Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

2600 PROSPECT N.E. - ALBUQUERQUE, NM 87107
TELEPHONE (505) 884-2215 FAX (505) 884-0214

July 14, 2004

Brad Bingham
Section Head
Hydrology Development
600 2nd Street NW
Albuquerque, New Mexico 87102

Leroy Chavez
Vice President of Development
Westland Development
401 Coors Blvd NW
Albuquerque, New Mexico 87121

File

Chris Perea
Wilson & Company
4900 Lang Ave NE
Albuquerque, New Mexico 87109

Martin Garcia
Albuquerque Engineering
1631 Eubank NE
Albuquerque, New Mexico

J10/D35

Lynn Mazur
Development Review Engineer
AMAFCA
2600 Prospect NE
Albuquerque, New Mexico 87107

RE: West I-40 Phase Three Diversion Channel Project
Project Schedule and the Laurelwood Pond

This letter summarizes events up to July 14th concerning Laurelwood Pond and the construction schedule of the West I-40 Diversion Channel.

- On November 15, 2002, AMAFCA authorized Wilson & Company to modify the final design of the Laurelwood Pond inlet structure to incorporate a re-design of the pond by others. This work incorporated the new pond invert elevations required by the new development and included a modified inlet structure to address water quality. Prior to November 15, 2002, AMAFCA intended to address water quality only, by removing the existing inlet structure and installing a new inlet to address floatable control.
  - Westland approached AMAFCA concerning reducing the size of the Laurelwood Pond by taking more flow in the new West I-40 Diversion Project. Once new flow rates were agreed to, AMAFCA was still required to install the debris removal structure. The agreement between Westland and AMAFCA was that AMAFCA would construct the structure, Westland would re-grade the pond; install a new outlet pipe and the foundation for the new structure. AMAFCA provided to Westland a copy of the details for the proposed Laurelwood pond debris removal structure for an example (old design).

- The notice to proceed was issued on March 17, 2004 for construction of the West I-40 Diversion Channel Phase Three Project.
- On May 12, 2004, a meeting was held between AMAFCA and Westland Development to discuss the current progress on both projects. Included in the meeting were the design engineers for both projects. Items discussed:
    - Electronic files needed by Westland for final design. Wilson & Company provided files.
    - Wilson & Company added a note concerning notification by Westland's contractor to Wilson and Company.
    - A note was added concerning the installation of a temporary ditch to drain the new pond into the existing 30-inch pipe. This was needed because the pond was modified before the storm drain modification was completed.
    - Westland Development needed to provide to AMAFCA calculations that supported assumptions concerning the drainage associated with the modified Laurelwood pond.
        - Calculate the amount of water that can removed from the pond under the existing conditions (new water elevation, and existing pipe elevation). The amount of flow allowed into the existing pipe needs to be limited to 175 cfs.
        - Calculate the amount of water that would spill during a 100yr event. In addition provided the location of the spill.
            - Detail the grade control needed to address head cutting or the additional maintenance required after a spill.
        - Calculate the amount of dead storage in the pond. This amount of water would need to be pumped by Westland Development until the new outlet pipe is installed as part of the West I-40 Diversion Channel Project.
    - Westland needed to verify that the alley inlet that is not longer functioning will not cause damage to private property. Excess flows should be directed into 72nd street.
    - AMAFCA was to provide to Westland Development the cost of installing the 48-inch pipe and the foundation of the debris removal structure. Due to the tight schedule to construct the subdivision, AMAFCA could not jeopardize that schedule due to the performance of AMAFCA's contractor. AMAFCA did **NOT** provide a cost to Westland Development for this work.
    - AMAFCA will require that the new outlet pipe be installed to the manhole indicated on the plan set, if Westland proceeds with the final design prior to the completion of the AMAFCA project. This will require Westland to install additional pipe. This will not be necessary if AMAFCA's contractor installs the 48-inch pipe outfall pipe before Westland's contractor installs the pond outfall pipe (original plan).
    - Westland will need to setup a meeting concerning coordination between AMAFCA and Westland once the WO is approved and work is started.
    - AMAFCA discussed alternative debris removal structure designs with Wilson & Company
- On Tuesday June 29, AMAFCA received a call from Westland Development concerning methods to remove stored water in the Laurelwood Pond. Rain events on June 26, 28 and

29 deposited water into the modified Laurelwood Pond. The pond contained approximately 4 acre-feet of storm runoff.

  - Information requested on May 12th had not been received by the City of Albuquerque or AMAFCA.
  - No provisions were made by Westland to drain the pond prior to the rain event.

- On June 30, AMAFCA was contacted by Westland Development; AMAFCA contractor did not want discharge hoses running across the job site. The contractor was instructed to comply with the section "care and diversion of water" in the contract. A letter was sent to all parties on June 30 which stated that pumping could start on July 1st after 8:00 am.
- On July 1, Salls Brothers Construction exposed the end of the 30-inch pipe and started to pump water. All water was evacuated from the pond by the afternoon of July 2.
- On July 2nd, AMAFCA summarized the events that occurred at Laurelwood Pond and re-requested information that was part of the correspondence on May 12th. AMAFCA requested that all information be submitted to AMAFCA by July 8th.
- As of July 14th, AMAFCA has not received any information.
  - Laurelwood Pond is currently a retention pond.
  - Laurelwood Pond does not have a spillway.
  - Laurelwood Pond contains an unknown amount of dead storage that needs to be pumped by Westland Development after every rain event.
  - AMAFCA's West I-40 Diversion Channel Project is behind schedule. The installation of the new 48-inch outfall pipe could be delayed until November 2004.
  - In a correspondence dated July 7th, Westland Development indicated that they did not want to install additional pipe (per an AMAFCA requirement stated in the May 12 correspondence), therefore they would need to wait until AMAFCA installed the new outlet pipe before final construction of the pond could be scheduled by Westland.
  - AMAFCA is unaware of any provisions being made by Westland Development to address existing conditions in their final design of the subdivision.

The above summery identifies a few items that need to be addressed. Delays in responding to the information requests will not negate review requirements and may result in delays.

Sincerely,
Jerry Lovato, PE

Field Engineer
AMAFCA

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

2600 PROSPECT N.E. - ALBUQUERQUE, NM 87107
TELEPHONE (505) 884-2215 FAX (505) 884-0214

July 2, 2004

Jerry Padilla
President
Albuquerque Excavators Inc.
7201 Isleta Boulevard SW
Albuquerque, New Mexico 87105

Leroy Chavez
Vice President of Development
Westland Development
401 Coors Blvd NW
Albuquerque, New Mexico 87121

Brad Bingham
Section Head
Hydrology Development
600 2nd Street NW
Albuquerque, New Mexico 87102

Martin Garcia
Albuquerque Engineering
1631 Eubank NE
Albuquerque, New Mexico

Chris Perea
Wilson & Company
4900 Lang Ave NE
Albuquerque, New Mexico 87109

Fred Salls
President
Salls Brothers Construction
7301 Reading Dr SE
Albuquerque, New Mexico 87105

Lynn Mazur
Development Review Engineer
AMAFCA
2600 Prospect NE
Albuquerque, New Mexico 87107

File
J10/D35

RE: West I-40 Phase Three Diversion Channel Project
Evacuation of storm waters from Laurelwood Pond

This letter summarizes events up to July 1st concerning Laurelwood Pond.

- On May 13, 2004 a meeting was held concerning the storage and conveyance of storm waters in the Laurelwood Pond. Modification of the pond by Westland Development had increased the ponds dead storage capacity and eliminated the ponds outfall. Westland Development was directed to re-establish an outfall for the pond (see attached email dated May 13, 2004). AMAFCA limited the flow in the 30-inch outfall pipe to 175 cfs. This was required, because 175 cfs was the capacity of the 30-inch pipe before the pond was modified by Westland. Albuquerque Excavators Inc. (AEI), AMAFCA's contractor on the West I-40 Diversion Project, had already started construction; therefore any increase in the outfall flow rate would need to be addressed by a change order to modify the bid item for care and diversion of water.

- On Tuesday June 29, AMAFCA received a call from Westland Development concerning methods to remove stored water in the Laurelwood Pond. Rain events on June 26, 28 and 29 deposited water into the modified Laurelwood Pond. Two options were discussed, pump water out of the pond and / or find and expose the existing 30-inch pipe and re-establish the outfall pipe (intake structure and outfall pipe removed by Westland Development). AMAFCA directed Westland Development to contact AEI concerning access through the job site and / or using the water for moisture conditioning for backfill. AMAFCA also called Wilson and Company to direct AEI to accommodate the storm water.

- On June 30, AMAFCA was contacted by Westland Development, AEI did not want discharge hoses running across the job site and AEI had severed the 30-inch storm drain during the installation of the new 96-inch storm drain. AMAFCA visited the site and directed AEI to comply with the section "care and diversion of water" in the contract, AEI elected to backfill and create an open ditch between the two ends of the severed 30-inch storm drain. A letter was sent to all parties on June 30 that stated that pumping could start on July 1st after 8:00 am (AEI time line).

- On July 1, Salls Brothers Construction exposed the end of the 30-inch pipe and started to pump water. At ~1:20 pm, the AEI constructed ditch failed. The pump used by Salls Brothers Construction was rated at 12,000 gallons per minute or 2.7 cfs. A meeting was held on site with AEI, Salls Brothers, Wilson & Co and AMAFCA. AEI and Salls Brothers worked together to place discharge hose across the job site to the end of the existing 30-inch CMP. Pumping was re-started, with the hope of pumping all water from the pond by the afternoon of July 2.

AMAFCA is requesting that Westland Development address items 3, 4, 6 and 7 in the email dated May 13, 2004, by Thursday July 8th.

Sincerely,

Jerry Lovato, PE

Field Engineer
AMAFCA

Attachments:

- Email, May 13, 2004
- Faxed letter, June 30, 2004

Jerry Lovato

From: Jerry Lovato [jlovato@amafca.org]

Sent: Thursday, May 13, 2004 9:00 AM

To: Lynn Mazur; Brad Bingham; Chris Perea (CAPerea@WilsonCo.com); Martin Garcia (mjGarcia@abqeng.com); Leroy Chavez

Cc: John Kelly (jkelly@amafca.org); Dan Agurrie (dsaguirre@wilsonco.com)

Subject: Laurelwood Pond Meeting Summary

Thursday, May 13, 2004

Good Morning all,
I just wanted to touch base and re-iterate action items from our meeting on 5/12

1. Martin will give Chris a plan set template for his project
2. Chris will provide a new detail for the structure to be inserted into Martin's Project
    a. Chris will add a note concerning notification by Westland's contractor to Wilson and Company.
    b. Chris will add a note concerning the installation of a temporary ditch to drain the new pond into the existing 30-inch pipe.
3. Martin will need to calculate the amount of water that can removed from the pond under the existing conditions (new water elevation, and pipe elevation). The amount of flow allowed into the existing pipe needs to be limited to 175 cfs.
4. Martin will need to verify that the alley inlet that is not longer functioning will not cause damage to private property. Excess flows should be directed into 72nd street.
5. AMAFCA will provide to Westland Development the cost of installing the 48-inch pipe and the foundation of the debris removal structure. Westland may elect to have AEI install the pipe. This was discussed yesterday. After further thought, AMAFCA will need to renege on this item. Due to the tight schedule to construct the subdivision, AMAFCA can not jeopardize that schedule due to the performance of AMAFCA's contractor. AMAFCA will **NOT** provide a cost to Westland Development for this work. Westland is free to contact AEI to inquire about installation of the 48-inch pipe.
6. AMAFCA will require that the pipe be installed to the manhole indicated on the plan set. This will require Westland to install additional pipe. This will not be necessary if AEI installs the 96-inch wye and the 48-inch pipe before Westland's contractor installs the pond outfall pipe (original plan).
7. Need to setup a meeting concerning coordination between AMAFCA and Westland once the WO is approved and work is started.
8. AMAFCA will discuss alternative debris removal structure designs with Wilson & Company.

If you have any corrections or questions please drop me a line

Thanks
-=Jerry=-

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

2600 PROSPECT N.E. - ALBUQUERQUE, NM 87107
TELEPHONE (505) 884-2215 FAX (505) 884-0214

June 30, 2004

By fax to:

Ed Demarey
Albuquerque Excavators, Inc.
877-2266

Leroy Chavez
Westland Development
831-4865

Fred Salls
Salls Brothers Construction
873-8781

RE: 30" drainpipe, Laurelwood Pond

Dear Mr. Demary, Mr. Chavez, and Mr. Salls:

Albuquerque Excavating is currently working on unplugging the 30" drain.

Salls Brothers Construction will be able to pump Laurelwood Pond at 8:00 a.m. tomorrow morning.

Salls Brothers Construction can discharge into the existing 30" drainpipe.

If you require additional information, please call me at 884-2215.

Sincerely,
AMAFCA

for

Jerry M. Lovato
Field Engineer

CITY OF ALBUQUERQUE

File

May 13, 2005

Martin J. Garcia, PE
ABQ ENGINEERING, INC.
6739 Academy Rd. NE
Albuquerque, NM 87109

RE: LAURELWOOD SOUTH SUBDIVISION (J-10/D35)
Engineers Certification for Release of Financial Guaranty
Engineers Stamp dated 12/17/2002
Engineers Certification dated 05/10/2005

Dear Martin:

Based upon the information provided in your Engineer's Certification Submittal dated 05/17/2005, the above referenced plan is adequate to satisfy the Grading and Drainage Certification for Release of Financial Guaranty.

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

Sincerely,

Arlene V. Portillo
Plan Checker, Planning Dept.- Hydrology
Development and Building Services

C: Marilyn Maldonado, COA# 699481
File

P.O. Box 1293
Albuquerque
New Mexico 87103
www.cabq.gov

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/28/2003rd)

J-10/D35

PROJECT TITLE: Laurelwood South Subdivision
DRB #: 1001717 EPC#: _____

ZONE MAP/DRG. FILE #: H10/J10
WORK ORDER#: _____

LEGAL DESCRIPTION: _____
CITY ADDRESS: _____

ENGINEERING FIRM: ABQ Engineering
ADDRESS: 6739 Academy NE Suite 130
CITY, STATE: Albuquerque

CONTACT: Martin J. Garcia
PHONE: 255-7802
ZIP CODE: 87109

OWNER: Westland Development
ADDRESS: 401 Coors Blvd. NW
CITY, STATE: Albuquerque, NM

CONTACT: Leroy Chavez
PHONE: 831-9600
ZIP CODE: 87121

ARCHITECT: _____
ADDRESS: _____
CITY, STATE: _____

CONTACT: _____
PHONE:
ZIP CODE: _____

SURVEYOR: _____
ADDRESS: _____
CITY, STATE: _____

CONTACT: _____
PHONE: _____
ZIP CODE: _____

CONTRACTOR: _____
ADDRESS: _____
CITY, STATE: _____

CONTACT: _____
PHONE: _____
ZIP CODE: _____

CHECK TYPE OF SUBMITTAL:

- ☐ DRAINAGE REPORT
- ☐ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
- ☐ DRAINAGE PLAN RESUBMITTAL
- ☐ CONCEPTUAL GRADING & DRAINAGE PLAN
- ☐ GRADING PLAN
- ☐ EROSION CONTROL PLAN
- ☒ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ☐ CLOMR/LOMR
- ☐ TRAFFIC CIRCULATION LAYOUT (TCL)
- ☐ ENGINEERS CERTIFICATION (TCL)
- ☐ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ☐ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- ☒ SIA / FINANCIAL GUARANTEE RELEASE
- ☐ PRELIMINARY PLAT APPROVAL
- ☐ S. DEV. PLAN FOR SUB'D. APPROVAL
- ☐ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ☐ SECTOR PLAN APPROVAL
- ☐ FINAL PLAT APPROVAL
- ☐ FOUNDATION PERMIT APPROVAL
- ☐ BUILDING PERMIT APPROVAL
- ☐ CERTIFICATE OF OCCUPANCY (PERM.)
- ☐ CERTIFICATE OF OCCUPANCY (TEMP.)
- ☐ GRADING PERMIT APPROVAL
- ☐ PAVING PERMIT APPROVAL
- ☐ WORK ORDER APPROVAL
- ☐ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ☐ YES
- ☒ NO
- ☐ COPY PROVIDED

DATE SUBMITTED: 5/17/05

BY: _____

RECEIVED
MAY 17 2005
HYDROLOGY SECTION

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope ot the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan**: Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5) acres.

J-10 | D35

ABQ Engineering, Inc.
Engineers ▪ Planners ▪ Construction Services

May 17, 2005

Mr. Brad Bingham
City of Albuquerque Development Services
600 2nd Street NW
Albuquerque, NM 87102

RE: As built Grading and Drainage Plan for Laurelwood South Subdivision

Mr. Bingham:

Enclosed is one blueline copy of the revised as built Grading and Drainage Plan for Laurelwood South subdivision for your approval and release of financial guarantee.

Please call me at 255-7802 if you have any questions or require additional information.

Sincerely,

Martin J. Garcia, PE
ABQ Engineering, Inc.
24063

cc Leroy Chavez, Westland Development Corp.

RECEIVED
MAY 17 2005
HYDROLOGY SECTION

6739 Academy Rd. NE, Suite 130 ▪ Albuquerque, New Mexico 87109 ▪ (505) 255-7802 ▪ Fax (505) 255-7902

CITY OF ALBUQUERQUE

May 6, 2005

Martin J. Garcia, PE
ABQ ENGINEERING, INC.
6739 Academy Rd. NE
Albuquerque, NM 87109

RE: LAURELWOOD SOUTH SUBDIVISION (J-10/D35)
Engineers Certification for Release of Financial Guaranty
Engineers Stamp dated 04/21/2004
Engineers Certification dated 05/03/2005

Dear Martin:

Based upon the information provided in your Engineer's Certification Submittal dated 05/05/2005, the above referenced plan cannot approve for Grading and Drainage Certification for Release of Financial Guaranty.

1. The approved grading and drainage plan has an Engineer Stamp date of 12/17/2002 not 04/21/2004 as indicated in your submittal. (see attached copy of G/D Report approval letter).

Also, attached for your use, are 2 samples of the preferred language for certification of a Grading & Drainage Plan.

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

Sincerely,

Arlene V. Portillo
Plan Checker, Planning Dept.- Hydrology
Development and Building Services

C: File

P.O. Box 1293
Albuquerque
New Mexico 87103
www.cabq.gov

CITY OF ALBUQUERQUE

May 6, 2005

Martin J. Garcia, PE
ABQ ENGINEERING, INC.
6739 Academy Rd. NE
Albuquerque, NM 87109

RE: LAURELWOOD SOUTH SUBDIVISION (J-10/D35)
Engineers Certification for Release of Financial Guaranty
Engineers Stamp dated 04/21/2004
Engineers Certification dated 05/03/2005

Dear Martin:

Based upon the information provided in your Engineer's Certification Submittal dated 05/05/2005, the above referenced plan cannot approve for Grading and Drainage Certification for Release of Financial Guaranty.

1. The approved grading and drainage plan has an Engineer Stamp date of 12/17/2002 not 04/21/2004 as indicated in your submittal. (see attached copy of G/D Report approval letter).

Also, attached for your use, are 2 samples of the preferred language for certification of a Grading & Drainage Plan.

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

Sincerely,

Arlene V. Portillo
Plan Checker, Planning Dept.- Hydrology
Development and Building Services

C: File

P.O. Box 1293
Albuquerque
New Mexico 87103
www.cabq.gov

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 18, 2002

Martin Garcia, PE
ABQ Engineering
1631 Eubank NE, Ste C
Albuquerque, NM 87112

Re: Laurelwood Park Subdivision Drainage Report
Engineer's Stamp dated 12-17-02 (J10/D35)

Dear Mr. Garcia,

Based upon the information provided in your submittal dated 12-17-02, the above referenced plan is approved for Preliminary Plat and Site Development Plan for Subdivision action by the DRB. Prior to Work Order, written concurrence from the Parks Dept. for maintenance of the alley runoff to Tract P will be required. Otherwise you must connect the storm drain to the proposed pipe in Rosewood. Grading for this project will not be allowed until the Work Order for the AMAFCA project is released.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Planning Dept.
Development and Building Services

C: Lynn Mazur, AMAFCA
Christina Sandoval, CoA Parks and Rec. Dept.
file

DRAINAGE AND TRANSPORTATION INFORMATION SHEET J-10/D35

(REV. 1/28/2003rd)

PROJECT TITLE: LAUREL WOODS SOUTH SUBD. ZONE MAP/DRG. FILE #: H/J-10
DRB #: _____ EPC#: _____ WORK ORDER#: _____

LEGAL DESCRIPTION: _____
CITY ADDRESS: _____

ENGINEERING FIRM: ABQ ENGINEERING CONTACT: MARTIN J. CHAVEZ
ADDRESS: 6739 ACADEMY PHONE: 255-7602
CITY, STATE: ALBUQ NM ZIP CODE: 87109

OWNER: WESTLAND DEV. CORP. CONTACT: Leroy Chavez
ADDRESS: _____ PHONE: 831-9600
CITY, STATE: _____ ZIP CODE: _____

ARCHITECT: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____
CITY, STATE: _____ ZIP CODE: _____

SURVEYOR: _____ CONTACT: _____
ADDRESS _____ PHONE: _____
CITY, STATE: _____ ZIP CODE: _____

CONTRACTOR: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____
CITY, STATE: _____ ZIP CODE: _____

CHECK TYPE OF SUBMITTAL:

- ____ DRAINAGE REPORT
- ____ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
- ____ DRAINAGE PLAN RESUBMITTAL
- ____ CONCEPTUAL GRADING & DRAINAGE PLAN
- ____ GRADING PLAN
- ____ EROSION CONTROL PLAN
- X ENGINEER'S CERTIFICATION (HYDROLOGY)
- ____ CLOMR/LOMR
- ____ TRAFFIC CIRCULATION LAYOUT (TCL)
- ____ ENGINEERS CERTIFICATION (TCL)
- ____ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ____ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- X SIA / FINANCIAL GUARANTEE RELEASE
- ____ PRELIMINARY PLAT APPROVAL
- ____ S. DEV. PLAN FOR SUB'D. APPROVAL
- ____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ____ SECTOR PLAN APPROVAL
- ____ FINAL PLAT APPROVAL
- ____ FOUNDATION PERMIT APPROVAL
- ____ BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY (PERM.)
- ____ CERTIFICATE OF OCCUPANCY (TEMP.)
- ____ GRADING PERMIT APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ WORK ORDER APPROVAL
- ____ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ____ YES
- ____ NO
- ____ COPY PROVIDED

DATE SUBMITTED: 5/5/05 BY: _____

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope ot the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan**: Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report**: Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

RECEIVED
MAY 05 2005
HYDROLOGY SECTION

ABQ Engineering, Inc.
Engineers ▪ Planners ▪ Construction Services

May 5, 2005

Mr. Brad Bingham
City of Albuquerque Development Services
600 2nd Street NW
Albuquerque, NM 87102

RE: As built Grading and Drainage Plan for Laurelwood South Subdivision

Mr. Bingham:

Enclosed is one blueline copy of the as built Grading and Drainage Plan for Laurelwood South subdivision for your approval and release of financial guarantee.

Please call me at 255-7802 if you have any questions or require additional information.

Sincerely,

Martin J. Garcia, PE
ABQ Engineering, Inc.
24063

cc Leroy Chavez, Westland Development Corp.

6739 Academy Rd. NE, Suite 130 ▪ Albuquerque, New Mexico 87109 ▪ (505) 255-7802 ▪ Fax (505) 255-7902

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 18, 2002

Martin Garcia, PE
ABQ Engineering
1631 Eubank NE, Ste C
Albuquerque, NM 87112

Re: Laurelwood Park Subdivision Drainage Report
Engineer's Stamp dated 12-17-02 (J10/D35)

Dear Mr. Garcia,

Based upon the information provided in your submittal dated 12-17-02, the above referenced plan is approved for Preliminary Plat and Site Development Plan for Subdivision action by the DRB. Prior to Work Order, written concurrence from the Parks Dept. for maintenance of the alley runoff to Tract P will be required. Otherwise you must connect the storm drain to the proposed pipe in Rosewood. Grading for this project will not be allowed until the Work Order for the AMAFCA project is released.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Planning Dept.
Development and Building Services

C: Lynn Mazur, AMAFCA
Christina Sandoval, CoA Parks and Rec. Dept.
file

ABQ Engineering Inc.

6739 Academy Road, NE
Suite 130
Albuquerque, N.M. 87109
Office (505) 255-7802
Facsimile (505) 255-7902

File

Laurelwood South

J-10/D035

FAX

DATE: 7/15/04

TO: Jerry Lovato

COMPANY: AMAFCA

PHONE:

FAX #: 884-0214

FROM: Marie Garcia

Phone No. : (505) 255-7802
Fax No. : (505) 255-7902

# of Pages: 3
(including cover page)

Comments:

See attached.

Mark

ABQ Engineering, Inc.
Engineers • Planners • Construction Services

July 14, 2004

Mr. Jerry Lovato, PE
Field Engineer
AMAFCA
2600 Prospect NE
Albuquerque, NM 87107

RE: Laurelwood Pond

Jerry, in response to your e-mail of May 13, 2004 Item No. 3 and Item No. 4 and your letter dated July 14, 2004, I have the following response to offer.

The AHYMO calculations conducted for the design of the pond indicate that there is 423 cfs entering the pond during a 100-yr storm event. This equates to approximately 23 acre-feet of water. The pond was designed to have a pipe outfall to the West I-40 project with a discharge of 170 cfs. This necessitated the pond to be sized a 7.1 acre-feet to be able to detain the 100-yr storm.

The pond has been graded and sized for the 7.1 acre-feet, but the outfall has not been constructed because AMAFCA's project has not yet been constructed to the point of connection. The pond is currently functioning as a temporary retention pond with a capacity of approximately 8 acre-feet (the pond size plus capacity in the existing concrete channel to the west). In the event of a storm large enough to cause the pond to overfill, the pond will be graded with a slight depression on the East side so that it overflows to the vacated 72nd Street right of way as it has done historically.

The old 30" pipe is still connected and can be used to drain the pond after a storm event. The pond can be drained by pumping it as was done on July 1st and 2nd. Westland has indicated that they would prefer to pump the pond rather that spend funding on a connection to the existing infrastructure that will be removed by AMAFCA in November with the West I-40 project.

With regard to the small drop inlet in the alley north of Laurelwood Subdivision, Westland has indicated that they can remove one curb stone along the east side of the alley to allow the runoff to go into the vacated 72nd street right of way. The computed flow from this area was just over 1 cfs so there should be minimal impact to the vacated right of way.

ABQ Engineering, Inc.
Engineers • Planners • Construction Services

It is clear that close coordination with AMAFCA is required in order for both projects to be successful in the immediate area of the Laurelwood subdivision. This information should satisfy your concerns, and establish the process for dealing with storm events during the period where the pond is not directly connected to AMAFCA's storm drainage infrastructure.

If you have any questions or require additional information, please call me at 255-7802.

Sincerely,

Martin J. Garcia, PE
ABQ Engineering
24063

6739 Academy Rd. NE, Suite 130 ▪ Albuquerque, New Mexico 87109 ▪ (505) 255-7802 ▪ Fax (505) 255-7902

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 Prospect N.E., Albuquerque, NM 87107
Phone: (505) 884-2215 Fax: (505) 884-0214

File
J10/D35

February 22, 2004

Leroy Chavez
Vice President of Development
Westland Development
401 Coors Blvd NW
Albuquerque, New Mexico 87121

Brad Bingham
Section Head
Hydrology Development
600 2nd Street NW
Albuquerque, New Mexico 87102

Martin Garcia
Albuquerque Engineering
1631 Eubank NE
Albuquerque, New Mexico

Chris Perea
Wilson & Company
4900 Lang Ave NE
Albuquerque, New Mexico 87109

RE: West I-40 Phase Three Diversion Channel Project
Completion of the Laurelwood Pond Outlet Pipe

Dear Leroy,

The installation of the new 48-inch storm drain and manhole has been completed by Albuquerque Excavators as part of their work on the West I-40 Diversion Channel Project. Wilson & Company has reviewed the as-built information. The newly installed pipe is 1.12 feet below the design grade shown on the plan set. This portion of the project has been completed to the satisfaction of AMAFCA.

As part of the letter agreement between Westland Development and AMAFCA, AMAFCA is required to build the riser structure on the foundation built by Westland Development.

You are directed to build the foundation per the design, with the appropriate adjustment to elevations. AMAFCA will build the extra 1.12 feet in the walls of the debris removal structure.

If you have any questions or issues regarding this project please call me at 884-2215.

Sincerely,
AMAFCA

Jerry Lovato, PE
Field Engineer, AMAFCA

Cc: Lynn Mazur, Development Review Engineer, AMAFCA

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/11/2002)

(LAUREL WOOD PARK SUBD)

J-10/D35

PROJECT TITLE: Laurelwood South Sub- ZONE MAP/DRG. FILE #: [redacted]

DRB #: 1001717 EPC#: WORK ORDER#:

LEGAL DESCRIPTION: Laurelwood South Sub. Tract A Plat, Drainage Mgmt Area

CITY ADDRESS:

ENGINEERING FIRM: ABQ ENGINEERING CONTACT: Marcia Garcia

ADDRESS: 1637 Eubank NE PHONE: 255 7802

CITY, STATE: ALBUQ NM 87112 ZIP CODE:

OWNER: Westland Dev Corp. CONTACT: Corey Chavez

ADDRESS: 401 Coors Blvd PHONE: 831-9600

CITY, STATE: ALBUQ ZIP CODE:

ARCHITECT: CONTACT:

ADDRESS: PHONE:

CITY, STATE: ZIP CODE:

SURVEYOR: CONTACT:

ADDRESS PHONE:

CITY, STATE: ZIP CODE:

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

CITY, STATE: ZIP CODE:

CHECK TYPE OF SUBMITTAL:

- ____ DRAINAGE REPORT
- X DRAINAGE PLAN
- ____ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- ____ EROSION CONTROL PLAN
- ____ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ____ CLOMR/LOMR
- ____ TRAFFIC CIRCULATION LAYOUT (TCL)
- ____ ENGINEERS CERTIFICATION (TCL)
- ____ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ____ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- ____ SIA / FINANCIAL GUARANTEE RELEASE
- X PRELIMINARY PLAT APPROVAL
- X S. DEV. PLAN FOR SUB'D. APPROVAL
- ____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ____ SECTOR PLAN APPROVAL
- ____ FINAL PLAT APPROVAL
- ____ FOUNDATION PERMIT APPROVAL
- ____ BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY (PERM.)
- ____ CERTIFICATE OF OCCUPANCY (TEMP.)
- ____ GRADING PERMIT APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ WORK ORDER APPROVAL
- ____ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- X YES
- ____ NO
- ____ COPY PROVIDED

DATE SUBMITTED: 12/17/12 BY:

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope ot the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five
2. **Drainage Plans:** Required for building permits, grading permits, paving permits and site plans less than five (5)
3. **Drainage Report:** Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

ABQ Engineering, Inc.
Engineers • Surveyors • Planners • Construction Services

December 17, 2002

Mr. Brad Bingham
Assistant City Engineer
City of Albuquerque
600 2nd Street NW
Albuquerque, NM 87102

RE: Grading and Drainage Plan Submittal for Laurelwood Park Subdivision

Dear Mr. Bingham:

Transmitted herewith for your review and approval is the revised Grading and Drainage Plan for the Laurelwood South Subdivision located South of Parkwood Drive, East of Alley "H", West of Vacated 72nd Street, and North of Hanover Road (Zone atlas map H10/J10). The design of the storm drainage pond and project has been coordinated with the West I-40 Drainage Channel construction.

Please call me if you need any clarification or require additional information.

Sincerely,

Martin J. Garcia, PE
ABQ Engineering, Inc.
22096

copy with enclosures: Lynn Mazur, AMAFCA

1631 Eubank NE ▪ Suite C ▪ Albuquerque, New Mexico 87112 ▪ (505) 255-7802 ▪ Fax (505) 255-7902

DRAINAGE REPORT

FOR

LAURELWOOD SOUTH SUBDIVISION

A 37-LOT SINGLE FAMILY
RESIDENTIAL SUBDIVISION

ALBUQUERQUE, NEW MEXICO
December 2002

Prepared By:

ABQ
Engineering,
Inc.

•Engineers •Planners
•Surveyors
•Construction Services

1631 Eubank NE, Suite C,
Albuquerque, NM 87112
505-255-7802 FAX 505-255-7902

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 PROSPECT N.E., ALBUQUERQUE, NM 87107
PHONE: (505) 884-2215 FAX: (505) 884-0214

Post-it® Fax Note 7671	Date 12-16	# of pages ▶ 1
To BRAD BINGHAM	From LYNN MAZUR	
Co./Dept. HYDROLOGY	Co. AMAFCA	
Phone #	Phone #	
Fax #	Fax #	

December 16, 2002

Mr. Martin Garcia, P.E.
ABQ Engineering, Inc.
1631 Eubank NE, Ste. C
Albuquerque, NM 87112

Re: Drainage Report for Laurelwood Park Subdivision, ZAP H-10
Engineer's Stamp Dated October 31, 2002

Dear Mr. Garcia:

The referenced report states that AMAFCA will allow a maximum discharge of 170 cfs from the detention pond to a 48-inch storm drain that is proposed with the West I-40 Diversion Channel construction. AMAFCA approves this discharge rate from the pond.

If you have any questions, please call me at 884-2215.

Sincerely,
AMAFCA

Lynn M. Mazur

Lynn M. Mazur, P.E.
Development Review Engineer

Cc: Brad Bingham, City Hydrology

DRAINAGE REPORT

FOR

LAURELWOOD SOUTH SUBDIVISION

A 37-LOT SINGLE FAMILY
RESIDENTIAL SUBDIVISION

ALBUQUERQUE, NEW MEXICO
December 2002

Prepared By:

ABQ
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•Engineers •Planners
•Surveyors
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1631 Eubank NE, Suite C,
Albuquerque, NM 87112
505-255-7802 FAX 505-255-7902

TABLE OF CONTENTS

DRAINAGE REPORT

LAURELWOOD SOUTH SUBDIVISION

I. INTRODUCTION

This report documents the methods used to determine and control the storm water runoff from the Laurelwood Park Subdivision along with existing off-site flows. The proposed Laurelwood South subdivision consists of 37 residential lots, a 1.8-acre tract for a storm drainage pond, and a .1447 park tract. Existing storm drainage flows into the existing pond through two concrete channels, one from the west and the other from the north.

II. PROJECT DESCRIPTION

The Laurelwood Park subdivision is a vacant 7.7-acre tract that will be developed into a 37-lot residential subdivision. It is bounded by Parkwood Drive on the North, Vacated 72nd Street on the East, Alley "H" on the West and Hanover Street on the South. The property is adjacent to Laurelwood Park and is surrounded by single-family development on the North, East, and West, and I-40 on the South. The property is Zoned R-D. The pond design and outflow from this pond has been coordinated and complies with the design of the West I-40 Drainage Channel that will be constructed by AMAFCA.

III. METHODOLOGY

The hydrology calculations follow the guidelines set forth in Section 22.2 of the Albuquerque Development Process Manual (DPM). The 100yr-24 hour storm was used to compute the runoff quantities for the pond. The offsite flows north of the subdivision utilized in the subdivision analysis were determined using the off-site drainage basin, computing individual hydrographs for each sub-basin, and routing the hydrographs through the street to the proposed pond. The drainage basin and flows were compared to the flows identified for this node (616) taken from the "West I-40 Drainage Master Plan" prepared by Bohannan Huston. The drainage basin used by Bohannan Huston in their analysis was 68 acres. Our field verification of the drainage basin identified the basin size at 40 acres. Bohannan Huston did not consider the effects of routing the flows through the streets, thus the peak flow from the north identified in the west I –40 DMP is higher than identified in our analysis (169.57 cfs vs. 98.01 cfs). The flows computed by Bohannan Huston in the West I-40 DMP coupled with AMAFCA's further analysis related to the construction of the West I-40 Drainage channel for the west channel were used for the west channel. The flows were then routed through the pond to determine the pond storage size required.

IV. DRAINAGE COMPUTATIONS

The proposed development is within Precipitation Zone 1. The Land Treatment Area for the proposed subdivision is as follows:

Type "D"	50%
Type "C"	23%
Type "B"	27%
Type "A"	0%

Off-site flows used are 98.06 cfs from the North, and 354.90 cfs from the West Channel. The flows from the North were computed using AHYMO to determine individual sub-basin hydrographs, and routing them to the pond location. The outflow from the pond to the new storm drain system being constructed by AMAFCA is constrained to a maximum of 170cfs (see AMAFC A letter). The analysis resulted in the need for 7.81 acre-feet of ponding area, which is being provided.

V. INFRASTRUCTURE

The North Channel will be removed with the subdivision. Some of the off-site flows (45cfs) will be conveyed to the pond via a new 30-inch storm drain system being constructed with this project. The remaining flows will be conveyed through the proposed 36 ft. street to the storm drainage pond (see Grading and Drainage Plan attached). The storm drainage pond will be reconfigured to allow for development of the property while containing the 100 yr 6-hr storm. The pond contains a controlled outlet structure that drains into a 4 ft. diameter pipe that is being constructed by AMAFCA as part of the West I-40 channel construction. There is an existing outlet structure that currently outfalls to the existing storm drain system that will continue to function until AMAFCA constructs the West I-40 Channel improvements. AMAFCA has indicated that they will allow a maximum discharge of 170 cfs from the pond.

There is also an existing drop inlet and 18-inch RCP storm drain located along the east property boundary that drains a 1.76-acre area next to Alley "K". The drop inlet and storm drain will be removed with this project, and the runoff associated with this storm drain will be directed to the Tract P (vacated 72nd Street right of way) via a 4 ft. valley gutter, it will then drain overland through a shallow swale south along Tract P into the West I-40 channel.

VI. SUMMARY AND CONCLUSION

In Summary, the existing pond can be reconfigured as shown on the plan to accommodate the developed flows and ponding requirements. Rosewood has the capacity to accommodate 82 cfs. Therefore a 30-inch storm drain will be installed to accommodate the additional 41cfs.

Included with this report are the AHYMO computer program input, output, and summary for the 100yr-24hour storm for the combination of on-site and off-site flows, the drainage calculation for determining the runoff associated with the existing 18" RCP that will be removed, the roadway capacity computations, storm drain capacity computations, and catch basin sizing, off-site drainage basin maps, and letter from AMAFCA allowing the 170 cfs discharge from the pond.

0
AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =12/13/2002
INPUT FILE = laureld.txt USER NO.= AHYMO-I-9702a0100003C-SH
START TIME= .00
LOCATION ALBUQUERQUE
*S COMPUTE 100 YEAR - 24 HOUR HYROGRAPHS FOR LAURELWOOD PARK SUBDIVISION
*S Laurelwood Park
*S Laureldmp.TXT - HYMO PER JAN 1997 DPM REVISIONS
RAINFALL TYPE= 2 RAIN24= 2.660
*S INITIAL ABSTRACTION AND INFILTRATION PERCULIAR TO Albuquerque AREA
*S USED TO ADAPT AHYMO FOR THIS ANALYSIS

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 EXISTING CONDITIONS BROKEN INTO 6 SUB BASINS from Parkwood											
*S SUBBASIN 1											
COMPUTE NM HYD	101.00	-	1	.00710	17.14	.635	1.67736	1.500	3.773	PER IMP=	50.00
ROUTE MCUNGE	101.01	1	2	.00710	17.08	.636	1.67851	1.500	3.758	CCODE =	.2
COMPUTE NM HYD	102.00	-	1	.00710	17.16	.635	1.67736	1.500	3.777	PER IMP=	50.00
ADD HYD	102.01	1& 2	3	.01420	34.24	1.271	1.67786	1.500	3.767		
ROUTE MCUNGE	102.02	3	4	.01420	33.98	1.271	1.67868	1.500	3.739	CCODE =	.2
COMPUTE NM HYD	103.00	-	1	.00710	17.17	.635	1.67736	1.500	3.778	PER IMP=	50.00
ADD HYD	103.01	1& 4	5	.02130	51.14	1.906	1.67819	1.500	3.752		
ROUTE MCUNGE	103.02	5	6	.02130	50.55	1.907	1.67858	1.500	3.708	CCODE =	.2
*S SUBBASIN 4											
COMPUTE NM HYD	104.00	-	1	.00710	17.10	.635	1.67736	1.500	3.764	PER IMP=	50.00
ADD HYD	104.01	1& 6	8	.02840	67.65	2.542	1.67824	1.500	3.722		
ROUTE MCUNGE	104.02	8	9	.02840	66.90	2.543	1.67864	1.500	3.681	CCODE =	.2
*S SUBBASIN 5											
COMPUTE NM HYD	105.00	-	1	.00710	17.16	.635	1.67736	1.500	3.777	PER IMP=	50.00
ADD HYD	105.01	1& 9	10	.03550	84.07	3.178	1.67835	1.500	3.700		
ROUTE MCUNGE	105.02	10	11	.03550	82.79	3.179	1.67885	1.500	3.644	CCODE =	.2
*S SUBBASIN 6											
COMPUTE NM HYD	106.00	-	1	.00710	14.82	.635	1.67736	1.500	3.261	PER IMP=	50.00
ADD HYD	106.01	1&11	12	.04260	97.61	3.814	1.67858	1.500	3.580		
ROUTE MCUNGE	106.02	12	13	.04260	97.05	3.800	1.67246	1.550	3.560	CCODE =	.1
* ADD FLOWS FROM ROSEWOOD											
COMPUTE NM HYD	107.00	-	1	.02040	49.03	1.825	1.67736	1.500	3.755	PER IMP=	50.00
ROUTE MCUNGE	107.01	1	14	.02040	49.03	1.825	1.67734	1.500	3.755	CCODE =	.0
ADD HYD	107.01	1&14	15	.04080	98.06	3.650	1.67734	1.500	3.755		
COMPUTE NM HYD	108.00	-	1	.01100	25.93	.984	1.67736	1.500	3.683	PER IMP=	50.00
*S ADD DEVELOPED SUBDIVISION											
ADD HYD	108.01	1&15	17	.05180	123.99	4.634	1.67734	1.500	3.740		
* ADD FLOW FROM WEST CHANNEL											
COMPUTE NM HYD	109.00	-	18	.19500	354.90	18.608	1.78921	1.600	2.844	PER IMP=	57.00
ADD HYD	109.01	17&18	19	.24680	439.74	23.242	1.76573	1.550	2.784		
ROUTE RESERVOIR	120.00	19	20	.24680	170.41	23.242	1.76573	1.950	1.079	AC-FT=	7.809

FINISH
2

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0

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        RUN DATE (MON/DAY/YR) = 12/13/2002
        START TIME (HR:MIN:SEC) = 15:43:48     USER NO.= AHYMO-I-9702a0100003C-SH
        INPUT FILE = laureld.txt

START                TIME=0.0  CODE  0  LINES  -3

Location               Albuquerque
     City of Albuquerque soil infiltration values (LAND FACTORS) used for computations.
     Land Treatment     Initial Abstr.(in)    Unif. Infilt.(in/hour)
          A             0.65                  1.67
          B             0.50                  1.25
          C             0.35                  0.83
          D             0.10                  0.04

*S COMPUTE 100 YEAR - 24 HOUR HYROGRAPHS FOR LAURELWOOD PARK SUBDIVISION
*S Laurelwood Park
*S Laureldmp.TXT  -  HYMO PER JAN 1997 DPM REVISIONS

RAINFALL             TYPE=-2    RAIN QUAR= 0.0    RAIN ONE= 2.0
                     RAIN SIX=  2.4  RAIN DAY=  2.66  DT= 0.05


              COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
                DT =    .050000 HOURS       END TIME =    24.000000 HOURS
*S INITIAL ABSTRACTION AND INFILTRATION PERCULIAR TO Albuquerque AREA
*S USED TO ADAPT AHYMO FOR THIS ANALYSIS

*--------------------------------------------------------------------- -------
*S EXISTING CONDITIONS BROKEN INTO 6 SUB BASINS from Parkwood

*S SUBBASIN 1
COMPUTE NM HYD       ID=1   HYD NO= 101   DA= .0071 SQ MI
                     PER  A=0   PER  B=27  PER  C=23   PER  D=50
                     TP=-.1219  RAIN=-1


     K =   .066436HR    TP =   .121900HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   15.326    CFS   UNIT VOLUME =    .9981       B =   526.28       P60 = 2.0000
     AREA =      .003550 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =   .110319HR    TP =   .121900HR    K/TP RATIO =   .904992     SHAPE CONSTANT, N =  3.914788
     UNIT PEAK =   10.177    CFS   UNIT VOLUME =    1.000       B =   349.45       P60 = 2.0000
     AREA =      .003550 SQ MI    IA =    .43100 INCHES    INF =   1.05680 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD            ID=1    CODE=10
```

PARTIAL HYDROGRAPH 101.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	5.000	.1	10.000	.0	15.000	.0	20.000	.0
.500	.0	5.500	.1	10.500	.0	15.500	.0	20.500	.0
1.000	.0	6.000	.1	11.000	.0	16.000	.0	21.000	.0
1.500	17.1	6.500	.1	11.500	.0	16.500	.0	21.500	.0
2.000	3.1	7.000	.0	12.000	.0	17.000	.0	22.000	.0
2.500	.4	7.500	.0	12.500	.0	17.500	.0	22.500	.0
3.000	.2	8.000	.0	13.000	.0	18.000	.0	23.000	.0
3.500	.1	8.500	.0	13.500	.0	18.500	.0	23.500	.0
4.000	.1	9.000	.0	14.000	.0	19.000	.0	24.000	.0
4.500	.1	9.500	.0	14.500	.0	19.500	.0		

RUNOFF VOLUME = 1.67736 INCHES = .6352 ACRE-FEET
PEAK DISCHARGE RATE = 17.14 CFS AT 1.500 HOURS BASIN AREA = .0071 SQ. MI.

*ROUTE SUBBASIN 1 THROUGH 2 IN STREET

COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=0 MAX ELEV=0.87
CH SLOPE=0.02 FP SLOPE=0.02
N=0.017 DIST=32.0

DIST	EL	DIST	EL
0.0	0.87	0.25	0.0
31.75	0.0	32.0	0.87

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
.00	.00	.00	31.50
.05	1.44	2.28	31.53
.09	2.89	7.23	31.55
.14	4.33	14.18	31.58
.18	5.78	22.88	31.61
.23	7.23	33.15	31.63
.27	8.68	44.86	31.66
.32	10.13	57.93	31.68
.37	11.58	72.27	31.71
.41	13.03	87.84	31.74
.46	14.48	104.57	31.76
.50	15.94	122.41	31.79
.55	17.40	141.34	31.82
.60	18.85	161.31	31.84
.64	20.31	182.29	31.87

.69	21.77	204.25	31.89
.73	23.23	227.17	31.92
.78	24.69	251.01	31.95
.82	26.16	275.76	31.97
.87	27.62	301.40	32.00

ROUTE MCUNGE ID=2 HYD NO=101.01 INFLOW ID=1
DT=0.0 L=500 FT NS=0 SLOPE=0.02

INFLOW END= 490 TABLE PTS= 20
DT= .050000 QMED= 8.57 CKMED= 4.8145
WIDTH MED= 31.56 NREACH= 2 DX= 250.00

DEPTH (FT)	AREA (SQ FT)	Q (CFS)	TRAVEL TIME(HR)	WIDTH (FT)	ck (FPS)	VEL (FPS)	C	D	C1	C2	C3	Q-M (CFS)	C1-M	C2-M	C3-M
.00	.0	.0	.120	31.5	1.39	.73	1.000	.000	1.000	.000	.000	.0	1.000	.000	.000
.05	1.4	2.3	.088	31.5	2.63	1.58	1.895	.005	.996	.310	-.307	.7	.998	.091	-.088
.09	2.9	7.2	.055	31.6	4.16	2.50	2.996	.011	.995	.501	-.495	4.5	.995	.426	-.421
.14	4.3	14.2	.042	31.6	5.44	3.27	3.915	.017	.993	.594	-.588	10.5	.994	.554	-.548
.18	5.8	22.9	.035	31.6	6.57	3.96	4.729	.022	.992	.652	-.645	18.3	.993	.626	-.619
.23	7.2	33.1	.030	31.6	7.60	4.59	5.471	.028	.992	.692	-.684	27.8	.992	.674	-.666
.27	8.7	44.9	.027	31.7	8.56	5.17	6.161	.033	.991	.722	-.713	38.8	.991	.708	-.699
.32	10.1	57.9	.024	31.7	9.46	5.72	6.808	.039	.990	.745	-.735	51.2	.990	.734	-.725
.37	11.6	72.3	.022	31.7	10.31	6.24	7.421	.044	.990	.764	-.753	64.9	.990	.755	-.745
.41	13.0	87.8	.021	31.7	11.12	6.74	8.004	.050	.989	.779	-.768	79.9	.989	.772	-.761
.46	14.5	104.6	.019	31.8	11.89	7.22	8.562	.055	.988	.792	-.781	96.1	.989	.786	-.775
.50	15.9	122.4	.018	31.8	12.64	7.68	9.098	.061	.988	.803	-.791	113.4	.988	.798	-.786
.55	17.4	141.3	.017	31.8	13.35	8.13	9.615	.067	.988	.813	-.800	131.7	.988	.808	-.796
.60	18.9	161.3	.016	31.8	14.05	8.56	10.113	.072	.987	.821	-.808	151.2	.987	.817	-.804
.64	20.3	182.3	.015	31.9	14.72	8.97	10.596	.078	.987	.829	-.815	171.7	.987	.825	-.812
.69	21.8	204.3	.015	31.9	15.37	9.38	11.064	.083	.986	.835	-.822	193.1	.986	.832	-.819
.73	23.2	227.2	.014	31.9	16.00	9.78	11.519	.089	.986	.841	-.827	215.6	.986	.838	-.825
.78	24.7	251.0	.014	31.9	16.61	10.16	11.961	.095	.986	.847	-.832	239.0	.986	.844	-.830
.82	26.2	275.8	.013	32.0	17.21	10.54	12.391	.100	.985	.852	-.837	263.3	.985	.849	-.835
.87	27.6	301.4	.013	32.0	17.78	10.91	12.803	.106	.985	.856	-.841	288.5	.985	.854	-.839

MAXIMUM NO. ITERATIONS FOR SOLUTION (KKMAX) = 3 OCCURRED 12 TIMES. AVERAGE NUMBER ITERATIONS = 1.0595
Equations solved using the Ponce correction to C2
PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 101.01

RUNOFF VOLUME = 1.67851 INCHES = .6356 ACRE-FEET
PEAK DISCHARGE RATE = 17.08 CFS AT 1.500 HOURS BASIN AREA = .0071 SQ. MI.

*******S SUBBASIN 2
COMPUTE NM HYD ID=1 HYD NO= 102 DA= .0071 SQ MI
PER A=0 PER B=27 PER C=23 PER D=50
TP=-.1215 RAIN=-1

K = .066218HR TP = .121500HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 15.377 CFS UNIT VOLUME = .9981 B = 526.28 P60 = 2.0000
AREA = .003550 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .109957HR TP = .121500HR K/TP RATIO = .904992 SHAPE CONSTANT, N = 3.914788
UNIT PEAK = 10.210 CFS UNIT VOLUME = 1.000 B = 349.45 P60 = 2.0000
AREA = .003550 SQ MI IA = .43100 INCHES INF = 1.05680 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 102.00

RUNOFF VOLUME = 1.67736 INCHES = .6352 ACRE-FEET
PEAK DISCHARGE RATE = 17.16 CFS AT 1.500 HOURS BASIN AREA = .0071 SQ. MI.

*****S ADD SUBBASIN 1 TO SUBBASIN 2

ADD HYD ID=3 HYD NO = 102.01 IDS=1 AND 2
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 102.01

RUNOFF VOLUME = 1.67786 INCHES = 1.2707 ACRE-FEET
PEAK DISCHARGE RATE = 34.24 CFS AT 1.500 HOURS BASIN AREA = .0142 SQ. MI.

***ROUTE SUBBASIN 1 AND 2 TRHOUGH STREET TO 3

COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=0 MAX ELEV=0.87
CH SLOPE=0.02 FP SLOPE=0.02
N=0.017 DIST=32.0

DIST	EL	DIST	EL
0.0	0.87	0.25	0.0
31.75	0.0	32.0	0.87

RATING CURVE VALLEY SECTION 1.0

WATER	FLOW	FLOW	TOP

SURFACE ELEV	AREA SQ FT	RATE CFS	WIDTH FT
.00	.00	.00	31.50
.05	1.44	2.28	31.53
.09	2.89	7.23	31.55
.14	4.33	14.18	31.58
.18	5.78	22.88	31.61
.23	7.23	33.15	31.63
.27	8.68	44.86	31.66
.32	10.13	57.93	31.68
.37	11.58	72.27	31.71
.41	13.03	87.84	31.74
.46	14.48	104.57	31.76
.50	15.94	122.41	31.79
.55	17.40	141.34	31.82
.60	18.85	161.31	31.84
.64	20.31	182.29	31.87
.69	21.77	204.25	31.89
.73	23.23	227.17	31.92
.78	24.69	251.01	31.95
.82	26.16	275.76	31.97
.87	27.62	301.40	32.00

ROUTE MCUNGE ID=4 HYD NO=102.02 INFLOW ID=3
DT=0.0 L=260 FT NS=0 SLOPE=0.02

INFLOW END= 493 TABLE PTS= 20
DT= .050000 QMED= 17.12 CKMED= 6.0122
WIDTH MED= 31.59 NREACH= 1 DX= 260.00

DEPTH (FT)	AREA (SQ FT)	Q (CFS)	TRAVEL TIME(HR)	WIDTH (FT)	ck (FPS)	VEL (FPS)	C	D	C1	C2	C3	Q-M (CFS)	C1-M	C2-M	C3-M
.00	.0	.0	.063	31.5	1.44	.73	1.000	.000	1.000	.000	.000	.0	1.000	.000	.000
.05	1.4	2.3	.046	31.5	2.63	1.58	1.822	.005	.996	.293	-.289	.7	.998	.071	-.069
.09	2.9	7.2	.029	31.6	4.16	2.50	2.881	.011	.995	.486	-.481	4.5	.995	.410	-.405
.14	4.3	14.2	.022	31.6	5.44	3.27	3.764	.016	.993	.582	-.575	10.5	.994	.540	-.534
.18	5.8	22.9	.018	31.6	6.57	3.96	4.547	.021	.992	.641	-.633	18.3	.993	.614	-.607
.23	7.2	33.1	.016	31.6	7.60	4.59	5.261	.027	.992	.682	-.673	27.8	.992	.663	-.655
.27	8.7	44.9	.014	31.7	8.56	5.17	5.924	.032	.991	.712	-.703	38.8	.991	.698	-.689
.32	10.1	57.9	.013	31.7	9.46	5.72	6.546	.037	.990	.736	-.726	51.2	.991	.725	-.716
.37	11.6	72.3	.012	31.7	10.31	6.24	7.135	.043	.990	.755	-.745	64.9	.990	.746	-.736
.41	13.0	87.8	.011	31.7	11.12	6.74	7.696	.048	.989	.771	-.760	79.9	.989	.764	-.753
.46	14.5	104.6	.010	31.8	11.89	7.22	8.233	.053	.989	.785	-.773	96.1	.989	.778	-.767
.50	15.9	122.4	.009	31.8	12.64	7.68	8.748	.059	.988	.796	-.784	113.4	.988	.791	-.779
.55	17.4	141.3	.009	31.8	13.35	8.13	9.245	.064	.988	.806	-.794	131.7	.988	.801	-.789
.60	18.9	161.3	.008	31.8	14.05	8.56	9.724	.069	.987	.815	-.802	151.2	.987	.810	-.798
.64	20.3	182.3	.008	31.9	14.72	8.97	10.188	.075	.987	.822	-.809	171.7	.987	.819	-.806
.69	21.8	204.3	.008	31.9	15.37	9.38	10.638	.080	.986	.829	-.816	193.1	.987	.826	-.812
.73	23.2	227.2	.007	31.9	16.00	9.78	11.076	.086	.986	.836	-.821	215.6	.986	.833	-.819
.78	24.7	251.0	.007	31.9	16.61	10.16	11.501	.091	.986	.841	-.827	239.0	.986	.838	-.824
.82	26.2	275.8	.007	32.0	17.21	10.54	11.915	.096	.985	.846	-.831	263.3	.985	.844	-.829
.87	27.6	301.4	.007	32.0	17.78	10.91	12.310	.102	.985	.851	-.836	288.5	.985	.849	-.834

MAXIMUM NO. ITERATIONS FOR SOLUTION (KKMAX) = 3 OCCURRED 8 TIMES. AVERAGE NUMBER ITERATIONS = 1.0707

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Equations solved using the Ponce correction to C2
PRINT HYD             ID=4  CODE=1

                                  PARTIAL HYDROGRAPH   102.02


    RUNOFF VOLUME =      1.67868 INCHES     =       1.2713 ACRE-FEET
    PEAK DISCHARGE RATE =      33.98 CFS  AT   1.500 HOURS   BASIN AREA =    .0142 SQ. MI.



*****S SUBBASIN 3

COMPUTE NM HYD        ID=1   HYD NO= 103   DA= .0071 SQ MI
                      PER  A=0   PER  B=27  PER  C=23   PER  D=50
                      TP=-.1214  RAIN=-1


     K =    .066163HR    TP =    .121400HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =    15.389    CFS   UNIT VOLUME =     .9980       B =   526.28      P60 = 2.0000
     AREA =       .003550 SQ MI    IA =     .10000 INCHES    INF =     .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000


     K =    .109866HR    TP =    .121400HR    K/TP RATIO =    .904992     SHAPE CONSTANT, N =  3.914788
     UNIT PEAK =    10.219    CFS   UNIT VOLUME =     1.000       B =   349.45      P60 = 2.0000
     AREA =       .003550 SQ MI    IA =     .43100 INCHES    INF =    1.05680 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

PRINT HYD             ID=1    CODE=1

                                  PARTIAL HYDROGRAPH   103.00


    RUNOFF VOLUME =      1.67736 INCHES     =         .6352 ACRE-FEET
    PEAK DISCHARGE RATE =      17.17 CFS  AT   1.500 HOURS   BASIN AREA =    .0071 SQ. MI.



***** ADD BASIN 1 2 AND 3

ADD HYD               ID=5   HYD NO =103.01  IDS=1 AND 4
PRINT HYD             ID=5 CODE=1

                                  PARTIAL HYDROGRAPH   103.01


    RUNOFF VOLUME =      1.67819 INCHES     =       1.9064 ACRE-FEET
    PEAK DISCHARGE RATE =      51.14 CFS  AT   1.500 HOURS   BASIN AREA =    .0213 SQ. MI.
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****ROUTE 1 2 AND 3 THROUGH 4

COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=0 MAX ELEV=0.87
CH SLOPE=0.02 FP SLOPE=0.02
N=0.017 DIST=32.0

DIST	EL	DIST	EL
0.0	0.87	0.25	0.0
31.75	0.0	32.0	0.87

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
.00	.00	.00	31.50
.05	1.44	2.28	31.53
.09	2.89	7.23	31.55
.14	4.33	14.18	31.58
.18	5.78	22.88	31.61
.23	7.23	33.15	31.63
.27	8.68	44.86	31.66
.32	10.13	57.93	31.68
.37	11.58	72.27	31.71
.41	13.03	87.84	31.74
.46	14.48	104.57	31.76
.50	15.94	122.41	31.79
.55	17.40	141.34	31.82
.60	18.85	161.31	31.84
.64	20.31	182.29	31.87
.69	21.77	204.25	31.89
.73	23.23	227.17	31.92
.78	24.69	251.01	31.95
.82	26.16	275.76	31.97
.87	27.62	301.40	32.00

ROUTE MCUNGE ID=6 HYD NO=103.02 INFLOW ID=5
DT=0.0 L=270 FT NS=0 SLOPE=0.02

INFLOW END= 494 TABLE PTS= 20
DT= .050000 QMED= 25.57 CKMED= 7.0904
WIDTH MED= 31.61 NREACH= 1 DX= 270.00

DEPTH (FT)	AREA (SQ FT)	Q (CFS)	TRAVEL TIME(HR)	WIDTH (FT)	ck (FPS)	VEL (FPS)	C	D	C1	C2	C3	Q-M (CFS)	C1-M	C2-M	C3-M
.00	.0	.0	.065	31.5	1.50	.73	1.000	.000	1.000	.000	.000	.0	1.000	.000	.000
.05	1.4	2.3	.047	31.5	2.63	1.58	1.754	.005	.996	.275	-.272	.7	.998	.052	-.050
.09	2.9	7.2	.030	31.6	4.16	2.50	2.774	.010	.995	.472	-.466	4.5	.995	.394	-.389

.14	4.3	14.2	.023	31.6	5.44	3.27	3.625	.015	.993	.569	-.562	10.5	.994	.527	-.521
.18	5.8	22.9	.019	31.6	6.57	3.96	4.379	.020	.992	.630	-.622	18.3	.993	.602	-.595
.23	7.2	33.1	.016	31.6	7.60	4.59	5.066	.026	.992	.672	-.663	27.8	.992	.652	-.644
.27	8.7	44.9	.015	31.7	8.56	5.17	5.704	.031	.991	.703	-.694	38.8	.991	.688	-.680
.32	10.1	57.9	.013	31.7	9.46	5.72	6.304	.036	.990	.728	-.718	51.2	.991	.716	-.707
.37	11.6	72.3	.012	31.7	10.31	6.24	6.871	.041	.990	.747	-.737	64.9	.990	.738	-.728
.41	13.0	87.8	.011	31.7	11.12	6.74	7.411	.046	.989	.764	-.753	79.9	.989	.756	-.745
.46	14.5	104.6	.010	31.8	11.89	7.22	7.928	.051	.989	.777	-.766	96.1	.989	.771	-.759
.50	15.9	122.4	.010	31.8	12.64	7.68	8.424	.056	.988	.789	-.777	113.4	.988	.783	-.772
.55	17.4	141.3	.009	31.8	13.35	8.13	8.902	.062	.988	.799	-.787	131.7	.988	.794	-.782
.60	18.9	161.3	.009	31.8	14.05	8.56	9.364	.067	.987	.808	-.795	151.2	.987	.804	-.791
.64	20.3	182.3	.008	31.9	14.72	8.97	9.811	.072	.987	.816	-.803	171.7	.987	.812	-.799
.69	21.8	204.3	.008	31.9	15.37	9.38	10.244	.077	.986	.823	-.810	193.1	.987	.820	-.806
.73	23.2	227.2	.008	31.9	16.00	9.78	10.665	.082	.986	.830	-.816	215.6	.986	.827	-.813
.78	24.7	251.0	.007	31.9	16.61	10.16	11.075	.088	.986	.836	-.821	239.0	.986	.833	-.819
.82	26.2	275.8	.007	32.0	17.21	10.54	11.474	.093	.985	.841	-.826	263.3	.985	.838	-.824
.87	27.6	301.4	.007	32.0	17.78	10.91	11.854	.098	.985	.846	-.830	288.5	.985	.843	-.828

MAXIMUM NO. ITERATIONS FOR SOLUTION (KKMAX) = 3 OCCURRED 10 TIMES. AVERAGE NUMBER ITERATIONS = 1.0793
Equations solved using the Ponce correction to C2
PRINT HYD ID=6 CODE=1

PARTIAL HYDROGRAPH 103.02

RUNOFF VOLUME = 1.67858 INCHES = 1.9069 ACRE-FEET
PEAK DISCHARGE RATE = 50.55 CFS AT 1.500 HOURS BASIN AREA = .0213 SQ. MI.

*S SUBBASIN 4
COMPUTE NM HYD ID=1 HYD NO= 104 DA= .0071 SQ MI
PER A=0 PER B=27 PER C=23 PER D=50
TP=-.1228 RAIN=-1

K = .066926HR TP = .122800HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 15.214 CFS UNIT VOLUME = .9982 B = 526.28 P60 = 2.0000
AREA = .003550 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .111133HR TP = .122800HR K/TP RATIO = .904992 SHAPE CONSTANT, N = 3.914788
UNIT PEAK = 10.102 CFS UNIT VOLUME = 1.000 B = 349.45 P60 = 2.0000
AREA = .003550 SQ MI IA = .43100 INCHES INF = 1.05680 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.67736 INCHES = .6352 ACRE-FEET
PEAK DISCHARGE RATE = 17.10 CFS AT 1.500 HOURS BASIN AREA = .0071 SQ. MI.

***ADD SUBBASIN 1 2 3 AND 4

ADD HYD ID=8 HYD NO =104.01 IDS=1 AND 6
PRINT HYD ID=8 CODE=1

PARTIAL HYDROGRAPH 104.01

RUNOFF VOLUME = 1.67824 INCHES = 2.5420 ACRE-FEET
PEAK DISCHARGE RATE = 67.65 CFS AT 1.500 HOURS BASIN AREA = .0284 SQ. MI.

******ROUTE 1 2 3 AND 4 THROUGH 5

COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=0 MAX ELEV=0.87
CH SLOPE=0.02 FP SLOPE=0.02
N=0.017 DIST=32.0

DIST	EL	DIST	EL
0.0	0.87	0.25	0.0
31.75	0.0	32.0	0.87

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
.00	.00	.00	31.50
.05	1.44	2.28	31.53
.09	2.89	7.23	31.55
.14	4.33	14.18	31.58
.18	5.78	22.88	31.61
.23	7.23	33.15	31.63
.27	8.68	44.86	31.66
.32	10.13	57.93	31.68
.37	11.58	72.27	31.71
.41	13.03	87.84	31.74
.46	14.48	104.57	31.76
.50	15.94	122.41	31.79
.55	17.40	141.34	31.82
.60	18.85	161.31	31.84
.64	20.31	182.29	31.87

.69	21.77	204.25	31.89
.73	23.23	227.17	31.92
.78	24.69	251.01	31.95
.82	26.16	275.76	31.97
.87	27.62	301.40	32.00

ROUTE MCUNGE ID=9 HYD NO=104.02 INFLOW ID=8
DT=0.0 L=260 FT NS=0 SLOPE=0.02

INFLOW END= 495 TABLE PTS= 20
DT= .050000 QMED= 33.83 CKMED= 8.0832
WIDTH MED= 31.63 NREACH= 1 DX= 260.00

DEPTH (FT)	AREA (SQ FT)	Q (CFS)	TRAVEL TIME(HR)	WIDTH (FT)	ck (FPS)	VEL (FPS)	C	D	C1	C2	C3	Q-M (CFS)	C1-M	C2-M	C3-M
.00	.0	.0	.063	31.5	1.44	.73	1.000	.000	1.000	.000	.000	.0	1.000	.000	.000
.05	1.4	2.3	.046	31.5	2.63	1.58	1.822	.005	.996	.293	-.289	.7	.998	.071	-.069
.09	2.9	7.2	.029	31.6	4.16	2.50	2.881	.011	.995	.486	-.481	4.5	.995	.410	-.405
.14	4.3	14.2	.022	31.6	5.44	3.27	3.764	.016	.993	.582	-.575	10.5	.994	.540	-.534
.18	5.8	22.9	.018	31.6	6.57	3.96	4.547	.021	.992	.641	-.633	18.3	.993	.614	-.607
.23	7.2	33.1	.016	31.6	7.60	4.59	5.261	.027	.992	.682	-.673	27.8	.992	.663	-.655
.27	8.7	44.9	.014	31.7	8.56	5.17	5.924	.032	.991	.712	-.703	38.8	.991	.698	-.689
.32	10.1	57.9	.013	31.7	9.46	5.72	6.546	.037	.990	.736	-.726	51.2	.991	.725	-.716
.37	11.6	72.3	.012	31.7	10.31	6.24	7.135	.043	.990	.755	-.745	64.9	.990	.746	-.736
.41	13.0	87.8	.011	31.7	11.12	6.74	7.696	.048	.989	.771	-.760	79.9	.989	.764	-.753
.46	14.5	104.6	.010	31.8	11.89	7.22	8.233	.053	.989	.785	-.773	96.1	.989	.778	-.767
.50	15.9	122.4	.009	31.8	12.64	7.68	8.748	.059	.988	.796	-.784	113.4	.988	.791	-.779
.55	17.4	141.3	.009	31.8	13.35	8.13	9.245	.064	.988	.806	-.794	131.7	.988	.801	-.789
.60	18.9	161.3	.008	31.8	14.05	8.56	9.724	.069	.987	.815	-.802	151.2	.987	.810	-.798
.64	20.3	182.3	.008	31.9	14.72	8.97	10.188	.075	.987	.822	-.809	171.7	.987	.819	-.806
.69	21.8	204.3	.008	31.9	15.37	9.38	10.638	.080	.986	.829	-.816	193.1	.987	.826	-.812
.73	23.2	227.2	.007	31.9	16.00	9.78	11.076	.086	.986	.836	-.821	215.6	.986	.833	-.819
.78	24.7	251.0	.007	31.9	16.61	10.16	11.501	.091	.986	.841	-.827	239.0	.986	.838	-.824
.82	26.2	275.8	.007	32.0	17.21	10.54	11.915	.096	.985	.846	-.831	263.3	.985	.844	-.829
.87	27.6	301.4	.007	32.0	17.78	10.91	12.310	.102	.985	.851	-.836	288.5	.985	.849	-.834

MAXIMUM NO. ITERATIONS FOR SOLUTION (KKMAX) = 3 OCCURRED 11 TIMES. AVERAGE NUMBER ITERATIONS = 1.0845
Equations solved using the Ponce correction to C2
PRINT HYD ID=9 CODE=1

PARTIAL HYDROGRAPH 104.02

RUNOFF VOLUME = 1.67864 INCHES = 2.5426 ACRE-FEET
PEAK DISCHARGE RATE = 66.90 CFS AT 1.500 HOURS BASIN AREA = .0284 SQ. MI.

*S SUBBASIN 5
COMPUTE NM HYD ID=1 HYD NO= 105 DA= .0071 SQ MI
PER A=0 PER B=27 PER C=23 PER D=50
TP=-.1215 RAIN=-1

K = .066218HR TP = .121500HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 15.377 CFS UNIT VOLUME = .9981 B = 526.28 P60 = 2.0000
AREA = .003550 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .109957HR TP = .121500HR K/TP RATIO = .904992 SHAPE CONSTANT, N = 3.914788
UNIT PEAK = 10.210 CFS UNIT VOLUME = 1.000 B = 349.45 P60 = 2.0000
AREA = .003550 SQ MI IA = .43100 INCHES INF = 1.05680 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 1.67736 INCHES = .6352 ACRE-FEET
PEAK DISCHARGE RATE = 17.16 CFS AT 1.500 HOURS BASIN AREA = .0071 SQ. MI.

**** ADD 1 2 3 4 AND 5

ADD HYD ID=10 HYD NO = 105.01 IDS=1 AND 9
PRINT HYD ID=10 CODE=1

PARTIAL HYDROGRAPH 105.01

RUNOFF VOLUME = 1.67835 INCHES = 3.1777 ACRE-FEET
PEAK DISCHARGE RATE = 84.07 CFS AT 1.500 HOURS BASIN AREA = .0355 SQ. MI.

****ROUTE 1 2 3 4 AND 5 THROUGH 6

COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=0 MAX ELEV=0.87
CH SLOPE=0.02 FP SLOPE=0.010
N=0.017 DIST=32.0
DIST EL DIST EL
0.0 0.87 0.25 0.0
31.75 0.0 32.0 0.87

RATING CURVE VALLEY SECTION 1.0
WATER FLOW FLOW TOP

SURFACE ELEV	AREA SQ FT	RATE CFS	WIDTH FT
.00	.00	.00	31.50
.05	1.44	1.61	31.53
.09	2.89	5.11	31.55
.14	4.33	10.03	31.58
.18	5.78	16.18	31.61
.23	7.23	23.44	31.63
.27	8.68	31.72	31.66
.32	10.13	40.96	31.68
.37	11.58	51.11	31.71
.41	13.03	62.11	31.74
.46	14.48	73.94	31.76
.50	15.94	86.56	31.79
.55	17.40	99.94	31.82
.60	18.85	114.06	31.84
.64	20.31	128.90	31.87
.69	21.77	144.43	31.89
.73	23.23	160.63	31.92
.78	24.69	177.49	31.95
.82	26.16	194.99	31.97
.87	27.62	213.12	32.00

ROUTE MCUNGE ID=11 HYD NO=105.02 INFLOW ID=10
DT=0.0 L=270 FT NS=0 SLOPE=0.010

INFLOW END= 496 TABLE PTS= 20
DT= .050000 QMED= 42.03 CKMED= 6.9895
WIDTH MED= 31.69 NREACH= 1 DX= 270.00

DEPTH (FT)	AREA (SQ FT)	Q (CFS)	TRAVEL TIME(HR)	WIDTH (FT)	ck (FPS)	VEL (FPS)	C	D	C1	C2	C3	Q-M (CFS)	C1-M	C2-M	C3-M
.00	.0	.0	.092	31.5	1.50	.52	1.000	.000	1.000	.000	.000	.0	1.000	.000	.000
.05	1.4	1.6	.067	31.5	1.86	1.12	1.240	.010	.991	.111	-.102	.5	.997	.035	-.032
.09	2.9	5.1	.042	31.6	2.94	1.77	1.962	.020	.986	.329	-.316	3.2	.988	.242	-.230
.14	4.3	10.0	.032	31.6	3.84	2.32	2.563	.031	.983	.443	-.426	7.4	.985	.394	-.378
.18	5.8	16.2	.027	31.6	4.64	2.80	3.096	.041	.980	.517	-.497	13.0	.982	.483	-.465
.23	7.2	23.4	.023	31.6	5.37	3.24	3.582	.051	.978	.568	-.546	19.7	.979	.544	-.523
.27	8.7	31.7	.021	31.7	6.05	3.66	4.034	.061	.976	.607	-.583	27.5	.977	.589	-.566
.32	10.1	41.0	.019	31.7	6.69	4.05	4.457	.072	.974	.638	-.612	36.2	.975	.624	-.599
.37	11.6	51.1	.017	31.7	7.29	4.41	4.859	.082	.972	.663	-.636	45.9	.973	.651	-.625
.41	13.0	62.1	.016	31.7	7.86	4.77	5.240	.092	.971	.684	-.655	56.5	.972	.674	-.646
.46	14.5	73.9	.015	31.8	8.41	5.10	5.606	.103	.969	.702	-.671	67.9	.970	.693	-.664
.50	15.9	86.6	.014	31.8	8.94	5.43	5.957	.113	.968	.717	-.685	80.2	.969	.710	-.678
.55	17.4	99.9	.013	31.8	9.44	5.75	6.295	.123	.967	.730	-.697	93.2	.967	.724	-.691
.60	18.9	114.1	.012	31.8	9.93	6.05	6.621	.134	.966	.742	-.708	106.9	.966	.736	-.703
.64	20.3	128.9	.012	31.9	10.41	6.35	6.937	.144	.964	.753	-.717	121.4	.965	.747	-.712
.69	21.8	144.4	.011	31.9	10.87	6.63	7.244	.154	.963	.762	-.725	136.6	.964	.757	-.721
.73	23.2	160.6	.011	31.9	11.31	6.91	7.542	.165	.962	.770	-.732	152.4	.963	.766	-.729
.78	24.7	177.5	.010	31.9	11.75	7.19	7.831	.175	.961	.778	-.739	169.0	.962	.774	-.736
.82	26.2	195.0	.010	32.0	12.17	7.45	8.113	.186	.960	.785	-.745	186.2	.961	.781	-.742
.87	27.6	213.1	.010	32.0	12.57	7.72	8.382	.196	.959	.791	-.750	204.0	.960	.788	-.748

```
MAXIMUM NO. ITERATIONS FOR SOLUTION (KKMAX) =   3 OCCURRED      14 TIMES.  AVERAGE NUMBER ITERATIONS =  1.0931
Equations solved using the Ponce correction to C2
PRINT HYD             ID=11  CODE=1

                                  PARTIAL HYDROGRAPH   105.02

    RUNOFF VOLUME =      1.67885 INCHES      =       3.1786 ACRE-FEET
    PEAK DISCHARGE RATE =      82.79 CFS  AT   1.500 HOURS   BASIN AREA =    .0355 SQ. MI.


*S SUBBASIN 6
COMPUTE NM HYD        ID=1   HYD NO= 106   DA= .0071 SQ MI
                      PER  A=0   PER  B=27  PER  C=23   PER  D=50
                      TP=-.1580  RAIN=-1

     K =    .086110HR     TP =    .158000HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =    11.825     CFS   UNIT VOLUME =     .9988       B =   526.28       P60 = 2.0000
     AREA =       .003550 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

     K =    .142989HR     TP =    .158000HR     K/TP RATIO =    .904992      SHAPE CONSTANT, N =  3.914788
     UNIT PEAK =    7.8515     CFS   UNIT VOLUME =     .9992       B =   349.45       P60 = 2.0000
     AREA =       .003550 SQ MI     IA =     .43100 INCHES     INF =    1.05680 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

*PRINT HYD            ID=1    CODE=1

***** ADD 1 2 3 4 5 AND 6

ADD HYD               ID=12   HYD NO = 106.01  IDS=1 AND 11
PRINT HYD             ID=12   CODE=1

                                  PARTIAL HYDROGRAPH   106.01

    RUNOFF VOLUME =      1.67858 INCHES      =       3.8137 ACRE-FEET
    PEAK DISCHARGE RATE =      97.61 CFS  AT   1.500 HOURS   BASIN AREA =    .0426 SQ. MI.


**** ROUTE 1 2 3 4 5 AND 6 TO PARKWOOD AND ROSEWOOD INTERSECTION

COMPUTE RATING CURVE  CID=1    VS NO=1    NO SEGS=1
                      MIN ELEV=0     MAX ELEV=0.87
                      CH SLOPE=0.02  FP SLOPE=0.010
                      N=0.017        DIST=32.0
```

DIST	EL	DIST	EL
0.0	0.87	0.25	0.0
31.75	0.0	32.0	0.87

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
.00	.00	.00	31.50
.05	1.44	1.61	31.53
.09	2.89	5.11	31.55
.14	4.33	10.03	31.58
.18	5.78	16.18	31.61
.23	7.23	23.44	31.63
.27	8.68	31.72	31.66
.32	10.13	40.96	31.68
.37	11.58	51.11	31.71
.41	13.03	62.11	31.74
.46	14.48	73.94	31.76
.50	15.94	86.56	31.79
.55	17.40	99.94	31.82
.60	18.85	114.06	31.84
.64	20.31	128.90	31.87
.69	21.77	144.43	31.89
.73	23.23	160.63	31.92
.78	24.69	177.49	31.95
.82	26.16	194.99	31.97
.87	27.62	213.12	32.00

ROUTE MCUNGE ID=13 HYD NO=106.02 INFLOW ID=12
DT=0.0 L=260 FT NS=0 SLOPE=0.010

INFLOW END= 497 TABLE PTS= 20
DT= .050000 QMED= 48.80 CKMED= 6.9895
WIDTH MED= 31.70 NREACH= 1 DX= 260.00

DEPTH (FT)	AREA (SQ FT)	Q (CFS)	TRAVEL TIME(HR)	WIDTH (FT)	ck (FPS)	VEL (FPS)	C	D	C1	C2	C3	Q-M (CFS)	C1-M	C2-M	C3-M
.00	.0	.0	.088	31.5	1.44	.52	1.000	.000	1.000	.000	.000	.0	1.000	.000	.000
.05	1.4	1.6	.065	31.5	1.86	1.12	1.288	.011	.991	.130	-.121	.5	.997	.041	-.038
.09	2.9	5.1	.041	31.6	2.94	1.77	2.037	.021	.986	.346	-.332	3.2	.988	.259	-.247
.14	4.3	10.0	.031	31.6	3.84	2.32	2.662	.032	.983	.459	-.441	7.4	.984	.409	-.394
.18	5.8	16.2	.026	31.6	4.64	2.80	3.215	.042	.980	.530	-.510	13.0	.981	.498	-.479
.23	7.2	23.4	.022	31.6	5.37	3.24	3.720	.053	.978	.581	-.559	19.7	.979	.558	-.536
.27	8.7	31.7	.020	31.7	6.05	3.66	4.189	.064	.976	.619	-.595	27.5	.977	.601	-.578
.32	10.1	41.0	.018	31.7	6.69	4.05	4.629	.074	.974	.649	-.623	36.2	.975	.635	-.610
.37	11.6	51.1	.016	31.7	7.29	4.41	5.045	.085	.972	.674	-.646	45.9	.973	.662	-.635
.41	13.0	62.1	.015	31.7	7.86	4.77	5.442	.096	.971	.694	-.665	56.5	.971	.684	-.656
.46	14.5	73.9	.014	31.8	8.41	5.10	5.822	.106	.969	.711	-.681	67.9	.970	.703	-.673
.50	15.9	86.6	.013	31.8	8.94	5.43	6.186	.117	.968	.726	-.694	80.2	.969	.719	-.688

.55	17.4	99.9	.013	31.8	9.44	5.75	6.537	.128	.967	.739	-.706	93.2	.967	.733	-.700
.60	18.9	114.1	.012	31.8	9.93	6.05	6.876	.139	.965	.750	-.716	106.9	.966	.745	-.711
.64	20.3	128.9	.011	31.9	10.41	6.35	7.204	.149	.964	.761	-.725	121.4	.965	.756	-.720
.69	21.8	144.4	.011	31.9	10.87	6.63	7.523	.160	.963	.770	-.733	136.6	.964	.765	-.729
.73	23.2	160.6	.010	31.9	11.31	6.91	7.832	.171	.962	.778	-.740	152.4	.963	.774	-.736
.78	24.7	177.5	.010	31.9	11.75	7.19	8.132	.182	.961	.785	-.746	169.0	.961	.782	-.743
.82	26.2	195.0	.010	32.0	12.17	7.45	8.425	.193	.960	.792	-.752	186.2	.960	.789	-.749
.87	27.6	213.1	.009	32.0	12.57	7.72	8.705	.204	.959	.798	-.757	204.0	.959	.795	-.755

MAXIMUM NO. ITERATIONS FOR SOLUTION (KKMAX) = 4 OCCURRED 2 TIMES. AVERAGE NUMBER ITERATIONS = 1.1017

DEPTH (FT)	AREA (SQ FT)	Q (CFS)	TRAVEL TIME(HR)	WIDTH (FT)	ck (FPS)	VEL (FPS)	C	D	C1	C2	C3	Q-M (CFS)	C1-M	C2-M	C3-M
.00	.0	.0	.088	31.5	1.44	.52	1.000	.000	1.000	.000	.000	.0	1.000	.000	.000
.05	1.4	1.6	.065	31.5	1.46	1.12	1.013	.013	.987	.013	.000	.5	.996	.004	.000
.09	2.9	5.1	.041	31.6	1.50	1.77	1.041	.041	.960	.040	.000	3.2	.975	.025	.000
.14	4.3	10.0	.031	31.6	1.56	2.32	1.078	.078	.927	.073	.000	7.4	.944	.056	.000
.18	5.8	16.2	.026	31.6	1.62	2.80	1.122	.122	.892	.108	.000	13.0	.910	.090	.000
.23	7.2	23.4	.022	31.6	1.69	3.24	1.169	.169	.856	.144	.000	19.7	.874	.126	.000
.27	8.7	31.7	.020	31.7	1.76	3.66	1.219	.219	.820	.180	.000	27.5	.838	.162	.000
.32	10.1	41.0	.018	31.7	1.84	4.05	1.271	.271	.787	.213	.000	36.2	.803	.197	.000
.37	11.6	51.1	.016	31.7	1.91	4.41	1.324	.324	.755	.245	.000	45.9	.771	.229	.000
.41	13.0	62.1	.015	31.7	1.99	4.77	1.378	.378	.726	.274	.000	56.5	.740	.260	.000
.46	14.5	73.9	.014	31.8	2.07	5.10	1.433	.433	.698	.302	.000	67.9	.712	.288	.000
.50	15.9	86.6	.013	31.8	2.15	5.43	1.487	.487	.672	.328	.000	80.2	.685	.315	.000
.55	17.4	99.9	.013	31.8	2.23	5.75	1.542	.542	.648	.352	.000	93.2	.660	.340	.000
.60	18.9	114.1	.012	31.8	2.31	6.05	1.597	.597	.626	.374	.000	106.9	.637	.363	.000
.64	20.3	128.9	.011	31.9	2.39	6.35	1.652	.652	.605	.395	.000	121.4	.616	.384	.000
.69	21.8	144.4	.011	31.9	2.47	6.63	1.707	.707	.586	.414	.000	136.6	.595	.405	.000
.73	23.2	160.6	.010	31.9	2.54	6.91	1.761	.761	.568	.432	.000	152.4	.577	.423	.000
.78	24.7	177.5	.010	31.9	2.62	7.19	1.815	.815	.551	.449	.000	169.0	.559	.441	.000
.82	26.2	195.0	.010	32.0	2.70	7.45	1.869	.869	.535	.465	.000	186.2	.543	.457	.000
.87	27.6	213.1	.009	32.0	2.78	7.72	1.922	.922	.520	.480	.000	204.0	.528	.472	.000

MAXIMUM NO. ITERATIONS FOR SOLUTION (KKMAX) = 3 OCCURRED 7 TIMES. AVERAGE NUMBER ITERATIONS = 1.0741
Equations solved with two passes: first using the Ponce correction to C1, second using the Fread correction to C1, C2 and C3
PRINT HYD ID=13 CODE=1

PARTIAL HYDROGRAPH 106.02

RUNOFF VOLUME = 1.67246 INCHES = 3.7998 ACRE-FEET
PEAK DISCHARGE RATE = 97.05 CFS AT 1.550 HOURS BASIN AREA = .0426 SQ. MI.

*COMPUTE RUNOFF FROM ROSEWOOD

COMPUTE NM HYD ID=1 HYD NO= 107 DA= .0204 SQ MI
PER A=0 PER B=27 PER C=23 PER D=50
TP=-.1234 RAIN=-1

K = .067253HR TP = .123400HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 43.501 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 2.0000
AREA = .010200 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .111676HR TP = .123400HR K/TP RATIO = .904992 SHAPE CONSTANT, N = 3.914788
UNIT PEAK = 28.885 CFS UNIT VOLUME = 1.001 B = 349.45 P60 = 2.0000
AREA = .010200 SQ MI IA = .43100 INCHES INF = 1.05680 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 107.00

RUNOFF VOLUME = 1.67736 INCHES = 1.8250 ACRE-FEET
PEAK DISCHARGE RATE = 49.03 CFS AT 1.500 HOURS BASIN AREA = .0204 SQ. MI.

COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=0 MAX ELEV=0.87
CH SLOPE=0.02 FP SLOPE=0.02
N=0.017 DIST=23.0

DIST	EL	DIST	EL
0.0	0.87	0.25	0.0
22.75	0.0	23.0	0.87

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
.00	.00	.00	22.50
.05	1.03	1.63	22.53
.09	2.06	5.16	22.55
.14	3.10	10.12	22.58
.18	4.13	16.31	22.61
.23	5.17	23.62	22.63
.27	6.20	31.94	22.66
.32	7.24	41.23	22.68
.37	8.28	51.42	22.71
.41	9.32	62.46	22.74
.46	10.36	74.32	22.76
.50	11.41	86.96	22.79
.55	12.45	100.36	22.82
.60	13.50	114.48	22.84
.64	14.54	129.31	22.87

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                                        .69       15.59      144.83       22.89
                                        .73       16.64      161.00       22.92
                                        .78       17.69      177.82       22.95
                                        .82       18.74      195.27       22.97
                                        .87       19.79      213.33       23.00
ROUTE MCUNGE          ID=14  HYD NO=107.01  INFLOW ID=1
                      DT=0.0  L=50 FT  NS=0  SLOPE=0.010

     ZERO VALUE HYDROGRAPH OR SHORT ROUTE - ROUTING BYPASSED
PRINT HYD             ID=14  CODE=1

                                  PARTIAL HYDROGRAPH   107.01

    RUNOFF VOLUME =     1.67734 INCHES     =       1.8249 ACRE-FEET
    PEAK DISCHARGE RATE =      49.03 CFS  AT   1.500 HOURS   BASIN AREA =    .0204 SQ. MI.


*** ADD ROSEWOOD TO PARKWOOD FLOWS

ADD HYD               ID=15  HYD NO = 107.01  IDS=1 AND 14
PRINT HYD             ID=15   CODE=1

                                  PARTIAL HYDROGRAPH   107.01

    RUNOFF VOLUME =     1.67734 INCHES     =       3.6499 ACRE-FEET
    PEAK DISCHARGE RATE =      98.06 CFS  AT   1.500 HOURS   BASIN AREA =    .0408 SQ. MI.


*** COMPUTE DEVELOPED FLOWS WITHIN SUBDIVISION
COMPUTE NM HYD        ID=1  HYD NO= 108   DA= .011 SQ MI
                      PER  A=0   PER  B=27  PER  C=23   PER  D=50
                      TP=-.1300  RAIN=-1


     K =   .070850HR    TP =   .130000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   22.266    CFS   UNIT VOLUME =    .9989       B =   526.28      P60 = 2.0000
     AREA =      .005500 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =   .117649HR    TP =   .130000HR    K/TP RATIO =   .904992     SHAPE CONSTANT, N =  3.914788
     UNIT PEAK =   14.784    CFS   UNIT VOLUME =    1.001       B =   349.45      P60 = 2.0000
     AREA =      .005500 SQ MI    IA =    .43100 INCHES    INF =   1.05680 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD             ID=1   CODE=1
```

PARTIAL HYDROGRAPH 108.00

RUNOFF VOLUME = 1.67736 INCHES = .9840 ACRE-FEET
PEAK DISCHARGE RATE = 25.93 CFS AT 1.500 HOURS BASIN AREA = .0110 SQ. MI.

*S ADD DEVELOPED SUBDIVISION

ADD HYD ID=17 HYD NO=108.01 IDS=1 AND 15
PRINT HYD ID=17 CODE=1

PARTIAL HYDROGRAPH 108.01

RUNOFF VOLUME = 1.67734 INCHES = 4.6339 ACRE-FEET
PEAK DISCHARGE RATE = 123.99 CFS AT 1.500 HOURS BASIN AREA = .0518 SQ. MI.

**** ADD THE FLOW FROM THE WEST CHANNEL

COMPUTE NM HYD ID=18 HYD NO= 109 DA= .195 SQ MI
PER A=0 PER B=21 PER C=22 PER D=57
TP=-.2305 RAIN=-1

K = .128415HR TP = .230500HR K/TP RATIO = .557115 SHAPE CONSTANT, N = 6.909629
UNIT PEAK = 249.28 CFS UNIT VOLUME = 1.000 B = 516.96 P60 = 2.0000
AREA = .111150 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .196828HR TP = .230500HR K/TP RATIO = .853919 SHAPE CONSTANT, N = 4.166877
UNIT PEAK = 133.19 CFS UNIT VOLUME = 1.000 B = 366.15 P60 = 2.0000
AREA = .083850 SQ MI IA = .42326 INCHES INF = 1.03512 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

PRINT HYD ID=18 CODE=1

PARTIAL HYDROGRAPH 109.00

RUNOFF VOLUME = 1.78921 INCHES = 18.6077 ACRE-FEET
PEAK DISCHARGE RATE = 354.90 CFS AT 1.600 HOURS BASIN AREA = .1950 SQ. MI.

**** COMBINE ALL FLOWS TO ROUTE THROUGH RESERVOIR

ADD HYD ID=19 HYD NO=109.01 IDS=17 AND 18
PRINT HYD ID=19 CODE=1

PARTIAL HYDROGRAPH 109.01

RUNOFF VOLUME = 1.76573 INCHES = 23.2415 ACRE-FEET
PEAK DISCHARGE RATE = 439.74 CFS AT 1.550 HOURS BASIN AREA = .2468 SQ. MI.

ROUTE RESERVOIR ID=20 HYD NO=120 INFLOW ID=19 CODE=10

OUTFLOW(CFS)	STORAGE(AC FT)	ELEV(FT)
0.0	0.0	16.0
104.80	0.62	17.0
121.01	1.39	18.0
135.30	2.27	19.0
148.21	3.24	20.0
160.09	4.28	21.0
169.59	5.41	22.0
170.00	6.62	23.0
170.50	8.07	24.0

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

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	16.00	.000	.00
.50	.00	16.00	.000	.00
1.00	.04	16.00	.000	.01
1.50	393.34	18.72	2.026	131.34
2.00	150.56	23.79	7.766	170.40
2.50	31.89	20.73	4.001	156.90
3.00	12.67	16.27	.170	28.70
3.50	6.37	16.07	.041	6.97
4.00	4.16	16.04	.026	4.36
4.50	3.37	16.03	.020	3.45
5.00	3.18	16.03	.019	3.19
5.50	3.23	16.03	.019	3.21
6.00	3.45	16.03	.020	3.42
6.50	2.16	16.02	.013	2.26
7.00	1.96	16.02	.012	1.98
7.50	1.86	16.02	.011	1.88
8.00	1.78	16.02	.011	1.79
8.50	1.73	16.02	.010	1.74

9.00	1.67	16.02	.010	1.68
9.50	1.61	16.02	.010	1.62
10.00	1.59	16.02	.009	1.59
10.50	1.53	16.01	.009	1.54
11.00	1.49	16.01	.009	1.49
11.50	1.45	16.01	.009	1.45
12.00	1.42	16.01	.008	1.42
12.50	1.38	16.01	.008	1.38
13.00	1.33	16.01	.008	1.34
13.50	1.30	16.01	.008	1.31
14.00	1.28	16.01	.008	1.28
14.50	1.24	16.01	.007	1.25
15.00	1.21	16.01	.007	1.22
15.50	1.20	16.01	.007	1.20
16.00	1.17	16.01	.007	1.17
16.50	1.14	16.01	.007	1.14
17.00	1.12	16.01	.007	1.12
17.50	1.10	16.01	.006	1.10
18.00	1.07	16.01	.006	1.07
18.50	1.06	16.01	.006	1.06
19.00	1.04	16.01	.006	1.04
19.50	1.01	16.01	.006	1.01
20.00	1.00	16.01	.006	1.00
20.50	.99	16.01	.006	.99
21.00	.97	16.01	.006	.96
21.50	.95	16.01	.006	.95
22.00	.93	16.01	.006	.93
22.50	.91	16.01	.005	.91
23.00	.91	16.01	.005	.90
23.50	.89	16.01	.005	.89
24.00	.86	16.01	.005	.86
24.50	.11	16.00	.001	.16
25.00	.03	16.00	.000	.03
25.50	.01	16.00	.000	.01
26.00	.00	16.00	.000	.00

PEAK DISCHARGE = 170.410 CFS - PEAK OCCURS AT HOUR 1.95
MAXIMUM WATER SURFACE ELEVATION = 23.820
MAXIMUM STORAGE = 7.8089 AC-FT INCREMENTAL TIME= .050000HRS

PRINT HYD ID=20 CODE=1

PARTIAL HYDROGRAPH 120.00

RUNOFF VOLUME = 1.76573 INCHES = 23.2415 ACRE-FEET
PEAK DISCHARGE RATE = 170.41 CFS AT 1.950 HOURS BASIN AREA = .2468 SQ. MI.

*----------

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 15:43:48

2

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 PROSPECT N.E., ALBUQUERQUE, NM 87107
PHONE: (505) 884-2215 FAX: (505) 884-0214

December 16, 2002

Mr. Martin Garcia, P.E.
ABQ Engineering, Inc.
1631 Eubank NE, Ste. C
Albuquerque, NM 87112

Re: Drainage Report for Laurelwood Park Subdivision, ZAP H-10
Engineer's Stamp Dated October 31, 2002

Dear Mr. Garcia:

The referenced report states that AMAFCA will allow a maximum discharge of 170 cfs from the detention pond to a 48-inch storm drain that is proposed with the West I-40 Diversion Channel construction. AMAFCA approves this discharge rate from the pond.

If you have any questions, please call me at 884-2215.

Sincerely,
AMAFCA

Lynn M. Mazur

Lynn M. Mazur, P.E.
Development Review Engineer

Cc: Brad Bingham, City Hydrology

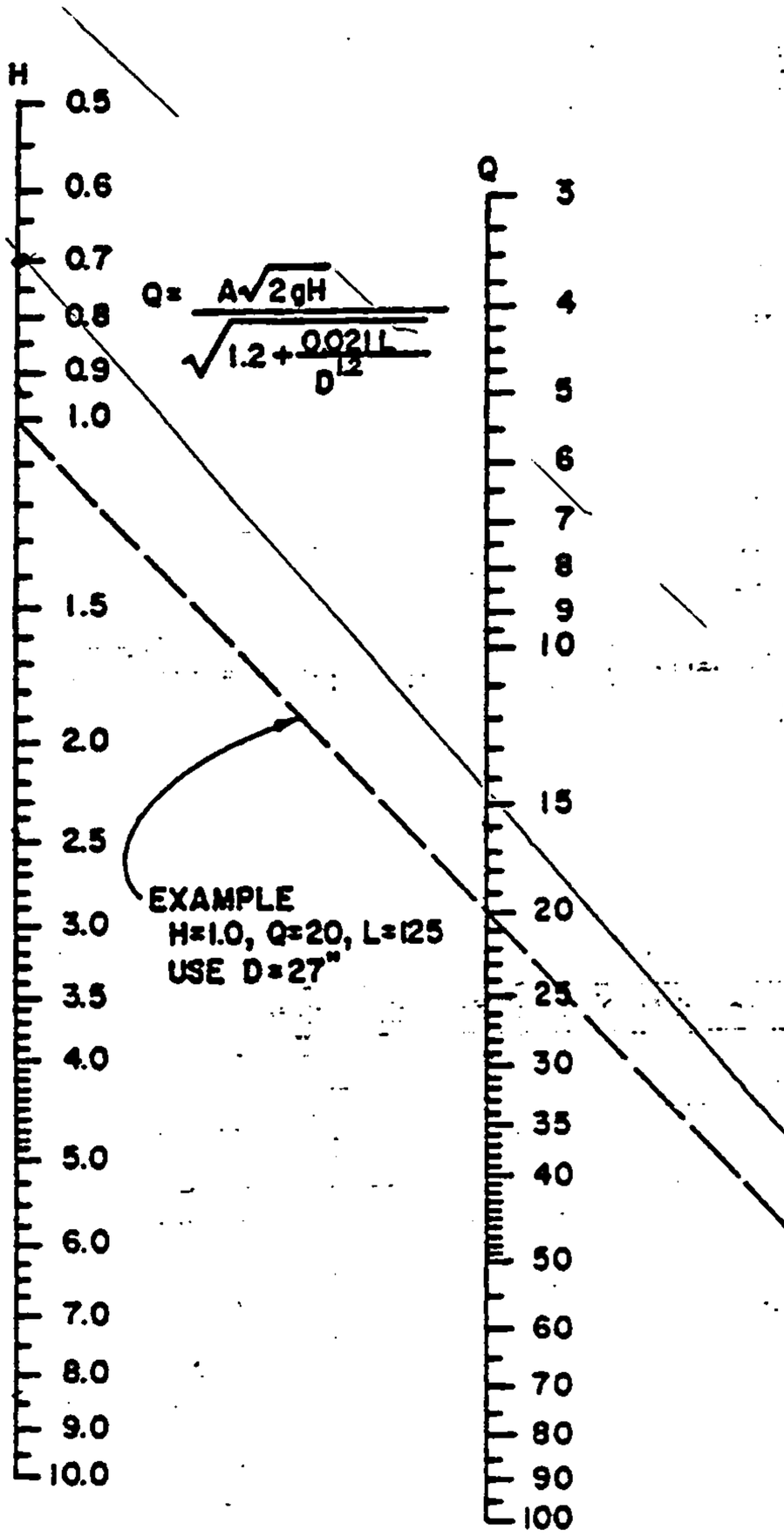
Laurelwood South Subdivision
STREET CAPACITY COMPUTATIONS

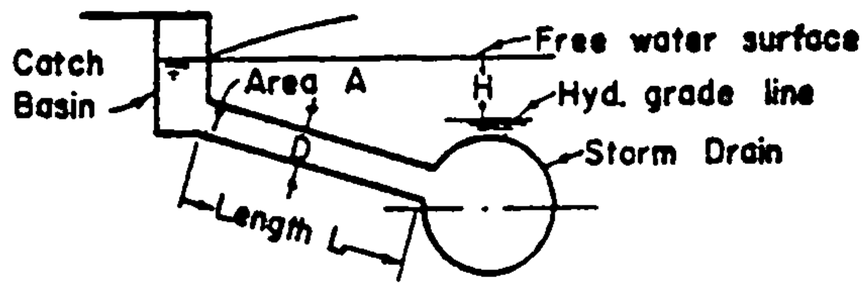
Street Width= 36.00 N= .017

Street Slope = 0.01 Crown= 0.01

Depth	Area	Wet. Per.	Hyd. Rad.	Flow	Velocity	Velocity head	Total Energy Head
0.30	9.18	36.60	0.25	22.63	2.46	0.09	0.39
0.31	9.54	36.62	0.26	24.12	2.53	0.10	0.41
0.32	9.90	36.64	0.27	25.64	2.59	0.10	0.42
0.33	10.26	36.66	0.28	27.21	2.65	0.11	0.44
0.34	10.62	36.68	0.29	28.81	2.71	0.11	0.45
0.35	10.98	36.70	0.30	30.44	2.77	0.12	0.47
0.36	11.34	36.72	0.31	32.11	2.83	0.12	0.48
0.37	11.70	36.74	0.32	33.81	2.89	0.13	0.50
0.38	12.06	36.76	0.33	35.55	2.95	0.13	0.51
0.39	12.42	36.78	0.34	37.33	3.01	0.14	0.53
0.40	12.78	36.80	0.35	39.13	3.06	0.15	0.55
0.41	13.14	36.82	0.36	40.97	3.12	0.15	0.56
0.42	13.50	36.84	0.37	42.84	3.17	0.16	0.58
0.43	13.86	36.86	0.38	44.75	3.23	0.16	0.59
0.44	14.22	36.88	0.39	46.69	3.28	0.17	0.61
0.45	14.58	36.90	0.40	48.66	3.34	0.17	0.62
0.46	14.94	36.92	0.40	50.66	3.39	0.18	0.64
0.47	15.30	36.94	0.41	52.69	3.44	0.18	0.65
0.48	15.66	36.96	0.42	54.75	3.50	0.19	0.67
0.49	16.02	36.98	0.43	56.84	3.55	0.20	0.69
0.50	16.38	37.00	0.44	58.97	3.60	0.20	0.70
0.51	16.74	37.02	0.45	61.12	3.65	0.21	0.72
0.52	17.10	37.04	0.46	63.30	3.70	0.21	0.73
0.53	17.46	37.06	0.47	65.52	3.75	0.22	0.75
0.54	17.82	37.08	0.48	67.76	3.80	0.22	0.76
0.55	18.18	37.10	0.49	70.03	3.85	0.23	0.78
0.56	18.54	37.12	0.50	72.33	3.90	0.24	0.80
0.57	18.90	37.14	0.51	74.66	3.95	0.24	0.81
0.58	19.26	37.16	0.52	77.02	4.00	0.25	0.83
0.59	19.62	37.18	0.53	79.40	4.05	0.25	0.84
0.60	19.98	37.20	0.54	81.82	4.10	0.26	0.86
0.61	20.34	37.22	0.55	84.26	4.14	0.27	0.88
0.62	20.70	37.24	0.56	86.73	4.19	0.27	0.89
0.63	21.06	37.26	0.57	89.23	4.24	0.28	0.91
0.64	21.42	37.28	0.57	91.75	4.28	0.28	0.92
0.65	21.78	37.30	0.58	94.30	4.33	0.29	0.94
0.66	22.14	37.32	0.59	96.88	4.38	0.30	0.96
0.67	22.50	37.34	0.60	99.48	4.42	0.30	0.97

DESIGN OF SPUN CONCRETE CONNECTOR PIPES FLOWING FULL





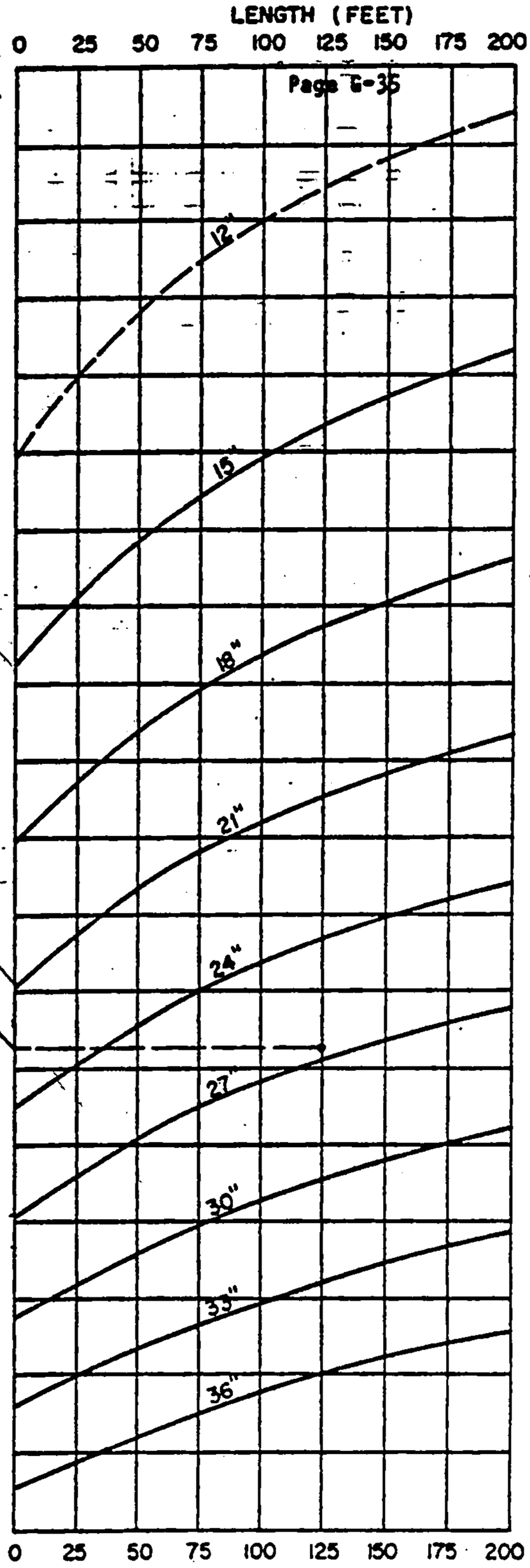


PLATE 22.3 D-8

12/15/02.

CALKALOOSA SOUTH
22096
M. GARCIA.

ROSEWOOD CAPACITY COMPUTATIONS.

Given: STREET CAPACITY @ 1.03% slope
- Q_{CAP} = 81.82 cfs.

Q @ end of Rosewood = 123.99 cfs

need pipe to carry - 123.99 - 81.82 cfs = 42.17 cfs.

for 24" Dia - A = 3.142 ft n = .50

$$Q = \frac{1.49}{n} A r^{2/3} S^{1/2}$$

slope = 1.5% = .015
50

$$Q = \frac{1.49}{.013} (3.142)(.5)^{2/3} (.015)^{.5}$$

n = .013 -

Q = 27.77 cfs -

try 30" dia A = 4.909 $Ar^{2/3}$ = 3.598

$$Q = \frac{1.49}{.013} (3.598)(.0150)^{.5}$$

Q = 50.36 cfs > 42.17 ✓

Use a 30" dia RCP -

LAUREL WOOD SOUTH
MR. GARCIA

SIZE CATCH BASINS: PARKWOOD

from ADH MD Q parkwood = 9.05 cfs

W= 23 ft- d = .70 ft A = 15.05

depth above gutter = .70 ft

Slope = .101 ft/ft Crown = 0.5%

from Plate 22.3 D-6

@CAP for Double C.I.D Inlet = 15 cfs

use 3 Double C.I.D = 45 cfs

DETERMINE CONNECTED PIPE SIZE

from 22.3 D-8 PIPE SIZE = 21"

$V = 1.33 + 1.2\frac{V^2}{2g} + cl$

$V = V^2 Q/A \cdot \frac{30}{4.91} = 6.11$

$V = 1.33 + 1.2\left(\frac{6.11^2}{64.4}\right) + 1.75 = 3.77$ ft

use 18" from 1st to 2nd, 24" from 2nd to 3rd, 30" to MH.

NORTH OFFSITE DRAINAGE BASIN PLAN

NORTH

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

BENCH MARKS

ALBUQUERQUE CONTROL SURVEY CONTROL STATION

NEW MEXICO STATE PLANE MONUMENT 6-J10

CENTRAL ZONE, NAD 1927

X = 360,369.13

Y = 1,492,117.53

C/G FACTOR = 0.99967760

DELTA ALPHA = -00°18'00"

NGVD 1929 ELEVATION = 5117.133

AS BUILT INFORMATION

CONTRACTOR

WORK PERFORMED BY	DATE
CONSTRUCTION ACCEPTANCE BY	DATE
FIELD VERIFICATION BY	DATE
DRAWINGS CORRECTED BY	DATE

MICRO-FILM INFORMATION

RECORDED BY DATE

NO.

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY M GARCIA DATE 12/17/2002

DRAWN BY F PHILLIPS DATE 12/17/2002

CHECKED BY M GARCIA DATE 12/17/2002

ABQ Engineering, Inc.

•Engineers •Planners
•Construction Services
1601 Babcock NE, Suite C,
Albuquerque, NM 87112
505-856-7988 FAX 505-856-7988
ABQ NO. 23006

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

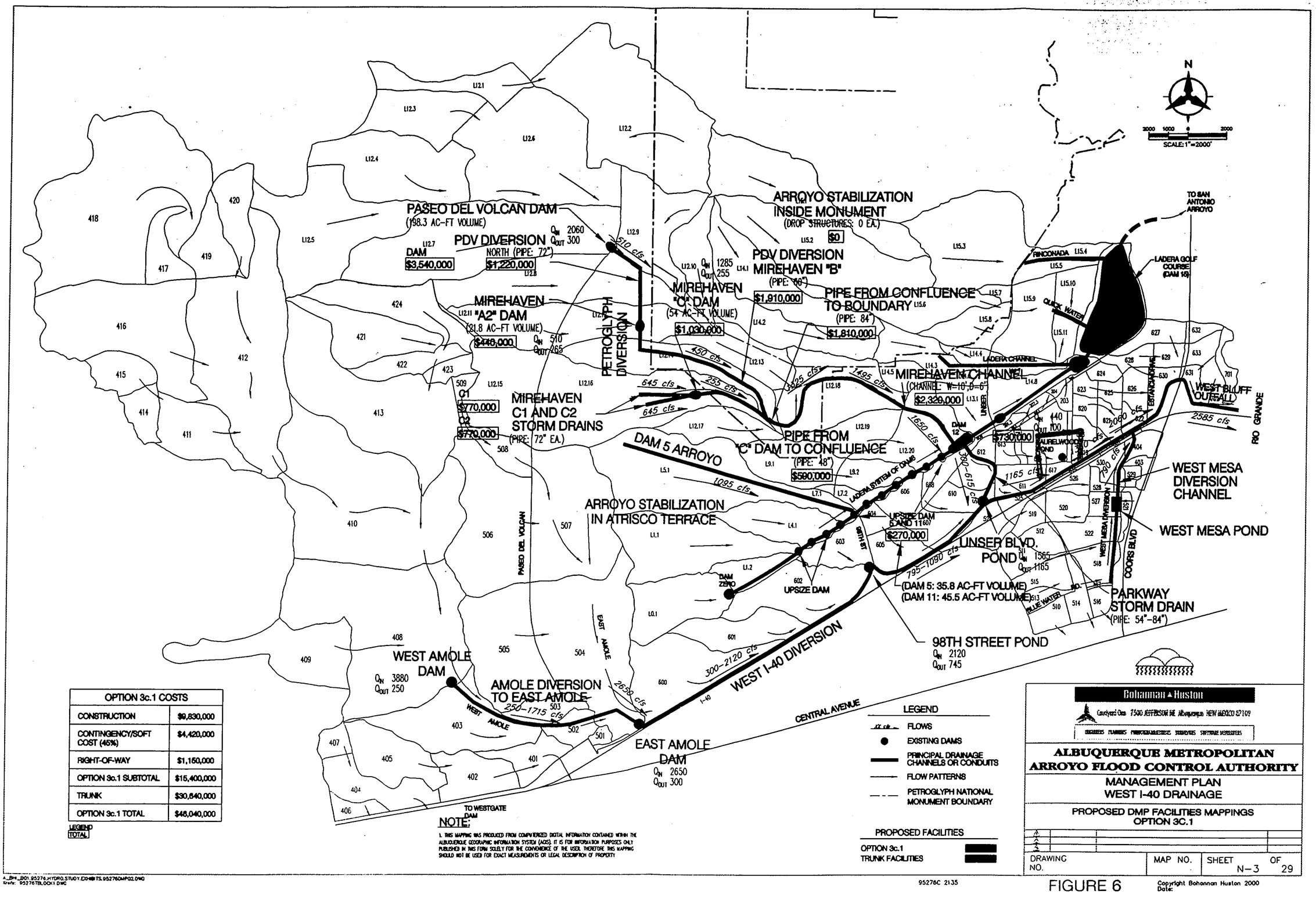
TITLE: LAURELWOOD PARK SUBDIVISION
NORTH OFFSITE DRAINAGE BASIN

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

City Project No. –

Zone Map No. H/J-10

SHEET 1 OF 1



OPTION 3c.1 COSTS	
CONSTRUCTION	$9,830,000
CONTINGENCY/SOFT COST (45%)	$4,420,000
RIGHT-OF-WAY	$1,150,000
OPTION 3c.1 SUBTOTAL	$15,400,000
TRUNK	$30,640,000
OPTION 3c.1 TOTAL	$46,040,000

LEGEND
TOTAL

NOTE:
1. THIS MAPPING WAS PRODUCED FROM COMPUTERIZED DIGITAL INFORMATION CONTAINED WITHIN THE ALBUQUERQUE GEOGRAPHIC INFORMATION SYSTEM (AGIS). IT IS FOR INFORMATION PURPOSES ONLY. PUBLISHED IN THIS FORM SOLELY FOR THE CONVENIENCE OF THE USER. THEREFORE THIS MAPPING SHOULD NOT BE USED FOR EXACT MEASUREMENTS OR LEGAL DESCRIPTION OF PROPERTY.

Bohannan ▲ Huston
Courtyard One 7500 JEFFERSON NE Albuquerque, NEW MEXICO 87109
ENGINEERS PLANNERS ENVIRONMENTAL SCIENTISTS SURVEYORS SOFTWARE DEVELOPERS

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

MANAGEMENT PLAN
WEST I-40 DRAINAGE

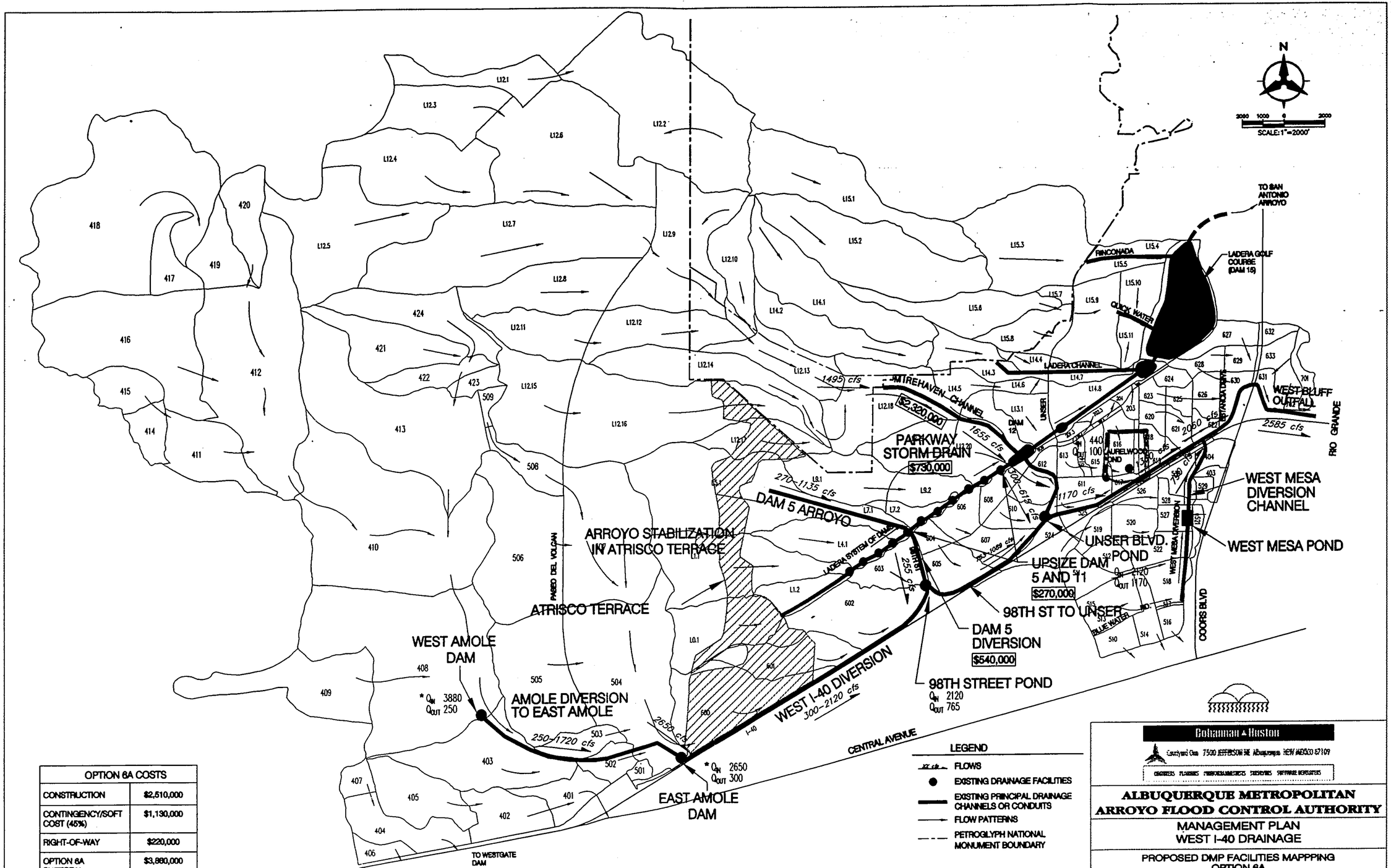
PROPOSED DMP FACILITIES MAPPINGS
OPTION 3C.1

DRAWING NO.	MAP NO.	SHEET N-3 OF 29

A_P#_B01.95276.HYDRO.STUDY.EXHIBITS.95276DMP02.DWG
Xrefs: 95276TBL_BOX1.DWG

95276C 2135

FIGURE 6



OPTION 6A COSTS	
CONSTRUCTION	$2,510,000
CONTINGENCY/SOFT COST (45%)	$1,130,000
RIGHT-OF-WAY	$220,000
OPTION 6A SUBTOTAL	$3,860,000
TRUNK (6A)	$24,010,000
OPTION 6A TOTAL	$27,870,000

*NOTE:
FLOW RATES REPRESENTS THE LARGER FLOW RATE BETWEEN OPTIONS 2D AND 3C.1 FOR ANY GIVEN FACILITY EXCEPT AS NOTED.

NOTE:

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Bohannan Huston

Courtyard One 7500 JEFFERSON NE Albuquerque NEW MEXICO 87109

ENGINEERS PLANNERS ENVIRONMENTALISTS SURVEYORS SOFTWARE DEVELOPERS

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

MANAGEMENT PLAN
WEST I-40 DRAINAGE

PROPOSED DMP FACILITIES MAPPPING
OPTION 6A

DRAWING NO.	MAP NO.	SHEET	OF
		N-4	29

A:_BH_801.95276.HYDRO.STUDY.EXHIBITS.95276DMP04.DWG
Xrefs: 95276TBLOCK1.DWG

95276C 2135

FIGURE 7

Date:

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 3, 2002

Martin Garcia, PE
ABQ Engineering
1631 Eubank NE, Ste C
Albuquerque, NM 87112

Re: Laurelwood Park Subdivision Drainage Report
Engineer's Stamp dated 10-31-02 (J10/D35)

Dear Mr. Garcia,

Based upon the information provided in your submittal dated 10-31-02, the above referenced plan cannot be approved for Preliminary Plat until the following comments are addressed.

- Written concurrence from AMAFCA is required.

- How were the offsite flows determined? Please provide an off-site basin map.

- The 5 lots between the pond and Street A cannot drain directly to the pond; they must drain to the street in order to protect the pond slope from erosion from irrigation or other nuisance flows. Please show a retaining wall or acceptable slope of this area.

- The pond must have an access road and an emergency spillway. It should be stated in this report which public agency will be maintaining this pond. Please provide all necessary excerpts from previously approved reports to establish the allowable discharge from this pond. Provide a detail of the outlet structure and size the outfall pipe. The AHYMO output shows 182 cfs as the maximum discharge which exceeds your stated allowable of 170 cfs.

- Per the DPM, street flows must adhere to either of two criteria. First, the depth of flow (d) cannot exceed the top of curb. Second, the depth of flow plus the velocity head ($d+V^2/2g$) cannot exceed 0.2 feet above the curb. My calculations show that the second criterion is not supported for Street B and, therefore, storm drain will be necessary. Since you have proposed an inverted crown section in lieu of storm drain, and storm drain is now necessary, a normal crown section will be required. Please provide a large enough storm drain to handle what this new section cannot.

- Draining the alley "K" to the vacated 72nd street tract is not allowable since the City's Storm Drain Maintenance Division does not maintain it. The Parks Dept. owns it. The storm in alley "K" should be connected to the storm drain in Street B.

If you would like to meet to discuss my comments or if you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Planning Dept.
Development and Building Services

C: Lynn Mazur, AMAFCA
Richard Dourte, CoA Trans. Dev. Div.
Christina Sandoval, CoA Parks and Rec. Dept.
file

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/11/2002)

J-10 | D35

PROJECT TITLE: LAURELWOOD PARK SUBDIVISION ZONE MAP/DRG. FILE #: ~~H10 J5 10~~

DRB #: 01388 EPC#: WORK ORDER#:

LEGAL DESCRIPTION: TRACT A PARK AND DRAINAGE MANAGEMENT AREA, EL RANCHO ATTUSLO PHASE III

CITY ADDRESS:

ENGINEERING FIRM: ABQ ENGINEERING INC. CONTACT: MARTIN J. GARCIA

ADDRESS: 1631 ELBANK NE SUITE C PHONE: 255-7801

CITY, STATE: ALBUQ. NM 87112 ZIP CODE: 87112

OWNER: WESTLAND DEVELOPMENT CORP. CONTACT: LEROY CHAVEZ

ADDRESS: 401 COORS BOULEVARD NW PHONE: 831-9600

CITY, STATE: ALBUQUERQUE, NM ZIP CODE: 87121

ARCHITECT: CONTACT:

ADDRESS: PHONE:

CITY, STATE: ZIP CODE:

SURVEYOR: CONTACT:

ADDRESS PHONE:

CITY, STATE: ZIP CODE:

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

CITY, STATE: ZIP CODE:

CHECK TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- ____ DRAINAGE PLAN
- ____ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- ____ EROSION CONTROL PLAN
- ____ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ____ CLOMR/LOMR
- ____ TRAFFIC CIRCULATION LAYOUT (TCL)
- ____ ENGINEERS CERTIFICATION (TCL)
- ____ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ____ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- ____ SIA / FINANCIAL GUARANTEE RELEASE
- X PRELIMINARY PLAT APPROVAL
- ____ S. DEV. PLAN FOR SUB'D. APPROVAL
- ____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ____ SECTOR PLAN APPROVAL
- ____ FINAL PLAT APPROVAL
- ____ FOUNDATION PERMIT APPROVAL
- ____ BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY (PERM.)
- ____ CERTIFICATE OF OCCUPANCY (TEMP.)
- ____ GRADING PERMIT APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ WORK ORDER APPROVAL
- X OTHER (SPECIFY) G.D PLAN APPROVAL

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- X YES
- ____ NO
- ____ COPY PROVIDED

RECEIVED
OCT 31 2002
HYDROLOGY SECTION

DATE SUBMITTED: 10/31/02 BY:

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope ot the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan**: Required for approval of Site Development Plans greater than five
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5)
3. **Drainage Report**: Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or

ABQ Engineering, Inc.
Engineers ▪ Surveyors ▪ Planners ▪ Construction Services

October 31, 2002

Mr. Brad Bingham
Assistant City Engineer
City of Albuquerque
600 2nd Street NW
Albuquerque, NM 87102

J-10/D35

RE: Grading and Drainage Plan Submittal for Laurelwood Park Subdivision

Dear Mr. Bingham:

Transmitted herewith for your review and approval is the Grading and Drainage Plan for the Laurelwood Park Subdivision located South of Parkwood Drive, East of Alley "H", West of Vacated 72nd Street, and North of Hanover Road (Zone atlas map H10/J10). The design of the storm drainage pond and project has been coordinated with the West I-40 Drainage Channel construction.

Please call me if you need any clarification or require additional information.

Sincerely,

Martin J. Garcia, PE
ABQ Engineering, Inc.
22096

RECEIVED
OCT 31 2002
HYDROLOGY SECTION

1631 Eubank NE ▪ Suite C ▪ Albuquerque, New Mexico 87112 ▪ (505) 255-7802 ▪ Fax (505) 255-7902

DRAINAGE REPORT

J-10/D35

FOR

LAURELWOOD PARK SUBDIVISION

A 37-LOT SINGLE FAMILY
RESIDENTIAL SUBDIVISION

ALBUQUERQUE, NEW MEXICO
OCTOBER 2002

Prepared By:

ABQ
Engineering,
Inc.

•Engineers •Planners
•Surveyors
•Construction Services

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DRAINAGE REPORT

LAURELWOOD PARK SUBDIVISION

I. INTRODUCTION

This report documents the methods used to determine and control the storm water runoff from the Laurelwood Park Subdivision along with existing off-site flows. The Laurelwood Park subdivision consists of 37 residential lots and one 1.53-acre tract. Storm drainage flows into the existing pond through two concrete channels, one from the west and the other from the north.

II. PROJECT DESCRIPTION

The Laurelwood Park subdivision is a vacant 7.7-acre tract that will be developed into a 37-lot residential subdivision. It is bounded by Parkwood Drive on the North, Vacated 72nd Street on the East, Alley "H" on the West and Hanover Street on the South. The property is adjacent to Laurelwood Park and is surrounded by single-family development on the North, East, and West, and I-40 on the South. The property is Zoned R-D.

III. METHODOLOGY

The hydrology calculations follow the guidelines set forth in Section 22.2 of the Albuquerque Development Process Manual (DPM). The 100yr-24 hour storm was used to compute the runoff quantities for the pond. The offsite flows utilized in the subdivision analysis were taken from the "West I-40 Drainage Master Plan" prepared by Bohannan Huston, and AMAFCA's further analysis related to the construction of the West I-40 Drainage channel.

INCLUDE EXCERPTS

IV. DRAINAGE COMPUTATIONS

The proposed development is within Precipitation Zone 1. The Land Treatment Area for the proposed subdivision is as follows:

Type "D"	57%
Type "C"	22%
Type "B"	21%
Type "A"	0%

Off-site flows used are169.57 cfs from the North Channel, and 355.43 cfs from the West Channel. The flows were input into AHYMO along with the data for the subdivision site, and the allowed maximum discharge of 170 cfs. The analysis results in the need for 7.39 acre-feet of ponding area.

V. INFRASTRUCTURE

The North Channel will be removed with the subdivision and the storm drainage flows conveyed through Street B to the storm drainage pond (see Grading and Drainage Plan attached). The storm drainage pond will be reconfigured to allow for development of the property while containing the 100 yr 6-hr storm. The pond contains a controlled outlet structure that drains into a 4 ft. diameter pipe parallel to the West I-40 channel. AMAFCA has indicated that they will allow a maximum discharge of 170 cfs from the pond.

There is also an existing drop inlet and 18-inch RCP storm drain located along the east property boundary that drains a 1.76-acre area next to Alley "K". The drop inlet and storm drain will be removed with this project, and the runoff associated with this storm drain will be directed to the vacated 72nd Street right of way via a 4 ft. valley gutter, it will then drain south along the vacated right of way to the West I-40 channel.

The flows being conveyed through the North Channel will be conveyed by Street "B" and the existing channel removed. Street "B" is will be 32 ft. wide with a 1.5% inverted crown.

VI. SUMMARY AND CONCLUSION

In Summary, the existing pond can be reconfigured as shown on the plan to accommodate the developed flows and ponding requirements. Street B has the capacity to accommodate the flows with a maximum depth at centerline of 0.85 ft.

Included with this report are the AHYMO computer program input, output, and summary for the 100yr-24hour storm for the combination of on-site and off-site flows, the drainage calculation for determining the runoff associated with the existing 18" RCP that will be removed, the roadway capacity computations, water depth calculations for three critical points along Street "B", and the Velocity-depth calculations required by the City's Development Process Manual.

```
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    AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                              - VERSION:  1997.02c       RUN DATE
(MON/DAY/YR) =10/31/2002
    INPUT FILE = Laurel.txt                                                                          USER NO.=
AHYMO-I-9702a0100003C-SH

                                      FROM  TO                    PEAK          RUNOFF                  TIME TO
CFS      PAGE =   1
                        HYDROGRAPH    ID    ID         AREA      DISCHARGE      VOLUME      RUNOFF      PEAK
PER
    COMMAND        IDENTIFICATION    NO.   NO.       (SQ MI)      (CFS)        (AC-FT)    (INCHES)   (HOURS)
ACRE     NOTATION

    START
TIME=        .00
    LOCATION                          ALBUQUERQUE
    *S COMPUTE 100 YEAR - 24 HOUR HYROGRAPHS FOR LAURELWOOD PARK SUBDIVISION
    *S Laurelwood Park
    *S Laurel.TXT  -  HYMO PER JAN 1997 DPM REVISIONS
    RAINFALL  TYPE= 2
RAIN24=    2.660
    *S INITIAL ABSTRACTION AND INFILTRATION PERCULIAR TO Albuquerque AREA
    *S USED TO ADAPT AHYMO FOR THIS ANALYSIS
    *S EXISTING CONDITIONS
    COMPUTE NM HYD         101.00    -     1         .01100        12.19         .343        .58387     1.500
1.732 PER IMP=     .00
    *S Pond Bottom elevation = 16    Pipe Invert = 13.0      Date: 10/29/02
    *S PROPOSED CONDITION
    COMPUTE NM HYD         102.00    -     2         .22300       549.16       21.280       1.78921    1.500
3.848 PER IMP=   57.00
    ROUTE RESERVOIR        110.00     2    10         .22300       187.41       21.190       1.78166    1.800
1.313 AC-FT=     7.490
    FINISH
    2
```

>170 ?

Author

```
 0

     AHYMO PROGRAM (AHYMO_97) -                          - Version:  1997.02c
          RUN DATE (MON/DAY/YR) = 10/31/2002
          START TIME (HR:MIN:SEC) = 11:12:28     USER NO.= AHYMO-I-9702a0100003C-SH
          INPUT FILE = Laurel.txt

START                  TIME=0.0  CODE  0  LINES  -3
Location                 Albuquerque
     City of Albuquerque soil infiltration values (LAND FACTORS) used for computations.
     Land Treatment     Initial Abstr.(in)     Unif. Infilt.(in/hour)
          A             0.65                   1.67
          B             0.50                   1.25
          C             0.35                   0.83
          D             0.10                   0.04

*S COMPUTE 100 YEAR - 24 HOUR HYROGRAPHS FOR LAURELWOOD PARK SUBDIVISION
*S Laurelwood Park
*S Laurel.TXT  -  HYMO PER JAN 1997 DPM REVISIONS

RAINFALL               TYPE=-2    RAIN QUAR= 0.0    RAIN ONE= 2.0
                       RAIN SIX=  2.4  RAIN DAY=  2.66  DT=0.05   0.033 for 6-hr

               COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
               DT =     .050000 HOURS       END TIME =     24.000000 HOURS
*S INITIAL ABSTRACTION AND INFILTRATION PERCULIAR TO Albuquerque AREA
*S USED TO ADAPT AHYMO FOR THIS ANALYSIS

*--------------------------------------------------------------------- -------

*S EXISTING CONDITIONS

COMPUTE NM HYD         ID=1  HYD NO= 101   DA= .011 SQ MI
                       PER  A=90   PER  B=0  PER  C=10   PER  D=0
                       TP=-.13   RAIN=-1

     K =    .151260HR     TP =    .130000HR     K/TP RATIO =  1.163535     SHAPE CONSTANT, N =  3.046962
     UNIT PEAK =   24.169     CFS   UNIT VOLUME =     .9987       B =   285.63      P60 = 2.0000
     AREA =       .011000 SQ MI     IA =     .62000 INCHES     INF =   1.58600 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000
```

PRINT HYD ID=1 CODE=10

PARTIAL HYDROGRAPH 101.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.000	.0	2.000	1.1	3.000	.1
4.000	.0						
.500	.0	1.500	12.2	2.500	.4	3.500	.0

RUNOFF VOLUME = .58387 INCHES = .3425 ACRE-FEET
PEAK DISCHARGE RATE = 12.19 CFS AT 1.500 HOURS BASIN AREA = .0110 SQ. MI.

*----------
*S Pond Bottom elevation = 16 Pipe Invert = 13.0 Date: 10/29/02
*S PROPOSED CONDITION

COMPUTE NM HYD ID=2 HYD=102 DA=0.223 SQ MI
PER A=0 PER B=21 PER C=22 PER D=57
TP=-.13 RAIN=-1

K = .072758HR TP = .130000HR K/TP RATIO = .559675 SHAPE CONSTANT, N = 6.869445
UNIT PEAK = 503.59 CFS UNIT VOLUME = .9994 B = 515.03 P60 = 2.0000
AREA = .127110 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .109869HR TP = .130000HR K/TP RATIO = .845143 SHAPE CONSTANT, N = 4.214104
UNIT PEAK = 272.33 CFS UNIT VOLUME = 1.002 B = 369.20 P60 = 2.0000
AREA = .095890 SQ MI IA = .42326 INCHES INF = 1.03512 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 102.00

RUNOFF VOLUME = 1.78921 INCHES = 21.2795 ACRE-FEET
PEAK DISCHARGE RATE = 549.16 CFS AT 1.500 HOURS BASIN AREA = .2230 SQ. MI.

ROUTE RESERVOIR ID=10 HYD=110 INFLOW 2 CODE 10.2

OUTFLOW	STORAGE	ELEV
0.0	0.0	0.0
104.80	0.62	1.0
121.01	1.39	2.0
135.30	2.27	3.0
148.21	3.24	4.0
160.09	4.28	5.0
171.14	5.41	6.0
181.52	6.62	7.0
191.34	8.07	8.0

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

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)	
.00	.00	.00	.000	.00	
.50	.00	.00	.000	.00	
1.00	.15	.00	.000	.04	
1.50	549.16	4.63	3.893	155.67	
2.00	109.42	7.08	6.733	182.29	← exceeds peak
2.50	15.99	2.66	1.974	130.49	
3.00	5.94	.07	.043	7.35	
3.50	3.66	.04	.023	3.85	
4.00	3.02	.03	.018	3.06	
4.50	2.80	.03	.017	2.82	
5.00	2.86	.03	.017	2.83	
5.50	2.99	.03	.018	2.96	
6.00	3.23	.03	.019	3.20	
6.50	1.88	.02	.011	1.94	
7.00	1.79	.02	.011	1.79	
7.50	1.68	.02	.010	1.71	
8.00	1.64	.02	.010	1.65	
8.50	1.59	.02	.009	1.60	

9.00	1.54	.01	.009	1.54
9.50	1.49	.01	.009	1.49
10.00	1.47	.01	.009	1.47
10.50	1.41	.01	.008	1.42
11.00	1.36	.01	.008	1.38
11.50	1.32	.01	.008	1.34
12.00	1.31	.01	.008	1.31
12.50	1.29	.01	.008	1.28
13.00	1.23	.01	.007	1.23
13.50	1.19	.01	.007	1.21
14.00	1.20	.01	.007	1.18
14.50	1.15	.01	.007	1.15
15.00	1.12	.01	.007	1.11
15.50	1.12	.01	.007	1.11
16.00	1.10	.01	.006	1.08
16.50	1.06	.01	.006	1.06
17.00	1.05	.01	.006	1.04
17.50	1.03	.01	.006	1.01
18.00	.98	.01	.006	.99
18.50	.98	.01	.006	.98
19.00	.97	.01	.006	.96
19.50	.93	.01	.006	.93
20.00	.94	.01	.005	.92
20.50	.90	.01	.005	.91
21.00	.90	.01	.005	.90
21.50	.88	.01	.005	.88
22.00	.87	.01	.005	.87
22.50	.87	.01	.005	.84
23.00	.87	.01	.005	.85
23.50	.82	.01	.005	.82
24.00	.81	.01	.005	.80
24.50	.04	.00	.000	.06
25.00	.00	.00	.000	.01

PEAK DISCHARGE = 187.409 CFS - PEAK OCCURS AT HOUR 1.80
MAXIMUM WATER SURFACE ELEVATION = 7.600
MAXIMUM STORAGE = 7.4896 AC-FT INCREMENTAL TIME= .100000HRS

PRINT HYD ID=10 CODE 10

PARTIAL HYDROGRAPH 110.00

pond inv = 16
WSE = 23.6
~~pond~~ = 2'

freeboard = 0.4'
too small

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
	.000 .0	6.000	3.2	12.000	1.3	18.000	1.0
24.000	.8						
	1.000 .0	7.000	1.8	13.000	1.2	19.000	1.0
25.000	.0						
	2.000 182.3	8.000	1.6	14.000	1.2	20.000	.9
	3.000 7.3	9.000	1.5	15.000	1.1	21.000	.9
	4.000 3.1	10.000	1.5	16.000	1.1	22.000	.9
	5.000 2.8	11.000	1.4	17.000	1.0	23.000	.9

RUNOFF VOLUME = 1.78166 INCHES = 21.1898 ACRE-FEET
PEAK DISCHARGE RATE = 187.41 CFS AT 1.800 HOURS BASIN AREA = .2230 SQ. MI.

*----------

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 11:12:28

```
START                  TIME=0.0  CODE  0  LINES  -3
Location                 Albuquerque
*S COMPUTE 100 YEAR - 24 HOUR HYROGRAPHS FOR LAURELWOOD PARK SUBDIVISION
*S Laurelwood Park
*S Laurel.TXT  -  HYMO PER JAN 1997 DPM REVISIONS

RAINFALL               TYPE=-2    RAIN QUAR= 0.0    RAIN ONE= 2.0
                       RAIN SIX=  2.4  RAIN DAY=  2.66  DT= 0.05

*S INITIAL ABSTRACTION AND INFILTRATION PERCULIAR TO Albuquerque AREA
*S USED TO ADAPT AHYMO FOR THIS ANALYSIS

*------------------------------------------------------------------ ----------------
---------------------------------

*S EXISTING CONDITIONS

COMPUTE NM HYD         ID=1   HYD NO= 101   DA= .011 SQ MI
                       PER  A=90   PER  B=0  PER  C=10   PER  D=0
                       TP=-.13   RAIN=-1

PRINT HYD              ID=1    CODE=10

*---------------------------------------------------------------------
*S Pond Bottom elevation = 16   Pipe Invert = 13.0      Date: 10/29/02
*S PROPOSED CONDITION

COMPUTE NM HYD         ID=2  HYD=102  DA=0.223 SQ MI
                       PER A=0  PER  B=21  PER  C=22  PER  D=57
                       TP=-.13  RAIN=-1
```

```
PRINT HYD              ID=2     CODE=1
ROUTE RESERVOIR        ID=10   HYD=110   INFLOW 2 CODE 10.2
                        OUTFLOW     STORAGE        ELEV
                         0.0          0.0           0.0
                         104.80       0.62          1.0
                         121.01       1.39          2.0
                         135.30       2.27          3.0
                         148.21       3.24          4.0
                         160.09       4.28          5.0
                         171.14       5.41          6.0
                         181.52       6.62          7.0
                         191.34       8.07          8.0
PRINT HYD               ID=10   CODE 10

*-------------------------------------------------------------------
FINISH
```

Laurelwood Park Subdivision
Drainage pond area computations:

							diameter =	4.00
							k=	0.60
							A=	12.57
Height above pond bottom	Pond Elev.	Area (sf)	Average Storage Volume	Cumul. Storage	head	Q	Inv el. =	13.00
0.00	16.00	20,166.00	-0.21	-0.05	3.00	95.67		
1.00	17.00	33,946.00	0.62	0.57	4.00	104.80		
2.00	18.00	37,115.00	0.82	1.39	5.00	121.01		
3.00	19.00	40,385.00	0.89	2.27	6.00	135.30		
4.00	20.00	43,755.00	0.97	3.24	7.00	148.21		
5.00	21.00	47,225.00	1.04	4.28	8.00	160.09		
6.00	22.00	50,796.00	1.13	5.41	9.00	171.14		
7.00	23.00	54,469.00	1.21	6.62	10.00	181.52		
8.00	24.00	72,137.00	1.45	8.07	11.00	191.34		

Hydrology Calculations to determine runoff associated with existing 18" RCP
Date: October 16,2002
DPM - Section 22.2
Volume 2, January 1993

Precipitation Zone	***1***
!00 Year Storm Depth, P (360)	***2.2***

Treatment Area	A	B	C	D
Excess Precipitation Factors	***0.44***	***0.67***	***0.99***	***1.97***
Peak Discharge Factors	***1.29***	***2.03***	***2.87***	***4.37***

Land Treatment Area	Acres	Existing	Proposed
Type "D" (Roof)		***1.0083***	***1.0083***
Type "C" (Unpaved Roadway)		***0.3892***	***0.3892***
Type "B" (Irrigated Lawns)		***0.3715***	***0.3715***
Type "A" (Undeveloped)		***0***	***0***
Total (Acres)		1.769	1.769
Excess Precipitaion(in)		1.48138157	1.48
Volume (100), cf		9512.65	9512.65
Volume (10),cf		6373.47	6373.47
Q (100), cfs		6.28	6.28 ←
Q (10), cfs		4.21	4.21

10/16/02

LAURELWOOD PARK

22055

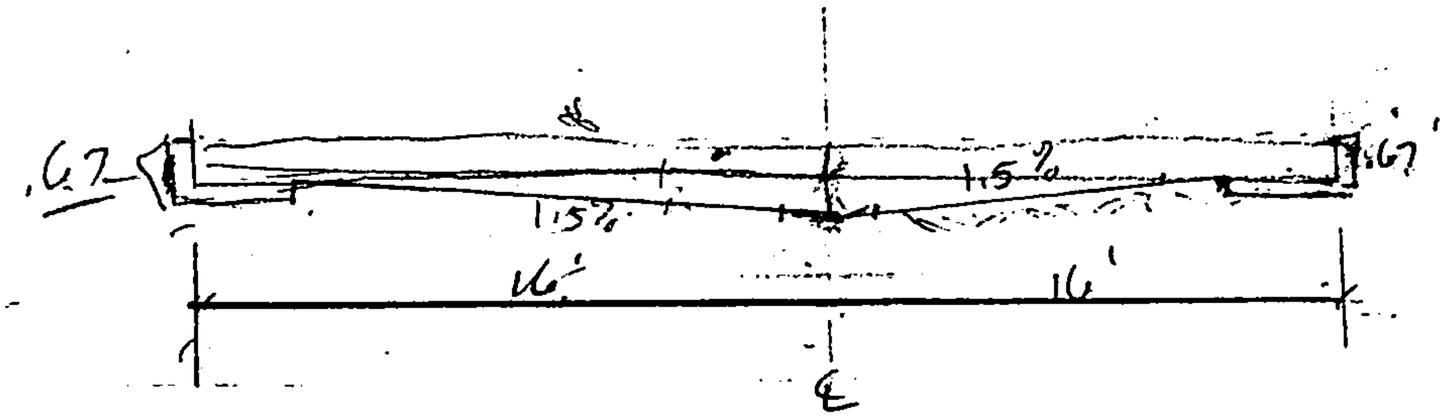
M. GARCIA

STREET "B" CAPACITY COMPUTATIONS.

GIVEN; INFLOW FROM NORTH = 169.57cfs

ASSUME: 32' F-F INVERTED CROWN STREET

101 STD CURB & GUTTER AND 1.5% INVERTED CROWN



$S = 0.0103^{1/2}$

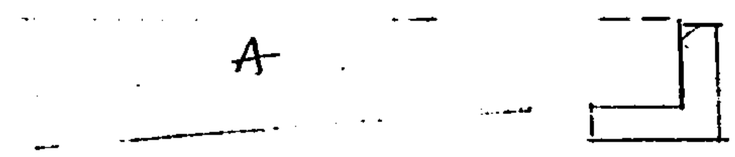
$A = 25.28$

$r^{2/3} = 0.8314$

$S^{1/2} = 0.1225$

$n = .017$

$$Q = \frac{1.49}{n} A r^{2/3} S^{1/2}$$



$$A = \left[(.67)(16) + \frac{16(16(.015))}{2}\right] 2 = [10.72 + 1.92]2 = \underline{25.28\ ft^2}$$

$$r_h = \frac{A}{P} = \frac{25.28}{32 + .67 + .67} = .7582 \qquad r^{2/3} = \underline{.8314}$$

$$Q_{CAP} = \frac{1.49}{.017}(25.28)(.8314)(.1225)$$

$$\underline{Q_{CAP} = 225.66\ cfs} \quad > 169.57\ cfs \quad \underline{ok}$$

LAUREL WOOD PARK

M. GARCIA

COMPUTE FLOW DEPTH @ INTERSECTION OF

① STREET 'B' & PARKWOOD.

② STREET 'B' & STREET 'C'

③ STREET B & JUST SOUTH OF STREET "A"

FLOW AT ① = 169.57 cfs + (4LOTS)(1.6486 cfs / LOT) = 172.16

② = 172.16 cfs + (15LOTS)(1.6486 cfs / LOT) = 181.89 cfs

③ = 181.89 cfs + (13LOTS)(.6486 cfs/LOT) = 190.32 cfs.

GIVEN!

INVERTED CROWN 1½%

$S = .0103 \therefore S^{1/2} = .1015$

$w = 32$ ft $\quad n = .017$

$Q = \frac{1.49}{n} A r^{2/3} s^{1/2}$

$A = wd + \frac{(\frac{1}{2}w)(.015)(\frac{1}{2}w)}{2} = 32d + \frac{(16)(.015)(32)}{2} =$

$\boxed{A = 32d + 3.84}$

$Per = w + 2d = \boxed{32 + 2d}$

$r_h = A/P = \frac{32d + 3.84}{32 + 2d}$

$Q = \frac{1.49}{.017}(32d + 3.84)\left(\frac{32d + 3.84}{32 + 2d}\right)^{2/3}(.1015)$

$Q = (343.58d + 34.16)\left(\frac{32d + 3.84}{32 + 2d}\right)^{2/3}$

Assume	$d = .5$ ft	$A = 19.84$	$Q = 146.68$ cfs.
	$d = .55$ ft	$A = 21.44$	$Q = 167.01$ cfs.
	$d = .56$ ft	$A = 21.76$	$Q = 171.20$ cfs.
	$d = .58$ ft	$A = 22.40$	$Q = 179.69$ cfs.
	$d = .59$ ft	$A = 22.72$	$Q = 183.99$ cfs.
	$d = .60$ ft	$A = 23.04$	$Q = 188.34$ cfs
	$d = .61$ ft	$A = 23.36$	$Q = 192.72$ cfs.

LAUREL WOOD PARK
M. GARCIA

FOR Q = 172.16 cfs depth @ L = .56 + .24 = .80 ft
Q = 181.89 cfs depth @ L = .59 + .24 = .83 ft
Q = 190.32 cfs depth @ L = .61 + .24 = .85 ft.

COMPUTE Q for 10 year STORM =
FROM DPW FACTOR FOR 10 YEAR STORM = 0.667

Q_{10} = 172.16 cfs × .667 = 114.18 cfs
181.89 cfs × .667 = 121.32 cfs.
190.32 fs × .667 = 126.94 cfs.

FIND DEPTH FOR 10YR STORM:

$$Q = (343.58d + 34.16)\left(\frac{32d + 3.84}{32 + 2d}\right)^{2/3}$$

for d = .4 A = 16.64 Q = 109.12 cfs.
d = .41 A = 16.96 Q = 112.68 cfs
d = .42 A = 17.28 Q = 116.29 cfs
d = .43 A = 17.60 Q = 119.94 cfs.
d = .44 A = 17.92 Q = 123.63 cfs.
d = .45 A = 18.24 Q = 127.37 cfs.

$\frac{(6.6)^2}{2(32)^2}$

COMPUTE VELOCITY.

Q = 114.13 $V = Q/A = \frac{114.13}{17.28} = 6.60$ fps. Vd = 6.60 × .42 = 2.77
Q = 121.32 $V = \frac{121.32}{17.92} = 6.77$ fps Vd = 6.77 × .44 = 2.98
Q = 126.94 $V = \frac{126.94}{18.24} = 6.96$ fps Vd = 6.96 × .45 = 3.13