~~152~~
#132

# Federal Emergency Management Agency

Washington, D.C. 20472

DEC 16 2003

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Martin J. Chavez
Mayor, City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

IN REPLY REFER TO:

**Case Number:** **03-06-1727P**
Community Name: City of Albuquerque, Bernalillo County, Texas
Community Number: 350002
Effective Date of this Revision: APR 21 2004

Dear Mayor Chavez:

The Flood Insurance Rate Map (FIRM) for your community has been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed that provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer (CCO) for your community. If you have any technical questions regarding this LOMR, please contact the Director, Federal Insurance and Mitigation Division of the Federal Emergency Management Agency (FEMA) in Denton, Texas, at (940) 898-5165, or the FEMA Map Assistance Center, toll free, at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our web site at http://www.fema.gov/nfip.

Sincerely,

Kevin C. Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

For: Doug Bellomo, P.E., CFM, Acting Chief
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

**List of Enclosures:**

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
List of Current Flood Insurance Study Data

cc: Carlos A. Montoya, Floodplain Administrator, City of Albuquerque
Scott M. McGee, P.E., Isaacson & Arfman, P.A.
Community Map Repository

3

Federal Emergency Management Agency
Washington, D.C. 20472

# LETTER OF MAP REVISION DETERMINATION DOCUMENT

| COMMUNITY AND REVISION INFORMATION | | PROJECT DESCRIPTION | BASIS OF REQUEST |
|---|---|---|---|
| COMMUNITY | CITY OF ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO | FILL<br>STORM SEWER SYSTEM | HYDROLOGIC ANALYSIS<br>HYDRAULIC ANALYSIS<br>NEW TOPOGRAPHIC DATA |
| | COMMUNITY NO.: 350002 | | |
| IDENTIFIER | KENSINGTON SUBDIVISION PHASE 4 | APPROXIMATE LATITUDE & LONGITUDE: 35.111, -106.713<br>SOURCE: USGS QUADRANGLE DATUM: NAD 27 | |
| FLOODING SOURCE & REVISED REACH | AN UNNAMED SHALLOW FLOODING AREA – bounded by Ouray Road Northwest to the north, Miami Road to the south, Pomelo Drive Northwest to the west, and Flor Silvestre Northwest to the east | | |

**SUMMARY OF REVISIONS**

| | | |
|---|---|---|
| Effective Flooding: | Zone AH | BFEs* |
| Revised Flooding: | Zone AH | BFEs |
| Increases: | YES | YES |
| Decreases: | YES | YES |

* BFEs - Base Flood Elevations

| ANNOTATED MAPPING ENCLOSURES | ANNOTATED STUDY ENCLOSURES |
|---|---|
| TYPE: FIRM* NO: 35001C0327 E Date: November 19, 2003 | NO REVISION TO THE FLOOD INSURANCE STUDY |

* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

## DETERMINATION

This document provides the determination from the Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center, toll free, at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the FEMA MCC Services, 12101 Indian Creek Court, Beltsville, MD 20705. Additional Information about the NFIP is available on our web site at http://www.fema.gov/nfip.

Kevin C. Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

Federal Emergency Management Agency
Washington, D.C. 20472

# LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

## COMMUNITY INFORMATION

### APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the modified drain system rests with your community. We may request that your community submit a description and schedule of drain system activities.

This revision has met our criteria for removing an area from the 1% annual chance floodplain to reflect the placement of fill. The community must ensure that any structures placed within the subject area be constructed such that they are "reasonably safe from flooding." "Reasonably safe from flooding" means base flood waters will not inundate the land or damage structures to be removed from the SFHA and that any subsurface waters related to the base flood will not damage existing or proposed buildings. The community and engineers should review and use *FEMA Technical Bulletin 10-01, Ensuring That Structures Built on Fill In or Near Special Flood Hazard Areas Are Reasonably Safe From Flooding*, which may be downloaded directly from the Federal Emergency Management Agency (FEMA) website at http://www.fema.gov/pdf/fima/tb1001.pdf.

### COMMUNITY REMINDERS

This LOMR partially supersedes previously issued LOMR Case Number 04-06-244P, dated November 20, 2003.

We based this determination on the 1% annual chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State law have been obtained. State or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center, toll free, at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the FEMA MCC Services, 12101 Indian Creek Court, Beltsville, MD 20705. Additional Information about the NFIP is available on our web site at http://www.fema.gov/nfip.

Kevin C. Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

Federal Emergency Management Agency
Washington, D.C. 20472

# LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

## COMMUNITY INFORMATION (CONTINUED)

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

We have enclosed a document, titled *List of Current Flood Insurance Study Data*, which includes this letter, to help your community maintain all information for floodplain management and flood insurance. If any of the items in that document are not filed in your community's map repository, please contact the FEMA Map Assistance Center at the number listed below for information on how to obtain those items.

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Frank Pagano
Director, Federal Insurance and Mitigation Division
Federal Emergency Management Agency, Region VI
Federal Regional Center, Room 206
800 North Loop 288
Denton, Texas 76209-3698
(940) 898-5127

**STATUS OF THE COMMUNITY NFIP MAPS**

We will not physically revise and republish the FIRM for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center, toll free, at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the FEMA MCC Services, 12101 Indian Creek Court, Beltsville, MD 20705. Additional Information about the NFIP is available on our web site at http://www.fema.gov/nfip.

Kevin C. Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

Federal Emergency Management Agency
Washington, D.C. 20472

# LETTER OF MAP REVISION
# DETERMINATION DOCUMENT (CONTINUED)

## PUBLIC NOTIFICATION OF REVISION

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period elapses and we resolve any appeals that we receive during this appeal period. Until this LOMR is effective, the revised BFEs presented in this LOMR may be changed.

This information will be published in the *Federal Register* and your local newspaper as detailed below.

LOCAL NEWSPAPER Name: *The Albuquerque Journal*
Dates: 01/14/2004 01/21/2004

| PUBLIC NOTIFICATION | | | | |
|---|---|---|---|---|
| FLOODING SOURCE | LOCATION OF REFERENCED ELEVATION | BFE (NAVD) | | MAP PANEL NUMBER |
| | | EFFECTIVE | REVISED | |
| UNNAMED SHALLOW FLOODING AREA | Area bounded by Ouray Road Northwest to the north, Miami Road to the south, Pomelo Drive Northwest to the west, and Flor Silvestre Northwest to the east | NONE | 5,109 | 35001C0327 E |
| | | 5,113 | NONE | |

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center, toll free, at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the FEMA MCC Services, 12101 Indian Creek Court, Beltsville, MD 20705. Additional Information about the NFIP is available on our web site at http://www.fema.gov/nfip.

Kevin C. Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

# LIST OF CURRENT FLOOD INSURANCE STUDY DATA

This list is provided to document all information currently effective for your community for insurance and floodplain management.

Date: DEC 16 2003

Community: City of Albuquerque, Bernalillo County, New Mexico

Community Number: 350002

Page Number: 1 of 2

**CURRENT EFFECTIVE FLOOD INSURANCE STUDY DATE:** November 19, 2003

## FLOOD INSURANCE RATE MAP

| Map Index | Effective Date |
|---|---|
| 350001CIND0 | November 19, 2003 |

| Panel Numbers | Effective Date |
|---|---|
| 0092 E, 0094 E, 0100 E, 0103 E, 0104 E, 0108 E, 0109 F, 0111 E, 0112 E, 0113 E, 0114 E, 0116 F, 0118 E, 0119 E, 0128 F, 0129 F, 0133 F, 0136 F, 0137 F, 0138 E, 0139 E, 0141 F, 0142 F, 0143 E, 0144 F, 0161 F, 0163 F, 0307 E, 0309 E, 0317 E, 0319 E, 0326 E, 0327 E, 0328 E, 0329 E, 0331 E, 0332 E, 0333 E, 0334 E, 0336 E, 0337 E, 0338 E, 0339 E, 0341 E, 0342 E, 0344 E, 0351 E, 0352 E, 0353 E, 0354 E, 0356 E, 0357 E, 0358 F, 0359 F, 0361 E, 0362 E, 0363 E, 0364 E, 0366 E, 0367 F, 0376 E, 0378 E, 0386 F, 0527 E, 0531 E, 0533 E, 0535 E, and 0555 E | November 19, 2003 |

## LETTERS OF MAP REVISION

| Panel Numbers | Effective Date |
|---|---|
| 0137 F | November 20, 2003 |

## LETTERS OF MAP REVISION *(Continued)*

| Panel Numbers | Effective Date |
|---|---|
| 0309 E | November 20, 2003 |
| 0327 E | November 20, 2003 |
| | APR 2 1 2004 |
| 0328 E | November 20, 2003 |

## LETTERS OF MAP AMENDMENT AND MAP REVISION BASED ON FILL

None

## BEST AVAILABLE DATA LETTERS

None

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITY OF ALBUQUERQUE, BERNALILLO CONTY, NEW MEXICO, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On November 19, 2003, the Department of Homeland Security's Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in Bernalillo County, New Mexico and Incorporated Areas, including the City of Albuquerque, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Division has determined that modification of the elevations of the flood having a 1% chance of being equaled or exceeded in any given year (base or 100-year flood) for certain locations in this community is appropriate. The modified Base Flood Elevations (BFEs) revise the FIRM for the community.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

Hydrologic and hydraulic analyses were performed to incorporate the placement of fill and the construction of a storm sewer system. The project has resulted in increases and decreases of the 1% annual chance (100-year) floodplain, and revisions to BFEs for an unnamed shallow flooding area bounded by Ouray Road Northwest to the north, Miami Road to the south, Pomelo Drive Northwest to the west, and Flor Silvestre Northwest to the east. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source cited above.

| Location | Existing BFE (feet)* | Modified BFE (feet)* |
|---|---|---|
| Area bounded by Ouray Road Northwest to the north, Miami Road to the south, | None | 5,109 |
| Pomelo Drive Northwest to the west, and Flor Silvestre Northwest to the east. | 5,113 | None |

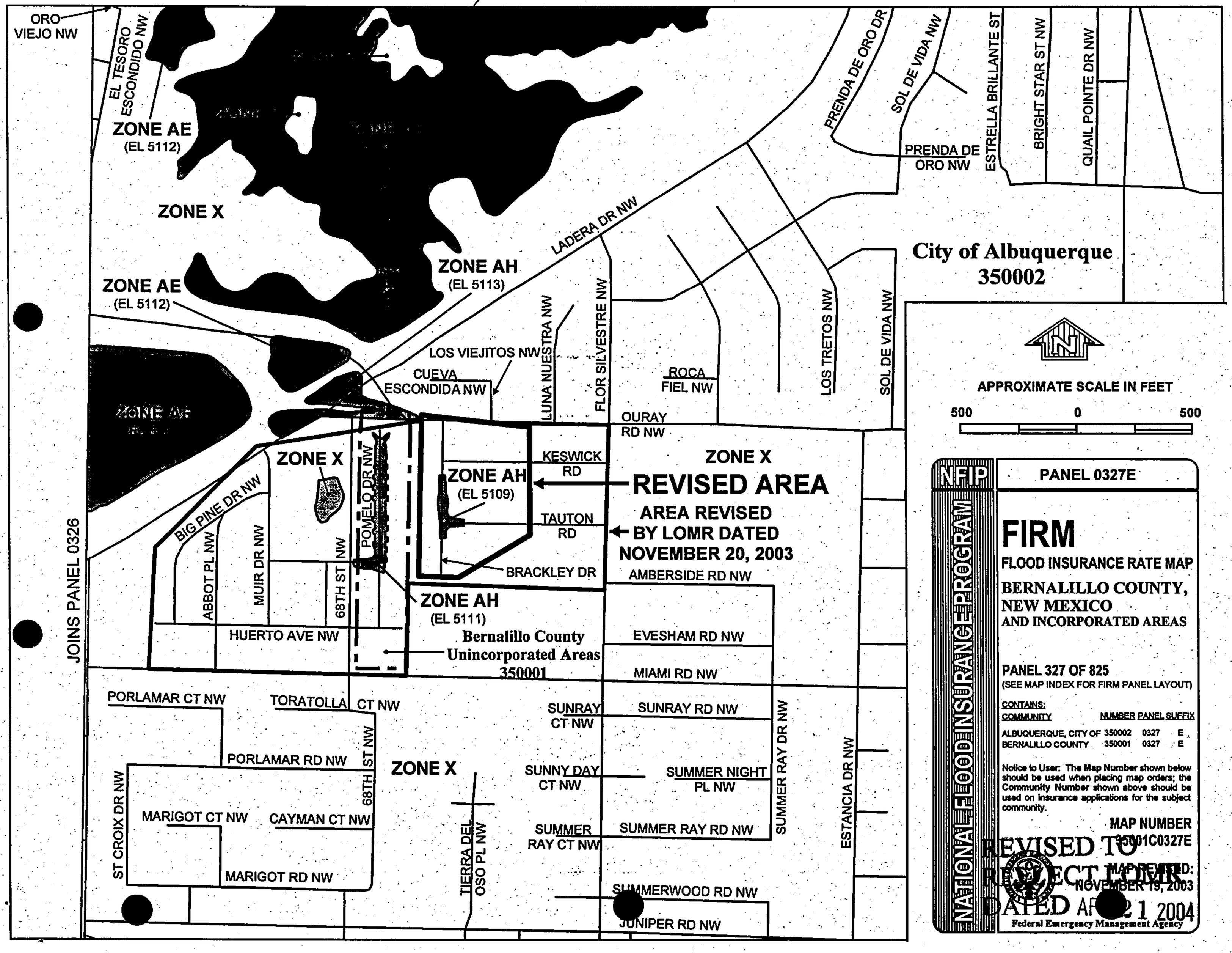
*North American Vertical Datum, rounded to nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Division must develop criteria for floodplain management. For the community to participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Division reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Division's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Martin J. Chavez
Mayor, City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103


ORO VIEJO NW
EL TESORO ESCONDIDO NW
ZONE AE
(EL 5112)
ZONE X
ZONE AE
(EL 5112)
ZONE AH
(EL 5113)
LADERA DR NW
PRENDA DE ORO DR
SOL DE VIDA NW
ESTRELLA BRILLANTE ST
BRIGHT STAR ST NW
QUAIL POINTE DR NW
PRENDA DE ORO NW
City of Albuquerque
350002
LOS VIEJITOS NW
CUEVA ESCONDIDA NW
LUNA NUESTRA NW
FLOR SILVESTRE NW
ROCA FIEL NW
LOS TRETOS NW
SOL DE VIDA NW
OURAY RD NW
APPROXIMATE SCALE IN FEET
500 0 500
ZONE X
BIG PINE DR NW
POMELO DR NW
ZONE AH
(EL 5109)
KESWICK RD
TAUTON RD
BRACKLEY DR
ZONE X
REVISED AREA
AREA REVISED
BY LOMR DATED
NOVEMBER 20, 2003
AMBERSIDE RD NW
ABBOT PL NW
MUIR DR NW
68TH ST NW
ZONE AH
(EL 5111)
HUERTO AVE NW
Bernalillo County
Unincorporated Areas
350001
EVESHAM RD NW
MIAMI RD NW
JOINS PANEL 0326
PORLAMAR CT NW
TORATOLLA CT NW
SUNRAY CT NW
SUNRAY RD NW
PORLAMAR RD NW
68TH ST NW
ZONE X
SUNNY DAY CT NW
SUMMER NIGHT PL NW
SUMMER RAY DR NW
ESTANCIA DR NW
ST CROIX DR NW
MARIGOT CT NW
CAYMAN CT NW
TIERRA DEL OSO PL NW
SUMMER RAY CT NW
SUMMER RAY RD NW
MARIGOT RD NW
SUMMERWOOD RD NW
JUNIPER RD NW
NFIP
PANEL 0327E
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
BERNALILLO COUNTY,
NEW MEXICO
AND INCORPORATED AREAS
PANEL 327 OF 825
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
ALBUQUERQUE, CITY OF 350002 0327 E
BERNALILLO COUNTY 350001 0327 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
35001C0327E
MAP REVISED:
NOVEMBER 19, 2003
REVISED TO
REFLECT LOMR
DATED APRIL 21 2004
Federal Emergency Management Agency

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

September 30, 2003

Ms. Serrano
PBS&J
12101 Indian Creek Court
Beltsviel Maryland, 20705

**RE: Kensington Subdivision (03-06-1727P)**

Dear Ms. Serrano:

I received your letter dated September 25, 2003 requesting submittal of notification and acceptance from adversely impacted property owners. The only property being adversely impacted by the 100-year floodplain is the public streets in the subdivision. The 100-year floodplain will be contained in the public right-of-way. The City accepts this responsibility and will maintain the streets and the storm drains with their street maintenance crews

If you have any questions or need to discuss my response please call me at (505) 924-3982.

Sincerely,

Carlos A. Montoya
City Floodplain Administrator

C: Scott M. McGee, P.E., Isaacson & Arfman, P.A.
Lynn Mazur, AMAFCA

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

# NATIONAL FLOOD INSURANCE PROGRAM
## FEMA MAP COORDINATION CONTRACTOR

SEP 25 2003

Carlos A. Montoya
City Floodplain Administrator
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

IN REPLY REFER TO:
Case No.: 03-06-1727P
Community: City of Albuquerque, Bernalillo County, New Mexico
Community No.: 350002

316-AD

Dear Mr. Montoya:

This is in regard to your May 6, 2003, request that the Federal Emergency Management Agency (FEMA) issue a Letter of Map Revision (LOMR) to the Flood Insurance Rate Map for the above-referenced community. In a previous letter, you were informed that additional data might be required to complete our review of the request. The data required to complete our review, which must be submitted within 90 days of the date of this letter, are listed below.

- Our review reveals increases in the 1% annual chance (100-year) floodplain for the unnamed shallow flooding area. Please submit documentation of individual legal notices that were sent to property owners who are adversely impacted by any increases in 1% annual chance floodplain. Legal notice may take the form of certified mailing receipts or certification that all property owners have been notified, with an accompanying mailing list and copy of letter sent. Examples of individual notices can be found on Pages 12 through 17 of the MT-2 instructions, which can be accessed at http://www.fema.gov/mit/tsd/mt2_inst.pdf.

  a. If you submit notification and acceptance from the adversely impacted property owners, FEMA can issue a LOMR effective the date of issuance.

  b. If you submit notification of, but not acceptance by, the adversely impacted property owners, FEMA may issue a LOMR effective three to six months after the date of issuance.

Please send the required data to us at the address shown at the bottom of this page. Further action on the request has been suspended pending receipt of the required data.

If we do not receive the required data within 90 days, we will suspend the processing of your request. Any data submitted after 90 days will be treated as an original submittal and will be subject to all submittal/payment procedures, including the review and processing fee in effect at the time of the re-submittal as outlined in Paragraph 72.7(a) of the National Flood Insurance Program (NFIP) regulations (44 CFR Parts 59-78). A copy of the notice summarizing the current fee schedule, which was published in the *Federal Register*, is enclosed for your information.

*12101 Indian Creek Court, Beltsville, MD 20705 • Phone: 1-800-697-7275 • Fax: 301-210-5157*

When you write to us about your request, please include the case number referenced above in your letter. If you have general questions about your case, FEMA policy, or the NFIP, please call FEMA's toll free map assistance line at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please contact the Engineer assigned to your case, Ms. Monica Serrano, by phone at 1-800-697-7275 Ext. 258, or by e-mail at mserrano@pbsj.com.

Sincerely,

Joseph A. Martinenza, Jr.
Program Manager, Region VI

Enclosure

cc: Scott M. McGee, P.E., Isaacson & Arfman, P.A.

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

May 30, 2003

Ms. Monica Serrano
PBS&J
12101 Indian Creek Court
Beltsviel Maryland, 20705

**RE: Request for Kensington Subdivision Phase 4 LOMR (03-06-1727P)**

Dear Ms. Serrano:

Mr. Scott McGee has asked me to respond to items 1 and 2 from your May 20, 2002 letter.

a. Our Floodplain Ordinance requires that residential structures be built one foot above the base flood elevation.
b. The City reviews all permit applications, subdivisions, and other proposed new developments to determine whether such proposals will be reasonably safe from flooding. In compliance with Section 65.6 of the National Flood Insurance Program (NFIP) regulations any property or structure, existing or proposed, to be removed from the Special Flood Hazard Area (SFHA) meets minimum floodplain Management criteria of Section 60.3 of the NFIP regulations and is reasonably safe from flooding. The City uses the Floodplain Ordinance criteria and the100-year standard for design and protection.
c. The consultant and developer are required to obtain applicable Federal and State permits. The City reviews easements and permits before we release work orders and building permits.
d. Our Floodplain Ordinance addresses the requirements that are necessary to build in the 100-year floodplain. We check all the commercial and residential building permit to see if they are in a floodplain. If they are in a floodplain they are required to submit a drainage plan from a professional engineer that addresses the drainage and floodplain.
e. The City of Albuquerque Floodplain Ordinance does not allow any fill or development in the floodway.

The City of Albuquerque maintenance group will maintain all the storm drains and inlets for this LOMR area. The storm drain lines are in the City Right-of-Way or easements and they will be maintained by the City of Albuquerque.

If you have any questions or need to discuss my response please call me at (505) 924-3982.

Sincerely,

Carlos A. Montoya
City Floodplain Administrator

C: Scott M. McGee, Isaacson & Arfman, P.A.

# NATIONAL FLOOD INSURANCE PROGRAM
## FEMA MAP COORDINATION CONTRACTOR

MAY 20 2003

Carlos A. Montoya
City Floodplain Administrator
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

IN REPLY REFER TO:
Case No.: 03-06-1727P
Community: City of Albuquerque, Bernalillo County, New Mexico
Community No.: 350002

316-ACK.FRQ

Dear Mr. Montoya:

This responds to your request, dated May 6, 2003, that the Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for the above-referenced community. Pertinent information about the request is listed below.

Identifier: Kensington Subdivision Phase 4

Flooding Source: Unnamed ponding area

FIRM Panel Affected: Bernalillo County, New Mexico, and Incorporated Areas
FIRM number 35001C0327 D, dated September 20, 1996

FEMA has implemented a procedure to recover costs associated with reviewing and processing requests for modifications to published flood information and maps. Effective September 1, 2002, FEMA revised that fee schedule. A copy of the notice summarizing the current fee schedule, which was published in the *Federal Register*, is enclosed for your information. In accordance with this schedule, the fee for your request is $4,200 and must be submitted before we can continue processing your request. Payment of this fee must be made in the form of a check or money order, made payable in U.S. funds to the National Flood Insurance Program, or credit card payment. For identification purposes, the case number referenced above must be included on the check or money order. We will not perform a detailed technical review of your request until payment is received.

Payment must be forwarded to one of the addresses listed below.

Using U.S. Postal Service:
Federal Emergency Management Agency
Fee-Charge System Administrator
P.O. Box 3173
Merrifield, VA 22116-3173

Using overnight service:
Fee-Charge System Administrator
c/o Dewberry & Davis, METS Division
8401 Arlington Boulevard, Stop 30
Fairfax, VA 22031

We have completed an inventory of the items that you submitted. The items identified below are required before we can begin a detailed review of your request.

1. In compliance with Section 65.5 of the National Flood Insurance Program (NFIP) regulations, the community official responsible for floodplain management must provide in writing a statement that a

property or structure, existing or proposed, to be removed from the Special Flood Hazard Area (SFHA) meets minimum floodplain management criteria of Section 60.3 of the NFIP regulations and is reasonably safe from flooding. This statement provides FEMA with assurance that the community has reviewed all development plans and has found them to meet the following requirements:

a. The lowest floor elevations (including basement) of all residential structures built in the area to be removed from the SFHA are at or above the base flood (Paragraph 60.3(b)).

b. The area to be removed from the SFHA (including any existing or proposed structures) has been determined to be "reasonably safe from flooding" (Subparagraphs 60.3(a)(3) and 60.3(a)(4), and *Technical Bulletin 10-01*).

c. All applicable Federal and State permits have been obtained (Subparagraph 60.3(a)(2)).

d. All applicable local permits have been obtained. This includes a local development permit to grade or place fill in the SFHA, and a permit for all existing or proposed construction (Subparagraph 60.3(b)(1)).

e. Fill has not been placed in a floodway (Subparagraph 60.3(d)(3)) that causes a rise in flood elevations associated with the base flood discharge.

To assist communities in determining if a property or structure, existing or proposed, is reasonably safe from flooding, FEMA has published *Technical Bulletin 10-01*. This bulletin outlines safe building practices that, when followed, reduce the risk of flood damage to a property or structure. Community Officials interested in obtaining copies of this bulletin should visit our Internet site at http://www.fema.gov/pdf/fima/tb1001.pdf or by calling the FEMA Map Assistance Center toll free at 1-877-FEMA MAP (1-877-336-2627).

2. To ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained, FEMA requires a maintenance agreement for channel and culvert improvement projects. Please submit a maintenance agreement for this project in accordance with Subparagraph 65.6(a)(12) of the NFIP regulations. Ensure that the maintenance agreement states who will be responsible for the maintenance and that the community will assume the maintenance duties if need be.

3. Our review of the submitted hydrologic model indicates that AHYMO Version 94 was used. This version is no longer accepted by FEMA for NFIP usage. Please submit the hydrologic model representing the 1% annual chance (100-year) flood for the unnamed ponding area using AHYMO Version 97.

4. Note that the hydrologic study submitted in the report is based on the six-hour storm. Please submit a hydrologic analysis and all applicable back-up information to support the discharges used in the submitted hydraulic analyses using the 24-hour storm. In addition, please resubmit all hydraulic analyses, representing the post project conditions based on the new discharges.

Please send the required data to us at the address shown at the bottom of the first page. If <u>all</u> required items are not submitted within 90 days of the date of this letter, FEMA will treat any subsequent request as an original submittal, and it will be subject to all submittal/payment procedures as outlined in Paragraph 72.7(a) of the NFIP regulations (44 CFR Parts 59-78).

If you are unable to meet the 90-day deadline for submittal of required items and would like FEMA to continue processing your request, you must request an extension of the deadline. This request must be submitted to us in writing and must provide (1) the reason why the data cannot be submitted within the requested timeframe and (2) a new date for the submittal of the data. FEMA receives a very large volume

of requests and cannot maintain inactive requests for an indefinite period of time. Therefore, the fees will be forfeited for any request for which neither the requested data nor a written extension request is received within 90 days.

When you write to us about your request, please include the case number referenced above in your letter. If you have general questions about your case, FEMA policy, or the NFIP, please call FEMA's toll free map assistance line at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please contact the Engineer assigned to your case, Ms. Monica Serrano, by phone at 1-800-697-7275 Ext. 258, or by e-mail at mserrano@pbsj.com.

Sincerely,

Joseph A. Martinenza, Jr.
Program Manager, Region VI

cc: Scott M. McGee, P.E., Isaacson & Arfman, P.A.

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

May 6, 2003

Joseph A. Martinenza
PBS&J
12101 Indian Creek Court
Beltsville, Maryland 20705

**RE: Request for a Letter of Map Revision for Kensington Subdivision Phase 4**

**City of Albuquerque, New Mexico, Community No. 350002, FIRM Panel 35001C0327D Effective Date September 20, 1996**

Dear Mr. Martinenza,

The purpose of this submittal is to convey the documents in order to request a Letter of Map Revision based on storm drain construction to revise the 100-year floodplain.

Enclosed with this letter are the Drainage Report, subdivision construction plans, and a check in the amount of $4,000.00.

As the City Floodplain Administrator, I have reviewed the response provided with this submittal. Our Community would greatly appreciate your prompt response and approval for this Letter of Map Revision.

If you have any questions, you can contact me at (505) 924-3982.

Sincerely,

Carlos A. Montoya
City Floodplain Administrator

C: Bill Blanton, Federal Emergency Management Agency Headquarters
Jack Quarles, FEMA Region VI
Scott McGee, Isaacson & Arfman
Lynn Mazur, AMAFCA
Brian Kent, Bernalillo County

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

1824

**KENSINGTON LIMITED PARTNERSHIP**
P.O. BOX 3881
ALBUQUERQUE, NM 87190
(505) 889-3061

**FIRST STATE BANK OF TAOS**
ALBUQUERQUE, NM 87109
95-145/1070

5/1/2003

PAY TO THE ORDER OF National Flood Insurance Program $ **4,000.00

Four Thousand and 00/100********** DOLLARS

National Flood Insurance Program

MEMO LOMR for Phase 3

B75

⑈001824⑈ ⑆107001452⑆ 0010680 24⑈

© 1984 - 2000 INTUIT INC. # 571 1-800-433-8810

**KENSINGTON LIMITED PARTNERSHIP** 1824

| | | | |
|---|---|---|---|
| National Flood Insurance Program | | 5/1/2003 | |
| Development Softs Costs:Engineering | LOMR for Phase 3 | | 4,000.00 |

RECEIVED
MAY 02 2003
HYDROLOGY SECTION

First State Bank #1068024 LOMR for Phase 3 4,000.00

# TABLE OF CONTENTS


| | | Page |
|---|---|---|
| I. | **BACKGROUND INFORMATION** | |
| | Zone Atlas Page | I.1 |
| | FEMA FIRM Panel 35001C0327D with Site Outlined | I.2 |
| | Site Exhibit | I.3 |
| II. | **FEMA FORMS** | |
| | Form 1 – Revision Requestor And Community Official | II.1 |
| | Form 3 – Hydrologic Analysis | II.3 |
| | Form 6 – Channelization | II.5 |

**APPENDICES**

A. Grading & Drainage Certification Letter

B. Hydraulic Grade Line Computations

C. Excerpts from the City of Albuquerque Development Process Manual

**SUPPORTING DOCUMENTS (POCKETS)**

1. Kensington Subdivision Phase Four Drainage Report
2. FEMA FIRM Panel 35001C0327D
   - Existing Floodplain Limits
   - Proposed Floodplain Limits
3. Recorded Plat of Kensington Subdivision Phase Four
4. As-Built Drawings
   - Grading Plan & Grading Details—Sheets 4 & 5
   - Storm Drain Plan & Profile—Sheets 7 & 9

# I

# BACKGROUND INFORMATION

# I. BACKGROUND INFORMATION

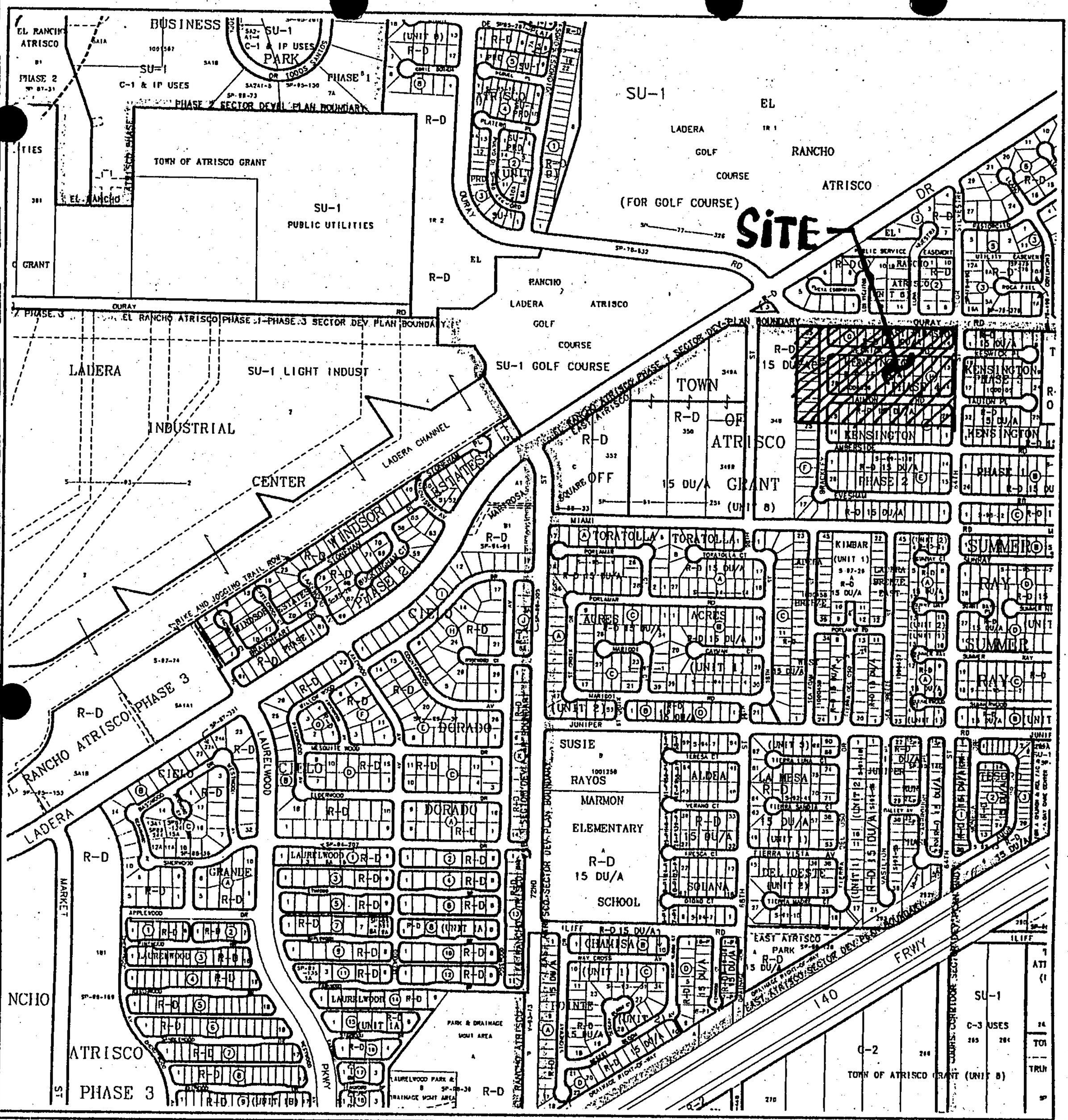
This document was prepared by Isaacson & Arfman, P.A. for the Kensington Limited Partnership of Albuquerque, New Mexico. Its purpose is to request a Letter of Map Revision (LOMR) from the Federal Insurance Administration (FIA) of the Federal Emergency Management Agency (FEMA).

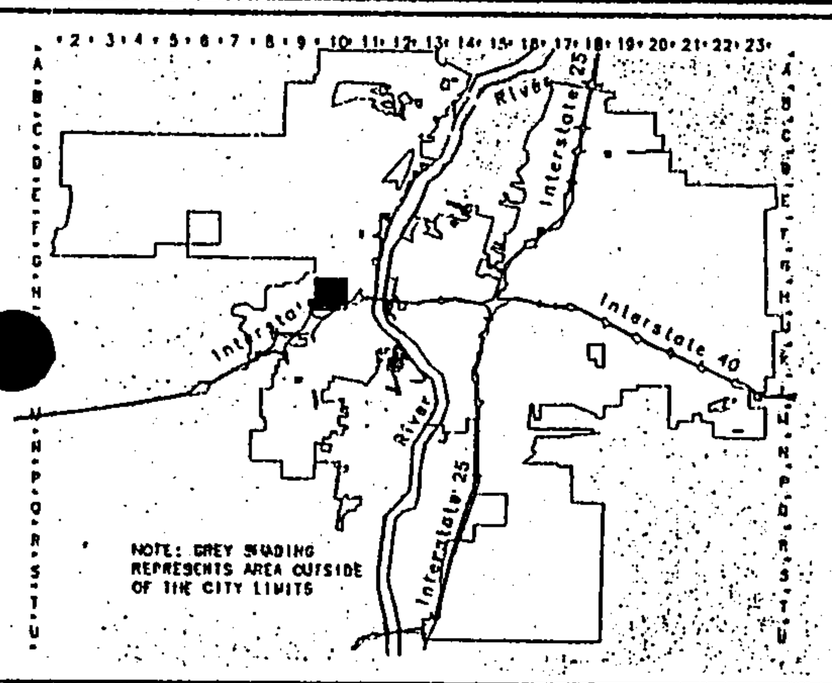
The area for which the revision is requested is a residential development located in the northwest quadrant of the City of Albuquerque, known as the Kensington Subdivision Phase 4. The development is bounded by developing land to the west and developed residential lots to the north, south, and east. The project site is shown on the Vicinity Map from the City of Albuquerque Zone Atlas on Page I.1.

The floodplain impacts Lots 15 - 20, Block D, Lots 26 - 35, Block F, Lots 1-6, Block G, and Lots 1-6 and 21-26, Block H of the development (see FEMA FIRM Panel Exhibit on Page I.2 and Site Exhibit on Page I.3). Complete removal from the floodplain based on fill placed at or above the Base Flood Elevation (BFE) and construction of a storm drain system is being requested.

Flood boundaries and zone designations are found on the Flood Insurance Rate Map (FIRM) 35001C0327D (Supporting Document No. 2). The source of instruction for this LOMR is "Revisions to National Flood Insurance Program Maps" MT-2.

All completed FEMA forms for this LOMR request may be found in Section II of this report, and supporting documents are included in appendices and pockets.




CITY OF Albuquerque

Albuquerque Geographic Information System

PLANNING DEPARTMENT

©Cop

I.1

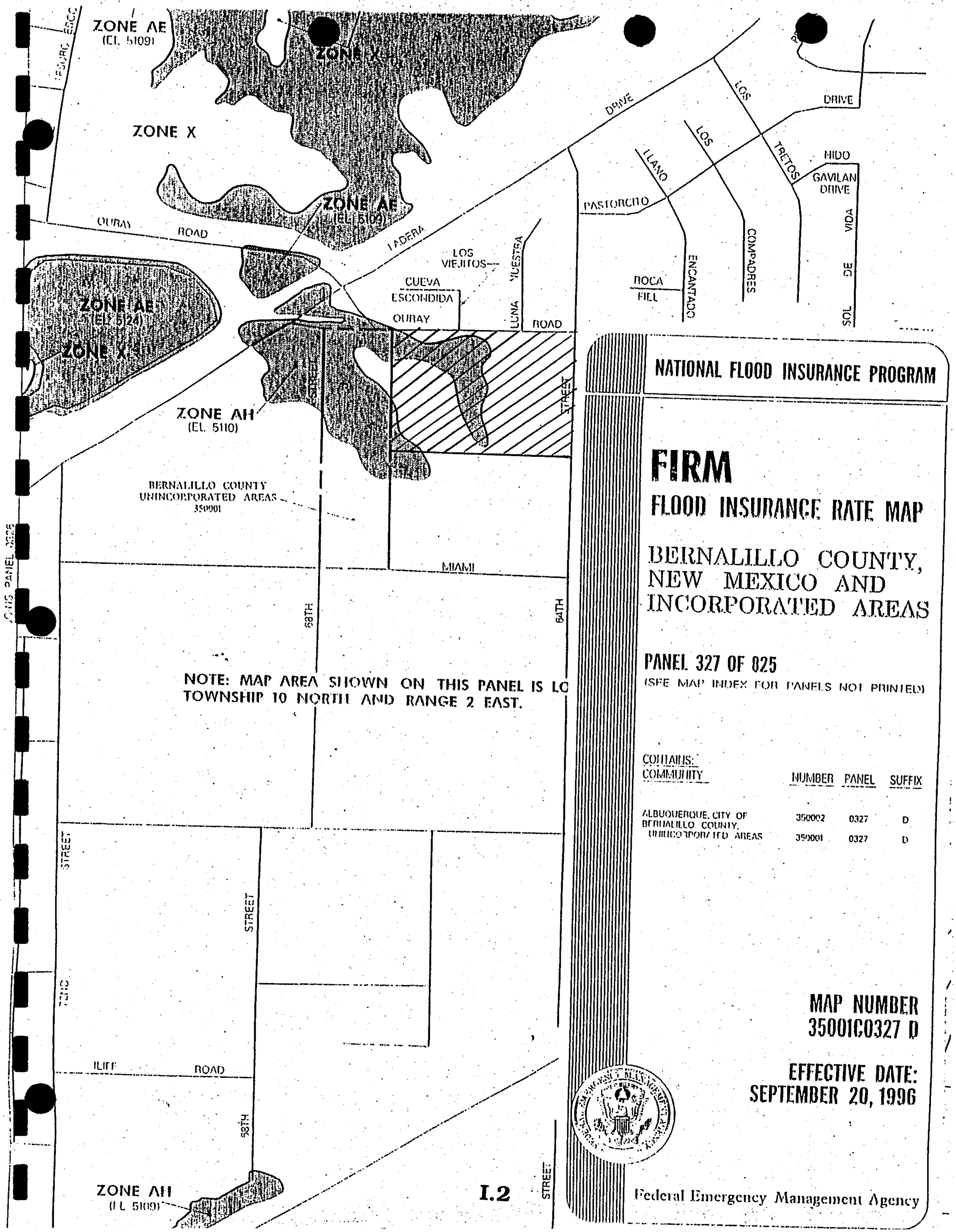
GRAPHIC SCALE IN FEET

250 0 750 1000

# Zone Atlas Page

# H-10-Z

Map Amended through April 03, 2002




# NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

## BERNALILLO COUNTY, NEW MEXICO AND INCORPORATED AREAS

**PANEL 327 OF 025**

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| ALBUQUERQUE, CITY OF | 350002 | 0327 | D |
| BERNALILLO COUNTY, UNINCORPORATED AREAS | 350001 | 0327 | D |

**MAP NUMBER**
**35001C0327 D**

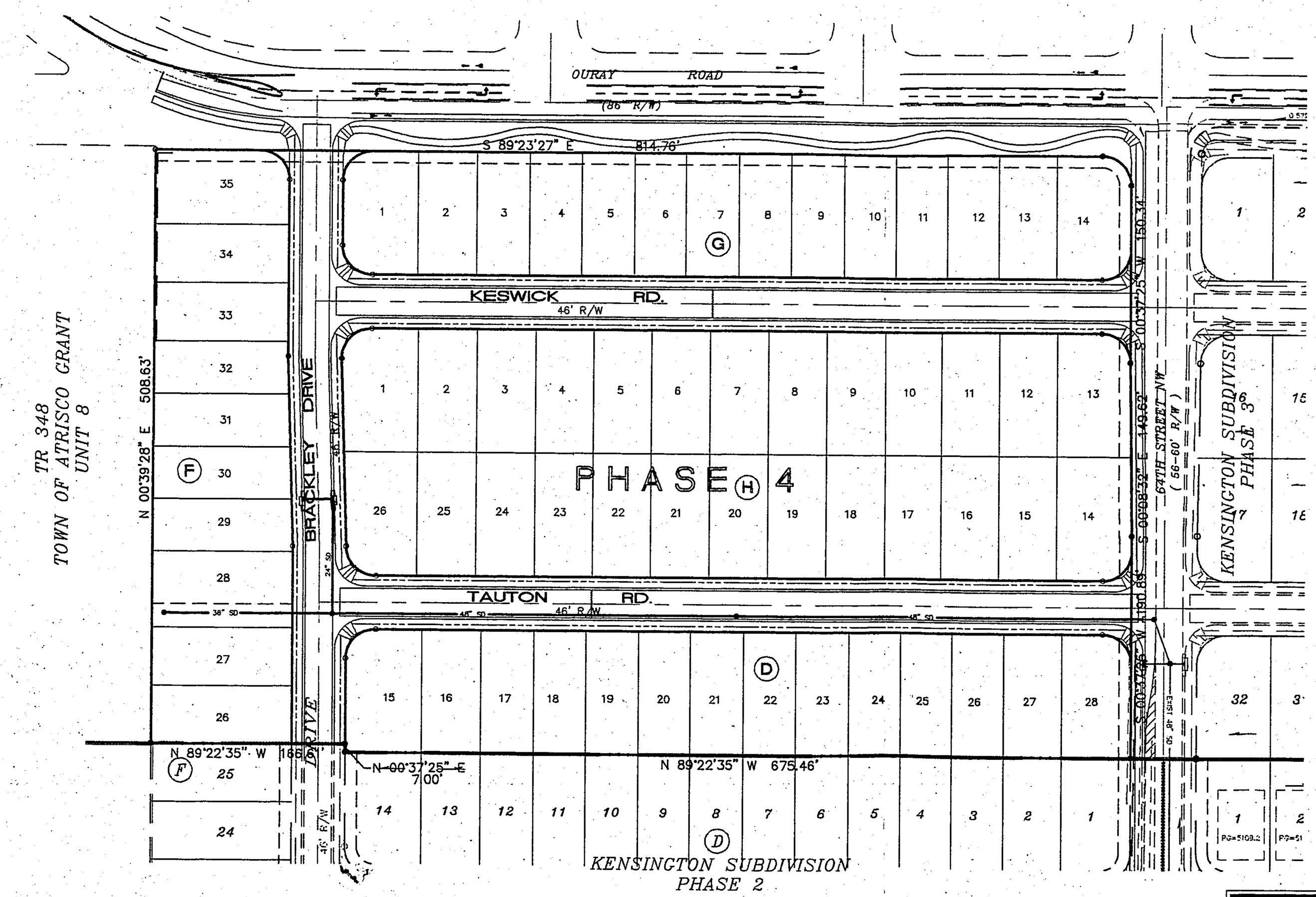
**EFFECTIVE DATE:**
**SEPTEMBER 20, 1996**

Federal Emergency Management Agency

# SITE EXHIBIT
# KENSINGTON SUBDIVISION
# PHASE FOUR

ALBUQUERQUE NEW MEXICO
JULY 2002

SCALE: 1"=100'




ISAACSON & ARFMAN, P.A.
Consulting Engineering Associates
128 Monroe Street N.E.
Albuquerque New Mexico
156EXH5.DWGanw 7/9/02

# II.

# FEMA APPLICATION FORMS

**Form 1 – Revision Requestor And Community Official**
**Form 3 - Hydrologic Analysis**
**Form 6 - Channelization**

| FEDERAL EMERGENCY MANAGEMENT AGENCY<br>**REVISION REQUESTER AND COMMUNITY OFFICIAL** | O.M.B No. 3067-0148<br>Expires April 30, 2001 |
|---|---|

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

**You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.**

## 1. REQUESTED RESPONSE FROM FEMA

This request is for a:

☐ CLOMR A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60,65 & 72).

☒ LOMR A letter from FEMA officially revising the current NFIP map to show the changes to floodplains, floodway or flood elevations. LOMRs typically decrease flood hazards. (See 44 CFR Ch. 1 Parts 60 & 65.)

☐ Other Describe: _____

## 2. OVERVIEW

1. The basis for this revision request is (are): (check all that apply)

☒ Physical Change ☐ Improved Methodology/Data ☐ Floodway Revision

☐ Other Describe: _____

Note: A photograph is not required, but is very helpful during review.

2. Flooding Source: Un-Named Playa/Ponding Area

3. Project Name/Identifier: Kensington Subdivision Phase Four

4. FEMA zone designations affected: AH
(example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, VE, B, C, D, X)

5. The NFIP map panel(s) affected for all impacted communities is (are):

| Community No. | Community Name | State | Map No. | Panel No. | Effective Date |
|---|---|---|---|---|---|
| Ex: 480301<br>480287 | Katy, City<br>Harris County | TX<br>TX | 480301<br>48201C | 0005D<br>0220G | 02/08/83<br>09/28/90 |
| 350002 | Albuquerque, City of | NM | 35001C | 0327D | 09/20/96 |
| | | | | | |

6. The area of revision encompasses the following types of flooding and structures. Check all that apply.

| Types of Flooding | Structures |
|---|---|
| ☐ Riverine | ☐ Channelization |
| ☐ Coastal | ☐ Levee/Floodwall |
| ☐ Alluvial fan | ☐ Bridge/Culvert |
| ☒ Shallow Flooding (e.g. Zones AO and AH) | ☐ Dam |
| ☐ Lakes | ☒ Fill |
| ☐ Other (describe) | ☒ Other (describe) Storm Drain |

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

## 4. ENCROACHMENT INFORMATION

1. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP?
   ☐ Yes ☒ No

**If Yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.**

2. Does the development in the floodway cause the 1% annual chance (base) elevation to increase at any location by more than 0.000 feet? ☐ Yes ☒ No ☐ N/A

3. Does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the base flood elevation to increase at any location by more than one foot (or other increase limit if community or state has adopted more stringent criteria - even if a floodway has not been delineated by FEMA)? ☐ Yes ☒ No

**If the answer to either items is Yes, please attach documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.**

## 5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for ☒ performing ☐ overseeing compliance with the maintenance and operation plans of the Kensington Subdivision, Phase Four
(Name)
flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

**Operation and maintenance plans are attached.** ☐ **Yes** ☐ **No** ☒ **N/A**

## 6. REVIEW FEE

The review fee for the appropriate request category has been included. ☒ Yes Fee amount: $4,000.00

***OR***

This request is based on a federally sponsored flood-control project where 50 percent or more of the project's cost is federally sponsored, or the request is based on detailed hydrologic and hydraulic studies conducted by Federal, State, or local agencies to replace approximate studies conducted by FEMA and shown on the effective FIRM; thus the project is fee exempt.
☐ Yes

**Please see Instructions for Fee Amounts**

## 7. SIGNATURE

***Note:*** **I understand that my signature indicates that all information submitted in support of this request is correct.**

Scott M McGee

Signature of Revision Requester

Scott M. McGee, P.E.
Printed Name and Title of Revision Requester

Isaacson & Arfman, P.A.
Company Name

Telephone No.: (505) 268-8828 Date: 4/30/03

***Note:*** **Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.**

Carlos A Montoya

Signature of Community Official

Carlos A. Montoya - City of Alb

Printed Name and Title of Community Official

Floodplain Adm.

Community Name

505-924-3982

Telephone No.: Date: 5-6-03

### CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is in accordance with 44 CFR Ch. I, Sect 65.2

Scott M McGee

Signature

Scott M. McGee, P.E.
Printed Name and Title of Revision Requester

Registr No. 10519 Expires (Date) December 31, 2003 State NM

Type of License/Expertise: P.E.

### Check which forms have been included with this request

| Form Name and (Number) | Required if ..... |
|---|---|
| ☒ **Hydrologic** (3) | new or revised discharges |
| ☐ **Hydraulic** (4) | new or revised water-surface elevations |
| ☐ **Mapping** (5) | floodplain/floodway changes |
| ☒ **Channelization** (6) | channel is modified |
| ☐ **Bridge/Culvert** (7) | addition/revision of bridge/culvert |
| ☐ **Levee/Floodwall** (8) | addition/revision of levee/floodwall |
| ☐ **Coastal** (9) | new or revised coastal elevations |
| ☐ **Coastal Structures** (10) | addition/revision of coastal structure |
| ☐ **Dam** (11) | addition/revision of dam |
| ☐ **Alluvial Fan** (12) | structures proposed on alluvial fan |

FEDERAL EMERGENCY MANAGEMENT AGENCY
**HYDROLOGIC ANALYSIS**

O.M.B No. 3067-0148
Expires April 30, 2001

**PUBLIC BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average **3.67** hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

**You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.**

***Note: Fill out one form for each flooding source studied***

Community Name: City of Albuquerque, New Mexico

Flooding Source: Un-Named Playa/Ponding Area

Project Name/Identifier: Kensington Subdivision, Phase Four

## 1. REASON FOR NEW HYDROLOGIC ANALYSIS

☐ No existing analysis ☐ Improved data ☒ Changed physical condition of watershed

☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Other

**For the reason stated above, please attach a detailed explanation.** If a computer program/model was used in revising the hydrologic analysis, **please provide a diskette with the input files** for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

**Explanation provided:** ☒ Yes* ☐ No **Diskettes provided:** ☒ Yes ☐ No

*See Supporting Documents 1.--Drainage Report

## 2. METHODOLOGY FOR NEW ANALYSIS

| Indicate Method | Required Data | Data Included |
|---|---|---|
| ☐ Statistical Analysis of Gage Records | Form 3 - Attachment A | ☐ Yes ☒ No |
| ☐ Regional Regression Equations | Form 3 - Attachment C | ☐ Yes ☒ No |
| ☒ Precipitation/Runoff Model | Form 3 - Attachment D | ☒ Yes ☐ No |
| ☒ Other | Back-up computations and supporting data | ☒ Yes ☐ No |

## 3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. ☒ Yes ☐ No ☐ Not Required

If Yes, attach evidence of approval. ☒ **Approval attached.*** If No, attach explanation. ☐ **Explanation attached.**

*See Appendix A

## 4. COMPARISON OF BASE FLOOD DISCHARGES

| Location: | Drainage Area (SqMi) | FIS(cfs) | Revised (cfs) |
|---|---|---|---|
| ____ | ____ | No FIS Information Available | ____ |
| ____ | ____ | | ____ |
| ____ | ____ | | ____ |

*Note: When revised discharges are not significantly different than the FIS discharges, FEMA may require a confidence limits analysis (see attachment B) at a later date to complete the review.*

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. ☐ **Explanation Included** ☒ **Explanation Not Required**

## 5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. ☐ **Data Attached** ☒ **Data Not Available**

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

## ATTACHMENT D: PRECIPITATION/RUNOFF MODEL

| | | FIS: | | Revised: | |
|---|---|---|---|---|---|
| 1. | Method or model used: | No FIS Information Available | | Rational Method (1) | |
| | Version: | " | | (1) | |
| | Date: | " | | Revised Dec. 5, 1999 | |
| 2. | Source of rainfall depth: | " | | (2) | |
| 3. | Source of rainfall distribution: | " | | (3) | |
| 4. | Rainfall duration: | " | | 100-year, 6-hour | |
| 5. | Areal adjustment to precipitation (%): | " | | 100% | |
| 6. | Maximum overland flow length | " | | N/A | |
| 7. | Hydrograph development method: | " | | N/A | |
| 8. | Loss rate method: | " | | (4) | |
| | Source of soils information: | " | | (5) | |
| | Source of land use information: | " | | (6) | |
| 9. | Channel routing method: | " | | N/A | |
| 10. | Reservoir routing: | ☐ Yes | ☐ No | ☐ Yes | ☒ No |
| 11. | Baseflow considerations: | ☐ Yes | ☐ No | ☐ Yes | ☒ No |
| 12. | Snowmelt considerations: | ☐ Yes | ☐ No | ☐ Yes | ☒ No |
| 13. | Model calibration: | ☐ Yes | ☐ No | ☐ Yes | ☒ No |
| 14. | Future land use condition: | ☐ Yes | ☐ No | ☐ Yes | ☒ No |

**If Yes, explain below how baseflow was determined:**

**If Yes, explain below how calibration was performed**

**If Yes, explain why below**

15. **Attach precipitation/runoff model, hydrologic model schematic, curve number calculations, time of concentration calculations, and supporting maps, delineating the watershed boundary and drainage area divides.**

**Information and Maps provided?** ☒ Yes ☐ No

**NOTE:** FEMA policy is to base flooding on existing conditions.

## Form 3 Attachment D Footnotes and Explanations

The runoff for the entire Kensington Subdivision (Phases One through Four) was calculated in a master drainage plan in 1997 using the AHYMO194 program (1994). The flows were routed through the storm drain lines, and this analysis provides flow rates for the various storm drain lines. See Supporting Document 1—Drainage Report and included diskette of the AHYMO input file.

The master drainage plan combined basins of Phases Three and Four. In order to analyze street flow capacities for Phase Four, the runoff for the Kensington Subdivision Phase Four basins was calculated based on the Rational Method per the City of Albuquerque Development Process Manual (C.O.A. D.P.M.), Section 22.2. See Supporting Document 1 (Drainage Report) and Appendix B (Excerpts from the C.O.A. D.P.M., Section 22.2).

(1) Rational method as calculated in C.O.A. D.P.M., Section 22.2.A.

(2) Per C.O.A. D.P.M. Section 22.2.A, Table A-2.

(3) Per C.O.A. D.P.M. Section 22.2.A, Table A-1.

(4) Initial abstraction/uniform infiltration precipitation losses per C.O.A. D.P.M. Section 22.2.A, Tables A-6 & A-7.

(5) Watershed Zone per C.O.A. D.P.M. Section 22.2.A, Figure A-1.

(6) Per C.O.A. D.P.M. Section 22.2.A, Tables A-4 & A-5.

| FEDERAL EMERGENCY MANAGEMENT AGENCY<br>**CHANNELIZATION** | O.M.B. Burden No. 3067-0148<br>Expires April 30, 2001 |
|---|---|

**PUBLIC BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average 1.75 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

**You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.**

Community Name: City of Albuquerque, New Mexico

Flooding Source: Un-Named Playa/Ponding Area

Project Name/Identifier: Kensington Subdivision, Phase 4

## 1. REACH TO BE REVISED

Describe the limits of the revision **OR** submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☒ Yes

See Supporting Documents 2.

Downstream Limit: _____

Upstream Limit: _____

## 2. CHANNEL DESCRIPTION

**Attach the following information about the channel (check box if information has been provided):**

☒ Description of the inlet and outlet See Supporting Documents 4.

☒ Description of the shape of the channel *(both cross sectional and planimetric configuration)* and its lining *(channel bottom and sides)*:

## 3. ACCESSORY STRUCTURES

The channelization includes:

- ☐ Levees *(Attach Levee/Floodwall System Analysis Form - Form 8)*
- ☐ Drop structures
- ☐ Superelevated sections
- ☐ Transitions in cross sectional geometry
- ☐ Debris basin/detention basin
- ☐ Energy dissipater
- ☒ Other (Describe): 24"-48" RCP Storm Drain

## 4. DRAWING CHECKLIST

**Attach the plans of the channelization certified by a registered professional engineer. The plan detail and information should include (check box if information has been provided):**

☒ Channel alignment and locations of inlet, outlet, and accessory structures

☐ Channel lining See Supporting Documents 4.

☒ Typical cross sections and profiles of channel banks and invert

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

## 5. HYDRAULIC CONSIDERATIONS

1. The channel was designed to carry 75.2 (cfs) and/or the 100-year flood.

2. The design elevation in the channel based on:

   ☐ Subcritical flow

   ☐ Critical flow

   ☐ Supercritical flow

   ☐ Energy grade line

3. **If there is the potential for a hydraulic jump at the following locations, check the box(es) that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.**

| | |
|---|---|
| Inlet to channel? | ☐ Yes |
| Outlet of channel? | ☐ Yes |
| At Drop Structures? | ☐ Yes |
| At Transitions? | ☐ Yes |
| Other locations? | ☐ Yes |

**Explanation Attached?** ☐ **Yes** ☐ **No** ☐ **N/A**

## 6. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood water-surface elevations, then provide the following information **(Check the box if provided):**

☐ Estimated sediment load

☐ Method used to estimate sediment transport

☐ Method used to estimate scour and/or deposition

☐ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

# APPENDIX A

**C.O.A. Grading & Drainage Plan Approval Letter**

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

March 25, 2002

RECEIVED
MAR 27 2002

Scott McGee, P.E.
Isaacson & Arfman
128 Monroe St. NE
Albuquerque, New Mexico 87108

RE: **KENSINGTON SUBD PHASE 4** **(H-10/D23B)**
**Engineers Certification For Release of Financial Guaranty**
**Engineers Stamp dated 10/25/2001**
**Engineers Certification dated 3/21/2002**

Dear Mr. McGee:

Based upon the information provided in your Engineers Certification dated 3/21/2002, the above referenced plan is adequate to satisfy the Grading and Drainage Certification for Release of Financial Guaranty for the above referenced project.

If you have any questions, please call me at 924-3981.

Sincerely,

Teresa A. Martin

Teresa A. Martin
Hydrology Plan Checker
Public Works Department
BLB

C: Arlene Portillo, PWD – #623182
File

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

# APPENDIX B

## Hydraulic Grade Line Computations

Hydraulic Grade Line (HGL) computations are included for two different conditions representing inflows to the two "sump" inlets on Brackley Drive. Run 1 models Q = 24.2 cfs which is 100% of the basin flow. Run 2 models Q = 22.4 cfs which is the storm drain capacity based on an HGL equal to stormwater ponding contained within the pubic right-of-way of Brackley Drive (water surface elevation = 5108.80).

A hydrograph is included (Q in = 24.2 and Q out = 22.4 cfs) as well as an exhibit indicating the extent of ponded water within the public right-of-way. The storm drain system has the capacity to handle the 100-year event with only minor ponding (approximately 2,800 cubic feet) within the public right-of-way.

# Hydraflow Hydraulic Grade Line Computations



| Line | Size | Q | Downstream | | | | | | | | Len | Upstream | | | | | | | | Check | | JL coeff | Minor loss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (in) | (cfs) | Invert elev (ft) | HGL elev (ft) | Depth (ft) | Area (sqft) | Vel (ft/s) | Vel head (ft) | EGL elev (ft) | Sf (%) | (ft) | Invert elev (ft) | HGL elev (ft) | Depth (ft) | Area (sqft) | Vel (ft/s) | Vel head (ft) | EGL elev (ft) | Sf (%) | Ave Sf (%) | Enrgy loss (ft) | (K) | (ft) |
| 1 | 48 | 60.00 | 5100.44 | 5105.30 | 4.00 | 12.56 | 4.78 | 0.35 | 5105.65 | 0.175 | 362 | 5101.99 | 5105.89 | 3.90 | 12.48 | 4.81 | 0.36 | 5106.25 | 0.155 | 0.165 | 0.596 | 0.20 | 0.07 |
| 2 | 48 | 60.00 | 5102.05 | 5105.96 | 3.91 | 12.50 | 4.80 | 0.36 | 5106.32 | 0.156 | 345 | 5103.11 | 5106.44 | 3.33 | 11.17 | 5.37 | 0.45 | 5106.89 | 0.170 | 0.163 | 0.562 | 1.00 | 0.45 |
| 3 | 36 | 35.80 | 5103.21 | 5106.89 | 3.00 | 7.07 | 5.07 | 0.40 | 5107.28 | 0.288 | 169 | 5103.60 | 5107.37 | 3.00 | 7.07 | 5.06 | 0.40 | 5107.77 | 0.288 | 0.288 | 0.487 | 0.10 | 0.04 |
| 4 | 24 | 24.20 | 5103.21 | 5106.89 | 2.00 | 3.14 | 7.70 | 0.92 | 5107.81 | 1.145 | 97.0 | 5104.57 | 5108.00 | 2.00 | 3.14 | 7.70 | 0.92 | 5108.92 | 1.145 | 1.145 | 1.111 | 1.00 | 0.92 |
| 5 | 24 | 12.10 | 5104.57 | 5108.92 | 2.00 | 3.14 | 3.85 | 0.23 | 5109.15 | 0.286 | 24.0 | 5104.93 | 5108.99 | 2.00 | 3.14 | 3.85 | 0.23 | 5109.22 | 0.286 | 0.286 | 0.069 | 1.00 | 0.23 |

| | | | |
|---|---|---|---|
| Project File: kensing4-master-reduced-4-28a-03.stm | IDF File: SAMPLE.IDF | Total number of lines: 5 | Run Date: 04-28-2003 |

NOTES: Initial tailwater elevation = 5105.3 (ft) , * Normal depth assumed., ** Critical depth assumed.

RUN 1

# Hydraflow Storm Sewer Tabulation

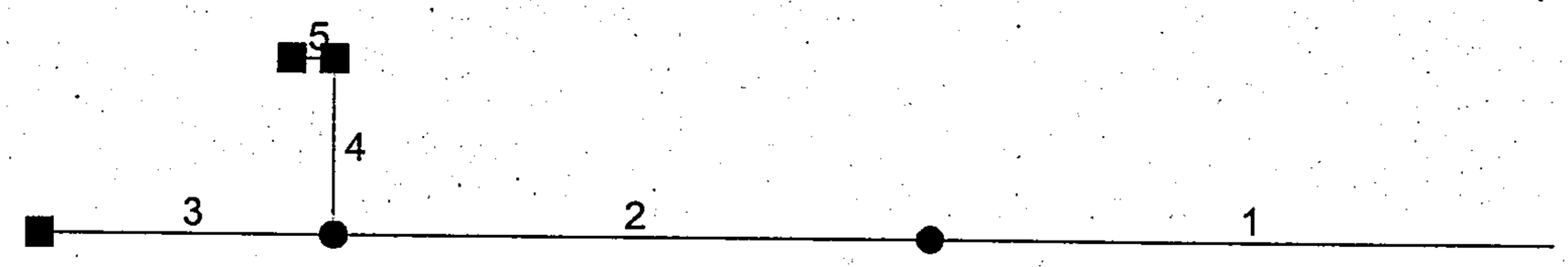


| Station | | Len | Drng Area | | Rnoff coeff | Area x C | | Tc | | Rain (I) | Total flow | Cap full | Vel | Pipe | | Invert Elev | | HGL Elev | | Grnd / Rim Elev | | Line ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Line | To Line | (ft) | Incr (ac) | Total (ac) | (C) | Incr | Total | Inlet (min) | Syst (min) | (in/hr) | (cfs) | (cfs) | (ft/s) | Size (in) | Slope (%) | Up (ft) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | Dn (ft) | |
| 1 | End | 362.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 1.8 | 0.0 | 60.00 | 94.00 | 4.79 | 48 | 0.43 | 5101.99 | 5100.44 | 5105.89 | 5105.30 | 5109.06 | 5107.44 | Tauton Rd - |
| 2 | 1 | 345.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 0.6 | 0.0 | 60.00 | 79.63 | 5.09 | 48 | 0.31 | 5103.11 | 5102.05 | 5106.44 | 5105.96 | 5108.56 | 5109.06 | Tauton Rd |
| 3 | 2 | 169.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 35.80 | 32.04 | 5.07 | 36 | 0.23 | 5103.60 | 5103.21 | 5107.37 | 5106.89 | 5109.00 | 5108.56 | Offsite Extension |
| 4 | 2 | 97.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 0.1 | 0.0 | 24.20 | 26.78 | 7.70 | 24 | 1.40 | 5104.57 | 5103.21 | 5108.00 | 5106.89 | 5108.34 | 5108.56 | Brackley Dr |
| 5 | 4 | 24.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 12.10 | 27.71 | 3.85 | 24 | 1.50 | 5104.93 | 5104.57 | 5108.99 | 5108.92 | 5108.37 | 5108.34 | Brackley Inlet |

Project File: kensing4-master-reduced-4-28a-03.stm | IDF File: SAMPLE.IDF | Total number of lines: 5 | Run Date: 04-28-2003

NOTES: Intensity = 0.00 / (Inlet time + 0.00) ^ 0.00; Return period = 100 Yrs. ; Initial tailwater elevation = 5105.30 (ft)

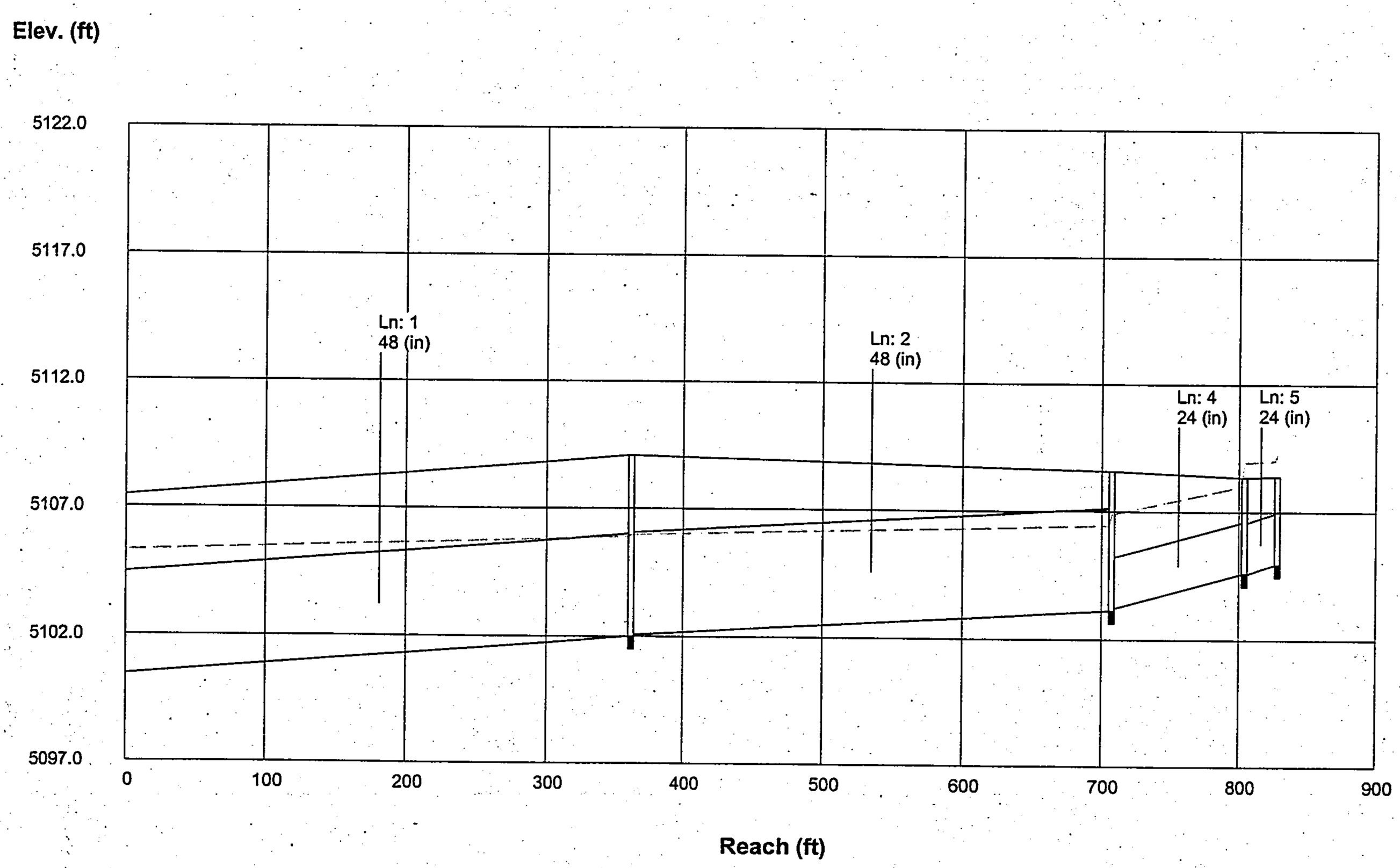
# Hydraflow Plan View




| | | | |
|---|---|---|---|
| Project file: kensing4-master-reduced-4-28-03.stm | IDF file: SAMPLE.IDF | No. Lines: 5 | 04-29-2003 |

# Storm Sewer Profile

Proj. file: kensing4-master-reduce[illegible]4-28a-03.stm



# HydroFlow Hydraulic Grade Line Computations



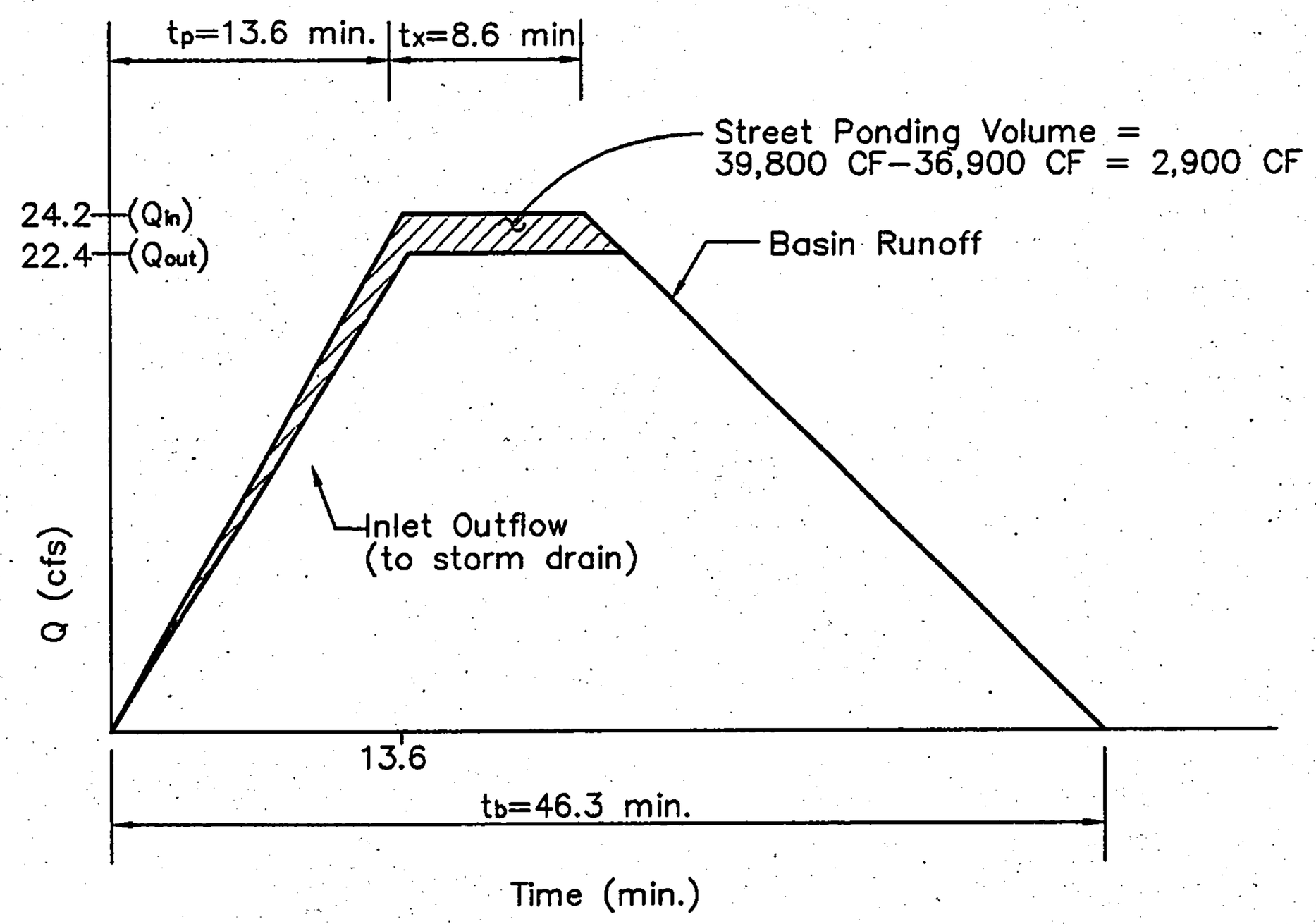
| Line | Size (in) | Q (cfs) | Downstream Invert elev (ft) | Downstream HGL elev (ft) | Downstream Depth (ft) | Downstream Area (sqft) | Downstream Vel (ft/s) | Downstream Vel head (ft) | Downstream EGL elev (ft) | Downstream Sf (%) | Len (ft) | Upstream Invert elev (ft) | Upstream HGL elev (ft) | Upstream Depth (ft) | Upstream Area (sqft) | Upstream Vel (ft/s) | Upstream Vel head (ft) | Upstream EGL elev (ft) | Upstream Sf (%) | Check Ave Sf (%) | Check Enrgy loss (ft) | JL coeff (K) | Minor loss (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 48 | 58.20 | 5100.44 | 5105.30 | 4.00 | 12.56 | 4.63 | 0.33 | 5105.63 | 0.164 | 362 | 5101.99 | 5105.85 | 3.86 | 12.43 | 4.68 | 0.34 | 5106.19 | 0.144 | 0.154 | 0.557 | 0.20 | 0.07 |
| 2 | 48 | 58.20 | 5102.05 | 5105.92 | 3.87 | 12.44 | 4.68 | 0.34 | 5106.26 | 0.144 | 345 | 5103.11 | 5106.35 | 3.24 | 10.90 | 5.34 | 0.44 | 5106.79 | 0.168 | 0.156 | 0.538 | 1.00 | 0.44 |
| 3 | 36 | 35.80 | 5103.21 | 5106.79 | 3.00 | 7.07 | 5.07 | 0.40 | 5107.19 | 0.288 | 169 | 5103.60 | 5107.28 | 3.00 | 7.07 | 5.06 | 0.40 | 5107.68 | 0.288 | 0.288 | 0.487 | 0.10 | 0.04 |
| 4 | 24 | 22.40 | 5103.21 | 5106.79 | 2.00 | 3.14 | 7.13 | 0.79 | 5107.58 | 0.981 | 97.0 | 5104.57 | 5107.74 | 2.00 | 3.14 | 7.13 | 0.79 | 5108.54 | 0.981 | 0.981 | 0.952 | 1.00 | 0.79 |
| 5 | 24 | 11.20 | 5104.57 | 5108.54 | 2.00 | 3.14 | 3.57 | 0.20 | 5108.73 | 0.245 | 24.0 | 5104.93 | 5108.59 | 2.00 | 3.14 | 3.57 | 0.20 | 5108.79 | 0.245 | 0.245 | 0.059 | 1.00 | 0.20 |

Project File: kensing4-master-reduced-4-28-03.stm | IDF File: SAMPLE.IDF | Total number of lines: 5 | Run Date: 04-28-2003

NOTES: Initial tailwater elevation = 5105.3 (ft) , * Normal depth assumed., ** Critical depth assumed.

RUN 2

# HYDROGRAPH




156HYDROGRAPH.DWGanw 3/20/03

## Street Ponding at Brackley Drive

### Hydrograph

| | | |
|---|---|---|
| $Q_p$= | 24.2 cfs | $V_{in}$= ((.5(tp)+tx+.5(tb-tx-tp))*Qp)*60 min/hr |
| E= | 1.48 in. | $V_{in}$= 39,800 cu.ft. |
| tc= | 0.2 hrs | |
| $A_D$= | 4.04 ac | |
| $A_T$= | 7.09 ac | |

$t_B$= (2.107*E*($A_T$/$Q_p$)-(0.25*$A_D$/$A_T$))*60 min/hr

$t_B$= 46.3 min.

$t_P$= ((0.7$t_C$)+(1.6-($A_D$/$A_T$))/12)*60 min/hr

$t_P$= 13.6 min.

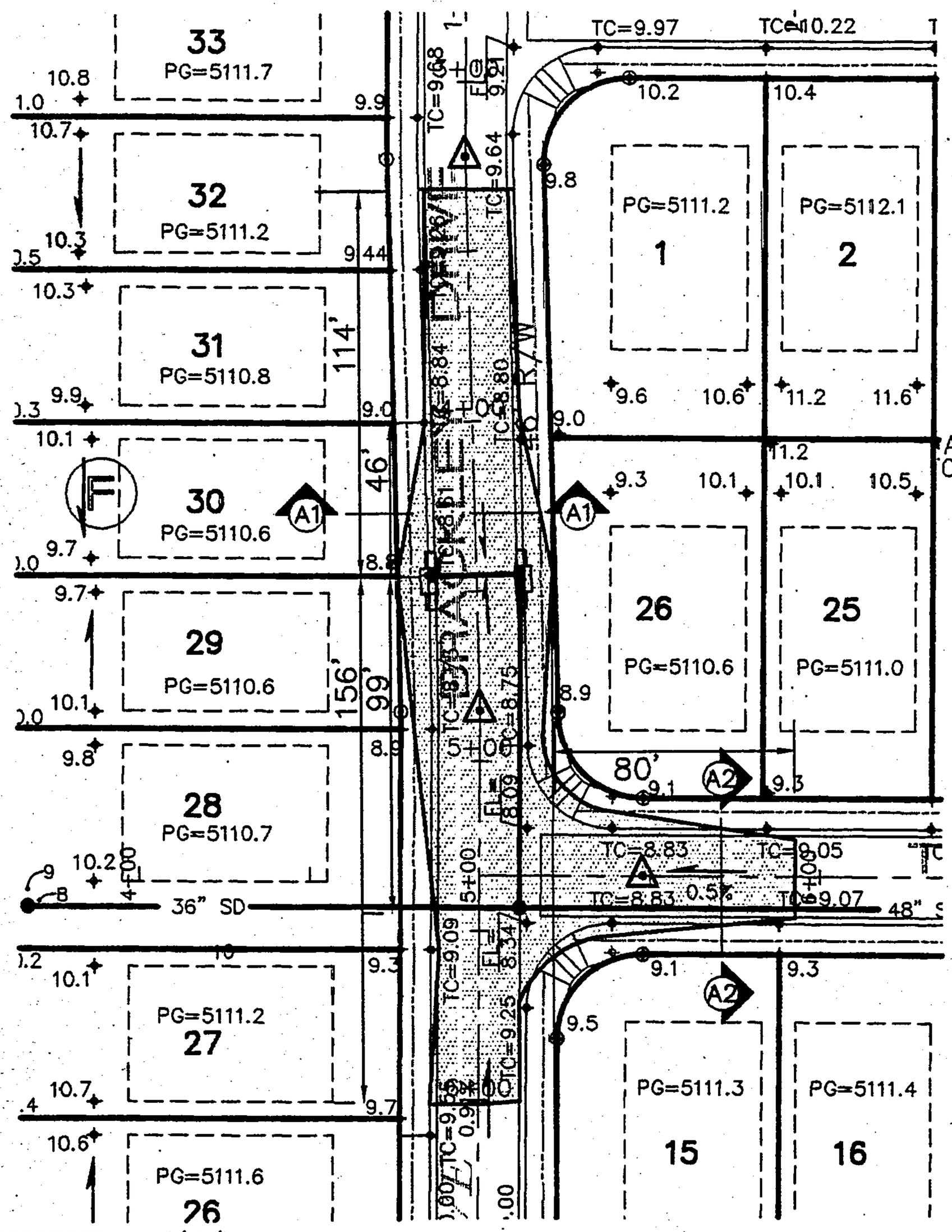
$t_x$= (0.25*AD/AT) * 60 min./hr

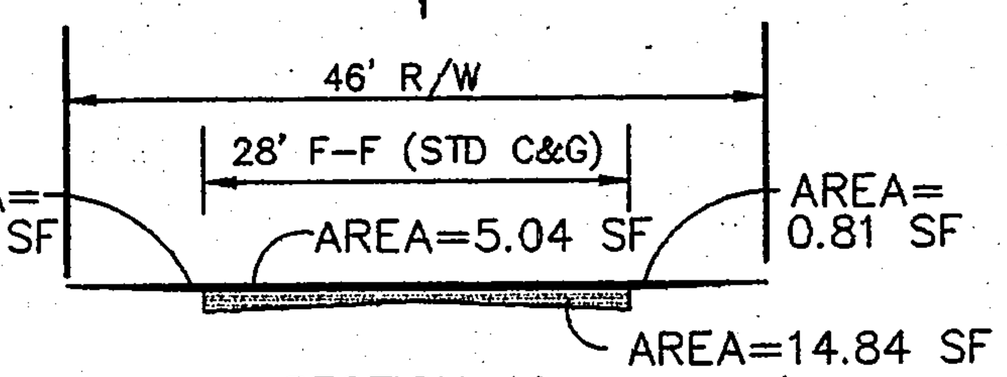
$t_x$= 8.6 min.

**Inlet Outflow**

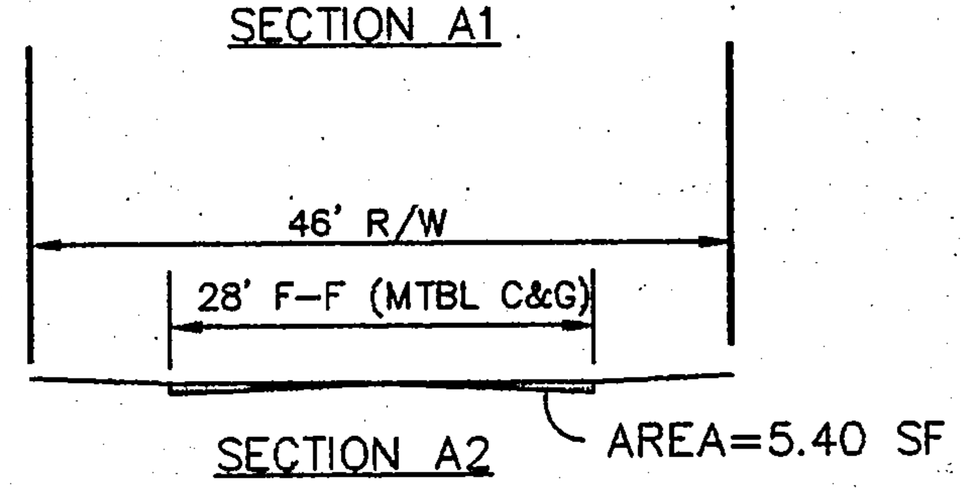
| Time (min) | Q (cfs) |
|---|---|
| 0 | 0 |
| 13.6 | 22.4 |
| 32.7 | 22.4 |

# BRACKLEY DRIVE
## LIMITS OF STREET PONDING
## WSEL=8.8




SECTION A1




SECTION A2

VOLUME=
(114*14.84)/2
+ (156*14.84)/2
+ (80*5.4)/2
+ (99*5.04+99*0.81)/2
+ (46*5.04+46*0.81)/2
= 2,644 CU. FT.

156CNTR.DWGanw 3/20/03

# Hydraflow HGL Computation Procedure



**General Procedure:** Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is assumed at the upstream end.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the assumed hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

Col. 21 The average of the downstream and upstream friction slopes.

Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

Col. 24 Minor loss. Equals Col. 23 x Col. 18. This amount is added to the upstream HGL and used as the starting HGL for the next upstream line(s).

* Normal depth assumed.
** Critical depth assumed.

# APPENDIX C

**Excerpts from the "City of Albuquerque Development Process Manual, Section 22.2"**

# PREFACE

Section 22.2, Hydrology was first published in March, 1982 as one of the sections in the three-volume Development Process Manual (DPM). The DPM is the result of the effort of a special team of City of Albuquerque staff and Albuquerque Urban Advisory Council members. The Manual was created in response to mutual needs of the private and public sectors in Albuquerque to clarify the development process. The Three volumes of the DPM are: 1 - "Procedures", 2 - "Design Criteria" and 3 - "Policies and Plans."

A major revision to Section 22.2 was adopted with the approval of a "Notice of Emergency Rule" by the City in January, 1986. This revision deleted a procedure which based rational method "C" coefficients on SCS Hydrologic Soil Group, and adopted Rational Method Coefficients based on textbook and handbook references.

The "D.P.M. Subcommittee on Drainage" was established by the City of Albuquerque in January, 1987. The Subcommittee held its first meeting in February, 1987. The Subcommittee consisted of members from City staff, Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) staff and local engineering consultants, and was organized to update and revise the DPM design criteria for Section 22.2, Hydrology. The Bernalillo County Public Works Department later joined the Subcommittee. In January, 1990 the subcommittee changed its name to the DPM "Drainage Design Criteria Committee" to avoid potential confusion with another committee established by the DPM Steering Group.

The Drainage Design Criteria Committee has met on a regular basis to develop a major update of the hydrology section of the DPM. In 1987, a research study to determine local infiltration factors was conducted by Dr. Richard Heggen at the University of New Mexico to supplement the work of the Committee.

A "draft" of the "Revision of Section 22.2, DPM" was distributed for community review in January, 1990. This document recommended use of initial abstraction and uniform infiltration to complete rainfall loss. It also included a procedure for smaller basins based on the Rational Method, and a procedure for large and small watersheds based on the HYMO computer program.

With the adoption of the Bernalillo County Storm Drainage Ordinance (No. 90-6) the County Engineer was responsible for establishing criteria, procedures and standards for the design of flood control, drainage controls, and erosion control improvements. To fulfill this requirement, Bernalillo County adopted "Interim Drainage Design Criteria for Bernalillo County" (April, 1990). This document incorporated Parts A, B, E and F from the January, 1990 draft of Section 22.2, Hydrology.

In January, 1991, a revision of "Section, 22.2," was distributed to eight (8) Federal and State agencies, and to 26 local engineering firms. A public "Notice of Review" was published in the Albuquerque Journal and Tribune on February 4, 1991.

Following incorporation of review comments, the August, 1991 version of Section 22.2, Hydrology was released for use by the Drainage Design Criteria Committee. This version included the placement of the rainfall peak in this second hour of the design storm. Modifications to the Probable Maximum Flood procedures incorporated a "local storm" and a "general storm." A "Notice of Second Review" was published in the Albuquerque Journal and Tribune on August 31, 1991. The August, 1991 version has been accepted by the City, County and AMAFCA as an allowable procedure for hydrologic analysis and design of flood control structures.

The January, 1993 version of Section 22.2, Hydrology incorporates comments received since August, 1991. The version includes a procedure to evaluate basin hydrology for steep natural slopes, and some text revisions suggested by the USDA Soil Conservation Service. For most applications, there will be no computational differences between the January, 1993 version and the August, 1991 version. The text has been reformatted into seven (7) separately numbered parts, to simplify future revision of the document.

The pages which follow replaced all previous pages in the Hydrology Section of the DPM (Section 22.2, pages 2 through 21). Following a public review and comment period, the revised Section 22.2, Hydrology was approved by the City Engineer and the Mayor. In the City of Albuquerque, the revision became effective on April 7, 1993. Bernalillo County also adopted the revision as the standard for design of flood and drainage control, effective April 7, 1993. The revised Section 22.2, Hydrology is to be regarded as the principal reference for hydrologic design in the City of Albuquerque and Bernalillo County.

The Drainage Design Criteria Committee wish to acknowledge the assistance of the many individuals who reviewed the document. In particular we wish to thank Richard Leonard, Brian Burnett and Dwayne Sheppard for their work on the Committee.

The D.P.M. Drainage Design Criteria Committee:

Richard J. Heggen, PE, PH, PhD
Professor of Civil Engineering
University of New Mexico

Clifford E. Anderson, PE & PS
Drainage Engineer, AMAFCA

Robert S. Foglesong, PE & PS
Surface Water Hydrologist
Bernalillo County Public Works

Howard C Stone, PE
Water Resources Manager
Bohannan-Huston Inc.

Charles M. Easterling, PE
Pres., Easterling & Assoc.

Fred Aguirre, PE
Hydrologist, PWD
City of Albuquerque

## INTRODUCTION

There have been many methods used in Albuquerque and Bernalillo County to compute runoff volumes, peak flow rates and runoff hydrographs from drainage basins. Any methodology used should be based on measurable conditions, be as simple as possible and produce accurate reproducible results. The methods, graphs, and tables which follow will be used by the City of Albuquerque, Bernalillo County and AMAFCA staff in the review and evaluation of development plans and drainage management plans.

Two basic methods of analysis are presented herein:

a) **PART A** - describes a simplified procedure for smaller watersheds based on the Rational Method and initial abstraction/uniform infiltration precipitation losses. The procedure is applicable to watersheds up to 40 acres in size, but the procedure may be extended to include larger watersheds with some limitations.

b) **PART C** - describes a unit hydrograph procedure which uses a version of the U.S.D.A. Agricultural Research Service HYMO computer program, modified to utilize initial abstraction/uniform infiltration precipitation losses. The AHYMO computer program developed by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), and the simplified input procedures available with this program, are also described. This procedure is applicable for small and large watersheds.

In addition to these procedures, **PART D** describes a modification of the **PART C** procedures to compute a Probable Maximum Flood. This has special application to the design of dams.

**PART B** describes the computation of time of concentration and time to peak which are used in PART A, PART C and PART D.

There may be conditions in which the procedures and analysis tools described in PART A, PART C or PART D are not applicable or optimal for design. **PART E** describes some additional analysis procedures and some criteria under which alternate procedures will be evaluated.

**PART F** contains a tabulated list of definitions of symbols used in this Section of the D.P.M. and a bibliography.

**PART G** contains the input and output files from the examples in PARTS C and D which utilize the HYMO computer program.

# PART A - PROCEDURE FOR 40 ACRE AND SMALLER BASINS

A simplified procedure for projects with sub-basins smaller than 40 acres has been developed based on initial abstraction/uniform infiltration precipitation losses and Rational Method procedures. For this procedure, Bernalillo County has been divided into four (4) Precipitation Zones.

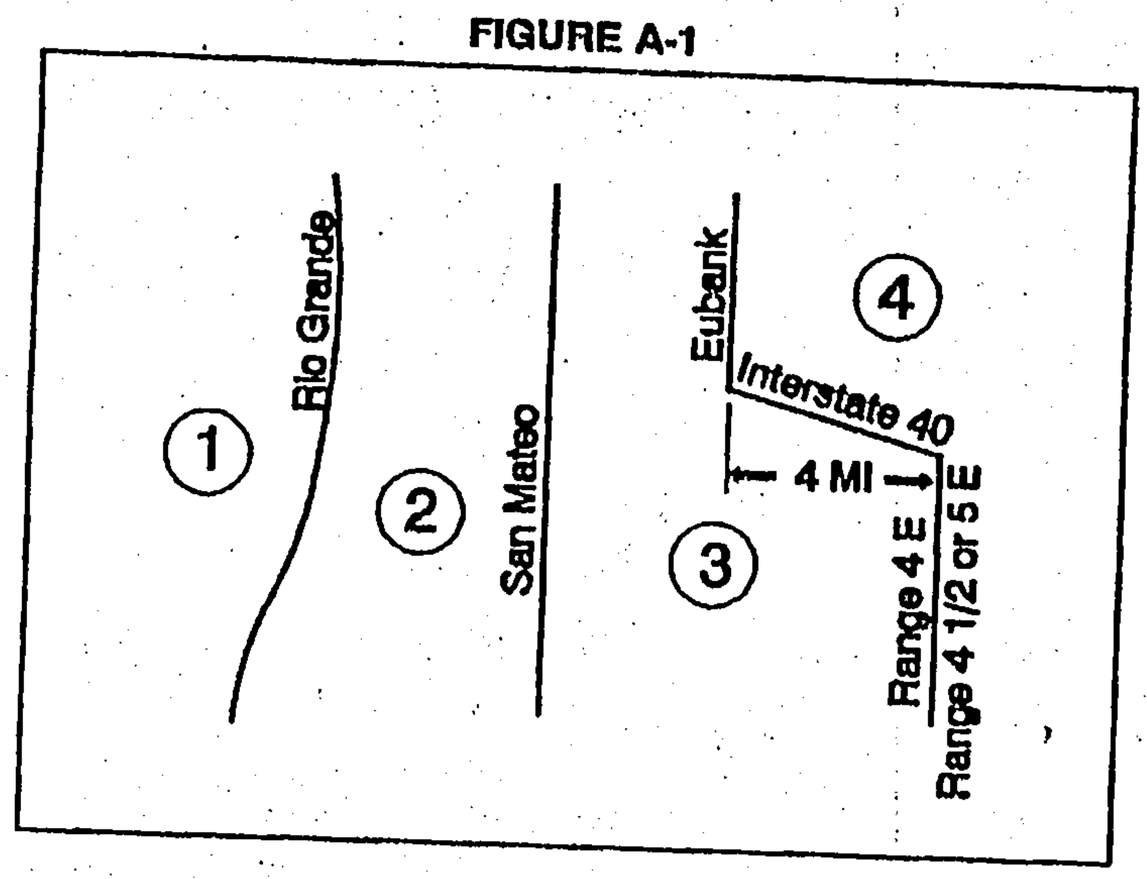
## *A.1 PRECIPITATION ZONES*

Bernalillo County's four precipitation zones are indicated in TABLE A-1 and on FIGURE A-1.

**TABLE A-1. PRECIPITATION ZONES**

| Zone | Location |
|---|---|
| 1 | West of the Rio Grande |
| 2 | Between the Rio Grande and San Mateo |
| 3 | Between San Mateo and Eubank, North of Interstate 40; and between San Mateo and the East boundary of Range 4 East, South of Interstate 40 |
| 4 | East of Eubank, North of Interstate 40; and East of the East boundary of Range 4 East, South of Interstate 40 |

**FIGURE A-1**




Where a watershed extends across a zone boundary, use the zone which contains the largest portion of the watershed.

## A.2 DESIGN STORM

The principal design storm is the 100-year 6-hour event defined by the NOAA Atlas 2, Precipitation-Frequency Atlas of the Western United States, Vol. IV - New Mexico. Assume an AMC II condition (a normally dry watershed). For design of retention or detention ponds, storms of 24-hour or longer duration many be required. The 24-hour event is defined by the NOAA Atlas 2. The 4-day and 10-day events can be obtained using the procedures in S.C.S. TSC Technical Note-Hydrology, PO-6 (Rev. 2) The 100-year 60-minute depth is computed by the following formula from Table 11 of NOAA Atlas 2:

$$P_{60} = 0.494 + 0.755 * (P_{360} * P_{360} / P_{1440}) \qquad \text{(a-1)}$$

**TABLE A-2. DEPTH (INCHES) AT 100-YEAR STORM**

| Zone | $P_{60}$ | $P_{360}$ | $P_{1440}$ | $P_{4days}$ | $P_{10days}$ |
|---|---|---|---|---|---|
| 1 | 1.87 | 2.20 | 2.66 | 3.12 | 3.67 |
| 2 | 2.01 | 2.35 | 2.75 | 3.30 | 3.95 |
| 3 | 2.14 | 2.60 | 3.10 | 3.95 | 4.90 |
| 4 | 2.23 | 2.90 | 3.65 | 4.70 | 5.95 |

The 2-year 60-minute depth is computed by the following formula from NOAA Atlas 2:

$$P_{60\text{-}2} = -0.011 + 0.942 * (P_{360\text{-}2} * P_{360\text{-}2} / P_{1440\text{-}2}) \qquad \text{(a-2)}$$

Based on fitting a logarithmic curve to the values in Table 12 of NOAA Atlas 2, the 12-minute (0.2 hour) depth was computed to be 50.24 percent of the 60-minute depth:

$$P_{12} = 0.5024 * P_{60} \qquad \text{(a-3)}$$

For certain applications (e.g., street drainage, low flow channels and sediment transport) storms of greater frequency than the 100-year storm must be considered. To estimate precipitation at return periods other than 100 years, multiply the 360-minute or 1440-minute 100-year precipitation amounts by the factors in TABLE A-3.

| TABLE A-3. RETURN PERIOD FACTORS | |
|---|---|
| **Return Period (years)** | **Factor** |
| 50 | 0.900 |
| 25 | 0.800 |
| 10 | 0.667 |
| 5 | 0.567 |
| 2 | 0.434 |

**Example A-1**

Find the 10-year, 6-hour storm depth for Zone 2.

$P_{360\text{-}10}$ = 2.35 * 0.667 = 1.57 inches

**Example A-2**

Find the 2-year, 1-hour storm depth for Zone 3.

$P_{360\text{-}2}$ = 2.60 * 0.434 = 1.128 inches

$P_{1440\text{-}2}$ = 3.10 * 0.434 = 1.345 inches

$P_{60\text{-}2}$ = -0.011 + 0.942* ($P_{360\text{-}2}$* $P_{360\text{-}2}$ / $P_{1440\text{-}2}$ )
= -0.011+ 0.942*(1.128*1.128/1.345)
= 0.880 inches

## *A.3 LAND TREATMENTS*

All land areas are described by one of four basic land treatments or by a combination of the four land treatments.

Land treatments are given in TABLE A-4.

| TABLE A-4. LAND TREATMENTS | |
|---|---|
| **Treatment** | **Land Condition** |
| A | Soil uncompacted by human activity with 0 to 10 percent slopes. Native grasses, weeds and shrubs in typical densities with minimal disturbance to grading, groundcover and infiltration capacity. |
| B | Irrigated lawns, parks and golf courses with 0 to 10 percent slopes. Native grasses, weeds and shrubs, and soil uncompacted by human activity with slopes greater than 10 percent and less than 20 percent. |
| C | Soil compacted by human activity. Minimal vegetation. Unpaved parking, roads, trails. Most vacant lots. Gravel or rock on plastic (desert landscaping). Irrigated lawns and parks with slopes greater than 10 percent. Native grasses, weeds and shrubs, and soil uncompacted by human activity with slopes at 20 percent or greater. Native grass, weed and shrub areas with clay or clay loam soils and other soils of very low permeability as classified by SCS Hydrologic Soil Group D. |
| D | Impervious areas, pavement and roofs. |
| Most watersheds contain a mix of land treatments. To determine proportional treatments, measure respective subareas. In lieu of specific measurement for treatment D, the areal percentages in TABLE A-5 may be employed. | |

| TABLE A-5. PERCENT TREATMENT D (Impervious) | |
|---|---|
| **Land Use** | **Percent** |
| Commercial* | 90 |
| Single Family Residential<br>N=units/acre, N≤6 | $7*\sqrt{((N*N)+(5*N))}$ (a-4) |
| Multiple Unit Residential<br>Detached*<br>Attached* | <br>60<br>70 |
| Industrial<br>Light*<br>Heavy* | <br>70<br>80 |
| Parks, Cemeteries | 7 |
| Playgrounds | 13 |
| Schools | 50 |
| Collector & Arterial Streets | 90 |
| *Includes local streets | |

TABLE A-5 does not provide areal percentages for land treatments A, B and C. Use of TABLE A-5 will require additional analysis to determine the appropriate areal percentages of these land treatments.

Backyard retention ponds, and other small on-site ponding, may have the effect of reducing runoff from impervious areas. Where it can be clearly demonstrated that backyard and small on-site retention ponding currently exist, impervious and/or pervious areas which drain to such ponds ~~may~~ can be given credit towards their determination of peak rates of runoff and runoff volumes from the development. ~~considered to be in land treatment A. Application of backyard ponding is not normally applicable to more than 35 percent of the area in land treatment D (impervious). Allowance for backyard ponding will not be considered for new developments and future development.~~

## *A.4 ABSTRACTIONS*

Initial abstraction is the precipitation depth which must be exceeded before direct runoff begins. Initial abstraction may be intercepted by,vegetation, retained in surface depressions, or absorbed on the watershed surface. Initial abstractions are shown in TABLE A-6.

| TABLE A-6. INITIAL ABSTRACTION ( IA) | |
|---|---|
| **Treatment** | **Initial Abstraction (inches)** |
| A | 0.65 |
| B | 0.50 |
| C | 0.35 |
| D | 0.10 |

Infiltration is the only significant abstraction after the initial abstraction. After initial abstraction is satisfied, treat infiltration as a constant loss rate as specified in TABLE A-7.

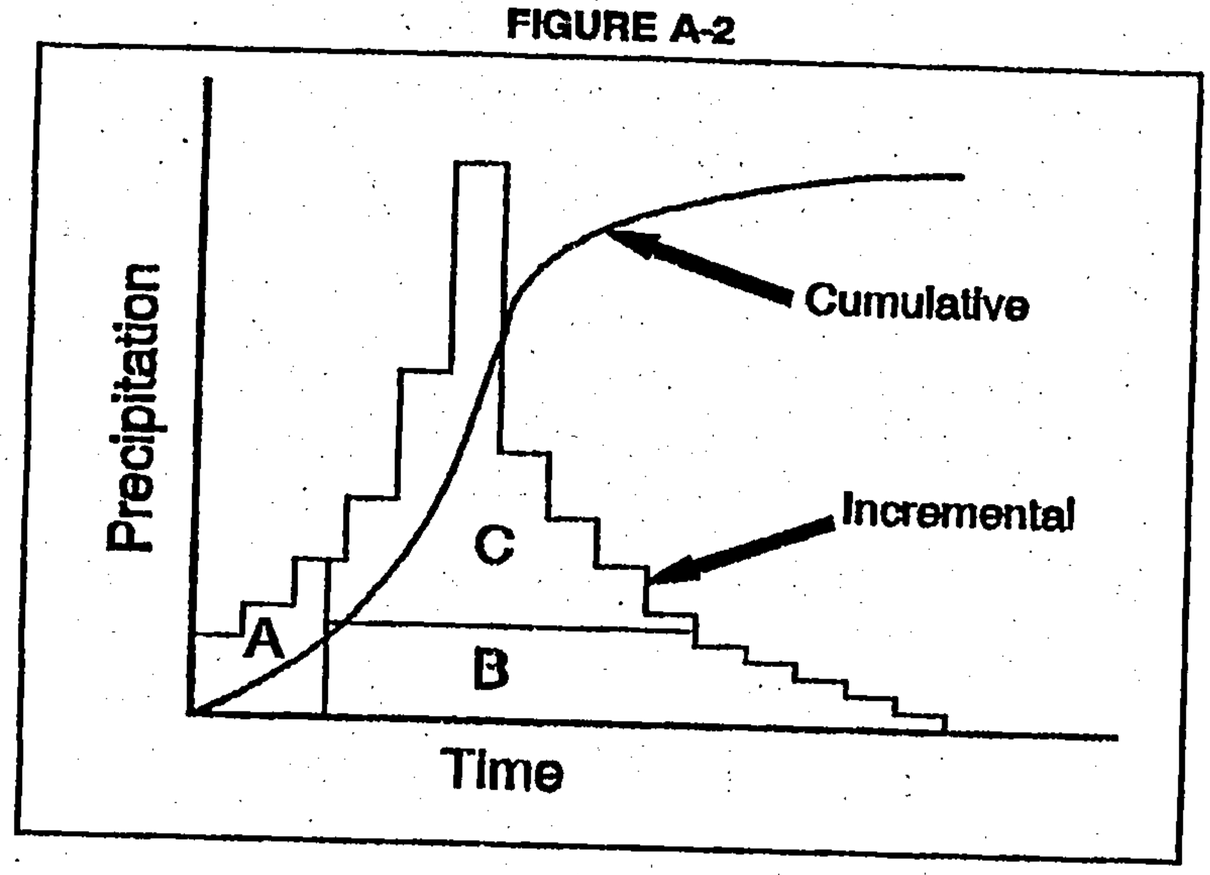
| TABLE A-7. INFILTRATION (INF) | |
|---|---|
| **Treatment** | **Loss Rate (inches/hour)** |
| A | 1.67 |
| B | 1.25 |
| C | 0.83 |
| D | 0.04* |
| * Treatment D infiltration rate is applicable from 0 to 3 hours; use uniform reduction from 3 to 6 hours, with no infiltration after 6 hours. | |

Runoff from a previous event can saturate a channel bed, rendering it minimally pervious for several days. Do not anticipate additional bed losses for design purposes.

## *A.5 EXCESS PRECIPITATION & VOLUMETRIC RUNOFF*

Excess precipitation, E, is the depth of precipitation remaining after abstractions are removed. Excess precipitation does not depend on watershed area. Excess precipitation is determined by subtracting the initial abstraction and infiltration from the design storm hydrograph. FIGURE A-2 illustrates the development of excess precipitation. The curved line plots cumulative precipitation. Precipitation intensities (in/hr) are shown as a histogram. Initial abstraction is area A. The horizontal line is at a height corresponding to the infiltration rate. Infiltration loss is area B. The remaining histogram, area C, is excess precipitation.

FIGURE A-2




Excess precipitation, E, by zone and treatment is summarized in TABLE A-8.

*(NOTE: In this table and several tables which follow, corresponding values for 2- and 10- year storms are shown in brackets below each 100-year value)*

**TABLE A-8. EXCESS PRECIPITATION, E (INCHES) - 6 HOUR STORM**

| Zone | Treatment | | | 100-YR [2-YR, 10-YR] |
|---|---|---|---|---|
| | A | B | C | D |
| 1 | 0.44 [0.00, 0.08] | 0.67 [0.01, 0.22] | 0.99 [0.12, 0.44] | 1.97 [0.72, 1.24] |
| 2 | 0.53 [0.00, 0.13] | 0.78 [0.02, 0.28] | 1.13 [0.15, 0.52] | 2.12 [0.79, 1.34] |
| 3 | 0.66 [0.00, 0.19] | 0.92 [0.06, 0.36] | 1.29 [0.20, 0.62] | 2.36 [0.89, 1.50] |

| | | | | |
|---|---|---|---|---|
| 4 | 0.80<br>[0.02, 0.28] | 1.08<br>[0.11, 0.46] | 1.46<br>[0.27, 0.73] | 2.64<br>[1.01, 1.69] |

To determine the volume of runoff,

1) Determine the area in each treatment, $A_A$, $A_B$, $A_C$, $A_D$

2) Compute the weighted excess precipitation, E

$$\text{Weighted E} = \frac{E_A A_A + E_B A_B + E_C A_C + E_D A_D}{A_A + A_B + A_C + A_D} \qquad \text{(a-5)}$$

3) Multiply the weighted E by the watershed area.

$$V_{360} \text{ (as volume)} = \text{weighted E} * (A_A + A_B + A_C + A_D) \qquad \text{(a-6)}$$

**EXAMPLE A-3**

Find the 100-year $V_{360}$ for 30 acres in zone 1. Eight acres are treatment A, 10 acres are treatment B, 5 acres are treatment C, and 7 acres are treatment D.

Weighted E = ((8 * 0.44) + (10 * 0.67) + (5 * 0.99) + (7 * 1.97)) / 30 = 0.965 inches

Volume = (0.965 * 30) / 12 = 2.41 acre-ft. = $V_{360}$

For ponds which hold water for longer than 6 hours, longer duration storms are required to establish runoff volumes. Since the additional precipitation is assumed to occur over a long period, the additional volume is based on the runoff from the impervious areas only.

For 24-hour storms:

7) $$V_{1440} = V_{360} + A_D * (P_{1440} - P_{360}) / 12 \text{ in/ft} \qquad \text{(a-}$$

For 4-day storms:

$$V_{4DAYS} = V_{360} + A_D * (P_{4DAYS} - P_{360}) / 12 \text{ in/ft} \qquad \text{(a-8)}$$

For 10-day storms:

$$V_{10DAYS} = V_{360} + A_D * (P_{10DAYS} - P_{360}) / 12 \text{ in/ft} \qquad \text{(a-9)}$$

**EXAMPLE A-4**

Find the 100-year 24-hour and 4-day runoff volume, $V_{1440}$ and $V_{4days}$, for the area in Example A-3.

$V_{360}$ = 2.41 acre-feet

$V_{1440}$ = 2.41 + 7 ac * (2.66 - 2.20) / 12 = 2.68 acre-feet

$V_{4DAYS}$ = 2.41 + 7 ac * (3.12 - 2.20) / 12 = 2.95 acre-feet

## A.6 *PEAK DISCHARGE RATE FOR SMALL WATERSHEDS*

Small watersheds are less than or equal to 40 acres.

**Peak Discharge**

Using a 0.2-hour (12-minute) time of concentration, peak discharge, $Q_P$, per acre is the volume of excess precipitation in the heaviest 12-minute portion of the storm, divided by the time increment 12 minutes, and multiplied by an attenuation factor. The attenuation factor (0.59 for treatment A, 0.67 for treatment B, 0.75 for treatment C and 0.93 for treatment D) describes the effect of routing. Determine the peak discharge using the values in TABLE A-9, which have been adjusted to consider the effects of initial abstraction.

**TABLE A-9. PEAK DISCHARGE (CFS/ACRE)**

| Zone | Treatment | | 100-YR [2-YR, 10-YR] | |
|---|---|---|---|---|
| | A | B | C | D |
| 1 | 1.29 [0.00, 0.24] | 2.03 [0.03, 0.76] | 2.87 [0.47, 1.49] | 4.37 [1.69, 2.89] |
| 2 | 1.56 [0.00, 0.38] | 2.28 [0.08, 0.95] | 3.14 [0.60, 1.71] | 4.70 [1.86, 3.14] |
| 3 | 1.87 [0.00, 0.58] | 2.60 [0.21,1.19] | 3.45 [0.78, 2.00] | 5.02 [2.04, 3.39] |
| 4 | 2.20 [0.05, 0.87] | 2.92 [0.38, 1.45] | 3.73 [1.00, 2.26] | 5.25 [2.17, 3.57] |

To determine the peak rate of discharge,

1) Determine the area in each treatment, $A_A$, $A_B$, $A_C$ and $A_D$.

2) Multiply the peak rate for each treatment by the respective areas and sum to compute the total $Q_P$.

$$\text{Total } Q_P = Q_{PA}A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D \qquad \text{(a-10)}$$

**Example A-5**

Find 100-year $Q_P$ for 14 acres in zone 1. The four land treatments are: 3 acres in treatment A, 5 acres in treatment B, 2 acres in treatment C and 4 acres in treatment D.

Total $Q_P = (1.29 * 3) + (2.03 * 5) + (2.87 * 2) + (4.37 * 4) = 37.24$ cfs

3) Approximately the same results can be achieved by a Rational Method solution. The 0.2-hour (12-minute) peak intensities, I, are given in TABLE A-10 and Rational Method coefficients, C, are given in TABLE A-11.

$$\text{Total } Q_P = (C_A * I * A_A) + (C_B * I * A_B) + (C_C * I * A_C) + (C_D * I * A_D) \qquad \text{(a-11)}$$

**TABLE A-10. PEAK INTENSITY (IN/HR at $t_c$ = 0.2 hour)**

| Zone | Intensity | 100-YR [2-YR, 10-YR] |
|---|---|---|
| 1 | 4.70 [1.84, 3.14] | |
| 2 | 5.05 [2.04, 3.41] | |
| 3 | 5.38 [2.21, 3.65] | |
| 4 | 5.61 [2.34, 3.83] | |

| TABLE A-11. RATIONAL METHOD COEFFICIENT, C | | | | |
|---|---|---|---|---|
| Zone | Treatment | | | 100-YR [2-YR, 10-YR] |
| | A | B | C | D |
| 1 | 0.27 [0.00, 0.08] | 0.43 [0.02, 0.24] | 0.61 [0.26, 0.47] | 0.93 [0.92, 0.92] |
| 2 | 0.31 [0.00, 0.11] | 0.45 [0.04, 0.28] | 0.62 [0.29, 0.50] | 0.93 [0.91, 0.92] |
| 3 | 0.35 [0.00, 0.16] | 0.48 [0.10, 0.33] | 0.64 [0.35, 0.55] | 0.93 [0.92, 0.93] |
| 4 | 0.39 [0.02, 0.23] | 0.52 [0.16, 0.38] | 0.66 [0.43, 0.59] | 0.94 [0.93, 0.93] |

(Note the quote from the ASCE Manual and Report on Engineering Practice No. 37 (1969): The commonly reported Rational C values "are applicable for storms to 5- to 10-yr frequencies. Less frequent, higher intensity storms will require the use of higher coefficients because infiltration and other losses have a proportionally smaller effect on runoff." Thus higher C's realized under heavy precipitation might be expected.)

**Example A-6**

Recompute Example A-5 using the Rational Method.

$$Q = CIA$$
$$= (0.27 * 4.70 * 3) + (0.43 * 4.70 * 5) + (0.61 * 4.70 * 2) + (0.93 * 4.70 * 4)$$
$$= 37.13 \text{ cfs}$$

## *A.7 USE OF RATIONAL METHOD FOR WATERSHEDS LARGER THAN 40 ACRES*

Peak rates of discharge may be computed for watersheds larger than 40 acres by using the Rational Method Coefficients (C's) from TABLE A-11 and modifying the Intensity (in/hr) for a larger time of concentration ($t_c$). This method may be used to establish peak flow rates for off-site flow areas when sizing channels, pipes and road crossings. On-site areas should be divided into 40 acre or smaller sub- basins and should not use this procedure. For watersheds larger than 40 acres, the rational method should not be used to establish allowable historic flow rates since it will tend to give somewhat larger values than those computed by unit hydrograph procedures.

The procedures outlined in PART B should be used to compute the time of concentration ($t_c$).

Then compute the Intensity (in/hour), using the time of concentration, $t_c$ (hours), and the 60-minute precipitation depth, $P_{60}$ (inches), with the following formula:

$$I = 0.726 * (\log_{10}(24.6 * t_c)) * (1/t_c) * P_{60} \qquad \text{(a-12)}$$

Do not use this formula for $t_c$ larger than 2.0 hours.

**EXAMPLE A-7**

Find $Q_P$ for a 100-year storm at a 120 acre watershed in zone 3, with a 2600 feet shallow concentrated flow upper subreach at 0.015 ft/ft slope and 1200 feet natural channel lower subreach at 0.02 ft/ft slope. The watershed is 50 percent treatment A, 20 percent treatment B, 10 percent treatment C and 20 percent treatment D.

Compute the time of concentration using Table B-1 from PART B as follows:

With a reach length longer than 2000 feet, use K = 3 for the portion below the first 2000 feet.

Since total reach length (2600 + 1200) is less than 4000 feet use equations b-1 and b-2 from PART B

$$t_c = ((2000 / (10 * 2 * \sqrt{(0.015)})) + (600 / (10 * 3 \sqrt{(0.015)})) + (1200 / (10 * 3 * \sqrt{(0.02)}))) / 3600 = 0.3507 \text{ hours}$$

Compute the Intensity, I, using equation a-12 as follows:

$$I = 0.726 * \log_{10}(24.6 * 0.3507) * (1 / 0.3507) * 2.14 = 4.15 \text{ inches/hour}$$

Using equation a-11 and the percentage of treatment types:

$A_A = 120 * 0.50 = 60$ acres
$A_c = 120 * 0.10 = 12$ inches
$A_B = 120 * 0.20 = 24$ acres
$A_D = 120 * 0.20 = 24$ acres

$$Q_P = (0.35 * 4.15 * 60) + (0.48 * 4.15 * 24) + (0.64 * 4.15 * 12) + (0.93 * 4.15 * 24) = 259.46 \text{ cfs}$$

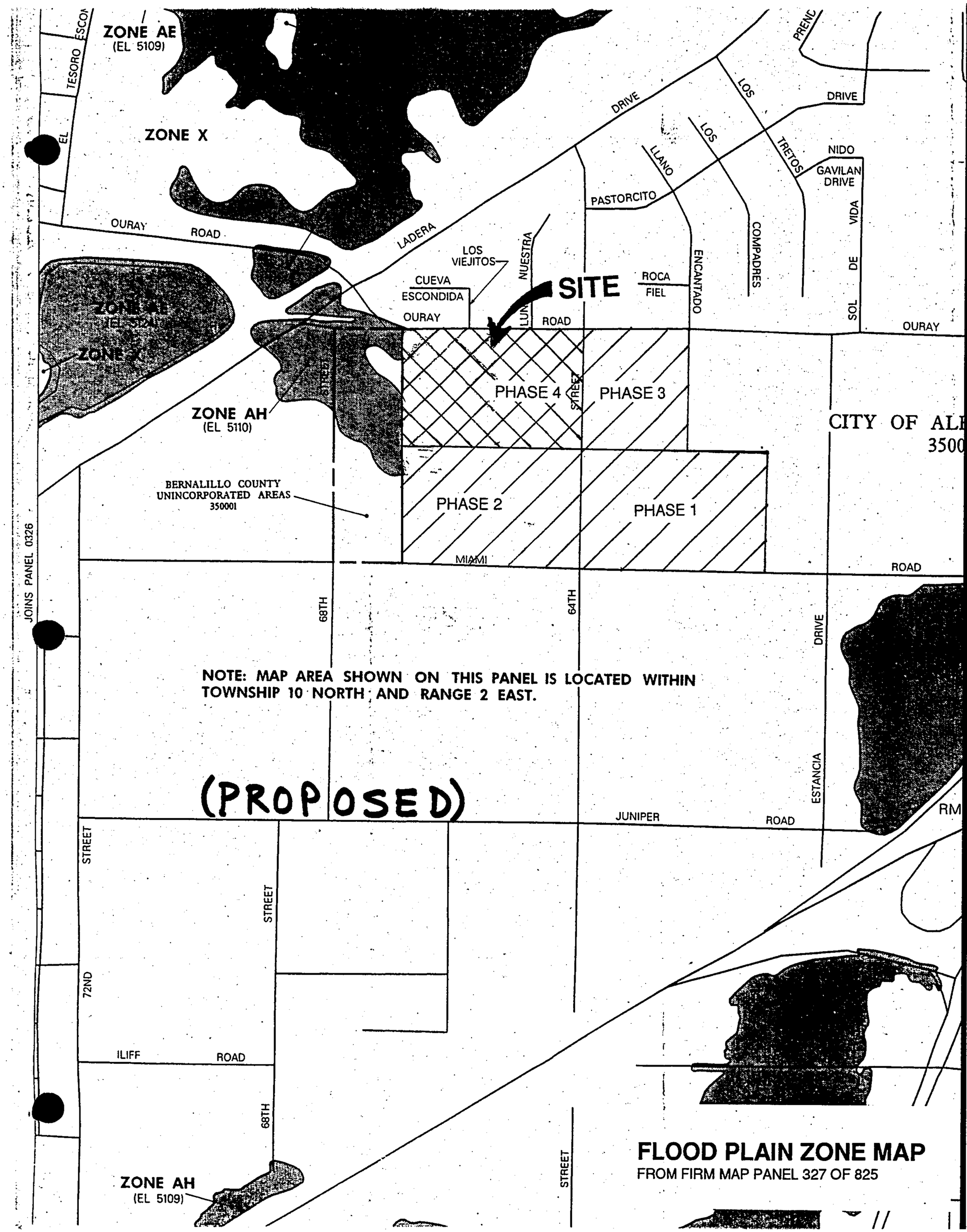
## *A.8 HYDROGRAPH FOR SMALL WATERSHED*

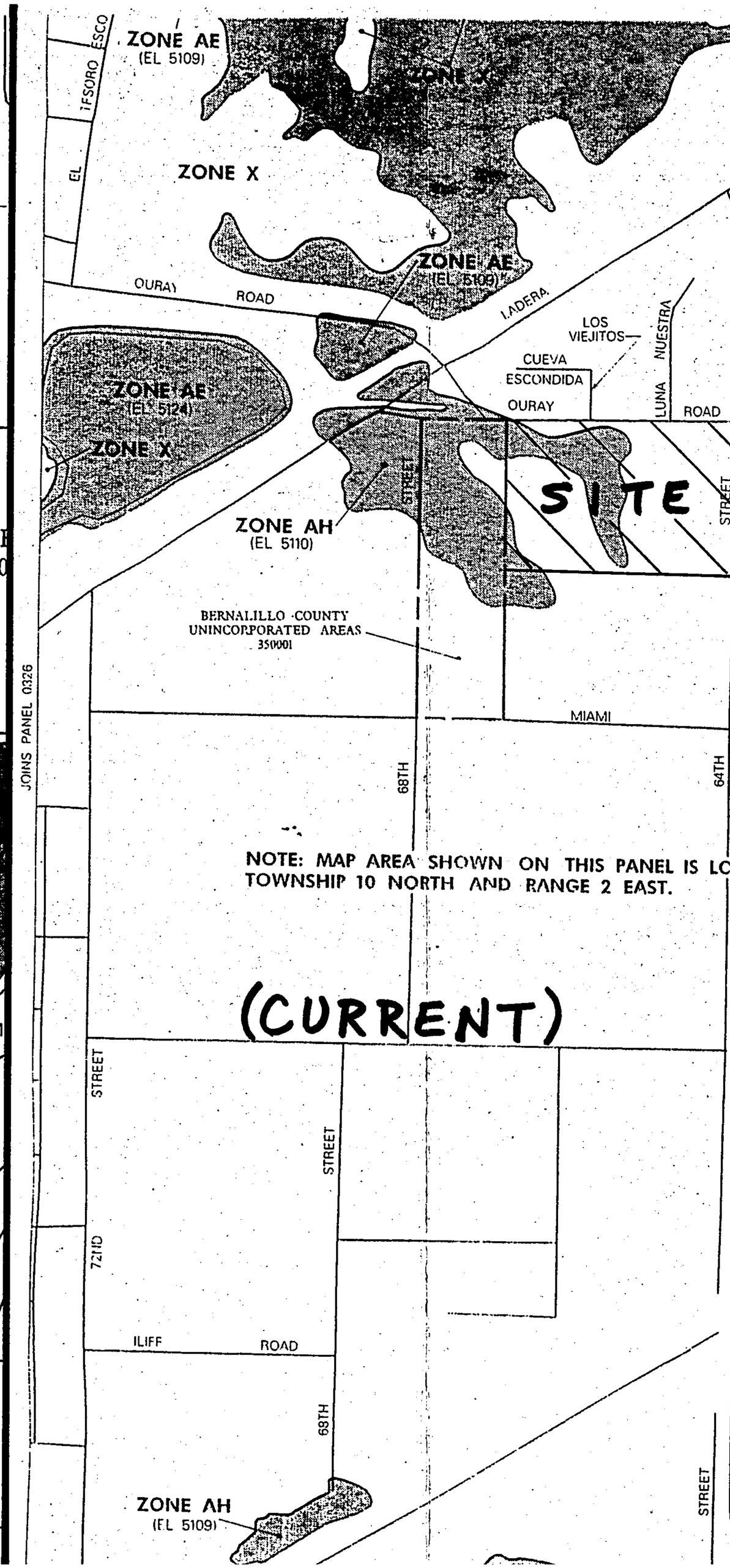
Base time, $t_B$, for a small watershed hydrograph is,

$$t_B = (2.107 * E * A_T / Q_P) - (0.25 * A_D / A_T) \qquad \text{(a-13)}$$

Where $t_B$ is in hours, E is the excess precipitation in inches (from TABLE A-8), $Q_P$ is the peak flow in cfs, $A_D$ is the area in treatment D, and $A_T$ is the total area in acres. Using the time of concentration, $t_c$ (hours), the time to peak in hours is:

$$t_P = (0.7 * t_C) + ((1.6 - (A_D / A_T)) / 12) \qquad \text{(a-14)}$$




NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO AND INCORPORATED AREAS

**PANEL 327 OF 825**
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| ALBUQUERQUE, CITY OF | 350002 | 0327 | D |
| BERNALILLO COUNTY, UNINCORPORATED AREAS | 350001 | 0327 | D |

**MAP NUMBER**
**35001C0327 D**

**EFFECTIVE DATE:**
**SEPTEMBER 20, 1996**

Federal Emergency Management Agency

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

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

*April 28, 2003*

*Mr. Carlos Montoya*
*City of Albuquerque*
*600 2nd Street SW*
*Albuquerque, NM 87103*

***Re: Ladera Vista Subdivision, (H10/D26)***

*Dear Mr. Montoya:*

*This letter is in response to your verbal comments regarding the Ladera Vista Subdivision and the LOMR for the Kensington Subdivision.*

*The summary from the Kensington Subdivision Phase Four Drainage Report states that a maximum of 45 cfs can be discharged from Basin 101 (the Ladera Vista area) to the 36 inch storm drain in Kensington Subdivision. Per the Ladera Vista Subdivision Drainage Report, Basin B1 and B2 drain 50.9 cfs to the 36 inch Kensington storm drain. The real situation was misstated. Basin B1 and B2 generate 50.9 cfs which eventually discharges to the Kensington Subdivision. However, the maximum rate of discharge is 35.75 cfs at a maximum HGL elevation of 7.98. The excess water ponds in Pomelo Place. Please see the revised calculations that more precisely reflect the ponding.*

*As a result, the discharge to the Kensington Subdivision from Ladera Vista is well below the 45 cfs rate. Because of this, there is no longer an issue about the "correct" flow rate. A LOMR for the Kensington Subdivision should now be able to be presented to the City and FEMA without difficulty.*

*Please contact me if I can be of further assistance.*

*Sincerely,*

*MARK GOODWIN & ASSOCIATES, P.A.*

*Amy L. Driscoll, PE*
*Project Engineer*

RECEIVED
APR 28 2003
HYDROLOGY SECTION

*cc: Scott McGee, Isaacson & Arfman*

*F:\laderavista\Carlos2*

```
AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
     RUN DATE (MON/DAY/YR) = 04/22/2003
     START TIME (HR:MIN:SEC) = 18:16:28     USER NO.= M_GOODWN.I01
     INPUT FILE = lvista3.dat

START              TIME=0.0
*****    LADERA VISTA
*****    FILE: C:\AHYMO\LVISTA.DAT FEBRUARY 2002   BY:AMY
*****
*****    100-YEAR 6-HOUR STORM EVENT
*****
RAINFALL           TYPE=1 RAIN QUARTER=0.0 IN
                   RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                   RAIN DAY=2.66 IN DT=0.033333 HR

          COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
          DT =     .033333 HOURS       END TIME =     5.999940 HOURS
             .0000   .0016   .0033   .0050   .0067   .0085   .0103
             .0122   .0141   .0160   .0180   .0201   .0222   .0243
             .0266   .0289   .0312   .0337   .0362   .0388   .0415
             .0443   .0472   .0502   .0534   .0567   .0601   .0637
             .0675   .0715   .0758   .0810   .0865   .0924   .1051
             .1335   .1773   .2400   .3257   .4384   .5820   .7607
             .9789  1.1808  1.2652  1.3365  1.4000  1.4577  1.5108
            1.5602  1.6063  1.6495  1.6902  1.7285  1.7648  1.7991
            1.8316  1.8624  1.8917  1.9194  1.9458  1.9519  1.9576
            1.9631  1.9683  1.9732  1.9780  1.9826  1.9870  1.9912
            1.9953  1.9993  2.0031  2.0068  2.0105  2.0140  2.0174
            2.0207  2.0240  2.0272  2.0303  2.0333  2.0363  2.0392
            2.0420  2.0448  2.0476  2.0502  2.0529  2.0554  2.0580
            2.0605  2.0629  2.0653  2.0677  2.0701  2.0724  2.0746
            2.0769  2.0791  2.0812  2.0834  2.0855  2.0876  2.0896
            2.0916  2.0936  2.0956  2.0976  2.0995  2.1014  2.1033
            2.1052  2.1070  2.1088  2.1106  2.1124  2.1142  2.1159
            2.1176  2.1193  2.1210  2.1227  2.1244  2.1260  2.1276
            2.1292  2.1308  2.1324  2.1340  2.1355  2.1371  2.1386
            2.1401  2.1416  2.1431  2.1446  2.1461  2.1475  2.1489
            2.1504  2.1518  2.1532  2.1546  2.1560  2.1573  2.1587
            2.1601  2.1614  2.1627  2.1641  2.1654  2.1667  2.1680
            2.1693  2.1705  2.1718  2.1731  2.1743  2.1756  2.1768
            2.1780  2.1793  2.1805  2.1817  2.1829  2.1841  2.1852
            2.1864  2.1876  2.1887  2.1899  2.1911  2.1922  2.1933
            2.1945  2.1956  2.1967  2.1978  2.1989  2.2000

*****    EXISTING CONDITIONS
*****
*****    BASIN D - OFF-SITE - ULTIMATELY DICHARGE DIRECTLY TO MIAMI
*****
COMPUTE NM HYD     ID=1 HYD NO=100.00 AREA=0.0037 SQ MI
                   PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                   TP=0.1333 HR MASS RAINFALL=-1

    K =    .130992HR    TP =    .133300HR    K/TP RATIO =    .982685     SHAPE CONSTANT, N =  3.593448
    UNIT PEAK =   9.0789    CFS   UNIT VOLUME =    .9988       B =   327.09      P60 = 1.8700
    AREA =       .003700 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

PRINT HYD          ID=1 CODE=1

                                PARTIAL HYDROGRAPH   100.00


    RUNOFF VOLUME =       .66738 INCHES     =        .1317 ACRE-FEET
    PEAK DISCHARGE RATE =       4.81 CFS  AT   1.533 HOURS   BASIN AREA =   .0037 SQ. MI.


*****
*****  DEVELOPED CONDITIONS
*****
*****  BASIN A - ON-SITE - DISCHARGE TO MIAMI
*****
COMPUTE NM HYD     ID=2 HYD NO=200.00 AREA=0.01124 SQ MI
                   PER A=0.00 PER B=40.00 PER C=0.00 PER D=60.00
                   TP=0.1333 HR MASS RAINFALL=-1

    K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   26.626    CFS   UNIT VOLUME =    .9989       B =   526.28      P60 = 1.8700
    AREA =       .006744 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333


    K =    .130992HR    TP =    .133300HR    K/TP RATIO =    .982685     SHAPE CONSTANT, N =  3.593448
    UNIT PEAK =   11.032    CFS   UNIT VOLUME =    .9991       B =   327.09      P60 = 1.8700
    AREA =       .004496 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

PRINT HYD          ID=2 CODE=1

                                PARTIAL HYDROGRAPH   200.00


    RUNOFF VOLUME =      1.44623 INCHES     =        .8670 ACRE-FEET
    PEAK DISCHARGE RATE =      24.68 CFS  AT   1.500 HOURS   BASIN AREA =   .0112 SQ. MI.


*****
*****  BASIN B1 - ON-SITE - DISCHARGE TO KENSINGTON SUB
```

```
*****
COMPUTE NM HYD       ID=3 HYD NO=300.00 AREA=0.01926 SQ MI
                     PER A=0.00 PER B=40.00 PER C=0.00 PER D=60.00
                     TP=0.1333 HR MASS RAINFALL=-1

    K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   45.624    CFS   UNIT VOLUME =    .9991       B =   526.28      P60 = 1.8700
    AREA =       .011556 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

    K =    .130992HR    TP =    .133300HR    K/TP RATIO =    .982685     SHAPE CONSTANT, N =  3.593448
    UNIT PEAK =   18.904    CFS   UNIT VOLUME =    .9996       B =   327.09      P60 = 1.8700
    AREA =       .007704 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

PRINT HYD            ID=3 CODE=1

                                        HYDROGRAPH FROM AREA   300.00

    RUNOFF VOLUME =     1.44623 INCHES     =       1.4856 ACRE-FEET
    PEAK DISCHARGE RATE =      42.28 CFS  AT   1.500 HOURS   BASIN AREA =    .0193 SQ. MI.

*****
*****  BASIN B2 - OFF-SITE BUT GOING TO OUR STORM DRAIN AT KENSINGTON SUB
*****
COMPUTE NM HYD       ID=4 HYD NO=400.00 AREA=0.0039 SQ MI
                     PER A=0.00 PER B=40.00 PER C=0.00 PER D=60.00
                     TP=0.1333 HR MASS RAINFALL=-1

    K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    9.2384    CFS   UNIT VOLUME =    .9981       B =   526.28      P60 = 1.8700
    AREA =       .002340 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

    K =    .130992HR    TP =    .133300HR    K/TP RATIO =    .982685     SHAPE CONSTANT, N =  3.593448
    UNIT PEAK =    3.8279    CFS   UNIT VOLUME =    .9967       B =   327.09      P60 = 1.8700
    AREA =       .001560 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

PRINT HYD            ID=4 CODE=1

                                        HYDROGRAPH FROM AREA   400.00

    RUNOFF VOLUME =     1.44623 INCHES     =       .3008 ACRE-FEET
    PEAK DISCHARGE RATE =       8.58 CFS  AT   1.500 HOURS   BASIN AREA =    .0039 SQ. MI.

*****
*****  BASIN C - ON-SITE - DISCHARGE TO LADERA
*****
COMPUTE NM HYD       ID=5 HYD NO=500.00 AREA=0.0011 SQ MI
                     PER A=0.00 PER B=40.00 PER C=0.00 PER D=60.00
                     TP=0.1333 HR MASS RAINFALL=-1

    K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    2.6057    CFS   UNIT VOLUME =    .9949       B =   526.28      P60 = 1.8700
    AREA =       .000660 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

    K =    .130992HR    TP =    .133300HR    K/TP RATIO =    .982685     SHAPE CONSTANT, N =  3.593448
    UNIT PEAK =    1.0797    CFS   UNIT VOLUME =    .9874       B =   327.09      P60 = 1.8700
    AREA =       .000440 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

PRINT HYD            ID=5 CODE=1

                                        OUTFLOW HYDROGRAPH RESERVOIR   500.00

    RUNOFF VOLUME =     1.44623 INCHES     =       .0848 ACRE-FEET
    PEAK DISCHARGE RATE =       2.43 CFS  AT   1.500 HOURS   BASIN AREA =    .0011 SQ. MI.

*****
*****  BASIN D - OFF-SITE - ULTIMATELY DIRECT DISCHARGE TO MIAMI
*****
COMPUTE NM HYD       ID=6 HYD NO=600.00 AREA=0.0037 SQ MI
                     PER A=0.00 PER B=40.00 PER C=0.00 PER D=60.00
                     TP=0.1333 HR MASS RAINFALL=-1

    K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    8.7647    CFS   UNIT VOLUME =    .9981       B =   526.28      P60 = 1.8700
    AREA =       .002220 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

    K =    .130992HR    TP =    .133300HR    K/TP RATIO =    .982685     SHAPE CONSTANT, N =  3.593448
    UNIT PEAK =    3.6316    CFS   UNIT VOLUME =    .9967       B =   327.09      P60 = 1.8700
    AREA =       .001480 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033333

PRINT HYD            ID=6 CODE=1
```

HYDROGRAPH FROM AREA 600.00

RUNOFF VOLUME = 1.44623 INCHES = .2854 ACRE-FEET
PEAK DISCHARGE RATE = 8.14 CFS AT 1.500 HOURS BASIN AREA = .0037 SQ. MI.

*****
ADD HYD ID=7 HYD=700.00 ID I=3 IDII=4
*****
PRINT HYD ID=7 CODE=1

HYDROGRAPH FROM AREA 700.00

RUNOFF VOLUME = 1.44621 INCHES = 1.7863 ACRE-FEET
PEAK DISCHARGE RATE = 50.86 CFS AT 1.500 HOURS BASIN AREA = .0232 SQ. MI.

*****
ROUTE RESERVOIR ID=8 HYD NO=800.00 INFLOW ID=7 CODE=5

| OUTFLOW(CFS) | STORAGE(AC-FT) | ELEVATION(FT) |
|---|---|---|
| 0.0 | 0.0 | 6.53 |
| 22.5 | 0.270 | 7.67 |
| 47.7 | 0.541 | 8.26 |
| 74.9 | 1.072 | 9.36 |

* * * * * * * * * * * * * * * *

| TIME (HRS) | INFLOW (CFS) | ELEV (FEET) | VOLUME (AC-FT) | OUTFLOW (CFS) |
|---|---|---|---|---|
| .00 | .00 | 6.53 | .000 | .00 |
| .17 | .00 | 6.53 | .000 | .00 |
| .33 | .00 | 6.53 | .000 | .00 |
| .50 | .00 | 6.53 | .000 | .00 |
| .67 | .00 | 6.53 | .000 | .00 |
| .83 | .00 | 6.53 | .000 | .00 |
| 1.00 | .00 | 6.53 | .000 | .00 |
| 1.17 | .11 | 6.53 | .000 | .01 |
| 1.33 | 12.26 | 6.72 | .045 | 3.75 |
| 1.50 | 50.86 | 7.75 | .306 | 25.87 |
| 1.67 | 26.30 | 7.93 | .390 | 33.68 |
| 1.83 | 15.28 | 7.68 | .275 | 22.92 |
| 2.00 | 10.73 | 7.32 | .188 | 15.68 |
| 2.17 | 5.04 | 7.05 | .123 | 10.21 |
| 2.33 | 2.46 | 6.81 | .065 | 5.43 |
| 2.50 | 1.54 | 6.68 | .036 | 3.00 |
| 2.67 | 1.02 | 6.62 | .021 | 1.78 |
| 2.83 | .72 | 6.59 | .014 | 1.13 |
| 3.00 | .53 | 6.57 | .009 | .77 |
| 3.17 | .41 | 6.56 | .007 | .55 |
| 3.33 | .34 | 6.55 | .005 | .42 |
| 3.50 | .29 | 6.55 | .004 | .35 |
| 3.67 | .26 | 6.54 | .004 | .30 |
| 3.83 | .25 | 6.54 | .003 | .27 |
| 4.00 | .23 | 6.54 | .003 | .24 |
| 4.17 | .22 | 6.54 | .003 | .23 |
| 4.33 | .22 | 6.54 | .003 | .22 |
| 4.50 | .22 | 6.54 | .003 | .22 |
| 4.67 | .22 | 6.54 | .003 | .22 |
| 4.83 | .23 | 6.54 | .003 | .22 |
| 5.00 | .23 | 6.54 | .003 | .23 |
| 5.17 | .24 | 6.54 | .003 | .23 |
| 5.33 | .24 | 6.54 | .003 | .24 |
| 5.50 | .25 | 6.54 | .003 | .25 |
| 5.67 | .26 | 6.54 | .003 | .25 |
| 5.83 | .27 | 6.54 | .003 | .26 |
| 6.00 | .28 | 6.54 | .003 | .27 |
| 6.17 | .11 | 6.54 | .003 | .23 |
| 6.33 | .03 | 6.54 | .001 | .11 |
| 6.50 | .01 | 6.53 | .001 | .05 |
| 6.67 | .01 | 6.53 | .000 | .02 |
| 6.83 | .00 | 6.53 | .000 | .01 |
| 7.00 | .00 | 6.53 | .000 | .00 |

PEAK DISCHARGE = 35.751 CFS - PEAK OCCURS AT HOUR 1.60
MAXIMUM WATER SURFACE ELEVATION = 7.980
MAXIMUM STORAGE = .4125 AC-FT INCREMENTAL TIME= .033333HRS

PRINT HYD ID=8 CODE=1

HYDROGRAPH FROM AREA 800.00

RUNOFF VOLUME = 1.44621 INCHES = 1.7863 ACRE-FEET
PEAK DISCHARGE RATE = 35.75 CFS AT 1.600 HOURS BASIN AREA = .0232 SQ. MI.

*****
FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 18:16:28

```
START                TIME=0.0
*****    LADERA VISTA
*****    FILE: C:\AHYMO\LVISTA.DAT FEBRUARY 2002   BY:AMY
*****
*****    100-YEAR 6-HOUR STORM EVENT
*****
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                     RAIN DAY=2.66 IN DT=0.033333 HR

*****   EXISTING CONDITIONS
*****
*****   BASIN D - OFF-SITE - ULTIMATELY DICHARGE DIRECTLY TO MIAMI
*****
COMPUTE NM HYD       ID=1 HYD NO=100.00 AREA=0.0037 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*****
*****  DEVELOPED CONDITIONS
*****
*****  BASIN A - ON-SITE - DISCHARGE TO MIAMI
*****
COMPUTE NM HYD       ID=2 HYD NO=200.00 AREA=0.01124 SQ MI
                     PER A=0.00 PER B=40.00 PER C=0.00 PER D=60.00
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=2 CODE=1
*****
*****  BASIN B1 - ON-SITE - DISCHARGE TO KENSINGTON SUB
*****
COMPUTE NM HYD       ID=3 HYD NO=300.00 AREA=0.01926 SQ MI
                     PER A=0.00 PER B=40.00 PER C=0.00 PER D=60.00
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=3 CODE=1
*****
*****  BASIN B2 - OFF-SITE BUT GOING TO OUR STORM DRAIN AT KENSINGTON SUB
*****
COMPUTE NM HYD       ID=4 HYD NO=400.00 AREA=0.0039 SQ MI
                     PER A=0.00 PER B=40.00 PER C=0.00 PER D=60.00
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=4 CODE=1
*****
*****  BASIN C - ON-SITE - DISCHARGE TO LADERA
*****
COMPUTE NM HYD       ID=5 HYD NO=500.00 AREA=0.0011 SQ MI
                     PER A=0.00 PER B=40.00 PER C=0.00 PER D=60.00
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=5 CODE=1
*****
*****  BASIN D - OFF-SITE - ULTIMATELY DIRECT DISCHARGE TO MIAMI
*****
COMPUTE NM HYD       ID=6 HYD NO=600.00 AREA=0.0037 SQ MI
                     PER A=0.00 PER B=40.00 PER C=0.00 PER D=60.00
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=6 CODE=1
*****
ADD HYD               ID=7  HYD=700.00  ID I=3  IDII=4
*****
PRINT HYD              ID=7 CODE=1
*****
ROUTE RESERVOIR        ID=8 HYD NO=800.00 INFLOW ID=7 CODE=5
                       OUTFLOW(CFS)   STORAGE(AC-FT)  ELEVATION(FT)
                       0.0              0.0              6.53
                       22.5             0.270            7.67
                       47.7             0.541            8.26
                       74.9             1.072            9.36
PRINT HYD              ID=8 CODE=1
*****
FINISH
```

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =04/22/2003
INPUT FILE = lvista3.dat USER NO.= M_GOODWN.I01

| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | PAGE = 1 NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| START | | | | | | | | | | TIME= .00 |
| RAINFALL TYPE= 1 | | | | | | | | | | RAIN6= 2.200 |
| COMPUTE NM HYD | 100.00 | - | 1 | .00370 | 4.81 | .132 | .66738 | 1.533 | 2.029 | PER IMP= .00 |
| COMPUTE NM HYD | 200.00 | - | 2 | .01124 | 24.68 | .867 | 1.44623 | 1.500 | 3.431 | PER IMP= 60.00 |
| COMPUTE NM HYD | 300.00 | - | 3 | .01926 | 42.28 | 1.486 | 1.44623 | 1.500 | 3.430 | PER IMP= 60.00 |
| COMPUTE NM HYD | 400.00 | - | 4 | .00390 | 8.58 | .301 | 1.44623 | 1.500 | 3.436 | PER IMP= 60.00 |
| COMPUTE NM HYD | 500.00 | - | 5 | .00110 | 2.43 | .085 | 1.44623 | 1.500 | 3.452 | PER IMP= 60.00 |
| COMPUTE NM HYD | 600.00 | - | 6 | .00370 | 8.14 | .285 | 1.44623 | 1.500 | 3.436 | PER IMP= 60.00 |
| ADD HYD | 700.00 | 3& 4 | 7 | .02316 | 50.86 | 1.786 | 1.44621 | 1.500 | 3.431 | |
| ROUTE RESERVOIR | 800.00 | 7 | 8 | .02316 | 35.75 | 1.786 | 1.44621 | 1.600 | 2.412 | AC-FT= .413 |
| FINISH | | | | | | | | | | |

1

HYDRAULIC REPORT FOR

Ladera Vista

Storm Sewer Analysis

Outfall to Kensington Sub

Initial HGL = 5107.5

April 22, 2003

Amy L. Driscoll, PE

Run date: 04-22-2003
File:

Return Period = 5 Yrs
Rainfall file: Your_County

LINE 1 / Q = 22.5 / HT = 36 / WID = 36 / N = .013 / L = 120 / JLC = .2

---

1 / Outfall

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 5107.50 | 36.00 | 5103.23 | 3.18 | 5107.66 | 0.00 | .37 | 7.07 |
| UPSTRM | 5107.67 | 36.00 | 5103.35 | 3.18 | 5107.83 | 0.00 | .25 | 7.07 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = 0 | Slope of invert (%) | = 0.100 |
| Runoff coefficient | = 0 | Slope energy grade line (%) | = 0.114 |
| Time of conc (min) | = 0 | Critical depth (in) | = 18.14 |
| Inlet time (min) | = 0 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) | = 0.00 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A | = 0.0 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) | = 22.5 | Confluence angle (deg) | = 5 |
| Default Q (cfs) | = 22.5 | Natural ground elev (ft) | = 5106.6 |
| Line capac. (cfs) | = 21.1 | Line storage (cuft) | = 848 |

---

LINE 1 / Q = 47.7 / HT = 36 / WID = 36 / N = .013 / L = 120 / JLC = .2

---

1 / Outfall

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 5107.50 | 36.00 | 5103.23 | 6.75 | 5108.21 | 0.00 | .37 | 7.07 |
| UPSTRM | 5108.26 | 36.00 | 5103.35 | 6.75 | 5108.96 | 0.00 | .25 | 7.07 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = 0 | Slope of invert (%) | = 0.100 |
| Runoff coefficient | = 0 | Slope energy grade line (%) | = 0.512 |
| Time of conc (min) | = 0 | Critical depth (in) | = 26.41 |
| Inlet time (min) | = 0 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) | = 0.00 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A | = 0.0 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) | = 47.7 | Confluence angle (deg) | = 5 |
| Default Q (cfs) | = 47.7 | Natural ground elev (ft) | = 5106.6 |
| Line capac. (cfs) | = 21.1 | Line storage (cuft) | = 848 |

---

LINE 1 / Q = 50.9 / HT = 36 / WID = 36 / N = .013 / L = 120 / JLC = .2

---

1 / Outfall

| | HGL | DEPTH | INVERT | VEL | EGL | T WID | COVER | AREA |
|---|---|---|---|---|---|---|---|---|
| DNSTRM | 5107.50 | 36.00 | 5103.23 | 7.20 | 5108.31 | 0.00 | .37 | 7.07 |
| UPSTRM | 5108.36 | 36.00 | 5103.35 | 7.20 | 5109.17 | 0.00 | .25 | 7.07 |

| | | | |
|---|---|---|---|
| Drainage area (ac) | = 0 | Slope of invert (%) | = 0.100 |
| Runoff coefficient | = 0 | Slope energy grade line (%) | = 0.583 |
| Time of conc (min) | = 0 | Critical depth (in) | = 27.28 |
| Inlet time (min) | = 0 | Req'd length curb inlet (ft) | = 0.0 |
| Intensity (in/hr) | = 0.00 | Req'd grate area (sf) | = 0.0 |
| Cumulative C*A | = 0.0 | Depth at inlet opening (in) | = 0 |
| Flow contrib (cfs) | = 50.9 | Confluence angle (deg) | = 5 |
| Default Q (cfs) | = 50.9 | Natural ground elev (ft) | = 5106.6 |
| Line capac. (cfs) | = 21.1 | Line storage (cuft) | = 848 |

---

# DRAINAGE REPORT

## FOR

# KENSINGTON SUBDIVISION
# PHASE FOUR

## A 62 LOT SINGLE FAMILY RESIDENTIAL SUBDIVISION

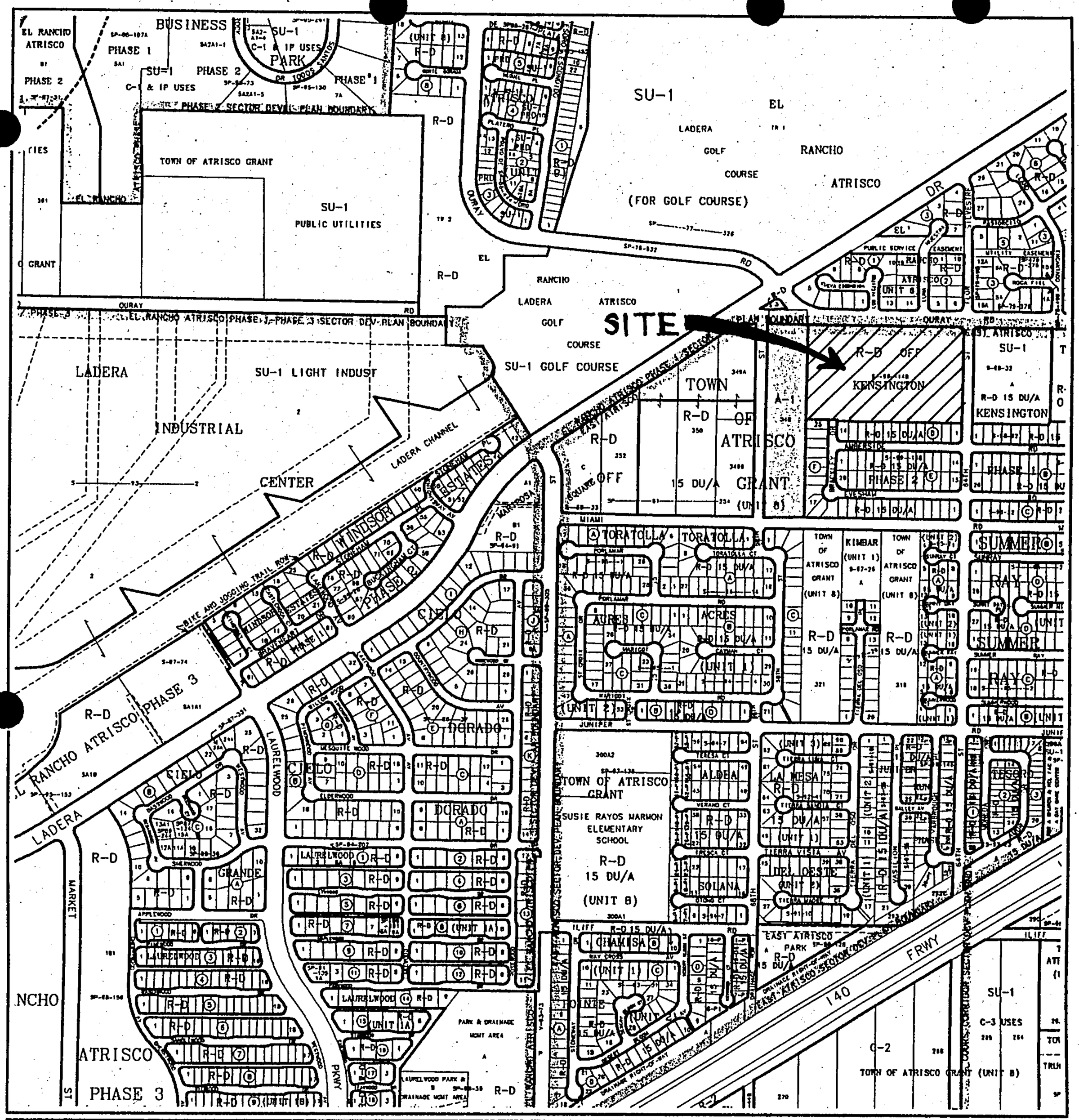
**ALBUQUERQUE NEW MEXICO**
**JANUARY 2001**

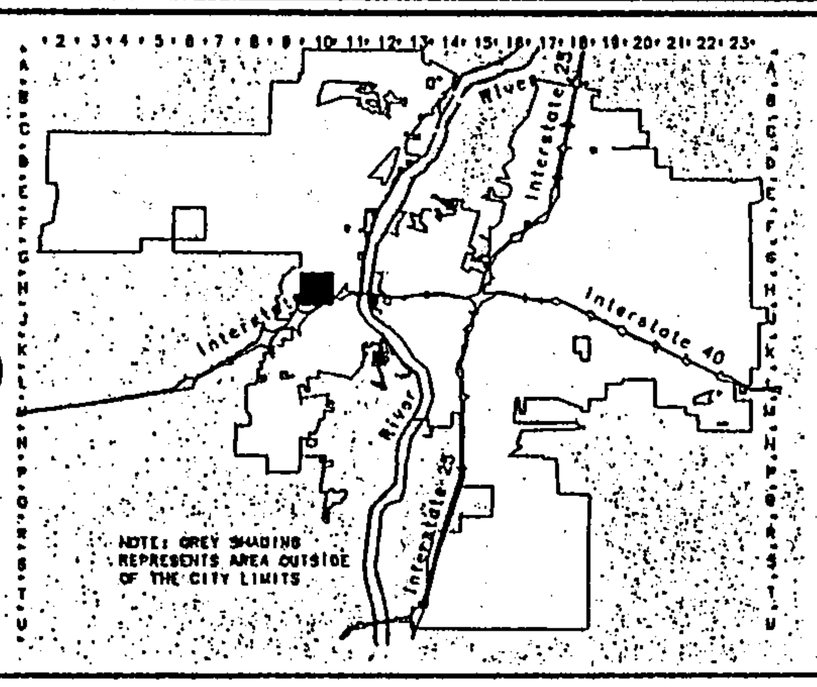

**Prepared by:**

**ISAACSON & ARFMAN, P.A.**
**128 Monroe Street NE**
**Albuquerque, NM 87108**
**(505) 268-8828**

_____

**Scott M. McGee, P.E.** **Date**




CITY OF Albuquerque

AGIS Albuquerque Geographic Information System

PLANNING DEPARTMENT

© Copyright 2000

GRAPHIC SCALE IN FEET

250 0 750 1000

# Zone Atlas Page

# H-10-Z

Map Amended through December 08, 2000

## INTRODUCTION

The fourth phase of Kensington Subdivision will be developed as a 62 lot single family residential subdivision. It is bordered on the east by 64th Street and on the north by Ouray Road. The land to the south and east has been developed as Kensington Subdivision Phases One, Two, and Three. To the west is Tract 348 of the Town of Atrisco Grant, Unit 8, an undeveloped parcel of land.

This site was previously addressed in the approved Kensington Subdivision Phases One, Two, and Three Drainage Report (H10/D23). Phase Four was a portion of Phase Three in the initial report, but Phase Three was divided into two separate Phases with the Kensington Subdivision Phase Three submittal. Phase Four was separated because the land west of 64th Street was zoned for office development, and a rezoning request needed to be processed before that area could be approved. Phase Three as addressed in this report is the area located to the east of 64th Street (see attached map).

# I. PROJECT INFORMATION

LEGAL DESCRIPTION: Tract A, Kensington Subdivision Phase Two as filed in the records of the County Clerk of Bernalillo on November 23, 1999 in Book 99C, Page 319.

ENGINEER: Isaacson & Arfman, P.A.
128 Monroe Street NE
Albuquerque, NM 87108
(505) 268-8828
Attn: Scott M. McGee, P.E.

SURVEYOR: Aldrich Land Surveying, Inc.
Attn: Tim Aldrich, NMPLS No. 7719
(505) 884-1990

BENCHMARK: ACS Control Station "2-H10" located at the northwest quadrant of 64th Street and Miami Road NW.
Elevation: 5108.81

ZONING: R-D (15 Du/Ac maximum)

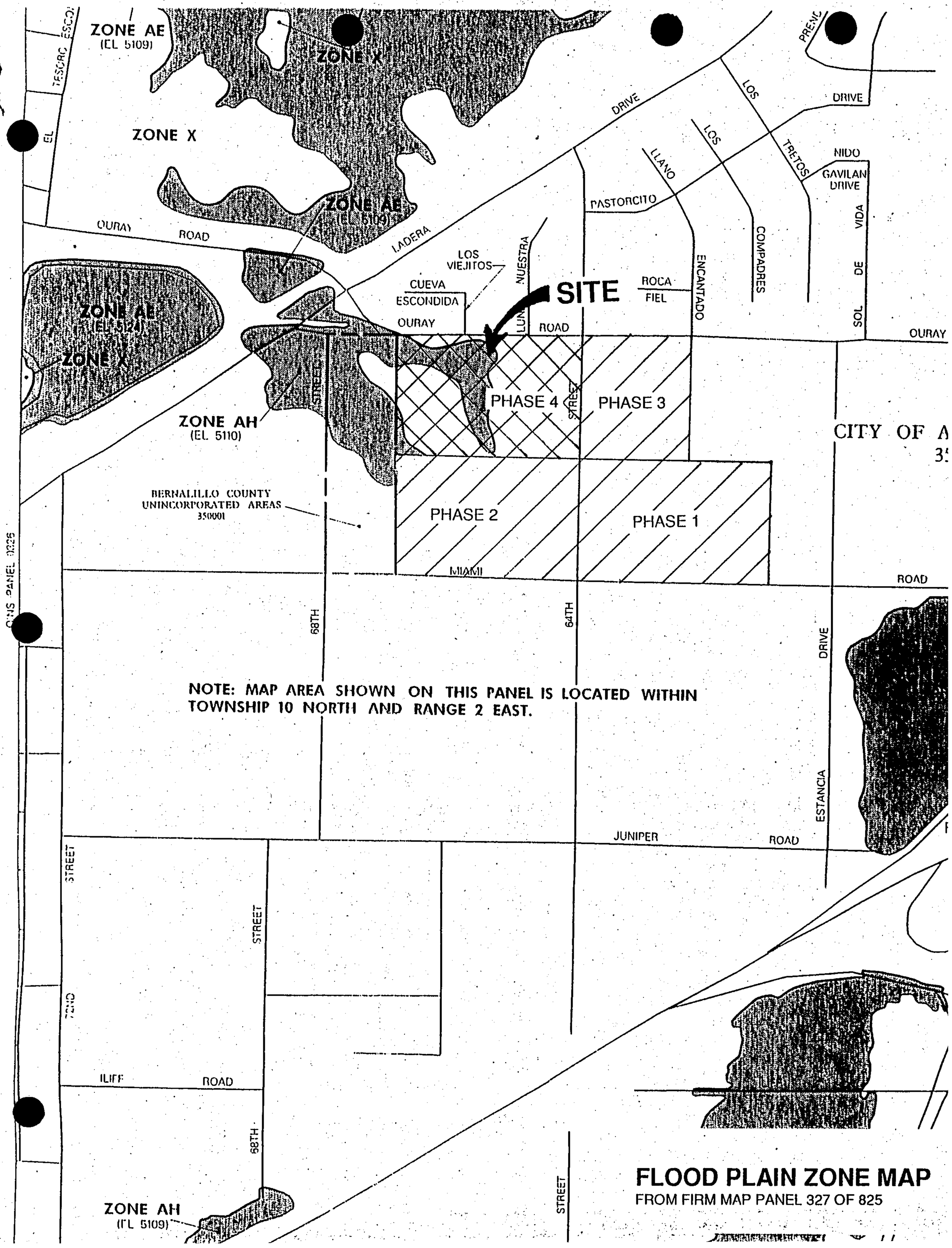
NUMBER OF EXISTING TRACTS: 1

NUMBER OF PROPOSED LOTS: Phase Four: 62

TOTAL AREA: 9.9267 Ac.

## II. SITE CHARACTERISTICS

FLOOD HAZARD: Portions of this proposed residential development are identified with a ZONE AH (EL 5110) flood hazard designation as determined by Panel No. 350002-0327 of the September 20, 1996 edition of the F.E.M.A. maps. The following floodplain map shows the ZONE AH encroaching on the northwest corner of the Phase Four area. Upon completion of the project, a LOMR will be requested based on as-built plans of both the site grading and the storm drain proposed to drain the playa area.




NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 10 NORTH AND RANGE 2 EAST.

EXISTING CONDITIONS: The site is undeveloped with native vegetative cover typical of the City's west side. It slopes at approximately 1.5% from the northwest to the southeast. A temporary retention pond (constructed with Phase Two), is located along the southern boundary, which captures the undeveloped flows generated within this phase.

64th Street has been improved with standard curb and gutter and 25 feet of permanent pavement along the east side. An existing sump inlet along 64th Street and storm drain to west Tauton Place has been installed. Ouray Road is constructed along the north side with permanent pavement and curb and gutter. The south side will be constructed with this project.

Runoff from the developed portions of 64th Street and Phase Three are collected by the existing storm drain system in 64th Street, and conveyed south to the Miami Road storm drain system. Offsite flows currently enter the site from the playa area to the west.

PROPOSED CONDITIONS: Upon development of Phase Four, the temporary retention pond constructed along the southern property boundary with Phase Two will be removed. The site will be re-graded to direct the developed flows to 64th Street and Brackley Drive.

This site falls within Basins 102 and 103 as defined in the previously approved Kensington Subdivision Drainage Report. Basin 101 is an offsite basin to the west, which accounts for portions of the playa floodplain. Additional subbasins were defined for this phase to aid in street flow and sump capacity calculations. (see attached Runoff Calculation Sheet).

Keswick Road will not require any storm drain or inlets (see Table 2 for street flow depths). Street flows up to 8.77 cfs are carried within the streets. Because the maximum 100-year, 6-hour depth is 0.31 ft, the entire flow can be contained with mountable curb & gutter. Approximately half of the flows are directed west to Brackley Drive, the rest is directed east to 64th Street.

Tauton Road will have a 42" storm drain that will carry 36 cfs from offsite Basin 101 to the west, and 23.51 cfs from the sump inlets at Brackley Drive. The storm drain will direct these waters east to the existing 48" pipe in 64th Street, where it will eventually be directed to the Miami Road drain. Up to 13.56 cfs is conveyed within the street on Tauton Road, which is then directed east to the inlets near Tauton Road in 64th Street. Curb & gutter east of

lot 17 shall to be standard 8" curb to carry flow in excess of 10.64 cfs, but west of lot 17, the proposed curb is mountable.

Ouray Road will convey runoff via street flows along Phase Four. The developed flows from the portion of Ouray Road fronting Phase Four will be accepted both at 64th Street and at Brackley Drive. 64th Street will convey these flows plus developed flows from Basin 103 to the existing sump inlet at the intersection of Tauton Place. An additional sump inlet will be added with this Phase along the west side of 64th Street. These combined inlets will capture 43.07 cfs of flows. (Refer to sump capacity calculation sheet and basin map.)

A Letter of Map Revision (LOMR) must be obtained for floodplain areas within Phase Four as part of development. These floodplains will be eliminated by the proposed storm drain system. The offsite floodplain elevation in Basin 101 is 5110', which is lower than lot elevations along the west property line of Phase Four.

In undeveloped conditions, Basin 101 produces 21.0 cfs of flow (refer to runoff calculation sheet.) These stormwaters will be collected by a perforated 36" CMP standpipe inlet at the west end of a 36" storm drain extension to the west property line. (See Offsite Inlet Detail in this report.) This inlet has the capacity to accept up to 24.8 cfs, which exceeds the undeveloped offsite conditions. Upon development in Basin 101, the CMP standpipe

inlet must be removed, and the 36" storm drain extended to allow a maximum of 45 cfs to enter the storm drain system.

## CONCLUSIONS & RECOMMENDATIONS

The Drainage Study for revised Kensington Phase Four is consistent with the previously approved Drainage Report for Kensington Subdivision Phases One, Two, and Three that is on file at the Hydrology Division, Public Works Department, City of Albuquerque. Phases One and Two are built, and Phase Three is currently under construction. All conform to the approved plan. The individual recommendations for Phase Four are presented below:

1. Two Type 'A' inlets shall be installed in Brackley Drive and will connect to the 64th Street storm drain system built with Phase One.
2. The temporary pond constructed with Phase Two at the southwest corner of the site is not needed and will be reclaimed as shown on the Grading Plan.
3. One Type "A" inlet will be installed on the west side of 64th Street. It will connect to the existing 64th Street storm drain system built with Phase One.
4. A 36" storm drain will be extended through the drainage right-of-way between Lots 26 and 27 of Block F. A perforated 36" CMP standpipe will collect water from the offsite playa area.
5. A Letter of Map Revision (LOMR) will be required prior to Phase Four financial guarantee release.
6. No rear ponding shall be allowed in this portion of the development.
7. Adjacent lots may share a common lot line drainage swale.

**TABLE 1**
**PHASE FOUR BASIN SUMMARY**
**(Per Masterplan AHYMO)**

| Basin ID | Area (Acres) | Contributing Basins | % A | % B | % C | % D | Basin Q (cfs) |
|---|---|---|---|---|---|---|---|
| 101 | 16.3136 | | 0 | 20 | 23 | 57 | 53.18 |
| 102 | 6.6176 | 102a & 102b | 0 | 20 | 23 | 57 | 23.51 |
| *102b | 4.1581 | | 0 | 20 | 23 | 57 | 14.79 |
| 103 | 7.7696 | 103a, 103b, 103c & 103d | 0 | 20 | 23 | 57 | 43.07 |
| *103c | 2.4643 | | 0 | 20 | 23 | 57 | 8.77 |
| *103d | 3.8111 | | 0 | 20 | 23 | 57 | 13.56 |

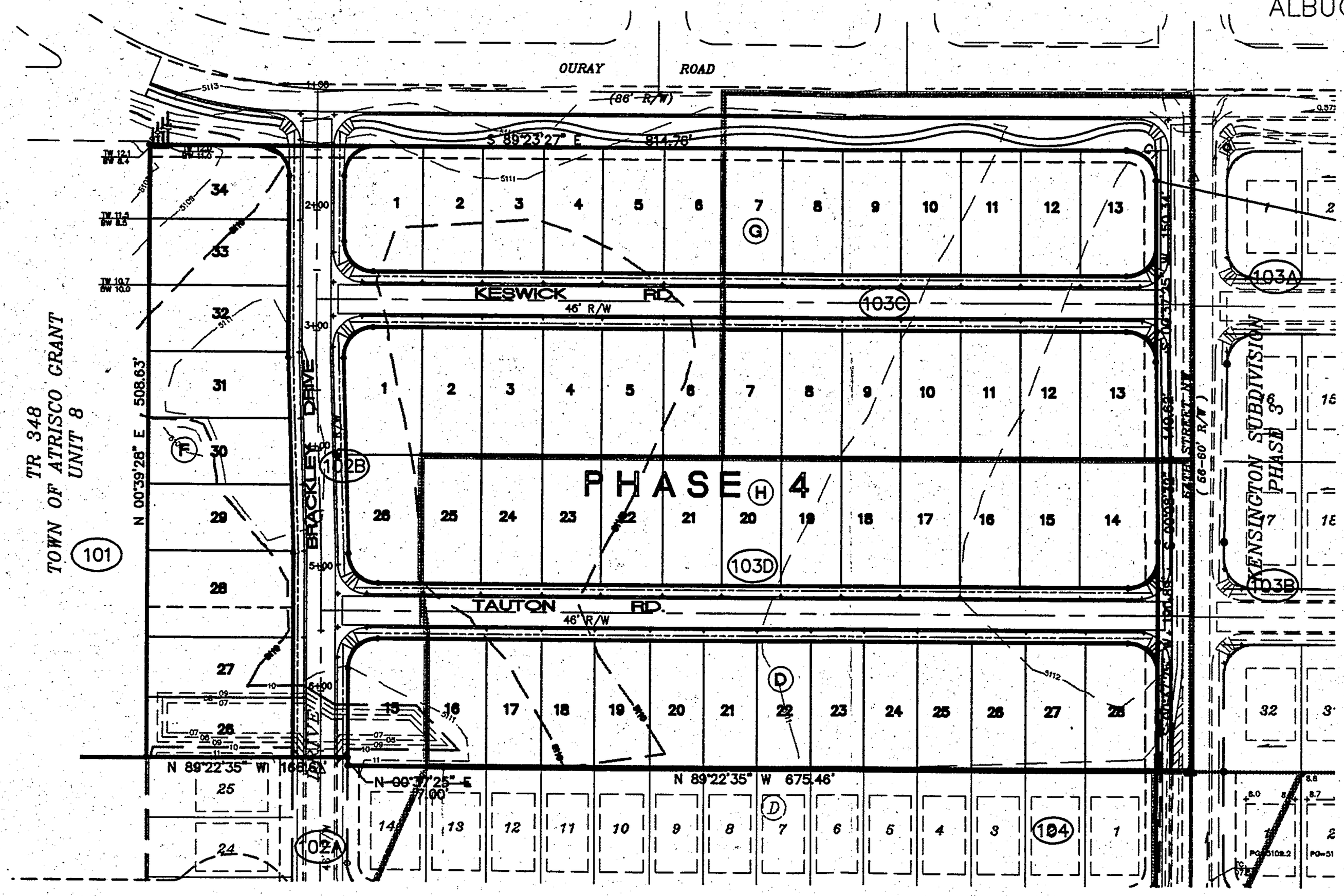
Refer to the attached exhibit for Basin Locations

*See attached Runoff Calculation sheet for Subbasin calculations

# SUB-BASIN EXHIBIT

# KENSINGTON SUBDIVISION

ALBUQUERQUE NEW MEXICO
JANUARY 2001




SCALE: 1"=100'

ISAACSON & ARFMAN, P.A.
Consulting Engineering Associates
128 Monroe Street N.E.
Albuquerque New Mexico
156EXH2.DWGrfh 01/17/01

**TABLE 2**

**STREET FLOW DEPTHS @ KEY LOCATIONS**

| Street | Location | Street Width | Curb Type | Slope (ft/ft) | Q100(cfs) | Depth (ft) | EG (ft) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 64th Street | @ Tauton Rd | 28 | std | 0.005 | 43.07 | 0.67 | 0.86 |
| Brackley Dr | within Phase 4 | 28 | std | 0.006 | 23.51 | 0.51 | 0.64 |
| Tauton Rd | within Phase 4, basin 103 | 28 | std | 0.005 | 13.56 | 0.44 | 0.52 |
| Tauton Rd | within Phase 4, basin 103 | 28 | mtbl | 0.005 | 10.64 | 0.33 | 0.38 |
| Keswick Rd | within Phase 4, basin 103 | 28 | mtbl | 0.005 | 8.77 | 0.31 | 0.36 |

# ANALYZE SUMP INLETS

64TH STREET

**DATA:**

| | | |
|---|---|---|
| Q = | 43.07 | CFS |
| H = | 0.67 | FT |
| C= | 0.67 | |

GRATE OPEN AREA:

| | |
|---|---|
| GROSS AREA FOR ONE GRATE = 2' - 1 1/2" * 2' - 11 3/8 " = | 6.28 SF |
| LESS BEARING BARS = (0.5")(1/12) * 2.95 * 13 = | 1.60 SF |
| LESS CROSS BARS = (0.5")(1/12) * 2.13 * 7 = | 0.62 SF |
| PLUS THE INTERSECTION COUNTED 2X = (0.5")(1/12) * (0.5")(1/12) *77 | 0.13 SF |
| **AREA =** | **4.2** |

*ASSUME 1/2 CLOGGING FACTOR THEREFORE USE AN AREA EQUAL TO 2.1 SF

**CALCULATIONS:**

FLOW THROUGH THE GRATE = $CA(2gH)^{1/2}$ = 9.24218

FLOW THROUGH DOUBLE THROAT = $CA(2gH)^{1/2}$ = 29.48696

**TOTAL CAPACITY= 38.73 EA**

**RECOMMENDATION:**

***EXISTING CONDITIONS:***

THE FLOWS ALONG 64TH STREET IN THE EXISTING CONDITION TOTAL 23.52 CFS. THIS IS APPROXIMATELY EQUAL TO HALF OF THE ULTIMATE FLOWRATE IN THIS STREET. ONE SUMP INLET WAS INSTALLED ALONG THE EAST SIDE OF 64TH STREET WITH PHASE THREE.

***ULTIMATE CONDITIONS:***

AN ADDITIONAL TYPE "A" SUMP INLET AT THE INTERSECTION OF TAUTON RD & 64TH STREET WILL BE ADDED TO THE WEST SIDE OF THE ROAD. WITH A TOTAL CAPACITY OF 77.46 CFS. THE TWO INLETS ARE ADEQUATELY SIZED TO HANDLE THE PROPOSED 43.07 CFS OF FLOWS FROM PHASES 3 & 4.

# ANALYZE SUMP INLETS

BRACKLEY DRIVE

**DATA:**

| | | |
|---|---|---|
| Q = | 23.51 | CFS |
| H = | 0.51 | FT |
| C= | 0.67 | |

GRATE OPEN AREA:

| | |
|---|---|
| GROSS AREA FOR ONE GRATE = 2' - 1 1/2" * 2' - 11 3/8 " = | 6.28 SF |
| LESS BEARING BARS = (0.5")(1/12) * 2.95 * 13 = | 1.60 SF |
| LESS CROSS BARS = (0.5")(1/12) * 2.13 * 7 = | 0.62 SF |
| PLUS THE INTERSECTION COUNTED 2X = (0.5")(1/12) * (0.5")(1/12) *77 | 0.13 SF |
| **AREA =** | **4.2** |

*ASSUME 1/2 CLOGGING FACTOR THEREFORE USE AN AREA EQUAL TO 2.1 SF

**CALCULATIONS:**

FLOW THROUGH THE GRATE = $CA(2gH)^{1/2}$ = 8.063473

FLOW THROUGH DOUBLE THROAT = $CA(2gH)^{1/2}$ = 25.72632

**TOTAL CAPACITY= 33.79 EA**

**RECOMMENDATION:**

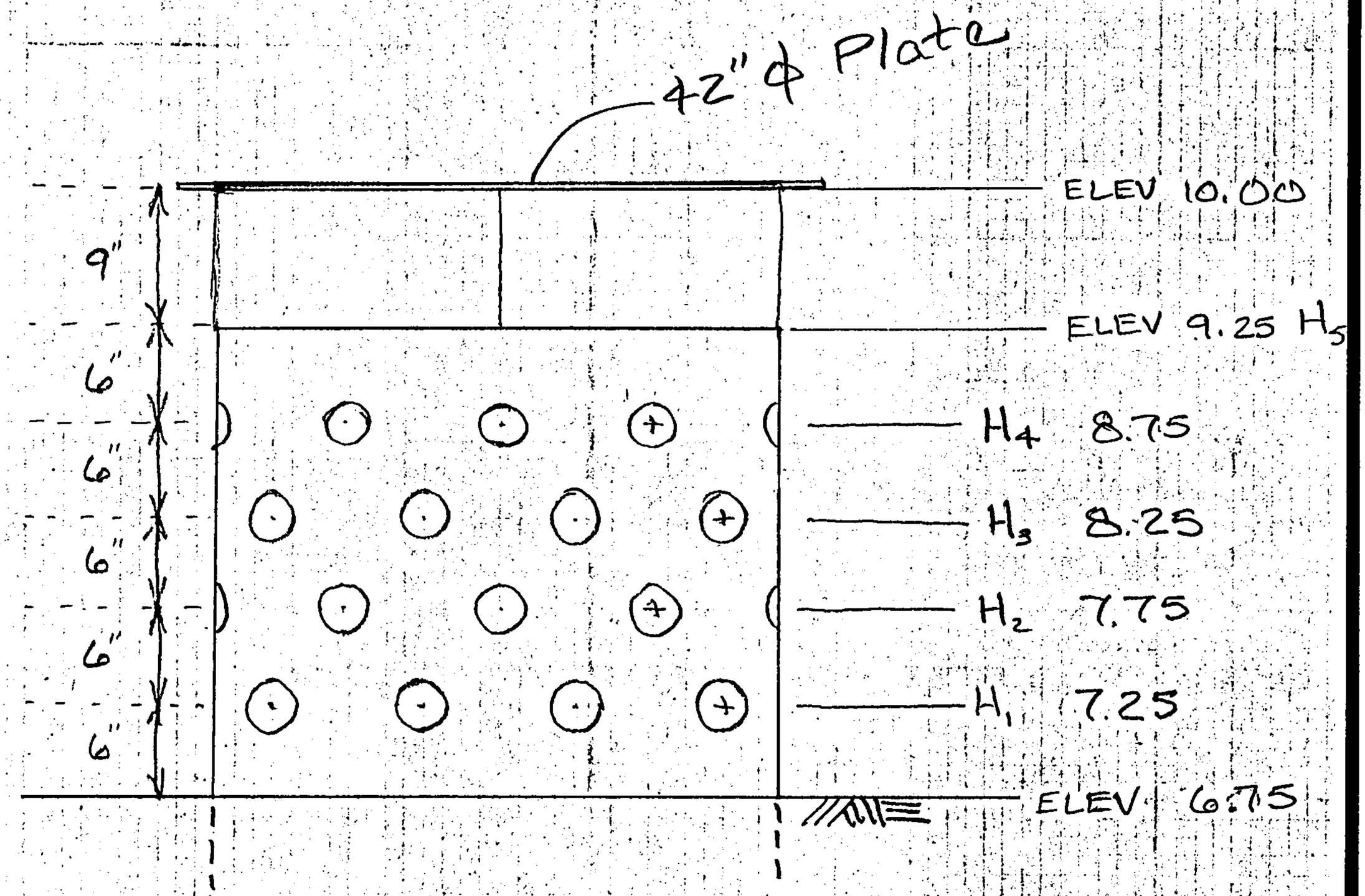
***ULTIMATE CONDITIONS:***

A TYPE "A" SINGLE GRATE SUMP INLET WILL BE ADDED TO EITHER SIDE OF BRACKLEY DRIVE BETWEEN KESWICK RD & TAUTON RD. THE TWO INLETS ARE ADEQUATELY SIZED TO HANDLE THE PROPOSED 23.51 CFS OF FLOWS FROM PHASES 2 & 4.

## RUNOFF CALCULATIONS FOR $Q_{100}$

| Precip. Zone | $Q_{100}$ Runoff Rates (cfs/ac) | | | |
|---|---|---|---|---|
| | A | B | C | D |
| 1 | 1.29 | 2.03 | 2.87 | 4.37 |
| ~~2~~ | ~~1.56~~ | ~~2.28~~ | ~~3.14~~ | ~~4.70~~ |
| ~~3~~ | ~~1.87~~ | ~~2.60~~ | ~~3.45~~ | ~~5.02~~ |
| ~~4~~ | ~~2.20~~ | ~~2.92~~ | ~~3.73~~ | ~~5.25~~ |

| Analysis Point | Land Treatment Areas (ac) | | | | | $Q_{100}$ (cfs) | Remarks |
|---|---|---|---|---|---|---|---|
| | $A_T$ | $A_A$ | $A_B$ | $A_C$ | $A_D$ | | |
| BASIN 101 | | 100% | | | | | |
| (Undeveloped) | 16.3136 | 16.3136 | | | | 21.04 | undeveloped offsite flows to the west |
| | | | | | | | |
| BASIN 102 | | 0% | 20% | 23% | 57% | | |
| 102b | 4.1581 | | 0.8316 | 0.9564 | 2.3701 | 14.79 | remainder of Basin 102 after Phase 2 |
| | | | | | | | |
| BASIN 103 | | 0% | 20% | 23% | 57% | | |
| 103c | 2.4643 | | 0.4929 | 0.5668 | 1.4047 | 8.77 | Keswick Rd portion of Basin 103 |
| 103d | 3.8111 | | 0.7622 | 0.8766 | 2.1723 | 13.56 | Taunton Rd portion of Basin 103 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |




8-3" ϕ perforations each level
36" ϕ Standpipe - CMP

# OFFSITE INLET

ISAACSON & ARFMAN, P.A.

SUBJECT Kensington 4 JOB NO. 1156
BY GLD DATE 1/16/06 SHEET NO. 1 OF 3

## Perforations:

ORIFICE EQUATION:

$$Q = CA\sqrt{2gH}$$

Assume $C = 0.6$ $g = 32.2\ ft/s^2$

$$A_e = \frac{\pi}{4}d^2 = \frac{\pi}{4}\left(\frac{3}{12}\right)^2 = 0.049\ ft^2$$

$$A_{level} = 8(0.049\ ft^2) = 0.3927\ ft^2$$

$$Q = 0.6(0.3927\ ft^2)\sqrt{2(32.2)H}$$

$$= \underline{\underline{1.8908\sqrt{H}}}$$

MAX CAPACITY AT WSEL = 9.85:

$$Q_1 = 1.8908\sqrt{9.85-7.25} = 3.05\ cfs$$

$$Q_2 = 1.8908\sqrt{9.85-7.75} = 2.74\ cfs$$

$$Q_3 = 1.8908\sqrt{9.85-8.25} = 2.39\ cfs$$

$$Q_4 = 1.8908\sqrt{9.85-8.75} = 1.98\ cfs$$

$$\Sigma Q_p = 10.16\ cfs$$

## TOP OF STANDPIPE:

WEIR EQUATION

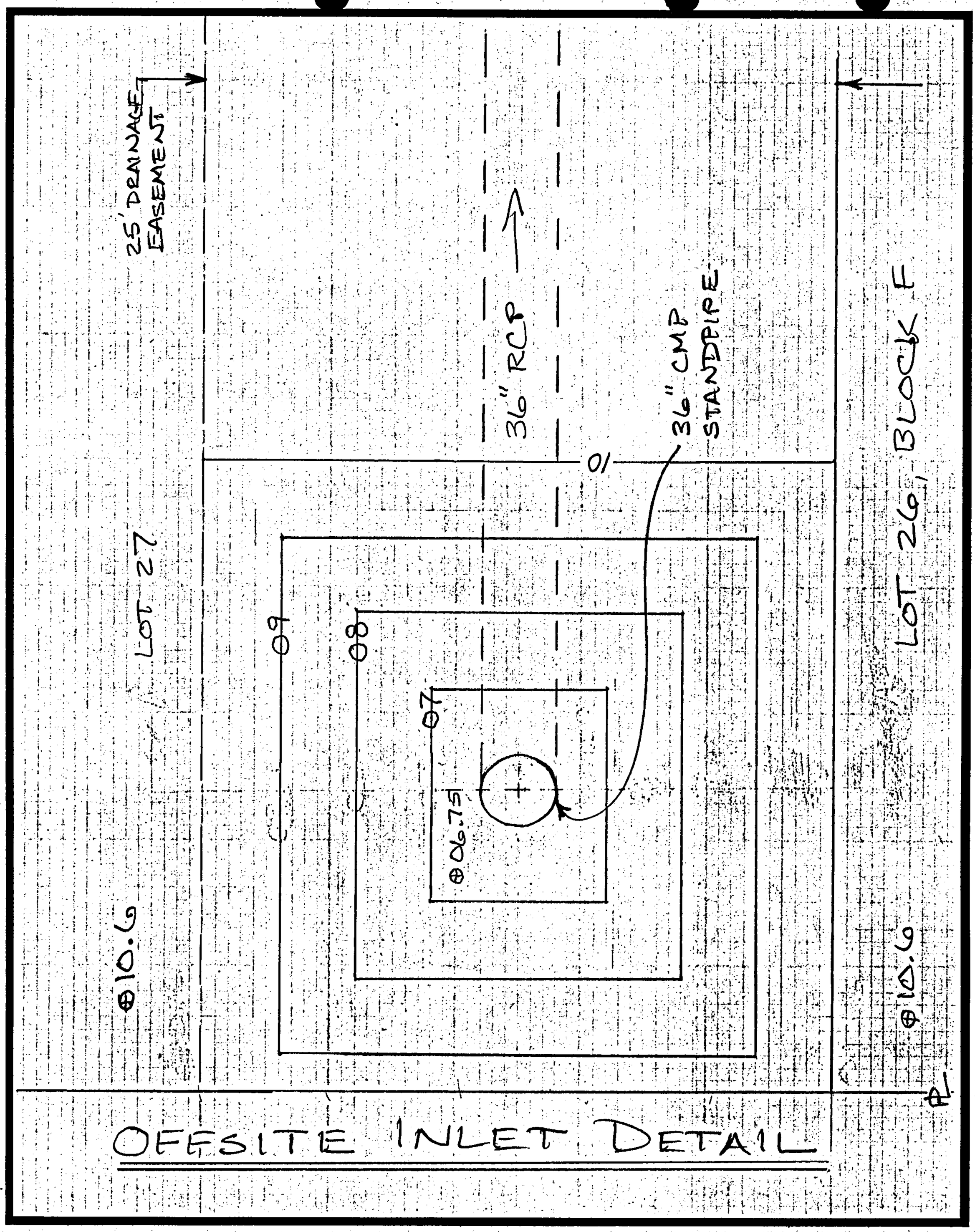
$$Q = CLH^{3/2}$$

Assume $C = 3.33$ $L$ = perimeter

$$Q_{Top} = 3.33(\pi)(3')(0.60')^{3/2} = 14.59\ cfs$$

$$Q_{TOTAL} = 14.59 + 10.161 = \boxed{24.75\ cfs}$$

$> Q_{101}$ (undeveloped) $= 21.04$ cfs $\therefore$ OK




**ISAACSON & ARFMAN, P.A.**

SUBJECT KENSINGTON 4 JOB NO. 1156

BY GLD DATE 1/17/01 SHEET NO. 3 OF 3

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =11/04/1997
INPUT FILE = KENSING.DAT USER NO.= ISCARFNM.I01



| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| *S | KENSING.DAT | | | | | | | | | |
| *S | CREATED BY: SMM 10/29/97 | | | | | | | | | |
| START | | | | | | | | | | |
| RAINFALL TYPE= 1 | | | | | | | | | | TIME= .00 RAIN6= 2.200 |
| *S BASIN 100 IS CURRENTLY UNDEVELOPED, ASSUME FUTURE DEVELOPMENT WILL | | | | | | | | | | |
| *S BE @ A DENSITY OF 6 DU/AC. APPROXIMATE 11.8 ACRES TO GRAVITY FLOW TO | | | | | | | | | | |
| *S MIAMI & 68TH INTERSECTION (BASED ON 1% FUTURE STREET SLOPES), WHICH | | | | | | | | | | |
| *S LEAVES 16.3-ACRE AREA THAT DRAINS TO PLAYA AT OURAY & 68TH ST NW. | | | | | | | | | | |
| *S HYD NO 100.0 IS STREET (GRAVITY) FLOW AREA. | | | | | | | | | | |
| COMPUTE NM HYD | 100.00 | - | 1 | .01844 | 41.92 | 1.451 | 1.47586 | 1.500 | 3.552 | PER IMP= 57.00 |
| *S ROUTE ON 28' F-F RESIDENTIAL STREETS AT 1% ASSUMED SLOPE | | | | | | | | | | |
| *S TO MIAMI / 68TH STREET INTERSECTION AND THEN EAST ON MIAMI | | | | | | | | | | |
| *S ROAD 1050 FT TO MIAMI / 64TH STREET INTERSECTION | | | | | | | | | | |
| ROUTE | 100.10 | 1 | 3 | .01844 | 27.42 | 1.451 | 1.47587 | 1.600 | 2.324 | |
| *S HYD NO 101.0 IS STREET FLOW (PLAYA) AREA THAT FLOWS NORTH TO LOW POINT | | | | | | | | | | |
| *S NEAR OURAY & 68TH WHERE IT IS INTERCEPTED BY THE PHASE 3 STORM DRAIN. | | | | | | | | | | |
| COMPUTE NM HYD | 101.00 | - | 2 | .02549 | 57.94 | 2.006 | 1.47586 | 1.500 | 3.552 | PER IMP= 57.00 |
| *S ROUTE ON 28' F-F RESIDENTIAL STREETS AT 1% ASSUMED SLOPE | | | | | | | | | | |
| ROUTE | 101.10 | 2 | 4 | * .02549 | 53.18 | 2.006 | 1.47587 | 1.533 | 3.260 | |
| *S ROUTE FLOW FROM OFFSITE PLAYA AREA TO ~~WOODBRIDGE~~/TAUTON INTERSECTION | | | | | | | | | | |
| *S IN 36" STORM DRAIN (IN TAUTON) TO ~~WOODBRIDGE~~ DR NW | | | | | | | | | | |
| ROUTE | 101.20 | 4 | 5 | * .02549 | 52.95 | 2.006 | 1.47586 | 1.567 | 3.246 | |
| *S BASIN INCLUDES NW PART OF PHASE 3 AREA, THE ADJACENT SOUTH HALF | | | | | | | | | | |
| *S OF THE OURAY R/W, AND A PORTION OF PHASE 2 WEST OF ~~WOODBRIDGE~~ DRIVE | | | | | | | | | | |
| COMPUTE NM HYD | 102.00 | - | 6 | .01034 | * 23.51 | .814 | 1.47586 | 1.500 | 3.553 | PER IMP= 57.00 |
| ADD HYD | 102.20 | 5& 6 | 7 | .03583 * | 75.17 | 2.820 | 1.47584 | 1.533 | 3.278 | |
| *S ROUTE COMBINED STORM DRAIN FLOW FROM THE ~~WOODBRIDGE~~/TAUTON INTERSECTION | | | | | | | | | | |
| *S IN 42" STORM DRAIN (IN TAUTON) TO 64TH STREET NW | | | | | | | | | | |
| ROUTE | 102.30 | 7 | 8 | .03583 | 72.20 | 2.820 | 1.47585 | 1.567 | 3.148 | |
| *S COMPUTE PHASE 3 RUNOFF | | | | | | | | | | |
| COMPUTE NM HYD | 103.00 | - | 9 | .01992 | 45.29 | 1.568 | 1.47586 | 1.500 | 3.552 | PER IMP= 57.00 |
| *S ROUTE RUNOFF FROM PHASE 3 AREA TO INTERSECTION OF 64TH STREET | | | | | | | | | | |
| *S AND TAUTON ON 28' F-F RESIDENTIAL STREET SECTION | | | | | | | | | | |
| ROUTE | 103.10 | 9 | 10 | .01992 | 43.07 | 1.568 | 1.47587 | 1.533 | 3.379 | |
| ADD HYD | 103.20 | 8&10 | 11 | .05575 | 113.76 | 4.388 | 1.47584 | 1.567 | 3.188 | |
| *S ROUTE STORM DRAIN FLOW FROM THE 64TH STREET/TAUTON INTERSECTION | | | | | | | | | | |
| *S IN 48" STORM DRAIN (IN 64TH ST) SOUTH TO AMBERSIDE RD NW | | | | | | | | | | |
| ROUTE | 103.30 | 11 | 12 | .05575 | 113.63 | 4.388 | 1.47585 | 1.567 | 3.185 | |
| *S COMPUTE RUNOFF FOR AMBERSIDE RD BLOCK WEST OF 64TH STREET | | | | | | | | | | |
| COMPUTE NM HYD | 104.00 | - | 13 | .00586 | 13.33 | .461 | 1.47586 | 1.500 | 3.555 | PER IMP= 57.00 |
| *S ROUTE RUNOFF FROM AMBERSIDE RD BLOCK (WEST OF 64TH) TO 64TH STREET | | | | | | | | | | |
| *S ON 28' F-F RESIDENTIAL STREET SECTION | | | | | | | | | | |
| ROUTE | 104.10 | 13 | 14 | .00586 | 11.54 | .461 | 1.47590 | 1.567 | 3.078 | |
| ADD HYD | 104.20 | 12&14 | 15 | .06161 | 125.18 | 4.849 | 1.47584 | 1.567 | 3.175 | |
| *S ROUTE STORM DRAIN FLOW FROM THE 64TH STREET/AMBERSIDE RD INTERSECTION | | | | | | | | | | |
| *S IN 48" STORM DRAIN (IN 64TH ST) SOUTH TO EVESHAM RD NW | | | | | | | | | | |
| ROUTE | 104.30 | 15 | 16 | .06161 | 124.09 | 4.849 | 1.47585 | 1.567 | 3.147 | |
| *S COMPUTE RUNOFF FOR EVESHAM RD BLOCK WEST OF 64TH STREET | | | | | | | | | | |

* BRACKLEY DRIVE

AHYMO SUMMARY

```
COMPUTE NM HYD        105.00   -    17        .00586        13.33        .461      1.47586    1.500    3.555 PER IMP=  57.00
*S ROUTE RUNOFF FROM EVESHAM RD BLOCK (WEST OF 64TH) TO 64TH STREET
*S ON 28' F-F RESIDENTIAL STREET SECTION
                                 FROM  TO                          PEAK          RUNOFF                    TIME TO    CFS
HYDROGRAPH   ID   ID          AREA     DISCHARGE      VOLUME      RUNOFF        PEAK      PER
   COMMAND        IDENTIFICATION   NO.  NO.       (SQ MI)       (CFS)        (AC-FT)   (INCHES)   (HOURS)    ACRE     NOTATION

ROUTE                 105.10   17   18        .00586        11.08        .461      1.47590    1.567    2.953
ADD HYD               105.20 18&16  19        .06747       135.16       5.311      1.47584    1.567    3.130
*S BASIN 300 IS AREA SOUTH OF MIAMI BETWEEN TORATOLLA AND 64TH STREET
*S ( INCLUDING APPROX. 1.38 AC OF SUMMER RAY SUBDIVISION)
COMPUTE NM HYD        300.00   -    20        .01100        25.01        .866      1.47586    1.500    3.553 PER IMP=  57.00
*S ROUTE RUNOFF FROM BASIN 300 TO THE INTERSECTION OF 64TH AND MIAMI RD
*S ON 28' F-F RESIDENTIAL STREET SECTION
ROUTE                 300.10   20   21        .01100        21.63        .866      1.47588    1.567    3.072
ADD HYD               300.10 21& 3  22        .02944        48.36       2.317      1.47580    1.567    2.566
*S ROUTE STORM DRAIN FLOW FROM THE 64TH STREET/EVESHAM RD INTERSECTION
*S IN 48" STORM DRAIN SOUTH TO MIAMI RD NW AND THEN 400 FT EAST IN MIAMI
ROUTE                 105.30   19   23        .06747       134.34       5.311      1.47585    1.600    3.111
*S ROUTE SURFACE RUNOFF FROM THE INTERSECTION OF 64TH/MIAMI RD 400 FT EAST
*S ON 40' F-F MIAMI ROAD STREET SECTION
ROUTE                 300.20   22   24        .02944        48.18       2.317      1.47582    1.600    2.557
*S COMBINE ROUTED OFFSITE SURFACE FLOW WITH STORM DRAIN FLOW TO OBTAIN
*S TOTAL STORM DRAIN FLOW IN 48" PIPE 400 FT EAST OF 64TH IN MIAMI RD
ADD HYD               300.30 23&24  25        .09691       182.51       7.628      1.47583    1.600    2.943
*S BASIN 106 IS PHASE 1 AREA NORTH OF MIAMI AND EAST OF 64TH STREET
COMPUTE NM HYD        106.00   -    26        .01558        35.42       1.226      1.47586    1.500    3.553 PER IMP=  57.00
*S ROUTE RUNOFF FROM PHASE 1 AREA TO THE INTERSECTION OF OAKHAM/MIAMI RD
*S ON 28' F-F RESIDENTIAL STREET SECTION
ROUTE                 106.10   26   27        .01558        30.43       1.226      1.47587    1.567    3.052
*S BASIN 301 IS MIAMI ROAD R/W AREA (440 X 60 FT) WEST OF OAKHAM/MIAMI
COMPUTE NM HYD        301.00   -    28        .00095         2.51        .091      1.79069    1.500    4.127 PER IMP=  82.00
*S ADD PHASE 1 RUNOFF TO FLOW FROM MIAMI RD R/W ABUTTING
*S EASTERN PORTION OF PHASE 1
ADD HYD               106.20 28&27  29        .01653        32.51       1.317      1.49390    1.567    3.073
*S COMBINE MIAMI S/D FLOW WITH PHASE 1 DISCHARGE TO DETERMINE THE
*S TOTAL FLOW RATE IN MIAMI RD S/D AT SOUTHEAST (LOW) CORNER OF SITE
ADD HYD               300.40 25&29  30        .11344       213.42       8.945      1.47846    1.567    2.940
FINISH
```

AHYMO SUMMARY

```
AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
     RUN DATE (MON/DAY/YR) = 11/04/1997
     START TIME (HR:MIN:SEC) = 09:31:01     USER NO.= ISCARFNM.I01
     INPUT FILE = KENSING.DAT

*S                 KENSING.DAT
*S                 CREATED BY: SMM 10/29/97
START              RAINFALL BEGINS AT 0.0 HRS
RAINFALL           TYPE=1 RAIN QUARTER=0 RAIN ONE=1.87
                   RAIN SIX=2.20 RAIN DAY=2.66 DT=0.03333HR

          COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
          DT =     .033330 HOURS       END TIME =     5.999400 HOURS
             .0000   .0016   .0033   .0050   .0067   .0085   .0103
             .0122   .0141   .0160   .0180   .0201   .0222   .0243
             .0266   .0289   .0312   .0337   .0362   .0388   .0415
             .0443   .0472   .0502   .0534   .0567   .0601   .0637
             .0675   .0715   .0758   .0809   .0865   .0924   .1050
             .1334   .1771   .2398   .3254   .4379   .5814   .7600
             .9780  1.1804  1.2649  1.3363  1.3997  1.4575  1.5106
            1.5600  1.6061  1.6493  1.6900  1.7284  1.7646  1.7989
            1.8314  1.8623  1.8915  1.9193  1.9456  1.9518  1.9576
            1.9630  1.9682  1.9732  1.9780  1.9825  1.9869  1.9912
            1.9953  1.9993  2.0031  2.0068  2.0104  2.0140  2.0174
            2.0207  2.0240  2.0272  2.0303  2.0333  2.0363  2.0392
            2.0420  2.0448  2.0475  2.0502  2.0528  2.0554  2.0580
            2.0605  2.0629  2.0653  2.0677  2.0700  2.0723  2.0746
            2.0768  2.0790  2.0812  2.0833  2.0855  2.0875  2.0896
            2.0916  2.0936  2.0956  2.0976  2.0995  2.1014  2.1033
            2.1051  2.1070  2.1088  2.1106  2.1124  2.1141  2.1159
            2.1176  2.1193  2.1210  2.1227  2.1244  2.1260  2.1276
            2.1292  2.1308  2.1324  2.1340  2.1355  2.1371  2.1386
            2.1401  2.1416  2.1431  2.1446  2.1460  2.1475  2.1489
            2.1504  2.1518  2.1532  2.1546  2.1560  2.1573  2.1587
            2.1600  2.1614  2.1627  2.1640  2.1654  2.1667  2.1680
            2.1692  2.1705  2.1718  2.1731  2.1743  2.1756  2.1768
            2.1780  2.1792  2.1804  2.1817  2.1829  2.1840  2.1852
            2.1864  2.1876  2.1887  2.1899  2.1910  2.1922  2.1933
            2.1944  2.1956  2.1967  2.1978  2.1989  2.2000

*S BASIN 100 IS CURRENTLY UNDEVELOPED, ASSUME FUTURE DEVELOPMENT WILL
*S BE @ A DENSITY OF 6 DU/AC. APPROXIMATE 11.8 ACRES TO GRAVITY FLOW TO
*S MIAMI & 68TH INTERSECTION (BASED ON 1% FUTURE STREET SLOPES), WHICH
*S LEAVES 16.3-ACRE AREA THAT DRAINS TO PLAYA AT OURAY & 68TH ST NW.
*S HYD NO 100.0 IS STREET (GRAVITY) FLOW AREA.
COMPUTE NM HYD       ID=1 HYD NO=100.0 AREA=0.01844 SQ MI
                     PER A=0 PER B=20 PER C=23 PER D=57
                     TP=-0.1333 HR   MASS RAIN=-1

    K =    .072649HR     TP =    .133300HR     K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    41.497     CFS    UNIT VOLUME =    .9991        B =    526.28       P60 = 1.8700
    AREA =       .010511 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330
```

```
K =   .117553HR    TP =   .133300HR    K/TP RATIO =   .881867     SHAPE CONSTANT, N =  4.024364
UNIT PEAK =   21.223    CFS   UNIT VOLUME =    .9998        B =   356.79       P60 = 1.8700
AREA =       .007929 SQ MI    IA =    .41977 INCHES    INF =   1.02535 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330

PRINT HYD            ID=1   CODE=1

                                PARTIAL HYDROGRAPH   100.00


RUNOFF VOLUME =      1.47586 INCHES      =       1.4515 ACRE-FEET
PEAK DISCHARGE RATE =       41.92 CFS  AT   1.500 HOURS   BASIN AREA =   .0184 SQ. MI.


*S ROUTE ON 28' F-F RESIDENTIAL STREETS AT 1% ASSUMED SLOPE
*S TO MIAMI / 68TH STREET INTERSECTION AND THEN EAST ON MIAMI
*S ROAD 1050 FT TO MIAMI / 64TH STREET INTERSECTION
COMPUTE RATING CURVE CID=1 VS N0=1 MIN EL=100.00 MAX EL=100.85
                     CH SLOPE=0.01 FP SLOPE=0.01 N=0.017 DIST=46.0
                     DIST ELEV   DIST ELEV   DIST ELEV   DIST ELEV
                     0    100.85 9.0 100.67  9.1 100.00  23   100.36
                     36.9 100.00 37  100.67  46  100.85

                                RATING CURVE VALLEY SECTION   .0
                                  WATER       FLOW        FLOW        TOP
                                 SURFACE      AREA        RATE       WIDTH
                                  ELEV       SQ FT       CFS         FT
                                 100.00        .00         .00        .00
                                 100.04        .08         .05       3.47
                                 100.09        .31         .34       6.94
                                 100.13        .70         .99      10.40
                                 100.18       1.24        2.14      13.87
                                 100.22       1.94        3.88      17.34
                                 100.27       2.79        6.31      20.81
                                 100.31       3.80        9.51      24.28
                                 100.36       4.97       13.58      27.75
                                 100.40       6.21       19.62      27.92
                                 100.45       7.46       26.57      27.93
                                 100.49       8.71       34.32      27.95
                                 100.54       9.96       42.83      27.96
                                 100.58      11.22       52.05      27.97
                                 100.63      12.47       61.96      27.99
                                 100.67      13.72       72.36      28.11
                                 100.72      15.08       77.02      32.58
                                 100.76      16.63       83.51      37.06
                                 100.81      18.39       91.70      41.53
                                 100.85      20.35      101.57      46.00
COMPUTE TRAVEL TIME   ID=3    REACH NO=1 NO VS=1 L=2350 FT SLP=0.01

                         TRAVEL TIME TABLE
                                     REACH=  1.0
```

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .045 | .078 | .05 | .9548 |
| .089 | .310 | .34 | .6015 |
| .134 | .698 | .99 | .4590 |
| .179 | 1.241 | 2.14 | .3789 |
| .224 | 1.940 | 3.88 | .3265 |
| .268 | 2.793 | 6.31 | .2892 |
| .313 | 3.801 | 9.51 | .2609 |
| .358 | 4.965 | 13.58 | .2387 |
| .403 | 6.214 | 19.62 | .2067 |
| .447 | 7.463 | 26.57 | .1834 |
| .492 | 8.713 | 34.32 | .1657 |
| .537 | 9.964 | 42.83 | .1519 |
| .582 | 11.215 | 52.05 | .1406 |
| .626 | 12.467 | 61.96 | .1313 |
| .671 | 13.719 | 72.36 | .1238 |
| .716 | 15.077 | 77.02 | .1278 |
| .761 | 16.635 | 83.51 | .1300 |
| .805 | 18.393 | 91.70 | .1309 |
| .850 | 20.351 | 101.57 | .1308 |

```
ROUTE                ID=3   HYD NO=100.1 INFLOW ID=1   DT=0.0
PRINT HYD            ID=3 CODE=1

                     PARTIAL HYDROGRAPH   100.10

    RUNOFF VOLUME =      1.47587 INCHES      =       1.4515 ACRE-FEET
    PEAK DISCHARGE RATE =      27.42 CFS  AT   1.600 HOURS   BASIN AREA =   .0184 SQ. MI.


*S HYD NO 101.0 IS STREET FLOW (PLAYA) AREA THAT FLOWS NORTH TO LOW POINT
*S NEAR OURAY & 68TH WHERE IT IS INTERCEPTED BY THE PHASE 3 STORM DRAIN.
COMPUTE NM HYD       ID=2 HYD NO=101.0 AREA=0.02549 SQ MI
                     PER A=0 PER B=20 PER C=23 PER D=57
                     TP=-0.1333 HR   MASS RAIN=-1

    K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   57.362    CFS   UNIT VOLUME =    .9992       B =   526.28      P60 = 1.8700
    AREA =      .014529 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330


    K =   .117553HR    TP =   .133300HR    K/TP RATIO =   .881867     SHAPE CONSTANT, N =  4.024364
    UNIT PEAK =   29.337    CFS   UNIT VOLUME =    1.000       B =   356.79      P60 = 1.8700
    AREA =      .010961 SQ MI    IA =    .41977 INCHES    INF =   1.02535 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330

PRINT HYD            ID=2   CODE=1

                     PARTIAL HYDROGRAPH   101.00
```

RUNOFF VOLUME = 1.47586 INCHES = 2.0064 ACRE-FEET
PEAK DISCHARGE RATE = 57.94 CFS AT 1.500 HOURS BASIN AREA = .0255 SQ. MI.

*S ROUTE ON 28' F-F RESIDENTIAL STREETS AT 1% ASSUMED SLOPE
COMPUTE TRAVEL TIME ID=4 REACH NO=1 NO VS=1 L=1000 FT SLP=0.01

TRAVEL TIME TABLE
REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .045 | .078 | .05 | .4063 |
| .089 | .310 | .34 | .2559 |
| .134 | .698 | .99 | .1953 |
| .179 | 1.241 | 2.14 | .1612 |
| .224 | 1.940 | 3.88 | .1389 |
| .268 | 2.793 | 6.31 | .1230 |
| .313 | 3.801 | 9.51 | .1110 |
| .358 | 4.965 | 13.58 | .1016 |
| .403 | 6.214 | 19.62 | .0880 |
| .447 | 7.463 | 26.57 | .0780 |
| .492 | 8.713 | 34.32 | .0705 |
| .537 | 9.964 | 42.83 | .0646 |
| .582 | 11.215 | 52.05 | .0598 |
| .626 | 12.467 | 61.96 | .0559 |
| .671 | 13.719 | 72.36 | .0527 |
| .716 | 15.077 | 77.02 | .0544 |
| .761 | 16.635 | 83.51 | .0553 |
| .805 | 18.393 | 91.70 | .0557 |
| .850 | 20.351 | 101.57 | .0557 |

ROUTE ID=4 HYD NO=101.1 INFLOW ID=2 DT=0.0
*S ROUTE FLOW FROM OFFSITE PLAYA AREA TO WOODBRIDGE/TAUTON INTERSECTION
*S IN 36" STORM DRAIN (IN TAUTON) TO WOODBRIDGE DR NW
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLOPE=0.003
DIA=3.0 FT N=0.013

RATING CURVE PIPE SECTION 1.0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | MAX WIDTH FT |
|---|---|---|---|
| .00 | .00 | .00 | .00 |
| .16 | .14 | .19 | 1.33 |
| .31 | .39 | .83 | 1.83 |
| .47 | .71 | 1.93 | 2.18 |
| .63 | 1.07 | 3.48 | 2.44 |
| .78 | 1.46 | 5.43 | 2.63 |
| .94 | 1.89 | 7.75 | 2.78 |
| 1.09 | 2.33 | 10.38 | 2.89 |
| 1.25 | 2.79 | 13.27 | 2.96 |
| 1.41 | 3.26 | 16.36 | 2.99 |
| 1.56 | 3.72 | 19.58 | 3.00 |
| 1.72 | 4.19 | 22.86 | 3.00 |

| | | | |
|---|---|---|---|
| 1.88 | 4.65 | 26.12 | 3.00 |
| 2.03 | 5.10 | 29.28 | 3.00 |
| 2.19 | 5.53 | 32.23 | 3.00 |
| 2.35 | 5.93 | 34.88 | 3.00 |
| 2.50 | 6.30 | 37.08 | 3.00 |
| 2.66 | 6.62 | 38.65 | 3.00 |
| 2.81 | 6.89 | 39.30 | 3.00 |
| 3.00 | 7.07 | 39.30 | 3.00 |

```
COMPUTE TRAVEL TIME  ID=5 REACH NO=1 NO VS=1 L=150 FT SLP=0.003
```

TRAVEL TIME TABLE

REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .156 | .140 | .19 | .0306 |
| .313 | .391 | .83 | .0196 |
| .469 | .706 | 1.93 | .0152 |
| .625 | 1.068 | 3.48 | .0128 |
| .782 | 1.465 | 5.43 | .0112 |
| .938 | 1.889 | 7.75 | .0102 |
| 1.094 | 2.332 | 10.38 | .0094 |
| 1.251 | 2.790 | 13.27 | .0088 |
| 1.407 | 3.255 | 16.36 | .0083 |
| 1.563 | 3.724 | 19.58 | .0079 |
| 1.720 | 4.191 | 22.86 | .0076 |
| 1.876 | 4.650 | 26.12 | .0074 |
| 2.032 | 5.097 | 29.28 | .0073 |
| 2.189 | 5.525 | 32.23 | .0071 |
| 2.345 | 5.928 | 34.88 | .0071 |
| 2.501 | 6.297 | 37.08 | .0071 |
| 2.658 | 6.622 | 38.65 | .0071 |
| 2.814 | 6.887 | 39.30 | .0073 |
| 3.000 | 7.069 | 39.30 | .0075 |

```
   ROUTE                  ID=5 HYD NO=101.2 INFLOW ID=4 DT=0.0
TRAVEL TIME TABLE EXCEEDED
   PRINT HYD              ID=5 CODE=1
```

PARTIAL HYDROGRAPH 101.20

RUNOFF VOLUME = 1.47586 INCHES = 2.0064 ACRE-FEET
PEAK DISCHARGE RATE = 52.95 CFS AT 1.567 HOURS BASIN AREA = .0255 SQ. MI.

```
   *S BASIN INCLUDES NW PART OF PHASE 3 AREA, THE ADJACENT SOUTH HALF
   *S OF THE OURAY R/W, AND A PORTION OF PHASE 2 WEST OF WOODBRIDGE DRIVE
   COMPUTE NM HYD        ID=6 HYD NO=102.0 AREA=0.01034 SQ MI
                         PER A=0 PER B=20 PER C=23 PER D=57
                         TP=-0.1333 HR   MASS RAIN=-1
```

```
K =    .072649HR     TP =    .133300HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
UNIT PEAK =    23.269     CFS    UNIT VOLUME =     .9989        B =    526.28       P60 = 1.8700
AREA =       .005894 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

K =    .117553HR     TP =    .133300HR     K/TP RATIO =    .881867      SHAPE CONSTANT, N =  4.024364
UNIT PEAK =    11.901     CFS    UNIT VOLUME =     .9993        B =    356.79       P60 = 1.8700
AREA =       .004446 SQ MI     IA =     .41977 INCHES     INF =    1.02535 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

PRINT HYD            ID=6      CODE=1

                                PARTIAL HYDROGRAPH   102.00

RUNOFF VOLUME =      1.47586 INCHES      =         .8139 ACRE-FEET
PEAK DISCHARGE RATE =       23.51 CFS  AT   1.500 HOURS   BASIN AREA =    .0103 SQ. MI.


ADD HYD              ID=7 HYD NO=102.2 ID=5 ID=6
PRINT HYD            ID=7  CODE=1

                                PARTIAL HYDROGRAPH   102.20

RUNOFF VOLUME =      1.47584 INCHES      =        2.8202 ACRE-FEET
PEAK DISCHARGE RATE =       75.17 CFS  AT   1.533 HOURS   BASIN AREA =    .0358 SQ. MI.


*S ROUTE COMBINED STORM DRAIN FLOW FROM THE WOODBRIDGE/TAUTON INTERSECTION
*S IN 42" STORM DRAIN (IN TAUTON) TO 64TH STREET NW
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLOPE=0.003
                     DIA=3.5 FT N=0.013
```

RATING CURVE PIPE SECTION 1.0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | MAX WIDTH FT |
|---|---|---|---|
| .00 | .00 | .00 | .00 |
| .18 | .19 | .29 | 1.56 |
| .36 | .53 | 1.25 | 2.14 |
| .55 | .96 | 2.92 | 2.54 |
| .73 | 1.45 | 5.25 | 2.84 |
| .91 | 1.99 | 8.19 | 3.07 |
| 1.09 | 2.57 | 11.69 | 3.25 |
| 1.28 | 3.17 | 15.66 | 3.37 |
| 1.46 | 3.80 | 20.02 | 3.45 |
| 1.64 | 4.43 | 24.68 | 3.49 |
| 1.82 | 5.07 | 29.54 | 3.50 |
| 2.01 | 5.70 | 34.48 | 3.50 |
| 2.19 | 6.33 | 39.40 | 3.50 |
| 2.37 | 6.94 | 44.16 | 3.50 |

| | | | |
|---|---|---|---|
| 2.55 | 7.52 | 48.62 | 3.50 |
| 2.74 | 8.07 | 52.61 | 3.50 |
| 2.92 | 8.57 | 55.93 | 3.50 |
| 3.10 | 9.01 | 58.30 | 3.50 |
| 3.28 | 9.37 | 59.28 | 3.50 |
| 3.50 | 9.62 | 59.28 | 3.50 |

```
COMPUTE TRAVEL TIME  ID=8 REACH NO=1 NO VS=1 L=730 FT SLP=0.003
```

TRAVEL TIME TABLE

REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .182 | .191 | .29 | .1342 |
| .365 | .532 | 1.25 | .0860 |
| .547 | .961 | 2.92 | .0668 |
| .730 | 1.453 | 5.25 | .0562 |
| .912 | 1.994 | 8.19 | .0494 |
| 1.094 | 2.571 | 11.69 | .0446 |
| 1.277 | 3.175 | 15.66 | .0411 |
| 1.459 | 3.797 | 20.02 | .0385 |
| 1.641 | 4.431 | 24.68 | .0364 |
| 1.824 | 5.069 | 29.54 | .0348 |
| 2.006 | 5.704 | 34.48 | .0335 |
| 2.189 | 6.330 | 39.40 | .0326 |
| 2.371 | 6.938 | 44.16 | .0319 |
| 2.553 | 7.520 | 48.62 | .0314 |
| 2.736 | 8.069 | 52.61 | .0311 |
| 2.918 | 8.571 | 55.93 | .0311 |
| 3.101 | 9.014 | 58.30 | .0313 |
| 3.283 | 9.374 | 59.28 | .0321 |
| 3.500 | 9.621 | 59.28 | .0329 |

```
   ROUTE                  ID=8 HYD NO=102.3 INFLOW ID=7 DT=0.0
TRAVEL TIME TABLE EXCEEDED
   PRINT HYD              ID=8 CODE=1
```

PARTIAL HYDROGRAPH 102.30

```
    RUNOFF VOLUME =      1.47585 INCHES      =       2.8202 ACRE-FEET
    PEAK DISCHARGE RATE =      72.20 CFS  AT   1.567 HOURS   BASIN AREA =    .0358 SQ. MI.


   *S COMPUTE PHASE 3 RUNOFF
   COMPUTE NM HYD       ID=9 HYD NO=103.0 AREA=0.01992 SQ MI
                        PER A=0 PER B=20 PER C=23 PER D=57
                        TP=-0.1333 HR   MASS RAIN=-1

    K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   44.828    CFS   UNIT VOLUME =    .9991       B =   526.28       P60 = 1.8700
    AREA =      .011354 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330
```

```
K =   .117553HR    TP =    .133300HR    K/TP RATIO =    .881867     SHAPE CONSTANT, N =  4.024364
UNIT PEAK =   22.927    CFS   UNIT VOLUME =    .9999       B =   356.79       P60 = 1.8700
AREA =       .008566 SQ MI    IA =     .41977 INCHES    INF =   1.02535 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

PRINT HYD            ID=9 CODE=1

                                PARTIAL HYDROGRAPH   103.00

RUNOFF VOLUME =     1.47586 INCHES      =       1.5679 ACRE-FEET
PEAK DISCHARGE RATE =       45.29 CFS  AT   1.500 HOURS   BASIN AREA =   .0199 SQ. MI.


*S ROUTE RUNOFF FROM PHASE 3 AREA TO INTERSECTION OF 64TH STREET
*S AND TAUTON ON 28' F-F RESIDENTIAL STREET SECTION
COMPUTE RATING CURVE CID=1 VS N0=1 MIN EL=100.00 MAX EL=100.85
                     CH SLOPE=0.01 FP SLOPE=0.01 N=0.017 DIST=46.0
                     DIST ELEV   DIST ELEV   DIST ELEV   DIST ELEV
                     0    100.85 9.0 100.67  9.1 100.00  23   100.36
                     36.9 100.00 37  100.67  46  100.85

                                RATING CURVE VALLEY SECTION   .0
                                  WATER       FLOW        FLOW        TOP
                                 SURFACE      AREA        RATE       WIDTH
                                  ELEV       SQ FT       CFS         FT
                                 100.00        .00         .00        .00
                                 100.04        .08         .05       3.47
                                 100.09        .31         .34       6.94
                                 100.13        .70         .99      10.40
                                 100.18       1.24        2.14      13.87
                                 100.22       1.94        3.88      17.34
                                 100.27       2.79        6.31      20.81
                                 100.31       3.80        9.51      24.28
                                 100.36       4.97       13.58      27.75
                                 100.40       6.21       19.62      27.92
                                 100.45       7.46       26.57      27.93
                                 100.49       8.71       34.32      27.95
                                 100.54       9.96       42.83      27.96
                                 100.58      11.22       52.05      27.97
                                 100.63      12.47       61.96      27.99
                                 100.67      13.72       72.36      28.11
                                 100.72      15.08       77.02      32.58
                                 100.76      16.63       83.51      37.06
                                 100.81      18.39       91.70      41.53
                                 100.85      20.35      101.57      46.00
COMPUTE TRAVEL TIME  ID=10   REACH NO=1 NO VS=1 L=750 FT SLP=0.01

                     TRAVEL TIME TABLE
                                   REACH=  1.0
```

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .045 | .078 | .05 | .3047 |
| .089 | .310 | .34 | .1920 |
| .134 | .698 | .99 | .1465 |
| .179 | 1.241 | 2.14 | .1209 |
| .224 | 1.940 | 3.88 | .1042 |
| .268 | 2.793 | 6.31 | .0923 |
| .313 | 3.801 | 9.51 | .0833 |
| .358 | 4.965 | 13.58 | .0762 |
| .403 | 6.214 | 19.62 | .0660 |
| .447 | 7.463 | 26.57 | .0585 |
| .492 | 8.713 | 34.32 | .0529 |
| .537 | 9.964 | 42.83 | .0485 |
| .582 | 11.215 | 52.05 | .0449 |
| .626 | 12.467 | 61.96 | .0419 |
| .671 | 13.719 | 72.36 | .0395 |
| .716 | 15.077 | 77.02 | .0408 |
| .761 | 16.635 | 83.51 | .0415 |
| .805 | 18.393 | 91.70 | .0418 |
| .850 | 20.351 | 101.57 | .0417 |

```
ROUTE          ID=10  HYD NO=103.1 INFLOW ID=9   DT=0.0
PRINT HYD      ID=10 CODE=1
```

PARTIAL HYDROGRAPH 103.10

RUNOFF VOLUME = 1.47587 INCHES = 1.5680 ACRE-FEET
PEAK DISCHARGE RATE = 43.07 CFS AT 1.533 HOURS BASIN AREA = .0199 SQ. MI.

```
ADD HYD        ID=11 HYD NO=103.2 ID=8 ID=10
PRINT HYD      ID=11 CODE=1
```

PARTIAL HYDROGRAPH 103.20

RUNOFF VOLUME = 1.47584 INCHES = 4.3881 ACRE-FEET
PEAK DISCHARGE RATE = 113.76 CFS AT 1.567 HOURS BASIN AREA = .0558 SQ. MI.

```
*S ROUTE STORM DRAIN FLOW FROM THE 64TH STREET/TAUTON INTERSECTION
*S IN 48" STORM DRAIN (IN 64TH ST) SOUTH TO AMBERSIDE RD NW
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLOPE=0.003
                     DIA=4.0 FT N=0.013
```

RATING CURVE PIPE SECTION 1.0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | MAX WIDTH FT |
|---|---|---|---|
| .00 | .00 | .00 | .00 |
| .21 | .25 | .41 | 1.78 |
| .42 | .69 | 1.79 | 2.44 |
| .63 | 1.25 | 4.16 | 2.91 |
| .83 | 1.90 | 7.49 | 3.25 |
| 1.04 | 2.60 | 11.70 | 3.51 |
| 1.25 | 3.36 | 16.69 | 3.71 |
| 1.46 | 4.15 | 22.36 | 3.85 |
| 1.67 | 4.96 | 28.58 | 3.94 |
| 1.88 | 5.79 | 35.24 | 3.99 |
| 2.08 | 6.62 | 42.17 | 4.00 |
| 2.29 | 7.45 | 49.23 | 4.00 |
| 2.50 | 8.27 | 56.25 | 4.00 |
| 2.71 | 9.06 | 63.05 | 4.00 |
| 2.92 | 9.82 | 69.41 | 4.00 |
| 3.13 | 10.54 | 75.11 | 4.00 |
| 3.34 | 11.20 | 79.85 | 4.00 |
| 3.54 | 11.77 | 83.24 | 4.00 |
| 3.75 | 12.24 | 84.63 | 4.00 |
| 4.00 | 12.57 | 84.63 | 4.00 |

COMPUTE TRAVEL TIME ID=12 REACH NO=1 NO VS=1 L=260 FT SLP=0.003

TRAVEL TIME TABLE

REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .208 | .250 | .41 | .0437 |
| .417 | .695 | 1.79 | .0280 |
| .625 | 1.255 | 4.16 | .0218 |
| .834 | 1.898 | 7.49 | .0183 |
| 1.042 | 2.604 | 11.70 | .0161 |
| 1.251 | 3.358 | 16.69 | .0145 |
| 1.459 | 4.146 | 22.36 | .0134 |
| 1.668 | 4.960 | 28.58 | .0125 |
| 1.876 | 5.788 | 35.24 | .0119 |
| 2.084 | 6.621 | 42.17 | .0113 |
| 2.293 | 7.451 | 49.23 | .0109 |
| 2.501 | 8.267 | 56.25 | .0106 |
| 2.710 | 9.062 | 63.05 | .0104 |
| 2.918 | 9.823 | 69.41 | .0102 |
| 3.127 | 10.539 | 75.11 | .0101 |
| 3.335 | 11.195 | 79.85 | .0101 |
| 3.544 | 11.773 | 83.24 | .0102 |
| 3.752 | 12.243 | 84.63 | .0104 |
| 4.000 | 12.566 | 84.63 | .0107 |

ROUTE ID=12 HYD NO=103.3 INFLOW ID=11 DT=0.0
TRAVEL TIME TABLE EXCEEDED
PROBLEM FAILED TO CONVERGE AFTER 50 ITERATIONS. CONVERGENCE WAS FORCED. OUTFLOW NUMBER = 51 RATE = 84.43
PRINT HYD ID=12 CODE=1

PARTIAL HYDROGRAPH 103.30

RUNOFF VOLUME = 1.47585 INCHES = 4.3882 ACRE-FEET
PEAK DISCHARGE RATE = 113.63 CFS AT 1.567 HOURS BASIN AREA = .0558 SQ. MI.

```
*S COMPUTE RUNOFF FOR AMBERSIDE RD BLOCK WEST OF 64TH STREET
COMPUTE NM HYD      ID=13 HYD NO=104.0 AREA=0.00586 SQ MI
                    PER A=0 PER B=20 PER C=23 PER D=57
                    TP=-0.1333 HR   MASS RAIN=-1

    K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000    SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   13.187    CFS   UNIT VOLUME =    .9985       B =   526.28      P60 = 1.8700
    AREA =      .003340 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330

    K =   .117553HR    TP =   .133300HR    K/TP RATIO =   .881867    SHAPE CONSTANT, N =  4.024364
    UNIT PEAK =   6.7445    CFS   UNIT VOLUME =    .9985       B =   356.79      P60 = 1.8700
    AREA =      .002520 SQ MI    IA =    .41977 INCHES    INF =   1.02535 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330

PRINT HYD           ID=13 CODE=1
```

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.47586 INCHES = .4613 ACRE-FEET
PEAK DISCHARGE RATE = 13.33 CFS AT 1.500 HOURS BASIN AREA = .0059 SQ. MI.

```
*S ROUTE RUNOFF FROM AMBERSIDE RD BLOCK (WEST OF 64TH) TO 64TH STREET
*S ON 28' F-F RESIDENTIAL STREET SECTION
COMPUTE RATING CURVE CID=1 VS NO=1 MIN EL=100.00 MAX EL=100.85
                    CH SLOPE=0.01 FP SLOPE=0.01 N=0.017 DIST=46.0
                    DIST ELEV   DIST ELEV   DIST ELEV   DIST ELEV
                    0    100.85 9.0 100.67  9.1 100.00  23   100.36
                    36.9 100.00 37  100.67  46  100.85
```

RATING CURVE VALLEY SECTION .0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | TOP WIDTH FT |
|---|---|---|---|
| 100.00 | .00 | .00 | .00 |
| 100.04 | .08 | .05 | 3.47 |
| 100.09 | .31 | .34 | 6.94 |
| 100.13 | .70 | .99 | 10.40 |
| 100.18 | 1.24 | 2.14 | 13.87 |
| 100.22 | 1.94 | 3.88 | 17.34 |
| 100.27 | 2.79 | 6.31 | 20.81 |
| 100.31 | 3.80 | 9.51 | 24.28 |
| 100.36 | 4.97 | 13.58 | 27.75 |

| | | | |
|---|---|---|---|
| 100.40 | 6.21 | 19.62 | 27.92 |
| 100.45 | 7.46 | 26.57 | 27.93 |
| 100.49 | 8.71 | 34.32 | 27.95 |
| 100.54 | 9.96 | 42.83 | 27.96 |
| 100.58 | 11.22 | 52.05 | 27.97 |
| 100.63 | 12.47 | 61.96 | 27.99 |
| 100.67 | 13.72 | 72.36 | 28.11 |
| 100.72 | 15.08 | 77.02 | 32.58 |
| 100.76 | 16.63 | 83.51 | 37.06 |
| 100.81 | 18.39 | 91.70 | 41.53 |
| 100.85 | 20.35 | 101.57 | 46.00 |

COMPUTE TRAVEL TIME ID=14 REACH NO=1 NO VS=1 L=680 FT SLP=0.006

TRAVEL TIME TABLE

REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .045 | .078 | .05 | .2763 |
| .089 | .310 | .34 | .1740 |
| .134 | .698 | .99 | .1328 |
| .179 | 1.241 | 2.14 | .1096 |
| .224 | 1.940 | 3.88 | .0945 |
| .268 | 2.793 | 6.31 | .0837 |
| .313 | 3.801 | 9.51 | .0755 |
| .358 | 4.965 | 13.58 | .0691 |
| .403 | 6.214 | 19.62 | .0598 |
| .447 | 7.463 | 26.57 | .0531 |
| .492 | 8.713 | 34.32 | .0480 |
| .537 | 9.964 | 42.83 | .0439 |
| .582 | 11.215 | 52.05 | .0407 |
| .626 | 12.467 | 61.96 | .0380 |
| .671 | 13.719 | 72.36 | .0358 |
| .716 | 15.077 | 77.02 | .0370 |
| .761 | 16.635 | 83.51 | .0376 |
| .805 | 18.393 | 91.70 | .0379 |
| .850 | 20.351 | 101.57 | .0378 |

ROUTE ID=14 HYD NO=104.1 INFLOW ID=13 DT=0.0
PRINT HYD ID=14 CODE=1

PARTIAL HYDROGRAPH 104.10

RUNOFF VOLUME = 1.47590 INCHES = .4613 ACRE-FEET
PEAK DISCHARGE RATE = 11.54 CFS AT 1.567 HOURS BASIN AREA = .0059 SQ. MI.

ADD HYD ID=15 HYD NO=104.2 ID=12 ID=14
PRINT HYD ID=15 CODE=1

PARTIAL HYDROGRAPH 104.20

RUNOFF VOLUME = 1.47584 INCHES = 4.8494 ACRE-FEET
PEAK DISCHARGE RATE = 125.18 CFS AT 1.567 HOURS BASIN AREA = .0616 SQ. MI.

*S ROUTE STORM DRAIN FLOW FROM THE 64TH STREET/AMBERSIDE RD INTERSECTION
*S IN 48" STORM DRAIN (IN 64TH ST) SOUTH TO EVESHAM RD NW
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLOPE=0.003
DIA=4.0 FT N=0.013

RATING CURVE PIPE SECTION 1.0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | MAX WIDTH FT |
|---|---|---|---|
| .00 | .00 | .00 | .00 |
| .21 | .25 | .41 | 1.78 |
| .42 | .69 | 1.79 | 2.44 |
| .63 | 1.25 | 4.16 | 2.91 |
| .83 | 1.90 | 7.49 | 3.25 |
| 1.04 | 2.60 | 11.70 | 3.51 |
| 1.25 | 3.36 | 16.69 | 3.71 |
| 1.46 | 4.15 | 22.36 | 3.85 |
| 1.67 | 4.96 | 28.58 | 3.94 |
| 1.88 | 5.79 | 35.24 | 3.99 |
| 2.08 | 6.62 | 42.17 | 4.00 |
| 2.29 | 7.45 | 49.23 | 4.00 |
| 2.50 | 8.27 | 56.25 | 4.00 |
| 2.71 | 9.06 | 63.05 | 4.00 |
| 2.92 | 9.82 | 69.41 | 4.00 |
| 3.13 | 10.54 | 75.11 | 4.00 |
| 3.34 | 11.20 | 79.85 | 4.00 |
| 3.54 | 11.77 | 83.24 | 4.00 |
| 3.75 | 12.24 | 84.63 | 4.00 |
| 4.00 | 12.57 | 84.63 | 4.00 |

COMPUTE TRAVEL TIME ID=16 REACH NO=1 NO VS=1 L=260 FT SLP=0.003

TRAVEL TIME TABLE
REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .208 | .250 | .41 | .0437 |
| .417 | .695 | 1.79 | .0280 |
| .625 | 1.255 | 4.16 | .0218 |
| .834 | 1.898 | 7.49 | .0183 |
| 1.042 | 2.604 | 11.70 | .0161 |
| 1.251 | 3.358 | 16.69 | .0145 |
| 1.459 | 4.146 | 22.36 | .0134 |
| 1.668 | 4.960 | 28.58 | .0125 |
| 1.876 | 5.788 | 35.24 | .0119 |
| 2.084 | 6.621 | 42.17 | .0113 |
| 2.293 | 7.451 | 49.23 | .0109 |
| 2.501 | 8.267 | 56.25 | .0106 |
| 2.710 | 9.062 | 63.05 | .0104 |

```
                                  2.918       9.823       69.41       .0102
                                  3.127      10.539       75.11       .0101
                                  3.335      11.195       79.85       .0101
                                  3.544      11.773       83.24       .0102
                                  3.752      12.243       84.63       .0104
                                  4.000      12.566       84.63       .0107
   ROUTE                   ID=16  HYD NO=104.3 INFLOW ID=15 DT=0.0
TRAVEL TIME TABLE EXCEEDED
   PROBLEM FAILED TO CONVERGE AFTER 50 ITERATIONS. CONVERGENCE WAS FORCED.  OUTFLOW NUMBER =   52  RATE =     84.30
   PRINT HYD               ID=16  CODE=1

                                    PARTIAL HYDROGRAPH   104.30


    RUNOFF VOLUME =      1.47585 INCHES      =       4.8494 ACRE-FEET
    PEAK DISCHARGE RATE =      124.09 CFS  AT   1.567 HOURS   BASIN AREA =   .0616 SQ. MI.


   *S COMPUTE RUNOFF FOR EVESHAM RD BLOCK WEST OF 64TH STREET
   COMPUTE NM HYD        ID=17 HYD NO=105.0 AREA=0.00586 SQ MI
                         PER A=0 PER B=20 PER C=23 PER D=57
                         TP=-0.1333 HR   MASS RAIN=-1

    K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   13.187    CFS   UNIT VOLUME =    .9985        B =   526.28      P60 = 1.8700
    AREA =       .003340 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330


    K =   .117553HR    TP =   .133300HR    K/TP RATIO =   .881867     SHAPE CONSTANT, N =  4.024364
    UNIT PEAK =   6.7445    CFS   UNIT VOLUME =    .9985        B =   356.79      P60 = 1.8700
    AREA =       .002520 SQ MI    IA =    .41977 INCHES    INF =   1.02535 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330

   PRINT HYD             ID=17 CODE=1

                                    PARTIAL HYDROGRAPH   105.00


    RUNOFF VOLUME =      1.47586 INCHES      =        .4613 ACRE-FEET
    PEAK DISCHARGE RATE =       13.33 CFS  AT   1.500 HOURS   BASIN AREA =   .0059 SQ. MI.


   *S ROUTE RUNOFF FROM EVESHAM RD BLOCK (WEST OF 64TH) TO 64TH STREET
   *S ON 28' F-F RESIDENTIAL STREET SECTION
   COMPUTE RATING CURVE CID=1 VS NO=1 MIN EL=100.00 MAX EL=100.85
                        CH SLOPE=0.006 FP SLOPE=0.006 N=0.017 DIST=46.0
                        DIST ELEV   DIST ELEV   DIST ELEV   DIST ELEV
                        0    100.85 9.0 100.67  9.1 100.00  23   100.36
                        36.9 100.00 37  100.67  46  100.85
```

RATING CURVE VALLEY SECTION .0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | TOP WIDTH FT |
|---|---|---|---|
| 100.00 | .00 | .00 | .00 |
| 100.04 | .08 | .04 | 3.47 |
| 100.09 | .31 | .26 | 6.94 |
| 100.13 | .70 | .77 | 10.40 |
| 100.18 | 1.24 | 1.66 | 13.87 |
| 100.22 | 1.94 | 3.00 | 17.34 |
| 100.27 | 2.79 | 4.88 | 20.81 |
| 100.31 | 3.80 | 7.37 | 24.28 |
| 100.36 | 4.97 | 10.52 | 27.75 |
| 100.40 | 6.21 | 15.20 | 27.92 |
| 100.45 | 7.46 | 20.58 | 27.93 |
| 100.49 | 8.71 | 26.59 | 27.95 |
| 100.54 | 9.96 | 33.17 | 27.96 |
| 100.58 | 11.22 | 40.32 | 27.97 |
| 100.63 | 12.47 | 48.00 | 27.99 |
| 100.67 | 13.72 | 56.05 | 28.11 |
| 100.72 | 15.08 | 59.66 | 32.58 |
| 100.76 | 16.63 | 64.68 | 37.06 |
| 100.81 | 18.39 | 71.03 | 41.53 |
| 100.85 | 20.35 | 78.68 | 46.00 |

COMPUTE TRAVEL TIME ID=18 REACH NO=1 NO VS=1 L=680 FT SLP=0.006

TRAVEL TIME TABLE

REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .045 | .078 | .04 | .3567 |
| .089 | .310 | .26 | .2247 |
| .134 | .698 | .77 | .1715 |
| .179 | 1.241 | 1.66 | .1415 |
| .224 | 1.940 | 3.00 | .1220 |
| .268 | 2.793 | 4.88 | .1080 |
| .313 | 3.801 | 7.37 | .0975 |
| .358 | 4.965 | 10.52 | .0892 |
| .403 | 6.214 | 15.20 | .0772 |
| .447 | 7.463 | 20.58 | .0685 |
| .492 | 8.713 | 26.59 | .0619 |
| .537 | 9.964 | 33.17 | .0567 |
| .582 | 11.215 | 40.32 | .0525 |
| .626 | 12.467 | 48.00 | .0491 |
| .671 | 13.719 | 56.05 | .0462 |
| .716 | 15.077 | 59.66 | .0477 |
| .761 | 16.635 | 64.68 | .0486 |
| .805 | 18.393 | 71.03 | .0489 |
| .850 | 20.351 | 78.68 | .0489 |

ROUTE ID=18 HYD NO=105.1 INFLOW ID=17 DT=0.0
PRINT HYD ID=18 CODE=1

PARTIAL HYDROGRAPH 105.10

```
RUNOFF VOLUME =      1.47590 INCHES      =          .4613 ACRE-FEET
PEAK DISCHARGE RATE =      11.08 CFS  AT   1.567 HOURS   BASIN AREA =   .0059 SQ. MI.


ADD HYD              ID=19 HYD NO=105.2 ID=18 ID=16
PRINT HYD            ID=19 CODE=1

                                PARTIAL HYDROGRAPH   105.20

RUNOFF VOLUME =      1.47584 INCHES      =        5.3106 ACRE-FEET
PEAK DISCHARGE RATE =     135.16 CFS  AT   1.567 HOURS   BASIN AREA =   .0675 SQ. MI.


*S BASIN 300 IS AREA SOUTH OF MIAMI BETWEEN TORATOLLA AND 64TH STREET
*S ( INCLUDING APPROX. 1.38 AC OF SUMMER RAY SUBDIVISION)
COMPUTE NM HYD       ID=20 HYD NO=300.0 AREA=0.01100 SQ MI
                     PER A=0 PER B=20 PER C=23 PER D=57
                     TP=-0.1333 HR   MASS RAIN=-1

K =    .072649HR     TP =    .133300HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   24.754     CFS   UNIT VOLUME =     .9989        B =   526.28      P60 = 1.8700
AREA =       .006270 SQ MI    IA =     .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330


K =    .117553HR     TP =    .133300HR    K/TP RATIO =    .881867     SHAPE CONSTANT, N =  4.024364
UNIT PEAK =   12.660     CFS   UNIT VOLUME =     .9993        B =   356.79      P60 = 1.8700
AREA =       .004730 SQ MI    IA =     .41977 INCHES    INF =   1.02535 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

PRINT HYD            ID=20   CODE=1

                                HYDROGRAPH FROM AREA   300.00

RUNOFF VOLUME =      1.47586 INCHES      =          .8658 ACRE-FEET
PEAK DISCHARGE RATE =      25.01 CFS  AT   1.500 HOURS   BASIN AREA =   .0110 SQ. MI.


*S ROUTE RUNOFF FROM BASIN 300 TO THE INTERSECTION OF 64TH AND MIAMI RD
*S ON 28' F-F RESIDENTIAL STREET SECTION
COMPUTE RATING CURVE CID=1 VS NO=1 MIN EL=100.00 MAX EL=100.85
                     CH SLOPE=0.006 FP SLOPE=0.006 N=0.017 DIST=46.0
                     DIST ELEV   DIST ELEV   DIST ELEV   DIST ELEV
                     0    100.85 9.0 100.67  9.1 100.00  23   100.36
                     36.9 100.00 37  100.67  46  100.85
```

RATING CURVE VALLEY SECTION .0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | TOP WIDTH FT |
|---|---|---|---|
| 100.00 | .00 | .00 | .00 |
| 100.04 | .08 | .04 | 3.47 |
| 100.09 | .31 | .26 | 6.94 |
| 100.13 | .70 | .77 | 10.40 |
| 100.18 | 1.24 | 1.66 | 13.87 |
| 100.22 | 1.94 | 3.00 | 17.34 |
| 100.27 | 2.79 | 4.88 | 20.81 |
| 100.31 | 3.80 | 7.37 | 24.28 |
| 100.36 | 4.97 | 10.52 | 27.75 |
| 100.40 | 6.21 | 15.20 | 27.92 |
| 100.45 | 7.46 | 20.58 | 27.93 |
| 100.49 | 8.71 | 26.59 | 27.95 |
| 100.54 | 9.96 | 33.17 | 27.96 |
| 100.58 | 11.22 | 40.32 | 27.97 |
| 100.63 | 12.47 | 48.00 | 27.99 |
| 100.67 | 13.72 | 56.05 | 28.11 |
| 100.72 | 15.08 | 59.66 | 32.58 |
| 100.76 | 16.63 | 64.68 | 37.06 |
| 100.81 | 18.39 | 71.03 | 41.53 |
| 100.85 | 20.35 | 78.68 | 46.00 |

COMPUTE TRAVEL TIME ID=21 REACH NO=1 NO VS=1 L=800 FT SLP=0.006

TRAVEL TIME TABLE

REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .045 | .078 | .04 | .4196 |
| .089 | .310 | .26 | .2643 |
| .134 | .698 | .77 | .2017 |
| .179 | 1.241 | 1.66 | .1665 |
| .224 | 1.940 | 3.00 | .1435 |
| .268 | 2.793 | 4.88 | .1271 |
| .313 | 3.801 | 7.37 | .1147 |
| .358 | 4.965 | 10.52 | .1049 |
| .403 | 6.214 | 15.20 | .0909 |
| .447 | 7.463 | 20.58 | .0806 |
| .492 | 8.713 | 26.59 | .0728 |
| .537 | 9.964 | 33.17 | .0667 |
| .582 | 11.215 | 40.32 | .0618 |
| .626 | 12.467 | 48.00 | .0577 |
| .671 | 13.719 | 56.05 | .0544 |
| .716 | 15.077 | 59.66 | .0562 |
| .761 | 16.635 | 64.68 | .0571 |
| .805 | 18.393 | 71.03 | .0575 |
| .850 | 20.351 | 78.68 | .0575 |

ROUTE ID=21 HYD NO=300.1 INFLOW ID=20 DT=0.0

PRINT HYD ID=21 CODE=1

HYDROGRAPH FROM AREA 300.10

```
RUNOFF VOLUME =      1.47588 INCHES      =          .8658 ACRE-FEET
PEAK DISCHARGE RATE =       21.63 CFS  AT   1.567 HOURS   BASIN AREA =    .0110 SQ. MI.


ADD HYD              ID=22 HYD NO=300.1 ID=21 ID=3
PRINT HYD            ID=22 CODE=1

                                HYDROGRAPH FROM AREA   300.10

RUNOFF VOLUME =      1.47580 INCHES      =         2.3172 ACRE-FEET
PEAK DISCHARGE RATE =       48.36 CFS  AT   1.567 HOURS   BASIN AREA =    .0294 SQ. MI.


*S ROUTE STORM DRAIN FLOW FROM THE 64TH STREET/EVESHAM RD INTERSECTION
*S IN 48" STORM DRAIN SOUTH TO MIAMI RD NW AND THEN 400 FT EAST IN MIAMI
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLOPE=0.010
                     DIA=4.0 FT N=0.013
```

RATING CURVE PIPE SECTION 1.0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | MAX WIDTH FT |
|---|---|---|---|
| .00 | .00 | .00 | .00 |
| .21 | .25 | .75 | 1.78 |
| .42 | .69 | 3.27 | 2.44 |
| .63 | 1.25 | 7.60 | 2.91 |
| .83 | 1.90 | 13.68 | 3.25 |
| 1.04 | 2.60 | 21.35 | 3.51 |
| 1.25 | 3.36 | 30.47 | 3.71 |
| 1.46 | 4.15 | 40.82 | 3.85 |
| 1.67 | 4.96 | 52.19 | 3.94 |
| 1.88 | 5.79 | 64.33 | 3.99 |
| 2.08 | 6.62 | 77.00 | 4.00 |
| 2.29 | 7.45 | 89.89 | 4.00 |
| 2.50 | 8.27 | 102.71 | 4.00 |
| 2.71 | 9.06 | 115.11 | 4.00 |
| 2.92 | 9.82 | 126.73 | 4.00 |
| 3.13 | 10.54 | 137.13 | 4.00 |
| 3.34 | 11.20 | 145.78 | 4.00 |
| 3.54 | 11.77 | 151.97 | 4.00 |
| 3.75 | 12.24 | 154.52 | 4.00 |
| 4.00 | 12.57 | 154.52 | 4.00 |

```
COMPUTE TRAVEL TIME  ID=23 REACH NO=1 NO VS=1 L=540 FT SLP=0.010
```

TRAVEL TIME TABLE

REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .208 | .250 | .75 | .0497 |
| .417 | .695 | 3.27 | .0319 |
| .625 | 1.255 | 7.60 | .0248 |
| .834 | 1.898 | 13.68 | .0208 |
| 1.042 | 2.604 | 21.35 | .0183 |
| 1.251 | 3.358 | 30.47 | .0165 |
| 1.459 | 4.146 | 40.82 | .0152 |
| 1.668 | 4.960 | 52.19 | .0143 |
| 1.876 | 5.788 | 64.33 | .0135 |
| 2.084 | 6.621 | 77.00 | .0129 |
| 2.293 | 7.451 | 89.89 | .0124 |
| 2.501 | 8.267 | 102.71 | .0121 |
| 2.710 | 9.062 | 115.11 | .0118 |
| 2.918 | 9.823 | 126.73 | .0116 |
| 3.127 | 10.539 | 137.13 | .0115 |
| 3.335 | 11.195 | 145.78 | .0115 |
| 3.544 | 11.773 | 151.97 | .0116 |
| 3.752 | 12.243 | 154.52 | .0119 |
| 4.000 | 12.566 | 154.52 | .0122 |

```
ROUTE                ID=23  HYD NO=105.3 INFLOW ID=19 DT=0.0
PRINT HYD            ID=23  CODE=1
```

PARTIAL HYDROGRAPH 105.30

RUNOFF VOLUME = 1.47585 INCHES = 5.3106 ACRE-FEET
PEAK DISCHARGE RATE = 134.34 CFS AT 1.600 HOURS BASIN AREA = .0675 SQ. MI.

```
*S ROUTE SURFACE RUNOFF FROM THE INTERSECTION OF 64TH/MIAMI RD 400 FT EAST
*S ON 40' F-F MIAMI ROAD STREET SECTION
COMPUTE RATING CURVE CID=2 VS N0=1 MIN EL=100.00 MAX EL=100.87
                     CH SLOPE=0.010 FP SLOPE=0.010 N=0.017 DIST=60.0
                     DIST ELEV   DIST ELEV   DIST ELEV   DIST ELEV
                     0    100.87 10. 100.67 10.1 100.00  30   100.48
                     49.9 100.00 50  100.67  60  100.87
```

RATING CURVE VALLEY SECTION .0

| WATER SURFACE ELEV | FLOW AREA SQ FT | FLOW RATE CFS | TOP WIDTH FT |
|---|---|---|---|
| 100.00 | .00 | .00 | .00 |
| 100.05 | .09 | .06 | 3.81 |
| 100.09 | .35 | .39 | 7.62 |
| 100.14 | .79 | 1.14 | 11.43 |
| 100.18 | 1.40 | 2.45 | 15.24 |
| 100.23 | 2.18 | 4.43 | 19.05 |
| 100.27 | 3.14 | 7.21 | 22.86 |
| 100.32 | 4.28 | 10.87 | 26.67 |
| 100.37 | 5.58 | 15.53 | 30.48 |
| 100.41 | 7.07 | 21.25 | 34.29 |

| | | | |
|---|---|---|---|
| 100.46 | 8.72 | 28.15 | 38.11 |
| 100.50 | 10.53 | 37.31 | 39.95 |
| 100.55 | 12.36 | 48.66 | 39.96 |
| 100.60 | 14.19 | 61.15 | 39.98 |
| 100.64 | 16.02 | 74.75 | 39.99 |
| 100.69 | 17.87 | 87.19 | 41.69 |
| 100.73 | 19.88 | 97.35 | 46.27 |
| 100.78 | 22.11 | 109.24 | 50.85 |
| 100.82 | 24.54 | 122.89 | 55.42 |
| 100.87 | 27.18 | 138.37 | 60.00 |

```
COMPUTE TRAVEL TIME  ID=24   REACH NO=2 NO VS=1 L=400 FT SLP=0.010
```

TRAVEL TIME TABLE

REACH= 2.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .208 | .250 | .75 | .0368 |
| .417 | .695 | 3.27 | .0236 |
| .625 | 1.255 | 7.60 | .0183 |
| .834 | 1.898 | 13.68 | .0154 |
| 1.042 | 2.604 | 21.35 | .0135 |
| 1.251 | 3.358 | 30.47 | .0122 |
| 1.459 | 4.146 | 40.82 | .0113 |
| 1.668 | 4.960 | 52.19 | .0106 |
| 1.876 | 5.788 | 64.33 | .0100 |
| 2.084 | 6.621 | 77.00 | .0096 |
| 2.293 | 7.451 | 89.89 | .0092 |
| 2.501 | 8.267 | 102.71 | .0089 |
| 2.710 | 9.062 | 115.11 | .0087 |
| 2.918 | 9.823 | 126.73 | .0086 |
| 3.127 | 10.539 | 137.13 | .0085 |
| 3.335 | 11.195 | 145.78 | .0085 |
| 3.544 | 11.773 | 151.97 | .0086 |
| 3.752 | 12.243 | 154.52 | .0088 |
| 4.000 | 12.566 | 154.52 | .0090 |

```
ROUTE                ID=24  HYD NO=300.2 INFLOW ID=22  DT=0.0
PRINT HYD            ID=24 CODE=1
```

HYDROGRAPH FROM AREA 300.20

```
RUNOFF VOLUME =      1.47582 INCHES      =       2.3172 ACRE-FEET
PEAK DISCHARGE RATE =       48.18 CFS  AT   1.600 HOURS   BASIN AREA =    .0294 SQ. MI.


*S COMBINE ROUTED OFFSITE SURFACE FLOW WITH STORM DRAIN FLOW TO OBTAIN
*S TOTAL STORM DRAIN FLOW IN 48" PIPE 400 FT EAST OF 64TH IN MIAMI RD
ADD HYD              ID=25 HYD NO=300.3 ID=23 ID=24
PRINT HYD            ID=25 CODE=1
```

HYDROGRAPH FROM AREA 300.30

```
RUNOFF VOLUME =      1.47583 INCHES      =       7.6278 ACRE-FEET
PEAK DISCHARGE RATE =     182.51 CFS  AT   1.600 HOURS   BASIN AREA =   .0969 SQ. MI.


*S BASIN 106 IS PHASE 1 AREA NORTH OF MIAMI AND EAST OF 64TH STREET
COMPUTE NM HYD       ID=26 HYD NO=106.0 AREA=0.01558 SQ MI
                     PER A=0 PER B=20 PER C=23 PER D=57
                     TP=-0.1333 HR   MASS RAIN=-1

K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
UNIT PEAK =   35.061    CFS   UNIT VOLUME =    .9990       B =   526.28      P60 = 1.8700
AREA =      .008881 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330


K =   .117553HR    TP =   .133300HR    K/TP RATIO =   .881867     SHAPE CONSTANT, N =  4.024364
UNIT PEAK =   17.932    CFS   UNIT VOLUME =    .9997       B =   356.79      P60 = 1.8700
AREA =      .006699 SQ MI    IA =    .41977 INCHES    INF =   1.02535 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033330

PRINT HYD            ID=26   CODE=1

                                PARTIAL HYDROGRAPH   106.00


RUNOFF VOLUME =      1.47586 INCHES      =       1.2263 ACRE-FEET
PEAK DISCHARGE RATE =      35.42 CFS  AT   1.500 HOURS   BASIN AREA =   .0156 SQ. MI.


*S ROUTE RUNOFF FROM PHASE 1 AREA TO THE INTERSECTION OF OAKHAM/MIAMI RD
*S ON 28' F-F RESIDENTIAL STREET SECTION
COMPUTE RATING CURVE CID=1 VS N0=1 MIN EL=100.00 MAX EL=100.85
                     CH SLOPE=0.006 FP SLOPE=0.006 N=0.017 DIST=46.0
                     DIST ELEV   DIST ELEV   DIST ELEV   DIST ELEV
                     0    100.85 9.0 100.67  9.1 100.00  23   100.36
                     36.9 100.00 37  100.67  46  100.85

                                RATING CURVE VALLEY SECTION   .0
                                  WATER      FLOW       FLOW       TOP
                                 SURFACE     AREA       RATE       WIDTH
                                  ELEV       SQ FT      CFS        FT
                                 100.00       .00        .00        .00
                                 100.04       .08        .04       3.47
                                 100.09       .31        .26       6.94
                                 100.13       .70        .77      10.40
                                 100.18      1.24       1.66      13.87
                                 100.22      1.94       3.00      17.34
                                 100.27      2.79       4.88      20.81
                                 100.31      3.80       7.37      24.28
                                 100.36      4.97      10.52      27.75
                                 100.40      6.21      15.20      27.92
                                 100.45      7.46      20.58      27.93
                                 100.49      8.71      26.59      27.95
```

| | | | |
|---|---|---|---|
| 100.54 | 9.96 | 33.17 | 27.96 |
| 100.58 | 11.22 | 40.32 | 27.97 |
| 100.63 | 12.47 | 48.00 | 27.99 |
| 100.67 | 13.72 | 56.05 | 28.11 |
| 100.72 | 15.08 | 59.66 | 32.58 |
| 100.76 | 16.63 | 64.68 | 37.06 |
| 100.81 | 18.39 | 71.03 | 41.53 |
| 100.85 | 20.35 | 78.68 | 46.00 |

COMPUTE TRAVEL TIME ID=27 REACH NO=1 NO VS=1 L=950 FT SLP=0.006

TRAVEL TIME TABLE

REACH= 1.0

| WATER DEPTH FEET | AVERAGE AREA SQ.FT. | FLOW RATE CFS | TRAVEL TIME HRS |
|---|---|---|---|
| .045 | .078 | .04 | .4983 |
| .089 | .310 | .26 | .3139 |
| .134 | .698 | .77 | .2395 |
| .179 | 1.241 | 1.66 | .1977 |
| .224 | 1.940 | 3.00 | .1704 |
| .268 | 2.793 | 4.88 | .1509 |
| .313 | 3.801 | 7.37 | .1362 |
| .358 | 4.965 | 10.52 | .1246 |
| .403 | 6.214 | 15.20 | .1079 |
| .447 | 7.463 | 20.58 | .0957 |
| .492 | 8.713 | 26.59 | .0865 |
| .537 | 9.964 | 33.17 | .0793 |
| .582 | 11.215 | 40.32 | .0734 |
| .626 | 12.467 | 48.00 | .0685 |
| .671 | 13.719 | 56.05 | .0646 |
| .716 | 15.077 | 59.66 | .0667 |
| .761 | 16.635 | 64.68 | .0679 |
| .805 | 18.393 | 71.03 | .0683 |
| .850 | 20.351 | 78.68 | .0683 |

ROUTE ID=27 HYD NO=106.1 INFLOW ID=26 DT=0.0
PRINT HYD ID=27 CODE=1

PARTIAL HYDROGRAPH 106.10

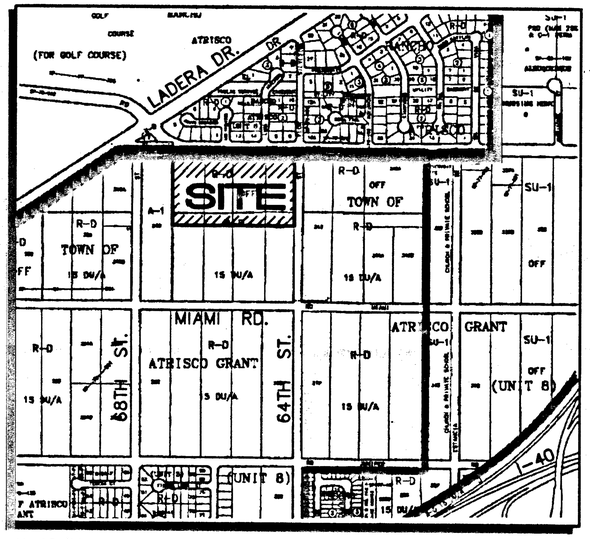
RUNOFF VOLUME = 1.47587 INCHES = 1.2263 ACRE-FEET
PEAK DISCHARGE RATE = 30.43 CFS AT 1.567 HOURS BASIN AREA = .0156 SQ. MI.

*S BASIN 301 IS MIAMI ROAD R/W AREA (440 X 60 FT) WEST OF OAKHAM/MIAMI
COMPUTE NM HYD ID=28 HYD NO=301.0 AREA=0.00095 SQ MI
PER A=0 PER B=0 PER C=18 PER D=82
TP=-0.1333 HR MASS RAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 3.0755 CFS UNIT VOLUME = .9955 B = 526.28 P60 = 1.8700
AREA = .000779 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

```
K =    .105867HR     TP =    .133300HR     K/TP RATIO =    .794199      SHAPE CONSTANT, N =  4.514851
UNIT PEAK =    .49792     CFS    UNIT VOLUME =    .9756        B =    388.14       P60 = 1.8700
AREA =       .000171 SQ MI     IA =    .35000 INCHES     INF =    .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033330

PRINT HYD            ID=28   CODE=1

                                    HYDROGRAPH FROM AREA   301.00

RUNOFF VOLUME =      1.79069 INCHES      =         .0907 ACRE-FEET
PEAK DISCHARGE RATE =        2.51 CFS  AT   1.500 HOURS   BASIN AREA =    .0010 SQ. MI.


*S ADD PHASE 1 RUNOFF TO FLOW FROM MIAMI RD R/W ABUTTING
*S EASTERN PORTION OF PHASE 1
ADD HYD              ID=29 HYD NO=106.2 ID=28 ID=27
PRINT HYD            ID=29 CODE=1

                                 PARTIAL HYDROGRAPH   106.20

RUNOFF VOLUME =      1.49390 INCHES      =        1.3170 ACRE-FEET
PEAK DISCHARGE RATE =       32.51 CFS  AT   1.567 HOURS   BASIN AREA =    .0165 SQ. MI.


*S COMBINE MIAMI S/D FLOW WITH PHASE 1 DISCHARGE TO DETERMINE THE
*S TOTAL FLOW RATE IN MIAMI RD S/D AT SOUTHEAST (LOW) CORNER OF SITE
ADD HYD              ID=30 HYD NO=300.4 ID=25 ID=29
PRINT HYD            ID=30 CODE=1

                                    HYDROGRAPH FROM AREA   300.40

RUNOFF VOLUME =      1.47846 INCHES      =        8.9448 ACRE-FEET
PEAK DISCHARGE RATE =      213.42 CFS  AT   1.567 HOURS   BASIN AREA =    .1134 SQ. MI.


FINISH

NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 09:31:13
```

TALOS LOG No. 20 01 45 1744




H-10/11 1"=750'±

## VICINITY MAP

## SUBDIVISION DATA / NOTES

1. Total Number of Existing Tracts: 1
2. Total Number of Lots Created: 64
3. Total Number of Tracts Created: 0
4. Gross Subdivision Acreage: 9.9267
5. Total Mileage of Full-Width Streets Created: 0.36 mi.
6. Bearings are New Mexico State Plane Grid Bearings (Central Zone).
7. Basis of boundary are the following plats of record entitled:
   "TOWN OF ATRISCO GRANT, UNIT NO. 8", (12-05-44, D-117)
   "KENSINGTON SUBDIVISION, PHASE 2", (11-23-99, 99C-319)
   all being records of Bernalillo County, New Mexico.
8. Field Survey performed October, 1997.
9. Title Report: None provided.
10. Unless otherwise noted, all points are "SET 5/8" REBAR with cap "ALS LS 7719".
11. City Standard Utility Note II:
    "City of Albuquerque Water and Sanitary Sewer Service to Kensington Subdivision, Phase 4, must be verified and coordinated with the Public Works Department, City of Albuquerque."
12. Centerline (in lieu of R/W) monumentation to be installed at all centerline PC's, PT's, angle points and street intersections prior to acceptance of subdivision street improvements and will consist of a standard four-inch (4") aluminum alloy cap stamped "City of Albuquerque", "Centerline Monumentation", "Survey Marker", "Do Not Disturb", "PLS #7719".
13. There shall be a minimum of 2,400 square feet of open space provided on each lot within the subdivision.
14. Total remaining open space requirement will be met via a cash payment to the City of Albuquerque per the provisions of Section 14-16-3-8(A)(2).

## DISCLOSURE STATEMENT

The intent of this plat is to subdivide the subject tract (TRACT A) into 64 residential lots, to dedicate public rights-of-way, and to grant those easements necessary to serve the residential development.

ALDRICH LAND SURVEYING
P.O. BOX 30701, ALBQ., N.M. 87190
505-884-1990

THIS IS TO CERTIFY THAT TAXES ARE CURRENT AND PAID ON UPC #: 1010 059 488 345 10227
PROPERTY OWNER OF RECORD: Kensington Limited Partnership
BERNALILLO COUNTY TREASURER'S OFFICE
Conchita Lucero 3/14/02

156PT1.DWG/rh 01/03/02

## LEGAL DESCRIPTION

A tract of land situate within the Town of Atrisco Grant, projected Sections 10 and 11, Township 11 North, Range 2 East, New Mexico Principal Meridian, City of Albuquerque, Bernalillo County, New Mexico, being all of TRACT A, KENSINGTON SUBDIVISION PHASE 2, as the same is shown and designated on said plat filed for record in the office of the County Clerk of Bernalillo County, New Mexico, on November 23, 1999, in Volume 99C, Folio 319 and being more particularly described as follows:

BEGINNING at the northwest corner of the herein described tract, said point being on the south right-of-way of Ouray Road, and also being common with the northeast corner of TRACT 348, TOWN OF ATRISCO GRANT, UNIT 8, as the same is shown and designated on said plat filed for record in the office of the County Clerk of Bernalillo County, New Mexico, on December 5, 1944, in Volume D, Folio 117, from whence the Albuquerque Control Survey Monument "6-G10" bears N 29°37'51" W, 2115.23 feet;

THENCE along said south right-of-way line S 89°23'27" E, 814.76 feet to a point of tangent curvature;

THENCE continuing 39.28 feet along a curve to the right whose radius is 25.00 feet and whose long chord bears S 44°23'01" E, 35.36 feet through a central angle of 90°00'52" to a point of tangency, said point being the south southwest right-of-way return of the Ouray Road and 64th Street intersection;

THENCE proceeding along the west right-of-way line of 64th Street N.W., S 00°37'25" W, 150.34 feet;

THENCE continuing along said right-of-way line S 00°08'32" E, 149.62 feet;

THENCE continuing along said right-of-way line S 00°37'25" W, 190.89 feet to the southeast corner, said corner being common with the northeast corner of LOT 1, BLOCK D, of said KENSINGTON SUBDIVISION, PHASE 2;

THENCE N 89°22'35" W, 675.46 feet along a line common with the northerly lot lines of LOTS 1-14, BLOCK D of said KENSINGTON SUBDIVISION, PHASE 2 to a point, said point being common with the northwest corner of LOT 14, BLOCK D of said KENSINGTON SUBDIVISION, PHASE 2 and further being a point on the east right-of-way line of Brackley Drive N.W.;

THENCE N 00°37'25" E, 7.00 feet along said right-of-way line to a point;

THENCE leaving said right-of-way and continuing N 89°22'35" W, 166.61 feet to the southwest corner, said corner being common with the northwest corner of LOT 25, BLOCK F, of said KENSINGTON SUBDIVISION, PHASE 2 and further being on the east line of said TRACT 348;

THENCE N 00°39'28" E, 508.63 feet along a line common with the east line of said TRACT 348 to the POINT OF BEGINNING and containing 9.9267 acres more or less.

## FREE CONSENT AND DEDICATION

The subdivision shown hereon is with the free consent and in accordance with the desires of the undersigned Owner(s) and/or Proprietor(s) thereof and said Owner(s) and/or Proprietor(s) do hereby dedicate all streets and public rights-of-way shown hereon to the City of Albuquerque in fee simple with warranty covenants and do hereby grant: all access, utility and drainage easements shown hereon including the right to construct, operate, inspect, and maintain facilities therein; and all public utility easements shown hereon for the common and joint use of gas, electrical power and communication services for overhead and/or buried distribution lines, conduits, and pipes for underground and/or overhead utilities where shown or indicated, and including the right of ingress and egress for construction and maintenance, and the right to trim interfering trees and shrubs. Said Owner(s) and/or Proprietor(s) do hereby consent to all of the foregoing and do hereby certify that this subdivision is their free act and deed.

## OWNER

KENSINGTON LIMITED PARTNERSHIP
ARGUS DEVELOPMENT CO., INC., GENERAL PARTNER

BFS 1-19-02
BEN F. SPENCER, PRESIDENT — Date
ARGUS DEVELOPMENT COMPANY, INC.

## ACKNOWLEDGMENT

OFFICIAL SEAL
Ruth T. Lozano
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: 4/22/03

STATE OF NEW MEXICO }
COUNTY OF BERNALILLO } SS

This instrument was acknowledged before me on January 19, 2002, by Ben F. Spencer as President of Argus Development Company, Inc., a New Mexico Corporation, a General Partner of Kensington Limited Partnership, a New Mexico Limited Partnership, on behalf of said partnership.

My Commission Expires: 4/22/03

Ruth T. Lozano
Notary Public


Mary Herrera Bern. Co. PLAT R 17.00 2002034889 5641131 Page: 1 of 3 03/14/2002 03:42P Bk-2002C Pg-88


# PLAT FOR KENSINGTON SUBDIVISION PHASE 4

BEING A REPLAT OF
TRACT A, KENSINGTON SUBDIVISION PHASE 2
WITHIN THE
TOWN OF ATRISCO GRANT
PROJECTED SECTIONS 10 & 11
TOWNSHIP 11 NORTH, RANGE 2 EAST, NMPM
CITY OF ALBUQUERQUE
BERNALILLO COUNTY, NEW MEXICO

NOVEMBER 2001

## APPROVALS

DRB PROJECT NO. 1000838
APPLICATION NO. 01410-00000-01583
02 DRB - 00322

| | |
|---|---|
| PUBLIC SERVICE CO. OF NM--GAS SERVICES DIVISION AND ELECTRIC SERVICES DIVISION | 1-07-02 DATE |
| QWEST CORPORATION | 1-7-02 DATE |
| COMCAST CABLE | 1-7-02 DATE |
| CITY SURVEYOR, ENGR. DIV., P.W.D. | 1-22-02 DATE |
| TRAFFIC ENGINEERING, TRANS. DEV. DIV., P.W.D. | 3-13-02 DATE |
| PARKS AND RECREATION | 3-13-02 DATE |
| UTILITY DEVELOPMENT DIV., P.W.D. | 3-13-02 DATE |
| REAL PROPERTY DIVISION, D.F.M. | N/A DATE |
| A.M.A.F.C.A. | 3-13-02 DATE |
| CITY ENGINEER, PUBLIC WORKS DEPT. | 3-13-02 DATE |

APPROVAL AND CONDITIONAL ACCEPTANCE AS SPECIFIED BY THE ALBUQUERQUE SUBDIVISION ORDINANCE, CHAPTER 14, ARTICLE 14 OF THE REVISED ORDINANCES OF ALBUQUERQUE, N.M, 1994.

| | |
|---|---|
| CITY PLANNER, ALBUQUERQUE PLANNING DIVISION | 3/14/02 DATE |

## SURVEYOR'S CERTIFICATION

"I, Timothy Aldrich, a duly qualified Registered Professional Land Surveyor under the laws of the State of New Mexico, do hereby certify that this plat and description were prepared by me or under my supervision, shows all easements as shown on the plat of record or made known to me by the owners and/or proprietors of the subdivision shown hereon, utility companies and other parties expressing an interest and meets the minimum requirements for monumentation and surveys of the Albuquerque Subdivision Ordinance, Chapter 14, Article 14, and further meets the Minimum Standards for Land Surveying in the State of New Mexico (Effective November 1, 1989 and revisions effective December 25, 1991 and February 2, 1994 and October 2000), and is true and correct to the best of my knowledge and belief".

Timothy Aldrich, N.M.P.L.S. No. 7719 — 01-04-02 Date

Mary Herrera Bern. Co. PLAT R 17.00 2002034980 5641131 Page: 3 of 3 03/14/2002 03:42P Bk-2002C Pg-88

1156-3

# PLAT
## FOR
# KENSINGTON SUBDIVISION PHASE 4

BEING A REPLAT OF
TRACT A , KENSINGTON SUBDIVISION PHASE 2
WITHIN THE
TOWN OF ATRISCO GRANT
PROJECTED SECTIONS 10 & 11
TOWNSHIP 11 NORTH, RANGE 2 EAST, NMPM
CITY OF ALBUQUERQUE
BERNALILLO COUNTY, NEW MEXICO

NOVEMBER 2001

## EASEMENTS NOTES

1. 20' PUBLIC DRAINAGE EASEMENT GRANTED BY THIS PLAT.
2. 10' PUBLIC UTILITY EASEMENT GRANTED BY THIS PLAT.
3. EXISTING 10' PUBLIC UTILITY EASEMENT (11-23-99, 99C-319).
4. LOT 28, BLOCK F IS COVERED BY AN EXISTING TEMPORARY PUBLIC DRAINAGE EASEMENT WHICH CAN BE RELEASED UPON DEVELOPMENT OF TR. 348. (12-07-2001, A28-4091)

LINE TABLE

| LINE | BEARING | DISTANCE |
|---|---|---|
| L1 | S 00°37'25" W | 0.35 |
| L2 | N 00°37'25" E | 5.15 |
| L3 | N 00°37'25" E | 12.21 |
| L4 | N 00°37'25" E | 7.00 |

CURVE TABLE

| CURVE | RADIUS | LENGTH | TANGENT | CHORD | BEARING | DELTA |
|---|---|---|---|---|---|---|
| C1 | 25.00 | 39.28 | 25.01 | 35.36 | N 44°23'01" W | 90°00'52" |
| C2 | 25.00 | 39.27 | 25.00 | 35.36 | N 45°37'25" E | 90°00'00" |
| C3 | 25.00 | 38.95 | 24.68 | 35.13 | N 44°46'47" W | 89°16'10" |
| C4 | 25.00 | 39.27 | 25.00 | 35.36 | N 45°37'25" E | 90°00'00" |
| C5 | 25.00 | 39.27 | 25.00 | 35.36 | N 44°22'35" W | 90°00'00" |
| C6 | 25.00 | 39.27 | 25.00 | 35.36 | S 45°37'25" W | 90°00'00" |
| C7 | 25.00 | 39.27 | 25.00 | 35.36 | S 44°22'35" E | 90°00'00" |
| C8 | 25.00 | 40.04 | 25.78 | 35.89 | S 44°44'43" W | 91°45'25" |
| C9 | 25.00 | 39.27 | 25.00 | 35.36 | S 44°22'35" E | 90°00'00" |
| C10 | 25.00 | 39.26 | 24.99 | 35.35 | S 45°36'59" W | 89°59'08" |
| C11 | 25.00 | 39.28 | 25.01 | 35.36 | N 44°23'01" W | 90°00'52" |

## LOT AREA TABLE

| BLOCK D | | BLOCK F | | BLOCK G | | BLOCK H | | | |
|---|---|---|---|---|---|---|---|---|---|
| LOT | AREA (SF) | LOT | AREA (SF) | LOT | AREA (SF) | LOT | AREA (SF) | LOT | AREA (SF) |
| 15 | 6756 | 26 | 6030 | 1 | 6520 | 1 | 6653 | 14 | 6775 |
| 16 | 5300 | 27 | 6028 | 2 | 5285 | 2 | 5300 | 15 | 5300 |
| 17 | 4770 | 28 | 7834 | 3 | 4757 | 3 | 5300 | 16 | 5300 |
| 18 | 4770 | 29 | 5398 | 4 | 4757 | 4 | 5300 | 17 | 5300 |
| 19 | 4770 | 30 | 5335 | 5 | 4758 | 5 | 5300 | 18 | 5300 |
| 20 | 4770 | 31 | 5272 | 6 | 4758 | 6 | 5300 | 19 | 5300 |
| 21 | 4770 | 32 | 5210 | 7 | 4759 | 7 | 5300 | 20 | 5300 |
| 22 | 4770 | 33 | 5769 | 8 | 4759 | 8 | 5300 | 21 | 5300 |
| 23 | 4770 | 34 | 5768 | 9 | 4759 | 9 | 5300 | 22 | 5300 |
| 24 | 4770 | 35 | 7205 | 10 | 4760 | 10 | 5300 | 23 | 5300 |
| 25 | 4770 | | | 11 | 4761 | 11 | 5300 | 24 | 5300 |
| 26 | 4770 | | | 12 | 4761 | 12 | 5300 | 25 | 5300 |
| 27 | 5300 | | | 13 | 5291 | 13 | 6639 | 26 | 6327 |
| 28 | 6275 | | | 14 | 6530 | | | | |

## PUBLIC UTILITY EASEMENTS

PUBLIC UTILITY EASEMENTS SHOWN ON THIS PLAT ARE GRANTED FOR THE COMMON AND JOINT USE OF:

1. THE PUBLIC SERVICE CO. OF NM--ELECTRIC SERVICES DIVISION FOR THE INSTALLATION, MAINTENANCE, AND SERVICE OF UNDERGROUND/OVERHEAD ELECTRICAL LINES, COMMUNICATION LINES, TRANSFORMERS, AND ANY OTHER EQUIPMENT, FIXTURES, STRUCTURES, AND RELATED FACILITIES REASONABLY NECESSARY TO PROVIDE ELECTRICAL SERVICE.
2. QWEST FOR THE INSTALLATION, MAINTENANCE AND SERVICE OF ALL BURIED COMMUNICATION LINES AND OTHER RELATED EQUIPMENT AND FACILITIES REASONABLY NECESSARY TO PROVIDE COMMUNICATION SERVICES, INCLUDING BUT NOT LIMITED TO ABOVE GROUND PEDESTALS AND CLOSURES.
3. COMCAST FOR THE INSTALLATION, MAINTENANCE, AND SERVICE OF SUCH LINES, CABLE, AND OTHER RELATED EQUIPMENT AND FACILITIES REASONABLY NECESSARY TO PROVIDE CABLE TV SERVICE.
4. THE PUBLIC SERVICE CO. OF NM--GAS SERVICES DIVISION FOR THE INSTALLATION, MAINTENANCE, AND SERVICE OF SUCH DISTRIBUTION AND SERVICE LINES AND FACILITIES REASONABLY NECESSARY TO PROVIDE GAS SERVICE.

INCLUDED IS THE RIGHT TO BUILD, REBUILD, CONSTRUCT, RECONSTRUCT, LOCATE, RELOCATE, CHANGE, REMOVE, MODIFY, RENEW, OPERATE, AND MAINTAIN FACILITIES FOR THE PURPOSES DESCRIBED ABOVE, TOGETHER WITH FREE ACCESS TO, FROM, AND OVER SAID EASEMENT, INCLUDING SUFFICIENT WORKING AREA SPACE FOR ELECTRIC TRANSFORMERS, WITH THE RIGHT AND PRIVILEGE TO TRIM AND REMOVE TREES, SHRUBS, OR BUSHES WHICH INTERFERE WITH THE PURPOSES SET FORTH HEREIN. NO BUILDING, SIGN, OR OTHER STRUCTURE SHALL BE ERECTED OR CONSTRUCTED ON SAID EASEMENTS, NOR SHALL ANY WELL BE DRILLED OR OPERATED THEREON. PROPERTY OWNERS SHALL BE SOLELY RESPONSIBLE FOR CORRECTING ANY VIOLATIONS OF NATIONAL ELECTRICAL SAFETY CODE CAUSED BY CONSTRUCTION OF POOLS, DECKING, OR ANY STRUCTURES ADJACENT TO OR NEAR EASEMENTS SHOWN ON THIS PLAT.

EASEMENTS FOR ELECTRIC TRANSFORMERS/SWITCHGEARS, AS INSTALLED, SHALL EXTEND TEN FEET (10') IN FRONT OF TRANSFORMER/SWITCHGEAR DOORS AND FIVE FEET (5') ON EACH SIDE.

In approving this plat, PNM Electric Services and Gas Services (PNM) did not conduct a Title Search of the properties shown hereon. Consequently, PNM does not waive nor release any easement or easement rights to which it may be entitled.

156PT1.DWGrfh 01/03/02

1156-2

2002034999
3041121
Page 2 of 3
02/14/2002 03:42P
Mary Herrera Bern. Co. PLAT R 17.00 Bk-2002C Pg-88

# PLAT
## FOR
# KENSINGTON SUBDIVISION PHASE 4

BEING A REPLAT OF
TRACT A, KENSINGTON SUBDIVISION PHASE 2
WITHIN THE
TOWN OF ATRISCO GRANT
PROJECTED SECTIONS 10 & 11
TOWNSHIP 11 NORTH, RANGE 2 EAST, NMPM
CITY OF ALBUQUERQUE
BERNALILLO COUNTY, NEW MEXICO

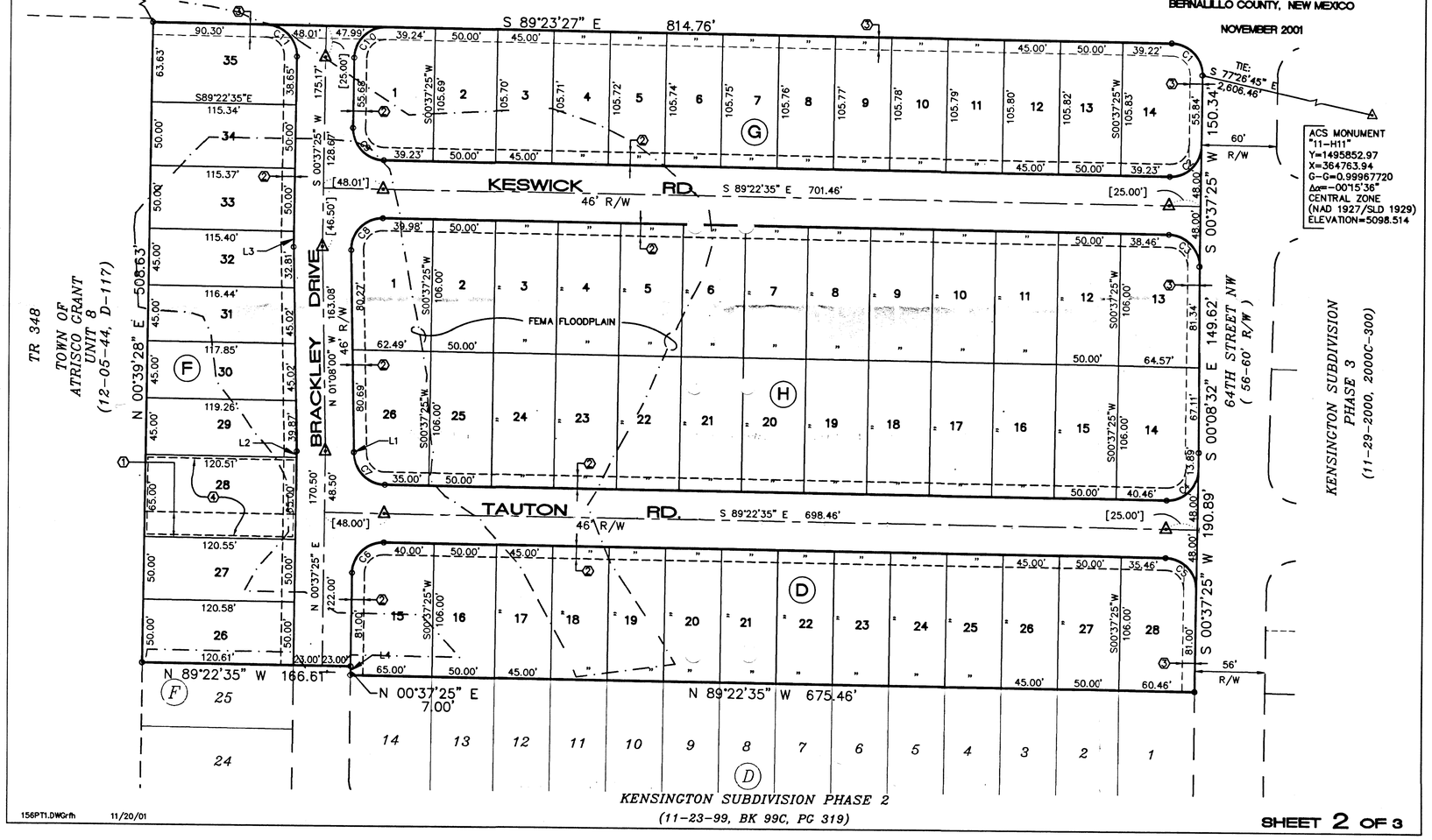
NOVEMBER 2001

**NOTES**

1. DISTANCES IN BRACKETS ARE ℄ MONUMENT DISTANCES.
2. SEE SHEET 3 FOR EASEMENT NOTES, LOT AREA TABLE AND CURVE TABLE.

SCALE: 1"=50'

50 25 0 50 100 FEET




156PT1.DWG/rfh 11/20/01

2002034999
5641131
Page: 2 of 3
03/14/2002 03:42P
Bk-2002C Pg-88
Mary Herrera Bern. Co. PLAT R 17.00

# PLAT
## FOR
# KENSINGTON SUBDIVISION PHASE 4

BEING A REPLAT OF
TRACT A, KENSINGTON SUBDIVISION PHASE 2
WITHIN THE
TOWN OF ATRISCO GRANT
PROJECTED SECTIONS 10 & 11
TOWNSHIP 11 NORTH, RANGE 2 EAST, NMPM
CITY OF ALBUQUERQUE
BERNALILLO COUNTY, NEW MEXICO

NOVEMBER 2001

**NOTES**

1. DISTANCES IN BRACKETS ARE ℄ MONUMENT DISTANCES.
2. SEE SHEET 3 FOR EASEMENT NOTES, LOT AREA TABLE AND CURVE TABLE.

SCALE: 1"=50'

50 25 0 50 100 FEET

ACS MONUMENT
"6-G10"
Y=1498292.068
X=360334.560
G-G=0.99967789
Δα=-00°16'07"
CENTRAL ZONE
(NAD 1927/SLD 1929)
ELEVATION=5111.87

TIE: N 29°37'51" W 2115.23'

ACS MONUMENT
"11-H11"
Y=1495852.97
X=364763.94
G-G=0.99967720
Δα=-00°15'36"
CENTRAL ZONE
(NAD 1927/SLD 1929)
ELEVATION=5098.514

TIE: S 77°26'45" E 2,606.46'

156PT1.DWGrfh 11/20/01



1156-2

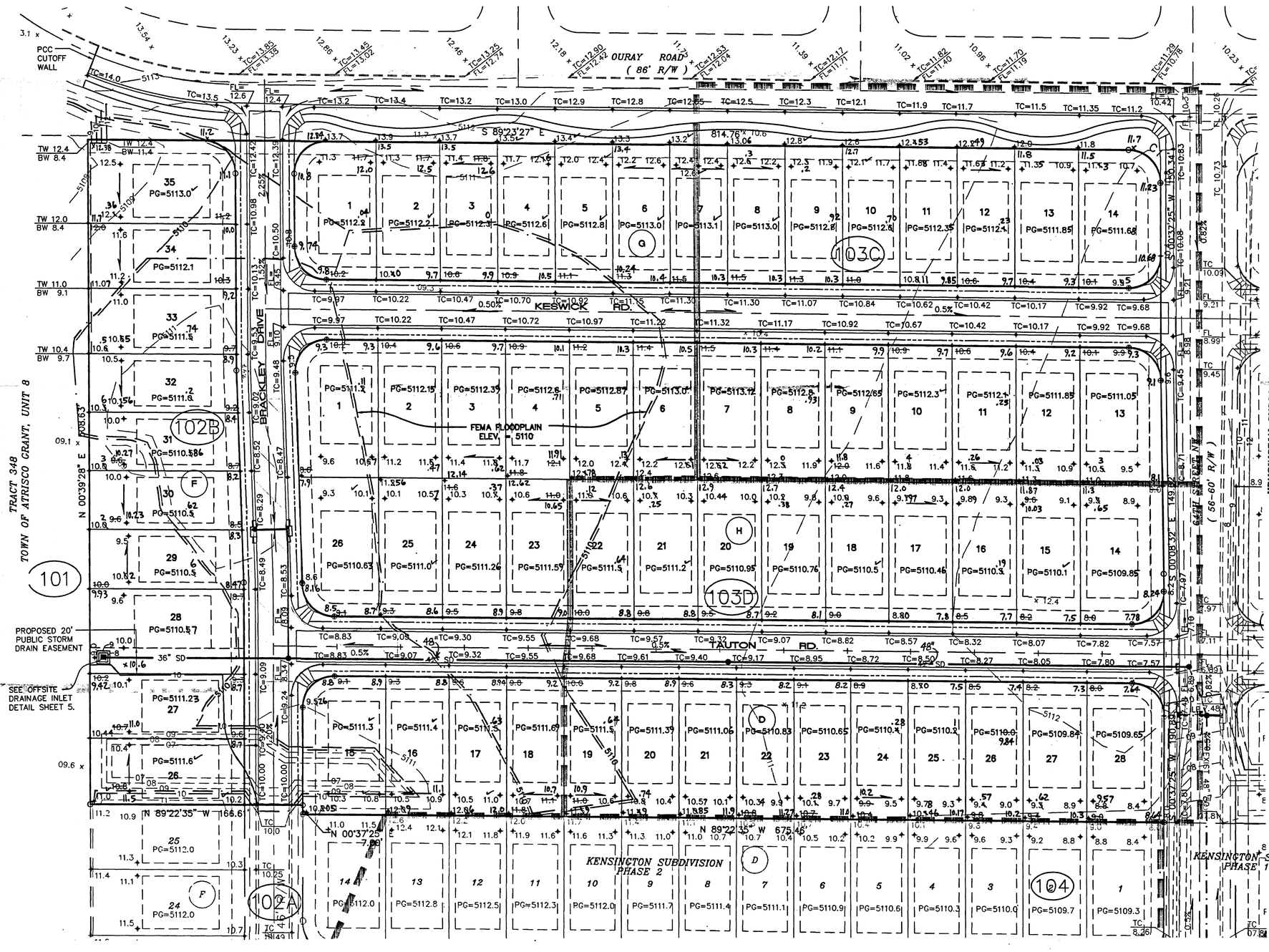
**ENGINEER'S CERTIFICATION**

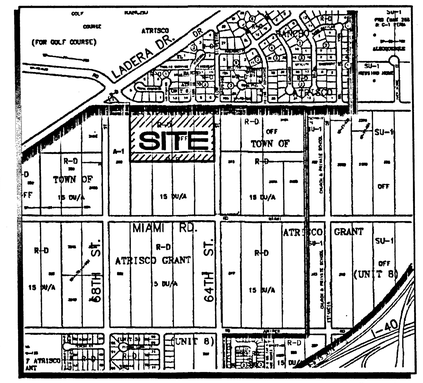
I, SCOTT M. MCGEE, LICENSED UNDER THE LAWS OF THE STATE OF NEW MEXICO, DO HEREBY CERTIFY THAT THIS PROJECT WAS CONSTRUCTED IN SUBSTANTIAL COMPLIANCE WITH THE APPROVED PLAN DATED 10/25/01 (CITY APPROVAL LETTER DATED 11/09/01). THE RETAINING WALL PROPOSED AT THE NORTHWEST PROPERTY CORNER RUNNING ALONG THE WEST PROPERTY LINE WAS NOT BUILT AS FILL DIRT WAS PLACED ON THE ADJACENT VACANT LOT (TRACT 348). AS-BUILT GRADES WERE FIELD VERIFIED BY ALDRICH LAND SURVEYING, NMLS NO. 7719 ON 01/17/02 IN ACCORDANCE WITH THE "NEW MEXICO ENGINEERING AND SURVEYING ACT" SECTION 61-23-1 THROUGH 61-23-32 NMSD (1978).

Scott M McGee
SCOTT M. MCGEE, NMPE NO. 10519

SCOTT M. MCGEE NEW MEXICO 10519 REGISTERED PROFESSIONAL ENGINEER

3/21/02
DATE




H-10/11 1"=750'±

VICINITY MAP

SCALE: 1"=40'

## LEGEND

| | |
|---|---|
| —5112— | EXISTING CONTOUR |
| TC=11.29 / FL=10.78 | EXISTING TOP OF CURB / FLOWLINE ELEVATION |
| ◆78.3 | PROPOSED SPOT ELEVATION |
| | FLOW ARROW |
| PG=5112.7 | PAD GRADE ELEVATION |
| TC=81.95 / FL=81.45 | TOP OF CURB / FLOWLINE ELEVATION |
| | PROPOSED RETAINING WALL |
| TW=10.0 / BW=9.0 | TOP OF RETAINING WALL / BOTTOM OF RETAINING WALL ELEVATION |
| | WATER BAR |
| | STORM DRAIN WITH MANHOLE |
| | TYPE 'A' INLET |
| 103 | BASIN ID |
| | FEMA FLOODPLAIN BOUNDARY |
| x7.78 | AS-BUILT ELEVATION |

AS-BUILT INFORMATION

CONTRACTOR
WORK STAKED BY DATE
FIELD VERIFICATION BY DATE
ACCEPTANCE DATE
FIELD VERIFICATION BY DATE
DRAWINGS CORRECTED BY DATE
MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

BENCH MARKS

ACS STA "2-H10" LOCATED AT THE NW QUADRANT OF 64TH STREET AND MIAMI ROAD NW.
ELEV = 5108.81

SURVEY INFORMATION

FIELD NOTES

| | | |
|---|---|---|
| 1 | ALS | 11/97 |

ENGINEER'S SEAL

SCOTT M. MCGEE NEW MEXICO 10519 REGISTERED PROFESSIONAL ENGINEER 10/25/01

| NO. | DATE | REMARKS | BY |
|---|---|---|---|
| | | REVISIONS | |

DESIGN

| | | |
|---|---|---|
| DESIGNED BY | SMM | DATE 1/01 |
| DRAWN BY | ANW | DATE 1/01 |
| CHECKED BY | SMM | DATE 1/01 |

ISAACSON & ARFMAN, P.A.
Consulting Engineering Associates
128 Monroe Street N.E.
Albuquerque New Mexico
156GRD.DWGrth 10/24/01

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: KENSINGTON SUBDIVISION - PHASE 4
# GRADING & DRAINAGE PLAN

| Design Review Committee | City Engineer Approval | Last Design Update | Mo./Day/Yr. | Mo./Day/Yr. |
|---|---|---|---|---|
| | | | | |

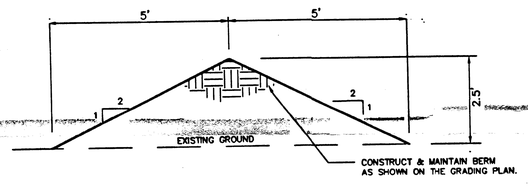
| City Project No. | Zone Map No. | Sheet | Of |
|---|---|---|---|
| 623182 | H-10 | 4 | 17 |

## GRADING NOTES:

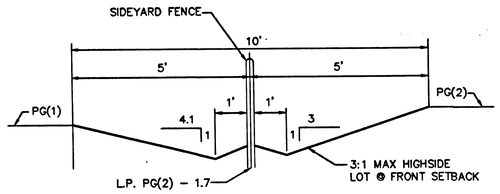
1. ALL TRASH, DEBRIS, & SURFACE VEGETATION SHALL BE CLEARED AND LEGALLY DISPOSED OFFSITE.
2. ALL SUBGRADE AND FILL SHALL BE COMPACTED TO A MINIMUM OF 90% ASTM D-1557.
3. EXCAVATION IS UNCLASSIFIED AND INCLUDES EXCAVATION TO SUBGRADE ELEVATIONS INDICATED, REGARDLESS OF CHARACTER OF MATERIALS ENCOUNTERED.
4. CONFORM TO ELEVATIONS AND DIMENSIONS SHOWN ON PLANS WITHIN A TOLERANCE OF 0.3± FEET.
5. SCARIFY AND COMPACT SUBGRADE FOR FILLS. PLACE FILL MATERIALS IN LAYERS NOT MORE THAN 8" IN LOOSE DEPTH. MOISTEN AS NECESSARY TO PROVIDE OPTIMUM MOISTURE (±2%) CONTENT.
6. UNIFORMLY GRADE AREAS WITHIN LIMITS OF GRADING AS SHOWN ON PLAN. SMOOTH FINISHED SURFACE WITHIN SPECIFIED TOLERANCE, COMPACT WITH UNIFORM SLOPES BETWEEN POINTS WHERE ELEVATIONS ARE INDICATED.
7. MAXIMUM SLOPES SHALL BE 3:1; MINIMUM SLOPES SHALL BE 1%.
8. TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT NEW MEXICO ONE CALL SYSTEM, 260-1990, FOR LOCATION OF EXISTING UTILITIES.
9. IF ANY UTILITY LINES, PIPELINES, OR UNDERGROUND UTILITY LINES ARE SHOWN ON THESE DRAWINGS, THEY ARE SHOWN IN AN APPROXIMATE MANNER ONLY, AND SUCH LINES MAY EXIST WHERE NONE ARE SHOWN. IF ANY SUCH EXISTING LINES ARE SHOWN, THE LOCATION IS BASED UPON INFORMATION PROVIDED BY THE OWNER OF SAID UTILITY, AND THE INFORMATION MAY BE INCOMPLETE, OR MAY BE OBSOLETE BY THE TIME CONSTRUCTION COMMENCES. THE ENGINEER HAS CONDUCTED ONLY PRELIMIARY INVESTIGATION OF THE LOCATION, DEPTH, SIZE OR TYPE OF EXISTING UTILITY LINES, PIPELINES, OR UNDERGROUND UTILITY LINES. THIS INVESTIGATION IS NOT CONCLUSIVE, AND MAY NOT BE COMPLETE, THEREFORE, MAKES NO REPRESENTATION PERTAINING THERETO, AND ASSUMES NO RESPONSIBILITY OR LIABILITY THEREFORE. THE CONTRACTOR SHALL INFORM ITSELF OF THE LOCATION OF ANY UTILITY LINE, PIPELINE, OR UNDERGROUND UTILITY LINE IN OR NEAR THE AREA OF THE WORK IN ADVANCE OF AND DURING EXCAVATION WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE CAUSED BY ITS FAILURE TO LOCATE, IDENTIFY AND PRESERVE ANY AND ALL EXISTING UTILITIES, PIPELINES, AND UNDERGROUND UTILITY LINES. IN PLANNING AND CONDUCTING EXCAVATION, THE CONTRACTOR SHALL COMPLY WITH STATE STATUTES, MUNICIPAL AND LOCAL ORDINANCES, RULES AND REGULATIONS, IF ANY, PERTAINING TO THE LOCATION OF THESE LINES AND FACILITIES.
10. THE CONTRACTOR SHALL PROMPTLY CLEAN UP ANY MATERIAL EXCAVATED WITHIN THE PUBLIC RIGHT-OF-WAY SO THAT THE EXCAVATED MATERIAL IS NOT ERODED AND WASHED DOWN THE STREET.
11. OWNER WILL PROVIDE SOIL TESTING AND INSPECTION SERVICES DURING EARTHWORK OPERATIONS. ALLOW TESTING SERVICE TO INSPECT AND APPROVE COMPACTED SUBGRADES AND FILL LAYERS BEFORE FURTHER CONSTRUCTION WORK IS DONE. SHALL COMPACTION TESTS INDICATE INADEQUATE DENSITY, CONTRACTOR SHALL PROVIDE ADDITIONAL COMPACTION AND TESTING AT NO ADDITIONAL EXPENSE.
12. OWNER HAS ESTABLISHED SUBDIVISION BOUNDARY CORNERS. CONTRACTOR SHALL PROVIDE ALL OTHER CONSTRUCTION STAKING INCLUDING TRACT CORNERS. CONTRACTOR SHALL LOCATE AND PRESERVE ALL BOUNDARY CORNERS AND REPLACE ANY LOST OR DISTURBED CORNERS.
13. ISAACSON & ARFMAN, P.A. (THE ENGINEER) HAS PREPARED THIS GRADING PLAN TO ESTABLISH FINAL SURFACE GRADES FOR BOTH THE PROPOSED INDIVIDUAL RESIDENTIAL LOTS AND THE PUBLIC RIGHTS-OF-WAY.

## EROSION CONTROL

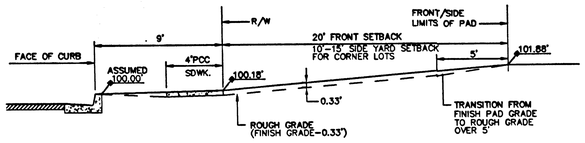
1. THE CONTRACTOR SHALL ENSURE THAT NO SOIL ERODES FROM THE SITE INTO THE PUBLIC RIGHT-OF-WAY OR ONTO PRIVATE PROPERTY. THIS CAN BE ACHIEVED BY CONSTRUCTING EROSION CONTROL BERMS (AS DETAILED BELOW) AS SHOWN ON THE PLAN AND WETTING THE SOIL TO KEEP IT FROM BLOWING.
2. THE CONTRACTOR SHALL SECURE "TOPSOIL DISTURBANCE PERMIT" FROM THE CITY ENVIRONMENTAL HEALTH DEPARTMENT PRIOR TO BEGINNING CONSTRUCTION. AN EXCAVATION PERMIT IS REQUIRED FOR ALL WORK WITHIN PUBLIC RIGHT-OF-WAY.
3. SEE GRADING NOTES.



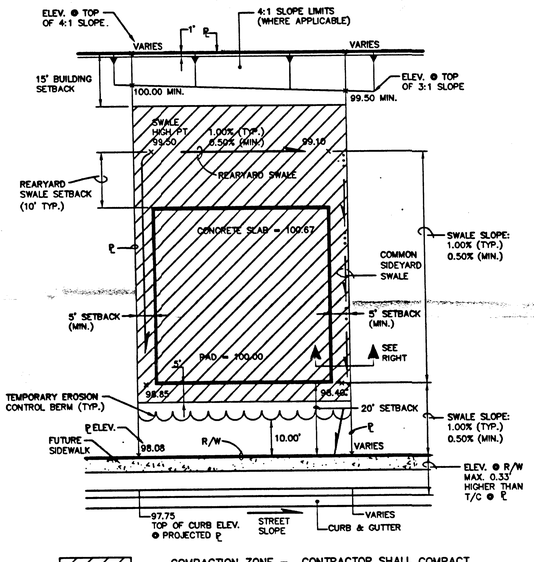

**EROSION CONTROL BERM**
SCALE: 1"=2'




**SIDEYARD DRAINAGE SWALE**
NOT TO SCALE

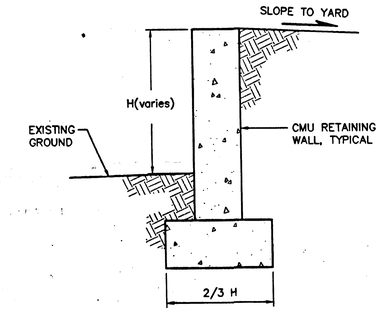



**FRONT/SIDE YARD GRADING**
SCALE: 1"=5'-0"

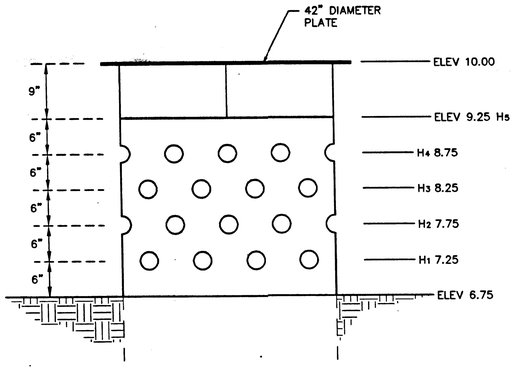



COMPACTION ZONE – CONTRACTOR SHALL COMPACT SOILS IN THIS AREA TO A MINIMUM OF 95% COMPACTION PER ASTM D698, FOR A DEPTH OF 12 INCHES.

**TYPICAL LOT GRADING SHOWING COMPACTION ZONE**
SCALE: 1"=20'




**WEST RETAINING WALL TYPICAL SECTION**
SCALE: 1"=1'-0"




8-3"ø PERFORATIONS EACH LEVEL
36"ø STANDPIPE – CMP

**OFFSITE INLET**
SCALE: 1"=1'

AS-BUILT INFORMATION
CONTRACTOR SUNDANCE DATE 02
STAKED BY AIS, INC. DATE 02
INSPECTOR'S ACCEPTANCE BY Jackson DATE 02
FIELD VERIFICATION BY AIS, INC. DATE 02
REMARKS CORRECTED BY AIS, INC. DATE 02
MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

BENCH MARKS
ACS BENCHMARK "11-H11"
LOCATED IN THE COORS BLVD. MEDIAN
630 FEET SOUTH OF QUIRAY ROAD
A 3-1/4" ALUMINUM CAP,
ELEV. = 5098.514 (NGVD 1929)

SURVEY INFORMATION
FIELD NOTES
1 ALS 11/97

ENGINEER'S SEAL
STATE OF NEW MEXICO 10519 PROFESSIONAL ENGINEER
SUSAN M. McGEE
11/28/01

| NO. | DATE | REVISIONS | BY |
|---|---|---|---|
| | | REMARKS | |

DESIGN
DESIGNED BY SMM DATE 1/01
DRAWN BY ANW DATE 1/01
CHECKED BY SMM DATE 1/01

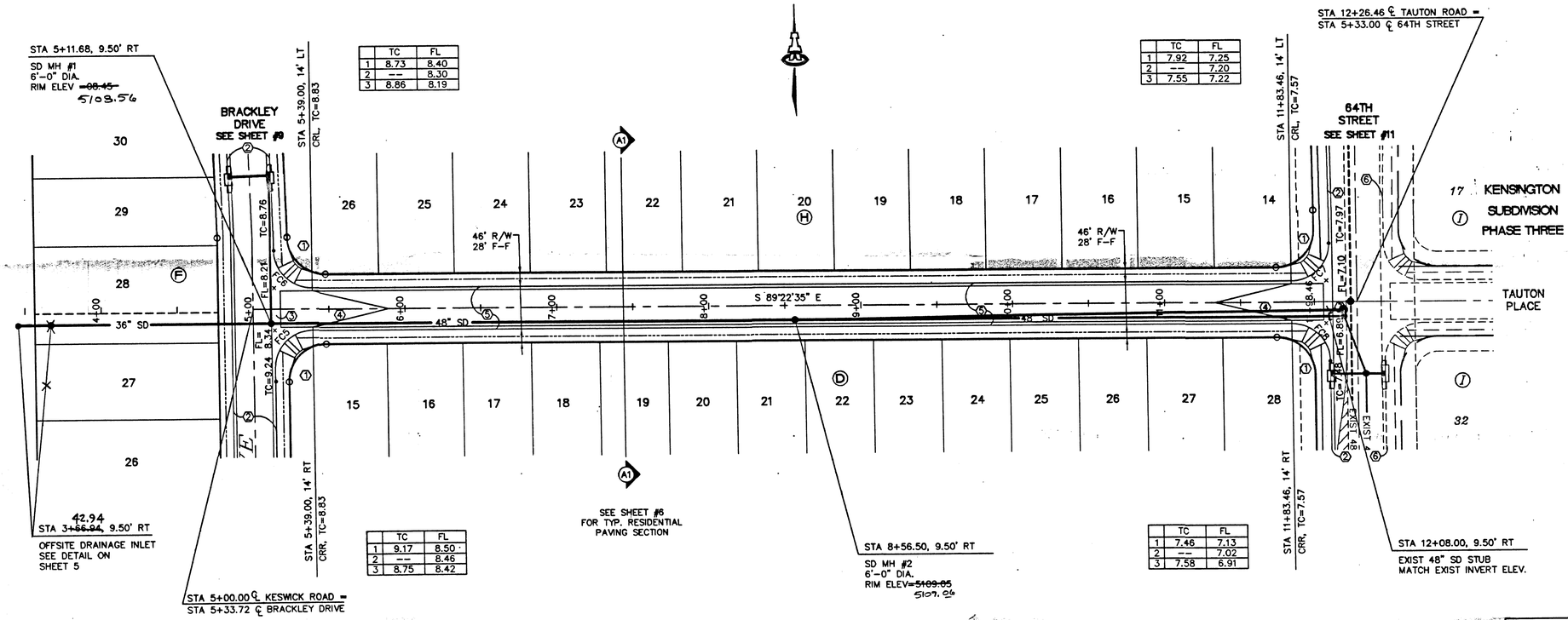
ISAACSON & ARFMAN, P.A.
Consulting Engineering Associates
128 Monroe Street N.E.
Albuquerque New Mexico
156GRD.DWGrfn 06/12/01

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: KENSINGTON SUBDIVISION – PHASE 4
# GRADING DETAILS

Design Review Committee: P.D.L. DEC 18 2001 DESIGN REVIEW COMMITTEE
City Engineer Approval
Last Design Update Mo./Day/Yr. Mo./Day/Yr.

| City Project No. | Zone Map No. | Sheet | Of |
|---|---|---|---|
| 623182 | H-10 | 5 | 17 |




| | TC | FL |
|---|---|---|
| 1 | 8.73 | 8.40 |
| 2 | -- | 8.30 |
| 3 | 8.86 | 8.19 |

| | TC | FL |
|---|---|---|
| 1 | 9.17 | 8.50 |
| 2 | -- | 8.46 |
| 3 | 8.75 | 8.42 |

| | TC | FL |
|---|---|---|
| 1 | 7.92 | 7.25 |
| 2 | -- | 7.20 |
| 3 | 7.55 | 7.22 |

| | TC | FL |
|---|---|---|
| 1 | 7.46 | 7.13 |
| 2 | -- | 7.02 |
| 3 | 7.58 | 6.91 |

# TAUTON ROAD

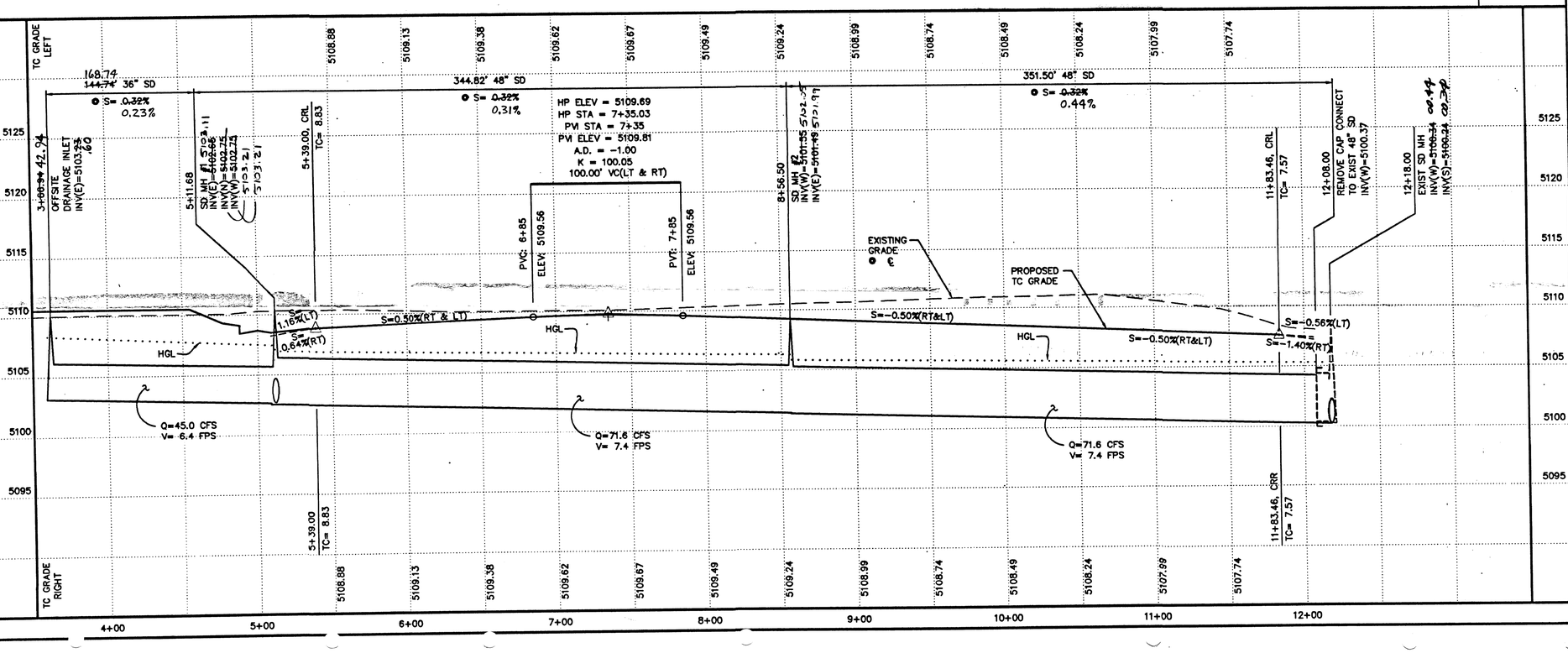
SCALES:
1"=40' HOR.
1"=5' VERT.

## KEYED CONSTRUCTION NOTES

1. CONSTRUCT HANDICAP RAMP PER DETAIL ON SHEET #6. TRANSITION FROM STANDARD TO MOUNTABLE CURB THROUGH RETURN PER COA STD DWG #2418.
2. STANDARD CURB & GUTTER PER COA STD DWG #2415.
3. CONSTRUCT PCC VALLEY GUTTER 6' WIDE, 1 1/2" INVERT PER COA STD DWG #2420.
4. CROWN TO NO CROWN TRANSITION PER COA STD DWG #2401.
5. MOUNTABLE CURB & CUTTER PER COA STD DWG #2415.
6. EXISTING STANDARD CURB & GUTTER.

## FACE OF CURB CURVE TABLE

| CURVE | LENGTH | RADIUS | DELTA |
|---|---|---|---|
| FC5 | 39.27 | 25.00 | 90°00'00" |
| FC6 | 39.27 | 25.00 | 90°00'00" |
| FC7 | 39.27 | 25.00 | 90°00'00" |
| FC8 | 39.27 | 25.00 | 90°00'00" |




AS-BUILT INFORMATION
CONTRACTOR Sundance
WORK STAKED BY ACS, Inc. DATE 02
INSPECTOR'S ACCEPTANCE BY [illegible] DATE 02
FIELD VERIFICATION BY ACS, Inc. DATE 02
DRAWINGS CORRECTED BY ACS, Inc. DATE 02
MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

BENCH MARKS
ACS BENCHMARK "11-H11"
LOCATED IN THE COORS BLVD. MEDIAN
630 FEET SOUTH OF OURAY ROAD
A 3-1/4" ALUMINUM CAP.
ELEV. = 5098.514 (NGVD 1929)

SURVEY INFORMATION
FIELD NOTES
1 ALS 11/97

ENGINEER'S SEAL
SCOTT M. McGEE
NEW MEXICO
10519
LICENSED PROFESSIONAL ENGINEER
11/28/01

| NO. | DATE | REMARKS | BY |
|---|---|---|---|
| | | REVISIONS | |
| | | DESIGN | |

DESIGNED BY SMM DATE 1/01
DRAWN BY ANW DATE 1/01
CHECKED BY SMM DATE 1/01

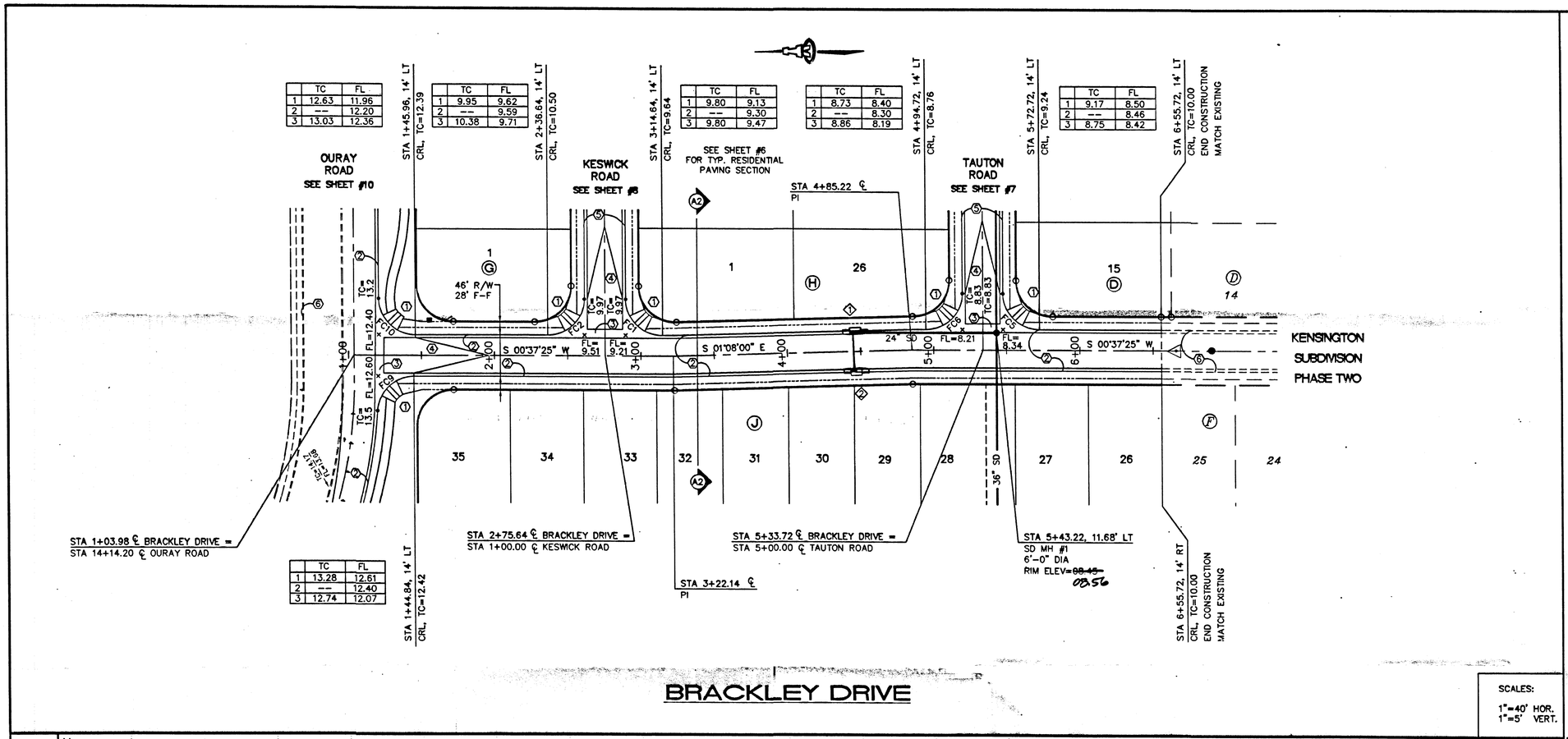
ISAACSON & ARFMAN, P.A.
Consulting Engineering Associates
128 Monroe Street N.E.
Albuquerque New Mexico
156PV2.DWGrfh 11/06/01

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: KENSINGTON SUBDIVISION - PHASE 4
TAUTON ROAD
STA 11+00.00 TO STA 8+26.46
PAVING PLAN & PROFILE

Design Review Committee: DEC 18 2001 DESIGN REVIEW COMMITTEE
City Engineer Approval
Last Design Update | Mo./Day/Yr. | Mo./Day/Yr.

City Project No. 623182 | Zone Map No. H-10 | Sheet 7 Of 17




| | TC | FL |
|---|---|---|
| 1 | 12.63 | 11.96 |
| 2 | -- | 12.20 |
| 3 | 13.03 | 12.36 |

| | TC | FL |
|---|---|---|
| 1 | 9.95 | 9.62 |
| 2 | -- | 9.59 |
| 3 | 10.38 | 9.71 |

| | TC | FL |
|---|---|---|
| 1 | 9.80 | 9.13 |
| 2 | -- | 9.30 |
| 3 | 9.80 | 9.47 |

| | TC | FL |
|---|---|---|
| 1 | 8.73 | 8.40 |
| 2 | -- | 8.30 |
| 3 | 8.86 | 8.19 |

| | TC | FL |
|---|---|---|
| 1 | 9.17 | 8.50 |
| 2 | -- | 8.46 |
| 3 | 8.75 | 8.42 |

| | TC | FL |
|---|---|---|
| 1 | 13.28 | 12.61 |
| 2 | -- | 12.40 |
| 3 | 12.74 | 12.07 |

# BRACKLEY DRIVE

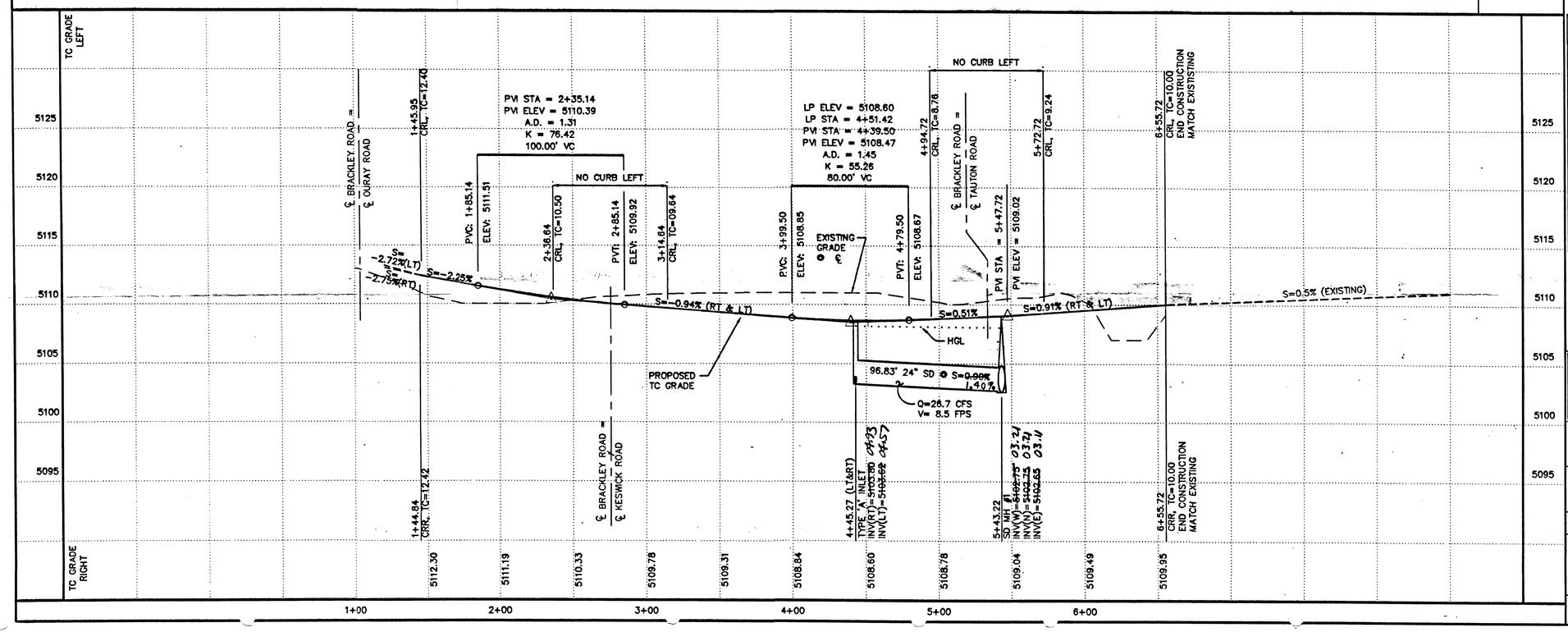
SCALES:
1"=40' HOR.
1"=5' VERT.

## KEYED CONSTRUCTION NOTES

1. CONSTRUCT HANDICAP RAMP PER DETAIL ON SHEET #6.
2. STANDARD CURB & GUTTER PER COA STD DWG #2415.
3. CONSTRUCT PCC VALLEY GUTTER 6' WIDE, 1 1/2" INVERT PER COA STD DWG #2420.
4. CROWN TO NO CROWN TRANSITION PER COA STD DWG #2401.
5. MOUNTABLE CURB & CUTTER PER COA STD DWG #2415.
6. EXISTING STANDARD CURB & GUTTER.

## FACE OF CURB CURVE TABLE

| CURVE | LENGTH | RADIUS | DELTA |
|---|---|---|---|
| FC1 | 39.27 | 25.00 | 90°00'00" |
| FC2 | 39.27 | 25.00 | 90°00'00" |
| FC5 | 39.27 | 25.00 | 90°00'00" |
| FC6 | 39.27 | 25.00 | 90°00'00" |
| FC9 | 39.27 | 25.00 | 90°00'00" |
| FC10 | 39.27 | 25.00 | 90°00'00" |




## STORM DRAIN INLET INFORMATION

| INLET NO. ◇ | INLET TYPE | STATION* & OFFSET | TOP GR. EL. | INV. OUT |
|---|---|---|---|---|
| 1 | TYPE A SUMP | 4+45.27, 14' LT | ~~07.71~~ 7.77 | ~~03.62~~ 4.57 |
| 2 | TYPE A SUMP | 4+45.27, 14' RT | ~~07.71~~ 7.73 | ~~03.80~~ 4.93 |

*STATIONING IS TO MIDPOINT OF GRATE ● FACE OF CURB

## CONNECTOR PIPE INFORMATION

| FROM INLET NO. ◇ | Q (CFS) | DIA. (IN) | LENGTH (FT) | SLOPE (FT/FT) |
|---|---|---|---|---|
| 2 | 13.3 | 24" | 24' | ~~0.0075~~ 0.015 |

ISAACSON & ARFMAN, P.A.
Consulting Engineering Associates
128 Monroe Street N.E.
Albuquerque New Mexico
156PV5.DWGrfh 11/09/01

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: KENSINGTON SUBDIVISION - PHASE 4
BRACKLEY DRIVE
STA 1+03.98 TO STA 6+55.72
PAVING PLAN & PROFILE

Design Review Committee: APPROVED DEC 18 2001 DESIGN REVIEW COMMITTEE
City Engineer Approval
Last Design Update: Mo./Day/Yr.
Mo./Day/Yr.

City Project No. 62318
Zone Map No. H-10
Sheet 9 Of 17

AS-BUILT INFORMATION
CONTRACTOR: Sundance DATE 02
WORK STAKED BY: ALS, Inc. DATE 02
INSPECTOR'S ACCEPTANCE BY: DATE 02
FIELD VERIFICATION BY: ALS, Inc. DATE 02
DRAWINGS CORRECTED BY: ALS, Inc. DATE 02
MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

BENCH MARKS
ACS BENCHMARK "11-H11"
LOCATED IN THE COORS BLVD. MEDIAN
6.30 FEET SOUTH OF OURAY ROAD
A 3-1/4" ALUMINUM CAP,
ELEV. = 5098.514 (NGVD 1929)

SURVEY INFORMATION
FIELD NOTES
1 ALS 11/97

ENGINEER'S SEAL
SCOTT M. McGEE NEW MEXICO 10519 REGISTERED PROFESSIONAL ENGINEER
11/28/01

| NO. | DATE | REMARKS | BY |
|---|---|---|---|
| | | REVISIONS | |

DESIGNED BY SMM DATE 1/01
DRAWN BY ANW DATE 1/01
CHECKED BY SMM DATE 1/01