CHAMBERS • CAMPBELL • ISAACSON • CHAPLIN, INC.
3500 INDIAN SCHOOL RD., N.E. / ALBUQUERQUE, NEW MEXICO 87106 / PHONE (505) 266-5521

May 14, 1976

RECEIVED
MAY 17 1976
CITY ENGINEERS

Mr. Kleston Laws
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

REFERENCE: Brentwood Hills Subdivision, Lots 1, 26 - 37
Drainage Report

Dear Mr. Laws:

Attached herewith please find two (2) copies of the above referenced report with the revision you requested. It appears impractical to drain any of the dry well/ponding basin to the swale at the rear of the lots, so the basin has been made large enough to contain flows from Area C (previously A2) as well as flows from Area B. We hope this revision meets with your approval.

Please contact us if there are any further questions.

Sincerely yours,

Kent M. Whitman

Kent M. Whitman
Engineering Department

KMW:dd
Attachment

cc: Mr. Ray A. Trujillo

CHAMBERS • CAMPBELL • ISAACSON • CHAPLIN, INC.
3500 INDIAN SCHOOL RD. N.E. / ALBUQUERQUE, NEW MEXICO 87106 / PHONE (505) 266-5521

April 23, 1976

RECEIVED
APR 27 1976
CITY ENGINEERS

Mr. Kleston Laws
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Dear Mr. Laws:

Enclosed herewith are two (2) copies of the drainage report for Brentwood Hills Subdivision, Lots 1, 26-37. Please review the report at your leisure and notify us regarding its acceptability.

Thank you for your cooperation.

Sincerely yours,

Kent M. Whitman

Kent M. Whitman
Engineering Dept.

KMW:dd
Enclosures

cc: Mr. Ray Trujillo

H.G. PICKARD AND ASSOCIATES
BUILDERS/DEVELOPERS

October 16, 1975

Environmental Protection Commission
City of Albuquerque
Albuquerque, New Mexico

Attn: Chairman

Dear Sir,

This letter is in reference to "Requirements for Drainage" in the vicinity of Lots 8-14, Brentwood Hills Addition.

H. G. Pickard & Assoc., Inc., is proposing the following:

1. Elevation of the building in relation to the existing curb will ba a minimum of one (1) foot;

2. lots will drain to Chelwood by means of swailes in the land contour and gutters on the roofs of the units;

3. drainage for land on the rear side of said lots will drain away and to the east;

4. there is an existing storm sewer on Chelwood in front of the proposed area - therefore, we feel there is no reason to comply with other provisions in Resolution 1972-2;

5. Immediately to the north is an arroya (approx. 300 feet) and we feel drainage water will be in the arroya prior to any peak flow from the east; and, there is a gutter spout on the east side of Chelwood which flows into the storm sewer system and the arroya which the City has provided.

Thank you for your help and consideration on this matter.

Sincerely,

John Duffy
Architectural Design

2725 VERMONT, NE • ALBUQUERQUE, N.M. 87110 • (505) 293-7674

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

H-22

May 13, 1980

John Esquibel
A & C Engineering, Inc.
5823 Lomas Blvd., N.E.
Albuquerque, New Mexico 87110

Reference: Prospect Avenue & Tract X-1 of Brentwood Hills

Dear Mr. Esquibel:

The drainage report for the referenced development addresses the problem of the handling of the offsite flows in a satisfactory manner, but the analysis of the onsite flows is more superficial. The drainage report is therefore approved in concept, but the site grading plan to be submitted with the construction plans must furnish more details for the onsite handling of the runoff; more particularly, the plans must show the proposed means to prevent adverse consequences to the existing development to the west. The runoff in the swale must not overflow the sidewalk and better details must be provided on the site grading plan for the mode of collection and conveyance of the detained runoff to the proposed 8" diameter pipe.

If you have any questions concerning the above, please don't hesitate to contact my office.

Very truly yours,

Bruno Conegliano
Assistant City Engineer

BC/lc
xc: Richard Heller, City Engineer
Richard Leonard, AMAFCA
Fred Aguirre, Civil Engineer

December 23, 1963

Mr. Roy S. Walker, Director
Federal Housing Administration
625 Truman St. N.E.
Albuquerque, New Mexico

Attn: Mr. Jack Winkler
Sub: Preliminary Drainage Report for Blocks 102-105, 110, and a Portion of 106 & of Brentwood Hills Subdivision, Albuquerque, New Mex.

Dear Mr. Walker:

The following storm water drainage report for the subject subdivision under the sponsorship of Roberson Construction Company, Inc. is hereby submitted for your consideration:

Reference drawings or maps attached:

1. A general location map showing the subdivision and the watershed contributing to the subdivision. This map was compiled by piecing together appropriate sections of U. S. G. S. quadrangle maps. Scale 1" = 2000' with a contour interval of 10' in the subdivision and of 40' in the mountainous area east of the subdivision.

2. A recorded plat of the subdivision upon which the existing contours have been superimposed. Scale: 1" = 100' with a contour interval of 5'.

Computation of Runoff:

The Rational Formula, Q = CIA in which Q is the runoff in cubic feet per second, I is the rainfall intensity in inches per hour, A is the contributing drainage area in acres, and C is the coefficient of runoff, was used to compute maximum flow at various critical points. The rainfall intensity was obtained from the U. S. Weather Bureau Paper No. 25, "Rainfall Intensity, Duration Frequency Curves", using the 50 year storm for the Albuquerque area. C was assigned the value of 0.50 in this study. Mannings Formula, Q = A 1.486/ n R ⅔ S ½, in which Q is the capacity of the section in cubic feet per second, A is the area of the section in square feet.

Computation of Runoff Continued:

C is the coefficient of roughness, R is the hydraulic radius, and S is the average slope expressed in feet per foot, was used to determine the hydraulic capacities of the streets and the channel immediately south of the subdivision. For the purposes of this study n was assigned the value of 0.015 for paved sections and 0.030 for the earth channel.

Off-Site Drainage:

Two distinct areas contribute storm water runoff to the vicinity of or into the subdivision. These are marked on the location map as area "A" and area "B".

Area "A" contains 350 acres, is about 12,000' in length, roughly 1,500' wide, and is channeled into a ditch northeast of Brentwood Hills which discharges into Chelwood Road which in turn is relieved by the drainage channel south of and adjacent to the subdivision. A 50 year storm center over area "A" could produce a runoff of 190 cfs.

Area "B" contains 1150 acres, is also about 1200' in length, has an average width of about 4000', and empties into the drainage channel south of the subdivision. A 50 year storm centered over area "B" could produce a runoff of 855 cfs.

Candelaria Road slopes to the east to Chelwood Road from a high point approximately 100' west of the intersection preventing storm water runoff from flowing west on Candelaria. Candelaria intercepts about 38 acres of drainage from Holiday Park Subdivision (the subdivision on the north side) producing a maximum flow of 45 cfs. The hydraulic capacity of Candelaria through this reach is on the order of 195 cfs (S= 0.0275). Therefore there is no possibility of Candelaria contributing runoff to the subdivision.

Off-Site Drainage Continued:

Thus, it is seen that all off site runoff is channeled into the drainage channel south of the subdivision. This channel has been graded to some extent and has a minimum section of 70' with approximately 3:1 side slopes and a minimum depth (with respect to Brentwood Hills Subdivision) of 4'. This implies a hydraulic capacity of somewhat more than 4,000 cfs. (s= 0.028). The channel is only required to carry 1250 cfs so a large built in safety factor exists.

Drainage within The Subdivision:

The total acreage contributing storm water runoff at each intersection within the subdivision is shown on the attached plat. The maximum concentration is 25.9 acres at the westerly end of Lexington Avenue. The hydraulic capacity of Lexington at this point is 125 cfs. (S=0.028 and a 32' paved section) Since the maximum flow could occur as a result of a 50 year storm is 90 CFS there is no possibility of the capability of the street being exceeded.

Drainage Outlet:

Construction of Brentwood Hills Subdivision will not alter the established storm water runoff pattern. The City of Albuquerque has constructed a drainage structure at the point where the drainage channel south of the subdivision crosses Juan Tabo Road. The section of this structure is presumably adequate.

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT

Conclusions And Recommendations:

While it has been demonstrated that storm water runoff drainage imposes no problem in Brentwood Hills Subdivision it is recommended that the following measures be incorporated in the final design.

1. The arroyo south of the subdivision be channelized to an uniform section and depth with a constant grade throughout the length of the subdivision.
2. Houses facing on Lexington Avenue (backing to the channel) should be sited at a minimum of 4' above the bed of the arroyo as it now exists.
3. The elevations of the pads upon which homes are to be constructed on the south side of Lexington at the intersection of Tahiti should be a minimum of 2' above the curb. House pads at the other "tee" intersections should be a minimum of 18" above the curb.
4. Streets joining Candelaria should have a minimum fall to the north of 2" from the property line as projected into the streets. While this fall is adverse to the topography it should pose only a small problem since the distance over which it is accomplished is very short. This water block will prevent any water entering the subdivision from Candelaria.

If we may be of further assistance or should you require additional information in this regard please let us know.

Signed: John G. Leverton
P.E. & L.S. No. 1824
State of New Mexico

DRAINAGE REPORT

FOR

BRENTWOOD HILLS SUBDIVISION

LOTS 1, 26 - 37

PREPARED FOR

FERNANDEZ & TRUJILLO, ARCHITECTS

BY

CHAMBERS, CAMPBELL, ISAACSON & CHAPLIN, INC.

MAY 1976

DRAINAGE REPORT

FOR

BRENTWOOD HILLS SUBDIVISION

LOTS 1, 26-37

PREPARED FOR

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BY

CHAMBERS, CAMPBELL, ISAACSON & CHAPLIN, INC.

MAY 1976

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PLATE 1 - LOCATION MAP

PLATE 2 - DRAINAGE MAP

A) PURPOSE & SCOPE:

Brentwood Hills Subdivision, Lots 1, 26-37, is a proposed R-3 residential development composed of 13 lots, each containing one fourplex apartment building. The overall site contains approximately 2.5 acres, and lot dimensions are typically 64-1/2'x 128'. The purpose of this report is to present a plan for controlling surface runoff in a manner acceptable to the Albuquerque Metropolitan Arroyo Flood Control Authority and the Albuquerque City Engineer's Office. The plan presented will pertain to development of all 13 lots, however, only lots 26 through 28 are intended for immediate development.

B) SITE LOCATION & TOPOGRAPHY:

The subject property is located in northeast Albuquerque on the South side of Candelaria Road, between Nakomis Drive and Marie Park. (See Location Map, Plate I.) Ground topography is relatively steep sloping from east to west at an average rate of 7-1/2%.

C) DESIGN CRITERIA:

1) Engineering Parameters: For calculation of composite coefficients of runoff, the following values of "C" were taken for the indicated land coverages:

a) Streets, Roofs, Walks - 0.95

b) Lawns - 0.15

c) Southwestern Landscaping - 0.6

d) Natural Ground - 0.35

e) Bare Earth - 0.45

In addition, all runoff volume calculations have been based on a 100 year - 6 hour rainfall of 2.8" per AMAFCA requirements. Rate of runoff calculations have been based on the frequency - intensity - duration relationship for a 100 year storm as presented by Gordon Herkenhoff and Associates in their 1963 Master Plan of Drainage for the City of Albuquerque. This relationship is expressed by the following equation: $I = 189/(Tc+25)$ $(Tc<10$ min.)

2) Flood Control Regulations: The drainage plan presented in this report has been designed to comply with the 1972 AMAFCA Resolution in regard to rate and volume of runoff leaving the site. That Resolution has been interpreted to say that the rate and volume of runoff allowed to leave the site after development shall be no greater than the rate and volume running off prior to development.

D) COMPUTATIONAL PROCEDURES:

Appendix A contains samples of the various types of hydraulic calculations performed. Hydrological flow rate calculations are based on the rational runoff method. Estimates were made of percents of area covered by each coverage type described above in

Section C-1 for each drainage sub-area. A composite runoff coefficient was then calculated for each sub-area. Since the time of concentration for the entire site is undoubtedly less than 10 minutes, the maximum rainfall intensity of 5.4 in./hour applies to the entire site.

Volume calculations for determination of net volumes of discharge for the entire site in both natural and developed states were perfo med by multiplication of the applicable C factor times the 100 year - 6 hour rainfall (0.233') times the appropriate area to obtain cubic feet of water.

E) OFF-SITE DRAINAGE:

Off-site flows approaching the subject property as a whole are intercepted by Marie Park and Candelaria Road. Therefore, off-site flows should be of little consequence to the ultimate development of the entire 13 lot site. However, since Lots 26 through 29 which are intended for immediate development are located at the lower end of the site, a small amount of off-site drainage approaches these lots from Lots 29-31. (See Plate II.) This interim drainage can easily be intercepted by a small temporary earthen swale as shown on Plate II.

F) ON-SITE DRAINAGE:

Since each lot will ultimately contain the same improvements,

a drainage management plan has been devised for a typical lot, and this plan shall be applied to each lot. Plate II illustrates a typical lot broken down into three subareas. Area "A" will be allowed to drain off-site freely, while all drainage from areas "B" and "C" will be retained on site in a ponding basin/dry well combination. Since the grounds surrounding the structure will be sodded, the site will contain no bare earthen surfaces, and siltation of the dry well should not be a problem. Table 1 itemizes runoff volumes in the natural and developed states. As indicated in the table, the required ponding volume for the entire lot (685 cu. ft.) is less than the runoff volume from areas B and C (1010 cu. ft.), and therefore, the plan complies with AMAFCA regulations.

A small drainage channel has been indicated along the south lot lines to carry runoff from areas "A" into Nakomis Drive. The developer does not wish to dedicate the land for this channel to the City; however, the developer does agree to include restrictive covenants guaranteeing the continued functionability of the channel in any deed or deeds written to transfer title to any lot or lots in the subdivision.

G) SUMMARY OF RECOMMENDATIONS:

In conclusion, we make the following recommendations regarding drainage for the Brentwood Hills Subdivision, Lot 1, 26-37:

1) That lots be graded to drain as shown in Plate II.

2) That the ponding basin/dry well combination shown in Plate II be adopted for each lot.

3) That the temporary swale shown along the west lot line of Lot 29 be provided.

4) That the channel section shown as zz on Plate 2 be adopted for the indicated drainage easement.

TABLE I

VOLUME CALCULATIONS

(PER LOT)

Area Designation	Area (S.F.)	% Area Running Off @ .95	% Area Running Off @ .15	% Area Running Off @ .6	% Area Running Off @ .35	% Area Running Off @ .45	Composite C	* Natural Volume 100 Year 6 Hour Storm CU. FT.	Developed Volume 100 Year 6 Hour Storm CU. FT.	Required Ponding Volume CU. FT.
A	2550	53	42	0	0	5	.59	210	350	
C	1226	100	0	0	0	0	.95	100	270	
B	4480	67	26	0	0	7	.71	365	740	
					TOTALS			675	1360	685

*Natural volume based on C = 0.35

APPENDIX A

SAMPLE CALCULATIONS

1. **Composite C for Developed State - Area B**

Total Area = 4480 S.F.

Area Running Off @ 0.95 = 2995 S.F. = 67%
Area Running Off @ 0.45 = 315 S.F. = 7%
Area Running Off @ 0.15 = 1170 S.F. = 26%

C Composite = (0.95x.67)+(0.45x0.07)+(0.15x0.26)= 0.71

2. **Depth of Gravel - Dry Well**

Water Storage Required =1010 $ft.^3$
Volume of tetrahedron above gravel = 365 $ft.^3$
Required volume dry well =1010 - 365 = 645 $ft.^3$
Typical porosity gravel = 0.47
Required volume gravel = 645/0.47 =1372 $ft.^3$
Surface area gravel = 206 S.F.
Required Depth =1372/206 = 6.7 ft.

3 **Adequacy of Lot Line Swale**

Flow = 0.4 cfs
Slope= 2%
n = 0.03

Bottom Width = 0
Sideslopes = 14:1

From Manning $Q = \frac{A(1.49)(R)^{2/3}S^{1/2}}{n}$

Solving for depth, d = 0.15 ft. < 0.5 ft. O.K.

PLATE I
LOCATION MAP