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

August 14, 2001

Diane Hoelzer, PE
Mark Goodwin & Associates
P.O. 90606
Albuquerque, NM 87199

Re: Bernardo Trails Subdivision Drainage Report
Engineer's Stamp dated 7-30-01 (D16/D11)

Dear Ms. Hoelzer,

Based upon the information provided in your submittal dated 7-31-01, the above referenced plan is approved for your Work Order documents. This will be the plan that must be certified prior to release of the SIA for this project.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Hydrology

C: file

Drainage Report

For

BERNARDO TRAILS SUBDIVISION

VISTA DEL NORTE MASTER PLANNED COMMUNITY
(OSUNA AND EDITH)

Mark Goodwin & Associates, P.A.

May 2001

I. PROJECT DESCRIPTION

The proposed Bernardo Trails Subdivision is identified as a portion of Tract T-2-A on the recorded Vista Del Norte Bulk Land Plat. This site is bounded by the AMAFCA North Diversion Channel to the east, Vista Del Norte Drive to the west, Villa Del Norte Unit 2 subdivision to the south and Tract T-1 vacant land to the north. This project covers approximately 27.7 acres and will be developed into 163 single family residential homes.

II. DRAINAGE DESIGN CRITERIA AND PREVIOUS REPORTS

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 100-year 6-hour storm event was analyzed to determine street capacities and sizing of the internal storm drain system using P(1 hr) = 2.00", P(6 hr)=2.30". The Land Treatment values used in the AHYMO analysis are in accordance with Table 5-A in the DPM Section 22.2 for Hydrology design.

Parson Brinkerhoff (AVID) prepared the approved drainage report for Vista Del Norte Master Drainage Plan Unit 1. Mark Goodwin and Associates prepared a revised Master Drainage Plan for the Vista Del Norte Unit 2 middle and north ponds which included minor modifications to the major drainage basin divides as discussed in the approved Drainage Report for Villa Del Norte Unit 2 (12-6-00, D16/D6A). This current drainage report used that report as a guide for this drainage plan with some modifications as will be addressed below.

III. EXISTING DRAINAGE CONDITIONS

This project is part of the backbone infrastructure associated with Vista Del Norte Unit 2. The construction of the North Pond will be part of Unit 2 proposed drainage infrastructure. Under existing drainage conditions runoff from the site is in a general northwesterly direction. Offsite runoff from the AMAFCA North Diversion channel earthen side slopes enter the project site from the east. The existing Villa del Norte Unit 2 development to the south does not have any flows entering this project site.

IV. DEVELOPED DRAINAGE CONDITIONS

IV. A. Ultimate Drainage Plan (Vista Del Norte Unit 2 Master Plan)

A conceptual grading and drainage plan has been prepared for Vista Del Norte Unit 2. Refer to the approved Villa Del Norte Unit 2 Drainage Report dated 12-6-00 for hydrology details on the major drainage basin boundaries between the middle and north pond and the preliminary drainage plan.

This project is part of the Vista Del Norte Unit 2 north detention pond drainage system, refer to Pocket 1 - "North Detention Pond Master Drainage Plan". This shows the master storm drain layout in Las Lomitas Drive that goes to the North Pond. The construction plans for Las Lomitas Drive improvements which includes the storm sewer have been prepared and the storm sewer analysis has been completed and is included as part of this report in Appendix C.

The future maximum allowable discharge from the North Detention pond is 4.15 cfs as determined in the Revised Drainage Report for the Alameda Business Park (BHI Report, Feb 1999). The master drainage plan is for the North Pond to discharge at a maximum rate of 4.15 cfs and gravity flow through an 18"- 24" storm sewer to the Alameda Lift station located north of Paseo Del Norte and east of Edith Blvd. Refer to Pocket 2 - "El Pueblo Storm Drain Master Plan". This shows the proposed alignment for the storm drain. The construction plans for this storm sewer have been prepared and the storm sewer analysis has been completed and is included as part of this report in Appendix C.

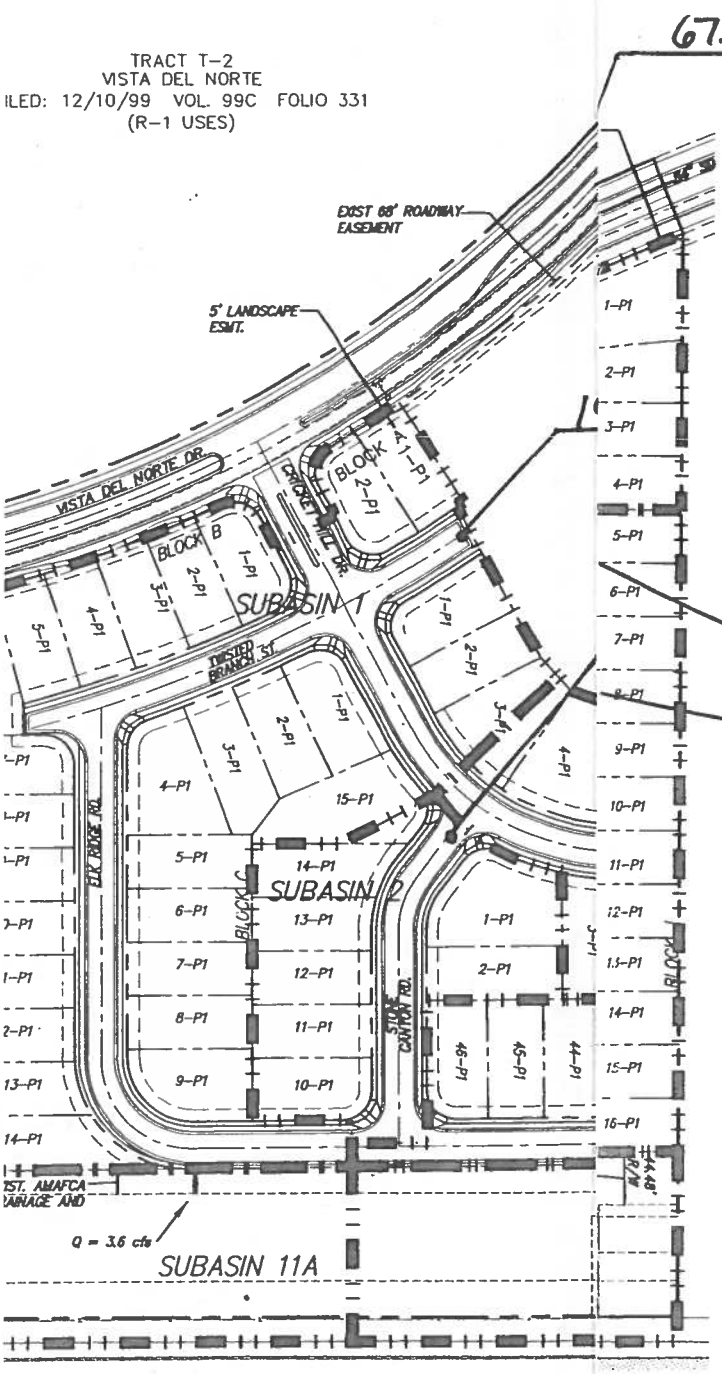
Ultimately this project site will drain through the storm sewer in Las Lomitas to the North Detention Pond.

Onsite runoff will enter the Las Lomitas Drive storm sewer from inlets in Cricket Hill Drive and Bridle Wood Road. Runoff from Subasin 1 will be conveyed through the commercial site and then discharge into the Las Lomitas Drive storm sewer. Refer to Exhibit 1 -"Subasin Boundary Exhibit" for summary of subasin divides hydrology and street capacities.

Internal streets are designed at a minimum grade between 0.6 percent and 0.7 percent. At this grade street capacity is reached for mountable curb and gutter at 12 cfs. In these areas a transitions to standard curb and gutter was made as reflected on the grading and drainage plan. Since street capacity is almost exceeded on Jackrabbit at the intersection with Bridle Wood, inlets were placed on jackrabbit just upstream of Bridle Wood Road. HEC-2 analysis for street capacities are in Appendix B.

IV. B. Project Site Interim Drainage Plan

The interim drainage plan is to provide two temporary retention ponds, an onsite pond to the north and an offsite pond at the south end on Tract A. When the master planned storm sewer in Las Lomitas Drive is constructed, these ponds will be eliminated. The project site will be phased constructed in three Units as shown on the grading and drainage plan. As part of the Unit 1 interim drainage plan a temporary swale will convey developed flows from Unit 1 at Willow Run Drive and Cricket Hill Drive to the temporary retention pond at the north end of the project site. HEC-2 swale capacity calculations can be found in Appendix B.



SUBASIN	AREA (acres)	Q peak (cfs)	Volume (acre-ft)
SB 1	4.463	16.27 cfs	0.641 AF
SB 2	1.186	4.33 cfs	0.170 AF
SB 3	4.759	17.34 cfs	0.683 AF
SB 4	0.716	2.63 cfs	0.103 AF
SB 5	2.630	9.60 cfs	0.378 AF
SB 6	2.485	9.06 cfs	0.357 AF
SB 7	1.157	4.24 cfs	0.166 AF
SB 8	2.579	9.41 cfs	0.371 AF
SB 9	3.145	11.47 cfs	0.451 AF
SB 10	1.692	6.17 cfs	0.243 AF
SB 11A	1.170	3.59 cfs	0.108 AF
SB 11B	3.579	10.98 cfs	0.329 AF
SB 11C	2.095	6.42 cfs	0.193 AF

LEGEND

NEW RIGHT-OF-WAY

NEW EASEMENT

42"SD NEW STORM DRAIN

SUBASIN BOUNDARY

N

100' 50' 0 100' 200'

SCALE: 1" = 100'

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CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

TITLE: EXHIBIT 1
BERNARDO TRAILS
SUBASIN BOUNDARY EXHIBIT

ZONE MAP NO. D-16

A01020BDN/1020SB/05-3-01/DLH

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =05/03/2001
INPUT FILE = BERN_TR.DAT USER NO.= M_GOODWN.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	NOTATION
START										TIME= .00
RAINFALL TYPE= 2										RAIN24= 2.600
COMPUTE NM HYD	100.1BT	-	1	.00697	16.27	.641	1.72413	1.500	3.647	PER IMP= 60.00
COMPUTE NM HYD	100.2BT	-	2	.00185	4.33	.170	1.72413	1.500	3.657	PER IMP= 60.00
COMPUTE NM HYD	100.3BT	-	1	.00743	17.34	.683	1.72413	1.500	3.647	PER IMP= 60.00
COMPUTE NM HYD	100.4BT	-	1	.00112	2.63	.103	1.72413	1.500	3.665	PER IMP= 60.00
COMPUTE NM HYD	100.5BT	-	1	.00411	9.60	.378	1.72413	1.500	3.649	PER IMP= 60.00
COMPUTE NM HYD	100.6BT	-	1	.00388	9.06	.357	1.72413	1.500	3.650	PER IMP= 60.00
COMPUTE NM HYD	100.7BT	-	1	.00181	4.24	.166	1.72412	1.500	3.658	PER IMP= 60.00
COMPUTE NM HYD	100.8BT	-	1	.00403	9.41	.371	1.72413	1.500	3.649	PER IMP= 60.00
COMPUTE NM HYD	100.9BT	-	1	.00491	11.47	.451	1.72412	1.500	3.649	PER IMP= 60.00
COMPUTE NM HYD	100.10BT	-	1	.00264	6.17	.243	1.72413	1.500	3.653	PER IMP= 60.00
COMPUTE NM HYD	100.11A	-	1	.00183	3.59	.108	1.10462	1.500	3.073	PER IMP= .00
COMPUTE NM HYD	100.11B	-	1	.00559	10.98	.329	1.10462	1.500	3.068	PER IMP= .00
COMPUTE NM HYD	100.11C	-	1	.00327	6.42	.193	1.10462	1.500	3.070	PER IMP= .00
COMPUTE NM HYD	100.23BT	-	1	.02371	46.54	1.397	1.10462	1.500	3.066	PER IMP= .00
FINISH										

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COMPUTE NM HYD	100.23BT	-	1	.02371	46.54	1.397	1.10462	1.500	3.066	PER IMP=	.00
FINISH											

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Consulting Engineers
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e-mail: dmg@swcp.com

PROJECT Bernardo Trails
SUBJECT Temporary Retention Ponds
BY DLH DATE 5-3-01
CHECKED ____ DATE ____
SHEET ____ OF ____

South Retention Pond

SB 1 only

$V_{10\text{-day}} = V_{360} + A_D \left(\frac{P_{10D} - P_{360}}{12}\right)$

$= 0.641 + (4.463 Ac)(.60)\left(\frac{3.47" - 2.6"}{12}\right) = 0.835$ AcFt

$= 36372$ CuFt

POND DESIGN: 3:1 side slopes

6 Ft depth

9216SF = 96'x96' TOP AREA (35.0')

3600SF = 60'x60' BOTTOM AREA (29.0')

$\frac{1}{3}(6)(9216 + 3600 + \sqrt{9216(3600)})$

VOLUME = 37,152 CuFt. Design Volume

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PROJECT Bernardo Trails
SUBJECT Temporary Retention Pond
BY DCH DATE 5-3-01
CHECKED _____ DATE _____
SHEET ____ OF ____

North Retention Pond (ON SITE)

Developed Unit 1, 2 & 3
SB 2, 3, 4, 5, 6, 7, 8, 9, 10

$V_{10} = 2.922 + 20.349(.60)\left(\frac{3.47" - 2.6"}{12}\right) = 3.80$ Ac Ft
$= 165,840$ Cu Ft (Req'd)

POND DESIGN: 3:1 side slopes
12' depth
Top Area = 90' x 300' = 27,000 SF @ Elev 5032.
Bottom Area = 18' x 228 = 4104 SF @ 5020.

$VOL = \frac{1}{3}(12)(27,000 + 4104 + \sqrt{27,000(4104)})$
$= 166,522$ Cu. Ft. = 3.82 Ac Ft. (Design Volume)

Temporary Swale Calculations Unit 1

SB 2 (100%) = 4.33 cfs
SB 3 (52.94% of 17.34 cfs) = 9.18 cfs
SB 5 (55.55% of 9.6 cfs) = 5.33 cfs
} 13.51 cfs

+ UNDEVELOPED SB3 (6.86 cfs)
$\left(\frac{.003497 \text{ sqmi}}{.02371 \text{ sqmi}}\right)(46.54 \text{ cfs})$

+ UNDEV. SB 4 (2.20 cfs)
$\left(\frac{.00112 \text{ sqmi}}{.02371}\right) 46.54$ cfs

+ UNDEV SB 6 + 1/2 SB 7 (9.39 cfs)
$\left(\frac{.00388 + .000905}{.02371}\right)(46.54 \text{ cfs})$

+ UNDEV SB 8 + 1/2 SB 7 (9.69 cfs)
$\left(\frac{.00403 + .000905}{.02371}\right)(46.54 \text{ cfs})$

TOTAL = 18.84 cfs
+ 6.86 cfs
25.70 cfs
+ 2.20 cfs
27.90 cfs
+ 9.39 cfs
37.29 cfs
+ 9.69 cfs
46.98 cfs

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PROJECT Bernardo Trails
SUBJECT Inlet Calcs
BY _____ DATE _____
CHECKED _____ DATE _____
SHEET ____ OF ____

Jackrabbit St.

(0.65') 45.80 cfs
- 21.00 Dbl 'A' inlet
(0.52') 24.80 cfs
14.00 Dbl 'A' inlet
10.80 cfs

Bridlewood Road

(10.80 cfs + 17.9 cfs + 3.67 cfs)

(0.57') 32.37 cfs
-16.80 Dbl 'A' inlet
(0.44') 15.57 cfs
10.00 Dbl 'A' inlet
5.57 cfs
4.30 Sng 'A' inlet
1.27 cfs

Cricket Hill Drive

(0.51') 24.3 cfs
13.6 Dbl 'A' inlet
10.7 cfs
7.0 Sngl 'A' inlet
3.7 cfs

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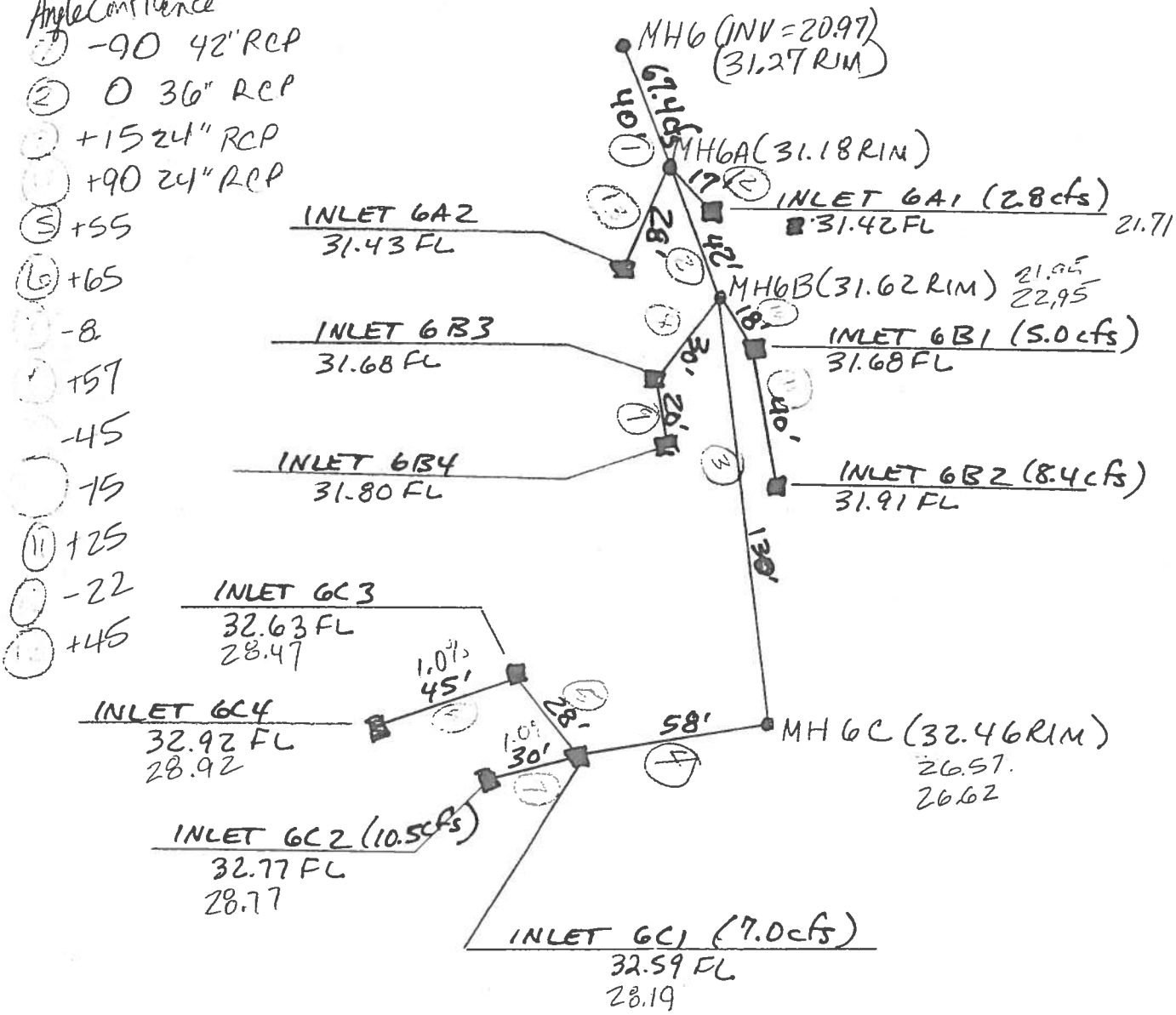
PROJECT Bernardo Trails
SUBJECT Bridle Wood Road
BY DLH DATE 5-7-01
CHECKED _____ DATE _____
SHEET ____ OF ____

MH #6 INV = 20.97' 42" RCP Q = 68 cfs
HGL = 28.22

MH #10 INV = 25.46 30" RCP Q = 26.1 cfs
HGL = 32.42

Angle Confluence
① -90 42" RCP
② 0 36" RCP
③ +15 24" RCP
④ +90 24" RCP
⑤ +55
⑥ +65
⑦ -8
⑧ +57
⑨ -45
⑩ -15
⑪ +125
⑫ -22
⑬ +45



BOTTOM AREA=18' x 228' @ ELEV.=5020.0'
DEPTH= 12.0'
REQ. VOLUME= 3.80 AC. FT
DESIGN VOLUME=3.82 AC. FT.
3:1 SIDE SLOPES

EXIST 68' ROADWAY EASEMENT

54" SD

SDMH#6

UBLIC WATERLINE &
ER EASEMENT (FILED

5030

42" SD

LAS LOMITAS DRIVE

SINGLE "C"

DBL "C"

DBL "A"

10' PUE (TYP.)

FP=35.25
10-P1

FP=34.95
11-P1

FP=34.65
12-P1

19-P1

FP=34.35

1-P1 FP=35.37

18-P1 FP=34.62

2-P1 FP=35.64

17-P1 FP=34.89

7-P1 FP=34.66

6-P1 FP=34.39

FP=34.12

FP=33.85

FP=33.58

46' R/W

D. Mark Goodwin & Associates, P.A.
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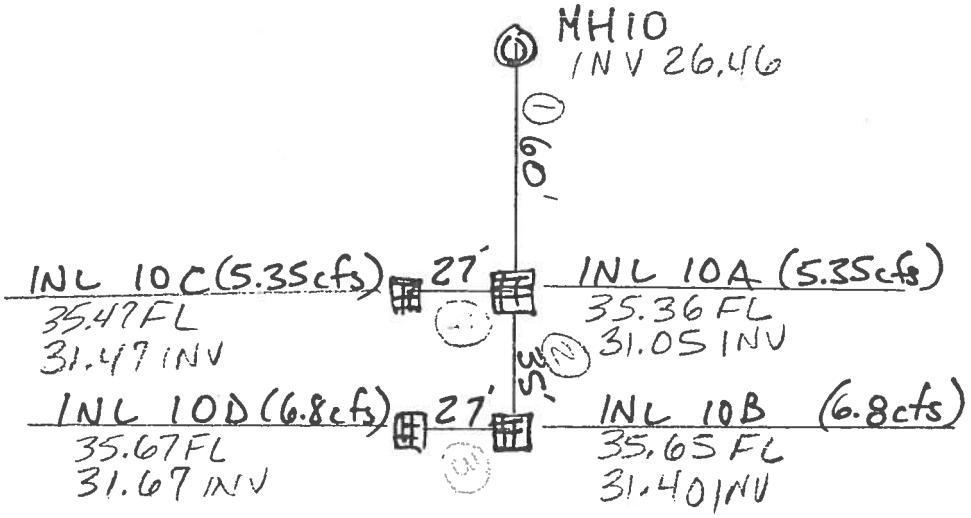
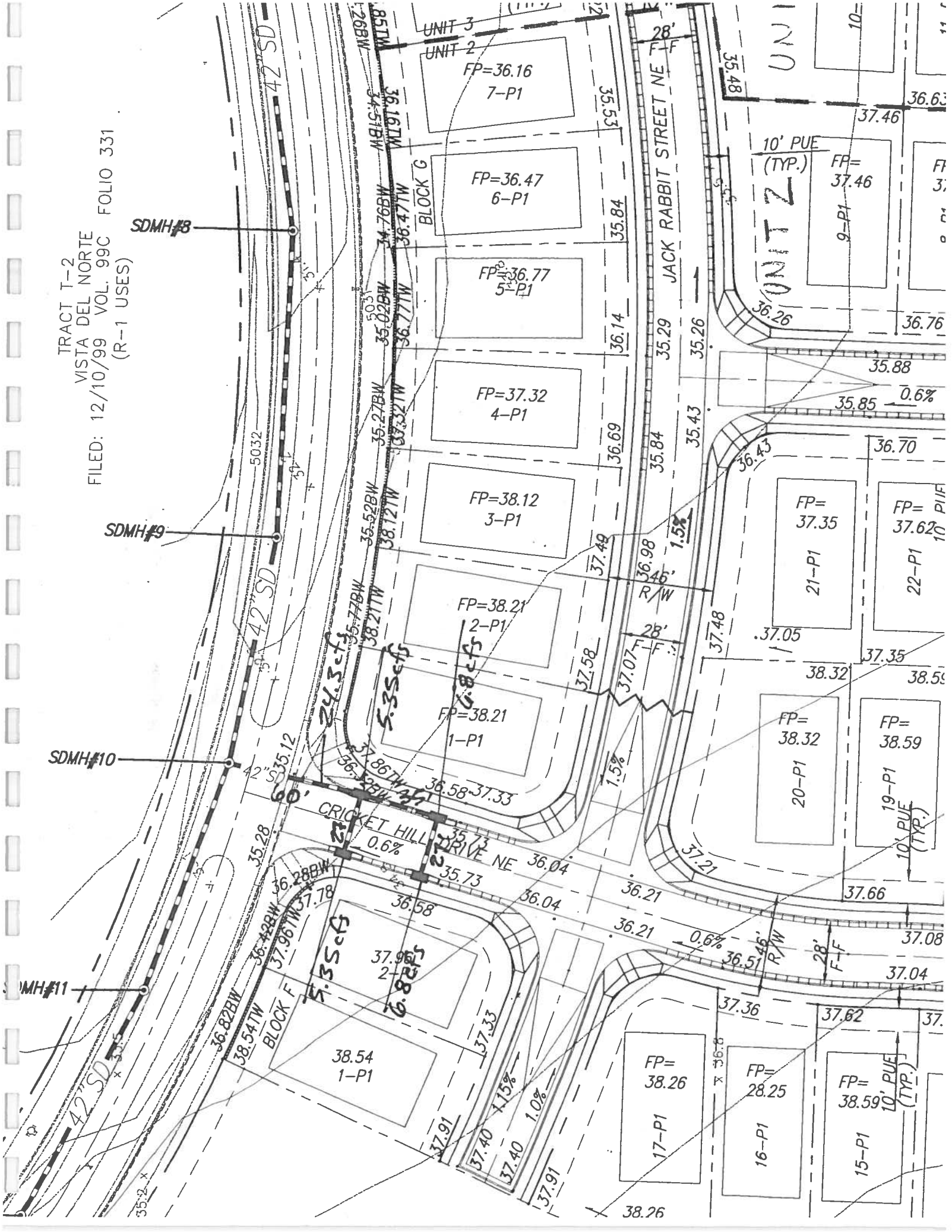
PROJECT Bernardo Trails
SUBJECT Cricket Hill Storm
BY DLH DATE 5-7-01
CHECKED _____ DATE _____
SHEET ____ OF ____

MH 10 INV = 25.46 42" RCP
HGL = 32.42 Q = 24.3 cfs (Qdesign was 26.1 cfs)
RIM = 35.32




TRACT T-2
VISTA DEL NORTE
FILED: 12/10/99 VOL. 99C FOLIO 331
(R-1 USES)
SDMH#8
SDMH#9
SDMH#10
SDMH#11
42" SD
UNIT 3
UNIT 2
UNIT 2
FP=36.16
7-P1
FP=36.47
6-P1
FP=36.77
5-P1
FP=37.32
4-P1
FP=38.12
3-P1
FP=38.21
2-P1
FP=38.21
1-P1
38.54
1-P1
BLOCK G
BLOCK F
JACK RABBIT STREET NE
CRICKET HILL DRIVE NE
10' PUE (TYP.)
28' F-F
R/W
1.5%
0.6%
1.15%
1.0%
24.3cfs
5.3cfs
6.8cfs
5.3cfs
6.8cfs
FP=37.46
9-P1
FP=37.35
21-P1
FP=37.62
22-P1
FP=38.32
20-P1
FP=38.59
19-P1
FP=38.26
17-P1
FP=28.25
16-P1
FP=38.59
15-P1