DRAINAGE REPORT

FOR

TODD NO. 2 SUBDIVISION

AUGUST, 1974

PREPARED FOR:

HOME PLANNING AND DEVELOPMENT CORPORATION
4010 CARLISLE BLVD NE
SUITE D
ALBUQUERQUE, NEW MEXICO

BY

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ALBUQUERQUE, NEW MEXICO 87107

Michial M. Emery
Chief Engineer

This report covers only the hydraulic performance of the subdivision. If the concepts presented in this report are strictly followed, the flows resulting from a 100 year storm falling on the Todd No. 2 Subdivision, which leave the subdivision shall not be increased in flow rate or volume due to the planned development, no other claim or guarantee is made or implied by this report.

Structural details presented in this report are for illustrative purposes only and Bohannan Westman Huston & Associtates makes no claims or guarantees as to the soundness or adequacy of this information.

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PURPOSE AND SCOPE

The purpose and scope of this report is to determine the quantity of runoff and a suitable method for handling the runoff resulting from a 100 Year Frequency Storm falling on Todd No. 2 Subdivision.

LOCATION AND TERRAIN

The Todd No. 2 Subdivision is located on the mesa east of Tramway Boulevard and north of the proposed extension to Lomas Boulevard. The slopes on this part of the east mesa are in the six (6) to nine (9) percent range and the soils are mainly granular decomposed granite.

PROPOSED DEVELOPMENT

The Todd No. 2 Subdivision will be developed as R-1 single family residences following the guidelines set forth by the Albuquerque Metropolitan Arroyo Flood Control Authority. Streets will be constructed to form central drainage channels and retention of fifty (50) percent of the water falling on each lot will be required.

Streets will traverse the natural grades at slopes that are greatly reduced from those running perpendicular to the

contours. The reduced grades on the streets slow the run-off velocity and increase the time of concentration for the runoff. This reduces the flow rates of the runoff substantially.

Retention of fifty (50) percent of the water falling on each lot will be implemented by grading the back yards flat and building fences around the back part of the lots.* With this arrangement, half of the water falling on each lot will not contribute to the runoff.

The development of Todd No. 2 is planned to take place in two (2) or more phases. Areas F and G (see map in back of this report) will not be developed initially, while the other areas are scheduled for development in the near future.

Water falling on Area F will be picked up by Monte Largo Drive and carried to Michael Hughes Drive. Michael Hughes Drive will then carry the water to Sasebo Street where it will flow towards Lomas Boulevard. Approximately 150' north of Lomas, the 63 cfs from Areas C and F will be picked up by a large drop inlet, that extends across the entire width of the street, and carried by a storm drain to the earth channel on the south side of Lomas Boulevard. As a back up to provide drainage of the area in case the drop inlet should malfunction, a paved alley will carry water which is deeper than three-tenths (.3) feet at the grate to a drainage easement and then to Lomas Boulevard.

*Soils in this area tend to loose their bearing strength when saturated. Because of this the recommendations in the soils report must be strictly adhered to, to avoid structural failures.

The 13 cfs from Area E will be drained by Parson's Street into drop inlets located approximately 150' north of Lomas Boulevard. The water entering these drop inlets will flow through a storm drain system under Lomas to the earth channel bordering the south side of Lomas. A small drainage easement will be provided here as it was in Area C to provide drainage of the area in case of failure of the storm drain inlet. This drainage easement will carry the water that is over two-tenths (.2') of a foot over the drop inlet.

The earth channel bordering Lomas Boulevard on the south will initially carry most of the storm flows from the Todd No. 2 Subdivision down the dedicated and platted drainage right-of-way that extends west adjacent to the Cuidad Vista Development. After construction of the proposed Lomas Dam, this channel will be tied into the outlet channel for that dam.

At the upper end of Lomas Boulevard, just beyond the termination of paving, a temporary block will be graded to divert water from the areas above Todd No. 2 into the natural arroyo systems to the south. This will greatly reduce the flows on Lomas Boulevard.

Present plans call for extending Lomas past this point sometime in the future. When Lomas is extended, the water block should be removed and replaced with a large drop inlet across the entire width of the street. Water from this drop inlet will be conducted into the arroyo system to the south or ponded behind the Lomas Dam if the dam has been completed by that time.

Areas that will not be drained into this channel are A, B, D and G. Water from these areas will be carried away from Todd No. 2 by streets.

Runoff from Area G will be collected in the southwest corner of the area and transported down the west side of Area A in a small ditch down the drainage and utility easement. At the southwest corner of A the ditch will tie into a drainage easement coming from the interior of A. The flows will join here and flow onto Durant Avenue.

Area G, a proposed school site, and Area F, a future residential area; will not be developed immediately but once they are developed, on-site ponding for some of the storm water falling on them must be provided. This retention must be arranged so that the combined runoff rate does not exceed 59 cfs and volume does not exceed 3.67 acre feet. With these upper limits for runoff rate and volume set, the total runoff rate and volume from Todd No. 2 will not change due to development.

HYDRAULIC ANALYSIS

A One Hundred Year Frequency Rain was used in conjunction with the rational method to compute the flow rate of storm water runoff originating in Todd No. 2 and a One Hundred Year, six-hour rain was used to compute the volume of the runoff. These flows and volumes were computed for both the developed and undeveloped conditions. To implement the use of the rational formula data was obtained from each of the seven (7) areas comprising Todd No. 2. The data was

taken from the contour map attached in the back of this report. A table of the data and the results of the Hydraulic Analysis is presented in the back of this report.

CONCLUSIONS

The runoff rates and volume of flows resulting from a 100 Year Storm falling on the Todd No. 2 Subdivision do not change due to the development of the area. This is accomplished by retaining 50% of the water falling on each lot and by careful layout of streets and lot lines.* Since the runoff rates and volumes do not change, the criterion for handling storm drainage in a subdivision set by the Albuquerque Metropolitan Arroyo Flood Control Authority are met.

*The soils investigation in this area indicates that very serious structural problems may result if water is indiscriminately ponded on the lots. For safe implementation of the ponding concept, the recommendations in the soils report must be adhered to in the strictest manner.

HYDRAULIC DATA

AREA	ACRES	UNDEVELOPED Q(cfs)	UNDEVELOPED Vol(ac-ft)	DEVELOPED Q(cfs)	DEVELOPED Vol(ac-ft)
A	9.61	16	1.04	15	.94
B	4.19	7	.45	9	.50
C	20.71	33	2.24	28	2.23
D	.60	1	.06	1	.06
E	7.65	12	.83	13	.82
F	20.21	30	2.19	31*	2.25*
G	13.34	25	1.45	27*	1.46*
Total	76.31	124	8.26	124	8.26

*Proposed Upper Limits

SAMPLE CALCULATIONS

The run-off calculations were made using the rational formula. The time of concentration used in the calculations was found by the following empirical formula.

$$TC = \text{Log}^{-1}[.3641(B) + .3854\ \text{Log}(L) - .197\ \text{Log}(S) - .3613]$$

where L = Distance to furthest point in the basin in feet.

S = Average slope of the basin in percent.

B = Ground factor.

Paved = .77

Bare Soil = 1.52

Poor Grass Surface = 1.84

Average Grass Surface = 2.16

Dense Grass Surface = 2.57

TC = Time of concentration.

AREA A

Undeveloped Run-off

Area (A)	9.61
Length of Area	880 ft.
Ground Factor	1.84
Average Slope	7.16%

Time of Concentration (TC)

$TC = \text{Log}^{-1}[.3641(1.84) + .3854 \text{ Log}(880) - .197 \text{ Log}(7.16) - .3613]$

$TC = \text{Log}^{-1}[.3641(1.84) + .3854(2.94) - .197(.855) - .3613]$

$TC = \text{Log}^{-1}[1.275] = 18.8$ min.

Intensity* (I)	4.2 in/hr
Run-off Coefficient (C)	.40
Q = AIC	16.1
Total Rainfall (TR)	3.0 in.
Volume = (A)(C)(TR)/(12)	.916 acre-feet

*Master Plan of Drainage, City of Albuquerque, New Mexico

Developed Run-off

The run-off from developed land was established by first determining the composite ground factor and run-off coefficient then using the rational formula to determine the flows.

Effective Area = Total Area - Retention Area

Bn = Area weighted ground factor

Bn = (B for surface) (Area of surface)/(Effective area)

Composite Ground Factor = $\sum_{n=1}^{\text{Total}} Bn$

Cn = Area weighted run-off coefficient

Cn = (C for surface) (Area of surface)/(Effective area)

Composite run-off coefficient = $\sum_{n=1}^{\text{Total}} Cn$

Type of Cover	n	Area	B	Bn	C	Cn
Streets	1	1.63	.77	.194	.95	.240
Houses	2	1.69	.77	.201	.95	.248
Lawns	3	3.14	2.57	1.250	.20	.097
Total		6.46		1.645		.585

Effective Area (A')*	6.46
Length of Area	1170
Ground Factor	1.645
Average Slope	4.70%
Time of Concentration	19.3 min.
Intensity** (I)	4.0
Run-off Coefficient	.585
Q = AIC	15.10
Total Rainfall (TR)	3.00
Volume = (A')(C) (TR)/12	.94

*The water from 3.15 acres will be retained on site.

**Master Plan of Drainage, City of Albuquerque, New Mexico

Channel Design

Flow from Todd No. 2	C, E, F	73 cfs
Flow from Eastern Drainage Area		1,444 cfs
Total Flow		1,517 cfs

Channel

Bottom Width	128	feet
Side Slopes	2:1 Lomas Side	4:1 Other Side
Water Depth	1.65	feet
Area	219.37	ft^2
Hydraulic Radius	1.584	
Slope	.0148	ft/ft max.*
n = Mannings No.	.035	

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

$$Q = (219.37)\ \frac{1.486}{.035}\ (1.584)^{2/3}\ (0.148)^{1/2} = 1539 \text{ cfs}$$

Velocity = 7.0 ft/sec.

Make channel 2 feet deep.

*Slope of channel is controlled by placement of concrete erosion checks.

NOTES:

1.) Any Additional Retaining Walls needed to comply with MPS Lot Grading shall be added even though not shown on this plan.

2.) Lot Grading submitted with each lot shall comply strictly with MPS Lot Grading.

NEIGHBORHOOD GRADING PLAN

Date / Revision: Elevations Lots 1, 8 & 9 Block 7

Project No.

Seal

TODD # 2 SUBDIVISION

ALBUQUERQUE, NEW MEXICO

Job No. 74-215 | Sheet 14 Of 17

Drawn By: JF, AC, KW | Date: MARCH, 1975

Checked By: RRG | Scale: 1" = 50'

HUSTON

Install 5' High Screen Wall

Install 5' High Screen Wall

Install 5' High Screen Wall

MONTE LARGO DRIVE

WITCHER AVENUE

CHIHUAHUA AVENUE

DURANT AVENUE

MICHAEL DRIVE

HUGHES DRIVE

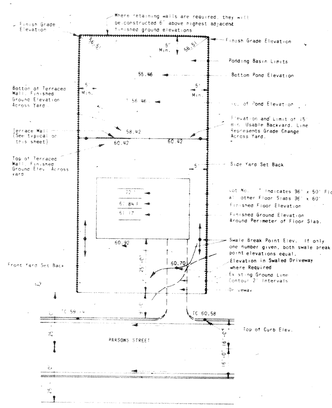
STUTZ DRIVE

KNIGHT DRIVE

10' Drainage Channel (See Plan & Profile Sheet 13 and Detail Sheet 10.)

Match Existing Channel @ 5828.80

Construct 4" apron slab from bottom of drainage channel to retaining wall



TYPICAL LOT LEGEND

NO SCALE

LEGEND

- EXISTING BLOCK WALL
- 6" HIGH BLOCK GARDEN WALL
- RETAINING WALL
- BACKYARD TERRACE WALL
- EXISTING CONTOURS
- POND LIMITS AND LOCATION
- T65.08 POND TOP ELEVATION
- 44.08 POND BOTTOM ELEVATION
- 70.00' LOT DIMENSIONS

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Project No.

Seal

TODD # 2 SUBDIVISION

ALBUQUERQUE, NEW MEXICO

Job No. 74-215	Sheet 15 Of 17
Drawn By: JF AC, KW	Date: MARCH, 1975
Checked By: RRG	Scale: 1" = 50'

Date Revision

Engineers Surveyors 5651 Indian Blvd. N.E.

BOHANNAN HUSTON

MONTE LARGO DRIVE

PRUITT DRIVE

MICHAEL DRIVE

HUGHES DRIVE

BOULEVARD

CONNER COURT

COURT

Install 5' High Screen Wall

Install 5' High Screen Wall

Install 5' High Screen Wall

5900

5910

5920

5880

5890

LEGEND

▬ ▬ ▬	EXISTING BLOCK WALL
▬ ▬ ▬	6" HIGH BLOCK GARDEN WALL
▪▪▪▪▪	RETAINING WALL
·····	BACKYARD TERRACE WALL
~ ~ ~	EXISTING CONTOURS
	POND LIMITS AND LOCATION
T 65.08	POND TOP ELEVATION
64.08	POND BOTTOM ELEVATION
70.00'	LOT DIMENSION

NOTES:

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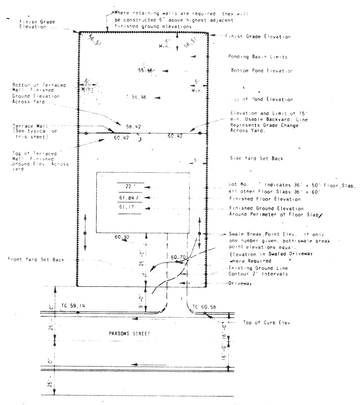

TYPICAL LOT LEGEND

NO SCALE

NEIGHBORHOOD GRADING PLAN

TODD # 2 SUBDIVISION

ALBUQUERQUE, NEW MEXICO

Job No. 74-215	Sheet 16 Of 17
Drawn By: JF, AC, KW	Date: MARCH, 1975
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Project No.

Seal

TOMMASINI WESTMAN HUSTON