HYDROLOGY G11/D12 ONE PLAN

G 11- D 12

1 PLAN

2 July 1976.

Leo S. Hunick
10014 - 4th St. NW
Albq NM

Re: West Wind Drainage Study.

Dear Mr. Hunick:

Some days ago I called to say the concept of the drainage report I had received was fine if it could be properly implemented. A grading plan will be required, showing implementation, prior to approval of a development plat.

If you have questions, please call

VTY
KHL

cc John Robert

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

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

February 18, 1977

Mr. John Garcia
Garcia-Marquez & Assoc.
2329T Wisconsin N.E.
Albuquerque, New Mexico 87110

SUBJECT: WESTWINDS DRAINAGE REPORT

Dear Mr. Garcia:

The drainage report dated January 20, 1977 has been reviewed and is approved.

Sincerely,

V. M. Kimmick
City Engineer

VMK/fs

cc: Jim Smith
Bob Kielich
Dwayne Sheppard
Drainage File

Public Works Department

Director — Erwin F. Hensch, P. E. 766-7467
Engineering 766-7441 — V. M. Kimmick, P. E.
Street Maint. 766-7755 — G. E. Paul, P. E.
Ass't. Director — Harold R. Orr, Jr. P. E.
Liquid Waste 766-7535 — R. P. Lowe, P. E.
Water 766-7437 — W. H. Otto, P. E.

AN EQUAL OPPORTUNITY EMPLOYER

LEVERTON ENGINEERING

4022-H RIO GRANDE BLVD., N.W.
ALBUQUERQUE, NEW MEXICO 87107
(505) 345-5479

December 29, 1978

RECEIVED
DEC 29 1978
CITY ENGINEERS

Mr. Bruno Conegliano
Assistant City Engineer, Hydrology
City of Albuquerque, New Mexico

Re: Drainage Report
West Winds Subdivision, CT-28-3
Albuquerque, New Mexico

Dear Mr. Conegliano;

Submitted herewith for your consideration and approval are two copies of our drainage report for the captioned subdivision.

Should the report require further exposition or clarification please let me know.

John Leverton

Attachments

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

MAYOR
David Rusk

February 21, 1979

Mr. John Leverton
Leverton Engineering
4022-H Rio Grande Blvd. N.W.
Albuquerque, N.M. 87107

G11-D12

Subject: Test Turnkey Work Authorization #T-41
West Winds Addition.

Dear Mr. Leverton:

Under the provisions of the Test Turnkey Project procedures, this letter is the Work Authorization to begin field work on the project.

Sincerely,

Richard S. Heller

Richard S. Heller
City Engineer

RSH/fs

cc - H. R. Orr
Kent Nowlin Construction, Inc.
Ray Dawson
Water Resources
Dwayne Sheppard
Bob Kielich
LaMonte Urban
Bruno Conegliano
Bill Mueller
Jim Milton, Traffic Engineering

Before

$L = 1400$ ft.

$A = 20$ Ac.

$h = 10'$

$T_c = 28$ min , $C = .3$

$i = 3.6$

$Q_b = C\,i\,A$

$= .3\,(3.6)(20$

$= 24$ cfs

After

$L = 1550$

$h = 8$

Area of streets = 3.35

Area of Lawn = 11.4

Area of roofs & driveways = 5.25

crown driveways so 66% of H_2O drains unto lawn

Grade all areas into flat terraces with 1 foot drops

Streets	3.35 (.8) =	2.68
Lawns	11.4 (.1) =	1.14
Roofs	5.25(.7) =	3.68
		7.50

Weighted $C = \frac{7.50}{20} = .37$

$Q_A = C\,i\,A$

$= .37\,(3.6)(20) = 27$ c.f.s.

A DRAINAGE REPORT

FOR

WESTWINDS

A SUBDIVISION ON THE WEST MESA AT

ALBUQUERQUE, NEW MEXICO

REGISTERED PROFESSIONAL ENGINEER
STATE OF
NO. 5859
NEW MEXICO
RICHARD E. NORTON

PREPARED FOR
LEO S. HUNICK

January 20, 1977

Mr. Leo S. Hunick
10014 4th Street N. W.
Albuquerque, New Mexico

Dear Mr. Hunick:

Transmitted herewith is the Drainage Study for "Westwind", your proposed development on th[illegible] mesa at Albuquerque, New Mexico.

If we can be of further assistance please feel free to contact us.

Sincerely,

R. L. Worden

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I PURPOSE OF THIS REPORT

The purpose of this report is to determine the existing drainage characteristics of the area involved and to make reccommandations for the disposal of storm drainage, after development, that will not endanger life or damage property.

II DESCRIPTION AND LOCATION

Westwinds Subdivision is a condeminium project Northeast of Albuquerque, New mexico, near the intersection of Atrisco and Coors Boulevard N. W.

III CLIMATE

Rainfall in the general Albuquerque area averages 8.6 inches per year with a coefficient of variation of 0.3 inches based on a 30 year period. Using the coefficient of .3 a maximum of 11.5 inches and a minimum of 5.8 inches can be anticipated. The average annual pan evaporation for the area is 90" with a computed lake evaporation of 64" . The potential evapotranspiration is listed as 48.2. The average Albuquerque relative humidity is 32%.

IV SOILS AND VEGETATION

The soils within the area are classified by the United States Soil Conservation Service as belonging to the "Bluepoint Caliza" and the "Wink-Mandurez..

The Bluepoint-Caliza consists of soils formed on alluvial fans and terrances adjacent to the Rio Grande flood plain. The soil consists of brown loamy fine sands with occassional gravel. The soil is permeable with ranges of less than 6 inches. It may contain varying ammounts of lime in the upper surfaces.

Wink-Mandurez soils are fine loamy sands over a clay loam subsoil. These soils have permeabilities from three to six inches per minute.

Present native vegatation consists of a good cover of grama and other grasses. There is a sprinkling of smokebrush, sagebrush chamisa and snakewood.

V. DRAINAGE CALCULATIONS

The ammount of runoff that will be generated by the project was determined by the Rational Formula.

The Rational Formula is as follows:

Q = C i A, where;

Q = Maximum rate of discharge in cubic feet per second due to an assumed 100 year frequency storm.

C = Coefficient of runoff; measure of losses due to varying infiltratation rates etc. For this development a C of .30 was used before development and a weighted C of .42 after development.

i = The intensity of rainfall in inches per hour based on a concentration time of 28 minutes.

A = The area of watershed in acres.

Drainage calculations before development.

L = 1400 feet

A = 20 acres

h = 9 feet

Tc = 28 minutes

C = .30

Q = C i A

= .30(3.6)(20)

= 24 cfs

It is proposed to grade the area into flat terraces with one foot drops as per map exhibit. All roofs will drain into the lawns and all driveways will be crowned to allow most of the water to drain into the lawns. Landscaping will play an important part in the drainage plan, particularly in maintaining the one foot drops to contain rainfall and prevent erosion. Street drainage areas were computed using the full right of way although the full width will not be paved. For this reason a coefficient of .9 was used for the streets. A coefficient of .7 was used for the roofs and driveways based on the assumption that they will drain into the lawns.

Drainage calculations after development are as follows;

Area of streets = 4.0 acres

Area of roofs and driveways = 5.2

Area of lawns = 10.8

Streets	4(.9) =	3.6
Lawns	10.8(.1) =	1.08
Roofs and driveways	5.2(.7) =	3.64

$$\text{Weighted } C = \frac{8.42}{20} = .42$$

$$Q = C\ i\ A$$
$$= .42(3.6)(20) = 30.3 \text{ cfs}$$

This water will eventually flow into Redlands street and the area southeast of the proposed development. This also the historical route of drainage flow.

CONCLUSIONS AND RECOMMENDATIONS :

It is recommended that the area be graded into flat terraces

with one foot drops. A one foot high landscaped berm should be constructed parallel to Ladera street on the west side of the proposed development to prevent the street from drain ing into the development. Careful landscaping on the terrace drops will tend to retain water and prevent erosion.

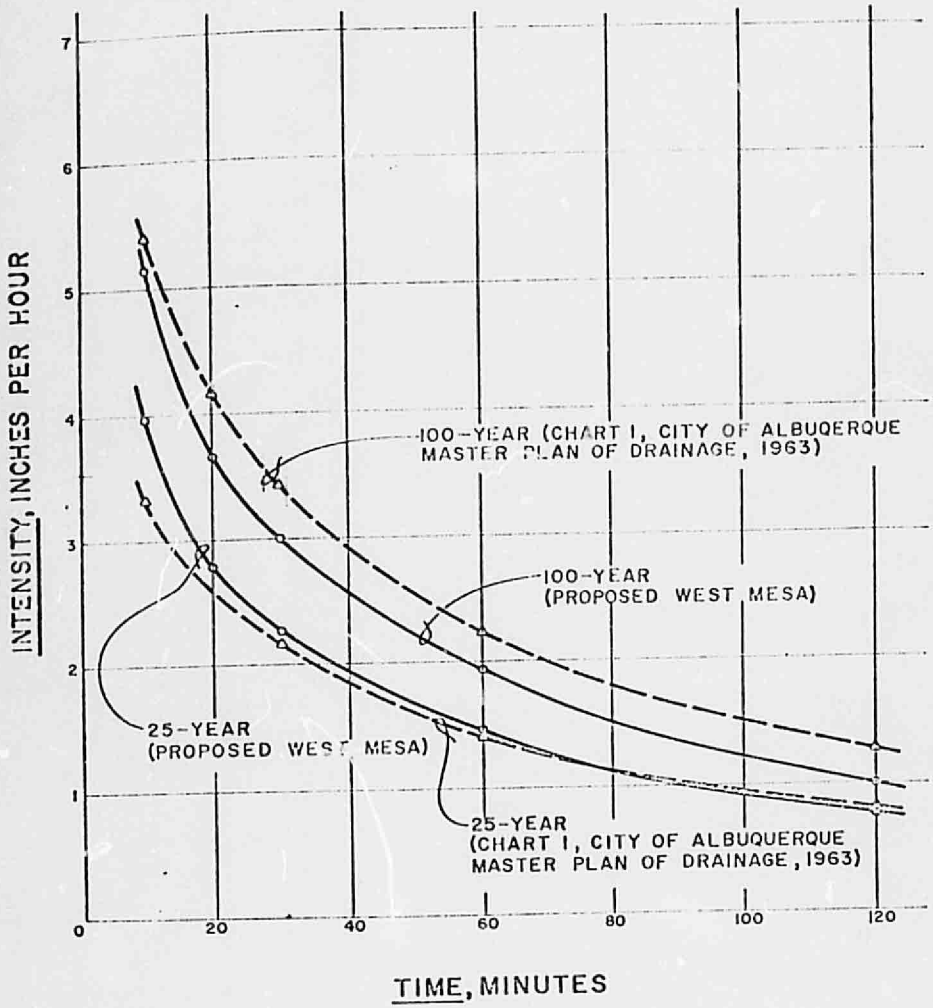
REFERENCES

Handbook of Steel Drainage and Highway Construction Products, American Iron and Steel Institute, 1967, New York, New York

Foundation Engineering, Terzaghi, Karl and Peck, Ralph B. John Wiley and Sons, New York, New York.

The Climate of New Mexico by the State Planning Office.

Soils Association and Land Classification for Irrigation, New Mexico State Univ ersity 1968.



INTENSITY-DURATION-FREQUENCY CURVES

WEST MESA, ALBUQUERQUE,

(SOURCE: WEATHER BUREAU ISOPLUVIALS, 1967 AND EXTRAPOLATION FOR ONE HOUR RAINFALL VALUES)

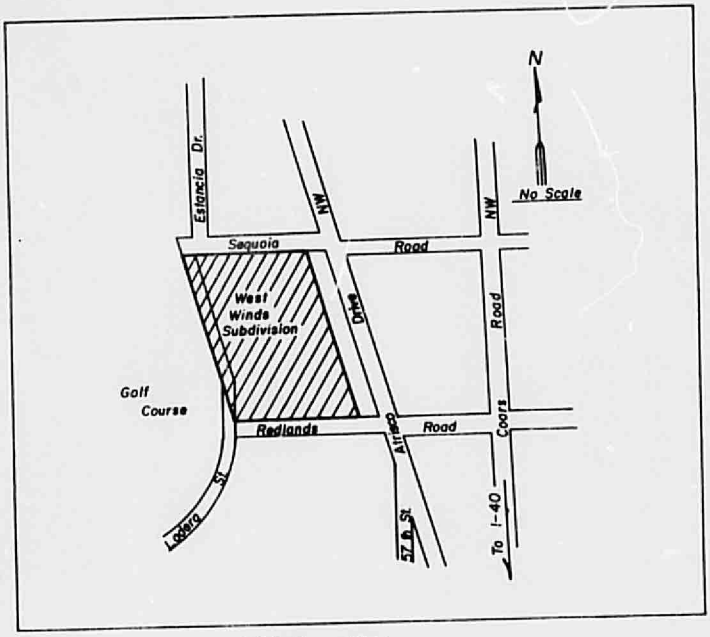
RECEIVED
DEC 29 1978

DRAINAGE REPORT

WEST WINDS SUBDIVISION

ALBUQUERQUE, NEW MEXICO

TURNKEY PROJECT CT - 28 - 3



Vicinity Map
Zone Atlas Map No. G-11

DEVELOPER: CODA ROBERSON CONSTRUCTION CO.

LEVERTON ENGINEERING - DECEMBER 1978

DRAINAGE REPORT

WEST WINDS SUBDIVISION
ALBUQUERQUE, NEW MEXICO

Zoning Atlas Map Coordinates G-11
Turnkey Project No. CT-28-3

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Narrative Report	Pages 1- 2
Calculations	Pages 3 - 4
Vicinity Map Showing Off-site Drainage Patterns	Plate 1
Subdivision Grading Plan	Sheet 9 of 10 of Construction Drawings

The construction drawings, which have been submitted to the City Engineer for comment and approval, are made a part of this report by reference.

Leverton Engineering Inc.
December 1978

Drainage Report
West Winds Subdivision
Turnkey Project CT-28-3

PURPOSE:

To design a grading and drainage management plan to conform and to comply with current City of Albuquerque policy and to the provisions of AMAFCA Resolution No. 2, Series of 1972.

SUMMARY:

The grading plan which evolved from the drainage study and which is presented herein fulfills the objectives outlined above as demonstrated by the following conclusions:

1. The quantity of storm water run-off resulting from a 100 year storm will be less after development then that which would occur at the present time.

   Run-off in the natural state Q = 19.2 cfs
   Run-off after development Q = 17.1 cfs

2. The volume of run-off as the consequence of a 100 year storm will remain unchanged after development as compared to the natural state.

   Volume of run-off after development = 62,000 cu.ft.
   = Volume of run-off in the natural state.

3. The hydraulic capacity of the streets built to the standard section shown on the construction plans and at the longitudinal grades indicated will be in excess of that required to carry the run-off of a 100 year storm.

   Min. capacity of streets = 60 cfs
   max. run-off = 17.1 cfs

4. The point of principal discharge of storm water run-off will not be changed by development.

5. Homes that may be built within the subdivision at the design elevations will not be damaged by the run-off from a 100 year storm.

OFFSITE OR UPLAND DRAINAGE:

Please refer to plate 1

The subdivision is situated on a drainage divide with the principal slope of the ground being toward the east and to the west. A small area to the north of the subdivision along the crest of the divide does drain toward the subdivision but the resultant run-off from a 100 year storm would be adequately contained and routed toward the east and to the west by Sequoia Road.

DEVELOPMENT OF RUN-OFF QUANTITIES:

The "Rational Formula" was used to evaluate run-off quantities. The run-off coefficent "c" was assigned the value of 0.40 for undeveloped, grassed, or other unsurfaced areas and 0.95 for all surfaced areas such as roofs, sidewalks, driveways and pavement.

Time of concentration was determined by using the length and surface characteristics of the watershed as the entrance argument to the nomograph on page 18-01 in Seelye's "Data Book for Civil Engineers."

Rainfall intensity was taken from the 100 year curve on Chart 1 of the "Master Plan of Drainage, City of Albuquerque, New Mexico and Environs, 1963.

"Manning's Formula" was used to compute the hydraulic capacities of the streets.

A 2.4" event rainfall was used in all calculations of run-off volume.

CONCLUSIONS:

The objectives of AMAFCA Resolution 1972-2 and City of Albuquerque Policy will have been complied with when the subdivision has been constructed in accordance with the design presented.

West Winds Subdivision
Drainage Calculations

Site Data

Gross area exclusive of ROW for Ladera St. = 17.8 Acres

Number of lots = 179

Area with run-off coefficient = 0.95

Pvmnt & curb & gutter:
3537' × 33.3' = 2.7 Ac

Sidewalks:
2 × 3230' × 4' = 0.4 Ac
(drives) — 179 × 10' × 4'

Driveways:
179 × 10' × 29' = 1.2 Ac

Houses & flat work
179 × 49' × 26.7' = 5.4 Ac

Total @ C = 0.95 = 9.7 Acres

Area with run-off coefficient = 0.40

17.8 − 9.7 = 8.1 Acres

Composite, after development, coefficient of run-off

$$= \frac{9.7 \times 0.95 + 8.1 \times 0.40}{17.8} = 0.70$$

Run-off

Quantity

1. In undeveloped state:
   $L = 1400'$, diff. in elev $= 7'$, $S = 0.005$ ft/ft
   $t = 42$ min, $i = 2.7''$

   $Q_u = 17.8 \times 0.4 \times 2.7 = \underline{19.2 \text{ cfs}}$

2. After development <u>without</u> retention:
   $L = 1570'$, diff. in elev $= 7'$, $S = 0.0045$ ft/ft
   $t = 47$ min, $i = 2.4$

   $Q_f = 17.8 \times 0.70 \times 2.4 = \underline{29.9 \text{ cfs}}$

Therefore, the Q that must be retained on site after development $= 29.3 - 19.2 = 10.7$ cfs which corresponds to $\frac{10.7}{0.7 \times 2.4} = \underline{6.4 \text{ Acres}}$

Volume @ 2.4" event rainfall

1. In undeveloped state:
   $\frac{17.8 \times 43{,}560 \times 0.4 \times 2.4}{12} = 62{,}000 \text{ ft}^3$

2. After development <u>without</u> retention:
   $\frac{17.8 \times 43{,}560 \times 0.70 \times 2.4}{12} = 108{,}600 \text{ ft}^3$

Therefore the volume that must be retained on site after development $= 108{,}600 - 62{,}000 = 46{,}600 \text{ ft}^3$ which corresponds to $\underline{7.6 \text{ Acres}}$

Since the area produced by <u>volume</u> considerations required to be retained on site is larger than that for Q then volume prevails.
Volume to be retained on site after development and apportioned equally to 179 lots $= 46{,}600 \text{ ft}^3$ and $\underline{260 \text{ ft}^3/\text{lot}}$

1704