City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

April 26, 2002

Tom Issacson, P.E.
Isaacson & Arfman, P.A.
128 Monroe St NE
Albuquerque, NM 87108

RE: SAN ANTONIO CONDOS *(Phase 2- Remainder of Units)* (D-18/D42)
(6501 San Antonio Ave NE)
ENGINEERS CERTIFICATION FOR CERTIFICATE OF OCCUPANCY
ENGINEERS STAMP DATED 6/24/1999
ENGINEERS CERTIFICATION DATED 4/25/2002

Dear Mr. Isaacson:

Based upon the information provided in your Engineers Certification submittal dated 4/25/2002, the above referenced site is approved for a Permanent Certificate of Occupancy.

If I can be of further assistance, please contact me at 924-3981.

Sincerely,

Teresa A. Martin

Teresa A. Martin
Hydrology Plan Checker
Public Works Department
BLB

C: Vickie Chavez, COA
drainage file
approval file

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 14, 2001

Thomas O. Isaacson, P.E.
Isaacson & Arfman, P.A.
128 Monroe St NE
Albuquerque, New Mexico 87108

RE: SAN ANTONIO CONDOS ***Phase 1 Units 1-12, 16-19, 28 & Clubhouse*** (D-18/D42)
(Santa Monica/San Antonio)
ENGINEERS CERTIFICATION FOR CERTIFICATE OF OCCUPANCY
ENGINEERS STAMP DATED 6/24/1999
ENGINEERS CERTIFICATION DATED 12/11/2001

Dear Mr. Isaacson:

Based upon the information provided in your Engineers Certification submittal dated 12/11/2001, the above referenced site is approved for Permanent Certificate of Occupancy for Phase 1 Units 1-12, 16-19, 28 & Clubhouse.

If I can be of further assistance, please contact me at 924-3981.

Sincerely,

Teresa A. Martin

Teresa A. Martin
Hydrology Plan Checker
Public Works Department
BIB

C: Vickie Chavez, COA
drainage file
approval file

DRAINAGE REPORT

FOR

SAN ANTONIO CONDOMINIUMS

Located on
San Antonio Drive Between
San Pedro and Louisiana
Albuquerque, New Mexico

APRIL 1999

Prepared by:

ISAACSON & ARFMAN, P.A.
128 Monroe Street NE
Albuquerque, NM 87108
(505) 268-8828

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR
NO. 3895
NEW MEXICO
THOMAS O. ISAACSON

Thomas O. Isaacson 4·16·99

Thomas O. Isaacson, PE **Date**

I. INTRODUCTION

This report presents the drainage findings relevant to the development of the San Antonio Condominiums which will be located on the north side of San Antonio Drive between San Pedro and Louisiana, Albuquerque, New Mexico. The proposed development will consist of 56 buildings, each of which will contain three condominium units for a total of 168 units. The site occupies an area of 9.80 acres.

Replatting of the property is required for development. A 3-foot wide dedication of additional right of way is required along San Antonio Drive. In addition, a 12-foot wide deceleration lane dedication will be given for the main entrance on San Antonio. The replat will also eliminate existing lot lines within the property. The boundaries of the grading and drainage plan for the project presented in this report are shown to the future right-of-way lines of the replat.

II. EXISTING CONDITIONS

Onsite. Figure A shows the site location. Figure B shows the site boundary and existing topographic conditions along with the existing drainage basin boundaries.

The site is somewhat higher than the adjacent streets to the north, Santa Monica, and to the south, San Antonio and consequently drains to these streets. The adjacent property to the west, the Academy Station Post Office, has constructed a retaining wall along the common lot line of the properties. A concrete drainage swale approximately 18-inches wide was constructed along the east (uphill) side of the retaining wall which intercepts local sheet flow and redirects it to the north and south.

The westerly third of the site was previously graded and portions paved. The prior use of the area is unknown. The 1978 City orthophoto topo map shows eleven clustered buildings on the site. Asphalt paving for the development remains. The remainder of the site is vegetated with native grasses and weeds.

As shown on Figure B, Drainage Basin 3 drains to Santa Monica and Drainage Basin 4 drains to San Antonio. 100-year runoff rates for these two basins are:

Basin 3, Q_{100} = 12.7 cfs

Basin 4, Q_{100} = 12.4 cfs

Appendix A, page A-1 shows the 100-year runoff calculations for Basins 3 and 4.

Adjacent Offsite Drainage Areas. The adjacent property to the east, Grace Church, has two minor offsite tributary areas which drain onto the property. These two areas, Drainage Basins 1 and 2 are shown on Figure B. 100-year runoff calculations are given in Appendix A-1. The 100-year runoff values are:

Basin 1, Q_{100} = 0.4 cfs

Basin 2, Q_{100} = 0.3 cfs

Adjacent Street Analysis and Downstream Capacity. The site is bounded by streets on the north and south which accept site runoff. The following paragraphs discuss the investigation and analysis of these streets.

SANTA MONICA AVENUE. Santa Monica Avenue adjoins the property on the north. Presently only the north half of the street is constructed; the south half will be constructed with this project. Street capacity calculations are based on full street width (40' face to face of curbs) conditions.

Figure C shows the drainage areas for the adjoining streets. Basin A, the drainage basin for Santa Monica at the northwest corner of the site, has a 100-year runoff rate of 24.7 cfs (see Appendix page A-2). Santa Monica has a grade of 3.07% and a street flow capacity of 65 cfs at this location.

Flows in Santa Monica contribute to San Pedro runoff which runs north to the North Pino Arroyo, a concrete-lined channel located approximately one-half mile north. The tributary area in San Pedro at this point is designated as Basin B on Figure C and has an area of 87 acres. At a runoff rate of 2.6 cfs/acre the 100-year flow rate for Basin B would be 227 cfs. Since there are no storm drains in this section of San Pedro, all runoff will travel in the street. San Pedro has an average slope of 1.57% with a corresponding street carrying capacity of 90 cfs (48' face to face street). Consequently flooding conditions exist at this location on San Pedro.

SAN ANTONIO DRIVE. Figure C also gives the drainage areas tributary to San Antonio at three locations adjacent to the project area.

Basin C is located just east of Louisiana where a battery of three storm drain inlets intercepts a portion of the street flows and conveys them south to the Pino Arroyo, a concrete-lined channel. See Figure D for drainage inlet information at this location.

100-year flows for Basin C are calculated on page A-2, Appendix. Inlet interception at this location is given on page A-3. Appendix. Flow summary at Basin C is:

100-Year Flow	=	42.7 cfs
Less Inlet Interception	=	-30.0 cfs
Flow Past Inlets	=	12.7 cfs

Basin D is located on San Antonio Drive opposite the southwest corner of the site. Flows accumulating at this location result from:

1) Flows passing the storm drain inlets at San Antonio and Louisiana.
2) Controlled runoff from developed tracts between the site and Louisiana Blvd. (Grace Church and adjoining gasoline station).
3) Uncontrolled runoff from remaining tributary areas.

100-year flow rates for Basin D are calculated as follows:

Flows from Subbasin D	=	37.2 cfs
Controlled Flows from Church & Station	=	25.9 cfs*
Flows Passing Inlets at Basin C	=	12.7 cfs
Total	=	75.8 cfs

Basin E is located just east of San Pedro where a battery of six inlets intercepts street flows and again conveys them south to the Pino Arroyo Channel. See Figure E drainage for inlet information.

100-year flows for Basin E are calculated on page A-2, Appendix; and inlet interception at this location is given on page A-3, Appendix. Flow summary at Basin E is:

100-Year Flow	=	98.8 cfs
Less Inlet Interception	=	-76.5 cfs
100-Year Flow Past Inlets	=	22.3 cfs

These calculations demonstrate that there are no downstream flooding conditions in the vicinity of the site.

*9.7 acres at 2.67 cfs/acre

Street flow depths and conjugate depths from a hydraulic jump are calculated for Basin D on page A-4, Appendix. The normal flow depth is 0.64 feet above gutter and the conjugate flow depth is 0.73 feet above top of curb.

III. PROPOSED DRAINAGE MANAGEMENT PLAN

Criteria and Concept. Developed flows from the site will drain to both Santa Monica and San Antonio. Since there is flooding potential downstream from Santa Monica, the developed flows draining to Santa Monica will be managed so that historic flow rates are not exceeded. Developed runoff rates to San Antonio for adjacent developments have in the past been limited to a developed runoff rate of 2.67 cfs per acre. This criteria has been placed in effect because of the limited downstream storm drain capacity at the San Antonio/San Pedro intersection. Drainage plans for the two developed properties to the east, Grace Church and a gasoline station, have been approved by City Hydrology under this criteria.

The Grading and Drainage Plan for the proposed development is found in the rear pocket. Developed flows are controlled by retention ponding with controlled discharge so that total developed flows from the site do not exceed those allowed by the above criteria.

Developed Flows to Santa Monica. Developed flows to Santa Monica originate from Basins 10, 20, and 30 and are summarized as follows:

Q_{100} Basin 10 (Ponded)	=	2.9 cfs
Q_{100} Basin 20	=	2.2 cfs
Q_{100} Basin 30	=	6.8 cfs
Total	=	11.9 cfs

Since the existing 100-year flows to Santa Monica are 12.7 cfs (Basin 3), the proposed plan will reduce flows by 12.7 – 11.9 = 0.8 cfs.

Calculations for 100-year frequency flows are found on page A-5, Appendix, and calculations for 100-year runoff volumes are found on page A-6, Appendix. Detention pond calculations for Pond 10 are found on pages A-7 thru A-10, Appendix. Ponding depths in Pond 10 do not exceed 1.5 feet.

Developed Flows to San Antonio. Developed flows to San Antonio originate from Basins 40, 50, 60, and 70 are summarized as follows:

Q_{100} Basin 40	=	0.1 cfs
Q_{100} Basin 50 (Ponded)	=	10.7 cfs
Q_{100} Basin 60 (Ponded)	=	0.9 cfs
Q_{100} Basin 700	=	0.5 cfs
Total	=	12.2 cfs

Allowable discharge at 2.67 cfs per acre is 2.67 x 5.29 acres = 14.1 cfs. Therefore, developed flows will be less than allowable flows by the amount of 14.1 – 12.2 = 1.9 cfs.

Calculations for 100-year frequency flows for Basins 40-70 are found on page A-5, Appendix, and calculations for 100-year runoff volumes are found on page A-6, Appendix. Detention pond calculations for Pond 50 are found on pages A-11 thru A-14 and for Pond 60 on pages A-15 thru A-18. Ponding depths for Pond 50 exceed 1.5' and a security fence will be installed. Ponding depths for Pond 60 are less than 1.5 feet.

Outlets from detention ponds will connect to new sidewalk culverts. Calculations to determine sidewalk culvert sizes are given on page A-19, Appendix.

Since there is a slight decrease in runoff to San Antonio, the street flow depth analysis made for existing conditions remains valid and it is not necessary to investigate flow depths for developed conditions. Peak flows are calculated to remain within the curbed street section. Should a hydraulic jump occur, flows would be higher than curb levels; however, since the development will have a perimeter wall, flows will be contained within the street right of way. Additionally, grading at the entrance is raised above the hydraulic jump flow level.

IV. PLATTING AND PUBLIC INFRASTRUCTURE

Replatting of the property is a development requirement as discussed in the Introduction section of this report. A copy of the preliminary plat is included in the rear pocket.

Required infrastructure improvements will include a deceleration lane at the entrance on westbound San Antonio and construction of the south half of the street on Santa Monica. Public infrastructure will include necessary sidewalk culverts associated with detention pond outlets from the development. A draft infrastructure list is presented on the following pages.

V. SUMMARY

The control of runoff by onsite detention ponding meets the runoff rates previously approved by the City and will not adversely affect downstream runoff conditions.

RUNOFF CALCULATIONS FOR Q_{100} ~ Existing Site Conditions

Precip. Zone	Excess Precipitation, E (inches)			
	A	B	C	D
1	1.29	2.03	2.87	4.37
2	1.56	2.28	3.14	4.70
3	1.87	2.60	3.45	5.02
4	2.20	2.92	3.73	5.25

Project: San Antonio Drive Condos

By: TDI Date: 1·27·99

Drainage Basin	Land Treatment Areas (ac)					Q_{100} (cf)	Remarks
	A_T	A_A	A_B	A_C	A_D		
1	0.11			0.11		0.4	Existing Condition
2	0.09			0.09		0.3	" "
3	4.58	2.86		0.82	0.90	12.7	" "
4	5.29	3.90		1.17	0.22	12.4	" "

RUNOFF CALCULATIONS FOR Q_{100} ~ Adjacent Street

Precip. Zone	Peak Discharge (cfs/ac) A	B	C	D
1	1.29	2.03	2.87	4.37
2	1.56	2.28	3.14	4.70
3	1.87	2.60	3.45	5.02
4	2.20	2.92	3.73	5.25

Project: San Antonio Condos

By: TDI Date: 4/7/99

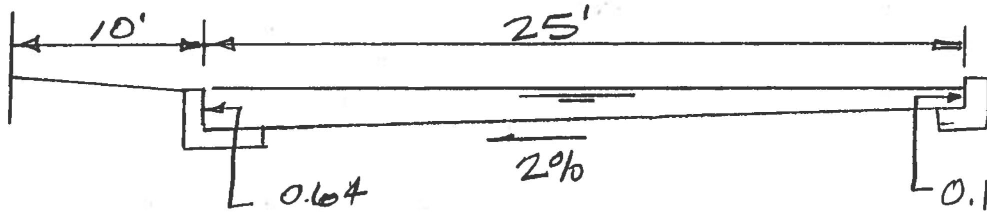
Drainage Basin	Land Treatment Areas (ac) A_T	A_A	A_B	A_C	A_D	Q_{100} (cf)	Remarks
A	7.13	2.86	–	1.33	2.94	24.7	Santa Monica opp. NW Site Corner
C	10.3	2.1	0.6	0.6	7.0	42.7	San Antonio & Louisiana
						-30.0	Inlet Interception
						12.7	Flow past Inlet.
D	10.1	4.0		0.6	5.5	37.2	Free Discharge
						+25.9	Controlled Discharge
						+12.7	Flows from Basin C
						75.8	San Antonio Flows at D
E	5.2	0.8	–	0.4	4.0	23.0	Free Discharge
						75.8	Flows from Basin D
						98.8	San Antonio Flows at E

STORM DRAIN INLET CALCULATION TABLE

Location	Q Upstream (cfs)	Street Grade (%)	Flow Depth (ft)	Inlet Type	Inlet Capacity (cfs)	Q Downstream (cfs)
C	42.7	3.0	.59	A	10.5	32.2
	32.2	"	.53	A	9.0	23.2
	23.2	"	.49	2C	10.5	12.7
E	98.8	3.0	.72	A	13.5	85.3
	85.3	"	.67	2C	15.5	69.8
	69.8	"	.62	2C	13.5	56.3
	56.3	"	.57	2C	12.0	44.3
	44.3	"	.53	2C	11.5	32.8
	32.8	"	.48	2C	10.5	22.3

CALCULATE SAN ANTONIO STREET FLOWS @ $\boxed{D}$

Find Flow Depth for $Q = 75.8$ cfs
$S = 2.95\%$



Try $d = 0.64'$

$$A = \left(\frac{.64 + .14}{2}\right) 25 = 9.75 \text{ ft}^2$$

$$R = 9.75 / 25.78 = .38$$

$$Q = \frac{1.486}{.017}(9.75)(.38)^{2/3}(.0295)^{1/2} = 76.8 \text{ cfs, OK}$$

$$v = Q/A = 75.8/9.75 = 7.77 \text{ fps}$$

Calc Hydraulic Jump Depth:

Hydraulic Depth = Area / Flow Width at top
$D_1 =$.

$$F = v/\sqrt{gD_1} = 7.77 / \sqrt{32.2 \times .39} = 2.19$$

$$\frac{D_2}{D_1} = \frac{1}{2}\left(\sqrt{1+8F^2} - 1\right) = \frac{1}{2}\left(\sqrt{1+8(2.19)^2} - 1\right) = 2.64$$

$$D_2 = D_1(2.64) = .39(2.64) = 1.03$$

Convert Hydraulic Depth, D_2, to Depth at Curb

$A_2 = 35 \times 1.03 = 36.05$
Street Area below Top of Curb $= \underline{10.5 \text{ ft}^2}$
25.55

Height above Top of Curb for D_2

$= 25.55 \text{ ft}^2 \div 35'$
$= \underline{\underline{.73}}$

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SUBJECT San Antonio Condos JOB NO.
BY TOI DATE 4/9/99 SHEET NO. OF

RUNOFF CALCULATIONS FOR Q_{100} ~ Developed On-Site Basins

Precip. Zone	Peak Discharge (cfs/ac) A	B	C	D
1	1.29	2.03	2.87	4.37
2	1.56	2.28	3.14	4.70
3	1.87	2.60	3.45	5.02
4	2.20	2.92	3.73	5.25

Project: San Antonio Condos

By: TOI Date: 4/3/99

Drainage Basin	Land Treatment Areas (ac) A_T	A_A	A_B	A_C	A_D	Q_{100} (cf)	Remarks
10	1.09		.10	.16	.83	5.0	
20	0.50		.06	.09	.35	2.2	
30	1.55		.20	.29	1.06	6.8	
40	.04			.04		0.1	
50	5.95		.71	1.06	4.18	26.5	
60	0.55		.11	.17	.27	2.2	
70	0.12		.02	.04	.06	0.5	

100-YEAR RUNOFF VOLUME CALCULATIONS ~ Developed On-Site Basins

Precip. Zone	Excess Precipitation, E (inches)			
	A	B	C	D
1	0.44	0.67	0.99	1.97
2	0.53	0.78	1.13	2.12
3	0.66	0.92	1.29	2.36
4	0.80	1.08	1.46	2.64

Project: San Antonio Condos

By: TDI Date: 4/8/99

Drainage Basin	Land Treatment Areas (ac)					Weighted E (in)	V_{100} (cf)	Remarks
	A_T	A_A	A_B	A_C	A_D			
10	1.09		.10	.16	.83	2.07	8,194	
20	0.50		.06	.09	.35	1.99	3,620	
30	1.55		.20	.29	1.06	1.93	9,446	
40	.04			.04		1.29	187	
50	5.95		.71	1.06	4.18	2.00	43,144	
60	0.55		.11	.17	.27	1.74	3476	
70	0.12		.02	.04	.06	1.76	768	

Weighted E = $(E_A A_A + E_B A_B + E_C A_C + E_D A_D) \div A_T$

Volume = $\frac{\text{Weighted E}}{12} \times A_T \times 43{,}560$

HYDROGRAPH COMPUTATIONS

Basin No. 10 A_D = .83 A_T = 1.09 Q_{100} = 5.0 E = 2.07

$t_P = (0.7\ t_C) + [(1.6 - A_D/A_T) \div 12]$

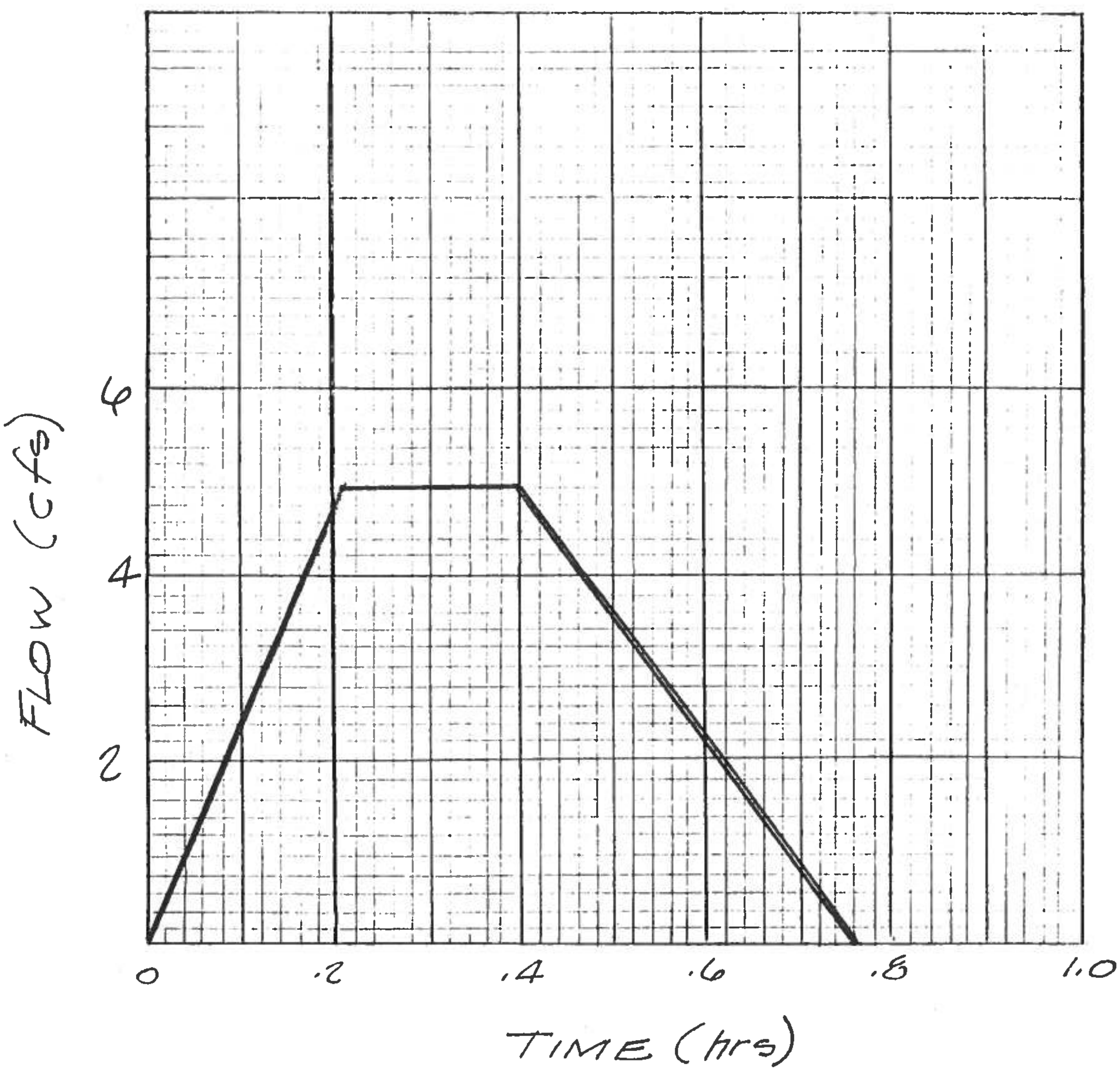
$= (0.7 \times 0.2^*) + [(1.6 - .83/1.09) \div 12] = .21$ hr

Peak Duration $= .25\ A_D/A_T$

$= .25\ (.83/1.09) = .19$ hr

$t_B = (2.107\ E\ A_T/Q_{100}) - (\text{Peak Duration})$

$= [2.107\ (2.07)\ (1.09/5.0) - (.19)] = 0.76$ hr



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SUBJECT San Antonio Condos JOB NO.

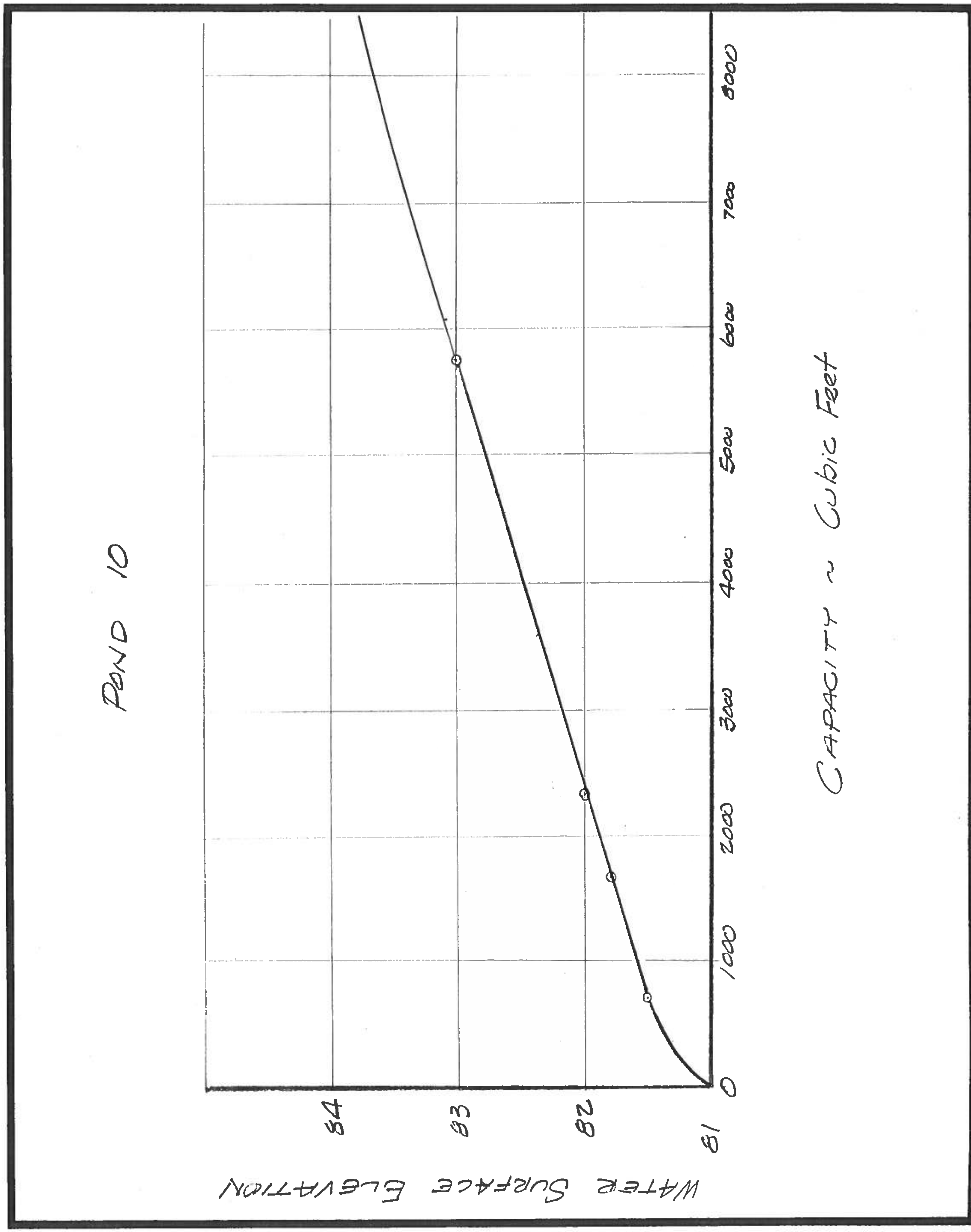
BY TOI DATE 4/3/99 SHEET NO. OF

A-7

POND VOLUME CALCULATIONS

POND NO.	CONTOUR	PLAN-IMETER READING	CONTOUR AREA	AVERAGE AREA	DEPTH	VOLUME (cf)	ACCUM VOLUME
10	81.0		-0-				
	81.5		2890	1445	.5	722	722
	81.8		3400	3145	.3	943	1665
	82.0		3400	3400	.2	680	2345
	83.0		3400	3400	1	3400	5745
	83.1		3400	3400	.1	340	6085
	84.0		4720	4060	.9	3654	9739

Scale: 1" = __________, Scale Factor: .015 x ________^{2} =



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SUBJECT________ JOB NO.____

BY TDI DATE 4/4/99 SHEET NO.____ OF____

A-9

DETENTION POND INFLOW/OUTFLOW CALCULATIONS

Time	Q_{in} (cfs)	Avg. Q_{in} (cfs)	Volume In (cf)	Trial Pond Elev.	Q_{out} (cfs)	Avg. Q_{out} (cfs)	Vol. Out (cfs)	Incr. Stor. (cf)	Pond Vol. (cf)	Pond Elev.	Remarks
0	0			81.0					0		
.1	2.4	1.2	432	81.1	2.44	1.22	440	0	0	81.0	OK
.2	4.7	3.55	1278	81.3	2.56	2.50	899	379	379	81.3	OK
.3	5.0	4.85	1746	81.6	2.72	2.64	950	796	1175	81.6	OK
.4	5.0	5.00	1800	81.8	2.82	2.77	997	803	1978	81.9	OK
.5	3.5	4.25	1530	82.0	2.92	2.87	1033	497	2475	82.0	OK
.6	2.2	2.85	1026	82.0	2.92	2.92	1051	-25	2450	82.0	OK
.7	0.9	1.55	558	81.9	2.87	2.90	1042	-484	1966	81.8	OK
.8	0	0.45	162	81.6	2.72	2.79	1006	-842	1122	81.6	OK

D = 8"
A = .35
h = WSEL − 79.0

POND 10

HYDROGRAPH COMPUTATIONS

Basin No. 50 A_D = 4.18 A_T = 5.95 Q_{100} = 26.5 E = 2.00

t_P = (0.7 t_C) + [(1.6 – A_D/A_T) ÷ 12]

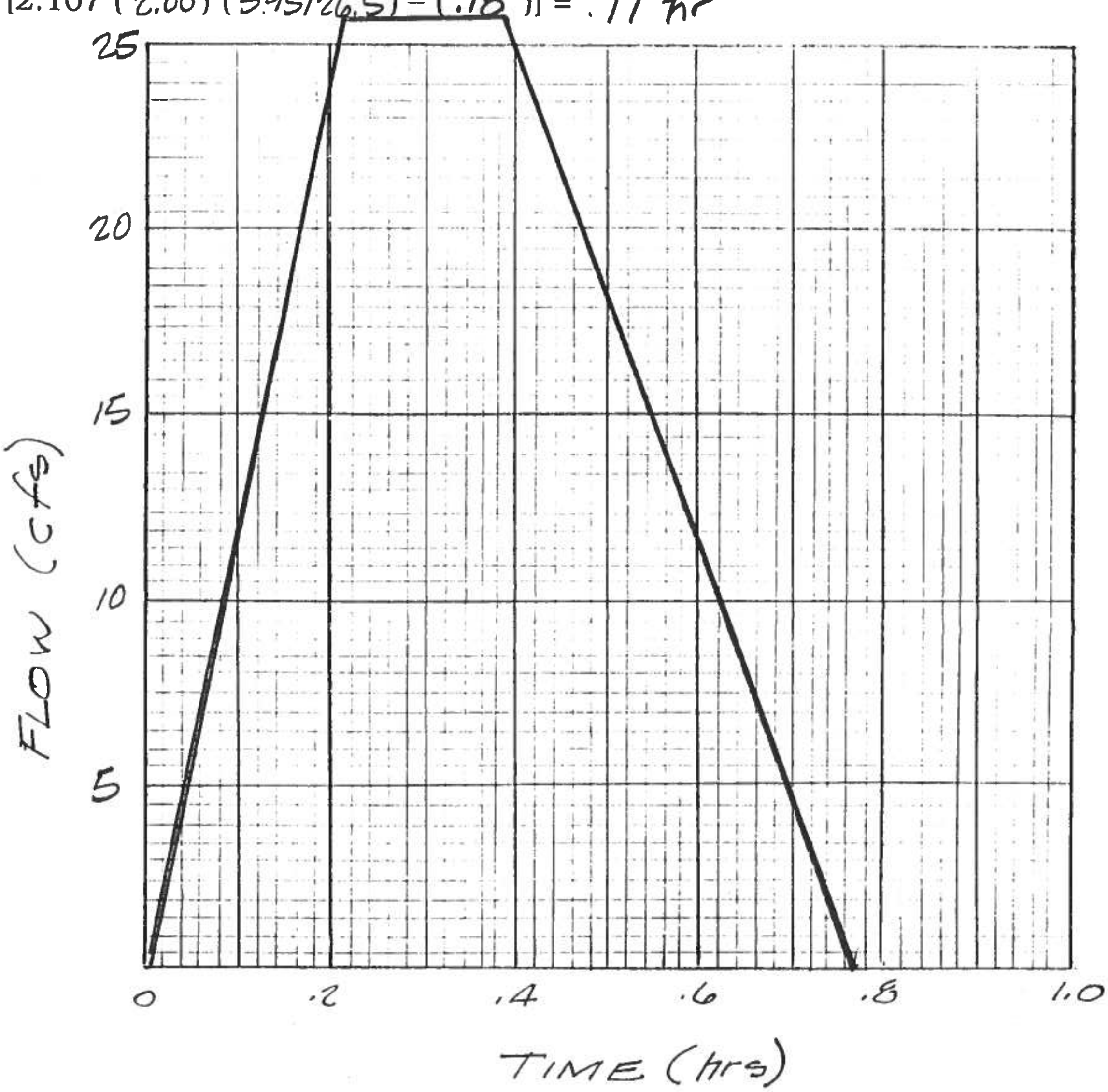
= (0.7 x 0.2*) + [(1.6 – 4.18/5.95) ÷ 12] = .21 hr

Peak Duration = .25 A_D/A_T

= .25 (4.18/5.95) = .18 hr

t_B = (2.107 E A_T/Q_{100}) – (Peak Duration)

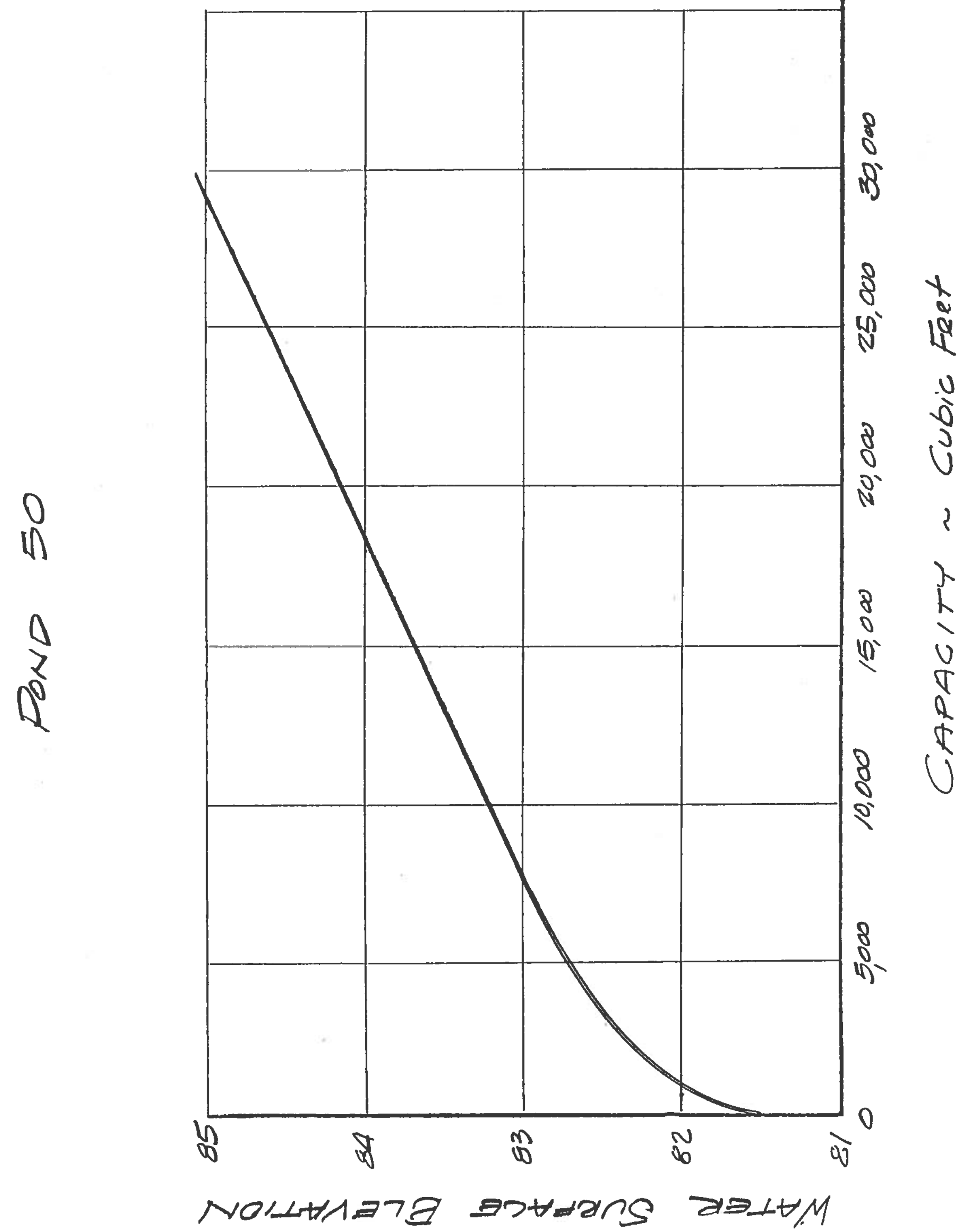
= [2.107 (2.00) (5.95/26.5) – (.18)] = .77 hr



POND VOLUME CALCULATIONS

POND NO.	CONTOUR	PLAN-IMETER READING	CONTOUR AREA	AVERAGE AREA	DEPTH	VOLUME (cf)	ACCUM VOLUME
50	81.5		0				
	82.0		2812	1406	.5	703	703
	82.5	305	7320	5066	.5	2533	3,236
	83.0		10,370	8845	.5	4422	7,658
	84.0		10,370	10370	1.0	10,370	18,028
	85.0		11,520	10,945	1.0	10,945	28,937

Scale: 1" = ________, Scale Factor: .015 x ________ ^{2} =


POND 50
CAPACITY ~ Cubic Feet
0
5000
10,000
15,000
20,000
25,000
30,000
WATER SURFACE ELEVATION
81
82
83
84
85

DETENTION POND INFLOW/OUTFLOW CALCULATIONS

Time	Q_{in} (cfs)	Avg. Q_{in} (cfs)	Volume In (cf)	Trial Pond Elev.	Q_{out} (cfs)	Avg. Q_{out} (cfs)	Vol. Out (cfs)	Incr. Stor. (cf)	Pond Vol. (cf)	Pond Elev.	Remarks
0									0	81.5	
.1	11.8	5.90	2124	82.2	—	—	—	2124	2124	82.2	OK
.2	23.8	17.80	6408	83.0	4.9	2.45	884	5524	7648	83.0	OK
.3	26.5	25.15	9054	83.6	8.0	6.47	2328	6726	14,374	83.6	OK
.4	25.0	25.75	9270	84.2	9.6	8.80	3168	6102	20,476	84.2	OK
.5	18.2	21.60	7776	84.5	10.3	9.95	3581	4195	24,671	84.6	OK
.6	11.8	15.0	5400	84.7	10.7	10.52	3786	1614	26,285	84.7	OK
.7	4.7	8.25	2970	84.7	10.7	10.70	3852	-882	25,403	84.7	OK
.8	0	2.35	846	84.4	10.1	10.4	3744	-2898	22,505	84.4	OK

Outlet Orifice = 16" diameter, Area = 1.41 #

h = WSEL − 82.2

POND 50

HYDROGRAPH COMPUTATIONS

Basin No. 60 A_D = .27 A_T = .55 Q_{100} = 2.2 E = 1.74

$t_P = (0.7\ t_C) + [(1.6 - A_D/A_T) \div 12]$

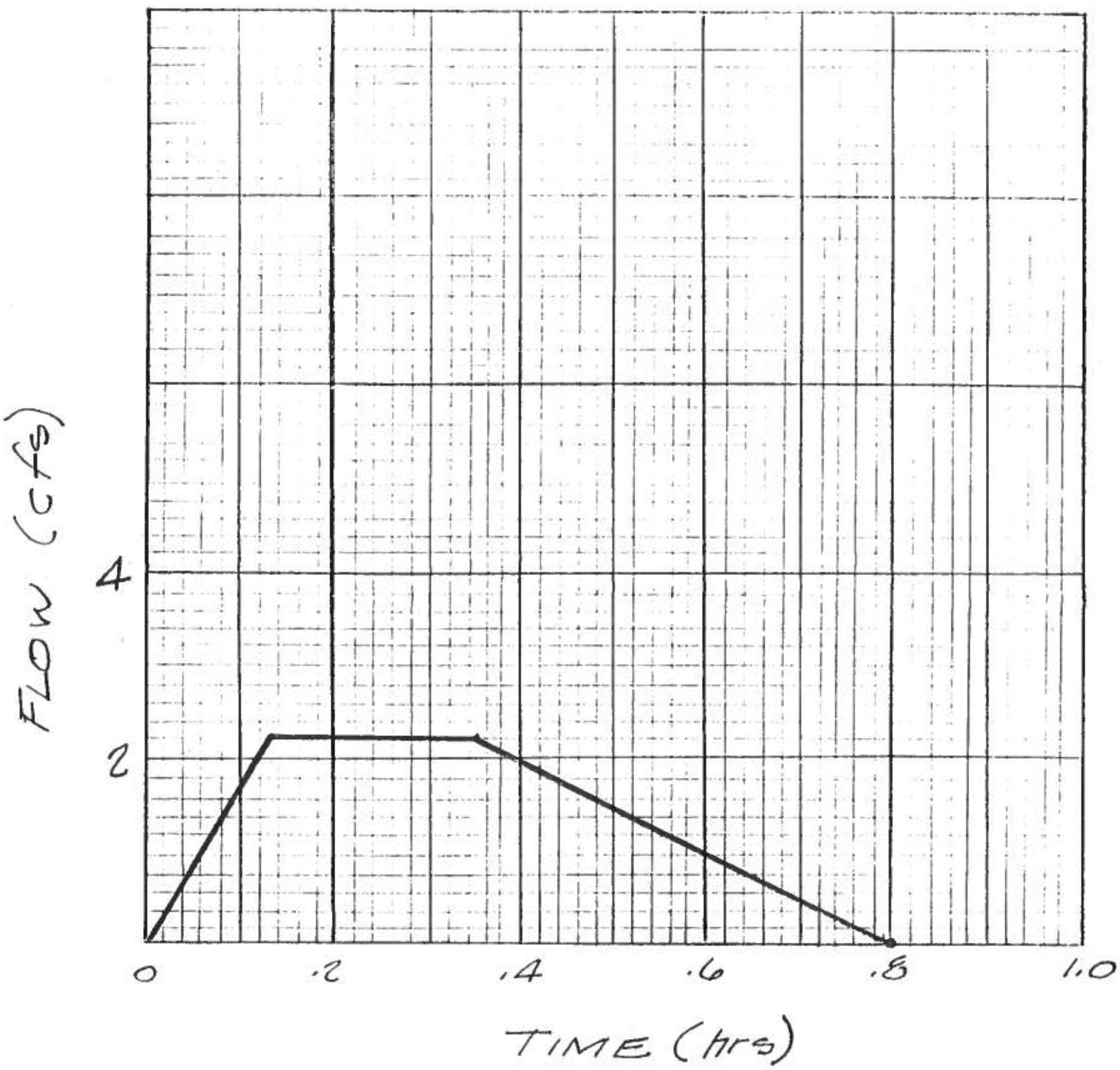
$= (0.7 \times 0.2^*) + [(1.6 - .27/.55) \div 12] =$ 0.23 hr

Peak Duration $= .25\ A_D/A_T$

$= .25\ (.27/.55) =$ .12 hr

$t_B = (2.107\ E\ \ A_T/Q_{100}) - (\text{Peak Duration})$

$= [2.107\ (1.74)\ (.55/2.2) - (.12)] =$ .80 hr



ISAACSON & ARFMAN, P.A.

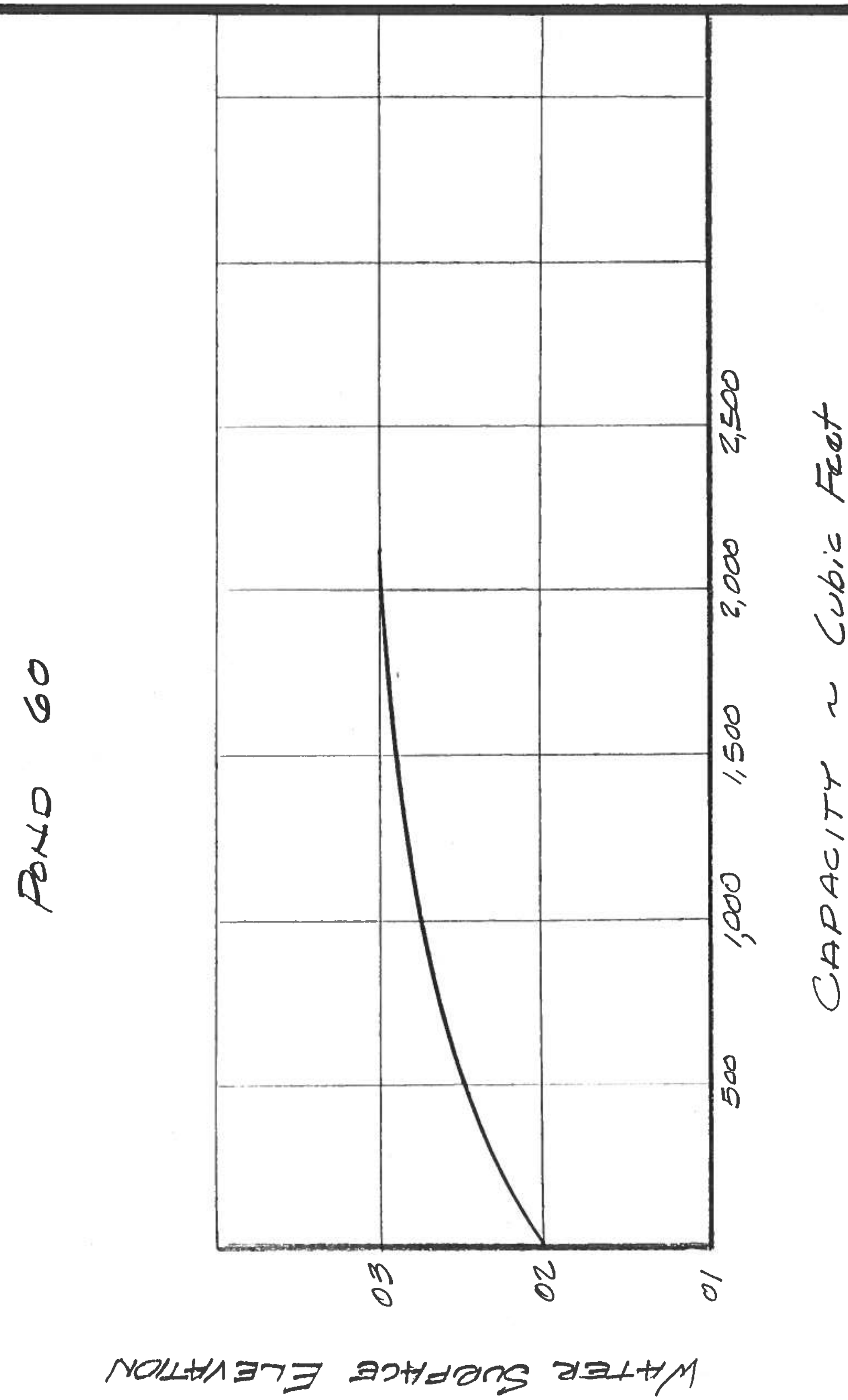
SUBJECT San Antonio Condos JOB NO.___

BY TOI DATE 4/3/99 SHEET NO.___ OF___

POND VOLUME CALCULATIONS

POND NO.	CONTOUR	PLAN-IMETER READING	CONTOUR AREA	AVERAGE AREA	DEPTH	VOLUME (cf)	ACCUM VOLUME
60	01.9						
	02.0		150	75	.1	7	7
	02.5	78	1872	1011	.5	506	513
	03.0	190	4560	3216	.5	1608	2,121

Scale: 1" = ________, Scale Factor: .015 x ________² =



ISAACSON & ARFMAN, P.A.

SUBJECT__________ JOB NO.____

BY________ DATE________ SHEET NO.____ OF____

A-17

DETENTION POND INFLOW/OUTFLOW CALCULATIONS

Time	Q_{in} (cfs)	Avg. Q_{in} (cfs)	Volume In (cf)	Trial Pond Elev.	Q_{out} (cfs)	Avg. Q_{out} (cfs)	Vol. Out (cfs)	Incr. Stor. (cf)	Pond Vol. (cf)	Pond Elev.	Remarks
0	0									01.9	
.1	1.7	0.85	306	02.3	0.4	0.2	72	234	234	02.3	OK
.2	2.2	1.95	702	02.6	0.7	0.55	198	504	738	02.6	OK
.3	2.2	2.2	792	02.8	0.81	0.75	271	521	1259	02.8	OK
.4	2.0	2.1	756	02.9	0.86	0.84	301	455	1714	02.9	OK
.5	1.5	1.75	630	03.0	0.91	0.89	319	311	2025	03.0	OK
.6	1.0	1.25	450	03.0	0.91	0.91	328	122	2147	03.0	OK
.7	0.5	0.75	270	03.0	0.91	0.91	328	- 58	2089	03.0	OK
.8	0	0.25	90	02.9	0.86	0.89	319	- 229	1860	02.9	OK

Outlet Orifice = 6" diameter

h = WSEL - 2.1.

POND 60

COMPUTE SIDEWALK CULVERT CAPACITY

$S = 2.00\%$

$n = .013$

$d = 6.5'' = .54$

For 12" Wide Culverts :

$A = 1 \times .54 = .54^{\#}$

$R = A/WP = .54/1+.54+.54 = .26$

$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

$= \frac{1.486}{.013} (.54)(.26)^{2/3} (.02)^{1/2}$

$= 3.55$ cfs ← Use for Ponds 10 & 60

For 18" Wide Culverts :

$A = 1.5 \times .54 = .81^{\#}$

$R = .81/1.5+.54+.54 = .31$

$Q = \frac{1.486}{.013} (.81)(.31)^{2/3} (.02)^{1/2}$

$= 6.00$ cfs ← Use 2 each for Pond 50

For 24" Wide Culverts :

$A = 2 \times .54 = 1.08$

$R = 1.08/2+.54+.54 = .35$

$Q = \frac{1.486}{.013} (1.08)(.35)^{.667} (.02)^{1/2}$

$= 8.67$ cfs (not used)

ISAACSON & ARFMAN, P.A.

SUBJECT ___ JOB NO. ___

BY TOI DATE 4/5/99 SHEET NO. ___ OF ___

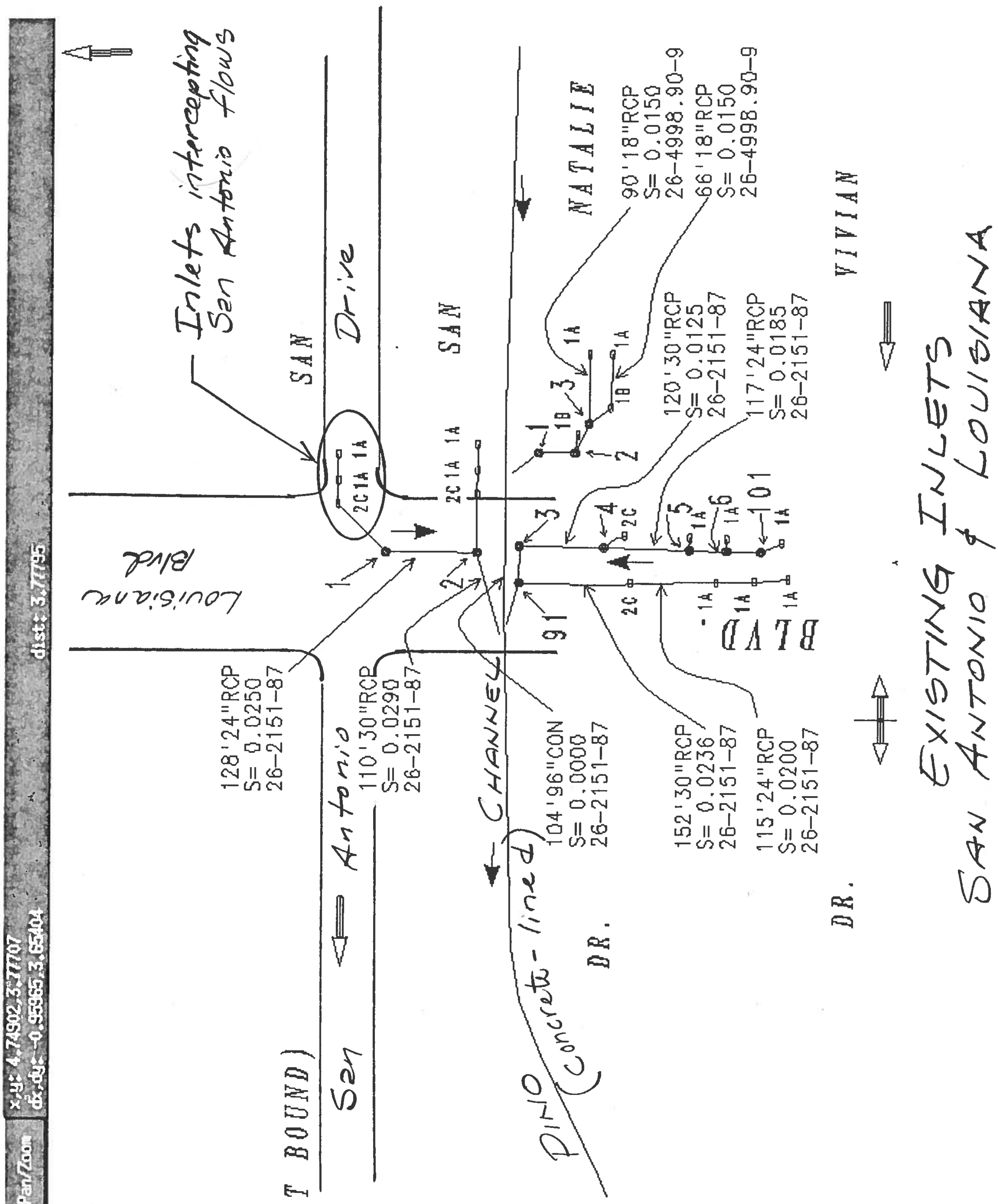
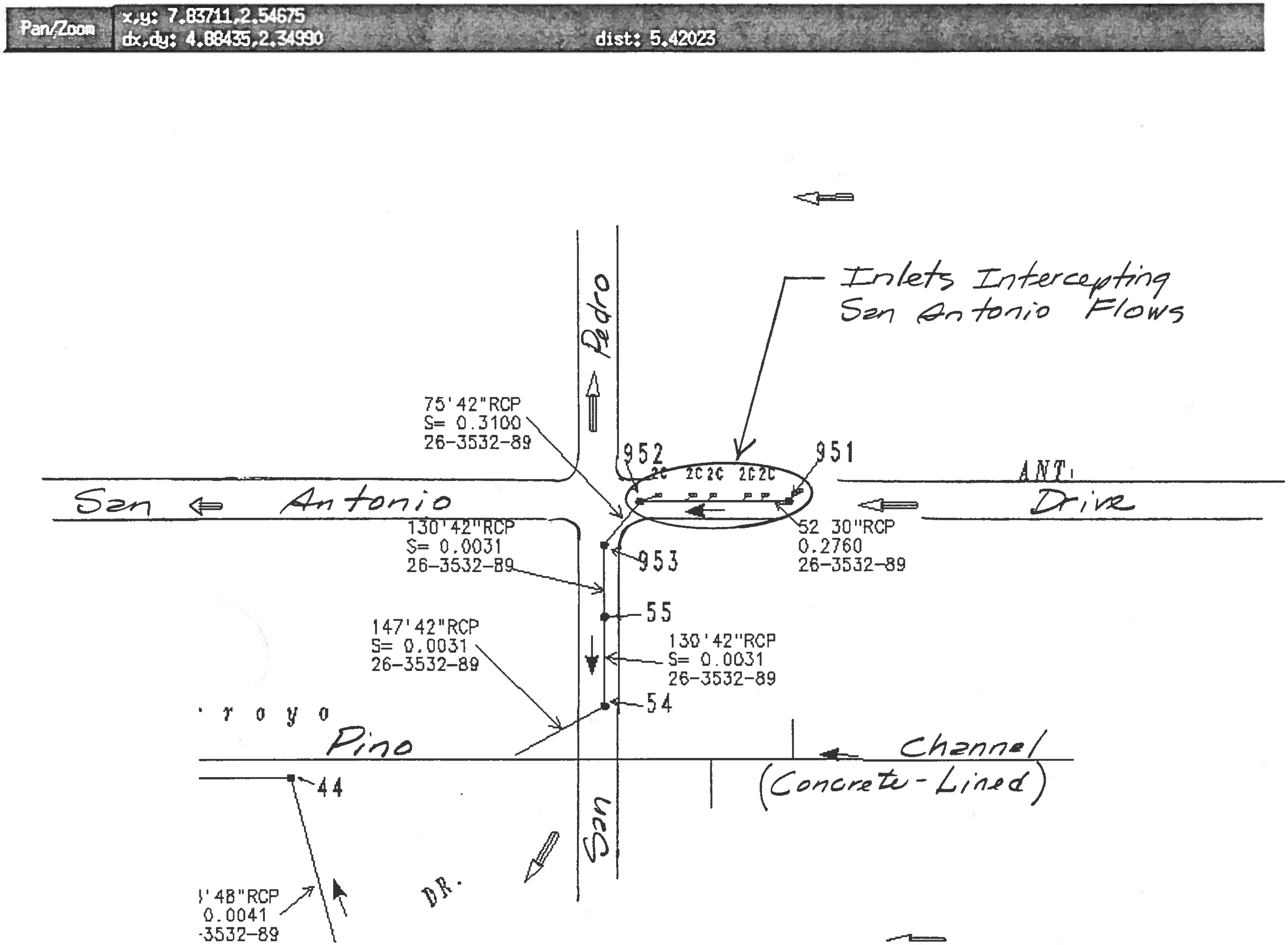

EXISTING INLETS
SAN ANTONIO & LOUISIANA
Inlets intercepting San Antonio flows
SAN Antonio Drive
SAN
San Antonio
T BOUND)
Louisiana Blvd
BLVD
NATALIE
VIVIAN
DR.
DINO
CHANNEL (Concrete-lined)
128'24"RCP
S= 0.0250
26-2151-87
110'30"RCP
S= 0.0290
26-2151-87
104'96"CON
S= 0.0000
26-2151-87
152'30"RCP
S= 0.0236
26-2151-87
115'24"RCP
S= 0.0200
26-2151-87
120'30"RCP
S= 0.0125
26-2151-87
117'24"RCP
S= 0.0185
26-2151-87
90'18"RCP
S= 0.0150
26-4998.90-9
66'18"RCP
S= 0.0150
26-4998.90-9
x,y: 4.74902,3.77707
dx,dy: -0.95965,3.65404
dist: 3.77795
Pan/Zoom

Figure D



EXISTING INLETS
SAN ANTONIO & SAN PEDRO

Figure E