



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

June 19, 2002

Ron Bohannon, PE
Tierra West LLC
8509 Jefferson NE
Albuquerque, NM 87113

Re: Desert Pine Unit 1 Pond Reclamation Grading Plan
Engineer Stamp date 6-18-02 (L9/D24)

Dear Mr. Bohannon,

Based on information provided in your submittal dated 6-18-02, the above referenced plan can be approved for Preliminary Plat action by the Development Review Board. Prior to Final Plat signoff by the City Engineer, a certified grading plan will be required.

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

Sincerely,

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

C: file

DRAINAGE AND TRANSPORTATION SHEET

(REV. 1/11/2002)

PROJECT TITLE: Desert Pine Subdivision Unit 1

ZONE MAP/DRG. FILE #: L9/D24

DRB #: _____ EPC #: _____

WORK ORDER #: _____

LEGAL DESCRIPTION Lots 36-39 Town of Atrisco Grant Unit 2

CITY ADDRESS: South of Sunset Garden Road, between 98th Street and 94th Street

ENGINEERING FIRM: Tierra West, LLC

ADDRESS: 8509 Jefferson NE

CITY, STATE: Albuquerque, NM

CONTACT: RONALD R. BOHANNAN OR SARA LAVY

PHONE: (505) 858-3100

ZIP CODE: 87113

OWNER: KB Home

ADDRESS: 4921 Alexander Blvd, NE Suite B

CITY, STATE: Albuquerque, NM

CONTACT: Jeff Dorwart

PHONE: (505) 344-9400

ZIP CODE: 87107

ARCHITECT: _____

ADDRESS: _____

CITY, STATE: _____

CONTACT: _____

PHONE: _____

ZIP CODE: _____

SURVEYOR: Aldrich Land Surveying

ADDRESS: 4800 Juan Tabo NE, Suite D

CITY, STATE: Albuquerque, NM

CONTACT: Tim Aldrich

PHONE: (505) 844-1990

ZIP CODE: 87111

CONTRACTOR: Sundance Mechanical

ADDRESS: 4400 Alameda Blvd, NE Suite E

CITY, STATE: Albuquerque, NM

CONTACT: Mike Mechenbier

PHONE: 345-2694

ZIP CODE: 87113

CHECK TYPE OF SUBMITTAL:

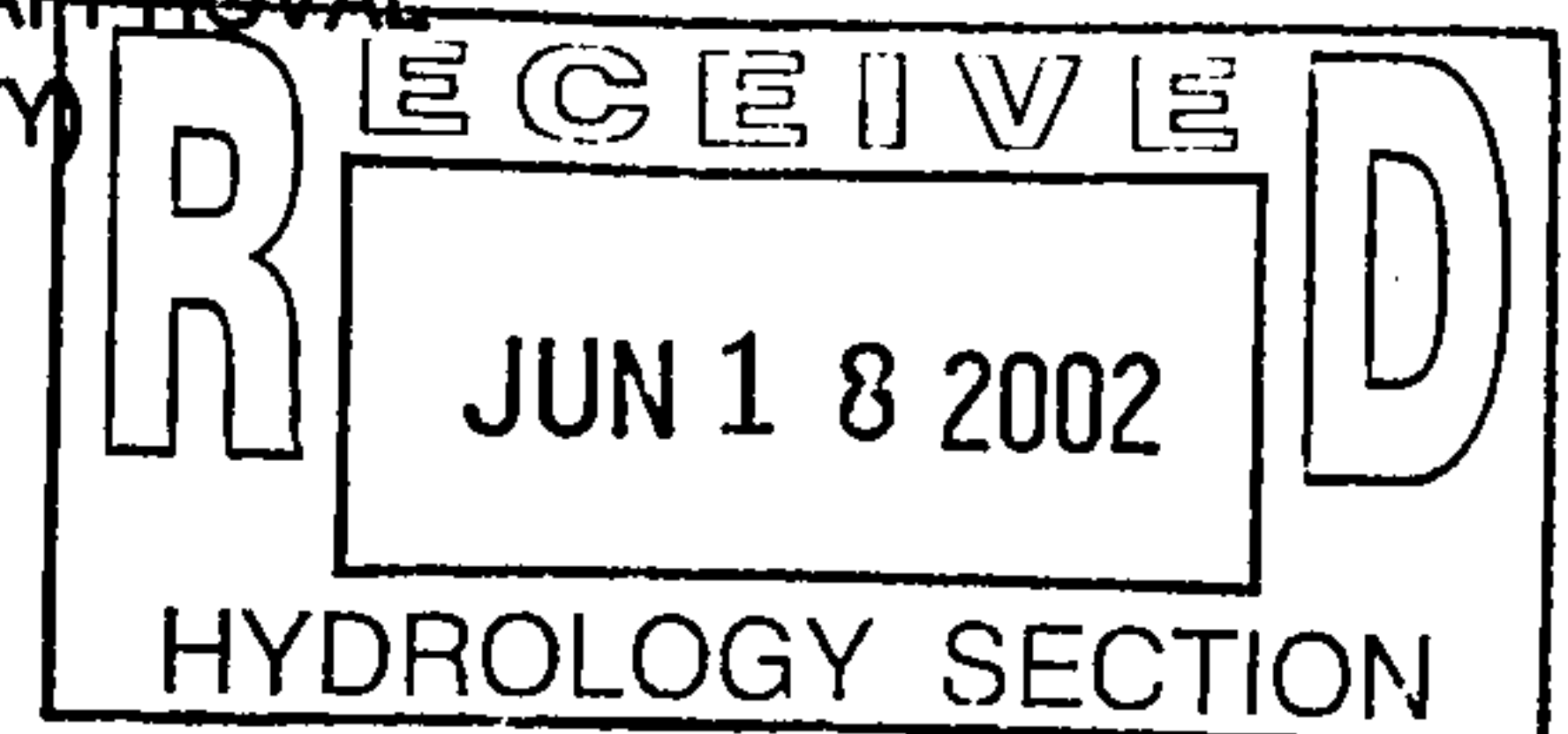
- ☐ DRAINAGE REPORT
☐ DRAINAGE PLAN
☐ CONCEPTUAL GRADING & DRAINAGE PLAN
☒ GRADING PLAN
☐ EROSION CONTROL PLAN
☐ ENGINEER'S CERTIFICATION (HYDROLOGY)
☐ CLOMR/LOMR
☐ TRAFFIC CIRCULATION LAYOUT (TCL)
☐ ENGINEERS CERTIFICATION (TCL)
☐ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
☐ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

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

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ☐ YES
☒ NO
☐ COPY PROVIDED



DATE SUBMITTED: 6/18/02 BY: Sara Lavy

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

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



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

June 28, 2002

Sara Lavy, P.E.
Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

RE: DESERT PINE SUBD UNIT 1 (L-9/D24)
(For 8 New Lots on Vacated Ponding Area)
ENGINEERS CERTIFICATION
ENGINEERS STAMP DATED 6/18/2002
ENGINEERS CERTIFICATION DATED 6/25/2002

Dear Ms. Lavy:

Based upon the information provided on your June 25, 2002 submittal and letter from Jeff Dorwart, KB homes, the above referenced project is approved for Engineers Certification acceptance.

Lean filling a small pipe is a marginally acceptable standard of abandonment but a 36" pipe under a house pad is less than desirable. I will approve the certification for Final Plat but must state that the City will, in no way be held liable for any settlement to the affected houses.

On an additional note, Railroad Ties are not an acceptable material for retaining walls. I will allow this for this Certification, but all future retaining walls must be CMU or concrete.

If you have any questions, please call me at 924-3986.

Sincerely,

Bradley Bingham
Senior Civil Engineer
COA, Hydrology Division

C: Arlene Portillo #655581
✓ File

TIERRA WEST, LLC

8509 Jefferson NE
Albuquerque, NM 87113

(505) 858-3100
fax (505) 858-1118

twllc@tierrawestllc.com
1-800-245-3102

June 25, 2002

Mr. Bradley Bingham, PE
Hydrology Section
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

RE: Engineer's Certification of Drainage
Desert Pine Subdivision Phase I, (L9/D24)

Dear Mr. Bingham:

As you requested, Tierra West LLC, on behalf of KB Home, is submitting an Engineer's Certification of Drainage for the eight new lots located on the vacated ponding area. Enclosed please find one copy of the as-built Grading and Drainage Plan and information sheet for the above referenced project. Salls Brothers Construction completed the earthwork for the eight lots. The on-site paving and curb and gutter was completed by Sundance Mechanical and previously certified. All work is in substantial compliance with the approved plans. As-built information was supplied by Aldrich Land Surveying.

If you have any questions regarding this matter, please do not hesitate to call me.

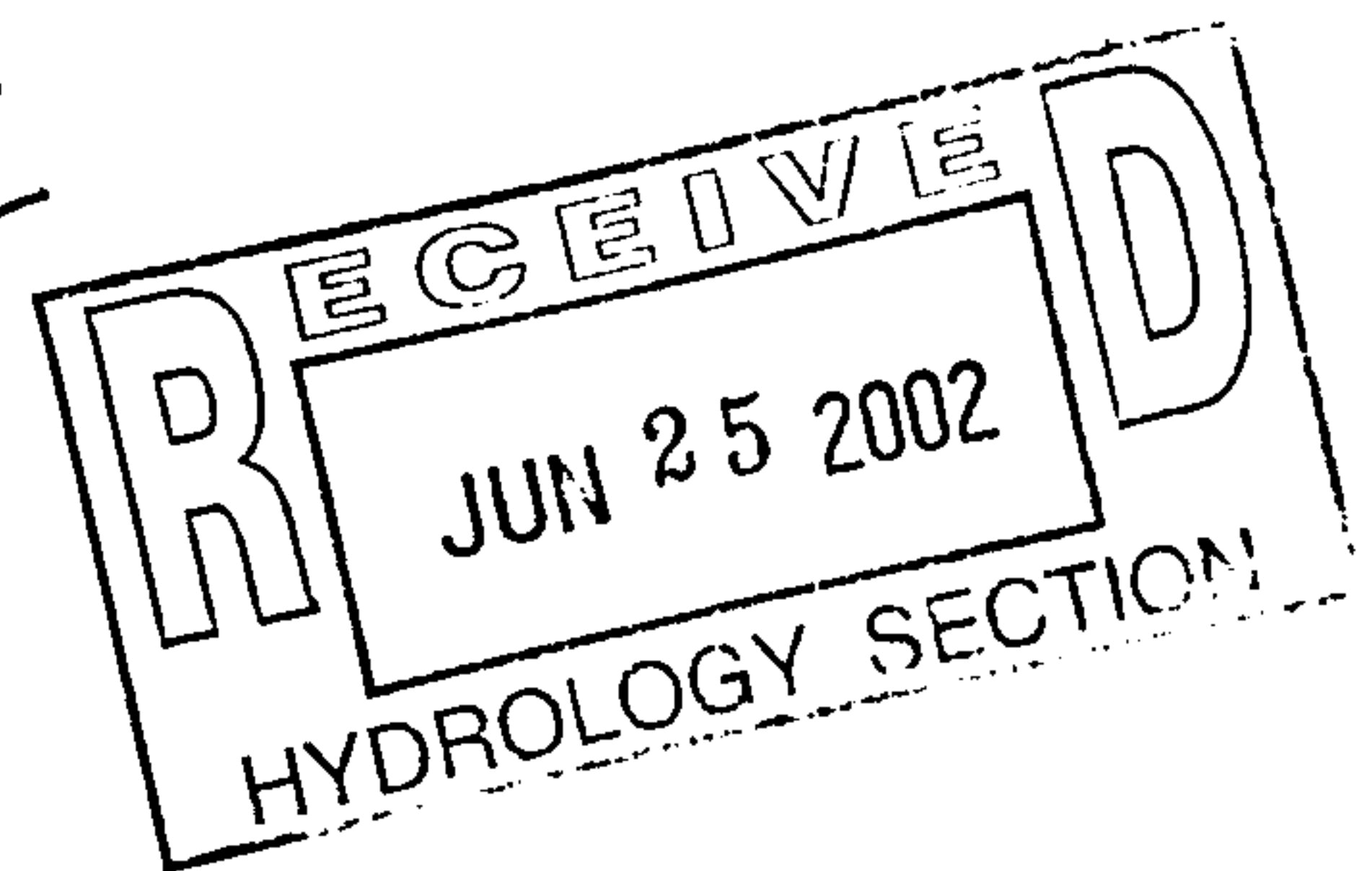
Sincerely,

Sara Lavy
Sara Lavy, P.E.

Enclosure/s

cc: Jeff Dorwart

JN: 21100
scl



21100: 21100 CO hydrology ltr.doc

DRAINAGE AND TRANSPORTATION SHEET

(REV. 1/11/2002)

PROJECT TITLE: Desert Pine Subdivision Unit 1 ZONE MAP/DRG. FILE #: L9/D24
DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION Lots 36-39 Town of Atrisco Grant Unit 2
CITY ADDRESS: South of Sunset Garden Road, between 98th Street and 94th Street

ENGINEERING FIRM: Tierra West, LLC CONTACT: RONALD R. BOHANNAN OR SARA LAVY
ADDRESS: 8509 Jefferson NE PHONE: (505) 858-3100
CITY, STATE: Albuquerque, NM ZIP CODE: 87113

OWNER: KB Home CONTACT: Jeff Dorwart
ADDRESS: 4921 Alexander Blvd, NE Suite B PHONE: (505) 344-9400
CITY, STATE: Albuquerque, NM ZIP CODE: 87107

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

SURVEYOR: Aldrich Land Surveying CONTACT: Tim Aldrich
ADDRESS: 4800 Juan Tabo NE, Suite D PHONE: (505) 844-1990
CITY, STATE: Albuquerque, NM ZIP CODE: 87111

CONTRACTOR: Sundance Mechanical CONTACT: Mike Mechenbier
ADDRESS: 4400 Alameda Blvd, NE Suite E PHONE: 345-2694
CITY, STATE: Albuquerque, NM ZIP CODE: 87113

CHECK TYPE OF SUBMITTAL:

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

CHECK TYPE OF APPROVAL SOUGHT:

- ☐ SIA / FINANACIAL GUARANTEE RELEASE
☐ PRELIMINARY PLAT APPROVAL
☐ S. DEV. PLAN FOR SUB'D. APPROVAL
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☐ CERTIFICATE OF OCCUPANCY (TEMP.)
☐ GRADING PERMIT APPROVAL
☐ PAVING PERMIT APPROVAL
☐ WORK ORDER APPROVAL
☒ OTHER (SPECIFY) - Engineer's Certification of Grades

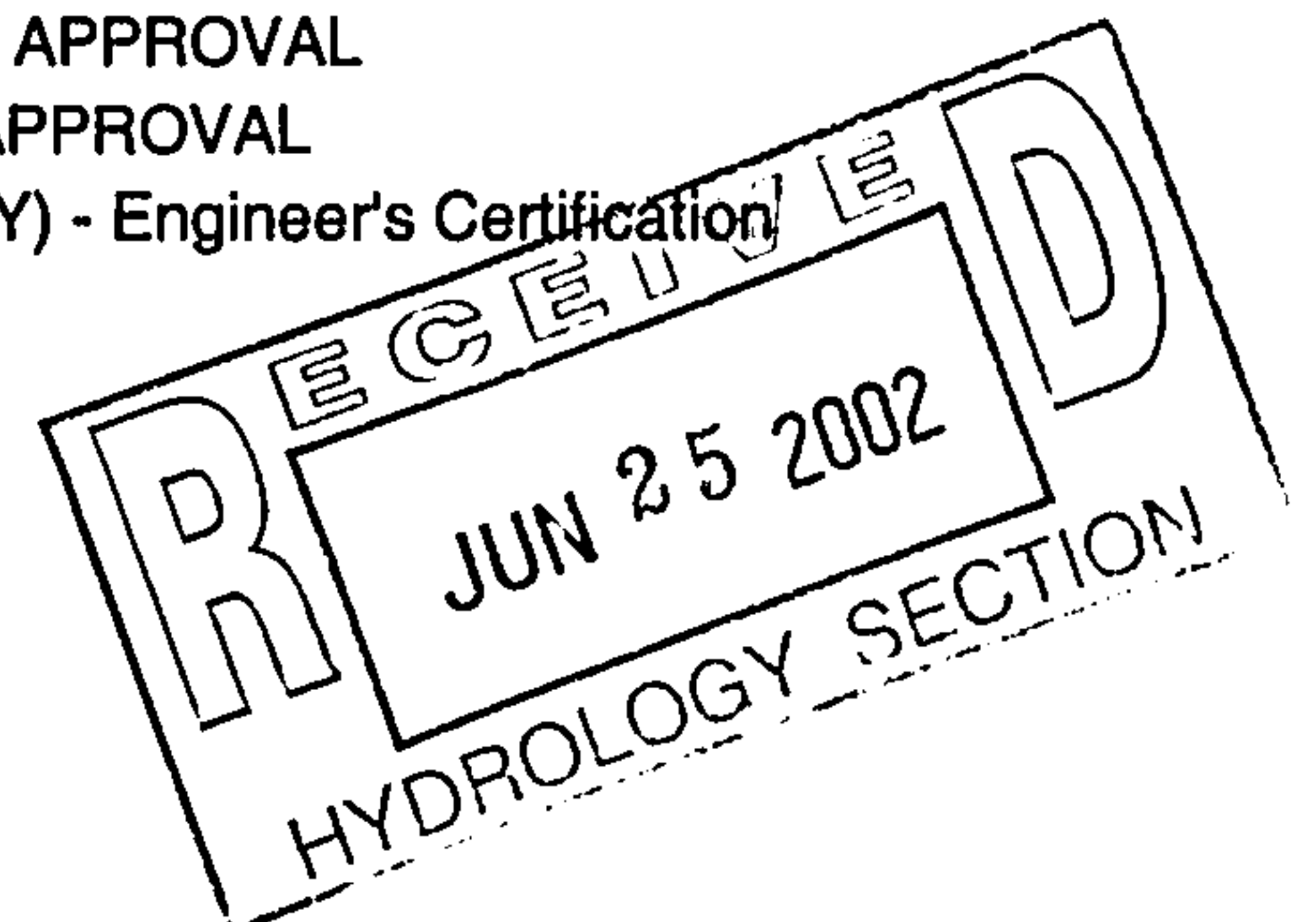
WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ☐ YES
☒ NO
☐ COPY PROVIDED

DATE SUBMITTED: 6/25/02 BY: Sara Lavy

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

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June 27, 2002

Mr. Bradley Bingham, PE
Sr. Engineer, PWD
Development and Building Services
P. O. Box 1293
Albuquerque, New Mexico 87103

RE: Desert Pine Subdivision, Storm Drainage Improvements

Unit 1

Dear Brad,

It has come to my attention that you are concerned with the temporary storm sewer pipe recently concrete lean filled at the Phase One temporary drainage pond. This was done in order to avoid ripping out the curb, sidewalk, paving and walls required to be installed as part of Phase One of the subdivision. Per your concerns, I reviewed the construction with Geo-Test Inc. and with Ronald Bohannon, PE. I am in concurrence with their conclusion that concrete lean fill of the abandoned RCP storm sewer will not cause settlement of the building pads and is an acceptable method of abandonment. Should you like to review the compaction tests for the pond please let me know and I will forward them to you. Should you have any question or comments, please do not hesitate to call.

Sincerely,


Jeff Dorwart
V.P. of Land Acquisition

Cc: Ronald R. Bohannon, PE
Geo-Test

RECEIVED
JUN 28 2002

TIERRA WEST, LLC

8509 Jefferson NE
Albuquerque, NM 87113

(505) 858-3100
fax (505) 858-1118

twllc@tierrawestllc.com
1-800-245-3102

May 24, 2002

Mr. Brad Bingham
Sr. Engineer, Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

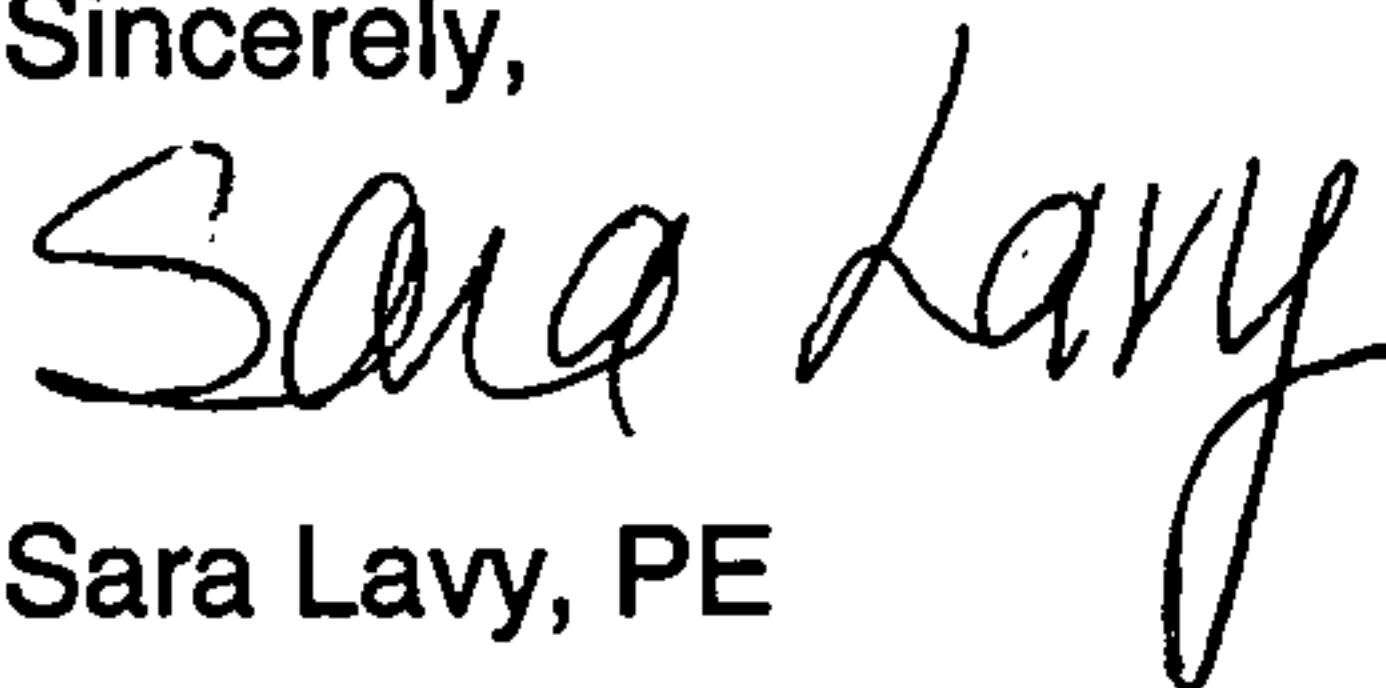
Re: Desert Pine Subdivision Unit 1 (L9/D24)

Dear Mr. Bingham:

We are submitting the Grading and Drainage Plan for a portion of Desert Pine Unit 1 to remove the existing retention pond. A new storm drain system was constructed with SAD 222 that is now complete and functional. This eliminates the need for the on-site retention pond. We have shown grades and pad elevations for the eight lots where the pond is located. The original drainage report for this site included the SAD 222 storm drain as the ultimate drainage solution for this area.

If you have any questions or need additional information, please contact me.

Sincerely,



Sara Lavy, PE

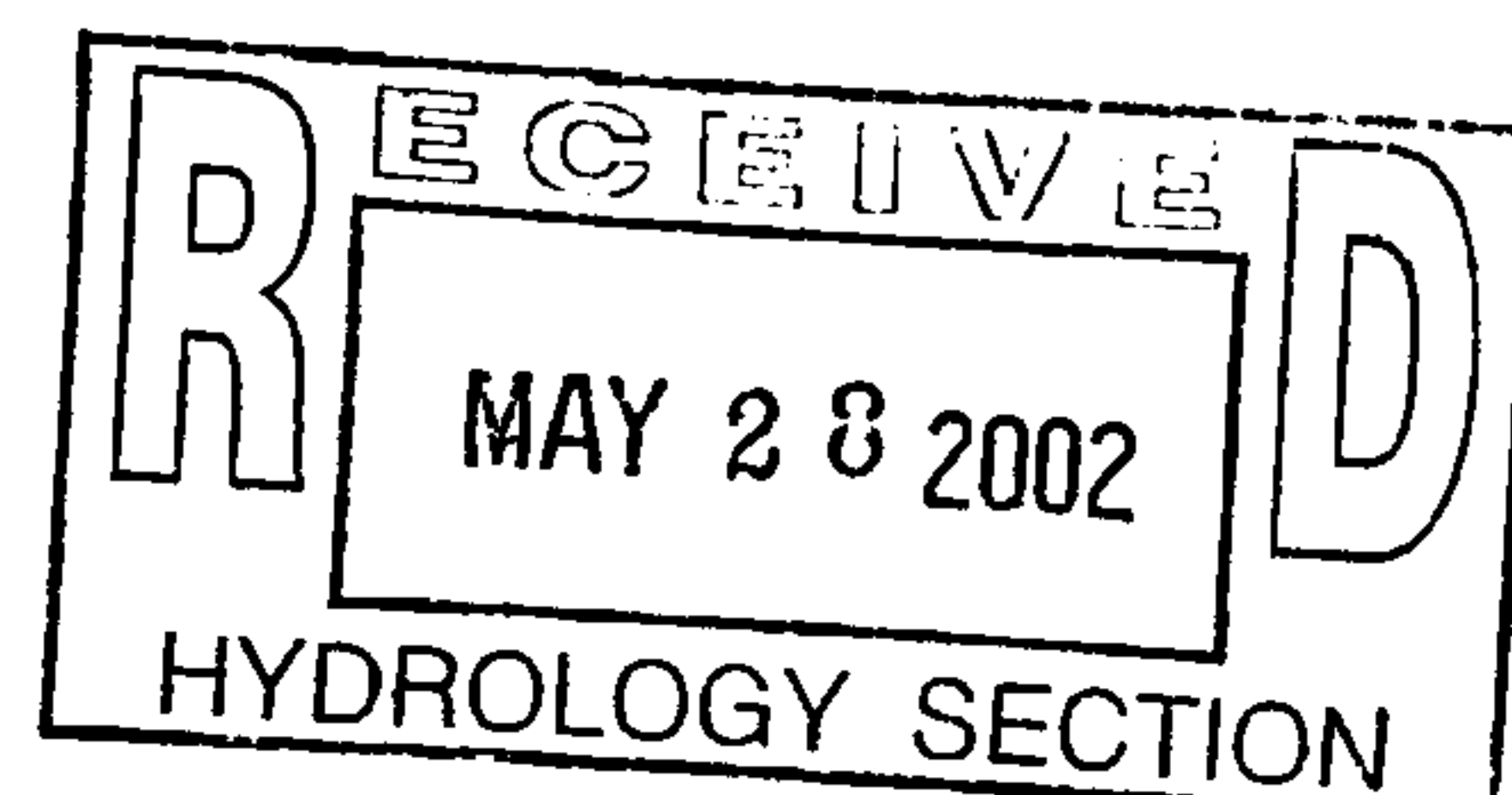
Enclosures

cc: Jeff Dorwart

JN: 21100

scl

21100: 21100 hyd pond removal ltr.doc



DRAINAGE AND TRANSPORTATION SHEET

(REV. 1/11/2002)

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DRB #: _____ EPC #: _____ WORK ORDER #: _____

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ENGINEERING FIRM: Tierra West, LLC CONTACT: RONALD R. BOHANNAN OR SARA LAVY
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ARCHITECT: _____ CONTACT: _____
ADDRESS: _____ PHONE: _____
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SURVEYOR: Aldrich Land Surveying CONTACT: Tim Aldrich
ADDRESS: 4800 Juan Tabo NE, Suite D PHONE: (505) 844-1990
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CONTRACTOR: Sundance Mechanical CONTACT: Mike Mechenbier
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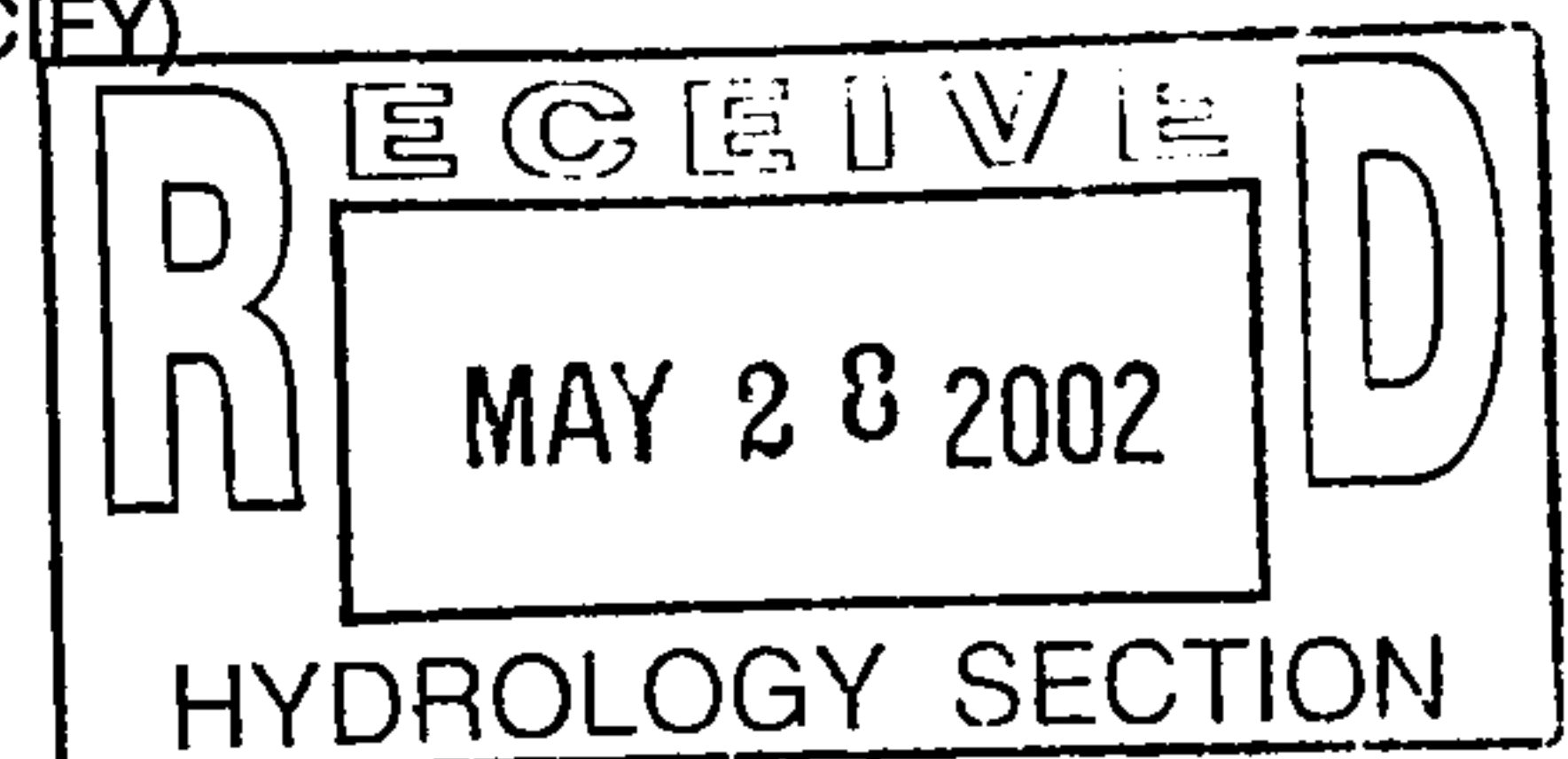
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☐ PAVING PERMIT APPROVAL
☐ WORK ORDER APPROVAL
☐ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ☐ YES
☒ NO
☐ COPY PROVIDED



DATE SUBMITTED: 5/24/02 BY: Sara Lavy

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

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City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

May 17, 2002

Ronald Bohannon, P.E.
Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

RE: DESERT PINE SUBDIVISION UNIT 1 (L-9/D24)
Engineers Certification
Engineers Stamp dated 1/9/2001
Engineers Certification dated 5/9/2002

Dear Mr. Bohannon:

Based upon the information provided in your Engineers Certification submittal dated 5/17/2002, the above referenced plan is adequate to satisfy the Grading and Drainage Certification for the above referenced project.

However, prior to release of financial guaranty, SAD 222 will need to be completed and accepted by the City.

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

Sincerely,

Teresa A. Martin

Teresa A. Martin

Hydrology Plan Checker
Public Works Department
BMB

C: Arlene Portillo, PWD - #655581

✓ File

DRAINAGE AND TRANSPORTATION SHEET

(REV. 1/11/2002)

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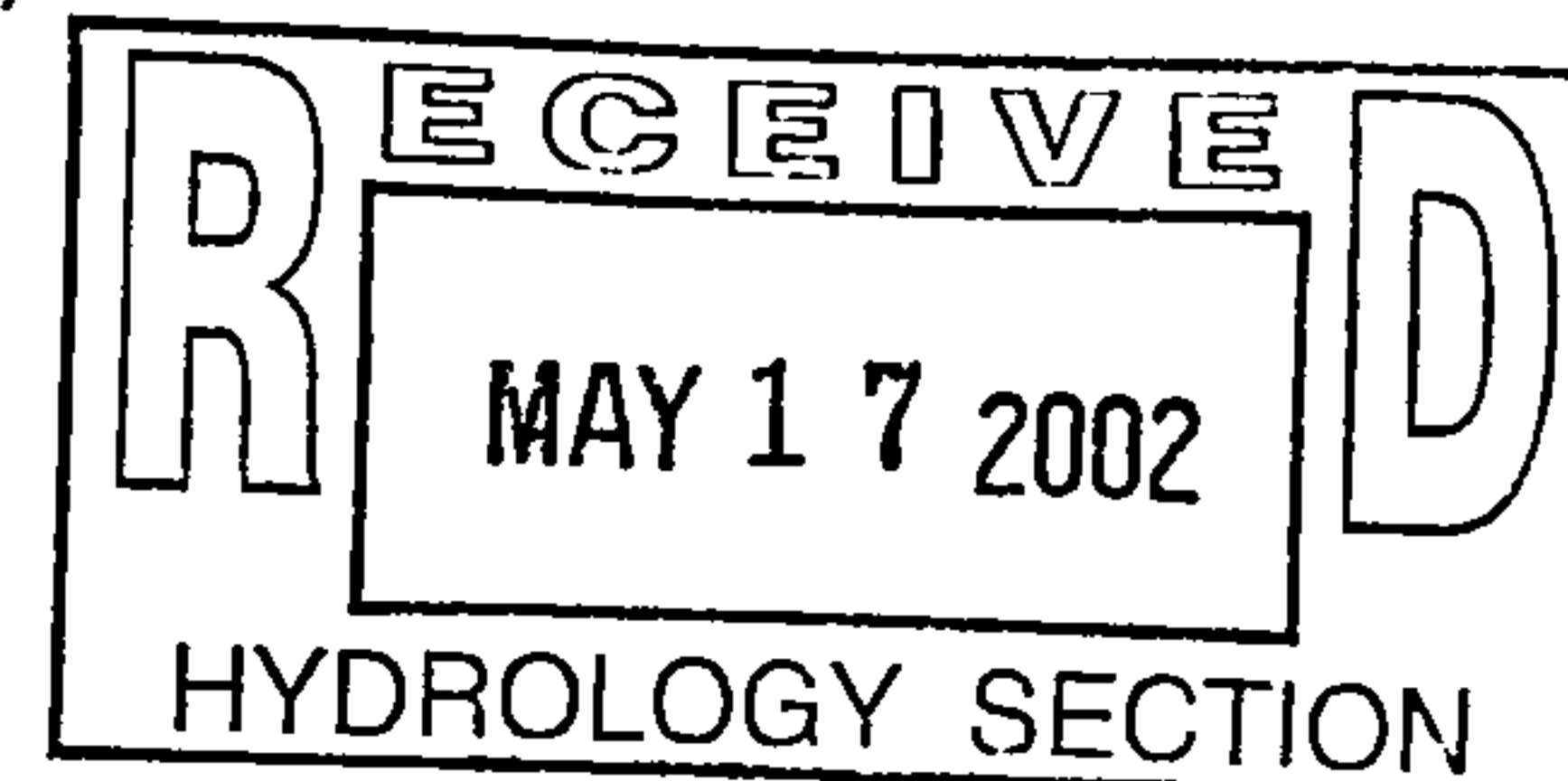
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☐ PAVING PERMIT APPROVAL
☐ WORK ORDER APPROVAL
☐ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ☐ YES
☒ NO
☐ COPY PROVIDED



DATE SUBMITTED: 5/9/02 BY: Ron Wright

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

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

May 22, 2002

Certificate of Work Order Completion

City Engineer
600 Second St.
Plaza Del Sol
Albuquerque, NM 87102

Re: Desert Pine Subdivision, Phase 1 Project No. 6555.81
MAP L-9

Dear Sir:

This is to certify that Project No. 6555.81 has been completed according to approved plans and construction specifications. Please be advised this Certificate of Work-Order Completion does not constitute acceptance of the city infrastructure until all requirements of the subdivision improvements agreement have been satisfied and a Certificate of Completion and Acceptance is issued by the City Engineer.

The project is described as follows:

Paving

A 28' FF residential road was constructed in Desert Rock Drive from Desert Mesa Road to Desert Pine Avenue with curb and gutter both sides. 4' sidewalks have been deferred.

A 28' FF residential road was constructed in Desert Tree Drive from Desert Mesa Road to Desert Pine Avenue with curb and gutter both sides. 4' sidewalks have been deferred.

A 32' FF residential road was constructed in Desert Tree Drive from Desert Pine Avenue to Sunset Gardens Road with curb and gutter and 4' sidewalks both sides.

A 28' FF residential road was constructed in Desert Bluff Drive from Desert Pine Avenue to the south property line with curb and gutter both sides. 4' sidewalks have been deferred.

A 28' FF residential road was constructed in Desert Creek Drive from Desert Rim Road to Desert Pine Avenue with curb and gutter both sides. 4' sidewalks have been deferred.

A 28' FF residential road was constructed in Desert Pine Avenue from Desert Rock Drive to 94th Street with curb and gutter both sides. 4' sidewalks have been deferred.

A 28' FF residential road was constructed in Desert Rim Road from Desert Bluff Drive to Desert Creek Drive with curb and gutter both sides. 4' sidewalks have been deferred.

A 32' FF residential road was constructed in Desert Rim Road from Desert Creek Drive to 94th Street with curb and gutter both sides. 4' sidewalks have been deferred.

A 28' FF residential road was constructed in Desert Mesa Road from 98th Street to Desert Bluff Drive with curb and gutter both sides. 4' sidewalks have been deferred.

A 40' FF residential road was constructed in Sunset Gardens Road from 98th Street to 94th Street with curb and gutter and 4' sidewalks both sides.

A 24' FE residential road was constructed in 94th Street from Sunset Gardens Road to the south property line with curb and gutter and 4' sidewalk on the west side.

A 24' FE arterial road in 98th Street from Sunset Gardens Road to the South Property line with curb and gutter and 4' sidewalk and 4' sidewalk on the east side was deferred.

Storm Sewer

A 18" RCP, storm sewer was installed in Desert Rim Road from 50' west of Desert Creek Drive to Desert Creek Drive.

A 18" RCP, storm sewer was installed in Desert Creek Drive from 50' north of Desert Rim Road to Desert Rim Road.

A 36" RCP, storm sewer was install in Desert Creek Drive from Desert Rim Road to the retention pond.

A 36" RCP, storm sewer was installed in Desert Rim Road from Desert Creek Drive to 94th Street.

A 36" RCP, storm sewer was installed in 94th Street from 50' north of Desert Rim Road to Desert Rim Road.

A 42" RCP, storm sewer line was installed in 94th Street from Desert Rim Road to the south property line.

A 18" RCP, storm sewer was installed in 94th Street from 65' south of Desert Rim Road to the retention pond.

Sanitary Sewer

An 8", SDR-35, gravity sanitary sewer line was installed in Desert Rock Drive from Desert Mesa Road to Desert Pine Avenue.

An 8", SDR-35, gravity sanitary sewer line was installed in Desert Tree Drive from Desert Mesa Road to Sunset Gardens Road.

An 8", SDR-35, gravity sanitary sewer line was installed in Desert Bluff Drive from Desert Pine Road to Desert Rim Road.

An 8", SDR-35, gravity sanitary sewer line was installed in Desert Creek Drive from Desert Rim Road to Desert Pine Avenue.

An 8", SDR-35, gravity sanitary sewer line was installed in Desert Pine Avenue from Desert Rock Drive to 94th Street.

An 8", SDR-35, gravity sanitary sewer line was installed in Desert Rim Road from Desert Bluff Drive to 94th Street.

An 8", SDR-35, gravity sanitary sewer line was installed in Desert Mesa Road from 98th Street to Desert Bluff Drive.

An 8", SDR-35, gravity sanitary sewer line was installed in 94th Street from Sunset Gardens Road to Eucariz Avenue (City project no. 6482.81).

An 8", SDR-35, gravity sanitary sewer line was installed in 94th Street from Eucariz Avenue (City project no. 6482.81) to Tower Road (City project no. 6482.81).

Water

An 6", C-900 PVC waterline was installed in Desert Rock Drive from Desert Mesa Road to Desert Pine Avenue.

An 8", C-900 PVC waterline was installed in Desert Tree Drive from Desert Mesa Road to Sunset Gardens Road.

An 6", C-900 PVC waterline was installed in Desert Bluff from Desert Pine Road to Desert Mesa Road.

An 8", C-900 PVC waterline was installed in Desert Bluff Drive from Desert Mesa Road to the south property line.

An 6", C-900 PVC waterline was installed in Desert Creek Drive from Desert Rim Road to Desert Pine Avenue.

An 6", C-900 PVC waterline was installed in Desert Pine Avenue from Desert Rock Drive to 94th Street.

An 8", C-900 PVC waterline was installed in Desert Rim Road from Desert Bluff Drive to 94th Street.

An 8", C-900 PVC waterline was installed in Desert Mesa Road from 98th Street to Desert Tree Drive.

An 6" C-900 PVC waterline was installed in Desert Mesa Road from Desert Tree Drive to Desert Bluff Drive.

An 8", C-900 PVC waterline was installed in 94th Street from Sunset Gardens Road to Eucariz Avenue (city project no. 648281)

An 8", C-900 PVC waterline was installed in 94th Street from Eucariz Avenue to Tower Road (City project no. 6482.81).

An 8", C-900 PVC waterline was installed in Sunset Gardens Road from 98th Street to 94th Street.

Miscellaneous

Temporary retention ponds were constructed at the southeast corner of the site.

Water infrastructure includes valves, fitting, valves boxes and fire hydrants as required.

Sanitary sewer included manholes and service connected as required. Storm sewer included manholes, inlets and connections to the retention pond as required. Residential street lights were installed per the DPM. Grading and drainage has been certified.

The contractor's correction period will begin the date of the City Engineers Certificate of Completion and Acceptance letter and is effective for a period of one (1) year.

Sincerely,



Peter Chang, P.E.

Chief Construction Engineer

Public Works Department

c: Sundance Mechanical
Tierra West
Master Scheduler
Project Administrator
Terri Martin, Hydrology
Martin Barker, Materials Testing Lab
Sam Hall, Water Systems
Dave Harmon, Traffic Engineering, PWD
Josie Jaramillo, New Meter Sales, PWD
George King, Maps & Records, PWD
Project No. 6555.81
Warranty:Contract

TIERRA WEST, LLC

8509 Jefferson NE
Albuquerque, NM 87113

(505) 858-3100
fax (505) 858-1118

twllc@tierrawestllc.com
1-800-245-3102

May 8, 2002

Mr. Bradley L. Bingham, P.E.
Sr. Engineer, City of Albuquerque, Hydrology
Albuquerque Public Works Department
P.O. Box 1293
Albuquerque, New Mexico 87103

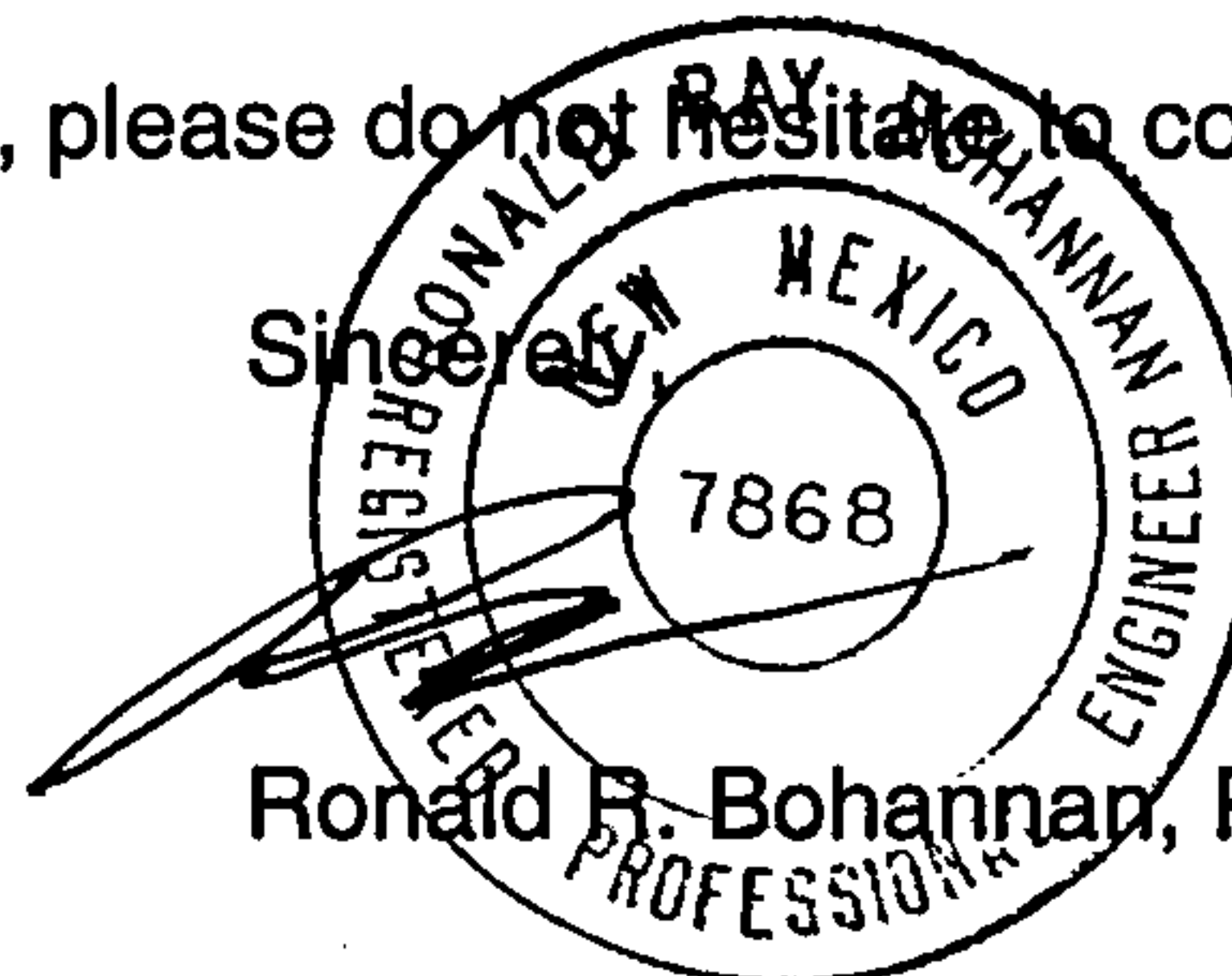
RE: Desert Pine Subdivision, Unit 1 (L9/D24)
Certification of Drainage and Release of Financial Guarantees

Dear Mr. Bingham:

Enclosed please find one copy of the as-built Grading and Drainage Plan and information sheet for Unit 1 of the Desert Pine Subdivision. Sundance Mechanical has completed the utility, paving, and curb and gutter required on the site. All work is complete and in substantial compliance with the approved plans, including the retaining walls. As-built information was supplied by Aldrich Land Surveying. We are, therefore, requesting Final Certification of Drainage and Release of Financial Guarantees for the site.

Should you have any questions, please do not hesitate to contact our office.

Sincerely,



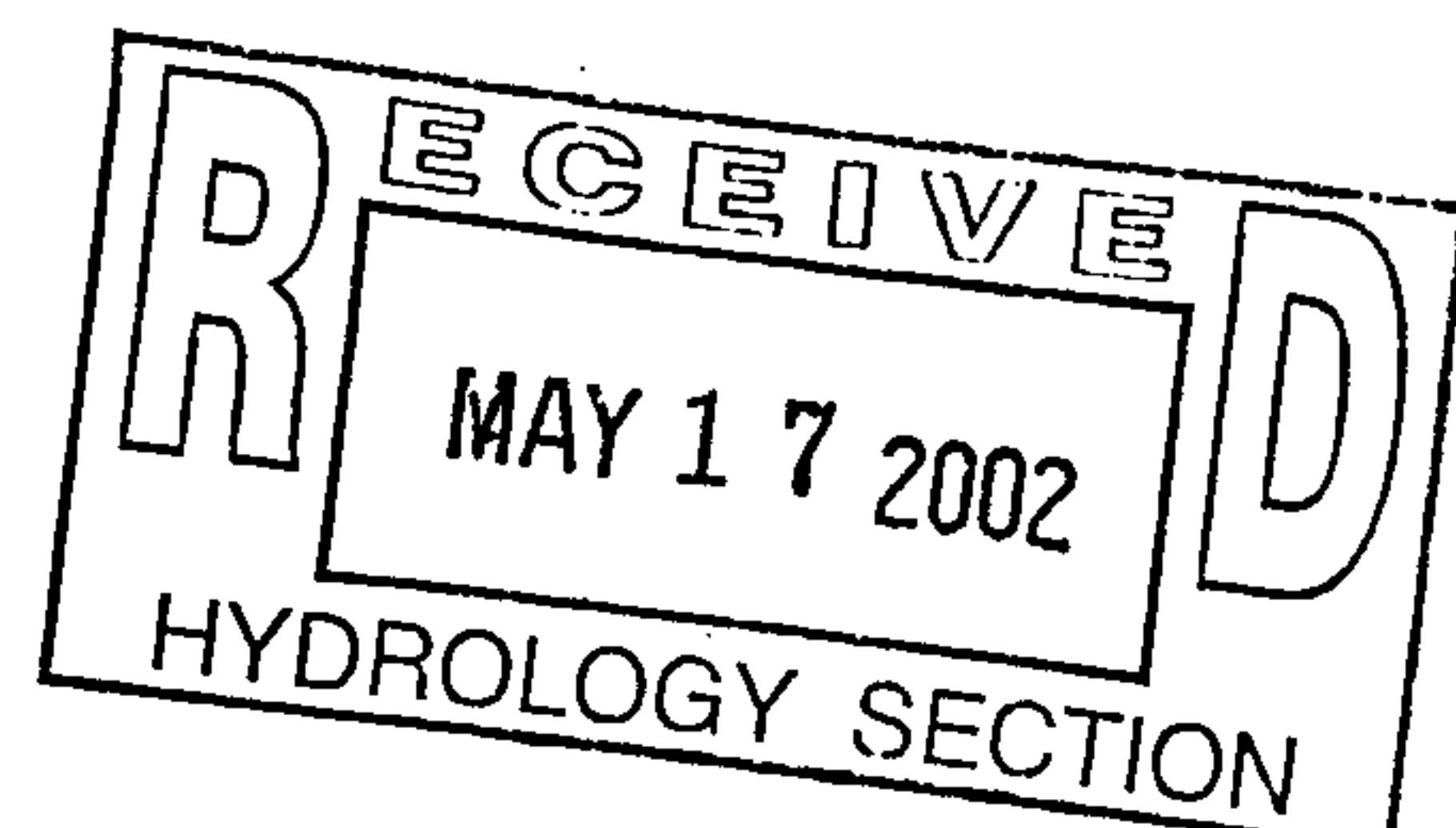
Ronald R. Bohannon, P. E.

Enclosure

cc: Jeff Dorwart

JN: 200038
scl

200038: 2038 final hydrology ltr.doc





City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

March 1, 2001

Ron Bohannon, PE
Tierra West LLC
8509 Jefferson NE
Albuquerque, NM 87113

Re: Desert Pine Subdivision Drainage Report (L9/D24)
Engineer Stamp date 1-9-01

Dear Mr. Bohannon,

Based on information provided in your resubmittal dated 1-11-01, the above referenced plan can be approved for Site Plan for Subdivision, Site Plan for Building Permit and Preliminary Plat action by the Development Review Board.

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

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Sr. Engineer, Hydrology

C: file

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Desert Pine Subdivision ZONE ATLAS/DRNG. FILE #: L-9/D24

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: Lots 36-39 Town of Atrisco Grant Unit 2

CITY ADDRESS: South of Sunset Gardens Road, between 98th Street and 94th Street

ENGINEERING FIR TIERRA WEST, LLC CONTACT: RONALD R. BOHANNAN OR SARA LAVY

ADDRESS: 8509 Jefferson NE, ABQ, NM 87113 PHONE: (505) 858-3100

OWNER: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: Precision Surveys CONTACT: Larry Medrano

ADDRESS: 8414-D Jefferson NE PHONE: (505)856-5700

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

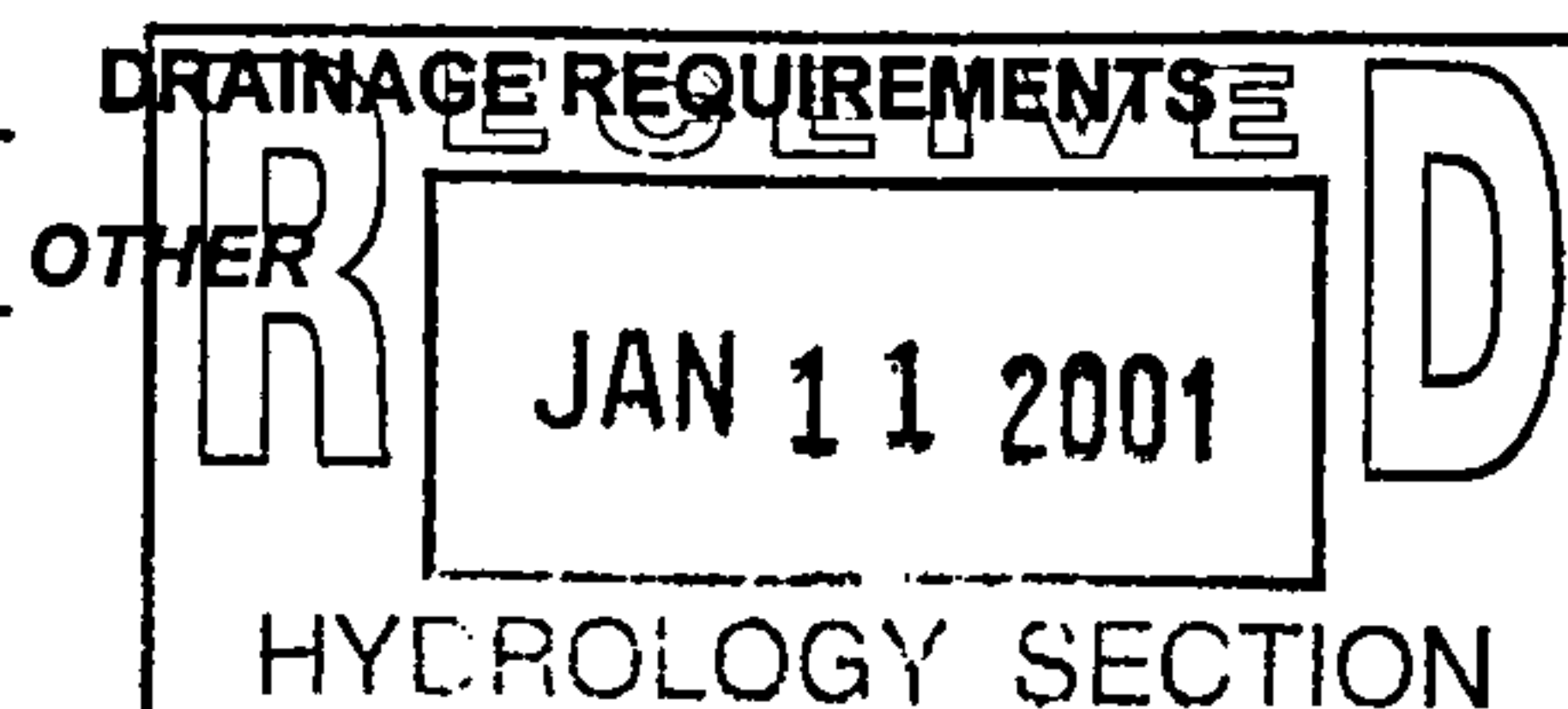
☒ DRAINAGE REPORT
☐ DRAINAGE PLAN
☐ CONCEPTUAL GRADING & DRAINAGE PLAN
☒ GRADING PLAN
☐ EROSION CONTROL PLAN
☐ ENGINEER'S CERTIFICATION
☐ OTHER

PRE-DESIGN MEETING:

☐ YES
☒ NO
☐ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

☐ SKETCH PLAN 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



DATE SUBMITTED: 1/8/01

BY: SARA LAVY

DRAINAGE REPORT

for

Desert Pine Subdivision

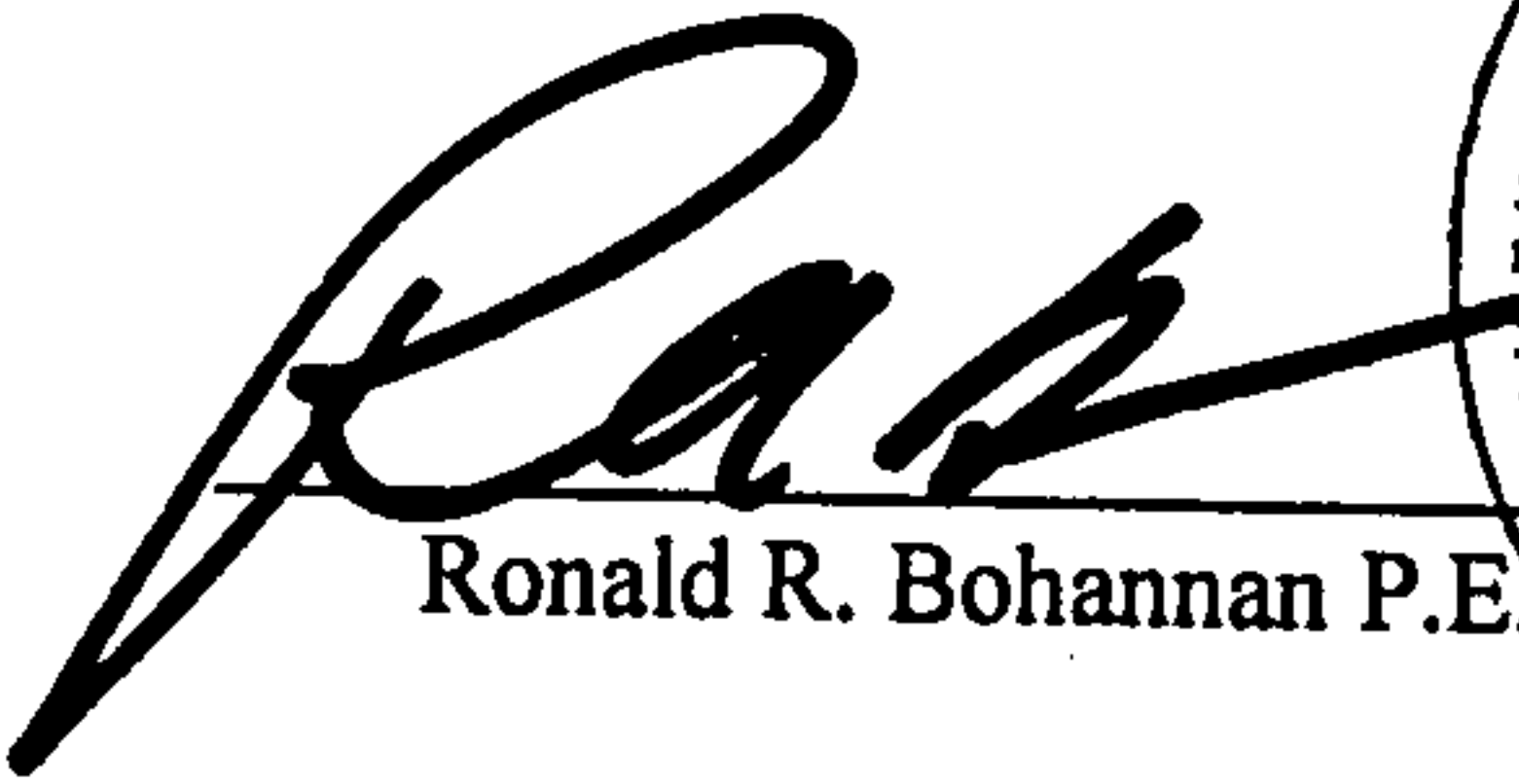
Prepared by

Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

Prepared for

Kaufman & Broad
4921 Alexander Blvd, NE Suite B
Albuquerque, New Mexico 87107

January 2001


Ronald R. Bohannon P.E. No. 7868

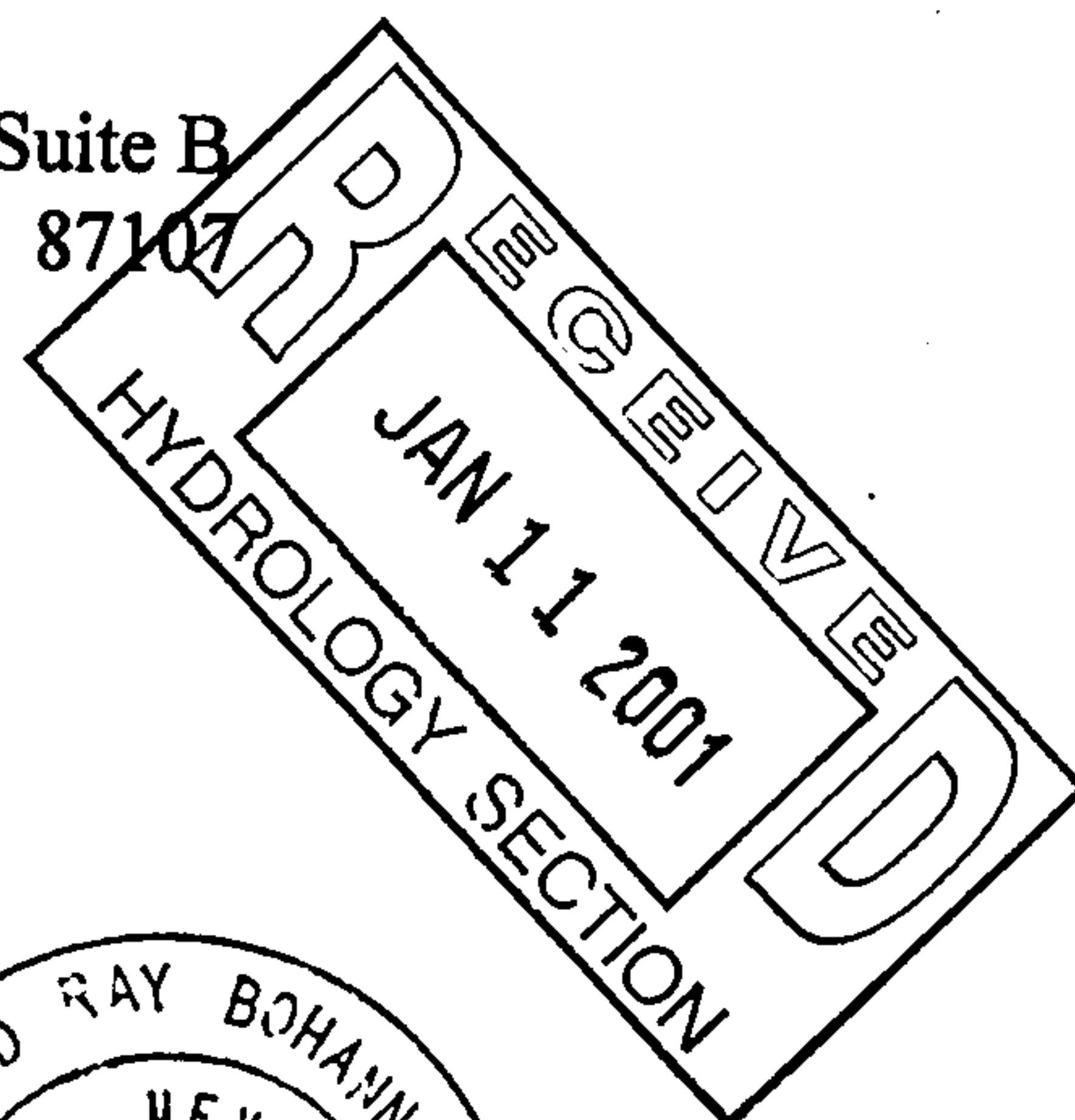
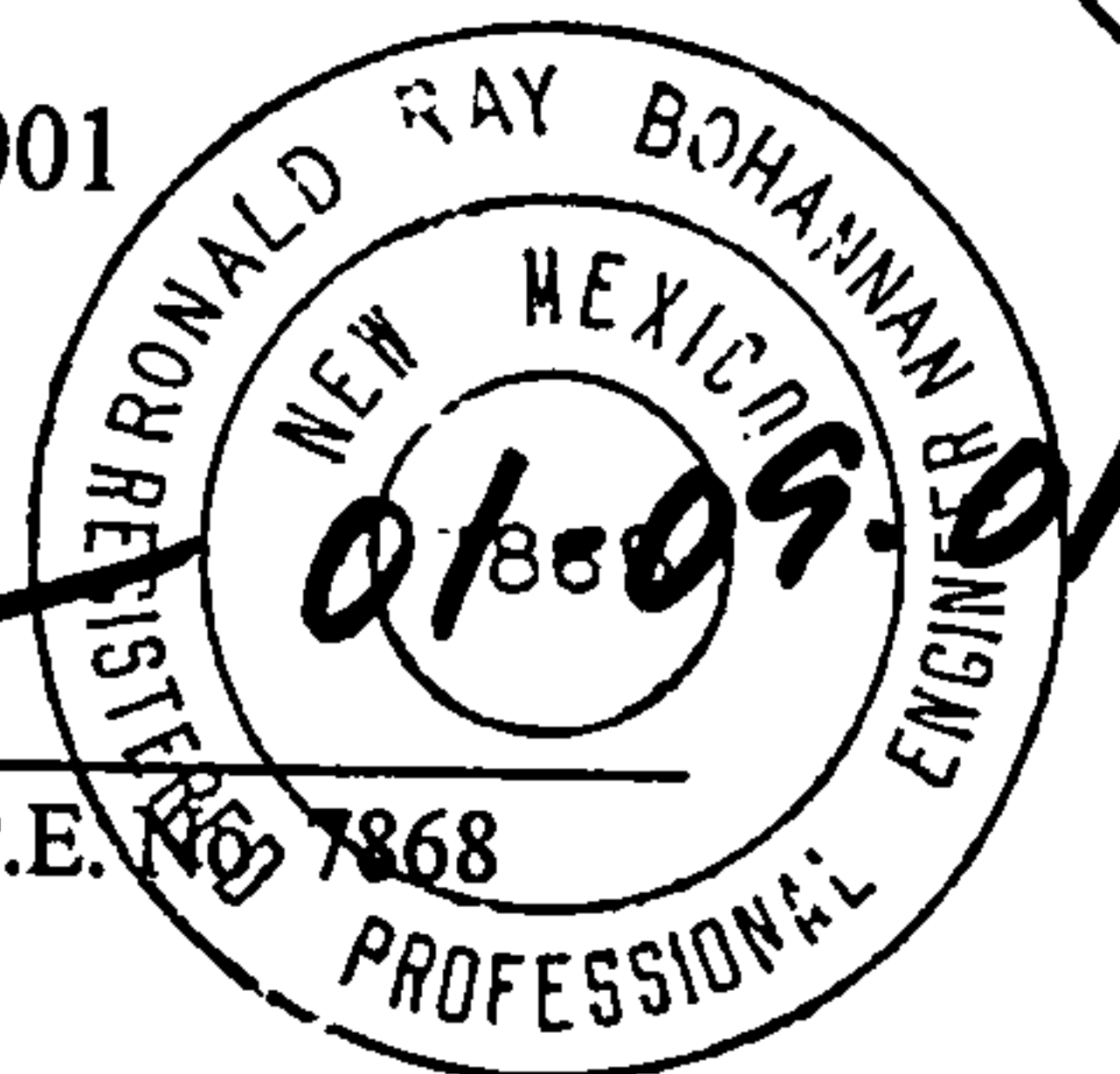


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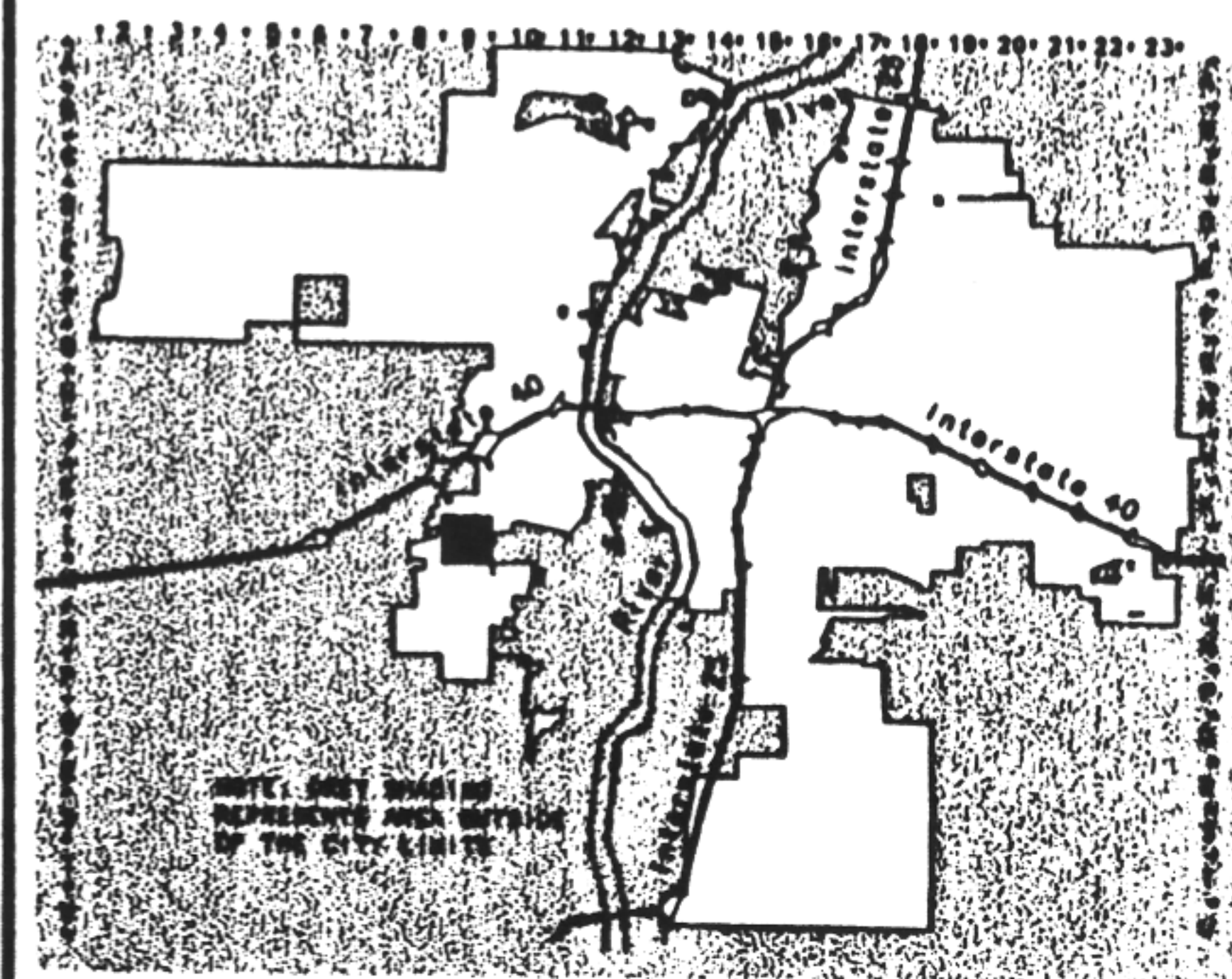
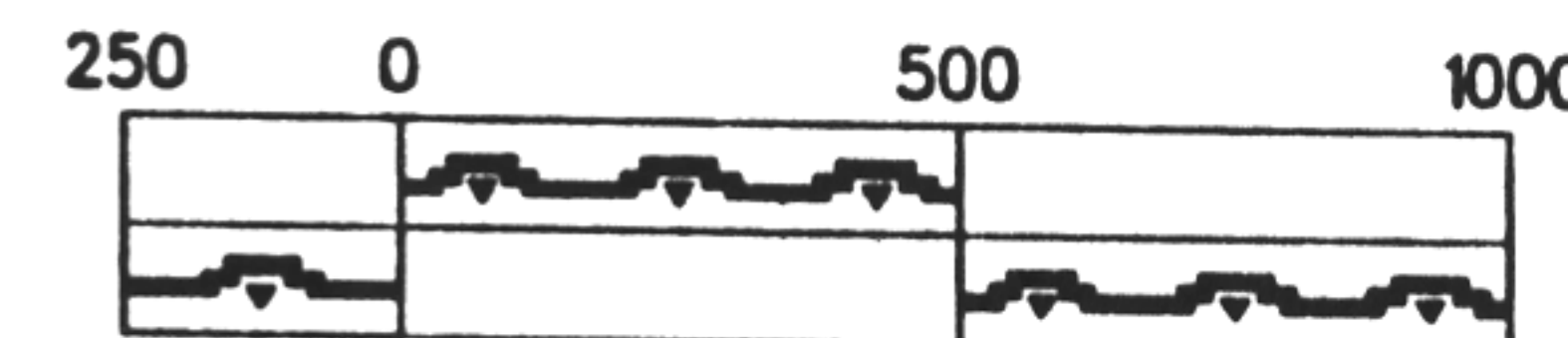
Street Capacity Calculations.....28



CITY OF
Albuquerque
Geographic Information System
PLANNING DEPARTMENT
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GRAPHIC SCALE IN FEET



Zone Atlas Page
L-9-Z

Map Amended through
June 29, 1998

Location

Desert Pine Subdivision is a proposed 127 unit single family subdivision. It is located south of Sunset Gardens Road between 98th Street and 94 Street. The site is shown on the attached Zone Atlas Map L-9 and contains approximately 17.0 acres. The purpose of this report is to provide the drainage analysis and management plan for the subdivision.

Existing Drainage Conditions

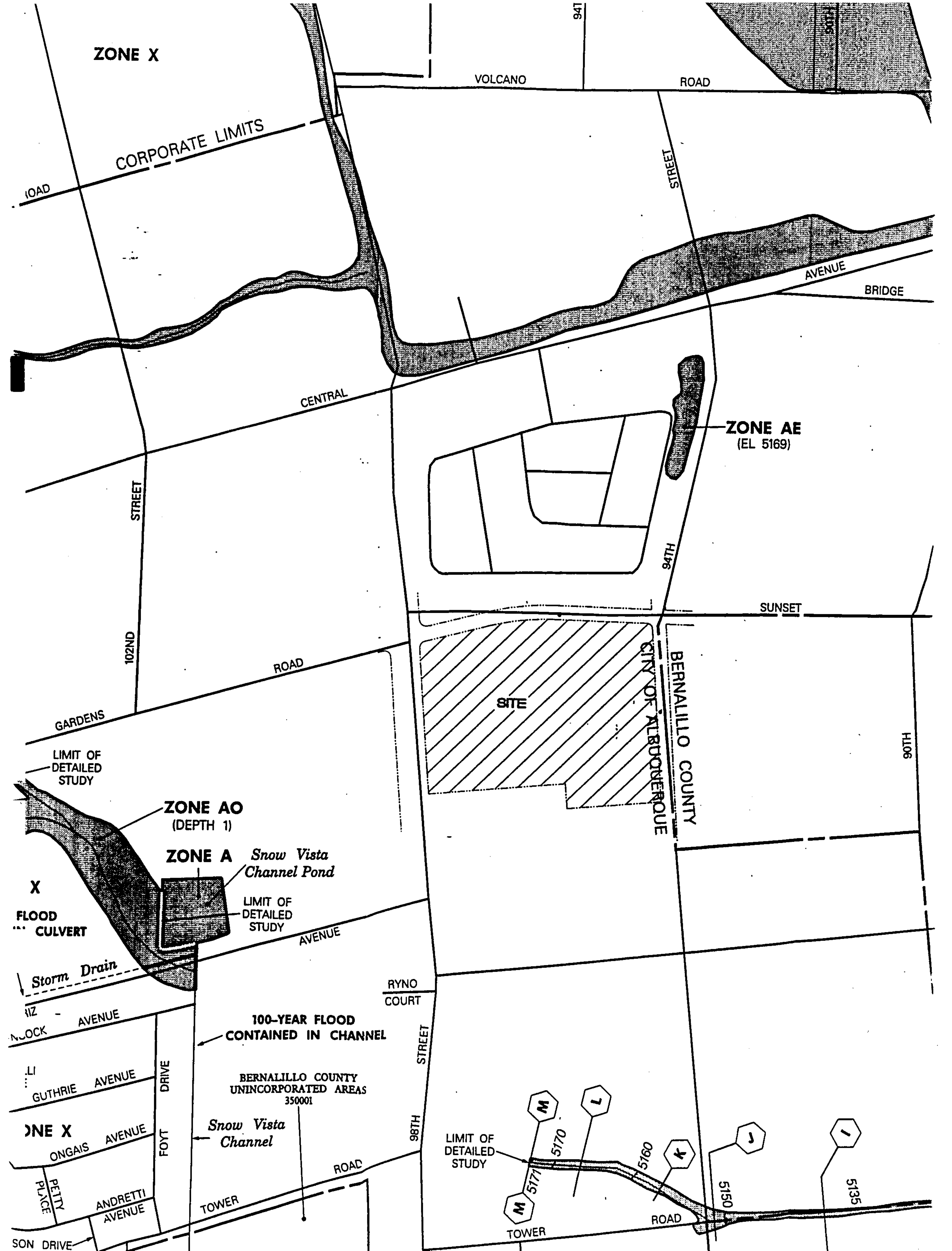
The site is currently undeveloped. The natural slope of the site is from west to east at approximately 3%. There is one existing basin (Basin 1) on the site. Basin 1 sheet flows east with an undeveloped runoff of 37.16 cfs.

The adjacent streets (98th Street and Sunset Gardens) prevent any runoff from entering the site from the west and north. The natural topography of the site prevents any runoff from the east and south from entering the site. The only offsite basin is from an out-parcel located at the southwest corner of the site. This basin has an undeveloped runoff of 2.96 cfs. This basin will be captured in Desert Bluff Drive and conveyed to the onsite pond. In the future, when this basin is developed, the developed runoff will drain through the site to 94th Street. Therefore, this basin was included in the ultimate storm drain calculations for the on-site drainage.

FIRM Map and Soil Conditions

The site is located on FIRM Map section 35001C0328 D as shown on the attached excerpt. This map shows that the site does not lie within any 100 year flood plains.

The site contains one soil type from the Soil Conservation Service Soil Survey of Bernalillo County. The soil found on the site is a Pajarito loamy fine sand and has slow runoff, severe hazard of soil blowing and permeability is moderately rapid.



ZONE X

CORPORATE LIMITS

VOLCANO ROAD

ROAD

STREET

AVENUE

BRIDGE

CENTRAL

ZONE AE
(EL 5169)

STREET

94TH

SUNSET

ROAD

SITE

CITY OF ALBUQUERQUE

BERNALILLO COUNTY

94TH

ZONE AO
(DEPTH 1)

ZONE A Snow Vista Channel Pond

LIMIT OF DETAILED STUDY

X FLOOD CULVERT

Storm Drain

100-YEAR FLOOD CONTAINED IN CHANNEL

BERNALILLO COUNTY UNINCORPORATED AREAS 350001

Snow Vista Channel

RYNO COURT

STREET

98TH

LIMIT OF DETAILED STUDY

5171 5170 5160 5150 5135
TOWER

ROAD

ZONE X

GUTHRIE AVENUE

ONGAIS AVENUE

ANDRETTI AVENUE

SON DRIVE

FOYT DRIVE

TOWER

On-Site Drainage Management Plan

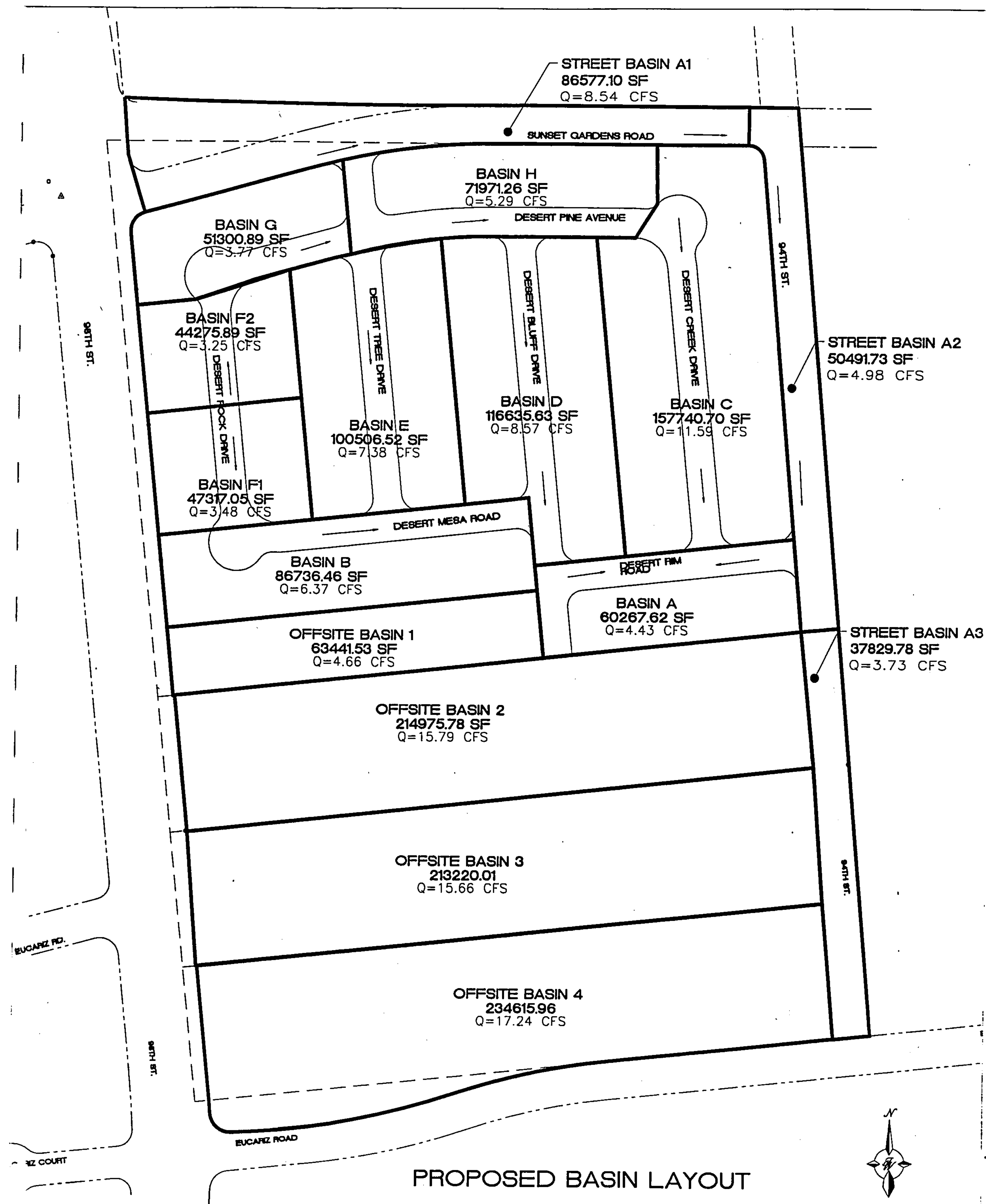
The proposed drainage management plan is to collect the developed flows in the adjacent streets. The flows will be conveyed via a new storm drain to new temporary retention ponds. In the future, when downstream improvements are built, the retention ponds will be removed.

The site is within the boundaries of SAD 222, which is in the process of being approved. The SAD will build downstream storm drain improvements. Until that time, two temporary retention ponds will be constructed to contain the developed flows from the site. When the improvements are in place, the ponds will be removed and the area reclaimed for lots.

A new storm drain system will be constructed in Desert Creek and Desert Rim Drives. This storm drain will convey the on-site drainage and the undeveloped flow from basin OS-1 to the retention ponds. This is a total of 57.08 cfs and a 100-year, 10-day volume of 2.98 ac-ft. The ponding area is split into two ponds. Pond 1 will contain the flows from the on-site basins, and OS-1. Pond 2 will contain the offsite basins A1 and A2. These basins consist of one-half of the adjacent streets of Sunset Gardens and 94th Street. These basins have a combined flow of 5.99 and a 100-year, 10-day volume of 0.385 ac-ft.

In the future, the retention ponds will be removed. The storm drain system has been designed for future and interim conditions. The future lines will be constructed at this time and will remain dry until the ponds are removed. Plugs will be installed to ensure runoff does not enter the future lines. In the future, the plugs will be removed and relocated to the interim lines to block the lines that entered the pond. The future flow rate of 58.81 cfs includes the developed flows from Basin OS-1 and all the on-site basins.

The ultimate storm drain system in 94th Street has been designed with this report. The three offsite basins located south of the site are labeled OS-2, OS-3 and OS-4. The offsite basins OS-2 and OS-3 will drain north to a sump location in 94th Street. Double 'A' drop inlets will be located in the sump to capture the developed flows. The combined flow rate in the storm drain system, included all onsite flows, will be 107.51 cfs. A 54" pipe will convey the flows to Eucariz Avenue. Basin OS-4 drains toward Eucariz and will be captured in a series of drop inlets on 94th Street near Eucariz. The total flow draining to Eucariz will be 122.81 cfs.



Pond 1 will have an emergency overflow to Pond 2. If Pond 2 overflows the runoff will enter 94th Street. We do not anticipate this occurring unless there is a storm event greater than a 100-year storm.

Calculations

The Weighted E method from the "City of Albuquerque Development Process Manual Volume 11 – Design Criteria, 1997 Revision" was used to calculate the runoff and volume for the site.

Summary

The site consists of nine on-site basins and several off-site basins. Offsite Basin 1 (OS-1) consists of the undeveloped flow from the adjacent out-parcel. The nine on-site basins and OS-1 have been included in the storm drain and pond capacity calculations. Off-site basins A1 and A2 consist of the adjacent developed streets. These basins will be captured in a storm sewer in 94th Street and conveyed to a temporary retention pond. Two retention ponds will be located in the ponding area at the southwest corner of the site. Both ponds will be designed for the 100-year-10-day volume. These ponds will be removed in the future when the SAD 222 downstream improvements are constructed. The ultimate storm drain in 94th has been designed with this report.

Runoff Calculations

Weighted E Method

Developed On-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year			100-Year, 10-Day		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
A	60,268	1.38	0%	0	50%	0.69	0%	0.00	50%	0.69	1.320	0.152	4.43	0.730	0.084	2.52	1.320	0.237	4.43
B	86,736	1.99	0%	0	50%	1.00	0%	0.00	50%	1.00	1.320	0.219	6.37	0.730	0.121	3.63	1.320	0.341	6.37
C	157,741	3.62	0%	0	50%	1.81	0%	0.00	50%	1.81	1.320	0.398	11.59	0.730	0.220	6.61	1.320	0.620	11.59
D	116,636	2.68	0%	0	50%	1.34	0%	0.00	50%	1.34	1.320	0.295	8.57	0.730	0.163	4.89	1.320	0.459	8.57
E	100,507	2.31	0%	0	50%	1.15	0%	0.00	50%	1.15	1.320	0.254	7.38	0.730	0.140	4.21	1.320	0.395	7.38
F1	47,317	1.09	0%	0	50%	0.54	0%	0.00	50%	0.54	1.320	0.119	3.48	0.730	0.066	1.98	1.320	0.186	3.48
F2	44,276	1.02	0%	0	50%	0.51	0%	0.00	50%	0.51	1.320	0.112	3.25	0.730	0.062	1.85	1.320	0.174	3.25
G	51,301	1.18	0%	0	50%	0.59	0%	0.00	50%	0.59	1.320	0.130	3.77	0.730	0.072	2.15	1.320	0.202	3.77
H	71,971	1.65	0%	0	50%	0.83	0%	0.00	50%	0.83	1.320	0.182	5.29	0.730	0.101	3.02	1.320	0.283	5.29
Total	736,752	16.91		0.00		8.46		0.00		8.46	11.880	1.860	54.12	6.570	1.029	30.87	11.880	2.896	54.12

Undeveloped Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year			100-Year, 10-Day		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
Onsite	736,752	16.91	0%	0	100%	16.91	0%	0.00	0%	0.00	0.670	0.944	34.33	0.220	0.310	12.85	0.670	0.944	34.33

Interim Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year			100-Year, 10-Day		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
A1 - Half Street	33,119	0.76	0%	0	0%	0.00	5%	0.04	95%	0.72	1.921	0.122	3.27	1.200	0.076	2.14	1.921	0.210	3.27
A2 - Half Street	27,577	0.63	0%	0	0%	0.00	5%	0.03	95%	0.60	1.921	0.101	2.72	1.200	0.063	1.79	1.921	0.175	2.72
OS-1	63,442	1.46	0%	0	100%	1.46	0%	0	0%	0.00	0.670	0.081	2.96	0.220	0.027	1.11	0.670	0.081	2.96

Developed Off-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year			100-Year, 10-Day		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
A1	86,577	1.99	0%	0	0%	0.00	5%	0.10	95%	1.89	1.921	0.318	8.54	1.200	0.199	5.60	1.921	0.549	8.54
A2	50,492	1.16	0%	0	0%	0.00	5%	0.06	95%	1.10	1.921	0.186	4.98	1.200	0.116	3.27	1.921	0.320	4.98
A3	37,830	0.87	0%	0	0%	0.00	5%	0.04	95%	0.83	1.921	0.139	3.73	1.200	0.087	2.45	1.921	0.240	3.73
1	63,442	1.46	0%	0	50%	0.73	0%	0.00	50%	0.73	1.320	0.160	4.66	0.730	0.089	2.66	1.320	0.249	4.66
2	214,976	4.94	0%	0	50%	2.47	0%	0.00	50%	2.47	1.320	0.543	15.79	0.730	0.300	9.01	1.320	0.845	15.79
3	213,220	4.89	0%	0	50%	2.45	0%	0.00	50%	2.45	1.320	0.538	15.66	0.730	0.298	8.93	1.320	0.838	15.66
4	234,616	5.39	0%	0	50%	2.69	0%	0.00	50%	2.69	1.320	0.592	17.24	0.730	0.328	9.83	1.320	0.922	17.24
Total	901,152	20.69		0		8.34		0.20		12.15		2.477	70.60		1.416	41.75		3.965	70.60

Equations:

$\text{Weighted E} = E_a \cdot A_a + E_b \cdot A_b + E_c \cdot A_c + E_d \cdot A_d / (\text{Total Area})$

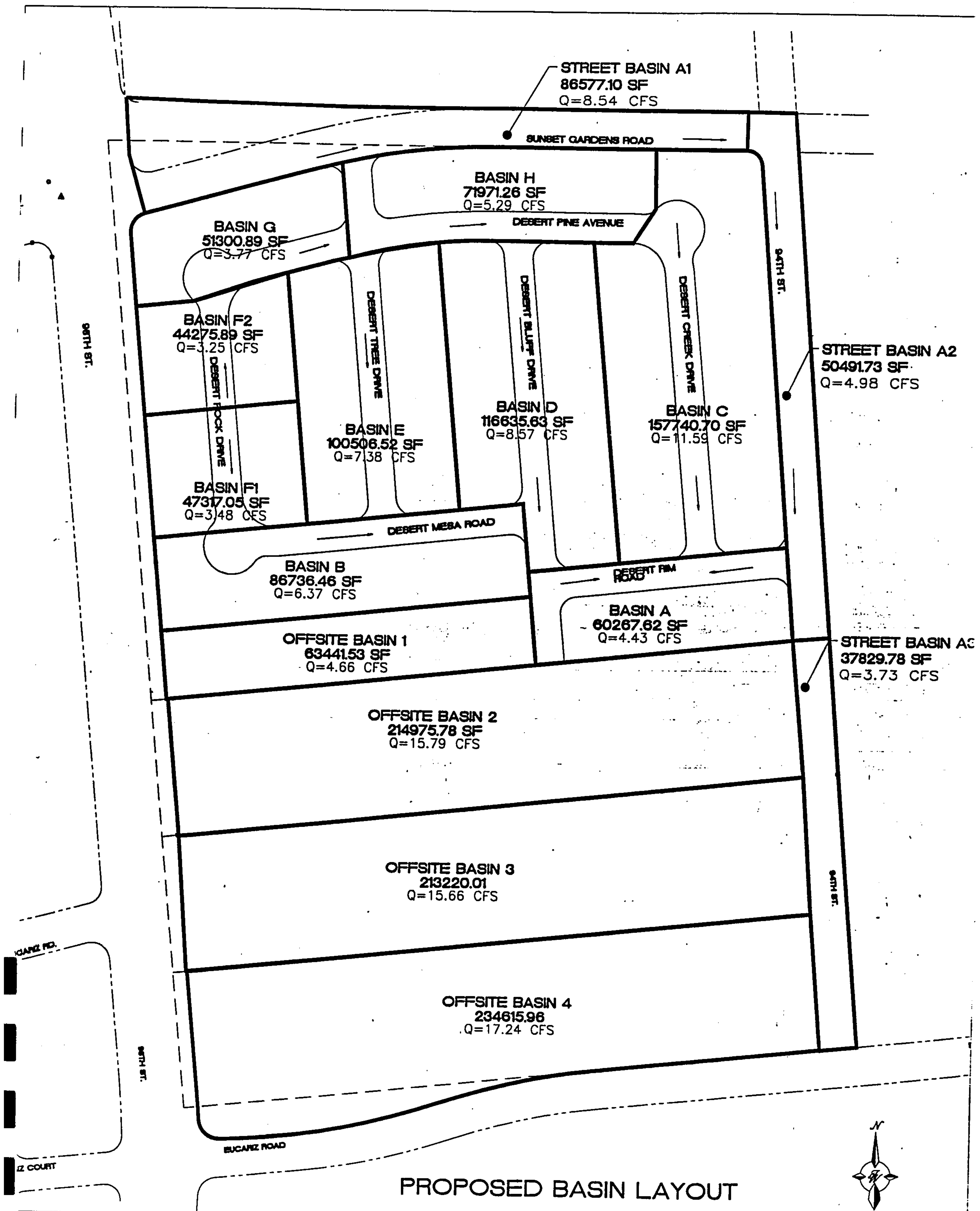
$\text{Volume} = \text{Weighted D} \cdot \text{Total Area}$

$\text{Flow} = Q_a \cdot A_a + Q_b \cdot A_b + Q_c \cdot A_c + Q_d \cdot A_d$

Excess Precipitation, E (inches)		
Zone 1	100-Year	10 - Year
E _a	0.44	0.08
E _b	0.67	0.22
E _c	0.99	0.44
E _d	1.97	1.24

Peak Discharge (cfs/acre)		
Zone 1	100-Year	10 - Year
Q _a	1.29	0.24
Q _b	2.03	0.76
Q _c	2.87	1.49
Q _d	4.37	2.89

Depth (in) at 100-Year Storm	
	Zone 1
P ₃₆₀	2.2
P ₁₄₄₀	2.66
P _{4days}	3.12
P _{10days}	3.67



Pond Calculations

POND SUMMARY

	POND 1	POND 2
Area of Pond Top (SF)	20,493.63	4053.48
Area of Pond Bottom (SF)	7388.78	242.60
Depth of Pond (FT)	11.00	8.00
Volume (CF)	153,353.26	17,184.32
Volume (AC-FT)	3.5205	0.3945
Volume Required (CF)	129,678.12	16,770.06
Volume Required (AC-FT)	2.9770	0.3850
Volume Provided (CF)	153,353.26	17,184.32
Volume Provided (AC-FT)	3.5205	0.3945

Pond 1 includes developed basins A thru H, and interim basin OS-1

Pond 2 includes interim basins A1 and A2

VOLUME OF POND

$$V = (A_t + A_b) / 2 * D$$

A_t = Area of Top

A_b = Area of Bottom

D = Depth

Emergency Spillway

Weir Equation:

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

Pond 1:

Q = 57.08 cfs

C = 2.95

H = 1.0 ft

L = Length of weir

$$L = \frac{57.08}{2.95(1.0)^{3/2}}$$

L = 19.35 ft

Use 20.00 feet for length of weir

Pond 2:

Q = 63.07 cfs

C = 2.95

H = 1.0 ft

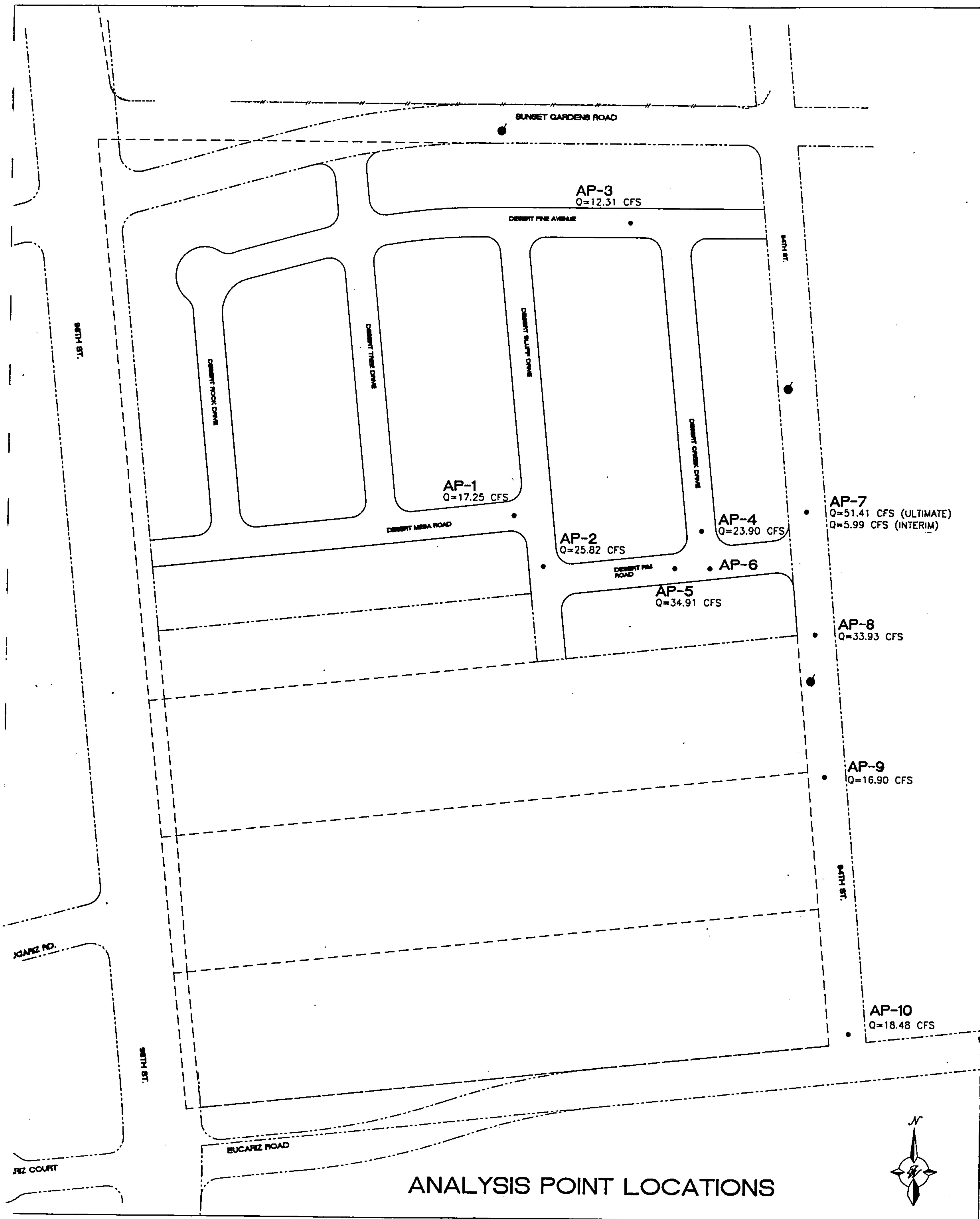
L = Length of weir

$$L = \frac{63.07}{2.95(1.0)^{3/2}}$$

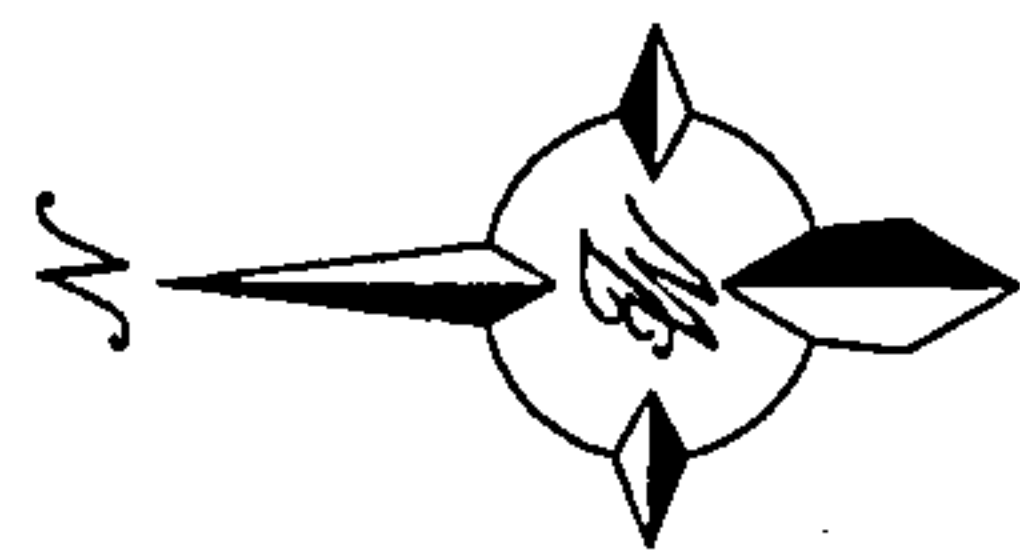
L = 21.38 ft

Use 22.00 feet for length of weir

Storm Drain Calculations



ANALYSIS POINT LOCATIONS



94TH ST.

DESERT CREEK DRIVE

DESERT RIM ROAD

L9=54"

L7=54"

8=18"

L5=36"

L4=36" MHA1

L3=36"

L2=18"

L1=18"

L11=24"

L10=24"

L6A=30"

L6=36"

CB4

CB4-A

CB1

CB2

CB5

CB3

CB6

MHA2

MHA3

ON-SITE STORM DRAIN LAYOUT

DROP INLET CALCULATIONS

Analysis Point	Type of Inlet	Area (SF)	Q (CFS)	H (FT)	Allowable H (FT)
6	Single 'A'	5.92	20.21	0.5027	0.67
7	Double 'A'	11.24	24.35	0.2024	0.67
7	Double 'A'	11.24	24.35	0.2024	0.67

AP-6 = Remainder from AP-4 and AP-5 = 20.21 cfs

AP-7 = Basins A1, A2, A3, OS-2, and OS-3 = 48.70 cfs

STORM DRAIN CALCULATIONS

Analysis Point	Pipe Size (in)	Area (SF)	Q (CFS)	H (FT)	Allowable H (FT)
CB-1	18	1.77	5.8	0.4646	4
CB-2	18	1.77	11.6	1.8586	4.43
CB-3	36	7.07	58.81	2.9857	6.05
CB-4	36	7.07	48.7	2.0474	4
CB-4A	30	4.91	24.35	1.0614	4
CB-5	24	3.14	13.5	0.7965	4
CB-6	24	3.14	27	3.1860	4
CB-7	18	1.77	7.65	0.8083	4
CB-8	18	1.77	7.65	0.8083	4
MHA-1	36	7.07	58.81	2.9857	6.52
MHA-2	54	15.90	107.51	1.9710	6.6
MHA-3	54	15.90	107.51	1.9710	6
MHA-4	54	15.90	122.81	2.5719	6

ORIFICE EQUATION

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

$$C = 0.6$$

$$g = 32.2$$

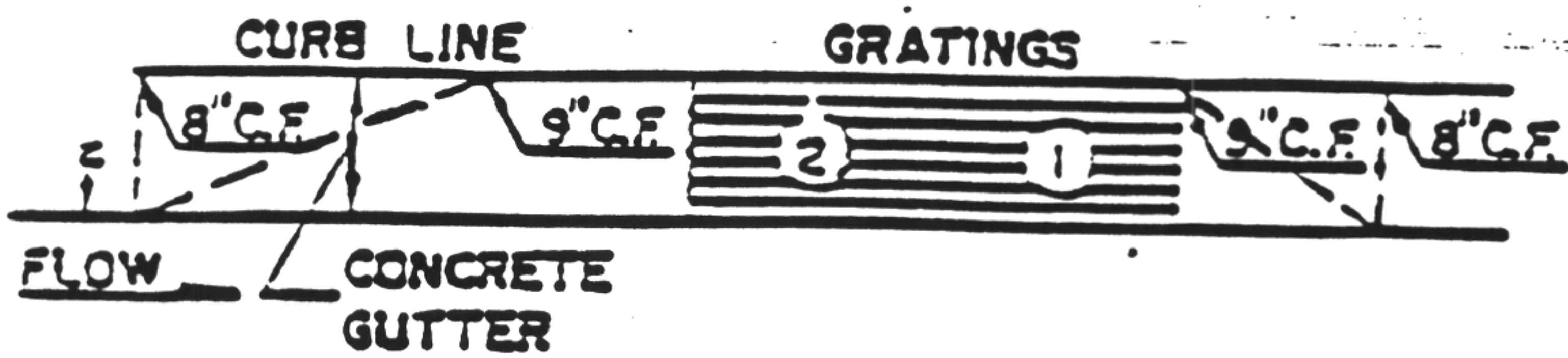
AP-4 (Desert Creek Drive)

S = 1.00%

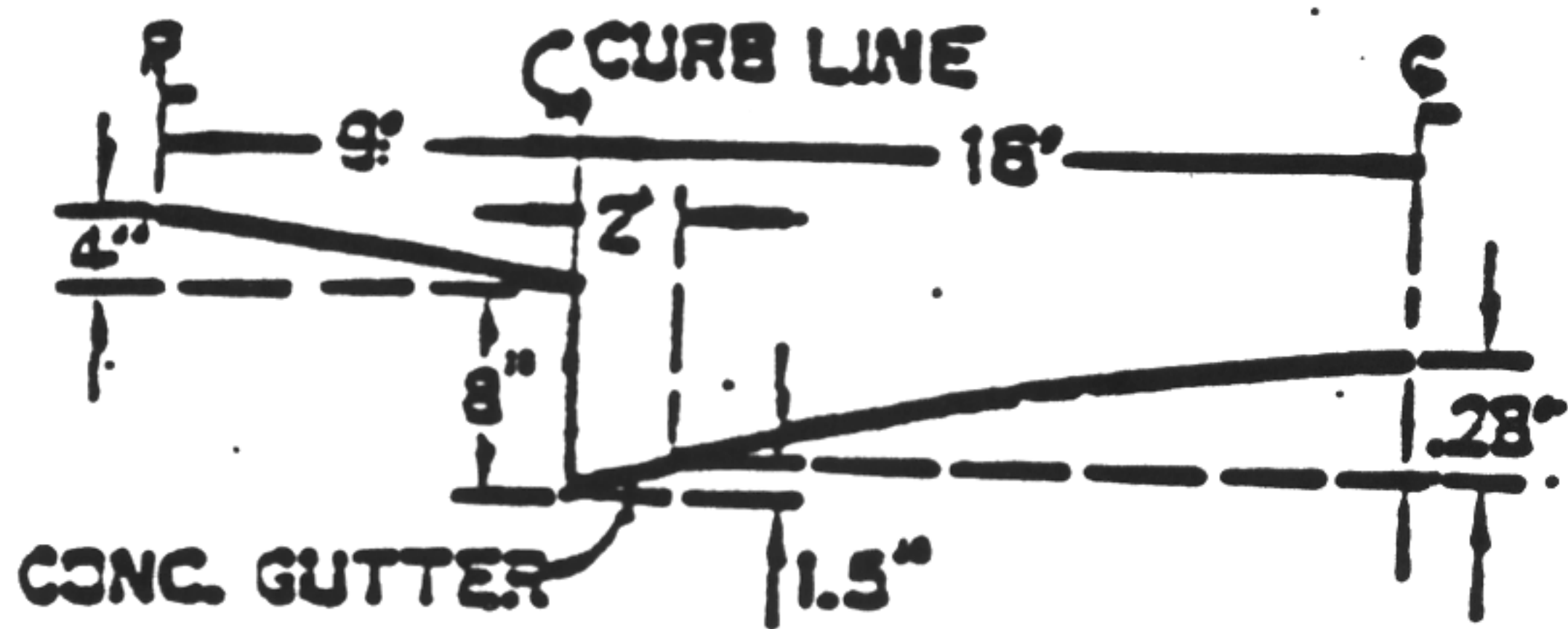
22.3

GRATING CAPACITIES FOR TYPE DOUBLE

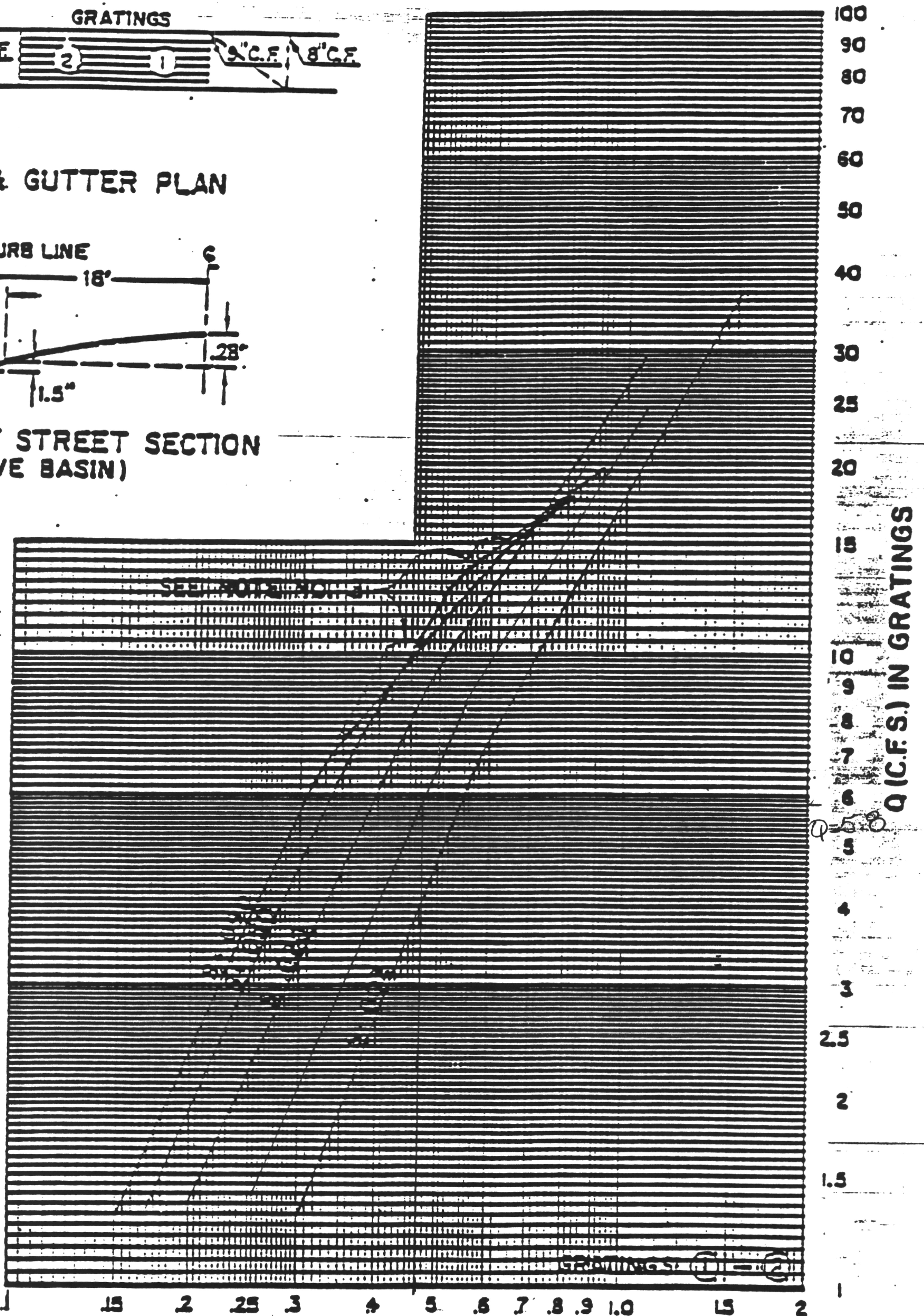
"C," AND "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION (ABOVE BASIN)



asins F2, G, H, C
2.25 + 3.77 + 5.29 + 11.59
23.90

Q = 23.90

d = 0.47

Q_{gr} = 5.8 (2) = 11.60

Q_{gr} = 12.30

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

Street Capacity Calculations

AP-4 with Q=23.90 cfs
28' F-F Street Section with 8" curb
Slope= 1.00%

For water depths less than 0.125 feet

Y= Water depth

Area = $8 \cdot Y^2$

P= $\text{SQRT}(257 \cdot Y^2) + Y$

n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.25	0.00	0.43	0.003
0.02	0.00	0.34	0.01	0.00	0.00	0.39	0.01	0.48	0.007
0.04	0.01	0.68	0.02	0.01	0.02	0.62	0.02	0.54	0.017
0.06	0.03	1.02	0.03	0.02	0.05	0.81	0.05	0.58	0.028
0.08	0.05	1.36	0.04	0.05	0.10	0.98	0.08	0.61	0.040
0.1	0.08	1.70	0.05	0.09	0.18	1.14	0.11	0.63	0.053
0.12	0.12	2.04	0.06	0.15	0.30	1.29	0.15	0.65	0.066
0.125	0.13	2.13	0.06	0.17	0.33	1.32	0.17	0.66	0.070

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$

P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.18	0.35	1.29	0.17	0.63	0.068
0.16	0.23	3.91	0.06	0.29	0.59	1.30	0.21	0.57	0.073
0.2	0.42	5.95	0.07	0.62	1.23	1.48	0.30	0.58	0.093
0.24	0.69	8.00	0.09	1.17	2.33	1.70	0.41	0.61	0.120
0.28	1.04	10.04	0.10	1.99	3.98	1.92	0.54	0.64	0.150
0.32	1.47	12.08	0.12	3.14	6.28	2.14	0.69	0.67	0.182
0.34	1.71	13.10	0.13	3.85	7.70	2.25	0.77	0.68	0.199
0.365	2.05	14.37	0.14	4.87	9.74	2.38	0.87	0.69	0.220

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= $A2 + Y2 \cdot 14$

P3= $P2 + Y2$

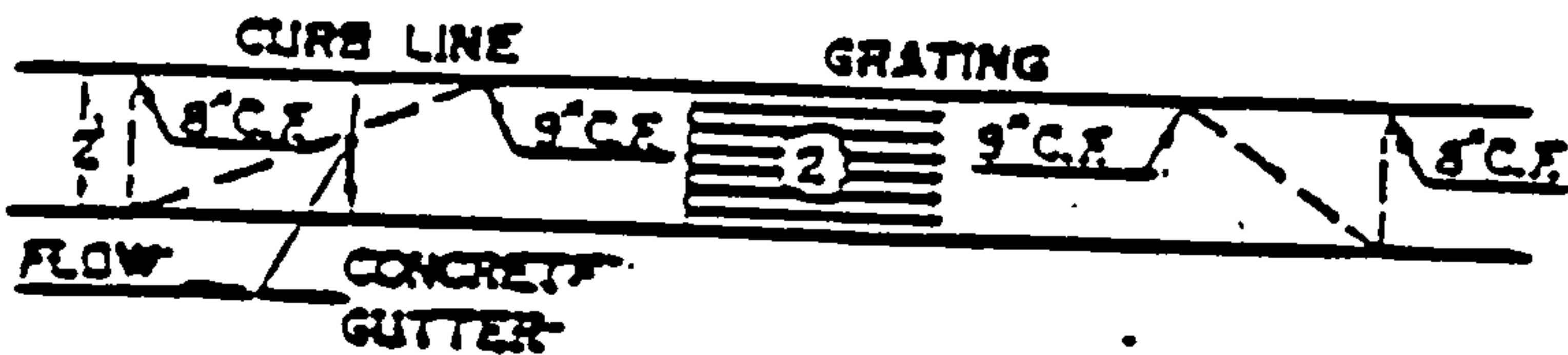
Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.12	14.38	0.15	5.15	10.30	2.44	0.90	0.71	0.228
0.4	2.54	14.41	0.18	6.96	13.92	2.74	1.10	0.76	0.277
0.45	3.24	14.46	0.22	10.42	20.85	3.22	1.45	0.85	0.359
0.470	3.51	14.48	0.24	11.95	23.90	3.40	1.60	0.87	0.392
0.54	4.50	14.55	0.31	17.96	35.92	4.00	2.16	0.96	0.510
0.58	5.06	14.59	0.35	21.80	43.60	4.31	2.50	1.00	0.578
0.63	5.76	14.64	0.39	27.00	54.00	4.69	2.96	1.04	0.665
0.667	6.27	14.67	0.43	31.12	62.24	4.96	3.31	1.07	0.730

AP-5 (Desert Rim Rd)

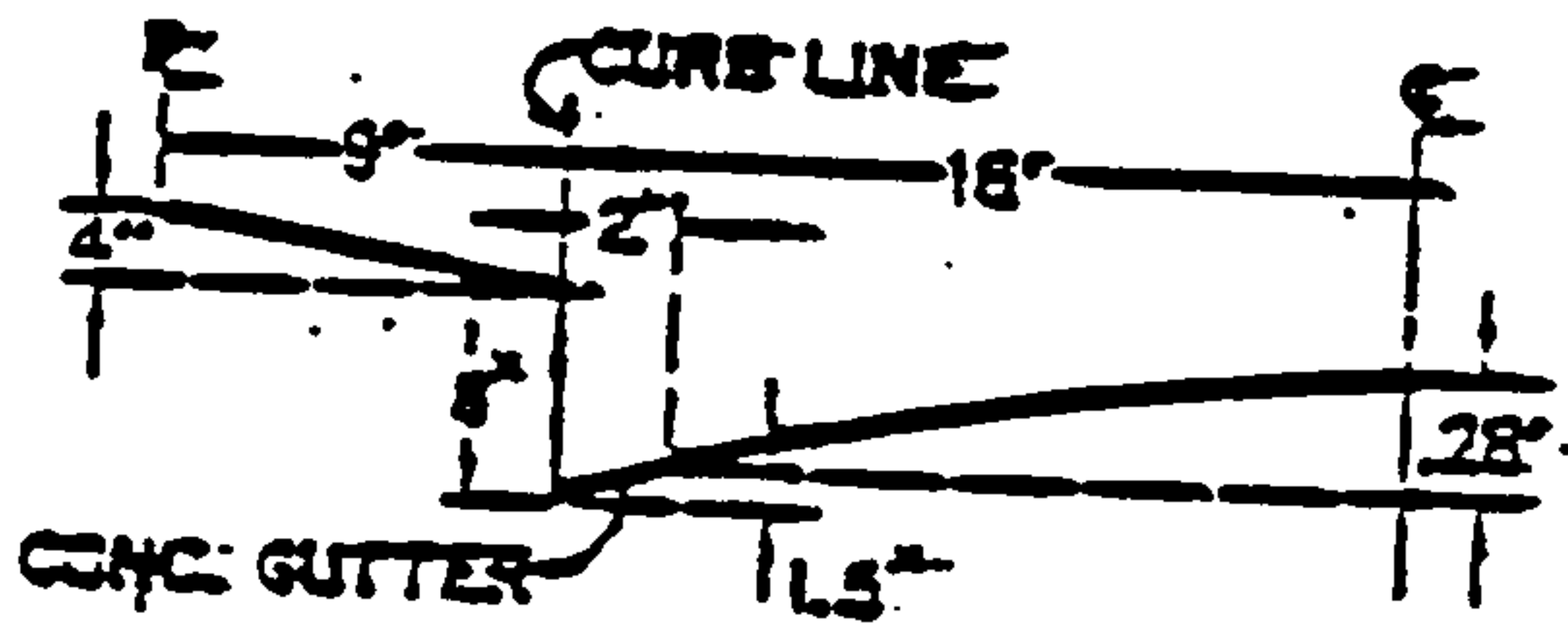
$S = 2.5790$

22.3

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



GRATING & GUTTER PLAN

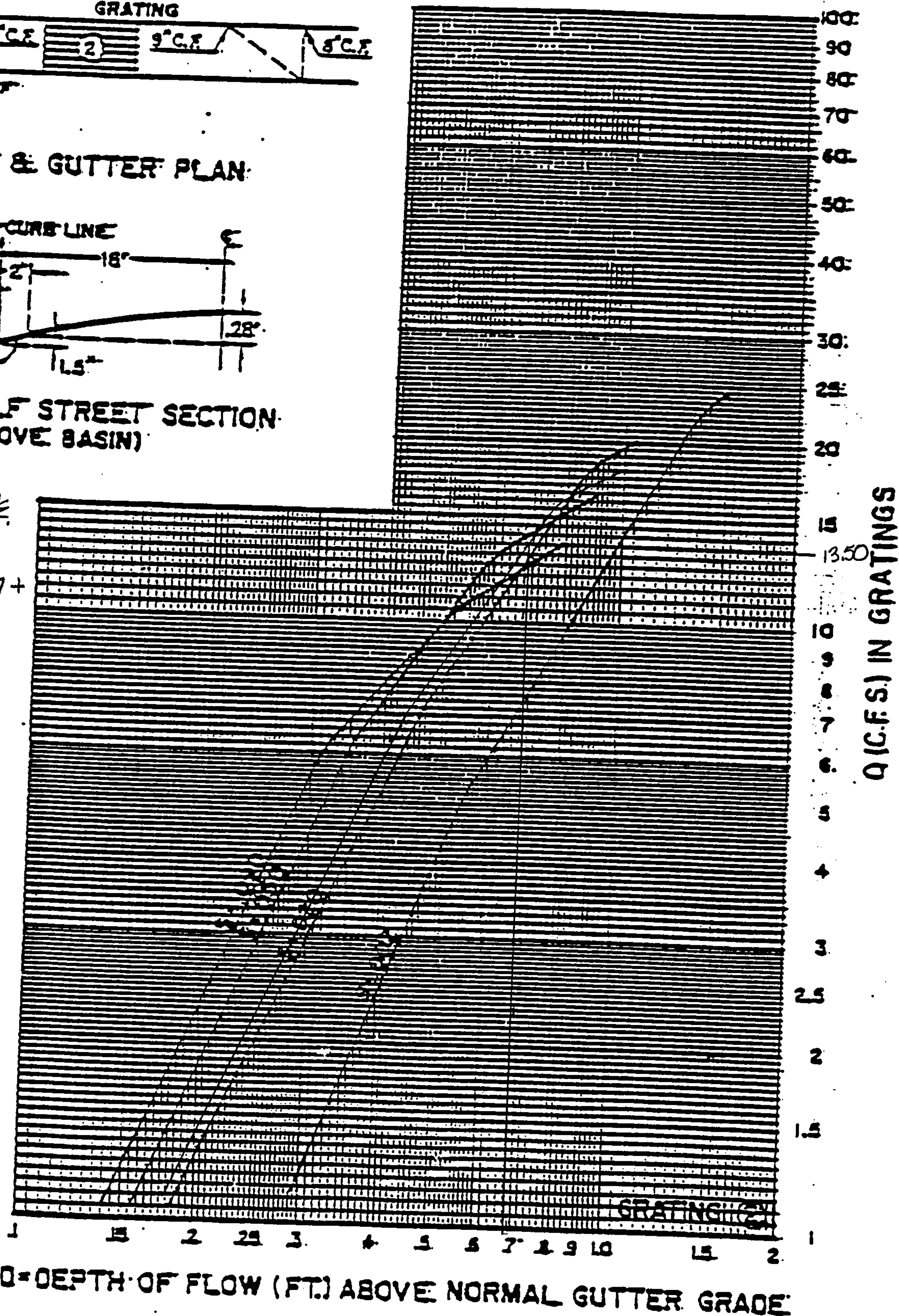


TYPICAL HALF STREET SECTION (ABOVE BASIN)

using F, E, D, B, O, S, &
A

$$= 3.48 + 7.38 + 8.57 + 6.37 + 4.66 + 4.43$$

$$= 34.91$$



$$Q = 34.91$$

$$d = 0.69$$

$$Q_{cap} = 1350(2) = 27.0$$

$$Q_{req} = 7.91$$

Street Capacity Calculations

AP-5 with Q=34.91 cfs
28' F-F Street Section with 8" curb
Slope= 2.57%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.39	0.00	0.69	0.006
0.02	0.00	0.34	0.01	0.00	0.00	0.62	0.01	0.78	0.014
0.04	0.01	0.68	0.02	0.01	0.03	0.99	0.04	0.87	0.033
0.06	0.03	1.02	0.03	0.04	0.07	1.30	0.08	0.93	0.055
0.08	0.05	1.36	0.04	0.08	0.16	1.57	0.13	0.98	0.078
0.1	0.08	1.70	0.05	0.15	0.29	1.82	0.18	1.02	0.102
0.12	0.12	2.04	0.06	0.24	0.47	2.06	0.25	1.05	0.128
0.125	0.13	2.13	0.06	0.26	0.53	2.12	0.26	1.06	0.134

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.28	0.56	2.07	0.27	1.01	0.132
0.16	0.23	3.91	0.06	0.47	0.94	2.09	0.33	0.92	0.143
0.2	0.42	5.95	0.07	0.99	1.97	2.38	0.48	0.94	0.183
0.24	0.69	8.00	0.09	1.87	3.74	2.73	0.65	0.98	0.234
0.28	1.04	10.04	0.10	3.19	6.39	3.08	0.86	1.03	0.290
0.32	1.47	12.08	0.12	5.03	10.07	3.44	1.10	1.07	0.350
0.34	1.71	13.10	0.13	6.17	12.34	3.61	1.23	1.09	0.381
0.365	2.05	14.37	0.14	7.81	15.62	3.82	1.39	1.11	0.421

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2 \cdot 14$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.12	14.38	0.15	8.26	16.52	3.91	1.44	1.13	0.435
0.4	2.54	14.41	0.18	11.15	22.31	4.40	1.76	1.23	0.522
0.46	3.32	14.46	0.23	17.46	34.91	5.26	2.40	1.37	0.685
0.50	3.94	14.51	0.27	23.11	46.21	5.87	2.94	1.46	0.815
0.54	4.50	14.55	0.31	28.79	57.58	6.41	3.46	1.54	0.934
0.58	5.06	14.59	0.35	34.95	69.90	6.91	4.01	1.60	1.054
0.63	5.76	14.64	0.39	43.28	86.57	7.52	4.74	1.67	1.206
0.667	6.27	14.67	0.43	49.89	99.77	7.95	5.30	1.72	1.319

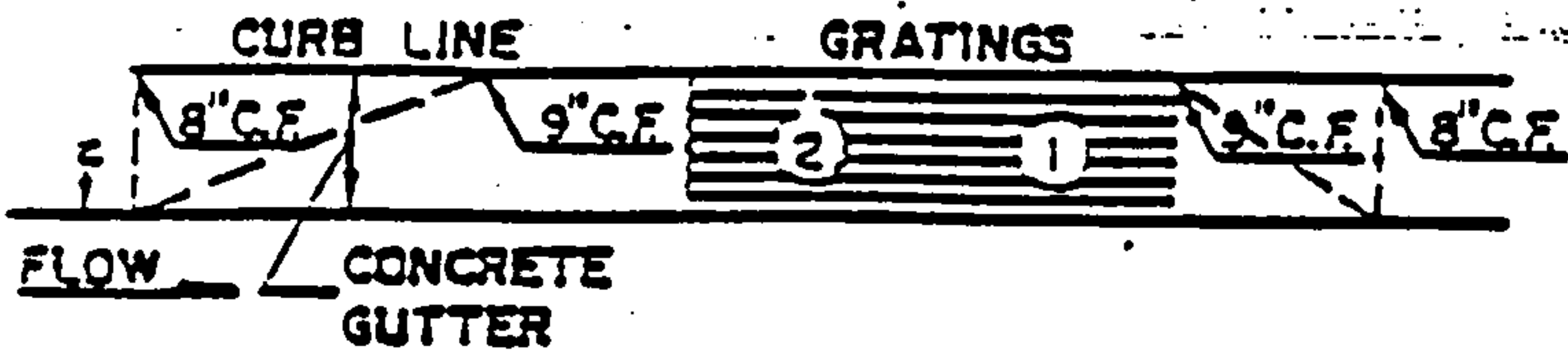
AP-10 (94th Street)

S = 1.3490

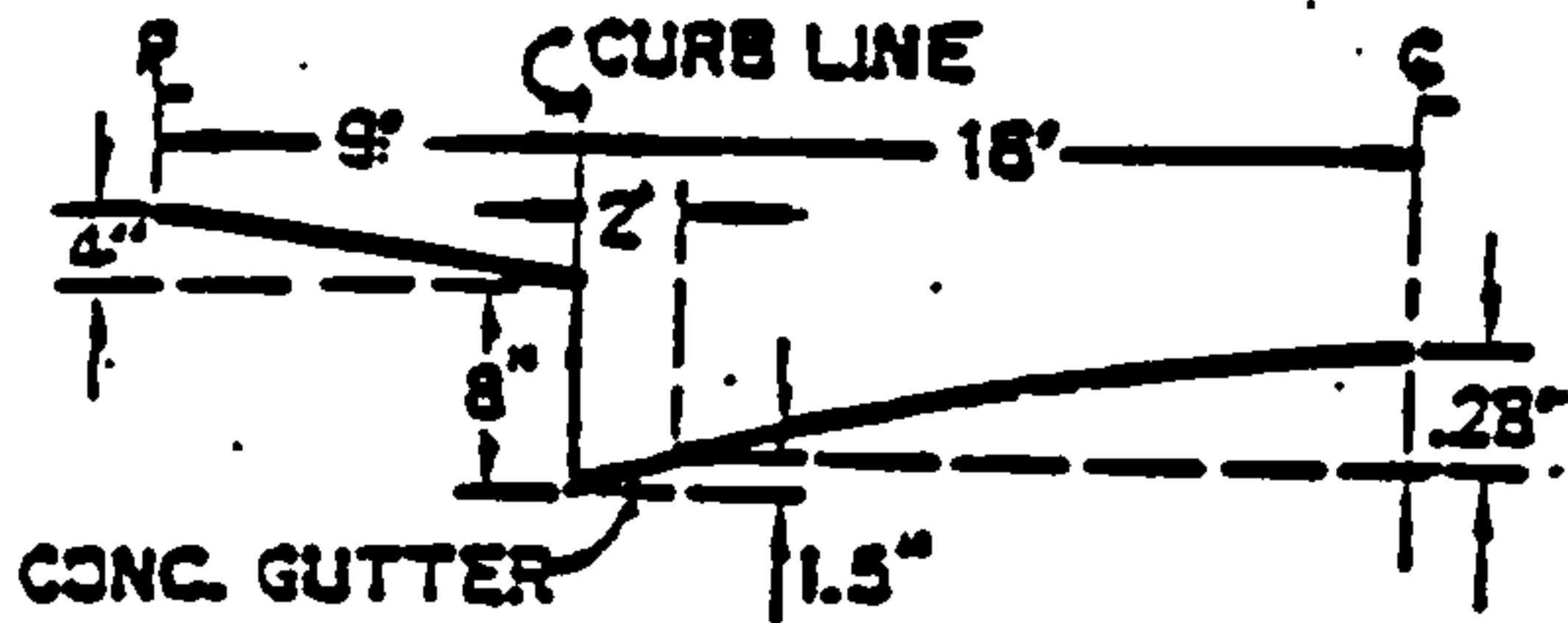
22.3

GRATING CAPACITIES FOR TYPE DOUBLE

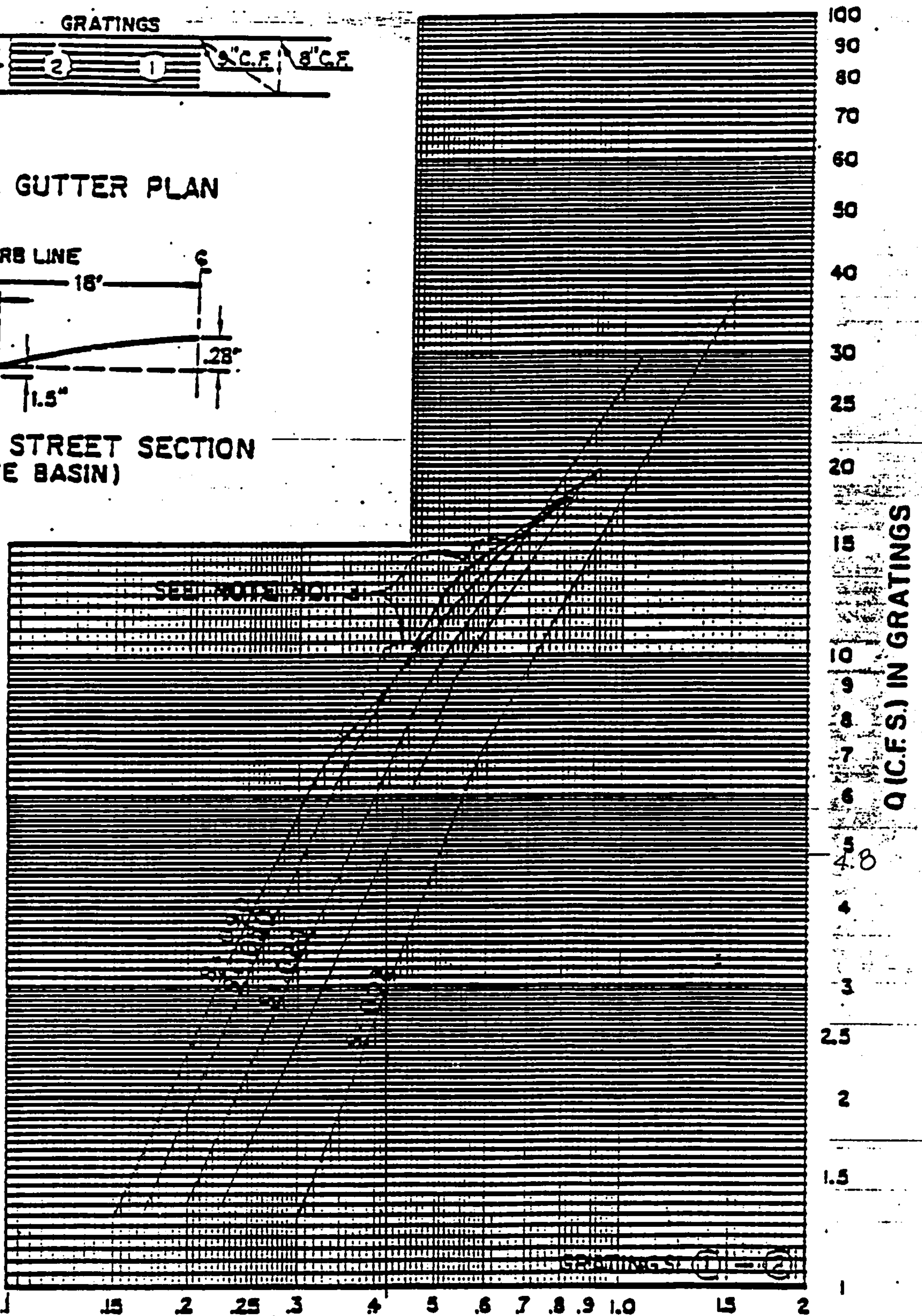
"C," AND "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)



$Q = 18.48$

$d = 0.42$

$Q_{cap} = 4.8 (2) = 9.6$

$Q_{left} = 18.48 - 9.6 = 8.88$

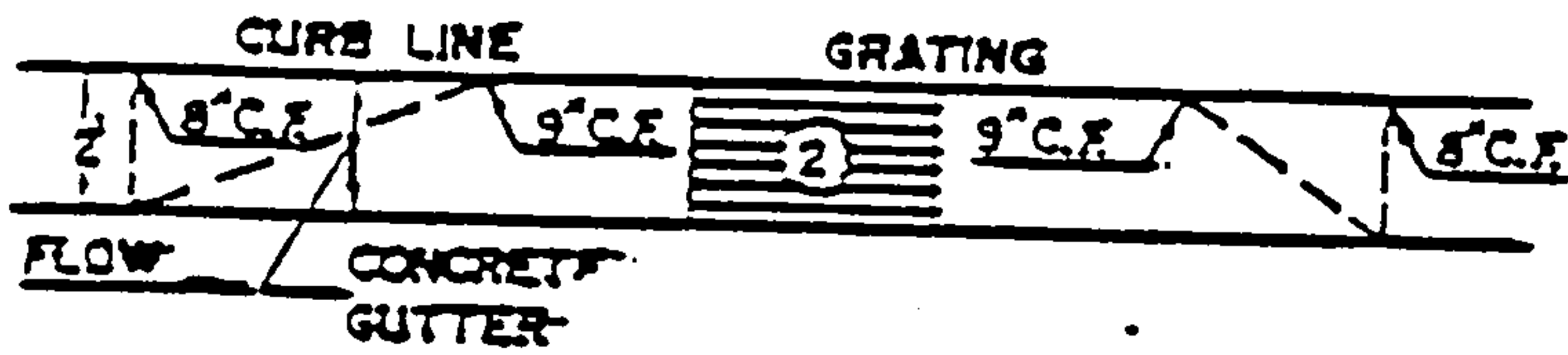
D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

AP-10 (94th Street)

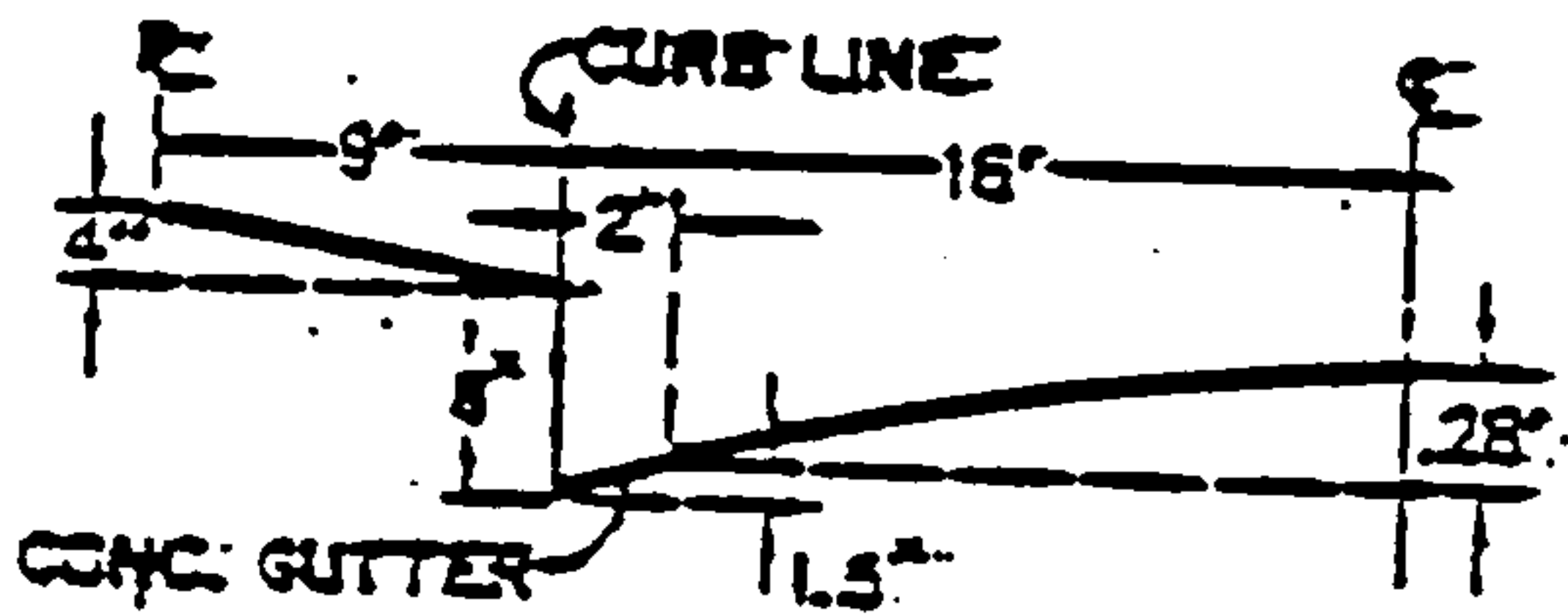
$S = 1.34\%$

22.3

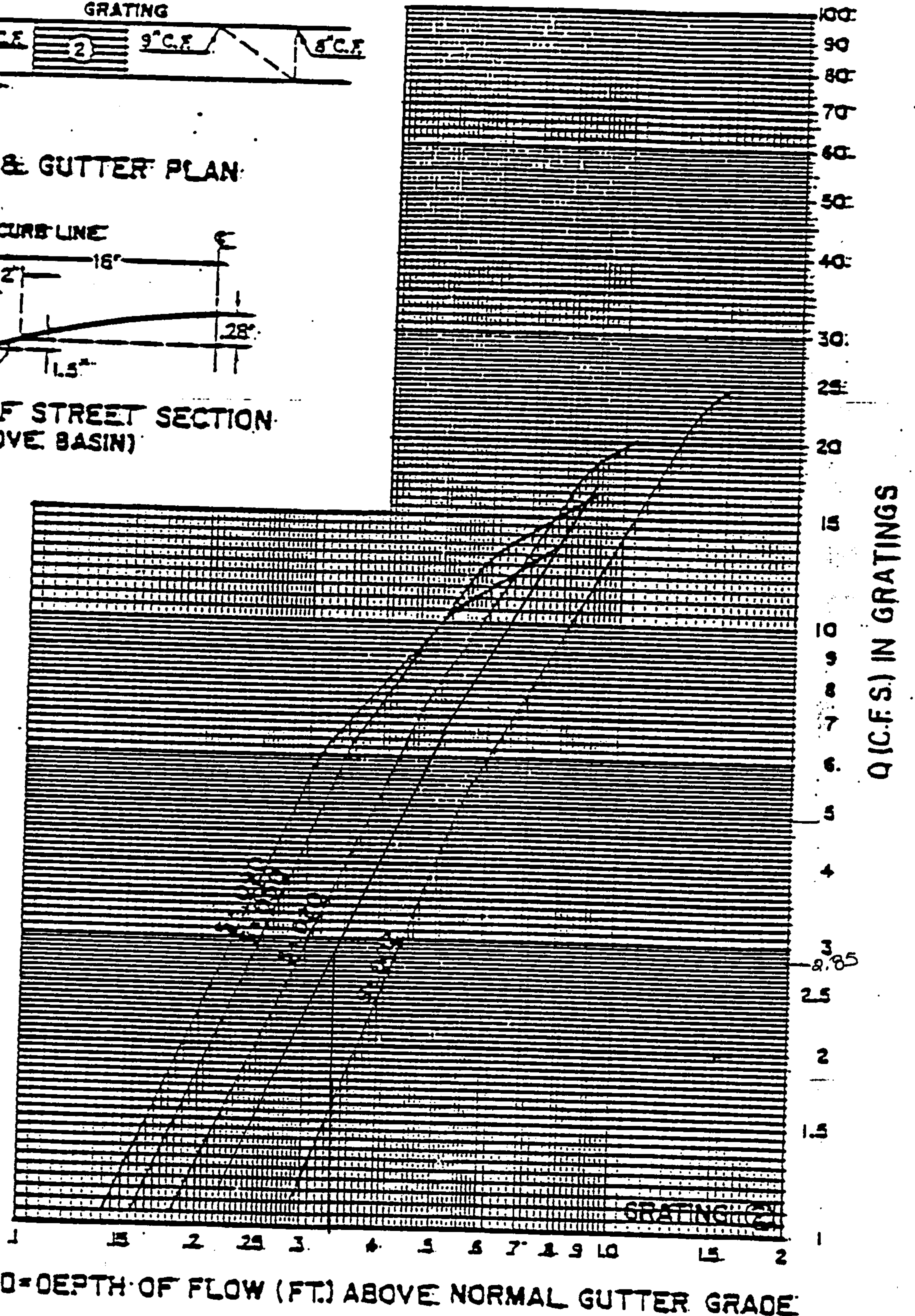
GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION (ABOVE BASIN)



$$Q = 8.88$$

$$d = 0.34$$

$$Q_{cap} = 2.85(2) = 5.7$$

$$Q_{left} = 8.88 - 5.7 = 3.18$$

REV. 3-83

Street Capacity Calculations

AP-10 with Q=18.48 cfs
40' F-F Street Section with 8" curb
Slope= 1.34%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.28	0.00	0.50	0.004
0.02	0.00	0.34	0.01	0.00	0.00	0.45	0.01	0.56	0.009
0.04	0.01	0.68	0.02	0.01	0.02	0.72	0.03	0.63	0.021
0.06	0.03	1.02	0.03	0.03	0.05	0.94	0.06	0.67	0.035
0.08	0.05	1.36	0.04	0.06	0.12	1.14	0.09	0.71	0.049
0.1	0.08	1.70	0.05	0.11	0.21	1.32	0.13	0.73	0.065
0.12	0.12	2.04	0.06	0.17	0.34	1.49	0.18	0.76	0.082
0.125	0.13	2.13	0.06	0.19	0.38	1.53	0.19	0.76	0.086

For water depths greater than 0.125 ft but less than 0.485 ft

Y1= Y - 0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

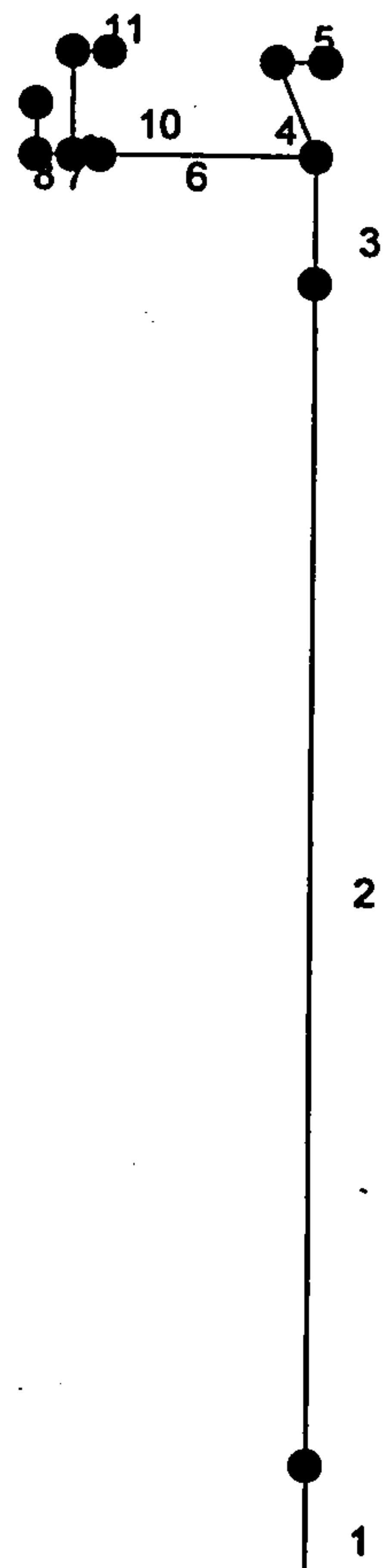
Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.20	0.41	1.50	0.19	0.73	0.084
0.18	0.31	4.93	0.06	0.50	0.99	1.60	0.29	0.67	0.102
0.23	0.61	7.48	0.08	1.16	2.32	1.90	0.44	0.70	0.140
0.28	1.04	10.04	0.10	2.31	4.61	2.23	0.62	0.74	0.185
0.34	1.71	13.08	0.13	4.44	8.88	2.60	0.88	0.79	0.245
0.37	2.14	14.71	0.15	5.98	11.97	2.80	1.04	0.81	0.278
0.42	2.97	17.42	0.17	9.24	18.48	3.11	1.32	0.84	0.336
0.485	4.09	20.49	0.20	14.11	28.21	3.45	1.67	0.87	0.404

For water depths greater than 0.485 ft but less than 0.667 ft

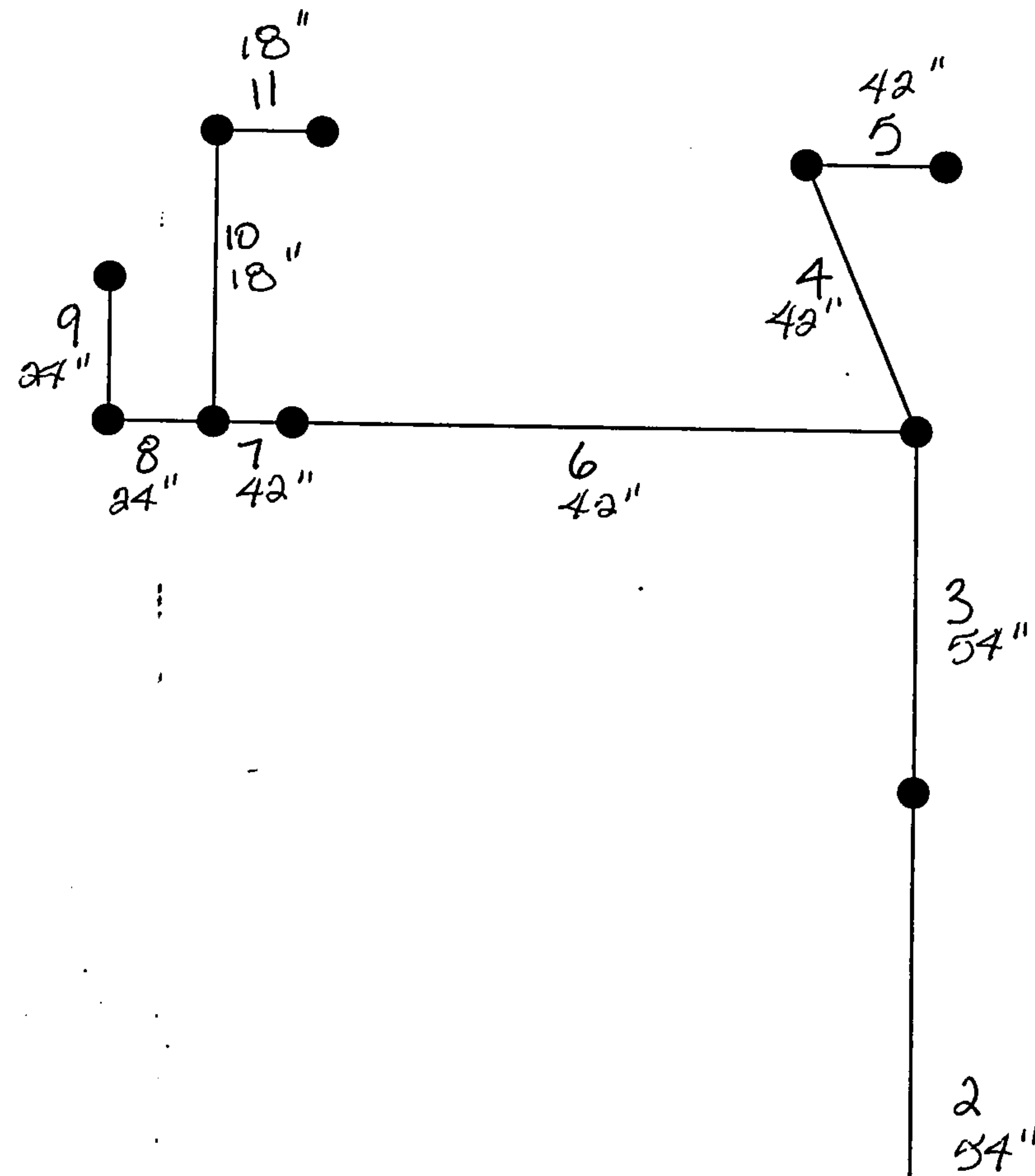
Y2= Y - 0.365
A3= $A2 + Y2^2 \cdot 20$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.485	4.09	20.49	0.20	14.11	28.21	3.45	1.67	0.87	0.404
0.510	4.59	20.52	0.22	17.08	34.17	3.73	1.90	0.92	0.456
0.535	5.09	20.54	0.25	20.28	40.57	3.99	2.13	0.96	0.507
0.560	5.59	20.57	0.27	23.70	47.40	4.24	2.38	1.00	0.559
0.585	6.09	20.59	0.30	27.32	54.63	4.49	2.63	1.03	0.612
0.610	6.59	20.62	0.32	31.13	62.27	4.73	2.88	1.07	0.665
0.635	7.09	20.64	0.34	35.14	70.29	4.96	3.15	1.10	0.718
0.667	7.73	20.67	0.37	40.55	81.10	5.25	3.50	1.13	0.786

Plan View



Plan View



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.	V (fps)
1	L14	122.81	54 c	60.0	5149.05	5149.18	0.217	5153.55*	5153.78*	0.0	End	7.72
2	L9	107.51	54 c	660.0	5149.18	5150.64	0.221	5154.71*	5156.68*	59.53	1	6.76
3	L7	107.51	54 c	70.0	5150.64	5150.83	0.271	5157.39*	5157.60*	59.07	2	6.76
4	L6	48.70	42 c	60.0	5150.43	5151.62	1.983	5158.31*	5158.45*	58.62	3	5.06
5	L6-A	24.35	42 c	37.0	5151.62	5155.48	10.432	5158.85	5158.87	58.62	4	2.56
6	L5	58.81	42 c	166.0	5150.43	5153.33	1.747	5158.31*	5158.88*	60.75	3	6.11
7	L4	58.81	42 c	21.0	5153.33	5153.64	1.476	5159.46*	5159.53*	60.59	6	6.11
8	L10	27.00	24 c	28.0	5153.64	5156.37	9.750	5160.11*	5160.51*	60.90	7	8.60
9	L11	13.50	24 c	28.0	5156.37	5157.36	3.535	5161.66*	5161.76*	61.42	8	4.30
10	L2	11.60	18 c	57.0	5153.64	5157.27	6.368	5160.11*	5160.81*	61.60	7	6.57
11	L1	5.80	18 c	28.0	5157.27	5157.79	1.857	5161.48*	5161.56*	61.79	10	3.28

PROJECT FILE: 2038.STM

I-D-F FILE: SAMPLE.IDF

TOTAL NO. LINES: 11

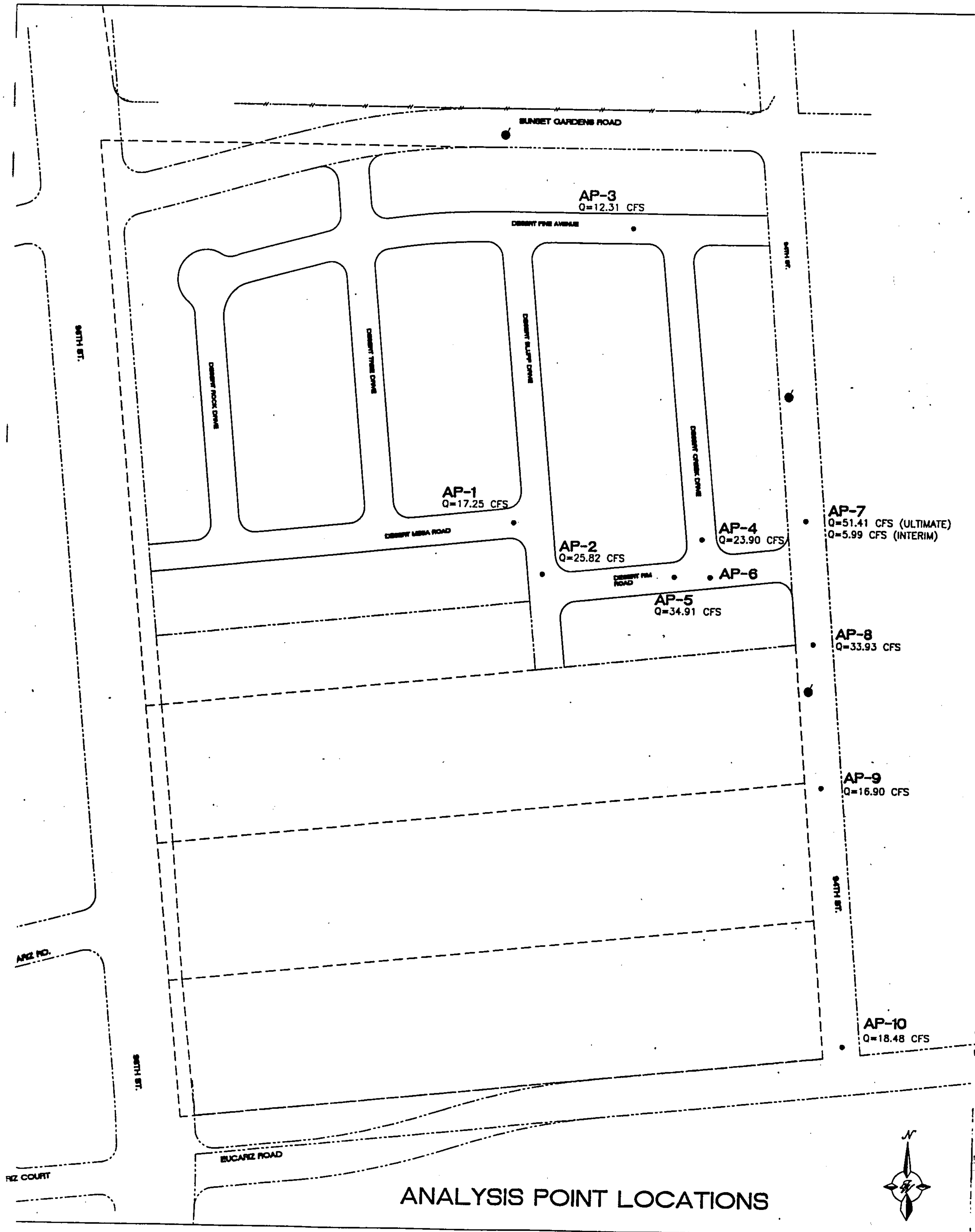
RUN DATE: 01-05-2001

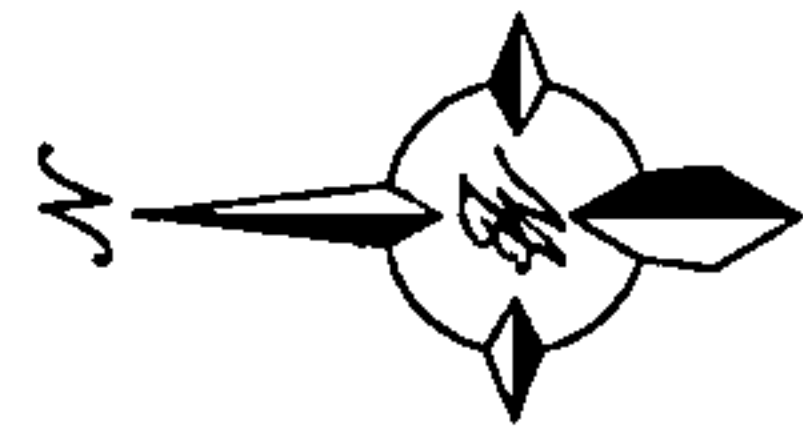
NOTES: c = circular; e = elliptical; b = box; Return period = 100 Yrs.; * Indicates surcharge condition.

Storm Sewer Inventory Report

[illegible]

Street Capacity Calculations





STANDARD
MOUNTABLE

SUNSET GARDENS ROAD

94TH ST.

DESERT CREEK DRIVE

DESERT PINA
ROAD

DESERT BLUFF DRIVE

DESERT TREE DRIVE

DESERT MESA ROAD

DESERT ROCK DRIVE

98TH ST.

CURB LOCATION EXHIBIT

Street Capacity Calculations

AP-1 with Q=17.25
28' F-F Street Section with 4" curb
Slope= 3.1%

For water depths less than 0.0625 feet

Y= Water depth
Area = $16 \cdot Y^2$
P= $\text{SQRT}(1025 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.010	0.002	0.33	0.00	0.00	0.00	0.44	0.00	0.77	0.0070
0.020	0.006	0.66	0.01	0.00	0.01	0.70	0.01	0.87	0.0165
0.025	0.010	0.83	0.01	0.01	0.02	0.81	0.02	0.90	0.0217
0.035	0.020	1.16	0.02	0.02	0.04	1.01	0.04	0.95	0.0328
0.045	0.032	1.49	0.02	0.04	0.08	1.20	0.05	0.99	0.0446
0.052	0.043	1.72	0.03	0.06	0.11	1.32	0.07	1.02	0.0532
0.060	0.058	1.98	0.03	0.08	0.17	1.45	0.09	1.04	0.0634
0.063	0.063	2.06	0.03	0.09	0.19	1.49	0.09	1.05	0.0666

For water depths greater than 0.0625 ft but less than 0.3025 ft

Y1= Y-0.0625
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.063	0.064	2.09	0.03	0.09	0.19	1.49	0.09	1.05	0.0670
0.100	0.173	3.98	0.04	0.33	0.65	1.89	0.19	1.05	0.1073
0.130	0.311	5.51	0.06	0.70	1.41	2.26	0.29	1.10	0.1479
0.160	0.495	7.04	0.07	1.29	2.59	2.61	0.42	1.15	0.1922
0.200	0.810	9.08	0.09	2.48	4.96	3.06	0.61	1.21	0.2553
0.255	1.374	11.88	0.12	4.99	9.99	3.63	0.93	1.27	0.3474
0.280	1.680	13.16	0.13	6.53	13.05	3.88	1.09	1.29	0.3910
0.303	1.983	14.31	0.14	8.13	16.26	4.10	1.24	1.31	0.4309

For water depths greater than 0.3025 ft but less than 0.333 ft

Y2= Y - 0.3025
A3= $A2 + Y2 \cdot 14$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.303	1.990	14.31	0.14	8.18	16.36	4.11	1.25	1.32	0.4325
0.304	2.002	14.31	0.14	8.27	16.53	4.13	1.25	1.32	0.4352
0.305	2.022	14.31	0.14	8.40	16.80	4.15	1.27	1.33	0.4395
0.308	2.054	14.31	0.14	8.62	17.25	4.20	1.29	1.33	0.4465
0.313	2.123	14.32	0.15	9.11	18.21	4.29	1.34	1.35	0.4616
0.318	2.204	14.32	0.15	9.69	19.39	4.40	1.40	1.37	0.4794
0.320	2.228	14.32	0.16	9.87	19.73	4.43	1.42	1.38	0.4846
0.333	2.410	14.34	0.17	11.24	22.48	4.66	1.55	1.42	0.5247

Street Capacity Calculations

AP-2 with Q=25.82 cfs
28' F-F Street Section with 8" curb
Slope= 1.3%

For water depths less than 0.125 feet

Y= Water depth
 Area = $8 \cdot Y^2$
 P= $\text{SQRT}(257 \cdot Y^2) + Y$
 n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.27	0.00	0.48	0.003
0.02	0.00	0.34	0.01	0.00	0.00	0.44	0.01	0.54	0.008
0.04	0.01	0.68	0.02	0.01	0.02	0.69	0.03	0.61	0.020
0.06	0.03	1.02	0.03	0.03	0.05	0.91	0.05	0.65	0.033
0.08	0.05	1.36	0.04	0.06	0.11	1.10	0.09	0.68	0.047
0.1	0.08	1.70	0.05	0.10	0.20	1.27	0.13	0.71	0.062
0.12	0.12	2.04	0.06	0.17	0.33	1.44	0.17	0.73	0.078
0.125	0.13	2.13	0.06	0.18	0.37	1.48	0.18	0.74	0.082

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125
 A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
 P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.130	0.14	2.38	0.06	0.20	0.39	1.45	0.19	0.71	0.080
0.160	0.23	3.91	0.06	0.33	0.66	1.46	0.23	0.64	0.086
0.200	0.42	5.95	0.07	0.69	1.38	1.66	0.33	0.65	0.110
0.240	0.69	8.00	0.09	1.30	2.61	1.90	0.46	0.68	0.141
0.280	1.04	10.04	0.10	2.23	4.45	2.15	0.60	0.72	0.176
0.320	1.47	12.08	0.12	3.51	7.02	2.40	0.77	0.75	0.214
0.340	1.71	13.10	0.13	4.30	8.61	2.52	0.86	0.76	0.233
0.365	2.05	14.37	0.14	5.45	10.89	2.66	0.97	0.78	0.258

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365
 A3= $A2 + Y2 \cdot 14$
 P3= $P2 + Y2$

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.370	2.12	14.38	0.15	5.76	11.52	2.72	1.01	0.79	0.267
0.400	2.54	14.41	0.18	7.78	15.56	3.07	1.23	0.86	0.323
0.465	3.44	14.47	0.24	12.91	25.82	3.75	1.74	0.97	0.446
0.500	3.94	14.51	0.27	16.11	32.23	4.10	2.05	1.02	0.514
0.540	4.50	14.55	0.31	20.08	40.16	4.47	2.41	1.07	0.591
0.580	5.06	14.59	0.35	24.37	48.75	4.82	2.80	1.12	0.670
0.630	5.76	14.64	0.39	30.19	60.37	5.25	3.30	1.16	0.769
0.667	6.27	14.67	0.43	34.79	69.58	5.55	3.70	1.20	0.844

Street Capacity Calculations

AP-3 with Q=12.31
28' F-F Street Section with 4" curb
Slope= 2.3%

For water depths less than 0.0625 feet

Y= Water depth
Area = $16 \cdot Y^2$
P= $\text{SQRT}(1025 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.010	0.002	0.33	0.00	0.00	0.00	0.38	0.00	0.67	0.0057
0.020	0.006	0.66	0.01	0.00	0.01	0.60	0.01	0.75	0.0135
0.025	0.010	0.83	0.01	0.01	0.01	0.70	0.02	0.78	0.0178
0.035	0.020	1.16	0.02	0.02	0.03	0.88	0.03	0.82	0.0269
0.045	0.032	1.49	0.02	0.03	0.07	1.03	0.05	0.86	0.0367
0.052	0.043	1.72	0.03	0.05	0.10	1.14	0.06	0.88	0.0438
0.060	0.058	1.98	0.03	0.07	0.14	1.25	0.08	0.90	0.0522
0.063	0.063	2.06	0.03	0.08	0.16	1.29	0.08	0.91	0.0549

For water depths greater than 0.0625 ft but less than 0.3025 ft

Y1= Y-0.0625
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.063	0.064	2.09	0.03	0.08	0.16	1.29	0.08	0.91	0.0552
0.100	0.173	3.98	0.04	0.28	0.57	1.64	0.16	0.91	0.0884
0.130	0.311	5.51	0.06	0.61	1.22	1.95	0.25	0.95	0.1222
0.160	0.495	7.04	0.07	1.12	2.24	2.26	0.36	1.00	0.1590
0.200	0.810	9.08	0.09	2.14	4.29	2.65	0.53	1.04	0.2116
0.255	1.374	11.88	0.12	4.32	8.65	3.15	0.80	1.10	0.2885
0.289	1.793	13.60	0.13	6.16	12.31	3.43	0.99	1.13	0.3376
0.303	1.983	14.31	0.14	7.04	14.08	3.55	1.07	1.14	0.3583

For water depths greater than 0.3025 ft but less than 0.333 ft

Y2= Y - 0.3025
A3= $A2 + Y2 \cdot 14$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.303	1.990	14.31	0.14	7.08	14.16	3.56	1.08	1.14	0.3596
0.304	2.002	14.31	0.14	7.15	14.31	3.57	1.09	1.14	0.3619
0.305	2.022	14.31	0.14	7.27	14.54	3.60	1.10	1.15	0.3656
0.310	2.088	14.31	0.15	7.67	15.33	3.67	1.14	1.16	0.3777
0.313	2.123	14.32	0.15	7.88	15.76	3.71	1.16	1.17	0.3842
0.320	2.228	14.32	0.16	8.54	17.08	3.83	1.23	1.19	0.4037
0.324	2.282	14.33	0.16	8.89	17.78	3.90	1.26	1.21	0.4138
0.333	2.410	14.34	0.17	9.73	19.46	4.04	1.34	1.23	0.4375

Street Capacity Calculations

AP-4 with Q=23.90 cfs
28' F-F Street Section with 8" curb
Slope= 1.00%

For water depths less than 0.125 feet

Y= Water depth
 Area = $8 \cdot Y^2$
 P= $\text{SQRT}(257 \cdot Y^2) + Y$
 n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.25	0.00	0.43	0.003
0.02	0.00	0.34	0.01	0.00	0.00	0.39	0.01	0.48	0.007
0.04	0.01	0.68	0.02	0.01	0.02	0.62	0.02	0.54	0.017
0.06	0.03	1.02	0.03	0.02	0.05	0.81	0.05	0.58	0.028
0.08	0.05	1.36	0.04	0.05	0.10	0.98	0.08	0.61	0.040
0.1	0.08	1.70	0.05	0.09	0.18	1.14	0.11	0.63	0.053
0.12	0.12	2.04	0.06	0.15	0.30	1.29	0.15	0.65	0.066
0.125	0.13	2.13	0.06	0.17	0.33	1.32	0.17	0.66	0.070

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125
 A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
 P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.18	0.35	1.29	0.17	0.63	0.068
0.16	0.23	3.91	0.06	0.29	0.59	1.30	0.21	0.57	0.073
0.2	0.42	5.95	0.07	0.62	1.23	1.48	0.30	0.58	0.093
0.24	0.69	8.00	0.09	1.17	2.33	1.70	0.41	0.61	0.120
0.28	1.04	10.04	0.10	1.99	3.98	1.92	0.54	0.64	0.150
0.32	1.47	12.08	0.12	3.14	6.28	2.14	0.69	0.67	0.182
0.34	1.71	13.10	0.13	3.85	7.70	2.25	0.77	0.68	0.199
0.365	2.05	14.37	0.14	4.87	9.74	2.38	0.87	0.69	0.220

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365
 A3= $A2 + Y2 \cdot 14$
 P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.12	14.38	0.15	5.15	10.30	2.44	0.90	0.71	0.228
0.4	2.54	14.41	0.18	6.96	13.92	2.74	1.10	0.76	0.277
0.45	3.24	14.46	0.22	10.42	20.85	3.22	1.45	0.85	0.359
0.470	3.51	14.48	0.24	11.95	23.90	3.40	1.60	0.87	0.392
0.54	4.50	14.55	0.31	17.96	35.92	4.00	2.16	0.96	0.510
0.58	5.06	14.59	0.35	21.80	43.60	4.31	2.50	1.00	0.578
0.63	5.76	14.64	0.39	27.00	54.00	4.69	2.96	1.04	0.665
0.667	6.27	14.67	0.43	31.12	62.24	4.96	3.31	1.07	0.730

Street Capacity Calculations

AP-5 with Q=34.91 cfs
28' F-F Street Section with 8" curb
Slope= 2.57%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.39	0.00	0.69	0.006
0.02	0.00	0.34	0.01	0.00	0.00	0.62	0.01	0.78	0.014
0.04	0.01	0.68	0.02	0.01	0.03	0.99	0.04	0.87	0.033
0.06	0.03	1.02	0.03	0.04	0.07	1.30	0.08	0.93	0.055
0.08	0.05	1.36	0.04	0.08	0.16	1.57	0.13	0.98	0.078
0.1	0.08	1.70	0.05	0.15	0.29	1.82	0.18	1.02	0.102
0.12	0.12	2.04	0.06	0.24	0.47	2.06	0.25	1.05	0.128
0.125	0.13	2.13	0.06	0.26	0.53	2.12	0.26	1.06	0.134

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.28	0.56	2.07	0.27	1.01	0.132
0.16	0.23	3.91	0.06	0.47	0.94	2.09	0.33	0.92	0.143
0.2	0.42	5.95	0.07	0.99	1.97	2.38	0.48	0.94	0.183
0.24	0.69	8.00	0.09	1.87	3.74	2.73	0.65	0.98	0.234
0.28	1.04	10.04	0.10	3.19	6.39	3.08	0.86	1.03	0.290
0.32	1.47	12.08	0.12	5.03	10.07	3.44	1.10	1.07	0.350
0.34	1.71	13.10	0.13	6.17	12.34	3.61	1.23	1.09	0.381
0.365	2.05	14.37	0.14	7.81	15.62	3.82	1.39	1.11	0.421

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2 \cdot 14$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.12	14.38	0.15	8.26	16.52	3.91	1.44	1.13	0.435
0.4	2.54	14.41	0.18	11.15	22.31	4.40	1.76	1.23	0.522
0.46	3.32	14.46	0.23	17.46	34.91	5.26	2.40	1.37	0.685
0.50	3.94	14.51	0.27	23.11	46.21	5.87	2.94	1.46	0.815
0.54	4.50	14.55	0.31	28.79	57.58	6.41	3.46	1.54	0.934
0.58	5.06	14.59	0.35	34.95	69.90	6.91	4.01	1.60	1.054
0.63	5.76	14.64	0.39	43.28	86.57	7.52	4.74	1.67	1.206
0.667	6.27	14.67	0.43	49.89	99.77	7.95	5.30	1.72	1.319

Street Capacity Calculations

AP-7 with Q=51.41 cfs
40' F-F Street Section with 8" curb
Slope= 1.71%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.32	0.00	0.56	0.004
0.02	0.00	0.34	0.01	0.00	0.00	0.51	0.01	0.63	0.011
0.04	0.01	0.68	0.02	0.01	0.02	0.81	0.03	0.71	0.025
0.06	0.03	1.02	0.03	0.03	0.06	1.06	0.06	0.76	0.041
0.08	0.05	1.36	0.04	0.07	0.13	1.28	0.10	0.80	0.059
0.1	0.08	1.70	0.05	0.12	0.24	1.49	0.15	0.83	0.077
0.12	0.12	2.04	0.06	0.19	0.39	1.68	0.20	0.85	0.097
0.125	0.13	2.13	0.06	0.22	0.43	1.73	0.22	0.86	0.102

For water depths greater than 0.125 ft but less than 0.485 ft

Y1= Y-0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.23	0.46	1.69	0.22	0.83	0.100
0.18	0.31	4.93	0.06	0.56	1.12	1.81	0.33	0.75	0.121
0.23	0.61	7.48	0.08	1.31	2.63	2.15	0.49	0.79	0.167
0.28	1.04	10.04	0.10	2.60	5.21	2.51	0.70	0.84	0.220
0.33	1.59	12.59	0.13	4.55	9.11	2.87	0.95	0.88	0.278
0.37	2.14	14.71	0.15	6.76	13.52	3.16	1.17	0.91	0.329
0.42	2.89	17.18	0.17	10.07	20.14	3.48	1.46	0.95	0.391
0.485	4.09	20.49	0.20	15.93	31.87	3.90	1.89	0.99	0.477

For water depths greater than 0.485 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2 \cdot 20$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.485	4.09	20.49	0.20	15.93	31.87	3.90	1.89	0.99	0.477
0.510	4.59	20.52	0.22	19.30	38.60	4.21	2.15	1.04	0.536
0.535	5.09	20.54	0.25	22.91	45.83	4.51	2.41	1.09	0.596
0.553	5.45	20.56	0.27	25.71	51.41	4.72	2.61	1.12	0.640
0.585	6.09	20.59	0.30	30.86	61.72	5.07	2.97	1.17	0.717
0.610	6.59	20.62	0.32	35.17	70.34	5.34	3.26	1.21	0.778
0.635	7.09	20.64	0.34	39.70	79.40	5.60	3.56	1.24	0.840
0.667	7.73	20.67	0.37	45.81	91.62	5.93	3.96	1.28	0.919

Street Capacity Calculations

AP-8 with Q=33.93 cfs
40' F-F Street Section with 8" curb
Slope= 0.92%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.24	0.00	0.41	0.003
0.02	0.00	0.34	0.01	0.00	0.00	0.37	0.01	0.47	0.007
0.04	0.01	0.68	0.02	0.01	0.02	0.59	0.02	0.52	0.016
0.06	0.03	1.02	0.03	0.02	0.04	0.78	0.05	0.56	0.026
0.08	0.05	1.36	0.04	0.05	0.10	0.94	0.08	0.59	0.037
0.1	0.08	1.70	0.05	0.09	0.17	1.09	0.11	0.61	0.049
0.12	0.12	2.04	0.06	0.14	0.28	1.23	0.15	0.63	0.062
0.125	0.13	2.13	0.06	0.16	0.32	1.27	0.16	0.63	0.065

For water depths greater than 0.125 ft but less than 0.485 ft

Y1= Y-0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.17	0.34	1.24	0.16	0.61	0.064
0.18	0.31	4.93	0.06	0.41	0.82	1.33	0.24	0.55	0.077
0.23	0.61	7.48	0.08	0.96	1.93	1.58	0.36	0.58	0.106
0.28	1.04	10.04	0.10	1.91	3.82	1.84	0.52	0.61	0.141
0.33	1.59	12.59	0.13	3.34	6.68	2.11	0.70	0.65	0.179
0.37	2.14	14.71	0.15	4.96	9.92	2.32	0.86	0.67	0.212
0.42	2.89	17.18	0.17	7.39	14.77	2.56	1.07	0.69	0.253
0.485	4.09	20.49	0.20	11.69	23.37	2.86	1.39	0.72	0.310

For water depths greater than 0.485 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2 \cdot 20$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.485	4.09	20.49	0.20	11.69	23.37	2.86	1.39	0.72	0.310
0.510	4.59	20.52	0.22	14.16	28.31	3.09	1.57	0.76	0.351
0.536	5.11	20.54	0.25	16.97	33.93	3.32	1.78	0.80	0.394
0.560	5.59	20.57	0.27	19.64	39.27	3.52	1.97	0.83	0.433
0.585	6.09	20.59	0.30	22.63	45.27	3.72	2.18	0.86	0.474
0.610	6.59	20.62	0.32	25.80	51.59	3.92	2.39	0.88	0.516
0.635	7.09	20.64	0.34	29.12	58.24	4.11	2.61	0.91	0.558
0.667	7.73	20.67	0.37	33.60	67.20	4.35	2.90	0.94	0.613

Street Capacity Calculations

AP-10 with Q=18.48 cfs
40' F-F Street Section with 8" curb
Slope= 1.34%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.28	0.00	0.50	0.004
0.02	0.00	0.34	0.01	0.00	0.00	0.45	0.01	0.56	0.009
0.04	0.01	0.68	0.02	0.01	0.02	0.72	0.03	0.63	0.021
0.06	0.03	1.02	0.03	0.03	0.05	0.94	0.06	0.67	0.035
0.08	0.05	1.36	0.04	0.06	0.12	1.14	0.09	0.71	0.049
0.1	0.08	1.70	0.05	0.11	0.21	1.32	0.13	0.73	0.065
0.12	0.12	2.04	0.06	0.17	0.34	1.49	0.18	0.76	0.082
0.125	0.13	2.13	0.06	0.19	0.38	1.53	0.19	0.76	0.086

For water depths greater than 0.125 ft but less than 0.485 ft

Y1= Y-0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.20	0.41	1.50	0.19	0.73	0.084
0.18	0.31	4.93	0.06	0.50	0.99	1.60	0.29	0.67	0.102
0.23	0.61	7.48	0.08	1.16	2.32	1.90	0.44	0.70	0.140
0.28	1.04	10.04	0.10	2.31	4.61	2.23	0.62	0.74	0.185
0.34	1.71	13.08	0.13	4.44	8.88	2.60	0.88	0.79	0.245
0.37	2.14	14.71	0.15	5.98	11.97	2.80	1.04	0.81	0.278
0.42	2.97	17.42	0.17	9.24	18.48	3.11	1.32	0.84	0.336
0.485	4.09	20.49	0.20	14.11	28.21	3.45	1.67	0.87	0.404

For water depths greater than 0.485 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2 \cdot 20$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.485	4.09	20.49	0.20	14.11	28.21	3.45	1.67	0.87	0.404
0.510	4.59	20.52	0.22	17.08	34.17	3.73	1.90	0.92	0.456
0.535	5.09	20.54	0.25	20.28	40.57	3.99	2.13	0.96	0.507
0.560	5.59	20.57	0.27	23.70	47.40	4.24	2.38	1.00	0.559
0.585	6.09	20.59	0.30	27.32	54.63	4.49	2.63	1.03	0.612
0.610	6.59	20.62	0.32	31.13	62.27	4.73	2.88	1.07	0.665
0.635	7.09	20.64	0.34	35.14	70.29	4.96	3.15	1.10	0.718
0.667	7.73	20.67	0.37	40.55	81.10	5.25	3.50	1.13	0.786



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

November 1, 2000

Ron Bohannon, PE
Tierra West LLC
8509 Jefferson NE
Albuquerque, NM 87113

Re: Desert Pine Subdivision Drainage Report (L9/D24)
Engineer Stamp date 11-13-00

Dear Mr. Bohannon,

Based on information provided in your resubmittal dated 11-14-00, the above referenced plan can be approved for Site Plan for Subdivision and Preliminary Plat action by the Development Review Board.

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

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Hydrology

C: file

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Desert Pine Subdivision ZONE ATLAS/DRNG. FILE #: L-9 / 10024
DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: Lots 36-39 Town of Atrisco Grant Unit 2

CITY ADDRESS: South of Sunset Gardens Road, between 98th Street and 94th Street

ENGINEERING FIR TIERRA WEST, LLC CONTACT: RONALD R. BOHANNAN OR SARA LAVY

ADDRESS: 8509 Jefferson NE, ABQ, NM 87113 PHONE: (505) 858-3100

OWNER: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: Precision Surveys CONTACT: Larry Medrano

ADDRESS: 8414-D Jefferson NE PHONE: (505)856-5700

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

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

PRE-DESIGN MEETING:

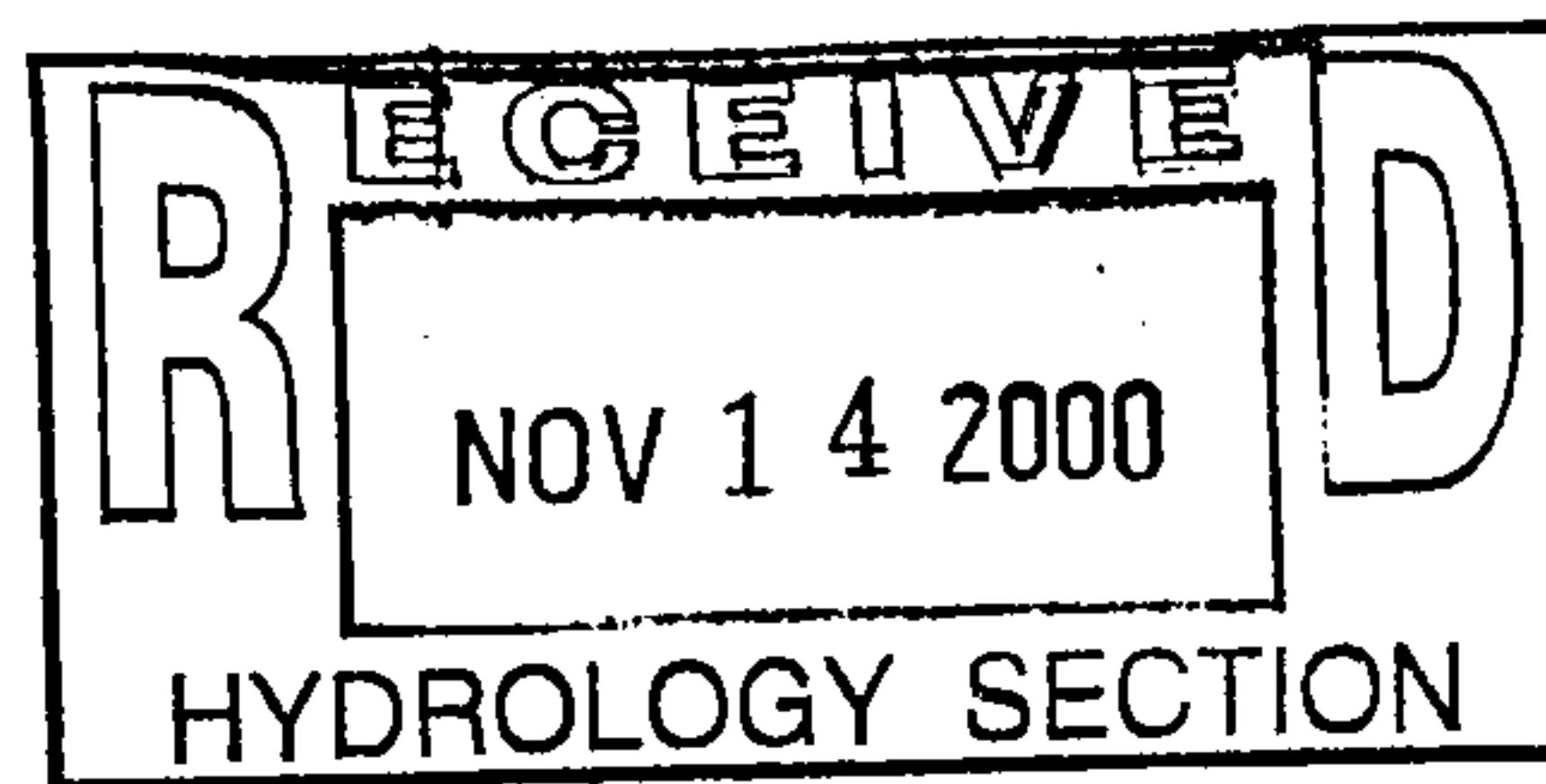
☐ YES
☒ NO
☐ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

☐ SKETCH PLAN 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
☐ OTHER

DATE SUBMITTED: 11/14/00

BY: SARA LAVY





TIERRA WEST, LLC

8509 Jefferson NE
Albuquerque, NM 87113

(505) 858-3100
fax (505) 858-1118

e-mail: twdms@aol.com
1-800-245-3102

November 13, 2000

Mr. Brad Bingham
Sr. Engineer, Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Desert Pine Subdivision (F16/D5C)

Dear Mr. Bingham:

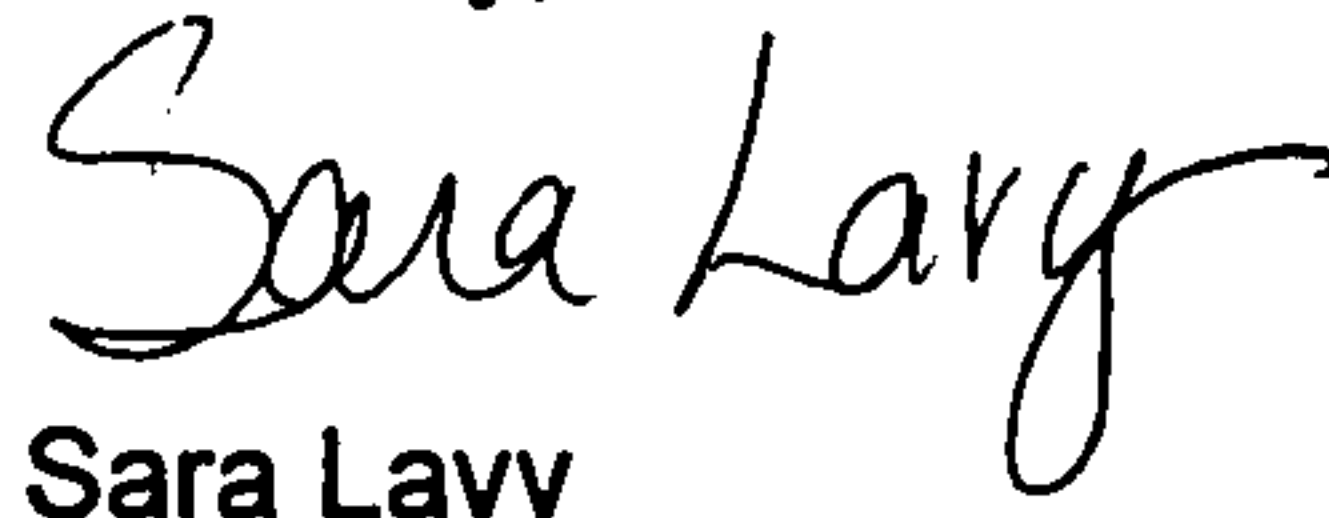
Tierra West, LLC, on behalf of the owner, is resubmitting the Drainage Report and Grading and Drainage Plan for your review. We have addressed the comments from your November 1, 2000, letter in the following manner:

1. You state that the out parcel, once developed, will drain to 98th Street. This parcel, as well as your entire site is included in Basin A-8D of the SAD 222, which is to drain to 94th Street. Your basin map (A1 and A2) and all calculations should include all of 94th Street and Sunset Garden Road per the basin map of SAD 222. You will also need to extend your storm drain to Sunset Gardens in order to pick up runoff from the north side of this street.
I have revised the basins so the outparcel (Basin OS-1) now drains through the site and is collected in the on-site storm drain system. The basin map has also been revised to include the full street sections for 94th Street and Sunset Gardens Road. We have super-elevated Sunset Gardens Road near the intersection with 94th Street. This allows the flow from Sunset Gardens Road to drain down 94th Street and be collected in the inlets near the subdivision. This eliminates the need to extend the storm drain to Sunset Gardens Road.
2. Please provide a preliminary profile of 94th Street from Sunset Gardens to Eucariz. You will need to coordinate with the SAD engineer. Your profile should include existing topo from the east side of the ROW. Also, please show where future inlets will be needed. You will need to include the entire length of storm drain to Eucariz on the Infrastructure List.
I have included a preliminary profile of 94th Street and designed the storm drain in 94th to Eucariz.
3. Please provide grades for 98th Street (per the SAD design) in order to determine the extent of retaining wall and accessibility. It appears that you will have close to 6 feet of retainage in some places. Is this your intent? It also appears that you have some retaining against a cedar fence, which is prohibited.
We have revised the grading plan to show the correct grades along 98th Street. We have clarified the retaining walls in areas that require more than 18" of retainage. Areas with retainage less than 18" will have a 2' screen wall with a 4' cedar fence.

4. Please show a water block on Sunset Gardens at 98th with applicable spot elevations.
We show the grades at Sunset Gardens and 98th as per the SAD plans. The water block is shown on Sunset Gardens and it will be detailed in the plan and profile sheets.
5. Please provide a cross-section of a typical lot with a backyard pond.
We added a cross-section of a typical lot with a backyard pond. We also added a cross-section showing a common drainage swale and easement between lots.

If you have any questions or need additional information, please contact me.

Sincerely,


Sara Lavy

Enclosures

cc: Jeff Dorwart

JN: 200038
scl



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

November 1, 2000

Ron Bohannon, PE
Tierra West LLC
8509 Jefferson NE
Albuquerque, NM 87113

Re: Desert Pine Subdivision Drainage Report (F16/D5C)

Engineer Stamp date 9-25-00

Dear Mr. Bohannon,

Based on information provided in your submittal dated 9-26-00, the above referenced plan cannot be approved for Site Plan for Subdivision and Preliminary Plat until the following comments are addressed.

- You state that the out parcel, once developed, will drain to 98th St. This parcel, as well as your entire site is included in Basin A-8D of the SAD 222, which is to drain to 94th St. Your basin map (A1 and A2) and all calculations should include all of 94th St. and Sunset Garden Rd. per the basin map of SAD 222. You will also need to extend your storm drain to Sunset Gardens in order to pick up runoff from the north side of this street.
- Please provide a preliminary profile of 94th St. from Sunset Gardens to Eucariz. You will need to coordinate with the SAD engineer. Your profile should include existing topo from the east side of the ROW. Also, please show where future inlets will be needed. You will need to include the entire length of storm drain to Eucariz on the Infrastructure List.
- Please provide grades for 98th St (per the SAD design) in order to determine the extent of retaining wall and accessibility. It appears that you will have close to 6 feet of retainage in some places. Is this your intent? It also appears that you have some retaining against a cedar fence, which is prohibited.
- Please show a water block on Sunset Gardens at 98th with applicable spot elevations.
- Please provide a cross-section of a typical lot with a backyard pond.

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

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Sr. Engineer, Hydrology

C: file

DRAINAGE REPORT

for

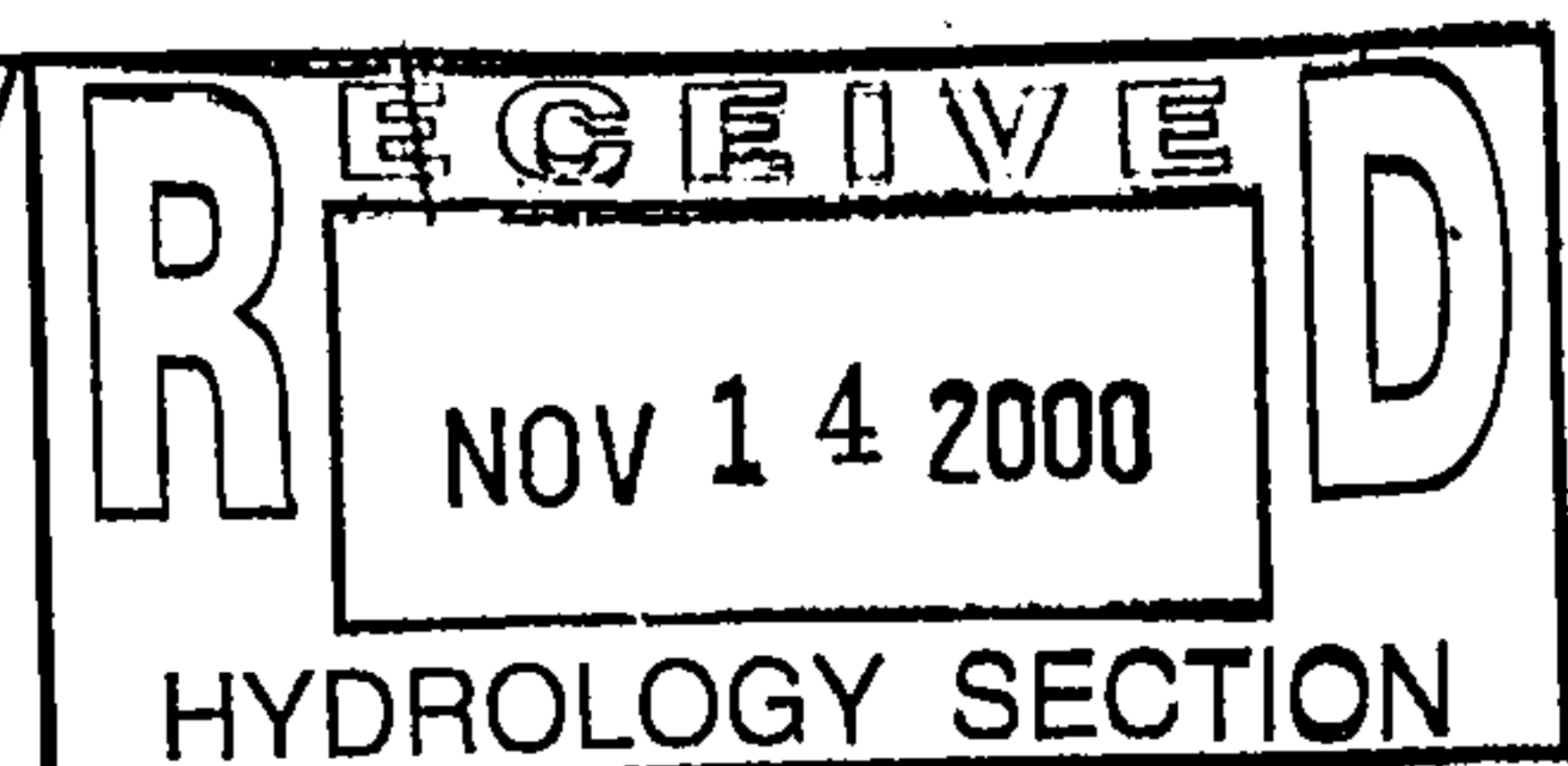
Desert Pine Subdivision

Prepared by

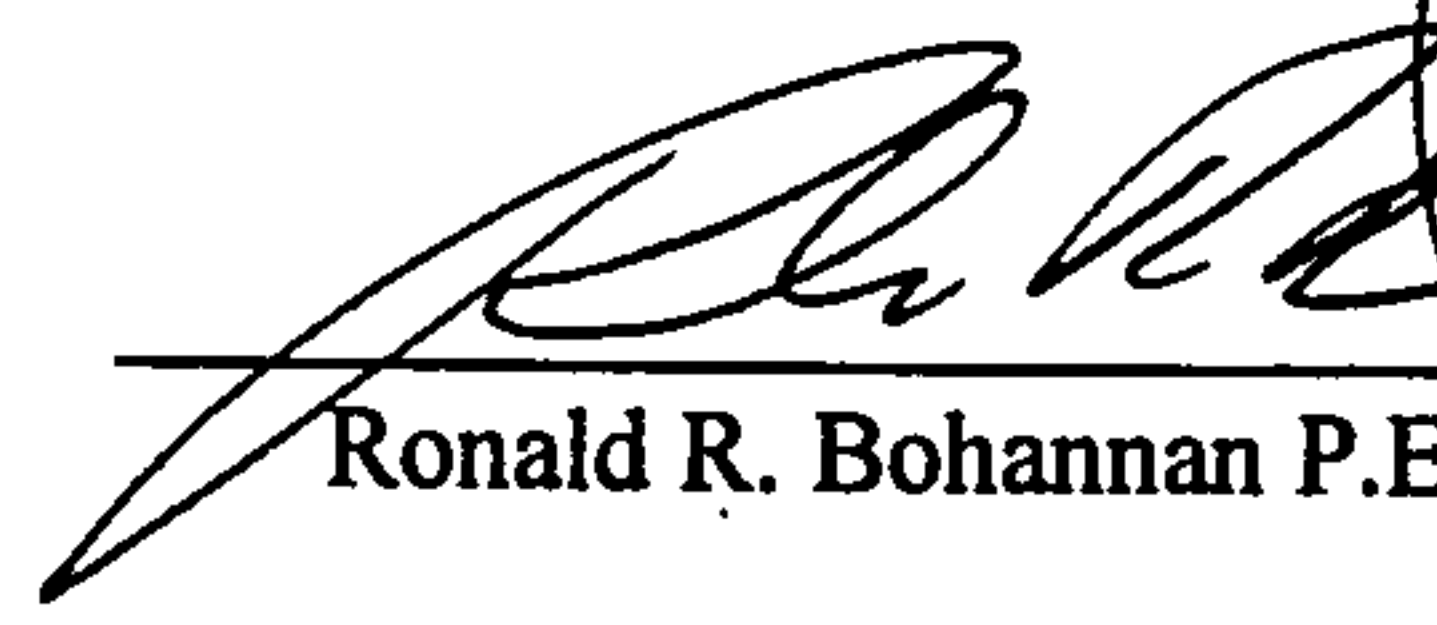
Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

Prepared for

Kaufman & Broad
4921 Alexander Blvd, NE Suite B
Albuquerque, New Mexico 87107



November 2000


Ronald R. Bohannon P.E. No. 7868

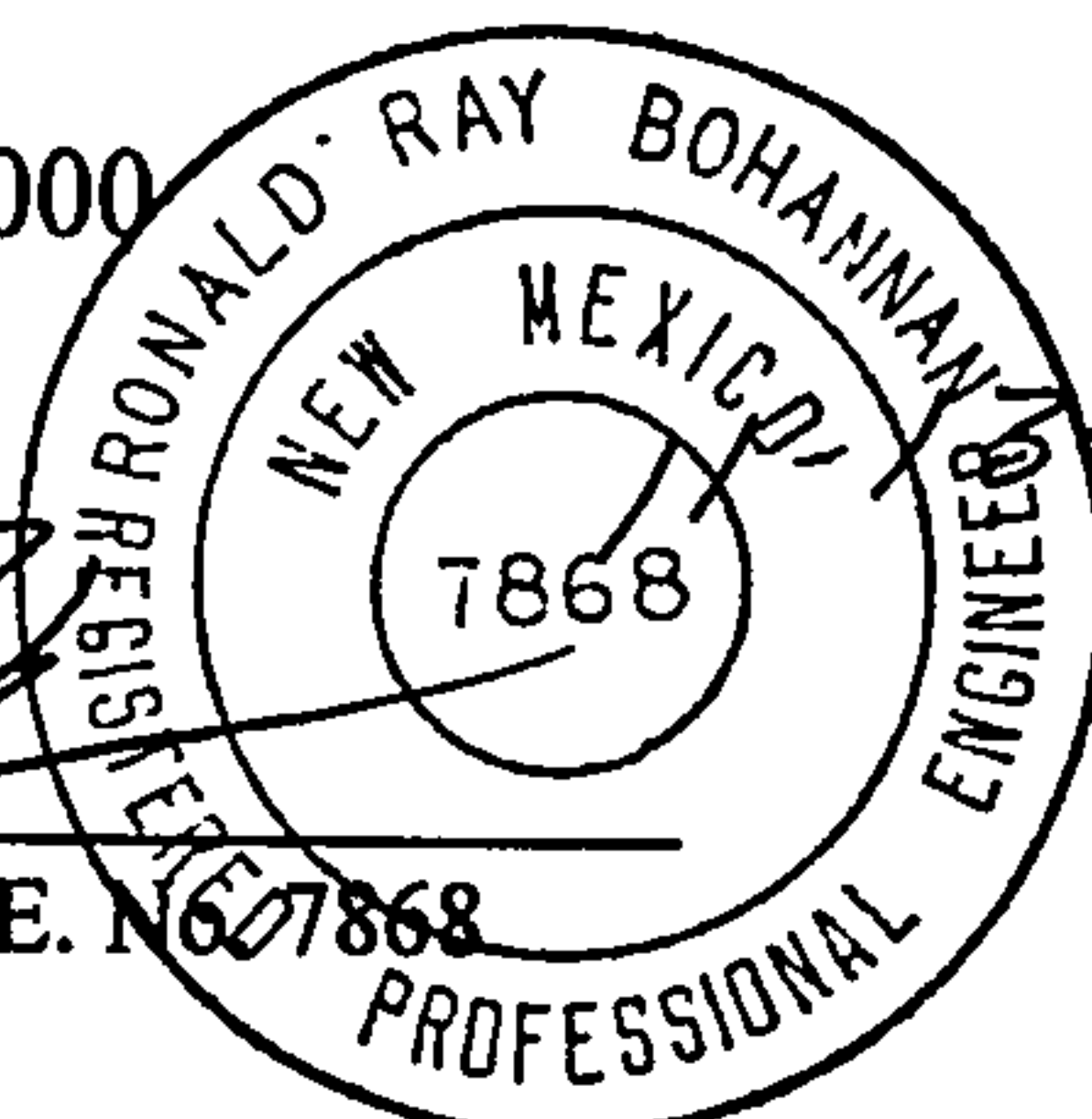


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Location

Desert Pine Subdivision is a proposed 127 unit single family subdivision. It is located south of Sunset Gardens Road between 98th Street and 94 Street. The site is shown on the attached Zone Atlas Map L-9 and contains approximately 17.0 acres. The purpose of this report is to provide the drainage analysis and management plan for the subdivision.

Existing Drainage Conditions

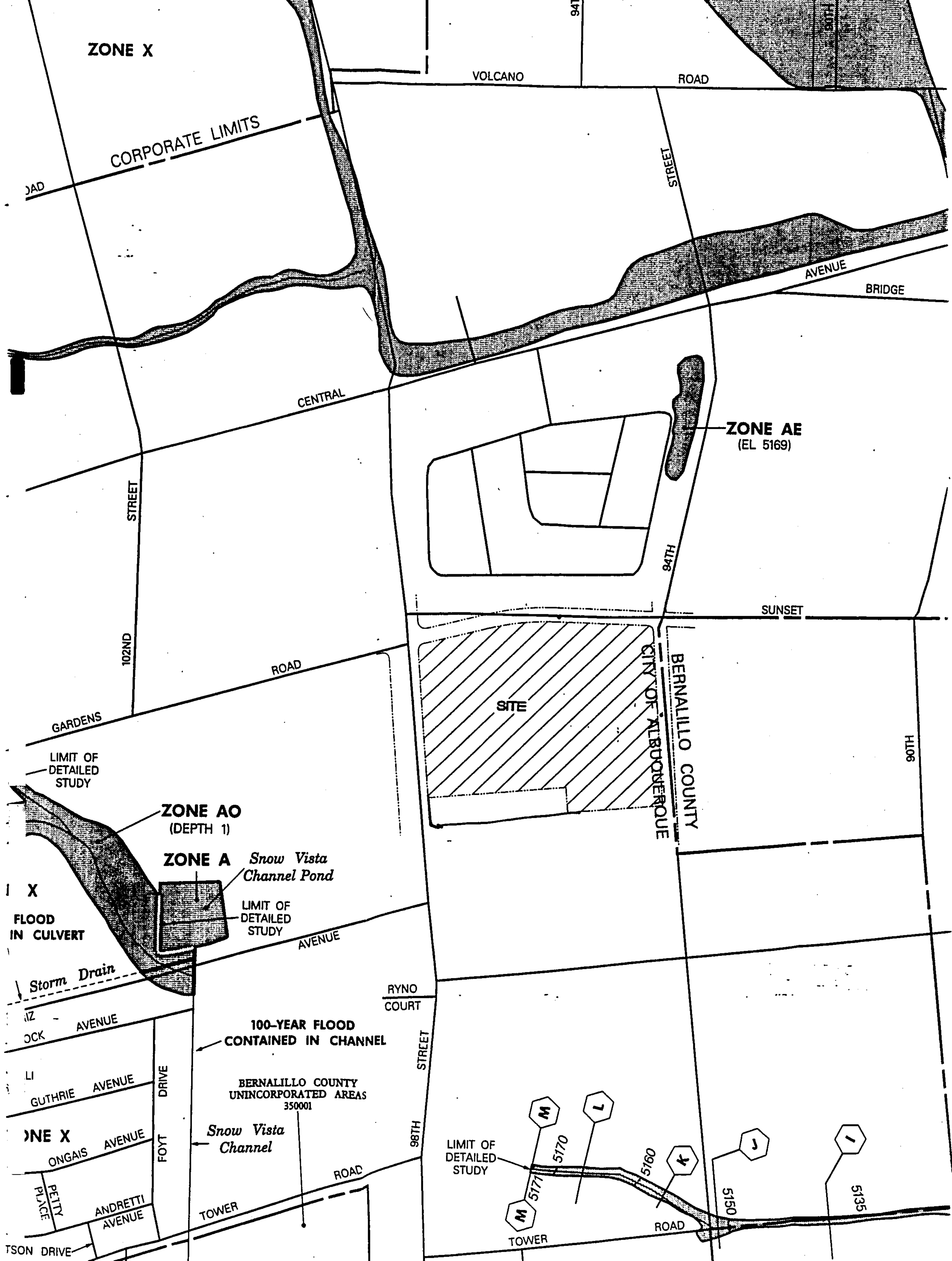
The site is currently undeveloped. The natural slope of the site is from west to east at approximately 3%. There is one existing basin (Basin 1) on the site. Basin 1 sheet flows east with an undeveloped runoff of 37.16 cfs.

The adjacent streets (98th Street and Sunset Gardens) prevent any runoff from entering the site from the west and north. The natural topography of the site prevents any runoff from the east and south from entering the site. The is only offsite basin from an out-parcel located at the southwest corner of the site. This basin has an undeveloped runoff of 2.96 cfs. This basin will be captured in Desert Bluff Drive and conveyed to the onsite pond. In the future, when this basin is developed, the developed runoff will drain through the site to 94th Street. Therefore, this basin was included in the ultimate storm drain calculations for the on-site drainage.

FIRM Map and Soil Conditions

The site is located on FIRM Map section 35001C0328 D as shown on the attached excerpt. This map shows that the site does not lie within any 100 year flood plains.

The site contains one soil type from the Soil Conservation Service Soil Survey of Bernalillo County. The soil found on the site is a Pajarito loamy fine sand and has slow runoff, severe hazard of soil blowing and permeability is moderately rapid.



On-Site Drainage Management Plan

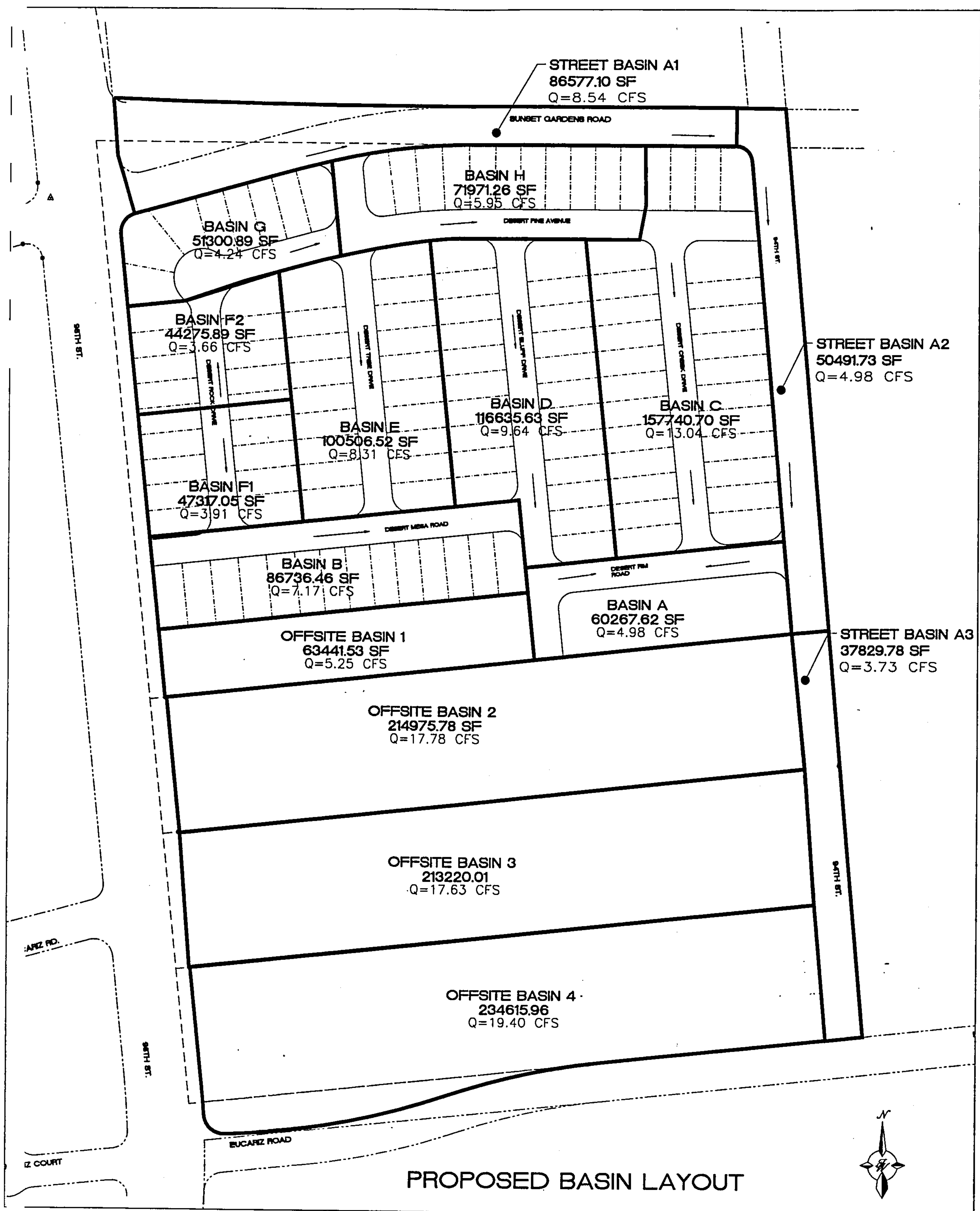
The proposed drainage management plan is to collect the developed flows in the adjacent streets. The flows will be conveyed via a new storm drain to new temporary retention ponds. In the future, when downstream improvements are built, the retention ponds will be removed.

The site is within the boundaries of SAD 222, which is in the process of being approved. The SAD will build downstream storm drain improvements. Until that time, two temporary retention ponds will be constructed to contain the developed flows from the site. When the improvements are in place, the ponds will be removed and the area reclaimed for lots.

A new storm drain system will be constructed in Desert Creek and Desert Rim Drives. This storm drain will convey the on-site drainage and the undeveloped flow from basin OS-1 to the retention ponds. This is a total of 58.88 cfs and a 100-year, 10-day volume of 3.46 ac-ft. The ponding area is split into two ponds. Pond 1 will contain the flows from the on-site basins, and OS-1. Pond 2 will contain the offsite basins A1 and A2. These basins consist of one-half of the adjacent streets of Sunset Gardens and 94th Street. These basins have a combined flow of 5.99 and a 100-year, 10-day volume of 0.385 ac-ft.

In the future, the retention ponds will be removed. The storm drain system has been designed for future and interim conditions. The future lines will be constructed at this time and will remain dry until the ponds are removed. Plugs will be installed to ensure runoff does not enter the future lines. In the future, the plugs will be removed and relocated to the interim lines to block the lines that entered the pond. The future flow rate of 66.15 cfs includes the developed flows from Basin OS-1 and all the on-site basins.

The ultimate storm drain system in 94th Street has been designed with this report. The three offsite basins located south of the site are labeled OS-2, OS-3 and OS-4. The offsite basins OS-2 and OS-3 will drain north to a sump location in 94th Street. Double 'A' drop inlets will be located in the sump to capture the developed flows. The combined flow rate in the storm drain system, included all onsite flows, will be 117.56 cfs. A 54" pipe will convey the flows to Eucariz Avenue. Basin OS-4 drains toward Eucariz and will be captured in a series of drop inlets on 94th Street near Eucariz. The total flow draining to Eucariz will be 134.66 cfs.



Pond 1 will have an emergency overflow to Pond 2. If Pond 2 overflows the runoff will enter 94th Street. We do not anticipate this occurring unless there is a storm event greater than a 100-year storm.

Calculations

The Weighted E method from the "City of Albuquerque Development Process Manual Volume 11 – Design Criteria, 1997 Revision" was used to calculate the runoff and volume for the site.

Summary

The site consists of nine on-site basins and several off-site basins. Offsite Basin 1 (OS-1) consists of the undeveloped flow from the adjacent out-parcel. The nine on-site basins and OS-1 have been included in the storm drain and pond capacity calculations. Off-site basins A1 and A2 consist of the adjacent developed streets. These basins will be captured in a storm sewer in 94th Street and conveyed to a temporary retention pond. Two retention ponds will be located in the ponding area at the southwest corner of the site. Both ponds will be designed for the 100-year-10-day volume. These ponds will be removed in the future when the SAD 222 downstream improvements are constructed. The ultimate storm drain in 94th has been designed with this report.

Runoff Calculations

235

Weighted E Method

Developed On-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year			100-Year, 10-Day		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
A	60,268	1.38	0%	0	20%	0.28	20%	0.28	60%	0.83	1.514	0.175	4.98	0.876	0.101	3.02	1.514	0.276	4.98
B	86,736	1.99	0%	0	20%	0.40	20%	0.40	60%	1.19	1.514	0.251	7.17	0.876	0.145	4.35	1.514	0.398	7.17
C	157,741	3.62	0%	0	20%	0.72	20%	0.72	60%	2.17	1.514	0.457	13.04	0.876	0.264	7.91	1.514	0.723	13.04
D	116,636	2.68	0%	0	20%	0.54	20%	0.54	60%	1.61	1.514	0.338	9.64	0.876	0.195	5.85	1.514	0.535	9.64
E	100,507	2.31	0%	0	20%	0.46	20%	0.46	60%	1.38	1.514	0.291	8.31	0.876	0.168	5.04	1.514	0.461	8.31
F1	47,317	1.09	0%	0	20%	0.22	20%	0.22	60%	0.65	1.514	0.137	3.91	0.876	0.079	2.37	1.514	0.217	3.91
F2	44,276	1.02	0%	0	20%	0.20	20%	0.20	60%	0.61	1.514	0.128	3.66	0.876	0.074	2.22	1.514	0.203	3.66
G	51,301	1.18	0%	0	20%	0.24	20%	0.24	60%	0.71	1.514	0.149	4.24	0.876	0.086	2.57	1.514	0.235	4.24
H	71,971	1.65	0%	0	20%	0.33	20%	0.33	60%	0.99	1.514	0.208	5.95	0.876	0.121	3.61	1.514	0.330	5.95
Total	736,752	16.91		0.00		3.38		3.38		10.15	13.626	2.134	60.92	7.884	1.235	36.94	13.626	3.377	60.92

Undeveloped Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year			100-Year, 10-Day		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
Onsite	736,752	16.91	0%	0	100%	16.91	0%	0.00	0%	0.00	0.670	0.944	34.33	0.220	0.310	12.85	0.670	0.944	34.33

Interim Basins

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year			100-Year, 10-Day		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
A1 - Half Street	33,119	0.76	0%	0	0%	0.00	5%	0.04	95%	0.72	1.921	0.122	3.27	1.200	0.076	2.14	1.921	0.210	3.27
A2 - Half Street	27,577	0.63	0%	0	0%	0.00	5%	0.03	95%	0.60	1.921	0.101	2.72	1.200	0.063	1.79	1.921	0.175	2.72
OS-1	63,442	1.46	0%	0	100%	1.46	0%	0	0%	0.00	0.670	0.081	2.96	0.220	0.027	1.11	0.670	0.081	2.96

Developed Off-Site Basins

OK

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year			100-Year, 10-Day		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
A1	86,577	1.99	0%	0	0%	0.00	5%	0.10	95%	1.89	1.921	0.318	8.54	1.200	0.199	5.60	1.921	0.549	8.54
A2	50,492	1.16	0%	0	0%	0.00	5%	0.06	95%	1.10	1.921	0.186	4.98	1.200	0.116	3.27	1.921	0.320	4.98
A3	37,830	0.87	0%	0	0%	0.00	5%	0.04	95%	0.83	1.921	0.139	3.73	1.200	0.087	2.45	1.921	0.240	3.73
1	63,442	1.46	0%	0	20%	0.29	20%	0.29	60%	0.87	1.514	0.184	5.25	0.876	0.106	3.18	1.514	0.291	5.25
2	214,976	4.94	0%	0	20%	0.99	20%	0.99	60%	2.96	1.514	0.623	17.78	0.876	0.360	10.78	1.514	0.985	17.78
3	213,220	4.89	0%	0	20%	0.98	20%	0.98	60%	2.94	1.514	0.618	17.63	0.876	0.357	10.69	1.514	0.977	17.63
4	234,616	5.39	0%	0	20%	1.08	20%	1.08	60%	3.23	1.514	0.680	19.40	0.876	0.393	11.76	1.514	1.075	19.40
Total	901,152	20.69		0		3.33		3.54		13.82		2.746	77.30		1.619	47.74		4.439	77.30

Equations:

$$\text{Weighted E} = \frac{E_a \cdot A_a + E_b \cdot A_b + E_c \cdot A_c + E_d \cdot A_d}{\text{Total Area}}$$

$$\text{Volume} = \text{Weighted D} \cdot \text{Total Area}$$

$$\text{Flow} = Q_a \cdot A_a + Q_b \cdot A_b + Q_c \cdot A_c + Q_d \cdot A_d$$

Excess Precipitation, E (Inches)		
Zone 1	100-Year	10 - Year
E _a	0.44	0.08
E _b	0.67	0.22
E _c	0.99	0.44
E _d	1.97	1.24

Peak Discharge (cfs/acre)		
Zone 1	100-Year	10 - Year
Q _a	1.29	0.24
Q _b	2.03	0.76
Q _c	2.87	1.49
Q _d	4.37	2.89

Depth (in) at 100-Year Storm	
	Zone 1
P ₃₆₀	2.2
P ₁₄₄₀	2.66
P _{4days}	3.12
P _{10days}	3.67

Pond Calculations

POND SUMMARY

	POND 1		POND 2	
Area of Pond Top (SF)	20256.33		4053.48	
Area of Pond Bottom (SF)	7779.87		242.60	
Depth of Pond (FT)	11.00		8.00	
Volume (CF)	154199.10		17184.32	
Volume (AC-FT)	3.5399		0.3945	
Volume Required (CF)	150674.04		16770.06	
Volume Required (AC-FT)	3.4590		0.3850	
Volume Provided (CF)	154199.1		17184.32	
Volume Provided (AC-FT)	3.5399		0.3945	

VOLUME OF POND

$V = (A_t + A_b) / 2 * D$

A_t = Area of Top

A_b = Area of Bottom

D = Depth

Emergency Spillway

Weir Equation:

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

Pond 1:

Q = 58.88 cfs

C = 2.95

H = 1.0 ft

L = Length of weir

$$L = \frac{58.88}{2.95(1.0)^{3/2}}$$

L = 19.96 ft

Use 20.00 feet for length of weir

Pond 2:

Q = 64.87 cfs

C = 2.95

H = 1.0 ft

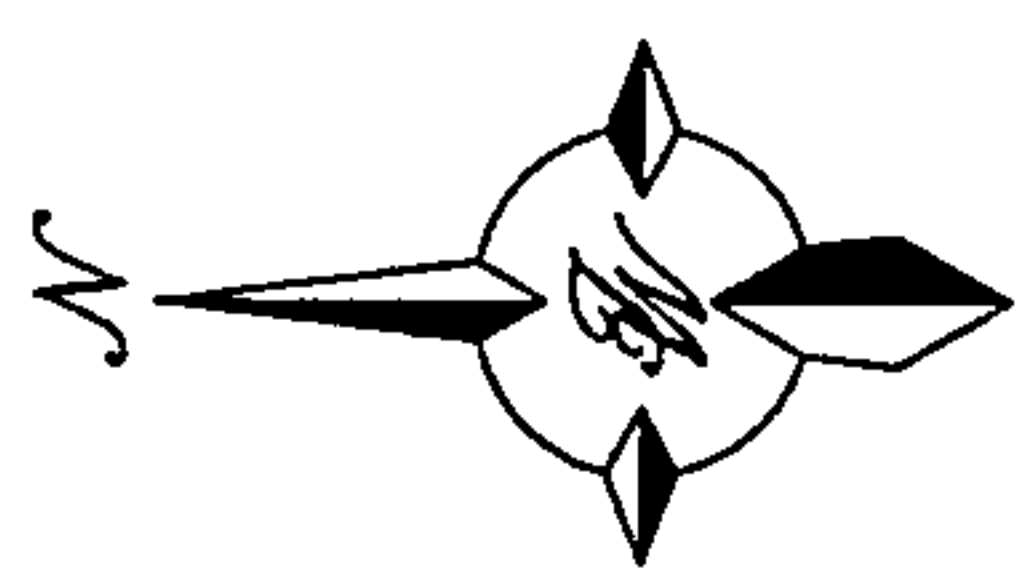
L = Length of weir

$$L = \frac{64.87}{2.95(1.0)^{3/2}}$$

L = 21.99 ft

Use 22.00 feet for length of weir

Storm Drain Calculations



94TH ST.

DESERT CREEK DRIVE

DESERT RIM ROAD

ON-SITE STORM DRAIN LAYOUT

CB4
L6A=30"
CB4-A

CB1
L1=18"

CB2

CB5

L11=24"

CB6

MHA1
L4=36"

L5=36"

MHA2

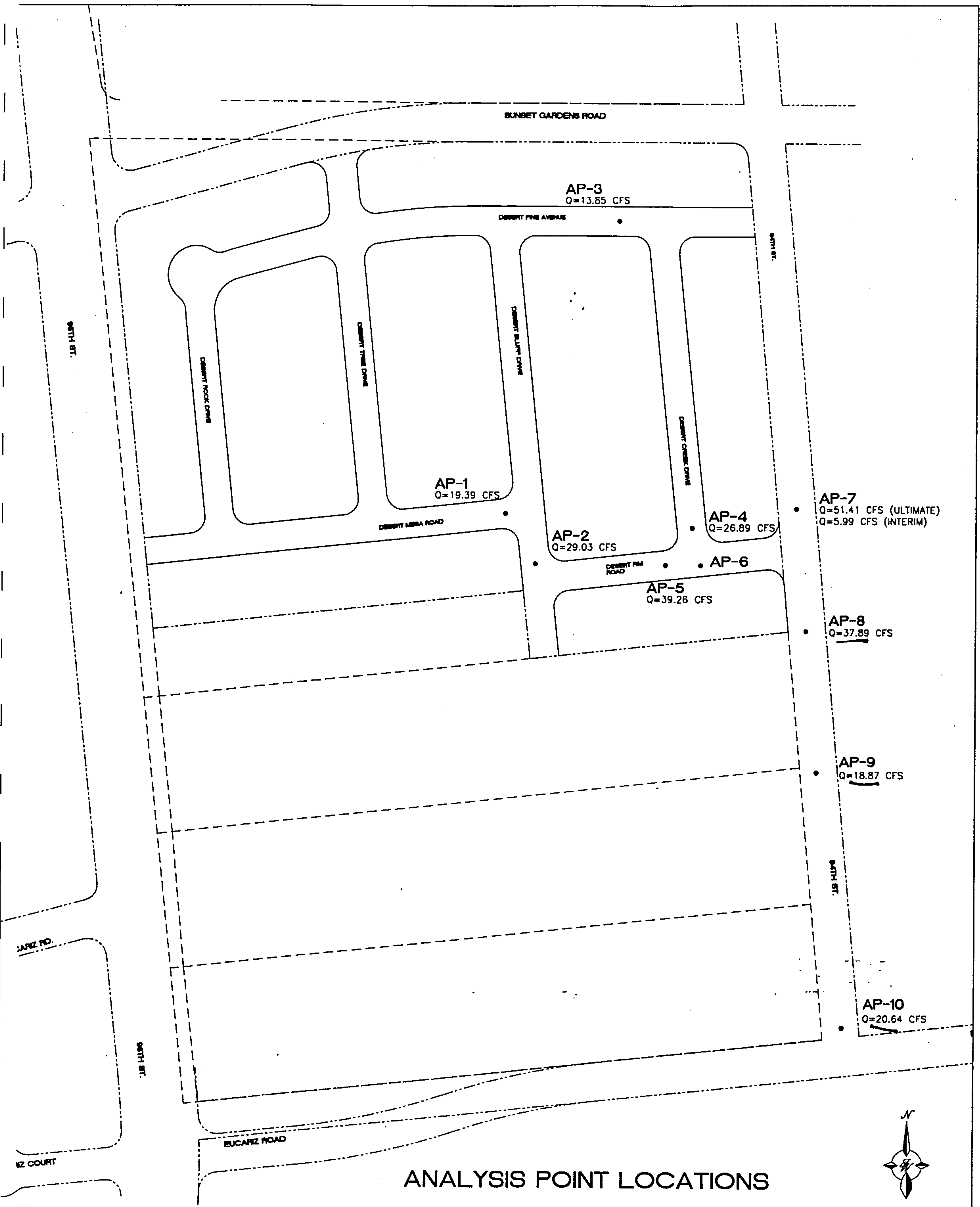
L6=36"

L7=54"
~~24"~~ 18"

L8=18"

MHA3

L9=54"
~~48"~~ 48"



ANALYSIS POINT LOCATIONS



Pipe Capacity

Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
L1	18	2	1.77	0.375	14.90	6.60	3.73
L2	18	4.6	1.77	0.375	22.59	13.20	7.47
L3	36	11.14	7.07	0.75	223.22	66.15	9.36
L4	36	1	7.07	0.75	66.88	66.15	9.36
L5	36	1	7.07	0.75	66.88	66.15	9.36
L6	36	3.44	7.07	0.75	124.04	51.41	7.27
L6-A	30	1	4.91	0.625	41.13	25.71	5.24
L7	54 ~~46~~	0.6	15.90	1.125	152.73	117.56	7.39
L8	18	5.02	1.77	0.375	23.60	5.99	3.39
L9	54 ~~46~~	0.6	15.90	1.125	152.73	117.56	7.39
L10	24	4.19	3.14	0.5	46.43	29.00	9.23
L11	24	1	3.14	0.5	22.68	14.50	4.62
L12	18	1	1.77	0.375	10.53	8.55	4.84
L13	18	1	1.77	0.375	10.53	8.55	4.84
L14	54 ~~46~~	0.6	15.90	1.125	152.73	134.66	8.47

L3 = Basins B, C, D, E, F1, F2, G, H, and OS-1 = 58.88 cfs

L4 = Basins A, B, C, D, E, F1, F2, G, H, and OS-1 = 66.15 cfs
(Assumes pond has been removed and Basin A developed.)

L6 = Basins A1, A2, OS-2, and OS-3 = 51.41 cfs

L8 = Halfstreet basins for A1 and A2 = 5.99
(Interim condition)

Manning's Equation:

$$Q = 1.49/n * A * R^{(2/3)} * S^{(1/2)}$$

A = Area

R = D/4

S = Slope

n = 0.013

DROP INLET CALCULATIONS

Analysis Point	Type of Inlet	Area (SF)	Q (CFS)	H (FT)	Allowable H (FT)
6	Single 'A'	5.92	23.95	0.7060	0.67
7	Double 'A'	11.24	25.71	0.2257	0.67
7	Double 'A'	11.24	25.71	0.2257	0.67

AP-6 = Remainder from AP-4 and AP-5 = 23.95 cfs

AP-7 = Basins A1, A2, A3, OS-2, and OS-3 = 51.41 cfs

STORM DRAIN CALCULATIONS

Analysis Point	Pipe Size (in)	Area (SF)	Q (CFS)	H (FT)	Allowable H (FT)
CB-1	18	1.77	6.6	0.6017	4
CB-2	18	1.77	13.2	2.4067	4.43
CB-3	36	7.07	66.15	3.7775	6.05
CB-4	36	7.07	51.41	2.2816	4
CB-4A	30	4.91	25.71	1.1832	4
CB-5	24	3.14	14.5	0.9189	4
CB-6	24	3.14	29	3.6754	4
CB-7	18	1.77	8.55	1.0097	4
CB-8	18	1.77	8.55	1.0097	4
MHA-1	36	7.07	66.15	3.7775	6.52
MHA-2	54	15.90	117.56	2.3567	6.6
MHA-3	54	15.90	117.56	2.3567	6
MHA-4	54	15.90	134.66	3.0921	6

ORIFICE EQUATION

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

$$C = 0.6$$

$$g = 32.2$$

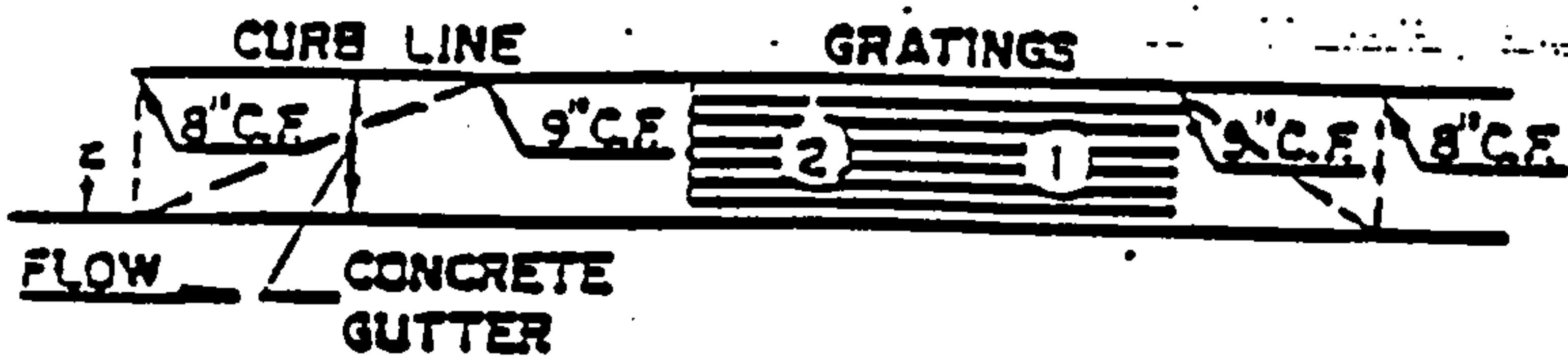
AP-4 (Desert Creek Drive)

$S = 1.00\%$

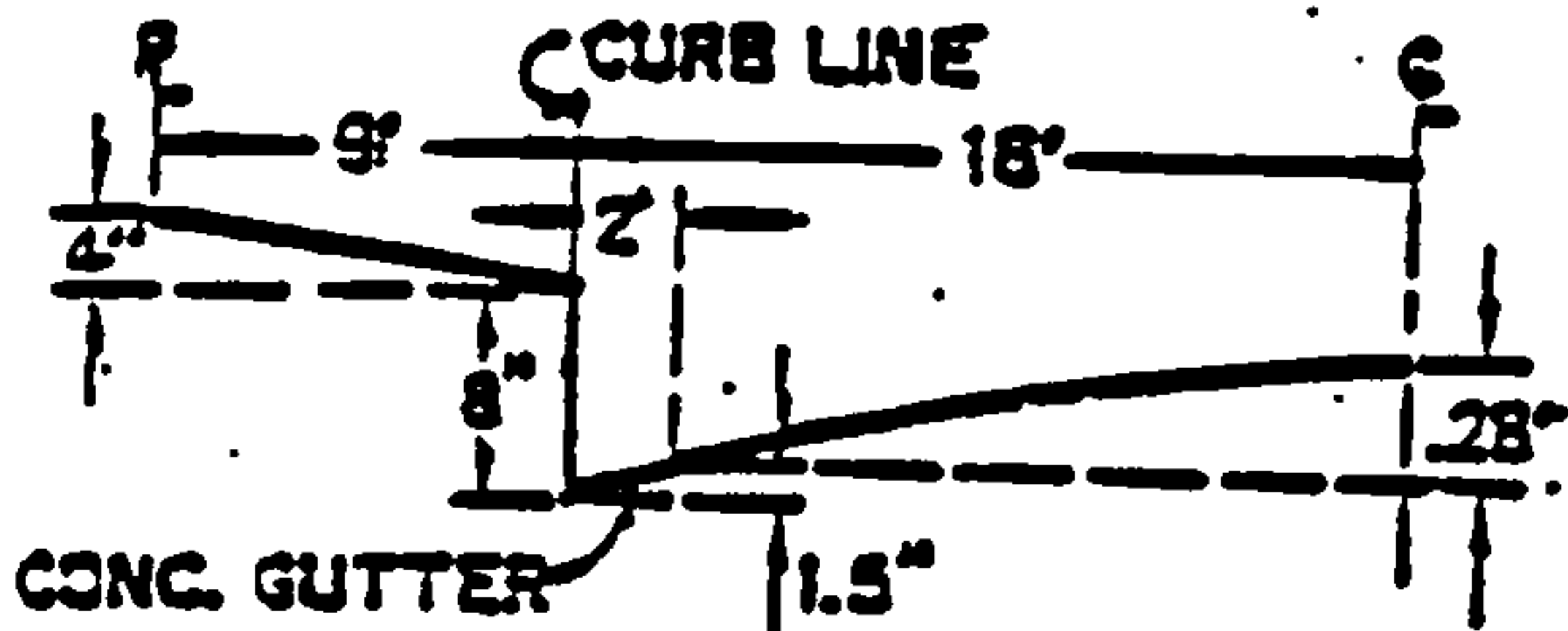
22.3

GRATING CAPACITIES FOR TYPE DOUBLE

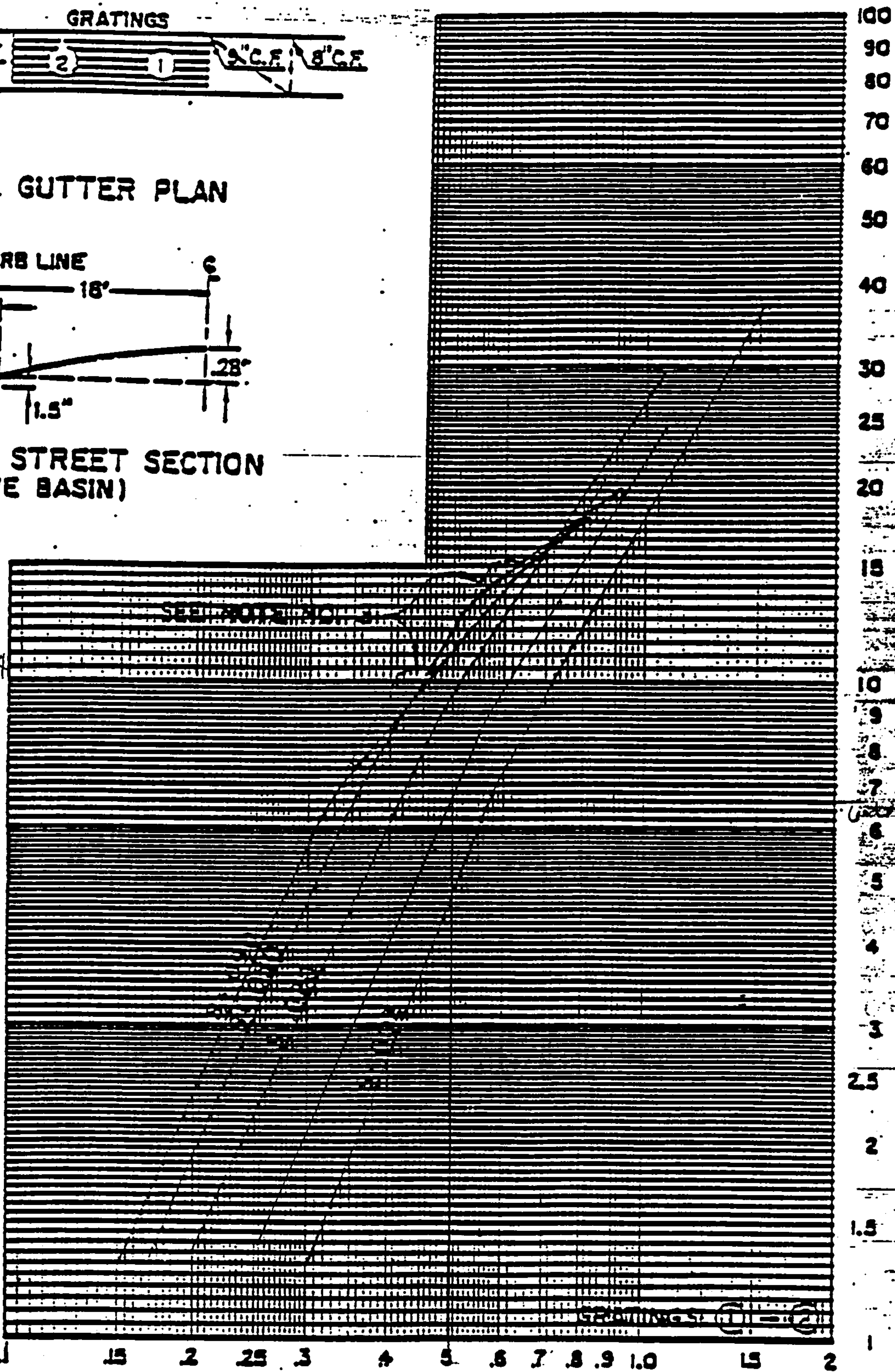
"C," AND "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

$$Q = 26.89$$

$$d = 0.50$$

$$Q_{cap} = 6.6(2) = 13.20$$

$$Q_{req} = 13.69$$

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

Street Capacity Calculations

AP-4 with Q=26.89 cfs
28' F-F Street Section with 8" curb
Slope= 1.62%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	rea (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.31	0.00	0.55	0.004
0.02	0.00	0.34	0.01	0.00	0.00	0.50	0.01	0.62	0.010
0.04	0.01	0.68	0.02	0.01	0.02	0.79	0.03	0.69	0.024
0.06	0.03	1.02	0.03	0.03	0.06	1.03	0.06	0.74	0.040
0.08	0.05	1.36	0.04	0.06	0.13	1.25	0.10	0.78	0.057
0.1	0.08	1.70	0.05	0.12	0.23	1.45	0.14	0.81	0.075
0.12	0.12	2.04	0.06	0.19	0.38	1.64	0.20	0.83	0.093
0.125	0.13	2.13	0.06	0.21	0.42	1.68	0.21	0.84	0.098

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	rea (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.22	0.45	1.65	0.21	0.80	0.097
0.16	0.23	3.91	0.06	0.37	0.75	1.66	0.27	0.73	0.104
0.2	0.42	5.95	0.07	0.78	1.57	1.89	0.38	0.74	0.133
0.24	0.69	8.00	0.09	1.48	2.97	2.16	0.52	0.78	0.170
0.28	1.04	10.04	0.10	2.53	5.07	2.45	0.69	0.82	0.212
0.32	1.47	12.08	0.12	4.00	7.99	2.73	0.87	0.85	0.256
0.34	1.71	13.10	0.13	4.90	9.80	2.86	0.97	0.87	0.280
0.365	2.05	14.37	0.14	6.20	12.40	3.03	1.11	0.88	0.309

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2 \cdot 14$
P3= $P2 + Y2$

Depth (ft)	rea (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.12	14.38	0.15	6.56	13.12	3.10	1.15	0.90	0.320
0.4	2.54	14.41	0.18	8.86	17.71	3.49	1.40	0.97	0.386
0.45	3.24	14.46	0.22	13.27	26.53	4.10	1.85	1.08	0.497
0.452	3.26	14.46	0.23	13.45	26.89	4.12	1.86	1.08	0.501
0.54	4.50	14.55	0.31	22.86	45.72	5.09	2.75	1.22	0.700
0.58	5.06	14.59	0.35	27.75	55.50	5.49	3.18	1.27	0.791
0.63	5.76	14.64	0.39	34.36	68.73	5.97	3.76	1.33	0.907
0.667	6.27	14.67	0.43	39.61	79.21	6.31	4.21	1.36	0.994

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667
A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$
P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

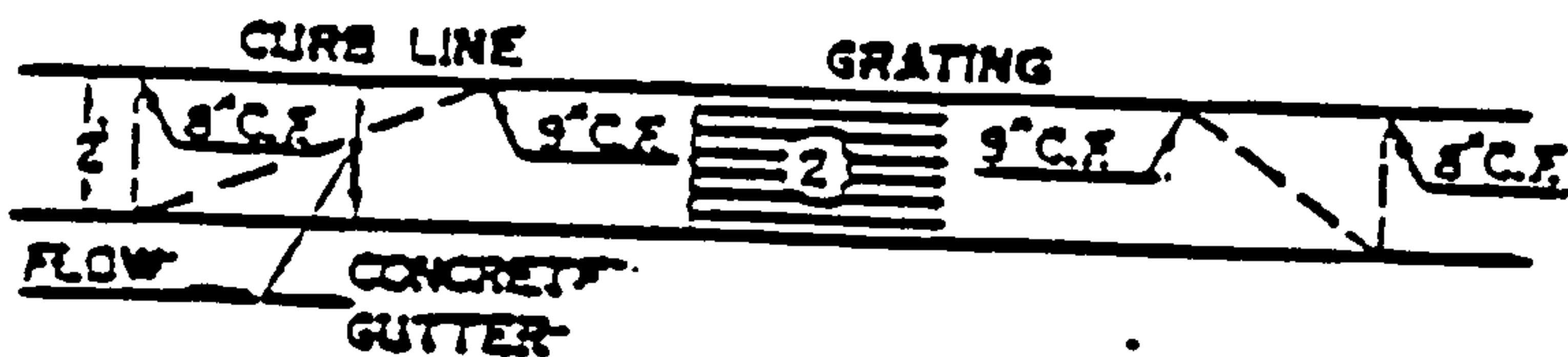
Depth (ft)	rea (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	41.81	83.62	6.18	4.33	1.30	0.986
0.72	7.09	17.32	0.41	43.43	86.87	6.13	4.41	1.27	0.985
0.74	7.43	18.32	0.41	45.27	90.54	6.09	4.51	1.25	0.988
0.76	7.79	19.32	0.40	47.31	94.62	6.07	4.61	1.23	0.993
0.78	8.17	20.32	0.40	49.55	99.10	6.06	4.73	1.21	1.000
0.8	8.58	21.32	0.40	52.00	104.00	6.06	4.85	1.19	1.009
0.847	9.60	23.68	0.41	58.54	117.09	6.10	5.16	1.17	1.038

AP-5 (Desert Rim Rd)

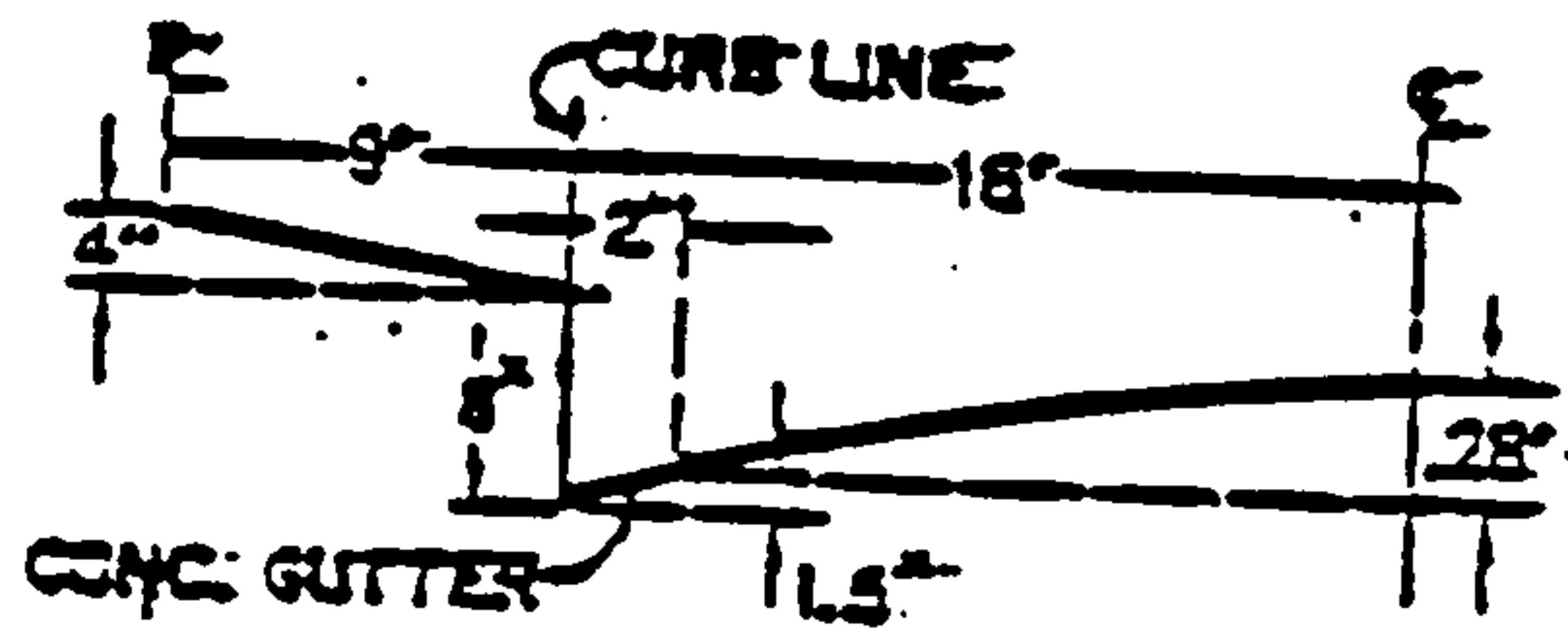
$S = 2.57\%$

22.3

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

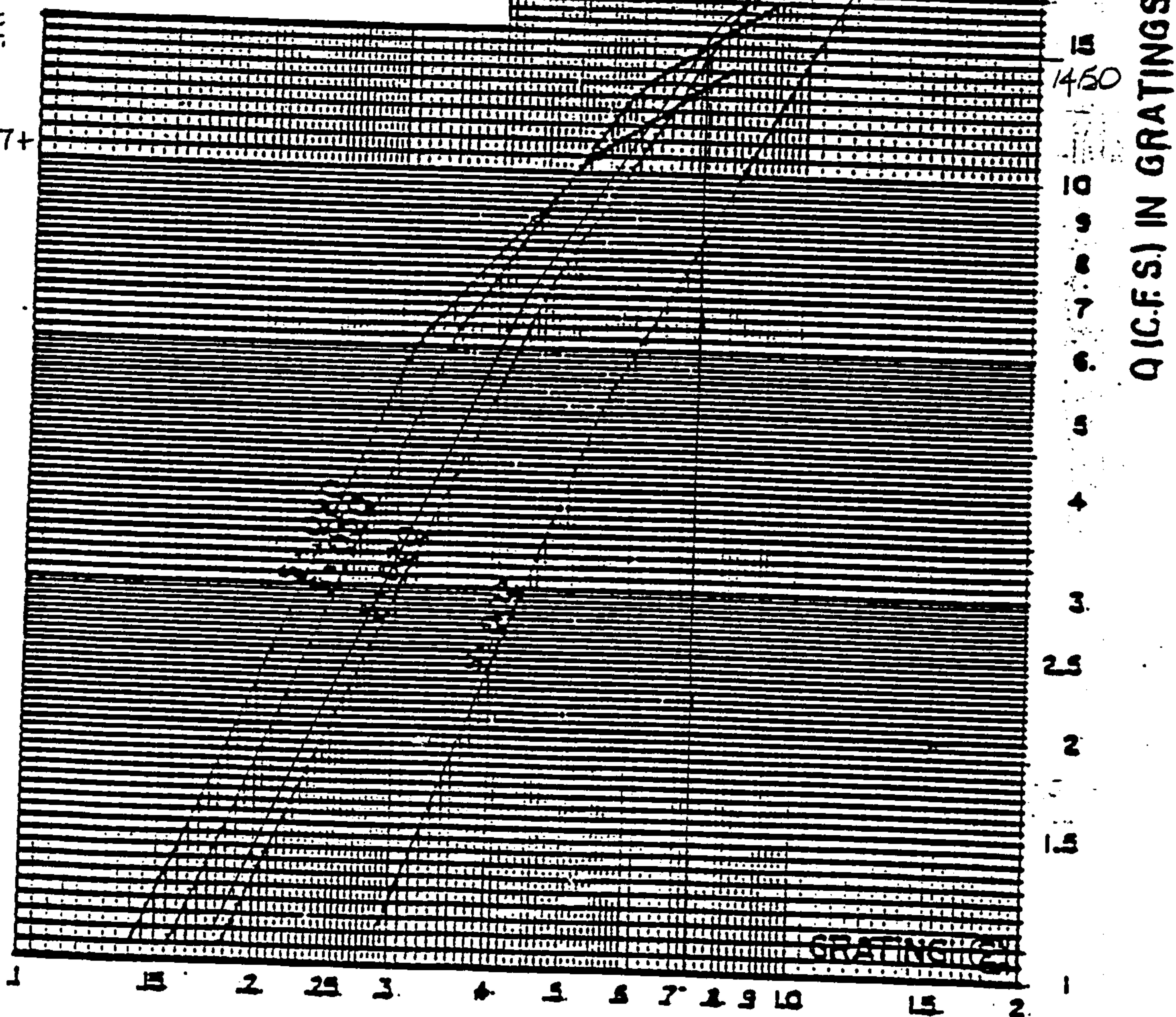


GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION (ABOVE BASIN)

$$\begin{aligned} & \text{sums } F, E, D, B, O, S, \dots \\ & A \\ & = 3.91 + 8.31 + 9.64 + 7.17 + \\ & \quad 5.25 + 4.98 \\ & = 39.26 \end{aligned}$$



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

$$Q = 39.26$$

$$d = 0.74$$

$$Q_{cap} = 1450(2) = 29.0$$

$$Q_{req} = 10.26$$

Street Capacity Calculations

AP-5 with Q=39.26 cfs
28' F-F Street Section with 8" curb
Slope= 2.57%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.39	0.00	0.69	0.006
0.02	0.00	0.34	0.01	0.00	0.00	0.62	0.01	0.78	0.014
0.04	0.01	0.68	0.02	0.01	0.03	0.99	0.04	0.87	0.033
0.06	0.03	1.02	0.03	0.04	0.07	1.30	0.08	0.93	0.055
0.08	0.05	1.36	0.04	0.08	0.16	1.57	0.13	0.98	0.078
0.1	0.08	1.70	0.05	0.15	0.29	1.82	0.18	1.02	0.102
0.12	0.12	2.04	0.06	0.24	0.47	2.06	0.25	1.05	0.128
0.125	0.13	2.13	0.06	0.26	0.53	2.12	0.26	1.06	0.134

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.28	0.56	2.07	0.27	1.01	0.132
0.16	0.23	3.91	0.06	0.47	0.94	2.09	0.33	0.92	0.143
0.2	0.42	5.95	0.07	0.99	1.97	2.38	0.48	0.94	0.183
0.24	0.69	8.00	0.09	1.87	3.74	2.73	0.65	0.98	0.234
0.28	1.04	10.04	0.10	3.19	6.39	3.08	0.86	1.03	0.290
0.32	1.47	12.08	0.12	5.03	10.07	3.44	1.10	1.07	0.350
0.34	1.71	13.10	0.13	6.17	12.34	3.61	1.23	1.09	0.381
0.365	2.05	14.37	0.14	7.81	15.62	3.82	1.39	1.11	0.421

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2 \cdot 14$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.12	14.38	0.15	8.26	16.52	3.91	1.44	1.13	0.435
0.4	2.54	14.41	0.18	11.15	22.31	4.40	1.76	1.23	0.522
0.47	3.57	14.48	0.25	19.63	39.26	5.51	2.61	1.41	0.737
0.50	3.94	14.51	0.27	23.11	46.21	5.87	2.94	1.46	0.815
0.54	4.50	14.55	0.31	28.79	57.58	6.41	3.46	1.54	0.934
0.58	5.06	14.59	0.35	34.95	69.90	6.91	4.01	1.60	1.054
0.63	5.76	14.64	0.39	43.28	86.57	7.52	4.74	1.67	1.206
0.667	6.27	14.67	0.43	49.89	99.77	7.95	5.30	1.72	1.319

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667
A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$
P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	52.66	105.32	7.79	5.45	1.64	1.311
0.72	7.09	17.32	0.41	54.71	109.41	7.72	5.56	1.60	1.312
0.74	7.43	18.32	0.41	57.02	114.03	7.68	5.68	1.57	1.317
0.76	7.79	19.32	0.40	59.59	119.17	7.65	5.81	1.55	1.325
0.78	8.17	20.32	0.40	62.41	124.82	7.64	5.96	1.52	1.335
0.8	8.58	21.32	0.40	65.49	130.99	7.64	6.11	1.50	1.348
0.847	9.60	23.68	0.41	73.74	147.47	7.68	6.50	1.47	1.388

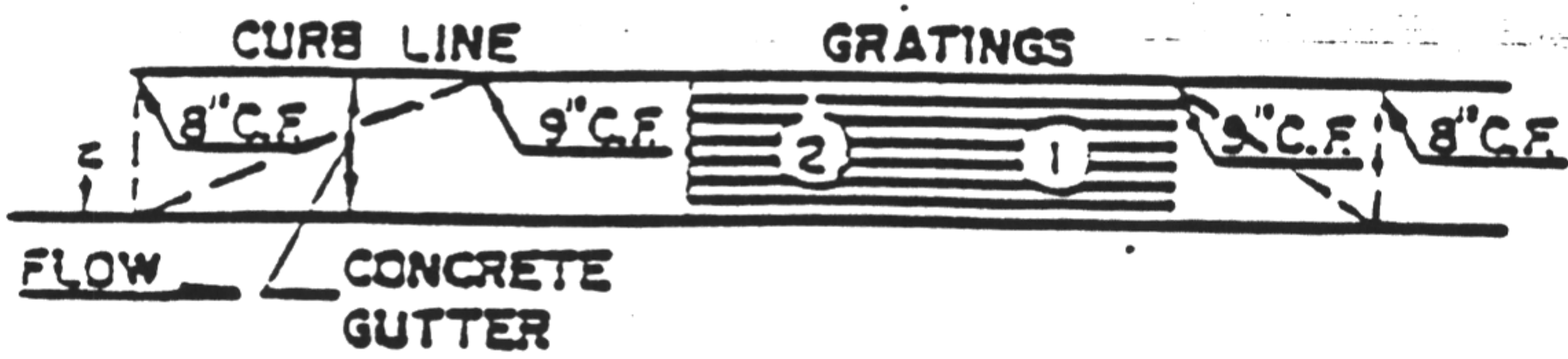
AP-10 (94th Street)

S = 1.3490

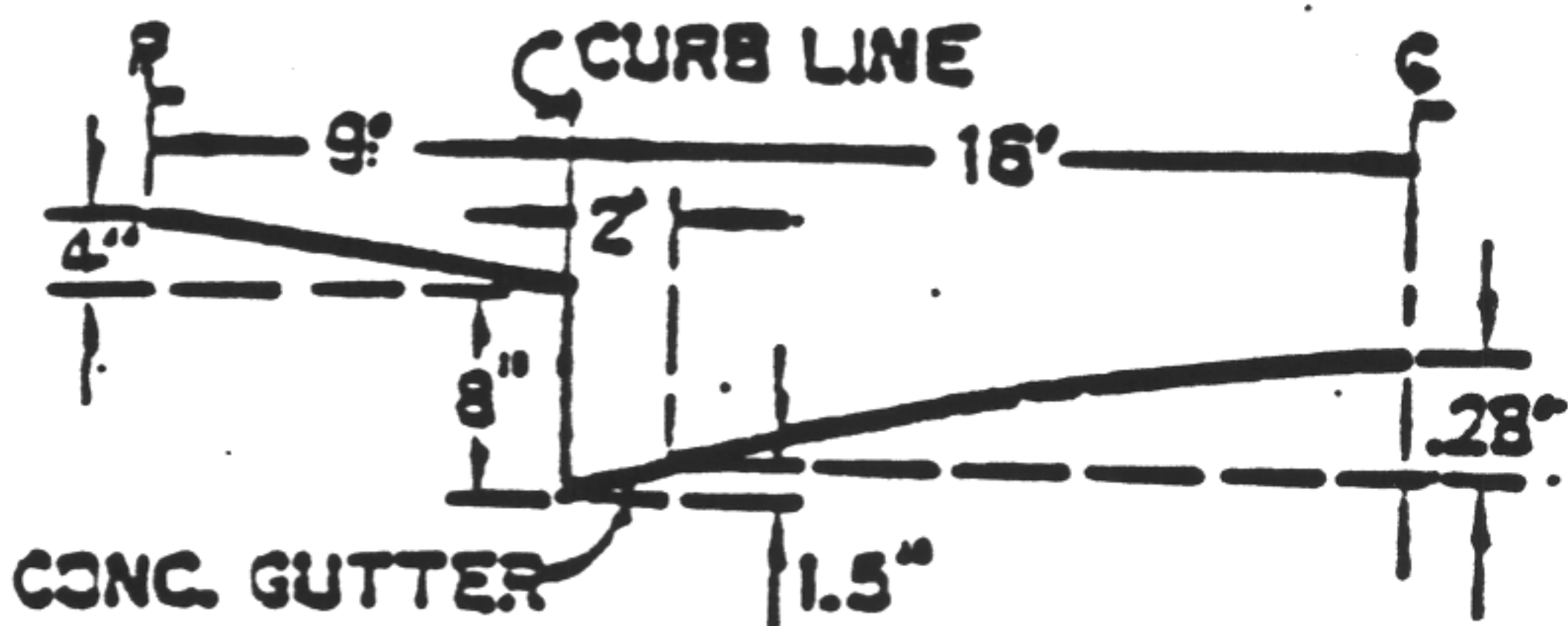
22.3

GRATING CAPACITIES FOR TYPE DOUBLE

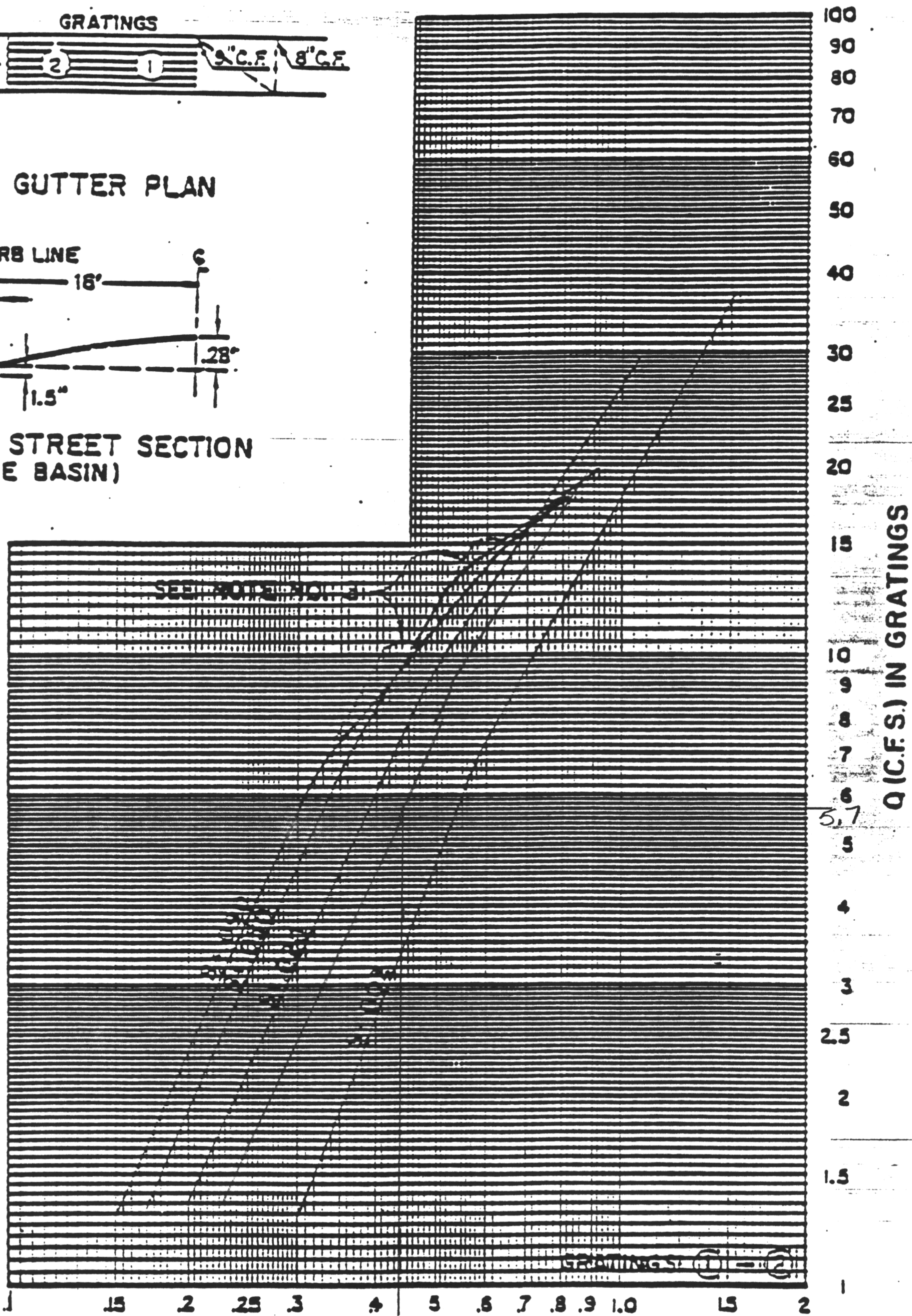
"C," AND "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)



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

$$Q = 20.64$$

$$d = 0.44$$

$$Q_{cap} = 5.7(2) = 11.4$$

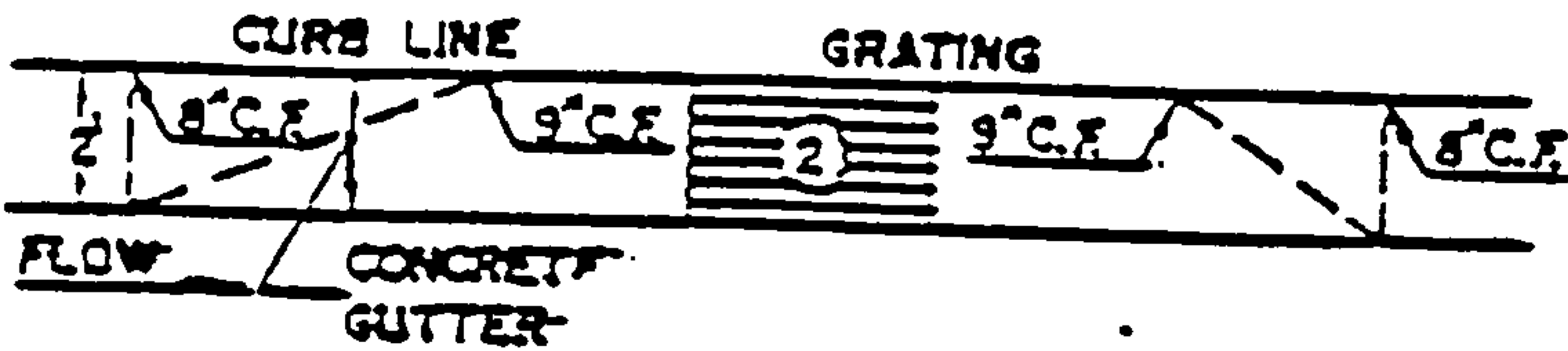
$$Q_{left} = 20.64 - 11.4 = 9.24 cfs$$

AP-10 (94th Street)

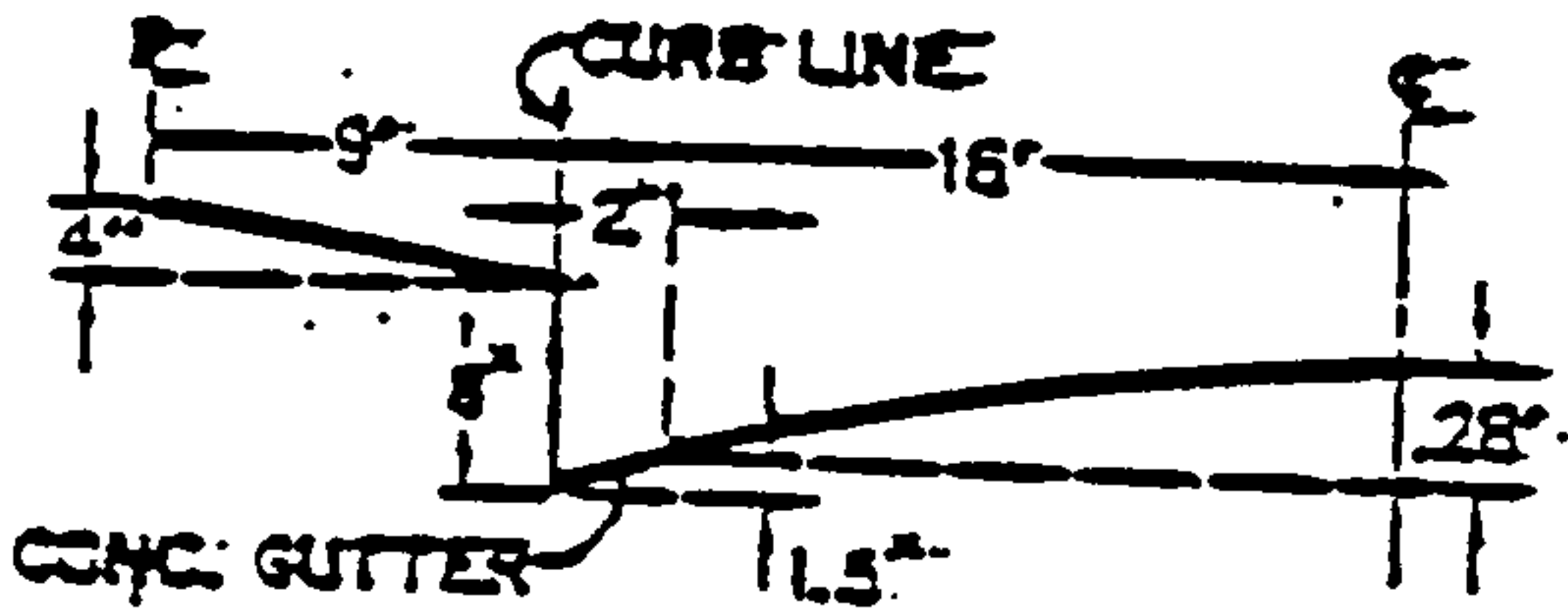
$S = 1.34\%$

22.3

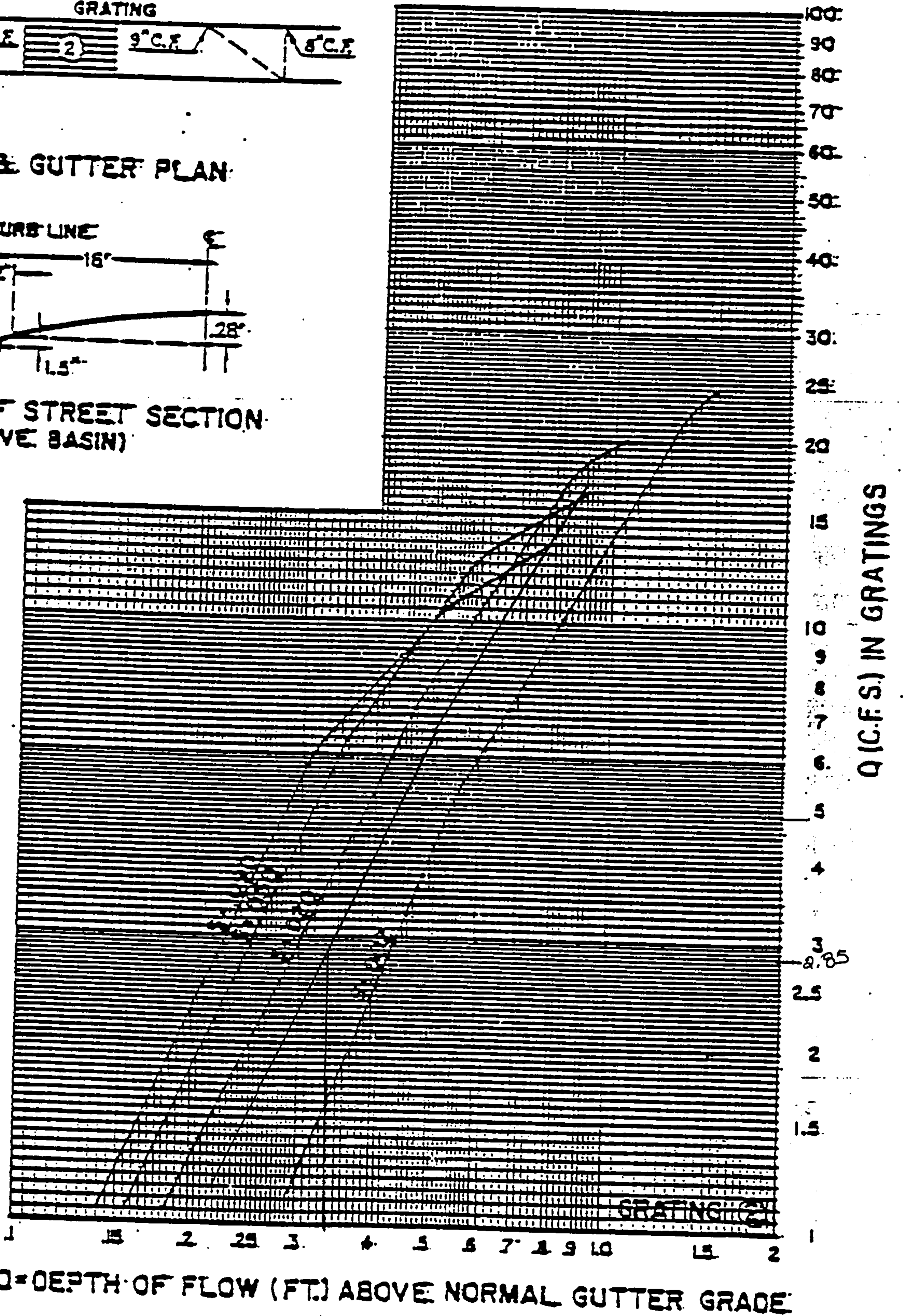
GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION (ABOVE BASIN)



$Q = 9.24$

$d = 0.34$

$Q_{cap} = 2.85(a) = 5.7$

$Q_{left} = 9.24 - 5.7 = 3.54$

REV. 3-83

Street Capacity Calculations

AP-10 with Q=20.64 cfs
40' F-F Street Section with 8" curb
Slope= 1.34%

For water depths less than 0.125 feet

Y= Water depth
 Area = $8 \cdot Y^2$
 P= $\text{SQRT}(257 \cdot Y^2) + Y$
 n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.28	0.00	0.50	0.004
0.02	0.00	0.34	0.01	0.00	0.00	0.45	0.01	0.56	0.009
0.04	0.01	0.68	0.02	0.01	0.02	0.72	0.03	0.63	0.021
0.06	0.03	1.02	0.03	0.03	0.05	0.94	0.06	0.67	0.035
0.08	0.05	1.36	0.04	0.06	0.12	1.14	0.09	0.71	0.049
0.1	0.08	1.70	0.05	0.11	0.21	1.32	0.13	0.73	0.065
0.12	0.12	2.04	0.06	0.17	0.34	1.49	0.18	0.76	0.082
0.125	0.13	2.13	0.06	0.19	0.38	1.53	0.19	0.76	0.086

For water depths greater than 0.125 ft but less than 0.485 ft

Y1= Y-0.125
 A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
 P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.20	0.41	1.50	0.19	0.73	0.084
0.18	0.31	4.93	0.06	0.50	0.99	1.60	0.29	0.67	0.102
0.23	0.61	7.48	0.08	1.16	2.32	1.90	0.44	0.70	0.140
0.28	1.04	10.04	0.10	2.31	4.61	2.23	0.62	0.74	0.185
0.34	1.76	13.28	0.13	4.62	9.24	2.63	0.90	0.79	0.249
0.37	2.14	14.71	0.15	5.98	11.97	2.80	1.04	0.81	0.278
0.44	3.23	18.17	0.18	10.32	20.64	3.20	1.41	0.85	0.352
0.485	4.09	20.49	0.20	14.11	28.21	3.45	1.67	0.87	0.404

For water depths greater than 0.485 ft but less than 0.667 ft

Y2= Y - 0.365
 A3= $A2 + Y2 \cdot 20$
 P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.485	4.09	20.49	0.20	14.11	28.21	3.45	1.67	0.87	0.404
0.510	4.59	20.52	0.22	17.08	34.17	3.73	1.90	0.92	0.456
0.535	5.09	20.54	0.25	20.28	40.57	3.99	2.13	0.96	0.507
0.560	5.59	20.57	0.27	23.70	47.40	4.24	2.38	1.00	0.559
0.585	6.09	20.59	0.30	27.32	54.63	4.49	2.63	1.03	0.612
0.610	6.59	20.62	0.32	31.13	62.27	4.73	2.88	1.07	0.665
0.635	7.09	20.64	0.34	35.14	70.29	4.96	3.15	1.10	0.718
0.667	7.73	20.67	0.37	40.55	81.10	5.25	3.50	1.13	0.786

Street Capacity Calculations

96TH ST.

SUNSET GARDENS ROAD

DESERT PINE AVENUE

94TH ST.

DESERT ROCK DRIVE

DESERT TREE DRIVE

DESERT BLUFF DRIVE

DESERT CREEK DRIVE

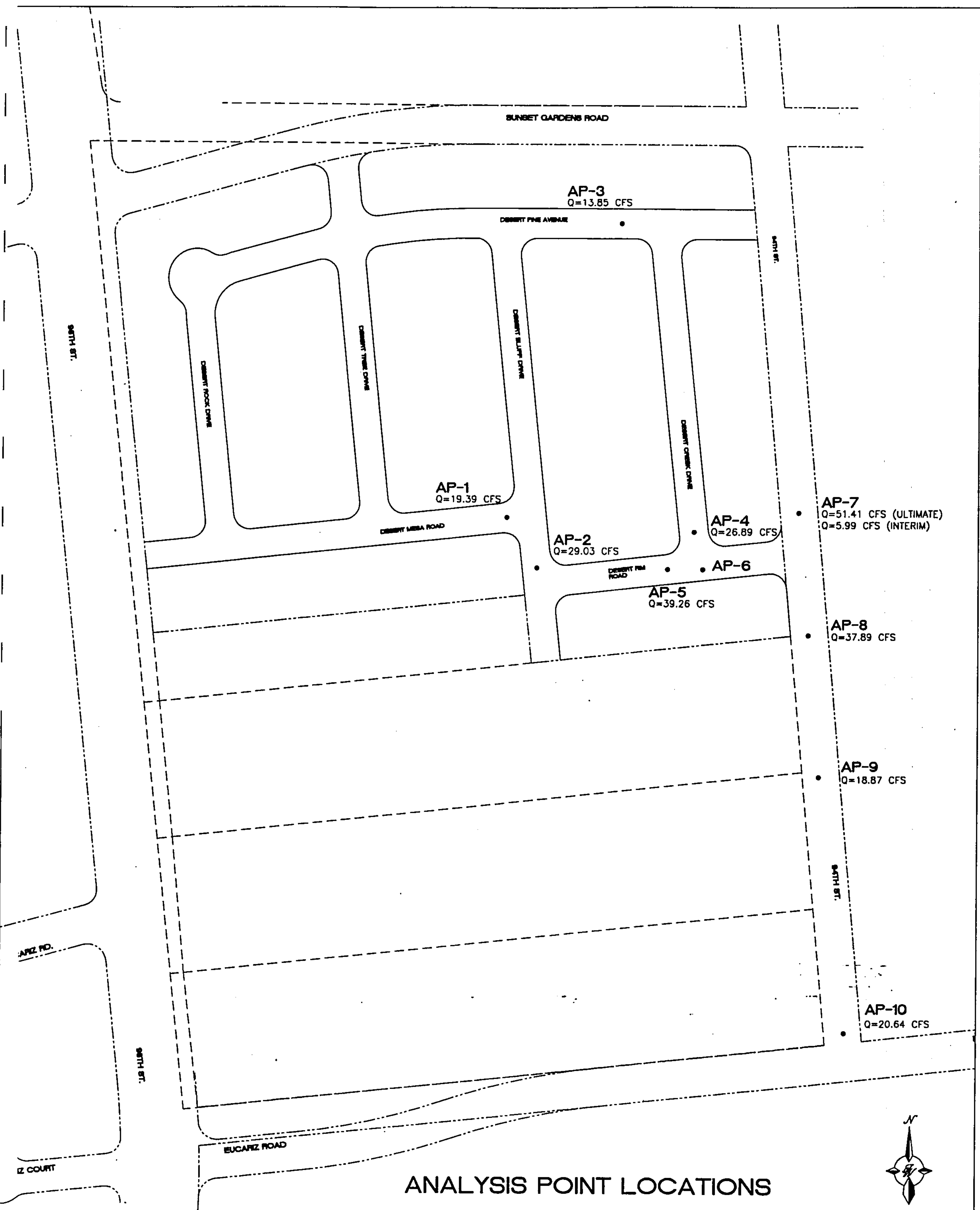
DESERT MESA ROAD

DESERT PIN
ROAD



STANDARD
MOUNTABLE

CURB LOCATION EXHIBIT



ANALYSIS POINT LOCATIONS

Street Capacity Calculations

AP-1 with Q=19.39
28' F-F Street Section with 4" curb
Slope= 3.1%

For water depths less than 0.0625 feet

Y= Water depth
Area = $16 \cdot Y^2$
P= $\text{SQRT}(1025 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.010	0.002	0.33	0.00	0.00	0.00	0.44	0.00	0.77	0.0070
0.020	0.006	0.66	0.01	0.00	0.01	0.70	0.01	0.87	0.0165
0.025	0.010	0.83	0.01	0.01	0.02	0.81	0.02	0.90	0.0217
0.035	0.020	1.16	0.02	0.02	0.04	1.01	0.04	0.95	0.0328
0.045	0.032	1.49	0.02	0.04	0.08	1.20	0.05	0.99	0.0446
0.052	0.043	1.72	0.03	0.06	0.11	1.32	0.07	1.02	0.0532
0.060	0.058	1.98	0.03	0.08	0.17	1.45	0.09	1.04	0.0634
0.063	0.063	2.06	0.03	0.09	0.19	1.49	0.09	1.05	0.0666

For water depths greater than 0.0625 ft but less than 0.3025 ft

Y1= Y-0.0625
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.063	0.064	2.09	0.03	0.09	0.19	1.49	0.09	1.05	0.0670
0.100	0.173	3.98	0.04	0.33	0.65	1.89	0.19	1.05	0.1073
0.130	0.311	5.51	0.06	0.70	1.41	2.26	0.29	1.10	0.1479
0.160	0.495	7.04	0.07	1.29	2.59	2.61	0.42	1.15	0.1922
0.200	0.810	9.08	0.09	2.48	4.96	3.06	0.61	1.21	0.2553
0.255	1.374	11.88	0.12	4.99	9.99	3.63	0.93	1.27	0.3474
0.280	1.680	13.16	0.13	6.53	13.05	3.88	1.09	1.29	0.3910
0.303	1.983	14.31	0.14	8.13	16.26	4.10	1.24	1.31	0.4309

For water depths greater than 0.3025 ft but less than 0.333 ft

Y2= Y - 0.3025
A3= $A2 + Y2 \cdot 14$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.303	1.990	14.31	0.14	8.18	16.36	4.11	1.25	1.32	0.4325
0.304	2.002	14.31	0.14	8.27	16.53	4.13	1.25	1.32	0.4352
0.305	2.022	14.31	0.14	8.40	16.80	4.15	1.27	1.33	0.4395
0.310	2.088	14.31	0.15	8.86	17.72	4.24	1.32	1.34	0.4539
0.313	2.123	14.32	0.15	9.11	18.21	4.29	1.34	1.35	0.4616
0.318	2.204	14.32	0.15	9.69	19.39	4.40	1.40	1.37	0.4794
0.320	2.228	14.32	0.16	9.87	19.73	4.43	1.42	1.38	0.4846
0.333	2.410	14.34	0.17	11.24	22.48	4.66	1.55	1.42	0.5247

For water depths greater than 0.333 ft but less than 0.513 ft

Y3= Y - 0.333
A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$
P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.335	2.438	14.44	0.17	11.41	22.81	4.68	1.57	1.42	0.5279
0.360	2.807	15.69	0.18	13.65	27.30	4.86	1.75	1.43	0.5692
0.380	3.123	16.69	0.19	15.65	31.30	5.01	1.90	1.43	0.6029
0.420	3.809	18.67	0.20	20.22	40.45	5.31	2.23	1.44	0.6725
0.460	4.597	20.70	0.22	25.82	51.63	5.62	2.59	1.46	0.7469
0.504	5.535	22.89	0.24	32.90	65.80	5.94	3.00	1.48	0.8295
0.513	5.740	23.34	0.25	34.51	69.01	6.01	3.08	1.48	0.8469

Street Capacity Calculations

AP-2 with Q=29.03 cfs
28' F-F Street Section with 8" curb
Slope= 1.3%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.27	0.00	0.48	0.003
0.02	0.00	0.34	0.01	0.00	0.00	0.44	0.01	0.54	0.008
0.04	0.01	0.68	0.02	0.01	0.02	0.69	0.03	0.61	0.020
0.06	0.03	1.02	0.03	0.03	0.05	0.91	0.05	0.65	0.033
0.08	0.05	1.36	0.04	0.06	0.11	1.10	0.09	0.68	0.047
0.1	0.08	1.70	0.05	0.10	0.20	1.27	0.13	0.71	0.062
0.12	0.12	2.04	0.06	0.17	0.33	1.44	0.17	0.73	0.078
0.125	0.13	2.13	0.06	0.18	0.37	1.48	0.18	0.74	0.082

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.20	0.39	1.45	0.19	0.71	0.080
0.16	0.23	3.91	0.06	0.33	0.66	1.46	0.23	0.64	0.086
0.2	0.42	5.95	0.07	0.69	1.38	1.66	0.33	0.65	0.110
0.24	0.69	8.00	0.09	1.30	2.61	1.90	0.46	0.68	0.141
0.28	1.04	10.04	0.10	2.23	4.45	2.15	0.60	0.72	0.176
0.32	1.47	12.08	0.12	3.51	7.02	2.40	0.77	0.75	0.214
0.34	1.71	13.10	0.13	4.30	8.61	2.52	0.86	0.76	0.233
0.365	2.05	14.37	0.14	5.45	10.89	2.66	0.97	0.78	0.258

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2 \cdot 14$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.12	14.38	0.15	5.76	11.52	2.72	1.01	0.79	0.267
0.4	2.54	14.41	0.18	7.78	15.56	3.07	1.23	0.86	0.323
0.4828	3.69	14.49	0.25	14.52	29.03	3.93	1.90	1.00	0.481
0.5	3.94	14.51	0.27	16.11	32.23	4.10	2.05	1.02	0.514
0.54	4.50	14.55	0.31	20.08	40.16	4.47	2.41	1.07	0.591
0.58	5.06	14.59	0.35	24.37	48.75	4.82	2.80	1.12	0.670
0.63	5.76	14.64	0.39	30.19	60.37	5.25	3.30	1.16	0.769
0.667	6.27	14.67	0.43	34.79	69.58	5.55	3.70	1.20	0.844

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667
A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$
P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	36.73	73.45	5.43	3.80	1.14	0.835
0.72	7.09	17.32	0.41	38.15	76.30	5.38	3.88	1.12	0.834
0.74	7.43	18.32	0.41	39.76	79.53	5.35	3.96	1.10	0.836
0.76	7.79	19.32	0.40	41.56	83.11	5.33	4.05	1.08	0.840
0.78	8.17	20.32	0.40	43.53	87.05	5.32	4.15	1.06	0.845
0.8	8.58	21.32	0.40	45.68	91.35	5.33	4.26	1.05	0.853
0.847	9.60	23.68	0.41	51.43	102.85	5.36	4.54	1.03	0.876

Street Capacity Calculations

AP-3 with Q=13.85
28' F-F Street Section with 4" curb
Slope= 2.3%

For water depths less than 0.0625 feet

Y= Water depth
Area = $16 \cdot Y^2$
P= $\text{SQRT}(1025 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.010	0.002	0.33	0.00	0.00	0.00	0.38	0.00	0.67	0.0057
0.020	0.006	0.66	0.01	0.00	0.01	0.60	0.01	0.75	0.0135
0.025	0.010	0.83	0.01	0.01	0.01	0.70	0.02	0.78	0.0178
0.035	0.020	1.16	0.02	0.02	0.03	0.88	0.03	0.82	0.0269
0.045	0.032	1.49	0.02	0.03	0.07	1.03	0.05	0.86	0.0367
0.052	0.043	1.72	0.03	0.05	0.10	1.14	0.06	0.88	0.0438
0.060	0.058	1.98	0.03	0.07	0.14	1.25	0.08	0.90	0.0522
0.063	0.063	2.06	0.03	0.08	0.16	1.29	0.08	0.91	0.0549

For water depths greater than 0.0625 ft but less than 0.3025 ft

Y1= Y-0.0625
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.063	0.064	2.09	0.03	0.08	0.16	1.29	0.08	0.91	0.0552
0.100	0.173	3.98	0.04	0.28	0.57	1.64	0.16	0.91	0.0884
0.130	0.311	5.51	0.06	0.61	1.22	1.95	0.25	0.95	0.1222
0.160	0.495	7.04	0.07	1.12	2.24	2.26	0.36	1.00	0.1590
0.200	0.810	9.08	0.09	2.14	4.29	2.65	0.53	1.04	0.2116
0.255	1.374	11.88	0.12	4.32	8.65	3.15	0.80	1.10	0.2885
0.301	1.959	14.22	0.14	6.93	13.85	3.54	1.06	1.14	0.3558
0.303	1.983	14.31	0.14	7.04	14.08	3.55	1.07	1.14	0.3583

For water depths greater than 0.3025 ft but less than 0.333 ft

Y2= Y - 0.3025
A3= $A2 + Y2 \cdot 14$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.303	1.990	14.31	0.14	7.08	14.16	3.56	1.08	1.14	0.3596
0.304	2.002	14.31	0.14	7.15	14.31	3.57	1.09	1.14	0.3619
0.305	2.022	14.31	0.14	7.27	14.54	3.60	1.10	1.15	0.3656
0.310	2.088	14.31	0.15	7.67	15.33	3.67	1.14	1.16	0.3777
0.313	2.123	14.32	0.15	7.88	15.76	3.71	1.16	1.17	0.3842
0.320	2.228	14.32	0.16	8.54	17.08	3.83	1.23	1.19	0.4037
0.324	2.282	14.33	0.16	8.89	17.78	3.90	1.26	1.21	0.4138
0.333	2.410	14.34	0.17	9.73	19.46	4.04	1.34	1.23	0.4375

For water depths greater than 0.333 ft but less than 0.513 ft

Y3= Y - 0.333
A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$
P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.335	2.438	14.44	0.17	9.87	19.74	4.05	1.36	1.23	0.4402
0.360	2.807	15.69	0.18	11.82	23.63	4.21	1.52	1.24	0.4747
0.380	3.123	16.69	0.19	13.54	27.09	4.34	1.65	1.24	0.5029
0.420	3.809	18.67	0.20	17.50	35.01	4.59	1.93	1.25	0.5611
0.460	4.597	20.70	0.22	22.35	44.69	4.86	2.24	1.26	0.6234
0.504	5.535	22.89	0.24	28.48	56.95	5.15	2.59	1.28	0.6926
0.513	5.740	23.34	0.25	29.87	59.73	5.20	2.67	1.28	0.7071

Street Capacity Calculations

AP-4 with Q=26.89 cfs
28' F-F Street Section with 8" curb
Slope= 1.00%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.25	0.00	0.43	0.003
0.02	0.00	0.34	0.01	0.00	0.00	0.39	0.01	0.48	0.007
0.04	0.01	0.68	0.02	0.01	0.02	0.62	0.02	0.54	0.017
0.06	0.03	1.02	0.03	0.02	0.05	0.81	0.05	0.58	0.028
0.08	0.05	1.36	0.04	0.05	0.10	0.98	0.08	0.61	0.040
0.1	0.08	1.70	0.05	0.09	0.18	1.14	0.11	0.63	0.053
0.12	0.12	2.04	0.06	0.15	0.30	1.29	0.15	0.65	0.066
0.125	0.13	2.13	0.06	0.17	0.33	1.32	0.17	0.66	0.070

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.18	0.35	1.29	0.17	0.63	0.068
0.16	0.23	3.91	0.06	0.29	0.59	1.30	0.21	0.57	0.073
0.2	0.42	5.95	0.07	0.62	1.23	1.48	0.30	0.58	0.093
0.24	0.69	8.00	0.09	1.17	2.33	1.70	0.41	0.61	0.120
0.28	1.04	10.04	0.10	1.99	3.98	1.92	0.54	0.64	0.150
0.32	1.47	12.08	0.12	3.14	6.28	2.14	0.69	0.67	0.182
0.34	1.71	13.10	0.13	3.85	7.70	2.25	0.77	0.68	0.199
0.365	2.05	14.37	0.14	4.87	9.74	2.38	0.87	0.69	0.220

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2 \cdot 14$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.12	14.38	0.15	5.15	10.30	2.44	0.90	0.71	0.228
0.4	2.54	14.41	0.18	6.96	13.92	2.74	1.10	0.76	0.277
0.45	3.24	14.46	0.22	10.42	20.85	3.22	1.45	0.85	0.359
0.488	3.77	14.49	0.26	13.44	26.89	3.56	1.74	0.90	0.423
0.54	4.50	14.55	0.31	17.96	35.92	4.00	2.16	0.96	0.510
0.58	5.06	14.59	0.35	21.80	43.60	4.31	2.50	1.00	0.578
0.63	5.76	14.64	0.39	27.00	54.00	4.69	2.96	1.04	0.665
0.667	6.27	14.67	0.43	31.12	62.24	4.96	3.31	1.07	0.730

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667
A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$
P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	32.85	65.70	4.86	3.40	1.02	0.722
0.72	7.09	17.32	0.41	34.12	68.25	4.82	3.47	1.00	0.720
0.74	7.43	18.32	0.41	35.57	71.13	4.79	3.54	0.98	0.721
0.76	7.79	19.32	0.40	37.17	74.34	4.77	3.63	0.96	0.724
0.78	8.17	20.32	0.40	38.93	77.86	4.76	3.71	0.95	0.729
0.8	8.58	21.32	0.40	40.85	81.71	4.76	3.81	0.94	0.735
0.847	9.60	23.68	0.41	46.00	91.99	4.79	4.06	0.92	0.754

Street Capacity Calculations

AP-7 with Q=51.41 cfs
40' F-F Street Section with 8" curb
Slope= 1.71%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.32	0.00	0.56	0.004
0.02	0.00	0.34	0.01	0.00	0.00	0.51	0.01	0.63	0.011
0.04	0.01	0.68	0.02	0.01	0.02	0.81	0.03	0.71	0.025
0.06	0.03	1.02	0.03	0.03	0.06	1.06	0.06	0.76	0.041
0.08	0.05	1.36	0.04	0.07	0.13	1.28	0.10	0.80	0.059
0.1	0.08	1.70	0.05	0.12	0.24	1.49	0.15	0.83	0.077
0.12	0.12	2.04	0.06	0.19	0.39	1.68	0.20	0.85	0.097
0.125	0.13	2.13	0.06	0.22	0.43	1.73	0.22	0.86	0.102

For water depths greater than 0.125 ft but less than 0.485 ft

Y1= Y-0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.23	0.46	1.69	0.22	0.83	0.100
0.18	0.31	4.93	0.06	0.56	1.12	1.81	0.33	0.75	0.121
0.23	0.61	7.48	0.08	1.31	2.63	2.15	0.49	0.79	0.167
0.28	1.04	10.04	0.10	2.60	5.21	2.51	0.70	0.84	0.220
0.33	1.59	12.59	0.13	4.55	9.11	2.87	0.95	0.88	0.278
0.37	2.14	14.71	0.15	6.76	13.52	3.16	1.17	0.91	0.329
0.42	2.89	17.18	0.17	10.07	20.14	3.48	1.46	0.95	0.391
0.485	4.09	20.49	0.20	15.93	31.87	3.90	1.89	0.99	0.477

For water depths greater than 0.485 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2 \cdot 20$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.485	4.09	20.49	0.20	15.93	31.87	3.90	1.89	0.99	0.477
0.510	4.59	20.52	0.22	19.30	38.60	4.21	2.15	1.04	0.536
0.535	5.09	20.54	0.25	22.91	45.83	4.51	2.41	1.09	0.596
0.553	5.45	20.56	0.27	25.71	51.41	4.72	2.61	1.12	0.640
0.585	6.09	20.59	0.30	30.86	61.72	5.07	2.97	1.17	0.717
0.610	6.59	20.62	0.32	35.17	70.34	5.34	3.26	1.21	0.778
0.635	7.09	20.64	0.34	39.70	79.40	5.60	3.56	1.24	0.840
0.667	7.73	20.67	0.37	45.81	91.62	5.93	3.96	1.28	0.919

Street Capacity Calculations

AP-8 with Q=37.89 cfs
40' F-F Street Section with 8" curb
Slope= 0.92%

For water depths less than 0.125 feet

Y= Water depth
Area = $8 \cdot Y^2$
P= $\text{SQRT}(257 \cdot Y^2) + Y$
n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.24	0.00	0.41	0.003
0.02	0.00	0.34	0.01	0.00	0.00	0.37	0.01	0.47	0.007
0.04	0.01	0.68	0.02	0.01	0.02	0.59	0.02	0.52	0.016
0.06	0.03	1.02	0.03	0.02	0.04	0.78	0.05	0.56	0.026
0.08	0.05	1.36	0.04	0.05	0.10	0.94	0.08	0.59	0.037
0.1	0.08	1.70	0.05	0.09	0.17	1.09	0.11	0.61	0.049
0.12	0.12	2.04	0.06	0.14	0.28	1.23	0.15	0.63	0.062
0.125	0.13	2.13	0.06	0.16	0.32	1.27	0.16	0.63	0.065

For water depths greater than 0.125 ft but less than 0.485 ft

Y1= Y-0.125
A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.17	0.34	1.24	0.16	0.61	0.064
0.18	0.31	4.93	0.06	0.41	0.82	1.33	0.24	0.55	0.077
0.23	0.61	7.48	0.08	0.96	1.93	1.58	0.36	0.58	0.106
0.28	1.04	10.04	0.10	1.91	3.82	1.84	0.52	0.61	0.141
0.33	1.59	12.59	0.13	3.34	6.68	2.11	0.70	0.65	0.179
0.37	2.14	14.71	0.15	4.96	9.92	2.32	0.86	0.67	0.212
0.42	2.89	17.18	0.17	7.39	14.77	2.56	1.07	0.69	0.253
0.485	4.09	20.49	0.20	11.69	23.37	2.86	1.39	0.72	0.310

For water depths greater than 0.485 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2 \cdot 20$
P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.485	4.09	20.49	0.20	11.69	23.37	2.86	1.39	0.72	0.310
0.510	4.59	20.52	0.22	14.16	28.31	3.09	1.57	0.76	0.351
0.554	5.47	20.56	0.27	18.95	37.89	3.47	1.92	0.82	0.423
0.560	5.59	20.57	0.27	19.64	39.27	3.52	1.97	0.83	0.433
0.585	6.09	20.59	0.30	22.63	45.27	3.72	2.18	0.86	0.474
0.610	6.59	20.62	0.32	25.80	51.59	3.92	2.39	0.88	0.516
0.635	7.09	20.64	0.34	29.12	58.24	4.11	2.61	0.91	0.558
0.667	7.73	20.67	0.37	33.60	67.20	4.35	2.90	0.94	0.613

Street Capacity Calculations

AP-9 with Q=18.87 cfs
40' F-F Street Section with 8" curb
Slope= 0.92%

For water depths less than 0.125 feet

Y= Water depth
 Area = $8 \cdot Y^2$
 P= $\text{SQRT}(257 \cdot Y^2) + Y$
 n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.24	0.00	0.41	0.003
0.02	0.00	0.34	0.01	0.00	0.00	0.37	0.01	0.47	0.007
0.04	0.01	0.68	0.02	0.01	0.02	0.59	0.02	0.52	0.016
0.06	0.03	1.02	0.03	0.02	0.04	0.78	0.05	0.56	0.026
0.08	0.05	1.36	0.04	0.05	0.10	0.94	0.08	0.59	0.037
0.1	0.08	1.70	0.05	0.09	0.17	1.09	0.11	0.61	0.049
0.12	0.12	2.04	0.06	0.14	0.28	1.23	0.15	0.63	0.062
0.125	0.13	2.13	0.06	0.16	0.32	1.27	0.16	0.63	0.065

For water depths greater than 0.125 ft but less than 0.485 ft

Y1= Y-0.125
 A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
 P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.17	0.34	1.24	0.16	0.61	0.064
0.18	0.31	4.93	0.06	0.41	0.82	1.33	0.24	0.55	0.077
0.23	0.61	7.48	0.08	0.96	1.93	1.58	0.36	0.58	0.106
0.28	1.04	10.04	0.10	1.91	3.82	1.84	0.52	0.61	0.141
0.33	1.59	12.59	0.13	3.34	6.68	2.11	0.70	0.65	0.179
0.37	2.14	14.71	0.15	4.96	9.92	2.32	0.86	0.67	0.212
0.45	3.48	18.88	0.18	9.43	18.87	2.71	1.23	0.71	0.282
0.485	4.09	20.49	0.20	11.69	23.37	2.86	1.39	0.72	0.310

For water depths greater than 0.485 ft but less than 0.667 ft

Y2= Y - 0.365
 A3= $A2 + Y2 \cdot 20$
 P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.485	4.09	20.49	0.20	11.69	23.37	2.86	1.39	0.72	0.310
0.510	4.59	20.52	0.22	14.16	28.31	3.09	1.57	0.76	0.351
0.535	5.09	20.54	0.25	16.81	33.62	3.31	1.77	0.80	0.392
0.560	5.59	20.57	0.27	19.64	39.27	3.52	1.97	0.83	0.433
0.585	6.09	20.59	0.30	22.63	45.27	3.72	2.18	0.86	0.474
0.610	6.59	20.62	0.32	25.80	51.59	3.92	2.39	0.88	0.516
0.635	7.09	20.64	0.34	29.12	58.24	4.11	2.61	0.91	0.558
0.667	7.73	20.67	0.37	33.60	67.20	4.35	2.90	0.94	0.613

Street Capacity Calculations

AP-10 with Q=20.64 cfs
40' F-F Street Section with 8" curb
Slope= 1.34%

For water depths less than 0.125 feet

Y= Water depth
 Area = $8 \cdot Y^2$
 P= $\text{SQRT}(257 \cdot Y^2) + Y$
 n= 0.017

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.28	0.00	0.50	0.004
0.02	0.00	0.34	0.01	0.00	0.00	0.45	0.01	0.56	0.009
0.04	0.01	0.68	0.02	0.01	0.02	0.72	0.03	0.63	0.021
0.06	0.03	1.02	0.03	0.03	0.05	0.94	0.06	0.67	0.035
0.08	0.05	1.36	0.04	0.06	0.12	1.14	0.09	0.71	0.049
0.1	0.08	1.70	0.05	0.11	0.21	1.32	0.13	0.73	0.065
0.12	0.12	2.04	0.06	0.17	0.34	1.49	0.18	0.76	0.082
0.125	0.13	2.13	0.06	0.19	0.38	1.53	0.19	0.76	0.086

For water depths greater than 0.125 ft but less than 0.485 ft

Y1= Y-0.125
 A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
 P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.20	0.41	1.50	0.19	0.73	0.084
0.18	0.31	4.93	0.06	0.50	0.99	1.60	0.29	0.67	0.102
0.23	0.61	7.48	0.08	1.16	2.32	1.90	0.44	0.70	0.140
0.28	1.04	10.04	0.10	2.31	4.61	2.23	0.62	0.74	0.185
0.33	1.59	12.59	0.13	4.03	8.06	2.54	0.84	0.78	0.235
0.37	2.14	14.71	0.15	5.98	11.97	2.80	1.04	0.81	0.278
0.44	3.23	18.17	0.18	10.32	20.64	3.20	1.41	0.85	0.352
0.485	4.09	20.49	0.20	14.11	28.21	3.45	1.67	0.87	0.404

For water depths greater than 0.485 ft but less than 0.667 ft

Y2= Y - 0.365
 A3= $A2 + Y2 \cdot 20$
 P3= $P2 + Y2$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.485	4.09	20.49	0.20	14.11	28.21	3.45	1.67	0.87	0.404
0.510	4.59	20.52	0.22	17.08	34.17	3.73	1.90	0.92	0.456
0.535	5.09	20.54	0.25	20.28	40.57	3.99	2.13	0.96	0.507
0.560	5.59	20.57	0.27	23.70	47.40	4.24	2.38	1.00	0.559
0.585	6.09	20.59	0.30	27.32	54.63	4.49	2.63	1.03	0.612
0.610	6.59	20.62	0.32	31.13	62.27	4.73	2.88	1.07	0.665
0.635	7.09	20.64	0.34	35.14	70.29	4.96	3.15	1.10	0.718
0.667	7.73	20.67	0.37	40.55	81.10	5.25	3.50	1.13	0.786

MESA REPRO

DEVELOPMENT & BUILDING SERVICE CENTER

ONE STOP

600 SECOND ST. N.W./2ND FLOOR

ATTENTION: 11ERR1

505-924-3900

Records Withdrawal Form

Project No. 19-074

Date: 9/13/2001

Project Title: DESERT PINE SUBDIVISION

a. File b. Mylars c. Redlines/Comments
d. Other DRAINAGE REPORT & PLAN

Requested By: D. Colucci Phone No.: 794-6080

Company DRAINAGE
Comments: 1 COPY OF REPORT & PLAN

Anticipated Return Date: 9/14/2001

Receipt Acknowledged

I here by accept full responsibility for the security of the above noted records/plans until return receipt acknowledgement is completed. Records/plans will be returned to the Development & Building Services Center on or before the indicated anticipated return date.

Delivery Picked Up By:

Name: Pascual Alcantar
Print

Organization: Mesa Reprographics

Signed: Pascual Alcantar
Phone No. 262-2046

Date: 9-14-01

Return Acknowledged

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Received by: R. HERBERT
Print



Date: _____