



# *City of Albuquerque*

January 14, 2000

Diane Hoelzer, P.E.  
Mark Goodwin & Associates, PA  
P. O. Box 90606  
Albuquerque, New Mexico 87199

**RE:    *Grading and Drainage Certification Plan for Sun Sage Hills Subdivision (M9/D14)***  
***Submitted for Release of Financial Guarantees, Engineer's Certification Stamp Dated***  
***1/12/00.***

Dear Ms. Hoelzer:

Based on the information provided, the above referenced plan is adequate to satisfy the Grading and Drainage Certification requirement per the Infrastructure List dated March 3, 1998 for the release of financial guarantees for the Sun Sage Hills Subdivision.

If you have any questions, or if I may be of further assistance to you, please call me at 924-3982.

Sincerely,

Susan M. Calongne, P.E.  
City/County Floodplain Administrator

c:    Terri Martin, DRB-98-52, City Project No. 562380  
     Pierre Amestoy, Jr., A Management Corporation  
     File

# DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sun Sage Hills Subdivision ZONE ATLAS#: M-9/D-14  
DRB#: 98-52 EPC# 96-87 WORK ORDER#: \_\_\_\_\_  
LEGAL DESCRIPTION: Portions of Tracts 503 and Parcel A, Town of Atrisco Grant (SP-83-237)  
CITY ADDRESS: \_\_\_\_\_

|                   |                                                 |          |                          |
|-------------------|-------------------------------------------------|----------|--------------------------|
| ENGINEERING FIRM: | <u>Mark Goodwin &amp; Associates, PA</u>        | CONTACT: | <u>Diane Hoelzer, PE</u> |
| ADDRESS:          | <u>P.O. Box 90606, Albuquerque, NM 87199</u>    | PHONE:   | <u>828-2200</u>          |
| OWNER:            | <u>A Management Corporation</u>                 | CONTACT: | <u>Pierre Amestoy</u>    |
| ADDRESS:          | <u>8661 San Pedro NE, Albuquerque, NM 87113</u> | PHONE:   | <u>822-8585</u>          |
| ARCHITECT:        | _____                                           | CONTACT: | _____                    |
| ADDRESS:          | _____                                           | PHONE:   | _____                    |
| SURVEYOR:         | <u>Aldrich Land Surveying</u>                   | CONTACT: | <u>Tim Aldrich</u>       |
| ADDRESS:          | <u>P.O. Box 30701, Albuquerque, NM 87190</u>    | PHONE:   | <u>884-1990</u>          |
| CONTACTOR:        | _____                                           | CONTACT: | _____                    |
| ADDRESS:          | _____                                           | PHONE:   | _____                    |

## TYPE OF SUBMITTAL:

☐ DRAINAGE REPORT  
☐ DRAINAGE PLAN  
☐ CONCEPTUAL GRADING & DRAINAGE PLAN  
☐ GRADING PLAN  
☐ EROSION CONTROL  
☒ ENGINEER'S CERTIFICATION  
☐ OTHER  
☐ EASEMENT VACATION

## PRE-DESIGN MEETING:

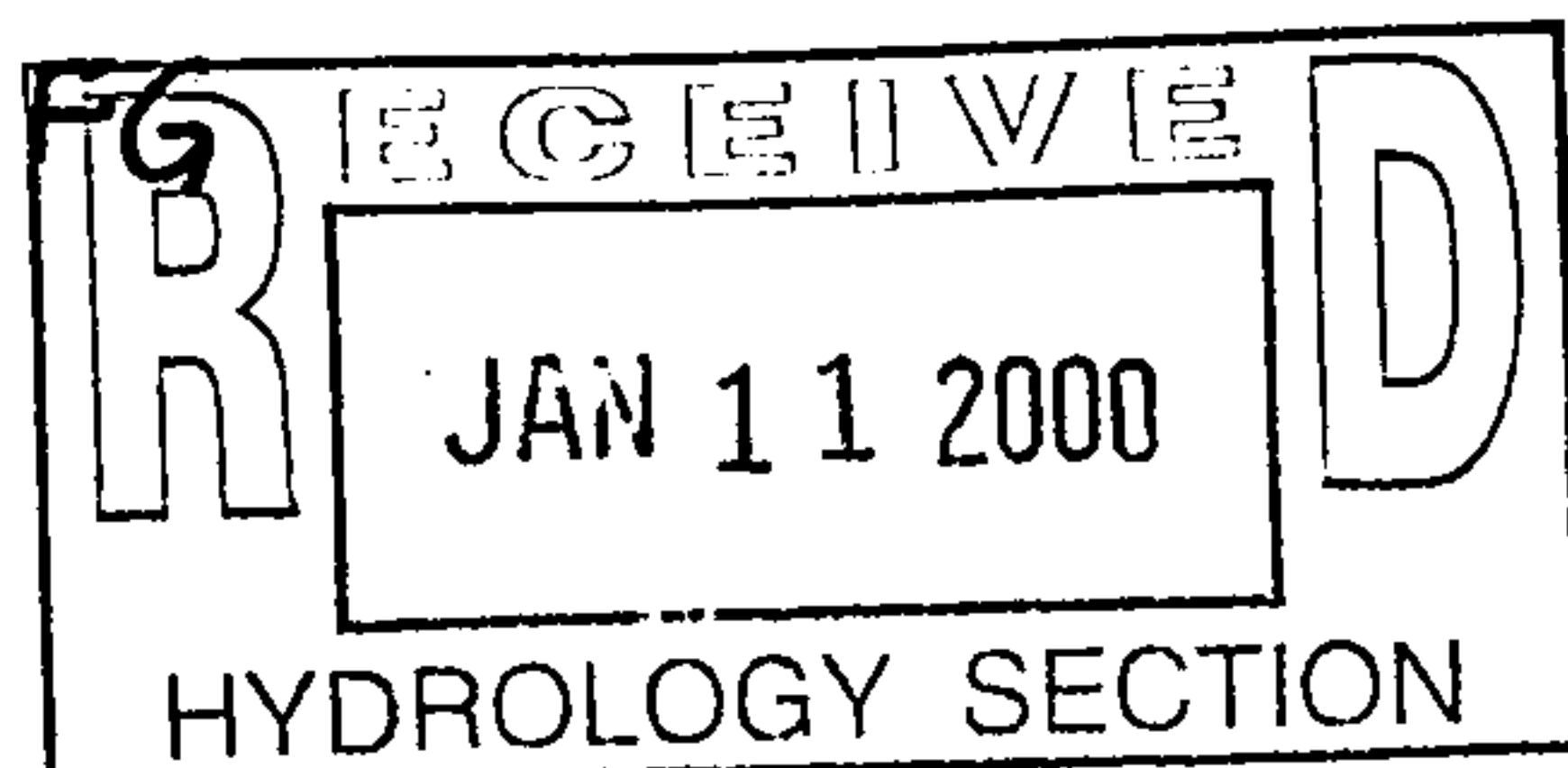
☐ YES  
☒ NO  
☐ COPY PROVIDED

## CHECK TYPE OF APPROVAL SOUGHT:

☐ SKETCH PLAT APPROVAL  
☐ PRELIMINARY PLAT APPROVAL  
☐ S. DEV. PLAN FOR SUB'D APPROVAL  
☐ S. DEV. PLAN FOR BLDG PERMIT APPROVAL  
☐ SECTOR PLAN APPROVAL  
☐ FINAL PLAT APPROVAL  
☐ FOUNDATION PERMIT APPROVAL  
☐ BUILDING PERMIT APPROVAL  
☐ CERTIFICATION OF OCCUPANCY APPROVAL  
☐ GRADING PERMIT APPROVAL  
☐ PAVING PERMIT APPROVAL  
☐ S.A.D. DRAINAGE REPORT  
☐ DRAINAGE REQUIREMENTS  
☐ OTHER  
☐ RELEASE OF FINANCIAL GUARANTY  
☐ TRAFFIC CIRCULATION LAYOUT

☒

ROFFG

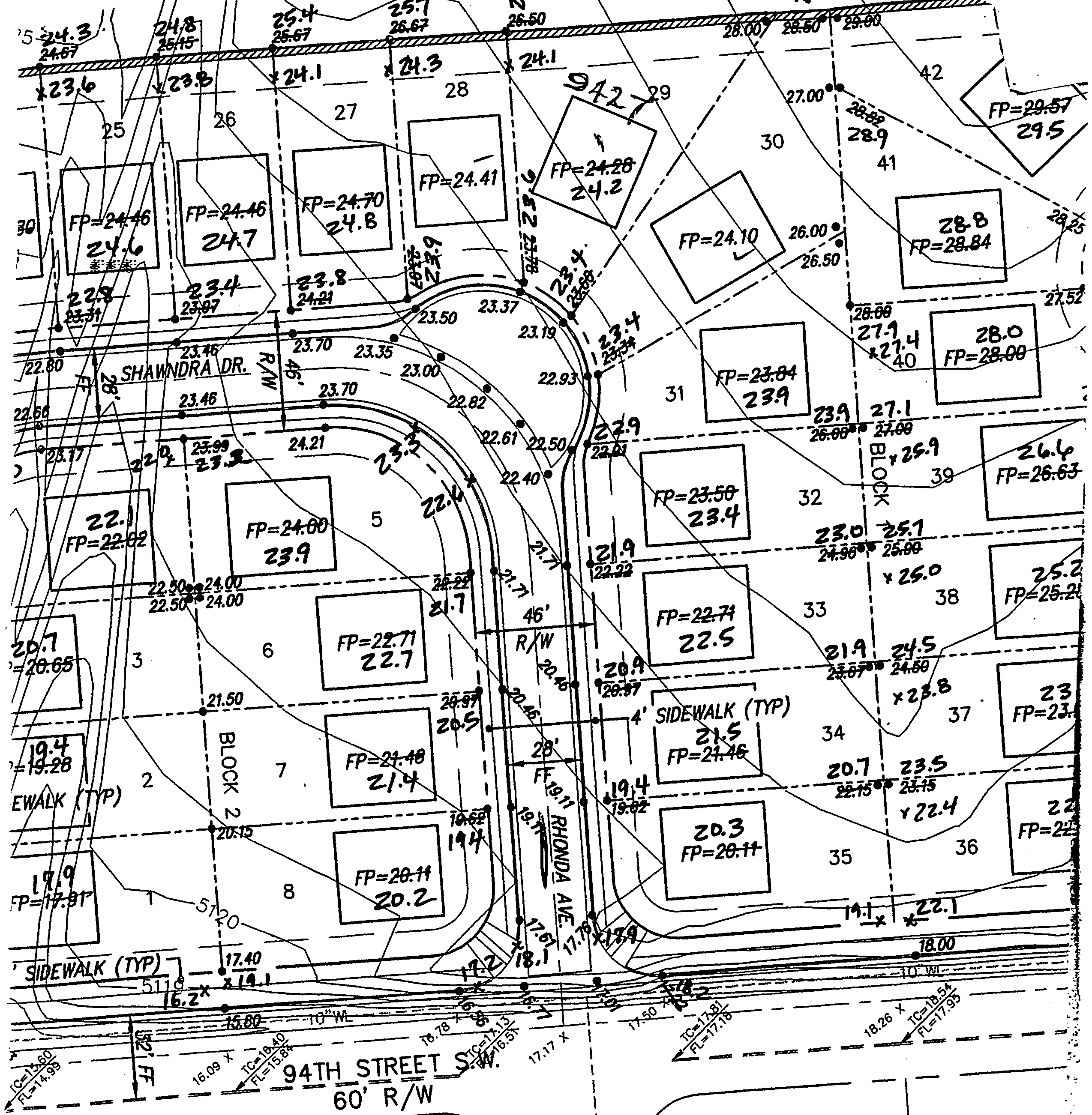


DATE SUBMITTED: 1/12/00

BY: Sheri Westgate

for

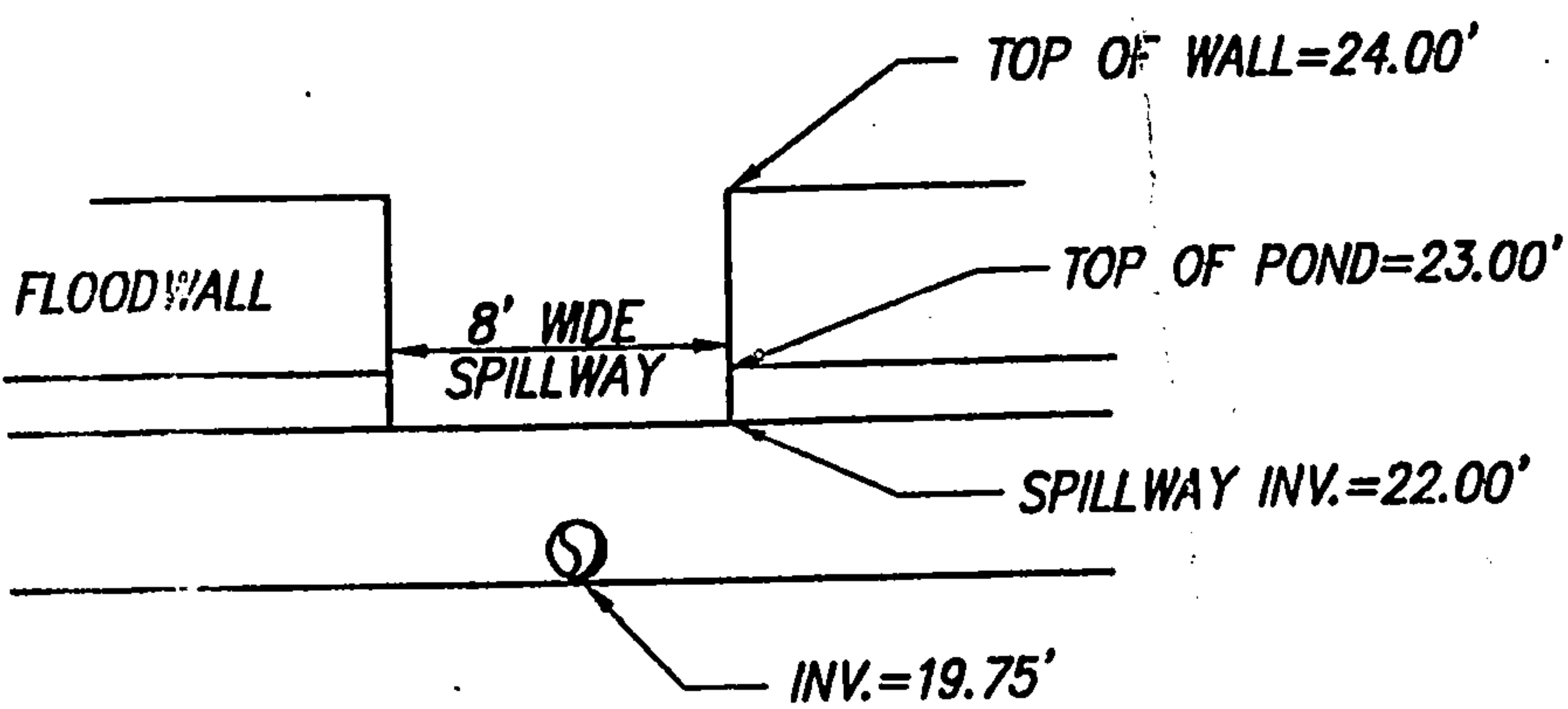
Diane Hoelzer, PE



(EXISTING RESIDENTIAL HOMES)

RIM=17.53  
INV=11.81 (E)

M9/D14  
SUN SAGE HILLS Sub D  
C.O. Stamped 1/12/00



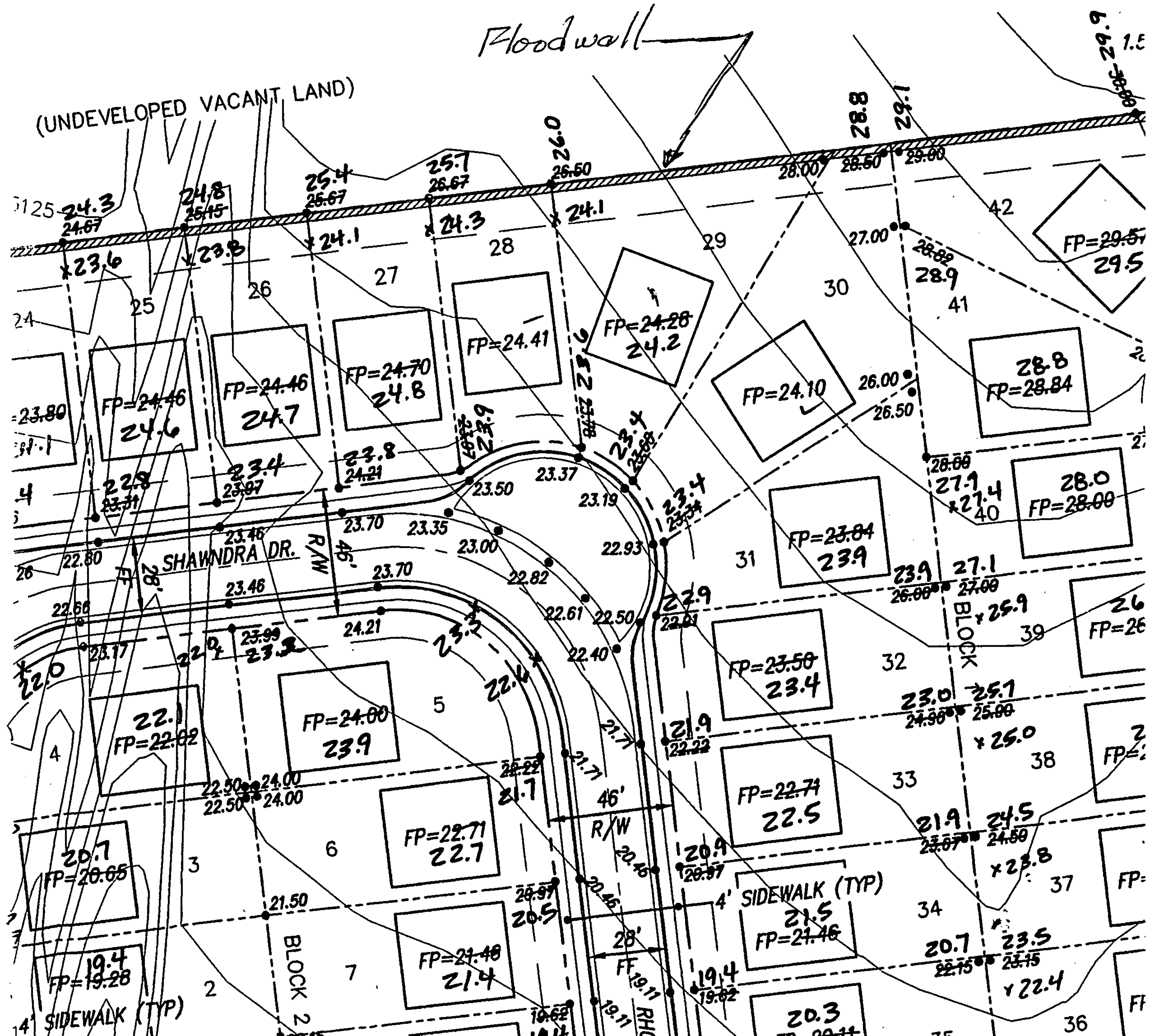
### SPILLWAY CALCS

$$Q = \text{CLM}^{1.5} \quad \text{N.T.S.}$$

$$18.2 \text{ CFS} = 3.6 (8.0') H^{1.5}$$

$$H = .736' \text{ OR } 8.8"$$

(UNDEVELOPED VACANT LAND)



M-9/DIA Rai Roger Guay (2/16)  
2/20  
Billy 98 SAGE

K&B Builders

352-5387

9427 Rhonda SW

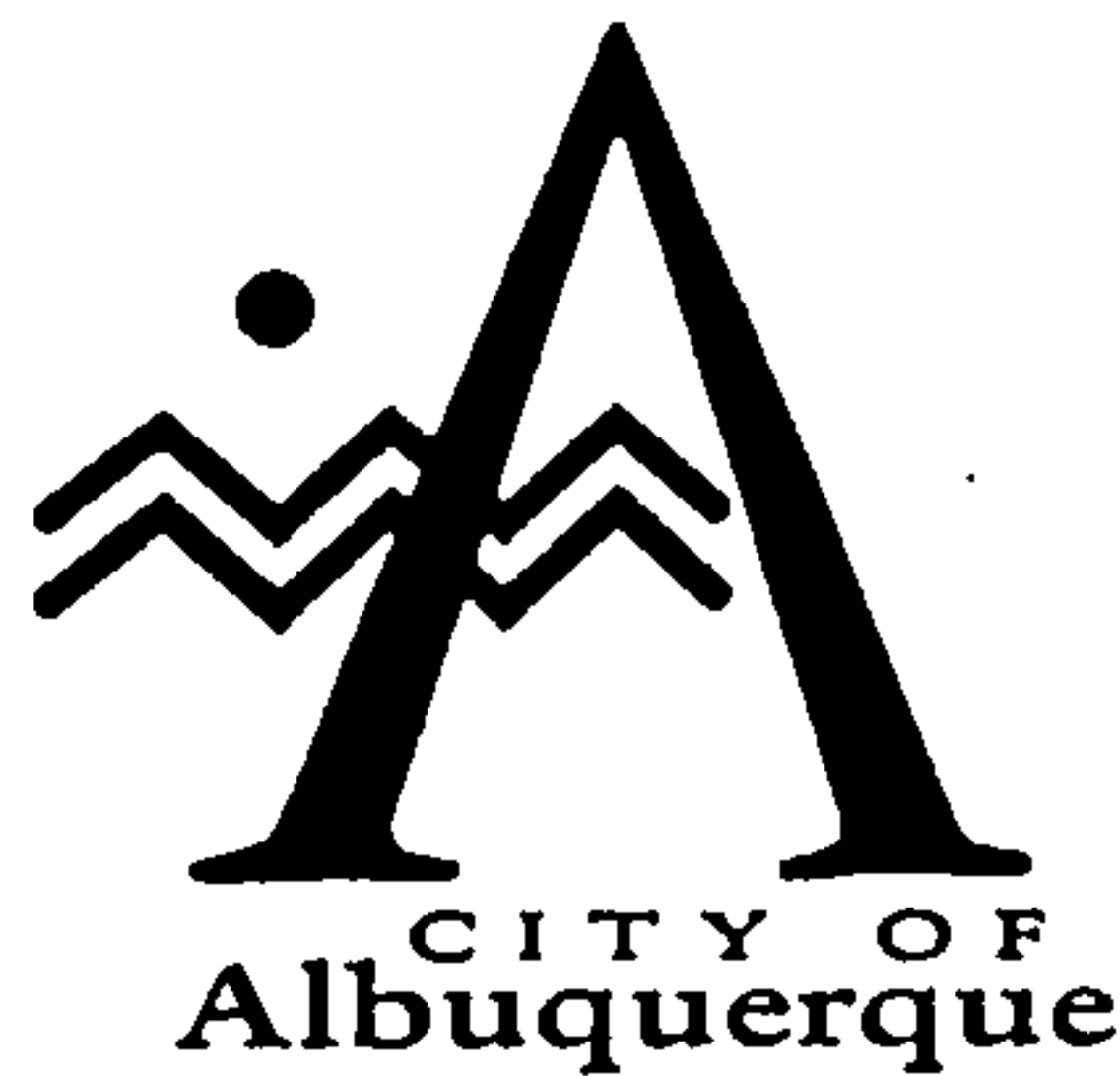
Desert Sage

8:45 2/20

WALL

NOT

Built on  
not to plan



March 2, 1998

Diane Hoelzer, P.E.  
Mark Goodwin & Associates, PA  
P. O. Box 90606  
Albuquerque, New Mexico 87199

**RE: Grading and Drainage Plan for Sun Sage Hills Subdivision (M9/D14) Submitted for Preliminary and Final Plat Approval and Grading Permit Release, Engineer's Stamp Dated 2/3/98.**

Dear Ms. Hoelzer:

Based on the information provided in the submittal of February 5, 1998, the above referenced plan is approved for Preliminary Plat action and Grading Permit release.

Please be advised that SAD 222 identifies a 36" storm drain in Sage Road adjacent to this site. This storm drain must be included on the Infrastructure List. Also, an Easement and an Agreement and Covenant are required for the temporary detention pond located adjacent to this site. These must also be included on the Infrastructure List.

The SIA must be in place for this subdivision prior to Final Plat approval. The Grading and Drainage Certification is required prior to release of Financial Guarantees.

If you have any questions, or if I may be of further assistance to you, please call me at 924-3982.

Sincerely,

Susan M. Calongne, P.E.  
City/County Floodplain Administrator

c: Fred Aguirre, DRB-98-52  
Pierre Amestoy, Jr., A Management Corporation  
File

Good for You, Albuquerque!



## DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sun Sage Hills Subdivision ZONE ATLAS/DRNG, FILE#: M9/D14  
DRB #: 98-52 EPC #: 96-87 WORK ORDER #: \_\_\_\_\_  
LEGAL DESCRIPTION: Parcel A-1, Unit 7, Town of Atrisco Grant  
CITY ADDRESS: Southwest corner of 94th St. and Sage Rd.

ENGINEERING FIRM: Mark Goodwin & Associates, PA  
ADDRESS: PO Box 90606 ABQ NM 87199  
OWNER: A Management Corporation  
ADDRESS: 8661 San Pedro Ave. ABQ, NM 87113  
ARCHITECT: N/A  
ADDRESS: \_\_\_\_\_  
SURVEYOR: ALS, Inc.  
ADDRESS: PO Box 30701 ABQ NM 87190  
CONTRACTOR: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_

CONTACT: Diane Hoelzer, PE  
PHONE: 828-2200  
CONTACT: Pierre Amestoy, Jr.  
PHONE: 822-8585  
CONTACT: \_\_\_\_\_  
PHONE: \_\_\_\_\_  
CONTACT: Tim Aldrich  
PHONE: 884-1990  
CONTACT: \_\_\_\_\_  
PHONE: \_\_\_\_\_

## TYPE OF SUBMITTAL:

## CHECK TYPE OF APPROVAL SOUGHT:

☐ DRAINAGE REPORT  
☒ DRAINAGE PLAN  
☐ CONCEPTUAL GRADING & DRAINAGE PLAN  
☒ GRADING PLAN  
☐ EROSION CONTROL PLAN  
☐ ENGINEER'S CERTIFICATION  
☐ OTHER

☐ SKETCH PLAT APPROVAL  
☒ PRELIMINARY PLAT APPROVAL  
☐ S. DEV. PLAN FOR SUB'D APPROVAL  
☐ S. DEV. PLAN FOR BLDG PERMIT APPROVAL  
☐ SECTOR PLAN APPROVAL  
☒ FINAL PLAT APPROVAL  
☐ FOUNDATION PERMIT APPROVAL  
☐ BUILDING PERMIT APPROVAL  
☐ CERTIFICATION OF OCCUPANCY APPROVAL  
☒ GRADING PERMIT APPROVAL  
☐ PAVING PERMIT APPROVAL  
☐ S.A.D. DRAINAGE REPORT  
☐ DRAINAGE REQUIREMENTS  
☐ OTHER RELEASE OF FINANCIAL GUARANTY

## PRE-DESIGN MEETING:

☐ YES  
☒ NO  
☐ COPY PROVIDED

DATE SUBMITTED: 2-6-98

BY: Diane Hoelzer

Diane Hoelzer, PE



D. Mark Goodwin & Associates, P.A.  
Consulting Engineers

P.O. BOX 90606, ALBUQUERQUE, NM 87199  
(505) 828-2200 FAX 797-9539  
e-mail: dmgs@swcp.com

February 3, 1998

One Stop Hydrology  
Plaza Del Sol  
City of Albuquerque, NM  
PO Box 1293  
Albuquerque, NM 87103

**Re: Grading and Drainage Plan Sun Sage Hills Subdivision (M-9/D-14)**

Dear Mr. Curtin,

This letter is in response to your letter dated October 11, 1996 in which you gave us preliminary plat and rough grading approval as well as some additional comments that needed to be addressed before final plat approval.

Since the preliminary plat expired for this project, I am now seeking preliminary, final plat and infrastructure list approval and have addressed your additional comments below:

1. Temporary bench mark has been added to the grading plan. A detail of the outlet and emergency spillway has been added to the G & D Plan. The shared swale section detail has been corrected to read 1'-8".
2. A note has been added to the plat that "a 10' Private Drainage Easement is centered on all side lot lines". A drainage covenant for the detention pond will be fully processed and recorded when the recording information from the final plat is complete.

I am submitting a revised grading and drainage plan with additional details and grade changes in order to balance the site as well as an infrastructure list. The contents of the previously approved drainage report which is in your files remains unchanged.

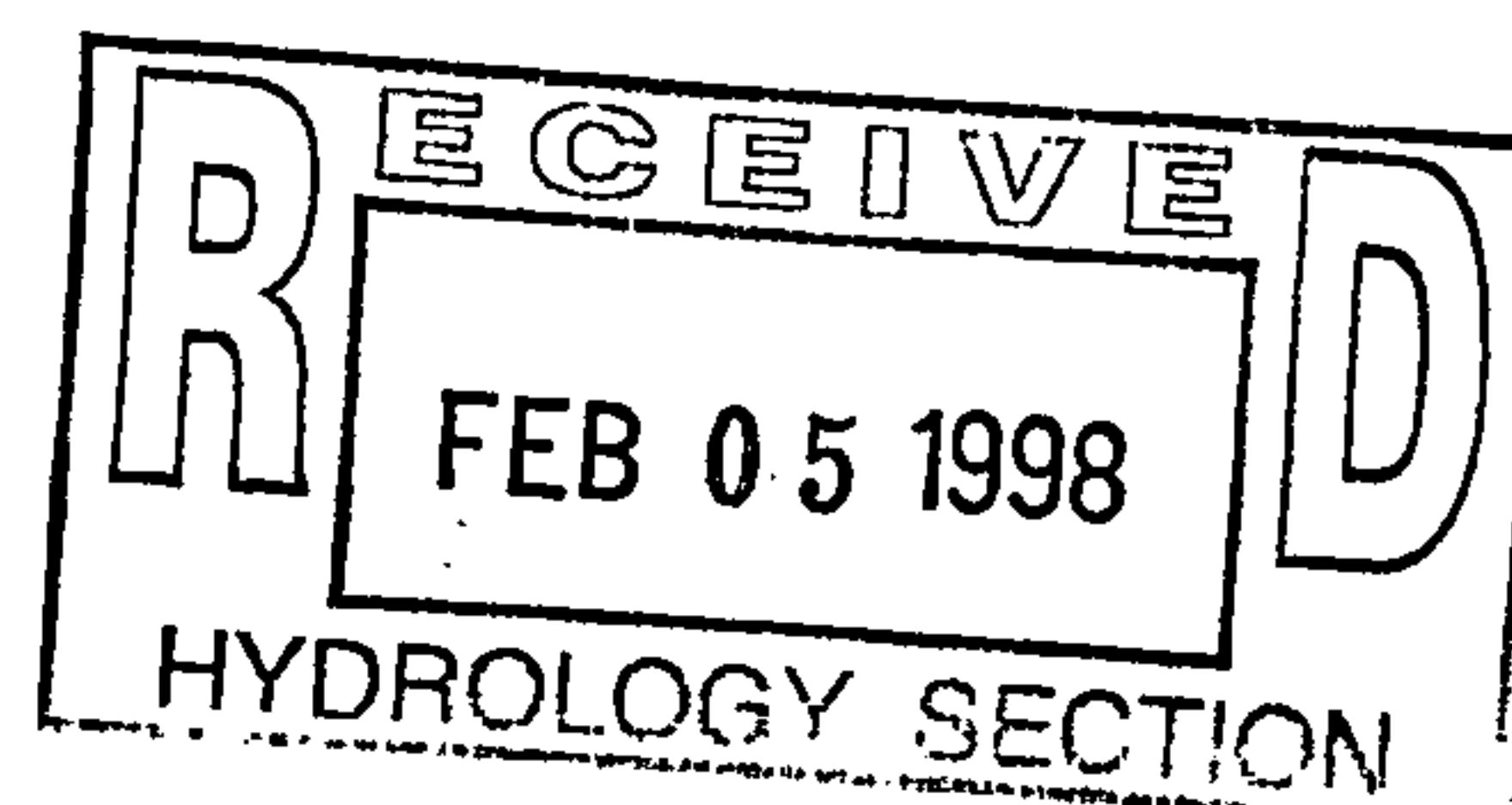
Sincerely,

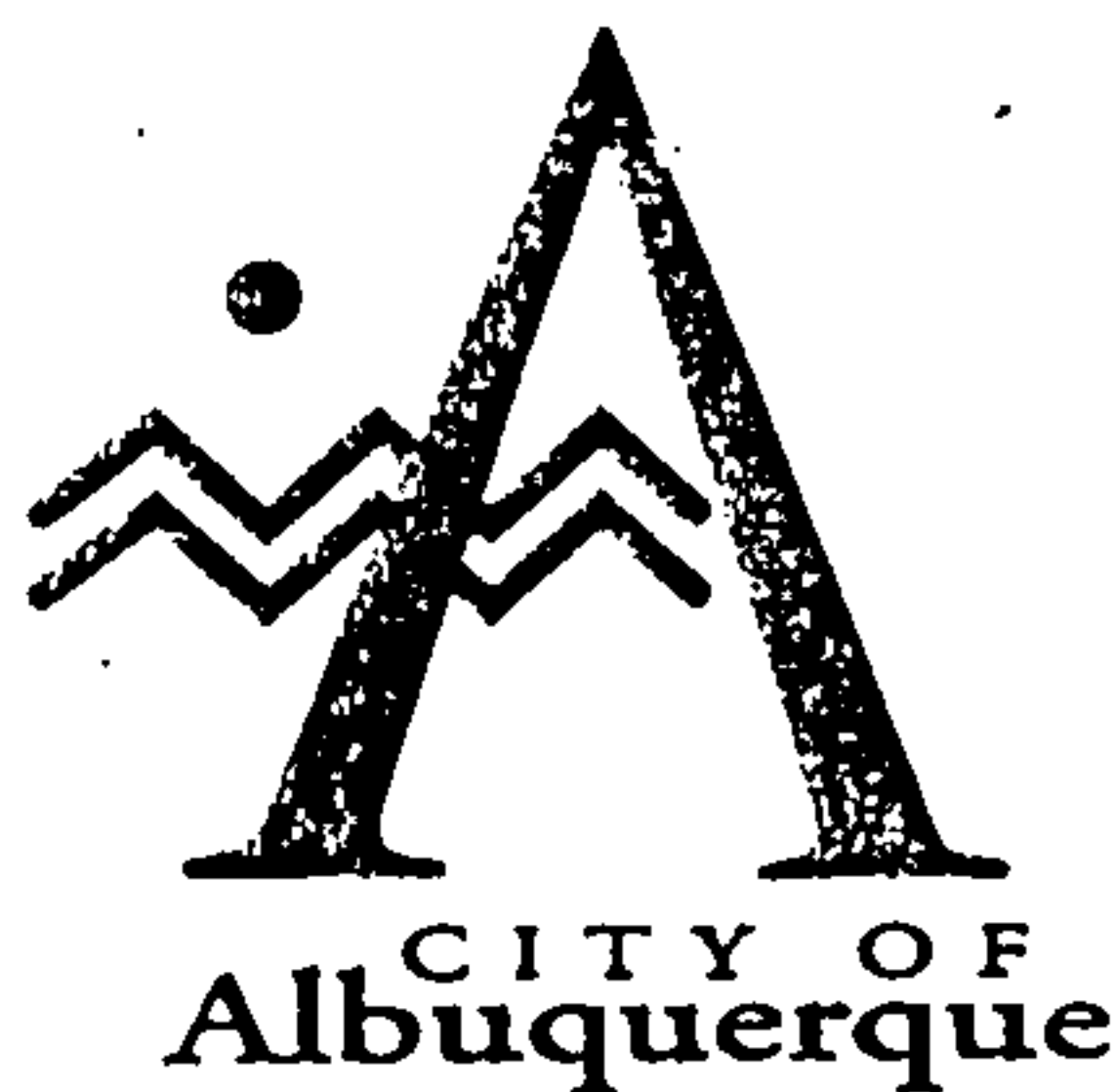
MARK GOODWIN & ASSOCIATES, P.A.

Diane Hoelzer, P.E.

DLH/sb

b:\sunsage\drin13.ltr





P.O. Box 1293 Albuquerque, NM 87103

\*\*\*

October 11, 1996

Martin J. Chávez, Mayor

Diane Hoelzer, PE  
Mark Goodwin & Assoc  
P.O. Box 90606  
Albuquerque, NM 87199

RE: GRADING PLAN FOR SUN SAGE HILLS (M-9/D14)  
RECEIVED SEPTEMBER 18, 1996 FOR PRELIMINARY PLAT, GRADING & BUILDING  
PERMIT  
ENGINEER'S STAMP DATED 9-18-96

Dear Ms. Hoelzer:

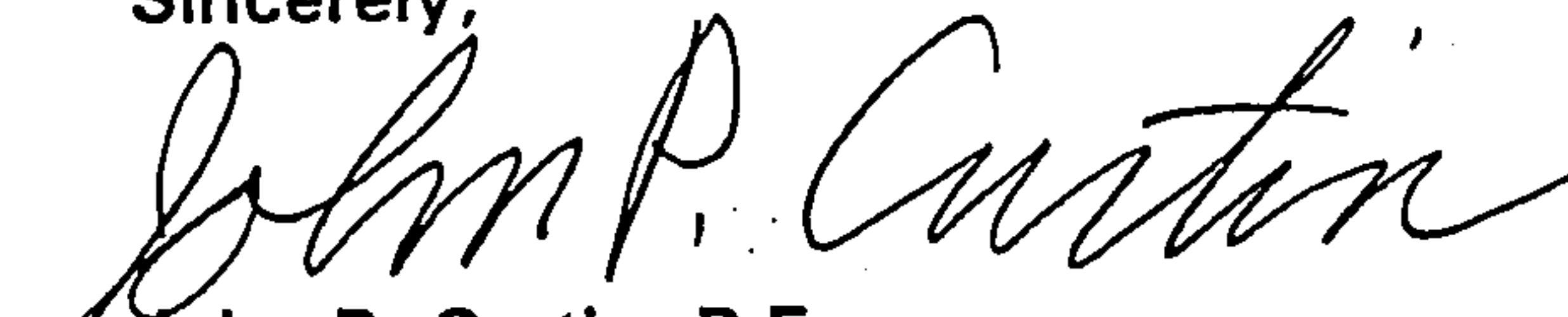
Based on the information included in the submittal referenced above, City Hydrology accepts the grading plan for preliminary plat & rough grading. City Hydrology does not review subdivisions for building permit. The following comments must be addressed before Final Plat & Work Order:

Where is the temporary benchmark located on the Grading Plan. Provide a detail for the outlet & emergency spillway for the detention pond. On the shared swale section, the dimension from the swale invert to the pad should be 1'-8" or 1.67' instead of 1.8'. When the difference between pad elevations exceeds 1.37', a wall is required.

Add a note on the Plat stating " A 10' Private Drainage Easement is Centered on All Side Lot Lines. Execute a Drainage Covenant for the detention pond and submit it to the City for processing & recording. The detention pond must not be removed until downstream capacity is adequate without it.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

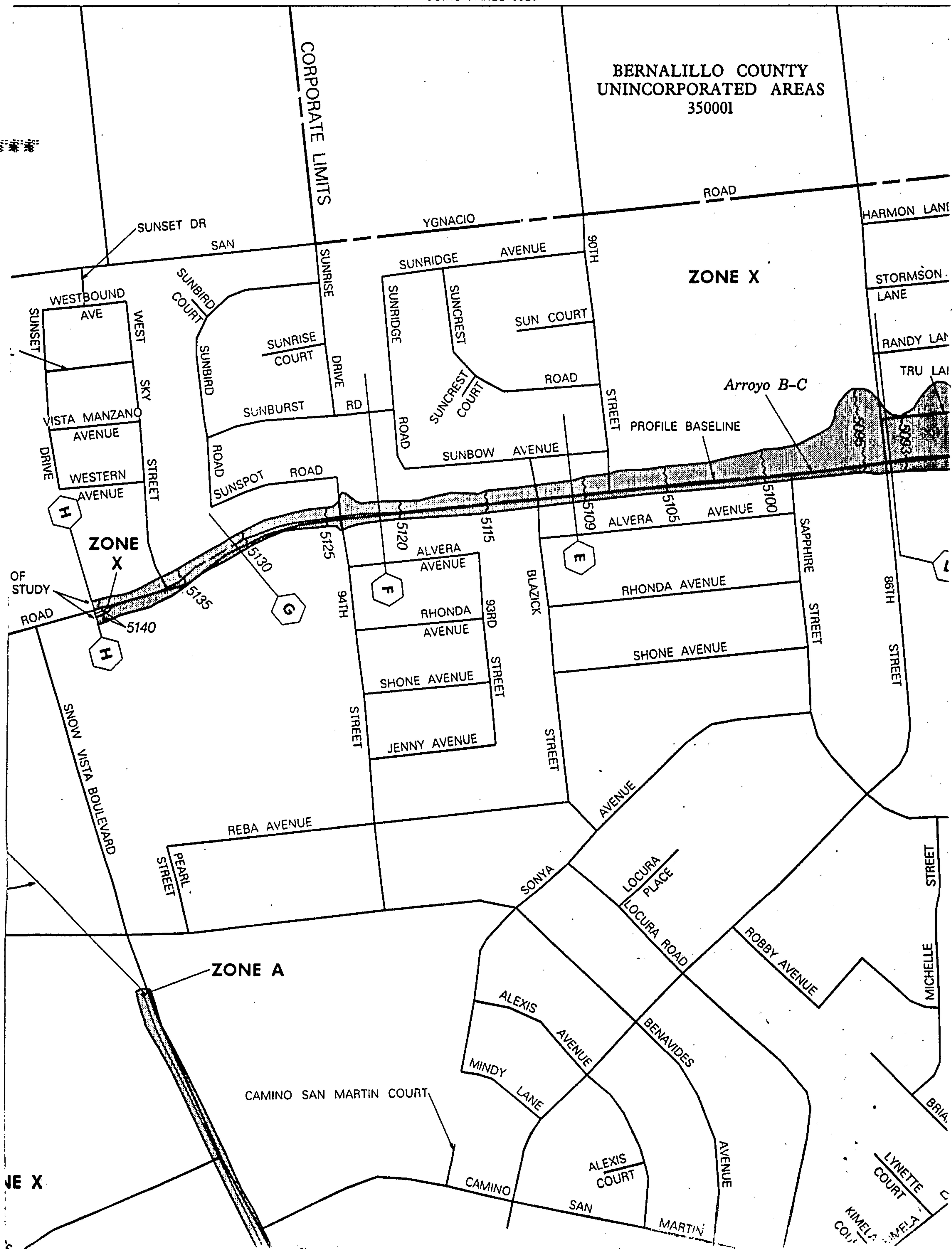
  
John P. Curtin, P.E.  
Civil Engineer, Hydrology

c: Andrew Garcia  
Fred Aguirre, DRB 95-356

Good for You, Albuquerque!



**JE X**



# LETTER OF TRANSMITTAL



D. Mark Goodwin & Associates, P.A.  
Consulting Engineers & Surveyors

P.O. BOX 90606, ALBUQUERQUE, NM 87199  
(505) 828-2200

TO

\*\*\* One Stop

|           |                 |         |
|-----------|-----------------|---------|
| DATE      | 2-5-98          | JOB NO. |
| ATTENTION | Hydrology Staff |         |
| RE:       | Sun Sage Hills  |         |
|           | M-9/D-14        |         |

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via \_\_\_\_\_ the following items:

- |                                         |                                       |                                |                                  |                                         |
|-----------------------------------------|---------------------------------------|--------------------------------|----------------------------------|-----------------------------------------|
| <input type="checkbox"/> Shop drawings  | <input type="checkbox"/> Prints       | <input type="checkbox"/> Plans | <input type="checkbox"/> Samples | <input type="checkbox"/> Specifications |
| <input type="checkbox"/> Copy of letter | <input type="checkbox"/> Change order | <input type="checkbox"/> _____ |                                  |                                         |

| COPIES | DATE     | NO. | DESCRIPTION                                  |
|--------|----------|-----|----------------------------------------------|
| 1      | 2-3-98   |     | Cover letter Response                        |
| 1      | 10-11-96 |     | Hydrology Previous Comment / Approval Letter |
| 1      | 2-3-98   |     | Revised E+D Plan.                            |
| 1      |          |     | Plat                                         |
| 1      |          |     | I.L.                                         |
|        |          |     |                                              |
|        |          |     |                                              |
|        |          |     |                                              |

THESE ARE TRANSMITTED as checked below:

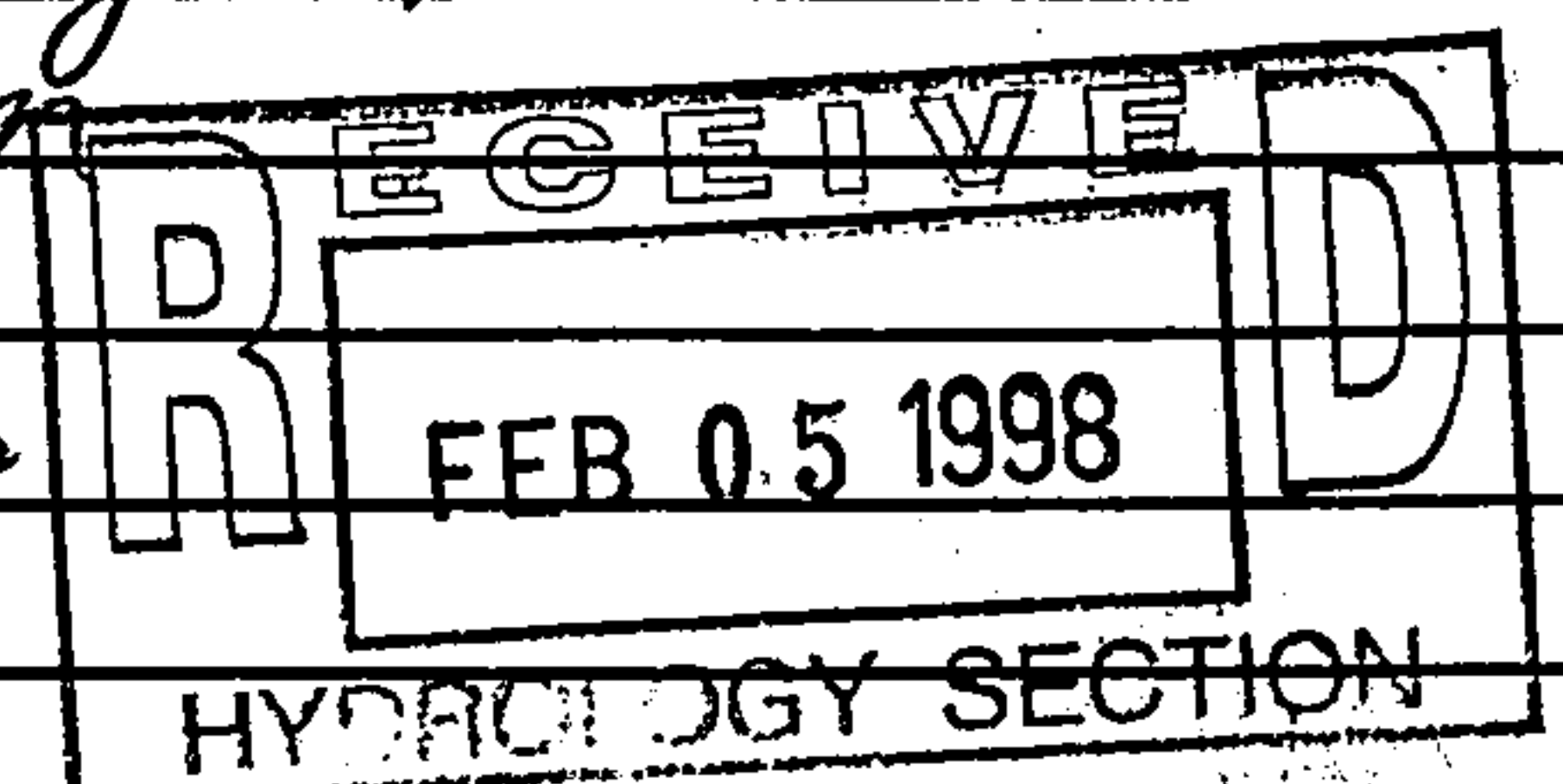
- |                                                                                                                |                                                   |                                                               |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------|
| <input type="checkbox"/> For approval                                                                          | <input type="checkbox"/> Approved as submitted    | <input type="checkbox"/> Resubmit _____ copies for approval   |
| <input type="checkbox"/> For your use                                                                          | <input type="checkbox"/> Approved as noted        | <input type="checkbox"/> Submit _____ copies for distribution |
| <input type="checkbox"/> As requested                                                                          | <input type="checkbox"/> Returned for corrections | <input type="checkbox"/> Return _____ corrected prints        |
| <input type="checkbox"/> For review and comment                                                                | <input type="checkbox"/> _____                    |                                                               |
| <input type="checkbox"/> FOR BIDS DUE _____ 19 _____ <input type="checkbox"/> PRINTS RETURNED AFTER LOAN TO US |                                                   |                                                               |

REMARKS

This project was previously approved for Prel-Plat and Rough Grading by John P. Curtin.

Drainage Rpt. remains unchanged, but I am submitting revised E+D Plan.

Call if you have questions.



COPY TO \_\_\_\_\_

SIGNED:

*Diane Heiber*

**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM**

**FLOOD INSURANCE RATE MAP**

**BERNALILLO COUNTY,  
NEW MEXICO AND  
INCORPORATED AREAS**

**PANEL 336 OF 825**

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:  
COMMUNITY

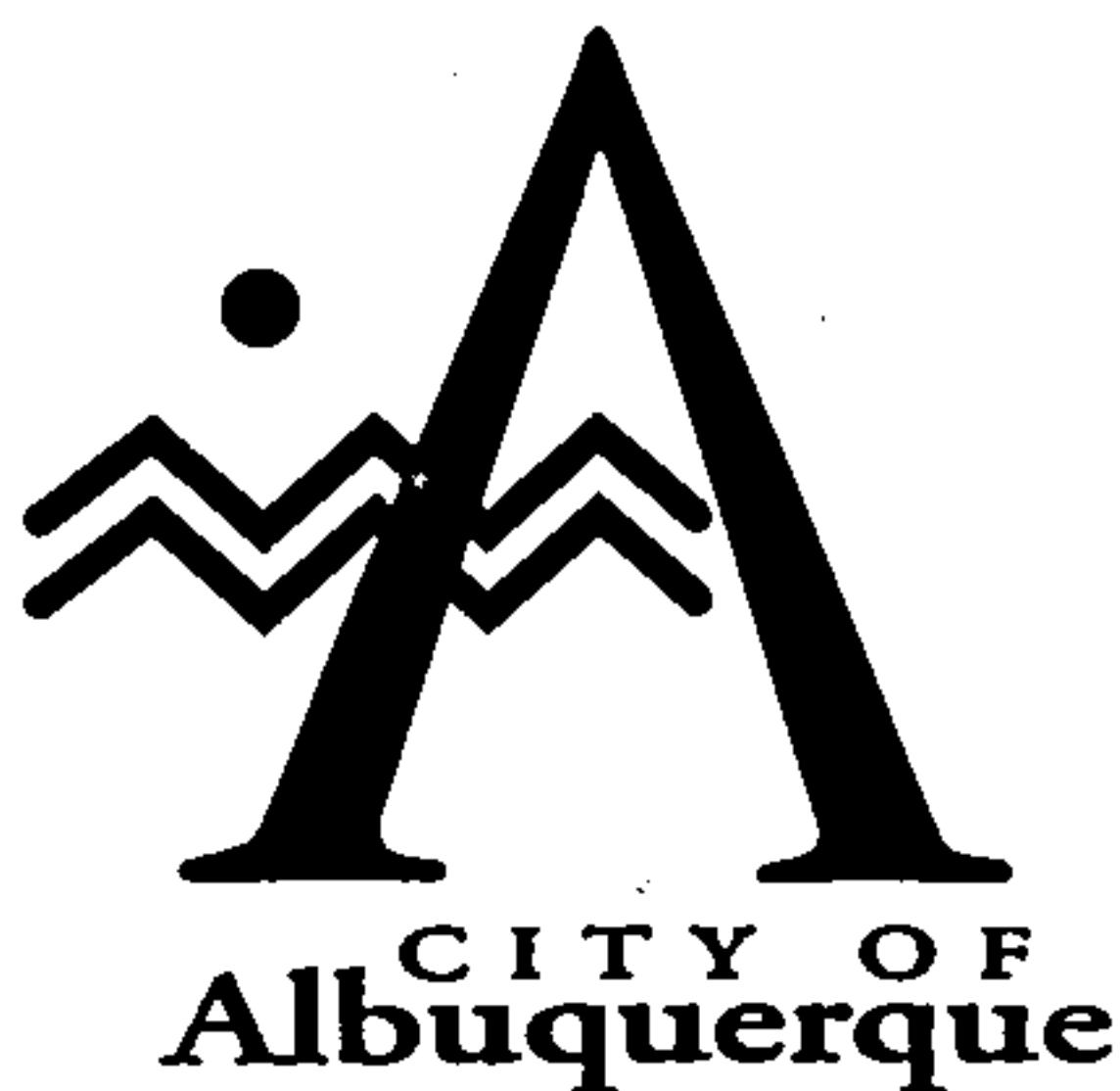
|                                            | <u>NUMBER</u> | <u>PANEL</u> | <u>SUFFIX</u> |
|--------------------------------------------|---------------|--------------|---------------|
| ALBUQUERQUE, CITY OF                       | 350002        | 0336         | D             |
| BERNALILLO COUNTY,<br>UNINCORPORATED AREAS | 350001        | 0336         | D             |

**MAP NUMBER  
35001C0336 D**

**EFFECTIVE DATE:  
SEPTEMBER 20, 1996**



**Federal Emergency Management Agency**



P.O. Box 1293 Albuquerque, NM 87103

\*\*\*

October 11, 1996

Martin J. Chávez, Mayor

Diane Hoelzer, PE  
Mark Goodwin & Assoc  
P.O. Box 90606  
Albuquerque, NM 87199

RE: GRADING PLAN FOR SUN SAGE HILLS (M-9/D14)  
RECEIVED SEPTEMBER 18, 1996 FOR PRELIMINARY PLAT, GRADING & BUILDING  
PERMIT  
ENGINEER'S STAMP DATED 9-18-96

Dear Ms. Hoelzer:

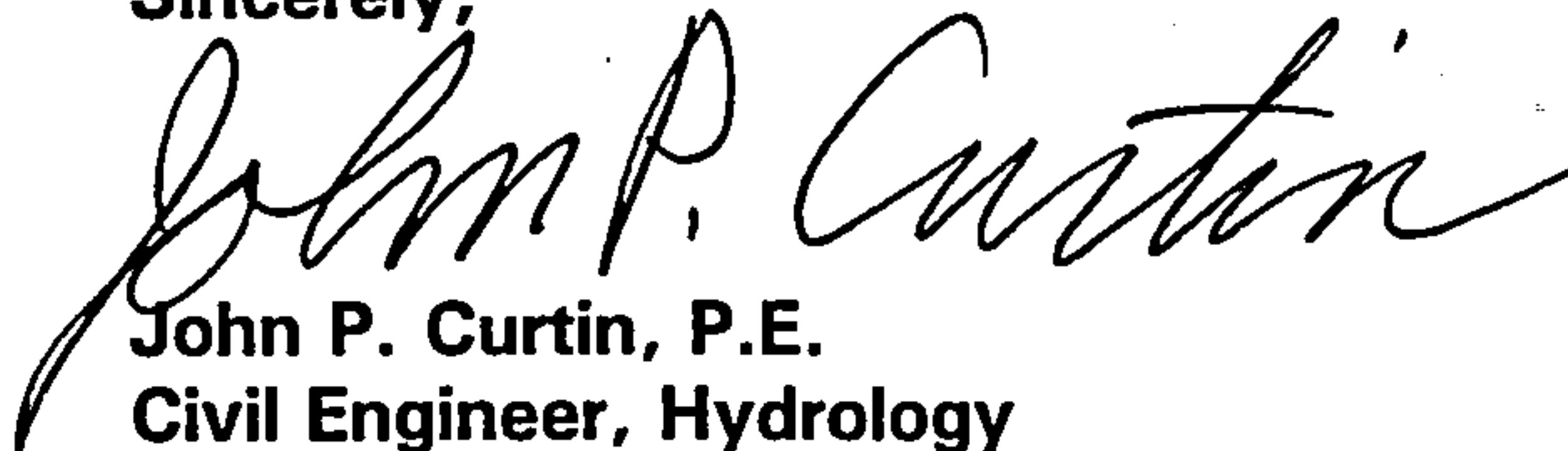
Based on the information included in the submittal referenced above, City Hydrology accepts the grading plan for preliminary plat & rough grading. City Hydrology does not review subdivisions for building permit. The following comments must be addressed before Final Plat & Work Order:

Where is the temporary benchmark located on the Grading Plan. Provide a detail for the outlet & emergency spillway for the detention pond. On the shared swale section, the dimension from the swale invert to the pad should be 1'-8" or 1.67' instead of 1.8'. When the difference between pad elevations exceeds 1.37', a wall is required.

Add a note on the Plat stating " A 10' Private Drainage Easement is Centered on All Side Lot Lines. Execute a Drainage Covenant for the detention pond and submit it to the City for processing & recording. The detention pond must not be removed until downstream capacity is adequate without it!

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

  
John P. Curtin, P.E.  
Civil Engineer, Hydrology

c: Andrew Garcia  
Fred Aguirre, DRB 95-356

Good for You, Albuquerque!





D. Mark Goodwin & Associates, P.A.  
Consulting Engineers and Surveyors  
P.O. BOX 90606, ALBUQUERQUE, NM 87199  
(505) 345-2010

\*\*\*  
September 18, 1996

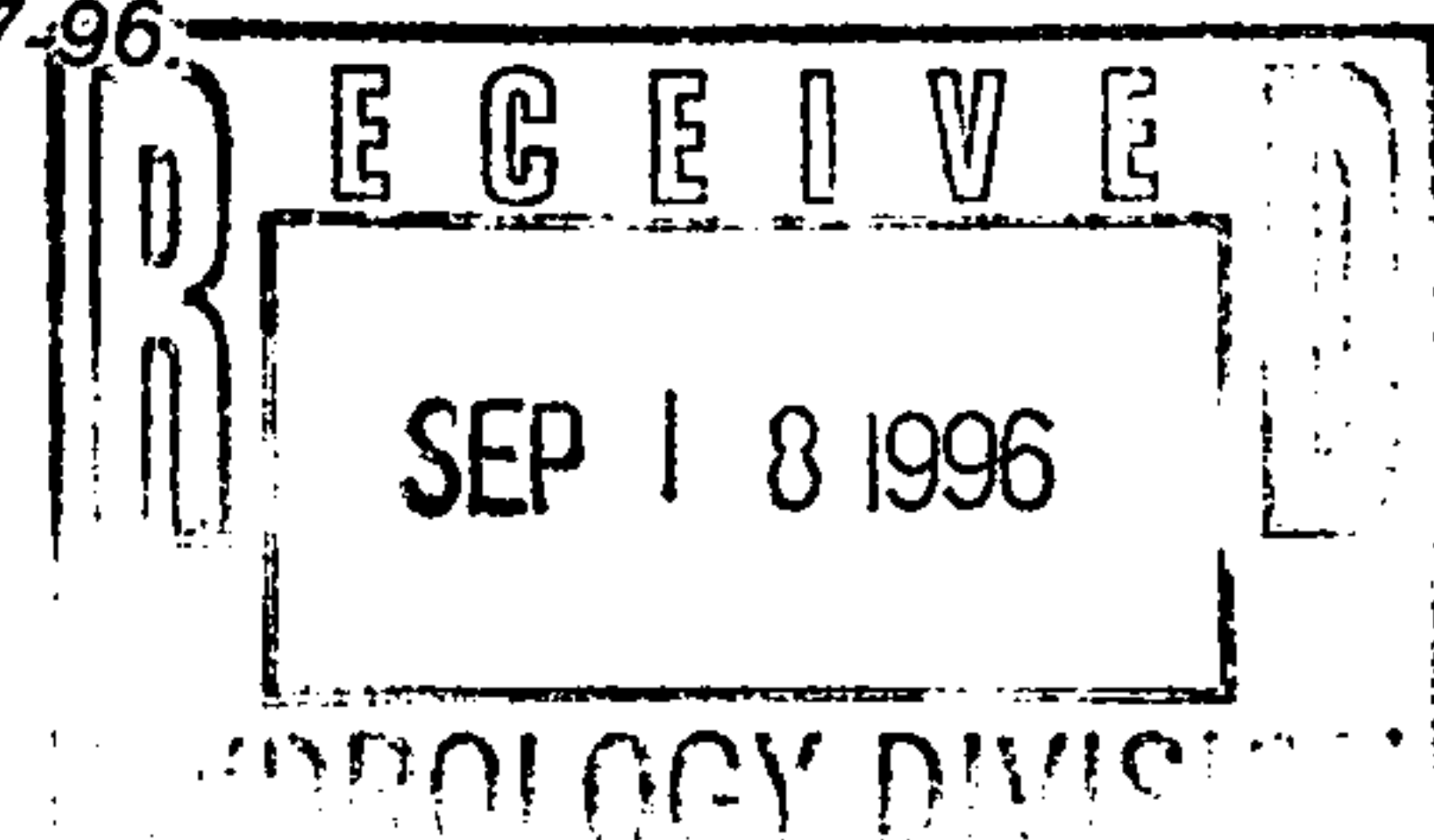
Mr. John P. Curtin, PE  
City of Albuquerque  
Hydrology Department  
P.O. Box 1293  
Albuquerque, NM 87103

**Re: Sun Sage Hills (M-9/D-14) Grading and Drainage Plan For Building Permit, Engineer's Stamp  
Dated 9-17-96**

Dear Mr. Curtin:

This letter is in response to comments in your letter dated August 29, 1996.

1. The original "conceptual" grading and drainage plan submittal has been changed to a grading and drainage plan and includes the legal description, ACS & temporary benchmark and an erosion control plan.
2. Regarding your comment that we need to add backyard ponds on each lot, my previous two submittals did not include backyard ponds in the hydrologic analyses for this site's drainage management plan. The required attenuation of the peak discharge as a result of increased impervious areas in Sun Sage Hills and the adjacent proposed commercial site are being controlled using a detention pond on the adjacent commercial site. In our phone conversation on September 16th regarding this matter, it is my understanding that the Sun Sage Hills subdivision will either be required to have backyard ponds on each lot or else the detention pond on the commercial site will have to attenuate flows such that the combined "developed" flows from the residential and commercial site cannot exceed the combined "existing" flows. Given these options, we have decided to go with Option 2 utilizing a temporary detention pond on the commercial site that will restrict flows from this site to 1.4 cfs. The 1.4 cfs restrictive flow from the commercial site will be included in the Bulk Land Plat that divides off the portion of property to be included as part of the Sun Sage Hills subdivision.
3. A typical section showing the 10' private drainage easement centered between each side lot line as well as the 0.3' swale invert below the lowest pad elevation has been added to the grading and drainage plan.
4. A typical lot grading detail has been added to the grading and drainage plan.
5. The 1.5' flood wall has been extended around the north side of the project site as shown on the grading and drainage plan.
6. The recently completed infrastructure list and preliminary plat are being submitted with the revised grading and drainage plan.
7. Table 5 Summary of On-site Street Capacities and page 1 have been corrected and are being submitted to be exchanged for the two pages in the Drainage Report dated 8-7-96.



Mr. John P. Curtin, PE  
September 18, 1996  
Page 2

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*I hope that I have adequately addressed all of your concerns, but if you have any further questions or comments, don't hesitate to call me.*

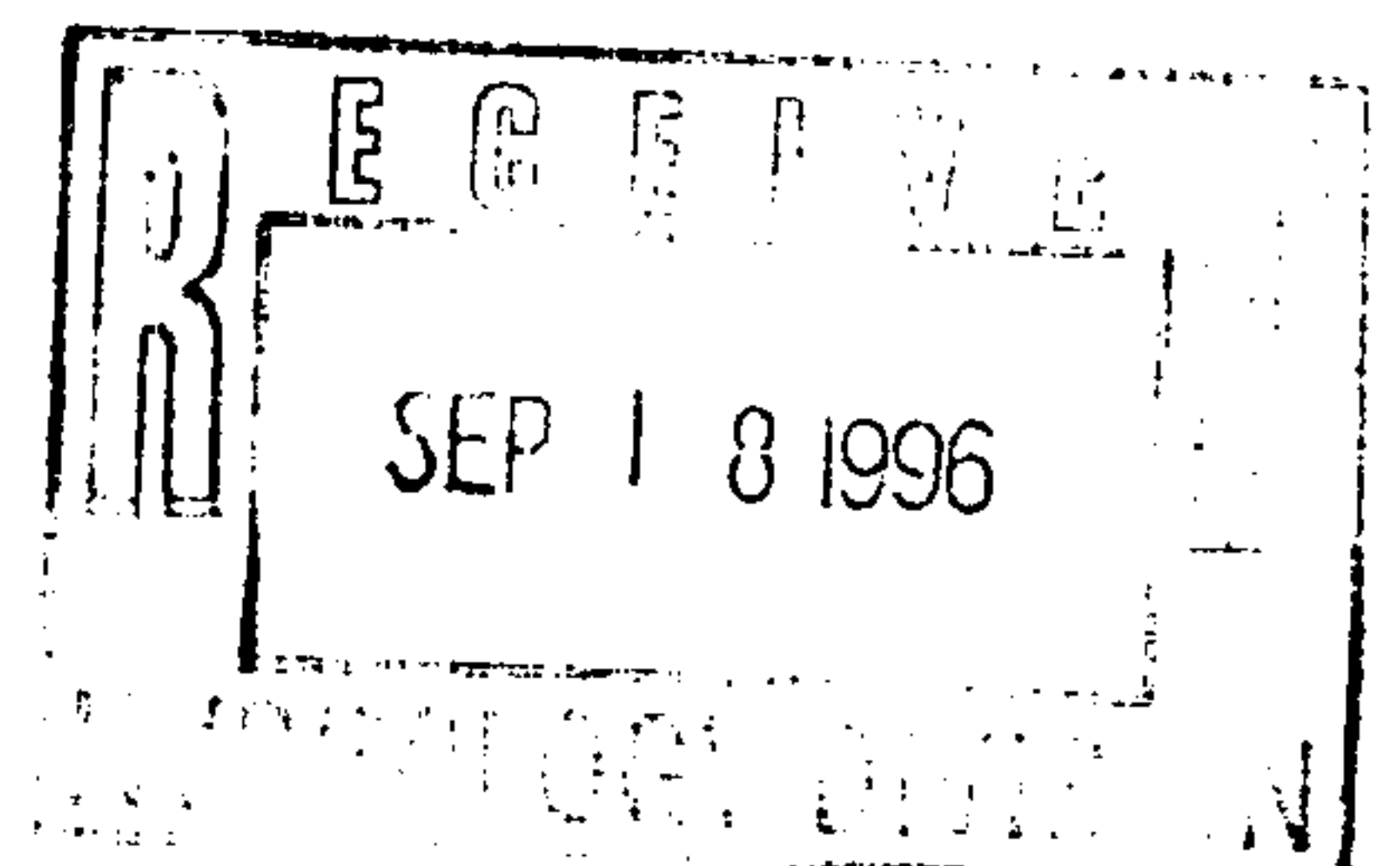
Sincerely,

D. MARK GOODWIN & ASSOCIATES, PA

*Diane Hoelzer*  
Diane Hoelzer, PE

DHL/sb

b:\sunsage\comments.no3



# DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sun Sage Hills Subdivision ZONE ATLAS/DRNG, FILE#: M-9 / 14  
DRB #: 95-356 EPC #: 96-87 WORK ORDER #: \_\_\_\_\_  
LEGAL DESCRIPTION: Portions of Tracts 503 and Parcel A, Town of Atrisco Grant (SP-83-237)  
CITY ADDRESS: \_\_\_\_\_

ENGINEERING FIRM: Mark Goodwin & Associates PA CONTACT: Diane Hoelzer, PE  
ADDRESS: PO Box 90606 PHONE: 345-2010  
OWNER: A Management Corporation CONTACT: Pierre Amestoy  
ADDRESS: 8661 San Pedro NE Albuquerque 87113 PHONE: 822-8585  
ARCHITECT: \_\_\_\_\_ CONTACT: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_  
SURVEYOR: ALS, Inc. CONTACT: Tim Aldrich  
ADDRESS: PO Box 30701 PHONE: 884-1990  
CONTRACTOR: \_\_\_\_\_ CONTACT: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_

## TYPE OF SUBMITTAL:

## CHECK TYPE OF APPROVAL SOUGHT:

☒ DRAINAGE REPORT  
☒ DRAINAGE PLAN  
☐ CONCEPTUAL GRADING & DRAINAGE PLAN  
☒ GRADING PLAN  
☐ EROSION CONTROL PLAN  
☐ ENGINEER'S CERTIFICATION  
☐ OTHER

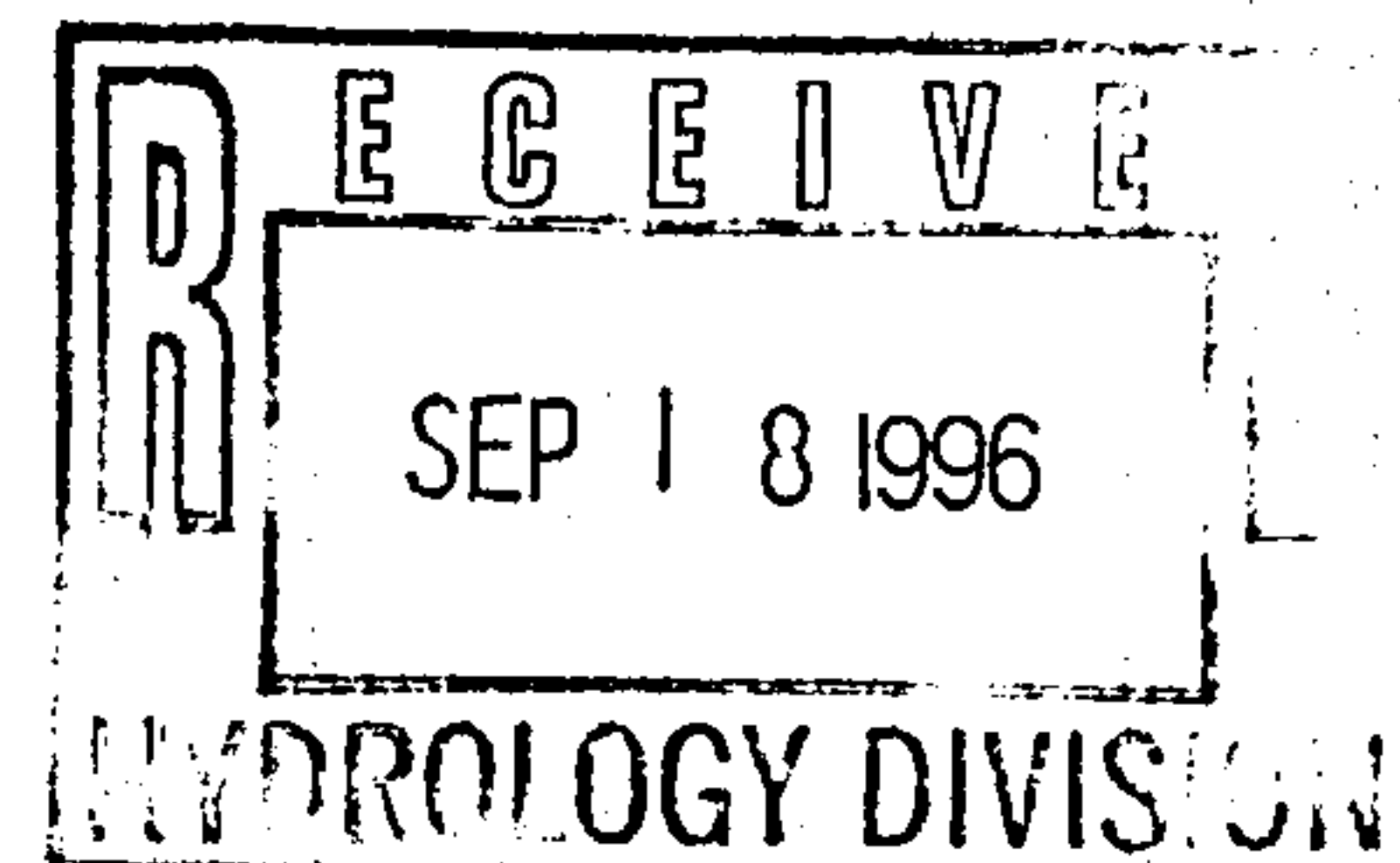
☐ SKETCH PLAT APPROVAL  
☒ PRELIMINARY PLAT APPROVAL  
☐ S. DEV. PLAN FOR SUB'D APPROVAL  
☐ S. DEV. PLAN FOR BLDG PERMIT APPROVAL  
☐ SECTOR PLAN APPROVAL  
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☐ FOUNDATION PERMIT APPROVAL  
☒ BUILDING PERMIT APPROVAL  
☐ CERTIFICATION OF OCCUPANCY APPROVAL  
☒ GRADING PERMIT APPROVAL  
☐ PAVING PERMIT APPROVAL  
☐ S.A.D. DRAINAGE REPORT  
☐ DRAINAGE REQUIREMENTS  
☐ OTHER \_\_\_\_\_ (Specify)

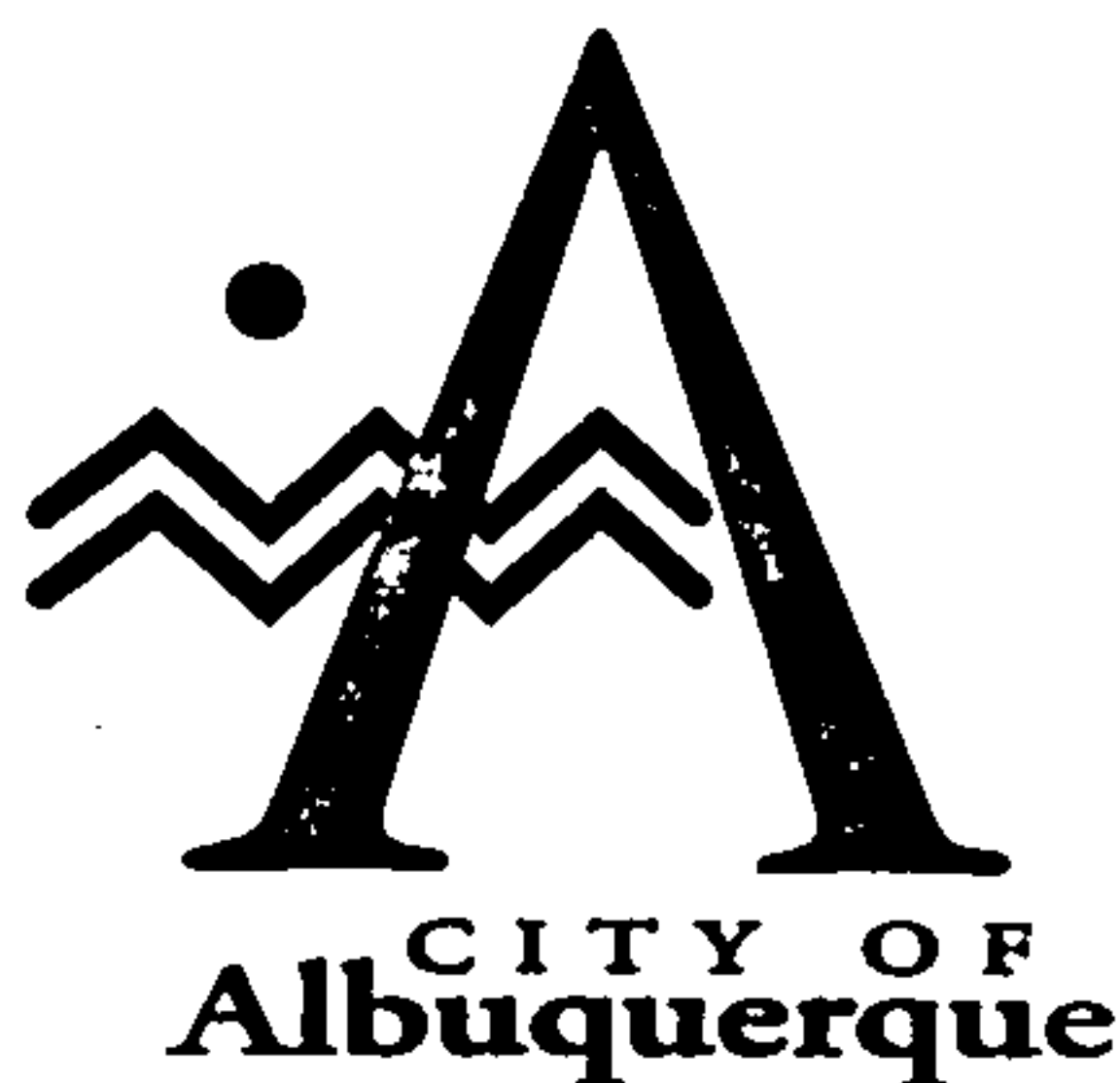
## PRE-DESIGN MEETING:

☐ YES  
☒ NO  
☐ COPY PROVIDED

DATE SUBMITTED: \_\_\_\_\_

BY: Diane Hoelzer  
Diane Hoelzer PE





P.O. Box 1293 Albuquerque, NM 87103

August 29, 1996

Martin J. Chávez, Mayor

Diane Hoelzer, PE  
Mark Goodwin & Assoc  
P.O. Box 90606  
Albuquerque, NM 87199

RE: DRAINAGE REPORT FOR SUN SAGE HILLS (M-9/D14)  
RECEIVED AUGUST 8, 1996 FOR PRELIMINARY PLAT, GRADING & BUILDING PERMIT  
ENGINEER'S STAMP DATED 8-7-96

Dear Ms. Hoelzer:

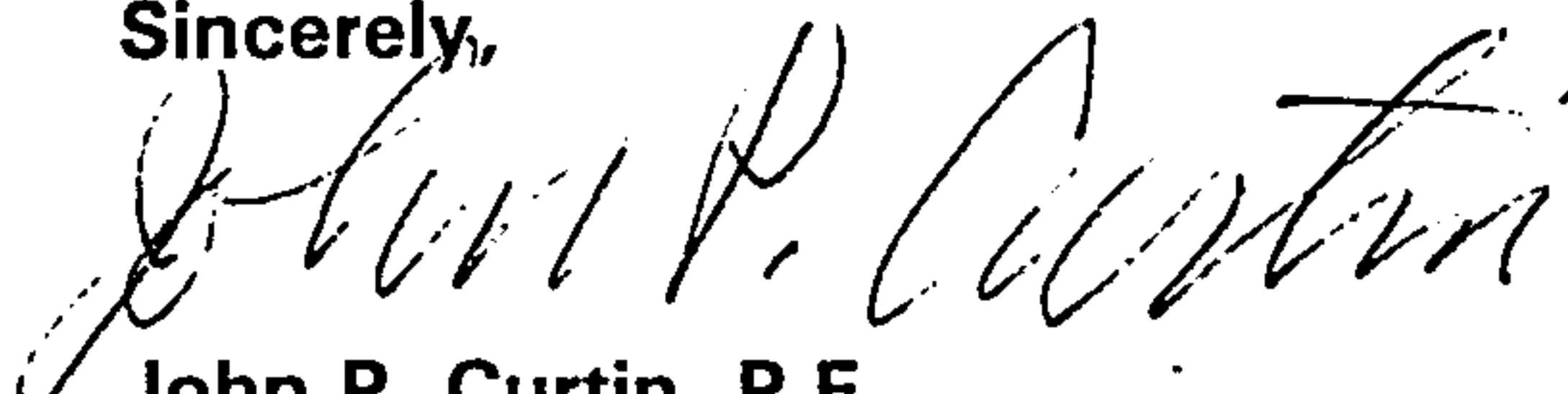
Based on the information included in the submittal referenced above, City Hydrology accepts the Drainage Report for Site Development Plan for Subdivision. Option 1 is accepted, because it is consistent with the existing drainage scheme for Westgate. Any future analysis of this area must include the backyard basins as 100% land treatment "A" to be consistent with current procedures. The following comments must be addressed:

A conceptual grading & drainage plan is only adequate for site development plan. A grading plan must include legal description, ACS & temporary benchmark and erosion control notes. Indicate backyard ponds on each lot. The shared swale requires a 10' private drainage easement centered on each side lot line. City Hydrology recommends that the invert of the swale be .3' below the lowest pad elevation instead of .03'. Provide a typical lot grading detail showing the fine grading that the Building Contractor must complete. The depth shown on FIRM panel 33 is the average depth. Continue the flood wall around the north side to protect the site from the FHZ A0 in Sage Blvd.

City Hydrology does not review subdivisions for building permit. Include the DRB number and a copy of the preliminary plat & the proposed infrastructure list in the submittal for preliminary plat. Why does Alvera Ct have a much higher Q than the rest of the streets? Shouldn't Jenny Ave have 25.9 cfs instead?

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,



John P. Curtin, P.E.  
Civil Engineer, Hydrology

c: Andrew Garcia  
Fred Aguirre, EPC 96-87

Good for You, Albuquerque!



FIGURE 6  
CITY OF ALBUQUERQUE  
NOTICE OF D.R.C. MEETING  
5-16-97  
(DATE)

DRB NO: 95-354  
PROJECT NO: 5102380  
ZONE ATLAS: m-9

PROJECT NAME: Jun Sage Hills  
LOCATION: 94th & Sage

TYPE OF PROJECT: AHBA ☒ CIP ☐ PWC ☐ SAD ☐ ALL PRIVATE ☐

Contact Person: Diane Hoelzer Phone: 345-2010  
Firm: Mark Goodwin

☒ Scheduled with the D.R.C. on 5-29-97 at 1:30 Plaza Del Sol/2nd Fl.  
☐ No DRC Meeting Scheduled. Please return any comments by \_\_\_\_\_

The Project Is Scheduled For:

|                                                                 |                                                |
|-----------------------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> / / Design Report Review               | <input type="checkbox"/> / / Final Plan Review |
| <input type="checkbox"/> / / Pre-Design Meeting                 | <input type="checkbox"/> / / Signoff of Plans  |
| <input checked="" type="checkbox"/> / / Preliminary Plan Review | <input type="checkbox"/> / / _____             |

The Project Relates To:

☒ / / Water ☒ / / San. Sewer ☒ / / Paving ☐ / / Storm Drainage ☐ / / \_\_\_\_\_

The Attached Package Includes:

/D/ Drawings /S/ Spec's /E/ Estimate /R/ Report /M/ Memo Only

Indicated below are the Departments/Divisions that have received project documents and/or are invited to attend. It will be the Project Managers responsibility to notify consulting engineering firms of date and time of scheduled meetings.

|                                                    |                            |                   |
|----------------------------------------------------|----------------------------|-------------------|
| <input checked="" type="checkbox"/> DRC Chairman   | Project Review Section     | All Drawings      |
| <input checked="" type="checkbox"/> Traffic Repres | Transportation Development | All Drawings      |
| <input checked="" type="checkbox"/> Water Repres.  | Utility Design             | All Drawings      |
| <input checked="" type="checkbox"/> Hydro Repres.  | Hydrology                  | All Drawings      |
| <input checked="" type="checkbox"/> Const. Repres. | Construction               | All Drawings      |
| <input checked="" type="checkbox"/> Ray Chavez     | Traffic Operations         | All Drawings      |
| <input checked="" type="checkbox"/> Sergio Miranda | Water (Shutoff Plan)       | All Water Shutoff |
| <input checked="" type="checkbox"/> Parks Repres.  | Parks & Recreation         | ALL Landscaping   |
| / / Andre Houle                                    | Street Maintenance         | All Paving        |
| / /                                                | Utility Coordinator        | ALL PWC & CIP     |
| / / Jim Hamel                                      | Transit Department         | CIP/Memo          |
| / / Rick Roybal                                    | Construction Coordinator   | CIP/Memo          |
| / / Jim Fink                                       | Line Maintenance           | CIP & SAS/Memo    |
| / / John Rupley                                    | City Architect             | Arch. Drawings    |
| / / Lee Lunsford                                   | SAD Engineer               | SAD/Memo          |
| / / Joe Luehring                                   | Transportation Develop.    | CIP/Memo          |
| / / Roger Green                                    | Utility Design             | CIP/Water & SAS   |
| / / Gene Bustamante                                | General Services Dept.     | Arch. Drawings    |
| / / Greg Smith                                     | PWD/Legal                  | Specs & Dwgs.     |
| / / Richard Sertich                                | Planning Department        | CIP/Memos         |
| / / CIP Manager                                    | CIP                        | CIP/Memos         |
| / / Donald Bartlett                                | Risk Management            | Arch. Drawings    |
| / / _____                                          | _____                      | _____             |

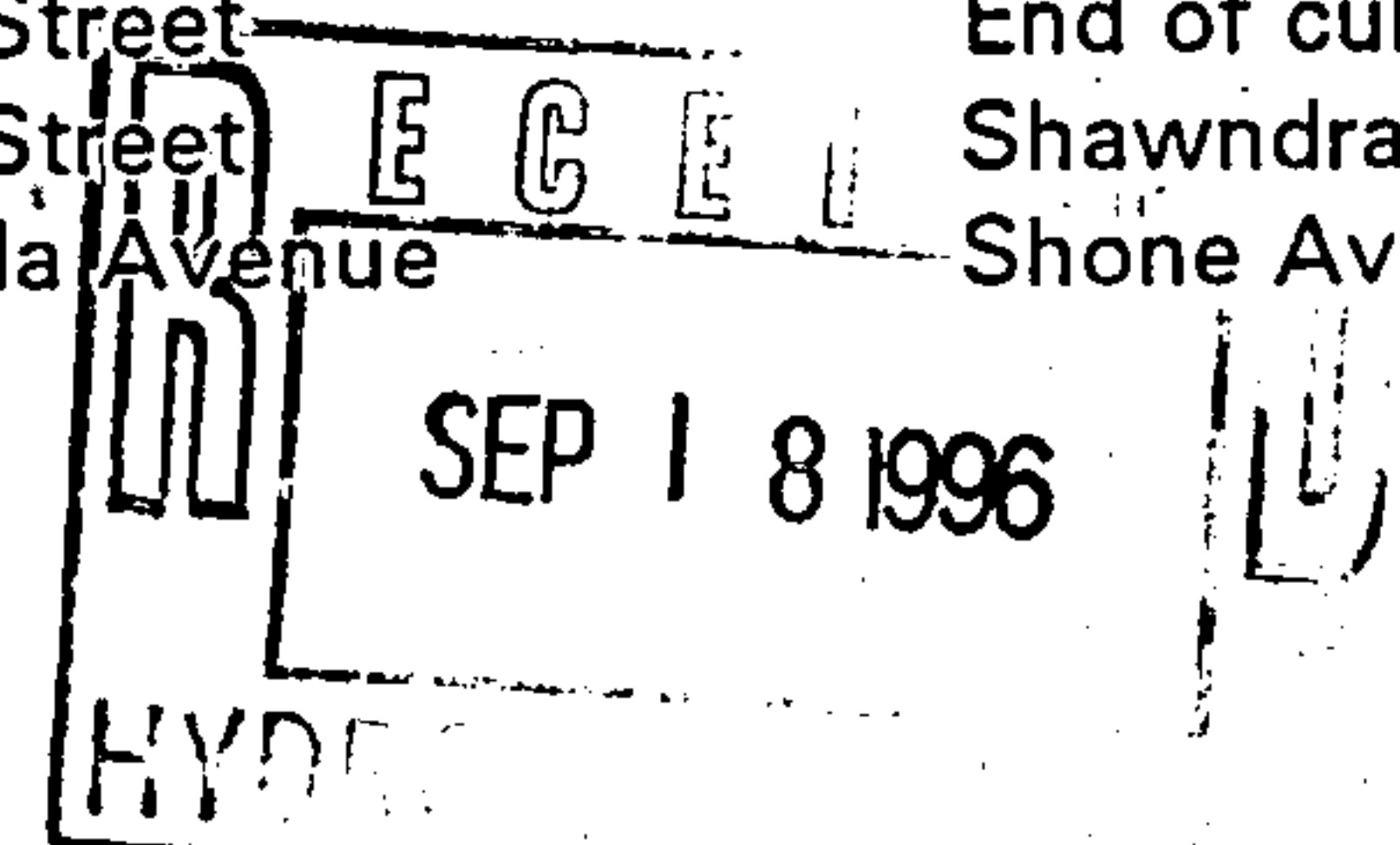
D.R.B. Case No. \_\_\_\_\_  
D.R.C. Project No. \_\_\_\_\_  
Date Submitted 9/13/96  
Prelim. Plat Approved \_\_\_\_\_  
Prelim. Plat Expires \_\_\_\_\_

Figure 12

\*\*\*  
**EXHIBIT "A"**  
**To Subdivision Improvements Agreement**  
**DEVELOPMENT REVIEW BOARD (DRB) REQUIRED INFRASTRUCTURE LISTING**  
**for Sun Sage Hills Subdivision**

Following is a summary of Public/Private Infrastructure required to be constructed or financially guaranteed to be constructed for the above development. This summary is not necessarily a complete listing. During the design process, if the City determines that appurtenant items have not been included in the summary, those items will be included in the listing and related financial guarantee, if the items normally are the Subdivider responsibility. In addition, any unforeseen items which arise during construction which are necessary to complete the project and which normally are the Subdivider's responsibility are the responsibility of the Subdivider and will be included in the financial guarantee provided to the City.

| <u>Size</u>   | <u>Type Improvement</u>                                        | <u>Location</u> | <u>From</u>    | <u>To</u>         |
|---------------|----------------------------------------------------------------|-----------------|----------------|-------------------|
| 28'FF<br>4' * | Residential Paving<br>Mountable C & G<br>Sidewalk (both sides) | Alvera Court    | 94th Street    | End of cul-de-sac |
| 28'FF<br>4' * | Residential Paving<br>Mountable C & G<br>Sidewalk (both sides) | Rhonda Avenue   | 94th Street    | Shawndra Drive    |
| 28'FF<br>4' * | Residential Paving<br>Mountable C & G<br>Sidewalk (both sides) | Shawndra Drive  | Rhonda Avenue  | Shone Avenue      |
| 28'FF<br>4' * | Residential Paving<br>Mountable C & G<br>Sidewalk (both sides) | Shone Avenue    | Shawndra Drive | 94th Street       |
| 28'FF<br>4' * | Residential Paving<br>Std. C & G<br>Sidewalk (both sides)      | Jenny Court     | 94th Street    | End of cul-de-sac |
| 4' *          | Sidewalk (W. side)                                             | 94th Street     | Sage Road      | Lot 1, Blk 1      |
| 6"            | Waterline                                                      | Alvera Court    | 94th Street    | End of cul-de-sac |
| 6"            | Waterline                                                      | Rhonda Avenue   | 94th Street    | Shawndra Drive    |
| 6"            | Waterline                                                      | Shawndra Drive  | Rhonda Avenue  | Shone Avenue      |
| 6"            | Waterline                                                      | Shone Avenue    | Shawndra Drive | 94th Street       |
| 6"            | Waterline                                                      | Jenny Court     | 94th Street    | End of cul-de-sac |
| 8"            | SAS Gravity Line                                               | Alvera Court    | 94th Street    | End of cul-de-sac |
| 8"            | SAS Gravity Line                                               | Rhonda Avenue   | 94th Street    | Shawndra Drive    |
| 8"            | SAS Gravity Line                                               | Shawndra Drive  | Rhonda Avenue  | Shone Avenue      |



DRB Case No. \_\_\_\_\_  
DRC Project No. \_\_\_\_\_  
Date Submitted \_\_\_\_\_  
Prelim. Plat Approved \_\_\_\_\_  
Prelim. Plat Expires \_\_\_\_\_

\*\*\*

| <u>Size</u> | <u>Type of Improvement</u> | <u>Location</u>  | <u>From</u>      | <u>To</u>                |
|-------------|----------------------------|------------------|------------------|--------------------------|
| 8"          | SAS Gravity Line           | Shone Avenue     | Shawndra Drive   | 94th Street              |
| 8"          | SAS Gravity Line           | Jenny Court      | 94th Street      | End of cul-de-sac        |
| 8"          | SAS Gravity Line           | 20' Easement     | W. Property line | Jenny Ct, end cul-de-sac |
| 1.5'        | Floodwall                  | W. Property Line | Lot 44, Blk 1    | Lot 7, Blk 1             |
| 1.5'        | Floodwall                  | N. Property Line | Lot 44, Blk 1    | Lot 50, Blk 1            |
| per design  | Drainage Channel           | 20' Easement     | W. Property Line | Jenny Ct, end cul-de-sac |

\* Internal Sidewalk to be deferred.

Water infrastructure to include valves, fittings, valveboxes and fire hydrants.

Sanitary sewer to include manholes and services connections.

Engineer's Certification for Grading and Drainage per DPM including Floodwalls as shown on the Grading Plan for Release of SIA and Financial Guarantees.

Prepared By:

*Diane Hoelzer*

Print Name:

Diane Hoelzer, PE

Firm:

Mark Goodwin & Associates, PA

Page 2 of 2

\*\*\*\*\*

### Development Review Board Member Approvals

Transportation Dev.

Date

Utility Dev.

Date

Parks & General Services

Date

Engineer/AMAFCA

Date

DRB Chairman

Date

NMUI

Date

# DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sun Sage Hills Subdivision ZONE ATLAS/DRNG, FILE#: M-9 / 114  
DRB #: \_\_\_\_\_ EPC #: 96-87 WORK ORDER #: \_\_\_\_\_  
LEGAL DESCRIPTION: Tracts 503 and Portion of Parcel A, Town of Atrisco Grant (SP-83-237)  
CITY ADDRESS: \_\_\_\_\_

ENGINEERING FIRM: Mark Goodwin & Associates PA CONTACT: Diane Hoelzer, PE  
ADDRESS: PO Box 90606 PHONE: 345-2010  
OWNER: Pierre Amestoy CONTACT: Pierre Amestoy  
ADDRESS: 8661 San Pedro SE PHONE: 822-8585  
ARCHITECT: \_\_\_\_\_ CONTACT: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_  
SURVEYOR: \_\_\_\_\_ CONTACT: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_  
CONTRACTOR: \_\_\_\_\_ CONTACT: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_

## TYPE OF SUBMITTAL:

☒ DRAINAGE REPORT  
☒ DRAINAGE PLAN  
☐ CONCEPTUAL GRADING & DRAINAGE PLAN  
☒ GRADING PLAN  
☐ EROSION CONTROL PLAN  
☐ ENGINEER'S CERTIFICATION  
☐ OTHER

## PRE-DESIGN MEETING:

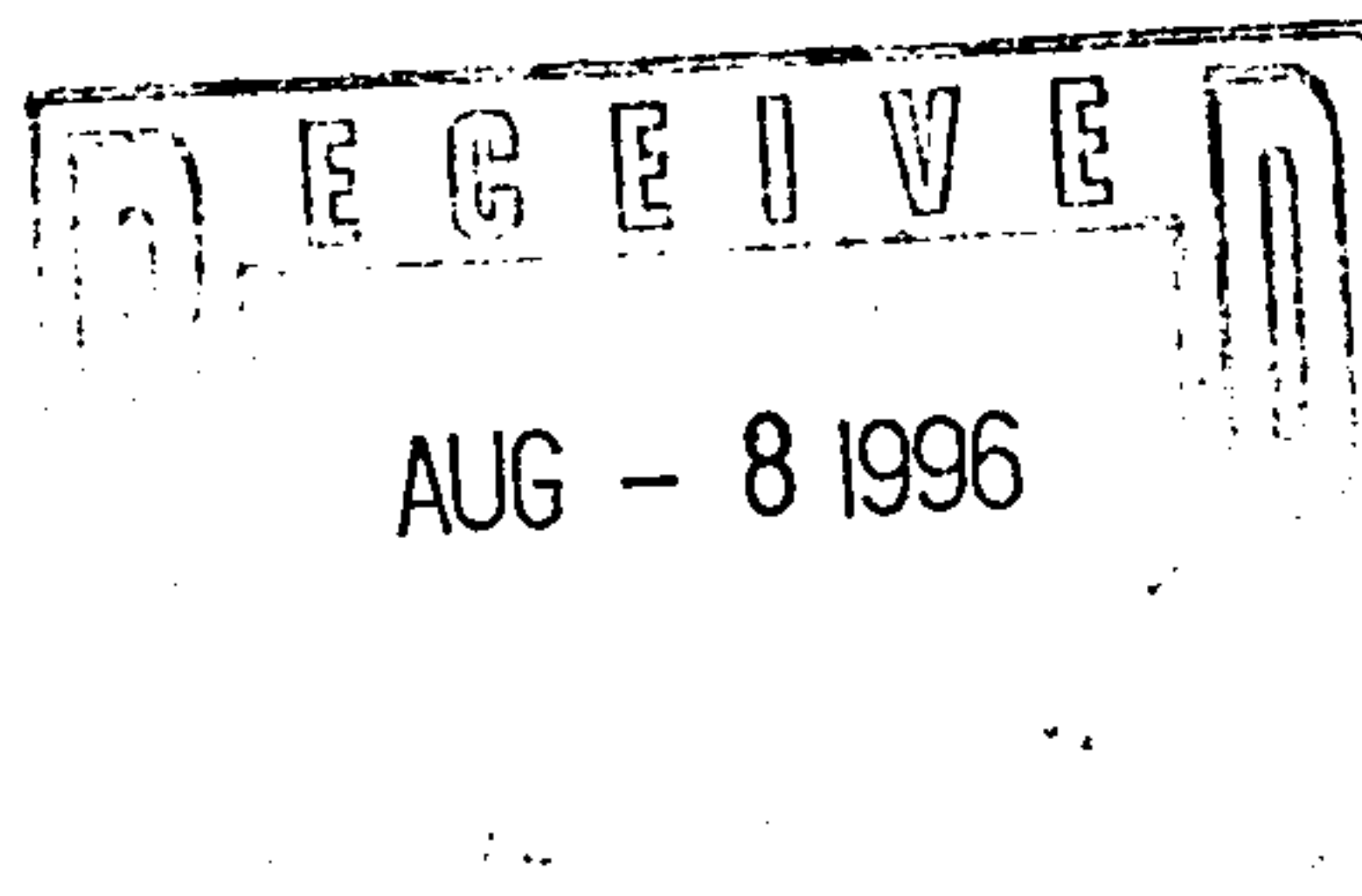
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☒ NO  
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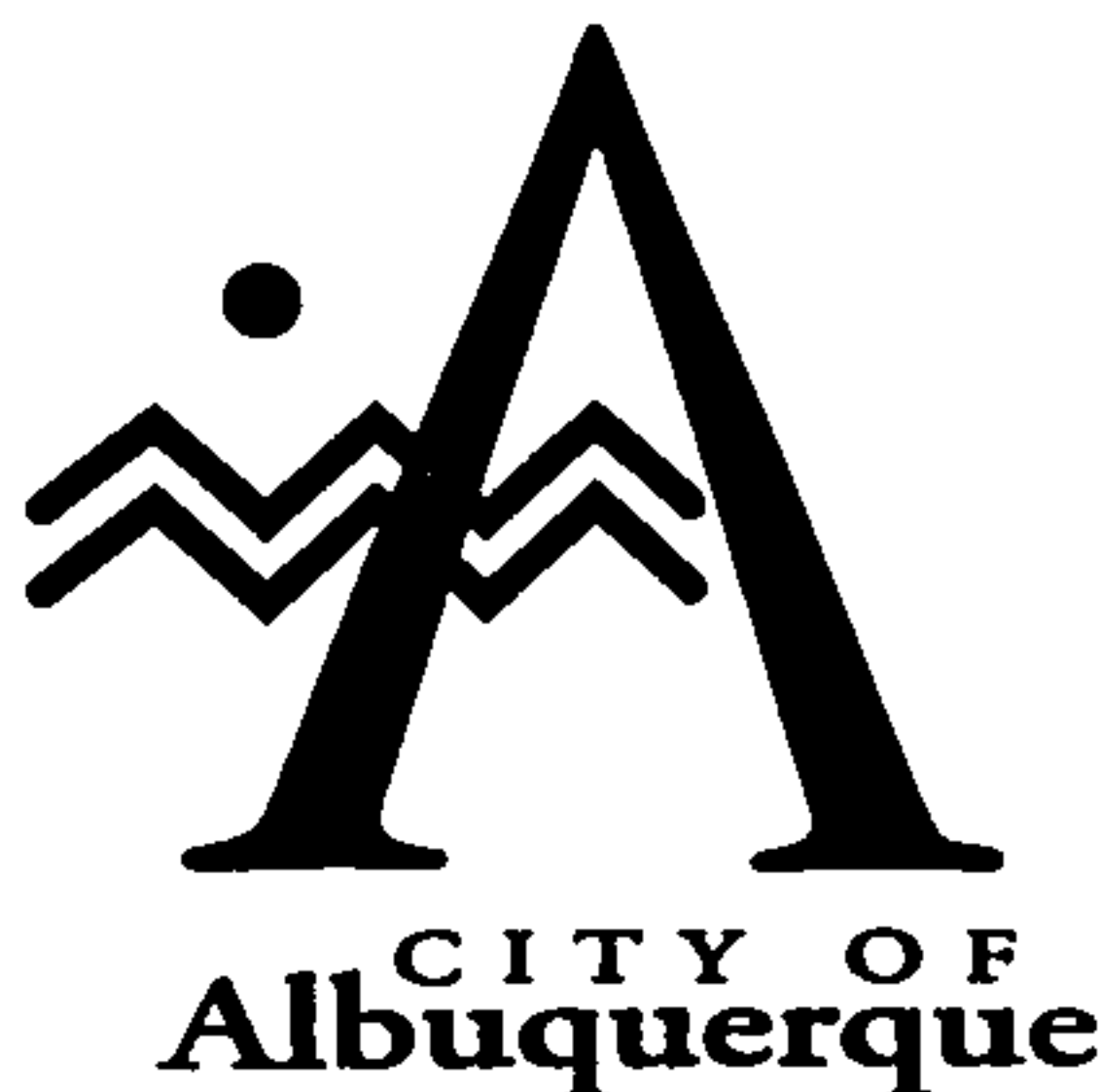
## CHECK TYPE OF APPROVAL SOUGHT:

☐ SKETCH PLAT APPROVAL  
☒ PRELIMINARY PLAT APPROVAL  
☐ S. DEV. PLAN FOR SUB'D APPROVAL  
☐ S. DEV. PLAN FOR BLDG PERMIT APPROVAL  
☐ SECTOR PLAN APPROVAL  
☐ FINAL PLAT APPROVAL  
☐ FOUNDATION PERMIT APPROVAL  
☒ BUILDING PERMIT APPROVAL  
☐ CERTIFICATION OF OCCUPANCY APPROVAL  
☒ GRADING PERMIT APPROVAL  
☐ PAVING PERMIT APPROVAL  
☐ S.A.D. DRAINAGE REPORT  
☐ DRAINAGE REQUIREMENTS  
☐ OTHER \_\_\_\_\_ (Specify)

DATE SUBMITTED: 8-7-96

BY: Diane Hoelzer  
Diane Hoelzer PE





P.O. Box 1293 Albuquerque, NM 87103

July 8, 1996

Martin J. Chávez, Mayor

Diane Hoelzer, PE  
Mark Goodwin & Assoc  
P.O. Box 90606  
Albuquerque, NM 87199

RE: DRAINAGE REPORT FOR SUN SAGE HILLS (M-9/D14)  
RECEIVED JUNE 10, 1996 FOR SITE DEV PLAN  
ENGINEER'S STAMP DATED 6-7-96

Dear Ms. Hoelzer:

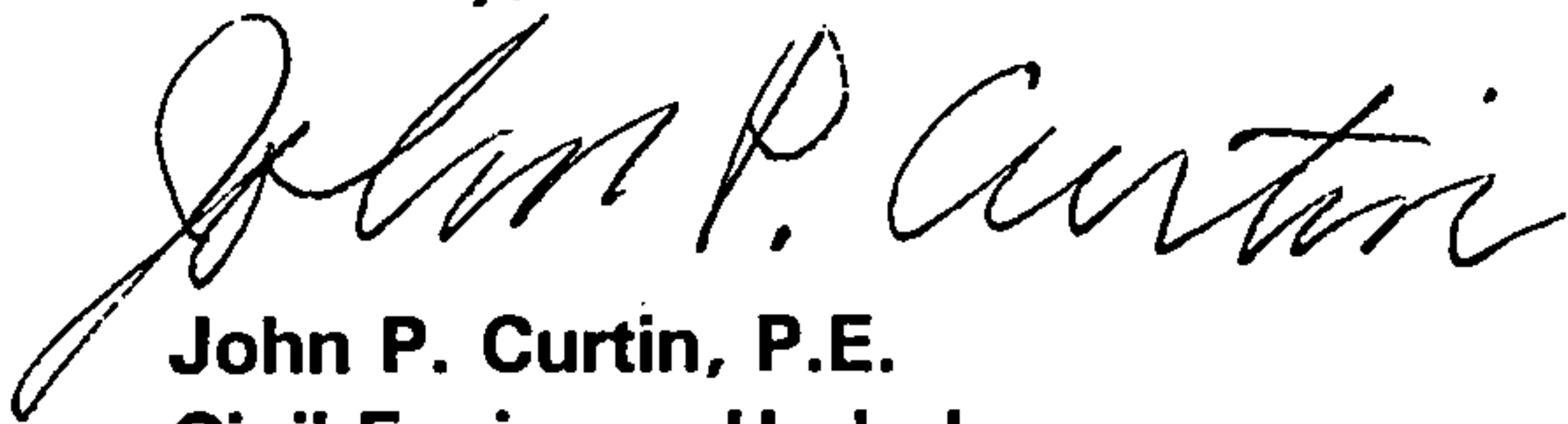
Based on the information included in the submittal referenced above, City Hydrology has the following comments that must be addressed:

If a variance from the current City criteria is requested, it must be clearly stated and justified. Based on the Report, there is a downstream capacity problem. Further development must not aggravate the existing condition. Who owns the commercial tract to the west? No work can be done on the adjacent property without written permission from the owner.

Drainage channels must be at least 15' wide for maintenance requirements. Could a flood wall be used instead of the temporary asphalt channel. The street sections used in the AHYMO ignored the .125' gutter lip. This caused the program to significantly over estimate the street capacity.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

  
John P. Curtin, P.E.  
Civil Engineer, Hydrology

c: Andrew Garcia  
Fred Aguirre, DRB ??? Good for You. Albuquerque!



# DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sun Sage Hills Subdivision ZONE ATLAS/DRNG, FILE#: M-9/1014  
DRB #: \_\_\_\_\_ EPC #: \_\_\_\_\_ WORK ORDER #: \_\_\_\_\_  
LEGAL DESCRIPTION: Tracts 503 and Portion of Parcel A, Town of Atrisco Grant (SP-83-237)  
CITY ADDRESS: \_\_\_\_\_

ENGINEERING FIRM: Mark Goodwin & Associates PA CONTACT: Diane Hoelzer, PE  
ADDRESS: PO Box 90606 PHONE: 345-2010  
OWNER: Pierre Amestoy CONTACT: Pierre Amestoy  
ADDRESS: 8661 San Pedro SE ? PHONE: 822-8585  
ARCHITECT: \_\_\_\_\_ CONTACT: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_  
SURVEYOR: \_\_\_\_\_ CONTACT: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_  
CONTRACTOR: \_\_\_\_\_ CONTACT: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_

## TYPE OF SUBMITTAL:

☒ DRAINAGE REPORT  
☒ DRAINAGE PLAN  
☐ CONCEPTUAL GRADING & DRAINAGE PLAN  
☒ GRADING PLAN  
☐ EROSION CONTROL PLAN  
☐ ENGINEER'S CERTIFICATION  
☐ OTHER

## PRE-DESIGN MEETING:

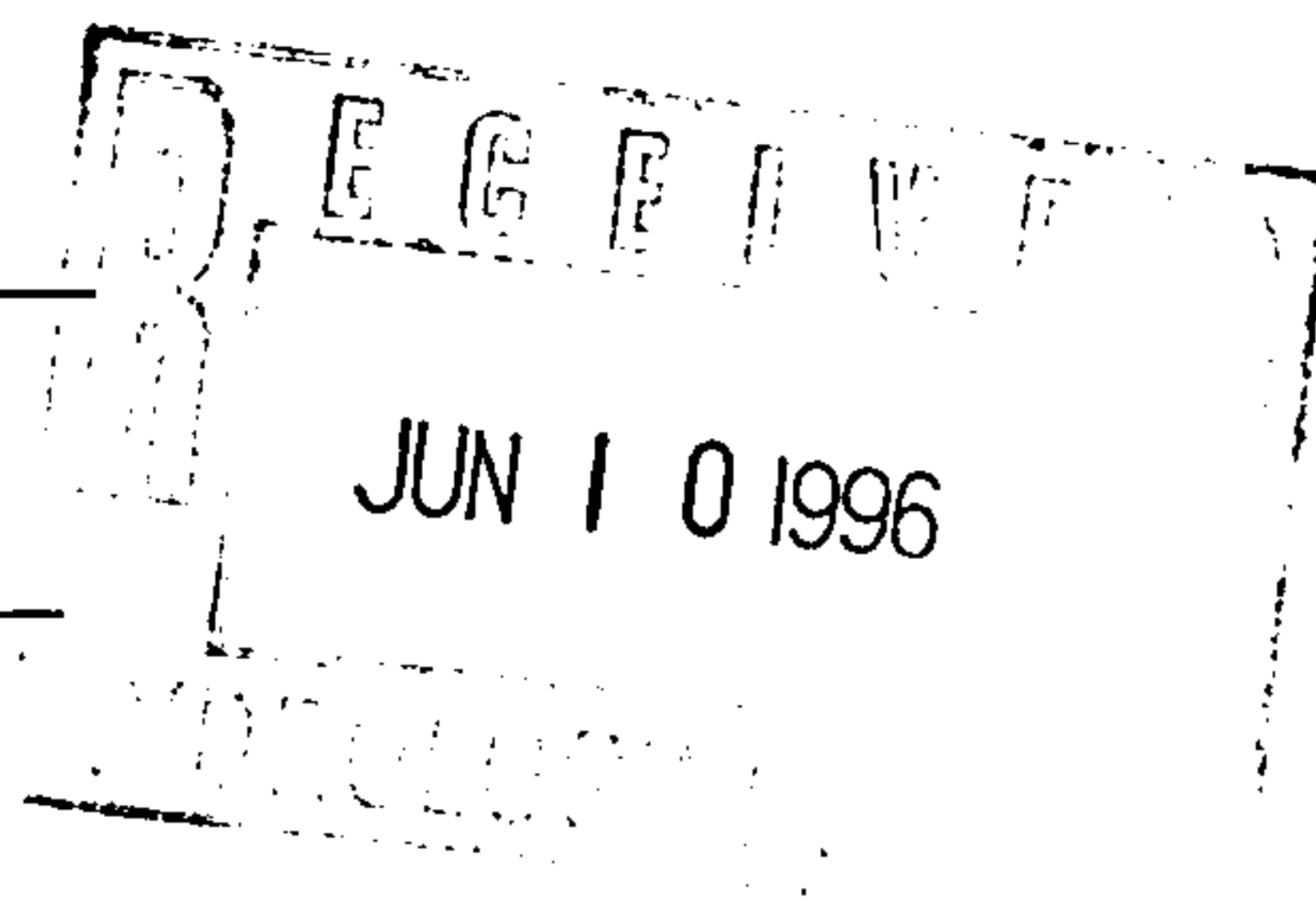
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☒ NO  
☐ COPY PROVIDED

## CHECK TYPE OF APPROVAL SOUGHT:

☐ SKETCH PLAT APPROVAL  
☐ PRELIMINARY PLAT APPROVAL  
☒ S. DEV. PLAN FOR SUB'D APPROVAL  
☐ S. DEV. PLAN FOR BLDG PERMIT APPROVAL  
☐ SECTOR PLAN APPROVAL  
☐ FINAL PLAT APPROVAL  
☐ FOUNDATION PERMIT APPROVAL  
☐ BUILDING PERMIT APPROVAL  
☐ CERTIFICATION OF OCCUPANCY APPROVAL  
☐ GRADING PERMIT APPROVAL  
☐ PAVING PERMIT APPROVAL  
☐ S.A.D. DRAINAGE REPORT  
☐ DRAINAGE REQUIREMENTS  
☐ OTHER \_\_\_\_\_ (Specify)

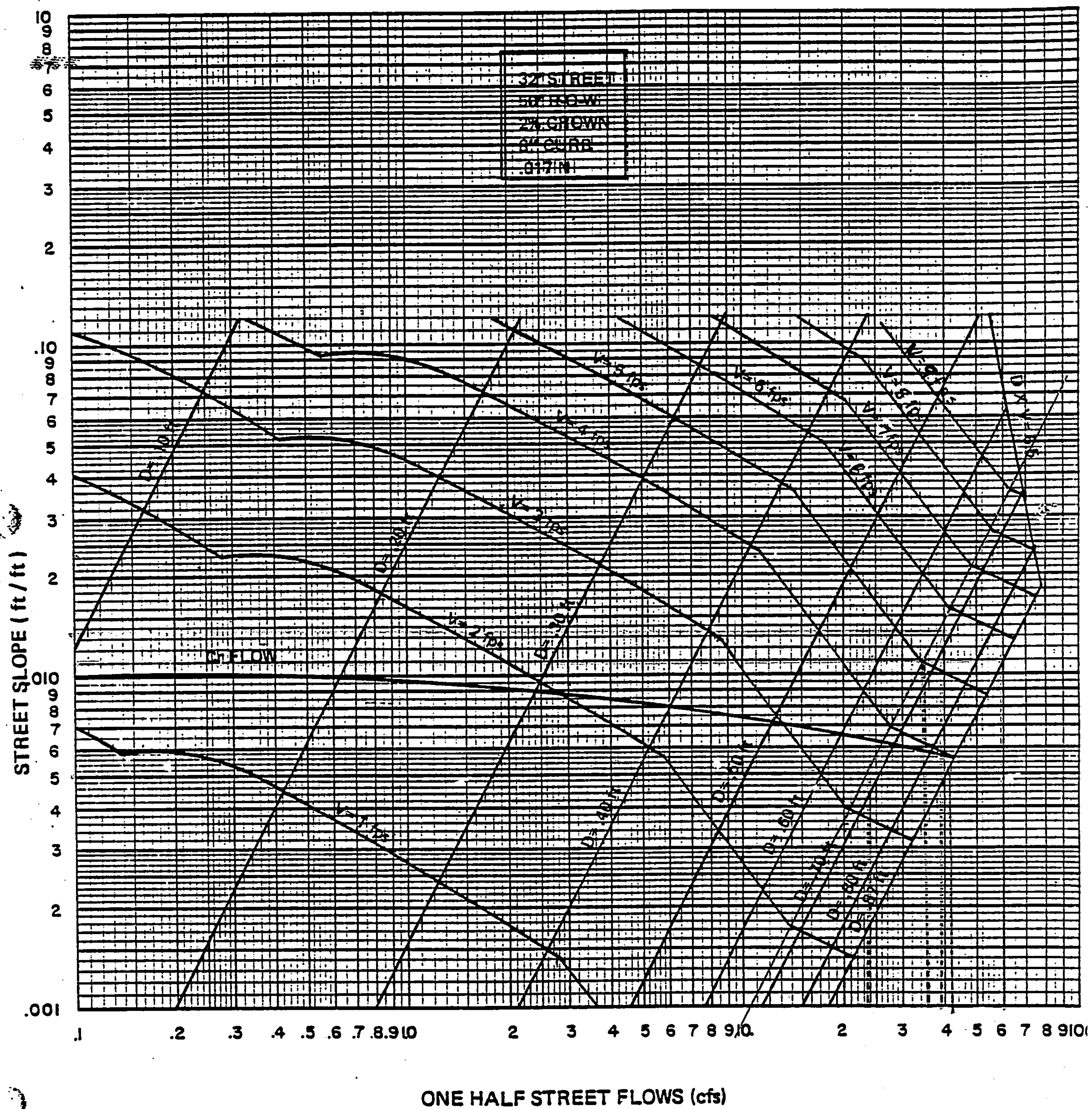
DATE SUBMITTED: June 7, 1996

BY: Diane Hoelzer  
Diane Hoelzer PE

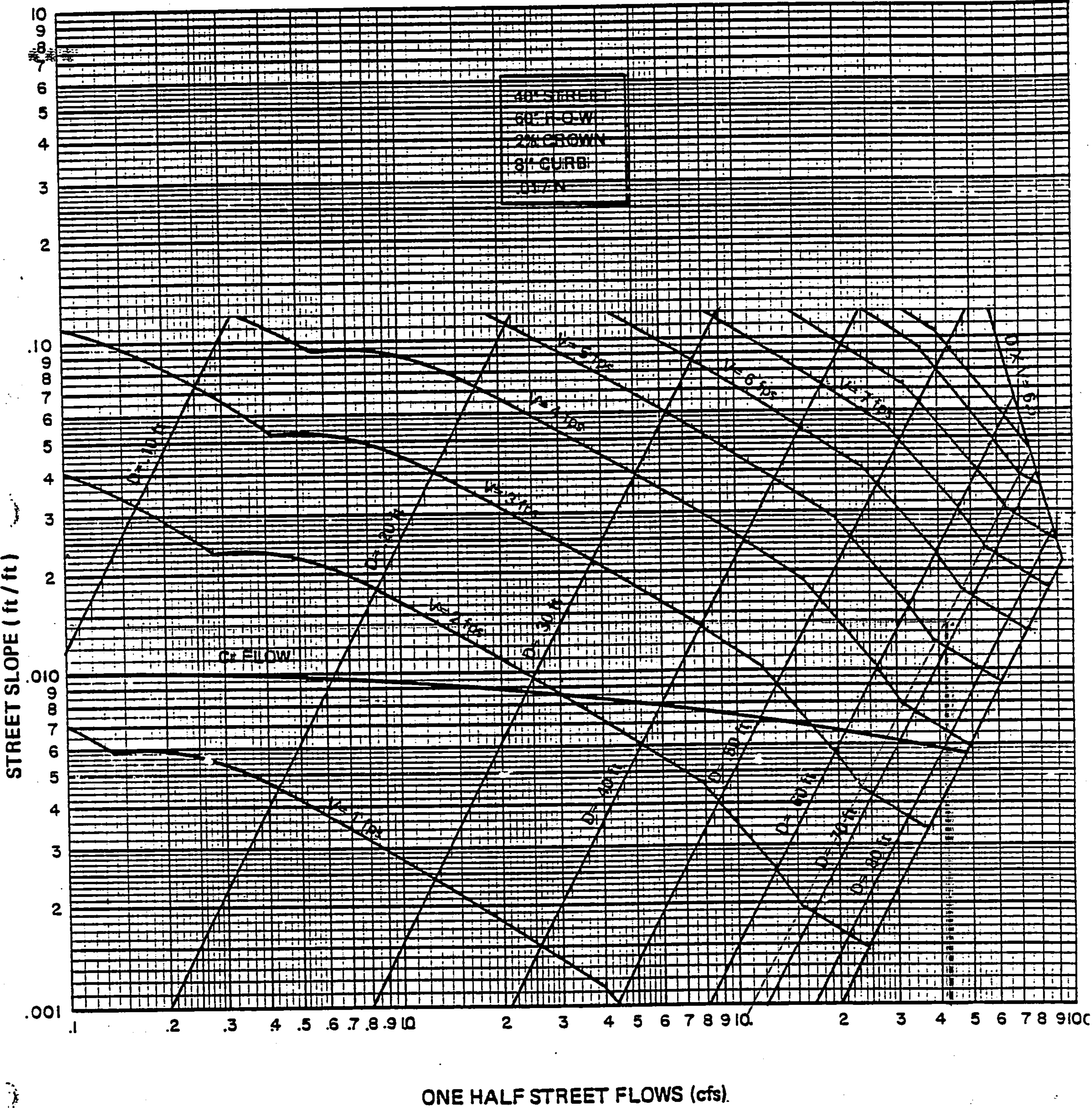


22.3

## STREET CAPACITY



STREET CAPACITY



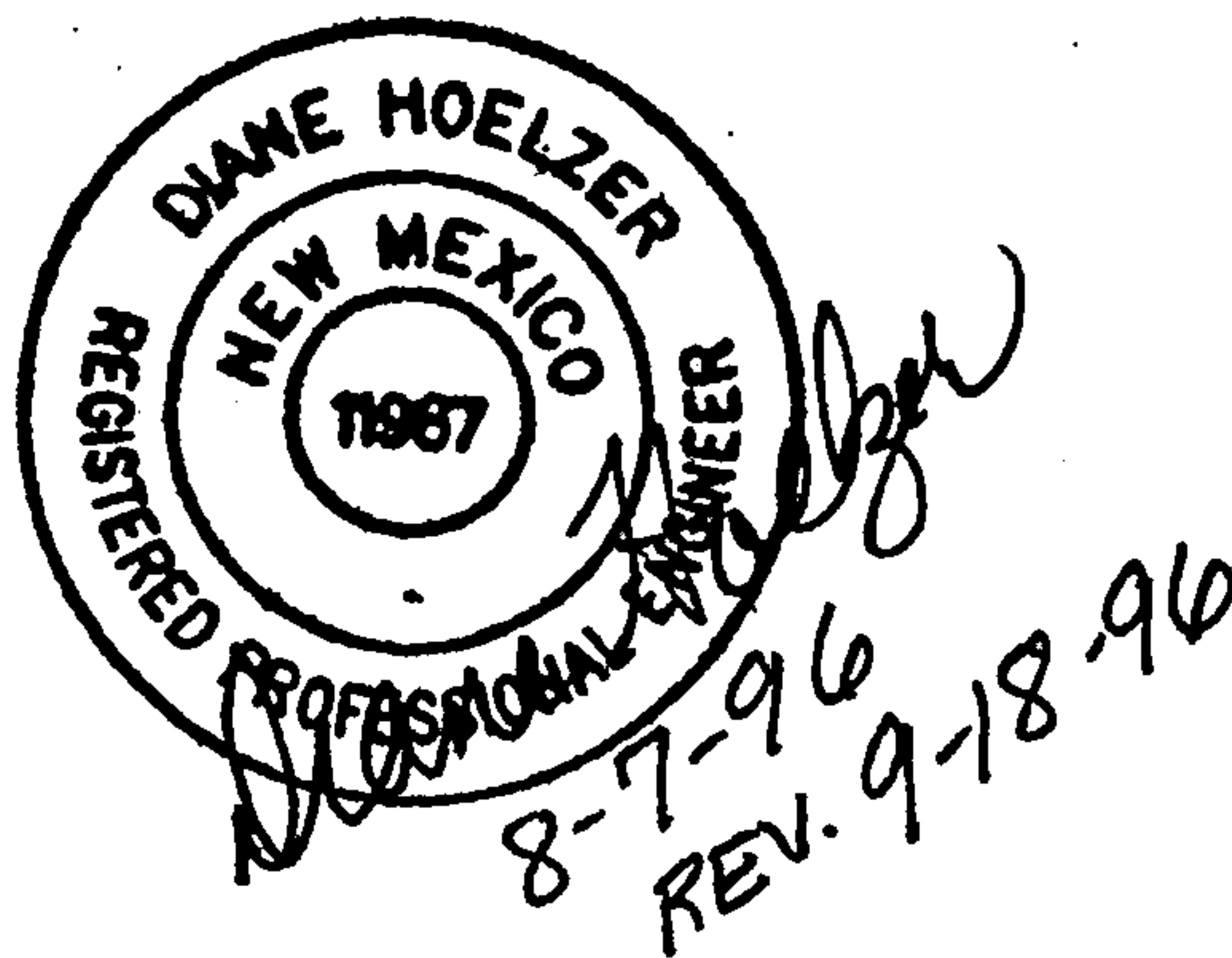
MARK GOODWIN

**& ASSOCIATES**  
CONSULTING ENGINEERS

dmg

**DRAINAGE REPORT**  
**for**  
**SUN SAGE HILLS SUBDIVISION**

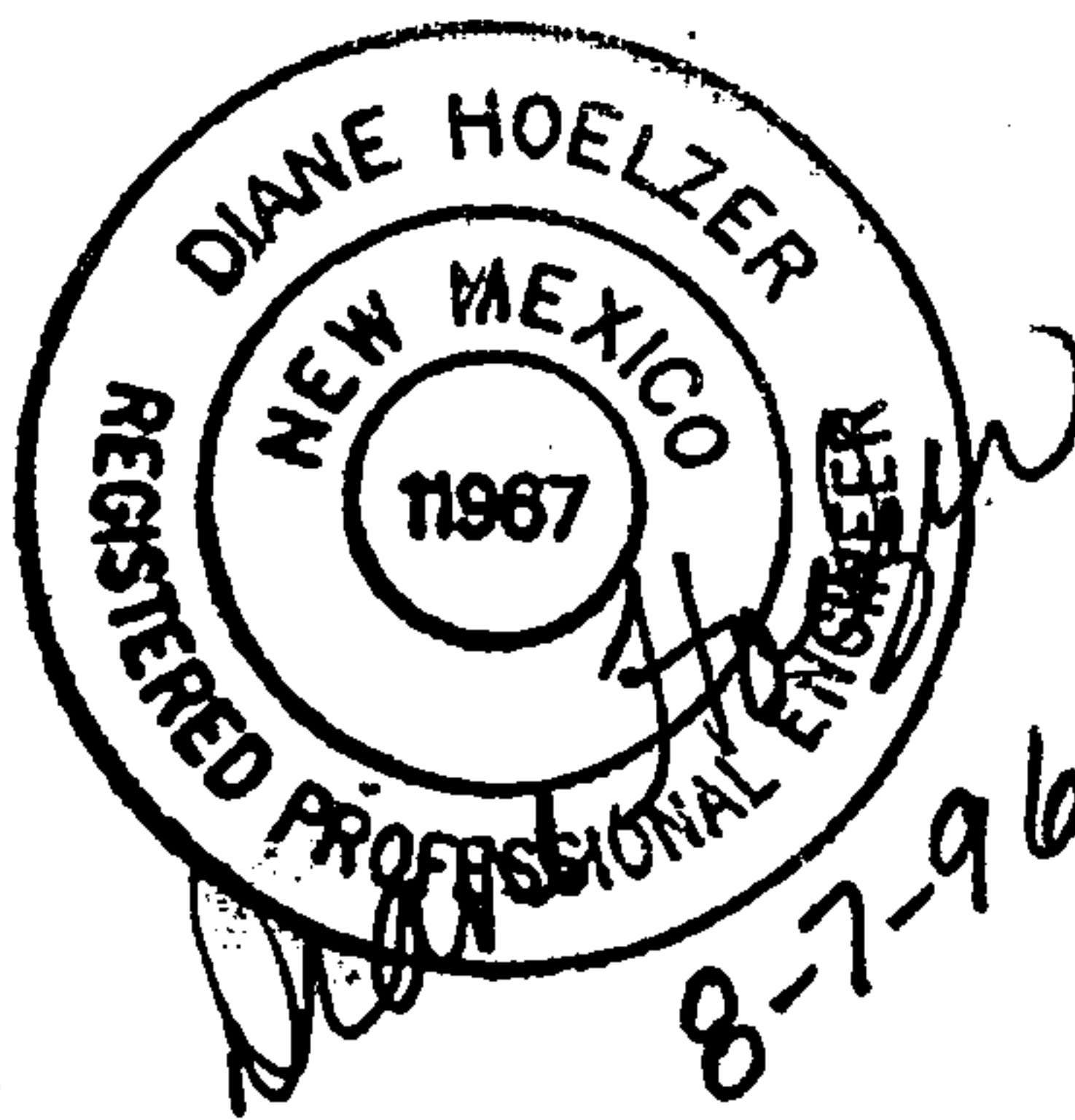
**ZONE ATLAS MAP M-9**



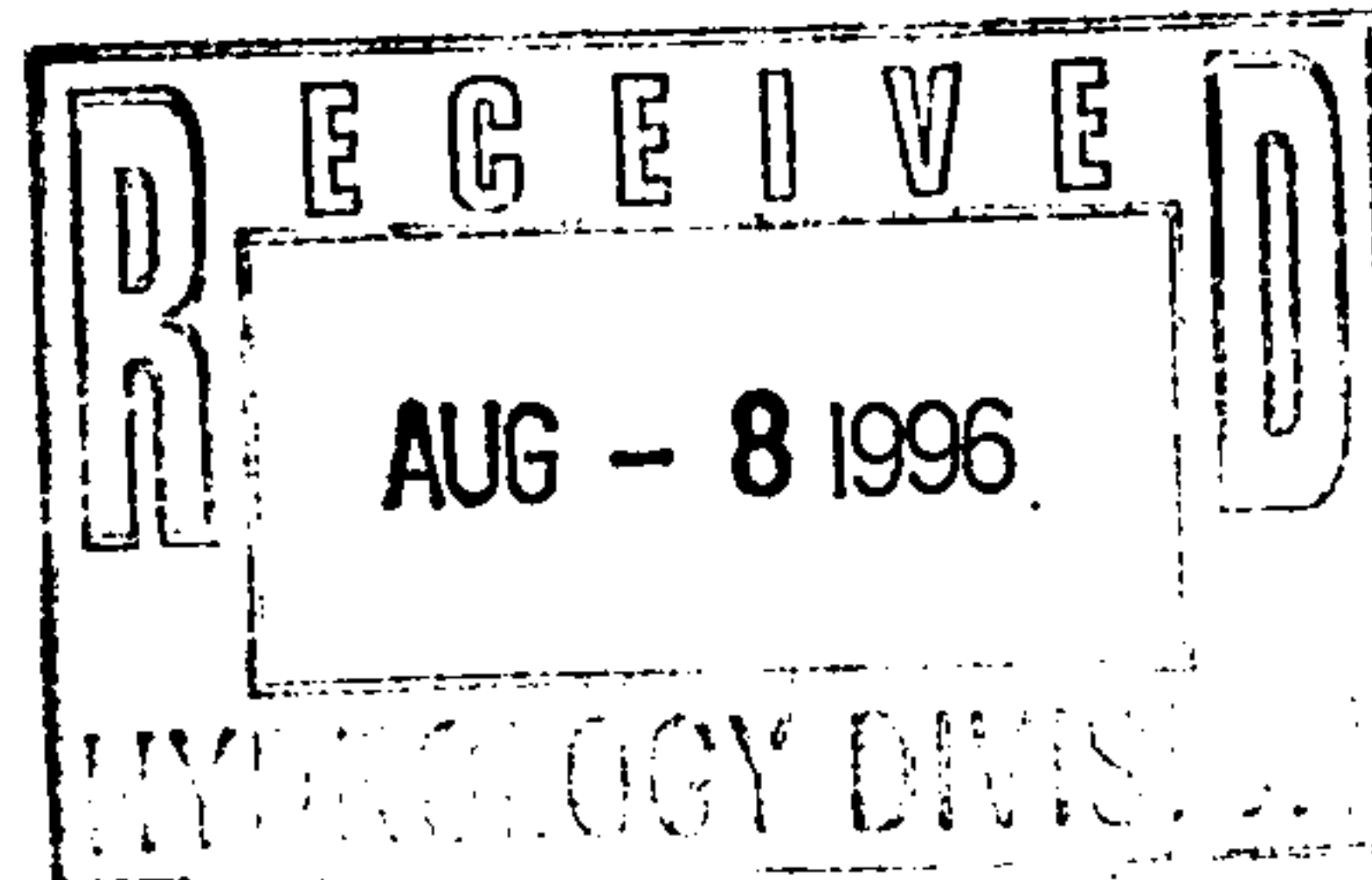
**August 1996**

**DRAINAGE REPORT**  
**for**  
**SUN SAGE HILLS SUBDIVISION**

**ZONE ATLAS MAP M-9**



**August 1996**





D. Mark Goodwin & Associates, P.A.  
Consulting Engineers and Surveyors

P.O. BOX 90606, ALBUQUERQUE, NM 87199  
(505) 345-2010

August 7, 1996

Mr. John P. Curtin  
City of Albuquerque  
Hydrology Department  
P.O. Box 1293  
Albuquerque, NM 87103

**Re: Sun Sage Hills Drainage Report — Second Submittal (M-9/D14), Engineer's Stamp dated 8/7/96**

Dear Mr. Curtin:

This resubmittal is in response to your letter dated July 8, 1996 and several subsequent meetings we've had since then regarding the Sun Sage Hills development.

In response to your comment regarding a downstream capacity problem, I have done additional field investigations of the watershed basin and have adjusted the AHYMO model to reflect field conditions and adjustments per construction plan designs. More specifically, I have: per your request changed the typical street cross section to include the 0.125' gutter lip per COA standard drawings, included an 8" berm section on Sapphire between 86th street and Michelle per construction plan design (which was field verified), and reduced the elevation increase within the 9' and 10' right-of-way section on either side of the typical street section from 0.33' to 0.2' per construction plans.

The revised "existing" conditions model indicates that the 100-year flows will rise above the top of curb in Sonya and Sapphire streets but will remain within the existing right-of-way limits. Field investigations reveal that when the top of curb is exceeded in this area, runoff will flow to lower elevations in the Westgate Park site before rising to the outer limits of the right of way or into the adjacent residential homes.

For "developed" conditions, two options are being presented as feasible drainage management plans for Sun Sage Hills and the undeveloped commercial site to the west. In both options all discharge from sub-basin 100 will flow in and through Sun Sage Hills subdivision through a permanent 20' sanitary sewer and drainage easement. All the drainage easements and covenants required for this project will be handle through a bulk land plat that includes parcels in sub-basins 100 and 101. Both options will also require a flood wall to be constructed along the west boundary of the Sun Sage Hills development.

Option 1 would restrict developed flows from sub-basin 100 to be no greater than existing flows from the site which is 18.2 cfs for the 100-year storm. The combined "developed" flows would increase from 29.2 cfs for existing conditions to 48.8 cfs for developed conditions.

Option 2 would require the restriction of flow further from sub-basin 100 to 1.4 cfs which equates to 0.1 cfs per acre. This option would require the construction of a temporary detention pond with the Sun Sage Hills project to be located entirely within the southeast corner of the commercial tract (sub-basin 100). The combined flows would increase from 29.2 cfs for existing conditions to 31.3 cfs for developed conditions.

For both of the options, the AHYMO model demonstrated that the Sun Sage Hills development would increase the maximum depth by 0.07' (option 1) and 0.04' (option 2) which would neither be noticeable or detectable by residents in the area and is well within the limits of accuracy of the AHYMO model.

Mr. John P. Curtin, PE  
August 7, 1996  
Page 2

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*It is our hope that the city would recommend implementation of Option 1 as the drainage management solution since it would require minimal construction and disturbance to the undeveloped commercial site to the west. A temporary detention pond would not be required and when a permanent detention facility is built in conjunction with the development of the commercial site, the pond should be able to completely drain within a 24 hour period. However, if the city wants combined developed flows from sub-basins 100 and the Sun Sage project site to not exceed combined existing flows from these two sub-basins then option 2 is also feasible. But Option 2 will require a temporary detention pond and a permanent detention pond when the commercial site develops. The AHYMO analysis of one possible permanent detention pond design for the option 2 developed conditions indicates that the pond would not completely drain within a 24 hour period.*

*If you have any further questions please call me.*

Sincerely,

*Diane Hoelzer*  
Diane Hoelzer, P.E.

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- VI. REFERENCES

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### APPENDIX A

HYDRAULIC CALCULATIONS

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EXISTING CONDITIONS - SUMMARY OUTPUT

EXISTING CONDITIONS - DETAILED OUTPUT

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OPTION 2 - TEMPORARY DETENTION POND - DETAILED OUTPUT

### APPENDIX D

PHOTOS

POCKET 1: PRELIMINARY GRADING AND DRAINAGE PLAN

## **LOCATION AND DESCRIPTION**

The proposed Sun Sage Hills subdivision is comprised of approximately 8.39 acres and is located south of Sage Road and west of 94th Street in the southwest quadrant of the City of Albuquerque. The site is bounded by Sage Road to the north and 94th Street to the east with existing residential developments adjacent to these roads. The south property line is directly adjacent to an existing residential area. Vacant land that is planned to be developed as a commercial site borders the west property line. The project site is being proposed for zoned as RLT. The topography on-site and in the immediate adjacent areas falls in a southeasterly direction at a slope of approximately 2 percent.

The FEMA map indicates that the site is not within a 100-year floodplain. Sage Road to the north lies within the Zone AO designation which indicates 100-year flooding at an average depth of 1.0 foot. An existing water block on 94th Street at Sage Road prevents runoff from diverting south from Sage to 94th Street.

Soils on-site and in the surrounding area consists primarily of bluepoint loamy fine sands with a hydrologic soil group classification A.

## **DRAINAGE DESIGN CRITERIA AND ASSUMPTIONS**

The design criteria used in this report was in accordance with Section 22.2 Hydrology of the Development Process Manual, Volume 2, Design Criteria, January 1993 edition. The 100-year 24-hour storm event was analyzed using the AHYMO model for a Type 1 rainfall distribution. The site lies within ZONE 1 (west of Rio Grande), which results in the use of the following storm depths: P60=1.87" and P360=2.20".

Land treatment values were determined utilizing Table A-5 (DPM section 22.2) for Percent Land Treatment D (impervious) utilizing the number of units per acre equation for developed residential areas. The remaining pervious areas were split between Land Treatment B and C in a 60/40 ratio.

The approved drainage management plan for existing residential development in this area (sub-basins 102 thru 106) required developed flows to not exceed existing flows. To accomplish this requirement, back yard retention ponds were utilized to capture runoff originating from the backyard, side yards and half of the roof area. The remaining contributing area which included the front yard, streets and half of the roof area was used to determine "developed conditions" peak discharges using the rational method. The remaining contributing area was approximately half of the total lot/street area. To account for the backyard retention volume in the AHYMO analysis for sub-basins 102 thru 106, the sub-basin area used in the AHYMO model was 56% of the actual total sub-basin area.

The drainage management plan for the Country Squire Subdivision (sub-basin 102) required the utilization of back yard retention ponds as well as a retention pond located at the southeast corner of the site to capture the remaining front yard and street runoff with an overflow channel discharging to sub-basin 103. The elimination of the retention pond was to occur at the time downstream improvements were built to allow for free discharge through the overflow channel. As a conservative assumption in the "existing" and "developed" conditions AHYMO analysis, it was assumed the retention pond was eliminated and runoff was allowed to flow freely through the overflow channel.

Land Treatment A was assumed for all undeveloped areas in the "existing conditions" AHYMO model.

A minimum time of concentration of 12 minutes was assumed for all sub-basins with a resulting 8 minute time to peak used in the AHYMO analysis.

Runoff was routed through the streets using 8" curbs and either a 9 or 10 feet of additional right-of-way on either side of the street to an additional height of 0.2 feet.

## LOCATION AND DESCRIPTION

The proposed Sun Sage Hills subdivision is comprised of approximately 8.39 acres and is located south of Sage Road and west of 94th Street in the southwest quadrant of the City of Albuquerque. The site is bounded by Sage Road to the north and 94th Street to the east with existing residential developments adjacent to these roads. The south property line is directly adjacent to an existing residential area. Vacant land that is planned to be developed as a commercial site borders the west property line. The project site is being proposed for zoned as RLT. The topography on-site and in the immediate adjacent areas falls in a southeasterly direction at a slope of approximately 2 percent.

The FEMA map indicates that the site is not within a 100-year floodplain. Sage Road to the north lies within the Zone AO designation which indicates 100-year flooding at a depth not greater than 1.0 foot. An existing water block on 94th Street at Sage Road prevents runoff from diverting south from Sage to 94th Street.

Soils on-site and in the surrounding area consists primarily of bluepoint loamy fine sands with a hydrologic soil group classification A.

## DRAINAGE DESIGN CRITERIA AND ASSUMPTIONS

The design criteria used in this report was in accordance with Section 22.2 Hydrology of the Development Process Manual, Volume 2, Design Criteria, January 1993 edition. The 100-year 24-hour storm event was analyzed using the AHYMO model for a Type 1 rainfall distribution. The site lies within ZONE 1 (west of Rio Grande), which results in the use of the following storm depths: P60=1.87" and P360=2.20".

Land treatment values were determined utilizing Table A-5 (DPM section 22.2) for Percent Land Treatment D (impervious) utilizing the number of units per acre equation for developed residential areas. The remaining pervious areas were split between Land Treatment B and C in a 60/40 ratio.

The approved drainage management plan for existing residential development in this area (sub-basins 102 thru 106) required developed flows to not exceed existing flows. To accomplish this requirement, back yard retention ponds were utilized to capture runoff originating from the backyard, side yards and half of the roof area. The remaining contributing area which included the front yard, streets and half of the roof area was used to determine "developed conditions" peak discharges using the rational method. The remaining contributing area was approximately half of the total lot/street area. To account for the backyard retention volume in the AHYMO analysis for sub-basins 102 thru 106, the sub-basin area used in the AHYMO model was 56% of the actual total sub-basin area.

The drainage management plan for the Country Squire Subdivision (sub-basin 102) required the utilization of back yard retention ponds as well as a retention pond located at the southeast corner of the site to capture the remaining front yard and street runoff with an overflow channel discharging to sub-basin 103. The elimination of the retention pond was to occur at the time downstream improvements were built to allow for free discharge through the overflow channel. As a conservative assumption in the "existing" and "developed" conditions AHYMO analysis, it was assumed the retention pond was eliminated and runoff was allowed to flow freely through the overflow channel.

Land Treatment A was assumed for all undeveloped areas in the "existing conditions" AHYMO model.

A minimum time of concentration of 12 minutes was assumed for all sub-basins with a resulting 8 minute time to peak used in the AHYMO analysis.

Runoff was routed through the streets using 8" curbs and either a 9 or 10 feet of additional right-of-way on either side of the street to an additional height of 0.2 feet.

## PREVIOUS DRAINAGE REPORTS

*In previously approved drainage reports for existing residential subdivisions (sub-basins 102 thru 106) within the drainage watershed, in particular, the Westgate Heights subdivision and the Country Squire subdivision, the 100 year developed flows were not allowed to exceed the 100 year existing flows. To attenuate the difference in peak discharges due to an increase in impervious areas, back yard retention ponds were utilized to capture runoff from the backyard, side yards and half of the roof area. For "developed conditions" only the area contributing runoff to the street was considered in determining peak flows which included the front yard, street, sidewalk and half of the roof area. The rational method was used to determine peak discharges using a "C" coefficient of 0.38 for undeveloped conditions and 0.69 for developed conditions.*

*Using the previously approved rational method, peak discharges were determined for undeveloped and developed flows using updated sub-basin areas and compared to developed flows generated by this reports' AHYMO analysis. As shown in Table 1 the difference in peak discharges generated by these two different methodologies is negligible with the exception of sub-basin 109. The reason for the increase in developed flows generated by AHYMO is that back yard retention ponds were not part of the drainage management plan for this recently developed residential area.*

*A 1990 report done for the Vista Nueva Subdivision located east and south of the Corriz Drive-Sapphire Street intersection calculated the 100-year "developed" conditions peak discharge at this point to be 169 cfs. This value compares to 180 cfs at this point under existing conditions and 198 cfs and 191 cfs under Options 1 and 2 developed conditions. One of the reason for the discrepancy in values is that in the 1990 rational method analysis the "C" coefficient used was in their developed conditions analysis was for undeveloped conditions.*

*A 1994 report, the Master Drainage Report For A 417 Acre Portion of Land Between the Snow Vista Channel & the Amole Del Norte Channel (Isaacson & Arfman) determined the peak discharge reaching the inlets to be 447 cfs. There are several reasons for the resulting difference of approximately 200 cfs between the two AHYMO analyses. The total area contributing to runoff at this point in the 1994 report was approximately 180.8 acres. After careful field investigation, the sub-basin boundaries were redefined and the total contributing runoff area was determined to be approximately 114.8 acres, a reduction by 35% from the earlier report. Land treatment values were also revised to reflect the current knowledge of existing and future development.*

## EXISTING DRAINAGE CONDITIONS

*Under existing conditions, runoff from the Sun Sage Hills project site and the undeveloped area to the west is in a southeasterly direction at a general slope of 2.0 percent. The Snow Vista Diversion Channel to the west functions as a water block intercepting most of the flows coming from that direction. Refer to Figure 3: Sub-basin boundary map. Offsite flows from the residential developments to the north are directed into their own onsite ponds or else along Sage Road eastward. Water blocks on 94th street, Blazick Street and Sapphire Street at Sage Road prevent runoff from flowing into this watershed from the north. Offsite flows from the undeveloped site immediately adjacent to the project site's west property boundary flow through the site and then south along 94th Street. Ultimately runoff from the project site flows south on 94th street, east on Reba Avenue, east on Sonya Avenue and then southeast on Sapphire Street combining with flows from the adjacent residential areas along the way. Until recently, these flows continued eastward, flowing through undeveloped areas before ultimately being intercepted by the Amole Del Norte Diversion Channel. (See Figure 3). Now these flows are intercepted by a series of Type C inlets and a drop inlet spanning Sapphire street just south of Corriz Drive.*

Under existing drainage conditions a peak discharge of 10.9 cfs from the project site combines with 18.2 cfs from the undeveloped property (sub-basin 100) to the west and discharges into 94th Street. These flows then combine with sub-basins 102 through 110 for a total peak discharge of 180 cfs in Sapphire Street at Corriz Drive. At this point the runoff is intercepted by a series of seven Type C inlets and a 40 wide traverse drop inlet which have recently been constructed as part of the Sunrise Estate Unit One development (see Figure 4). According to the construction plans, this 60"/66" storm drain system has the capacity to carry a peak discharge of 380 cfs.

According to the "existing conditions" AHYMO analysis, the existing flows are within top of curb up to Sonya Avenue. At this location flows begin to exceed top of curb by 0.13' along Sonya Avenue and up to a maximum of 0.26' near the inlets on Sapphire street. In all location the peak runoff is contained within the right of way limits. Field investigations revealed that further protection against flooding of residential homes along these streets is provided because as soon as flows along Sonya Avenue and Sapphire street to 86th Street exceed top of curb, the runoff will flow to the lower lying areas within the adjacent Westgate Heights Park before spreading into and above the right of way limits. Since this situation was not considered in the AHYMO analysis, it is safe to assume that the actual depth of flow will be somewhat less than the maximum depth of flow determined in the "existing conditions" AHYMO analysis.

For the homes located along Sapphire street south of the 86th street intersection, per construction plans, these homes were elevated above the top of curb, several of which were designed to have an 8" diversion wall along the front yard boundary protecting them from potential flood waters. (See photos and Figure 5).

See Figure 3 for a depiction of the sub-basin boundaries and flow path. Refer to Table 2 for a summary of the peak discharges and hydrologic parameters used in the existing and developed conditions. The supporting AHYMO summary output and data input file for existing conditions can be found in the Appendix A.

## **PROPOSED DRAINAGE CONDITIONS**

The peak discharge from the project site under developed conditions is 30.8 cfs, of which 7.7 cfs will be the maximum discharge on Shone Avenue, Rhonda Avenue, Alvera Court and Shawndra Drive. The proposed developed commercial site to the west will generate a peak discharge of 58.8 cfs. Two options are being presented to restrict the maximum developed flows from this site to either the existing 100-year peak discharge of 18.2 cfs (Option 1) or to 0.1 cfs per acre or a total maximum of 1.4 cfs (Option 2). Refer to Table 2 for a summary of existing and developed conditions peak discharges. Refer to Table 5 for a summary of on-site street capacities.

Two options are being presented as the possible drainage management plan for the development of the Sun Sage Hills subdivision and the commercial site to the west by restricting the maximum allowable discharge from the commercial site (sub-basin 100).

The first option would be to restrict the developed flows from sub-basin 100 to the existing undeveloped peak flow of 18.2 cfs. As long as sub-basin 100 remained undeveloped, a flood wall along Sun Sage Hills west boundary would intercept these flows and direct them south and east to Jenny Court through a 10' wide 1.5' deep permanent concrete diversion channel located within a 20' wide sanitary sewer /drainage easement. When the commercial site is developed, they would be require to attenuate their developed flows to a maximum discharge of 18.2 cfs, probably through the construction of a detention pond(s). The "developed conditions" AHYMO analysis has presented one feasible pond design using a 116'x116' pond with 3:1 side slopes, approximately 5.0 feet deep and which will drain in less than 24 hours using an orifice outfall structure. The maximum pond water surface elevation is 4.2 feet with a peak storage volume of 1.0 acre-feet. A temporary detention pond would not be required for this option.

Table 3 presents results of the comparison between Option 1 - "developed" conditions and the "existing" conditions analysis. The maximum difference in flow depths between developed and existing conditions is 0.07 feet along Sonya Avenue. This increase in depth would neither be noticeable or detectable in the field. Along Sapphire from Sonya to 86th street the AHYMO analysis indicates that flows will exceed the right of way limit by some small amount. To approximate this amount the right of way limits were extended vertical an additional 0.13 feet. When this situation was modeled the maximum water surface elevation rose to 0.88' with an estimated velocity of 5.9 fps. In addition as mentioned before, though not accounted for in the AHYMO model, flows overtopping the curb along Sonya and Sapphire would flow into the lower elevated areas of the Westgate Heights Park.

Option 2 would restrict the flows from sub-basin 100 to 0.1 cfs per acre or 1.4 cfs. This option would require the construction of a flood wall along Sun Sage Hills west property boundary and a temporary detention pond with this project and a permanent detention facility when the commercial site develops. A temporary detention pond design was modeled in AHYMO. A temporary pond with approximate dimensions of 111' by 111' with 3:1 side slopes releasing a maximum discharge of 1.4 cfs through a restricted orifice type outfall structure would reach a maximum storage volume of 0.4 acre-feet at a depth of 1.48 feet. A permanent detention pond with approximate dimensions of 181' by 181' with 3:1 side slopes and outfall structure to restrict flows to 1.4 cfs would require a maximum storage volume of approximately 1.91 acre-feet at a depth of 2.8 feet. The Option 2 "developed" conditions model indicates that the detained volume in the permanent pond would not completely drain within a 24 hour period. Table 4 presents results of the comparison between Option 2 - "developed" conditions and the "existing" conditions analysis. The maximum difference in flow depths between developed and existing conditions is 0.04 feet along Sapphire Street. This increase in depth would neither be noticeable or detectable in the field. Appendix A contains calculations associated with the detention ponds used in the AHYMO analysis.

A bulk land plat will address all the required drainage easements and covenants for the chosen option as necessary.

It should also be noted that sub-basins 100, 101, 108, 110, are the last parcels within this drainage basin to develop. Sub-basins 108 and 110 are comprised of only approximately 10 acres.

For "developed" conditions, a peak discharge of 198 cfs for Option 1 and 191 cfs for Option 2 will reach the drop inlet on Sapphire at Corriz at a maximum water depth of 0.97' and 0.95' respectively.

Under developed conditions, Land Treatment values changed for sub-basins 100, 108 and 110. Sub-basin 100 is proposed for future commercial development. Sub-basins 108 and 110 are assumed residential development with a maximum density of 4 units per acre utilizing back yard retention ponds which have historically been a part of the drainage management plan for this area.

## CONCLUSIONS

Information from field verification of existing sub-basin boundaries and flow directions, updated knowledge on existing and proposed land treatment values in the watershed and information from previously approved drainage reports were used to update the hydrologic parameters input into the AHYMO model to analyze existing and developed drainage conditions in the watershed. The hydrologic analysis indicates that there is capacity within the existing right-of-way to convey runoff east and southeast along Reba, Sonya, Blazick and Sapphire streets to the recently construction series of inlets in Sapphire street at Corriz Drive.

In the "existing conditions" model as well as the option 1 and 2 "developed conditions" model, results indicate flows begin to overtop the curb in Sonya and Sapphire Streets. However, the use of back yard retention ponds, the elevation of homes above top of curb, the use of block walls and diversion walls around front yards and the floodwater ponding capacity of the Westgate Park along Sonya and Sapphire work together to minimize and/or prevent damage to residential homes during to the 100 year storm under existing and developed

*conditions. As Options 1 and 2 "developed conditions" AHYMO analysis shows, the increase in runoff and flow depths as a result of developing Sun Sage Hills subdivision and the adjacent commercial site as well as the last two remaining developable parcels in the watershed, sub-basins 108 and 110, will not be noticeable or detectable by an observer in the field. In addition, the marginal increase in flow depth is well within the limits of accuracy of the AHYMO model capabilities.*

*The difference in the 100-year water surface elevations and velocities in the streets between Option 1 and Option 2 would not be detectable or noticeable to an observer in the field. Option 1 allowing a maximum discharge from sub-basin 100 of 18.2 cfs will require minimal disturbance to this site since a temporary detention pond would not be required until the site develops and under developed conditions could drain in approximately 6 hours. Option 2 allowing a maximum discharge from sub-basin 100 of 1.4 cfs will require a temporary detention pond and a permanent detention pond when the site develops. Under developed conditions the permanent detention would not drain within a 24 hour period.*

## REFERENCES

1. DRAINAGE REPORT FOR THE COUNTRY SQUIRE SUBDIVISION 14.99 Ac  
 Goldberg-Mann & Associates, Inc. (M-9/D2) 77 Lots  
 April 4, 1980  $C_{UN} = 0.4$   
 $C_{Dev} = 0.8$   $4.96 + 1.94 = 6.90 \text{ Ac}$
2. WESTGATE HEIGHTS UNITS 2-A, COMPREHENSIVE DRAINAGE REPORT  
 Meurer, Serafini and Meurer, Inc. (M-9/D5A) UN = 10 Ac  
 October 1977 39 Lots Dev = 5.18 Ac  
 $C_{Dev} = 0.69$   
 $C_{UN} = 0.38$
3. DRAINAGE REPORT FOR VISTA NUEVA SUBDIVISION  
 Bordenave Designs (M-10/D5A)  
 March 5, 1990
4. MASTER DRAINAGE REPORT FOR A 417 AC PORTION OF LAND BETWEEN THE  
 SNOW VISTA CHANNEL AND THE AMOLE DEL NORTE CHANNEL  
 Isaacson and Arfman, P.A.  
 May 1994 (M-10/D5)

Westgate 3 (M-9/D8)

36 Ac  $C_{Res} = 0.69$   
 $C_{School} = 0.38$   
 $C_{Park} = 0.25$

**TABLE 1**

***Comparison of Peak Discharges Between  
Previous Rational Method and This AHYMO Analysis***

| <b><i>Sub Basin<br/>ID</i></b>                                                                                                                                                                    | <b><i>Area<br/>( Acres)</i></b> | <b><i>Undeveloped<br/>Q 100<br/>A</i></b> | <b><i>Developed<br/>Q 100<br/>B</i></b> | <b><i>Developed<br/>Q 100<br/>C</i></b> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------------------|-----------------------------------------|-----------------------------------------|
| <b><i>102</i></b>                                                                                                                                                                                 | <b><i>14.99</i></b>             | <b><i>32.4</i></b>                        | <b><i>27.9</i></b>                      | <b><i>28.2</i></b>                      |
| <b><i>103</i></b>                                                                                                                                                                                 | <b><i>4.54</i></b>              | <b><i>9.8</i></b>                         | <b><i>8.5</i></b>                       | <b><i>8.4</i></b>                       |
| <b><i>104</i></b>                                                                                                                                                                                 | <b><i>15.42</i></b>             | <b><i>33.3</i></b>                        | <b><i>28.7</i></b>                      | <b><i>27.7</i></b>                      |
| <b><i>105</i></b>                                                                                                                                                                                 | <b><i>6.02</i></b>              | <b><i>13.0</i></b>                        | <b><i>11.2</i></b>                      | <b><i>10.8</i></b>                      |
| <b><i>106</i></b>                                                                                                                                                                                 | <b><i>21.63</i></b>             | <b><i>46.7</i></b>                        | <b><i>40.3</i></b>                      | <b><i>39.8</i></b>                      |
| <b><i>108</i></b>                                                                                                                                                                                 | <b><i>6.87</i></b>              | <b><i>14.8</i></b>                        | <b><i>12.8</i></b>                      | <b><i>12.3</i></b>                      |
| <b><i>109</i></b>                                                                                                                                                                                 | <b><i>3.65</i></b>              | <b><i>7.9</i></b>                         | <b><i>6.8</i></b>                       | <b><i>11.5</i></b>                      |
| <b><i>110</i></b>                                                                                                                                                                                 | <b><i>2.21</i></b>              | <b><i>4.8</i></b>                         | <b><i>4.1</i></b>                       | <b><i>4.0</i></b>                       |
|                                                                                                                                                                                                   |                                 |                                           |                                         |                                         |
| <b><i>TOTAL</i></b>                                                                                                                                                                               | <b><i>75.33</i></b>             | <b><i>162.7</i></b>                       | <b><i>140.3</i></b>                     | <b><i>142.7</i></b>                     |
|                                                                                                                                                                                                   |                                 |                                           |                                         |                                         |
| <b><i>A) Q100 = cia = .38(5.4) * acres<br/>B) Q100 = cia = .69(5.4) * ½ acres<br/>C) Using AHYMO (1994 Methodology) using appropriate<br/>land treatment values and ½ of the actual area.</i></b> |                                 |                                           |                                         |                                         |
|                                                                                                                                                                                                   |                                 |                                           |                                         |                                         |
|                                                                                                                                                                                                   |                                 |                                           |                                         |                                         |

**TABLE 2**

**Existing and Developed Conditions  
Hydrologic Parameters and Peak Discharge**

| Sub-Basin<br>I.D. | Actual Area<br>Sq. Mi. | AHYMO<br>Area<br>Sq. Mi. |          | Existing Conditions |    |    |    | Ex.<br>Q100<br>cfs | AHYMO<br>Area<br>Sq. Mi. |     | Developed Conditions |    |    |    | Dev.<br>Q100<br>cfs |
|-------------------|------------------------|--------------------------|----------|---------------------|----|----|----|--------------------|--------------------------|-----|----------------------|----|----|----|---------------------|
|                   |                        |                          |          | A                   | B  | C  | D  |                    |                          |     | A                    | B  | C  | D  |                     |
| 100               | .0219                  | .0219                    | UND      | 100                 | 0  | 0  | 0  | 18.2               | .0219                    | COM | 0                    | 5  | 5  | 90 | 58.6                |
| 101               | .0131                  | .0131                    | UND      | 100                 | 0  | 0  | 0  | 10.9               | .0131                    | RES | 0                    | 21 | 15 | 64 | 30.6                |
| 102               | .0234                  | .01310                   | RES      | 0                   | 30 | 20 | 50 | 28.2               |                          |     | Unchanged            |    |    |    | 28.2                |
| 103               | .0071                  | .00398                   | RES      | 0                   | 32 | 21 | 47 | 8.4                |                          |     | Unchanged            |    |    |    | 8.4                 |
| 104               | .0241                  | .01350                   | RES      | 0                   | 34 | 24 | 42 | 27.7               |                          |     | Unchanged            |    |    |    | 27.7                |
| 105               | .0094                  | .00526                   | RES      | 0                   | 34 | 24 | 42 | 10.8               |                          |     | Unchanged            |    |    |    | 10.8                |
| 106               | .0338                  | .01893                   | RES      | 0                   | 32 | 22 | 46 | 39.8               |                          |     | Unchanged            |    |    |    | 39.8                |
| 107               | .0267                  | .0267                    | PAR<br>K | 0                   | 54 | 23 | 23 | 47.0               |                          |     | Unchanged            |    |    |    | 47.0                |
| 108               | .0107                  | .0107                    | UND      | 100                 | 0  | 0  | 0  | 8.9                | .0060                    | RES | 0                    | 35 | 23 | 42 | 12.3                |
| 109               | .0057                  | .0057                    | RES      | 0                   | 36 | 25 | 39 | 11.5               |                          |     | Unchanged            |    |    |    | 11.5                |
| 110               | .00345                 | .00345                   | UND      | 100                 | 0  | 0  | 0  | 3.0                | .00193                   | RES | 0                    | 34 | 24 | 42 | 4.0                 |

RES = residential  
COM = commercial  
UND =undeveloped

**TABLE 3**

**Summary of AHYMO Analysis for Developed Conditions  
(OPTION 1: Commercial Site Sub-Basin 100 Restricted Peak Discharge = 18.2 cfs)**

|                                |        |         | DISCHARGE (cfs) |             |             |              | DEPTH (feet) |             |                |               | VELOCITY (fps)    |         |
|--------------------------------|--------|---------|-----------------|-------------|-------------|--------------|--------------|-------------|----------------|---------------|-------------------|---------|
| LOCATION                       |        | Slope % | ROW Cap         | Top of Curb | Exist. Q100 | Devel'd Q100 | ROW Depth    | Top of Curb | Existing Depth | Devel'd Depth | Existing Velocity | Devel'd |
| 94th St. south to Reba         | 32' FF | .5      | 77.2            | 46.2        | 29.2        | 43.7         | .87          | .67         | .56            | .65           | 2.4               | 3.3     |
| Reba Ave, 94th to Blazick      | 32' FF | 1.64    | 139.9           | 83.7        | 56.2        | 70.8         | .87          | .67         | .58            | .62           | 5.3               | 5.8     |
| Blazick St., Reba to Sonya     | 32' FF | 2.0     | 154.5           | 92.5        | 87.7        | 104.1        | .87          | .67         | .65            | .71           | 6.6               | 7.4     |
| Sonya Ave, Blazick to Sapphire | 32' FF | 1.12    | 115.6           | 69.2        | 98.1        | 114.4        | .87          | .67         | .80            | .87           | 5.1               | 5.3     |
| Sapphire, Sonya to 86th        | 32' FF | 1.35    | 126.9           | 76.0        | 121.6       | 136.7        | .87          | .67         | .85            | .88*          | 5.7               | 5.9*    |
| Sapphire, 86th to Michelle     | 40' FF | 1.4     | 823.0           | 83.0        | 168.2       | 185.4        | 1.67         | .67         | .90            | .96           | 6.3               | 6.5     |
| Sapphire, Michelle to inlets   | 40' FF | 1.4     | 215.6           | 84.6        | 179.9       | 198.4        | 1.0          | .67         | .93            | .97           | 6.4               | 6.6     |

\* = outside of right of way, estimated value.

**TABLE 4**

**Summary of AHYMO Analysis for Developed Conditions  
(OPTION 2: Commercial Site Sub-Basin 100 Restricted Peak Discharge = 1.40 cfs)**

|                                |        |         | DISCHARGE (cfs) |             |             |              | DEPTH (feet) |             |                |               | VELOCITY (fps)    |         |
|--------------------------------|--------|---------|-----------------|-------------|-------------|--------------|--------------|-------------|----------------|---------------|-------------------|---------|
| LOCATION                       |        | Slope % | ROW Cap         | Top of Curb | Exist. Q100 | Devel'd Q100 | ROW Depth    | Top of Curb | Existing Depth | Devel'd Depth | Existing Velocity | Devel'd |
| 94th St. south to Reba         | 32' FF | .5      | 77.2            | 46.2        | 29.2        | 31.3         | .87          | .67         | .56            | .57           | 2.4               | 2.9     |
| Reba Ave, 94th to Blazick      | 32' FF | 1.64    | 139.9           | 83.7        | 56.2        | 58.1         | .87          | .67         | .58            | .58           | 5.3               | 5.3     |
| Blazick St., Reba to Sonya     | 32' FF | 2.0     | 154.5           | 92.5        | 87.7        | 92.1         | .87          | .67         | .65            | .67           | 6.6               | 6.7     |
| Sonya Ave, Blazick to Sapphire | 32' FF | 1.12    | 115.6           | 69.2        | 98.1        | 102.9        | .87          | .67         | .80            | .82           | 5.1               | 5.2     |
| Sapphire, Sonya to 86th        | 32' FF | 1.35    | 126.9           | 76.0        | 121.6       | 126.5        | .87          | .67         | .85            | .87           | 5.7               | 5.7     |
| Sapphire, 86th to Michelle     | 40' FF | 1.4     | 823.0           | 83.0        | 168.2       | 177.1        | 1.67         | .67         | .90            | .94           | 6.3               | 5.7     |
| Sapphire, Michelle to inlets   | 40' FF | 1.4     | 215.6           | 84.6        | 179.9       | 190.9        | 1.0          | .67         | .93            | .95           | 6.4               | 6.5     |

**TABLE 5**

**Summary of On-Site Street Capacities**

| <b>Location</b>                                                                      | <b>Roadway</b>      | <b>Slope<br/>%</b> | <b>Q<br/>(cfs)</b> | <b>Depth<br/>(feet)</b> | <b>Velocity<br/>(fps)</b> | <b>Top<br/>Width</b> | <b>EG</b>   |
|--------------------------------------------------------------------------------------|---------------------|--------------------|--------------------|-------------------------|---------------------------|----------------------|-------------|
| <b>Jenny Court</b>                                                                   | <b>28' FF, Std.</b> | <b>2.17</b>        | <b>25.9</b>        | <b>0.43</b>             | <b>4.4</b>                | <b>28.1</b>          | <b>0.73</b> |
| <b>Rhonda Ave.</b>                                                                   | <b>28' FF, Mt.</b>  | <b>3.71</b>        | <b>5.20</b>        | <b>0.18</b>             | <b>3.3</b>                | <b>17.79</b>         | <b>0.35</b> |
| <b>Shone Ave.</b>                                                                    | <b>28' FF, Mt.</b>  | <b>2.29</b>        | <b>10.1</b>        | <b>0.30</b>             | <b>2.29</b>               | <b>28.18</b>         | <b>0.38</b> |
| <b>Alvera Court</b>                                                                  | <b>28' FF, Mt.</b>  | <b>3.00</b>        | <b>7.7</b>         | <b>0.27</b>             | <b>2.10</b>               | <b>27.16</b>         | <b>0.34</b> |
| <b>Std. = Standard curb &amp; gutter</b><br><b>Mt. = Mountable curb &amp; gutter</b> |                     |                    |                    |                         |                           |                      |             |

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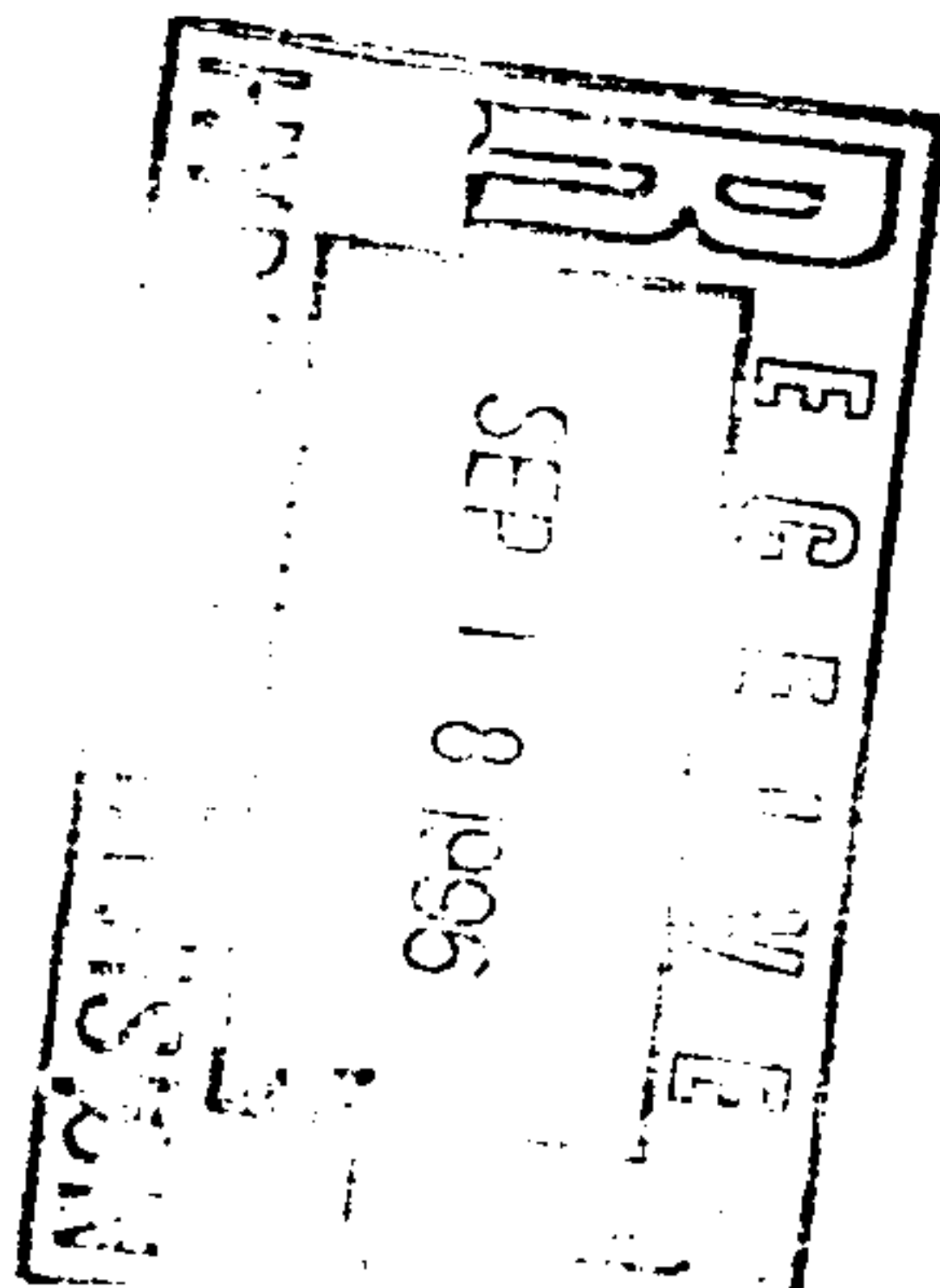


**TABLE 5**

***Summary of On-Site Street Capacities***

| <b><i>Location</i></b>                                                                             | <b><i>Roadway</i></b>      | <b><i>Slope<br/>%</i></b> | <b><i>Q<br/>(cfs)</i></b> | <b><i>Depth<br/>(feet)</i></b> | <b><i>Velocity<br/>(fps)</i></b> | <b><i>Top<br/>Width</i></b> | <b><i>EG</i></b>   |
|----------------------------------------------------------------------------------------------------|----------------------------|---------------------------|---------------------------|--------------------------------|----------------------------------|-----------------------------|--------------------|
| <b><i>Alvera Court</i></b>                                                                         | <b><i>28' FF, Std.</i></b> | <b><i>2.17</i></b>        | <b><i>25.9</i></b>        | <b><i>0.43</i></b>             | <b><i>4.4</i></b>                | <b><i>28.1</i></b>          | <b><i>0.73</i></b> |
| <b><i>Rhonda Ave.</i></b>                                                                          | <b><i>28' FF, Mt.</i></b>  | <b><i>1.96</i></b>        | <b><i>7.7</i></b>         | <b><i>0.23</i></b>             | <b><i>2.9</i></b>                | <b><i>23.2</i></b>          | <b><i>0.36</i></b> |
| <b><i>Shone Ave.</i></b>                                                                           | <b><i>28' FF, Mt.</i></b>  | <b><i>1.96</i></b>        | <b><i>7.7</i></b>         | <b><i>0.23</i></b>             | <b><i>3.3</i></b>                | <b><i>23.2</i></b>          | <b><i>0.36</i></b> |
| <b><i>Jenny Ave.</i></b>                                                                           | <b><i>28' FF, Mt.</i></b>  | <b><i>2.78</i></b>        | <b><i>7.7</i></b>         | <b><i>0.22</i></b>             | <b><i>3.3</i></b>                | <b><i>21.8</i></b>          | <b><i>0.38</i></b> |
| <b><i>Std. = Standard curb &amp; gutter</i></b><br><b><i>Mt. = Mountable curb &amp; gutter</i></b> |                            |                           |                           |                                |                                  |                             |                    |



**FIGURE 1**

**LEGAL DESCRIPTION**

T10N  
R2E  
SEC 33

**UNIFORM PROPERTY CODE**

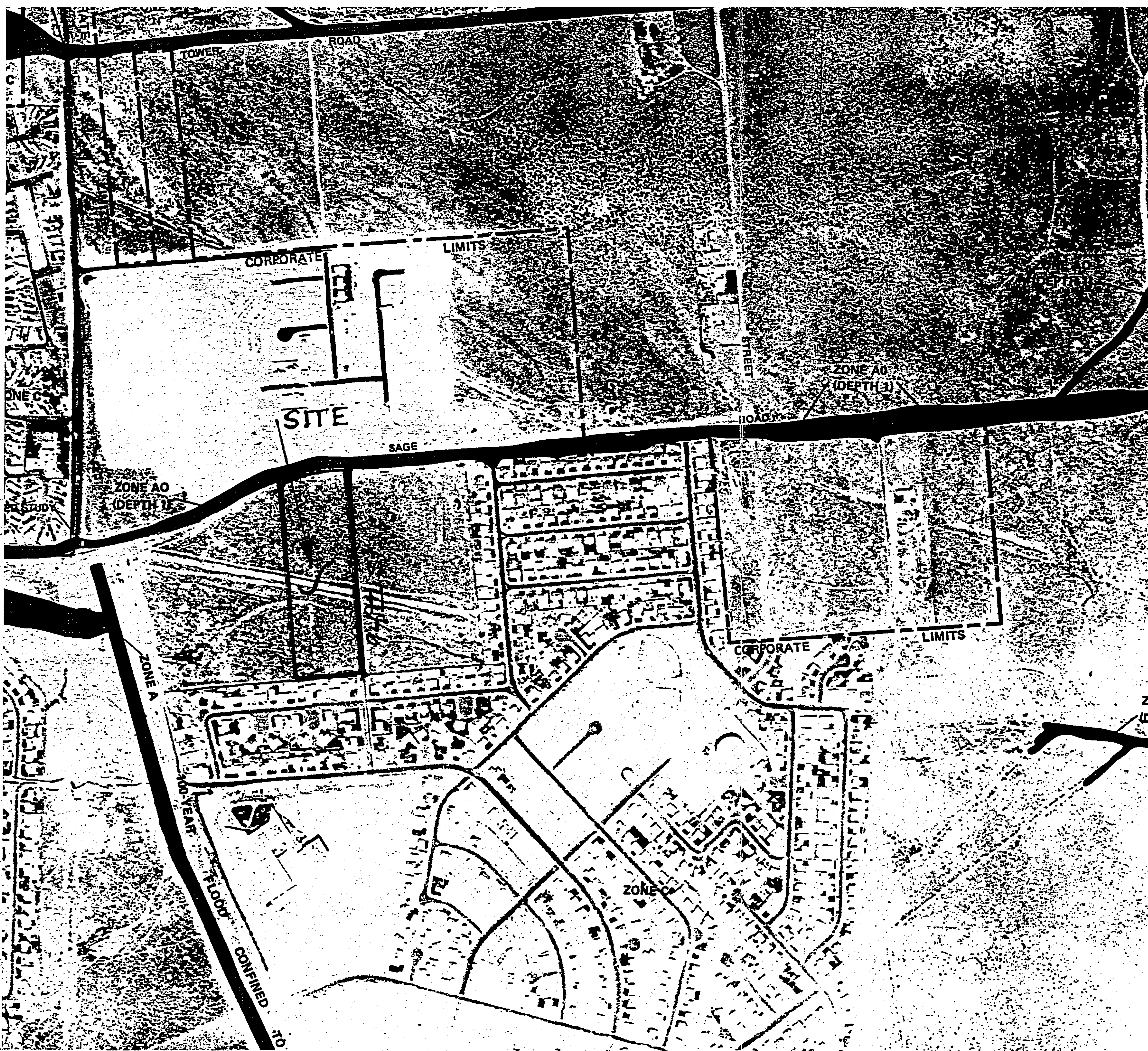
1-009-055

Scale: 1" = 750'

**A**buquerque **G**eographic **I**nformation **S**ystem  
**City of Albuquerque**

© Planning Department July 08, 1993

**M-9-Z**



NATIONAL FLOOD INSURANCE PROGRAM

**FIRM**  
FLOOD INSURANCE RATE MAP

CITY OF  
**ALBUQUERQUE,**  
**NEW MEXICO**  
BERNALILLO COUNTY

PANEL 33 OF 50

COMMUNITY-PANEL NUMBER

350002 0033 C

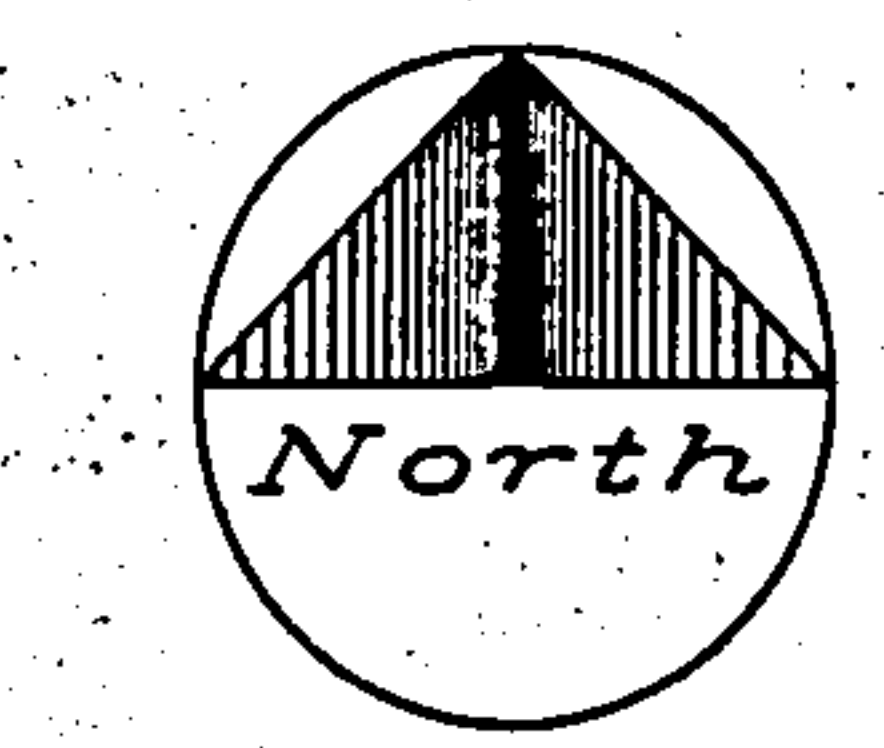
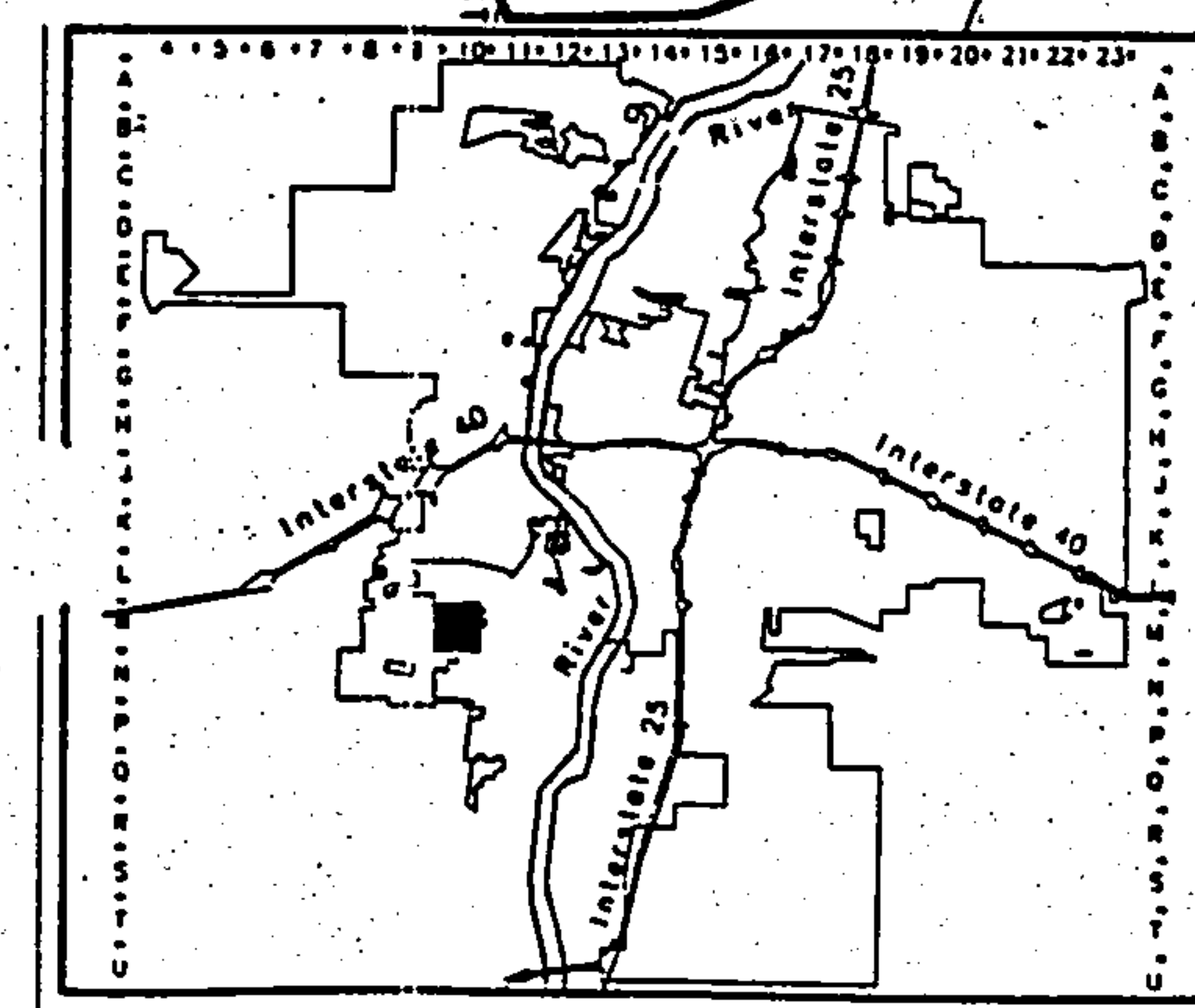
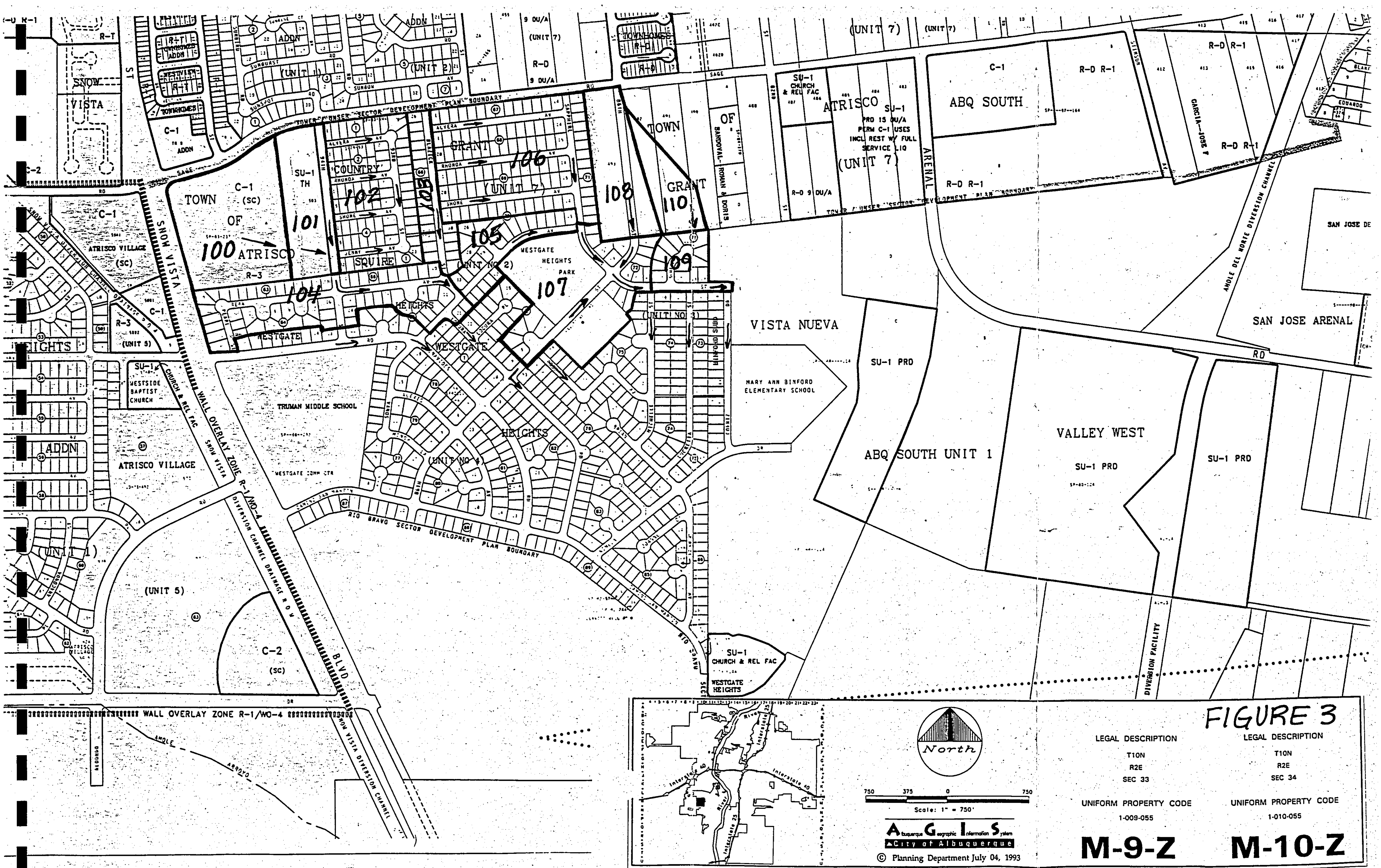
EFFECTIVE DATE:

OCTOBER 14, 1983



Federal Emergency Management Agency

FIGURE 2



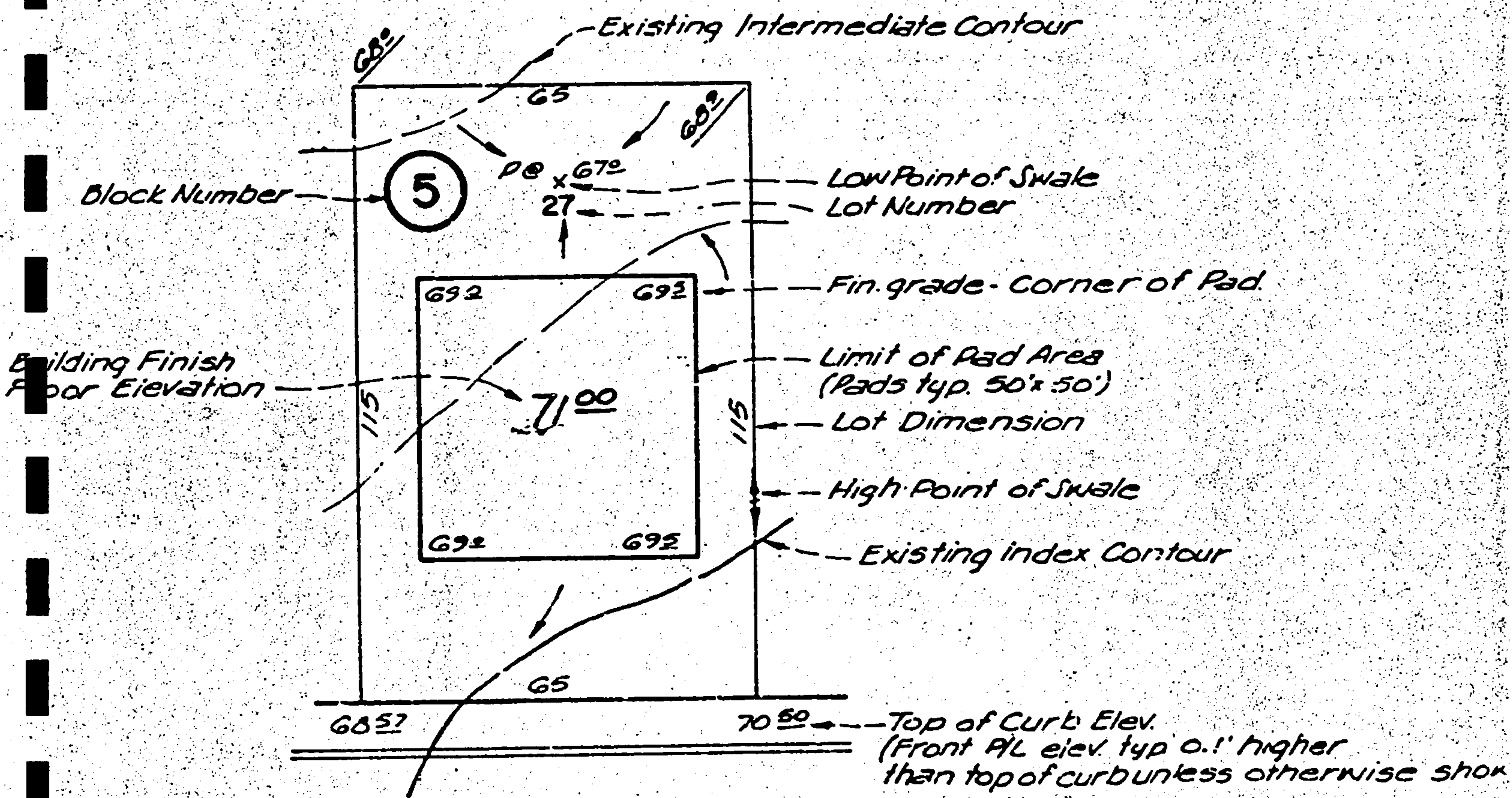
Scale: 1" = 750'

Albuquerque Geographic Information System  
City of Albuquerque  
© Planning Department July 04, 1993









## TYPICAL LOT PLAN

Westgate Heights Units

Figure 6

***APPENDIX A***  
***HYDRAULIC CALCULATIONS***

1\*\*\*\*\*

\*\*\*\*\*

\* WATER SURFACE PROFILES \*

\*

\* VERSION OF SEPTEMBER 1988 \*

\*

\* ERROR: 01,02 \*

\*

\* UPDATED: 4 APRIL 1989 \*

\*

\* RUN DATE 7/26/96 TIME 8:16:49 \*

\*

\*\*\*\*\*

\*\*\*\*\*

\* U.S. ARMY CORPS OF ENGINEERS

\* THE HYDROLOGIC ENGINEERING CENTER

\* 609 SECOND STREET, SUITE D

\* DAVIS, CALIFORNIA 95616-4687

\* (916) 756-1104, (916) 551-1748

Permanent Concrete Diversion Channel  
(from sub-basin 100 to street in Jenny Court)

|        |      |        |       |        |
|--------|------|--------|-------|--------|
| X      | X    | XXXXXX | XXXX  | XXXX   |
| X      | X    | X      | X     | X      |
| X      | X    | X      | X     | X      |
| XXXXXX | XXXI | I      | XXXXX | XXXXX  |
| X      | X    | X      | X     | X      |
| X      | X    | X      | X     | X      |
| X      | X    | XXXXXX | XXXX  | XXXXXX |

END OF BANNER

1

7/26/96 8:16:49

PAGE 1

THIS RUN EXECUTED 7/26/96 8:16:49

\*\*\*\*\*

HEC2 RELEASE DATED SEP 88 UPDATED APR 1989

ERROR CORR - 01,02

7

MODIFICATION -

\*\*\*\*\*

T1 JENNY COURT DIVERSION CHANNEL - DEVELOPED CONDITIONS  
T2 10' WIDE RECTANGULAR CONCRETE CHANNEL SUB-CRITICAL FLOW  
T3 100-YEAR / 6-HOUR DESIGN STORM

| J1 | ICHECK | INQ | MINV | IDIR | STRT | METRIC | HVINS | Q | WSEL | FQ |
|----|--------|-----|------|------|------|--------|-------|---|------|----|
|    | 0      | 2   | 0    | 0    | .005 | 0      | 0     | 0 | 0    | 0  |

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

|    | 38   | 43   | 1    | 2    | 26 | 4    | 68  | 3    |
|----|------|------|------|------|----|------|-----|------|
| MC | .017 | .017 | .017 | .1   | .3 |      |     |      |
| QT | 1    | 18.2 |      |      |    |      |     |      |
| X1 | 1    | 4    | 0    | 10.2 | 0  | 0    | 0   | 0    |
| GR | 2.0  | 0    | 0    | 0.1  | 0  | 10.1 | 2.0 | 10.2 |

1

7/26/96 8:16:49

PAGE 2

| SECHO | DEPTH | CWSEL | CRWS  | WSELK  | EG   | HV    | HL    | OLOSS  | BANK ELEV  |
|-------|-------|-------|-------|--------|------|-------|-------|--------|------------|
| Q     | QLOB  | QCH   | QROB  | ALOB   | ACH  | AROB  | VOL   | TWA    | LEFT/RIGHT |
| TIME  | VLOB  | VCH   | VROB  | XNL    | XNCH | XNR   | WTW   | ELMIN  | SSTA       |
| SLOPE | XLOBL | XLCH  | XLOBR | ITRIAL | IDC  | ICONT | CORAR | TOPWID | ENDST      |

\*PROP 1

CCHV= .100 CBHV= .300

\*SECHO 1.000

2096 WSEL NOT GIVEN, AVG OF MAX, MIN USED

|         |     |      |     |      |      |      |      |       |       |
|---------|-----|------|-----|------|------|------|------|-------|-------|
| 1.00    | .50 | .50  | .00 | .00  | .70  | .21  | .00  | .00   | 2.00  |
| 18.     | 0.  | 18.  | 0.  | 0.   | 5.   | 0.   | 0.   | 0.    | 2.00  |
| .00     | .00 | 3.65 | .00 | .000 | .017 | .000 | .000 | .00   | .08   |
| .004987 | 0.  | 0.   | 0.  | 0    | 0    | 6    | .00  | 10.05 | 10.12 |

0

1

7/26/96 8:16:49

PAGE 3

THIS RUN EXECUTED 7/26/96 8:16:49

\*\*\*\*\*

HEC2 RELEASE DATED SEP 88 UPDATED APR 1989

ERROR CORR - 01,02

MODIFICATION -

\*\*\*\*\*

NOTE- ASTERISK (\*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

100-YEAR / 6-HOUR DE

SUMMARY PRINTOUT

| SECHO   | Q       | CWSEL | CRIWS | VCH  | TOPWID  | PRCH | EG  |
|---------|---------|-------|-------|------|---------|------|-----|
| 1.000   | 18.20   | (.50) | .00   | 3.65 | (10.05) | .91  | .70 |
| 1       |         |       |       |      |         |      |     |
| 7/26/96 | 8:16:49 |       |       |      |         |      |     |

*WSEL 8'*  
*14.4 cfs*

Summary

PAGE 4

SUMMARY OF ERRORS AND SPECIAL NOTES



D. Mark Goodwin & Associates, P.A.  
Consulting Engineers and Surveyors

PROJECT Sun Sage Hills  
SUBJECT \_\_\_\_\_  
BY DLH DATE 8/7  
CHECKED \_\_\_\_\_ DATE \_\_\_\_\_  
SHEET \_\_\_\_\_ OF \_\_\_\_\_

### PERMANENT DETENTION POND - OPTION 1

$Q_{MAX} = \text{OUTFLOW} = 18. \text{ cfs}$

| OUTFLOW | STORAGE | ELEV. |
|---------|---------|-------|
| 0       | 0       | 19.0  |
| 1.74    | .094    | 19.5  |
| 5.72    | .194    | 20.0  |
| 7.40    | .301    | 20.5  |
| 10.87   | .414    | 21.   |
| 14.59   | .662    | 22.   |
| 17.53   | .938    | 23.   |
| 20.05   | 1.248   | 24.0  |

Peak Discharge = 18. cfs

Max. Storage Volume = .998 acre feet

Max. Water Surface Elev. = 23.2 feet

POND SIZE 116' x 116' with 3:1 side slopes

Outflow calculations using orifice equation

$$Q = .6 (\text{Area}) \sqrt{2gh}$$

$$18.2 = .6 (\text{Area}) \sqrt{64.4 (3.5)}$$

| Elev. | Head | Q     |
|-------|------|-------|
| 19.0  | 0    |       |
| 19.5  | .5   | 1.74  |
| 20.0  | 1.0  | 5.72  |
| 20.5  | 1.5  | 7.4   |
| 21.0  | 2.0  | 10.87 |
| 22.0  | 3.0  | 14.59 |
| 23.0  | 4.0  | 17.53 |
| 24.0  | 5.0  | 20.05 |



D. Mark Goodwin & Associates, P.A.  
Consulting Engineers and Surveyors

PROJECT Sun Sage Hills  
SUBJECT \_\_\_\_\_  
BY DLH DATE \_\_\_\_\_  
CHECKED \_\_\_\_\_ DATE 8/7  
SHEET \_\_\_\_\_ OF \_\_\_\_\_

## PERMANENT DETENTION POND - OPTION 2

Q MAX OUTFLOW = 1.4 cfs

| OUTFLOW | STORAGE | ELEV. |
|---------|---------|-------|
| 0       | 0       | 19.0  |
| .36     | .31     | 19.5  |
| .77     | .63     | 20.0  |
| .99     | .97     | 20.5  |
| 1.15    | 1.31    | 21.0  |
| 1.45    | 2.04    | 22.0  |
| 1.70    | 2.82    | 23.0  |

Peak Discharge = 1.4 cfs

Max Storage Volume = 1.91 acre-feet

Max. Water Surface Elev. = 21.8 feet

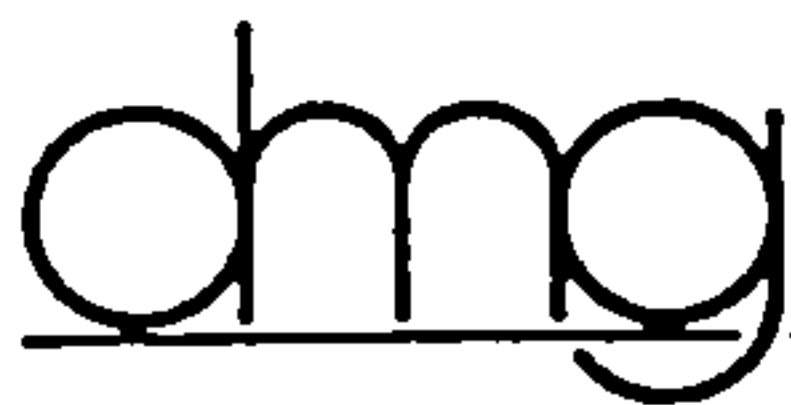
POND SIZE 181' x 181' WITH 3:1 SIDE SLOPES.

OUTFLOW CALCULATED USING ORIFICE EQUATION.

$$Q = .6(\text{Area})\sqrt{2gh}$$

$$1.4 = .6(\text{Area})\sqrt{64.4(2.5)} \quad \text{Area} = .1838$$

| Elev. | Head | Q    |
|-------|------|------|
| 19.0  | 0    | 0    |
| 19.5  | .5   | .36  |
| 20.0  | .76  | .77  |
| 20.5  | 1.26 | .99  |
| 21.0  | 1.76 | 1.15 |
| 22.0  | 2.76 | 1.45 |
| 23.0  | 3.76 | 1.70 |



D. Mark Goodwin & Associates, P.A.  
Consulting Engineers and Surveyors

PROJECT Sun Sage Hills  
SUBJECT \_\_\_\_\_  
BY DLH DATE 8/7  
CHECKED \_\_\_\_\_ DATE \_\_\_\_\_  
SHEET \_\_\_\_\_ OF \_\_\_\_\_

# TEMPORARY DETENTION POND - OPTION 2

$$Q_{max} = 1.4 \text{ cfs}$$

APPROX. 111' x 111'

| OUTFLOW | STORAGE | ELEV. |
|---------|---------|-------|
| 0       | 0       | 19.0  |
| .47     | .1229   | 19.5  |
| 1.08    | .2532   | 20.0  |
| 1.40    | .4000   | 20.5  |
| 1.65    | .5361   | 21.0  |

## OUTFLOW CALCS. ORIFICE (Max depth = 1.5')

$$Q = CA\sqrt{2gh} \Rightarrow 1.4 = .6(\text{Area})\sqrt{64.4(1.25)}$$

$$\text{Area} = .260$$

|      | Elev. | Head | Q cfs |
|------|-------|------|-------|
| 19.0 |       |      |       |
| 19.5 | .50   | .50  | 0.47  |
| 20.0 | 1.0   | .75  | 1.084 |
| 20.5 | 1.5   | 1.25 | 1.40  |
| 21.0 | 2.0   | 1.75 | 1.656 |

***APPENDIX B***  
***EXISTING CONDITIONS***

USER NO.= M GOODWIN.I01

INPUT FILE = sagex2.dat

[illegible]

AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994  
RUN DATE (MON/DAY/YR) = 07/24/1996  
START TIME (HR:MIN:SEC) = 07:12:56 USER NO.= M\_GOODWN.I01  
INPUT FILE = sagex2.dat

START TIME=0.0  
\*\*\*\*\* SUN SAGE HILLS SUBDIVISION - EXISTING CONDITIONS  
\*\*\*\*\* 100-YEAR 6-HOUR STORM EVENT  
\*\*\*\*\* REAR YARD PONDS IN SUB-BASINS 102-106;  
\*\*\*\*\* REVISED ASSUME 56% OF LOT AREA CONTRIBUTES TO RUNOFF  
\*\*\*\*\* FOR SUB-BASINS WITH REAR YARD PONDS;  
\*\*\*\*\* REVISED SPLIT B/C LAND TREATMENT 60/40  
\*\*\*\*\* REVISED TO INCLUDE 0.125 GUTTER LIP  
\*\*\*\*\* \*\*\*\*\*  
\*\*\*\*\* FILE: SAGEX2.DAT JULY 24 1996 BY:DLH  
\*\*\*\*\* \*\*\*\*\*

RAINFALL TYPE=1 RAIN QUARTER=0.0 IN  
RAIN ONE=1.87 IN RAIN SIX=2.20 IN  
RAIN DAY=2.66 IN DT=0.0333 HR

COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.  
DT = .033300 HOURS END TIME = 5.994000 HOURS

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| .0000  | .0016  | .0033  | .0050  | .0067  | .0085  | .0103  |
| .0121  | .0140  | .0160  | .0180  | .0200  | .0221  | .0243  |
| .0265  | .0288  | .0312  | .0336  | .0361  | .0387  | .0414  |
| .0442  | .0471  | .0501  | .0533  | .0566  | .0600  | .0636  |
| .0674  | .0714  | .0757  | .0808  | .0863  | .0922  | .1044  |
| .1323  | .1754  | .2374  | .3221  | .4335  | .5756  | .7527  |
| .9690  | 1.1767 | 1.2619 | 1.3336 | 1.3972 | 1.4551 | 1.5084 |
| 1.5579 | 1.6041 | 1.6474 | 1.6881 | 1.7266 | 1.7629 | 1.7973 |
| 1.8298 | 1.8607 | 1.8900 | 1.9178 | 1.9442 | 1.9515 | 1.9573 |
| 1.9627 | 1.9680 | 1.9729 | 1.9777 | 1.9823 | 1.9867 | 1.9909 |
| 1.9950 | 1.9990 | 2.0029 | 2.0066 | 2.0102 | 2.0137 | 2.0172 |
| 2.0205 | 2.0238 | 2.0269 | 2.0300 | 2.0331 | 2.0360 | 2.0389 |
| 2.0418 | 2.0446 | 2.0473 | 2.0500 | 2.0526 | 2.0552 | 2.0578 |
| 2.0603 | 2.0627 | 2.0651 | 2.0675 | 2.0698 | 2.0721 | 2.0744 |
| 2.0766 | 2.0788 | 2.0810 | 2.0832 | 2.0853 | 2.0873 | 2.0894 |
| 2.0914 | 2.0934 | 2.0954 | 2.0974 | 2.0993 | 2.1012 | 2.1031 |
| 2.1050 | 2.1068 | 2.1086 | 2.1104 | 2.1122 | 2.1140 | 2.1157 |
| 2.1174 | 2.1191 | 2.1208 | 2.1225 | 2.1242 | 2.1258 | 2.1274 |
| 2.1290 | 2.1306 | 2.1322 | 2.1338 | 2.1353 | 2.1369 | 2.1384 |
| 2.1399 | 2.1414 | 2.1429 | 2.1444 | 2.1459 | 2.1473 | 2.1487 |
| 2.1502 | 2.1516 | 2.1530 | 2.1544 | 2.1558 | 2.1571 | 2.1585 |
| 2.1599 | 2.1612 | 2.1625 | 2.1639 | 2.1652 | 2.1665 | 2.1678 |
| 2.1691 | 2.1703 | 2.1716 | 2.1729 | 2.1741 | 2.1754 | 2.1766 |
| 2.1778 | 2.1791 | 2.1803 | 2.1815 | 2.1827 | 2.1839 | 2.1850 |
| 2.1862 | 2.1874 | 2.1886 | 2.1897 | 2.1909 | 2.1920 | 2.1931 |
| 2.1943 | 2.1954 | 2.1965 | 2.1976 | 2.1987 | 2.1998 |        |

\*\*\*\*\*  
\*\*\*\*\* SUB-BASIN 100 UNDEVELOPED  
\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=100.0 AREA=0.0219 SQ MI  
PER A=100 PER B=0 PER C=0 PER D=0  
TP=0.1333 HR MASS RAINFALL=-1

K = .163684HR TP = .133300HR K/TP RATIO = 1.227936 SHAPE CONSTANT, N = 2.899764  
UNIT PEAK = 44.941 CFS UNIT VOLUME = .9993 B = 273.54 P60 = 1.8700  
AREA = .021900 SQ MI IA = .65000 INCHES INF = 1.67000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 100.00

RUNOFF VOLUME = .43919 INCHES = .5130 ACRE-FEET  
PEAK DISCHARGE RATE = 18.20 CFS AT 1.532 HOURS BASIN AREA = .0219 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 101 UNDEVELOPED

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=101.0 AREA=0.0131 SQ MI  
PER A=100 PER B=0 PER C=0 PER D=0  
TP=0.1333 HR MASS RAINFALL=-1

K = .163684HR TP = .133300HR K/TP RATIO = 1.227936 SHAPE CONSTANT, N = 2.899764  
UNIT PEAK = 26.882 CFS UNIT VOLUME = .9991 B = 273.54 P60 = 1.8700  
AREA = .013100 SQ MI IA = .65000 INCHES INF = 1.67000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 101.00

RUNOFF VOLUME = .43919 INCHES = .3068 ACRE-FEET  
PEAK DISCHARGE RATE = 10.89 CFS AT 1.532 HOURS BASIN AREA = .0131 SQ. MI.

\*\*\*\*\*

\*\*\*\*\*ADD SB 100 AND SB 101

\*\*\*\*\*

ADD HYD ID=3 HYD=101 ID=1 ID=2  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 101.00

RUNOFF VOLUME = .43918 INCHES = .8198 ACRE-FEET  
PEAK DISCHARGE RATE = 29.10 CFS AT 1.532 HOURS BASIN AREA = .0350 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 250 FT SOUTH ON 94TH STREET 32' FF 50' ROW

\*\*\*\*\* @ 0.005 FT/FT

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=0.87

CH SLP=.005 FP SLP=0.005 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
| .00                      | .00                   | .00                 | .00                |
| .05                      | .03                   | .02                 | 1.45               |
| .09                      | .13                   | .10                 | 2.91               |
| .14                      | .30                   | .27                 | 5.21               |
| .18                      | .65                   | .64                 | 9.79               |
| .23                      | 1.20                  | 1.39                | 14.38              |
| .27                      | 1.97                  | 2.63                | 18.96              |
| .32                      | 2.94                  | 4.46                | 23.55              |
| .37                      | 4.12                  | 6.97                | 28.14              |
| .41                      | 5.51                  | 10.38               | 32.01              |
| .46                      | 6.98                  | 15.35               | 32.02              |
| .50                      | 8.44                  | 21.05               | 32.03              |
| .55                      | 9.91                  | 27.44               | 32.03              |
| .60                      | 11.38                 | 34.47               | 32.04              |
| .64                      | 12.85                 | 42.12               | 32.05              |

|     |       |       |       |
|-----|-------|-------|-------|
| .69 | 14.33 | 48.98 | 33.56 |
| .73 | 15.96 | 54.42 | 37.67 |
| .78 | 17.78 | 60.93 | 41.78 |
| .82 | 19.78 | 68.53 | 45.89 |
| .87 | 21.98 | 77.24 | 50.00 |

COMPUTE TRAVEL TIME ID=4 REACH NO=1 NO VS=1 LENGTH=250 FT SLOPE=0.005

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .02                 | .1449                 |
| .092                   | .133                      | .10                 | .0913                 |
| .137                   | .305                      | .27                 | .0770                 |
| .183                   | .648                      | .64                 | .0703                 |
| .229                   | 1.202                     | 1.39                | .0600                 |
| .275                   | 1.965                     | 2.63                | .0519                 |
| .321                   | 2.938                     | 4.46                | .0458                 |
| .366                   | 4.122                     | 6.97                | .0411                 |
| .412                   | 5.513                     | 10.38               | .0369                 |
| .458                   | 6.979                     | 15.35               | .0316                 |
| .504                   | 8.445                     | 21.05               | .0279                 |
| .549                   | 9.911                     | 27.44               | .0251                 |
| .595                   | 11.378                    | 34.47               | .0229                 |
| .641                   | 12.845                    | 42.12               | .0212                 |
| .687                   | 14.326                    | 48.98               | .0203                 |
| .733                   | 15.956                    | 54.42               | .0204                 |
| .778                   | 17.776                    | 60.93               | .0203                 |
| .824                   | 19.783                    | 68.53               | .0200                 |
| .870                   | 21.978                    | 77.24               | .0198                 |

ROUTE ID=4 HYD NO=201 INFLOW ID=3 DT=0.0  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 201.00

RUNOFF VOLUME = .43921 INCHES = .8199 ACRE-FEET  
PEAK DISCHARGE RATE = 29.24 CFS AT 1.532 HOURS BASIN AREA = .0350 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 104 RESIDENTIAL (4.0 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=104.0 AREA=0.0135 SQ MI  
PER A=0 PER B=34 PER C=24 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 22.385 CFS UNIT VOLUME = .9988 B = 526.28 P60 = 1.8700  
AREA = .005670 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120595HR TP = .133300HR K/TP RATIO = .904691 SHAPE CONSTANT, N = 3.916166  
UNIT PEAK = 20.532 CFS UNIT VOLUME = .9998 B = 349.54 P60 = 1.8700  
AREA = .007830 SQ MI IA = .43793 INCHES INF = 1.07621 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.28283 INCHES = .9236 ACRE-FEET  
PEAK DISCHARGE RATE = 27.72 CFS AT 1.499 HOURS BASIN AREA = .0135 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 AND 101 AND 104

\*\*\*\*\*

ADD HYD ID=2 HYD=104 ID=1 ID=4  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = .67402 INCHES = 1.7434 ACRE-FEET  
PEAK DISCHARGE RATE = 56.19 CFS AT 1.532 HOURS BASIN AREA = .0485 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 770 FT EAST ON REBA AVE 32' FF 50' ROW

\*\*\*\*\* @ 0.0164 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=0.87

CH SLP=.0164 FP SLP=0.0164 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

|    |      |       |      |      |      |
|----|------|-------|------|------|------|
| 0  | .87  | 9.0   | .67  | 9.05 | 0.   |
| 11 | .125 | 25    | .405 | 39   | .125 |
| 41 | 0.   | 41.05 | .67  | 50   | .87  |

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
| .00                      | .00                   | .00                 | .00                |
| .05                      | .03                   | .03                 | 1.45               |
| .09                      | .13                   | .18                 | 2.91               |
| .14                      | .30                   | .50                 | 5.21               |
| .18                      | .65                   | 1.16                | 9.79               |
| .23                      | 1.20                  | 2.52                | 14.38              |
| .27                      | 1.97                  | 4.77                | 18.96              |
| .32                      | 2.94                  | 8.07                | 23.55              |
| .37                      | 4.12                  | 12.62               | 28.14              |
| .41                      | 5.51                  | 18.80               | 32.01              |
| .46                      | 6.98                  | 27.79               | 32.02              |
| .50                      | 8.44                  | 38.12               | 32.03              |
| .55                      | 9.91                  | 49.69               | 32.03              |
| .60                      | 11.38                 | 62.43               | 32.04              |
| .64                      | 12.85                 | 76.28               | 32.05              |
| .69                      | 14.33                 | 88.71               | 33.56              |
| .73                      | 15.96                 | 98.56               | 37.67              |
| .78                      | 17.78                 | 110.35              | 41.78              |
| .82                      | 19.78                 | 124.11              | 45.89              |
| .87                      | 21.98                 | 139.89              | 50.00              |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=770 FT SLOPE=0.0164

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .03                 | .2464                 |
| .092                   | .133                      | .18                 | .1552                 |
| .137                   | .305                      | .50                 | .1310                 |
| .183                   | .648                      | 1.16                | .1195                 |
| .229                   | 1.202                     | 2.52                | .1020                 |
| .275                   | 1.965                     | 4.77                | .0882                 |
| .321                   | 2.938                     | 8.07                | .0778                 |
| .366                   | 4.122                     | 12.62               | .0699                 |
| .412                   | 5.513                     | 18.80               | .0627                 |

|      |        |        |       |
|------|--------|--------|-------|
| .458 | 6.979  | 27.79  | .0537 |
| .504 | 8.445  | 38.12  | .0474 |
| .549 | 9.911  | 49.69  | .0427 |
| .595 | 11.378 | 62.43  | .0390 |
| .641 | 12.845 | 76.28  | .0360 |
| .687 | 14.326 | 88.71  | .0345 |
| .733 | 15.956 | 98.56  | .0346 |
| .778 | 17.776 | 110.35 | .0345 |
| .824 | 19.783 | 124.11 | .0341 |
| .870 | 21.978 | 139.89 | .0336 |

ROUTE ID=3 HYD NO=204 INFLOW ID=2 DT=0.0  
 PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 204.00

RUNOFF VOLUME = .67403 INCHES = 1.7435 ACRE-FEET  
 PEAK DISCHARGE RATE = 54.25 CFS AT 1.565 HOURS BASIN AREA = .0485 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 102 RESIDENTIAL (5.1 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=102.0 AREA=0.0131 SQ MI  
 PER A=0 PER B=30 PER C=20 PER D=50  
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
 UNIT PEAK = 25.860 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8700  
 AREA = .006550 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120942HR TP = .133300HR K/TP RATIO = .907291 SHAPE CONSTANT, N = 3.904285  
 UNIT PEAK = 17.136 CFS UNIT VOLUME = .9996 B = 348.74 P60 = 1.8700  
 AREA = .006550 SQ MI IA = .44000 INCHES INF = 1.08200 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 102.00

RUNOFF VOLUME = 1.37477 INCHES = .9605 ACRE-FEET  
 PEAK DISCHARGE RATE = 28.19 CFS AT 1.499 HOURS BASIN AREA = .0131 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 103 RESIDENTIAL (4.6 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=103.0 AREA=0.00398 SQ MI  
 PER A=0 PER B=32 PER C=21 PER D=47  
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
 UNIT PEAK = 7.3852 CFS UNIT VOLUME = .9978 B = 526.28 P60 = 1.8700  
 AREA = .001871 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .121037HR TP = .133300HR K/TP RATIO = .908002 SHAPE CONSTANT, N = 3.901043  
 UNIT PEAK = 5.5151 CFS UNIT VOLUME = .9980 B = 348.52 P60 = 1.8700  
 AREA = .002109 SQ MI IA = .44057 INCHES INF = 1.08358 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 1.33869 INCHES = .2842 ACRE-FEET  
 PEAK DISCHARGE RATE = 8.42 CFS AT 1.499 HOURS BASIN AREA = .0040 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 102 AND 103

\*\*\*\*\*

ADD HYD ID=4 HYD=103 ID=1 ID=2  
 PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 1.36633 INCHES = 1.2446 ACRE-FEET  
 PEAK DISCHARGE RATE = 36.61 CFS AT 1.499 HOURS BASIN AREA = .0171 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100, 101, 102, 103, 104

\*\*\*\*\*

ADD HYD ID=2 HYD=104 ID=3 ID=4  
 PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = .85433 INCHES = 2.9881 ACRE-FEET  
 PEAK DISCHARGE RATE = 87.66 CFS AT 1.532 HOURS BASIN AREA = .0656 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 150 FT SOUTHEAST ON BLAZICK AVE 32' FF 50' ROW

\*\*\*\*\* @ 0.02 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.02 FP SLP=0.02 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
| .00                      | .00                   | .00                 | .00                |
| .05                      | .03                   | .03                 | 1.45               |
| .09                      | .13                   | .20                 | 2.91               |
| .14                      | .30                   | .55                 | 5.21               |
| .18                      | .65                   | 1.28                | 9.79               |
| .23                      | 1.20                  | 2.78                | 14.38              |
| .27                      | 1.97                  | 5.26                | 18.96              |
| .32                      | 2.94                  | 8.92                | 23.55              |
| .37                      | 4.12                  | 13.93               | 28.14              |
| .41                      | 5.51                  | 20.76               | 32.01              |
| .46                      | 6.98                  | 30.69               | 32.02              |
| .50                      | 8.44                  | 42.10               | 32.03              |
| .55                      | 9.91                  | 54.88               | 32.03              |
| .60                      | 11.38                 | 68.94               | 32.04              |
| .64                      | 12.85                 | 84.23               | 32.05              |
| .69                      | 14.33                 | 97.96               | 33.56              |

|     |       |        |       |
|-----|-------|--------|-------|
| .73 | 15.96 | 108.84 | 37.67 |
| .78 | 17.78 | 121.86 | 41.78 |
| .82 | 19.78 | 137.06 | 45.89 |
| .87 | 21.98 | 154.48 | 50.00 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=150 FT SLOPE=0.02

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .03                 | .0435                 |
| .092                   | .133                      | .20                 | .0274                 |
| .137                   | .305                      | .55                 | .0231                 |
| .183                   | .648                      | 1.28                | .0211                 |
| .229                   | 1.202                     | 2.78                | .0180                 |
| .275                   | 1.965                     | 5.26                | .0156                 |
| .321                   | 2.938                     | 8.92                | .0137                 |
| .366                   | 4.122                     | 13.93               | .0123                 |
| .412                   | 5.513                     | 20.76               | .0111                 |
| .458                   | 6.979                     | 30.69               | .0095                 |
| .504                   | 8.445                     | 42.10               | .0084                 |
| .549                   | 9.911                     | 54.88               | .0075                 |
| .595                   | 11.378                    | 68.94               | .0069                 |
| .641                   | 12.845                    | 84.23               | .0064                 |
| .687                   | 14.326                    | 97.96               | .0061                 |
| .733                   | 15.956                    | 108.84              | .0061                 |
| .778                   | 17.776                    | 121.86              | .0061                 |
| .824                   | 19.783                    | 137.06              | .0060                 |
| .870                   | 21.978                    | 154.48              | .0059                 |

ROUTE ID=3 HYD NO=203 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 203.00

RUNOFF VOLUME = .85433 INCHES = 2.9881 ACRE-FEET  
PEAK DISCHARGE RATE = 87.58 CFS AT 1.532 HOURS BASIN AREA = .0656 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 105 RESIDENTIAL (4.0 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=105.0 AREA=0.00526 SQ MI  
PER A=0 PER B=34 PER C=24 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 8.7220 CFS UNIT VOLUME = .9980 B = 526.28 P60 = 1.8700  
AREA = .002209 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120595HR TP = .133300HR K/TP RATIO = .904691 SHAPE CONSTANT, N = 3.916166  
UNIT PEAK = 7.9999 CFS UNIT VOLUME = .9988 B = 349.54 P60 = 1.8700  
AREA = .003051 SQ MI IA = .43793 INCHES INF = 1.07621 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 1.28283 INCHES = .3599 ACRE-FEET  
PEAK DISCHARGE RATE = 10.81 CFS AT 1.499 HOURS BASIN AREA = .0053 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 104 AND 105

\*\*\*\*\*

ADD HYD ID=2 HYD=105 ID=1 ID=3  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = .88614 INCHES = 3.3479 ACRE-Feet  
PEAK DISCHARGE RATE = 98.09 CFS AT 1.532 HOURS BASIN AREA = .0708 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 1050 FT EAST ON SONYA AVE 32' FF 50' ROW

\*\*\*\*\* @ 0.0112 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.0112 FP SLP=0.0112 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

|    |      |       |      |      |      |
|----|------|-------|------|------|------|
| 0  | .87  | 9.0   | .67  | 9.05 | 0.   |
| 11 | .125 | 25    | .405 | 39   | .125 |
| 41 | 0.   | 41.05 | .67  | 50   | .87  |

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
| .00                      | .00                   | .00                 | .00                |
| .05                      | .03                   | .02                 | 1.45               |
| .09                      | .13                   | .15                 | 2.91               |
| .14                      | .30                   | .41                 | 5.21               |
| .18                      | .65                   | .96                 | 9.79               |
| .23                      | 1.20                  | 2.08                | 14.38              |
| .27                      | 1.97                  | 3.94                | 18.96              |
| .32                      | 2.94                  | 6.67                | 23.55              |
| .37                      | 4.12                  | 10.43               | 28.14              |
| .41                      | 5.51                  | 15.53               | 32.01              |
| .46                      | 6.98                  | 22.97               | 32.02              |
| .50                      | 8.44                  | 31.50               | 32.03              |
| .55                      | 9.91                  | 41.07               | 32.03              |
| .60                      | 11.38                 | 51.59               | 32.04              |
| .64                      | 12.85                 | 63.03               | 32.05              |
| .69                      | 14.33                 | 73.31               | 33.56              |
| .73                      | 15.96                 | 81.45               | 37.67              |
| .78                      | 17.78                 | 91.19               | 41.78              |
| .82                      | 19.78                 | 102.56              | 45.89              |
| .87                      | 21.98                 | 115.60              | 50.00              |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=1050 FT SLOPE=0.0112

TRAVEL TIME TABLE

REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .02                 | .4066                 |
| .092                   | .133                      | .15                 | .2562                 |
| .137                   | .305                      | .41                 | .2161                 |
| .183                   | .648                      | .96                 | .1972                 |
| .229                   | 1.202                     | 2.08                | .1683                 |
| .275                   | 1.965                     | 3.94                | .1455                 |
| .321                   | 2.938                     | 6.67                | .1284                 |
| .366                   | 4.122                     | 10.43               | .1153                 |
| .412                   | 5.513                     | 15.53               | .1035                 |
| .458                   | 6.979                     | 22.97               | .0886                 |

|      |        |        |       |
|------|--------|--------|-------|
| .504 | 8.445  | 31.50  | .0782 |
| .549 | 9.911  | 41.07  | .0704 |
| .595 | 11.378 | 51.59  | .0643 |
| .641 | 12.845 | 63.03  | .0594 |
| .687 | 14.326 | 73.31  | .0570 |
| .733 | 15.956 | 81.45  | .0571 |
| .778 | 17.776 | 91.19  | .0569 |
| .824 | 19.783 | 102.56 | .0563 |
| .870 | 21.978 | 115.60 | .0555 |

ROUTE ID=3 HYD NO=205 INFLOW ID=2 DT=0.0  
 PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 205.00

RUNOFF VOLUME = .88615 INCHES = 3.3480 ACRE-FEET  
 PEAK DISCHARGE RATE = 88.83 CFS AT 1.598 HOURS BASIN AREA = .0708 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 106 RESIDENTIAL (4.5 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=106.0 AREA=0.01893 SQ MI  
 PER A=0 PER B=32 PER C=22 PER D=46  
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
 UNIT PEAK = 34.379 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 1.8700  
 AREA = .008708 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120756HR TP = .133300HR K/TP RATIO = .905895 SHAPE CONSTANT, N = 3.910652  
 UNIT PEAK = 26.776 CFS UNIT VOLUME = .9999 B = 349.17 P60 = 1.8700  
 AREA = .010222 SQ MI IA = .43889 INCHES INF = 1.07889 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 106.00

RUNOFF VOLUME = 1.32880 INCHES = 1.3415 ACRE-FEET  
 PEAK DISCHARGE RATE = 39.79 CFS AT 1.499 HOURS BASIN AREA = .0189 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 105 AND 106

\*\*\*\*\*

ADD HYD ID=2 HYD=106 ID=1 ID=3  
 PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 106.00

RUNOFF VOLUME = .97948 INCHES = 4.6895 ACRE-FEET  
 PEAK DISCHARGE RATE = 121.59 CFS AT 1.565 HOURS BASIN AREA = .0898 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 400 FT SOUTHEAST ON SAPPHIRE ST. TO 86TH ST.

\*\*\*\*\* 32' FF 50' ROW @ 0.0135 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1  
 MIN ELEV=0.0 MAX ELEV=.87  
 CH SLP=.0135 FP SLP=0.0135 N=0.017

DIST=50  
DIST ELEV DIST ELEV DIST ELEV  
0 .87 9.0 .67 9.05 0.  
11 .125 25 .405 39 .125  
41 0. 41.05 .67 50 .87

| RATING CURVE VALLEY SECTION 9.0 |       |        |       |  |
|---------------------------------|-------|--------|-------|--|
| WATER                           | FLOW  | FLOW   | TOP   |  |
| SURFACE                         | AREA  | RATE   | WIDTH |  |
| ELEV                            | SQ FT | CFS    | FT    |  |
| .00                             | .00   | .00    | .00   |  |
| .05                             | .03   | .03    | 1.45  |  |
| .09                             | .13   | .17    | 2.91  |  |
| .14                             | .30   | .45    | 5.21  |  |
| .18                             | .65   | 1.05   | 9.79  |  |
| .23                             | 1.20  | 2.29   | 14.38 |  |
| .27                             | 1.97  | 4.32   | 18.96 |  |
| .32                             | 2.94  | 7.33   | 23.55 |  |
| .37                             | 4.12  | 11.45  | 28.14 |  |
| .41                             | 5.51  | 17.05  | 32.01 |  |
| .46                             | 6.98  | 25.22  | 32.02 |  |
| .50                             | 8.44  | 34.59  | 32.03 |  |
| .55                             | 9.91  | 45.09  | 32.03 |  |
| .60                             | 11.38 | 56.64  | 32.04 |  |
| .64                             | 12.85 | 69.20  | 32.05 |  |
| .69                             | 14.33 | 80.48  | 33.56 |  |
| .73                             | 15.96 | 89.42  | 37.67 |  |
| .78                             | 17.78 | 100.12 | 41.78 |  |
| .82                             | 19.78 | 112.60 | 45.89 |  |
| .87                             | 21.98 | 126.92 | 50.00 |  |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=400 FT SLOPE=0.0135

TRAVEL TIME TABLE  
REACH= 1.0

| WATER | AVERAGE | FLOW   | TRAVEL |
|-------|---------|--------|--------|
| DEPTH | AREA    | RATE   | TIME   |
| FEET  | SQ.FT.  | CFS    | HRS    |
| .046  | .033    | .03    | .1411  |
| .092  | .133    | .17    | .0889  |
| .137  | .305    | .45    | .0750  |
| .183  | .648    | 1.05   | .0684  |
| .229  | 1.202   | 2.29   | .0584  |
| .275  | 1.965   | 4.32   | .0505  |
| .321  | 2.938   | 7.33   | .0446  |
| .366  | 4.122   | 11.45  | .0400  |
| .412  | 5.513   | 17.05  | .0359  |
| .458  | 6.979   | 25.22  | .0307  |
| .504  | 8.445   | 34.59  | .0271  |
| .549  | 9.911   | 45.09  | .0244  |
| .595  | 11.378  | 56.64  | .0223  |
| .641  | 12.845  | 69.20  | .0206  |
| .687  | 14.326  | 80.48  | .0198  |
| .733  | 15.956  | 89.42  | .0198  |
| .778  | 17.776  | 100.12 | .0197  |
| .824  | 19.783  | 112.60 | .0195  |
| .870  | 21.978  | 126.92 | .0192  |

ROUTE ID=3 HYD NO=206 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 206.00

RUNOFF VOLUME = .97949 INCHES = 4.6895 ACRE-FEET  
PEAK DISCHARGE RATE = 119.68 CFS AT 1.598 HOURS BASIN AREA = .0898 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 107 RESIDENTIAL (PARK/RESIDENTIAL/WATER TNK)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=107.0 AREA=0.0267 SQ MI  
PER A=0 PER B=54 PER C=23 PER D=23  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 24.245 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8700  
AREA = .006141 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .123487HR TP = .133300HR K/TP RATIO = .926384 SHAPE CONSTANT, N = 3.819526  
UNIT PEAK = 52.894 CFS UNIT VOLUME = 1.000 B = 342.95 P60 = 1.8700  
AREA = .020559 SQ MI IA = .45519 INCHES INF = 1.12455 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 107.00

RUNOFF VOLUME = 1.03176 INCHES = 1.4692 ACRE-FEET  
PEAK DISCHARGE RATE = 46.95 CFS AT 1.499 HOURS BASIN AREA = .0267 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 108 UNDEVELOPED

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=108.0 AREA=0.01073 SQ MI  
PER A=100 PER B=0 PER C=0 PER D=0  
TP=0.1333 HR MASS RAINFALL=-1

K = .163684HR TP = .133300HR K/TP RATIO = 1.227936 SHAPE CONSTANT, N = 2.899764  
UNIT PEAK = 22.019 CFS UNIT VOLUME = .9990 B = 273.54 P60 = 1.8700  
AREA = .010730 SQ MI IA = .65000 INCHES INF = 1.67000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = .43919 INCHES = .2513 ACRE-FEET  
PEAK DISCHARGE RATE = 8.92 CFS AT 1.532 HOURS BASIN AREA = .0107 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 107 AND 108

\*\*\*\*\*

ADD HYD ID=4 HYD=108 ID=1 ID=2  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = .86188 INCHES = 1.7205 ACRE-FEET  
PEAK DISCHARGE RATE = 55.64 CFS AT 1.499 HOURS BASIN AREA = .0374 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 108

\*\*\*\*\*

ADD HYD ID=2 HYD=108 ID=3 ID=4  
PRINT HYD ID=2 CODE=1

# PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = .94487 INCHES = 6.4100 ACRE-FEET  
 PEAK DISCHARGE RATE = 168.16 CFS AT 1.565 HOURS BASIN AREA = .1272 SQ. MI.

\*\*\*\*\*  
 \*\*\*\*\* ROUTE 300 FT SOUTHEAST ON SAPPHIRE ST. TO MICHELLE  
 \*\*\*\*\* INCLUDES 8" DIVERSION BERM  
 \*\*\*\*\* 40' FF 60' ROW @ 0.014 FT/FT  
 COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=1.67  
 CH SLP=.014 FP SLP=0.014 N=0.017  
 DIST=60.05  
 DIST ELEV DIST ELEV DIST ELEV  
 0 1.67 0.05 1.0 10 0.67  
 10.05 0. 12 .125 30 .485  
 48 .125 50 0. 50.05 .67  
 60 1.0 60.05 1.67

| RATING CURVE VALLEY SECTION 9.0 |                       |                     |                    |  |
|---------------------------------|-----------------------|---------------------|--------------------|--|
| WATER<br>SURFACE<br>ELEV        | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |  |
| .00                             | .00                   | .00                 | .00                |  |
| .09                             | .12                   | .15                 | 2.79               |  |
| .18                             | .58                   | .93                 | 9.06               |  |
| .26                             | 1.76                  | 3.82                | 17.86              |  |
| .35                             | 3.72                  | 10.17               | 26.66              |  |
| .44                             | 6.45                  | 21.08               | 35.46              |  |
| .53                             | 9.86                  | 39.44               | 40.03              |  |
| .62                             | 13.38                 | 65.39               | 40.04              |  |
| .70                             | 16.93                 | 93.65               | 42.05              |  |
| .79                             | 20.86                 | 122.77              | 47.35              |  |
| .88                             | 25.26                 | 157.57              | 52.65              |  |
| .97                             | 30.12                 | 198.48              | 57.95              |  |
| 1.05                            | 35.35                 | 253.28              | 59.96              |  |
| 1.14                            | 40.63                 | 318.68              | 59.97              |  |
| 1.23                            | 45.90                 | 389.80              | 59.98              |  |
| 1.32                            | 51.17                 | 466.37              | 60.00              |  |
| 1.41                            | 56.44                 | 548.16              | 60.01              |  |
| 1.49                            | 61.72                 | 634.98              | 60.02              |  |
| 1.58                            | 67.00                 | 726.63              | 60.04              |  |
| 1.67                            | 72.27                 | 822.96              | 60.05              |  |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=300 FT SLOPE=0.014

## TRAVEL TIME TABLE REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .088                   | .123                      | .15                 | .0673                 |
| .176                   | .579                      | .93                 | .0516                 |
| .264                   | 1.762                     | 3.82                | .0384                 |
| .352                   | 3.718                     | 10.17               | .0305                 |
| .439                   | 6.448                     | 21.08               | .0255                 |
| .527                   | 9.862                     | 39.44               | .0208                 |
| .615                   | 13.381                    | 65.39               | .0171                 |
| .703                   | 16.934                    | 93.65               | .0151                 |
| .791                   | 20.863                    | 122.77              | .0142                 |
| .879                   | 25.258                    | 157.57              | .0134                 |
| .967                   | 30.118                    | 198.48              | .0126                 |
| 1.055                  | 35.355                    | 253.28              | .0116                 |
| 1.143                  | 40.625                    | 318.68              | .0106                 |
| 1.231                  | 45.897                    | 389.80              | .0098                 |
| 1.318                  | 51.170                    | 466.37              | .0091                 |

|  |       |        |        |       |
|--|-------|--------|--------|-------|
|  | 1.406 | 56.444 | 548.16 | .0086 |
|  | 1.494 | 61.719 | 634.98 | .0081 |
|  | 1.582 | 66.996 | 726.63 | .0077 |
|  | 1.670 | 72.273 | 822.96 | .0073 |

ROUTE ID=3 HYD NO=208 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

# PARTIAL HYDROGRAPH 208.00

RUNOFF VOLUME = .94488 INCHES = 6.4100 ACRE-FEET  
PEAK DISCHARGE RATE = 167.68 CFS AT 1.565 HOURS BASIN AREA = .1272 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 109 RESIDENTIAL (3.8 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=109.0 AREA=0.0057 SQ MI  
PER A=0 PER B=36 PER C=25 PER D=39  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 8.7765 CFS UNIT VOLUME = .9980 B = 526.28 P60 = 1.8700  
AREA = .002223 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120695HR TP = .133300HR K/TP RATIO = .905437 SHAPE CONSTANT, N = 3.912748  
UNIT PEAK = 9.1114 CFS UNIT VOLUME = .9989 B = 349.31 P60 = 1.8700  
AREA = .003477 SQ MI IA = .43852 INCHES INF = 1.07787 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

# PARTIAL HYDROGRAPH 109.00

RUNOFF VOLUME = 1.24675 INCHES = .3790 ACRE-FEET  
PEAK DISCHARGE RATE = 11.48 CFS AT 1.499 HOURS BASIN AREA = .0057 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 110 UNDEVELOPED

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=110.0 AREA=0.00345 SQ MI  
PER A=100 PER B=0 PER C=0 PER D=0  
TP=0.1333 HR MASS RAINFALL=-1

K = .163684HR TP = .133300HR K/TP RATIO = 1.227936 SHAPE CONSTANT, N = 2.899764  
UNIT PEAK = 7.0797 CFS UNIT VOLUME = .9975 B = 273.54 P60 = 1.8700  
AREA = .003450 SQ MI IA = .65000 INCHES INF = 1.67000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

# PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = .43919 INCHES = .0808 ACRE-FEET  
PEAK DISCHARGE RATE = 2.87 CFS AT 1.532 HOURS BASIN AREA = .0035 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 109 AND 110

\*\*\*\*\*

ADD HYD ID=4 HYD=110 ID=1 ID=2

PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = .94222 INCHES = .4598 ACRE-FEET  
PEAK DISCHARGE RATE = 14.28 CFS AT 1.499 HOURS BASIN AREA = .0092 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 thru 110

\*\*\*\*\*

ADD HYD ID=2 HYD=110 ID=3 ID=4  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = .94470 INCHES = 6.8698 ACRE-FEET  
PEAK DISCHARGE RATE = 180.28 CFS AT 1.565 HOURS BASIN AREA = .1364 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 200 FT EAST ON SAPPHIRE ST. FROM MICHELLE ST. TO INLETS

\*\*\*\*\* 40' FF 60' ROW @ 0.014 FT/FT

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=1.0

CH SLP=.014 FP SLP=0.014 N=0.017

DIST=60

DIST ELEV DIST ELEV DIST ELEV

0 1.0 10 0.67 10.05 0.

12 .125 30 .485 48 .125

50 0. 50.05 .67 60 1.0

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
| .00                      | .00                   | .00                 | .00                |
| .05                      | .04                   | .04                 | 1.67               |
| .11                      | .18                   | .25                 | 3.34               |
| .16                      | .43                   | .66                 | 7.26               |
| .21                      | .95                   | 1.73                | 12.53              |
| .26                      | 1.75                  | 3.79                | 17.81              |
| .32                      | 2.83                  | 7.09                | 23.08              |
| .37                      | 4.18                  | 11.88               | 28.35              |
| .42                      | 5.81                  | 18.37               | 33.62              |
| .47                      | 7.72                  | 26.76               | 38.89              |
| .53                      | 9.82                  | 39.16               | 40.03              |
| .58                      | 11.93                 | 54.05               | 40.04              |
| .63                      | 14.03                 | 70.76               | 40.04              |
| .68                      | 16.15                 | 88.08               | 40.91              |
| .74                      | 18.39                 | 104.16              | 44.09              |
| .79                      | 20.79                 | 122.18              | 47.27              |
| .84                      | 23.36                 | 142.24              | 50.45              |
| .89                      | 26.10                 | 164.43              | 53.64              |
| .95                      | 29.01                 | 188.84              | 56.82              |
| 1.00                     | 32.08                 | 215.55              | 60.00              |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=200 FT SLOPE=0.014

TRAVEL TIME TABLE

REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .053                   | .044                      | .04                 | .0631                 |

|       |        |        |       |
|-------|--------|--------|-------|
| .105  | .176   | .25    | .0398 |
| .158  | .433   | .66    | .0362 |
| .211  | .954   | 1.73   | .0305 |
| .263  | 1.752  | 3.79   | .0257 |
| .316  | 2.828  | 7.09   | .0221 |
| .368  | 4.181  | 11.88  | .0196 |
| .421  | 5.812  | 18.37  | .0176 |
| .474  | 7.720  | 26.76  | .0160 |
| .526  | 9.820  | 39.16  | .0139 |
| .579  | 11.927 | 54.05  | .0123 |
| .632  | 14.034 | 70.76  | .0110 |
| .684  | 16.148 | 88.08  | .0102 |
| .737  | 18.385 | 104.16 | .0098 |
| .789  | 20.790 | 122.18 | .0095 |
| .842  | 23.361 | 142.24 | .0091 |
| .895  | 26.101 | 164.43 | .0088 |
| .947  | 29.007 | 188.84 | .0085 |
| 1.000 | 32.081 | 215.55 | .0083 |

ROUTE ID=3 HYD NO=210 INFLOW ID=2 DT=0.0  
 PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 210.00

RUNOFF VOLUME = .94470 INCHES = 6.8698 ACRE-FEET  
 PEAK DISCHARGE RATE = 179.87 CFS AT 1.565 HOURS BASIN AREA = .1364 SQ. MI.

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 07:13:02

***APPENDIX C***  
***DEVELOPED CONDITIONS***  
***OPTION 1 AND OPTION 2***

# S.B.100 DEVELOPED

**INPUT FILE = saged.dat**

RUN DATE (MON/DAY/YR) =08/06/1996

USER NO.= M GOODWIN.I01

|                  |                | FROM | TO  |         | PEAK      | RUNOFF  | TIME TO  |         | CFS   | PAGE = 1       |
|------------------|----------------|------|-----|---------|-----------|---------|----------|---------|-------|----------------|
|                  | HYDROGRAPH     | ID   | ID  | AREA    | DISCHARGE | VOLUME  | RUNOFF   | PEAK    | PER   |                |
| COMMAND          | IDENTIFICATION | NO.  | NO. | (SQ MI) | (CFS)     | (AC-FT) | (INCHES) | (HOURS) | ACRE  | NOTATION       |
| START            |                |      |     |         |           |         |          |         |       | TIME= .00      |
| RAINFALL TYPE= 1 |                |      |     |         |           |         |          |         |       | RAIN6= 2.200   |
| COMPUTE NM HYD   | 100.00         | -    | 1   | .02190  | 58.56     | 2.161   | 1.85049  | 1.499   | 4.178 | PER IMP= 90.00 |
| COMPUTE NM HYD   | 101.00         | -    | 2   | .01310  | 30.61     | 1.077   | 1.54209  | 1.499   | 3.651 | PER IMP= 64.00 |
| ADD HYD          | 101.00         | 1& 2 | 3   | .03500  | 89.17     | 3.239   | 1.73504  | 1.499   | 3.981 |                |
| ROUTE            | 201.00         | 3    | 4   | .03500  | 87.02     | 3.239   | 1.73505  | 1.532   | 3.885 |                |
| COMPUTE NM HYD   | 104.00         | -    | 1   | .01350  | 27.72     | .924    | 1.28283  | 1.499   | 3.208 | PER IMP= 42.00 |
| ADD HYD          | 104.00         | 1& 4 | 2   | .04850  | 113.98    | 4.162   | 1.60916  | 1.532   | 3.672 |                |
| ROUTE            | 204.00         | 2    | 3   | .04850  | 109.04    | 4.162   | 1.60917  | 1.565   | 3.513 |                |
| COMPUTE NM HYD   | 102.00         | -    | 1   | .01310  | 28.19     | .961    | 1.37477  | 1.499   | 3.362 | PER IMP= 50.00 |
| COMPUTE NM HYD   | 103.00         | -    | 2   | .00398  | 8.42      | .284    | 1.33869  | 1.499   | 3.304 | PER IMP= 47.00 |
| ADD HYD          | 103.00         | 1& 2 | 4   | .01708  | 36.61     | 1.245   | 1.36633  | 1.499   | 3.349 |                |
| ADD HYD          | 104.00         | 3& 4 | 2   | .06558  | 143.86    | 5.407   | 1.54592  | 1.532   | 3.428 |                |
| ROUTE            | 203.00         | 2    | 3   | .06558  | 143.31    | 5.407   | 1.54593  | 1.532   | 3.415 |                |
| COMPUTE NM HYD   | 105.00         | -    | 1   | .00526  | 10.81     | .360    | 1.28283  | 1.499   | 3.211 | PER IMP= 42.00 |
| ADD HYD          | 105.00         | 1& 3 | 2   | .07084  | 153.83    | 5.767   | 1.52638  | 1.532   | 3.393 |                |
| ROUTE            | 205.00         | 2    | 3   | .07084  | 139.30    | 5.767   | 1.52639  | 1.665   | 3.072 |                |
| COMPUTE NM HYD   | 106.00         | -    | 1   | .01893  | 39.79     | 1.342   | 1.32880  | 1.499   | 3.285 | PER IMP= 46.00 |
| ADD HYD          | 106.00         | 1& 3 | 2   | .08977  | 165.01    | 7.108   | 1.48471  | 1.598   | 2.872 |                |
| ROUTE            | 206.00         | 2    | 3   | .08977  | 164.22    | 7.108   | 1.48472  | 1.598   | 2.858 |                |
| COMPUTE NM HYD   | 107.00         | -    | 1   | .02670  | 46.95     | 1.469   | 1.03176  | 1.499   | 2.748 | PER IMP= 23.00 |
| COMPUTE NM HYD   | 108.00         | -    | 2   | .00600  | 12.29     | .409    | 1.27962  | 1.499   | 3.201 | PER IMP= 42.00 |
| ADD HYD          | 108.00         | 1& 2 | 4   | .03270  | 59.24     | 1.879   | 1.07722  | 1.499   | 2.831 |                |
| ADD HYD          | 108.00         | 3& 4 | 2   | .12247  | 210.14    | 8.987   | 1.37591  | 1.565   | 2.681 |                |
| ROUTE            | 208.00         | 2    | 3   | .12247  | 210.30    | 8.987   | 1.37591  | 1.598   | 2.683 |                |
| COMPUTE NM HYD   | 109.00         | -    | 1   | .00570  | 11.48     | .379    | 1.24675  | 1.499   | 3.148 | PER IMP= 39.00 |
| COMPUTE NM HYD   | 110.00         | -    | 2   | .00193  | 3.98      | .132    | 1.28283  | 1.499   | 3.219 | PER IMP= 42.00 |
| ADD HYD          | 110.00         | 1& 2 | 4   | .00763  | 15.46     | .511    | 1.25580  | 1.499   | 3.166 |                |
| ADD HYD          | 110.00         | 3& 4 | 2   | .13010  | 222.14    | 9.498   | 1.36887  | 1.565   | 2.668 |                |
| ROUTE            | 210.00         | 2    | 3   | .13010  | 222.86    | 9.498   | 1.36887  | 1.598   | 2.677 |                |
| FINISH           |                |      |     |         |           |         |          |         |       |                |

### OPTION 1

RUN DATE (MON/DAY/YR) =08/06/1996

USER NO.= M\_GOODMAN.I01

[illegible]

AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994  
RUN DATE (MON/DAY/YR) = 08/06/1996  
START TIME (HR:MIN:SEC) = 16:48:33 USER NO.= M\_GOODWN.I01  
INPUT FILE = sagedo1.dat

START TIME=0.0  
\*\*\*\*\* SUN SAGE HILLS SUBDIVISION - DEVELOPED CONDITIONS  
\*\*\*\*\* 100-YEAR 6-HOUR STORM EVENT  
\*\*\*\*\* REAR YARD PONDS IN SUB-BASINS 102-106, 108, 110;  
\*\*\*\*\* ASSUME 56% OF TOTAL LOT AREA CONTRIBUTES TO STREET RUNOFF  
\*\*\*\*\* FOR SUB-BASINS (102-06,108,110) WITH REAR YARD PONDS;  
\*\*\*\*\* SPLIT B/C LAND TREATMENT 60/40  
\*\*\*\*\* SB 100 LIMIT DISCHARGE TO 18.2 CFS WHERE Q.(EXIST)=Q(DEV)  
\*\*\*\*\*  
\*\*\*\*\* FILE: SAGEDO1.DAT JULY 23 1996 BY:DLH  
\*\*\*\*\*

RAINFALL TYPE=1 RAIN QUARTER=0.0 IN  
RAIN ONE=1.87 IN RAIN SIX=2.20 IN  
RAIN DAY=2.66 IN DT=0.0333 HR

COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.  
DT = .033300 HOURS END TIME = 5.994000 HOURS

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| .0000  | .0016  | .0033  | .0050  | .0067  | .0085  | .0103  |
| .0121  | .0140  | .0160  | .0180  | .0200  | .0221  | .0243  |
| .0265  | .0288  | .0312  | .0336  | .0361  | .0387  | .0414  |
| .0442  | .0471  | .0501  | .0533  | .0566  | .0600  | .0636  |
| .0674  | .0714  | .0757  | .0808  | .0863  | .0922  | .1044  |
| .1323  | .1754  | .2374  | .3221  | .4335  | .5756  | .7527  |
| .9690  | 1.1767 | 1.2619 | 1.3336 | 1.3972 | 1.4551 | 1.5084 |
| 1.5579 | 1.6041 | 1.6474 | 1.6881 | 1.7266 | 1.7629 | 1.7973 |
| 1.8298 | 1.8607 | 1.8900 | 1.9178 | 1.9442 | 1.9515 | 1.9573 |
| 1.9627 | 1.9680 | 1.9729 | 1.9777 | 1.9823 | 1.9867 | 1.9909 |
| 1.9950 | 1.9990 | 2.0029 | 2.0066 | 2.0102 | 2.0137 | 2.0172 |
| 2.0205 | 2.0238 | 2.0269 | 2.0300 | 2.0331 | 2.0360 | 2.0389 |
| 2.0418 | 2.0446 | 2.0473 | 2.0500 | 2.0526 | 2.0552 | 2.0578 |
| 2.0603 | 2.0627 | 2.0651 | 2.0675 | 2.0698 | 2.0721 | 2.0744 |
| 2.0766 | 2.0788 | 2.0810 | 2.0832 | 2.0853 | 2.0873 | 2.0894 |
| 2.0914 | 2.0934 | 2.0954 | 2.0974 | 2.0993 | 2.1012 | 2.1031 |
| 2.1050 | 2.1068 | 2.1086 | 2.1104 | 2.1122 | 2.1140 | 2.1157 |
| 2.1174 | 2.1191 | 2.1208 | 2.1225 | 2.1242 | 2.1258 | 2.1274 |
| 2.1290 | 2.1306 | 2.1322 | 2.1338 | 2.1353 | 2.1369 | 2.1384 |
| 2.1399 | 2.1414 | 2.1429 | 2.1444 | 2.1459 | 2.1473 | 2.1487 |
| 2.1502 | 2.1516 | 2.1530 | 2.1544 | 2.1558 | 2.1571 | 2.1585 |
| 2.1599 | 2.1612 | 2.1625 | 2.1639 | 2.1652 | 2.1665 | 2.1678 |
| 2.1691 | 2.1703 | 2.1716 | 2.1729 | 2.1741 | 2.1754 | 2.1766 |
| 2.1778 | 2.1791 | 2.1803 | 2.1815 | 2.1827 | 2.1839 | 2.1850 |
| 2.1862 | 2.1874 | 2.1886 | 2.1897 | 2.1909 | 2.1920 | 2.1931 |
| 2.1943 | 2.1954 | 2.1965 | 2.1976 | 2.1987 | 2.1998 |        |

\*\*\*\*\*  
\*\*\*\*\* SUB-BASIN 100 (UNDEVELOPED) ASSUME COMMERCIAL DEVELOPED  
\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=100.0 AREA=0.0219 SQ MI  
PER A=0 PER B=5 PER C=5 PER D=90  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 77.816 CFS UNIT VOLUME = .9992 B = 526.28 P60 = 1.8700  
AREA = .019710 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .118429HR TP = .133300HR K/TP RATIO = .888442 SHAPE CONSTANT, N = 3.992480  
UNIT PEAK = 5.8269 CFS UNIT VOLUME = .9982 B = 354.67 P60 = 1.8700  
AREA = .002190 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 100.00

RUNOFF VOLUME = 1.85049 INCHES = 2.1614 ACRE-FEET  
 PEAK DISCHARGE RATE = 58.56 CFS AT 1.499 HOURS BASIN AREA = .0219 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* MAXIMUM FLOW FROM SB 100 IS 18.2 CFS  
 \*\*\*\*\* ROUTE THROUGH DETENTION POND (APPROX. POND AREA 116'x116')  
 \*\*\*\*\* USING AN ORIFICE TO CONSTRICT FLOW

\*\*\*\*\*  
 ROUTE RESERVOIR ID=2 HYD=POND.101 INFLOW=1 CODE=10

OUTFLOW(CFS) STORAGE(AC FT) ELEV(FT)

|       |       |      |
|-------|-------|------|
| 0     | 0     | 19.0 |
| 1.74  | .094  | 19.5 |
| 5.72  | .194  | 20.0 |
| 7.40  | .301  | 20.5 |
| 10.87 | .414  | 21.0 |
| 14.59 | .662  | 22.0 |
| 17.53 | .938  | 23.0 |
| 20.05 | 1.248 | 24.0 |

\*\*\*\*\*

| TIME<br>(HRS) | INFLOW<br>(CFS) | ELEV<br>(FEET) | VOLUME<br>(AC-FT) | OUTFLOW<br>(CFS) |
|---------------|-----------------|----------------|-------------------|------------------|
|---------------|-----------------|----------------|-------------------|------------------|

|      |       |       |      |       |
|------|-------|-------|------|-------|
| .00  | .00   | 19.00 | .000 | .00   |
| .33  | .00   | 19.00 | .000 | .00   |
| .67  | .00   | 19.00 | .000 | .00   |
| 1.00 | .00   | 19.00 | .000 | .00   |
| 1.33 | 16.89 | 19.41 | .077 | 1.43  |
| 1.67 | 29.83 | 22.92 | .916 | 17.29 |
| 2.00 | 14.08 | 23.12 | .977 | 17.84 |
| 2.33 | 3.00  | 22.22 | .722 | 15.23 |
| 2.66 | 1.24  | 21.01 | .416 | 10.90 |
| 3.00 | .66   | 20.13 | .222 | 6.16  |
| 3.33 | .44   | 19.61 | .117 | 2.65  |
| 3.66 | .36   | 19.41 | .077 | 1.42  |
| 4.00 | .32   | 19.28 | .053 | .99   |
| 4.33 | .31   | 19.21 | .039 | .72   |
| 4.66 | .32   | 19.16 | .030 | .56   |
| 5.00 | .33   | 19.13 | .025 | .46   |
| 5.33 | .35   | 19.12 | .022 | .41   |
| 5.66 | .37   | 19.11 | .021 | .39   |
| 5.99 | .40   | 19.11 | .021 | .39   |
| 6.33 | .04   | 19.09 | .017 | .31   |
| 6.66 | .01   | 19.06 | .010 | .19   |
| 6.99 | .00   | 19.03 | .006 | .12   |
| 7.33 | .00   | 19.02 | .004 | .07   |
| 7.66 | .00   | 19.01 | .002 | .04   |
| 7.99 | .00   | 19.01 | .001 | .03   |
| 8.33 | .00   | 19.00 | .001 | .02   |
| 8.66 | .00   | 19.00 | .001 | .01   |
| 8.99 | .00   | 19.00 | .000 | .01   |
| 9.32 | .00   | 19.00 | .000 | .00   |

PEAK DISCHARGE = 18.021 CFS - PEAK OCCURS AT HOUR 1.86  
 MAXIMUM WATER SURFACE ELEVATION = 23.195  
 MAXIMUM STORAGE = .9984 AC-FT INCREMENTAL TIME= .033300HRS

PRINT HYD ID=2 CODE=1

HYDROGRAPH FROM AREA POND.101

RUNOFF VOLUME = 1.85047 INCHES = 2.1613 ACRE-FEET  
 PEAK DISCHARGE RATE = 18.02 CFS AT 1.865 HOURS BASIN AREA = .0219 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 101 SUN SAGE HILLS TOWNHOMES (6.9 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=101.0 AREA=0.0131 SQ MI

PER A=0 PER B=21 PER C=15 PER D=64

TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420

UNIT PEAK = 33.100 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 1.8700

AREA = .008384 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120523HR TP = .133300HR K/TP RATIO = .904149 SHAPE CONSTANT, N = 3.918663

UNIT PEAK = 12.372 CFS UNIT VOLUME = .9994 B = 349.71 P60 = 1.8700

AREA = .004716 SQ MI IA = .43750 INCHES INF = 1.07500 INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 101.00

RUNOFF VOLUME = 1.54209 INCHES = 1.0774 ACRE-FEET

PEAK DISCHARGE RATE = 30.61 CFS AT 1.499 HOURS BASIN AREA = .0131 SQ. MI.

\*\*\*\*\*

\*\*\*\*\*ADD SB 100 AND SB 101

\*\*\*\*\*

ADD HYD ID=3 HYD=101 ID=1 ID=2

PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 101.00

RUNOFF VOLUME = 1.73501 INCHES = 3.2387 ACRE-FEET

PEAK DISCHARGE RATE = 43.69 CFS AT 1.532 HOURS BASIN AREA = .0350 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 250 FT SOUTH ON 94TH STREET 32' FF 50' ROW

\*\*\*\*\* @ 0.005 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.005 FP SLP=0.005 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
| .00                      | .00                   | .00                 | .00                |
| .05                      | .03                   | .02                 | 1.45               |
| .09                      | .13                   | .10                 | 2.91               |
| .14                      | .30                   | .27                 | 5.21               |
| .18                      | .65                   | .64                 | 9.79               |
| .23                      | 1.20                  | 1.39                | 14.38              |
| .27                      | 1.97                  | 2.63                | 18.96              |
| .32                      | 2.94                  | 4.46                | 23.55              |

|     |       |       |       |
|-----|-------|-------|-------|
| .37 | 4.12  | 6.97  | 28.14 |
| .41 | 5.51  | 10.38 | 32.01 |
| .46 | 6.98  | 15.35 | 32.02 |
| .50 | 8.44  | 21.05 | 32.03 |
| .55 | 9.91  | 27.44 | 32.03 |
| .60 | 11.38 | 34.47 | 32.04 |
| .64 | 12.85 | 42.12 | 32.05 |
| .69 | 14.33 | 48.98 | 33.56 |
| .73 | 15.96 | 54.42 | 37.67 |
| .78 | 17.78 | 60.93 | 41.78 |
| .82 | 19.78 | 68.53 | 45.89 |
| .87 | 21.98 | 77.24 | 50.00 |

COMPUTE TRAVEL TIME ID=4 REACH NO=1 NO VS=1 LENGTH=250 FT SLOPE=0.005

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .02                 | .1449                 |
| .092                   | .133                      | .10                 | .0913                 |
| .137                   | .305                      | .27                 | .0770                 |
| .183                   | .648                      | .64                 | .0703                 |
| .229                   | 1.202                     | 1.39                | .0600                 |
| .275                   | 1.965                     | 2.63                | .0519                 |
| .321                   | 2.938                     | 4.46                | .0458                 |
| .366                   | 4.122                     | 6.97                | .0411                 |
| .412                   | 5.513                     | 10.38               | .0369                 |
| .458                   | 6.979                     | 15.35               | .0316                 |
| .504                   | 8.445                     | 21.05               | .0279                 |
| .549                   | 9.911                     | 27.44               | .0251                 |
| .595                   | 11.378                    | 34.47               | .0229                 |
| .641                   | 12.845                    | 42.12               | .0212                 |
| .687                   | 14.326                    | 48.98               | .0203                 |
| .733                   | 15.956                    | 54.42               | .0204                 |
| .778                   | 17.776                    | 60.93               | .0203                 |
| .824                   | 19.783                    | 68.53               | .0200                 |
| .870                   | 21.978                    | 77.24               | .0198                 |

ROUTE ID=4 HYD NO=201 INFLOW ID=3 DT=0.0  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 201.00

RUNOFF VOLUME = 1.73502 INCHES = 3.2387 ACRE-FEET  
PEAK DISCHARGE RATE = 43.87 CFS AT 1.532 HOURS BASIN AREA = .0350 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 104 RESIDENTIAL (4.0 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=104.0 AREA=0.01350 SQ MI  
PER A=0 PER B=34 PER C=24 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 22.385 CFS UNIT VOLUME = .9988 B = 526.28 P60 = 1.8700  
AREA = .005670 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120595HR TP = .133300HR K/TP RATIO = .904691 SHAPE CONSTANT, N = 3.916166  
UNIT PEAK = 20.532 CFS UNIT VOLUME = .9998 B = 349.54 P60 = 1.8700  
AREA = .007830 SQ MI IA = .43793 INCHES INF = 1.07621 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.28283 INCHES = .9236 ACRE-FEET  
 PEAK DISCHARGE RATE = 27.72 CFS AT 1.499 HOURS BASIN AREA = .0135 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 AND 101 AND 104

\*\*\*\*\*

ADD HYD ID=2 HYD=104 ID=1 ID=4  
 PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.60914 INCHES = 4.1623 ACRE-FEET  
 PEAK DISCHARGE RATE = 70.83 CFS AT 1.532 HOURS BASIN AREA = .0485 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 770 FT EAST ON REBA AVE 32' 50' ROW

\*\*\*\*\* FF @ 0.0164 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.0164 FP SLP=0.0164 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
|--------------------------|-----------------------|---------------------|--------------------|

|     |       |        |       |
|-----|-------|--------|-------|
| .00 | .00   | .00    | .00   |
| .05 | .03   | .03    | 1.45  |
| .09 | .13   | .18    | 2.91  |
| .14 | .30   | .50    | 5.21  |
| .18 | .65   | 1.16   | 9.79  |
| .23 | 1.20  | 2.52   | 14.38 |
| .27 | 1.97  | 4.77   | 18.96 |
| .32 | 2.94  | 8.07   | 23.55 |
| .37 | 4.12  | 12.62  | 28.14 |
| .41 | 5.51  | 18.80  | 32.01 |
| .46 | 6.98  | 27.79  | 32.02 |
| .50 | 8.44  | 38.12  | 32.03 |
| .55 | 9.91  | 49.69  | 32.03 |
| .60 | 11.38 | 62.43  | 32.04 |
| .64 | 12.85 | 76.28  | 32.05 |
| .69 | 14.33 | 88.71  | 33.56 |
| .73 | 15.96 | 98.56  | 37.67 |
| .78 | 17.78 | 110.35 | 41.78 |
| .82 | 19.78 | 124.11 | 45.89 |
| .87 | 21.98 | 139.89 | 50.00 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=770 FT SLOPE=0.0164

TRAVEL TIME TABLE  
 REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .03                 | .2464                 |
| .092                   | .133                      | .18                 | .1552                 |

|      |        |        |       |
|------|--------|--------|-------|
| .137 | .305   | .50    | .1310 |
| .183 | .648   | 1.16   | .1195 |
| .229 | 1.202  | 2.52   | .1020 |
| .275 | 1.965  | 4.77   | .0882 |
| .321 | 2.938  | 8.07   | .0778 |
| .366 | 4.122  | 12.62  | .0699 |
| .412 | 5.513  | 18.80  | .0627 |
| .458 | 6.979  | 27.79  | .0537 |
| .504 | 8.445  | 38.12  | .0474 |
| .549 | 9.911  | 49.69  | .0427 |
| .595 | 11.378 | 62.43  | .0390 |
| .641 | 12.845 | 76.28  | .0360 |
| .687 | 14.326 | 88.71  | .0345 |
| .733 | 15.956 | 98.56  | .0346 |
| .778 | 17.776 | 110.35 | .0345 |
| .824 | 19.783 | 124.11 | .0341 |
| .870 | 21.978 | 139.89 | .0336 |

ROUTE ID=3 HYD NO=204 INFLOW ID=2 DT=0.0  
 PRINT HYD ID=3 CODE=1

#### PARTIAL HYDROGRAPH 204.00

RUNOFF VOLUME = 1.60915 INCHES = 4.1623 ACRE-FEET  
 PEAK DISCHARGE RATE = 69.10 CFS AT 1.565 HOURS BASIN AREA = .0485 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 102 RESIDENTIAL (5.1 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=102.0 AREA=0.01310 SQ MI  
 PER A=0 PER B=30 PER C=20 PER D=50  
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
 UNIT PEAK = 25.860 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8700  
 AREA = .006550 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120942HR TP = .133300HR K/TP RATIO = .907291 SHAPE CONSTANT, N = 3.904285  
 UNIT PEAK = 17.136 CFS UNIT VOLUME = .9996 B = 348.74 P60 = 1.8700  
 AREA = .006550 SQ MI IA = .44000 INCHES INF = 1.08200 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

#### PARTIAL HYDROGRAPH 102.00

RUNOFF VOLUME = 1.37477 INCHES = .9605 ACRE-FEET  
 PEAK DISCHARGE RATE = 28.19 CFS AT 1.499 HOURS BASIN AREA = .0131 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 103 RESIDENTIAL (4.6 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=103.0 AREA=0.00398 SQ MI  
 PER A=0 PER B=32 PER C=21 PER D=47  
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
 UNIT PEAK = 7.3852 CFS UNIT VOLUME = .9978 B = 526.28 P60 = 1.8700  
 AREA = .001871 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .121037HR TP = .133300HR K/TP RATIO = .908002 SHAPE CONSTANT, N = 3.901043  
UNIT PEAK = 5.5151 CFS UNIT VOLUME = .9980 B = 348.52 P60 = 1.8700  
AREA = .002109 SQ MI IA = .44057 INCHES INF = 1.08358 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 1.33869 INCHES = .2842 ACRE-FEET  
PEAK DISCHARGE RATE = 8.42 CFS AT 1.499 HOURS BASIN AREA = .0040 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 102 AND 103

\*\*\*\*\*

ADD HYD ID=4 HYD=103 ID=1 ID=2  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 1.36633 INCHES = 1.2446 ACRE-FEET  
PEAK DISCHARGE RATE = 36.61 CFS AT 1.499 HOURS BASIN AREA = .0171 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100, 101, 102, 103, 104

\*\*\*\*\*

ADD HYD ID=2 HYD=104 ID=3 ID=4  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.54590 INCHES = 5.4069 ACRE-FEET  
PEAK DISCHARGE RATE = 104.14 CFS AT 1.532 HOURS BASIN AREA = .0656 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 150 FT SOUTHEAST ON BLAZICK AVE 32' FF 50' ROW  
\*\*\*\*\* @ 0.02 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.02 FP SLP=0.02 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
| .00                      | .00                   | .00                 | .00                |
| .05                      | .03                   | .03                 | 1.45               |
| .09                      | .13                   | .20                 | 2.91               |
| .14                      | .30                   | .55                 | 5.21               |
| .18                      | .65                   | 1.28                | 9.79               |
| .23                      | 1.20                  | 2.78                | 14.38              |
| .27                      | 1.97                  | 5.26                | 18.96              |
| .32                      | 2.94                  | 8.92                | 23.55              |
| .37                      | 4.12                  | 13.93               | 28.14              |

|     |       |        |       |
|-----|-------|--------|-------|
| .41 | 5.51  | 20.76  | 32.01 |
| .46 | 6.98  | 30.69  | 32.02 |
| .50 | 8.44  | 42.10  | 32.03 |
| .55 | 9.91  | 54.88  | 32.03 |
| .60 | 11.38 | 68.94  | 32.04 |
| .64 | 12.85 | 84.23  | 32.05 |
| .69 | 14.33 | 97.96  | 33.56 |
| .73 | 15.96 | 108.84 | 37.67 |
| .78 | 17.78 | 121.86 | 41.78 |
| .82 | 19.78 | 137.06 | 45.89 |
| .87 | 21.98 | 154.48 | 50.00 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=150 FT SLOPE=0.02

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .03                 | .0435                 |
| .092                   | .133                      | .20                 | .0274                 |
| .137                   | .305                      | .55                 | .0231                 |
| .183                   | .648                      | 1.28                | .0211                 |
| .229                   | 1.202                     | 2.78                | .0180                 |
| .275                   | 1.965                     | 5.26                | .0156                 |
| .321                   | 2.938                     | 8.92                | .0137                 |
| .366                   | 4.122                     | 13.93               | .0123                 |
| .412                   | 5.513                     | 20.76               | .0111                 |
| .458                   | 6.979                     | 30.69               | .0095                 |
| .504                   | 8.445                     | 42.10               | .0084                 |
| .549                   | 9.911                     | 54.88               | .0075                 |
| .595                   | 11.378                    | 68.94               | .0069                 |
| .641                   | 12.845                    | 84.23               | .0064                 |
| .687                   | 14.326                    | 97.96               | .0061                 |
| .733                   | 15.956                    | 108.84              | .0061                 |
| .778                   | 17.776                    | 121.86              | .0061                 |
| .824                   | 19.783                    | 137.06              | .0060                 |
| .870                   | 21.978                    | 154.48              | .0059                 |

ROUTE ID=3 HYD NO=203 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 203.00

RUNOFF VOLUME = 1.54591 INCHES = 5.4069 ACRE-FEET  
PEAK DISCHARGE RATE = 103.85 CFS AT 1.532 HOURS BASIN AREA = .0656 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 105 RESIDENTIAL (4.0 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=105.0 AREA=0.00526 SQ MI  
PER A=0 PER B=34 PER C=24 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 8.7220 CFS UNIT VOLUME = .9980 B = 526.28 P60 = 1.8700  
AREA = .002209 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120595HR TP = .133300HR K/TP RATIO = .904691 SHAPE CONSTANT, N = 3.916166  
UNIT PEAK = 7.9999 CFS UNIT VOLUME = .9988 B = 349.54 P60 = 1.8700  
AREA = .003051 SQ MI IA = .43793 INCHES INF = 1.07621 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 1.28283 INCHES = .3599 ACRE-FEET  
 PEAK DISCHARGE RATE = 10.81 CFS AT 1.499 HOURS BASIN AREA = .0053 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 104 AND 105

\*\*\*\*\*

ADD HYD ID=2 HYD=105 ID=1 ID=3  
 PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 1.52636 INCHES = 5.7668 ACRE-FEET  
 PEAK DISCHARGE RATE = 114.37 CFS AT 1.532 HOURS BASIN AREA = .0708 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 1050 FT EAST ON SONYA AVE 32' FF 50' ROW

\*\*\*\*\* @ 0.0112 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.0112 FP SLP=0.0112 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
|--------------------------|-----------------------|---------------------|--------------------|

|     |       |        |       |
|-----|-------|--------|-------|
| .00 | .00   | .00    | .00   |
| .05 | .03   | .02    | 1.45  |
| .09 | .13   | .15    | 2.91  |
| .14 | .30   | .41    | 5.21  |
| .18 | .65   | .96    | 9.79  |
| .23 | 1.20  | 2.08   | 14.38 |
| .27 | 1.97  | 3.94   | 18.96 |
| .32 | 2.94  | 6.67   | 23.55 |
| .37 | 4.12  | 10.43  | 28.14 |
| .41 | 5.51  | 15.53  | 32.01 |
| .46 | 6.98  | 22.97  | 32.02 |
| .50 | 8.44  | 31.50  | 32.03 |
| .55 | 9.91  | 41.07  | 32.03 |
| .60 | 11.38 | 51.59  | 32.04 |
| .64 | 12.85 | 63.03  | 32.05 |
| .69 | 14.33 | 73.31  | 33.56 |
| .73 | 15.96 | 81.45  | 37.67 |
| .78 | 17.78 | 91.19  | 41.78 |
| .82 | 19.78 | 102.56 | 45.89 |
| .87 | 21.98 | 115.60 | 50.00 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=1050 FT SLOPE=0.0112

TRAVEL TIME TABLE  
 REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .02                 | .4066                 |
| .092                   | .133                      | .15                 | .2562                 |

|      |        |        |       |
|------|--------|--------|-------|
| .137 | .305   | .41    | .2161 |
| .183 | .648   | .96    | .1972 |
| .229 | 1.202  | 2.08   | .1683 |
| .275 | 1.965  | 3.94   | .1455 |
| .321 | 2.938  | 6.67   | .1284 |
| .366 | 4.122  | 10.43  | .1153 |
| .412 | 5.513  | 15.53  | .1035 |
| .458 | 6.979  | 22.97  | .0886 |
| .504 | 8.445  | 31.50  | .0782 |
| .549 | 9.911  | 41.07  | .0704 |
| .595 | 11.378 | 51.59  | .0643 |
| .641 | 12.845 | 63.03  | .0594 |
| .687 | 14.326 | 73.31  | .0570 |
| .733 | 15.956 | 81.45  | .0571 |
| .778 | 17.776 | 91.19  | .0569 |
| .824 | 19.783 | 102.56 | .0563 |
| .870 | 21.978 | 115.60 | .0555 |

ROUTE ID=3 HYD NO=205 INFLOW ID=2 DT=0.0  
 PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 205.00

RUNOFF VOLUME = 1.52637 INCHES = 5.7668 ACRE-FEET  
 PEAK DISCHARGE RATE = 103.74 CFS AT 1.598 HOURS BASIN AREA = .0708 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 106 RESIDENTIAL (4.5 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=106.0 AREA=0.01893 SQ MI  
 PER A=0 PER B=32 PER C=22 PER D=46  
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
 UNIT PEAK = 34.379 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 1.8700  
 AREA = .008708 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120756HR TP = .133300HR K/TP RATIO = .905895 SHAPE CONSTANT, N = 3.910652  
 UNIT PEAK = 26.776 CFS UNIT VOLUME = .9999 B = 349.17 P60 = 1.8700  
 AREA = .010222 SQ MI IA = .43889 INCHES INF = 1.07889 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 106.00

RUNOFF VOLUME = 1.32880 INCHES = 1.3415 ACRE-FEET  
 PEAK DISCHARGE RATE = 39.79 CFS AT 1.499 HOURS BASIN AREA = .0189 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 105 AND 106

\*\*\*\*\*

ADD HYD ID=2 HYD=106 ID=1 ID=3  
 PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 106.00

RUNOFF VOLUME = 1.48470 INCHES = 7.1083 ACRE-FEET  
 PEAK DISCHARGE RATE = 136.70 CFS AT 1.565 HOURS BASIN AREA = .0898 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 400 FT SOUTHEAST ON SAPPHIRE ST. TO 86TH ST.

\*\*\*\*\* 32' FF 50' ROW @ 0.0135 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.0135 FP SLP=0.0135 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0

WATER FLOW FLOW TOP  
SURFACE AREA RATE WIDTH

ELEV SQ FT CFS FT

.00 .00 .00 .00

.05 .03 .03 1.45

.09 .13 .17 2.91

.14 .30 .45 5.21

.18 .65 1.05 9.79

.23 1.20 2.29 14.38

.27 1.97 4.32 18.96

.32 2.94 7.33 23.55

.37 4.12 11.45 28.14

.41 5.51 17.05 32.01

.46 6.98 25.22 32.02

.50 8.44 34.59 32.03

.55 9.91 45.09 32.03

.60 11.38 56.64 32.04

.64 12.85 69.20 32.05

.69 14.33 80.48 33.56

.73 15.96 89.42 37.67

.78 17.78 100.12 41.78

.82 19.78 112.60 45.89

.87 21.98 126.92 50.00

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=400 FT SLOPE=0.0135

TRAVEL TIME TABLE

REACH= 1.0

WATER AVERAGE FLOW TRAVEL

DEPTH AREA RATE TIME

FEET SQ.FT. CFS HRS

.046 .033 .03 .1411

.092 .133 .17 .0889

.137 .305 .45 .0750

.183 .648 1.05 .0684

.229 1.202 2.29 .0584

.275 1.965 4.32 .0505

.321 2.938 7.33 .0446

.366 4.122 11.45 .0400

.412 5.513 17.05 .0359

.458 6.979 25.22 .0307

.504 8.445 34.59 .0271

.549 9.911 45.09 .0244

.595 11.378 56.64 .0223

.641 12.845 69.20 .0206

.687 14.326 80.48 .0198

.733 15.956 89.42 .0198

.778 17.776 100.12 .0197

.824 19.783 112.60 .0195

.870 21.978 126.92 .0192

ROUTE ID=3 HYD NO=206 INFLOW ID=2 DT=0.0

TRAVEL TIME TABLE EXCEEDED

PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 206.00

RUNOFF VOLUME = 1.48470 INCHES = 7.1083 ACRE-FEET  
PEAK DISCHARGE RATE = 134.57 CFS AT 1.598 HOURS BASIN AREA = .0898 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 107 RESIDENTIAL (PARK/RESIDENTIAL/WATER TNK)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=107.0 AREA=0.0267 SQ MI  
PER A=0 PER B=54 PER C=23 PER D=23  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 24.245 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8700  
AREA = .006141 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .123487HR TP = .133300HR K/TP RATIO = .926384 SHAPE CONSTANT, N = 3.819526  
UNIT PEAK = 52.894 CFS UNIT VOLUME = 1.000 B = 342.95 P60 = 1.8700  
AREA = .020559 SQ MI IA = .45519 INCHES INF = 1.12455 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 107.00

RUNOFF VOLUME = 1.03176 INCHES = 1.4692 ACRE-FEET  
PEAK DISCHARGE RATE = 46.95 CFS AT 1.499 HOURS BASIN AREA = .0267 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 108 UNDEVELOPED ASSUME RESIDENTIAL @ 4.0 UN/AC

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=108.0 AREA=0.00600 SQ MI  
PER A=0 PER B=35 PER C=23 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 9.9491 CFS UNIT VOLUME = .9982 B = 526.28 P60 = 1.8700  
AREA = .002520 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .121029HR TP = .133300HR K/TP RATIO = .907941 SHAPE CONSTANT, N = 3.901327  
UNIT PEAK = 9.0991 CFS UNIT VOLUME = .9990 B = 348.54 P60 = 1.8700  
AREA = .003480 SQ MI IA = .44052 INCHES INF = 1.08345 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = 1.27962 INCHES = .4095 ACRE-FEET  
PEAK DISCHARGE RATE = 12.29 CFS AT 1.499 HOURS BASIN AREA = .0060 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 107 AND 108

\*\*\*\*\*

ADD HYD ID=4 HYD=108 ID=1 ID=2  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = 1.07722 INCHES = 1.8787 ACRE-FEET  
PEAK DISCHARGE RATE = 59.24 CFS AT 1.499 HOURS BASIN AREA = .0327 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 108

\*\*\*\*\*

ADD HYD ID=2 HYD=108 ID=3 ID=4  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = 1.37590 INCHES = 8.9869 ACRE-FEET  
PEAK DISCHARGE RATE = 185.43 CFS AT 1.565 HOURS BASIN AREA = .1225 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 300 FT SOUTHEAST ON SAPPHIRE ST. TO MICHELLES

\*\*\*\*\* 40' FF 60' ROW @ 0.014 FT/FT

\*\*\*\*\* INCLUDES 8" DIVERSION BERM

COMPUTE RATING CURVE CID=1 VS NO=11 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=1.67

CH SLP=.014 FP SLP=0.014 N=0.017

DIST=60.05

DIST ELEV DIST ELEV DIST ELEV

0 1.67 0.05 1.0 10 0.67

10.05 0. 12 .125 30 .485

48 .125 50 0. 50.05 0.67

60 1.0 60.05 1.67

RATING CURVE VALLEY SECTION 11.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
|--------------------------|-----------------------|---------------------|--------------------|

|     |     |     |     |
|-----|-----|-----|-----|
| .00 | .00 | .00 | .00 |
|-----|-----|-----|-----|

|     |     |     |      |
|-----|-----|-----|------|
| .09 | .37 | .40 | 8.51 |
|-----|-----|-----|------|

|     |      |      |       |
|-----|------|------|-------|
| .18 | 1.48 | 2.55 | 16.43 |
|-----|------|------|-------|

|     |      |      |       |
|-----|------|------|-------|
| .26 | 3.25 | 7.33 | 23.92 |
|-----|------|------|-------|

|     |      |       |       |
|-----|------|-------|-------|
| .35 | 5.69 | 15.46 | 31.41 |
|-----|------|-------|-------|

|     |      |       |       |
|-----|------|-------|-------|
| .44 | 8.78 | 27.58 | 38.90 |
|-----|------|-------|-------|

|     |       |       |       |
|-----|-------|-------|-------|
| .53 | 12.44 | 45.89 | 42.16 |
|-----|-------|-------|-------|

|     |       |       |       |
|-----|-------|-------|-------|
| .62 | 16.08 | 69.36 | 40.86 |
|-----|-------|-------|-------|

|     |       |       |       |
|-----|-------|-------|-------|
| .70 | 19.66 | 93.94 | 42.05 |
|-----|-------|-------|-------|

|     |       |        |       |
|-----|-------|--------|-------|
| .79 | 23.59 | 120.55 | 47.35 |
|-----|-------|--------|-------|

|     |       |        |       |
|-----|-------|--------|-------|
| .88 | 27.98 | 152.43 | 52.65 |
|-----|-------|--------|-------|

|     |       |        |       |
|-----|-------|--------|-------|
| .97 | 32.84 | 189.99 | 57.95 |
|-----|-------|--------|-------|

|      |       |        |       |
|------|-------|--------|-------|
| 1.05 | 38.08 | 238.86 | 59.96 |
|------|-------|--------|-------|

|      |       |        |       |
|------|-------|--------|-------|
| 1.14 | 43.35 | 296.03 | 59.97 |
|------|-------|--------|-------|

|      |       |        |       |
|------|-------|--------|-------|
| 1.23 | 48.62 | 357.91 | 59.98 |
|------|-------|--------|-------|

|      |       |        |       |
|------|-------|--------|-------|
| 1.32 | 53.90 | 424.30 | 60.00 |
|------|-------|--------|-------|

|      |       |        |       |
|------|-------|--------|-------|
| 1.41 | 59.17 | 495.01 | 60.01 |
|------|-------|--------|-------|

|      |       |        |       |
|------|-------|--------|-------|
| 1.49 | 64.44 | 569.91 | 60.02 |
|------|-------|--------|-------|

|      |       |        |       |
|------|-------|--------|-------|
| 1.58 | 69.72 | 648.85 | 60.04 |
|------|-------|--------|-------|

|      |       |        |       |
|------|-------|--------|-------|
| 1.67 | 75.00 | 731.70 | 60.05 |
|------|-------|--------|-------|

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=300 FT SLOPE=0.014

TRAVEL TIME TABLE

REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .088                   | .374                      | .40                 | .0777                 |
| .176                   | 1.481                     | 2.55                | .0484                 |
| .264                   | 3.254                     | 7.33                | .0370                 |

|       |        |        |       |
|-------|--------|--------|-------|
| .352  | 5.686  | 15.46  | .0307 |
| .439  | 8.777  | 27.58  | .0265 |
| .527  | 12.435 | 45.89  | .0226 |
| .615  | 16.084 | 69.36  | .0193 |
| .703  | 19.659 | 93.94  | .0174 |
| .791  | 23.588 | 120.55 | .0163 |
| .879  | 27.983 | 152.43 | .0153 |
| .967  | 32.843 | 189.99 | .0144 |
| 1.055 | 38.080 | 238.86 | .0133 |
| 1.143 | 43.350 | 296.03 | .0122 |
| 1.231 | 48.622 | 357.91 | .0113 |
| 1.318 | 53.895 | 424.30 | .0106 |
| 1.406 | 59.169 | 495.01 | .0100 |
| 1.494 | 64.444 | 569.91 | .0094 |
| 1.582 | 69.721 | 648.85 | .0090 |
| 1.670 | 74.998 | 731.70 | .0085 |

ROUTE ID=3 HYD NO=208 INFLOW ID=2 DT=0.0  
 PRINT HYD ID=3 CODE=1

#### PARTIAL HYDROGRAPH 208.00

RUNOFF VOLUME = 1.37590 INCHES = 8.9870 ACRE-FEET  
 PEAK DISCHARGE RATE = 185.03 CFS AT 1.565 HOURS BASIN AREA = .1225 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 109 RESIDENTIAL (3.8 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=109.0 AREA=0.0057 SQ MI  
 PER A=0 PER B=36 PER C=25 PER D=39  
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
 UNIT PEAK = 8.7765 CFS UNIT VOLUME = .9980 B = 526.28 P60 = 1.8700  
 AREA = .002223 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120695HR TP = .133300HR K/TP RATIO = .905437 SHAPE CONSTANT, N = 3.912748  
 UNIT PEAK = 9.1114 CFS UNIT VOLUME = .9989 B = 349.31 P60 = 1.8700  
 AREA = .003477 SQ MI IA = .43852 INCHES INF = 1.07787 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

#### PARTIAL HYDROGRAPH 109.00

RUNOFF VOLUME = 1.24675 INCHES = .3790 ACRE-FEET  
 PEAK DISCHARGE RATE = 11.48 CFS AT 1.499 HOURS BASIN AREA = .0057 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 110 UNDEVELOPED ASSUME RESIDENTIAL @ 4.0 UN/AC

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=110.0 AREA=0.00193 SQ MI  
 PER A=0 PER B=34 PER C=24 PER D=42  
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
 UNIT PEAK = 3.2003 CFS UNIT VOLUME = .9960 B = 526.28 P60 = 1.8700  
 AREA = .000811 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120595HR TP = .133300HR K/TP RATIO = .904691 SHAPE CONSTANT, N = 3.916166

UNIT PEAK = 2.9353 CFS UNIT VOLUME = .9958 B = 349.54 P60 = 1.8700  
AREA = .001119 SQ MI IA = .43793 INCHES INF = 1.07621 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = 1.28283 INCHES = .1320 ACRE-FEET  
PEAK DISCHARGE RATE = 3.98 CFS AT 1.499 HOURS BASIN AREA = .0019 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 109 AND 110

\*\*\*\*\*

ADD HYD ID=4 HYD=110 ID=1 ID=2  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = 1.25580 INCHES = .5110 ACRE-FEET  
PEAK DISCHARGE RATE = 15.46 CFS AT 1.499 HOURS BASIN AREA = .0076 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 thru 110

\*\*\*\*\*

ADD HYD ID=2 HYD=110 ID=3 ID=4  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = 1.36885 INCHES = 9.4980 ACRE-FEET  
PEAK DISCHARGE RATE = 198.37 CFS AT 1.565 HOURS BASIN AREA = .1301 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 200 FT EAST ON SAPPHIRE ST. FROM MICHELLE ST. TO INLETS

\*\*\*\*\* 40' FF 60' ROW @ 0.014 FT/FT

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=1.0

CH SLP=.014 FP SLP=0.014 N=0.017

DIST=60

DIST ELEV DIST ELEV DIST ELEV

0 1.0 10 0.67 10.05 0.

12 .125 30 .485 48 .125

50 0. 50.05 0.67 60 1.0

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
| .00                      | .00                   | .00                 | .00                |
| .05                      | .04                   | .04                 | 1.67               |
| .11                      | .18                   | .25                 | 3.34               |
| .16                      | .43                   | .66                 | 7.26               |
| .21                      | .95                   | 1.73                | 12.53              |
| .26                      | 1.75                  | 3.79                | 17.81              |
| .32                      | 2.83                  | 7.09                | 23.08              |
| .37                      | 4.18                  | 11.88               | 28.35              |
| .42                      | 5.81                  | 18.37               | 33.62              |
| .47                      | 7.72                  | 26.76               | 38.89              |
| .53                      | 9.82                  | 39.16               | 40.03              |

|      |       |        |       |
|------|-------|--------|-------|
| .58  | 11.93 | 54.05  | 40.04 |
| .63  | 14.03 | 70.76  | 40.04 |
| .68  | 16.15 | 88.08  | 40.91 |
| .74  | 18.39 | 104.16 | 44.09 |
| .79  | 20.79 | 122.18 | 47.27 |
| .84  | 23.36 | 142.24 | 50.45 |
| .89  | 26.10 | 164.43 | 53.64 |
| .95  | 29.01 | 188.84 | 56.82 |
| 1.00 | 32.08 | 215.55 | 60.00 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=200 FT SLOPE=0.014

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .053                   | .044                      | .04                 | .0631                 |
| .105                   | .176                      | .25                 | .0398                 |
| .158                   | .433                      | .66                 | .0362                 |
| .211                   | .954                      | 1.73                | .0305                 |
| .263                   | 1.752                     | 3.79                | .0257                 |
| .316                   | 2.828                     | 7.09                | .0221                 |
| .368                   | 4.181                     | 11.88               | .0196                 |
| .421                   | 5.812                     | 18.37               | .0176                 |
| .474                   | 7.720                     | 26.76               | .0160                 |
| .526                   | 9.820                     | 39.16               | .0139                 |
| .579                   | 11.927                    | 54.05               | .0123                 |
| .632                   | 14.034                    | 70.76               | .0110                 |
| .684                   | 16.148                    | 88.08               | .0102                 |
| .737                   | 18.385                    | 104.16              | .0098                 |
| .789                   | 20.790                    | 122.18              | .0095                 |
| .842                   | 23.361                    | 142.24              | .0091                 |
| .895                   | 26.101                    | 164.43              | .0088                 |
| .947                   | 29.007                    | 188.84              | .0085                 |
| 1.000                  | 32.081                    | 215.55              | .0083                 |

ROUTE ID=3 HYD NO=210 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 210.00

RUNOFF VOLUME = 1.36886 INCHES = 9.4980 ACRE-FEET  
PEAK DISCHARGE RATE = 198.36 CFS AT 1.565 HOURS BASIN AREA = .1301 SQ. MI.

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 16:48:39

## OPTION 2

RUN DATE (MON/DAY/YR) =08/06/1996

USER NO.= M GOODMAN.I01

[illegible]

AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994  
RUN DATE (MON/DAY/YR) = 08/06/1996  
START TIME (HR:MIN:SEC) = 20:29:32 USER NO.= M\_GOODWN.I01  
INPUT FILE = sagedo2.dat

START TIME=0.0  
\*\*\*\*\* SUN SAGE HILLS SUBDIVISION - DEVELOPED CONDITIONS  
\*\*\*\*\* 100-YEAR 6-HOUR STORM EVENT  
\*\*\*\*\* REAR YARD PONDS IN SUB-BASINS 102-106, 108, 110;  
\*\*\*\*\* ASSUME 56% OF TOTAL LOT AREA CONTRIBUTES TO STREET RUNOFF  
\*\*\*\*\* FOR SUB-BASINS (102-06,108,110) WITH REAR YARD PONDS;  
\*\*\*\*\* SPLIT B/C LAND TREATMENT 60/40  
\*\*\*\*\* SB 100 LIMIT DISCHARGE TO 1.4 CFS WHERE Q(DEV)=0.1 CFS/ACRE  
\*\*\*\*\*  
\*\*\*\*\* FILE: SAGEDO2.DAT JULY 26 1996 BY:DLH  
\*\*\*\*\*

RAINFALL TYPE=1 RAIN QUARTER=0.0 IN  
RAIN ONE=1.87 IN RAIN SIX=2.20 IN  
RAIN DAY=2.66 IN DT=0.0333 HR

COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.  
DT = .033300 HOURS END TIME = 5.994000 HOURS

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| .0000  | .0016  | .0033  | .0050  | .0067  | .0085  | .0103  |
| .0121  | .0140  | .0160  | .0180  | .0200  | .0221  | .0243  |
| .0265  | .0288  | .0312  | .0336  | .0361  | .0387  | .0414  |
| .0442  | .0471  | .0501  | .0533  | .0566  | .0600  | .0636  |
| .0674  | .0714  | .0757  | .0808  | .0863  | .0922  | .1044  |
| .1323  | .1754  | .2374  | .3221  | .4335  | .5756  | .7527  |
| .9690  | 1.1767 | 1.2619 | 1.3336 | 1.3972 | 1.4551 | 1.5084 |
| 1.5579 | 1.6041 | 1.6474 | 1.6881 | 1.7266 | 1.7629 | 1.7973 |
| 1.8298 | 1.8607 | 1.8900 | 1.9178 | 1.9442 | 1.9515 | 1.9573 |
| 1.9627 | 1.9680 | 1.9729 | 1.9777 | 1.9823 | 1.9867 | 1.9909 |
| 1.9950 | 1.9990 | 2.0029 | 2.0066 | 2.0102 | 2.0137 | 2.0172 |
| 2.0205 | 2.0238 | 2.0269 | 2.0300 | 2.0331 | 2.0360 | 2.0389 |
| 2.0418 | 2.0446 | 2.0473 | 2.0500 | 2.0526 | 2.0552 | 2.0578 |
| 2.0603 | 2.0627 | 2.0651 | 2.0675 | 2.0698 | 2.0721 | 2.0744 |
| 2.0766 | 2.0788 | 2.0810 | 2.0832 | 2.0853 | 2.0873 | 2.0894 |
| 2.0914 | 2.0934 | 2.0954 | 2.0974 | 2.0993 | 2.1012 | 2.1031 |
| 2.1050 | 2.1068 | 2.1086 | 2.1104 | 2.1122 | 2.1140 | 2.1157 |
| 2.1174 | 2.1191 | 2.1208 | 2.1225 | 2.1242 | 2.1258 | 2.1274 |
| 2.1290 | 2.1306 | 2.1322 | 2.1338 | 2.1353 | 2.1369 | 2.1384 |
| 2.1399 | 2.1414 | 2.1429 | 2.1444 | 2.1459 | 2.1473 | 2.1487 |
| 2.1502 | 2.1516 | 2.1530 | 2.1544 | 2.1558 | 2.1571 | 2.1585 |
| 2.1599 | 2.1612 | 2.1625 | 2.1639 | 2.1652 | 2.1665 | 2.1678 |
| 2.1691 | 2.1703 | 2.1716 | 2.1729 | 2.1741 | 2.1754 | 2.1766 |
| 2.1778 | 2.1791 | 2.1803 | 2.1815 | 2.1827 | 2.1839 | 2.1850 |
| 2.1862 | 2.1874 | 2.1886 | 2.1897 | 2.1909 | 2.1920 | 2.1931 |
| 2.1943 | 2.1954 | 2.1965 | 2.1976 | 2.1987 | 2.1998 |        |

\*\*\*\*\*  
\*\*\*\*\* SUB-BASIN 100 (UNDEVELOPED) ASSUME COMMERCIAL DEVELOPED  
\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=100.0 AREA=0.0219 SQ MI  
PER A=0 PER B=5 PER C=5 PER D=90  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 77.816 CFS UNIT VOLUME = .9992 B = 526.28 P60 = 1.8700  
AREA = .019710 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .118429HR TP = .133300HR K/TP RATIO = .888442 SHAPE CONSTANT, N = 3.992480  
UNIT PEAK = 5.8269 CFS UNIT VOLUME = .9982 B = 354.67 P60 = 1.8700  
AREA = .002190 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

# PARTIAL HYDROGRAPH 100.00

RUNOFF VOLUME = 1.85049 INCHES = 2.1614 ACRE-FEET  
 PEAK DISCHARGE RATE = 58.56 CFS AT 1.499 HOURS BASIN AREA = .0219 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* MAXIMUM FLOW FROM SB 100 IS 1.4 CFS

\*\*\*\*\* ROUTE THROUGH DETENTION POND (APPROX. DIMENSIONS 181'x181')

\*\*\*\*\* ORIFICE OPENING

\*\*\*\*\*

ROUTE RESERVOIR ID=2 HYD=POND.101 INFLOW=1 CODE=10

OUTFLOW(CFS) STORAGE(AC FT) ELEV(FT)

|      |        |      |
|------|--------|------|
| 0    | 0      | 19.0 |
| .36  | .3104  | 19.5 |
| .77  | .6325  | 20.0 |
| .99  | .9663  | 20.5 |
| 1.15 | 1.3122 | 21.0 |
| 1.45 | 2.0406 | 22.0 |
| 1.70 | 2.8188 | 23.0 |

\*\*\*\*\*

| TIME<br>(HRS) | INFLOW<br>(CFS) | ELEV<br>(FEET) | VOLUME<br>(AC-FT) | OUTFLOW<br>(CFS) |
|---------------|-----------------|----------------|-------------------|------------------|
|---------------|-----------------|----------------|-------------------|------------------|

|       |       |       |       |      |
|-------|-------|-------|-------|------|
| .00   | .00   | 19.00 | .000  | .00  |
| .33   | .00   | 19.00 | .000  | .00  |
| .67   | .00   | 19.00 | .000  | .00  |
| 1.00  | .00   | 19.00 | .000  | .00  |
| 1.33  | 16.89 | 19.13 | .083  | .10  |
| 1.67  | 29.83 | 20.85 | 1.207 | 1.10 |
| 2.00  | 14.08 | 21.57 | 1.726 | 1.32 |
| 2.33  | 3.00  | 21.80 | 1.896 | 1.39 |
| 2.66  | 1.24  | 21.82 | 1.911 | 1.40 |
| 3.00  | .66   | 21.80 | 1.898 | 1.39 |
| 3.33  | .44   | 21.77 | 1.874 | 1.38 |
| 3.66  | .36   | 21.73 | 1.847 | 1.37 |
| 4.00  | .32   | 21.70 | 1.819 | 1.36 |
| 4.33  | .31   | 21.66 | 1.790 | 1.35 |
| 4.66  | .32   | 21.62 | 1.762 | 1.34 |
| 5.00  | .33   | 21.58 | 1.734 | 1.32 |
| 5.33  | .35   | 21.54 | 1.707 | 1.31 |
| 5.66  | .37   | 21.51 | 1.681 | 1.30 |
| 5.99  | .40   | 21.47 | 1.656 | 1.29 |
| 6.33  | .04   | 21.43 | 1.626 | 1.28 |
| 6.66  | .01   | 21.38 | 1.592 | 1.27 |
| 6.99  | .00   | 21.34 | 1.558 | 1.25 |
| 7.33  | .00   | 21.29 | 1.523 | 1.24 |
| 7.66  | .00   | 21.24 | 1.489 | 1.22 |
| 7.99  | .00   | 21.20 | 1.456 | 1.21 |
| 8.33  | .00   | 21.15 | 1.423 | 1.20 |
| 8.66  | .00   | 21.11 | 1.390 | 1.18 |
| 8.99  | .00   | 21.06 | 1.358 | 1.17 |
| 9.32  | .00   | 21.02 | 1.326 | 1.16 |
| 9.66  | .00   | 20.97 | 1.294 | 1.14 |
| 9.99  | .00   | 20.93 | 1.263 | 1.13 |
| 10.32 | .00   | 20.88 | 1.232 | 1.11 |
| 10.66 | .00   | 20.84 | 1.202 | 1.10 |
| 10.99 | .00   | 20.80 | 1.172 | 1.09 |
| 11.32 | .00   | 20.75 | 1.142 | 1.07 |
| 11.66 | .00   | 20.71 | 1.113 | 1.06 |
| 11.99 | .00   | 20.67 | 1.084 | 1.04 |
| 12.32 | .00   | 20.63 | 1.055 | 1.03 |
| 12.65 | .00   | 20.59 | 1.027 | 1.02 |
| 12.99 | .00   | 20.55 | .999  | 1.01 |
| 13.32 | .00   | 20.51 | .972  | .99  |

|       |     |       |      |     |
|-------|-----|-------|------|-----|
| 13.65 | .00 | 20.47 | .945 | .98 |
| 13.99 | .00 | 20.43 | .918 | .96 |
| 14.32 | .00 | 20.39 | .892 | .94 |
| 14.65 | .00 | 20.35 | .866 | .92 |
| 14.99 | .00 | 20.31 | .841 | .91 |
| 15.32 | .00 | 20.28 | .816 | .89 |
| 15.65 | .00 | 20.24 | .792 | .88 |
| 15.98 | .00 | 20.20 | .768 | .86 |
| 16.32 | .00 | 20.17 | .745 | .84 |
| 16.65 | .00 | 20.13 | .722 | .83 |
| 16.98 | .00 | 20.10 | .699 | .81 |
| 17.32 | .00 | 20.07 | .677 | .80 |
| 17.65 | .00 | 20.03 | .655 | .78 |
| 17.98 | .00 | 20.00 | .634 | .77 |
| 18.32 | .00 | 19.97 | .613 | .74 |

| TIME<br>(HRS) | INFLOW<br>(CFS) | ELEV<br>(FEET) | VOLUME<br>(AC-FT) | OUTFLOW<br>(CFS) |
|---------------|-----------------|----------------|-------------------|------------------|
|---------------|-----------------|----------------|-------------------|------------------|

|       |     |       |      |     |
|-------|-----|-------|------|-----|
| 18.65 | .00 | 19.94 | .593 | .72 |
| 18.98 | .00 | 19.91 | .573 | .69 |
| 19.31 | .00 | 19.88 | .554 | .67 |
| 19.65 | .00 | 19.85 | .536 | .65 |

PEAK DISCHARGE = 1.397 CFS - PEAK OCCURS AT HOUR 2.60  
 MAXIMUM WATER SURFACE ELEVATION = 21.823  
 MAXIMUM STORAGE = 1.9113 AC-FT INCREMENTAL TIME = .033300HRS

PRINT HYD ID=2 CODE=1

HYDROGRAPH FROM AREA POND.101

RUNOFF VOLUME = 1.40559 INCHES = 1.6417 ACRE-FEET  
 PEAK DISCHARGE RATE = 1.40 CFS AT 2.597 HOURS BASIN AREA = .0219 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 101 SUN SAGE HILLS TOWNHOMES (6.9 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=101.0 AREA=0.0131 SQ MI  
 PER A=0 PER B=21 PER C=15 PER D=64  
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
 UNIT PEAK = 33.100 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 1.8700  
 AREA = .008384 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120523HR TP = .133300HR K/TP RATIO = .904149 SHAPE CONSTANT, N = 3.918663  
 UNIT PEAK = 12.372 CFS UNIT VOLUME = .9994 B = 349.71 P60 = 1.8700  
 AREA = .004716 SQ MI IA = .43750 INCHES INF = 1.07500 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 101.00

RUNOFF VOLUME = 1.54209 INCHES = 1.0774 ACRE-FEET  
 PEAK DISCHARGE RATE = 30.61 CFS AT 1.499 HOURS BASIN AREA = .0131 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 AND SB 101

\*\*\*\*\*

ADD HYD ID=3 HYD=101 ID=1 ID=2

PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 101.00

RUNOFF VOLUME = 1.45667 INCHES = 2.7191 ACRE-FEET  
PEAK DISCHARGE RATE = 31.34 CFS AT 1.499 HOURS BASIN AREA = .0350 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 250 FT SOUTH ON 94TH STREET 32' FF 50' ROW

\*\*\*\*\* @ 0.005 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.005 FP SLP=0.005 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
| .00                      | .00                   | .00                 | .00                |
| .05                      | .03                   | .02                 | 1.45               |
| .09                      | .13                   | .10                 | 2.91               |
| .14                      | .30                   | .27                 | 5.21               |
| .18                      | .65                   | .64                 | 9.79               |
| .23                      | 1.20                  | 1.39                | 14.38              |
| .27                      | 1.97                  | 2.63                | 18.96              |
| .32                      | 2.94                  | 4.46                | 23.55              |
| .37                      | 4.12                  | 6.97                | 28.14              |
| .41                      | 5.51                  | 10.38               | 32.01              |
| .46                      | 6.98                  | 15.35               | 32.02              |
| .50                      | 8.44                  | 21.05               | 32.03              |
| .55                      | 9.91                  | 27.44               | 32.03              |
| .60                      | 11.38                 | 34.47               | 32.04              |
| .64                      | 12.85                 | 42.12               | 32.05              |
| .69                      | 14.33                 | 48.98               | 33.56              |
| .73                      | 15.96                 | 54.42               | 37.67              |
| .78                      | 17.78                 | 60.93               | 41.78              |
| .82                      | 19.78                 | 68.53               | 45.89              |
| .87                      | 21.98                 | 77.24               | 50.00              |

COMPUTE TRAVEL TIME ID=4 REACH NO=1 NO VS=1 LENGTH=250 FT SLOPE=0.005

TRAVEL TIME TABLE

REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .02                 | .1449                 |
| .092                   | .133                      | .10                 | .0913                 |
| .137                   | .305                      | .27                 | .0770                 |
| .183                   | .648                      | .64                 | .0703                 |
| .229                   | 1.202                     | 1.39                | .0600                 |
| .275                   | 1.965                     | 2.63                | .0519                 |
| .321                   | 2.938                     | 4.46                | .0458                 |
| .366                   | 4.122                     | 6.97                | .0411                 |
| .412                   | 5.513                     | 10.38               | .0369                 |
| .458                   | 6.979                     | 15.35               | .0316                 |
| .504                   | 8.445                     | 21.05               | .0279                 |
| .549                   | 9.911                     | 27.44               | .0251                 |
| .595                   | 11.378                    | 34.47               | .0229                 |
| .641                   | 12.845                    | 42.12               | .0212                 |

|      |        |       |       |
|------|--------|-------|-------|
| .687 | 14.326 | 48.98 | .0203 |
| .733 | 15.956 | 54.42 | .0204 |
| .778 | 17.776 | 60.93 | .0203 |
| .824 | 19.783 | 68.53 | .0200 |
| .870 | 21.978 | 77.24 | .0198 |

ROUTE ID=4 HYD NO=201 INFLOW ID=3 DT=0.0  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 201.00

RUNOFF VOLUME = 1.45470 INCHES = 2.7154 ACRE-FEET  
PEAK DISCHARGE RATE = 31.14 CFS AT 1.532 HOURS BASIN AREA = .0350 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 104 RESIDENTIAL (4.0 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=104.0 AREA=0.01350 SQ MI  
PER A=0 PER B=34 PER C=24 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 22.385 CFS UNIT VOLUME = .9988 B = 526.28 P60 = 1.8700  
AREA = .005670 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120595HR TP = .133300HR K/TP RATIO = .904691 SHAPE CONSTANT, N = 3.916166  
UNIT PEAK = 20.532 CFS UNIT VOLUME = .9998 B = 349.54 P60 = 1.8700  
AREA = .007830 SQ MI IA = .43793 INCHES INF = 1.07621 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.28283 INCHES = .9236 ACRE-FEET  
PEAK DISCHARGE RATE = 27.72 CFS AT 1.499 HOURS BASIN AREA = .0135 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 AND 101 AND 104

\*\*\*\*\*

ADD HYD ID=2 HYD=104 ID=1 ID=4  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.40686 INCHES = 3.6390 ACRE-FEET  
PEAK DISCHARGE RATE = 58.10 CFS AT 1.532 HOURS BASIN AREA = .0485 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 770 FT EAST ON REBA AVE 32' 50' ROW

\*\*\*\*\* FF @ 0.0164 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.0164 FP SLP=0.0164 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

| RATING CURVE VALLEY SECTION 9.0 |                       |                     |                    |  |
|---------------------------------|-----------------------|---------------------|--------------------|--|
| WATER<br>SURFACE<br>ELEV        | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |  |
| .00                             | .00                   | .00                 | .00                |  |
| .05                             | .03                   | .03                 | 1.45               |  |
| .09                             | .13                   | .18                 | 2.91               |  |
| .14                             | .30                   | .50                 | 5.21               |  |
| .18                             | .65                   | 1.16                | 9.79               |  |
| .23                             | 1.20                  | 2.52                | 14.38              |  |
| .27                             | 1.97                  | 4.77                | 18.96              |  |
| .32                             | 2.94                  | 8.07                | 23.55              |  |
| .37                             | 4.12                  | 12.62               | 28.14              |  |
| .41                             | 5.51                  | 18.80               | 32.01              |  |
| .46                             | 6.98                  | 27.79               | 32.02              |  |
| .50                             | 8.44                  | 38.12               | 32.03              |  |
| .55                             | 9.91                  | 49.69               | 32.03              |  |
| .60                             | 11.38                 | 62.43               | 32.04              |  |
| .64                             | 12.85                 | 76.28               | 32.05              |  |
| .69                             | 14.33                 | 88.71               | 33.56              |  |
| .73                             | 15.96                 | 98.56               | 37.67              |  |
| .78                             | 17.78                 | 110.35              | 41.78              |  |
| .82                             | 19.78                 | 124.11              | 45.89              |  |
| .87                             | 21.98                 | 139.89              | 50.00              |  |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=770 FT SLOPE=0.0164

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .03                 | .2464                 |
| .092                   | .133                      | .18                 | .1552                 |
| .137                   | .305                      | .50                 | .1310                 |
| .183                   | .648                      | 1.16                | .1195                 |
| .229                   | 1.202                     | 2.52                | .1020                 |
| .275                   | 1.965                     | 4.77                | .0882                 |
| .321                   | 2.938                     | 8.07                | .0778                 |
| .366                   | 4.122                     | 12.62               | .0699                 |
| .412                   | 5.513                     | 18.80               | .0627                 |
| .458                   | 6.979                     | 27.79               | .0537                 |
| .504                   | 8.445                     | 38.12               | .0474                 |
| .549                   | 9.911                     | 49.69               | .0427                 |
| .595                   | 11.378                    | 62.43               | .0390                 |
| .641                   | 12.845                    | 76.28               | .0360                 |
| .687                   | 14.326                    | 88.71               | .0345                 |
| .733                   | 15.956                    | 98.56               | .0346                 |
| .778                   | 17.776                    | 110.35              | .0345                 |
| .824                   | 19.783                    | 124.11              | .0341                 |
| .870                   | 21.978                    | 139.89              | .0336                 |

ROUTE ID=3 HYD NO=204 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 204.00

RUNOFF VOLUME = 1.40424 INCHES = 3.6323 ACRE-FEET  
PEAK DISCHARGE RATE = 56.61 CFS AT 1.532 HOURS BASIN AREA = .0485 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 102 RESIDENTIAL (5.1 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=102.0 AREA=0.01310 SQ MI  
PER A=0 PER B=30 PER C=20 PER D=50

TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 25.860 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8700  
AREA = .006550 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120942HR TP = .133300HR K/TP RATIO = .907291 SHAPE CONSTANT, N = 3.904285  
UNIT PEAK = 17.136 CFS UNIT VOLUME = .9996 B = 348.74 P60 = 1.8700  
AREA = .006550 SQ MI IA = .44000 INCHES INF = 1.08200 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 102.00

RUNOFF VOLUME = 1.37477 INCHES = .9605 ACRE-FEET  
PEAK DISCHARGE RATE = 28.19 CFS AT 1.499 HOURS BASIN AREA = .0131 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 103 RESIDENTIAL (4.6 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=103.0 AREA=0.00398 SQ MI  
PER A=0 PER B=32 PER C=21 PER D=47  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 7.3852 CFS UNIT VOLUME = .9978 B = 526.28 P60 = 1.8700  
AREA = .001871 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .121037HR TP = .133300HR K/TP RATIO = .908002 SHAPE CONSTANT, N = 3.901043  
UNIT PEAK = 5.5151 CFS UNIT VOLUME = .9980 B = 348.52 P60 = 1.8700  
AREA = .002109 SQ MI IA = .44057 INCHES INF = 1.08358 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 1.33869 INCHES = .2842 ACRE-FEET  
PEAK DISCHARGE RATE = 8.42 CFS AT 1.499 HOURS BASIN AREA = .0040 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 102 AND 103

\*\*\*\*\*

ADD HYD ID=4 HYD=103 ID=1 ID=2  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 1.36633 INCHES = 1.2446 ACRE-FEET  
PEAK DISCHARGE RATE = 36.61 CFS AT 1.499 HOURS BASIN AREA = .0171 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100, 101, 102, 103, 104

\*\*\*\*\*

ADD HYD ID=2 HYD=104 ID=3 ID=4

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.39436 INCHES = 4.8769 ACRE-Feet  
PEAK DISCHARGE RATE = 92.11 CFS AT 1.532 HOURS BASIN AREA = .0656 SQ. MI.

\*\*\*\*\*  
\*\*\*\*\* ROUTE 150 FT SOUTHEAST ON BLAZICK AVE 32' FF 50' ROW  
\*\*\*\*\* @ 0.02 FT/FT  
\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87  
CH SLP=.02 FP SLP=0.02 N=0.017  
DIST=50  
DIST ELEV DIST ELEV DIST ELEV  
0 .87 9.0 .67 9.05 0.  
11 .125 25 .405 39 .125  
41 0. 41.05 .67 50 .87

| RATING CURVE VALLEY SECTION 9.0 |                       |                     |                    |
|---------------------------------|-----------------------|---------------------|--------------------|
| WATER<br>SURFACE<br>ELEV        | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
| .00                             | .00                   | .00                 | .00                |
| .05                             | .03                   | .03                 | 1.45               |
| .09                             | .13                   | .20                 | 2.91               |
| .14                             | .30                   | .55                 | 5.21               |
| .18                             | .65                   | 1.28                | 9.79               |
| .23                             | 1.20                  | 2.78                | 14.38              |
| .27                             | 1.97                  | 5.26                | 18.96              |
| .32                             | 2.94                  | 8.92                | 23.55              |
| .37                             | 4.12                  | 13.93               | 28.14              |
| .41                             | 5.51                  | 20.76               | 32.01              |
| .46                             | 6.98                  | 30.69               | 32.02              |
| .50                             | 8.44                  | 42.10               | 32.03              |
| .55                             | 9.91                  | 54.88               | 32.03              |
| .60                             | 11.38                 | 68.94               | 32.04              |
| .64                             | 12.85                 | 84.23               | 32.05              |
| .69                             | 14.33                 | 97.96               | 33.56              |
| .73                             | 15.96                 | 108.84              | 37.67              |
| .78                             | 17.78                 | 121.86              | 41.78              |
| .82                             | 19.78                 | 137.06              | 45.89              |
| .87                             | 21.98                 | 154.48              | 50.00              |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=150 FT SLOPE=0.02

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .03                 | .0435                 |
| .092                   | .133                      | .20                 | .0274                 |
| .137                   | .305                      | .55                 | .0231                 |
| .183                   | .648                      | 1.28                | .0211                 |
| .229                   | 1.202                     | 2.78                | .0180                 |
| .275                   | 1.965                     | 5.26                | .0156                 |
| .321                   | 2.938                     | 8.92                | .0137                 |
| .366                   | 4.122                     | 13.93               | .0123                 |
| .412                   | 5.513                     | 20.76               | .0111                 |
| .458                   | 6.979                     | 30.69               | .0095                 |
| .504                   | 8.445                     | 42.10               | .0084                 |
| .549                   | 9.911                     | 54.88               | .0075                 |
| .595                   | 11.378                    | 68.94               | .0069                 |
| .641                   | 12.845                    | 84.23               | .0064                 |

|      |        |        |       |
|------|--------|--------|-------|
| .687 | 14.326 | 97.96  | .0061 |
| .733 | 15.956 | 108.84 | .0061 |
| .778 | 17.776 | 121.86 | .0061 |
| .824 | 19.783 | 137.06 | .0060 |
| .870 | 21.978 | 154.48 | .0059 |

ROUTE ID=3 HYD NO=203 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 203.00

RUNOFF VOLUME = 1.39402 INCHES = 4.8757 ACRE-FEET  
PEAK DISCHARGE RATE = 92.38 CFS AT 1.532 HOURS BASIN AREA = .0656 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 105 RESIDENTIAL (4.0 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=105.0 AREA=0.00526 SQ MI  
PER A=0 PER B=34 PER C=24 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 8.7220 CFS UNIT VOLUME = .9980 B = 526.28 P60 = 1.8700  
AREA = .002209 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120595HR TP = .133300HR K/TP RATIO = .904691 SHAPE CONSTANT, N = 3.916166  
UNIT PEAK = 7.9999 CFS UNIT VOLUME = .9988 B = 349.54 P60 = 1.8700  
AREA = .003051 SQ MI IA = .43793 INCHES INF = 1.07621 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 1.28283 INCHES = .3599 ACRE-FEET  
PEAK DISCHARGE RATE = 10.81 CFS AT 1.499 HOURS BASIN AREA = .0053 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 104 AND 105

\*\*\*\*\*

ADD HYD ID=2 HYD=105 ID=1 ID=3  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 1.38576 INCHES = 5.2355 ACRE-FEET  
PEAK DISCHARGE RATE = 102.90 CFS AT 1.532 HOURS BASIN AREA = .0708 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 1050 FT EAST ON SONYA AVE 32' FF 50' ROW

\*\*\*\*\* @ 0.0112 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1  
MIN ELEV=0.0 MAX ELEV=.87  
CH SLP=.0112 FP SLP=0.0112 N=0.017  
DIST=50  
DIST ELEV DIST ELEV DIST ELEV  
0 .87 9.0 .67 9.05 0.  
11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

| RATING CURVE VALLEY SECTION 9.0 |                       |                     |                    |
|---------------------------------|-----------------------|---------------------|--------------------|
| WATER<br>SURFACE<br>ELEV        | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
| .00                             | .00                   | .00                 | .00                |
| .05                             | .03                   | .02                 | 1.45               |
| .09                             | .13                   | .15                 | 2.91               |
| .14                             | .30                   | .41                 | 5.21               |
| .18                             | .65                   | .96                 | 9.79               |
| .23                             | 1.20                  | 2.08                | 14.38              |
| .27                             | 1.97                  | 3.94                | 18.96              |
| .32                             | 2.94                  | 6.67                | 23.55              |
| .37                             | 4.12                  | 10.43               | 28.14              |
| .41                             | 5.51                  | 15.53               | 32.01              |
| .46                             | 6.98                  | 22.97               | 32.02              |
| .50                             | 8.44                  | 31.50               | 32.03              |
| .55                             | 9.91                  | 41.07               | 32.03              |
| .60                             | 11.38                 | 51.59               | 32.04              |
| .64                             | 12.85                 | 63.03               | 32.05              |
| .69                             | 14.33                 | 73.31               | 33.56              |
| .73                             | 15.96                 | 81.45               | 37.67              |
| .78                             | 17.78                 | 91.19               | 41.78              |
| .82                             | 19.78                 | 102.56              | 45.89              |
| .87                             | 21.98                 | 115.60              | 50.00              |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=1050 FT SLOPE=0.0112

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .02                 | .4066                 |
| .092                   | .133                      | .15                 | .2562                 |
| .137                   | .305                      | .41                 | .2161                 |
| .183                   | .648                      | .96                 | .1972                 |
| .229                   | 1.202                     | 2.08                | .1683                 |
| .275                   | 1.965                     | 3.94                | .1455                 |
| .321                   | 2.938                     | 6.67                | .1284                 |
| .366                   | 4.122                     | 10.43               | .1153                 |
| .412                   | 5.513                     | 15.53               | .1035                 |
| .458                   | 6.979                     | 22.97               | .0886                 |
| .504                   | 8.445                     | 31.50               | .0782                 |
| .549                   | 9.911                     | 41.07               | .0704                 |
| .595                   | 11.378                    | 51.59               | .0643                 |
| .641                   | 12.845                    | 63.03               | .0594                 |
| .687                   | 14.326                    | 73.31               | .0570                 |
| .733                   | 15.956                    | 81.45               | .0571                 |
| .778                   | 17.776                    | 91.19               | .0569                 |
| .824                   | 19.783                    | 102.56              | .0563                 |
| .870                   | 21.978                    | 115.60              | .0555                 |

ROUTE ID=3 HYD NO=205 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 205.00

RUNOFF VOLUME = 1.38279 INCHES = 5.2243 ACRE-FEET  
PEAK DISCHARGE RATE = 92.41 CFS AT 1.565 HOURS BASIN AREA = .0708 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 106 RESIDENTIAL (4.5 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=106.0 AREA=0.01893 SQ MI  
PER A=0 PER B=32 PER C=22 PER D=46

TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 34.379 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 1.8700  
AREA = .008708 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120756HR TP = .133300HR K/TP RATIO = .905895 SHAPE CONSTANT, N = 3.910652  
UNIT PEAK = 26.776 CFS UNIT VOLUME = .9999 B = 349.17 P60 = 1.8700  
AREA = .010222 SQ MI IA = .43889 INCHES INF = 1.07889 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 106.00

RUNOFF VOLUME = 1.32880 INCHES = 1.3415 ACRE-FEET  
PEAK DISCHARGE RATE = 39.79 CFS AT 1.499 HOURS BASIN AREA = .0189 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 105 AND 106

\*\*\*\*\*

ADD HYD ID=2 HYD=106 ID=1 ID=3  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 106.00

RUNOFF VOLUME = 1.37140 INCHES = 6.5659 ACRE-FEET  
PEAK DISCHARGE RATE = 126.54 CFS AT 1.565 HOURS BASIN AREA = .0898 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 400 FT SOUTHEAST ON SAPPHIRE ST. TO 86TH ST.

\*\*\*\*\* 32' FF 50' ROW @ 0.0135 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.0135 FP SLP=0.0135 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

|    |      |       |      |      |      |
|----|------|-------|------|------|------|
| 0  | .87  | 9.0   | .67  | 9.05 | 0.   |
| 11 | .125 | 25    | .405 | 39   | .125 |
| 41 | 0.   | 41.05 | .67  | 50   | .87  |

RATING CURVE VALLEY SECTION 9.0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | TOP WIDTH FT |
|--------------------|-----------------|---------------|--------------|
| .00                | .00             | .00           | .00          |
| .05                | .03             | .03           | 1.45         |
| .09                | .13             | .17           | 2.91         |
| .14                | .30             | .45           | 5.21         |
| .18                | .65             | 1.05          | 9.79         |
| .23                | 1.20            | 2.29          | 14.38        |
| .27                | 1.97            | 4.32          | 18.96        |
| .32                | 2.94            | 7.33          | 23.55        |
| .37                | 4.12            | 11.45         | 28.14        |
| .41                | 5.51            | 17.05         | 32.01        |
| .46                | 6.98            | 25.22         | 32.02        |
| .50                | 8.44            | 34.59         | 32.03        |
| .55                | 9.91            | 45.09         | 32.03        |
| .60                | 11.38           | 56.64         | 32.04        |
| .64                | 12.85           | 69.20         | 32.05        |

|     |       |        |       |
|-----|-------|--------|-------|
| .69 | 14.33 | 80.48  | 33.56 |
| .73 | 15.96 | 89.42  | 37.67 |
| .78 | 17.78 | 100.12 | 41.78 |
| .82 | 19.78 | 112.60 | 45.89 |
| .87 | 21.98 | 126.92 | 50.00 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=400 FT SLOPE=0.0135

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .03                 | .1411                 |
| .092                   | .133                      | .17                 | .0889                 |
| .137                   | .305                      | .45                 | .0750                 |
| .183                   | .648                      | 1.05                | .0684                 |
| .229                   | 1.202                     | 2.29                | .0584                 |
| .275                   | 1.965                     | 4.32                | .0505                 |
| .321                   | 2.938                     | 7.33                | .0446                 |
| .366                   | 4.122                     | 11.45               | .0400                 |
| .412                   | 5.513                     | 17.05               | .0359                 |
| .458                   | 6.979                     | 25.22               | .0307                 |
| .504                   | 8.445                     | 34.59               | .0271                 |
| .549                   | 9.911                     | 45.09               | .0244                 |
| .595                   | 11.378                    | 56.64               | .0223                 |
| .641                   | 12.845                    | 69.20               | .0206                 |
| .687                   | 14.326                    | 80.48               | .0198                 |
| .733                   | 15.956                    | 89.42               | .0198                 |
| .778                   | 17.776                    | 100.12              | .0197                 |
| .824                   | 19.783                    | 112.60              | .0195                 |
| .870                   | 21.978                    | 126.92              | .0192                 |

ROUTE ID=3 HYD NO=206 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 206.00

RUNOFF VOLUME = 1.37058 INCHES = 6.5619 ACRE-FEET  
PEAK DISCHARGE RATE = 125.13 CFS AT 1.565 HOURS BASIN AREA = .0898 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 107 RESIDENTIAL (PARK/RESIDENTIAL/WATER TNK)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=107.0 AREA=0.0267 SQ MI  
PER A=0 PER B=54 PER C=23 PER D=23  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 24.245 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8700  
AREA = .006141 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .123487HR TP = .133300HR K/TP RATIO = .926384 SHAPE CONSTANT, N = 3.819526  
UNIT PEAK = 52.894 CFS UNIT VOLUME = 1.000 B = 342.95 P60 = 1.8700  
AREA = .020559 SQ MI IA = .45519 INCHES INF = 1.12455 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 107.00

RUNOFF VOLUME = 1.03176 INCHES = 1.4692 ACRE-FEET  
PEAK DISCHARGE RATE = 46.95 CFS AT 1.499 HOURS BASIN AREA = .0267 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 108 UNDEVELOPED ASSUME RESIDENTIAL @ 4.0 UN/AC

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=108.0 AREA=0.00600 SQ MI  
PER A=0 PER B=35 PER C=23 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 9.9491 CFS UNIT VOLUME = .9982 B = 526.28 P60 = 1.8700  
AREA = .002520 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .121029HR TP = .133300HR K/TP RATIO = .907941 SHAPE CONSTANT, N = 3.901327  
UNIT PEAK = 9.0991 CFS UNIT VOLUME = .9990 B = 348.54 P60 = 1.8700  
AREA = .003480 SQ MI IA = .44052 INCHES INF = 1.08345 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = 1.27962 INCHES = .4095 ACRE-FEET  
PEAK DISCHARGE RATE = 12.29 CFS AT 1.499 HOURS BASIN AREA = .0060 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 107 AND 108

\*\*\*\*\*

ADD HYD ID=4 HYD=108 ID=1 ID=2  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = 1.07722 INCHES = 1.8787 ACRE-FEET  
PEAK DISCHARGE RATE = 59.24 CFS AT 1.499 HOURS BASIN AREA = .0327 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 108

\*\*\*\*\*

ADD HYD ID=2 HYD=108 ID=3 ID=4  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = 1.29225 INCHES = 8.4406 ACRE-FEET  
PEAK DISCHARGE RATE = 177.12 CFS AT 1.565 HOURS BASIN AREA = .1225 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 300 FT SOUTHEAST ON SAPPHIRE ST. TO MICHELLES

\*\*\*\*\* 40' FF 60' ROW @ 0.014 FT/FT

\*\*\*\*\* INCLUDES 8" DIVERSION BERM

COMPUTE RATING CURVE CID=1 VS NO=11 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=1.67

CH SLP=.014 FP SLP=0.014 N=0.017

DIST=60.05

DIST ELEV DIST ELEV DIST ELEV

0 1.67 0.05 1.0 10 0.67

10.05 0. 12 .125 30 .485

48 .125 50 0. 50.05 0.67

60 1.0 60.05 1.67

| RATING CURVE VALLEY SECTION 11.0 |       |        |       |  |
|----------------------------------|-------|--------|-------|--|
| WATER                            | FLOW  | FLOW   | TOP   |  |
| SURFACE                          | AREA  | RATE   | WIDTH |  |
| ELEV                             | SQ FT | CFS    | FT    |  |
| .00                              | .00   | .00    | .00   |  |
| .09                              | .37   | .40    | 8.51  |  |
| .18                              | 1.48  | 2.55   | 16.43 |  |
| .26                              | 3.25  | 7.33   | 23.92 |  |
| .35                              | 5.69  | 15.46  | 31.41 |  |
| .44                              | 8.78  | 27.58  | 38.90 |  |
| .53                              | 12.44 | 45.89  | 42.16 |  |
| .62                              | 16.08 | 69.36  | 40.86 |  |
| .70                              | 19.66 | 93.94  | 42.05 |  |
| .79                              | 23.59 | 120.55 | 47.35 |  |
| .88                              | 27.98 | 152.43 | 52.65 |  |
| .97                              | 32.84 | 189.99 | 57.95 |  |
| 1.05                             | 38.08 | 238.86 | 59.96 |  |
| 1.14                             | 43.35 | 296.03 | 59.97 |  |
| 1.23                             | 48.62 | 357.91 | 59.98 |  |
| 1.32                             | 53.90 | 424.30 | 60.00 |  |
| 1.41                             | 59.17 | 495.01 | 60.01 |  |
| 1.49                             | 64.44 | 569.91 | 60.02 |  |
| 1.58                             | 69.72 | 648.85 | 60.04 |  |
| 1.67                             | 75.00 | 731.70 | 60.05 |  |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=300 FT SLOPE=0.014

TRAVEL TIME TABLE  
REACH= 1.0

| WATER | AVERAGE | FLOW   | TRAVEL |
|-------|---------|--------|--------|
| DEPTH | AREA    | RATE   | TIME   |
| FEET  | SQ.FT.  | CFS    | HRS    |
| .088  | .374    | .40    | .0777  |
| .176  | 1.481   | 2.55   | .0484  |
| .264  | 3.254   | 7.33   | .0370  |
| .352  | 5.686   | 15.46  | .0307  |
| .439  | 8.777   | 27.58  | .0265  |
| .527  | 12.435  | 45.89  | .0226  |
| .615  | 16.084  | 69.36  | .0193  |
| .703  | 19.659  | 93.94  | .0174  |
| .791  | 23.588  | 120.55 | .0163  |
| .879  | 27.983  | 152.43 | .0153  |
| .967  | 32.843  | 189.99 | .0144  |
| 1.055 | 38.080  | 238.86 | .0133  |
| 1.143 | 43.350  | 296.03 | .0122  |
| 1.231 | 48.622  | 357.91 | .0113  |
| 1.318 | 53.895  | 424.30 | .0106  |
| 1.406 | 59.169  | 495.01 | .0100  |
| 1.494 | 64.444  | 569.91 | .0094  |
| 1.582 | 69.721  | 648.85 | .0090  |
| 1.670 | 74.998  | 731.70 | .0085  |

ROUTE ID=3 HYD NO=208 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 208.00

RUNOFF VOLUME = 1.29163 INCHES = 8.4365 ACRE-FEET  
PEAK DISCHARGE RATE = 177.53 CFS AT 1.565 HOURS BASIN AREA = .1225 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 109 RESIDENTIAL (3.8 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=109.0 AREA=0.0057 SQ MI  
PER A=0 PER B=36 PER C=25 PER D=39

TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 8.7765 CFS UNIT VOLUME = .9980 B = 526.28 P60 = 1.8700  
AREA = .002223 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120695HR TP = .133300HR K/TP RATIO = .905437 SHAPE CONSTANT, N = 3.912748  
UNIT PEAK = 9.1114 CFS UNIT VOLUME = .9989 B = 349.31 P60 = 1.8700  
AREA = .003477 SQ MI IA = .43852 INCHES INF = 1.07787 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 109.00

RUNOFF VOLUME = 1.24675 INCHES = .3790 ACRE-FEET  
PEAK DISCHARGE RATE = 11.48 CFS AT 1.499 HOURS BASIN AREA = .0057 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 110 UNDEVELOPED ASSUME RESIDENTIAL @ 4.0 UN/AC

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=110.0 AREA=0.00193 SQ MI  
PER A=0 PER B=34 PER C=24 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 3.2003 CFS UNIT VOLUME = .9960 B = 526.28 P60 = 1.8700  
AREA = .000811 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120595HR TP = .133300HR K/TP RATIO = .904691 SHAPE CONSTANT, N = 3.916166  
UNIT PEAK = 2.9353 CFS UNIT VOLUME = .9958 B = 349.54 P60 = 1.8700  
AREA = .001119 SQ MI IA = .43793 INCHES INF = 1.07621 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = 1.28283 INCHES = .1320 ACRE-FEET  
PEAK DISCHARGE RATE = 3.98 CFS AT 1.499 HOURS BASIN AREA = .0019 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 109 AND 110

\*\*\*\*\*

ADD HYD ID=4 HYD=110 ID=1 ID=2  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = 1.25580 INCHES = .5110 ACRE-FEET  
PEAK DISCHARGE RATE = 15.46 CFS AT 1.499 HOURS BASIN AREA = .0076 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 thru 110

\*\*\*\*\*

ADD HYD ID=2 HYD=110 ID=3 ID=4

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = 1.28953 INCHES = 8.9475 ACRE-FEET  
PEAK DISCHARGE RATE = 190.87 CFS AT 1.565 HOURS BASIN AREA = .1301 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 200 FT EAST ON SAPPHIRE ST. FROM MICHELLE ST. TO INLETS

\*\*\*\*\* 40' FF 60' ROW @ 0.014 FT/FT

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=1.0

CH SLP=.014 FP SLP=0.014 N=0.017

DIST=60

DIST ELEV DIST ELEV DIST ELEV

0 1.0 10 0.67 10.05 0.

12 .125 30 .485 48 .125

50 0. 50.05 0.67 60 1.0

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
| .00                      | .00                   | .00                 | .00                |
| .05                      | .04                   | .04                 | 1.67               |
| .11                      | .18                   | .25                 | 3.34               |
| .16                      | .43                   | .66                 | 7.26               |
| .21                      | .95                   | 1.73                | 12.53              |
| .26                      | 1.75                  | 3.79                | 17.81              |
| .32                      | 2.83                  | 7.09                | 23.08              |
| .37                      | 4.18                  | 11.88               | 28.35              |
| .42                      | 5.81                  | 18.37               | 33.62              |
| .47                      | 7.72                  | 26.76               | 38.89              |
| .53                      | 9.82                  | 39.16               | 40.03              |
| .58                      | 11.93                 | 54.05               | 40.04              |
| .63                      | 14.03                 | 70.76               | 40.04              |
| .68                      | 16.15                 | 88.08               | 40.91              |
| .74                      | 18.39                 | 104.16              | 44.09              |
| .79                      | 20.79                 | 122.18              | 47.27              |
| .84                      | 23.36                 | 142.24              | 50.45              |
| .89                      | 26.10                 | 164.43              | 53.64              |
| .95                      | 29.01                 | 188.84              | 56.82              |
| 1.00                     | 32.08                 | 215.55              | 60.00              |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=200 FT SLOPE=0.014

TRAVEL TIME TABLE

REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .053                   | .044                      | .04                 | .0631                 |
| .105                   | .176                      | .25                 | .0398                 |
| .158                   | .433                      | .66                 | .0362                 |
| .211                   | .954                      | 1.73                | .0305                 |
| .263                   | 1.752                     | 3.79                | .0257                 |
| .316                   | 2.828                     | 7.09                | .0221                 |
| .368                   | 4.181                     | 11.88               | .0196                 |
| .421                   | 5.812                     | 18.37               | .0176                 |
| .474                   | 7.720                     | 26.76               | .0160                 |
| .526                   | 9.820                     | 39.16               | .0139                 |
| .579                   | 11.927                    | 54.05               | .0123                 |
| .632                   | 14.034                    | 70.76               | .0110                 |
| .684                   | 16.148                    | 88.08               | .0102                 |
| .737                   | 18.385                    | 104.16              | .0098                 |
| .789                   | 20.790                    | 122.18              | .0095                 |

|       |        |        |       |
|-------|--------|--------|-------|
| .842  | 23.361 | 142.24 | .0091 |
| .895  | 26.101 | 164.43 | .0088 |
| .947  | 29.007 | 188.84 | .0085 |
| 1.000 | 32.081 | 215.55 | .0083 |

ROUTE ID=3 HYD NO=210 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 210.00

RUNOFF VOLUME = 1.28924 INCHES = 8.9456 ACRE-FEET  
PEAK DISCHARGE RATE = 191.20 CFS AT 1.565 HOURS BASIN AREA = .1301 SQ. MI.

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 20:29:38

### OPTION 2

RUN DATE (MON/DAY/YR) =08/06/1996

USER NO.= M GOODMAN.I01

[illegible]

AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994  
RUN DATE (MON/DAY/YR) = 08/06/1996  
START TIME (HR:MIN:SEC) = 20:30:13 USER NO.= M\_GOODWN.I01  
INPUT FILE = sagedo2t.dat

START TIME=0.0  
\*\*\*\*\* SUN SAGE HILLS SUBDIVISION - DEVELOPED CONDITIONS  
\*\*\*\*\* 100-YEAR 6-HOUR STORM EVENT  
\*\*\*\*\* TEMPORARY DETENTION POND WITH SB 100 UNDEVELOPED  
\*\*\*\*\* REAR YARD PONDS IN SUB-BASINS 102-106, 108, 110;  
\*\*\*\*\* ASSUME 56% OF TOTAL LOT AREA CONTRIBUTES TO STREET RUNOFF  
\*\*\*\*\* FOR SUB-BASINS (102-06,108,110) WITH REAR YARD PONDS;  
\*\*\*\*\* SPLIT B/C LAND TREATMENT 60/40  
\*\*\*\*\* SB 100 LIMIT DISCHARGE TO 1.4 CFS WHERE Q(DEV)=0.1 CFS/ACRE  
\*\*\*\*\*  
\*\*\*\*\* FILE: SAGEDO2T.DAT JULY 26 1996 BY:DLH  
\*\*\*\*\*

RAINFALL TYPE=1 RAIN QUARTER=0.0 IN  
RAIN ONE=1.87 IN RAIN SIX=2.20 IN  
RAIN DAY=2.66 IN DT=0.0333 HR

COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.  
DT = .033300 HOURS END TIME = 5.994000 HOURS

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| .0000  | .0016  | .0033  | .0050  | .0067  | .0085  | .0103  |
| .0121  | .0140  | .0160  | .0180  | .0200  | .0221  | .0243  |
| .0265  | .0288  | .0312  | .0336  | .0361  | .0387  | .0414  |
| .0442  | .0471  | .0501  | .0533  | .0566  | .0600  | .0636  |
| .0674  | .0714  | .0757  | .0808  | .0863  | .0922  | .1044  |
| .1323  | .1754  | .2374  | .3221  | .4335  | .5756  | .7527  |
| .9690  | 1.1767 | 1.2619 | 1.3336 | 1.3972 | 1.4551 | 1.5084 |
| 1.5579 | 1.6041 | 1.6474 | 1.6881 | 1.7266 | 1.7629 | 1.7973 |
| 1.8298 | 1.8607 | 1.8900 | 1.9178 | 1.9442 | 1.9515 | 1.9573 |
| 1.9627 | 1.9680 | 1.9729 | 1.9777 | 1.9823 | 1.9867 | 1.9909 |
| 1.9950 | 1.9990 | 2.0029 | 2.0066 | 2.0102 | 2.0137 | 2.0172 |
| 2.0205 | 2.0238 | 2.0269 | 2.0300 | 2.0331 | 2.0360 | 2.0389 |
| 2.0418 | 2.0446 | 2.0473 | 2.0500 | 2.0526 | 2.0552 | 2.0578 |
| 2.0603 | 2.0627 | 2.0651 | 2.0675 | 2.0698 | 2.0721 | 2.0744 |
| 2.0766 | 2.0788 | 2.0810 | 2.0832 | 2.0853 | 2.0873 | 2.0894 |
| 2.0914 | 2.0934 | 2.0954 | 2.0974 | 2.0993 | 2.1012 | 2.1031 |
| 2.1050 | 2.1068 | 2.1086 | 2.1104 | 2.1122 | 2.1140 | 2.1157 |
| 2.1174 | 2.1191 | 2.1208 | 2.1225 | 2.1242 | 2.1258 | 2.1274 |
| 2.1290 | 2.1306 | 2.1322 | 2.1338 | 2.1353 | 2.1369 | 2.1384 |
| 2.1399 | 2.1414 | 2.1429 | 2.1444 | 2.1459 | 2.1473 | 2.1487 |
| 2.1502 | 2.1516 | 2.1530 | 2.1544 | 2.1558 | 2.1571 | 2.1585 |
| 2.1599 | 2.1612 | 2.1625 | 2.1639 | 2.1652 | 2.1665 | 2.1678 |
| 2.1691 | 2.1703 | 2.1716 | 2.1729 | 2.1741 | 2.1754 | 2.1766 |
| 2.1778 | 2.1791 | 2.1803 | 2.1815 | 2.1827 | 2.1839 | 2.1850 |
| 2.1862 | 2.1874 | 2.1886 | 2.1897 | 2.1909 | 2.1920 | 2.1931 |
| 2.1943 | 2.1954 | 2.1965 | 2.1976 | 2.1987 | 2.1998 |        |

\*\*\*\*\*  
\*\*\*\*\* SUB-BASIN 100 UNDEVELOPED  
\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=100.0 AREA=0.0219 SQ MI  
PER A=100 PER B=0 PER C=0 PER D=0  
TP=0.1333 HR MASS RAINFALL=-1

K = .163684HR TP = .133300HR K/TP RATIO = 1.227936 SHAPE CONSTANT, N = 2.899764  
UNIT PEAK = 44.941 CFS UNIT VOLUME = .9993 B = 273.54 P60 = 1.8700  
AREA = .021900 SQ MI IA = .65000 INCHES INF = 1.67000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 100.00

RUNOFF VOLUME = .43919 INCHES = .5130 ACRE-FEET

PEAK DISCHARGE RATE = 18.20 CFS AT 1.532 HOURS BASIN AREA = .0219 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* MAXIMUM FLOW FROM SB 100 IS 1.4 CFS

\*\*\*\*\* ROUTE THROUGH DETENTION POND

\*\*\*\*\* ORIFICE OPENING

\*\*\*\*\*

ROUTE RESERVOIR ID=2 HYD=POND.101 INFLOW=1 CODE=10

OUTFLOW(CFS) STORAGE(AC FT) ELEV(FT)

|       |        |      |
|-------|--------|------|
| 0     | 0      | 19.0 |
| .47   | .12298 | 19.5 |
| 1.084 | .25319 | 20.0 |
| 1.40  | .4000  | 20.5 |
| 1.656 | .5361  | 21.0 |

\* \* \* \* \*

| TIME<br>(HRS) | INFLOW<br>(CFS) | ELEV<br>(FEET) | VOLUME<br>(AC-FT) | OUTFLOW<br>(CFS) |
|---------------|-----------------|----------------|-------------------|------------------|
|---------------|-----------------|----------------|-------------------|------------------|

|       |       |       |      |      |
|-------|-------|-------|------|------|
| .00   | .00   | 19.00 | .000 | .00  |
| .33   | .00   | 19.00 | .000 | .00  |
| .67   | .00   | 19.00 | .000 | .00  |
| 1.00  | .00   | 19.00 | .000 | .00  |
| 1.33  | .00   | 19.00 | .000 | .00  |
| 1.67  | 10.42 | 20.18 | .306 | 1.20 |
| 2.00  | 1.72  | 20.48 | .394 | 1.39 |
| 2.33  | .86   | 20.46 | .390 | 1.38 |
| 2.66  | .44   | 20.40 | .369 | 1.33 |
| 3.00  | .22   | 20.30 | .342 | 1.28 |
| 3.33  | .11   | 20.20 | .312 | 1.21 |
| 3.66  | .06   | 20.10 | .282 | 1.15 |
| 4.00  | .03   | 20.00 | .253 | 1.08 |
| 4.33  | .01   | 19.89 | .225 | .95  |
| 4.66  | .01   | 19.80 | .201 | .84  |
| 5.00  | .00   | 19.72 | .179 | .74  |
| 5.33  | .00   | 19.64 | .160 | .65  |
| 5.66  | .00   | 19.58 | .144 | .57  |
| 5.99  | .00   | 19.52 | .129 | .50  |
| 6.33  | .00   | 19.47 | .116 | .44  |
| 6.66  | .00   | 19.43 | .105 | .40  |
| 6.99  | .00   | 19.38 | .094 | .36  |
| 7.33  | .00   | 19.34 | .085 | .32  |
| 7.66  | .00   | 19.31 | .076 | .29  |
| 7.99  | .00   | 19.28 | .069 | .26  |
| 8.33  | .00   | 19.25 | .062 | .24  |
| 8.66  | .00   | 19.23 | .056 | .21  |
| 8.99  | .00   | 19.20 | .050 | .19  |
| 9.32  | .00   | 19.18 | .045 | .17  |
| 9.66  | .00   | 19.17 | .041 | .16  |
| 9.99  | .00   | 19.15 | .037 | .14  |
| 10.32 | .00   | 19.13 | .033 | .13  |
| 10.66 | .00   | 19.12 | .030 | .11  |
| 10.99 | .00   | 19.11 | .027 | .10  |
| 11.32 | .00   | 19.10 | .024 | .09  |
| 11.66 | .00   | 19.09 | .022 | .08  |
| 11.99 | .00   | 19.08 | .019 | .07  |
| 12.32 | .00   | 19.07 | .017 | .07  |
| 12.65 | .00   | 19.06 | .016 | .06  |
| 12.99 | .00   | 19.06 | .014 | .05  |
| 13.32 | .00   | 19.05 | .013 | .05  |
| 13.65 | .00   | 19.05 | .011 | .04  |
| 13.99 | .00   | 19.04 | .010 | .04  |
| 14.32 | .00   | 19.04 | .009 | .04  |
| 14.65 | .00   | 19.03 | .008 | .03  |
| 14.99 | .00   | 19.03 | .008 | .03  |
| 15.32 | .00   | 19.03 | .007 | .03  |

|       |     |       |      |     |
|-------|-----|-------|------|-----|
| 15.65 | .00 | 19.02 | .006 | .02 |
| 15.98 | .00 | 19.02 | .006 | .02 |
| 16.32 | .00 | 19.02 | .005 | .02 |
| 16.65 | .00 | 19.02 | .004 | .02 |
| 16.98 | .00 | 19.02 | .004 | .02 |
| 17.32 | .00 | 19.01 | .004 | .01 |
| 17.65 | .00 | 19.01 | .003 | .01 |
| 17.98 | .00 | 19.01 | .003 | .01 |
| 18.32 | .00 | 19.01 | .003 | .01 |

| TIME<br>(HRS) | INFLOW<br>(CFS) | ELEV<br>(FEET) | VOLUME<br>(AC-FT) | OUTFLOW<br>(CFS) |
|---------------|-----------------|----------------|-------------------|------------------|
|---------------|-----------------|----------------|-------------------|------------------|

|       |     |       |      |     |
|-------|-----|-------|------|-----|
| 18.65 | .00 | 19.01 | .002 | .01 |
| 18.98 | .00 | 19.01 | .002 | .01 |
| 19.31 | .00 | 19.01 | .002 | .01 |
| 19.65 | .00 | 19.01 | .002 | .01 |

PEAK DISCHARGE = 1.389 CFS - PEAK OCCURS AT HOUR 2.10  
 MAXIMUM WATER SURFACE ELEVATION = 20.483  
 MAXIMUM STORAGE = .3951 AC-FT INCREMENTAL TIME= .033300HRS

PRINT HYD ID=2 CODE=1

#### HYDROGRAPH FROM AREA POND.101

RUNOFF VOLUME = .43784 INCHES = .5114 ACRE-FEET  
 PEAK DISCHARGE RATE = 1.39 CFS AT 2.098 HOURS BASIN AREA = .0219 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 101 SUN SAGE HILLS TOWNHOMES (6.9 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=101.0 AREA=0.0131 SQ MI  
 PER A=0 PER B=21 PER C=15 PER D=64  
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
 UNIT PEAK = 33.100 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 1.8700  
 AREA = .008384 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120523HR TP = .133300HR K/TP RATIO = .904149 SHAPE CONSTANT, N = 3.918663  
 UNIT PEAK = 12.372 CFS UNIT VOLUME = .9994 B = 349.71 P60 = 1.8700  
 AREA = .004716 SQ MI IA = .43750 INCHES INF = 1.07500 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

#### PARTIAL HYDROGRAPH 101.00

RUNOFF VOLUME = 1.54209 INCHES = 1.0774 ACRE-FEET  
 PEAK DISCHARGE RATE = 30.61 CFS AT 1.499 HOURS BASIN AREA = .0131 SQ. MI.

\*\*\*\*\*

\*\*\*\*\*ADD SB 100 AND SB 101

\*\*\*\*\*

ADD HYD ID=3 HYD=101 ID=1 ID=2  
 PRINT HYD ID=3 CODE=1

#### PARTIAL HYDROGRAPH 101.00

RUNOFF VOLUME = .85114 INCHES = 1.5888 ACRE-FEET

PEAK DISCHARGE RATE = 31.01 CFS AT 1.499 HOURS BASIN AREA = .0350 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 250 FT SOUTH ON 94TH STREET 32' FF 50' ROW

\*\*\*\*\* @ 0.005 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.005 FP SLP=0.005 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
|--------------------------|-----------------------|---------------------|--------------------|

|     |       |       |       |
|-----|-------|-------|-------|
| .00 | .00   | .00   | .00   |
| .05 | .03   | .02   | 1.45  |
| .09 | .13   | .10   | 2.91  |
| .14 | .30   | .27   | 5.21  |
| .18 | .65   | .64   | 9.79  |
| .23 | 1.20  | 1.39  | 14.38 |
| .27 | 1.97  | 2.63  | 18.96 |
| .32 | 2.94  | 4.46  | 23.55 |
| .37 | 4.12  | 6.97  | 28.14 |
| .41 | 5.51  | 10.38 | 32.01 |
| .46 | 6.98  | 15.35 | 32.02 |
| .50 | 8.44  | 21.05 | 32.03 |
| .55 | 9.91  | 27.44 | 32.03 |
| .60 | 11.38 | 34.47 | 32.04 |
| .64 | 12.85 | 42.12 | 32.05 |
| .69 | 14.33 | 48.98 | 33.56 |
| .73 | 15.96 | 54.42 | 37.67 |
| .78 | 17.78 | 60.93 | 41.78 |
| .82 | 19.78 | 68.53 | 45.89 |
| .87 | 21.98 | 77.24 | 50.00 |

COMPUTE TRAVEL TIME ID=4 REACH NO=1 NO VS=1 LENGTH=250 FT SLOPE=0.005

TRAVEL TIME TABLE

REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .02                 | .1449                 |
| .092                   | .133                      | .10                 | .0913                 |
| .137                   | .305                      | .27                 | .0770                 |
| .183                   | .648                      | .64                 | .0703                 |
| .229                   | 1.202                     | 1.39                | .0600                 |
| .275                   | 1.965                     | 2.63                | .0519                 |
| .321                   | 2.938                     | 4.46                | .0458                 |
| .366                   | 4.122                     | 6.97                | .0411                 |
| .412                   | 5.513                     | 10.38               | .0369                 |
| .458                   | 6.979                     | 15.35               | .0316                 |
| .504                   | 8.445                     | 21.05               | .0279                 |
| .549                   | 9.911                     | 27.44               | .0251                 |
| .595                   | 11.378                    | 34.47               | .0229                 |
| .641                   | 12.845                    | 42.12               | .0212                 |
| .687                   | 14.326                    | 48.98               | .0203                 |
| .733                   | 15.956                    | 54.42               | .0204                 |
| .778                   | 17.776                    | 60.93               | .0203                 |
| .824                   | 19.783                    | 68.53               | .0200                 |
| .870                   | 21.978                    | 77.24               | .0198                 |

ROUTE ID=4 HYD NO=201 INFLOW ID=3 DT=0.0

PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 201.00

RUNOFF VOLUME = .85110 INCHES = 1.5887 ACRE-FEET  
PEAK DISCHARGE RATE = 30.86 CFS AT 1.532 HOURS BASIN AREA = .0350 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 104 RESIDENTIAL (4.0 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=104.0 AREA=0.01350 SQ MI  
PER A=0 PER B=34 PER C=24 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 22.385 CFS UNIT VOLUME = .9988 B = 526.28 P60 = 1.8700  
AREA = .005670 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120595HR TP = .133300HR K/TP RATIO = .904691 SHAPE CONSTANT, N = 3.916166  
UNIT PEAK = 20.532 CFS UNIT VOLUME = .9998 B = 349.54 P60 = 1.8700  
AREA = .007830 SQ MI IA = .43793 INCHES INF = 1.07621 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.28283 INCHES = .9236 ACRE-FEET  
PEAK DISCHARGE RATE = 27.72 CFS AT 1.499 HOURS BASIN AREA = .0135 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 AND 101 AND 104

\*\*\*\*\*

ADD HYD ID=2 HYD=104 ID=1 ID=4  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = .97127 INCHES = 2.5123 ACRE-FEET  
PEAK DISCHARGE RATE = 57.81 CFS AT 1.532 HOURS BASIN AREA = .0485 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 770 FT EAST ON REBA AVE 32' 50' ROW

\*\*\*\*\* FF @ 0.0164 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87  
CH SLP=.0164 FP SLP=0.0164 N=0.017  
DIST=50  
DIST ELEV DIST ELEV DIST ELEV  
0 .87 9.0 .67 9.05 0.  
11 .125 25 .405 39 .125  
41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0  
WATER FLOW FLOW TOP  
SURFACE AREA RATE WIDTH  
ELEV SQ FT CFS FT

|     |       |        |       |
|-----|-------|--------|-------|
| .00 | .00   | .00    | .00   |
| .05 | .03   | .03    | 1.45  |
| .09 | .13   | .18    | 2.91  |
| .14 | .30   | .50    | 5.21  |
| .18 | .65   | 1.16   | 9.79  |
| .23 | 1.20  | 2.52   | 14.38 |
| .27 | 1.97  | 4.77   | 18.96 |
| .32 | 2.94  | 8.07   | 23.55 |
| .37 | 4.12  | 12.62  | 28.14 |
| .41 | 5.51  | 18.80  | 32.01 |
| .46 | 6.98  | 27.79  | 32.02 |
| .50 | 8.44  | 38.12  | 32.03 |
| .55 | 9.91  | 49.69  | 32.03 |
| .60 | 11.38 | 62.43  | 32.04 |
| .64 | 12.85 | 76.28  | 32.05 |
| .69 | 14.33 | 88.71  | 33.56 |
| .73 | 15.96 | 98.56  | 37.67 |
| .78 | 17.78 | 110.35 | 41.78 |
| .82 | 19.78 | 124.11 | 45.89 |
| .87 | 21.98 | 139.89 | 50.00 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=770 FT SLOPE=0.0164

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .03                 | .2464                 |
| .092                   | .133                      | .18                 | .1552                 |
| .137                   | .305                      | .50                 | .1310                 |
| .183                   | .648                      | 1.16                | .1195                 |
| .229                   | 1.202                     | 2.52                | .1020                 |
| .275                   | 1.965                     | 4.77                | .0882                 |
| .321                   | 2.938                     | 8.07                | .0778                 |
| .366                   | 4.122                     | 12.62               | .0699                 |
| .412                   | 5.513                     | 18.80               | .0627                 |
| .458                   | 6.979                     | 27.79               | .0537                 |
| .504                   | 8.445                     | 38.12               | .0474                 |
| .549                   | 9.911                     | 49.69               | .0427                 |
| .595                   | 11.378                    | 62.43               | .0390                 |
| .641                   | 12.845                    | 76.28               | .0360                 |
| .687                   | 14.326                    | 88.71               | .0345                 |
| .733                   | 15.956                    | 98.56               | .0346                 |
| .778                   | 17.776                    | 110.35              | .0345                 |
| .824                   | 19.783                    | 124.11              | .0341                 |
| .870                   | 21.978                    | 139.89              | .0336                 |

ROUTE ID=3 HYD NO=204 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 204.00

RUNOFF VOLUME = .97121 INCHES = 2.5122 ACRE-Feet  
PEAK DISCHARGE RATE = 56.28 CFS AT 1.532 HOURS BASIN AREA = .0485 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 102 RESIDENTIAL (5.1 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=102.0 AREA=0.01310 SQ MI  
PER A=0 PER B=30 PER C=20 PER D=50  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 25.860 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8700  
AREA = .006550 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120942HR TP = .133300HR K/TP RATIO = .907291 SHAPE CONSTANT, N = 3.904285  
UNIT PEAK = 17.136 CFS UNIT VOLUME = .9996 B = 348.74 P60 = 1.8700  
AREA = .006550 SQ MI IA = .44000 INCHES INF = 1.08200 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 102.00

RUNOFF VOLUME = 1.37477 INCHES = .9605 ACRE-FEET  
PEAK DISCHARGE RATE = 28.19 CFS AT 1.499 HOURS BASIN AREA = .0131 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 103 RESIDENTIAL (4.6 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=103.0 AREA=0.00398 SQ MI  
PER A=0 PER B=32 PER C=21 PER D=47  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 7.3852 CFS UNIT VOLUME = .9978 B = 526.28 P60 = 1.8700  
AREA = .001871 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .121037HR TP = .133300HR K/TP RATIO = .908002 SHAPE CONSTANT, N = 3.901043  
UNIT PEAK = 5.5151 CFS UNIT VOLUME = .9980 B = 348.52 P60 = 1.8700  
AREA = .002109 SQ MI IA = .44057 INCHES INF = 1.08358 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 1.33869 INCHES = .2842 ACRE-FEET  
PEAK DISCHARGE RATE = 8.42 CFS AT 1.499 HOURS BASIN AREA = .0040 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 102 AND 103

\*\*\*\*\*

ADD HYD ID=4 HYD=103 ID=1 ID=2  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 1.36633 INCHES = 1.2446 ACRE-FEET  
PEAK DISCHARGE RATE = 36.61 CFS AT 1.499 HOURS BASIN AREA = .0171 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100, 101, 102, 103, 104

\*\*\*\*\*

ADD HYD ID=2 HYD=104 ID=3 ID=4  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.07412 INCHES = 3.7568 ACRE-FEET  
PEAK DISCHARGE RATE = 91.78 CFS AT 1.532 HOURS BASIN AREA = .0656 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 150 FT SOUTHEAST ON BLAZICK AVE 32' FF 50' ROW

\*\*\*\*\* @ 0.02 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.02 FP SLP=0.02 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
|--------------------------|-----------------------|---------------------|--------------------|

|     |       |        |       |
|-----|-------|--------|-------|
| .00 | .00   | .00    | .00   |
| .05 | .03   | .03    | 1.45  |
| .09 | .13   | .20    | 2.91  |
| .14 | .30   | .55    | 5.21  |
| .18 | .65   | 1.28   | 9.79  |
| .23 | 1.20  | 2.78   | 14.38 |
| .27 | 1.97  | 5.26   | 18.96 |
| .32 | 2.94  | 8.92   | 23.55 |
| .37 | 4.12  | 13.93  | 28.14 |
| .41 | 5.51  | 20.76  | 32.01 |
| .46 | 6.98  | 30.69  | 32.02 |
| .50 | 8.44  | 42.10  | 32.03 |
| .55 | 9.91  | 54.88  | 32.03 |
| .60 | 11.38 | 68.94  | 32.04 |
| .64 | 12.85 | 84.23  | 32.05 |
| .69 | 14.33 | 97.96  | 33.56 |
| .73 | 15.96 | 108.84 | 37.67 |
| .78 | 17.78 | 121.86 | 41.78 |
| .82 | 19.78 | 137.06 | 45.89 |
| .87 | 21.98 | 154.48 | 50.00 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=150 FT SLOPE=0.02

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .03                 | .0435                 |
| .092                   | .133                      | .20                 | .0274                 |
| .137                   | .305                      | .55                 | .0231                 |
| .183                   | .648                      | 1.28                | .0211                 |
| .229                   | 1.202                     | 2.78                | .0180                 |
| .275                   | 1.965                     | 5.26                | .0156                 |
| .321                   | 2.938                     | 8.92                | .0137                 |
| .366                   | 4.122                     | 13.93               | .0123                 |
| .412                   | 5.513                     | 20.76               | .0111                 |
| .458                   | 6.979                     | 30.69               | .0095                 |
| .504                   | 8.445                     | 42.10               | .0084                 |
| .549                   | 9.911                     | 54.88               | .0075                 |
| .595                   | 11.378                    | 68.94               | .0069                 |
| .641                   | 12.845                    | 84.23               | .0064                 |
| .687                   | 14.326                    | 97.96               | .0061                 |
| .733                   | 15.956                    | 108.84              | .0061                 |
| .778                   | 17.776                    | 121.86              | .0061                 |
| .824                   | 19.783                    | 137.06              | .0060                 |
| .870                   | 21.978                    | 154.48              | .0059                 |

ROUTE ID=3 HYD NO=203 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 203.00

RUNOFF VOLUME = 1.07411 INCHES = 3.7568 ACRE-FEET  
 PEAK DISCHARGE RATE = 92.05 CFS AT 1.532 HOURS BASIN AREA = .0656 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 105 RESIDENTIAL (4.0 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=105.0 AREA=0.00526 SQ MI  
 PER A=0 PER B=34 PER C=24 PER D=42  
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
 UNIT PEAK = 8.7220 CFS UNIT VOLUME = .9980 B = 526.28 P60 = 1.8700  
 AREA = .002209 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120595HR TP = .133300HR K/TP RATIO = .904691 SHAPE CONSTANT, N = 3.916166  
 UNIT PEAK = 7.9999 CFS UNIT VOLUME = .9988 B = 349.54 P60 = 1.8700  
 AREA = .003051 SQ MI IA = .43793 INCHES INF = 1.07621 INCHES PER HOUR  
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 1.28283 INCHES = .3599 ACRE-FEET  
 PEAK DISCHARGE RATE = 10.81 CFS AT 1.499 HOURS BASIN AREA = .0053 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 104 AND 105

\*\*\*\*\*

ADD HYD ID=2 HYD=105 ID=1 ID=3  
 PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 1.08961 INCHES = 4.1167 ACRE-FEET  
 PEAK DISCHARGE RATE = 102.57 CFS AT 1.532 HOURS BASIN AREA = .0708 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 1050 FT EAST ON SONYA AVE 32' FF 50' ROW

\*\*\*\*\* @ 0.0112 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87  
 CH SLP=.0112 FP SLP=0.0112 N=0.017  
 DIST=50  
 DIST ELEV DIST ELEV DIST ELEV  
 0 .87 9.0 .67 9.05 0.  
 11 .125 25 .405 39 .125  
 41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0  
 WATER FLOW FLOW TOP  
 SURFACE AREA RATE WIDTH  
 ELEV SQ FT CFS FT  
 .00 .00 .00 .00  
 .05 .03 .02 1.45

|     |       |        |       |
|-----|-------|--------|-------|
| .09 | .13   | .15    | 2.91  |
| .14 | .30   | .41    | 5.21  |
| .18 | .65   | .96    | 9.79  |
| .23 | 1.20  | 2.08   | 14.38 |
| .27 | 1.97  | 3.94   | 18.96 |
| .32 | 2.94  | 6.67   | 23.55 |
| .37 | 4.12  | 10.43  | 28.14 |
| .41 | 5.51  | 15.53  | 32.01 |
| .46 | 6.98  | 22.97  | 32.02 |
| .50 | 8.44  | 31.50  | 32.03 |
| .55 | 9.91  | 41.07  | 32.03 |
| .60 | 11.38 | 51.59  | 32.04 |
| .64 | 12.85 | 63.03  | 32.05 |
| .69 | 14.33 | 73.31  | 33.56 |
| .73 | 15.96 | 81.45  | 37.67 |
| .78 | 17.78 | 91.19  | 41.78 |
| .82 | 19.78 | 102.56 | 45.89 |
| .87 | 21.98 | 115.60 | 50.00 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=1050 FT SLOPE=0.0112

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .02                 | .4066                 |
| .092                   | .133                      | .15                 | .2562                 |
| .137                   | .305                      | .41                 | .2161                 |
| .183                   | .648                      | .96                 | .1972                 |
| .229                   | 1.202                     | 2.08                | .1683                 |
| .275                   | 1.965                     | 3.94                | .1455                 |
| .321                   | 2.938                     | 6.67                | .1284                 |
| .366                   | 4.122                     | 10.43               | .1153                 |
| .412                   | 5.513                     | 15.53               | .1035                 |
| .458                   | 6.979                     | 22.97               | .0886                 |
| .504                   | 8.445                     | 31.50               | .0782                 |
| .549                   | 9.911                     | 41.07               | .0704                 |
| .595                   | 11.378                    | 51.59               | .0643                 |
| .641                   | 12.845                    | 63.03               | .0594                 |
| .687                   | 14.326                    | 73.31               | .0570                 |
| .733                   | 15.956                    | 81.45               | .0571                 |
| .778                   | 17.776                    | 91.19               | .0569                 |
| .824                   | 19.783                    | 102.56              | .0563                 |
| .870                   | 21.978                    | 115.60              | .0555                 |

ROUTE ID=3 HYD NO=205 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 205.00

RUNOFF VOLUME = 1.08954 INCHES = 4.1164 ACRE-FEET  
PEAK DISCHARGE RATE = 92.13 CFS AT 1.565 HOURS BASIN AREA = .0708 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 106 RESIDENTIAL (4.5 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=106.0 AREA=0.01893 SQ MI  
PER A=0 PER B=32 PER C=22 PER D=46  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 34.379 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 1.8700  
AREA = .008708 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120756HR TP = .133300HR K/TP RATIO = .905895 SHAPE CONSTANT, N = 3.910652  
UNIT PEAK = 26.776 CFS UNIT VOLUME = .9999 B = 349.17 P60 = 1.8700  
AREA = .010222 SQ MI IA = .43889 INCHES INF = 1.07889 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 106.00

RUNOFF VOLUME = 1.32880 INCHES = 1.3415 ACRE-FEET  
PEAK DISCHARGE RATE = 39.79 CFS AT 1.499 HOURS BASIN AREA = .0189 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 105 AND 106

\*\*\*\*\*

ADD HYD ID=2 HYD=106 ID=1 ID=3

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 106.00

RUNOFF VOLUME = 1.13999 INCHES = 5.4579 ACRE-FEET  
PEAK DISCHARGE RATE = 126.26 CFS AT 1.565 HOURS BASIN AREA = .0898 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 400 FT SOUTHEAST ON SAPPHIRE ST. TO 86TH ST.

\*\*\*\*\* 32' FF 50' ROW @ 0.0135 FT/FT

\*\*\*\*\*

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=.87

CH SLP=.0135 FP SLP=0.0135 N=0.017

DIST=50

DIST ELEV DIST ELEV DIST ELEV

0 .87 9.0 .67 9.05 0.

11 .125 25 .405 39 .125

41 0. 41.05 .67 50 .87

RATING CURVE VALLEY SECTION 9.0

| WATER<br>SURFACE<br>ELEV | FLOW<br>AREA<br>SQ FT | FLOW<br>RATE<br>CFS | TOP<br>WIDTH<br>FT |
|--------------------------|-----------------------|---------------------|--------------------|
|--------------------------|-----------------------|---------------------|--------------------|

|     |       |        |       |
|-----|-------|--------|-------|
| .00 | .00   | .00    | .00   |
| .05 | .03   | .03    | 1.45  |
| .09 | .13   | .17    | 2.91  |
| .14 | .30   | .45    | 5.21  |
| .18 | .65   | 1.05   | 9.79  |
| .23 | 1.20  | 2.29   | 14.38 |
| .27 | 1.97  | 4.32   | 18.96 |
| .32 | 2.94  | 7.33   | 23.55 |
| .37 | 4.12  | 11.45  | 28.14 |
| .41 | 5.51  | 17.05  | 32.01 |
| .46 | 6.98  | 25.22  | 32.02 |
| .50 | 8.44  | 34.59  | 32.03 |
| .55 | 9.91  | 45.09  | 32.03 |
| .60 | 11.38 | 56.64  | 32.04 |
| .64 | 12.85 | 69.20  | 32.05 |
| .69 | 14.33 | 80.48  | 33.56 |
| .73 | 15.96 | 89.42  | 37.67 |
| .78 | 17.78 | 100.12 | 41.78 |
| .82 | 19.78 | 112.60 | 45.89 |
| .87 | 21.98 | 126.92 | 50.00 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=400 FT SLOPE=0.0135

TRAVEL TIME TABLE

REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .046                   | .033                      | .03                 | .1411                 |
| .092                   | .133                      | .17                 | .0889                 |
| .137                   | .305                      | .45                 | .0750                 |
| .183                   | .648                      | 1.05                | .0684                 |
| .229                   | 1.202                     | 2.29                | .0584                 |
| .275                   | 1.965                     | 4.32                | .0505                 |
| .321                   | 2.938                     | 7.33                | .0446                 |
| .366                   | 4.122                     | 11.45               | .0400                 |
| .412                   | 5.513                     | 17.05               | .0359                 |
| .458                   | 6.979                     | 25.22               | .0307                 |
| .504                   | 8.445                     | 34.59               | .0271                 |
| .549                   | 9.911                     | 45.09               | .0244                 |
| .595                   | 11.378                    | 56.64               | .0223                 |
| .641                   | 12.845                    | 69.20               | .0206                 |
| .687                   | 14.326                    | 80.48               | .0198                 |
| .733                   | 15.956                    | 89.42               | .0198                 |
| .778                   | 17.776                    | 100.12              | .0197                 |
| .824                   | 19.783                    | 112.60              | .0195                 |
| .870                   | 21.978                    | 126.92              | .0192                 |

ROUTE ID=3 HYD NO=206 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 206.00

RUNOFF VOLUME = 1.13997 INCHES = 5.4578 ACRE-FEET  
PEAK DISCHARGE RATE = 124.84 CFS AT 1.565 HOURS BASIN AREA = .0898 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 107 RESIDENTIAL (PARK/RESIDENTIAL/WATER TNK)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=107.0 AREA=0.0267 SQ MI  
PER A=0 PER B=54 PER C=23 PER D=23  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 24.245 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8700  
AREA = .006141 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .123487HR TP = .133300HR K/TP RATIO = .926384 SHAPE CONSTANT, N = 3.819526  
UNIT PEAK = 52.894 CFS UNIT VOLUME = 1.000 B = 342.95 P60 = 1.8700  
AREA = .020559 SQ MI IA = .45519 INCHES INF = 1.12455 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 107.00

RUNOFF VOLUME = 1.03176 INCHES = 1.4692 ACRE-FEET  
PEAK DISCHARGE RATE = 46.95 CFS AT 1.499 HOURS BASIN AREA = .0267 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 108 UNDEVELOPED ASSUME RESIDENTIAL @ 4.0 UN/AC

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=108.0 AREA=0.00600 SQ MI  
PER A=0 PER B=35 PER C=23 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 9.9491 CFS UNIT VOLUME = .9982 B = 526.28 P60 = 1.8700  
AREA = .002520 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .121029HR TP = .133300HR K/TP RATIO = .907941 SHAPE CONSTANT, N = 3.901327  
UNIT PEAK = 9.0991 CFS UNIT VOLUME = .9990 B = 348.54 P60 = 1.8700  
AREA = .003480 SQ MI IA = .44052 INCHES INF = 1.08345 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = 1.27962 INCHES = .4095 ACRE-FEET  
PEAK DISCHARGE RATE = 12.29 CFS AT 1.499 HOURS BASIN AREA = .0060 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 107 AND 108

\*\*\*\*\*

ADD HYD ID=4 HYD=108 ID=1 ID=2  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = 1.07722 INCHES = 1.8787 ACRE-FEET  
PEAK DISCHARGE RATE = 59.24 CFS AT 1.499 HOURS BASIN AREA = .0327 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 THRU 108

\*\*\*\*\*

ADD HYD ID=2 HYD=108 ID=3 ID=4  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = 1.12321 INCHES = 7.3365 ACRE-FEET  
PEAK DISCHARGE RATE = 176.83 CFS AT 1.565 HOURS BASIN AREA = .1225 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 300 FT SOUTHEAST ON SAPPHIRE ST. TO MICHELLES

\*\*\*\*\* 40' FF 60' ROW @ 0.014 FT/FT

\*\*\*\*\* INCLUDES 8" DIVERSION BERM

COMPUTE RATING CURVE CID=1 VS NO=11 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=1.67

CH SLP=.014 FP SLP=0.014 N=0.017

DIST=60.05

DIST ELEV DIST ELEV DIST ELEV

0 1.67 0.05 1.0 10 0.67

10.05 0. 12 .125 30 .485

48 .125 50 0. 50.05 0.67

60 1.0 60.05 1.67

RATING CURVE VALLEY SECTION 11.0

| WATER   | FLOW | FLOW | TOP   |
|---------|------|------|-------|
| SURFACE | AREA | RATE | WIDTH |

| ELEV | SQ FT | CFS | FT |
|------|-------|-----|----|
|------|-------|-----|----|

|     |     |     |     |
|-----|-----|-----|-----|
| .00 | .00 | .00 | .00 |
|-----|-----|-----|-----|

|     |     |     |      |
|-----|-----|-----|------|
| .09 | .37 | .40 | 8.51 |
|-----|-----|-----|------|

|      |       |        |       |
|------|-------|--------|-------|
| .18  | 1.48  | 2.55   | 16.43 |
| .26  | 3.25  | 7.33   | 23.92 |
| .35  | 5.69  | 15.46  | 31.41 |
| .44  | 8.78  | 27.58  | 38.90 |
| .53  | 12.44 | 45.89  | 42.16 |
| .62  | 16.08 | 69.36  | 40.86 |
| .70  | 19.66 | 93.94  | 42.05 |
| .79  | 23.59 | 120.55 | 47.35 |
| .88  | 27.98 | 152.43 | 52.65 |
| .97  | 32.84 | 189.99 | 57.95 |
| 1.05 | 38.08 | 238.86 | 59.96 |
| 1.14 | 43.35 | 296.03 | 59.97 |
| 1.23 | 48.62 | 357.91 | 59.98 |
| 1.32 | 53.90 | 424.30 | 60.00 |
| 1.41 | 59.17 | 495.01 | 60.01 |
| 1.49 | 64.44 | 569.91 | 60.02 |
| 1.58 | 69.72 | 648.85 | 60.04 |
| 1.67 | 75.00 | 731.70 | 60.05 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=300 FT SLOPE=0.014

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .088                   | .374                      | .40                 | .0777                 |
| .176                   | 1.481                     | 2.55                | .0484                 |
| .264                   | 3.254                     | 7.33                | .0370                 |
| .352                   | 5.686                     | 15.46               | .0307                 |
| .439                   | 8.777                     | 27.58               | .0265                 |
| .527                   | 12.435                    | 45.89               | .0226                 |
| .615                   | 16.084                    | 69.36               | .0193                 |
| .703                   | 19.659                    | 93.94               | .0174                 |
| .791                   | 23.588                    | 120.55              | .0163                 |
| .879                   | 27.983                    | 152.43              | .0153                 |
| .967                   | 32.843                    | 189.99              | .0144                 |
| 1.055                  | 38.080                    | 238.86              | .0133                 |
| 1.143                  | 43.350                    | 296.03              | .0122                 |
| 1.231                  | 48.622                    | 357.91              | .0113                 |
| 1.318                  | 53.895                    | 424.30              | .0106                 |
| 1.406                  | 59.169                    | 495.01              | .0100                 |
| 1.494                  | 64.444                    | 569.91              | .0094                 |
| 1.582                  | 69.721                    | 648.85              | .0090                 |
| 1.670                  | 74.998                    | 731.70              | .0085                 |

ROUTE ID=3 HYD NO=208 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 208.00

RUNOFF VOLUME = 1.12320 INCHES = 7.3364 ACRE-FEET  
PEAK DISCHARGE RATE = 177.24 CFS AT 1.565 HOURS BASIN AREA = .1225 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 109 RESIDENTIAL (3.8 UN/AC)

\*\*\*\*\*

COMPUTE NM HYD ID=1 HYD NO=109.0 AREA=0.0057 SQ MI  
PER A=0 PER B=36 PER C=25 PER D=39  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 8.7765 CFS UNIT VOLUME = .9980 B = 526.28 P60 = 1.8700  
AREA = .002223 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120695HR TP = .133300HR K/TP RATIO = .905437 SHAPE CONSTANT, N = 3.912748  
UNIT PEAK = 9.1114 CFS UNIT VOLUME = .9989 B = 349.31 P60 = 1.8700  
AREA = .003477 SQ MI IA = .43852 INCHES INF = 1.07787 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 109.00

RUNOFF VOLUME = 1.24675 INCHES = .3790 ACRE-FEET  
PEAK DISCHARGE RATE = 11.48 CFS AT 1.499 HOURS BASIN AREA = .0057 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* SUB-BASIN 110 UNDEVELOPED ASSUME RESIDENTIAL @ 4.0 UN/AC

\*\*\*\*\*

COMPUTE NM HYD ID=2 HYD NO=110.0 AREA=0.00193 SQ MI  
PER A=0 PER B=34 PER C=24 PER D=42  
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420  
UNIT PEAK = 3.2003 CFS UNIT VOLUME = .9960 B = 526.28 P60 = 1.8700  
AREA = .000811 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .120595HR TP = .133300HR K/TP RATIO = .904691 SHAPE CONSTANT, N = 3.916166  
UNIT PEAK = 2.9353 CFS UNIT VOLUME = .9958 B = 349.54 P60 = 1.8700  
AREA = .001119 SQ MI IA = .43793 INCHES INF = 1.07621 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = 1.28283 INCHES = .1320 ACRE-FEET  
PEAK DISCHARGE RATE = 3.98 CFS AT 1.499 HOURS BASIN AREA = .0019 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 109 AND 110

\*\*\*\*\*

ADD HYD ID=4 HYD=110 ID=1 ID=2  
PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = 1.25580 INCHES = .5110 ACRE-FEET  
PEAK DISCHARGE RATE = 15.46 CFS AT 1.499 HOURS BASIN AREA = .0076 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ADD SB 100 thru 110

\*\*\*\*\*

ADD HYD ID=2 HYD=110 ID=3 ID=4  
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 110.00

RUNOFF VOLUME = 1.13098 INCHES = 7.8474 ACRE-FEET  
PEAK DISCHARGE RATE = 190.58 CFS AT 1.565 HOURS BASIN AREA = .1301 SQ. MI.

\*\*\*\*\*

\*\*\*\*\* ROUTE 200 FT EAST ON SAPPHIRE ST. FROM MICHELLE ST. TO INLETS

\*\*\*\*\* 40' FF 60' ROW @ 0.014 FT/FT

COMPUTE RATING CURVE CID=1 VS NO=9 NO SEGS=1

MIN ELEV=0.0 MAX ELEV=1.0

CH SLP=.014 FP SLP=0.014 N=0.017

DIST=60

DIST ELEV DIST ELEV DIST ELEV

0 1.0 10 0.67 10.05 0.

12 .125 30 .485 48 .125

50 0. 50.05 0.67 60 1.0

RATING CURVE VALLEY SECTION 9.0

WATER FLOW FLOW TOP  
SURFACE AREA RATE WIDTH  
ELEV SQ FT CFS FT

|      |       |        |       |
|------|-------|--------|-------|
| .00  | .00   | .00    | .00   |
| .05  | .04   | .04    | 1.67  |
| .11  | .18   | .25    | 3.34  |
| .16  | .43   | .66    | 7.26  |
| .21  | .95   | 1.73   | 12.53 |
| .26  | 1.75  | 3.79   | 17.81 |
| .32  | 2.83  | 7.09   | 23.08 |
| .37  | 4.18  | 11.88  | 28.35 |
| .42  | 5.81  | 18.37  | 33.62 |
| .47  | 7.72  | 26.76  | 38.89 |
| .53  | 9.82  | 39.16  | 40.03 |
| .58  | 11.93 | 54.05  | 40.04 |
| .63  | 14.03 | 70.76  | 40.04 |
| .68  | 16.15 | 88.08  | 40.91 |
| .74  | 18.39 | 104.16 | 44.09 |
| .79  | 20.79 | 122.18 | 47.27 |
| .84  | 23.36 | 142.24 | 50.45 |
| .89  | 26.10 | 164.43 | 53.64 |
| .95  | 29.01 | 188.84 | 56.82 |
| 1.00 | 32.08 | 215.55 | 60.00 |

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 LENGTH=200 FT SLOPE=0.014

TRAVEL TIME TABLE  
REACH= 1.0

| WATER<br>DEPTH<br>FEET | AVERAGE<br>AREA<br>SQ.FT. | FLOW<br>RATE<br>CFS | TRAVEL<br>TIME<br>HRS |
|------------------------|---------------------------|---------------------|-----------------------|
| .053                   | .044                      | .04                 | .0631                 |
| .105                   | .176                      | .25                 | .0398                 |
| .158                   | .433                      | .66                 | .0362                 |
| .211                   | .954                      | 1.73                | .0305                 |
| .263                   | 1.752                     | 3.79                | .0257                 |
| .316                   | 2.828                     | 7.09                | .0221                 |
| .368                   | 4.181                     | 11.88               | .0196                 |
| .421                   | 5.812                     | 18.37               | .0176                 |
| .474                   | 7.720                     | 26.76               | .0160                 |
| .526                   | 9.820                     | 39.16               | .0139                 |
| .579                   | 11.927                    | 54.05               | .0123                 |
| .632                   | 14.034                    | 70.76               | .0110                 |
| .684                   | 16.148                    | 88.08               | .0102                 |
| .737                   | 18.385                    | 104.16              | .0098                 |
| .789                   | 20.790                    | 122.18              | .0095                 |
| .842                   | 23.361                    | 142.24              | .0091                 |
| .895                   | 26.101                    | 164.43              | .0088                 |
| .947                   | 29.007                    | 188.84              | .0085                 |
| 1.000                  | 32.081                    | 215.55              | .0083                 |

ROUTE ID=3 HYD NO=210 INFLOW ID=2 DT=0.0  
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 210.00

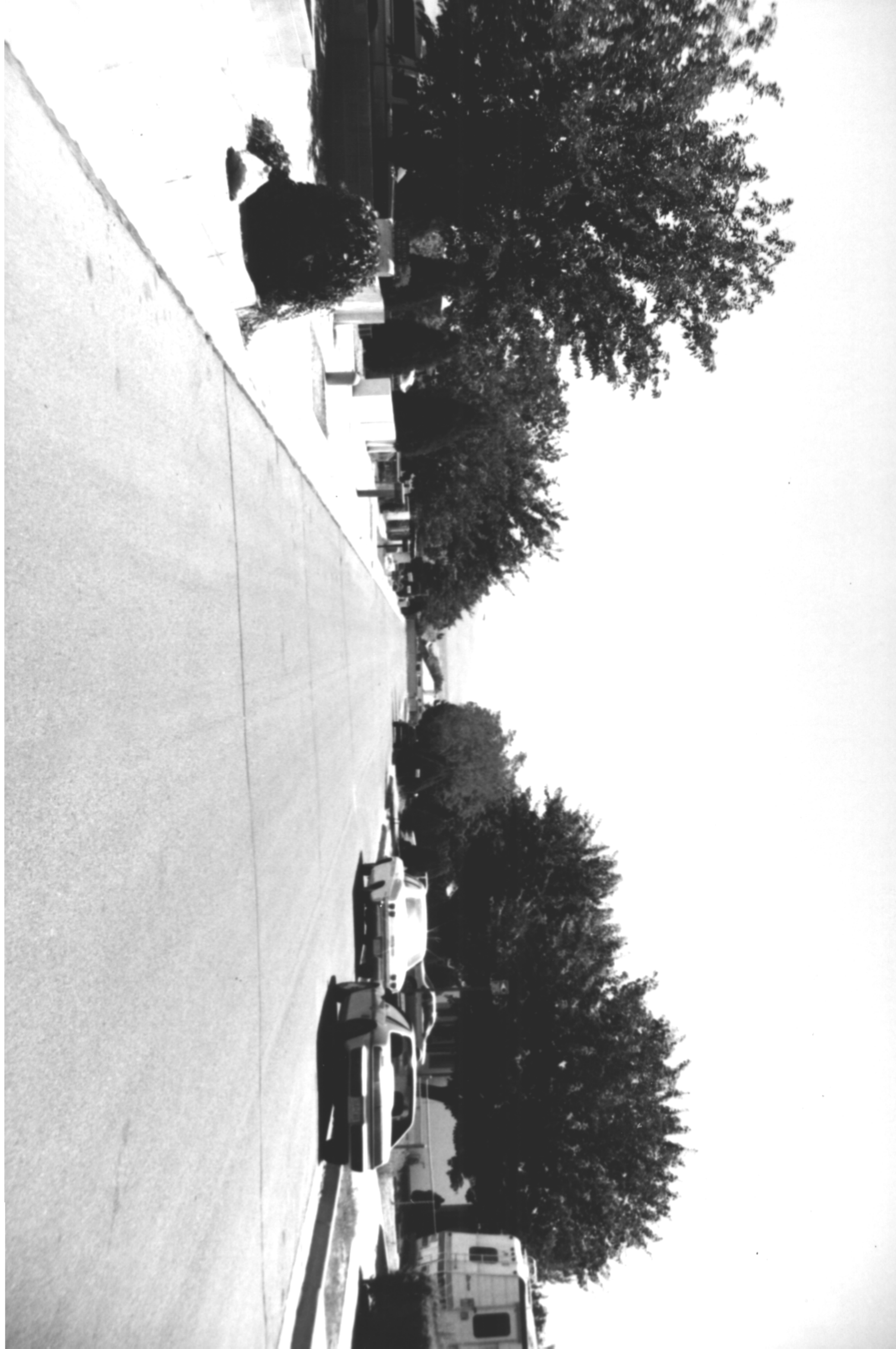
RUNOFF VOLUME = 1.13097 INCHES = 7.8474 ACRE-FEET  
PEAK DISCHARGE RATE = 190.91 CFS AT 1.565 HOURS BASIN AREA = .1301 SQ. MI.

FINISH

NORMAL PROGRAM FINISH      END TIME (HR:MIN:SEC) = 20:30:19

APPENDIX D

PHOTOS



① Reba Avenue



② Reba Avenue



3 Blazick Street

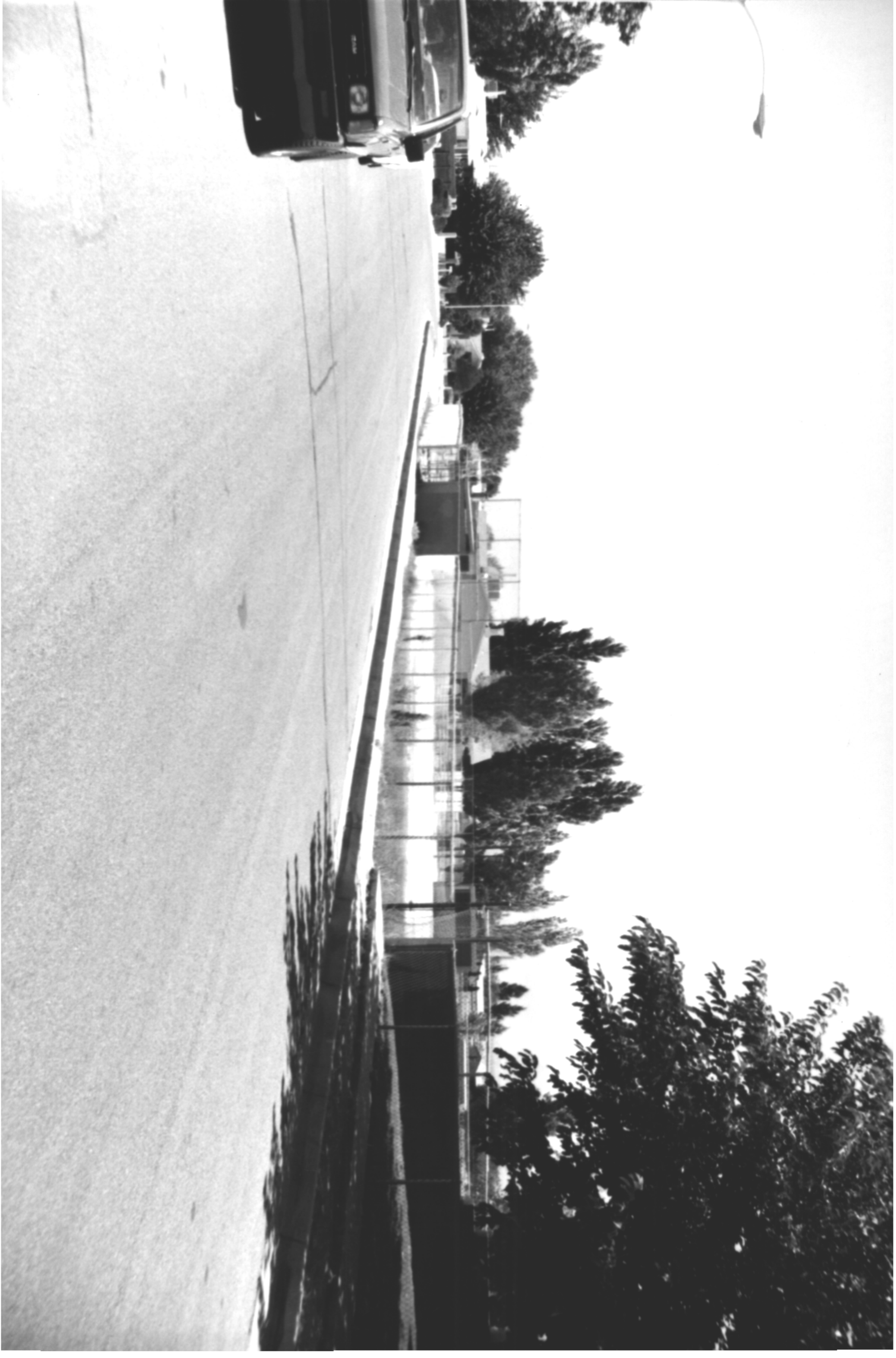




4 Sonya Avenue @ Blazick



5 Sonya Avenue near Westgate Park



6 Sonya Avenue near Westgate Park



7 Sonya Avenue @ culdesac



8 Sonya Avenue near Sapphire



9 Sapphire near Westgate Park



10 Sapphire looking towards 86th st.



H Sapphire @ 86th St. Intersection



12 Sapphire near Michelle St.



13 Sapphire near Inlets



14 Sapphire near Inlets

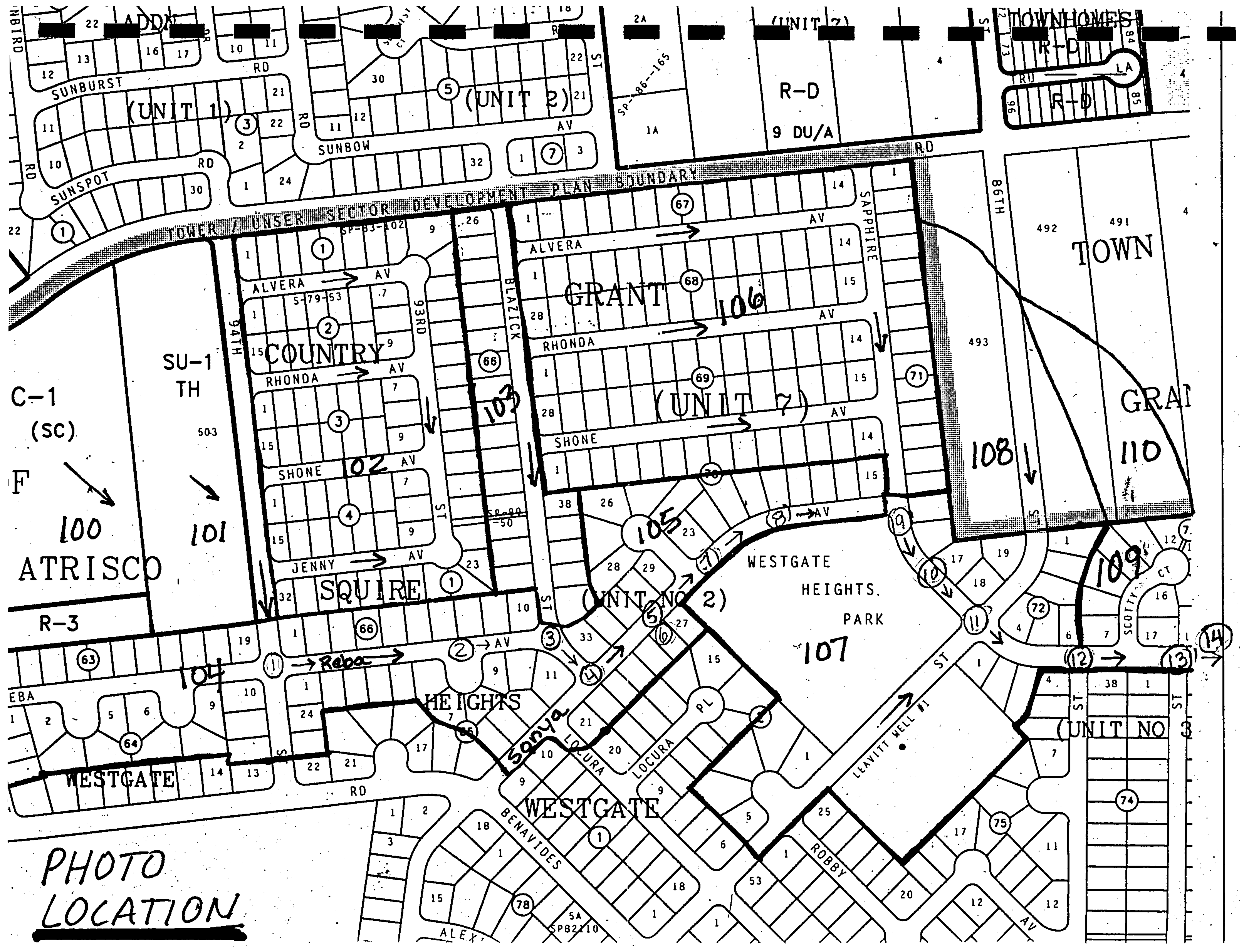


PHOTO  
LOCATION