M9/D8

15 Plans

Nov 15, 1976

Jess Edgar
Best Brand Homes Inc
505 San Pedro SE
Albuquerque, NM 87108

Re: Westgate Heights, Unit 2

Dear Mr. Edgar:

The subject subdivision was filed on June 16, 1972, and the drainage study does not require on lot grading.

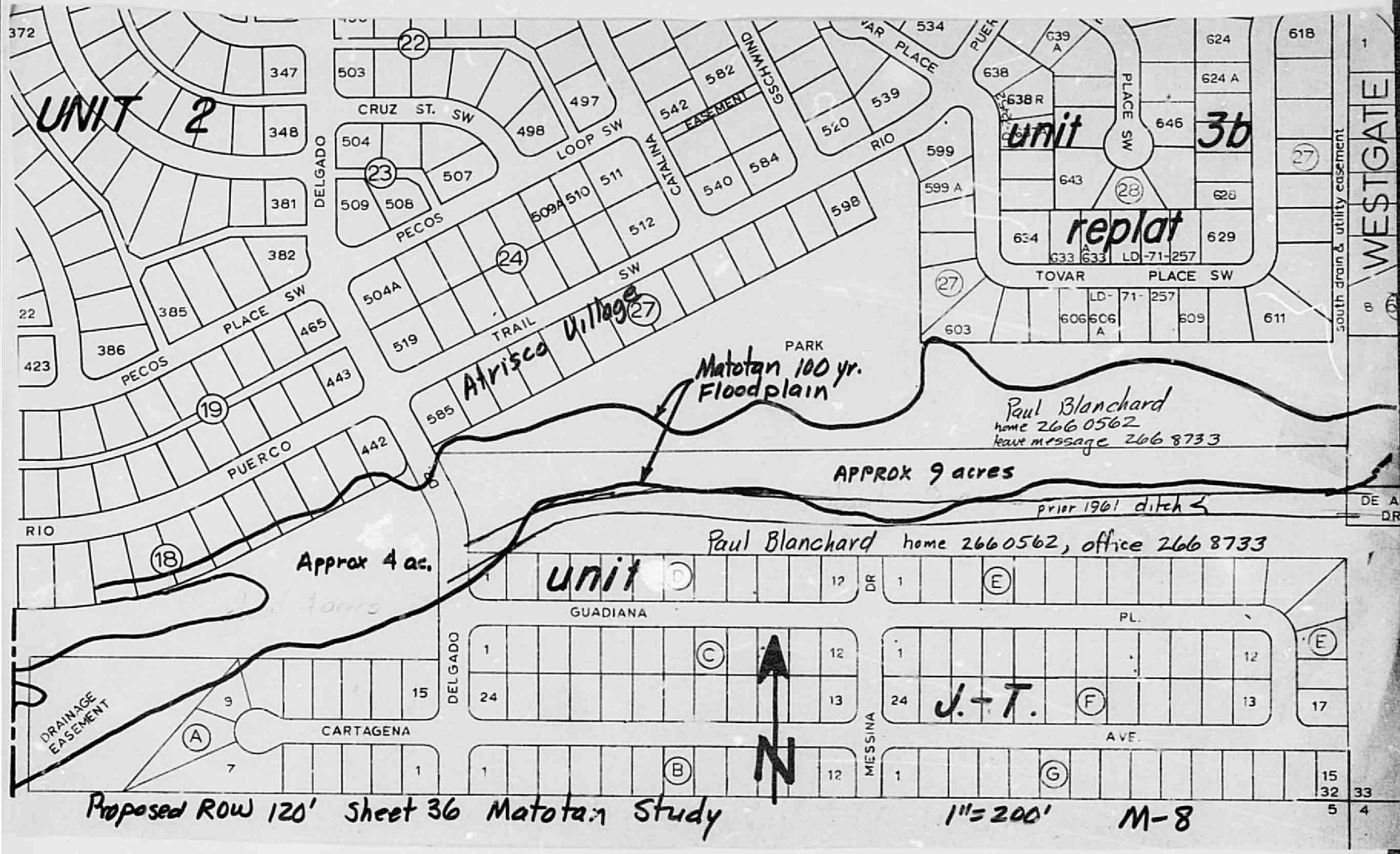
The A.M.A.F.C.A. Drainage Resolution 1972-2 states in Section 10. "The Executive Engineer or his disignee shall waive compliance with the requirements contained in the Regulation as to any land within any subdivision where the following conditions existed on July 15, 1972:

"A. A plat of such subdivision has been filed of record in the Office of the County Clerk of Bernalillo County, New Mexico, and any grading, earth moving or construction altering any watercourse located within the subdivision has been or will be performed in accordance with a drainage plan and report prepared by a registered professional engineer...."

This language would ~~seem~~ to allow some lots of the subject subdivision ~~to [illegible] some [illegible] to [illegible]~~ to drain totally to the street. I donot know what effect such a solution may have on other individual lots and property. Uncontrolled flows seem to violate the Western Albuquerque Metropolitan Drainage Management Plan.

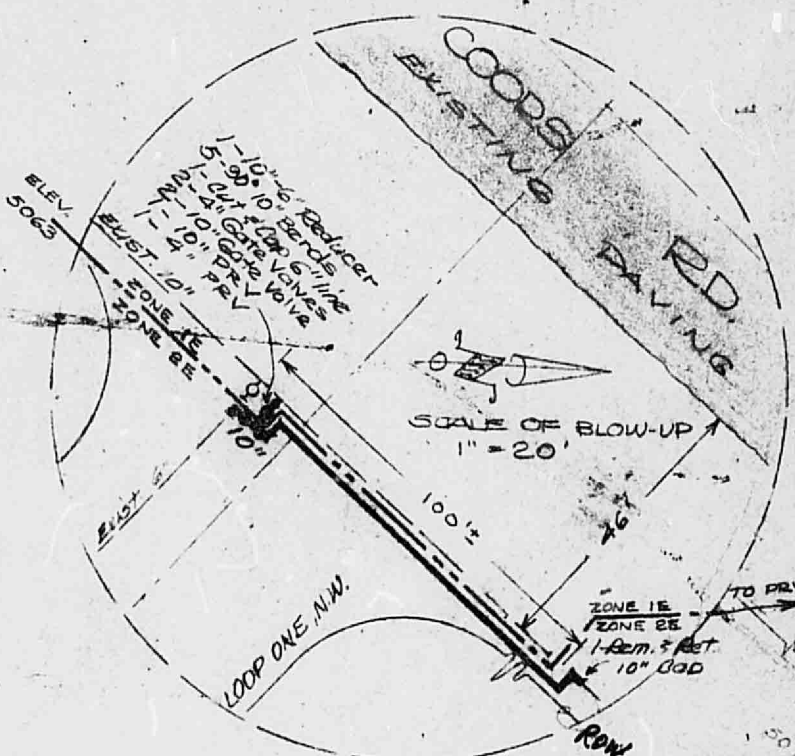
Very truly yours Kleaton H Lavo

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


UNIT 2
CRUZ ST. SW
LOOP SW
PECOS
TRAIL SW
PLACE SW
DELGADO
CATALINA
GSCHWIND
EASEMENT
RIO
PUERCO
Atrisco Village
PARK
Matotan 100 yr. Floodplain
Paul Blanchard
home 2660562
leave message 266 8733
APPROX 9 acres
prior 1961 ditch
Paul Blanchard home 2660562, office 266 8733
Approx 4 ac.
unit 3b
replat
TOVAR PLACE SW
unit D
unit C
unit B
unit G
J.-T.
GUADIANA PL.
CARTAGENA
MESSINA AVE.
DRAINAGE EASEMENT
south drain & utility easement
WESTGATE
Proposed ROW 120' Sheet 36 Matotan Study
1"=200'
M-8

UNIT 2

C.E.D. NO. W-70-72
WATER AGREEMENT NO. 1332-72
MAP NO. F-11-N
BLK. TO BLK SHT. 11
KENT NOWLIN CONSTRUCTION, INC.
CITY COMMISSION W.O. NO 541



Legend

- Proposed water
- Existing water
- ZONE LINE

January 7, 1977

Mr. Thomas J. Haack
Murray-McCormick, Inc.
2601 Wyoming Blvd. N.E., Suite F
Albuquerque, New Mexico 87110

SUBJECT: WESTGATE HEIGHTS, UNIT NO. 3 DRAINAGE REPORT

Dear Mr. Haack:

The drainage report submitted by your letter of December 3, 1976 has been reviewed and the comments are as follows:

1. The Drainage Policy Resolution 59-1976 places responsibility upon the developer for channels carrying less than 2000 cfs. Request the plan indicate the treatment proposed for the channel indicated in Snow Vista Blvd. The temporary berm on the northeast corner of the subdivision is also involved in this treatment, which should eliminate the temporary berm.

2. At the eastern edge of the subdivision, flows from all streets should have some dissipation or show that velocities are less than 8 fps.

If these matters are handled, the remainder of the report is satisfactory.

Sincerely,

V. M. Kimmick
City Engineer

VMK/fs

January 25, 1977

Mr. Thomas J. Haack
2601 Wyoming Blvd. N.E. Suite F
Albuquerque, N.M. 87110

SUBJECT: WESTGATE HEIGHTS - UNIT NO. 3

Dear Mr. Haack:

Your letter dated January 21, 1977 has been reviewed, and the drainage report is acceptable. The temporary berm at Snow Vista and Sage Road and discharge velocities at Sapphire, the mid-block rundown and Kimela Drive are acceptable.

Sincerely,

V. M. Kimmick
City Engineer

VMK/fs

cc: Jim Smith(AMAFCA)
Bob Kielich
Drainage File

MURRAY-McCORMICK, INC.
ENVIRONMENTAL DESIGN
ARCHITECTURE · ENGINEERING · PLANNING · SURVEYING

January 21, 1977

RECEIVED
JAN 24 1977
CITY ENGINEERS

Mr. V. M. Kimmick, City Engineer
City of Albuquerque
Department of Public Works
P. O. Box 1293
Albuquerque, New Mexico 87103

Re: Westgate Heights Subdivision, Unit No. 3

Gentlemen:

In response to your recent correspondence, a copy of which is attached, we wish to offer the following comments.

Although we are cognizant of Resolution 59-1976, our purpose within the report involves only Westgate Heights, Unit No. 3 which lies entirely to the east of 86th Street, S.W., and is not adjacent to the proposed Snow Vista Channel improvement.

The study considered flows at the intersection of Sage and Snow Vista only for the potential hazard of 100 year flood water encroachment into the watersheds draining to and thru Westgate Heights, Unit 3.

To this end, we have recommended the definition of these flows through the installation of a berm along Snow Vista and Sage Road.

As you requested, we herewith provide the discharge velocities at the points of storm water exit from Westgate Heights, Unit 3.

Sapphire Street	5.7 F.P.S.
Mid Block Rundown	7.2 F.P.S.
Kimela Drive	5.4 F.P.S.

I trust the above information will complete your review and your letter of approval will be forthcoming.

Very truly yours,

Thomas J. Mack

TJH:dw
cc: J. D. Fulmer

2601 WYOMING BLVD., NE. SUITE F/ALBUQUERQUE, NEW MEXICO 87110/505-292-1936
CALIFORNIA ALASKA OREGON WASHINGTON TEXAS GEORGIA FLORIDA COLORADO

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

January 7, 1977

Mr. Thomas J. Haack
Murray-McCormick, Inc.
2601 Wyoming Blvd. N.E., Suite F
Albuquerque, New Mexico 87110

SUBJECT: WESTGATE HEIGHTS, UNIT NO. 3 DRAINAGE REPORT

Dear Mr. Haack:

The drainage report submitted by your letter of December 3, 1976 has been reviewed and the comments are as follows:

1. The Drainage Policy Resolution 59-1976 places responsibility upon the developer for channels carrying less than 2000 cfs. Request the plan indicate the treatment proposed for the channel indicated in Snow Vista Blvd. The temporary berm on the northeast corner of the subdivision is also involved in this treatment, which should eliminate the temporary berm.

2. At the eastern edge of the subdivision, flows from all streets should have some dissipation or show that velocities are less than 8 fps.

If these matters are handled, the remainder of the report is satisfactory.

Sincerely,

V. M. Kimmick
City Engineer

VMK/fs

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.

FORM NO. M-202
Rev. 8/22/68

APPLICATION FOR PERMIT TO INSTALL UTILITY FACILITIES WITHIN PUBLIC RIGHT OF WAY

TO: NEW MEXICO STATE HIGHWAY DEPARTMENT
P. O. BOX 1149
SANTA FE, NEW MEXICO 87501

Permit No. _____
- [x] New Installation
- [ ] Renewal Permit
- [ ] Relocation
- [x] Remain in Place

1. Pursuant to New Mexico Statutes Annotated, 1953 Compilation, Sections 55-7-19 and 55-2-7, the undersigned V. M. Kennedy City Engineer City of Alamogordo
Address: Box [redacted] 448
herein makes application to use highway rights of way to install:
Size and Type of Facility 10-INCH WATER LINE
in the following location: N. M. Project No. 5-1309, S. R. [redacted]
Hwy. Station Entrance Intersection of Loop on To Luz North & Coors Road
County, Section 35, Township 11 N, Range 7E

2. For the purpose of this application "within" shall be construed as meaning "on, over, under, across or along."

a. "Engineer" shall be construed as meaning the State Highway Engineer of the New Mexico State Highway Department or his representative.

b. "Applicant" shall be construed as meaning the individual, firm, corporation, association, governmental subdivision, or other organization making application, or the successors of any of the above.

c. "Facility" shall be construed as meaning, but not limited to, any publicly, privately, cooperatively, municipally or governmentally owned facility used for carriage, distribution or transmission of water, gas or electricity, oil and products derived therefrom, sewage, steam or other products carried by means of pipelines, conduits, wires, culverts, ditches, conveyors or other methods.

d. If application is for a parallel installation, justification as to why private right may not be utilized must be furnished.

Applicant proposes to relocate, install or leave facility 5 feet within the EAST right of way line. The proposed installation shall be:

~~N.A.~~ Parallel (Crossing or Parallel) SUBSURFACE (Subsurface or Overhead) N.A. (Boring, Jacking or Pavement Cut)

a. If Applicant requests installation by pavement cut, complete justification therefore shall be submitted by attachment.

b. Where application for pavement cut is justified, the application may be held in abeyance pending receipt of cash bond in an amount to be fixed by the Engineer.

4. There is attached hereto a diagrammatic dimensioned drawing showing the location of existing and/or proposed installation referenced to roadway and right of way, right of way lines, any access control lines, distance of proposed installation above or below grade, highway stationing, identification of materials to be used and any other pertinent data. If application is for parallel installation, nature of adjacent land use shall be shown. Proposed installations on or in bridges or other structures, or for the installation of any structures, will require detailed structural drawings.

5. Applicant desires this permit to be in affect for 25 years. Permit will not be issued for a period longer than 25 years, must be renewed upon expiration and the burden of timely renewal is on the Applicant. The Applicant shall formally notify the Engineer of actual commencement and completion of construction of the installation. The Applicant shall also formally notify the Engineer of removal or abandonment of the facility, or relinquishment of the permit.

6. The signing of the application by the Engineer and returning it to the Applicant shall validate this application as a permit. The granting of this permit shall not be construed as granting any easement or property right.

7. To comply with the Bureau of Public Roads PPM 30-1, servicing of facilities will not be permitted within the access control lines on any controlled access project. Should an emergency occur, the Applicant shall notify the Engineer and shall provide such flagmen, flashers, warning or other safety devices as required by the Engineer. All routine maintenance shall be performed from outside any access control lines.

8. The relocation or installation of facilities within public right of way shall be in strict conformance with all provisions of this application, drawing and the Instructions for Utility Permits, as they may be modified by the Engineer, and no departure therefrom may be made without the written consent of the Engineer. All facilities shall be so placed that they will not interfere with nor endanger any roadway features nor other existing facilities. All construction of facilities shall be subject to the inspection and approval of the Engineer. All such work shall be performed so that danger, inconvenience and delay to the traveling public will be held to a minimum. Protection and handling of traffic during the installation are the responsibility of the Applicant and must be approved by the Engineer.

9. The Applicant will, except as otherwise ordered by the Engineer, restore the public right of way, and all bridges or other structures thereon or adjacent thereto which have been altered or affected by facility installation performed hereunder, in accordance with sound construction practices and the Engineer's specifications, and shall cause the work to be done in a workmanlike manner. If any damage is caused to the highway right of way or to any bridge, structure or improvement thereon or adjacent thereto by reason of the installation, maintenance, alteration or removal of such facilities or other appurtenances, the Applicant will reimburse the Engineer the full amount thereof promptly upon demand by the Engineer; provided, however, that the obligation imposed under this paragraph shall not apply in the event the damage resulted from causes beyond the control of the Applicant. All such facilities located within the right of way shall at all times be kept in such repair so as not to damage the highway, inconvenience or endanger the traveling public and shall be kept free from advertisements, posters and the like.

10. The Applicant will at all times indemnify and save harmless the Engineer from any and all claims of every kind or character caused by or incident to the installation, alteration, removal or condition of these facilities in the right of way and will promptly reimburse the Engineer for any and all expenses incurred by the Engineer in resisting any such claim or claims. Nothing herein shall be construed to mean that the Applicant hereunder will indemnify and save harmless the Engineer from any claim caused by or incident to any neglect, carelessness or breach of duty on the part of the Engineer.

11. Should the Applicant at any time fail to promptly and fully perform any of the obligations imposed hereby, and after thirty (30) days written notice thereof, the Engineer may, at his option (a) cause the obligations to be fully carried out and performed, and the Applicant will promptly reimburse the Engineer for all costs and expenses incident thereto, (b) may summarily order the removal of such facility and if the Applicant fails to comply within a reasonable time, the Engineer may direct the removal of the facility with all costs and expenses thereto to be borne by Applicant.

12. If by reason of any change in the location, construction, grade or by any other matter affecting the highway upon which any facility is located because of changing traffic conditions or otherwise, it shall become advisable in the opinion of the Engineer that said facility be removed, relocated or otherwise modified, the Applicant, upon written notice from the Engineer, shall remove, relocate or modify such facility without undue delay in such manner as the Engineer may direct or approve, at the Applicant's expense and at no cost to the Engineer, unless at the time of such removal, relocation or modification, the State law authorizes payment or reimbursement for such removal, relocation or modification. All facilities located on public right of way under the dual jurisdiction of the State and a subordinate governmental entity shall comply with all applicable rules and regulations of such entity properly and lawfully in force and including but not limited to provisions of local franchises not in conflict with the rules and regulations of the Engineer. The Engineer makes no warranty either express or implied as to the continued existence of any highway in any particular location and expressly assumes no obligation with regard to the facility upon change, vacation or abandonment of any highway or portions thereof.

13. Neither the making of this application nor anything herein contained shall constitute a waiver on the part of the Applicant of any rights or claims had or made by some with respect to the occupancy of the streets and highways under the Constitution and Laws of the State of New Mexico, nor shall anything herein contained in anywise prejudice or impair any rights or claims existing independent of this application with respect to the construction, operation and maintenance of the Applicant's facilities in the State of New Mexico.

14. Each copy of the application must be signed by the Applicant as an individual owner or by any official designated to execute such documents.

This application is hereby granted subject to all provisions herein and to the following special provisions, changes or amendments:

City of Albuquerque

Applicant ~~V. M. Kinnick~~

By V. M. Kinnick

Title CITY ENGINEER

Approval of this permit is hereby given this _____ day of _____, 19____.

NEW MEXICO STATE HIGHWAY DEPARTMENT

By _____

MURRAY-McCORMICK, INC.
ENVIRONMENTAL DESIGN
ARCHITECTURE · ENGINEERING · PLANNING · SURVEYING

December 3, 1976

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

Attention: Mr. Kleston H. Laws
Asst. City Engineer, Hydrology

Re: Westgate Heights, Unit No. 3, Drainage Report

Gentlemen:

We herewith amend the above Drainage Study in response to your recent review. It is suggested you replace the existing Figure V with that attached and attach this letter to the cover of the report.

We have taken elevations along the west edge of the berm in Snow Vista Blvd., and determined that the flow is toward the south thus substantially reducing the flow toward Sage Road. As the drainage design within Unit 2 does not include the areas above this intersection, we have retained the recommendation for a protective berm as originally submitted.

Note that the pattern of drainage within the southern portion of the project has been changed and the right-of-way of Sapphire Street has been increased to 60.0 ft. with a pavement and standard crown of 40.0 ft. face to face of curbs. This street now has sufficient capacity and with an increase in gradient to the east ($\simeq 2.5\%$) will have sufficient capacity to carry runoff for adjacent lots. Planning in the undeveloped area should, however, be accomplished in such a way as to divert flows from the southwest and northwest directly to the proposed alignment of Kimela rather than into Sapphire Street.

We trust the report is now in order and will receive your approval.

Very truly yours,

Thomas J. Mallick

Encl.

2601 WYOMING BLVD., NE. SUITE F/ALBUQUERQUE, NEW MEXICO 87110/505-292-1936
CALIFORNIA ALASKA OREGON WASHINGTON TEXAS GEORGIA FLORIDA COLORADO

MURRAY-McCORMICK, INC.
ENVIRONMENTAL DESIGN
ARCHITECTURE · ENGINEERING · PLANNING · SURVEYING

December 3, 1976

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

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Very truly yours,

Thomas J. Mack

Encl.

2601 WYOMING BLVD., NE. SUITE F/ALBUQUERQUE, NEW MEXICO 87110/505-292-1936
CALIFORNIA ALASKA OREGON WASHINGTON TEXAS GEORGIA FLORIDA COLORADO

CITY OF ALBUQUERQUE, NEW MEXICO
WATER RESOURCES DEPARTMENT
ENGINEERING DIVISION

RECEIVED
DEC 19 1977
CITY ENGINEERS

MEMORANDUM - December 15, 1977

TO: Mr. Dave Quintana, Engineer, Public Works Department
FROM: P. Brasher, Engineer, Water Resources Department
SUBJECT: WESTGATE HEIGHTS UNITS 2a and 4

Comments on subject plans from the Engineering Division of the Water Resources Department will be delayed pending the outcome of a Westgate Heights Master Plan study.

PB:ds

cc: M. Mendoza
f/ Project File

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

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

November 15, 1976

M9-D8

Mr. Jess Edgar
Best Brand Homes, Inc.
505 San Pedro S.E.
Albuquerque, N.M. 87108

RE: WESTGATE HEIGHTS, UNIT 2

Dear Mr. Edgar:

The subject subdivision was filed on June 16, 1972, and the drainage study does not require on lot ponding.

The AMAFCA Drainage Resolution 1972-2 states in Section 10, "The Executive Engineer or his designee shall waive compliance with the requirements contained in the Regulation as to any land within any subdivision where the following conditions existed on July 15, 1972.

A. A plat of such subdivision has been filed of record in the Office of the County Clerk of Bernalillo County, New Mexico, and any grading, earth moving or construction altering any watercourse located within the subdivision has been or will be performed in accordance with a drainage plan and report prepared by a registered professional engineer...."

This language would seem to allow some lots of the subject subdivision to drain totally to the street. I don't know what effect such a solution may have on other individual lots and property. Uncontrolled flows seem to violate the Western Albuquerque Metropolitan Drainage Management Plan.

Very truly yours,

Kleston H. Laws
Assistant City Engineer-Hydrology

KHL/fs

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.

INSTRUCTIONS FOR DRAINAGE STUDY REVISIONS

WESTGATE HEIGHTS, UNIT 2

1. Page i, Drainage Study Index: Change title of Exhibit "F" to "STREETS AND MAXIMUM RUNOFFS".

2. Page 4, V. CONCLUSIONS AND RECOMMENDATIONS: Delete recommendation "B" and replace it with recommendation "B. Design streets to carry maximum runoffs contained in Exhibit 'F' through use of tables in Exhibit 'E'".

3. Pages 18 and 19, Exhibit "E": Delete "n(composite)=.006" and table "R/W TO R/W - OVERFLOW SECTIONS CAPACITIES". Do not delete "15'Lined Channel".

4. Replace pages 24, 25, 26 and 27 with revised pages 24A-24D, 25A-25D, 26A-26D, and 27A-27D.

5. Replace page 29 with revised page 29 entitled "STREETS AND MAXIMUM RUNOFFS".

REVISED MAY 1972

50' R.O.W. 32' FACE-FACE 8" CURB 8" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	15.3611	51.3731	.0050	.0707	.2990	.4472	2.8545	43.8477
.0165	15.3611	51.3731	.0100	.1000	.2990	.4472	420368	62.0100
.0165	15.3611	51.3731	.0150	.1225	.2990	.4472	4.9441	75.9464
.0165	15.3611	51.3731	.0200	.1414	.2990	.4472	5.7089	87.6954
.0165	15.3611	51.3731	.0250	.1581	.2990	.4472	6.3828	98.0464
.0165	15.3611	51.3731	.0300	.1732	.2990	.4472	6.9920	107.4045
.0165	15.3611	51.3731	.0350	.1871	.2990	.4472	7.5522	116.0101
.0165	15.3611	51.3731	.0400	.2000	.2990	.4472	8.0736	124.0200

50' R.O.W. 32' FACE-FACE 8" CURB 6" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	18.9167	51.3569	.0050	.0707	.3683	.5138	3.2801	62.0482
.0165	18.9167	51.3569	.0100	.1000	.3683	.5138	4.6387	87.7494
.0165	18.9167	51.3569	.0150	.1225	.3683	.5138	5.6813	107.4706
.0165	18.9167	51.3569	.0200	.1414	.3683	.5138	6.5602	124.0964
.0165	18.9167	51.3569	.0250	.1581	.3683	.5138	7.3345	138.7439
.0165	18.9167	51.3569	.0300	.1732	.3683	.5138	8.0345	151.9864
.0165	18.9167	51.3569	.0350	.1871	.3683	.5138	8.6783	164.1640
.0165	18.9167	51.3569	.0400	.2000	.3683	.5138	9.2775	175.4988

50' R.O.W. 32' FACE-FACE 8" CURB 4" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	22.4722	51.3453	.0050	.0707	.4377	.5765	3.6797	82.6903
.0165	22.4722	51.3453	.0100	.1000	.4377	.5765	5.2038	116.9417
.0165	22.4722	51.3453	.0150	.1225	.4377	.5765	6.3734	143.2238
.0165	22.4722	5123453	.0200	.1414	.4377	.5765	7.3593	165.3806
.0165	22.4722	51.3453	.0250	.1581	.4377	.5765	8.2280	184.9011
.0165	22.4722	51.3453	.0300	.1732	.4377	.5765	9.0133	202.5490
.0165	22.4722	51.3453	.0350	.1871	.4377	.5765	9.7355	218.7780
.0165	22.4722	51.3453	.0400	.2000	.4377	.5765	10.4077	233.8835

50' R.O.W. 32' FACE-FACE 8" CURB 2" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	26.0278	51.3384	.0050	.0707	.5070	.6358	4.0585	105.6348
.0165	26.0278	51.3384	.0100	.1000	.5070	.6358	5.7396	149.3901
.0165	26.0278	51.3384	.0150	.1225	.5070	.6358	7.0296	182.9648
.0165	26.0278	51.3384	.0200	.1414	.5070	.6358	8.1171	211.2696
.0165	26.0278	51.3384	.0250	.1581	.5070	.6358	9.0752	236.2066
.0165	26.0278	51.3384	.0300	.1732	.5070	.6358	9.9414	258.7513
.0165	26.0278	51.3384	.0350	.1871	.5070	.6358	10.7379	279.4834
.0165	26.0278	51.3384	.0400	.2000	.5070	.6358	11.4793	298.7803

50' R.O.W. 32' FACE-FACE 8" CURB 8" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	24.3611	51.3904	.0050	.0707	.4740	.6080	3.8805	94.5336
.0165	24.3611	51.3904	.0100	.1000	.4740	.6080	5.4879	133.6907
.0165	24.3611	51.3904	.0150	.1225	.4740	.6080	6.7212	163.7370
.0165	24.3611	51.3904	.0200	.1414	.4740	.6080	7.7610	189.0672
.0165	24.3611	51.3904	.0250	.1581	.4740	.6080	8.6771	211.3836
.0165	24.3611	51.3904	.0300	.1732	.4740	.6080	9.5053	231.5591
.0165	24.3611	51.3904	.0350	.1871	.4740	.6080	10.2669	250.1124
.0165	24.3611	51.3904	.0400	.2000	.4740	.6080	10.9757	267.3814

50' R.O.W. 32' FACE-FACE 8" CURB 6" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	27.9167	51.3742	.0050	.0707	.5434	.6659	4.2502	118.6523
.0165	27.9167	51.3742	.0100	.1000	.5434	.6659	6.0107	167.7996
.0165	27.9167	51.3742	.0150	.1225	.5434	.6659	7.3616	205.5117
.0165	27.9167	51.3742	.0200	.1414	.5434	.6659	8.5005	237.3045
.0165	27.9167	51.3742	.0250	.1581	.5434	.6659	9.5038	265.3145
.0165	27.9167	51.3742	.0300	.1732	.5434	.6659	10.4109	290.6375
.0165	27.9167	51.3742	.0350	.1871	.5434	.6659	11.2451	313.9244
.0165	27.9167	51.3742	.0400	.2000	.5434	.6659	12.0215	335.5993

50' R.O.W. 32' FACE-FACE 8" CURB 4" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	31.4722	51.3626	.0050	.0707	.6127	.7214	4.6045	144.9124
.0165	31.4722	51.3626	.0100	.1000	.6127	.7214	6.5117	204.9371
.0165	31.4722	51.3626	.0150	.1225	.6127	.7214	7.9751	250.9957
.0165	31.4722	51.3626	.0200	.1414	.6127	.7214	9.2089	289.8248
.0165	31.4722	51.3626	.0250	.1581	.6127	.7214	10.2959	324.0340
.0165	31.4722	51.3626	.0300	.1732	.6127	.7214	11.2786	354.9615
.0165	31.4722	51.3626	.0350	.1871	.6127	.7214	12.1822	383.4022
.0165	31.4722	51.3626	.0400	.2000	.6127	.7214	13.0234	409.8742

50' R.O.W. 32' FACE-FACE 8" CURB 2" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	35.0278	51.3557	.0050	.0707	.6821	.7748	4.9454	173.2267
.0165	35.0278	51.3557	.0100	.1000	.6821	.7748	6.9939	244.9795
.0165	35.0278	51.3557	.0150	.1225	.6821	.7748	8.5657	300.0374
.0165	35.0278	51.3557	.0200	.1414	.6821	.7748	9.8908	346.4534
.0165	35.0278	51.3557	.0250	.1581	.6821	.7748	11.0583	387.3466
.0165	35.0278	51.3557	.0300	.1732	.6821	.7748	12.1137	424.3170
.0165	35.0278	51.3557	.0350	.1871	.6821	.7748	13.0843	458.3147
.0165	35.0278	51.3557	.0400	.2000	.6821	.7748	13.9877	489.9590

50' R.O.W. 32' FACE-FACE 8" CURB 8" CROWN .6' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	33.3611	51.4236	.0050	.0707	.6488	.7494	4.7822	159.5397
.0165	33.3611	51.4236	.0100	.1000	.6488	.7494	6.7631	225.6231
.0165	33.3611	51.4236	.0150	.1225	.6488	.7494	8.2830	276.3308
.0165	33.3611	51.4236	.0200	.1414	.6488	.7494	9.5644	319.0793
.0165	33.3611	51.4236	.0250	.1581	.6488	.7494	10.6933	356.7415
.0165	33.3611	51.4236	.0300	.1732	.6488	.7494	11.7140	390.7908
.0165	33.3611	51.4236	.0350	.1871	.6488	.7494	12.6525	422.1023
.0165	33.3611	51.4236	.0400	.2000	.6488	.7494	13.5261	451.2463

50' R.O.W. 32' FACE-FACE 8" CURB 6" CROWN .6' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	36.9167	51.4074	.0050	.0707	.7181	.8019	5.1172	188.9082
.0165	36.9167	51.4074	.0100	.1000	.7181	.8019	7.2367	267.1566
.0165	36.9167	51.4074	.0150	.1225	.7181	.8019	8.8632	327.1987
.0165	36.9167	51.4074	.0200	.1414	.7181	.8019	10.2343	377.8165
.0165	36.9167	51.4074	.0250	.1581	.7181	.8019	11.4423	422.4116
.0165	36.9167	51.4074	.0300	.1732	.7181	.8019	12.5344	462.7288
.0165	36.9167	51.4074	.0350	.1871	.7181	.8019	13.5387	499.8042
.0165	36.9167	51.4074	.0400	.2000	.7181	.8019	14.4735	534.3132

50' R.O.W. 32' FACE-FACE 8" CURB 4" CROWN .6' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	40.4722	51.3958	.0050	.0707	.787	.8527	5.4414	220.2241
.0165	40.4722	51.3958	.0100	.1000	.7875	.8527	7.6953	311.4440
.0165	40.4722	51.3958	.0150	.1225	.7875	.8527	9.4247	381.4394
.0165	40.4722	51.3958	.0200	.1414	.7875	.8527	10.8827	440.4483
.0165	40.4722	51.3958	.0250	.1581	.7875	.8527	12.1673	492.4362
.0165	40.4722	51.3958	.0300	.1732	.7875	.8527	13.3286	539.4368
.0165	40.4722	51.3958	.0350	.1871	.7875	.8527	14.3965	582.6583
.0165	40.4722	51.3958	.0400	.2000	.7875	.8527	15.3905	622.8879

50' R.O.W. 32' FACE-FACE 8" CURB 2" CROWN .6' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	44.0278	51.3889	.0050	.0707	.8568	.9021	5.7560	253.4243
.0165	44.0278	51.3889	.0100	.1000	.8568	.9021	8.1402	358.3961
.0165	44.0278	51.3889	.0150	.1225	.8568	.9021	9.9697	438.9438
.0165	44.0278	51.3889	.0200	.1414	.8568	.9021	11.5120	506.8487
.0165	44.0278	51.3889	.0250	.1581	.8568	.9021	12.8708	566.6741
.0165	44.0278	51.3889	.0300	.1732	.8568	.9021	14.0993	620.7603
.0165	44.0278	51.3889	.0350	.1871	.8568	.9021	15.2290	670.4978
.0165	44.0278	51.3889	.0400	.2000	.8568	.9021	16.2805	716.7923

50' R.O.W. 32' FACE-FACE 6" CURB 8" CROWN .7' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	37.8611	51.4461	.0050	.0707	.7359	.8151	5.2008	196.9066
.0165	37.8611	51.4461	.0100	.1000	.7359	.8151	7.3550	278.4680
.0165	37.8611	51.4461	.0150	.1225	.7359	.8151	9.0080	341.0523
.0165	37.8611	51.4461	.0200	.1414	.7359	.8151	10.4015	393.8132
.0165	37.8611	51.4461	.0250	.1581	.7359	.8151	11.6293	440.2966
.0165	37.8611	51.4461	.0300	.1732	.7359	.8151	12.7392	482.3207
.0165	37.8611	51.4461	.0350	.1871	.7359	.8151	13.7599	520.9659
.0165	37.8611	51.4461	.0400	.2000	.7359	.8151	14.7100	556.9360

50' R.O.W. 32' FACE-FACE 8" CURB 6" CROWN .7' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	41.4167	51.4299	.0050	.0707	.8053	.8656	5.5225	228.7225
.0165	41.4167	51.4299	.0100	.1000	.8053	.8656	7.8100	323.4624
.0165	41.4167	51.4299	.0150	.1225	.8053	.8656	9.5652	396.1589
.0165	41.4167	51.4299	.0200	.1414	.8053	.8656	11.0449	457.4449
.0165	41.4167	51.4299	.0250	.1581	.8053	.8656	12.3486	511.4390
.0165	41.4167	51.4299	.0300	.1732	.8053	.8656	13.5272	560.2533
.0165	41.4167	51.4299	.0350	.1871	.8053	.8656	14.6111	605.1428
.0165	41.4167	51.4299	.0400	.2000	.8053	.8656	15.6199	646.9248

50' R.O.W. 32' FACE-FACE 8" CURB 4" CROWN .7' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	44.9722	51.4184	.0050	.0707	.8746	.9146	5.8349	262.4101
.0165	44.9722	51.4184	.0100	.1000	.8746	.9146	8.2518	371.1039
.0165	44.9722	51.4184	.0150	.1225	.8746	.9146	10.1064	454.5076
.0165	44.9722	51.4184	.0200	.1414	.8746	.9146	11.6699	524.8202
.0165	44.9722	51.4184	.0250	.1581	.8746	.9146	13.0473	586.7668
.0165	44.9722	51.4184	.0300	.1732	.8746	.9146	14.2926	642.7709
.0165	44.9722	51.4184	.0350	.1871	.8746	.9146	15.4378	694.2719
.0165	44.9722	51.4184	.0400	.2000	.8746	.9146	16.5037	742.2079

50' R.O.W. 32' FACE-FACE 8" CURB 2" CROWN .7' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	48.5278	51.4114	.0050	.0707	.9439	.9622	6.1390	297.9142
.0165	48.5278	51.4114	.0100	.1000	.9439	.9622	8.6819	421.3143
.0165	48.5278	51.4114	.0150	.1225	.9439	.9622	10.6331	516.0025
.0165	48.5278	51.4114	.0200	.1414	.9439	.9622	12.2781	595.8284
.0165	48.5278	51.4114	.0250	.1581	.9439	.9622	13.7273	666.1564
.0165	48.5278	51.4114	.0300	.1732	.9439	.9622	15.0375	729.7377
.0165	48.5278	51.4114	.0350	.1871	.9439	.9622	16.2424	788.2068
.0165	48.5278	51.4114	.0400	.2000	.9439	.9622	17.3638	842.6286

60' R.O.W. 40' FACE-FACE 8" CURB 8" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	18.8556	61.3652	.0050	.0707	.3073	.4553	2.9056	54.7868
.0165	18.8556	61.3652	.0100	.1000	.3073	.4553	4.1091	77.4802
.0165	18.8556	61.3652	.0150	.1225	.3073	.4553	5.0327	94.8935
.0165	18.8556	61.3652	.0200	.1414	.3073	.4553	5.8112	109.5736
.0165	18.8556	61.3652	.0250	.1581	.3073	.4553	6.4971	122.5070
.0165	18.8556	61.3652	.0300	.1732	.3073	.4553	7.1172	134.1997
.0165	18.8556	61.3652	.0350	.1871	.3073	.4553	7.6875	144.9522
.0165	18.8556	61.3652	.0400	.2000	.3073	.4553	8.2183	154.9604

60' R.O.W. 40' FACE-FACE 8" CURB 6" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	23.3000	61.3523	.0050	.0707	.3798	.5244	3.3463	77.9692
.0165	23.3000	61.3523	.0100	.1000	.3798	.5244	4.7324	110.2651
.0165	23.3000	61.3523	.0150	.1225	.3798	.5244	5.7960	135.0466
.0165	23.3000	61.3523	.0200	.1414	.3798	.5244	6.6926	155.9384
.0165	23.3000	61.3523	.0250	.1581	.3798	.5244	7.4826	174.3444
.0165	23.3000	61.3523	.0300	.1732	.3798	.5244	8.1968	190.9848
.0165	23.3000	61.3523	.0350	.1871	.3798	.5244	8.8535	206.2871
.0165	23.3000	61.3523	.0400	.2000	.3798	.5244	9.4648	220.5302

60' R.O.W. 40' FACE-FACE 8" CURB 4" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	27.7444	61.3430	.0050	.0707	.4523	.5892	3.7597	104.3104
.0165	27.7444	61.3430	.0100	.1000	.4523	.5892	5.3170	147.5172
.0165	27.7444	61.3430	.0150	.1225	.4523	.5892	6.5120	180.6710
.0165	27.7444	61.3430	.0200	.1414	.4523	.5892	7.5194	208.6209
.0165	27.7444	61.3430	.0250	.1581	.4523	.5892	8.4069	233.2452
.0165	27.7444	61.3430	.0300	.1732	.4523	.5892	9.2093	255.5074
.0165	27.7444	61.3430	.0350	.1871	.4523	.5892	9.9472	275.9795
.0165	27.7444	61.3430	.0400	.2000	.4523	.5892	10.6340	295.0345

60' R.O.W. 40' FACE-FACE 8" CURB 2" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	32.1889	61.3375	.0050	.0707	.5248	.6506	4.1514	133.6289
.0165	32.1889	61.3375	.0100	.1000	.5248	.6506	5.8710	188.9798
.0165	32.1889	61.3375	.0150	.1225	.5248	.6506	7.1904	231.4521
.0165	32.1889	61.3375	.0200	.1414	.5248	.6506	8.3028	267.2578
.0165	32.1889	61.3375	.0250	.1581	.5248	.6506	9.2828	298.8033
.0165	32.1889	61.3375	.0300	.1732	.5248	.6506	10.1688	327.3227
.0165	32.1889	61.3375	.0350	.1871	.5248	.6506	10.9836	353.5489
.0165	32.1889	61.3375	.0400	.2000	.5248	.6506	11.7419	377.9596

60' R.O.W. 40' FACE-FACE 8" CURB 8" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	29.6556	61.3796	.0050	.0707	.4831	.6157	3.9286	116.5060
.0165	29.6556	61.3796	.0100	.1000	.4831	.6157	5.5559	164.7643
.0165	29.6556	61.3796	.0150	.1225	.4831	.6157	6.8046	201.7943
.0165	29.6556	61.3796	.0200	.1414	.4831	.6157	7.8573	233.0120
.0165	29.6556	61.3796	.0250	.1581	.4831	.6157	8.7847	260.5153
.0165	29.6556	61.3796	.0300	.1732	.4831	.6157	9.6232	285.3802
.0165	29.6556	61.3796	.0350	.1871	.4831	.6157	10.3942	308.2459
.0165	29.6556	61.3796	.0400	.2000	.4831	.6157	11.1119	329.5287

60' R.O.W. 40' FACE-FACE 8" CURB 6" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	34.1000	61.3667	.0050	.0707	.5557	.6759	4.3125	147.0556
.0165	34.1000	61.3667	.0100	.1000	.5557	.6759	6.0988	207.9681
.0165	34.1000	61.3667	.0150	.1225	.5557	.6759	7.4694	254.7078
.0165	34.1000	61.3667	.0200	.1414	.5557	.6759	8.6250	294.1113
.0165	34.1000	61.3667	.0250	.1581	.5557	.6759	9.6430	328.8264
.0165	34.1000	61.3667	.0300	.1732	.5557	.6759	10.5634	360.2113
.0165	34.1000	61.3667	.0350	.1871	.5557	.6759	11.4098	389.0727
.0165	34.1000	61.3667	.0400	.2000	.5557	.6759	12.1975	415.9362

60' R.O.W. 40' FACE-FACE 8" CURB 4" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	38.5444	61.3574	.0050	.0707	.6282	.7335	4.6799	180.3842
.0165	38.5444	61.3574	.0100	.1000	.6282	.7335	6.6184	255.1018
.0165	38.5444	61.3574	.0150	.1225	.6282	.7335	8.1058	312.4346
.0165	38.5444	61.3574	.0200	.1414	.6282	.7335	9.3598	360.7684
.0165	38.5444	61.3574	.0250	.1581	.6282	.7335	10.4646	403.3514
.0165	38.5444	61.3574	.0300	.1732	.6282	.7335	11.4634	441.8493
.0165	38.5444	61.3574	.0350	.1871	.6282	.7335	12.3819	477.2518
.0165	38.5444	61.3574	.0400	.2000	.6282	.7335	13.2368	510.2036

60' R.O.W. 40' FACE-FACE 8" CURB 2" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	42.9889	61.3519	.0050	.0707	.7007	.7889	5.0333	216.3774
.0165	42.9889	61.3519	.0100	.1000	.7007	.7889	7.1182	306.0039
.0165	42.9889	61.3519	.0150	.1225	.7007	.7889	8.7180	374.7767
.0165	42.9889	61.3519	.0200	.1414	.7007	.7889	10.0667	432.7549
.0165	42.9889	61.3519	.0250	.1581	.7007	.7889	11.2549	483.8346
.0165	42.9889	61.3519	.0300	.1732	.7007	.7889	12.3291	530.0143
.0165	42.9889	61.3519	.0350	.1871	.7007	.7889	13.3169	572.4809
.0165	42.9889	61.3519	.0400	.2000	.7007	.7889	14.2364	612.0078

60' R.O.W. 40' FACE-FACE 8" CURB 8" CROWN .6' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	40.4556	61.4074	.0050	.0707	.6588	.7571	4.8301	195.4036
.0165	40.4556	61.4074	.0100	.1000	.6588	.7571	6.8308	276.3425
.0165	40.4556	61.4074	.0150	.1225	.6588	.7571	8.3659	338.4490
.0165	40.4556	61.4074	.0200	.1414	.6588	.7571	9.6602	390.8073
.0165	40.4556	61.4074	.0250	.1581	.6588	.7571	10.8004	436.9358
.0165	40.4556	61.4074	.0300	.1732	.6588	.7571	11.8312	478.6392
.0165	40.4556	61.4074	.0350	.1871	.6588	.7571	12.7792	516.9894
.0165	40.4556	61.4074	.0400	.2000	.6588	.7571	13.6615	552.6850

60' R.O.W. 40' FACE-FACE 8" CURB 6" CROWN .6' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	44.9000	61.3944	.0050	.0707	.7313	.8117	5.1783	232.5051
.0165	44.9000	61.3944	.0100	.1000	.7313	.8117	7.3232	328.8119
.0165	44.9000	61.3944	.0150	.1225	.7313	.8117	8.9691	402.7107
.0165	44.9000	61.3944	.0200	.1414	.7313	.8117	10.3566	465.0102
.0165	44.9000	61.3944	.0250	.1581	.7313	.8117	11.5790	519.8972
.0165	44.9000	61.3944	.0300	.1732	.7313	.8117	12.6842	569.5189
.0165	44.9000	61.3944	.0350	.1871	.7313	.8117	13.7005	615.1507
.0165	44.9000	61.3944	.0400	.2000	.7313	.8117	14.6464	657.6237

60' R.O.W. 40' FACE-FACE 8" CURB 4" CROWN .6' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	49.3444	61.3851	.0050	.0707	.8038	.8645	5.5151	272.1386
.0165	49.3444	61.3851	.0100	.1000	.8038	.8645	7.7995	384.8621
.0165	49.3444	61.3851	.0150	.1225	.8038	.8645	9.5524	471.3579
.0165	49.3444	61.3851	.0200	.1414	.8038	.8645	11.0302	544.2772
.0165	49.3444	61.3851	.0250	.1581	.8038	.8645	12.3321	608.5204
.0165	49.3444	61.3851	.0300	.1732	.8038	.8645	13.5091	666.6007
.0165	49.3444	61.3851	.0350	.1871	.8038	.8645	14.5915	720.0111
.0165	49.3444	61.3851	.0400	.2000	.8038	.8645	15.5990	769.7242

60' R.O.W. 40' FACE-FACE 8" CURB 2" CROWN .6' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	53.7889	61.3796	.0050	.0707	.8763	.9158	5.8418	314.2221
.0165	53.7889	61.3796	.0100	.1000	.8763	.9158	8.2615	444.3771
.0165	53.7889	61.3796	.0150	.1225	.8763	.9158	10.1182	544.2486
.0165	53.7889	61.3796	.0200	.1414	.8763	.9158	11.6835	628.4442
.0165	53.7889	61.3796	.0250	.1581	.8763	.9158	13.0626	702.6219
.0165	53.7889	61.3796	.0300	.1732	.8763	.9158	14.3093	769.6838
.0165	53.7889	61.3796	.0350	.1871	.8763	.9158	15.4559	831.3535
.0165	53.7889	61.3796	.0400	.2000	.8763	.9158	16.5230	888.7542

60' R.O.W. 40' FACE-FACE 8" CURB 8" CROWN .8' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	51.2556	61.4482	.0050	.0707	.8341	.8861	5.6515	289.6713
.0165	51.2556	61.4482	.0100	.1000	.8341	.8861	7.9924	409.6571
.0165	51.2556	61.4482	.0150	.1225	.8341	.8861	9.7887	501.7254
.0165	51.2556	61.4482	.0200	.1414	.8341	.8861	11.3030	579.3426
.0165	51.2556	61.4482	.0250	.1581	.8341	.8861	12.6372	647.7247
.0165	51.2556	61.4482	.0300	.1732	.8341	.8861	13.8433	709.5469
.0165	51.2556	61.4482	.0350	.1871	.8341	.8861	14.9525	766.3982
.0165	51.2556	61.4482	.0400	.2000	.8341	.8861	15.9849	819.3141

60' R.O.W. 40' FACE-FACE 8" CURB 6" CROWN .8' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	55.7000	61.4353	.0050	.0707	.9066	.9368	5.9744	332.7735
.0165	55.7000	61.4353	.0100	.1000	.9066	.9368	8.4491	470.6128
.0165	55.7000	61.4353	.0150	.1225	.9066	.9368	10.3479	576.3806
.0165	55.7000	61.4353	.0200	.1414	.9066	.9368	11.9488	665.5469
.0165	55.7000	61.4353	.0250	.1581	.9066	.9368	13.3591	744.1041
.0165	55.7000	61.4353	.0300	.1732	.9066	.9368	14.6342	815.1252
.0165	55.7000	61.4353	.0350	.1871	.9066	.9368	15.8067	880.4358
.0165	55.7000	61.4353	.0400	.2000	.9066	.9368	16.8981	941.2255

60' R.O.W. 40' FACE-FACE 8" CURB 4" CROWN .8' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	60.1444	61.4260	.0050	.0707	.9791	.9860	6.2887	378.2280
.0165	60.1444	61.4260	.0100	.1000	.9791	.9860	8.8935	534.8951
.0165	60.1444	61.4260	.0150	.1225	.9791	.9860	10.8923	655.1101
.0165	60.1444	61.4260	.0200	.1414	.9791	.9860	12.5773	756.4560
.0165	60.1444	61.4260	.0250	.1581	.9791	.9860	14.0619	845.7435
.0165	60.1444	61.4260	.0300	.1732	.9791	.9860	15.4040	926.4656
.0165	60.1444	61.4260	.0350	.1871	.9791	.9860	16.6382	1000.6972
.0165	60.1444	61.4260	.0400	.2000	.9791	.9860	17.7870	1069.7903

60' R.O.W. 40' FACE-FACE 8" CURB 2" CROWN .8' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0165	64.5889	61.4205	.0050	.0707	1.0516	1.0341	6.5951	425.9711
.0165	64.5889	61.4205	.0100	.1000	1.0516	1.0341	9.3269	602.4141
.0165	64.5889	61.4205	.0150	.1225	1.0516	1.0341	11.4231	737.8036
.0165	64.5889	61.4205	.0200	.1414	1.0516	1.0341	13.1902	851.9422
.0165	64.5889	61.4205	.0250	.1581	1.0516	1.0341	14.7471	952.5004
.0165	64.5889	61.4205	.0300	.1732	1.0516	1.0341	16.1547	1043.4119
.0165	64.5889	61.4205	.0350	.1871	1.0516	1.0341	17.4490	1127.0136
.0165	64.5889	61.4205	.0400	.2000	120516	1.0341	18.6538	1204.8282

60' R.O.W. 44' FACE-FACE 8" CURB 8" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	20.3111	61.3637	.0050	.0707	.3310	.4785	3.1467	63.9133
.0160	20.3111	61.3637	.0100	.1000	.3310	.4785	4.4501	90.3871
.0160	20.3111	61.3637	.0150	.1225	.3310	.4785	5.4503	110.7011
.0160	20.3111	61.3637	.0200	.1414	.3310	.4785	6.2934	127.8267
.0160	20.3111	61.3637	.0250	.1581	.3310	.4785	7.0363	142.9146
.0160	20.3111	61.3637	.0300	.1732	.3310	.4785	7.7079	156.5551
.0160	20.3111	61.3637	.0350	.1871	.3310	.4785	8.3254	169.0988
.0160	20.3111	61.3637	.0400	.2000	.3310	.4785	8.9003	180.7742

60' R.O.W. 44' FACE-FACE 8" CURB 6" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	25.2000	61.3519	.0050	.0707	.4107	.5526	3.6337	91.5700
.0160	25.2000	61.3519	.0100	.1000	.4107	.5526	5.1389	129.4996
.0160	25.2000	61.3519	.0150	.1225	.4107	.5526	6.2938	158.6039
.0160	25.2000	61.3519	.0200	.1414	.4107	.5526	7.2675	183.1401
.0160	25.2000	61.3519	.0250	.1581	.4107	.5526	8.1253	204.7568
.0160	25.2000	61.3519	.0300	.1732	.4107	.5526	8.9008	224.2998
.0160	25.2000	61.3519	.0350	.1871	.4107	.5526	9.6139	242.2715
.0160	25.2000	61.3519	.0400	.2000	.4107	.5526	10.2777	258.9992

60' R.O.W. 44' FACE-FACE 8" CURB 4" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	30.0889	61.3435	.0050	.0707	.4905	.6220	4.0900	123.0643
.0160	30.0889	61.3435	.0100	.1000	.4905	.6220	5.7842	174.0392
.0160	30.0889	61.3435	.0150	.1225	.4905	.6220	7.0841	213.1536
.0160	30.0889	61.3435	.0200	.1414	.4905	.6220	8.1800	246.1286
.0160	30.0889	61.3435	.0250	.1581	.4905	.6220	9.1456	275.1801
.0160	30.0889	61.3435	.0300	.1732	.4905	.6220	10.0185	301.4447
.0160	30.0889	61.3435	.0350	.1871	.4905	.6220	10.8212	325.5975
.0160	30.0889	61.3435	.0400	.2000	.4905	.6220	11.5683	348.0784

60' R.O.W. 44' FACE-FACE 8" CURB 2" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	34.9778	61.3384	.0050	.0707	.5702	.6877	4.5221	158.1723
.0160	34.9778	61.3384	.0100	.1000	.5702	.6877	6.3952	223.6895
.0160	34.9778	61.3384	.0150	.1225	.5702	.6877	7.8325	273.9625
.0160	34.9778	61.3384	.0200	.1414	.5702	.6877	9.0442	316.3447
.0160	34.9778	61.3384	.0250	.1581	.5702	.6877	10.1117	353.6841
.0160	34.9778	61.3384	.0300	.1732	.5702	.6877	11.0768	387.4415
.0160	34.9778	61.3384	.0350	.1871	.5702	.6877	11.9643	418.4846
.0160	34.9778	61.3384	.0400	.2000	.5702	.6877	12.7904	447.3789

60' R.O.W. 44' FACE-FACE 8" CURB 8" CROWN .3' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	25.9111	61.3720	.0050	.0707	.4222	.5628	3.7008	95.8919
.0160	25.9111	61.3720	.0100	.1000	.4222	.5628	5.2337	135.6117
.0160	25.9111	61.3720	.0150	.1225	.4222	.5628	6.4100	166.0897
.0160	25.9111	61.3720	.0200	.1414	.4222	.5628	7.4016	191.7839
.0160	25.9111	61.3720	.0250	.1581	.4222	.5628	8.2752	214.4209
.0160	25.9111	61.3720	.0300	.1732	.4222	.5628	9.0651	234.8863
.0160	25.9111	61.3720	.0350	.1871	.4222	.5628	9.7914	253.7062
.0160	25.9111	61.3720	.0400	.2000	.4222	.5628	10.4675	271.2233

60' R.O.W. 44' FACE-FACE 8" CURB 6" CROWN .3' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	30.8000	61.3602	.0050	.0707	.5020	.6316	4.1533	127.9205
.0160	30.8000	61.3602	.0100	.1000	.5020	.6316	5.8736	180.9070
.0160	30.8000	61.3602	.0150	.1225	.5020	.6316	7.1937	221.5649
.0160	30.8000	61.3602	.0200	.1414	.5020	.6316	8.3065	255.8411
.0160	30.8000	61.3602	.0250	.1581	.5020	.6316	9.2870	286.0390
.0160	30.8000	61.3602	.0300	.1732	.5020	.6316	10.1734	313.3401
.0160	30.8000	61.3602	.0350	.1871	.5020	.6316	10.9885	338.4460
.0160	30.8000	61.3602	.0400	.2000	.5020	.6316	11.7472	361.8139

60' R.O.W. 44' FACE-FACE 8" CURB 4" CROWN .3' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	35.6889	61.3518	.0050	.0707	.5817	.6968	4.5823	163.5361
.0160	35.6889	61.3518	.0100	.1000	.5817	.6968	6.4803	231.2749
.0160	35.6889	61.3518	.0150	.1225	.5817	.6968	7.9367	283.2528
.0160	35.6889	61.3518	.0200	.1414	.5817	.6968	9.1645	327.0721
.0160	35.6889	61.3518	.0250	.1581	.5817	.6968	10.2463	365.6778
.0160	35.6889	61.3518	.0300	.1732	.5817	.6968	11.2242	400.5799
.0160	35.6889	61.3518	.0350	.1871	.5817	.6968	12.1235	432.6758
.0160	35.6889	61.3518	.0400	.2000	.5817	.6968	12.9606	462.5498

60' R.O.W. 44' FACE-FACE 8" CURB 2" CROWN .3' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	40.5778	61.3467	.0050	.0707	.6614	.7592	4.9920	202.5632
.0160	40.5778	61.3467	.0100	.1000	.6614	.7592	7.0597	286.4676
.0160	40.5778	61.3467	.0150	.1225	.6614	.7592	8.6464	350.8498
.0160	40.5778	61.3467	.0200	.1414	.6614	.7592	9.9839	405.1264
.0160	40.5778	61.3467	.0250	.1581	.6614	.7592	11.1624	452.9451
.0160	40.5778	61.3467	.0300	.1732	.6614	.7592	12.2278	496.1765
.0160	40.5778	61.3467	.0350	.1871	.6614	.7592	13.2075	535.9319
.0160	40.5778	61.3467	.0400	.2000	.6614	.7592	14.1194	572.9353

60' R.O.W. 44' FACE-FACE 8" CURB 8" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	31.5111	61.3853	.0050	.0707	.5133	.6411	4.2155	132.8343
.0160	31.5111	61.3853	.0100	.1000	.5133	.6411	5.9616	187.8561
.0160	31.5111	61.3853	.0150	.1225	.5133	.6411	7.3014	230.0758
.0160	31.5111	61.3853	.0200	.1414	.5133	.6411	8.4310	265.6687
.0160	31.5111	61.3853	.0250	.1581	.5133	.6411	9.4261	297.0266
.0160	31.5111	61.3853	.0300	.1732	.5133	.6411	10.3258	325.3764
.0160	31.5111	61.3853	.0350	.1871	.5133	.6411	11.1531	351.4466
.0160	31.5111	61.3853	.0400	.2000	.5133	.6411	11.9232	375.7123

60' R.O.W. 44' FACE-FACE 8" CURB 6" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	36.4000	61.3735	.0050	.0707	.5931	.7059	4.6415	168.9495
.0160	36.4000	61.3735	.0100	.1000	.5931	.7059	6.5640	238.9307
.0160	36.4000	61.3735	.0150	.1225	.5931	.7059	8.0393	292.6291
.0160	36.4000	61.3735	.0200	.1414	.5931	.7059	9.2829	337.8990
.0160	36.4000	61.3735	.0250	.1581	.5931	.7059	10.3786	377.7826
.0160	36.4000	61.3735	.0300	.1732	.5931	.7059	11.3692	413.8401
.0160	36.4000	61.3735	.0350	.1871	.5931	.7059	12.2802	446.9984
.0160	36.4000	61.3735	.0400	.2000	.5931	.7059	13.1281	477.8613

60' R.O.W. 44' FACE-FACE 8" CURB 4" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	41.2889	61.3651	.0050	.0707	.6728	.7678	5.0487	208.4552
.0160	41.2889	61.3651	.0100	.1000	.6728	.7678	7.1399	294.8001
.0160	41.2889	61.3651	.0150	.1225	.6728	.7678	8.7446	361.0549
.0160	41.2889	61.3651	.0200	.1414	.6728	.7678	10.0974	416.9103
.0160	41.2889	61.3651	.0250	.1581	.6728	.7678	11.2892	466.1199
.0160	41.2889	61.3651	.0300	.1732	.6728	.7678	12.3667	510.6088
.0160	41.2889	61.3651	.0350	.1871	.6728	.7678	13.3576	551.5205
.0160	41.2889	61.3651	.0400	.2000	.6728	.7678	14.2799	589.6002

60' R.O.W. 44' FACE-FACE 8" CURB 2" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	46.1778	61.3600	.0050	.0707	.7526	.8274	5.4400	251.2083
.0160	46.1778	61.3600	.0100	.1000	.7526	.8274	7.6934	355.2622
.0160	46.1778	61.3600	.0150	.1225	.7526	.8274	9.4224	435.1055
.0160	46.1778	61.3600	.0200	.1414	.7526	.8274	10.8801	502.4166
.0160	46.1778	61.3600	.0250	.1581	.7526	.8274	12.1643	561.7188
.0160	46.1778	61.3600	.0300	.1732	.7526	.8274	13.3253	615.3322
.0160	46.1778	61.3600	.0350	.1871	.7526	.8274	14.3930	664.6347
.0160	46.1778	61.3600	.0400	.2000	.7526	.8274	15.3867	710.5244

60' R.O.W. 44' FACE-FACE 8" CURB 8" CROWN .5' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	37.1111	61.4035	.0050	.0707	.6044	.7148	4.6997	174.4103
.0160	37.1111	61.4035	.0100	.1000	.6044	.7148	6.6463	246.6533
.0160	37.1111	61.4035	.0150	.1225	.6044	.7148	8.1401	302.0874
.0160	37.1111	61.4035	.0200	.1414	.6044	.7148	9.3994	348.8205
.0160	37.1111	61.4035	.0250	.1581	.6044	.7148	10.5088	389.9932
.0160	37.1111	61.4035	.0300	.1732	.6044	.7148	11.5118	427.2161
.0160	37.1111	61.4035	.0350	.1871	.6044	.7148	12.4342	461.4461
.0160	37.1111	61.4035	.0400	.2000	.6044	.7148	13.2927	493.3067

60' R.O.W. 44' FACE-FACE 8" CURB 6" CROWN .5' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	42.0000	61.3918	.0050	.0707	.6841	.7764	5.1044	214.3868
.0160	42.0000	61.3918	.0100	.1000	.6841	.7764	7.2188	303.1887
.0160	42.0000	61.3918	.0150	.1225	.6841	.7764	8.8412	371.3288
.0160	42.0000	61.3918	.0200	.1414	.6841	.7764	10.2089	428.7735
.0160	42.0000	61.3918	.0250	.1581	.6841	.7764	11.4139	479.3834
.0160	42.0000	61.3918	.0300	.1732	.6841	.7764	12.5033	525.1382
.0160	42.0000	61.3918	.0350	.1871	.6841	.7764	13.5051	567.2141
.0160	42.0000	61.3918	.0400	.2000	.6841	.7764	14.4376	606.3773

60' R.O.W. 44' FACE-FACE 8" CURB 4" CROWN .5' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	46.8889	61.3834	.0050	.0707	.7639	.8356	5.4937	257.5936
.0160	46.8889	61.3834	.0100	.1000	.7639	.8356	7.7693	364.2924
.0160	46.8889	61.3834	.0150	.1225	.7639	.8356	9.5154	446.1652
.0160	46.8889	61.3834	.0200	.1414	.7639	.8356	10.9874	515.1872
.0160	46.8889	61.3834	.0250	.1581	.7639	.8356	12.2843	575.9968
.0160	46.8889	61.3834	.0300	.1732	.7639	.8356	13.4568	630.9729
.0160	46.8889	61.3834	.0350	.1871	.7639	.8356	14.5350	681.5286
.0160	46.8889	61.3834	.0400	.2000	.7639	.8356	15.5385	728.5847

60' R.O.W. 44' FACE-FACE 8" CURB 2" CROWN .5' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0160	51.7778	61.3783	.0050	.0707	.8436	.8928	5.8695	303.9106
.0160	51.7778	61.3783	.0100	.1000	.8436	.8928	8.3008	429.7944
.0160	51.7778	61.3783	.0150	.1225	.8436	.8928	10.1663	526.3885
.0160	51.7778	61.3783	.0200	.1414	.8436	.8928	11.7390	607.8211
.0160	51.7778	61.3783	.0250	.1581	.8436	.8928	13.1246	679.5647
.0160	51.7778	61.3783	.0300	.1732	.8436	.8928	14.3773	744.4258
.0160	51.7778	61.3783	.0350	.1871	.8436	.8928	15.5293	804.0718
.0160	51.7778	61.3783	.0400	.2000	.8436	.8928	16.6015	859.5889

64' R.O.W. 48' FACE-FACE 8" CURB 8" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	22.0000	65.3614	.0050	.0707	.3366	.4839	3.1940	70.2688
.0159	22.0000	65.3614	.0100	.1000	.3366	.4839	4.5170	99.3750
.0159	22.0000	65.3614	.0150	.1225	.3366	.4839	5.5322	121.7090
.0159	22.0000	65.3614	.0200	.1414	.3366	.4839	6.3881	140.5375
.0159	22.0000	65.3614	.0250	.1581	.3366	.4839	7.1421	157.1257
.0159	22.0000	65.3614	.0300	.1732	.3366	.4839	7.8238	172.1226
.0159	22.0000	65.3614	.0350	.1871	.3366	.4839	8.4506	185.9136
.0159	22.0000	65.3614	.0400	.2000	.3366	.4839	9.0341	198.7500

64' R.O.W. 48' FACE-FACE 8" CURB 6" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	27.3333	65.3506	.0050	.0707	.4183	.5593	3.6917	100.9073
.0159	27.3333	65.3506	.0100	.1000	.4183	.5593	5.2209	142.7044
.0159	27.3333	65.3506	.0150	.1225	.4183	.5593	6.3943	174.7765
.0159	27.3333	65.3506	.0200	.1414	.4183	.5593	7.3835	201.8145
.0159	27.3333	65.3506	.0250	.1581	.4183	.5593	8.2550	225.6355
.0159	27.3333	65.3506	.0300	.1732	.4183	.5593	9.0429	247.1713
.0159	27.3333	65.3506	.0350	.1871	.4183	.5593	9.7674	266.9755
.0159	27.3333	65.3506	.0400	.2000	.4183	.5593	10.4418	285.4089

64' R.O.W. 48' FACE-FACE 8" CURB 4" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	32.6667	65.3429	.0050	.0707	.4999	.6299	4.1579	135.8232
.0159	32.6667	65.3429	.0100	.1000	.4999	.6299	5.8801	192.0830
.0159	32.6667	65.3429	.0150	.1225	.4999	.6299	7.2016	235.2527
.0159	32.6667	65.3429	.0200	.1414	.4999	.6299	8.3157	271.6465
.0159	32.6667	65.3429	.0250	.1581	.4999	.6299	9.2972	303.7100
.0159	32.6667	65.3429	.0300	.1732	.4999	.6299	10.1846	332.6976
.0159	32.6667	65.3429	.0350	.1871	.4999	.6299	11.0006	359.3545
.0159	32.6667	65.3429	.0400	.2000	.4999	.6299	11.7602	384.1661

64' R.O.W. 48' FACE-FACE 8" CURB 2" CROWN .2' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	38.0000	65.3383	.0050	.0707	.5816	.6968	4.5991	174.7662
.0159	38.0000	65.3383	.0100	.1000	.5816	.6968	6.5041	247.1567
.0159	38.0000	65.3383	.0150	.1225	.5816	.6968	7.9659	302.7039
.0159	38.0000	65.3383	.0200	.1414	.5816	.6968	9.1982	349.5324
.0159	38.0000	65.3383	.0250	.1581	.5816	.6968	10.2839	390.7891
.0159	38.0000	65.3383	.0300	.1732	.5816	.6968	11.2655	428.0880
.0159	38.0000	65.3383	.0350	.1871	.5816	.6968	12.1681	462.3879
.0159	38.0000	65.3383	.0400	.2000	.5816	.6968	13.0082	494.3134

64' R.O.W. 48' FACE-FACE 8" CURB 8" CROWN .3' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	28.0000	65.3697	.0050	.0707	.4283	.5682	3.7506	105.0174
.0159	28.0000	65.3697	.0100	.1000	.4283	.5682	5.3042	148.5171
.0159	28.0000	65.3697	.0150	.1225	.4283	.5682	6.4963	181.8955
.0159	28.0000	65.3697	.0200	.1414	.4283	.5682	7.5012	210.0349
.0159	28.0000	65.3697	.0250	.1581	.4283	.5682	8.3866	234.8261
.0159	28.0000	65.3697	.0300	.1732	.4283	.5682	9.1871	257.2391
.0159	28.0000	65.3697	.0350	.1871	.4283	.5682	9.9232	277.8500
.0159	28.0000	65.3697	.0400	.2000	.4283	.5682	10.6084	297.0342

64' R.O.W. 48' FACE-FACE 8" CURB 6" CROWN .3' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	33.3333	65.3589	.0050	.0707	.5100	.6383	4.2133	140.4450
.0159	33.3333	65.3589	.0100	.1000	.5100	.6383	5.9586	198.6192
.0159	33.3333	65.3589	.0150	.1225	.5100	.6383	7.2977	243.2579
.0159	33.3333	65.3589	.0200	.1414	.5100	.6383	8.4267	280.8900
.0159	33.3333	65.3589	.0250	.1581	.5100	.6383	9.4213	314.0446
.0159	33.3333	65.3589	.0300	.1732	.5100	.6383	10.3206	344.0186
.0159	33.3333	65.3589	.0350	.1871	.5100	.6383	11.1475	371.5825
.0159	33.3333	65.3589	.0400	.2000	.5100	.6383	11.9172	397.2384

64' R.O.W. 48' FACE-FACE 8" CURB 4" CROWN .3' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	38.6667	65.3512	.0050	.0707	.5917	.7048	4.6519	179.8736
.0159	38.6667	65.3512	.0100	.1000	.5917	.7048	6.5788	254.3797
.0159	38.6667	65.3512	.0150	.1225	.5917	.7048	8.0573	311.5502
.0159	38.6667	65.3512	.0200	.1414	.5917	.7048	9.3038	359.7472
.0159	38.6667	65.3512	.0250	.1581	.5917	.7048	10.4020	402.2096
.0159	38.6667	65.3512	.0300	.1732	.5917	.7048	11.3948	440.5986
.0159	38.6667	65.3512	.0350	.1871	.5917	.7048	12.3078	475.9009
.0159	38.6667	65.3512	.0400	.2000	.5917	.7048	13.1576	508.7594

64' R.O.W. 48' FACE-FACE 8" CURB 2" CROWN .3' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	44.0000	65.3466	.0050	.0707	.6733	.7682	5.0706	223.1068
.0159	44.0000	65.3466	.0100	.1000	.6733	.7682	7.1709	315.5206
.0159	44.0000	65.3466	.0150	.1225	.6733	.7682	8.7826	386.4323
.0159	44.0000	65.3466	.0200	.1414	.6733	.7682	10.1412	446.2136
.0159	44.0000	65.3466	.0250	.1581	.6733	.7682	11.3382	498.8819
.0159	44.0000	65.3466	.0300	.1732	.6733	.7682	12.4204	546.4978
.0159	44.0000	65.3466	.0350	.1871	.6733	.7682	13.4156	590.2851
.0159	44.0000	65.3466	.0400	.2000	.6733	.7682	14.3418	631.0413

64' R.O.W. 48' FACE-FACE 8" CURB 8" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	34.0000	65.3830	.0050	.0707	.5200	.6467	4.2680	145.1111
.0159	34.0000	65.3830	.0100	.1000	.5200	.6467	6.0358	205.2182
.0159	34.0000	65.3830	.0150	.1225	.5200	.6467	7.3923	251.3399
.0159	34.0000	65.3830	.0200	.1414	.5200	.6467	8.5359	290.2223
.0159	34.0000	65.3830	.0250	.1581	.5200	.6467	9.5435	324.4784
.0159	34.0000	65.3830	.0300	.1732	.5200	.6467	10.4544	355.4483
.0159	34.0000	65.3830	.0350	.1871	.5200	.6467	11.2920	383.9280
.0159	34.0000	65.3830	.0400	.2000	.5200	.6467	12.0717	410.4363

64' R.O.W. 48' FACE-FACE 8" CURB 6" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	39.3333	65.3722	.0050	.0707	.6017	.7127	4.7038	185.0181
.0159	39.3333	65.3722	.0100	.1000	.6017	.7127	6.6522	261.6551
.0159	39.3333	65.3722	.0150	.1225	.6017	.7127	8.1473	320.4607
.0159	39.3333	65.3722	.0200	.1414	.6017	.7127	9.4077	370.0362
.0159	39.3333	65.3722	.0250	.1581	.6017	.7127	10.5181	413.7130
.0159	39.3333	65.3722	.0300	.1732	.6017	.7127	11.5220	453.1999
.0159	39.3333	65.3722	.0350	.1871	.6017	.7127	12.4452	489.5118
.0159	39.3333	65.3722	.0400	.2000	.6017	.7127	13.3045	523.3102

64' R.O.W. 48' FACE-FACE 8" CURB 4" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	44.6667	65.3645	.0050	.0707	.6833	.7758	5.1204	228.7091
.0159	44.6667	65.3645	.0100	.1000	.6833	.7758	7.2413	323.4434
.0159	44.6667	65.3645	.0150	.1225	.6833	.7758	8.8687	396.1357
.0159	44.6667	65.3645	.0200	.1414	.6833	.7758	10.2407	457.4181
.0159	44.6667	65.3645	.0250	.1581	.6833	.7758	11.4495	511.4090
.0159	44.6667	65.3645	.0300	.1732	.6833	.7758	12.5422	560.2205
.0159	44.6667	65.3645	.0350	.1871	.6833	.7758	13.5472	605.1073
.0159	44.6667	65.3645	.0400	.2000	.6833	.7758	14.4825	646.8869

64' R.O.W. 48' FACE-FACE 8" CURB 2" CROWN .4' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	50.0000	65.3599	.0050	.0707	.7650	.8364	5.5205	276.0236
.0159	50.0000	65.3599	.0100	.1000	.7650	.8364	7.8071	390.3563
.0159	50.0000	65.3599	.0150	.1225	.7650	.8364	9.5617	478.0869
.0159	50.0000	65.3599	.0200	.1414	.7650	.8364	11.0409	552.0472
.0159	50.0000	65.3599	.0250	.1581	.7650	.8364	12.3441	617.2075
.0159	50.0000	65.3599	.0300	.1732	.7650	.8364	13.5223	676.1169
.0159	50.0000	65.3599	.0350	.1871	.7650	.8364	14.6058	730.2897
.0159	50.0000	65.3599	.0400	.2000	.7650	.8364	15.6143	780.7126

64' R.O.W. 48' FACE-FACE 8" CURB 8" CROWN .5' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	40.0000	65.4013	.0050	.0707	.6116	.7205	4.7549	190.1976
.0159	40.0000	65.4013	.0100	.1000	.6116	.7205	6.7245	268.9800
.0159	40.0000	65.4013	.0150	.1225	.6116	.7205	8.2358	329.4319
.0159	40.0000	65.4013	.0200	.1414	.6116	.7205	9.5099	380.3952
.0159	40.0000	65.4013	.0250	.1581	.6116	.7205	10.6324	425.2947
.0159	40.0000	65.4013	.0300	.1732	.6116	.7205	11.6472	465.8870
.0159	40.0000	65.4013	.0350	.1871	.6116	.7205	12.5804	503.2155
.0159	40.0000	65.4013	.0400	.2000	.6116	.7205	13.4490	537.9600

64' R.O.W. 48' FACE-FACE 8" CURB 6" CROWN .5' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	45.3333	65.3905	.0050	.0707	.6933	.7833	5.1692	234.3391
.0159	45.3333	65.3905	.0100	.1000	.6933	.7833	7.3104	331.4055
.0159	45.3333	65.3905	.0150	.1225	.6933	.7833	8.9534	405.8872
.0159	45.3333	65.3905	.0200	.1414	.6933	.7833	10.3385	468.6782
.0159	45.3333	65.3905	.0250	.1581	.6933	.7833	11.5588	523.9981
.0159	45.3333	65.3905	.0300	.17[illegible]	.6933	.7833	12.6620	574.0112
.0159	45.3333	65.3905	.0350	.187[illegible]	.6933	.7833	13.6765	620.0029
.0159	45.3333	65.3905	.0400	.2000	.6933	.7833	14.6208	662.8110

64' R.O.W. 48' FACE-FACE 8" CURB 4" CROWN .5' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	50.6667	65.3828	.0050	.0707	.7749	.8437	5.5675	282.0874
.0159	50.6667	65.3828	.0100	.1000	7749	.8437	7.8737	398.9318
.0159	50.6667	65.3828	.0150	.1225	.7749	.8437	9.6432	488.5897
.0159	50.6667	65.3828	.0200	.1414	.7749	.8437	11.1350	564.1748
.0159	50.6667	65.3828	.0250	.1581	.7749	.8437	12.4493	630.7666
.0159	50.6667	65.3828	.0300	.1732	.7749	.8437	13.6376	690.9702
.0159	50.6667	65.3828	.0350	.1871	.7749	.8437	14.7303	746.3331
.0159	50.6667	65.3828	.0400	.2000	.7749	.8437	15.7473	797.8637

64' R.O.W. 48' FACE-FACE 8" CURB 2" CROWN .5' OVERFLOW

N	A	P	S	S1/2	R	R2/3	V	Q
.0159	56.0000	65.3782	.0050	.0707	.8566	.9019	5.9519	333.3076
.0159	56.0000	65.3782	.0100	.1000	.8566	.9019	8.4173	471.3682
.0159	56.0000	65.3782	.0150	.1225	.8566	.9019	10.3090	577.3057
.0159	56.0000	65.3782	.0200	.1414	.8566	.9019	11.9038	666.6153
.0159	56.0000	65.3782	.0250	.1581	.8566	.9019	13.3089	745.2985
.0159	56.0000	65.3782	.0300	.1732	.8566	.9019	14.5792	816.4336
.0159	56.0000	65.3782	.0350	.1871	.8566	.9019	15.7473	881.8491
.0159	56.0000	65.3782	.0400	.2000	.8566	.9019	16.8346	942.7363

EXHIBIT F

STREETS AND MAXIMUM RUNOFFS

STREET DESCRIPTION & LOCATION	MAXIMUM RUNOFF (in c.f.s.)
A. Street #1 - 50' R/W, 32' f. to f.	14
B. 94th Street SW - 60' R/W, 40' f. to f.	12
C. Benavides Rd., SW - 64' R/W, 48' f. to f. from junction with Street #1 to street #8	82
D. Street #2 - 50' R/W, 32' f. to f. from junction with Street #1 to junction with Street #3	21
E. Street #3 - 50- R/W, 32' f. to f. from Sage Road to junction with Street #4	10
F. Street #4 - 50' R/W, 32' f. to f. from Benavides Rd. SW to junction with Street #10	4
Street #4 - from Street #10 to junction with Street #8	111
G. Streets #5, 6 and 7 - 50' R/W, 32' f. to f. from Street #3 to Street #8	16
H. Street #8 - 50' R/W, 32' f. to f. from Sage Rd to junction with Street #4	22
Street #8 - from Street #4 to junction with Street #9	18
I. Street #9 - 60' R/W, 44' f, to f. from Benavides Road, SW to Street #8	40
J. Street #10 - 50' R/W, 32' f. to f. from Street #2 and #3 to Street #4	98

REVISED MAY 1972

Problems with Westgate Heights

Berm on N. W. corner does not appear to be constructed as specified in any case is it on other people's property?

Dr. easement and Rundown does not appear to be functioning and in any case it does not protect adjacent properties

What is on site ponding?

Lots on W side of Blazich directly exposed to surface runoff

O.S.(2) the 7.0Ac drains into lots N of intersection of BCH & Sapphire

Meurer, Senapini, and Meurer, Inc.
2601 Wyoming Blvd., NE
87110
Westgate Heights units 2a & 4

Dear Carl Tebbens

I have reviewed the drainage report for unit 2a of Westgate Heights and have no objections therefore approval is hereby granted

Regarding unit 4 of Westgate Heights my concurrence is somewhat restrained and limited to the proposals for the on site handling of the runoff. I find that the attention given to the offsite flows is not as comprehensive as it would be desirable.

No discussion is found on the manner in which the runoff from offsite areas 3 & 4 will be prevented from affecting the west side of the development.

I have no objection to the diversion of the flows to Benavides Rd provided that a desilting basin will prevent sediment to be conveyed to the public street. I believe that a solution may be worked out with the A.P.S. people but some concrete agreement must be on hand.

Another concern regards the unplatted tract of land north of De Anza Dr and East of Show Vista Blvd. which from the contours (not supplied in the report) appears to effect the lots along Ladrones st. in a progressively greater manner. The discharge of Ladrones Arroyo does not indicate any contributions from this area but

must be taken in consideration. I appreciate the fact that when the property to the south will be developed this problem will be eliminated; in the meantime an interim solution must be provided

The provisions for the R.O.W for the Channels east of Units 3 & 4 and the dike construction shown on the revised figure IB Westport Heights Unit 3 are in agreement with previous discussions. The implementation of these facilities will have to be discussed in an addendum to the subdivision drainage report together with answers to the other questions raised above

3200 x ? = Sq ft ÷ 43,560 = ____ Ac 2198

AREA

B = 479 Ac.

1. 284 x 3200 = 21 Ac +3 → 24 AC.

2. 551 x 3200 = 41 Ac

3. 275 x 3200 = 20 Ac

4. 1818 x 3200 = 133 Ac +6 = 139 Ac

5. 155 x 3200 ÷ 12 ÷ 2 = 6

6. 299 x 3200 = 22 Ac

7 1296 x 3200 = 95 Ac +6 = 101 Ac

8. 164 x 3200 = 12 Ac

9. 650 x 3200 = 48 Ac

886

Mr. Roberts letter on Westgate Unit 2.

1. The ~~storm~~ runoff from Drainage Areas A & B. are outside of Westgate Unit 2 Area. Question. What would Roberts comments be if Drainage Areas A & B were to be developed? Also with the present drainage what happens to the run-off.

2. Per Roberts recommendations

a. What City policy? It is like saying something ~~is bad~~ does not comply with something else, but you will not find out what the somethings are.

b. The 993 cfs of ~~water~~ run-off is generated outside of the proposed development. Check should be made ~~out~~ on the flows from A & B

Received 27 Oct 76

DRAINAGE REPORT
WESTGATE HEIGHTS UNIT 3
ALBUQUERQUE, NEW MEXICO

ZONE MAP NO M-9

MURRAY-McCORMICK, INC.
ENVIRONMENTAL DESIGN

ECOSYSTEMS ANALYSIS • PLANNING • LAND SURVEYS • ENGINEERING

2601 WYOMING BLVD., NE. SUITE F / ALBUQUERQUE, N.M. 87110 / 505-292-1936

DRAINAGE REPORT

WESTGATE HEIGHTS UNIT 3

ALBUQUERQUE, NEW MEXICO

ZONE MAP NO M-9

Prepared For

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

Prepared By

Murray-McCormick, Inc.
2601 Wyoming Blvd., N.E.
Albuquerque, New Mexico
505 292-1936

October 22, 1976

TABLE OF CONTENTS

	Page No.
PUPROSE AND INTRODUCTION	1
THE SITE	1
GENERAL SITE CHARACTERISTICS	2
ANALYTICAL METHOD	2
OFFSITE WATERSHEDS	3
ESTIMATED OFFSITE FLOWS	5
WESTGATE HEIGHTS, UNIT 2	8
UNPLATTED LANDS TO THE SOUTHWEST	8
UNDEVELOPED RUNOFF - UNIT NO. 3	8
ESTIMATED RUNOFF DEVELOPED STATE	9
SUMMARY OF RESULTS	10
RECOMMENDATIONS	11
SUMMARY	12

APPENDIX

Figure Ia U.S.G.S. Topographic Map of Major Watersheds Affecting the Site.

Figure Ib Drainage Characteristics Plan

Composite Runoff Coefficients - Rational Method

Lot Ponding Requirements

Figure II Typical Lot Drainage

Figure III Time of Concentration for Small Drainage Basins - Seelye

Figure IV Intensity Duration Curves - Albuquerque & Environs

APPENDIX - Cont'd.

Figure V 100 Year - 6 Hour Precipitation

a. Unit Hydrograph Calculations

Figure VIb. Determination of Effective Rainfall

c. Determination of Storm Hydrograph

d. Depth-Duration-Frequency Graphs

e. Unit Hydrograph - Watershed "A"

f. Storm Hydrograph - Watershed "A"

Figure VII Street Flow Capacity Characteristics

Rational Method - Runoff Computations

Reference Copy

Storm Drainage Study Relative to the Development of Westgate Heights, Unit 2

Campbell-Hicks & Associates, Inc.
By Donald L. Campbell P.E. & L.S. No. 3633

Figure VIII Area Grading Plan, Unit No. 2, Westgate Heights

Bibliography of References

DRAINAGE REPORT

WESTGATE HEIGHTS SUBDIVISION
UNIT NO. 3

PURPOSE AND INTRODUCTION

The following report with its supporting calculations and exhibits describes the drainage characteristics affecting the development of the above subdivision. Further, a number of recommendations regarding the design and grading of the project are included within the text to guide and control the engineering design and drainage such that urban planning and development can be accomplished with a minimum risk to life and property.

A two phase approach is utilized to evaluate the effect of development on the area. The first phase determines the existing characteristics of the watersheds affecting the site and the quantities of water entering the project from upstream. In addition, the present (undeveloped) runoff of the subject site is also determined for later comparison with the developed runoff and the resultant compliance with requirements of the City of Albuquerque and the Albuquerque Metropolitan Arroyo Flood Control Authority. The second phase is the runoff in the developed state and the further evaluation of means to control runoff in the upstream watersheds.

THE SITE

Westgate Heights, Unit No. 3, 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 and northwest by Westgate Heights, Unit 2, on the north by Unit 7 of Atrisco Village, and on the east, south and southwest by unplatted lands.

GENERAL SITE CHARACTERISTICS

The site encompassing 36.0 acres, more or less, slopes from northwest to southeast with an average slope of 2%. The soil in this unit and vicinity is sandy with little clay and can be considered open and highly absorbant with a high degree of porosity. Percolation tests were made in October 1975 in Westgate Heights, Unit 2, and the results have been included in the Appendix. Due to the general uniformity of soils in the vicinity, it can be assumed the porosity of the surface soils indicated by the above percolation tests for Unit 2 also apply to Unit 3. The existing vegetation is sparse bunch grass and few shrubs.

ANALYTICAL METHOD

Due to the complexity of the upstream watershed characteristics, and magnitude of the area, two methods of analysis have been utilized in the evaluation of offsite flows. The "Rational Method" was utilized to determine the present (undeveloped) runoff from the subject site and for the ultimate determination of flows passing through or near the site. However, in order to establish the basic drainage pattern for the offsite flows, the Colorado Unit Hydrograph Procedure (CUHP) was utilized. This Procedure allowing for a more objective evaluation of the effects of infiltration, detention and depression

storage and the relative pervious vs. impervious characteristics of the analyzed watersheds.

The logic, method and application of the Colorado Unit Hydrograph Procedure and the "Rational Method" will not be included within the text of this report. Reference is made to Urban Storm Drainage Criteria Manual, Volume 1, prepared by Wright-McLaughlin Engineers, Denver, Colorado, as amended under the date of March 1969.

The procedures and calculations contained in this report parallel those given in the section entitled "Runoff", where assumptions or data unique to the subject area are employed, a discussion of their applicability appears in the report.

OFFSITE WATERSHEDS

Offsite flows affecting Westgate Heights, Unit 3, are produced by two watersheds. The largest area, shown on Figure 1 as Area "A", consists of undeveloped and unplatted lands above Units 1 through 3 of Atrisco Village. Although the natural watershed extends somewhat farther west, flows from this area have been diverted to the south by an intercepting ditch along the existing power line approximately 1,300 feet west of the western limit of the above units of Atrisco Village. The adequacy of this channel to function during the 100 year storm was established within the Drainage Management Plan, Western Albuquerque Metropolitan Area, prepared by William Matotan & Associates, Inc., Engineers, and sustained by this report subject to adequate maintenance by those authorities having jurisdiction. The remainder of the area south of De Vargas Road has been platted

as R-1 single family, along with other uses including schools, commercial, and office and institutional zoning. At this writing a significant portion of the single family area is developed. For the purposes of this report the entire single family area is considered to be developed. The higher density and non-single family uses which are undeveloped at this time are treated as undeveloped land as each parcel will, at the time of development, have to meet the discharge requirements of the Albuquerque Metropolitan Arroyo Flood Control Authority Resolution 72-2.

Land use distribution in this watershed is:

Single Family Residential	294 Ac.	30%
Existing Mobile Home Park	10 Ac.	1%
Undeveloped	687 Ac.	69%
Total Watershed "A"	991 Ac.	100%

Watershed "B" abutts that above on the north and its discharge enters the study area at Sage Road along the northern boundary of Westgate Heights, Unit 2. This watershed consists of 533 acres of undeveloped land.

At the writing of this report a diversion berm exists within the median of Snow Vista Blvd. This berm causes the flow from the southern portion of watershed "A" to be diverted ~~north~~ South to the ~~intersection of Snow Vista Boulevard and Sage Road~~. Furthermore, the northern portion of this watershed is also concentrated at ~~this~~ the intersection of Snow Vista Blvd & Sage Road. The flow is then distributed to Sage Road and an existing ditch flowing southeasterly through undeveloped land to the western limit of Westgate Heights, Unit 2. Due to the nature of the intersection of Snow Vista

Boulevard and Sage Road, the quantitative determination of the flow distribution to these corridors is next to impossible; therefore, it will be assumed that all flows arriving at this intersection are to be conducted easterly by Sage Road. not consistant with previous sentenance

It should be noted at this time that the previously mentioned report by Matotan makes two recommendations affecting flows at the Sage-Snow Vista intersection. The most significant recommendation is the construction of the Westgate diversion channel from the Amole Arroyo northward approximately 12,000 feet and thus intercepting 1,390 acres of upstream watershed. The second recommendation is the extension of the existing diversion dike above Atrisco Village to Central Avenue. The probability of timing of either improvement cannot be measured, and; therefore, this report further assumes that control of flows in Sage Road must be limited to protection of Westgate Heights, Unit 2 and 3, as the upstream flows entering Unit 2 must pass through Unit 3.

ESTIMATED OFFSITE FLOWS

Watershed "A"

Study Point No. 1 (Snow Vista & Sage Road)

Area	991 Ac.	1.55 sq. miles
L	10,300 Ft.	1.95 Miles
Lca	4,600 Ft.	0.87 Miles
Unit Duration	10 minutes	
Frequency	100 years	
Duration	6 hours	

(Estimated OFfsite Flows cont'd.)

Assumptions:

	Area Pervious	Area Impervious	Total
Single Family	55%	45%	100%
Mobile Home Park	45%	55%	100%
Undeveloped	80%	20%	100%

Pervious Area

Maximum infiltration 0.50 inch per hour

Detention & Depression Storage 0.40 inch

Impervious Areas

Detention & Depression Storage 0.10 inch

Calculation of the various parameters depicting the unit hydrograph (Figure IVa) and the resultant storm hydrograph appear in the Appendix to this report. As can be seen on the storm hydrograph, the peak flow at this intersection occurs at 60 minutes and a flow rate (Q) of 815 cubic feet per second (c.f.s.).

Conversion to "Rational Method"

$Q = C_f \times C \times I \times A$ Where: $Q = \cancel{815}$ 381

$T_c = 60$ min.

$I = 2.22$

$A = \cancel{991}$ Ac. 717

Solve for: $[C_f \times C]$

Where $C_f = 1.25$

(Estimated Offsite Flows cont'd.)

$$[C_f \times C] = \frac{Q}{I \times A}$$

$$[C_f \times C] = \frac{815}{(2.22)(991)}$$

$$[C_f \times C] = \underline{\underline{0.37}} \quad 0.24$$

Proceeding eastward along Sage Road as the primary corridor for offsite drainage and utilizing the "Rational Method" to study point No. 2. where

Study Point No. 2

Channel Flow

Channel Flow = 3,000 ft.

Velocity = 7.0 ft. per second

Flow Time in channel = 7 minutes

T_c at Study Point #1 60 minutes

Total T_c = 67 minutes

$$I = \frac{189}{t+25} = \frac{189}{67+25} = 2.05 \text{ inches per hour}$$

COMPOSITE RUNOFF COEFFICIENT

		C_fxC	% Area	
Watershed "A"	991.0 Ac.	0.37	64%	0.24
Area "B"	18.0 Ac.	0.18(1)	1%	0.00
Watershed "C"	533.0 Ac.	0.18	35%	0.06
Total	1542.0 Ac.			0.30

(1) See Appendix - Composite Runoff Coefficients for Rational Method

(Estimated OFfsite Flows - cont'd.)

Flow at Study Point No. 2

$Q = [C_f C]IA$

$A = (0.30)(2.05)(1542) = 948$ c.f.s.

(say 950 c.f.s.)

WESTGATE HEIGHTS, UNIT 2

The drainage report covering Westgate Heights, Unit 2, considered the subdivision to contain no lot ponding. The subdivision, however, was constructed in accordance with an area grading plan dated August 1, 1972, and prepared by Ralph K. Hicks, N.M.L.S. No. 3367. This plan included ponding on selected lots. Due to this alteration, the report of Ralph K. Hicks & Associates dated March 1972 was used as reference material and a re-evaluation of the Westgate Heights Unit 2 water shed draining to Unit 3 was undertaken. The results of that study appear in the Appendix, pages A-10.1 thru A-10.5 and Figure Ib.

UNPLATTED LANDS TO THE SOUTHWEST

Approximately 34 acres east of Snow Vista Boulevard and south of Units 2 and 3 flow in an easterly manner and are conducted by Benavides Road to the east. The control of these flows for the development of Unit No. 3 is included within the recommendations of this report.

UNDEVELOPED RUNOFF - UNIT NO. 3

Drainage Basin	Elev. Diff.	Length of Flow	Tc	I100 yr. in./hr.	C	Area Acres	Q C.F.S.
On-Site	30	1250'	16	4.61	0.38	36.0	63

Offsite:

Westgate Heights Unit 2 (northwesterly)	140
Atrisco Village (northerly)	5
Unplatted (southwesterly)	41
Total Offsite Flow As Modified by This Report	186
Total Undeveloped Runoff	214

186
63
249

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 can 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 satisfies AMAFCA's requirement that the runoff rate from the developed tract not exceed the runoff rate from the tract in its natural state.

For non-ponded runoff, a composite runoff coefficient is developed based upon the percentage of different types of surfaces in the drainage area. The runoff coefficients for various surfaces are as follows:

Streets, Walks and Drives	C = 0.80
Roofs	C = 0.80
Lawns, sandy soils, (Average 2 to 7% slope)	C = 0.12

SUMMARY OF RESULTS

Developed Runoff:

Saphire Street	150 c.f.s.
Kimela	~~73~~ 57 c.f.s.
Total flow	~~223~~ 207 c.f.s.
Less: Total Offsite Flow	~~186~~ 214 c.f.s. 214 over page

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 flow entering the project on the northwest and north perimeters is to be conducted to the east via Saphire Avenue. This flow will then be conducted by existing arroyos easterly in the course of historical drainage. Onsite flows from Areas W3(2) thru W3(7), A-7 and A-8 are conducted to Kimela Avenue and thence northeasterly in the historical course of natural drainage within existing arroyos. As the development of this site will not increase runoff above the current "undeveloped" runoff level, it is not within the scope of this report nor the responsibility of the developer to provide determination of the adequacy of downstream facilities. but should show there is no such facility in which to concentrate flows.

RECOMMENDATIONS

The following recommendations are made to enable the developer of this site and the local government to complete this project within the framework required by the City of Albuquerque and A.M.A.F.C.A.:

1. Due to the lack of clear flow pattern at the intersection of Snow Vista and Sage Road, a compacted earthen berm should be constructed to prevent upstream flows from entering Area O.S.(1).
2. A diversion wall should be constructed along the north line of Block 72 to direct flows from O.S.(5) to the proposed 10' drainage R.O.W.
3. The platted and future streets to the southwest of the subject site should be subgraded a minimum of 2.0 ft. below existing ground to provide interception and control of flows from the southwest.
4. Flows within the streets of the development are distributed so that only Saphire Avenue assumes a major role in conveying off-site flows. This street should be graded at not less than 1.0% slope and 2.00 ~~0.50%~~ crown in order to insure adequate carrying capacity. Diversion walls should be installed as shown on Figure 1 to provide freeboard protection through the horizontal curve.
5. The ponding areas in each backyard should be situated toward the rear of the yard. There should be a minimum of 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.

6. Ponds should average 6" deep and the minimum surface area should not be less than 15% of the total area drained into the pond.

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 downstream areas than that which existed before development.

A number of points, however, must be recognized. At this time considerable flow has been channeled to the intersection of Snow Vista and Sage Road, and within current planning, interception of this flow is provided by the Westgate Heights channel. Therefore, this report provides only for interim or temporary protection and definition of flow distribution in this area and further makes no attempt to evaluate the capability of Sage Road to handle its existing flow.

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.

Respectfully submitted,

Bo K. Johnson
N.M.P.E. No. 5922
October 22, 1976

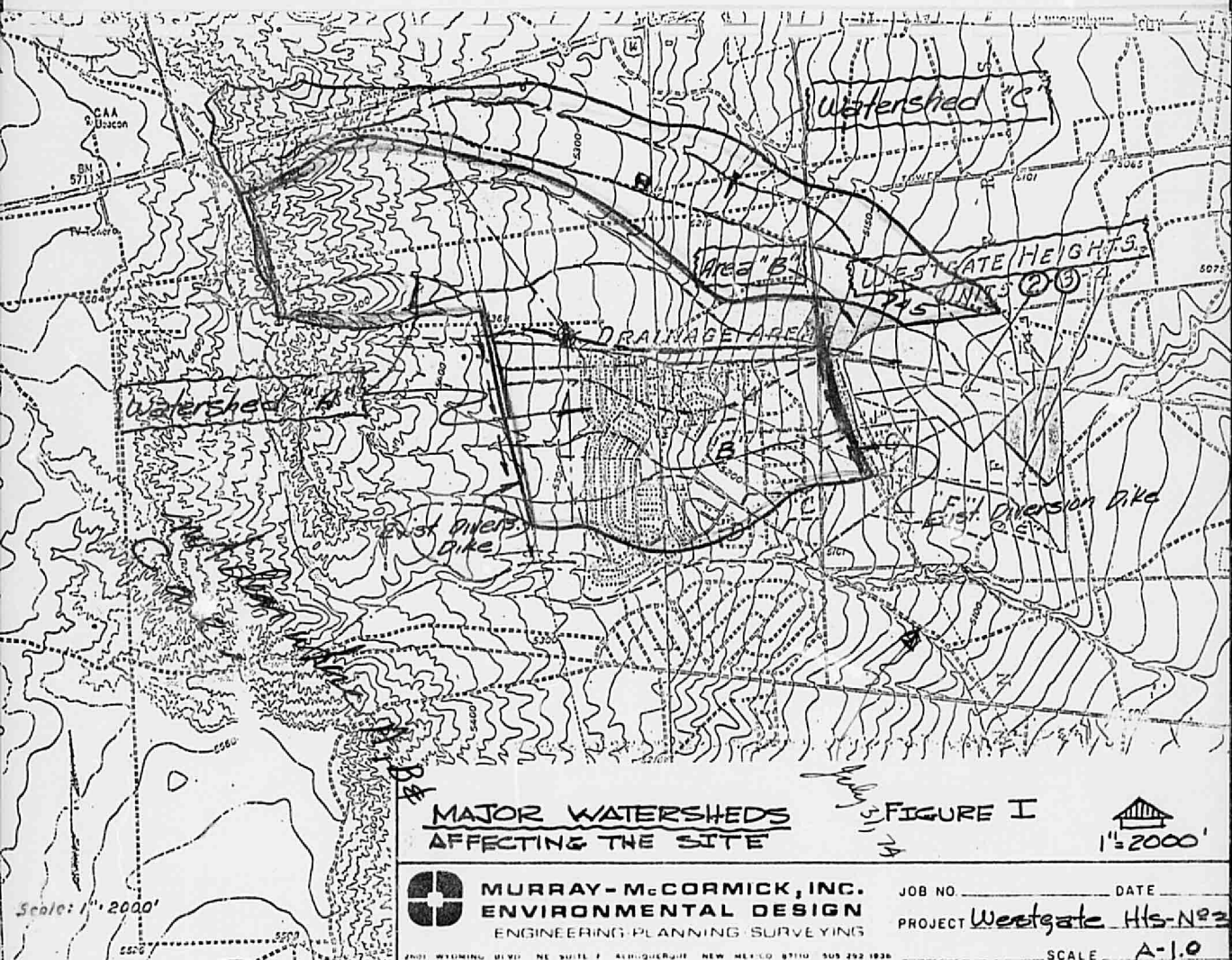
10-A is watershed A 525

10-B, 10-G is watershed B

10-R; 10-C; 10-D; 10-F. } 745

1931 Supplement!

958 total



MAJOR WATERSHEDS AFFECTING THE SITE

FIGURE I

1" = 2000'

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PROJECT Westgate Hts-No 3

SCALE A-1.0

"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 2

Gross Area			72.1 Ac.
Less:	Park Site	7.8 Ac.	
	School Site	11.4 Ac.	
	Area in Streets	11.2 Ac.	
Area in Lots			41.7 Ac.
Average Lot Area (219 Lots)			8,294 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 2

C = 0.80

Streets & Walk Area	20x65	1,300 S.F.
Roof Area	20x55	1,100 S.F.
Driveway	30x15	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 - $C \times C_f$ - 0.55 x 1.25 = 0.69

Elementary School Site

C = 0.30 x 1.25 = 0.38

Park Site

C = 0.20 x 1.25 = 0.25

Typical Lot Area - Westgate Heights, Unit 3

Gross Area		36.0 Ac.
Less: Well Site	3.4 Ac.	
Area in Streets	5.1 Ac.	
Area in lots		27.5 Ac.
Average lot area (136 lots)		8,808 Sq.Ft.
Typical lot width		65 Ft.

Ponded Lots - Westgate Heights, Unit 3

C = 0.80

Streets & Walk Area	20x65	1,300 S.F.
Roof Area	20x55	1,100 S.F.
Driveway	30x15	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 - $C \times C_f = 0.55 \times 1.25 = 0.69$

Non-Ponded Lots - Westgate Heights, Unit 3

C = 0.80

Streets & Walk Area	20x65	1,300 S.F.
Roof Area	40x55	2,200 S.F.
Driveway	30x15	450 S.F.
Patio	10x10	100 S.F.
Total Impervious Area		4,050 S.F.

C = 0.12

Total Lot Area	8,808 S.F.
Less Roof Area	-2,200 S.F.
Less Driveway	- 450 S.F.
Total Pervious Area	6,158 S.F.

Impervious Area	4050 Sq.Ft.	40% @ 0.80	0.320
Pervious Area	6158 Sq.Ft.	60% @ 0.12	0.072
Total Area	10,208 Sq.Ft.	100%	0.392

Composite Runoff Coefficient - $C \times C_f = 0.39 \times 1.25 = 0.49$

PONDING REQUIREMENTS

Typical Lot Area

Average Lot Area			8,808 S.F.
Less: Front & Side Yards			3,250 S.F.
Area Draining to Pond			5,558 S.F.
Roof Area 20 x 55			1,100 S.F.
Patio Area			100 S.F.
Lawn Area			4,358 S.F.

Runoff Coefficient

Impervious Area	1200 S.F.	22% @ 0.80	0.18
Pervious Area	4358 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 5558 x 0.18 = 340 cu.ft.

Depth of pond 0.50 ft (6")

Minimum area of pond 680 sq.ft.

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

V = 15% x 5558 sq.ft. x 0.5 ft. = 416 cu.ft.

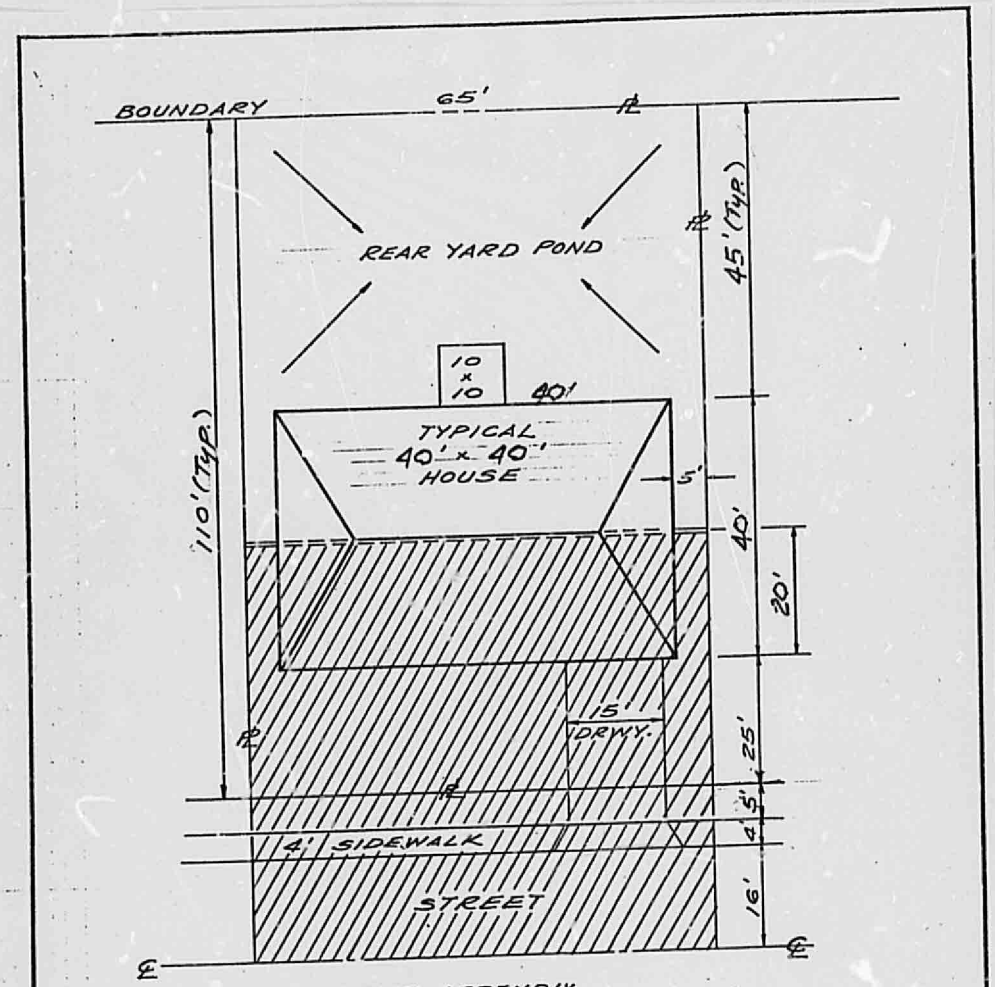

FIGURE II
TYPICAL LOT DRAINAGE

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PROJECT Westgate Hts-No 3
SCALE A-4.2

TIME OF CONCENTRATION
FOR SMALL DRAINAGE BASINS

FIGURE III

FIG. G-INTENSITY EXPECTATION FOR ONE-HOUR RAINFALL.*

FIG. H-OVERLAND FLOW TIME.

FIG. J-VALUES OF i RAINFALL INTENSITY-DURATION.

*Reproduced from Miscellaneous Publication No. 204, U.S. Dept. of Agriculture, by David L. Yarnell.
+Adapted from Engineering Manual of the War Department, Part VIII, Chap. 1, Dec. '45.

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SCALE _____

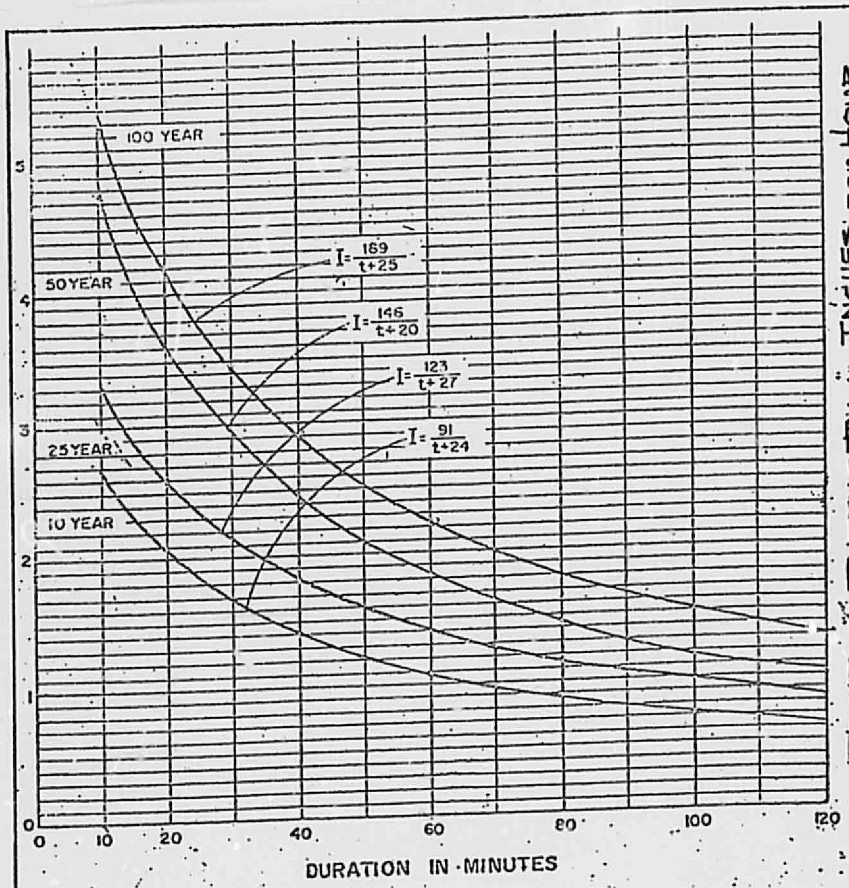

FIGURE IV

INTENSITY-DURATION CURVES

MASTER PLAN OF DRAINAGE CITY OF [illegible]UERQUE – NEW MEXICO & D. ENVIRONS	
INTENSITY DURATION FREQUENCY CURVES (ALBUQUERQUE AREA-1961)	
GORDON HERKENHOFF & ASSOC CONSULTING ENGINEERS	CHART

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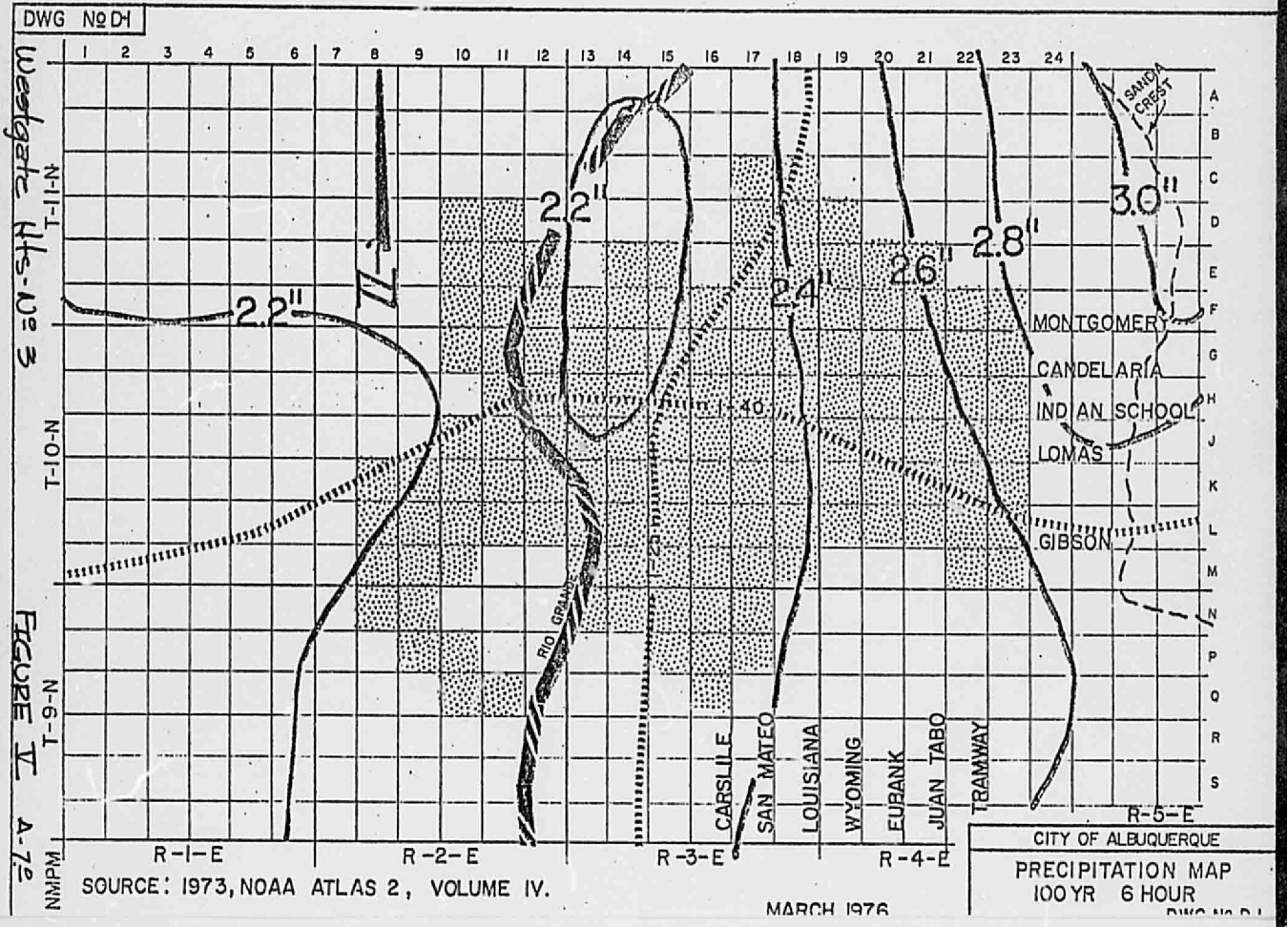
SCALE _____ A-6.2



Westgate Hts-Unit 3

SOURCE: 1973, NOAA ATLAS 2, VOLUME IV.

MARCH 1976

FIGURE IV A-7a

FIGURE VIa

UNIT HYDROGRAPH CALCULATIONS

Watershed "A"

Study Point No. 1 (Snow Vista & Sage Road)

Area	991 Ac.	1.55 Sq. Miles
L	10,300 Ft.	1.95 Miles
L_{ca}	4,600 Ft.	0.87 Miles

10 minute unit storm

PERVIOUS-IMPERVIOUS AREAS

(Table 2-1 C.U.H.P.)

	Area	% of Area	% Pervious Area	
Single Family Residentia'	294 Ac.	30%	55%	17%
Mobile Home Park	10 Ac.	1%	45%	0%
Undeveloped Area	687 Ac.	69%	80%	55%
	991 Ac.	100%		72%

Pervious Area 72%
Impervious Area 28% = I_a

(1)

$$C_t = \frac{7.81}{(I_a)^{0.78}}$$

$$C_t = \frac{7.81}{(28)^{0.78}} = \underline{0.58}$$

(2)

$$t_p = C_t\,[L x L_{ca}]^{0.3}$$

$$t_p = 0.58\,[1.95 x 0.87]^{0.3} = \underline{0.68}$$

(3)

$$C_p = 0.89\,C_t^{0.46}$$

$$C_p = 0.89(0.58)^{0.46} = \underline{0.69}$$

(4)

$$q_p = \frac{640(C_p)}{t_p}$$

$$q_p = \frac{640(0.69)}{0.68} = 649$$

Say 650

(5)

$$Q_p = q_p\,A$$

$$Q_p = 650(1.55) = 1008 \text{ c.f.s.}$$

(6)

$W_{75\%q}$ = 0.40 hrs. : 24 min.

$W_{50\%q}$ = 0.85 hrs. = 51 min.

A-8.1

(7)
$T_p = 60t_p + \frac{t_u}{2}$

$T_p = 60(0.68) + \frac{10}{2} = 46$ minutes

(8)
See Figure VIe.

(9 & 10)

991 Ac. x 0.08 = 79.3 Ac.Ft.
1 ϕ" = (200 c.f.s. x 60 sec./min. x 20 min.) ÷ 43560 = 5.51 Ac.Ft./Sq.In.

(79.3 Ac.Ft.) ÷ 5.51 = 14.39 sq.in. (13.67 → 15.11)

(11 thru 13)

Detention & Depression Storage - Red

Pervious Area	= 72% =	0.18	0.13
Imperv.	= 28%	0.90	0.25
			0.38

Distribution of Flows @ Snow Vista & Sage

TO SOUTH

294 AC = 79% × 0.45 imp. Ac. = 0.36
80 AC = 21% × 0.20 imp. Ac = 0.09
0.40 × 374 = 149.6 = 54%

TO EAST

10 Ac = 2% × 0.55 imp Ac = 0.01
607 Ac = 98% × 0.20 imp Ac = 0.20
0.21 × 617 = 129.6 = 46%

54% of 815 = 434 to South
46% of 815 = 381 to East

A-8.3

DETERMINATION OF EFFECTIVE RAINFALL

Location: Westgate Hts. No 3

Design Storm: 100 Year Recurrence Interval

Time (min.) (1)	Total Precipitation (in.) (2)	Incremental Precipitation (in.) (3)	Rearranged Incremental Precipitation (in.) (4)	PERVIOUS AREA 72 %				IMPERVIOUS AREA 28 %				Total Average Effective Precipitation (in.) (13)
				Maximum Infiltration (in.) (5)	Detention & Depression Storage (in.) (6)	Effective Precipitation (in.) (7)	72 % Effective Precipitation (in.) (8)	Detention & Depression Storage (in.) (9)	Loss (in.) (10)	Effective Precipitation (in.) (11)	28 % Effective Precipitation (in.) (12)	
0	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.95	0.95	0.14	"	0.06	"	"	0.10	0.00	0.04	0.01	0.01
20	1.35	0.40	0.40	"	0.32	0.00	0.00	0.00	0.00	0.08	0.11	0.11
30	1.70	0.35	0.95	"	0.08	0.85	0.61	"	0.05	0.90	0.25	0.86
40	1.88	0.18	0.35	"	0.00	0.27	0.19	"	0.02	0.33	0.09	0.28
50	2.08	0.20	0.20	"	"	0.12	0.09	"	0.01	0.19	0.05	0.14
60	2.22	0.14	0.18	"	"	0.10	0.07	"	0.01	0.17	0.05	0.12
70	2.28	0.06	0.06	"	"	0.00	0.00	"	0.00	0.06	0.02	0.02
80	2.33	0.05	0.05	"	"	"	"	"	"	0.05	0.01	0.01
90	2.37	0.04	0.04	"	"	"	"	"	"	0.04	"	"
100	2.41	"	"	"	"	"	"	"	"	"	"	"
110	2.45	0.04	0.04	"	"	"	"	"	"	0.04	"	"
120	2.48	0.03	0.03	"	"	"	"	"	"	0.03	"	"
130	2.51	0.03	0.03	"	"	"	"	"	"	0.03	"	"
140	2.53	0.02	0.02	"	"	"	"	"	"	0.02	"	"
150	2.55	"	"	"	"	"	"	"	"	"	"	"
160	2.57	"	"	"	"	"	"	"	"	"	"	"
170	2.59	"	"	"	"	"	"	"	"	"	"	"
180	2.61	"	"	"	"	"	"	"	"	"	"	"
190	2.63	"	"	"	"	"	"	"	"	"	"	"
200	2.65	"	"	"	"	"	"	"	"	"	"	"
210	2.67	"	"	"	"	"	"	"	"	"	"	"
220	2.69	"	"	"	"	"	"	"	"	"	"	"
230	2.71	0.02	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01

Figure VI-b.

DETERMINATION OF EFFECTIVE RAINFALL

Location: Westgate Hts. No 3 - (Cont'd)

Design Storm: 100 Year Recurrence Interval

Time (min.) (1)	Total Precipitation (in.) (2)	Incremental Precipitation (in.) (3)	Rearranged Incremental Precipitation (in.) (4)	PERVIOUS AREA 72 % Maximum Infiltration (in.) (5)	Detention & Depression Storage (in.) (6)	Effective Precipitation (in.) (7)	72 % Effective Precipitation (in.) (8)	IMPERVIOUS AREA 28 % Detention & Depression Storage (in.) (9)	Loss (in.) (10)	Effective Precipitation (in.) (11)	28 % Effective Precipitation (in.) (12)	Total Average Effective Precipitation (in.) (13)
240	2.73	0.02	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01
250	2.75	"	"	"	"	"	"	"	"	"	"	"
260	2.77	"	"	"	"	"	"	"	"	"	"	"
270	2.79	"	"	"	"	"	"	"	"	"	"	"
280	2.81	"	"	"	"	"	"	"	"	"	"	"
290	2.83	"	"	"	"	"	"	"	"	"	"	"
300	2.85	"	"	"	"	"	"	"	"	"	"	"
310	2.87	"	"	"	"	"	"	"	"	"	"	"
320	2.89	"	"	"	"	"	"	"	"	"	"	"
330	2.91	0.02	0.02	"	"	"	"	"	"	"	"	"
340	2.92	0.01	0.01	"	"	"	"	"	"	0.02	0.01	0.01
350	2.93	"	"	"	"	"	"	"	"	0.01	0.00	0.00
360	2.94	0.01	0.01	0.08	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
		2.94	2.94		0.40	1.34	0.96	0.10	0.11	2.73	0.84	1.80

WESTGATE HTS - Nº 3

DETERMINATION OF STORM HYDROGRAPH

Time (min.) (1)	Unit Hydrograph (cfs) (2)	Excess Precipitation in Inches														Storm Hydrograph (cfs)
		0.01 (3)	0.11 (4)	0.86 (5)	0.28 (6)	0.14 (7)	0.12 (8)	0.07 (9)	0.01 (10)	0.01 (11)	0.01 (12)	0.01 (13)	0.01 (14)	0.01 (15)	0.01 (16)	
0	0	0														0
10	140	1	0													1
20	300	3	15	0												18
30	480	5	33	120	0											158
40	650	7	53	258	39	0										357
50	540	5	72	413	84	20	0									594
60	420	4	59	559	134	42	17	0								815
70	340	3	46	464	182	67	36	3	0							783
80	280	3	37	361	151	91	58	6	1	0						708
90	240	2	31	292	118	76	78	10	3	1	0					611
100	210	2	26	240	95	59	65	13	5	3	1	0				509
110	190	2	23	206	78	48	50	11	7	5	3	1	0			434
120	170	2	21	181	67	39	41	8	5	7	5	3	1	0		380
130	160	2	19	163	59	34	34	7	4	5	7	5	3	1	0	343
140	150	2	18	146	53	29	29	6	3	4	5	7	5	3	1	
150	145	1	17	134	48	27	25	5	3	3	4	5	7	5	3	
160	140	1	16	129	45	24	23	4	2	3	3	4	5	7	5	
170	135	1	15	125	42	22	20	4	2	2	3	3	4	5	7	
180	130	1	15	120	41	21	19	3	2	2	2	3	3	4	5	
190	121	1	14	116	39	20	18	3	2	2	2	2	3	3	4	
200	112	1	13	112	38	20	17	3	2	2	2	2	2	3	3	
210	104	1	12	104	36	19	17	3	2	2	2	2	2	2	3	
220	96	1	11	96	34	18	16	3	1	2	2	2	2	2	2	
230	88	1	11	89	31	17	16	3	1	1	2	2	2	2	2	
240	80	1	10	83	29	16	15	3	1	1	1	2	2	2	2	
250	73	1	9	76	27	15	13	2	1	1	1	1	2	2	2	

WESTGATE HTS - No 3

DETERMINATION OF STORM HYDROGRAPH

Time (min.) (1)	Unit Hydrograph (cfs) (2)	Excess Precipitation in Inches														Storm Hydrograph (cfs)
		0.01 (17)	0.01 (18)	0.01 (19)	0.01 (20)	0.01 (21)	0.01 (22)	0.01 (23)	0.01 (24)	0.01 (25)	0.01 (26)	0.01 (27)	0.01 (28)	0.01 (29)	0.01 (30)	
0	0															
10	140															
20	300															
30	480															
40	650															
50	540															
60	420															
70	340															
80	280															
90	240															
100	210															
110	190															
120	170															
130	160															
140	150	0														311
150	145	1	0													288
160	140	3	1	0												275
170	135	5	3	1	0											264
180	130	7	5	3	1	0										257
190	121	5	7	5	3	1	0									250
200	112	4	5	7	5	3	1	0								245
210	104	3	4	5	7	5	3	1	0							235
220	96	3	3	4	5	7	5	3	1	0						223
230	88	2	3	3	4	5	7	5	3	1	0					213
240	80	2	2	3	3	4	5	7	5	3	1	0				203
250	73	2	2	2	3	3	4	5	7	5	3	1	0			190

WESTGATE HTS No 3

DETERMINATION OF STORM HYDROGRAPH

Time (min.) (1)	Unit Hydrograph (cfs) (2)	Excess Precipitation in Inches														Storm Hydrograph (cfs) (17)
		0.01 (3)	0.11 (4)	0.86 (5)	0.28 (6)	0.14 (7)	0.12 (8)	0.02 (9)	0.01 (10)	0.01 (11)	0.01 (12)	0.01 (13)	0.01 (14)	0.01 (15)	0.01 (16)	
260	67	1	8	69	25	13	12	2	1	1	1	1	1	2	2	
270	60	1	7	63	22	12	12	2	1	1	1	1	1	1	2	
280	54	1	7	58	20	11	11	2	1	1	1	1	1	1	1	
290	47	0	6	52	19	10	10	2	1	1	1	1	1	1	1	
300	40		5	46	17	9	7	2	1	1	1	1	1	1	1	
310	34		4	40	15	8	8	1	1	1	1	1	1	1	1	
320	27		4	34	13	7	7	1	1	1	1	1	1	1	1	
330	21		3	29	11	7	6	1	1	1	1	1	1	1	1	
340	14		2	23	10	6	6	1	1	1	1	1	1	1	1	
350	8		2	18	8	5	5	1	1	1	1	1	1	1	1	
360	0		1	12	6	4	4	1	0	1	1	1	1	1	1	
			0	7	4	3	3	1		0	1	1	1	1	1	
				0	2	2	3	1			0	1	1	1	1	
					0	1	2	0				0	1	1	1	
						0	1						0	1	1	
							0							0	1	
															0	

WESTGATE Hts. No 3

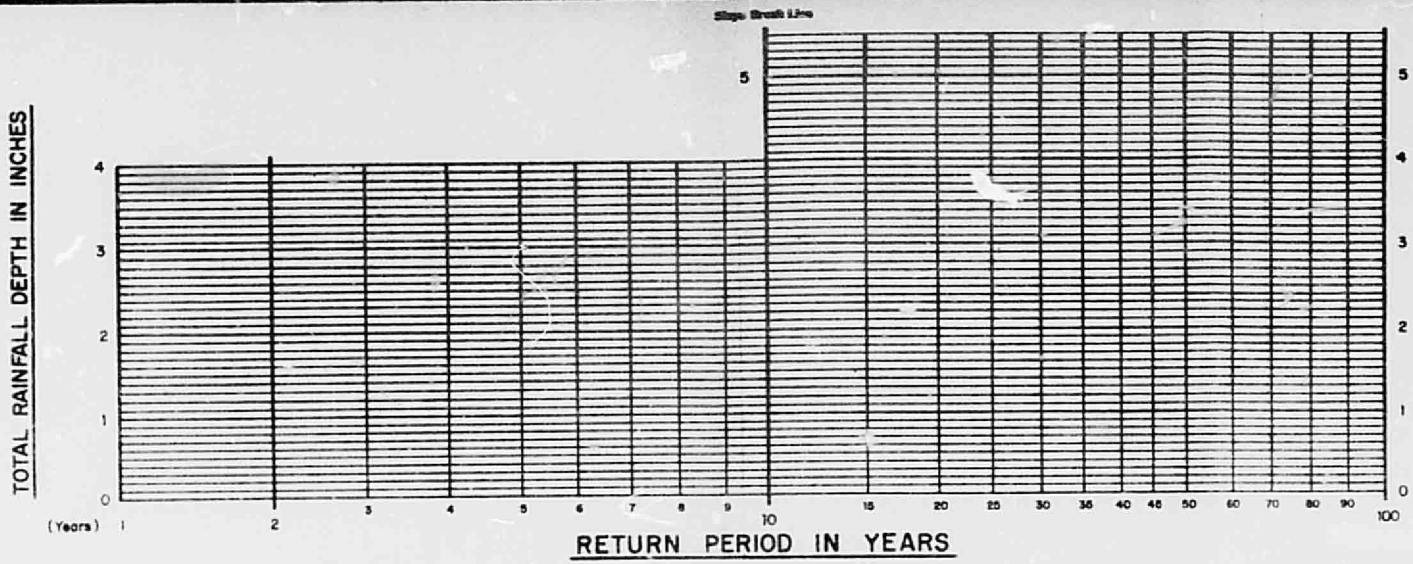
DETERMINATION OF STORM HYDROGRAPH

Time (min.) (1)	Unit Hydrograph (cfs) (2)	Excess Precipitation in Inches														Storm Hydrograph (cfs)
		0.01 (17)	0.01 (18)	0.01 (19)	0.01 (20)	0.01 (21)	0.01 (22)	0.01 (23)	0.01 (24)	0.01 (25)	0.01 (26)	0.01 (27)	0.01 (28)	0.01 (29)	0.01 (30)	
260	67	2	2	2	2	3	3	4	5	7	5	3	1	0		178
270	60	2	2	2	2	2	3	3	4	5	7	5	3	1	0	168
280	54	2	2	2	2	2	2	3	3	4	5	7	5	3	1	
290	47	1	2	2	2	2	2	2	3	3	4	5	7	5	3	
300	40	1	1	2	2	2	2	2	2	3	3	4	5	7	5	
310	34	1	1	1	2	2	2	2	2	2	3	3	4	5	7	
320	27	1	1	1	1	2	2	2	2	2	2	3	3	4	5	
330	21	1	1	1	1	1	2	2	2	2	2	2	3	3	4	
340	14	1	1	1	1	1	1	2	2	2	2	2	2	3	3	
350	8	1	1	1	1	1	1	1	2	2	2	2	2	2	3	
360	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	
		1	1	1	1	1	1	1	1	1	2	2	2	2	2	
		1	1	1	1	1	1	1	1	1	1	2	2	2	2	
		1	1	1	1	1	1	1	1	1	1	1	2	2	2	
		1	1	1	1	1	1	1	1	1	1	1	1	2	2	
		1	1	1	1	1	1	1	1	1	1	1	1	1	2	
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		0	1	1	1	1	1	1	1	1	1	1	1	1	1	
			0	1	1	1	1	1	1	1	1	1	1	1	1	
				0	1	1	1	1	1	1	1	1	1	1	1	
					0	1	1	1	1	1	1	1	1	1	1	
						0	1	1	1	1	1	1	1	1	1	
							0	1	1	1	1	1	1	1	1	
								0	1	1	1	1	1	1	1	
									0	1	1	1	1	1	1	

WESTGATE Hts. No. 3

DETERMINATION OF STORM HYDROGRAPH

Time (hr.)	Unit Hydrograph (cfs) (2)	Excess Precipitation in Inches												Storm Hydrograph (cfs)
		0.01 (31)	0.01 (32)	0.01 (33)	0.01 (34)									
260	67													
270	60													
280	54	0												160
290	47	1	0											150
300	40	3	1	0										138
310	34	5	3	1	0									129
320	27	7	5	3	1									120
330	21	5	7	5	3									111
340	14	4	5	7	5									100
350	8	3	4	5	7									87
360	0	3	3	4	5									69
370		2	3	3	4									54
380		2	2	3	3									40
390		2	2	2	3									32
400		2	2	2	2									27
410		2	2	2	2									24
420		2	2	2	2									22
430		1	2	2	2									20
440		1	1	2	2									18
450		1	1	1	2									16
460		1	1	1	1									14
470		1	1	1	1									13
480		1	1	1	1									12
490		1	1	1	1									11
500		1	1	1	1									10
510		1	1	1	1									9



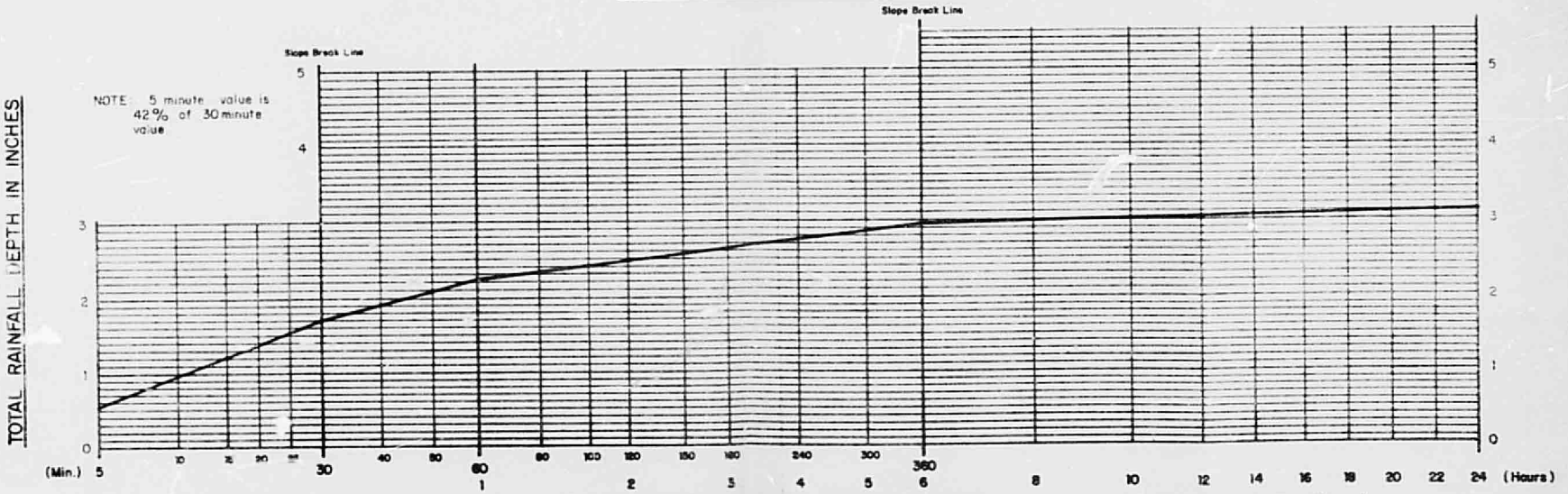


FIGURE V.I.d

RAINFALL
DEPTH - DURATION - FREQUENCY GRAPHS
Denver Region

DENVER REGIONAL COUNCIL OF GOVERMENTS

WESTGATE HTS. - Nº 3

Section __, T. __, R. __ W.

Wright - McLaughlin Engineers

STREET FLOW CAPACITY CHARACTERISTICS

FIGURE VII

MURRAY-McCORMICK, INC.
ENVIRONMENTAL DESIGN
ENGINEERING·PLANNING·SURVEYING
3501 W. OLIVAS BLVD., NE, SUITE F / ALBUQUERQUE, NEW MEXICO 87110 / 505-332-1939

JOB NO. _____ DATE _____

PROJECT _____

SCALE _____

A-8 11

RATIONAL METHOD

RUNOFF COMPUTATIONS

Sheet No. A-10.1

Project: WESTGATE HTS. UNIT 2

Drainage Area No. O.S.(1) Atwood Village Unit 7

Area = 39.2 acres

Maximum Overland Flow: L = 800' S = 2.00%

Maximum Channel Flow:

Channel No. 1 L = 1000' S = 2.00%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: about half of the site. (Fig. H, Seelye) explain. 22 min.

Channel No. 1 Flow:

2.2 7.2 FPS. Velocity say 5.2 channel flow for next half.

Velocity = 5.2 ft/sec; Time = $\frac{1060}{5 \times 60}$ = 3.2 min.

why both overland & channel flow

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{X\ 60}$ = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{X\ 60}$ = _____ min.

Total Accumulation Time: T = 25.3 min.

I = 189/(25+25) = 3.78 = _____

Q = CIA = (0.38) (3.78) (39.) = 56 c.f.s.

Date: 10-19-76

Comp. by: [signature]

Checked by: _____

RATIONAL METHOD

RUNOFF COMPUTATIONS

Sheet No. A-10.2

Project: Westlake Hts-Unit 2.

Drainage Area No. OS.(1) + W2(1)

Area = 392 1.4 = 40.4 acres

Maximum Overland Flow: L = _____ S = _____

Maximum Channel Flow:

Channel No. 1 L = 110' S = _____

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: see previous page 25.3 min.

Channel No. 1 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = 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 = 25.3 min.

I = 189/(25+25) = 3.78 = _____

Q = CIA = (0.39) (3.78) (40.4) = 60 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

392 @ 0.33 17% 0.37
1.4 @ 0.60 3% 0.02
0.39

RATIONAL METHOD

RUNOFF COMPUTATIONS

Sheet No. A-10.3

Project: WESTGATE HTS. - UNIT 2

Drainage Area No. OS.(1) + W2(1) + W2(2) + W2(3) + W2(4)

Area = 40.4 + 1.1 + 6.2 + 0.8 = 48.5 acres

Maximum Overland Flow: L = _____ S = _____

Maximum Channel Flow:

Channel No. 1 L = 430' S = 0.50%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 25.3 min.

Channel No. 1 Flow:

Velocity = 4.0 ft/sec; Time = $\frac{430}{4 \times 60}$ = 1.8 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\text{X } 60}$ = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\text{X } 60}$ = _____ min.

Total Accumulation Time: T = 27.1 min.

I = 189/(27+25) = 3.63 = _____

Q = CIA = (0.44) (3.63) (48.5) = 78 c.f.s.

40.4 @ 0.39 83% 0.32
8.1 @ 0.69 17% 0.12
48.5 0.44

Date: _____

Comp. by: _____

Checked by: _____

RATIONAL METHOD

RUNOFF COMPUTATIONS

Sheet No. A-10.7

Project: WESTGATE HTS-NO 3.

Drainage Area No. W3(2)

Area = 2.3 acres

Maximum Overland Flow: L = 110' S = 1.00%

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: 12 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 = 12 min.

I = 189/(12+25) = 5.11 = _____

Q = CIA = (0.69) (5.11) (2.3) = 8.1 c.f.s.

Date: 10-19-76

Comp. by: [signature]

Checked by: _____

RATIONAL METHOD

RUNOFF COMPUTATIONS

Sheet No. A-10.6

Project: Westgate Hts. - Unit 3

Drainage Area No. Westgate Hts Unit 2 + W3(1) + O.S. (5)

Area = 88.7 + 5.3 + 4.1 98.1 acres

Maximum Overland Flow: L = _____ S = _____

Maximum Channel Flow:

Channel No. 1 L = 700' S = 1.00%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 30.4 min.

Channel No. 1 Flow:

Velocity = 7 ft/sec; Time = $\frac{700}{7 \times 60}$ = 1.67 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\text{X } 60}$ = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\text{X } 60}$ = _____ min.

Total Accumulation Time: T = 32.1 min.

I = 189/32+25 = 3.32 = _____

Q = CIA = (0.46) (3.32) (98.1) = 150 c.f.s.

Date: 10-19-76

Comp. by: [signature]

Checked by: _____

88.7 @ 0.46 91% .042
5.3 @ 0.49 5% .002
4.1 @ 0.38 4% .002
95.1 0.46

RATIONAL METHOD

RUNOFF COMPUTATIONS

Sheet No. A-10.5

Project: Westgate Hts - Unit 2

Drainage Area No. 0.5(1)+W2(1+W2(6)+W2(7)+W2(8)+W2(9)+0.5(2+W2)

Area = 62.3+0.6+0.9+7.2+6.8 +8.3+2.1 = 88.7 acres

Maximum Overland Flow: L = 400' S = 7.00%

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: 29.6 min.

Channel No. 1 Flow:

Velocity = 5.2 ft/sec; Time = $\frac{400}{5 \times 60}$ = 0.80 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\text{X } 60}$ = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{\text{X } 60}$ = _____ min.

Total Accumulation Time: T = 30.4 min.

I = 139/(30+25) = 3.44 = _____

Q = CIA = (0.46) (3.44) (88.7) = 140 c.f.s.

62.3 @ 0.49	70%	0.34
3.3 @ 0.69	4%	0.03
7.2 @ 0.38	8%	0.03
6.8 @ 0.25	8%	0.02
8.3 @ 0.33	10%	0.04
88.7		0.46

Date: 10-19-76

Comp. by: [signature]

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. A-10.4

Project: WESTGATE HTS - UNIT 2

Drainage Area No. OS(1)+W2(1)+W2(2)+W2(3)+W2(4)+W2(5)+W2(6)

Area = 48.5+7.8+11.0 = 67.3 acres

Maximum Overland Flow: L = _____ S = _____

Maximum Channel Flow:

Channel No. 1 L = 1030' S = 1.00%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 27.1 min.

Channel No. 1 Flow:

Velocity = 7 ft/sec; Time = $\frac{1030}{7 \times 60}$ = 2.5 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{X\ 60}$ = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{X\ 60}$ = _____ min.

Total Accumulation Time: T = 29.6 min.

I = 185/(50+25) = 3.44 = _____

Q = CIA = (0.47) (3.44) (67.3) = 105 c.f.s.

48.5 @ .41 72% 0.30
13.8 @ .63 22% = 0.15
0.47

Date: 10-13-76

Comp. by: [signature]

Checked by: _____

RATIONAL METHOD

RUNOFF COMPUTATIONS

Sheet No. A-10.11

Project: Westgate Hts-Unit 3

Drainage Area No. O.S.(6) + W3(2) thru W3(7)

Area = 34.0 + 14.3 = 48.3 acres

Maximum Overland Flow: L = 300' S = 2.5%

Maximum Channel Flow:

Channel No. 1 L = 500' S = 0.50%

Channel No. 2 L = 850' S = 1.20%

Channel No. 3 L = 1350' S = 1.80%

Accumulation Time

Overland Flow or Inlet Time: 20 min.

Channel No. 1 Flow:

Velocity = 2.0 ft/sec; Time = $\frac{500}{2.0 \times 60}$ = 4.2 min.

Channel No. 2 Flow:

Velocity = 3.5 ft/sec; Time = $\frac{850}{3.5 \times 60}$ = 4.0 min.

Channel No. 3 Flow:

Velocity = 4.0 ft/sec; Time = $\frac{1350}{4.0 \times 60}$ = 5.6 min.

Total Accumulation Time: T = 33.8 min.

I = 189/(34+25) = 3.20 =

Q = CIA = (0.47) (3.20) (48.3) = 72.6 c.f.s.

34.0 @ 0.38 70% 0.27
14.3 @ 0.66 30% 0.20
48.3 0.47

Date:

Comp. by:

Checked by:

RATIONAL METHOD

RUNOFF COMPUTATIONS

Sheet No. A-10.10

Project: Westgate Hts-Unit 3

Drainage Area No. W3(3)

Area = 39 acres

Maximum Overland Flow: L = 110' S = 1.00%

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: 12 min.

Channel No. 1 Flow:

Velocity = _____ ft/sec; Time = $\frac{\text{_____}}{\text{X 60}}$ = _____ min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = $\frac{\text{_____}}{\text{X 60}}$ = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = $\frac{\text{_____}}{\text{X 60}}$ = _____ min.

Total Accumulation Time: T = 12 min.

I = 189/(12+25) = 5.11 = _____

Q = CIA = (0.69) (5.11) (3.9) = 13.8 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. A-10.9

Project: Westgate Hts. Unit 3

Drainage Area No. W3(2) + W3(3) + W3(4) + W3(5) + W3(6) + W3(

Area = 7.3 + 3.2 + 3.4 + 1.7 + .99 + 2.05 = 14.3 acres

Maximum Overland Flow: L = _____ S = _____

Maximum Channel Flow:

Channel No. 1 L = 1400' S = 0.50%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 12 min.

Channel No. 1 Flow:

Velocity = 2.5 ft/sec; Time = $\frac{1400}{X\ 60}$ = 9.3 min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{X\ 60}$ = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = $\frac{\quad}{X\ 60}$ = _____ min.

Total Accumulation Time: T = 21.3 min.

I = 189/(21+25) = 4.11 = _____

Q = CIA = (0.66) (4.11) (14.3) = 38.8 c.f.s.

Date: 10-19-76

Comp. by: [signature]

Checked by: _____

1.7 @ 0.45 12% 0.05

12.6 @ 0.69 88% 0.61

14.3 0.66

(8)

RATIONAL METHOD

RUNOFF COMPUTATIONS

Sheet No. A-10.8

Project: Westgate Hts

Drainage Area No. W3(4)+W3(5)

Area = 3.4 + 1.7 = 5.1 acres

Maximum Overland Flow: L = 110 S = 1.00%

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 = 12 min

I = 189/(12+25) = 5.11 = _____

Q = CIA = (0.61) (5.11) (5.1) = 15.9 cfs c.f.s.

Date: 10-12-76

Comp. by: [signature]

Checked by: _____

3.4 @ 0.6 = 67% 0.46

1.7 @ 0.45 = 33% 0.15

5.1 0.61

CAMPBELL-HICKS and ASSOCIATES, Inc.
Soils Testing Laboratory
Consulting Civil Engineers
232 Murial Street, N.E. • Phone (505) 296-7139 • Albuquerque, New Mexico 87123

STORM DRAINAGE STUDY RELATIVE TO THE DEVELOPMENT OF WESTGATE HEIGHTS, UNIT 2 ALBUQUERQUE, NEW MEXICO

MARCH 1972

DRAINAGE STUDY INDEX

DESCRIPTION	PAGE NO.
I. General	1
II. Location	1
III. Existing Drainage Conditions	1
A. General	
B. Topography	
C. Drainage Areas and Channels	
IV. Proposed Drainage Plans	2
A. General	
B. Drainage Areas	
C. Runoff Quantities	
D. Drainage Channels and Facilities	
V. Conclusions and Recommendations	4
VI. Exhibits	
A. Location Map	6
B. Contributing Area Photo-Map	7
C. Master Plan of Drainage	8
D. Summary and Runoff Computation Sheets	9
E. Summary of Street Carrying Capacities and Computer Output Sheets	18
F. Recommended Street Grades	29
VII. References	30

STORM DRAINAGE STUDY RELATIVE TO THE DEVELOPMENT OF WESTGATE HEIGHTS, UNIT 2

I. GENERAL

This report has been prepared to present findings of a study of storm drainage conditions in an area proposed for development as Westgate Heights, Unit 2, and to describe proposed methods for providing adequate storm drainage in the area.

II. LOCATION

The area proposed for development is located in Section 33, Township 10 North, Range 2 East, N.M.P.M. It is bounded on the North by Unit Seven of Atrisco Village; on the West by Snow Vista Blvd., S.W.; on the South by unplatted land; and on the East by unplatted land.

III. EXISTING DRAINAGE CONDITIONS

A. General

This area, being generally located between Snow Vista Blvd., S.W., and unplatted land, lies on the east side of the west mesa. Physiographics features: sloping surfaces lightly ribbed with minor arroyo washes; sandy soil with sparce vegetation; and small valleys, bluffs, flat surfaces, and raw gullies. The Albuquerque volcanos are between this sub-area and the flat mesa top.*

B. Topography

The area of proposed development slopes gradually upward toward the top of the west mesa at a nearly uniform rate of about one to one and one-half percent. It is crossed by several minor drainage areas which are outlined on Exhibit "B", a scale photograph by Koogle and Pouls Engineering, Inc. Through field investigation it is considered that the photograph (dated 11-2-71) is satisfactory for the purpose of determining the original division lines.

C. Drainage Areas and Channels

At the present time only one major and one semi-major

*See Reference #1.

drainage areas contributing 396 c.f.s. and 60 c.f.s. respectively from the West end of the development exist. However, the runoff from these areas can be carried by aligning master planned streets in such a manner (i.e. set property lines high enough and adjust grades on streets within the development) as to carry water around the development, redepositing it in its original channel.

IV. PROPOSED DRAINAGE PLANS

A. General

In order to provide an adequate system of storm drainage for this proposed development, it was necessary to:

(1) Determine the drainage areas which can and will contribute storm runoff during a 100 year design storm.

(2) Determine the amount of runoff which could be expected after the entire area is developed.

(3) Prepare a table of street carrying capacities for use in sizing streets and overflow sections (section above high curb to proper y line).

(4) Determine the points where the storm runoff will concentrate.

(5) Determine the ability of each of the drainage channels, streets plus overflow sections, and structures to handle the runoff that may concentrate on them.

(6) Determine and recommend the means by which the expected runoff can be carried by the master planned area.

(7) Design additional channels and structures to simulate and distribute the expected runoff in a manner similar to the existing terrain at the outlet end.

B. Drainage Areas

A study of the photography, Exhibit "B", to determine the areas which could conceivably contribute runoff to the proposed development was made, from which a copy of computations is contained in Exhibit "D" of this report. Finally, the Master Plan of Drainage, Exhibit "C", was prepared showing the entire area with directions of flow as well as runoff quantities.

C. Runoff Quantities

The quantities of storm runoff to be expected from each drainage area were determined using the Rational Formula, Q=CIA, where: Q=quantity of storm runoff in cubic feet per second; C=coefficient of runoff dependent upon the type of surface drained; I=intensity of rainfall in inches per hour for a duration equal to the total accumulation time in minutes; and A=area of contributing watershed in acres.

The area (A) of each separate contributing area was determined by outlining the watershed on a scale photograph or the contour map and measuring the area in acres (by planimeter).

The intensity of rainfall (I) was determined by assuming a 100 year frequency rainfall and then utilizing Intensity Duration Frequency Curves (Chart I) for the Albuquerque Area, "Master Plan of Drainage - City of Albuquerque, New Mexico and Environs," 1963, prepared by Gordon Herkenhoff and Associates, Consulting Engineers, together with expected accumulation of runoff from each of the areas. The total accumulation times are determined by a combination of Yarnell's method and probable future streets and drainage channel alignments and grades, as shown, assuming overland flows to cross either poor grass, asphalt pavement or bare soil surfaces, depending upon the probable type of development in each area and estimating the probable type of grading to be done in each area; assuming future streets to be asphalt paved with either full crown (8"), 3/4 crown (6"), or 1/2 crown (4"). These times of flow were calculated by use of tables on pages 5.00, 5.04 and 5.05 of Design by E.E. Seelye.

The coefficient of runoff (C) was determined by assuming the maximum possible development in the areas under consideration. A coefficient of 0.45 is used for maximum runoff conditiond in suburban areas.* A coefficient of 0.283 is used for areas where undeveloped areas are shown.* A coefficient of 0.70 should be used for commercial areas or where a large amount of the exposed surface is impermeable.

The quantities of runoff are shown along with the areas after development on Exhibit "C", the Master Plan of Drainage for this subdivision.

D. Drainage Channels and Facilities

All existing structure capacities, as well as any future proposed structures, were verified from com-

*See Reference #2

puter output sheets which form a part of Exhibit "D" and are based on Manning's Equation, Q=AV, where $V=\frac{1.486}{n} R^{2/3} S^{1/2}$ when A=cross-sectional area of the channel or structure; R=hydraulic radius of channel or area divided by wetted perimeter; S=slope of channel or facility in feet per foot; and "n" values of 0.015 for concrete and asphalt surfaces, 0.013 for concrete pipes, 0.0225 for dirt lined channels or a composite "n" value based on proportional wetted surfaces with different values.

V. CONCLUSIONS AND RECOMMENDATIONS

The main conclusion of this study was that a master plan of drainage of this entire area from the top of the ridge one and one-half to two miles west to the valley area about the same distance to the east of 98th Street., S.W., is badly needed. A discussion with the Flood Plain Management Branch of the Corps of Engineers revealed one has been begun but that it is not scheduled for completion until probably June or July of this year. The only available study found by this firm is the one referenced in this report (Reference #2 - Plate 10). That study suggests the runoff coefficients which are used as indicated on page 3 of this report.

Two areas which can conceivably contribute runoff in addition to that runoff from Westgate Heights Addition just to the west are shown as Areas A and B on Exhibit "B". These two areas will contribute considerable runoff particularly when curb and gutter is placed along 98th Street and Sage Road, S.W. It is felt that if a minimum of three foot water blocks are located at the upstream end of all incoming streets no serious flooding will occur until the remaining area in this vicinity is developed.

In addition to the above recommendation the following recommendations must be complied with:

A. A 15' paved drainage easement to be constructed at about 795' south of the northwest property corner on Sage Road, S.W., is recommended.

B. Comply with the minimum grade requirements outlined in Exhibit "F".

C. Provide temporary structures under both streets that have access off Sage Road and one under Benavides until further development (curb and gutter, lined channels along Sage Road and Snow Vista Blvd. and others) requires their removal.

D. An extension of the street at the east edge of the 6.835 acre park or the providing of a drainage easement in the

next subdivision to the east is required to transport the runoff to the existing semi-major channel near that point.

An example of other measures that may prove desirable in the future are the following:

A. Provide a lined channel along the west edge of Snow Vista Blvd.

B. Provide a waterblock in Sage Road, S.W., and maybe a lined channel along its north side.

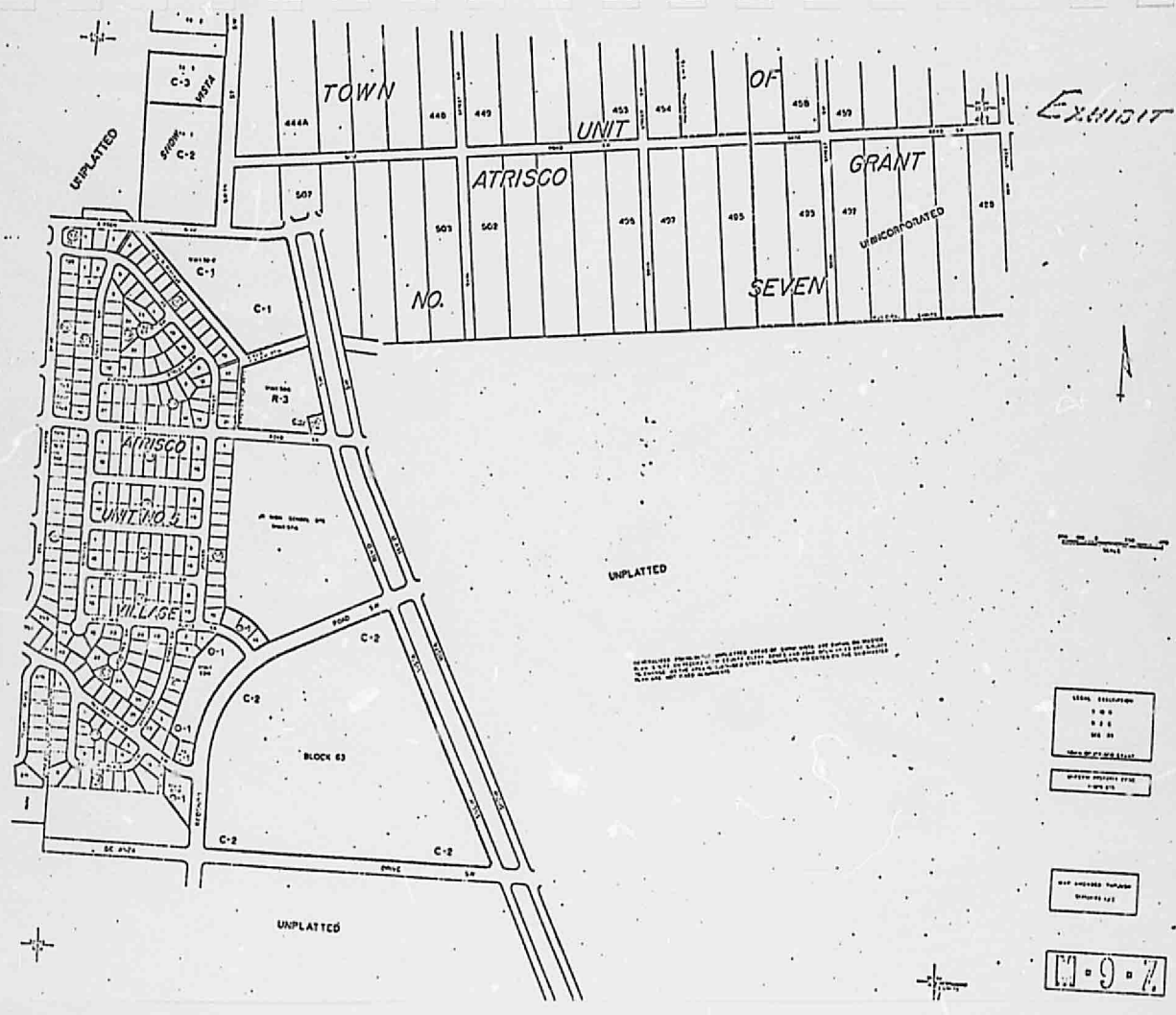
C. Divert some runoff east on San Ygnacio Road, S.W., and Tower Road, S.W., by providing minor waterblocks in 98th Street, S.W., as curb and gutter is constructed.

From the above recommendations and suggestions it may be seen that after the Corps of Engineers' drainage study is completed in connection with the Southwest Valley or A.M.A.F.C.A. channel completion, this area as well as others may be modified or adjusted by constructing waterblocks as required to make possible not altering the original drainage pattern.

If all the recommendations are adhered to, it is felt that this will improve the area as well as force an early solution to many of the drainage problems.

Respectfully submitted,

Donald L. Campbell
P.E. & L.S. No. 3633


TOWN
OF
UNIT
ATRISCO
GRANT
NO.
SEVEN
UNINCORPORATED
UNPLATTED
ATRISCO
UNIT NO. 2
VILLAGE
BLOCK 63
C-1
C-2
C-3
R-3
O-1
UNPLATTED
Exhibit "A"
M-9-Z

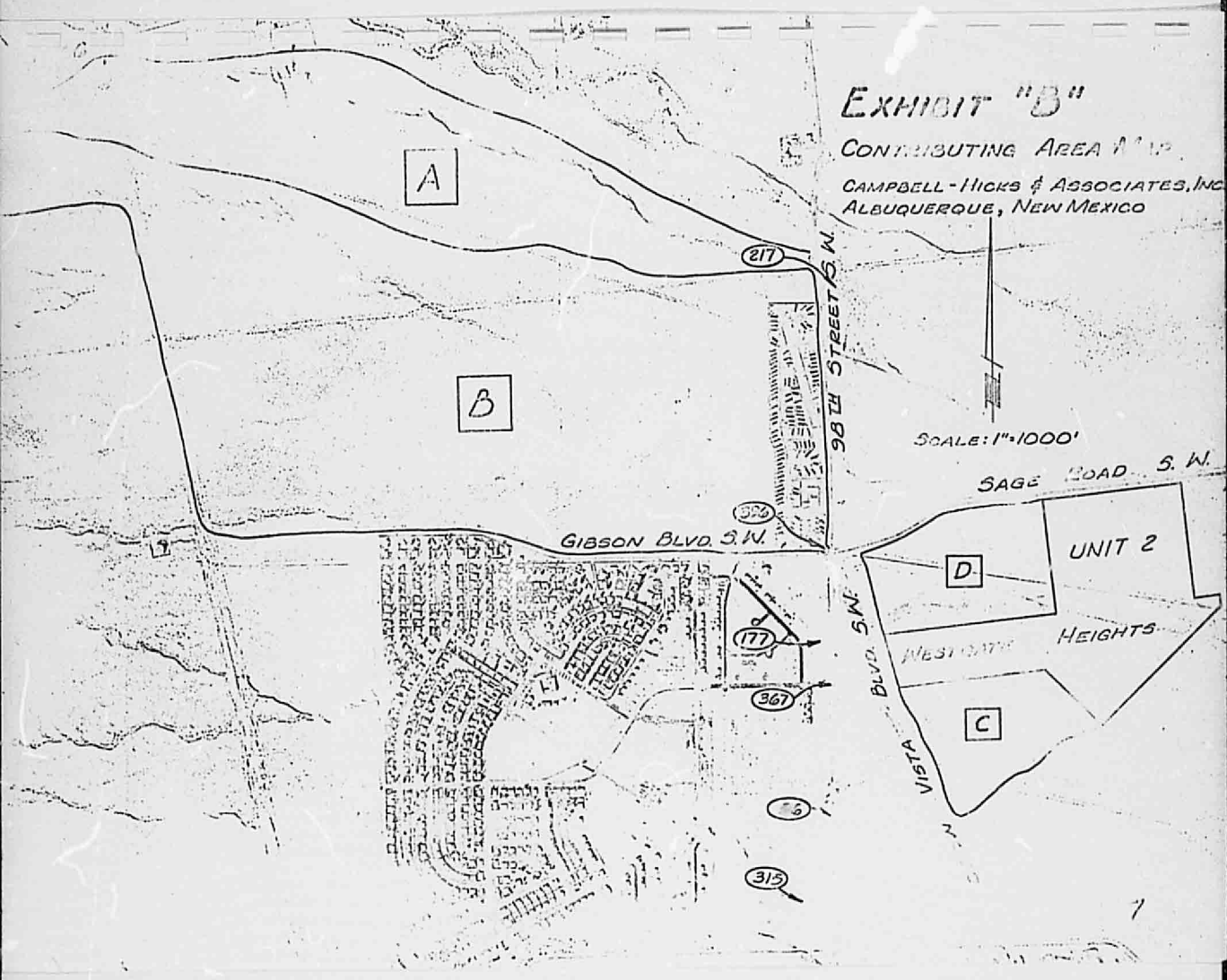


EXHIBIT "B"
CONTRIBUTING AREA MAP
CAMPBELL-HICKS & ASSOCIATES, INC.
ALBUQUERQUE, NEW MEXICO
SCALE: 1"=1000'
A
B
C
D
98TH STREET S.W.
SAGE ROAD S.W.
GIBSON BLVD. S.W.
UNIT 2
HEIGHTS
VISTA BLVD. S.W.
217
177
367
315

EXHIBIT D

SUMMARY OF RUNOFF COMPUTATIONS

Sheet No.	Area Number	Area (in acres)	Expected Runoff (in C.F.S.) Individual	Total
1	A	264	217	
2	B	479	396	
3	C	34	60	
4	D	39	67	
5	1	15	31	98
6	2	36	69	167
7	3	25	43	210
8	4	11	22	82

RUNOFF COMPUTATIONS

Sheet No. 1

Job No. Westgate #2

Drainage Area No. A

Area = 264 acres

Maximum Overland Flow: L = 1000' S = 0.5% .

Maximum Channel Flow:

Channel No. 1 L = 5000' S = 5.8 % .

Channel No. 2 L = 5500' S = 3.0 % .

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 31.1 min.

Channel No. 1 Flow:

Velocity= 20.2 ft/sec; Time= $\frac{5000}{20.2 \times 60}$ = 4.1 min.

Channel No. 2 Flow:

Velocity= 19.1 ft/sec; Time= $\frac{5500}{19.1 \times 60}$ = 4.8 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{X\ 60}$ = _____ min.

Total Accumulation Time: T = 40.0 min.

$I = \frac{189}{T+25} = \frac{189}{65} = 2.91$

$Q = CIA = (0.285)(2.91)(264) = 217$ c.f.s.

Date: 3-7-72

Comp. by: DHP

Checked by: HEP

RUNOFF COMPUTATIONS

Sheet No. 2

Job No. Westgate #2

Drainage Area No. B

Area = 479 acres

Maximum Overland Flow: L = 1000' S = 0.6 %.

Maximum Channel Flow:

Channel No. 1 L = 5000' S = 6.4 %.

Channel No. 2 L = 5850' S = 2.7 %.

Channel No. 3 L = _____ S = _____

Accumulation Time 30.8 min.

Overland Flow:

Channel No. 1 Flow:

Velocity= 23.2 ft/sec; Time= $\frac{5000}{23.2 \times 60}$ = 3.6 min.

Channel No. 2 Flow:

Velocity= 18.4 ft/sec; Time= $\frac{5850}{18.4 \times 60}$ = 5.3 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 39.7 min.

$I = \frac{189}{T+25} = \frac{189}{64.7} = 2.92$

$Q = CIA = (0.283)(2.92)(479) = 396$ c.f.s.

Date: 3-7-77

Comp. by: [signature]

Checked by: [signature]

RUNOFF COMPUTATIONS

Sheet No. 3

Job No. Westgate #2

Drainage Area No. C

Area = 34 acres

Maximum Overland Flow: L = 800' S = 2.0 %

Maximum Channel Flow:

Channel No. 1 L = 850' S = 2.3 %

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 22.0 min.

Channel No. 1 Flow:

Velocity= 10 ft/sec; Time= $\frac{850}{10 \times 60}$ = 1.4 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 23.4 min.

$I = \frac{189}{T+25} = \frac{189}{48.4} = 3.90$

$Q = CIA = (0.45)(3.90)(34) = 60$ c.f.s.

Date: 3-8-77

Comp. by: [signature]

Checked by: HSP

RUNOFF COMPUTATIONS

Sheet No. 4

Job No. Westgate #2

Drainage Area No. D

Area = 39 acres

Maximum Overland Flow: L = 800' S = 2.0 %

Maximum Channel Flow:

Channel No. 1 L = 800' S = 3.0 %

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 22.0 min.

Channel No. 1 Flow:

Velocity= 6.0 ft/sec; Time= $\frac{800}{6.0 \times 60}$ = 2.2 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 24.2 min.

$I = \frac{109}{T+25} = \frac{109}{49.2} = 3.84$

$Q = CIA = (0.45)(3.84)(39) = 67$ c.f.s.

Date: 2-28-72

Comp. by: DWK

Checked by: WEP

RUNOFF COMPUTATIONS

Sheet No. 5

Job No. Westgate #2

Drainage Area No. 1

Area = 15 acres

Maximum Overland Flow: L = 139' S = 2.0 %

Maximum Channel Flow:

Channel No. 1 L = 1765' S = 2.5 %

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 11.0 min.

Channel No. 1 Flow:

Velocity= 5.6 ft/sec; Time= $\frac{1765}{5.6 \times 60}$ = 5.2 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 16.2 min.

$I = \frac{189}{T+25} = \frac{189}{41.2} = 4.58$

$Q = CIA = (0.45)(4.58)(15) = 31$ c.f.s.

$67 + 31 = 98$

Date: 2-28-72

Comp. by: D.P.C.

Checked by: R.E.P.

RUNOFF COMPUTATIONS

Sheet No. 6

Job No. Whitgate "2

Drainage Area No. 2

Area = 36 acres

Maximum Overland Flow: L = 150' S = 2.0 %

Maximum Channel Flow:

Channel No. 1 L = 1013' S = 1.2 %

Channel No. 2 L = 910' S = 1.5 %

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 11.2 min.

Channel No. 1 Flow:

Velocity= 3.8 ft/sec; Time= $\frac{1013}{3.8 \times 60}$ = 4.4 min.

Channel No. 2 Flow:

Velocity= 4.3 ft/sec; Time= $\frac{910}{4.3 \times 60}$ = 3.5 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 19.1 min.

$I = \frac{189}{T+25} = \frac{189}{44.1} = 4.29$

$Q = CIA = (0.45)(4.29)(36) = 69$ c.f.s.

.98 + 69 = 167

Date: 2-28-72

Comp. by: DRS

Checked by: HEP

RUNOFF COMPUTATIONS

Sheet No. 7

Job No. Westgate #2

Drainage Area No. 3

Area = 25 acres

Maximum Overland Flow: L = 300' S = 0.5 %

Maximum Channel Flow:

Channel No. 1 L = 1000' S = 1.3 %

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 20.0 min.

Channel No. 1 Flow:

Velocity= 3.5 ft/sec; Time= $\frac{1000}{3.5 \times 60}$ = 4.8 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 24.8 min.

$I = \frac{189}{T+25} = \frac{189}{49.8} = 3.79$

$Q = CIA = (0.45)(3.79)(25) = 43$ c.f.s.

167 + 43 = 210

Date: 2-28-72

Comp. by: [signature]

Checked by: [signature]

RUNOFF COMPUTATIONS

Sheet No. 8

Job No. Westgate "2

Drainage Area No. 4

Area = 11 acres

Maximum Overland Flow: L = 129' S = 2.0 %

Maximum Channel Flow:

Channel No. 1 L = 2340' S = 2.0 %

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 10.5 min.

Channel No. 1 Flow:

Velocity= 5.0 ft/sec; Time= $\frac{2340}{5.0 \times 60}$ = 7.8 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 18.3 min.

$I = \frac{189}{T+25} = \frac{189}{43.3} = 4.37$

Q = CIA = (0.45)(4.37)(11) = 22 c.f.s.

60+22 = 82

Date: 2-28-72

Comp. by: NVC

Checked by: JHP

EXHIBIT E

STREET CARRYING CAPACITIES
AT VARIOUS GRADES
IN CFS

n(conc)=.015 n(soil)=.0225 n(composite)=.006

STREET WIDTH	TYPE CROWN	CURB HT	.0050	.0100	.0150	.0200	.0250	.0300	.0350	.0400
32'	8"	8"	18	25	31	36	40	44	47	50
	6"	8"	35	49	61	70	78	86	92	99
	4"	8"	56	80	98	113	126	138	149	160
	2"	8"	82	116	142	164	183	201	217	232
40'	8"	8"	22	32	39	45	50	55	59	63
	6"	8"	44	62	76	88	98	108	116	124
	4"	8"	71	100	123	142	159	174	188	201
	2"	8"	103	146	178	206	230	252	272	291
44'	8"	8"	25	35	43	49	55	60	65	70
	6"	8"	48	68	84	97	108	119	128	137
	4"	8"	78	111	135	156	175	192	207	221
	2"	8"	113	160	196	227	254	278	300	321
48'	8"	8"	27	38	47	54	60	66	71	76
	6"	8"	53	75	92	106	118	130	140	150
	4"	8"	85	121	148	171	191	209	226	242
	2"	8"	124	175	215	248	277	304	328	351

R/W TO R/W

OVERFLOW SECTIONS CAPACITIES

R/W	ST WD	HT CURB DEPTH	.0050	.0100	.0150	.0200	.0250	.0300	.0350	.0400
50'	32'	0.1	14	19	23	27	30	33	36	38
		0.2	43	61	75	86	96	105	114	122
		0.4	137	193	237	273	305	335	361	386

R/W TO R/W
OVERFLOW SECTIONS CAPACITIES

R/W	ST WD	HT CURB DEPTH	.0050	.0100	.0150	.0200	.0250	.0300	.0350	.0400
60'	40'	0.1	17	24	29	33	37	41	44	47
		0.2	53	75	92	106	119	130	140	150
		0.4	168	238	292	337	376	412	445	476
		0.6	331	468	573	662	740	810	875	936
60'	44'	0.1	18	25	31	36	40	44	47	50
		0.2	57	80	98	113	127	139	150	160
		0.4	180	254	311	359	402	440	475	508
		0.6	353	499	612	706	790	865	934	999
64'	48'	0.1	19	27	33	39	43	47	51	55
		0.2	61	87	106	123	137	150	162	174
		0.4	195	275	337	390	436	477	515	551
		0.6	383	541	663	766	856	938	1013	1083

15' LINED CHANNEL

.0050	.0100	.0150	.0200	.0250	.0300	.0350	.0400	.0450	.0500
45	64	78	90	101	111	120	128	136	143

EXHIBIT F

RECOMMENDED STREET GRADES

STREET DESCRIPTION & LOCATION	MIN. % GRADE	CROWN HEIGTH	PROPERTY LINE ABOVE HIGH CURB
A. Street #1; 50' R/W, 32' F. to F.	0.5	8"	0.0'
B. 94th Street, S.W.; 60' R/W, 40' F. to F.	0.5	8"	0.0'
C. Benavides Rd., S.W.; 64' R/W, 48' F. to F., from junction with Street #1 to Street #8	0.5	8"	0.2'
D. Street #2; 50' R/W, 32' F. to F. from junction with Street #1 to junction with Street #3	0.5	8"	0.3'
E. Street #3; 50' R/W, 32' F. to F. from Sage Road to junction with Street #4	0.5	8"	0.1'
F. Street #4; 50' R/W, 32' F. to F. from Benavides Rd., S.W. to junction with Street #10.....	0.5	8"	0.1'
Street #4-from Street #10 to junction with Street #8	1.0	8"	0.4'
G. Streets #5, 6 and 7; 50' R/W, 32' F. to F. from Street #3 to Street #8	0.5	8"	0.1'
H. Street #8; 50' R/W, 32' F. to F. from Sage Rd. to junction with Street #4	0.5	8"	0.2'
....from Street #4 to junction with Street #9	1.0	8"	0.4'
I. Street #9; 60' R/W, 44' F. to F. from Benavides Road, S.W. to Street #8	0.5	8"	0.1'
J. Street #10; 50' R/W, 32' F. to F. from Street #2 and #3 to Street #4	1.0	8"	0.3'

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1. Quality in Environment by David A. Crane and Associates, February 1070.

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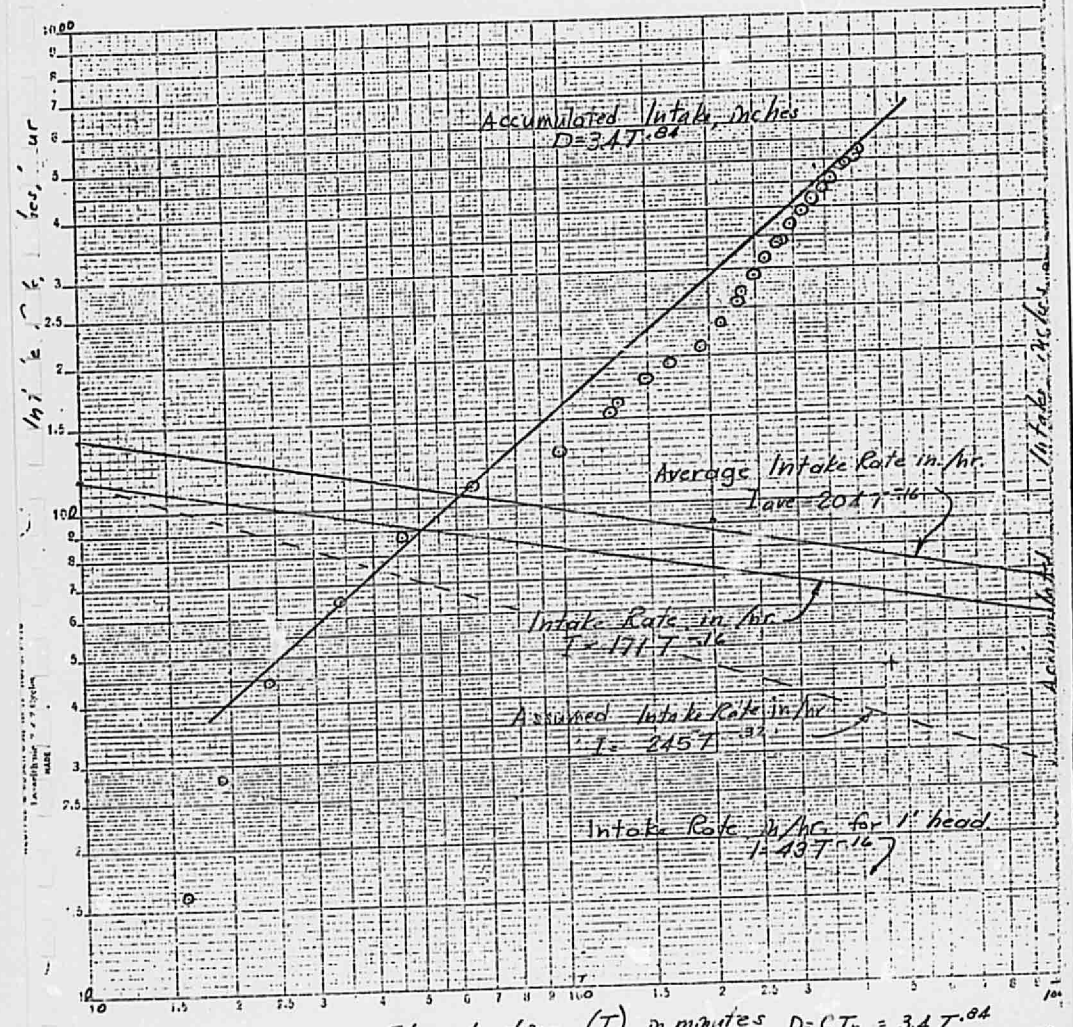
3. Design by Elwyn E. Seelye, Volume 1, 2nd edition, 1945.

Hole #2 Westgate Htr. Unit 2 5 Oct 1973
Percolation



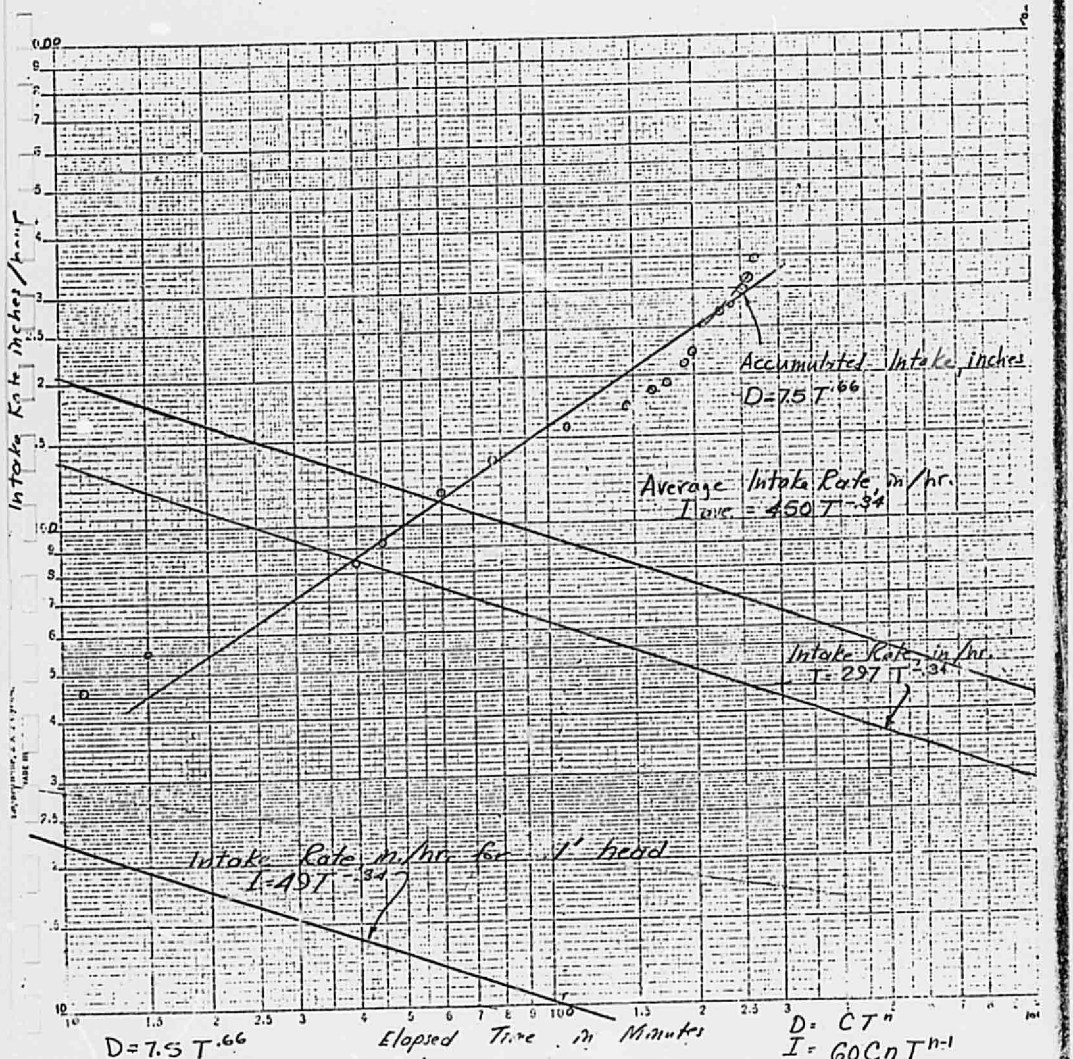
$D = CT^n = 3.4\,T^{.84}$

$I = 60CnT^{n-1} = 17.1\,T^{-.16}$

$I_{ave} = 60CT^{n-1} = 20.4\,T^{-.16}$

Hole #1 Westgate Hts. No. 2

4 Oct 1973



$D = 7.5\ T^{.66}$

$I = 297\ T^{-.34}$

$I_{ave} = 450\ T^{-.34}$

$D = C T^{n}$

$I = 60 C n T^{n-1}$

$I_{ave.} = 60 C T^{n-1}$

Westgate Hts. Unit 2
4 Oct 73
Coen

Hole #1

Time	d_1	d_2	Δd	$\Sigma \Delta d$	Σt	Ave Intake
			in.	in.	min.	in/hr.
10:15	64½"	22"				
10:22	45"	20"	23"	23"	7	197
10:26	43"	18"	23"	46"	11	251
10:30	27"	16"	9"	55"	15	220
10:55	45"	12"	29"	84"	40	126
11:00	20"	9"	8"	92"	45	127
11:15	34"	9½	25"	117"	60	117
11:32	28"	8"	18½"	135½	77	106
12:04	50	30"	22"	157½	109	87
12:40	45	10"	15"	172½	145	71
12:53	23	9"	13"	185½	164	68
1:12	17"	9"	8"	193½	177	66
1:25	27"	11"	18"	211½	190	67
1:33	20"	0"	9"	220½	198	67
1:44	31"	0"	31"	251½	209	72
2:01	18"	7"	18"	269½	226	72
2:13	24"	0"	17"	286½	238	72
2:26	23"	0"	23"	309½	251	74
2:33	16"	0"	16"	325½	258	76
2:40	20"	0"	20"	345½	265	78

30 Oct 73
Cor—
p. 3 of 3

Tm	Hole d₁	d₂	Δ	30 Oct 73 ΣQ	Σt	Ave Cor— lb/in²
2:05	24	10	24	339	278	1.22
2:08	17	0	7	346	281	1.23
2:23	24	0	24	370	296	1.25
2:40	24	0	24	394	313	1.26
2:57	24	7	24	418	330	1.27
3:[illegible]	24	0	17	435	345	1.26
3:29	24	0	24	459	362	1.26
3:47	24	16	24	483	390	1.28
3:51	19	0	3	486	384	1.27
4:09	24	0	24	510	402	1.27
4:20	19		18	528	413	

5 Oct 73

Time	d_1	d_2	Δd	$\Sigma \Delta d$	Σt
9:15	Dry	22"			
9:20		0"			
9:23	24"	0"			
9:27		12"			
9:29	17"	12"	5	5	2
9:43	23	7	11	16	16
9:46	19	4	12	28	19
9:51	20	0	16	44	24
10:01	21	0	21	65	34
10:13	22	0	22	87	46
10:32	23	8	23	110	65
11:05	27	0	19	129	98
11:32	24	8	24	153	125
11:37	16	0	8	161	130
11:55	19	7	19	180	148
12:14	19	4	12	192	167
12:40	20	0	16	208	193
1:00	24	0	24	232	213
1:14	24	8	24	256	227
1:19	19	0	11	267	232
1:36	24	0	24	291	249
1:50	24	0	24	315	263
2:05	24	10	24	339	278
2:08	17	0	7	346	281
2:23	24	0	24	370	296
2:40	24	0	24	394	313
2:57	24	7	24	418	330
3:12	24	0	17	435	345
3:29	24	0	24	459	362
3:47	24	16	24	483	380
3:51	19	0	3	486	384
4:09	24	0	24	510	402
4:10	18		18	528	413

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(1) Herkenhoff, Gordon & Associates, "Master Plan of Drainage City of Albuquerque, New Mexico and Environs, 1963". Albuquerque; Gordon Herkenhoff & Associates, Consulting Engineers.

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