REVISED DRAINAGE REPORT
FOR TRACTS B-1 & B-2
SEVEN BAR NORTH SUBDIVISION

MAY 1994
(revised JUNE 3, 1994)

DRAINAGE REPORT
FOR TRACTS B-1 & B-2
SEVEN BAR NORTH SUBDIVISION

Prepared for:

BROWN/NZD DEVELOPMENT JOINT VENTURE
C/O BROWN & ASSOCIATES
3411 CANDELARIA NE
ALBUQUERQUE, NEW MEXICO 87107

Prepared by:

Job No. 93217.43

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for
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Seven Bar North Subdivision

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Prepared by:

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APPENDICES

PLATES

I. INTRODUCTION/PURPOSE OF REPORT

This report presents the Drainage Management Plan for Preliminary Plat and rough grading approval for the development of Tracts B-1 and B-2 of the Seven Bar North Subdivision. The property is currently zoned R-LT and the proposed development is for 162 lots of detached, single family residential housing and the related streets and infrastructure. As shown on the location map on the Drainage Basin Map, the property is bounded by Seven Bar Loop Road on the west, Sierrita Road and undeveloped, vacant land (Tract B-3) on the north, and Seven Bar/Skyview Channel on the south and east.

The report outlines the study methodologies used and summarizes the existing and proposed drainage conditions. Calculations and supporting data are presented in the appendices. A drainage basin map, a preliminary grading plan and a copy of the Preliminary Plat are included in the Plates at the end of the report. The purpose of this report is to obtain drainage report approval for the Preliminary Plat for Tracts B-1 and B-2, and rough grading approval.

II. STUDY METHODOLOGIES

Undeveloped, existing conditions and proposed, developed conditions were analyzed for the 100-year, 6-hour storm event consistent with the City of Albuquerque Design Process Manual (DPM), including the January, 1993 revision of Section 22.2, Hydrology. The analysis also references the previously submitted Drainage Master Plan for the Seven Bar North Subdivision, dated April, 1994 and is consistent with that report.

Street hydraulics and channel capacities were analyzed using Manning's equation with the Manning's "n" values suggested in the DPM. Rating curves for streets and channels are provided in the Appendices, along with all hydrologic and

hydraulic calculations. Streets are designed to convey the energy grade line of the design storm event within the right-of-way. Normal flow depth is confined to the top of curb.

III. EXISTING CONDITIONS

Site Characteristics

This site is currently undeveloped vacant land with slopes ranging from 2% to 8% in a generally southwestern direction. Soils are highly absorptive sandy soils with occasional clay lenses. Vegetation is light, consisting of grasses and small sagebrush.

The site is not located within a FEMA floodplain, as shown on the Floodplain Map provided on the Drainage Master Plan (enclosed in the rear of this report).

The existing drainage conditions are shown graphically on the "Existing Drainage Conditions" map (from the Drainage Master Plan submittal, see Appendix) and are summarized as follows:

Onsite Drainage Basins

Tract B-2, approximately 19.9 acres, currently drains in primarily sheet flow, to the southwest corner of the tract, where it discharges over a concrete rundown into the Seven Bar/Skyview Channel. The 100-year storm event currently generates 26.2 cfs of peak flow.

Tract B-1, approximately 15.2 acres, also drains in sheet flow into the Seven Bar/Skyview Channel. The 100-year storm event generates a peak flow rate of 20.0 cfs from Tract B-1.

Offsite Drainage Basins

The area to the north of Tracts B-1 and B-2 and south of Westside Boulevard currently drains across these tracts and into the Seven Bar/Skyview Channel. This area is shown on the Existing Drainage Conditions map as Basin E-3 and consists of approximately 56.6 acres which generate a peak flow of 74.5 cfs during the 100-year storm.

IV. PROPOSED DEVELOPED CONDITIONS

The proposed development is a single-family, detached-unit residential subdivision with 162 lots on 35.1 acres, producing a density of 4.62 du/acre. Proposed street configurations are shown on the Preliminary Plat, the Drainage Basin Map and on the Preliminary Grading Plan. As shown on the Preliminary Plat, the project is proposed to be divided into two phases.

Phase I Development

Phase 1 includes the development of all of Tract B-1 and the construction of Seven Bar Loop Road and associated storm drain from Black's Arroyo to Sierrita Road, and the construction of Sierrita Road and associated storm drain from Seven Bar Loop Road to the eastern boundary of Tract B-1. The storm drain to be constructed in Seven Bar Loop Road and Sierrita Road is designed to accommodate flows for the fully developed condition of Basins B-1 through B-9 as shown in the Drainage Master Plan for Seven Bar North Subdivision. The detention pond at the northeast intersection of Seven Bar Loop Road and Sierrita Road and the swale along the north edge of the project will also be constructed during Phase 1.

For purposes of analysis, Tract B-1 is subdivided into six smaller sub-basins, Basins 1A through 1F, as shown on the Drainage Basin Map. Basin 1A discharges

8.0 cfs into the Seven Bar Loop Road storm drain. This storm drain then discharges via existing storm drain pipe stub out into the Black's Channel. The remaining five basins (1B through 1F) together generate a fully developed runoff of 44.7 cfs (9.7 + 5.4 + 11.2 + 5.2 + 13.2). This runoff is conveyed by street flow to a proposed storm drain inlet and storm drain which lies in a 25' public drainage easement between Lots 15 and 16. This storm drain then discharges through a pipe penetration directly into Seven Bar/Skyview Channel as preliminarily shown on a plan and profile sheet in the appendix.

As stated in the Methodology Section of this report, street flows were calculated and energy grade lines confined to the right-of-way. A Summary Table of the street calculations is provided at the front of Appendix 2 for review and reference. The allowable locations for the use of roll curb have been identified on the Curb Type Identification Map in the rear of this report.

Calculations are found in Appendix 3 for the public drainage channel sizing and preliminary designs of this channel are located in the rear of this report (see Plates).

Phase II Development

Phase II consists of the development of all of Tract B-2 and the construction of Sierrita Road and storm drain from the west boundary of Tract B-2 to the northeast boundary of Tract B-2. Tract B-2 is subdivided into six smaller basins, 2A through 2F. These basins combine to generate a fully developed runoff of 68.1 cfs. This flow is conveyed by street flow to a public concrete channel which discharges, through a drainage and public utility easement, into Seven Bar/Skyview Channel. All connections, in both phases, to the Seven Bar/Skyview Channel will be coordinated through AMAFCA.

As stated in the Methodology Section of this report, street flows were calculated and energy grade lines confined to the right-of-way. A Summary Table of the street calculations is provided at the front of Appendix 2 for review and reference. The allowable locations for the use of roll curb have been identified on the Drainage Plan.

Calculations are found in Appendix 3 for the public drainage channel sizing and preliminary design are also shown in the rear plates of this report.

Backyard Ponding

Most of the lots located against the Skyview Channel require backyard ponds due to elevation differences between pads and the channel right-of-way. Pond locations are shown on the preliminary grading plans enclosed in the rear of this report.

Offsite Basins

This offsite basin that impacts Tracts B-1 and B-2 is Basin E-3. Basin E-3 consists of approximately 56.6 acres and generates a peak flow of 74.5 cfs and a peak volume of 2.13 acre-feet during the 100-year storm. These flows will be captured in a temporary swale beginning on the northern boundary of Tract B-2 and flowing adjacent to, and north of, Sierrita Road. Calculations for the swale are found in the Appendix.

A detention/sedimentation pond will be provided at the terminus of the swale at the northeast corner of the intersection of Seven Bar Loop Road and Sierrita Road. The pond is designed to remove the sediment from the 10-year storm and have an orifice-controlled discharge into a connector pipe that runs to a storm drain manhole that is being built in Sierrita Road as part of the Phase I improvements.

With the development of upstream basins, the pond will be filled, the asphalt-lined swale will be removed and disposed of, and the connector pipe will be removed from the pond to the property line and the reminder abandoned in place. Design details of the pond are to be found in Appendix at the end of this report.

V. PHASING/BUILDING PERMIT/FINAL PLAT APPROVALS

This report requests only Preliminary Plat and rough grading approvals. Prior to final plat and building permit approvals, final grading plans and work order construction plans, by phase, must be submitted and approved by the City and AMAFCA.

VI. CONCLUSION

The drainage management plan presented in this report for Tracts B-1 and B-2 provides a workable solution to the drainage issues created by the development of this property and should be approved as satisfying the requirements for Preliminary Plat drainage report and rough grading approval.

HYDROLOGY - FORMULAS USED

FROM SECTION 22.2 OF DPM - JANUARY 93 UPDATE

EXISTING CONDITIONS:

TIME OF CONCENTRATION, $t_c = \left(\frac{L_1}{V_1} + \frac{L_2}{V_2} + \ldots + \frac{L_x}{V_x}\right) / 3600 \text{ sec/hr}$

WHERE $V = K\sqrt{S}$

K FROM TABLE B-1

S IS SLOPE IN PERCENT

$L_1 + L_2 + \ldots L_x < 4000$ FT

INTENSITY; $I = 0.726\left(\log(24.6 \times t_c)\right)\frac{P_{60}}{t_c}$

RATIONAL METHOD "C" = %A(.27) + %B(.43) + %C(.61) + %D(.93)
(ZONE 1, 100 YR, 6 HR STORM)

$\boxed{Q_p = CIA}$

DEVELOPED CONDITIONS

FOR SMALL WATERSHEDS $t_p = 8$ MINUTES

$t_c = 12$ MINUTES

RATIONAL METHOD "C" = %A(.27) + %B(.43) + %C(.61) + %D(.93)
(ZONE 1, 100 YR, 6 HR STORM)

"C" = %A(.08) + %B(.24) + %C(.47) + %D(.92)
(ZONE 1, 10 YR, 6-HR STORM)

EXCESS PRECIPITATION, E_c = %A(.44) + %B(.67) + %C(.99) + %D(1.97)

VOLUME = AREA(E_c)

BOHANNAN-HUSTON INC.

PROJECT NAME TRACTS A&D SHEET ____ OF ____

PROJECT NO. C2221740 BY DP DATE 3/31/94

SUBJECT HYDROLOGY CH'D ____ DATE ____

FULLY DEVELOPED CONDITIONS

SUMMARY OF HYDROLOGIC DATA

BASIN ID	AREA AC	AREA SQ.MI.	% LAND TREATMENT A	B	C	D	TIME TO PEAK	10-YR DISCHARGE CFS/AC	Q(10YR) CFS	RATIONAL METHOD (100YR) COMPOSITE C	I (IN/HR)	Q(100YR) (CFS)
1-A	2.455	0.0038	3.7	25.8	25.8	44.6	0.1333	1.88	4.6	0.69	4.70	8.0
1-B	2.878	0.0045	3.2	23.4	23.4	49.9	0.1333	1.98	5.7	0.72	4.70	9.7
1-C	1.532	0.0024	4.8	17.3	17.3	60.5	0.1333	2.15	3.3	0.76	4.70	5.4
1-D	3.214	0.0050	4.9	19.0	19.0	57.2	0.1333	2.09	6.7	0.74	4.70	11.2
1-E	1.502	0.0023	4.3	19.9	19.9	55.9	0.1333	2.07	3.1	0.74	4.70	5.2
1-F	3.727	0.0058	4.9	17.7	17.7	59.6	0.1333	2.13	8.0	0.75	4.70	13.2
2-A	3.555	0.0056	4.1	19.8	19.8	56.3	0.1333	2.08	7.4	0.74	4.70	12.4
2-B	2.662	0.0042	3.8	20.4	20.4	55.4	0.1333	2.07	5.5	0.74	4.70	9.2
2-C	3.382	0.0053	4.3	21.0	21.0	53.7	0.1333	2.03	6.9	0.73	4.70	11.6
2-D	3.645	0.0057	4.3	20.7	20.7	54.2	0.1333	2.04	7.5	0.73	4.70	12.5
2-E	2.522	0.0039	4.0	18.5	18.5	59.1	0.1333	2.13	5.4	0.75	4.70	8.9
2-F	3.945	0.0062	4.4	20.8	20.8	54.0	0.1333	2.04	8.0	0.73	4.70	13.5

EXISTING CONDITIONS

100-YEAR STORM

SUMMARY OF HYDROLOGIC DATA

BASIN ID	AREA AC	AREA SQ.MI.	% LAND TREATMENT A	B	C	D	TIME OF CONCENT	RATIONAL COMPOSITE C	I (IN/HR)	Q (CFS)
E-1	73.0	0.1141	100.0	0.0	0.0	0.0	0.20	0.27	3.68	72.5
E-3	56.6	0.0884	100.0	0.0	0.0	0.0	0.20	0.28	4.70	74.5

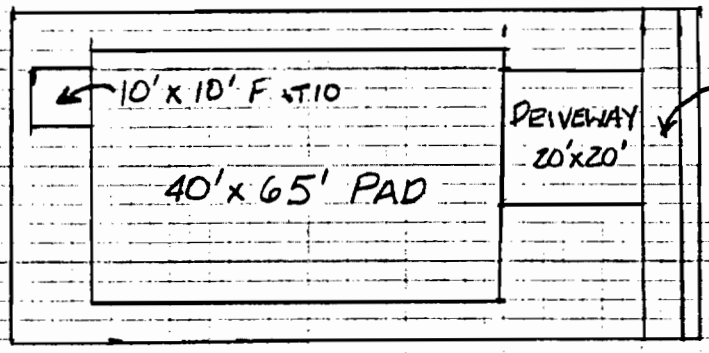
IMPERVIOUS AREA CALCULATIONS

LOT WIDTH(IN FEET)		50	55	60	65	70	75	80
PAD WIDTH		40	45	50	55	60	65	70
PAD DEPTH		65	65	65	65	65	65	65
DRIVEWAY	(20'x20')	400	400	400	400	400	400	400
WALKWAY	(4' WIDE)	200	220	240	260	280	300	320
PATIO	(10'x10')	100	100	100	100	100	100	100
TOTAL IMPERVIOUS		3300	3645	3990	4335	4680	5025	5370
		sq.ft/lot			sq.ft/lot	sq.ft/lot	sq.ft/lot	

ROADWAY	TYPE 1	TYPE 2	TYPE 3	TYPE 4	CUL 1
F-F WIDTH	76	48	51	28	
SIDEWALK	6	4	4	4	0
RADIUS					40
	88	56	59	36	5027
	sq.ft/ft	sq.ft/ft	sq.ft/ft	sq.ft/ft	sq.ft

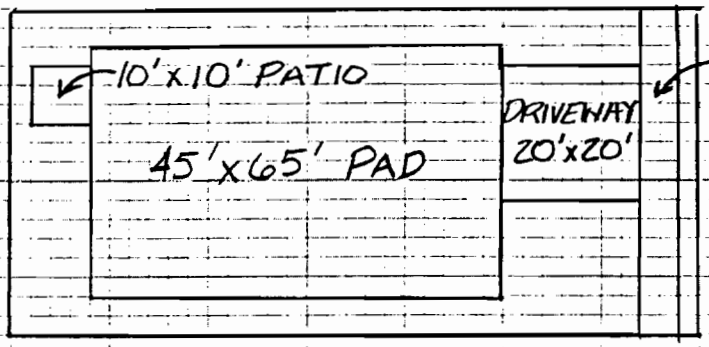
BASIN ID	AREA TYPE D AC	PERCENT TYPE D	TOTAL NUMBER OF LOTS PER BASIN 50'	55'	60'	65'	70'	75'	80'	TOTAL LENGTH OF ROADWAY PER BASIN TYPE 1	TYPE 2	TYPE 3	TYPE 4	NUMBER OF CUL-DE-SACS PER BASIN
1-A	1.09	44.6	5	5	0	0	0	0	0	0	0	0	220	1
1-B	1.44	49.9	7	3	0	0	0	0	0	0	0	124	450	1
1-C	0.93	60.5	4	4	0	0	0	0	0	0	0	0	350	0
1-D	1.84	57.2	5	12	0	0	0	0	0	0	0	0	550	0
1-E	0.84	55.9	5	2	0	0	0	0	0	0	0	0	320	0.25
1-F	2.22	59.6	14	6	0	0	0	0	0	0	0	0	762	0.25
2-A	2.00	56.3	0	9	7	0	0	0	0	0	0	0	700	0.25
2-B	1.48	55.4	0	2	9	0	0	0	0	0	0	113	400	0
2-C	1.81	53.7	0	7	9	0	0	0	0	0	0	0	350	1
2-D	1.98	54.2	0	6	11	0	0	0	0	0	0	0	530	0.25
2-E	1.49	59.1	0	9	2	0	0	0	0	0	0	0	530	1
2-F	2.13	54.0	0	11	8	0	0	0	0	0	0	0	440	1
				44	46	0								

50' LOT



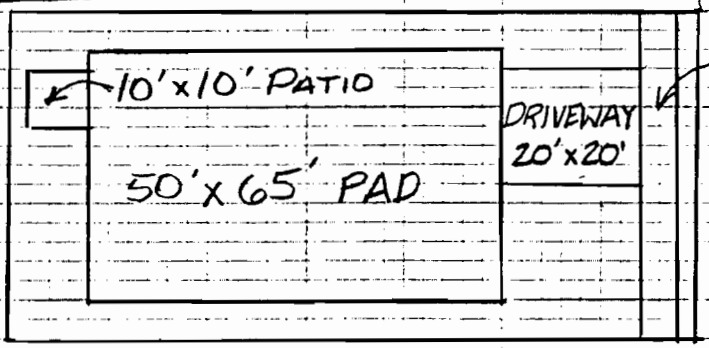
50' LOT TOTAL IMPERVIOUS AREA = 3300 ☑

55' LOT



55' LOT TOTAL IMPERVIOUS AREA = 3645 ☑

60' LOT



60' LOT TOTAL IMPERVIOUS AREA = 3990 ☑

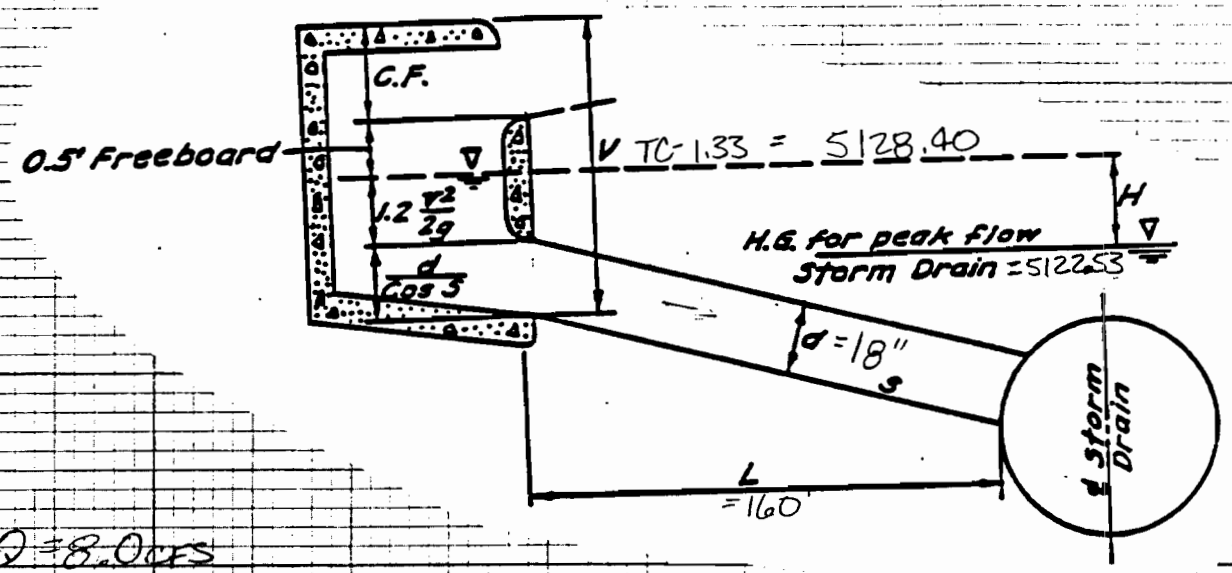
BOHANNAN-HUSTON INC.

PROJECT NAME TRACTS A & D SHEET 1 OF 2

PROJECT NO. 9321740 BY PE DATE

SUBJECT HYDROLOGY CH'D DATE

STA 1+35
TYPE "A" SINGLE - IN SUMP
TC = 5129.73



Q = 8.0 CFS
V = 4.53 FPS
1.2 V²/2g = 0.38

$V_{MIN} = 1.33 + 0.38 + 1.5 = 3.21$
USE 4'

$H_f = \left(\frac{Q}{K}\right)^2 L = \left(\frac{8.0}{105}\right)^2 160 = 0.93'$

$H_{provided} = 5128.40 - 5122.53 = 5.87'$ ✓

BOHANNAN-HUSTON INC.

PROJECT NAME TRACT A D, PH I & 2 SHEET ____ OF ____
PROJECT NO. 9321740 BY PR DATE 4/26/94
SUBJECT DRAINAGE REPT CH'D DATE

GRATE 1A

CAPACITY OF SINGLE "A" CATCH BASIN IN SUMP

ORIFICE EQUATION

$Q = 0.6 A_{NET} \sqrt{2gH}$

$A_{NET} = \frac{31 \times 18.5}{144} = 3.98 \text{ FT}^2$

$H = 0.83 \left(10''\right)$

$Q = 17.5 \text{ CFS}$

WEIR EQUATION

$Q = 2.68 P_{NET} H^{1.5}$

$P_{NET} = \frac{2(18.5) + 31}{12} = 5.167$

$H = 0.83 \left(10'' \text{ CURB}\right)$

$Q = 11.5 \text{ CFS}$

NEED $Q_{CAP} = 8.0 (1.15) = 9.2 \text{ CFS}$

(1.15 ← clogging factor)

BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

SUBJECT _____ CH'D _____ DATE _____

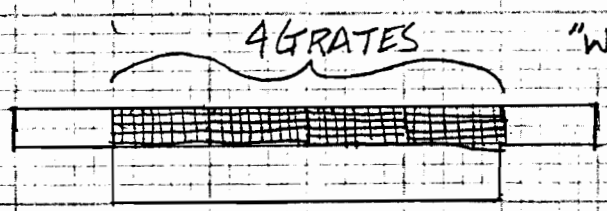
OUTLET 1C: PIPE TO CHANNEL CONNECTION

STORM INLETS:

Q_{100} = 44.7 CFS

DESIGN FOR 200% IN SUMP = 89.4 CFS

USE QUADRUPLE TYPE "A" WITH 4 GRATES & WINGS AT EACH END:



CAPACITY OF ORIFICE: $Q = 0.6 A_{ET} \sqrt{2gh}$

GRATES: $A_{NET} = 4[31 \times 18.5/144] = 15.9$ SF

$H = 0.83 + 0.18 = 1.0'$ @ RIGHT OF WAY

$Q = 0.6(15.9)\sqrt{2(32.2)(1)} = 76.6$ CFS

WINGS: $A_{NET} = 2(3.5)(6\text{ in})/12 = 3.5$ SF

$H = 0.74'$

$Q = 0.6(3.5)\sqrt{2(32.2)(0.74)}$

$= 14.5$ CFS

TOTAL CAPACITY = 76.6 + 14.5 = 91.1 CFS > 89.4 ✓

PIPE TO CHANNEL:

USE 42" RCP - RATING CURVE ATTACHED

NORMAL DEPTH = [illegible]

CHECK ORIFICE OF PIPE: $A = \pi(1.75)^2 = 9.62$ SF

$h = 1 + 6.78 - 3.5/2$

$= 6.03'$

$Q = 0.6(9.62)\sqrt{2g(6.03)}$

$= 113$ CFS > 89.4 ✓

BOHANNAN-HUSTON INC.

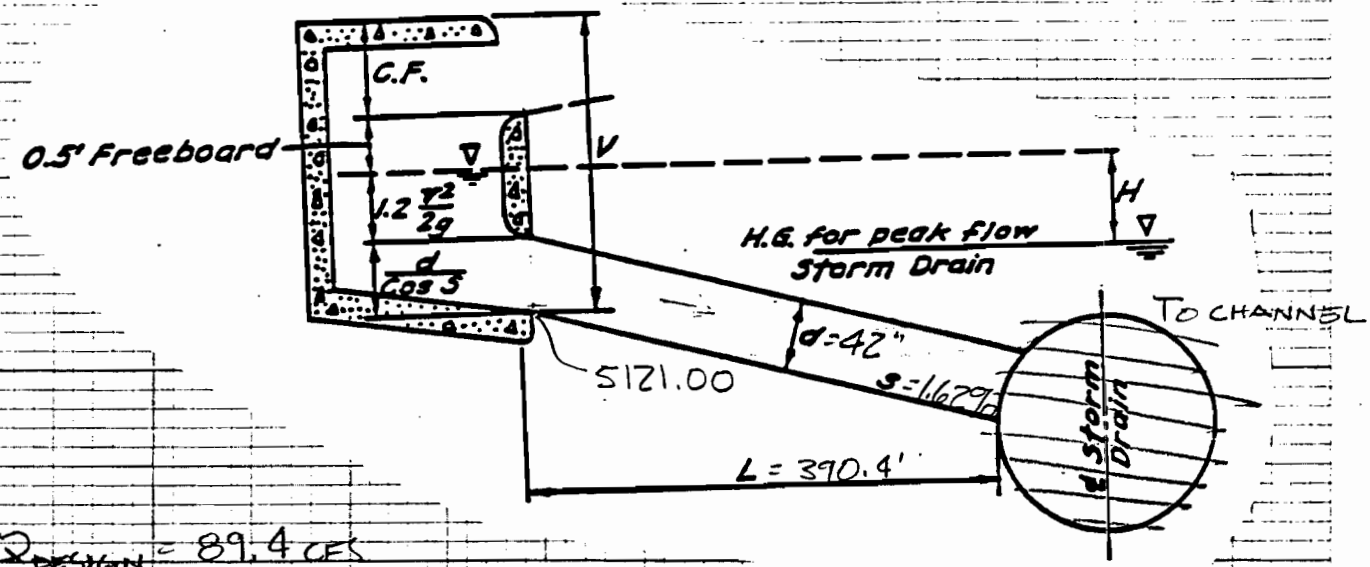
PROJECT NAME SEVEN BAR NORTH SHEET ____ OF ____

PROJECT NO. C9321740 BY PR DATE ____

SUBJECT ____ CH'D ____ DATE ____

CATCH BASIN DEPTH:

STA 5+49.15 QUAD TYPE "A" IN SUMP
TC=5127.78



$Q_{DESIGN} = 89.4$ CFS

$A_{42"} = \pi(1.75)^2 = 9.62$ SF

$V = Q/A = 9.29$ FPS $\Rightarrow 1.2\frac{V^2}{2g} = 1.61'$

$V_{DEPTH,MIN} = 1.33 + 1.61 + 3.5 = 6.44'$

DEPTH PROVIDED = 5127.78 − 5121.00 = 6.78' > 6.44' ✓

BOHANNAN-HUSTON INC.

PROJECT NAME SEVEN BAR NORTH SHEET ____ OF ____

PROJECT NO. C9321740 BY PR DATE ____

SUBJECT ____ CH'D ____ DATE ____

BACKWATER CHECK, CHANNEL AT PEAK

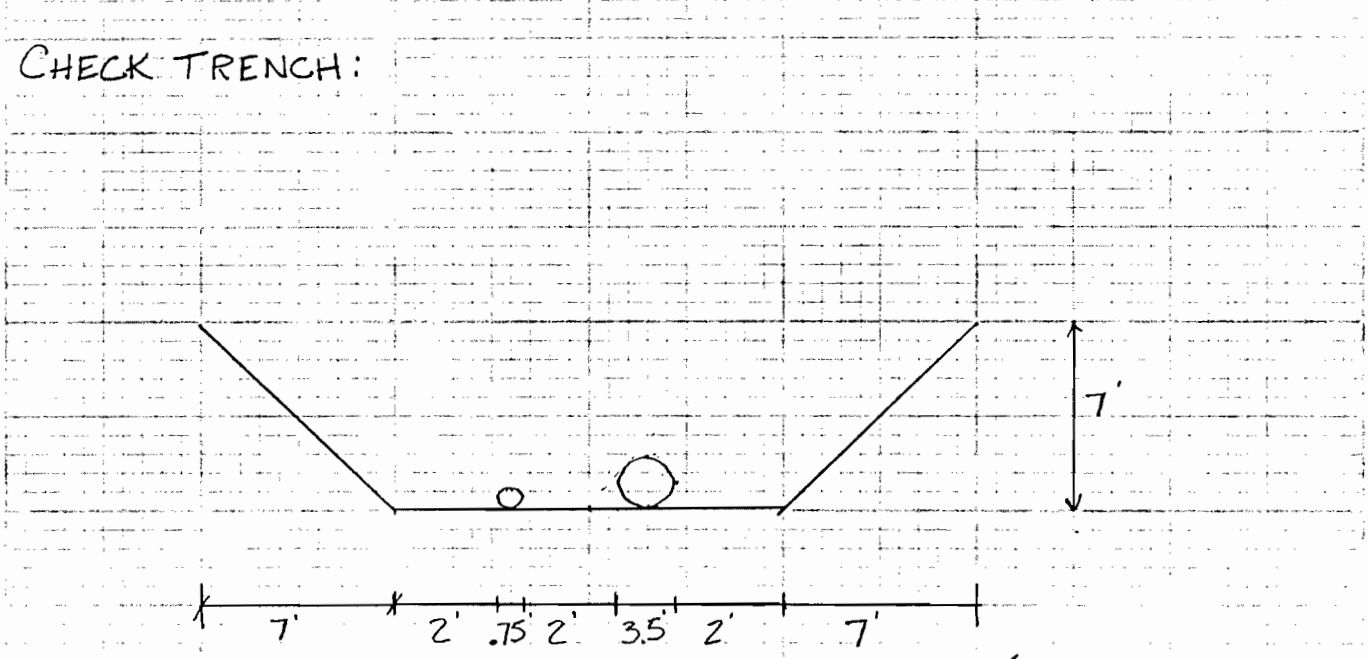
MAX DEPTH IN CHANNEL (± STA 7+20) = 5.75'

CHANNEL INVERT = 5113.68

WATER SURFACE @ 5119.43 < 5121 ✓

AT THE PEAK FLOW IN SEVEN BAR CHANNEL, THE MINOR FLOWS FROM THE DEVELOPMENT WILL ENTER THROUGH CATCH BASIN.

CHECK TRENCH:



TOTAL WIDTH REQ'D = 24.25 < 25 ✓

BOHANNAN-HUSTON INC.

PROJECT NAME SEVEN BAR NORTH SHEET ____ OF ____

PROJECT NO. C9321746 BY PR DATE ____

SUBJECT ____ CH'D ____ DATE ____

OUTLET PIPE AT BASIN 1C

CULVERT RATING TABLE

42. INCH DIAMETER PIPE

N = 0.01300 INCREMENT = 1.00 SLOPE = 0.01620

FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
1.00000	0.05957	0.12525	2.10244
2.00000	0.16728	0.55406	3.31225
3.00000	0.30503	1.31374	4.30691
4.00000	0.46609	2.41279	5.17663
5.00000	0.64640	3.85195	5.95910
6.00000	0.84309	5.62740	6.67470
7.00000	1.05400	7.73216	7.33602
8.00000	1.27735	10.15689	7.95153
9.00000	1.51167	12.89037	8.52726
10.00000	1.75567	15.91981	9.06768
11.00000	2.00821	19.23116	9.57625
12.00000	2.26829	22.80913	10.05565
13.00000	2.53496	26.63742	10.50802
14.00000	2.80736	30.69880	10.93512
15.00000	3.08467	34.97512	11.33837
16.00000	3.36612	39.44738	11.71893
17.00000	3.65099	44.09579	12.07777
18.00000	3.93855	48.89979	12.41570
19.00000	4.22811	53.83798	12.73335
20.00000	4.51900	58.88823	13.03124
21.00000	4.81056	64.02759	13.30980
22.00000	5.10212	69.23224	13.56932
23.00000	5.39301	74.47753	13.81001
24.00000	5.68258	79.73788	14.03200
25.00000	5.97013	84.98666	14.23530
26.00000	6.25500	90.19618	14.41986
27.00000	6.53645	95.33746	14.58551
28.00000	6.81376	100.38007	14.73196
29.00000	7.08616	105.29201	14.85883
30.00000	7.35283	110.03918	14.96556
31.00000	7.61291	114.58525	15.05145
32.00000	7.86545	118.89076	15.11556
33.00000	8.10945	122.91258	15.15671
34.00000	8.34377	126.60252	15.17331
35.00000	8.56712	129.90555	15.16327
36.00000	8.77802	132.75681	15.12377
37.00000	8.97472	135.07658	15.05079
38.00000	9.15503	136.76060	14.93831
39.00000	9.31609	137.65956	14.77654
40.00000	9.45384	137.52634	14.54714
41.00000	9.56155	135.82037	14.20485
42.00000	9.62112	128.05524	13.30980

Q = 89.4 CFS

C:\P\9321740\DATABASE.PAD\STORM-CONN.CRF

BHI JOB NO. 9321.44

SCALE: 1" = 20' (HORIZ.)
1" = 20' (VERT.)

DRAWING NO. | MAP NO. | SHEET 1 OF 2

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
DRC CHAIRMAN			WATER		
TRANSPORTATION			WASTE WATER		
HYDROLOGY					

SEVEN BAR RANCH
STORM DRAIN PLAN & PROFILE
CONNECTION TO 7-BAR CHANNEL

AMAFCA

NO.	DATE	REMARKS	BY

REVISIONS

DESIGNED BY PR, DF DATE 4/94
DRAWN BY TSG DATE 4/94
CHECKED BY JRT DATE 4/94

ENGINEER'S SEAL

SURVEY INFORMATION

BENCH MARKS

NO.	FIELD NOTES BY	DATE
	TBM NO.205 CHISLED "X" LOCATED APPROXIMATELY 459 FEET SOUTH OF THE BLACK'S DIVERSION INLET STRUCTURE ON THE EAST MALL- ELEV. 5110.55	

AS-BUILT INFORMATION

CONTRACTOR STAKED BY
INSPECTOR'S FIELD VERIFICATION BY
DATE
DATE
DATE
MICRO-FILM INFORMATION
RECORDED BY
DATE

NOTES

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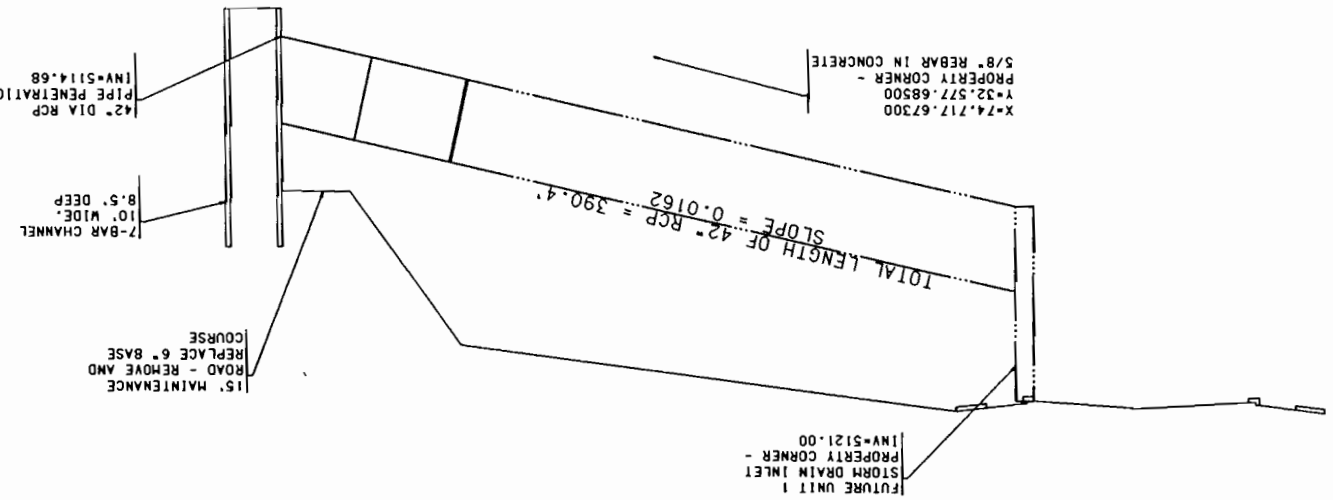
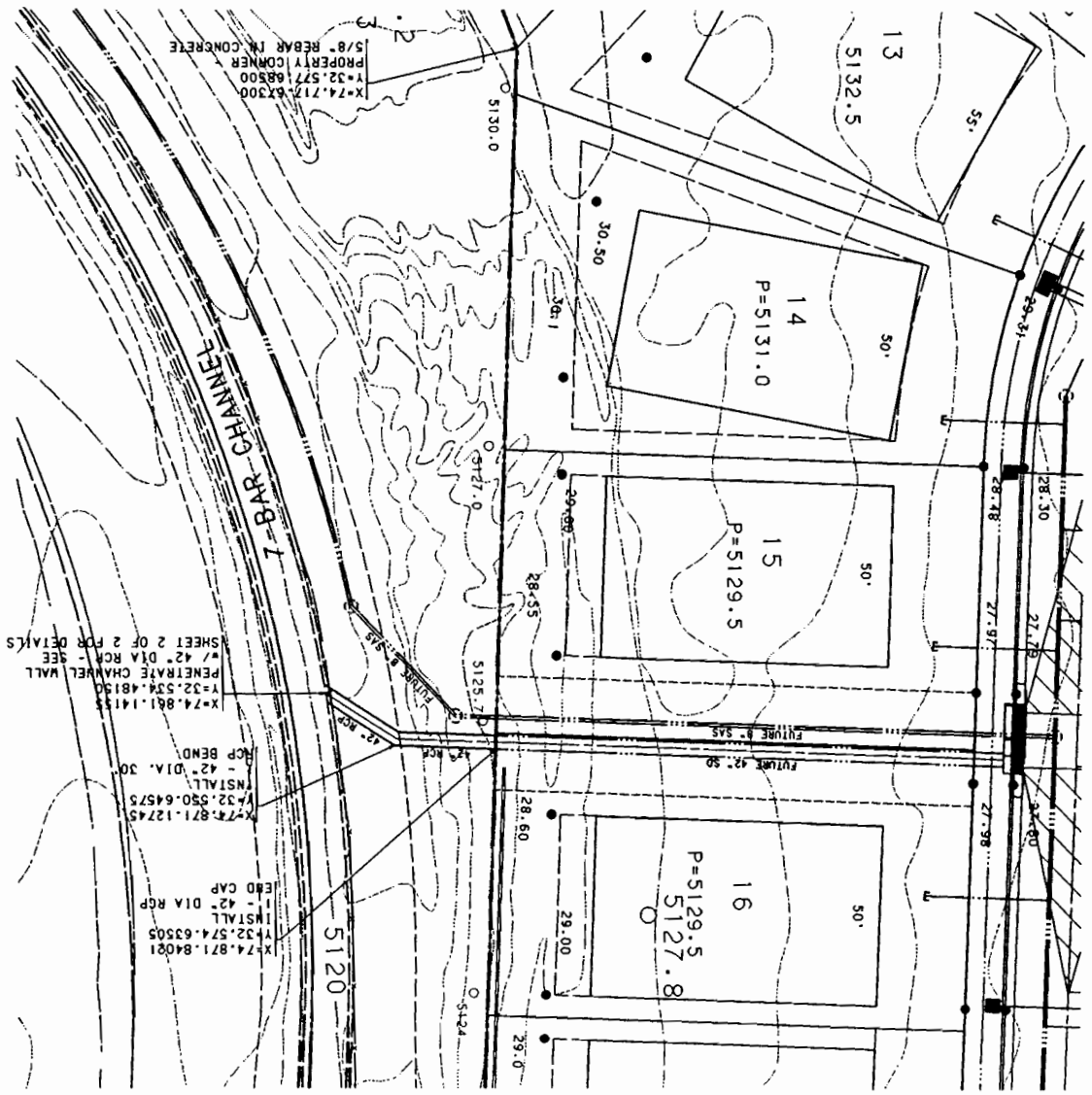
SCALE: 1" = 20' (HORIZ.)



TYPICAL STREET SECTION A-A
NO SCALE



SCALE: 1" = 20'

DATE: APRIL 1994

OUTLET 2A

$Q = 68.1$ CFS

WEIR IS @ STA 3+61.93, 57.65' LT

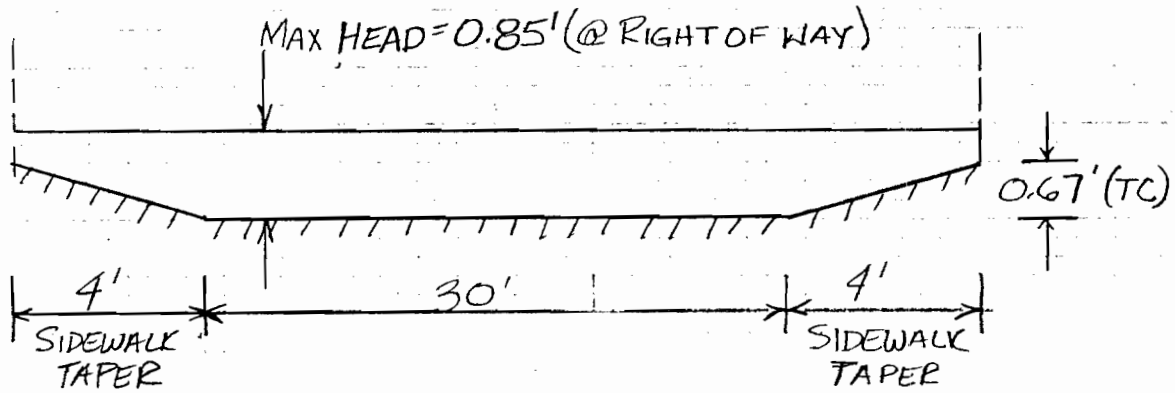
$\text{FL} = 44.17 - (57.65 - 13)\,0.02 = \underline{5143.28}$

7 BAR CHANNEL INVERT @ STA 15+73.24 (7.92' LT)

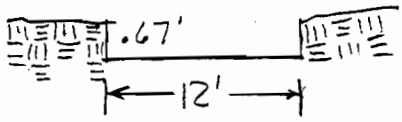
$= 5132.21$

TOP OF CHANNEL $= 5132.21 + 6 = 5138.21$

WEIR X-SECTION: DEPTH = 0.83' FOR Q = 68.1 CFS



CHANNEL X-SECTION:



BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

SUBJECT _____ CH'D _____ DATE _____

TREATMENT OF EXISTING FLOWS

THE UPSTREAM, UNDEVELOPED BASIN E-3 HAS THE FOLLOWING CHARACTERISTICS:

AREA = 56.6 ACRES
%A = 95
%B = 5
t_c = 0.20 HRS
I = 4.44 IN/HR
E = 0.452"

Q_{100} = 74.5 CFS

V_{100} = 2.13 AC-FT

① CONVEY FLOWS IN AN EARTHEN SWALE ADJACENT TO THE NORTHERN BOUNDARY OF TRACT B-2 AND SIERRITA RD.

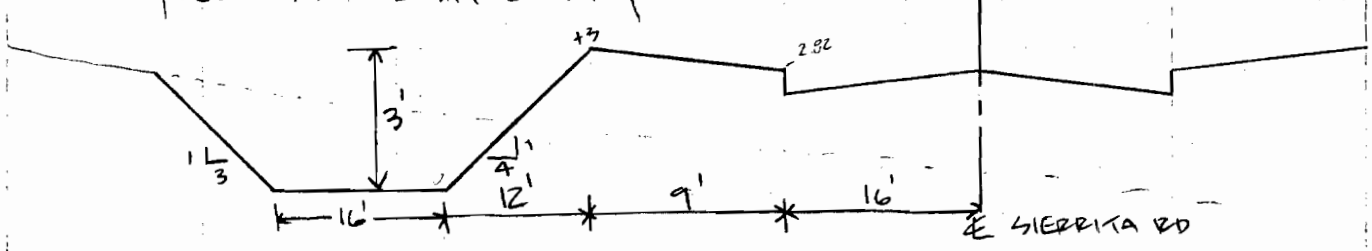
MANNINGS "n" = 0030

MAX. STREET SLOPE IN SIERRITA = MAX SWALE SLOPE = 6.163%

TO KEEP VELOCITY IN SWALE < 8 FPS, USE A BOTTOM WIDTH = 16' AND SIDE SLOPES @ 4:1 & 3:1 - SEE ATTACHED STREAM OUTPUTS FOR S = 6.163% & 3.70%

FOR S = 6.163% : VEL = 7.7 FPS, d = 0.55'
FOR S = 3.7% VEL = 6.6 FPS, d = 0.64'

PROVIDE A LINED HIEGHT OF 3', GIVING A FREEBOARD > 2' AT EVERY PLACE



BOHANNAN-HUSTON INC.

PROJECT NAME Seven Bar North SHEET 1 OF
PROJECT NO. 93217.43 BY DATE
SUBJECT Tracts B-1 & B-2 CH'D DATE

② Sediment Pond

Provide a sedimentation, detention pond at the corner of Seven Bar Loop Road and Sierrita Road to accept flows from the swale in ① and discharge into the storm drain in Sierrita Road

Flow into pond = 74.5 cfs
Volume = 2.13 ac-ft = 92,867 ft³

Assume flows enter an orifice controlled 18" outlet that enters into the SD manhole @ Sta. 10+32.91 (Sierrita Road)

2A - Pond Size Based on Settling Velocity (V_s)

Assume: - Design particle: very fine sand (D = 0.06mm)
- 100% removal of design particle for 10-year storms
- V_s = 0.009 fps for very fine sand

Surface Area = $SA = (1.2)(Q_{10})/V_s$

where Q_{10} = 10-year peak flow rate = 14.8 cfs

$SA = (1.2)(14.8)/(0.009) = 1,970$ sf

Assume pond length = 3x pond width = 3W

or $(3W)(W) = 1970$ sf

W = 26'
L = 77'

BOHANNAN-HUSTON INC.

PROJECT NAME Seven Bar North SHEET 2 OF
PROJECT NO. 93217.43 BY DATE
SUBJECT Tracts B-1 & B-2 CH'D DATE

ZB - POND SIZED BASED ON SEDIMENT STORAGE

- FROM USLE SPREADSHEET (ATTACHED), THE AVERAGE ANNUAL SEDIMENT YIELD FOR BASIN E-3 IS 286CY OR 7732CF

ASSUME: MAXIMUM SEDIMENT STORAGE DEPTH = 3'
MINIMUM SETTLING DEPTH = 2'

USING SA = 1,970SF FROM ABOVE WHERE THE VOLUME IS A FUNCTION OF THE DEPTH Z

BOTTOM AREA = $(77')(26') = 2002\ FT^2$

TOP AREA = $(2002 + 618Z + 36Z^2)\ FT^2$

$$\text{VOLUME} = \frac{(\text{BOTTOM AREA}) + (\text{TOP AREA})}{2} Z$$

$$\text{VOLUME} = 2002Z + 309Z^2 + 18Z^3$$

FOR SEDIMENT VOLUME = 7,732CF & SOLVING FOR Z:

$$Z = 2.63' < 3'$$

SEDIMENT STORAGE DEPTH = 2.63'

POND VOLUMETRICS

- ASSUMING THAT THE POND OUTFLOW IS ORIFICE CONTROLLED AND THE OUTFLOW PIPE $\phi = 18"$
- FROM SITE GEOMETRY: POND INVERT = 5148
  POND TOP = 5153
  POND DEPTH = 5'
  POND VOLUME = $19,985\ FT^3 = 0.459\ AC\text{-}FT$
  VOLUME IN = $92,783\ FT^3 = 2.13\ AC\text{-}FT$
  $Q_{IN} = 74.5\ CFS$

BOHANNAN-HUSTON INC.

PROJECT NAME Seven Bar North SHEET 3 OF
PROJECT NO. 93217.43 BY DATE
SUBJECT Tracts B-1 & B-2 CH'D DATE

POND VOLUMETRICS (CONT'D)

FOR A POND: $V_{POND} = \left(\frac{V_{TOTAL}}{Q_{IN}^2}\right) Q_{OUT}^2 - (DURATION)\, Q_{OUT} + V_{TOTAL}$

WHERE $DURATION = \frac{2V_{TOTAL}}{Q_{IN}} = \frac{2(92{,}783 FT^3)}{74.5 CFS} = 2491 SEC.$

SO $19{,}985 = \left(\frac{92{,}783}{(74.5)^2}\right) Q_{OUT}^2 - (2{,}491) Q_{OUT} + 92{,}783$

OR $16.72 Q_{OUT}^2 - 2{,}491 Q_{OUT} + 72{,}798 = 0$

OR $Q_{OUT} = 39.9$ CFS TO MAINTAIN POND VOLUMETRICS

ORIFICE CONTROL:

1) ASSUME OUTLET = 18"

IF $Q = 0.6A\sqrt{2gh}$

$h = \frac{Q^2}{(.72)A^2 g} = \frac{(39.9)^2}{(.72)(1.767)^2 32.2} = 22'$ HEAD

18"Ø PIPE INSUFFICIENT

2) ORIFICE REQUIRED FOR HEAD = 5' - SEDIMENT STORAGE DEPTH
= 5' - 2.63' = 2.37'

$A = \frac{Q}{.6\sqrt{2gh}} = \frac{39.9}{.6\sqrt{2(32.2)(2.37)}}$

$= 5.38 FT^2$

$= 31.4"Ø$

∴ USE A 36" CMP STANDPIPE WITH AN ORIFICE PLATE INSTALLED WITH A 31.4"Ø HOLE IN IT

CONNECTOR PIPE

- DISCHARGE INTO MANHOLE ON SIERRITA ROAD: (STA 10+32.91)

  MH #SD24A : INV = 5142.52

  ASSUME CMP PROJECTS 3' BELOW POND OR INV = 5145.00

  ℓ CONNECTOR = 97'

  ∴ SLOPE = 2.56%

  MIN ϕ = 25" < 36"

  - USE 36" RCP TO MINIMIZE TRANSITION

- AFTER CMP STAND PIPE, TRANSITION TO 36" RCP

BOHANNAN-HUSTON INC.

PROJECT NAME Seven Bar Ranch SHEET 5 OF

PROJECT NO. 9321743 BY DATE

SUBJECT Tracts B-1 & B-2 CH'D DATE

SEVEN BAR RANCH NORTH SEDIMENT YIELD ANALYSIS
UNIVERSAL SOIL LOSS EQUATION

DESCRIPTION	VARIABLE	UNIT		
BASIN			E-3	
Drainage Area	DA	Sq. Mi.	0.088	
Slope	S	Ft/Ft	0.050	
Slope Angle	THETA	Radians	0.050	
	L	Feet	1900.000	
Rainfall	R		25.000	
Soil Erodability*	K		0.240	
Slope Length Factor	LS		1.682	
Cover*	C		0.170	
Support Practice Factor	P		1.000	
Sediment Yield	A	Tons/Acre	1.716	
		Tons	96.649	
		Cy	71.591	
			Total Annual Sediment Yield	71.591 Cy
Estimated Soil Unit Weight	100.000	Lbs/Cf	Adjustment Factor	4.000

			Adjusted Sediment Yield	286.366 Cy
				7731.880 Cf

NOTE: The Universal Soil Loss Equation typically underestimates the actual sediment yield by 4 times so a factor of 4 is applied to the total annual sediment yield.

BHI JOB NO. 9321.44

DRAWING NO. XXXX

MAP NO. A-13

SHEET X OF X

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
DRC CHAIRMAN			WATER		
TRANSPORTATION			WASTE WATER		
HYDROLOGY					

SEVEN BAR RANCH NORTH

OUTFLOW STRUCTURE DETAILS

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY	PR. DF	DATE 5/94
DRAWN BY	TSG	DATE 5/94
CHECKED BY	JRT	DATE 5/94

ENGINEER'S SEAL SURVEY INFORMATION

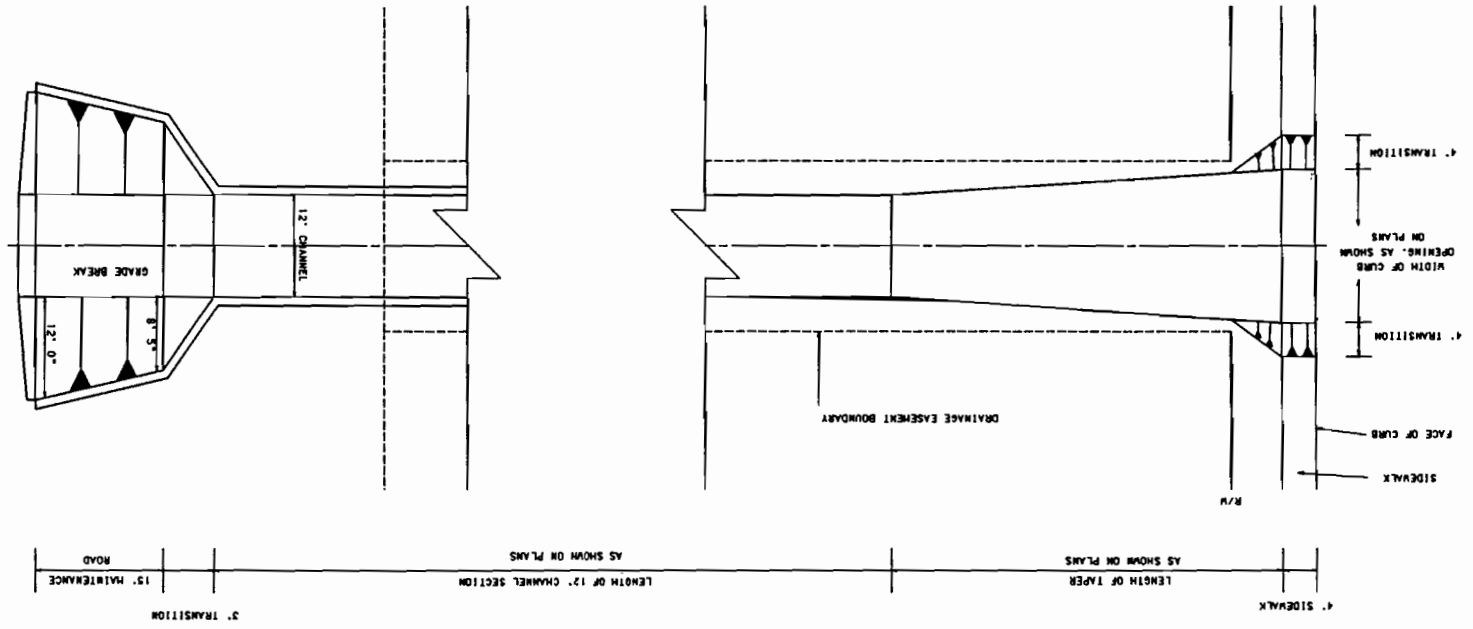
FIELD NOTES BY

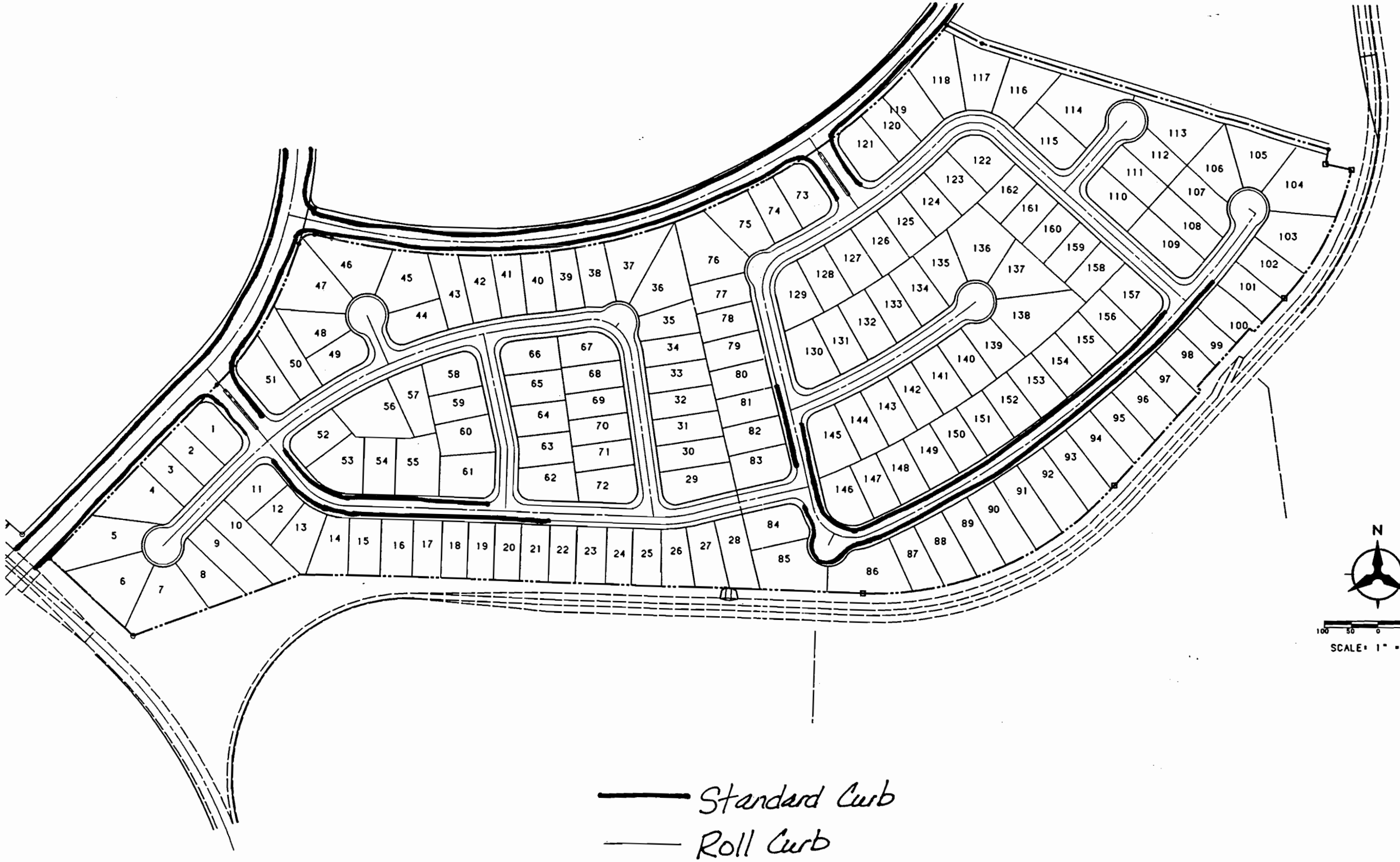
NO.	DATE	BENCH MARKS
		TBM NO.203
		CHISLED "X" LOCATED APPROXIMATELY 459 FEET SOUTH OF THE BLACK'S DIVERSION INLET STRUCTURE ON THE EAST WALL.
		ELEV. 5110.55

AS-BUILT INFORMATION

CONTRACTOR STAKED BY	
FIELD VERIFICATION BY	DATE
DRAWINGS CORRECTED BY	DATE
MICRO-FILM INFORMATION	
RECORDED BY	DATE
NO.	

OUTFLOW CHANNEL PLAN VIEW





SURVEY INFORMATION		
NO.	BY	FIELD NOTES DATE

BENCH MARKS	
TBM NO.205	
CHISLED "X" LOCATED APPROXIMATELY 459 FEET SOUTH OF THE BLACK'S DIVERSION INLET STRUCTURE ON THE EAST WALL.	
ELEV. 5110.55	

AS-BUILT INFORMATION	
CONTRACTOR	
WORK STAKED BY	
INSPECTOR'S FIELD CHANGES BY	DATE
FIELD VERIFICATION BY	DATE
DRAWINGS CORRECTED BY	DATE
MICRO-FILM INFORMATION	
RECORDED BY	DATE
NO.	

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY PR. DF DATE 5/94
DRAWN BY TSG. DF DATE 5/94

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

SEVEN BAR RANCH
CURB TYPE IDENTIFICATION MAP

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
DRC CHAIRMAN			WATER		
TRANSPORTATION			WASTE WATER		
HYDROLOGY					

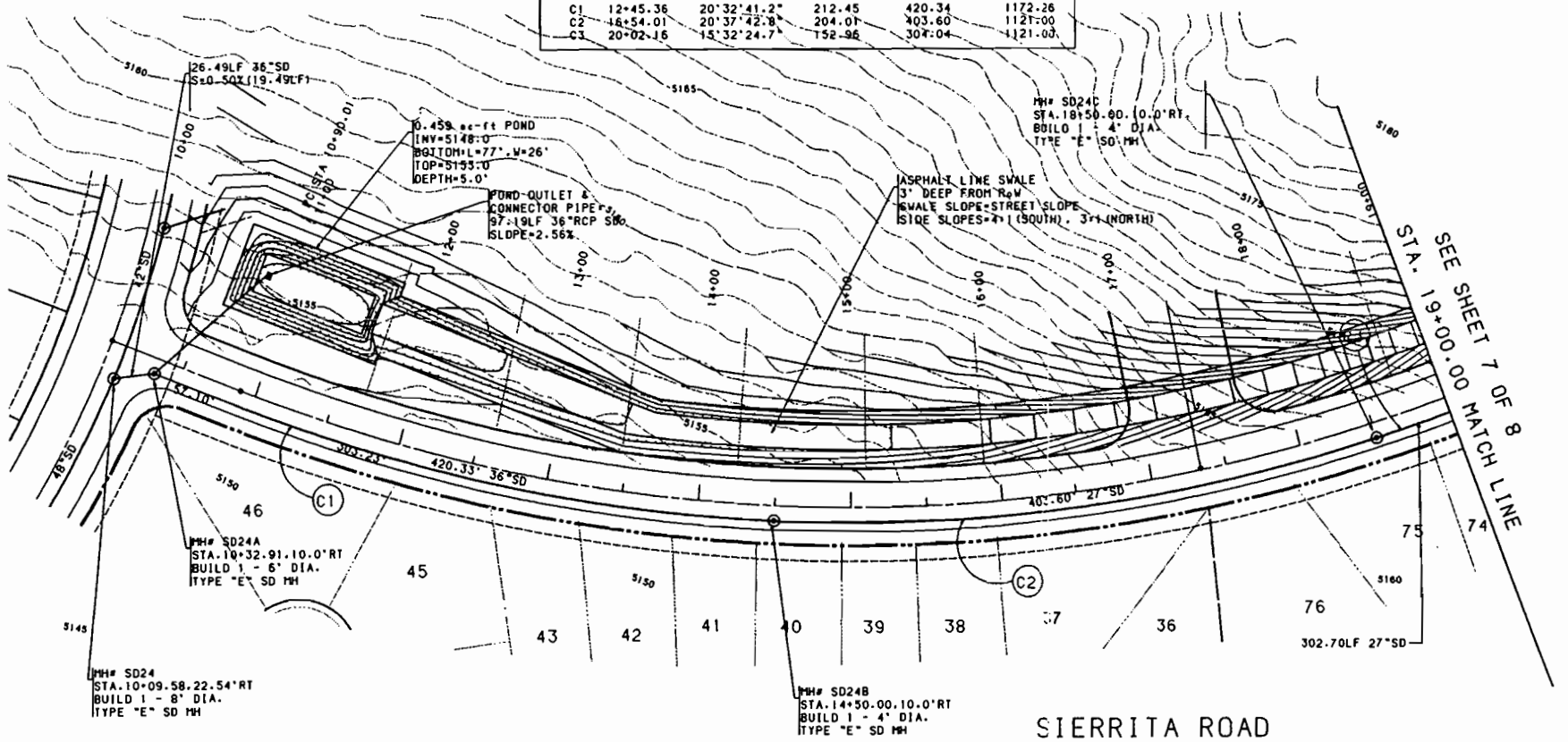
DRAWING NO. XXXX | MAP NO. A-13 | SHEET 1 OF 1

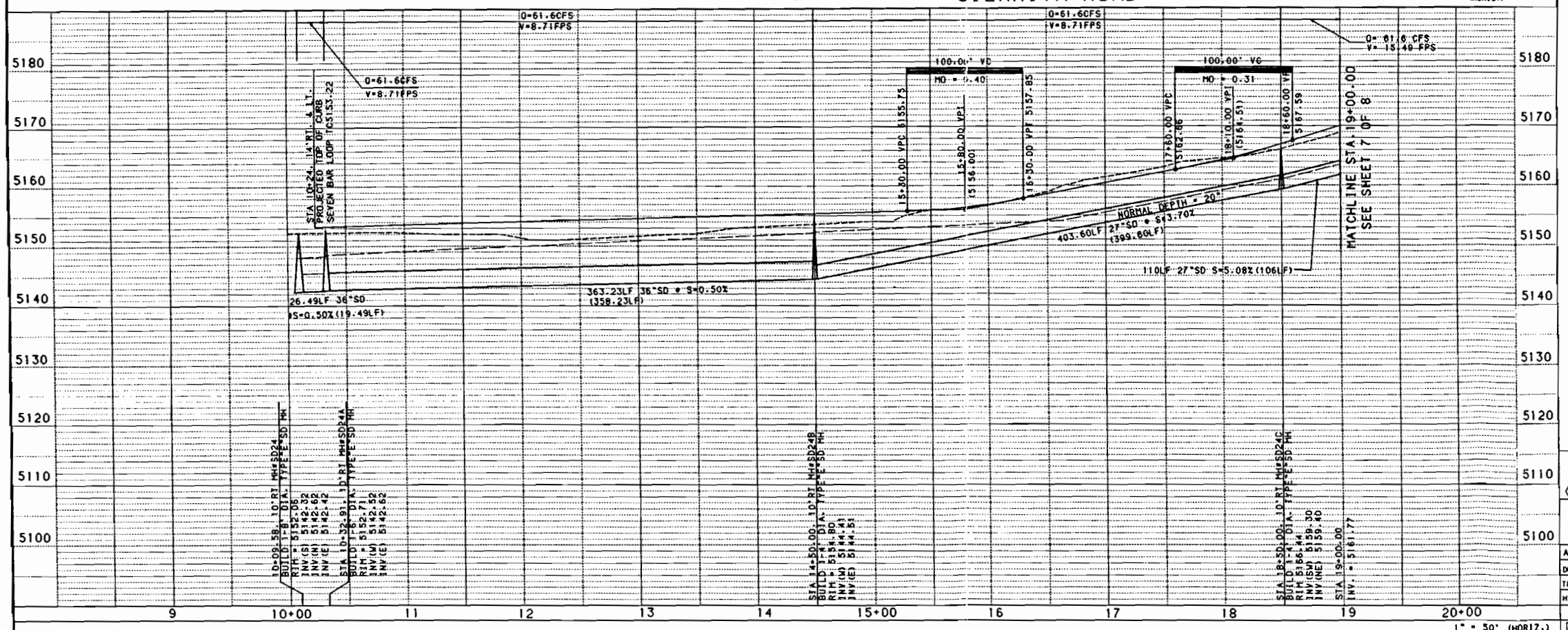
BHI JOB NO. 93217.44

DATE: MAY, 1994

1740.PADJCURB-TYPE.CRF

STORM DRAIN CURVE DATA					
NO	P.I. STA	DELTA	TANGENT	LENGTH	RADIUS
C1	12+45.36	20°32'41.2"	212.45	420.34	1172.26
C2	16+54.01	20°37'42.8"	204.01	403.60	1121.00
C3	20+02.16	15°32'24.7"	152.96	307.04	1121.00





CDP:[C9321740.PWP]POND.GRF

BHI JOB NO. 93217.48

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AS-BUILT INFORMATION

BENCH MARKS

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			TBM NO.205 CHISLED "X" LOCATED APPROXIMATELY 450 FEET SOUTH OF THE BLACK'S DIVERSION INLET STRUCTURE ON THE EAST WALL. ELEV. 5110.55

CONTRACTOR STAKED BY ____ DATE ____
INSPECTOR'S FIELD CHANGE BY ____ DATE ____
VERIFICATION BY ____ DATE ____
CORRECTED BY ____ DATE ____

MICRO-FILM INFORMATION
RECORDED BY ____ DATE ____
NO. ____

ENGINEER'S SEAL SURVEY INFORMATION

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY PR, DF DATE 4/94
DRAWN BY TSC/KCW DATE 4/94
CHECKED BY JRT DATE 4/94

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING

SEVEN BAR RANCH - TRACTS B-1 & B-2
STORM DRAIN PLAN & PROFILE
PRELIMINARY DETENTION POND DESIGN

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
DRC CHAIRMAN			WATER		
TRANSPORTATION			WASTE WATER		
HYDROLOGY					

DRAWING NO. 0000 | MAP NO. A-13 | SHEET 1 OF 1

DATE: APRIL 1994