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

April 24, 2000

James V. Domenick, P.E.
Parsons Brinckerhoff
5801 Osuna Rd. NE, Suite 200
Albuquerque, New Mexico 87109

RE: Grading and Drainage Certification for Mirabella Subdivision, Unit 4, (L21/D37A3), Submitted for Release of Financial Guarantees, Engineer's Certification Stamp Dated 4/18/00.

Dear Mr. Domenick:

Based on the information provided on April 18, 2000 and April 24, 2000, the above referenced plan is adequate to satisfy the Grading and Drainage Certification requirement per the Infrastructure List dated December 30, 1997 for the release of Financial Guarantees for Mirabella Subdivision Unit 4.

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

Sincerely,

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

c: Stan Strickman, Trails Management, Inc.
Terri Martin, DRB-97-209, City Project #6154.81
File

DRAINAGE INFORMATION SHEET

APPLICANT'S NAME: MARCELLA JARAMILLO ZONE ATLAS/DRNG. FILE #: L-21

DRB #: 97-209 EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: (MIRABELLA UNIT 4) TRACT D-2-A-1-A-2-B, MANZANO MESA

CITY ADDRESS: _____

ENGINEERING FIRM: PARSONS BRINCKERHOFF CONTACT: MARCELLA JARAMILLO

ADDRESS: 5801 OSUNA RD NE, SUITE 200 87109 PHONE: 505-881-5357

OWNER: TRAILS MANAGEMENT, INC. CONTACT: STAN STRICKMAN

ADDRESS: 6301 INDIAN SCHOOL RD, SUITE 208 87110 PHONE: 505-875-1721

ARCHITECT: — CONTACT: —

ADDRESS: — PHONE: —

SURVEYOR: ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH

ADDRESS: 4109 MONTGOMERY BLVD. NE 87109 PHONE: 505-884-1990

CONTRACTOR: NEW CONCEPTS, INC. CONTACT: TOM LAKEMAN

ADDRESS: 508 PARAGON RD SE 87105 PHONE: 505-452-8910

TYPE OF SUBMITTAL:
- ___ DRAINAGE REPORT
- ___ DRAINAGE PLAN
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- ___ GRADING PLAN
- ___ EROSION CONTROL PLAN
- X ENGINEER'S CERTIFICATION
- ___ OTHER _____

PRE-DESIGN MEETING:
- ___ YES
- X NO
- ___ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:
- ___ SKETCH PLAT APPROVAL
- ___ PRELIMINARY PLAT APPROVAL
- ___ S. DEV. PLAN FOR SUB'D APPROVAL
- ___ S. DEV PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- ___ FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- ___ BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY APPROVAL
- ___ GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ S.A.D. DRAINAGE REPORT
- ___ DRAINAGE REQUIREMENTS
- ___ SUBDIVISION CERTIFICATION
- X OTHER RELEASE OF FINANCIAL GUARANTEE (SPECIFY)

DATE SUBMITTED: 4-18-00

BY: Marcella V. Jaramillo

RECEIVED
APR 18 2000
HYDROLOGY SECTION

Revised 02/98

L-21/D037A3

Transmittal

Parsons Brinckerhoff
5801 Osuna Road NE
Suite 200
Albuquerque, NM 87109
505-881-5357
Fax: 505-881-7602

to: SUSAN CALONGNE
COA HYDROLOGY
ONE STOP DESK
PLAZA DEL SOL

from: MARCELLA JARAMILLO
date: 4- -00 **time:**
project: MIRABELLA UNIT 4
project number: 33455LS-4.1

via:
- ☐ mail
- ☐ messenger
- ☐ overnight

for your:
- ☐ information/use
- ☐ approval
- ☐ review/comment

the following:
- ☐ shop drawings
- ☐ copy of letter
- ☐ prints
- ☐ change order
- ☐ plans
- ☐ samples
- ☐ specifications
- ☐ other

drawing	rev. no.	description	copies	date

MIRABELLA UNIT 4 GRADING & DRAINAGE CERTIFICATION
- DRAINAGE INFORMATION SHEET
- COPY OF BLOW UP (PLANSET) GRADING & DRAINAGE PLAN
- COPY OF ORIGINAL APPROVED OVERALL GRADING & DRAINAGE PLAN

If enclosures are not as noted, kindly notify us at once

comments

RECEIVED
APR 18 2000
HYDROLOGY SECTION

copies to:

signature: Lenora Chavez

Transmittal

Parsons Brinckerhoff
5801 Osuna Road NE
Suite 200
Albuquerque, NM 87109
505-881-5357
Fax: 505-881-7602

to: SUSAN CALONGNE
COA HYDROLOGY
PLAZA DEL SOL
ONE STOP SHOP

from: MARCELLA JARAMILLO
date: 4-24-00 **time:**
project: MIRABELLA UNIT 4
project number: 33455LS-4.1

via:
- ☐ mail
- ☐ messenger
- ☐ overnight

for your:
- ☐ information/use
- ☐ approval
- ☐ review/comment

the following:
- ☐ shop drawings
- ☐ copy of letter
- ☐ prints
- ☐ change order
- ☐ plans
- ☐ samples
- ☐ specifications
- ☐ other

drawing	rev. no.	description	copies	date

MIRABELLA UNIT 4
1 DISPLAY OF GRADING PLAN SHOWING RETAINING WALLS

If enclosures are not as noted, kindly notify us at once

comments

copies to:

signature: Susan Calongne

City of Albuquerque

March 8, 2000

James V. Domenick, P.E.
Parsons Brinckerhoff
5801 Osuna Rd. NE, Suite 200
Albuquerque, New Mexico 87109

RE: Grading and Drainage Certification for Mirabella Subdivision, Unit 3, (L21/D37A3), Submitted for Release of Financial Guarantees, Engineer's Certification Stamp Dated 1/20/00.

Dear Mr. Domenick:

Based on the additional information provided on March 3, 2000, the above referenced plan is adequate to satisfy the Grading and Drainage Certification requirement per the Infrastructure List dated December 30, 1997 for the release of Financial Guarantees for Mirabella Unit 3.

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

Sincerely,

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

c: Stan Strickman, Manzano Mesa Limited Partnership
Terri Martin, DRB-97-209, City Project #6125.81
File

DRAINAGE INFORMATION SHEET

APPLICANT'S NAME: MARCELLA JARAMILLO ZONE ATLAS/DRNG. FILE #: L-21 / D037A3

DRB #: 97-209 EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: (MIRABELLA UNIT 3) TRACT D-2-A-1-A-2-C, MANZANO MESA

CITY ADDRESS: _____

ENGINEERING FIRM: PARSONS BRINCKERHOFF CONTACT: MARCELLA JARAMILLO

ADDRESS: 5801 OSUNA RD NE, SUITE 200 87109 PHONE: 881-5357

OWNER: MANZANO MESA LIMITED PARTNERSHIP CONTACT: STAN STRICKMAN

ADDRESS: 6301 INDIAN SCHOOL RD. NE, SUITE 208 87110 PHONE: 875-1721

ARCHITECT: — CONTACT: —

ADDRESS: — PHONE: —

SURVEYOR: ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH

ADDRESS: 4109 MONTGOMERY BLVD NE 87109 PHONE: 884-1990

CONTRACTOR: NEW CONCEPTS INC. CONTACT: TOM LAKEMAN

ADDRESS: 508 PARAGON RD SE 87105 PHONE: 452-8910

TYPE OF SUBMITTAL:

- ___ DRAINAGE REPORT
- ___ DRAINAGE PLAN
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- ___ GRADING PLAN
- ___ EROSION CONTROL PLAN
- X ENGINEER'S CERTIFICATION
- ___ OTHER _____

PRE-DESIGN MEETING:

- ___ YES
- ___ NO
- ___ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SKETCH PLAT APPROVAL
- ___ PRELIMINARY PLAT APPROVAL
- ___ S. DEV. PLAN FOR SUB'D APPROVAL
- ___ S. DEV PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- ___ FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- ___ BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY APPROVAL
- ___ GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ S.A.D. DRAINAGE REPORT
- ___ DRAINAGE REQUIREMENTS
- ___ SUBDIVISION CERTIFICATION
- X OTHER RELEASE OF FINANCIAL GUARANTY (SPECIFY)

DATE SUBMITTED: _____

BY: _____

RECEIVED
MAR 03 2000
HYDROLOGY SECTION

Revised 02/98

Parsons Brinckerhoff
5801 Osuna Road NE
Suite 200
Albuquerque, NM 87109
505-881-5357
Fax: 505-881-7602

February 29, 2000

Susan Calongne, PE
COA Hydrology Dept.
Plaza Del Sol
Albuquerque, NM

RE: Mirabella Unit 3 Grading Certification

Dear Susan,

This Grading Plan (Engineer's Stamp date 6-23-98) For Willow Wood North (a.k.a Mirabella) is the final approved grading plan which was approved at the August 4, 1998 DRB Hearing. I have sent you the information sent to me by Claire Senova regarding this action.

I have included a scaled down version of this overall grading plan to include with the Mirabella Unit 3 Grading Certification submittal, I have already sent you. This version is identical to the one submitted for the grading certification, except for that one was just a blowup of the Mirabella Unit 3 portion of this overall grading plan.

If you have any questions or comments, you can contact me at 881-5357.

Thank you.
Sincerely,

Marcella V. Jaramillo

Marcella V. Jaramillo, EI

RECEIVED
FEB 28 2000
HYDROLOGY SECTION

City of Albuquerque

February 17, 2000

James V. Domenick, P.E.
Parsons Brinckerhoff
5801 Osuna Rd. NE, Suite 200
Albuquerque, New Mexico 87109

RE: ***Grading and Drainage Certification for Mirabella Unit 3, (L21/D37A4), Submitted for Release of Financial Guarantees, Engineer's Certification Stamp Dated 1/20/00.***

Dear Mr. Domenick:

Our files indicate that the approved Grading and Drainage Plan for Mirabella Subdivision, formerly known as Willow Wood North Subdivision, was dated December 9, 1997. Both DRB and City Hydrology approved this 1997 plan.

The plan provided in the above referenced submittal is dated April 30, 1999. I cannot find in my files any letter indicating that City Hydrology approved the plan dated April 30, 1999.

Since you are required to certify the plan that was approved by City Hydrology and by DRB, please provide me with documentation that this plan was approved by the DRB, as well as a copy of the approval letter from City Hydrology for this plan. I need this information prior to acceptance of the certification plan.

If you have any questions, please call me at 924-3982.

Sincerely,

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

RECEIVED
FEB 28 2000
HYDROLOGY SECTION

c: Stan Strickman, Manzano Mesa Limited Partnership
File

FAX

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
DEVELOPMENT AND BUILDING SERVICES
(ONE STOP SHOP)
600 2ND STREET - PLAZA DEL SOL - 2ND FLOOR WEST
FAX NO. 924-3864

DATE: 2/28/00

TIME:

NO. OF PAGES:
(INCLUDING COVER PAGE)

TO: Marcella

FROM: Claire

COMMENTS:
This is the Action Sheet showing action taken. No official notice since its a minor case Claire

RECEIVED
FEB 28 2000
HYDROLOGY SECTION

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

August 21, 2000

James V. Domenick, PE
Parsons Brinckerhoff.
5801 Osuna Rd. NE, Ste 200
Albuquerque, NM 87109

Re: Mirabella (Willow Wood North) Subdivision Amended Grading Plan
Engineer's Stamp dated 8-1-00, (L21/D37A3)

Dear Mr. Domenick,

Based on your submittal dated 8-3-00, the above referenced amended plan is approved. All future units will need to adhere to this updated plan.

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

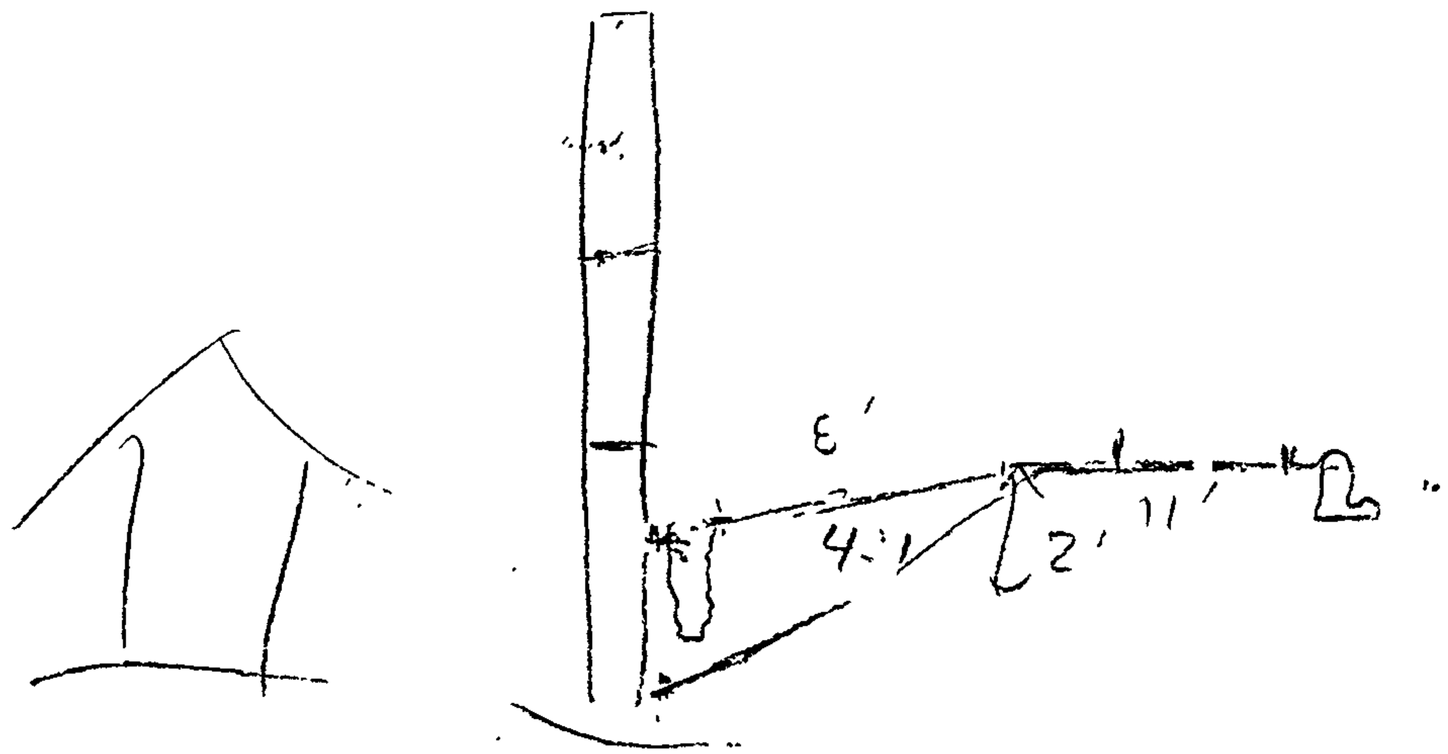
Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Sr. Engineer, Hydrology

C: file

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


8'
4:1
2' 11'

APPLICANT'S NAME Parsons Brinckerhoff ZONE ATLAS/DRNG FILE # L-21 / D03743

DRB # 97-209 EPC # WORK ORDER #

LEGAL DESCRIPTION Mirabella Sub'd

CITY ADDRESS

ENGINEERING FIRM PARSONS BRINCKERHOFF CONTACT: MARCELLA JARAMILLO

ADDRESS: 5801 OSUNA RD SUITE 200 87109 PHONE: 881-5357

OWNER: TRAILS MANAGEMENT, INC. CONTACT: STAN STRICKMAN

ADDRESS: 6301 INDIAN SCHOOL SUITE 208 PHONE: 875-1721

ARCHITECT: — CONTACT: —

ADDRESS: — PHONE: —

SURVEYOR ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH

ADDRESS: PHONE:

CONTRACTOR: NEW CONCEPTS INC CONTACT: 452-8910

ADDRESS: 508 PARAGON RD SW PHONE TOM LAKEMAN

TYPE OF SUBMITTAL:

- __ DRAINAGE REPORT
- __ DRAINAGE PLAN
- __ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN (AMMENDED)
- __ EROSION CONTROL PLAN
- __ ENGINEER'S CERTIFICATION
- __ OTHER

PRE-DESIGN MEETING:

- __ YES
- X NO
- __ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- __ SKETCH PLAT APPROVAL
- __ PRELIMINARY PLAT APPROVAL
- __ S DEV. PLAN FOR SUB'D APPROVAL
- __ S. DEV PLAN FOR BLDG. PERMIT APPROVAL
- __ SECTOR PLAN APPROVAL
- __ FINAL PLAT APPROVAL
- __ FOUNDATION PERMIT APPROVAL
- __ BUILDING PERMIT APPROVAL
- __ CERTIFICATE OF OCCUPANCY APPROVAL
- __ GRADING PERMIT APPROVAL
- __ PAVING PERMIT APPROVAL
- __ S.A.D. DRAINAGE REPORT
- __ DRAINAGE REQUIREMENTS
- __ SUBDIVISION CERTIFICATION
- X OTHER (SPECIFY)

AMENDED GRADING PLAN APPROVAL

DATE SUBMITTED 8-1-00

BY Marella V Jaramillo

RECEIVED AUG 3 2000

Revised 02/98

Transmittal

Parsons Brinckerhoff
5801 Osuna Road NE
Suite 200
Albuquerque, NM 87109
505-881-5357
Fax: 505-881-7602

To: COA PWD-HYDROLOGY
PLAZA DEL SOL
ONE STOP SHOP

From: MARCELLA JARAMILLO

By:

Date: 8-1-00 **Time:**

Project: MIRABELLA

PB Project Number: 33467

Copies:	Description:	For:
1	DRAINAGE INFO. SHEET	
1	MIRABELLA (A.K.A. WILLOWWOOD NORTH) GRADING PLAN [REVISED]	
1	" PRELIMINARY PLAT [APPROVED]	

If enclosures are not as noted, kindly notify us at once.

Comments:

RECEIVED
AUG 3 2000
HYDROLOGY SECTION

Copies to:

Date:

Received by:

Over a Century of Engineering Excellence

Transmittal

L-21/D037A3

Parsons Brinckerhoff
5801 Osuna Road NE
Suite 200
Albuquerque, NM 87109
505-881-5357
Fax: 505-881-7602

to: SUSAN CALONGNE
COA HYDROLOGY
PLAZA DEL SOL
ONE STOP DESK

from: MARCELLA JARAMILLO

date: 3-3-00 **time:**

project: MIRABELLA UNIT 3

project number: 33455LS-3.1

via:
- ☐ mail
- ☐ messenger
- ☐ overnight

for your:
- ☐ information/use
- ☐ approval
- ☐ review/comment

the following:
- ☐ shop drawings
- ☐ copy of letter
- ☐ prints
- ☐ change order
- ☐ plans
- ☐ samples
- ☐ specifications
- ☐ other

drawing	rev. no.	description	copies	date

GRADING CERTIFICATION SUBMITTAL (#2)
FOR MIRABELLA UNIT 3 (CITY PROJ. #6125.81)

If enclosures are not as noted, kindly notify us at once

comments

RECEIVED
MAR 03 2000
HYDROLOGY SECTION

copies to:

signature: L. Chavez 3/3/00

Over a Century of Engineering Excellence

24. DRB-97-510 V-98-70 Bohannan Huston Inc., agents for Las Ventanas Limited Partnership, request Vacation (voiding) of a Private Utility Easement for Tracts 5 and 18, Ventana Ranch, zoned RLT (City) and located on Ventana Ranch Rd NW and Rainbow Blvd NW. (B-9) **VACATION OF THE PUBLIC UTILITY EASEMENT AS SHOWN ON EXHIBIT A IN THE PLANNING FILE WAS APPROVED WITH FINDING.**

25. DRB-97-209 Avid Engineering Inc., agents for Curb Inc., request Amended Preliminary Plat approval (includes Amended Grading Plan approval) and Amended Infrastructure List approval for Tract D-2-A, Manzano Mesa, zoned R-1 (City) and located on Juan Tabo Blvd NE between Southern Blvd NE and Herman Roser Ave NE containing approximately 120.448 acres. (L-21) **WITH THE INITIALING OF THE INFRASTRUCTURE LIST AND THE APPROVAL OF THE AMENDED GRADING PLAN ENGINEER STAMP DATED 6/23/98 THE AMENDED PRELIMINARY PLAT WS APPROVED. THE ORIGINAL PRELIMINARY PLAT DATED 12/30/97 REMAINS.**

26. DRB-97-312 Bohannan Huston Inc., agents for Sivage Thomas Homes, request Amended Infrastructure List approval for Parkway View, zoned RD (City) and located on Ladera NW west of Unser NW and south of I-40, containing approximately 18 acres. (J-9) **THE AMENDED INFRASTRUCTURE LIST WAS APPROVED WITH THE REVISED DATED OF 84/98 (THE ORIGINAL WAS INITIALED.)**

27. DRB-97-375 Mark Goodwin & Associates PA, agents for Sunset West, request Amended Preliminary Plat (includes Amended Grading Plan approval) and Amended Infrastructure List approval for Lots 1-4, 29-32, Tract 2, Unit 3, Block 1, North Albuquerque acres, (Eagle Rock Estates, Unit 1) zoned RD (City) and located east of Louisiana Blvd NE between Modesto Ave NE and Eagle Rock Ave NE containing approximately 8 acres. (C-19) **WITH THE APPROVAL OF THE AMENDED INFRASTRUCTURE LIST WITH THE REVISED DATED OF 8/4/98 AND THE APPROVAL OF THE REVISED GRADING PLAN DATED 8/4/98 THE AMENDED PRELIMINARY PLAT TO ENCUMBER LOT P-P-1 WITH A TEMPORARY PUBLIC DRAINAGE EASEMENT WAS APPROVED.**

****

RECEIVED
FEB 28 2000
HYDROLOGY SECTION

Transmittal

Parsons Brinckerhoff
5801 Osuna Road NE
Suite 200
Albuquerque, NM 87109
505-881-5357
Fax: 505-881-7602

to: SUSAN CALONGNE
COA HYDROLOGY
PLAZA DEL SOL
ONE STOP DESK

from: MARCELLA JARAMILLO

date: 2-29-00 **time:**

project: MIRABELLA UNIT 3

project number: 33455LS-3.1

via:
- ☐ mail
- ☐ messenger
- ☐ overnight

for your:
- ☐ information/use
- ☐ approval
- ☐ review/comment

the following:
- ☐ shop drawings
- ☐ copy of letter
- ☐ prints
- ☐ change order
- ☐ plans
- ☐ samples
- ☐ specifications
- ☐ other

drawing	rev. no.	description	copies	date

CLARIFICATION FOR MIRABELLA UNIT 3
GRADING CERTIFICATION SUBMITTAL

If enclosures are not as noted, kindly notify us at once.

RECEIVED
FEB 28 2000
HYDROLOGY SECTION

comments

copies to:

signature: Whitney Peterson

Transmittal

Parsons Brinckerhoff
5801 Osuna Road NE
Suite 200
Albuquerque, NM 87109
505-881-5357
Fax: 505-881-7602

to: SUSAN CALONGNE
COA HYDROLOGY
PLAZA DEL SOL
ONE STOP DESK

from: MARCELLA JARAMILLO

date: 2-17-00 **time:**

project: MIRABELLA

project number: 33450LS

via:
- ☐ mail
- ☐ messenger
- ☐ overnight

for your:
- ☐ information/use
- ☐ approval
- ☐ review/comment

the following:
- ☐ shop drawings
- ☐ copy of letter
- ☐ prints
- ☐ change order
- ☐ plans
- ☐ samples
- ☐ specifications
- ☐ other

drawing	rev. no.	description	copies	date

(1) BLUELINE OF CORRECT/APPROVED GRADING AND DRAINAGE PLAN FOR MIRABELLA (a.k.a. WILLOWWOOD NORTH, a.k.a. MANZANO MESA)

(2) LETTERS RE: APPROVAL OF ABOVE GRADING & DRAINAGE PLAN

If enclosures are not as noted, kindly notify us at once

comments

copies to:

signature: M. Jaramillo

RECEIVED
FEB 17 2000
HYDROLOGY SECTION

Transmittal

Parsons Brinckerhoff
5801 Osuna Road NE
Suite 200
Albuquerque, NM 87109
505-881-5357
Fax: 505-881-7602

to: SUSAN CALONGNE
COA HYDROLOGY
ONE STOP DESK
PLAZA DEL SOL

from: MARCELLA JARAMILLO

date: 2-10-00 **time:**

project: MIRABELLA UNIT 4

project number: 33455LS-4.1

via:
- ☐ mail
- ☐ messenger
- ☐ overnight

for your:
- ☐ information/use
- ☐ approval
- ☐ review/comment

the following:
- ☐ shop drawings
- ☐ copy of letter
- ☐ prints
- ☐ change order
- ☐ plans
- ☐ samples
- ☐ specifications
- ☐ other

drawing	rev. no.	description	copies	date
		1 COPY - CORRECT MIRABELLA GRADING PLAN		
		1 COPY - LETTER SENT TO KYM DICOME RE: THESE CHANGES TO PLAT & GRADING PLAN [FYI]		

If enclosures are not as noted, kindly notify us at once.

RECEIVED
FEB 10 2000
HYDROLOGY SECTION

comments

copies to:

signature: T. Chavez 2/10/00

AVID ENGINEERING, INC.

Civil • Structural • Transportation

December 9, 1997

Ms. Kym Dicome, Chairperson
Development Review Board
Planning Department, City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103
[Hand Delivered]

RE: WILLOW WOOD NORTH SUBDIVISION
PRELIMINARY PLAT AND GRADING PLAN REVISIONS
DRB 97-209

Dear Ms. Dicome:

Per comments received from the City Environmental Health Department the Preliminary Plat and Grading Plan for Willow Wood North have been slightly revised. The revisions include removing the cul-de-sacs on De Soto Place and Glacier Bay Place and extending the streets to connect with Deer Lodge Road. We also added two (2) additional 10' Tracts on Deer Lodge Place and Deer Lodge Road to provide pedestrian access from the subdivision to Southern Blvd. The revised layout resulted in five (5) additional lots, bringing the total lot count for Willow Wood North to 573 lots, and two (2) additional blocks.

On the Grading Plan, various lot and pad elevations along Deer Lodge Road, De Soto Street, Manistee Street, Glacier Bay Street and Adirondack Place were changed as a result of the Preliminary Plat changes. The changes in elevations resulted in the elimination of retaining walls in Unit 2.

Should you have any questions or need additional information, please call anytime.

Sincerely,

David B. Thompson, P.E.

RECEIVED
FEB 10 2000
HYDROLOGY SECTION

Attachments

cc: DRB Members
Lisa Manwill, COA Drainage
Stan Strickman, Trails Inc.

Project # 33450 PBDocs # 262 Doc. Type: Letter
Date Rec'd / Sent: 12/09/97 Routing:
Copy to: / / / /
File project Key Word: Design, Preliminary Plats
Comments: Preliminary Plat & Grading Plan
Ltr re:

5801 Osuna Rd. NE • Suite 200 • Albuquerque,

6076.48

JUL 17 1998

CITY OF
Albuquerque

July 16, 1998

Dave Thompson, P.E.
Avid Engineering, Inc
5801 Osuna Rd. NE
Suite 200
Albuquerque, NM 87109

RE: WILLOW WOOD NORTH (L21-D37A4). DRAINAGE PLAN FOR PRELIMINARY PLAT APPROVAL. ENGINEER'S STAMP DATED DECEMBER 9, 1997.

Dear Mr. Thompson:

The enclosed Drainage Information Sheet for your December 17, 1997 submittal identified the project as Willow Wood NORTH (emphasis added) and was so titled on the Drainage Management Plan dated December 9, 1997. The City's approval letter of December 24, 1997 (also enclosed) referred to Willow Wood Unit 6. This letter is to confirm that the approval was for Willow Wood North.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

John P. Murray, P.E.
Hydrology

c: Andrew Garcia
File

RECEIVED
FEB 17 2000
HYDROLOGY SECTION

Good for You, All

Project # 33450 PBDocs # 10 Doc. Type: letter
Date Rec'd/~~Sent~~ 07/17/98 Routing:
Copy to: / / / /
File project Key Word: drainage, AGENCY APPROVAL,
Comments:

DRAINAGE INFORMATION SHEET

PROJECT TITLE: WILLOW WOOD NORTH ATLAS/DRAINAGE FILE# L-21/ D37A4

LEGAL DESCRIPTION: TRACT D-2-A MANZANO MESA
CITY ADDRESS: JUAN TABO AND SINGING ARROW
ENGINEERING FIRM: AVID ENG. INC., CONTACT:DAVE THOMPSON
ADDRESS: 5801 OSUNA RD. NE, ALB., NM, 87109
OWNER: MANZANO MESA LTD CONTACT:STAN STRICKMAN
ADDRESS: 6301 INDIAN SCHOOL RD NE, SUITE 680 PHONE: 881-9190
ARCHITECT: NA CONTACT: NA
ADDRESS: NA PHONE: NA
SURVEYOR: AVID ENGINEERING, INC. CONTACT: Ruan Bacigalupa
ADDRESS: Same as Above PHONE: 881-5357
CONTRACTOR: NA CONTACT: NA
ADDRESS: NA PHONE: NA

PRE-DESIGN MEETING:

____ YES
XX NO
____ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. 97-209
EPC NO. ____
PROJECT NO. ____

TYPE OF SUBMITTAL:

XX DRAINAGE REPORT
____ DRAINAGE PLAN
____ CONCEPTUAL GRADING & DRAINAGE PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
____ ENGINEERS CERTIFICATION
____ FOUNDATION PERMIT

CHECK TYPE OF APPROVAL SOUGHT:

____ SECTOR PLAN APPROVAL
____ SKETCH PLAT APPROVAL
XX PRELIMINARY PLAT APPROVAL
____ SITE DEVELOPMENT PLAN APPROVAL
____ FINAL PLAT APPROVAL
____ BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY APPROVAL
____ ROUGH GRADING PERMIT
____ GRADING/PAVING PERMIT APPROVAL
____ OTHER ____(SPECIFY)

DATE SUBMITTED: 12-17-97
BY: [signature]
REV. 10/85

RECEIVED
FEB 17 2000
HYDROLOGY SECTION

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

December 24, 1997

Dave Thompson, P.E.
Avid Engineering, Inc
5801 Osuna Rd. NE
Suite 200
Albuquerque, NM 87109

RE: WILLOW WOOD UNIT 6 (L21-D37A4). DRAINAGE PLAN FOR PRELIMINARY PLAT APPROVAL. ENGINEER'S STAMP DATED DECEMBER 9, 1997.

Dear Mr. Thompson:

Based on the information provided on your December 17, 1997 submittal, the above referenced submittal is approved for Preliminary Plat.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa-Ann Manwill, P.E.
Hydrology

c: Andrew Garcia
File

RECEIVED
FEB 17 2000
HYDROLOGY SECTION

CITY OF
Albuquerque

Martin J. Chávez, Mayor

October 9, 1997

Rick Beltramo, P.E.
Avid Engineering, Inc
5801 Osuna Rd. NE
Suite 200
Albuquerque, NM 87109

RE: WILLOW WOOD NORTH (L21-D37A4). DRAINAGE PLAN FOR PRELIMINARY PLAT APPROVAL. ENGINEER'S STAMP DATED SEPTEMBER 5, 1997.

Dear Mr. Beltramo:

Based on the information provided on your September 24, 1997 submittal, the above referenced submittal is approved for Final Plat.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Hydrology

c: Andrew Garcia
File

CITY OF
Albuquerque

Martin J. Chávez, Mayor

October 6, 1997

Rick Beltramo, P.E.
Avid Engineering, Inc
5801 Osuna Rd. NE
Suite 200
Albuquerque, NM 87109

RE: WILLOW WOOD ~~UNIT~~ North 6 (L21-D37A4). DRAINAGE PLAN FOR PRELIMINARY PLAT APPROVAL. ENGINEER'S STAMP DATED SEPTEMBER 5, 1997.

Dear Mr. Beltramo:

Based on the information provided on your September 19, 1997 submittal, the above referenced submittal is approved for Preliminary Plat.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Hydrology

c: Andrew Garcia
File

CITY OF
Albuquerque

August 7, 1997

Martin J. Chávez, Mayor

Rick Beltramo, P.E.
AVID Engineering, Inc.
5801 Osuna NE
Suite 200
Albuquerque, NM 87109

RE: WILLOW WOOD NORTH (L21-D37A3). DRAINAGE REPORT FOR PRELIMINARY PLAT APPROVAL. ENGINEER'S STAMP DATED JULY 18, 1997.

Dear Mr. Beltramo:

Based on the information provided on your July 21, 1997 submittal, City Hydrology has the following comments:

1. Preliminary Plat approval requires a complete and comprehensive grading and drainage plan and phasing plan.

2. Take the word "preliminary" out of your report. As mentioned above, Preliminary Plat approval requires a comprehensive submittal.

3. Do you have a copy of the LOMR? If so, please submit.

4. Provide storm drain size on plan sheet. Provide a plan and profile of storm drain for Work Order approval.

5. If the on site storm drain is put in with Units 4 & 5, how will Units 1, 2, and 3 drain? It appears, by the interim drainage plan, that an earthen channel will be built all the way to Elizabeth Street however, page 4 of the report discusses storm drain pipe as an interim condition.

6. Per page 4 of your repot, add interim condition storm drain facilities to the infrastructure list.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Engineering Assoc./Hyd.

c: Andrew Garcia
[File]

DRAINAGE INFORMATION SHEET

PROJECT TITLE: **WILLOW WOOD NORTH** ATLAS/DRAINAGE FILE# **L-21/**

LEGAL DESCRIPTION: **TRACT D-2-A MANZANO MESA**
CITY ADDRESS: **JUAN TABO AND SINGING ARROW**
ENGINEERING FIRM: **AVID ENG. INC.,** CONTACT:**RICK BELTRAMO**
ADDRESS: **5801 OSUNA RD. NE, ALB., NM, 87109**
OWNER: **MANZANO MESA LTD** CONTACT:**STAN STRICKMAN**
ADDRESS: **6301 INDIAN SCHOOL RD NE, SUITE 680** PHONE: **881-9190**
ARCHITECT: **NA** CONTACT: **NA**
ADDRESS: **NA** PHONE: **NA**
SURVEYOR: **AVID ENGINEERING, INC.** CONTACT: **Ruan Bacigalupa**
ADDRESS: **Same as Above** PHONE: **881-5357**
CONTRACTOR: **NA** CONTACT: **NA**
ADDRESS: **NA** PHONE: **NA**

PRE-DESIGN MEETING:

____ YES
XX NO
____ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. 97-209
EPC NO._____
PROJECT NO._____

TYPE OF SUBMITTAL:

XX DRAINAGE REPORT
____ DRAINAGE PLAN
____ CONCEPTUAL GRADING & DRAINAGE PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
____ ENGINEERS CERTIFICATION
____ FOUNDATION PERMIT

CHECK TYPE OF APPROVAL SOUGHT:

____ SECTOR PLAN APPROVAL
____ SKETCH PLAT APPROVAL
XX PRELIMINARY PLAT APPROVAL
____ SITE DEVELOPMENT PLAN APPROVAL
____ FINAL PLAT APPROVAL
____ BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY APPROVAL
____ ROUGH GRADING PERMIT
____ GRADING/PAVING PERMIT APPROVAL
____ OTHER _____(SPECIFY)

DATE SUBMITTED: Sept. 17, 1997
BY: _____
REV. 10/85

RECEIVED
SEP 19 1997
HYDROLOGY SECTION

AVID ENGINEERING, INC.

Civil • Structural • Transportation

September 18, 1997

Lisa Ann Manwill, P.E.
Engineering Assoc./Hyd.
The City of Albuquerque
Public Works Department
P.O. Box 1293
Albuquerque, NM 87103
[Hand Delivered]

RE: WILLOW WOOD NORTH SUBDIVISION
DRAINAGE REPORT COMMENT RESPONSES
Drainage File L21-D37A3

Dear Ms. Manwill:

Submitted are responses to your comments dated August 7, 1997. Also submitted is a revised drainage report. Below are detailed responses to your written comments and your comments from our meeting.

Comment 1
A revised Grading and Drainage Plan was completed and is submitted with this report. The phasing plan is included in the report, (see figure 3 labeled "Storm Drain Layout and Phasing Plan").

Comment 2
The word "preliminary" was removed from the report as it pertains to the drainage report.

Comment 3
FEMA has approved the Letter of Map Revision (LOMR), however the LOMR is in the public review phase. A copy of the FEMA approval letter is included in the appendix.

Comment 4
The storm drain sizes are shown on the exhibit labeled "Storm Drain Layout and Phasing Plan" in the report. The pipe sizes will be shown on the construction plans when individual phases are constructed.

A Work Order Approval is not being sought, so no storm drain plan and profiles will not be submitted.

5801 Osuna Rd. NE • Suite 200 • Albuquerque, NM 87109 • (505) 881-5357 • Fax 505-881-7602

Comment 5
The original plan for Willow Wood (the existing subdivision) intended for no off-site flows to enter Willow Wood North. However, this drainage management plan recommends a slight revision to the intersection grading which would redirect a small amount of flow from the existing Willow Wood Subdivision to Willow Wood North, via Herman Roser/Elizabeth Street. This will be accomplished by removing temporary pavement in the intersection and replacing it with permanent pavement and valley gutters aligned to direct flow to Elizabeth Street as opposed to Bryce Canyon. The net result is that less flow is discharged to Bryce Canyon. A detailed analysis is provided in the hydraulic calculations section of the appendix.

Comment 6
Surge pond contours have been added.

Please note that revisions to the Drainage Report have been made in response to your comments. In addition, the extension of Los Padres has been removed from Willow Wood North and combined with Willow Wood Subdivision as Unit 6. The original Willow Wood North drainage report accommodates Unit 6, and therefore requires only grading plan appeal.

Finally, the number and size of lots within Willow Wood North have been changed. The total number of lots has been slightly increased. No changes in street geometry have been made.

I believe that your comments have been addressed to your satisfaction. If not, or you have any additional comment or questions, please call me anytime at 881-5357.

Sincerely,

Rick Beltramo, P.E.
Project Manager

Attachments

cc: Stan Strickman, Trails Inc.

RECEIVED
SEP 19 1997
HYDROLOGY SECTION

CITY OF ALBUQUERQUE

NOTICE OF D.R.C. MEETING

6-3-98
(DATE)

DRB NO: 97-209
PROJECT NO: 589781
ZONE ATLAS: L-21

PROJECT NAME: Minabella Unit 1
LOCATION: (Juan Tabo + Singing Arrow

TYPE OF PROJECT: AHBA X CIP ___ PWC ___ SAD ___ ALL PRIVATE ___

Contact Person: Dave Thompson **Phone:** 881-5357
Firm: Avid Eng

X Scheduled with the D.R.C. on 6-9-98 at 3:30 Plaza Del Sol/2nd Fl.
___ No DRC Meeting Scheduled. Please return any comments by _____

The Project Is Scheduled For:

/ / Design Report Review
/ / Pre-Design Meeting
/ / Preliminary Plan Review
/ / Final Plan Review
/X/ Signoff of Plans
/ / _____

The Project Relates To:

/ / Water / / San. Sewer / / Paving / / Storm Drainage / / _____

The Attached Package Includes:

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

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

/D/ DRC Chairman	Project Review Section	All Drawings
/D/ Traffic Repres	Transportation Development	All Drawings
/D/ Utility Dev.(Bob Kane)	Utility Design	All AHBA Drawings
/ / Utility Dev.(Keith Reed)	Utility Design	All CIP Drawings
/D/ Hydro Repres. Murray	Hydrology	All Drawings
/D/ Const. Repres. Pung	Construction	All Drawings
/ / Ray Chavez	Traffic Operations	All Drawings
/ / Sergio Miranda	Water (Shutoff Plan)	All Water Shutoff
/ / CIP/Parks Repres.	Parks & Recreation	ALL Landscaping
/ / Andre Houle	Street Maintenance	All Paving
/M/ Kevin Broderick	Utility Coordinator	ALL PWC & CIP
/ / Jim Hamel	Transit Department	CIP/Memo
/D/ Joe Luehring	Construction Coordinator	CIP/Memo
/ / Jim Fink	Line Maintenance	CIP & SAS/Memo
/ / George Gee	City Architect	Arch. Drawings
/ / Lee Lunsford	SAD Engineer	SAD/Memo
/ / Tom Ellis	Park Mangement	Parks/Community Ctrs/APS
/ / Gene Bustamante	General Services Dept.	Arch. Drawings
/ / Greg Smith	PWD/Legal	Specs & Dwgs.
/ / Richard Sertich	Planning Department	CIP/Memos
/ / CIP Project Manager	CIP	CIP/Memos
/ / Donald Bartlett	Risk Management	Arch. Drawings
/ / _____	_____	_____

DRCNOTIC. 10/19/95

[redacted]

AVID ENGINEERING, INC.

MASTER DRAINAGE REPORT
FOR
WILLOW WOOD NORTH SUBDIVISION

PREPARED FOR:

MANZANO MESA LIMITED PARTNERSHIP
6301 INDIAN SCHOOL, NE SUITE 208
ALBUQUERQUE, NM 87109

PREPARED BY:

AVID ENGINEERING, INC.
5801 OSUNA RD, NE SUITE 200
ALBUQUERQUE, NM 87109

Revised August 1997

RECEIVED
SEP 19 1997
HYDROLOGY SECTION

DRAINAGE INFORMATION SHEET

PROJECT TITLE: **WILLOW WOOD NORTH** ATLAS/DRAINAGE FILE# **L-21/**

LEGAL DESCRIPTION: **TRACT D-2-A MANZANO MESA**
CITY ADDRESS: **JUAN TABO AND SINGING ARROW**
ENGINEERING FIRM: **AVID ENG. INC.,** CONTACT:**RICK BELTRAMO**
ADDRESS: **5801 OSUNA RD. NE, ALB., NM, 87109**
OWNER: **MANZANO MESA LTD** CONTACT:**STAN STRICKMAN**
ADDRESS: **6301 INDIAN SCHOOL RD NE, SUITE 680** PHONE: **881-9190**
ARCHITECT: **NA** CONTACT: **NA**
ADDRESS: **NA** PHONE: **NA**
SURVEYOR: **AVID ENGINEERING, INC.** CONTACT: **Ruan Bacigalupa**
ADDRESS: **Same as Above** PHONE: **881-5357**
CONTRACTOR: **NA** CONTACT: **NA**
ADDRESS: **NA** PHONE: **NA**

PRE-DESIGN MEETING:

_____ YES
XX NO
_____ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. 97-209
EPC NO._____
PROJECT NO._____

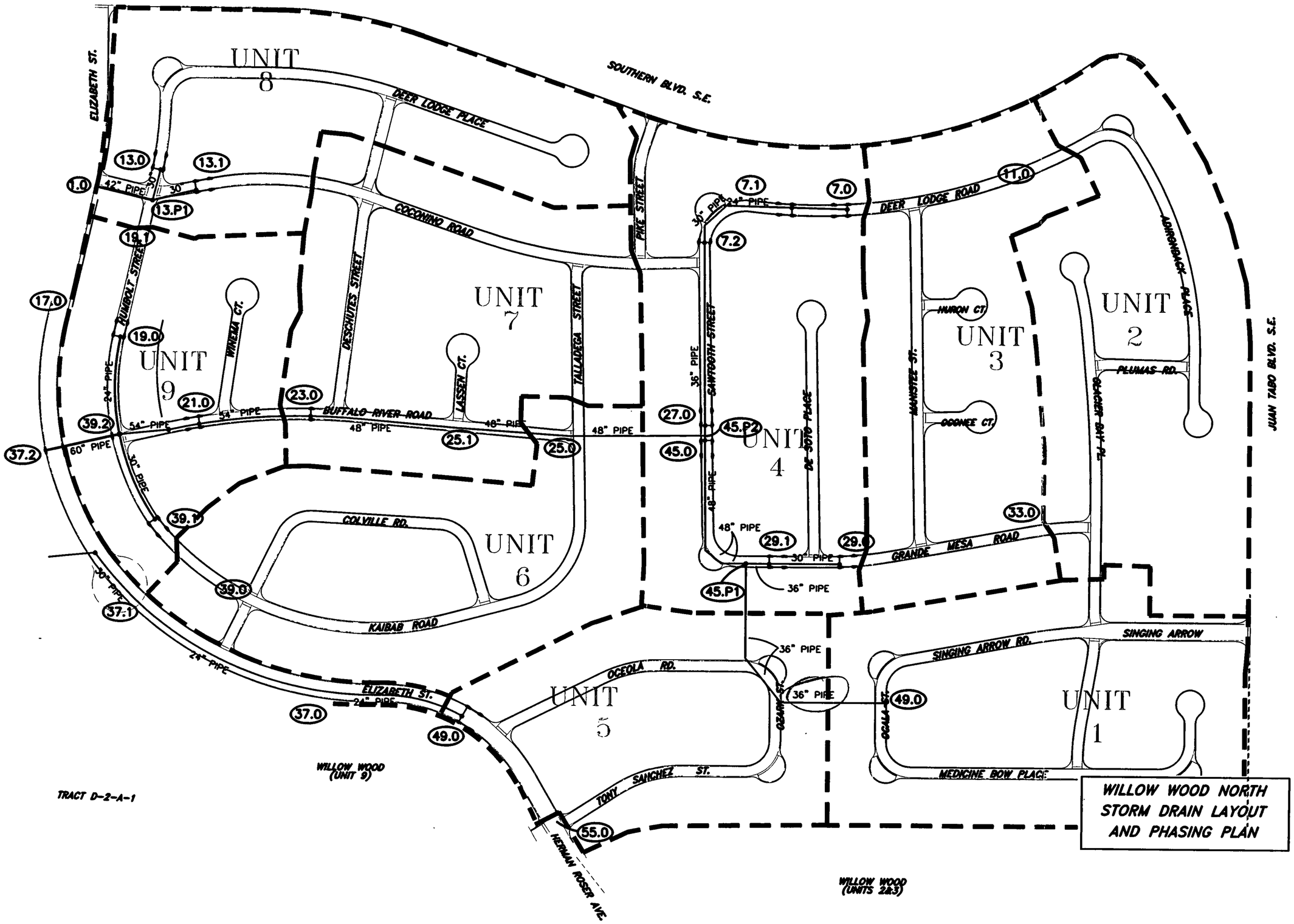
TYPE OF SUBMITTAL:

XX DRAINAGE REPORT
_____ DRAINAGE PLAN
_____ CONCEPTUAL GRADING & DRAINAGE PLAN
_____ GRADING PLAN
_____ EROSION CONTROL PLAN
_____ ENGINEERS CERTIFICATION
_____ FOUNDATION PERMIT

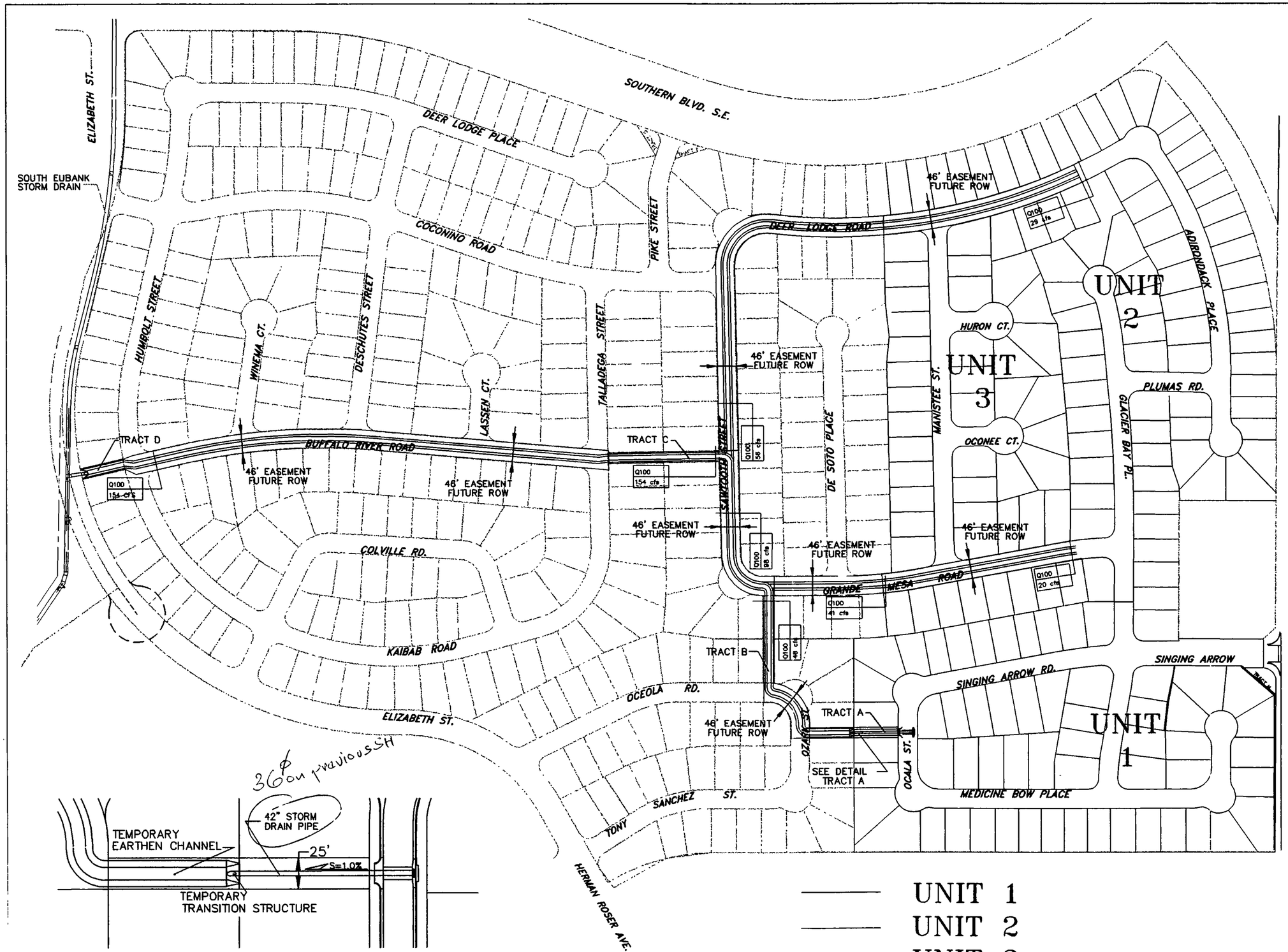
CHECK TYPE OF APPROVAL SOUGHT:

_____ SECTOR PLAN APPROVAL
_____ SKETCH PLAT APPROVAL
XX PRELIMINARY PLAT APPROVAL
_____ SITE DEVELOPMENT PLAN APPROVAL
_____ FINAL PLAT APPROVAL
_____ BUILDING PERMIT APPROVAL
_____ CERTIFICATE OF OCCUPANCY APPROVAL
_____ ROUGH GRADING PERMIT
_____ GRADING/PAVING PERMIT APPROVAL
_____ OTHER _____(SPECIFY)

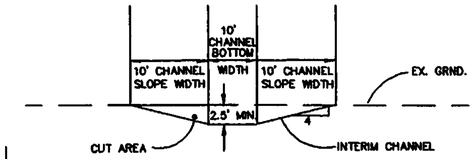
DATE SUBMITTED: Sept. 17, 1997
BY: _____
REV. 10/85



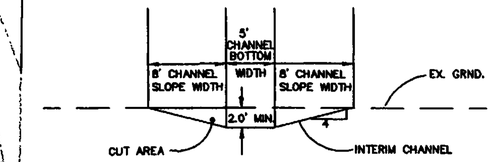
WILLOW WOOD NORTH STORM DRAIN LAYOUT AND PHASING PLAN



DETAIL TRACT A, UNIT 1



TYPICAL CHANNEL SECTION – 46' R.O.W.
NTS



TYPICAL CHANNEL SECTION
25' EASEMENT
TRACTS A, B, C, AND D
NTS

	10' WIDE CHANNEL			
	MAX. SLOPE=3.0%		MIN. SLOPE=0.5%	
Q100 (cfs)	DEPTH (ft)	VELOCITY (fps)	DEPTH (ft)	VELOCITY (fps)
154	1.3	8.2	2.3	6.7

	10' WIDE CHANNEL			
	MAX. SLOPE=3.0%		MIN. SLOPE=0.5%	
Q100 (cfs)	DEPTH (ft)	VELOCITY (fps)	DEPTH (ft)	VELOCITY (fps)
48	0.9	6.2	1.4	3.3
154	1.6	8.6	2.4	4.4

INTERIM DRAINAGE IMPROVEMENTS EXHIBIT

TABLE OF CONTENTS

	PAGE
DRAINAGE INFORMATION SHEET	i
TABLE OF CONTENTS	ii
INTRODUCTION AND PROJECT DESCRIPTION	1
PURPOSE AND SCOPE	1
DESIGN CRITERIA AND STANDARDS	1
EXISTING DRAINAGE CONDITIONS	2
DEVELOPED CONDITIONS	2
INTERIM IMPROVEMENTS	3
SOUTH EUBANK STORM DRAIN IMPROVEMENTS	4
APS TRACT D-2-A-1	4
SUMMARY	4

FIGURES AND EXHIBITS
VICINITY MAP
MANZANO MESA MASTER PLAN
STORM DRAIN LAYOUT AND PHASING PLAN
INTERIM DRAINAGE IMPROVEMENTS

APPENICIES
INFRASTRUCTURE LIST
SUMMARY STREET HYDRAULICS TABLE
SUMMARY HYDROLOGIC TABLE
HYDRAULIC COMPUTATIONS
AHYMO SUMMARY PRINTOUT
AHYMO DETAILED OUTPUT
FEMA LOMR APPROVAL LETTER

PLATES
DRAINAGE PLAN
PRELIMINARY PLAT

INTRODUCTION AND PROJECT DESCRIPTION

This report is the drainage Masterplan for Willow Wood North subdivision, a planned residential development located in southeast Albuquerque within the Manzano Mesa Masterplan area. More specifically, the project is located at the southwest corner of the Juan Tabo Blvd. and Southern Blvd. intersection (see location map).

Willow Wood North is the second such development within Manzano Mesa. The first was Willow Wood subdivision, located south of and adjacent to the proposed Willow Wood North. Manzano Mesa is owned by the Albuquerque Public Schools (APS). The planned development is zoned R-1 for approximately 569 single family homes on 114 acres are proposed. Remaining areas of Manzano Mesa are not addressed by this report.

PURPOSE AND SCOPE

The purpose of this report is to determine and define all drainage improvements necessary to support the proposed 569 lot subdivision. This Master drainage report will support City approval of the Preliminary Plat. Included in this report is a grading plan showing conceptual grades and planned phasing, temporary drainage design for phased development, typical lot grading details and construction erosion control plans.

The plan includes analysis which determines street flow capacities and determines the location, size, number and types of catch basins and storm drain pipes. The storm drain sewer is the predominate storm drain infrastructure required to support the development.

DESIGN CRITERIA AND STANDARDS

This report is developed in accordance with City of Albuquerque regulations, ordinances and design criteria. Detailed design criteria predominately is derived from the City Development Procedures Manual (DPM). The plan studies the existing and developed conditions for the 100-year, 6-hour storm event, as defined by chapter 22.2 of the DPM. More specifically, hydrology was developed using the current version of AHYMO, in accordance with the chapter 22.2 of the DPM. AHYMO is a unit, synthetic hydrograph model developed for the Albuquerque area. The AHYMO computer model provides capabilities to analyze street hydraulics, channel and pipe routing and complex hydrograph development. Summary printouts of the AHYMO analysis is provided in the appendix. Summary basin data is provided in the Hydrologic Summary Table.

Street and storm drain capacities are based on Manning's formula, as described in the Development Process Manual. Detailed hydraulic gradeline analysis and catch basin hydraulic analysis is also based on the DPM. Hydraulic computations are included in Appendix .

EXISTING DRAINAGE CONDITIONS

The existing condition site is unimproved, and in undisturbed condition except for some temporary access roads serving the existing Willow Wood subdivision to the south and some dirt roads and paths. Existing vegetation consists of typical native grasses and shrubs. Site topography is relatively uniform with slopes typically in the 1.5-2% range, sloping predominately from east to west. On-site soils consist of typical alluvial fan deposits consisting of decomposed granites in the form of sand, gravel and some clay material. The Soil Conservation Service (SCS) classification of souls in this area are:

EmB Embudo soil complex, gravely fine sandy loam; 0-5% slopes. These are generally deep, well drained soils formed in alluvium derived decomposed, coarse grained rocks. They exhibit medium run-off characteristics with moderate erosion.

TgB Tijeras soil complex, gravely fine sandy loam; 1-5% slopes. These are generally deep, well drained soils formed in decomposed granite alluvium. Rub-off and erosion are moderate.

Under existing conditions no off-site flows reach the site. Potential off-site flows from the east are intercepted by Juan Tabo Blvd., and storm drain improvements located within Juan Tabo Blvd. Recently the City of Albuquerque constructed a storm drain detention/surge pond at the corner of Singing Arrow and Juan Tabo Blvd. The pond collects off-site runoff and discharges to the Juan Tabo storm drain which in-turn discharges to the Tijeras Arroyo. Currently, FEMA floodplains exist on the project site. The construction of the surge pond removes the floodplains. The city has received approval for a Letter of Map Revision (LOMR) from FEMA. At the writing of this report, the city was in the process of submitting as-built information to FEMA in order to obtain the floodplain map revision, completing the floodplain removal. This approval is expected in the very near future. The FEMA approval letter is included in the appendix.

Runoff generated onsite flows west across the remainder of the Manzano Mesa property toward Eubank Blvd. discharging to historic locations. Undeveloped flow rates have been determined and are shown in the Hydrologic Summary Table.

DEVELOPED CONDITIONS

Recently the City of Albuquerque purchased property within the Manzano Mesa development for a regional park and major storm drain detention pond. Major storm drain collection and outfall sewers have been identified and are currently under design which will serve large areas of the southeast and northeast heights. Included in the service area is Willow Wood North Subdivision. Willow Wood North will be allowed free discharge to planned storm drain located within Elizabeth Street.

This Master drainage report shows constructing a storm drain collection system within Willow Wood North and connecting to the Elizabeth St. storm drain at 3 locations. The City is currently in the process of developing detailed construction plans for the Elizabeth Street storm drain. The

hydraulic grade line and storm drain layout of the Elizabeth Street storm drain are based on plans and detailed information provided by the city.

In summary, the storm drain improvements are designed to collect runoff at points where street flow criteria is exceeded. Flow is collected by standard City catch basins. The storm drain then oufalls to the Elizabeth street storm drain. Located in the appendix are summary and detailed calculations for street hydraulics and inlet analysis. Also included in the appendix is the Infrastructure List. This listing shows the planned storm drain improvements in a sequential phased manner. The hydraulic grade line analysis is also provided in the appendix.

The drainage plan (Plate 1) provides a preliminary design for the streets and internal grading of the subdivision. The drainage plan shows building pad grades, street spot grades and slopes, basin limits, phasing limits and storm drain infrastructure. Analysis points are also shown which refer to tables within the report showing both street and storm drain flow rates and other design parameters.

At three locations, surface flows are intercepted by public storm drains located within Tracts A, B, and C which are pedestrian access easements. These Tracts are 25' wide and contain public water and storm sewer lines. A public drainage easement is provided placed on these tracts for construction and maintenance of the public storm drain improvements, in addition to the water, sewer and access. These tracts are designed to allow an additional 100% of the design flow to pass though the easements via surface flow. This additional safety factor is provided to insure that no private property is damaged should the storm drain fail.

This Master drainage report establishes the parameters under which public infrastructure and private lot grading will be designed, but it is not a substitute for the final grading plan for each development. Phase specific construction plans will have to be submitted to City staff for review and approval on a phase by phase basis as development occurs. It is planned that as each phase develops an addendum to the Master Drainage Report be submitted. Each addendum will include all analysis, design, details, etc. necessary to obtain construction plan approval by the DRC, final plat approval by the DRB and construction permits.

INTERIM IMPROVEMENTS

This report assumes that the Elizabeth Street storm drain and associated detention pond will be completed by the City prior to the construction of the first phase of development, Unit 1. Units 1 through 3 are intended to outfall to interim earthen channels constructed in future street alignments as shown in the exhibit labeled "Interim Drainage Improvements Exhibit." These interim channels will convey all storm runoff from Units 1 through 3 until permanent storm drains are constructed with Units 4 through 9. The channels will outfall to a temporary reinforced concrete pipe which in-turn outfalls to the Elizabeth Street storm drain. The channels are designed to follow the existing terrain, maintaining a positive and minimal grade to the outfall. The channel is designed to be cut into the existing terrain with a 10 ft. wide bottom, 4:1 side slopes, 2.5 ft. minimum depth from invert to existing ground. The spoil from the cut will be placed on both sides of the channel as a compacted berm. When the ultimate storm drain and

street improvements are constructed the temporary channels will be filled. Maintenance of the interim improvements will be the ultimate responsibility of APS, as defined by previous agreement between the City and APS. Provided in the appendix is a phasing plan for interim improvements.

UNIT 1 Interim improvements proposed for Unit 1 include one Double Winged, Double Grate Type A catch basin which discharges into 150 LF 36" RC Pipe. The 36" RC Pipe then discharges to a temporary earthen channel approximately 2500 feet in length. The temporary channel then discharges to 50 LF of 60" RC Pipe which intern discharges to the Manzano Mesa storm drain located within Elizabeth Street. These improvements are shown on the infrastructure listing.

UNIT 2 Unit 2 builds an additional 2000 LF of interim earthen channel. Two separate channels make up the additional improvements, which connect and outfall to the Unit 1 earthen channels.

UNIT 3 Unit 3 builds no additional interim storm drain infrastructure because Units 1 and 2 completed all interim improvements necessary to serve Unit 3.

UNITS 4 - 9 These units will be required to construct permanent storm drain improvements to the outfall in Elizabeth Street. No interim storm drain improvements are proposed for these Units.

SOUTH EUBANK STORM DRAIN

Based on information provided by the City and the development project schedule, it is assumed that the Elizabeth Street storm drain and the detention pond and regional park will be completed and in place prior to development of Unit 1. In the event that this assumption is incorrect, and the regional storm detention pond or the Elizabeth Street storm drain is not constructed at the time of Unit 1 development, other interim improvements will be required to support the development. Under agreement between the City and APS, APS has reserved the right to constructed interim channels and storm water detention facilities on City property. The location of the interim retention pond is planned to be in the area of the proposed regional detention pond. Interim channels would be placed on alignments which do not conflict with the planned uses of the park. The primary location to be considered would be the Elizabeth Street storm drain, along the APS boundary. Additional design and revisions to this report would be required accommodate these additional improvements.

APS TRACT D-2-A-1

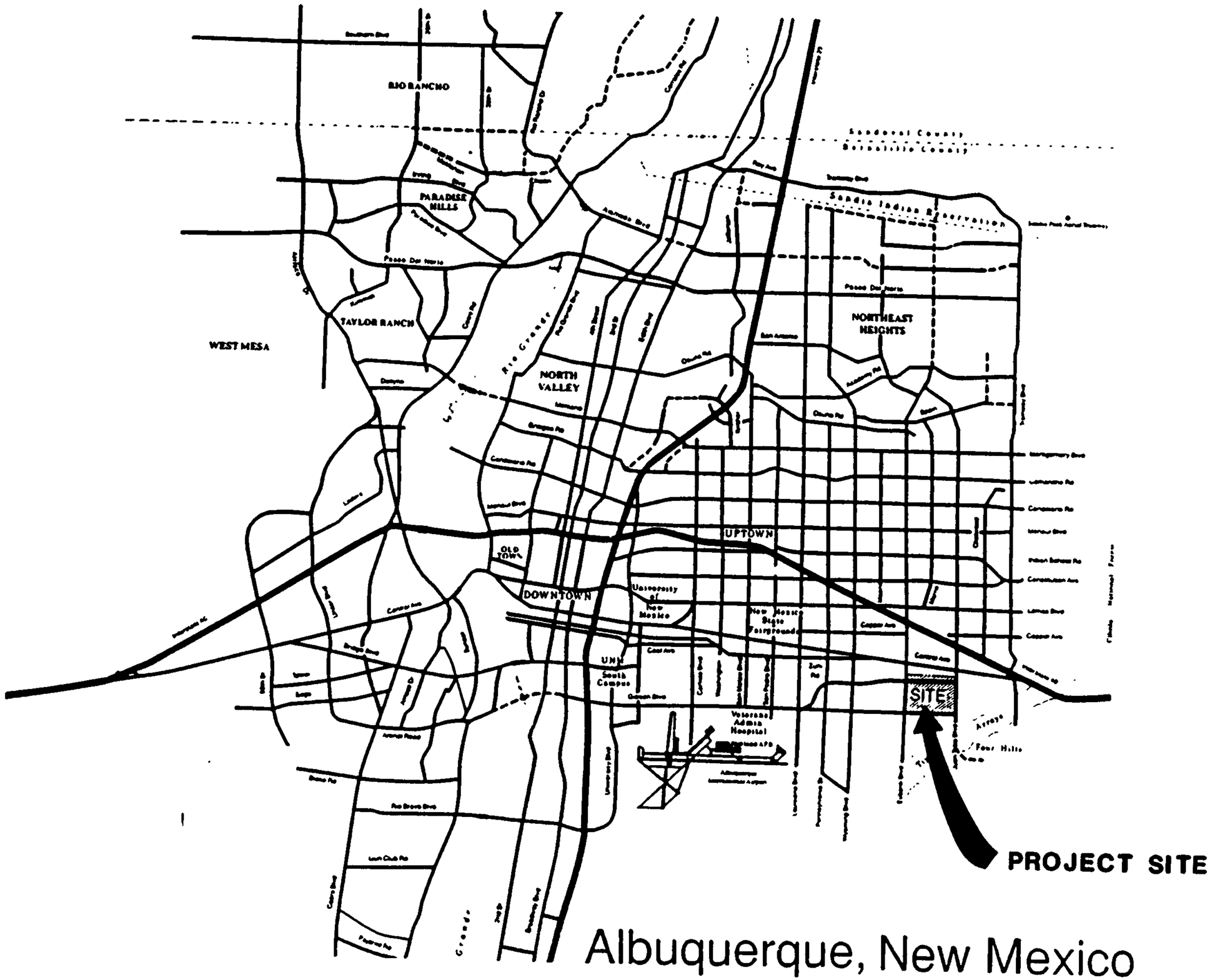
Within the Preliminary Plat is a 12.91 acre site, Tract D-2-A-1. This site was addressed in detail and an outfall made available to accept free discharge (reference approved Willow Wood Drainage Report). Therefore, this Master drainage plan does not include analysis for Tract D-2-A-1.

SUMMARY

The overall plan for the subdivision's internal drainage is in conformance with the City's Development Process Manual. Major conveyances have been properly sized and located to permit the subsequent design of the final grading for each phase of development. Willow Wood North subdivision is being developed in conformance with the approved Master plan developed for the area by APS, and approved by the City in 1991. Willow Wood North subdivision is also being developed in conformance with the approved South Eubank Storm Drain Plan, developed by the City.

Based on the above, it is recommended that this document serve as the basis for approval of the Preliminary Plat for Willow Wood North Subdivision, approximately 127.686 acres (12.91 acres Tract D-2-A-1 and 114.776 acres R-1, 569 lots).

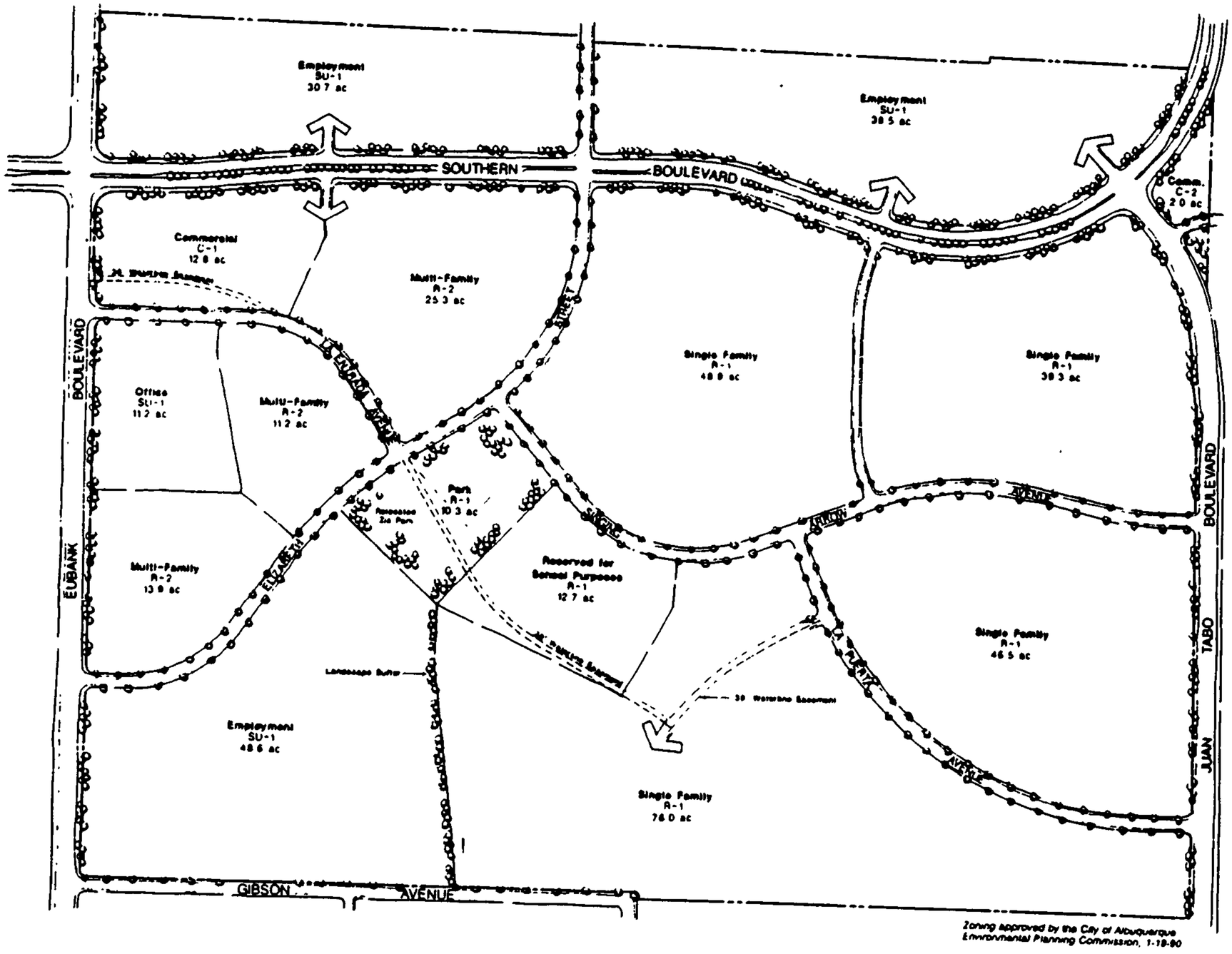
EXHIBITS



Albuquerque, New Mexico

FIGURE I

VICINITY MAP



Zoning approved by the City of Albuquerque
Environmental Planning Commission, 1-18-90

SITE DATA

LAND USE	ZONING	ACRES	DENSITY	UNITS
• Single Family	R-1	210.7	3.5 du/ac	737
• Multi-Family	R-2	50.4	24.0 du/ac	1208
Commercial	C-1	12.8		
Commercial	C-2	2.0		
Office	SU-1	11.2		
Employment	SU-1	117.8		
• Park	R-1	10.3		
• Reserved for School Purposes	R-1	12.7		
• Interior R.O.W.		20.1		
Arterial R.O.W.		32.0		
TOTAL		480.0	(n) 3.38 du/ac (g) 2.65 du/ac	1945

NOTE • Used to Calculate Net Density (n)
Total Units ÷ Gross Acres = Gross Density (g)

MASTER PLAN

Manzano Mesa

ALBUQUERQUE PUBLIC SCHOOLS

9/11/89

0 100 200 400 600
SCALE IN FEET
1"=200'

A. WAYNE SMITH
& ASSOCIATES

818 GOLD, SOUTHWEST #210
ALBUQUERQUE, NEW MEXICO
(505) 764-0801

APPENDIX

Figure II, EXHIBIT "D"
to the Subdivision Improvements Agreement

D.R.B. Case No. 97-209
D.R.C. Project No.
Date Submitted 9-5-97
Submitted by AVID Engineering, Inc.
By:

DEVELOPMENT REVIEW BOARD
REQUIRED INFRASTRUCTURE LISTING
for WILLOW WOOD NORTH SUBDIVISION
UNITS 1 THROUGH 9

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

ITEM	LOCATION	FROM	TO
UNIT 1			
PAVING			
28' Residential paving, standard curb and gutter, 4' sidewalk (both sides)	Singing Arrow Road Ocala Street Medicine Bow Place Glacier Bay Place	Juan Tabo Blvd. Singing Arrow Road Ocala Street Medicine Bow Place	Ocala Street Medicine Bow Place End of Cul-De-Sac Singing Arrow Road
Right-Turn Lane	At Intersection of Southern Blvd. and Eubank Blvd. Westbound to northbound movement.		
6' sidewalk,	west side, Juan Tabo Blvd.	South Property Line	850 ' North
Street Trees,	west side, Juan Tabo Blvd.	South Property Line	850 ' North

$360.00 Per lot contribution for future off-site regional transportation improvements, see note (5)

ITEM	LOCATION	FROM	TO
UTILITIES			
6" Waterlines and 8" Sanitary Sewerlines	Singing Arrow Road Ocala Street Medicine Bow Place Glacier Bay Place	Juan Tabo Blvd. Singing Arrow Road Ocala Street Medicine Bow Place	Ocala Street Medicine Bow Place End of Cul-De-Sac Singing Arrow Road
8" Sanitary Sewerline	Tract A Ozark Street Tony Sanchez Street	Ocala Street Tract A Ozark Street	Ozark Street Tony Sanchez Street Herman Roser Avenue
STORM DRAIN			
Temporary 5' Wide Earthen Channels	Tract A Ozark St. Oceola Rd. Tract B Grand Mesa Rd. Sawtooth St. Tract C Buffalo River Rd. Tract D	West Property Line Tract A Ozark St. Oceola Rd. Tract B Grand Mesa Rd. Sawtooth St. Tract C Buffalo River Rd. Tract D	Ozark St. Oceola Rd. Tract B Grand Mesa Rd. Sawtooth St. Tract C Buffalo River Rd. Tract D
60" RCP Storm Drain	Elizabeth St.		Elizabeth St. Eubank Storm Drain (by others, in Elizabeth St.)

Temporary Earthen Channels located within Public Drainage Easements and Future Street Right-Of-Way.
Retaining Walls throughout the Subdivision.
Grading and Drainage Certification is required prior to release of Financial Guarantees.

UNIT 2			
PAVING			
28' Residential paving, standard curb gutter, 4' sidewalk (both sides)	Glacier Bay Place Plumas Road Adirondack place Deer Lodge Road	Signing Arrow Road Glacier Bay Place Deer Lodge Road Adirondack place	Cul-De-Sac Adirondack place Cul-De-Sac 100' West

ITEM	LOCATION	FROM	TO
6" sidewalk	west side Juan Tabo Blvd.	Singing Arrow Rd.	1050' North
Street Trees	west side Juan Tabo Blvd.	Singing Arrow Rd.	1050' North

$360.00 Per lot contribution for future off-site regional transportation improvements, see note (5).

UTILITIES

6" Waterlines and 8" Sanitary Sewerlines	Glacier Bay Place	Signing Arrow Road	Cul-De-Sac
	Plumas Road	Glacier Bay Place	Adirondack place
	Adirondack place	Deer Lodge Road	Cul-De-Sac
	Deer Lodge Road	Adirondack place	100' West

STORM DRAIN

Temporary 5' Wide Earthen Channels	Grand Mesa Road	West Property Line	Tract B
	Deer Lodge Rd.	West Property Line	Sawtooth St.
	Sawtooth St.	Deer Lodge Rd.	Tract C

Temporary Earthen Channels located within Public Drainage Easements and Future Street Right-Of-Way.
Retaining Walls throughout the Subdivision.
Grading and Drainage Certification is required prior to release of Financial Guarantees.

UNIT 3

PAVING

28' Residential paving, standard curb and gutter, 4' sidewalk (both sides)	Manistee Street	Grande Mesa Road	Deer Lodge Road
	Grand Mesa Road	130' west of Manistee St.	Glacier Bay Place
	Oconee Court	Manistee Street	Cul-de-sac
	Huron Court	Manistee Street	Cul-de-sac

$360.00 Per lot contribution for future off-site regional transportation improvements, see note (5).

UTILITIES

6" Waterlines and 8" Sanitary Sewerlines	Manistee Street	Grande Mesa Road	Deer Lodge Road
	Grand Mesa Road	130' west of Manistee St.	Glacier Bay Place
	Oconee Court	Manistee Street	Cul-de-sac

ITEM	LOCATION	FROM	TO
	Huron Court	Manistee Street	Cul-de-sac
8" Sanitary Sewerline	Grand Mesa Road	130' west of Manistee St.	Tract B
	Tract B	Grand Mesa Road	Oceola Road
	Oceola Road	Tract B	Ozark Street
	Ozark Street	Oceola Road	Tract A

STORM DRAIN

Retaining Walls throughout the Subdivision.

Grading and Drainage Certification is required prior to release of Financial Guarantees.

UNIT 4

PAVING

28' Residential paving, standard curb and gutter, 4' sidewalk (both sides)	De Soto Place	Grande Mesa Road	Cul-de-sac
	Grande Mesa Road	Sawtooth Street	110' East of De Soto Place
	Sawtooth Street	Grande Mesa Road	Deer Lodge Road
	Deer Lodge Road	Sawtooth Street	140' West of Manistee Street
	Coconino Road	Pike Street	Sawtooth Street
	Pike Street	Coconino Road	Southern Boulevard

$360.00 Per lot contribution for future off-site regional transportation improvements, see note (5).

UTILITIES

6" Waterlines and 8" Sanitary Sewerlines	De Soto Place	Grande Mesa Road	Cul-de-sac
	Grande Mesa Road	Sawtooth Street	110' East of De Soto Place
	Sawtooth Street	Grande Mesa Road	Deer Lodge Road
	Deer Lodge Road	Sawtooth Street	140' West of Manistee Street
	Coconino Road	Pike Street	Sawtooth Street
	Tract B	Grand Mesa Road	Oceola Road
8" Waterline	Pike Street	Coconino Road	Southern Boulevard

ITEM	LOCATION	FROM	TO
STORM DRAIN			
60" RCP Storm Drain	Tract D	Elizabeth Street	Humbolt Street
54" RCP Storm Drain	Buffalo River Rd.	Humbolt Street	Deschutes St.
48" RCP Storm Drain	Buffalo River Rd.	Deschutes St.	Tract C
48" RCP Storm Drain	Tract C	Buffalo River Rd.	Sawtooth Street
48" RCP Storm Drain	Sawtooth Street	Tract C	Grande Mesa Road
48" RCP Storm Drain	Grande Mesa Road	Sawtooth Street	Tract B
36" RCP Storm Drain	Tract B	Grande Mesa Road	Unit 5/ Unit4 Phase line
36" RCP Storm Drain	Sawtooth Street	Tract C	Deer Lodge Road
24" RCP Storm Drain	Deer Lodge Road	Sawtooth Street	Unit 3/ Unit4 Phase line
30" RCP Storm Drain	Grande Mesa Road	Sawtooth Street	Unit 3/ Unit4 Phase line

Retaining Walls throughout the Subdivision.
Grading and Drainage Certification is required prior to release of Financial Guarantees.

UNIT 5			
PAVING			
28' Residential paving, standard curb and gutter, 4' sidewalk (both sides)	Ozark Street Tony Sanchez Street Oceola Street	Oceola Street Ozark Street Ozark Street	Tony Sanchez Street Herman Roser Avenue Elizabeth Street
20' Residential paving, standard curb & gutter, 6' sidewalk (north and east side only), 4' Temp. Paving	Elizabeth Street	Tony Sanchez Street	130' north of Oceola Street

$360.00 Per lot contribution for future off-site regional transportation improvements, see note (5).

ITEM	LOCATION	FROM	TO
UTILITIES			
6" Waterlines and 8" Sanitary Sewerlines	Ozark Street Tony Sanchez Street Oceola Street	Oceola Street Ozark Street Ozark Street	Tony Sanchez Street Herman Roser Avenue Elizabeth Street
10" Waterlines and 8" Sanitary Sewerline	Elizabeth Street	Tony Sanchez Street	130' north of Oceola Street
STORM DRAIN			
36" RCP Storm Drain 36" RCP Storm Drain 36" RCP Storm Drain	Tract B Ozark Street Tract A	Unit 5/ Unit4 Phase line Tract B Ozark Street	Ozark Street Tract A Unit 1/ Unit 5 Phase Line
30" RCP Storm Drain 24" RCP Storm Drain	Tract G-2 Easement Elizabeth St.	Eubank Storm Drain Tract G-2	Elizabeth Rd. Oceola Rd.

Retaining Walls throughout the Subdivision.
Grading and Drainage Certification is required prior to release of Financial Guarantees.

UNIT 6			
PAVING			
28' Residential paving, standard curb and gutter, 4' sidewalk (both sides)	Humbolt Street Kaibab Road Talladega Street Colville Road	Colville Road Colville Road Kaibab Road Elizabeth Street	230' northwest Talladega Street 100' north of Buffalo River Rd. Kaibab Road
20' Residential paving, standard curb & gutter, 6' sidewalk (north and east side only), 4' Temp. Paving	Elizabeth Street	130' north of Oceola St.	250' northwest of Colville Rd.

ITEM	LOCATION	FROM	TO
$360.00 Per lot contribution for future off-site regional transportation improvements, see note (5).			
UTILITIES			
6" Waterlines and 8" Sanitary Sewerline	Humbolt Street Kaibab Road Talladega Street Colville Road	Colville Road Colville Road Kaibab Road Elizabeth Street	230' northwest Talladega Street 100' north of Buffalo River Rd. Kaibab Road
8" Sanitary Sewerline	Humbolt Street Tract D Elizabeth Street	230' northwest Colville Rd. Humbolt Street Tract D	Tract D Elizabeth Street Public Utility Easement Tract G-2, Manzano Mesa
8" Sanitary Sewerline	Public Utility Easement Tract G-2, Manzano Mesa	Elizabeth Street	Chiricahua Street, Willow Wood Subd., Unit 5
10" Waterline	Elizabeth Street	130' north of Oceola St.	250' northwest of Colville Rd.
STORM DRAIN			
Retaining Walls throughout the Subdivision.			
Grading and Drainage Certification is required prior to release of Financial Guarantees			
UNIT 7			
PAVING			
28' Residential paving, standard curb & gutter, 4' sidewalk (both sides)	Buffalo River Road Deschutes St. Lassen Court Talladega Street Coconino Road	140' west of Deschutes St. Buffalo River Road Buffalo River Road 100' north of Buffalo River Rd. 140' west of Deschutes St.	Talladega Street 125' north of Coconino Rd. Cul-de-sac Coconino Road 100' east of Talladega Street
$360.00 Per lot contribution for future off-site regional transportation improvements, see note (5).			

ITEM	LOCATION	FROM	TO
UTILITIES			
6" Waterlines and 8" Sanitary Sewerline	Buffalo River Road Deschutes St. Lassen Court Talladega Street Coconino Road	140' west of Deschutes St. Buffalo River Road Buffalo River Road 100' north of Buffalo River Rd. 140' west of Deschutes St.	Talladega Street 125' north of Coconino Rd. Cul-de-sac Coconino Road 100' east of Talladega Street
8" Sanitary Sewerline	Buffalo River Road	140' west of Deschutes St.	Humbolt Street
STORM DRAIN			
42" RCP Storm Drain	Coconino Rd.	Elizabeth St.(Eubank SD)	Humbolt Street
30" RCP Storm Drain	Coconino Rd.	Humbolt	100 ft. east
30" RCP Storm Drain	Humbolt St.	Coconino Rd.	100 ft. north

Retaining Walls throughout the Subdivision.
Grading and Drainage Certification is required prior to release of Financial Guarantees

UNIT 8			
PAVING			
28' Residential paving, *mountable or standard curb & gutter, 4' sidewalk (both sides)	Coconino Road Humbolt Street Deer Lodge Place Deschutes Street	140' west of Deschutes St. 100' south of Coconino Rd. Humbolt Street 120' south of Deer Lodge Place	Humbolt Street Deer Lodge Place Cul-de-sac Deer Lodge Place

$360.00 Per lot contribution for future off-site regional transportation improvements, see note (5).

UTILITIES			
6" Waterlines and 8" Sanitary Sewerline	Coconino Road Humbolt Street Deer Lodge Place Deschutes Street	140' west of Deschutes St. 100' south of Coconino Rd. Humbolt Street 120' south of Deer Lodge Place	Humbolt Street Deer Lodge Place Cul-de-sac Deer Lodge Place

ITEM	LOCATION	FROM	TO
8" Sanitary Sewerline	Humbolt Street	100' south of Coconino Rd.	Tract D
8" Waterline	Tract E	Elizabeth Street	Humbolt Street

STORM DRAIN
Retaining Walls throughout the Subdivision.
Grading and Drainage Certification is required prior to release of Financial Guarantees.

UNIT 9

PAVING

28' Residential paving, *mountable or standard curb & (both sides)	Humbolt Street Buffalo River Road Winema Court	100' south of Coconino Road Humbolt Street Buffalo River Road	230' northwest of Colville Rd. 140' west of Deschutes St. Cul-de-sac
20' Residential paving, standard curb & gutter, 6' sidewalk (north and east side only), 4' Temp. Paving	Elizabeth Street	Southern Boulevard	250' northwest of Colville Rd.
12' Residential Paving, Left-Turn Lane, north bound to west bound	Elizabeth Street	Southern Boulevard	250' south of Southern Blvd.

$360.00 Per lot contribution for future off-site regional transportation improvements, see note (5).

UTILITIES

6" Waterlines and 8" Sanitary Sewerline	Humbolt Street Buffalo River Road Winema Court	100' south of Coconino Road Humbolt Street Buffalo River Road	230' northwest of Colville Rd. 140' west of Deschutes St. Cul-de-sac
10" Waterlines	Elizabeth Street	Southern Boulevard	250' northwest of Colville Rd.

ITEM	LOCATION	FROM	TO

STORM DRAIN

Retaining Walls throughout the Subdivision.

Grading and Drainage Certification is required prior to release of Financial Guarantees.

NOTES:

(1) Waterlines include valves, fittings and services.
(2) Sanitary Sewerlines include manholes and services.
(3) Storm drains include manholes, inlets, connector pipes and outlet structures.
(4) Paving includes street lights and sidewalks.
(5) Per lot assessments for off-site improvements not required if Impact Fees are applied.

Figure II, EXHIBIT "D"
to the Subdivision Improvements Agreement
DEVELOPMENT REVIEW BOARD
REQUIRED INFRASTRUCTURE LISTING
for WILLOW WOOD NORTH SUBDIVISION
UNITS 1 THROUGH 9

D.R.B. Case No. 97-209
S-97-
D.R.C. Project No. _____

Approved on _____, by the Development Review Board

_____
Planning Department — Date

_____
Utility Development Division, City Engineer — Date

_____
Transportation Development Division, Traffic Engineer — Date

_____
Design and Development, CIP — Date

_____
City Engineer/AMAFCA — Date

SUMMARY OF STREET HYDRAULICS

ANALYSIS POINT	Q_{10} (CFS)	d_{10} X V_{10}	Q_{100} (CFS)	FLOW AREA (sq. ft)	d_{100} (ft)	V_{100} (ft/s)	E_{100} (ft)	Comments
AP-11.0	16.87	1.22	28.69	8.74	0.53	3.28	0.70	Energy is acceptable to AP-7.0 to reduce build costs
AP-07.0			28.00	7.72	0.50	3.63	0.70	Energy is acceptable to AP-7.1 to reduce build costs
AP-07.1			26.00	7.38	0.48	3.52	0.67	
AP-07.2			15.20	4.89	0.39	3.11	0.54	
AP-27.0			23.20	7.67	0.49	3.02	0.63	
AP-45.0			26.20	7.93	0.51	3.30	0.68	
AP-45.P1			49.40	SUMP CONDITION FLOW DEPTH = 0.33'				100% of flow routed to storm sewer
AP-33.0			41.00	11.37	0.62	3.61	0.82	Energy is acceptable to AP-29.0 to reduce build costs
AP-29.0			23.40	8.08	0.51	2.90	0.64	
AP-29.1			26.20	7.65	0.49	3.42	0.67	
AP-25.0			24.00	5.79	0.43	4.15	0.70	Energy is acceptable
AP-25.1			24.00	5.98	0.43	4.01	0.68	Energy is acceptable
AP-23.0			24.00	7.90	0.50	3.04	0.64	Energy is acceptable
AP-21.0			7.00	4.69	0.39	1.49	0.42	Energy is acceptable
AP-39.0			38.00	10.85	0.61	3.50	0.80	
AP-39.1			18.00	6.93	0.47	2.60	0.57	
AP-13.0			10.40	5.71	0.42	1.82	0.47	
AP-13.1			6.20	3.88	0.36	1.60	0.40	
AP-19.1			16.60	6.56	0.45	2.53	0.55	
AP-19.0			4.00	6.15	0.44	0.65	0.45	
AP-39.2			29.00	SUMP CONDITION FLOW DEPTH = 0.67'				100% of flow routed to storm sewer
AP-55.0			19.00	5.28	0.55	3.60	0.75	Flow is concentrated on right side of roadway.
AP-49.0			19.00	6.79	0.45	2.80	0.57	
AP-37.1			24.00	7.50	0.47	3.20	0.63	
AP-37.2			33.00	SUMP CONDITION FLOW DEPTH = 0.46'				100% of flow routed to storm sewer
AP-01.0			2.00	1.38	0.25	1.50	0.29	
AP-17.0			4.00	2.22	0.29	1.80	0.34	

E:\WWNORTH\HYD\STREET.XLS

HYROLOGIC SUMMARY TABLE

Willow Wood North

	Area		UNDEVELOPED CONDITIONS Land Treatments						DEVELOPED CONDITIONS Land Treatments						
Basin	(Acres)	(sq. mi)	% Type A	% Type B	% Type C	% Type D	Yield (cfs/acre)	Peak Flow (cfs)	% Type A	% Type B	% Type C	% Type D	Runoff Volume (acre-ft)	Yield (cfs/acre)	Peak Flow (cfs)
1	0.57	0.0009	100	0	0	0	1.8700	1.07	0	28	9.5	62.5	0.0878	4.2105	2.40
3	4.55	0.0071	100	0	0	0	1.8700	8.51	12.5	25	12.5	50	0.6211	3.8110	17.34
5	3.63	0.0057	100	0	0	0	1.8700	6.79	12.5	25	12.5	50	0.4955	3.8099	13.83
7	4.14	0.0065	100	0	0	0	1.8700	7.74	12.5	25	12.5	50	0.5652	3.8116	15.78
9	4.52	0.0071	100	0	0	0	1.8700	8.45	12.5	25	12.5	50	0.6170	3.8097	17.22
11	7.53	0.0118	100	0	0	0	1.8700	14.08	12.5	25	12.5	50	1.0279	3.8101	28.69
13	3.12	0.0049	100	0	0	0	1.8700	5.83	12.5	25	12.5	50	0.4259	3.8077	11.88
15	4.16	0.0065	100	0	0	0	1.8700	7.78	12.5	25	12.5	50	0.5679	3.8101	15.85
17	0.88	0.0014	100	0	0	0	1.8700	1.65	0	2	13	85	0.1604	4.8068	4.23
19	3.38	0.0053	100	0	0	0	1.8700	6.32	12.5	25	12.5	50	0.4614	3.8107	12.88
21	3.66	0.0057	100	0	0	0	1.8700	6.84	12.5	25	12.5	50	0.4996	3.8115	13.95
23	3.53	0.0055	100	0	0	0	1.8700	6.60	12.5	25	12.5	50	0.4819	3.8159	13.47
25	6.39	0.0100	100	0	0	0	1.8700	11.95	12.5	25	12.5	50	0.8723	3.8075	24.33
27	2.02	0.0032	100	0	0	0	1.8700	3.78	12.5	25	12.5	50	0.2758	3.8218	7.72
29	5.23	0.0082	100	0	0	0	1.8700	9.78	12.5	25	12.5	50	0.7140	3.8088	19.92
33	5.59	0.0087	100	0	0	0	1.8700	10.45	12.5	25	12.5	50	0.7631	3.8086	21.29
35	5.36	0.0084	100	0	0	0	1.8700	10.02	12.5	25	12.5	50	0.7317	3.8116	20.43
37	1.69	0.0026	100	0	0	0	1.8700	3.16	0	0	13.5	86.5	0.3114	4.8166	8.14
39	3.31	0.0052	100	0	0	0	1.8700	6.19	12.5	25	12.5	50	0.4519	3.8097	12.61
41	3.64	0.0057	100	0	0	0	1.8700	6.81	12.5	25	12.5	50	0.4969	3.8132	13.88
43	6.37	0.0100	100	0	0	0	1.8700	11.91	12.5	25	12.5	50	0.8696	3.8085	24.26
45	2.67	0.0042	100	0	0	0	1.8700	4.99	12.5	25	12.5	50	0.3645	3.8127	10.18
47	6.73	0.0105	100	0	0	0	1.8700	12.59	12.5	25	12.5	50	0.9187	3.8113	25.65
49	5.04	0.0079	100	0	0	0	1.8700	9.42	12.5	25	12.5	50	0.6880	3.8135	19.22
51	5.21	0.0081	100	0	0	0	1.8700	9.74	12.5	25	12.5	50	0.7112	3.8100	19.85
53	1.52	0.0024	100	0	0	0	1.8700	2.84	0	31	8.5	60.5	0.2288	4.1250	6.27
55	3.83	0.0060	100	0	0	0	1.8700	7.16	12.5	25	12.5	50	0.5228	3.8094	14.59
57	7.54	0.0118	100	0	0	0	1.8700	14.10	12.5	25	12.5	50	1.0293	3.6764	27.72
APS	12.91	0.0202	100	0	0	0	1.8700	24.14	N/A	N/A	N/A	N/A	N/A	4.0200	51.90 (1)
SUMS	128.72	0.2011						240.71							495.48

E:\WWNORTH\HYD\SUMMARY.XLS

NOTE: (1) HYROLOGY PER WILLOW WOOD DRAINAGE REPORT.

FILE: SUMMARY.XLS

WILLOW WOOD NORTH
STORM DRAIN ANALYSIS - MANNING'S METHOD

Analysis Segment			Pipe Flow (cfs)	Segment Length (ft)	Change in Elevation (ft)	Segment Slope	K	Calculated d (ft)	Pipe Size (ft)	Pipe Size (in)	Normal Depth (ft)	Normal Depth (in)	% Pipe in Flow
MAIN STORM SEWER													
AP-45.P2	TO	AP-25.0	132	329	4.00	0.012	1197.1	3.74	4.00	48.0	2.8	34	70%
AP-25.0	TO	AP-25.1	132	268	5.00	0.019	966.4	3.45	4.00	48.0	2.4	29	60%
AP-25.1	TO	AP-23.0	132	302	5.00	0.017	1025.9	3.53	3.50	48.0	2.9	35	73%
AP-23.0	TO	AP-21.0	146	267	2.40	0.009	1539.9	4.11	4.50	54.0	3.0	36	67%
AP-21.0	TO	AP-39.2	177	200	2.76	0.014	1506.7	4.07	4.50	54.0	2.9	35	64%
AP-19.0	TO	AP-39.2	19	240	3.92	0.016	148.7	1.71	2.00	24.0	1.2	14	60%
AP-39.1	TO	AP-39.2	28	227	2.10	0.009	291.1	2.20	2.50	30.0	1.6	19	64%
AP-39.2	TO	AP-37.2	224	164	2.50	0 015	1814.3	4.37	5.00	60.0	3.1	37	62%
DEER LODGE RD. TO SAWTOOTH													
AP-07.0	TO	AP-07.1	18	230	2.50	0.011	172.6	1.81	2.00	24.0	1.3	16	65%
AP-07.1	TO	AP-07.2	36	173	2.00	0.012	334.8	2.32	2.50	30.0	1.7	20	68%
AP-07.2	TO	AP-27.0	47	450	3.40	0.008	540.7	2.77	3.00	36.0	2.0	24	67%
GRANDE MESA RD. TO SAWTOOTH													
AP-29.0	TO	AP-29.1	18	188	1.69	0.009	189.8	1.87	2.50	30.0	1.3	16	52%
AP-29.1	TO	AP-45.P1	35	56	0.40	0.007	414.1	2.51	3.00	36.0	1.7	20	57%
AP-45.P1	TO	AP-45.0	85	380	3.00	0.008	956.6	3.43	4.00	48.0	2.0	24	50%
OZARK ST. TO GRANDE MESA RD.													
AP-49.0	TO	AP-45.P1	48	618	4.55	0.007	559.4	2.81	3.00	36.0	2.1	25	70%
HUMBOLT ST. AND COCONIMO RD.													
AP-13.0	TO	AP-13.P1	32	56	0.58	0.010	314.4	2.26	2.50	30.0	1.7	20	68%
AP-13.1	TO	AP-13.P1	28	110	1.68	0.015	226.6	2.00	2.50	30.0	1.3	16	52%
AP-13.P1	TO	AP-01.0	60	146	1.42	0.010	608.4	2.90	3.50	42.0	2.0	24	57%
ELIZABETH ST. FROM TONY SANCHEZ TO AP-37.2													
AP-49.0	TO	AP-37.1	20	610	7.20	0.012	184.1	1.85	2.00	24.0	1.4	17	70%
AP-37.1	TO	AP-37.2	28	404	5.10	0.013	249.2	2.07	2.50	30.0	1.4	17	56%

E:/WWNORTH/HYD/PIPESIZEF.XLS

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January 1994 RUN DATE (MON/DAY/YR) =04/15/1997
INPUT F = E:\WWNORTH\HYD\HYM100.IN USER NO.= AVID__NM.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										
RAINFALL TYPE= 1										TIME= .00
										RAIN6= 2.600
*S ADD BASINS 11 AND 9 TOGETHER AND ROUTE TO STORM SEWER AT AP-9										
COMPUTE NM HYD	11.00	-	1	.01177	28.69	1.028	1.63814	1.500	3.809	PER IMP= 50.00
COMPUTE NM HYD	9.00	-	2	.00706	17.22	.617	1.63814	1.500	3.811	PER IMP= 50.00
ADD HYD	45.20	1& 2	3	.01883	45.91	1.645	1.63812	1.500	3.810	
*S STORM SEWER FLOW AT AP-9										
ROUTE	9.10	3	41	.01883	44.79	1.645	1.63814	1.533	3.717	
*S ADD BASINS 7 AND 27 TOGETHER AND ROUTE TO AP-45 VIA SURFACE FLOW										
COMPUTE NM HYD	7.00	-	1	.00647	15.78	.565	1.63814	1.500	3.811	PER IMP= 50.00
COMPUTE NM HYD	27.00	-	2	.00316	7.72	.276	1.63815	1.500	3.816	PER IMP= 50.00
*S SURFACE FLOW AT AP-45 DUE TO BASIN 7 AND 27										
ADD HYD	27.00	1& 2	3	.00963	23.50	.841	1.63809	1.500	3.812	
*S ADD BASINS 35 AND 33 TOGETHER AND ROUTE TO STORM SEWER AT AP-33										
COMPUTE NM HYD	35.00	-	1	.00838	20.43	.732	1.63814	1.500	3.810	PER IMP= 50.00
COMPUTE NM HYD	33.00	-	2	.00873	21.29	.763	1.63814	1.500	3.810	PER IMP= 50.00
ADD HYD	35.00	1& 2	4	.01711	41.72	1.495	1.63811	1.500	3.810	
*S STORM SEWER FLOW AT AP-33										
ROUTE	29.10	4	42	.01711	41.34	1.495	1.63817	1.500	3.775	
COMPUTE NM HYD	29.00	-	1	.00817	19.92	.714	1.63814	1.500	3.810	PER IMP= 50.00
*S ADD BASINS 29 AND 45 AND ROUTE TO AP-45 VIA SURFACE FLOW										
COMPUTE NM HYD	45.00	-	2	.00417	10.18	.364	1.63814	1.500	3.813	PER IMP= 50.00
ADD HYD	45.10	1& 2	4	.01234	30.10	1.078	1.63810	1.500	3.811	
*S TOTAL SURFACE FLOW AT AP-45										
ADD HYD	45.10	3& 4	6	.02197	53.59	1.919	1.63810	1.500	3.812	
*S ADD BASINS 51 AND 57 AND ROUTE TO AP-29 VIA STORM SEWER										
COMPUTE NM HYD	51.00	-	1	.00814	19.85	.711	1.63814	1.500	3.810	PER IMP= 50.00
COMPUTE NM HYD	57.00	-	2	.01178	28.72	1.029	1.63814	1.500	3.809	PER IMP= 50.00
ADD HYD	57.00	1& 2	5	.01992	48.56	1.740	1.63812	1.500	3.809	
ROUTE	42.00	5	43	.01992	47.65	1.740	1.63814	1.533	3.737	
ADD HYD	29.10	42&43	43	.03703	88.63	3.235	1.63813	1.533	3.740	
ROUTE	45.30	43	42	.03703	89.22	3.235	1.63815	1.533	3.765	
*S ADD STORM SEWER FLOWS FROM BASINS 9, 11, 35, 33, 51 AND 57										
ADD HYD	45.40	41&42	41	.05586	134.01	4.880	1.63813	1.533	3.749	
*S ADD SUFRACE FLOWS TO STORM SEWER FLOWS AT AP-45										
ADD HYD	45.F	41& 6	41	.07783	185.68	6.800	1.63812	1.533	3.728	
*S TOTAL STORM SEWER FLOWS AT AP-45										
ROUTE	45.F	41	40	.07783	185.95	6.800	1.63813	1.533	3.733	
*S SURFACE FLOW FROM BASIN 25										
COMPUTE NM HYD	25.00	-	13	.00998	24.33	.872	1.63814	1.500	3.809	PER IMP= 50.00
*S SURFACE FLOW FROM BASIN 23 TO INLET 33										
COMPUTE NM HYD	23.00	-	1	.00552	13.47	.482	1.63815	1.500	3.811	PER IMP= 50.00
*S STORM SEWER FLOW FROM INLET 33 TO MAIN STORM SEWER AT AP-33										
ROUTE	23.10	1	41	.00552	13.48	.482	1.63819	1.500	3.816	
ADD HYD	23.F	40&41	42	.08335	199.00	7.282	1.63812	1.533	3.730	
*S MAIN STORM SEWER FLOW AT AP-33										
ROUTE	23.F	42	40	.08335	198.67	7.282	1.63813	1.533	3.724	

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 SURFACE FLOW FROM BASIN 21 TO INLET 21										
COMPUTE NM HYD	21.00	-	1	.00572	13.95	.500	1.63814	1.500	3.811	PER IMP= 50.00
*S STORM SEWER FLOW FROM BASIN 21 TO MAIN STORM SEWER AT AP-21										
ROUTE	21.10	1	41	.00572	13.98	.500	1.63818	1.500	3.818	
ADD HYD	21.F	40&41	42	.08907	212.16	7.782	1.63812	1.533	3.722	
*S MAIN STORM SEWER FLOW AT AP-21										
ROUTE	21.F	42	40	.08907	211.89	7.782	1.63812	1.533	3.717	
*S SURFACE FLOW FROM BASIN 19										
COMPUTE NM HYD	19.00	-	4	.00528	12.88	.461	1.63814	1.500	3.812	PER IMP= 50.00
ADD HYD	39.10	3& 4	3	.01526	37.21	1.333	1.63811	1.500	3.810	
*S SURFACE FLOW FROM BASIN 39										
COMPUTE NM HYD	39.00	-	5	.00517	12.61	.452	1.63815	1.500	3.812	PER IMP= 50.00
*S TOTAL SURFACE FLOW AT AP-39 DUE TO BASINS 25, 19 AND 39										
ADD HYD	39.20	3& 5	3	.02043	49.83	1.785	1.63811	1.500	3.811	
COMPUTE NM HYD	43.00	-	1	.00995	24.26	.869	1.63814	1.500	3.809	PER IMP= 50.00
COMPUTE NM HYD	41.00	-	2	.00569	13.88	.497	1.63814	1.500	3.811	PER IMP= 50.00
*S SURFACE FLOW FROM BASINS 41 AND 43 TO INLET 39										
ADD HYD	43.00	1& 2	4	.01564	38.14	1.366	1.63811	1.500	3.810	
*S STORM SEWER FLOW FROM INLET 39 TO AP-39										
ROUTE	39.10	4	42	.01564	37.89	1.366	1.63814	1.500	3.786	
*S STORM SEWER FLOW FROM INLET 39 ADD TO MAIN STORM SEWER AT AP-39										
ADD HYD	39.20	40&42	40	.10471	249.30	9.148	1.63812	1.533	3.720	
*S SURFACE FLOWS ADD TO STORM SEWER AT AP-39										
ADD HYD	39.F	40& 3	42	.12514	297.33	10.933	1.63812	1.533	3.712	
*S TOTAL STORM SEWER FLOW AT AP-39										
ROUTE	39.F	42	40	.12514	297.45	10.933	1.63812	1.533	3.714	
*S ADD BASINS 49, 55, 53 AND 37 TOGETHER AND ROUTE TO AP-37										
COMPUTE NM HYD	49.00	-	1	.00788	19.22	.688	1.63815	1.500	3.810	PER IMP= 50.00
COMPUTE NM HYD	55.00	-	2	.00598	14.59	.522	1.63814	1.500	3.811	PER IMP= 50.00
ADD HYD	49.00	1& 2	3	.01386	33.80	1.211	1.63811	1.500	3.811	
COMPUTE NM HYD	53.00	-	1	.00238	6.27	.229	1.80613	1.500	4.117	PER IMP= 60.50
ADD HYD	49.00	1& 3	3	.01624	40.07	1.440	1.66272	1.500	3.856	
COMPUTE NM HYD	37.00	-	1	.00264	8.14	.311	2.21144	1.500	4.818	PER IMP= 86.50
*S TOTAL SURFACE FLOW AT INLET 37										
ADD HYD	49.00	3& 1	3	.01888	48.21	1.751	1.73943	1.500	3.990	
*S DIVIDE FLOW 37 BY RATIO TO MEET STREET CAPACITY										
*S 90% TO STORM SEWER - 10% REMAINS ON SURFACE										
DIVIDE HYD	4.10	3	4	.01699	43.39	1.576	1.73943	1.500	3.990	
	37.10	AND	3	.00189	4.82	.175	1.73943	1.500	3.990	
*S STORM SEWER FLOW FROM INLET 37 TO AP-37										
ROUTE	37.P	4	41	.01699	42.98	1.576	1.73946	1.500	3.952	
*S ADD SURFACE FLOWS FROM BASIN 1 AND 17 AND ROUTE TO AP-37										
COMPUTE NM HYD	1.00	-	1	.00089	2.40	.088	1.84817	1.500	4.221	PER IMP= 62.50
COMPUTE NM HYD	17.00	-	2	.00138	4.23	.161	2.18703	1.500	4.787	PER IMP= 85.00
*S TOTAL SURFACE FLOW FROM BASINS 1 AND 17 AT AP-37										
ADD HYD	17.10	1& 2	2	.00227	6.63	.249	2.05395	1.500	4.565	
*S TOTAL STREET FLOW AP-37										
ADD HYD	37.10	3& 2	3	.00416	11.45	.424	1.91108	1.500	4.304	

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 ADD PIPE FLOW FROM INLET 37 TO MAIN PIPE FLOW										
ADD HYD	37.20	40&41	40	.14213	340.03	12.509	1.65023	1.533	3.738	
*S TOTAL STORM SEWER FLOW ENTERING CITY STORM SEWER AT AP-37										
ADD HYD	40.F	40& 3	40	.14629	351.00	12.933	1.65764	1.533	3.749	
*S ADD BASINS 5 AND 3 TOGETHER AND ROUTE TO STORM SEWER AT INLET 13.10										
COMPUTE NM HYD	5.00	-	1	.00567	13.83	.495	1.63814	1.500	3.811	PER IMP= 50.00
COMPUTE NM HYD	3.00	-	2	.00711	17.34	.621	1.63814	1.500	3.811	PER IMP= 50.00
ADD HYD	5.00	1& 2	3	.01278	31.17	1.117	1.63810	1.500	3.811	
*S STORM SEWER FLOW AT INLET 13.10										
ROUTE	3.10	3	43	.01278	31.17	1.117	1.63814	1.500	3.811	
*S ADD BASINS 13 AND 15 TOGETHER AND ROUTE TO STORM SEWER AT INLET 13.20										
COMPUTE NM HYD	15.00	-	1	.00650	15.85	.568	1.63814	1.500	3.811	PER IMP= 50.00
COMPUTE NM HYD	13.00	-	2	.00487	11.88	.425	1.63815	1.500	3.812	PER IMP= 50.00
ADD HYD	13.10	1& 2	3	.01137	27.74	.993	1.63810	1.500	3.811	
*S STORM SEWER FLOW AT INLET 13.20										
ROUTE	13.10	3	44	.01137	27.72	.993	1.63814	1.500	3.810	
*S ADD PIPE FLOWS AT AP-13 AND ROUTE OUT TO CITY DRAINAGE										
ADD HYD	13.F	44&43	44	.02415	58.90	2.110	1.63811	1.500	3.811	
*S TOTAL STORM SEWER FLOW ENTERING CITY STORM SEWER AT AP-1										
ROUTE	13.F	44	45	.02415	58.82	2.110	1.63814	1.500	3.806	
*S SURFACE FLOW FROM BASIN 47: ACCOUNTED FOR IN PREVIOUS PHASE										
COMPUTE NM HYD	47.00	-	23	.01052	25.65	.919	1,63814	1.500	3.809	PER IMP= 50.00
*S INTERNAL CHECK TOTAL FLOWS FROM AP-37 AND AP-1										
ADD HYD	48.10	40&44	48	.17044	408.01	15.043	1.65487	1.533	3.740	
*S INTERNAL CHECK TOTAL FLOW FROM SUBDIVISION										
ADD HYD	49.F	48&23	49	.18096	432.74	15.962	1.65390	1.533	3.736	
FINISH										

```
AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
   RUN DATE (MON/DAY/YR) = 04/15/1997
   START TIME (HR:MIN:SEC) = 14:48:13     USER NO.= AVID__NM.I01
   INPUT FILE = E:\WWNORTH\HYD\HYM100.IN

*WILLOW WOOD NORTH APRIL 1997
*COMPUTATIONS FOR 6 HR STORM (TYPE 1), ZONE 3, 100 YR STORM
*BASIN AREAS VARY: 50% D, 12.5% C, 25% B, 12.5% A ASSUMED
*FILE: PANTERA/WWNORTH/HYD/HYM100.IN
*
START          TIME=0.0 HR  PUNCH CODE=0
RAINFALL         TYPE=1 (SIX HR STORM)  RAIN QUARTER=0.0 IN
          RAIN ONE=2.14 IN  RAIN SIX=2.60 IN
          RAIN DAY=0.0 IN  DT=0.0333333 HRS

COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
DT =   .033333 HOURS      END TIME =    5.999995 HOURS
  .0000  .0027  .0055  .0084  .0113  .0143  .0173
  .0204  .0236  .0269  .0302  .0337  .0372  .0408
  .0445  .0484  .0523  .0564  .0606  .0649  .0694
  .0741  .0789  .0839  .0892  .0946  .1004  .1063
  .1126  .1193  .1263  .1322  .1385  .1453  .1598
  .1923  .2424  .3143  .4123  .5412  .7056  .9102
 1.1599 1.3908 1.4875 1.5691 1.6417 1.7077 1.7685
 1.8250 1.8777 1.9272 1.9738 2.0177 2.0591 2.0984
 2.1356 2.1709 2.2043 2.2361 2.2663 2.2737 2.2808
 2.2875 2.2939 2.3001 2.3061 2.3118 2.3173 2.3226
 2.3278 2.3328 2.3377 2.3424 2.3470 2.3515 2.3558
 2.3601 2.3643 2.3684 2.3724 2.3763 2.3801 2.3839
 2.3875 2.3911 2.3947 2.3982 2.4016 2.4050 2.4083
 2.4116 2.4148 2.4179 2.4210 2.4241 2.4271 2.4301
 2.4331 2.4360 2.4388 2.4417 2.4445 2.4472 2.4499
 2.4526 2.4553 2.4579 2.4605 2.4631 2.4656 2.4682
 2.4706 2.4731 2.4755 2.4780 2.4803 2.4827 2.4851
 2.4874 2.4897 2.4919 2.4942 2.4964 2.4987 2.5008
 2.5030 2.5052 2.5073 2.5094 2.5115 2.5136 2.5157
 2.5177 2.5198 2.5218 2.5238 2.5258 2.5278 2.5297
 2.5317 2.5336 2.5355 2.5374 2.5393 2.5412 2.5431
 2.5449 2.5468 2.5486 2.5504 2.5522 2.5540 2.5558
 2.5575 2.5593 2.5610 2.5628 2.5645 2.5662 2.5679
 2.5696 2.5713 2.5730 2.5746 2.5763 2.5779 2.5795
 2.5812 2.5828 2.5844 2.5860 2.5876 2.5892 2.5907
 2.5923 2.5939 2.5954 2.5969 2.5985 2.6000

*
*
*
*
*
*S ADD BASINS 11 AND 9 TOGETHER AND ROUTE TO STORM SEWER AT AP-9
*COMPUTE HYDROGRAPH FOR BASINS 11
COMPUTE NM HYD     ID=1  HYD NO=11  DA=0.01177 SQ MI
          %A=12.5  %B=25.0  %C=12.5  %D=50.0
          TP=0.1333 HR
          MASS RAINFALL=-1
```

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 23.234 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 2.1400
AREA = .005885 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .133656HR TP = .133300HR K/TP RATIO = 1.002670 SHAPE CONSTANT, N = 3.520804
UNIT PEAK = 14.209 CFS UNIT VOLUME = .9994 B = 321.84 P60 = 2.1400
AREA = .005885 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=1

– OUTFLOW HYDROGRAPH REACH 11.00

RUNOFF VOLUME = 1.63814 INCHES = 1.0283 ACRE-FEET
PEAK DISCHARGE RATE = 28.69 CFS AT 1.500 HOURS BASIN AREA = .0118 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-11.10
*46' ROW, STD CURB SECTION, S=0.008
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=101.00
CH SLP=0.008 FP SLP=0.008 N=0.017
DIST=46.00
0.000 101.00 4.000 100.92 8.833 100.67
9.000 100.00 11.000 100.13 23.000 100.37
35.000 100.13 37.000 100.00 37.167 100.67
42.000 100.92 46.000 101.00

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.03	1.65
100.11	.17	.18	3.29
100.16	.42	.49	6.87
100.21	.92	1.26	12.16
100.26	1.70	2.76	17.45
100.32	2.75	5.20	22.74
100.37	4.09	8.74	28.03
100.42	5.57	14.56	28.21
100.47	7.06	21.53	28.24
100.53	8.55	29.53	28.26
100.58	10.04	38.49	28.29
100.63	11.52	48.36	28.31
100.68	13.02	58.42	28.89
100.74	14.59	67.62	30.92
100.79	16.27	77.83	32.96

```
                    100.84    18.06    89.07    34.99
                    100.89    19.96   101.40    37.03
                    100.95    21.98   111.96    40.74
                    101.00    24.27   121.98    46.00
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 9
COMPUTE NM HYD     ID=2  HYD NO=9  DA=0.00706 SQ MI
           %A=12.5  %B=25.0  %C=12.5  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK = _13.937   CFS  UNIT VOLUME =   .9985      B =  526.28     P60 = 2.1400
  AREA =     .003530 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

  K =  .133656HR   TP =  .133300HR   K/TP RATIO =  1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  8.5230   CFS  UNIT VOLUME =   .9987      B =  321.84     P60 = 2.1400
  AREA =     .003530 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD        ID=2 CODE=1

                    OUTFLOW HYDROGRAPH REACH    9.00

  RUNOFF VOLUME =    1.63814 INCHES    =      .6168 ACRE-FEET
  PEAK DISCHARGE RATE =     17.22 CFS  AT   1.500 HOURS   BASIN AREA =  .0071 SQ. MI.

*
*
*
*ADD HYDROGRAPHS FOR BASINS 11 AND 9
ADD HYD          ID=3  HYD=45.2  ID I=1  ID II=2
PRINT HYD        ID=3  CODE=1

                    OUTFLOW HYDROGRAPH REACH   45.20

  RUNOFF VOLUME =    1.63812 INCHES    =     1.6451 ACRE-FEET
  PEAK DISCHARGE RATE =     45.91 CFS  AT   1.500 HOURS   BASIN AREA =  .0188 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-9.10
*46' ROW, STD CURB SECTION, S=0.008
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
           MIN ELEV=100.00 MAX ELEV=101.00
```

CH SLP=0.008 FP SLP=0.008 N=0.017
DIST=46.00

0.000 101.00	4.000 100.92	8.833 100.67
9.000 100.00	11.000 100.13	23.000 100.37
35.000 100.13	37.000 100.00	37.167 100.67
42.000 100.92	46.000 101.00	

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.03	1.65
100.11	.17	.18	3.29
100.16	.42	.49	6.87
100.21	.92	1.26	12.16
100.26	1.70	2.76	17.45
100.32	2.75	5.20	22.74
100.37	4.09	8.74	28.03
100.42	5.57	14.56	28.21
100.47	7.06	21.53	28.24
100.53	8.55	29.53	28.26
100.58	10.04	38.49	28.29
100.63	11.52	48.36	28.31
100.68	13.02	58.42	28.89
100.74	14.59	67.62	30.92
100.79	16.27	77.83	32.96
100.84	18.06	89.07	34.99
100.89	19.96	101.40	37.03
100.95	21.98	111.96	40.74
101.00	24.27	121.98	46.00

*COMPUTE FLOW DEPTH IN PIPE
*4' DIA. SECTION, N=0.015, S=0.010
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.010
DIA=4.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.21	.25	.65	1.78
.42	.69	2.83	2.44
.63	1.25	6.59	2.91
.83	1.90	11.85	3.25
1.04	2.60	18.51	3.51
1.25	3.36	26.40	3.71
1.46	4.15	35.38	3.85
1.67	4.96	45.23	3.94
1.88	5.79	55.76	3.99
2.08	6.62	66.73	4.00
2.29	7.45	77.90	4.00
2.50	8.27	89.01	4.00
2.71	9.06	99.77	4.00
2.92	9.82	109.84	4.00
3.13	10.54	118.85	4.00

3.34	11.20	126.35	4.00
3.54	11.77	131.71	4.00
3.75	12.24	133.92	4.00
4.00	12.57	133.92	4.00

COMPUTE TRAVEL TIME ID=41 REACH NO=1 NO VS=1 L=1010 SLP=0.010

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.208	.250	.65	.1073
.417	.695	2.83	.0688
.625	1.255	6.59	.0534
.834	1.898	11.85	.0449
1.042	2.604	18.51	.0395
1.251	3.358	26.40	.0357
1.459	4.146	35.38	.0329
1.668	4.960	45.23	.0308
1.876	5.788	55.76	.0291
2.084	6.621	66.73	.0278
2.293	7.451	77.90	.0268
2.501	8.267	89.01	.0261
2.710	9.062	99.77	.0255
2.918	9.823	109.84	.0251
3.127	10.539	118.85	.0249
3.335	11.195	126.35	.0249
3.544	11.773	131.71	.0251
3.752	12.243	133.92	.0256
4.000	12.566	133.92	.0263

*S STORM SEWER FLOW AT AP-9
ROUTE ID=41 HYD NO=9.10 INFLOW ID=3
PRINT HYD ID=41 CODE=1

OUTFLOW HYDROGRAPH REACH 9.10

RUNOFF VOLUME = 1.63814 INCHES = 1.6451 ACRE-FEET
PEAK DISCHARGE RATE = 44.79 CFS AT 1.533 HOURS BASIN AREA = .0188 SQ. MI.

*
*
*
*S ADD BASINS 7 AND 27 TOGETHER AND ROUTE TO AP-45 VIA SURFACE FLOW
*COMPUTE HYDROGRAPH FOR BASINS 7
COMPUTE NM HYD ID=1 HYD NO=7 DA=0.00647 SQ MI
%A=12.5 %B=25.0 %C=12.5 %D=50.0
TP=0.1333 HR
MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 12.772 CFS UNIT VOLUME = .9985 B = 526.28 P60 = 2.1400
AREA = .003235 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .133656HR TP = .133300HR K/TP RATIO = 1.002670 SHAPE CONSTANT, N = 3.520804
UNIT PEAK = 7.8107 CFS UNIT VOLUME = .9986 B = 321.84 P60 = 2.1400
AREA = .003235 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 7.00

RUNOFF VOLUME = 1.63814 INCHES = .5653 ACRE-FEET
PEAK DISCHARGE RATE = 15.78 CFS AT 1.500 HOURS BASIN AREA = .0065 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-7.10
*46' ROW, STD CURB SECTION, S=0.020
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=101.00
CH SLP=0.020 FP SLP=0.020 N=0.017
DIST=46.00
0.000 101.00 4.000 100.92 8.833 100.67
9.000 100.00 11.000 100.13 23.000 100.37
35.000 100.13 37.000 100.00 37.167 100.67
42.000 100.92 46.000 101.00

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.05	1.65
100.11	.17	.29	3.29
100.16	.42	.78	6.87
100.21	.92	1.99	12.16
100.26	1.70	4.37	17.45
100.32	2.75	8.21	22.74
100.37	4.09	13.82	28.03
100.42	5.57	23.02	28.21
100.47	7.06	34.04	28.24
100.53	8.55	46.69	28.26
100.58	10.04	60.86	28.29
100.63	11.52	76.46	28.31
100.68	13.02	92.37	28.89
100.74	14.59	106.92	30.92
100.79	16.27	123.06	32.96
100.84	18.06	140.84	34.99
100.89	19.96	160.33	37.03
100.95	21.98	177.02	40.74
101.00	24.27	192.86	46.00

```
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 27
COMPUTE NM HYD     ID=2  HYD NO=27  DA=0.00316 SQ MI
            %A=12.5  %B=25.0  %C=12.5  %D=50.0
            TP=0.1333 HR
            MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  6.2379   CFS  UNIT VOLUME =   .9976      B =  526.28     P60 = 2.1400
  AREA =     .001580 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

  K =  .133656HR   TP =  .133300HR   K/TP RATIO =  1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  3.8148   CFS  UNIT VOLUME =   .9967      B =  321.84     P60 = 2.1400
  AREA =     .001580 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD        ID=2 CODE=1

                    OUTFLOW HYDROGRAPH REACH   27.00

  RUNOFF VOLUME =    1.63815 INCHES    =      .2761 ACRE-FEET
  PEAK DISCHARGE RATE =     7.72 CFS  AT   1.500 HOURS   BASIN AREA =   .0032 SQ. MI.

*
*
*S SURFACE FLOW AT AP-45 DUE TO BASIN 7 AND 27
*ADD HYDROGRAPHS FOR BASINS 7 AND 27
ADD HYD          ID=3  HYD=27  ID I=1  ID II=2
PRINT HYD        ID=3  CODE=1

                    OUTFLOW HYDROGRAPH REACH   27.00

  RUNOFF VOLUME =    1.63809 INCHES    =      .8413 ACRE-FEET
  PEAK DISCHARGE RATE =    23.50 CFS  AT   1.500 HOURS   BASIN AREA =   .0096 SQ. MI.

*
*
*
*S ADD BASINS 35 AND 33 TOGETHER AND ROUTE TO STORM SEWER AT AP-33
*COMPUTE HYDROGRAPH FOR BASINS 35
COMPUTE NM HYD     ID=1  HYD NO=35  DA=0.00838 SQ MI
            %A=12.5  %B=25.0  %C=12.5  %D=50.0
            TP=0.1333 HR
            MASS RAINFALL=-1

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

UNIT PEAK = 16.542 CFS UNIT VOLUME = .9987 B = 526.28 P60 = 2.1400
AREA = .004190 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .133656HR TP = .133300HR K/TP RATIO = 1.002670 SHAPE CONSTANT, N = 3.520804
UNIT PEAK = 10.117 CFS UNIT VOLUME = .9990 B = 321.84 P60 = 2.1400
AREA = .004190 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 35.00

RUNOFF VOLUME = 1.63814 INCHES = .7321 ACRE-FEET
PEAK DISCHARGE RATE = 20.43 CFS AT 1.500 HOURS BASIN AREA = .0084 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-35.10
*46' ROW, STD CURB SECTION, S=0.010
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=101.00
CH SLP=0.010 FP SLP=0.010 N=0.017
DIST=46.00
0.000 101.00 4.000 100.92 8.833 100.67
9.000 100.00 11.000 100.13 23.000 100.37
35.000 100.13 37.000 100.00 37.167 100.67
42.000 100.92 46.000 101.00

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.03	1.65
100.11	.17	.21	3.29
100.16	.42	.55	6.87
100.21	.92	1.41	12.16
100.26	1.70	3.09	17.45
100.32	2.75	5.81	22.74
100.37	4.09	9.77	28.03
100.42	5.57	16.27	28.21
100.47	7.06	24.07	28.24
100.53	8.55	33.01	28.26
100.58	10.04	43.03	28.29
100.63	11.52	54.06	28.31
100.68	13.02	65.32	28.89
100.74	14.59	75.61	30.92
100.79	16.27	87.01	32.96
100.84	18.06	99.59	34.99
100.89	19.96	113.37	37.03

```
                    100.95    21.98    125.17    40.74
                    101.00    24.27    136.37    46.00
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 33
COMPUTE NM HYD     ID=2  HYD NO=33  DA=0.00873 SQ MI
           %A=12.5  %B=25.0  %C=12.5  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  17.233   CFS  UNIT VOLUME =   .9988     B =  526.28     P60 = 2.1400
  AREA =     .004365 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

  K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  10.539   CFS  UNIT VOLUME =   .9990     B =  321.84     P60 = 2.1400
  AREA =     .004365 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD          ID=2 CODE=1

                    OUTFLOW HYDROGRAPH REACH   33.00


  RUNOFF VOLUME =    1.63814 INCHES    =      .7627 ACRE-FEET
  PEAK DISCHARGE RATE =     21.29 CFS  AT   1.500 HOURS   BASIN AREA =  .0087 SQ. MI.


*
*
*ADD HYDROGRAPHS FOR BASINS 35 AND 33
ADD HYD            ID=4  HYD=35  ID I=1  ID II=2
PRINT HYD          ID=4  CODE=1

                    OUTFLOW HYDROGRAPH REACH   35.00

  RUNOFF VOLUME =    1.63811 INCHES    =     1.4948 ACRE-FEET
  PEAK DISCHARGE RATE =     41.72 CFS  AT   1.500 HOURS   BASIN AREA =  .0171 SQ. MI.


*
*
*
*COMPUTE FLOW DEPTH AT AP-33.10
*46' ROW, STD CURB SECTION, S=0.012
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
           MIN ELEV=100.00 MAX ELEV=101.00
           CH SLP=0.012  FP SLP=0.012  N=0.017
           DIST=46.00
           0.000 101.00    4.000 100.92    8.833 100.67
```

9.000 100.00 11.000 100.13 23.000 100.37
35.000 100.13 37.000 100.00 37.167 100.67
42.000 100.92 46.000 101.00

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.04	1.65
100.11	.17	.23	3.29
100.16	.42	.60	6.87
100.21	.92	1.54	12.16
100.26	1.70	3.38	17.45
100.32	2.75	6.36	22.74
100.37	4.09	10.71	28.03
100.42	5.57	17.83	28.21
100.47	7.06	26.36	28.24
100.53	8.55	36.16	28.26
100.58	10.04	47.14	28.29
100.63	11.52	59.22	28.31
100.68	13.02	71.55	28.89
100.74	14.59	82.82	30.92
100.79	16.27	95.32	32.96
100.84	18.06	109.09	34.99
100.89	19.96	124.19	37.03
100.95	21.98	137.12	40.74
101.00	24.27	149.39	46.00

*COMPUTE FLOW DEPTH IN PIPE
*4' DIA. SECTION, N=0.015, S=0.008
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.008
DIA=4.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.21	.25	.58	1.78
.42	.69	2.54	2.44
.63	1.25	5.89	2.91
.83	1.90	10.60	3.25
1.04	2.60	16.55	3.51
1.25	3.36	23.62	3.71
1.46	4.15	31.64	3.85
1.67	4.96	40.45	3.94
1.88	5.79	49.87	3.99
2.08	6.62	59.68	4.00
2.29	7.45	69.68	4.00
2.50	8.27	79.62	4.00
2.71	9.06	89.23	4.00
2.92	9.82	98.24	4.00
3.13	10.54	106.30	4.00
3.34	11.20	113.01	4.00
3.54	11.77	117.81	4.00
3.75	12.24	119.78	4.00

```
                    4.00      12.57     119.78      4.00
COMPUTE TRAVEL TIME ID=42  REACH NO=1  NO VS=1 L=290 SLP=0.008
```

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.208	.250	.58	.0345
.417	.695	2.54	.0221
.625	1.255	5.89	.0172
.834	1.898	10.60	.0144
1.042	2.604	16.55	.0127
1.251	3.358	23.62	.0115
1.459	4.146	31.64	.0106
1.668	4.960	40.45	.0099
1.876	5.788	49.87	.0093
2.084	6.621	59.68	.0089
2.293	7.451	69.68	.0086
2.501	8.267	79.62	.0084
2.710	9.062	89.23	.0082
2.918	9.823	98.24	.0081
3.127	10.539	106.30	.0080
3.335	11.195	113.01	.0080
3.544	11.773	117.81	.0081
3.752	12.243	119.78	.0082
4.000	12.566	119.78	.0085

```
*S STORM SEWER FLOW AT AP-33
ROUTE          ID=42  HYD NO=29.10  INFLOW ID=4
PRINT HYD      ID=42  CODE=1
```

OUTFLOW HYDROGRAPH REACH 29.10

RUNOFF VOLUME = 1.63817 INCHES = 1.4949 ACRE-FEET
PEAK DISCHARGE RATE = 41.34 CFS AT 1.500 HOURS BASIN AREA = .0171 SQ. MI.

```
*
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 29
COMPUTE NM HYD     ID=1  HYD NO=29  DA=0.00817 SQ MI
           %A=12.5  %B=25.0  %C=12.5  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1
```

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 16.128 CFS UNIT VOLUME = .9987 B = 526.28 P60 = 2.1400
AREA = .004085 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .133656HR TP = .133300HR K/TP RATIO = 1.002670 SHAPE CONSTANT, N = 3.520804
UNIT PEAK = 9.8630 CFS UNIT VOLUME = .9990 B = 321.84 P60 = 2.1400
AREA = .004085 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 29.00

RUNOFF VOLUME = 1.63814 INCHES = .7138 ACRE-FEET
PEAK DISCHARGE RATE = 19.92 CFS AT 1.500 HOURS BASIN AREA = .0082 SQ. MI.

*
*
*S ADD BASINS 29 AND 45 AND ROUTE TO AP-45 VIA SURFACE FLOW
*COMPUTE FLOW DEPTH AT AP-29.10
*46' ROW, STD CURB SECTION, S=0.007
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=101.00
CH SLP=0.007 FP SLP=0.007 N=0.017
DIST=46.00
0.000 101.00 4.000 100.92 8.833 100.67
9.000 100.00 11.000 100.13 23.000 100.37
35.000 100.13 37.000 100.00 37.167 100.67
42.000 100.92 46.000 101.00

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.03	1.65
100.11	.17	.17	3.29
100.16	.42	.46	6.87
100.21	.92	1.18	12.16
100.26	1.70	2.58	17.45
100.32	2.75	4.86	22.74
100.37	4.09	8.18	28.03
100.42	5.57	13.62	28.21
100.47	7.06	20.14	28.24
100.53	8.55	27.62	28.26
100.58	10.04	36.00	28.29
100.63	11.52	45.23	28.31
100.68	13.02	54.65	28.89
100.74	14.59	63.26	30.92
100.79	16.27	72.80	32.96
100.84	18.06	83.32	34.99
100.89	19.96	94.85	37.03
100.95	21.98	104.73	40.74
101.00	24.27	114.10	46.00

*
*
*

```
*COMPUTE HYDROGRAPH FOR BASINS 45
COMPUTE NM HYD     ID=2  HYD NO=45  DA=0.00417 SQ MI
            %A=12.5  %B=25.0  %C=12.5  %D=50.0
            TP=0.1333 HR
            MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  8.2317   CFS  UNIT VOLUME =   .9981      B =  526.28     P60 = 2.1400
  AREA =     .002085 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

  K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  5.0341   CFS  UNIT VOLUME =   .9977      B =  321.84     P60 = 2.1400
  AREA =     .002085 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD          ID=2 CODE=1

                    OUTFLOW HYDROGRAPH REACH   45.00

  RUNOFF VOLUME =    1.63814 INCHES    =      .3643 ACRE-FEET
  PEAK DISCHARGE RATE =     10.18 CFS  AT   1.500 HOURS   BASIN AREA =  .0042 SQ. MI.

*
*
*
*ADD HYDROGRAPHS FOR BASINS 29 AND 45
ADD HYD            ID=4  HYD=45.1  ID I=1  ID II=2
PRINT HYD          ID=4  CODE=1

                    OUTFLOW HYDROGRAPH REACH   45.10

  RUNOFF VOLUME =    1.63810 INCHES    =     1.0781 ACRE-FEET
  PEAK DISCHARGE RATE =     30.10 CFS  AT   1.500 HOURS   BASIN AREA =  .0123 SQ. MI.

*
*
*S TOTAL SURFACE FLOW AT AP-45
*ADD HYDROGRAPHS FOR SURFACE FLOWS BASINS 7, 27, 29 AND 45
ADD HYD            ID=6  HYD=45.1  ID I=3  ID II=4
PRINT HYD          ID=6  CODE=1

                    OUTFLOW HYDROGRAPH REACH   45.10

  RUNOFF VOLUME =    1.63810 INCHES    =     1.9194 ACRE-FEET
  PEAK DISCHARGE RATE =     53.59 CFS  AT   1.500 HOURS   BASIN AREA =  .0220 SQ. MI.
```

```
*
*
*
*S ADD BASINS 51 AND 57 AND ROUTE TO AP-29 VIA STORM SEWER
*ADD BASINS 51 AND 57 TOGETHER
*COMPUTE HYDROGRAPH FOR BASINS 51
COMPUTE NM HYD     ID=1  HYD NO=51  DA=0.00814 SQ MI
            %A=12.5  %B=25.0  %C=12.5  %D=50.0
            TP=0.1333 HR
            MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  16.069   CFS  UNIT VOLUME =   .9987     B =  526.28     P60 = 2.1400
  AREA =     .004070 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

  K =  .133656HR   TP =  .133300HR   K/TP RATIO =  1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  9.8268   CFS  UNIT VOLUME =   .9990     B =  321.84     P60 = 2.1400
  AREA =     .004070 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD        ID=1 CODE=1

                    OUTFLOW HYDROGRAPH REACH   51.00


  RUNOFF VOLUME =    1.63814 INCHES    =      .7112 ACRE-FEET
  PEAK DISCHARGE RATE =     19.85 CFS  AT   1.500 HOURS   BASIN AREA =  .0081 SQ. MI.


*
*
*
*
*COMPUTE FLOW DEPTH AT AP-51.10
*46' ROW, STD CURB SECTION, S=0.0125
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
MIN ELEV=100.00 MAX ELEV=101.00
CH SLP=0.0125  FP SLP=0.0125  N=0.017
DIST=46.00
0.000 101.00    4.000 100.92    8.833 100.67
9.000  100.00   11.000 100.13   23.000 100.37
35.000 100.13   37.000 100.00   37.167 100.67
42.000 100.92   46.000 101.00

          RATING CURVE VALLEY SECTION  1.0
            WATER      FLOW      FLOW      TOP
            SURFACE    AREA      RATE      WIDTH
            ELEV      SQ FT     CFS       FT
            100.00     .00       .00       .00
            100.05     .04       .04      1.65
            100.11     .17       .23      3.29
            100.16     .42       .61      6.87
```

100.21	.92	1.57	12.16
100.26	1.70	3.45	17.45
100.32	2.75	6.49	22.74
100.37	4.09	10.93	28.03
100.42	5.57	18.20	28.21
100.47	7.06	26.91	28.24
100.53	8.55	36.91	28.26
100.58	10.04	48.11	28.29
100.63	11.52	60.44	28.31
100.68	13.02	73.02	28.89
100.74	14.59	84.53	30.92
100.79	16.27	97.28	32.96
100.84	18.06	111.34	34.99
100.89	19.96	126.75	37.03
100.95	21.98	139.95	40.74
101.00	24.27	152.47	46.00

```
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 57
COMPUTE NM HYD     ID=2  HYD NO=57  DA=0.01178 SQ MI
            %A=12.5  %B=25.0  %C=12.5  %D=50.0
            TP=0.1333 HR
            MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  23.254   CFS  UNIT VOLUME =   .9989     B =  526.28     P60 = 2.1400
  AREA =     .005890 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333


  K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  14.221   CFS  UNIT VOLUME =   .9994     B =  321.84     P60 = 2.1400
  AREA =     .005890 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD        ID=2 CODE=1

                    OUTFLOW HYDROGRAPH REACH   57.00

  RUNOFF VOLUME =    1.63814 INCHES    =      1.0292 ACRE-FEET
  PEAK DISCHARGE RATE =     28.72 CFS  AT   1.500 HOURS   BASIN AREA =  .0118 SQ. MI.


*
*
*
*COMPUTE FLOW DEPTH AT AP-57.10
*46' ROW, STD CURB SECTION, S=0.011
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
            MIN ELEV=100.00 MAX ELEV=101.00
            CH SLP=0.011  FP SLP=0.011  N=0.017
            DIST=46.00
            0.000 101.00    4.000 100.92    8.833 100.67
```

9.000 100.00 11.000 100.13 23.000 100.37
35.000 100.13 37.000 100.00 37.167 100.67
42.000 100.92 46.000 101.00

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.03	1.65
100.11	.17	.22	3.29
100.16	.42	.58	6.87
100.21	.92	1.47	12.16
100.26	1.70	3.24	17.45
100.32	2.75	6.09	22.74
100.37	4.09	10.25	28.03
100.42	5.57	17.07	28.21
100.47	7.06	25.24	28.24
100.53	8.55	34.62	28.26
100.58	10.04	45.13	28.29
100.63	11.52	56.70	28.31
100.68	13.02	68.50	28.89
100.74	14.59	79.30	30.92
100.79	16.27	91.26	32.96
100.84	18.06	104.45	34.99
100.89	19.96	118.91	37.03
100.95	21.98	131.28	40.74
101.00	24.27	143.03	46.00

*
*
*

*ADD HYDROGRAPHS FOR BASINS 51 AND 57
ADD HYD ID=5 HYD=57 ID I=1 ID II=2
PRINT HYD ID=5 CODE=1

OUTFLOW HYDROGRAPH REACH 57.00

RUNOFF VOLUME = 1.63812 INCHES = 1.7403 ACRE-FEET
PEAK DISCHARGE RATE = 48.56 CFS AT 1.500 HOURS BASIN AREA = .0199 SQ. MI.

*
*
*

*COMPUTE FLOW DEPTH IN PIPE
*4' DIA. SECTION, N=0.015, S=0.006
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.006
DIA=4.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00

.21	.25	.51	1.78
.42	.69	2.20	2.44
.63	1.25	5.10	2.91
.83	1.90	9.18	3.25
1.04	2.60	14.34	3.51
1.25	3.36	20.45	3.71
1.46	4.15	27.40	3.85
1.67	4.96	35.03	3.94
1.88	5.79	43.19	3.99
2.08	6.62	51.69	4.00
2.29	7.45	60.34	4.00
2.50	8.27	68.95	4.00
2.71	9.06	77.28	4.00
2.92	9.82	85.08	4.00
3.13	10.54	92.06	4.00
3.34	11.20	97.87	4.00
3.54	11.77	102.02	4.00
3.75	12.24	103.73	4.00
4.00	12.57	103.73	4.00

COMPUTE TRAVEL TIME ID=43 REACH NO=1 NO VS=1 L=630 SLP=0.006

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.208	.250	.51	.0864
.417	.695	2.20	.0554
.625	1.255	5.10	.0430
.834	1.898	9.18	.0362
1.042	2.604	14.34	.0318
1.251	3.358	20.45	.0287
1.459	4.146	27.40	.0265
1.668	4.960	35.03	.0248
1.876	5.788	43.19	.0235
2.084	6.621	51.69	.0224
2.293	7.451	60.34	.0216
2.501	8.267	68.95	.0210
2.710	9.062	77.28	.0205
2.918	9.823	85.08	.0202
3.127	10.539	92.06	.0200
3.335	11.195	97.87	.0200
3.544	11.773	102.02	.0202
3.752	12.243	103.73	.0207
4.000	12.566	103.73	.0212

* S STORM SEWER FLOW AT AP-57
ROUTE ID=43 HYD NO=42.0 INFLOW ID=5
PRINT HYD ID=43 CODE=1

OUTFLOW HYDROGRAPH REACH 42.00

RUNOFF VOLUME = 1.63814 INCHES = 1.7404 ACRE-FEET
PEAK DISCHARGE RATE = 47.65 CFS AT 1.533 HOURS BASIN AREA = .0199 SQ. MI.

```
*
*
*
*ADD HYDROGRAPHS FOR PIPE FLOWS 42 AND 43 TOGETHER
ADD HYD          ID=43  HYD=29.10  ID I=42  ID II=43
PRINT HYD         ID=43  CODE=1

                    OUTFLOW HYDROGRAPH REACH   29.10

  RUNOFF VOLUME =    1.63813 INCHES    =     3.2352 ACRE-FEET
  PEAK DISCHARGE RATE =     88.63 CFS  AT   1.533 HOURS   BASIN AREA =   .0370 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH IN PIPE
*4' DIA. SECTION, N=0.015, S=0.009
COMPUTE RATING CURVE CID=1  VS NO=1  CODE=-1  SLP=0.009
                          DIA=4.0 FT   N=0.015

                  RATING CURVE PIPE SECTION  1.0
                    WATER      FLOW      FLOW      MAX
                   SURFACE     AREA      RATE      WIDTH
                    ELEV      SQ FT      CFS       FT
                     .00       .00       .00       .00
                     .21       .25       .62      1.78
                     .42       .69      2.69      2.44
                     .63      1.25      6.25      2.91
                     .83      1.90     11.24      3.25
                    1.04      2.60     17.56      3.51
                    1.25      3.36     25.05      3.71
                    1.46      4.15     33.56      3.85
                    1.67      4.96     42.91      3.94
                    1.88      5.79     52.90      3.99
                    2.08      6.62     63.30      4.00
                    2.29      7.45     73.91      4.00
                    2.50      8.27     84.44      4.00
                    2.71      9.06     94.65      4.00
                    2.92      9.82    104.20      4.00
                    3.13     10.54    112.75      4.00
                    3.34     11.20    119.86      4.00
                    3.54     11.77    124.95      4.00
                    3.75     12.24    127.04      4.00
                    4.00     12.57    127.04      4.00
COMPUTE TRAVEL TIME ID=42  REACH NO=1  NO VS=1 L=370 SLP=0.009

                TRAVEL TIME TABLE
                        REACH=  1.0

                WATER     AVERAGE    FLOW      TRAVEL
                DEPTH     AREA       RATE      TIME
```

FEET	SQ.FT.	CFS	HRS
.208	.250	.62	.0414
.417	.695	2.69	.0266
.625	1.255	6.25	.0206
.834	1.898	11.24	.0173
1.042	2.604	17.56	.0152
1.251	3.358	25.05	.0138
1.459	4.146	33.56	.0127
1.668	4.960	42.91	.0119
1.876	5.788	52.90	.0112
2.084	6.621	63.30	.0107
2.293	7.451	73.91	.0104
2.501	8.267	84.44	.0101
2.710	9.062	94.65	.0098
2.918	9.823	104.20	.0097
3.127	10.539	112.75	.0096
3.335	11.195	119.86	.0096
3.544	11.773	124.95	.0097
3.752	12.243	127.04	.0099
4.000	12.566	127.04	.0102

```
* S STORM SEWER FLOW AT AP-9
ROUTE          ID=42  HYD NO=45.30  INFLOW ID=43
PRINT HYD      ID=42  CODE=1

                    OUTFLOW HYDROGRAPH REACH   45.30


  RUNOFF VOLUME =    1.63815 INCHES    =     3.2352 ACRE-FEET
  PEAK DISCHARGE RATE =    89.22 CFS  AT   1.533 HOURS   BASIN AREA =   .0370 SQ. MI.


*
*
*
*S ADD STORM SEWER FLOWS FROM BASINS 9, 11, 35, 33, 51 AND 57
ADD HYD        ID=41  HYD=45.40  ID I=41  ID II=42
PRINT HYD      ID=41  CODE=1

                    OUTFLOW HYDROGRAPH REACH   45.40


  RUNOFF VOLUME =    1.63813 INCHES    =     4.8803 ACRE-FEET
  PEAK DISCHARGE RATE =    134.01 CFS  AT   1.533 HOURS   BASIN AREA =   .0559 SQ. MI.


*
*
*
*S ADD SUFRACE FLOWS TO STORM SEWER FLOWS AT AP-45
ADD HYD        ID=41  HYD=45.F  ID I=41  ID II=6
PRINT HYD      ID=41  CODE=1

                    HYDROGRAPH FROM AREA 45.F
```

RUNOFF VOLUME = 1.63812 INCHES = 6.7997 ACRE-FEET
PEAK DISCHARGE RATE = 185.68 CFS AT 1.533 HOURS BASIN AREA = .0778 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH IN PIPE
*5.0' DIA. SECTION, N=0.015, S=0.016
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.016
DIA=5.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.26	.39	1.50	2.22
.52	1.09	6.50	3.06
.78	1.96	15.11	3.63
1.04	2.97	27.18	4.06
1.30	4.07	42.44	4.39
1.56	5.25	60.56	4.64
1.82	6.48	81.13	4.81
2.08	7.75	103.73	4.93
2.35	9.04	127.87	4.99
2.61	10.35	153.04	5.00
2.87	11.64	178.67	5.00
3.13	12.92	204.15	5.00
3.39	14.16	228.81	5.00
3.65	15.35	251.90	5.00
3.91	16.47	272.57	5.00
4.17	17.49	289.77	5.00
4.43	18.39	302.07	5.00
4.69	19.13	307.13	5.00
5.00	19.63	307.13	5.00

COMPUTE TRAVEL TIME ID=40 REACH NO=1 NO VS=1 L=895 SLP=0.016

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.261	.390	1.50	.0648
.521	1.086	6.50	.0415
.782	1.961	15.11	.0323
1.042	2.966	27.18	.0271
1.303	4.069	42.44	.0238
1.563	5.246	60.56	.0215
1.824	6.479	81.13	.0199
2.084	7.749	103.73	.0186
2.345	9.043	127.87	.0176
2.606	10.345	153.04	.0168

2.866	11.641	178.67	.0162
3.127	12.918	204.15	.0157
3.387	14.159	228.81	.0154
3.648	15.348	251.90	.0151
3.908	16.467	272.57	.0150
4.169	17.492	289.77	.0150
4.429	18.395	302.07	.0151
4.690	19.130	307.13	.0155
5.000	19.635	307.13	.0159

```
*S TOTAL STORM SEWER FLOWS AT AP-45
ROUTE          ID=40  HYD NO=45.F  INFLOW ID=41
PRINT HYD      ID=40  CODE=1

                    HYDROGRAPH FROM AREA 45.F

  RUNOFF VOLUME =    1.63813 INCHES    =     6.7997 ACRE-FEET
  PEAK DISCHARGE RATE =    185.95 CFS  AT   1.533 HOURS   BASIN AREA =   .0778 SQ. MI.

*
*
*
*
*
*S SURFACE FLOW FROM BASIN 25
*COMPUTE HYDROGRAPH FOR BASINS 25
COMPUTE NM HYD     ID=3  HYD NO=25  DA=0.00998 SQ MI
           %A=12.5  %B=25.0  %C=12.5  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  19.701   CFS  UNIT VOLUME =   .9988      B =  526.28      P60 = 2.1400
  AREA =     .004990 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

  K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  12.048   CFS  UNIT VOLUME =   .9992      B =  321.84      P60 = 2.1400
  AREA =     .004990 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD      ID=3 CODE=1

                    OUTFLOW HYDROGRAPH REACH   25.00

  RUNOFF VOLUME =    1.63814 INCHES    =      .8719 ACRE-FEET
  PEAK DISCHARGE RATE =     24.33 CFS  AT   1.500 HOURS   BASIN AREA =   .0100 SQ. MI.

*
*
```

```
*
*COMPUTE FLOW DEPTH AT AP-25.10
*46' ROW, STD CURB SECTION, S=0.017
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
            MIN ELEV=100.00 MAX ELEV=101.00
            CH SLP=0.017  FP SLP=0.017  N=0.017
            DIST=46.00
            0.000 101.00   4.000 100.92   8.833 100.67
            9.000  100.00  11.000 100.13  23.000 100.37
            35.000 100.13  37.000 100.00  37.167 100.67
            42.000 100.92  46.000 101.00
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.04	1.65
100.11	.17	.27	3.29
100.16	.42	.72	6.87
100.21	.92	1.83	12.16
100.26	1.70	4.02	17.45
100.32	2.75	7.57	22.74
100.37	4.09	12.74	28.03
100.42	5.57	21.22	28.21
100.47	7.06	31.38	28.24
100.53	8.55	43.04	28.26
100.58	10.04	56.11	28.29
100.63	11.52	70.49	28.31
100.68	13.02	85.16	28.89
100.74	14.59	98.58	30.92
100.79	16.27	113.45	32.96
100.84	18.06	129.85	34.99
100.89	19.96	147.82	37.03
100.95	21.98	163.20	40.74
101.00	24.27	177.81	46.00

```
*
*
*
*S SURFACE FLOW FROM BASIN 23 TO INLET 33
*COMPUTE HYDROGRAPH FOR BASINS 23
COMPUTE NM HYD     ID=1  HYD NO=23  DA=0.00552 SQ MI
            %A=12.5  %B=25.0  %C=12.5  %D=50.0
            TP=0.1333 HR
            MASS RAINFALL=-1

 K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000   SHAPE CONSTANT, N =  7.106420
 UNIT PEAK =  10.897   CFS  UNIT VOLUME =  .9984     B =  526.28     P60 = 2.1400
 AREA =     .002760 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

 K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670   SHAPE CONSTANT, N =  3.520804
 UNIT PEAK =  6.6639   CFS  UNIT VOLUME =  .9983     B =  321.84     P60 = 2.1400
 AREA =     .002760 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333
```

PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 23.00

RUNOFF VOLUME = 1.63815 INCHES = .4823 ACRE-FEET
PEAK DISCHARGE RATE = 13.47 CFS AT 1.500 HOURS BASIN AREA = .0055 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-23.10
*46' ROW, STD CURB SECTION, S=0.011
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=101.00
CH SLP=0.011 FP SLP=0.011 N=0.017
DIST=46.00
0.000 101.00 4.000 100.92 8.833 100.67
9.000 100.00 11.000 100.13 23.000 100.37
35.000 100.13 37.000 100.00 37.167 100.67
42.000 100.92 46.000 101.00

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.03	1.65
100.11	.17	.22	3.29
100.16	.42	.58	6.87
100.21	.92	1.47	12.16
100.26	1.70	3.24	17.45
100.32	2.75	6.09	22.74
100.37	4.09	10.25	28.03
100.42	5.57	17.07	28.21
100.47	7.06	25.24	28.24
100.53	8.55	34.62	28.26
100.58	10.04	45.13	28.29
100.63	11.52	56.70	28.31
100.68	13.02	68.50	28.89
100.74	14.59	79.30	30.92
100.79	16.27	91.26	32.96
100.84	18.06	104.45	34.99
100.89	19.96	118.91	37.03
100.95	21.98	131.28	40.74
101.00	24.27	143.03	46.00

*COMPUTE FLOW DEPTH IN PIPE
*5.0' DIA. SECTION, N=0.015, S=0.012
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.012
DIA=5.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER	FLOW	FLOW	MAX

SURFACE ELEV	AREA SQ FT	RATE CFS	WIDTH FT
.00	.00	.00	.00
.26	.39	1.30	2.22
.52	1.09	5.63	3.06
.78	1.96	13.09	3.63
1.04	2.97	23.54	4.06
1.30	4.07	36.76	4.39
1.56	5.25	52.44	4.64
1.82	6.48	70.26	4.81
2.08	7.75	89.83	4.93
2.35	9.04	110.74	4.99
2.61	10.35	132.54	5.00
2.87	11.64	154.73	5.00
3.13	12.92	176.79	5.00
3.39	14.16	198.15	5.00
3.65	15.35	218.15	5.00
3.91	16.47	236.05	5.00
4.17	17.49	250.94	5.00
4.43	18.39	261.60	5.00
4.69	19.13	265.98	5.00
5.00	19.63	265.98	5.00

COMPUTE TRAVEL TIME ID=41 REACH NO=1 NO VS=1 L=50 SLP=0.012

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.261	.390	1.30	.0042
.521	1.086	5.63	.0027
.782	1.961	13.09	.0021
1.042	2.966	23.54	.0017
1.303	4.069	36.76	.0015
1.563	5.246	52.44	.0014
1.824	6.479	70.26	.0013
2.084	7.749	89.83	.0012
2.345	9.043	110.74	.0011
2.606	10.345	132.54	.0011
2.866	11.641	154.73	.0010
3.127	12.918	176.79	.0010
3.387	14.159	198.15	.0010
3.648	15.348	218.15	.0010
3.908	16.467	236.05	.0010
4.169	17.492	250.94	.0010
4.429	18.395	261.60	.0010
4.690	19.130	265.98	.0010
5.000	19.635	265.98	.0010

*S STORM SEWER FLOW FROM INLET 33 TO MAIN STORM SEWER AT AP-33
ROUTE ID=41 HYD NO=23.10 INFLOW ID=1
PRINT HYD ID=41 CODE=1

OUTFLOW HYDROGRAPH REACH 23.10

RUNOFF VOLUME = 1.63819 INCHES = .4823 ACRE-FEET
PEAK DISCHARGE RATE = 13.48 CFS AT 1.500 HOURS BASIN AREA = .0055 SQ. MI.

*
*
*
*ADD HYDROGRAPHS FOR BASIN 23 AND PIPE FLOW IN MAIN
ADD HYD ID=42 HYD=23.F ID I=40 ID II=41
PRINT HYD ID=42 CODE=1

HYDROGRAPH FROM AREA 23.F

RUNOFF VOLUME = 1.63812 INCHES = 7.2819 ACRE-FEET
PEAK DISCHARGE RATE = 199.00 CFS AT 1.533 HOURS BASIN AREA = .0834 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH IN PIPE
*5.0' DIA. SECTION, N=0.015, S=0.011
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.011
DIA=5.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.26	.39	1.24	2.22
.52	1.09	5.39	3.06
.78	1.96	12.53	3.63
1.04	2.97	22.54	4.06
1.30	4.07	35.19	4.39
1.56	5.25	50.21	4.64
1.82	6.48	67.27	4.81
2.08	7.75	86.01	4.93
2.35	9.04	106.03	4.99
2.61	10.35	126.89	5.00
2.87	11.64	148.14	5.00
3.13	12.92	169.27	5.00
3.39	14.16	189.72	5.00
3.65	15.35	208.87	5.00
3.91	16.47	226.00	5.00
4.17	17.49	240.26	5.00
4.43	18.39	250.46	5.00
4.69	19.13	254.66	5.00
5.00	19.63	254.66	5.00

COMPUTE TRAVEL TIME ID=40 REACH NO=1 NO VS=1 L=280 SLP=0.011

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.261	.390	1.24	.0244
.521	1.086	5.39	.0157
.782	1.961	12.53	.0122
1.042	2.966	22.54	.0102
1.303	4.069	35.19	.0090
1.563	5.246	50.21	.0081
1.824	6.479	67.27	.0075
2.084	7.749	86.01	.0070
2.345	9.043	106.03	.0066
2.606	10.345	126.89	.0063
2.866	11.641	148.14	.0061
3.127	12.918	169.27	.0059
3.387	14.159	189.72	.0058
3.648	15.348	208.87	.0057
3.908	16.467	226.00	.0057
4.169	17.492	240.26	.0057
4.429	18.395	250.46	.0057
4.690	19.130	254.66	.0058
5.000	19.635	254.66	.0060

```
*S MAIN STORM SEWER FLOW AT AP-33
ROUTE          ID=40  HYD NO=23.F INFLOW ID=42
PRINT HYD      ID=40  CODE=1
```

HYDROGRAPH FROM AREA 23.F

RUNOFF VOLUME = 1.63813 INCHES = 7.2820 ACRE-FEET
PEAK DISCHARGE RATE = 198.67 CFS AT 1.533 HOURS BASIN AREA = .0834 SQ. MI.

```
*
*
*
*S SURFACE FLOW FROM BASIN 21 TO INLET 21
*COMPUTE HYDROGRAPH FOR BASINS 21
COMPUTE NM HYD    ID=1  HYD NO=21  DA=0.00572 SQ MI
          %A=12.5  %B=25.0  %C=12.5  %D=50.0
          TP=0.1333 HR
          MASS RAINFALL=-1
```

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 11.291 CFS UNIT VOLUME = .9984 B = 526.28 P60 = 2.1400
AREA = .002860 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .133656HR TP = .133300HR K/TP RATIO = 1.002670 SHAPE CONSTANT, N = 3.520804
UNIT PEAK = 6.9053 CFS UNIT VOLUME = .9983 B = 321.84 P60 = 2.1400
AREA = .002860 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 21.00

RUNOFF VOLUME = 1.63814 INCHES = .4997 ACRE-FEET
PEAK DISCHARGE RATE = 13.95 CFS AT 1.500 HOURS BASIN AREA = .0057 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-21.10
*46' ROW, STD CURB SECTION, S=0.017
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=101.00
CH SLP=0.017 FP SLP=0.017 N=0.017
DIST=46.00
0.000 101.00 4.000 100.92 8.833 100.67
9.000 100.00 11.000 100.13 23.000 100.37
35.000 100.13 37.000 100.00 37.167 100.67
42.000 100.92 46.000 101.00

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.04	1.65
100.11	.17	.27	3.29
100.16	.42	.72	6.87
100.21	.92	1.83	12.16
100.26	1.70	4.02	17.45
100.32	2.75	7.57	22.74
100.37	4.09	12.74	28.03
100.42	5.57	21.22	28.21
100.47	7.06	31.38	28.24
100.53	8.55	43.04	28.26
100.58	10.04	56.11	28.29
100.63	11.52	70.49	28.31
100.68	13.02	85.16	28.89
100.74	14.59	98.58	30.92
100.79	16.27	113.45	32.96
100.84	18.06	129.85	34.99
100.89	19.96	147.82	37.03
100.95	21.98	163.20	40.74
101.00	24.27	177.81	46.00

*COMPUTE FLOW DEPTH IN PIPE
*5.0' DIA. SECTION, N=0.015, S=0.017
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.017
DIA=5.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE	FLOW AREA	FLOW RATE	MAX WIDTH

ELEV	SQ FT	CFS	FT
.00	.00	.00	.00
.26	.39	1.54	2.22
.52	1.09	6.70	3.06
.78	1.96	15.58	3.63
1.04	2.97	28.02	4.06
1.30	4.07	43.75	4.39
1.56	5.25	62.42	4.64
1.82	6.48	83.63	4.81
2.08	7.75	106.92	4.93
2.35	9.04	131.81	4.99
2.61	10.35	157.75	5.00
2.87	11.64	184.17	5.00
3.13	12.92	210.43	5.00
3.39	14.16	235.85	5.00
3.65	15.35	259.65	5.00
3.91	16.47	280.96	5.00
4.17	17.49	298.68	5.00
4.43	18.39	311.37	5.00
4.69	19.13	316.58	5.00
5.00	19.63	316.58	5.00

COMPUTE TRAVEL TIME ID=41 REACH NO=1 NO VS=1 L=50 SLP=0.017

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.261	.390	1.54	.0035
.521	1.086	6.70	.0023
.782	1.961	15.58	.0017
1.042	2.966	28.02	.0015
1.303	4.069	43.75	.0013
1.563	5.246	62.42	.0012
1.824	6.479	83.63	.0011
2.084	7.749	106.92	.0010
2.345	9.043	131.81	.0010
2.606	10.345	157.75	.0009
2.866	11.641	184.17	.0009
3.127	12.918	210.43	.0009
3.387	14.159	235.85	.0008
3.648	15.348	259.65	.0008
3.908	16.467	280.96	.0008
4.169	17.492	298.68	.0008
4.429	18.395	311.37	.0008
4.690	19.130	316.58	.0008
5.000	19.635	316.58	.0009

*S STORM SEWER FLOW FROM BASIN 21 TO MAIN STORM SEWER AT AP-21
ROUTE ID=41 HYD NO=21.10 INFLOW ID=1
PRINT HYD ID=41 CODE=1

OUTFLOW HYDROGRAPH REACH 21.10

RUNOFF VOLUME = 1.63818 INCHES = .4998 ACRE-FEET

PEAK DISCHARGE RATE = 13.98 CFS AT 1.500 HOURS BASIN AREA = .0057 SQ. MI.

*
*
*
*ADD HYDROGRAPHS FOR BASIN 21 AND PIPE FLOW IN MAIN
ADD HYD ID=42 HYD=21.F ID I=40 ID II=41
PRINT HYD ID=42 CODE=1

HYDROGRAPH FROM AREA 21.F

RUNOFF VOLUME = 1.63812 INCHES = 7.7817 ACRE-FEET
PEAK DISCHARGE RATE = 212.16 CFS AT 1.533 HOURS BASIN AREA = .0891 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH IN PIPE
*5.0' DIA. SECTION, N=0.015, S=0.015
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.015
DIA=5.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.26	.39	1.45	2.22
.52	1.09	6.30	3.06
.78	1.96	14.63	3.63
1.04	2.97	26.32	4.06
1.30	4.07	41.10	4.39
1.56	5.25	58.63	4.64
1.82	6.48	78.56	4.81
2.08	7.75	100.44	4.93
2.35	9.04	123.81	4.99
2.61	10.35	148.18	5.00
2.87	11.64	172.99	5.00
3.13	12.92	197.66	5.00
3.39	14.16	221.54	5.00
3.65	15.35	243.90	5.00
3.91	16.47	263.92	5.00
4.17	17.49	280.56	5.00
4.43	18.39	292.48	5.00
4.69	19.13	297.37	5.00
5.00	19.63	297.37	5.00

COMPUTE TRAVEL TIME ID=40 REACH NO=1 NO VS=1 L=260 SLP=0.015

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.261	.390	1.45	.0194
.521	1.086	6.30	.0125
.782	1.961	14.63	.0097
1.042	2.966	26.32	.0081
1.303	4.069	41.10	.0072
1.563	5.246	58.63	.0065
1.824	6.479	78.56	.0060
2.084	7.749	100.44	.0056
2.345	9.043	123.81	.0053
2.606	10.345	148.18	.0050
2.866	11.641	172.99	.0049
3.127	12.918	197.66	.0047
3.387	14.159	221.54	.0046
3.648	15.348	243.90	.0045
3.908	16.467	263.92	.0045
4.169	17.492	280.56	.0045
4.429	18.395	292.48	.0045
4.690	19.130	297.37	.0046
5.000	19.635	297.37	.0048

*S MAIN STORM SEWER FLOW AT AP-21
ROUTE ID=40 HYD NO=21.F INFLOW ID=42
PRINT HYD ID=40 CODE=1

HYDROGRAPH FROM AREA 21.F

RUNOFF VOLUME = 1.63812 INCHES = 7.7817 ACRE-FEET
PEAK DISCHARGE RATE = 211.89 CFS AT 1.533 HOURS BASIN AREA = .0891 SQ. MI.

*
*
*
*S SURFACE FLOW FROM BASIN 19
*COMPUTE HYDROGRAPH FOR BASINS 19
COMPUTE NM HYD ID=4 HYD NO=19 DA=0.00528 SQ MI
%A=12.5 %B=25.0 %C=12.5 %D=50.0
TP=0.1333 HR
MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 10.423 CFS UNIT VOLUME = .9982 B = 526.28 P60 = 2.1400
AREA = .002640 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .133656HR TP = .133300HR K/TP RATIO = 1.002670 SHAPE CONSTANT, N = 3.520804
UNIT PEAK = 6.3741 CFS UNIT VOLUME = .9981 B = 321.84 P60 = 2.1400
AREA = .002640 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=4 CODE=1

OUTFLOW HYDROGRAPH REACH 19.00

RUNOFF VOLUME = 1.63814 INCHES = .4613 ACRE-FEET
PEAK DISCHARGE RATE = 12.88 CFS AT 1.500 HOURS BASIN AREA = .0053 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-19.10
*46' ROW, STD CURB SECTION, S=0.018
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=101.00
CH SLP=0.018 FP SLP=0.018 N=0.017
DIST=46.00
0.000 101.00 4.000 100.92 8.833 100.67
9.000 100.00 11.000 100.13 23.000 100.37
35.000 100.13 37.000 100.00 37.167 100.67
42.000 100.92 46.000 101.00

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.04	1.65
100.11	.17	.28	3.29
100.16	.42	.74	6.87
100.21	.92	1.89	12.16
100.26	1.70	4.14	17.45
100.32	2.75	7.79	22.74
100.37	4.09	13.11	28.03
100.42	5.57	21.83	28.21
100.47	7.06	32.29	28.24
100.53	8.55	44.29	28.26
100.58	10.04	57.73	28.29
100.63	11.52	72.53	28.31
100.68	13.02	87.63	28.89
100.74	14.59	101.44	30.92
100.79	16.27	116.74	32.96
100.84	18.06	133.61	34.99
100.89	19.96	152.11	37.03
100.95	21.98	167.93	40.74
101.00	24.27	182.97	46.00

*
*
*
*ADD HYDROGRAPHS FOR BASINS 25 AND 19
ADD HYD ID=3 HYD=39.10 ID I=3 ID II=4
PRINT HYD ID=3 CODE=1

OUTFLOW HYDROGRAPH REACH 39.10

```
RUNOFF VOLUME =    1.63811 INCHES    =      1.3332 ACRE-FEET
PEAK DISCHARGE RATE =     37.21 CFS  AT   1.500 HOURS   BASIN AREA =   .0153 SQ. MI.


*
*
*
*S SURFACE FLOW FROM BASIN 39
*COMPUTE HYDROGRAPH FOR BASINS 39
COMPUTE NM HYD     ID=5  HYD NO=39  DA=0.00517 SQ MI
           %A=12.5  %B=25.0  %C=12.5  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
UNIT PEAK =  10.206   CFS  UNIT VOLUME =   .9982      B =  526.28      P60 = 2.1400
AREA =     .002585 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670    SHAPE CONSTANT, N =  3.520804
UNIT PEAK =  6.2413   CFS  UNIT VOLUME =   .9981      B =  321.84      P60 = 2.1400
AREA =     .002585 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD        ID=5 CODE=1

                    OUTFLOW HYDROGRAPH REACH   39.00


RUNOFF VOLUME =    1.63815 INCHES    =       .4517 ACRE-FEET
PEAK DISCHARGE RATE =     12.61 CFS  AT   1.500 HOURS   BASIN AREA =   .0052 SQ. MI.


*
*
*
*COMPUTE FLOW DEPTH AT AP-39.20
*46' ROW, STD CURB SECTION, S=0.008
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
           MIN ELEV=100.00 MAX ELEV=101.00
           CH SLP=0.008  FP SLP=0.008  N=0.017
           DIST=46.00
           0.000 101.00    4.000 100.92    8.833 100.67
           9.000  100.00   11.000 100.13   23.000 100.37
           35.000 100.13   37.000 100.00   37.167 100.67
           42.000 100.92   46.000 101.00

                RATING CURVE VALLEY SECTION  1.0
                  WATER      FLOW      FLOW      TOP
                 SURFACE     AREA      RATE      WIDTH
                  ELEV      SQ FT      CFS       FT
                 100.00      .00       .00       .00
```

100.05	.04	.03	1.65
100.11	.17	.18	3.29
100.16	.42	.49	6.87
100.21	.92	1.26	12.16
100.26	1.70	2.76	17.45
100.32	2.75	5.20	22.74
100.37	4.09	8.74	28.03
100.42	5.57	14.56	28.21
100.47	7.06	21.53	28.24
100.53	8.55	29.53	28.26
100.58	10.04	38.49	28.29
100.63	11.52	48.36	28.31
100.68	13.02	58.42	28.89
100.74	14.59	67.62	30.92
100.79	16.27	77.83	32.96
100.84	18.06	89.07	34.99
100.89	19.96	101.40	37.03
100.95	21.98	111.96	40.74
101.00	24.27	121.98	46.00

```
*
*
*
*S TOTAL SURFACE FLOW AT AP-39 DUE TO BASINS 25, 19 AND 39
*ADD HYDROGRAPHS FOR BASINS 25, 19 AND 39 TOGETHER
ADD HYD          ID=3  HYD=39.20  ID I=3  ID II=5
PRINT HYD        ID=3  CODE=1

                    OUTFLOW HYDROGRAPH REACH   39.20

  RUNOFF VOLUME =    1.63811 INCHES    =     1.7849 ACRE-FEET
  PEAK DISCHARGE RATE =    49.83 CFS  AT   1.500 HOURS   BASIN AREA =   .0204 SQ. MI.


*
*
*
*
*ADD BASINS 43 AND 41 TOGETHER
*COMPUTE HYDROGRAPH FOR BASINS 43
COMPUTE NM HYD     ID=1  HYD NO=43  DA=0.00995 SQ MI
           %A=12.5  %B=25.0  %C=12.5  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  19.642   CFS   UNIT VOLUME =   .9988      B =  526.28      P60 = 2.1400
  AREA =     .004975 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


  K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  12.012   CFS   UNIT VOLUME =   .9992      B =  321.84      P60 = 2.1400
  AREA =     .004975 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333
```

```
PRINT HYD        ID=1 CODE=1

                    OUTFLOW HYDROGRAPH REACH   43.00

  RUNOFF VOLUME =    1.63814 INCHES    =      .8693 ACRE-FEET
  PEAK DISCHARGE RATE =    24.26 CFS  AT   1.500 HOURS   BASIN AREA =   .0100 SQ. MI.


*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 41
COMPUTE NM HYD     ID=2  HYD NO=41  DA=0.00569 SQ MI
           %A=12.5  %B=25.0  %C=12.5  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  11.232   CFS  UNIT VOLUME =   .9984      B =  526.28      P60 = 2.1400
  AREA =     .002845 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


  K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  6.8691   CFS  UNIT VOLUME =   .9983      B =  321.84      P60 = 2.1400
  AREA =     .002845 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD        ID=2 CODE=1

                    OUTFLOW HYDROGRAPH REACH   41.00

  RUNOFF VOLUME =    1.63814 INCHES    =      .4971 ACRE-FEET
  PEAK DISCHARGE RATE =    13.88 CFS  AT   1.500 HOURS   BASIN AREA =   .0057 SQ. MI.


*
*
*
*COMPUTE FLOW DEPTH AT AP-41.10
*46' ROW, STD CURB SECTION, S=0.007
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
           MIN ELEV=100.00 MAX ELEV=101.00
           CH SLP=0.007  FP SLP=0.007  N=0.017
           DIST=46.00
           0.000 101.00   4.000 100.92   8.833 100.67
           9.000  100.00   11.000 100.13  23.000 100.37
           35.000 100.13  37.000 100.00  37.167 100.67
           42.000 100.92  46.000 101.00

                    RATING CURVE VALLEY SECTION  1.0
```

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.03	1.65
100.11	.17	.17	3.29
100.16	.42	.46	6.87
100.21	.92	1.18	12.16
100.26	1.70	2.58	17.45
100.32	2.75	4.86	22.74
100.37	4.09	8.18	28.03
100.42	5.57	13.62	28.21
100.47	7.06	20.14	28.24
100.53	8.55	27.62	28.26
100.58	10.04	36.00	28.29
100.63	11.52	45.23	28.31
100.68	13.02	54.65	28.89
100.74	14.59	63.26	30.92
100.79	16.27	72.80	32.96
100.84	18.06	83.32	34.99
100.89	19.96	94.85	37.03
100.95	21.98	104.73	40.74
101.00	24.27	114.10	46.00

```
*
*
*
*S SURFACE FLOW FROM BASINS 41 AND 43 TO INLET 39
*ADD HYDROGRAPHS FOR BASINS 43 AND 41
ADD HYD          ID=4  HYD=43  ID I=1  ID II=2
PRINT HYD        ID=4  CODE=1

                    OUTFLOW HYDROGRAPH REACH   43.00

  RUNOFF VOLUME =    1.63811 INCHES    =     1.3664 ACRE-FEET
  PEAK DISCHARGE RATE =    38.14 CFS  AT  1.500 HOURS  BASIN AREA =  .0156 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-39.10
*46' ROW, STD CURB SECTION, S=0.015
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=101.00
          CH SLP=0.015  FP SLP=0.015  N=0.017
          DIST=46.00
          0.000 101.00   4.000 100.92   8.833 100.67
          9.000  100.00  11.000 100.13  23.000 100.37
          35.000 100.13  37.000 100.00  37.167 100.67
          42.000 100.92  46.000 101.00

                RATING CURVE VALLEY SECTION  1.0
                  WATER     FLOW     FLOW     TOP
                 SURFACE    AREA     RATE     WIDTH
```

ELEV	SQ FT	CFS	FT
100.00	.00	.00	.00
100.05	.04	.04	1.65
100.11	.17	.25	3.29
100.16	.42	.67	6.87
100.21	.92	1.72	12.16
100.26	1.70	3.78	17.45
100.32	2.75	7.11	22.74
100.37	4.09	11.97	28.03
100.42	5.57	19.93	28.21
100.47	7.06	29.48	28.24
100.53	8.55	40.43	28.26
100.58	10.04	52.70	28.29
100.63	11.52	66.21	28.31
100.68	13.02	79.99	28.89
100.74	14.59	92.60	30.92
100.79	16.27	106.57	32.96
100.84	18.06	121.97	34.99
100.89	19.96	138.85	37.03
100.95	21.98	153.30	40.74
101.00	24.27	167.02	46.00

*COMPUTE FLOW DEPTH IN PIPE
*5.0' DIA. SECTION, N=0.015, S=0.008
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.008
DIA=5.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.26	.39	1.06	2.22
.52	1.09	4.60	3.06
.78	1.96	10.69	3.63
1.04	2.97	19.22	4.06
1.30	4.07	30.01	4.39
1.56	5.25	42.82	4.64
1.82	6.48	57.37	4.81
2.08	7.75	73.35	4.93
2.35	9.04	90.42	4.99
2.61	10.35	108.22	5.00
2.87	11.64	126.34	5.00
3.13	12.92	144.35	5.00
3.39	14.16	161.79	5.00
3.65	15.35	178.12	5.00
3.91	16.47	192.74	5.00
4.17	17.49	204.90	5.00
4.43	18.39	213.60	5.00
4.69	19.13	217.17	5.00
5.00	19.63	217.17	5.00

COMPUTE TRAVEL TIME ID=42 REACH NO=1 NO VS=1 L=250 SLP=0.008

TRAVEL TIME TABLE
REACH= 1.0

WATER	AVERAGE	FLOW	TRAVEL

DEPTH FEET	AREA SQ.FT.	RATE CFS	TIME HRS
.261	.390	1.06	.0256
.521	1.086	4.60	.0164
.782	1.961	10.69	.0127
1.042	2.966	19.22	.0107
1.303	4.069	30.01	.0094
1.563	5.246	42.82	.0085
1.824	6.479	57.37	.0078
2.084	7.749	73.35	.0073
2.345	9.043	90.42	.0069
2.606	10.345	108.22	.0066
2.866	11.641	126.34	.0064
3.127	12.918	144.35	.0062
3.387	14.159	161.79	.0061
3.648	15.348	178.12	.0060
3.908	16.467	192.74	.0059
4.169	17.492	204.90	.0059
4.429	18.395	213.60	.0060
4.690	19.130	217.17	.0061
5.000	19.635	217.17	.0063

```
*S STORM SEWER FLOW FROM INLET 39 TO AP-39
ROUTE          ID=42  HYD NO=39.10  INFLOW ID=4
PRINT HYD      ID=42  CODE=1
```

OUTFLOW HYDROGRAPH REACH 39.10

RUNOFF VOLUME = 1.63814 INCHES = 1.3664 ACRE-FEET
PEAK DISCHARGE RATE = 37.89 CFS AT 1.500 HOURS BASIN AREA = .0156 SQ. MI.

```
*
*
*
*S STORM SEWER FLOW FROM INLET 39 ADD TO MAIN STORM SEWER AT AP-39
*ADD HYDROGRAPHS FOR PIPE FLOW FROM INLET 39 TO MAIN FLOW AT AP 39
ADD HYD        ID=40  HYD=39.20  ID I=40  ID II=42
PRINT HYD      ID=40  CODE=1
```

OUTFLOW HYDROGRAPH REACH 39.20

RUNOFF VOLUME = 1.63812 INCHES = 9.1481 ACRE-FEET
PEAK DISCHARGE RATE = 249.30 CFS AT 1.533 HOURS BASIN AREA = .1047 SQ. MI.

```
*
*
*
*S SURFACE FLOWS ADD TO STORM SEWER AT AP-39
*ADD HYDROGRAPHS FOR STREET FLOW AT AP-39 TO MAIN PIPE FLOW
ADD HYD        ID=42  HYD=39.F  ID I=40  ID II=3
PRINT HYD      ID=42  CODE=1
```

HYDROGRAPH FROM AREA 39.F

RUNOFF VOLUME = 1.63812 INCHES = 10.9329 ACRE-FEET
PEAK DISCHARGE RATE = 297.33 CFS AT 1.533 HOURS BASIN AREA = .1251 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH IN PIPE
*5.5' DIA. SECTION, N=0.015, S=0.013
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.013
DIA=5.5 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.29	.47	1.74	2.44
.57	1.31	7.56	3.36
.86	2.37	17.57	3.99
1.15	3.59	31.59	4.47
1.43	4.92	49.33	4.83
1.72	6.35	70.38	5.10
2.01	7.84	94.29	5.30
2.29	9.38	120.56	5.42
2.58	10.94	148.62	5.49
2.87	12.52	177.87	5.50
3.15	14.09	207.65	5.50
3.44	15.63	237.26	5.50
3.73	17.13	265.92	5.50
4.01	18.57	292.77	5.50
4.30	19.92	316.79	5.50
4.59	21.17	336.77	5.50
4.87	22.26	351.08	5.50
5.16	23.15	356.95	5.50
5.50	23.76	356.95	5.50

COMPUTE TRAVEL TIME ID=40 REACH NO=1 NO VS=1 L=160 SLP=0.013

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.287	.472	1.74	.0121
.573	1.314	7.56	.0077
.860	2.373	17.57	.0060
1.146	3.589	31.59	.0050
1.433	4.923	49.33	.0044
1.720	6.348	70.38	.0040
2.006	7.839	94.29	.0037

2.293	9.377	120.56	.0035
2.579	10.942	148.62	.0033
2.866	12.518	177.87	.0031
3.153	14.086	207.65	.0030
3.439	15.630	237.26	.0029
3.726	17.132	265.92	.0029
4.013	18.571	292.77	.0028
4.299	19.925	316.79	.0028
4.586	21.166	336.77	.0028
4.872	22.258	351.08	.0028
5.159	23.147	356.95	.0029
5.500	23.758	356.95	.0030

```
*S TOTAL STORM SEWER FLOW AT AP-39
ROUTE          ID=40  HYD NO=39.F  INFLOW ID=42
PRINT HYD      ID=40  CODE=1

                    HYDROGRAPH FROM AREA 39.F

  RUNOFF VOLUME =    1.63812 INCHES    =     10.9330 ACRE-FEET
  PEAK DISCHARGE RATE =    297.45 CFS  AT   1.533 HOURS   BASIN AREA =   .1251 SQ. MI.


*
*
*
*
*S ADD BASINS 49, 55, 53 AND 37 TOGETHER AND ROUTE TO AP-37
*COMPUTE HYDROGRAPH FOR BASINS 49
COMPUTE NM HYD     ID=1 HYD NO=49  DA=0.00788 SQ MI
           %A=12.5  %B=25.0  %C=12.5  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  15.555   CFS  UNIT VOLUME =   .9987      B =  526.28      P60 = 2.1400
  AREA =     .003940 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

  K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  9.5129   CFS  UNIT VOLUME =   .9989      B =  321.84      P60 = 2.1400
  AREA =     .003940 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD      ID=1 CODE=1

                    OUTFLOW HYDROGRAPH REACH   49.00


  RUNOFF VOLUME =    1.63815 INCHES    =      .6885 ACRE-FEET
  PEAK DISCHARGE RATE =     19.22 CFS  AT   1.500 HOURS   BASIN AREA =   .0079 SQ. MI.
```

```
*
*
*
*COMPUTE FLOW DEPTH AT AP-49.10
*46' ROW, STD CURB SECTION, S=0.016
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
            MIN ELEV=100.00 MAX ELEV=101.00
            CH SLP=0.016  FP SLP=0.016  N=0.017
            DIST=46.00
            0.000 101.00    4.000 100.92    8.833 100.67
            9.000  100.00   11.000 100.13   23.000 100.37
            35.000 100.13   37.000 100.00   37.167 100.67
            42.000 100.92   46.000 101.00
```

– RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.04	1.65
100.11	.17	.26	3.29
100.16	.42	.69	6.87
100.21	.92	1.78	12.16
100.26	1.70	3.90	17.45
100.32	2.75	7.35	22.74
100.37	4.09	12.36	28.03
100.42	5.57	20.59	28.21
100.47	7.06	30.44	28.24
100.53	8.55	41.76	28.26
100.58	10.04	54.43	28.29
100.63	11.52	68.38	28.31
100.68	13.02	82.62	28.89
100.74	14.59	95.64	30.92
100.79	16.27	110.06	32.96
100.84	18.06	125.97	34.99
100.89	19.96	143.41	37.03
100.95	21.98	158.33	40.74
101.00	24.27	172.50	46.00

```
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 55
COMPUTE NM HYD     ID=2  HYD NO=55  DA=0.00598 SQ MI
            %A=12.5  %B=25.0  %C=12.5  %D=50.0
            TP=0.1333 HR
            MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000   SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  11.805   CFS  UNIT VOLUME =  .9984    B =  526.28    P60 = 2.1400
  AREA =    .002990 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

  K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670   SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  7.2192   CFS  UNIT VOLUME =  .9984    B =  321.84    P60 = 2.1400
  AREA =    .002990 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
```

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=2 CODE=1

OUTFLOW HYDROGRAPH REACH 55.00

RUNOFF VOLUME = 1.63814 INCHES = .5225 ACRE-FEET
PEAK DISCHARGE RATE = 14.59 CFS AT 1.500 HOURS BASIN AREA = .0060 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-55.10
*46' ROW, STD CURB SECTION, S=0.014
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=101.00
CH SLP=0.014 FP SLP=0.014 N=0.017
DIST=46.00
0.000 101.00 4.000 100.92 8.833 100.67
9.000 100.00 11.000 100.13 23.000 100.37
35.000 100.13 37.000 100.00 37.167 100.67
42.000 100.92 46.000 101.00

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.04	1.65
100.11	.17	.24	3.29
100.16	.42	.65	6.87
100.21	.92	1.66	12.16
100.26	1.70	3.65	17.45
100.32	2.75	6.87	22.74
100.37	4.09	11.57	28.03
100.42	5.57	19.26	28.21
100.47	7.06	28.48	28.24
100.53	8.55	39.06	28.26
100.58	10.04	50.92	28.29
100.63	11.52	63.97	28.31
100.68	13.02	77.28	28.89
100.74	14.59	89.46	30.92
100.79	16.27	102.96	32.96
100.84	18.06	117.83	34.99
100.89	19.96	134.14	37.03
100.95	21.98	148.10	40.74
101.00	24.27	161.36	46.00

*
*
*
*ADD HYDROGRAPHS FOR BASINS 49 AND 55
ADD HYD ID=3 HYD=49 ID I=1 ID II=2
PRINT HYD ID=3 CODE=1

```
                    OUTFLOW HYDROGRAPH REACH   49.00

  RUNOFF VOLUME =    1.63811 INCHES    =     1.2109 ACRE-FEET
  PEAK DISCHARGE RATE =    33.80 CFS  AT  1.500 HOURS  BASIN AREA =  .0139 SQ. MI.


*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 53
COMPUTE NM HYD     ID=1  HYD NO=53  DA=0.00238 SQ MI
           %A=2.0  %B=30.0  %C=7.5  %D=60.5
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  5.6848   CFS  UNIT VOLUME =   .9973     B =  526.28     P60 = 2.1400
  AREA =    .001440 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333


  K =  .130211HR   TP =  .133300HR   K/TP RATIO =  .976824    SHAPE CONSTANT, N =  3.615464
  UNIT PEAK =  2.3179   CFS  UNIT VOLUME =   .9944     B =  328.66     P60 = 2.1400
  AREA =    .000940 SQ MI   IA =   .47911 INCHES   INF =  1.19152 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD        ID=1 CODE=1

                    OUTFLOW HYDROGRAPH REACH   53.00

  RUNOFF VOLUME =    1.80613 INCHES    =      .2293 ACRE-FEET
  PEAK DISCHARGE RATE =     6.27 CFS  AT  1.500 HOURS  BASIN AREA =  .0024 SQ. MI.


*
*
*
*ADD HYDROGRAPHS FOR BASINS 49, 55, AND 53
ADD HYD          ID=3  HYD=49  ID I=1  ID II=3
PRINT HYD        ID=3  CODE=1

                    OUTFLOW HYDROGRAPH REACH   49.00

  RUNOFF VOLUME =    1.66272 INCHES    =     1.4401 ACRE-FEET
  PEAK DISCHARGE RATE =    40.07 CFS  AT  1.500 HOURS  BASIN AREA =  .0162 SQ. MI.


*
*
```

```
*
*COMPUTE FLOW DEPTH AT AP-53.10
*60' ROW, STD CURB SECTION, S=0.010
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=101.09
          CH SLP=0.010  FP SLP=0.010  N=0.017
          DIST=60.00
          0.000 101.09   4.000 101.01   9.833 100.67
          10.000 100.00  12.000 100.13  30.000 100.49
          48.000 100.13  50.000 100.00  50.167 100.67
          56.000 101.01  60.000 101.09
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.06	.05	.04	1.79
100.11	.21	.26	3.59
100.17	.52	.71	8.30
100.23	1.17	1.90	14.06
100.29	2.14	4.17	19.83
100.34	3.44	7.78	25.59
100.40	5.07	12.99	31.36
100.46	7.04	20.04	37.12
100.52	9.30	30.19	40.26
100.57	11.61	43.61	40.29
100.63	13.92	58.92	40.31
100.69	16.24	75.30	40.96
100.75	18.65	91.95	42.93
100.80	21.17	110.31	44.90
100.86	23.80	130.41	46.87
100.92	26.54	152.28	48.84
100.98	29.40	175.98	50.81
101.03	32.39	198.09	54.26
101.09	35.67	217.80	59.99

```
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 37
COMPUTE NM HYD     ID=1  HYD NO=37  DA=0.00264 SQ MI
          %A=0.0  %B=0.0  %C=13.5  %D=86.5
          TP=0.1333 HR
          MASS RAINFALL=-1

K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000   SHAPE CONSTANT, N =  7.106420
UNIT PEAK =  9.0158   CFS  UNIT VOLUME =  .9981     B =  526.28     P60 = 2.1400
AREA =    .002284 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

K =  .108912HR   TP =  .133300HR   K/TP RATIO =  .817047   SHAPE CONSTANT, N =  4.373949
UNIT PEAK =  1.0143   CFS  UNIT VOLUME =  .9872     B =  379.38     P60 = 2.1400
AREA =    .000356 SQ MI   IA =   .35000 INCHES   INF =   .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333
```

PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 37.00

RUNOFF VOLUME = 2.21144 INCHES = .3114 ACRE-FEET
PEAK DISCHARGE RATE = 8.14 CFS AT 1.500 HOURS BASIN AREA = .0026 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-37.10
*60' ROW, STD CURB SECTION, S=0.012
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=101.09
CH SLP=0.012 FP SLP=0.012 N=0.017
DIST=60.00
0.000 101.09 4.000 101.01 9.833 100.67
10.000 100.00 12.000 100.13 30.000 100.49
48.000 100.13 50.000 100.00 50.167 100.67
56.000 101.01 60.000 101.09

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.06	.05	.04	1.79
100.11	.21	.28	3.59
100.17	.52	.78	8.30
100.23	1.17	2.09	14.06
100.29	2.14	4.57	19.83
100.34	3.44	8.52	25.59
100.40	5.07	14.23	31.36
100.46	7.04	21.95	37.12
100.52	9.30	33.07	40.26
100.57	11.61	47.77	40.29
100.63	13.92	64.54	40.31
100.69	16.24	82.49	40.96
100.75	18.65	100.73	42.93
100.80	21.17	120.84	44.90
100.86	23.80	142.85	46.87
100.92	26.54	166.82	48.84
100.98	29.40	192.77	50.81
101.03	32.39	216.99	54.26
101.09	35.67	238.59	59.99

*
*
*
*S TOTAL SURFACE FLOW AT INLET 37
*ADD HYDROGRAPHS FOR BASINS 49, 55, 53, AND 37
ADD HYD ID=3 HYD=49 ID I=3 ID II=1
PRINT HYD ID=3 CODE=1

OUTFLOW HYDROGRAPH REACH 49.00

RUNOFF VOLUME = 1.73943 INCHES = 1.7515 ACRE-FEET
PEAK DISCHARGE RATE = 48.21 CFS AT 1.500 HOURS BASIN AREA = .0189 SQ. MI.

```
*
*
*S DIVIDE FLOW 37 BY RATIO TO MEET STREET CAPACITY
*S 90% TO STORM SEWER - 10% REMAINS ON SURFACE
DIVIDE HYD      ID=3 RATIO=-.90 ID=4 HYD=4.10
                     ID=3 HYD=37.10
PRINT HYD       ID=3 CODE=1
```

OUTFLOW HYDROGRAPH REACH 37.10

RUNOFF VOLUME = 1.73943 INCHES = .1751 ACRE-FEET
PEAK DISCHARGE RATE = 4.82 CFS AT 1.500 HOURS BASIN AREA = .0019 SQ. MI.

```
*
*
*
*
*COMPUTE FLOW DEPTH AT AP-37.20
*60' ROW, STD CURB SECTION, S=0.014
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=101.09
          CH SLP=0.014 FP SLP=0.014 N=0.017
          DIST=60.00
          0.000 101.09   4.000 101.01   9.833 100.67
          10.000 100.00  12.000 100.13  30.000 100.49
          48.000 100.13  50.000 100.00  50.167 100.67
          56.000 101.01  60.000 101.09
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.06	.05	.05	1.79
100.11	.21	.31	3.59
100.17	.52	.84	8.30
100.23	1.17	2.25	14.06
100.29	2.14	4.93	19.83
100.34	3.44	9.21	25.59
100.40	5.07	15.37	31.36
100.46	7.04	23.71	37.12
100.52	9.30	35.72	40.26
100.57	11.61	51.60	40.29
100.63	13.92	69.71	40.31
100.69	16.24	89.10	40.96

100.75	18.65	108.80	42.93
100.80	21.17	130.52	44.90
100.86	23.80	154.30	46.87
100.92	26.54	180.18	48.84
100.98	29.40	208.22	50.81
101.03	32.39	234.38	54.26
101.09	35.67	257.70	59.99

*COMPUTE FLOW DEPTH IN PIPE
*4' DIA. SECTION, N=0.015, S=0.011
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.011
DIA=4.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.21	.25	.68	1.78
.42	.69	2.97	2.44
.63	1.25	6.91	2.91
.83	1.90	12.43	3.25
1.04	2.60	19.41	3.51
1.25	3.36	27.69	3.71
1.46	4.15	37.10	3.85
1.67	4.96	47.44	3.94
1.88	5.79	58.48	3.99
2.08	6.62	69.99	4.00
2.29	7.45	81.71	4.00
2.50	8.27	93.36	4.00
2.71	9.06	104.63	4.00
2.92	9.82	115.20	4.00
3.13	10.54	124.65	4.00
3.34	11.20	132.51	4.00
3.54	11.77	138.14	4.00
3.75	12.24	140.45	4.00
4.00	12.57	140.45	4.00

COMPUTE TRAVEL TIME ID=41 REACH NO=1 NO VS=1 L=350 SLP=0.011

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.208	.250	.68	.0355
.417	.695	2.97	.0227
.625	1.255	6.91	.0177
.834	1.898	12.43	.0148
1.042	2.604	19.41	.0130
1.251	3.358	27.69	.0118
1.459	4.146	37.10	.0109
1.668	4.960	47.44	.0102
1.876	5.788	58.48	.0096
2.084	6.621	69.99	.0092
2.293	7.451	81.71	.0089
2.501	8.267	93.36	.0086

2.710	9.062	104.63	.0084
2.918	9.823	115.20	.0083
3.127	10.539	124.65	.0082
3.335	11.195	132.51	.0082
3.544	11.773	138.14	.0083
3.752	12.243	140.45	.0085
4.000	12.566	140.45	.0087

*S STORM SEWER FLOW FROM INLET 37 TO AP-37
ROUTE ID=41 HYD NO=37.P INFLOW ID=4
PRINT HYD ID=41 CODE=1

HYDROGRAPH FROM AREA 37.P

RUNOFF VOLUME = 1.73946 INCHES = 1.5764 ACRE-FEET
PEAK DISCHARGE RATE = 42.98 CFS AT 1.500 HOURS BASIN AREA = .0170 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-37.30
*60' ROW, STD CURB SECTION, S=0.011
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=101.09
CH SLP=0.011 FP SLP=0.011 N=0.017
DIST=60.00
0.000 101.09 4.000 101.01 9.833 100.67
10.000 100.00 12.000 100.13 30.000 100.49
48.000 100.13 50.000 100.00 50.167 100.67
56.000 101.01 60.000 101.09

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.06	.05	.04	1.79
100.11	.21	.27	3.59
100.17	.52	.75	8.30
100.23	1.17	2.00	14.06
100.29	2.14	4.37	19.83
100.34	3.44	8.16	25.59
100.40	5.07	13.63	31.36
100.46	7.04	21.02	37.12
100.52	9.30	31.66	40.26
100.57	11.61	45.74	40.29
100.63	13.92	61.79	40.31
100.69	16.24	78.98	40.96
100.75	18.65	96.44	42.93
100.80	21.17	115.69	44.90
100.86	23.80	136.77	46.87
100.92	26.54	159.72	48.84
100.98	29.40	184.57	50.81

```
                    101.03    32.39    207.75    54.26
                    101.09    35.67    228.43    59.99
*
*
*
*S ADD SURFACE FLOWS FROM BASIN 1 AND 17 AND ROUTE TO AP-37
*COMPUTE HYDROGRAPH FOR BASINS 1
COMPUTE NM HYD     ID=1  HYD NO=1  DA=0.00089 SQ MI
           %A=0.0  %B=28.0  %C=9.5  %D=62.5
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  2.1961   CFS  UNIT VOLUME =  .9941     B =  526.28     P60 = 2.1400
  AREA =     .000556 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

  K =  .127388HR   TP =  .133300HR   K/TP RATIO =  .955646    SHAPE CONSTANT, N =  3.697850
  UNIT PEAK =  .83749   CFS  UNIT VOLUME =  .9835     B =  334.50     P60 = 2.1400
  AREA =     .000334 SQ MI   IA =   .46200 INCHES   INF =  1.14360 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD        ID=1  CODE=1

                    OUTFLOW HYDROGRAPH REACH    1.00


  RUNOFF VOLUME =    1.84817 INCHES    =      .0877 ACRE-FEET
  PEAK DISCHARGE RATE =     2.40 CFS  AT  1.500 HOURS  BASIN AREA =  .0009 SQ. MI.


*
*
*
*COMPUTE FLOW DEPTH AT AP-1.10
*60' ROW, STD CURB SECTION, S=0.009
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=101.09
          CH SLP=0.007  FP SLP=0.007  N=0.017
          DIST=60.00
          0.000 101.09   4.000 101.01   9.833 100.67
          10.000 100.00  12.000 100.13  30.000 100.49
          48.000 100.13  50.000 100.00  50.167 100.67
          56.000 101.01  60.000 101.09

              RATING CURVE VALLEY SECTION  1.0
                WATER     FLOW     FLOW     TOP
               SURFACE    AREA     RATE     WIDTH
                ELEV     SQ FT     CFS      FT
               100.00     .00      .00      .00
               100.06     .05      .03     1.79
               100.11     .21      .22     3.59
               100.17     .52      .60     8.30
               100.23    1.17     1.59    14.06
```

100.29	2.14	3.49	19.83
100.34	3.44	6.51	25.59
100.40	5.07	10.87	31.36
100.46	7.04	16.77	37.12
100.52	9.30	25.26	40.26
100.57	11.61	36.49	40.29
100.63	13.92	49.29	40.31
100.69	16.24	63.00	40.96
100.75	18.65	76.93	42.93
100.80	21.17	92.29	44.90
100.86	23.80	109.11	46.87
100.92	26.54	127.41	48.84
100.98	29.40	147.23	50.81
101.03	32.39	165.73	54.26
101.09	35.67	182.22	59.99

```
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 17
COMPUTE NM HYD     ID=2  HYD NO=17  DA=0.00138 SQ MI
            %A=0.0  %B=2.0  %C=13.0  %D=85.0
            TP=0.1333 HR
            MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000   SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  4.6311   CFS  UNIT VOLUME =  .9969     B =  526.28     P60 = 2.1400
  AREA =     .001173 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333


  K =  .112211HR   TP =  .133300HR   K/TP RATIO =  .841797   SHAPE CONSTANT, N =  4.232429
  UNIT PEAK =  .57516   CFS  UNIT VOLUME =  .9763     B =  370.38     P60 = 2.1400
  AREA =     .000207 SQ MI   IA =   .37000 INCHES   INF =   .88600 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD        ID=2  CODE=1

                    OUTFLOW HYDROGRAPH REACH   17.00


  RUNOFF VOLUME =    2.18703 INCHES    =      .1610 ACRE-FEET
  PEAK DISCHARGE RATE =      4.23 CFS  AT   1.500 HOURS   BASIN AREA =   .0014 SQ. MI.


*
*
*
*COMPUTE FLOW DEPTH AT AP-17.10
*60' ROW, STD CURB SECTION, S=0.009
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
            MIN ELEV=100.00 MAX ELEV=101.09
            CH SLP=0.009  FP SLP=0.009  N=0.017
            DIST=60.00
            0.000 101.09    4.000 101.01    9.833 100.67
            10.000 100.00   12.000 100.13   30.000 100.49
```

48.000 100.13 50.000 100.00 50.167 100.67
56.000 101.01 60.000 101.09

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.06	.05	.04	1.79
100.11	.21	.25	3.59
100.17	.52	.68	8.30
100.23	1.17	1.81	14.06
100.29	2.14	3.95	19.83
100.34	3.44	7.38	25.59
100.40	5.07	12.33	31.36
100.46	7.04	19.01	37.12
100.52	9.30	28.64	40.26
100.57	11.61	41.37	40.29
100.63	13.92	55.89	40.31
100.69	16.24	71.44	40.96
100.75	18.65	87.23	42.93
100.80	21.17	104.65	44.90
100.86	23.80	123.71	46.87
100.92	26.54	144.47	48.84
100.98	29.40	166.95	50.81
101.03	32.39	187.92	54.26
101.09	35.67	206.62	59.99

*
*
*
*ADD HYDROGRAPHS FOR BASINS 1 AND 17
*S TOTAL SURFACE FLOW FROM BASINS 1 AND 17 AT AP-37
ADD HYD ID=2 HYD=17.10 ID I=1 ID II=2
PRINT HYD ID=2 CODE=1

OUTFLOW HYDROGRAPH REACH 17.10

RUNOFF VOLUME = 2.05395 INCHES = .2487 ACRE-FEET
PEAK DISCHARGE RATE = 6.63 CFS AT 1.500 HOURS BASIN AREA = .0023 SQ. MI.

*
*
*
*ADD STREET FLOW FROM 37 TO FLOW FROM 1 AND 17
*S TOTAL STREET FLOW AP-37
ADD HYD ID=3 HYD=37.10 ID I=3 ID II=2
PRINT HYD ID=3 CODE=1

OUTFLOW HYDROGRAPH REACH 37.10

RUNOFF VOLUME = 1.91108 INCHES = .4238 ACRE-FEET
PEAK DISCHARGE RATE = 11.45 CFS AT 1.500 HOURS BASIN AREA = .0042 SQ. MI.

```
*
*
*
*S ADD PIPE FLOW FROM INLET 37 TO MAIN PIPE FLOW
ADD HYD          ID=40  HYD=37.20  ID I=40  ID II=41
PRINT HYD         ID=40  CODE=1

                    OUTFLOW HYDROGRAPH REACH    37.20

  RUNOFF VOLUME =    1.65023 INCHES    =    12.5093 ACRE-FEET
  PEAK DISCHARGE RATE =    340.03 CFS  AT   1.533 HOURS   BASIN AREA =   .1421 SQ. MI.

*
*
*
*S TOTAL STORM SEWER FLOW ENTERING CITY STORM SEWER AT AP-37
*ADD STREET FLOW AT AP-37 TO MAIN PIPE FLOW
ADD HYD          ID=40  HYD=40.F  ID I=40  ID II=3
PRINT HYD         ID=40  CODE=1

                    HYDROGRAPH FROM AREA 40.F

  RUNOFF VOLUME =    1.65764 INCHES    =    12.9331 ACRE-FEET
  PEAK DISCHARGE RATE =    351.00 CFS  AT   1.533 HOURS   BASIN AREA =   .1463 SQ. MI.

*
*
*
*S ADD BASINS 5 AND 3 TOGETHER AND ROUTE TO STORM SEWER AT INLET 13.10
*COMPUTE HYDROGRAPH FOR BASINS 5
COMPUTE NM HYD     ID=1  HYD NO=5  DA=0.00567 SQ MI
           %A=12.5  %B=25.0  %C=12.5  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  11.193   CFS  UNIT VOLUME =   .9984     B =  526.28     P60 = 2.1400
  AREA =    .002835 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

  K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  6.8449   CFS  UNIT VOLUME =   .9983     B =  321.84     P60 = 2.1400
  AREA =    .002835 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD         ID=1 CODE=1
```

OUTFLOW HYDROGRAPH REACH 5.00

RUNOFF VOLUME = 1.63814 INCHES = .4954 ACRE-FEET
PEAK DISCHARGE RATE = 13.83 CFS AT 1.500 HOURS BASIN AREA = .0057 SQ. MI.

```
*
*
*
*COMPUTE FLOW DEPTH AT AP-5.10
*46' ROW, STD CURB SECTION, S=0.015
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=101.00
          CH SLP=0.015  FP SLP=0.015  N=0.017
          DIST=46.00
          0.000 101.00   4.000 100.92   8.833 100.67
          9.000  100.00  11.000 100.13  23.000 100.37
          35.000 100.13  37.000 100.00  37.167 100.67
          42.000 100.92  46.000 101.00
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.04	1.65
100.11	.17	.25	3.29
100.16	.42	.67	6.87
100.21	.92	1.72	12.16
100.26	1.70	3.78	17.45
100.32	2.75	7.11	22.74
100.37	4.09	11.97	28.03
100.42	5.57	19.93	28.21
100.47	7.06	29.48	28.24
100.53	8.55	40.43	28.26
100.58	10.04	52.70	28.29
100.63	11.52	66.21	28.31
100.68	13.02	79.99	28.89
100.74	14.59	92.60	30.92
100.79	16.27	106.57	32.96
100.84	18.06	121.97	34.99
100.89	19.96	138.85	37.03
100.95	21.98	153.30	40.74
101.00	24.27	167.02	46.00

```
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 3
COMPUTE NM HYD     ID=2  HYD NO=3  DA=0.00711 SQ MI
          %A=12.5  %B=25.0  %C=12.5  %D=50.0
          TP=0.1333 HR
          MASS RAINFALL=-1
```

```
K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000   SHAPE CONSTANT, N =  7.106420
UNIT PEAK =  14.035   CFS  UNIT VOLUME =  .9985     B =  526.28     P60 = 2.1400
AREA =     .003555 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670   SHAPE CONSTANT, N =  3.520804
UNIT PEAK =  8.5833   CFS  UNIT VOLUME =  .9987     B =  321.84     P60 = 2.1400
AREA =     .003555 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD        ID=2  CODE=1

                    OUTFLOW HYDROGRAPH REACH    3.00

RUNOFF VOLUME =    1.63814 INCHES    =      .6212 ACRE-FEET
PEAK DISCHARGE RATE =     17.34 CFS  AT   1.500 HOURS   BASIN AREA =   .0071 SQ. MI.


*
*
*
*ADD HYDROGRAPHS FOR BASINS 5 AND 3
ADD HYD          ID=3  HYD=5  ID I=1  ID II=2
PRINT HYD        ID=3  CODE=1

                    OUTFLOW HYDROGRAPH REACH    5.00

RUNOFF VOLUME =    1.63810 INCHES    =     1.1165 ACRE-FEET
PEAK DISCHARGE RATE =     31.17 CFS  AT   1.500 HOURS   BASIN AREA =   .0128 SQ. MI.


*
*
*
*COMPUTE FLOW DEPTH AT AP-3.10
*46' ROW, STD CURB SECTION, S=0.009
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=101.00
          CH SLP=0.009  FP SLP=0.009  N=0.017
          DIST=46.00
          0.000 101.00    4.000 100.92    8.833 100.67
          9.000  100.00   11.000 100.13   23.000 100.37
          35.000 100.13   37.000 100.00   37.167 100.67
          42.000 100.92   46.000 101.00

                RATING CURVE VALLEY SECTION  1.0
                  WATER      FLOW      FLOW      TOP
                 SURFACE     AREA      RATE     WIDTH
                  ELEV      SQ FT     CFS       FT
                 100.00      .00      .00       .00
                 100.05      .04      .03      1.65
```

100.11	.17	.20	3.29
100.16	.42	.52	6.87
100.21	.92	1.33	12.16
100.26	1.70	2.93	17.45
100.32	2.75	5.51	22.74
100.37	4.09	9.27	28.03
100.42	5.57	15.44	28.21
100.47	7.06	22.83	28.24
100.53	8.55	31.32	28.26
100.58	10.04	40.82	28.29
100.63	11.52	51.29	28.31
100.68	13.02	61.96	28.89
100.74	14.59	71.73	30.92
100.79	16.27	82.55	32.96
100.84	18.06	94.48	34.99
100.89	19.96	107.56	37.03
100.95	21.98	118.75	40.74
101.00	24.27	129.38	46.00

*COMPUTE FLOW DEPTH IN PIPE
*4' DIA. SECTION, N=0.015, S=0.009
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.009
DIA=4.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.21	.25	.62	1.78
.42	.69	2.69	2.44
.63	1.25	6.25	2.91
.83	1.90	11.24	3.25
1.04	2.60	17.56	3.51
1.25	3.36	25.05	3.71
1.46	4.15	33.56	3.85
1.67	4.96	42.91	3.94
1.88	5.79	52.90	3.99
2.08	6.62	63.30	4.00
2.29	7.45	73.91	4.00
2.50	8.27	84.44	4.00
2.71	9.06	94.65	4.00
2.92	9.82	104.20	4.00
3.13	10.54	112.75	4.00
3.34	11.20	119.86	4.00
3.54	11.77	124.95	4.00
3.75	12.24	127.04	4.00
4.00	12.57	127.04	4.00

COMPUTE TRAVEL TIME ID=43 REACH NO=1 NO VS=1 L=50 SLP=0.009

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.208	.250	.62	.0056

.417	.695	2.69	.0036
.625	1.255	6.25	.0028
.834	1.898	11.24	.0023
1.042	2.604	17.56	.0021
1.251	3.358	25.05	.0019
1.459	4.146	33.56	.0017
1.668	4.960	42.91	.0016
1.876	5.788	52.90	.0015
2.084	6.621	63.30	.0015
2.293	7.451	73.91	.0014
2.501	8.267	84.44	.0014
2.710	9.062	94.65	.0013
2.918	9.823	104.20	.0013
3.127	10.539	112.75	.0013
3.335	11.195	119.86	.0013
3.544	11.773	124.95	.0013
3.752	12.243	127.04	.0013
4.000	12.566	127.04	.0014

```
*S STORM SEWER FLOW AT INLET 13.10
ROUTE          ID=43  HYD NO=3.10  INFLOW ID=3
PRINT HYD      ID=43  CODE=1

                    OUTFLOW HYDROGRAPH REACH    3.10


  RUNOFF VOLUME =    1.63814 INCHES    =     1.1165 ACRE-FEET
  PEAK DISCHARGE RATE =    31.17 CFS  AT   1.500 HOURS   BASIN AREA =  .0128 SQ. MI.


*
*
*
*
*
*S ADD BASINS 13 AND 15 TOGETHER AND ROUTE TO STORM SEWER AT INLET 13.20
*COMPUTE HYDROGRAPH FOR BASINS 15
COMPUTE NM HYD     ID=1  HYD NO=15  DA=0.00650 SQ MI
           %A=12.5  %B=25.0  %C=12.5  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  12.831   CFS   UNIT VOLUME =   .9985      B =  526.28      P60 = 2.1400
  AREA =     .003250 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333


  K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670    SHAPE CONSTANT, N =  3.520804
  UNIT PEAK =  7.8469   CFS   UNIT VOLUME =   .9986      B =  321.84      P60 = 2.1400
  AREA =     .003250 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD      ID=1 CODE=1

                    OUTFLOW HYDROGRAPH REACH   15.00
```

RUNOFF VOLUME = 1.63814 INCHES = .5679 ACRE-FEET
PEAK DISCHARGE RATE = 15.85 CFS AT 1.500 HOURS BASIN AREA = .0065 SQ. MI.

*
*
*

```
*COMPUTE FLOW DEPTH AT AP-15.10
*46' ROW, STD CURB SECTION, S=0.008
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
            MIN ELEV=100.00 MAX ELEV=101.00
            CH SLP=0.008  FP SLP=0.008  N=0.017
            DIST=46.00
            0.000 101.00    4.000 100.92    8.833 100.67
            9.000  100.00   11.000 100.13   23.000 100.37
            35.000 100.13   37.000 100.00   37.167 100.67
            42.000 100.92   46.000 101.00
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.03	1.65
100.11	.17	.18	3.29
100.16	.42	.49	6.87
100.21	.92	1.26	12.16
100.26	1.70	2.76	17.45
100.32	2.75	5.20	22.74
100.37	4.09	8.74	28.03
100.42	5.57	14.56	28.21
100.47	7.06	21.53	28.24
100.53	8.55	29.53	28.26
100.58	10.04	38.49	28.29
100.63	11.52	48.36	28.31
100.68	13.02	58.42	28.89
100.74	14.59	67.62	30.92
100.79	16.27	77.83	32.96
100.84	18.06	89.07	34.99
100.89	19.96	101.40	37.03
100.95	21.98	111.96	40.74
101.00	24.27	121.98	46.00

*
*
*

```
*COMPUTE HYDROGRAPH FOR BASIN 13
COMPUTE NM HYD     ID=2  HYD NO=13  DA=0.00487 SQ MI
            %A=12.5  %B=25.0  %C=12.5  %D=50.0
            TP=0.1333 HR
            MASS RAINFALL=-1
```

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 9.6135 CFS UNIT VOLUME = .9982 B = 526.28 P60 = 2.1400

AREA = .002435 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .133656HR TP = .133300HR K/TP RATIO = 1.002670 SHAPE CONSTANT, N = 3.520804
UNIT PEAK = 5.8792 CFS UNIT VOLUME = .9979 B = 321.84 P60 = 2.1400
AREA = .002435 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=2 CODE=1

OUTFLOW HYDROGRAPH REACH 13.00

RUNOFF VOLUME = 1.63815 INCHES = .4255 ACRE-FEET
PEAK DISCHARGE RATE = 11.88 CFS AT 1.500 HOURS BASIN AREA = .0049 SQ. MI.

*
*
*
*ADD HYDROGRAPHS FOR BASINS 15 AND 13
ADD HYD ID=3 HYD=13.10 ID I=1 ID II=2
PRINT HYD ID=3 CODE=1

OUTFLOW HYDROGRAPH REACH 13.10

RUNOFF VOLUME = 1.63810 INCHES = .9933 ACRE-FEET
PEAK DISCHARGE RATE = 27.74 CFS AT 1.500 HOURS BASIN AREA = .0114 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH IN PIPE
*4' DIA. SECTION, N=0.015, S=0.017
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.017
DIA=4.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.21	.25	.85	1.78
.42	.69	3.70	2.44
.63	1.25	8.59	2.91
.83	1.90	15.45	3.25
1.04	2.60	24.13	3.51
1.25	3.36	34.43	3.71
1.46	4.15	46.12	3.85
1.67	4.96	58.97	3.94
1.88	5.79	72.70	3.99

2.08	6.62	87.00	4.00
2.29	7.45	101.57	4.00
2.50	8.27	116.06	4.00
2.71	9.06	130.08	4.00
2.92	9.82	143.21	4.00
3.13	10.54	154.96	4.00
3.34	11.20	164.73	4.00
3.54	11.77	171.73	4.00
3.75	12.24	174.60	4.00
4.00	12.57	174.60	4.00

COMPUTE TRAVEL TIME ID=44 REACH NO=1 NO VS=1 L=50 SLP=0.017

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.208	.250	.85	.0041
.417	.695	3.70	.0026
.625	1.255	8.59	.0020
.834	1.898	15.45	.0017
1.042	2.604	24.13	.0015
1.251	3.358	34.43	.0014
1.459	4.146	46.12	.0012
1.668	4.960	58.97	.0012
1.876	5.788	72.70	.0011
2.084	6.621	87.00	.0011
2.293	7.451	101.57	.0010
2.501	8.267	116.06	.0010
2.710	9.062	130.08	.0010
2.918	9.823	143.21	.0010
3.127	10.539	154.96	.0009
3.335	11.195	164.73	.0009
3.544	11.773	171.73	.0010
3.752	12.243	174.60	.0010
4.000	12.566	174.60	.0010

*S STORM SEWER FLOW AT INLET 13.20
ROUTE ID=44 HYD NO=13.10 INFLOW ID=3
PRINT HYD ID=44 CODE=1

OUTFLOW HYDROGRAPH REACH 13.10

RUNOFF VOLUME = 1.63814 INCHES = .9934 ACRE-FEET
PEAK DISCHARGE RATE = 27.72 CFS AT 1.500 HOURS BASIN AREA = .0114 SQ. MI.

*
*
*

*S ADD PIPE FLOWS AT AP-13 AND ROUTE OUT TO CITY DRAINAGE
ADD HYD ID=44 HYD=13.F ID I=44 ID II=43
PRINT HYD ID=44 CODE=1

HYDROGRAPH FROM AREA 13.F

RUNOFF VOLUME = 1.63811 INCHES = 2.1099 ACRE-FEET
PEAK DISCHARGE RATE = 58.90 CFS AT 1.500 HOURS BASIN AREA = .0242 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH IN PIPE
*4' DIA. SECTION, N=0.015, S=0.017
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.017
DIA=4.0 FT N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.21	.25	.85	1.78
.42	.69	3.70	2.44
.63	1.25	8.59	2.91
.83	1.90	15.45	3.25
1.04	2.60	24.13	3.51
1.25	3.36	34.43	3.71
1.46	4.15	46.12	3.85
1.67	4.96	58.97	3.94
1.88	5.79	72.70	3.99
2.08	6.62	87.00	4.00
2.29	7.45	101.57	4.00
2.50	8.27	116.06	4.00
2.71	9.06	130.08	4.00
2.92	9.82	143.21	4.00
3.13	10.54	154.96	4.00
3.34	11.20	164.73	4.00
3.54	11.77	171.73	4.00
3.75	12.24	174.60	4.00
4.00	12.57	174.60	4.00

COMPUTE TRAVEL TIME ID=45 REACH NO=1 NO VS=1 L=170 SLP=0.017

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.208	.250	.85	.0139
.417	.695	3.70	.0089
.625	1.255	8.59	.0069
.834	1.898	15.45	.0058
1.042	2.604	24.13	.0051
1.251	3.358	34.43	.0046
1.459	4.146	46.12	.0042
1.668	4.960	58.97	.0040

1.876	5.788	72.70	.0038
2.084	6.621	87.00	.0036
2.293	7.451	101.57	.0035
2.501	8.267	116.06	.0034
2.710	9.062	130.08	.0033
2.918	9.823	143.21	.0032
3.127	10.539	154.96	.0032
3.335	11.195	164.73	.0032
3.544	11.773	171.73	.0032
3.752	12.243	174.60	.0033
4.000	12.566	174.60	.0034

```
*S TOTAL STORM SEWER FLOW ENTERING CITY STORM SEWER AT AP-1
ROUTE          ID=45  HYD NO=13.F  INFLOW ID=44
PRINT HYD      ID=45  CODE=1
```

HYDROGRAPH FROM AREA 13.F

RUNOFF VOLUME = 1.63814 INCHES = 2.1099 ACRE-FEET
PEAK DISCHARGE RATE = 58.82 CFS AT 1.500 HOURS BASIN AREA = .0242 SQ. MI.

```
*
*
*
*COMPUTE FLOW DEPTH AT AP-13.10
*46' ROW, STD CURB SECTION, S=0.0125
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=101.00
          CH SLP=0.0125  FP SLP=0.0125  N=0.017
          DIST=46.00
          0.000 101.00   4.000 100.92   8.833 100.67
          9.000  100.00  11.000 100.13  23.000 100.37
          35.000 100.13  37.000 100.00  37.167 100.67
          42.000 100.92  46.000 101.00
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.05	.04	.04	1.65
100.11	.17	.23	3.29
100.16	.42	.61	6.87
100.21	.92	1.57	12.16
100.26	1.70	3.45	17.45
100.32	2.75	6.49	22.74
100.37	4.09	10.93	28.03
100.42	5.57	18.20	28.21
100.47	7.06	26.91	28.24
100.53	8.55	36.91	28.26
100.58	10.04	48.11	28.29
100.63	11.52	60.44	28.31
100.68	13.02	73.02	28.89
100.74	14.59	84.53	30.92

```
                    100.79    16.27    97.28    32.96
                    100.84    18.06   111.34    34.99
                    100.89    19.96   126.75    37.03
                    100.95    21.98   139.95    40.74
                    101.00    24.27   152.47    46.00
*
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS 47
*S SURFACE FLOW FROM BASIN 47: ACCOUNTED FOR IN PREVIOUS PHASE
COMPUTE NM HYD     ID=23  HYD NO=47  DA=0.01052 SQ MI
           %A=12.5  %B=25.0  %C=12.5  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000   SHAPE CONSTANT, N =  7.106420
UNIT PEAK =  20.767   CFS  UNIT VOLUME =  .9989     B =  526.28     P60 = 2.1400
AREA =     .005260 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

K =  .133656HR   TP =  .133300HR   K/TP RATIO = 1.002670   SHAPE CONSTANT, N =  3.520804
UNIT PEAK =  12.700   CFS  UNIT VOLUME =  .9993     B =  321.84     P60 = 2.1400
AREA =     .005260 SQ MI   IA =   .50000 INCHES   INF =  1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .033333

PRINT HYD        ID=23 CODE=1

                    OUTFLOW HYDROGRAPH REACH   47.00

RUNOFF VOLUME =    1.63814 INCHES    =      .9191 ACRE-FEET
PEAK DISCHARGE RATE =     25.65 CFS  AT   1.500 HOURS   BASIN AREA =  .0105 SQ. MI.

*
*
*
*COMPUTE FLOW DEPTH AT AP-47.10
*46' ROW, STD CURB SECTION, S=0.011
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
           MIN ELEV=100.00 MAX ELEV=101.00
           CH SLP=0.011  FP SLP=0.011  N=0.017
           DIST=46.00
           0.000 101.00   4.000 100.92   8.833 100.67
           9.000  100.00   11.000 100.13  23.000 100.37
           35.000 100.13  37.000 100.00  37.167 100.67
           42.000 100.92  46.000 101.00

                 RATING CURVE VALLEY SECTION  1.0
                   WATER      FLOW      FLOW      TOP
                  SURFACE     AREA      RATE     WIDTH
                   ELEV      SQ FT     CFS       FT
                  100.00      .00      .00       .00
```

100.05	.04	.03	1.65
100.11	.17	.22	3.29
100.16	.42	.58	6.87
100.21	.92	1.47	12.16
100.26	1.70	3.24	17.45
100.32	2.75	6.09	22.74
100.37	4.09	10.25	28.03
100.42	5.57	17.07	28.21
100.47	7.06	25.24	28.24
100.53	8.55	34.62	28.26
100.58	10.04	45.13	28.29
100.63	11.52	56.70	28.31
100.68	13.02	68.50	28.89
100.74	14.59	79.30	30.92
100.79	16.27	91.26	32.96
100.84	18.06	104.45	34.99
100.89	19.96	118.91	37.03
100.95	21.98	131.28	40.74
101.00	24.27	143.03	46.00

```
*
*
*
*S INTERNAL CHECK TOTAL FLOWS FROM AP-37 AND AP-1
ADD HYD          ID=48  HYD=48.1  ID I=40  ID II=44
PRINT HYD        ID=48  CODE=1
```

OUTFLOW HYDROGRAPH REACH 48.10

RUNOFF VOLUME = 1.65487 INCHES = 15.0429 ACRE-FEET
PEAK DISCHARGE RATE = 408.01 CFS AT 1.533 HOURS BASIN AREA = .1704 SQ. MI.

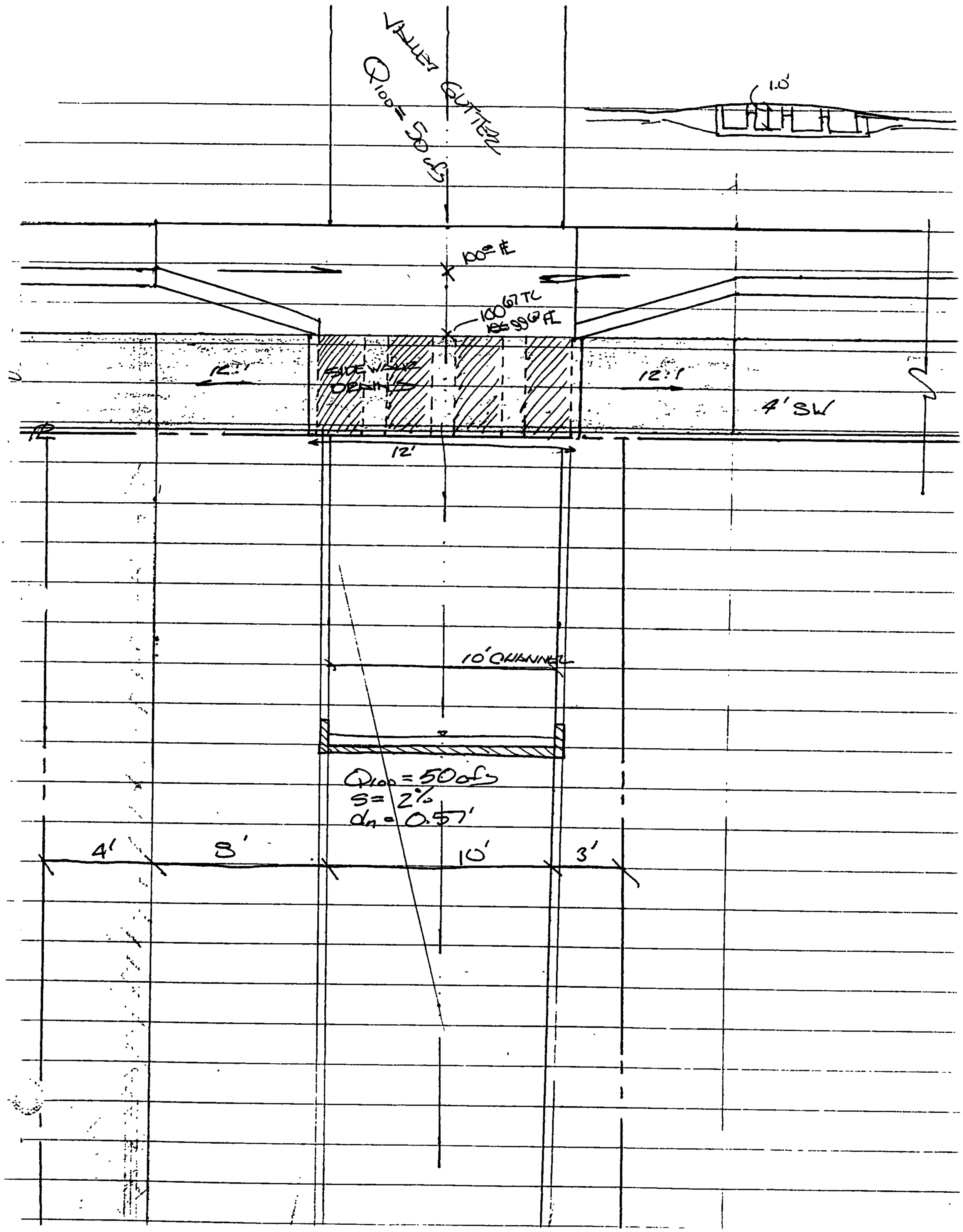
```
*
*
*
*S INTERNAL CHECK TOTAL FLOW FROM SUBDIVISION
ADD HYD          ID=49  HYD=49.F  ID I=48  ID II=23
PRINT HYD        ID=49  CODE=1
```

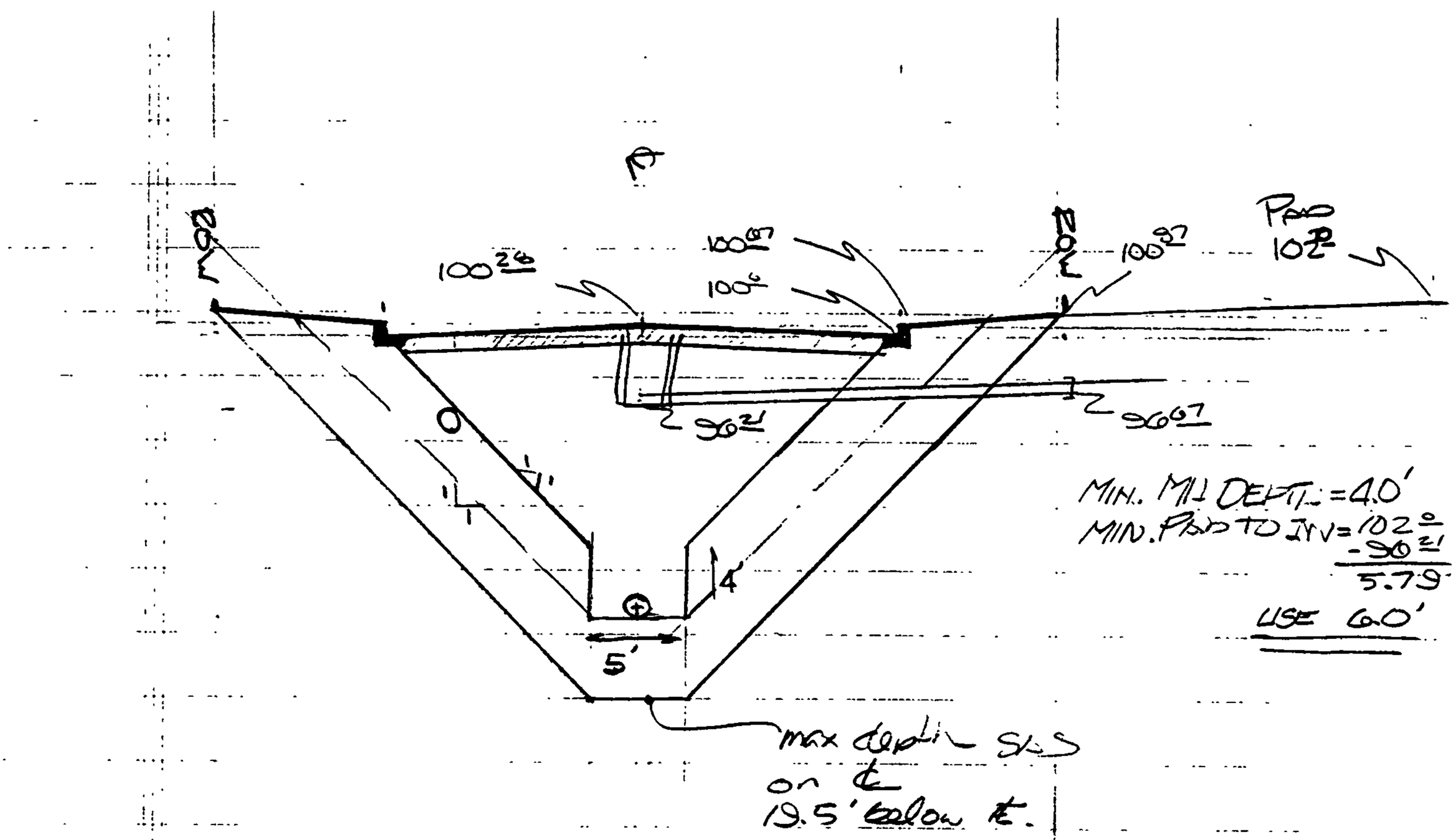
HYDROGRAPH FROM AREA 49.F

RUNOFF VOLUME = 1.65390 INCHES = 15.9620 ACRE-FEET
PEAK DISCHARGE RATE = 432.74 CFS AT 1.533 HOURS BASIN AREA = .1810 SQ. MI.

```
*
*
*
*
FINISH
```

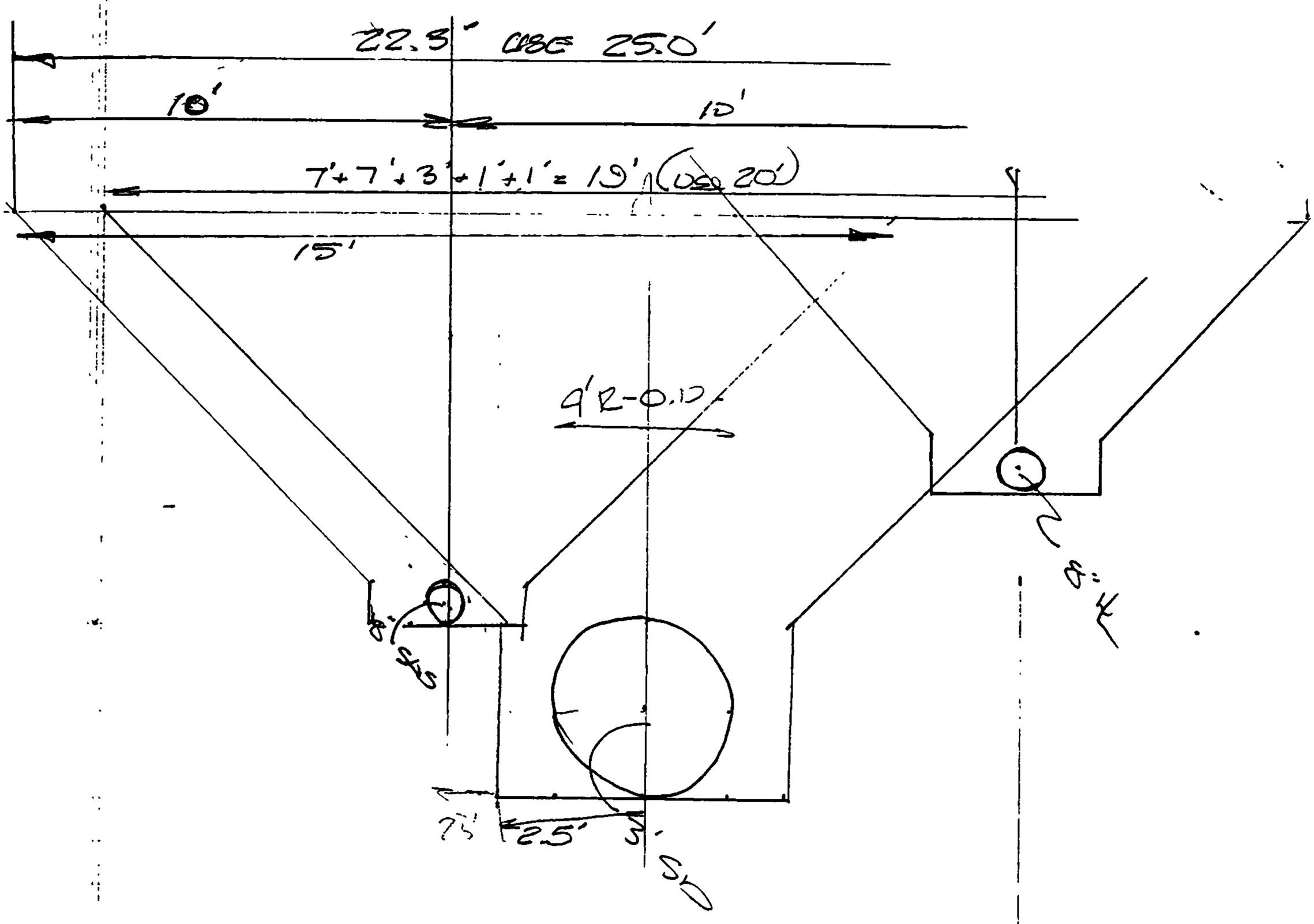
NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 14:48:19


VALLEY GUTTER
Q100 = 50 cfs
1.0'
100 FL
100.67 TC
99.67 FL
12:1
12:1
SIDEWALK OPENING
4' SW
12'
10' CHANNEL
Q100 = 50 cfs
S = 2%
dn = 0.57'
4'
8'
10'
3'



MIN. MI DEPTH = 4.0'
MIN. PAD TO INV = 102
- 96
5.79
USE 6.0'

SAS TRENCH PRISM
Willow Wood North



William Wood Nash
TRACT A UTILITIES
4-9-97

AVID ENGINEERING, INC.

INLET PLACEMENT

7.0

S = 1.0%

Q_{ST} = 46 CFS Q_{CAP} = 35 CFS

INLET CAPACITY ⇒ ½ STREET FLOW = 23 CFS, S = 1.0% ⇒ CAPACITY = 4.8 CFS

Q_{ST} = 46 − 9.6 = 36.4 CFS

$Q_{ST} > Q_{CAP}$

FIRST TWO INLETS IN BATTERY ⇒ 2 * 4.8 CFS = 9.6 CFS

2ND TWO INLETS ⇒ ½ STREET FLOW = 18.2 CFS ⇒ CAPACITY = 4.2 CFS

2 * 4.2 CFS = 8.4 CFS

Q_{ST} = 36.4 − 8.4 = 28.0 CFS REMAINING

Q_{PIPE} = 18.0 CFS

7.1

Q'_{ST} = 28.0 CFS Q_7 = 16 CFS S = 1.0%

Q_{ST} = 28.0 + 16.0 = 44.0 CFS Q_{CAP} = 43 CFS

FIRST TWO INLETS ⇒ ½ STREET FLOW = 22 CFS, ⇒ CAPACITY = 4.8 CFS

2 * (4.8 CFS) = 9.6 CFS

Q_{ST} = 44.0 CFS − 9.6 CFS = 34.4 CFS

2ND TWO INLETS ⇒ ½ STREET FLOW = 17.2 CFS ⇒ CAPACITY = 4.2 CFS

2 * (4.2 CFS) = 8.4 CFS

Q_S = 34.4 CFS − 8.4 CFS = 26 CFS

SP-7.1

7.2

Q_S = 26 CFS S = 1.3%

FLOW DEPTH = 0.46' FLOW AREA = 6.82 FT² V = 3.81 FT/S

$E = 0.46 + \frac{3.81^2}{64.4} = 0.69'$ EXCEEDING TOTAL ENERGY TO STAY BELOW TOP OF CURB.

ADD TWO INLETS TO REDUCE ENERGY.

½ STREET FLOW = 13 CFS ⇒ CAPACITY = 5.4 CFS

2 * (5.4 CFS) = 10.8 CFS

Q_S = 26 CFS − 10.8 CFS = 15.2 CFS FA = 4.87 FT²

$E = 0.39 + \frac{3.11^2}{64.4} = .54'$ ok FD = 0.39' V = 3.11 FT/S

PLACE INLETS AT SP-7.1 ⇒ 2 INLETS

Q_S = 15.2 CFS 7.2

PROJECT NAME WILLOW WOOD NORTH SHEET 1 OF

PROJECT NO. BY DATE

SUBJECT INLET PLACEMENT CH'D DATE

AVID ENGINEERING, INC.

(21.0)

Q_s = 15.2 CFS + 8 CFS = 23.2

S = 0.7%

FA = 7.67 Ft²
FD = 0.49 Ft
V = 3.02 Ft/s

SUMP CONDITION

Q_s ~ 23.2 CFS

~~AP-2~~ ~~AP-2~~ (33.0)

Q_{85} = 20 CFS S = 1%

FA = 6.28 Ft²
FD = 0.44 Ft
V = 3.18 Ft/s

E = 0.60'

@ 1.8% ⇒ Q = 41 CFS
FA = 8.14 Ft²
FD = 0.51 Ft
V = 5.04 Ft/s

E = 0.90 Ft
NEED TO FLATTEN GRADE TO CARRY PAST PHASE LINE

$Q_s = Q_{85} + Q_{33}$ = 20 + 21 = 41 CFS

FA = 9.21 Ft²
FD = 0.55
V = 4.45

E = 0.86'

S = 1% ⇒ Q = 41 CFS
FA = 9.74 Ft²
FD = 0.57 Ft
V = 4.21 Ft/s

E = 0.85'

S = 0.7% ⇒ Q = 41 CFS
FA = 10.84 Ft²
FD = 0.61 Ft
V = 3.78 Ft/s

E = .83'

S = 0.6% ⇒ Q = 41 CFS
FA = 11.37 Ft²
FD = 0.62 Ft
V = 3.61 Ft/s

E = 0.82'

MAKE SLOPE 0.6% TO HOLD WATER W/IN RIGHT OF WAY AND REMOVE WATER WITH INLETS PLACED AT IN LATER PHASE.

PROJECT NAME Willow Wood North SHEET 2 OF
PROJECT NO. BY DATE
SUBJECT Inlet Placement CH'D DATE

AVID ENGINEERING, INC.

29.0

$Q_{ST} = 41$ CFS $S = 0.6\%$

$\frac{1}{2} Q_S = 20.5$ CFS ⇒ CAPACITY = 4.8 CFS

$2 * (4.8 \text{ CFS}) = 9.6$ CFS

FA: 9.67 FD = 0.568' V = 3.25 FT/S

$Q_{ST} = 41 - 9.6 = 31.4$ CFS E = 0.732 TAKE MORE FLOW OUT

2ND SET OF INLETS

$Q_{ST} = 31.4$ CFS, $\frac{1}{2} Q_S = 15.7$ CFS ⇒ CAPACITY = 4.0 CFS

$2 * (4 \text{ CFS}) = 8$ CFS

$Q_{ST} = 31.4 \text{ CFS} - 8 \text{ CFS} = 23.4$ CFS

$Q_S = 23.4$ CFS

S = 0.9% ⇒ $Q_S = 23.4$ CFS FD = 0.47 FT

FA = 7.16 FT²

V = 3.27 FT/S

E = 0.64' OK

SP-29.1 29.1

$Q_S = 23.4 + Q_{29} = 23.4 + 20 = 43.4$ CFS

S = 0.9% FA = 10.40 FT² E = 0.86

FD = 0.59 FT INLETS NEEDED TO REDUCE ENERGY

V = 4.17 FT/S

$Q_S = 43.4$ CFS, S = 0.9%

$\frac{1}{2} Q_S = 21.7$ CFS ⇒ CAPACITY = 4.6 CFS FIRST SET OF INLETS

$2(4.6 \text{ CFS}) = 9.2$ CFS

$Q_S = 43.4 \text{ CFS} - 9.2 \text{ CFS} = 34.2$ CFS FA = 9.00 FT²

FD = 0.545 FT

V = 3.8 FT/S

2ND SET OF INLETS E = 0.77 FT TWO MORE INLETS

$\frac{1}{2} Q_S = 17.1$ CFS ⇒ CAPACITY = 4.0 CFS

$2 * (4.0 \text{ CFS}) = 8.0$ CFS

$Q_S = 34.2 - 8.0 \text{ CFS} = 26.2$ CFS

$Q_S = 26.2$ CFS

45.0

CHECK FLOW ENERGY AT S = 0.8%

$Q_S = 26.2$ CFS FA = 7.93 FT²

E = 0.68 FT FD = 0.51 FT

V = 3.30 FT/S

OK TILL SUMP CONDITION @ 4

$Q_S = 26.2$ CFS

PROJECT NAME WILLOW WOOD NORTH SHEET 3 OF

PROJECT NO. BY DATE

SUBJECT INLET PLACEMENT CH'D DATE

AVID ENGINEERING, INC.

~~AP-3~~, ~~AP-4~~

BASIN 25 TRY TO ROUTE DOWN BUFFALO RIVER RD

25.0 $Q_{25} = 24$ CFS

$S_1 = 1.9\%$ ⇒ $Q_{CAP} = 38.5$ CFS ok ~~AP-3~~ (25.0)

$S_2 = 1.7\%$ ⇒ $Q_{CAP} = 39$ CFS ok ~~AP-4~~ (25.1)

$S_3 = 0.9\%$ ⇒ $Q_{CAP} = 44$ CFS ok ~~AP-5~~

$S_4 = 2.0\%$ ⇒ $Q_{CAP} = 37$ CFS ok ~~AP-6~~

BASIN 23 (23.0)

$Q_{23} = 14$ CFS SLOPE ON DESCHUTES = 1.2%

$Q_{CAP} = 42$ CFS

PICK UP FLOW BEFORE BUFFALO RIVER RD.

INLET CAPACITY FOR S = 1.2%, HALF STREET FLOW OF 7CFS IS 1.65CFS

2x 1.65CFS = 3.3CFS NOT EFFICIENT

ROUTE FLOW TO BUFFALO RIVER RD. AND PICK UP THERE FOR MORE EFFICIENT USE OF INLET.

AT (23.0) Q = 24+14 = 38CFS

INLET CAPACITY FOR S=0.9%, HALF STREET FLOW OF 19CFS, IS ~~3.7~~ 5.2 7.1CFS

~~2x 3.7CFS = 7.4CFS~~ 10.4 7.1CFS x (2) = 14.2 CFS INTERCEPTED

Q_S = 38CFS - 14CFS = 24CFS OVERFLOW

~~38CFS~~ ~~38.0~~ CFS
~~- 24CFS~~ ~~10.4~~ CFS
~~30.6CFS~~ ~~27.6~~ CFS ~~REMAINING STREET FLOW ON BUFFALO RIVER RD~~

PLACE TWO TYPE "A" INLETS ON BUFFALO RIVER RD @ (23.0)

BASIN 21 (21.0)

$Q_{21} = 14$ CFS SLOPE ON WINEMA CT = 1.5% ⇒ $Q_{CAP} = 40$ CFS

ROUTE FLOW TO BUFFALO RIVER RD. TO MAXIMIZE INLET EFFICIENCY

Q_S = ~~27.6~~ 24 + 14 = ~~41.6~~ 38 CFS S = 2.0% ⇒ Q_{CAP} = 37CFS

INLET CAPACITY FOR 2.0%, HALF STREET FLOW OF 20.8CFS IS ~~5.5~~ 10.5 CFS

~~2x 5.5CFS = 11CFS~~ ~~41.6CFS~~ 38CFS - 21CFS = 17CFS OVERFLOW

2x 10.5CFS = 21 CFS ~~11.0CFS~~

~~30.6 CFS~~ ~~REMAINING ON STREET~~

SECOND SET OF INLETS ⇒ CAPACITY FOR 2.0%, HALF STREET FLOW = 15.3CFS IS 4.7CFS

2x 4.7CFS = 9.4CFS ~~30.6CFS~~ 17CFS - 10CFS = 7CFS OVERFLOW

2x 5.0CFS = 10CFS ~~9.4CFS~~

21.2 CFS ~~REMAINING ON STREET~~

~~Q_S = 21.2CFS TO SUMP CONDITION @ (39.2)~~ Q_S = 7CFS TO (39.2)

PROJECT NAME WILLOW WOOD NORTH SHEET 4 OF

PROJECT NO. BY DATE

SUBJECT INLET PLACEMENT CH'D DATE

AVID ENGINEERING, INC.

39.0

$Q_S = Q_{43} + Q_{41} = 24 + 14 = 38$ CFS

S = 0.7% FA = 10.36 FT² d = 0.59' V = 3.67 FT/S E = 0.80'

S = 0.6% FA = 10.85 FT² d = 0.61' V = 3.50 FT/S E = 0.80'

ROW IS NOT FLOODED HOLD FLOW TILL PHASE BOUNDRY

39.1 PICK UP FLOW FROM 43+41 AND 60% OF 39

$Q_S = 38 + 0.60(12.6) = 46.6$ CFS

S = 1.1% 1ST SET OF INLETS

d = 0.63 CAPACITY = 8.4 CFS EACH ⇒ 16.8 CFS INTERCEPTED

Q_S = 46 CFS − 17 CFS = 29 CFS OVER FLOW

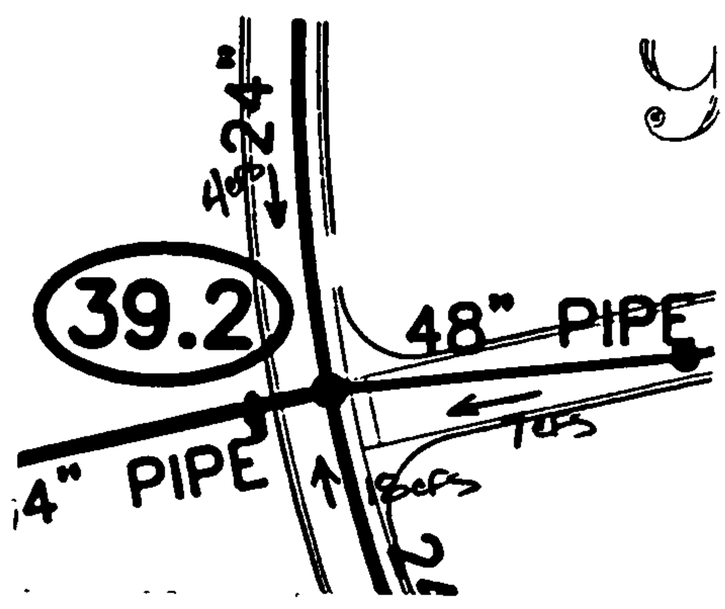
2ND SET OF INLETS

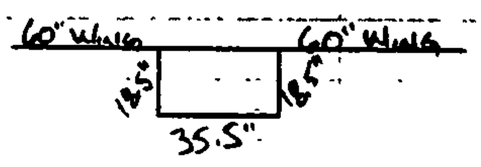
d = 0.49' CAPACITY = 5.4 CFS EACH ⇒ 10.8 CFS INTERCEPTED

Q_S = 29 CFS − 11 CFS = 18 CFS

39.2

FLOW ENTERING AP-39.2:





FLOW INTO SUMP CONDITION

Q_S = 4 CFS + 7 CFS + 18 CFS = 29 CFS

USE SINGLE GRATE DOUBLE WING TYPE A INLET

HEAD = 0.67'

FLOW WILL NOT TOP CURB

3-SIDED WEIR ($h \le 0.83'$)

$Q = 3.3\,P h^{1.5}$

$P = 2\left(\frac{60''}{12''/ft}\right) + 2\left(\frac{18.5''}{12''/ft}\right) + \frac{35.5''}{12''/ft}$

P = 16.04 ft

$Q = 52.9\,h^{1.5}$

$29 = 52.9\,h^{1.5}$

$h = 0.67'$

PROJECT NAME Willow Wood North SHEET 5 OF

PROJECT NO. BY DATE

SUBJECT Inlet Placement CH'D DATE

AVID ENGINEERING, INC.

(13.0)

$Q_3 = Q_3 + Q_5 = 17cfs + 14cfs = 31cfs$

$S = 1.0\%$ 1ST SET OF INLETS $d = 0.52$ CAPACITY = 6cfs EACH ⇒ 12cfs INTERCEPTED

$Q_5 = 31cfs - 12cfs = 19cfs$ OVERFLOWED

2ND SET OF INLETS

$d = 0.44$ CAPACITY = 4.3cfs EACH ⇒ 8.6cfs INTERCEPTED

$Q_5 = 19cfs - 8.6cfs = 10.4cfs$

$Q_5 = 10.4cfs$ OVERFLOW

(13.1)

$Q_5 = Q_{13} + Q_{15} = 12 + 16 = 28cfs$

$S = 1.9\%$ 1ST SET OF INLETS

$d = 0.45$ CAPACITY = 6.4cfs EACH ⇒ 12.8cfs INTERCEPTED

$Q_5 = 28cfs - 12.8cfs = 15.2cfs$ OVERFLOW

2ND SET OF INLETS

$d = 0.38$ CAPACITY = 4.5cfs ⇒ 9.0cfs INTERCEPTED

$Q_5 = 15.2 - 9.0 = 6.2cfs$ OVERFLOW

(19.1)

OVERFLOW FROM ANALYSIS POINTS 13.0 AND 13.1 FLOW TO ANALYSIS POINT 19.1 $S = 1.7\%$

$Q_5 = 10.4cfs + 6.2cfs = 16.6cfs$ OVERFLOW

CHECK ENERGY

$FA = 4.76\ ft^2$

$d = 0.39'$

$V = 3.50\ ft/s$

$E = 0.39' + \frac{3.50^2}{64.4} = 0.58'$ ok

(19.0) ADD 1/2 PEAK FLOW FROM BASIN 19 TO STREET FLOW

$Q_5 = 16.6cfs + 1/2(13cfs) = 23.1cfs$

$S = 1.7\%$ 1ST SET OF INLETS, $d = 0.43$, CAPACITY = 6.0cfs ⇒ 12cfs INTERCEPTED

$Q_5 = 23cfs - 12cfs = 11cfs$

2ND SET OF INLETS

$d = 0.35$, CAPACITY = 3.5cfs ⇒ 7cfs INTERCEPTED

$Q_5 = 11cfs - 7cfs = 4cfs$ OVERFLOW TO (39.2)

PROJECT NAME Willow Wood North SHEET 6 OF

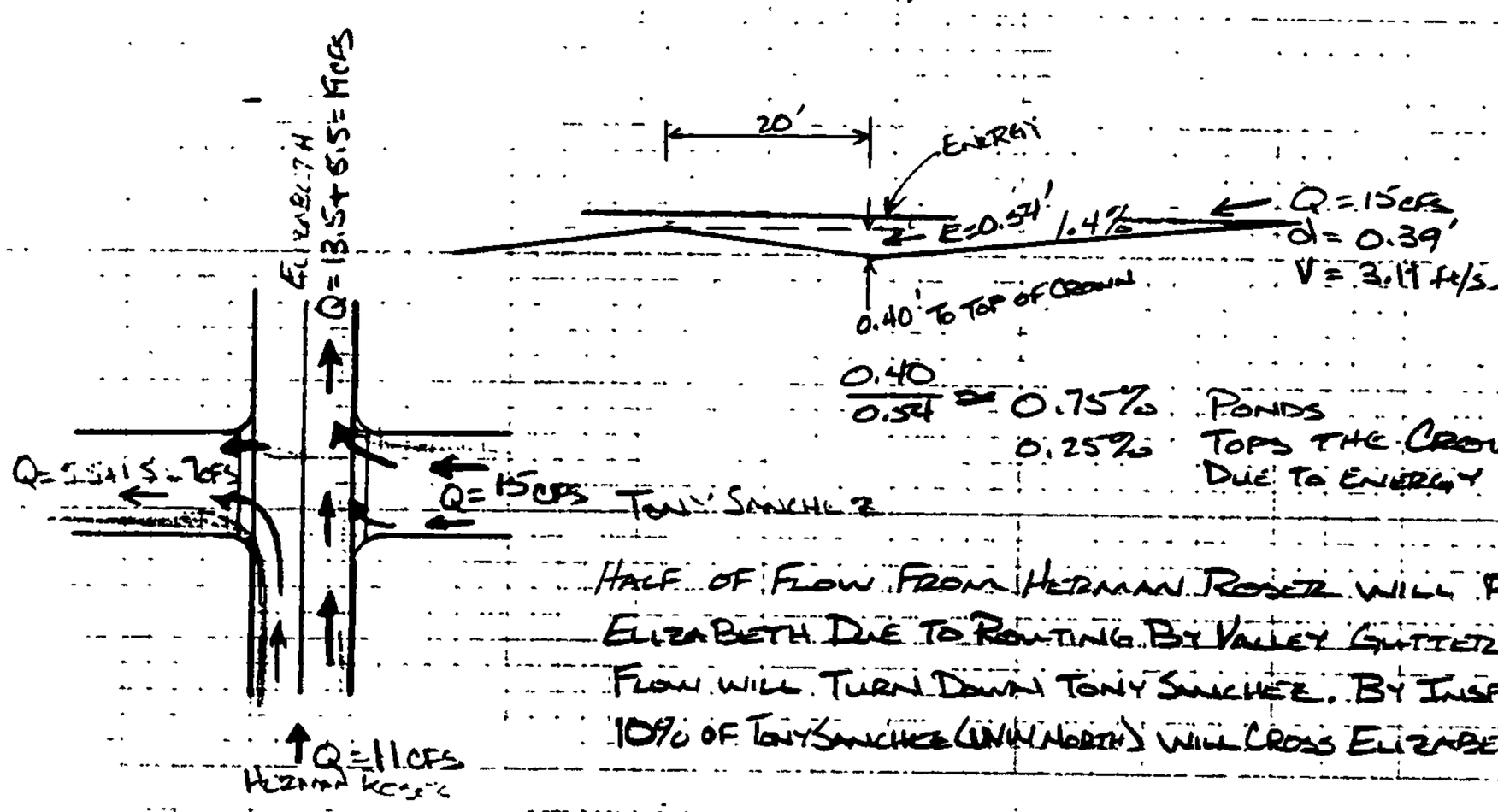
PROJECT NO. BY DATE

SUBJECT Inlet Placement CH'D DATE

AVID ENGINEERING, INC.

(55.0)

THE STORM FLOW FROM WW NORTH SUB-BASIN 55 CAN BE ROUTED DOWN ELIZABETH OR CONTINUE DOWN TONY SANCHEZ. AT THE INTERSECTION OF TONY SANCHEZ / ELIZABETH / HERMAN ROSER THE FLOWS FROM WW NORTH SUB-BASIN 55 AND WW UNIT IV SUB-BASIN A-6 MEET. A PREVIOUS ANALYSIS DETERMINED THAT ROUTING 100% OF FLOW ENTERING THE INTERSECTION DOWN TONY SANCHEZ WOULD RESULT IN COMBINED FLOWS EXCEEDING THE CAPACITY OF THE INLETS AND SOME STREETS IN UNITS IV AND V. THEREFORE THE FLOWS WILL BE SPLIT AT THE INTERSECTION BY USING VALLEY GUTTERS AND LEANING THE NORMAL CROWN ON ELIZABETH / HERMAN ROSER



$\frac{0.40}{0.54} = 0.75\%$ PONDS

0.25% TOPS THE CROWN DUE TO ENERGY

HALF OF FLOW FROM HERMAN ROSER WILL FLOW DOWN ELIZABETH DUE TO ROUTING BY VALLEY GUTTER THE REMAINING FLOW WILL TURN DOWN TONY SANCHEZ. BY INSPECTION APROX. 10% OF TONY SANCHEZ (WW NORTH) WILL CROSS ELIZABETH ($Q_{10\%} = 1.5$ CFS)

FLOW DEPTHS

ELIZABETH ⇒ $Q_5 = 19$ CFS $d = 0.55'$ FLOW CONCENTRATED ON RIGHT SIDE OF ELIZABETH.

~~47.0~~ (53.0)

$Q_5 = 19\text{CFS} + 20\text{CFS} = 39\text{CFS}$

$S = 1.00\%$ $d = 0.55'$

$V = 3.6$ ft/s

$E = 0.55' + \frac{3.6^2}{64.4} = 0.75'$

ENERGY WILL TOP CURB, ~~INLETS NEEDED TO REDUCE ENERGY~~ ENERGY CONTAINED IN R.O.W WILL PICK UP FLOW TO REDUCE ENERGY @ AP 37.0

(37.0)

1st SET OF INLETS

$Q_5 = 39$ CFS, ~~d=0.7'~~, $S = 1.5\%$, TWO TYPE A'S

$\frac{1}{2} Q_5 = 19.5$ CFS ⇒ CAPACITY = 10 CFS 1ST SET $d = 0.52$

$Q_5 = 39\text{CFS} - 2(10\text{CFS}) = 25$ CFS OVERFLOW CHECK ENERGY ⇒ $d = 0.46'$

~~CHECK ENERGY @ GRADE CHANGE~~ (37.0)

~~$Q_5 = 19$ CFS, $d = 0.42$, $S = 1.5\%$~~

~~$V = 3.25$ ft/s~~ ~~$E = 0.58'$ ok~~

$V = 3.5$ ft/s

$E = 0.65'$

$E = 0.65'$

FLOW OK

PROJECT NAME Wilson Woods North SHEET 7 OF

PROJECT NO. BY DATE

SUBJECT Inlet Placement CH'D DATE

AVID ENGINEERING, INC.

(37.1)

CHECK ENERGY FOR CHANGE IN GRADE, APPLY @ 60% OF FLOW FOR BASIN 37 TO STREET FLOW

$Q_S = 19\text{CFS} + .6(80\text{CFS}) = \underline{24\text{CFS}}$ OVERFLOW

$\frac{1}{2}Q_S = 12\text{CFS}$ $d = 0.47'$ $V = 3.2\text{FT/S}$ $E = 0.47' + \frac{(3.2)^2}{64.4} = 0.63'$

ENERGY IS OK TO SUMP CONDITION @ (37.2), THEREFORE NO DROP INLETS ARE REQUIRED @ (37.1). FLOW CONTINUES TO SUMP @ (37.2)

(1.0)

CHECK ENERGY

$\underline{Q_S = 2\text{CFS}}$, $S = 0.7\%$

$\frac{1}{2}Q_S = 1\text{CFS}$ $d = 0.25'$ $V = 1.5\text{FT/S}$ $E = 0.25 + \frac{1.5^2}{64.4} = 0.28'$

ENERGY IS OK

(17.0)

CHECK ENERGY AFTER GRADE CHANGE, APPLY ½ FLOW FROM SUB-BASIN 17

$Q_S = 2\text{CFS} + .5(4) = \underline{4\text{CFS}}$, $S = 0.83\%$

$d = 0.29'$ $V = 1.8\text{FT/S}$ $E = 0.29 + \frac{1.8^2}{64.4} = 0.34'$

ENERGY OK, STREET FLOW CONTINUES TO SUMP CONDITION @ (37.2)

(37.2)

$Q_S = 27\text{CFS}$ FROM SUB-BASIN 37

$Q_S = \underline{6\text{CFS}}$ FROM SUB-BASIN 17

$Q_S = 33\text{CFS}$ ⇐ TOTAL STREET FLOW TO BE REMOVED

2-1 DOUBLE WINGED - SINGLE GRATE TYPE A INLET

$Q = 52.9h^{1.5}$ (3-SIDED WEIR, SO THAT FLOW WILL NOT TOP CURB)

$Q = 52.9(.83)^{1.5} = 40.0\text{CFS}$ PER INLET

TOTAL CAPACITY OF STREET 80 CFS W/OUT TOPPING CURB.

½ FLOW = 16.5CFS ⇒ $16.5\text{CFS} = 52.9h^{1.5}$

$h = 0.46'$

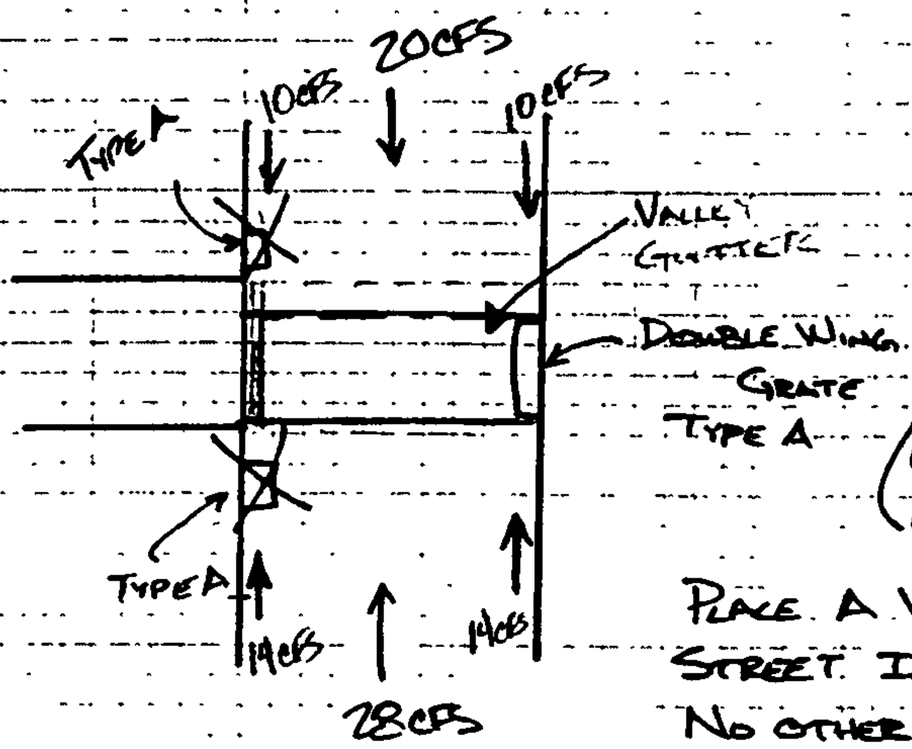
PROJECT NAME Willow Wood North SHEET 8 OF

PROJECT NO. BY DATE

SUBJECT Inlet Placement CH'D DATE

AVID ENGINEERING, INC.

49.0



FOR DOUBLE GRATE - DOUBLE WING TYPE A INLET

Q = 47.4 CFS FOR h ≤ 0.83'
FLOW DOES NOT TOP CURB

Q = 64.3 CFS FOR h ≤ 1.0'
FLOW STAYS W/IN R.O.W.

(CAPACITIES BASED ON ORFICE AND WEIR EQUATIONS.)

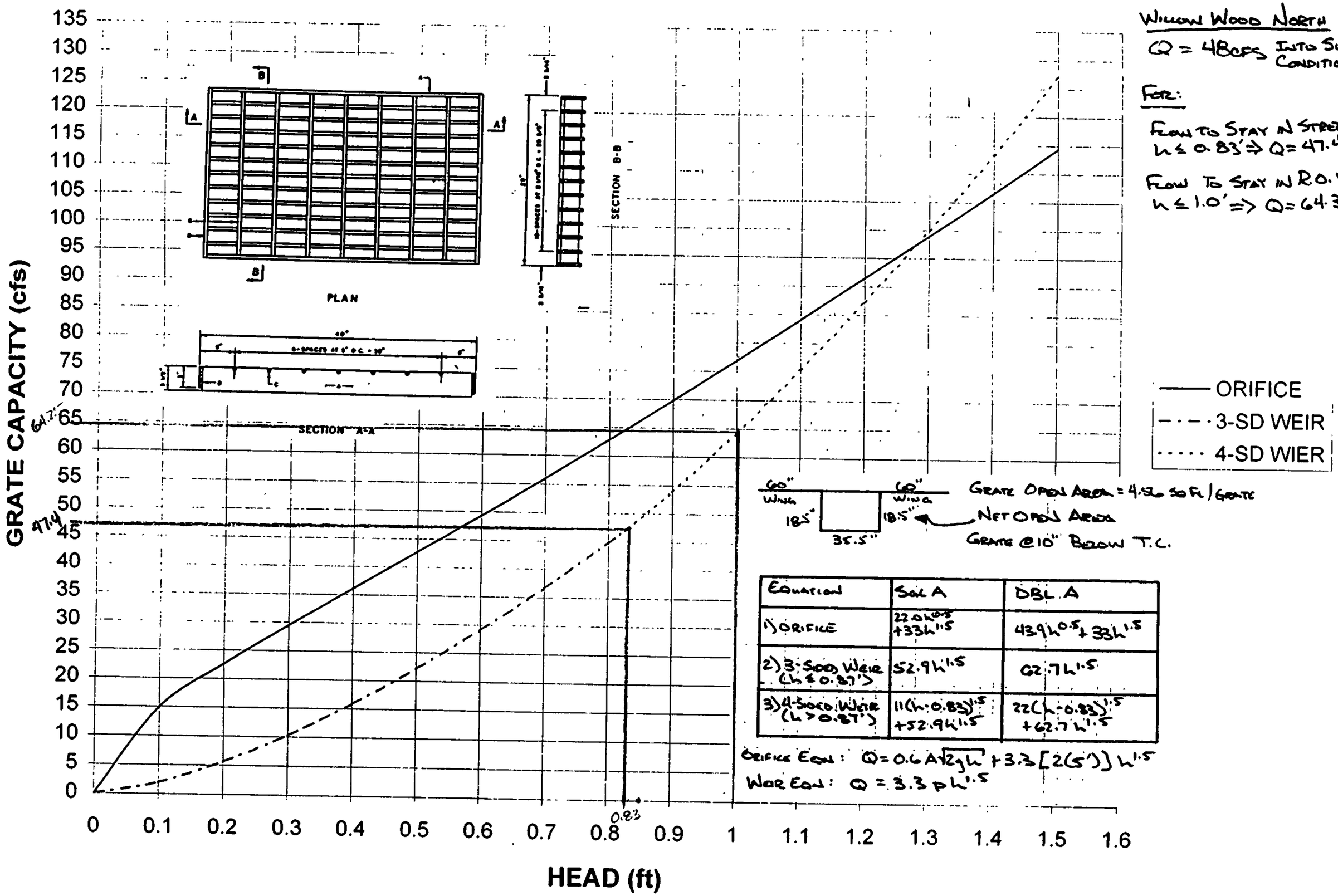
PLACE A VALLEY GUTTER TO ROUTE FLOW ACROSS STREET INTO DOUBLE GRATE-DOUBLE WING TYPE A. NO OTHER INLETS ARE NEEDED.

100% OF FLOW ROUTED TO STORM SEWER

PROJECT NAME WILLOW WOOD NORTH SHEET ____ OF ____
PROJECT NO. ____ BY ____ DATE ____
SUBJECT INLET PLACEMENT CH'D ____ DATE ____

TYPE A DOUBLE WINGED-DOUBLE GRATE INLET

49.0



Willow Wood North

Q = 48cfs Into Sump Condition

For:

Flow to Stay in Street
$h \le 0.83' \Rightarrow Q = 47.4cfs$

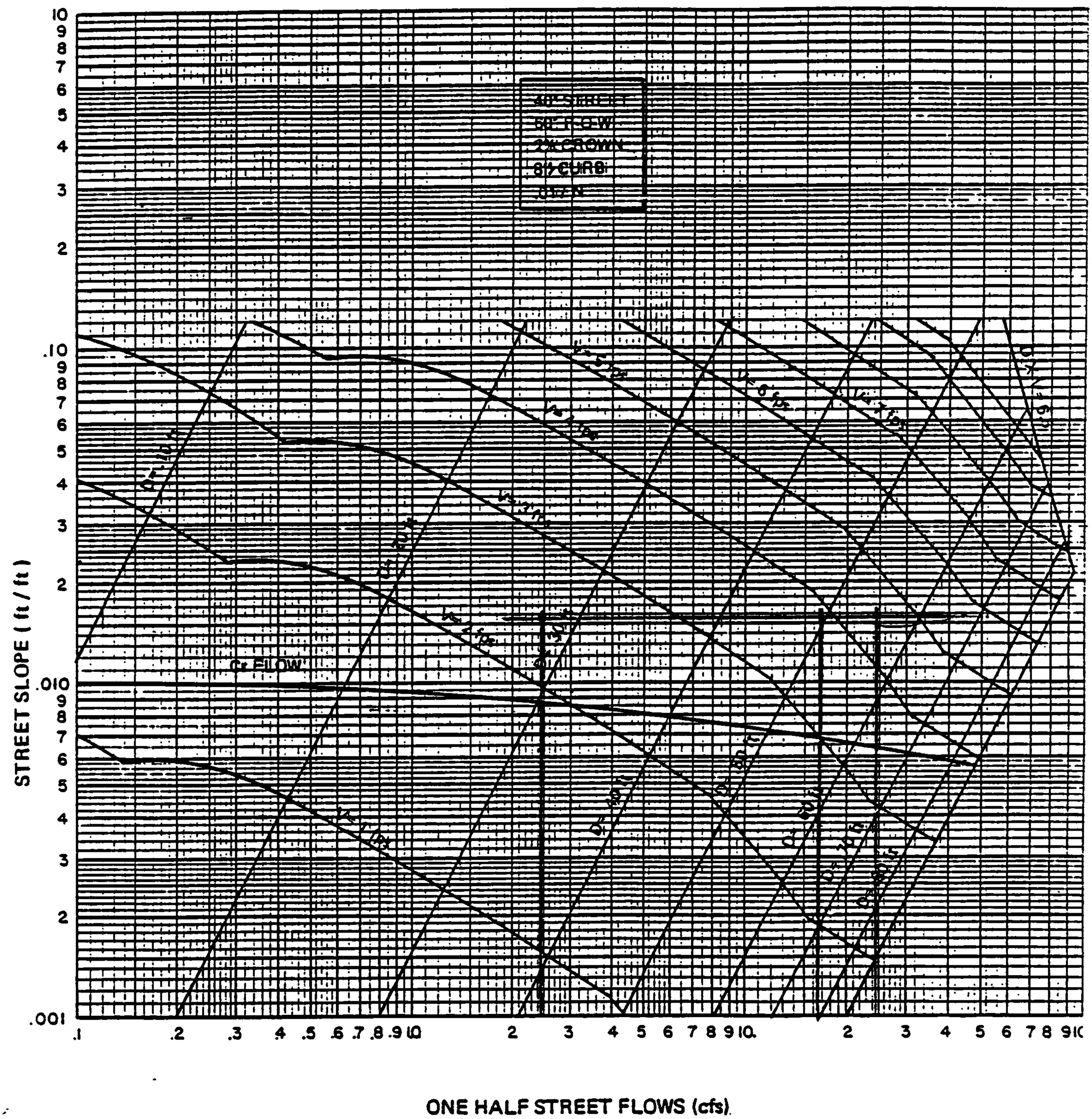
Flow to Stay in R.O.W
$h \le 1.0' \Rightarrow Q = 64.3cfs$

Equation	Sol A	DBL A
1) Orifice	$22.0h^{0.5} + 33h^{1.5}$	$43.9h^{0.5} + 33h^{1.5}$
2) 3-SD Weir ($h \le 0.87'$)	$52.9h^{1.5}$	$62.7h^{1.5}$
3) 4-SD Weir ($h > 0.87'$)	$11(h-0.83)^{1.5} + 52.9h^{1.5}$	$22(h-0.83)^{1.5} + 62.7h^{1.5}$

Orifice Eqn: $Q = 0.6A\sqrt{2gh} + 3.3[2(5')]h^{1.5}$

Weir Eqn: $Q = 3.3ph^{1.5}$

STREET CAPACITY

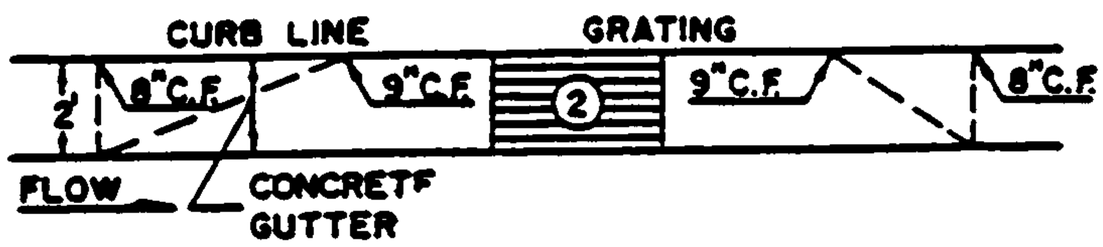


REV. 3-83

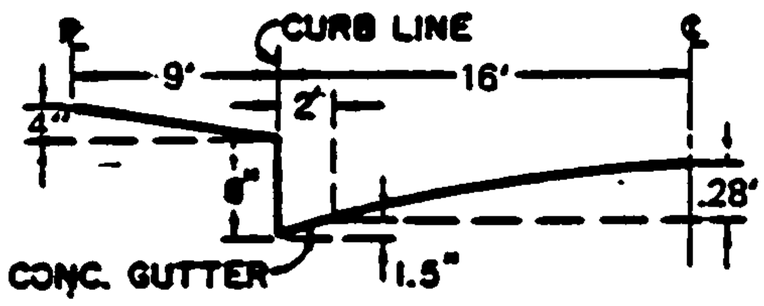
PLATE 22.3 D-2

S=0.6%

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN

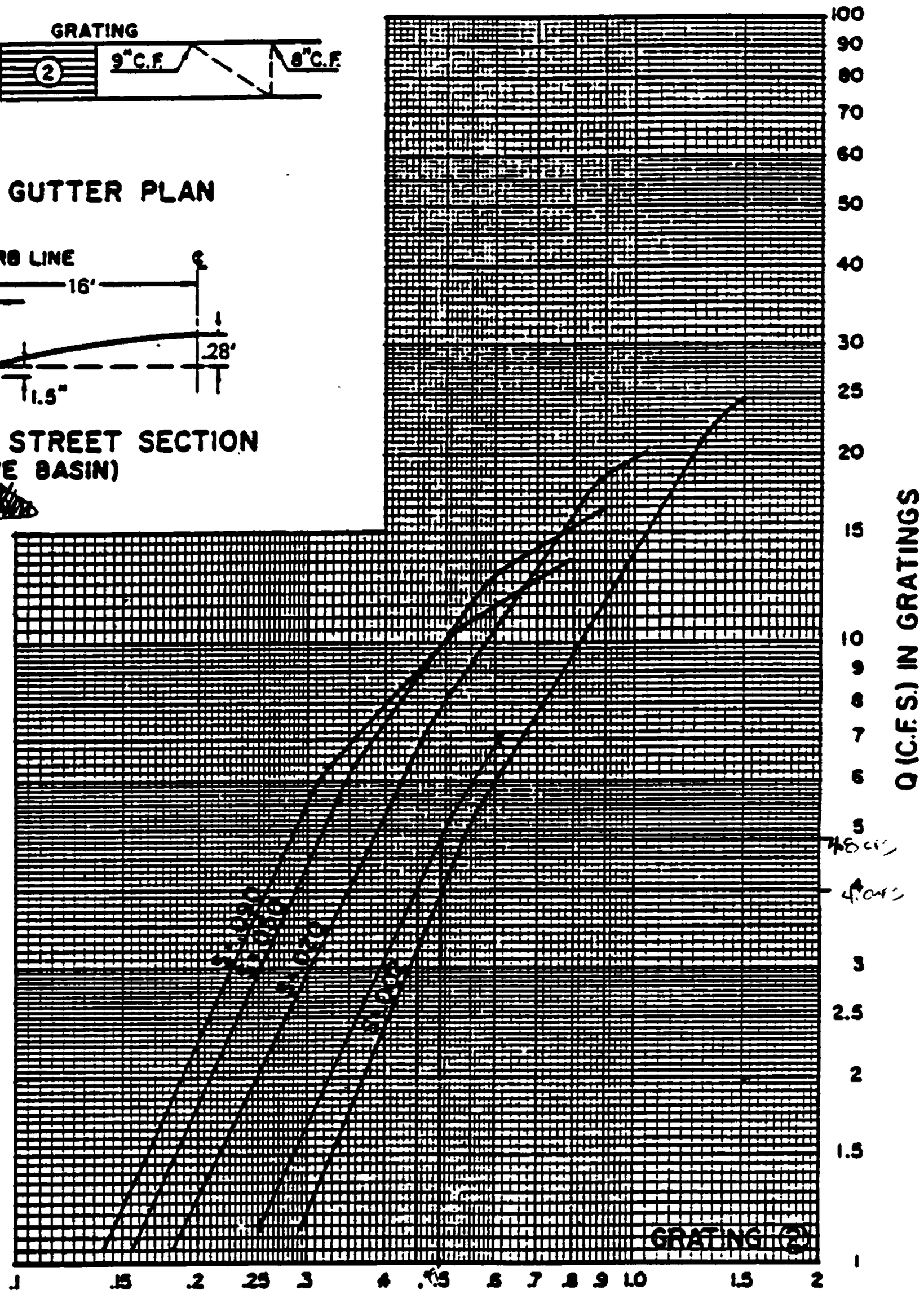


TYPICAL HALF STREET SECTION
(ABOVE BASIN)

29.0

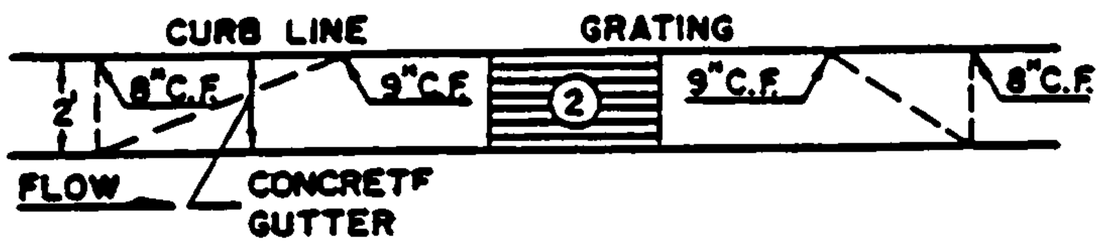
1ST SET OF INLETS
Q_s = 41 CFS, S=0.6%
½ Q_s = 20.5 CFS
FLOW DEPTH = 0.49 FT

2ND SET OF INLETS
Q_s = 31.4 CFS, S=0.6%
½ Q_s = 15.7 CFS
FLOW DEPTH = 0.45

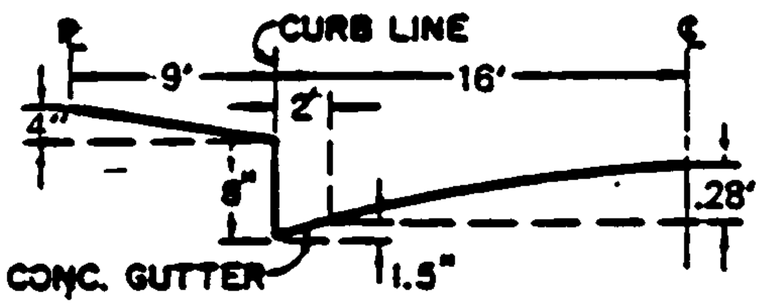


S=0.9%

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

29.1

SP-29.1

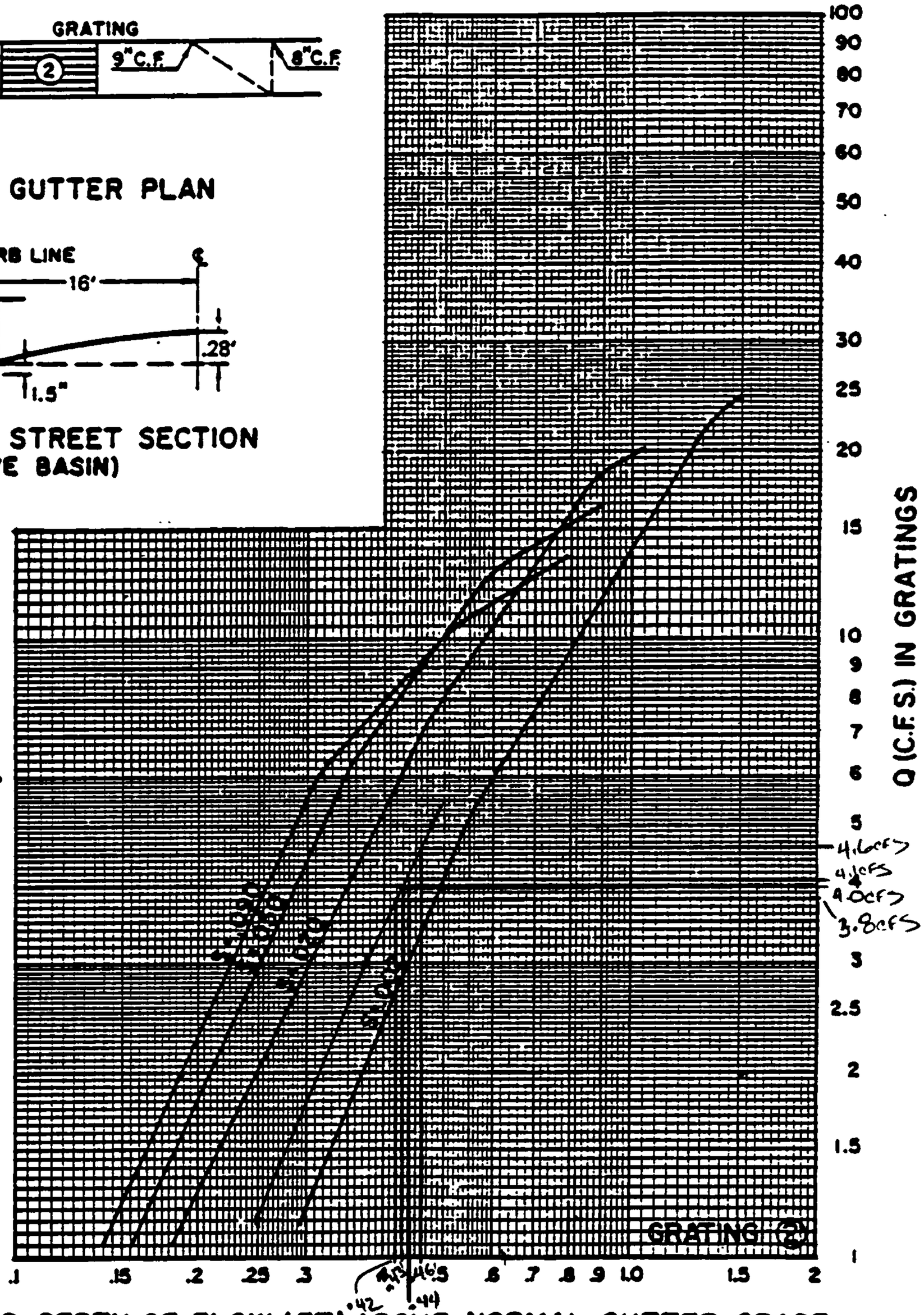
1ST SET OF INLETS
Q_S = 43.4CFS, S=0.9%
1/2 Q_S = 21.7CFS
FLOW DEPTH = 0.46'

2ND SET OF INLETS
1/2 Q_S = 17.1CFS, S=0.9%
FLOW DEPTH = 0.43'

23.0

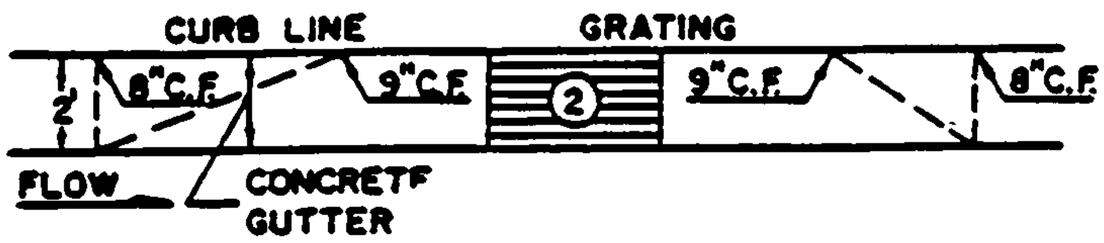
1ST SET
Q_S = 38CFS S=0.9%
1/2 = 19CFS
FLOW DEPTH = 0.44

2ND SET
Q_S = 29.8CFS, S=0.9%
1/2 Q_S = 14.9CFS
FLOW DEPTH = 0.42

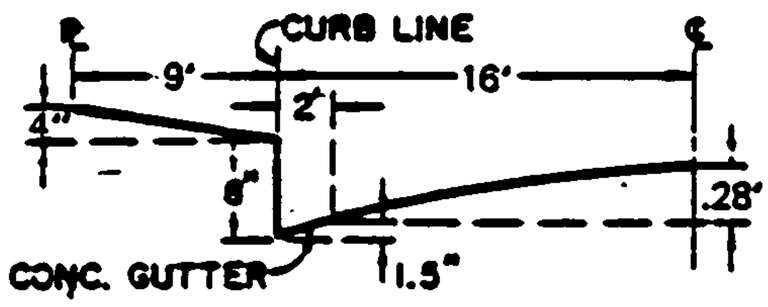


S=0.9%

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

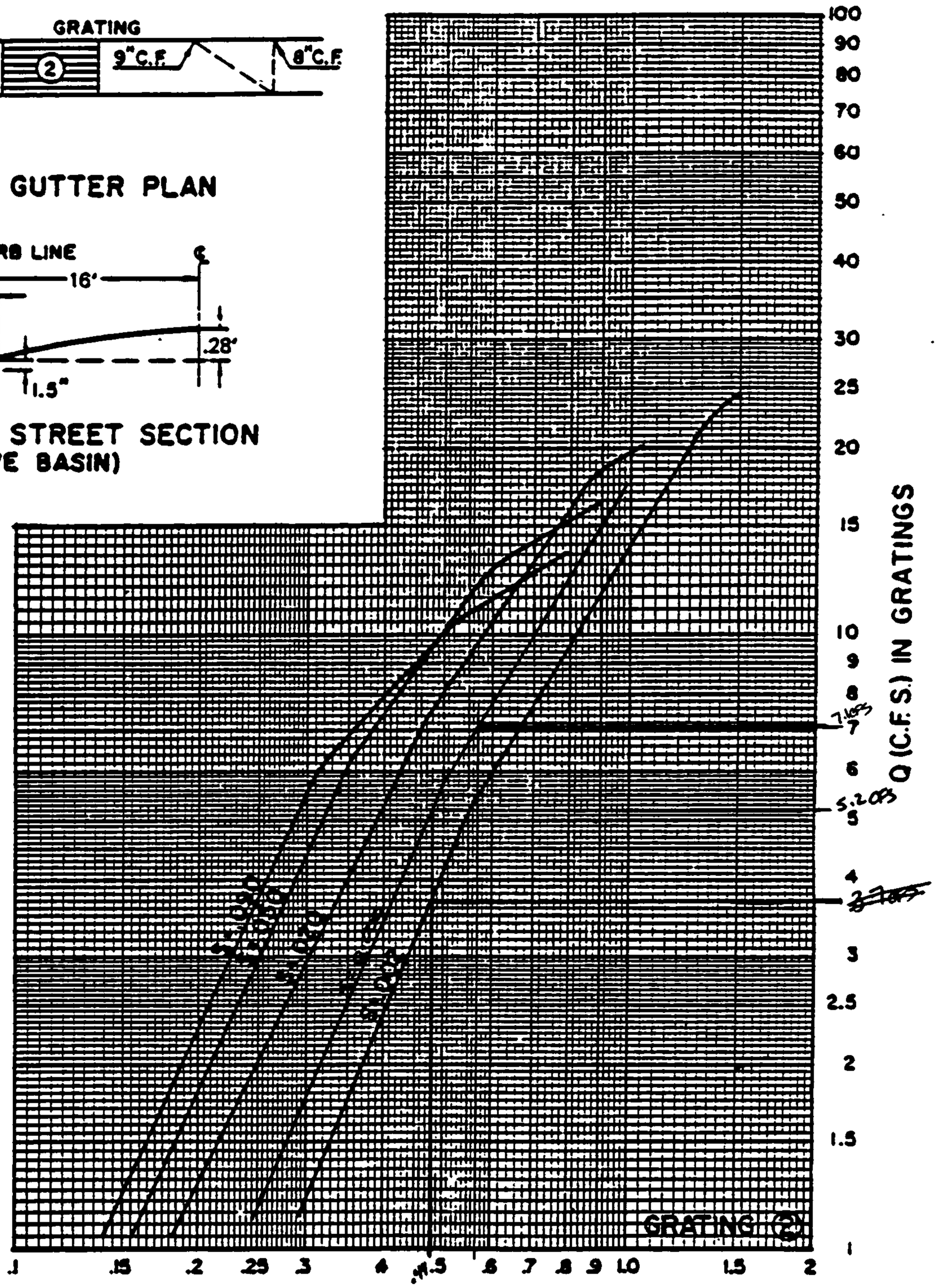
39.1

~~ANALYSIS POINT-9~~

Q=38cfs, S=0.9%

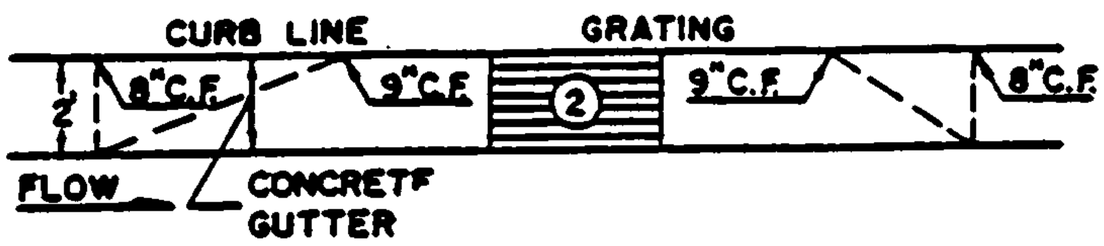
1/2 STREET Q=19cfs

DEPTH=0.44'

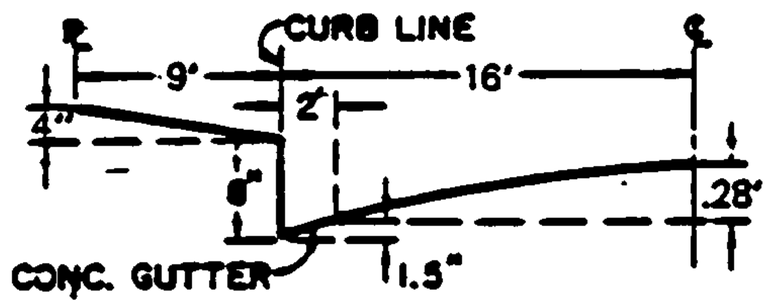


S=1.0%

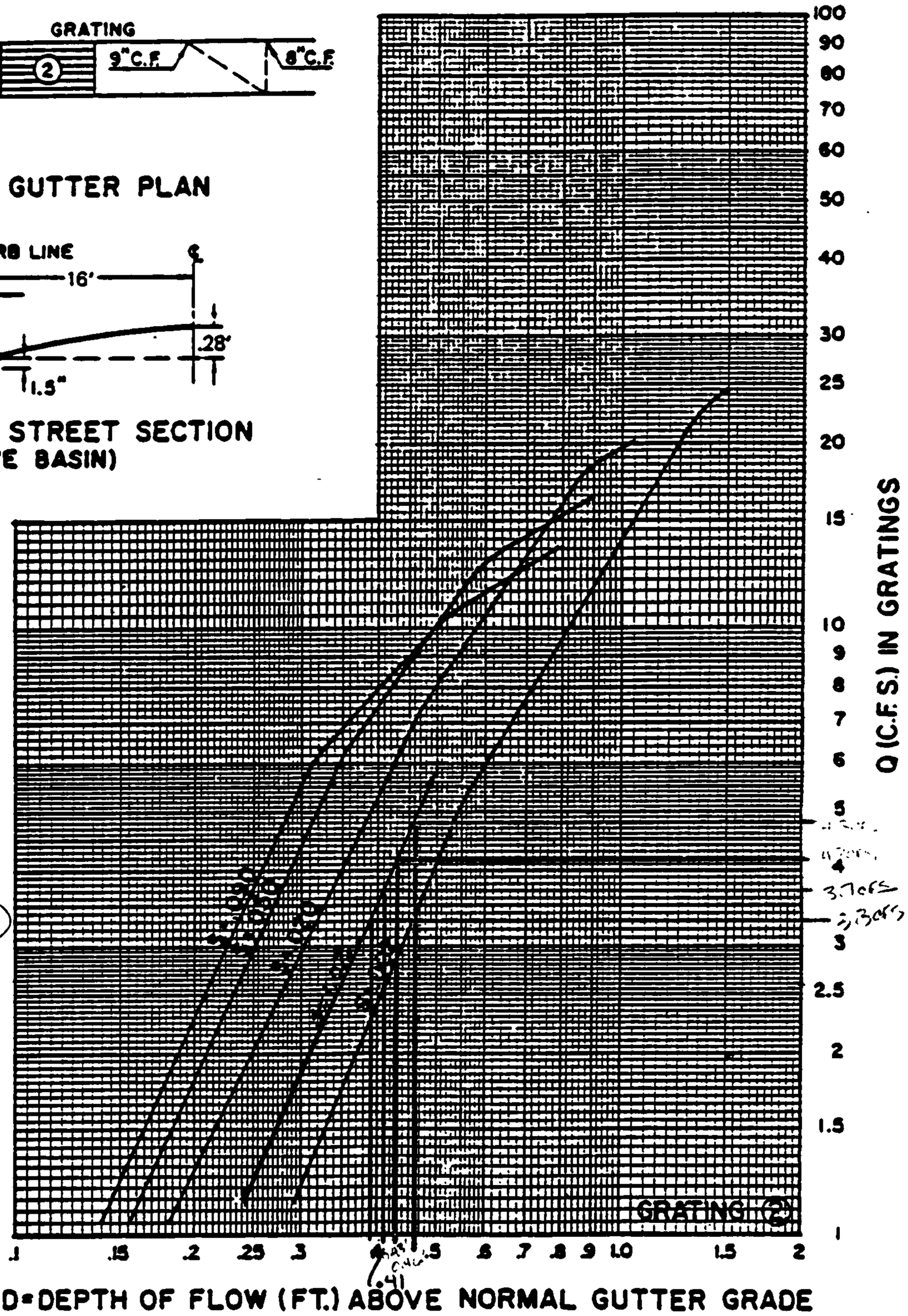
GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)



7.0

~~[illegible]~~

SET OF INLETS
Q_S = 46CFS, S=1.0%
½ FLOW = 23CFS
FLOW DEPTH = 0.46 FT

½ SET OF INLETS
Q_S = 36.4CFS, S=1.0%
½ STREET FLOW = 18.2CFS
FLOW DEPTH = 0.43

13.0

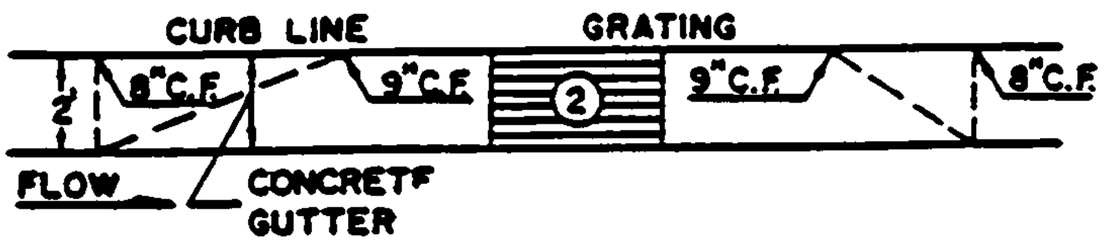
~~[illegible]~~

1ST SET OF INLETS
Q_S = 31CFS, S=1.0%
½ Q_S = 15.5CFS
FLOW DEPTH = 0.41

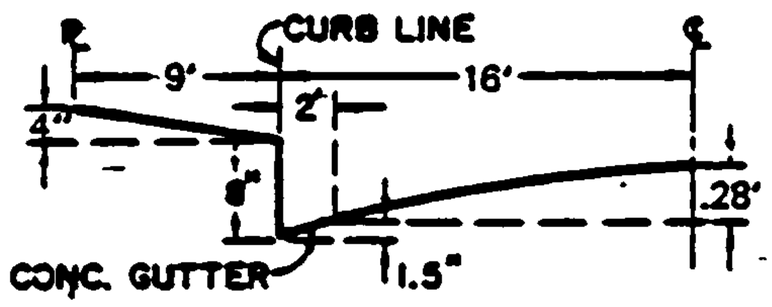
2ND SET OF INLETS
Q_S = 23.6CFS, S=1.0%
½ Q_S = 11.8CFS
FLOW DEPTH = 0.39

S=1.0%

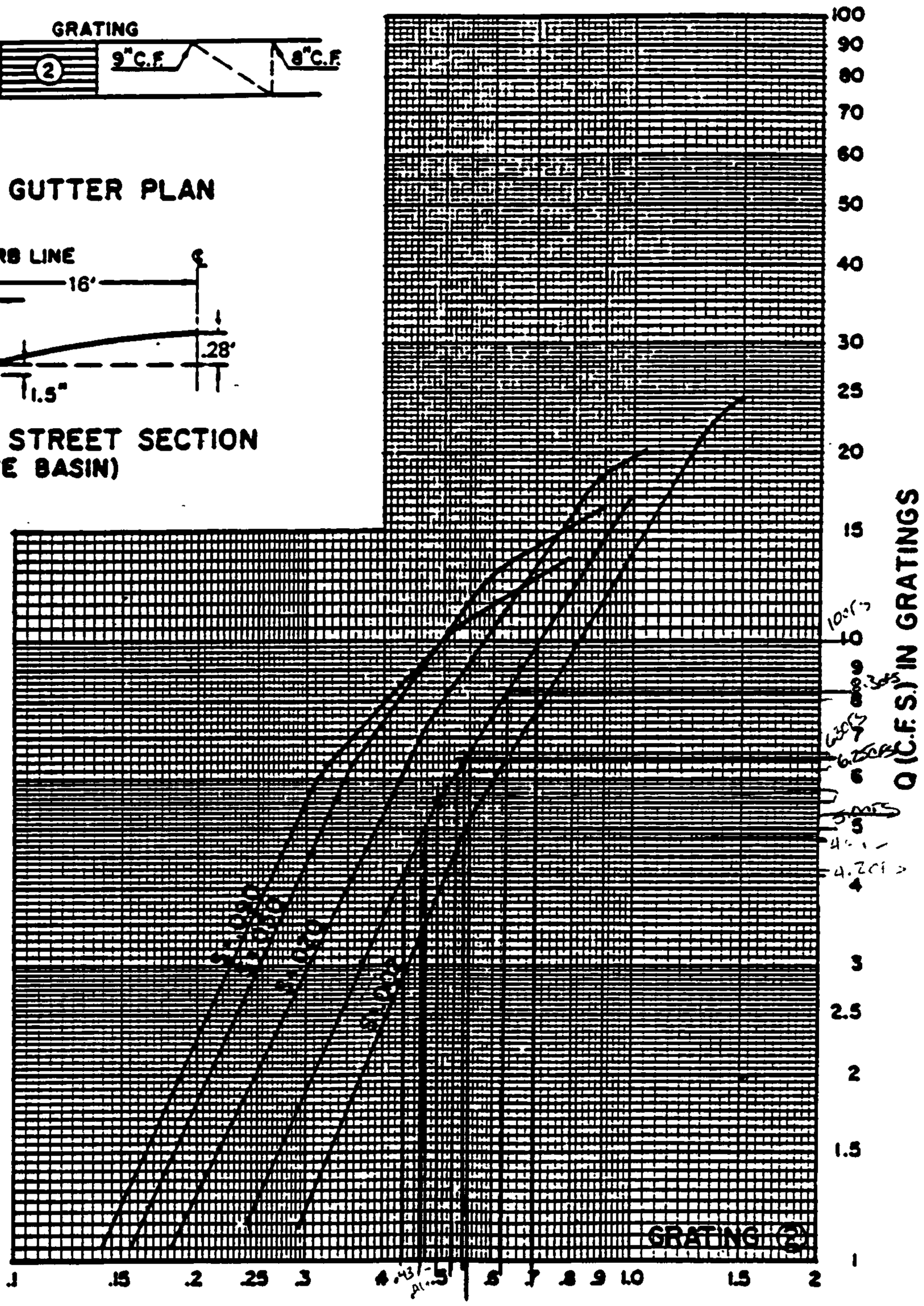
GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)



D=DEPTH OF FLOW (FT) ABOVE NORMAL GUTTER GRADE

AP-8

1st SET OF INLETS
Q_S=44.0CFS S=1.0%
Q_S=22CFS
FLOW DEPTH=0.46'

2ND SET OF INLETS
Q_S=34.4 CFS S=1.0%
$1/2 Q_S$=17.2CFS
FLOW DEPTH=0.43

~~55.2~~
~~1ST SET~~
~~Q_S=49CFS~~
~~$1/2 Q_S$=24.5~~
~~FLOW DEPTH=0.47~~
~~Q_S=17CFS~~
~~$1/2 Q_S$=8.5CFS~~
~~FLOW DEPTH=0.43~~

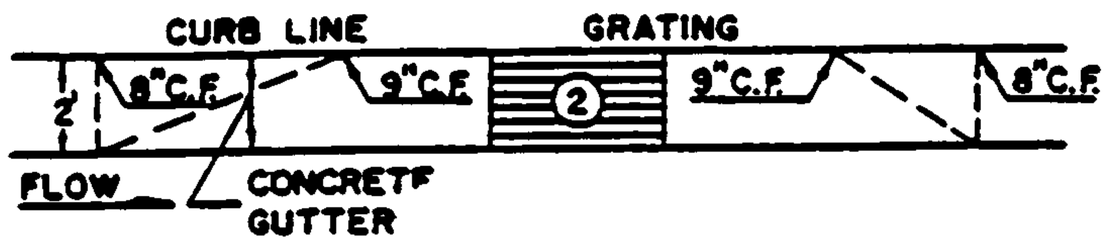
55.2
55.2
Q_S=34.6 CFS
$1/2 Q_S$=17.3CFS
FLOW DEPTH=0.54'

49.0
49.0
1st SET Q_S=39.CFS
$1/2 Q_S$=19.5CFS
d=0.7'

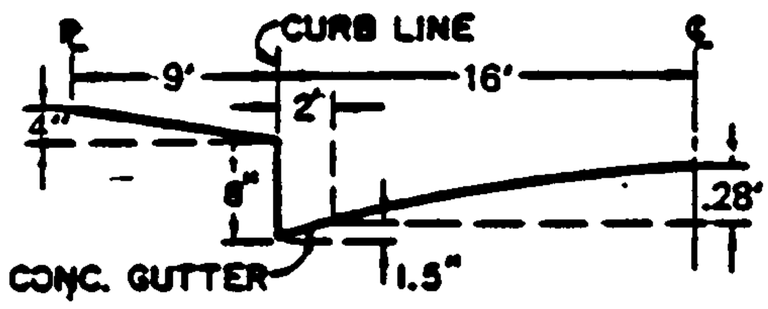
49.0
2ND SET
Q_S=19CFS
$1/2 Q_S$=9.5CFS
d=0.55'

S=1.2%

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

23.0

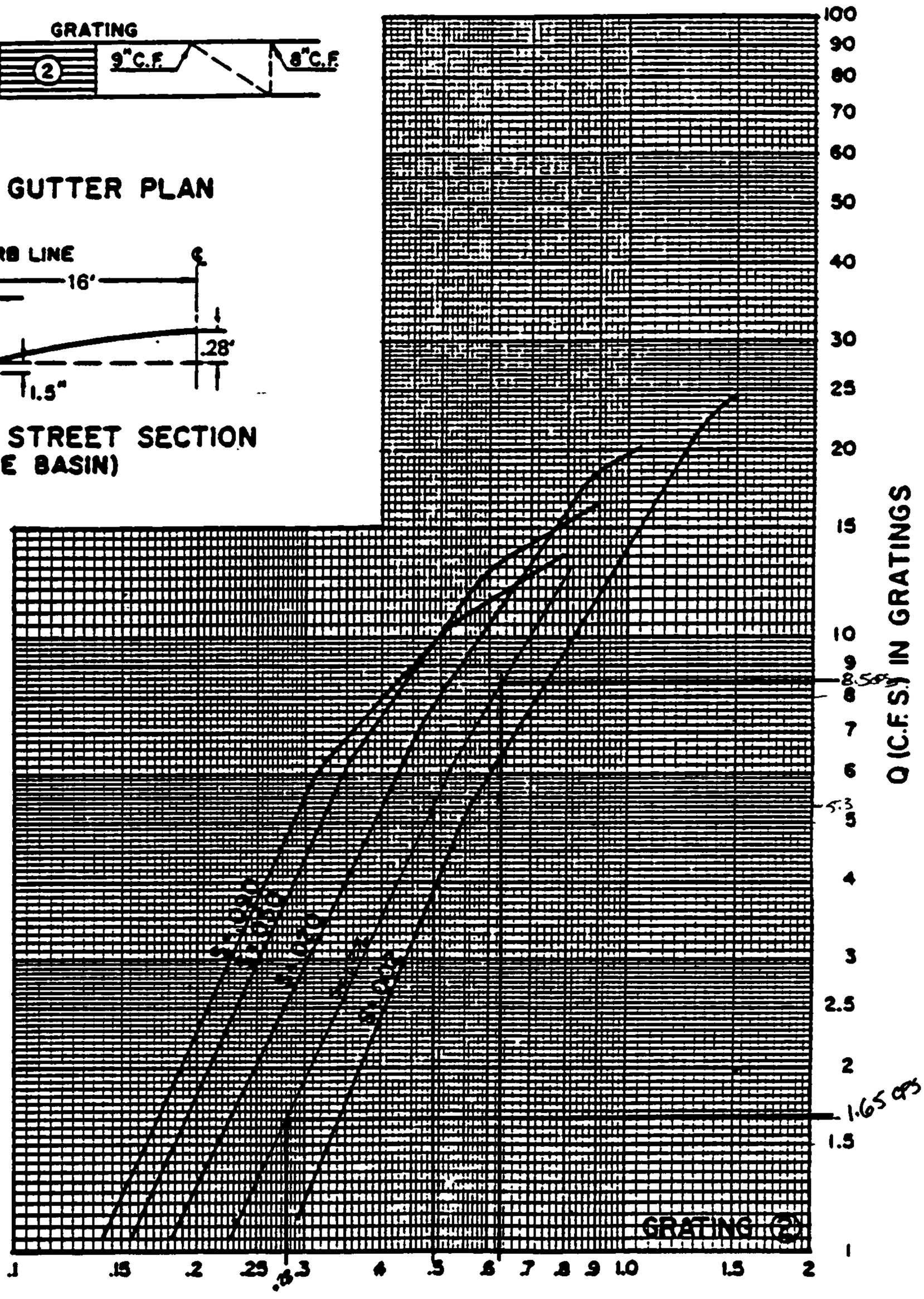
Basin 23

Q_{23} = 14 cfs

½ Street Q = 7 cfs

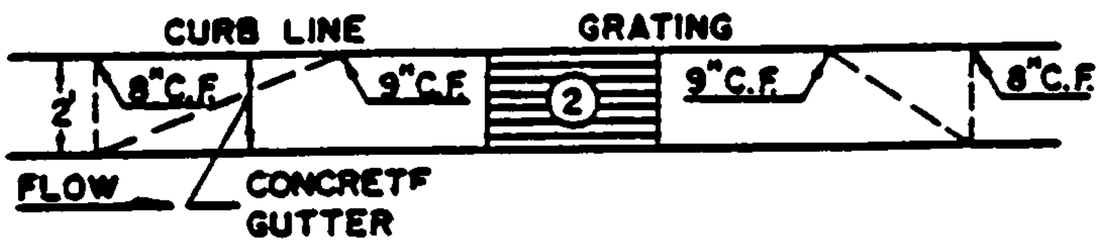
Depth of Flow = 0.28 ft
(From Flow Depth Chart)

S = 1.2%

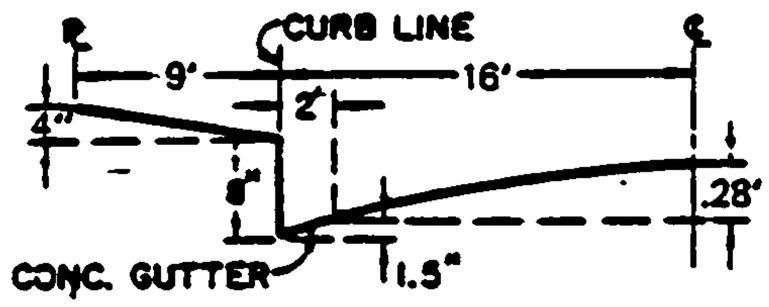


S = 1.3%

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



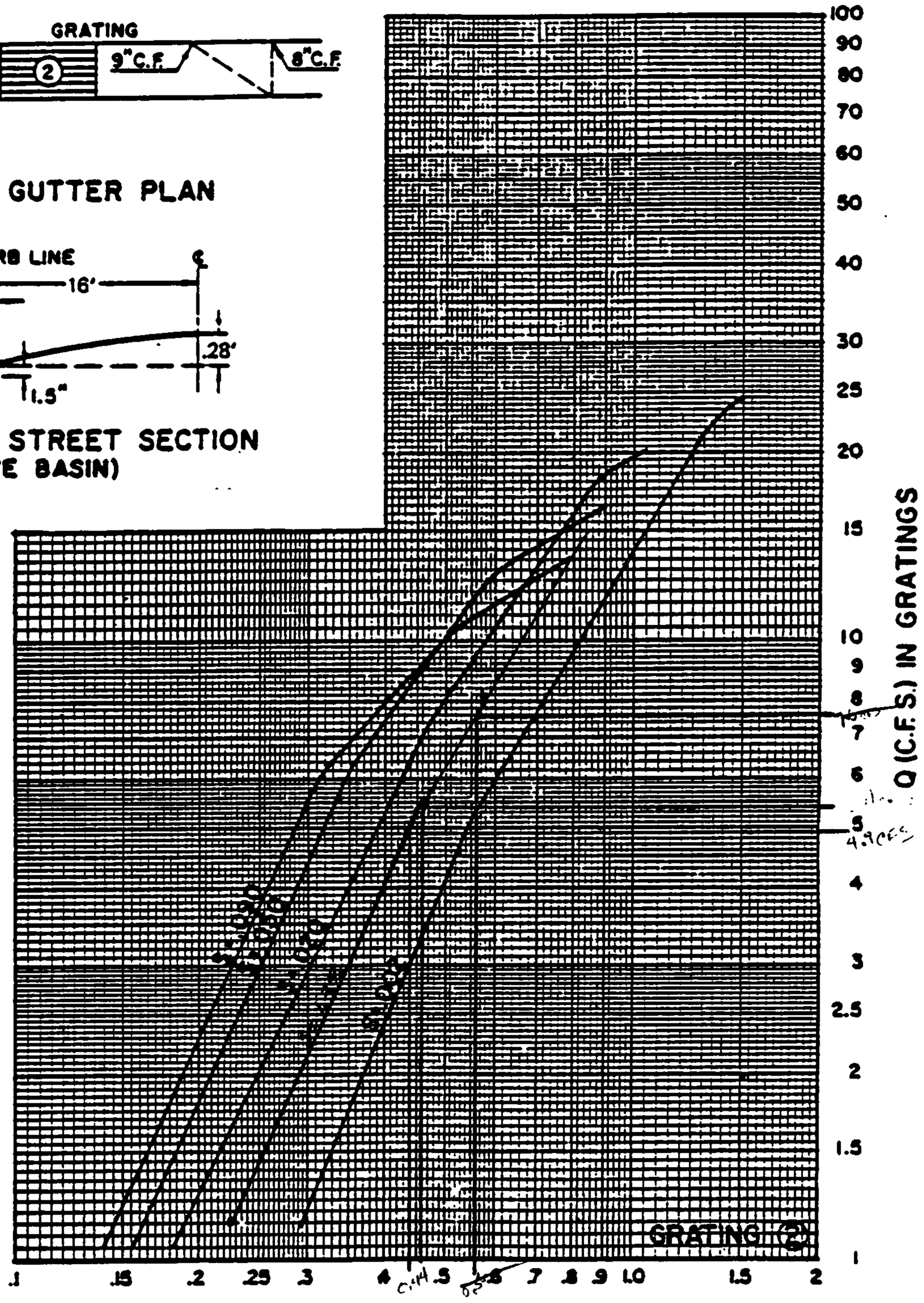
GRATING & GUTTER PLAN



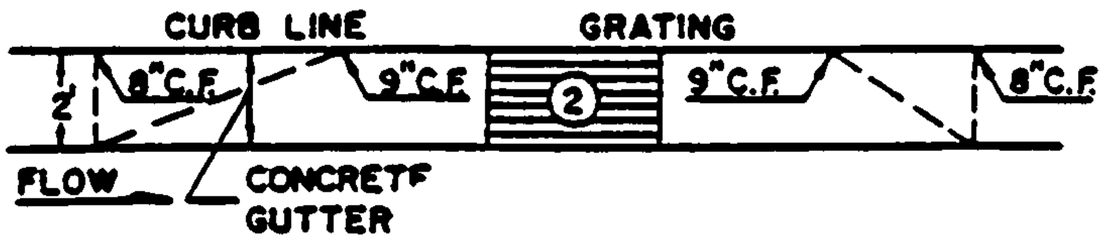
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

~~ANALYSIS POINT 2E~~
~~1 SET OF INLETS~~
~~Q_S = 44 CFS, S = 1.3%~~
~~= 22 CFS~~
~~FLOW DEPTH = 0.34~~ 0.44
7.2
~~Sp = 7.10~~

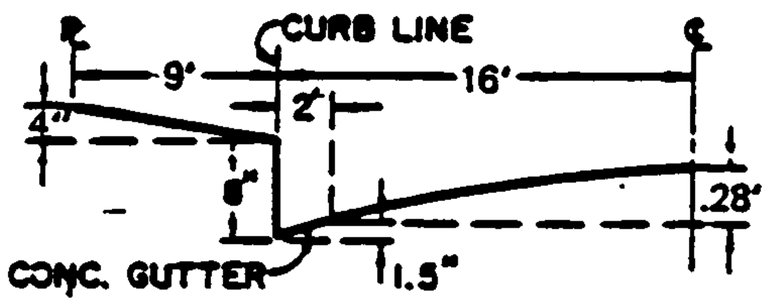
1ST SET OF INLETS
Q_S = 26 CFS, S = 1.3%
1/2 Q_S = 13 CFS
FLOW DEPTH = 0.46



GRATING CAPACITIES FOR TYPE "A", "C" and "D"

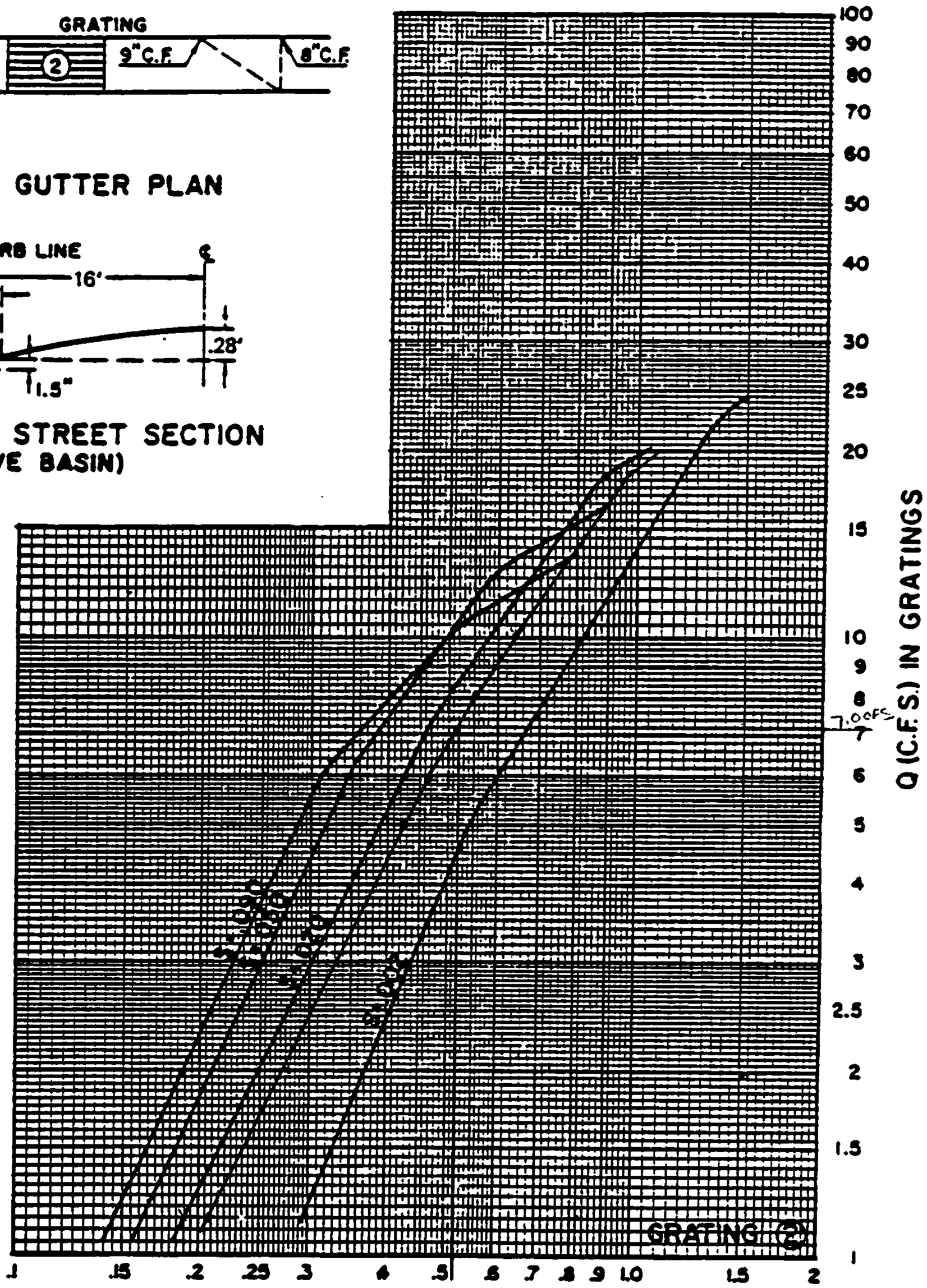


GRATING & GUTTER PLAN



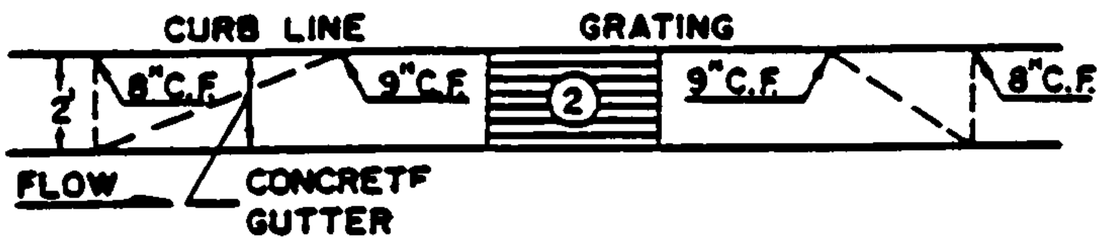
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

37.0
YQS = 19.5
d=0.52
CAPACITY = 7.0CFS

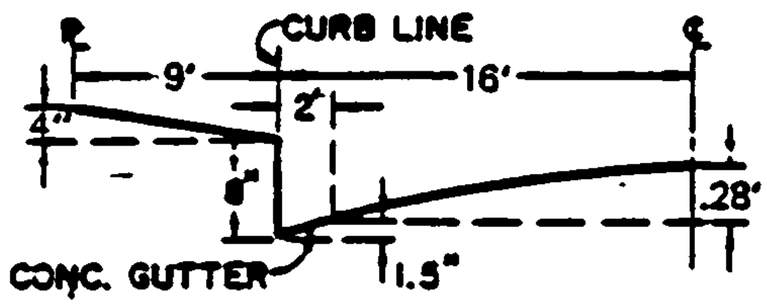


S=1.7%

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

19.0

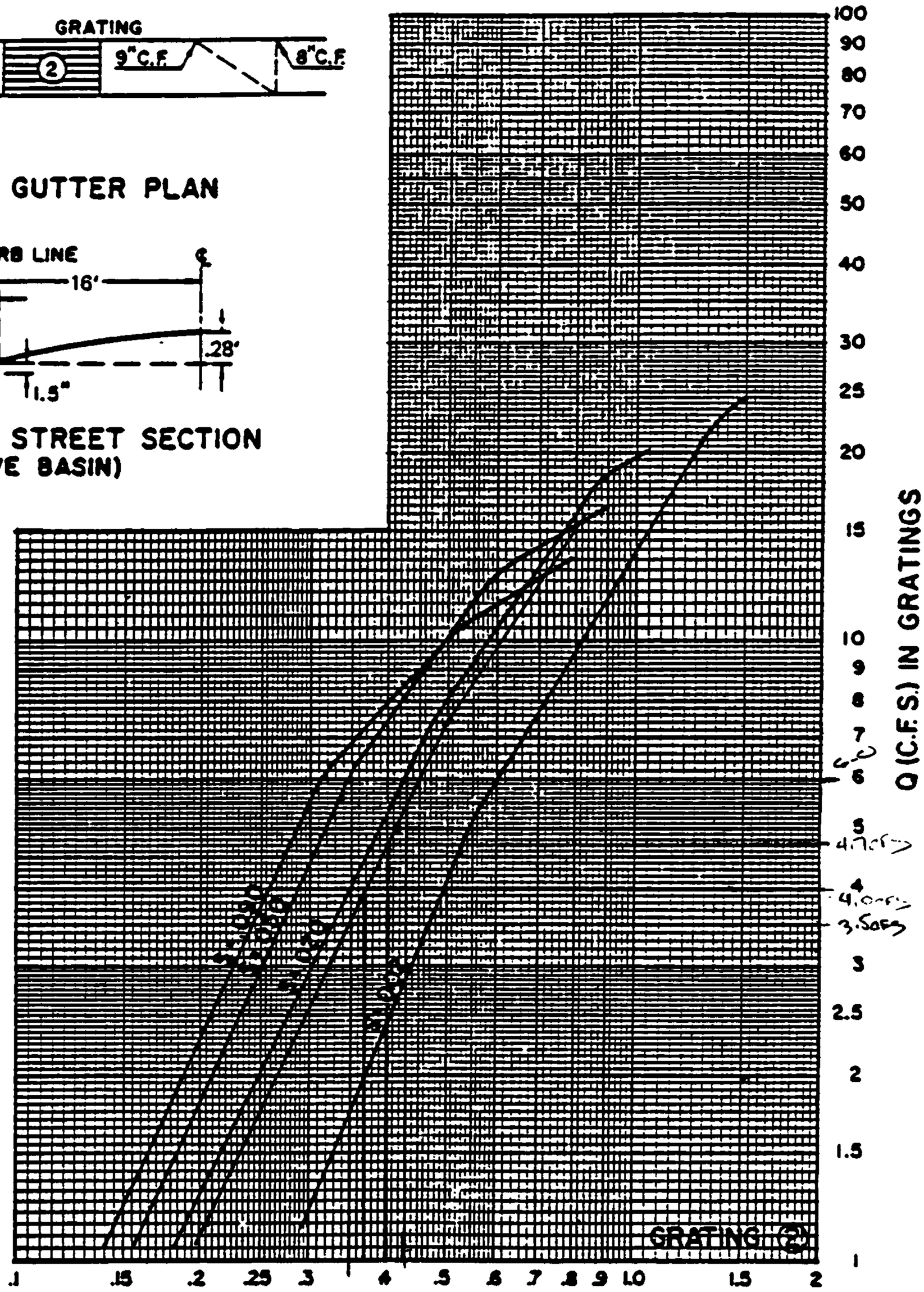
AR-16

S=1.7%

1ST SET
Q_S = 36.1 CFS
½ Q_S = 18.05 CFS
FLOW DEPTH = 0.40'

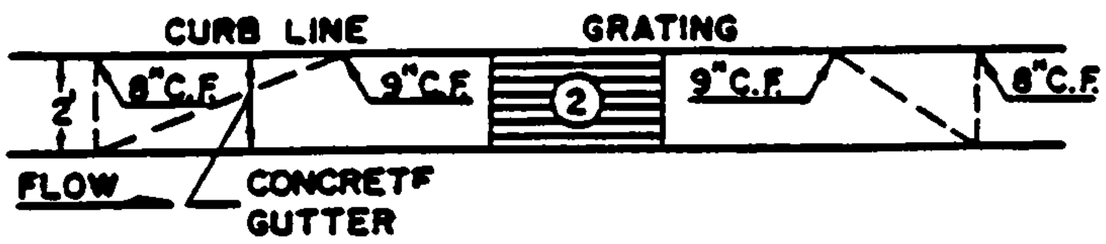
S=1.7%

2ND SET
Q_S = 26.7 CFS
½ Q_S = 13.35 CFS
FLOW DEPTH = 0.37'

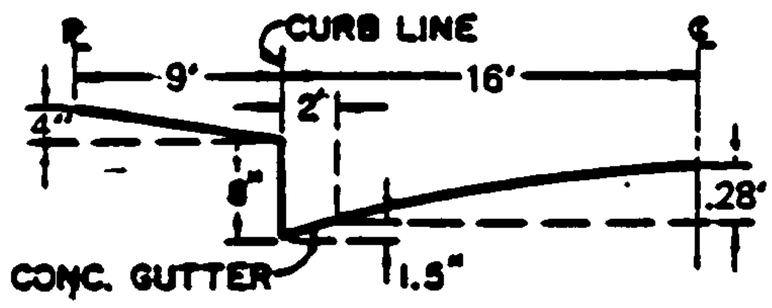


S=1.9%

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN

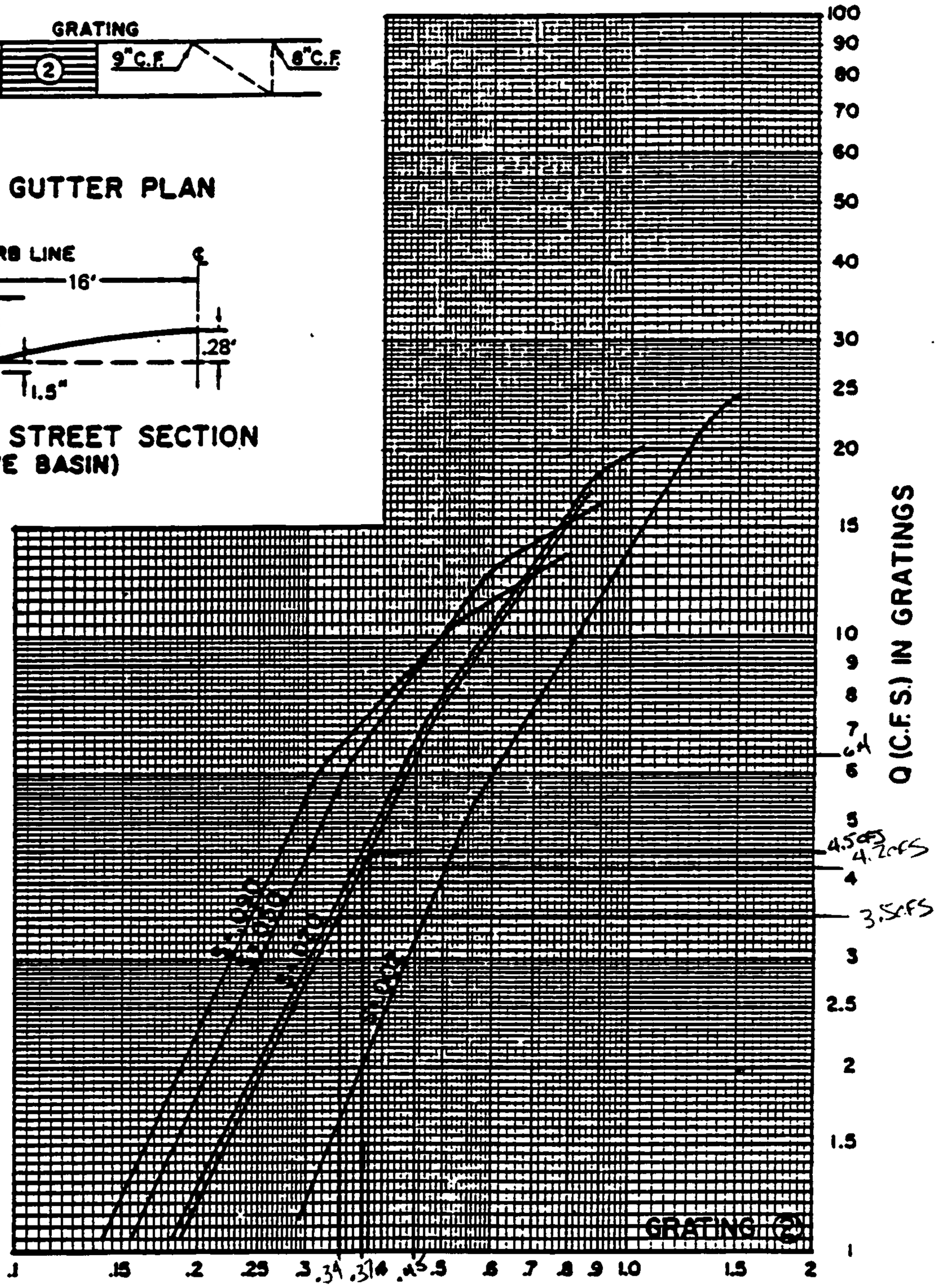


TYPICAL HALF STREET SECTION
(ABOVE BASIN)

13.1

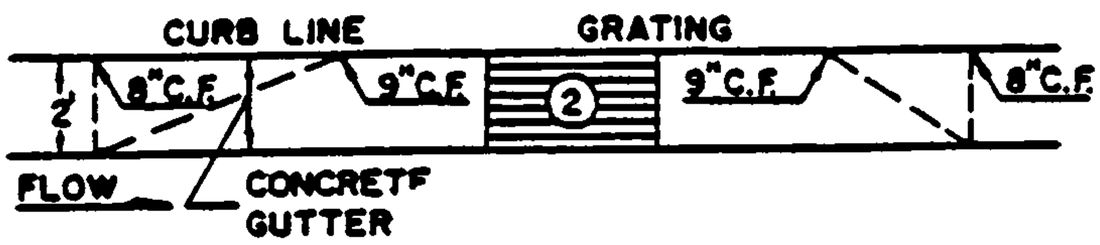
1st SET OF INLETS
Q_s = 28CFS, S = 1.9%
½ Q_s = 14CFS
FLOW DEPTH = 0.37

2nd SET
Q_s = 19.60FS, S = 1.9%
½ Q_s = 9.8CFS
FLOW DEPTH = 0.34

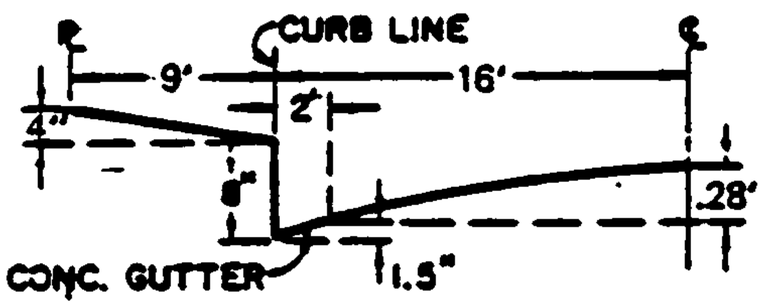


S= 2.0%

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN



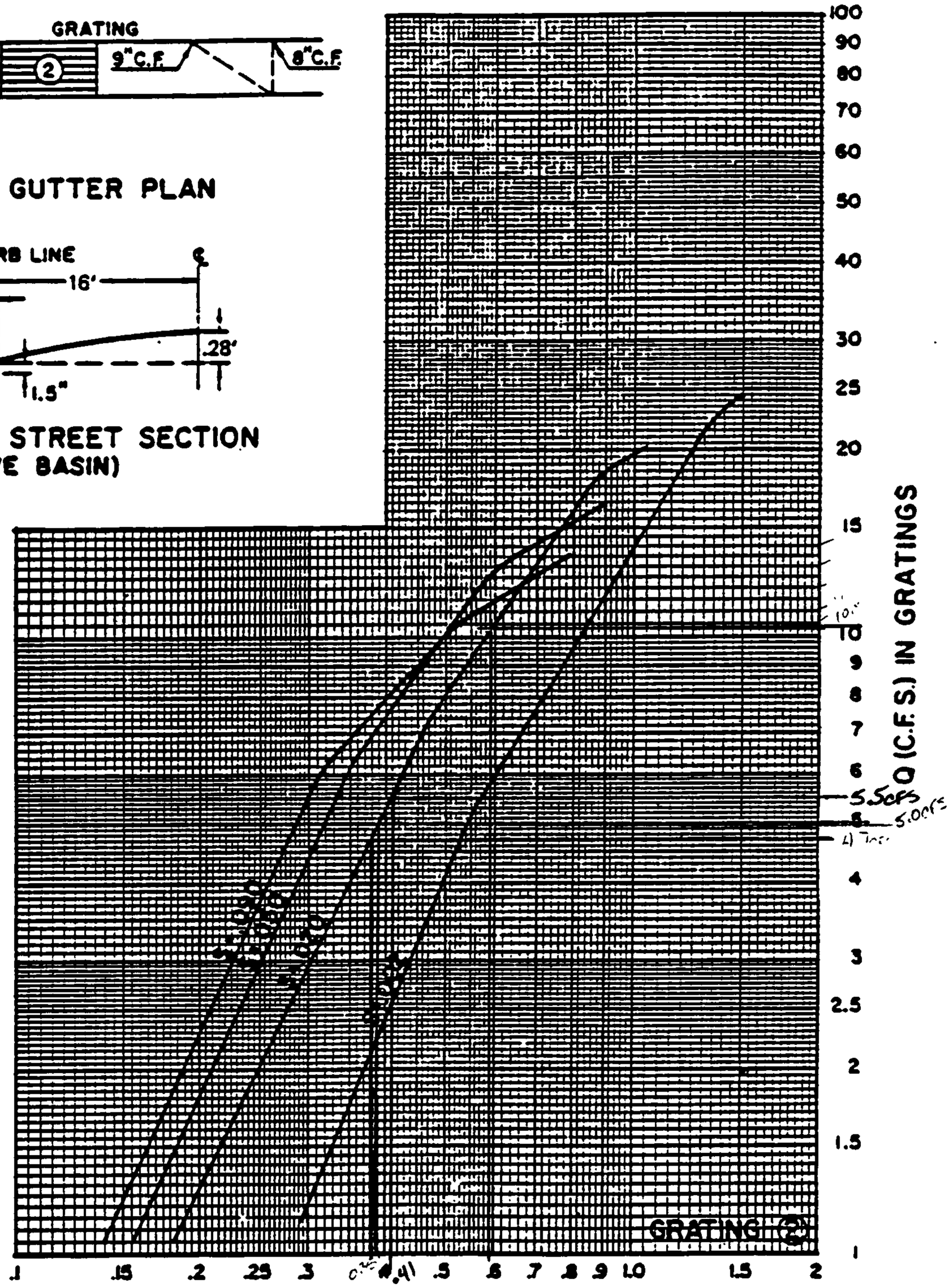
TYPICAL HALF STREET SECTION
(ABOVE BASIN)

21.0

BASIN 21
ANALYSIS POINT # 7

SET OF INLETS
Q_s = 41.6 CFS, S= 2.0%
½ STREET FLOW = 20.8 CFS
FLOW DEPTH = 0.41 FT

2ND SET OF INLETS
Q_s = 30.6 CFS, S= 2.0%
½ STREET FLOW = 15.3 CFS
FLOW DEPTH = 0.38 FT



File 6076.48 DRAINAGE
WWNORTH

Rick Beltran
881-7602
8/14

Federal Emergency Mana

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 97-06-776P

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

Community: City of Albuquerque, New Mexico
Community No.: 350002
Panels Affected: 35001C0358 D, 0359 D, and 0367 D

Effective Date of This Revision: JUL 16 1997

102-I-A-C

Dear Mayor Chavez:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) for Bernalillo County, New Mexico and Incorporated Areas (the effective FIRM for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated June 3, 1997, Ms. Susan M. Calongne, P.E., City/County Floodplain Administrator, City of Albuquerque/Bernalillo County, requested that FEMA revise the FIRM to show the effects of the Juan Tabo Detention Basin at the northwest corner of the intersection of Juan Tabo Boulevard and Singing Arrow Avenue. This request follows up on a Conditional Letter of Map Revision issued on July 23, 1996.

All data required to complete our review of this request were submitted with letters from Ms. Calongne.

We have completed our review of the submitted data and the flood data shown on the effective FIRM. We have revised the FIRM to modify the elevations and floodplain boundary delineations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) in the area bordered by Bucking Bronco Trail to the south, Juan Tabo Boulevard to the east, Southern Avenue to the north, and Eubank Boulevard to the west. As a result of the modifications, the Special Flood Hazard Area (SFHA) designated Zone AO, the area that would be inundated by the base flood with average depths between 1 and 3 feet, was removed from the area described above, except for two small ponding areas along Eubank Boulevard, one approximately 600 feet south of Southern Avenue and the other at the intersection of Elizabeth Street. In addition, the SFHA designated Zone AO along Juan Tabo Boulevard between Horseshoe Trail and Southern Avenue was removed, except the area from the intersection of Fawn Trail and Juan Tabo Boulevard to approximately 300 feet south of the intersection. The SFHA increased only along the boundaries of the Juan Tabo Detention Basin. The Juan Tabo Detention Basin is designated Zone A, the area that would be inundated by the base flood, with base flood elevations not determined. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 35001C0358 D, 0359 D, and 0367 D. This Letter of Map Revision (LOMR) hereby revises the above-referenced panel(s) of the effective FIRM dated September 20, 1996.

The modifications are effective as of the date shown above. The map panel(s) as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

The following table is a partial listing of existing and modified base flood elevations (BFEs):

Location	Existing BFE (feet)*	Modified BFE (feet)*
Intersection of Juan Tabo Boulevard and Singing Arrow Avenue	1	None
Intersection of Juan Tabo Boulevard and Horseshoe Trail	1	None
Intersection of La Puerta Avenue SE and La Vara Drive SE	1	None

*Depth, rounded to the nearest whole foot

Public notification of the proposed modified BFEs will be given in the *Albuquerque Journal* on or about August 5 and August 12, 1997. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in the *Albuquerque Journal*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare a related article for publication in your community's local newspaper. This article should describe the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

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

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

The basis of this LOMR is, in whole or in part, a stormwater detention basin and appurtenant drainage system project. NFIP regulations, as cited in Paragraph 60.3(b)(7), require that communities ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management regulations. Consequently, the ultimate responsibility for maintenance of the stormwater detention basin and drainage system rests with your community.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed minimum NFIP criteria. These criteria are the minimum and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR. Our records show that your community has met this requirement.

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

Mr. James LeGrotte
Director, Mitigation Division
Federal Emergency Management Agency, Region VI
Federal Regional Center, Room 206
800 North Loop 288
Denton, Texas 76201-3698
(817) 898-5127

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the CCO for your community at the telephone number cited above. If you have any technical questions regarding this LOMR, please contact Mr. Alan Johnson of our staff in Washington, DC, either by telephone at (202) 646-3403 or by facsimile at (202) 646-4596.

Sincerely,

Fredepick H. Sharrocks, Jr., Chief
Hazard Identification Branch
Mitigation Directorate

Enclosure(s)

cc: Ms. Susan M. Calongne, P.E.
City/County Floodplain Administrator
City of Albuquerque/Bernalillo County

Mr. Patrick J. Conley, P.E.
Smith Engineering Company

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

On September 20, 1996, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the City of Albuquerque, New Mexico, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Directorate has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified base flood elevations (BFEs) revise the FIRM for the community.

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

A hydraulic analysis was performed to incorporate the Juan Tabo Detention Basin and has resulted in the Special Flood Hazard Area (SFHA) designated Zone AO, the area that would be inundated by the base flood with average depths between 1 and 3 feet, being removed from the area bordered by Bucking Bronco Trail to the south, Juan Tabo Boulevard to the east, Southern Avenue to the north, and Eubank Boulevard to the west, except for two small ponding areas along Eubank Boulevard, one approximately 600 feet south of Southern Avenue and one at the intersection of Elizabeth Street. In addition, the SFHA designated Zone AO along Juan Tabo Boulevard between Horseshoe Trail and Southern Avenue was removed, except from the intersection of Fawn Trail and Juan Tabo Boulevard to approximately 300 feet south of the intersection. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Intersection of Juan Tabo Boulevard and Singing Arrow Avenue	1	None
Intersection of Juan Tabo Boulevard and Horseshoe Trail	1	None
Intersection of La Puerta Avenue SE and La Vara Drive SE	1	None

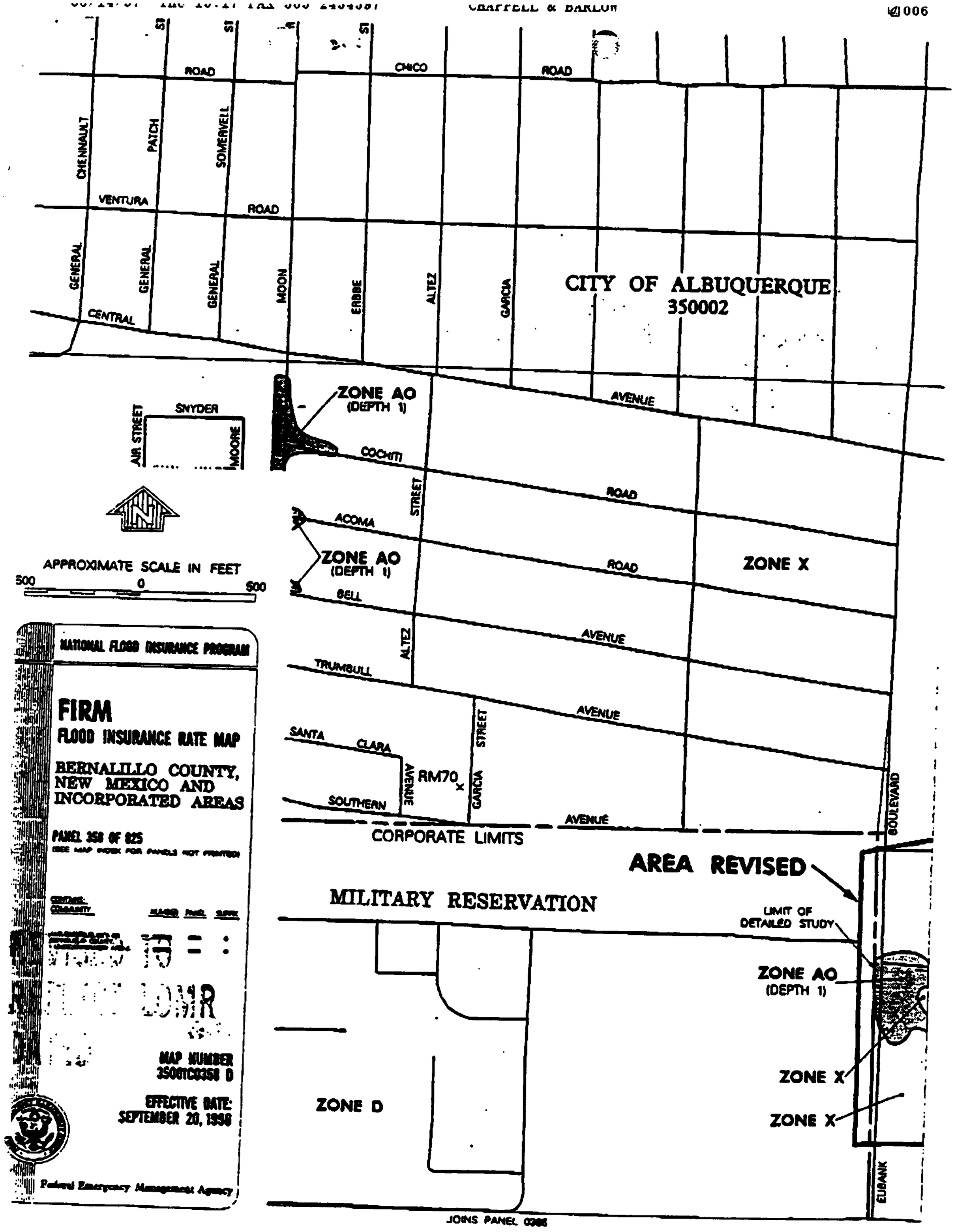
*Depth, rounded to nearest whole foot

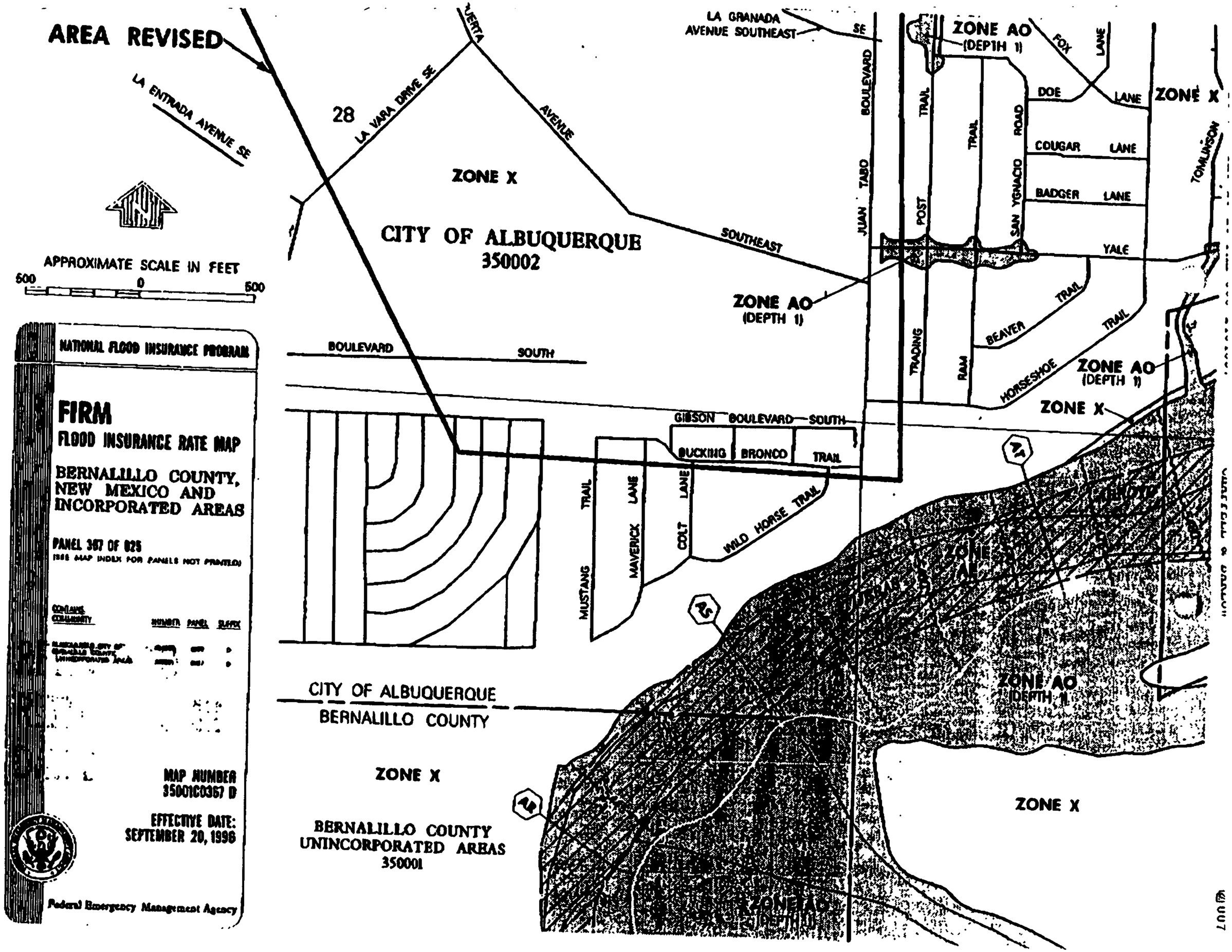
Under the above-mentioned Acts of 1968 and 1973, the Mitigation Directorate must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified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

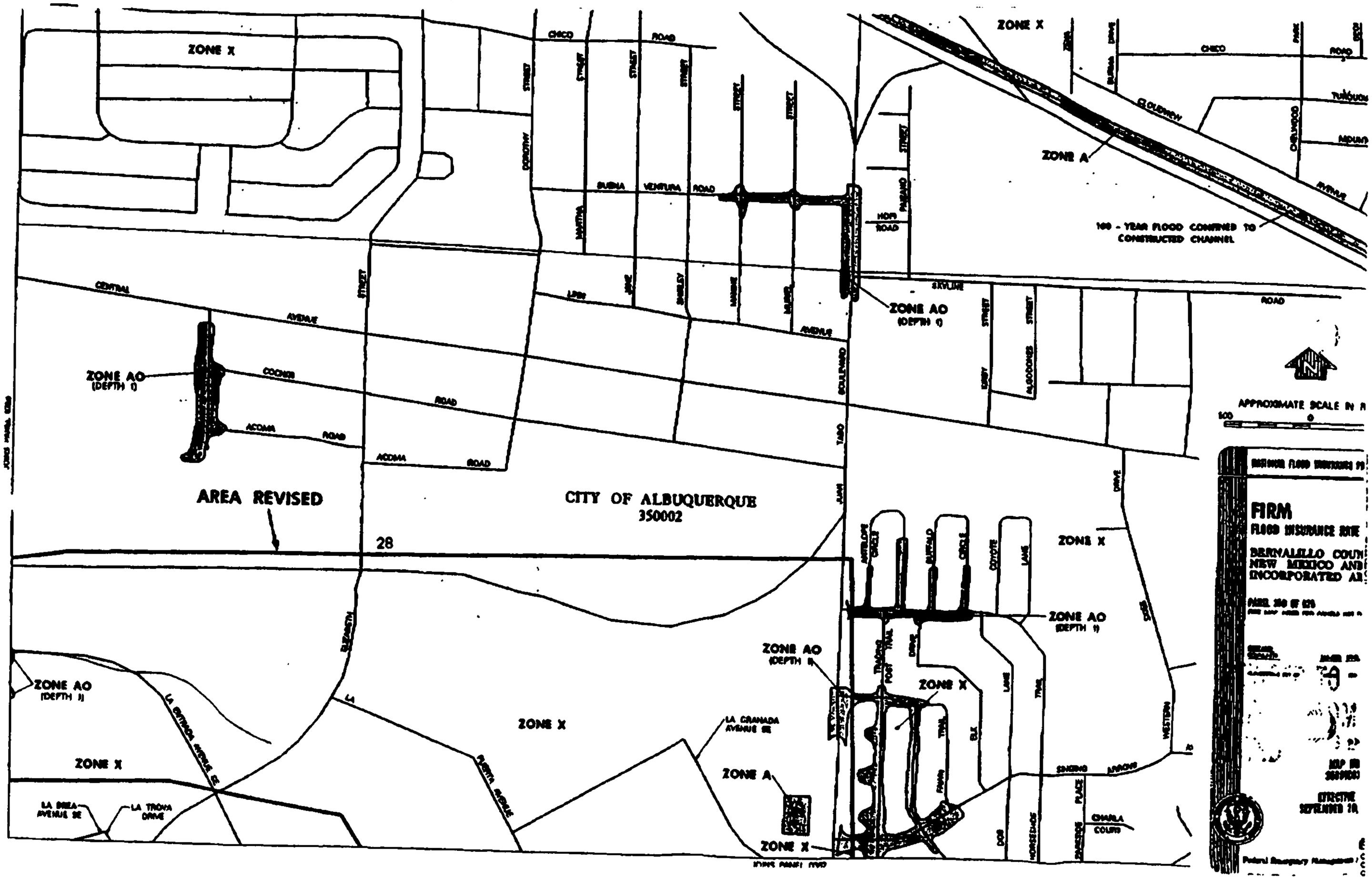
Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Directorate reconsider the determination. Any request for reconsideration must be based on knowledge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

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

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


ROAD
CHICO
ROAD
CHENNAULT
PATCH
SOMERVELL
VENTURA
ROAD
GENERAL
GENERAL
GENERAL
MOON
ERBBE
ALTEZ
GARCIA
CITY OF ALBUQUERQUE
350002
CENTRAL
AVENUE
ZONE AO
(DEPTH 1)
SNYDER
AIR STREET
MOORE
COCHITI
STREET
ROAD
ACOMA
ZONE AO
(DEPTH 1)
ROAD
ZONE X
BELL
AVENUE
ALTEZ
TRUMBULL
AVENUE
SANTA
CLARA
STREET
AVENUE
RM70
GARCIA
SOUTHERN
AVENUE
BOULEVARD
CORPORATE LIMITS
AREA REVISED
MILITARY RESERVATION
LIMIT OF
DETAILED STUDY
ZONE AO
(DEPTH 1)
ZONE X
ZONE X
ZONE D
EUBANK
JOINS PANEL 0355
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
BERNALILLO COUNTY,
NEW MEXICO AND
INCORPORATED AREAS
PANEL 350 OF 825
SEE MAP INDEX FOR PANELS NOT PRINTED
COMMUNITY
NUMBER
SUFFIX
D
MAP NUMBER
350001C0350 D
EFFECTIVE DATE:
SEPTEMBER 20, 1996
Federal Emergency Management Agency


AREA REVISED
LA ENTRADA AVENUE SE
LA VARA DRIVE SE
28
ZONE X
CITY OF ALBUQUERQUE
350002
APPROXIMATE SCALE IN FEET
500
0
500
LA GRANADA AVENUE SOUTHEAST
SE
ZONE AO
(DEPTH 1)
FOX
LANE
DOE
LANE
ZONE X
TOMLINSON
COUGAR
LANE
BADGER
LANE
YALE
JUAN TABO BOULEVARD
POST
TRAIL
TRADING
RAM
SAN YGNACIO ROAD
BEAVER
TRAIL
HORSESHOE
TRAIL
SOUTHEAST
ZONE AO
(DEPTH 1)
BOULEVARD
SOUTH
GIBSON BOULEVARD SOUTH
BUCKING
BRONCO
TRAIL
WILD HORSE TRAIL
MUSTANG
TRAIL
MAVERICK
LANE
COLT
LANE
ZONE AO
(DEPTH 1)
ZONE X
ZONE AO
(DEPTH 1)
ZONE X
CITY OF ALBUQUERQUE
BERNALILLO COUNTY
ZONE X
BERNALILLO COUNTY
UNINCORPORATED AREAS
350001
ZONE X
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
BERNALILLO COUNTY,
NEW MEXICO AND
INCORPORATED AREAS
PANEL 367 OF 825
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY NUMBER PANEL SUFFIX
MAP NUMBER
35001C0367 D
EFFECTIVE DATE:
SEPTEMBER 20, 1996
Federal Emergency Management Agency


ZONE X
ZONE A
ZONE AO
(DEPTH 1)
100 - YEAR FLOOD CONFINED TO CONSTRUCTED CHANNEL
AREA REVISED
CITY OF ALBUQUERQUE
350002
28
CHICO ROAD
VENTURA ROAD
CENTRAL AVENUE
COORS ROAD
ACOMA ROAD
SKYLINE ROAD
LA GRANADA AVENUE SE
LA BRIA AVENUE SE
LA TROVA DRIVE
APPROXIMATE SCALE IN F
FIRM
FLOOD INSURANCE RATE
BERNALILLO COUN
NEW MEXICO AND
INCORPORATED AR
EFFECTIVE
SEPTEMBER 19