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DRAINAGE REPORT

PROYECTO BIENVENIDO
AN ADDITION TO THE CITY OF
ALBUQUERQUE, NEW MEXICO

MARCH, 1970

BOHANNAN WESTMAN ENGINEERS, INC.
4205 CARLISLE BLVD. NE
ALBUQUERQUE, NEW MEXICO
PHONE: 345-2681

DRAINAGE REPORT
FOR
PROYECTO BIENVENIDO
SUBDIVISION
BERNALILLO COUNTY, NEW MEXICO

MARCH, 1970

BOHANNAN-WESTMAN ENGINEERS, INC.
4205 Carlisle Blvd. N E
Albuquerque, New Mexico
Phone: 345-2681

REGISTERED PROFESSIONAL ENGINEER
STATE OF NEW MEXICO
NO. 4301
SAMUEL L. GRAY

SPONSOR:

Northern New Mexico
District of Lulac Council
214 Sixth Street S W
Albuquerque, New Mexico
Phone: 243-0687

SUBMITTED BY:

Samuel L. Gray

Samuel L. Gray
N.M.P.E. No. 4301

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DRAINAGE REPORT

PROYECTO BIENVENIDO SUBDIVISION

BERNALILLO COUNTY, NEW MEXICO

I. PURPOSE OF REPORT: The purpose of this report is to determine the amount of storm water occuring within Proyecto Bienvenido Subdivision, Bernalillo County, New Mexico, and to determine and recommend the best and most economical method of disposing of this storm water without endangering life or property.

II. LOCATION: Proyecto Bienvenido Subdivision is located in the City of Albuquerque, New Mexico; in the Northwest quarter of Section Eighteen, T 10 N, R 2 E. The subdivision adjoins Mountain Road on the South, the Duranes Ditch on the West, unplatted land on the East and a projected subdivision on the North. Plate I, location plan, is included in this report.

III. TERRAIN: The area which composes the Proyecto Bienvenido subdivision is very gently sloping land lying entirely within the Rio Grande Valley floor. The land has been utilized for many years for irrigated farming. The slope is approximately 0.1% from west to east or completely flat. A Topographic Contour Map is included within this report.

The Proyecto Bienvenido Subdivision and the projected

subdivision adjoining to the North are protected from exterior intrusion of storm water in the manner as follows: On the west by the Middle Rio Grande Conservency District Duranes Ditch; adjoining the projected subdivision on the north by a private irrigation ditch flowing east. The banks of this ditch are approximately two feet above the adjacent land and effectively serves as a protection dyke for the area.

The elevation of the area is approximately 4,955 feet above mean sea level.

IV. SOIL: No exact sieve analysis was performed but from visual inspection the soil found within Proyecto Bienvenido is composed of sandy, silty loam with a small amount of fine gravel.

V. VEGETATION: The existing vegetation within the subdivision and adjacent areas consists of sparse grass, weeds and a few small elm trees along the ditches and drives.

VI. FUTURE DEVELOPMENT: For the purpose of this report and the analysis of drainage, all of the land is assumed to be developed for residential purposes with the streets paved, curbed and guttered.

VII. DISPOSAL OF STORM WATER: There are three methods utilized for the disposal of storm water within a given area, namely:

1. Surface drainage; overland or confined in streets or open ditches.

2. Storm sewers.

3. Design ponding.

Adequate storm water drainage for any given area may be achieved by any of the three methods or by any combination of two or all of these methods, dependent upon the characteristics of soil, gradient, type of development, and the availability of adequate facilities for disposal of the storm water when it leaves the area.

Surface drainage requires a minimum slope of 0.30% for paved streets with curb and gutter. Unpaved channels should have a minimum grade of 1.00%. Any development dependent upon surface drainage only and where these minimum grades are not provided will result in ponding.

In open unpaved ditches the result will be deposits of silt and debris and the encouragement of the growth of weeds and brush, thus further obstructing the channel.

In streets the result is small ponds (commonly referred to as bird baths). Also due to the low velocity deposits of sand and silt will occur, thus increasing the cost of maintenance and cleaning.

The use of storm sewers within an area is dependent upon discharge into a natural watercourse or into an existing

adjacent storm sewer.

Design ponding where used for storm water disposal within a given area requires the following considerations:

1. Open areas of sufficient size within the subdivision, unpaved and not used for other purposes must be available for ponding.

2. The depth of the water table below the surface and the character of the soil shall be such as to permit fairly rapid percolation of the storm water into the ground.

3. The prevailing area weather and humidity norm shall be conducive to fairly rapid evaporation of ponded water.

VIII. DRAINAGE CALCULATIONS: There are several drainage formulas that can be used;

1. The Burkli Ziegler Formula
2. The Rational Formula
3. The Talbot Formula
4. The Unit Hydrograph

There are many others, some theoretical and others documented by experiments. The Rational Formula was selected for this report due to it's common usage, simplicity and accepted accuracy. The Rational Formula is as follows:

$Q = C\ i\ A$, where

Q = Runoff = Peak discharge of watershed in cubic feet

per second (c.f.s.) due to maximum storm assumed.

A = Area of watershed in acres.

i = Intensity of rainfall in inches per hour based on concentration time. (Concentration time = time required for rain falling at most remote point to reach discharge point.)

A design storm of 100 years was used for this report with the intensity taken from Technical Paper No. 40 "Rainfall Frequency Atlas of United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years". The coefficient of runoff "C" has been selected as 0.50, an amount commonly used for developed areas. Concentration time is based upon a combination of overland time and street time. Street time is based on the Manning Formula;

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

Table IV, Street Carrying Capacities taken from "Master Plan of Drainage, City of Albuquerque, New Mexico and Environs, 1963", prepared by Gordon Herkenhoff and Associates, is included in this report.

A tabulation of all drainage areas with areas in acres and quantities in cubic feet per second is included in the Drainage Analysis sheet.

DRAINAGE ANALYSIS

Rational Formula
(Q = cia)

SPONSOR: Northern New Mexico
District of Lulac Council
214 Sixth Street S.W.
Albuquerque, New Mexico

PROJECT Proyecto Bienvenido

DATE: April 2, 1970

By Bohannan Westman Engineers

Design Storm Frequency 100

"C" Value 0.50

Designation	Area Acres	Length & Time Overland Flow	Length & Time Channel flow	Total Time Min.	Intensity Inches per Hour	Q cfs
Ia	3.3	375'--35 min.		35	1.2	1.90
Ib	1.7	450'--35 min.		35	1.2	1.00
II	3.62	65'--11 min.	520--4.8 min.	15.8	2.2	4.00
II+Ia						5.90
III	1.71	65'--11 min.	300--2.8 min.	13.8	2.4	2.05
III+Ib						3.05
IV	0.49	65'--11 min.	108--1.0 min.	12.0	2.5	0.61
V	0.86	65'--11 min.	126--1.17 min	12.17	2.6	1.12
VIa	0.35	220'--23 min.	190--1.10 min	24.10	1.7	0.30
VIb	1.96	220'--23 min.	310--1.8 min.	24.80	1.5	1.50
VIa+VIb						1.80

These tables were taken from "Master Plan of Drainage, City of Albuquerque, New Mexico and Environs, 1963", prepared by Gordon Herkenhoff and Associates.

TABLE IV

STREET CARRYING CAPACITIES
(CFS)

Slope	32' Street 6" Crown at center line or 6" sidehill with no crown	32' Street Flat Cross-section	32' Street 6" Inverted crown at center line	32' Street with 8" sidehill with no crown	32' Street with 12" sidehill with no crown	40' Street 6" Crown at center-line or 6" sidehill with no crown	44' Street 6" Crown at center-line or 6" sidehill with no crown	48' Street 6" Crown at center-line or 6" sidehill with no crown
0.0025	37	78	133	25	17	47	51	56
0.0050	53	111	189	36	23	66	72	79
0.0075	65	136	231	44	29	81	89	97
0.0100	75	156	267	51	33	93	102	112
0.0125	84	175	299	57	37	104	115	125
0.0150	92	193	328	62	41	114	126	138
0.0175	99	207	352	67	44	123	135	148
0.0200	105	221	376	71	47	131	144	158
0.0225	112	235	400	76	50	139	154	168
0.0250	118	247	422	80	52	147	162	177
0.0275	124	260	444	84	55	155	170	186
0.0300	129	271	462	88	57	161	177	193
0.0325	134	282	480	91	59	167	184	202
0.0350	139	293	499	95	62	174	191	209
0.0375	145	304	518	98	64	180	199	•217
0.0400	149	313	534	101	66	186	205	224
0.0425	154	322	550	104	68	192	211	231
0.0450	158	332	566	107	70	197	217	237
0.0475	163	341	582	110	72	203	223	244
0.0500	167	350	598	113	74	208	230	251

Coefficient of Roughness = n = 0.015 for all streets.
Carrying Capacity Given in Cubic Feet per Second (C.F.S.)
Arterial Design (Stage & Final) has a +2% Slope from the Top of Curb to the top of Median Curb.
Curb Height = 8"

To convert from n = 0.015 to n = 0.0175, multiply c.f.s. by 86%

X

XI. RECOMMENDATIONS: It is hereby recommended that the provisions for storm drainage within Proyecto Bievenido be as follows:

a. Due to the relatively small amount of open and unpaved surface available and due to the fact that this area has been designated for a recreation area; disposition of storm drainage by the ponding method is not considered feasible.

b. The proximity of an existing storm sewer on Mountain Road provides, by an extension north along the principal street within Proyecto Bienvenido, an adequate and economical facility for the removal of storm drainage.

c. This principal North South street should be constructed on an undulating series of minimum grades of 0.40% with inlets at the low points to collect the storm drainage. The advantages of this plan are as follows:

1. The entire area may be divided into smaller sections thereby reducing the amount of surface concentration at any one point.

2. The elevation of the street can be maintained at a minimum, thereby providing facilities for disposal of storm drainage upon development of the projected subdivision to the North.

3. By maintaining the street at a minimum elevation adequate and positive drainage can be achieved from the buildings to parking areas and streets with a minimum of additional

fill under the buildings.

d. All streets and parking areas should be constructed using minimum grades.

e. The building pads should be a minimum of one and one half ($1\frac{1}{2}$) feet above adjoining streets and a minimum of one foot above adjacent parking areas.

ADDENDUM: No. 1

That the proposed storm sewer be extended to the parking area in the Northwest section of tract with a flat grate inlet in parking area, site grading revised for this inlet.

XII. REFERENCES:

1. "Data Book for Civil Engineers" by Elwyn E. Seelye
2. "Highway Engineering" by Ritter and Paquette
3. "Hydrology" by Wisler and Brater
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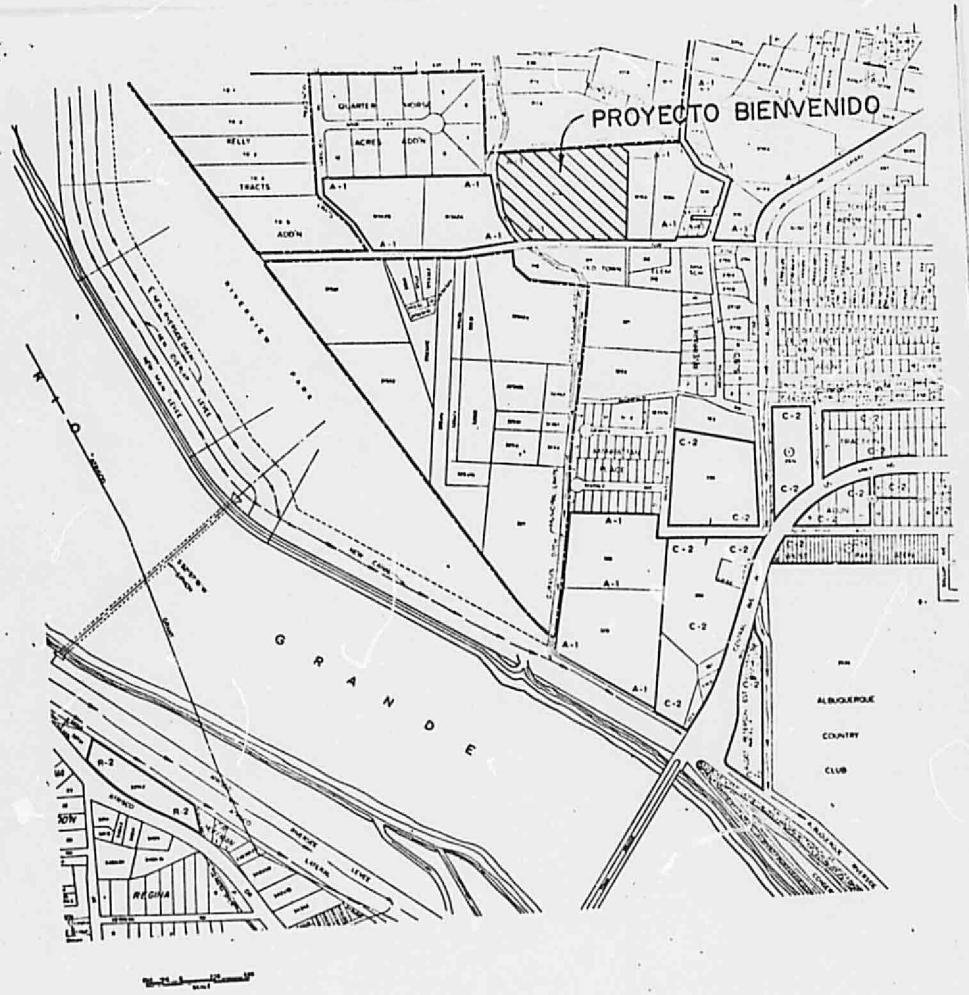

LOCATION PLAN

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ALBUQUERQUE, NEW MEXICO

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By Bohannan Westman Engineers

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