HYDROLOGY G12/D9 1 of 2 3 PLANS

G12/D9

3 PLANS

HOME PLANNING DEVELOPMENT COMPANY
ALBUQUERQUE, NEW MEXICO

DRAINAGE REPORT
FOR
THOMAS VILLAGE PATIO HOMES

April, 1983
Revised September 13, 1983

Prepared by
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Consulting Engineers
149 Jackson N.E.
Albuquerque, New Mexico

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MAPS AND ENCLOSURES

Map No. 4 - Existing Conditions

Map No. 5 - Developed Conditions

From Contract Drawings Titled
"Thomas Village Patio Homes, Site Improvements"

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MAPS AND ENCLOSURES (continued)

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Existing Plat of Thomas Village Patio Homes
Proposed Plat of Thomas Village Patio Homes

I

INTRODUCTION

Home Planning Development Company proposes to improve a 12.427 acre tract of land designated as Thomas Village Patio Homes. (See enclosed plat of Existing Thomas Village Patio Homes.) The tract of land is located within the Northwest Quadrant of Albuquerque, New Mexico, and being situate within the Southeast Quarter (SE 1/4) of Section 1, Township 10 North, Range 2 East, N.M.P.M. (See enclosed Location Map, Map No. 1, Zone Atlas Map G-12.)

The current zoning for this tract is SU-1. The proposed type of development will consist of townhouse units for single family residences.

It is the intent of this report to provide an acceptable method of developing the subject property without appreciably effecting the present storm drainage patterns.

Guidelines for the analysis are based on the City of Albuquerque's Development Process Manual, Volume 2, Design Criteria, Section 22.

II

EXISTING CONDITIONS

The subject property is presently undeveloped with a gentle slope of approximately 0.4 percent from northwest to southeast. The tract is bounded on the south by Don Quixote Drive N.W., which is an improved roadway with pavement and estate curb and gutter.

The Duranes Ditch, a Middle Rio Grande Conservancy District (MRGCD) irrigation channel, bounds the subject property on the west. The irrigation channel is an improved waterway with concrete lining running the length of the property.

The area to the north and east of the property is presently developed with single family residences. The subject property has a small irrigation ditch located within its northerly boundary.

Delineation of the site on Soil Conservation Service soils maps indicate that the soil groups in the area are classified as stratified loams and sandy loams, and are of

the Gila (Ge) series which belongs to hydrologic soil group B. (See enclosed Soils Map, Map No. 2.)

Delineation of the site on the Albuquerque Master Drainage Study indicates that the area is not within any flood zones. (See enclosed Albuquerque Master Drainage Study, Map No. 3.) Also, there are no offsite flows which impact the subject property. The flows from all of the adjacent lands are either diverted by the existing irrigation ditches or drain away from the subject property.

Presently the subject property drains to the southeast and discharges at the southeast corner of the property. (See enclosed Map No. 4, Existing Conditions.) The storm water generated from the subject property flows to the east along the north side of Don Quixote Drive N.W. until it is intercepted by Rio Grande Boulevard N.W. at the intersection of Rio Grande Boulevard and Don Quixote Drive. The storm water then flows north to the intersection of Matthew Drive N.W. and Rio Grande Boulevard.

An existing storm drain system is located in Matthew which eventually conveys the storm water to the east.

III

DEVELOPED CONDITIONS

The proposed development consists of 70 patio homes with a central open space and recreation area. (See enclosed Map No. 5, Developed Conditions.) Development of the site with uncontrolled discharge would increase the peak flow rate to approximately 21 cfs. In accordance with the Interim Drainage Guidelines, it is proposed that runoff from the site be detained with an allowable discharge equivalent to the undeveloped peak during a one year storm.

The method of controlling on-site runoff consists of the construction of detention ponds in two areas, together with rear yard retention of storm water along the east, north, and west units. The roofs of the patio homes will be designed to discharge storm water to the front. Runoff will be conveyed overland to the appropriate ponds. All ponds will be maintained by the homeowners association.

A 24 inch storm drain will be constructed from the pond outlets to the existing storm sewer in Matthew Drive N.W. The inlets to the storm drain will be designed to limit the dis-

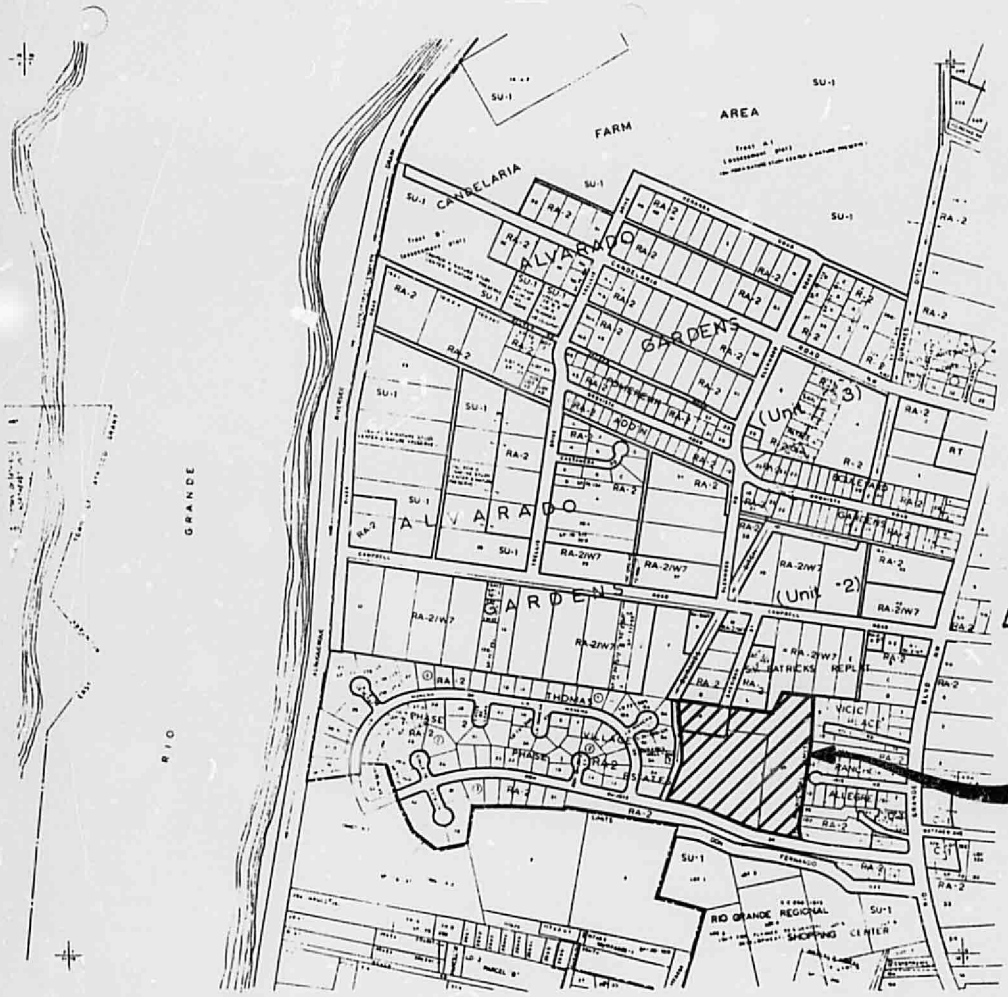
discharge from the ponds to the one year undeveloped discharge rate for the contributing drainage areas. The discharge rate is less than the 100 year undeveloped discharge rate, and therefore, will reduce the amount of storm water the existing storm drain in Matthew Drive will be conveying.

IV

EROSION CONTROL

Retention ponds on-site will minimize the amount of erosion due to development in the construction phase.

After development, erosion will be controlled by landscaping the open areas.

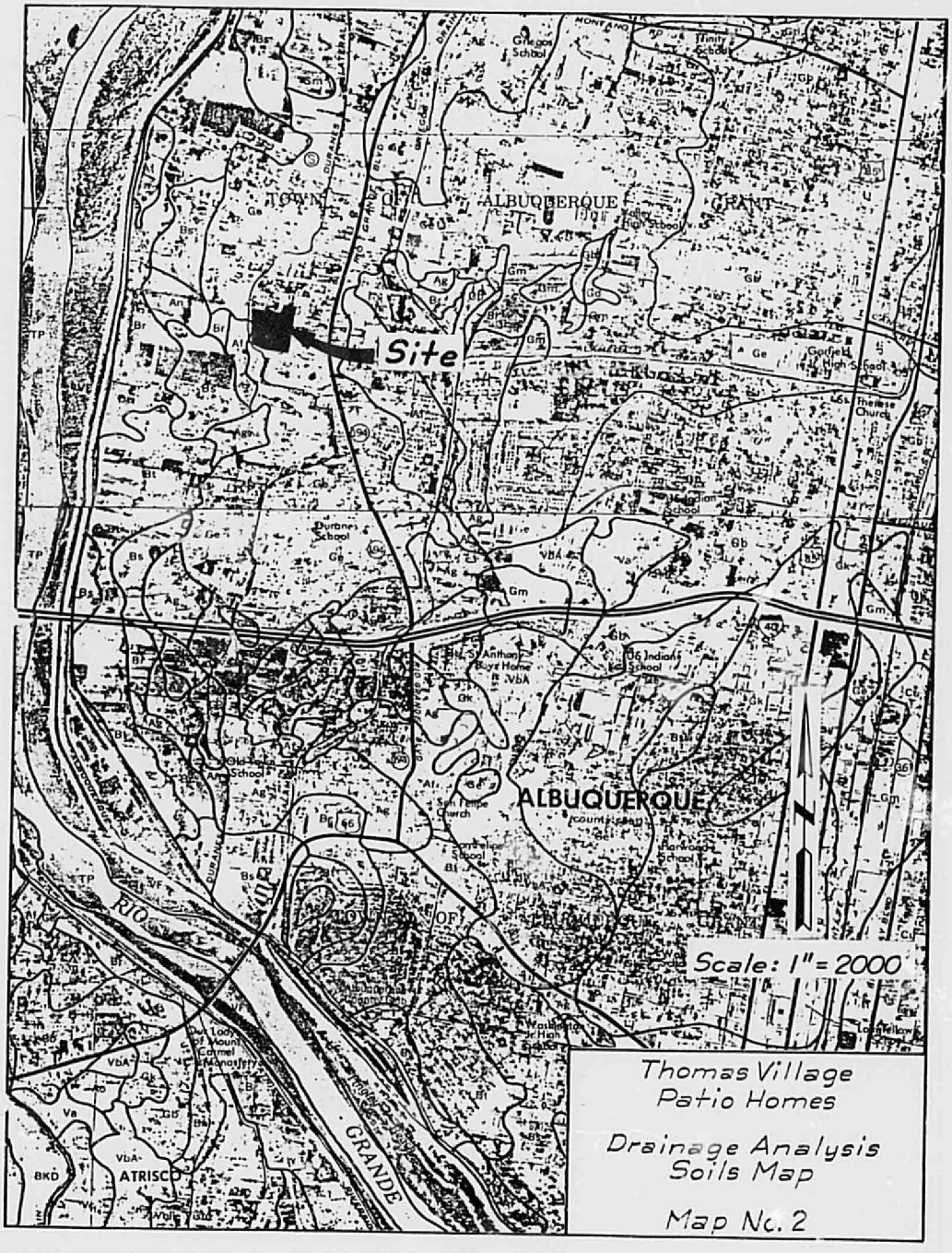


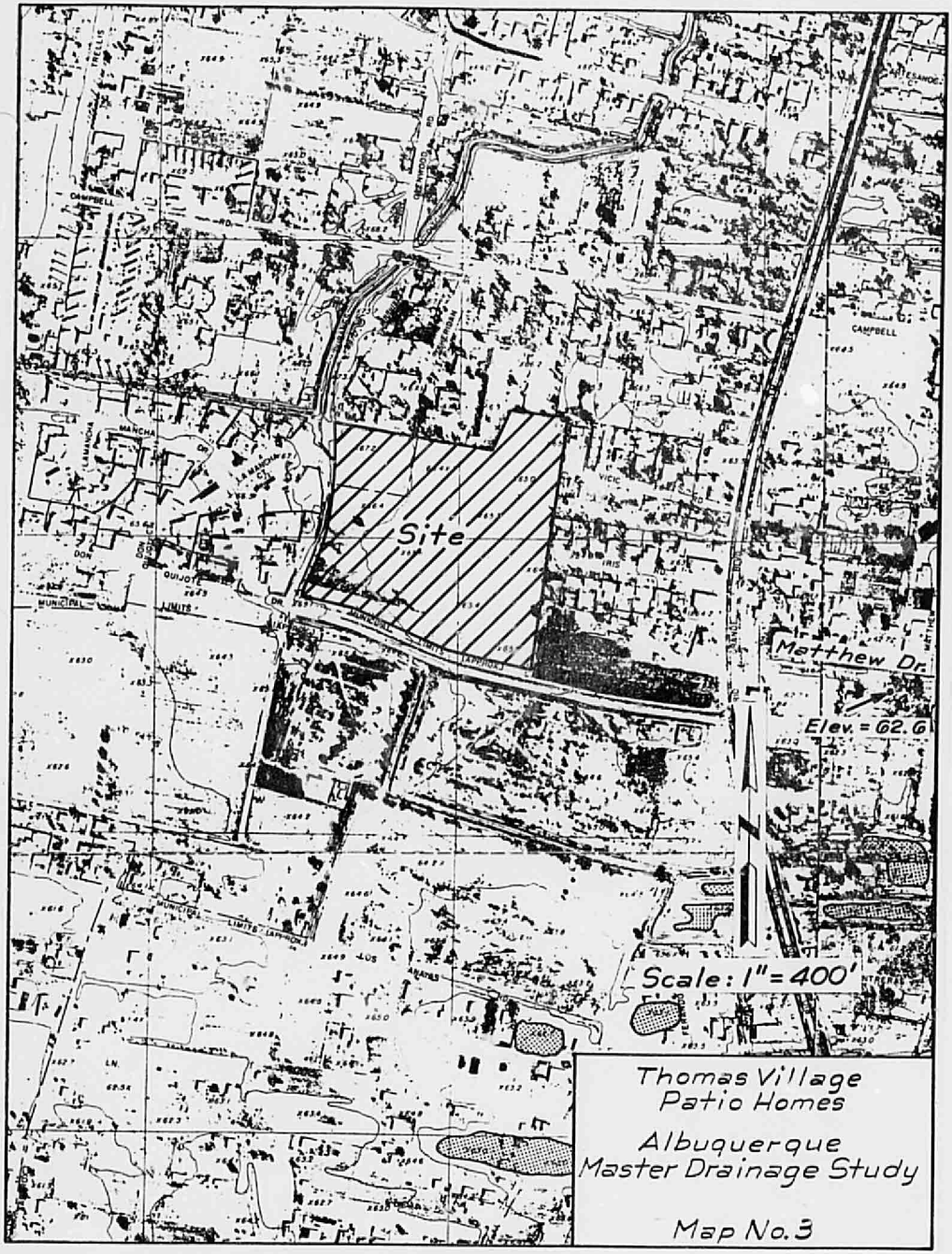
Thomas Village
Patio Homes
Drainage Analysis

Location Map

G-12-Z

Map No. 1


Site
ALBUQUERQUE
Scale: 1" = 2000
Thomas Village
Patio Homes
Drainage Analysis
Soils Map
Map No. 2



Thomas Village
Patio Homes

Albuquerque
Master Drainage Study

Map No. 3

V

DRAINAGE ANALYSIS

Following is the Drainage Analysis (computations) for the subject property under both the existing and developed conditions.

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Project THOMAS Village P.H. Sheet 1 of 35
DRAINAGE ANALYSIS Job No. 319
By RSF Chk'd JA Date 3/3/83

DRAINAGE ANALYSIS

CRITERIA

DEVELOPMENT PROCESS MANUAL, VOL 2, SECTION 22

DESIGN PARAMETERS

PEAK RUNOFF RATE - RATIONAL FORMULA, $Q = CIA$

RUNOFF COEFFICIENTS - from PLATE 22.2 C-1, DPM
SCS soil group B

$I_{100} = (2.2)\ 6.84 \times t_c^{-.51}$

$I_{10} = 0.657\ I_{100}$

$I_1 = 0.350\ I_{100}$

TRAVEL TIME DETERMINED from PLATES 22.2B-1 & 22.2 B.2

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Project Thomas Village P.H. Sheet 2 of 35
Drainage Analysis Job No. 319
By RAT Chk'd [illegible] Date 3/3/83

Existing Conditions - Onsite

Total Area = 12.427 acres
Average Slope = 0.4%
Average Velocity = 0.4 ft/sec from Plate 22.2B-1
Length of watershed = 1000 ft.

$T_c = \frac{1000}{.4} \div 60 = 41.66$ mins

$I_{100} = 2.2 \times 6.34 \times 41.66^{-.51} = 2.25$ in/hr
$I_{10} = 0.657 \times 2.25 = 1.48$ in/hr
$I_1 = 0.350 \times 2.25 = 0.79$ in/hr

$C = 0.34$ from Plate 22.2 C-1

$Q_{100} = 0.34 \times 2.25 \times 12.427 = 9.51$ cfs
$Q_{10} = 0.34 \times 1.48 \times 12.427 = 6.25$ cfs
$Q_1 = 0.34 \times 0.79 \times 12.427 = 3.34$ cfs

TABLE 1 - DEVELOPED CONDITIONS, PEAK RATES

Refer to Map No. 5 Developed Conditions for Locations of Drainage Areas & Analysis Points

Analysis Point	Drainage Area Designation	Area (AC.)	Location of Travel (FT.)	Slope (%)	Travel Time T_c (MIN.)	% Impervious / C	I_{10} in/hr	I_{100} in/hr	Q_{10} (CFS)	Q_{100} (CFS)
	A1.1	0.373	70' ROOF 30' DRIVE 160 STREET	.5 ROOF .5 DRIVE .5 STREET	2.92 + 0.53 + 2.05 USE 10	80 / 0.76	3.06	4.65	0.87	1.32
	A1.2	0.297	70 ROOF 30 DRIVE 115 STREET	.5 ROOF .5 DRIVE .36 STREET	USE 10	80 / 0.76	3.06	4.65	0.69	1.05
	A1.3	0.370	70' ROOF 30' DRIVE 180 STREET	.5 ROOF .5 DRIVE .35 STREET	USE 10	80 / 0.76	3.06	4.65	0.86	1.31
	A1.4	0.815	130 GRASS 520 STREET	.3 GRASS .35 STREET	6.19 + 3.81 = 10	80 / 0.76	3.06	4.65	1.90	2.88
	A1.5	0.255	70 ROOF 30 DRIVE 200 STREET	.5 ROOF .5 DRIVE .35 STREET	USE 10	80 / 0.76	3.06	4.65	0.59	0.90
	A1.6	0.095	170 STREET	.85	USE 10	80 / 0.76	3.06	4.65	0.22	0.34
(1)	A1	2.205	130 GRASS 340 STREET	.3 GRASS .35 STREET	6.19 + 4.05 = 10.24	80 / 0.76	3.02	4.59	5.06	7.69
	A2.1	1.004	70' ROOF 30' DRIVE 525 STREET	.5 ROOF .5 DRIVE .36 STREET	2.92 + 0.53 + 6.04 USE 10	80 / 0.76	3.06	4.65	2.33	3.55
	A2.2	0.349	70 ROOF 30 DRIVE 160 STREET	.5 ROOF .5 DRIVE .42 STREET	USE 10	80 / 0.76	3.06	4.65	0.81	1.23
	A2.3	0.350	"	"	USE 10	80 / 0.76	3.06	4.65	0.81	1.24
	A2.4	0.453	70 ROOF 30 DRIVE 180 STREET	.5 ROOF .5 DRIVE .86 STREET	USE 10	80 / 0.76	3.06	4.65	1.05	1.60
(2)	A2	2.156	70 ROOF 30 DRIVE 350 STREET	.5 ROOF .5 DRIVE .36 STREET	2.92 + 0.53 + 6.32 USE 10	80 / 0.76	3.06	4.65	5.01	7.62
	A3.1	0.331	70 ROOF 30 DRIVE 160 STREET	.5 ROOF .5 DRIVE .35 STREET	USE 10	80 / 0.76	3.06	4.65	0.77	1.17
	A3.2	0.391	70 ROOF 30 DRIVE 220 STREET	.5 ROOF .5 DRIVE .4 STREET	USE 10	80 / 0.76	3.06	4.65	0.91	1.38

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Project Thomas Village PH I Sheet 3 of 35
Drainage Analysis Job No. 319
By RSF Ck'd JA Date 3/31/83

REVISED 9/13/83

TABLE 1 - DEVELOPED CONDITIONS (CONT.)

Analysis Point	Drainage Area Designation	Area (AC.)	Length of Travel (FT)	Slope (%)	Travel Time Tc (MIN.)	% Imper. / C	I_{10} in/hr	I_{100} in/hr	Q_{10} (CFS)	Q_{100} (CFS)
	A3.3	0.444	70 ROOF 80 DRIVE 160 STREET	.5 ROOF .6 DRIVE .34 STREET	USE 10	80/.76	3.06	4.65	1.03	1.57
	A3.4	0.652	70 ROOF 80 DRIVE 1100 STREET	.5 ROOF .5 DRIVE .37 STREET	USE 10	80/0.76	3.06	4.65	1.28	1.95
(3)	A3	1.718	"	"	USE 10	80/0.76	3.06	4.65	4.00	6.07
	A4.1	0.796	70 ROOF 80 DRIVE 2100 STREET	.5 ROOF .6 DRIVE .4 STREET	USE 10	80/0.76	3.06	4.65	1.85	2.81
	A4.2	0.804	70 ROOF 80 DRIVE 1320 STREET	.5 ROOF .6 DRIVE .4 STREET	USE 10	80/0.76	3.06	4.65	1.87	2.84
	A4.3	0.128	460 STREET	.4	USE 10	80/0.76	3.06	4.65	0.30	0.45
	A4.4	0.173	230 STREET	.4	USE 10	80/0.76	3.06	4.65	0.40	0.61
(4)	A4	1.901	70 ROOF 80 DRIVE 1320 STREET	.5 ROOF .5 DRIVE .4 STREET	USE 10	80/0.76	3.06	4.65	4.42	6.72
(5)	A	9.521	130 GRASS 840 STREET 400 GRASS	.3 GRASS .35 STREET .3 GRASS	6.19+4.05 = 19.61 = 29.85	67/.67	1.75	2.66	11.16	16.97
	B	1.073	70 ROOF 400 GRASS	.5 ROOF .3 GRASS	2.92+19.61 = 22.53	40/.52	2.02	3.07	1.13	1.71
	C	0.232	70 ROOF 30 DRIVE 100 STREET	.5 ROOF .6 DRIVE 2 STREET	USE 10	55/0.60	3.06	4.65	0.43	0.65
	A, B & C	12.427*	USE D.A. A	USE D.A. A	29.85	56/0.61	1.75	2.66	13.27	20.16

* INCLUDES ALL REAR YARDS

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Drainage Analysis Job No. 317
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Drainage Analysis Job No. 319
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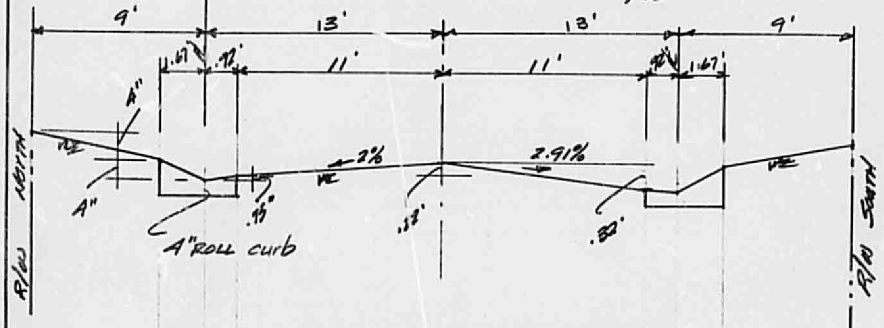
Maximum Flow Depth in Streets

Location - due east of analysis point (2) from sheet 3

Drainage Area A2.1, Q_{100} = 3.55cfs
Q_{10} = 2.33cfs

Drainage Area A2.4, Q_{100} = 1.60cfs
Q_{10} = 1.05cfs



TYPICAL STREET SECTION

Determine flow in north half of street when depth of flow is crown high.

$A = \frac{1}{2} \times .22 \times 11 + \frac{.22 + .28}{2} \times .92 + \frac{1}{2} \times .28 \times 1.40$

$= 1.21 + 0.23 + 0.20 = 1.64 \text{ ft}^2$

$P = 13 + 1.40 = 14.40 \text{ ft.}$

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DRAINAGE ANALYSIS Job No. 319
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Max. Flow Depth in Street (cont)

$$D = \frac{A}{P} = \frac{1.64}{14.40} = .114 \text{ FT}$$

$$Q = \frac{1.486}{n} R^{2/3} S^{1/2} A \qquad n = 0.017$$

$S = 0.37\%$ north curb

$$Q = \frac{1.486}{.017} \times .114^{2/3} \times .0037^{1/2} \times 1.64 = 2.05 \text{ cfs}$$

THEREFORE FLOW FROM DRAINAGE AREA A2.1 will FLOW ACROSS STREET from NORTH SIDE TO SOUTH SIDE for the 100yr & 10yr FLOWS.

DETERMINE DEPTH OF FLOW IN SOUTH HALF OF STREET FOR Q_{10} & Q_{100}

$Q_{10} = (2.33 + 1.05) - 2.05 = 1.33$ cfs

$Q_{100} = (3.55 + 1.60) - 2.05 = 3.10$ cfs

FOR Q_{10} ASSUME DEPTH OF FLOW @ CURBLINE = 0.26 ft.

$$\therefore A = \tfrac{1}{2} \times .26 \times 1.32 + \frac{.26 + .20}{2} \times .92 + \tfrac{1}{2} \times 20 \times 6.88 = 1.07 \text{ ft}^2$$

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Project THOMAS VILLAGE RH Sheet 7 of 35
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MAX. FLOW DEPTH IN STREET (CONT.)

$P = 1.32 + .92 + 6.88 = 9.12$ FT, $S = 0.36\%$ SOUTH CURB

$Q = \frac{1.486}{.017} \times \left(\frac{1.07}{9.12}\right)^{2/3} \times .0036^{1/2} \times 1.07 = 1.34$ CFS

OK

THEN FOR 10 YR STORM

FLOW DEPTH IN NORTH HALF OF STREET
$= 0.28$ @ ℄

$V = \frac{2.05}{1.64} = 1.25$ FT/SEC ; $V \times d = 0.33$

FLOW DEPTH IN SOUTH HALF OF STREET
$= 0.26$ FT @ ℄

$V = \frac{1.33}{1.07} = 1.24$ FT/SEC ; $V \times d = .32$

OK

FOR Q_{100} ASSUME DEPTH OF FLOW @ FLOWLINE
$= 0.36$ FT.

$\therefore A = \frac{1}{2} \times .03 \times .81 + \frac{.03 + .36}{2} \times 1.67 + \frac{.36 + .30}{2} \times .92$
$+ \frac{1}{2} \times .30 \times 10.31 = 2.18$ FT²

$P = .81 + 1.67 + .92 + 10.31 = 13.71$ FT.

$S = 0.36\%$

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Project THOMAS VILLAGE P.H. Sheet 8 of 35
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MAX. FLOW DEPTH IN STREET (CONT.)

$$Q = \frac{1.486}{.017} \times \left(\frac{2.18}{13.71}\right)^{2/3} \times .0036^{1/2} \times 2.18 = 3.36 \text{ CFS}$$

OK

THEN FOR 100 YR STORM

Flow depth in North half of street
= 0.25 FT @ ℄

$V = \frac{2.05}{1.64} = 1.25$ FT/SEC ; $V \times d = 0.33$

Flow depth in South half of street
= 0.36 FT @ ℄

$V = \frac{3.36}{2.18} = 1.54$ FT/SEC ; $V \times d = .55$ OK

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Required Pond Volumes

Refer to Map No 5 for pond locations.

All ponds will be allowed to discharge at the 1 year undeveloped rate

Pond A

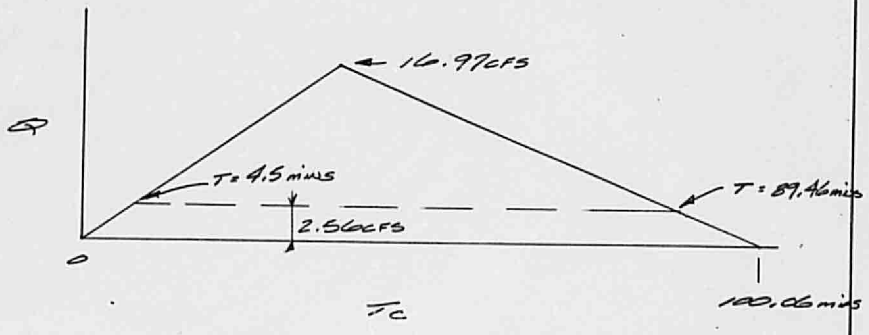
Q_{100} = 16.97 cfs, see sheet 4

T_c = 29.85 mins

Runoff Volume = $.67 \times 2.2 \times 9.521 \times \frac{43560}{12}$ = 50,943.3 FT^3

Allowable Discharge = Q, undeveloped

$Q_1 = CIA = .34 \times .79 \times 9.521 = 2.56$ cfs



Vol. Req = $\frac{(89.46 - 4.50) \times (16.97 - 2.56)}{2} \times 60$ = 36,728 FT^3

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REQUIRED POND VOLUMES (CONT.)

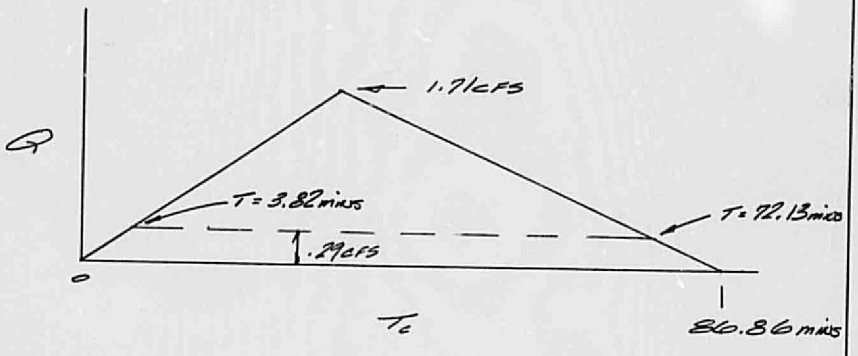
POND B

$Q_{100} = 1.71$ CFS

$T_c = 22.53$ MINS

RUNOFF VOLUME $= .52 \times 2.2 \times 1.073 \times \frac{43560}{12} = 4455.9$ FT^3

ALLOWABLE DISCHARGE $= .34 \times .79 \times 1.073 = 0.29$ CFS



$$\text{VOL. REQ} = \frac{(1.71 - .29) \times (72.13 - 3.82)}{2} \times 60$$

$$= \underline{2910.0 \text{ FT}^3}$$

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Project Thomas Village P.A. Sheet 11 of 35
Drainage Analysis Job No. 311
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Volume of Ponds

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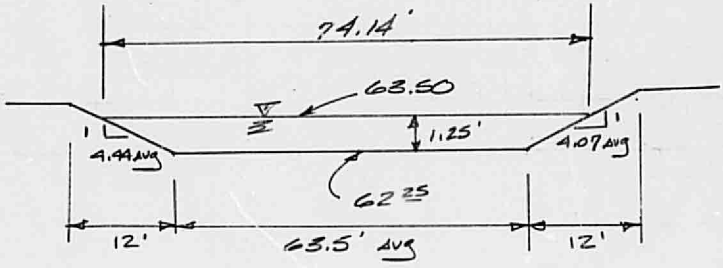
Pond A

See sheet 11a following for schematic plan of Pond 'A'.

Invert of Pond A @ 62.00

Assume depth of pool = 1.5 ft

∴ Water surface @ 63.50



Section 'A'-'A'

$A = \frac{74.14 + 63.5}{2} \times 1.25 = 86.03 \text{ ft}^2$

$VOL = 332 \times 86.03 = 28561.96 \text{ ft}^3$

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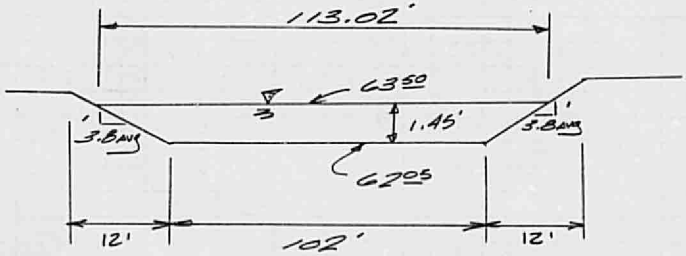
POND A (CONT.)

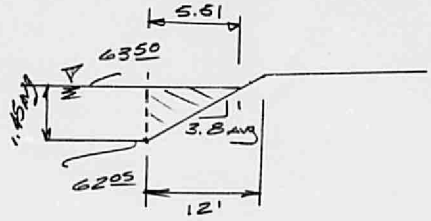


SECTION B:B'

$A_{ICE} = \frac{113.02 + 102}{2} \times 1.45' = 155.89 FT^2$

$VOL = 155.89 \times 40 LF = 6,235.58 FT^3$

VOLUME @ EAST END OF POND 'A'



$A = \frac{1}{2}\ 5.51 \times 1.45 = 3.99 FT^2$

$VOL = 102 \times 3.99 = 407.46 FT^3$

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Project Thomas Village P.H. Sheet 4 of 35
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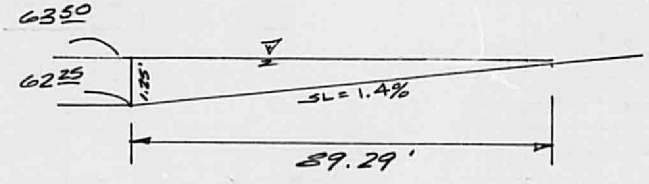
By RF Chk'd JA Date 3/3/83

Pond A (cont.)

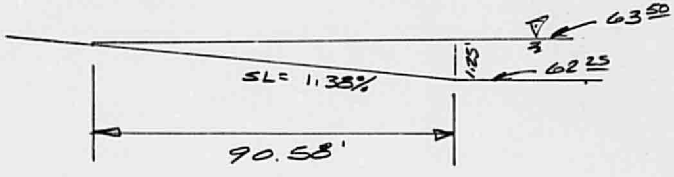
Volume in North Drainage Ponding



$A = \frac{1}{2} 89.29 \times 1.25 = 55.81 \text{ FT}^2$

$Vol = 15 \times 55.81 = 837.15 \text{ FT}^3$

Volume in South Drainage Ponding



$A = \frac{1}{2} 90.58 \times 1.25 = 56.61 \text{ FT}^2$

$Volume = 56.61 \times 15 = 849.19 \text{ FT}^3$

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Project Thomas Village P.H. Sheet 15 of 35
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Pond A (cont.)

Total Volume of Pond A w/ water surface @ elevation 63.50 (depth = 1.5')

= 28,561.96 + 6235.58 + 407.46 + 837.15 + 849.19

= 36,891.34 ft³

Required Vol = 36,728 see ck. 9

∴ ok

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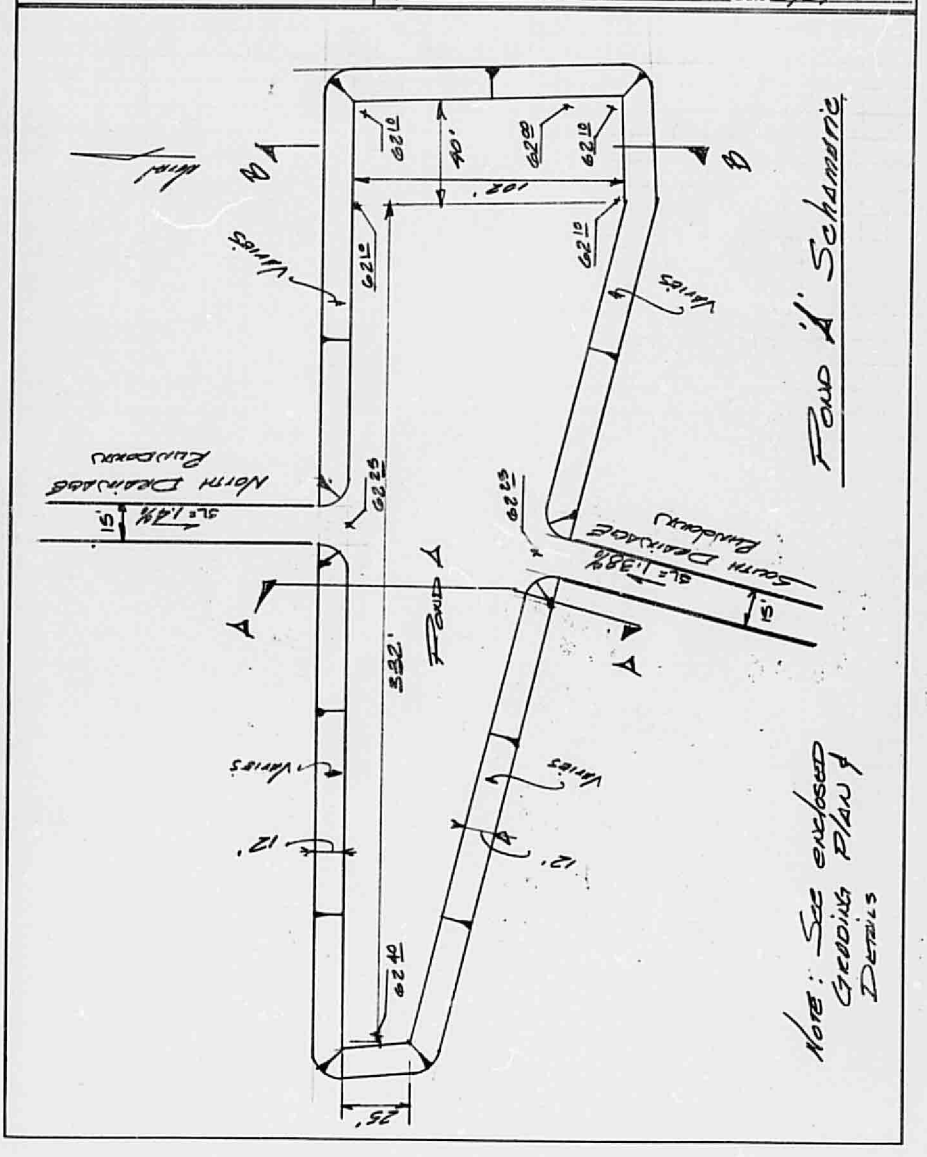

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Project Thomas Village P.H. Sheet 17 of 35
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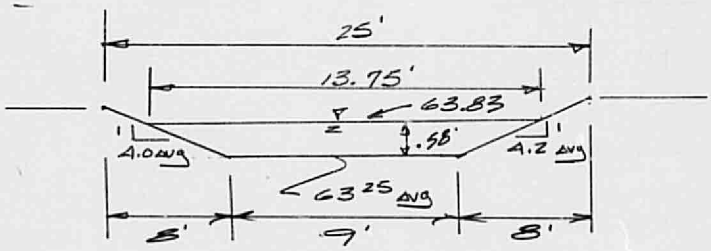
Volume of Ponds (cont.)

Pond B



TYPICAL SECTION

Assume water surface @ elev 63.83

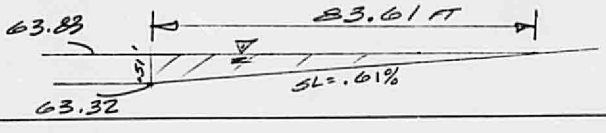
∴ Avg depth = .58'

∴ $A = \frac{13.75+9}{2} \times .583 = 6.6 \text{ FT}^3$

Length of Pond B = 390 LF

Volume = 390 × 6.6 = 2574.0 FT^3

Volume in drainage ditch



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Pond B (cont)

$A = \frac{1}{2} \times .51 \times 83.61 = 21.32 \text{ FT}^3$

15' wide

$Vol = 21.32 \times 15 = 319.8 \text{ FT}^3$

TOTAL VOLUME POND B w/ WATER SURFACE @ elev. 63.83 (depth = .83' MAX)

$= 2574.0 + 319.8 = \underline{\underline{2893.8}} \text{ FT}^3$

REQUIRED VOL = 2910 see sheet 10

∴ OK

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Outlets from Ponds

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Project Thomas Village P.H. Sheet 20 of 35
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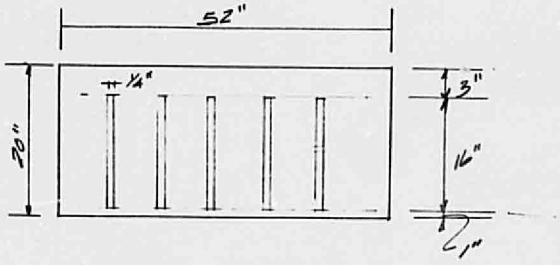
Controlled Discharge from Ponds

Refer to Map No 5 for pond locations.

Ponds will be allowed to discharge @ a rate equal to the Q, undeveloped rate. Refer to Detail sheets (Appendix) enclosed for configuration of discharge structure. The flow will be regulated by milling ¼" wide slots in a steel plate that will be attached to the outlet structure.



TYPICAL SLOTTED PLATE

Determine number of slots required for each pond.

Pond 'A'

$Q_1 = 2.56$ cfs see sh. 9

$Q = c A \sqrt{2gh}$

$c = 0.60$

$h = 10" = 0.83$ ft.

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Controlled Discharge from Ponds (cont.)

Pond 'A' cont.

$$A = \frac{Q}{c\sqrt{2gh}}$$

$$= \frac{2.56}{.6\sqrt{2g0.83}} = 0.58 \text{ SF}$$

$$= 84.04 \text{ in}^2$$

Required open area

Area per slot = .25 x 16 = 4.0 in²

Number of slots req. = $\frac{84.04}{4}$ = 21 slots

Pond 'B'

Q_1 = 0.29 cfs see sh. 10

depth of pond = 0.83 ft. see sh. 18

$$A = \frac{Q}{c\sqrt{2gh}} \qquad c = 0.60 \qquad h = .83/2 = 0.42 \text{ ft}$$

$$A = \frac{0.29}{.6\sqrt{2g.42}} = 0.093 \text{ SF}$$

$$= 13.38 \text{ in}^2$$

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Project Thomas Village P.H. Sheet 22 of 35
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Controlled Discharge from Ponds (cont.)

Pond 'B' (cont.)

Area of slot @ depth = 0.83 ft.

$= 0.25" \times 0.83 \times 12 = 2.49 \text{ in}^2$

Number of slots req $= \frac{13.38}{2.49} = 5.37$

use 6 slots

Pond 'C'

$Q_1 = 0.06$ cfs see sh 11

depth of pond = 0.85 ft. see sh 19

$A = \frac{Q}{C\sqrt{2gh}}$ $\quad C = 0.60$

$h = \frac{.85}{2} = 0.43$ ft

$A = \frac{0.06}{.6\sqrt{2g \cdot .43}} = 0.019 \text{ ft}^2$

$= 2.73 \text{ in}^2$

Area of slot @ depth = 0.85 ft.

$= 0.25 \times .85 \times 12 = 2.55 \text{ in}^2$

Number of slots required $= \frac{2.73}{2.55} = 1.07$

use 2 slots

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Project Thomas Village P.H. Sheet 23 of 35
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Rundowns to Pond A

Refer to Map No. 5 for location of rundowns & appendix for details enclosed.

At Analysis Point (1)

Assume weir flow

$Q = CLH^{3/2}$

$C = 2.63$, Table 5-3 Brater & King 6th Ed.

$L = 12'$

$Q_{10} = 7.69$ cfs

$H^{3/2} = \frac{Q}{CL} = \frac{7.69}{2.63 \times 12} = 0.24$

$H = 0.39$ ft. OK

At Analysis Point (2)

$C = 2.63$

$L = 15$ ft

$Q = 7.62$ cfs

$H^{3/2} = \frac{7.62}{2.63 \times 15} = 0.19$; $H = 0.33$ ft OK

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Project Thomas V. Tilton P.H. Sheet 24 of 35
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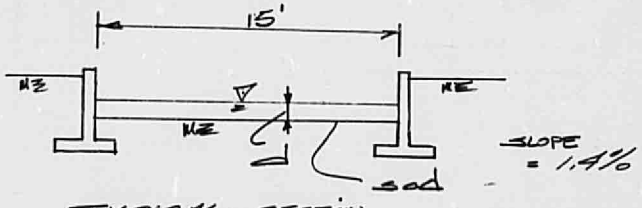
Runoffs to Pond 'A' (cont.)

Analysis Point (2) (cont.)

$$V = \frac{Q}{A} = \frac{7.62}{.33 \times 15} = 1.54 \text{ ft/sec}$$

discharge enters 15' wide sod lined channel; determine depth of flow in channel.



TYPICAL SECTION

$n = .025$

Assume $d = 0.21$ ft

$A = 3.15 \text{ ft}^2$; $P = 15.42$ ft

$$Q = \frac{1.486}{.025} \times \left(\frac{3.15}{15.42}\right)^{2/3} \times .014^{1/2} \times 3.15 = 7.68 \text{ cfs}$$

OK

$$V = \frac{7.68}{3.15} = 2.43 \text{ ft/sec}$$

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Runoffs to Pond 'A' (cont.)

At Analysis Point (3)

$Q = CLH^{3/2}$ $C = 2.63$
$L = 15$ ft
$Q = 6.07$ cfs

$H^{3/2} = \frac{6.07}{2.63 \times 15} = 0.15$

$H = 0.29$ ft OK

discharge enters 15' wide sod lined channel channel; determine depth of flow in channel, see sh 24 for typical section

slope = 1.38%, $n = 0.025$

Assume $d = 0.18$ ft
$A = 2.7$ ft^2; $p = 15.36$ ft

$Q = \frac{1.486}{.025} \times \left(\frac{2.7}{15.36}\right)^{2/3} \times .0138^{1/2} \times 2.7 = 5.92$ cfs
OK

$V = \frac{5.92}{2.7} = 2.19$ ft/sec

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Project Thomas Village P.H. Sheet 26 of 35
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By RF Chk'd JA Date 3/3/83

Curbows to Pond 'A' (cont.)

At Analysis Point (4)

$C = 2.63$

$L = 12'$

$Q = 6.72$ cfs

$$H^{3/2} = \frac{Q}{CL} = \frac{6.72}{2.63 \times 12} = 0.21$$

$H = 0.36$ ft OK

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100 yr. Overflow Spillway

The emergency overflow spillway for Pond A is to the south through a 15' sod lined channel located between lots 42 & 43.

Assume discharge into channel is weir flow. Refer to enclosed details for entrance configuration.

Q_{100} = 16.97 cfs (use flow @ Analysis Point ⑤, sh. 4)

Determine H where $Q = CLH^{3/2}$

L = 15'

C = 2.63 - Table 5-3, p 5-40
King & Brater, 6th ed.

$$H^{3/2} = \frac{16.97}{2.63 \times 15} = 0.43 \text{ ft.}$$

H = 0.57 ft OK

$$V = \frac{Q}{A} = \frac{16.97}{15 \times .57} = 1.98 \text{ ft/sec.}$$

$$F_r = \sqrt{\frac{Q^2 B}{g A^3}} = \sqrt{\frac{16.97^2 \times 15}{g \times 8.55^3}} = 0.46 \text{ subcritical}$$

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Project Thomas Village P.H. Sheet 28 of 35
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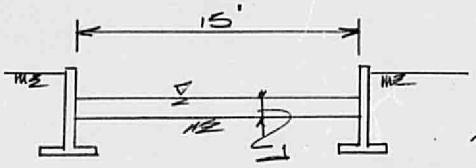
100yr. Overflow Spillway (cont.)

Determine depth of flow in 15' wide sod lined channel



$n = 0.025$

$S = 0.61\%$

$Q = 16.97$ cfs

Assume $d = 0.44$ ft

$A = .44 \times 15 = 6.60$ ft²

$P = 15 + .44 \times 2 = 15.88$ ft

$$Q = \frac{1.486}{.025}\left(\frac{6.6}{15.88}\right)^{2/3} \times .006^{1/2} \times 6.6 = \underline{17.06 \text{ cfs}}$$

OK

$$V = \frac{Q}{A} = \frac{17.06}{6.6} = 2.58 \text{ ft/sec}$$

$$F_r = \sqrt{\frac{16.97^2 \times 15}{1 \times 6.6^3}} = 0.68 \rightarrow \text{subcritical}$$

OK

100yr. emergency spillway for the entire subdivision is located at the south east corner of the subdivision.

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Project Thomas Village PH. Sheet 29 of 35
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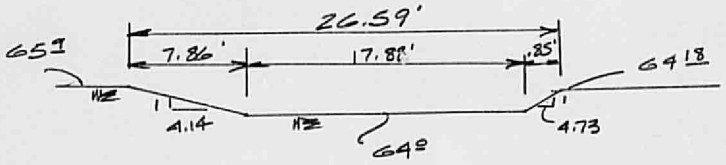
100 yr. Overflow Spillway (cont.)

The elevation @ the top of of berm is 64.00,



Assume weir flow with L = 17.88 FT

Q = 20.16 cfs see sh 4

$Q = CLH^{3/2}$

determine H

$$H^{3/2} = \frac{20.16}{2.63 \times 17.88} = 0.428$$

H = 0.57 FT OK

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Project Thomas Village P.H. Sheet 30 of 35
Drainage Analysis Job No. 319
By RF Chk'd JA Date 5/13/83

Hydraulic Design - 24" RCP Discharge Pipe

A 24" RCP will be install to drain the ponds from the controlled discharge. The proposed Storm Drain will start at Pond 'A', flow south to Don Quixote Dr. N.W., then east to Rio Grande Blvd. N.W, then north to the existing storm drain system in Rio Grande & Matthew Dr. N.W. (See enclosed profiles) At Rio Grande & Matthew the existing storm drain is a 24" RCP with a slope to the east of 0.12%. Presently the existing system drains an extensive area, therefore it is assumed that the existing storm drain is full, surcharged & overflowing. Matthew Dr. is constructed with peak & valleys with catch basins located in the sags. It is assumed that the storm water will overflow the crest of the street and proceed

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By RF Chk'd JA Date 3/3/83

Hydraulic Design - 24" RCP Discharge Pipe (cont.)

EAST. The critical elevation of Matthew Dr is located approximately 400' east of Rio Grande Blvd. (See Map No 3 enclosed) The elev. @ ℄ is 62.6, assumed top of curb @ 62.8 & that the storm water will be @ elev 62.9

∴ HGL @ Matthew & Rio Grande = 62.90 = Manhole @ Sta 0+33.50

Then project HGL to MH @ Sta. 1486.68.

24" RCP. $Q = 2.91$ cfs, $L = 153.18$ LF

$$S_f = \sqrt{\frac{n^2 Q^2}{1.486^2 R^{4/3} A^2}} = \sqrt{\frac{.013^2 \times 2.91^2}{1.486^2 \times .5^{4/3} \times \pi^2}}$$

$$= 1.666 \times 10^{-4}$$

$$h_f = L \times S_f = .03$$

Then HGL @ Sta 1486.68 = 62.90 + .03 = 62.93 out

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By RF Chk'd JA Date 3/3/82

Hydraulic Design - 24" RCP Discharge Pipe (cont.)

Manhole Losses @ Sta 1+86.68

$$h_{MH} + h_b = (.05 + .22)\frac{V^2}{2g}$$

$$V = \frac{Q}{A} = \frac{2.91}{\pi} = 0.93 \text{ ft/sec}$$

$$h_{MH} + h_b = .27 \times \frac{.93^2}{2g} = .0036 \text{ ft}$$

say .01 ft

HGL = 62.93 + .01 = 62.94 in @ Sta 1+86.68

Project HGL to Manhole - Sta 6+10.14

24" RCP, Q = 2.91 cfs, L = 423.46

$S_f = 1.666 \times 10^{-4}$

$h_f = S_f \times L = .07$ ft

HGL = 62.94 + .07 = 63.01 out

$$h_{MH} + h_b = (.05 + .05)\frac{V^2}{2g} = .1 \times \frac{.93^2}{2g} = .0013 \text{ ft}$$

say .01 ft

HGL = 63.01 + .01 = 63.02 in

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Hydraulic Design - 24" RCP Discharge Pipe (cont.)

Project HGL to Manhole - Sta 10+10.16 Don Quixote

24" RCP, $Q = 2.91$ cfs, $L = 400$ ft

$S_f = 1.666 \times 10^{-4}$

$h_f = S_f \times L = .07$ ft

HGL = 63.02 + .07 = 63.09 out

$h_{MH} + h_b = (.05 + .20)\frac{V^2}{2g} = .25 \times \frac{.93^2}{2g} = .003$ ft

say .01 ft

HGL = 63.09 + .01 = 63.10 in

Project HGL to Manhole - Sta 3+39.04 Don Juan

24" RCP, $Q = 2.56$ cfs, $L = 303.50$ LF

$S_f = \sqrt{\frac{.013 \times 2.56}{1.486 \times .5^{\frac{2}{3}} \times \pi}} = 1.28 \times 10^{-4}$

$h_f = S_f \times L = .04$ ft, $V = \frac{2.56}{\pi} = .81$ m/sec

HGL = 63.10 + .04 = 63.14 out

$h_{MH} + h_b = (.05 + .18)\frac{V^2}{2g} = .23 \times \frac{.81^2}{2g} = .002$ ft

say .01 ft

HGL = 63.14 + .01 = 63.15 in

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Drainage Analysis Job No. 319
By RF Chk'd JA Date 3/3/83

Hydraulic Design - 24" RCP Discharge Pipe (cont)

Project HGL to Junction Box - Sta 3+65.69 - 52.63' Lt.

24" RCP, $Q = 2.56$ cfs, $L = 53.05$ ft

$S_f = 1.28 \times 10^{-4}$

$h_f = S_f \times L = .01$ ft

HGL = 63.15 + .01 = 63.16 in ok

HGL for 12" RCP Lateral @ Sta 10+10.14 Drainage

West Lateral

12" RCP, $Q = .29$ cfs, $L = 38.68'$

$$S_f = \frac{\sqrt{.013 \times .29}}{1.486 \times .25^{\frac{2}{3}} \times .78} = 6.717 \times 10^{-5}$$

$h_f = S_f \times L = .003$ ft say .01 ft

HGL @ MH Sta 10+10.14 = 63.10 in

HGL @ Conc. Junction Box = 63.10 + .01 = 63.11 in

East Lateral

12" RCP, $Q = .06$ cfs, $L = 56.55$ ft

$$S_f = \frac{\sqrt{.013 \times .06}}{1.486 \times .25^{\frac{2}{3}} \times .78} = 2.875 \times 10^{-6}$$

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Project Thanks Village #1 Sheet 35 of 35
Drainage Analysis Job No. 319
By RF Chk'd JK Date 3/3/82

Hydraulic Design - 24" RCP Discharge Pipe (cont)

$h_f = S_f \times L = .00016$ ft say .01 ft

HGL @ Conc. Junction Box = 63.10 + .01 = 63.11 i.e. 63.11

See enclosed Storm Drain plan & profile for HGL profile.

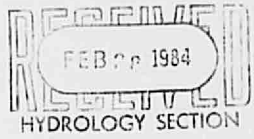
HOME PLANNING DEVELOPMENT COMPANY
Albuquerque, New Mexico

THOMAS VILLAGE PATIO HOMES
(G12-D9 & D9a)

ADDENDUM TO DRAINAGE REPORT

February 24, 1984

Andrews, Asbury & Robert, Inc.
Consulting Engineers
Albuquerque, New Mexico 87108



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Project Thomas Village P.H. Sheet 1 of 6
Drainage Analysis Job No. 319
By RF Chk'd JA Date 2/16/84

Hydraulic Design - 18" RCP Discharge Pipe

An 18" RCP will be installed to drain the ponds from the controlled discharge. The proposed Storm Drain will start at Pond A, flow south to Don Quixote Dr. N.W., then east to Rio Grande Blvd. N.W, then north to the existing storm drain system in Rio Grande & Matthew Dr. N.W. (See enclosed profiles) At Rio Grande & Matthew the existing storm drain is a 24" RCP with a slope to the east of 0.15%. Presently the existing systemic drains an extensive area, therefore it is assumed that the existing storm drain is full, surcharged & overflowing. Matthew Dr. is constructed with peaks & valleys with catch basins located in the sags. It is assumed that the storm water will overflow the crest of the street and proceed

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Drainage Analysis Job No. 319
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Hydraulic Design - 18" RCP Discharge Pipe (cont.)

EAST. The critical elevation of Matthew Dr is located approximately 400' east of Rio Grande Blvd. (See Map No 3 of report dated Sept. 13, 83) The elev. @ ℄ is 62.6, assumed top of curb @ 62.8 ∴ that the storm water will be @ elev 62.9

∴ HGL @ Matthew ℄ Rio Grande = 62.90 = Manhole @ Sta 0+26.16

Then project HGL to MH @ Sta. 1+88.63.

18" RCP. $Q = 2.25$ cfs, $L = 162.47$ LF

$$S_f = \left(\frac{n^2 Q^2}{1.486^2 R^{4/3}}\right) = \left(\frac{.013^2 \times 2.25^2}{1.486^2 \times .375^{4/3} \times 1.767}\right)$$

$$= 4.588 \times 10^{-4}$$

$$h_f = L \times S_f = 0.07$$

Then HGL @ Sta 1+88.63 = 62.90 + .07 = 62.97 ⌓

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
149 Jackson, N.E., Albuquerque, N.M. 87108
Telephone (505) 265-6631

Project Thomas Village P.H. Sheet 3 of 6
Drainage Analysis Job No. 319
By RF Chk'd JA Date 2/10/84

Hydraulic Design - 18" RCP Discharge Pipe (cont.)

Manhole Losses @ Sta 1+88.63

$$h_{MH} + h_b = (.05 + .22)\frac{V^2}{2g}$$

$$V = \frac{Q}{A} = \frac{2.25}{1.767} = 1.27 \text{ ft/sec}$$

$$h_{MH} + h_b = .27 \times \frac{\overline{1.27}^2}{2g} = .0068 \text{ ft}$$

$$\text{say } .01 \text{ ft}$$

HGL = 62.97 + .01 = 62.98 in @ Sta 1+88.63

Project HGL to Manhole - Sta 6+09.76

18" RCP, Q = 2.25 cfs, L = 421.13

$S_f = 4.588 \times 10^{-4}$

$h_f = S_f \times L = 0.19$ ft

HGL = 62.98 + .19 = 63.17 out

$$h_{MH} + h_b = (.05 + .05)\frac{V^2}{2g} = .1 \times \frac{\overline{1.27}^2}{2g} = .0025 \text{ ft}$$

$$\text{say } .01 \text{ ft}$$

HGL = 63.17 + .01 = 63.18 in

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Project Thomas Village DH. Sheet 4 of 6
Drainage Analysis Job No. 219
By RF Chk'd JA Date 2/16/84

Hydraulic Design - 18" RCP Discharge Pipe (cont.)

Project HGL to Manhole - Sta 10+10.16 Don Quixote

18" RCP, $Q = 2.25$ cfs, $L = 400.37$

$S_f = 4.588 \times 10^{-4}$

$h_f = S_f \times L = .18$ ft

HGL = 63.18 + .18 = 63.36 out

$h_{MH} + h_L = (.05 + .20)\frac{V^2}{2g} = .25 \times \frac{1.27^2}{2g} = .006$ ft

say .01 ft

HGL = 63.36 + .01 = 63.37 in

Project HGL to Manhole - Sta 0+42.50 Don Juan

18" RCP, $Q = 2.25$ cfs, $L = 25.7$ LF

$S_f = \sqrt{\frac{.013 \times 2.25^2}{1.486 \times .5184 \times 1.27}} = 4.588 \times 10^{-4}$

$h_f = S_f \times L = .01$ ft , $V = 1.27$ ft/sec

HGL = 63.37 + .01 = 63.38 out

$h_{MH} + h_L = (.05 + .18)\frac{V^2}{2g} = .23 \times \frac{1.27^2}{2g} = .006$ ft

say .01 ft

HGL = 63.38 + .01 = 63.39 in

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Project Thomas Village P.H. Sheet 5 of 6
Drainage Analysis Job No. 319
By RT Chk'd [illegible] Date 2/16/84

Hydraulic Design - 18" RCP Discharge Pipe (cont.)

Project HGL to Manhole - Sta 3+39.04

18" RCP, $Q = 1.98$ cfs, $L = 295.99$

$S_f = \sqrt{0.013 \times 1.98^2} = 3.554 \times 10^{-4}$

$h_f = S_f \times L = 0.11$ ft

HGL = 63.39 + .11 = 63.50

$V = 1.12$ ft/sec

$h_{min\ f\ b} = (.05 + .18) \times \frac{1.12^2}{2g} = 0.0048$

say 0.01 ft

HGL = 63.50 + .01 = 63.51

Project HGL to Junction Box - Sta 3+65.67

18" RCP, $Q = 1.98$ cfs, $L = 30.65$ ft

$S_f = 3.554 \times 10^{-4}$

$h_f = 0.02$

HGL @ Junction Box = 63.51 + .02 = 63.53

Design elev. of pool in Pond 'A' = 63.50 OK

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CONSULTING ENGINEERS
149 Jackson, N.E., Albuquerque, N.M. 87106
Telephone (505) 265-6631

Project Thomas V.M. P.H. Sheet 6 of 6
Drainage Analysis Job No. 319
By RF Chk'd [illegible] Date 2/16/84

HGL for 12" RCP Lateral @ Std. 0+42.50 Dodd Road

12" RCP $Q = 0.79$ cfs $L = 34.50$ LF

$$S_f = \frac{\sqrt{.003 \times 0.79}}{1.486 \times .25^{2/3} \times .79} = 8.082 \times 10^{-3}$$

$h_f = 0.28$

HGL = 63.39 + .28 = 63.67

Pad @ Pond B = 63.87 OK

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ENGINEERING

ATL ENGINEERING SERVICES

GEOTECHNICAL INVESTIGATION FOR THE PROPOSED
THOMAS VILLAGE DEVELOPMENT
ALBUQUERQUE, NEW MEXICO
ATL ENGINEERING SERVICES LAB. NO. 0842-83
MARCH 25, 1983

ENGINEERING SERVICES

Albuquerque Testing Laboratory, Inc.
532 Jefferson N.E. (87108)
P. O. Box 4101 (87106)
Albuquerque, New Mexico
(505) 268-4537

March 25, 1983

Andrews, Asbury & Robert, Inc.
149 Jackson Street, N.E.
Albuquerque, New Mexico 87108

Attention: Mr. John B. Robert, P.E. & L.S.

Re: ATL Engineering Services Lab. No. 0842-83. Geotechnical Investigation for the Proposed Thomas Village Development - Albuquerque, New Mexico

Gentlemen:

Our report for the referenced project is herewith submitted. It contains a description of the equipment and procedures utilized; Boring Log Graphs depicting subsurface soils encountered at the test locations; results of laboratory tests performed on representative soil samples; and our analysis and recommendations concerning earthwork, foundation support and other pertinent geotechnical considerations.

We appreciate the opportunity of working with you on this project. If any questions should arise concerning this report, or if we can be of further assistance to you, please call us.

Respectfully submitted,

ATL ENGINEERING SERVICES

Nicholas T. Korecki

Nicholas T. Korecki, P.E.

Reviewed by:

Robert K. Lloyd

Robert K. Lloyd, P.E.

NTK/ksc

THOMAS VILLAGE DEVELOPMENT

ALBUQUERQUE, NEW MEXICO

INTRODUCTION:

The five (5) test borings were drilled on March 16, 1983 using a truck mounted Mobile B-56 "Pacemaker" rotary drill powered by a Ford Industrial Engine. All borings were advanced "dry" using 6-5/8" O.D. by 3-1/4" I.D. continuous flight, 5-foot sectional hollow stem augers. Standard penetration tests (A.S.T.M. D-1586) were made at 2-1/2 to 5 foot vertical intervals in the holes in order to provide a measure of the relative density or consistency of the subsurface soils encountered and to obtain samples of the soils for visual inspection and laboratory testing.

SITE CONDITIONS:

The ground surface at the site possesses very little relief. Subsurface soils at the test locations consisted of surface and near surface silty sandy clays (CL) underlain by fine to medium grained gravelly "clean" sands (SP). The sand stratum contained thin seams of gray clay (CL) at Test Locations 2, 3, and 5.

All recovered soil samples exhibited low to moderate moisture content. The water table was encountered at 14-1/2' to 16' below the existing ground surface at the time of drilling.

PROPOSED CONSTRUCTION:

We understand that the Thomas Village Development will consist of single story frame and stucco single family residences. Floor slabs will be reinforced concrete at slightly above the present ground's surface. Roads and driveways will be paved.

FOUNDATIONS:

The subsurface clean sand soils at the site are capable of safely supporting the intended construction. The near surface silty to sandy clays are however, compressible and susceptible to volume changes upon dryin .

All foundations may be based on the naturally deposited sand stratum encountered at a minimum depth of two (2) feet below the present ground's surface but also not less than two (2) feet below the low exterior finished grade. Some foundations may have to be

based deeper than two feet below the finished grade in order to satisfy the requirement that foundations be based in the sand stratum. We advise that the bottoms of all foundation excavations be thoroughly moistened with optimum moisture (±2%) to as deep as practicable and compacted to a minimum of 95 percent of Modified Proctor Density.

For foundations based on the compacted naturally deposited soils as recommended, a soil bearing pressure of 2000 pounds per square foot may be used. Minimum width of continuous footings should be 1'-4", minimum least dimension of spot footings should be 2'-0".

If desired, a greater degree of protection against moisture induced soil consolidation may be provided by basing all foundations on a thickness of engineered fill at least equal to one half the least dimension of the footing but also not less than 1-1/2 feet. Engineered compacted fill soils should also extend laterally from all footing perimeters a distance equal to the depth of compacted fill placed beneath the footings. Plasticity Index of engineered fill soils should be limited to 10. On-site sand soils approved by the Soils Engineer, should be acceptable for use. Foundation excavations should be made into the sand stratum. Prior to placing fill soils, the exposed bottom of excavations should be scarified a minimum depth of 8 inches, moistened with optimum moisture to as deep as practical, and compacted to a minimum of 90 percent of Modified Proctor Density. Engineered fill soils should be moistened with optimum moisture (±2%) outside of the building area, placed in maximum 8 inch loose lifts and compacted to a minimum of 95 percent of Modified Proctor Density.

For foundations based on engineered fill soils, a soil bearing pressure of 2500 pounds per square foot may be used. Minimum foundation sizes recommended above should also apply.

Depending upon finished floor elevations, it may prove more economical to base all foundations on engineered fill soils. This is especially true where the depth to the sand stratum would require somewhat deeper than normal foundation depth. It is or prime importance that all foundations be based either entirely on the naturally deposited underlying sand type soils or entirely on the specified thickness of engineered fill soils brought up from these sands.

"ON-GRADE" FLOOR SLABS:

All "on-grade" reinforced concrete floor slabs should be based on a minimum 6 inch compacted thickness of imported, select fill soils consisting of a pit-run sand and gravel, crushed rock, or similar material having a Plasticity Index not exceeding 6. In addition, the compacted select fill should be underlain by at least one (1) foot of compacted "on-site" soils. Prior to placement of fill soils, the building areas should be completely stripped of vegetation and topsoil. The exposed ground should then be overcut a vertical depth of at least one (1) foot. The excavated soils should be thoroughly mixed "off-site" with optimum moisture (+2%), then placed and compacted to a minimum of 90 percent of Modified Proctor Density and brought up so that the minimum compacted thickness is 12 inches. Imported, select slab fill soils should then be placed and compacted to a minimum of 90 percent of Modified Proctor Density.

As an additional measure to protect against soil volume changes resulting from drying of the clay soils beneath the slabs, all building areas may be excavated down to the sand stratum with the clay soils replaced with imported engineered fill soils, with a Plasticity Index not exceeding 8, placed and compacted as recommended above to a minimum of 90 percent of Modified Proctor Density.

PAVEMENTS:

Support for asphaltic concrete pavements may be provided by a minimum 6 inch compacted thickness of a well graded crushed gravel and fines base course fill. The subgrade should be prepared as outlined in the paragraph above. Roads should be designed to provide good drainage away from the pavements. The base course should be compacted to a minimum of 95 percent of Modified Proctor Density.

The following minimum pavement sections are suggested for varying traffic conditions:

Traffic Conditions	Minimum Total Pavement Thickness (inches)
Light: passenger cars, general parking areas	2

Traffic Conditions	Minimum Total Pavement Thickness (inches)
Heavy: medium to heavy duty trucks	3

In addition, the asphalt pavement should conform to the following specifications:

Stability (Marshall - 75 blow briquette)	1500 minimum
Flow (Marshall)	10 to 16
Percent Voids in Compacted Mix	3 to 7
Percent Voids Filled with Asphalt	75 to 85
Percent Asphalt Cement Content by Weight of Total Mix	5 to 7
Sand Equivalent	40 minimum
Compaction	96% of Laboratory Molded Specimen

Additional specifications for asphaltic concrete and select gravel base course may be taken from the "New Mexico Standard Specifications for Public Works Construction", 1979 Edition, Sections 115 and 302 respectively.

SITE DRAINAGE AND PROTECTION OF FOUNDATION SOILS:

It will be very important at this site to keep the soils at and below foundation depths protected from moisture intrusions.

In order to help prevent moisture intrusions into the foundation strata, we advise that the following precautions be taken:

1. Final site grading should be designed such that positive surface water drainage is provided and maintained away from all foundations and exterior walls.

2. All foundation excavations should be kept dry, with concreting operations to follow as soon as practical. The contractor shall have equipment available to remove any surface water which may collect in the excavations for any reason.

3. Properly compact all backfill around foundations, exterior walls and in utility trenches to a minimum of 90 percent of Modified Proctor Density. The on-site

silty to clayey sands, when properly placed and compacted should provide a relatively impervious backfill.

4. Discourage the planting of vegetation adjacent to exterior walls unless underdrains are provided beneath the planted areas to lead irrigation waters away from the foundations. Consideration should be given to paving adjacent to all exterior walls.

5. All ponding areas should be kept a minimum of 15 feet away from all building exterior walls.

Any changes or deviations from the proposed construction as stated in this report is structure loads, foundation depths or any other factors which could affect or alter the recommendations covered herein, should be brought to our attention before finalization of plans and prior to construction.

Your attention is directed to the fact that only a very small, fractional part of the proposed site area was "opened" and subsurface soils exposed and tested through the test borings. Subsurface soils and their in-situ properties which can materially affect design considerations may be different in areas not covered by the test borings. Therefore, if during construction and when excavations for footings are opened, soil foundation conditions differ from those encountered by the test borings of this report, our laboratory should be notified immediately for possible revision of our recommendations.

Professional opinions and recommendations presented in this report are based on our evaluations of the subsurface soil conditions at the site, our understanding of the proposed construction and our experience in the geotechnical field. Our only guarantee concerning the project is that our engineering and geological work and judgments given herein meet the standards of our profession at this time.

Respectfully submitted,

ATL ENGINEERING SERVICES

Nicholas T. Korecki

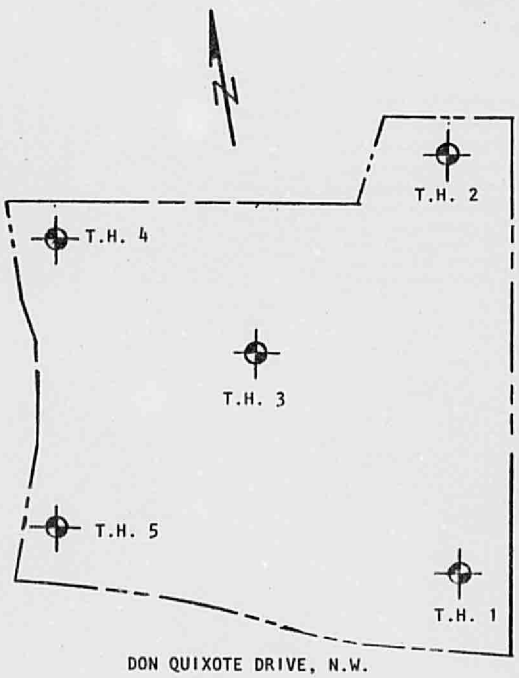
Nicholas T. Korecki, P.E.

Reviewed by:

Robert K. Lloyd

Robert K. Lloyd, P.E.

APPENDIX



TEST LOCATIONS

SCALE: 1"=200'

ENGINEERING SERVICES

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PROJECT: Thomas Village Development

LAB NO.: 0842-83

Albuquerque, New Mexico

DATE: March 25, 1983

BORING LOG GRAPH -TEST HOLE NO. 1

DEPTH - FT.	VISUAL DESCRIPTION	PENETRATION RESISTANCE Per Foot N	Per 6" or as Noted	Per Foot C	SAMPLER TYPE	MOISTURE CONTENT % M	DRY DENSITY P.C.F. D	PARTICLE SIZE DISTRIBUTION % GRAVEL	SAND	SILT & CLAY	ATTERBERG LIMITS% LIQUID LIMIT	PLASTIC LIMIT	P.I.
	Clay, brown, silty, sandy (CL) Soft to	6	4 3 3		S	30.0					44	22	22
2½	Moderately Firm with depth.	12	3 5 7		C	19.4	105				46	25	21
	3.75'												
5	Sand, tan, clean, medium to fine grained (SP).	11	4 5 6		S	4.3							
7½	Medium	12	3 5 7		S	3.7							
10	Dense	14	4 4 10		S	5.0							
	12'												
12½	Sand, light gray, clean, well graded, gravelly. (SW-SP)												
	15' ▼												
15		8	4 4 4		S	*SATURATED							

ENGINEERING SERVICES

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PROJECT: Thomas Village Development

LAB NO.: 0842-83

Albuquerque, New Mexico

DATE: March 25, 1983

BORING LOG GRAPH -TEST HOLE NO. 2

DEPTH - FT.	VISUAL DESCRIPTION	PENETRATION RESISTANCE Per Foot N	Per 6" or as Noted	Per Foot C	SAMPLER TYPE	MOISTURE CONTENT % M	DRY DENSITY P.C.F. D	PARTICLE SIZE DISTRIBUTION % GRAVEL	SAND	SILT & CLAY	ATTERBERG LIMITS% LIQUID LIMIT	PLASTIC LIMIT	P.I.
	Clay, grayish-brown, silty, sandy (CL). Moderately	9	6 5 4		S	18.1		10	31	59	28	17	11
2½	Firm	15	3 7 8		S	19.2	101						
	3.75'												
5	Sand, tan, clean, fine to medium grained (SP). Some gravel	6	3 3 3		S	2.5		3	93	4			
7½	gray Clay layer at 15' depth. (CL).	9	3 4 5		S	2.8							
10	Loose	7	2 2 5		S	2.8		0	97	3			
12½													
	14½'+1												
15		9	3 4 5		S	*SATURATED		1	52	47			

ENGINEERING SERVICES

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PROJECT: Thomas Village Development

LAB NO.: 0842-83

Albuquerque, New Mexico

DATE: March 25, 1983

BORING LOG GRAPH -TEST HOLE NO. 3

DEPTH - FT.	VISUAL DESCRIPTION	PENETRATION RESISTANCE Per Foot N	Per 6" or as Noted	Per Foot C	SAMPLER TYPE	MOISTURE CONTENT % M	DRY DENSITY P.C.F. D	PARTICLE SIZE DISTRIBUTION % GRAVEL	SAND	SILT & CLAY	ATTERBERG LIMITS% LIQUID LIMIT	PLASTIC LIMIT	P.I.
2½	Clay, brown, silty sandy (CL-ML, some SC). Moderately Firm	15	3 6 9		S	15.7		0	53	47			
		13	3 5 8		C	26.8 14.4	74 87	0	39	61	27	22	5
	4'												
5	Sand, tan, clean, medium to fine	12	5 6 6		S	5.5		0	66	34			
7½	grained (SP). Silt-Clay seam at 5' depth	7	4 3 4		S	2.8		18	79	3			
10	(ML-CL).	7	3 3 4		S	2.3		5	92	3			
12½	Generally Loose												
15	16'+	3	3 2 1		S	*SATURATED		3	95	2			
17½													
20			5 3 4		S	*SATURATED		2	97	1			

ENGINEERING SERVICES

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PROJECT: Thomas Village Development

LAB NO.: 0842-83

Albuquerque, New Mexico

DATE: March 25, 1983

BORING LOG GRAPH -TEST HOLE NO. _____

DEPTH - FT.	VISUAL DESCRIPTION	PENETRATION RESISTANCE Per Foot N	Per 6" or as Noted	Per Foot C	SAMPLER TYPE	MOISTURE CONTENT % M	DRY DENSITY P.C.F. D	PARTICLE SIZE DISTRIBUTION % GRAVEL	SAND	SILT & CLAY	ATTERBERG LIMITS% LIQUID LIMIT	PLASTIC LIMIT	P.I.
	Clay, brown, silty, sandy (CL) Soft	5	2 2 3		S	24.7							
2'													
2½	Sand, tan, clean, fine (SP).	7	3 3 4		S	5.8							
5	Loose to Medium Dense	9	4 4 5		S	4.7							
7½		21	7 10 11		S	2.9		17	81	2			
9'													
10	Sand, light gray, clean, well graded, gravelly (SW-SP). Medium Dense	10	5 5 5		S	3.4							
12½													
15	16'+	13	6 6 7		S	*SATURATED		3	96	1			

ENGINEERING SERVICES

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PROJECT: Thomas Village Development

LAB NO.: 0842-83

Albuquerque, New Mexico

DATE: March 25, 1983

BORING LOG GRAPH -TEST HOLE NO. 5

DEPTH - FT.	VISUAL DESCRIPTION	PENETRATION RESISTANCE Per Foot N	Per 6" or as Noted	Per Foot C	SAMPLER TYPE	MOISTURE CONTENT % M	DRY DENSITY P.C.F. D	PARTICLE SIZE DISTRIBUTION % GRAVEL	SAND	SILT & CLAY	ATTERBERG LIMITS% LIQUID LIMIT	PLASTIC LIMIT	P.I.
	Clay, brown, silty, sandy (CL) Soft	7	2 3 4		S	22.2		0	43	57	40	24	16
2'													
2½		7	2 2 5		S	5.8		0	26	74			
	Sand, tan, clean, medium to fine (SP).												
5		11	3 4 7		S	3.9		15	83	2			
	Clay (CL) seam at 3½', gravelly.												
7½		10	3 3 7		S	4.1		14	84	2			
	Loose to Medium with depth.												
10		17	7 8 9		S	3.8		18	80	2			
12½													
15		13	4 6 7		S	*SATURATED		10	89	1			
16'													

NOTES AND DEFINITIONS

1. **PENETRATION RESISTANCE** – BLOWS PER FOOT USING "A" ROD, 140 LB. HAMMER WITH 30-INCH GUIDED FREE FALL UNLESS OTHERWISE NOTED.
   - N – STANDARD PENETRATION RESISTANCE (ASTM: D-1586), 2" O.D. SPLIT BARREL SAMPLER
   - C – CONTINUOUS PENETRATION RESISTANCE, 2½" O.D., CONICAL, STEEL DRIVE POINT
   - R – PENETRATION RESISTANCE, 3" O.D. MODIFIED DAMES & MOORE SPLIT RING SAMPLER
2. **SAMPLE TYPE**
   - S – STANDARD SPLIT BARREL; 2" O.D. x 1-3/8" I.D.
   - C – CALIFORNIA SAMPLER; 2-3/8" O.D. EQUIPPED WITH 2" I.D. x 4" HIGH BRASS LINERS
   - R – MODIFIED DAMES & MOORE SAMPLER; 3" O.D. EQUIPPED WITH 2.42" I.D. x 1" HIGH BRASS LINERS
   - T – SHELBY TUBE
3. **SOIL INDEX PROPERTIES**
   - M – MOISTURE CONTENT, % OF DRY SOIL WEIGHT
   - D – DENSITY, LBS PER CUBIC FOOT COMPUTED EITHER BY VOLUMETRIC OR DISPLACEMENT METHODS. SOILS CLASSIFICATIONS ARE VISUAL UNLESS ACCOMPANIED BY GRAIN SIZE ANALYSIS AND ATTERBERG LIMITS.
4. **WATER TABLE** – IF ENCOUNTERED IS NOTED ON LOG GRAPHS AS ⏚ .

UNIFIED SOIL CLASSIFICATION SYSTEM
ASTM: D2487

COARSE-GRAINED SOIL

MORE THAN 50% LARGER THAN 200 SIEVE SIZE

Symbol	Letter	DESCRIPTION	MAJOR DIVISIONS
	GW	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% - 200 FINES	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size.
	GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% - 200 FINES	
	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, MORE THAN 12% - 200 FINES	
	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, MORE THAN 12% - 200 FINES	
	SW	WELL-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% - 200 FINES	SANDS More than half of coarse fraction is smaller than No. 4 sieve size.
	SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% - 200 FINES	
	SM	SILTY SANDS, SAND-SILT MIXTURES MORE THAN 12% - 200 FINES	
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES MORE THAN 12% - 200 FINES	

NOTE – Soils with 5 to 12 percent minus 200 fines should be classified with dual symbols.

FINE-GRAINED SOIL

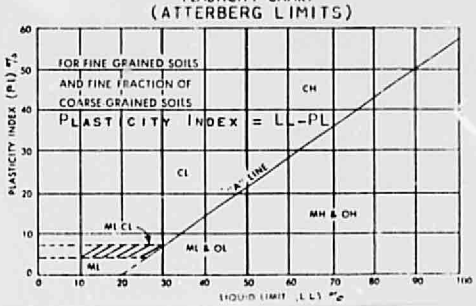
MORE THAN 50% SMALLER THAN 200 SIEVE SIZE

Symbol	Letter	DESCRIPTION	MAJOR DIVISIONS
	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	SILTS AND CLAYS Liquid limit less than 50
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
	OL	ORGANIC SILTS AND ORGANIC SILT CLAYS OF LOW PLASTICITY	
	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	SILTS AND CLAYS Liquid limit greater than 50
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
	PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

SOIL FRACTIONS

Component			Size Range
Boulders			Above 12 in.
Cobbles			3 in. to 12 in.
Gravel			3 in. to No. 4 sieve
Coarse Gravel			3 in. to ¾ in.
Fine gravel	G		¾ in. to No. 4 sieve
Sand			No. 4 to No. 200
Coarse	CS	TS	No. 4 to No. 10
Medium	MS	TS	No. 10 to No. 40
Fine	FS	TS	No. 40 to No. 200
Fines (silt or clay)	S/C		Below No. 200 sieve

PLASTICITY CHART
(ATTERBERG LIMITS)



Lab No. 0842-83

Project: Thomas Village Development

CONFINED SWELL TEST

Sample Identification: Test Hole No. 3, Depth= 0-1½ ft.

Material: Brown, sandy clay (CL-CH)

Test Data: Swell Ring Diam. = 1.370 in. Area = 1.4741 $in.^2$ Height = 1.000 in.

Volume = 0.00085 cu.ft. Weight = 147.0 grams

Initial Wt. Soil & Ring = 194.5 grams

After Test, Wt. Soil & Ring = 195.8 grams

Oven Dry Soil = 39.9 grams

Test Results:

Soil Sample

Wet Density = 123.2 p.c.f.

Dry Density = 103.5 p.c.f.

Moisture (Prior to test) = 19.0 %

(After Test) = 22.3 %

(Increase) = 3.3 %

DATE	TIME	PROVING RING (10^{-4}) inches (0.462 lbs/0.0001 inches)	LOAD (lbs.)	SWELLING STRESS (lbs./$in.^2$)
3/21/83	10:30	0	0	0
	11:45	8.2	3.79	2.57
	1:15	12.8	5.91	4.01
	2:00	14.5	6.70	4.54
3/22/83	7:36	25.0 (END)	11.55	7.84 (1129 psf)

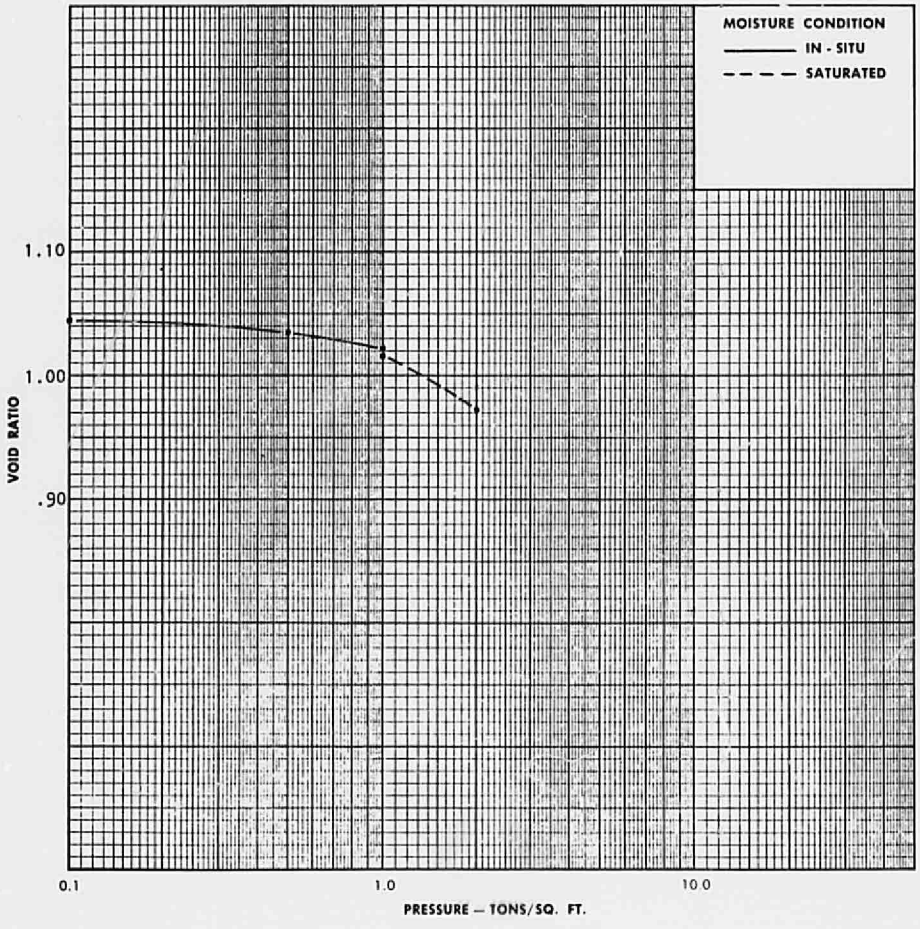
CONSOLIDATION TEST DATA

Lab. No. 0842-83

Project Thomas Village Development Location Albuquerque, New Mexico

Source of Sample Test Hole No. 1 at 3 foot depth

Material Brown, silty clay



ALBUQUERQUE TESTING LAB., INC.

Lab. No. 0842-83

Page No. A-10

ATL ENGINEERING SERVICES

Project Thomas Village Development

Location Albuquerque, New Mexico

Sample Source Test Hole 1 at 3 foot depth

Material Brown clay

Undisturbed [X] C Remolded [ ]

CONSOLIDATION TEST

Date	Time	Load T/sf	Elasped Time(min)	Dial Reading	Date	Time	Load T/sf	Elasped Time(min)	Dial Reading
3/21/83	2:00	¼	0	0.0000					
			¼	0.0077					
			½	0.0080					
			1	0.0084					
			2	0.0087					
			4	0.0089					
3/22/83	7:35			0.0084					
	7:45	1	0	0.0084					
			¼	0.0110					
			½	0.0116					
			1	0.0120					
			2	0.0123					
			4	0.0125					
	10:30			0.0160					
	3:15	SATURATE		0.0174					
	4:50	2	0	0.0174					
			¼	0.0234					
			½	0.0241					
			1	0.0252					
			2	0.0261					
			4	0.0270					
	5:11			0.0305					
3/23/83	7:55		(END)	0.0389					

Wet Wt. Soil + Ring 118.0 gm.
Ring Wt. 33.1 gm.
Wet Soil 84.9 gm.
Dry Soil 61.0 gm.
Assumed Sp Gr. 2.65

CONSOLIDATION RING

Dia. 1.9140 in. Area 2.8772 sq.in.

Ht. 1.000 in. Vol. 0.00167 cu.ft.

Percent Moisture 39.2 Dry Density 80.5 pcf

$V_s = \frac{\text{Dry Density}}{(62.4)\text{Sp.Gr.}} = 0.4868$

$V_v = 1 - V_s = 0.5132$

Init.Void Ratio $(e_o) = \frac{V_v}{V_s} = 1.0542$

$e = \frac{\triangle - V_s}{V_s}$

Load T/sf	Dial Reading	1-Dial Reading (△)	e	Percent Consolidation
0	0.0000	1.0000	1.0542	--
¼				
½	0.0084	0.9916	1.0370	0.84
1	0.0160	0.9840	1.0214	1.60
1*	0.0174	0.9826	1.0185	1.74
2*	0.0389	0.9611	0.9743	3.89
4*				
8*				
12*				
16*				

*Saturated

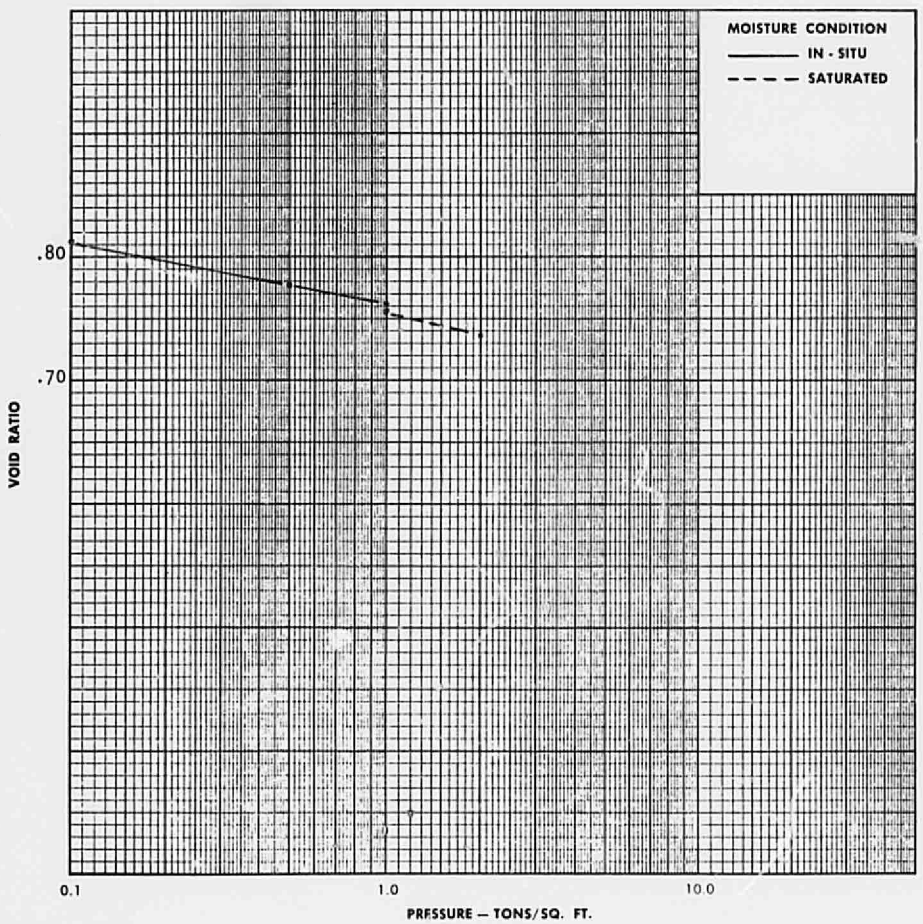
CONSOLIDATION TEST DATA

Lab. No. 0842-83

Project Thomas Village Development Location Albuquerque, New Mexico

Source of Sample Test Hole No. 2 at 3 foot depth

Material Brown, silty, sandy clay



ALBUQUERQUE TESTING LAB., INC.

Lab. No. 0842-83

Page No. A-12

ATL ENGINEERING SERVICES

Project Thomas Village Development

Location Albuquerque, New Mexico

Sample Source Test Hole No. 2 at 3 foot depth

Material Brown, silty, sandy clay

Undisturbed [X] C Remolded [ ]

CONSOLIDATION TEST

Date	Time	Load T/sf	Elasped Time(min)	Dial Reading	Date	Time	Load T/sf	Elasped Time(min)	Dial Reading
3/21/83	10:14	½	0	0.0000					
			¼	0.0161					
			½	0.0165					
			1	0.0168					
			2	0.0172					
			4	0.0174					
	11:45			0.0183					
	1:12	1	0	0.0185					
			¼	0.0252					
			½	0.0257					
			1	0.0262					
			2	0.0266					
			4	0.0270					
	2:00			0.0281					
3/22/83	7:35	SATURATE		0.0295					
	8:55	2	0	0.0295					
			¼	0.0365					
			½	0.0372					
			1	0.0378					
			2	0.0383					
			4	0.0386					
	10:30			0.0409					
	3:12		(END)	0.0415					

Wet Wt. Soil + Ring 115.2 gm.
Ring Wt. 24.5 gm.
Wet Soil 90.7 gm.
Dry Soil 70.8 gm.

Assumed Sp. Gr. 2.65

CONSOLIDATION RING

Dia. 1.9424 in. Area 2.9632 sq.in.

Ht. 1.000 in. Vol. 0.00171 cu.ft.

Percent Moisture 28.1 Dry Density 91.3 pcf

$V_s = \frac{\text{Dry Density}}{(62.4)Sp.Gr.} = 0.5521$

$V_v = 1 - V_s = 0.4479$

Init.Void Ratio $(e_o) = \frac{V_v}{V_s} = 0.8112$

$e = \frac{\triangle - V_s}{V_s}$

Load T/sf	Dial Reading	1-Dial Reading (△)	e	Percent Consolidation
0	0.0000	1.0000	0.8112	--
¼				
½	0.0185	0.9815	0.7777	1.85
1	0.0281	0.9719	0.7603	2.81
1*	0.0295	0.9705	0.7577	2.95
2*	0.0415	0.9585	0.7360	4.15
4*				
8*				
12*				
16*				

*Saturated

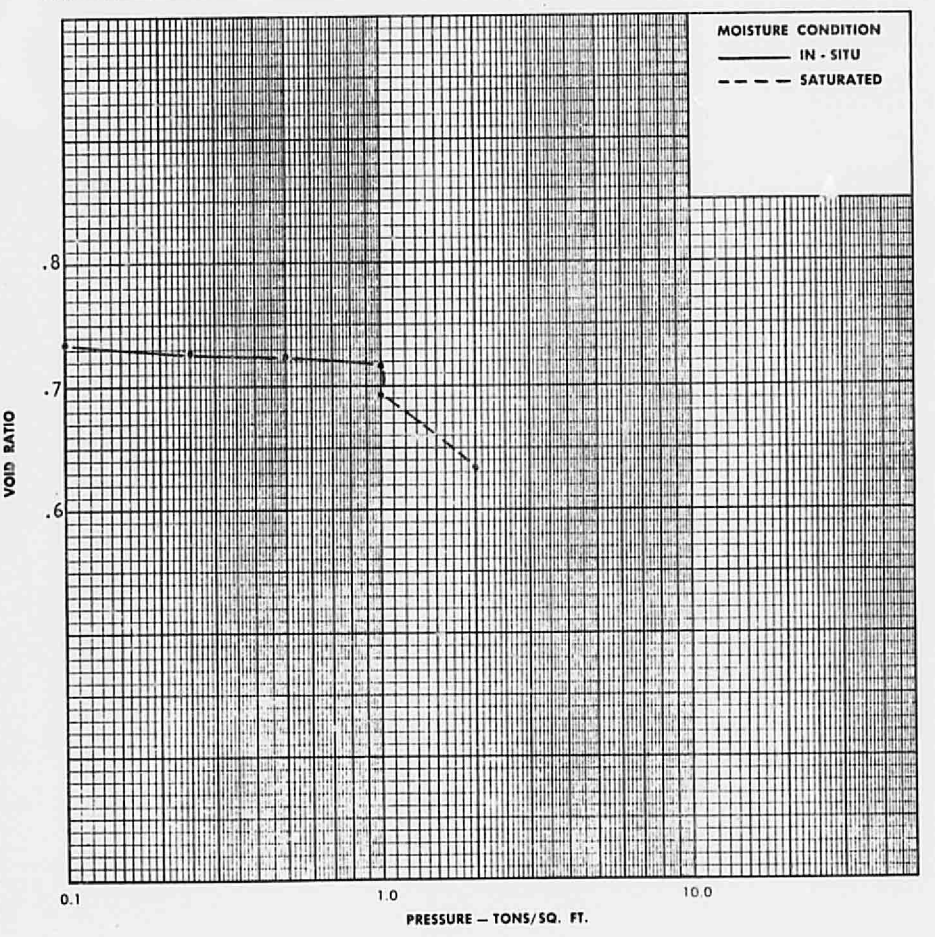
CONSOLIDATION TEST DATA

Lab. No. 0842-83

Project Thomas Village Development Location Albuquerque, New Mexico

Source of Sample Test Hole No. 3 at 2½ foot depth

Material Brown, sandy clay with pinholes



ALBUQUERQUE TESTING LAB., INC.

Lab. No. 0842-83

Page No. A-14

ATL ENGINEERING SERVICES

Project Thomas Village Development

Location Albuquerque, New Mexico

Sample Source Test Hole 3 at 2½-4'

Material Brown, sandy clay with pinholes

Undisturbed [X] C Remolded [ ]

CONSOLIDATION TEST

Date	Time	Load T/sf	Elasped Time(min)	Dial Reading	Date	Time	Load T/sf	Elasped Time(min)	Dial Reading
3/18/83	11:50	¼	0	0.0000				1	0.0107
			¼	0.0017				2	0.0124
			½	0.0017				4	0.0143
			1	0.0018	3/19/83	8:09			0.0225
			2	0.0018		8:25	2	0	0.0225
			4	0.0019				¼	0.0435
	12:55	½	0	0.0024				½	0.0452
			¼	0.0036				1	0.0470
			½	0.0037		8:47			0.0527
			1	0.0038					
			2	0.0038	3/21/83	7:43		END	0.0576
			4	0.0039					
	1:45			0.0047					
	2:45	1	0	0.0048					
			¼	0.0070					
			½	0.0071					
			1	0.0072					
			2	0.0073					
			4	0.0074					
	2:58			0.0075					
	4:06			0.0082					
	4:50	SATURATE	0	0.0083					
			¼	0.0087					
			½	0.0091					

Wet Wt. Soil + Ring 115.1 gm.
Ring Wt. 33.0 gm.
Wet Soil 82.1 gm.
Dry Soil 72.3 gm.

Assumed Sp. Gr. 2.65

CONSOLIDATION RING

Dia. 1.9140 in. Area 2.8772 sq.in.

Ht. 1.000 in. Vol. 0.00167 cu.ft.

Percent Moisture 13.6 Dry Density 95.4 pcf

$V_s = \frac{\text{Dry Density}}{(62.4)\text{Sp.Gr.}} = 0.5769$

$V_v = 1 - V_s = 0.4231$

Init.Void Ratio $(e_o) = \frac{V_v}{V_s} = 0.7333$

$e = \frac{\triangle - V_s}{V_s}$

Load T/sf	Dial Reading	1-Dial Reading (△)	e	Percent Consolidation
0	0.0000	1.0000	0.7333	--
¼	0.0024	0.9976	0.7292	0.24
½	0.0048	0.9952	0.7250	0.48
1	0.0083	0.9917	0.7189	0.83
1*	0.0225	0.9775	0.6943	2.25
2*	0.0576	0.9424	0.6335	5.76
4*				
8*				
12*				
16*				

*Saturated

G12/D9

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

October 17, 1986

Roberta Contreras
2513 Don Juan, NW
Albuquerque, New Mexico 87107

Dear Ms. Contreras:

In response to your question concerning your rear yard pond, you will find enclosed a copy of the Grading Plan for Thomas Village Patio Homes. Please note that the plan does show a low spot in your backyard, which was intended to pick-up all developed flows from your lot. Therefore, it must be determined that your lot was constructed in compliance with the approved plan.

If you have any further questions, please contact City Inspection (Engineering) at 768-2530. They were involved in inspection and acceptance of your subdivision through work order.

Thank you,

Richard L. Duran

Richard L. Duran
Drainage Inspector

RLD/bsj

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

March 13, 1984

Mr. John Andrews
Andrews, Asbury & Robert, Inc.
149 Jackson, N.E.
Albuquerque, New Mexico 87108

RE: ADDENDUM TO THE DRAINAGE REPORT FOR THOMAS VILLAGE
PATIO HOMES (G12-D9&9a) RECEIVED FEBRUARY 28, 1984

Dear Mr. Andrews:

The above referenced plan is approved. Please attach a copy of these plan sheets to the construction set prior to sign-off.

If I can be of further assistance, please contact me.

Yours truly,

Billy J. Goolsby, P.E.

Billy Goolsby
City/County Flood Ordinance Administrator

BG/ca

ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers
149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S.

February 28, 1984

Mr. Fred Aguirre
City Engineering
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

SUBJECT: THOMAS VILLAGE PATIO HOMES DRAINAGE REPORT
(G12-D9 & D92)

Dear Mr. Aguirre:

As discussed with you previously, it has been determined in the field that the 24 inch diameter storm drain in Rio Grande Boulevard cannot be constructed to the profile proposed due to a conflict with a 24 inch diameter waterline.

As per your request, we have prepared an addendum to the drainage report and also have revised sheets 16.1, 17.1 and 20.1 of the construction plans to provide a storm drain system that can be constructed and also provide for drainage of the detention areas located within the subdivision.

Transmitted herewith are two (2) copies of the Addendum to Drainage Report along with two (2) copies each of revised sheets 16.1, 17.1, and 20.1.

We request you review and approval of the changes proposed. This project is presently under construction, therefore your early attention to this request will be appreciated.

Very truly yours,

John A. Andrews

JOHN A. ANDREWS, P.E.

mt-319

Attachments

RECEIVED
FEB 29 1984
HYDROLOGY SECTION

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

FILE COPY

October 26, 1983

Mr. Robert Foglesong, PE
Andrews, Asbury & Robert, Inc.
149 Jackson NE
Albuquerque, NM 87108

REF: THOMAS VILLAGE PATIO HOMES (G12-D9 & D9a)

Dear Mr. Foglesong:

Your submittal of October 24, 1983, is in compliance with my request which means that the plan is hereby approved.

Prior to sign-off the appropriate "Construction Within City R/W" document and financial security for drainage, utilities and street improvements will be required.

If I can be of further assistance, please contact me at 766-7644.

Yours truly,

Billy J. Goolsby P.E.

Billy J. Goolsby PE
Civil Engineer/Hydrology

BJG:mrk

ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers
149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S.

October 24, 1983

Mr. Billy J. Goolsby
Civil Engineer/Hydrology
City Engineering
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

G12-D9a

SUBJECT: THOMAS VILLAGE PATIO HOMES SITE DEVELOPMENT
DRAINAGE REPORT

Dear Mr. Goolsby:

Enclosed are two (2) copies of the revised Map No. 5, Developed Conditions for the subject project.

Very truly yours,

ROBERT S. FOGLESON, P.E. & L.S.

mt-319

Enclosures (2)

RECEIVED
OCT 24 1983
ENGINEERING

ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers
149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S.

October 19, 1983

G12-09a

Mr. Billy J. Goolsby
Civil Engineer/Hydrology
City Engineering
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

SUBJECT: THOMAS VILLAGE PATIO HOMES SITE IMPROVEMENTS
CITY OF ALBUQUERQUE PROJECT NO. 1809

Dear Mr. Goolsby:

In response to your letter of September 30, 1983, with regard to the drainage report and plat for the subject project, we submit the following:

Comment 1.

Reply: The note on sheet 1 of 2 of the plat has been changed to correctly identify the lots that will be accessed via Tract B.

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OCT 19 1983
ENGINEERING

Comment 2.

Reply: The note on sheet 1 of 2 states that Tracts A, B, C, D, E, and F will be used for several purposes but Tracts G, E, and F are to be used specifically for drainage purposes.

Comment 3.

Reply: The street names have been changed on the proposed plat.

With response to your comments concerning the drainage report, we have incorporated the changes as discussed per our phone conversation of October 18, 1983.

Enclosed are two (2) copies of the revised Developed Conditions Map, Map No. 5, together with two copies of the subdivision plat.

Very truly yours,

Robert S. Foglesong

ROBERT S. FOGLESONG, P.E. & L.S.

mt-319

Enclosures

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

September 30, 1983

Mr. Robert Foglesong, P.E.
Andrews, Asbury & Robert, Inc.
149 Jackson N.E.
Albuquerque, N.M. 87108

RE: THOMAS VILLAGE PATIO HOMES (G12-D9 & D9a)

Dear Mr. Foglesong:

In order to have the plat "signed off" and the drainage plan approved the following comments need attention.

With regard to the plat the following comments apply:

1. In the notes on sheet 1 of 2 the note stating "Tract B to be used for access easement to lots 15 through 18"is incorrect. There is no longer a lot 18.

2. On the current print of the plat, tracts C, E & F are identified as drainage easements. Why are not all the easement tracts identified as such, since the note on the cover page states that they are for that purpose?

3. The name Don Juan Loop will not be allowed and it is hereby suggested that each segment be given a separate name.

On the most revised drainage plan, Pond "C" has been eliminated and yet provisions have been made by valley gutter to direct water into this area. Where does the water go from there? Also, the pipe outlet for Pond "B" has been deleted.

Should you have any questions concerning this review, please feel free to contact me.

Yours truly,

Billy J. Goolsby P.E.

Billy J. Goolsby, P.E.
Civil Engineer/Hydrology

BJG/tsl

AN EQUAL OPPORTUNITY EMPLOYER

ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers
149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S.

612-09 & 90

September 19, 1983

Mr. Fred Aguirre
City Engineering
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

SUBJECT: THOMAS VILLAGE PATIO HOMES SITE IMPROVEMENTS

Dear Mr. Aguirre:

Enclosed are two (2) copies of the revised drainage report for subject project as per your request.

Very truly yours,

ROBERT S. FOGLESONG, P.E.

mt-319

Enclosures (2)

cc: Mr. Jeff Leslie (w/enclosure)

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SEP 26 1983
ENGINEERING

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

G12 - D9A

April 29, 1983

Mr. John Robert
Andrews, Asbury & Robert
149 Jackson N.E.
Albuquerque, N.M. 87108

RE: THOMAS VILLAGE PATIO HOMES DRAINAGE REPORT

Dear John:

Following are my comments in regards to the referenced drainage plan:

1. Page 4 - Interim Drainage Guidelines are no longer in affect due to the adoption of the Drainage Ordinance. "Downstream Capacity" is the governing criteria.

2. Page 6 - Erosion Control Plan: We are working very hard at "educating" the contractors regarding erosion control during the construction phase. I would appreciate a note being placed on the plans stating that the contractor will be responsible for ensuring that sediment migration during construction is controlled.

3. Sheets 20-22/35 and 1A and 9A: Would a type "D" inlet with an orifice plate to restrict flows be more economical than the proposed scheme?

4. Due to the minimal grades across the pond bottom, would a low flow channel be appropriate? We have found that this cuts down on the runoff "pooling", thus reducing maintenance of the pond.

5. It is alright with me to eliminate pond C since the soils report states on page 5 that "all ponding should be kept a minimum of 15 feet from all building exterior walls".

6. The note on the plat regarding maintenance of the ponds appears appropriate.

7. Is this project going to be phased, or will build-out be all at once?

8. Good work on analyzing street/rundown capacities and the existing storm sewer condition in Rio Grande Blvd.

9. Financial guarantees for the storm drainage improvements will be required.

I'm pleased with the concept you've proposed for the subdivision. It is an improvement on the drainage schemes utilized in other parts of Thomas Village.

Please call if you have any questions.

Very truly yours,

Brian G. Burnett
Civil Engineer/Hydrology

BGB/tsl

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

G12 - D9A

April 29, 1983

Mr. John Robert
Andrews, Asbury, Robert
149 Jackson N.E.
Albuquerque, N.M. 87108

RE: THOMAS VILLAGE PATIO HOMES DRAINAGE REPORT

Dear John:

The referenced report is approved in concept. A detailed review is forthcoming. This letter will permit you to submit the construction plan set to City Engineering for the normal review procedure. Plat signatures will be withheld until the drainage report is approved.

If you have any questions, please call.

Very truly yours,

Brian G. Burnett
Civil Engineer/Hydrology

BGB/tsl

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

April 7, 1983

Mr. Bill Moore
5001 Edith Blvd. N.E.
Albuquerque, N.M. 87107

Dear Mr. Moore:

Per our conversation of April 6, 1983, this letter is to notify you that a drainage plan will not be required prior to submitting a plat for the subdivision of land between Edith Blvd. and the A.T. & S.F. Railroad Right-of-Way (Zone Atlas Page F-15). To obtain signatures, the plat must be brought before the Development Review Board (DRB). The Planning Department (766-7422) can answer any questions you may have about this procedure.

Enclosed is page F-15 taken from the Master Drainage Study which indicates flooding on your property. Mr. Andre Houle, Flood Plain Administrator, should be contacted at 766-7644 to discuss requirements for development.

Please call me if you have any questions.

Very truly yours,

Brian G. Burnett
Civil Engineer/Hydrology

BGB/tsl

cc: Andre Houle, Hydrology Section

ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers
149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S.

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APR 06 1983
ENGINEERING

April 6, 1983

Brian Burnett
Civil Engineer/Hydrology
City Engineering
City of Albuquerque
Post Office Box 1293
Albuquerque, New Mexico 87103

SUBJECT: THOMAS VILLAGE PATIO HOMES

Dear Mr. Burnett:

Enclosed are two (2) copies of the Drainage Report for the subject project together with the complete zoning history and a copy of the soils investigation.

We trust that this data will provide you with the information needed to make a timely approval of the Drainge Report.

If you have any questions, please don't hesitate to call.

Very truly yours,

Robert S. Foglesong

ROBERT S. FOGLESONG, P.E. & L.S.

mt-319

Enclosures

RECEIVED

APR 07 1983

ENGINEERING

INFORMATION SHEET

PROJECT TITLE THOMAS VILLAGE PATIO HOMES TYPE OF SUBMITTAL DRAINAGE REPORT

ZONE ATLAS PAGE NO. G-12-Dga CITY ADDRESS N/A

LEGAL DESCRIPTION TRACT A, THOMAS VILLAGE PATIO HOMES (filed October 12, 1982)

ENGINEERING FIRM ANDREWS, ASBURY & ROBERT INC CONTACT JOHN ROBERT

ADDRESS 149 JACKSON NE PHONE 265-6631

OWNER HOME PLANNING DEVELOPMENT COMPANY CONTACT JEFF LESLIE

ADDRESS 5620 EUBANK NE PHONE 296-5451

ARCHITECT BARKER-BOL & ASSOCIATES CONTACT H. L. BARKER

ADDRESS 209 GOLD SW PHONE 842-6789

SURVEYOR ANDREWS, ASBURY & ROBERT, INC. CONTACT GAYLE JEWELL

ADDRESS 149 JACKSON NE PHONE 265-6631

CONTRACTOR N/A CONTACT

ADDRESS PHONE

DATE SUBMITTED April 6, 1983

BY ANDREWS, ASBURY & ROBERT, INC.

To Fred for filing

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

August 23, 1982

Mr. Dave Millikan
Bohannan-Huston, Inc.
4125 Carlisle N.E.
Albuquerque, N.M. 87107

RE: THOMAS VILLAGE CONCEPTUAL GRADING AND DRAINAGE PLAN

Dear Dave:

The referenced drainage plan is approved by this office. Because of the sensitive nature of drainage in the area, a drainage report will be required for review and approval prior to construction plan submittal.

Very truly yours,

Brian G. Burnett
Civil Engineer/Hydrology

BGB/tsl

G12-D9

May 28, 1982

BOHANNAN-HUSTON INC.

4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000
6713 VISCOUNT BLVD., EL PASO, TEXAS 79925 915 778-4491
330 GARFIELD, SANTA FE, NEW MEXICO 87501 505 984-7601

Mr. Charles M. Easterling
Principal Assistant City Engineer
Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

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AUG 05 1982
ENGINEERING

Re: Proposed Patio Home Development at Thomas Village

Dear Chuck:

This letter is intended to serve as the conceptual grading and drainage plan for the proposed patio home development at Thomas Village. The site is located along the north side of Don Quixote Drive. It is located within the area indicated on Zone Atlas Map G-12 (see vicinity map).

The site generally slopes from the northwest corner to the southeast corner at approximately 0.4%. The soils are classified as stratified loams and sandy loams by the "Soil Survey of Bernalillo County and parts of Sandoval and Valencia Counties, New Mexico." This soil is classified as belonging to hydrologic soil type "B".

The site is not indicated as being located within any flood hazard areas by the Albuquerque Master Drainage Study.

The site has an irrigation ditch which runs along the outside of its westerly boundary. It also has a seven-foot wide easement within its northerly boundary for irrigation.

There are no upland flows which impact the site. The flows from all of the adjacent lands are either intercepted by the irrigation ditches or drain away from this parcel (see enclosures).

Under present conditions, approximately 9.5 cfs is discharged from the site along its easterly boundary and at its southeast corner due to a 100-year storm (see enclosures).

The proposed development consists of approximately 80 patio homes with a central open space and recreation area. Development of the site with uncontrolled discharge would increase the peak flow rate to 21.0 cfs. In accordance with the Interim Drainage Guidelines, we propose that the runoff from the site be detained with an allowable discharge equivalent to the undeveloped peak during a 1-year storm.

PRINCIPALS
JERRY R. BOHANNAN, P.E. & L.S.
LARRY W. HUSTON
DONALD T. CREMANS, P.E.
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The method of controlling on-site runoff consists of the construction of retention ponds in two areas and a large detention pond in the center of the development. Runoff will be conveyed overland to the appropriate ponds. All of the ponds will be maintained by the homeowners association. Detailed analysis of the required volumes for each pond are included in the enclosed material.

An 18" storm drain will be constructed from the pond outlet to the existing storm sewer in Rio Grande Boulevard. There is adequate elevation difference to maintain a slope of approximately 0.3% on the storm drain. The storm drain will be designed to limit the discharge from the pond to the 1-year undeveloped discharge rate from the site. This discharge rate is less than the 100-year undeveloped discharge rate from the site. Therefore, the required downstream capacity will be less than under existing conditions.

A drainage easement will be obtained from the landowner to the east to allow construction of this storm drain. The easement and storm drain will be dedicated to the City.

Detention and retention ponds on-site will minimize the amount of erosion due to development during construction and once the development is complete.

Overflow spillways will be provided for all of the ponds which result in discharge of flow rates up to the 100-year peak rate to the right-of-way of Don Quixote Drive in the event the capacity of the ponds becomes exceeded.

We believe this information and the enclosed drainage plates and computations should allow review of the proposed development. A detailed drainage report will be provided prior to development.

If you have any questions, do not hesitate to call Dave Millikan or me.

Sincerely yours,

Michial M. Emery

Michial M. Emery, P.E.
Vice President

Enclosures

cc: Mr. Jeff Leslie
Mr. Lawrence Kline
Mr. H. Barker

DMYM/cs
Job No. 2 064 0

Undeveloped Site

Average Slope = 0.4%
Average Velocity = 0.4 ft/sec
from Plate 22.2 B-1
Length from most remote point = 1000 ft
$T_c = \frac{1000}{0.4} \div 60 = 41.7$ min

$I_{100} = 2.2$ in/6 hr
from Plate 22.2 D-1
1 yr factor ≈ 0.350
$I_{/6} = 1.03$
from Plate 22.2 D-2
$I = 2.2 \times 1.03 \times 0.35 = .79$ in/hr
$C = 0.34$
from Plate 22.2 C-1
$Q = cIA = 0.34 \times 0.79 \times 12.35 = 3.3$ cfs

Undeveloped 1-yr Peak Flow Rate = 3.3 cfs.

$Q_{100} = 0.34 \times (1.03 \times 2.2) \times 12.35 = 9.5$ cfs

Undeveloped 100-yr Peak Flow Rate = 9.5 cfs

Developed Site

Area A

Area = 0.66 ac.
% Impervious = 60
C = .63
from Plate 22.2 C-1

Runoff Volume = 2.2in x .63 x .66 ac x $\frac{43560}{12}$

= 3320 ft³

Volume Provided:

Bottom Area = 20 x 100 = 2000
Top Area = 26 x 106 = 2756
Average = 2378
Depth = 1.5'
Volume provided = 1.5 x 2378 = 3567 ft³

Volume provided exceeds Runoff Volume

Area B

Area = 1.52 ac.
% Impervious = 40
C = 0.52
from Plate 22.2 C-1

Runoff Volume = 2.2 × 0.52 × 1.52 ac × $\frac{43560}{12}$

= 6312 ft^3

Volume Provided:

West Pond: Bottom Area = 10 × 90 = 900
Top Area = 18 × 100 = 1800
Average = 1350 sf
Depth = 1'
Volume Provided = 1350 ft^3

Next Pond: Bottom Area = 10 × 80 = 800
Top Area = 16 × 90 = 1440
Average = 1120 sf
Depth = 1'
Volume Provided = 1120 ft^3

Next Pond: Bottom Area = 10×160 = 1600
Top Area = 16×180 = 2880
Average = 2240
Depth = 1'
Volume Provided = 2240 ft³

East Pond: Same as Previous Pond
Volume Provided = 2240 ft³

Total Volume Provided Area B = 1350
1120
2240
2240
6950 ft³

Volume Provided exceeds Runoff Volume

Area C

Area = 8.66 ac.
% Impervious = 80
C = 0.76
From Plate 22.2C-1
Length from most remote point

70' @ 0.5% on roof	V=0.4	T=2.9
40' @ 2.0% on driveway	V=1.8	T=0.4
350' @ 0.5% on street	V=1.9	T=3.1
350' @ 0.5% on grass	V=0.4	T=14.6

Total time of Concentration = 21.0 min

$I_{100}/6 = 1.45$

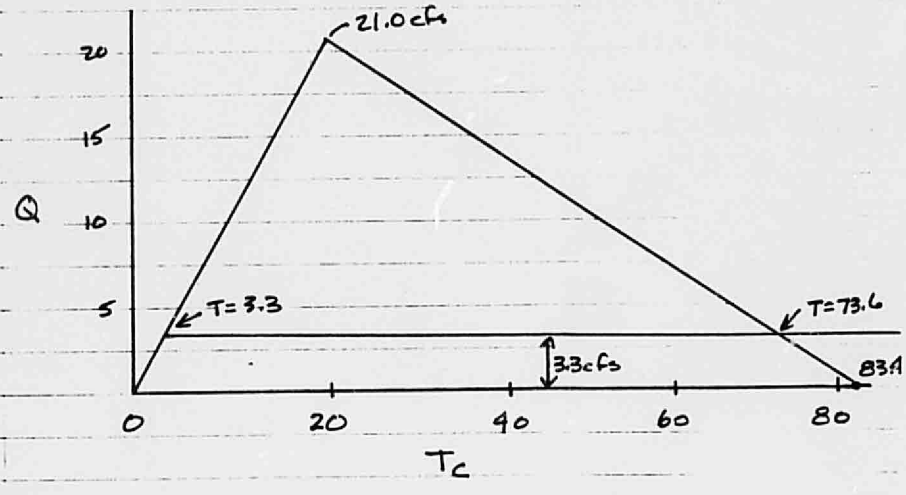
$I_{100} = 1.45 \times 2.2 = 3.19$ in/hr

$Q_{100} = CIA = .76 \times 3.19 \times 8.66 = 21.0$ cfs

Runoff Volume $= 0.76 \times 2.2 \times 8.66 \times \frac{43560}{12}$

$= 52,561$ ft^3

Discharge (allowable) = 3.3 cfs



Vol Req'd $= \frac{(21.0-3.3) \times (73.6-3.3)}{2} \times 60 = 37,329$ ft^3

Volume Provided: Bottom Area $= \frac{110+35}{2} \times 370$

$= 26285$ sf

Depth req'd $= \frac{37,329}{26,285} = 1.42'$

Depth req'd is less than 1.5'

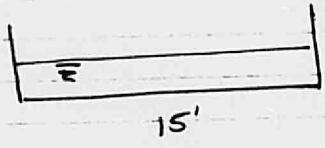
Therefore, a fence is not req'd.

Overflow weir computations

width = 15'
assume h = .7'
C = 3.0

$Q = 3.0 \times 15' \times (.7)^{3/2} = 26$ cfs
Q req'd = 21.0 cfs
Depth over weir < 0.7'

Normal depth in swale, s = .005, n = .030
Q = 21.0

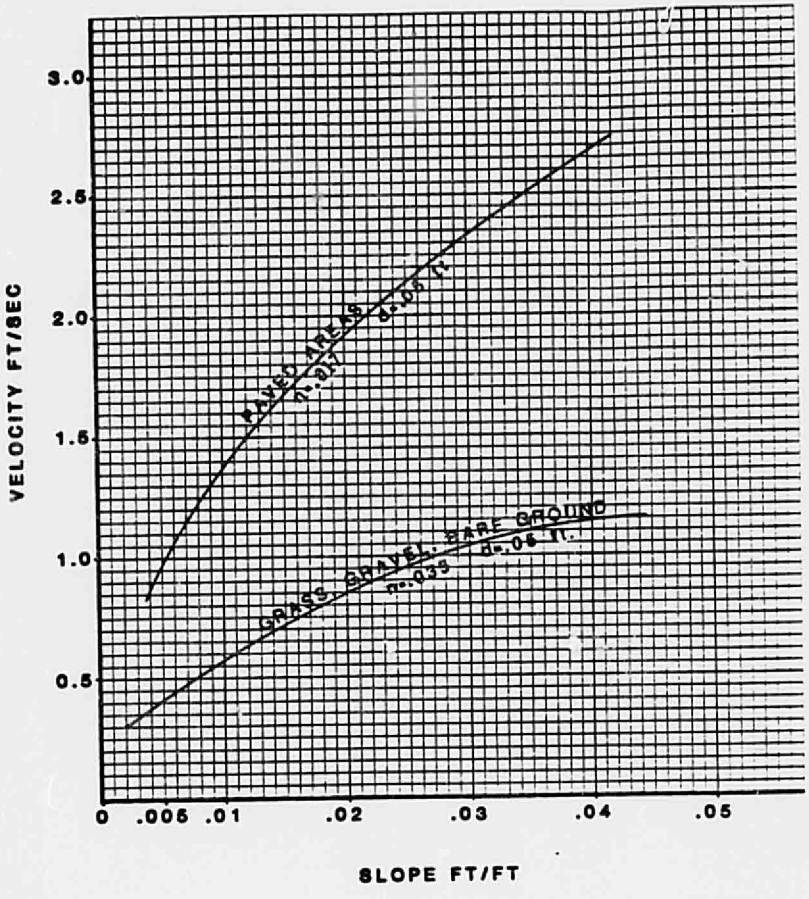


D = 0.6'
V = 2.4 fps

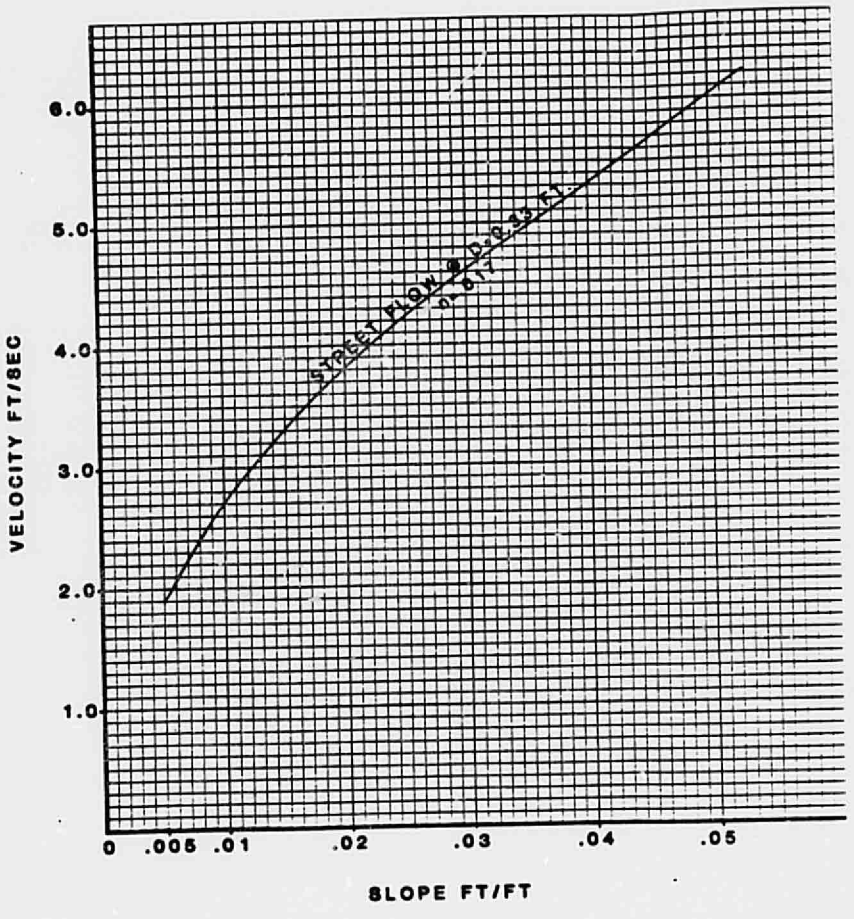
All units and garages shall be 0.7' min above swale ℄

OVERLAND FLOW SEGMENTS

Velocity Determinations for Tc Calculations



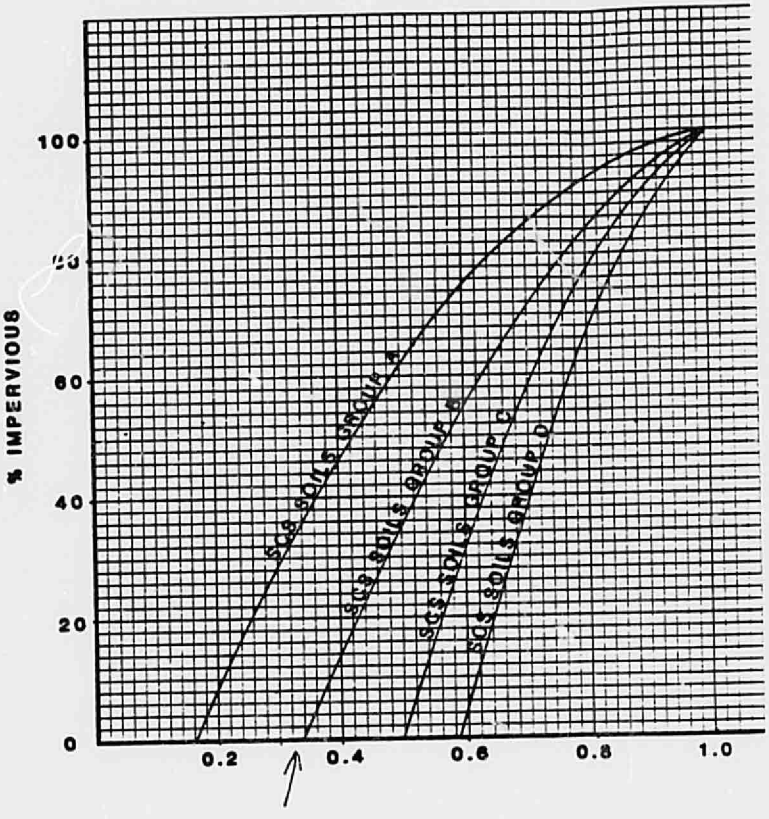
STREET FLOW SEGMENTS

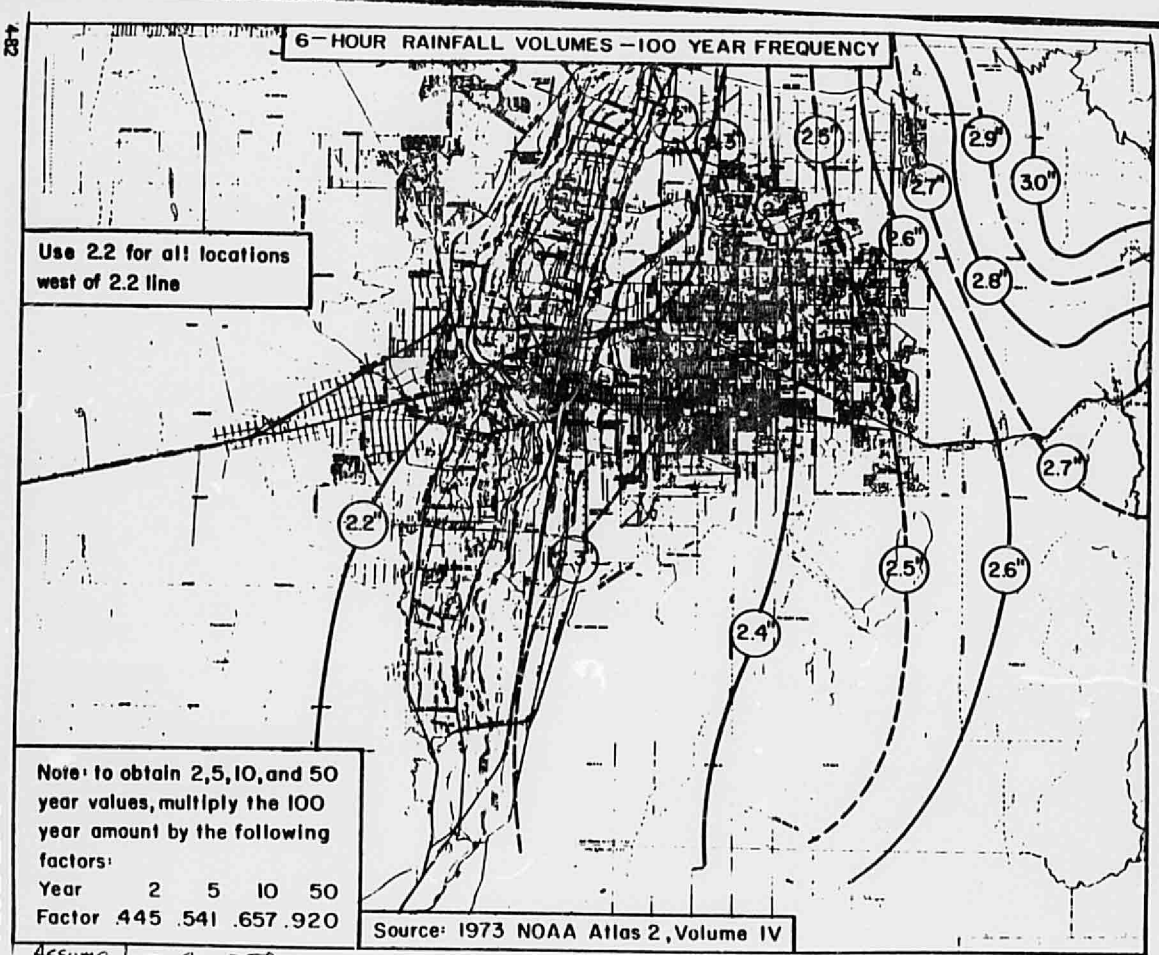


VELOCITY DETERMINATIONS FOR Tc CALCULATIONS

DRAINAGE CRITERIA

Determination of Rational Formula 'C' Factor



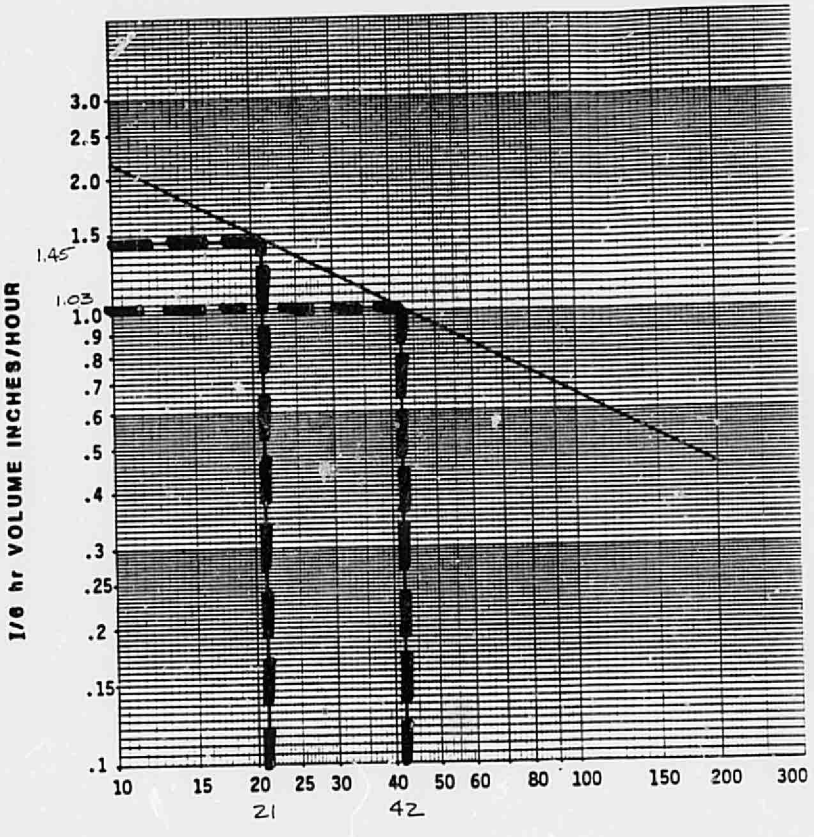


Assume 1yr ≈ .350

PLATE 22.2 D-1

DIMENSIONLESS RAINFALL INTENSITIES

$I = (6\text{-hr rain}) 6.84\ t_c^{-0.51}$



note: To get actual intensities, multiply rainfall volume from plate D-1 by value from curve. Use reduction factors on Plate D-1 for other than 100-yr.