M9/09

16 PLANS

L.R.F.

m9-D9

MEURER, SERAFINI AND MEURER, INC.
CONSULTING ENGINEERS • SURVEYORS • PLANNERS

2601 WYOMING BLVD., N.E., SUITE F • ALBUQUERQUE, NEW MEXICO 87112 • (505) 292-1936

December 24, 1980

RECEIVED
DEC 29 1980
CITY ENGINEER

Dick Heller
City Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Re: Ladrones Road Drainage, Westgate Heights, Unit 4.

Dear Dick,

Transmitted herewith are the calculations and a proposed swale section for the above mentioned location.

We have sized the section to carry the developed flows from Unit 4 plus the expected contribution of the undeveloped area South of that unit. One foot of free board has been provided.

If there are any questions, please feel free to contact me.

Sincerely,

MEURER, SERAFINI AND MEURER, INC.

Jim Leymon

Jim Leymon

JL:de

Enclosures

RSH	RNA	ADM	
HRO		SUR	
CDS		COUN	
DES		SEC	
INSP		FILE	
HYDRO		RETURN	

Reading file

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 11, 1980

M9-D9

Mr. Vance Emory
Maint. & Operations Supt.
Albuq. Public Schools
915 Locust St. S.E.
Albuquerque, New Mexico 87106

RE: FLOODING AT LOTS 2 and 3 BLOCK 77, WESTGATE ADDITION UNIT 2

Dear Mr. Emory:

Please find attached a copy of page M-9-Z of the Zone Atlas, showing the location of the lots referenced above, a sketch prepared by my inspector, Bernie Montoya, and some photographs taken by the owner of the residence at 1305 Sonya St. S.W. I cannot find in our records any site grading or drainage plans for the Truman Middle School, built some time in 1974 or 1975.

The conditions illustrated by the photographs are obviously unacceptable and I am asking the cooperation of A.P.S. in solving this problem. A grading plan should be prepared, showing how the water will be intercepted and diverted from these residences onto a public street. Further, in order to avoid that the runoff from the school site discharge onto the street unwanted and dangerous silt, a properly designed detention basin should be constructed.

Please advise me of your decision on this matter so that I can inform the residents of the remedies that will be provided.

Very truly yours,

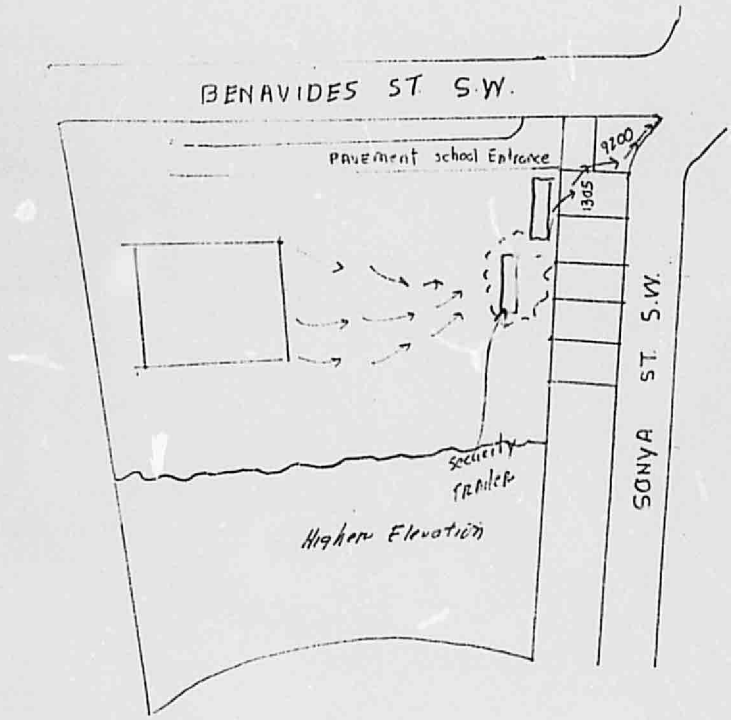
Bruno Conegliano
Asst. City Engineer-Hydrology

BC/tsl

Attachments

TOWN
OF
UNIT
GRANT
ATRISCO
HEIGHTS
SEVEN
NO.
ADD'N
WESTGATE
TWO
UNIT
WESTGATE
HEIGHTS
UNIT I
REPLAT
SNOWVISTA
SUB'D
BLOCK 63
UNPLATTED
UNPLATTED
C-1
C-2
C-3
R-3

M-9-Z


N
BENAVIDES ST. S.W.
Pavement school Entrance
9200
1305
SONYA ST. S.W.
Security Trailer
Higher Elevation

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

September 7, 1978

M9-D9

Mr. J. D. Fullmer
Mortgage Investment Co.
P. O. Box 3189, Station D
Albuquerque, New Mexico 87110

SUBJECT: TEST TURNKEY PROJECT WORK AUTHORIZATION #T-14
WESTGATE HEIGHTS, UNIT 4

Dear Mr. Fullmer:

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

Very truly yours,

C. D. Sheppard, P.E.

C. D. Sheppard
Acting City Engineer

CDS/fs

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

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

July 27, 1978

M9-09

Mr. J. D. Fullmer
Mortgage Investment Co.
P. O. Box 3189, Station D
Albuquerque, N.M. 87110

SUBJECT: TEST TURNKEY PROJECT WORK AUTHORIZATION #T-10
WESTGATE HEIGHTS, UNIT 4

Dear Mr. Fullmer:

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

Sincerely,

V. M. Kimmick
City Engineer

VMK/fs

cc - H. R. Orr
Contractor
Ray Dawson
Water Resources
Dwayne Sheppard
Bob Kielich
LaMonte Urban
Bruno Conegliano
Bill Mueller

Genge/Murray-McCormick
2801 Wyoming Blvd., N.E. Suite F
Albuquerque, N.M. 87110 / 505 292-1936
Engineering · Surveying · Planning
Tucson · Phoenix · Denver · Pueblo

May 9, 1977

RECEIVED
MAY 12 1977
CITY ENGINEERS

M9-D9

City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Attention: Mr. V. M. Kimmick
City Engineer

Re: Westgate Heights Subdivision, Unit 4

Gentlemen:

Mortgage Investment Company, 2727 San Pedro Drive N.E., has retained us to prepare the improvement plans for the above subdivision.

In accordance with the ordinances of the City of Albuquerque ordinances and procedural requirements, we hereby request the City's design for the master planned lines and approval to proceed in the preparation of the remaining improvement documents.

Very truly yours,

GENGE/MURRAY-McCORMICK, INC.

Thomas J. Haack

TJH:dw

APPROVED:

By: V. M. Kimmick, City Engineer

Date: 8-23-77

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

June 18, 1980

Mr. Joe Fulmer
Mortgage Investment Co. of El Paso
P.O. Box 3189, Station D
Albuquerque, New Mexico 87110

Dear Mr. Fulmer:

Mr. John R. Suydam with the firm of Castillo Preston Ltd. has contacted my office to obtain signature on a site development plan. In the process, I have found that a summary plat for a parcel of land East of the Southeast end of Westgate Heights Unit 4 has been approved without legal access. Even though the Master Plan for Westgate Heights was approved (Zoning Action S-1082) substantial changes have occurred and a study indicating both current planning thinking, and the method of handling the runoff must be supplied. The biggest item of concern pertains to the fact that, as noted in the AMAFCA comments pertaining to Zoning Action 79-137; the parcel sold to the Archdiocese is subject to flooding. Without a method to collect the surface waters from Camino de San Martin Dr. and their safe disposition to an adequate facility, the City will not be able to grant access to this parcel. I am, therefore, requesting that a meeting be called with Mr. R. S. Heller and Richard Leonard to review this matter and hopefully provide an adequate resolution.

Sincerely,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/tsl
Reading File
cc: Rick Leonard, AMAFCA
R. S. Heller, City Engineer
Mr. John R. Suydam, Castillo Preston Ltd.

AGENDA ITEM NO. 11

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
PLANNING DIVISION

ENVIRONMENTAL PLANNING COMMISSION
November 15, 1979
Z-79-137

Z-79-137 Archdiocese of Santa Fe requests a change of zone from R-1 to SU-1 (Special Use for a Church and Related Facilities) for an unplatted parcel of land located on the east side of Ladrones Road S.W., approximately 1600 feet east of the intersection of Snow Vista Boulevard and De Anza Drive S.W., containing approximately 4.5 acres. (M-9/10)

COMMENTS FROM OTHER DEPARTMENTS, 11-15-79:

Traffic Engineer:	"Because of the curvature on De Anza, the proposed landscaped berm could create visibility restrictions for traffic exiting from the driveways. See Transportation Dept. comments regarding right-of-way dedications."
Transportation:	"Dedication of right-of-way for all three adjacent streets (including 43 ft. to the centerline of De Anza Drive which is designated as a minor arterial street on the approved Long Range Major Street Plan) should be a condition of approval."
Water Resources:	Water - "In order that adequate water service and/or fire protection can be provided, waterline extensions at the developer's expense will be required. Design must be coordinated with the Engineering Division of the Water Resources Department. Service to this tract can be made possible by waterline extensions; however, the developer is advised that static water pressure may exceed 100 psig. The Water Resources Department recommends that the developer provide in its design precautions for protection of the integrity of the private plumbing system against high water pressure and extreme pressures due to occasional surges. Such precautions are the entire responsibility and expense of the developer." Sanitary Sewer - "Our records indicate the existence of a major sanitary sewer interceptor which crosses this tract. An unobstructed fifty foot easement centered about this sewerline will be required. Developer must field verify the location of this sewer line. Design must be coordinated with the Engineering Division of the Water Resources Department."
Fire Dept.:	"Comply with Fire Code - Ordinance No. 50-1975. Provide required flow and hydrant distribution."
Environmental Health:	"No adverse comments. Top Soil Disturbance Permit required."
City Engineer:	"Require a drainage study prior to approval of development plan and building plans.
APS:	"No adverse comments."
COG:	"This property is located within the Gibson West Corridor delineated on the Long Range Major Street Plan. Of significance, however, is a proposed east-west minor arterial connecting Snow Vista Boulevard with Unser Boulevard and which is an extension of De Anza Drive. The location of this proposed church is in the vicinity of that De Anza alignment, although such an alignment is not fixed at this time."
AMAFCA:	"The tract is in the Flood Hazard Area as shown on the Flood Hazard Boundary Map 27 dated 2-14-78. A drainage report will be required prior to development."
Parks & Recreation:	"No adverse comment."
Zoning Enforcement:	" " "
City Real Estate Officer:	" " "
Refuse Removal Division:	no reply received

PLANNING DIVISION COMMENTS TO THE ENVIRONMENTAL PLANNING COMMISSION, 11-15-79:

The applicant is requesting a zone change from R-1 to SU-1 for a church and approval of the church's site development plan. The property is located .8 mile south of Sage Road and .5 mile east of 98th Street/Snow Vista Boulevard. This 4.5 acre tract and all surrounding property is undeveloped. The Westgate Heights Master Plan encompasses this and all surrounding parcels.

Zone Change Request

The proposed zoning is consistent with the health, safety, and general welfare of the City in that it is a reasonable use, located in accordance with an approved private master plan for this area.

The applicant is requesting the change from the R-1 zone so that the uses established in the Westgate Heights Master Plan may develop.

The property is located in the Developing Urban Area of the Comprehensive Plan and the Westgate Heights Master Plan. The request conforms with both plans. The master plan indicates that the adjacent property should be developed as single-family residential.

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

June 9, 1981

Mrs. Peggy Reed
8608 Lynette Ct. S.W.
Albuquerque, New Mexico 87105

Reference: 8608 Lynette Ct. S.W.; Westgate Heights U-4;
Block 83; Lot 11

Gentlemen:

At the request of Mrs. Peggy Reed, I am submitting the following information regarding the above address.

Our maps indicate the property in question is no longer in a flood hazard zone, according to the Flood Hazard Boundary Map (F.H.B.M.) dated 12-4-79.

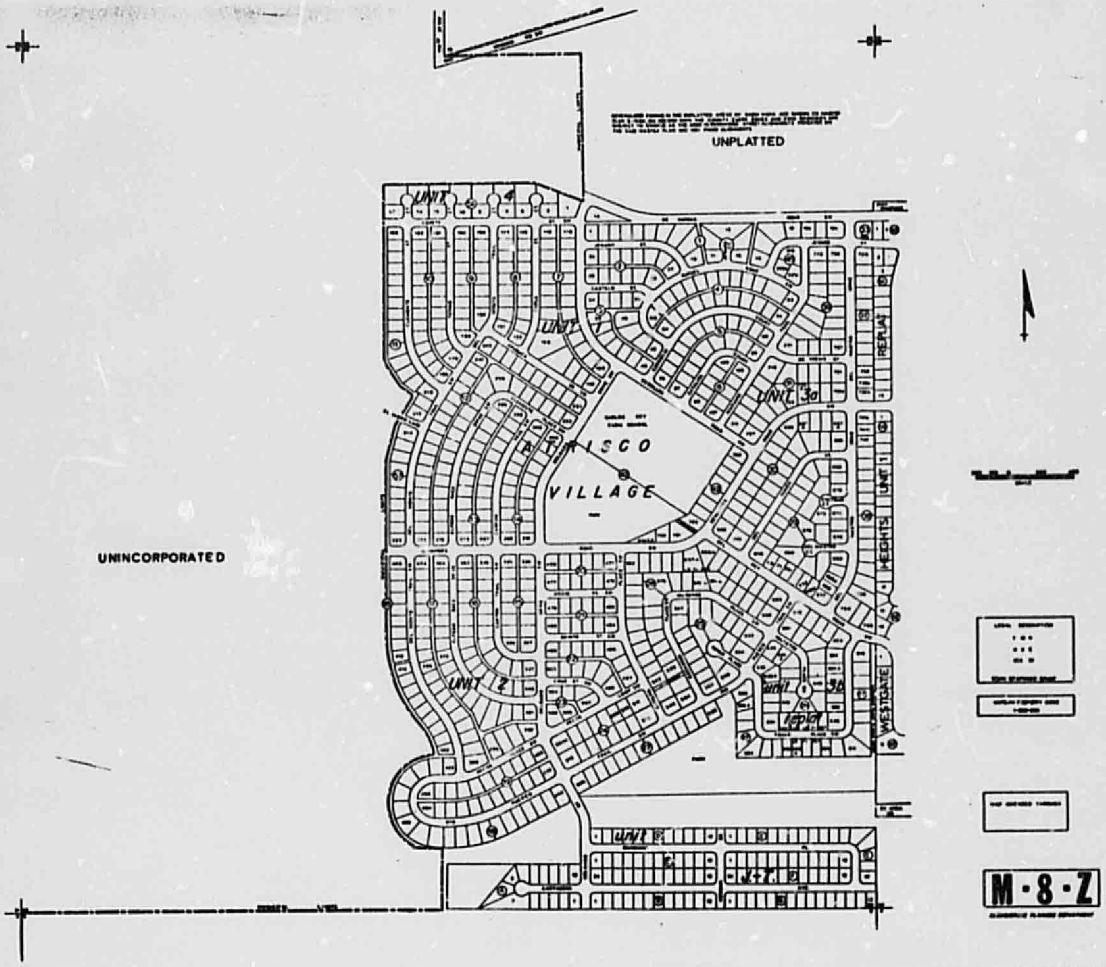
If you have any questions, please don't hesitate to contact my office.

Very truly yours,

Brian G. Burnett

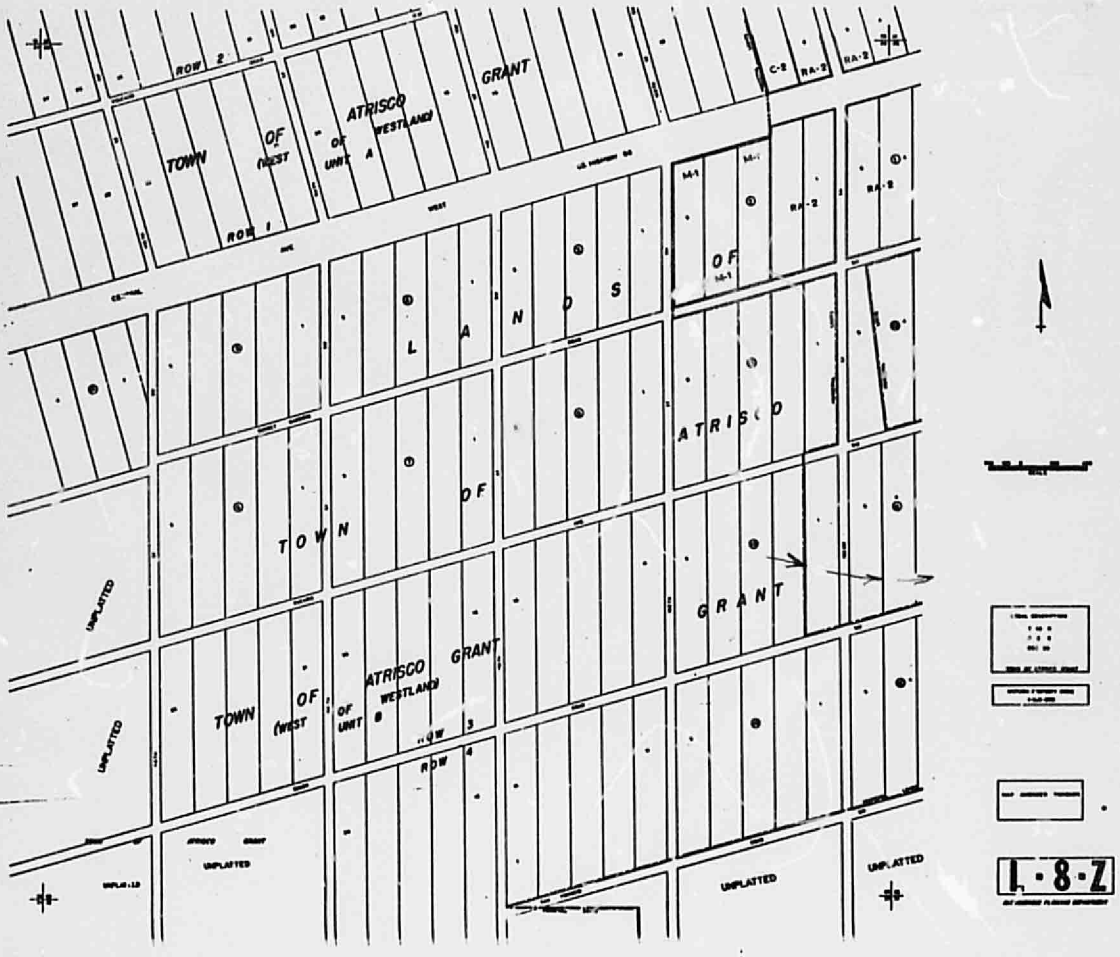
Brian G. Burnett
Civil Engineer/Hydrology

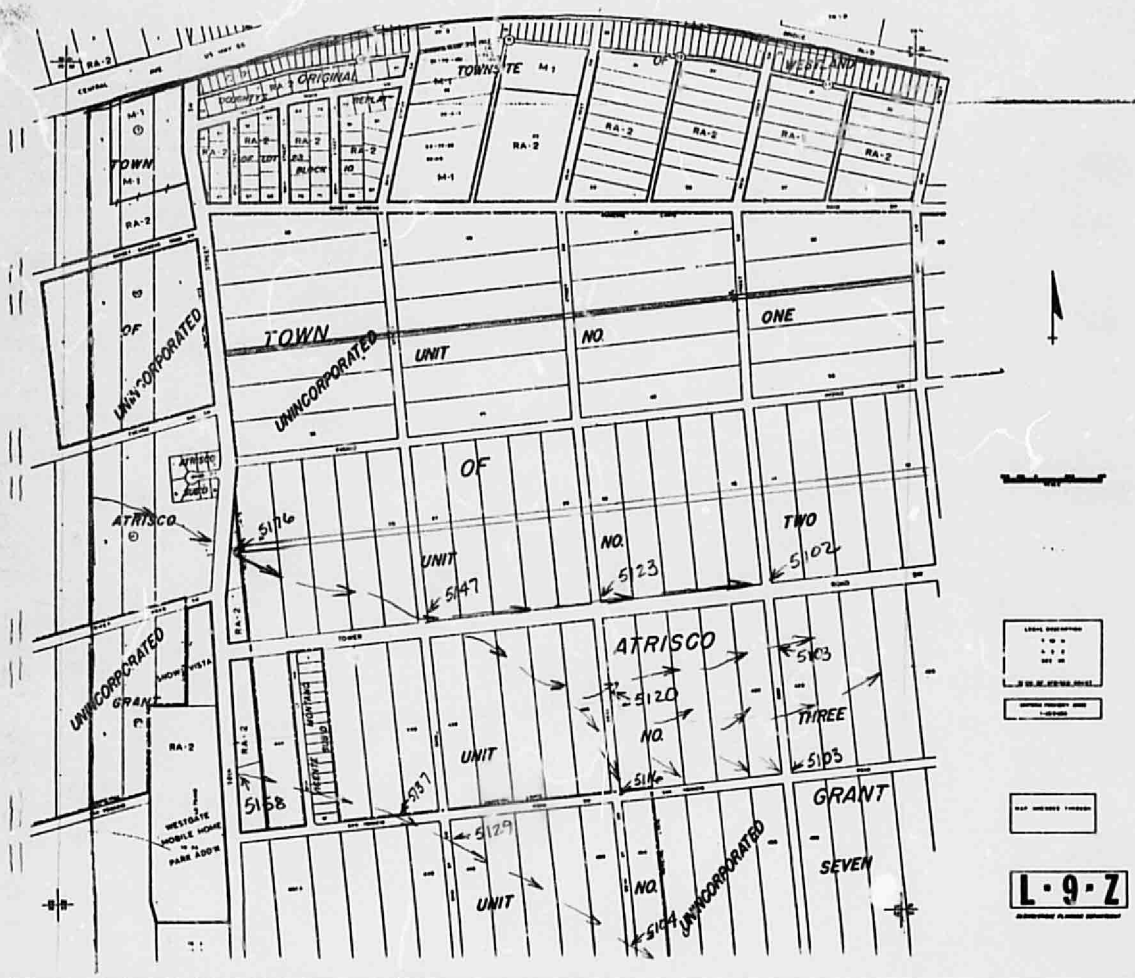
BGB/fs


UNPLATTED
UNINCORPORATED
UNIT 4
UNIT 7
UNIT 3a
UNIT 2
UNIT 3b
UNIT 1
UNIT 6
UNIT 5
SAN FRANCISCO
VILLAGE
REPLAT
HEIGHTS
WESTGATE
M-8-Z

TOWN
OF
UNIT
ATRISCO
GRANT
NO.
SEVEN
UNPLATTED
C-3
C-2
C-1
R-3
SU-1
WESTGATE
HEIGHTS
UNIT 1
REPLAT
SNOWVISTA
SUB'D
BLOCK 83
UNIT
TWO
UNPLATTED
H-9-Z

TOWN of ATRISCO GRANT
UNIT SEVEN
UNIT NO. THREE
SU-1
SOUTHWESTERN
ARENAL ROAD SW
UNPLATTED
M-10-Z


ROW 2
ROW 1
TOWN OF (WEST OF UNIT A WESTLAND) ATRISCO GRANT
C-2
RA-2
M-1
LA NOS
ATRISCO
TOWN OF
GRANT
UNPLATTED
TOWN OF (WEST OF UNIT B WESTLAND) ATRISCO GRANT
ROW 3
ROW 4
UNPLATTED
UNPLATTED
UNPLATTED
I-8-Z


TOWN
OF
UNINCORPORATED
ATRISCO
GRANT
TOWNSITE
OF
WESTLAND
TOWN
UNIT
NO.
ONE
OF
UNIT
NO.
TWO
ATRISCO
UNIT
NO.
THREE
GRANT
UNIT
NO.
SEVEN
UNINCORPORATED
5176
5147
5123
5102
5120
5103
5116
5105
5158
5137
5129
5144
L·9·Z

TOWN OF ATRISCO GRANT
UNIT NO. THREE
TOWN OF ATRISCO GRANT
UNIT NO. THREE
TOWN OF ATRISCO GRANT
UNIT NO. THREE
TOWN OF ATRISCO GRANT
UNIT NO. SEVEN
UNPLATTED
UNPLATTED
SUB'D
SU-1
C-2
O-1
RA-2
TOWER
POND

L-10-Z

MEURER - SERAFINI - MEURER, INC. ALBUQUERQUE, N.M.

By J.L. Date 12-23 PROJECT CHURCH SITE sheet No. 1 of 2

Checked By ____ Date ____ WESTGATE UNIT 4 Job No. 0640214

CONTRIBUTING AREAS

1. FLOW FROM UNIT 4 (FROM DRAINAGE REPORT BY MGM PREPARED DEC. 1976) 77.9 cfs

2. OFFSITE CONTRIBUTION (SOUTH OF UNIT 4)

AREA = 57.8 AC.
L = 3000 FT.
H = 72 FT.
Tc = 16.7 MIN.
I = 4.9 IN./HR.
C = 0.4 (UNDEVELOPED)
Q = ACI = 57.8 (0.4) 4.9 = 113.3 cfs

TOTAL 191.2 cfs

TRAPEZOIDAL CHANNEL

USE MANNINGS $Q = 1.49/n \, A R_h^{2/3} S^{1/2}$

S = 0.5%
n = 0.025

BOTTOM WIDTH = 32 FT. (FL TO FL EXIST. PVMT.)

SIDE SLOPE = 3:1

@ DEPTH = 1.21' Q = 192.2 cfs

PROVIDE 1'-0" FREE BOARD, USE D = 2.21'

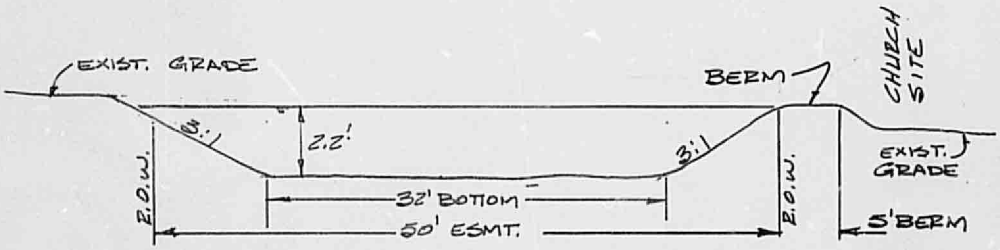
@ DEPTH = 2.21' Q = 544.7 cfs

MEURER - SERAFINI - MEURER, INC. ALBUQUERQUE, N.M.

By J.L. Date 12-23 PROJECT CHURCH SITE sheet No. 2 of 2

Checked By ____ Date ____ WESTGATE UNIT 4 Job No. 0604021.4

CHANNEL SECTION



GRANT OF EASEMENT
FOR TEMPORARY DRAINAGE
RIGHT-OF-WAY

THIS INDENTURE made and executed this 17th day of July, 1980, by and between PROPERTY MANAGEMENT COMPANY OF NEW MEXICO, hereinafter called the Grantor and THE CITY OF ALBUQUERQUE NEW MEXICO, a municipal corporation, hereinafter called the Grantee.

Witnesseth, that for good and valuable consideration the receipt of which is hereby acknowledged the Grantors have this day bargained and sold by these presents do sell, convey and deliver unto the City of Albuquerque a temporary easement as right-of-way including the temporary easement as right-of-way including the temporary right to enter upon the real estate hereinafter described at any time it may see fit and construct, maintain and repair, drainage ditches across, through, and under the lands hereinafter described and the further right to remove trees, bushes, undergrowth and obstructions interfering with the location, construction and maintenance of said drainage ditches.

The land affected by the grant of this easement and right-of-way is situate in Section 34, Township 10 North, Range 9 East, New Mexico Principal Meridian, within the Town of Atrisco Grant, Bernalillo County New Mexico, and being tied to the northeast corner of WESTGATE HEIGHTS, Unit 3, a subdivision of the City of Albuquerque, County of Bernalillo, State of New Mexico, as the same is shown and designated on the said plat filed in the office of the County Clerk of Bernalillo County, New Mexico, on April 22, 1977 (D7-167).

Right-of-way #1 - a 75 foot wide easement, the centerline of which being herein more particularly described as follows:

Beginning at the intersection of Sapphire Street S.W. and the west line of said Section 34 from whence the northeast corner of said WESTGATE HEIGHTS, Unit 3, bears North 00°28'10" East a distance of 400.64 feet, being also the westerly end and point of beginning of the drainage right-of-way centerline herein described; thence South 89°31'50" East a distance of 495.00 feet along said centerline to a point; thence South 73°00'00" East a distance of 375.00 feet along said centerline; thence South 83°20'00" East a distance of 590.00 feet along said centerline to a point; thence South 52°00'00" East a distance of 931.14 feet along said centerline to the easterly end of the drainage right-of-way herein set forth.

Right-of-way #2 - a 75 foot wide easement, the centerline of which being herein more particularly described as follows.

Beginning at the intersection of Kimela Drive S.W., and the west line of said Section 34 from whence the northeast corner of said WESTGATE HEIGHTS, Unit 3, bears North 00°28'10" East a distance of 1,679.58 feet, being also the westerly end and point of beginning of the drainage right-of-way centerline herein described; thence North 51°23'00" East a distance of 196.71 feet along said centerline to a point; thence South 89°31'50" East a distance of 1966.56 feet along said centerline to the easterly end of the drainage right-of-way centerline herein set forth.

Right-of-way #3 - A 50 foot wide easement, the centerline of which being herein more particularly described as follows:

Beginning at a point on the west line of said Section 34 from whence the northeast corner of said WESTGATE HEIGHTS, Unit 3, bears North 00°28'10" East a distance of 3,170.32 feet; thence North 89°31'50" West a distance of 25.00 feet to the centerline of the proposed Ladrones Road S.W., being also the westerly end and point of beginning of the drainage right-of-way centerline herein described; thence South 00°28'10" West a distance of 535.17 feet along said drainage centerline to a point; thence East a distance of 2289.92 feet along said centerline to the easterly end of the drainage right-of-way centerline herein set forth.

TO HAVE AND TO HOLD the said right and easement for the uses and purposes aforesaid, unto Grantee its successors and assigns for so long as said easement shall not be abandoned for use as a right-of-way for aforesaid drainage.

The Grantors do hereby covenant with the Grantee that they are lawfully seized and possessed of the real estate above described and that they have a good and lawful right to convey it or any part thereof, that it is free from all encumbrances except those of record and taxes due and owing the Treasurer of Bernalillo County and that they will warrant and defend the title thereto against the lawful claims of all persons whomsoever.

As part of the consideration for this grant, the Grantors do hereby release any and all claims for damages for whatsoever cause incidental to the exercise of the rights herein granted provided, however, that the Grantee agrees to save the Grantors harmless from any and all liability that may arise as a result of the construction and use of the easement for the purposes set forth.

Said easement is subject to, and in conjunction with, other grants of easements heretofore granted over the above described real estate.

IN WITNESS WHEREOF, the parties have set their hands and seals this 17th day of July, 1980

PROPERTY MANAGEMENT COMPANY OF NEW MEXICO

By: J.D. Fulmer
J.D. Fulmer, Vice President

Attest: Joe Wilson
Joe Wilson
Asst. Vice President

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this 17th day of July, 1980, by J. D. Fulmer and Joe Wilson, Vice President and Assistant Vice President respectively.

My Commission Expires:

OFFICAL SEAL
Signature Susan L. Floyd
Notary Public
NOTARY PUBLIC - NEW MEXICO
Notary Bond Filed with Secretary of State
My Commission Expires 2-13-82

28 27
33 34
N00°28'10"E
1434.25
400.64
75'
DRAINAGE R.O.W. #1
N89°31'50"W
N73°00'00"W
N83°00'00"W
N55°00'00"W
495'
375'
590'
931.14
3905.29
1278.94
1762.93
DRAINAGE R.O.W. #2
75'
418.18
S08°41'50"W
N51°23'00"E
196.71
860.41
448.07
S81°18'40"E
NORTH
Scale: 1" = 600'
N00°28'10"E
2925.71
1430.36
25'
DRAINAGE R.O.W. #3
50'
S08°39'00"W
535.17
N00°28'10"E
WEST
2289.92
200'
33 34
4 3
WEST
2236.15

DRAINAGE REPORT

WESTGATE HEIGHTS UNIT 4

ALBUQUERQUE, NEW MEXICO

MEURER, SERAFINI AND MEURER, INC. CONSULTING ENGINEERS

2601 WYOMING BOULEVARD N.E. • SUITE F • ALBUQUERQUE, NEW MEXICO 87110 • 505/292-1936

DRAINAGE REPORT

WESTGATE HEIGHTS UNIT 4

ALBUQUERQUE, NEW MEXICO

Prepared For

Mortgage Investment Company
2727 San Pedro, N.E.
Albuquerque, New Mexico

Prepared By

Meurer, Serafini and Meurer, Inc.
2601 Wyoming Blvd., N.E.
Albuquerque, New Mexico
505 292-1936

December 1976

WESTGATE HEIGHTS, UNIT 4

COMPREHENSIVE DRAINAGE STUDY

TABLE OF CONTENTS

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PURPOSE AND INTRODUCTION	1
THE SITE	1
GENERAL SITE CHARACTERISTICS	2
DESIGN CRITERIA	3
ESTIMATED RUNOFF UNDEVELOPED STATE	4
ESTIMATED RUNOFF DEVELOPED STATE	4
SUMMARY OF RUSULTS	5
RECOMMENDATIONS	6
SUMMARY	7

APPENDIX

EXHIBITS

FIG. 1	Vicinity and Location Map
FIG. 2	Primary Drainage Basin
FIG. 3	Developed Drainage Characteristics
FIG. 4	Proposed Amendment to Westgate Heights Subdivision
FIG. 5	Typical Lot Drainage
FIG. 6	Time of Concentration for Small Drainage Basins
FIG. 7	Intensity Duration Curves - Albuquerque & Environs
FIG. 8	100 Year - 6 Hour Precipitation
FIG. 9	Street Flow Capacity Characteristics
FIG. 10	Velocities for Upland Method of Estimating Tc

APPENDIX (Cont'd)

Composite "C" Factor Calculations

Lot Ponding Requirement Calculations

Rational Method Calculations

Street Flow Quantity Tables

Bibliography

DRAINAGE REPORT

WESTGATE HEIGHTS SUBDIVISION
UNIT 4

PURPOSE AND INTRODUCTION

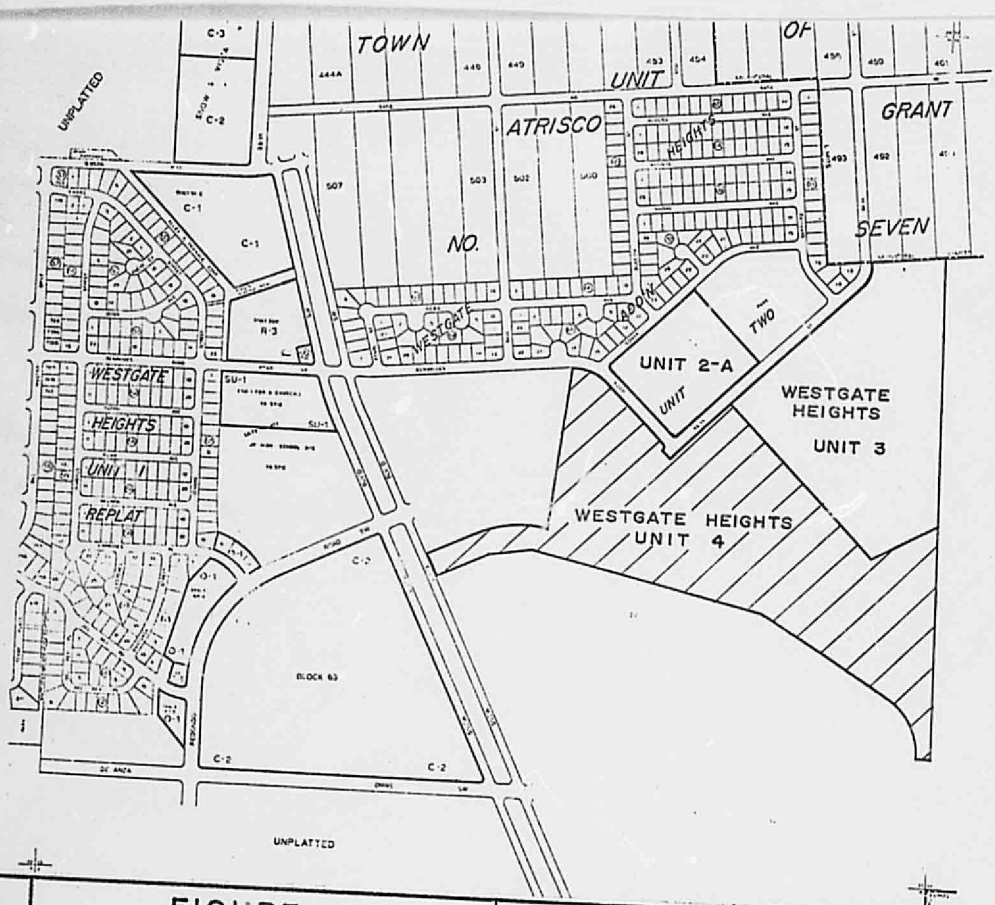
The following report with the supporting calculations and exhibits describes the drainage characteristics affecting the development of Westgate Heights, Unit 4. A number of recommendations regarding the design and implementation of drainage improvements are included within the text to assist the City of Albuquerque, the Albuquerque Metropolitan Flood Control Authority and the developer in the engineering design and implementation of drainage facilities such that urban planning and development can be accomplished with a minimum risk to life and property.

THE SITE

Westgate Heights, Unit 4, a proposed R-1 development, is located within the southwest quadrant of the City of Albuquerque, east of Snow Vista Boulevard and south of Sage Road. It is bounded on the west by Truman Middle School and on the north by Westgate Heights Units 2 and 3, on the south and the east by unplatted lands.

GENERAL SITE CHARACTERISTICS

The site encompasses 65.06 acres, more or less, slopes from west to east with an average slope of 2%. The surface soils are predominantly sandy with little clay and can be considered open and highly absorbent with a high degree of porosity.



NORTH

800'±

FIGURE 1
WESTGATE HEIGHTS
UNIT 4
VICINITY & LOCATION MAP

MEURER, SERAFINI AND MEURER, INC.
CONSULTING ENGINEERS • SURVEYORS • PLANNERS
2601 Wyoming Blvd., N.E.
Albuquerque, New Mexico 87110
(505) 292-1936

DESIGN CRITERIA

In analyzing the storm runoff, the Rational Formula, $Q = C \cdot C_f \cdot I \cdot A$, was used. See Urban Storm Drainage, Criteria Manual, Vol. 1, Runoff, Section 3 "Rational Method".

Where:

Q = Runoff quantity in cubic feet/second.

A = Contributing area in acres.

C_f = Frequency Factor for Rational Formula.

I = Intensity in inches/hour for a duration equal to the time of concentration (duration) measured in minutes and obtained from Figure IV, Intensity Duration Frequency Curves, Albuquerque Area 1961. (Note: Where a Time of Concentration [Tc] is less than ten minutes from Figure III, the intensity value equal to ten minutes was employed.)

C = Runoff Coefficient (No Unit). This coefficient represents the integrated effects of infiltration, detention storage, evaporation, retention, flow routing, and interception which all affect the time distribution and peak rate of runoff.

ESTIMATED RUNOFF UNDEVELOPED STATE

Drainage within the boundary of the primary drainage basin is in the form of sheet flow with general accumulation into several small arroyos. Offsite drainage from the west passes through the subdivision. The total runoff in the undeveloped site forms the basis for comparison with the flow in the developed state.

TABLE 1

RUNOFF IN UNDEVELOPED STATE

Elev. Diff.	Length of Flow	Tc[1].	I100 Yr. In./Hr.	C[2].	Area Ac.	Q100 C.F.S.
80'	3500'	18	4.4	.4	97.62	172

ESTIMATED RUNOFF DEVELOPED STATE

As development occurs, the area of impervious surfaces increases and thereby the amount of runoff also increases. To offset this increase, onsite restrictions of flows must be incorporated into the development. While this may take different forms, the most practical solution for this type of development is to utilize on-lot ponding. The contributing area to the backyard ponding includes the backyard, sideyard, and in a majority of cases, one-half the roof area due to the popularity of the pitched roof concept. The area drained to the street includes the front yard, driveway, sidewalk-parkway areas, and one-half the roof area. This approach is to satisfy AMAFCA's requirement that the runoff rate from the developed tract not exceed the runoff rate from the tract in its natural state.

SUMMARY OF RESULTS

Total Undeveloped Runoff (See Page 3) 172 c.f.s.

Developed Runoff

O-S-1	12.26 c.f.s.
O-S-2	14.94 c.f.s.
O-S-3	41.06 c.f.s.
O-S-4	4.34

1. See Appendix; Rational Method Calculations.
2. See Appendix: Composite "C" Computations.

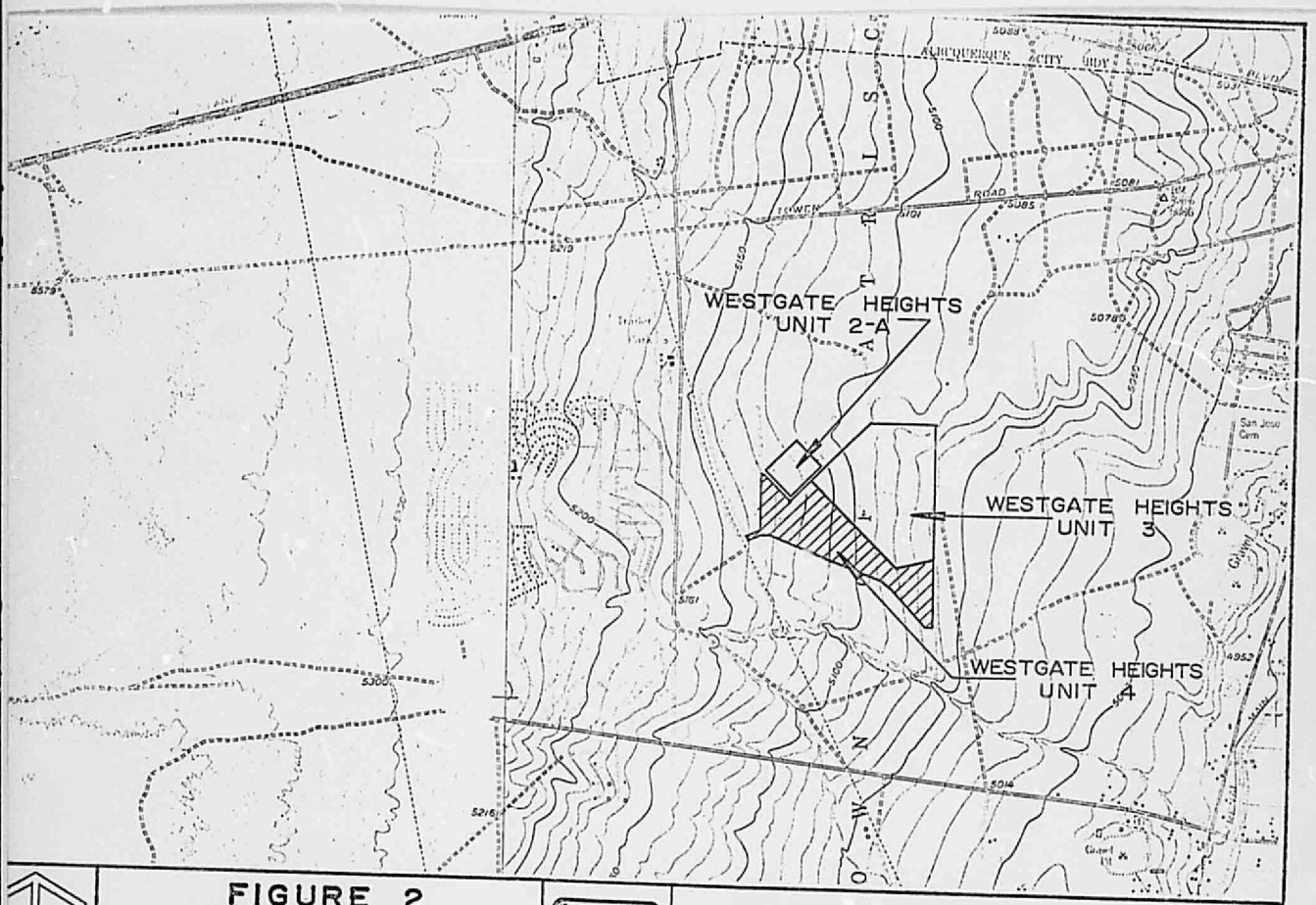


FIGURE 2

WESTGATE HEIGHTS
UNIT 4
PRIMARY DRAINAGE BASIN

MEURER, SERAFINI AND MEURER, INC.
CONSULTING ENGINEERS • SURVEYORS • PLANNERS
2601 Wyoming Blvd., N.E. Albuquerque, New Mexico 87110
(505) 292-1936

Developed Runoff (cont'd.)

Single Family Area	35.95	
Total Developed Runoff		77.89 c.f.s.

See Composite Flows (Table 2)

TABLE 2

RUNOFF IN DEVELOPED STATE

Area Designation	Acreage (Ac.)	I_{100} In./Hr.	"C"[3].	Qmax. (cfs)	Q100 (cfs)
Offsite					
O-S-1	3.29	5.4	.69	12.26	12.26
O-S-2	4.79	4.5	.69	14.94	14.94
O-S-3	19.01	5.4	.40	41.06	41.06
O-S-4	2.01	5.4	.40	4.34	4.34
A-1	9.68	4.47	.53	22.93	
B-1	2.81	5.17	.54	7.84	
B-2	.38	5.4	.48	2.28	
B-3	1.58	5.4	.43	3.67	
B-4	0.37	5.4	.80	1.61	
B-5	1.37	5.4	.47	3.48	
B-6	.75	5.4	.46	1.86	
B-7	3.50	5.4	.43	8.13	
C-1	2.88	5.09	.47	6.89	
C-2	0.67	5.4	.19	0.69	
C-3	0.97	5.4	.66	3.46	
C-4	0.91	5.4	.45	2.21	
C-5	1.96	5.4	.51	5.4	
C-6	1.29	5.4	.51	3.55	
C-7	1.32	5.4	.44	1.32	

TABLE 2 (Cont'd.)

RUNOFF IN DEVELOPED STATE

Area Designation	Acreage (Ac.)	I_{100} In./Hr.	"C"[3].	Qmax. (cfs)	Q100 (cfs)
D-1	1.82	5.4	.47	4.62	
D-2	0.52	5.4	.35	0.98	
D-3	0.53	5.4	.38	1.09	
E-1	0.96	5.4	.50	2.59	

TABLE 3

COMPOSITE FLOWS - DEVELOPED STATE

Area Designation	Acreage (Ac.)	I_{100} In./Hr.	"C"[3]	Qmax. (cfs)	Q100 (cfs)
W6 #4 Total	34.77	2.11	.49	35.95	
A + O-S-4 (I)	11.69	4.04	.51	24.09	
B-1 thru B-7 + O-S-1 (II)	14.55	2.71	.53	20.9	
C-1 thru C-7 + O-S-3 & 4 (III)	31.02	2.11	.43	27.87	
I + II (IV)	26.24	2.71	.52	36.98	
III + IV (V)	57.26	2.71	.47	73.13	
V + D (VI)	60.13	2.71	.47	76.28	
VI + E (VII)	61.09	2.71	.47	77.89	77.89 cfs

SUMMARY OF RESULTS

Total Undeveloped Runoff (see Page 3) 172 cfs

Developed Runoff:

O-S-1	12.26 cfs
O-S-2	14.94 cfs
O-S-3	41.06 cfs
O-S-4	4.34 cfs
Total Developed Runoff	72.6 cfs

As shown above, the development of this project including the lot ponding will not increase the storm runoff over that occurring in the natural undeveloped state. Further, offsite flows entering the site on the west perimeter are to be intercepted by and conveyed in Benavidez Road and Locura Road to Ladrones Road.

RECOMMENDATIONS

The following recommendations regarding the design and implementation of drainage improvements are included to assist the City of Albuquerque, the Albuquerque Metropolitan Flood Control Authority and the developer in the engineering design and implementation of drainage facilities:

1. Flows within the streets of the development are distributed so that only Benavidez Road and Ladrones Road assume the major role in conveying offsite flows. These streets should be graded at not less than .5% slope in order to insure adequate capacity.
2. Paving and other surface improvements as shown on Figure 3 should be constructed in accordance with the typical sections

shown on Figure 4, therein providing permanent definition of flow patterns for offsite runoff.

3. The ponding areas in each backyard should be situated toward the rear of the yard. There should be a minimum of a five foot buffer zone between the rear property lines and the edge of the pond to protect any walls which might be constructed. In no case should ponded waters be allowed to stand against a wall or house foundation.

4. Ponds should average 6" deep and the minimum surface area should not be less than 15% of the total area drained into the pond. See Appendix, Lot Ponding Calculation.

SUMMARY

The subject property, by utilizing backyard ponding on single family lots and outlet control in the multi-family and commercial areas, will contribute no more surface runoff to surrounding areas than that which existed before development.

In conclusion, the development of this site should have a beneficial effect on the drainage characteristics of this area, and can be developed safely with no harm to life or property.

Prepared by:

_____

Approved:

_____

Carl A. Tebbens
N.M.P.E. No.6309

APPENDIX

"RATIONAL METHOD"

COMPOSITE RUNOFF COEFFICIENTS

For purposes of this report the runoff coefficient (C) and frequency factor (C_f) are combined in one factor designated (C). Each of the following determinations of composite runoff coefficients is first computed upon the basis of relative percentages of surface characteristics for the individual areas, and coefficients for 2 to 10 year frequency storms. Each is then multiplied by the frequency factor (C_f) of 1.25 for 100 year storms.

UNDEVELOPED LAND

$$C = 0.30^{1.} \times 1.25^{2.} = 0.38$$

DEVELOPED LAND

Typical Lot Area - Westgate Heights, Unit 4

Gross Area		65.09 Ac.
Less: Area in Streets	14.81 Ac.	
Area in Lots		50.25 Ac.
Average Lot Area (253 Lots)		86.18 Sq.Ft.
Typical Lot Width		65 Ft.

1. See Bibliography; Item (1) Table XII
2. See Bibliography; Item (2) Article 3.7

Ponded Lots - Westgate Heights, Unit 4

C = 0.80

Streets & Walk Area	20 x 65	1,300 S.F.
Roof Area	20 x 55	1,100 S.F.
Driveway	30 x 15	450 S.F.
Total Impervious Area		2,850 S.F.

C = 0.12

Front and Side Yards	3,250 S.F.
Less Roof Area	-1,100 S.F.
Less Driveway	-450 S.F.
Total Pervious Area	1,700 S.F.

Impervious Area	2850 Sq.Ft.	63% @ 0.80	0.504
Pervious Area	1700 Sq.Ft.	37% @ 0.12	0.044
Total Area	4550 Sq.Ft.	100%	0.548

Composite Runoff Coefficient = C x C_f = 0.55 x 1.25 = 0.69

PONDING REQUIREMENTS

Typical Lot Area

Average Lot Area		8,618 S.F.
Less: Front & Side Yards		-3,250 S.F.
Area Draining to Pond		5,368 S.F.
Roof Area	20 x 55	1,100 S.F.
Patio Area		100 S.F.
Lawn Area		4,168 S.F.

Runoff Coefficient

Impervious Area	1200 S.F.	22% @ 0.80	0.18
Pervious Area	4168 S.F.	78% @ 0.12	0.09
			0.27

$C \times C_1 = 0.27 \times 1.25 = 0.34$

Pond Volume Requirement

100-year 6-hour precipitation = 2.2 in.

Volume = Runoff coefficient x area x precipitation

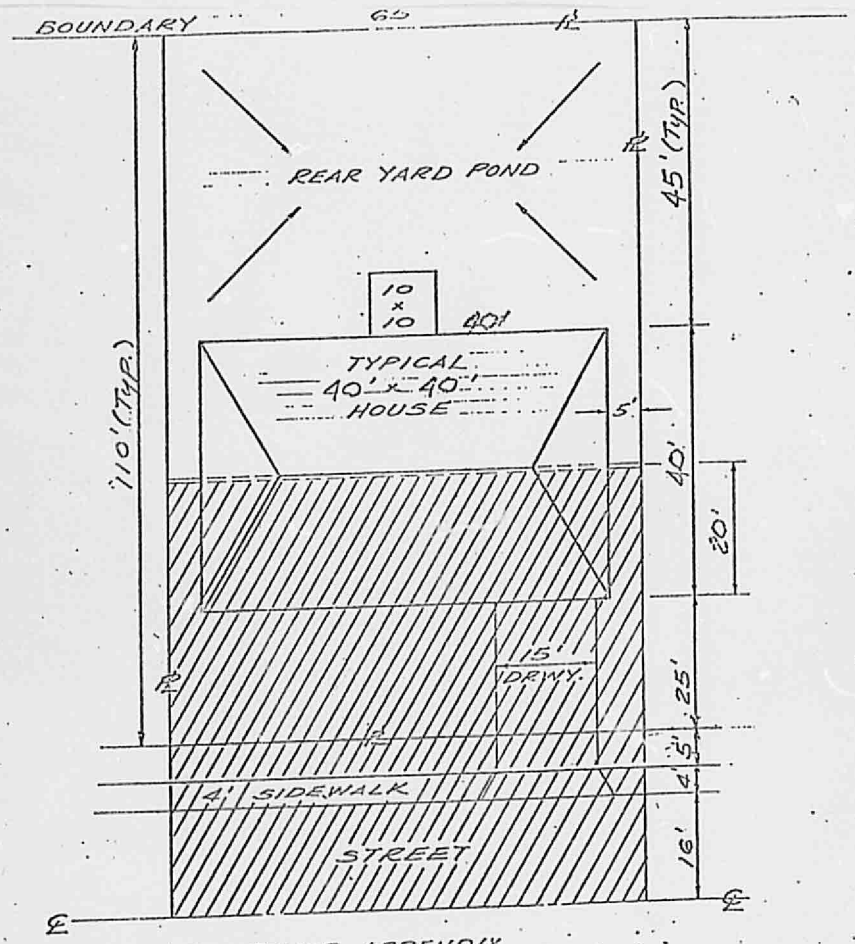
V = 0.34 x 5368 x 0.18 = 329 cu.ft.

Depth of pond 0.50 ft. (6")

Minimum area of pond 657 sq.ft.

Pond area as a percentage of area drained = 12% - use 15%

V = 15% x 5368 sq.ft. x 0.5 ft. = 403 cu.ft.



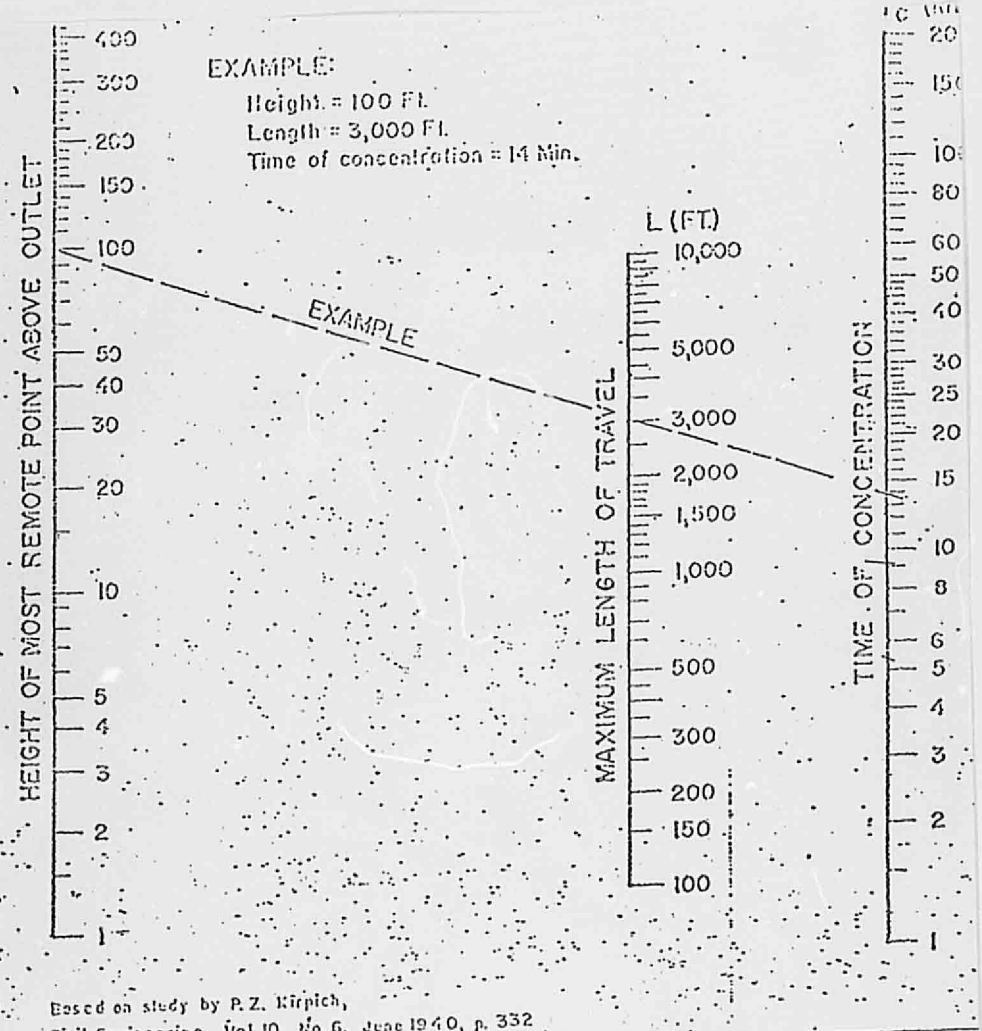
NOTE: REFER APPENDIX FOR CALCULATION

AREA DRAINED

FIGURE-5
TYPICAL LOT DRAINAGE

MURRAY-McCORMICK, INC.
ENVIRONMENTAL DESIGN
ENGINEERING·PLANNING·SURVEYING
9401 WYOMING BLVD., NE SUITE F / ALBUQUERQUE, NEW MEXICO 87110 / 505-292-1956

JOB NO. _____ DATE _____
PROJECT Westgate Hts-No 4
SCALE A-1°



Based on study by P. Z. Kirpich,
Civil Engineering, Vol. 10, No. 6, June 1940, p. 332

TIME OF CONCENTRATION OF SMALL DRAINAGE BASINS

FIGURE - 6

Reprinted from "Design of Roadside Drainage Channels - Hydraulic Engineering Circular No. 6", April 1962, U. S. Dept.

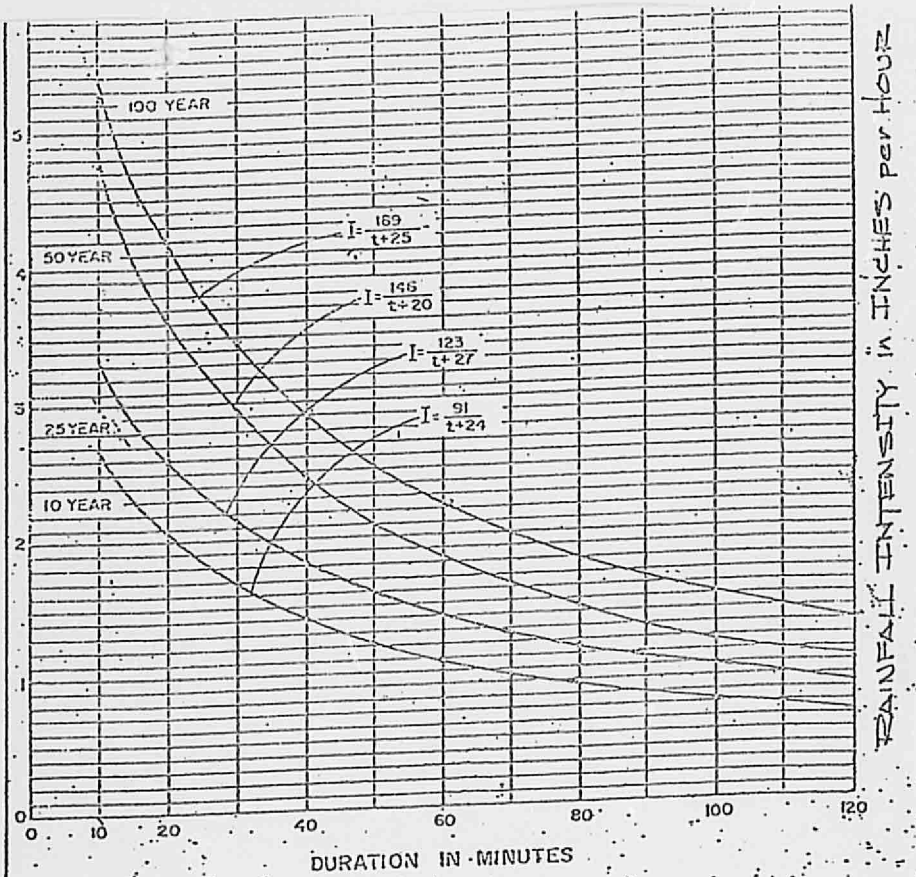


FIGURE 7

INTENSITY-DURATION CURVES

MASTER PLAN OF DRAINAGE
CITY OF ALBUQUERQUE - NEW MEXICO
AND ENVIRONS

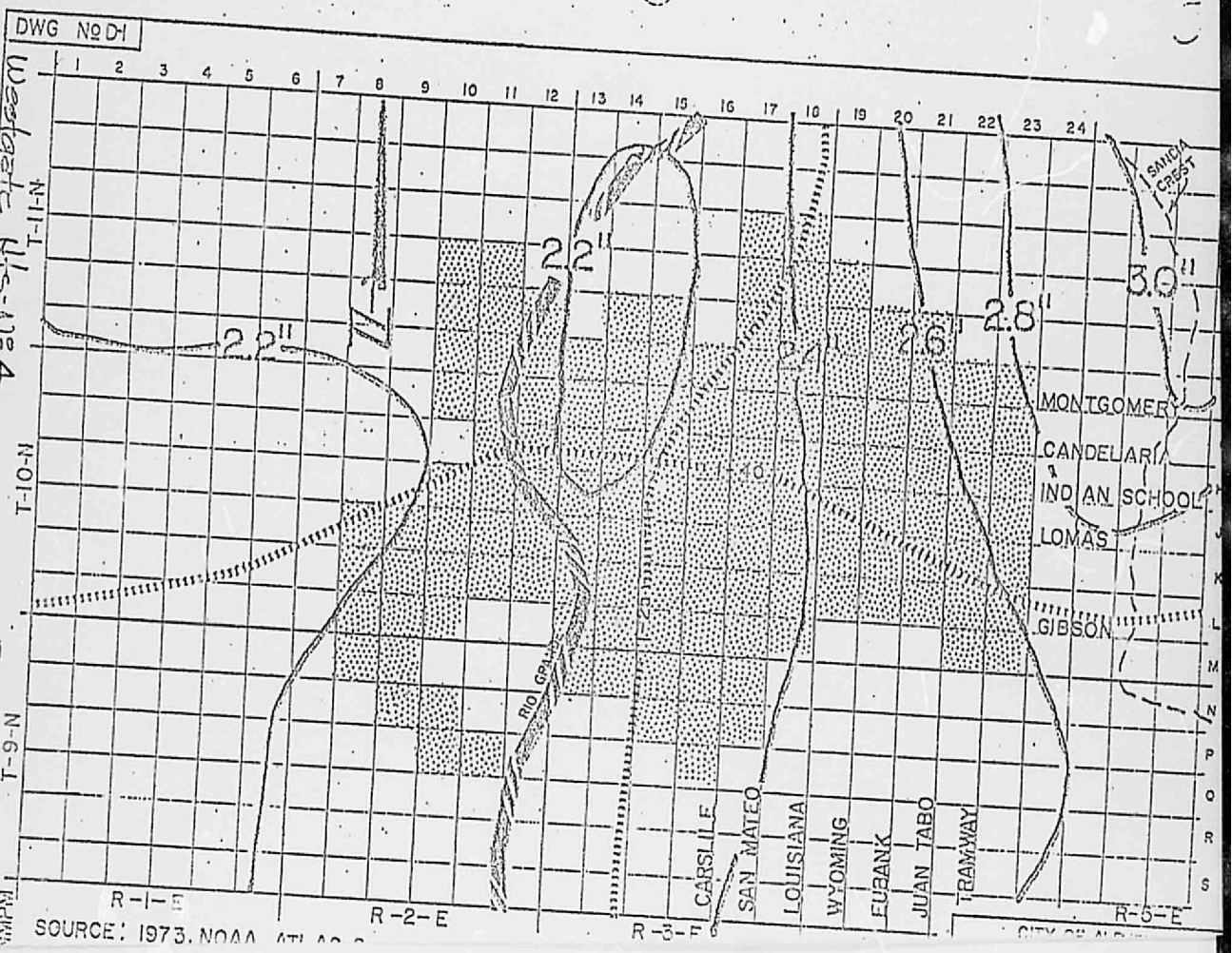
INTENSITY DURATION
FREQUENCY CURVES

(ALBUQUERQUE AREA-1961)

GORDON HERKENHOFF & ASSOC. CONSULTING ENGINEERS | CHART

MURRAY-McCORMICK, INC.
ENVIRONMENTAL DESIGN
ENGINEERING·PLANNING·SURVEYING
2601 WYOMING BLVD., NE SUITE F / ALBUQUERQUE, NEW MEXICO 87110 / 505-292-1938

JOB NO. _____ DATE _____
PROJECT Westgate Hts. No 4
SCALE A-6.2



SOURCE: 1973, NOAA ATLAS 2

Westgate Hts-Nº 4

FIGURE 8

A-72

SECTION DATA

32 Ft. F-F
8" Std. Curb & Gutter
0.14' Crown
50 Ft. R.O.W.
P.L. 0.2 above Top of Curb

1.00% Street Gradient

STREET FLOW
CAPACITY CHARACTERISTICS

FIGURE 9

MURRAY-McCORMICK, INC.
ENVIRONMENTAL DESIGN
ENGINEERING·PLANNING·SURVEYING
2601 WYOMING BLVD., NE, SUITE F / ALBUQUERQUE, NEW MEXICO 87110 / 505-292-1038

JOB NO. _____ DATE _____
PROJECT Westgate Heights No. 4
SCALE _____

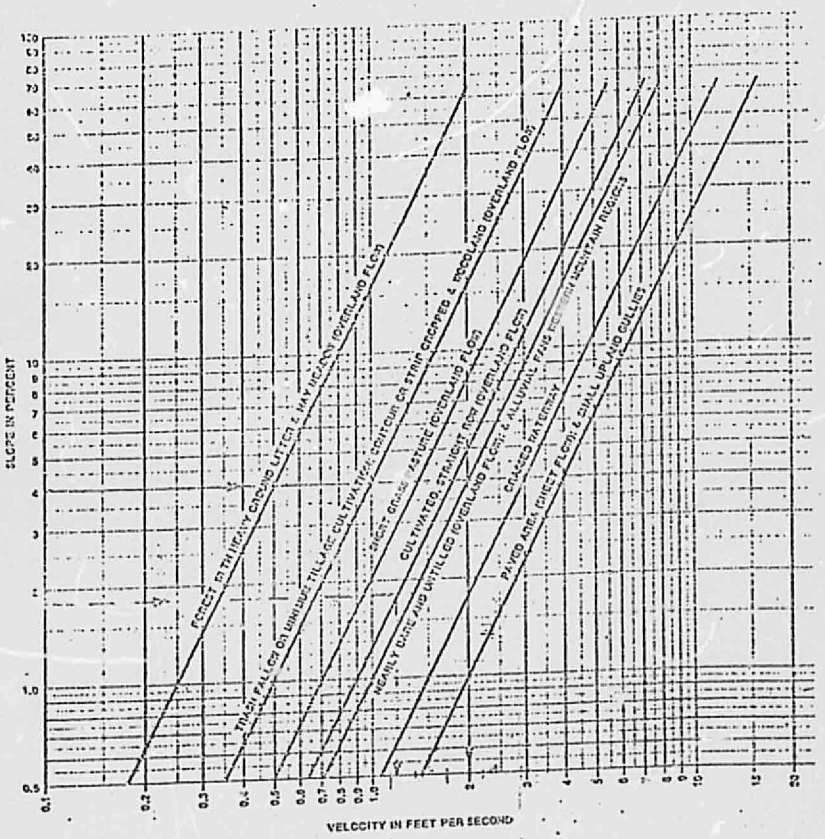


Figure 10 -Velocities for upland method of estimating T_c

RUNOFF COMPUTATIONS

Sheet No. _____

Project: WESTGATE HEIGHTS 4

Drainage Area No. O.S. 1

Area = ~~5.37~~ 3.29 acres

Maximum Overland Flow: L = 650' S = 1.8%

Maximum Channel Flow:

Channel No. 1 L = _____ S = _____

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 7.74 min.

Channel No. 1 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 7.74 min.

I = 189/(7.74+25) = 189 / 32.74 = 5.77 use 5.4

Q = CIA = (~~.44~~ .69) (5.4) (~~5.37~~ 3.29) = ~~12.76~~ 12.24 c.f.s.

Date: 10-77

Comp. by: K Lucas

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

___ % Ponded @ _____

~~80~~ % Non-Ponded @ ~~.44~~ ~~32.69~~

~~20~~ % _____ @ ~~.8~~ ~~1.00~~ See "C" comps. W.C. 2-A

100 % TOTAL ~~.44~~ .69

RUNOFF COMPUTATIONS

Sheet No. _____

Project: WESTGATE HEIGHTS 4

Drainage Area No. O.S. 2

Area = 4.79 acres

Maximum Overland Flow: L = _____ S = _____

Maximum Channel Flow:

Channel No. 1 L = 2320' S = 2%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 18 min.

Channel No. 1 Flow:

Velocity = _____ ft/sec; Time = ~~2320~~ / X 60 = 15.97 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 16.8 min.

I = 189 / (16.8 + 25) = 189 / 41.8 = 4.52

Q = CIA = (.69) (4.52) (4.79) = 14.94 c.f.s.

Date: 10-77

Comp. by: K Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

30 %	Ponded	@ .12	3.4
70 %	Non-Ponded	@ .7	56.0
___ %	_____	@ ___	59.4
100 %	TOTAL		.69

RUNOFF COMPUTATIONS

Sheet No. _____

Project: WESTGATE HEIGHTS 4

Drainage Area No. O.S. 3

Area = 19.01 acres

Maximum Overland Flow: L = 1400' S = 1.9%

Maximum Channel Flow:

Channel No. 1 L = _____ S = _____

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 9.4 min.

Channel No. 1 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 9.4 min.

I = 189/9.6+25 = 189/34.6 = 5.46 use 5.4

Q = CIA = (.4) (5.4) (19.0) = 41.06 c.f.s.

Date: 10-77

Comp. by: K Guerra

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

100 % Ponded @ .4 ____

____ % Non-Ponded @ ____ ____

____ % _____ @ ____ ____

100 % TOTAL .4

RUNOFF COMPUTATIONS

Sheet No. _____

Project: WESTGATE HEIGHTS U

Drainage Area No. O.S.4

Area = 2.01 acres

Maximum Overland Flow: L = 600' S = 2.5 %

Maximum Channel Flow:

Channel No. 1 L = _____ S = _____

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 4.5 min.

Channel No. 1 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 4.5 min.

I = 189/4.5+25 = 189/29.5 = 6.41 use 5.4

Q = CIA = (.4) (5.4) (2.01) = 4.34 c.f.s.

Date: 10-77

Comp. by: R Jones

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

___ % Ponded @ ___ ___

___ % Non-Ponded @ ___ ___

100 % _____ @ .4 ___

100 % TOTAL .4

RUNOFF COMPUTATIONS

Sheet No. _____

Project: WESTGATE HEIGHTS UNIT 4 -

Drainage Area No. A-1

Area = 9.68 acres

Maximum Overland Flow: L = 50' S = 1.0%

Maximum Channel Flow:

Channel No. 1 L = _____ S = _____

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: _____ min.

Channel No. 1 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 17.24 min.

I = 189/17.24 + 25 = 189/42.24 = 4.47

Q = CIA = (.53) (4.47) (9.68) = 22.93 c.f.s.

Date: 11-77

Comp. by: E Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

40 %	Ponded	@ .12	4.8
60 %	Non-Ponded	@ .8	48.0
___ %	_____	@ ___	52.8
100 %	TOTAL		53

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westgate Heights Unit 4

Drainage Area No. B-1

Area = 2.81 acres

Maximum Overland Flow: L = 50' S = 1.0%

Maximum Channel Flow:

Channel No. 1 L = 900' S = 0.56%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: .83 min.

Channel No. 1 Flow:

Velocity = 1.4 ft/sec; Time = 900 / X 60 = 10.71 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 11.54 min.

I = 139 / 11.54+25 = 139/36.54 = 5.17

Q = CIA = (.54) (5.17) (2.81) = 7.84 c.f.s.

Date: 11-77

Comp. by: R Lucas

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

38 %	Ponded	@ .12	4.56
62 %	Non-Ponded	@ .8	49.60
___ %	_____	@ ___	54.16
100 %	TOTAL		.54

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westgate Heights Unit 4

Drainage Area No. B-2

Area = .88 acres

Maximum Overland Flow: L = 60' S = 1.0%

Maximum Channel Flow:

Channel No. 1 L = 120' S = 15%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: .83 min.

Channel No. 1 Flow:

Velocity = 2.5 ft/sec; Time = 120 / X 60 = .8 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 1.63 min.

I = 184/1.63+25 = 184/26.63 = 7.1 use (5.4)

Q = CIA = (.48) (5.4) (.88) = 2.28 c.f.s.

Date: 11-77

Comp. by: R. Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

47 % Ponded @ .12 5.64

53 % Non-Ponded @ .8 42.40

___ % _____ @ ___ 48.04

100 % TOTAL .48

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westgate Heights Unit 4

Drainage Area No. B-3

Area = 1.58 acres

Maximum Overland Flow: L = 50 S = 1.5%

Maximum Channel Flow:

Channel No. 1 L = 600' S = 1%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 1.83 min.

Channel No. 1 Flow:

Velocity = 2 ft/sec; Time = 600 / X 60 = 5.0 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 5.83 min.

I = 164/5.83+25 = 164/30.83 = 6.13 use (5.4)

Q = CIA = (.43) (5.4) (1.58) = 3.67 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

54	% Ponded	@	.12	6.48
46	% Non-Ponded	@	.8	36.80
___	% _____	@	___	42.8
100	% TOTAL			.43

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westgate Heights Unit 4

Drainage Area No. B-4

Area = .37 acres

Maximum Overland Flow: L = _____ S = _____

Maximum Channel Flow:

Channel No. 1 L = 300' S = 1.7%

Channel No. 2 L = 263' S = 1.3%

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: _____ min.

Channel No. 1 Flow:

Velocity = 2.6 ft/sec; Time = 300 / X 60 = 1.92 min.

Channel No. 2 Flow:

Velocity = 2.3 ft/sec; Time = 263 / X 60 = 1.91 min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 3.83 min.

I = 184/3.83+25 = 184/28.83 = 6.56 use (5.4)

Q = CIA = (.8) (5.4) (.37) = 1.61 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

___ % Ponded @ ___ ___

___ % Non-Ponded @ ___ ___

___ % _____ @ .8 ___

100 % TOTAL .8

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westmore Heights Unit 4

Drainage Area No. B-5

Area = 1.37 acres

Maximum Overland Flow: L = 50' S = 1.0%

Maximum Channel Flow:

Channel No. 1 L = 395' S = 1.2%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: .83 min.

Channel No. 1 Flow:

Velocity = 2.2 ft/sec; Time = 395 / X 60 = 2.99 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 3.82 min.

I = 189/3.82+25 = 189/28.82 = 6.56 use (5.4)

Q = CIA = (.47) (5.4) (1.37) = 3.48 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

49 %	Ponded	@ .12	5.88
51 %	Non-Ponded	@ .8	40.8
___ %	_____	@ ___	46.68
100 %	TOTAL		.47

RUNOFF COMPUTATIONS

Sheet No. _____

Project: WESTGATE HEIGHTS UNIT 4

Drainage Area No. B-6

Area = 0.75 acres

Maximum Overland Flow: L = 50' S = 1%

Maximum Channel Flow:

Channel No. 1 L = 140' S = 1.4%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: .83 min.

Channel No. 1 Flow:

Velocity = 2.4 ft/sec; Time = 140 / X 60 = .97 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 1.8 min.

I = 189 / 1.5 + 25 = 189 / 26.8 = 7.05 USE (5.4)

Q = CIA = (.46) (5.4) (.75) = 1.86 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

50 %	Ponded	@	.17	8.5
50 %	Non-Ponded	@	.8	40.0
___ %	_____	@	___	46.0
100 %	TOTAL			.46

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westland Heights Unit 4

Drainage Area No. B-7

Area = 3.5 acres

Maximum Overland Flow: L = 50' S = 1%

Maximum Channel Flow:

Channel No. 1 L = 550' S = 1.5%

Channel No. 2 L = 200' S = 1.5%

Channel No. 3 L = 136' S = 1.3%

Accumulation Time

Overland Flow or Inlet Time: .83 min.

Channel No. 1 Flow:

Velocity = 2.5 ft/sec; Time = 550 / X 60 = 3.67 min.

Channel No. 2 Flow:

Velocity = 1.4 ft/sec; Time = 200 / X 60 = 2.38 min.

Channel No. 3 Flow:

Velocity = 2.3 ft/sec; Time = 136 / X 60 = 0.99 min.

Total Accumulation Time: T = 7.87 min.

I = 189 / 7.87+25 = 189/32.87 = 5.75 use (5.4)

Q = CIA = (.43) (5.4) (3.5) = 8.13 c.f.s.

Date: 11-77

Comp. by: E. Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

55	% Ponded	@	.12	6.6
45	% Non-Ponded	@	.8	36.0
___	% _____	@	___	42.6
100	% TOTAL			.43

HYDROLOGY M9/D9 2 of 2 16 PLANS

RUNOFF COMPUTATIONS

Sheet No. _____

Project: WESTGATE HEIGHTS UNIT 4

Drainage Area No. C-1

Area = 2.88 acres

Maximum Overland Flow: L = 50' S = 1%

Maximum Channel Flow:

Channel No. 1 L = 950' S = 0.5%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 8.3 min.

Channel No. 1 Flow:

Velocity = 1.4 ft/sec; Time = 950 / X 60 = 11.31 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 12.14 min.

I = 189/(12.14+25) = 189/37.14 = 5.09

Q = CIA = (.47) (5.09) (2.88) = 6.89 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

44 %	Ponded	@ .12	5.28
51 %	Non-Ponded	@ .18	9.18
___ %	_____	@ ___	46.68
100 %	TOTAL		.47

RUNOFF COMPUTATIONS

Sheet No. _____

Project: WESTGATE HEIGHTS UNIT 4

Drainage Area No. C-2

Area = .67 acres

Maximum Overland Flow: L = 50' S = 1%

Maximum Channel Flow:

Channel No. 1 L = 130' S = 0.4%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: .83 min.

Channel No. 1 Flow:

Velocity = 1.4 ft/sec; Time = 130 / X 60 = 1.55 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 2.38 min.

i = 189/2.38+25 = 189/27.38 = 6.9 use (5.4)

Q = CIA = (.19) (5.4) (.67) = 0.69 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

89 %	Ponded	@	.12	10.03
11 %	Non-Ponded	@	.8	8.8
___ %	_____	@	___	19.43
100 %	TOTAL			.19

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westgate Heights Unit 4

Drainage Area No. C-3

Area = 0.97 acres

Maximum Overland Flow: L = 50 S = 1%

Maximum Channel Flow:

Channel No. 1 L = _____ S = _____

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: .83 min.

Channel No. 1 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 6.19 min.

I = 189/6.19+25 = 189/31.19 = 6.06 USE (5.4)

Q = CIA = (.66) (5.4) (0.97) = 3.46 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

20 %	Ponded	@ .12	2.4
80 %	Non-Ponded	@ .8	64.2
___ %	_____	@ ___	66.4
100 %	TOTAL		.66

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westgate Heights Unit 4

Drainage Area No. C-4

Area = 0.91 acres

Maximum Overland Flow: L = 50' S = 1%

Maximum Channel Flow:

Channel No. 1 L = 250' S = 2.0%

Channel No. 2 L = 200' S = 1.3%

Channel No. 3 L = 456' S = 1.8%

Accumulation Time

Overland Flow or Inlet Time: .83 min.

Channel No. 1 Flow:

Velocity = 2.8 ft/sec; Time = 250 / X 60 = 1.49 min.

Channel No. 2 Flow:

Velocity = 2.3 ft/sec; Time = 200 / X 60 = 1.45 min.

Channel No. 3 Flow:

Velocity = 2.75 ft/sec; Time = 456 / X 60 = 2.76 min.

Total Accumulation Time: T = 6.53 min.

I = 189/6.53+25 = 189/31.53 = 5.99 use (5.4)

Q = CIA = (.45) (5.4) (.91) = 2.21 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

52 %	Ponded	@	.12	6.24
48 %	Non-Ponded	@	.8	38.40
___ %	_____	@	___	44.64
100 %	TOTAL			.45

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westgate Heights Unit 4

Drainage Area No. C-5

Area = 1.96 acres

Maximum Overland Flow: L = _____ S = _____

Maximum Channel Flow:

Channel No. 1 L = 100' S = 1.7%

Channel No. 2 L = 350 S = 2.3%

Channel No. 3 L = 110' S = 2.0%

Accumulation Time

Overland Flow or Inlet Time: _____ min.

Channel No. 1 Flow:

Velocity = 2.6 ft/sec; Time = 100 / X 60 = 0.64 min.

Channel No. 2 Flow:

Velocity = 3.0 ft/sec; Time = 350 / X 60 = 1.94 min.

Channel No. 3 Flow:

Velocity = 3.25 ft/sec; Time = 110 / X 60 = 0.56 min.

Total Accumulation Time: T = 3.14 min.

I = 184 / 3.14+25 = 184/28.14 = 6.72 use (6.4)

Q = CIA = (.51) (6.4) (1.96) = 5.4 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

43 %	Ponded	@ .12	5.16
57 %	Non-Ponded	@ .8	45.60
___ %	_____	@ ___	50.76
100 %	TOTAL		.51

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westgate Heights Unit 4

Drainage Area No. C-6

Area = 1.29 acres

Maximum Overland Flow: L = 50' S = 1%

Maximum Channel Flow:

Channel No. 1 L = 320' S = 2.5%

Channel No. 2 L = 130' S = 5.5%

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: .83 min.

Channel No. 1 Flow:

Velocity = 3.2 ft/sec; Time = 320 / X 60 = 1.67 min.

Channel No. 2 Flow:

Velocity = 4.75 ft/sec; Time = 130 / X 60 = .46 min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 2.96 min.

I = 187/2.96 + 25 = 187/27.96 = 6.76 use (5.4)

Q = CIA = (.51) (5.4) (1.29) = 3.55 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

43 % Ponded @ .12 5.16

57 % Non-Ponded @ .8 45.6

___ % _____ @ ___ 50.76

100 % TOTAL .51

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westgate Heights Unit 4

Drainage Area No. C-7

Area = 1.32 acres

Maximum Overland Flow: L = 50' S = 1%

Maximum Channel Flow:

Channel No. 1 L = 150' S = 0.7%

Channel No. 2 L = 450' S = 1.6%

Channel No. 3 L = 105' S = 5.8%

Accumulation Time

Overland Flow or Inlet Time: 18.3 min.

Channel No. 1 Flow:

Velocity = 1.75 ft/sec; Time = 150' / X 60 = 1.43 min.

Channel No. 2 Flow:

Velocity = 2.5 ft/sec; Time = 450' / X 60 = 3.0 min.

Channel No. 3 Flow:

Velocity = 3.5 ft/sec; Time = 105 / X 60 = 0.5 min.

Total Accumulation Time: T = 4.93 min.

I = 189/4.93+25 = 189/29.93 = 6.31 use (5.4)

Q = CIA = (.44) (5.4) (1.32) = 3.14 c.f.s.

Date: 11-77

Comp. by: K Lucas

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

53 %	Ponded	@ .12	6.36
47 %	Non-Ponded	@ .8	37.60
___ %	_____	@ ___	43.96
100 %	TOTAL		.44

RUNOFF COMPUTATIONS

Sheet No. _____

Project: WESTGATE HEIGHTS UNIT 4

Drainage Area No. D-1

Area = 1.82 acres

Maximum Overland Flow: L = 50' S = 1%

Maximum Channel Flow:

Channel No. 1 L = 100' S = 1.1%

Channel No. 2 L = 350' S = 0.59%

Channel No. 3 L = 230 S = 0.71%

Accumulation Time

Overland Flow or Inlet Time: 18.9 min.

Channel No. 1 Flow:

Velocity = 2.1 ft/sec; Time = 100 / X 60 = .79 min.

Channel No. 2 Flow:

Velocity = 1.6 ft/sec; Time = 350 / X 60 = 3.65 min.

Channel No. 3 Flow:

Velocity = 1.75 ft/sec; Time = 230 / X 60 = 2.19 min.

Total Accumulation Time: T = 7.56 min.

I = 189/7.56 + 25 = 189/32.56 = 5.8 use (5.4)

Q = CIA = (.47) (5.4) (1.82) = 4.62 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

49 %	Ponded	@ .12	5.88
51 %	Non-Ponded	@ .8	40.80
___ %	_____	@ ___	46.68
100 %	TOTAL		.47

RUNOFF COMPUTATIONS

Sheet No. _____

Project: Westgate Heights Unit 4

Drainage Area No. D-2

Area = 0.52 acres

Maximum Overland Flow: L = 50' S = 1%

Maximum Channel Flow:

Channel No. 1 L = 200' S = 2%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 3 min.

Channel No. 1 Flow:

Velocity = 2.8 ft/sec; Time = 200 / X 60 = 1.19 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 2.02 min.

I = 189 / 2.02 + 25 = 189 / 27.02 = 6.99 use (5.4)

Q = CIA = (.35) (5.4) (0.52) = 0.98 c.f.s.

Date: 11-77

Comp. by: R Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

66 %	Ponded	@ .12	7.92
34 %	Non-Ponded	@ .8	27.2
___ %	_____	@ ___	35.12
100 %	TOTAL		.35

RUNOFF COMPUTATIONS

Sheet No. _____

Project: WESTGATE HEIGHTS UNIT 4

Drainage Area No. D-3

Area = 0.53 acres

Maximum Overland Flow: L = _____ S = _____

Maximum Channel Flow:

Channel No. 1 L = 400' S = 1.5%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: _____ min.

Channel No. 1 Flow:

Velocity = 2.5 ft/sec; Time = 400 / X 60 = 2.67 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 2.67 min.

I = 189/2.67+25 = 189/27.67 = 6.83 use (5.4)

Q = CIA = (.38) (5.4) (0.53) = 1.09 c.f.s.

Date: 11-17

Comp. by: K Lucas

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

62 % Ponded @ .12 7.44

38 % Non-Ponded @ .5 3.4

___ % _____ @ ___ 3.54

100 % TOTAL .38

RUNOFF COMPUTATIONS

Sheet No. _____

Project: WESTGATE HEIGHTS UNIT 4

Drainage Area No. E-1

Area = 0.96 acres

Maximum Overland Flow: L = 50' S = 1%

Maximum Channel Flow:

Channel No. 1 L = 190' S = 1.6%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 18.3 min.

Channel No. 1 Flow:

Velocity = 2.5 ft/sec; Time = 190 / X 60 = 1.27 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 2.10 min.

I = 189/2.1+25 = 189/27.1 = 6.97 use (5.4)

Q = CIA = (.50) (5.4) (0.96) = 2.59 c.f.s.

Date: 11-77

Comp. by: R. Lucero

Checked by: _____

WEIGHTED RUNOFF COEFFICIENT

44 %	Ponded	@ .12	5.28
56 %	Non-Ponded	@ .8	44.80
___ %	_____	@ ___	50.08
100 %	TOTAL		.50