F 18 - D 7

3 PLANS

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

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

January 12, 1976

Mr. Michial M. Emery
Bohannan,Westman,Huston & Assoc., Inc.
4125 Carlisle Blvd. NE
Albuquerque, New Mexico 87107

RE: DRAINAGE HIGHLAND PARK EAST, TRACT 1

Dear Mr. Emery:

The plans for the first building in the subject area can be approved subject to the developer constructing additional inlets on Osuna Street and designing future buildings in the development for controlled runoff from the roofs.

Plans for additional inlets on Osuna will require the City Engineer's approval.

Sincerely,

Kleston H Laws

Kleston H. Laws
Assistant City Engineer-Hydrology

KHL/fs

cc: Mr. John Robert

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.

February 11, 1976

Mr. Bill Hooten
Hooten & Stahl, Inc., Realtors
2051 Wyoming Blvd., N.E.
Albuquerque, New Mexico 87112

Re: Storm Sewer Improvements Design on Osuna

Dear Mr. Hooten:

Enclosed are the plans for the referenced storm sewer and the cost estimate for its construction. After you have reviewed this material, please advise; and we will submit the design to the City for their review and approval.

Sincerely yours,

Michial M. Emery
Chief Design Engineer

Enclosures

MME/sh
Job Number E75-016
File E75-042

ESTIMATE

STORM SEWER IMPROVEMENTS ON OSUNA

170' Trench and Backfill	@ $3.45	$ 586.50
170' of 18" RCP	@ $9.11	$1,548.70
1 Double C Inlet	1 EA	$1,083.50
67 Sq/Yd Pavement Removal and Replacement	$16.00/SY	$1,072.00
16 LF Curb Removal and Replacement	$ 6.00/LF	$ 96.00
1 MH 4' Dia. Type E	1 EA	$ 413.00
TOTAL		$4,799.70

PROJECT NAME

PROJECT NO.

SUBJECT

BY

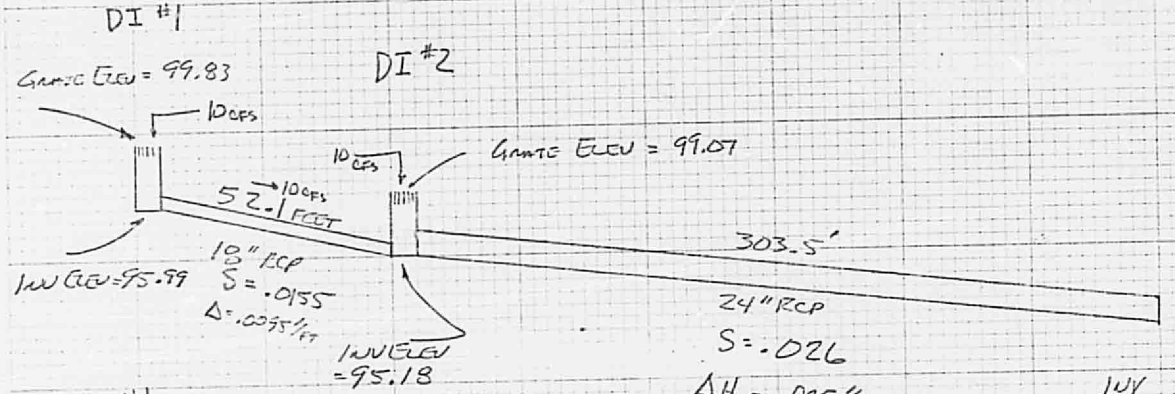
CHD

SHEET OF

DATE

DATE

EXISTING STORM SEWER IN OSUNA



DI #1

WITH WATER @ GRATE ELEV.

$h = 3.09'$

$\frac{L}{100S} = \frac{52.1}{(100)(.0155)} = 33.61$

$Q = 14$ CFS (NOMAGRAPH - BPR)

(CAPACITY OF FIRST INLET #1 TO DETERMINE FLOW TO DROP INLET #2)

DI #2

WITH WATER @ GRATE ELEV

$h = 7.89'$

$\frac{L}{100S} = \frac{303.5}{(100)(.026)} = 116.$

$Q = 25.$ CFS (CAPACITY OF DROP INLET AND STORM SEWER TO BEAR AROYO)

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

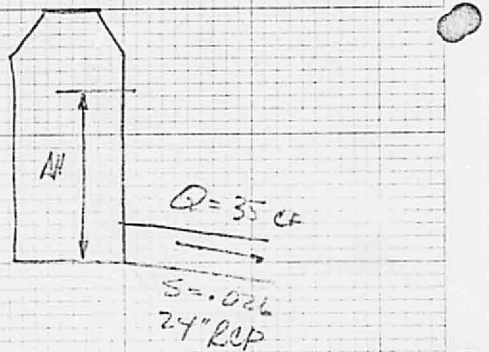
SUBJECT _____ CHKD _____ DATE _____

PROPOSED REVISIONS TO STORM SEWER IN CANA

1) CONSTRUCT AN ADDITION DOUBLE C INLET Q=70 CFS MIN
2) CONSTRUCT A NEW MH DOWN STREAM OF DI #2
   AS TO ALLOW THE 35 CFS TO PASS.

REQUIRED HEAD COMPUTATION (ΔH)
ASSUME $\frac{L}{100 S_o}$ = 116.

ΔH = 5.5'



LOCAT THE NEW M.H. ON THE EXISTING 24" LINE A DISTANCE FROM THE EXISTING D.I. #2 TO ACHIEVE 5.5' OF HEAD IN THE PIPE PLUS FRICTION LOSSES BETWEEN DI #2 AND THE NEW M.H. REFERENCE ELEVATION WILL BE THE GRATE ELEVATION OF DI #2

99.07 GRATE ELEV. ON DI #1
95.18 INV ELEV ON DI #2

3.89 FT DEPTH BELOW REFERENCE ELEV.

5.50' REQUIRED HEAD @ MH
-3.89 AVAILABLE HEAD @ GRATE

∴ 1.61 FT I HAVE TO BE PICKUP FROM DI #2 TO MH @ SLOPE OF EXISTING 24" PIPE LESS FRICTION LOSS.

SLOPE OF PIPE = .026 '/FT
FRICTION LOSS = .013 '/FT. (Q=25 CFS)

ACTUAL HEAD GAIN = .013 '/FT

$L = 1.61/.013 = 123.85'$ USE 125'

BELOW DI #2 AS MH LOCATION

DRAINAGE REPORT

FOR

TRAILER PARK

AT CORNER OF SAN MATEO BOULEVARD, N.E. AND OSUNA ROAD, N.E.

FEBRUARY 1975

PREPARED FOR

HOOTEN & STAHL, INC.

PREPARED BY

BOHANNAN WESTMAN HUSTON & ASSOCIATES, INC.
4125 Carlisle Blvd., N.E.
Albuquerque, New Mexico 87107

STATE OF NEW MEXICO
MICHIAL M. EMERY
No. 5194
REGISTERED PROFESSIONAL ENGINEER

Michial M. Emery

Michial M. Emery
New Mexico P.E. No. 5194

This report covers the hydrologic performance of the trailer park and surrounding area at the corner of Osuna Road, N.E. and San Mateo Boulevard, N.E. Information from drainage reports for Mediterranean Apartments, Tract 2, Highland Park East, and Plaza del Oso Townhouses is utilized to develop an acceptable method of handling the flow in Osuna Boulevard, N.E. If concepts presented in this report are strictly followed, the flows resulting from a 100 year storm in Osuna Boulevard, N.E. between the trailer park and San Mateo Boulevard, N.E. shall not be increased in rate due to the planned development.

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DRAINAGE REPORT FOR TRAILER PARK

AT OSUNA ROAD, N.E. AND SAN MATEO BOULEVARD, N.E.

PURPOSE AND SCOPE

The purpose and scope of this report is to determine a suitable method for controlling the rate of runoff resulting from a 100 year, six hour frequency storm falling on this area, to define these resulting quantities, and propose an acceptable method of handling this runoff.

LOCATION AND TERRAIN

The project area is located approximately 600 feet east of the intersection of San Mateo Boulevard, N.E. and Osuna Road, N.E. Presently this area is a trailer park. The natural slopes in this area are in the one (1) to four (4) percent range.

PROPOSED DEVELOPMENT

The area now occupied by this trailer park will be developed as an office complex consisting of several separate buildings. The buildings will be designed with flat roofs and drain spouts will be placed such that three (3) inches of rainfall will be ponded on the roofs. A minimum of 4.3 acres of rainfall will be ponded on the roofs and the drain spouts will be designed to prevent this water from contributing to runoff until the peak flow in Osuna Road, N.E. has passed.

Overflow drain spouts will be placed three (3) inches above top of roof and a 3/4 inch drain spout will be provided at top of roof elevation to pass the retained water in 6 to 24 hours.

HYDROLOGIC ANALYSIS

A 100 year frequency rain was used in conjunction with the rational method to compute the flow rates of storm water runoff origination from the trailer park. For the trailer park area, an analysis was made to determine the runoff generated after the planned development. An analysis was also made to determine the runoff of this area in its natural state. To implement the use of the rational formula, data was obtained from Plate I in the back of this report. A table of the data and the results of the hydrologic analysis are presented in the Appendix of this report.

INTERNAL DRAINAGE

Water falling on the trailer park area will be conveyed by streets along the perimeter to Osuna Road, N.E.

EXTERNAL DRAINAGE

The data for external drainage is from drainage reports on the surrounding area, that is, Mediterranean Apartments, Plaza del Oso Townhouses, and Tract 2 Highland Park East. The resultant runoff from these areas is shown on Plate I in the back of this report. The external drainage in Osuna Road, N.E. is a computed flow based upon data provided by the three above mentioned drainage reports and data from the project area (trailer park).

The flow in Osuna Road, N.E. coming from the east of the project area is approximately 40 cfs. At the east property line of the project area there presently exists two (2) double C inlets and a 24" reinforced concrete culvert pipe which diverts approximately 20 cfs from Osuna Road, N.E. north to the Bear Canyon. This leaves approximately 20 cfs which still flows past the trailer park in Osuna Road, N.E.

It is proposed to add one (1) double C inlet and one (1) single C inlet in Osuna Road, N.E. at this location to increase the flow diverted from Osuna Road, N.E. to 35 cfs which is the capacity of the 24" storm line already in existence.

This, then, would leave approximately 5 cfs flowing in Osuna Road, N.E. past the project area.

CONCLUSIONS

The flow rate in Osuna Road, N.E. at the west property line of the trailer park, in the undeveloped state (that is, the project area in the natural condition but the existing subdivision to the east developed), would be 69 cfs. This 69 cfs consists of 19 cfs entering Osuna Road, N.E. from Plaza del Oso Townhouses (see Drainage Report dated December 8, 1972), 21 cfs entering Osuna Road, N.E. from Tract 2 Highland Park East (see calculation in the Appendix), and 29 cfs from the project area. The flows from Plaza del Oso Townhouses and Tract 2 Highland Park East entering Osuna Road, N.E. are less than the flows would have been under natural conditions.

In the developed state (e.g. the project area developed and the three (3) double C inlets and the single C inlet connected by a 24" culvert pipe to the Bear Arroyo) the flow rate in Osuna Road, N.E., at the west property line of the project area will be 69 cfs. This 69 cfs consists of the 5 cfs flowing in Osuna Road, N.E. from the east and 64 cfs entering Osuna Road, N.E. from the project area. As stated above, the 5 cfs in Osuna from the east is the result of removing 35 cfs, at the east property line of the trailer park, from the original flow of 40 cfs in Osuna Road, N.E.

Since the runoff rate is not increased, we recommend the approval of the drainage plan for this project.

APPENDIX

SUMMARY OF HYDROLOGIC DATA

AREA	ACRES	UNDEVELOPED Q(cfs)	DEVELOPED Q(cfs)
Trailer Park	19.5	29	64
Osuna Road, N.E.	N/A	40	5
	TOTAL	69	69

SAMPLE CALCULATIONS

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

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

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

L = Distance to Furthest Point in the Basin in Feet

UNDEVELOPED RUNOFF

Area A	= 19.5 Acres
Length of Area (L)	= 1200 Feet
Ground Factor (B)	= 1.84
Average Slope (S)	= 2.5%
Time of Concentration (TC)	
$TC = Log^{-1}[.3641(1.84) + .3854 \text{ Log } (1200) - .197 \text{ Log } (2.5) - .3613]$	
$TC = Log^{-1}[.6699 + 1.19 - .08 - .3613]$	
$TC = Log^{-1}[1.42]$	= 26.2 min.
* Intensity (I)	= 3.7 in./hr.
Runoff Coefficient (C)	= 0.4
Flow Rate (Q = CIA)	= 28.9 cfs
Total Rainfall (TR)	= 2.8 in.

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

DEVELOPED RUNOFF

The runoff from the developed land was established by the same method as described above except the ground factor B and the runoff coefficient C have been changed to reflect that all of the developed area will be roofed over or paved. This will give a conservative estimate of the developed flow rate because in reality there will be some planters and other landscaping.

Also 4.3 acres of ponding has been provided upon roofs of buildings. This in effect changes the area used to calculate the flow rate.

* Effective Area (A^1)	= 15.2 Acres
Length of Area (L)	= 1600 Feet
Ground Factor (B)	= .80
Average Slope (S)	= 2.0%
Time of Concentration (TC)	
$TC = Log^{-1}[.3641(.80) + .3854 Long (1600) - .197 Log (2.0) - .3613]$	
$TC = Log^{-1}[.29 + 1.24 - .06 - .3613]$	
$TC = Log^{-1}[1.018]$	= 12.8 min.
** Intensity (I)	= 4.7 in./hr.
Runoff Coefficient (C)	= .90
Flow Rate (Q = CIA)	= 64.2 cfs
Total Rainfall (TR)	= 2.8 in.

* The water from 4.3 acres will be ponded on the roofs.

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

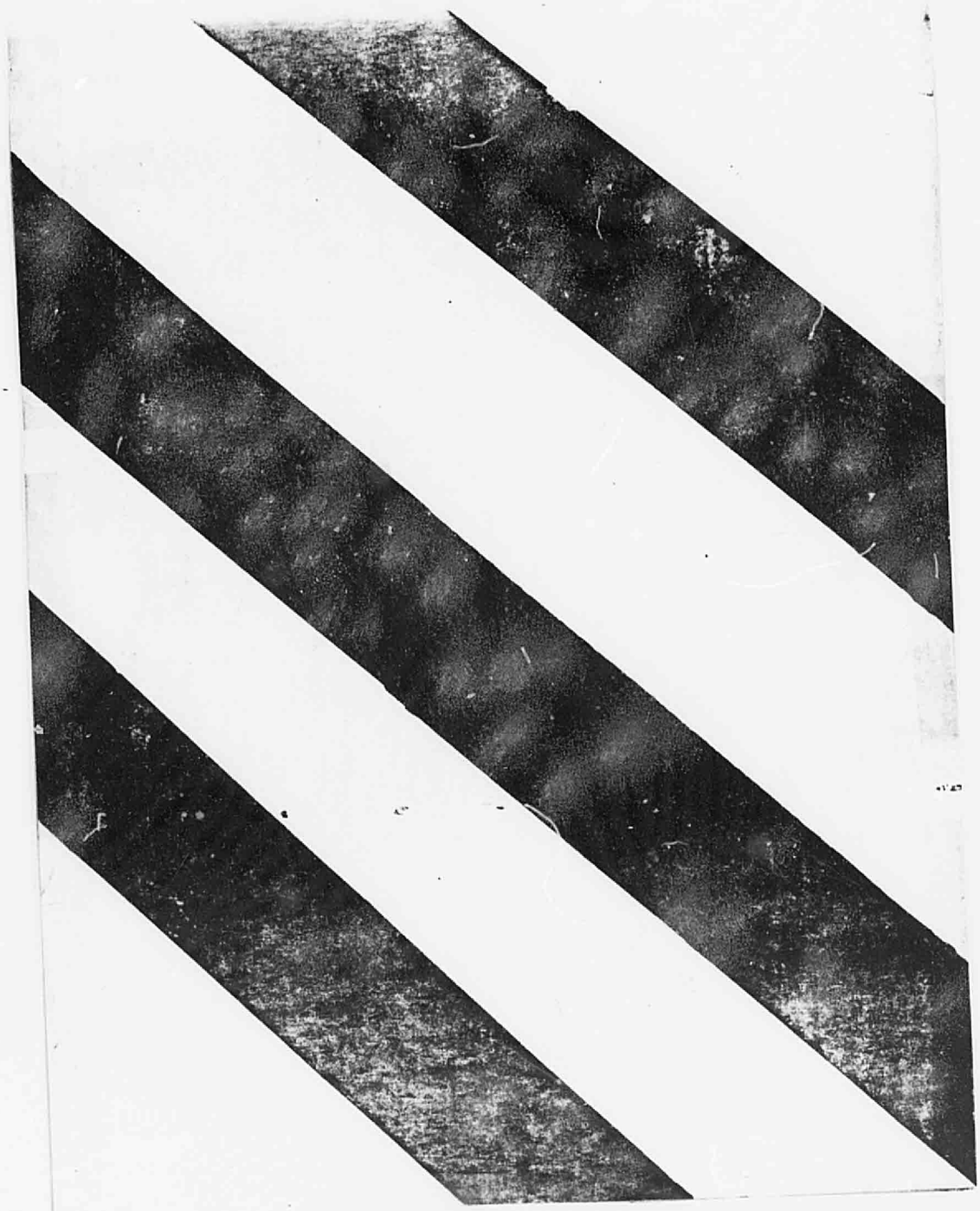
CALCULATION TO DETERMINE FLOW RATE ENTERING OSUNA ROAD FROM TRACT 2, HIGHLAND PARK EAST

The drainage report on Tract 2, Highland Park East was done at a time when the area now occupied by Plaza del Oso Townhouses was undeveloped. The author of this drainage report therefore assumed that about half of the area in the Plaza would drain through Tract 2, Highland Park East.

The area used in calculating the runoff from Highland Park East was 16 acres of which 11 acres was in the Plaza del Oso Townhouse complex.

In determining the flow leaving Tract 2, Highland Park East a straight proportion was used to reduce the flow rate to reflect only the 5 acres which now enter Osuna Road, N.E. from Tract 2.

$$\frac{16 \text{ Acres}}{66 \text{ cfs}} = \frac{5 \text{ Acres}}{X \text{ cfs}}$$

$$\therefore X = \frac{66(5)}{16} \cong 21 \text{ cfs}$$

21 cfs was used as the flow rate presently leaving Tract 2, Highland Park East via Osuna Road, N.E.