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

July 12, 2004

Ms. Celia S. Tomlinson, PE
RHOMBUS P.A., INC.
2620-B San Mateo Bd. NE
Albuquerque, NM 87110

RE: OAKLAND MEADOWS SUBDIVISION (C-20/D043)
Engineers Certification for Release of Financial Guaranty
Engineers Stamp dated 04/02/2003
Engineers Certification dated 07/06/2004

Dear Celia:

Based upon the information provided in your Engineer's Certification Submittal dated 07/09/2004, the above referenced plan is adequate to satisfy the Grading and Drainage Certification for Release of Financial Guaranty.

If you have any questions, you can contact me at 924-3982

Sincerely,

Arlene V. Portillo

Arlene V. Portillo
Plan Checker, Planning Dept.- Hydrology
Development and Building Services
BUB

C: Marilyn Maldonado, COA# 710481
File

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

RHOMBUS
FACILITIES ENGINEERS ◊ ENVIRONMENTAL CONSULTANTS

VISIT US! WWW.RHOMBUSPA.COM

C-20/D43

R. Tourt

February 3, 2004

Mr. Tor Rasmussen
T R CONTRACTORS
12113 Elena Drive NE
Albuquerque, New Mexico 87122

SUBJECT: OAKLAND MEADOWS SUBDIVISION (L31&32, B2, T3, U3 NAA)
CITY PROJECT NO. 710481 STORM SEWER LINE IN BARSTOW

Dear Mr. Rasmussen:

The purpose of this letter is to give you the final word on the storm sewer line construction in Barstow. With a copy of this letter and Attachments A, B, and C, RHOMBUS is authorizing your Contractor to proceed with the construction of the removal and lowering of the storm drain line based on the attached drawings approved by the City on January 29, 2004. ***See Attachment A.*** The cost of the Change Order is SEVEN THOUSAND EIGHT-HUNDRED SEVENTY DOLLARS AND TWO CENTS **($7,870.02).** In the unlikely event that additional length is required, the unit price of the pipe removal and replacement is FORTY-FIVE DOLLARS AND FIFTY-ONE CENTS **($45.51).** The costs are based on J & H's proposal dated January 29, 2004. ***See Attachment B.***

It is understood that J & H Services will remove the manhole that was built on Station 12+30. At our progress meeting on 12/10/03, we established that the manhole was not built according to City Specifications as noted on the minutes of the meeting. ***See Attachment C.*** Paying the cost of the non-compliant manhole and its removal is the responsibility of J & H.

RHOMBUS has exhausted all efforts in trying to get the City to participate financially in the resolution of the shallow storm sewer problem. The City is steadfast in its position that the Developer must pay for all infrastructures associated with the development of a subdivision, citing the highlighted paragraph on the approved Infrastructures List. ***See Attachment D.*** Please note that the City did make design compromises to arrive at the less expensive solution.

FEB 0 : 2004
HYDROLOGY SECTION

@ NMIA.COM
[illegible] • SUITE B • ALBUQUERQUE, NM 87110 • TEL 505-881-6690 • FAX 505-881-6696 • E-Mail [illegible]

At this time, based on the basic contract ***(Attachment E)*** between RHOMBUS and you, RHOMBUS has delivered all the deliverables spelled out in the document, except the As-built Certification. We can only deliver the As-built Certification after your contractor has satisfactorily completed all the buildables shown on the approved plans and the aforementioned Change Order.

Sincerely,
RHOMBUS P.A., Inc.

Celia S. Tomlinson, PE
Principal

Cc (with all Attachments except "E"): Richard Dourte, PE, City Engineer; James Pung, PE, City Const. Engr;
(with Attachments A, B, C): Jim Mitchell, J&H Services

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RHOMBUS

FACILITIES ENGINEERS ◊ ENVIRONMENTAL CONSULTANTS

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January 28, 2004

Design Review Committee (DRC)
CITY OF ALBUQUERQUE
600 2ND Street NW
Albuquerque, New Mexico 87102

SUBJECT: OAKLAND MEADOWS SUBDIVISION (L31&32, B2, T3, U3 NAA)
CITY PROJECT NO. 710481 STORM SEWER LINE MODIFICATION

Ladies/Gentlemen:

Pursuant to RHOMBUS' discussions with City Engineer Richard Dourte, PE, concerning the proposed pavement over the shallow storm sewer line in Barstow, we have attached, for your review and approval, a print of the profile of the proposed vertical re-alignment of the existing 24" RCP Class III pipe.

As discussed, the shortened pipe removal/lowering scope will be possible by using a pavement half-crown (1% instead of the standard 2% full crown) on the east half of Barstow and by using an 8" thick concrete collar in lieu of a manhole at the start of the pipe lowering, per detail B.

Your immediate attention to this matter will be appreciated.

RECEIVED
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Sincerely,
RHOMBUS P.A., Inc.

Celia S. Tomlinson

Celia S. Tomlinson, PE
Principal
1/28/04

REGISTERED PROFESSIONAL ENGINEER
STATE OF NEW MEXICO
NO. 4895
CELIA S. TOMLINSON

Approved:

1/29/04
Jane Rael, PE, DRC Chairperson Date

Brad L. Bjork 1/28/04
Hydrology Date

Cc: Tor Rasmussen, Owner
Jim Mitchell, J & H
f/ Rita Guetschow

ATTACHMENT - DWGS 3 SHTS

ATTACHMENT "A"

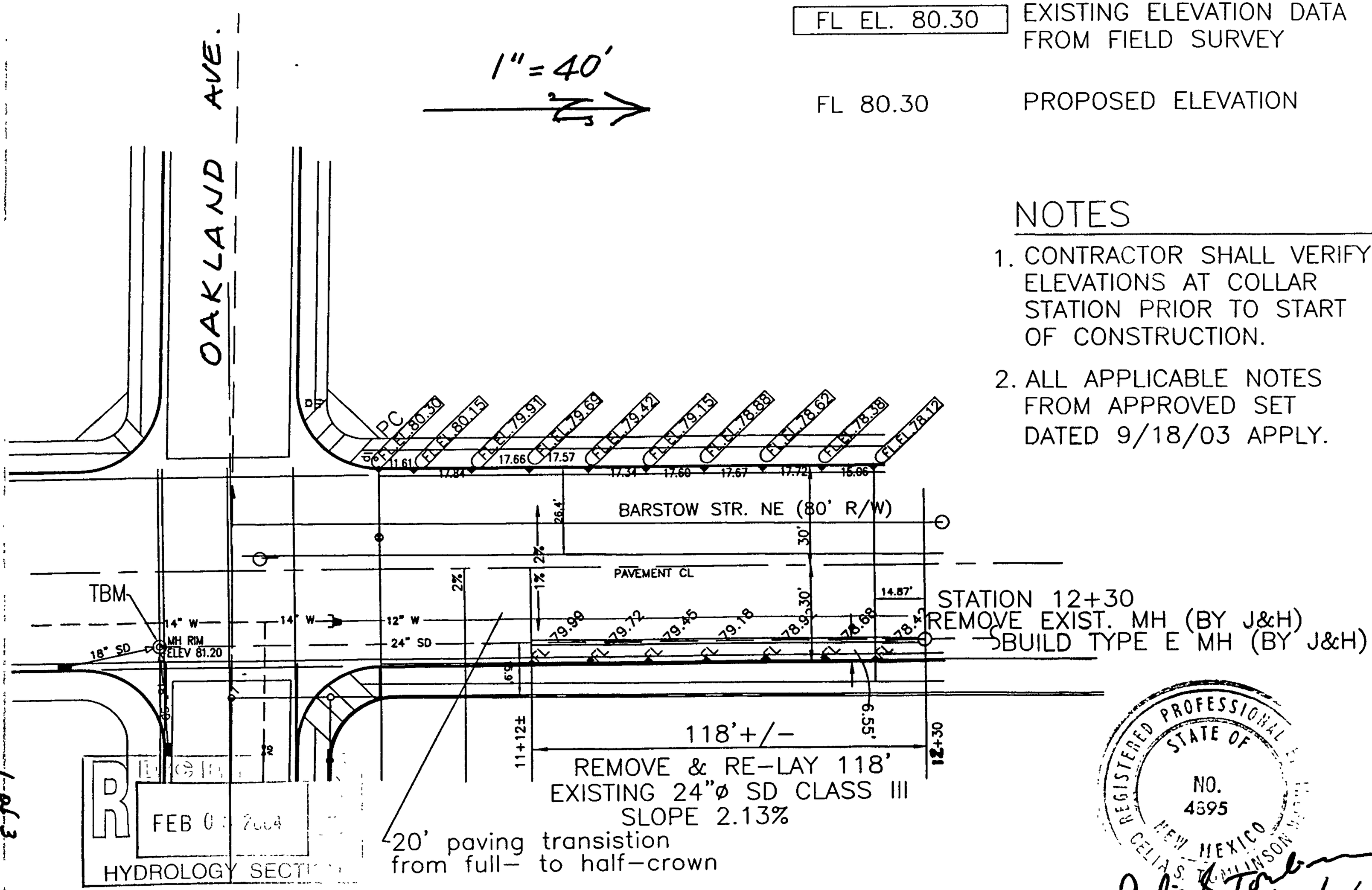
2620 SAN MATEO NE • SUITE B • ALBUQUERQUE, NM 87110 • TEL 505-881-6690 • FAX 505-881-6896 • E-Mail RHOMBUS~~PA@AOL.COM~~ @NMIA.COM

LEGEND

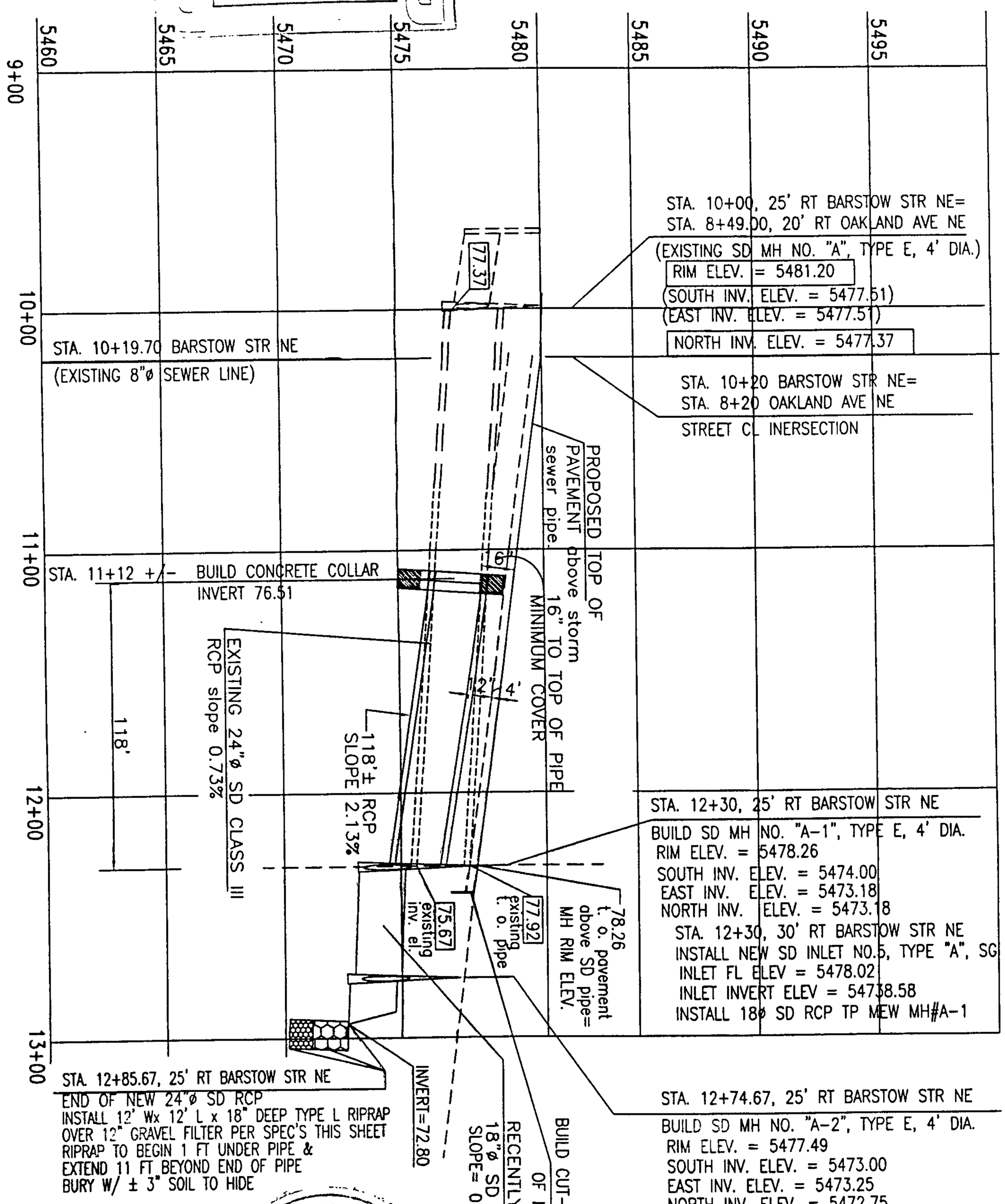
FL EL. 80.30	EXISTING ELEVATION DATA FROM FIELD SURVEY
FL 80.30	PROPOSED ELEVATION

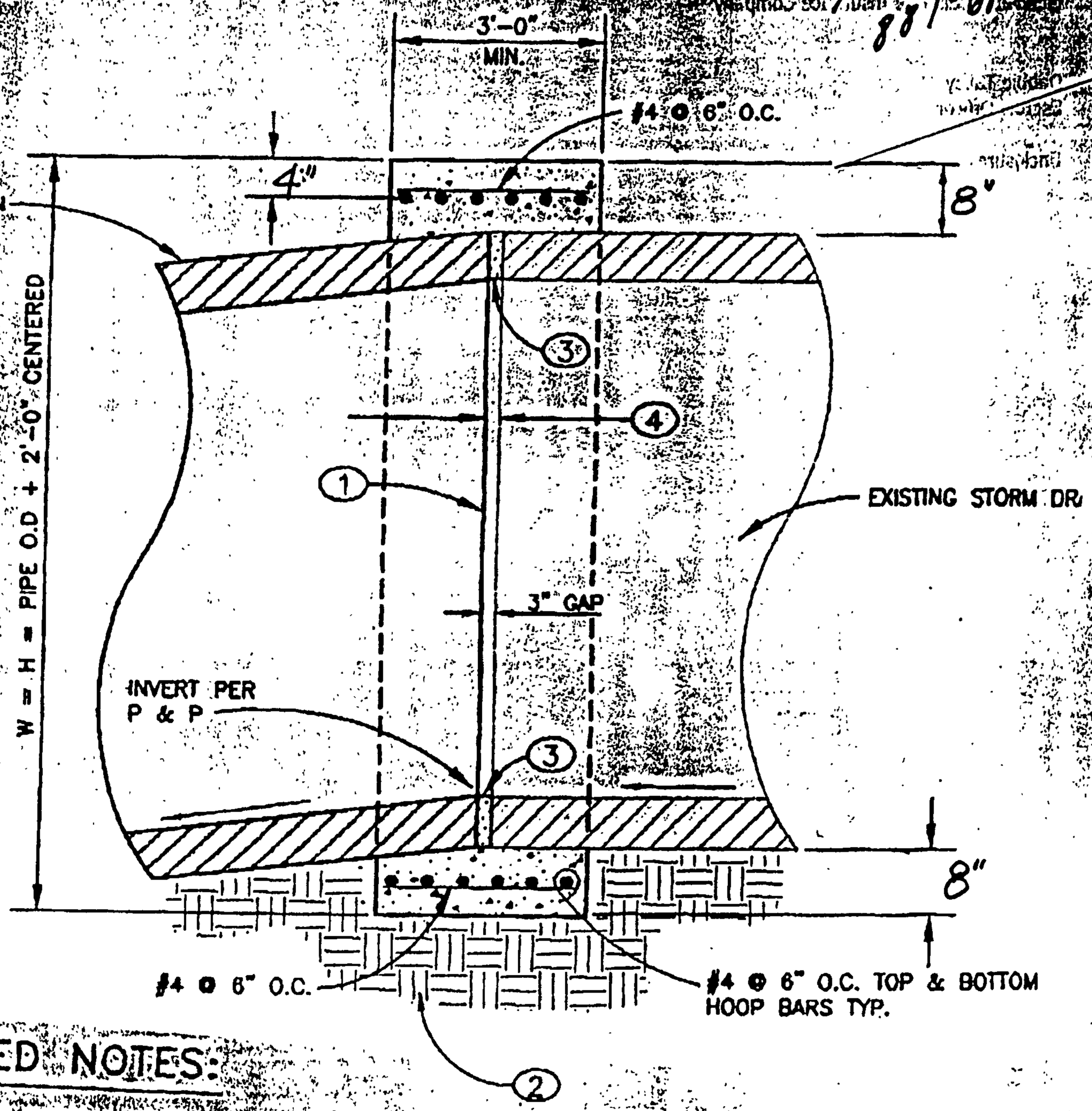
NOTES

1. CONTRACTOR SHALL VERIFY ELEVATIONS AT COLLAR STATION PRIOR TO START OF CONSTRUCTION.
2. ALL APPLICABLE NOTES FROM APPROVED SET DATED 9/18/03 APPLY.



1 of 3


5460
5465
5470
5475
5480
5485
5490
5495
9+00
10+00
11+00
12+00
13+00
STA. 10+00, 25' RT BARSTOW STR NE=
STA. 8+49.00, 20' RT OAKLAND AVE NE
(EXISTING SD MH NO. "A", TYPE E, 4' DIA.)
RIM ELEV. = 5481.20
(SOUTH INV. ELEV. = 5477.51)
(EAST INV. ELEV. = 5477.51)
NORTH INV. ELEV. = 5477.37
77.37
STA. 10+19.70 BARSTOW STR NE
(EXISTING 8"ø SEWER LINE)
STA. 10+20 BARSTOW STR NE=
STA. 8+20 OAKLAND AVE NE
STREET CL INERSECTION
PROPOSED TOP OF PAVEMENT above storm sewer pipe.
16" TO TOP OF PIPE MINIMUM COVER
6
2"
4'
STA. 11+12 +/- BUILD CONCRETE COLLAR
INVERT 76.51
EXISTING 24"ø SD CLASS III RCP slope 0.73%
118'
118'± RCP SLOPE 2.13%
STA. 12+30, 25' RT BARSTOW STR NE
BUILD SD MH NO. "A-1", TYPE E, 4' DIA.
RIM ELEV. = 5478.26
SOUTH INV. ELEV. = 5474.00
EAST INV. ELEV. = 5473.18
NORTH INV. ELEV. = 5473.18
STA. 12+30, 30' RT BARSTOW STR NE
INSTALL NEW SD INLET NO.5, TYPE "A", SG
INLET FL ELEV = 5478.02
INLET INVERT ELEV = 54738.58
INSTALL 18ø SD RCP TP MEW MH#A-1
78.26 t. o. pavement above SD pipe= MH RIM ELEV.
77.92 existing t. o. pipe
75.67 existing inv. el.
STA. 12+85.67, 25' RT BARSTOW STR NE
END OF NEW 24"ø SD RCP
INSTALL 12' Wx 12' L x 18" DEEP TYPE L RIPRAP
OVER 12" GRAVEL FILTER PER SPEC'S THIS SHEET
RIPRAP TO BEGIN 1 FT UNDER PIPE &
EXTEND 11 FT BEYOND END OF PIPE
BURY W/ ± 3" SOIL TO HIDE
INVERT=72.80
18"ø SD RCP SLOPE= 0.4%
RECENTLY INSTALLED
BUILD CUT-OFF WALL @ END OF NEW PAVEMENT
STA. 12+74.67, 25' RT BARSTOW STR NE
BUILD SD MH NO. "A-2", TYPE E, 4' DIA.
RIM ELEV. = 5477.49
SOUTH INV. ELEV. = 5473.00
EAST INV. ELEV. = 5473.25
NORTH INV. ELEV. = 5472.75
1" = 60'
1" = 6'V



KEYED NOTES:

1. SAWCUT EXISTING RCP AT SPECIFIED STATION TO CONSTRUCT COLLAR.
2. 24" SUBGRADE COMPACTED TO 95% ASTM D-1557.
3. AFTER CONSTRUCTION OF COLLAR, FILL 3" GAP WITH 6000 PSI EPOXY GROUT. FINISH SMOOTH TO MATCH INTERIOR FINISH OF PIPE.

GAP NOT TO EXCEED 3".

CONCRETE PIPE SUPPORTS SHALL EXTEND OUTSIDE OF WALL AND SHALL CRADLE PIPE TO SPRING LINE. SIMILAR TO C.O.A. STD. DWG. 2101.

BACKFILL PER C.O.A. STD. SPECS.

RPCC COLLAR DETAIL

NTS

B / 33

11, 19

RECEIVED
FEB 03 2004
HYDROLOGY SECTION

La Cueva Arroyo Analyses
for
New Subdivision at Northeast Corner of Oakland & Barstow NE
Albuquerque, Bernalillo County, New Mexico

Prepared for Rhombus PA
by Per Se Engineering,
Tucker Green, PE

CONTENTS:

Short narrative
Site FEMA map
Figures from North Albuquerque Acres
    Master Drainage Plan
La Cueva Arroyo plots- analysis setup (3)
La Cueva Arroyo plot - analysis results
HEC-RAS analysis:
    Input file
    List of warnings
    Summary tables (4)
    Perspective view, entire channel
    Cross-section plots (21)
Erosion Setback calculations
Local scour calculations

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APR 03 2003
HYDROLOGY SECTION

TUCKER H. GREEN
10731
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER

12-30-02

La Cueva Arroyo Analyses for
New Subdivision at Northeast Corner of Oakland & Barstow NE

This report addresses flows in La Cueva arroyo, which abuts the north side of the project site. Separately, Rhombus PA will address details of drainage relating to onsite activities and conditions. The major work was creating a data set as input to the HEC RAS computer program. The output from the program includes numeric values for water surface elevation, energy grade, velocity, Froude number (and much more) at each cross-section, plus graphical representation of the cross-sections and a perspective view of the entire channel. HEC-RAS stands for [U.S. Army Corps of Engineers] Hydraulic Engineering Center River Analysis System.

For most purposes, the analysis could have stopped just upstream (east) of the site. Per Se chose to extend the analysis quite a bit eastward for several reasons. One was for comparison with the analysis for another recent subdivision slightly upstream (City of Albuquerque drainage file C20/D35). There was also reason to question whether upstream conditions would "allow" flow to be split and apportioned within the arroyo the way that downstream, near-the-site conditions indicated. Also, it seems to take a while for HEC RAS to "settle down" at the start of a run, which for this case began at the upstream end of the reach. [The steep (>2%) channel bed slopes ensured that the design flow was supercritical (Froude No. >1). Flatter slopes might have meant subcritical flow, for which the analysis would have proceeded from downstream to upstream. The cross-sections were spaced farther apart at the upstream end, reducing the additional work required.

The design flow used was 3094 cfs for future conditions, taken the North Albuquerque Acres Master Drainage Plan, Figure 5E, Storm Drain Facilities C-19. This is a little less than 10% higher than the 2850 cfs used recently nearby.

Currently the La Cueva enters a hard-lined (concrete) channel just downstream from the site. The Master Drainage Plan envisages extending the channel eastward at some indefinite time in the future. No account was taken of the future channel in this analysis. There is some reason to suspect that such a future channel might be roughly 7 ft deep with 2H:1V sideslopes, a 10 ft bottom width, and a bed slope on the order of 3%. But maybe not.

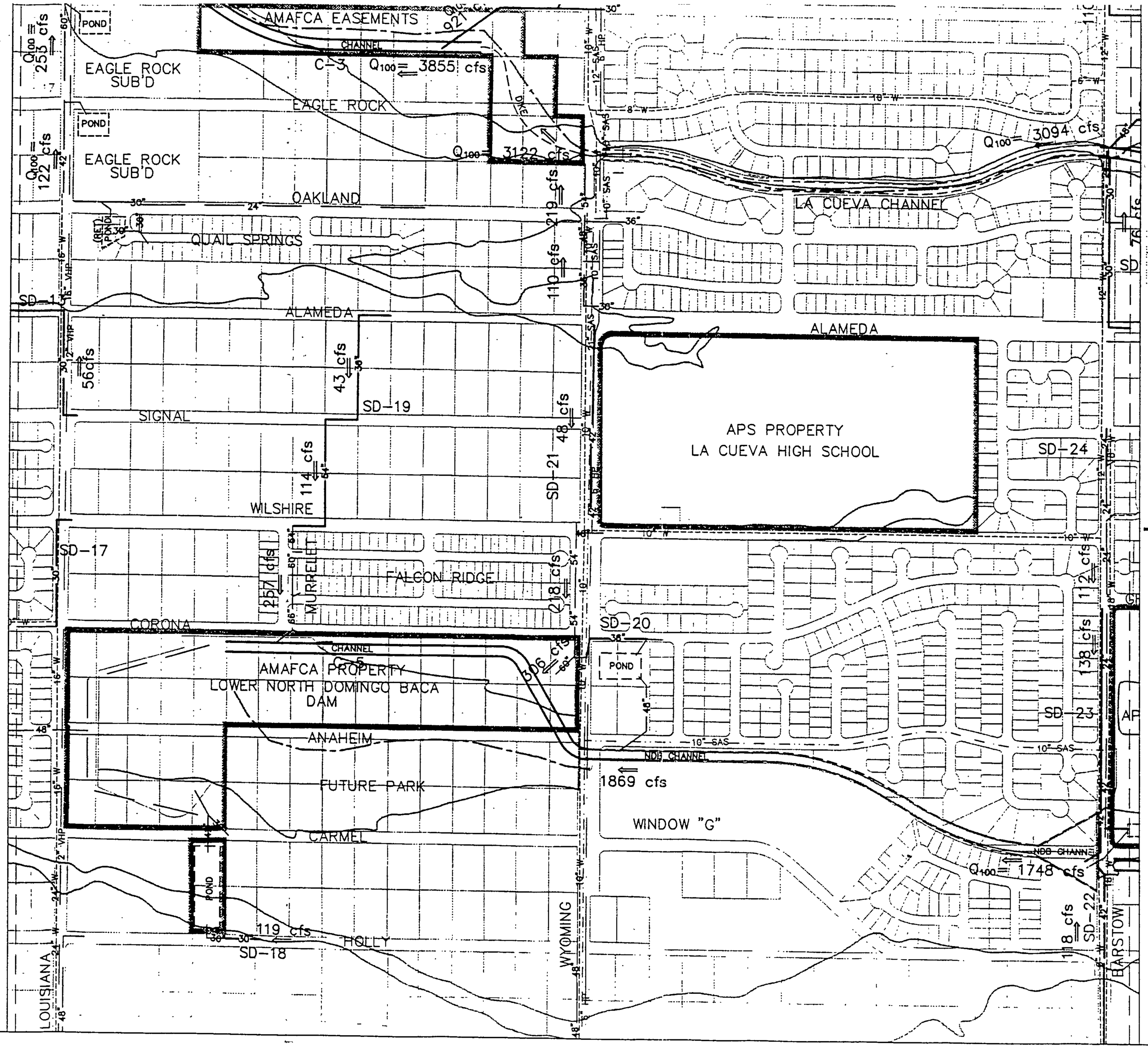
Cross-sections for input to HEC RAS were prepared from digital data supplied by AMAFCA, including ortho-rectified photography, photography with contours, and digital contours separately. Per Se overlaid the digital contours on the photograph and then used parts of the contour set to generate local digital DTM's, which then were used to generate cross-sections. [The basic DTM supplied by AMAFCA was to large to deal with readily. Maybe there is a way to break the big chunk into smaller usable chunks, that I'll find later.] Per Se checked the resulting cross-sections against the supplied contour lines, editing as necessary and simplifying as appropriate. The section cuts on the "analysis setup" plots show the locations of the points used for the various cross-sections. In some cases "obstructions" were added to the cross-section to keep the flow within the confines of the arroyo - see cross-section plots.

Roughness values were basically as prescribed in the Albuquerque DPM (Development Process Manual): n = 0.030 for arroyo beds, and 0.045 for arroyo overbank areas. The judgment comes in estimating where the changes are. Per Se used the aerial photography and engineering judgment. "Bank" stations for the cross-sections were revised after the first set of analysis was run.

END OF REPORT

TUCKER H. GREEN
10731
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER

12-30-02



N

500 0 250 500

(IN FEET)

LEGEND

- MUNICIPAL LIMITS
- EXISTING PLATTING
- EXISTING ARROYO FLOW PATH
- 10" W — EXISTING WATER LINE
- 10" SAS — EXISTING SANITARY SEWER
- 12" VHP — EXISTING GAS LINE
- 78" — EXISTING STORM DRAIN
- 54" — PROPOSED STORM DRAIN
- CHANNEL — PROPOSED CHANNEL
- PROPOSED STRUCTURE OR ROAD
- PROPOSED DIKE
- #5 AV-5 — POTENTIAL AVULSION

NOTE:
All flow rates shown are future condition 100-year.

NORTH ALBUQUERQUE ACRES
MASTER DRAINAGE PLAN

STORM DRAIN FACILITIES C-19

FIGURE 5E

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

CITY OF Albuquerque

Resource Technology, Inc.
Civil Engineering
Environmental Sciences
Water Resources
Landscape Architecture
Planning
1720 - B Randolph Road SE
Albuquerque, New Mexico 87106
E-mail: rti@nvma.com
Telephone: (505) 243-7300
Facsimile (505) 243-7400

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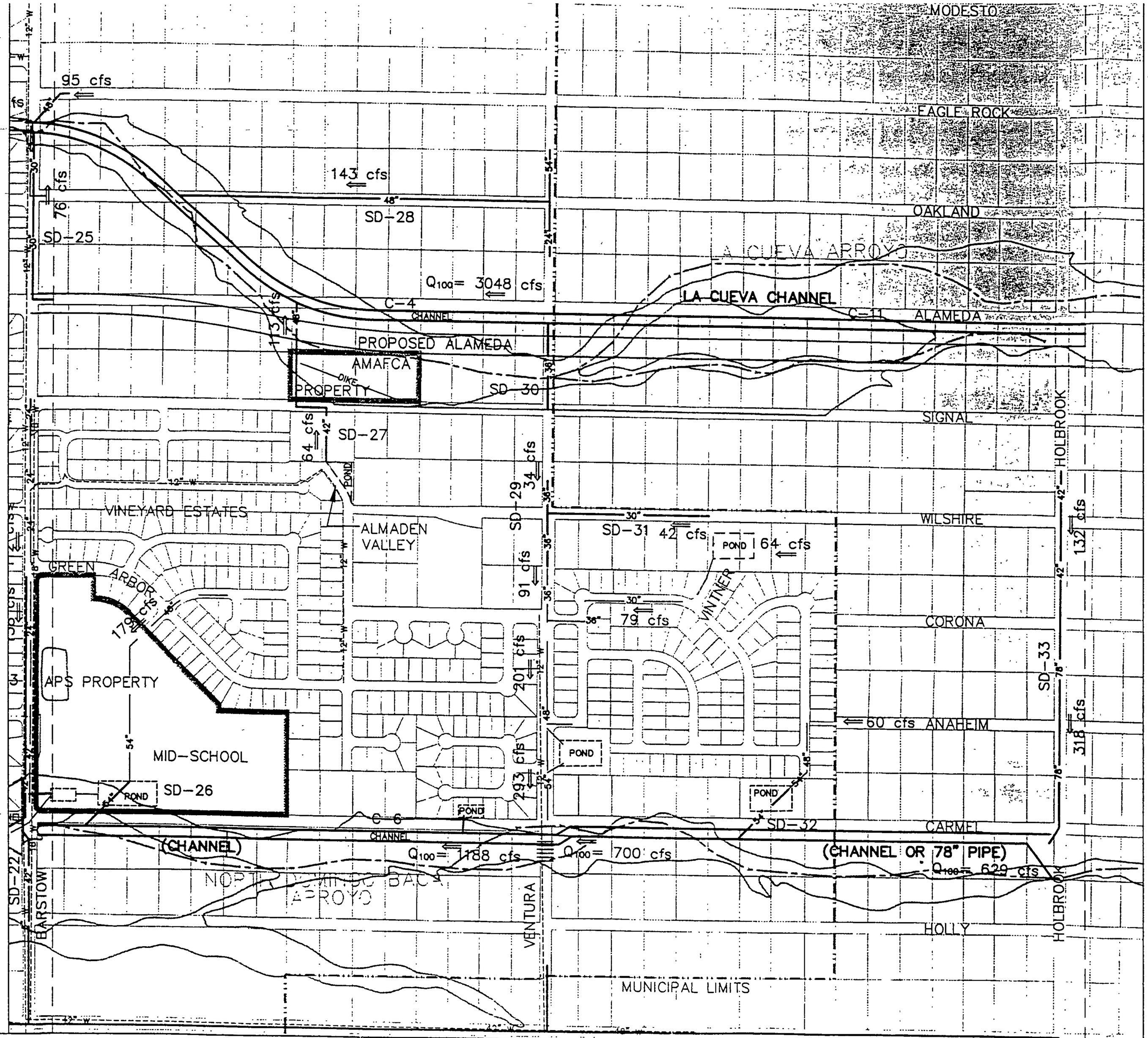

LEGEND

- MUNICIPAL LIMITS
- EXISTING PLATTING
- EXISTING ARROYO FLOW PATH
- 10" W — EXISTING WATER LINE
- 10" SAS — EXISTING SANITARY SEWER
- 12" VHP — EXISTING GAS LINE
- 78" — EXISTING STORM DRAIN
- 54" — PROPOSED STORM DRAIN
- CHANNEL — PROPOSED CHANNEL
- PROPOSED STRUCTURE OR ROAD
- PROPOSED DIKE
- #5 AV-5 — POTENTIAL AVULSION

NOTE:
All flow rates shown are future condition 100-year.

NORTH ALBUQUERQUE ACRES
MASTER DRAINAGE PLAN

STORM DRAIN FACILITIES
C-20

FIGURE 5F

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

City of Albuquerque

Resource Technology, Inc.
Civil Engineering
Environmental Sciences
Water Resources
Landscape Architecture
Planning
1720 – B Randolph Road SE
Albuquerque, New Mexico 87106
E-mail: rti@nmia.com
Telephone (505) 243-7300
Facsimile: (505) 243-7400

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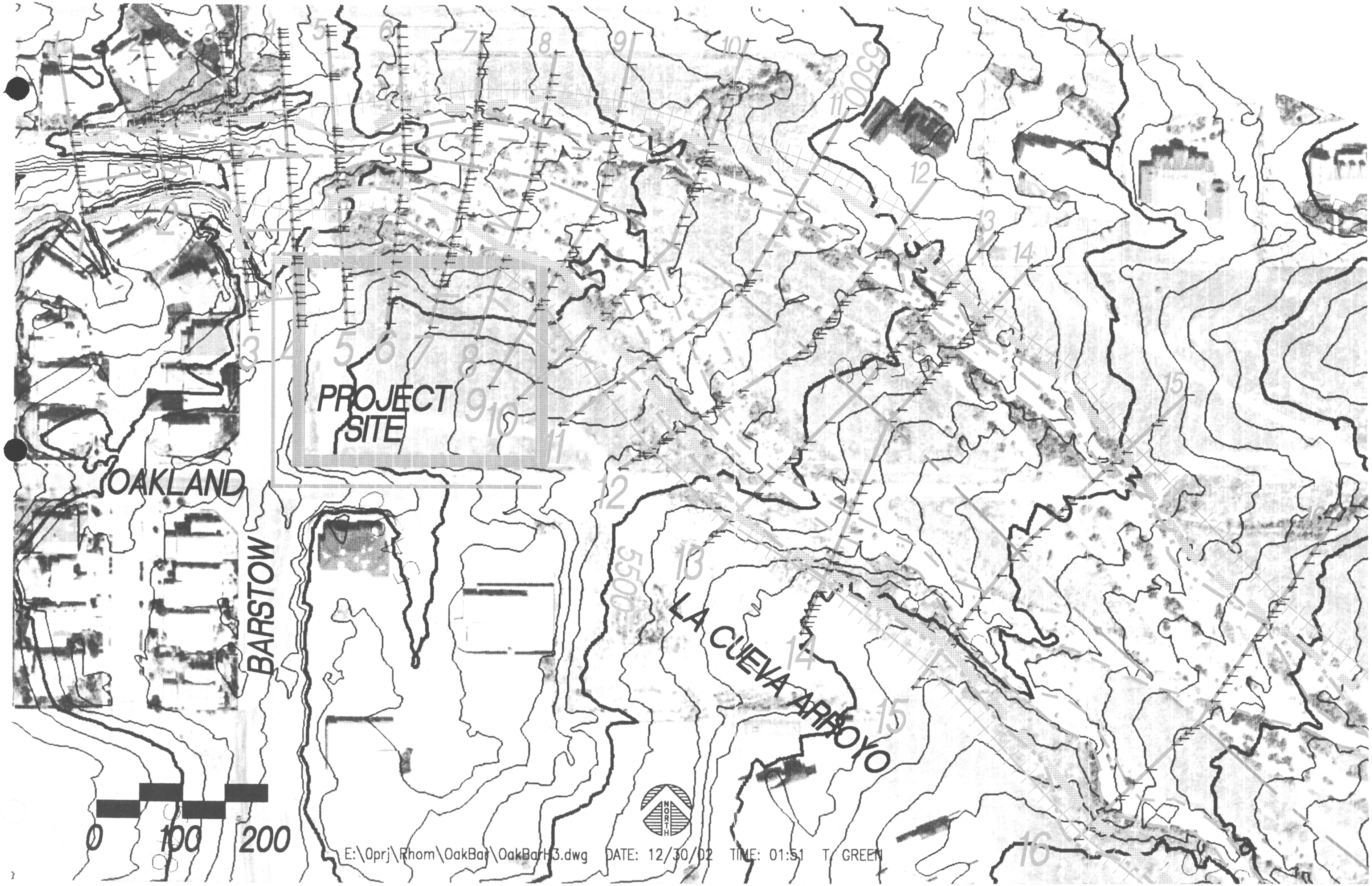

PROJECT SITE
OAKLAND
BARSTOW
LA CUEVA ARROYO
0 100 200
NORTH
E:\Oprj\Rhom\OakBar\OakBarH3.dwg DATE: 12/30/02 TIME: 01:51 T. GREEN

E:\0prj\Rhom\OakBar\OakBarH3.dwg DATE: 12/30/02 TIME: 01:51 T. GREEN

HEC-RAS Plan: OBb RevBanks River: LACUEVA Reach: OaklandToVentura Profile: PF1 3094 SUPER

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
OaklandToVentura	21	3094.00	5565.80	5568.20	5568.51	5569.42	0.030023	8.84	350.01	282.90	1.40
OaklandToVentura	20	3094.00	5550.80	5554.54	5555.58	5557.16	0.028261	13.01	239.67	118.52	1.56
OaklandToVentura	19	3094.00	5540.50	5544.40	5544.93	5545.85	0.028387	9.66	321.27	231.72	1.43
OaklandToVentura	18	3094.00	5532.14	5536.19	5536.41	5537.12	0.026816	7.77	398.26	413.16	1.39
OaklandToVentura	17	3094.00	5523.00	5526.95	5527.17	5527.95	0.038065	8.10	388.32	296.33	1.21
OaklandToVentura	16	3094.00	5513.80	5517.37	5518.04	5519.31	0.022705	11.19	276.50	194.64	1.65
OaklandToVentura	15	3094.00	5506.80	5510.05	5510.66	5512.02	0.027221	11.27	274.66	222.39	1.78
OaklandToVentura	14	3094.00	5501.64	5503.83	5504.01	5504.71	0.037335	7.64	414.83	371.06	1.25
OaklandToVentura	13	3094.00	5498.74	5501.29	5501.66	5502.53	0.048247	8.94	346.02	353.66	1.59
OaklandToVentura	12	3094.00	5495.50	5498.52	5498.75	5499.46	0.029520	7.91	411.78	396.72	1.30
OaklandToVentura	11	3094.00	5493.20	5495.45	5495.69	5496.44	0.030349	8.34	401.90	357.23	1.32
OaklandToVentura	10	3094.00	5490.17	5492.64	5492.85	5493.59	0.023439	8.27	418.70	352.53	1.24
OaklandToVentura	9	3094.00	5487.50	5489.61	5490.03	5491.03	0.029668	9.98	335.79	238.38	1.43
OaklandToVentura	8	3094.00	5483.90	5487.34	5487.72	5488.86	0.022525	10.06	323.55	192.57	1.32
OaklandToVentura	7	3094.00	5481.80	5484.49	5485.16	5486.67	0.035299	12.09	273.97	193.25	1.58
OaklandToVentura	6	3094.00	5478.30	5482.50	5483.20	5484.70	0.017631	12.07	275.37	175.73	1.31
OaklandToVentura	5	3094.00	5475.40	5479.57	5480.47	5482.53	0.033890	15.16	257.15	167.37	1.70
OaklandToVentura	4	3094.00	5472.96	5476.08	5477.32	5480.19	0.045513	16.29	189.99	99.05	2.07
OaklandToVentura	3	3094.00	5470.40	5473.49	5474.87	5478.13	0.020941	17.30	178.88	87.31	2.13
OaklandToVentura	2	3094.00	5464.91	5470.89	5472.75	5476.69	0.012059	19.32	160.16	41.75	1.74
OaklandToVentura	1	3094.00	5463.80	5467.64	5469.59	5475.20	0.014011	22.08	140.16	66.12	2.67

STANDARD TABLE 1

HEC-RAS Plan: OBb RevBanks River: LACUEVA Reach: OaklandToVentura Profile: PF1 3094 SUPER

Reach	River Sta	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
		(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
OaklandToVentura	21	5569.42	5568.20	1.21				3094.00		282.90
OaklandToVentura	20	5557.16	5554.54	2.62	12.12	0.14		3089.05	4.95	118.52
OaklandToVentura	19	5545.85	5544.40	1.45	10.96	0.35		3091.33	2.67	231.72
OaklandToVentura	18	5537.12	5536.19	0.94	8.58	0.15		3094.00		413.16
OaklandToVentura	17	5527.95	5526.95	1.01	9.16	0.01		3045.02	48.98	296.33
OaklandToVentura	16	5519.31	5517.37	1.94	8.55	0.09		3094.00		194.64
OaklandToVentura	15	5512.02	5510.05	1.97	7.29	0.00		3093.99	0.01	222.39
OaklandToVentura	14	5504.71	5503.83	0.88	6.98	0.33		2945.47	148.53	371.06
OaklandToVentura	13	5502.53	5501.29	1.24	2.15	0.04		3094.00		353.66
OaklandToVentura	12	5499.46	5498.52	0.94	2.98	0.09	142.09	2951.91		396.72
OaklandToVentura	11	5496.44	5495.45	0.99	3.01	0.01	382.71	2711.29		357.23
OaklandToVentura	10	5493.59	5492.64	0.96	2.85	0.01	379.96	2650.95	63.09	352.53
OaklandToVentura	9	5491.03	5489.61	1.42	2.51	0.05	379.06	2714.94		238.38
OaklandToVentura	8	5488.86	5487.34	1.51	2.17	0.01	149.88	2944.12		192.57
OaklandToVentura	7	5486.67	5484.49	2.18	2.13	0.07	156.77	2937.23		193.25
OaklandToVentura	6	5484.70	5482.50	2.20	1.96	0.00	84.24	2999.24	10.52	175.73
OaklandToVentura	5	5482.53	5479.57	2.97	2.08	0.08	24.73	2425.08	644.19	167.37
OaklandToVentura	4	5480.19	5476.08	4.12	2.22	0.12		3094.00		99.05
OaklandToVentura	3	5478.13	5473.49	4.65	2.01	0.05		3094.00		87.31
OaklandToVentura	2	5476.69	5470.89	5.79	1.33	0.11		3094.00		41.75
OaklandToVentura	1	5475.20	5467.64	7.57	1.30	0.18		3094.00		66.12

STANDARD TABLE 2

HEC-RAS Plan: OBb RevBanks River: LACUEVA Reach: OaklandToVentura Profile: PF1 3094 SUPER

Reach	River Sta	Max Chl Dpth	Crit W.S.	W.S. Elev	Sta W.S. Lft	Sta W.S. Rgt	Vel Head	XS Delta WS	XS Delta EG	Beta	E.G. Elev
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)
OaklandToVentura	21	2.40	5568.51	5568.20	39.29	322.19	1.21	13.67	12.26	1.00	5569.42
OaklandToVentura	20	3.74	5555.58	5554.54	68.24	430.85	2.62	10.13	11.31	1.01	5557.16
OaklandToVentura	19	3.90	5544.93	5544.40	17.10	452.06	1.45	8.21	8.73	1.00	5545.85
OaklandToVentura	18	4.05	5536.41	5536.19	5.71	418.87	0.94	9.24	9.17	1.00	5537.12
OaklandToVentura	17	3.95	5527.17	5526.95	53.56	387.48	1.01	9.58	8.64	1.01	5527.95
OaklandToVentura	16	3.57	5518.04	5517.37	23.60	327.81	1.94	7.32	7.29	1.00	5519.31
OaklandToVentura	15	3.25	5510.66	5510.05	76.60	373.40	1.97	6.22	7.31	1.00	5512.02
OaklandToVentura	14	2.19	5504.01	5503.83	106.53	477.59	0.88	2.54	2.18	1.01	5504.71
OaklandToVentura	13	2.55	5501.66	5501.29	58.68	412.34	1.24	2.77	3.07	1.00	5502.53
OaklandToVentura	12	3.02	5498.75	5498.52	18.36	415.08	0.94	3.07	3.02	1.03	5499.46
OaklandToVentura	11	2.25	5495.69	5495.45	18.18	375.40	0.99	2.81	2.85	1.03	5496.44
OaklandToVentura	10	2.47	5492.85	5492.64	45.36	397.89	0.96	3.03	2.56	1.05	5493.59
OaklandToVentura	9	2.11	5490.03	5489.61	105.15	343.52	1.42	2.27	2.18	1.03	5491.03
OaklandToVentura	8	3.44	5487.72	5487.34	71.01	287.56	1.51	2.85	2.19	1.03	5488.86
OaklandToVentura	7	2.69	5485.16	5484.49	71.67	264.93	2.18	1.99	1.97	1.04	5486.67
OaklandToVentura	6	4.20	5483.20	5482.50	119.24	294.97	2.20	2.93	2.16	1.05	5484.70
OaklandToVentura	5	4.17	5480.47	5479.57	120.02	293.71	2.97	3.49	2.34	1.11	5482.53
OaklandToVentura	4	3.12	5477.32	5476.08	136.62	235.66	4.12	2.59	2.06	1.00	5480.19
OaklandToVentura	3	3.09	5474.87	5473.49	127.43	214.74	4.65	2.60	1.45	1.00	5478.13
OaklandToVentura	2	5.98	5472.75	5470.89	7.21	48.95	5.79	3.25	1.48	1.00	5476.69
OaklandToVentura	1	3.84	5469.59	5467.64	4.43	70.56	7.57			1.00	5475.20

PER SE EXTRA TABLE #1

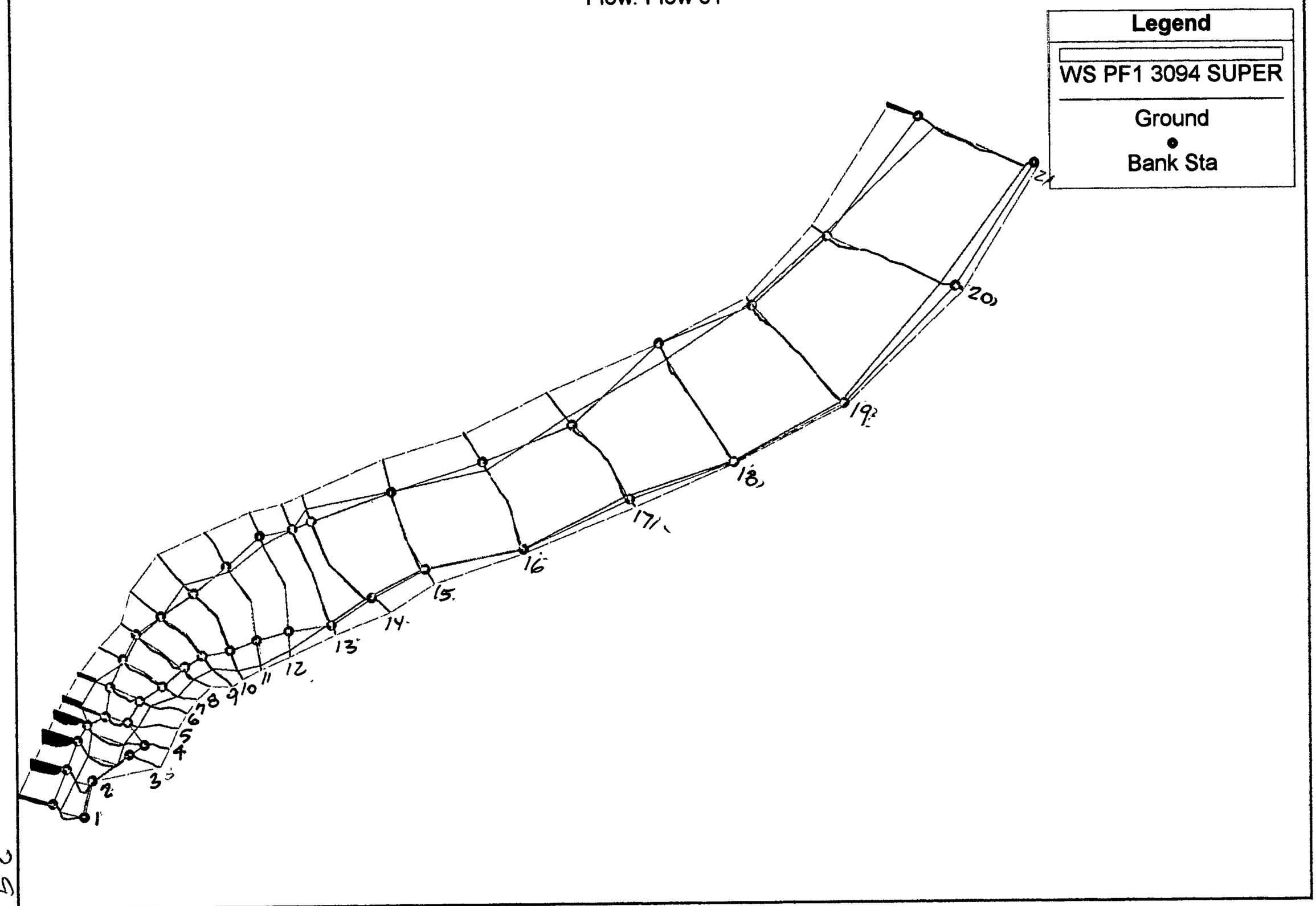
HEC-RAS Plan: OBb RevBanks River: LACUEVA Reach: OaklandToVentura Profile: PF1 3094 SUPER

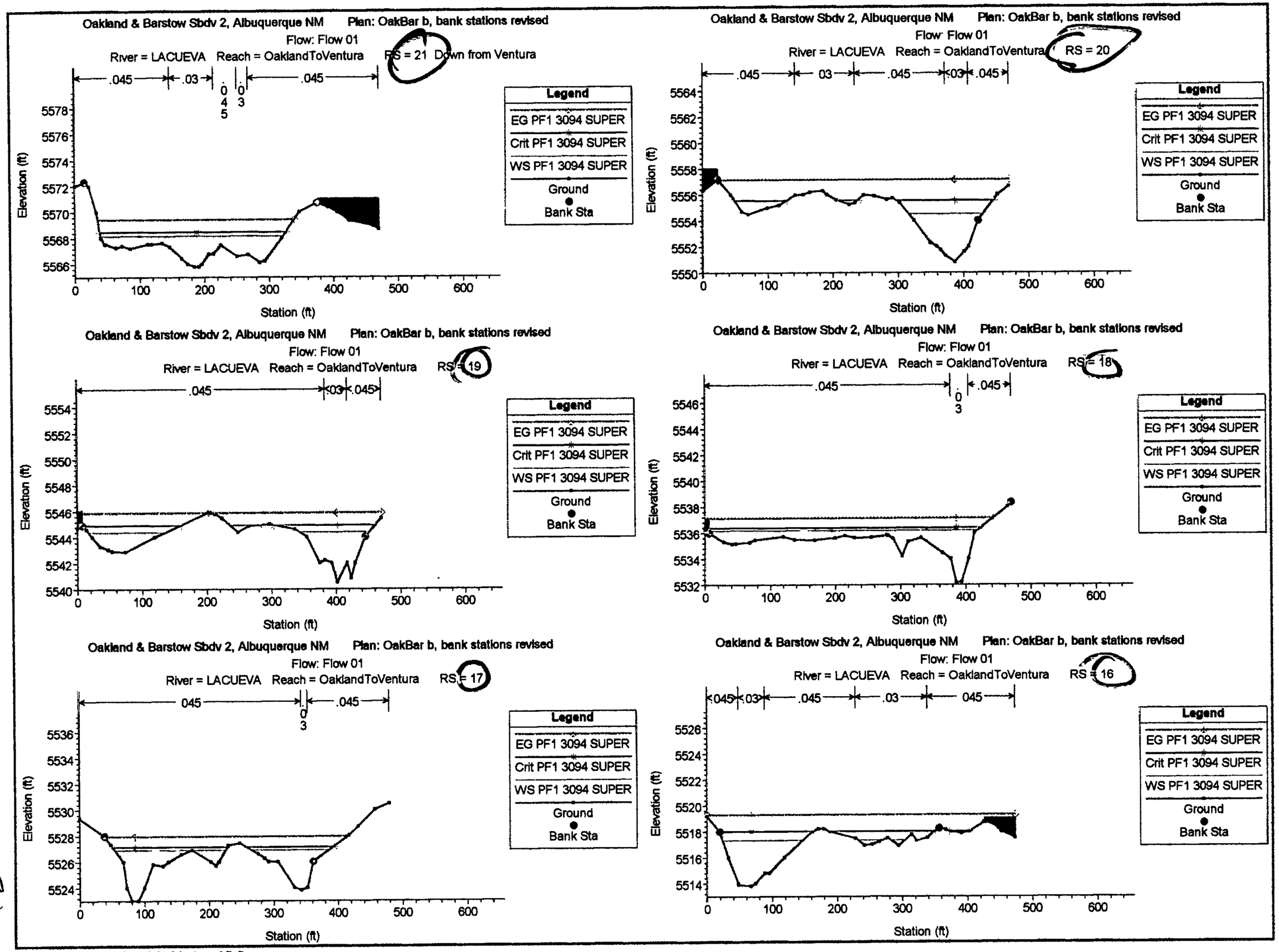
Reach	River Sta	Froude # Chl	Froude # XS	Vel Head	Vel Total	Vel Chnl	Invert Slope	Frctn Slope	Mann Wtd Total	Alpha
				(ft)	(ft/s)	(ft/s)		(ft/ft)		
OaklandToVentura	21	1.40	1.40	1.21	8.84	8.84	0.0361		0.0358	1.00
OaklandToVentura	20	1.56	1.60	2.62	12.91	13.01	0.0266	0.0291	0.0347	1.01
OaklandToVentura	19	1.43	1.44	1.45	9.63	9.66	0.0269	0.0283	0.0370	1.01
OaklandToVentura	18	1.39	1.39	0.94	7.77	7.77	0.0324	0.0276	0.0368	1.00
OaklandToVentura	17	1.21	1.23	1.01	7.97	8.10	0.0316	0.0324	0.0445	1.02
OaklandToVentura	16	1.65	1.65	1.94	11.19	11.19	0.0240	0.0294	0.0340	1.00
OaklandToVentura	15	1.78	1.79	1.97	11.26	11.27	0.0239	0.0250	0.0317	1.00
OaklandToVentura	14	1.25	1.24	0.88	7.46	7.64	0.0580	0.0323	0.0425	1.02
OaklandToVentura	13	1.59	1.59	1.24	8.94	8.94	0.0415	0.0428	0.0387	1.00
OaklandToVentura	12	1.30	1.30	0.94	7.51	7.91	0.0225	0.0377	0.0391	1.07
OaklandToVentura	11	1.32	1.28	0.99	7.70	8.34	0.0271	0.0299	0.0386	1.08
OaklandToVentura	10	1.24	1.19	0.96	7.39	8.27	0.0270	0.0267	0.0373	1.13
OaklandToVentura	9	1.43	1.37	1.42	9.21	9.98	0.0419	0.0266	0.0356	1.08
OaklandToVentura	8	1.32	1.30	1.51	9.56	10.06	0.0284	0.0259	0.0347	1.07
OaklandToVentura	7	1.58	1.67	2.18	11.29	12.09	0.0443	0.0289	0.0353	1.10
OaklandToVentura	6	1.31	1.58	2.20	11.24	12.07	0.0358	0.0249	0.0332	1.12
OaklandToVentura	5	1.70	1.71	2.97	12.03	15.16	0.0436	0.0258	0.0354	1.32
OaklandToVentura	4	2.07	2.07	4.12	16.29	16.29	0.0394	0.0397	0.0300	1.00
OaklandToVentura	3	2.13	2.13	4.65	17.30	17.30	0.0654	0.0309	0.0200	1.00
OaklandToVentura	2	1.74	1.74	5.79	19.32	19.32	0.0111	0.0159	0.0200	1.00
OaklandToVentura	1	2.67	2.67	7.57	22.08	22.08		0.0130	0.0130	1.00

PER SE EXTRA TABLE # 2

Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised

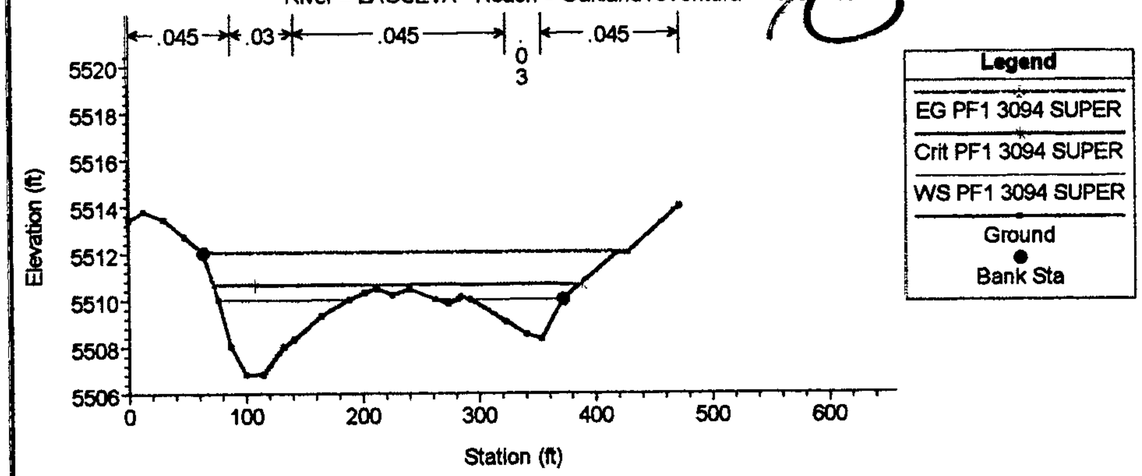
Flow: Flow 01



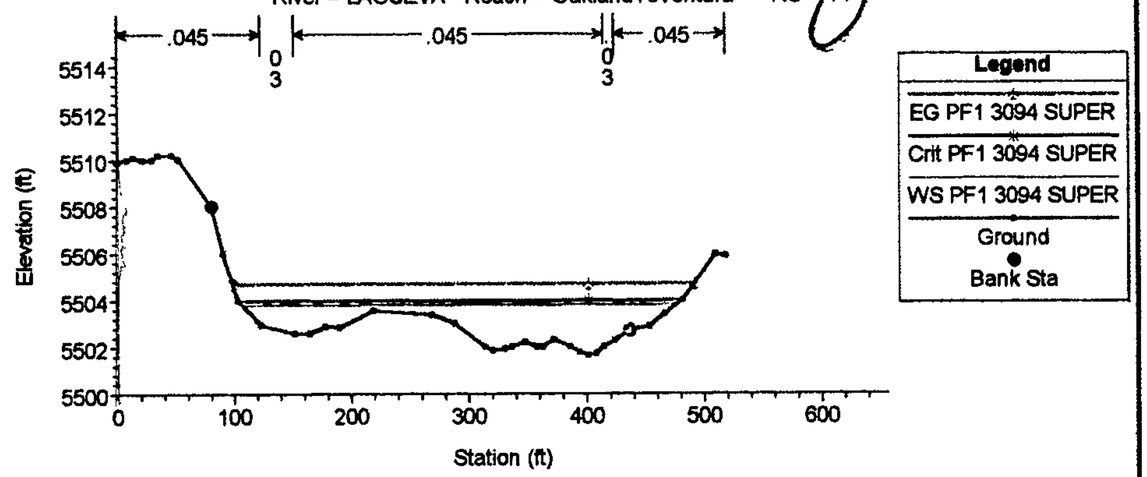


1 in Horiz. = 200 ft 1 in Vert. = 10 ft

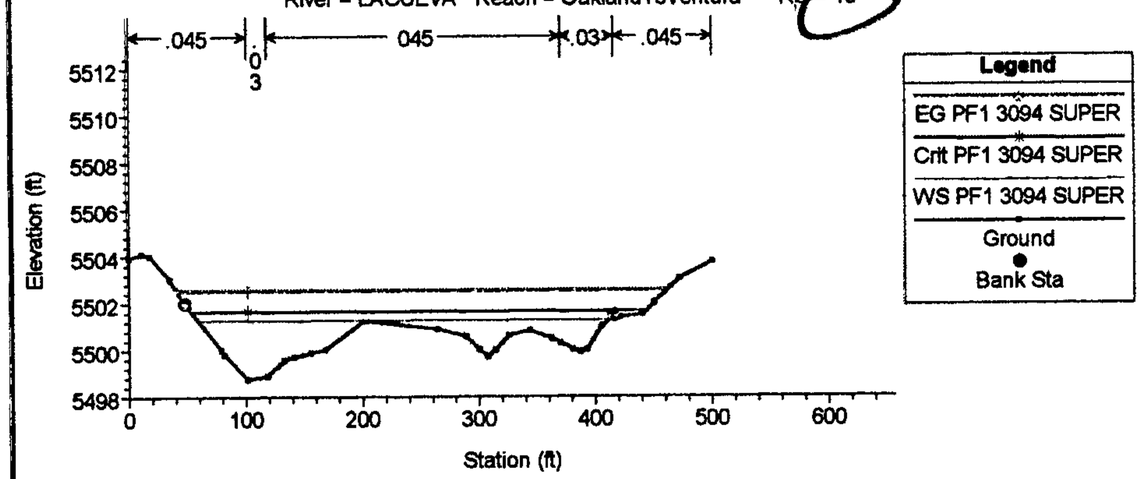
Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 15



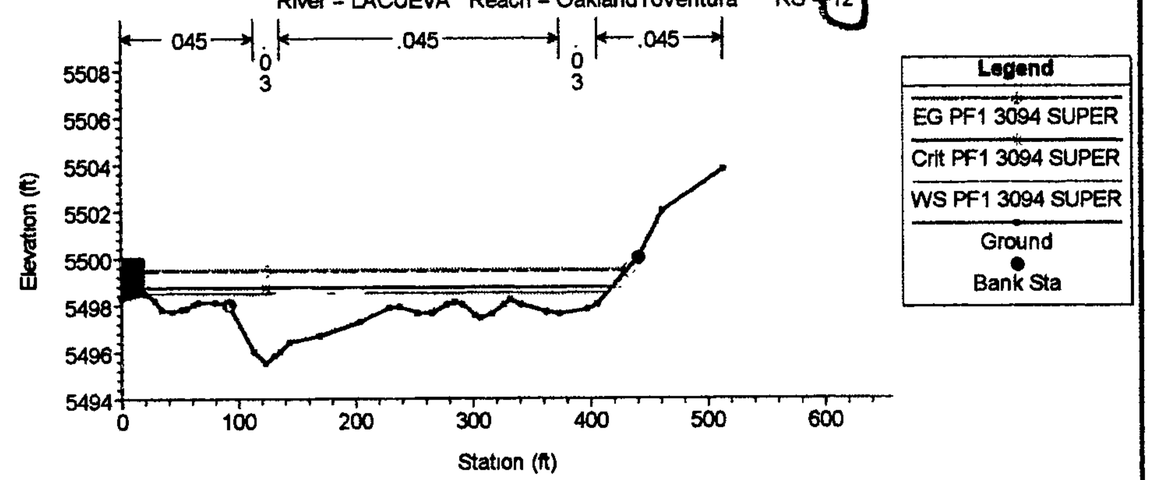
Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 14



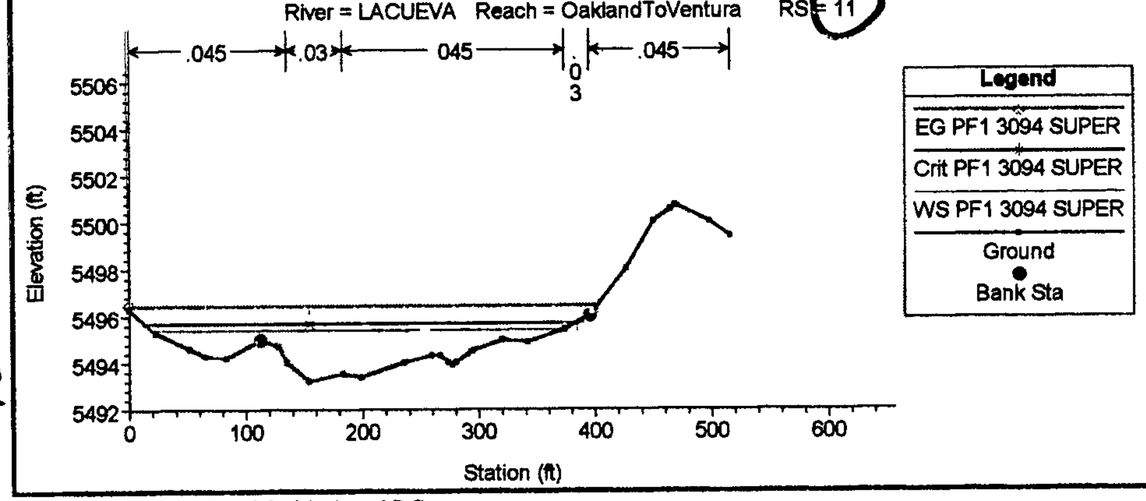
Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 13



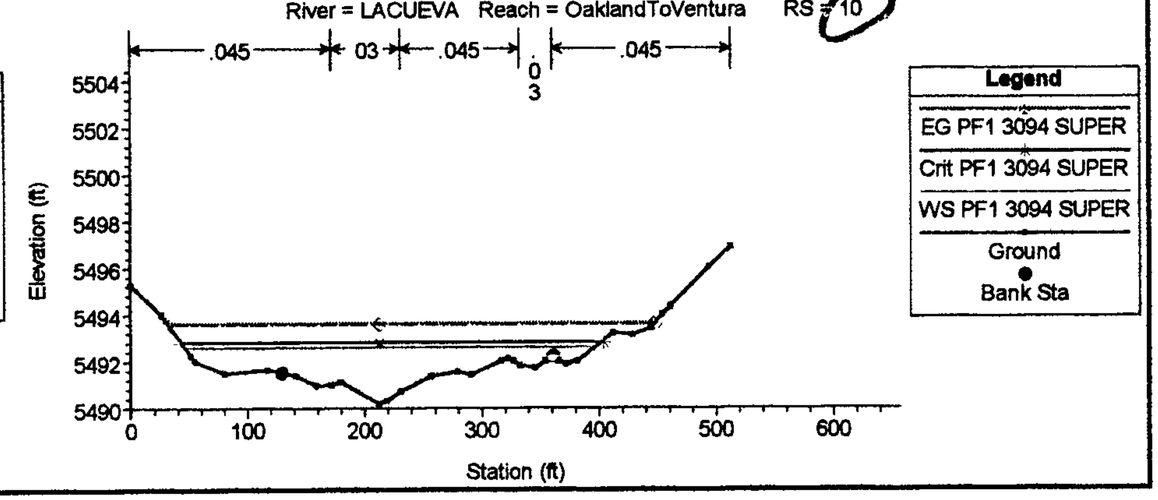
Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 12



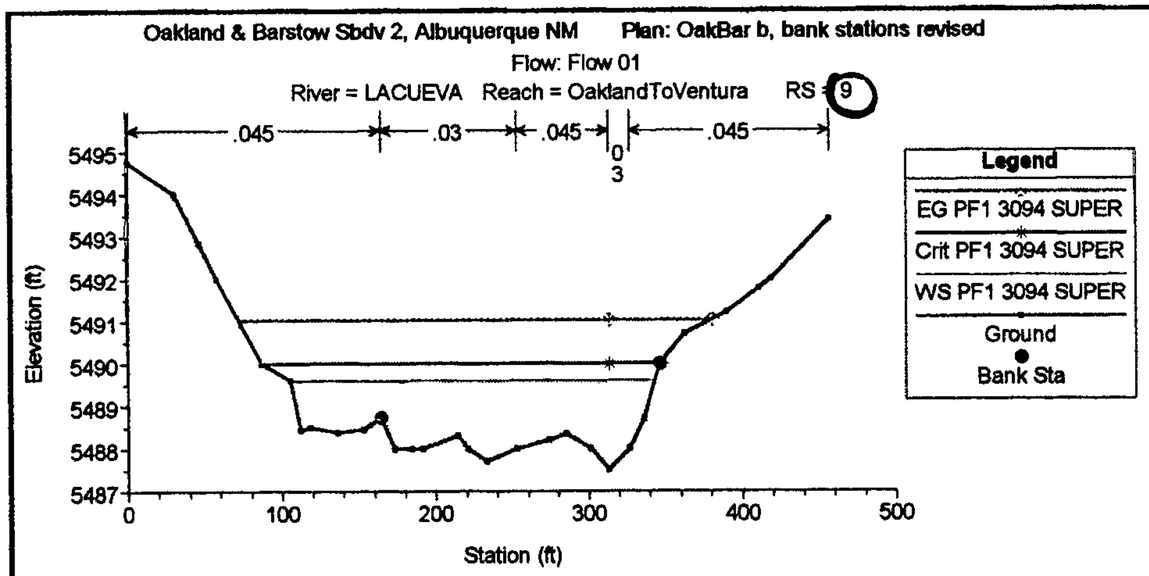
Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 11

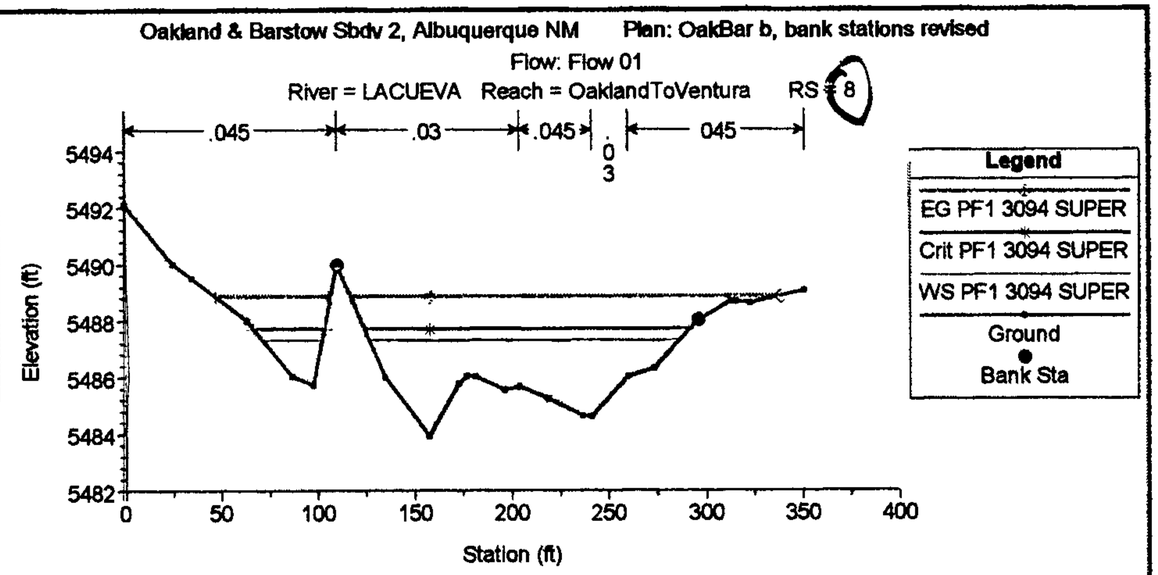


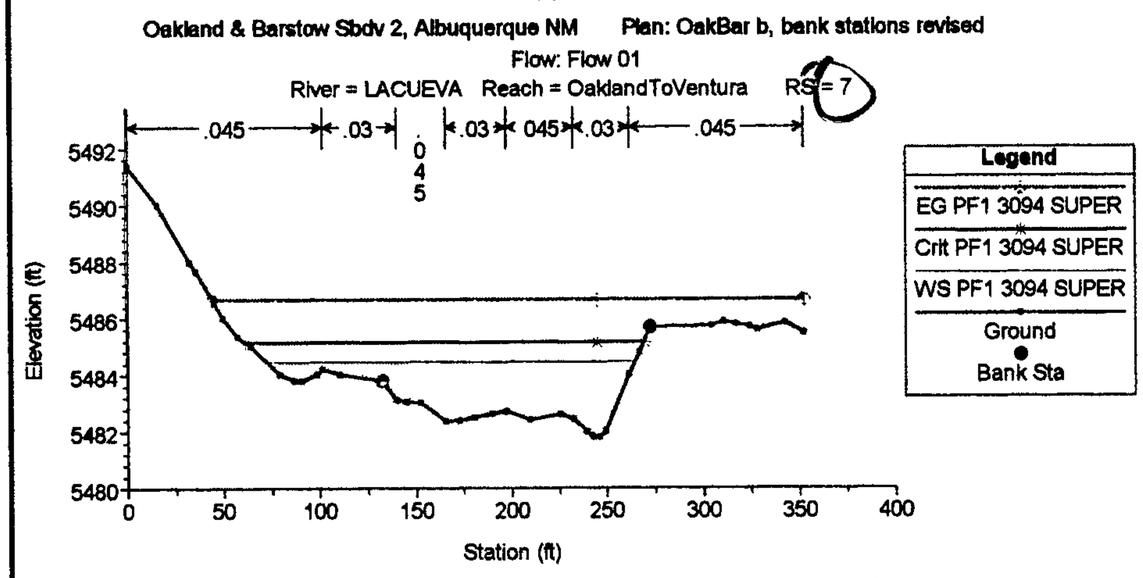
Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 10

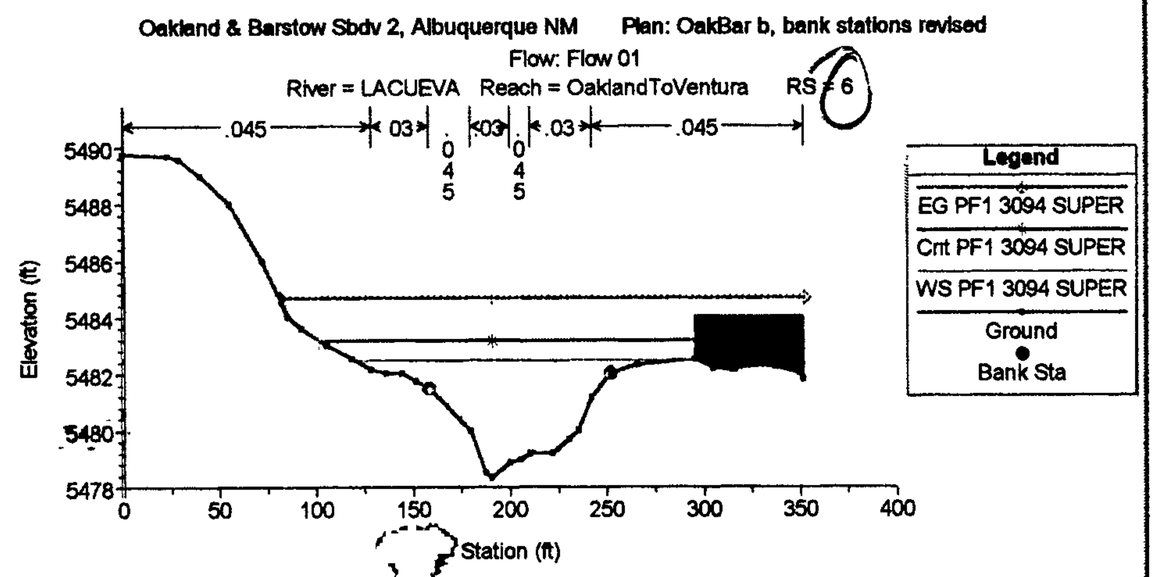


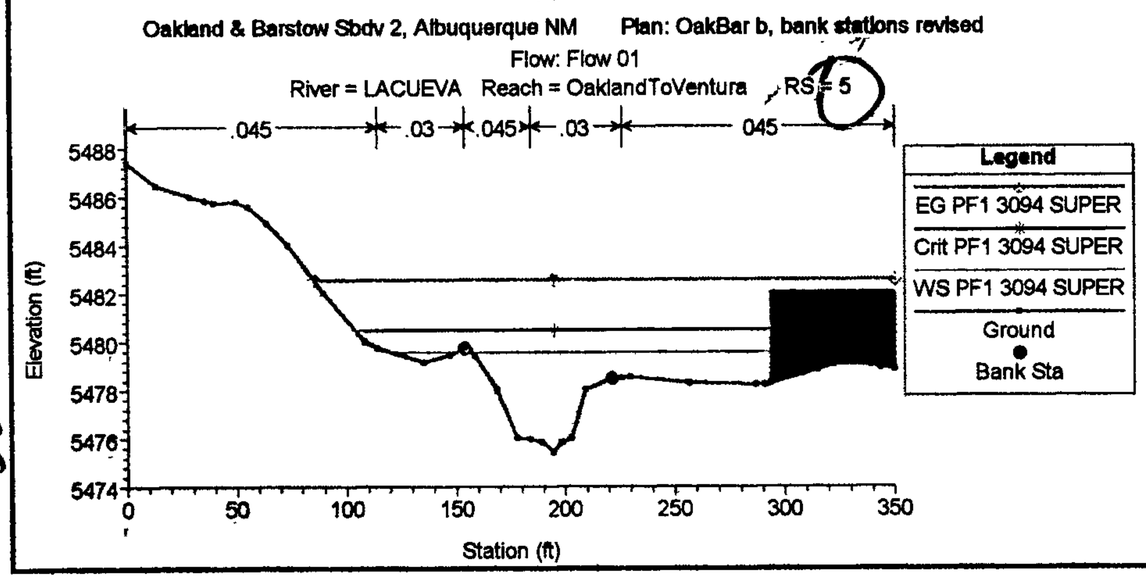
1 in Horiz. = 200 ft 1 in Vert. = 10 ft

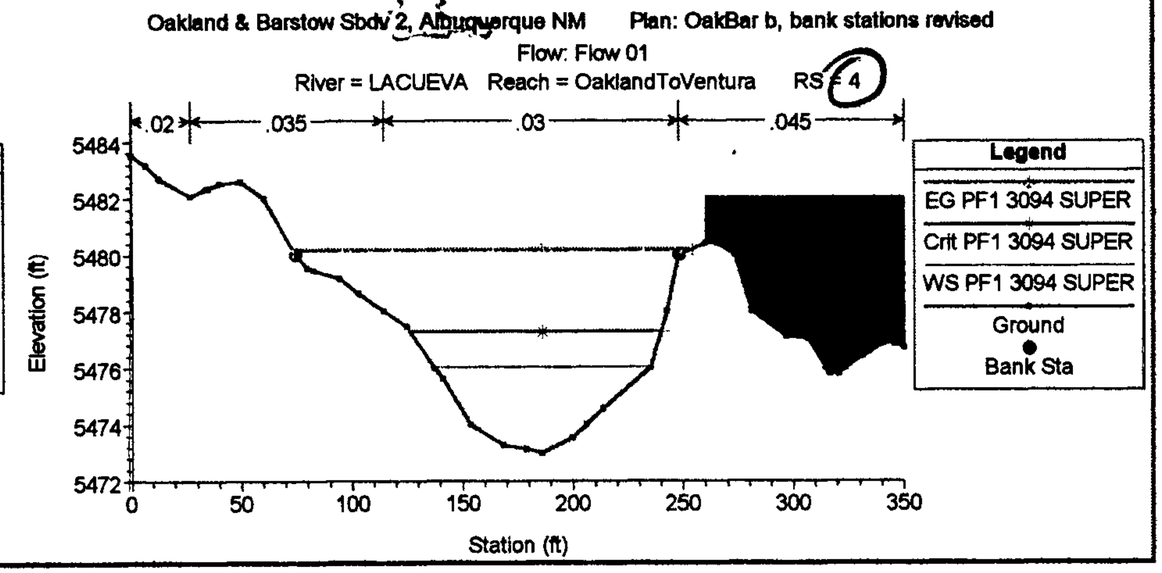

Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 9
.045 .03 .045 .03 .045
Elevation (ft)
Station (ft)
Legend
EG PF1 3094 SUPER
Crit PF1 3094 SUPER
WS PF1 3094 SUPER
Ground
Bank Sta


Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 8
.045 .03 .045 .03 045
Elevation (ft)
Station (ft)
Legend
EG PF1 3094 SUPER
Crit PF1 3094 SUPER
WS PF1 3094 SUPER
Ground
Bank Sta

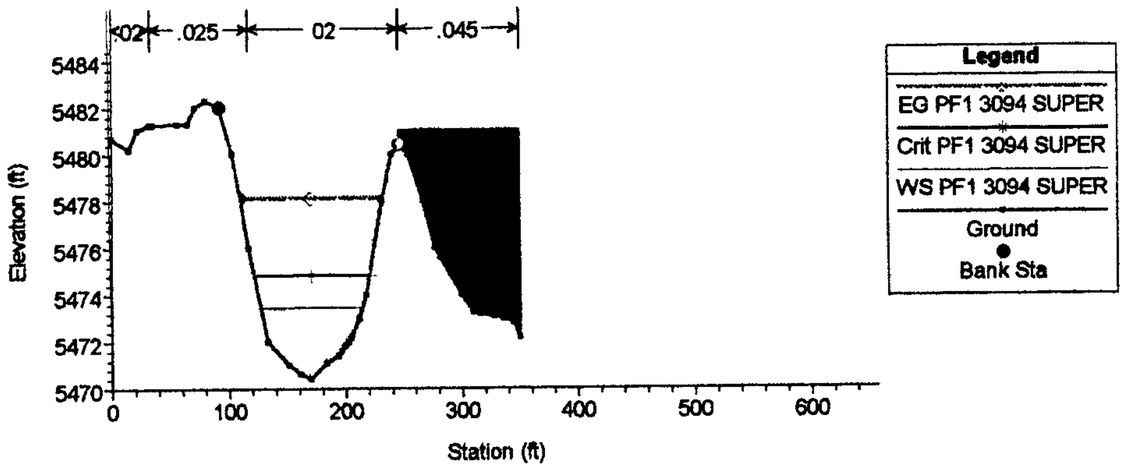

Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 7
.045 .03 .03 045 .03 .045
Elevation (ft)
Station (ft)
Legend
EG PF1 3094 SUPER
Crit PF1 3094 SUPER
WS PF1 3094 SUPER
Ground
Bank Sta


Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 6
.045 03 03 .03 .045
Elevation (ft)
Station (ft)
Legend
EG PF1 3094 SUPER
Crit PF1 3094 SUPER
WS PF1 3094 SUPER
Ground
Bank Sta

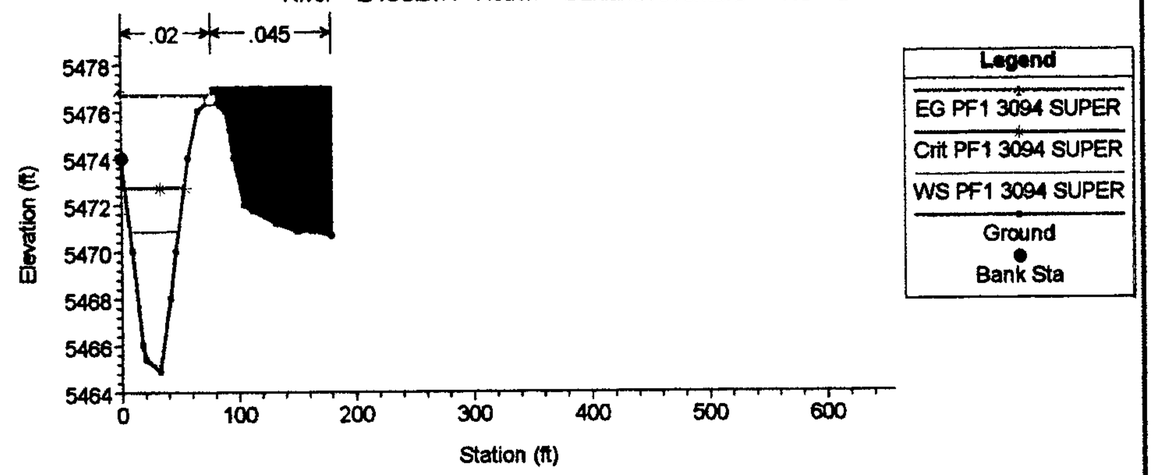

Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 5
.045 .03 .045 .03 045
Elevation (ft)
Station (ft)
Legend
EG PF1 3094 SUPER
Crit PF1 3094 SUPER
WS PF1 3094 SUPER
Ground
Bank Sta


Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 4
.02 .035 .03 .045
Elevation (ft)
Station (ft)
Legend
EG PF1 3094 SUPER
Crit PF1 3094 SUPER
WS PF1 3094 SUPER
Ground
Bank Sta

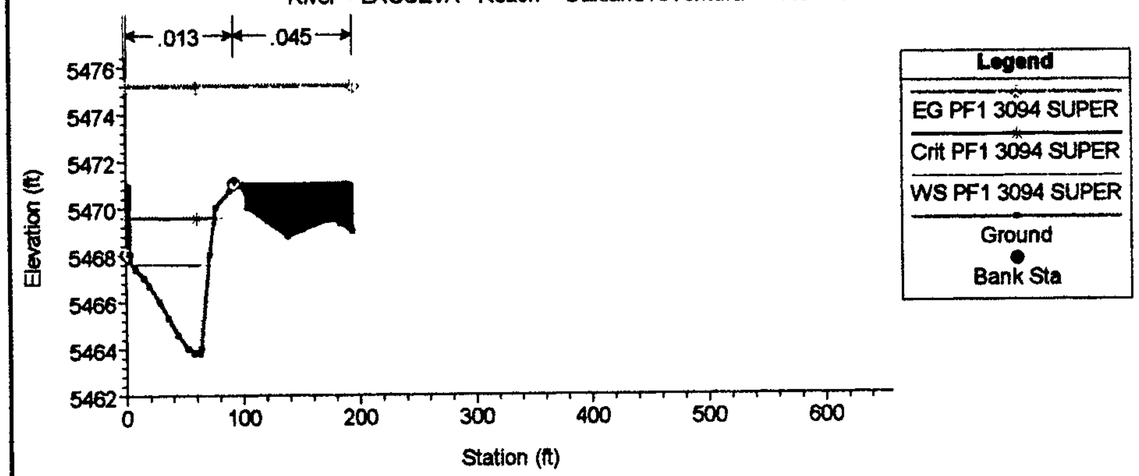
Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 3



Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 2



Oakland & Barstow Sbdv 2, Albuquerque NM Plan: OakBar b, bank stations revised
Flow: Flow 01
River = LACUEVA Reach = OaklandToVentura RS = 1



1 in Horiz. = 200 ft 1 in Vert. = 10 ft

EROSION SETBACK ANALYSIS

Q100 = 3094 cfs,
per Fig 5E of North Albuquerque Acres Master Drainage Plan, STORM DRAIN FACILITIES C-19, PREPARED FOR THE City of Albuquerque NM by Resource Technology, Inc.

SETBACK ANALYSIS METHODS per AMAFCA's SEDG: SEDIMENT & EROSION DESIGN GUIDE

Qd = Q dominant = dominant discharge, cfs
Sc = critical (bed) slope, ft/ft
So = S "nought" = actual slope of the channel bed
Wd = dominant channel Width, associated with dominant discharge, ft
Lambda (Greek L) = nominal channel meander sinuosity length, ft
DeltaMax = maximum difference of bank erosion comapred to original location
= Bank Setback

Qd = 0.20*Q100 = 0.2*3094 = 618.8 say 620 cfs (Eq 3.77)

Estimate Sc =0.037*(Qd^(-0.133)) (Eq 3.80)
Sc = .016 < (.027= So min invert slope near site)

Since So > Sc use Eq 3.78 to compute Wd
Wd = 4.60*(Qd^0.4) = 60.2 apx 60 feet

Lambda = $(0.8 + 4*\log_{10}(Qd))*Wd$ = 720.6 feet (Eq 3.74b for 200 cfs < Qd < 2000 cfs)

Bank Setback = Lamda/4 = 180.1 apx 180 feet (Discussion preceding Eq's 3.75a,b,c)
or
Bank Setback = $[0.92+4.6*\log_{10}(Qd)]*[Qd^{0.4}]$ =180.2 feet (Eq 3.81b for So > Sc)

Centerline Setback = Bank Setback + Wd/2 apx = 180 + 30 = 210 feet

LOCAL SCOUR near subdivision at NE corner of Oakland & Barstow NE, Albuquerque NM
Project site is on inside of bend; conservaively assume parallel flow.

Use Eq 3.89 of AMAFCA's Sediment & Erosion Design Guide
Ys =Depth of scour, ft
Yn = normal flow depth in channel for design flow
Fr = Froude number for channel (Fr>1 indicates supercritical flow)
Ys = Yn * [0.73 + 0.14*(Fr^2)]

CrossSection	Channel Depth	Froude No.	Froude Squared	Scour Depth
12	3.02	1.30	1.69	2.92
11	2.25	1.32	1.74	2.19
10	2.47	1.24	1.54	2.33
9	2.11	1.43	2.04	2.14
8	3.44	1.32	1.74	3.35
7	2.69	1.58	2.50	2.90
6	4.20	1.31	1.72	4.08
5	4.17	1.70	2.89	4.73
4	3.12	2.07	4.28	4.15 +

STREET FLOW CONSIDERATIONS:
Oakland Meadows Subdivision: NE corner of Oakland & Barstow NE

IN A NUTSHELL: Qpeak-100year to the proposed inlet is 4.64 cfs. For the given half street section of 30' CL to FC and a slope of 1.41%, the calculated depth is 0.34' (4-1/8"). A normal Type A inlet will handle 4.64 cfs at a normal street depth of 0.~~39'~~ .37 or, while a Double A (2 grates + the "sweeper" opening) will handle it at 0.~~39'~~ .37. Either should work fairly well. Either inlent could be recessed back toward the sidewalk to create extra head over the inlet thereby increasing its capacity.

GENERAL DISCUSSION:
Most data below are approximate, taken by Per Se Engineering from paper print of the Oakland Meadows Grading & Drainage plan dated 3-14-2003.

The west half of Barstow is paved for a little over 200' north of the intersection (where the pavement stops shortly before the arroyo) and the entire street is paved south of the intersection. The south half of Oakland is paved east of the intersection for several hundred feet (stopping near the arroyo, which runs diagonally) and all of Oakland is paved west of the intersection. There is a water block (high point) west of the intersection; this shows up on the ground and in site photos but may not be apparent from either photo-topo (not accurate enough?) or site topo (didn't extend that far).

There are 2 "Double A" (double grate plus sweeper opening) existing inlets on the south side of Oakland east of Barstow and 1 on the east side of Barstow south of Oakland. There are no inlets nearby on the west side of Barstow. This analysis <u>assumes</u> that these inlets are adequate to handle their respective upstream-same-side-of-street flows. In reality there is typically some bypass for all inlets.

Although not part of this analysis, it is Per Se Engineering's suggestion that the proposed new inlet on the east side of Barstow north of Oakland be recessed from the flowline to increase the performance of the inlet, particularly for low flows. Recessing the inlet so the back of inlet concrete butted against face of side walk could add approximately 0.04' to 0.11' (1/2" to 2-3/8") of head to the inlet, plus drawing more water to the inlet.

ASSUME travel times are smaller than time of concentration for such a small area. Use DPM small watershed hydrology methods (no routing) and add appropriate flows to get peak flows.

TUCKER A. GREEN 10731 NEW MEXICO REGISTERED PROFESSIONAL ENGINEER

4-3-02

BARSTOW NE:
80' ROW, ½ section 40', 30' paving to <u>face</u> of curb, standard 8" curb & gutter included in that 30', 6' sidewalk at PL leaves apx 5.37' say 5' "dirt" (5/40 = 1/8 = 0.125 = 12.5%) between SW and <u>back</u> of curb. 25' radius at PL, 25' radius at FC at NE corner of Oakland. Design slope 1.41%. Total contributing ROW = 9265 sf.

New inlet will be apx 200' N of Oakland CL (170' N of subdiv S PL)

OAKLAND NE:
60' ROW, ½ section 30', 20' paving to face of curb, standard 8" curb & gutter included in that 20', 4' sidewalk at PL leaves apx 5.37' say 5' "dirt" (5/30 = 1/6 = 16.67 apx 17%) between SW and back of curb. 25' radius at PL, 25' radius at FC at NE corner of Oakland AND at Cul de Sac (CS). Existing slope varies: apx 5.13% on east (upstream), 2.89% west of CS. Including the entrance to the Cul de Sac, 9781 sf of ROW contributing.

CUL DE SAC:
33' "ROW", 24' FC to FC (including apx 18" C&G, prob. mountable) then SW to "ROW" each side, 25' radius at PL, 25' radius at FC at Oakland, high point apx 12' N of curb return from Oakland (based on P&P for CS). Somewhat less than ½ of Lot 4 (the 100' wide southeast lot) and ¼ of Lot 1 (the 78' wide southwest lot) - not including the driveway of either drain to this part of the CS. This part of the CS "ROW" is included in "OAKLAND" above.

OAKLAND MEADOWS SUBDIV:
Lots 1 & 2 drain through/under the wall to Barstow. Each lot has a 50'L x 40'W (2000sf) pad shown. Taking the dividing line as the middle of the pad westward, each lot has 78*75 = 5850 sf draining to Barstow, neglecting any "bite" taken by curved ROW at street intersections. From the typical site layout, directly applicable to Lots 1 & 2, this area contains (1) half the building pad (1000sf) = Trt D; (2) 1400 sf of lawn = Trt B; (3) roughly 120 sf of CMU wall as Trt D; and (4) the rest as native landscaping, Trt A. Trt D as an actual percent then = (1000+120)/5850 = 19.15% and Trt B = 1400/5850 = 23.93%. For calculation use 24% = 1404sf D and 26% = 1521sf B leaving 50% = 2925 sf A for each lot (use total area = 11,700 for both lots, a little more than actual)..

Use these same percentages for the portions of Lots 1 & 4 which drain to Oakland. Lot 1 SE corner = 1902 sf: 24% D apx 456, 26% B = apx 496sf, leaving apx 1360sf A. Lot 4 south "half" = 6190sf: apx 1486 D, apx 1609 B, leaving apx 3095 sf A.

REMAINING DEVELOPABLE AREA east of site on N side of Oakland draining past site. (Get info from copy of drawing [oakbarh3->oakbarh4] for La Cueva arroyo flood plain analysis, w/assumptions.) Use same percentage A, B, D as for OAKLAND and SUBDIV.

Apx 20,5000sf developable.
Apx 10,560 developable to Oakland: 24% = 2534sf D, 26% = 2746sf B, 50% = 5280sf A.
Apx 6300sf of N side of Oakland drains to Barstow: 17% = 1071sf B, 9489sf = D.

ALBUQUERQUE, NM (1/93) CRITERIA - SIMPLE PROCEDURE FOR <= 40 ACRES
PX100-6 = PRECIPITATION EXCESS FROM 100-YEAR 6-HOUR STORM
VOL10D = VOLUME OF RUNOFF FROM 100-YEAR 10-DAY STORM
TRTMT CLASS A=UNDISTURBED, B=LAWNS, C=UNPAVED ROADS, D=ROOFS,PAVEMENT: SEE DPM 22.2 P A-5

****** PROJECT INFO ******
OAK-BAR FLOW IN STREET - SEE SEPARATE SHEET FOR DISCUSSION
CALC SEQUENTIAL SMALL AREAS SEPARATELY, ADD (OK BECAUSE Time odf Concentration IS SMALL)
**** ALL FLOWS ARE FOR DEVELOPED CONDITIONS ****
AREAS BY AUTOCAD POLYLINES

RAIN ZONE 3 SEE DPM P 22.2-2
100-YEAR PRECIPTATION (P) DEPTHS, INCHES

1 HR	6 HR	24 HR	4 DAY	10 DAY
2.14	2.6	3.1	3.95	4.9

DEVELOPABLE PART OF LOT TO EAST OF SITE THAT REASONABLY MIGHT DRAIN TO OAKLAND SF TOTAL 10,560

TRTMT CLASS	AREA SQUARE FEET	AREA ACRES	PX100-6 IN/AC	QP100-6 CFS/AC	QP100-6 CFS	VOL6HR AC-FT	VOL1D AC-FT	VOL4D AC-FT	VOL10D AC-FT	TRTMT PERCENT
A	5,280.0	0.1212	0.66	1.87	0.227	0.007	0.007	0.007	0.007	50.00
B	2,746.0	0.0630	0.92	2.60	0.164	0.005	0.005	0.005	0.005	26.00
C	0.0	0.0000	1.29	3.45	0.000	0.000	0.000	0.000	0.000	0.00
D	2,534.0	0.0582	2.36	5.02	0.292	0.011	0.014	0.018	0.023	24.00
TOTAL	10,560	0.2424	AVG Q/AC=	2.816	0.683	0.023	0.025	0.029	0.034	100.00
	SQ MI=>	0.000379			CU FT=>	999	1105	1284	1485	<=CU FT
			Cumulative Total, CFS		**0.683**					

N HALF OF OAKLAND ROW OPPOSITE DEVELOPABLE PART OF LOT TO EAST OF SITE, ETC. SF TOTAL 6,300

TRTMT CLASS	AREA SQUARE FEET	AREA ACRES	PX100-6 IN/AC	QP100-6 CFS/AC	QP100-6 CFS	VOL6HR AC-FT	VOL1D AC-FT	VOL4D AC-FT	VOL10D AC-FT	TRTMT PERCENT
A	0.0	0.0000	0.66	1.87	0.000	0.000	0.000	0.000	0.000	0.00
B	1,071.0	0.0246	0.92	2.60	0.064	0.002	0.002	0.002	0.002	17.00
C	0.0	0.0000	1.29	3.45	0.000	0.000	0.000	0.000	0.000	0.00
D	5,229.0	0.1200	2.36	5.02	0.603	0.024	0.029	0.037	0.047	83.00
TOTAL	6,300	0.1446	AVG Q/AC=	4.609	0.667	0.025	0.030	0.039	0.049	100.00
	SQ MI=>	0.000226			CU FT=>	1110	1328	1699	2113	<=CU FT
			Cumulative Total, CFS		**1.349**					

PORTION OF OAKLAND MEADOWS SUBDIV DRAINING TO OAKLAND RD. SF TOTAL 8,092

TRTMT CLASS	AREA SQUARE FEET	AREA ACRES	PX100-6 IN/AC	QP100-6 CFS/AC	QP100-6 CFS	VOL6HR AC-FT	VOL1D AC-FT	VOL4D AC-FT	VOL10D AC-FT	TRTMT PERCENT
A	4,045.0	0.0929	0.66	1.87	0.174	0.005	0.005	0.005	0.005	49.99
B	2,105.0	0.0483	0.92	2.60	0.126	0.004	0.004	0.004	0.004	26.01
C	0.0	0.0000	1.29	3.45	0.000	0.000	0.000	0.000	0.000	0.00
D	1,942.0	0.0446	2.36	5.02	0.224	0.009	0.011	0.014	0.017	24.00
TOTAL	8,092	0.1858	AVG Q/AC=	2.816	0.523	0.018	0.019	0.023	0.026	100.00
	SQ MI=>	0.000290			CU FT=>	766	847	984	1138	<=CU FT
			Cumulative Total, CFS		**1.872**					

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N HALF OF OAKLAND ROW OPPOSITE OAKLAND MEADOWS SUBDIV — SF TOTAL 9,781

TRTMT CLASS	AREA SQUARE FEET	AREA ACRES	PX100-6 IN/AC	QP100-6 CFS/AC	QP100-6 CFS	VOL6HR AC-FT	VOL1D AC-FT	VOL4D AC-FT	VOL10D AC-FT	TRTMT PERCENT
A	1,663.0	0.0382	0.66	1.87	0.071	0.002	0.002	0.002	0.002	17.00
B	0.0	0.0000	0.92	2.60	0.000	0.000	0.000	0.000	0.000	0.00
C	0.0	0.0000	1.29	3.45	0.000	0.000	0.000	0.000	0.000	0.00
D	8,118.0	0.1864	2.36	5.02	0.936	0.037	0.044	0.058	0.072	83.00
TOTAL	9,781	0.2245	AVG Q/AC=	4.484	1.007	0.039	0.047	0.060	0.074	100.00
	SQ MI=>	0.000351			CU FT=>	1688	2026	2601	3244	<=CU FT

Cumulative Total, CFS 2.879

PORTION OF OAKLAND MEADOWS DRAINING TO BARSTOW AT YARD WALLS — SF TOTAL 11,700

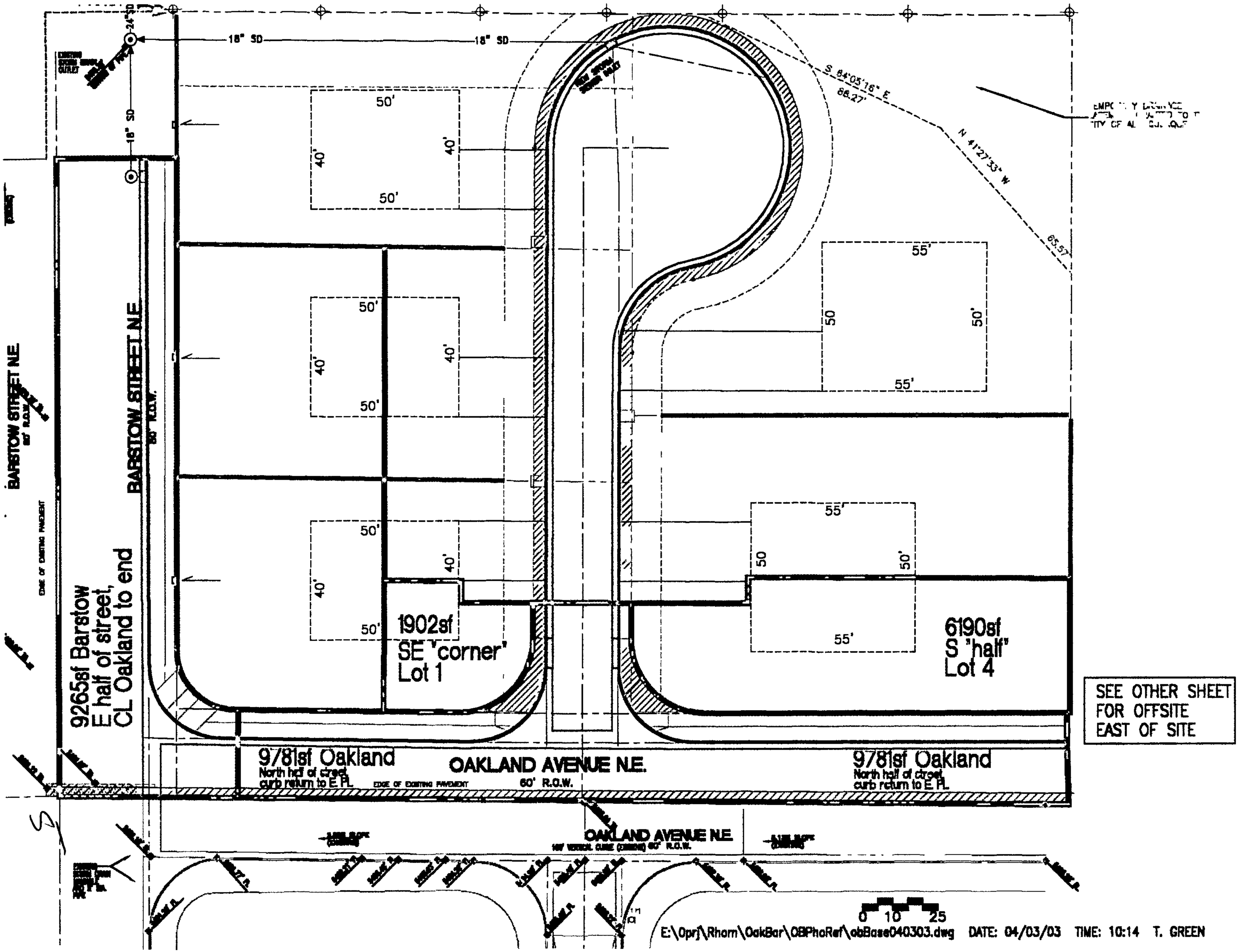
TRTMT CLASS	AREA SQUARE FEET	AREA ACRES	PX100-6 IN/AC	QP100-6 CFS/AC	QP100-6 CFS	VOL6HR AC-FT	VOL1D AC-FT	VOL4D AC-FT	VOL10D AC-FT	TRTMT PERCENT
A	5,850.0	0.1343	0.66	1.87	0.251	0.007	0.007	0.007	0.007	50.00
B	3,042.0	0.0698	0.92	2.60	0.182	0.005	0.005	0.005	0.005	26.00
C	0.0	0.0000	1.29	3.45	0.000	0.000	0.000	0.000	0.000	0.00
D	2,808.0	0.0645	2.36	5.02	0.324	0.013	0.015	0.020	0.025	24.00
TOTAL	11,700	0.2686	AVG Q/AC=	2.816	0.756	0.025	0.028	0.033	0.038	100.00
	SQ MI=>	0.000420			CU FT=>	1107	1224	1423	1645	<=CU FT

Cumulative Total, CFS 3.635

E HALF OF BARSTOW OPPOSITE OAKLAND MEADOWS — SF TOTAL 9,265

TRTMT CLASS	AREA SQUARE FEET	AREA ACRES	PX100-6 IN/AC	QP100-6 CFS/AC	QP100-6 CFS	VOL6HR AC-FT	VOL1D AC-FT	VOL4D AC-FT	VOL10D AC-FT	TRTMT PERCENT
A	0.0	0.0000	0.66	1.87	0.000	0.000	0.000	0.000	0.000	0.00
B	1,158.0	0.0266	0.92	2.60	0.069	0.002	0.002	0.002	0.002	12.50
C	0.0	0.0000	1.29	3.45	0.000	0.000	0.000	0.000	0.000	0.00
D	8,107.0	0.1861	2.36	5.02	0.934	0.037	0.044	0.058	0.072	87.50
TOTAL	9,265	0.2127	AVG Q/AC=	4.718	1.003	0.039	0.046	0.060	0.074	100.00
	SQ MI=>	0.000332			CU FT=>	1683	2021	2595	3237	<=CU FT

Cumulative Total, CFS 4.639


18" SD
18" SD
24" SD
18" SD
S 84°05'16" E
88.27'
N 41°27'33" W
65.57'
50'
40'
40'
50'
50'
40'
40'
50'
50'
40'
40'
50'
55'
50
50'
55'
55'
50
50'
55'
1902sf
SE "corner"
Lot 1
6190sf
S "half"
Lot 4
BARSTOW STREET NE
BARSTOW STREET NE
9265sf Barstow
E half of street,
CL Oakland to end
9781sf Oakland
North half of street
curb return to E.P.L.
OAKLAND AVENUE N.E.
60' R.O.W.
9781sf Oakland
North half of street
curb return to E.P.L.
OAKLAND AVENUE N.E.
SEE OTHER SHEET
FOR OFFSITE
EAST OF SITE
0 10 25
E:\Oprj\Rhorn\OakBar\OBPhoRef\obBase040303.dwg DATE: 04/03/03 TIME: 10:14 T. GREEN