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DESIGN PROFESSIONALS, INC.
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DRAINAGE REPORT

for

VILLA SANDIA EAST
(ACADEMY HILLS SUBDIVISION, UNIT 3, TRACT 6)

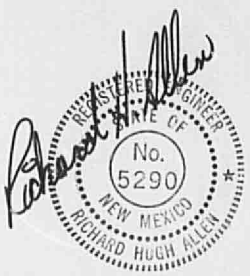
NOVEMBER 7, 1979

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CITY ENGINEER

DRAINAGE REPORT

FOR

VILLA SANDIA EAST
ALBUQUERQUE, NEW MEXICO

1. PURPOSE

The purpose of this study is to determine the storm run-off characteristics of the referenced site under both existing undeveloped conditions and under proposed developed conditions. The study was conducted within the guidelines established in Drainage Resolution 1972-2 of AMAFCA and associated amendments thereto. Based upon the drainage analysis presented herein, the proposed development complies with the requirements of the referenced Drainage Resolution.

2. LOCATION

The drainage study contained herein is for ACADEMY HILLS SUBDIVISION, Tract No. 3, Unit No. 6 located in Albuquerque, New Mexico. The subject property is bounded on the north by the Bear Tributary Arroyo, on the west by Eubank Boulevard, on the south by Juan Tabo Boulevard and on the east by Unit No. 5 of ACADEMY HILLS SUBDIVISION. This report includes recommended improvements for the Bear Tributary Arroyo which are to be constructed within the 150 foot wide proposed drainage easement which abuts the north property line of Unit No. 6.

3. HYDROLOGY

The Rationale Formula was used in calculating peak flow rates based on the 100-year storm and for determining intensity duration curves for short duration storms of very high intensities which are common in the northeast heights. The Manning Formula for open channel flow was used to size the soft lined channel and concrete trickle section for the Bear Tributary Arroyo as well as for the sizing of the piping system to convey storm run-off from ACADEMY PLACE, Unit No. 5, across Unit No. 6. Roughness coefficients utilized in solving Manning's equation were as follows:

Grass-lined channel:	n = 0.025
Concrete channel:	n = 0.015
Concrete pipe (partially full)	n = 0.013

Design aids used throughout the analysis include the following:

A. Intensity Duration Frequency Curves for the City of Albuquerque as developed by Gordon Henkenhoff & Associates.

B. 100-Year, 6-Hour Precipitation Map for the City of Albuquerque (June, 1967).
C. Charts, graphs and nomographs as illustrated in the Data Book for Civil Engineers, Volume I, 3rd edition (1960) by Elwyn E. Seelye.
D. Precipitation-Frequency Atlas of the Western United States (NOAA ATLAS 2), Volume IV-New Mexico (1973).
E. Northeast Heights Drainage Management Plan prepared for AMAFCA by Leonard Rice Consulting Water Engineers, Inc., April, 1975.
F. Water Resources Engineering by Ray K. Linsley, 1964.

4. PROJECT DESCRIPTION

A. Analysis of Unit No. 5 (Southeast of proposed development).
(1) Existing Condition: Storm run-off from Unit No. 5 of ACADEMY PLACE currently flows across the proposed development area through an earthen channel. Since no information was available from either the City or the designer of the subdivision regarding the rates of flow from Unit No. 5, a run-off analysis of the area was conducted based upon drawings provided by the City of Albuquerque hydrology department. The rate of flow leaving Unit No. 5 through an 18'± wide concrete channel and entering Unit No. 6 was calculated to be approximately 64 CFS.
(2) Proposed Development: When the site (Unit No. 6) is fully developed, the storm run-off from Unit No. 5 will be conveyed directly to the Bear Tributary Arroyo through three 22 1/2" x 36 1/4" concrete arch pipe. Capacity of the three arch pipe is 76.5 CFS flowing full at a 2.3% slope. Concrete intake and outlet structures will be provided at the inlet and outlet ends of the pipe. A semi-circular concrete trickle section extending from the outlet structure to the main concrete trickle section for the Bear Tributary will also be provided. The capacity of this trickle section will be 31.4 CFS and is capable of carrying the 10-year storm run-off from Unit No. 5. Run-offs greater than the 10-year storm will flow directly into the grass-lined portion of the improved Bear Tributary.

B. Analysis of Unit No. 6.
(1) Existing Condition: The subject parcel of land generally slopes from east to west. (See sheet 1 of the attached calculations for slopes. Drainage Areas A through E are indicated on the site plan/included in the Appendix.) With the exception of area E, run-off appears to cross the site as sheet flow. Run-off from areas A, D and E appears to enter the Bear Tributary north of the site while that from areas B and C appears to empty into Juan Tabo and Eubank. There are no improvements on the existing site. The easterly portion of the earthen channel (approximately 200') noted under Section A appears to have been cut through Unit 6 during or shortly after the construction of ACADEMY PLACE Unit No. 5. Side slopes in this section are on the order of 1:1.

Soil borings taken at five locations on the site indicate fairly uniform soils consisting of a very sandy silt, grading to a coarse to fine-grained silty sand. Neither ground water nor bedrock were encountered in any of the test holes which were driven to a depth of 20 feet.

(2) Proposed Development: Plans call for locating 2-story 8-plex units and single-story townhouses on the 9.921 acre site. Asphalt paving, roofed areas, sidewalks and patio slabs amount to approximately 282,900 SF (6.494 acres). Landscaped and grassed areas amount to approximately 149,260 SF (3.427 acres).

Developed AREA 1 will drain directly to Juan Tabo Boulevard (see attached Site Drainage Plan). The rate of flow (Q) will be approximately 8.5 cfs and the volume of run-off (V) will be approximately 17710 CF. The existing run-off rate and volume of flow into Eubank and Juan Tabo is 8.67 cfs and 17952 CF respectively. Therefore, neither Q nor V will be exceeded under developed conditions.

Developed AREAS 2, 3, 4 and 5 will drain to a detention area comprised of two 120' x 60' depressed tennis courts.

(a) Court #1: Inflow/outflow hydropgraphs indicate that Court #1 at 3' deep will detain 100% of the run-off from AREAS 4 and 5. (Volume to be retained = 14580 CF; Volume available = (3) x (7200) = 21600CF). Discharge will be to the Bear Tributary via a 6" diameter pipe located in the north wall of court #1. Total time to drain the court will be approximately 12 hours at a rate of about .34 cfs.

(b) Court #2: Inflow/outflow hydrographs for AREAS 2 and 3 indicate that for a 50 minute storm the required detention volume must be 28600 CF. Based upon a 4 foot deep tennis court the volume available for detention will be 28800 CF. Also, at T=50 minutes, the inflow rate and outflow rate from the tennis court will be 9.54 CFS. The volume discharged directly from the tennis court after T=50 minutes will be approximately 11106 CF. Discharge will occur through a 32 foot wide x 6" deep notch in the top of the north wall of the court. Using the formula for a broad crested wier, the velocity of discharge will be about 1.5 fps.

Based on the 50 minute storm the following chart may be developed to show that neither the run-off rate nor volume of discharge under developed conditions exceeds Q and V for the undeveloped state:

AREA	Q @ T=50 Minutes	V @ T=50 Minutes	V Total
1	4.02 cfs	12060 CF	15360
2 and 3	9.54 cfs	0 CF	7806
Total Developed	13.56 cfs	12060 CF	23,166
Total Undeveloped	17.87 cfs	--	34,595 CF

Court #2 will discharge to the Bear Tributary via a 6" diameter pipe located in the north wall of the tennis court. Total time to drain the court (28600 CF) will be approximately 23.4 hours at a rate of about .34 cfs.

(c) Special Design for Tennis Courts: In order to prevent irrigation run-off and small storm (1-2 year frequency) run-off from entering the tennis court areas, baffle plates will be installed in the manholes and drop inlets to divert these lower flows directly to the main arroyo. The maximum rate of discharge from such baffled drain lines will be approximately 4 cfs.

C. Analysis of Bear Tributary Arroyo:

(1) Existing Condition: The arroyo north of the project site is an unimproved earthen channel with a meandering flowline. The upper reach (east of the site) of the arroyo is semi-improved having been widened to approximately 100'± with a relatively flat bottom. Three 42" diameter concrete pipe carry flows from the arroyo beneath Eubank Boulevard just north of the northwest corner of the property. The pipes are currently completely plugged with silt and earth from the rains experienced during the spring and summer of 1979. The natural slope of the channel is approximately 3.6% from east to west. According to the Rice Report, the 100-year storm will produce a Q of 1400 CFS. Velocities in the channel are currently on the order of 18 fps with a depth of flow of about 1 foot.

(2) Proposed Development: A grass-lined channel with a shallow concrete trickle section will be constructed in the proposed 150' wide drainage easement north of the subject site. The main channel will vary in width from 100' at its easterly end to 50' at its intersection with the existing 42" RCP near Eubank. The trickle section will be trapezoidal measuring 16' at the bottom with a depth of 1.0 feet. A 2.5' high gabion drop structure will be constructed at the easterly end of the improved channel section to dicipate energy.

The grass-lined channel and concrete tricle section will slope at about 3.5% from the gabion structure to a point

approximately 100 feet east of the existing 42" diameter concrete pipe. The last 100 feet will slope at 1.615%. The slope was flattened at this point in contemplation of the construction at some point in the future of a bridge structure to carry Eubank over the Bear Tributary. The proposed grades will allow such a structure to be installed without adversely affecting the existing park area west of Eubank.

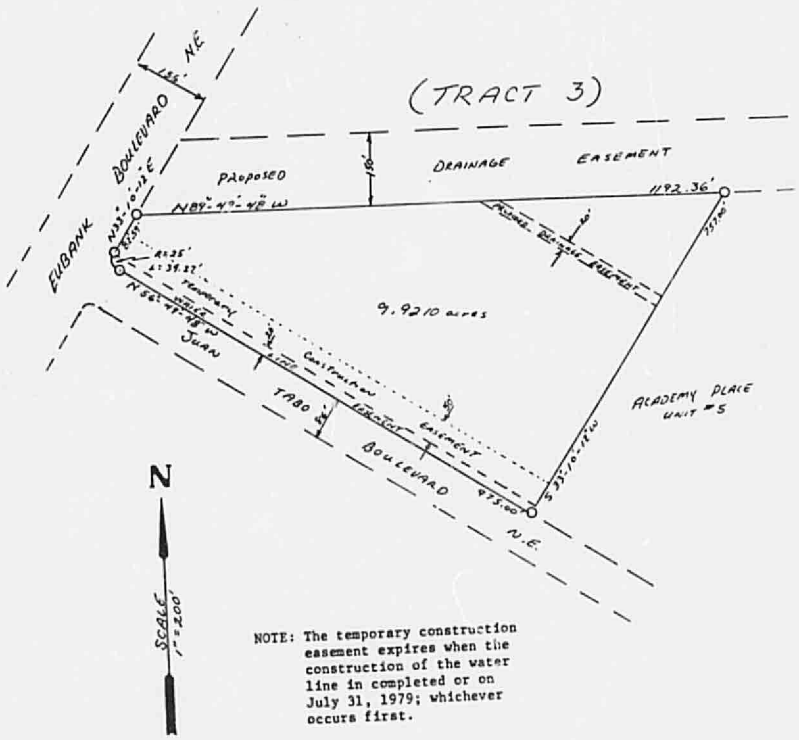
Flows in the proposed grass-lined channel will be super critical with velocities varying from 26 fps at the edge of the trickle section to 10 fps at the toe of the channel bank during the 100-year storm. Normal depths of flow will be approximately 1.2 feet on the grass-lined section and 2.2 feet at the centerline of the trickle section. Bank heights for the channel were based on the larger of either the suquent depth or normal depth plus 2.5 feet.

The concrete tricle section was designed to carry 300 cfs. Velocities for this Q will be on the order of 17 fps with a normal depth of flow of 1 foot.

It should be noted that the intent of using a grass-lined channel is to allow the continuance of the park-like setting created in the existing drainage easement west of Eubank. Although the design velocities in the channel are somewhat high adjacent to the trickle section, the frequency with which erosin may occur is on the order of once in 20 years and therefore appears to be justifiable. Also, since the developer of the site south of the drainage easement has agreed to maintain the grass-lined channel, there will be no maintenance burden on the City for upkeep of the channel. Finally, the proposed park-like setting of the channel will enhance the environment of the entire area adjacent to this reach of the Bear Tributary.

(3) Grading along the north bank of the drainage easement extends beyond the right-of-way line in several locations. The Owner of the property north of the drainage easement was contacted and does not object to this grading. The reason for the grading extension is to allow the channel banks to be cut back to a 3 on 1 slope. Since the banks are to be sodded, the more gentle slope will permit easier maintenance. It should be noted, however, that in no case will flows in the channel extend beyond the north right-of-way line of the 150' drainage easement.

CERTIFICATE OF SURVEY



NOTE: The temporary construction easement expires when the construction of the water line in completed or on July 31, 1979; whichever occurs first.

DESCRIPTION:

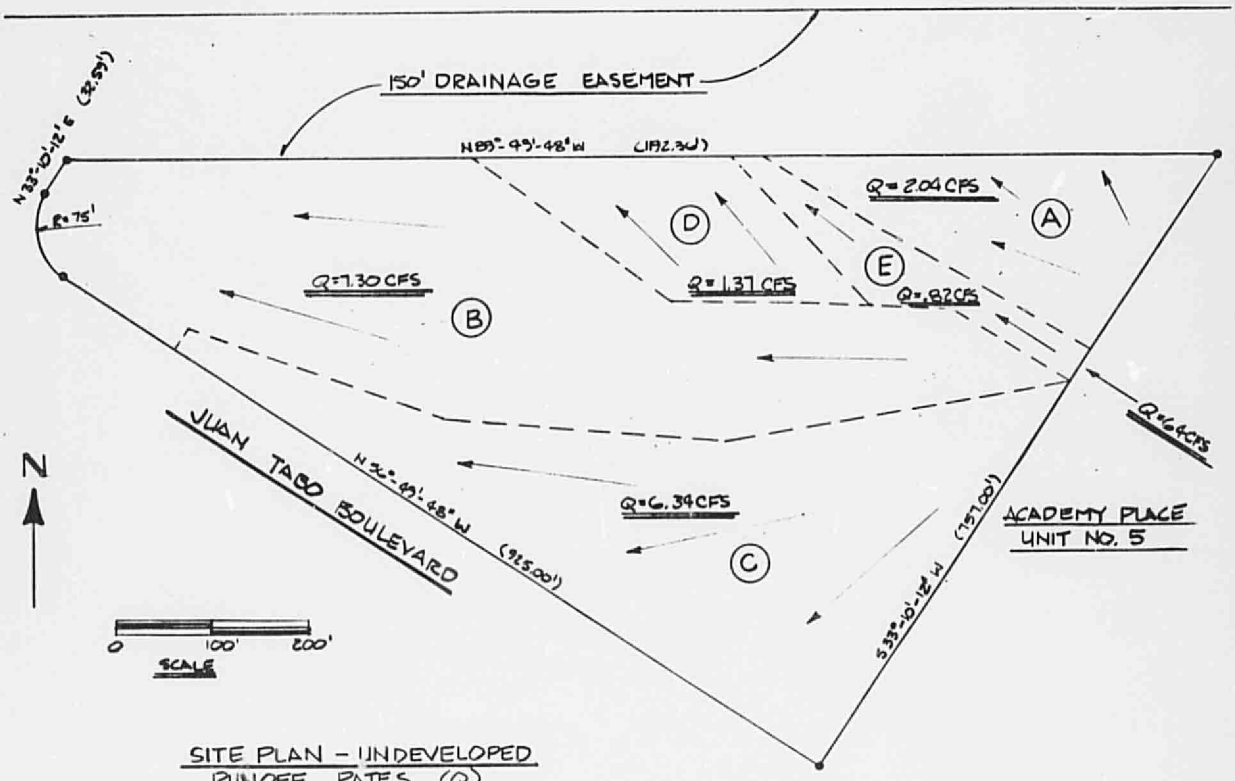
The Southerly Portion of Tract No. 3, ACADEMY HILLS SUBDIVISION, UNIT No. 6, an Addition to the City of Albuquerque, New Mexico, within the Elena Gallegos Grant, Section 28, T 11 N, R 4 E, N.M.P.M., Bernalillo County, New Mexico, as the same is shown and designated on a Plat of said Addition, filed in the office of the County Clerk of Bernalillo County, New Mexico on June 26, 1978; and being more particularly described as follows:

BEGINNING at the Southeast Corner of the herein described parcel, being one in the same as the Southeast Corner of the affore mentioned Tract No. 3 and running thence; N 56°-49'-48" W, 975.00 ft. along the Northeasterly R.O.W. of Juan Tabo Boulevard N. E. to a point of curvature; thence along said curve to the right, said curve having a radius of 25.00 ft. and a central angle of 90°-00'-00", an arc length of 39.27 ft. to a point on the Southeasterly R.O.W. of Eubank Boulevard N. E.; Thence N 33°-10'-12" E, 82.59 ft. along said Southeasterly R.O.W. to a point; thence leaving said R.O.W., S 89°-49'-48" E, 1192.36 ft. along the Southerly R.O.W. of a 150.00 ft. proposed drainage easement, to a point; thence S 33°-10'-12" W, 757.00 ft. to the point of beginning; containing 9.9210 acres, more or less.

CERTIFICATION:

I, Robert J. Garver, do hereby certify that I am a Registered Land Surveyor, under the laws of the State of New Mexico, and that this description was prepared by me or under my supervision, and is true and correct to the best of my belief and knowledge. To this affect I do hereby set my hand and seal this 1st day of March, 19 79 .

ROBERT J. GARVER N.M.L.S. No. 5825



SITE PLAN - UNDEVELOPED
RUNOFF RATES (Q)

CALCULATIONS FOR RUN-OFF IN UNDEVELOPED STATE

Assumptions:

1. Flow from killieck (existing subdivision run-off) will be conveyed across site in buried RCCP.
2. With the exception of the one arroyo flowing north west from killieck, sheet flow will be assumed across the site from the referenced arroyo to Juan Tabo & Eubank.
3. Approximate grades:
   - Area A: (8/360) = .022 (2.2%)
   - Area B: (50/1080) = .046 (4.6%)
   - Area C: (20/600) = .033 (3.3%)
   - Area D: (13/400) = .032 (3.2%)
   - Area E: (Arroyo) (7.6/410) = .018 (1.8%)
4. Coefficient of runoff (Open area, little vegetation)
   - C' = 0.10 to 0.30 (Use 0.30)
   - Composite run-off coefficient = C = C' (C_f)
     - [C_f for 100 year storm = 1.25]
   - C = (.30)(1.25) = 0.38
   - C_f obtained from URBAN STORM DRAINAGE MANUAL, Volume 1, Section 3 - RUNOFF - 1969.
5. Site was broken into 5 areas, 4 of which illustrate basic sheet flow. The 5th area (arroyo) was treated as channel flow. Slopes for various areas are shown on the following pages.
6. R = 6 hr. precipitation for 100 year storm = 2.65" (From Kirkenhall 6-hour, 100 year precipitation map)

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RICHARD HIGH ALLEN

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JOB JUAN TABO 8-PLEX JOB # 7944.4
BY RH ALLEN DATE 8/17/77
CHK. DATE
SCALE SHEET NO. 1 OF 25

LEED CALCULATIONS, UNDEVELOPED SITE

Area A: $\frac{1}{2}(129)(195)+\frac{1}{2}(122)(126+195)+\frac{1}{2}(54)(126+103)+\frac{1}{2}(103)(166) = 46890\ \phi$ (1.076 Ac)

Area C: $\frac{1}{2}(267)(475+232)+\frac{1}{2}(147)(232+145)+\frac{1}{2}(117)(145+90)+\frac{1}{2}(265)(90+28) = 151476\ \phi$ (3.477 Ac)

Area D: $\frac{1}{2}(206)(135)+\frac{1}{2}(135)(186+63)+\frac{1}{2}(134)(8)+\frac{1}{2}(7)(60+54)+\frac{1}{2}(60)(10)+\frac{1}{2}(10)^2 = 31997\ \phi$ (0.735 Ac)

Area @ arroyo: $(49)(147)+\frac{1}{2}(35)(36)+\frac{1}{2}(35)(56)+\frac{1}{2}(56)(61)+\frac{1}{2}(61)(100)+\frac{1}{2}(44)(54)+\frac{1}{2}(47)(54+61)+\frac{1}{2}(25)(56)+\frac{1}{2}(35)(35+40)+\frac{1}{2}(40)(27) = 19914\ \phi$ (.457 Ac)

Area B: $9.921 - [1.076+3.477+0.735+0.457] = 4.176$ Ac

Summary:

		SQ. FT.	ACRES
	Area A:	46890.	1.076
	Area B:	181882.	4.176
	Area C:	151476.	3.477
	Area D:	31997.	0.735
(E)	Arroyo:	19914.	0.457
	TOTALS	432159.	9.921

RUN-OFF CALCULATIONS FOR UNDEVELOPED SITE

For Sheet Flows:

Area	Elev. Diff. (Ft)	Length of Flow (Ft)	T_c (1) (Minutes)	i 100 yr (2) (In/Hr)	C	Area (3) (Acre)	Volume (4) (Ft^3)	Q (5) (CFS)
A	8	360	12.2	5.0	0.33	1.076	3735.	2.041
B	50	1080	15.9	4.6	0.33	4.176	15265.	7.300
C	20	600	13.8	4.8	0.33	3.477	12710.	6.542
D	13	400	12.2	4.9	0.33	0.735	2657.	1.369
				TOTALS		9.461	34575.	17.055 > 17.87
E Arroyo Area	6	420	14.5	4.7	0.58	0.457	1670.	.916

(1) T_c obtained from Nomograph in SEELYE's "DATA BOOK FOR CIVIL ENGINEERS, Vol. 1, pg. 18.01, Figure H.

(2) Intensity from Henkenhaft Intensity Duration Curve for Albuquerque

(3) See area calculations above and site map.

(4) $V = (R_T) \div 12 [A][43560] C [R_T = 2.6"]$ (5) $Q = CiA$

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JOB UNKNOWN 8-PLEX

BY RK KELLEY DATE 5/[illegible]

CHK DATE

SCALE SHEET NO. 2 OF 25

RUN-OFF CALCULATIONS FOR SUBDIVISION LOCATED EAST OF PROPERTY

NOTE: No drainage report was on file at the City Engineer's office for the AS-BUILT condition of the subject subdivision. The drainage report on file in Bruno Conegliano's office was based on a layout and storm water flow pattern which varied from the AS-BUILT drawings. Since the main concern to the JUAN-Tabo/Eubank project is the storm water flow entering the site from the subject subdivision via a drainage R.O.W. west of the intersection of Kiehne Avenue and Malaguena Lane, and since no information is available concerning this run-off, the following assumptions will be made in order to estimate this flow:

1. Directional flow arrows shown on the City's AS-BUILT drawings for this subdivision are correct and in fact the relative direction of the storm water run-off.
2. 70% of the drained area is hard surface run-off ($C = 0.9$ for 100 yr.)
3. $R = 2.65"$ (6-hour precipitation)
4. 30% of the drained area is grassed or landscaped ($C = 0.4$ for 100 yr. storm)
5. Composite $C = C_c$

$C_c = (.7)(.9) + (.3)(.4) = 0.75$

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JOB JUAN TABO & -PLEX JOB # 79414
BY R.A. ALLEN DATE 8/28/79
CHK DATE
SCALE SHEET NO. 3 OF 25

CALCULATIONS FOR DRAINED AREA

Area 1: $(215)(340) + 62(70) + \frac{1}{2}(35)(105+212) + 155(177) + 90(125) + 212(100) + \frac{1}{2}(100)(85+28) - \frac{1}{2}(75)(30) = 98788^{sf}$

Area 2: (A&B) $1000(140) + \frac{1}{2}(160)(82) + 148(45) + \frac{1}{2}(70)(28) + \frac{1}{2}(95+70)(45) + \frac{1}{2}(80)(25)2 + 33635 = 193547^{sf}$

Area 3: (A&B) $155(90) + 90(32) + 210(135) + \frac{1}{2}(160+210)60 + 160(170) + 640(140) + \frac{1}{2}(70)(185) + \frac{1}{2}(205)(120) + \frac{1}{2}(225+180)(110) + 300(97) + 80(45) + 230(115) + \frac{1}{2}(110)(140) + 75(78) + (345)(142) + 145(70) + 160(65) + 165(100) + 160(40) + 160(60) + \frac{1}{2}(80)(140)$ = 472515 sf

TOTAL = 694303 sf = 15.93 Ac

RUNOFF CALCULATIONS

Area 3A&3B:
L = 1550' (Assume sheet flow along street)
H = (79.10 − 21.) = 58.1' (S = 3.748% (avg))

Area 2A&2B:
L = 1415' (Assume sheet flow along street)
H = (76.0 − 21.) = 55.0' (S = 3.887% (avg))

Area 1:
L = 320'
H = (21.0 − 13.) = 8.0' (S = 2.5% (avg))

Area	Elev Diff.	Length of Flow	Tc	i (60 yr)	C	Area (acres)	Volume (Ft³)	Q (CFS)
3	58.1	1550'	10.11 min	5.4	.75	9.24	69476	37.43
2	55.0	1415	Use 10.11 min	5.4	.75	4.4±	33266	17.98
		TOTALS AT INTERSECTION OF KIELICH AND HICKOX				13.63	102461	55.40
1	8.0	320	10+6=16	4.6		2.27	16979	7.8±
							119440 cf	

∴ Discharge at upper end of 20' wide drainage R.O.W. ≈ 64 CFS

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JOB JUAN TABO B-PLEX JOB # 1944
BY RH Allen DATE 8/19/94
CHK. DATE
SCALE SHEET NO 4 OF 25

ANALYSIS OF FLOW IN EXISTING CHANNEL

Width = B = 20' n = 0.013
Slope = 2% (.02) Q = 64 cfs

1. Normal depth = d_N (Uniform flow)
From Manning: $Q = \frac{1.486}{n} R^{2/3} S^{1/2} A$

$$64 = \frac{1.486}{0.013}\left(\frac{20 d_N}{20 + 2d_N}\right)^{2/3} (.02)^{1/2} (20 d_N)$$

$d_N = 0.384'$

2. $V_1 = Q/A = 64/(.384 \times 20)$ (Uniform flow)
$V_N = 8.33$ ft/sec

3. Flow regime (based on Froude No.)

$$F = \frac{V}{\sqrt{gd}} = \frac{8.33}{\sqrt{32.2}(.384)} = 2.37 > 1$$

∴ flow is supercritical

4. Critical depth = d_c

$$\frac{Q^2}{g} = \frac{A^3}{B}$$

$$\frac{64^2}{32.2} = \frac{(d_c B)^3}{B} \qquad d_c = 0.693'$$

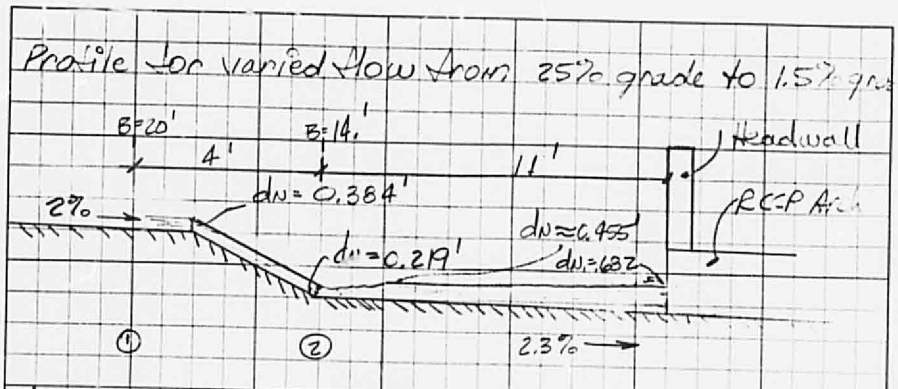
*Possibility exists for hydraulic jump reaction.



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JOB JUAN TABO & FLEXES JOB # 7947.4
BY R.H. ALLEN DATE 8/29/79
CHK. DATE
SCALE SHEET NO. 5 OF 25

Profile for varied flow from 25% grade to 1.5% grade:



Assumptions:

1. Flow prior to ① is on a mild slope (2%) and is uniform.
2. Slope on 4' section is 25%. Width of section changes from 20' to 12'±. Flow at ② is assumed to be non-uniform.
3. AT ②: $d_N = 0.219'$ $B = 14.3'$ (From Manning Equation)
   $V_N = 20.4$ fps $n = .013$
   $d_c = .854'$ $S = .25$
4. At flat slope:

$$64 = \frac{1.486}{.013}\left(\frac{14.0\,d_N}{14.0+2d_N}\right)^{2/3}(.023)^{1/2}(14.0\,d_N)$$

Solving for d_N (trial & error) $d_N = .461'$ $V_N = 9.92$ fps $d_c = .846'$

$$F_r = V/\sqrt{gd} = 9.92/\sqrt{(32.2)(.461)} = 2.57$$

Conclusion:

- Flow in 12' channel is supercritical @ 100 year storm.
- Velocity in 12' channel is 9.84 fps (for 100 yr. storm)
- It appears that hydraulic jump will not occur and that flow in pipe will be supercritical.

Flow in pipe: (Arch 36 1/4" X 22 1/2"

$$64 = \frac{1.486}{.013}\left(\frac{9.0\,d_N}{9.0+2d_N}\right)^{2/3}(.023)^{1/2}(9.0\,d_N)$$

$d_N = 0.682'$ $V_N = 10.43$ fps $d_c =$ [illegible]

Flow in pipe is supercritical. $F_r = 2.22$

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JOB JUAN TABO 8-PLEX JOB 2804.4
BY RK ALLEN DATE
CHK DATE
SCALE SHEET NO

CALCULATIONS FOR "TRICKLE SECTION" (Cross Valley)

1. Assume section will carry 10 year storm

C = 0.75

Sheet flow in subdivision

Area	Tc	i (10 year)	i (25 year)	C	Area	Q_{10}	Q_{25}
2&3	10 MIN	2.7	3.30	.75	13.68	27.70	33.85
1	16 MIN	2.25	2.80	.75	2.27	3.83	4.77
						31.53	38.63

Manning equation to find flow characteristics at entrance to culverts.

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

* A. 10 year storm:

$$31.53 = \frac{1.486}{.013} \left(\frac{9.0 d_N}{9.0 + 6 d_N}\right)^{2/3} (.023)^{1/2} (9.0 d_N)$$

$$1.8188 = \left(\frac{9.0 d_N}{9.0 + 6 d_N}\right)^{2/3} (9.0 d_N)$$

$d_N = .423'$ $V = 8.28$ fps $T = \frac{423}{8.28(60)} = .99$ min

B. 25 year storm:

$$38.63 = \frac{1.486}{.013} \left(\frac{10.77 d_N}{10.77 + 6 d_N}\right)^{2/3} (.023)^{1/2} (10.77 d_N)$$

$$2.2284 = \left(\frac{10.77 d_N}{10.77 + 6 d_N}\right)^{2/3} (10.77 d_N)$$

$d_N = .43'$ $V = 8.34$ fps $T = \frac{423}{8.34(60)} = .99$ min

Trickle Section to carry 10-year storm:

$$31.53 = \frac{1.486}{.013} R^{2/3} (.030)^{1/2} A$$

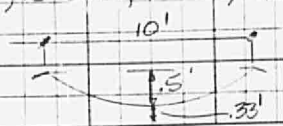
Try circular section, 6" deep, 6' wide $Q = 19$ cfs

6" deep 8' wide $Q = 25$ cfs

6" deep 10' wide $Q = 31.4$ cfs

USE: OR R = 25.25' $\theta = 22.84°$

Use partial circle, R = 25.25', .5 deep x 10' wide



Area = 3.32 sf

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JOB JUAN TABO 8-PLEX JOB 7-79-11
BY RH ALLEN DATE 9/12/79
CHK DATE
SCALE SHEET NO 8 OF 25

CALCULATIONS FOR PIPE SIZE TO ~~XXXXX~~ HOLE RUN OFF
(See Seelye, pg 18-72)

Slope of pipe ≈ 2% n=.013 (5711.61 to 5704.0; L = 420'±)
Using Nomograph on pg 18-72 of Seelye, 2-36"Φ pipe will handle flow @ 4.3 FPS flowing full.
Other combinations are shown below:

	Pipe Size	Quantity	Vel Full	Cap Full	Vel (assume)	Cap Not Full	Q req'd (cfs)	Tot. Capacity
RCCP	36"Φ	2	4.3	32 cfs	—	—	32 cfs	
	32"Φ	3	3.9	22 cfs	—	—	21.3 cfs	
	30"Φ	4		18.5 cfs	4.33		16 cfs	
	32"Φ	4	3.9	22 cfs	4.29		16 cfs	
CMP	30"Φ	4	3.2	16			16	64
	36"Φ	3	3.6	25.5				76.5

Costs: (excluding excavation and backfill which have ~~not~~ been)

n	Mat'l.	Pipe Size	$/LF	Quantity	Total LF	Total $	Reserve Capacity
.013	R.C.C.P.	30"Φ	$25.	4	1680	$42000.	10 cfs
	R.C.C.P.	32"Φ	29.	4	1680	$48720.	24 cfs
	R.C.C.P.	36"Φ	36.	3	1760	$45360.	30 cfs
.015	Galv. CMP	30"Φ	15.50	4	1680	26040.	—
	" "	36"Φ	28.	3	1260	35280.	12.5 cfs
	" CMP	30"Φ	15.50	5	2100	32550.	16 cfs
	" "	36"Φ	28.	4	1680	47040.	39 cfs
	" "	42"x29" O	30.	4	1680	50400.	38 cfs
	" "	42"x29" O	30.	3	1260	37800.	12.5 cfs
	" "	35"x24" O	16.	5	2100	37800.	16 cfs
.013	RCCP	36"4x22"O		4	1680		10 cfs

~USE 3 PIPE

Note: Figures above (committed) are based on n. formula with n=0.015. Prices are based on Galvanized, unlined CMP.

ASTM C506 & C507 (15" TO 18" COVER)

Reinf. Concrete Pipe Arch		Thickness	Cost CMP
30"x19" Equiv.	29½" x 18" E	3"	$ /LF
36" Equivalent	36⅛" x 22½" E	3½"	$ /LF USE
42" Equivalent	43¾ x 26⅝ E	4"	41.50/LF

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JOB JUAN TABO 8 PLEXES JOB # 794.4
BY CH Allen DATE 8/31/79
CHK. DATE
SCALE SHEET NO. 7 OF 25

DEVELOPED SITE RUN-OFF CALCULATION

1. A series of hydrographs will be developed to determine maximum discharge from the developed site. Storms of greater duration than Tc will be analyzed even though the intensities for such storms will be less than the 100 year storm w/a duration = Tc.

2. Development of coefficient of run-off factor $(C_f)_{100}$

	Asphalt		1.00
	Concrete walks		1.00
	Roofs		1.00
(From soil borings)	Lawns, sandy soil		1.00
	Average steepness (2-7%)	40% (.15)	0.19
	Steep (7% +)	60% (.21)	

Summary of Developed Areas

Roofs & Patios	115358	±
Paving	136432.	±
Sidewalks	31104.	±
Total hard surface	282894	± (65% or total)
Total site 9.9210 Ac (43560) =	432159.	
less hard surface	-282894.	
Total lawn area	149265.	(35% of Tc. i

$C_f = 0.19(.35) + 1.00(.65) = 0.72$

3. For 100 year storm: $Q = C_f i A$

Developed Area	S	Elev. Diff	Length of flow	Tc (Minutes)	i 100	i 10	C	Area (Acre)	Peak Q (cfs) 100 yr.	Peak Q (cfs) 10 yr.
1	(.0291)	2.33	80 Grass	11.2	16.8	4.6	2.2	.72	2.557	8.47	4.05
	(.0402)	4.67	365 Pavt	5.6							
2	(.0167)	1.00	60 Grass	10.9	17.6	4.38	2.15	.72	2.100	6.62	3.25
	(.0278)	10.00	420 Pavt	6.7							
3	(.0063)	0.50	80 Grass	15.0	21.5	3.8	1.9	.72	3.159	8.64	4.32
	(.0222)	7.00	340 Pavt	6.5							
4	(.0222)	14.0	515 Pavt	7.3	5.4	3.3	.72	1.129	4.39	2.68	
5	(.0278)	10.0	3600 Pavt	6.5	6.9	5.4	3.3	.72	0.976	3.79	2.32
	(.0139)	1.5	*110 Pipe	0.4							
	*Based on 12" ϕ R.C.P., V = 5.2 fps								(2+3+4+5) =	23.44	12.57

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JOB WANTARO B-PLEX JOB # 7944-C
BY RH ALLEN DATE 9/28/79
CHK DATE
SCALE SHEET NO 9 OF 25

Richard H. Allen NO. 529 REGISTERED PROFESSIONAL ENGINEER

AREA CALCULATIONS (DEVELOPED SITE)

		SF	Acre
AREA (1):	$96.5(412.5) + 85(366) + 230(14) + 11(84) + 71(54) + 60(105) + 51(195) + \frac{1}{2}(51+25)(37) + 63(24) + 33(115)\frac{1}{2} + 85(113) - \frac{1}{2}(51)^2 + \frac{1}{2}(80+100)(22) + \frac{1}{2}(35)(65)$	= 111377	2.557
AREA (2):	$\frac{1}{2}(344)(532) + 85(48) + 145(22) + \frac{1}{2}(22)(8) - \frac{1}{2}(33+53)(64) - \frac{1}{2}(111)(72) - \frac{1}{2}(72+40)(10)$	= 91466	2.100
AREA (3):	$A_3 = 432159 - (A_1 + A_2 + A_{4+5})$	= 137605	3.159
AREA (4) + (5):	$\frac{1}{2}(80)(110) - \frac{1}{2}(36)(22) + \frac{1}{2}(186+245)(93) + \frac{1}{2}(300+245)(86) - \frac{1}{2}(87)(26) + \frac{1}{2}(68)(43) + \frac{1}{2}(21)(88) + \frac{1}{2}(130+235)(160) + 83(10) + \frac{1}{2}(40)(62) + \frac{1}{2}(20+61)(66) + 57(36) + \frac{1}{2}(98+57)(69) + \frac{1}{2}(98+44)(23)$ = 91711 ☐		
AREA (5):	$91(45) + 14(30) + 5(15) + \frac{1}{2}(102+75)57 + 66(101) + 101(9) + \frac{1}{2}(123+195)(33.5) + (118+98)\frac{1}{2}(80) + \frac{1}{2}(119+128)(25) + 67(128) + 44(20) + 30(35) + \frac{1}{2}(30)(35)$	= 42498	0.976
AREA (4):	$A_4 = 91711 - 42498$	= 49213.	1.129
	TOTALS (CHECK)	432159	9.9210

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JOB VILLA SANDIA EAST JOB # 7944
BY RHALLEN DATE 9/28/79
CHK. DATE
SCALE SHEET NO. 10 OF 25

ANALYSIS OF AREA I UNDER DEVELOPED CONDITIONS.

1. Total run-off rate (Q_{100}) for undeveloped site = 13.64 cfs.
$Q_{100A} + Q_{100C} = 7.30 + 6.34 = 13.64$ cfs (Previously calculated)

Developed $Q_{100(1)} = 8.47$ cfs < 13.64 cfs $\therefore$ OK

2. Check discharge rate at southeast entrance drive:
Area contributing = A_1 = 96.5(412.5) + 85(366) - 42(113) - 39(257) + 15(138) + 40(25) - 59217$^{\square'}$ = 1.36 acre

T_c = 16.8 Min. i = 4.6"/hr. C = 0.72

$\therefore Q_{100} = (0.72)(4.6)(1.36) = 4.5$ cfs

Width of entrance = 32' Slope = 4/60 = 6.67% Vel. for part (4-7% slope) = 4.5'

(Using sheet flow)

$Q = VA$

$4.5 = 4.5(32)(d)$

$d = 1/32 = .03' \approx 3/8"$ (for 100 yr. storm criteria)

- Assuming JUAN TABO as a Neighborhood Collector Street (2 lanes in one direction, 24' wide), at least one lane must be kept free of storm flow during 10 year storm. Therefore, width of street available to carry flow = 12'.

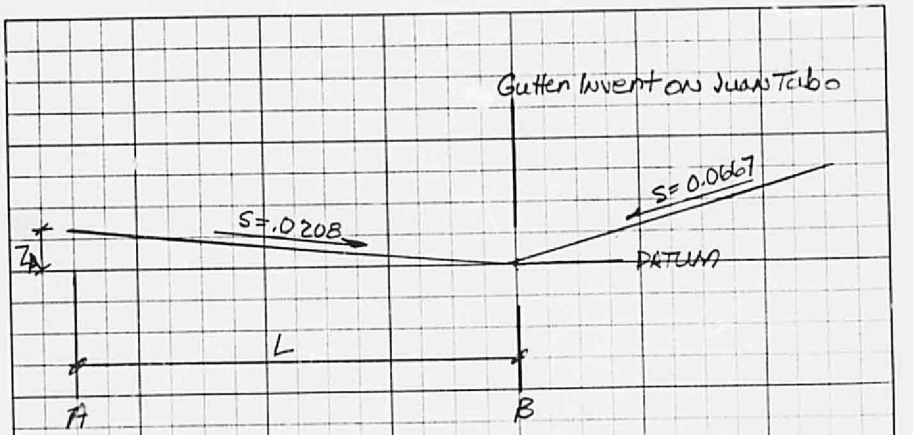
- For 10 year frequency storm:
$Q_{10} = (0.72)(2.2)(1.36) = 2.15$ cfs
Depth of entrance flow from subdivision based on same parameters as stated above would be $d = .015' \approx 3/16"$

Assuming energy equation is valid in short region between gutter invert at drive entrance and center of Juan Tabo, distance of travel across Juan Tabo may be estimated. For 10 year storm, travel "L" = 2.7' which is less than allowed 12', $\therefore$ Flows to Juan Tabo are acceptable (See following sheet)

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BY E. ALLEN DATE 9/29/77
CHK. DATE
SCALE SHEET NO. 11 OF 25



At point A: $Z_A = -0.0208(L)$
$V_A = 0$
$d_A = .015'$
$h_L = +SL$

At point B: $Z_B = 0$
$V_B = 4.5$ cfs
$d_B = 0.015'$

For NON-uniform flow:

$$S = \frac{n^2 V_{ave}^2}{2.22 R_{ave}^{4/3}}$$

$$S = \frac{(.015)^2 (2.25)^2}{2.22 (.015)^{4/3}}$$

$S = .1387$

$V_{ave} = 2.25$ cfs

$R_{ave} = A/P = \left[\frac{32(.015)}{32.03}\right] = .015$

$$h_L + Z_A + \frac{V_A^2}{2g} + d_A = Z_B + \frac{V_B^2}{2g} + d_B$$

(Energy equation from point B to point A)

$$(.1387L) + (.0208L) + .015' = 0 + \frac{4.5^2}{2g} + .015'$$

$.1179L = 0.3144$

$L = 2.7' < 12'$ ∴ OK

For 100 year storm, $Q = 4.5$ cfs; $d = .03'$; $R = .0299$
Solving energy equation,
$L = 9.11' < 12'$ ∴ OK even @ 100 year storm

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JOB VILLA SANDIA EAST JOB # 7944
BY RH ALLEN DATE 9/29/77
CHK. DATE
SCALE SHEET NO. 12 OF 25

SUMMARY TABLE OF VOLUMETRIC RUNOFFS

PRECIP. (IN.)	AREA 1	AREA 2	AREA 3	AREA 4	AREA 5	TOTAL 2+3+4+5
	RUNOFF (CU. FT.)					
0.27	1804.	1482.	2229.	797.	688.	5196.
0.36	2406.	1976.	2972.	1063.	918.	6929.
0.47	3141.	2579.	3881.	1388.	1199.	9047.
0.50	3342.	2744.	4128.	1477.	1275.	9624.
0.65	4344.	3567.	5367.	1920.	1657.	12511.

GENERAL EQUATION: $V = (43560) \times (A) \times (PRECIP./12) \times .72$

(AREA CALCS ⇒ SEE PREVIOUS PAGES)

(1) = 2.557 Ac
(2) = 2.100 Ac
(3) = 3.159 Ac
(4) = 1.129 Ac
(5) = 0.976 Ac

For purposes of computing required storage volumes, the 100 year - 6 hour precipitation shall be used. This will produce total volumes in excess of the 100 year - 1 hour storm.

AREA	PRECIP.	Area	"Ce"	RUNOFF VOLUME	
2	2.65"	2.10 Ac	.72	14545	> 36424 Ft³
3	2.65	3.159	.72	21879	
4	2.65	1.129	.72	7820.	> 14580 Ft³
5	2.65	0.976	.72	6760	
			TOTAL	51004.	

Note: Since area 1 run-off will go directly to street, no retention/detention is required.

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JOB VILLA SANDIA EAST JOB NO. 7774
BY R H ALLEN DATE 9/29/79
CHK. DATE
SCALE SHEET NO. 13 OF 25

DETENTION/RETENTION PONDS:

NOTE: At the suggestion of Dick Heller, City Engineer, the use of tennis courts within the 150' wide Drainage R.O.W. on the north side of the property will be investigated for retaining storm runoff.

Assumptions:

1. 2-tennis courts @ 120'x60' each will be used.
2. Pipes will be installed along north side of courts to allow runoff to flow to arroyo after storm has passed.
3. 100 year flow in arroyo = 1400 c.f.s (Based on Rice Report) This is peak Q.

1. Calculate depth of water to be retained in tennis courts.
   Area = 2 (120)(60) = 14400 sf
   Depth = Vol. ÷ Area

   "d" for Court #2 = Vol. 2 + Vol. 3 ÷ 7200
   = (36424) ÷ 7200 = 5.06'
   "d" for Court #1 = Vol. 4 + Vol. 5 ÷ 7200
   = 14580 ÷ 7200 = 2.03'

   d = 5.1' for Court #2
   d = 2.0' for Court #1
   ∴ Volume available for storage = 52260 FT³ > 51417 FT³ OK

2. Calculate maximum inflow rate to tennis courts:
   A. Court #2 (Areas 2 & 3 contributing)
   Case ①: Storm duration = 17.6 Min. (Tc of Area #2)
   $Q_T = Q_2 + Q_3 = 6.62 + 6.83 = 13.45$ cfs
   Case ②: Storm duration = 21.5 Min. (Tc of Area #3)
   $Q_T = Q_2 + Q_3 = 6.14 + 8.64 = 14.78$ cfs

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JOB VILLA SANDIA EAST II JOB 1974
BY RH ALLEN DATE 10/1/79
CHK. DATE
SCALE SHEET NO. 14 OF 25

For Court #2, Case ② will be used: Q_T = 14.78 cfs.

B. Court #1: Since Tc for each area (4&5) differs by a small amount, Q_T = 4.39 + 3.79 = 8.18 cfs (this is based upon peak rates from both areas occuring simultaneously)

(See hydrographs contained in this report for Area #2 & Area #3 Q_T values)

3. Court #2 Wall height may be reduced if storage is reduced. Hydrographs for areas #2 & #3 indicate that for a 50 minute storm the following conditions apply:

- Q (inflow) = $Q_2 + Q_3$ = 3.81 + 5.73 = 9.54 cfs.
- (1st 50 Min) Vol. to be stored = $V_2 + V_3$ = 11430 + 17190 = 28620 CF
- Depth in Court #2 = 3.98' (28620 ÷ 7200)
- If pond is full @ T = 50 min., then $Q_{outflow}$ = 9.54 cfs

Summary:

A. Area ① run-off based on contributing area of 2.218 acres (See sheet 5)

Q_1 @ 50 minutes = (2.52)(.72)(2.218) = 4.02 cfs

V_1 @ 50 minutes = 4.02(50)(60) = 12060 CF

B. Q_T (undeveloped) = 13.64 CFS

17.87 − 4.02 = 13.85 cfs > 9.54 ($Q_{outflow}$ from Court #1)

∴ Q(developed) flowing from site at T = 50 minutes is less than Q_T (undeveloped) OK ✓

C. Total Volume to be dumped off site after T = 50 minutes (V_T):

$V_T = V_1 + (V_2 + V_3)_{50\ min.}$ = (2.65/12)(2.218)(43560)(.72) + [(2.65/12)(5.259)(43560)(.72) − 28620] = 15362 + 7804

= 23166 CF < 34595 (Vol. undeveloped)

∴ $V_{developed} < V_{undeveloped}$ OK ✓

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JOB VILLA SANDIA EAST JOB # 7144

BY R.H. ALLEN DATE 10/1/79

CHK. DATE

SCALE SHEET NO. 15 OF 25

TENNIS COURTS (CONTINUED)

4. FOR COURT #2, CALCULATE DISCHARGE MECHANISM.
$Q = 9.54$ cfs
Use broad depression in top of wall at northeast corner, North wall, 6" deep.

For broad crested weirs:
$Q = C_w L h^{3/2}$ (From Water Resources Engineering, p. 262, by Ray K. Linsley, 1964)

$Q = 9.54$ cfs
$L = 20'$
h = head on weir
C_w = Coefficient (based on H_d/h
H_d = Height of weir
Substituting known values and through trial and error process, it can be shown that $h \cong 0.3'$

h	H_d/h	C_w	$h^{3/2}$	L	Q	
.2'	20					
.3'	13	3.33	.1643	20'	10.94	
.4'	10	3.32	.253	20'	16.80	
.2'	20	3.33	.0894	30'	8.93	
.2'	20	3.33	.0894	40'	11.9	
.2'	20	3.33	.0894	32'	9.54	(Solving for L)

In order to cut down depth of flow, use weir length = 32'
Velocity = $9.54/(32)(.2) = 1.49$ fps Ok ✓

5. Pipe Size for discharge of Courts
A. Court #2
Volume to discharge = 28620 CF
Ideal time = 24 hours
Rate ≈ 0.33 cfs
$S = 0.025$
$n = 0.015$
Use MINIMUM pipe size of 6" ϕ, concrete.

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BY EH ALLEN DATE 10/2/79
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SCALE SHEET NO. 16 OF 25

From Nomograph on page B-72 of DATA BOOK FOR CIVIL ENGINEERS by SEELYE:

For 6" ϕ pipe:

$V = 4.4$ ft/sec

$Q = 0.75$ cfs

Time to discharge $\approx \frac{28620}{0.75(60)(60)} = 10.6$ hrs

Extend time of discharge by flattening slope.

Try $S = 0.0125$

(Using Manning equation)

$Q = \frac{1.486}{n} R^{2/3} S^{1/2} (A)$ $\quad R = D/4 = .5/4 = .125$

$Q = \frac{1.486}{.015} (.125)^{2/3} (.0125)^{1/2} (\pi)(.5^2/4)$

$Q = 0.54$ cfs

$T \approx \frac{28620}{(.54)(60)^2} = 14.7$ hours

Try $S = 0.005$

$Q = 0.34$ cfs

$T \approx \frac{28620}{.34(3600)} = 23.4$ hours ✓ OK

Use 6" ϕ pipe at slope of .5%

$L = 10'$ < Invert at tennis court = 5687.10
Invert at arroyo = 5687.05

B. Court # 1. Volume = 1458Ø

Using 6" ϕ pipe @ slope = .005,

$T \approx \frac{14580}{(60)^2(.34)} = 11.91$ hours

$L \approx 8'$ < Invert @ tennis court = 84.60
Invert @ arroyo = 84.56

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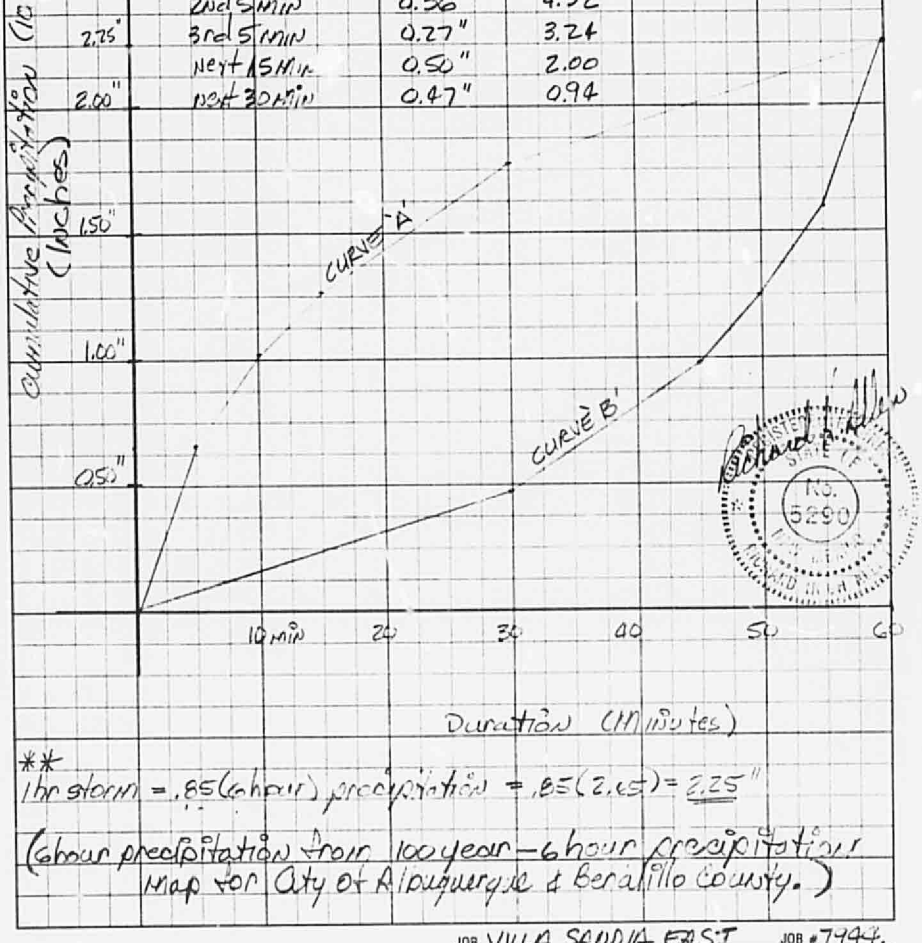
JOB VILLA SANDIA EAST JOB # 7744
BY RH ALLEN DATE 10/2/79
CHK. DATE
SCALE SHEET NO. 17 OF 25

ENVELOPE CURVES
(100 YEAR STORM)

Duration	*Ratio to 1-hour	"cumulative" Rainfall
5 MIN	.29	.65"
10 "	.45	1.01"
15 "	.57	1.28"
30 "	.79	1.78"
60 "	1.00	2.25" **

Rainfall	Δ("/hr)
1st 5 MIN 0.65"	7.8
2nd 5 MIN 0.36"	4.32
3rd 5 MIN 0.27"	3.24
Next 15 MIN 0.50"	2.00
next 30 MIN 0.47"	0.94

* NOAA Atlas, Table 12



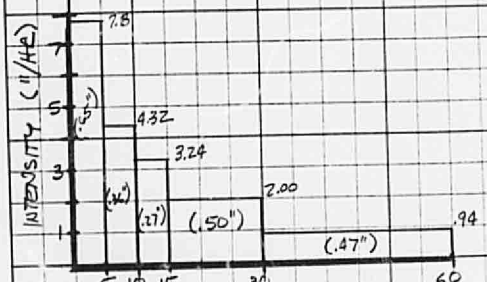
** 1hr storm = .85(6-hour) precipitation = .85(2.65) = 2.25"

(6-hour precipitation from 100 year–6 hour precipitation Map for City of Albuquerque & Bernalillo County.)

DESIGN PROFESSIONALS, INC.
Carlisle Boulevard N.E.
Albuquerque, New Mexico
(505) 881-6338 87107

JOB VILLA SANDIA EAST JOB #7444.
BY RH ALLEN DATE 9/29/79
CHK. DATE
SCALE SHEET NO. 18 OF 25

HYETOGRAPHS



CURVE 'A' PLOT

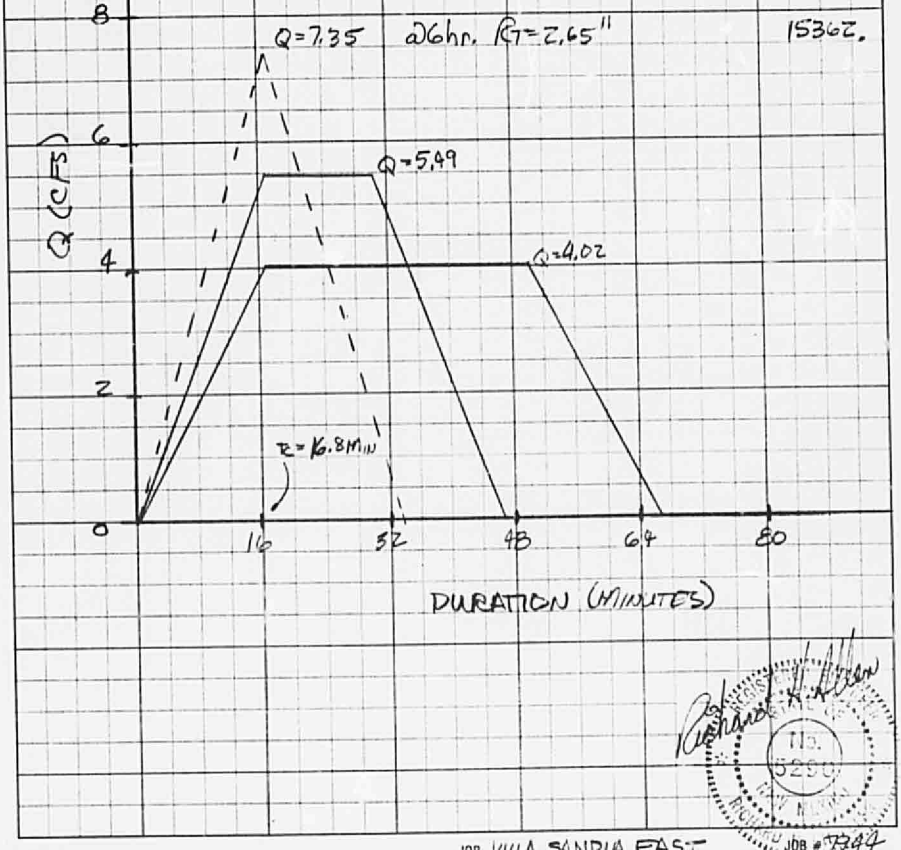
REGISTERED
No.
5250
RICHARD H. ALLEN

DESIGN PROFESSIONALS, INC.
Carlisle Boulevard N.E.
Albuquerque, New Mexico
(505) 881-8338 87107

JOB VILLA SANDIA EAST JOB # 7944
BY EH ALLEN DATE 9/29/77
CHK. DATE
SCALE SHEET NO. 19 OF 25

HYDROGRAPH FOR AREA (1): T_c = 16.8 MIN i_{100} = 4.6"/hr.
A = 2.557 - .339 = 2.218 AC.

Time (MIN) (DURATION)	i	Q (cfs)	V (CF)
16.8	4.6	7.35	7409.
20.0	4.15	6.63	7956.
30.0	3.44	5.49	9882.
40.0	2.91	4.65	11160.
50.0	2.52	4.02	12060.
60.0	2.23	3.56	12816.
120.0	1.30	2.08	14976.
Q=7.35	24hr. P_T=2.65"		15362.



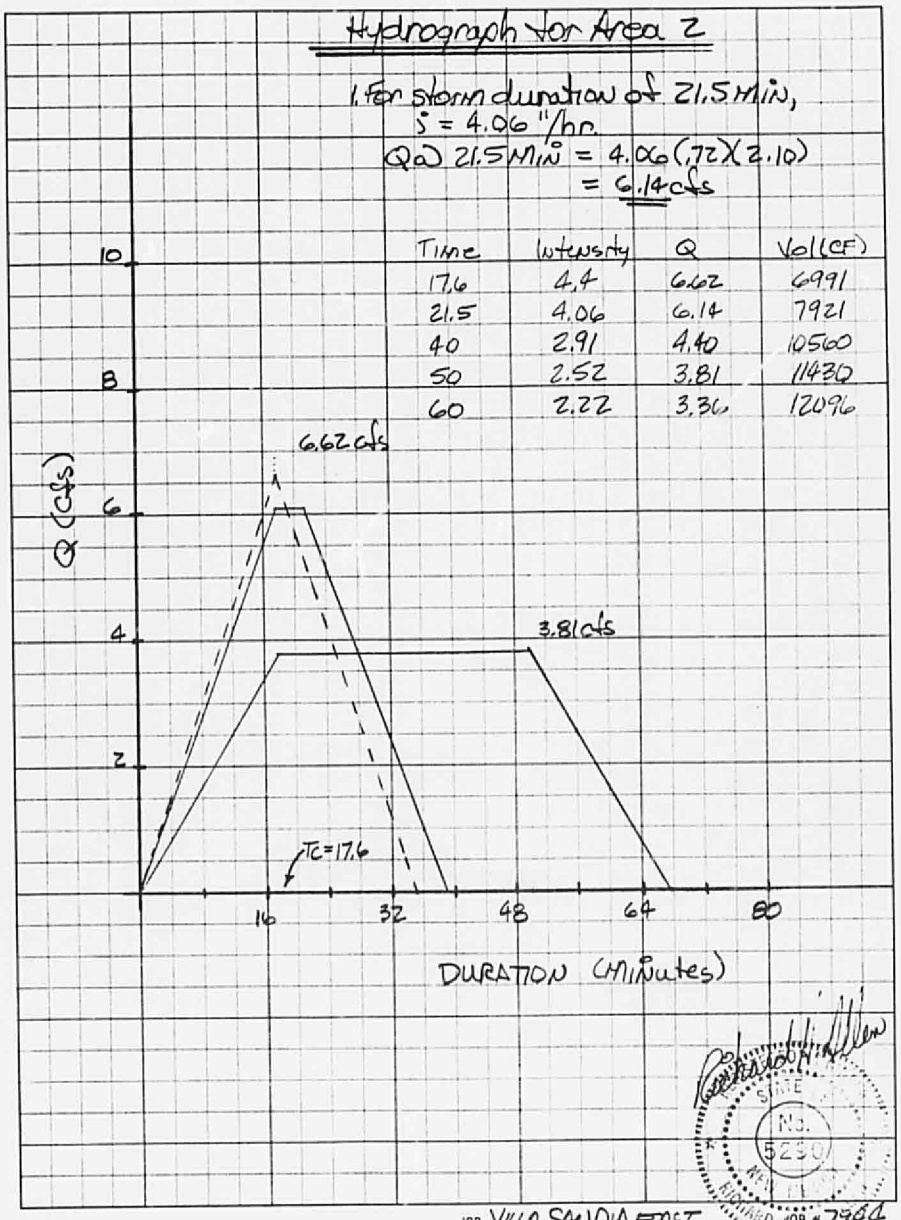
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JOB VILLA SANDIA EAST JOB # 7744
BY R.H. ALLEN DATE 10/1/79
CHK. DATE
SCALE SHEET NO 20 OF 25

Hydrograph for Area 2

1. For storm duration of 21.5 MIN,
   i = 4.06 "/hr.
   Q@ 21.5 MIN = 4.06 (.72)(2.10)
   = 6.14 cfs

Time	Intensity	Q	Vol(CF)
17.6	4.4	6.62	6991
21.5	4.06	6.14	7921
40	2.91	4.40	10560
50	2.52	3.81	11430
60	2.22	3.36	12096

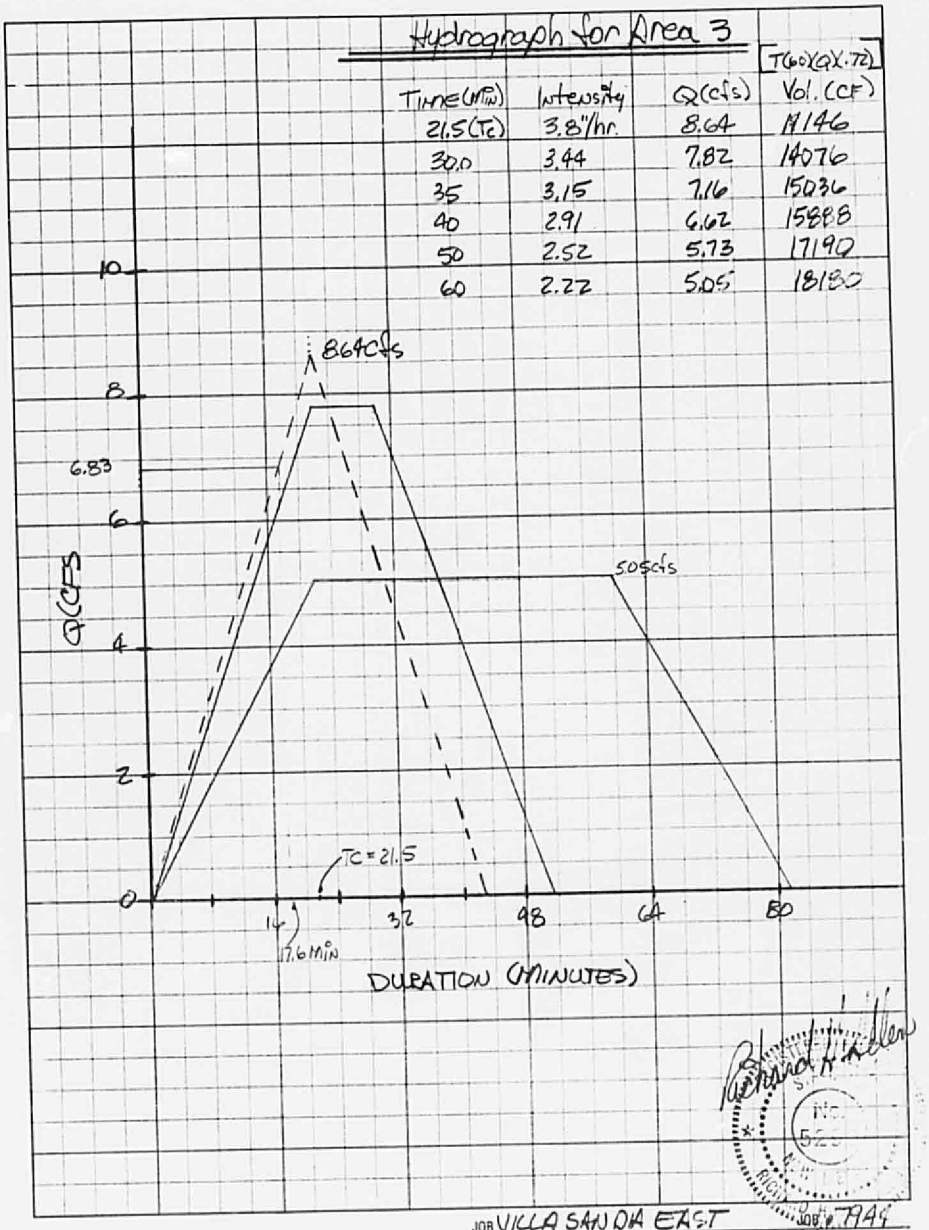


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JOB VILLA SANDIA EAST JOB # 7944
BY RH ALLEN DATE 10/1/79
CHK. DATE
SCALE SHEET NO. 21 OF 25

Hydrograph for Area 3

Time (min)	Intensity	Q (cfs)	T60X(QX.72) Vol. (CF)
21.5 (T_c)	3.8"/hr.	8.64	11146
30.0	3.44	7.82	14076
35	3.15	7.16	15036
40	2.91	6.62	15888
50	2.52	5.73	17190
60	2.22	5.05	18180



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JOB VILLA SANDIA EAST JOB # 7949
BY RH ALLEN DATE 10/1/79
CHK. DATE
SCALE SHEET NO 22 OF 25

BASED ON MEETING W/ KELLER & ORR, CONCRETE SECTION WILL BE SIZED TO CARRY 1-YEAR STORM. THIS WILL BE APPROXIMATELY 300 CFS (See letter dated 10/17/17 (KELLER SUGGESTED 200 CFS BUT I FEEL THIS IS TOO LOW FOR 10 YEAR STORM.)

1. FOR 300 CFS, TRY TRAPEZOIDAL SECTION 16' WIDE AT BOTTOM.

$Q = 300$ CFS; $n = 0.015$; $S = .035$

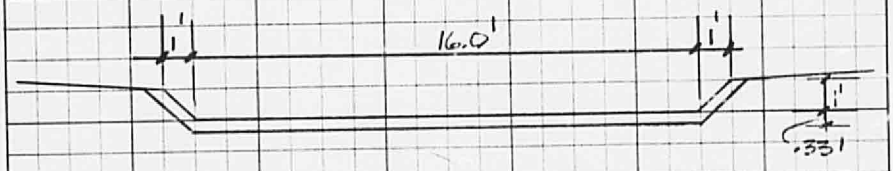
1. Try $d = 1$

$$Q = \frac{1.486}{.015}(.035)^{1/2}\left[\frac{16(1)+1^2(\frac{1}{2}X2)}{(18.828)}\right]^{2/3}(16+1)$$

$Q \approx 294$ cfs OK

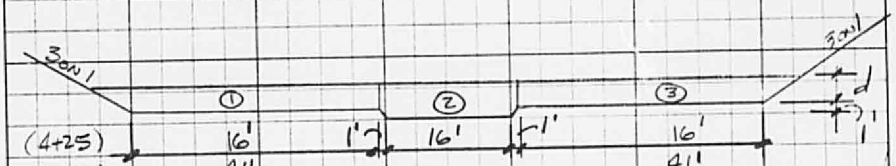
$V = 17.3$ fps

Basic concrete section will be as follows:



2. FOR 100 YEAR STORM, CALCULATE DEPTHS, VELOCITIES, FROUDE NUMBERS & SEQUENT DEPTHS AS A CHECK.

Typical Channel Section:



	@ 4+25	@ 13+50
$A_① = A_③ =$	$16d + \frac{1}{2}d^2$	$41d + \frac{1}{2}d^2$
$P_① = P_③ =$	$16 + 3.162d$	$41 + 3.162d$
$A_② =$	$17 + 18d$	$17 + 18d$
$P_② =$	18.828	18.828

DESIGN PROFESSIONALS, INC.
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Albuquerque, New Mexico
(505) 881-8338 87107

JOB VILLA SANDIA EAST
BY EALLEN DATE 10/19/17
CHK. DATE
SCALE SHEET NO. 23 OF 25

General Equation (Manning's)

$Q = \frac{1.486}{.025}(.035)^{1/2}\left(\frac{A_1}{P_1}\right)^{2/3}A_1 + \frac{1.486}{.015}(.035)^{1/2}\left(\frac{A_2}{P_2}\right)^{2/3}A_2 + \frac{1.49}{.025}(.035)^{1/2}\left(\frac{A_3}{P_3}\right)^{2/3}A_3$

A. Substituting $Q = 1400$ cfs, $A_3 = A_1$, $P_3 = P_1$ @ STA 4+25:

$$1400 = \left[11.120\left(\frac{16d + \frac{1}{2}d^2}{16+3.1623d}\right)^{2/3}(16d + \frac{1}{2}d^2)\right]2 + 18.534\left(\frac{17+18d}{18.828}\right)^{2/3}(17+18d)$$

$d \cong 1.06'$

d' = depth at concrete = 2.06'

$V_1 = V_3 = 10.4$ fps

$V_2 = 28.6$ fps

$Fr_3 = Fr_1 = 10.4/\sqrt{32.2(1.06)} = 1.78$

$Fr_2 = 28.6/\sqrt{32.2(2.06)} = 3.51$

$d_{s_3} = d_{s_1} = \frac{1}{2}(1.06)\left[\sqrt{1+8(1.78)^2} - 1\right] = 2.19'$

$d_{s_2} = \frac{1}{2}(2.06)\left[\sqrt{1+8(3.51)^2} - 1\right] = 9.25'$

B. Substituting and solving for d at STA 13+50

$$1400 = \left[11.12\left(\frac{41d + \frac{1}{2}d^2}{41+3.1623d}\right)^{2/3}(41d + \frac{1}{2}d^2)\right]2 + 18.534\left(\frac{17+18d}{18.829}\right)^{2/3}(17+18d)$$

$d \cong 0.78'$

d' = depth at concrete = 1.78'

$V_1 = V_3 = 9.1$ fps

$V_2 = 25.9$ fps

$Fr_3 = Fr_1 = 9.1/\sqrt{32.2(.78)} = 1.82$

$Fr_2 = 25.9/\sqrt{32.2(1.78)} = 3.42$

$d_{s_2} = d_{s_1} = \frac{1}{2}(.78)\left[\sqrt{1+8(1.82)^2} - 1\right] = 1.66'$

$d_{s_2} = \frac{1}{2}(1.78)\left[\sqrt{1+8(3.42)^2} - 1\right] = 7.76'$

3. SEQUENT DEPTHS IN CHANNEL

If jump occurs in concrete channel area it will extend out across full channel section as follows:

At 4+25: $d_{seq.} = 9.25'$

$(9.25 - 1.0)18 \div 50 = 2.97' = d_{s_2}$

At 13+50: $d_{seq.} = 7.76'$

$(7.76 - 1.0)(18) \div 93 = 1.31' = d_{s_2}$

REGISTERED PROFESSIONAL ENGINEER STATE OF NEW MEXICO No. 5201

DESIGN PROFESSIONALS, INC.
Carlisle Boulevard N.E.
Albuquerque, New Mexico
(505) 881-8338 87107

JOB VILLA SANDIA EAST JOB # 7984

BY BH ALLEN DATE 10/3/77

CHK DATE

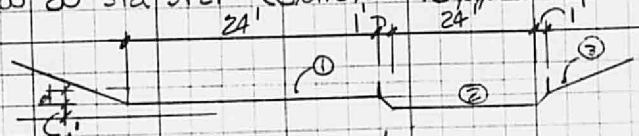
SCALE SHEET NO. 24 OF 25

Channel bank heights will be based on 100 year storm sequent depths but in no case less than 2.5' + d normal.:

	2.5+d_N		$d_1+d_{s_2}$		Use
4+25:	2.5+1.06 =	3.56'	2.19+2.97 =	5.16'	5.2'
13+50:	2.5+.78 =	3.28'	1.66+1.31 =	2.97'	3.3'

Note: To be conservative, the 3.3' depth will be used at Sta. 14+92 for a minimum bank height.

4. Depth of flow @ Sta 3+21 (Entrance to pipe)



$A_① = 24d + \frac{1}{2}(d)(3d)$ $\quad P_① = 24 + 3.162d$

$A_② = 26d + 25$ $\quad P_② = 26.828$

$A_③ = \frac{1}{2}(3d^2)$ $\quad P_③ = 3.162d$

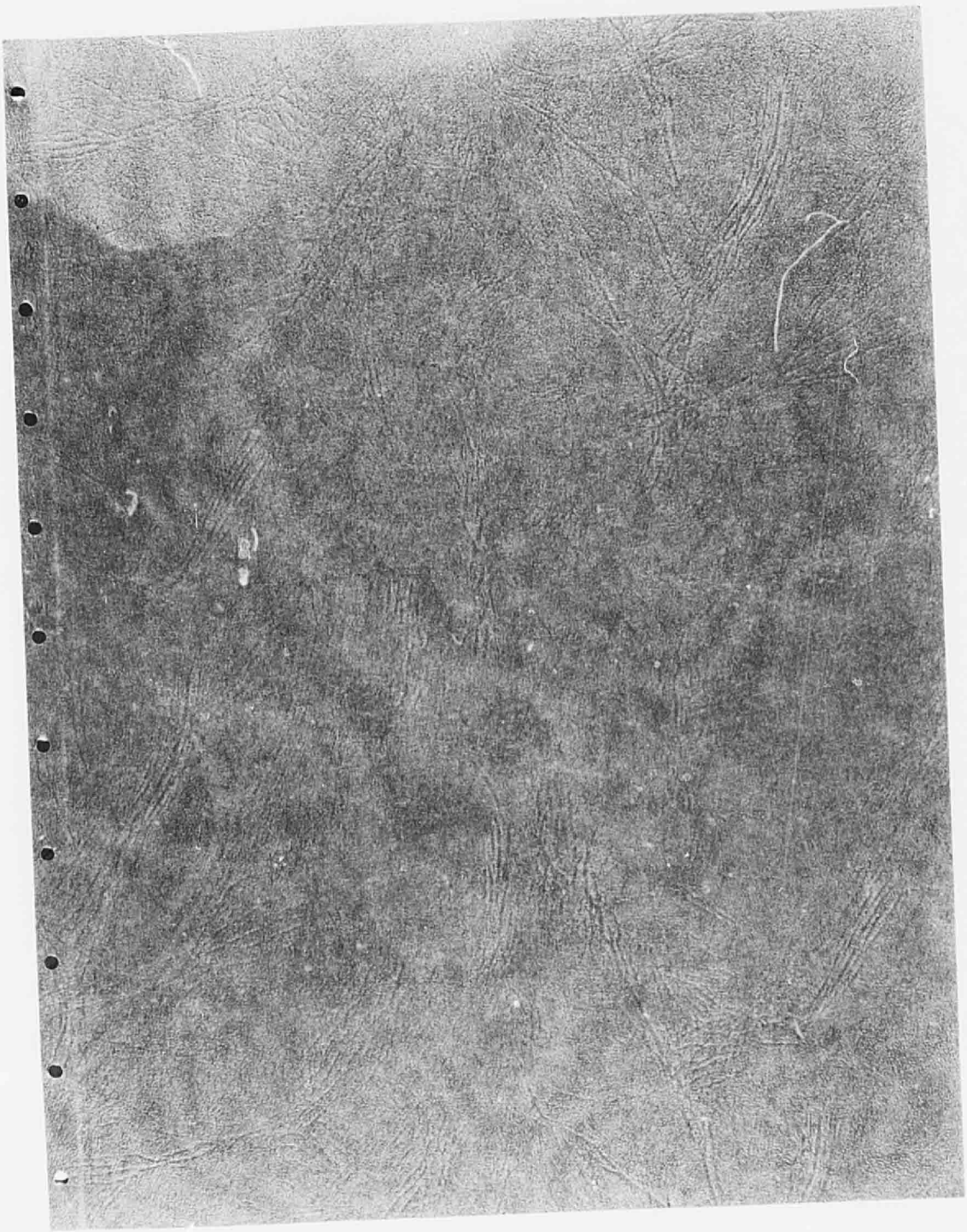
$$1400 = \frac{1.486}{.025}(.01615)^{1/2}\left(\frac{24d+1.5d^2}{24+3.162d}\right)^{2/3}(24+1.5d^2) + \frac{1.486}{.025}(.01615)^{1/2}\left(\frac{26d+25}{26.828}\right)^{2/3}(26d+25) + \frac{1.486}{.025}(.01615)^{1/2}\left(\frac{1.5d^2}{3.162d}\right)^{2/3}(1.5d^2)$$

$$1400 = 7.554\left(\frac{A_1}{P_1}\right)^{2/3}A_1 + 12.59\left(\frac{A_2}{P_2}\right)^{2/3}A_2 + 7.554\left(\frac{A_3}{P_3}\right)^{2/3}A_3$$

Solving for d: $d \approx 1.2'$

DESIGN PROFESSIONALS, INC.
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(505) 881-8338 87107

JOB VILLA SANDIA EAST JOB # 7744
BY RH ALLEN DATE 10/9/79
CHK DATE
SCALE SHEET NO. 25 OF 25



DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

B75

October 9, 1979

RECEIVED
OCT 15 1979
CITY ENGINEER

Mr. Richard Heller, City Engineer
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: Channel Improvement North of Villa Sandia East (A Subdivision at the Intersection of Juan Tabo and Eubank)

Dear Mr. Heller:

This letter will confirm our meeting in your office on October 8, 1979 regarding the above referenced project. Present for the meeting were yourself, Ripp Orr, Dick Vaughan and Rich Allen.

The significant items which were discussed and which were agreed upon at our meeting were as follows:

1. A hard lined channel capable of transporting 200 cfs is acceptable to the City for carrying low flows in the otherwise grass lined channel abutting the north side of the Villa Sandia East property.
2. Velocities of 20 feet per second ± are not unreasonable for the hard lined channel referenced above in item 1.
3. The owners of the property adjacent to the arroyo will be responsible for the maintenance of the grass lined channel within the designed 150 foot right-of-way.
4. Low flows (less than the 50 year) should be conveyed directly to the grass lined channel in lieu of temporary detention in the planned tennis courts.

It is my understanding that the referenced items are acceptable to the City of Albuquerque and are reasonable parameters for the final drainage calculations for the subject channel improvement.

Please advise if you have any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

cc: Ripp Orr, P.E.

1-year pre phone conversation w/ Rich Allen 10/15/79 — RHA

ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

RICHARD E. LEONARD
EXECUTIVE ENGINEER

B. H. SWINBURNE, CHAIRMAN
WILLIAM V. HEREFORD, VICE-CHAIRMAN
FRANCES McCOY, SECRETARY-TREASURER
VERNON DOAK, DIRECTOR
KLEETON LAWS, DIRECTOR

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
3600 PROSPECT AVE. N.E.
P. O. BOX 25861 - ALBUQUERQUE, N. M. 87125
TELEPHONE 344-3818

December 13, 1979

Mr. Richard Heller
City Engineer
Albuquerque, NM

Dear Dick:

Reference Villa Sandia East being developed by L. B. Nelson Corporation.

Based on a briefing by Mr. Allen of Design Professionals, Inc., I concur enthusiastically with the park section design concept. I do, however, recommend the following design modifications:

a. Concrete should be 6" thick to accommodate the mesh and to withstand maintenance vehicle traffic.

b. There should be a cutoff wall at upstream edge of the concrete.

c. There should be a filter between gabions and soil.

d. I should prefer to maintain a constant channel slope; however, I recognize the slope break may be necessary to fit your Eubank bridge.

My principal concern is that adequate right-of-way be obtained. Until this ROW is conveyed to either the City or AMAFCA, no drainage report should be approved.

Sincerely,

Richard E. Leonard

Richard E. Leonard
Executive Engineer

ic
cc: Richard Allen
B. Conaghan

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

December 18, 1979

Mr. Lee Ross
L.B. Nelson Corporation of New Mexico
6400 Uptown Boulevard NE, Suite 473-West
Albuquerque, New Mexico 87110

SUBJECT: Villa Sandia East (7944)

Dear Mr. Ross:

Attached is Addendum No. 1 for the subject project which I briefly discussed with you on 12/18/79. As I mentioned, the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) requested several design changes relative to the work in the 150' drainage R.O.W. (See copy of their letter attached hereto dated 12/13/79). The enclosed Addendum incorporates the requested changes into the project.

Also, due to the apparent unavailability of 4" to 6" smooth rock for use in the gabion structure, it is recommended that a 2"+ cobblestone rock be used on this project. This item change is reflected in Addendum No. 1.

The final drawings will reflect the changes noted in the enclosed Addendum. However, copies of the Addendum should be forwarded immediately to those contractors who already have a set of drawings and are planning to submit a bid on this project for portions of the civil/drainage work.

Please advise if you have any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

RHA:ch

DPI
ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

letters received

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE / ALBUQUERQUE, NEW MEXICO 87107 / (505) 881-6336

December 19, 1979

E 21-015

Mr. Bruno Conegliano, City Drainage Engineer
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: Villa Sandia East Drainage Report (7944)

Dear Mr. Conegliano:

Since the submission to you of the subject drainage report on November 9, 1979, several minor design revisions have been requested by AMAFCA. These revisions were discussed with Richard Leonard on December 13, 1979.

In order to incorporate the changes into the project, an addendum has been issued by Design Professionals, Incorporated. A copy of this addendum together with a copy of Mr. Leonard's letter dated 12/13/79 is enclosed herewith for your review in conjunction with the subject drainage report. Your earliest possible review of this drainage report would be appreciated.

Please advise if you have any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
President

cc: Richard Leonard, P.E.
Richard Heller, P.E.
Lee Ross, L.B. Nelson Corporation

RHA:ch

ARCHITECTS / ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD C. VAUGHAN

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

December 28, 1979

LRF

RECEIVED
JAN 02 1979
CITY ENGINEER

Mr. Richard Heller, City Engineer
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: Villa Sandia at Bear Canyon North (7948.6)
Drainage Ponds for Buildings No. 1 (5901 McKinney Drive, N.E.) and Building No. 3 (6017 McKinney Drive, N.E.)

Dear Mr. Heller:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a letter of certification from Kent Nowlin Construction Company relative to the drainage ponds for the referenced project. This letter, a copy of which is attached hereto, states that the ponds and swales adjacent to Building No. 1 and Building No. 3 have been constructed in accordance with the plans and field changes approved by DPI and the City of Albuquerque's drainage division.

Based upon Kent Nowlin's letter and survey data, we herein state that the ponds adjacent to the referenced buildings will retain the quantities of run-off stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by Mr. Conegliano and is currently on file in his office.

E 21-D13

Please advise if you have any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

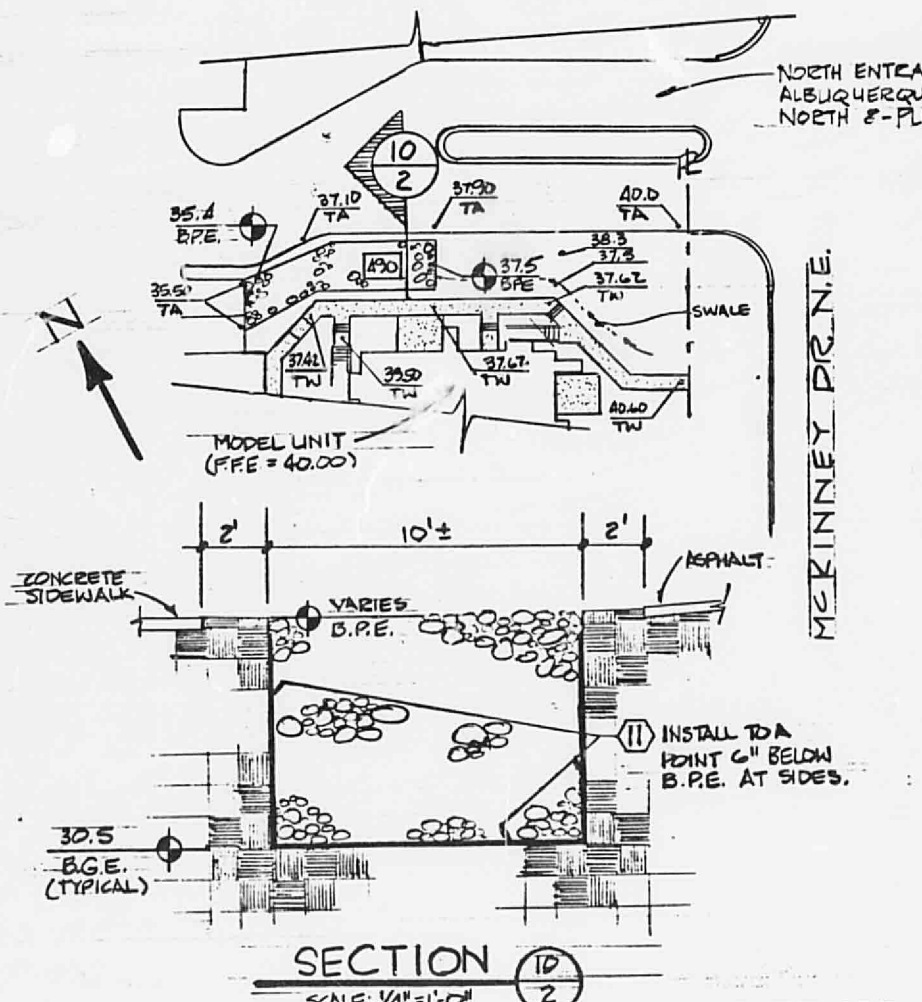
RICHARD H. ALLEN, P.E.
Vice President

cc: L.B. Nelson Corporation

RHA:ch

ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

NORTH ENTRANCE
HOLDING POND REVISION



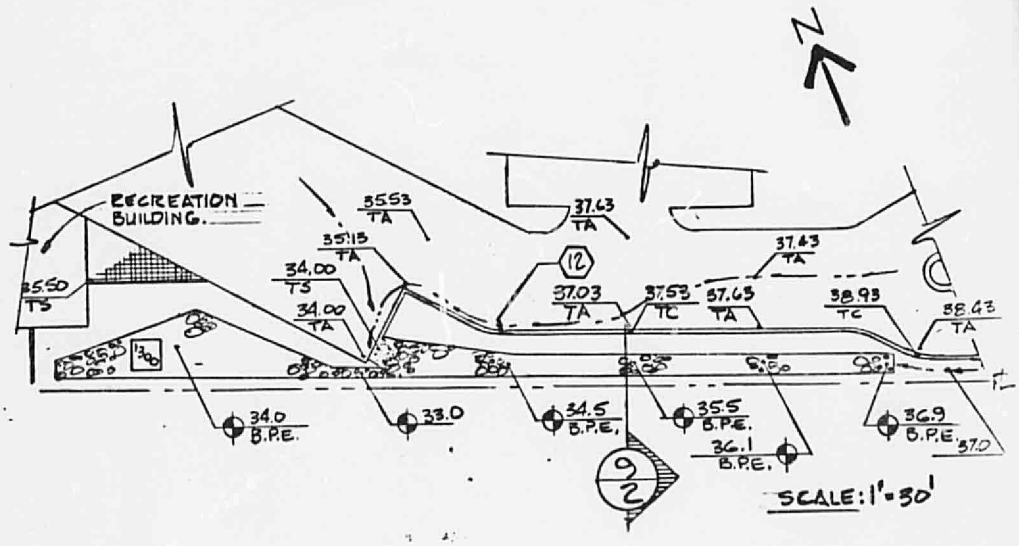
SECTION 10/2

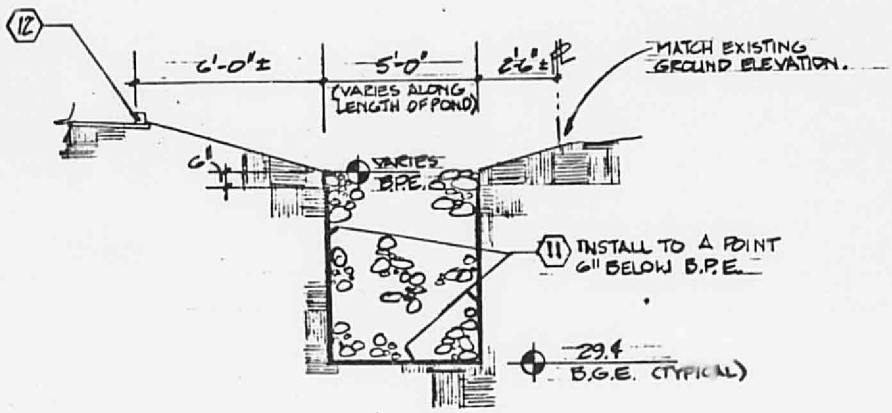
SCALE: 1/4" = 1'-0"

DESIGN PROFESSIONALS, INC.
Carlisle Boulevard N.E.
Albuquerque, New Mexico
(505) 881-8338 87107

JOB ALBUQUERQUE NORTH 8-PLEX JOB # 7948.6
BY R.H. ALLEN DATE AUGUST 8, 1979
CHK. DATE
SCALE SHEET NO. 1 OF 1

SOUTHEAST CORNER
HOLDING POND REVISION



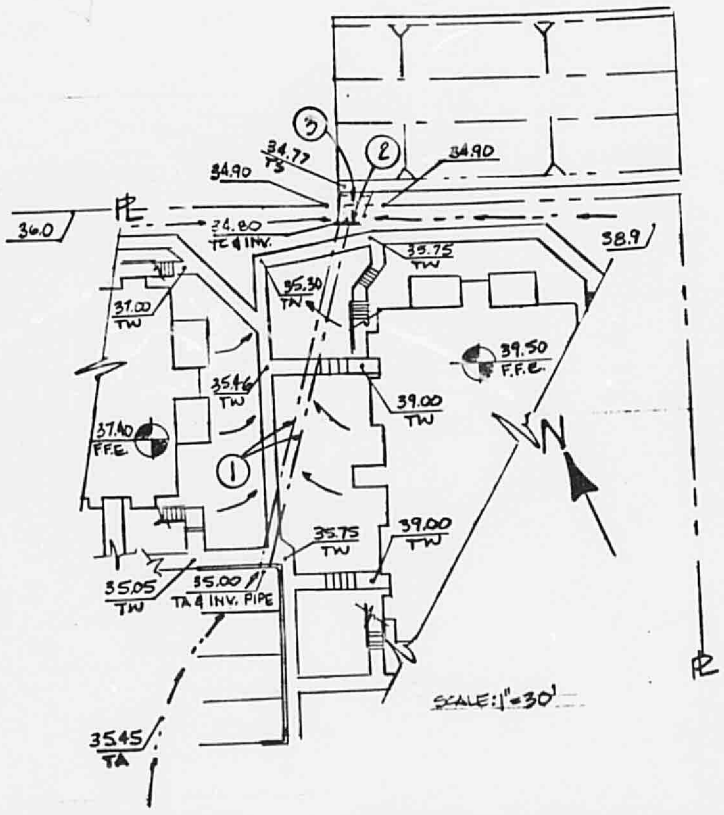


SECTION 9/2

SCALE: 1/4"=1'-0"

DESIGN PROFESSIONALS, INC.
Carlisle Boulevard N.E.
Albuquerque, New Mexico
(505) 881-8338 87107

JOB ALBUQUERQUE NORTH B PLEY JOB # 7948.6
BY R.H. ALLEN DATE JULY 5, 1979
CHK. DATE
SCALE SHEET NO. 2 OF 2



(1) 6" Ø PVC DRAIN PIPE BELOW GRADE.

(2) CONC. HEADWALL AS REQUIRED.

(3) CONC. PAD, 4" THICK

NOTE: SEE CONTRACT DRAWINGS FOR ADDITIONAL INFORMATION AND ELEVATIONS.

REVISED DRAINAGE PLAN FOR NORTHEAST CORNER

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR
No. 5290
NEW MEXICO
RICHARD HUGH ALLEN

DESIGN PROFESSIONALS, INC.
4201 CARLISLE BLVD, N.E.
ALBUQUERQUE, N.M. 87107

PROJECT: VILLA SANDIA AT BEAR CANYON NORTH (794E)

DATE: 10/17/79
BY: R.H. ALLEN

RICHARD E. LEONARD
EXECUTIVE ENGINEER

S. H. SWINBURNE, CHAIRMAN
WILLIAM V. HEREFORD, VICE CHAIRMAN
FRANCES McCOY, SECRETARY TREASURER
VERNON DOAK, DIRECTOR
KLEETON LAWS, DIRECTOR

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

2600 PROSPECT AVE., N.E.
P. O. BOX 25851 - ALBUQUERQUE, N. M. 87125
TELEPHONE 344-3516

January 7, 1980

Mr. Richard G. Vaughan, P.E.
Design Professionals, Inc.
4201 Carlisle Blvd., NE
Albuquerque, NM 87107

Dear Mr. Vaughan:

Reference our telephone conversation today.

The Northeast Heights Drainage Management Plan calls for a 150 ft. ROW for the Bear Arroyo Tributary between Wyoming and Tramway boulevards. It also spells out that the Bear Trib will be soft lined. These aspects of the Drainage Management Plan have never been modified, nor -- to the best of my knowledge -- ever formally proposed for modification.

In my November 27, 1979, letter (attached) concerning drainage aspects of the Academy/Tramway/Eubank Sector Development Plan, I commented that proposed easements and hard lining are inconsistent with the Drainage Management Plan.

I hope this will help to clarify the matter.

Sincerely,

Richard E Leonard

Richard E. Leonard
Executive Engineer

lc
cc: Mr. Heller
Mr. Conegliano ✓

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

March 28, 1980

Mr. Richard Allen
Design Professionals, Inc.
4125 Carlisle Blvd., NE
Albuquerque, New Mexico 87107

Dear Mr. Allen:

The drainage report for the Villa Sandia East is approved in concept.

Sincerely,

Fred J. Aguirre
Civil Engineer

FJA/lc

7/11

Dick:

Called Richardson and he said there needed another letter with the attachments. If we don't receive it, I'll call him and have him send another letter.

FH

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

April 2, 1980

E 21 - D 165

RECEIVED
APR 10 1980
CITY ENGINEER

Mr. Richard Heller, City Engineer
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: Villa Sandia at Bear Canyon North (7948.6)
Drainage for Building No. 6 (6033 McKinney Drive, N.E.)

Dear Mr. Heller:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a letter of certification from Kent Nowlin Construction Company relative to the drainage for the referenced project. The referenced letter and field notes (attached hereto) indicate that the drainage ways adjacent to Building No. 6 have been constructed in compliance with the design criteria.

Based upon Kent Nowlin's letter and survey data, we herein state that the drainage ways adjacent to the referenced building will adequately convey the quantities of run-off stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by your staff and is currently on file in your office.

Please advise if there are any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

cc: L.B. Nelson Corporation

ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

Drainage Report is approved
according to Bruno
3-20-80
JJh

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

April 3, 1980

RECEIVED
APR 11 1980
CITY ENGINEER

E21-D15

Mr. Fred Aguirre
City of Albuquerque Drainage Dept.
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: Villa Sandia at Bear Canyon North (7948.6)
Drainage for Building No. 6 (6033 McKinney Drive, N.E.)

Dear Mr. Aguirre:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a letter of certification from Kent Nowlin Construction Company relative to the drainage for the referenced project. The referenced letter and field notes (attached hereto) indicate that the drainage ways adjacent to Building No. 6 have been constructed in compliance with the design criteria.

Based upon Kent Nowlin's letter and survey data, we herein state that the drainage ways adjacent to the referenced building will adequately convey the quantities of run-off stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by your staff and is currently on file in your office.

Please advise if there are any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

cc: L.B. Nelson Corporation

ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

April 3, 1980

RECEIVED
APR 11 1980
CITY ENGINEER

Mr. Fred Aguirre
City of Albuquerque Drainage Dept.
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: Villa Sandia at Bear Canyon North (7948.6)
Drainage for Building No. 6 (6033 McKinney Drive, N.E.)

Dear Mr. Aguirre:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a letter of certification from Kent Nowlin Construction Company relative to the drainage for the referenced project. The referenced letter and field notes (attached hereto) indicate that the drainage ways adjacent to Building No. 6 have been constructed in compliance with the design criteria.

Based upon Kent Nowlin's letter and survey data, we herein state that the drainage ways adjacent to the referenced building will adequately convey the quantities of run-off stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by your staff and is currently on file in your office.

Please advise if there are any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

cc: L.B. Nelson Corporation

ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE · ALBUQUERQUE, NEW MEXICO 87107 (505) 881-6336

April 3, 1980

RECEIVED
APR 11 1980
CITY ENGINEER

Mr. Fred Aguirre
City of Albuquerque Drainage Dept.
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: Villa Sandia at Bear Canyon North (7948.6)
Drainage for Building No. 6 (6033 McKinney Drive, N.E.)

Dear Mr. Aguirre:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a letter of certification from Kent Nowlin Construction Company relative to the drainage for the referenced project. The referenced letter and field notes (attached hereto) indicate that the drainage ways adjacent to Building No. 6 have been constructed in compliance with the design criteria.

Based upon Kent Nowlin's letter and survey data, we herein state that the drainage ways adjacent to the referenced building will adequately convey the quantities of run-off stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by your staff and is currently on file in your office.

Please advise if there are any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

cc: L.B. Nelson Corporation

ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

KENT NOWLIN CONSTRUCTION, INC.

Highway · Utilities / Municipal · Heavy

April 3, 1980

E21-D15

~~6~~ 8

Design Professionals, Inc.
4201 Carlisle Blvd., NE
Albuquerque, NM 87107

ATTN: Richard H. Allen, P.E.

RE: VILLA SANDIA AT BEAR CANYON NORTH

Dear Mr. Allen:

This is to inform you that the swales adjacent to Building Number 6, street addresses 6033 through 6047 McKinney Drive NE, of the referenced project have been constructed in accordance with the projec drawings. This has been verified through field measurements conducted by our survey crew on April 3, 1980.

Very truly yours,

KENT NOWLIN CONSTRUCTION, INC.

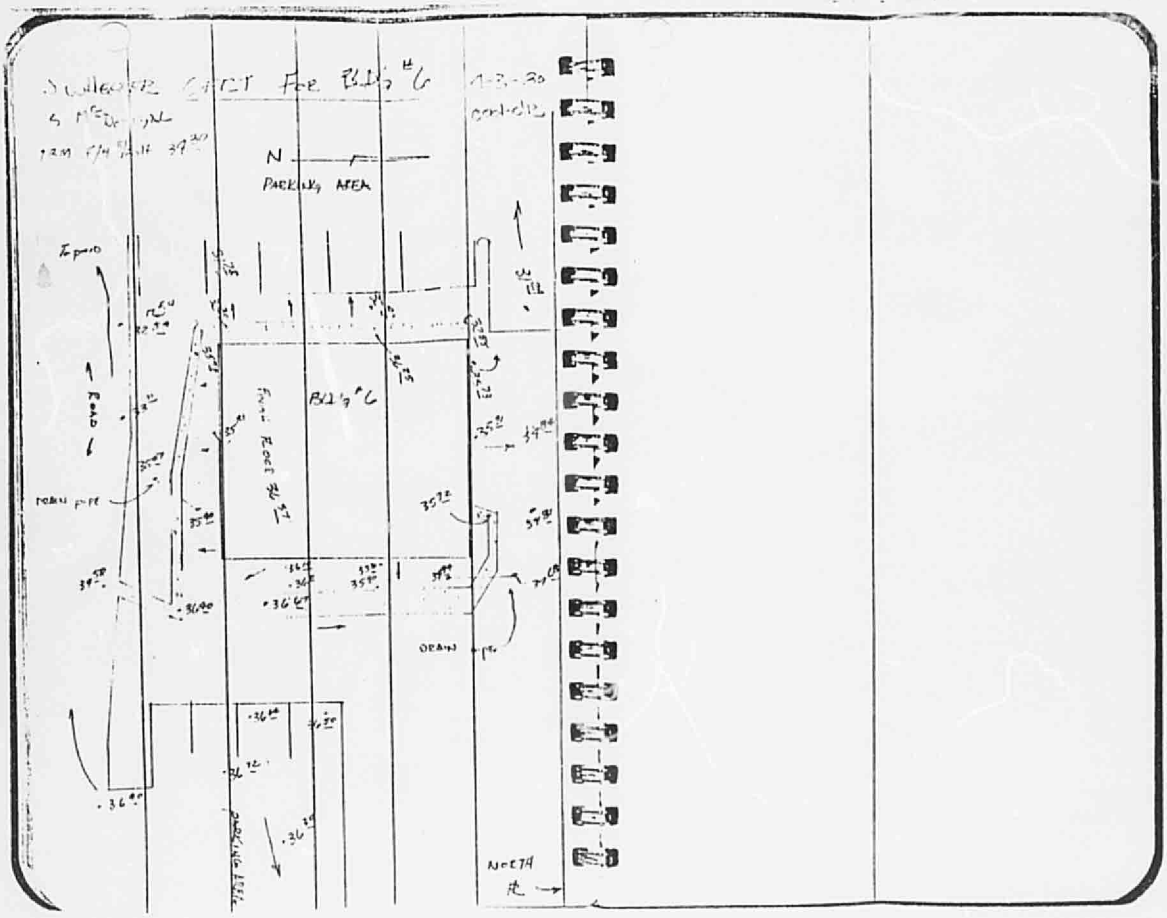
R. O. Kinz

R. O. Kinz
Survey Division

ew

cc: L. B. Nelson Corporation

P. O. Box 14654 / 4001 Bogan, N.E. / Albuquerque, New Mexico 87191 / Phone (505) 881-2511 / All Types Utilities


N
PARKING AREA
BLDG #6
ROAD
DRAIN
NORTH

FISH RSA ADM
REP SUR
CON COUN
DES SEC
INSP FILE
HYDRO RETURN

Any action necessary on our part?

E21-D15

1947

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

November 11, 1980

RECEIVED
NOV 17 1980
CITY ENGINEER

Mr. Richard Heller, City Engineer
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

RE: Villa Sandia at Bear Canyon North (7948.6)
Drainage for Pool/Recreation Facility

Dear Mr. Heller:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a Letter of Certification from Hugg Surveying Company relative to the drainage for the referenced project. The referenced letter and accompanying survey notes (attached hereto) indicate that the drainage pond adjacent to the pool area has been constructed in substantial compliance with the revised design criteria. A drain has been provided in the bottom of the ponding area to allow the area to drain to a large pond at the southwest corner of the site. This is a temporary holding area and will eventually empty directly to the arroyo located on the north side of the property after said arroyo is hard lined.

Based upon the Hugg survey, we herein state that the graded drainage areas will adequately convey or hold the quantities of runoff stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by your staff and is on file in your office.

Please advise if there are any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

cc: L.B. Nelson Corporation of New Mexico

DPI
ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

ADDENDUM NO. 1
FOR
VILLA SANDIA EAST

OWNER: L.B. Nelson Corporation
ARCHITECT/ENGINEER: Design Professionals, Inc.
4201 Carlisle Boulevard, N.E.
Albuquerque, New Mexico 87107

1. rawing C-1
. Under GENERAL NOTES, item 3 A-Stone, change the second sentence to read as follows:

"Size of stone shall be 2"+, similar tc cobblestone rock as supplied by Albuquerque Gravel Products".

The remainder of 3A will remain unchanged.

2. Drawing C-5
. A. Change the channel slab thickness on section 13/5 from 4" to 6". Change mesh from 6 x 6:W2.9 x W2.9 to 4 x 4:W2.9 x W2.9.
B. Change section marker 21 to 22 and section marker 22 to 23.
C. Revise Detail 14/5 to reflect a 6" slab thickness. See Standard City of Albuquerque channel construction joint details for dimensions of keyway.
D. Change slab thickness on channel section at station 14+70 from .33' to .5'.
E. Change slab thickness on channel section at station 14+92 from .67' to a 3' cut-off wall. See REVISED GABION SECTION 23/7 attached to this Addendum.

3. Drawing C-7
A. Change slab thickness on section 24/7 from 4" to 6". Change mesh from 6 x 6:W2.9 x W2.9 to 4 x 4:W2.9 x W2.9.
B. Change slab thickness on sections 15/7 and 16/7 from 4" to 6".
C. Change Detail 17 to reflect a 6" thick slab. See City of Albuquerque Standard drawings for keyway dimensions.
D. Change Section 23/7 per attached drawing labeled REVISED GABION SECTION. Similar changes apply to Section 22/7.

All drawings shall be revised where they are in conflict with items described in this Addendum.

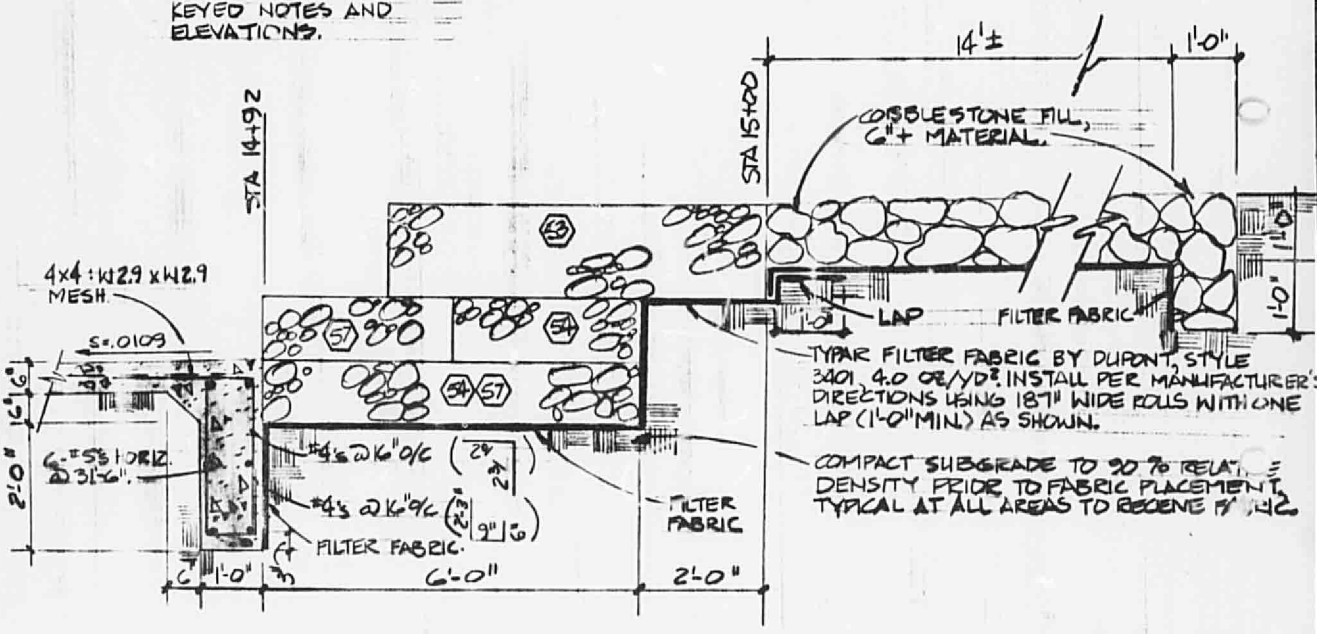
END OF ADDENDUM NO. 1



NOTE:

- FABRIC AT SECTION (22/S7) IS SIMILAR. DELETE CUTOFF WALL AND TURN FABRIC DOWN 1'± AT FRONT EDGE OF GABIONS.
- SEE ORIGINAL DRAWINGS FOR KEYED NOTES AND ELEVATIONS.





REVISED GABION SECTION (23/S7)

SCALE: 1/2"=1'-0"

DESIGN PROFESSIONALS, INC
BY: RH ALLEN
DATE: 12/18/79
JOB: VILLA SANDIA EAST

12/10/79

Villa Sandia East.

1. The slope shown for area E on sheet 1 of 25 in computations doesn't agree by the elev. diff. and length shown on sheet 2 of 25

2. The Tc values are questionable, they seem too high. It is suggested that a nomograph (used by the City) be used for determining these values. The Tc values will have an effect on the other computations.

3. For areas A & D the Tc being the same the I_{100} values should also be the same.

4. The arroyo area Tc is very high if channel flow was used to compute the Tc.

5. Again Tc values are questionable for determination of offsite flow value.

6. Page 9 of 25 in computations again Tc values are questionable, but assuming they are correct, the $I_{100 \& 10}$ values cannot

be verified.

7. Statement on 13 of 25 in computations "Since area 1 runoff will go directly to street, no retention/detention is required." Is this correct? ~~8.5 cfs is to be dumped in the street, does it have the capacity to carry this additional flow and what will be the downstream effect?~~ A total of 8.47 cfs is being collected, will the existing inlet handle this increase?

Was the original 8.67 cfs taping the existing system? It appears Juan Jobo also collects for flow east and south of this location.

8. On page 14 of 25 middle of page in computing "d" for court #2 & #1.(Vol. 2 + Vol. 3 ÷ 7800), 7800 needs to be changed to 7200, it is confusing. will flow over the wall of the tennis court cause erosion by wall and cause failure?

How is the wall to be protected?

9. Cannot find any details of strutures, or whatever, for flow into or out of the tennis courts.

10. What is being shown and what is it for? (See sheet C-7, section at outflow channel (16/717), "pipe?" in upper right corner above 36¼ X22½ oval pipe) "15" R.C.P.?" should be labeled or noted.

11. Small write up for baffles in MH's and OI, since this is not standard, does it need more details? Also cannot find location of such on plans.

12. On page 4 of the report, 3-42" concrete pipes are stated as being under Eubank Boulevard for the Bear Tributary Arroyo crossing, the plans show 4 pipes. Is an additional pipe being proposed at this location? If so, there is no mention of it. C-1 shows 4 existing Is this crossing an overflow crossing also? The maximum Q at 7' depth is only about 550 cfs. Has the back-water created by this crossing been analyzed for upstream effects.

Billy Goolsby

DESIGN PROFESSIONALS, INC.
4125 CARLISLE, NE, ALBUQUERQUE, N.M. 87107 (505) 881-6336

Date November 9, 1978 Project No. 7944

Project Villa Sandia East - Drainage Report

To: City of Albuquerque - Hydrology Dept
P.O. Box 1263
Albuquerque, New Mexico
Attention: Bruno Conegliano

☑ Transmittal
☐ Memorandum
☐ Shop Drawing No.
Quantity 2-EA
(Drainage Report)

Attached are two copies of the Drainage Report for the subject project. Please review this report at your earliest convenience and advise me of your comments.

Let me know if there are any questions.

(Since this particular area has been discussed in great detail during several meetings w/City personnel, there should not be too many questions regarding the overall concept of the proposed drainage improvements. Therefore, your earliest attention to this report would be appreciated.)

Signed: Richard L. Miller

cc: L.B. Nelson Corporation - Lee Ross
File: 7944

ARCHITECTS / ENGINEERS

DESIGN PROFESSIONALS, INC.
4301 CARLISLE, NE, ALBUQUERQUE, N.M. 87107 (505) 881-6336

Date MAY 30, 1984 Project No. _____

Project VILLA SANDIA @ BEAR CANYON NORTH

To: Cory Hydrology

Attention: Fred Aquino

☐ Transmittal
☐ Memorandum
☐ Shop Drawing No. _____
Quantity _____

Attached, per your request, are copies of the site certification letters & survey data for the project we discussed this morning in your office.

Please advise if there are any questions.

Signed Richard A. Allen, PE

cc File: 7948

ARCHITECTS / ENGINEERS

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

April 15, 1980

Mr. Richard Heller, City Engineer
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

Re: Villa Sandia at Bear Canyon North (7948.6)
Drainage for Building No. 7 (6049-6063 McKinney Drive, N.E.)

Dear Mr. Heller:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a letter of certification from Kent Nowlin Construction Company relative to the drainage for the referenced project. The referenced letter (attached hereto) indicates that the drainage ways adjacent to Building No. 7 have been constructed in compliance with the design criteria.

Based upon Kent Nowlin's letter and survey data, we herein state that the drainage ways adjacent to the referenced building will adequately convey the quantities of run-off stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by your staff and is currently on file in your office.

Please advise if there are any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

cc: L.B. Nelson Corporation

DPI
ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

Highway · Utilities / Municipal · Heavy

KENT NOWLIN CONSTRUCTION, INC.

April 15, 1980

Design Professionals, Inc.
4201 Carlisle Blvd., NE
Albuquerque, NM 87107

ATTN: Richard H. Allen, P.E.

RE: VILLA SANDIA AT BEAR CANYON NORTH

Dear Mr. Allen:

This is to inform you that the swales adjacent to Building Number 7, street address 6049 McKinney Drive NE, of the referenced project have been constructed in accordance with the project drawings. This has been verified through field measurements conducted by our survey crew on April 14, 1980.

Very truly yours,

KENT NOWLIN CONSTRUCTION, INC.

R. O. Kinz

R. O. Kinz
Survey Division

ew

cc: L. B. Nelson Corporation

P. O. Box 14654 / 4001 Bogan, N.E. / Albuquerque, New Mexico 87191 / Phone (505) 881-2511 / All Types Utilities

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

November 11, 1980

Mr. Richard Heller, City Engineer
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

RE: Villa Sandia at Bear Canyon North (7948.6)
Drainage for Pool/Recreation Facility

Dear Mr. Heller:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a Letter of Certification from Hugg Surveying Company relative to the drainage for the referenced project. The referenced letter and accompanying survey notes (attached hereto) indicate that the drainage pond adjacent to the pool area has been constructed in substantial compliance with the revised design criteria. A drain has been provided in the bottom of the ponding area to allow the area to drain to a large pond at the southwest corner of the site. This is a temporary holding area and will eventually empty directly to the arroyo located on the north side of the property after said arroyo is hard lined.

Based upon the Hugg survey, we herein state that the graded drainage areas will adequately convey or hold the quantities of runoff stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by your staff and is on file in your office.

Please advise if there are any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

cc: L.B. Nelson Corporation of New Mexico

DPI
ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

HUGG SURVEYING COMPANY

1701 Grande S.E.
Rio Rancho, New Mexico 87124
Phone: (505) 898-5391

Garry P. Hugg, L.S.
Registered - New Mexico, - Arizona,
Colorado, - Nevada, - Washington

NOV 07 1980

November 2, 1980

L.B. Nelson Corporation
6400 Uptown Blvd. N E
Suite 473W
Albuquerque, New Mexico 87110

Attention: Neal O'Conner

RE: Storm Drainage Ponding Area immediately west of the swimming pool at Villa Sandia at Bear Canyon North.

The above captioned ponding area contains approximately 1880 square feet and has an average floor elevation of 28.9.

A copy of the field notes are enclosed for your use and information.

Sincerly,

Garry P. Hugg L.S.

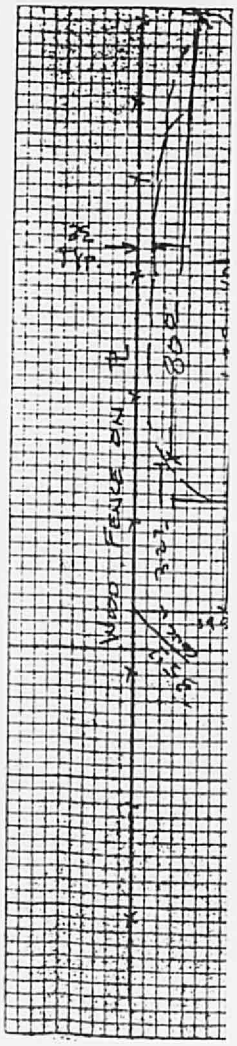
GPH/drh

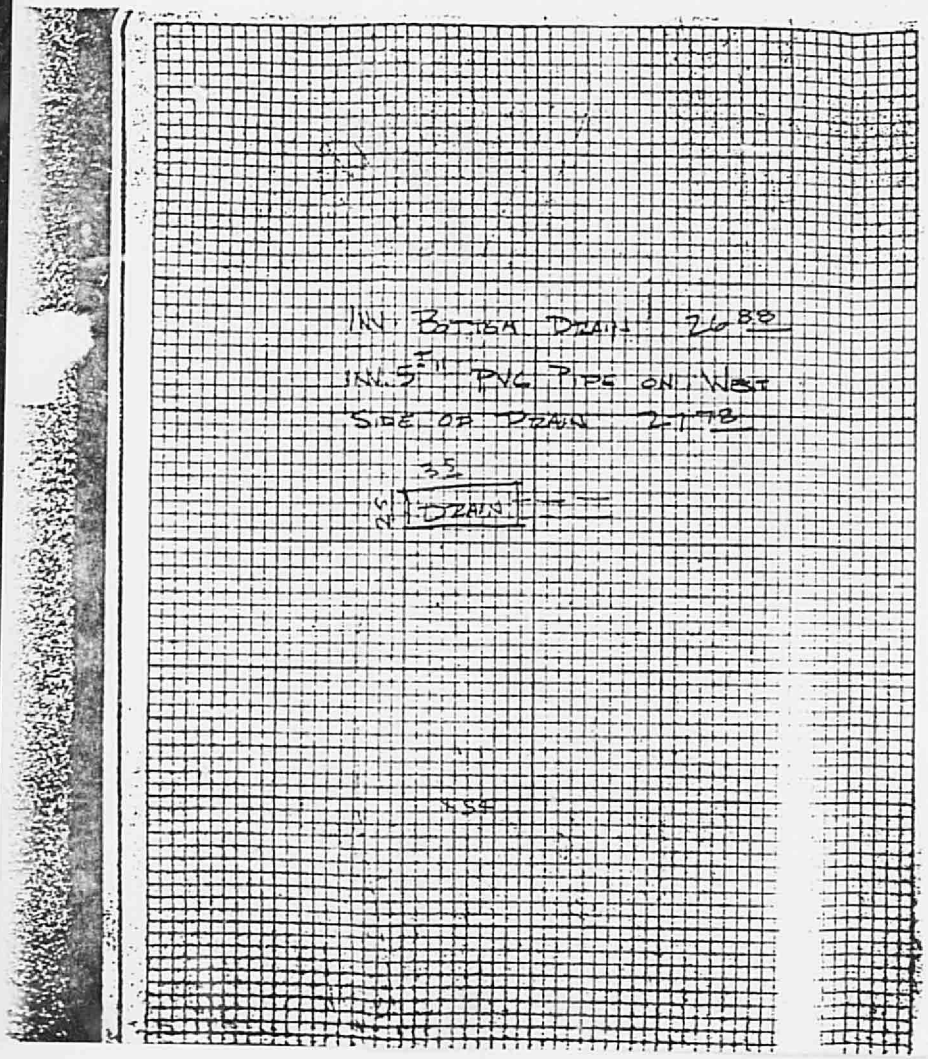
REGISTERED LAND SURVEYOR STATE OF No. 5823 NEW MEXICO GARRY P. HUGG

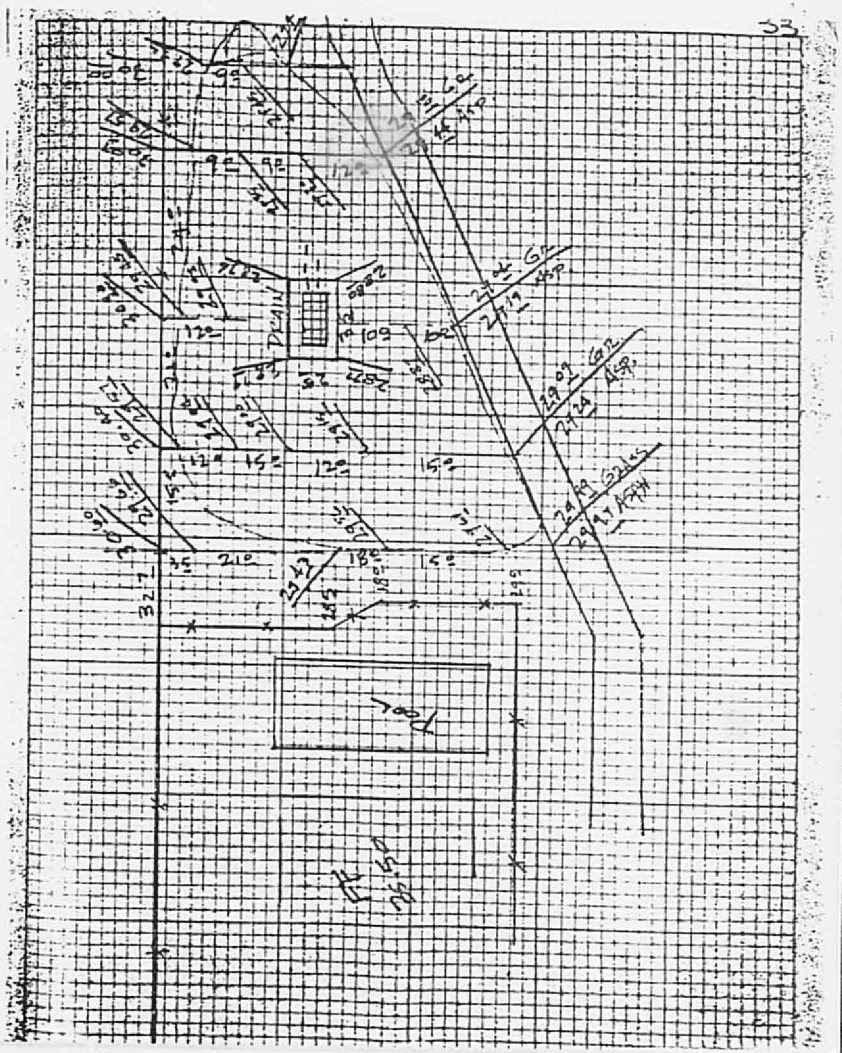
cc: Rich Allen, DPI

PONDING AREA WEST OF POOL
VILLA SANDIA @ BEAR CANYON NORTH
FOR: L.B. NELSON CO.

$\frac{407'}{2} \times 30 = 12210^{0'}$




INV. BOTTOM DRAIN 2688
INV. 5" PVC PIPE ON WEST
SIDE OF DRAIN 2778
35
25
DRAIN
554


33
DRAIN
TREE
GAS
ASPH
210
327
554

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

May 13, 1980

Mr. Fred Aguirre
City of Albuquerque - Drainage
P. O. 1213
Albuquerque, New Mexico 87103

Subject: Villa Sandia at Bear Canyon North

Dear Mr. Aguirre:

Enclosed are four copies of changes we discussed relative to an erosion problem at the referenced project. I have reviewed the changes with Ceilia Thomlinson and Sergio Miranda of the City Engineer's office and they concur with my solution to the problem.

Please advise if you have any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

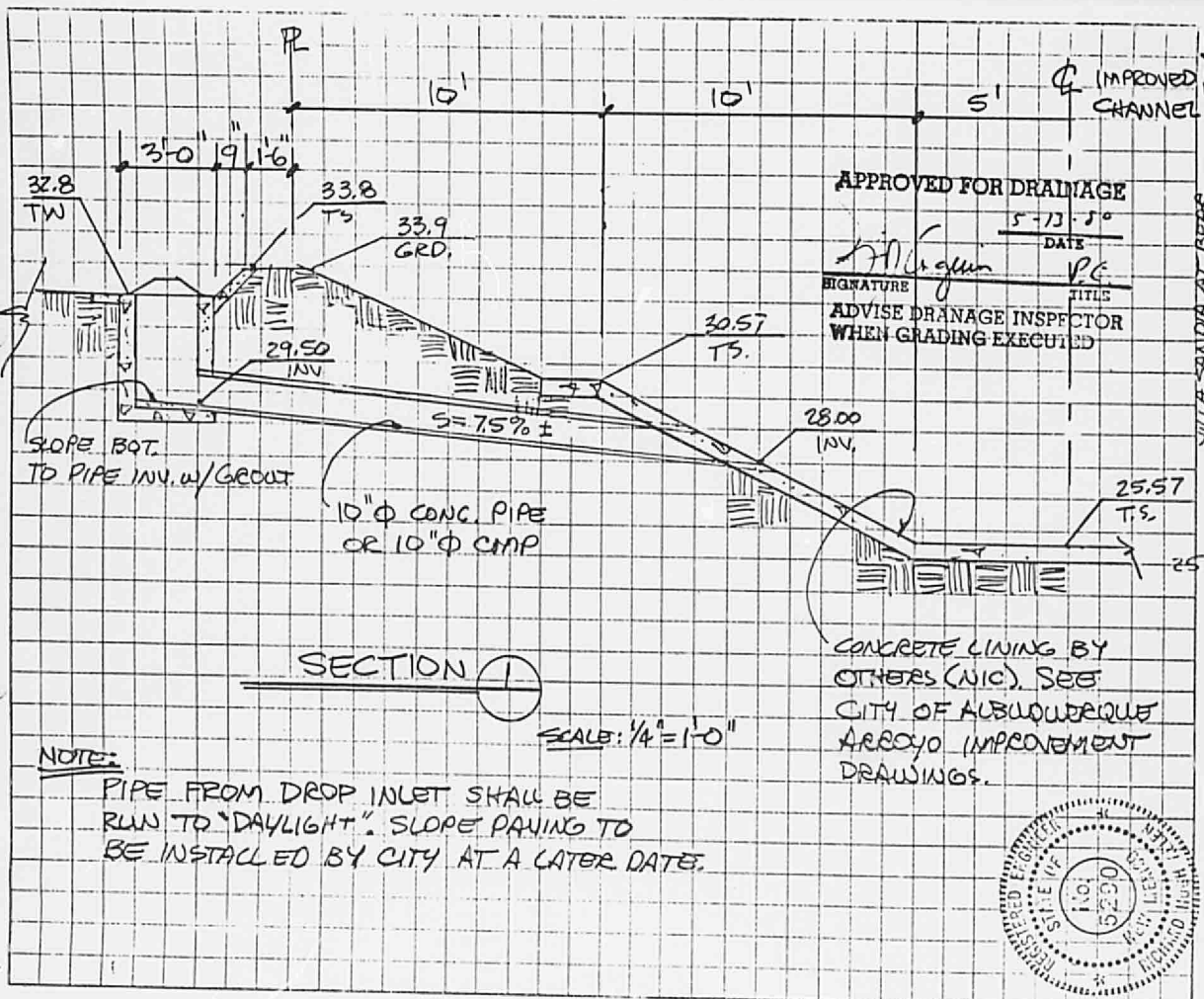
Richard H. Allen

Richard H. Allen, P.E.
Vice President

RHA:dm

cc: Sergio Miranda
L.B. Nelson Corporation

DPI
ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN



SECTION 1

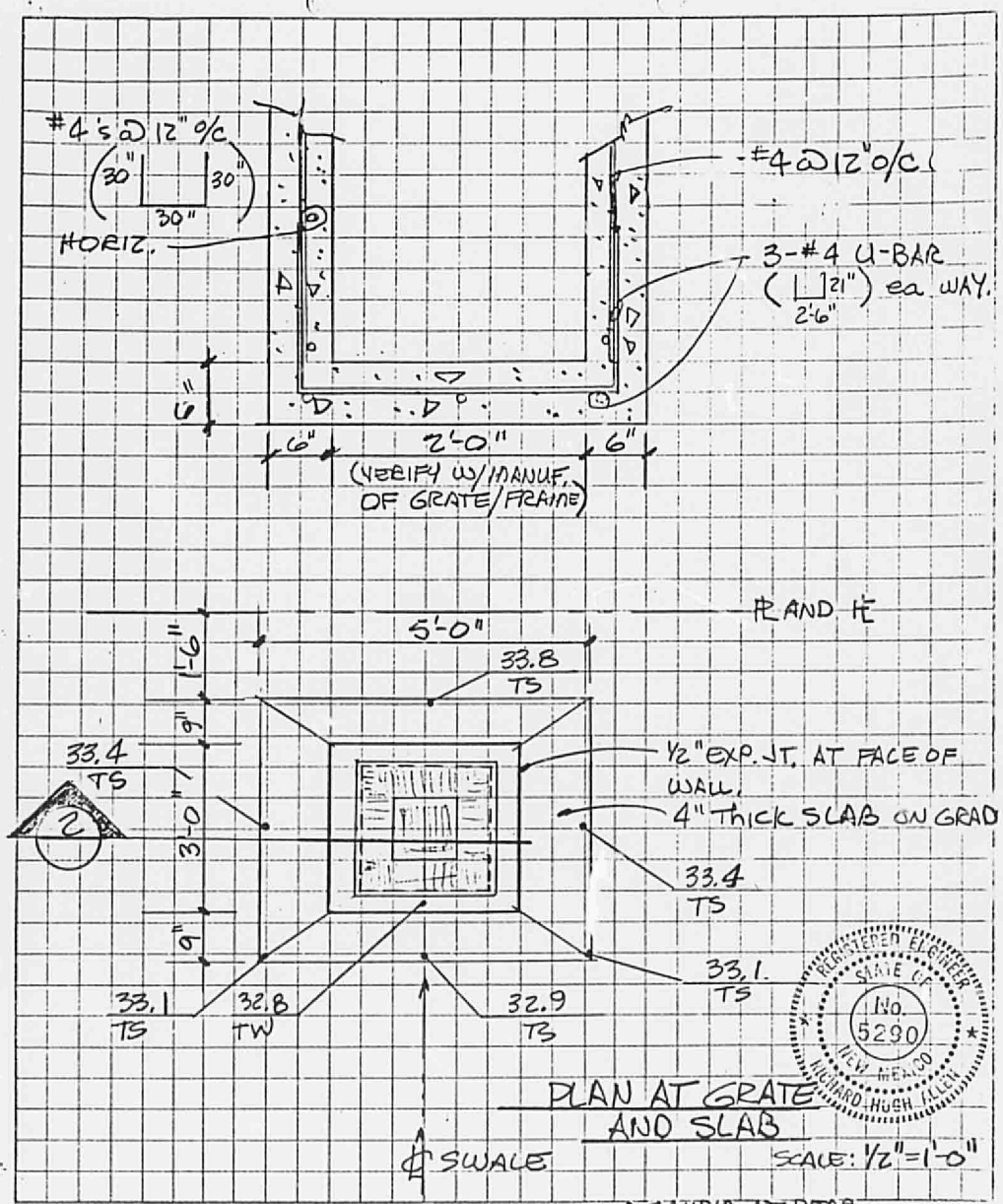
SCALE: 1/4"=1'-0"

NOTE:
PIPE FROM DROP INLET SHALL BE RUN TO "DAYLIGHT". SLOPE PAVING TO BE INSTALLED BY CITY AT A LATER DATE.

REGISTERED PROFESSIONAL ENGINEER 15390 NEW MEXICO U.S.A.

JOB VILLA SANDIA AT CANYON NORTH BEAR
JOB # 1948
BY R.H. ALLEN
DATE 5/12/80
CHK
DATE
SCALE AS NOTED
SHEET NO 1 OF 4

DESIGN PROFESSIONALS, INC.
Carlisle Boulevard N.E.
Albuquerque, New Mexico
(505) 881-6338
87107



PLAN AT GRATE AND SLAB

SCALE: ½"=1'-0"

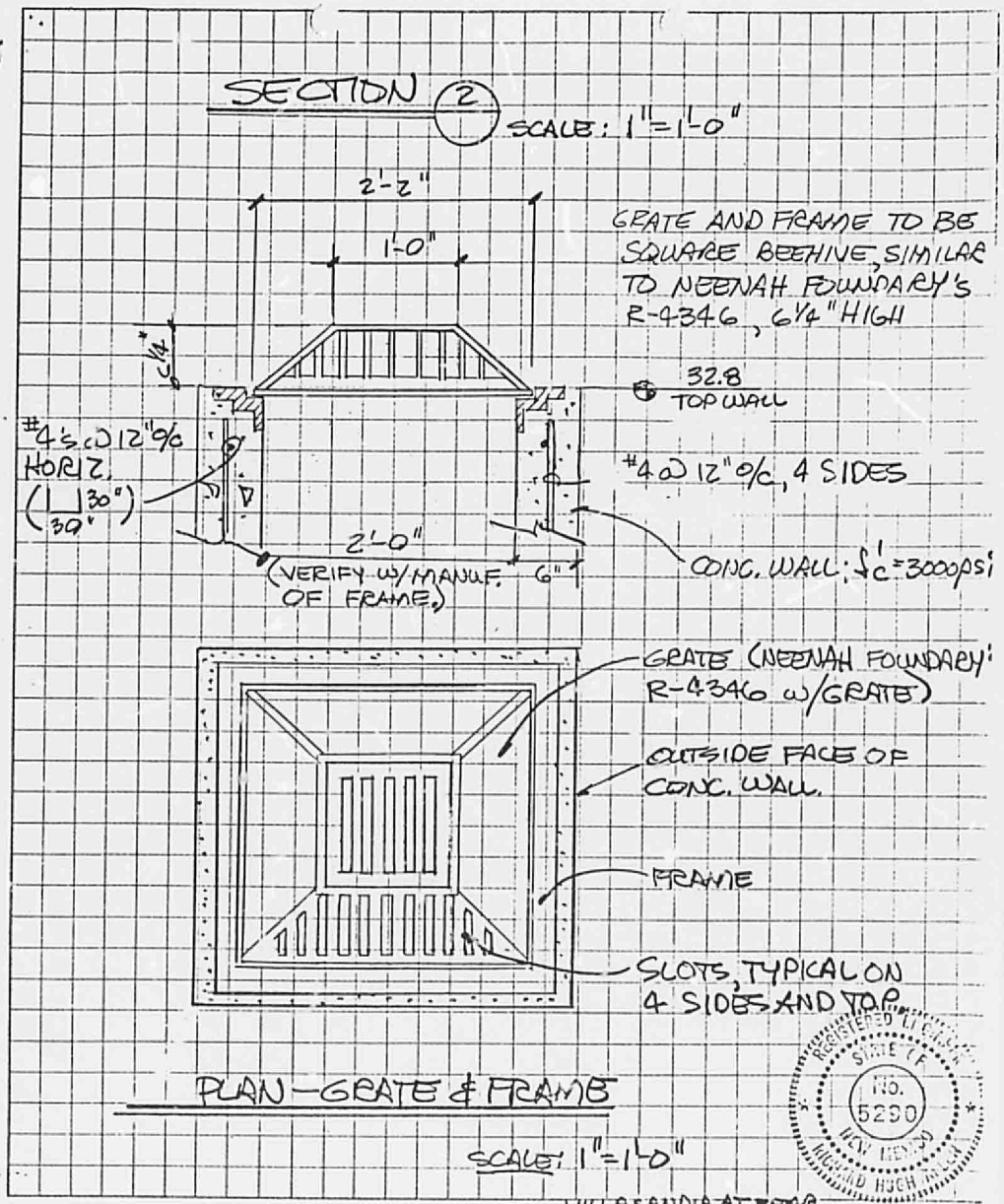
DESIGN PROFESSIONALS, INC.
Carlisle Boulevard N.E.
Albuquerque, New Mexico
(505) 881-6338 87107

JOB VILLA SANDIA AT BEAR CANYON NORTH JOB # 7948.6

BY RH ALLEN DATE 5/12/80

CHK DATE

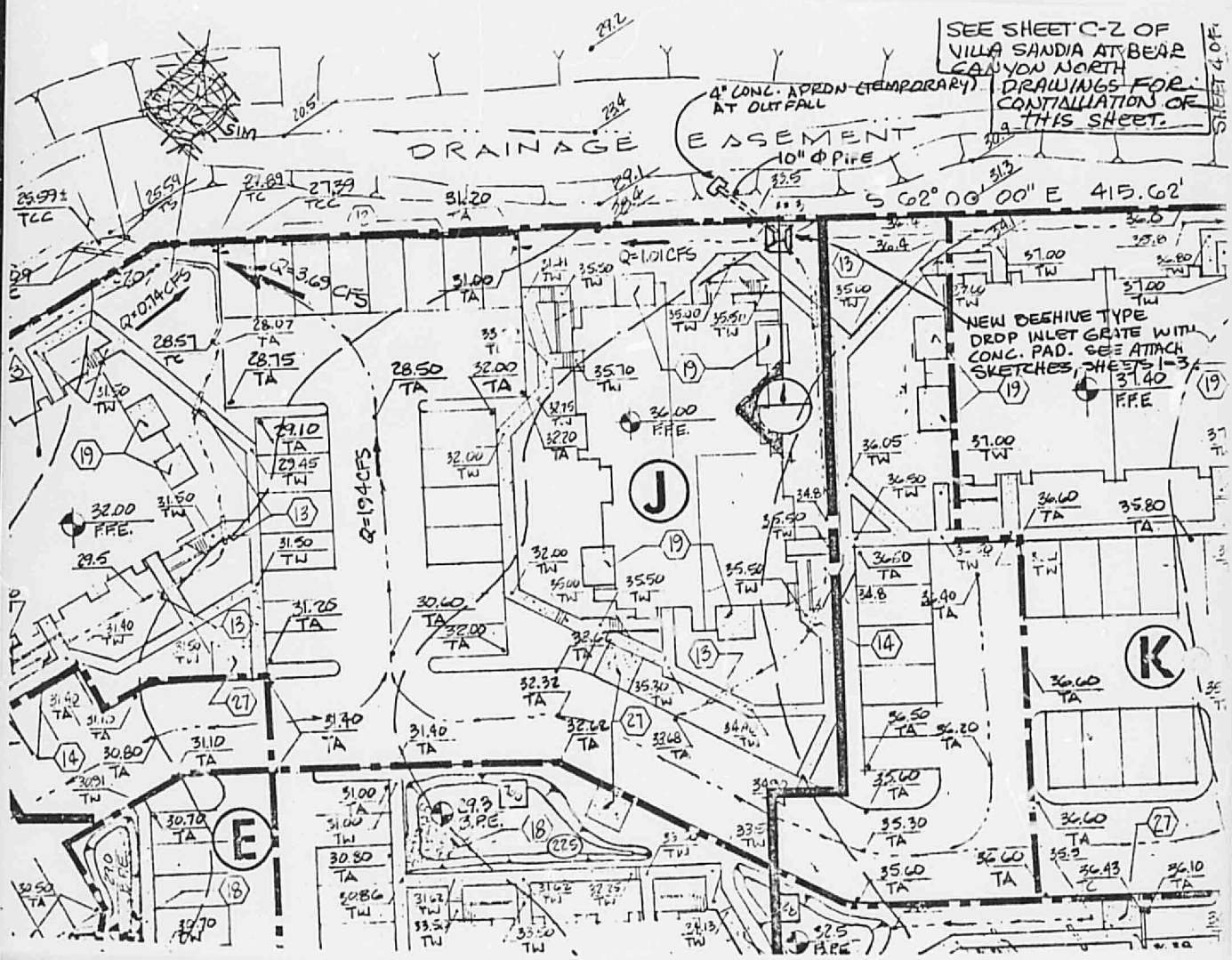
SCALE AS NOTED SHEET NO 2 OF 4



REGISTERED LICENSED ENGINEER STATE OF NEW MEXICO NO. 5290 RICHARD HUCH

DESIGN PROFESSIONALS, INC.
Carlisle Boulevard N.E.
Albuquerque, New Mexico
(505) 881-8338 87107

VILLA SANDIA AT BEAR CANYON NORTH
JOB # 7948.6
BY RH ALLEN
DATE 5/12/80
CHK
DATE
SCALE AS NOTED
SHEET NO 3 OF 4


SEE SHEET C-2 OF VILLA SANDIA AT BEAR CANYON NORTH DRAWINGS FOR CONTINUATION OF THIS SHEET.
SHEET 40
4" CONC. APRON (TEMPORARY) AT OUTFALL
DRAINAGE EASEMENT
10" Φ Pipe
S 62° 00' 00" E 415.62'
NEW BEEHIVE TYPE DROP INLET GRATE WITH CONC. PAD. SEE ATTACH SKETCHES, SHEETS 1-3
Q=3.69 CFS
Q=0.74 CFS
Q=1.01 CFS
Q=1.94 CFS
J
K
E
31.40 F.F.E.
32.00 F.F.E.
36.00 F.F.E.
29.3 F.F.E.
32.5 F.F.E.

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

April 2, 1980

Mr. Richard Heller, City Engineer
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: Villa Sandia at Bear Canyon North (7948.6)
Drainage for Building No. 6 (5934 McKinney Drive, N.E.)

Dear Mr. Heller:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a letter of certification from Kent Nowlin Construction Company relative to the drainage for the referenced project. The referenced letter and field notes (attached hereto) indicate that the drainage ways adjacent to Building No. 6 have been constructed in compliance with the design criteria.

Based upon Kent Nowlin's letter and survey data, we herein state that the drainage ways adjacent to the referenced building will adequately convey the quantities of run-off stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by your staff and is currently on file in your office.

Please advise if there are any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

cc: L.B. Nelson Corporation

DPI
ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

KENT NOWLIN
CONSTRUCTION, INC.

Highway - Utilities / Municipal - Heavy

April 3, 1980

Design Professionals, Inc.
4201 Carlisle Blvd., NE
Albuquerque, NM 87107

ATTN: Richard H. Allen, P.E.

RE: VILLA SANDIA AT BEAR CANYON NORTH

Dear Mr. Allen:

This is to inform you that the swales adjacent to Building Number 6, street addresses 6033 through 6047 McKinney Drive NE, of the referenced project have been constructed in accordance with the project drawings. This has been verified through field measurements conducted by our survey crew on April 3, 1980.

Very truly yours,

KENT NOWLIN CONSTRUCTION, INC.

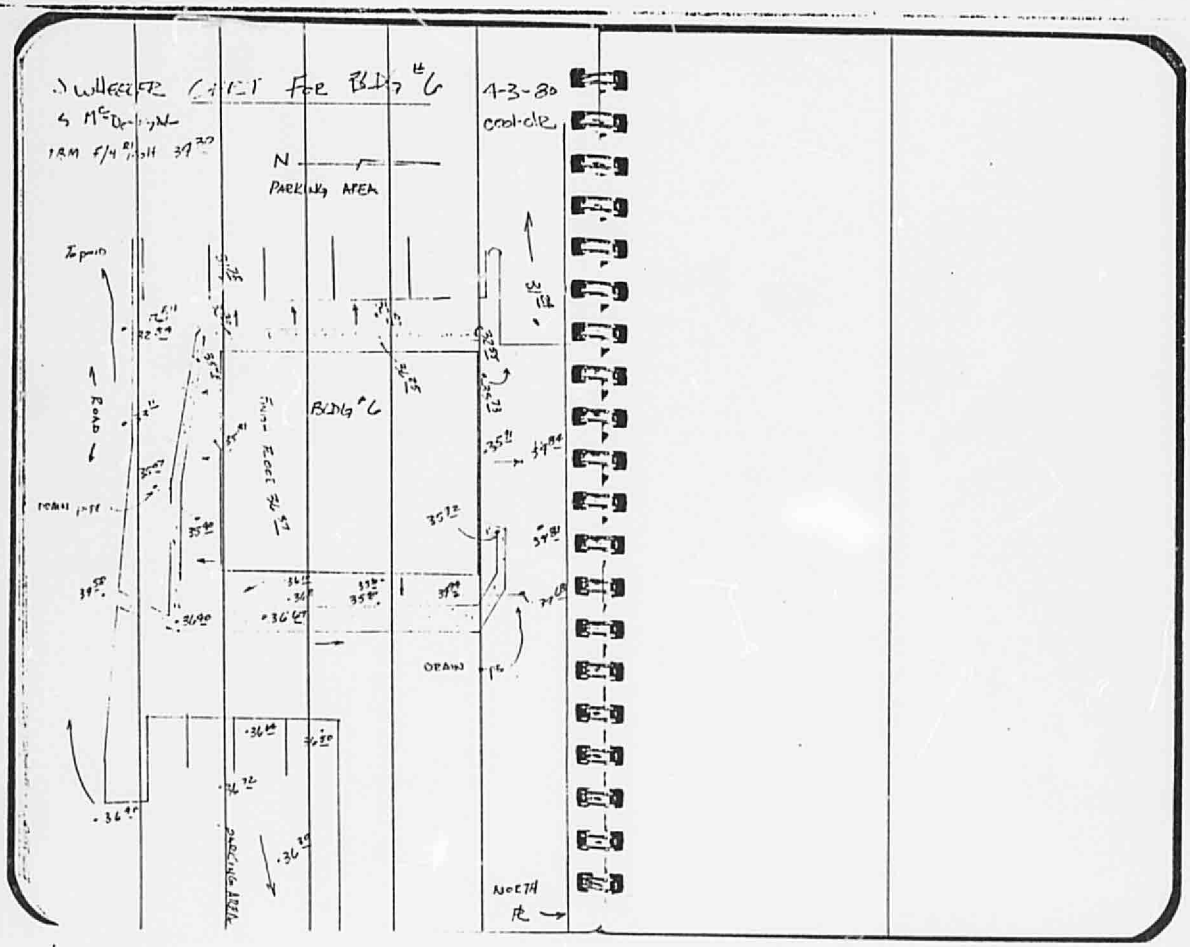
R. O. Kinz

R. O. Kinz
Survey Division

ew

cc: L. B. Nelson Corporation

P. O. Box 14654 / 4001 Bogan, N.E. / Albuquerque, New Mexico 87191 / Phone (505) 881-2511 / All Types Utilities


N
PARKING AREA
BLDG "C"
ROAD
DRAIN
NORTH

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

March 28, 1980

Mr. Richard Heller, City Engineer
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: Villa Sandia at Bear Canyon North (7948.6)
Drainage Ponds for Building No. 5 (5934 McKinney Drive, N.E.)

Dear Mr. Heller:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a letter of certification from Kent Nowlin Construction Company relative to the drainage ponds for the referenced project. The referenced letter and sketch of the pond areas (attached hereto) indicates that the ponds adjacent to Building No. 5 have been constructed in compliance with the design criteria. The pond area north of Building No. 5 is approximately 70 sq. ft. less in area than that originally designed. However, two 21' deep dry wells have been installed in the pond bottom which will adequately compensate for the smaller pond area.

Based upon Kent Nowlin's letter and survey data, we herein state that the ponds adjacent to the referenced building will retain the quantities of run-off stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by your staff and is currently on file in your office.

Please advise if there are any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

cc: L.B. Nelson Corporation

DPI
ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD S. VAUGHAN

Highway - Utilities / Municipal - Heavy

KENT NOWLIN CONSTRUCTION, INC.

March 27, 1980

Richard H. Allen, P.E.
Design Professionals, Inc.
4201 Carlisle Boulevard NE
Albuquerque, NM 87107

RE: VILLA SANDIA AT BEAR CANYON NORTH

Dear Mr. Allen:

This is to inform you that the drainage ponds adjacent to Building Number 5, street address 5935 McKinnev Drive NE, of the referenced project have been constructed in accordance with the project drawings and field modifications. The surface areas of the pond bottoms have been checked and are shown on the attached drawing. This has been verified through field measurements conducted by our survey crew on March 27, 1980.

Very truly yours,

KENT NOWLIN CONSTRUCTION, INC.

R. O. Kinz

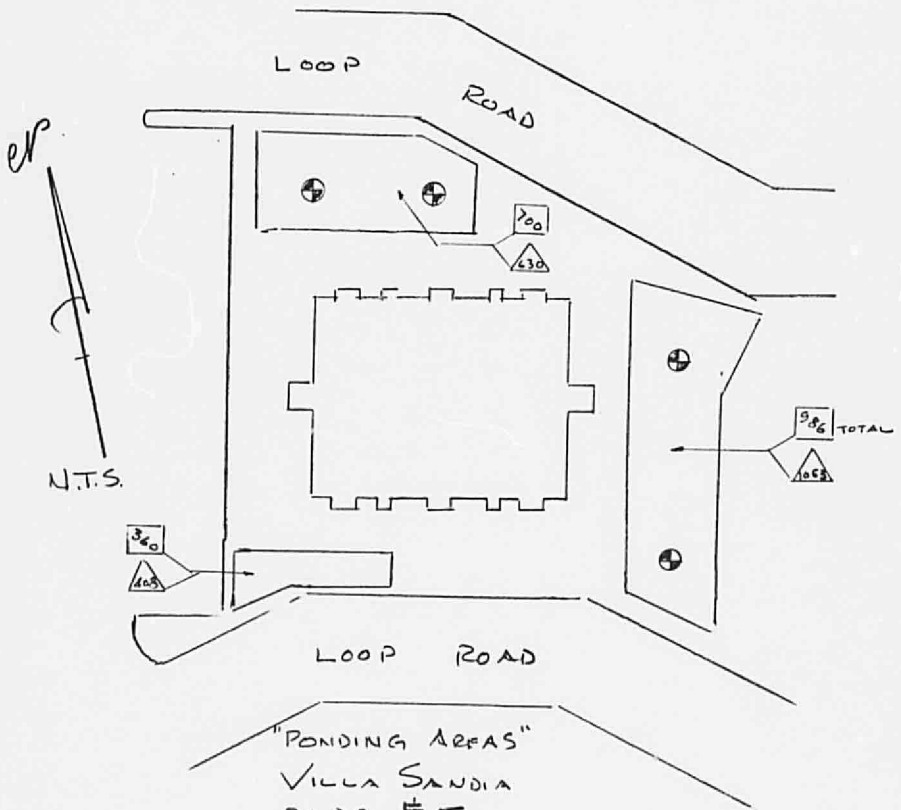
R. O. Kinz
Survey Chief

ew

Enclosure

cc: L. B. Nelson

P. O. Box 14654 / 4001 Bogan, N.E. / Albuquerque, New Mexico 87191 / Phone (505) 881-2511 / All Types Utilities



"PONDING AREAS"
VILLA SANDIA
BLDG ± 5
5935 McKINNEY DRIVE N. E.

⊕ 2½' DIAMETER BY 21' DEEP HOLE FILLED WITH GRAVEL

[986] DESIGN POND AREA (SF) AT BOTTOM OF POND

△405 AS-BUILT POND AREA (SF) AT BOTTOM OF POND.

3/27/80

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

December 28, 1979

Mr. Richard Heller, City Engineer
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: Villa Sandia at Bear Canyon North (7948.6)
Drainage Ponds for Buildings No. 1 (5901 McKinney Drive, N.E.) and Building No. 3 (6017 McKinney Drive, N.E.)

Dear Mr. Heller:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a letter of certification from Kent Nowlin Construction Company relative to the drainage ponds for the referenced project. This letter, a copy of which is attached hereto, states that the ponds and swales adjacent to Building No. 1 and Building No. 3 have been constructed in accordance with the plans and field changes approved by DPI and the City of Albuquerque's drainage division.

Based upon Kent Nowlin's letter and survey data, we herein state that the ponds adjacent to the referenced buildings will retain the quantities of run-off stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by Mr. Conegliano and is currently on file in his office.

Please advise if you have any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

RICHARD H. ALLEN, P.E.
Vice President

cc: L.B. Nelson Corporation

RHA:ch

DPI
ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

Highway - Utilities / Municipal - Heavy

KENT NOWLIN
CONSTRUCTION, INC.

December 28, 1979

Richard H. Allen, P.E.
Design Professionals, Inc.
4201 Carlisle Boulevard NE
Albuquerque, New Mexico 87107

SUBJECT: Villa Sandia at Bear Canyon North

Dear Mr. Allen:

This is to inform you that the drainage ponds and swales adjacent to Building No. 1, street address 5901 McKinney Drive NE, and Building No. 3, street address 6017 McKinney Drive NE, of the referenced project have been constructed in accordance with the project drawings and field modifications attached hereto. In addition, the surface areas of the pond bottoms have been checked and they comply with the requirements shown on the drawings. This has been verified through field measurements conducted by our survey crew on December 28, 1979.

Very truly yours,

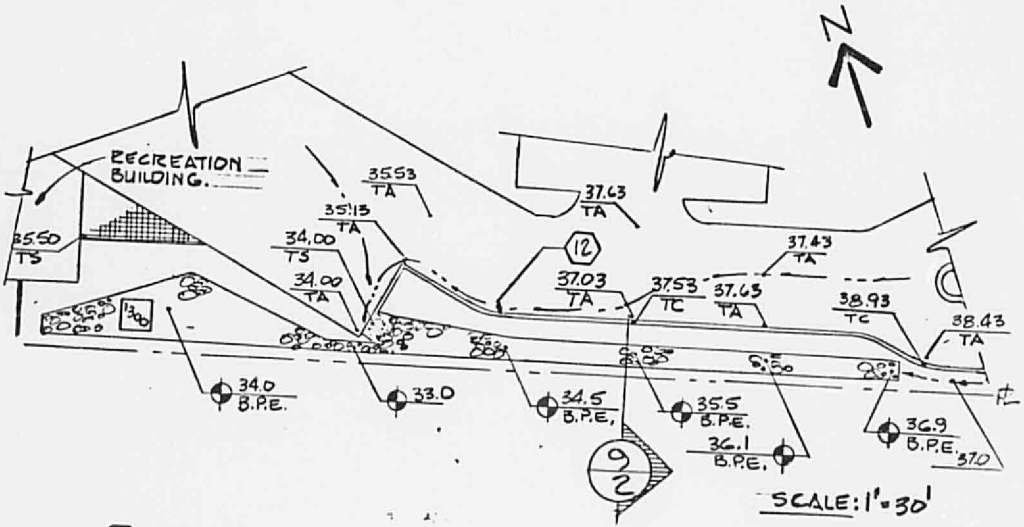
KENT NOWLIN CONSTRUCTION COMPANY

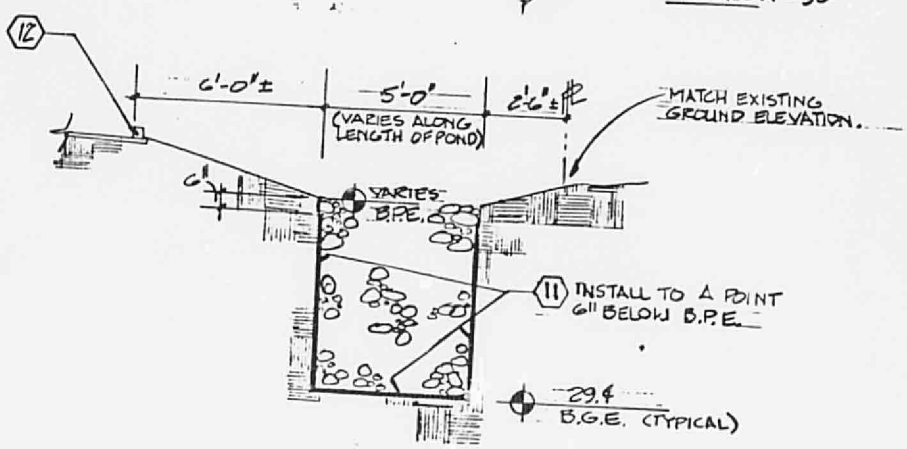
Richard O. Kinz
RICHARD O. KINZ

cc: L.B. Nelson Corporation

P. O. Box 14654 / 4001 Bogan, N.E. / Albuquerque, New Mexico 87191 / Phone (505) 881-2511 / All Types Utilities

SOUTHEAST CORNER HOLDING POND REVISION





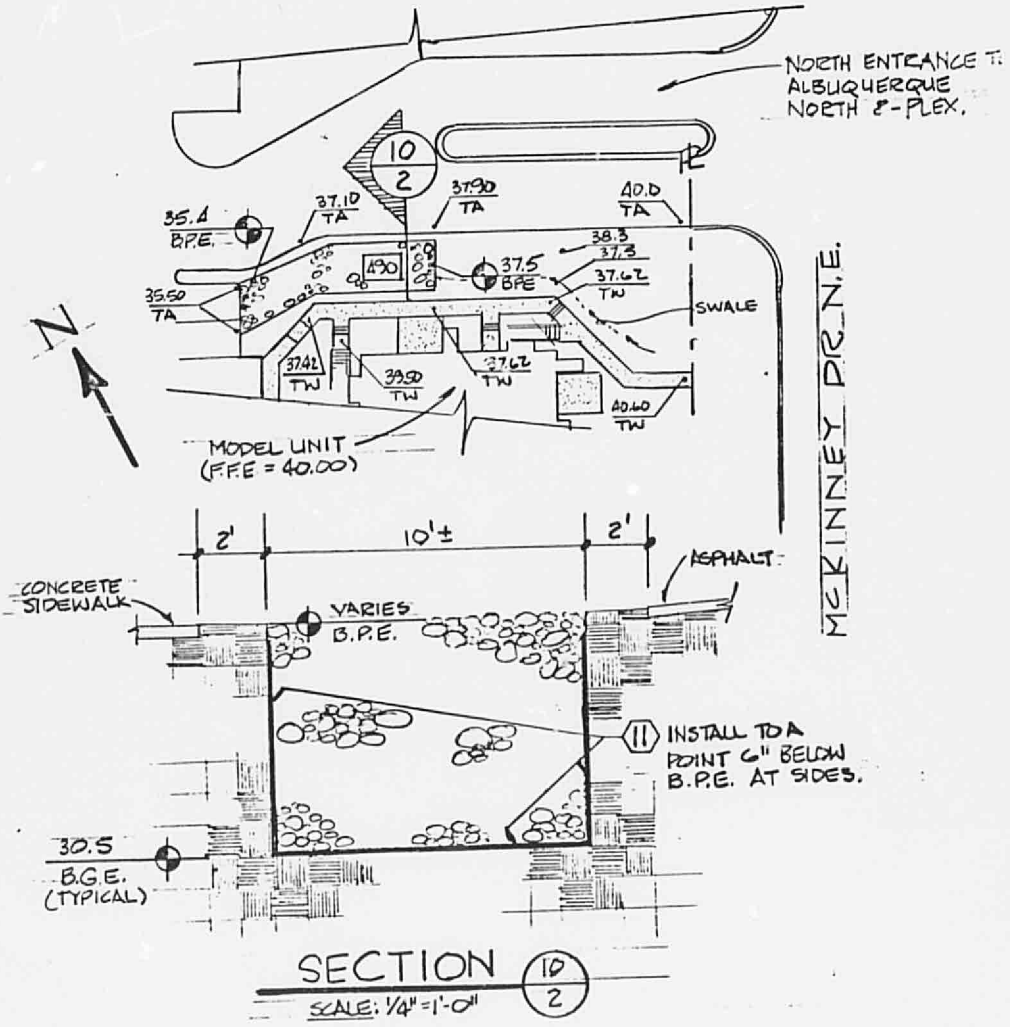
SECTION 9/2

SCALE: 1/4"=1'-0"

DESIGN PROFESSIONALS, INC.
Carlisle Boulevard N.E.
Albuquerque, New Mexico
(505) 881-6338 87107

JOB ALBUQUERQUE NORTH & PLEY JOB # 79066
BY R.H. ALLEN DATE JULY 5, 1979
CHK'D DATE
SCALE SHEET NO 2 OF 2

NORTH ENTRANCE
HOLDING POND REVISION

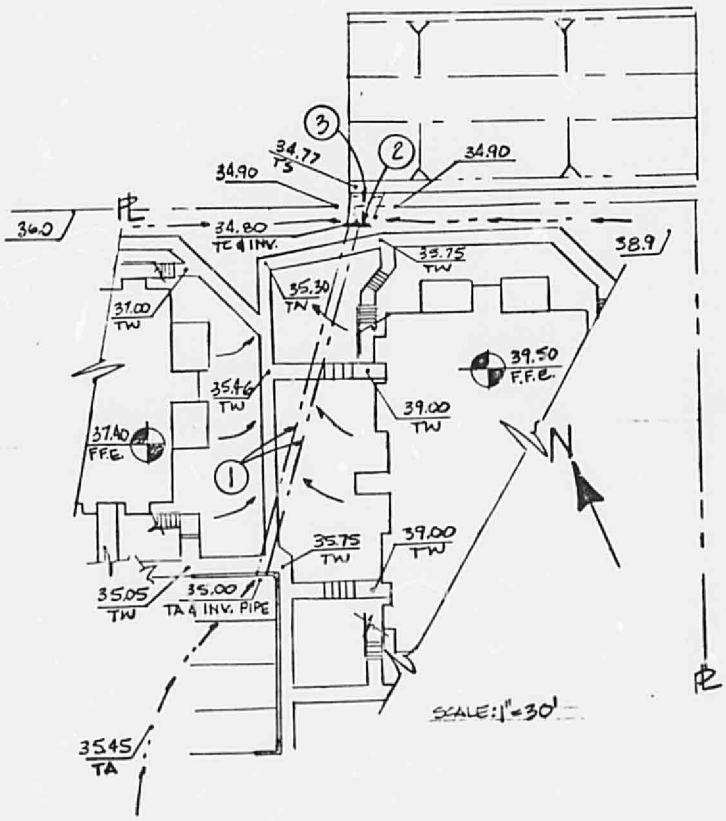


SECTION 10/2

SCALE: 1/4" = 1'-0"

DESIGN PROFESSIONALS, INC.
Carlisle Boulevard N.E.
Albuquerque, New Mexico
(505) 881-8338 87107

JOB ALBUQUERQUE NORTH 8-PLEX JOB # 7948.6
BY R.H. ALLEN DATE AUGUST 8, 1979
CHK DATE
SCALE SHEET NO 1 OF 1



① C'Φ PVC DRAIN PIPE BELOW GRADE.

② CONC. HEADWALL AS REQUIRED.

③ CONC. PAD, 4" THICK

NOTE: SEE CONTRACT DRAWINGS FOR ADDITIONAL INFORMATION AND ELEVATIONS.

REVISED DRAINAGE PLAN FOR NORTHEAST CORNER

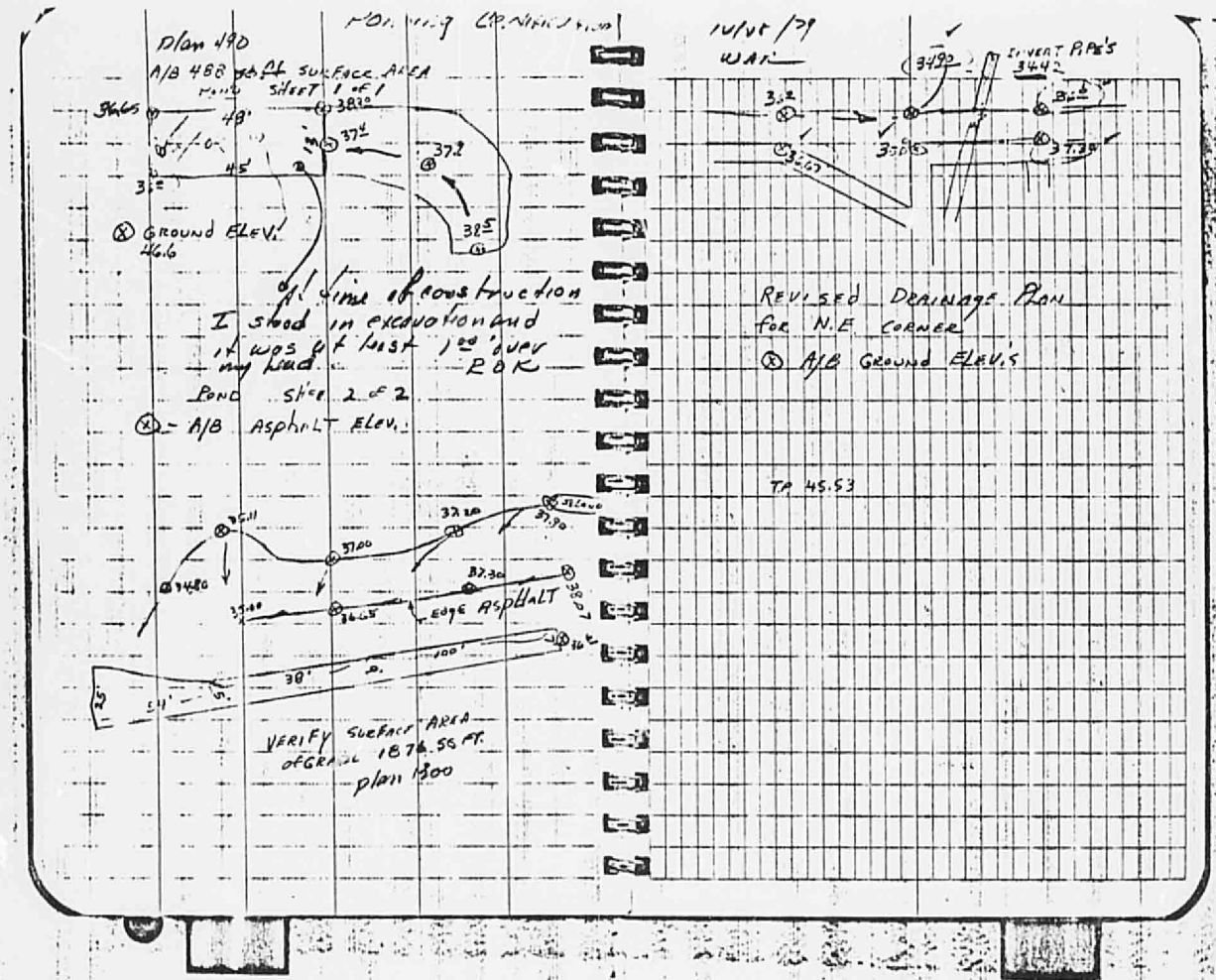
REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR No. 5290 NEW MEXICO RICHARD HUGH ALLEN

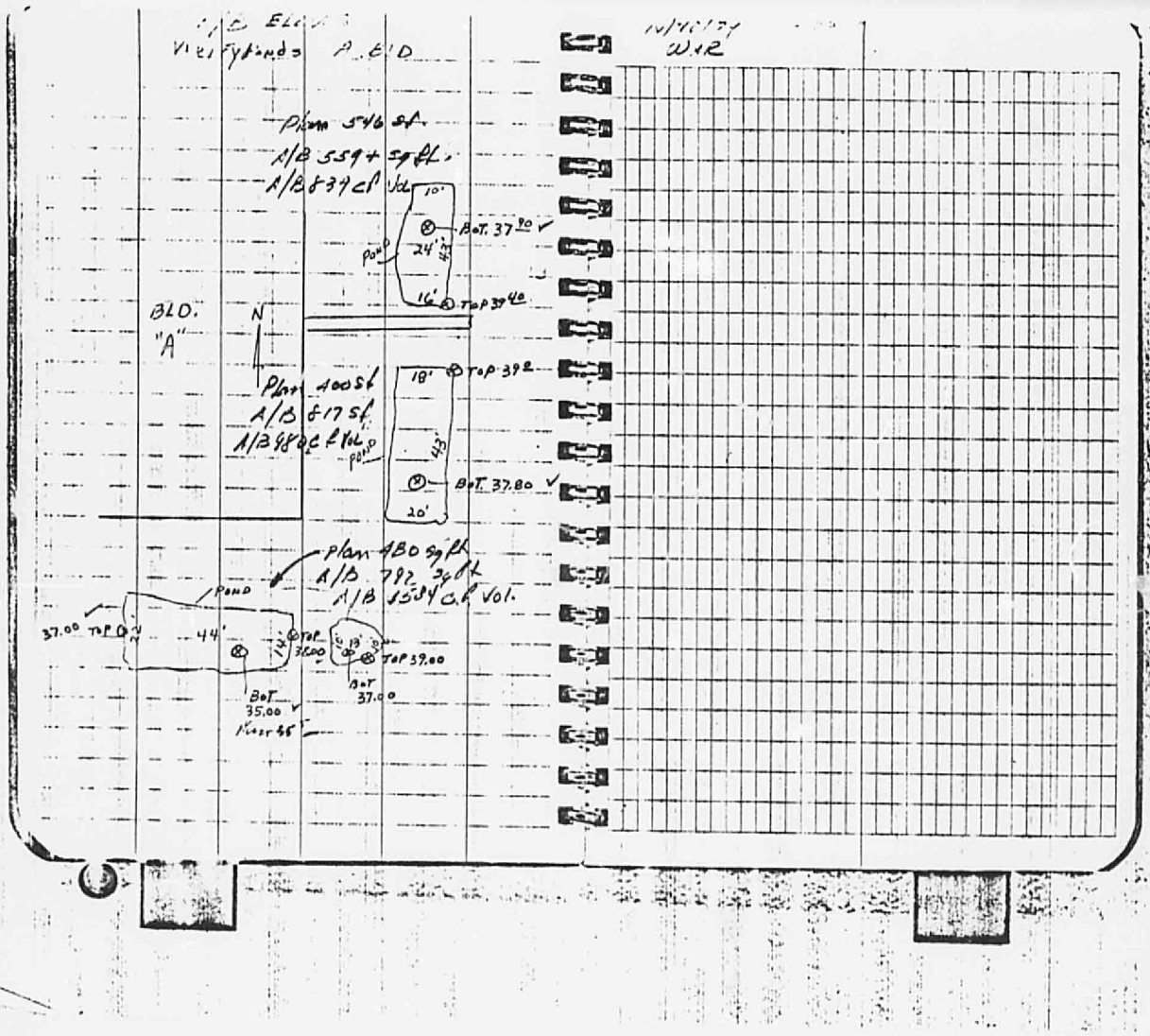
DESIGN PROFESSIONALS, INC.
4201 CARLISLE BLVD, N.E.
ALBUQUERQUE, N.M. 87107

PROJECT: VILLA SANDIA AT BEAR CANYON NORTH (1948.)

DATE: 10/17/79

BY: R.H. ALLEN


Plan 490
A/B 488 sq.ft. SURFACE AREA
SHEET 1 of 1
GROUND ELEV.
46.6
At time of construction
I stood in excavation and
it was at least 100' away
my hand. ROK
POND SHEET 2 of 2
A/B ASPHALT ELEV.
VERIFY SURFACE AREA
OF GRASS 1876.56 SQ. FT.
plan 1300
EDGE ASPHALT
100'
30'
25'
11/VE/79
WAI
INVERT PIPES
REVISED DRAINAGE PLAN
FOR N.E CORNER
A/B GROUND ELEV.'S
TP 45.53


Plan 5946 sq.ft.
A/B 559+ sq.ft.
A/B 8374 c.f. Vol.
10'
24'
43'
Bot. 37.90
Top 39.40
BLD. "A"
N
Plan 4005 sq.ft.
A/B 6175 sq.ft.
A/B 9480 c.f. Vol.
18'
Top 39.2
49'
Bot. 37.80
20'
Plan 480 sq.ft.
A/B 792 sq.ft.
A/B 1584 c.f. Vol.
Pond
37.00 Top
44'
Top 39.00
Top 39.00
Bot 35.00
Bot 37.00

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

File

January 15, 1980

Mr. Richard Heller, City Enginer
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: Villa Sandia at Bear Canyon North (7948.6)
Drainage Ponds for Building No. 2 (6001 McKinney Drive N.E.) and Building No. 4 (5917 McKinney Drive N.E.)

Dear Mr. Heller:

Per your request of June 18, 1979 and DPI's letter to you of the same date, we have obtained a letter of certification from Kent Nowlin Construction Company relative to the drainage ponds for the referenced project. This letter, a copy of which is attached hereto, states that the ponds and swales adjacent to Building No. 2 and Building No. 4 have been constructed in accordance with the plans and field changes approved by DPI and the City of Albuquerque's drainage division.

Based upon Kent Nowlin's letter and survey data, we herein state that the ponds adjacent to the referenced buildings will retain the quantities of run-off stated in the drainage report for Tract A, Unit 2 of Academy Acres Subdivision. This report has been reviewed by Mr. Conegliano and is currently on file in his office.

Please advise if you have any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard G. Vaughan

RICHARD G. VAUGHAN, P.E.
Executive Vice President

cc: L.B. Nelson Corporation of New Mexico

RGV:ch

DPI
ARCHITECTS/ENGINEERS
GEORGE H. BOLLING
ROBERT L. ROCHELEAU
JOHN PETER VARSA
RICHARD H. ALLEN
HOWARD S. COTTRELL
RICHARD G. VAUGHAN

Highway - Utilities / Municipal - Heavy

KENT NOWLIN
CONSTRUCTION, INC.

January 16, 1980

Richard H. Allen, P.E.
Design Professionals, Inc.
4201 Carlisle Boulevard NE
Albuquerque, NM 87107

RE: VILLA SANDIA AT BEAR CANYON NORTH

Dear Mr. Allen:

This is to inform you that the drainage ponds and swales adjacent to Building No. 2 street address 6001 McKinney Drive NE, and Building No. 4 street address 5917 McKinney Drive NE, of the referenced project have been constructed in accordance with the project drawings and field modifications attached hereto. In addition, the surface areas of the pond bottoms have been checked and they comply with the requirements shown on the drawings. This has been verified through field measurements conducted by our survey crew on January 16, 1980.

Very truly yours,

KENT NOWLIN CONSTRUCTION, INC.

R. O. Kinz

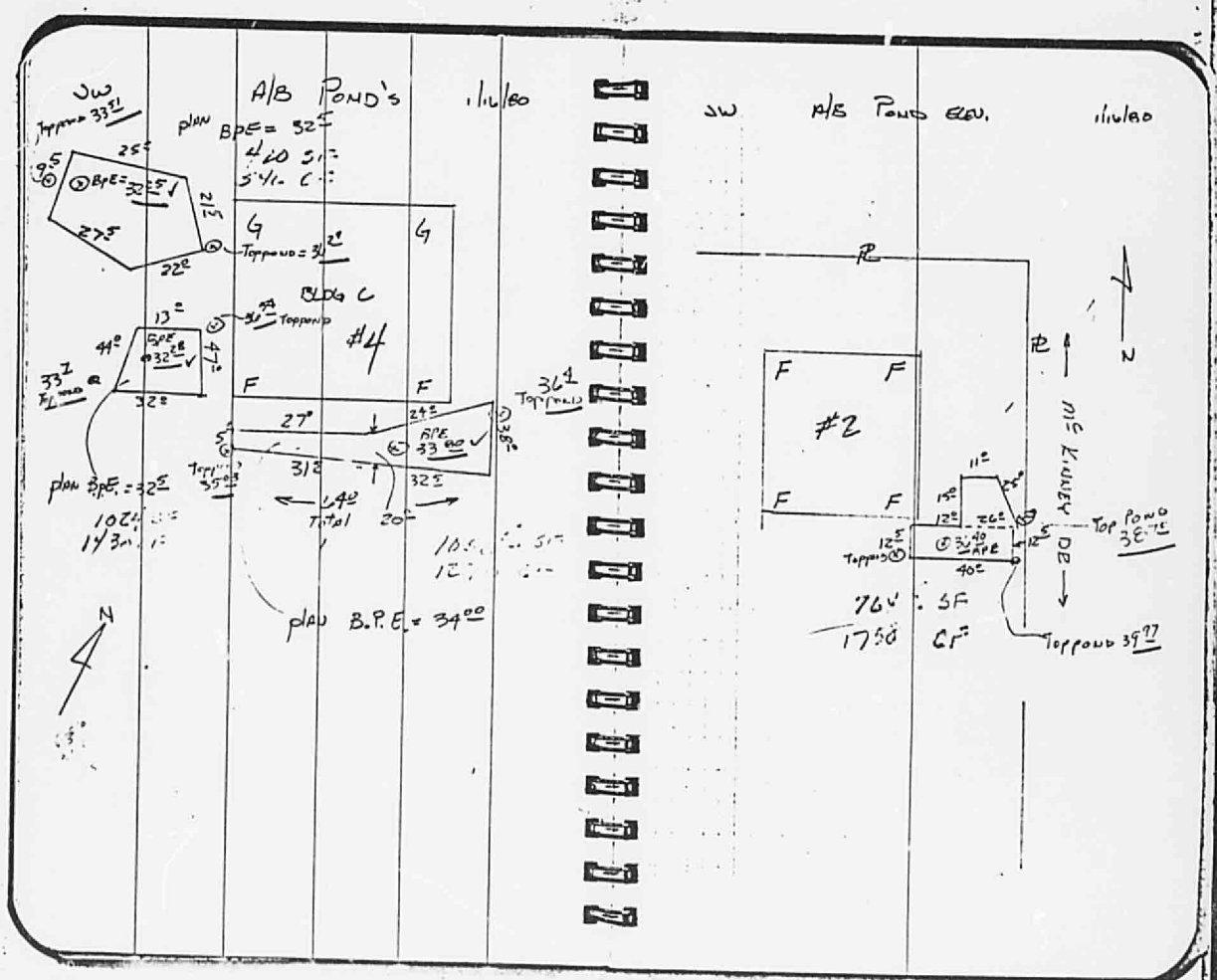
Richard O. Kinz
Survey Chief

ew

cc: L. B. Nelson Corporation

Enclosure

P. O. Box 14654 / 4001 Bogan, N.E. / Albuquerque, New Mexico 87191 / Phone (505) 881-2511 / All Types Utilities


A/B POND'S
SW
A/B POND ELEV.
BLDG C
#4
#2
G
F
N
DB
Toppond 39.97
Top Pond 38.12
plan B.P.E. = 34.00

