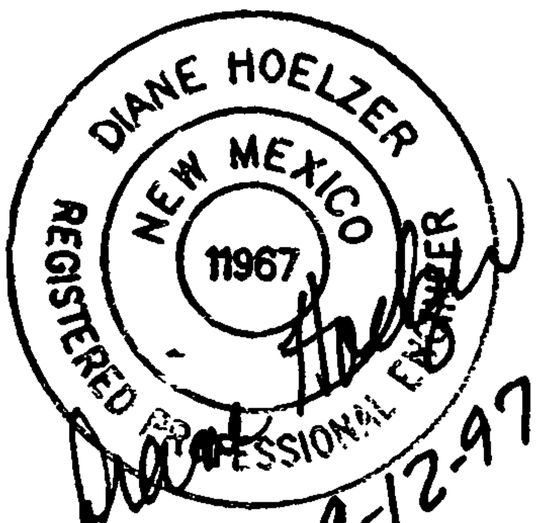
DRAINAGE REPORT

for

CLIFFORD WEST BUSINESS PARK



SEPTEMBER 1997

K-9/D23

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Clifford West Business Park ZONE ATLAS/DRNG.FILE#: ~~K-9 D23~~

DRB #: 97-138 EPC #: S-97-21 WORK ORDER #: _____

LEGAL DESCRIPTION: ATRISCO BUSINESS PARK, UNIT 2, TRACT K-1 and

CITY ADDRESS: UNSER DIVERSION CHANNEL CORRIDER J-1, TOWN OF ATRISCO GRANT

ENGINEERING FIRM: Mark Goodwin + Assoc. PA CONTACT: Diane Hoelzer

ADDRESS: P.O. Box 90606 ABQ 87199 PHONE: 828-2200

OWNER: Grayland Inc. CONTACT: Jack Clifford

ADDRESS: P.O. Box 35640 ABQ 87176 PHONE: 881-0900

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

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

PRE-DESIGN MEETING:

____ YES
____ NO
____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL
X 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
____ CERTIFICATION OF OCCUPANCY APPROVAL
____ GRADING PERMIT APPROVAL
____ PAVING PERMIT APPROVAL
____ S.A.D. DRAINAGE REPORT
____ DRAINAGE REQUIREMENTS
____ OTHER _____ (Specify)

DATE SUBMITTED: _____

BY: Diane Hoelzer

TABLE OF CONTENTS

I. LOCATION AND DESCRIPTION

The proposed Clifford West Business Park , which was part of the larger Atrisco Business Park is comprised of approximately 52.2 acres and is located south of I-25, just west of Unser Blvd. between Los Volcanes Road and Bluewater Road. Proposed development includes the infrastructure to support the individual development of 29 commercial sites.

The topographic relief in the area is in an southeasterly direction at a slope of approximately 2.0 percent.

The FEMA map indicates that a portion of the site is within the 100-year floodplain. Presently AMAFCA is working on a LOMR for the Unser Diversion. The Unser Diversion infrastructure has been built.

II. DRAINAGE DESIGN CRITERIA AND ASSUMPTIONS

The design criteria used in this report was in accordance with Section 22.2 Hydrology of the Development Process Manual, Volume 2, Design Criteria, January 1993 edition. The drainage management plan for this site is based entirely on the previously approved Atrisco Business Park Master Drainage Plan for fully developed conditions dated October 22, 1993. In accordance with that plan the allowable discharge from this site is 56.6 cfs and the 100-year peak discharge from this site is 217.1 cfs. These two values are the basis for all the drainage calculations in this report.

IV. EXISTING DRAINAGE CONDITIONS

Under existing drainage conditions, on-site runoff flows in a southeasterly direction. All of these flows are intercepted by either Unser Blvd. or Bluewater Road. There is an existing swale on this site just north of Bluewater Road that intercepts flows and conveys the runoff to the east toward Unser Blvd. After some ponding the flows spill over into Unser Blvd. at the intersection with Bluewater Road.

Off-site flows along the east and south property line continue in the southeasterly direction, away from the project site. Off-site flows north of the project site flow in a southeasterly direction through the site. All flows west of the site are intercepted by the Unser Diversion facility.

There is an existing storm drain in Unser Blvd. that includes stub-outs in Los Volcanes Road and Bluewater Road and four inlets in the west flowline of Unser Blvd. This system includes two inlets at the intersection of Los Volcanes Rd./Unser Blvd. and four inlets at the intersection of Bluewater Road/Unser Bvld.

V. PROPOSED DRAINAGE CONDITIONS

A. MASTER DRAINAGE PLAN

For this drainage plan the primary drainage requirement is that every individual commercial site will be required to retain a certain amount of their runoff on-site and all runoff from the site must discharge directly into the adjacent storm drain. The allowable discharge from each lot within the project site was calculated based on the approved master drainage plan for Atrisco Business Park and is summarized in a Table in Figure 3 and shown on the grading and drainage plan. Drainage calculations are in the Appendix A Hydrology.

The storm drain in Bluewater Road will be extended west to the Unit 1/3 boundary divide and in Oliver Ross Road and Saul Bell Road within the project site. Storm drain stub-outs will be provided to the property line for each of the 29 lots. Four 18" storm drain laterals will be extended from the existing inlets in Unser Blvd. to the property line to allow direct discharge from the seven properties adjacent to Unser Blvd. The storm drain in

Bluewater will include four stub-outs to the property line to service those lots that drain in a southerly direction.

Street flows in Los Volcanes Road will be intercepted by the existing inlets at the Unser Blvd. Intersection. Street flows in Bluewater Road will be intercepted by the existing inlets at the intersection of Unser Blvd. Street flows in Saul Bell Road will be intercepted by two new inlets located just west of the Unser Blvd. intersection.

Off-site flows originating from the west are intercepted by the Unser Diversion Facility. Off-site flows originating from the north will be intercepted by a temporary drainage swale located within the public right-of-way along the north side of Los Volcanes Road before discharging into the street at the intersection of Unser Blvd. and Los Volcanes Road. The profile for Los Volcanes road is being constructed lower than the surrounding area to help prevent the possibility of offsite flows originating from the north from entering the project site as it is developing.

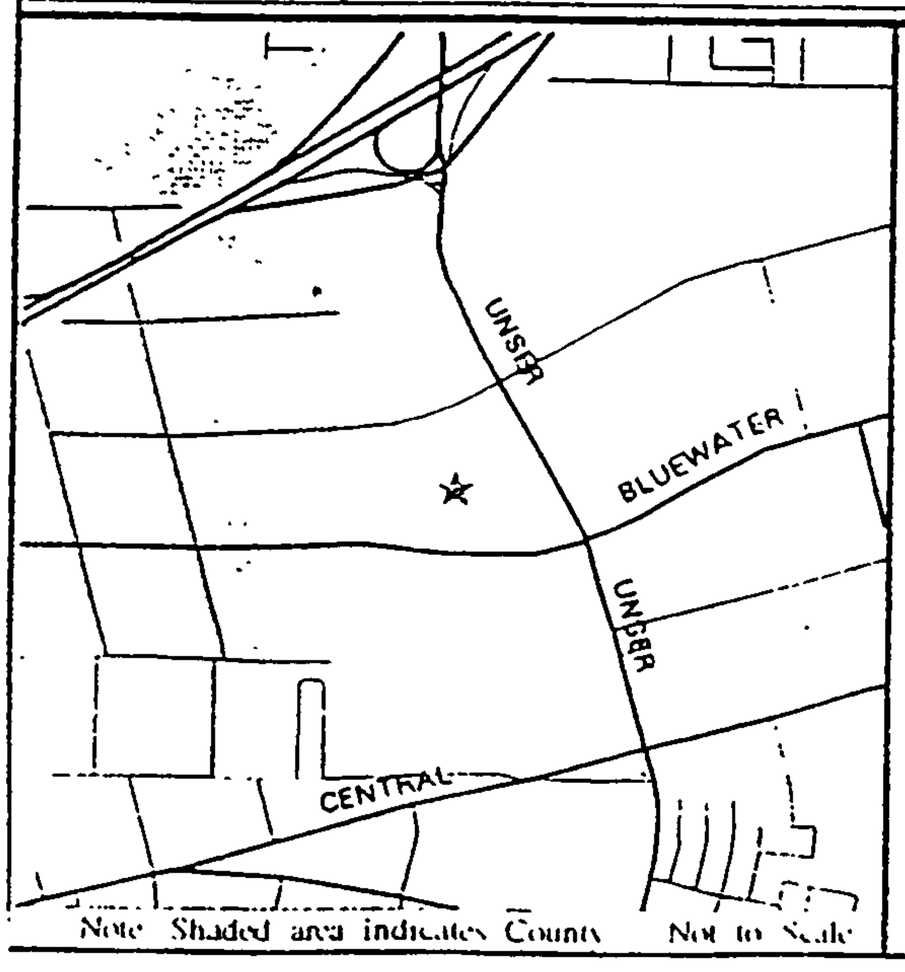
The Atrisco Business Park Master Plan Fully Developed Conditions exhibit is included in the back pocket of this report to facilitate in the understanding of the big picture for development of the area. Another close up exhibit of the area and the drainage basin areas used in the master plan is included in Appendix A Hydrology.

TABLE 1

SUMMARY OF STREET CAPACITY AND INLET CALCULATIONS

Clifford West Industrial Park

LOCATION	LOCATION	WIDTH ft.	SLOPE %	Q cfs	DEPTH ft	Q per INLET cfs	# of INLETS	REMAIN Q (cfs)	ADDITIONAL Q (cfs)
Oliver Ross Rd	@ Bluewater	40' FF	1.54	7.88	0.31	2.50	2	2.88	—
Saul Bell Rd	@ Unser	40' FF	0.60	4.24	0.29	1.65	2	0.94	—
Bluewater	@ Unser	40' FF	2.00	12.81	0.34	3.80	2	5.21	—
Bluewater	@ Unser	40' FF	0.005	5.21	0.32	1.90	2	1.41	—
Bluewater	@ Oliver Ross	40'FF	1.00	5.69	0.30	2.0	1	3.69	—



LAND USE MAP

KEY to Land Use Abbreviations

AGRI Agricultural
COMM Commercial -Retail, Service Wholesale
DRNG Drainage
EDUC Public or Private School
GOLF Golf Course
MED Medical Office or Facility
MFG Manufacturing or Mining
MH Mobile Home
MULT Multi-Family or Group Home
OFF Office
ORG Social or Civic Organization
PARK Park, Recreation or Open Space
PRKG Parking
PUBF Public Facility
RELG Religious Facility
SF Single Family
TRAN Transportation Facility
UTIL Utility
VAC Vacant Land or Abandoned Bldgs
WH Warehousing & Storage

AGIS

Scale 1" = 400'

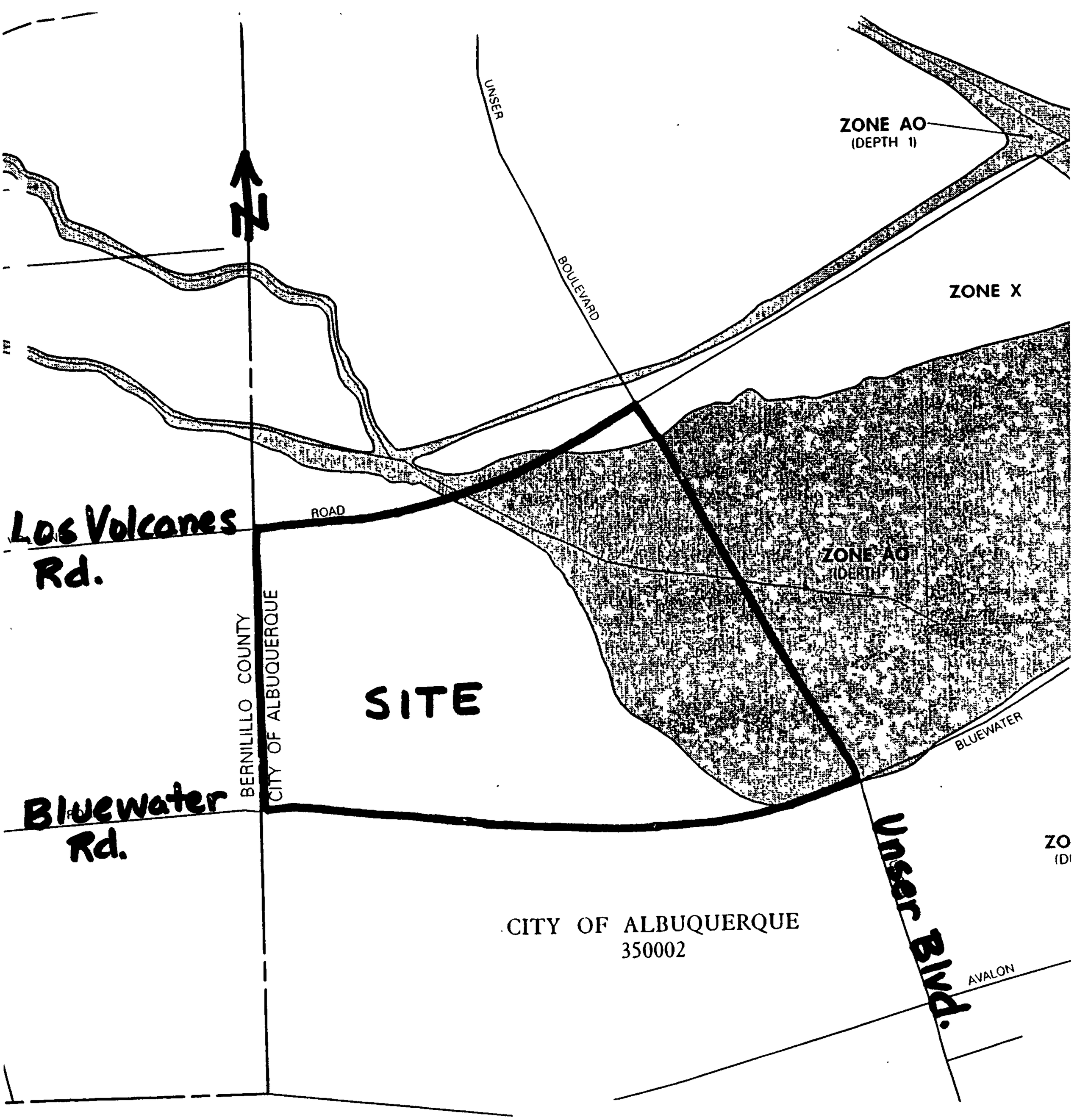
CASE PLANNER

HEARING DATE
1-16-97

MAP NO.
K-9/K-10

FILE NO.
Z-97-11

FIGURE 1



FIRM Flood Insurance Rate Map
Panel No. 35001C0328-D
September 20, 1996

FIGURE 2

APPENDIX A

HYDROLOGY

Type 'C' Sump Inlets Calculations
For Saul Bell Road

Capacity is measured by the weir equation at the lip of the gutter assuming an allowable ponding elevation which is 0.67' (or top of curb elevation). The length of the grate facing the street is 2.95' with a corresponding ponding depth of 0.54' (at top of curb). The side width is 2.0' with a corresponding average ponding depth of 0.604'.

With these values and the using the weir equation, the design capacity for the two type 'C' grates is:

Front: *Qcap = 3.0 x 2.95' x (.54')**(1.5) = 3.51 cfs*

Sides: *Qcap = 3.0 x 2.0' x (.604')**(1.5)x(2 sides) = 5.63 cfs*

Design Qcap (per inlet) = 9.14 cfs

Total Design Capacity (2 inlets) ***Q(design) = 18.28 cfs***

Q(100 yr.) = 4.24 cfs

The storm drain has the capacity to handle twice the 4.24 cfs flow (or 8.48 cfs) and thus an emergency overflow spillway is not necessary.

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT
SUBJECT Hydrology
BY DLH DATE 9-12-97
CHECKED DATE
SHEET OF

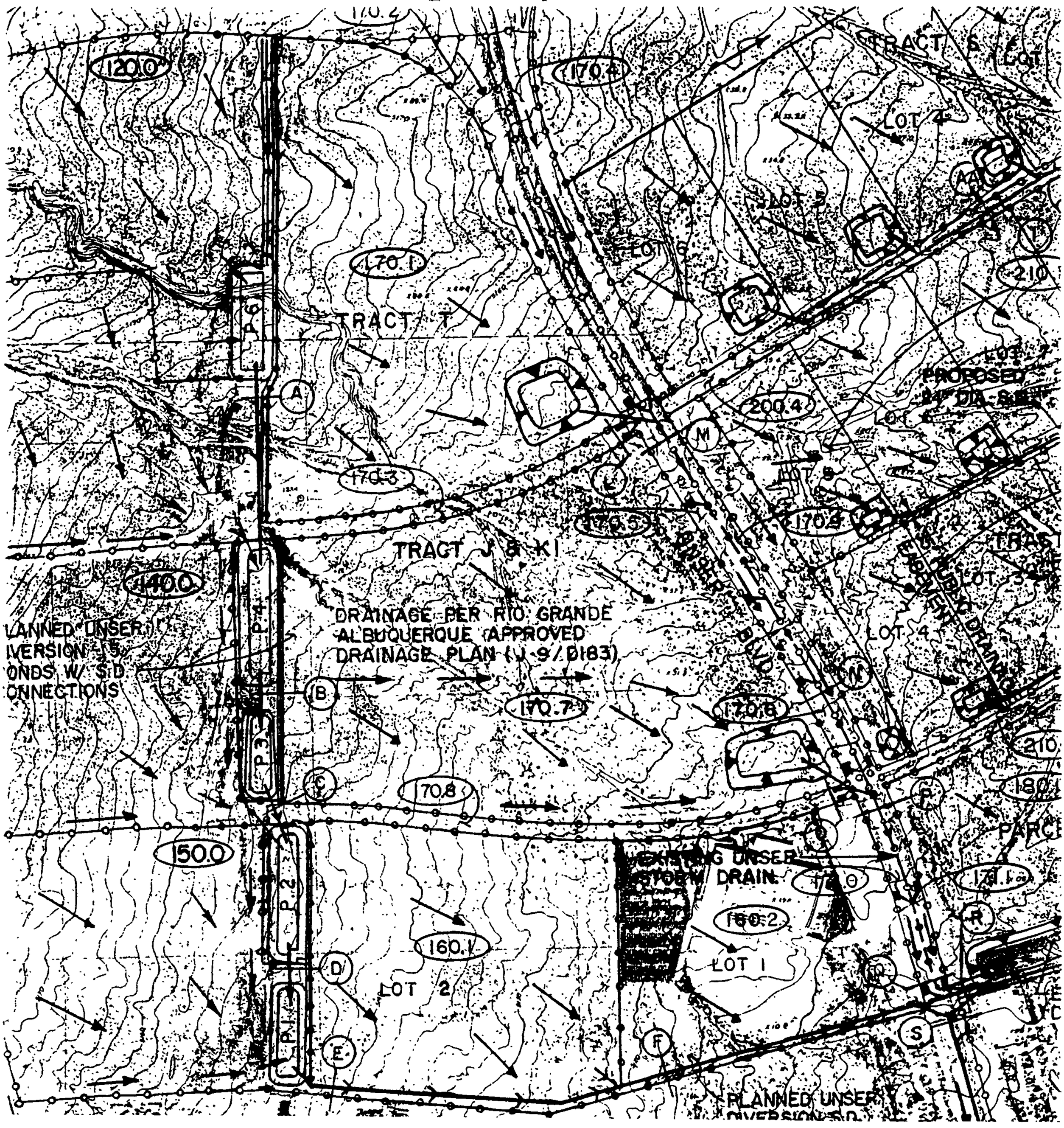
Summary of Approved Hydrology Criteria FOR

THE ATRISCO BUSINESS PARK MASTER DRAINAGE PLAN (K10/D23)

APPROVED 10-22-93

POCKET 1 FOR SCHEMATIC.

1. 100 YR · 24 HR. STORM
   RAINFALL TYPE 2
   $P_1 = 1.87$ $P_6 = 2.20"$ $P_{24} = 2.66"$
   $D_T = 0.05$
   SUBIBASIN 170.7 = 55 ACRES $\Rightarrow$ $Q_{Max} = 217.1$ CFS
2. FOR SAD 214 REPORT Q max. allowable = 56.6 cfs



FROM ATRISCO BUSINESS PARK MASTER DRAINAGE PLAN
COA DRAINAGE REPORT FILE (K10-D23)
APPROVED 10-22-93

```
START                   TIME=0.0
*****     CLIFFORD WEST BUSINESS PARK
*****     100-YEAR 6-HOUR STORM EVENT
*****     FILE: CLIFFEX.DAT  JULY 1997 BY:DLH
RAINFALL                TYPE=1 RAIN QUARTER=0.0 IN
                        RAIN ONE=1.90 IN RAIN SIX=2.20 IN
                        RAIN DAY=0.0 IN DT=0.0333 HR
*****
***** NORTH OFFSITE EXISTING CONDITIONS
*****
COMPUTE NM HYD          ID=1 HYD NO=100.0 AREA=0.02532 SQ MI
                        PER A=100 PER B=0 PER C=0 PER D=0
                        TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*****
***** LOS VOLCANES PAVED CONDITIONS
*****
COMPUTE NM HYD          ID=1 HYD NO=100.0 AREA=0.002036 SQ MI
                        PER A=0 PER B=10 PER C=0 PER D=90
                        TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*****
***** SAUL BELL RD PAVED CONDITIONS
*****
COMPUTE NM HYD          ID=1 HYD NO=100.0 AREA=0.001572 SQ MI
                        PER A=0 PER B=10 PER C=0 PER D=90
                        TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*****
***** OLIVER ROSS RD PAVED CONDITIONS
*****
COMPUTE NM HYD          ID=1 HYD NO=100.0 AREA=0.002928 SQ MI
                        PER A=0 PER B=10 PER C=0 PER D=90
                        TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*****
***** BLUEWATER PAVED CONDITIONS
*****
COMPUTE NM HYD          ID=1 HYD NO=100.0 AREA=0.004764 SQ MI
                        PER A=0 PER B=10 PER C=0 PER D=90
                        TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
FINISH
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AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =09/11/1997

INPUT FILE = CLIFFEX.DAT USER NO.=
M_GOODWN.I01

CFS PAGE = 1 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)	PER ACRE NOTATION
START TIME= .00									
RAINFALL TYPE= 1									
RAIN6= 2.200									
COMPUTE NM HYD	100.00	-	1	.02532	21.53	.606	.44912	1.532	1.328 PER IMP= .00
COMPUTE NM HYD	100.00	-	1	.00204	5.48	.200	1.83780	1.499	4.209 PER IMP= 90.00
COMPUTE NM HYD	100.00	-	1	.00157	4.24	.154	1.83780	1.499	4.213 PER IMP= 90.00
COMPUTE NM HYD	100.00	-	1	.00293	7.88	.287	1.83780	1.499	4.205 PER IMP= 90.00
COMPUTE NM HYD	100.00	-	1	.00476	12.81	.467	1.83780	1.499	4.202 PER IMP= 90.00
FINISH									

APPENDIX B

STORM DRAIN

9-3-97

If drainage off of each lot requires an 18" SD directly into the main line, there will need to be a manhole at each service storm drain intersection with the main storm drain.

For Clifford West Business Park
Grading & Drainage Plan

K-9/10

1

HYDRAULIC REPORT FOR

0

CLIFFORD WEST BUS. PARK

@ UNSER AND BLUEWATER

100 YR 6 HR STORM

DMG & ASSOCIATES

MARCH 1998

BY: DLH

1
0

Run date: 03-10-1998
File: CLIFF.ST3

Return Period = 100 Yrs
Rainfall file: Your_County

LINE 1 / Q = 58.0 / HT = 36 / WID = 36 / N = .013 / L = 99 / JLC = .05

EXMH 1 - EXMH 2 / Outfall

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	12.00	36.00	6.41	8.21	13.05	0.00	5.73	7.07
UPSTRM	12.75	36.00	7.86	8.21	13.79	0.00	5.6	7.07

Drainage area (ac)	= 0	Slope of invert (%)	= 1.465
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.756
Time of conc (min)	= 13	Critical depth (in)	= 29.12
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 58	Confluence angle (deg)	= 0
Default Q (cfs)	= 58	Natural ground elev (ft)	= 16.47
Line capac. (cfs)	= 80.7	Line storage (cuft)	= 700

LINE 2 / Q = 46.6 / HT = 36 / WID = 36 / N = .013 / L = 299.75 / JLC = .05

EXMH 2 - MH 14 / DNLN = 1

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	12.80	36.00	7.86	6.59	13.48	0.00	5.6	7.07
UPSTRM	14.16	35.67	11.19	6.60	14.84	6.86	6.01	7.06

Drainage area (ac)	= 0	Slope of invert (%)	= 1.111
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.455
Time of conc (min)	= 11	Critical depth (in)	= 26.10
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 46.5	Confluence angle (deg)	= 0
Default Q (cfs)	= 46.6	Natural ground elev (ft)	= 20.2
Line capac. (cfs)	= 70.3	Line storage (cuft)	= 2117

LINE 3 / Q = 46.6 / HT = 30 / WID = 30 / N = .013 / L = 244.07 / JLC = .05

MH 14 - MH 13 / DNLN = 2

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	14.20	30.00	11.24	9.50	15.60	0.00	6.46	4.91
UPSTRM	17.35	30.00	13.70	9.49	18.75	0.00	6.75	4.91

Drainage area (ac)	= 0	Slope of invert (%)	= 1.008
Runoff coefficient	= 0	Slope energy grade line (%)	= 1.291
Time of conc (min)	= 10	Critical depth (in)	= 27.45
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 46.5	Confluence angle (deg)	= 0
Default Q (cfs)	= 46.6	Natural ground elev (ft)	= 22.96
Line capac. (cfs)	= 41.2	Line storage (cuft)	= 1198

LINE 4 / Q = 42.4 / HT = 30 / WID = 30 / N = .013 / L = 356.84 / JLC = .05

MH 13 - MH 12 / DNLN = 3

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	17.42	30.00	13.75	8.64	18.58	0.00	6.7	4.91
UPSTRM	21.24	30.00	17.35	8.64	22.40	0.00	7.72	4.91

Drainage area (ac)	= 0	Slope of invert (%)	= 1.009
Runoff coefficient	= 0	Slope energy grade line (%)	= 1.070
Time of conc (min)	= 8	Critical depth (in)	= 26.55
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 42.4	Confluence angle (deg)	= 0
Default Q (cfs)	= 42.42	Natural ground elev (ft)	= 27.58
Line capac. (cfs)	= 41.2	Line storage (cuft)	= 1751

LINE 5 / Q = 40.1 / HT = 30 / WID = 30 / N = .013 / L = 288.73 / JLC = .1

MH 12 - MH 11 / DNLN = 4

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	21.30	30.00	17.40	8.16	22.33	0.00	7.68	4.91
UPSTRM	24.05	30.00	20.31	8.16	25.09	0.00	7.46	4.91

Drainage area (ac)	= 0	Slope of invert (%)	= 1.008
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.954
Time of conc (min)	= 6	Critical depth (in)	= 25.38
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 40	Confluence angle (deg)	= 0
Default Q (cfs)	= 40.06	Natural ground elev (ft)	= 30.27
Line capac. (cfs)	= 41.2	Line storage (cuft)	= 1417

LINE 6 / Q = 20.7 / HT = 24 / WID = 24 / N = .013 / L = 241 / JLC = .05

MH 11-END BLUE / DNLN = 5

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	24.15	24.00	20.81	6.59	24.83	0.00	7.46	3.14
UPSTRM	27.66	19.35	26.00	7.63	28.56	18.97	5.4	2.71

Drainage area (ac)	= 0	Slope of invert (%)	= 2.154
Runoff coefficient	= 0	Slope energy grade line (%)	= 1.548
Time of conc (min)	= 0	Critical depth (in)	= 19.33
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 20.7	Confluence angle (deg)	= 0
Default Q (cfs)	= 20.7	Natural ground elev (ft)	= 33.4
Line capac. (cfs)	= 33.2	Line storage (cuft)	= 706

LINE 7 / Q = 19.4 / HT = 24 / WID = 24 / N = .013 / L = 26.45 / JLC = .05

MH 11 - MH 10 / DNLN = 5

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	24.15	24.00	20.81	6.18	24.75	0.00	7.46	3.14
UPSTRM	24.35	24.00	20.94	6.18	24.94	0.00	7.18	3.14

Drainage area (ac)	= 0	Slope of invert (%)	= 0.491
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.736
Time of conc (min)	= 6	Critical depth (in)	= 18.71
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 19.3	Confluence angle (deg)	=-90
Default Q (cfs)	= 19.4	Natural ground elev (ft)	= 30.13
Line capac. (cfs)	= 15.9	Line storage (cuft)	= 83

LINE 8 / Q = 12.0 / HT = 24 / WID = 24 / N = .013 / L = 187.14 / JLC = .05

MH 10 - MH 9 / DNLN = 7

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	24.38	24.00	20.99	3.82	24.61	0.00	7.13	3.14
UPSTRM	24.91	24.00	21.97	3.82	25.13	0.00	8.71	3.14

Drainage area (ac)	= 0	Slope of invert (%)	= 0.524
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.282
Time of conc (min)	= 5	Critical depth (in)	= 14.72
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 12	Confluence angle (deg)	= 0
Default Q (cfs)	= 12	Natural ground elev (ft)	= 32.69
Line capac. (cfs)	= 16.4	Line storage (cuft)	= 588

LINE 9 / Q = 11.6 / HT = 24 / WID = 24 / N = .013 / L = 135 / JLC = .05

MH 9 - MH 8 / DNLN = 8

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	24.92	24.00	22.02	3.68	25.13	0.00	8.66	3.14
UPSTRM	25.27	24.00	22.69	3.68	25.48	0.00	10.15	3.14

Drainage area (ac)	= 0	Slope of invert (%)	= 0.496
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.262
Time of conc (min)	= 5	Critical depth (in)	= 14.45
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 11.5	Confluence angle (deg)	= 0
Default Q (cfs)	= 11.57	Natural ground elev (ft)	= 34.85
Line capac. (cfs)	= 15.9	Line storage (cuft)	= 424

LINE 10 / Q = 11.1 / HT = 24 / WID = 24 / N = .013 / L = 94.2 / JLC = .05

MH 8 - MH 7 / DNLN = 9

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	25.28	24.00	22.74	3.53	25.48	0.00	10.1	3.14
UPSTRM	25.51	24.00	23.21	3.53	25.70	0.00	11.13	3.14

Drainage area (ac)	= 0	Slope of invert (%)	= 0.499
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.240
Time of conc (min)	= 4	Critical depth (in)	= 14.15
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 11	Confluence angle (deg)	= 0
Default Q (cfs)	= 11.09	Natural ground elev (ft)	= 36.35
Line capac. (cfs)	= 16.0	Line storage (cuft)	= 296

LINE 11 / Q = 10.0 / HT = 24 / WID = 24 / N = .013 / L = 161.9 / JLC = .1

MH 7 - MH 5 / DNLN = 10

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	25.52	24.00	23.26	3.18	25.68	0.00	11.08	3.14
UPSTRM	25.80	20.73	24.07	3.47	25.98	16.47	12.84	2.88

Drainage area (ac)	= 0	Slope of invert (%)	= 0.500
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.191
Time of conc (min)	= 3	Critical depth (in)	= 13.44
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 10	Confluence angle (deg)	= 0
Default Q (cfs)	= 10	Natural ground elev (ft)	= 38.92
Line capac. (cfs)	= 16.0	Line storage (cuft)	= 488

LINE 12 / Q = 4.0 / HT = 18 / WID = 18 / N = .013 / L = 157.3 / JLC = .05

MH 5 - MH 4 / DNLN = 11

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	25.82	14.35	24.62	2.59	25.92	14.01	12.79	1.54
UPSTRM	29.93	9.17	29.17	4.41	30.24	18.00	10.74	0.91

Drainage area (ac)	= 0	Slope of invert (%)	= 2.893
Runoff coefficient	= 0	Slope energy grade line (%)	= 2.744
Time of conc (min)	= 2	Critical depth (in)	= 9.15
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 3.9	Confluence angle (deg)	= 0
Default Q (cfs)	= 3.99	Natural ground elev (ft)	= 41.42
Line capac. (cfs)	= 17.9	Line storage (cuft)	= 192

LINE 13 / Q = 3.6 / HT = 18 / WID = 18 / N = .013 / L = 138.81 / JLC = .05

MH 4 - MH 3 / DNLN = 12

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	29.95	8.75	29.22	4.14	30.22	18.00	10.69	0.86
UPSTRM	33.96	8.68	33.24	4.22	34.24	17.99	8.87	0.84

Drainage area (ac)	= 0	Slope of invert (%)	= 2.896
Runoff coefficient	= 0	Slope energy grade line (%)	= 2.899
Time of conc (min)	= 1	Critical depth (in)	= 8.64
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 3.5	Confluence angle (deg)	= 0
Default Q (cfs)	= 3.56	Natural ground elev (ft)	= 43.62
Line capac. (cfs)	= 17.9	Line storage (cuft)	= 118

LINE 14 / Q = 2.3 / HT = 18 / WID = 18 / N = .013 / L = 128.4 / JLC = .05

MH 3 - MH 2 / DNLN = 13

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	33.98	8.24	33.29	2.84	34.10	17.95	8.82	0.80
UPSTRM	37.58	6.94	37.00	3.63	37.78	17.52	7.29	0.63

Drainage area (ac)	= 0	Slope of invert (%)	= 2.889
Runoff coefficient	= 0	Slope energy grade line (%)	= 2.867
Time of conc (min)	= 1	Critical depth (in)	= 6.91
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 2.2	Confluence angle (deg)	= 0
Default Q (cfs)	= 2.28	Natural ground elev (ft)	= 45.8
Line capac. (cfs)	= 17.9	Line storage (cuft)	= 92

LINE 15 / Q = 1.1 / HT = 18 / WID = 18 / N = .013 / L = 131.4 / JLC = .05

MH 2 - MH 1 / DNLN = 14

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	37.59	6.46	37.05	1.96	37.65	17.34	7.25	0.59
UPSTRM	41.27	4.92	40.85	2.94	41.40	16.04	6.38	0.39

Drainage area (ac)	= 0	Slope of invert (%)	= 2.892
Runoff coefficient	= 0	Slope energy grade line (%)	= 2.856
Time of conc (min)	= 0	Critical depth (in)	= 4.91
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 1.1	Confluence angle (deg)	= 0
Default Q (cfs)	= 1.15	Natural ground elev (ft)	= 48.73
Line capac. (cfs)	= 17.9	Line storage (cuft)	= 64

LINE 16 / Q = 5.6 / HT = 18 / WID = 18 / N = .013 / L = 214.9 / JLC = .05

MH 5 - MH 6 / DNLN = 11

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	25.82	14.35	24.62	3.62	26.02	14.01	12.79	1.54
UPSTRM	26.61	10.91	25.70	4.98	26.99	17.59	10.93	1.12

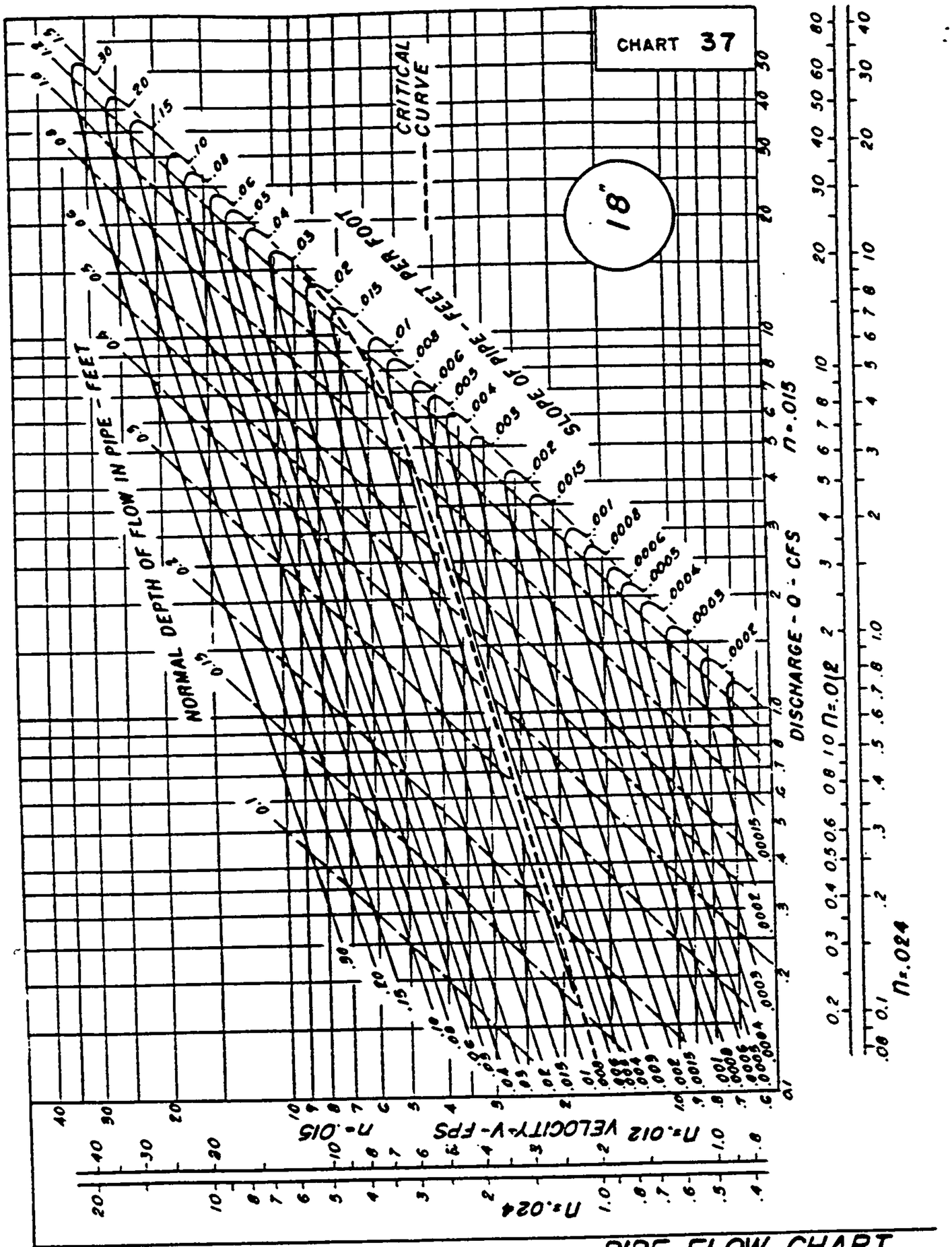
Drainage area (ac)	= 0	Slope of invert (%)	= 0.503
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.454
Time of conc (min)	= 1	Critical depth (in)	= 10.82
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 5.5	Confluence angle (deg)	=-90
Default Q (cfs)	= 5.58	Natural ground elev. (ft)	= 38.13
Line capac. (cfs)	= 7.4	Line storage (cuft)	= 286

LINE 17 / Q = 4.2 / HT = 18 / WID = 18 / N = .013 / L = 197 / JLC = .05

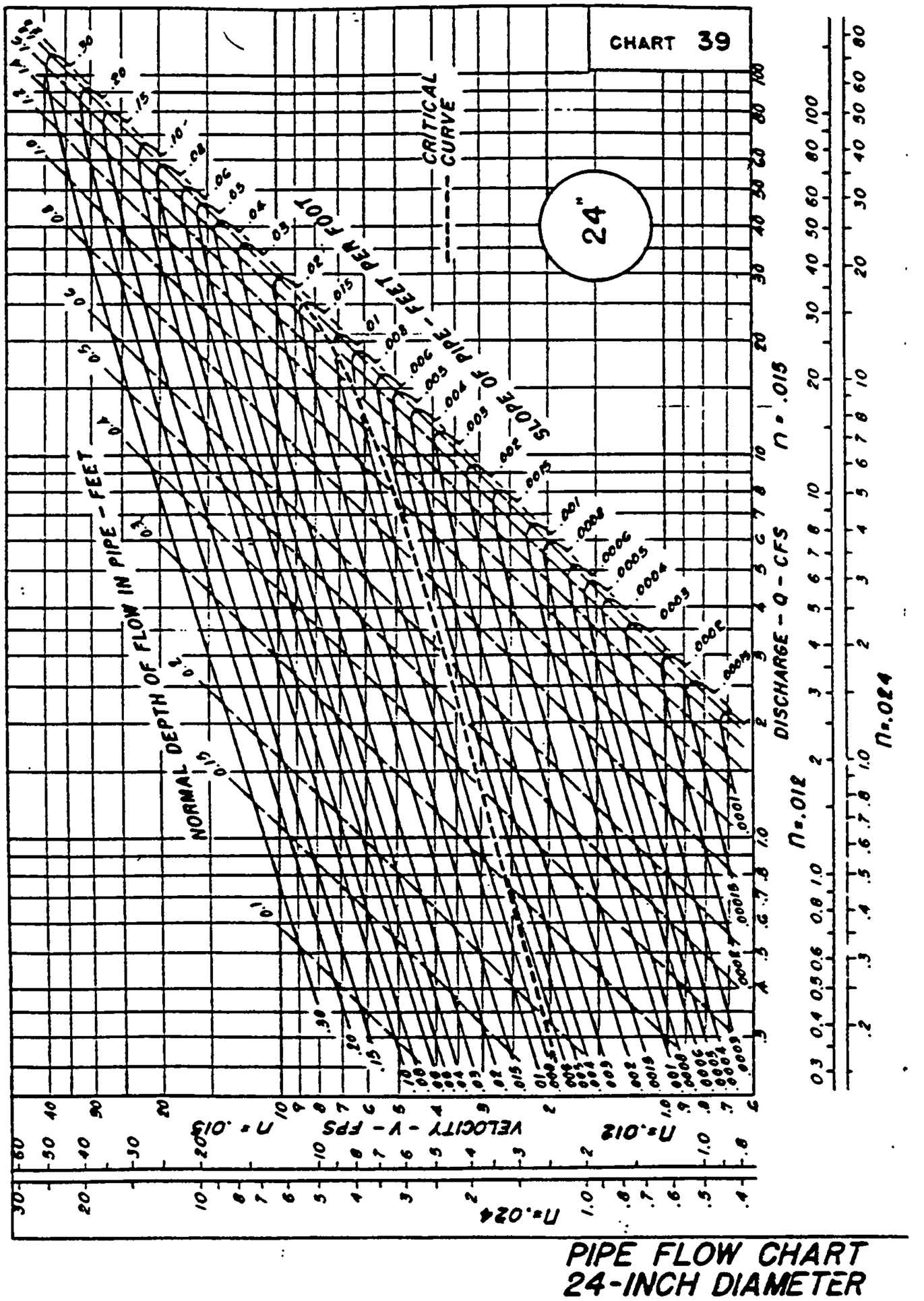
MH 6 - MH 15 / DNLN = 16

	HGL	DEPTH	INVERT	VEL	EGL	T WID	COVER	AREA
DNSTRM	26.63	10.54	25.75	3.91	26.87	17.71	10.88	1.08
UPSTRM	27.68	9.44	26.88	4.52	28.00	17.98	5	0.94

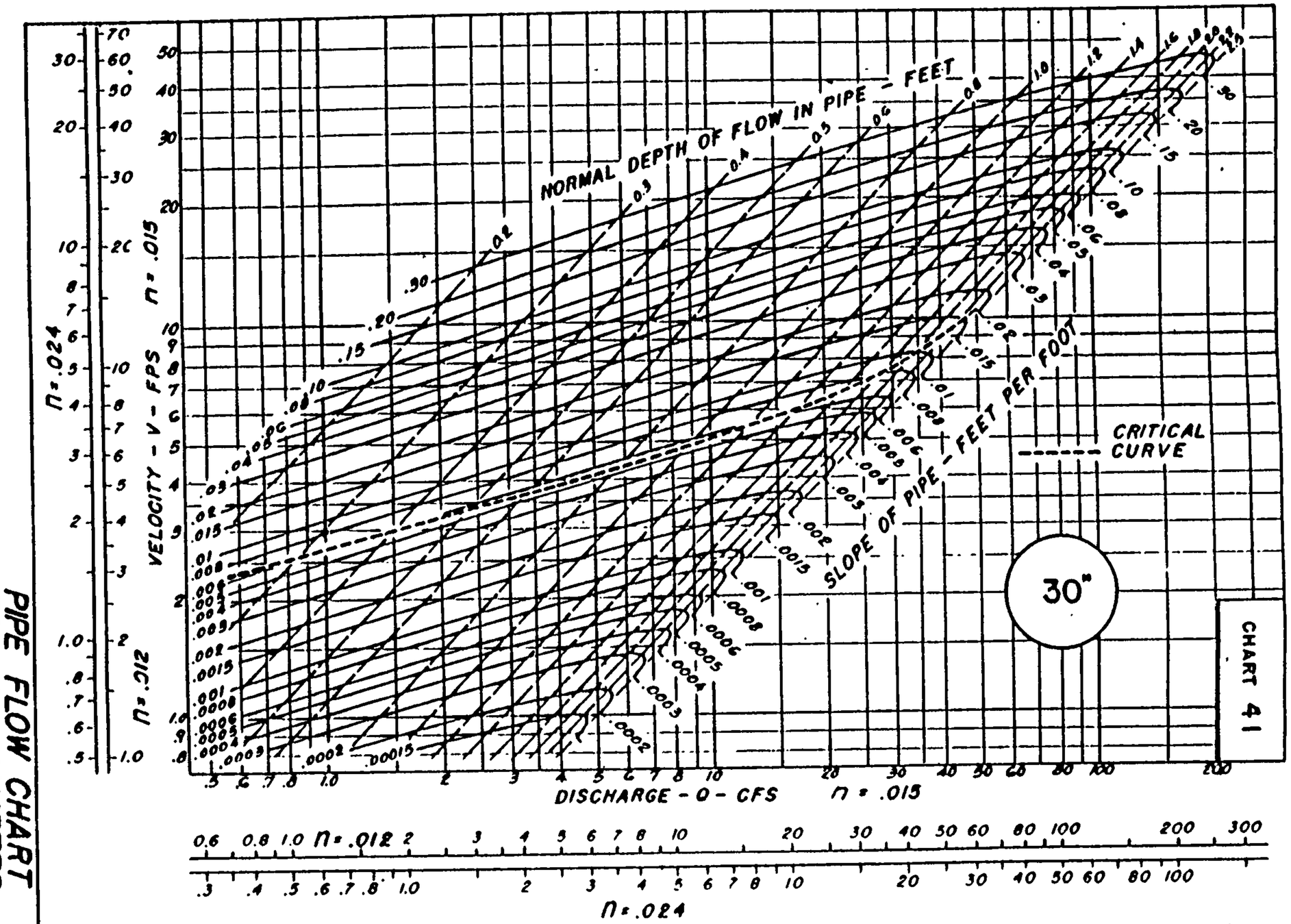
Drainage area (ac)	= 0	Slope of invert (%)	= 0.574
Runoff coefficient	= 0	Slope energy grade line (%)	= 0.567
Time of conc (min)	= 0	Critical depth (in)	= 9.43
Inlet time (min)	= 0	Req'd length curb inlet (ft)	= 0.0
Intensity (in/hr)	= 0.00	Req'd grate area (sf)	= 0.0
Cumulative C*A	= 0.0	Depth at inlet opening (in)	= 0
Flow contrib (cfs)	= 4.2	Confluence angle (deg)	= 0
Default Q (cfs)	= 4.24	Natural ground elev (ft)	= 33.38
Line capac. (cfs)	= 8.0	Line storage (cuft)	= 199



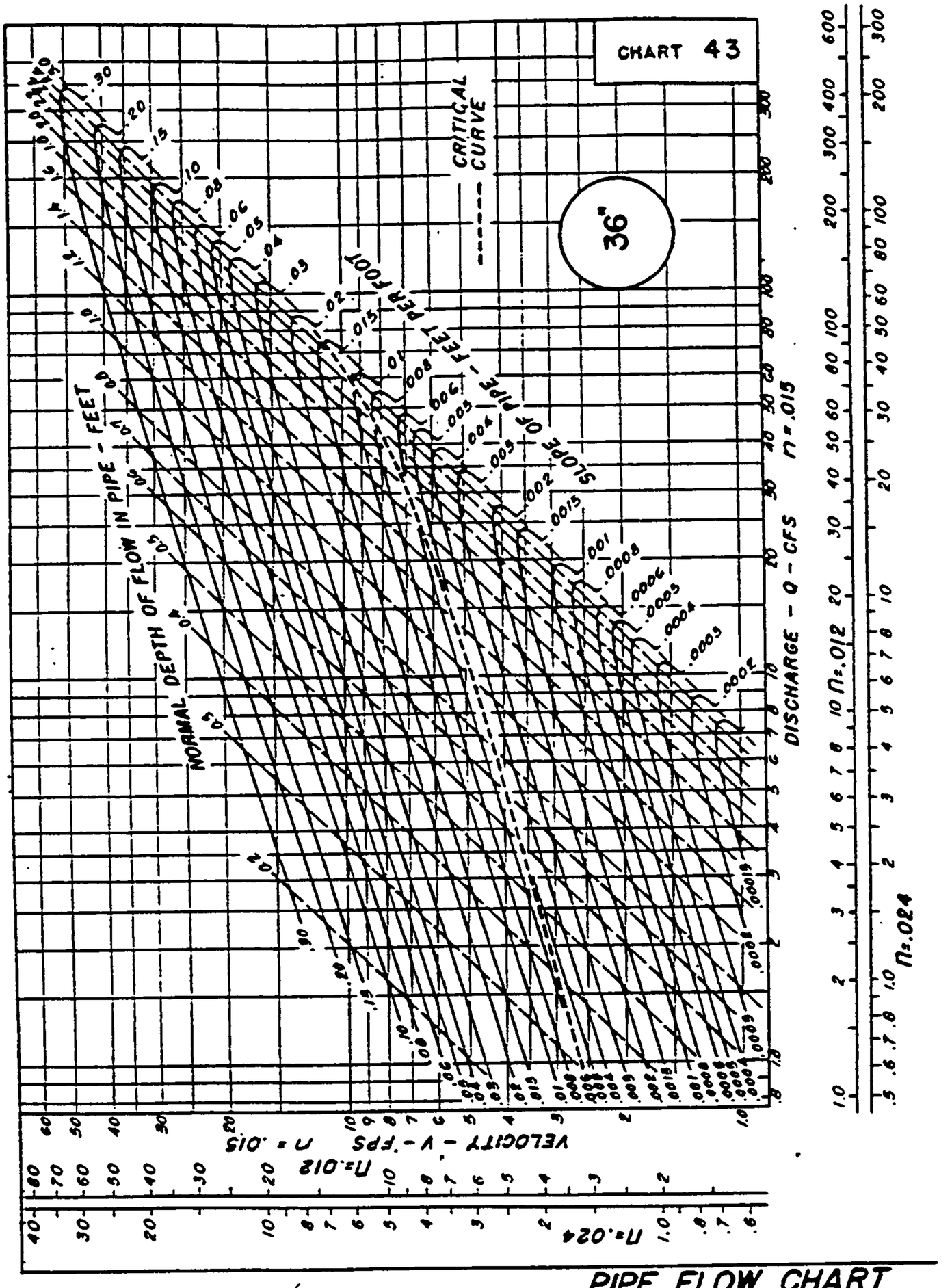
PIPE FLOW CHART
18-INCH DIAMETER



PIPE FLOW CHART
24-INCH DIAMETER



PIPE FLOW CHART
30-INCH DIAMETER



PIPE FLOW CHART
36-INCH DIAMETER

APPENDIX C

HYDRAULICS

```
1**********************************************************
****************************************
 * WATER SURFACE PROFILES              *                      *  U.S. ARMY CORPS OF ENGINEERS
     *
 *  VERSION OF SEPTEMBER 1988                                *
    *  THE HYDROLOGIC ENGINEERING CENTER  *
 *  ERROR: 01,02                                             *
    *  609 SECOND STREET, SUITE D         *
 *  UPDATED:  4 APRIL    1989                                *
    *  DAVIS, CALIFORNIA 95616-4687       *
 *  RUN DATE     9/11/97   TIME   20:52:46                   *
    *  (916) 756-1104, (916) 551-1748     *
 ***********************************************************
    ****************************************
```

```
X      X  XXXXXXX   XXXXX                XXXXX
X      X  X         X     X              X
X      X  X         X
X      X  X         X
XXXXXXX   XXXX      X           XXXXX     XXXXX
X      X  X         X                     X
X      X  X         X     X               X
X      X  XXXXXXX   XXXXX
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XXXXXXX
 END OF BANNER
1
     9/11/97       20:52:46
                          PAGE     1
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Los Volcanes Ditch

```
THIS RUN EXECUTED  9/11/97    20:52:46
 ************************************************
   HEC2 RELEASE DATED SEP 88 UPDATED APR  1989


   ERROR CORR -  01,02
   MODIFICATION -
 ************************************************
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```
 T1          CLIFFORD WEST BUSINESS PARK
 T2          V-DITCH ON LOS VOLCANES ROAD
 T3          100-YEAR / 6-HOUR DESIGN STORM

 J1  ICHECK     INQ        NINV       IDIR       STRT       METRIC     HVINS      Q
WSEL       FQ

         0          2          0          0       .01          0          0          0          0
        0

 J3  VARIABLE CODES FOR SUMMARY PRINTOUT

       43          1          2         26          4         68          3


 NC      .025       .025       .025         .1         .3

 QT         1      21.53
```

```
 X1          1              4              0         10.0              0              0              0
  0              0              0
 GR        1.0              0              0          3.0              0            7.0            1.0
10.0
1
      9/11/97       20:52:46
                              PAGE     2

     SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     BANK
ELEV
     Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA
LEFT/RIGHT
     TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN
SSTA
     SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID
ENDST

 *PROF 1

 CCHV=      .100 CEHV=      .300
 *SECNO 1.000
 2096 WSEL NOT GIVEN, AVG OF MAX, MIN USED
      1.00       .81       .81       .00       .00      1.08       .26       .00       .00
1.00
       22.        0.       22.        0.        0.        5.        0.        0.        0.
1.00
       .00       .00      4.11       .00      .000      .025      .000      .000       .00
.56
    .010039        0.        0.        0.         0         0         6       .00      8.88
9.44
0
1
      9/11/97       20:52:46
                              PAGE     3


THIS RUN EXECUTED  9/11/97     20:52:46
 **************************************************
   HEC2 RELEASE DATED SEP 88 UPDATED APR  1989


   ERROR CORR -  01,02
   MODIFICATION -
 **************************************************

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


      100-YEAR / 6-HOUR DE

 SUMMARY PRINTOUT

          Q         CWSEL       CRIWS        VCH       TOPWID       FRCH         EG

        21.530         .81         .00        4.11        8.88         .94        1.08

1
      9/11/97       20:52:46
                              PAGE     4
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1**************************************************
 *  WATER SURFACE PROFILES                        *
 *  VERSION OF SEPTEMBER 1988                     *
 *  ERROR: 01,02                                  *
 *  UPDATED:  4 APRIL    1989                     *
 *  RUN DATE     3/ 9/98   TIME   17:13:18        *
 **************************************************
```

```
****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616-4687        *
*  (916) 756-1104, (916) 551-1748      *
****************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                  X     X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX              XXXXXXX
```


STREET CAPACITY CALCULATIONS

THIS RUN EXECUTED 3/ 9/98 17:13:18

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 **************************************************
   HEC2 RELEASE DATED SEP 88 UPDATED APR  1989

   ERROR CORR -  01,02
   MODIFICATION -
 **************************************************

 T1          OLIVER ROSS ROAD CAPACITY CALCULATIONS
 T2          40'FF W/ 8" STD CURB SUB-CRITICAL FLOW
 T3          FILE:40FFCLIF.DAT (100-YR 6-HR STORM)

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0         2         0         1      .0154        0         0         0         0         0

 J3  VARIABLE CODES FOR SUMMARY PRINTOUT

      43         1         2        26         4        68         3

 NC     .017      .017      .017       .1        .3
 QT        5      7.88      4.24     12.81      5.21      5.69
 X1        1         9         0        60         0         0         0         0         0         0
 GR      1.0         0       .67       9.9         0        10      .125        12       .40        30
 GR     .125        48         0        50       .67      50.1       1.0        60
1
```

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CCHV= .100 CEHV= .300
*SECNO 1.000
2096 WSEL NOT GIVEN, AVG OF MAX, MIN USED

3265 DIVIDED FLOW

1.00	.31	.31	.33	.00	.40	.10	.00	.00	1.00
8.	0.	8.	0.	0.	3.	0.	0.	0.	1.00
.00	.00	2.50	.00	.000	.017	.000	.000	.00	9.95
.015296	0.	0.	0.	0	23	7	.00	27.90	50.05

0
1

T1 SAUL BELL ROAD
T2 100YR 6HR
T3 40FF STD

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	3	0	0	.006					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	2	0	-1	0	0	0	0	0	0	0

1

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 2

CCHV= .100 CEHV= .300
*SECNO 1.000

```
 2096 WSEL NOT GIVEN, AVG OF MAX, MIN USED

 3265 DIVIDED FLOW

      1.00       .29       .29       .00       .00       .33       .03       .00       .00      1.00
        4.        0.        4.        0.        0.        3.        0.        0.        0.      1.00
       .00       .00      1.50       .00      .000      .017      .000      .000       .00      9.96
    .005931        0.        0.        0.         0         0         7       .00     26.29     50.04
0
1
     3/ 9/98      17:13:18                                                                  PAGE     5


 T1 BLUEWATER
 T2 100YR 6HR
 T3 40FF STD

 J1  ICHECK     INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0          4         0         1       .020

 J2  NPROF      IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

       3          0        -1         0         0         0         0         0         0

1
     3/ 9/98      17:13:18                                                                  PAGE     6


    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST


 *PROF 3

 CCHV=      .100 CEHV=      .300
 *SECNO 1.000
 2096 WSEL NOT GIVEN, AVG OF MAX, MIN USED

 3265 DIVIDED FLOW

      1.00       .34       .34       .39       .00       .49       .15       .00       .00      1.00
        13.       0.       13.        0.        0.        4.        0.        0.        0.      1.00
       .00       .00      3.10       .00      .000      .017      .000      .000       .00      9.95
    .019969        0.        0.        0.         0        16         7       .00     32.13     50.05
0
1
     3/ 9/98      17:13:18                                                                  PAGE     7
```

T1 BLUEWATER
T2 100YR 6HR
T3 40FF STD

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	5	0	0	.005					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	4	0	-1	0	0	0	0	0	0	0

1
3/ 9/98 17:13:18 PAGE 8

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 4

CCHV= .100 CEHV= .300
*SECNO 1.000
2096 WSEL NOT GIVEN, AVG OF MAX, MIN USED

3265 DIVIDED FLOW

1.00	.32	.32	.00	.00	.35	.03	.00	.00	1.00
5.	0.	5.	0.	0.	4.	0.	0.	0.	1.00
.00	.00	1.48	.00	.000	.017	.000	.000	.00	9.95
.004981	0.	0.	0.	0	0	7	.00	29.60	50.05

0
1
3/ 9/98 17:13:18 PAGE 9

T1 BLUEWATER
T2 100YR 6HR
T3 40FF STD

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	6	0	1	.010					

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	5	0	-1	0	0	0	0	0	0	0

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 5

CCHV= .100 CEHV= .300
*SECNO 1.000
2096 WSEL NOT GIVEN, AVG OF MAX, MIN USED

3265 DIVIDED FLOW

1.00	.30	.30	.30	.00	.36	.06	.00	.00	1.00
6.	0.	6.	0.	0.	3.	0.	0.	0.	1.00
.00	.00	1.96	.00	.000	.017	.000	.000	.00	9.96
.009899	0.	0.	0.	0	14	7	.00	26.70	50.04

0
1

THIS RUN EXECUTED 3/ 9/98 17:13:18

****
HEC2 RELEASE DATED SEP 88 UPDATED APR 1989

ERROR CORR - 01,02
MODIFICATION -
****

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

FILE:40FFCLIF.DAT (1

SUMMARY PRINTOUT

Q	CWSEL	CRIWS	VCH	TOPWID	FRCH	EG
7.880	.31	.33	2.50	27.90	1.57	.40
4.240	.29	.00	1.50	26.29	1.00	.33
12.810	.34	.39	3.10	32.13	1.71	.49

5.210	.32	.00	1.48	29.60	.88	.35
5.690	.30	.30	1.96	26.70	1.28	.36

SUMMARY OF ERRORS AND SPECIAL NOTES

```
**********************************************************
****************************************
 *  WATER SURFACE PROFILES                              *                                *
U.S. ARMY CORPS OF ENGINEERS       *
 *  VERSION OF SEPTEMBER 1988                           *                                *
THE HYDROLOGIC ENGINEERING CENTER  *
 *  ERROR: 01,02                                        *                                *
609 SECOND STREET, SUITE D         *
 *  UPDATED:  4 APRIL    1989                           *                                *
DAVIS, CALIFORNIA 95616-4687       *
 *  RUN DATE     9/12/97   TIME   11:48:41              *                                *
(916) 756-1104, (916) 551-1748     *
 ********************************************************
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```
                                    X     X  XXXXXXX   XXXXX                  XXXXX
                                    X     X  X        X     X                X     X
                                    X     X  X        X     X                      X
                                    XXXXXXX  XXXX     X           XXXXX     XXXXX
                                    X     X  X        X                    X
                                    X     X  X        X     X              X
                                    X     X  XXXXXXX  XXXXX                XXXXXXX
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 END OF BANNER
1
     9/12/97       11:48:41
                  PAGE    1
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TEMPORARY SWALE

THIS RUN

LOS VOLCANES RD.

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EXECUTED  9/12/97    11:48:41
 ****************************************************
   HEC2 RELEASE DATED SEP 88 UPDATED APR  1989


   ERROR CORR -  01,02
   MODIFICATION -
 ****************************************************


 T1           CLIFFORD WEST BUSINESS PARK
 T2           V-DITCH ON LOS VOLCANES ROAD
 T3           100-YEAR / 6-HOUR DESIGN STORM

 J1  ICHECK     INQ        NINV       IDIR       STRT       METRIC     HVINS      Q          WSEL       FQ
        0         2          0          0       .008          0          0          0          0
0

 J3  VARIABLE CODES FOR SUMMARY PRINTOUT
       43          1          2         26          4         68          3

 NC     .025       .025       .025         .1         .3

 QT        1      21.53

 X1        1          4          0       12.0          0          0          0          0
0          0
 GR      1.0          0          0        3.0          0        9.0        1.0       12.0

1
     9/12/97       11:48:41
                  PAGE    2
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CCHV= .100 CEHV= .300
*SECNO 1.000
2096 WSEL NOT GIVEN, AVG OF MAX, MIN USED

1.00	.73	.73	.00	.00	.93	.20	.00	.00	1.00
22.	0.	22.	0.	0.	6.	0.	0.	0.	1.00
.00	.00	3.62	.00	.000	.025	.000	.000	.00	.82
.008012	0.	0.	0.	0	0	6	.00	10.36	11.18

0
1

EXECUTED 9/12/97 11:48:41

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HEC2 RELEASE DATED SEP 88 UPDATED APR 1989

ERROR CORR - 01,02
MODIFICATION -

****

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

100-YEAR / 6-HOUR DE

SUMMARY PRINTOUT

Q	CWSEL	CRIWS	VCH	TOPWID	FRCH	EG
21.530	.73	.00	3.62	10.36	.84	.93

1

SUMMARY OF ERRORS AND SPECIAL NOTES

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT Clifford West B. Park
SUBJECT Hydrology
BY DLH DATE 9-12-97
CHECKED _____ DATE _____
SHEET ___ OF ___

Allowable Discharge Calculations

Q allowable = 56.6 cfs

Total Area Unit 1, 2, 3 = 52.1054 acres

$\frac{56.6 \text{ cfs}}{52.1057} = 1.08625 \text{ cfs/acre}$

Unit 1 + 2 33.1363 acres (1.08625 cfs/Ac) = 36.00 cfs

Tract A 18.9694 acres (1.08625 cfs/Ac) = 20.60 cfs

Summation of Discharge Allowed From All lots in Unit 1 + 2 =

36.00 cfs
− 7.88 cfs Oliver Ross Rd
− 4.24 cfs Saul Bell Rd.
23.88 cfs

Σ Qallowable all Lots Unit 1+2 → 23.88 cfs

Σ Lot Areas = 30.2563 ac.

$Q_{allowable\ (lots)} = \frac{23.88 \text{ cfs}}{30.2563 \text{ ac}} = \boxed{0.789257 \text{ cfs/ac}}$

SUMMARY TABLE OF 100 YEAR PEAK DISCHARGE VALUESS

OFFSITE LOCATION	AREA (ACRES)	PEAK Q (CFS)
A	16.20	21.53
B	1.303	5.48
C	3.049	12.81

ONSITE LOCATION	AREA (ACRES)	Peak Q allowable (CFS)
D	1.874	7.88
E	1.006	4.24
B1 L1	0.7624	0.60
B1 L2	2.7373	2.16
B1 L3	1.8222	1.44
B1 L4	2.0901	1.65
B1 L5	0.7199	0.57
B1 L6	0.9781	0.77
B1 L7	1.1148	0.88
B1 L8	0.8819	0.70
B2 L1	1.0237	0.81
B2 L2	0.9949	0.78
B2 L3	0.9753	0.77
B2 L4	1.7310	1.36
B2 L5	1.3065	1.03
B2 L6	1.3870	1.10
B2 L7	1.3661	1.08
B2 L8	0.9143	0.72
B2 L9	0.7219	0.57
B2 L10	0.7986	0.63
B2 L11	1.2873	1.02
B2 L12	1.3072	1.03
B3 L1	0.7043	0.55
B3 L2	0.5479	0.43
B3 L3	0.5036	0.40
B3 L4	0.5494	0.43
B3 L5	0.5552	0.44
B3 L6	0.5648	0.45
B3 L7	0.5920	0.47
B3 L8	0.6046	0.48
B3 L9	0.7140	0.56
Tract A	18.9694	20.66
TOTAL	52.1054	56.60

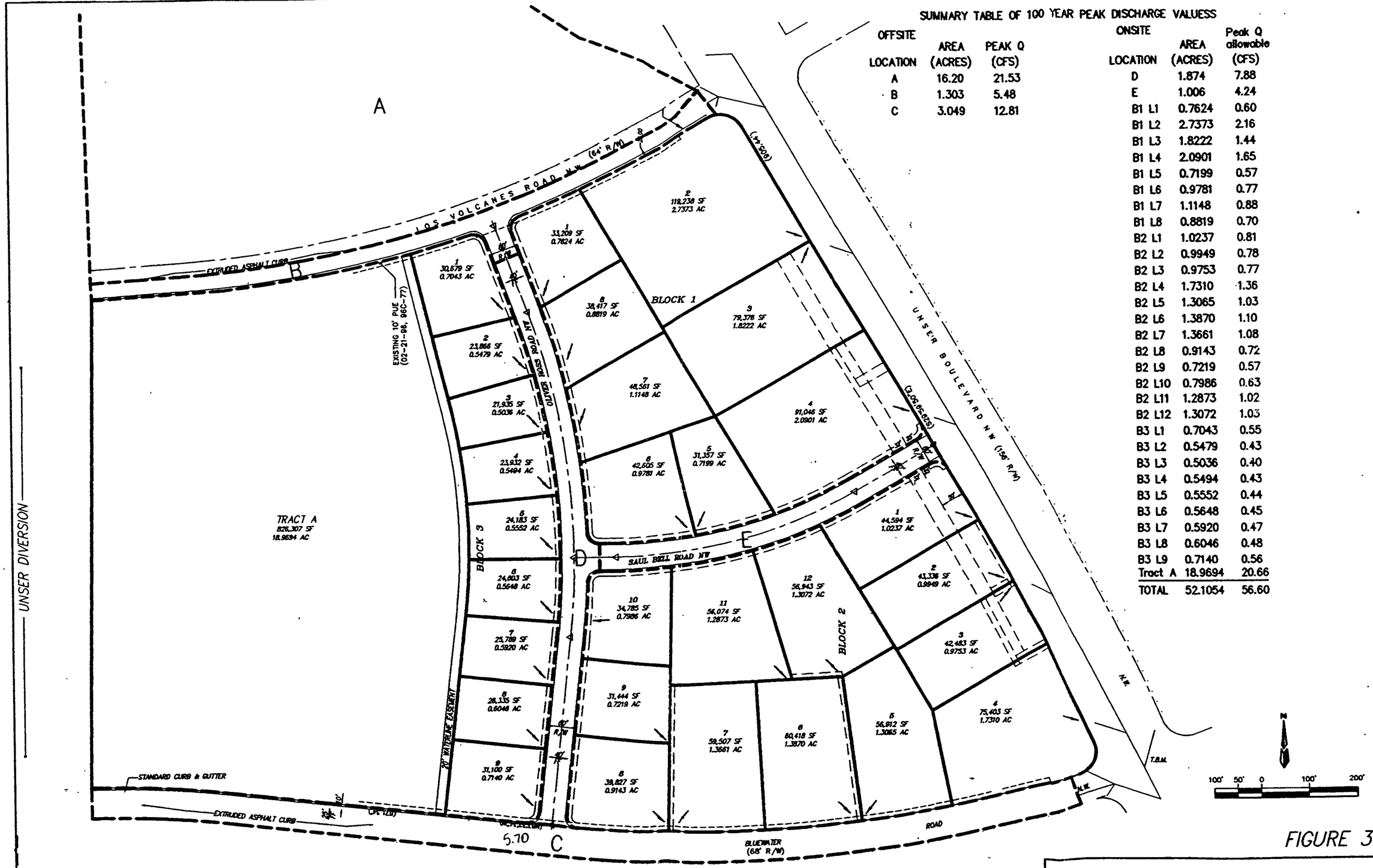

FIGURE 3

CLIFFORD WEST BUSINESS PARK DRAINAGE BASIN BOUNDARIES AND ALLOWABLE DISCHARGES

6135CLIF\CLIFEX3\9-12-97\DLH

LOS VOLCANES ROAD NW (64' R/W)

EXTRUDED ASPHALT CURB

EXISTING 10' PUE (02-21-96, 96C-77)

UNSER DIVERSION

TRACT A
18.9694 AC

BLOCK 1

BLOCK 2

BLOCK 3

1 30,679 SF 0.7043 AC
2 119,238 SF 2.7373 AC
1 33,209 SF 0.7624 AC
8 38,417 SF 0.8819 AC
2 23,866 SF 0.5479 AC
3 79,376 SF 1.8222 AC
7 48,561 SF 1.1148 AC
3 21,935 SF 0.5036 AC
4 91,046 SF 2.0901 AC
4 23,932 SF 0.5494 AC
6 31,357 SF 0.7199 AC
8 42,605 SF 0.9781 AC
5 24,183 SF 0.5552 AC
1 44,594 SF 1.0237 AC
6 24,603 SF 0.5648 AC
12 56,943 SF 1.3072 AC
2 43,336 SF 0.9949 AC
10 34,785 SF 0.7986 AC
11 56,074 SF 1.2873 AC
7 25,789 SF 0.5920 AC
3 42,483 SF 0.9753 AC
9 31,444 SF 0.7219 AC
8 26,335 SF 0.6046 AC
7 59,507 SF 1.3661 AC
6 60,418 SF 1.3870 AC
5 56,912 SF 1.3065 AC
4 75,403 SF 1.7310 AC
9 31,100 SF 0.7140 AC
8 39,627 SF 0.9143 AC

EXISTING STORM DRAIN

UNSER BOULEVARD NW (156' R/W)

EXISTING STORM DRAIN N.W.

SAUL HILL ROAD NW

BLUEWATER ROAD NW (68' R/W)

20' WATERLINE EASEMENT

STANDARD CURB & GUTTER

EXTRUDED ASPHALT CURB

T.B.M.

N

100' 50' 0 100' 200'

FIGURE 4

CLIFFORD WEST BUSINESS PARK STORM DRAIN SCHEMATIC

6135CLIF\CLIFEX4\9-12-97\DLH