City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

November 21, 2003

Shahab Biazar PE
Advanced Engineering and Consulting
10205 Snowflake Ct NW
Albuquerque, NM 87114

Re: Lots 27 & 28 La Cueva Tierra Pond Reclamation Grading Certification
Engineer's Stamp dated 9-24-03 (C20/D1)

Dear Mr. Biazar,

Based upon the information provided in your submittal dated 10-17-03, the above referenced certification is approved for Final Plat signoff by the City Engineer.

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

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Planning Dept.
Development and Building Services

C: file

CITY OF
Albuquerque

Martin J. Chávez, Mayor

September 9, 1997

CERTIFICATE OF COMPLETION AND ACCEPTANCE

Mr. H. Griffin Pickard, Jr.
President & CEO
Signature J Homes, Inc.
7007 Wyoming Blvd., NE Suite D-6
Albuquerque, NM 87109

RE: TIERRA LA CUEVA, PHASE II (DEFERRED OFF-SITE INFRASTRUCTURE)
CITY PROJECT NO. 4368.82 MAP NO. C-19

Dear Mr. Pickard:

This is to certify that the City of Albuquerque accepts the construction of the infrastructure for the off-site drainage improvements, as certified by Mr. Jeffrey Mortensen, Jeff Mortensen & Associates, Inc., as compliance with completing the required public infrastructure listed in the Subdivision Improvements Agreement (SIA) between Signature J Homes, Inc. and the City of Albuquerque executed on July 29, 1993.

Having satisfied the requirements referenced above, the SIA and any associated Financial Guaranty, held by the City, can now be released.

Please be advised this Certificate of Completion and Acceptance shall only become effective upon final plat approval and filing in the office of the Bernalillo County Clerk's Office.

Should you have any questions or issues regarding this project, please contact me.

Sincerely,

Ricardo B. Roybal, P.E.
City Engineer
Dev. & Bld. Services Div.
Public Works Department

CITY OF
Albuquerque

P.O. Box 1293 Albuquerque, NM 87103

November 26, 1996

Martin J. Chávez, Mayor

Ronald R. Bohannan, PE
Tierra West Dev Mgt Ser
4600 Montgomery NE Suite #3
Albuquerque, NM 87109

RE: ENGINEER'S CERTIFICATION FOR LA CUEVA TIERRA (C-20/D1)
RECEIVED NOVEMBER 20, 1996 FOR FINANCIAL GUARANTY RELEASE
ENGINEER'S STAMP DATED 11/21/96

Dear Mr. Bohannan:

Based on the information included in the submittal referenced above, City Hydrology accepts the engineer's certification for financial guaranty release.

Contact Terri Martin to obtain the Financial Guaranty Release for City Project Number 51.49.80.

If I can be of further assistance, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer, Hydrology

c: Terri Martin, CPN 5149.80

CITY OF
Albuquerque

City of Albuquerque

P. O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103
PUBLIC WORKS DEPARTMENT

June 14, 1996

CERTIFICATE OF WORK ORDER COMPLETION

Helmick-Spradlin
Development Partnership
10211 Montgomery Blvd. NE
Albuquerque, NM 87111

RE: LA CUEVA TIERRA (MAP NO. C-20), PROJECT NO. 5149.90

Dear Sir:

This is to certify that the City of Albuquerque accepts Project No. 5149.90 as being completed according to approved plans and construction specifications. Please be advised this certificate of completion and acceptance shall only become effective upon final plat approval and filing in the office of the Bernalillo County Clerk's Office.

The project is described as follows:

- The utilities, consisted of water and sewer lines, were installed to service all lots as well as individual meters to each lot. Street lights and wheel chair ramps were installed at each intersection per City standards. Internal sidewalks have been deferred until each lot is developed.

- The work along Ventura consisted of extending the sidewalk, curb and gutter, permanent roadway section and a temporary 24" CMP storm drain segment. The CMP was approved by City Hydrology and will be replaced in the future with a permanent 54" RCP line.

Manjit Tolay Filing

JUN 24 1996

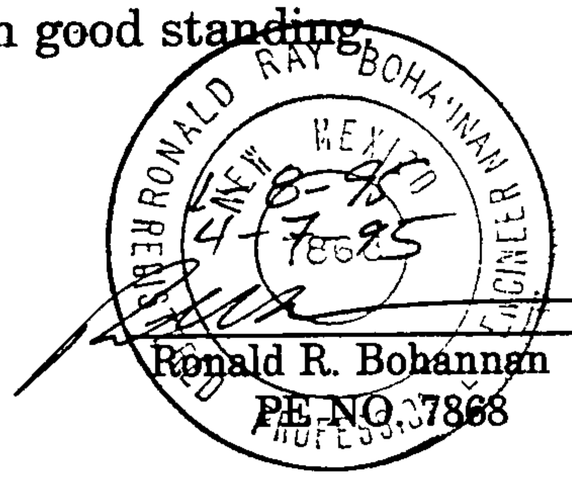
DRAINAGE REPORT

FOR

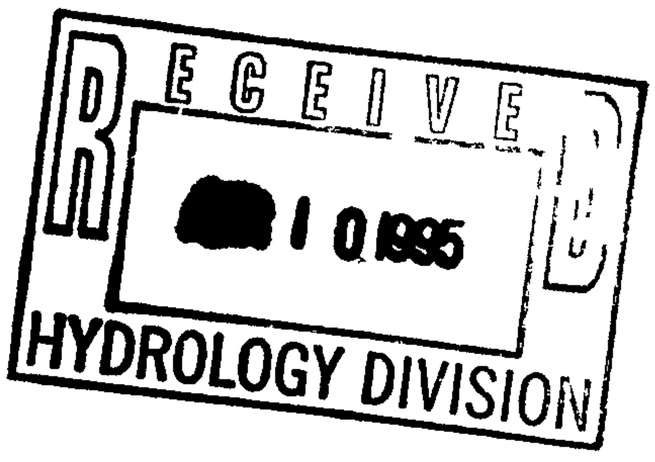
LA CUEVA TIERRA SUBDIVISION

~~2/07/95~~
4/7/95

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the state of New Mexico in good standing.



Ronald R. Bohannan
PE NO. 7868



Prepared by:

Tierra West Development
Management Services
4600 Montgomery Blvd. NE, Suite 3
Albuquerque, NM 87109
(505) 883-7592

POND VOLUME CALCULATIONS

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = $Ab * D + 0.5 * C * D^2$

C = (At - Ab) / Dt

@ 5536.00

@ 5530.00

Ab = 4136.00 SF
At = 10292.00 SF
Dt = 6.00 FT

C = 1026.00 FT / LF-DEPTH

DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
0	0.00000	0
0.85	0.08922	2.69
1	0.10673	4.25
1.5	0.16892	7.37
2	0.23701	9.51
2.5	0.31098	11.26
3	0.39084	12.76
3.5	0.47659	14.11
4	0.56823	15.34
4.5	0.66575	16.48
5	0.76917	17.54
5.5	0.87847	18.54
6	0.99366	19.50

$Q = CA\sqrt{2gH}$
C = 0.60
A = ¶ r^2, where r = 9"
g = 32.2
H = water depht, measured from the center of the orifice plate

PONDCALC.WK4

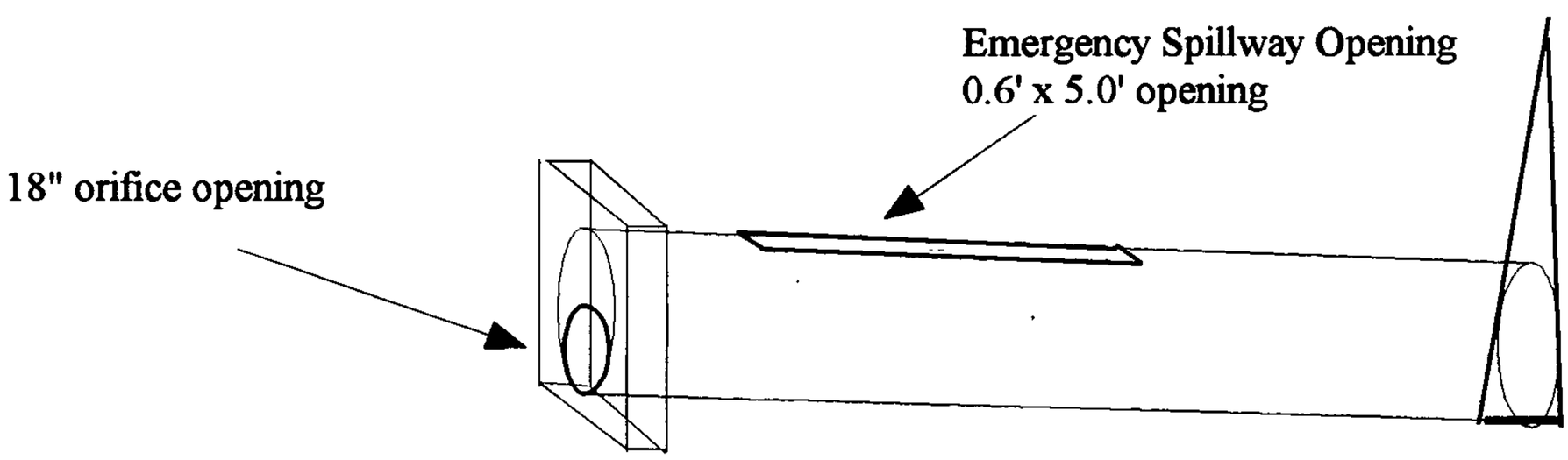
EMERGENCY SPILLWAY

Since the normal water depth in the pond does not exceed the elevation at the top of pipe, an opening, as described below, will be provided for an emergency spillway.

The maximum head (H) on top of the pipe is approximately 4'.

$Q = CA\sqrt{2gH}$
C = 0.60
A = 0.7*3.5 = 3.00 cfs ⟶ cut opening on top of the 36" RCP pipe
g = 32.2
H = water depth, measured from the center of the orifice plate

$Q = 0.6*5.0*\sqrt{64.4*4}$ = 28.89 cfs > 28.48 cfs (100-year storm)



PURPOSE

The purpose of this Grading and Drainage Plan is to present the drainage management plan for LA CUEVA TIERRA, UNIT III for Preliminary Plat approval.

EXISTING CONDITIONS

The parcel is Lots 66 and 67 of Vineyard Estates Unit 3, and Lots 17 through 20, Block 8, Tract 3, Unit 3 of Albuquerque, Bernalillo County, New Mexico, filed October 1994. See attached highlighted Vicinity Map C-20 for site location.

The site lies adjacent to the North Domingo Baca Arroyo and has a small flood finger extending into the project. The development of Vineyard Estate IV and development of storm sewer system in Ventura has removed the flooding on site.

The out flows in the existing Vineyard Estate IV pond are split in two outflow of 21 cfs and 25 cfs. The 21 cfs drains through a 24" CMP along Ventura to North Domingo Baca Arroyo. Two 24" CMP drain an additional 25 cfs to La Cueva Tierra subdivision and then to the North Domingo Baca Arroyo. All on site runoff sheet flows towards the southwest side of the Tract to North Domingo Baca Arroyo.

HYDROLOGY ANALYSIS

Hydrological aspects of this site were evaluated using AMAFCA's AHYMO program according to guidelines presented in the City of Albuquerque DPM, Section 22.2 (January 1993). All of the pertinent hydrologic parameters and calculations are located in the calculations of this report. Historical undeveloped runoff is 16.81 cfs.

PROPOSED MANAGEMENT PLAN (ON-SITE)

The development of this site will create a total runoff of 28.48 cfs on site. All the runoff on site will routed to the streets and surface flow to a detention pond on the southwest side of the project. The flow from the pond is confined to an outflow of 13.97 cfs with an 18" orifice plate. The outflow of 13.97 cfs is less than undeveloped rate of 16.81 cfs. The interim storm sewer is designed to drain twice the 100-yr storm of 56.96 cfs. Volume required for ponding is 0.447 Ac-Ft and the volume provided is 0.672 Ac-Ft. We are providing an emergency spillway where the water will drain out of the pond

to Robs Place. Upon completion of the downstream arroyo the pond can be filled in and the lots reclaimed. The storm sewer will be connected allowing full discharge out of the subdivision. Once the lots are reclaimed, there will not be a need of emergency spillway since the storm drain system is designed for twice the 100-year runoff.

If the alignment of arroyo was to move towards the south, we will be able to extend the storm sewer to the south by creating a high point on Carmel where the pipe crosses. Therefore, at the point of pipe crossing on Carmel the runoff from the street will drain to the east and west.

PROPOSED MANAGEMENT PLAN (OFF-SITE)

We are proposing an interim ponding solution and redirecting the 25 cfs down Ventura. We propose extending the 54" RCP storm sewer to the North Domingo Baca Arroyo, and drain the 25 cfs through the 54" RCP. In order to route the 25 cfs will build two new manholes 1 and 2 intercepting both the 24" CMP, and rerouting the flow to the proposed 54" RCP to North Domingo Baca Arroyo. See the following sheet for manhole locations. Also see enclosed Grading and Drainage Plan for on-site and offsite flows.

We are proposing to extend the 54" RCP from station 11+42.94 (where it was left off by Jeff Mortensen & Associates Inc. design) and extend it up to station 6+63 where it would tie into the existing 24"x35" CMAP. See enclosed copies of the plans designed by Jeff Mortensen & Associates Inc. for stationing and location of the existing storm structures. A Letter of Map Revision will be done as well.

An evaluation of the North Domingo Baca Arroyo was completed by Mark Goodwin & Associates. A flood wall will be built along the south property line protecting the subdivision. The depth of the wall will be built to the scour depth plus two feet. The top of the wall will be built to the top of the energy grade line plus two feet. See enclosed report on bank protection analysis prepared by Mark Goodwin & Associates.

EROSION CONTROL PLAN

The plan centers on the fact that storm water will not be allowed to discharge during the construction process until the site is developed. It is the responsibility of the contractor to build a berm along the south and west property line. See the enclosed Grading and Drainage Plan for the erosion control plan.

ANAHEIM AVE. N.E.

(50' R.O.W.)

STA 11+42.94

(SEE CITY PROJECT #3391.96 SHEET 11 OF 34)
BEGIN EXTENTION OF 54" RCP

EXISTING 6-24" CMP

MH #1

EXISTING 24" CMP

24" CMP

24" CMP

MH #2

W/ END SECTIONS

STA 9+95.00

24" CMP

(SEE CITY PROJECT #3391.96 SHEET 11 OF 34)
NEW 6' DIA. MH

EXISTING 4' MH

1' WATER BLOCK

EXISTING 24" CMP

VENTURA STREET N.E.

86' ROW

44' F-F

54" RCP IV

12"

293.84'

S 00°13'20" W

TC=49.85

TC=48.24

TC=47.17

TC=46.15

TC=44.37

TC=44.30

TC=44.18

TC=43.84

TC=43.18

TC=38.66

TC=40.59

TC=44.26

ASPHALT CURB

P= 42.08
PAD= 50*50

P= 40.36

P= 39.28

P= 39.29

P= 38.91

PAD= 50*50

PAD= 50*50

PAD= 50*50

25R

5%

50.00' ROW

12.00' F-F

5/8" REBAR W/CAP
STAMPED "LS 3243"

Q=25 CFS (73' R.O.W.)

DRAINAGE EASEMENT

WATER VALVE

FOUND 3/4" PIPE

BANK PROTECTION
ALONG SOUTH PROPERTY LINE

W/CAP

TIEN S 66°29'02" W 2911.16'

5545

5540

MH #3

EXISTING 4' DIA. MH

CONNECT TO EXISTING
24" X 35" CMAP CULVERT
(16 TOTAL)

EXISTING 24" CMP

EROSION CONTROL PLAN NOTES

1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING A TOPSOIL DISTURBANCE PERMIT PRIOR TO BEGINING WORK.
2. CONTRACTOR IS RESPONSIBLE FOR CLEANINIG ALL SEDIMENT O OF EXISTING RIGHT-OF-WAY.
3. CONTRACTOR IS RESPONSIBLE FOR CLEANING UP ANY SEDIMEN THAT GETS INTO EXISTING RIGHT-OF-WAY.
4. EROSION CONTROL BERM IS REQUIRED ON THE SOUTH & WEST LINE TO DIVERT RUNOFF TO NEW DESILTING POND ON THE SOUTHWEST SIDE OF THE TRACT.
5. EROSION CONTROL BERM MUST BE IN PLACE PRIOR TO ANY CONSTRUCITON ON SITE.

BASIS OF ELEVATIONS
ASC MONUMENT "1-C21"
CENTRAL STATION DATA
NM STATE PLANE COORDINATES
(CENTRAL ZONE) NAD 1927
X=415,503.35
Y=1,518,787.29
GROUND TO GRID FACTOR=0.99963867
DELTA ALPHA=-00°09'46"

N

40 0 20

1"=40'

4' SW

25'

38.35

60' OR 65'

FINDING STREET CAPACITY – 28 F–F CROSS–SECTION FOR 4" CURB

$Q = 1.49/n\ A\ R^{(2/3)}\ S^{1/2}$
n = 0.017
SLOPE = 0.0060
$R^{2/3} = (A/P)^{2/3}$
$Fr = V / SQRT(g\ Y)$
D2 = HYDRAULIC JUMP HEIGHT = $Y/2\ [\ SQRT(1+8Fr^2) - 1\ ]$
E = HYDRAULIC JUMP = $D + V^2/2g$

@ $Y \leq 0.0625$
$A1 = \frac{1}{2}\ Y\ (Y/0.03125) = 16Y^2$
$P1 = SQRT[Y^2 + (Y/0.03125)^2] + Y = SQRT(1025Y^2) + Y$

Y (FT)	A	P	R^2/3	Q	Q/A	2Q	E	Fr	D*V	D2
0.0100	0.00	0.33	0.0286	0.00	0.19	0.00	0.01	0.34	0.0019	--
0.0250	0.01	0.83	0.0528	0.00	0.36	0.01	0.03	0.40	0.0089	--
0.0400	0.03	1.32	0.0722	0.01	0.49	0.03	0.04	0.43	0.0195	--
0.0550	0.05	1.82	0.0892	0.03	0.60	0.06	0.06	0.45	0.0332	--
0.0625	0.06	2.06	0.0972	0.04	0.66	0.08	0.07	0.46	0.0411	--

@ $0.0625 < Y \leq 0.3025$ & $Y1 = Y - 0.0625$
$A2 = A1 + \frac{1}{2}Y1\ (Y1/0.02) + 2Y1 = A1 + 25Y1^2 + 2Y1$
$P2 = P1 + SQRT[Y1^2 + (Y1/0.02)^2] + Y1 = P1 + SQRT(2501Y^2) + Y1$

0.1000	0.17	3.98	0.1235	0.14	0.84	0.29	0.11	0.47	0.0836	--
0.2000	0.81	9.08	0.1997	1.10	1.35	2.19	0.23	0.53	0.2704	--
0.2200	1.00	10.10	0.2137	1.44	1.45	2.89	0.25	0.54	0.3183	--
0.2400	1.21	11.12	0.2273	1.86	1.54	3.71	0.28	0.55	0.3694	--
0.2760	1.63	12.95	0.2510	2.77	1.70	5.54	0.32	0.57	0.4690	--
0.2807	1.69	13.19	0.2540	2.91	1.72	5.81	0.33	0.57	0.4827	--
0.2950	1.88	13.92	0.2631	3.35	1.78	6.69	0.34	0.58	0.5255	--
0.3025	1.98	14.31	0.2678	3.59	1.81	7.19	0.35	0.58	0.5484	--

@ $0.3025 < Y \leq 0.3333$ & $Y1 = Y - 0.3025$
$A3 = A2 + 14\ Y2$
$P3 = P2 + Y2$

0.3050	2.02	14.31	0.2709	3.70	1.83	7.40	0.36	0.59	0.5594	--
0.3100	2.09	14.31	0.2771	3.92	1.88	7.83	0.36	0.59	0.5815	--
0.3150	2.16	14.32	0.2832	4.14	1.92	8.27	0.37	0.60	0.6039	--
0.3200	2.23	14.32	0.2892	4.36	1.96	8.72	0.38	0.61	0.6265	--
0.3250	2.30	14.33	0.2951	4.59	2.00	9.18	0.39	0.62	0.6494	--
0.3293	2.36	14.33	0.3002	4.79	2.03	9.59	0.39	0.62	0.6693	--
0.3333	2.41	14.34	0.3049	4.98	2.06	9.97	0.40	0.63	0.6880	--

@ $0.3333 < Y \leq 0.5133$ & $Y3 = Y - 0.3333$
$A4 = A3 + \frac{1}{2}Y3\ (Y3/0.02) + 2Y3 = A3 + 25Y3^2 + 14Y3$
$P4 = P3 + SQRT[Y3^2 + (Y3/0.02)^2] = P3 + SQRT(2501Y3^2)$

0.3400	2.51	14.67	0.3081	5.23	2.09	10.47	0.41	0.63	0.7091	--	
0.3579	2.77	15.57	0.3166	5.95	2.14	11.89	0.43	0.63	0.7672	--	
0.4098	3.63	18.16	0.3419	8.41	2.31	16.81	0.49	0.64	0.9486	--	*
0.4293	3.99	19.14	0.3515	9.49	2.38	18.98	0.52	0.64	1.0215	--	
0.4693	4.78	21.14	0.3712	12.01	2.51	24.02	0.57	0.65	1.1792	--	
0.4893	5.21	22.14	0.3810	13.43	2.58	26.85	0.59	0.65	1.2620	--	
0.5001	5.44	22.68	0.3863	14.24	2.62	28.48	0.61	0.65	1.3079	--	**
0.5300	6.13	24.17	0.4008	16.65	2.71	33.30	0.64	0.66	1.4384	--	***

*** Depth times velocity based on the 10–year flow (16.81 CFS) = 0.95 ≤ 6.5**
& the depth (0.41) of the flow is less than .5'

**** Qp = 28.48 CFS**

***** Capacity of the street:**
(0.2' above the curb) = 33.30 CFS > 28.48 CFS

STORM

Q (cfs)

STREET slope (ft/ft)

Street capacity program input

```
10   16.81 0.006
100  28.48 0.006
999  0.00 0.00
```

Street capacity program output

28-FT F-F, 4" CURB STREET SECTION

STREET CAPACITY BASED ON 100-YR STORM

FLOW CFS	SLOPE FT/FT	Dn FT	Vn FT/S	D*V FT²/S	Fr	E FT	D2 FT
28.48	.00600	.500	2.621	1.309	.653	.606	----

END OF THE OUTPUT FILE

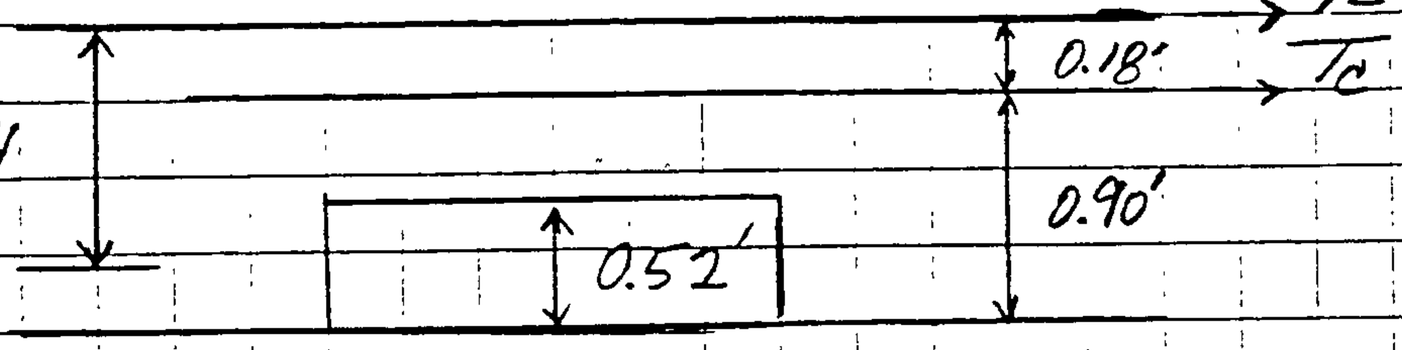
STREET CAPACITY BASED ON 10-YR STORM

FLOW CFS	SLOPE FT/FT	Dn FT	Vn FT/S	D*V FT²/S	Fr	E FT	D2 FT
16.81	.00600	.409	2.320	.950	.639	.493	----

END OF THE OUTPUT FILE

Drop Inlet Capacity
(Ponding Sections)

Throat



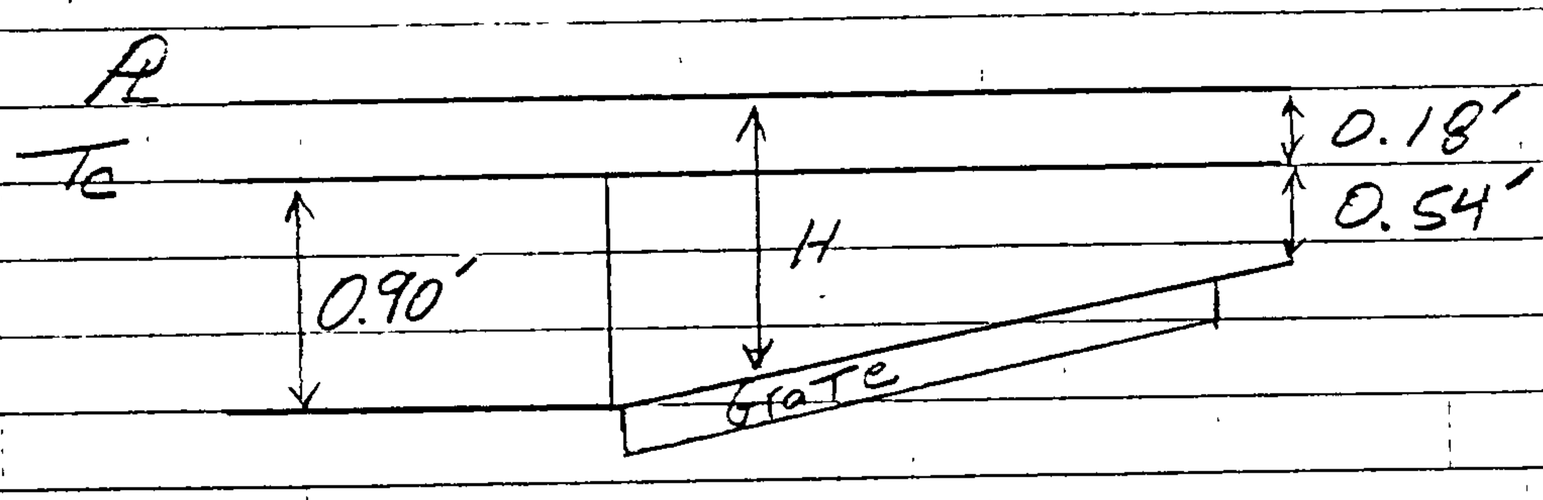
$$H = 0.90 + 0.18 - 0.52/2 = 0.82'$$

$$Q = CA\sqrt{2gH}$$

$$= 0.6(3.85)\sqrt{64.4(0.82)}$$

$$= 16.82 \text{ cfs}$$

Grate



$$H = 0.18 + (0.90 + 0.54)/2 = 0.90'$$

$$Q = 0.60(4.21)\sqrt{64.4(0.90)}$$

$$= 19.20 \text{ cfs}$$

$$Q_{Total} = 19.20 + 16.82 = 36.02 \text{ cfs}$$

$$Q_{100} = 28.48 \text{ cfs}$$

$$2 \times Q_{100} = 56.96 \text{ cfs}$$

USE TWO DBL-A = $2 \times 36.02 = 72.04$ cfs > 56.96 cfs

Pond Calculation (Minimum Size of The Pond)

From AHYMO Summary output:

Volume for Q_{100} under developed Conditions = 1.021 Ac-ft

" " " " Undeveloped " = 0.574 Ac-ft

Volume Required to Pond = 1.021 − 0.574 = 0.447 Ac-ft

Volume = 0.447 Ac-ft = 19,471.40 CF

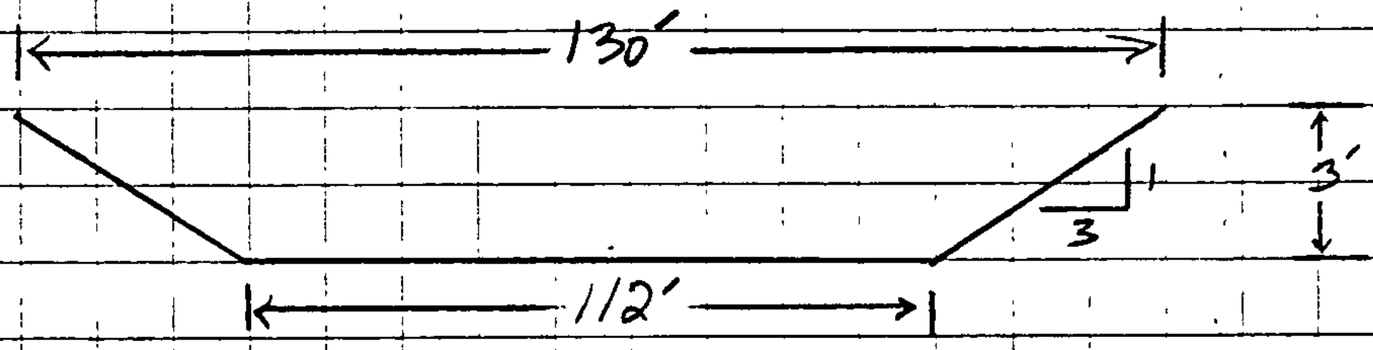
Pond Dimensions

Top Dimensions = 130 X 89 = 11,570 SF

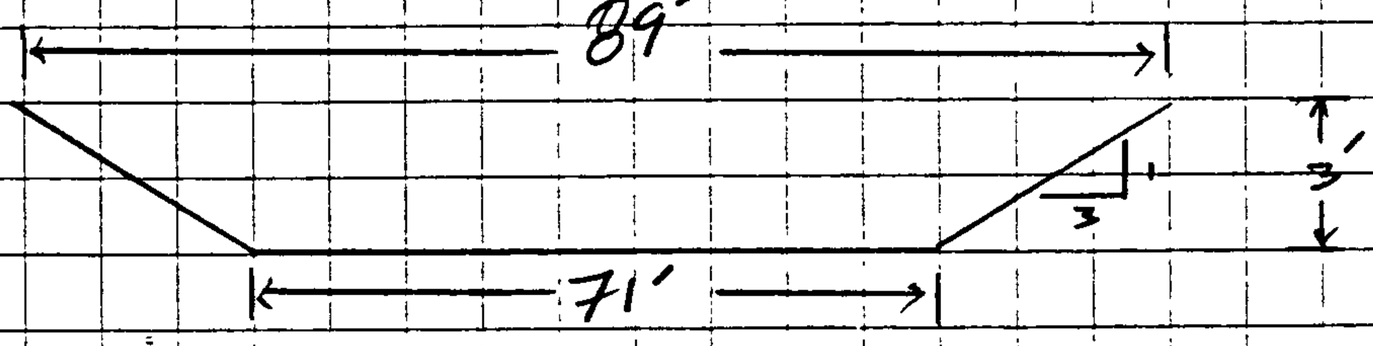
Bottom " = 112 X 71 = 7,952 SF

Volume = (11,570 + 7,952)/2 × 3

V = 29,283 SF



N-S Phase of the Pond



S-E Phase of The Pond

See next sheet for AHYMO input file calculation for The Pond.

AHYMO input File Calculation

Allowable Discharge = 19.42 cfs

Sizing the orifice Plate:

$$Q = CA\sqrt{2gh}$$

$C = 0.8$, $h = 2.5'$

$$A = Q/C\sqrt{2gh}$$

$$= 19.42/0.8\sqrt{2 \times 32.2 \times 2.5} = 1.9131\ SF$$

$A = \pi r^2$, $r = \sqrt{A/\pi} = 0.78' = 9.36''$

Use an 18" orifice Plate $A = 1.7671\ SF$

Volume @ a Given Depth of 0.4':

$$\left[\underbrace{(112 \times 71)}_{\text{Bottom Area}} + (1124 + 2 \times 0.4 \times 3)(71 + 2 \times 0.4 \times 3)\right]/2 \times 0.4$$

Top Area

$$= 3269.79\ CF = 0.07506\ AC\text{-}Ft$$

AHYMO INPUT FILE

WATER ELEV. FT	OUTFLOW CFS	VOLUME CF	VOLUME AC-FT
0.000	0.00	0.00	0.00000
0.400	7.18	3269.79	0.07506
0.800	10.15	6722.18	0.15432
1.200	12.43	10364.06	0.23793
1.600	14.35	14202.37	0.32604
2.000	16.04	18244.00	0.41882
2.400	17.58	22495.87	0.51643
2.500	17.94	23592.50	0.54161

Over Flow Weir Calculation (Emergency Spillway @ The Pond)

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

$$H = \left(\frac{Q}{CL}\right)^{2/3}$$

$Q = 28.48$ c/s

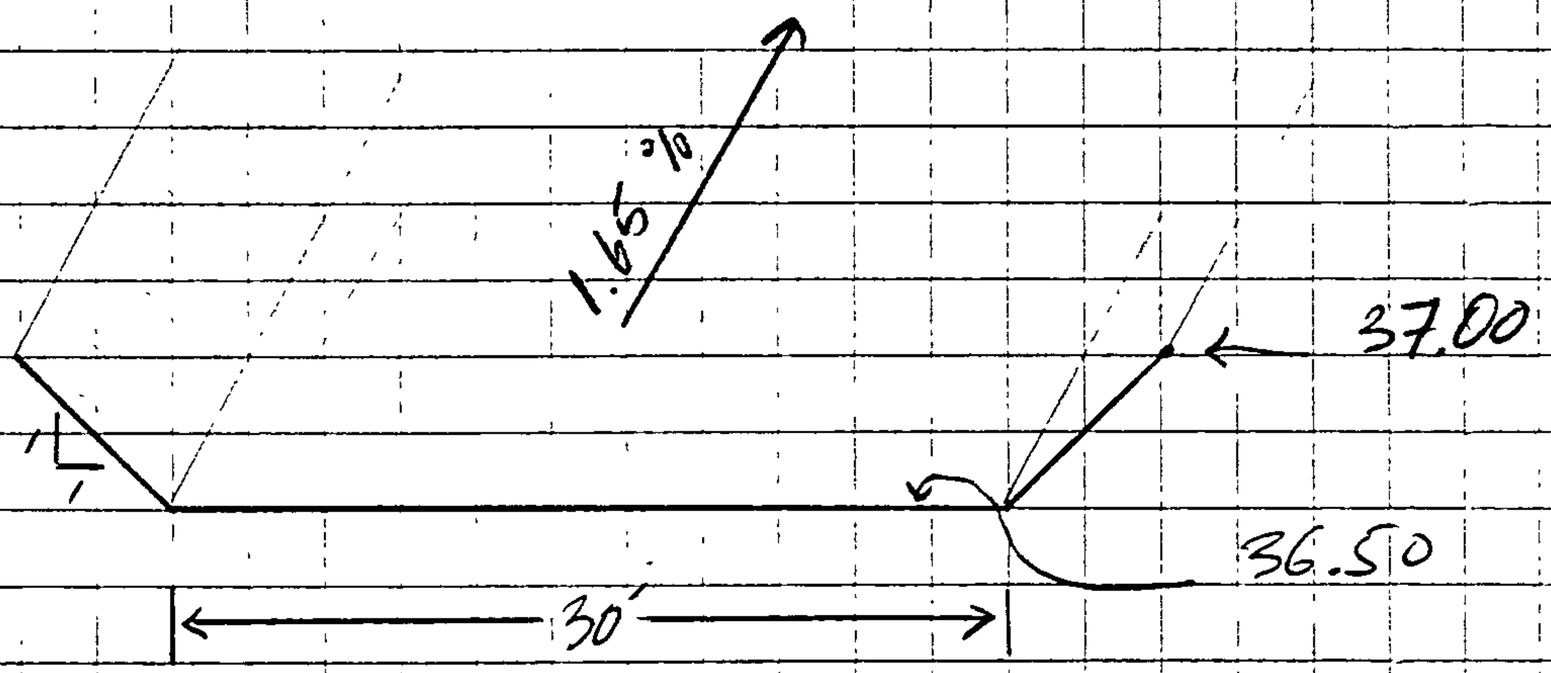
$C = 2.95$

$L = 30'$

$$H = \left(\frac{28.48}{2.95 \times 30}\right)^{2/3}$$

$H = 0.47'$

Robs Plate



Pond

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: DRAINAGE PIPE HYDRAULICS

Solve For Actual Depth

Given Input Data:

Diameter.....	2.50 ft
Slope.....	0.0180 ft/ft
Manning's n.....	0.012
Discharge.....	28.48 cfs

Computed Results:

Depth.....	1.22 ft
Velocity.....	12.01 fps
Flow Area.....	2.37 sf
Critical Depth....	1.82 ft
Critical Slope....	0.0053 ft/ft
Percent Full.....	48.68 %
Full Capacity.....	59.62 cfs
QMAX @.94D.....	64.13 cfs
Froude Number.....	2.17 (flow is Supercritical)

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Comment: DRAINAGE PIPE HYDRAULICS

Solve For Actual Depth

Given Input Data:

Diameter.....	2.50 ft
Slope.....	0.0180 ft/ft
Manning's n.....	0.012
Discharge.....	56.96 cfs ← $2\,Q_{100\text{-yr}}$

Computed Results:

Depth.....	1.96 ft
Velocity.....	13.83 fps
Flow Area.....	4.12 sf
Critical Depth....	2.37 ft
Critical Slope....	0.0142 ft/ft
Percent Full.....	78.23 %
Full Capacity.....	59.62 cfs
QMAX @.94D.....	64.13 cfs
Froude Number.....	1.72 (flow is Supercritical)