

222e Hamman  
9/11/14

- DMP may need to be amended to accommodate "first flush".

- Need contact @ High Desert HOA.

- Plat states that HOA needs to review plans & (don't see on Prelim plat. on Final?)

Determine  
→

- Fred Aguirre said to submit engineers certificate every        ? lots. (?) (per Kevin Patton)

per report:

- Unit 1, developed sim. to "Estate Type" subdivisions -

- Have private cross lot drainage easements.

- Each lot required separate G&D plan.

- Submitted to & Approved by High Desert Residential Owners Assoc. New Const Committee.

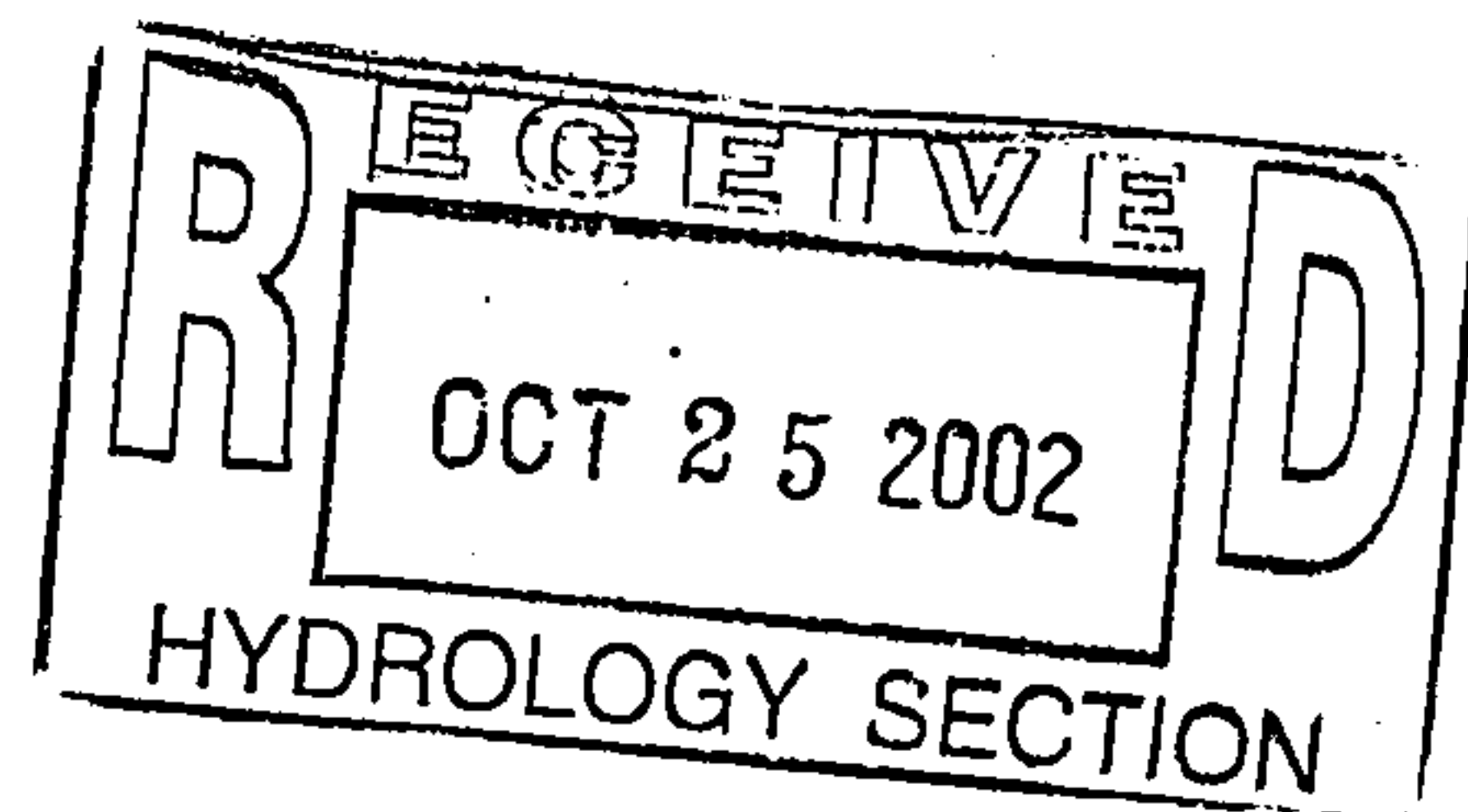
see #23D610'

DRAINAGE REPORT  
FOR  
TRACT 13 AT HIGH DESERT

OCTOBER 25, 2002

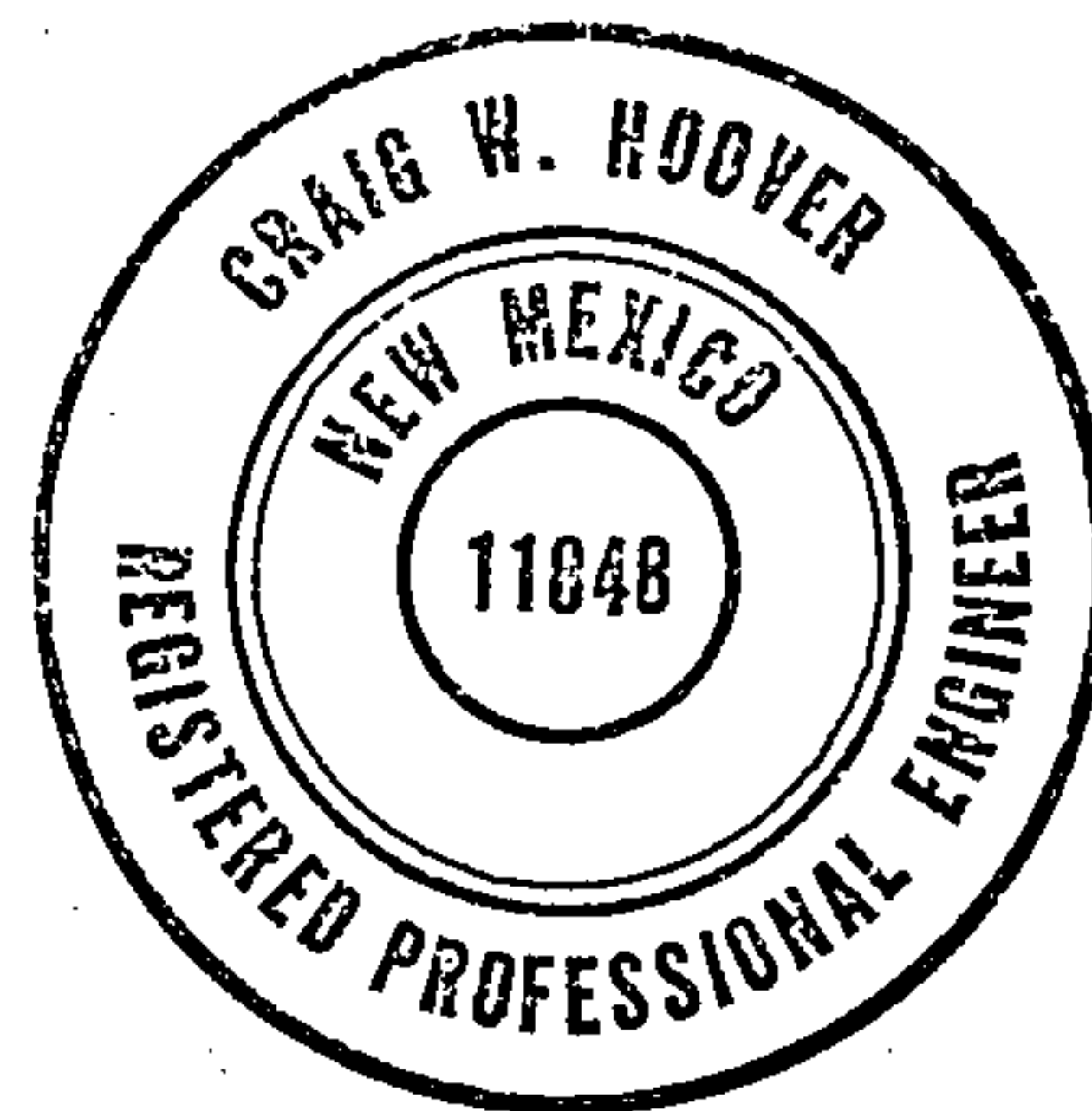
PREPARED BY:

BOHANNAN HUSTON, INC.  
COURTYARD I  
7500 JEFFERSON STREET NE  
ALBUQUERQUE, NM 87109



PREPARED FOR:

HIGH DESERT INVESTMENT CORPORATION  
13000 ACADEMY ROAD NE  
ALBUQUERQUE, NM. 87111



ARROYO ANALYSIS PREPARED BY:

Craig W. Hoover 10/25/02  
Craig W. Hoover, P.E. Date



UNIT 1 PREPARED BY:

Kevin G. Patton 10.25.02  
Kevin G. Patton, P.E. Date

UNITS 2 & 3 PREPARED BY:

Scott Steffen 10/25/02  
Scott Steffen, P.E. Date

## TABLE OF CONTENTS

|                                                                        | Page |
|------------------------------------------------------------------------|------|
| I. INTRODUCTION.....                                                   | 1    |
| II. PURPOSE.....                                                       | 2    |
| III. METHODOLOGIES .....                                               | 3    |
| A. Unit 1                                                              |      |
| B. Hydrology                                                           |      |
| C. Sediment Bulking                                                    |      |
| D. Hydraulic Analysis                                                  |      |
| E. Prudent Lines                                                       |      |
| F. Equilibrium Slope                                                   |      |
| IV. PRUDENT LINES .....                                                | 8    |
| A. Bear Canyon Arroyo                                                  |      |
| B. Tributaries                                                         |      |
| C. Embudito Arroyo                                                     |      |
| V. FEMA FLOODPLAINS.....                                               | 9    |
| A. Bear Canyon Arroyo                                                  |      |
| B. Tributaries                                                         |      |
| C. Embudito Arroyo                                                     |      |
| D. Nationwide 404 Permits                                              |      |
| VI. SUMMARY OF THE RELATED PLATTING AND EASEMENTS .....                | 11   |
| A. Vacation and Relocate High Desert Place ROW in Bear Canyon Arroyo   |      |
| B. Vacation of Existing Temporary Waterline and Construction Easements |      |
| C. Vacation of Existing Floating Desiltation Pond Easement             |      |
| D. AMAFCA Prudent Line Easements                                       |      |
| VII. EXISTING HYDROLOGIC AND SITE DRAINAGE CONDITIONS .....            | 13   |

|       |                                                                                   |    |
|-------|-----------------------------------------------------------------------------------|----|
| VIII. | DEVELOPED HYDROLOGICAL AND HYDRAULIC CONDITIONS .....                             | 14 |
|       | A. High Desert Place Bridge Crossing & Channel Improvements at Bear Canyon Arroyo |    |
|       | B. Embudito Arroyo - Northern Bank Improvements                                   |    |
|       | C. Unit 1                                                                         |    |
|       | 1. Estate Type Cross-lot Drainage & Building Envelopes                            |    |
|       | 2. Proposed Conditions                                                            |    |
|       | 3. Offsite Basins                                                                 |    |
|       | 4. Culvert Crossings                                                              |    |
|       | D. Units 2 & 3                                                                    |    |
|       | 1. Unit 2                                                                         |    |
|       | a. On-site Basins                                                                 |    |
|       | 2. Unit 3                                                                         |    |
|       | a. Offsite Basins                                                                 |    |
|       | b. On-site Basins                                                                 |    |
|       | 3. High Desert Street                                                             |    |
| IX.   | CONCLUSION .....                                                                  | 29 |

## APPENDICES

APPENDIX A: LOCATION MAP

### UNIT 1

APPENDIX B: ROADWAY CROSS-SECTION

APPENDIX C: BASIN SUMMARIES

APPENDIX D: LOT CHARACTERISTICS

APPENDIX E: CULVERT ANALYSIS

APPENDIX F: STREET HYDRAULICS / INLET ANALYSIS FOR HIGH DESERT PLACE

APPENDIX G: POND ANALYSIS

APPENDIX H: NATIONWIDE 404 PERMIT CORRESPONDENCE

APPENDIX I: BEAR CANYON & EMBUDITO ARROYO HYDROLOGY

APPENDIX J: PRUDENT LINE CALCULATIONS

APPENDIX K: BEAR CANYON & EMBUDITO ARROYO HYDRAULIC ANALYSIS

- EMBUDITO ARROYO EQUILIBRIUM SLOPE CALCULATIONS
- BEAR CANYON HEC-RAS
- BEAR CANYON RIPRAP ELEVATION REQUIREMENTS
- EMBUDITO HEC-RAS
- EMBUDITO RIPRAP ELEVATION REQUIREMENTS
- EMBUDITO ARROYO DROP STRUCTURE SKETCHES

### UNITS 2 & 3

APPENDIX L: AHYMO INPUT, OUTPUT FILES

APPENDIX M: STREET HYDRAULICS/ INLET CAPACITY ANALYSIS

APPENDIX N: SEDIMENTATION POND ANALYSIS

## EXHIBITS

- EXHIBIT 1: EXISTING DRAINAGE BASINS MAP – DMP
- EXHIBIT 2: 1995 PRUDENT LINE MAP
- EXHIBIT 3: REVISED PRUDENT LINE MAP
- EXHIBIT 4: EXISTING FEMA FLOODPLAIN MAP
- EXHIBIT 5: BULK LAND PLAT
- EXHIBIT 6: PRELIMINARY PLAT
- EXHIBIT 7: DETAILED REVISED PRUDENT LINE MAP
- EXHIBIT 8: PROPOSED BEAR CANYON ARROYO IMPROVEMENTS
- EXHIBIT 9: EMBUDITO ARROYO CROSS-SECTIONS
- EXHIBIT 10: PROPOSED EMBUDITO ARROYO IMPROVEMENTS
- EXHIBIT 11: PROPOSED DRAINAGE BASINS MAP – UNIT 1
- EXHIBIT 12: GRADING AND DRAINAGE PLAN – UNIT 1
- EXHIBIT 13: PROPOSED DRAINAGE BASINS MAP – UNITS 2 & 3
- EXHIBIT 14: GRADING AND DRAINAGE PLAN – UNITS 2 & 3

## I. INTRODUCTION

This report pertains to the development of Tract 13 at High Desert.

For location of the site, please refer to the vicinity map on the grading and drainage plan enclosed with this report.

The site is located north of Glenwood Hills and the Trailhead Subdivision, south of High Desert Open Space Tracts OS-2 and OS-3, and the Michial Emery Bear Canyon Trailhead parking lot, west of the Cibola National Forest and City Open Space Tract (Tract OS-5). The site is zoned SU-2 HD/R-R and is approximately 72.73 acres in size. Access to the site will be provided from High Desert Place.

The High Desert Development is bound by an approved City of Albuquerque and Bernalillo County Sector Development Plan. All of Tract 13 is located outside of the Design Overlay Boundary. The development of Tract 13 is broken into four units. Units 1, 2 and 3 are proposed as a part of this preliminary plat. Unit 4, located at the southeast corner of Tract 13, will be left as a vacant parcel to be developed at a later date and therefore is not a part of this submittal.

Unit 1 of Tract 13 will be developed in a manner similar to past "Estate Type" Subdivisions. The development will consist of building envelopes sited on the existing terrain. As with past "Estate Type" developments, this site will be encompassed by a private cross-lot drainage easement located outside of the building envelopes, public roadways and the existing AMAFCA easements. This private cross-lot easement allows storm water to generally take its natural course across the existing topography. Each lot owner is required to provide a separate, individual grading and drainage plan, stamped and certified by a New Mexico Professional Engineer. The individual lot grading and drainage plan is submitted to and approved by the High Desert Residential Owners Association New Construction Committee.

The roadways, which will serve the internal lots, are designed (as closely as possible) to follow the natural topography in order to permit the storm water to maintain its natural course. Similar to previous "Estate Type" developments, the roadways within Tract 13 Unit 1 will construct estate-type curb and gutters that will allow the storm water to pass over the roadways without trapping or redirecting the storm water. There are some cases where it was not possible to match existing terrain because the existing terrain exceeds the allowable design criteria. In these instance, standard curb and gutter or roll curb and some storm drain is necessary to redirect the flow.

Units 2 & 3 are mass graded sites where curb and gutter and storm drain will be used to convey the flows to ponds and ultimately to the existing arroyos.

## II. PURPOSE

The purpose of this report is to provide site-specific drainage analysis for existing and proposed conditions in the residential development, referred to as Tract 13 Unit 1, 2 & 3. This plan is prepared and submitted to support rough grading, infrastructure design, preliminary and final plat approvals.

This report will reference the following City of Albuquerque and the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) approved studies prepared for the High Desert Development: 1) the High Desert Drainage Management Master Plan, dated December 1993; 2) the High Desert - Phase II Prudent Line Analysis, date August 1995; and 3) the High Desert Subdivision LOMR-Forms and Floodplain Maps, date January 1999.

The High Desert Drainage Management Master Plan, dated December 1993, was prepared to support future drainage plans submitted for the development of individual land parcels within High Desert and to provide design guidance for the design of primary drainage infrastructure to be constructed by High Desert in advance of or simultaneously with individual parcel development. In addition, it provides fully developed flow rates for basins that influence the "Estate Type" Subdivisions in the High Desert Development.

The High Desert – Phase II Prudent Line Analysis, dated August 1995 establishes prudent lines for Bear Canyon. The report establishes prudent lines from fully developed flow rates of the basins influencing the "Estate Type" Subdivisions in the High Desert Development.

The High Desert Subdivision LOMR-Forms and Floodplain Maps, date January 1999 shows the presence of any flood plain within High Desert.

### **III. METHODOLOGIES**

We have included in this report those necessary exhibits and appendices from past approved reports mentioned above to support this development. Refer to the above referenced reports for the specific methodologies used in preparing those individual reports or plans.

#### **A. Unit 1**

Site conditions are analyzed for 100-year, 6-hour storm events in accordance with the City of Albuquerque Drainage Ordinance and the Development Process Manual (DPM), Volume 2, Design Criteria, Section 22.2, Hydrology for the City of Albuquerque, January 1993. The modified rational method contained within this edition of the Development Process Manual (DPM) was utilized to determine the hydrologic discharges and volumes generated by this development.

Unit 1 is approximately 38.03 acres. Part A of the DPM, Section 22.2, which provides a simplified procedure for projects with sub-basins smaller than 40 acres, was used. This was used for a more detailed analysis where the smaller flows would directly impact onsite infrastructure. For major flows that impact infrastructure, i.e. culverts, the High Desert Phase II – Prudent Analysis was used which uses AHYMO.

#### **B. Hydrology**

The initial hydrology for project area watersheds was presented in the High Desert DMMP and was based on the City's Development Process Manual (DPM), Chapter 22, as

revised January 1991. Both AMAFCA and the City have approved the High Desert DMMP.

For purposes of this study, only proposed development conditions are modeled. Storm runoff volumes and flow rates were determined using the hydrologic computer program (HYMO) as modified for the AMAFCA/Albuquerque region (AHYMO) and using the Rational Method (for basins within Tract 13). The hydrologic analysis analyzed the 100-year 6-hour storm event in accordance with the City of Albuquerque Drainage Ordinance and the DPM, Volume 2, Design Criteria, Section 22.2, Hydrology for the City of Albuquerque, January 1993.

The rainfall input is the same as was used within the High Desert DMMP and are as follow:

Rain One (1 hour- 100 year) 2.23 inches

Rain Six (6 hour- 100 year) 2.90 inches

Rain Day (24 hour- 100 year) 3.65 inches

Area reduction factors were not applied since the overall combined area of the watersheds is less than 5 square miles.

### **Bear Canyon Arroyo**

The High Desert DMMP established two basins for the Bear Canyon Arroyo. These basins were further subdivided with the Bear Canyon Crossing Feasibility Study, February 19, 2002 by Bohannon Huston Inc. to provide a more accurate estimation of the 100-year flow rate at the location of the proposed bridge crossing. The hydrology from the City and AMAFCA approved Feasibility Study is incorporated into this report in Appendix H.

### **Tributaries**

There are a number of small tributary arroyos (tributary to the Bear Canyon) located upstream and within Tract 13 between the Bear Canyon Arroyo and the

Embudito Arroyo. For these arroyos the hydrology developed as part of the High Desert – Phase 2 Prudent Line Analysis, June 1995 was used

### **Embudito Arroyo**

Similar to the Bear Canyon Arroyo the High Desert DMMP established two basins for the Embudito Arroyo. These basins were subdivided to allow determination of the 100-year flow rate adjacent to Tract 13 (corresponding to the west boundary of the existing Trailhead subdivision on the south side of the arroyo). Appendix H presents the hydrologic model for the Embudito Arroyo.

## **C. Sediment Bulking**

A sediment-bulking factor of 10%, taken from the High Desert DMMP, is being used for undeveloped areas and estate development. (Refer to High Desert DMMP for additional sediment bulking information).

## **D. Hydraulic Analysis**

Hydraulic analysis methods consist of using standard design methods outlined in the DPM, Section 22. Culverts are analyzed using, the "Drainage Structure Analyzer" within the Storm and Sanitary Software by Bentley. This software allows analysis of culverts considering both inlet and outlet control and determines the necessary headwater to pass the design flow rate. The arroyos are analyzed using HEC-RAS to determine the water surface profile within the arroyo.

### **Bear Canyon Arroyo**

The HEC-RAS model created as part the Bear Canyon Crossing Feasibility Study, February 19, 2002 by Bohannon Huston Inc. has been modified with this report to reflect refinements to the channel geometry at the proposed bridge crossing. The cross section width at the bridge was not revised and the model shows that the final design maintains 3' of freeboard from the water surface elevation to the low chord on the upstream side of the bridge. Additionally, the HEC-RAS model

establishes the upstream and downstream water surface elevations. These elevations then in turn are used to set the profile of the top of riprap for the proposed bank protection associated with the bridge. The top of riprap elevation is being set to provide a minimum of 2' of freeboard. The HEC-RAS model for the Bear Canyon Arroyo is included in Appendix J.

### **Tributaries**

Three roadway crossings using culvert pipes are proposed to accommodate and provide access to the lots within Tract 13. At each culvert crossing, the culverts have been sized to ensure that the 100-year headwater depth required to pass the flow does not overtop the roadway.

### **Embudito Arroyo**

A HEC-RAS model has also been created for the Embudito Arroyo to determine the 100-year water surface elevation. Based on the water surface elevation the proposed north bank protection profile will be set to provide a minimum of 2' of freeboard. The HEC-RAS model for the Embudito Arroyo is included in Appendix K.

## **E. Prudent Lines**

Prudent lines for the arroyos in the vicinity of Tract 13 were established in 1995 as part of the High Desert – Phase 2 Prudent Line Analysis, June 1995. The building envelopes in Tract 13 are not located within the prudent lines. The report was reviewed and approved by AMAFCA. As part of this report prudent lines (or maximum erosion envelope limits) were established for the Bear Canyon and Embudito arroyos and the tributary arroyos within Tract 13. See Exhibit 2 – 1995 Prudent Line Map.

The 1995 study utilized two methods for establishing the arroyo prudent lines, the approximate maximum erosion method and the erosion rate method. The first method is based on fundamental assumptions that a typical bend will have the approximate shape of

a sine-generated curve and the meander wavelength for natural channels (including arroyos) is usually in the range of 10 to 14 channel widths. The method is also based on field observations that indicated the lateral erosion rate for a bend reduces markedly when the ratio of the radius of curvature to width reaches a value of 2 to, which corresponds to a sinuosity of 1.5. Thus, the maximum offset from a straight channel will generally be 2.5 to 3.5 times the channel width depending on the assumed meander wavelength. This method was used for the Tributary Arroyos and the Embudito Arroyo. The second method requires more field data and the development of a hydraulic model (such as a HEC-RAS model) to estimate sediment transport capacity on a reach-by-reach basis. The Bear Canyon Arroyo was analyzed using this method. Additional details on both methods are provided the High Desert – Phase 2 Prudent Line Analysis, June 1995 and in the AMAFCA "Sediment and Erosion Design Guide."

As part of this study the prudent lines are being revised to reflect adjustments to the prudent line that will result from the proposed infrastructure improvements. Where bank protection is proposed the prudent line will be confined to within the bank protection. Similarly, the culverts at the roadway crossings (3) within Unit 1 will constrict the prudent line. Upstream and downstream of the ends of the bank protection and the culverts the prudent line transitioning from confined line to the original unconfined line will be established using Figure 3-76 from the AMAFCA Sediment and Erosion Design Guide. See Appendix I.

## **F. Equilibrium Slope**

To ensure adequate long-term scour protection for the proposed improvements along the Bear Canyon and Embudito Arroyos an arroyo equilibrium slope analysis was prepared for each arroyo. The Bear Canyon Analysis was completed as part of the Bear Canyon Crossing Feasibility Study. Refer to this report for additional information. For the Embudito Arroyo the equilibrium analysis was completed as part of this study. For both arroyos the analysis was based on procedures contained in the AMAFCA Sediment and Erosion Design Guide.

#### **IV. PRUDENT LINES**

For purposes of this report the 1995 prudent lines were used as the starting point and then revised to account for the impacts of the proposed improvements.

##### **A. Bear Canyon**

The proposed improvements will have the greatest impact on the Bear Canyon Arroyo prudent line. With the construction of the proposed bridge as outlined in the Bear Canyon Crossing Feasibility Study and this report, the prudent line will be significantly reduced in width at and near the bridge crossing. Since the arroyo beneath the bridge will be contained in a hard lined channel section the prudent line by definition will follow the banks of the channel lining. Upstream and downstream of the bridge the prudent line will also be contained by the proposed bank protection. Beyond the limits of the arroyo improvements the arroyo will be free to meander and the prudent line will expand tying into the original prudent line established in 1995. The revised prudent lines for the Bear Canyon Arroyo are shown in Exhibit 3.

##### **B. Tributaries**

The tributary arroyo prudent lines will also be modified by roadway crossings. The southward extension of High Desert Place into Tract 13 will cross two arroyos (the Bear Arroyo and N. Branch Middle Arroyo) with existing established prudent lines. At the crossings, culverts will pass the runoff underneath the road. The culverts will also draw in the prudent line both upstream and downstream of the culvert as the flow is directed through the culvert. Similarly, Barranca Vista Place will cross the Bear Arroyo upstream of High Desert Place and the prudent line will be modified by the culvert crossing. See Exhibit 3 for the revised prudent lines.

The southern portion of Tract 13 (Units 2 and 3) will be mass graded filling in and removing flows from the upstream reach of the South Arroyo. This will eliminate the prudent line on this arroyo within Tract 13. See Exhibit 3.

### **C. *Embudito***

The High Desert Phase 2 Prudent Line Analysis, June 1995, proposed "construction of a bank improvement on the north bank" since the unconfined prudent line was approximately 150 feet outside (north of) the 100-year floodplain, see Exhibit 2. In accordance with this earlier study this report also proposes bank protection along the north bank of the arroyo adjacent to Tract 13. The proposed bank protection will be located immediately south of the property line. The bank protection will serve two purposes, it will control the prudent line thereby protecting the southern edge of Tract 13 and it will provide a space for a trail along the south side of the property line keeping with the City Parks and Open Space objectives for this area. Exhibit 3 shows the revised prudent line.

## **V. FEMA FLOODPLAIN**

FEMA Floodplains have been defined for a number of the arroyos adjacent to and within Tract 13. The property lines for Tract 13 acknowledge the flood plains and where the tract boundary borders an arroyo the property line is exactly concurrent with floodplain line. The proposed improvements will alter the existing floodplain along the Bear Canyon and Tributary Arroyos within Tract 13.

### **A. Bear Canyon**

The proposed bridge crossing and associated bank protection will significantly alter the existing flood along the Bear Canyon Arroyo. Consequently, a Conditional Letter of Map Revision (CLOMR) is being prepared (under a separate cover) to submit to FEMA to reflect the revised floodplain.

## **B. Tributaries (Culvert Crossings)**

Within Tract 13 the only existing floodplain is along the North and South Branches and main stem of the Bear Arroyo. See Exhibit 4. Two roadway crossings of this floodplain will alter the limits of the 100-year floodplain. These revisions to the flood plain are being included in the CLOMR being prepared for this project.

## **C. Embudito**

The proposed north bank protection will have a negligible impact on the existing FEMA floodplain for the Embudito Arroyo. As part of this study a HEC-RAS model was developed for the arroyo to determine the 100-year water surface elevation as necessary for the design of the proposed north bank protection. In development of this HEC-RAS model, it became apparent that the existing 100-year flood plain is narrower and notably south of the mapped flood plain. The significance of this fact lies in the resulting negligible impact of the proposed north bank protection on the actual arroyo flood plain. This is illustrated in the arroyo cross sections, Exhibit 9, that show the existing 100-year water surface, the proposed north bank protection the property line and the mapped flood plain (the same line since the south boundary of Tract 13 corresponds with the north edge of the mapped flood plain for the Embudito Arroyo). As can be seen in the cross sections for over 80 percent of the length of the proposed bank protection that will be fully buried wire tied riprap lies outside of (north of) the limits of the 100-year flow. Where a portion of the bank protection is within the 100-year flood plain (near the downstream end) the encroachment is minimal and will not substantially alter the 100-year water surface or the limits of the flood plain. Consequently, a FEMA map revision is not proposed for the Embudito Arroyo.

## **D. Nationwide 404 Permits**

As part of the due diligence concerning development of this parcel we contacted the Army Corps of Engineers concerning their Nationwide Permitting Requirements for roadway and utility crossing of the existing arroyos within this tract. Our understanding of

the regulations after meeting w/ the Army Corps of Engineers, determined that our crossings are regulated under Section 404 of the Clean Water Act and that a Department of the Army permit will be required for the road and utility crossings in jurisdictional waterways. Our understanding is that the roadway and utility crossings could be constructed under Nationwide Permit #12 – Utility Line Activities and Nationwide Permit #14 – Linear Transportation Crossings.

We will be submitting a permit application or description letter to the Army Corps of Engineers for each crossing. We will provide the City of Albuquerque a copy of our permits prior to obtaining work order approval.

For further information concerning the Nationwide 404 Permitting for this development, refer to the correspondence letters between Bohannon Huston and the Army Corps of Engineers in Appendix H of this report.

## **VI. SUMMARY OF THE RELATED PLATTING AND EASEMENTS**

Refer to a copy of the Recorded Bulk Land Plat enclosed in the Exhibit section of this report.

The High Desert Bulk Land Plat that was recorded in November of 1993 created Tracts 13, OS-2 and OS-3. As a part of this development we are requesting to vacate and relocate that portion of the High Desert Place Right-of-Way that separates Tracts OS-3 and OS-2. We are also requesting to vacate those existing waterline, floating desiltation basin and AMAFCA easements that have been relocated or are no longer required.

As a part of developing Unit 1, High Desert Investment Corporation will provide a public drainage easement to the City of Albuquerque addressing cross-lot drainage within Unit 1. This easement is identical to the public drainage easement that was granted to the City with the past developments of the "Estate Type" Subdivisions at High Desert.

An existing recorded maintenance agreement; associated with the existing AMAFCA easements mentioned above, defines the different responsibilities required by AMAFCA and the Residential Owners Association. The revised prudent line analysis will require the addition of new AMAFCA easement as well as vacating those portions that are no longer required. The final plat will clearly identify all maintenance responsibilities for all arroyo and tributary easements.

**A. Vacation and Relocate High Desert Place ROW in Bear Canyon Arroyo**

Refer to the Preliminary Plat in Exhibit section of this report.

As a part of the planning and due diligence in developing this tract it was determined that we needed to relocate the existing roadway alignment so as to reduce the amount of impact we would have in crossing the Bear Canyon Arroyo. We have determined that the proposed alignment would produce the least amount of impact to the arroyo and vegetation in this area.

**B. Vacation of Existing Temporary Waterline and Construction Easements**

Refer to the Preliminary Plat in Exhibit section of this report.

There is an existing fifty-foot wide public waterline and access easement as well as a fifteen-foot and thirty-five foot wide temporary construction easement across Tracts 13 and OS-3 that are no longer required. These easements were granted in June of 1982. A separate alignment was created across Tracts 13 and OS-3 as a part of City Work Order Projects Phase 1-C-1 and Phase 1-C-2. The preliminary plat indicates the location of the existing waterlines and those easements the existing waterlines are located within. The June of 1982 easements mentioned above have already been vacated across Units 1 and 2 of the Overlook and Units 1, 2, and 2A of the Highlands Subdivisions. Therefore, this plat continues that process of vacating those easements which are no longer required.

### **C. Vacation of Existing Floating Desiltation Pond Easement**

Refer to the Preliminary Plat in Exhibit section of this report.

There is an existing Floating Desilting Basin Easement that was granted with the recorded Bulk Land Plat that straddles Tract OS-3 and what is now know as The Overlook Subdivision. This easement is no longer required and that portion that existed in the Overlook has already been vacated.

### **D. AMAFCA Prudent Line Easements**

In November of 1993 with the filing of the Plat of High Desert, the Albuquerque Academy, Inc. granted easements along the Bear Canyon Arroyo, Bear Canyon Tributary Arroyos and the Embudito Arroyo to AMAFCA and the High Desert Residential Owners Association. As part of the accompanying agreement among these parties it was stipulated that an additional easement to the prudent line would be granted to AMAFCA, at which time the maintenance responsibilities of AMAFCA will extend to the Prudent Line. With this report the Prudent lines are being revised and as such the limits of the easements and AMAFCA's maintenance responsibility are being modified. Based on these revised prudent lines (Exhibit 3) new easements for the above referenced arroyos have been defined as shown on the Preliminary Plat (Exhibit 6).

## **VII. EXISTING HYDROLOGIC AND SITE DRAINAGE CONDITIONS**

Vegetation consists primarily of native grasses and trees. Slopes in the project site range from 2% to 15%. The Soil Conservation Service has classified the soils on this site as Embudo-Tijeras complex, Embudo gravely fine sandy loam and Tijeras gravely fine sandy loam, all of which correspond to a common hydrological soil group classification B.

Please refer to the High Desert - Phase II Prudent Line Analysis, dated August 1995 and the Existing Drainage Conditions Map enclosed with this report.

The above reports provide existing and developed flow rates within the prudent lines from the surrounding area. This report will focus on the fully developed conditions, and how it will affect the proposed development within Tract 13. The Existing Drainage Conditions Map enclosed provides the reader with an idea of what has been platted outside of this proposed subdivision.

## **VIII. DEVELOPED HYDROLOGICAL AND HYDRAULIC CONDITIONS**

### **A. High Desert Place Bridge Crossing & Arroyo Improvements at the Bear Canyon Arroyo.**

As proposed in the Bear Canyon Crossing Feasibility Study access to Tract 13 will be provided via a bridge crossing the Bear Canyon Arroyo. The proposed crossing will be approximately 4,800 feet east of Tramway Boulevard. Bank protection and channel lining (in the immediate vicinity of the bridge) will be constructed to direct the flow under the bridge, protect the bridge from scour and protect the northern lots of Tract 13 that are adjacent to the arroyo in the vicinity of the bridge. See Exhibit 8.

The bridge crossing is designed to pass the 100-year flow of 4,510 cfs (see Appendix J) with 3 feet of freeboard. Underneath the bridge the arroyo will be lined with tinted concrete slope paving forming a 40 feet wide trapezoidal section with 2:1 (horizontal to vertical) side slopes. At the upstream edge of the bridge the invert of the arroyo is 6170.0, the water surface elevation is 6174.8 and the bridge low chord elevation is 6177.9. This configuration produces 3.1 feet of freeboard at the upstream edge of the bridge. See Appendix L for HEC-RAS model results.

Upstream and downstream of the bridge the concrete slope paving will be extended down to the scour depth to ensure the integrity of the structure and bridge. Downstream of the bridge a 60 feet long by 40 feet wide boulder plunge pool will be constructed across the bottom of the arroyo. This plunge pool will drop the flow 2' vertically to account for the long-term scour (see the Bear Canyon Crossing Feasibility Study for additional scour information). The plunge pool will also slow the water down

reducing the velocity from approximately 22 fps under the bridge to 11 fps at the downstream end of the boulders. This downstream velocity of 11 fps (arroyo station 9+20) matches the pre project flow velocity at this location.

Along the south bank additional bank protection is being extended both upstream and downstream of the bridge to ensure a smooth flow transition and protect the lots along the south side of the arroyo. This bank protection will be fully buried wire tied riprap. The riprap will extend upstream roughly 300' and tie into the prudent line. Downstream the riprap will extend 350' below the bridge. The earth cover over the riprap will be graded to match existing ground prior to construction and will also be reseeded to enhance revegetation of the slope. Appendix L includes a typical section for the riprap bank protection. The top of the riprap is being set at a minimum of 2 feet above the calculated 100-year water surface and is being extended down below the arroyo bed elevation to account for both long term and local scour. To minimize the footprint of disturbance (grading limits) the riprap section includes a 9 feet wide horizontal segment at the bottom. This portion is designed to fall down to the total scour depth as scour occurs along the bank protection. By using this "self launching riprap" the total width of the grading limits is reduced by 14 feet along the entire length of the bank protection.

## **B. Embudito Arroyo – North Bank Protection and Drop Structures**

Bank protection along the north bank of the arroyo adjacent to Tract 13 and two drop structures are proposed to control lateral migration and vertical erosion in the arroyo.

The bank protection will follow the approximate alignment identified in the High Desert – Phase 2 Prudent Line Analysis. Similar to the Bear Canyon Arroyo, the bank protection will consist of buried wire tied riprap on a 2:1 slope. Again the riprap section includes "self launching riprap" to reduce the area that will be disturbed during construction. In addition to controlling lateral migration of the arroyo, the bank protection is being configured to create a trail along the top of the north bank of the arroyo. This trail

link is in accordance with prior discussions with the City of Albuquerque Open Space and Parks and Recreation Departments. The City previously indicated the desire for a trail in this area and that the trail be located along the top of the bank rather than in the bottom of the arroyo. Cross sections illustrating the north bank protection are shown in Exhibit 9.

Based on evidence of degradation of the arroyo bottom and from the results of an equilibrium slope analysis, it is evident that vertical grade control structures are needed. Upon review of the anticipated long-term scour in a meeting with AMAFCA staff it was agreed that at the downstream end of the arroyo (within the project limits) a 6 feet tall drop structure would be constructed. In addition to controlling the grade of the arroyo this west drop structure will also protect the existing 36" and 16" waterlines running across the arroyo at this location. See Exhibit 10. A second structure, the east drop structure, is proposed immediately downstream of the proposed waterline crossing near the east end of Tract 13. This structure will have an effective height of 4 feet and will be located approximately 880 upstream of the west drop structure. In the future two additional 4 feet tall drop structures are planned roughly 250 feet and 530 feet upstream of the west drop structure. While these structures are not being constructed as part of this project, the long term scour design depth for the north bank protection assumes they will ultimately be constructed. The drop structures will consist of a gabion crest and dumped boulder plunge pool. See the sketches in Appendix L. A low flow notch in the crest, designed to pass the 2-year storm event will train the arroyo to the center. This will decrease the frequency of erosion along both the north and the south banks thereby reducing arroyo maintenance requirements.

what does  
the interim  
condition  
determine

Get letter  
of commitment  
from AMAFCA

### C. Unit 1

Refer to the High Desert Drainage Management Master Plan, dated December 1993 and the Grading and Drainage plan enclosed with this report.

#### 1. Cross-Lot Drainage and Building Envelopes

The site proposes to preserve the natural terrain while at the same time adhering to the City's Design Criteria found in the Development Process Manual.

The site, Tract 13 Unit 1, contains 27 lots on approximately 38.02 acres. Each lot contains a maximum building envelope of 12,000 square feet. As with past "Estate Type" Subdivisions, the site will be encompassed by a private cross-lot drainage easements located outside of the building envelopes, public roadways and the existing AMAFCA easements. This private cross-lot easement allows storm water to generally take its natural course across the existing topography. Each lot owner is required to provide a separate, individual grading and drainage plan, stamped and certified by a New Mexico Professional Engineer requiring each lot to safely manage upland storm water flows. The individual lot grading and drainage plan is submitted to and approved by the High Desert Residential Owners Association New Construction Committee (HDROA NCC). Building or non-native landscaping will not be permitted outside building envelopes. Before the HDROA NCC accepts each home, the lot owner is required to submit a copy of the approved grading and drainage plan certified by their engineer. This certified plan is reviewed by NCC for compliance with the Design Guidelines and approved drainage report for the site-specific subdivision.

The above referenced report (HDDMMP) has projected storm water runoff values for fully developed conditions within the High Desert Development in order to properly size downstream storm drainage structures. This report compares the projected land treatment percentages assumed in the above report with a more accurate estimate from our enclosed preliminary plat layout. The following results indicate approximately the same values with only negligible differences:

|                     | Land Treatment Types (%) |      |      |       | Peak Discharge |
|---------------------|--------------------------|------|------|-------|----------------|
|                     | A                        | B    | C    | D     | (cfs/acre)     |
| HDDMMP 1993         | 74.56                    | 0.00 | 8.28 | 17.15 | 2.64           |
| Tract 13 (Unit 1) * | 76.90                    | 4.63 | 0.00 | 18.47 | 2.80           |

In determining the land treatment percentages shown above, HDDMMP assumed 1 du/acre (Tract 13 has 0.71 du/acre) while this report calculated an

average building envelope of 12,000 square feet (.2755 AC) within an average lot size of 0.85 acres (50,617 SF). This report assumes that on average, at least 27% of the area within the building envelope will be landscaped (Land Treatment Type B) and 73% (or 8,760 SF) will be impervious (Land Treatment Type D).

## **2. Proposed Conditions**

Tract 13 Unit1 encompasses the northern portion of Tract 13. This unit will consist of 27 lots. The drainage associated with the development of Tract 13 Unit 1 will all flow into the Bear Canyon Arroyo, an existing AMAFCA easement.

The following basins directly impact High Desert Place and will be captured and redirected by standard curb and gutter and conveyed to low points in the street. Basin OS-2-R1 (2.28ac, Q100=5.71cfs) is a portion of the Bear Canyon Arroyo located just south of the Michial M. Emery Bear Canyon Trailhead Parking Lot. This flow will be impeded from its natural flow west by High Desert Place. High Desert Place has standard curb and gutter and will capture this flow and carry it downstream to a low point north of the bridge crossing where it will be discharged to a water-harvesting pond just west of the street. This is similar to the water harvesting pond that was constructed just north of here on High Desert Place. The pond was sized for the 2 year 6 hour storm event. Storms larger than this will flow over the pond and continue down the Bear Canyon Arroyo, within the existing drainage easement. See Appendix for design analysis of pond. Basin OS-2-R2 (0.38Ac, Q100=0.86cfs) is located on High Desert Place. This basin is bounded by the low point just downstream of the parking lot to the high point just inside the Tract 13 boundary. This flow will travel north along High Desert Place and be discharged into the same water harvesting pond as mentioned above.

Basin BCA-2C-R1 (0.71Ac, Q100=2.82cfs) is located at the intersection of High Desert Place and Barranca Vista Place. This basin will flow south and be

---

\* I believe that this is a conservative estimate due to the fact that the estimate did not take into account that each lot is required to manage storm water flows, using minor detention and water harvesting techniques, within this building envelope, thus reducing peak flow rates indicated above.

intercepted by roll curb and gutter at the entrance of Barranca Vista Place. This curb and gutter will carry the flow in High Desert Place and be carried downstream where it will be collected by an inlet. This inlet is located at a low point south of La Arista Place and connects to a 48" culvert. For more information on all culverts see the Culvert Section located within the Unit 1 Section of this report.

Basin BCA-2C-R2 (2.31Ac, Q100=8.61cfs) is located about the north knuckle off of High Desert Place. This basin contains half of Lots 1-4 and 18 is bounded Basin BCA-2C-R1 to the north and the low point south of La Arista Place to the south. This basin will be handled in the same respect as Basin BCA-2C-R1 where it will be collected by an inlet at the low point.

Basin BCA-2C-R5 (0.98Ac, Q100=4.74cfs) is located south of Basin BCA-2C-R2 and is bounded by the low point south of La Arista Place to the north and the highpoint south of Trail Vista Court to the south. This basin contains a portion of Lots 12 and 17. The flow within the basin generated by Lot 17 will flow south and be intercepted by roll curb and gutter at the intersection of Trail Vista Place. This flow will discharge into High Desert Place and be collected by an inlet at the low point south of La Arista Place.

Basin BCA-2C-R7 (.21Ac, Q100=1.05cfs) is just north of the Unit1/Unit 2 boundary line. It is bounded by a high point just south of La Arista Place to the north and the Unit1/Unit 2 boundary line to the south. The flow generated by this basin will continue south into Unit 2 where it will be collected by an inlet at the low point. For more information on this inlet and any storm drain associated with it refer to the Unit 2 & 3 Section of this report.

Basin BCA-2B (1) (7.77ac, Q100=21.50cfs) consists of the backyards of Lots 1-7,9,24-26 and all of Lot 8 and is bounded by the northern boundary of Tract 13. Flows generated by this basin will flow north to the existing Bear Canyon Arroyo.

Basin BCA-2C-R3 (4.23Ac, Q100=13.05) is bounded by Barranca Oso Court to the west, Barranca Vista Place and Basin BCA-2C-R4 to the south, Basin BCA-2B(1) to the north, and Basin OFF1 to the east. This basin includes half of the Lots 23-27. The flow generated by this basin, combined with Basin OFF1, will flow southwest under Barranca Vista Place via 3 – 36" culverts. Basin BCA-2C-R4 (11.08Ac, Q100=30.48cfs) is bounded by Basin BCA-2C-R3 and Barranca Vista Place to the north, High Desert Place to the west, Basin BCA-2C-R8 to the south, and Basin OFF2 to the east. The flow generated from this basin, combined with Basin BCA-2C-R3, OFF1, and OFF2, will flow west under High Desert Place via 4- 48" culverts. For total flows and design analysis for culverts see the Culvert Section under the Unit 1 section.

Basin BCA-2C-R8 (3.93Ac, Q100=9.95cfs) is bounded by High Desert Place to the west, Basin BCA-2C-R4 to the north, the Unit1/Unit2 boundary line to the south and Basin OFF3 to the east. The flow generated by this basin will flow west under High Desert Place via 2 – 48" culverts. See the Culvert Section in the Unit 1 section of this report for more information.

Basin BCA-2C-R6 (12.14Ac, Q100=30.64cfs) is bounded by High Desert Place to the east, Basin BCA-2B(1) to the north and the Unit1/Unit2 boundary line to the south. This basin contains portions of Lots 5-7 and 9, all of Lots 10 and 11, and all of La Arista Place the flow generated by this flow will continue west along its natural course down the Bear Canyon Arroyo.

### 3. *Offsite Basins*

There are three offsite basins, OFF1 (94.90Ac, Q100=224cfs), OFF2 (60.83Ac, Q100=210cfs), and OFF3 (7.95Ac, Q100=27.76cfs). OFF1 & OFF2 flows were determined by using the total flow calculated by using the High Desert Phase 2 – Prudent Line Analysis and subtracting the proposed onsite basin just downstream of each offsite basin. OFF3 was determined by the Rational Method.

$$\text{OFF 1} = \text{Total Flow (237cfs)} - \text{BCA-2C-R3 (13.05cfs)} = 224\text{cfs}$$

$$\text{OFF 2} = \text{Total Flow (240cfs)} - \text{BCA-2C-R4 (30.48cfs)} = 210\text{cfs}$$

$$\text{OFF 3} = 28\text{cfs}$$

### 4. *Culvert Crossings*

There will be three culvert crossings as mentioned above in the Proposed Conditions. The 3 - 36" culverts under Barranca Vista Place will be referred to as Culvert Crossing #1; the 4 - 48" culverts under High Desert Place south of La Arista Place will be referred to as Culvert Crossing #2, and the 2 - 48" culverts under High Desert south of Trail Vista Court will be referred to as Culvert Crossing #3.

As mentioned above, the Culvert Crossing #1, 2, and 3 will allow the upstream basins to flow its natural course, which would otherwise be impeded by the proposed street. The number and sizes of culverts were designed in order to have adequate cover over the culverts as well has to have the headwater depths at acceptable levels. The flows used to design these culverts are the flows, which were determined in the High Desert Phase 2 – Prudent Line Analysis. Culvert Crossing #1 uses a flow of 237 cfs, Culvert Crossing #2 uses 480 cfs, which is the combined flow of two of the fingers of the existing AMAFCA easement, and Culvert Crossing #3 uses 193cfs, which is 27.76cfs from Basin OFF3, 9.95cfs from Basin BCA-2C-R8, 153.9 cfs discharge from Unit 2 (see the Unit 2 section for

further information) and 1.0 cfs from Basin BCA-2C-R7. For further information on the prudent line analysis please see the Prudent Line Section of this report.

#### **D. Wilderness Village and Compound**

The Wilderness Village and Compound Subdivisions encompass the southern portion of the Wilderness Subdivision at High Desert. This area is approximately 35.6 acres and is bounded by the Wilderness Estates Subdivision (Unit 1) to the north, the Embudito Arroyo to the South, City of Albuquerque Open Space to the east, and City of Albuquerque and High Desert Open Space to the west (see location map, **Appendix A**).

Proposed site hydrological conditions are analyzed for the 100-year, 6-hour storm in accordance with the revised Section 22.2, Hydrology, of the Development Process Manual (DPM) for the City of Albuquerque, dated January 1993. In addition, the 1-year, 6-hour storm is analyzed to determine retention criteria as part of the erosion control measures to be implemented with the proposed development. The results of the AHYMO analyses are provided in **Appendix L**. Street capacities were analyzed using Manning's equation, consistent with the revised DPM Section 22.2. The new rational method hydrologic procedures identified within the revised DPM Section 22.2 are utilized to determine peak flow rates for design of the storm drainage improvements within the projects. The 100-year, 6-hour storm is used as the design event. Street hydraulic and inlet capacity calculations are provided in **Appendix M**.

Developed runoff from the proposed site generally drains in an east to west direction and is conveyed by local streets, public storm drains, and drainage swales. The only offsite flows that impact the proposed development come from the steep areas to the east of the site, which are in the City of Albuquerque Open Space and the Sandia Mountain Wilderness. These undeveloped flows are conveyed through the proposed development by local streets, public storm drains and drainage swales. Runoff in streets is collected in public storm drain systems, and eventually discharged into existing arroyos that are tributary to the Bear Canyon Arroyo. The storm drain systems discharge into

retention ponds designed to retain the 1-year design storm in order to limit downstream erosion and provide water quality benefits to the downstream arroyo network. The ponds will be constructed with a spillway to by-pass larger flows. In addition, storm flows will pass through a first flush, storm water quality manhole system prior to being discharged into a retention pond.

## **1. Wilderness Village Subdivision**

The Wilderness Village Subdivision at High Desert is a proposed single-family, residential development with 57 lots on approximately 22.5 acres, producing a density of 2.5 D.U.'s per acre. The proposed development is divided into five main drainage basins and five minor basins as illustrated on the Proposed Basin Map, **Exhibit 13**. The five minor basins are located along the western edge of the Village and will discharge runoff offsite via overland flow. Proposed street configurations are shown on the Preliminary Plat (See **Exhibit 6**).

### **a) On-Site Basins**

Runoff from Basin 2A, 22.9 cfs, is conveyed west in High Desert Place to a low point in the western cul-de-sac terminus of the street. At this point, the runoff is collected by a public storm drain and conveyed northwest, where it joins flows from Basin 2B. Basins 50 through 52 are located to the west of Basin 2A. Basins 51 and 52 correspond to Lots 51 and 52, which will be developed in a manner similar to past "Estate Type" Subdivisions. The owners of these lots will be required to provide a site specific grading and drainage plan stamped and certified by a New Mexico Professional Engineer prior to building. The individual lot grading and drainage plan shall be submitted to and approved by the High Desert Residential Owners Association New Construction Committee. Future runoff (1.5 cfs, 3.3 cfs, 2.6 cfs, Basins 50-52, respectively) from these basins will discharge from the site via overland flow. Water harvesting to retain the 1-year storm (0.3 cfs, 0.01 acre-feet for Lot 8 and 0.4 cfs, 0.01

acre-feet for Lot 9) on-site shall be encouraged to minimize off-site erosion.

Runoff from Basin 2B, 20.7 cfs, is conveyed west in Embudito View Court to a low point in the western cul-de-sac terminus of the street. At this point, the runoff is collected by a public storm drain and conveyed northwest, where it joins flows from Basin 2A. The combined flow, 43.6 cfs, is then conveyed to the west where it joins flows from Basin 2C.

Runoff from Basin 2C, 25.8 cfs, is conveyed west in Piedra Grande Court to a low point in the western cul-de-sac terminus of the street. At this point, the runoff is collected by a public storm drain and conveyed west, where it joins flows from Basin 2B. The combined flow, 69.4 cfs, is then conveyed to the west where it joins flows from Basin 2D.

Runoff from Basin 2D, 14.4 cfs, is conveyed west in Wilderness Court to a low point in the western cul-de-sac terminus of the street. At this point, the runoff is collected by a public storm drain and conveyed west, where it joins flows from Basins 2A, 2B and 2C. The combined flow, 83.6 cfs, is conveyed to a retention pond in the High Desert Open Space to the west of Basin 2D. The retention pond is sized to retain the 1-year storm (18.6 cfs, 0.6 acre-feet) and by-pass larger storm events. Basin 8 (Lot 8, 1.8 cfs) and Basin 9 (Lot 9, 2.6 cfs) are located to the west of Basin 2D. Lots 8 and 9 will be developed in a manner similar to past "Estate Type" Subdivisions. The owners of these lots will be required to provide a site specific grading and drainage plan stamped and certified by a New Mexico Professional Engineer prior to building. The individual lot grading and drainage plan shall be submitted to and approved by the High Desert Residential Owners Association New Construction Committee. Future runoff from these basins will discharge from the site via overland flow. Water harvesting to retain the 1-year storm (0.3 cfs,

0.01 acre-feet for Lot 8 and 0.4 cfs, 0.01 acre-feet for Lot 9) on-site shall be encouraged to minimize off-site erosion.

Because the runoff at the end of the cul-de-sacs is collected in a sump condition more rigorous design criteria is applied. The storm drain inlets were analyzed to show that the ponded water surface elevation resulting from two (2) times the 100-year storm is lower than the proposed pad elevations adjacent to the low point. The analysis is provided in **Appendix M**.

## **2. Wilderness Compound Subdivision**

The Wilderness Compound Subdivision at High Desert 13 is a proposed single-family, residential development with 26 lots on approximately 6.4 acres, producing a density of 4.1 D.U.'s per acre. The proposed development is divided into five drainage basins as illustrated on the Proposed Basin Map, **Exhibit 13**. In addition, there are seven off-site basins contributing flow to the proposed development. Four of these offsite basins impact the Compound. Runoff from the offsite basins and the Compound is conveyed by a public storm drain system, which discharges to an existing arroyo to the east side of High Desert Place, on the north side of the Compound. Proposed street configurations are shown on the Preliminary Plat (See **Exhibit 6**).

### **a) Off-Site Basins**

The offsite basins encompass those contributing areas in the City of Albuquerque Open Space and the Sandia Mountain Wildernesss to the east of the proposed development. These basins are characterized by steep terrain, with slopes up to 80%, and boulder outcroppings.

Basins OS-1 and OS-7, 25.8 cfs and 16.4 cfs, respectively, are south of the Compound and separated from the Village by High Desert

Place. These basins do not contribute flow to the Village or Compound. Runoff from Basin OS-7 enters the site via overland flow and combines with runoff from Basin 2E, 9.5 cfs, before entering a public storm drain in High Desert Place. Runoff from Basins 2E and OS-7 flows through Sedimentation Pond #1 on the east side of High Desert Place before entering the storm drain. Runoff from Basin OS-1 enters the site via overland flow and combines with runoff from Basin 2G, 1.1 cfs, before entering a public storm drain in High Desert Place. Runoff from Basins 2G and OS-1 flows through Sedimentation Pond #2 on the east side of High Desert Place before entering the storm drain, where it combines with flows from Basins 2E and OS-7. Ponds 1 and 2 are sized to store the annual sediment load from the contributing basins. Sediment volumes were calculated using the procedure developed in the High Desert DMMP. The DMMP requires that sedimentation ponds be sized to store five (5) times the annual sediment load. Due to the location of these ponds in the upper watershed and the steepness of the existing terrain it is not possible to provide this volume of sediment storage for Ponds 1 and 2. These ponds will require periodic maintenance to remove sediment in order to keep the system operating properly. The analysis for the sedimentation ponds is included in **Appendix N**.

Runoff from Basin OS-2, 6.8 cfs, enters the site via overland flow, is collected by an earthen drainage swale, then directed to Foothills Trail, where it combines with flows from Basin 3D. The drainage swale will be located on the Compound property to the east of the perimeter wall, which will separate the proposed development from the City of Albuquerque Open Space. A cross section of the proposed swale is shown on the Compound grading plan (**Exhibit 14**). The drainage swale will also serve to collect sedimentation from Basin OS-2 and will require periodic maintenance to remove sediment in order to keep the system operating properly.

Runoff from Basin OS-3, 2.4 cfs, enters the site via overland flow, is collected by an earthen drainage swale, then directed to Wilderness Court, where it combines with flows from Basin 3C. The drainage swale is similar to that described in the preceding paragraph. The drainage swale will also serve to collect sedimentation from Basin OS-3 and will require periodic maintenance to remove sediment in order to keep the system operating properly.

Runoff from Basin OS-5, 58.3 cfs, enters the site in a meandering channel at the eastern edge of Basin 3B. At this point the runoff will be contained within Tract 13D in a proposed trapezoidal channel, which will convey the runoff to Sedimentation Pond #3. The runoff will pass through the pond and enter a public storm drain. The storm drain conveys the flow west in Foothills Trail, combining with runoff from Basins 3B, 3C, and 3D. Runoff from Basin OS-4, 6.8 cfs, is intercepted by the proposed channel, and combines with flow from Basin OS-5.

Pond 3 is sized to store two (2) times the annual sediment load from the contributing basins. The sediment volume was calculated using the procedure developed in the High Desert DMMP. The DMMP requires that sedimentation ponds be sized to store five (5) times the annual sediment load. Due to the location of these ponds in the upper watershed and the steepness of the existing terrain it is not possible to provide this volume of sediment storage for Pond 3. The pond will require periodic maintenance to remove sediment in order to keep the system operating properly. The analysis for the sedimentation pond is included in Appendix N.

## **b) On-Site Basins**

Runoff from Basin 3D, 6.7 cfs, combines with flow from Basin OS-2, and is conveyed west in Foothills Trail. This combined flow, 13.5 cfs, heads north in Foothills Trail to the intersection of Foothills Trail and Wilderness Court. Storm drain inlets south of the Foothills Trail/Wilderness Court intersection collect a portion of this flow. The by-pass flow heads west in Wilderness Court, combining with flow from Basin 3E.

Runoff from Basin 3C, 2.3 cfs, combines with flow from Basin OS-3, and is conveyed west in Wilderness Court. Storm drain inlets east of the Foothills Trail/Wilderness Court intersection collect this combined flow, 4.8 cfs. Runoff from Basin 3B, 8.3 cfs, is conveyed south in Foothills Trail. Storm drain inlets north of the Foothills Trail/Wilderness Court intersection collect a portion of this flow. The by-pass flow heads west in Wilderness Court, combining with flow from Basin 3E.

Runoff from Basin 3E, 7.2 cfs, combines with the by-pass flow from the Foothills Trail/Wilderness Court intersection and is conveyed in Wilderness Court to High Desert Place. This flow, 10.9 cfs, enters High Desert Place, combining with runoff from Basin 2F, and is conveyed north to a low point in High Desert Place. Flow in the Compound storm drain system, 86.4 cfs, enters the storm drain in High Desert Place, combining with flows from Basins 2E, 2G, OS-1, and OS-7.

## **3. High Desert Place**

Basin 2F encompasses the southern extension of High Desert Place serving the Village and Compound. Runoff from Basin 2F, 7.4 cfs, and the bypass flow from the Compound, 10.9 cfs, is conveyed north to a low point in High Desert

Place, about 70 feet south of the north boundary of the Village and Compound. The flow is collected by storm drain inlets and combines with the flows from the Compound, Basins 2E and 2G, and the offsite basins. The flow in the storm drain, 153.9 cfs, is conveyed north where it discharges into an existing arroyo on the east side of High Desert Place. Culvert Crossing #3 conveys this flow across High Desert Place. See Section VIII.C.4 for a discussion of Culvert Crossing #3.

## **IX. CONCLUSION**

The primary goal of this drainage plan for High Desert - Tract 13, is to provide sound and innovative drainage management schemes that permit preservation of the natural terrain with the least possible impact. The utilization of drainage schemes outlined in this report accomplishes this goal in a safe and adequate manner. We recommend that this plan be approved as requested.

## APPENDICES

APPENDIX A: LOCATION MAP

### UNIT 1

APPENDIX B: ROADWAY CROSS-SECTION

APPENDIX C: BASIN SUMMARIES

APPENDIX D: LOT CHARACTERISTICS

APPENDIX E: CULVERT ANALYSIS

APPENDIX F: STREET HYDRAULICS / INLET ANALYSIS FOR HIGH DESERT PLACE

APPENDIX G: POND ANALYSIS

APPENDIX H: NATIONWIDE 404 PERMIT CORRESPONDENCE

APPENDIX I: BEAR CANYON & EMBUDITO ARROYO HYDROLOGY

APPENDIX J: PRUDENT LINE CALCULATIONS

APPENDIX K: BEAR CANYON & EMBUDITO ARROYO HYDRAULIC ANALYSIS

- EMBUDITO ARROYO EQUILIBRIUM SLOPE CALCULATIONS
- BEAR CANYON HEC-RAS
- BEAR CANYON RIPRAP ELEVATION REQUIREMENTS
- EMBUDITO HEC-RAS
- EMBUDITO RIPRAP ELEVATION REQUIREMENTS
- EMBUDITO ARROYO DROP STRUCTURE SKETCHES

### UNITS 2 & 3

APPENDIX L: AHYMO INPUT, OUTPUT FILES

APPENDIX M: STREET HYDRAULICS/ INLET CAPACITY ANALYSIS

APPENDIX N: SEDIMENTATION POND ANALYSIS

## EXHIBITS

- EXHIBIT 1: EXISTING DRAINAGE BASINS MAP – DMP
- EXHIBIT 2: 1995 PRUDENT LINE MAP
- EXHIBIT 3: REVISED PRUDENT LINE MAP
- EXHIBIT 4: EXISTING FEMA FLOODPLAIN MAP
- EXHIBIT 5: BULK LAND PLAT
- EXHIBIT 6: PRELIMINARY PLAT
- EXHIBIT 7: DETAILED REVISED PRUDENT LINE MAP
- EXHIBIT 8: PROPOSED BEAR CANYON ARROYO IMPROVEMENTS
- EXHIBIT 9: EMBUDITO ARROYO CROSS-SECTIONS
- EXHIBIT 10: PROPOSED EMBUDITO ARROYO IMPROVEMENTS
- EXHIBIT 11: PROPOSED DRAINAGE BASINS MAP – UNIT 1
- EXHIBIT 12: GRADING AND DRAINAGE PLAN – UNIT 1
- EXHIBIT 13: PROPOSED DRAINAGE BASINS MAP – UNITS 2 & 3
- EXHIBIT 14: GRADING AND DRAINAGE PLAN – UNITS 2 & 3



## **APPENDICES**

APPENDIX A: LOCATION MAP

### **UNIT 1**

APPENDIX B: ROADWAY CROSS-SECTION

APPENDIX C: BASIN SUMMARIES

APPENDIX D: LOT CHARACTERISTICS

APPENDIX E: CULVERT ANALYSIS

APPENDIX F: STREET HYDRAULICS / INLET ANALYSIS FOR HIGH  
DESERT STREET

APPENDIX G: POND ANALYSIS

APPENDIX H: NATIONWIDE 404 PERMIT CORRESPONDENCE

APPENDIX I: BEAR CANYON & EMBUDITO ARROYO HYDROLOGY

APPENDIX J: PRUDENT LINE CALCULATIONS

APPENDIX K: BEAR CANYON & EMBUDITO ARROYO HYDRAULIC  
CALCULATIONS

- EMBUDITO ARROYO EQUILIBRIUM SLOPE  
CALCULATIONS
- BEAR CANYON HEC-RAS
- BEAR CANYON RIPRAP ELEVATION  
REQUIREMENTS
- EMBUDITO HEC-RAS
- EMBUDITO RIPRAP ELEVATION  
REQUIREMENTS
- EMBUDITO ARROYO DROP STRUCTURE  
SKETCHES

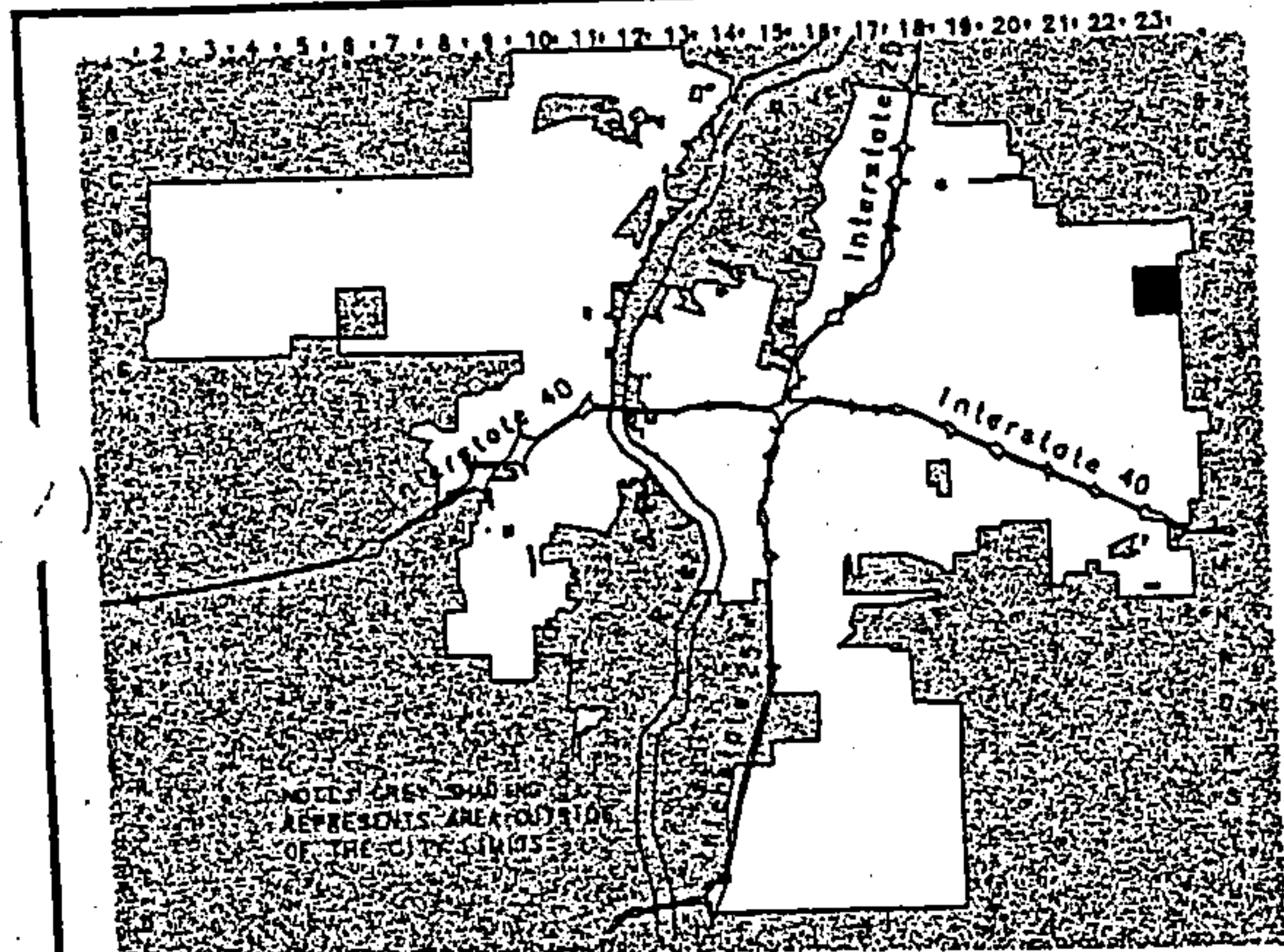
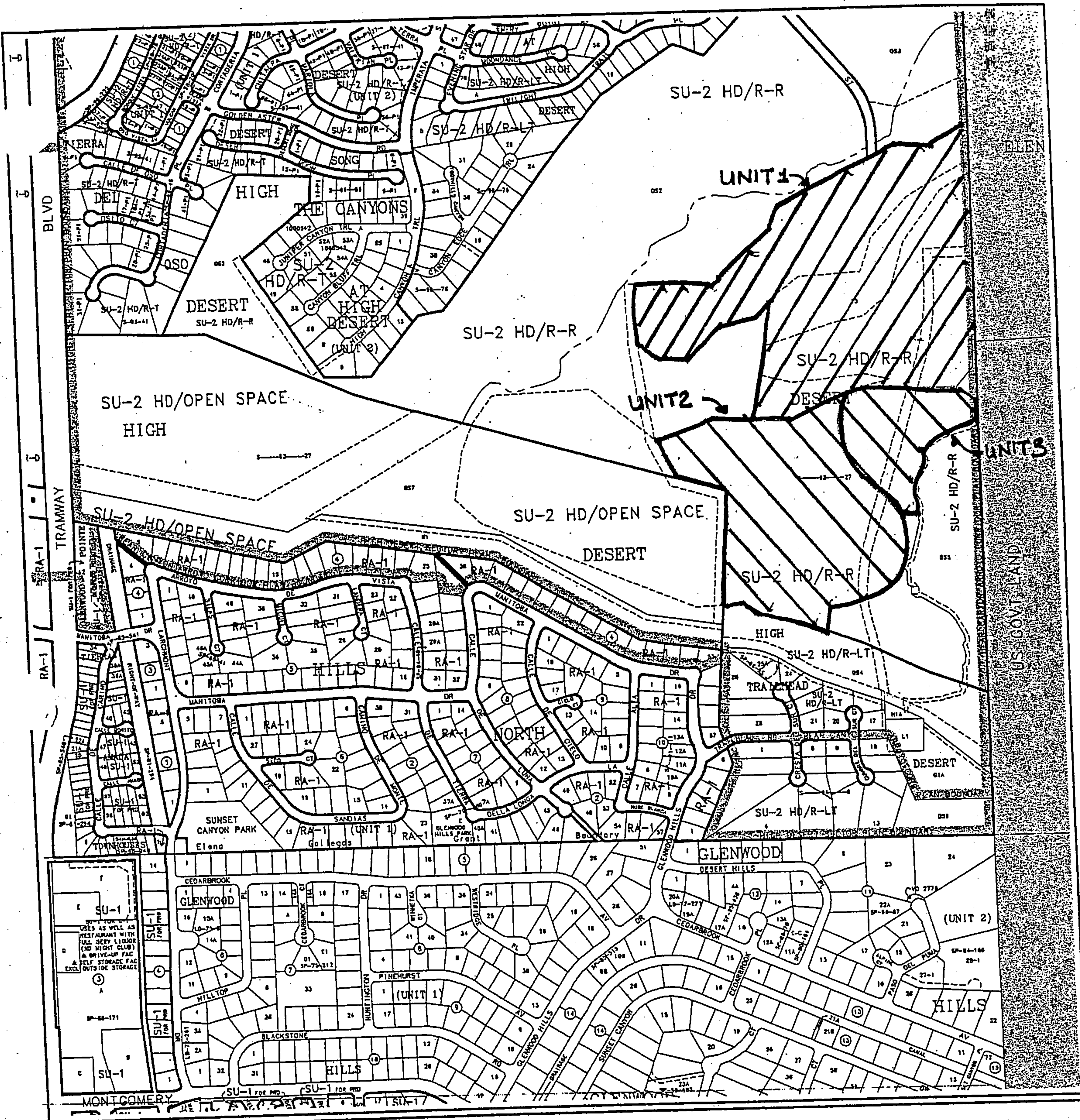
### **UNITS 2&3**

APPENDIX L: AHYMO INPUT, OUTPUT FILES

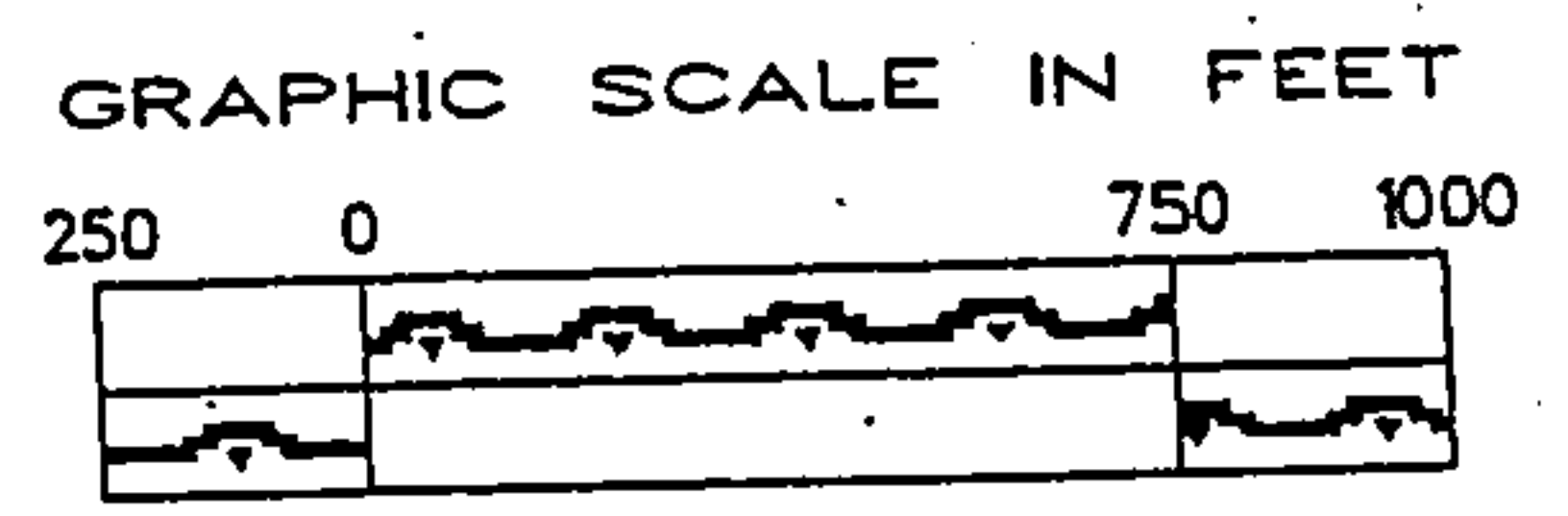
APPENDIX M: STREET HYDRAULICS / INLET CAPACITY ANALYSIS

## APPENDIX A

### LOCATION MAP



CITY OF  
Albuquerque  
A Geographic Information System  
PLANNING DEPARTMENT  
© Copyright 2002

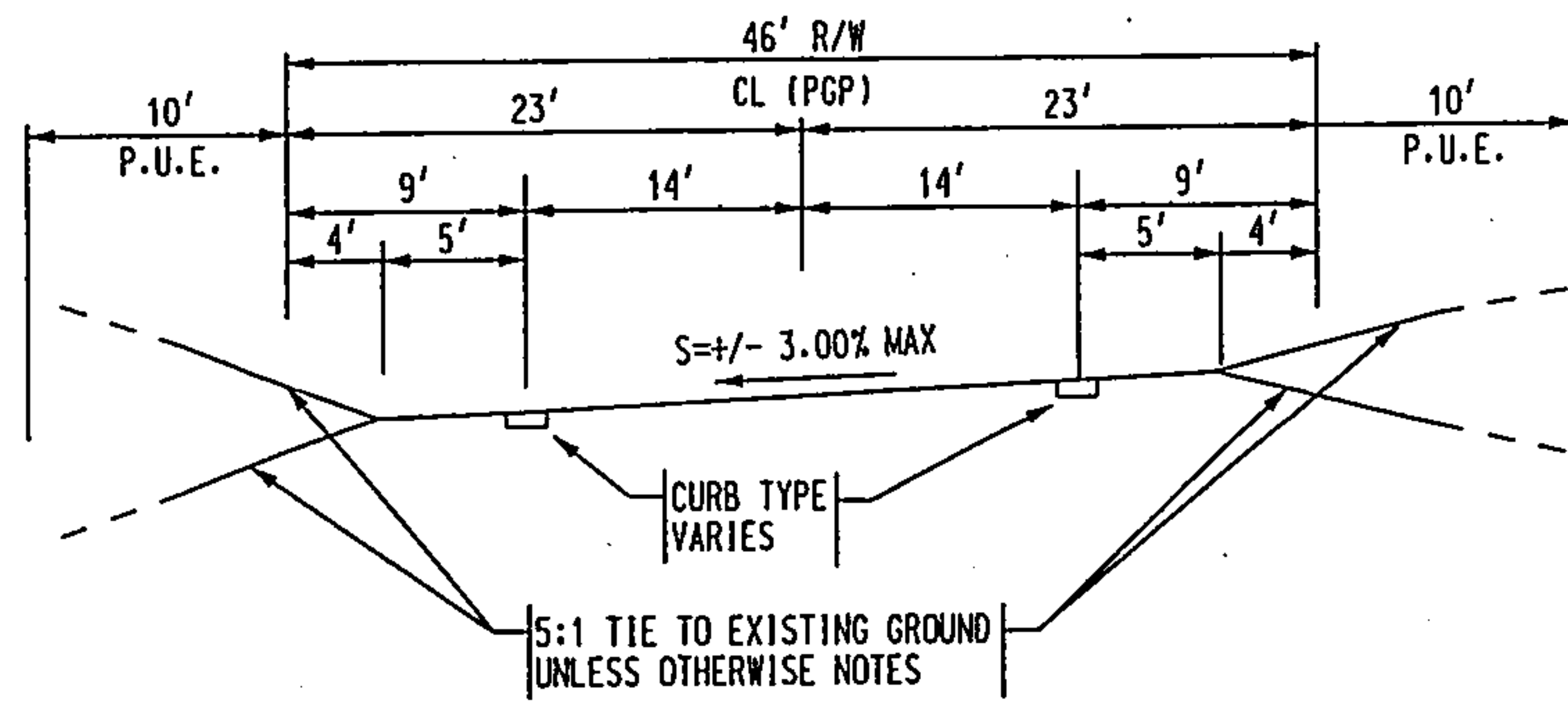


Zone Atlas Page  
**F-23-Z**  
Map Amended through April 03, 2002

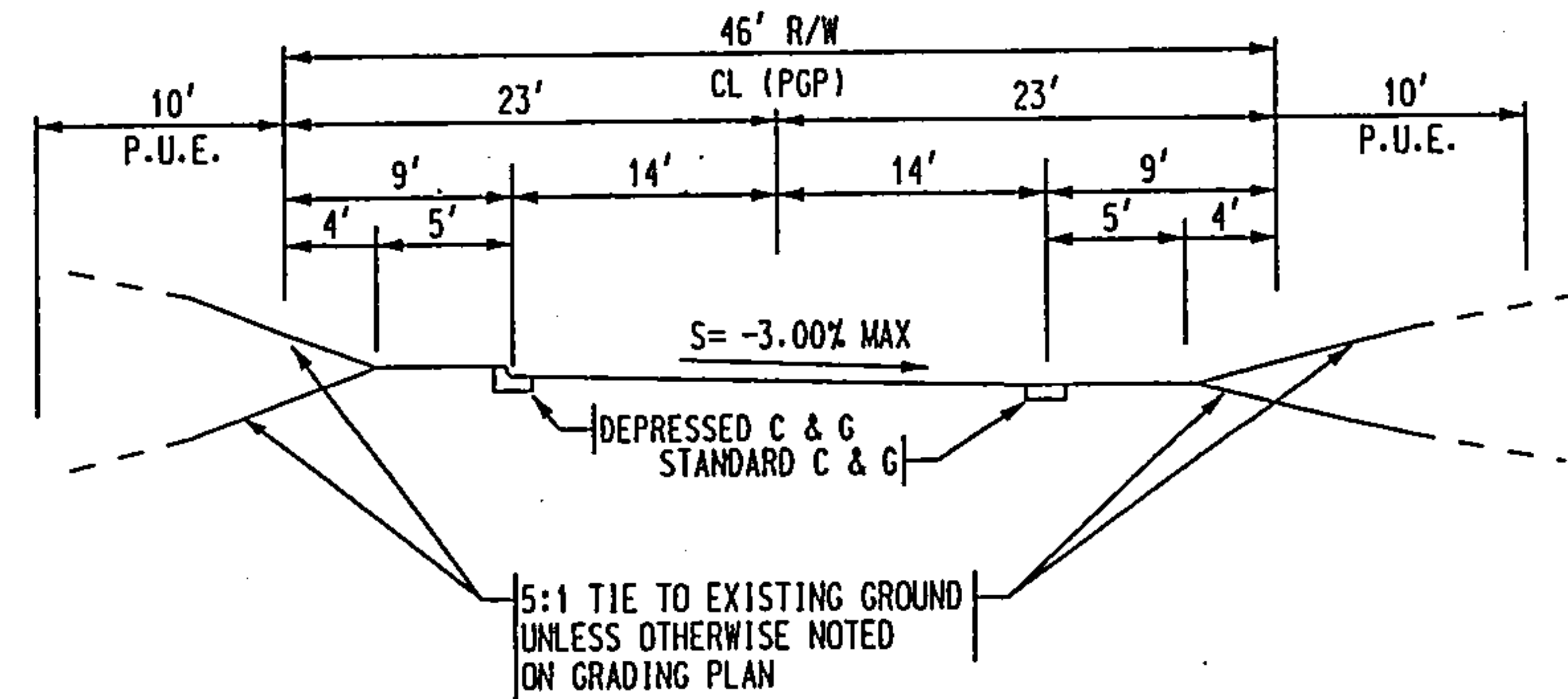
A

## APPENDIX B

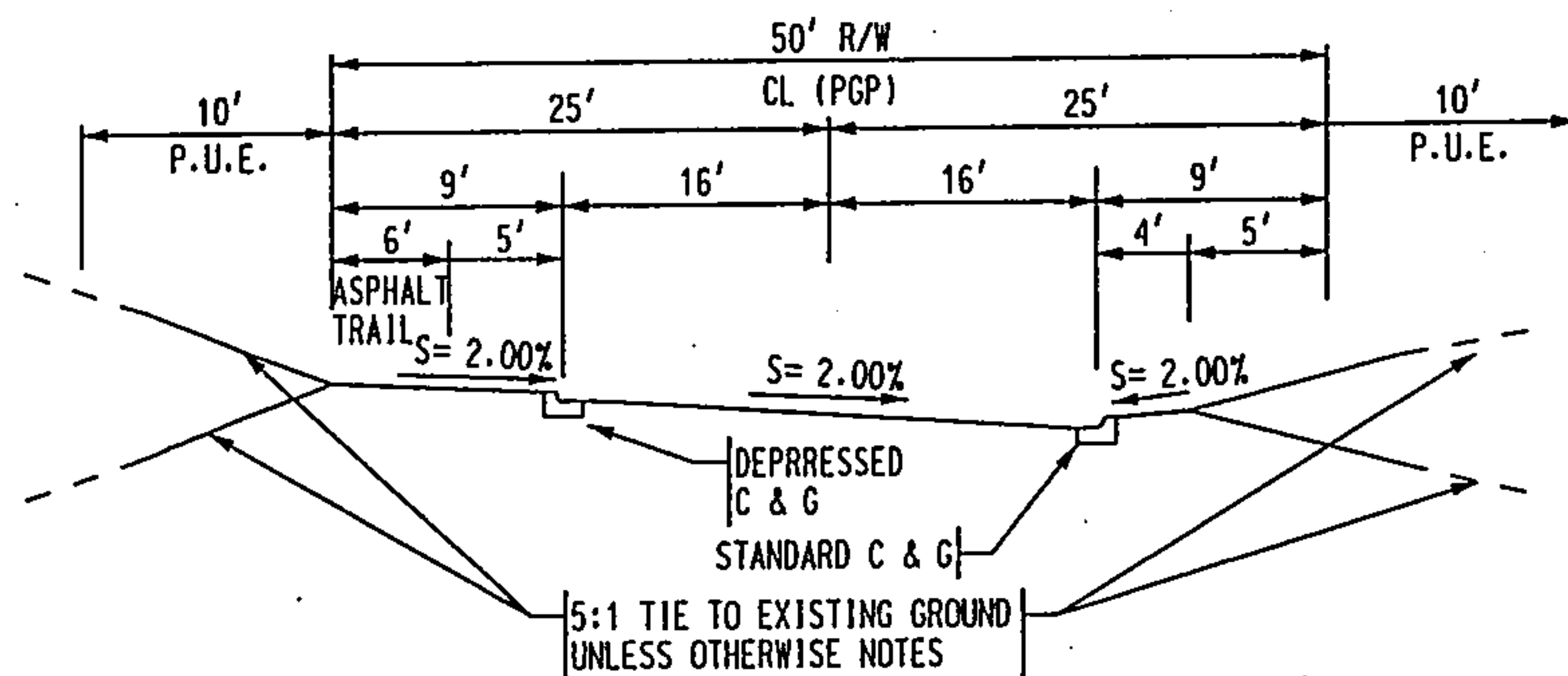
### ROADWAY CROSS-SECTION



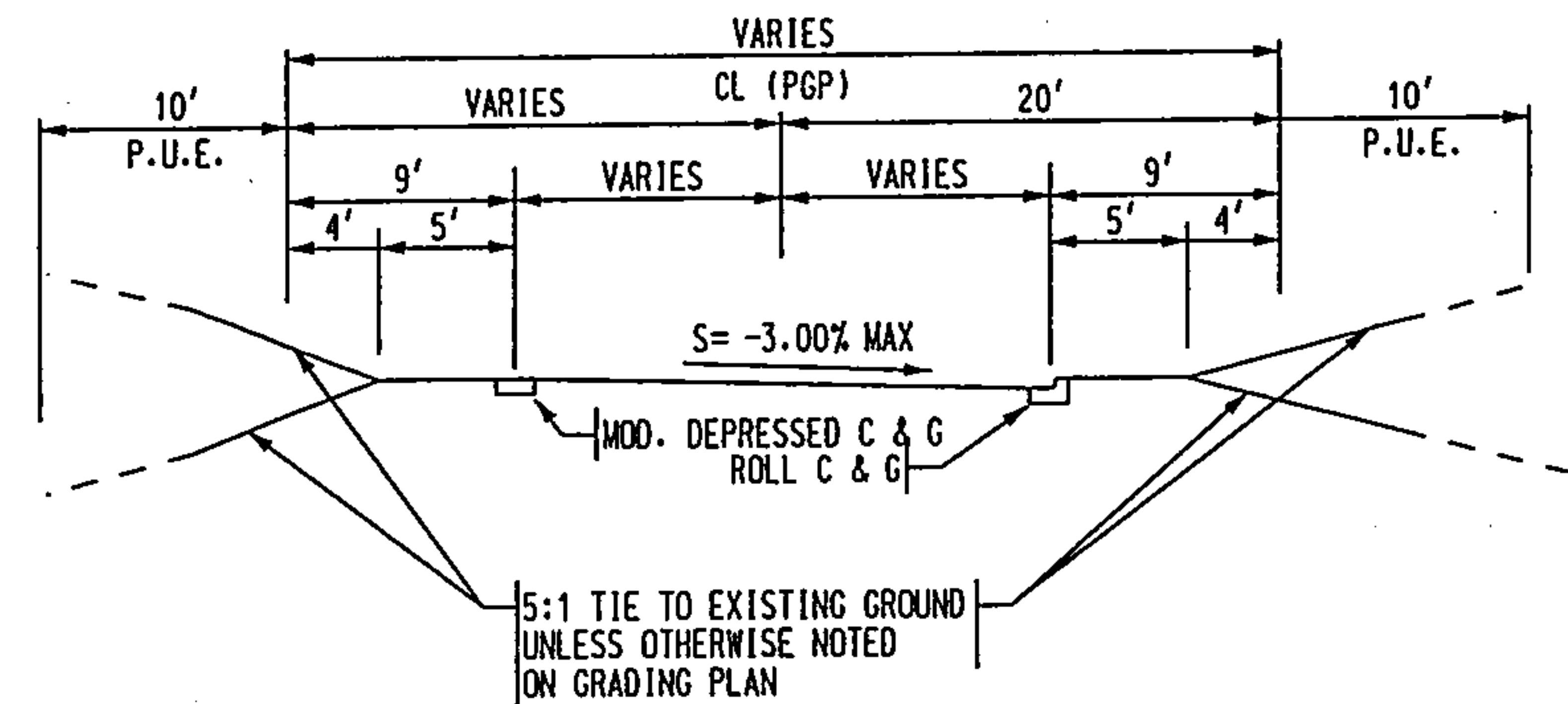
**TYPICAL STREET SECTION**  
NOT TO SCALE



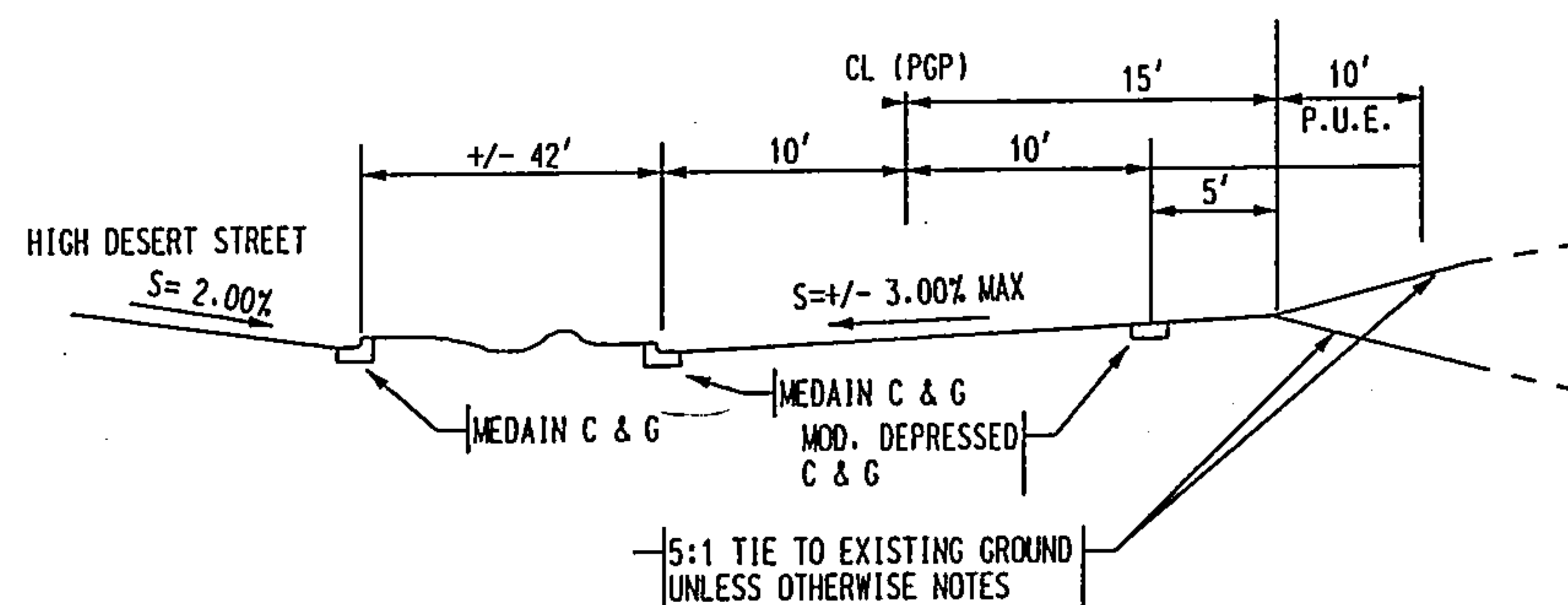
**LA ARISTA TYPICAL SECTION**  
NOT TO SCALE



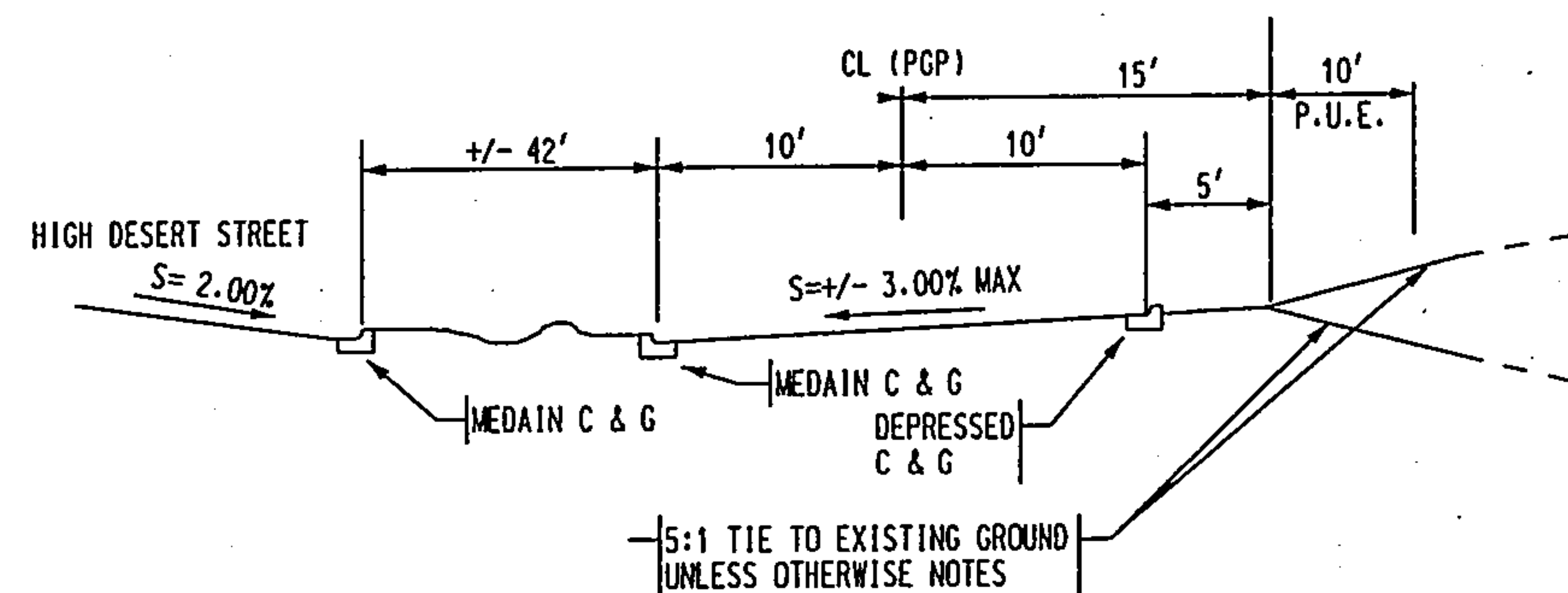
**HIGH DESERT PLACE TYPICAL SECTION**  
NOT TO SCALE



**BARRANCA VISTA CT & TRAIL VISTA CT TYPICAL ENTRANCE SECTION**  
NOT TO SCALE



**KNUCKLE TYPICAL SECTION**  
NOT TO SCALE



**KNUCKLE TYPICAL SECTION**  
NOT TO SCALE

**THE WILDERNESS ESTATES (UNIT 1) TYPICAL SECTION**

## APPENDIX C

### BASIN SUMMARIES

**Tract 13 Unit 1 @ HIGH DESERT  
HYDROLOGICAL VOLUMETRIC & DISCHARGE DATA (EXISTING)**

| Basin        | AREA<br>(ACRES) | % LAND TREATMENT* |       |      |      | PEAK DISCHARGE - (CFS/ACRE)* |      |      |      | DEVELOPED<br>(CFS) |
|--------------|-----------------|-------------------|-------|------|------|------------------------------|------|------|------|--------------------|
|              |                 | A                 | B     | C    | D    | A                            | B    | C    | D    |                    |
| BCA-2B(1)    | 7.77            | 90.00             | 10.00 | 0.00 | 0.00 | 2.20                         | 2.92 | 3.73 | 5.25 | 17.65              |
| BCA-2C(1)    | 58.20           | 90.00             | 10.00 | 0.00 | 0.00 | 2.20                         | 2.92 | 3.73 | 5.25 | 132.23             |
| <b>TOTAL</b> | <b>65.97</b>    |                   |       |      |      |                              |      |      |      | <b>149.88</b>      |

**Tract 13 Unit 1 @ HIGH DESERT  
HYDROLOGICAL VOLUMETRIC & DISCHARGE DATA (DEVELOPED)  
(CALCULATED)**

| Basin        | AREA<br>(ACRES) | % LAND TREATMENT* |       |       |       | PEAK DISCHARGE - (CFS/ACRE)* |      |      |      | DEVELOPED<br>(CFS) |
|--------------|-----------------|-------------------|-------|-------|-------|------------------------------|------|------|------|--------------------|
|              |                 | A                 | B     | C     | D     | A                            | B    | C    | D    |                    |
| BCA-2B(1)    | 7.77            | 76.58             | 6.32  | 0.00  | 17.10 | 2.20                         | 2.92 | 3.73 | 5.25 | 21.50              |
| BCA-2C-R1    | 0.71            | 38.03             | 5.32  | 0.00  | 56.65 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.82               |
| BCA-2C-R2    | 2.31            | 43.72             | 8.18  | 0.00  | 48.10 | 2.20                         | 2.92 | 3.73 | 5.25 | 8.61               |
| BCA-2C-R3    | 4.23            | 66.90             | 5.36  | 0.00  | 27.74 | 2.20                         | 2.92 | 3.73 | 5.25 | 13.05              |
| BCA-2C-R4    | 11.08           | 77.26             | 6.14  | 0.00  | 16.60 | 2.20                         | 2.92 | 3.73 | 5.25 | 30.48              |
| BCA-2C-R5    | 0.98            | 10.71             | 3.86  | 0.00  | 85.43 | 2.20                         | 2.92 | 3.73 | 5.25 | 4.74               |
| BCA-2C-R6    | 12.14           | 87.73             | 2.18  | 0.00  | 10.09 | 2.20                         | 2.92 | 3.73 | 5.25 | 30.64              |
| BCA-2C-R7    | 0.21            | 0.00              | 10.00 | 0.00  | 90.00 | 2.20                         | 2.92 | 3.73 | 5.25 | 1.05               |
| BCA-2C-R8    | 3.93            | 88.04             | 1.44  | 0.00  | 10.52 | 2.20                         | 2.92 | 3.73 | 5.25 | 9.95               |
| * OFF1       |                 |                   |       |       |       |                              |      |      |      | 224.00             |
| * OFF2       |                 |                   |       |       |       |                              |      |      |      | 210.00             |
| OFF3         | 7.95            | 5.00              | 20.00 | 75.00 | 0.00  | 2.20                         | 2.92 | 3.73 | 5.25 | 27.76              |
| <b>TOTAL</b> | <b>51.31</b>    |                   |       |       |       |                              |      |      |      | <b>584.58</b>      |
| OS-2-R1      | 2.28            | 90.00             | 0.00  | 0.00  | 10.00 | 2.20                         | 2.92 | 3.73 | 5.25 | 5.71               |
| OS-2-R2      | 0.38            | 0.00              | 10.00 | 0.00  | 90.00 | 2.20                         | 2.92 | 3.73 | 5.25 | 1.91               |
| <b>TOTAL</b> | <b>53.59</b>    |                   |       |       |       |                              |      |      |      | <b>590.29</b>      |

\*These basins were studied in the High Desert Phase II - Prudent Line Analysis. The flows were determined by taking the flow calculated by the prudent analysis minus the contributing onsite basin analyzed with this report.

## APPENDIX D

### LOT CHARACTERISTICS

| Tract 13 Unit 1 |             |       |  |                        |       |
|-----------------|-------------|-------|--|------------------------|-------|
| LOT             | Lot Area    |       |  | Building Envelope Area |       |
|                 | Square Feet | Acres |  | Square Feet            | Acres |
| 1               | 37,301      | 0.86  |  | 12,000                 | 0.28  |
| 2               | 31,864      | 0.74  |  | 12,000                 | 0.28  |
| 3               | 32,448      | 0.75  |  | 12,000                 | 0.28  |
| 4               | 47,372      | 1.09  |  | 12,000                 | 0.28  |
| 5               | 39,751      | 0.92  |  | 12,000                 | 0.28  |
| 6               | 35,287      | 0.82  |  | 12,000                 | 0.28  |
| 7               | 41,486      | 0.96  |  | 12,000                 | 0.28  |
| 8               | 74,312      | 1.71  |  | 12,000                 | 0.28  |
| 9               | 40,200      | 0.93  |  | 12,000                 | 0.28  |
| 10              | 112,703     | 2.59  |  | 12,000                 | 0.28  |
| 11              | 96,388      | 2.22  |  | 12,000                 | 0.28  |
| 12              | 69,667      | 1.60  |  | 12,000                 | 0.28  |
| 13              | 79,322      | 1.83  |  | 12,000                 | 0.28  |
| 14              | 38,805      | 0.90  |  | 12,000                 | 0.28  |
| 15              | 38,259      | 0.88  |  | 12,000                 | 0.28  |
| 16              | 36,259      | 0.84  |  | 12,000                 | 0.28  |
| 17              | 44,963      | 1.04  |  | 12,000                 | 0.28  |
| 18              | 121,586     | 2.80  |  | 12,000                 | 0.28  |
| 19              | 48,047      | 1.11  |  | 12,000                 | 0.28  |
| 20              | 53,577      | 1.23  |  | 12,000                 | 0.28  |
| 21              | 75,047      | 1.73  |  | 12,000                 | 0.28  |
| 22              | 40,328      | 0.93  |  | 12,000                 | 0.28  |
| 23              | 60,245      | 1.39  |  | 12,000                 | 0.28  |
| 24              | 71,711      | 1.65  |  | 12,000                 | 0.28  |
| 25              | 38,631      | 0.89  |  | 12,000                 | 0.28  |
| 26              | 36,616      | 0.85  |  | 12,000                 | 0.28  |
| 27              | 30,618      | 0.71  |  | 12,000                 | 0.28  |

# DEVELOPED CONDITIONS FOR EACH LOT

| LOT<br># | AREA<br>(ACRES) | % LAND TREATMENT* |       |      |       | PEAK DISCHARGE - (CFS/ACRE)* |      |      |      | Q(100-YR)<br>DEVELOPED<br>(CFS) |
|----------|-----------------|-------------------|-------|------|-------|------------------------------|------|------|------|---------------------------------|
|          |                 | A                 | B     | C    | D     | A                            | B    | C    | D    |                                 |
| 1        | 0.86            | 67.44             | 8.79  | 0.00 | 23.77 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.57                            |
| 2        | 0.74            | 62.16             | 10.22 | 0.00 | 27.62 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.31                            |
| 3        | 0.75            | 62.67             | 10.08 | 0.00 | 27.25 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.33                            |
| 4        | 1.09            | 74.31             | 6.94  | 0.00 | 18.75 | 2.20                         | 2.92 | 3.73 | 5.25 | 3.08                            |
| 5        | 0.92            | 69.57             | 8.22  | 0.00 | 22.22 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.70                            |
| 6        | 0.82            | 65.85             | 9.22  | 0.00 | 24.93 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.48                            |
| 7        | 0.96            | 70.83             | 7.88  | 0.00 | 21.29 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.79                            |
| 8        | 1.71            | 83.63             | 4.42  | 0.00 | 11.95 | 2.20                         | 2.92 | 3.73 | 5.25 | 4.44                            |
| 9        | 0.93            | 69.89             | 8.13  | 0.00 | 21.98 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.72                            |
| 10       | 2.59            | 89.19             | 2.92  | 0.00 | 7.89  | 2.20                         | 2.92 | 3.73 | 5.25 | 6.38                            |
| 11       | 2.22            | 87.39             | 3.41  | 0.00 | 9.21  | 2.20                         | 2.92 | 3.73 | 5.25 | 5.56                            |
| 12       | 1.60            | 82.50             | 4.73  | 0.00 | 12.78 | 2.20                         | 2.92 | 3.73 | 5.25 | 4.20                            |
| 13       | 1.83            | 84.70             | 4.13  | 0.00 | 11.17 | 2.20                         | 2.92 | 3.73 | 5.25 | 4.70                            |
| 14       | 0.90            | 68.89             | 8.40  | 0.00 | 22.71 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.66                            |
| 15       | 0.88            | 68.18             | 8.59  | 0.00 | 23.23 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.61                            |
| 16       | 0.84            | 66.67             | 9.00  | 0.00 | 24.33 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.53                            |
| 17       | 1.04            | 73.08             | 7.27  | 0.00 | 19.65 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.97                            |
| 18       | 2.80            | 90.00             | 2.70  | 0.00 | 7.30  | 2.20                         | 2.92 | 3.73 | 5.25 | 6.84                            |
| 19       | 1.11            | 74.77             | 6.81  | 0.00 | 18.41 | 2.20                         | 2.92 | 3.73 | 5.25 | 3.12                            |
| 20       | 1.23            | 77.24             | 6.15  | 0.00 | 16.62 | 2.20                         | 2.92 | 3.73 | 5.25 | 3.38                            |
| 21       | 1.73            | 83.82             | 4.37  | 0.00 | 11.82 | 2.20                         | 2.92 | 3.73 | 5.25 | 4.48                            |
| 22       | 0.93            | 69.89             | 8.13  | 0.00 | 21.98 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.72                            |
| 23       | 1.39            | 79.86             | 5.44  | 0.00 | 14.71 | 2.20                         | 2.92 | 3.73 | 5.25 | 3.74                            |
| 24       | 1.65            | 83.03             | 4.58  | 0.00 | 12.39 | 2.20                         | 2.92 | 3.73 | 5.25 | 4.31                            |
| 25       | 0.89            | 68.54             | 8.49  | 0.00 | 22.97 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.64                            |
| 26       | 0.85            | 67.06             | 8.89  | 0.00 | 24.05 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.55                            |
| 27       | 0.71            | 60.56             | 10.65 | 0.00 | 28.79 | 2.20                         | 2.92 | 3.73 | 5.25 | 2.24                            |
| Total    |                 |                   |       |      |       |                              |      |      |      | 93.04                           |
|          |                 |                   |       |      |       |                              |      |      |      |                                 |

## **APPENDIX E**

### **CULVERT ANALYSIS**

Analyzer Report

=====

Drainage Structure Analyzer

Culvert Hydraulic Analysis

Date: Thursday, September 12, 2002 10:35:22 AM

=====

Input Data

-----

|                        |                             |
|------------------------|-----------------------------|
| Shape                  | Circular                    |
| Material               | RC C76-A                    |
| Roughness              | 0.013000                    |
| Entrance Edge          | Smooth tapered inlet throat |
| Number of Barrels      | 3                           |
| Length                 | 0.0000 ft                   |
| Slope                  | 3.1700%                     |
| Tailwater              | 0.0000 ft                   |
| Inlet Control Equation | Entrance Loss               |
| Size (W x T):          | 36.00 x 3.0000              |
| Flow Rate              | 237.0000 cfs                |

Output Results

-----

|                 |                |
|-----------------|----------------|
| Flow Rate       | 237.0000 cfs   |
| Control         | Outlet         |
| Capacity        | 356.2593 cfs   |
| Outlet Velocity | 11.6114 ft/s   |
| Depth At Outlet | 2.8800 ft      |
| Headwater       | 5.2094 ft      |
| Critical Depth  | 2.7600 ft      |
| Normal Depth    | 1.7880 ft      |
| Size (W x T):   | 36.00 x 3.0000 |

Analyzer Report

=====

Drainage Structure Analyzer

Culvert Hydraulic Analysis

D. : Monday, October 07, 2002 09:26:48 AM

=====

Input Data

-----

|                              |                             |
|------------------------------|-----------------------------|
| Shape .....                  | Circular                    |
| Material .....               | RC C76-A                    |
| Roughness .....              | 0.013000                    |
| Entrance Edge .....          | Smooth tapered inlet throat |
| Number of Barrels .....      | 4                           |
| Length .....                 | 0.0000 ft                   |
| Slope .....                  | 4.4300%                     |
| Tailwater .....              | 0.0000 ft                   |
| Inlet Control Equation ..... | Entrance Loss               |
| Size (W x T): .....          | 48.00 x 4.0000              |
| Flow Rate .....              | 480.0000 cfs                |

Output Results

-----

|                       |                |
|-----------------------|----------------|
| Flow Rate .....       | 480.0000 cfs   |
| Control .....         | Outlet         |
| Capacity .....        | 1209.3365 cfs  |
| Outlet Velocity ..... | 10.8510 ft/s   |
| Depth At Outlet ..... | 3.6450 ft      |
| Headwater .....       | 5.3455 ft      |
| Critical Depth .....  | 3.2900 ft      |
| Normal Depth .....    | 1.7510 ft      |
| Size (W x T): .....   | 48.00 x 4.0000 |

Analyzer Report

=====

Drainage Structure Analyzer

Culvert Hydraulic Analysis

Date Monday, October 21, 2002 09:21:29 AM

=====

Input Data

-----

|                        |                             |
|------------------------|-----------------------------|
| Shape                  | Circular                    |
| Material               | RC C76-A                    |
| Roughness              | 0.013000                    |
| Entrance Edge          | Smooth tapered inlet throat |
| Number of Barrels      | 2                           |
| Length                 | 0.0000 ft                   |
| Slope                  | 5.6250%                     |
| Tailwater              | 0.0000 ft                   |
| Inlet Control Equation | Entrance Loss               |
| Size (W x T):          | 48.00 x 4.0000              |
| Flow Rate              | 193.0000 cfs                |

Output Results

-----

|                    |                |
|--------------------|----------------|
| Flow Rate          | 193.0000 cfs   |
| Control            | Inlet          |
| Capacity           | 681.3599 cfs   |
| Manning's Velocity | 23.3195 ft/s   |
| Headwater          | 4.6033 ft      |
| Critical Depth     | 2.9700 ft      |
| Normal Depth       | 1.4560 ft      |
| Size (W x T):      | 48.00 x 4.0000 |

## APPENDIX F

STREET HYDRAULICS / INLET ANALYSIS FOR HIGH DESERT STREET

\*\*\*\*\*

## PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

HDS T13 2% cross-slope 3.35%

MANNING'S N= .017 SLOPE= .0335

| POINT                         | DIST  | ELEV   | POINT  | DIST   | ELEV  | POINT  | DIST  | ELEV   |
|-------------------------------|-------|--------|--------|--------|-------|--------|-------|--------|
| 1                             | 0.00  | 0.76   | 5      | 7.00   | 0.13  | 9      | 37.63 | 1.40   |
| 2                             | 43.75 | 0.67   | 6      | 35.00  | 0.69  | 10     | 46.00 | 1.57   |
| 3                             | 4.83  | 0.67   | 7      | 37.00  | 0.73  | 11     | 0.00  | 0.00   |
| 4                             | 5.00  | 0.00   | 8      | 37.17  | 1.40  | 12     | 0.00  | 0.00   |
| <input type="checkbox"/> WSEL | DEPTH | FLOW   | FLOW   | WETTED | FLOW  | TOPWID | VEL   | ENERGY |
|                               | INC   | AREA   | RATE   | PER    | VEL   |        | HEAD  | HEAD   |
| (FT)                          | (FT)  | SQ.FT. | (CFS)  | (FT)   | (FPS) | (FT)   | (FT)  | (FT)   |
| 0.05                          | 0.05  | 0.02   | 0.0    | 0.85   | 1.32  | 0.81   | 0.03  | 0.08   |
| 0.10                          | 0.10  | 0.08   | 0.2    | 1.71   | 2.10  | 1.63   | 0.07  | 0.17   |
| 0.15                          | 0.15  | 0.19   | 0.5    | 3.40   | 2.37  | 3.28   | 0.09  | 0.24   |
| 0.20                          | 0.20  | 0.42   | 1.1    | 5.93   | 2.74  | 5.77   | 0.12  | 0.32   |
| 0.25                          | 0.25  | 0.77   | 2.5    | 8.46   | 3.24  | 8.26   | 0.16  | 0.41   |
| 0.30                          | 0.30  | 1.25   | 4.7    | 10.99  | 3.75  | 10.75  | 0.22  | 0.52   |
| 0.35                          | 0.35  | 1.84   | 7.8    | 13.52  | 4.24  | 13.24  | 0.28  | 0.63   |
| 0.40                          | 0.40  | 2.57   | 12.1   | 16.05  | 4.72  | 15.73  | 0.35  | 0.75   |
| 0.45                          | 0.45  | 3.42   | 17.7   | 18.58  | 5.18  | 18.22  | 0.42  | 0.87   |
| 0.50                          | 0.50  | 4.39   | 24.7   | 21.11  | 5.62  | 20.71  | 0.49  | 0.99   |
| 0.55                          | 0.55  | 5.49   | 33.2   | 23.64  | 6.04  | 23.20  | 0.57  | 1.12   |
| 0.60                          | 0.60  | 6.71   | 43.3   | 26.17  | 6.46  | 25.69  | 0.65  | 1.25   |
| 0.65                          | 0.65  | 8.06   | 55.3   | 28.70  | 6.86  | 28.18  | 0.73  | 1.38   |
| 0.70                          | 0.70  | 10.92  | 44.6   | 84.70  | 4.08  | 84.17  | 0.26  | 0.96   |
| 0.75                          | 0.75  | 15.78  | 69.0   | 110.53 | 4.37  | 109.98 | 0.30  | 1.05   |
| 0.80                          | 0.80  | 21.50  | 112.2  | 115.44 | 5.22  | 114.86 | 0.42  | 1.22   |
| 0.85                          | 0.85  | 27.25  | 166.4  | 115.50 | 6.11  | 114.87 | 0.58  | 1.43   |
| 0.90                          | 0.90  | 32.99  | 228.9  | 115.55 | 6.94  | 114.88 | 0.75  | 1.65   |
| 0.95                          | 0.95  | 38.73  | 299.0  | 115.60 | 7.72  | 114.90 | 0.93  | 1.88   |
| 1.00                          | 1.00  | 44.48  | 376.4  | 115.65 | 8.46  | 114.91 | 1.11  | 2.11   |
| 1.05                          | 1.05  | 50.23  | 460.7  | 115.70 | 9.17  | 114.92 | 1.31  | 2.36   |
| 1.10                          | 1.10  | 55.97  | 551.7  | 115.75 | 9.86  | 114.93 | 1.51  | 2.61   |
| 1.15                          | 1.15  | 61.72  | 649.1  | 115.80 | 10.52 | 114.95 | 1.72  | 2.87   |
| 1.20                          | 1.20  | 67.47  | 752.7  | 115.86 | 11.16 | 114.96 | 1.93  | 3.13   |
| 1.25                          | 1.25  | 73.21  | 862.3  | 115.91 | 11.78 | 114.97 | 2.15  | 3.40   |
| 1.30                          | 1.30  | 78.96  | 977.8  | 115.96 | 12.38 | 114.98 | 2.38  | 3.68   |
| 1.35                          | 1.35  | 84.71  | 1099.0 | 116.01 | 12.97 | 115.00 | 2.61  | 3.96   |
| 1.40                          | 1.40  | 90.46  | 1225.8 | 116.06 | 13.55 | 115.01 | 2.85  | 4.25   |
| 1.45                          | 1.45  | 96.30  | 1338.0 | 118.98 | 13.89 | 117.93 | 3.00  | 4.45   |
| 1.50                          | 1.50  | 102.26 | 1458.8 | 121.45 | 14.27 | 120.39 | 3.16  | 4.66   |
| 1.55                          | 1.55  | 108.34 | 1584.8 | 123.91 | 14.63 | 122.85 | 3.32  | 4.87   |
| 1.57                          | 1.57  | 110.80 | 1636.8 | 124.89 | 14.77 | 123.84 | 3.39  | 4.96   |

OS-2-R1 (5.36 cfs) + OS-2-R2 (1.91 cfs)

$$Q_{100} = 7.27 \text{ cfs}$$

$$d = .34$$

$$V = 4.14$$

$$E = .61 < .87 \checkmark$$

\*\*\*\*\*

PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

HDS T13 2% cross-slope 3.00%

MANNING'S N= .017 SLOPE= .03

| POINT | DIST  | ELEV   | POINT | DIST   | ELEV  | POINT  | DIST  | ELEV   |
|-------|-------|--------|-------|--------|-------|--------|-------|--------|
| 1     | 0.00  | 0.76   | 5     | 7.00   | 0.13  | 9      | 37.63 | 1.40   |
| 2     | 43.75 | 0.67   | 6     | 35.00  | 0.69  | 10     | 46.00 | 1.57   |
| 3     | 4.83  | 0.67   | 7     | 37.00  | 0.73  | 11     | 0.00  | 0.00   |
| 4     | 5.00  | 0.00   | 8     | 37.17  | 1.40  | 12     | 0.00  | 0.00   |
| WSEL  | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL   | ENERGY |
|       | INC   | AREA   | RATE  | PER    | VEL   |        | HEAD  | HEAD   |
| (FT)  | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) | (FT)   | (FT)  | (FT)   |
| 0.05  | 0.05  | 0.02   | 0.0   | 0.85   | 1.25  | 0.81   | 0.02  | 0.07   |
| 0.10  | 0.10  | 0.08   | 0.2   | 1.71   | 1.99  | 1.63   | 0.06  | 0.16   |
| 0.15  | 0.15  | 0.19   | 0.4   | 3.40   | 2.24  | 3.28   | 0.08  | 0.23   |
| 0.20  | 0.20  | 0.42   | 1.1   | 5.93   | 2.59  | 5.77   | 0.10  | 0.30   |
| 0.25  | 0.25  | 0.77   | 2.4   | 8.46   | 3.06  | 8.26   | 0.15  | 0.40   |
| 0.30  | 0.30  | 1.25   | 4.4   | 10.99  | 3.55  | 10.75  | 0.20  | 0.50   |
| 0.35  | 0.35  | 1.84   | 7.4   | 13.52  | 4.01  | 13.24  | 0.25  | 0.60   |
| 0.40  | 0.40  | 2.57   | 11.5  | 16.05  | 4.46  | 15.73  | 0.31  | 0.71   |
| 0.45  | 0.45  | 3.42   | 16.7  | 18.58  | 4.90  | 18.22  | 0.37  | 0.82   |
| 0.50  | 0.50  | 4.39   | 23.3  | 21.11  | 5.32  | 20.71  | 0.44  | 0.94   |
| 0.55  | 0.55  | 5.49   | 31.4  | 23.64  | 5.72  | 23.20  | 0.51  | 1.06   |
| 0.60  | 0.60  | 6.71   | 41.0  | 26.17  | 6.11  | 25.69  | 0.58  | 1.18   |
| 0.65  | 0.65  | 8.06   | 52.3  | 28.70  | 6.49  | 28.18  | 0.65  | 1.30   |
| 0.70  | 0.70  | 10.92  | 65.3  | 31.23  | 6.86  | 31.17  | 0.72  | 1.43   |
| 0.75  | 0.75  | 15.78  | 80.6  | 33.76  | 7.24  | 33.66  | 0.79  | 1.55   |
| 0.80  | 0.80  | 21.50  | 97.4  | 36.29  | 7.61  | 36.15  | 0.86  | 1.67   |
| 0.85  | 0.85  | 27.25  | 115.5 | 38.82  | 7.99  | 38.64  | 0.93  | 1.79   |
| 0.90  | 0.90  | 32.99  | 135.0 | 41.35  | 8.36  | 41.13  | 1.00  | 1.91   |
| 0.95  | 0.95  | 38.73  | 155.5 | 43.88  | 8.74  | 43.62  | 1.07  | 2.03   |
| 1.00  | 1.00  | 44.48  | 177.0 | 46.41  | 9.11  | 46.11  | 1.14  | 2.15   |
| 1.05  | 1.05  | 50.23  | 200.0 | 48.94  | 9.49  | 48.60  | 1.21  | 2.27   |
| 1.10  | 1.10  | 55.97  | 224.5 | 51.47  | 9.86  | 51.09  | 1.28  | 2.39   |
| 1.15  | 1.15  | 61.72  | 250.0 | 54.00  | 10.24 | 53.58  | 1.35  | 2.51   |
| 1.20  | 1.20  | 67.47  | 277.0 | 56.53  | 10.61 | 56.07  | 1.42  | 2.63   |
| 1.25  | 1.25  | 73.21  | 305.5 | 59.06  | 10.99 | 58.56  | 1.49  | 2.75   |
| 1.30  | 1.30  | 78.96  | 336.0 | 61.59  | 11.36 | 61.05  | 1.56  | 2.87   |
| 1.35  | 1.35  | 84.71  | 368.0 | 64.12  | 11.74 | 63.54  | 1.63  | 2.99   |
| 1.40  | 1.40  | 90.46  | 401.5 | 66.65  | 12.11 | 66.03  | 1.70  | 3.11   |
| 1.45  | 1.45  | 96.30  | 437.0 | 69.18  | 12.49 | 68.52  | 1.77  | 3.23   |
| 1.50  | 1.50  | 102.26 | 474.5 | 71.71  | 12.86 | 71.01  | 1.84  | 3.35   |
| 1.55  | 1.55  | 108.34 | 514.0 | 74.24  | 13.24 | 73.50  | 1.91  | 3.47   |
| 1.57  | 1.57  | 110.80 | 548.9 | 76.77  | 13.61 | 76.49  | 1.98  | 3.59   |

OS-2-R1 (5.36) + OS-2-R2 (1.91)

 $Q_{\text{max}} = 7.27$  $d = .34$  $V = 3.99$  $E = .60 < .87$

\*\*\*\*\*

## PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

HDS T13 2% cross-slope 8.0%

MANNING'S N= .017 SLOPE= .08

| POINT  | DIST  | ELEV   | POINT  | DIST   | ELEV  | POINT  | DIST  | ELEV   |
|--------|-------|--------|--------|--------|-------|--------|-------|--------|
| 1      | 0.00  | 0.76   | 5      | 7.00   | 0.13  | 9      | 37.63 | 1.40   |
| 2      | 43.75 | 0.67   | 6      | 35.00  | 0.69  | 10     | 46.00 | 1.57   |
| 3      | 4.83  | 0.67   | 7      | 37.00  | 0.73  | 11     | 0.00  | 0.00   |
| 4      | 5.00  | 0.00   | 8      | 37.17  | 1.40  | 12     | 0.00  | 0.00   |
| □ WSEL | DEPTH | FLOW   | FLOW   | WETTED | FLOW  | TOPWID | VEL   | ENERGY |
|        | INC   | AREA   | RATE   | PER    | VEL   |        | HEAD  | HEAD   |
| (FT)   | (FT)  | SQ.FT. | (CFS)  | (FT)   | (FPS) | (FT)   | (FT)  | (FT)   |
| 0.05   | 0.05  | 0.02   | 0.0    | 0.85   | 2.05  | 0.81   | 0.07  | 0.12   |
| 0.10   | 0.10  | 0.08   | 0.3    | 1.71   | 3.25  | 1.63   | 0.16  | 0.26   |
| 0.15   | 0.15  | 0.19   | 0.7    | 3.40   | 3.66  | 3.28   | 0.21  | 0.36   |
| 0.20   | 0.20  | 0.42   | 1.8    | 5.93   | 4.23  | 5.77   | 0.28  | 0.48   |
| 0.25   | 0.25  | 0.77   | 3.9    | 8.46   | 5.00  | 8.26   | 0.39  | 0.64   |
| 0.30   | 0.30  | 1.25   | 7.2    | 10.99  | 5.79  | 10.75  | 0.52  | 0.82   |
| 0.35   | 0.35  | 1.84   | 12.1   | 13.52  | 6.55  | 13.24  | 0.67  | 1.02   |
| 0.40   | 0.40  | 2.57   | 18.7   | 16.05  | 7.29  | 15.73  | 0.83  | 1.23   |
| 0.45   | 0.45  | 3.42   | 27.3   | 18.58  | 8.00  | 18.22  | 0.99  | 1.44   |
| 0.50   | 0.50  | 4.39   | 38.1   | 21.11  | 8.68  | 20.71  | 1.17  | 1.67   |
| 0.55   | 0.55  | 5.49   | 51.3   | 23.64  | 9.34  | 23.20  | 1.35  | 1.90   |
| 0.60   | 0.60  | 6.71   | 67.0   | 26.17  | 9.98  | 25.69  | 1.55  | 2.15   |
| 0.65   | 0.65  | 8.06   | 85.4   | 28.70  | 10.60 | 28.18  | 1.75  | 2.40   |
| 0.70   | 0.70  | 10.92  | 68.9   | 84.70  | 6.31  | 84.17  | 0.62  | 1.32   |
| 0.75   | 0.75  | 15.78  | 106.6  | 110.53 | 6.75  | 109.98 | 0.71  | 1.46   |
| 0.80   | 0.80  | 21.50  | 173.4  | 115.44 | 8.06  | 114.86 | 1.01  | 1.81   |
| 0.85   | 0.85  | 27.25  | 257.2  | 115.50 | 9.44  | 114.87 | 1.38  | 2.23   |
| 0.90   | 0.90  | 32.99  | 353.7  | 115.55 | 10.72 | 114.88 | 1.78  | 2.68   |
| 0.95   | 0.95  | 38.73  | 462.0  | 115.60 | 11.93 | 114.90 | 2.21  | 3.16   |
| 1.00   | 1.00  | 44.48  | 581.6  | 115.65 | 13.08 | 114.91 | 2.65  | 3.65   |
| 1.05   | 1.05  | 50.23  | 711.9  | 115.70 | 14.17 | 114.92 | 3.12  | 4.17   |
| 1.10   | 1.10  | 55.97  | 852.5  | 115.75 | 15.23 | 114.93 | 3.60  | 4.70   |
| 1.15   | 1.15  | 61.72  | 1003.1 | 115.80 | 16.25 | 114.95 | 4.10  | 5.25   |
| 1.20   | 1.20  | 67.47  | 1163.2 | 115.86 | 17.24 | 114.96 | 4.62  | 5.82   |
| 1.25   | 1.25  | 73.21  | 1332.6 | 115.91 | 18.20 | 114.97 | 5.14  | 6.39   |
| 1.30   | 1.30  | 78.96  | 1511.1 | 115.96 | 19.14 | 114.98 | 5.69  | 6.99   |
| 1.35   | 1.35  | 84.71  | 1698.4 | 116.01 | 20.05 | 115.00 | 6.24  | 7.59   |
| 1.40   | 1.40  | 90.46  | 1894.3 | 116.06 | 20.94 | 115.01 | 6.81  | 8.21   |
| 1.45   | 1.45  | 96.30  | 2067.7 | 118.98 | 21.47 | 117.93 | 7.16  | 8.61   |
| 1.50   | 1.50  | 102.26 | 2254.3 | 121.45 | 22.05 | 120.39 | 7.55  | 9.05   |
| 1.55   | 1.55  | 108.34 | 2449.1 | 123.91 | 22.61 | 122.85 | 7.94  | 9.49   |
| 1.57   | 1.57  | 110.80 | 2529.4 | 124.89 | 22.83 | 123.84 | 8.09  | 9.66   |

$$BCA-2C-R1 = 2.9245$$

$$d = .22$$

$$V = 4.600$$

$$E = .56 < .97 \checkmark$$

\*\*\*\*\*

PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

HDS T13 2% cross-slope 4.03%

MANNING'S N= .017 SLOPE= .0403

| POINT  | DIST  | ELEV   | POINT  | DIST   | ELEV  | POINT  | DIST  | ELEV   |
|--------|-------|--------|--------|--------|-------|--------|-------|--------|
| 1      | 0.00  | 0.76   | 5      | 7.00   | 0.13  | 9      | 37.63 | 1.40   |
| 2      | 43.75 | 0.67   | 6      | 35.00  | 0.69  | 10     | 46.00 | 1.57   |
| 3      | 4.83  | 0.67   | 7      | 37.00  | 0.73  | 11     | 0.00  | 0.00   |
| 4      | 5.00  | 0.00   | 8      | 37.17  | 1.40  | 12     | 0.00  | 0.00   |
| □ WSEL | DEPTH | FLOW   | FLOW   | WETTED | FLOW  | TOPWID | VEL   | ENERGY |
|        | INC   | AREA   | RATE   | PER    | VEL   |        | HEAD  | HEAD   |
| (FT)   | (FT)  | SQ.FT. | (CFS)  | (FT)   | (FPS) | (FT)   | (FT)  | (FT)   |
| 0.05   | 0.05  | 0.02   | 0.0    | 0.85   | 1.45  | 0.81   | 0.03  | 0.08   |
| 0.10   | 0.10  | 0.08   | 0.2    | 1.71   | 2.31  | 1.63   | 0.08  | 0.18   |
| 0.15   | 0.15  | 0.19   | 0.5    | 3.40   | 2.60  | 3.28   | 0.10  | 0.25   |
| 0.20   | 0.20  | 0.42   | 1.3    | 5.93   | 3.00  | 5.77   | 0.14  | 0.34   |
| 0.25   | 0.25  | 0.77   | 2.7    | 8.46   | 3.55  | 8.26   | 0.20  | 0.45   |
| 0.30   | 0.30  | 1.25   | 5.1    | 10.99  | 4.11  | 10.75  | 0.26  | 0.56   |
| 0.35   | 0.35  | 1.84   | 8.6    | 13.52  | 4.65  | 13.24  | 0.34  | 0.69   |
| 0.40   | 0.40  | 2.57   | 13.3   | 16.05  | 5.17  | 15.73  | 0.42  | 0.82   |
| 0.45   | 0.45  | 3.42   | 19.4   | 18.58  | 5.68  | 18.22  | 0.50  | 0.95   |
| 0.50   | 0.50  | 4.39   | 27.1   | 21.11  | 6.16  | 20.71  | 0.59  | 1.09   |
| 0.55   | 0.55  | 5.49   | 36.4   | 23.64  | 6.63  | 23.20  | 0.68  | 1.23   |
| 0.60   | 0.60  | 6.71   | 47.5   | 26.17  | 7.08  | 25.69  | 0.78  | 1.38   |
| 0.65   | 0.65  | 8.06   | 60.6   | 28.70  | 7.52  | 28.18  | 0.88  | 1.53   |
| 0.70   | 0.70  | 10.92  | 48.9   | 84.70  | 4.48  | 84.17  | 0.31  | 1.01   |
| 0.75   | 0.75  | 15.78  | 75.7   | 110.53 | 4.79  | 109.98 | 0.36  | 1.11   |
| 0.80   | 0.80  | 21.50  | 123.1  | 115.44 | 5.72  | 114.86 | 0.51  | 1.31   |
| 0.85   | 0.85  | 27.25  | 182.5  | 115.50 | 6.70  | 114.87 | 0.70  | 1.55   |
| 0.90   | 0.90  | 32.99  | 251.0  | 115.55 | 7.61  | 114.88 | 0.90  | 1.80   |
| 0.95   | 0.95  | 38.73  | 327.9  | 115.60 | 8.47  | 114.90 | 1.11  | 2.06   |
| 1.00   | 1.00  | 44.48  | 412.8  | 115.65 | 9.28  | 114.91 | 1.34  | 2.34   |
| 1.05   | 1.05  | 50.23  | 505.3  | 115.70 | 10.06 | 114.92 | 1.57  | 2.62   |
| 1.10   | 1.10  | 55.97  | 605.1  | 115.75 | 10.81 | 114.93 | 1.81  | 2.91   |
| 1.15   | 1.15  | 61.72  | 711.9  | 115.80 | 11.53 | 114.95 | 2.07  | 3.22   |
| 1.20   | 1.20  | 67.47  | 825.6  | 115.86 | 12.24 | 114.96 | 2.33  | 3.53   |
| 1.25   | 1.25  | 73.21  | 945.8  | 115.91 | 12.92 | 114.97 | 2.59  | 3.84   |
| 1.30   | 1.30  | 78.96  | 1072.5 | 115.96 | 13.58 | 114.98 | 2.86  | 4.16   |
| 1.35   | 1.35  | 84.71  | 1205.4 | 116.01 | 14.23 | 115.00 | 3.14  | 4.49   |
| 1.40   | 1.40  | 90.46  | 1344.5 | 116.06 | 14.86 | 115.01 | 3.43  | 4.83   |
| 1.45   | 1.45  | 96.30  | 1467.6 | 118.98 | 15.24 | 117.93 | 3.61  | 5.06   |
| 1.50   | 1.50  | 102.26 | 1600.0 | 121.45 | 15.65 | 120.39 | 3.80  | 5.30   |
| 1.55   | 1.55  | 108.34 | 1738.3 | 123.91 | 16.04 | 122.85 | 4.00  | 5.55   |
| 1.57   | 1.57  | 110.80 | 1795.2 | 124.89 | 16.20 | 123.84 | 4.08  | 5.65   |

BCA-2C-R1(2.82) + BCA-2C-R2(8.61) + BCA-2C-R5(4.74)

$$Q_{100} = 16.17$$

$$d = .42$$

$$V = 5.41$$

$$E = .88$$

\*\*\*\*\*

## PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

HDS T13 2% cross-slope 1.33%

MANNING'S N= .017 SLOPE= .0133

| POINT | DIST  | ELEV   | POINT  | DIST   | ELEV  | POINT  | DIST  | ELEV   |
|-------|-------|--------|--------|--------|-------|--------|-------|--------|
| 1     | 0.00  | 0.76   | 5      | 7.00   | 0.13  | 9      | 37.63 | 1.40   |
| 2     | 43.75 | 0.67   | 6      | 35.00  | 0.69  | 10     | 46.00 | 1.57   |
| 3     | 4.83  | 0.67   | 7      | 37.00  | 0.73  | 11     | 0.00  | 0.00   |
| 4     | 5.00  | 0.00   | 8      | 37.17  | 1.40  | 12     | 0.00  | 0.00   |
| WSEL  | DEPTH | FLOW   | FLOW   | WETTED | FLOW  | TOPWID | VEL   | ENERGY |
| (FT)  | INC   | AREA   | RATE   | PER    | VEL   | (FT)   | HEAD  | HEAD   |
| (FT)  | (FT)  | SQ.FT. | (CFS)  | (FT)   | (FPS) | (FT)   | (FT)  | (FT)   |
| 0.05  | 0.05  | 0.02   | 0.0    | 0.85   | 0.83  | 0.81   | 0.01  | 0.06   |
| 0.10  | 0.10  | 0.08   | 0.1    | 1.71   | 1.32  | 1.63   | 0.03  | 0.13   |
| 0.15  | 0.15  | 0.19   | 0.3    | 3.40   | 1.49  | 3.28   | 0.03  | 0.18   |
| 0.20  | 0.20  | 0.42   | 0.7    | 5.93   | 1.72  | 5.77   | 0.05  | 0.25   |
| 0.25  | 0.25  | 0.77   | 1.6    | 8.46   | 2.04  | 8.26   | 0.06  | 0.31   |
| 0.30  | 0.30  | 1.25   | 2.9    | 10.99  | 2.36  | 10.75  | 0.09  | 0.39   |
| 0.35  | 0.35  | 1.84   | 4.9    | 13.52  | 2.67  | 13.24  | 0.11  | 0.46   |
| 0.40  | 0.40  | 2.57   | 7.6    | 16.05  | 2.97  | 15.73  | 0.14  | 0.54   |
| 0.45  | 0.45  | 3.42   | 11.1   | 18.58  | 3.26  | 18.22  | 0.17  | 0.62   |
| 0.50  | 0.50  | 4.39   | 15.5   | 21.11  | 3.54  | 20.71  | 0.19  | 0.69   |
| 0.55  | 0.55  | 5.49   | 20.9   | 23.64  | 3.81  | 23.20  | 0.23  | 0.78   |
| 0.60  | 0.60  | 6.71   | 27.3   | 26.17  | 4.07  | 25.69  | 0.26  | 0.86   |
| 0.65  | 0.65  | 8.06   | 34.8   | 28.70  | 4.32  | 28.18  | 0.29  | 0.94   |
| 0.70  | 0.70  | 10.92  | 43.5   | 31.23  | 4.57  | 30.67  | 0.32  | 1.02   |
| 0.75  | 0.75  | 15.78  | 54.4   | 38.74  | 4.82  | 38.16  | 0.35  | 1.10   |
| 0.80  | 0.80  | 21.50  | 70.7   | 51.25  | 5.07  | 50.65  | 0.38  | 1.18   |
| 0.85  | 0.85  | 27.25  | 104.9  | 77.76  | 5.32  | 77.14  | 0.41  | 1.26   |
| 0.90  | 0.90  | 32.99  | 144.2  | 104.27 | 5.57  | 103.63 | 0.44  | 1.34   |
| 0.95  | 0.95  | 38.73  | 188.4  | 139.78 | 5.82  | 138.12 | 0.47  | 1.42   |
| 1.00  | 1.00  | 44.48  | 237.1  | 175.29 | 6.07  | 172.61 | 0.50  | 1.50   |
| 1.05  | 1.05  | 50.23  | 290.3  | 220.80 | 6.32  | 218.10 | 0.53  | 1.58   |
| 1.10  | 1.10  | 55.97  | 347.6  | 266.31 | 6.57  | 263.59 | 0.56  | 1.66   |
| 1.15  | 1.15  | 61.72  | 409.0  | 321.82 | 6.82  | 319.08 | 0.59  | 1.74   |
| 1.20  | 1.20  | 67.47  | 474.3  | 377.33 | 7.07  | 374.57 | 0.62  | 1.82   |
| 1.25  | 1.25  | 73.21  | 543.4  | 442.84 | 7.32  | 440.06 | 0.65  | 1.90   |
| 1.30  | 1.30  | 78.96  | 616.1  | 508.35 | 7.57  | 505.55 | 0.68  | 1.98   |
| 1.35  | 1.35  | 84.71  | 692.5  | 573.86 | 7.82  | 571.04 | 0.71  | 2.06   |
| 1.40  | 1.40  | 90.46  | 772.4  | 644.37 | 8.07  | 641.53 | 0.74  | 2.14   |
| 1.45  | 1.45  | 96.30  | 843.1  | 714.88 | 8.32  | 712.02 | 0.77  | 2.22   |
| 1.50  | 1.50  | 102.26 | 919.2  | 785.39 | 8.57  | 782.51 | 0.80  | 2.30   |
| 1.55  | 1.55  | 108.34 | 998.6  | 855.90 | 8.82  | 853.00 | 0.83  | 2.38   |
| 1.57  | 1.57  | 110.80 | 1031.3 | 888.41 | 9.07  | 885.49 | 0.86  | 2.46   |

BCA-2C-R1 (2.82) + BCA-2C-R2 (8.61) + BCA-2C-R5 (4.74)

$$Q_{100} = 16.17$$

$$d = .51$$

$$V = 3.57$$

$$E = 1.70 \text{ to } 2.87$$

11-11-61

Single "A" sump

$Q_i = 16.17 \text{ cfs}$

$Q_{100} = 11.43 \text{ cfs}$

$Q_{100} = 4.74 \text{ cfs}$

4  
48" culverts

# Type "A" single (2)

## ANALYSIS OF AN INLET IN A SUMP CONDITION -

INLET TYPE: Single Grate Type "A" with curb opening wings on both sides on inlet.

WEIR:  $Q = C * L * H^{1.5}$

Wing opening

C= 3.0

L= 4.0 ft

$Q = 3.0(4.0)H^{1.5} = 12.0H^{1.5}$

Grate opening

C=3.0

L(single grate)=[(2.67')+2(1.8')]=6.2'

$Q = 3.0(6.27)H^{1.5} = 18.81 * H^{1.5}$

ORIFICE:  $Q = C * A * (2 * G * H)^{0.5}$

Grate opening

C=0.6

A(single grate)=4.09 sf

$Q = 2.46 * (64.4 * H)^{0.5}$

Wing opening

C=0.6

A=2.0 sf

$Q = 1.2 * (64.4 * H)^{0.5}$

|             | WS<br>ELEVATION | HEIGHT<br>ABOVE INLET | Q (CFS)<br>WEIR<br>WING<br>OPENING | Q (CFS)<br>WEIR<br>SINGLE<br>GRATE | Q (CFS)<br>ORIFICE<br>SINGLE<br>GRATE | TOTAL<br>Q<br>(CFS) | COMMENTS:                                         |
|-------------|-----------------|-----------------------|------------------------------------|------------------------------------|---------------------------------------|---------------------|---------------------------------------------------|
| ~FL @ INLET | 0.00            | 0.00                  | 0.00                               | 0.00                               | 0.00                                  | 0.00                | Flow at single "A" inlet w/ two wing openings     |
|             | 0.10            | 0.10                  | 0.38                               | 0.59                               | 6.24                                  | 1.35                | Weir controls on grate analysis                   |
|             | 0.20            | 0.20                  | 1.07                               | 1.68                               | 8.82                                  | 3.83                |                                                   |
|             | 0.30            | 0.30                  | 1.97                               | 3.09                               | 10.80                                 | 7.03                |                                                   |
|             | 0.40            | 0.40                  | 3.04                               | 4.76                               | 12.47                                 | 10.83               |                                                   |
|             | 0.50            | 0.50                  | 4.24                               | 6.65                               | 13.94                                 | 15.14               | Q(100 yr) = 16.17 cfs is provided at this depth   |
|             | 0.60            | 0.60                  | 5.58                               | 8.74                               | 15.27                                 | 19.90               |                                                   |
| TOP OF CURB | 0.70            | 0.70                  | 7.03                               | 11.02                              | 16.50                                 | 25.07               |                                                   |
|             | 0.80            | 0.80                  | 8.59                               | 13.46                              | 17.64                                 | 30.63               | Q(2x100 yr) = 32.34 cfs is provided at this depth |
|             | 0.90            | 0.90                  | 10.25                              | 16.06                              | 18.71                                 | 36.55               |                                                   |
| ROW LIMIT   | 1.00            | 1.00                  | 12.00                              | 18.81                              | 19.72                                 | 42.81               |                                                   |

NOTE:

The total runoff intercepted by the inlet at the low point in the road is:

$Q(100) = 2 * [(\text{runoff of the wing opening}) + (\text{the lesser of the weir or orifice amount taken by the double grate})]$ .

THE 100 YR STORM EVENT = 16.17CFS at the sump condition

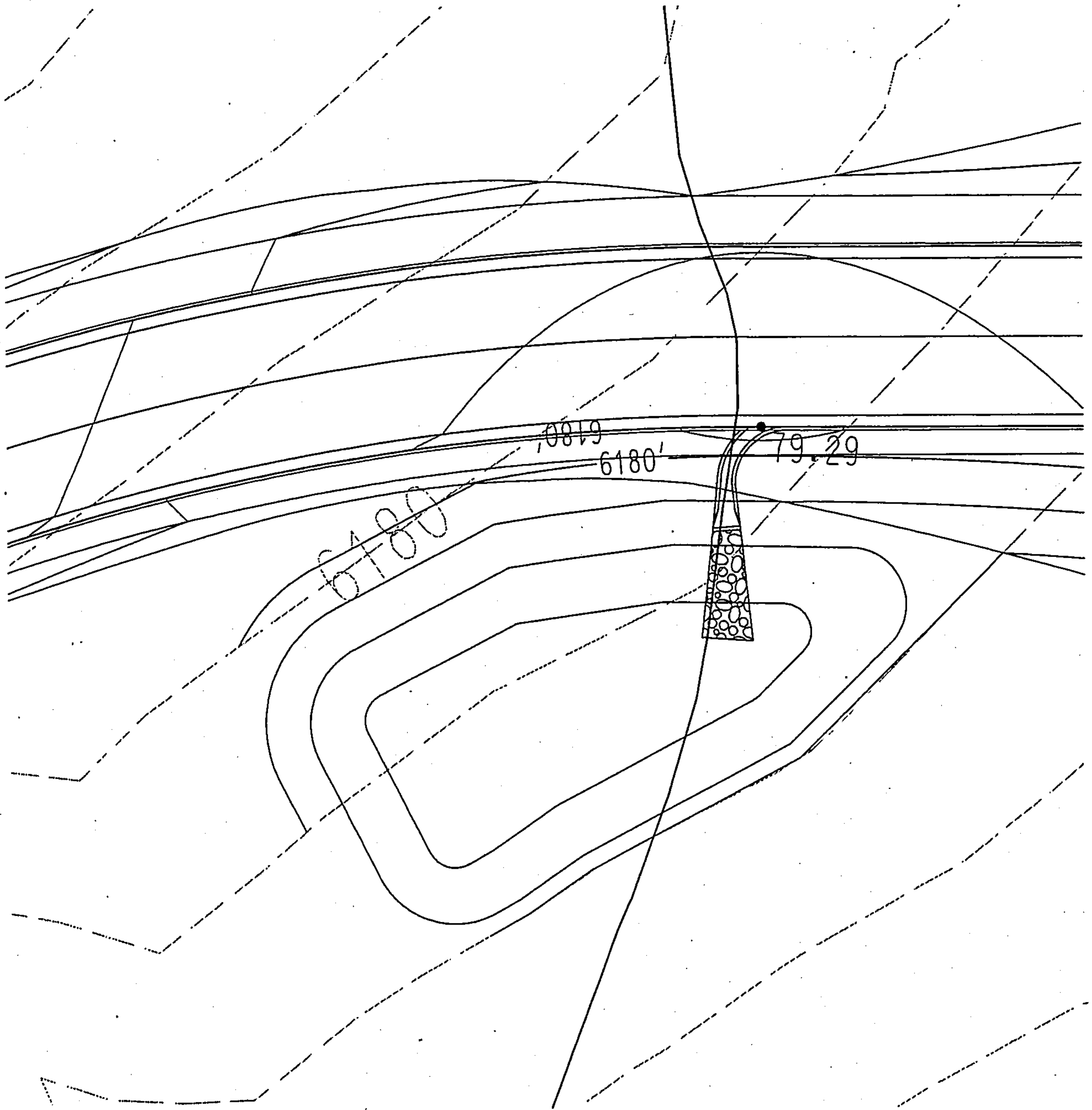
THE 2 x 100 YR STORM EVENT = 32.4 CFS at the sump condition

## APPENDIX G

### POND ANALYSIS

42

1"=30'



Zone 4

Table A-8

Volume for 2-yr storm

$$A = .02 \quad B = 0.11 \quad C = 0.27 \quad D = 1.01$$

$$\text{Basin OS-2-R1} \quad A = 90\% \quad B = 0 \quad C = 0 \quad D = 10\% \quad \text{Acre} = 2.28 \text{ A}$$

$$\text{Weighted E} = \frac{.02(.9)(2.28) + 0.11(0) + 0.27(0) + 1.01(.10)(2.28)}{2.28}$$

$$E = .119$$

.984

$$\text{Basin OS-2-R1} \quad A = 0 \quad B = 10\% \quad C = 0 \quad D = 90\% \quad \text{Acre} = 0.38 \text{ A}$$

$$\text{Weighted E} = \frac{.02(0) + 0.11(.10)(.38) + .27(0) + 1.01(.90)(.38)}{.38}$$

= 2.48

$$E = .92$$

$$V_{360} = \frac{E \cdot \text{Acres}}{12} = \frac{.119(2.28)}{12} = .0226 \text{ acre-ft}$$

$$\frac{.92(.38)}{12} = .0291 \text{ acre-ft}$$

$$\underline{.0517 \text{ acre-ft}}$$

Actual pond volume = .15 ac-ft

See pond volume next sheet

**Bohannon & Huston** INC.

PROJECT NAME \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

PROJECT NO. \_\_\_\_\_ BY \_\_\_\_\_ DATE \_\_\_\_\_

SUBJECT \_\_\_\_\_ CH'D \_\_\_\_\_ DATE \_\_\_\_\_

ENGINEERING ▲

SPATIAL DATA ▲

ADVANCED TECHNOLOGIES ▲

2-7

44  
44  
44  
44

Triangle Volume

Triangle Volume Report

Original Surface: pond top  
ign Surface: pond

Mode: Entire Surface  
Cut Factor: 1.0000  
Fill Factor: 1.0000

Cut: 6448.2525 cu ft  
Fill: 0.0000 cu ft  
Net: 6448.2525 cu ft = .15 acre ft

Cut: 238.8242 cu yd  
Fill: 0.0000 cu yd  
Net: 238.8242 cu yd

## **APPENDIX H**

NATIONWIDE 404 PERMIT CORRESPONDENCE

November 9, 2001

Ms. Jean Manger  
U.S. Army Corps of Engineers  
Albuquerque District  
4101 Jefferson Plaza NE  
Albuquerque, NM. 87109

Re: Tract 13 High Desert - Nationwide Permitting for Linear Transportation Crossing and Utility Line Activities

Dear Ms. Manger:

I write to request your review and approval of our proposed development of Tract 13 in High Desert, as the design and development pertains to the Department of Army Corps of Engineers Nationwide Permit requirements.

Thank you for taking the time to meet with us in the field at High Desert on Wednesday, September 5, 2001, to inspect the site, help us define arroyo ordinary high water marks, and answer our questions concerning the regulations for the nationwide permits.

As we explained in the meeting that day, Tract 13 will be developed in accordance with the City of Albuquerque approved Sector Development Plan for High Desert. It will be necessary to cross Bear Canyon Arroyo and the small finger arroyos within Tract 13 with public roadways and public utilities (water, sanitary sewer, Qwest, PNM-Gas and Electric, and Comcast Cable) to provide the necessary infrastructure for the development of Tract 13.

I have enclosed a series of photographs of all the possible arroyo crossings within Tract 13, indicating the current condition of the possible crossing areas. The photos are numbered, and a map of Tract 13 is attached with photo locations and directions cross-referenced and indicated.

When crossing Bear Canyon Arroyo with a public roadway, it is our intent to span the ordinary high water mark within the arroyo and to disturb the least amount of the existing terrain as possible (see the enclosed Photos and Photo Orientation Map).

After discussions in our meeting with you and after reviewing the current regulations, it is my understanding that the above-mentioned activities could be constructed under the following nationwide permits:

- Nationwide Permit # 33 – Temporary Construction Access and Dewatering

It will be necessary to cross the arroyos with construction equipment in order to build the permanent infrastructure improvements. As with past projects in High Desert, specific corridors will be defined and strictly enforced which minimize the amount of disturbance to the surrounding terrain and vegetation. The contractor will be required to install a temporary construction fence defining these corridors. Upon completion of the infrastructure improvements, the terrain and vegetation (less the permanent roadway crossings) will be restored as much as possible to match its original shape and reclaimed with the mixture of grasses and shrubs most appropriate for the specific site. High Desert has been very successful in the past in restoring similar areas of like construction (i.e., an existing public waterline that crosses the Bear Canyons Arroyo).

The information provided in the Federal Register for Nationwide Permit #33 also focuses on the dewatering activities. The Bear Canyon Arroyo and finger arroyos in Tract 13 are dry arroyos and convey storm water only in significant storm events. Local regulations, by AMAFCA prohibit construction activities within arroyos during the local rainy seasons (the months of July, August and September). Therefore, the dewatering portion of Nationwide Permit #33 is not applicable to our proposed construction activities. Appropriate measures will be taken to maintain near normal downstream flows (if applicable during construction). As mentioned above, the affected areas will be restored to the pre-project conditions.

- Nationwide Permit # 12 – Utility Line Activities

It will be necessary to install below ground wet and dry utilities to serve the proposed development. In order to reduce disturbance where possible, the water, sanitary sewer and dry utilities lines (phone, cable television, gas and electric) will cross the arroyos at the same location as the public roadways. It will also be necessary for the sanitary sewer and the water lines to cross the arroyo in specific locations outside the public roadways in accordance with the City of Albuquerque approved master utility plan. Please refer to the enclosed exhibit for the approximate locations where the water and sewer may be located outside of public roadways (Photo locations 9 – 13 and 23 - 25). As with past projects, the areas affected by the utility crossings not located beneath the roadways will be restored to the pre-project conditions.

It may be necessary to provide a utility access corridor above the proposed utility lines not located within the public roadways. It is my understanding that this is allowed as a part of Nationwide Permit #12 as long as the loss of the waters of the United States is  $\frac{1}{2}$  acre or less. It is our understanding that "Loss of the Water of the United States" is defined as that area between the average normal high water marks determined in the field. The average normal high water mark found in the field ranged at each proposed crossing from eight (8) feet wide to twenty-two (22) feet wide. The actual measurement will be determined when the exact location of the roadway and utility crossings have been designed. At this time our preliminary calculations indicate a loss of waters of the United States of  $\frac{1}{2}$  acre or less.

- Nationwide Permit # 14 – Linear Transportation Crossings

It will be necessary to cross the arroyos in a few isolated locations in order to reach and serve this tract. Bridges or culverts with necessary erosion protection will be installed at these locations. Nationwide Permit #14 subsection (1) allows for public roadway crossings provided the discharge does not cause a loss of greater than  $\frac{1}{2}$  acre of waters of the United States. I have enclosed photos of the arroyos where the roadways are anticipated (Photos #1 – 3, 6 – 7 and 19 - 22). The average normal high water mark found in the field ranged at each proposed crossing from eight (8) feet wide to twenty-two (22) feet wide. The actual measurements will be determined when the exact location of the roadway and utility crossings have been designed. It is my understanding that any necessary erosion control required with the roadway crossings is included in the  $\frac{1}{2}$  acre mentioned above. High Desert Investment Corporation has been successful in providing some erosion control beneath the arroyos and returning the arroyo to its pre-construction condition. If this type of erosion control is used and the pre-construction condition is re-established, it would be my understanding that this would not be included in the  $\frac{1}{2}$  acre disturbance or loss. At this time our preliminary calculations indicate a loss of waters of the United States of  $\frac{1}{2}$  acre or less. The proposed infrastructure will be designed in accordance with the City of Albuquerque requirements. This will include coordinating with the City's FEMA Floodplain Administrator concerning the work with the FEMA Floodplain. The proposed development may require a FEMA letter of map revision.

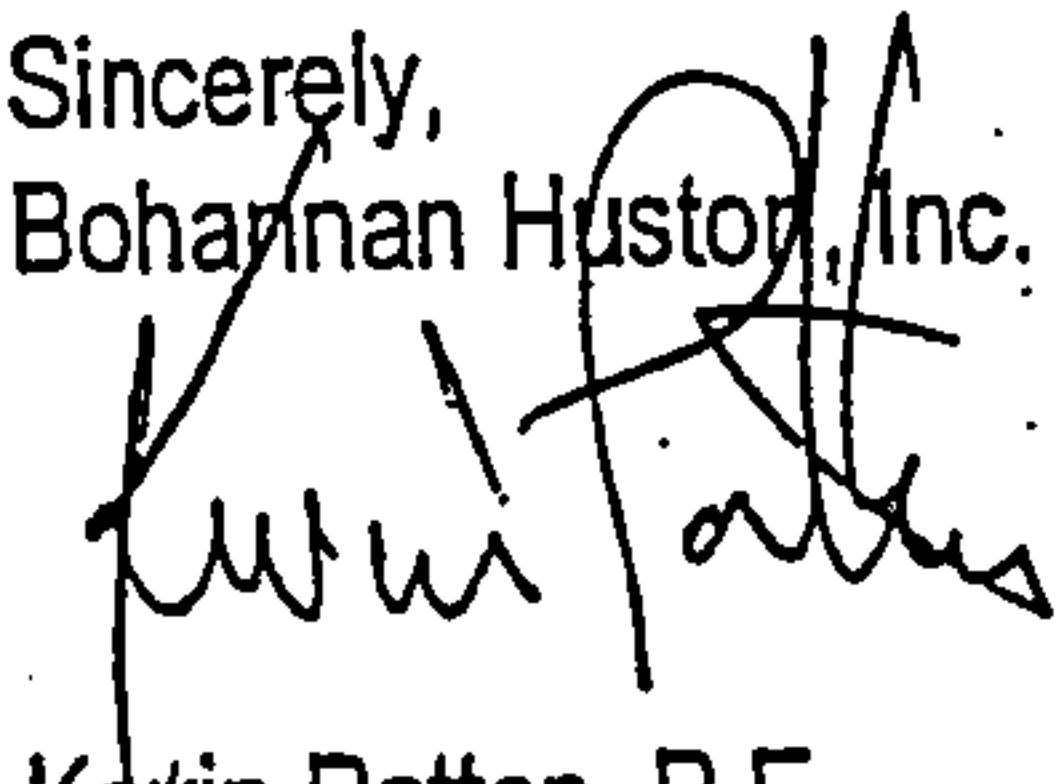
Mrs. Jean Manger  
U.S. Army Corps of Engineers  
November 9, 2001  
Page 3

As mentioned above, as the development progresses and we begin to finalize the crossing locations, we will again coordinate with your office concerning any necessary permitting or change in regulations. In the meantime, we request your review of our understanding of the permits we believe to be necessary from the Army Corps of Engineers concerning the above information. We look forward to hearing from you with written confirmation of our understanding as described in this letter.

Again, please accept our thanks for your site inspection of the possible arroyo crossings and your help in advising us concerning definition of the normal arroyo high water marks. We also appreciate your guidance that the potential arroyo crossings we have planned can in all likelihood be constructed using Nationwide Permits, as detailed in this letter.

Please call me at 823-1000 if you should have any questions or require any additional information.

Sincerely,  
Bohannon Huston, Inc.



Kevin Patton, P.E.  
Project Manager

KP/am  
Enclosures

cc: Douglas Collister, HDIC (w/enclosures)

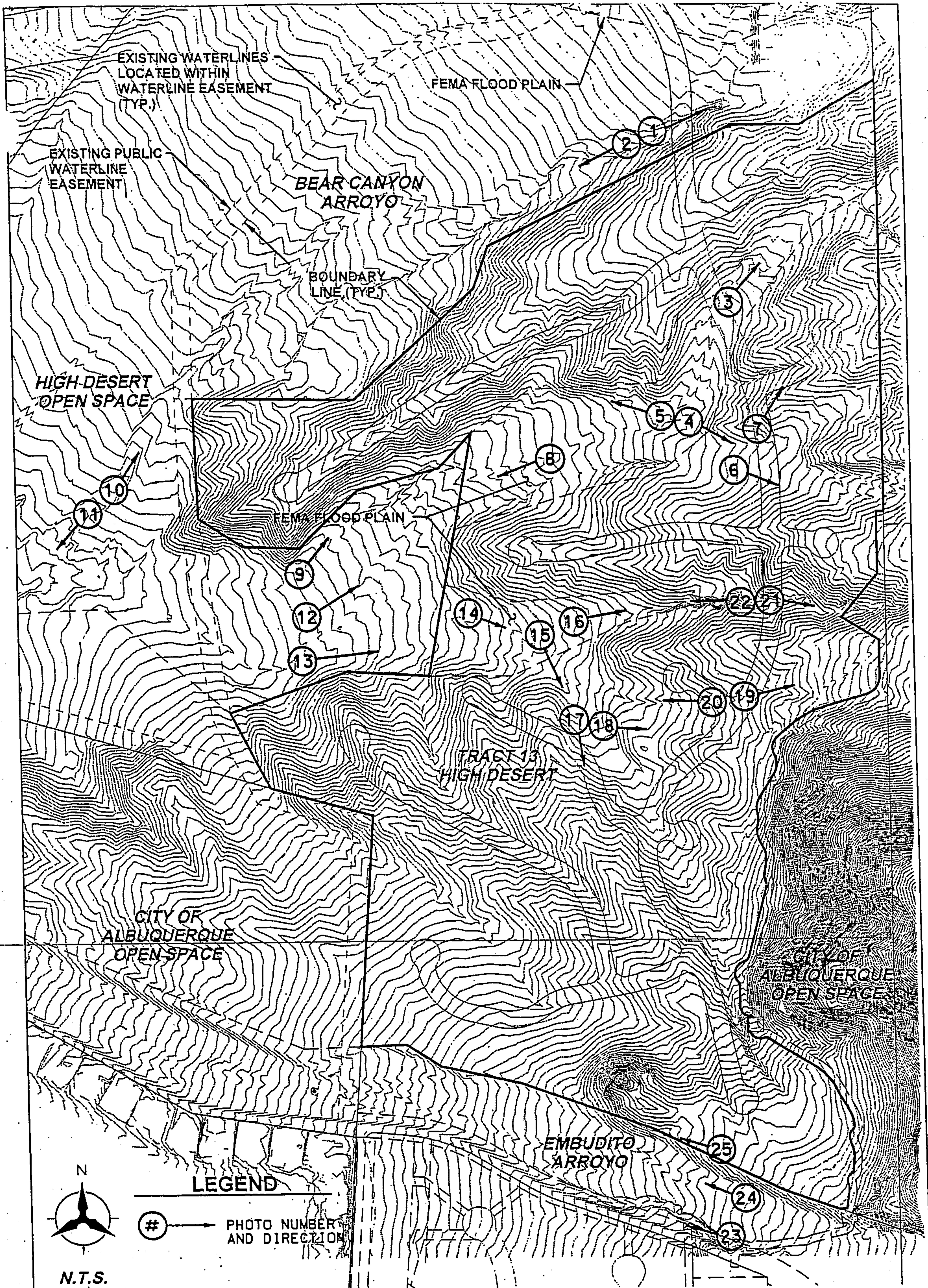




Photo 1



Photo 2

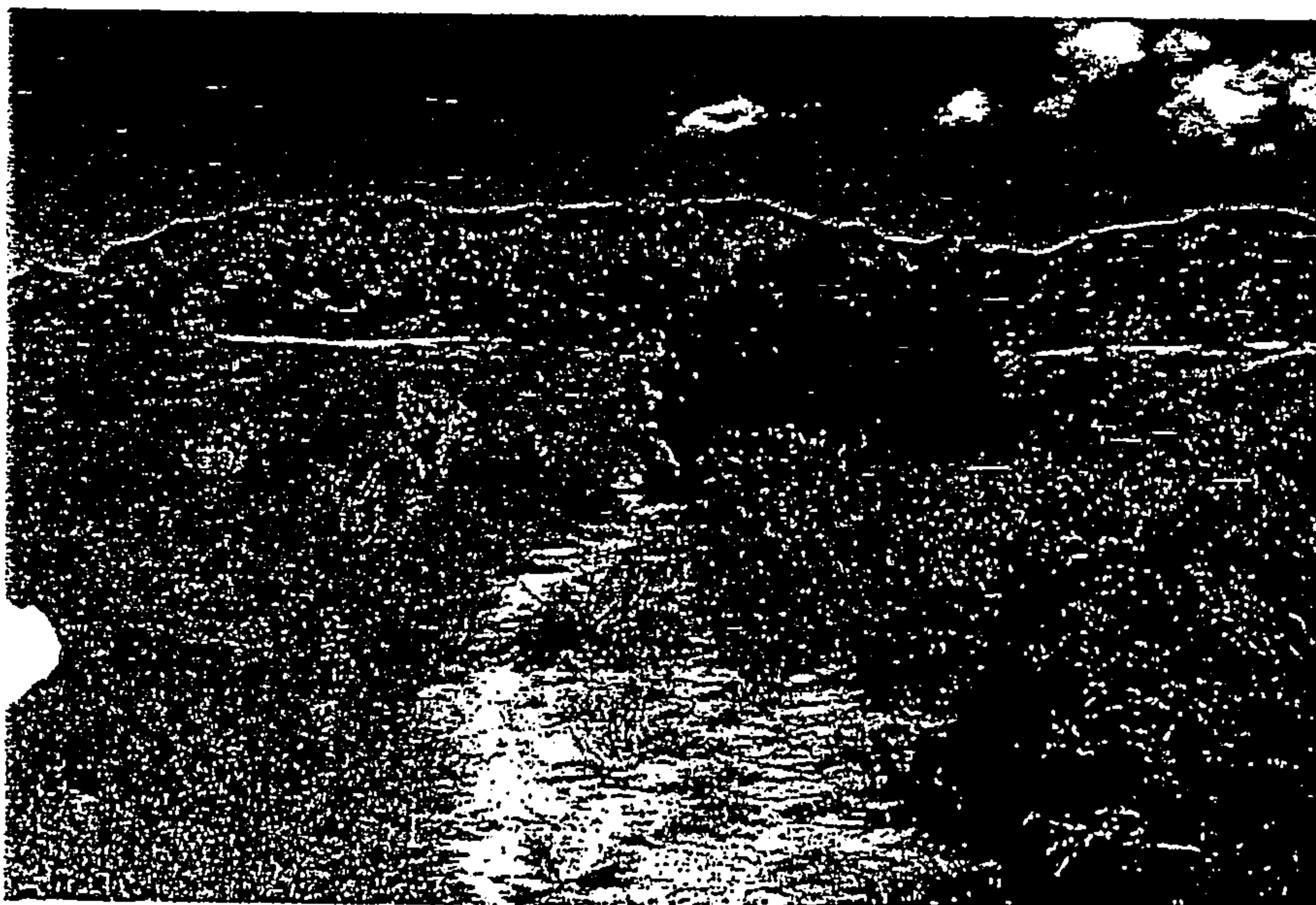


Photo 3



Photo 4



Photo 5



Photo 6

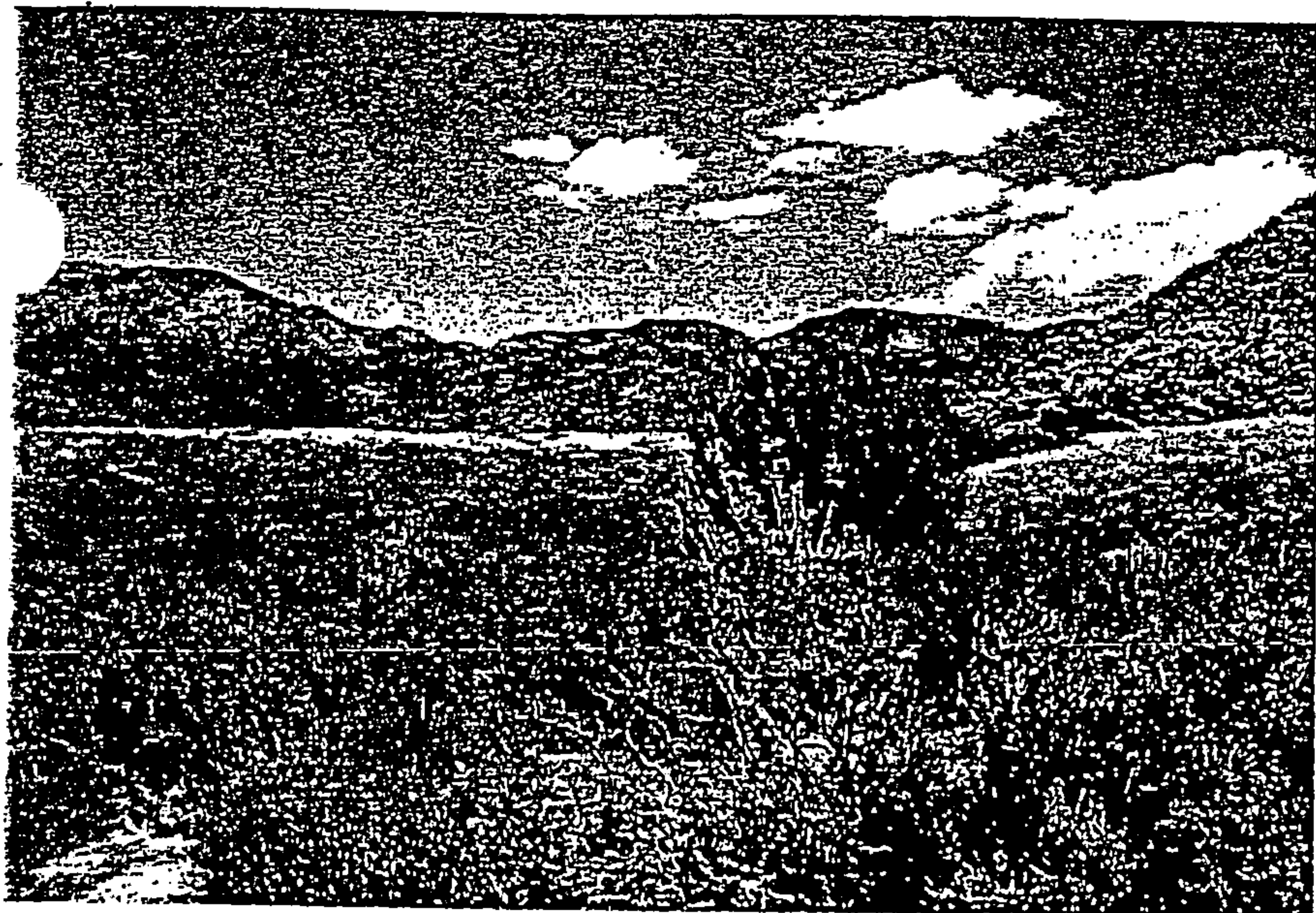


Photo 7

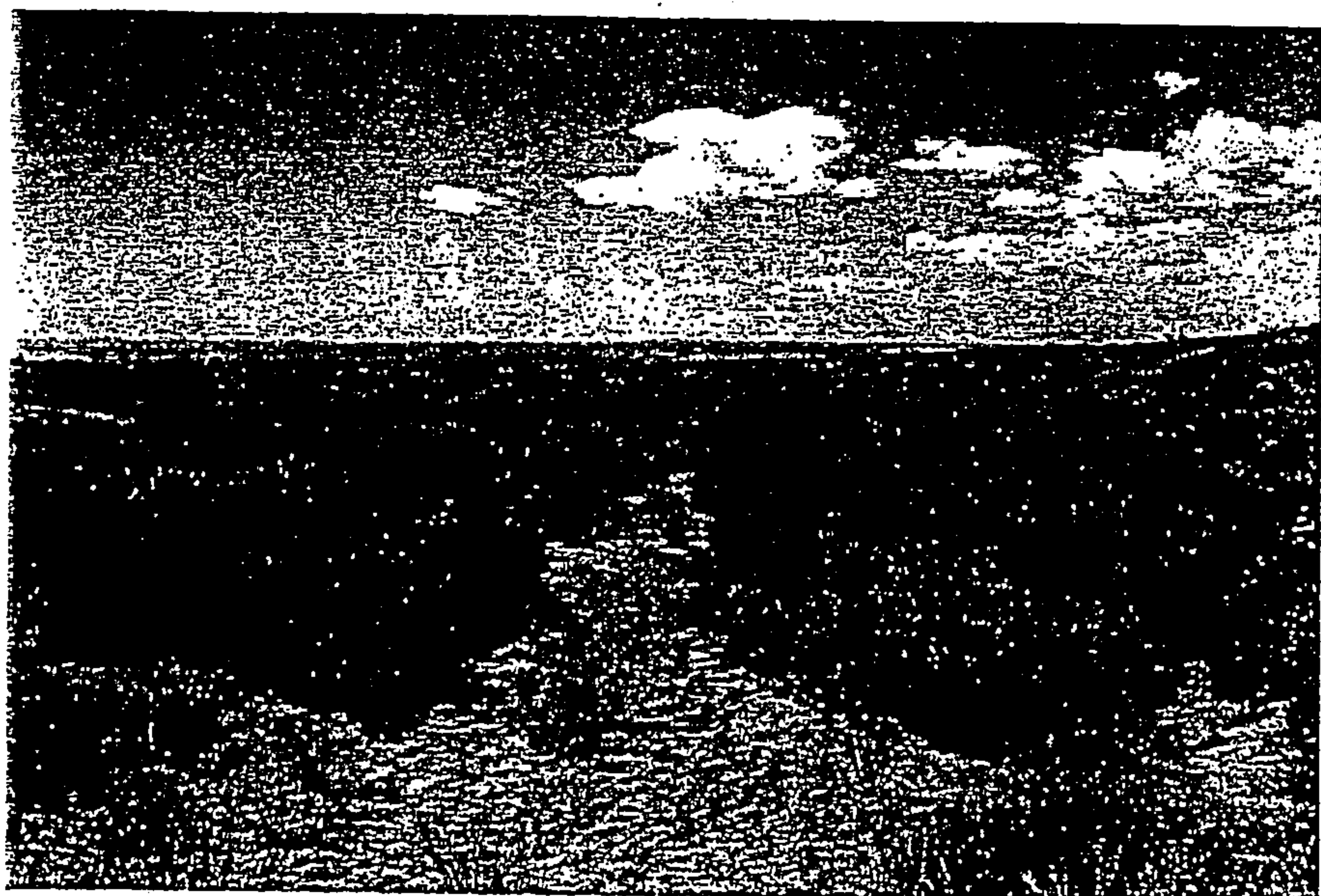


Photo 8

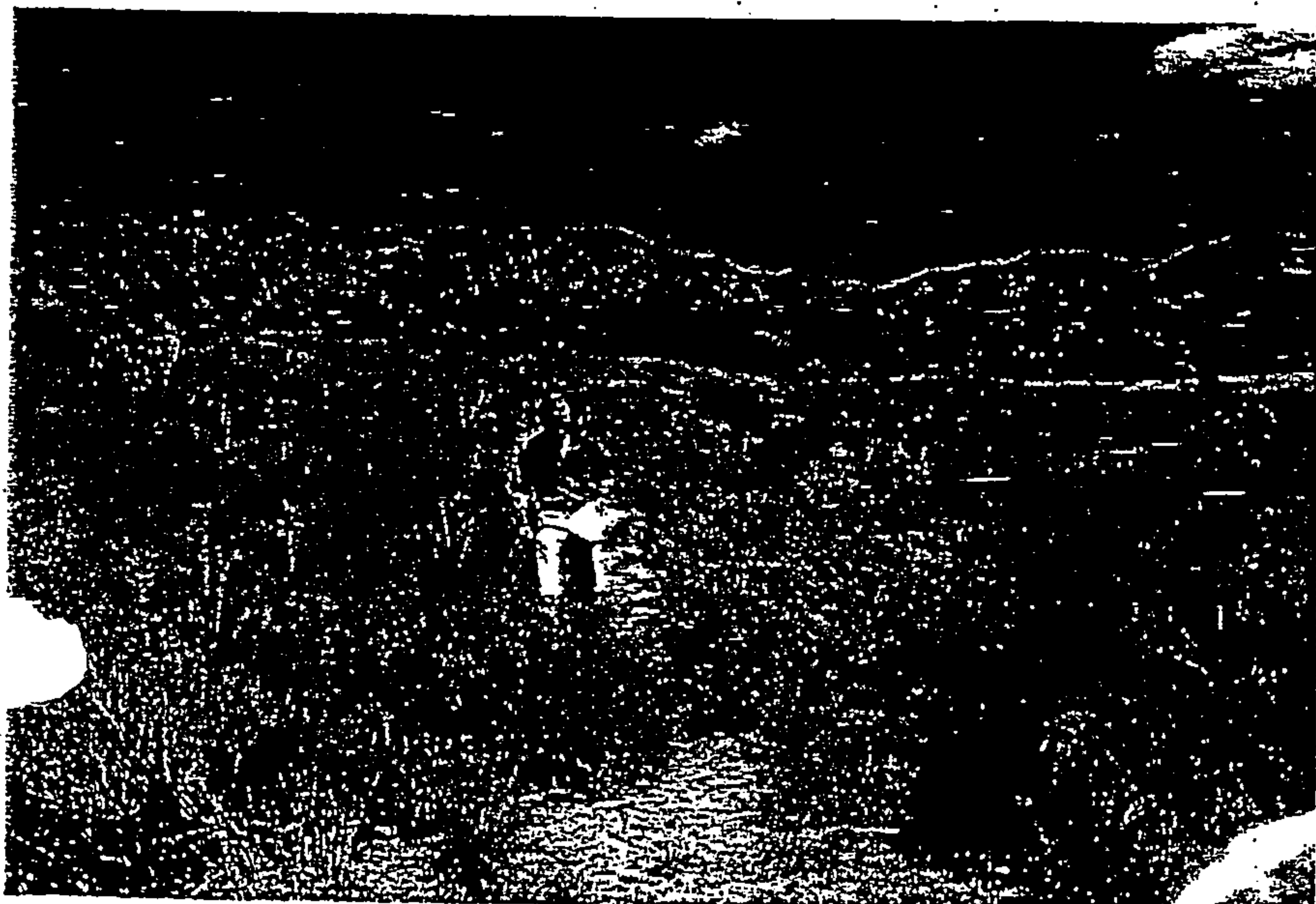


Photo 9

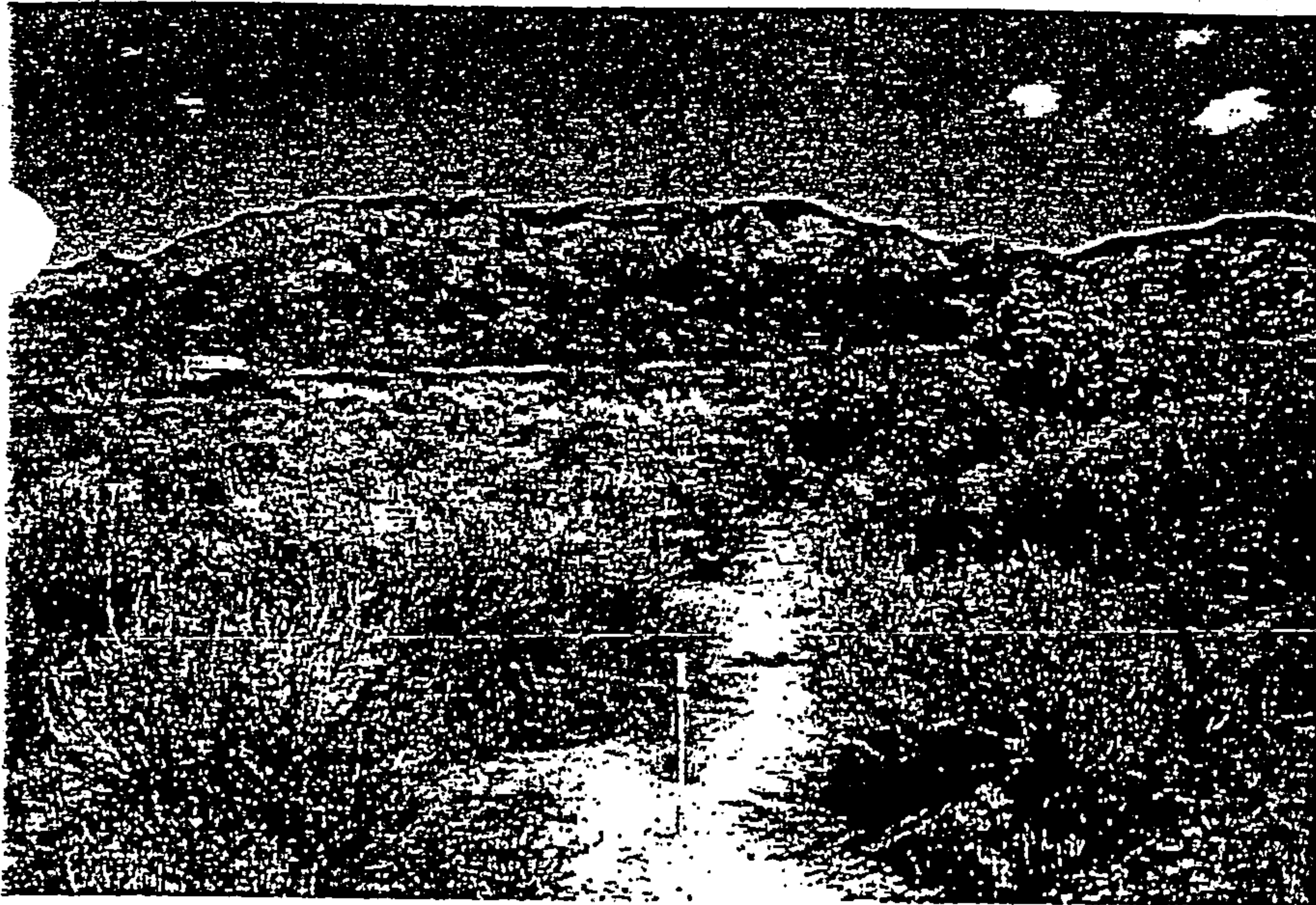


Photo 10

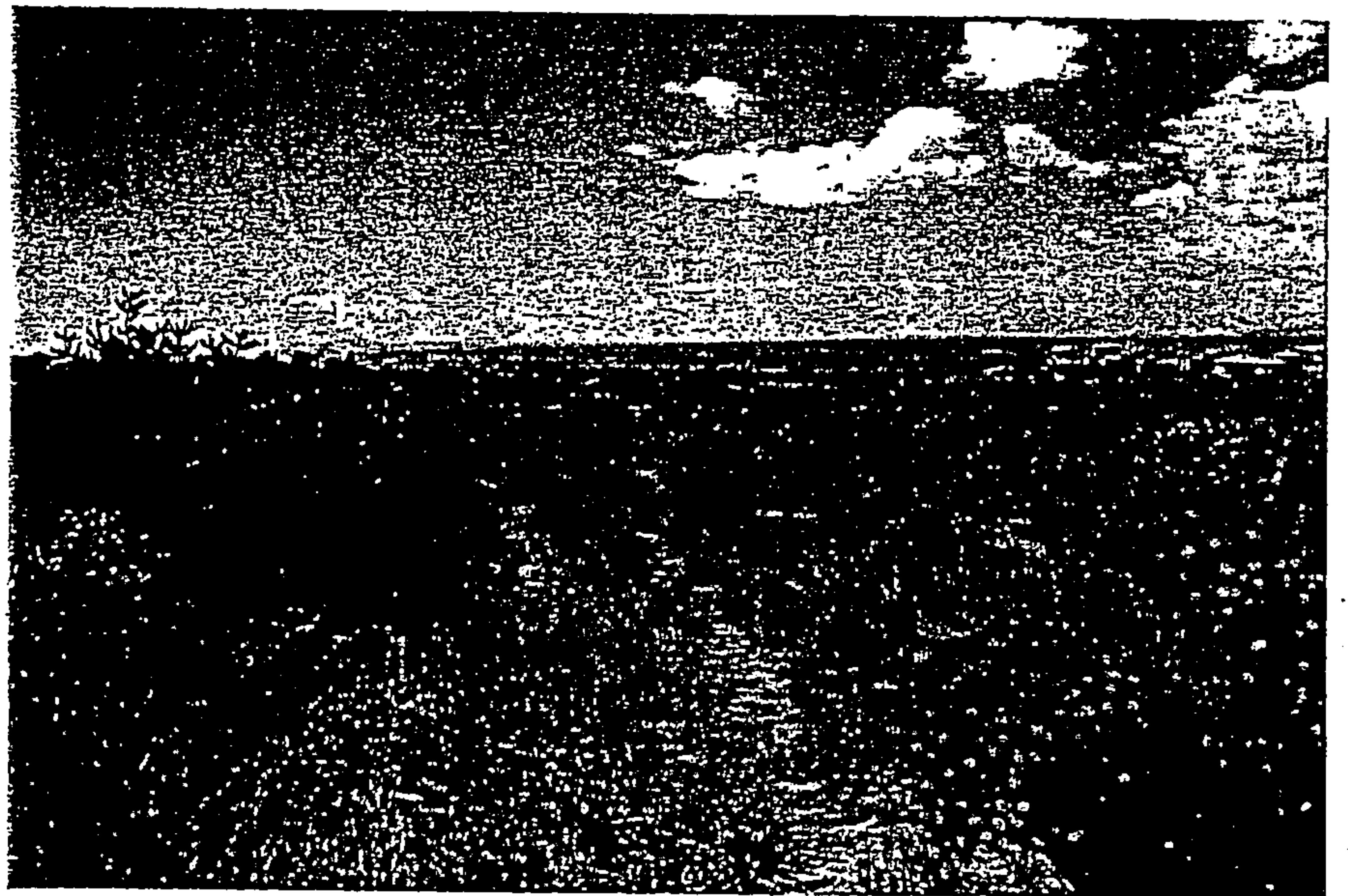


Photo 11

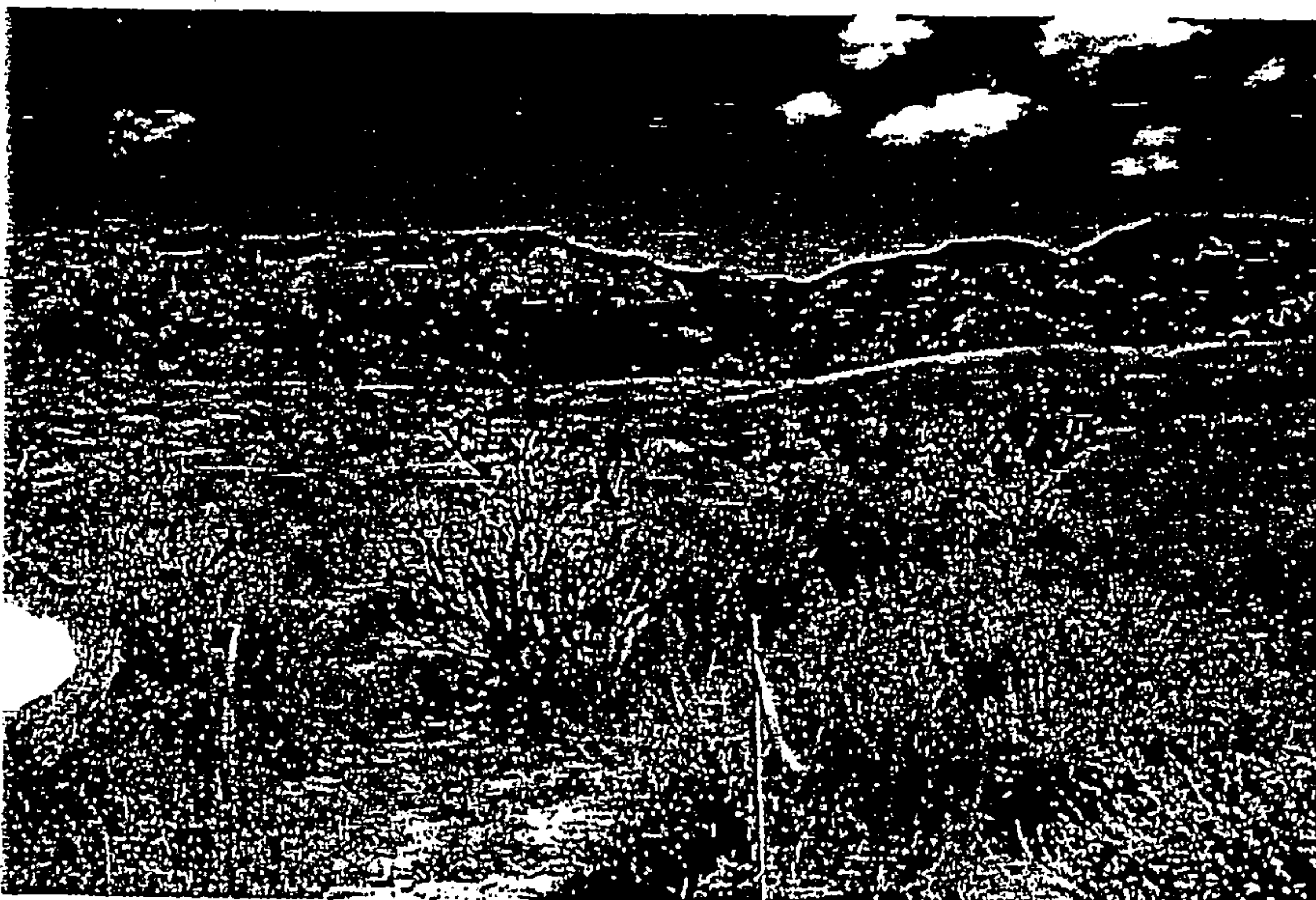


Photo 12

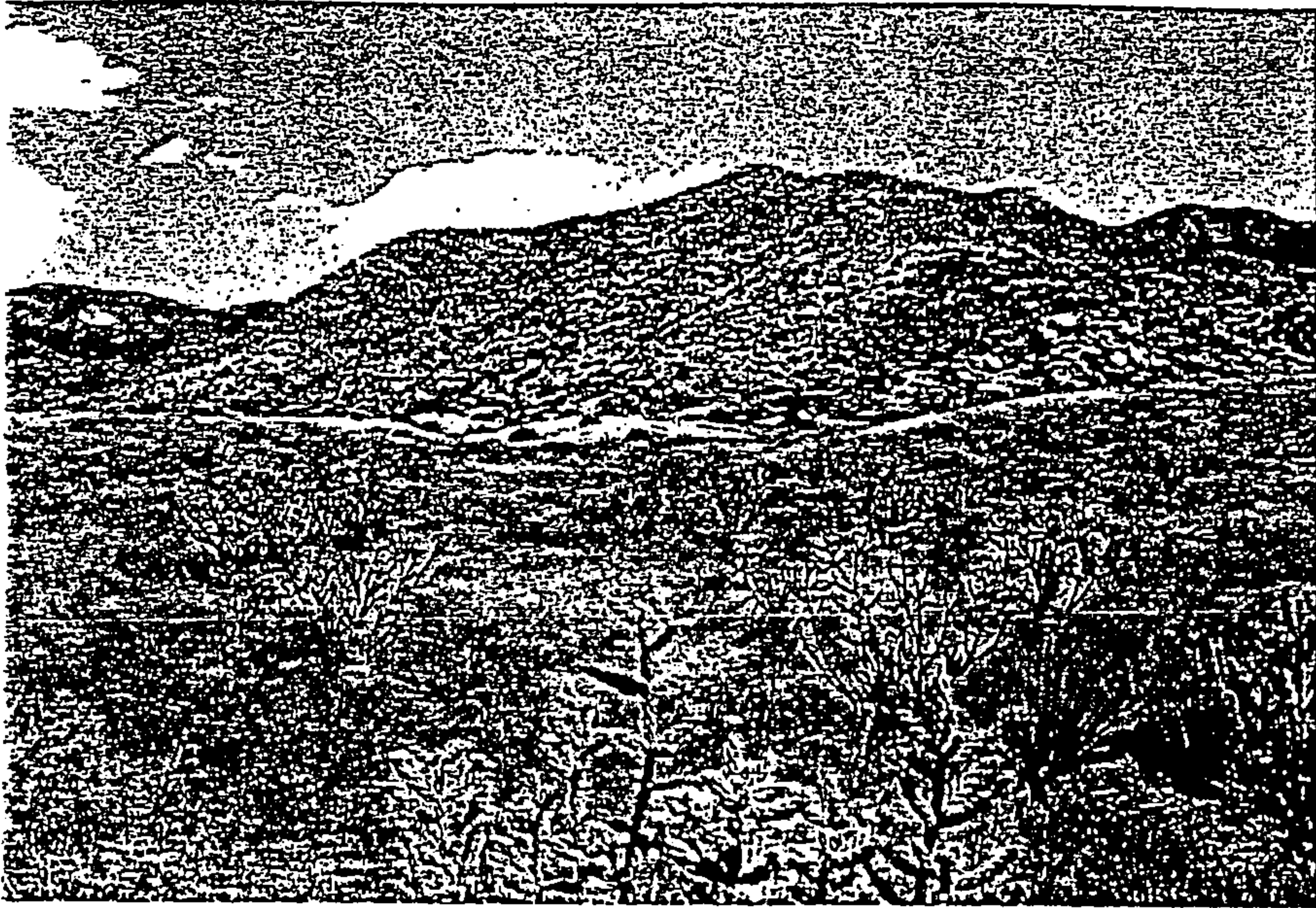


Photo 13

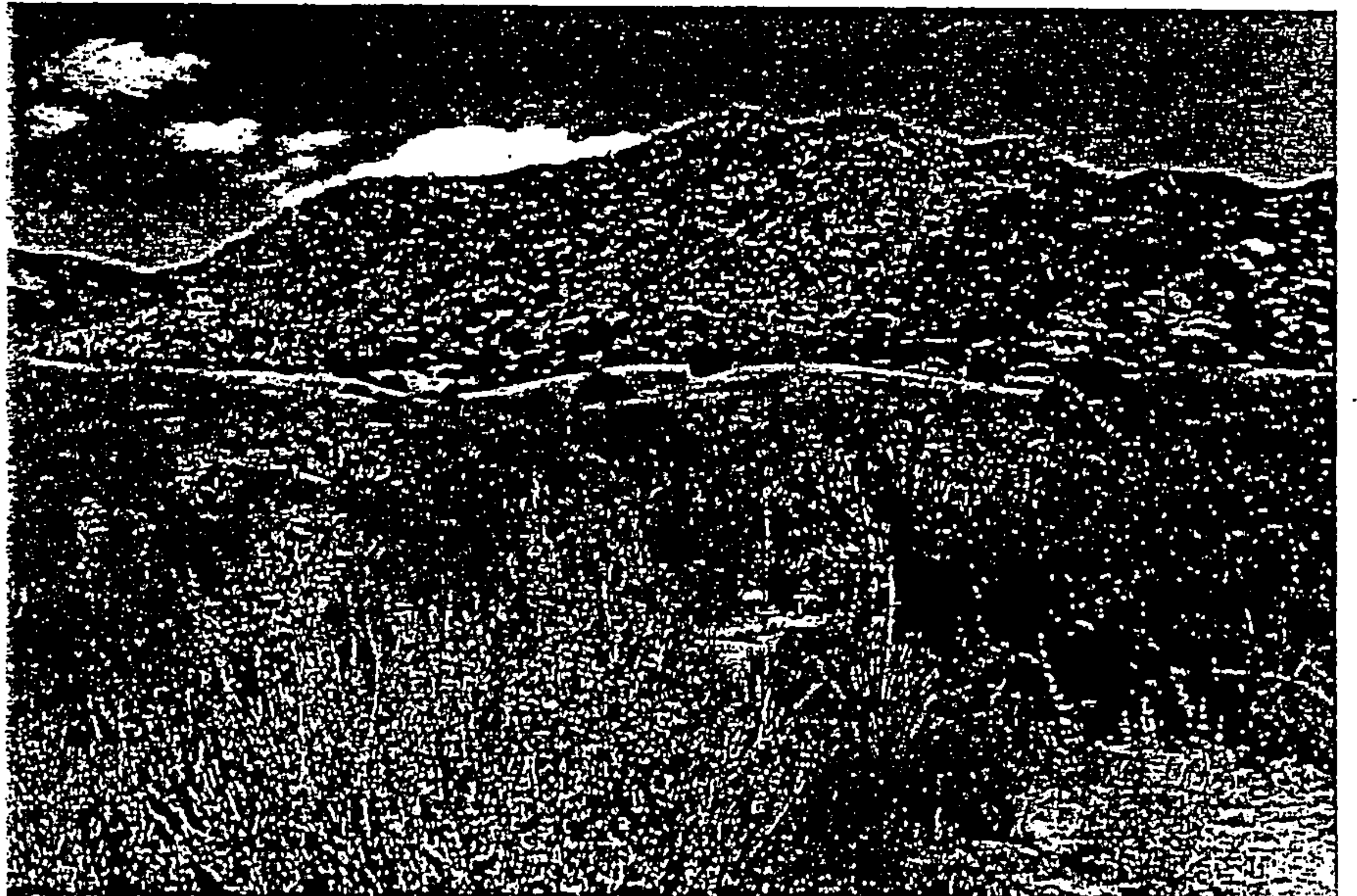


Photo 14



Photo 15

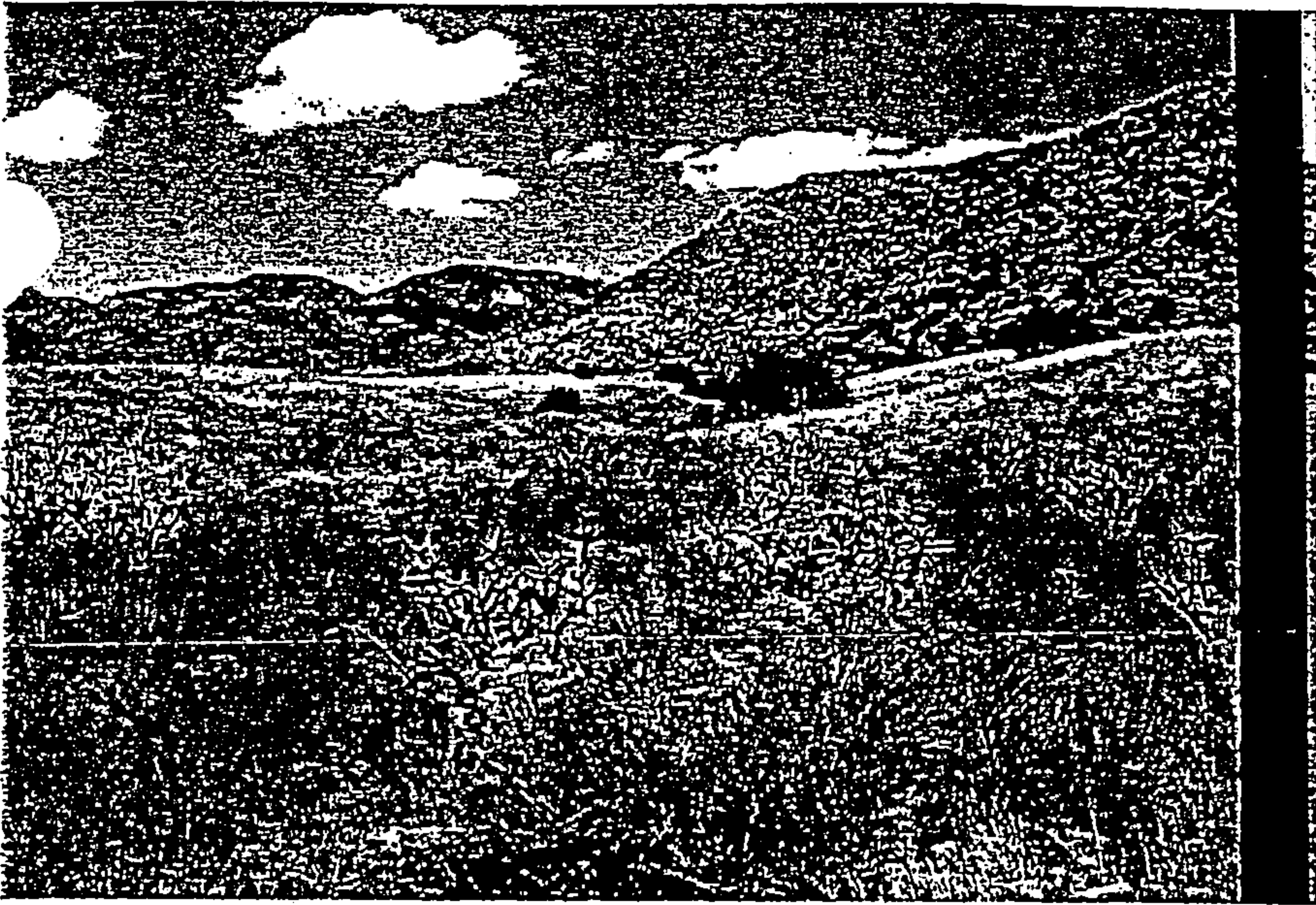


Photo 16



Photo 17



Photo 18

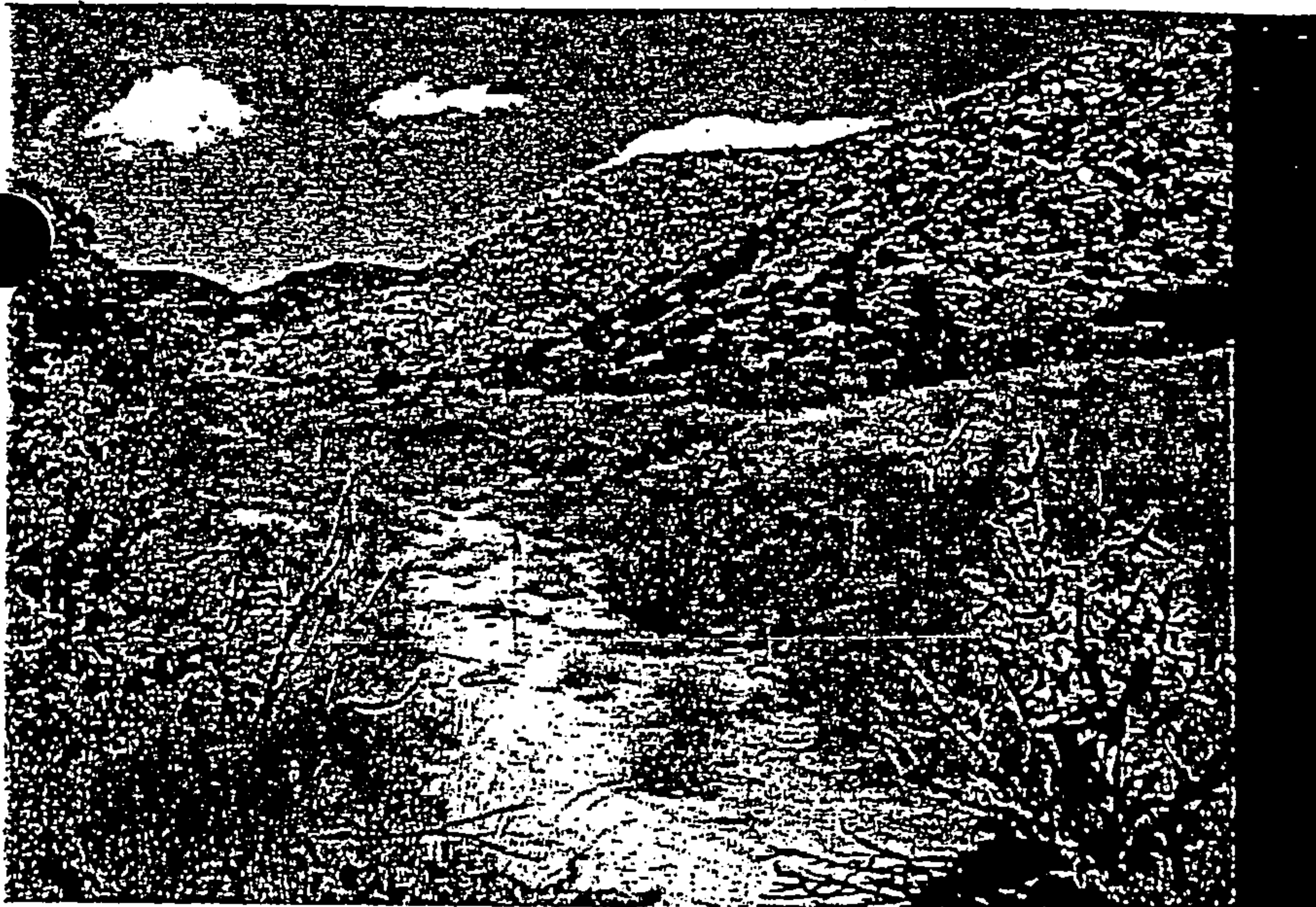


Photo 19



Photo 20

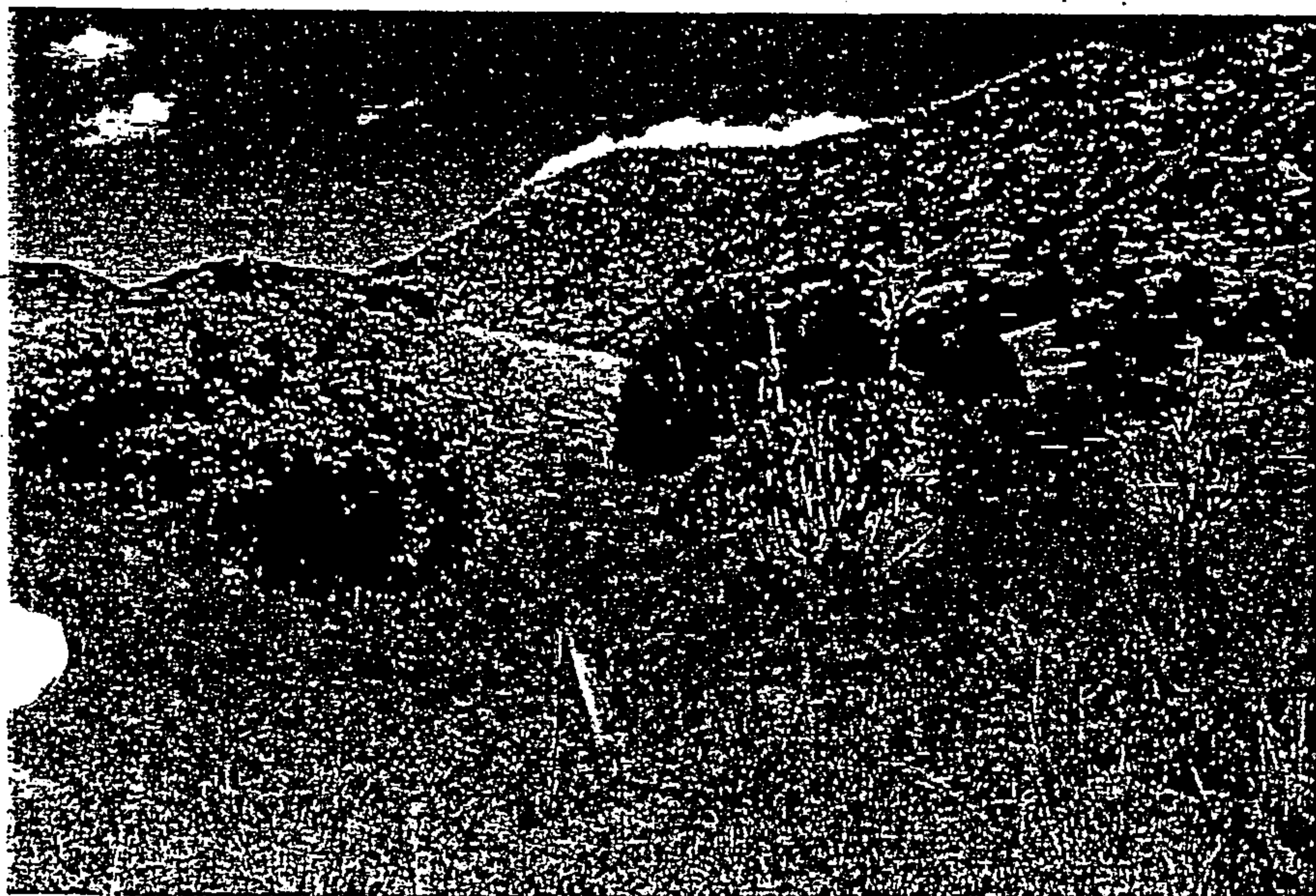


Photo 21



Photo 22



Photo 23



Photo 24



Photo 25

# CLIENT/COURIER TRANSMITTAL

To: Jean Manger  
U.S. Army Corps of Engineers  
Albuquerque District  
4101 Jefferson Plaza NE

phone: 342-3216

Requested By: Kevin Patton / am

Date: November 16, 2001

Time Due: ☒ This A.M. ☐ This P.M.  
☐ Rush ☐ By Tomorrow

BOHANNAN HUSTON

Courtyard One

7500 JEFFERSON NE

Albuquerque

NEW MEXICO 87109

voice 505.823.1000

fax 505.798.7988

Job No.: 01 158 B 03

Job Name: Tract 13 – High Desert

## DELIVERY VIA

- ☒ Courier ☐ Federal Express  
☐ Mail ☐ UPS  
☐ Other \_\_\_\_\_

## PICK UP

Item: \_\_\_\_\_

| <u>ITEM NO.</u> | <u>QUANTITY</u> | <u>DESCRIPTION</u>                                                                                                                    |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 1               | 1               | Letter dated 11/9/01 re: Tract 13 High Desert – Nationwide Permitting for Linear Transportation Crossing and Utility Line Activities. |

## COMMENTS / INSTRUCTIONS

REC'D BY:

*Jean E. Manger*

DATE:

*11/16/01*

TIME:

*1105*



## DEPARTMENT OF THE ARMY

ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS  
4101 JEFFERSON PLAZA NE  
ALBUQUERQUE, NEW MEXICO 87109-3435  
FAX (505) 342-3498

November 29, 2001

REPLY TO  
ATTENTION OF:

Operations Division  
Regulatory Branch

Mr. Kevin Patton, P.E.  
Bohannon-Huston, Inc.  
Courtyard 1  
7500 Jefferson Street NE  
Albuquerque, New Mexico 87109-4335

Dear Mr. Patton:

This replies to your November 9, 2001, letter regarding High Desert's proposed Tract 13 road crossings and utility line activities in Bear Canyon Arroyo and tributaries in Albuquerque, Bernalillo County, New Mexico. We have assigned Action No. 2001 00603 to this activity.

We have studied the project description, other records, and documents available to us. I visited the site on September 5, 2001. The proposed project is regulated under the provisions of Section 404 of the Clean Water Act and a Department of the Army permit will be required for the road crossings and utility crossings in jurisdictional waterways.

Some of the waterways depicted in your November 9 submittal do not appear to have an identifiable ordinary high water mark (Photos 12, 13, 16, 17, 18, 21, and 22). We observed that several of the waterways have questionable ordinary high water marks in their upper reaches during the September field visit. In some cases, swales are located in the upper reaches of a waterway where the supporting drainage area does not provide enough flow to create an identifiable mark on the bank or changes in vegetation or soils. Projects located in swales that do not have an ordinary high water mark are not in jurisdictional waters and will not require a permit.

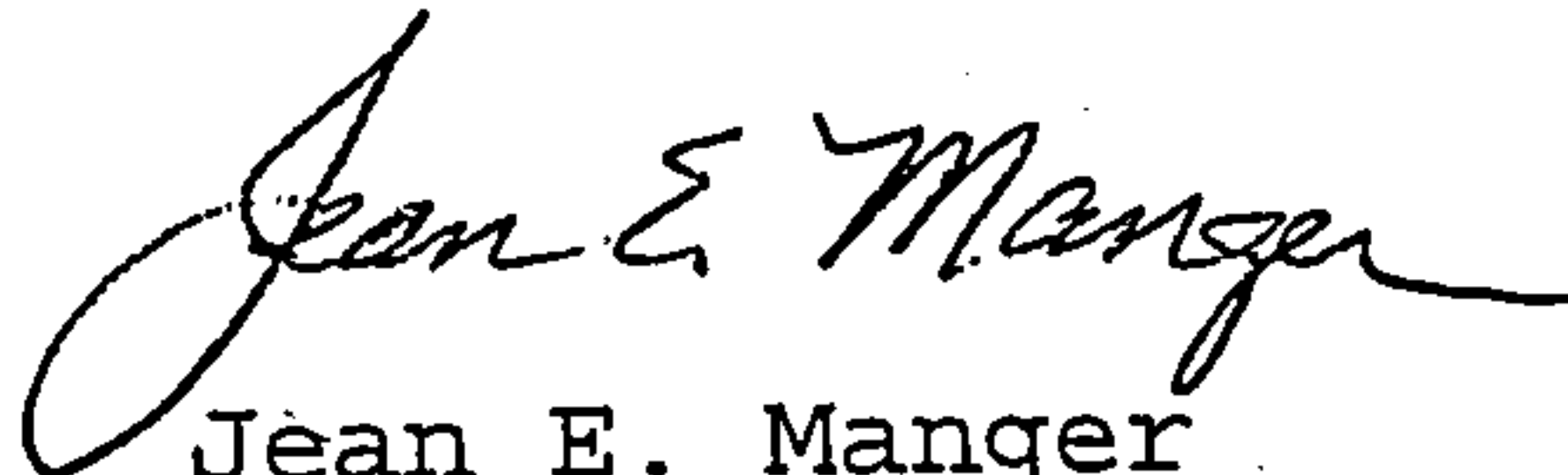
As we discussed in a telephone conversation on November 21, it is unlikely that Nationwide Permit (NWP) No. 33 for temporary construction fills will be required for this project. The acreage limits of Nationwide Permit Nos. 14 and 12 for linear transportation activities and utility lines, respectively, will likely authorize the proposed work at each crossing site. Temporary road crossings are themselves eligible for use of NWP No. 14. Road crossings spanning a waterway with no discharges of

dredged or fill material below the ordinary high water mark will not require a Section 404 permit.

High Desert should submit a permit application or description letter as soon as possible to insure that their construction plans are not delayed by permit processing. The application form may be accessed on our web site at [www.spa.usace.army.mil/reg/](http://www.spa.usace.army.mil/reg/). The project description should include specific drawings or maps identifying each crossing (road or utility) location. Please include a description of the type, amount, and dimensions of fill material below the ordinary high water mark.

If you have any questions regarding this determination, please feel free to call me at (505) 342-3216 or e-mail at [jean.e.manger@usace.army.mil](mailto:jean.e.manger@usace.army.mil).

Sincerely,



Jean E. Manger  
Regulatory Project Manager

## APPENDIX I

BEAR CANYON & EMBUDITO ARROYO HYDROLOGY

# BEAR CANYON - 100 YEAR

BCA.SUM

- VERSION: 1997.02c

RUN DATE (MON/DAY/YR) =12/11/2001  
USER NO.= AHYMO-S-9702c1BohanHu-AH

AHYMO PROGRAM SUMMARY TABLE (AHYMO\_97) -  
INPUT FILE = bca.hym

| COMMAND          | HYDROGRAPH<br>IDENTIFICATION | FROM<br>ID<br>NO. | TO<br>ID<br>NO. | AREA<br>(SQ MI) | PEAK<br>DISCHARGE<br>(CFS) | RUNOFF<br>VOLUME<br>(AC-FT) | RUNOFF<br>(INCHES) | TIME TO<br>PEAK<br>(HOURS) | CFS<br>PER<br>ACRE | PAGE = 1<br>NOTATION |
|------------------|------------------------------|-------------------|-----------------|-----------------|----------------------------|-----------------------------|--------------------|----------------------------|--------------------|----------------------|
| START            |                              |                   |                 |                 |                            |                             |                    |                            |                    | TIME= .00            |
| LOCATION         |                              |                   | DEFAULT         |                 |                            |                             |                    |                            |                    | PK BF = 1.10         |
| SEDIMENT BULK    |                              |                   |                 |                 |                            |                             |                    |                            |                    | RAIN6= 2.900         |
| RAINFALL TYPE= 1 |                              |                   |                 |                 |                            |                             |                    |                            |                    | PER IMP= .00         |
| COMPUTE NM HYD   | 1.00                         | -                 | 1               | 4.97400         | 4440.01                    | 399.960                     | 1.50769            | 2.033                      | 1.395              |                      |
| ROUTE            | 1.10                         | 1                 | 2               | 4.97400         | 4261.04                    | 399.964                     | 1.50771            | 2.133                      | 1.339              |                      |
| COMPUTE NM HYD   | 3.00                         | -                 | 3               | .99860          | 1468.61                    | 61.562                      | 1.15591            | 1.633                      | 2.298              | PER IMP= 1.00        |
| ADD HYD          | 4.00                         | 2& 3              | 4               | 5.97260         | 4510.02                    | 461.527                     | 1.44889            | 2.100                      | 1.180              |                      |
| FINISH           |                              |                   |                 |                 |                            |                             |                    |                            |                    |                      |

\*\*\*\*\*

EMBPO - 2 YR

emb\_p2.sum

- VERSION: 1997.02c

RUN DATE (MON/DAY/YR) =09/13/2002  
USER NO.= AHYMO-S-9702c1BohanHu-AH

AHYMO PROGRAM SUMMARY TABLE (AHYMO\_97) -  
INPUT FILE = emb\_p2.hym

| COMMAND          | HYDROGRAPH<br>IDENTIFICATION | FROM<br>ID<br>NO. | TO<br>ID<br>NO. | AREA<br>(SQ MI) | PEAK<br>DISCHARGE<br>(CFS) | RUNOFF<br>VOLUME<br>(AC-FT) | RUNOFF<br>(INCHES) | TIME TO<br>PEAK<br>(HOURS) | CFS<br>PER<br>ACRE | PAGE = 1<br>NOTATION |
|------------------|------------------------------|-------------------|-----------------|-----------------|----------------------------|-----------------------------|--------------------|----------------------------|--------------------|----------------------|
|                  |                              |                   |                 |                 |                            |                             |                    |                            |                    | TYPE = 1             |
| LAND FACTORS     |                              |                   |                 |                 |                            |                             |                    |                            |                    | RAIN6= 1.260         |
| *S 2-YR RAINFALL |                              |                   |                 |                 |                            |                             |                    |                            |                    | PK BF = 1.12         |
| RAINFALL TYPE= 1 |                              |                   |                 |                 |                            |                             |                    |                            |                    | PER IMP= .00         |
| SEDIMENT BULK    |                              |                   |                 |                 |                            |                             |                    |                            |                    | PK BF = 1.10         |
| COMPUTE NM HYD   | OFFSITE                      | -                 | 1               | 2.62630         | 281.10                     | 33.890                      | .24195             | 2.033                      | .167               | PER IMP= .00         |
| SEDIMENT BULK    |                              |                   |                 |                 |                            |                             |                    |                            |                    | PK BF = 1.10         |
| COMPUTE NM HYD   | 49.00                        | -                 | 2               | .01800          | 1.15                       | .031                        | .03246             | 1.533                      | .100               | PER IMP= .00         |
| COMPUTE NM HYD   | 50.00                        | -                 | 3               | .02240          | 8.62                       | .302                        | .25281             | 1.500                      | .602               | PER IMP= 17.92       |
| COMPUTE NM HYD   | 51.00                        | -                 | 4               | .01860          | 7.16                       | .251                        | .25281             | 1.500                      | .602               | PER IMP= 17.92       |
| COMPUTE NM HYD   | 51.00                        | -                 | 4               | .01860          | 7.16                       | .251                        | .25281             | 1.500                      | .602               | PER IMP= 17.92       |
| ADD HYD          | EMI&1A                       | 1& 2              | 5               | 2.64430         | 281.20                     | 33.921                      | .24053             | 2.033                      | .166               |                      |
| ADD HYD          | EMI-1B                       | 5& 3              | 6               | 2.66670         | 282.84                     | 34.223                      | .24063             | 2.033                      | .166               |                      |
| ADD HYD          | EMI-TOT                      | 6& 4              | 7               | 2.68530         | 284.20                     | 34.474                      | .24071             | 2.033                      | .165               |                      |
| FINISH           |                              |                   |                 |                 |                            |                             |                    |                            |                    |                      |

EMBVD10 2 YR

emb\_p.sum

- VERSION: 1997.02c

RUN DATE (MON/DAY/YR) =09/13/2002  
USER NO.= AHYMO-S-9702c1BohanHu-AH

AHYMO PROGRAM SUMMARY TABLE (AHYMO\_97) -  
INPUT FILE = emb\_p.hym

| COMMAND          | HYDROGRAPH<br>IDENTIFICATION | FROM<br>ID<br>NO. | TO<br>ID<br>NO. | AREA<br>(SQ MI) | PEAK<br>DISCHARGE<br>(CFS) | RUNOFF<br>VOLUME<br>(AC-FT) | RUNOFF<br>(INCHES) | TIME TO<br>PEAK<br>(HOURS) | CFS<br>PER<br>ACRE | PAGE = 1<br>NOTATION |
|------------------|------------------------------|-------------------|-----------------|-----------------|----------------------------|-----------------------------|--------------------|----------------------------|--------------------|----------------------|
| LAND FACTORS     |                              |                   |                 |                 |                            |                             |                    |                            |                    | TYPE = 1             |
| RAINFALL TYPE= 1 |                              |                   |                 |                 |                            |                             |                    |                            |                    | RAIN6= 2.900         |
| SEDIMENT BULK    |                              |                   |                 |                 |                            |                             |                    |                            |                    | PK BF = 1.12         |
| COMPUTE NM HYD   | OFFSITE                      | -                 | 1               | 2.62630         | 2200.26                    | 208.507                     | 1.48860            | 2.067                      | 1.309              | PER IMP= .00         |
| SEDIMENT BULK    |                              |                   |                 |                 |                            |                             |                    |                            |                    | PK BF = 1.10         |
| COMPUTE NM HYD   | 49.00                        | -                 | 2               | .01800          | 29.66                      | .895                        | .93184             | 1.500                      | 2.575              | PER IMP= .00         |
| COMPUTE NM HYD   | 50.00                        | -                 | 3               | .02240          | 48.03                      | 1.626                       | 1.36129            | 1.500                      | 3.350              | PER IMP= 17.92       |
| COMPUTE NM HYD   | 51.00                        | -                 | 4               | .01860          | 39.88                      | 1.350                       | 1.36129            | 1.500                      | 3.350              | PER IMP= 17.92       |
| COMPUTE NM HYD   | 51.00                        | -                 | 4               | .01860          | 39.88                      | 1.350                       | 1.36129            | 1.500                      | 3.350              | PER IMP= 17.92       |
| ADD HYD          | EM1&1A                       | 1& 2              | 5               | 2.64430         | 2202.76                    | 209.401                     | 1.48481            | 2.067                      | 1.302              |                      |
| ADD HYD          | EM1-1B                       | 5& 3              | 6               | 2.66670         | 2208.72                    | 211.028                     | 1.48377            | 2.067                      | 1.294              |                      |
| ADD HYD          | EM1TOT                       | 6& 4              | 7               | 2.68530         | 2213.66                    | 212.378                     | 1.48292            | 2.067                      | 1.288              |                      |
| FINISH           |                              |                   |                 |                 |                            |                             |                    |                            |                    |                      |

## APPENDIX J

### PRUDENT LINE CALCULATIONS

# High Desert Tract 13 Lateral Erosion Widths

| Arroyo Name             | Q100<br>(cfs) | Qd<br>(cfs) | S<br>(ft/ft) | Sc<br>(ft/ft) | Sub or Super | $\Delta_{max}$<br>(feet) | Wd<br>(feet) | $\lambda/Wd$ | $\lambda$<br>(feet) | Lv<br>(feet) | Total<br>Erosion Width |
|-------------------------|---------------|-------------|--------------|---------------|--------------|--------------------------|--------------|--------------|---------------------|--------------|------------------------|
| Bear Canyon             | 4500          | 900.0       | 0.045        | 0.015         | super        | 220.5                    | 69.9         | 12.6         | 881.9               | 441          | 511                    |
| N. Branch North Arroyo  | 237           | 47.4        | 0.045        | 0.022         | super        | 53.8                     | 21.5         | 10.0         | 215.3               | 108          | 129                    |
| Middle Arroyo           | 480           | 96.0        | 0.045        | 0.020         | super        | 71.4                     | 28.6         | 10.0         | 285.5               | 143          | 171                    |
| N. Branch Middle Arroyo | 117           | 23.4        | 0.045        | 0.024         | super        | 40.6                     | 16.2         | 10.0         | 162.3               | 81           | 97                     |

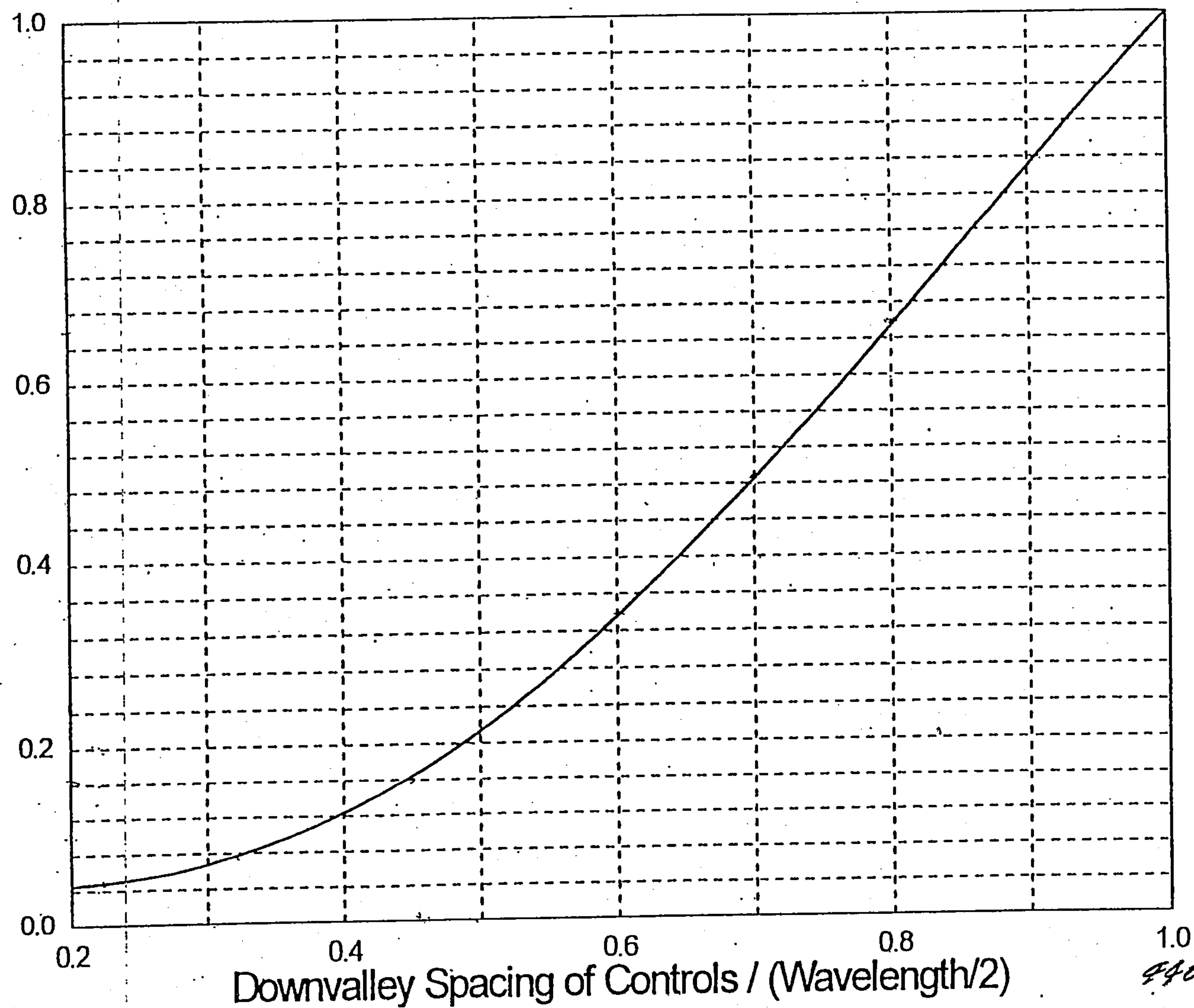
Note: Formulas from AMAFCA Sediment Erosion Design Guide (see pgs. 3-68 through 3-75)

## Assumptions:

- 1) Approximate method based on optimal bend shape
- 2) Dominant Discharge =  $Q_d = 0.2 \cdot Q_{100}$ ;  $Q_d < 2000 \text{ cfs}$
- 3) Critical Slope =  $S_c = 0.037 \cdot Q_d^{-0.133}$ ; assumes wide rectangular channel, uniform flow,  $n=0.035$ ,  $W/D=40$
- 4) Maximum lateral erosion distance ( $\Delta_{max}$ ) varies due to  $Q_d$  and  $S$ ; presence of lateral controls not considered
- 5) Meander wavelength to channel width ( $\lambda/Wd$ ) varies due to  $Q_d$
- 6) Downvalley length =  $L_v = \lambda/2$
- 7) Total Erosion Width =  $2 \cdot (\Delta_{max} + 0.5 \cdot Wd)$
- 8) Critical bank height not considered
- 9) 100-year flood zone not considered

====

Maximum Offset / Maximum Unconstrained Offset



| X<br>LONGITUDINAL | Y<br>PLANVIEW |
|-------------------|---------------|
| 100'              | 9'            |
| 200'              | 35'           |
| 300'              | 110'          |
| 400'              | 200'          |

Figure 3.24. Maximum lateral erosion distance for control spaced at less than half the assumed unconstrained meander length.

1/ Confluence with N. Branch

Lambda =  
Delta Max =

215.3 ft  
53.8 ft

| X   | Y  |
|-----|----|
| 22  | 2  |
| 43  | 6  |
| 65  | 18 |
| 86  | 36 |
| 108 | 54 |

+  $\frac{21.5}{2}$

3/ Confluence with Middle Arroyo

Lambda =  
Delta Max =

285.5 ft  
71.4 ft

| X   | Y  |
|-----|----|
| 29  | 3  |
| 57  | 9  |
| 86  | 24 |
| 114 | 47 |
| 143 | 71 |

+  $\frac{28.6}{2}$

4/ Confluence with Middle Branch

*(N. Branch Middle Arroyo)* Lambda =  
Delta Max =

162.3 ft  
40.6 ft

| X  | Y  |
|----|----|
| 16 | 2  |
| 32 | 5  |
| 49 | 14 |
| 65 | 27 |
| 81 | 41 |

+  $\frac{16.7}{2}$

Bear Arroyo East Side

Lambda =  
Delta Max =

880.7 ft  
176.4 ft

$Q_{100} = 4500$   
 $S = 0.05$   
 $W_d = 69.9$

| X   | Y   |
|-----|-----|
| 88  | 7   |
| 176 | 21  |
| 264 | 60  |
| 352 | 116 |
| 440 | 176 |

+  $\frac{69.9}{2}$  34.95

Bear Arroyo West Side

Lambda =  
Delta Max =

4568.0 ft  
915.0 ft

| X    | Y   |
|------|-----|
| 457  | 37  |
| 914  | 110 |
| 1370 | 311 |
| 1827 | 604 |
| 2284 | 915 |

+  $\frac{69.9}{2}$  34.95

$W_d = 69.9$  (don't change; dependent on  $Q_{100}$  which assume don't change).

## **APPENDIX K**

### BEAR CANYON & EMBUDITO ARROYO HYDRAULIC ANALYSIS

- EMBUDITO ARROYO EQUILIBRIUM SLOPE CALCULATIONS
- BEAR CANYON HEC-RAS
- BEAR CANYON RIPRAP ELEVATION REQUIREMENTS
- EMBUDITO HEC-RAS
- EMBUDITO RIPRAP ELEVATION REQUIREMENTS
- EMBUDITO ARROYO DROP STRUCTURE SKETCHES

# EMBUDITO ARROYO EQUILIBRIUM SLOPE CALCULATIONS

Reach 1

7/15/2002

Reference: "Sediment and Erosion Design Guide", Resource Consultants & Engineers, Inc., Nov. 1994  
prepared for Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA)

The equilibrium slope can be estimated by:

$$S = CQ^{-0.133}$$

where,  $C = 18.28n^2F^{0.133}Fr^{2.133}$

and,  $n =$  Manning's roughness coefficient  
 $F =$  width-depth ratio of the flowing water  
 $Fr =$  maximum Froude number (0.7 to 1.0)  
 $Q =$  dominant discharge

Assumptions:

$n =$  0.03  
 $F =$  40  
 $Fr =$  1.66  
 $Q =$  20% of 100-year storm  
 $V =$  9.3  
 $d =$  0.97

So,  $C =$  0.0796

The equilibrium width of the channel bottom can be estimated by:

$$W = 0.5F^{0.6}Fr^{0.4}Q^{0.4}$$

| Analysis Point | 100-year Flow<br>(cfs) | Dominant Discharge<br>(cfs) | Equilibrium Slope<br>S<br>% | Equilibrium Width<br>W<br>(ft) |
|----------------|------------------------|-----------------------------|-----------------------------|--------------------------------|
| 1              | 2330                   | 466                         | 3.52                        | 43.6                           |

# EMBUDITO ARROYO EQUILIBRIUM SLOPE CALCULATIONS

## Reach 3

7/16/2002

Reference: "Sediment and Erosion Design Guide", Resource Consultants & Engineers, Inc., Nov. 1994  
prepared for Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA)

The equilibrium slope can be estimated by:

$$S = CQ^{-0.133}$$

where,  $C = 18.28n^2F^{0.133}Fr^{2.133}$

and,  $n =$  Manning's roughness coefficient  
 $F =$  width-depth ratio of the flowing water  
 $Fr =$  maximum Froude number (0.7 to 1.0)  
 $Q =$  dominant discharge

Assumptions:

$n =$  0.03  
 $F =$  40 *240*  
 $Fr =$  1.49 *1.0*  
 $Q =$  20% of 100-year storm  
 $V =$  8.62  
 $d =$  1.04

So,  $C = 0.0629$

The equilibrium width of the channel bottom can be estimated by:

$$W = 0.5F^{0.6}Fr^{0.4}Q^{0.4}$$

| Analysis Point | 100-year Flow (cfs) | Dominant Discharge (cfs) | Equilibrium Slope S % | Equilibrium Width W (ft) |
|----------------|---------------------|--------------------------|-----------------------|--------------------------|
| 1              | 2330                | 466                      | 2.78                  | 45.5                     |

# EMBUDITO ARROYO EQUILIBRIUM SLOPE CALCULATIONS

Reach 2

7/15/2002

Reference: "Sediment and Erosion Design Guide", Resource Consultants & Engineers, Inc., Nov. 1994  
prepared for Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA).

The equilibrium slope can be estimated by:

$$S = CQ^{-0.133}$$

where,  $C = 18.28n^2F^{0.133}Fr^{2.133}$

and,  $n =$  Manning's roughness coefficient  
 $F =$  width-depth ratio of the flowing water  
 $Fr =$  maximum Froude number (0.7 to 1.0)  
 $Q =$  dominant discharge

Assumptions:

$n =$  0.03  
 $F =$  40  
 $Fr =$  2.07  
 $Q =$  20% of 100-year storm  
 $V =$  12.12  
 $d =$  1.06

So,  $C = 0.1274$

The equilibrium width of the channel bottom can be estimated by:

$$W = 0.5F^{0.6}Fr^{-0.4}Q^{0.4}$$

| Analysis Point | 100-year Flow (cfs) | Dominant Discharge (cfs) | Equilibrium Slope S % | Equilibrium Width W (ft) |
|----------------|---------------------|--------------------------|-----------------------|--------------------------|
| 1              | 2330                | 466                      | 5.63                  | 39.9                     |

# REACH 2

## Analyzer Report

### Drainage Structure Analyzer

### Channel Hydraulic Analysis

Date: Wednesday, July 17, 2002 09:39:43 AM

#### Input Data

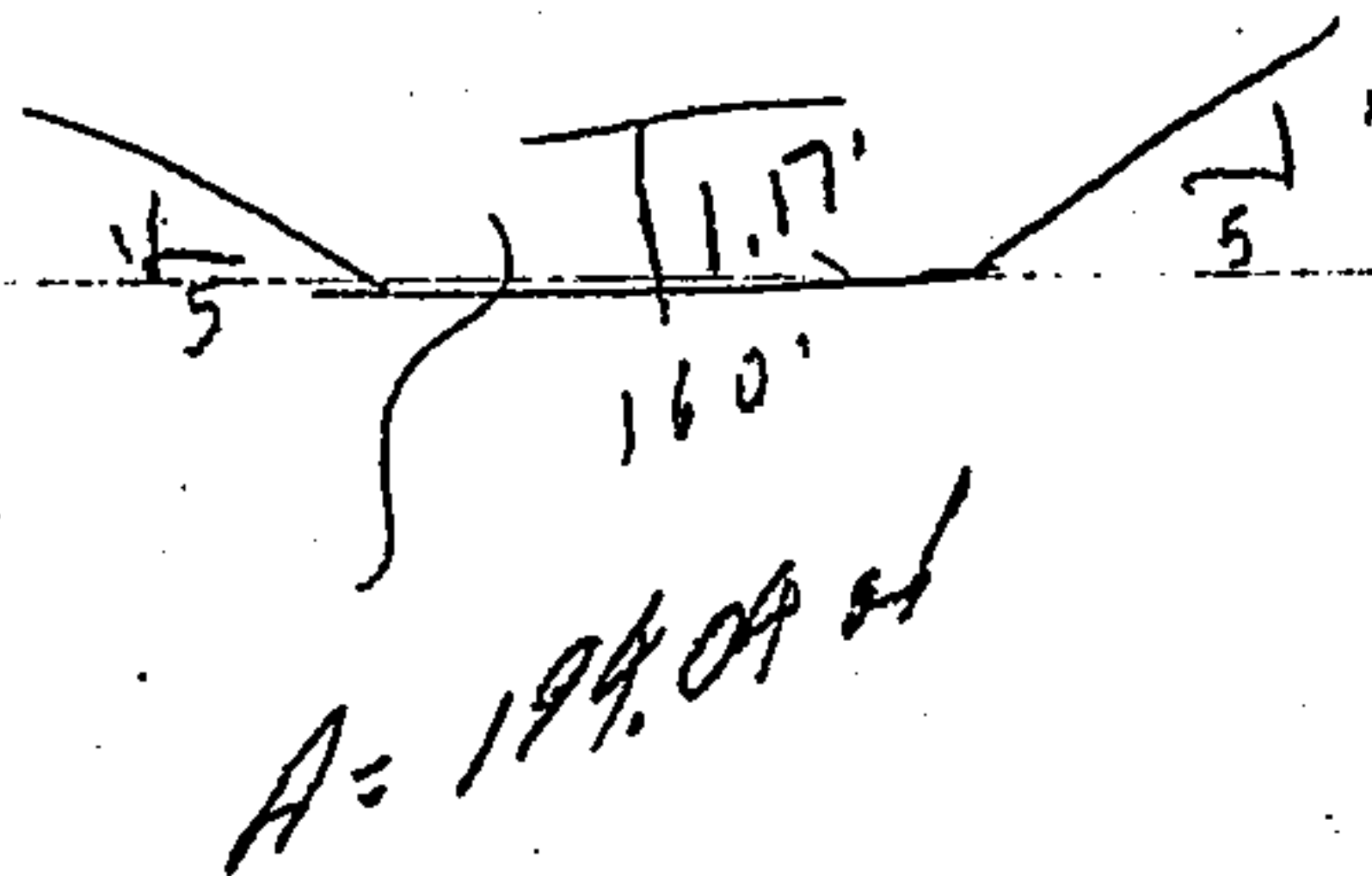
|              |                           |
|--------------|---------------------------|
| Shape        | Trapezoidal               |
| Material     | Bare Soil                 |
| Roughness    | <del>0.035</del> 0.030000 |
| Bottom Width | 160.00 ft                 |
| Left Slope   | 5.000%                    |
| Right Slope  | 5.000%                    |
| Bed Slope    | 6.500%                    |
| Flow Rate    | 2330.0 cfs                |

#### Output Results

|                |                             |
|----------------|-----------------------------|
| Flow Rate      | 2330.0 cfs                  |
| Depth          | <del>1.17</del> 1.06 ft     |
| Velocity       | <del>12.05</del> 12.12 ft/s |
| Top Width      | <del>171.66</del> 202.42 ft |
| Critical Depth | 1.74 ft                     |

#### Super Critica

$$F = \frac{V}{\sqrt{gD}} = \frac{12.05}{\sqrt{32.2 \cdot \frac{199.04}{171.66}}} = 1.0$$



Reach 3

Analyzer Report

=====

Drainage Structure Analyzer

Channel Hydraulic Analysis

Date: Thursday, July 18, 2002 08:15:09 AM

=====

Input Data

-----

|              |             |
|--------------|-------------|
| Shape        | Trapezoidal |
| Material     | Bare Soil   |
| Roughness    | 0.030000    |
| Bottom Width | 240.00 ft   |
| Left Slope   | 5.000%      |
| Right Slope  | 5.000%      |
| Bed Slope    | 3.230%      |
| Flow Rate    | 2330.0 cfs  |

Output Results

-----

|                |            |
|----------------|------------|
| Flow Rate      | 2330.0 cfs |
| Depth          | 1.04 ft    |
| Velocity       | 8.62 ft/s  |
| Top Width      | 281.48 ft  |
| Critical Depth | 1.37 ft    |

Super Critica

REACH1

Analyzer Report

=====

Drainage Structure Analyzer

Channel Hydraulic Analysis

Date: Wednesday, July 17, 2002 10:44:07 AM

=====

Input Data

-----

|              |             |
|--------------|-------------|
| Shape        | Trapezoidal |
| Material     | Bare Soil   |
| Roughness    | 0.030000    |
| Bottom Width | 240.00 ft   |
| Left Slope   | 5.000%      |
| Right Slope  | 5.000%      |
| Bed Slope    | 4.100%      |
| Flow Rate    | 2330.0 cfs  |

Output Results

-----

|                |            |
|----------------|------------|
| Flow Rate      | 2330.0 cfs |
| Depth          | 0.97 ft    |
| Velocity       | 9.29 ft/s  |
| Top Width      | 278.67 ft  |
| Critical Depth | 1.37 ft    |

Super Critica

✓ w/ Boulders w/ grading  
Subcritical  
use Critical WSE

HEC-RAS Plan: Plan 97 River Stream Reach: Reach Profile: PF 1

6+40-9+00, 12+50-14+50

| Reach | River Sta | Q-Totals (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Ch.W.S. (ft) | E.G. Elev (ft) | E. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Friction # Chl |
|-------|-----------|----------------|----------------|----------------|--------------|----------------|------------------|-----------------|-------------------|----------------|----------------|
| Reach | 1620.000  | 4510.00        | 6194.16        | 6198.57        | 6198.57      | 6200.15        | 0.011681         | 11.73           | 464.48            | 147.39         | 1.00           |
| Reach | 1610.000  | 4510.00        | 6193.87        | 6198.07        | 6198.07      | 6198.58        | 0.011743         | 11.60           | 474.21            | 157.44         | 1.00           |
| Reach | 1600.000  | 4510.00        | 6193.36        | 6197.40        | 6197.40      | 6198.92        | 0.012280         | 11.50           | 470.80            | 156.92         | 1.01           |
| Reach | 1590.000  | 4510.00        | 6192.85        | 6196.83        | 6196.83      | 6198.32        | 0.012517         | 11.40           | 473.11            | 160.04         | 1.02           |
| Reach | 1580.000  | 4510.00        | 6192.33        | 6196.29        | 6196.29      | 6197.75        | 0.012812         | 11.31           | 478.05            | 166.39         | 1.03           |
| Reach | 1570.000  | 4510.00        | 6192.00        | 6195.77        | 6195.77      | 6197.18        | 0.012987         | 11.13           | 483.24            | 171.80         | 1.03           |
| Reach | 1560.000  | 4510.00        | 6191.74        | 6195.21        | 6195.21      | 6196.60        | 0.013522         | 10.75           | 482.62            | 174.56         | 1.04           |
| Reach | 1550.000  | 4510.00        | 6191.26        | 6194.63        | 6194.63      | 6196.00        | 0.013796         | 10.60           | 485.95            | 179.36         | 1.04           |
| Reach | 1540.000  | 4510.00        | 6190.78        | 6194.15        | 6194.15      | 6195.51        | 0.013873         | 10.48           | 488.32            | 182.38         | 1.04           |
| Reach | 1530.000  | 4510.00        | 6190.41        | 6193.68        | 6193.68      | 6195.05        | 0.014092         | 10.33           | 484.33            | 179.47         | 1.04           |
| Reach | 1520.000  | 4510.00        | 6190.12        | 6193.21        | 6193.21      | 6194.58        | 0.014287         | 10.12           | 483.29            | 179.99         | 1.04           |
| Reach | 1510.000  | 4510.00        | 6189.90        | 6192.88        | 6192.88      | 6194.24        | 0.014263         | 10.13           | 485.26            | 182.01         | 1.04           |
| Reach | 1500.000  | 4510.00        | 6189.51        | 6192.59        | 6192.59      | 6193.93        | 0.014165         | 10.36           | 489.86            | 185.52         | 1.05           |
| Reach | 1490.000  | 4510.00        | 6189.11        | 6192.27        | 6192.27      | 6193.59        | 0.014329         | 10.62           | 490.36            | 186.65         | 1.04           |
| Reach | 1480.000  | 4510.00        | 6188.71        | 6192.04        | 6192.00      | 6193.31        | 0.013607         | 10.73           | 501.93            | 189.83         | 1.04           |
| Reach | 1470.000  | 4510.00        | 6188.30        | 6192.12        |              | 6193.11        | 0.009391         | 9.76            | 566.71            | 194.67         | 0.88           |
| Reach | 1460.000  | 4510.00        | 6187.91        | 6191.91        |              | 6193.00        | 0.010354         | 10.57           | 541.49            | 187.34         | 0.93           |
| Reach | 1450.000  | 4510.00        | 6187.53        | 6191.44        | 6191.44      | 6192.86        | 0.013944         | 12.09           | 477.18            | 171.00         | 1.08           |
| Reach | 1440.000  | 4510.00        | 6187.14        | 6191.13        | 6191.13      | 6192.55        | 0.013788         | 12.18           | 477.98            | 170.70         | 1.08           |
| Reach | 1430.000  | 4510.00        | 6186.76        | 6190.76        | 6190.76      | 6192.18        | 0.013586         | 12.11           | 479.58            | 171.52         | 1.07           |
| Reach | 1420.000  | 4510.00        | 6186.38        | 6190.38        | 6190.38      | 6191.81        | 0.013689         | 12.15           | 478.75            | 171.94         | 1.07           |
| Reach | 1410.000  | 4510.00        | 6186.00        | 6190.01        | 6190.01      | 6191.43        | 0.013712         | 12.19           | 479.59            | 172.69         | 1.07           |
| Reach | 1400.000  | 4510.00        | 6185.99        | 6189.79        | 6189.79      | 6191.19        | 0.013631         | 11.72           | 482.53            | 174.36         | 1.06           |
| Reach | 1390.000  | 4510.00        | 6185.65        | 6189.53        | 6189.53      | 6190.98        | 0.013338         | 11.67           | 476.88            | 168.05         | 1.05           |
| Reach | 1380.000  | 4510.00        | 6185.32        | 6189.21        | 6189.21      | 6190.70        | 0.013619         | 11.83           | 471.59            | 166.29         | 1.06           |
| Reach | 1370.000  | 4510.00        | 6184.98        | 6188.10        | 6188.10      | 6190.41        | 0.011964         | 11.52           | 518.24            | 200.32         | 1.01           |
| Reach | 1360.000  | 4510.00        | 6184.64        | 6188.63        | 6188.63      | 6190.09        | 0.014203         | 12.26           | 493.81            | 204.14         | 1.09           |
| Reach | 1350.000  | 4510.00        | 6184.30        | 6188.62        | 6188.62      | 6189.74        | 0.010532         | 11.16           | 577.94            | 247.76         | 0.95           |
| Reach | 1340.000  | 4510.00        | 6184.00        | 6188.25        | 6188.25      | 6189.34        | 0.010920         | 11.26           | 577.15            | 246.83         | 0.96           |
| Reach | 1330.000  | 4510.00        | 6183.82        | 6187.89        | 6187.89      | 6189.00        | 0.011865         | 11.16           | 563.75            | 243.26         | 0.99           |
| Reach | 1320.000  | 4510.00        | 6183.57        | 6187.62        | 6187.62      | 6188.73        | 0.011691         | 11.21           | 562.85            | 238.71         | 1.03           |
| Reach | 1310.000  | 4510.00        | 6183.22        | 6187.22        | 6187.22      | 6188.40        | 0.012826         | 11.63           | 538.34            | 224.28         | 1.03           |
| Reach | 1300.000  | 4510.00        | 6182.86        | 6186.86        | 6186.86      | 6188.04        | 0.012865         | 11.78           | 530.24            | 213.51         | 1.04           |
| Reach | 1290.000  | 4510.00        | 6182.32        | 6186.49        | 6186.49      | 6187.70        | 0.012807         | 12.07           | 525.12            | 207.81         | 1.04           |
| Reach | 1280.000  | 4510.00        | 6181.85        | 6186.26        | 6186.25      | 6187.47        | 0.012656         | 12.25           | 523.84            | 205.13         | 1.05           |
| Reach | 1270.000  | 4510.00        | 6181.28        | 6185.73        | 6185.73      | 6187.09        | 0.012928         | 12.31           | 489.90            | 173.24         | 1.09           |
| Reach | 1260.000  | 4510.00        | 6180.72        | 6185.32        | 6185.32      | 6186.81        | 0.013880         | 12.97           | 469.48            | 164.86         | 1.09           |
| Reach | 1250.000  | 4510.00        | 6180.16        | 6184.85        | 6184.85      | 6186.41        | 0.013726         | 12.93           | 461.06            | 156.92         | 1.09           |
| Reach | 1240.000  | 4510.00        | 6179.69        | 6184.41        | 6184.41      | 6186.15        | 0.014614         | 13.46           | 441.86            | 149.95         | 1.13           |
| Reach | 1230.000  | 4510.00        | 6177.84        | 6183.93        | 6183.93      | 6185.85        | 0.012450         | 13.15           | 445.79            | 144.53         | 1.07           |
| Reach | 1220.000  | 4510.00        | 6175.54        | 6183.70        | 6183.70      | 6185.42        | 0.007759         | 13.15           | 506.92            | 152.83         | 0.87           |
| Reach | 1210.000  | 4510.00        | 6174.00        | 6183.37        | 6183.37      | 6185.04        | 0.008024         | 12.81           | 535.52            | 180.22         | 0.85           |
| Reach | 1200.000  | 4510.00        | 6174.00        | 6183.17        | 6183.17      | 6184.70        | 0.008017         | 12.25           | 536.65            | 182.38         | 0.85           |
| Reach | 1190.000  | 4510.00        | 6174.00        | 6182.77        | 6182.77      | 6184.26        | 0.008085         | 11.92           | 536.65            | 182.38         | 0.83           |
| Reach | 1180.000  | 4510.00        | 6174.00        | 6182.26        | 6182.26      | 6183.72        | 0.007500         | 11.61           | 546.15            | 184.97         | 0.83           |
| Reach | 1170.000  | 4510.00        | 6174.00        | 6181.80        | 6181.80      | 6183.29        | 0.007443         | 11.47           | 542.39            | 186.08         | 0.83           |
| Reach | 1160.000  | 4510.00        | 6174.00        | 6181.46        | 6181.46      | 6182.91        | 0.007393         | 11.14           | 546.27            | 188.73         | 0.83           |
| Reach | 1150.000  | 4510.00        | 6172.00        | 6181.00        | 6181.00      | 6182.43        | 0.007292         | 10.87           | 547.64            | 196.07         | 0.81           |
| Reach | 1140.000  | 4510.00        | 6172.00        | 6180.26        | 6180.26      | 6181.68        | 0.007590         | 10.52           | 546.51            | 197.76         | 0.82           |
| Reach | 1130.000  | 4510.00        | 6172.00        | 6179.46        | 6179.46      | 6180.69        | 0.008348         | 10.73           | 506.35            | 178.21         | 0.86           |
| Reach | 1120.000  | 4510.00        | 6172.00        | 6179.15        | 6179.15      | 6180.41        | 0.008118         | 10.69           | 512.11            | 183.87         | 0.85           |
| Reach | 1110.000  | 4510.00        | 6171.67        | 6178.93        | 6178.93      | 6180.41        | 0.007341         | 10.47           | 531.79            | 197.29         | 0.81           |
| Reach | 1100.000  | 4510.00        | 6171.33        | 6178.50        | 6178.50      | 6179.75        | 0.005985         | 9.49            | 514.38            | 201.40         | 0.73           |
| Reach | 1090.000  | 4510.00        | 6171.00        | 6178.20        | 6178.20      | 6179.41        | 0.005698         | 9.40            | 527.85            | 213.74         | 0.71           |
| Reach | 1080.000  | 4510.00        | 6170.67        | 6177.92        | 6177.92      | 6179.06        | 0.005051         | 9.17            | 549.00            | 227.92         | 0.68           |
| Reach | 1070.000  | 4510.00        | 6170.33        | 6177.69        | 6177.57      | 6178.69        | 0.004251         | 8.68            | 585.90            | 243.04         | 0.63           |
| Reach | 1060.000  | 4510.00        | 6170.00        | 6177.41        | 6177.28      | 6178.64        | 0.001222         | 9.55            | 618.60            | 258.40         | 0.67           |
| Reach | 1050.000  | Bridge         | 6166.00        | 6172.85        | 6172.85      | 6173.90        | 0.006543         | 7.30            | 598.91            | 308.31         | 0.46           |
| Reach | 1040.000  | 4510.00        | 6164.80        | 6172.03        | 6172.03      | 6173.94        | 0.007442         | 7.99            | 585.18            | 290.42         | 0.52           |
| Reach | 1030.000  | 4510.00        | 6163.60        | 6169.26        | 6169.26      | 6171.87        | 0.018369         | 10.66           | 385.10            | 76.06          | 0.79           |
| Reach | 1020.000  | 4510.00        | 6162.40        | 6167.46        | 6167.46      | 6169.93        | 0.022378         | 10.92           | 386.95            | 82.97          | 0.86           |
| Reach | 1010.000  | 4510.00        | 6162.00        | 6166.76        |              | 6168.33        | 0.012952         | 8.85            | 481.61            | 93.15          | 0.66           |
| Reach | 1000.000  | 4510.00        | 6161.20        | 6166.37        |              | 6168.01        | 0.001741         | 6.52            | 724.11            | 109.56         | 0.42           |
| Reach | 990.000   | 4510.00        | 6160.77        | 6164.97        | 6164.97      | 6168.88        | 0.011530         | 11.22           | 413.08            | 110.04         | 0.98           |
| Reach | 980.000   | 4510.00        | 6160.46        | 6164.69        | 6164.69      | 6168.59        | 0.011747         | 11.16           | 414.71            | 112.14         | 0.98           |
| Reach | 970.000   | 4510.00        | 6160.15        | 6164.42        | 6164.42      | 6166.32        | 0.011747         | 11.16           | 414.90            | 114.38         | 0.98           |
| Reach | 960.000   | 4510.00        | 6159.86        | 6164.19        | 6164.19      | 6166.06        | 0.011643         | 11.05           | 419.20            | 118.20         | 0.98           |
| Reach | 950.000   | 4510.00        | 6159.54        | 6163.96        | 6163.96      | 6165.81        | 0.011705         | 11.00           | 422.23            | 123.92         | 0.98           |
| Reach | 940.000   | 4510.00        | 6159.23        | 6164.24        | 6164.24      | 6165.55        | 0.007405         | 9.41            | 545.62            | 267.69         | 0.80           |
| Reach | 930.000   | 4510.00        | 6158.92        | 6163.95        | 6163.95      | 6165.15        | 0.007283         | 9.15            | 585.41            | 287.81         | 0.79           |

明  
細  
表

HEC-RAS Plan: Plan 97 River: Stream Reach: Reach Profile: PF 1 (Continued)

| Reach | River Sta | Q Total | Min Ch El | W.S. Elev | Orf W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|-------|-----------|---------|-----------|-----------|----------|-----------|------------|----------|-----------|-----------|--------------|
|       |           | (cfs)   | (ft)      | (ft)      | (ft)     | (ft)      | (ft/ft)    | (ft/s)   | (sq ft)   | (ft)      |              |
| Reach | 820.0000  | 4510.00 | 6158.62   | 6163.60   | 6163.60  | 6164.75   | 0.007714   | 9.10     | 606.14    | 305.96    | 0.80         |
| Reach | 810.0000  | 4510.00 | 6158.31   | 6163.28   | 6163.28  | 6164.32   | 0.007739   | 8.85     | 643.00    | 334.55    | 0.80         |
| Reach | 800.0000  | 4510.00 | 6158.00   | 6162.95   | 6162.95  | 6163.86   | 0.007668   | 8.49     | 678.83    | 346.00    | 0.79         |
| Reach | 790.0000  | 4510.00 | 6158.00   | 6162.45   | 6162.45  | 6163.35   | 0.007699   | 8.58     | 683.31    | 345.25    | 0.79         |
| Reach | 780.0000  | 4510.00 | 6156.59   | 6161.89   | 6161.89  | 6162.80   | 0.007188   | 8.65     | 693.43    | 347.85    | 0.77         |
| Reach | 770.0000  | 4510.00 | 6156.00   | 6161.42   | 6161.42  | 6162.32   | 0.007121   | 8.77     | 697.26    | 348.08    | 0.77         |
| Reach | 760.0000  | 4510.00 | 6156.00   | 6160.95   | 6160.95  | 6161.83   | 0.007437   | 8.83     | 698.93    | 346.79    | 0.79         |
| Reach | 750.0000  | 4510.00 | 6155.68   | 6160.45   | 6160.45  | 6161.33   | 0.007888   | 8.94     | 693.69    | 344.56    | 0.81         |
| Reach | 740.0000  | 4510.00 | 6154.81   | 6159.95   | 6159.95  | 6160.84   | 0.008062   | 9.06     | 688.26    | 342.06    | 0.82         |
| Reach | 730.0000  | 4510.00 | 6154.00   | 6159.39   | 6159.39  | 6160.29   | 0.007558   | 9.09     | 694.18    | 340.03    | 0.80         |
| Reach | 720.0000  | 4510.00 | 6154.00   | 6158.86   | 6158.86  | 6159.76   | 0.007772   | 9.12     | 690.70    | 337.98    | 0.80         |
| Reach | 710.0000  | 4510.00 | 6153.32   | 6158.31   | 6158.31  | 6159.21   | 0.008309   | 9.18     | 681.79    | 336.55    | 0.83         |
| Reach | 700.0000  | 4510.00 | 6152.42   | 6157.75   | 6157.75  | 6158.65   | 0.008167   | 9.12     | 684.39    | 336.67    | 0.82         |
| Reach | 690.0000  | 4510.00 | 6152.00   | 6157.20   | 6157.20  | 6158.10   | 0.008689   | 9.10     | 674.50    | 336.03    | 0.84         |
| Reach | 680.0000  | 4510.00 | 6152.00   | 6156.66   | 6156.66  | 6157.56   | 0.008827   | 8.98     | 671.65    | 335.25    | 0.84         |
| Reach | 670.0000  | 4510.00 | 6152.00   | 6156.14   | 6156.14  | 6157.03   | 0.009573   | 8.90     | 660.12    | 333.03    | 0.87         |
| Reach | 660.0000  | 4510.00 | 6151.29   | 6155.60   | 6155.60  | 6156.51   | 0.009939   | 8.89     | 650.93    | 330.21    | 0.88         |
| Reach | 650.0000  | 4510.00 | 6150.00   | 6155.02   | 6155.02  | 6155.92   | 0.009668   | 8.79     | 652.60    | 329.04    | 0.87         |
| Reach | 640.0000  | 4510.00 | 6150.00   | 6154.48   | 6154.48  | 6155.37   | 0.010011   | 8.71     | 649.49    | 328.63    | 0.88         |
| Reach | 630.0000  | 4510.00 | 6150.00   | 6154.23   | 6154.23  | 6155.25   | 0.010408   | 9.11     | 620.08    | 313.20    | 0.90         |
| Reach | 620.0000  | 4510.00 | 6149.29   | 6153.62   | 6153.62  | 6154.75   | 0.012548   | 9.62     | 583.01    | 307.35    | 0.98         |
| Reach | 610.0000  | 4510.00 | 6148.00   | 6153.09   | 6153.09  | 6154.17   | 0.011049   | 9.37     | 598.74    | 302.42    | 0.92         |
| Reach | 600.0000  | 4510.00 | 6148.00   | 6152.53   | 6152.53  | 6153.65   | 0.011830   | 9.59     | 586.70    | 296.34    | 0.95         |
| Reach | 590.0000  | 4510.00 | 6148.00   | 6152.17   | 6152.17  | 6153.21   | 0.011206   | 9.51     | 613.95    | 323.25    | 0.93         |
| Reach | 580.0000  | 4510.00 | 6146.89   | 6151.84   | 6151.84  | 6152.74   | 0.009092   | 9.05     | 662.43    | 327.33    | 0.85         |
| Reach | 570.0000  | 4510.00 | 6146.00   | 6151.31   | 6151.31  | 6152.22   | 0.009594   | 9.18     | 657.15    | 329.14    | 0.87         |
| Reach | 560.0000  | 4510.00 | 6146.00   | 6150.79   | 6150.79  | 6151.69   | 0.010950   | 9.20     | 643.41    | 330.35    | 0.92         |
| Reach | 550.0000  | 4510.00 | 6146.00   | 6150.25   | 6150.25  | 6151.14   | 0.010837   | 9.22     | 645.59    | 329.70    | 0.91         |
| Reach | 540.0000  | 4510.00 | 6146.00   | 6149.75   | 6149.75  | 6150.64   | 0.010354   | 9.26     | 652.22    | 329.17    | 0.90         |
| Reach | 530.0000  | 4510.00 | 6144.72   | 6149.23   | 6149.23  | 6150.12   | 0.010746   | 9.33     | 646.54    | 329.34    | 0.91         |
| Reach | 520.0000  | 4510.00 | 6144.00   | 6148.68   | 6148.68  | 6149.58   | 0.010508   | 9.37     | 650.87    | 330.10    | 0.91         |
| Reach | 510.0000  | 4510.00 | 6144.00   | 6148.11   | 6148.11  | 6149.01   | 0.010336   | 9.50     | 652.88    | 332.17    | 0.91         |
| Reach | 500.0000  | 4510.00 | 6144.00   | 6147.59   | 6147.59  | 6148.48   | 0.010516   | 9.49     | 653.44    | 334.57    | 0.91         |
| Reach | 490.0000  | 4510.00 | 6144.00   | 6147.09   | 6147.09  | 6147.98   | 0.012061   | 9.43     | 636.23    | 335.98    | 0.96         |
| Reach | 480.0000  | 4510.00 | 6143.40   | 6146.23   | 6146.23  | 6147.13   | 0.015175   | 8.96     | 602.78    | 334.19    | 1.03         |
| Reach | 470.0000  | 4510.00 | 6142.00   | 6145.76   | 6145.76  | 6146.66   | 0.015305   | 8.80     | 602.30    | 335.77    | 1.03         |
| Reach | 460.0000  | 4510.00 | 6142.00   | 6145.28   | 6145.28  | 6146.18   | 0.015481   | 8.57     | 600.91    | 335.74    | 1.03         |
| Reach | 450.0000  | 4510.00 | 6141.54   | 6144.78   | 6144.78  | 6145.68   | 0.015986   | 8.46     | 598.94    | 340.13    | 1.04         |
| Reach | 440.0000  | 4510.00 | 6140.34   | 6144.37   | 6144.37  | 6145.25   | 0.014906   | 8.79     | 611.31    | 344.39    | 1.02         |
| Reach | 430.0000  | 4510.00 | 6140.00   | 6143.79   | 6143.79  | 6144.68   | 0.015564   | 8.51     | 603.80    | 345.20    | 1.02         |
| Reach | 420.0000  | 4510.00 | 6140.00   | 6143.25   | 6143.25  | 6144.13   | 0.015693   | 8.16     | 603.94    | 347.75    | 1.02         |
| Reach | 410.0000  | 4510.00 | 6140.00   | 6142.72   | 6142.72  | 6143.60   | 0.015840   | 8.13     | 605.99    | 353.70    | 1.02         |
| Reach | 400.0000  | 4510.00 | 6140.00   | 6142.29   | 6142.29  | 6143.16   | 0.015955   | 7.72     | 610.43    | 361.89    | 1.01         |
| Reach | 390.0000  | 4510.00 | 6138.65   | 6141.63   | 6141.63  | 6142.51   | 0.015756   | 7.38     | 607.02    | 355.96    | 1.00         |
| Reach | 380.0000  | 4510.00 | 6138.00   | 6141.13   | 6141.13  | 6141.99   | 0.014951   | 6.96     | 619.45    | 362.70    | 0.96         |
| Reach | 370.0000  | 4510.00 | 6138.00   | 6140.84   |          | 6141.48   | 0.010474   | 6.32     | 712.71    | 392.55    | 0.82         |
| Reach | 360.0000  | 4510.00 | 6138.00   | 6140.98   |          | 6141.32   | 0.003995   | 4.62     | 967.62    | 403.35    | 0.53         |
| Reach | 350.0000  | 4510.00 | 6138.00   | 6140.28   | 6140.28  | 6141.10   | 0.016193   | 8.03     | 627.09    | 382.19    | 1.03         |
| Reach | 340.0000  | 4510.00 | 6136.63   | 6139.75   | 6139.75  | 6140.58   | 0.016215   | 8.02     | 623.92    | 376.88    | 1.03         |
| Reach | 330.0000  | 4510.00 | 6136.00   | 6139.18   | 6139.18  | 6139.99   | 0.016399   | 7.98     | 619.40    | 371.67    | 1.03         |
| Reach | 320.0000  | 4510.00 | 6136.00   | 6138.55   | 6138.55  | 6139.41   | 0.017094   | 7.84     | 608.49    | 365.68    | 1.04         |
| Reach | 310.0000  | 4510.00 | 6135.69   | 6138.09   | 6138.09  | 6138.95   | 0.016951   | 7.78     | 607.82    | 362.33    | 1.04         |
| Reach | 300.0000  | 4510.00 | 6134.13   | 6137.46   | 6137.46  | 6138.30   | 0.016047   | 7.99     | 616.22    | 362.50    | 1.02         |
| Reach | 290.0000  | 4510.00 | 6134.00   | 6136.85   | 6136.85  | 6137.69   | 0.015908   | 8.20     | 618.77    | 364.90    | 1.03         |
| Reach | 280.0000  | 4510.00 | 6132.02   | 6136.33   | 6136.33  | 6137.16   | 0.014465   | 8.63     | 632.90    | 368.86    | 1.00         |
| Reach | 270.0000  | 4510.00 | 6132.00   | 6135.72   | 6135.72  | 6136.55   | 0.012714   | 8.42     | 648.93    | 369.40    | 0.95         |
| Reach | 260.0000  | 4510.00 | 6132.00   | 6135.20   | 6135.20  | 6136.04   | 0.012695   | 8.33     | 650.21    | 379.04    | 0.95         |
| Reach | 250.0000  | 4510.00 | 6131.18   | 6134.43   | 6134.43  | 6135.40   | 0.014766   | 8.66     | 601.26    | 361.06    | 1.01         |
| Reach | 240.0000  | 4510.00 | 6130.34   | 6133.73   | 6133.73  | 6134.67   | 0.013562   | 8.24     | 607.50    | 342.07    | 0.97         |
| Reach | 230.0000  | 4510.00 | 6130.00   | 6133.07   | 6133.07  | 6134.03   | 0.013147   | 7.74     | 598.01    | 326.71    | 0.94         |
| Reach | 220.0000  | 4510.00 | 6130.00   | 6132.44   | 6132.44  | 6133.43   | 0.013411   | 7.29     | 584.55    | 314.36    | 0.89         |
| Reach | 210.0000  | 4510.00 | 6130.00   | 6131.84   | 6131.84  | 6132.84   | 0.013012   | 6.40     | 585.08    | 305.64    | 0.89         |
| Reach | 200.0000  | 4510.00 | 6130.00   | 6131.28   | 6131.28  | 6132.27   | 0.011968   | 5.09     | 591.52    | 301.99    | 0.82         |
| Reach | 190.0000  | 4510.00 | 6128.47   | 6130.64   | 6130.64  | 6131.66   | 0.011756   | 4.24     | 583.02    | 295.78    | 0.78         |
| Reach | 180.0000  | 4510.00 | 6128.00   | 6129.92   | 6129.92  | 6131.02   | 0.012334   | 4.42     | 554.09    | 267.11    | 0.80         |
| Reach | 170.0000  | 4510.00 | 6128.00   | 6129.31   | 6129.31  | 6130.39   | 0.011999   | 4.32     | 562.47    | 281.66    | 0.79         |
| Reach | 160.0000  | 4510.00 | 6128.00   | 6128.67   | 6128.67  | 6129.75   | 0.011619   | 3.09     | 566.78    | 287.53    | 0.72         |
| Reach | 150.0000  | 4510.00 | 6128.00   | 6127.83   | 6127.83  | 6129.18   | 0.014640   |          | 484.34    | 182.27    | 0.00         |
| Reach | 140.0000  | 4510.00 | 6127.25   | 6127.40   | 6127.20  | 6128.53   | 0.011317   | 0.83     | 533.88    | 212.59    | 0.51         |
| Reach | 130.0000  | 4510.00 | 6126.23   | 6127.75   |          | 6128.27   | 0.004095   | 2.43     | 833.99    | 368.01    | 0.48         |
| Reach | 120.0000  | 4510.00 | 6126.00   | 6126.98   | 6126.98  | 6127.70   | 0.014421   | 4.44     | 679.54    | 453.47    | 0.85         |
| Reach | 110.0000  | 4510.00 | 6126.00   | 6126.38   | 6126.38  | 6127.13   | 0.016314   | 2.74     | 663.87    | 469.93    | 0.79         |
| Reach | 100.0000  | 4510.00 | 6125.30   | 6125.88   | 6125.88  | 6126.59   | 0.014272   | 2.67     | 673.92    | 440.63    | 0.74         |
| Reach | 90.0000   | 4510.00 | 6124.44   | 6125.30   | 6125.30  | 6126.05   | 0.015555   | 3.26     | 664.84    | 443.81    | 0.81         |

w/ Boulders w/grading Mixed

use WSE

9+00 - 12+50

HEC-RAS Plan: Plan 97 River: Stream Reach: Reach Profile: PF 1

| Reach | River Sta | Q Total<br>(cfs) | Min Ch El<br>(ft) | W.S. Elev<br>(ft) | Crit W.S.<br>(ft) | E.G. Elev<br>(ft) | E.G. Slope<br>(ft/ft) | Vel Chnl<br>(ft/s) | Flow Area<br>(sq ft) | Top Width<br>(ft) | Froude # Chl |
|-------|-----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Reach | 1620.000  | 4510.00          | 6194.16           | 6197.38           | 6198.57           | 6201.18           | 0.042511              | 18.00              | 299.36               | 129.90            | 1.81         |
| Reach | 1610.000  | 4510.00          | 6193.87           | 6196.85           | 6198.07           | 6200.73           | 0.046600              | 18.38              | 296.49               | 135.21            | 1.88         |
| Reach | 1600.000  | 4510.00          | 6193.36           | 6196.17           | 6197.40           | 6200.21           | 0.052800              | 18.68              | 288.95               | 138.36            | 1.98         |
| Reach | 1590.000  | 4510.00          | 6192.85           | 6195.61           | 6196.83           | 6199.67           | 0.056371              | 18.81              | 287.75               | 143.03            | 2.03         |
| Reach | 1580.000  | 4510.00          | 6192.33           | 6195.10           | 6196.29           | 6199.07           | 0.057851              | 18.66              | 290.29               | 148.51            | 2.05         |
| Reach | 1570.000  | 4510.00          | 6192.00           | 6194.60           | 6195.77           | 6198.45           | 0.059078              | 18.34              | 293.54               | 154.05            | 2.06         |
| Reach | 1560.000  | 4510.00          | 6191.74           | 6194.10           | 6195.21           | 6197.81           | 0.061075              | 17.50              | 296.74               | 161.07            | 2.06         |
| Reach | 1550.000  | 4510.00          | 6191.26           | 6193.56           | 6194.63           | 6197.16           | 0.062214              | 17.18              | 299.54               | 165.91            | 2.06         |
| Reach | 1540.000  | 4510.00          | 6190.78           | 6193.14           | 6194.15           | 6196.49           | 0.057357              | 16.47              | 309.62               | 168.84            | 1.98         |
| Reach | 1530.000  | 4510.00          | 6190.41           | 6192.72           | 6193.68           | 6195.88           | 0.052845              | 15.55              | 317.14               | 167.40            | 1.89         |
| Reach | 1520.000  | 4510.00          | 6190.12           | 6192.29           | 6193.21           | 6195.33           | 0.049801              | 14.71              | 323.53               | 168.08            | 1.82         |
| Reach | 1510.000  | 4510.00          | 6189.90           | 6192.09           | 6192.88           | 6194.77           | 0.041187              | 13.98              | 345.36               | 172.39            | 1.68         |
| Reach | 1500.000  | 4510.00          | 6189.51           | 6191.91           | 6192.59           | 6194.31           | 0.034976              | 13.80              | 366.15               | 176.73            | 1.57         |
| Reach | 1490.000  | 4510.00          | 6189.11           | 6191.62           | 6192.27           | 6193.93           | 0.034125              | 14.05              | 371.59               | 179.11            | 1.57         |
| Reach | 1480.000  | 4510.00          | 6188.71           | 6191.41           | 6192.00           | 6193.56           | 0.030493              | 13.96              | 385.30               | 179.69            | 1.50         |
| Reach | 1470.000  | 4510.00          | 6188.30           | 6191.21           | 6191.73           | 6193.23           | 0.027065              | 13.81              | 396.85               | 176.90            | 1.43         |
| Reach | 1460.000  | 4510.00          | 6187.91           | 6191.91           | 6191.61           | 6193.00           | 0.010354              | 10.57              | 541.49               | 187.34            | 0.93         |
| Reach | 1450.000  | 4510.00          | 6187.53           | 6191.44           | 6191.44           | 6192.86           | 0.013944              | 12.09              | 477.18               | 171.00            | 1.08         |
| Reach | 1440.000  | 4510.00          | 6187.14           | 6190.74           | 6191.13           | 6192.64           | 0.021182              | 14.11              | 413.22               | 163.78            | 1.31         |
| Reach | 1430.000  | 4510.00          | 6186.76           | 6190.20           | 6190.76           | 6192.38           | 0.025294              | 14.95              | 387.26               | 160.19            | 1.42         |
| Reach | 1420.000  | 4510.00          | 6186.38           | 6189.73           | 6190.38           | 6192.09           | 0.028275              | 15.53              | 371.95               | 157.52            | 1.50         |
| Reach | 1410.000  | 4510.00          | 6186.00           | 6189.29           | 6190.01           | 6191.79           | 0.030793              | 16.02              | 361.49               | 156.18            | 1.56         |
| Reach | 1400.000  | 4510.00          | 6185.99           | 6189.17           | 6189.79           | 6191.44           | 0.026484              | 14.49              | 378.67               | 156.95            | 1.43         |
| Reach | 1390.000  | 4510.00          | 6185.85           | 6189.04           | 6189.53           | 6191.13           | 0.022656              | 13.89              | 397.03               | 158.10            | 1.34         |
| Reach | 1380.000  | 4510.00          | 6185.32           | 6188.72           | 6189.21           | 6190.86           | 0.023224              | 14.10              | 392.03               | 156.38            | 1.36         |
| Reach | 1370.000  | 4510.00          | 6184.98           | 6188.42           | 6189.10           | 6190.62           | 0.024053              | 14.45              | 390.29               | 163.51            | 1.38         |
| Reach | 1360.000  | 4510.00          | 6184.64           | 6188.19           | 6188.63           | 6190.38           | 0.024308              | 14.84              | 407.47               | 193.15            | 1.40         |
| Reach | 1350.000  | 4510.00          | 6184.30           | 6187.72           | 6188.62           | 6190.10           | 0.027872              | 15.51              | 378.18               | 189.69            | 1.49         |
| Reach | 1340.000  | 4510.00          | 6184.00           | 6187.43           | 6188.25           | 6189.82           | 0.029548              | 16.14              | 389.32               | 196.98            | 1.54         |
| Reach | 1330.000  | 4510.00          | 6183.92           | 6187.20           | 6187.89           | 6189.48           | 0.030983              | 15.84              | 402.03               | 223.55            | 1.56         |
| Reach | 1320.000  | 4510.00          | 6183.57           | 6186.97           | 6187.62           | 6189.15           | 0.028776              | 15.59              | 411.37               | 223.28            | 1.51         |
| Reach | 1310.000  | 4510.00          | 6183.22           | 6186.56           | 6187.22           | 6188.83           | 0.031806              | 16.20              | 394.86               | 210.07            | 1.58         |
| Reach | 1300.000  | 4510.00          | 6182.86           | 6186.16           | 6186.86           | 6188.50           | 0.033879              | 16.81              | 385.45               | 203.85            | 1.63         |
| Reach | 1290.000  | 4510.00          | 6182.32           | 6185.75           | 6186.49           | 6188.16           | 0.032838              | 16.96              | 378.03               | 188.58            | 1.62         |
| Reach | 1280.000  | 4510.00          | 6181.85           | 6185.50           | 6186.25           | 6187.81           | 0.030044              | 16.62              | 382.27               | 179.15            | 1.56         |
| Reach | 1270.000  | 4510.00          | 6181.28           | 6185.00           | 6185.73           | 6187.48           | 0.031304              | 16.87              | 365.80               | 163.83            | 1.58         |
| Reach | 1260.000  | 4510.00          | 6180.72           | 6184.64           | 6185.32           | 6187.17           | 0.029548              | 16.90              | 361.66               | 152.16            | 1.55         |
| Reach | 1250.000  | 4510.00          | 6180.16           | 6184.10           | 6184.85           | 6186.84           | 0.030856              | 17.09              | 347.75               | 142.72            | 1.58         |
| Reach | 1240.000  | 4510.00          | 6179.69           | 6183.70           | 6184.41           | 6186.54           | 0.028038              | 16.62              | 343.08               | 129.22            | 1.51         |
| Reach | 1230.000  | 4510.00          | 6177.84           | 6183.27           | 6183.93           | 6186.28           | 0.022242              | 17.55              | 355.47               | 127.29            | 1.40         |
| Reach | 1220.000  | 4510.00          | 6175.54           | 6182.59           | 6183.70           | 6186.03           | 0.018026              | 17.89              | 356.52               | 122.07            | 1.29         |
| Reach | 1210.000  | 4510.00          | 6174.00           | 6182.15           | 6183.37           | 6185.72           | 0.020296              | 17.86              | 344.49               | 121.39            | 1.33         |
| Reach | 1200.000  | 4510.00          | 6174.00           | 6181.66           | 6183.17           | 6185.47           | 0.025328              | 18.19              | 318.14               | 111.12            | 1.45         |
| Reach | 1190.000  | 4510.00          | 6174.00           | 6181.21           | 6182.77           | 6185.19           | 0.028500              | 18.36              | 309.33               | 113.56            | 1.52         |
| Reach | 1180.000  | 4510.00          | 6174.00           | 6180.59           | 6182.26           | 6184.86           | 0.030558              | 18.74              | 299.05               | 112.70            | 1.59         |
| Reach | 1170.000  | 4510.00          | 6174.00           | 6179.99           | 6181.80           | 6184.52           | 0.032498              | 18.76              | 284.16               | 101.35            | 1.63         |
| Reach | 1160.000  | 4510.00          | 6174.00           | 6179.54           | 6181.46           | 6184.17           | 0.036165              | 18.71              | 275.59               | 98.63             | 1.70         |
| Reach | 1150.000  | 4510.00          | 6172.00           | 6179.03           | 6181.00           | 6183.79           | 0.038435              | 18.68              | 270.11               | 96.12             | 1.73         |
| Reach | 1140.000  | 4510.00          | 6172.00           | 6178.41           | 6180.26           | 6183.36           | 0.043944              | 18.72              | 265.64               | 109.67            | 1.83         |
| Reach | 1130.000  | 4510.00          | 6172.00           | 6177.62           | 6179.46           | 6182.87           | 0.048756              | 18.89              | 253.82               | 100.86            | 1.92         |
| Reach | 1120.000  | 4510.00          | 6172.00           | 6177.48           | 6179.15           | 6182.31           | 0.040204              | 18.06              | 267.63               | 105.83            | 1.76         |
| Reach | 1110.000  | 4510.00          | 6171.67           | 6177.24           | 6178.93           | 6181.88           | 0.035114              | 17.60              | 273.37               | 105.07            | 1.66         |
| Reach | 1100.000  | 4510.00          | 6171.33           | 6176.83           | 6178.50           | 6181.53           | 0.034502              | 17.62              | 262.16               | 97.33             | 1.65         |
| Reach | 1090.000  | 4510.00          | 6171.00           | 6176.51           | 6178.20           | 6181.20           | 0.031963              | 17.50              | 262.87               | 91.23             | 1.60         |
| Reach | 1080.000  | 4510.00          | 6170.67           | 6176.14           | 6177.92           | 6180.88           | 0.030475              | 17.54              | 258.90               | 79.10             | 1.57         |
| Reach | 1070.000  | 4510.00          | 6170.33           | 6175.54           | 6177.57           | 6180.55           | 0.030991              | 17.96              | 251.16               | 62.78             | 1.58         |
| Reach | 1060.002  | 4510.00          | 6170.00           | 6174.81           | 6177.28           | 6180.35           | 0.008575              | 18.88              | 238.85               | 59.25             | 1.66         |
| Reach | 1000      | Bridge           |                   |                   |                   |                   |                       |                    |                      |                   |              |
| Reach | 980.0000  | 4510.00          | 6166.00           | 6170.71           | 6172.95           | 6178.59           | 0.055843              | 16.43              | 232.45               | 58.82             | 1.34         |
| Reach | 970       | 4510.00          | 6164.80           | 6168.47           | 6172.03           | 6177.67           | 0.116047              | 20.07              | 205.34               | 61.93             | 1.85         |
| Reach | 960       | 4510.00          | 6163.60           | 6166.63           | 6169.26           | 6176.20           | 0.179224              | 21.94              | 194.68               | 68.59             | 2.22         |
| Reach | 950       | 4510.00          | 6162.40           | 6165.08           | 6167.46           | 6174.07           | 0.213044              | 22.07              | 197.01               | 76.88             | 2.37         |
| Reach | 940       | 4510.00          | 6161.20           | 6163.70           | 6165.83           | 6171.61           | 0.214318              | 21.14              | 207.68               | 85.92             | 2.35         |
| Reach | 930.0000  | 4510.00          | 6160.00           | 6167.37           | 6164.21           | 6168.01           | 0.001741              | 6.52               | 724.11               | 109.56            | 0.42         |
| Reach | 920       | 4510.00          | 6161.69           | 6165.85           | 6165.85           | 6167.84           | 0.011543              | 11.45              | 405.51               | 104.38            | 0.99         |
| Reach | 910       | 4510.00          | 6161.38           | 6165.01           | 6165.54           | 6167.63           | 0.018379              | 13.11              | 352.34               | 104.30            | 1.22         |
| Reach | 900       | 4510.00          | 6161.08           | 6164.57           | 6165.24           | 6167.41           | 0.021324              | 13.64              | 338.09               | 105.45            | 1.30         |
| Reach | 890       | 4510.00          | 6160.77           | 6164.19           | 6164.97           | 6167.18           | 0.023545              | 13.96              | 329.49               | 106.80            | 1.36         |
| Reach | 880       | 4510.00          | 6160.46           | 6163.88           | 6164.69           | 6166.94           | 0.024959              | 14.12              | 325.25               | 108.34            | 1.39         |
| Reach | 870       | 4510.00          | 6160.15           | 6163.61           | 6164.42           | 6166.69           | 0.025729              | 14.16              | 323.98               | 110.10            | 1.41         |
| Reach | 860       | 4510.00          | 6159.85           | 6163.38           | 6164.19           | 6166.43           | 0.025776              | 14.08              | 325.73               | 112.15            | 1.41         |
| Reach | 850       | 4510.00          | 6159.54           | 6163.17           | 6163.96           | 6166.16           | 0.025493              | 13.94              | 328.89               | 114.48            | 1.40         |
| Reach | 840       | 4510.00          | 6159.23           | 6163.00           | 6164.24           | 6165.89           | 0.024552              | 13.69              | 335.06               | 117.37            | 1.37         |
| Reach | 830       | 4510.00          | 6158.92           | 6162.85           | 6163.95           | 6165.61           | 0.023403              | 13.40              | 342.80               | 121.24            | 1.34         |

HEC-RAS Plan Plan 97 River Stream Reach Reach Profile PF 1 (Continued)

| Reach | River Sta | Q Total<br>(cfs) | Min Ch El<br>(ft) | W.S. Elev<br>(ft) | Crit W.S.<br>(ft) | E.G. Elev<br>(ft) | E.G. Slope<br>(ft/ft) | Vel Chnl<br>(ft/s) | Flow Area<br>(sq ft) | Top Width<br>(ft) | Froude # Chl |
|-------|-----------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Reach | 820.0000  | 4510.00          | 6158.62           | 6162.70           | 6163.60           | 6165.34           | 0.022582              | 13.14              | 363.38               | 234.20            | 1.32         |
| Reach | 810.0000  | 4510.00          | 6158.31           | 6162.35           | 6163.28           | 6165.09           | 0.026361              | 13.55              | 371.53               | 255.71            | 1.41         |
| Reach | 800.0000  | 4510.00          | 6158.00           | 6161.98           | 6162.95           | 6164.79           | 0.031658              | 13.98              | 375.39               | 269.14            | 1.52         |
| Reach | 790.0000  | 4510.00          | 6158.00           | 6161.45           | 6162.45           | 6164.45           | 0.034131              | 14.58              | 368.74               | 266.19            | 1.58         |
| Reach | 780.0000  | 4510.00          | 6156.59           | 6160.80           | 6161.89           | 6164.08           | 0.034145              | 15.16              | 356.13               | 258.93            | 1.59         |
| Reach | 770.0000  | 4510.00          | 6156.00           | 6160.33           | 6161.42           | 6163.73           | 0.034107              | 15.54              | 354.47               | 259.12            | 1.60         |
| Reach | 760.0000  | 4510.00          | 6156.00           | 6159.89           | 6160.95           | 6163.37           | 0.037434              | 16.05              | 356.17               | 266.68            | 1.67         |
| Reach | 750.0000  | 4510.00          | 6155.68           | 6159.41           | 6160.45           | 6162.96           | 0.041521              | 16.56              | 355.12               | 271.95            | 1.75         |
| Reach | 740.0000  | 4510.00          | 6154.81           | 6158.91           | 6159.95           | 6162.54           | 0.042238              | 16.83              | 354.17               | 273.85            | 1.77         |
| Reach | 730.0000  | 4510.00          | 6154.00           | 6158.29           | 6159.39           | 6162.10           | 0.040632              | 17.06              | 346.14               | 261.54            | 1.75         |
| Reach | 720.0000  | 4510.00          | 6154.00           | 6157.75           | 6158.86           | 6161.67           | 0.044051              | 17.44              | 341.22               | 260.63            | 1.81         |
| Reach | 710.0000  | 4510.00          | 6153.32           | 6157.22           | 6158.31           | 6161.20           | 0.048736              | 17.78              | 338.09               | 266.14            | 1.89         |
| Reach | 700.0000  | 4510.00          | 6152.42           | 6156.65           | 6157.75           | 6160.70           | 0.048864              | 17.80              | 335.41               | 267.32            | 1.90         |
| Reach | 690.0000  | 4510.00          | 6152.00           | 6156.10           | 6157.20           | 6160.19           | 0.053998              | 17.90              | 330.40               | 268.19            | 1.97         |
| Reach | 680.0000  | 4510.00          | 6152.00           | 6155.57           | 6156.66           | 6159.63           | 0.056392              | 17.72              | 327.95               | 270.79            | 2.00         |
| Reach | 670.0000  | 4510.00          | 6152.00           | 6155.10           | 6156.14           | 6159.00           | 0.061462              | 17.46              | 330.06               | 279.78            | 2.06         |
| Reach | 660.0000  | 4510.00          | 6151.29           | 6154.59           | 6155.60           | 6158.34           | 0.060699              | 17.02              | 333.66               | 280.84            | 2.04         |
| Reach | 650.0000  | 4510.00          | 6150.00           | 6153.98           | 6155.02           | 6157.72           | 0.059782              | 16.81              | 331.08               | 274.88            | 2.02         |
| Reach | 640.0000  | 4510.00          | 6150.00           | 6153.44           | 6154.48           | 6157.08           | 0.063396              | 16.66              | 331.41               | 273.48            | 2.06         |
| Reach | 630.0000  | 4510.00          | 6150.00           | 6153.29           | 6154.23           | 6156.49           | 0.047651              | 15.44              | 349.49               | 251.31            | 1.81         |
| Reach | 620.0000  | 4510.00          | 6149.29           | 6152.78           | 6153.62           | 6155.99           | 0.050529              | 15.54              | 346.80               | 251.51            | 1.86         |
| Reach | 610.0000  | 4510.00          | 6148.00           | 6152.15           | 6153.09           | 6155.48           | 0.049246              | 15.68              | 341.57               | 242.56            | 1.84         |
| Reach | 600.0000  | 4510.00          | 6148.00           | 6151.62           | 6152.53           | 6154.97           | 0.051637              | 15.94              | 339.94               | 241.64            | 1.88         |
| Reach | 590.0000  | 4510.00          | 6148.00           | 6151.22           | 6152.17           | 6154.42           | 0.050121              | 15.96              | 349.44               | 247.23            | 1.86         |
| Reach | 580.0000  | 4510.00          | 6146.89           | 6150.82           | 6151.84           | 6153.91           | 0.044124              | 15.88              | 362.68               | 253.89            | 1.77         |
| Reach | 570.0000  | 4510.00          | 6146.00           | 6150.34           | 6151.31           | 6153.46           | 0.046011              | 16.15              | 362.70               | 259.39            | 1.81         |
| Reach | 560.0000  | 4510.00          | 6146.00           | 6149.92           | 6150.79           | 6152.93           | 0.053656              | 16.37              | 364.01               | 280.92            | 1.92         |
| Reach | 550.0000  | 4510.00          | 6146.00           | 6149.40           | 6150.25           | 6152.40           | 0.052942              | 16.49              | 370.11               | 294.23            | 1.92         |
| Reach | 540.0000  | 4510.00          | 6146.00           | 6148.90           | 6149.75           | 6151.89           | 0.049236              | 16.51              | 377.49               | 300.47            | 1.87         |
| Reach | 530.0000  | 4510.00          | 6144.72           | 6148.38           | 6149.23           | 6151.39           | 0.051378              | 16.68              | 375.23               | 302.19            | 1.90         |
| Reach | 520.0000  | 4510.00          | 6144.00           | 6147.81           | 6148.68           | 6150.87           | 0.050988              | 16.87              | 374.01               | 299.33            | 1.90         |
| Reach | 510.0000  | 4510.00          | 6144.00           | 6147.23           | 6148.11           | 6150.36           | 0.049658              | 17.06              | 372.80               | 294.89            | 1.89         |
| Reach | 500.0000  | 4510.00          | 6144.00           | 6146.69           | 6147.59           | 6149.85           | 0.052954              | 17.29              | 368.08               | 293.96            | 1.94         |
| Reach | 490.0000  | 4510.00          | 6144.00           | 6146.23           | 6147.09           | 6149.23           | 0.063030              | 17.17              | 359.79               | 293.78            | 2.07         |
| Reach | 480.0000  | 4510.00          | 6143.40           | 6145.51           | 6146.23           | 6148.00           | 0.071866              | 15.28              | 367.72               | 315.57            | 2.11         |
| Reach | 470.0000  | 4510.00          | 6142.00           | 6145.13           | 6145.76           | 6147.25           | 0.057697              | 13.76              | 394.72               | 317.21            | 1.89         |
| Reach | 460.0000  | 4510.00          | 6142.00           | 6144.69           | 6145.28           | 6146.64           | 0.052367              | 12.73              | 406.74               | 315.05            | 1.79         |
| Reach | 450.0000  | 4510.00          | 6141.54           | 6144.21           | 6144.78           | 6146.11           | 0.051522              | 12.25              | 410.76               | 317.28            | 1.76         |
| Reach | 440.0000  | 4510.00          | 6140.34           | 6143.84           | 6144.37           | 6145.61           | 0.043112              | 12.57              | 432.90               | 324.87            | 1.65         |
| Reach | 430.0000  | 4510.00          | 6140.00           | 6143.20           | 6143.79           | 6145.12           | 0.051703              | 12.53              | 409.46               | 318.44            | 1.77         |
| Reach | 420.0000  | 4510.00          | 6140.00           | 6142.65           | 6143.25           | 6144.59           | 0.053582              | 11.87              | 404.65               | 318.77            | 1.77         |
| Reach | 410.0000  | 4510.00          | 6140.00           | 6142.14           | 6142.72           | 6144.06           | 0.052720              | 11.75              | 409.19               | 325.68            | 1.76         |
| Reach | 400.0000  | 4510.00          | 6140.00           | 6141.76           | 6142.29           | 6143.55           | 0.042080              | 9.94               | 425.59               | 331.32            | 1.55         |
| Reach | 390.0000  | 4510.00          | 6138.65           | 6141.01           | 6141.63           | 6143.07           | 0.047229              | 9.45               | 399.19               | 303.01            | 1.80         |
| Reach | 380.0000  | 4510.00          | 6138.00           | 6140.46           | 6141.13           | 6142.60           | 0.046193              | 8.59               | 396.06               | 294.57            | 1.55         |
| Reach | 370.0000  | 4510.00          | 6138.00           | 6139.91           | 6140.62           | 6142.13           | 0.044642              | 8.17               | 390.76               | 282.51            | 1.51         |
| Reach | 360.0000  | 4510.00          | 6138.00           | 6140.98           | 6140.15           | 6141.32           | 0.003995              | 4.62               | 967.62               | 403.35            | 0.53         |
| Reach | 350.0000  | 4510.00          | 6138.00           | 6140.28           | 6140.28           | 6141.10           | 0.016193              | 8.03               | 627.09               | 382.19            | 1.03         |
| Reach | 340.0000  | 4510.00          | 6136.63           | 6139.34           | 6139.75           | 6140.79           | 0.038002              | 10.42              | 470.08               | 363.89            | 1.51         |
| Reach | 330.0000  | 4510.00          | 6136.00           | 6138.64           | 6139.16           | 6140.34           | 0.047283              | 10.90              | 431.63               | 343.99            | 1.66         |
| Reach | 320.0000  | 4510.00          | 6136.00           | 6138.01           | 6138.55           | 6139.84           | 0.050646              | 10.54              | 416.25               | 330.63            | 1.69         |
| Reach | 310.0000  | 4510.00          | 6135.69           | 6137.59           | 6138.09           | 6139.32           | 0.047081              | 10.30              | 427.45               | 336.68            | 1.63         |
| Reach | 300.0000  | 4510.00          | 6134.13           | 6136.84           | 6137.46           | 6138.79           | 0.054282              | 11.29              | 402.18               | 318.29            | 1.76         |
| Reach | 290.0000  | 4510.00          | 6134.00           | 6136.20           | 6136.85           | 6138.23           | 0.056546              | 11.85              | 394.89               | 313.16            | 1.81         |
| Reach | 280.0000  | 4510.00          | 6132.02           | 6135.64           | 6136.33           | 6137.68           | 0.052215              | 12.95              | 397.15               | 302.93            | 1.79         |
| Reach | 270.0000  | 4510.00          | 6132.00           | 6134.95           | 6135.72           | 6137.14           | 0.053519              | 13.43              | 389.34               | 297.68            | 1.82         |
| Reach | 260.0000  | 4510.00          | 6132.00           | 6134.48           | 6135.20           | 6136.61           | 0.049269              | 12.95              | 401.27               | 312.60            | 1.76         |
| Reach | 250.0000  | 4510.00          | 6131.18           | 6133.76           | 6134.43           | 6136.08           | 0.051833              | 12.91              | 385.03               | 299.28            | 1.79         |
| Reach | 240.0000  | 4510.00          | 6130.34           | 6132.95           | 6133.73           | 6135.55           | 0.050000              | 11.89              | 362.82               | 269.69            | 1.73         |
| Reach | 230.0000  | 4510.00          | 6130.00           | 6132.21           | 6133.07           | 6135.05           | 0.046703              | 10.28              | 346.55               | 240.21            | 1.62         |
| Reach | 220.0000  | 4510.00          | 6130.00           | 6131.52           | 6132.44           | 6134.55           | 0.047646              | 9.09               | 334.19               | 204.11            | 1.59         |
| Reach | 210.0000  | 4510.00          | 6130.00           | 6130.91           | 6131.84           | 6134.04           | 0.052872              | 7.64               | 329.99               | 223.76            | 1.58         |
| Reach | 200.0000  | 4510.00          | 6130.00           | 6130.29           | 6131.28           | 6133.49           | 0.055521              | 4.06               | 322.95               | 233.01            | 1.38         |
| Reach | 190.0000  | 4510.00          | 6128.47           | 6129.48           | 6130.64           | 6132.88           | 0.059818              | 6.66               | 307.04               | 173.13            | 1.59         |
| Reach | 180.0000  | 4510.00          | 6128.00           | 6128.76           | 6129.92           | 6132.26           | 0.062338              | 5.49               | 302.50               | 173.23            | 1.54         |
| Reach | 170.0000  | 4510.00          | 6128.00           | 6128.13           | 6129.31           | 6131.64           | 0.062005              | 2.53               | 301.90               | 181.37            | 1.27         |
| Reach | 160.0000  | 4510.00          | 6128.00           | 6127.44           | 6128.67           | 6131.00           | 0.062561              |                    | 297.79               | 160.67            | 0.00         |
| Reach | 150.0000  | 4510.00          | 6128.00           | 6126.73           | 6127.83           | 6130.36           | 0.064810              |                    | 295.33               | 161.59            | 0.00         |
| Reach | 140.0000  | 4510.00          | 6127.25           | 6126.07           | 6127.20           | 6129.70           | 0.065597              |                    | 294.93               | 162.52            | 0.00         |
| Reach | 130.0000  | 4510.00          | 6126.23           | 6125.42           | 6126.57           | 6129.05           | 0.063982              |                    | 294.82               | 159.34            | 0.00         |
| Reach | 120.0000  | 4510.00          | 6126.00           | 6126.98           | 6126.98           | 6127.70           | 0.014421              | 4.44               | 679.54               | 453.47            | 0.85         |
| Reach | 110.0000  | 4510.00          | 6126.00           | 6125.95           | 6126.38           | 6127.40           | 0.036654              |                    | 477.95               | 364.74            | 0.00         |
| Reach | 100.0000  | 4510.00          | 6125.30           | 6125.29           | 6125.86           | 6126.98           | 0.040295              |                    | 445.70               | 333.96            | 0.00         |
| Reach | 90.0000   | 4510.00          | 6124.44           | 6124.74           | 6125.30           | 6126.52           | 0.047658              | 3.21               | 434.42               | 360.80            | 1.23         |

### Riprap Bank Protection Southwest of Bear Canyon Bridge

Start Riprap

| Station<br>Arroyo Centerline | Station<br>Riprap | Elevation<br>Bottom<br>Riprap | Elevation<br>Top<br>Riprap | Elevation<br>Existing | Elevation<br>Water + 2' | Freeboard |
|------------------------------|-------------------|-------------------------------|----------------------------|-----------------------|-------------------------|-----------|
| 6+40                         | 0+00              | 6144.50                       | 6156.50                    | 6157.68               | 6156.48                 | 2.02      |
| 6+60                         | 0+20.22           | 6145.58                       | 6157.58                    | 6158.50               | 6157.60                 | 1.98      |
| 6+80                         | 0+40.44           | 6146.67                       | 6158.67                    | 6159.17               | 6158.68                 | 1.99      |
| 7+00                         | 0+60.66           | 6147.75                       | 6159.75                    | 6160.48               | 6159.75                 | 2.00      |
| 7+20                         | 0+80.88           | 6148.83                       | 6160.83                    | 6161.80               | 6160.86                 | 1.97      |
| 7+40                         | 1+01.10           | 6149.92                       | 6161.92                    | 6162.31               | 6161.95                 | 1.97      |
| 7+60                         | 1+21.32           | 6151.00                       | 6163.00                    | 6163.65               | 6162.95                 | 2.05      |
| 7+80                         | 1+41.34           | 6152.00                       | 6164.00                    | 6165.08               | 6163.89                 | 2.11      |
| 8+00                         | 1+61.36           | 6153.00                       | 6165.00                    | 6165.62               | 6164.95                 | 2.05      |
| 8+20                         | 1+81.38           | 6153.75                       | 6165.75                    | 6166.10               | 6165.60                 | 2.15      |
| 8+40                         | 2+01.40           | 6154.50                       | 6166.50                    | 6167.08               | 6166.24                 | 2.26      |
| 8+60                         | 2+21.47           | 6155.02                       | 6167.02                    | 6167.25               | 6166.19                 | 2.83      |
| 8+80                         | 2+41.53           | 6155.54                       | 6167.54                    | 6168.36               | 6166.69                 | 2.85      |
| 9+00                         | 2+57.87           | 6155.96                       | 6167.96                    | 6169.66               | 6167.24                 | 2.72      |
| 9+20                         | 2+78.08           | 6156.48                       | 6168.48                    | 6170.11               | 6167.85                 | 2.63      |
| 9+40                         | 2+98.29           | 6157.00                       | 6169.00                    | 6171.09               | 6165.70                 | 5.30      |
| 9+40.97                      | 3+00.59           | 6157.02                       | 6169.02                    | 6171.19               | 6165.72                 | 5.30      |

End of Riprap

### Riprap Bank Protection Southeast of Bear Canyon Bridge

Start of Riprap

| Station<br>Arroyo Centerline | Station<br>Riprap | Elevation<br>Bottom<br>Riprap | Elevation<br>Top<br>Riprap | Elevation<br>Existing | Elevation<br>Water + 2' | Freeboard |
|------------------------------|-------------------|-------------------------------|----------------------------|-----------------------|-------------------------|-----------|
| 11+15.26                     | 0+00              | 6165.50                       | 6179.50                    | 6182.02               | 6179.26                 | 2.24      |
| 11+20                        | 0+4.74            | 6165.78                       | 6179.78                    | 6181.86               | 6179.48                 | 2.30      |
| 11+40                        | 0+24.74           | 6166.94                       | 6180.94                    | 6181.89               | 6180.91                 | 2.03      |
| 11+60                        | 0+44.75           | 6168.10                       | 6182.10                    | 6184.25               | 6181.54                 | 2.56      |
| 11+80                        | 0+64.75           | 6169.26                       | 6183.26                    | 6187.58               | 6182.55                 | 2.71      |
| 12+00                        | 0+84.76           | 6170.42                       | 6184.42                    | 6189.07               | 6183.65                 | 2.77      |
| 12+20                        | 0+48.93           | 6171.24                       | 6185.24                    | 6188.68               | 6184.59                 | 2.65      |
| 12+40                        | 1+19.09           | 6172.41                       | 6186.41                    | 6188.08               | 6185.70                 | 2.71      |
| 12+50                        | 1+29.16           | 6173-6175                     | 6187.00                    | 6187.38               | 6186.85                 | 2.15      |
| 12+60                        | 1+40.34           | 6175.36                       | 6187.36                    | 6187.77               | 6187.32                 | 2.04      |
| 12+80                        | 1+62.71           | 6176.09                       | 6188.09                    | 6188.10               | 6188.25                 | 1.84      |
| 13+00                        | 1+84.10           | 6176.82                       | 6188.82                    | 6189.08               | 6188.86                 | 1.96      |
| 13+20                        | 2+07.43           | 6177.55                       | 6189.55                    | 6190.19               | 6189.62                 | 1.93      |
| 13+40                        | 2+29.80           | 6178.27                       | 6190.27                    | 6191.96               | 6190.25                 | 2.02      |
| 13+60                        | 2+52.16           | 6179.00                       | 6191.00                    | 6194.33               | 6190.63                 | 2.37      |
| 13+80                        | 2+74.52           | 6179.56                       | 6191.56                    | 6194.89               | 6191.21                 | 2.35      |
| 14+00                        | 2+96.89           | 6180.11                       | 6192.11                    | 6195.44               | 6191.79                 | 2.32      |
| 14+20                        | 3+19.25           | 6180.67                       | 6192.67                    | 6197.66               | 6192.38                 | 2.29      |
| 14+40                        | 3+41.62           | 6181.22                       | 6193.22                    | 6201.17               | 6193.13                 | 2.09      |
| 14+50                        | 3.52+80           | 6181.50                       | 6193.50                    | 6202.63               | 6193.44                 | 2.06      |

End of Riprap

# EMBANKMENT TOP OF ROAD CALCULATIONS

| Centerline Station | Min. Ch. Elev. | W.S. Elev. | Critical Elev. | Top Elev. | Slope       | Adjusted Slope | Adjusted Elevation | Difference | Adjusted Station | PI Location |
|--------------------|----------------|------------|----------------|-----------|-------------|----------------|--------------------|------------|------------------|-------------|
| 0                  |                |            |                | 6150.1    |             |                | 6150.1             | 0.00       |                  |             |
| 20                 | 6144.34        | 6147.1     | 6148.1         | 6151.55   | 7.250%      | 0.077          | 6151.64            | 0.09       |                  |             |
| 40                 | 6146           | 6148.5     | 6149.5         | 6153.08   | 7.650%      | 0.077          | 6153.18            | 0.10       |                  |             |
| 60                 | 6147.98        | 6150.2     | 6151.08        | 6154.56   | 7.400%      | 0.077          | 6154.72            | 0.16       |                  |             |
| 80                 | 6149.44        | 6151.64    | 6152.56        | 6156.25   | 8.450%      | 0.077          | 6156.26            | 0.01       |                  |             |
| 100                | 6151.32        | 6153.3     | 6154.25        | 6157.66   | 7.050%      | 0.077          | 6157.8             | 0.14       |                  |             |
| 120                | 6152.58        | 6154.7     | 6155.66        | 6159.3    | 8.200%      | 0.077          | 6159.34            | 0.04       |                  |             |
| 140                | 6154.57        | 6156.48    | 6157.3         | 6160.65   | 6.750%      | 0.06           | 6160.54            | -0.11      |                  |             |
| 160                | 6155.98        | 6157.77    | 6158.65        | 6162.04   | 6.950%      | 0.06           | 6161.74            | -0.30      |                  |             |
| 180                | 6157.18        | 6159.2     | 6160.04        | 6163.17   | 5.650%      | 0.06           | 6162.94            | -0.23      |                  |             |
| 200                | 6158.36        | 6160.42    | 6161.17        | 6164.3    | 5.650%      | 0.06           | 6164.14            | -0.16      |                  |             |
| 220                | 6159.91        | 6161.52    | 6162.3         | 6165.52   | 6.100%      | 0.06           | 6165.34            | -0.18      |                  |             |
| 240                | 6160.47        | 6162.73    | 6163.52        | 6166.65   | 5.650%      | 0.06           | 6166.54            | -0.11      | 260              | X           |
| 260                | 6162           | 6163.86    | 6164.65        | 6167.72   | 5.350%      | 0.067          | 6167.88            | 0.16       |                  |             |
| 280*               | 6163.47        | 6165.01    | 6165.72        | 6168.92   | 6.000%      | 0.067          | 6169.22            | 0.30       |                  |             |
| 300                | 6164           | 6166.14    | 6166.92        | 6170.37   | 7.250%      | 0.067          | 6170.56            | 0.19       |                  |             |
| 320                | 6165.81        | 6167.63    | 6168.37        | 6171.71   | 6.700%      | 0.067          | 6171.9             | 0.19       |                  |             |
| 340                | 6167.17        | 6169.02    | 6169.71        | 6173.11   | 7.000%      | 0.067          | 6173.24            | 0.13       |                  |             |
| 360                | 6168.59        | 6170.44    | 6171.11        | 6174.4    | 6.450%      | 0.067          | 6174.58            | 0.18       |                  |             |
| 380                | 6170           | 6171.71    | 6172.4         | 6175.77   | 6.850%      | 0.067          | 6175.92            | 0.15       |                  |             |
| 400                | 6171.88        | 6173.05    | 6173.77        | 6177.2    | 7.150%      | 0.067          | 6177.26            | 0.06       |                  |             |
| 420                | 6172.73        | 6174.46    | 6175.2         | 6178.58   | 6.900%      | 0.067          | 6178.6             | 0.02       |                  |             |
| 440                | 6174           | 6175.82    | 6176.58        | 6179.91   | 6.650%      | 0.067          | 6179.94            | 0.03       |                  |             |
| 460                | 6175.55        | 6177.11    | 6177.91        | 6181.24   | 6.650%      | 0.067          | 6181.28            | 0.04       |                  |             |
| 480                | 6176.65        | 6178.44    | 6179.24        | 6182.46   | 6.100%      | 0.067          | 6182.62            | 0.16       |                  |             |
| 500                | 6177.89        | 6179.62    | 6180.46        | 6183.9    | 7.200%      | 0.067          | 6183.96            | 0.06       |                  |             |
| 520                | 6179.27        | 6181.05    | 6181.9         | 6185.27   | 6.850%      | 0.067          | 6185.3             | 0.03       |                  |             |
| 540                | 6180.38        | 6182.46    | 6183.27        | 6186.41   | 5.700%      | 0.067          | 6186.64            | 0.23       |                  |             |
| 560                | 6181.57        | 6183.56    | 6184.41        | 6187.69   | 6.400%      | 0.067          | 6187.98            | 0.29       |                  |             |
| 580                | 6182.65        | 6184.86    | 6185.69        | 6189.09   | 7.000%      | 0.067          | 6189.32            | 0.23       |                  |             |
| 600                | 6184.08        | 6186.26    | 6187.09        | 6190.46   | 6.850%      | 0.067          | 6190.66            | 0.20       |                  |             |
| 620                | 6185.13        | 6187.58    | 6188.46        | 6191.77   | 6.550%      | 0.067          | 6192               | 0.23       |                  |             |
| 640                | 6186.2         | 6188.73    | 6189.77        | 6193.17   | 7.000%      | 0.067          | 6193.34            | 0.17       |                  |             |
| 660                | 6187.68        | 6190.19    | 6191.17        | 6194.63   | 7.300%      | 0.067          | 6194.68            | 0.05       | 720.6            | X           |
| 680                | 6189.32        | 6191.73    | 6192.63        | 6195.91   | 6.400%      | 0.063          | 6195.94            | 0.03       |                  |             |
| 700                | 6190           | 6192.89    | 6193.91        | 9196.99   | 15005.400%  | 0.063          | 6197.2             | -2999.79   |                  |             |
| 720                | 6191.55        | 6193.97    | 9194.99        | 6198.23   | -14993.800% | 0.063          | 6198.46            | 0.23       |                  |             |
| 740                | 6192.44        | 6195.33    | 6196.23        | 6199.43   | 6.000%      | 0.063          | 6199.72            | 0.29       |                  |             |
| 760                | 6194           | 6196.54    | 6197.43        |           |             |                |                    |            |                  |             |

TOP  
OF  
ROAD

| Centerline<br>Station | Min. Ch. Elev. | W.S. Elev. | Critical Elev. | Top Elev | Slope  | Adjusted<br>Slope | Adjusted<br>Elevation | Difference | Adjusted<br>Station | PI<br>Location |
|-----------------------|----------------|------------|----------------|----------|--------|-------------------|-----------------------|------------|---------------------|----------------|
| 780                   | 6195.17        | 6197.85    | 6198.77        | 6200.77  | 6.700% | 0.063             | 6200.98               | 0.21       |                     |                |
| 800                   | 6196.39        | 6199.39    | 6200.22        | 6202.22  | 7.250% | 0.063             | 6202.24               | 0.02       |                     |                |
| 820                   | 6198           | 6200.48    | 6201.39        | 6203.39  | 5.850% | 0.063             | 6203.5                | 0.11       |                     |                |
| 840                   | 6199.06        | 6201.76    | 6202.71        | 6204.71  | 6.600% | 0.063             | 6204.76               | 0.05       |                     |                |
| 860                   | 6200           | 6203.05    | 6203.97        | 6205.97  | 6.300% | 0.063             | 6206.02               | 0.05       |                     |                |
| 880                   | 6200.23        | 6204.14    | 6204.99        | 6206.99  | 5.100% | 0.063             | 6207.28               | 0.29       |                     |                |
| 900                   | 6201.77        | 6205.42    | 6206.42        | 6208.42  | 7.150% | 0.063             | 6208.54               | 0.12       | 943.3               | X              |
| 920                   | 6202.06        | 6206.51    | 6207.59        | 6209.59  | 5.850% | 0.06              | 6209.74               | 0.15       |                     |                |
| 940                   | 6204           | 6207.63    | 6208.73        | 6210.73  | 5.700% | 0.06              | 6210.94               | 0.21       |                     |                |
| 960                   | 6204           | 6208.81    | 6210.12        | 6212.12  | 6.950% | 0.06              | 6212.14               | 0.02       |                     |                |
| 980                   | 6205.78        | 6209.98    | 6211.32        | 6213.32  | 6.000% | 0.06              | 6213.34               | 0.02       |                     |                |
| 1000                  | 6026           | 6210.68    | 6212.52        | 6214.52  | 6.000% | 0.06              | 6214.54               | 0.02       |                     |                |
| 1020                  | 6207.07        | 6211.21    | 6213.32        | 6215.32  | 4.000% | 0.06              | 6215.74               | 0.42       |                     |                |
| 1040                  | 6208           | 6211.93    | 6214.16        | 6216.16  | 4.200% | 0.06              | 6216.94               | 0.78       |                     |                |
| 1060                  | 6210           | 6213.79    | 6215.64        | 6217.64  | 7.400% | 0.06              | 6218.14               | 0.50       |                     |                |
| 1080                  | 6211.3         | 6214.33    | 6216.71        | 6218.71  | 5.350% | 0.06              | 6219.34               | 0.63       |                     |                |
| 1100                  | 6212.25        | 6216.13    | 6217.77        | 6219.77  | 5.300% | 0.06              | 6220.54               | 0.77       |                     |                |
| 1120                  | 6214           | 6218.13    | 6219.69        | 6221.69  | 9.600% | 0.06              | 6221.74               | 0.05       |                     |                |
| 1140                  | 6214           | 6219.04    | 6220.74        | 6222.74  | 5.250% | 0.06              | 6222.94               | 0.20       |                     |                |
| 1160                  | 6216           | 6219.74    | 6221.57        | 6223.57  | 4.150% | 0.06              | 6224.14               | 0.57       |                     |                |
| 1180                  | 6218           | 6221.03    | 6222.87        | 6224.87  | 6.500% | 0.06              | 6225.34               | 0.47       |                     |                |
| 1200                  | 6218           | 6222.67    | 6224.29        | 6226.29  | 7.100% | 0.06              | 6226.54               | 0.25       |                     |                |
| 1220                  | 6218           | 6223.72    | 6225.54        | 6227.54  | 6.250% | 0.06              | 6227.74               | 0.20       | 1267.3              | X              |
| 1240                  | 6220           | 6225.64    | 6227.08        | 6229.08  | 7.700% | 0.075             | 6229.24               | 0.16       |                     |                |
| 1260                  | 6220           | 6226.56    | 6228.47        | 6230.47  | 6.950% | 0.075             | 6230.74               | 0.27       |                     |                |
| 1280                  | 6220.57        | 6227.68    | 6229.94        | 6231.94  | 7.350% | 0.075             | 6232.24               | 0.30       |                     |                |
| 1300                  | 6224           | 6229.63    | 6231.39        | 6233.39  | 7.250% | 0.075             | 6233.74               | 0.35       |                     |                |
| 1320                  | 6228           | 6232.37    | 6233.11        | 6235.11  | 8.600% | 0.075             | 6235.24               | 0.13       |                     |                |
| 1340                  | 6231.44        | 6233.96    | 6234.7         | 6236.7   | 7.950% | 0.075             | 6236.74               | 0.04       |                     |                |
| 1360                  | 6233.26        | 6235.35    | 6236.13        | 6238.13  | 7.150% | 0.075             | 6238.24               | 0.11       |                     |                |
| 1380                  | 6234.72        | 6236.92    | 6237.68        | 6239.68  | 7.750% | 0.075             | 6239.74               | 0.06       |                     |                |
| 1400                  | 6236.12        | 6238.08    | 6238.92        | 6240.92  | 6.200% | 0.075             | 6241.24               | 0.32       |                     |                |
| 1420                  | 6238.16        | 6239.56    | 6240.45        | 6242.45  | 7.650% | 0.075             | 6242.74               | 0.29       |                     |                |
| 1440                  | 6239.44        | 6241.26    | 6242.23        | 6244.23  | 8.900% | 0.075             | 6244.24               | 0.01       | 1487.3              | X              |
| 1460                  | 6240.82        | 6242.54    | 6243.48        | 6245.48  | 6.250% | 0.068             | 6245.6                | 0.12       |                     |                |
| 1480                  | 6242.16        | 6244.01    | 6244.94        | 6246.94  | 7.300% | 0.068             | 6246.96               | 0.02       |                     |                |
| 1500                  | 6243.66        | 6245.31    | 6246.21        | 6248.21  | 6.350% | 0.068             | 6248.32               | 0.11       | 1547.3              | X              |
| 1520                  | 6244.9         | 6246.44    | 6247.34        | 6249.34  | 5.650% | 0.065             | 6249.62               | 0.28       |                     |                |
| 1540                  | 6246           | 6247.62    | 6248.58        | 6250.58  | 6.200% | 0.065             | 6250.92               | 0.34       |                     |                |

=====

| Centerline<br>Station | Min. Ch. Elev. | W/S Elev | Critical Elev | Top Elev | Slope  | Adjusted<br>Slope | Adjusted<br>Elevation | Difference | Adjusted<br>Station | PI<br>Location |
|-----------------------|----------------|----------|---------------|----------|--------|-------------------|-----------------------|------------|---------------------|----------------|
| 1560                  | 6247.3         | 6249.64  | 6249.96       | 6251.96  | 6.900% | 0.065             | 6252.22               | 0.26       |                     |                |
| 1580                  | 6248.56        | 6250.21  | 6251.32       | 6253.32  | 6.800% | 0.065             | 6253.52               | 0.20       |                     |                |
| 1600                  | 6249.28        | 6251.33  | 6252.64       | 6254.64  | 6.600% | 0.065             | 6254.82               | 0.18       | 1647.3              | X              |
| 1620                  | 6251.05        | 6253.16  | 6254.25       | 6256.25  | 8.050% | 0.076             | 6256.34               | 0.09       |                     |                |
| 1640                  | 6252.59        | 6254.59  | 6255.62       | 6257.62  | 6.850% | 0.076             | 6257.86               | 0.24       |                     |                |
| 1660                  | 6254.29        | 6256.17  | 6257.13       | 6259.13  | 7.550% | 0.076             | 6259.38               | 0.25       |                     |                |
| 1680                  | 6255.35        | 6257.63  | 6258.52       | 6260.52  | 6.950% | 0.076             | 6260.9                | 0.38       |                     |                |
| 1700                  | 6257.16        | 6258.99  | 6259.88       | 6261.88  | 6.800% | 0.076             | 6262.42               | 0.54       |                     |                |
| 1720                  | 6258.7         | 6260.61  | 6261.55       | 6263.55  | 8.350% | 0.076             | 6263.94               | 0.39       |                     |                |
| 1740                  | 6260.07        | 6262.23  | 6263.18       | 6265.18  | 8.150% | 0.076             | 6265.46               | 0.28       |                     |                |
| 1760*                 | 6261.09        | 6263.6   | 6264.68       | 6266.68  | 7.500% | 0.076             | 6266.98               | 0.30       | 1799.5              | X              |
| 1780                  | 6262.56        | 6265.09  | 6266.32       | 6268.32  | 8.200% | 0.076             | 6268.5                | 0.18       |                     |                |
| 1800                  | 6264.07        | 6266.44  | 6267.88       | 6269.83  | 7.550% | 0.076             | 6270.02               | 0.19       |                     |                |

小  
大  
大  
大

**Figure 6**

## 100YRSUM.TXT

## SUMMARY OUTPUT - 100-YEAR, 6-HOUR STORM

AHYMO PROGRAM SUMMARY TABLE (AHYMO\_97) -  
INPUT FILE = M:\AHYMO\100YR IN.TXT

- VERSION: 1997.02c

RUN DATE (MON/DAY/YR) =10/02/2002  
USER NO.= AHYMO-S-9702c1BohanHu-AH

| COMMAND                                         | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | PAGE = 1 | NOTATION |
|-------------------------------------------------|---------------------------|-------------|-----------|--------------|----------------------|-----------------------|-----------------|----------------------|--------------|----------|----------|
| *S HIGH DESERT TRACT 13, UNITS 2 AND 3          |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| START                                           |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| RAINFALL TYPE= 1                                |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| *S****HIGH DESERT TRACT 13 OFFSITE BASINS       |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| COMPUTE NM HYD                                  | BASIN01                   | -           | 1         | .01070       | 25.78                | .877                  | 1.53758         | 1.500                | 3.765        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN02                   | -           | 2         | .00280       | 6.76                 | .230                  | 1.53758         | 1.500                | 3.773        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN03                   | -           | 3         | .00100       | 2.43                 | .082                  | 1.53758         | 1.500                | 3.794        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN04                   | -           | 4         | .00280       | 6.76                 | .230                  | 1.53758         | 1.500                | 3.773        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN05                   | -           | 5         | .02420       | 58.29                | 1.985                 | 1.53758         | 1.500                | 3.764        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN06                   | -           | 6         | .00080       | 1.95                 | .066                  | 1.53758         | 1.500                | 3.799        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN07                   | -           | 7         | .00680       | 16.39                | .558                  | 1.53758         | 1.500                | 3.767        | PER IMP= | 15.00    |
| *S****HIGH DESERT TRACT 13 UNIT 2               |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| COMPUTE NM HYD                                  | BASIN2A                   | -           | 10        | .00900       | 22.89                | .832                  | 1.73374         | 1.500                | 3.974        | PER IMP= | 38.00    |
| COMPUTE NM HYD                                  | BASIN2B                   | -           | 11        | .00750       | 20.71                | .788                  | 1.96923         | 1.500                | 4.314        | PER IMP= | 55.00    |
| COMPUTE NM HYD                                  | BASIN2C                   | -           | 12        | .00930       | 25.82                | .984                  | 1.98465         | 1.500                | 4.337        | PER IMP= | 56.00    |
| COMPUTE NM HYD                                  | BASIN2D                   | -           | 13        | .00520       | 14.24                | .539                  | 1.94220         | 1.500                | 4.278        | PER IMP= | 53.00    |
| COMPUTE NM HYD                                  | BASIN2E                   | -           | 14        | .00370       | 9.45                 | .345                  | 1.74940         | 1.500                | 3.992        | PER IMP= | 40.00    |
| COMPUTE NM HYD                                  | BASIN2F                   | -           | 15        | .00230       | 7.36                 | .300                  | 2.44519         | 1.500                | 5.001        | PER IMP= | 90.00    |
| COMPUTE NM HYD                                  | BASIN2G                   | -           | 16        | .00050       | 1.13                 | .036                  | 1.34423         | 1.500                | 3.526        | PER IMP= | .00      |
| COMPUTE NM HYD                                  | LOT8                      | -           | 30        | .00070       | 1.81                 | .065                  | 1.73231         | 1.500                | 4.031        | PER IMP= | 36.00    |
| COMPUTE NM HYD                                  | LOT9                      | -           | 31        | .00110       | 2.64                 | .091                  | 1.54285         | 1.500                | 3.744        | PER IMP= | 22.00    |
| COMPUTE NM HYD                                  | LOT50                     | -           | 32        | .00080       | 1.49                 | .045                  | 1.06610         | 1.500                | 2.904        | PER IMP= | .00      |
| COMPUTE NM HYD                                  | LOT51                     | -           | 33        | .00140       | 3.31                 | .115                  | 1.53714         | 1.500                | 3.696        | PER IMP= | 25.00    |
| COMPUTE NM HYD                                  | LOT52                     | -           | 34        | .00110       | 2.61                 | .090                  | 1.53714         | 1.500                | 3.703        | PER IMP= | 25.00    |
| *S****ADD UNIT 2 BASINS                         |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| ADD HYD                                         | BASINAB                   | 10&11       | 40        | .01650       | 43.60                | 1.620                 | 1.84075         | 1.500                | 4.129        |          |          |
| ADD HYD                                         | BASINABC                  | 40&12       | 42        | .02580       | 69.42                | 2.604                 | 1.89261         | 1.500                | 4.204        |          |          |
| ADD HYD                                         | BASINABCD                 | 42&13       | 43        | .03100       | 83.65                | 3.143                 | 1.90092         | 1.500                | 4.216        |          |          |
| ADD HYD                                         | BASING01                  | 16& 1       | 44        | .01120       | 26.91                | .913                  | 1.52891         | 1.500                | 3.755        |          |          |
| ADD HYD                                         | BASINE07                  | 14& 7       | 46        | .01050       | 25.85                | .903                  | 1.61217         | 1.500                | 3.846        |          |          |
| *S ROUTE BASINS OS-7 AND 2E THROUGH POND AND SD |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| ROUTE RESERVOIR                                 | POND                      | 46          | 47        | .01050       | 24.75                | .903                  | 1.61217         | 1.500                | 3.684        | AC-FT=   | .042     |
| ROUTE                                           | PIPE                      | 47          | 48        | .01050       | 24.79                | .903                  | 1.61206         | 1.550                | 3.689        |          |          |
| *S ROUTE BASINS OS-1 AND 2G THROUGH POND AND SD |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| ROUTE RESERVOIR                                 | POND                      | 44          | 49        | .01120       | 26.26                | .913                  | 1.52891         | 1.500                | 3.663        | AC-FT=   | .037     |
| ROUTE                                           | PIPE                      | 49          | 41        | .01120       | 26.02                | .913                  | 1.52899         | 1.550                | 3.630        |          |          |
| *S****HIGH DESERT TRACT 13 UNIT 3               |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| COMPUTE NM HYD                                  | BASIN3A                   | -           | 50        | .00048       | 1.02                 | .032                  | 1.24513         | 1.500                | 3.326        | PER IMP= | .00      |
| COMPUTE NM HYD                                  | BASIN3B                   | -           | 51        | .00305       | 8.25                 | .310                  | 1.90355         | 1.500                | 4.228        | PER IMP= | 50.00    |
| COMPUTE NM HYD                                  | BASIN3C                   | -           | 52        | .00086       | 2.34                 | .087                  | 1.90355         | 1.500                | 4.255        | PER IMP= | 50.00    |
| COMPUTE NM HYD                                  | BASIN3D                   | -           | 53        | .00248       | 6.71                 | .252                  | 1.90355         | 1.500                | 4.231        | PER IMP= | 50.00    |
| COMPUTE NM HYD                                  | BASIN3E                   | -           | 54        | .00265       | 7.17                 | .269                  | 1.90355         | 1.500                | 4.230        | PER IMP= | 50.00    |
| *S****ADD UNIT 3 AND OFFSITE BASINS             |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| ADD HYD                                         | BASINOS4&5                | 4& 5        | 60        | .02700       | 65.05                | 2.214                 | 1.53756         | 1.500                | 3.765        |          |          |
| ADD HYD                                         | BASIN3AOS45               | 50&60       | 61        | .02748       | 66.07                | 2.246                 | 1.53245         | 1.500                | 3.757        |          |          |
| *S ROUTE BASINS 3A, OS-4 AND OS-5 THROUGH POND  |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| ROUTE RESERVOIR                                 | POND                      | 61          | 62        | .02748       | 63.63                | 2.246                 | 1.53244         | 1.500                | 3.618        | AC-FT=   | .153     |
| ADD HYD                                         | BASIN3C3                  | 52& 3       | 63        | .00186       | 4.77                 | .169                  | 1.70653         | 1.500                | 4.007        |          |          |

| COMMAND                             | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS)  | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | PAGE = 2<br>NOTATION |
|-------------------------------------|---------------------------|-------------|-----------|--------------|-----------------------|-----------------------|-----------------|----------------------|--------------|----------------------|
| ADD HYD                             | BASIN3D2                  | 53&2        | 64        | .00528       | 100YRSUM.TXT<br>13.48 | .481                  | 1.70938         | 1.500                | 3.988        |                      |
| ADD HYD                             | BASIN3C245                | 63&62       | 65        | .02934       | 68.40                 | 2.415                 | 1.54342         | 1.500                | 3.643        |                      |
| ADD HYD                             | 3BD2                      | 64&51       | 66        | .00833       | 21.73                 | .791                  | 1.78045         | 1.500                | 4.076        |                      |
| ADD HYD                             | 3ABCD2345                 | 66&65       | 68        | .03767       | 90.13                 | 3.206                 | 1.59583         | 1.500                | 3.738        |                      |
| *S****ADD UNIT 3 AND UPSTREAM PONDS |                           |             |           |              |                       |                       |                 |                      |              |                      |
| ADD HYD                             | SD1                       | 48&41       | 70        | .02170       | 50.81                 | 1.816                 | 1.56911         | 1.550                | 3.658        |                      |
| ADD HYD                             | W1                        | 68&70       | 72        | .05937       | 140.78                | 5.022                 | 1.58607         | 1.500                | 3.705        |                      |
| ROUTE                               | SUM                       | 72          | 74        | .05937       | 139.35                | 5.022                 | 1.58608         | 1.500                | 3.667        |                      |
| ADD HYD                             | BASIN2F3E                 | 15&54       | 75        | .00495       | 14.54                 | .569                  | 2.15511         | 1.500                | 4.588        |                      |
| ADD HYD                             | OUT                       | 74&75       | 76        | .06432       | 153.88                | 5.591                 | 1.62986         | 1.500                | 3.738        |                      |
| FINISH                              |                           |             |           |              |                       |                       |                 |                      |              |                      |

\*INPUT - 100-YEAR, 6-HOUR STORM

\*

\*S HIGH DESERT TRACT 13, UNITS 2 AND 3

\* 10-02-02

START

RAINFALL BEGINS AT 0.00 HOURS

\* 100 YEAR RETURN PERIOD

\*\*\*\*\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

```

MISC. DATA
RAINFALL RETURN PERIOD_____ 100-YEAR
RAINFALL DURATION_____ 6-HOUR
ZONE 4
RAINFALL DEPTHS: 1 HOUR (P60)_____ 2.26 INCHES
                  (UNADJUSTED) 6 HOUR (P360)_____ 2.85 INCHES
                  24 HOUR (P1440)_____ 3.75 INCHES

```

RAINFALL DATA TAKEN FROM NOAA.

HYDROGRAPH METHODOLOGY

CITY OF ALBQ. DPM VOL. 2, SECTION 22.2 July, 1997  
 INITIAL ABSTRACTION - INFILTRATION METHOD  
 TC CALCULATIONS PER C.O.A. DPM 22.2-B.4  
 AMAFCA AHYMO VERSION MARCH 20,1992

BEGIN ANALYSIS

RAINFALL TYPE=1 RAIN QUARTER=0.0 RAIN ONE=2.26  
 RAIN SIX=2.85 RAIN DAY=3.75 DT=0.05

\*S\*\*\*\*\*HIGH DESERT TRACT 13 OFFSITE BASINS

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 01 \*\*\*\*

COMPUTE NM HYD ID=1 HYD=BASIN01 AREA=0.0107 PER A=0.0 PER B=20.0  
 PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1

PRINT HYD ID=1 CODE=1

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 02 \*\*\*\*

COMPUTE NM HYD ID=2 HYD=BASIN02 AREA=0.0028 PER A=0.0 PER B=20.0  
 PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1

PRINT HYD ID=2 CODE=1

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 03 \*\*\*\*

COMPUTE NM HYD ID=3 HYD=BASIN03 AREA=0.0010 PER A=0.0 PER B=20.0  
 PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1

PRINT HYD ID=3 CODE=1

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 04 \*\*\*\*

COMPUTE NM HYD ID=4 HYD=BASIN04 AREA=0.0028 PER A=0.0 PER B=20.0  
 PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1

PRINT HYD ID=4 CODE=1

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 05 \*\*\*\*

COMPUTE NM HYD ID=5 HYD=BASIN05 AREA=0.0242 PER A=0.0 PER B=20.0  
 PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1

PRINT HYD ID=5 CODE=1

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 06 \*\*\*\*

COMPUTE NM HYD ID=6 HYD=BASIN06 AREA=0.0008 PER A=0.0 PER B=20.0  
 PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1

PRINT HYD ID=6 CODE=1

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 07 \*\*\*\*

COMPUTE NM HYD ID=7 HYD=BASIN07 AREA=0.0068 PER A=0.0 PER B=20.0  
 PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1

PRINT HYD ID=7 CODE=1

\*S\*\*\*\*\*HIGH DESERT TRACT 13 UNIT 2

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 2A \*\*\*\*

COMPUTE NM HYD ID=10 HYD=BASIN2A AREA=0.0090 PER A=0.0 PER B=38  
 PER C=24 PER D=38 TP=.133 RAINFALL=-1

PRINT HYD ID=10 CODE=1

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 2B \*\*\*\*

```

COMPUTE NM HYD      ID=11 HYD=BASIN2B  AREA=0.0075 PER A=0.0 PER B=28
PER C=17 PER D=55  TP=.133  RAINFALL=-1
PRINT HYD          ID=11  CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2C *****
COMPUTE NM HYD      ID=12 HYD=BASIN2C  AREA=0.0093 PER A=0.0 PER B=27
PER C=17 PER D=56  TP=.133  RAINFALL=-1
PRINT HYD          ID=12  CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2D *****
COMPUTE NM HYD      ID=13 HYD=BASIN2D  AREA=0.0052 PER A=0.0 PER B=29
PER C=18 PER D=53  TP=.133  RAINFALL=-1
PRINT HYD          ID=13  CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2E *****
COMPUTE NM HYD      ID=14 HYD=BASIN2E  AREA=0.0037 PER A=0.0 PER B=40
PER C=20 PER D=40  TP=.133  RAINFALL=-1
PRINT HYD          ID=14  CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2F *****
COMPUTE NM HYD      ID=15 HYD=BASIN2F  AREA=0.0023 PER A=0.0 PER B=10
PER C=0.0 PER D=90  TP=.133  RAINFALL=-1
PRINT HYD          ID=15  CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2G *****
COMPUTE NM HYD      ID=16 HYD=BASIN2G  AREA=0.0005 PER A=0.0 PER B=25.0
PER C=75.0 PER D=0.0  TP=.133  RAINFALL=-1
PRINT HYD          ID=16  CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 8 *****
COMPUTE NM HYD      ID=30 HYD=LOT8  AREA=0.0007 PER A=0.0 PER B=32
PER C=32 PER D=36  TP=.133  RAINFALL=-1
PRINT HYD          ID=30  CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 9 *****
COMPUTE NM HYD      ID=31 HYD=LOT9  AREA=0.0011 PER A=0.0 PER B=39
PER C=39 PER D=22  TP=.133  RAINFALL=-1
PRINT HYD          ID=31  CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 50 *****
COMPUTE NM HYD      ID=32 HYD=LOT50  AREA=0.0008 PER A=0.0 PER B=100
PER C=0.0 PER D=0.0  TP=.133  RAINFALL=-1
PRINT HYD          ID=32  CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 51 *****
COMPUTE NM HYD      ID=33 HYD=LOT51  AREA=0.0014 PER A=0.0 PER B=50.0
PER C=25.0 PER D=25.0  TP=.133  RAINFALL=-1
PRINT HYD          ID=33  CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 52 *****
COMPUTE NM HYD      ID=34 HYD=LOT52  AREA=0.0011 PER A=0.0 PER B=50.0
PER C=25.0 PER D=25.0  TP=.133  RAINFALL=-1
PRINT HYD          ID=34  CODE=1
*
*****
*S****ADD UNIT 2 BASINS
*****
ADD HYD              ID=40 HYD=BASINAB ID I=10 ID II=11
PRINT HYD            ID=40  CODE=1
*
ADD HYD              ID=42 HYD=BASINABC ID I=40 ID II=12
PRINT HYD            ID=42  CODE=1
*
ADD HYD              ID=43 HYD=BASINABCD ID I=42 ID II=13
PRINT HYD            ID=43  CODE=1
*
ADD HYD              ID=44 HYD=BASINGO1 ID I=16 ID II=1
PRINT HYD            ID=44  CODE=1
*
ADD HYD              ID=46 HYD=BASINE07 ID I=14 ID II=7
PRINT HYD            ID=46  CODE=1
*
*****
*S ROUTE BASINS OS-7 AND 2E THROUGH POND AND SD
*****
ROUTE RESERVOIR      ID=47 HYD=POND INFLOW ID=46 CODE=10
OUTFLOW (CFS) STORAGE (AC FT) ELEV (FT)
0.00 0.0000 6202
0.01 0.0010 6203

```

100YR IN.txt

|       |        |      |
|-------|--------|------|
| 1.34  | 0.0071 | 6204 |
| 21.12 | 0.0355 | 6205 |
| 44.68 | 0.0759 | 6206 |

\*

```
PRINT HYD          ID=47      CODE=1
COMPUTE RATING CURVE  CID=1 VS NO=1 CODE=-1 SLP=0.06
                     DIAM=2.0 FT  N=0.014
COMPUTE TRAVEL TIME  ID=48      REACH NO=1 NO VS=1 L=400 FT
                     SLOPE=0.06
ROUTE               ID=48      HYD NO=PIPE  INFLOW ID=47
PRINT HYD          ID=48      CODE=1
```

\*

\*\*\*\*\*

\*S ROUTE BASINS OS-1 AND 2G THROUGH POND AND SD

\*\*\*\*\*

```
ROUTE RESERVOIR    ID=49 HYD=POND INFLOW ID=44 CODE=10
                   OUTFLOW (CFS) STORAGE (AC FT) ELEV (FT)
                   0.00  0.0000  6182
                   1.51  0.0056  6183
                   29.76 0.0413  6184
                   85.94 0.0905  6185
```

\*

```
PRINT HYD          ID=49      CODE=1
COMPUTE RATING CURVE  CID=1 VS NO=1 CODE=-1 SLP=0.08
                     DIAM=2.0 FT  N=0.014
COMPUTE TRAVEL TIME  ID=41      REACH NO=1 NO VS=1 L=627 FT
                     SLOPE=0.08
ROUTE               ID=41      HYD NO=PIPE  INFLOW ID=49
PRINT HYD          ID=41      CODE=1
```

\*

\*\*\*\*\*

\*S\*\*\*\*HIGH DESERT TRACT 13 UNIT 3

\*\*\*\*\*

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 3A \*\*\*\*\*

```
COMPUTE NM HYD      ID=50 HYD=BASIN3A AREA=0.00048 PER A=0.0 PER B=50
                     PER C=50 PER D=0.0 TP=.133 RAINFALL=-1
PRINT HYD          ID=50      CODE=1
```

\*

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 3B \*\*\*\*\*

```
COMPUTE NM HYD      ID=51 HYD=BASIN3B AREA=0.00305 PER A=0.0 PER B=30
                     PER C=20 PER D=50 TP=.133 RAINFALL=-1
PRINT HYD          ID=51      CODE=1
```

\*

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 3C \*\*\*\*\*

```
COMPUTE NM HYD      ID=52 HYD=BASIN3C AREA=0.00086 PER A=0.0 PER B=30
                     PER C=20 PER D=50 TP=.133 RAINFALL=-1
PRINT HYD          ID=52      CODE=1
```

\*

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 3D \*\*\*\*\*

```
COMPUTE NM HYD      ID=53 HYD=BASIN3D AREA=0.00248 PER A=0.0 PER B=30
                     PER C=20 PER D=50 TP=.133 RAINFALL=-1
PRINT HYD          ID=53      CODE=1
```

\*

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 3E \*\*\*\*\*

```
COMPUTE NM HYD      ID=54 HYD=BASIN3E AREA=0.00265 PER A=0.0 PER B=30
                     PER C=20 PER D=50 TP=.133 RAINFALL=-1
PRINT HYD          ID=54      CODE=1
```

\*

\*\*\*\*\*

\*S\*\*\*\*ADD UNIT 3 AND OFFSITE BASINS

\*\*\*\*\*

```
ADD HYD             ID=60 HYD=BASINOS4&5 ID I=4 ID II=5
PRINT HYD          ID=60      CODE=1
```

\*

```
ADD HYD             ID=61 HYD=BASIN3AOS45 ID I=50 ID II=60
PRINT HYD          ID=61      CODE=1
```

\*

\*\*\*\*\*

\*S ROUTE BASINS 3A, OS-4 AND OS-5 THROUGH POND

\*\*\*\*\*

```
ROUTE RESERVOIR    ID=62 HYD=POND INFLOW ID=61 CODE=10
                   OUTFLOW (CFS) STORAGE (AC FT) ELEV (FT)
                   0.00  0.00000  6177
                   0.01  0.00100  6178
                   3.84  0.02865  6179
                   34.38 0.10516  6180
                   90.38 0.19603  6181
                   125.93 0.30227  6182
```

\*

51  
52  
53  
54

```
100YR IN.txt
PRINT HYD      ID=62      CODE=1
*
ADD HYD        ID=63 HYD=BASIN3C3 ID I=52 ID II=3
PRINT HYD      ID=63      CODE=1
*
ADD HYD        ID=64 HYD=BASIN3D2 ID I=53 ID II=2
PRINT HYD      ID=64      CODE=1
*
ADD HYD        ID=65 HYD=BASIN3C245 ID I=63 ID II=62
PRINT HYD      ID=65      CODE=1
*
ADD HYD        ID=66 HYD=3BD2 ID I=64 ID II=51
PRINT HYD      ID=66      CODE=1
*
ADD HYD        ID=68 HYD=3ABCD2345 ID I=66 ID II=65
PRINT HYD      ID=68      CODE=1
*
*****
*S***ADD UNIT 3 AND UPSTREAM PONDS
*****
ADD HYD        ID=70 HYD=SD1 ID I=48 ID II=41
PRINT HYD      ID=70      CODE=1
*
ADD HYD        ID=72 HYD=W1 ID I=68 ID II=70
PRINT HYD      ID=72      CODE=1
*
COMPUTE TRAVEL TIME ID=74 REACH NO=1 NO VS=1 L=233 FT
                        SLOPE=0.04
ROUTE            ID=74 HYD NO=SUM INFLOW ID=72
PRINT HYD      ID=74      CODE=1
*
ADD HYD        ID=75 HYD=BASIN2F3E ID I=15 ID II=54
PRINT HYD      ID=75      CODE=1
*
ADD HYD        ID=76 HYD=OUT ID I=74 ID II=75
PRINT HYD      ID=76      CODE=1
*
FINISH
```

## 1YR SUM.TXT

## SUMMARY OUTPUT - 1-YEAR, 6-HOUR STORM

AHYMO PROGRAM SUMMARY TABLE (AHYMO\_97) -  
INPUT FILE = M:\AHYMO\1YR IN.TXT

- VERSION: 1997.02c

RUN DATE (MON/DAY/YR) =10/02/2002  
USER NO.= AHYMO-S-9702c1BohanHu-AH

| COMMAND                                         | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | PAGE = 1<br>NOTATION |
|-------------------------------------------------|---------------------------|-------------|-----------|--------------|----------------------|-----------------------|-----------------|----------------------|--------------|----------------------|
| *S HIGH DESERT TRACT 13, UNITS 2 AND 3          |                           |             |           |              |                      |                       |                 |                      |              |                      |
| START                                           |                           |             |           |              |                      |                       |                 |                      |              |                      |
| RAINFALL TYPE= 1                                |                           |             |           |              |                      |                       |                 |                      |              |                      |
| *S****HIGH DESERT TRACT 13 OFFSITE BASINS       |                           |             |           |              |                      |                       |                 |                      |              |                      |
| COMPUTE NM HYD                                  | BASIN01                   | -           | 1         | .01070       | 3.49                 | .100                  | .17580          | 1.500                | .509         | PER IMP= 15.00       |
| COMPUTE NM HYD                                  | BASIN02                   | -           | 2         | .00280       | .92                  | .026                  | .17580          | 1.500                | .511         | PER IMP= 15.00       |
| COMPUTE NM HYD                                  | BASIN03                   | -           | 3         | .00100       | .33                  | .009                  | .17580          | 1.500                | .515         | PER IMP= 15.00       |
| COMPUTE NM HYD                                  | BASIN04                   | -           | 4         | .00280       | .92                  | .026                  | .17580          | 1.500                | .511         | PER IMP= 15.00       |
| COMPUTE NM HYD                                  | BASIN05                   | -           | 5         | .02420       | 7.89                 | .227                  | .17580          | 1.500                | .509         | PER IMP= 15.00       |
| COMPUTE NM HYD                                  | BASIN06                   | -           | 6         | .00080       | .26                  | .008                  | .17580          | 1.500                | .516         | PER IMP= 15.00       |
| COMPUTE NM HYD                                  | BASIN07                   | -           | 7         | .00680       | 2.22                 | .064                  | .17580          | 1.500                | .510         | PER IMP= 15.00       |
| *S****HIGH DESERT TRACT 13 UNIT 2               |                           |             |           |              |                      |                       |                 |                      |              |                      |
| COMPUTE NM HYD                                  | BASIN2A                   | -           | 10        | .00900       | 4.17                 | .143                  | .29767          | 1.500                | .725         | PER IMP= 38.00       |
| COMPUTE NM HYD                                  | BASIN2B                   | -           | 11        | .00750       | 4.75                 | .165                  | .41327          | 1.500                | .989         | PER IMP= 55.00       |
| COMPUTE NM HYD                                  | BASIN2C                   | -           | 12        | .00930       | 5.99                 | .209                  | .42042          | 1.500                | 1.006        | PER IMP= 56.00       |
| COMPUTE NM HYD                                  | BASIN2D                   | -           | 13        | .00520       | 3.19                 | .111                  | .39982          | 1.500                | .959         | PER IMP= 53.00       |
| COMPUTE NM HYD                                  | BASIN2E                   | -           | 14        | .00370       | 1.77                 | .061                  | .30861          | 1.500                | .747         | PER IMP= 40.00       |
| COMPUTE NM HYD                                  | BASIN2F                   | -           | 15        | .00230       | 2.25                 | .080                  | .64952          | 1.500                | 1.528        | PER IMP= 90.00       |
| COMPUTE NM HYD                                  | BASIN2G                   | -           | 16        | .00050       | .09                  | .002                  | .07787          | 1.500                | .295         | PER IMP= .00         |
| COMPUTE NM HYD                                  | LOT8                      | -           | 30        | .00070       | .33                  | .011                  | .29074          | 1.500                | .726         | PER IMP= 36.00       |
| COMPUTE NM HYD                                  | LOT9                      | -           | 31        | .00110       | .36                  | .012                  | .19672          | 1.500                | .510         | PER IMP= 22.00       |
| COMPUTE NM HYD                                  | LOT50                     | -           | 32        | .00080       | .02                  | .000                  | .01010          | 1.550                | .034         | PER IMP= .00         |
| COMPUTE NM HYD                                  | LOT51                     | -           | 33        | .00140       | .46                  | .015                  | .20562          | 1.500                | .513         | PER IMP= 25.00       |
| COMPUTE NM HYD                                  | LOT52                     | -           | 34        | .00110       | .36                  | .012                  | .20562          | 1.500                | .514         | PER IMP= 25.00       |
| *S****ADD UNIT 2 BASINS                         |                           |             |           |              |                      |                       |                 |                      |              |                      |
| ADD HYD                                         | BASINAB                   | 10&11       | 40        | .01650       | 8.92                 | .308                  | .35018          | 1.500                | .845         |                      |
| ADD HYD                                         | BASINABC                  | 40&12       | 42        | .02580       | 14.91                | .517                  | .37549          | 1.500                | .903         |                      |
| ADD HYD                                         | BASINABCD                 | 42&13       | 43        | .03100       | 18.10                | .628                  | .37956          | 1.500                | .912         |                      |
| ADD HYD                                         | BASINGO1                  | 16& 1       | 44        | .01120       | 3.58                 | .102                  | .17138          | 1.500                | .500         |                      |
| ADD HYD                                         | BASINE07                  | 14& 7       | 46        | .01050       | 3.99                 | .125                  | .22254          | 1.500                | .593         |                      |
| *S ROUTE BASINS OS-7 AND 2E THROUGH POND AND SD |                           |             |           |              |                      |                       |                 |                      |              |                      |
| ROUTE RESERVOIR                                 | POND                      | 46          | 47        | .01050       | 3.81                 | .125                  | .22254          | 1.550                | .567         | AC-FT= .011          |
| ROUTE                                           | PIPE                      | 47          | 48        | .01050       | 3.94                 | .125                  | .22243          | 1.550                | .586         |                      |
| *S ROUTE BASINS OS-1 AND 2G THROUGH POND AND SD |                           |             |           |              |                      |                       |                 |                      |              |                      |
| ROUTE RESERVOIR                                 | POND                      | 44          | 49        | .01120       | 3.45                 | .102                  | .17138          | 1.550                | .481         | AC-FT= .008          |
| ROUTE                                           | PIPE                      | 49          | 41        | .01120       | 3.72                 | .102                  | .17147          | 1.550                | .518         |                      |
| *S****HIGH DESERT TRACT 13 UNIT 3               |                           |             |           |              |                      |                       |                 |                      |              |                      |
| COMPUTE NM HYD                                  | BASIN3A                   | -           | 50        | .00048       | .06                  | .001                  | .04896          | 1.550                | .184         | PER IMP= .00         |
| COMPUTE NM HYD                                  | BASIN3B                   | -           | 51        | .00305       | 1.79                 | .062                  | .38008          | 1.500                | .915         | PER IMP= 50.00       |
| COMPUTE NM HYD                                  | BASIN3C                   | -           | 52        | .00086       | .51                  | .017                  | .38008          | 1.500                | .920         | PER IMP= 50.00       |
| COMPUTE NM HYD                                  | BASIN3D                   | -           | 53        | .00248       | 1.45                 | .050                  | .38008          | 1.500                | .916         | PER IMP= 50.00       |
| COMPUTE NM HYD                                  | BASIN3E                   | -           | 54        | .00265       | 1.55                 | .054                  | .38008          | 1.500                | .915         | PER IMP= 50.00       |
| *S****ADD UNIT 3 AND OFFSITE BASINS             |                           |             |           |              |                      |                       |                 |                      |              |                      |
| ADD HYD                                         | BASINOS4&5                | 4& 5        | 60        | .02700       | 8.80                 | .253                  | .17578          | 1.500                | .509         |                      |
| ADD HYD                                         | BASIN3AOS45               | 50&60       | 61        | .02748       | 8.85                 | .254                  | .17355          | 1.500                | .503         |                      |
| *S ROUTE BASINS 3A, OS-4 AND OS-5 THROUGH POND  |                           |             |           |              |                      |                       |                 |                      |              |                      |
| ROUTE RESERVOIR                                 | POND                      | 61          | 62        | .02748       | 8.30                 | .254                  | .17355          | 1.550                | .472         | AC-FT= .040          |
| ADD HYD                                         | BASIN3C3                  | 52& 3       | 63        | .00186       | .84                  | .027                  | .27002          | 1.500                | .702         |                      |

| COMMAND                             | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | 1YR SUM.TXT<br>2.37<br>PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | PAGE = 2<br>NOTATION |
|-------------------------------------|---------------------------|-------------|-----------|--------------|---------------------------------------------|-----------------------|-----------------|----------------------|--------------|----------------------|
| ADD HYD                             | BASIN3D2                  | 53&2        | 64        | .00528       |                                             | .076                  | .27164          | 1.500                | .701         |                      |
| ADD HYD                             | BASIN3C245                | 63&62       | 65        | .02934       | 9.05                                        | .281                  | .17960          | 1.550                | .482         |                      |
| ADD HYD                             | 3BD2                      | 64&51       | 66        | .00833       | 4.16                                        | .138                  | .31131          | 1.500                | .779         |                      |
| ADD HYD                             | 3ABCD2345                 | 66&65       | 68        | .03767       | 12.76                                       | .419                  | .20873          | 1.550                | .529         |                      |
| *S****ADD UNIT 3 AND UPSTREAM PONDS |                           |             |           |              |                                             |                       |                 |                      |              |                      |
| ADD HYD                             | SD1                       | 48&41       | 70        | .02170       | 7.65                                        | .227                  | .19606          | 1.550                | .551         |                      |
| ADD HYD                             | W1                        | 68&70       | 72        | .05937       | 20.41                                       | .646                  | .20410          | 1.550                | .537         |                      |
| ROUTE                               | SUM                       | 72          | 74        | .05937       | 20.65                                       | .646                  | .20411          | 1.550                | .543         |                      |
| ADD HYD                             | BASIN2F3E                 | 15&54       | 75        | .00495       | 3.80                                        | .133                  | .50514          | 1.500                | 1.200        |                      |
| ADD HYD                             | OUT                       | 74&75       | 76        | .06432       | 23.97                                       | .780                  | .22726          | 1.550                | .582         |                      |
| FINISH                              |                           |             |           |              |                                             |                       |                 |                      |              |                      |

```

**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2B ****

```

```

1YR IN.txt
COMPUTE NM HYD      ID=11 HYD=BASIN2B AREA=0.0075 PER A=0.0 PER B=28
PER C=17 PER D=55 TP=.133 RAINFALL=-1
PRINT HYD          ID=11 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2C *****
COMPUTE NM HYD      ID=12 HYD=BASIN2C AREA=0.0093 PER A=0.0 PER B=27
PER C=17 PER D=56 TP=.133 RAINFALL=-1
PRINT HYD          ID=12 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2D *****
COMPUTE NM HYD      ID=13 HYD=BASIN2D AREA=0.0052 PER A=0.0 PER B=29
PER C=18 PER D=53 TP=.133 RAINFALL=-1
PRINT HYD          ID=13 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2E *****
COMPUTE NM HYD      ID=14 HYD=BASIN2E AREA=0.0037 PER A=0.0 PER B=40
PER C=20 PER D=40 TP=.133 RAINFALL=-1
PRINT HYD          ID=14 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2F *****
COMPUTE NM HYD      ID=15 HYD=BASIN2F AREA=0.0023 PER A=0.0 PER B=10
PER C=0.0 PER D=90 TP=.133 RAINFALL=-1
PRINT HYD          ID=15 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2G *****
COMPUTE NM HYD      ID=16 HYD=BASIN2G AREA=0.0005 PER A=0.0 PER B=25.0
PER C=75.0 PER D=0.0 TP=.133 RAINFALL=-1
PRINT HYD          ID=16 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 8 *****
COMPUTE NM HYD      ID=30 HYD=LOT8 AREA=0.0007 PER A=0.0 PER B=32
PER C=32 PER D=36 TP=.133 RAINFALL=-1
PRINT HYD          ID=30 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 9 *****
COMPUTE NM HYD      ID=31 HYD=LOT9 AREA=0.0011 PER A=0.0 PER B=39
PER C=39 PER D=22 TP=.133 RAINFALL=-1
PRINT HYD          ID=31 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 50 *****
COMPUTE NM HYD      ID=32 HYD=LOT50 AREA=0.0008 PER A=0.0 PER B=100
PER C=0.0 PER D=0.0 TP=.133 RAINFALL=-1
PRINT HYD          ID=32 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 51 *****
COMPUTE NM HYD      ID=33 HYD=LOT51 AREA=0.0014 PER A=0.0 PER B=50.0
PER C=25.0 PER D=25.0 TP=.133 RAINFALL=-1
PRINT HYD          ID=33 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 52 *****
COMPUTE NM HYD      ID=34 HYD=LOT52 AREA=0.0011 PER A=0.0 PER B=50.0
PER C=25.0 PER D=25.0 TP=.133 RAINFALL=-1
PRINT HYD          ID=34 CODE=1
*
*****
*S*****ADD UNIT 2 BASINS
*****
ADD HYD          ID=40 HYD=BASINAB ID I=10 ID II=11
PRINT HYD        ID=40 CODE=1
*
ADD HYD          ID=42 HYD=BASINABC ID I=40 ID II=12
PRINT HYD        ID=42 CODE=1
*
ADD HYD          ID=43 HYD=BASINABCD ID I=42 ID II=13
PRINT HYD        ID=43 CODE=1
*
ADD HYD          ID=44 HYD=BASINGO1 ID I=16 ID II=1
PRINT HYD        ID=44 CODE=1
*
ADD HYD          ID=46 HYD=BASINEO7 ID I=14 ID II=7
PRINT HYD        ID=46 CODE=1
*
*****
*S ROUTE BASINS OS-7 AND 2E THROUGH POND AND SD
*****
ROUTE RESERVOIR  ID=47 HYD=POND INFLOW ID=46 CODE=10
OUTFLOW (CFS) STORAGE (AC FT) ELEV (FT)
0.00 0.0000 6202
0.01 0.0010 6203

```

1YR IN.txt

|       |        |      |
|-------|--------|------|
| 1.34  | 0.0071 | 6204 |
| 21.12 | 0.0355 | 6205 |
| 44.68 | 0.0759 | 6206 |

\*

```
PRINT HYD ID=47 CODE=1
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.06
DIAM=2.0 FT N=0.014
COMPUTE TRAVEL TIME ID=48 REACH NO=1 NO VS=1 L=400 FT
SLOPE=0.06
ROUTE ID=48 HYD NO=PIPE INFLOW ID=47
PRINT HYD ID=48 CODE=1
```

\*\*\*\*\*

\*S ROUTE BASINS OS-1 AND 2G THROUGH POND AND SD  
\*\*\*\*\*

```
ROUTE RESERVOIR ID=49 HYD=POND INFLOW ID=44 CODE=10
OUTFLOW (CFS) STORAGE (AC FT) ELEV (FT)
0.00 0.0000 6182
1.51 0.0056 6183
29.76 0.0413 6184
85.94 0.0905 6185
```

\*

```
PRINT HYD ID=49 CODE=1
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.08
DIAM=2.0 FT N=0.014
COMPUTE TRAVEL TIME ID=41 REACH NO=1 NO VS=1 L=627 FT
SLOPE=0.08
ROUTE ID=41 HYD NO=PIPE INFLOW ID=49
PRINT HYD ID=41 CODE=1
```

\*\*\*\*\*

\*S\*\*\*\*HIGH DESERT TRACT 13 UNIT 3

\*\*\*\*\*

```
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 3A *****
COMPUTE NM HYD ID=50 HYD=BASIN3A AREA=0.00048 PER A=0.0 PER B=50
PER C=50 PER D=0.0 TP=.133 RAINFALL=-1
PRINT HYD ID=50 CODE=1
```

\*

```
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 3B *****
COMPUTE NM HYD ID=51 HYD=BASIN3B AREA=0.00305 PER A=0.0 PER B=30
PER C=20 PER D=50 TP=.133 RAINFALL=-1
PRINT HYD ID=51 CODE=1
```

\*

```
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 3C *****
COMPUTE NM HYD ID=52 HYD=BASIN3C AREA=0.00086 PER A=0.0 PER B=30
PER C=20 PER D=50 TP=.133 RAINFALL=-1
PRINT HYD ID=52 CODE=1
```

\*

```
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 3D *****
COMPUTE NM HYD ID=53 HYD=BASIN3D AREA=0.00248 PER A=0.0 PER B=30
PER C=20 PER D=50 TP=.133 RAINFALL=-1
PRINT HYD ID=53 CODE=1
```

\*

```
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 3E *****
COMPUTE NM HYD ID=54 HYD=BASIN3E AREA=0.00265 PER A=0.0 PER B=30
PER C=20 PER D=50 TP=.133 RAINFALL=-1
PRINT HYD ID=54 CODE=1
```

\*

\*\*\*\*\*

\*S\*\*\*\*ADD UNIT 3 AND OFFSITE BASINS

\*\*\*\*\*

```
ADD HYD ID=60 HYD=BASINOS4&5 ID I=4 ID II=5
PRINT HYD ID=60 CODE=1
```

\*

```
ADD HYD ID=61 HYD=BASIN3AOS45 ID I=50 ID II=60
PRINT HYD ID=61 CODE=1
```

\*

\*\*\*\*\*

\*S ROUTE BASINS 3A, OS-4 AND OS-5 THROUGH POND  
\*\*\*\*\*

```
ROUTE RESERVOIR ID=62 HYD=POND INFLOW ID=61 CODE=10
OUTFLOW (CFS) STORAGE (AC FT) ELEV (FT)
0.00 0.00000 6177
0.01 0.00100 6178
3.84 0.02865 6179
34.38 0.10516 6180
90.38 0.19603 6181
125.93 0.30227 6182
```

\*

1YR IN.txt

```

PRINT HYD          ID=62      CODE=1
*
ADD HYD             ID=63 HYD=BASIN3C3 ID I=52 ID II=3
PRINT HYD           ID=63      CODE=1
*
ADD HYD             ID=64 HYD=BASIN3D2 ID I=53 ID II=2
PRINT HYD           ID=64      CODE=1
*
ADD HYD             ID=65 HYD=BASIN3C245 ID I=63 ID II=62
PRINT HYD           ID=65      CODE=1
*
ADD HYD             ID=66 HYD=3BD2 ID I=64 ID II=51
PRINT HYD           ID=66      CODE=1
*
ADD HYD             ID=68 HYD=3ABCD2345 ID I=66 ID II=65
PRINT HYD           ID=68      CODE=1
*
*****
*S***ADD UNIT 3 AND UPSTREAM PONDS
*****
ADD HYD             ID=70 HYD=SD1 ID I=48 ID II=41
PRINT HYD           ID=70      CODE=1
*
ADD HYD             ID=72 HYD=W1 ID I=68 ID II=70
PRINT HYD           ID=72      CODE=1
*
COMPUTE TRAVEL TIME ID=74 REACH NO=1 NO VS=1 L=233 FT
                        SLOPE=0.04
ROUTE                ID=74 HYD NO=SUM INFLOW ID=72
PRINT HYD            ID=74      CODE=1
*
ADD HYD             ID=75 HYD=BASIN2F3E ID I=15 ID II=54
PRINT HYD           ID=75      CODE=1
*
ADD HYD             ID=76 HYD=OUT ID I=74 ID II=75
PRINT HYD           ID=76      CODE=1
*
FINISH

```



## 2YRSUM.TXT

SUMMARY OUTPUT - 2-YEAR, 6-HOUR STORM

AHYMO PROGRAM SUMMARY TABLE (AHYMO\_97) -  
 INPUT FILE = M:\AHYMO\2YR IN.TXT

- VERSION: 1997.02c

RUN DATE (MON/DAY/YR) = 10/02/2002  
 USER NO. = AHYMO-S-9702c18ohanHu-AH

| COMMAND                                         | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | PAGE = 1 | NOTATION |
|-------------------------------------------------|---------------------------|-------------|-----------|--------------|----------------------|-----------------------|-----------------|----------------------|--------------|----------|----------|
| *S HIGH DESERT TRACT 13, UNITS 2 AND 3          |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| START                                           |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| RAINFALL TYPE= 1                                |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| *S****HIGH DESERT TRACT 13 OFFSITE BASINS       |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| COMPUTE NM HYD                                  | BASIN01                   | -           | 1         | .01070       | 7.06                 | .193                  | .33843          | 1.500                | 1.032        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN02                   | -           | 2         | .00280       | 1.85                 | .051                  | .33843          | 1.500                | 1.034        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN03                   | -           | 3         | .00100       | .67                  | .018                  | .33843          | 1.500                | 1.042        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN04                   | -           | 4         | .00280       | 1.85                 | .051                  | .33843          | 1.500                | 1.034        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN05                   | -           | 5         | .02420       | 15.97                | .437                  | .33843          | 1.500                | 1.031        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN06                   | -           | 6         | .00080       | .53                  | .014                  | .33843          | 1.500                | 1.042        | PER IMP= | 15.00    |
| COMPUTE NM HYD                                  | BASIN07                   | -           | 7         | .00680       | 4.49                 | .123                  | .33843          | 1.500                | 1.032        | PER IMP= | 15.00    |
| *S****HIGH DESERT TRACT 13 UNIT 2               |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| COMPUTE NM HYD                                  | BASIN2A                   | -           | 10        | .00900       | 6.89                 | .231                  | .48031          | 1.500                | 1.195        | PER IMP= | 38.00    |
| COMPUTE NM HYD                                  | BASIN2B                   | -           | 11        | .00750       | 7.10                 | .250                  | .62429          | 1.500                | 1.478        | PER IMP= | 55.00    |
| COMPUTE NM HYD                                  | BASIN2C                   | -           | 12        | .00930       | 8.91                 | .314                  | .63340          | 1.500                | 1.497        | PER IMP= | 56.00    |
| COMPUTE NM HYD                                  | BASIN2D                   | -           | 13        | .00520       | 4.81                 | .169                  | .60762          | 1.500                | 1.447        | PER IMP= | 53.00    |
| COMPUTE NM HYD                                  | BASIN2E                   | -           | 14        | .00370       | 2.87                 | .097                  | .49229          | 1.500                | 1.210        | PER IMP= | 40.00    |
| COMPUTE NM HYD                                  | BASIN2F                   | -           | 15        | .00230       | 3.02                 | .113                  | .91734          | 1.500                | 2.050        | PER IMP= | 90.00    |
| COMPUTE NM HYD                                  | BASIN2G                   | -           | 16        | .00050       | .26                  | .006                  | .21770          | 1.500                | .816         | PER IMP= | .00      |
| COMPUTE NM HYD                                  | LOT8                      | -           | 30        | .00070       | .55                  | .018                  | .47481          | 1.500                | 1.222        | PER IMP= | 36.00    |
| COMPUTE NM HYD                                  | LOT9                      | -           | 31        | .00110       | .70                  | .021                  | .35822          | 1.500                | .992         | PER IMP= | 22.00    |
| COMPUTE NM HYD                                  | LOT50                     | -           | 32        | .00080       | .18                  | .004                  | .10322          | 1.500                | .344         | PER IMP= | .00      |
| COMPUTE NM HYD                                  | LOT51                     | -           | 33        | .00140       | .86                  | .027                  | .36341          | 1.500                | .957         | PER IMP= | 25.00    |
| COMPUTE NM HYD                                  | LOT52                     | -           | 34        | .00110       | .68                  | .021                  | .36341          | 1.500                | .959         | PER IMP= | 25.00    |
| *S****ADD UNIT 2 BASINS                         |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| ADD HYD                                         | BASINAB                   | 10&11       | 40        | .01650       | 13.98                | .480                  | .54572          | 1.500                | 1.324        |          |          |
| ADD HYD                                         | BASINABC                  | 40&12       | 42        | .02580       | 22.89                | .794                  | .57731          | 1.500                | 1.386        |          |          |
| ADD HYD                                         | BASINABCD                 | 42&13       | 43        | .03100       | 27.71                | .963                  | .58239          | 1.500                | 1.397        |          |          |
| ADD HYD                                         | BASINGO1                  | 16& 1       | 44        | .01120       | 7.33                 | .199                  | .33300          | 1.500                | 1.022        |          |          |
| ADD HYD                                         | BASINE07                  | 14& 7       | 46        | .01050       | 7.36                 | .220                  | .39259          | 1.500                | 1.095        |          |          |
| *S ROUTE BASINS OS-7 AND 2E THROUGH POND AND SD |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| ROUTE RESERVOIR                                 | POND                      | 46          | 47        | .01050       | 7.01                 | .220                  | .39259          | 1.550                | 1.043        | AC-FT=   | .015     |
| ROUTE                                           | PIPE                      | 47          | 48        | .01050       | 7.13                 | .220                  | .39247          | 1.550                | 1.061        |          |          |
| *S ROUTE BASINS OS-1 AND 2G THROUGH POND AND SD |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| ROUTE RESERVOIR                                 | POND                      | 44          | 49        | .01120       | 7.02                 | .199                  | .33300          | 1.550                | .980         | AC-FT=   | .013     |
| ROUTE                                           | PIPE                      | 49          | 41        | .01120       | 7.21                 | .199                  | .33309          | 1.550                | 1.006        |          |          |
| *S****HIGH DESERT TRACT 13 UNIT 3               |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| COMPUTE NM HYD                                  | BASIN3A                   | -           | 50        | .00048       | .20                  | .004                  | .17501          | 1.500                | .638         | PER IMP= | .00      |
| COMPUTE NM HYD                                  | BASIN3B                   | -           | 51        | .00305       | 2.74                 | .095                  | .58342          | 1.500                | 1.403        | PER IMP= | 50.00    |
| COMPUTE NM HYD                                  | BASIN3C                   | -           | 52        | .00086       | .78                  | .027                  | .58342          | 1.500                | 1.411        | PER IMP= | 50.00    |
| COMPUTE NM HYD                                  | BASIN3D                   | -           | 53        | .00248       | 2.23                 | .077                  | .58342          | 1.500                | 1.403        | PER IMP= | 50.00    |
| COMPUTE NM HYD                                  | BASIN3E                   | -           | 54        | .00265       | 2.38                 | .082                  | .58342          | 1.500                | 1.403        | PER IMP= | 50.00    |
| *S****ADD UNIT 3 AND OFFSITE BASINS             |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| ADD HYD                                         | BASINOS4&5                | 4& 5        | 60        | .02700       | 17.82                | .487                  | .33841          | 1.500                | 1.031        |          |          |
| ADD HYD                                         | BASIN3AOS45               | 50&60       | 61        | .02748       | 18.02                | .492                  | .33555          | 1.500                | 1.025        |          |          |
| *S ROUTE BASINS 3A, OS-4 AND OS-5 THROUGH POND  |                           |             |           |              |                      |                       |                 |                      |              |          |          |
| ROUTE RESERVOIR                                 | POND                      | 61          | 62        | .02748       | 17.01                | .492                  | .33555          | 1.550                | .967         | AC-FT=   | .062     |
| ADD HYD                                         | BASIN3C3                  | 52& 3       | 63        | .00186       | 1.44                 | .045                  | .45148          | 1.500                | 1.212        |          |          |

| 2YRSUM.TXT                          |                           |             |           |              |                      |                       |                 |                      |              | PAGE = 2 |
|-------------------------------------|---------------------------|-------------|-----------|--------------|----------------------|-----------------------|-----------------|----------------------|--------------|----------|
| COMMAND                             | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | NOTATION |
| ADD HYD                             | BASIN3D2                  | 53&2        | 64        | .00528       | 4.08                 | .128                  | .45339          | 1.500                | 1.208        |          |
| ADD HYD                             | BASIN3C245                | 63&62       | 65        | .02934       | 18.30                | .536                  | .34284          | 1.550                | .975         |          |
| ADD HYD                             | 3BD2                      | 64&51       | 66        | .00833       | 6.82                 | .223                  | .50096          | 1.500                | 1.279        |          |
| ADD HYD                             | 3ABCD2345                 | 66&65       | 68        | .03767       | 24.37                | .759                  | .37780          | 1.550                | 1.011        |          |
| *S****ADD UNIT 3 AND UPSTREAM PONDS |                           |             |           |              |                      |                       |                 |                      |              |          |
| ADD HYD                             | SD1                       | 48&41       | 70        | .02170       | 14.34                | .419                  | .36175          | 1.550                | 1.032        |          |
| ADD HYD                             | W1                        | 68&70       | 72        | .05937       | 38.71                | 1.178                 | .37194          | 1.550                | 1.019        |          |
| ROUTE                               | SUM                       | 72          | 74        | .05937       | 39.06                | 1.178                 | .37195          | 1.550                | 1.028        |          |
| ADD HYD                             | BASIN2F3E                 | 15&54       | 75        | .00495       | 5.40                 | .195                  | .73846          | 1.500                | 1.704        |          |
| ADD HYD                             | OUT                       | 74&75       | 76        | .06432       | 43.79                | 1.373                 | .40014          | 1.550                | 1.064        |          |
| FINISH                              |                           |             |           |              |                      |                       |                 |                      |              |          |

\*INPUT - 2-YEAR, 6-HOUR STORM

\*S HIGH DESERT TRACT 13, UNITS 2 AND 3  
\* 10-02-02

START... RAINFALL BEGINS AT 0.00 HOURS  
\* 2 YEAR RETURN PERIOD

\*\*\*\*\*

```

*
* ..... MISC. DATA .....
* ..... RAINFALL RETURN PERIOD..... 100-YEAR .....
* ..... RAINFALL DURATION..... 6-HOUR .....
* ..... ZONE 4 .....
* ..... RAINFALL DEPTHS: 1 HOUR (P60)..... 0.98 INCHES .....
* ..... (UNADJUSTED) 6 HOUR (P360)..... 1.24 INCHES .....
* ..... 24 HOUR (P1440)..... 1.63 INCHES .....
* ..... RAINFALL DATA TAKEN FROM NOAA. ....
* ..... HYDROGRAPH METHODOLOGY .....
* ..... CITY OF ALBQ. DPM VOL. 2, SECTION 22.2 July, 1997 .....
* ..... INITIAL ABSTRACTION - INFILTRATION METHOD .....
* ..... TC CALCULATIONS PER C.O.A. DPM 22.2-B.4 .....
* ..... AMAFCA AHYMO VERSION MARCH 20,1992 .....
* ..... BEGIN ANALYSIS .....

```

\*\*\*\*\*

RAINFALL..... TYPE=1 RAIN QUARTER=0.0 RAIN ONE=0.98  
RAIN SIX=1.24 RAIN DAY=1.63 DT=0.05

\*\*\*\*\*  
\*S\*\*\*\*\*HIGH DESERT TRACT 13 OFFSITE BASINS  
\*\*\*\*\*

\*\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 01 \*\*\*\*\*  
COMPUTE NM HYD..... ID=1 HYD=BASIN01 AREA=0.0107 PER A=0.0 PER B=20.0  
PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1  
PRINT HYD..... ID=1 CODE=1

\*\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 02 \*\*\*\*\*  
COMPUTE NM HYD..... ID=2 HYD=BASIN02 AREA=0.0028 PER A=0.0 PER B=20.0  
PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1  
PRINT HYD..... ID=2 CODE=1

\*\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 03 \*\*\*\*\*  
COMPUTE NM HYD..... ID=3 HYD=BASIN03 AREA=0.0010 PER A=0.0 PER B=20.0  
PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1  
PRINT HYD..... ID=3 CODE=1

\*\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 04 \*\*\*\*\*  
COMPUTE NM HYD..... ID=4 HYD=BASIN04 AREA=0.0028 PER A=0.0 PER B=20.0  
PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1  
PRINT HYD..... ID=4 CODE=1

\*\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 05 \*\*\*\*\*  
COMPUTE NM HYD..... ID=5 HYD=BASIN05 AREA=0.0242 PER A=0.0 PER B=20.0  
PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1  
PRINT HYD..... ID=5 CODE=1

\*\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 06 \*\*\*\*\*  
COMPUTE NM HYD..... ID=6 HYD=BASIN06 AREA=0.0008 PER A=0.0 PER B=20.0  
PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1  
PRINT HYD..... ID=6 CODE=1

\*\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 07 \*\*\*\*\*  
COMPUTE NM HYD..... ID=7 HYD=BASIN07 AREA=0.0068 PER A=0.0 PER B=20.0  
PER C=65.0 PER D=15.0 TP=.133 RAINFALL=-1  
PRINT HYD..... ID=7 CODE=1

\*\*\*\*\*  
\*S\*\*\*\*\*HIGH DESERT TRACT 13 UNIT 2  
\*\*\*\*\*  
\*\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 2A \*\*\*\*\*  
COMPUTE NM HYD..... ID=10 HYD=BASIN2A AREA=0.0090 PER A=0.0 PER B=38  
PER C=24 PER D=38 TP=.133 RAINFALL=-1  
PRINT HYD..... ID=10 CODE=1

\*\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 2B \*\*\*\*\*

```

                                2YR IN.txt
COMPUTE NM HYD      ID=11 HYD=BASIN2B AREA=0.0075 PER A=0.0 PER B=28
                    PER C=17 PER D=55 TP=.133 RAINFALL=-1
PRINT HYD          ID=11 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2C *****
COMPUTE NM HYD      ID=12 HYD=BASIN2C AREA=0.0093 PER A=0.0 PER B=27
                    PER C=17 PER D=56 TP=.133 RAINFALL=-1
PRINT HYD          ID=12 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2D *****
COMPUTE NM HYD      ID=13 HYD=BASIN2D AREA=0.0052 PER A=0.0 PER B=29
                    PER C=18 PER D=53 TP=.133 RAINFALL=-1
PRINT HYD          ID=13 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2E *****
COMPUTE NM HYD      ID=14 HYD=BASIN2E AREA=0.0037 PER A=0.0 PER B=40
                    PER C=20 PER D=40 TP=.133 RAINFALL=-1
PRINT HYD          ID=14 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2F *****
COMPUTE NM HYD      ID=15 HYD=BASIN2F AREA=0.0023 PER A=0.0 PER B=10
                    PER C=0.0 PER D=90 TP=.133 RAINFALL=-1
PRINT HYD          ID=15 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 2G *****
COMPUTE NM HYD      ID=16 HYD=BASIN2G AREA=0.0005 PER A=0.0 PER B=25.0
                    PER C=75.0 PER D=0.0 TP=.133 RAINFALL=-1
PRINT HYD          ID=16 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 8 *****
COMPUTE NM HYD      ID=30 HYD=LOT8 AREA=0.0007 PER A=0.0 PER B=32
                    PER C=32 PER D=36 TP=.133 RAINFALL=-1
PRINT HYD          ID=30 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 9 *****
COMPUTE NM HYD      ID=31 HYD=LOT9 AREA=0.0011 PER A=0.0 PER B=39
                    PER C=39 PER D=22 TP=.133 RAINFALL=-1
PRINT HYD          ID=31 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 50 *****
COMPUTE NM HYD      ID=32 HYD=LOT50 AREA=0.0008 PER A=0.0 PER B=100
                    PER C=0.0 PER D=0.0 TP=.133 RAINFALL=-1
PRINT HYD          ID=32 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 51 *****
COMPUTE NM HYD      ID=33 HYD=LOT51 AREA=0.0014 PER A=0.0 PER B=50.0
                    PER C=25.0 PER D=25.0 TP=.133 RAINFALL=-1
PRINT HYD          ID=33 CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR LOT 52 *****
COMPUTE NM HYD      ID=34 HYD=LOT52 AREA=0.0011 PER A=0.0 PER B=50.0
                    PER C=25.0 PER D=25.0 TP=.133 RAINFALL=-1
PRINT HYD          ID=34 CODE=1
*
*****
*S****ADD UNIT 2 BASINS
*****
ADD HYD      ID=40 HYD=BASINAB ID I=10 ID II=11
PRINT HYD    ID=40 CODE=1
*
ADD HYD      ID=42 HYD=BASINABC ID I=40 ID II=12
PRINT HYD    ID=42 CODE=1
*
ADD HYD      ID=43 HYD=BASINABCD ID I=42 ID II=13
PRINT HYD    ID=43 CODE=1
*
ADD HYD      ID=44 HYD=BASINGO1 ID I=16 ID II=1
PRINT HYD    ID=44 CODE=1
*
ADD HYD      ID=46 HYD=BASINEO7 ID I=14 ID II=7
PRINT HYD    ID=46 CODE=1
*
*****
*S ROUTE BASINS OS-7 AND 2E THROUGH POND AND SD
*****
ROUTE RESERVOIR ID=47 HYD=POND INFLOW ID=46 CODE=10
                . 0.00 0.0000 6202
                . 0.01 0.0010 6203

```

2YR IN.txt

|       |        |      |
|-------|--------|------|
| 1.34  | 0.0071 | 6204 |
| 21.12 | 0.0355 | 6205 |
| 44.68 | 0.0759 | 6206 |

\*

PRINT HYD ID=47 CODE=1  
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.06  
DIAM=2.0 FT N=0.014  
COMPUTE TRAVEL TIME ID=48 REACH NO=1 NO VS=1 L=400 FT  
SLOPE=0.06  
ROUTE ID=48 HYD NO=PIPE INFLOW ID=47  
PRINT HYD ID=48 CODE=1

\*

\*\*\*\*\*  
\*S ROUTE BASINS OS-1 AND 2G THROUGH POND AND SD  
\*\*\*\*\*

ROUTE RESERVOIR ID=49 HYD=POND INFLOW ID=44 CODE=10  
OUTFLOW (CFS) STORAGE (AC FT) ELEV (FT)  
0.00 0.0000 6182  
1.51 0.0056 6183  
29.76 0.0413 6184  
85.94 0.0905 6185

\*

PRINT HYD ID=49 CODE=1  
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=0.08  
DIAM=2.0 FT N=0.014  
COMPUTE TRAVEL TIME ID=41 REACH NO=1 NO VS=1 L=627 FT  
SLOPE=0.08  
ROUTE ID=41 HYD NO=PIPE INFLOW ID=49  
PRINT HYD ID=41 CODE=1

\*

\*\*\*\*\*

\*S\*\*\*\*HIGH DESERT TRACT 13 UNIT 3

\*\*\*\*\*

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 3A \*\*\*\*\*  
COMPUTE NM HYD ID=50 HYD=BASIN3A AREA=0.00048 PER A=0.0 PER B=50  
PER C=50 PER D=0.0 TP=.133 RAINFALL=-1  
PRINT HYD ID=50 CODE=1

\*

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 3B \*\*\*\*\*  
COMPUTE NM HYD ID=51 HYD=BASIN3B AREA=0.00305 PER A=0.0 PER B=30  
PER C=20 PER D=50 TP=.133 RAINFALL=-1  
PRINT HYD ID=51 CODE=1

\*

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 3C \*\*\*\*\*  
COMPUTE NM HYD ID=52 HYD=BASIN3C AREA=0.00086 PER A=0.0 PER B=30  
PER C=20 PER D=50 TP=.133 RAINFALL=-1  
PRINT HYD ID=52 CODE=1

\*

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 3D \*\*\*\*\*  
COMPUTE NM HYD ID=53 HYD=BASIN3D AREA=0.00248 PER A=0.0 PER B=30  
PER C=20 PER D=50 TP=.133 RAINFALL=-1  
PRINT HYD ID=53 CODE=1

\*

\*\*\*\* COMPUTE AND PRINT NM HYD DATA FOR BASIN 3E \*\*\*\*\*  
COMPUTE NM HYD ID=54 HYD=BASIN3E AREA=0.00265 PER A=0.0 PER B=30  
PER C=20 PER D=50 TP=.133 RAINFALL=-1  
PRINT HYD ID=54 CODE=1

\*

\*\*\*\*\*

\*S\*\*\*\*ADD UNIT 3 AND OFFSITE BASINS

\*\*\*\*\*

ADD HYD ID=60 HYD=BASINOS4&5 ID I=4 ID II=5  
PRINT HYD ID=60 CODE=1

\*

ADD HYD ID=61 HYD=BASIN3AOS45 ID I=50 ID II=60  
PRINT HYD ID=61 CODE=1

\*

\*\*\*\*\*

\*S ROUTE BASINS 3A, OS-4 AND OS-5 THROUGH POND  
\*\*\*\*\*

ROUTE RESERVOIR ID=62 HYD=POND INFLOW ID=61 CODE=10  
OUTFLOW (CFS) STORAGE (AC FT) ELEV (FT)  
0.00 0.00000 6177  
0.01 0.00100 6178  
3.84 0.02865 6179  
34.38 0.10516 6180  
90.38 0.19603 6181  
125.93 0.30227 6182

\*

2YR IN.txt

```
PRINT HYD . . . ID=62 . . . CODE=1
*
ADD HYD . . . ID=63 HYD=BASIN3C3 ID I=52 ID II=3
PRINT HYD . . . ID=63 . CODE=1
*
ADD HYD . . . ID=64 HYD=BASIN3D2 ID I=53 ID II=2
PRINT HYD . . . ID=64 . CODE=1
*
ADD HYD . . . ID=65 HYD=BASIN3C245 ID I=63 ID II=62
PRINT HYD . . . ID=65 . CODE=1
*
ADD HYD . . . ID=66 HYD=3BD2 ID I=64 ID II=51
PRINT HYD . . . ID=66 . CODE=1
*
ADD HYD . . . ID=68 HYD=3ABCD2345 ID I=66 ID II=65
PRINT HYD . . . ID=68 . CODE=1
*
*****
*S***ADD UNIT 3 AND UPSTREAM PONDS
*****
ADD HYD . . . ID=70 HYD=SD1 ID I=48 ID II=41
PRINT HYD . . . ID=70 . CODE=1
*
ADD HYD . . . ID=72 HYD=W1 ID I=68 ID II=70
PRINT HYD . . . ID=72 . CODE=1
*
COMPUTE TRAVEL TIME . . ID=74 . REACH NO=1 NO VS=1 L=233 FT
. . . . . SLOPE=0.04
ROUTE . . . ID=74 . HYD NO=SUM INFLOW ID=72
PRINT HYD . . . ID=74 . CODE=1
*
ADD HYD . . . ID=75 HYD=BASIN2F3E ID I=15 ID II=54
PRINT HYD . . . ID=75 . CODE=1
*
ADD HYD . . . ID=76 HYD=OUT ID I=74 ID II=75
PRINT HYD . . . ID=76 . CODE=1
*
FINISH
```

## **APPENDIX M**

STREET HYDRAULICS / INLET CAPACITY ANALYSIS

33

**HIGH DESERT TRACT 13**  
**Inlet & Street Capacity Calculations**  
October 03, 2002

**1. STREET 'E'**

Basin 2A (See AHYMO summary table or Basin Map)

S = 5.51%  
Q = 22.9 cfs  
D = 0.36 at 19.5 cfs  
Q/inlet = 4.6 cfs/grate

At 5.51%, a road with standard curb can handle 19.5 cfs. Install two inlets.  
Q in sump:

22.9 cfs  
- 9.2 cfs  
13.7 cfs

Single grate inlet in sump can carry 13.7 cfs at a depth of 0.57'. The flow will be contained within the curb while entering the inlet. In the unlikely event that a storm produces twice the 100-year storm, the inlet can carry 28 cfs at a depth of 0.82 feet.

**2. STREET 'F'**

Basin 2B (See AHYMO summary table or Basin Map)

S = 5.13%  
Q = 20.7 cfs  
D = 0.37'

At 5.13%, a road with standard curb can handle 22 cfs. Install inlet on grade and in sump. The inlet on grade will remove 6.8 cfs from the road.

Q in sump:

20.7 cfs  
- 6.8 cfs  
13.9 cfs

Single grate inlet in sump can carry 13.9 cfs at a depth of 0.52'. The flow will be contained within the curb while entering the inlet. In the unlikely event that a storm produces twice the 100-year storm, the inlet can carry 27.8 cfs at a depth of 0.83 feet.

### 3. STREET 'G'

Basin 2C (See AHYMO summary table or Basin Map)

$$S = 3.62\%$$

$$Q = 25.8 \text{ cfs}$$

$$D = 0.41'$$

At 3.62%, a road with standard curb can handle 26.4 cfs. Install inlet in sump and on grade. The inlet on grade will remove 7 cfs from the road.

Q in sump:

$$25.8 \text{ cfs}$$

$$- 7.0 \text{ cfs}$$

$$18.8 \text{ cfs}$$

Single grate inlet in sump can carry 18.8 cfs at a depth of 0.63'. The flow will be contained within the curb while entering the inlet since the grate is depressed from the flowline of curb. In the unlikely event that a storm produces twice the 100-year storm, the inlet can carry 37.6 cfs at a depth of 1.0 foot.

### 4. STREET 'H' WEST OF HIGH DESERT STREET

Basin 2D (See AHYMO summary table or Basin Map)

$$S = 4.67\%$$

$$Q = 14.2 \text{ cfs}$$

At 4.67%, a road with standard curb can handle 26.4 cfs. Install inlet in sump.

Single grate inlet in sump can carry 14.2 cfs at a depth of 0.52'. The flow will be contained within the curb while entering the inlet. In the unlikely event that a storm produces twice the 100-year storm, the inlet can carry 28.4 cfs at a depth of 0.85 feet.

### 5. STREET 'I' NORTH OF STREET 'H'

Basin 3B (See AHYMO summary table or Basin Map)

$$S = 7.9\%$$

$$\text{Width} = 28' \text{ F-F}$$

$$Q = 8.3 \text{ cfs}$$

$$D = 0.26'$$

$$Q/\text{grate} = 3.8 \text{ cfs (see nomograph)}$$

At 7.9%, a road with standard curb can handle 13.9 cfs. Therefore, no inlets needed. See PC stream output. Water flows into intersection; add inlets to relieve intersection and Street H between High Desert Street and Street I. Each inlet will collect 3.8 cfs. Two inlets will remove 7.6 cfs from Street I.

$$\begin{array}{r} 8.3 \\ - 7.6 \\ \hline \end{array}$$

0.70 cfs bypass to intersection and heads west in Street H.

## 6. STREET 'H' EAST OF STREET 'I'

Basins OS3 and 3C (See AHYMO summary table or Basin Map)

S = 9.5%

Width=24' F-F

Q = 4.8 cfs

D= 0.22'

Q/grate = 2.9 cfs (see nomograph)

At 9.5%, a road with standard curb can handle 13.0 cfs. Therefore, no inlets needed. See PC stream output. Water flows into intersection; add inlets to relieve intersection and Street H between High Desert Street and Street I. Each inlet will collect 2.9 cfs. Two inlets will remove 5.8 cfs from Street H.

$$\begin{array}{r} 4.8 \\ - 5.8 \\ \hline \end{array}$$

0.0 cfs bypass into intersection

## 7. STREET 'I' SOUTH OF STREET 'H'

Basins OS2 and 3D (See AHYMO summary table or Basin Map)

S = 5.8%

Q = 13.5 cfs

D=0.32'

Q/grate=5.2 cfs/grate (See nomograph)

At 5.8%, a road with standard curb can handle 18.8 cfs. Therefore, no inlets needed. See PC stream output. Water flows into intersection; add inlets to relieve intersection and Street H between High Desert Street and Street I. Each inlet will collect 5.2 cfs. Two inlets will remove 10.4 cfs from Street H.

$$\begin{array}{r} 13.5 \\ - 10.4 \\ \hline \end{array}$$

3.1 cfs bypass to intersection and heads west in Street H.

8. **STREET 'H' BETWEEN HIGH DESERT STREET AND STREET 'I'**

Basin 3E + overflows (See AHYMO summary table or Basin Map)

$$S = 8.59\%$$

|                            |                        |
|----------------------------|------------------------|
| Q = above Basin 3E         | Q = 7.2 cfs (Basin 3E) |
| 0.7 cfs (Street I north)   | + 3.8 cfs (bypass)     |
| + 3.1 cfs (Street I south) | 11.0 cfs               |
| 3.8 cfs                    |                        |

$$D = 0.28'$$

$$Q/\text{grate} = 4.6 \text{ cfs/grate}$$

At 8.9%, a road with standard curb can handle 12.1 cfs. Therefore, no inlets are needed. See PC stream output. Water flows into High Desert Street.

9. **HIGH DESERT STREET**

Basin 2F + by-pass flows (See AHYMO summary table or Basin Map)

$$S = 0.59\%$$

$$\text{Width} = 32' \text{ F-F}$$

|                                               |
|-----------------------------------------------|
| Q = 11.0 cfs (Street H east)                  |
| + 7.2 cfs (Basin 2F)                          |
| + 1.0 cfs (High Desert St north of low point) |
| 19.2 cfs                                      |

At 0.6%, a road with standard curb can handle 47.1 cfs. Therefore no inlets required before low point in High Desert Street. Install a single grate inlet at low point on both sides of High Desert Street. A single grate inlet in a sump can carry 11.8 cfs at a depth of 0.47'. Two inlets have a capacity of 23.6 cfs. The flow will be contained within the curb while entering the inlet.

\*\*\*\*\*

PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

STREET 'E'

MANNING'S N= .017 SLOPE= .0551

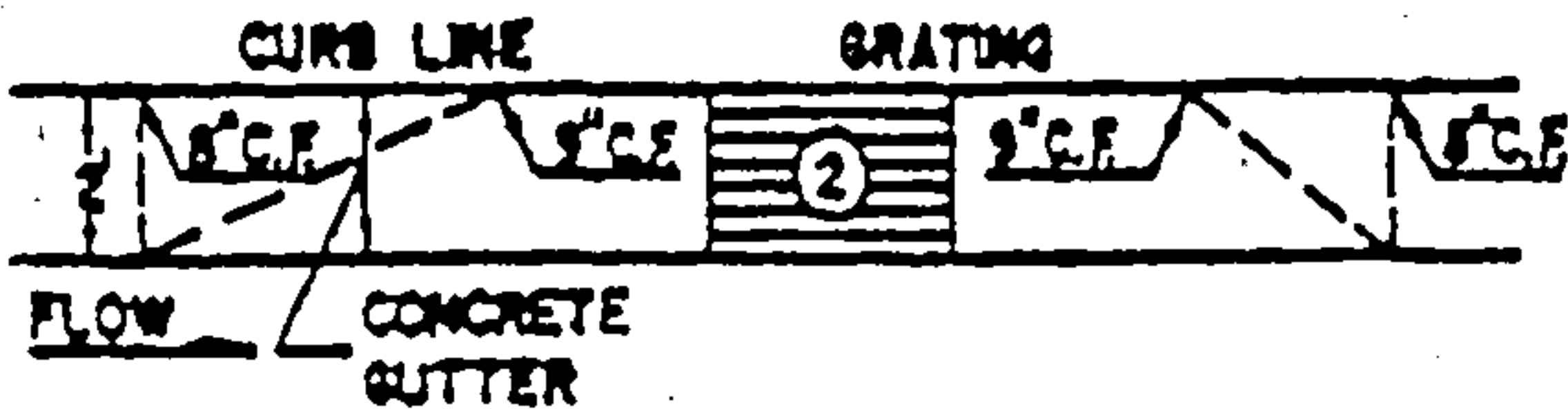
| POINT | DIST | ELEV | POINT | DIST  | ELEV | POINT | DIST  | ELEV |
|-------|------|------|-------|-------|------|-------|-------|------|
| 1     | 0.00 | 0.83 | 5     | 11.00 | 0.13 | 9     | 37.17 | 0.67 |
| 2     | 8.38 | 0.67 | 6     | 23.00 | 0.41 | 10    | 37.63 | 0.67 |
| 3     | 8.83 | 0.67 | 7     | 35.00 | 0.13 | 11    | 46.00 | 0.83 |
| 4     | 9.00 | 0.00 | 8     | 37.00 | 0.00 | 12    | 0.00  | 0.00 |

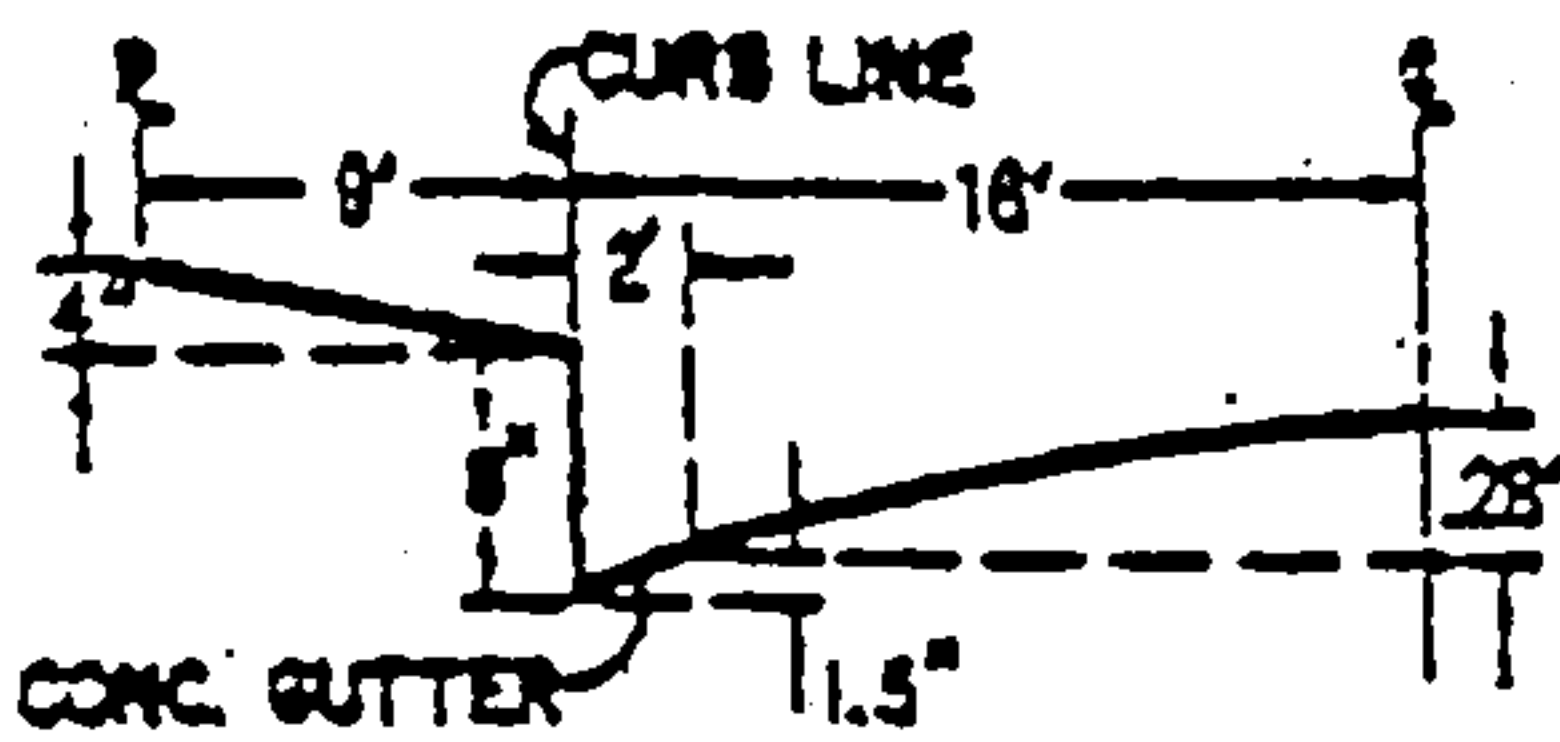
| WSEL | DEPTH | FLOW    | FLOW  | WETTED | FLOW  | TOPWID | VEL  | ENERGY |
|------|-------|---------|-------|--------|-------|--------|------|--------|
| (FT) | INC   | AREA    | RATE  | PER    | VEL   | (FT)   | HEAD | HEAD   |
| (FT) | (FT)  | SQ. FT. | (CFS) | (FT)   | (FPS) | (FT)   | (FT) | (FT)   |
| 0.01 | 0.01  | 0.00    | 0.0   | 0.33   | 0.58  | 0.31   | 0.01 | 0.02   |
| 0.02 | 0.02  | 0.01    | 0.0   | 0.66   | 0.92  | 0.63   | 0.01 | 0.03   |
| 0.03 | 0.03  | 0.01    | 0.0   | 0.99   | 1.21  | 0.94   | 0.02 | 0.05   |
| 0.04 | 0.04  | 0.03    | 0.0   | 1.32   | 1.46  | 1.25   | 0.03 | 0.07   |
| 0.05 | 0.05  | 0.04    | 0.1   | 1.64   | 1.70  | 1.56   | 0.04 | 0.09   |
| 0.06 | 0.06  | 0.06    | 0.1   | 1.97   | 1.92  | 1.88   | 0.06 | 0.12   |
| 0.07 | 0.07  | 0.08    | 0.2   | 2.30   | 2.12  | 2.19   | 0.07 | 0.14   |
| 0.08 | 0.08  | 0.10    | 0.2   | 2.63   | 2.32  | 2.50   | 0.08 | 0.16   |
| 0.09 | 0.09  | 0.13    | 0.3   | 2.96   | 2.51  | 2.81   | 0.10 | 0.19   |
| 0.10 | 0.10  | 0.16    | 0.4   | 3.29   | 2.69  | 3.13   | 0.11 | 0.21   |
| 0.11 | 0.11  | 0.19    | 0.5   | 3.62   | 2.87  | 3.44   | 0.13 | 0.24   |
| 0.12 | 0.12  | 0.23    | 0.7   | 3.95   | 3.04  | 3.75   | 0.14 | 0.26   |
| 0.13 | 0.13  | 0.26    | 0.8   | 4.28   | 3.21  | 4.07   | 0.16 | 0.29   |
| 0.14 | 0.14  | 0.31    | 1.0   | 5.15   | 3.14  | 4.93   | 0.15 | 0.29   |
| 0.15 | 0.15  | 0.36    | 1.1   | 6.03   | 3.15  | 5.79   | 0.15 | 0.30   |
| 0.16 | 0.16  | 0.43    | 1.4   | 6.91   | 3.20  | 6.65   | 0.16 | 0.32   |
| 0.17 | 0.17  | 0.50    | 1.6   | 7.79   | 3.27  | 7.51   | 0.17 | 0.34   |
| 0.18 | 0.18  | 0.58    | 1.9   | 8.67   | 3.36  | 8.38   | 0.18 | 0.36   |
| 0.19 | 0.19  | 0.66    | 2.3   | 9.54   | 3.47  | 9.24   | 0.19 | 0.38   |
| 0.20 | 0.20  | 0.76    | 2.7   | 10.42  | 3.58  | 10.10  | 0.20 | 0.40   |
| 0.21 | 0.21  | 0.87    | 3.2   | 11.30  | 3.70  | 10.96  | 0.21 | 0.42   |
| 0.22 | 0.22  | 0.98    | 3.7   | 12.18  | 3.82  | 11.83  | 0.23 | 0.45   |
| 0.23 | 0.23  | 1.10    | 4.4   | 13.06  | 3.95  | 12.69  | 0.24 | 0.47   |
| 0.24 | 0.24  | 1.23    | 5.0   | 13.93  | 4.07  | 13.55  | 0.26 | 0.50   |
| 0.25 | 0.25  | 1.37    | 5.8   | 14.81  | 4.20  | 14.41  | 0.27 | 0.52   |
| 0.26 | 0.26  | 1.52    | 6.6   | 15.69  | 4.33  | 15.27  | 0.29 | 0.55   |
| 0.27 | 0.27  | 1.68    | 7.5   | 16.57  | 4.46  | 16.14  | 0.31 | 0.58   |
| 0.28 | 0.28  | 1.84    | 8.5   | 17.45  | 4.59  | 17.00  | 0.33 | 0.61   |
| 0.29 | 0.29  | 2.02    | 9.5   | 18.32  | 4.71  | 17.86  | 0.35 | 0.64   |
| 0.30 | 0.30  | 2.20    | 10.7  | 19.20  | 4.84  | 18.72  | 0.36 | 0.66   |
| 0.31 | 0.31  | 2.39    | 11.9  | 20.08  | 4.97  | 19.59  | 0.38 | 0.69   |
| 0.32 | 0.32  | 2.59    | 13.2  | 20.96  | 5.09  | 20.45  | 0.40 | 0.72   |
| 0.33 | 0.33  | 2.80    | 14.6  | 21.84  | 5.22  | 21.31  | 0.42 | 0.75   |
| 0.34 | 0.34  | 3.02    | 16.1  | 22.71  | 5.34  | 22.17  | 0.44 | 0.78   |
| 0.35 | 0.35  | 3.25    | 17.7  | 23.59  | 5.47  | 23.03  | 0.46 | 0.81   |
| 0.36 | 0.36  | 3.48    | 19.5  | 24.47  | 5.59  | 23.90  | 0.49 | 0.85   |
| 0.37 | 0.37  | 3.72    | 21.3  | 25.35  | 5.71  | 24.76  | 0.51 | 0.88   |
| 0.38 | 0.38  | 3.98    | 23.2  | 26.23  | 5.83  | 25.62  | 0.53 | 0.91   |
| 0.39 | 0.39  | 4.24    | 25.2  | 27.10  | 5.95  | 26.48  | 0.55 | 0.94   |
| 0.40 | 0.40  | 4.50    | 27.4  | 27.98  | 6.07  | 27.35  | 0.57 | 0.97   |
| 0.41 | 0.41  | 4.78    | 29.6  | 28.86  | 6.19  | 28.21  | 0.60 | 1.01   |
| 0.42 | 0.42  | 5.06    | 32.6  | 28.88  | 6.43  | 28.21  | 0.64 | 1.06   |
| 0.43 | 0.43  | 5.35    | 35.6  | 28.90  | 6.66  | 28.22  | 0.69 | 1.12   |
| 0.45 | 0.45  | 5.91    | 42.1  | 28.94  | 7.12  | 28.23  | 0.79 | 1.24   |
| 0.46 | 0.46  | 6.19    | 45.4  | 28.96  | 7.34  | 28.23  | 0.84 | 1.30   |
| 0.47 | 0.47  | 6.48    | 48.9  | 28.98  | 7.56  | 28.24  | 0.89 | 1.36   |
| 0.48 | 0.48  | 6.76    | 52.5  | 29.01  | 7.77  | 28.24  | 0.94 | 1.42   |
| 0.49 | 0.49  | 7.04    | 56.2  | 29.03  | 7.98  | 28.25  | 0.99 | 1.48   |
| 0.50 | 0.50  | 7.32    | 60.0  | 29.05  | 8.19  | 28.25  | 1.04 | 1.54   |

Street E on grade

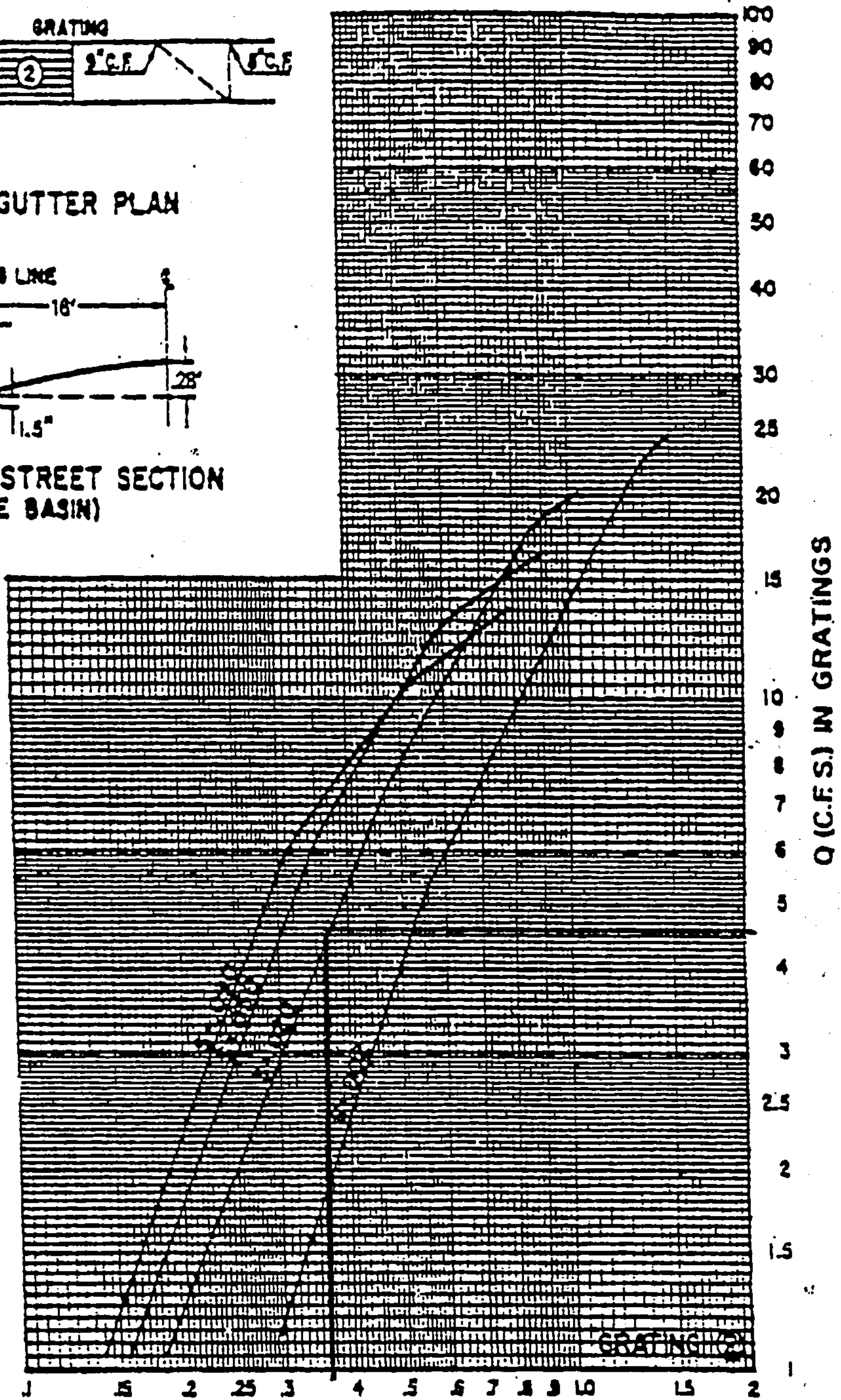
# GRATING CAPACITIES FOR TYPE 'A' , 'C' and 'D'



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION  
(ABOVE BASIN)



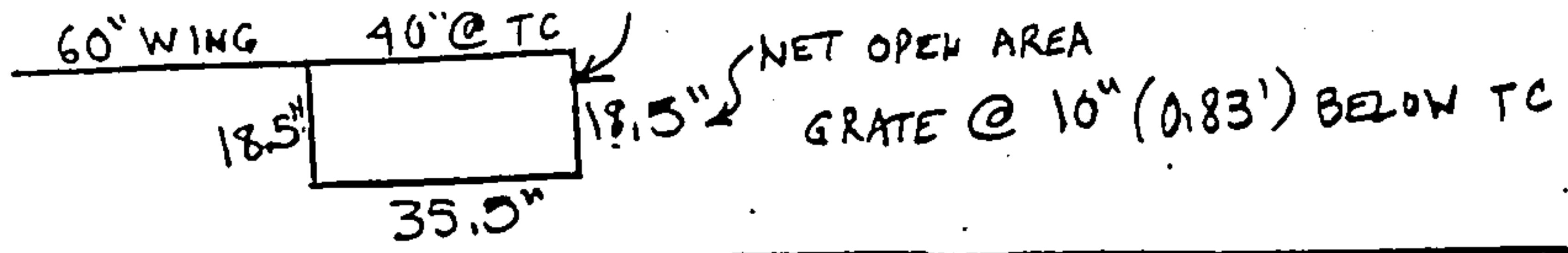
D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

PLATE 22.3 D-5

$$d = 0.36$$

$$S = 5.51\%$$

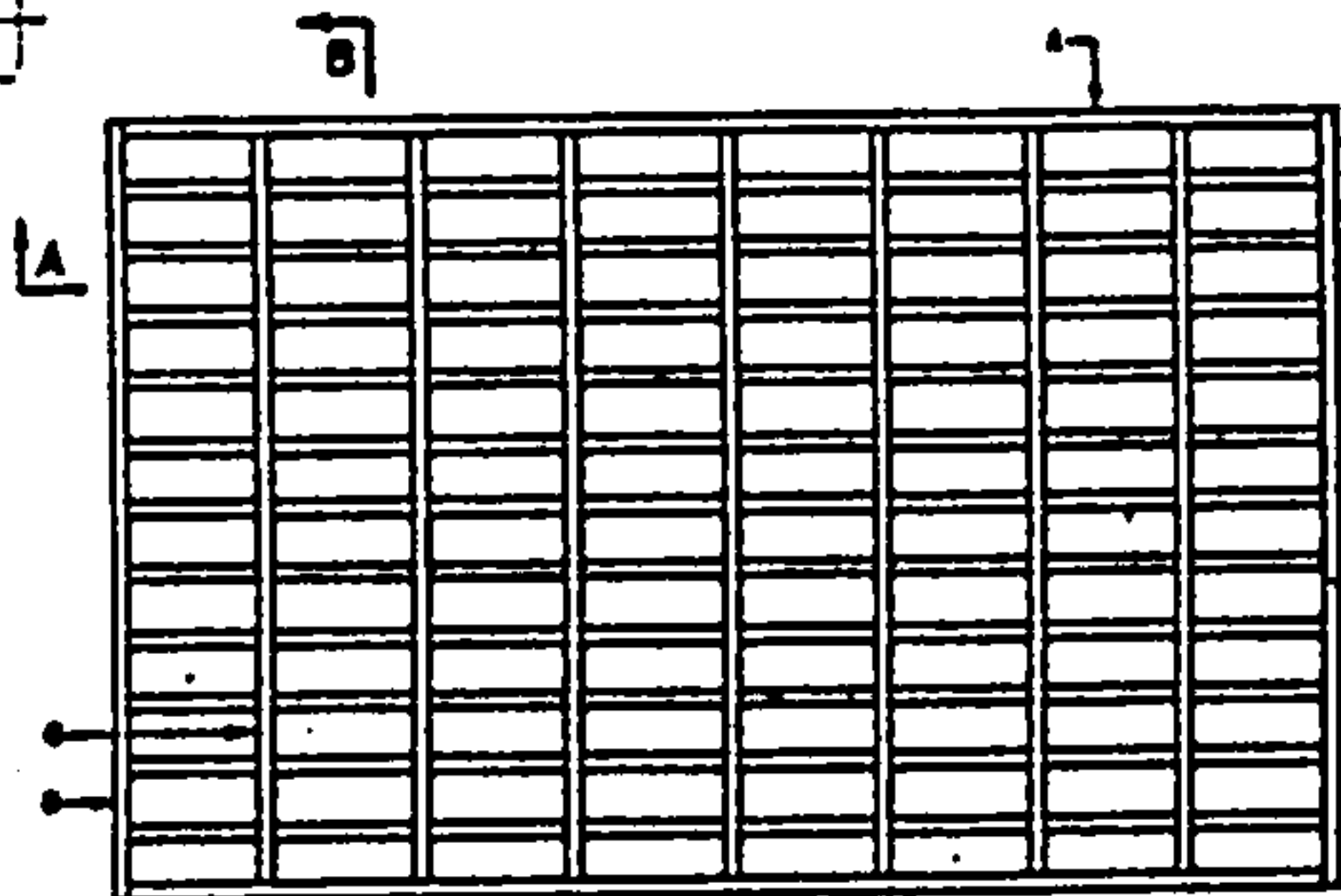
$$Q = 4.6 \text{ cfs/grate}$$



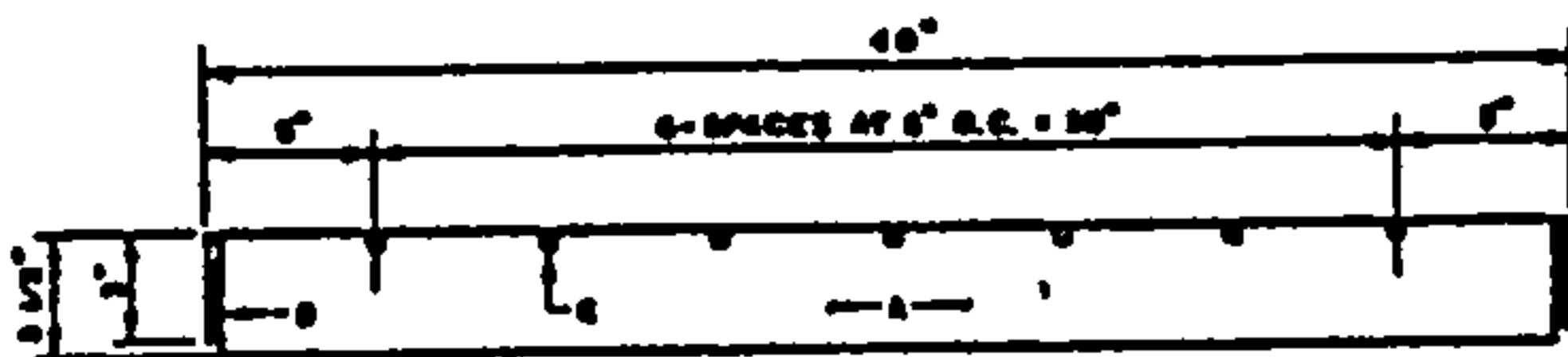
| EQUATION                              | SGL A                              | DBL A                              | TRPL A                             | QDPL A                             |
|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| 1) ORIFICE                            | $22.0 h^{0.5} + 16.5 h^{1.5}$      | $43.9 h^{0.5} + 16.5 h^{1.5}$      | $65.9 h^{0.5} + 16.5 h^{1.5}$      | $87.8 h^{0.5} + 16.5 h^{1.5}$      |
| 2) 3-SIDED WEIR<br>( $h \leq 0.83'$ ) | $36.4 h^{1.5}$                     | $46.2 h^{1.5}$                     | $56.0 h^{1.5}$                     | $65.7 h^{1.5}$                     |
| 3) 4-SIDED WEIR<br>( $h > 0.83'$ )    | ADD TO 2):<br>$11(h - 0.83)^{1.5}$ | ADD TO 2):<br>$22(h - 0.83)^{1.5}$ | ADD TO 2):<br>$33(h - 0.83)^{1.5}$ | ADD TO 2):<br>$44(h - 0.83)^{1.5}$ |

1)  $Q = 0.6 A \sqrt{2gh} + 3.3(5') h^{1.5}$   
 2) & 3)  $Q = 3.3 P h^{1.5}$

GRATE CAPACITY (Q) IN CFS



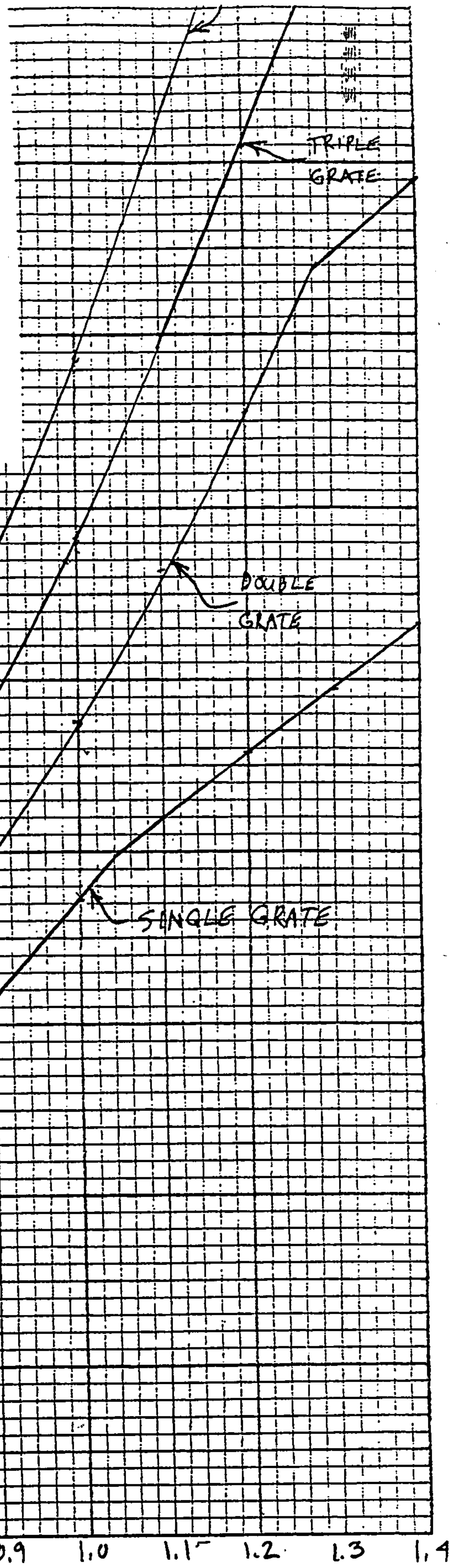
PLAN



SECTION A-A



SECTION B-B



TC 0.83'  
HEAD (h) IN FEET

BOHANNAN-HUSTON INC.

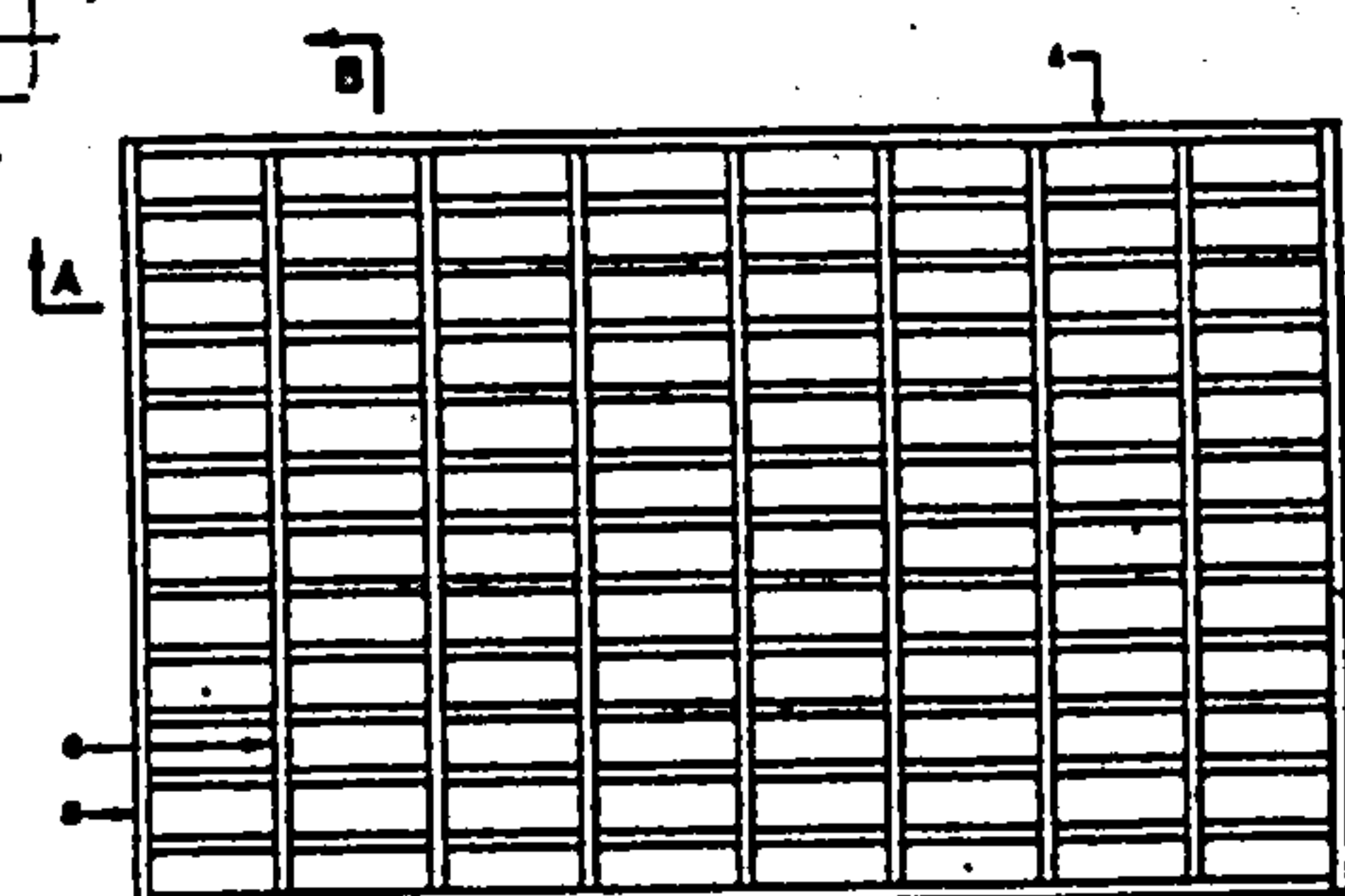
PROJECT NAME Street E Sump SHEET        OF         
 PROJECT NO.        BY JPK DATE 4/9/92  
 SUBJECT RATING CURVE FOR TYPE A INLETS CH'D        DATE

60" WING 40" @ TC  
 18.5" 18.5" 35.0"  
 NET OPEN AREA  
 GRATE @ 10" (0.83') BELOW TC

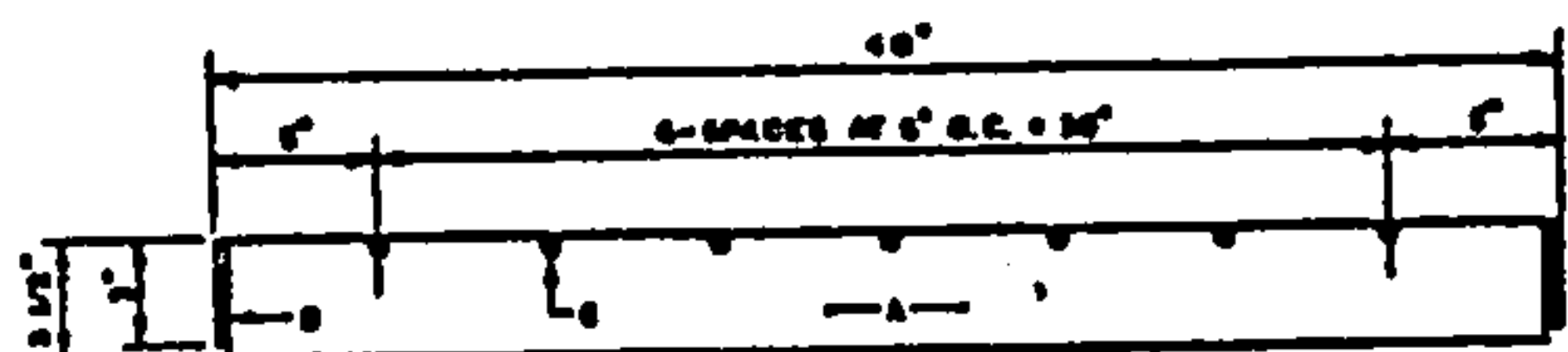
| EQUATION                              | SGL A                            | DBL A                            | TRPL A                           | QDPL A                           |
|---------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 1) ORIFICE                            | $22.0 h^{0.5} + 16.5 h^{1.5}$    | $43.9 h^{0.5} + 16.5 h^{1.5}$    | $65.9 h^{0.5} + 16.5 h^{1.5}$    | $87.8 h^{0.5} + 16.5 h^{1.5}$    |
| 2) 3-SIDED WEIR<br>( $h \leq 0.83'$ ) | $36.4 h^{1.5}$                   | $46.2 h^{1.5}$                   | $56.0 h^{1.5}$                   | $65.7 h^{1.5}$                   |
| 3) 4-SIDED WEIR<br>( $h > 0.83'$ )    | ADD TO 2):<br>$11(h-0.83)^{1.5}$ | ADD TO 2):<br>$22(h-0.83)^{1.5}$ | ADD TO 2):<br>$33(h-0.83)^{1.5}$ | ADD TO 2):<br>$44(h-0.83)^{1.5}$ |

1)  $Q = 0.6 A \sqrt{2gh} + 3.3(5') h^{1.5}$   
 2) & 3)  $Q = 3.3 P h^{1.5}$

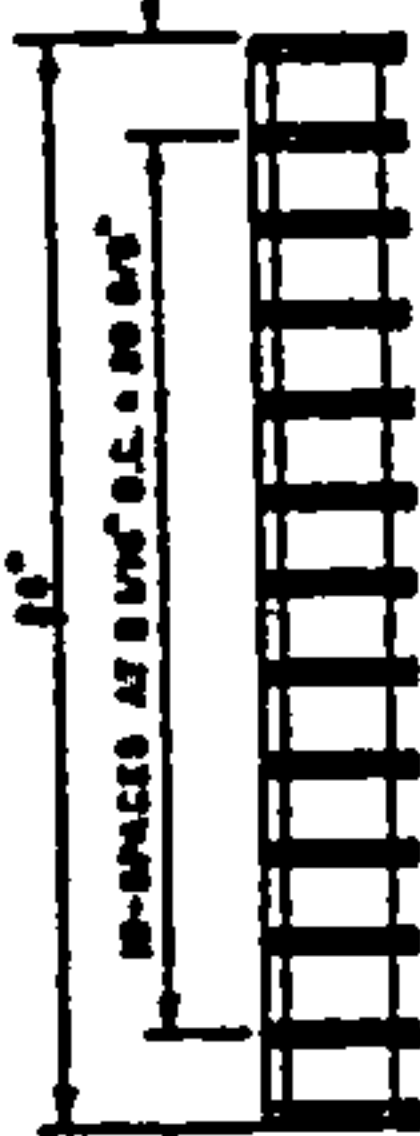
GRATE CAPACITY (Q) IN CFS



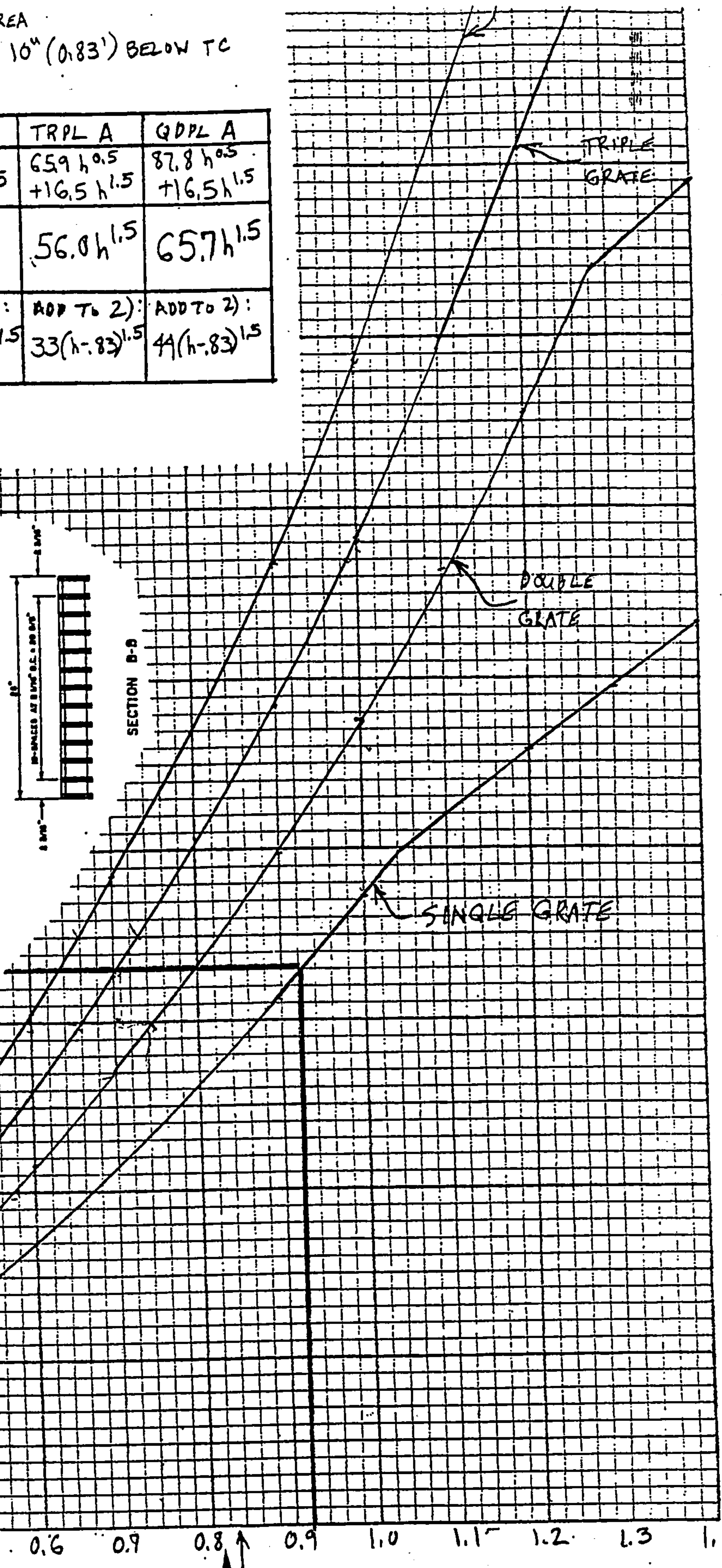
PLAN



SECTION A-A



SECTION B-B



HEAD (h) IN FEET

BOHANNAN-HUSTON INC.

PROJECT NAME Street E 2x100 yr SHEET        OF         
 PROJECT NO.        BY JPK DATE 4/9/92  
 CURB RATING CURVE FOR TYPE A INLETS CH'D        DATE

\*\*\*\*\*

PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

STREET 'F'

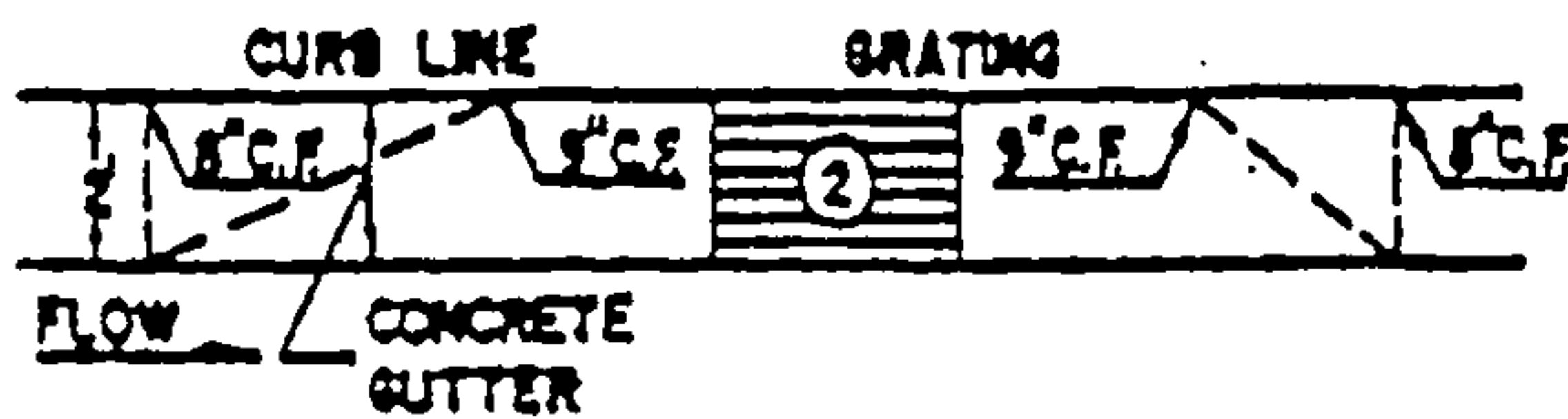
MANNING'S N= .017 SLOPE= .0513

| POINT | DIST | ELEV | POINT | DIST  | ELEV | POINT | DIST  | ELEV |
|-------|------|------|-------|-------|------|-------|-------|------|
| 1     | 0.00 | 0.83 | 5     | 11.00 | 0.13 | 9     | 37.17 | 0.67 |
| 2     | 8.38 | 0.67 | 6     | 23.00 | 0.41 | 10    | 37.63 | 0.67 |
| 3     | 8.83 | 0.67 | 7     | 35.00 | 0.13 | 11    | 46.00 | 0.83 |
| 4     | 9.00 | 0.00 | 8     | 37.00 | 0.00 | 12    | 0.00  | 0.00 |

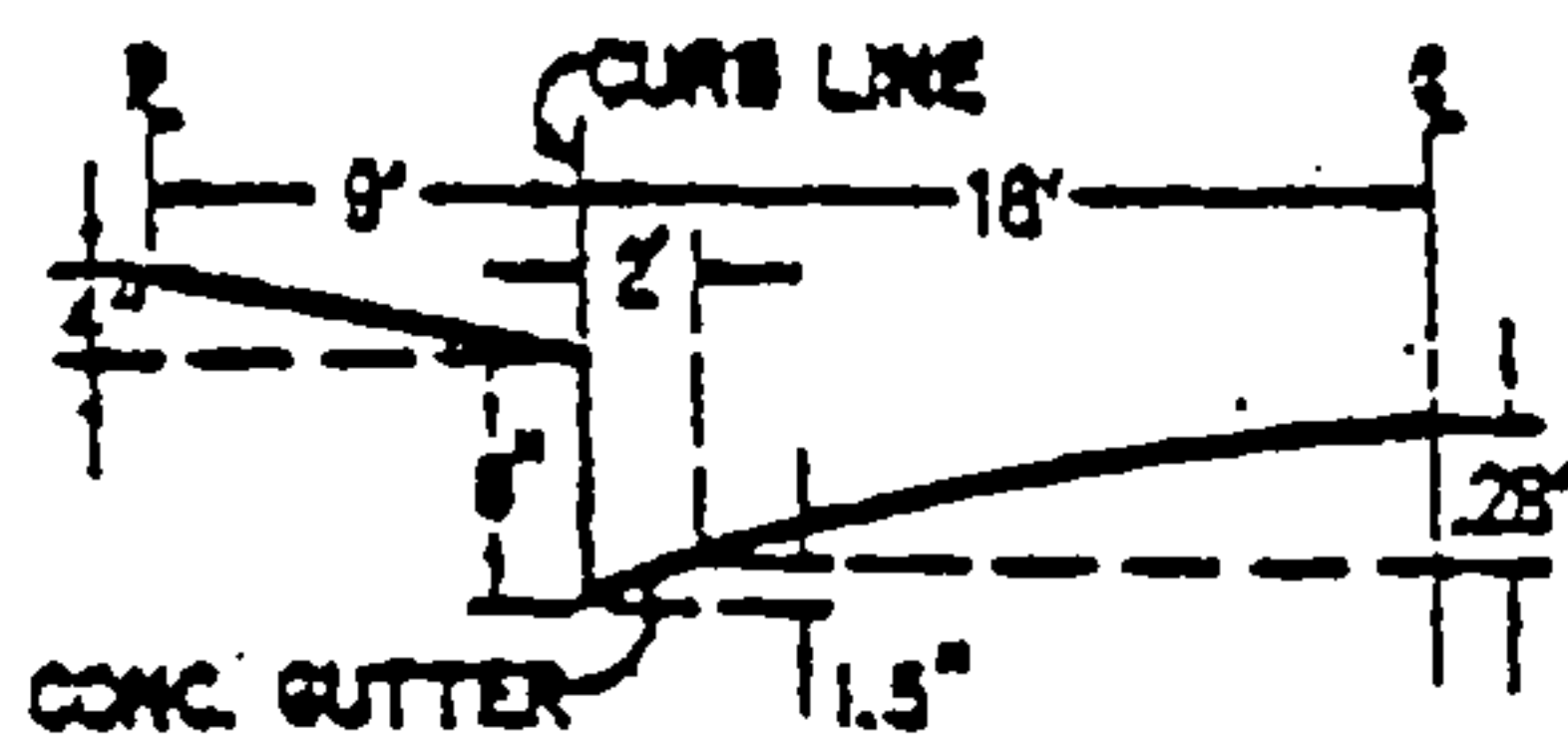
| WSEL | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL  | ENERGY |
|------|-------|--------|-------|--------|-------|--------|------|--------|
| (FT) | INC   | AREA   | RATE  | PER    | VEL   | (FT)   | HEAD | HEAD   |
|      | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) |        | (FT) | (FT)   |
| 0.01 | 0.01  | 0.00   | 0.0   | 0.33   | 0.56  | 0.31   | 0.00 | 0.01   |
| 0.02 | 0.02  | 0.01   | 0.0   | 0.66   | 0.89  | 0.63   | 0.01 | 0.03   |
| 0.03 | 0.03  | 0.01   | 0.0   | 0.99   | 1.16  | 0.94   | 0.02 | 0.05   |
| 0.04 | 0.04  | 0.03   | 0.0   | 1.32   | 1.41  | 1.25   | 0.03 | 0.07   |
| 0.05 | 0.05  | 0.04   | 0.1   | 1.64   | 1.64  | 1.56   | 0.04 | 0.09   |
| 0.06 | 0.06  | 0.06   | 0.1   | 1.97   | 1.85  | 1.88   | 0.05 | 0.11   |
| 0.07 | 0.07  | 0.08   | 0.2   | 2.30   | 2.05  | 2.19   | 0.07 | 0.14   |
| 0.08 | 0.08  | 0.10   | 0.2   | 2.63   | 2.24  | 2.50   | 0.08 | 0.16   |
| 0.09 | 0.09  | 0.13   | 0.3   | 2.96   | 2.42  | 2.81   | 0.09 | 0.18   |
| 0.10 | 0.10  | 0.16   | 0.4   | 3.29   | 2.60  | 3.13   | 0.10 | 0.20   |
| 0.11 | 0.11  | 0.19   | 0.5   | 3.62   | 2.77  | 3.44   | 0.12 | 0.23   |
| 0.12 | 0.12  | 0.23   | 0.7   | 3.95   | 2.93  | 3.75   | 0.13 | 0.25   |
| 0.13 | 0.13  | 0.26   | 0.8   | 4.28   | 3.09  | 4.07   | 0.15 | 0.28   |
| 0.14 | 0.14  | 0.31   | 0.9   | 5.15   | 3.03  | 4.93   | 0.14 | 0.28   |
| 0.15 | 0.15  | 0.36   | 1.1   | 6.03   | 3.04  | 5.79   | 0.14 | 0.29   |
| 0.16 | 0.16  | 0.43   | 1.3   | 6.91   | 3.08  | 6.65   | 0.15 | 0.31   |
| 0.17 | 0.17  | 0.50   | 1.6   | 7.79   | 3.16  | 7.51   | 0.15 | 0.32   |
| 0.18 | 0.18  | 0.58   | 1.9   | 8.67   | 3.25  | 8.38   | 0.16 | 0.34   |
| 0.19 | 0.19  | 0.66   | 2.2   | 9.54   | 3.35  | 9.24   | 0.17 | 0.36   |
| 0.20 | 0.20  | 0.76   | 2.6   | 10.42  | 3.46  | 10.10  | 0.19 | 0.39   |
| 0.21 | 0.21  | 0.87   | 3.1   | 11.30  | 3.57  | 10.96  | 0.20 | 0.41   |
| 0.22 | 0.22  | 0.98   | 3.6   | 12.18  | 3.69  | 11.83  | 0.21 | 0.43   |
| 0.23 | 0.23  | 1.10   | 4.2   | 13.06  | 3.81  | 12.69  | 0.23 | 0.46   |
| 0.24 | 0.24  | 1.23   | 4.8   | 13.93  | 3.93  | 13.55  | 0.24 | 0.48   |
| 0.25 | 0.25  | 1.37   | 5.6   | 14.81  | 4.05  | 14.41  | 0.26 | 0.51   |
| 0.26 | 0.26  | 1.52   | 6.4   | 15.69  | 4.18  | 15.27  | 0.27 | 0.53   |
| 0.27 | 0.27  | 1.68   | 7.2   | 16.57  | 4.30  | 16.14  | 0.29 | 0.56   |
| 0.28 | 0.28  | 1.84   | 8.2   | 17.45  | 4.43  | 17.00  | 0.30 | 0.58   |
| 0.29 | 0.29  | 2.02   | 9.2   | 18.32  | 4.55  | 17.86  | 0.32 | 0.61   |
| 0.30 | 0.30  | 2.20   | 10.3  | 19.20  | 4.67  | 18.72  | 0.34 | 0.64   |
| 0.31 | 0.31  | 2.39   | 11.5  | 20.08  | 4.79  | 19.59  | 0.36 | 0.67   |
| 0.32 | 0.32  | 2.59   | 12.7  | 20.96  | 4.92  | 20.45  | 0.38 | 0.70   |
| 0.33 | 0.33  | 2.80   | 14.1  | 21.84  | 5.04  | 21.31  | 0.39 | 0.72   |
| 0.34 | 0.34  | 3.02   | 15.6  | 22.71  | 5.16  | 22.17  | 0.41 | 0.75   |
| 0.35 | 0.35  | 3.25   | 17.1  | 23.59  | 5.28  | 23.03  | 0.43 | 0.78   |
| 0.36 | 0.36  | 3.48   | 18.8  | 24.47  | 5.39  | 23.90  | 0.45 | 0.81   |
| 0.37 | 0.37  | 3.72   | 20.5  | 25.35  | 5.51  | 24.76  | 0.47 | 0.84   |
| 0.38 | 0.38  | 3.98   | 22.4  | 26.23  | 5.63  | 25.62  | 0.49 | 0.87   |
| 0.39 | 0.39  | 4.24   | 24.3  | 27.10  | 5.74  | 26.48  | 0.51 | 0.90   |
| 0.40 | 0.40  | 4.50   | 26.4  | 27.98  | 5.86  | 27.35  | 0.53 | 0.93   |
| 0.41 | 0.41  | 4.78   | 28.6  | 28.86  | 5.97  | 28.21  | 0.55 | 0.96   |
| 0.42 | 0.42  | 5.06   | 31.4  | 28.88  | 6.20  | 28.21  | 0.60 | 1.02   |
| 0.43 | 0.43  | 5.35   | 34.4  | 28.90  | 6.43  | 28.22  | 0.64 | 1.07   |
| 0.45 | 0.45  | 5.91   | 40.6  | 28.94  | 6.87  | 28.23  | 0.73 | 1.18   |
| 0.46 | 0.46  | 6.19   | 43.9  | 28.96  | 7.08  | 28.23  | 0.78 | 1.24   |
| 0.47 | 0.47  | 6.48   | 47.2  | 28.98  | 7.29  | 28.24  | 0.83 | 1.30   |
| 0.48 | 0.48  | 6.76   | 50.7  | 29.01  | 7.50  | 28.24  | 0.87 | 1.35   |
| 0.49 | 0.49  | 7.04   | 54.2  | 29.03  | 7.70  | 28.25  | 0.92 | 1.41   |
| 0.50 | 0.50  | 7.32   | 57.9  | 29.05  | 7.90  | 28.25  | 0.97 | 1.47   |

Street F on grade

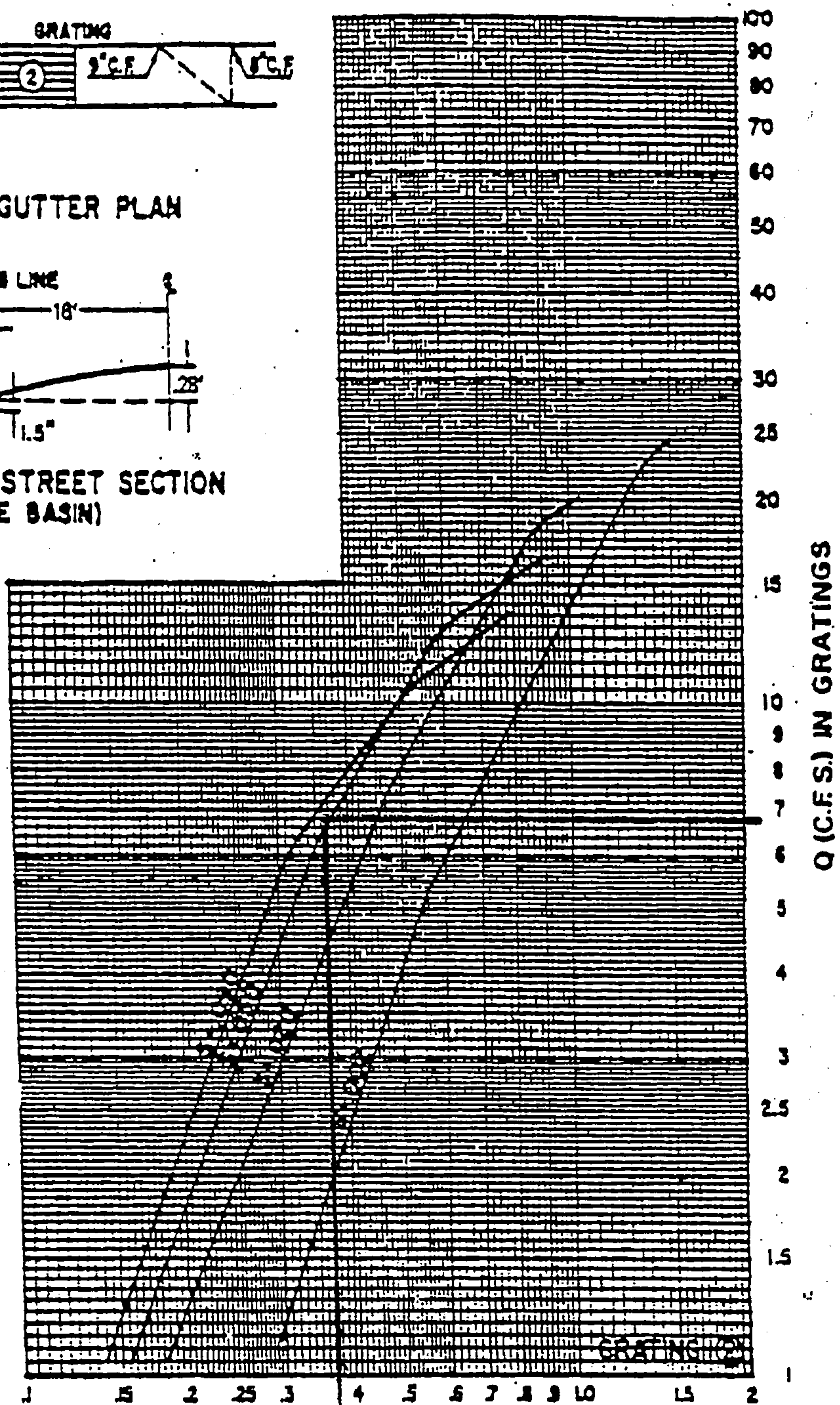
# GRATING CAPACITIES FOR TYPE 'A', 'C' and 'D'



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION (ABOVE BASIN)



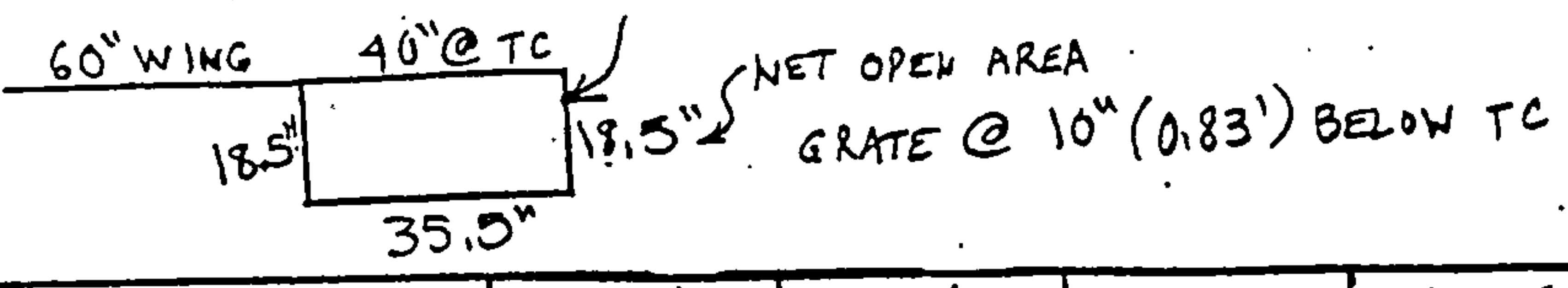
D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

$$S = 5.13\%$$

$$d = 0.37'$$

$$Q = 6.8 \text{ cfs/grate}$$

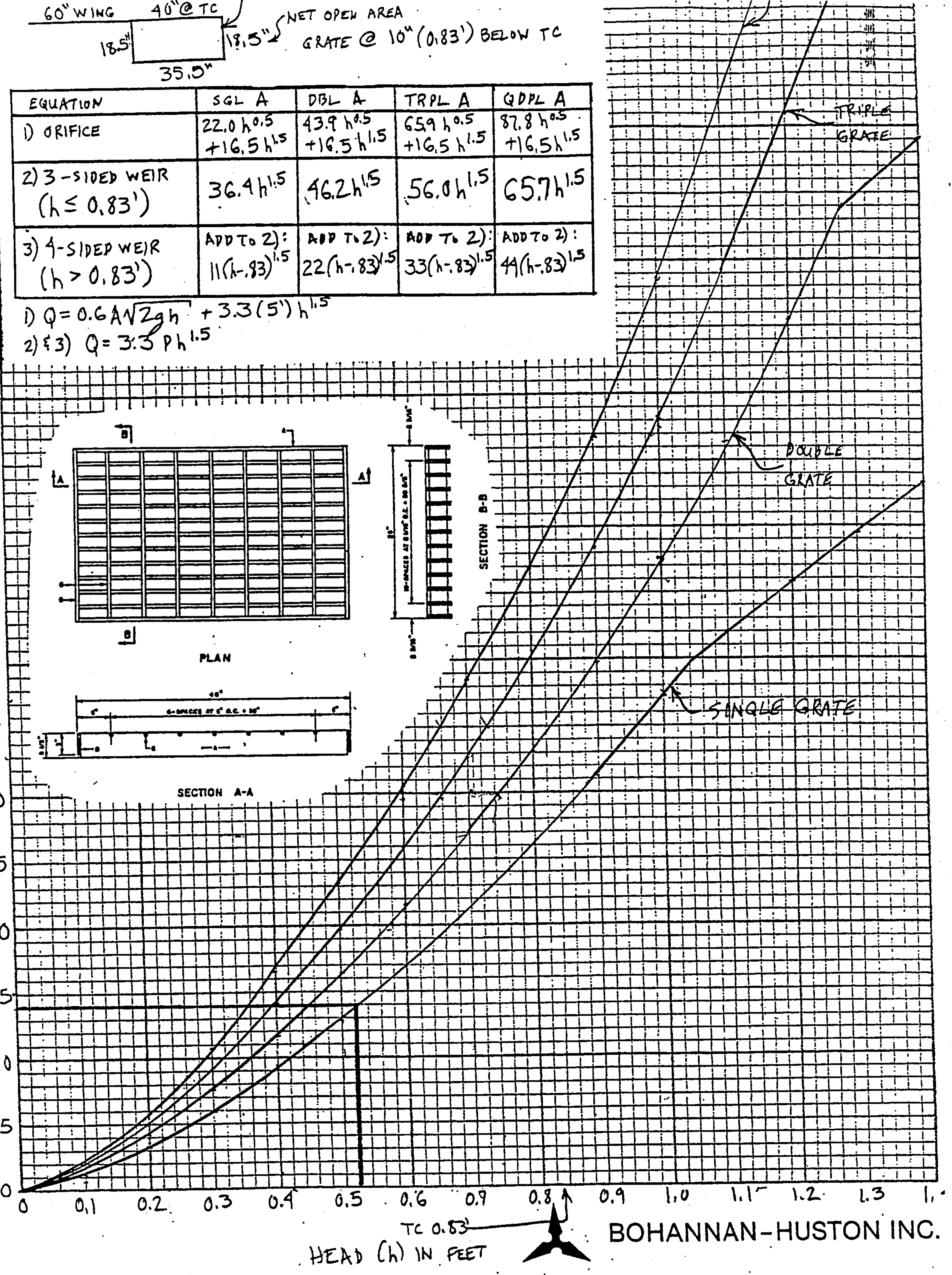
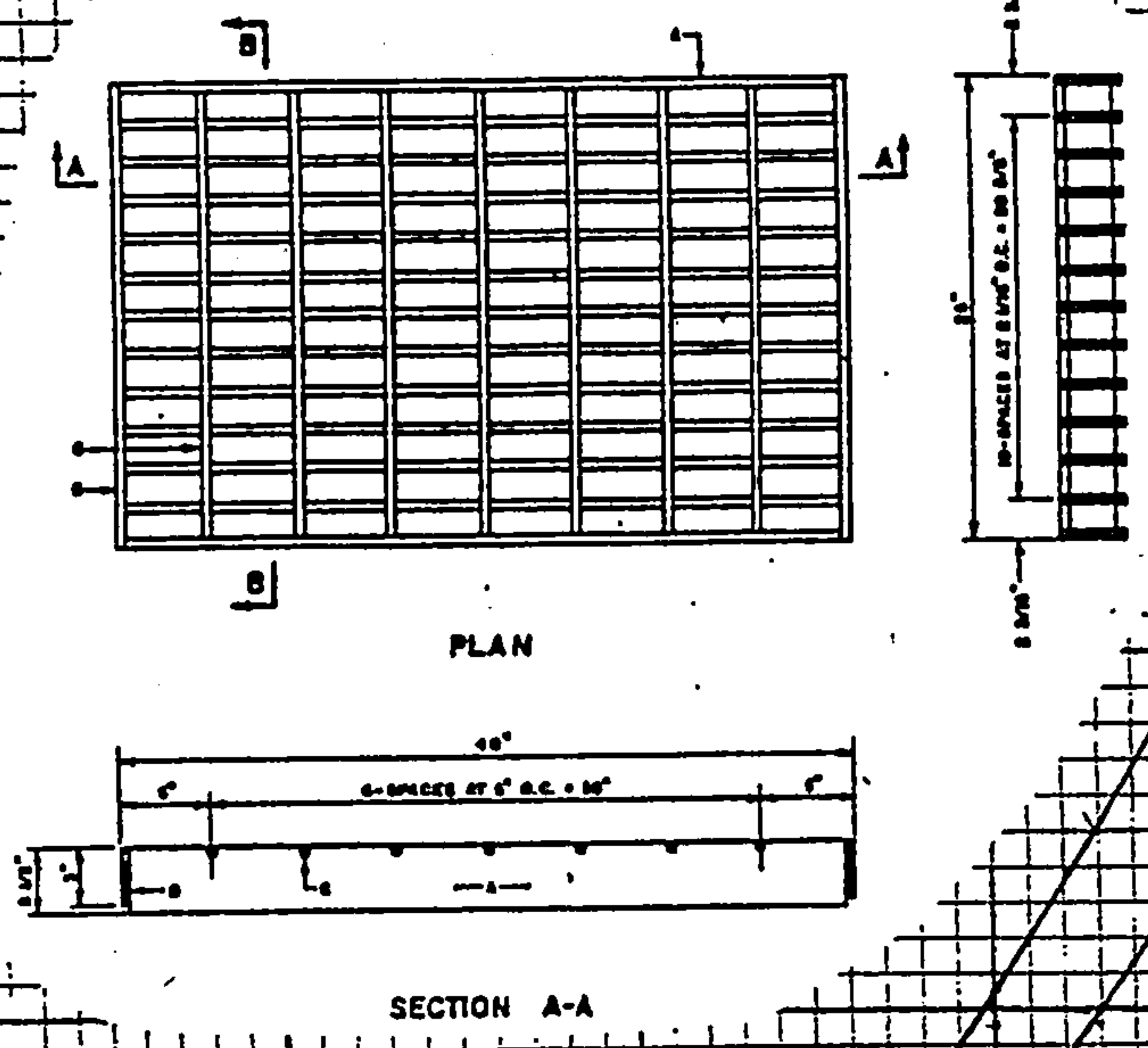
PLATE 22.3 D-5



| EQUATION                              | SGL A                              | DBL A                              | TRPL A                             | QDPL A                             |
|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| 1) ORIFICE                            | $22.0 h^{0.5} + 16.5 h^{1.5}$      | $43.9 h^{0.5} + 16.5 h^{1.5}$      | $65.9 h^{0.5} + 16.5 h^{1.5}$      | $87.8 h^{0.5} + 16.5 h^{1.5}$      |
| 2) 3-SIDED WEIR<br>( $h \leq 0.83'$ ) | $36.4 h^{1.5}$                     | $46.2 h^{1.5}$                     | $56.0 h^{1.5}$                     | $65.7 h^{1.5}$                     |
| 3) 4-SIDED WEIR<br>( $h > 0.83'$ )    | ADD TO 2):<br>$11(h - 0.83)^{1.5}$ | ADD TO 2):<br>$22(h - 0.83)^{1.5}$ | ADD TO 2):<br>$33(h - 0.83)^{1.5}$ | ADD TO 2):<br>$44(h - 0.83)^{1.5}$ |

1)  $Q = 0.6 A \sqrt{2gh} + 3.3(5') h^{1.5}$   
 2) & 3)  $Q = 3.3 P h^{1.5}$

GRATE CAPACITY (Q) IN CFS



BOHANNAN-HUSTON INC.

PROJECT NAME Sheet F Sump SHEET \_\_\_\_\_ OF \_\_\_\_\_

PROJECT NO. \_\_\_\_\_ BY JPK DATE 4/9/92

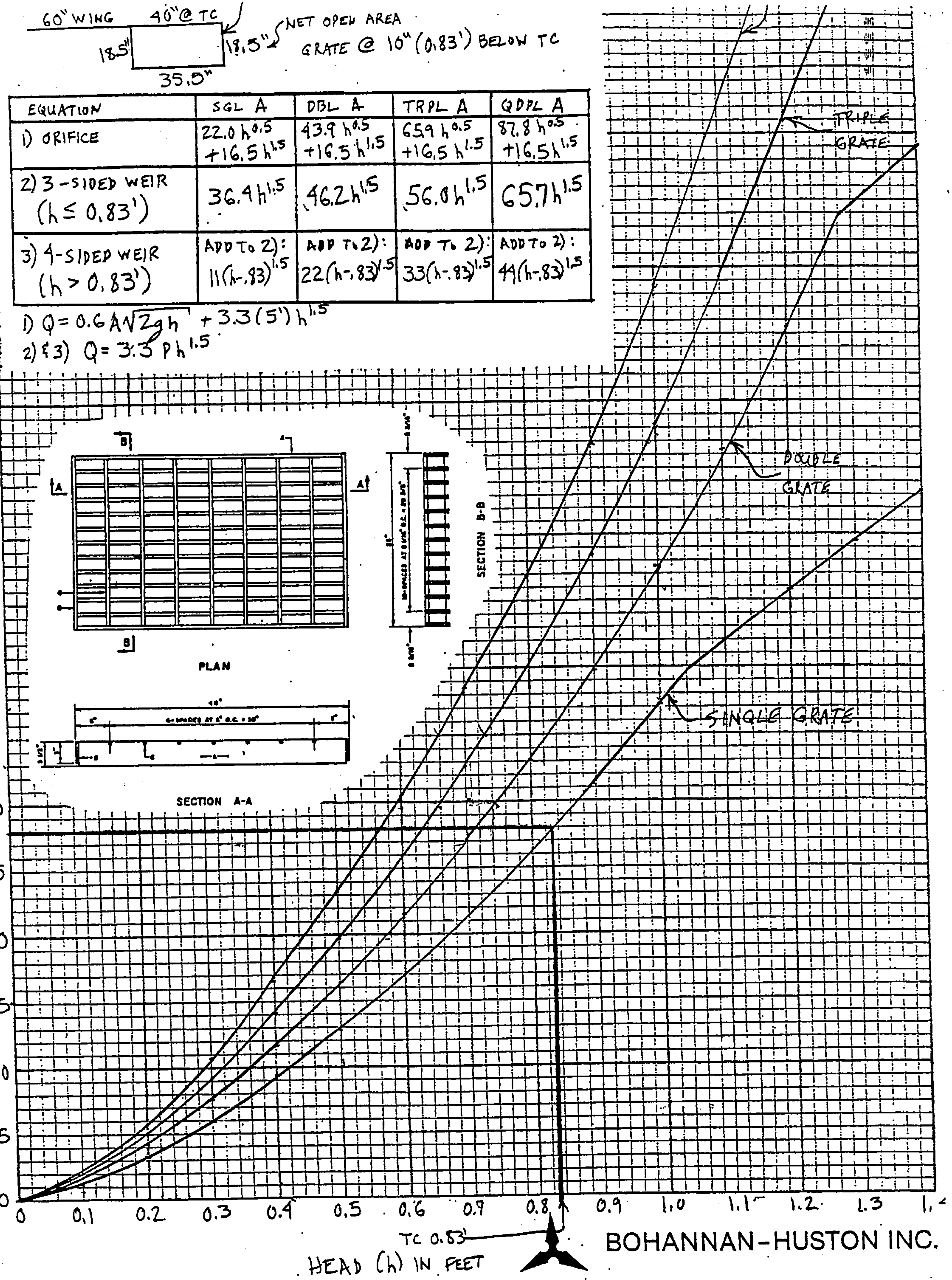
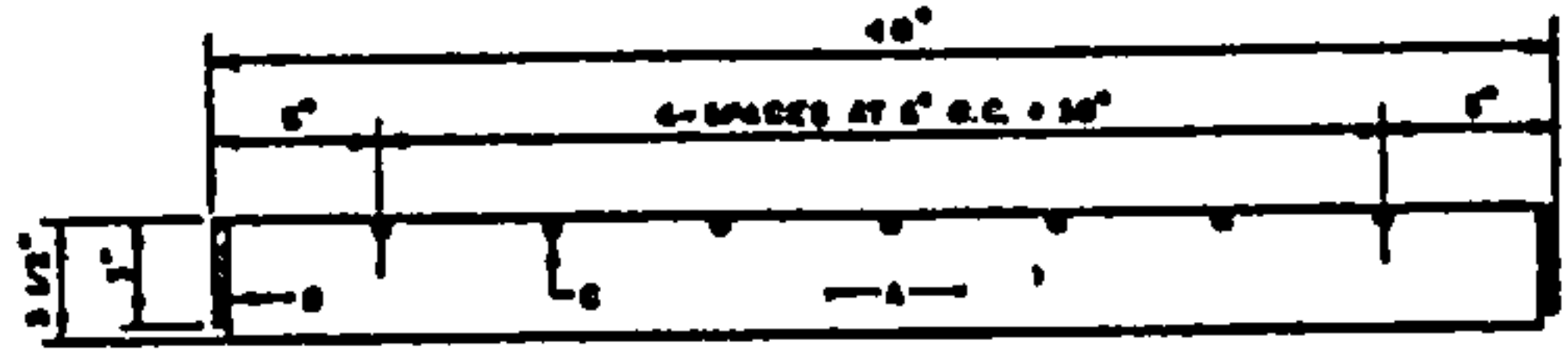
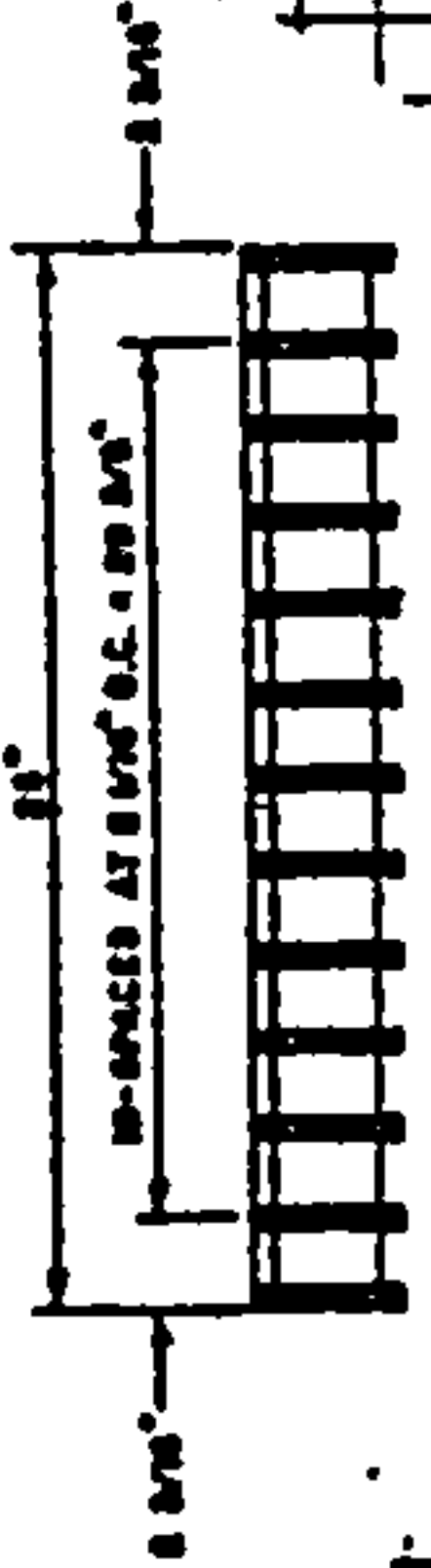
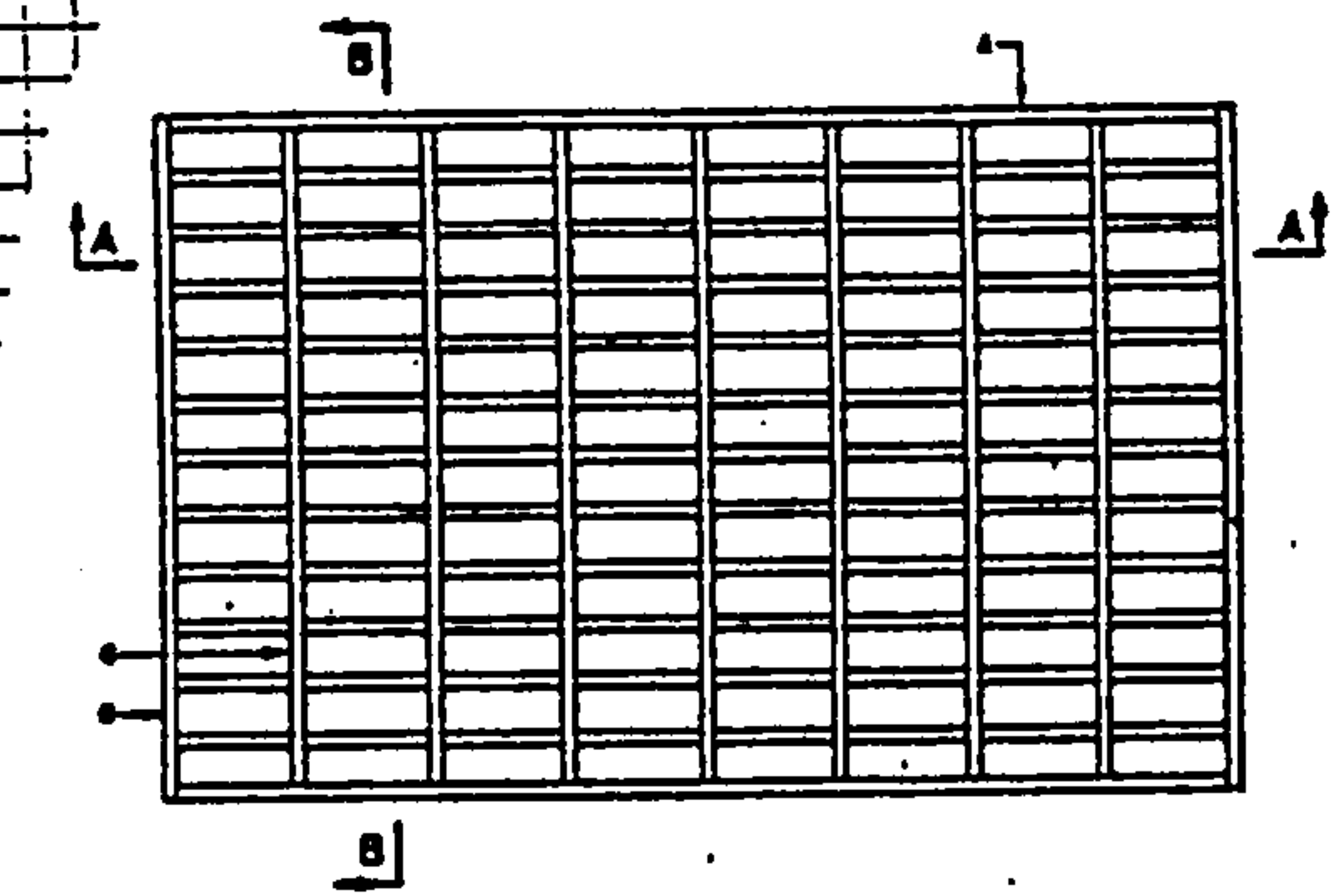
SUBJECT RATING CURVE FOR TYPE A INLETS CH'D \_\_\_\_\_ DATE \_\_\_\_\_

60" WING 40" @ TC  
 18.5" 18.5" 35.5"  
 NET OPEN AREA  
 GRATE @ 10" (0.83') BELOW TC

| EQUATION                              | SGL A                             | DBL A                             | TRPL A                            | QDPL A                            |
|---------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1) ORIFICE                            | $22.0 h^{0.5}$<br>$+16.5 h^{1.5}$ | $43.9 h^{0.5}$<br>$+16.5 h^{1.5}$ | $65.9 h^{0.5}$<br>$+16.5 h^{1.5}$ | $87.8 h^{0.5}$<br>$+16.5 h^{1.5}$ |
| 2) 3-SIDED WEIR<br>( $h \leq 0.83'$ ) | $36.4 h^{1.5}$                    | $46.2 h^{1.5}$                    | $56.0 h^{1.5}$                    | $65.7 h^{1.5}$                    |
| 3) 4-SIDED WEIR<br>( $h > 0.83'$ )    | ADD TO 2):<br>$11(h-0.83)^{1.5}$  | ADD TO 2):<br>$22(h-0.83)^{1.5}$  | ADD TO 2):<br>$33(h-0.83)^{1.5}$  | ADD TO 2):<br>$44(h-0.83)^{1.5}$  |

1)  $Q = 0.6 A \sqrt{2gh} + 3.3(5') h^{1.5}$   
 2) & 3)  $Q = 3.3 P h^{1.5}$

GRATE CAPACITY (Q) IN CFS



PROJECT NAME Street F 2x100 yds SHEET \_\_\_\_\_ OF \_\_\_\_\_  
 PROJECT NO. \_\_\_\_\_ BY JPK DATE 4/9/92  
 CURB RATING CURVE FOR TYPE A INLETS CH'D \_\_\_\_\_ DATE \_\_\_\_\_

000000

\*\*\*\*\*

PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

STREET 'G'

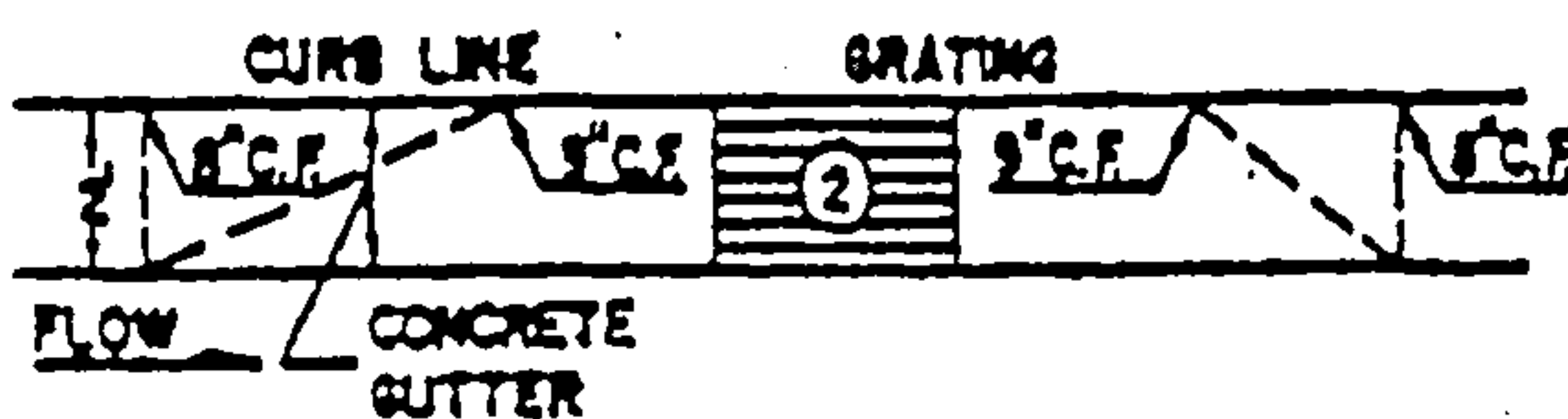
MANNING'S N= .017 SLOPE= .0362

| POINT | DIST | ELEV | POINT | DIST  | ELEV | POINT | DIST  | ELEV |
|-------|------|------|-------|-------|------|-------|-------|------|
| 1     | 0.00 | 0.83 | 5     | 11.00 | 0.13 | 9     | 37.17 | 0.67 |
| 2     | 8.38 | 0.67 | 6     | 23.00 | 0.41 | 10    | 37.63 | 0.67 |
| 3     | 8.83 | 0.67 | 7     | 35.00 | 0.13 | 11    | 46.00 | 0.83 |
| 4     | 9.00 | 0.00 | 8     | 37.00 | 0.00 | 12    | 0.00  | 0.00 |

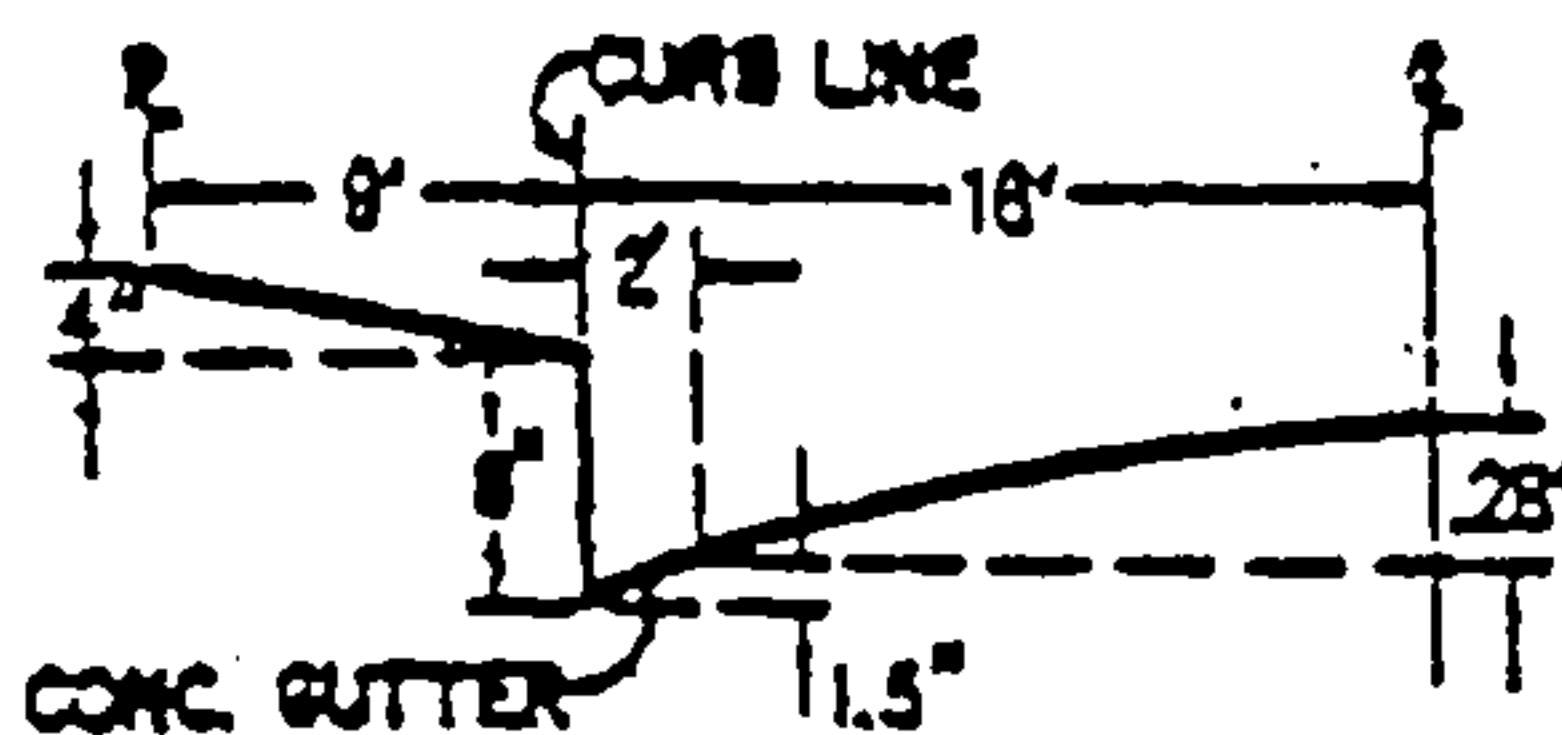
| WSEL | DEPTH | FLOW    | FLOW  | WETTED | FLOW  | TOPWID | VEL  | ENERGY |
|------|-------|---------|-------|--------|-------|--------|------|--------|
| (FT) | INC   | AREA    | RATE  | PER    | VEL   | (FT)   | HEAD | HEAD   |
| (FT) | (FT)  | SQ. FT. | (CFS) | (FT)   | (FPS) | (FT)   | (FT) | (FT)   |
| 0.01 | 0.01  | 0.00    | 0.0   | 0.33   | 0.47  | 0.31   | 0.00 | 0.01   |
| 0.02 | 0.02  | 0.01    | 0.0   | 0.66   | 0.75  | 0.63   | 0.01 | 0.03   |
| 0.03 | 0.03  | 0.01    | 0.0   | 0.99   | 0.98  | 0.94   | 0.01 | 0.04   |
| 0.04 | 0.04  | 0.03    | 0.0   | 1.32   | 1.18  | 1.25   | 0.02 | 0.06   |
| 0.05 | 0.05  | 0.04    | 0.1   | 1.64   | 1.37  | 1.56   | 0.03 | 0.08   |
| 0.06 | 0.06  | 0.06    | 0.1   | 1.97   | 1.55  | 1.88   | 0.04 | 0.10   |
| 0.07 | 0.07  | 0.08    | 0.1   | 2.30   | 1.72  | 2.19   | 0.05 | 0.12   |
| 0.08 | 0.08  | 0.10    | 0.2   | 2.63   | 1.88  | 2.50   | 0.05 | 0.13   |
| 0.09 | 0.09  | 0.13    | 0.3   | 2.96   | 2.03  | 2.81   | 0.06 | 0.15   |
| 0.10 | 0.10  | 0.16    | 0.3   | 3.29   | 2.18  | 3.13   | 0.07 | 0.17   |
| 0.11 | 0.11  | 0.19    | 0.4   | 3.62   | 2.33  | 3.44   | 0.08 | 0.19   |
| 0.12 | 0.12  | 0.23    | 0.6   | 3.95   | 2.46  | 3.75   | 0.09 | 0.21   |
| 0.13 | 0.13  | 0.26    | 0.7   | 4.28   | 2.60  | 4.07   | 0.10 | 0.23   |
| 0.14 | 0.14  | 0.31    | 0.8   | 5.15   | 2.55  | 4.93   | 0.10 | 0.24   |
| 0.15 | 0.15  | 0.36    | 0.9   | 6.03   | 2.55  | 5.79   | 0.10 | 0.25   |
| 0.16 | 0.16  | 0.43    | 1.1   | 6.91   | 2.59  | 6.65   | 0.10 | 0.26   |
| 0.17 | 0.17  | 0.50    | 1.3   | 7.79   | 2.65  | 7.51   | 0.11 | 0.28   |
| 0.18 | 0.18  | 0.58    | 1.6   | 8.67   | 2.73  | 8.38   | 0.12 | 0.30   |
| 0.19 | 0.19  | 0.66    | 1.9   | 9.54   | 2.81  | 9.24   | 0.12 | 0.31   |
| 0.20 | 0.20  | 0.76    | 2.2   | 10.42  | 2.90  | 10.10  | 0.13 | 0.33   |
| 0.21 | 0.21  | 0.87    | 2.6   | 11.30  | 3.00  | 10.96  | 0.14 | 0.35   |
| 0.22 | 0.22  | 0.98    | 3.0   | 12.18  | 3.10  | 11.83  | 0.15 | 0.37   |
| 0.23 | 0.23  | 1.10    | 3.5   | 13.06  | 3.20  | 12.69  | 0.16 | 0.39   |
| 0.24 | 0.24  | 1.23    | 4.1   | 13.93  | 3.30  | 13.55  | 0.17 | 0.41   |
| 0.25 | 0.25  | 1.37    | 4.7   | 14.81  | 3.41  | 14.41  | 0.18 | 0.43   |
| 0.26 | 0.26  | 1.52    | 5.3   | 15.69  | 3.51  | 15.27  | 0.19 | 0.45   |
| 0.27 | 0.27  | 1.68    | 6.1   | 16.57  | 3.61  | 16.14  | 0.20 | 0.47   |
| 0.28 | 0.28  | 1.84    | 6.9   | 17.45  | 3.72  | 17.00  | 0.21 | 0.49   |
| 0.29 | 0.29  | 2.02    | 7.7   | 18.32  | 3.82  | 17.86  | 0.23 | 0.52   |
| 0.30 | 0.30  | 2.20    | 8.6   | 19.20  | 3.92  | 18.72  | 0.24 | 0.54   |
| 0.31 | 0.31  | 2.39    | 9.6   | 20.08  | 4.03  | 19.59  | 0.25 | 0.56   |
| 0.32 | 0.32  | 2.59    | 10.7  | 20.96  | 4.13  | 20.45  | 0.26 | 0.58   |
| 0.33 | 0.33  | 2.80    | 11.9  | 21.84  | 4.23  | 21.31  | 0.28 | 0.61   |
| 0.34 | 0.34  | 3.02    | 13.1  | 22.71  | 4.33  | 22.17  | 0.29 | 0.63   |
| 0.35 | 0.35  | 3.25    | 14.4  | 23.59  | 4.43  | 23.03  | 0.30 | 0.65   |
| 0.36 | 0.36  | 3.48    | 15.8  | 24.47  | 4.53  | 23.90  | 0.32 | 0.68   |
| 0.37 | 0.37  | 3.72    | 17.2  | 25.35  | 4.63  | 24.76  | 0.33 | 0.70   |
| 0.38 | 0.38  | 3.98    | 18.8  | 26.23  | 4.73  | 25.62  | 0.35 | 0.73   |
| 0.39 | 0.39  | 4.24    | 20.4  | 27.10  | 4.83  | 26.48  | 0.36 | 0.75   |
| 0.40 | 0.40  | 4.50    | 22.2  | 27.98  | 4.92  | 27.35  | 0.38 | 0.78   |
| 0.41 | 0.41  | 4.78    | 24.0  | 28.86  | 5.02  | 28.21  | 0.39 | 0.80   |
| 0.42 | 0.42  | 5.06    | 26.4  | 28.88  | 5.21  | 28.21  | 0.42 | 0.84   |
| 0.43 | 0.43  | 5.35    | 28.9  | 28.90  | 5.40  | 28.22  | 0.45 | 0.88   |
| 0.45 | 0.45  | 5.91    | 34.1  | 28.94  | 5.77  | 28.23  | 0.52 | 0.97   |
| 0.46 | 0.46  | 6.19    | 36.8  | 28.96  | 5.95  | 28.23  | 0.55 | 1.01   |
| 0.47 | 0.47  | 6.48    | 39.7  | 28.98  | 6.12  | 28.24  | 0.58 | 1.05   |
| 0.48 | 0.48  | 6.76    | 42.6  | 29.01  | 6.30  | 28.24  | 0.62 | 1.10   |
| 0.49 | 0.49  | 7.04    | 45.5  | 29.03  | 6.47  | 28.25  | 0.65 | 1.14   |

Street G

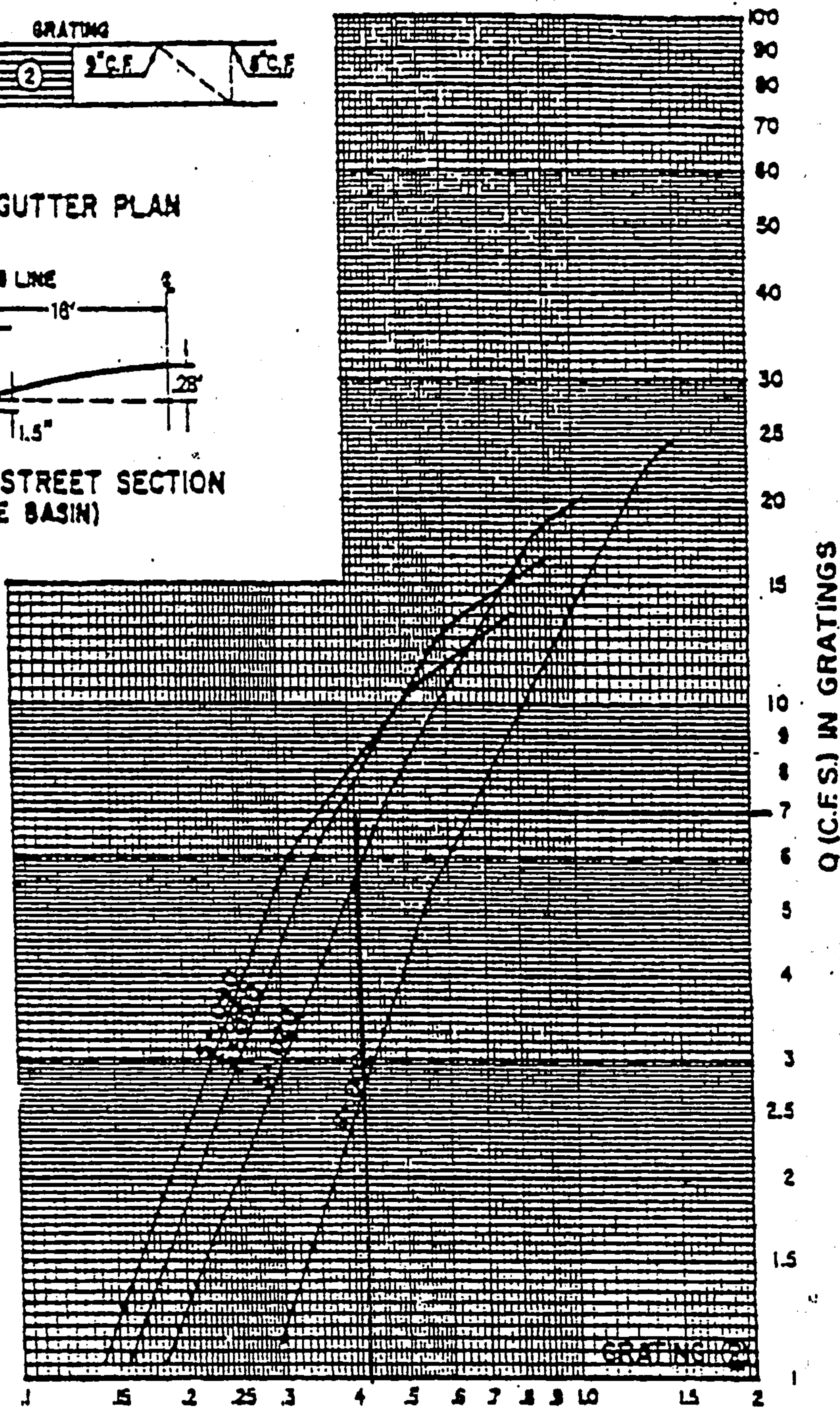
# GRATING CAPACITIES FOR TYPE 'A' , 'C' and 'D'



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION  
(ABOVE BASIN)



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

PLATE 22.3 D-5

$$d = 0.41'$$

$$S = 3.62\%$$

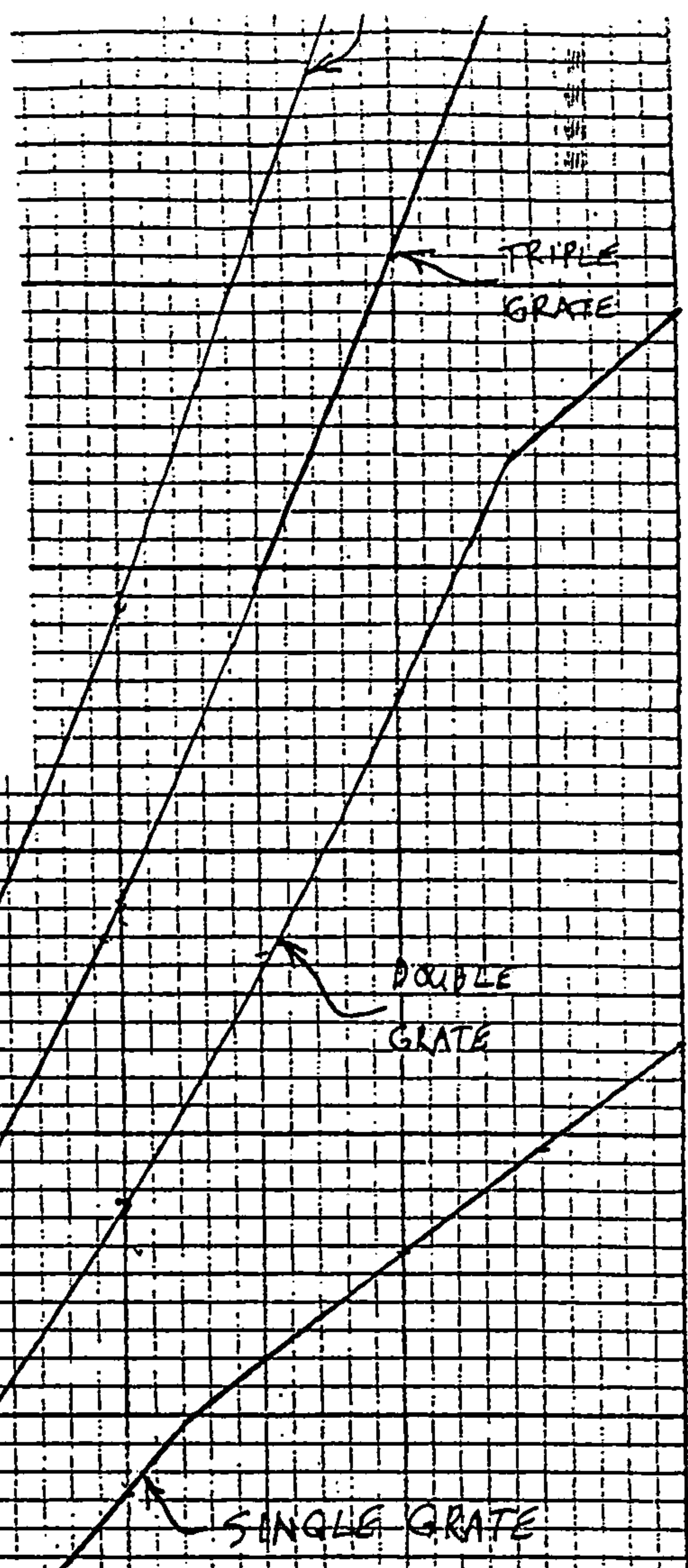
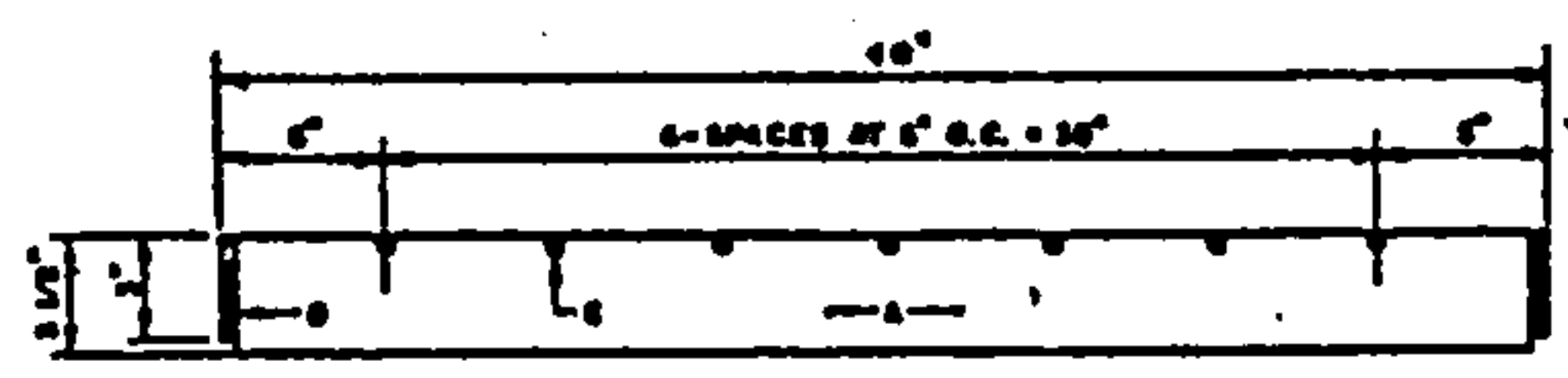
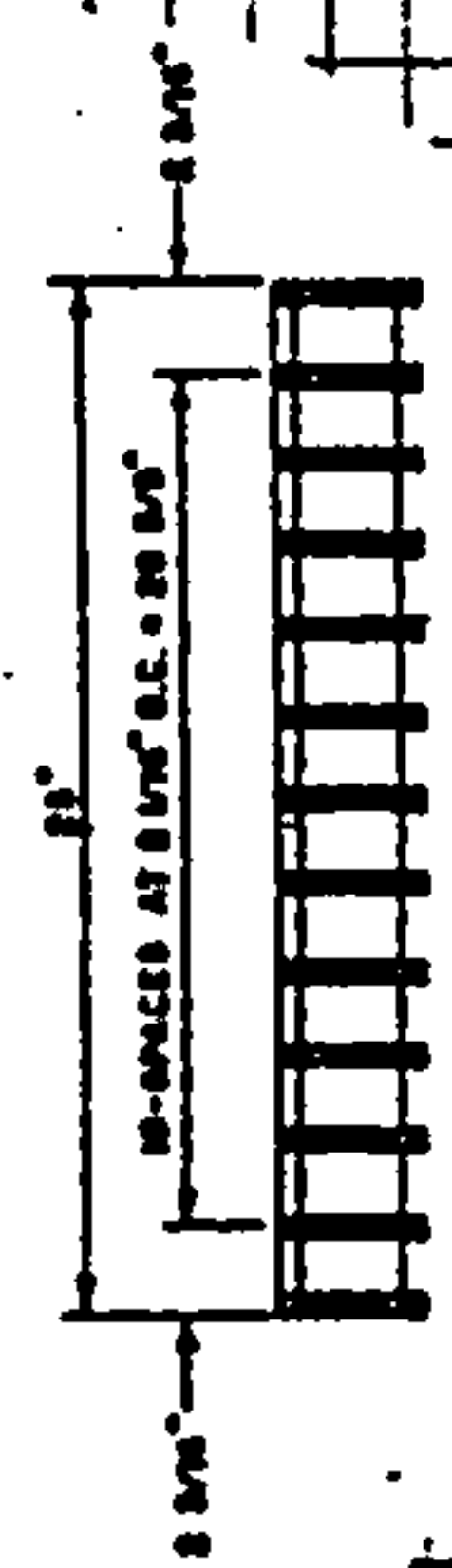
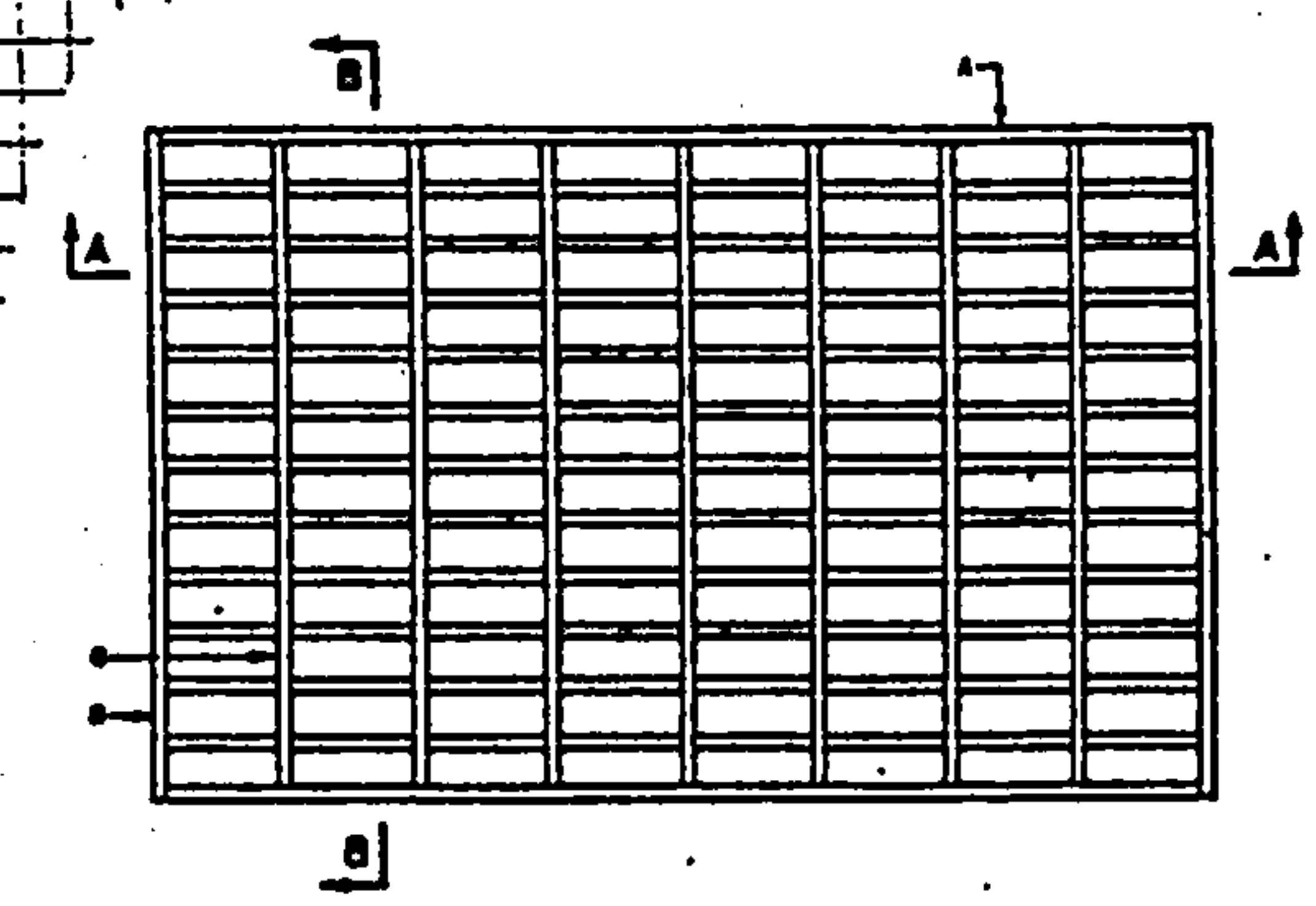
$$Q = 7 \text{ cfs/grate}$$

60" WING 40" @ TC  
 18.5" 18.5" 35.5" NET OPEN AREA  
 GRATE @ 10" (0.83') BELOW TC

| EQUATION                              | SGL A                            | DBL A                            | TRPL A                           | QDPL A                           |
|---------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 1) ORIFICE                            | $22.0 h^{0.5} + 16.5 h^{1.5}$    | $43.9 h^{0.5} + 16.5 h^{1.5}$    | $65.9 h^{0.5} + 16.5 h^{1.5}$    | $87.8 h^{0.5} + 16.5 h^{1.5}$    |
| 2) 3-SIDED WEIR<br>( $h \leq 0.83'$ ) | $36.4 h^{1.5}$                   | $46.2 h^{1.5}$                   | $56.0 h^{1.5}$                   | $65.7 h^{1.5}$                   |
| 3) 4-SIDED WEIR<br>( $h > 0.83'$ )    | ADD TO 2):<br>$11(h-0.83)^{1.5}$ | ADD TO 2):<br>$22(h-0.83)^{1.5}$ | ADD TO 2):<br>$33(h-0.83)^{1.5}$ | ADD TO 2):<br>$44(h-0.83)^{1.5}$ |

1)  $Q = 0.6 A \sqrt{2gh} + 3.3(5') h^{1.5}$   
 2) & 3)  $Q = 3.3 P h^{1.5}$

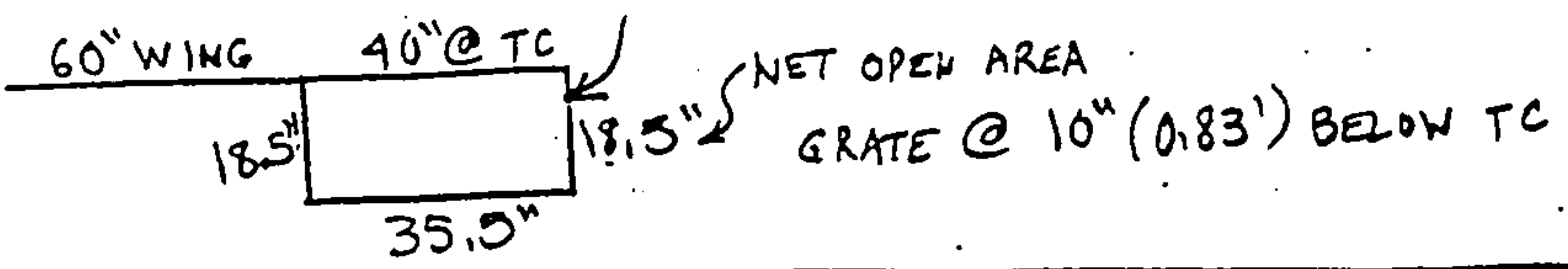
GRATE CAPACITY (Q) IN CFS



TC 0.83'  
 HEAD (h) IN FEET

BOHANNAN-HUSTON INC.

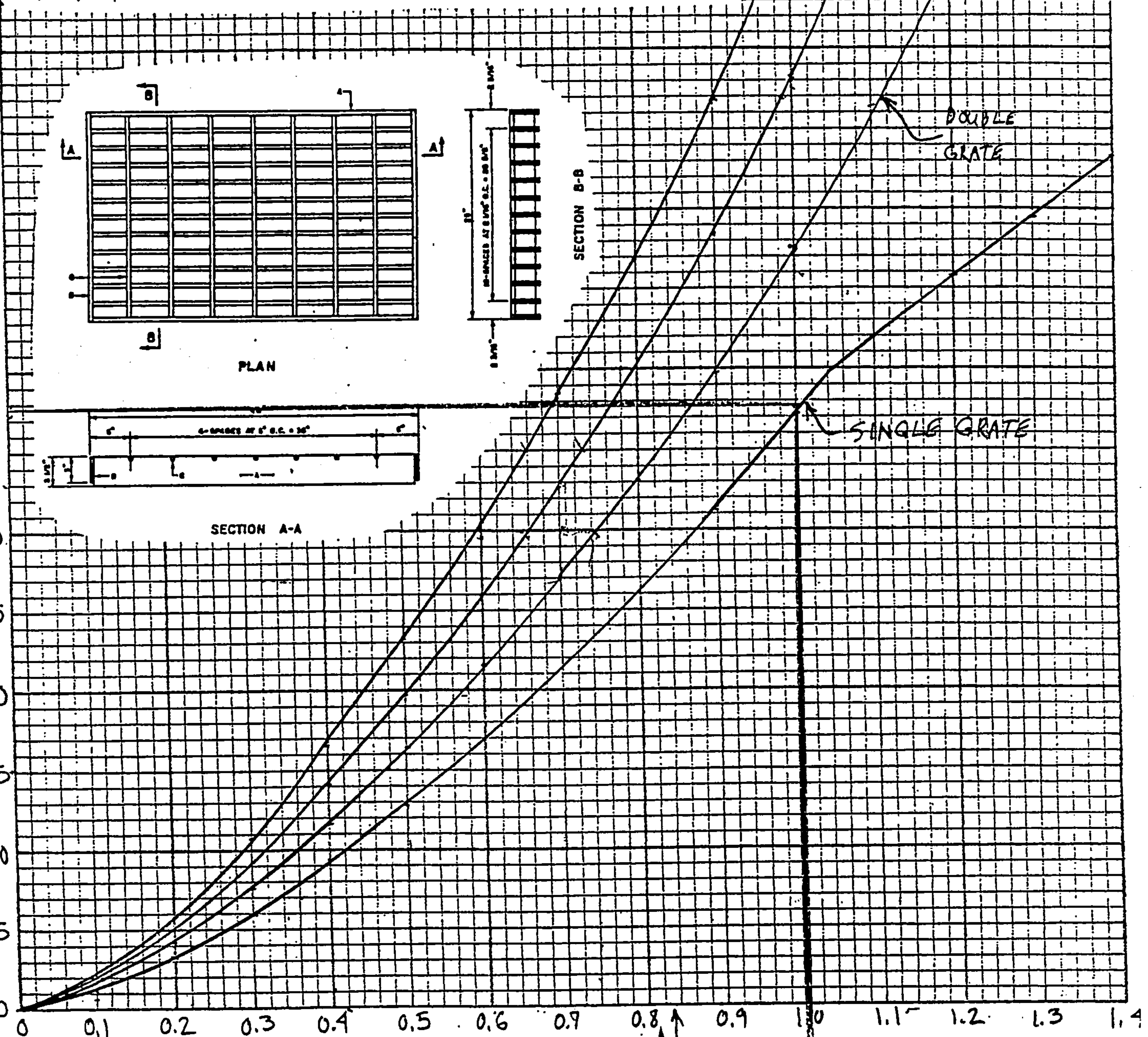
PROJECT NAME \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_  
 PROJECT NO. \_\_\_\_\_ BY JPK DATE 4/9/92  
 DIRECT RATING CURVE FOR TYPE A INLETS CH'D \_\_\_\_\_ DATE \_\_\_\_\_



| EQUATION                              | SGL A                             | DBL A                             | TRPL A                            | QDPL A                            |
|---------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1) ORIFICE                            | $22.0 h^{0.5}$<br>$+16.5 h^{1.5}$ | $43.9 h^{0.5}$<br>$+16.5 h^{1.5}$ | $65.9 h^{0.5}$<br>$+16.5 h^{1.5}$ | $87.8 h^{0.5}$<br>$+16.5 h^{1.5}$ |
| 2) 3-SIDED WEIR<br>( $h \leq 0.83'$ ) | $36.4 h^{1.5}$                    | $46.2 h^{1.5}$                    | $56.0 h^{1.5}$                    | $65.7 h^{1.5}$                    |
| 3) 4-SIDED WEIR<br>( $h > 0.83'$ )    | ADD TO 2):<br>$11(h-0.83)^{1.5}$  | ADD TO 2):<br>$22(h-0.83)^{1.5}$  | ADD TO 2):<br>$33(h-0.83)^{1.5}$  | ADD TO 2):<br>$44(h-0.83)^{1.5}$  |

1)  $Q = 0.6 A \sqrt{2gh} + 3.3(5') h^{1.5}$   
 2) & 3)  $Q = 3.3 P h^{1.5}$

GRATE CAPACITY (Q) IN CFS



TC 0.83'  
HEAD (h) IN FEET

BOHANNAN-HUSTON INC.

PROJECT NAME Street 6 2nd Dy SHEET        OF         
 PROJECT NO.        BY JPK DATE 4/9/92  
 SUBJECT RATING CURVE FOR TYPE A INLETS CH'D        DATE

\*\*\*\*\*

PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

STREET 'H'

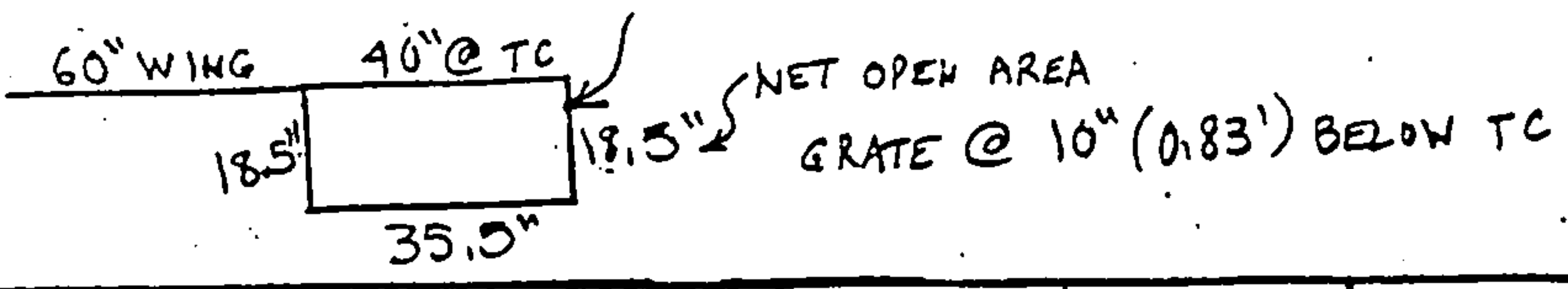
MANNING'S N= .017 SLOPE= .0467

| POINT | DIST | ELEV | POINT | DIST  | ELEV | POINT | DIST  | ELEV |
|-------|------|------|-------|-------|------|-------|-------|------|
| 1     | 0.00 | 0.83 | 5     | 11.00 | 0.13 | 9     | 37.17 | 0.67 |
| 2     | 8.38 | 0.67 | 6     | 23.00 | 0.41 | 10    | 37.63 | 0.67 |
| 3     | 8.83 | 0.67 | 7     | 35.00 | 0.13 | 11    | 46.00 | 0.83 |
| 4     | 9.00 | 0.00 | 8     | 37.00 | 0.00 | 12    | 0.00  | 0.00 |

| WSEL | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL  | ENERGY |
|------|-------|--------|-------|--------|-------|--------|------|--------|
| (FT) | INC   | AREA   | RATE  | PER    | VEL   | (FT)   | HEAD | HEAD   |
| (FT) | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) | (FT)   | (FT) | (FT)   |
| 0.01 | 0.01  | 0.00   | 0.0   | 0.33   | 0.53  | 0.31   | 0.00 | 0.01   |
| 0.02 | 0.02  | 0.01   | 0.0   | 0.66   | 0.85  | 0.63   | 0.01 | 0.03   |
| 0.03 | 0.03  | 0.01   | 0.0   | 0.99   | 1.11  | 0.94   | 0.02 | 0.05   |
| 0.04 | 0.04  | 0.03   | 0.0   | 1.32   | 1.35  | 1.25   | 0.03 | 0.07   |
| 0.05 | 0.05  | 0.04   | 0.1   | 1.64   | 1.56  | 1.56   | 0.04 | 0.09   |
| 0.06 | 0.06  | 0.06   | 0.1   | 1.97   | 1.76  | 1.88   | 0.05 | 0.11   |
| 0.07 | 0.07  | 0.08   | 0.1   | 2.30   | 1.95  | 2.19   | 0.06 | 0.13   |
| 0.08 | 0.08  | 0.10   | 0.2   | 2.63   | 2.14  | 2.50   | 0.07 | 0.15   |
| 0.09 | 0.09  | 0.13   | 0.3   | 2.96   | 2.31  | 2.81   | 0.08 | 0.17   |
| 0.10 | 0.10  | 0.16   | 0.4   | 3.29   | 2.48  | 3.13   | 0.10 | 0.20   |
| 0.11 | 0.11  | 0.19   | 0.5   | 3.62   | 2.64  | 3.44   | 0.11 | 0.22   |
| 0.12 | 0.12  | 0.23   | 0.6   | 3.95   | 2.80  | 3.75   | 0.12 | 0.24   |
| 0.13 | 0.13  | 0.26   | 0.8   | 4.28   | 2.95  | 4.07   | 0.14 | 0.27   |
| 0.14 | 0.14  | 0.31   | 0.9   | 5.15   | 2.89  | 4.93   | 0.13 | 0.27   |
| 0.15 | 0.15  | 0.36   | 1.1   | 6.03   | 2.90  | 5.79   | 0.13 | 0.28   |
| 0.16 | 0.16  | 0.43   | 1.3   | 6.91   | 2.94  | 6.65   | 0.13 | 0.29   |
| 0.17 | 0.17  | 0.50   | 1.5   | 7.79   | 3.01  | 7.51   | 0.14 | 0.31   |
| 0.18 | 0.18  | 0.58   | 1.8   | 8.67   | 3.10  | 8.38   | 0.15 | 0.33   |
| 0.19 | 0.19  | 0.66   | 2.1   | 9.54   | 3.19  | 9.24   | 0.16 | 0.35   |
| 0.20 | 0.20  | 0.76   | 2.5   | 10.42  | 3.30  | 10.10  | 0.17 | 0.37   |
| 0.21 | 0.21  | 0.87   | 2.9   | 11.30  | 3.41  | 10.96  | 0.18 | 0.39   |
| 0.22 | 0.22  | 0.98   | 3.4   | 12.18  | 3.52  | 11.83  | 0.19 | 0.41   |
| 0.23 | 0.23  | 1.10   | 4.0   | 13.06  | 3.63  | 12.69  | 0.21 | 0.44   |
| 0.24 | 0.24  | 1.23   | 4.6   | 13.93  | 3.75  | 13.55  | 0.22 | 0.46   |
| 0.25 | 0.25  | 1.37   | 5.3   | 14.81  | 3.87  | 14.41  | 0.23 | 0.48   |
| 0.26 | 0.26  | 1.52   | 6.1   | 15.69  | 3.99  | 15.27  | 0.25 | 0.51   |
| 0.27 | 0.27  | 1.68   | 6.9   | 16.57  | 4.11  | 16.14  | 0.26 | 0.53   |
| 0.28 | 0.28  | 1.84   | 7.8   | 17.45  | 4.22  | 17.00  | 0.28 | 0.56   |
| 0.29 | 0.29  | 2.02   | 8.8   | 18.32  | 4.34  | 17.86  | 0.29 | 0.58   |
| 0.30 | 0.30  | 2.20   | 9.8   | 19.20  | 4.46  | 18.72  | 0.31 | 0.61   |
| 0.31 | 0.31  | 2.39   | 10.9  | 20.08  | 4.57  | 19.59  | 0.32 | 0.63   |
| 0.32 | 0.32  | 2.59   | 12.2  | 20.96  | 4.69  | 20.45  | 0.34 | 0.66   |
| 0.33 | 0.33  | 2.80   | 13.5  | 21.84  | 4.81  | 21.31  | 0.36 | 0.69   |
| 0.34 | 0.34  | 3.02   | 14.9  | 22.71  | 4.92  | 22.17  | 0.38 | 0.72   |
| 0.35 | 0.35  | 3.25   | 16.3  | 23.59  | 5.03  | 23.03  | 0.39 | 0.74   |
| 0.36 | 0.36  | 3.48   | 17.9  | 24.47  | 5.15  | 23.90  | 0.41 | 0.77   |
| 0.37 | 0.37  | 3.72   | 19.6  | 25.35  | 5.26  | 24.76  | 0.43 | 0.80   |
| 0.38 | 0.38  | 3.98   | 21.3  | 26.23  | 5.37  | 25.62  | 0.45 | 0.83   |
| 0.39 | 0.39  | 4.24   | 23.2  | 27.10  | 5.48  | 26.48  | 0.47 | 0.86   |
| 0.40 | 0.40  | 4.50   | 25.2  | 27.98  | 5.59  | 27.35  | 0.49 | 0.89   |
| 0.41 | 0.41  | 4.78   | 27.3  | 28.86  | 5.70  | 28.21  | 0.50 | 0.91   |
| 0.42 | 0.42  | 5.06   | 30.0  | 28.88  | 5.92  | 28.21  | 0.54 | 0.96   |
| 0.43 | 0.43  | 5.35   | 32.8  | 28.90  | 6.13  | 28.22  | 0.58 | 1.01   |
| 0.45 | 0.45  | 5.91   | 38.7  | 28.94  | 6.55  | 28.23  | 0.67 | 1.12   |
| 0.46 | 0.46  | 6.19   | 41.8  | 28.96  | 6.75  | 28.23  | 0.71 | 1.17   |
| 0.47 | 0.47  | 6.48   | 45.0  | 28.98  | 6.96  | 28.24  | 0.75 | 1.22   |
| 0.48 | 0.48  | 6.76   | 48.3  | 29.01  | 7.15  | 28.24  | 0.79 | 1.27   |
| 0.49 | 0.49  | 7.04   | 51.7  | 29.03  | 7.35  | 28.25  | 0.84 | 1.33   |
| 0.50 | 0.50  | 7.32   | 55.2  | 29.05  | 7.54  | 28.25  | 0.88 | 1.38   |
| 0.51 | 0.51  | 7.61   | 58.8  | 29.07  | 7.73  | 28.26  | 0.93 | 1.44   |
| 0.52 | 0.52  | 7.89   | 62.4  | 29.09  | 7.91  | 28.26  | 0.97 | 1.49   |

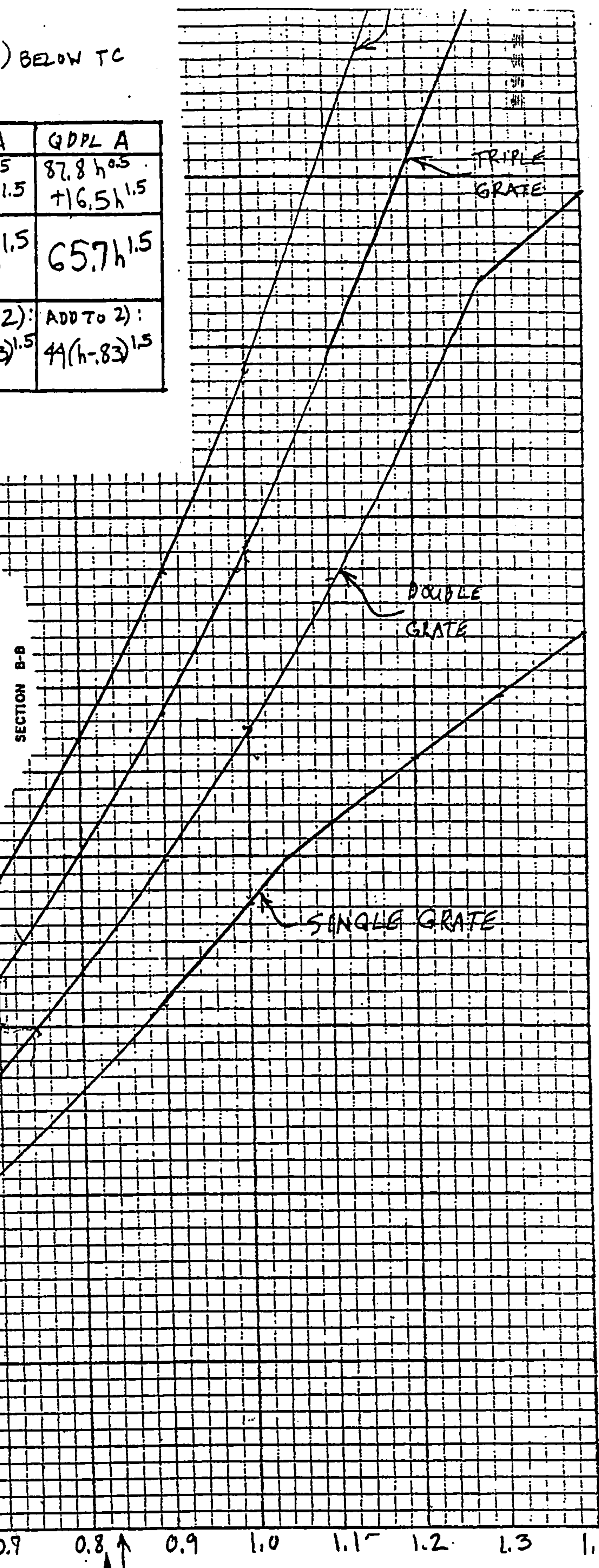
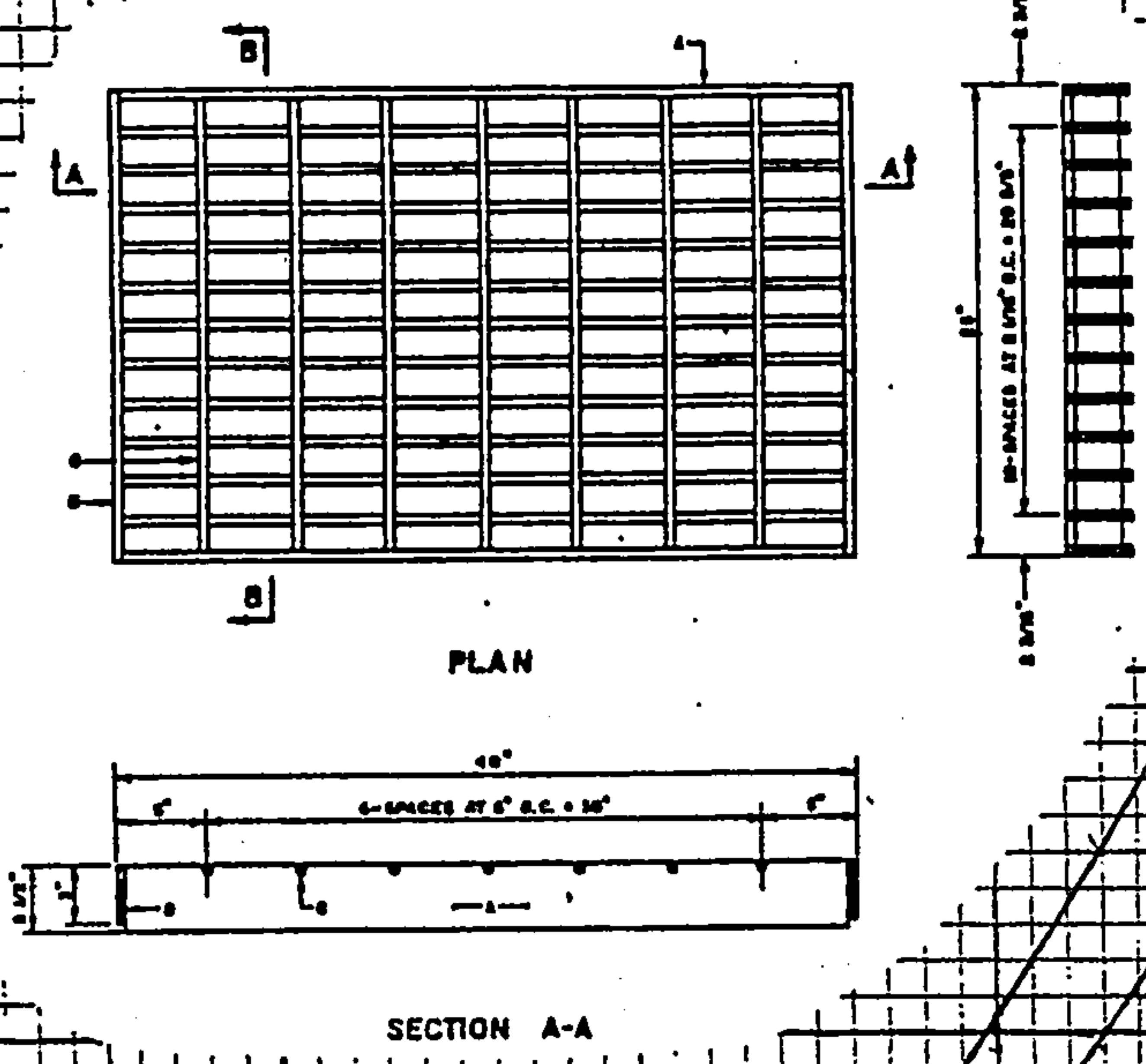
90



| EQUATION                              | SGL A                            | DBL A                            | TRPL A                           | QDPL A                           |
|---------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 1) ORIFICE                            | $22.0 h^{0.5} + 16.5 h^{1.5}$    | $43.9 h^{0.5} + 16.5 h^{1.5}$    | $65.9 h^{0.5} + 16.5 h^{1.5}$    | $87.8 h^{0.5} + 16.5 h^{1.5}$    |
| 2) 3-SIDED WEIR<br>( $h \leq 0.83'$ ) | $36.4 h^{1.5}$                   | $46.2 h^{1.5}$                   | $56.0 h^{1.5}$                   | $65.7 h^{1.5}$                   |
| 3) 4-SIDED WEIR<br>( $h > 0.83'$ )    | ADD TO 2):<br>$11(h-0.83)^{1.5}$ | ADD TO 2):<br>$22(h-0.83)^{1.5}$ | ADD TO 2):<br>$33(h-0.83)^{1.5}$ | ADD TO 2):<br>$44(h-0.83)^{1.5}$ |

1)  $Q = 0.6 A \sqrt{2gh} + 3.3(5') h^{1.5}$   
2) & 3)  $Q = 3.3 P h^{1.5}$

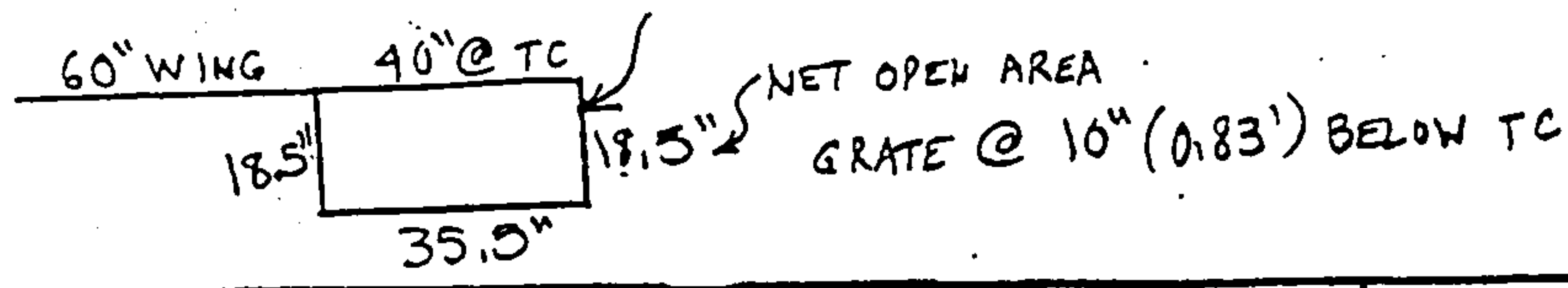
GRATE CAPACITY (Q) IN CFS



TC 0.83'  
HEAD (h) IN FEET

BOHANNAN-HUSTON INC.

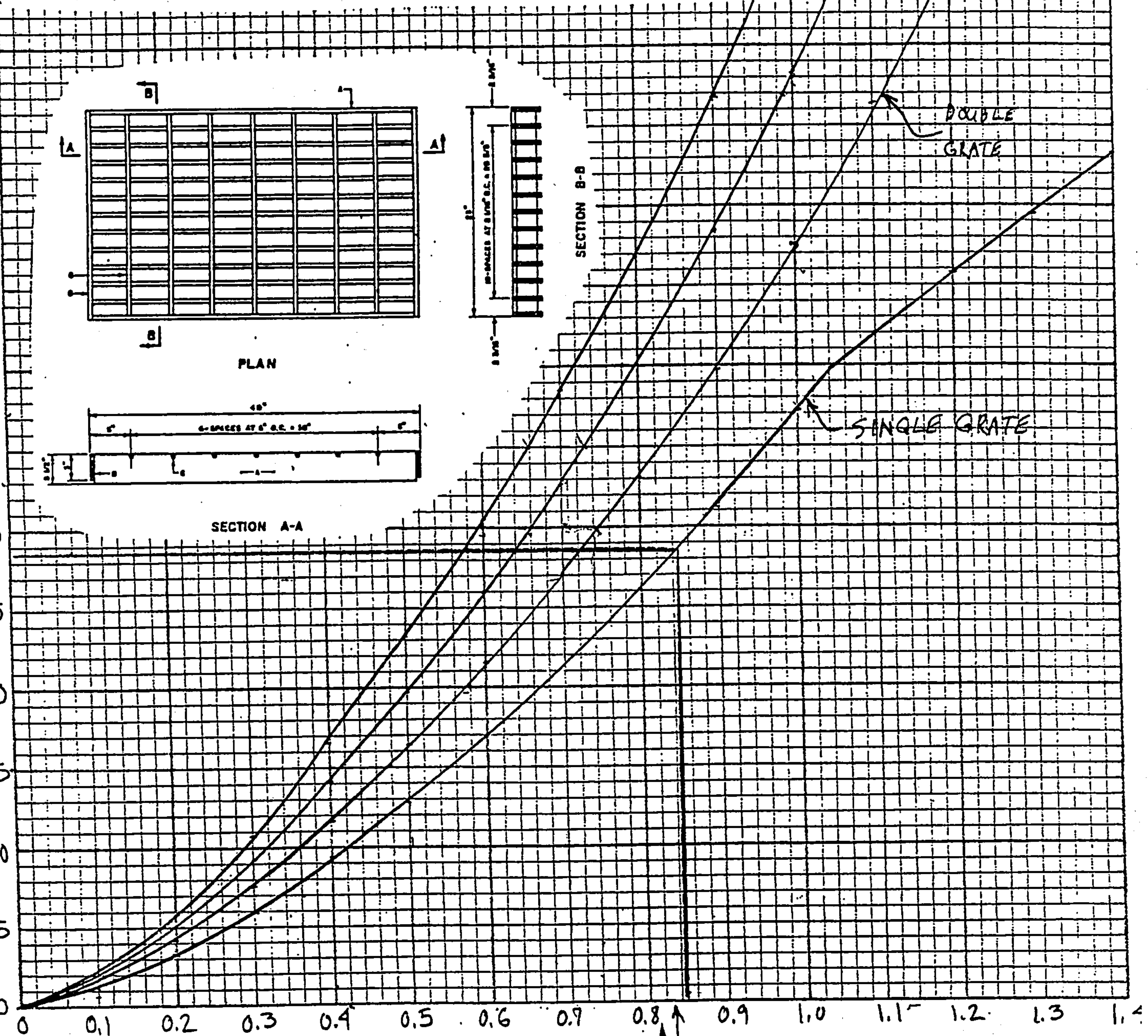
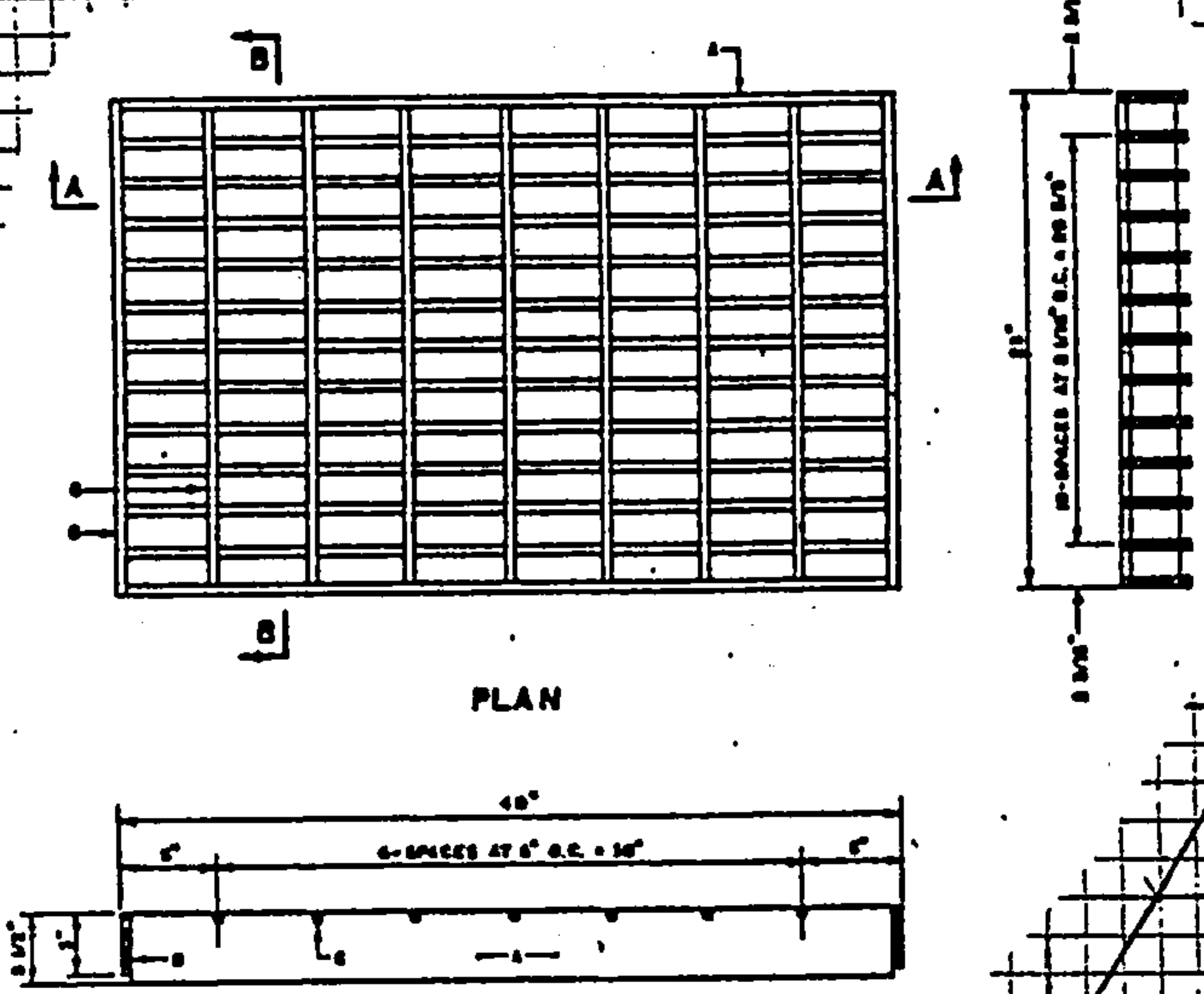
PROJECT NAME STREET H Sump SHEET        OF         
PROJECT NO.        BY JPK DATE 4/9/92  
SURJECT RATING CURVE FOR TYPE A INLETS CH'D        DATE



| EQUATION                              | SGL A                             | DBL A                             | TRPL A                            | QDPL A                            |
|---------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1) ORIFICE                            | $22.0 h^{0.5}$<br>$+16.5 h^{1.5}$ | $43.9 h^{0.5}$<br>$+16.5 h^{1.5}$ | $65.9 h^{0.5}$<br>$+16.5 h^{1.5}$ | $87.8 h^{0.5}$<br>$+16.5 h^{1.5}$ |
| 2) 3-SIDED WEIR<br>( $h \leq 0.83'$ ) | $36.4 h^{1.5}$                    | $46.2 h^{1.5}$                    | $56.0 h^{1.5}$                    | $65.7 h^{1.5}$                    |
| 3) 4-SIDED WEIR<br>( $h > 0.83'$ )    | ADD TO 2):<br>$11(h-0.83)^{1.5}$  | ADD TO 2):<br>$22(h-0.83)^{1.5}$  | ADD TO 2):<br>$33(h-0.83)^{1.5}$  | ADD TO 2):<br>$44(h-0.83)^{1.5}$  |

1)  $Q = 0.6 A \sqrt{2gh} + 3.3(5') h^{1.5}$   
2) & 3)  $Q = 3.3 P h^{1.5}$

GRATE CAPACITY (Q) IN CFS



TC 0.83'  
HEAD (h) IN FEET

BOHANNAN-HUSTON INC.

PROJECT NAME Street H 2000 yr SHEET \_\_\_\_\_ OF \_\_\_\_\_  
PROJECT NO. \_\_\_\_\_ BY JPK DATE 4/9/92  
SUBJECT RATING CURVE FOR TYPE A INLETS CH'D \_\_\_\_\_ DATE \_\_\_\_\_

\*\*\*\*\*

PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

STREET I NORTH OF STREET H

MANNING'S N= .017 SLOPE= .0793

| POINT | DIST  | ELEV   | POINT | DIST   | ELEV  | POINT  | DIST  | ELEV   |
|-------|-------|--------|-------|--------|-------|--------|-------|--------|
| 1     | 0.00  | 0.83   | 5     | 11.00  | 0.13  | 9      | 37.17 | 0.67   |
| 2     | 8.38  | 0.67   | 6     | 23.00  | 0.41  | 10     | 37.63 | 0.67   |
| 3     | 8.83  | 0.67   | 7     | 35.00  | 0.13  | 11     | 46.00 | 0.83   |
| 4     | 9.00  | 0.00   | 8     | 37.00  | 0.00  | 12     | 0.00  | 0.00   |
| WSEL  | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL   | ENERGY |
| (FT)  | INC   | AREA   | RATE  | PER    | VEL   | (FT)   | HEAD  | HEAD   |
| (FT)  | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) | (FT)   | (FT)  | (FT)   |
| 0.01  | 0.01  | 0.00   | 0.0   | 0.33   | 0.70  | 0.31   | 0.01  | 0.02   |
| 0.02  | 0.02  | 0.01   | 0.0   | 0.66   | 1.10  | 0.63   | 0.02  | 0.04   |
| 0.03  | 0.03  | 0.01   | 0.0   | 0.99   | 1.45  | 0.94   | 0.03  | 0.06   |
| 0.04  | 0.04  | 0.03   | 0.0   | 1.32   | 1.75  | 1.25   | 0.05  | 0.09   |
| 0.05  | 0.05  | 0.04   | 0.1   | 1.64   | 2.03  | 1.56   | 0.06  | 0.11   |
| 0.06  | 0.06  | 0.06   | 0.1   | 1.97   | 2.30  | 1.88   | 0.08  | 0.14   |
| 0.07  | 0.07  | 0.08   | 0.2   | 2.30   | 2.55  | 2.19   | 0.10  | 0.17   |
| 0.08  | 0.08  | 0.10   | 0.3   | 2.63   | 2.78  | 2.50   | 0.12  | 0.20   |
| 0.09  | 0.09  | 0.13   | 0.4   | 2.96   | 3.01  | 2.81   | 0.14  | 0.23   |
| 0.10  | 0.10  | 0.16   | 0.5   | 3.29   | 3.23  | 3.13   | 0.16  | 0.26   |
| 0.11  | 0.11  | 0.19   | 0.7   | 3.62   | 3.44  | 3.44   | 0.18  | 0.29   |
| 0.12  | 0.12  | 0.23   | 0.8   | 3.95   | 3.65  | 3.75   | 0.21  | 0.33   |
| 0.13  | 0.13  | 0.26   | 1.0   | 4.28   | 3.85  | 4.07   | 0.23  | 0.36   |
| 0.14  | 0.14  | 0.31   | 1.2   | 5.15   | 3.77  | 4.93   | 0.22  | 0.36   |
| 0.15  | 0.15  | 0.36   | 1.4   | 6.03   | 3.78  | 5.79   | 0.22  | 0.37   |
| 0.16  | 0.16  | 0.43   | 1.6   | 6.91   | 3.84  | 6.65   | 0.23  | 0.39   |
| 0.17  | 0.17  | 0.50   | 1.9   | 7.79   | 3.92  | 7.51   | 0.24  | 0.41   |
| 0.18  | 0.18  | 0.58   | 2.3   | 8.67   | 4.04  | 8.38   | 0.25  | 0.43   |
| 0.19  | 0.19  | 0.66   | 2.8   | 9.54   | 4.16  | 9.24   | 0.27  | 0.46   |
| 0.20  | 0.20  | 0.76   | 3.3   | 10.42  | 4.30  | 10.10  | 0.29  | 0.49   |
| 0.21  | 0.21  | 0.87   | 3.8   | 11.30  | 4.44  | 10.96  | 0.31  | 0.52   |
| 0.22  | 0.22  | 0.98   | 4.5   | 12.18  | 4.59  | 11.83  | 0.33  | 0.55   |
| 0.23  | 0.23  | 1.10   | 5.2   | 13.06  | 4.74  | 12.69  | 0.35  | 0.58   |
| 0.24  | 0.24  | 1.23   | 6.0   | 13.93  | 4.89  | 13.55  | 0.37  | 0.61   |
| 0.25  | 0.25  | 1.37   | 6.9   | 14.81  | 5.04  | 14.41  | 0.39  | 0.64   |
| 0.26  | 0.26  | 1.52   | 7.9   | 15.69  | 5.20  | 15.27  | 0.42  | 0.68   |
| 0.27  | 0.27  | 1.68   | 9.0   | 16.57  | 5.35  | 16.14  | 0.44  | 0.71   |
| 0.28  | 0.28  | 1.84   | 10.1  | 17.45  | 5.50  | 17.00  | 0.47  | 0.75   |
| 0.29  | 0.29  | 2.02   | 11.4  | 18.32  | 5.66  | 17.86  | 0.50  | 0.79   |
| 0.30  | 0.30  | 2.20   | 12.8  | 19.20  | 5.81  | 18.72  | 0.52  | 0.82   |
| 0.31  | 0.31  | 2.39   | 14.3  | 20.08  | 5.96  | 19.59  | 0.55  | 0.86   |
| 0.32  | 0.32  | 2.59   | 15.8  | 20.96  | 6.11  | 20.45  | 0.58  | 0.90   |
| 0.33  | 0.33  | 2.80   | 17.5  | 21.84  | 6.26  | 21.31  | 0.61  | 0.94   |
| 0.34  | 0.34  | 3.02   | 19.4  | 22.71  | 6.41  | 22.17  | 0.64  | 0.98   |
| 0.35  | 0.35  | 3.25   | 21.3  | 23.59  | 6.56  | 23.03  | 0.67  | 1.02   |
| 0.36  | 0.36  | 3.48   | 23.3  | 24.47  | 6.71  | 23.90  | 0.70  | 1.06   |
| 0.37  | 0.37  | 3.72   | 25.5  | 25.35  | 6.85  | 24.76  | 0.73  | 1.10   |
| 0.38  | 0.38  | 3.98   | 27.8  | 26.23  | 7.00  | 25.62  | 0.76  | 1.14   |
| 0.39  | 0.39  | 4.24   | 30.2  | 27.10  | 7.14  | 26.48  | 0.79  | 1.18   |
| 0.40  | 0.40  | 4.50   | 32.8  | 27.98  | 7.28  | 27.35  | 0.82  | 1.22   |
| 0.41  | 0.41  | 4.78   | 35.5  | 28.86  | 7.43  | 28.21  | 0.86  | 1.27   |
| 0.42  | 0.42  | 5.06   | 39.1  | 28.88  | 7.71  | 28.21  | 0.92  | 1.34   |
| 0.43  | 0.43  | 5.35   | 42.7  | 28.90  | 7.99  | 28.22  | 0.99  | 1.42   |

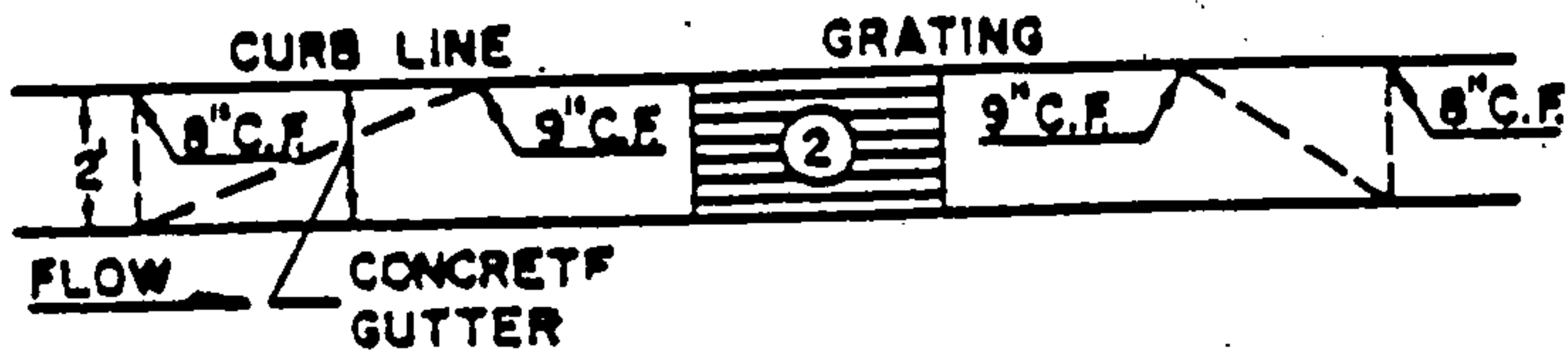
Q100

STD CURB  
LIMIT

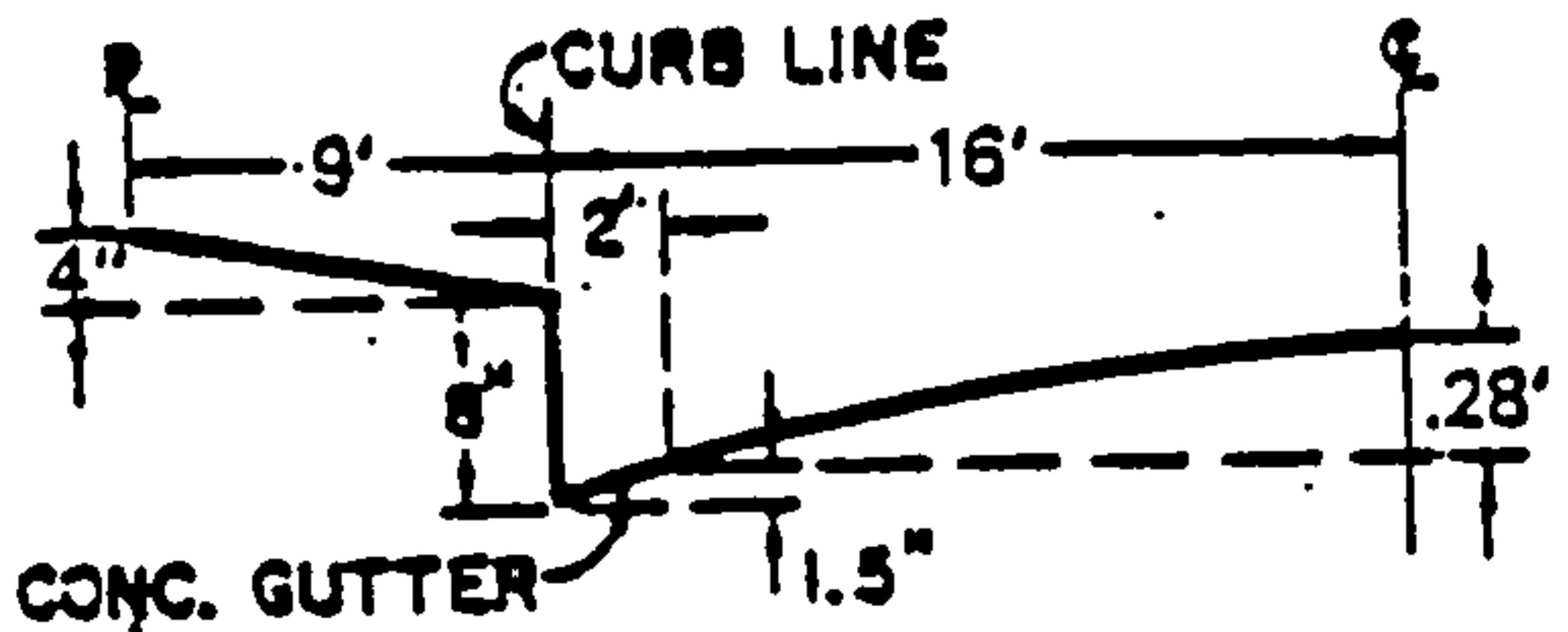
□

| WSEL | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL  | ENERGY |
|------|-------|--------|-------|--------|-------|--------|------|--------|
| (FT) | INC   | AREA   | RATE  | PER    | VEL   | (FT)   | HEAD | HEAD   |
|      | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) |        | (FT) | (FT)   |
| 0.45 | 0.45  | 5.91   | 50.5  | 28.94  | 8.54  | 28.23  | 1.13 | 1.58   |
| 0.46 | 0.46  | 6.19   | 54.5  | 28.96  | 8.80  | 28.23  | 1.20 | 1.66   |
| 0.47 | 0.47  | 6.48   | 58.7  | 28.98  | 9.06  | 28.24  | 1.28 | 1.75   |
| 0.48 | 0.48  | 6.76   | 63.0  | 29.01  | 9.32  | 28.24  | 1.35 | 1.83   |
| 0.49 | 0.49  | 7.04   | 67.4  | 29.03  | 9.57  | 28.25  | 1.42 | 1.91   |
| 0.50 | 0.50  | 7.32   | 71.9  | 29.05  | 9.82  | 28.25  | 1.50 | 2.00   |
| 0.51 | 0.51  | 7.61   | 76.6  | 29.07  | 10.07 | 28.26  | 1.57 | 2.08   |
| 0.52 | 0.52  | 7.89   | 81.4  | 29.09  | 10.31 | 28.26  | 1.65 | 2.17   |
| 0.53 | 0.53  | 8.17   | 86.2  | 29.11  | 10.55 | 28.27  | 1.73 | 2.26   |
| 0.54 | 0.54  | 8.45   | 91.2  | 29.13  | 10.79 | 28.27  | 1.81 | 2.35   |
| 0.55 | 0.55  | 8.74   | 96.3  | 29.15  | 11.02 | 28.28  | 1.89 | 2.44   |
| 0.56 | 0.56  | 9.02   | 101.5 | 29.17  | 11.26 | 28.28  | 1.97 | 2.53   |
| 0.57 | 0.57  | 9.30   | 106.8 | 29.19  | 11.48 | 28.29  | 2.05 | 2.62   |
| 0.58 | 0.58  | 9.59   | 112.2 | 29.21  | 11.71 | 28.29  | 2.13 | 2.71   |
| 0.59 | 0.59  | 9.87   | 117.8 | 29.23  | 11.93 | 28.30  | 2.21 | 2.80   |
| 0.60 | 0.60  | 10.15  | 123.4 | 29.25  | 12.16 | 28.30  | 2.29 | 2.89   |
| 0.61 | 0.61  | 10.43  | 129.1 | 29.27  | 12.37 | 28.31  | 2.38 | 2.99   |
| 0.62 | 0.62  | 10.72  | 135.0 | 29.29  | 12.59 | 28.31  | 2.46 | 3.08   |
| 0.63 | 0.63  | 11.00  | 140.9 | 29.31  | 12.81 | 28.32  | 2.55 | 3.18   |
| 0.64 | 0.64  | 11.28  | 146.9 | 29.34  | 13.02 | 28.32  | 2.63 | 3.27   |
| 0.65 | 0.65  | 11.57  | 153.0 | 29.36  | 13.23 | 28.33  | 2.72 | 3.37   |
| 0.66 | 0.66  | 11.85  | 159.3 | 29.38  | 13.44 | 28.33  | 2.80 | 3.46   |
| 0.67 | 0.67  | 12.13  | 165.6 | 29.40  | 13.65 | 28.34  | 2.89 | 3.56   |
| 0.68 | 0.68  | 12.42  | 168.2 | 30.44  | 13.54 | 30.30  | 2.85 | 3.53   |
| 0.69 | 0.69  | 12.72  | 171.1 | 31.49  | 13.45 | 31.34  | 2.81 | 3.50   |
| 0.70 | 0.70  | 13.06  | 171.7 | 33.45  | 13.15 | 32.39  | 2.68 | 3.38   |
| 0.71 | 0.71  | 13.39  | 175.3 | 34.50  | 13.10 | 33.44  | 2.66 | 3.37   |
| 0.72 | 0.72  | 13.73  | 179.2 | 35.54  | 13.05 | 34.48  | 2.65 | 3.37   |
| 0.73 | 0.73  | 14.08  | 183.3 | 36.59  | 13.02 | 35.53  | 2.63 | 3.36   |
| 0.74 | 0.74  | 14.44  | 187.6 | 37.64  | 13.00 | 36.58  | 2.62 | 3.36   |
| 0.75 | 0.75  | 14.81  | 192.2 | 38.68  | 12.98 | 37.62  | 2.62 | 3.37   |
| 0.76 | 0.76  | 15.19  | 197.0 | 39.73  | 12.97 | 38.67  | 2.61 | 3.37   |
| 0.77 | 0.77  | 15.58  | 202.0 | 40.78  | 12.96 | 39.72  | 2.61 | 3.38   |
| 0.78 | 0.78  | 15.98  | 207.2 | 41.83  | 12.96 | 40.77  | 2.61 | 3.39   |
| 0.79 | 0.79  | 16.40  | 212.7 | 42.87  | 12.97 | 41.81  | 2.61 | 3.40   |
| 0.80 | 0.80  | 16.82  | 218.4 | 43.92  | 12.98 | 42.86  | 2.62 | 3.42   |
| 0.81 | 0.81  | 17.25  | 224.3 | 44.97  | 13.00 | 43.91  | 2.62 | 3.43   |
| 0.82 | 0.82  | 17.70  | 230.4 | 46.01  | 13.02 | 44.95  | 2.63 | 3.45   |
| 0.83 | 0.83  | 18.15  | 236.8 | 47.06  | 13.04 | 46.00  | 2.64 | 3.47   |

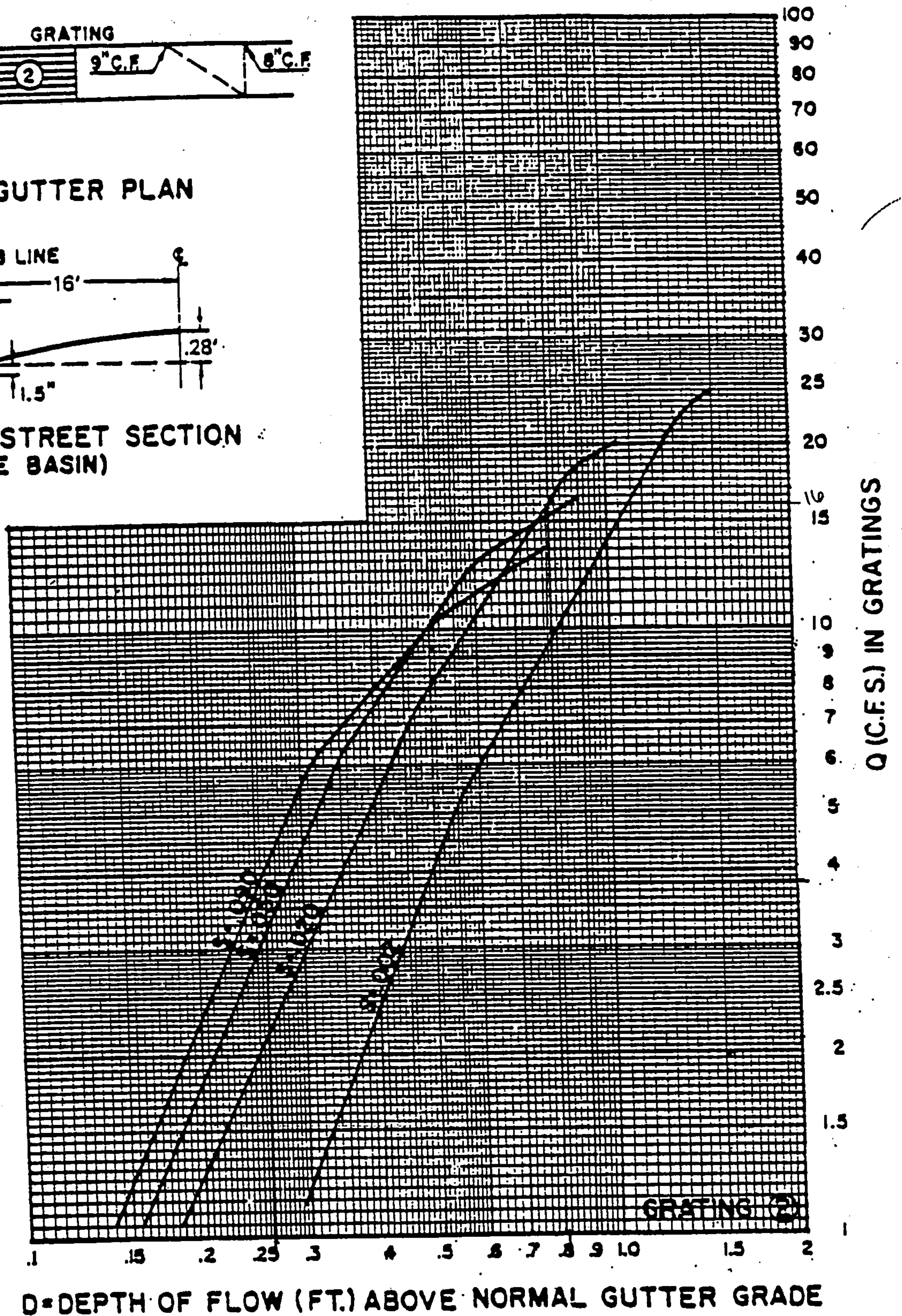
# GRATING CAPACITIES FOR TYPE 'A' , 'C' and 'D'



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION (ABOVE BASIN)



\*\*\*\*\*

PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

STREET H, EAST OF STREET I

MANNING'S N= .017 SLOPE= .095

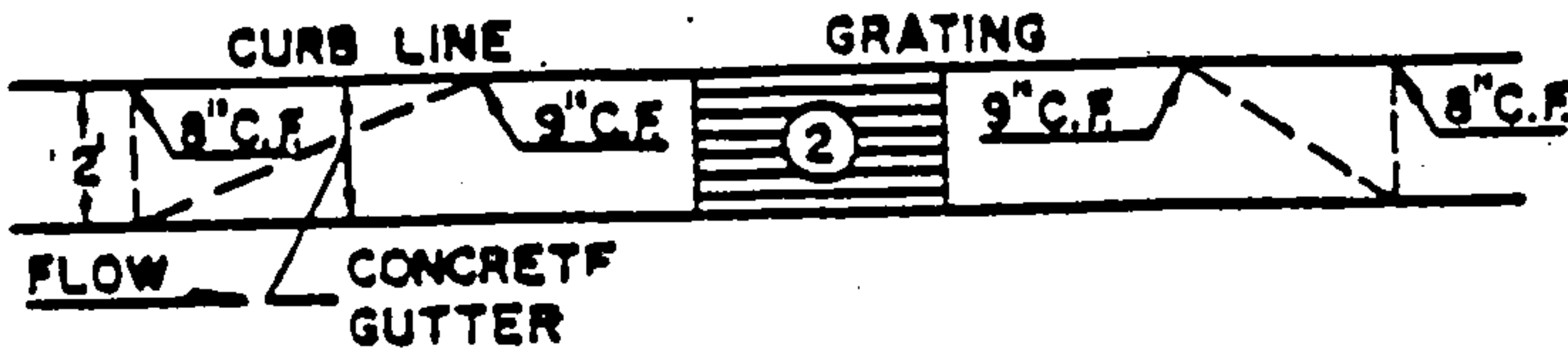
| POINT | DIST  | ELEV   | POINT | DIST   | ELEV  | POINT  | DIST  | ELEV   |
|-------|-------|--------|-------|--------|-------|--------|-------|--------|
| 1     | 0.00  | 0.83   | 5     | 9.00   | 0.13  | 9      | 31.17 | 0.67   |
| 2     | 6.37  | 0.67   | 6     | 19.00  | 0.33  | 10     | 31.63 | 0.67   |
| 3     | 6.83  | 0.67   | 7     | 29.00  | 0.13  | 11     | 38.00 | 0.83   |
| 4     | 7.00  | 0.00   | 8     | 31.00  | 0.00  | 12     | 0.00  | 0.00   |
| WSEL  | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL   | ENERGY |
| (FT)  | INC   | AREA   | RATE  | PER    | VEL   | (FT)   | HEAD  | HEAD   |
| (FT)  | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) | (FT)   | (FT)  | (FT)   |
| 0.01  | 0.01  | 0.00   | 0.0   | 0.33   | 0.76  | 0.31   | 0.01  | 0.02   |
| 0.02  | 0.02  | 0.01   | 0.0   | 0.66   | 1.21  | 0.63   | 0.02  | 0.04   |
| 0.03  | 0.03  | 0.01   | 0.0   | 0.99   | 1.58  | 0.94   | 0.04  | 0.07   |
| 0.04  | 0.04  | 0.03   | 0.0   | 1.32   | 1.92  | 1.25   | 0.06  | 0.10   |
| 0.05  | 0.05  | 0.04   | 0.1   | 1.64   | 2.23  | 1.56   | 0.08  | 0.13   |
| 0.06  | 0.06  | 0.06   | 0.1   | 1.97   | 2.52  | 1.88   | 0.10  | 0.16   |
| 0.07  | 0.07  | 0.08   | 0.2   | 2.30   | 2.79  | 2.19   | 0.12  | 0.19   |
| 0.08  | 0.08  | 0.10   | 0.3   | 2.63   | 3.05  | 2.50   | 0.14  | 0.22   |
| 0.09  | 0.09  | 0.13   | 0.4   | 2.96   | 3.30  | 2.81   | 0.17  | 0.26   |
| 0.10  | 0.10  | 0.16   | 0.6   | 3.29   | 3.54  | 3.13   | 0.19  | 0.29   |
| 0.11  | 0.11  | 0.19   | 0.7   | 3.62   | 3.77  | 3.44   | 0.22  | 0.33   |
| 0.12  | 0.12  | 0.23   | 0.9   | 3.95   | 3.99  | 3.75   | 0.25  | 0.37   |
| 0.13  | 0.13  | 0.26   | 1.1   | 4.28   | 4.21  | 4.07   | 0.28  | 0.41   |
| 0.14  | 0.14  | 0.31   | 1.3   | 5.30   | 4.06  | 5.07   | 0.26  | 0.40   |
| 0.15  | 0.15  | 0.37   | 1.5   | 6.32   | 4.03  | 6.08   | 0.25  | 0.40   |
| 0.16  | 0.16  | 0.43   | 1.8   | 7.34   | 4.07  | 7.08   | 0.26  | 0.42   |
| 0.17  | 0.17  | 0.51   | 2.1   | 8.36   | 4.16  | 8.09   | 0.27  | 0.44   |
| 0.18  | 0.18  | 0.59   | 2.5   | 9.38   | 4.28  | 9.09   | 0.28  | 0.46   |
| 0.19  | 0.19  | 0.69   | 3.0   | 10.40  | 4.41  | 10.10  | 0.30  | 0.49   |
| 0.20  | 0.20  | 0.80   | 3.6   | 11.42  | 4.56  | 11.10  | 0.32  | 0.52   |
| 0.21  | 0.21  | 0.91   | 4.3   | 12.44  | 4.72  | 12.11  | 0.35  | 0.56   |
| 0.22  | 0.22  | 1.04   | 5.1   | 13.46  | 4.88  | 13.11  | 0.37  | 0.59   |
| 0.23  | 0.23  | 1.17   | 5.9   | 14.49  | 5.04  | 14.12  | 0.40  | 0.63   |
| 0.24  | 0.24  | 1.32   | 6.9   | 15.51  | 5.21  | 15.12  | 0.42  | 0.66   |
| 0.25  | 0.25  | 1.48   | 7.9   | 16.53  | 5.38  | 16.13  | 0.45  | 0.70   |
| 0.26  | 0.26  | 1.64   | 9.1   | 17.55  | 5.55  | 17.13  | 0.48  | 0.74   |
| 0.27  | 0.27  | 1.82   | 10.4  | 18.57  | 5.72  | 18.14  | 0.51  | 0.78   |
| 0.28  | 0.28  | 2.00   | 11.8  | 19.59  | 5.89  | 19.14  | 0.54  | 0.82   |
| 0.29  | 0.29  | 2.20   | 13.4  | 20.61  | 6.07  | 20.15  | 0.57  | 0.86   |
| 0.30  | 0.30  | 2.41   | 15.0  | 21.63  | 6.23  | 21.15  | 0.60  | 0.90   |
| 0.31  | 0.31  | 2.62   | 16.8  | 22.65  | 6.40  | 22.16  | 0.64  | 0.95   |
| 0.32  | 0.32  | 2.85   | 18.7  | 23.67  | 6.57  | 23.16  | 0.67  | 0.99   |
| 0.33  | 0.33  | 3.09   | 20.8  | 24.69  | 6.74  | 24.17  | 0.70  | 1.03   |
| 0.34  | 0.34  | 3.33   | 23.6  | 24.71  | 7.08  | 24.17  | 0.78  | 1.12   |
| 0.35  | 0.35  | 3.57   | 26.5  | 24.73  | 7.41  | 24.18  | 0.85  | 1.20   |
| 0.36  | 0.36  | 3.81   | 29.5  | 24.76  | 7.74  | 24.18  | 0.93  | 1.29   |
| 0.37  | 0.37  | 4.05   | 32.7  | 24.78  | 8.06  | 24.19  | 1.01  | 1.38   |
| 0.38  | 0.38  | 4.30   | 36.0  | 24.80  | 8.37  | 24.19  | 1.09  | 1.47   |
| 0.39  | 0.39  | 4.54   | 39.4  | 24.82  | 8.68  | 24.20  | 1.17  | 1.56   |
| 0.40  | 0.40  | 4.78   | 42.9  | 24.84  | 8.98  | 24.20  | 1.25  | 1.65   |
| 0.41  | 0.41  | 5.02   | 46.6  | 24.86  | 9.28  | 24.21  | 1.34  | 1.75   |
| 0.42  | 0.42  | 5.26   | 50.4  | 24.88  | 9.57  | 24.21  | 1.42  | 1.84   |
| 0.43  | 0.43  | 5.51   | 54.3  | 24.90  | 9.85  | 24.22  | 1.51  | 1.94   |

Q<sub>100</sub>STD CURB  
LIMIT

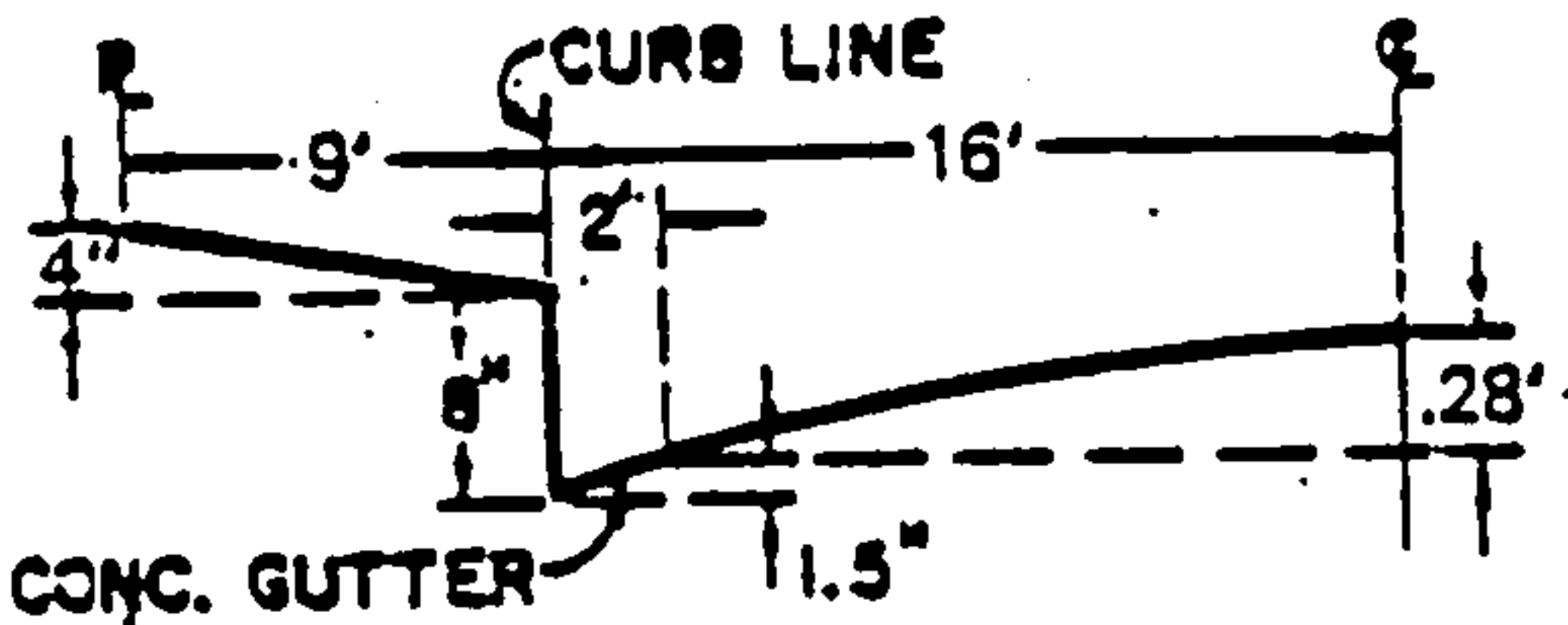
□

| WSEL | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL  | ENERGY |
|------|-------|--------|-------|--------|-------|--------|------|--------|
| (FT) | INC   | AREA   | RATE  | PER    | VEL   | (FT)   | HEAD | HEAD   |
|      | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) |        | (FT) | (FT)   |
| 0.45 | 0.45  | 5.99   | 62.4  | 24.94  | 10.41 | 24.23  | 1.68 | 2.13   |
| 0.46 | 0.46  | 6.23   | 66.6  | 24.96  | 10.68 | 24.23  | 1.77 | 2.23   |
| 0.47 | 0.47  | 6.48   | 70.9  | 24.98  | 10.95 | 24.24  | 1.86 | 2.33   |
| 0.48 | 0.48  | 6.72   | 75.4  | 25.00  | 11.22 | 24.24  | 1.95 | 2.43   |
| 0.49 | 0.49  | 6.96   | 79.9  | 25.02  | 11.48 | 24.25  | 2.05 | 2.54   |
| 0.50 | 0.50  | 7.20   | 84.6  | 25.04  | 11.74 | 24.25  | 2.14 | 2.64   |
| 0.51 | 0.51  | 7.45   | 89.3  | 25.06  | 12.00 | 24.26  | 2.23 | 2.74   |
| 0.52 | 0.52  | 7.69   | 94.2  | 25.09  | 12.25 | 24.26  | 2.33 | 2.85   |
| 0.53 | 0.53  | 7.93   | 99.1  | 25.11  | 12.50 | 24.27  | 2.43 | 2.96   |
| 0.54 | 0.54  | 8.17   | 104.2 | 25.13  | 12.74 | 24.27  | 2.52 | 3.06   |
| 0.55 | 0.55  | 8.42   | 109.3 | 25.15  | 12.99 | 24.28  | 2.62 | 3.17   |
| 0.56 | 0.56  | 8.66   | 114.6 | 25.17  | 13.23 | 24.28  | 2.72 | 3.28   |
| 0.57 | 0.57  | 8.90   | 119.9 | 25.19  | 13.47 | 24.29  | 2.82 | 3.39   |
| 0.58 | 0.58  | 9.15   | 125.3 | 25.21  | 13.70 | 24.29  | 2.92 | 3.50   |
| 0.59 | 0.59  | 9.39   | 130.9 | 25.23  | 13.94 | 24.30  | 3.02 | 3.61   |
| 0.60 | 0.60  | 9.63   | 136.5 | 25.25  | 14.17 | 24.30  | 3.12 | 3.72   |
| 0.61 | 0.61  | 9.87   | 142.2 | 25.27  | 14.40 | 24.31  | 3.22 | 3.83   |
| 0.62 | 0.62  | 10.12  | 148.0 | 25.29  | 14.63 | 24.31  | 3.32 | 3.94   |
| 0.63 | 0.63  | 10.36  | 153.9 | 25.31  | 14.85 | 24.32  | 3.43 | 4.06   |
| 0.64 | 0.64  | 10.60  | 159.9 | 25.33  | 15.08 | 24.32  | 3.53 | 4.17   |
| 0.65 | 0.65  | 10.85  | 165.9 | 25.35  | 15.30 | 24.33  | 3.63 | 4.28   |
| 0.66 | 0.66  | 11.09  | 172.1 | 25.37  | 15.52 | 24.33  | 3.74 | 4.40   |
| 0.67 | 0.67  | 11.33  | 178.3 | 25.39  | 15.73 | 24.34  | 3.84 | 4.51   |
| 0.68 | 0.68  | 11.58  | 181.1 | 26.19  | 15.64 | 26.06  | 3.80 | 4.48   |
| 0.69 | 0.69  | 11.84  | 184.1 | 26.99  | 15.55 | 26.85  | 3.76 | 4.45   |
| 0.70 | 0.70  | 12.13  | 184.0 | 28.70  | 15.17 | 27.65  | 3.57 | 4.27   |
| 0.71 | 0.71  | 12.41  | 187.7 | 29.50  | 15.12 | 28.44  | 3.55 | 4.26   |
| 0.72 | 0.72  | 12.70  | 191.6 | 30.30  | 15.09 | 29.24  | 3.53 | 4.25   |
| 0.73 | 0.73  | 12.99  | 195.7 | 31.09  | 15.06 | 30.04  | 3.52 | 4.25   |
| 0.74 | 0.74  | 13.30  | 200.0 | 31.89  | 15.04 | 30.83  | 3.51 | 4.25   |
| 0.75 | 0.75  | 13.61  | 204.4 | 32.69  | 15.02 | 31.63  | 3.50 | 4.25   |
| 0.76 | 0.76  | 13.93  | 209.1 | 33.48  | 15.01 | 32.43  | 3.50 | 4.26   |
| 0.77 | 0.77  | 14.26  | 214.0 | 34.28  | 15.01 | 33.22  | 3.50 | 4.27   |
| 0.78 | 0.78  | 14.59  | 219.1 | 35.08  | 15.02 | 34.02  | 3.50 | 4.28   |
| 0.79 | 0.79  | 14.94  | 224.4 | 35.87  | 15.02 | 34.81  | 3.51 | 4.30   |
| 0.80 | 0.80  | 15.29  | 229.9 | 36.67  | 15.04 | 35.61  | 3.51 | 4.31   |
| 0.81 | 0.81  | 15.65  | 235.6 | 37.47  | 15.06 | 36.41  | 3.52 | 4.33   |
| 0.82 | 0.82  | 16.02  | 241.5 | 38.26  | 15.08 | 37.20  | 3.53 | 4.35   |
| 0.83 | 0.83  | 16.39  | 247.6 | 39.06  | 15.10 | 38.00  | 3.54 | 4.37   |

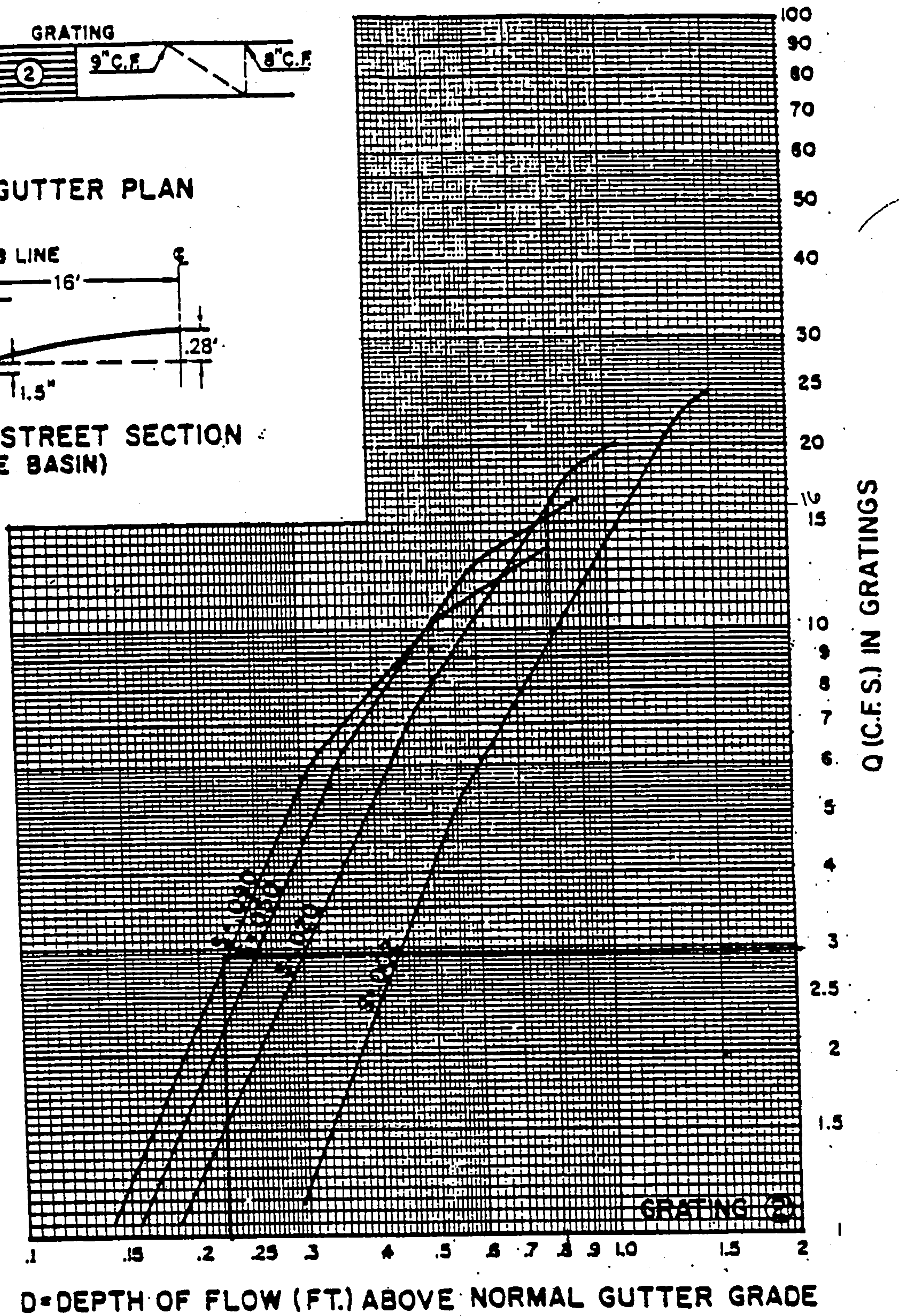
# GRATING CAPACITIES FOR TYPE 'A', 'C' and 'D'



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION  
(ABOVE BASIN)



$$d = 0.22 \text{ FT}$$

$$S = 9.5\%$$

$$Q = 2.9 \text{ } ^{74}\text{Cfs/GRATE}$$

\*\*\*\*\*

PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

STREET I SOUTH OF STREET H

MANNING'S N= .017 SLOPE= .0581

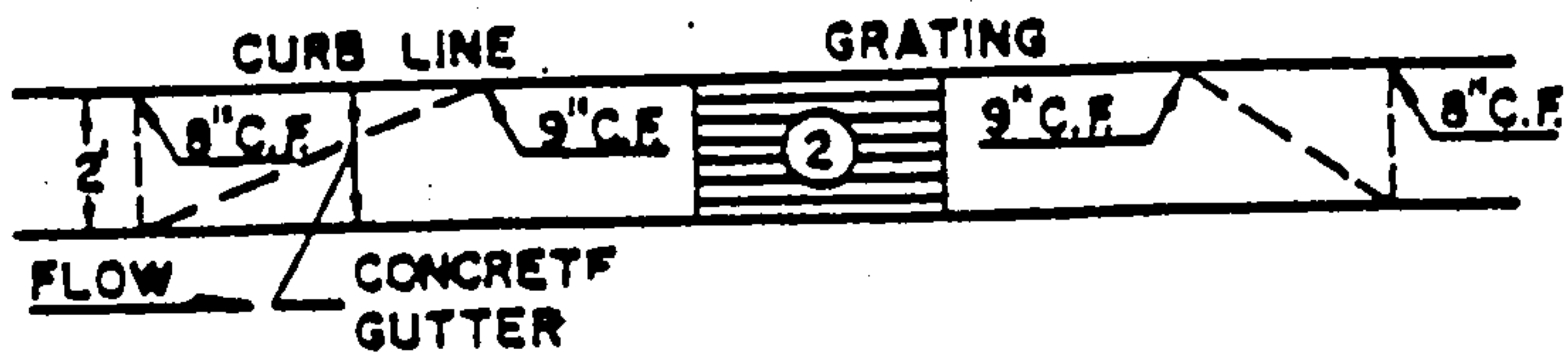
| POINT | DIST  | ELEV   | POINT | DIST   | ELEV  | POINT  | DIST  | ELEV   |
|-------|-------|--------|-------|--------|-------|--------|-------|--------|
| 1     | 0.00  | 0.83   | 5     | 11.00  | 0.13  | 9      | 37.17 | 0.67   |
| 2     | 8.38  | 0.67   | 6     | 23.00  | 0.41  | 10     | 37.63 | 0.67   |
| 3     | 8.83  | 0.67   | 7     | 35.00  | 0.13  | 11     | 46.00 | 0.83   |
| 4     | 9.00  | 0.00   | 8     | 37.00  | 0.00  | 12     | 0.00  | 0.00   |
| WSEL  | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL   | ENERGY |
| (FT)  | INC   | AREA   | RATE  | PER    | VEL   | (FT)   | HEAD  | HEAD   |
|       | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) |        | (FT)  | (FT)   |
| 0.01  | 0.01  | 0.00   | 0.0   | 0.33   | 0.60  | 0.31   | 0.01  | 0.02   |
| 0.02  | 0.02  | 0.01   | 0.0   | 0.66   | 0.95  | 0.63   | 0.01  | 0.03   |
| 0.03  | 0.03  | 0.01   | 0.0   | 0.99   | 1.24  | 0.94   | 0.02  | 0.05   |
| 0.04  | 0.04  | 0.03   | 0.0   | 1.32   | 1.50  | 1.25   | 0.03  | 0.07   |
| 0.05  | 0.05  | 0.04   | 0.1   | 1.64   | 1.74  | 1.56   | 0.05  | 0.10   |
| 0.06  | 0.06  | 0.06   | 0.1   | 1.97   | 1.97  | 1.88   | 0.06  | 0.12   |
| 0.07  | 0.07  | 0.08   | 0.2   | 2.30   | 2.18  | 2.19   | 0.07  | 0.14   |
| 0.08  | 0.08  | 0.10   | 0.2   | 2.63   | 2.38  | 2.50   | 0.09  | 0.17   |
| 0.09  | 0.09  | 0.13   | 0.3   | 2.96   | 2.58  | 2.81   | 0.10  | 0.19   |
| 0.10  | 0.10  | 0.16   | 0.4   | 3.29   | 2.76  | 3.13   | 0.12  | 0.22   |
| 0.11  | 0.11  | 0.19   | 0.6   | 3.62   | 2.95  | 3.44   | 0.13  | 0.24   |
| 0.12  | 0.12  | 0.23   | 0.7   | 3.95   | 3.12  | 3.75   | 0.15  | 0.27   |
| 0.13  | 0.13  | 0.26   | 0.9   | 4.28   | 3.29  | 4.07   | 0.17  | 0.30   |
| 0.14  | 0.14  | 0.31   | 1.0   | 5.15   | 3.23  | 4.93   | 0.16  | 0.30   |
| 0.15  | 0.15  | 0.36   | 1.2   | 6.03   | 3.23  | 5.79   | 0.16  | 0.31   |
| 0.16  | 0.16  | 0.43   | 1.4   | 6.91   | 3.28  | 6.65   | 0.17  | 0.33   |
| 0.17  | 0.17  | 0.50   | 1.7   | 7.79   | 3.36  | 7.51   | 0.18  | 0.35   |
| 0.18  | 0.18  | 0.58   | 2.0   | 8.67   | 3.45  | 8.38   | 0.19  | 0.37   |
| 0.19  | 0.19  | 0.66   | 2.4   | 9.54   | 3.56  | 9.24   | 0.20  | 0.39   |
| 0.20  | 0.20  | 0.76   | 2.8   | 10.42  | 3.68  | 10.10  | 0.21  | 0.41   |
| 0.21  | 0.21  | 0.87   | 3.3   | 11.30  | 3.80  | 10.96  | 0.22  | 0.43   |
| 0.22  | 0.22  | 0.98   | 3.8   | 12.18  | 3.93  | 11.83  | 0.24  | 0.46   |
| 0.23  | 0.23  | 1.10   | 4.5   | 13.06  | 4.05  | 12.69  | 0.26  | 0.49   |
| 0.24  | 0.24  | 1.23   | 5.2   | 13.93  | 4.18  | 13.55  | 0.27  | 0.51   |
| 0.25  | 0.25  | 1.37   | 5.9   | 14.81  | 4.32  | 14.41  | 0.29  | 0.54   |
| 0.26  | 0.26  | 1.52   | 6.8   | 15.69  | 4.45  | 15.27  | 0.31  | 0.57   |
| 0.27  | 0.27  | 1.68   | 7.7   | 16.57  | 4.58  | 16.14  | 0.33  | 0.60   |
| 0.28  | 0.28  | 1.84   | 8.7   | 17.45  | 4.71  | 17.00  | 0.34  | 0.62   |
| 0.29  | 0.29  | 2.02   | 9.8   | 18.32  | 4.84  | 17.86  | 0.36  | 0.65   |
| 0.30  | 0.30  | 2.20   | 10.9  | 19.20  | 4.97  | 18.72  | 0.38  | 0.68   |
| 0.31  | 0.31  | 2.39   | 12.2  | 20.08  | 5.10  | 19.59  | 0.40  | 0.71   |
| 0.32  | 0.32  | 2.59   | 13.6  | 20.96  | 5.23  | 20.45  | 0.42  | 0.74   |
| 0.33  | 0.33  | 2.80   | 15.0  | 21.84  | 5.36  | 21.31  | 0.45  | 0.78   |
| 0.34  | 0.34  | 3.02   | 16.6  | 22.71  | 5.49  | 22.17  | 0.47  | 0.81   |
| 0.35  | 0.35  | 3.25   | 18.2  | 23.59  | 5.61  | 23.03  | 0.49  | 0.84   |
| 0.36  | 0.36  | 3.48   | 20.0  | 24.47  | 5.74  | 23.90  | 0.51  | 0.87   |
| 0.37  | 0.37  | 3.72   | 21.8  | 25.35  | 5.87  | 24.76  | 0.53  | 0.90   |
| 0.38  | 0.38  | 3.98   | 23.8  | 26.23  | 5.99  | 25.62  | 0.56  | 0.94   |
| 0.39  | 0.39  | 4.24   | 25.9  | 27.10  | 6.11  | 26.48  | 0.58  | 0.97   |
| 0.40  | 0.40  | 4.50   | 28.1  | 27.98  | 6.24  | 27.35  | 0.60  | 1.00   |
| 0.41  | 0.41  | 4.78   | 30.4  | 28.86  | 6.36  | 28.21  | 0.63  | 1.04   |
| 0.42  | 0.42  | 5.06   | 33.4  | 28.88  | 6.60  | 28.21  | 0.68  | 1.10   |
| 0.43  | 0.43  | 5.35   | 36.6  | 28.90  | 6.84  | 28.22  | 0.73  | 1.16   |

Q<sub>100</sub>STD CURB  
LIMIT

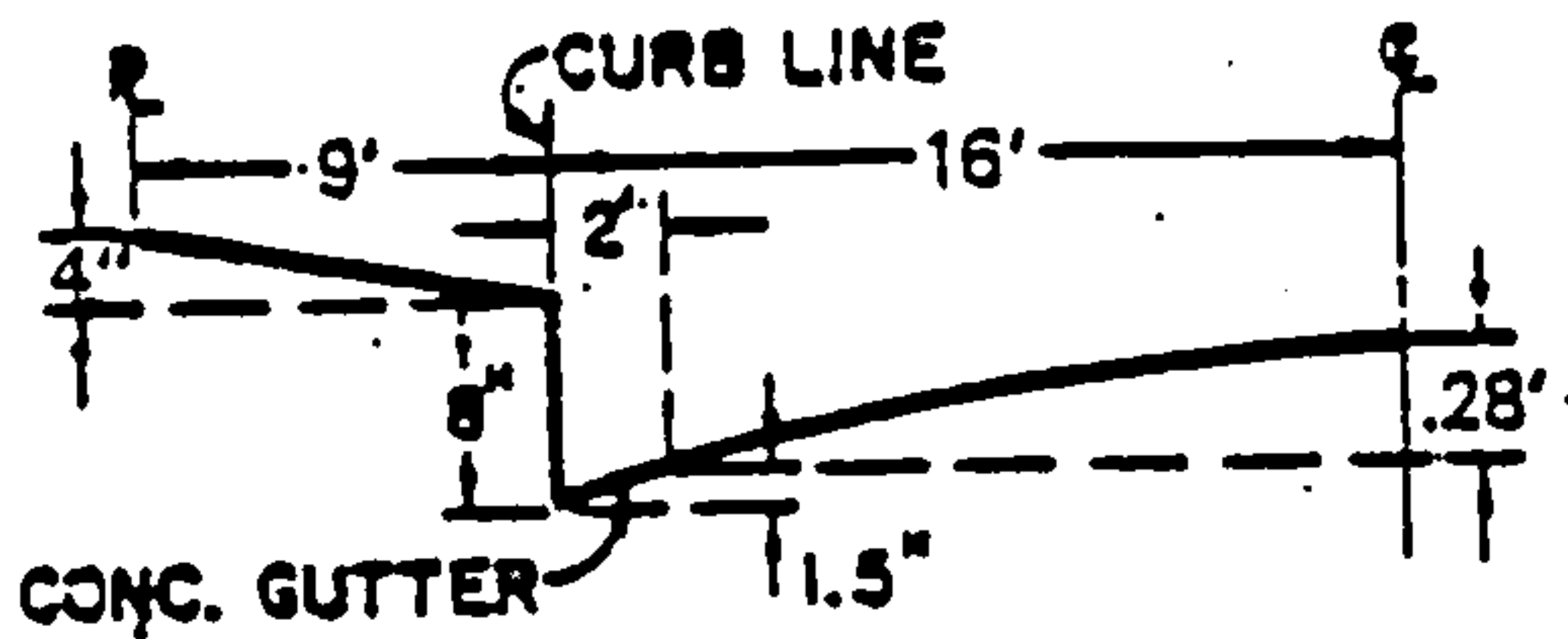
□

| WSEL | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL  | ENERGY |
|------|-------|--------|-------|--------|-------|--------|------|--------|
| (FT) | INC   | AREA   | RATE  | PER    | VEL   | (FT)   | HEAD | HEAD   |
|      | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) |        | (FT) | (FT)   |
| 0.45 | 0.45  | 5.91   | 43.2  | 28.94  | 7.31  | 28.23  | 0.83 | 1.28   |
| 0.46 | 0.46  | 6.19   | 46.7  | 28.96  | 7.53  | 28.23  | 0.88 | 1.34   |
| 0.47 | 0.47  | 6.48   | 50.2  | 28.98  | 7.76  | 28.24  | 0.93 | 1.40   |
| 0.48 | 0.48  | 6.76   | 53.9  | 29.01  | 7.98  | 28.24  | 0.99 | 1.47   |
| 0.49 | 0.49  | 7.04   | 57.7  | 29.03  | 8.20  | 28.25  | 1.04 | 1.53   |
| 0.50 | 0.50  | 7.32   | 61.6  | 29.05  | 8.41  | 28.25  | 1.10 | 1.60   |
| 0.51 | 0.51  | 7.61   | 65.6  | 29.07  | 8.62  | 28.26  | 1.15 | 1.66   |
| 0.52 | 0.52  | 7.89   | 69.6  | 29.09  | 8.83  | 28.26  | 1.21 | 1.73   |
| 0.53 | 0.53  | 8.17   | 73.8  | 29.11  | 9.03  | 28.27  | 1.27 | 1.80   |
| 0.54 | 0.54  | 8.45   | 78.1  | 29.13  | 9.24  | 28.27  | 1.32 | 1.86   |
| 0.55 | 0.55  | 8.74   | 82.4  | 29.15  | 9.44  | 28.28  | 1.38 | 1.93   |
| 0.56 | 0.56  | 9.02   | 86.9  | 29.17  | 9.63  | 28.28  | 1.44 | 2.00   |
| 0.57 | 0.57  | 9.30   | 91.4  | 29.19  | 9.83  | 28.29  | 1.50 | 2.07   |
| 0.58 | 0.58  | 9.59   | 96.1  | 29.21  | 10.02 | 28.29  | 1.56 | 2.14   |
| 0.59 | 0.59  | 9.87   | 100.8 | 29.23  | 10.22 | 28.30  | 1.62 | 2.21   |
| 0.60 | 0.60  | 10.15  | 105.6 | 29.25  | 10.40 | 28.30  | 1.68 | 2.28   |
| 0.61 | 0.61  | 10.43  | 110.5 | 29.27  | 10.59 | 28.31  | 1.74 | 2.35   |
| 0.62 | 0.62  | 10.72  | 115.5 | 29.29  | 10.78 | 28.31  | 1.80 | 2.42   |
| 0.63 | 0.63  | 11.00  | 120.6 | 29.31  | 10.96 | 28.32  | 1.87 | 2.50   |
| 0.64 | 0.64  | 11.28  | 125.7 | 29.34  | 11.14 | 28.32  | 1.93 | 2.57   |
| 0.65 | 0.65  | 11.57  | 131.0 | 29.36  | 11.32 | 28.33  | 1.99 | 2.64   |
| 0.66 | 0.66  | 11.85  | 136.3 | 29.38  | 11.50 | 28.33  | 2.05 | 2.71   |
| 0.67 | 0.67  | 12.13  | 141.7 | 29.40  | 11.68 | 28.34  | 2.12 | 2.79   |
| 0.68 | 0.68  | 12.42  | 144.0 | 30.44  | 11.59 | 30.30  | 2.09 | 2.77   |
| 0.69 | 0.69  | 12.72  | 146.5 | 31.49  | 11.51 | 31.34  | 2.06 | 2.75   |
| 0.70 | 0.70  | 13.06  | 147.0 | 33.45  | 11.25 | 32.39  | 1.97 | 2.67   |
| 0.71 | 0.71  | 13.39  | 150.1 | 34.50  | 11.21 | 33.44  | 1.95 | 2.66   |
| 0.72 | 0.72  | 13.73  | 153.4 | 35.54  | 11.17 | 34.48  | 1.94 | 2.66   |
| 0.73 | 0.73  | 14.08  | 156.9 | 36.59  | 11.15 | 35.53  | 1.93 | 2.66   |
| 0.74 | 0.74  | 14.44  | 160.6 | 37.64  | 11.12 | 36.58  | 1.92 | 2.66   |
| 0.75 | 0.75  | 14.81  | 164.5 | 38.68  | 11.11 | 37.62  | 1.92 | 2.67   |
| 0.76 | 0.76  | 15.19  | 168.6 | 39.73  | 11.10 | 38.67  | 1.91 | 2.67   |
| 0.77 | 0.77  | 15.58  | 172.9 | 40.78  | 11.10 | 39.72  | 1.91 | 2.68   |
| 0.78 | 0.78  | 15.98  | 177.4 | 41.83  | 11.10 | 40.77  | 1.91 | 2.69   |
| 0.79 | 0.79  | 16.40  | 182.0 | 42.87  | 11.10 | 41.81  | 1.91 | 2.70   |
| 0.80 | 0.80  | 16.82  | 186.9 | 43.92  | 11.11 | 42.86  | 1.92 | 2.72   |
| 0.81 | 0.81  | 17.25  | 192.0 | 44.97  | 11.13 | 43.91  | 1.92 | 2.73   |
| 0.82 | 0.82  | 17.70  | 197.2 | 46.01  | 11.14 | 44.95  | 1.93 | 2.75   |
| 0.83 | 0.83  | 18.15  | 202.7 | 47.06  | 11.17 | 46.00  | 1.94 | 2.77   |

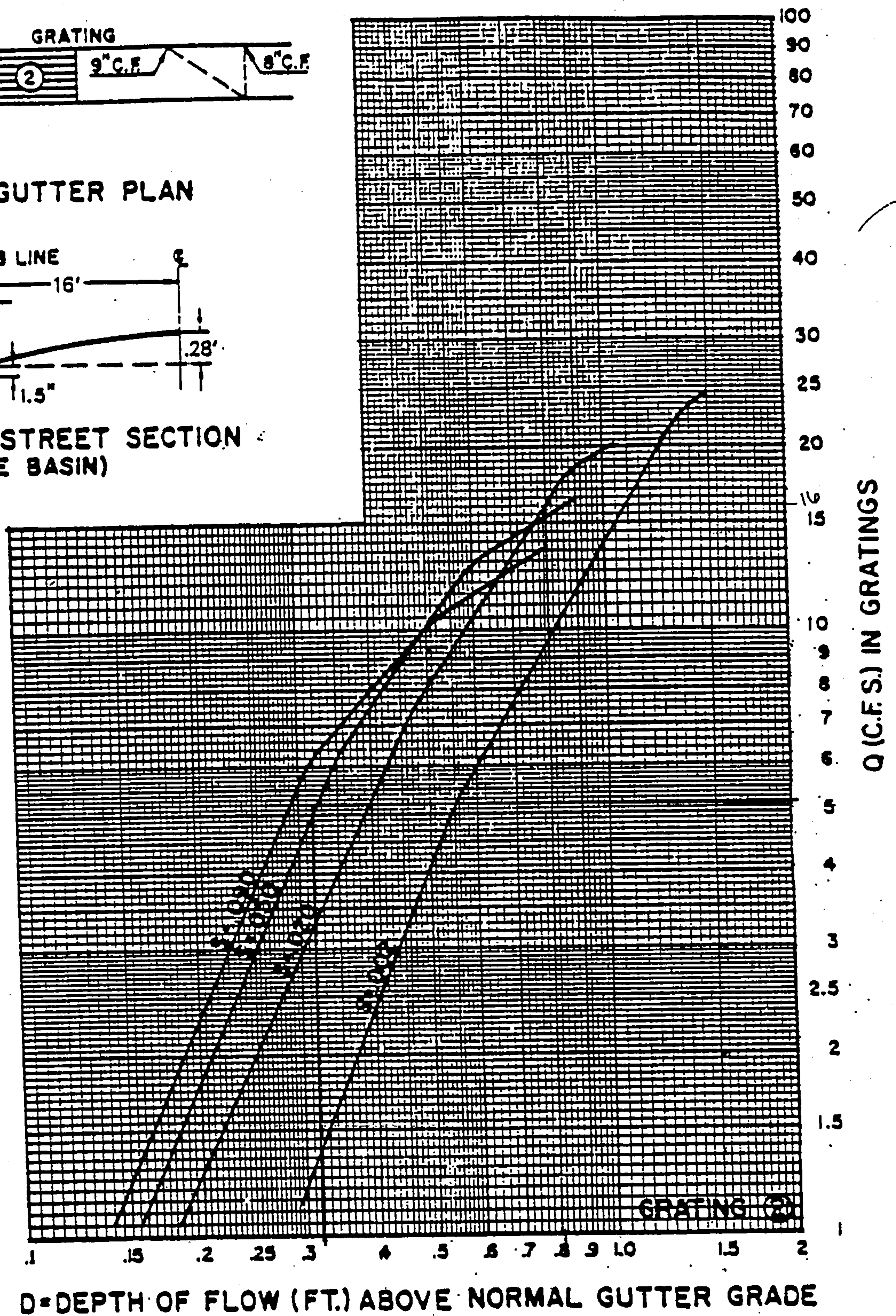
# GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION  
(ABOVE BASIN)



$$d = 0.32 \text{ FT}$$

$$S = 5.81\%$$

$$Q = 5.2 \text{ cfs / GRATE}$$

\*\*\*\*\*

PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

STREET H, BETWEEN HIGH DESERT STREET AND STREET I

MANNING'S N= .017 SLOPE= .0891

| POINT | DIST  | ELEV   | POINT | DIST   | ELEV  | POINT  | DIST  | ELEV   |
|-------|-------|--------|-------|--------|-------|--------|-------|--------|
| 1     | 0.00  | 0.83   | 5     | 11.00  | 0.13  | 9      | 37.17 | 0.67   |
| 2     | 8.38  | 0.67   | 6     | 23.00  | 0.41  | 10     | 37.63 | 0.67   |
| 3     | 8.83  | 0.67   | 7     | 35.00  | 0.13  | 11     | 46.00 | 0.83   |
| 4     | 9.00  | 0.00   | 8     | 37.00  | 0.00  | 12     | 0.00  | 0.00   |
| WSEL  | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL   | ENERGY |
| (FT)  | INC   | AREA   | RATE  | PER    | VEL   | (FT)   | HEAD  | HEAD   |
| (FT)  | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) | (FT)   | (FT)  | (FT)   |
| 0.01  | 0.01  | 0.00   | 0.0   | 0.33   | 0.74  | 0.31   | 0.01  | 0.02   |
| 0.02  | 0.02  | 0.01   | 0.0   | 0.66   | 1.17  | 0.63   | 0.02  | 0.04   |
| 0.03  | 0.03  | 0.01   | 0.0   | 0.99   | 1.53  | 0.94   | 0.04  | 0.07   |
| 0.04  | 0.04  | 0.03   | 0.0   | 1.32   | 1.86  | 1.25   | 0.05  | 0.09   |
| 0.05  | 0.05  | 0.04   | 0.1   | 1.64   | 2.16  | 1.56   | 0.07  | 0.12   |
| 0.06  | 0.06  | 0.06   | 0.1   | 1.97   | 2.44  | 1.88   | 0.09  | 0.15   |
| 0.07  | 0.07  | 0.08   | 0.2   | 2.30   | 2.70  | 2.19   | 0.11  | 0.18   |
| 0.08  | 0.08  | 0.10   | 0.3   | 2.63   | 2.95  | 2.50   | 0.14  | 0.22   |
| 0.09  | 0.09  | 0.13   | 0.4   | 2.96   | 3.19  | 2.81   | 0.16  | 0.25   |
| 0.10  | 0.10  | 0.16   | 0.5   | 3.29   | 3.42  | 3.13   | 0.18  | 0.28   |
| 0.11  | 0.11  | 0.19   | 0.7   | 3.62   | 3.65  | 3.44   | 0.21  | 0.32   |
| 0.12  | 0.12  | 0.23   | 0.9   | 3.95   | 3.87  | 3.75   | 0.23  | 0.35   |
| 0.13  | 0.13  | 0.26   | 1.1   | 4.28   | 4.08  | 4.07   | 0.26  | 0.39   |
| 0.14  | 0.14  | 0.31   | 1.2   | 5.15   | 4.00  | 4.93   | 0.25  | 0.39   |
| 0.15  | 0.15  | 0.36   | 1.5   | 6.03   | 4.01  | 5.79   | 0.25  | 0.40   |
| 0.16  | 0.16  | 0.43   | 1.7   | 6.91   | 4.07  | 6.65   | 0.26  | 0.42   |
| 0.17  | 0.17  | 0.50   | 2.1   | 7.79   | 4.16  | 7.51   | 0.27  | 0.44   |
| 0.18  | 0.18  | 0.58   | 2.5   | 8.67   | 4.28  | 8.38   | 0.28  | 0.46   |
| 0.19  | 0.19  | 0.66   | 2.9   | 9.54   | 4.41  | 9.24   | 0.30  | 0.49   |
| 0.20  | 0.20  | 0.76   | 3.5   | 10.42  | 4.55  | 10.10  | 0.32  | 0.52   |
| 0.21  | 0.21  | 0.87   | 4.1   | 11.30  | 4.71  | 10.96  | 0.34  | 0.55   |
| 0.22  | 0.22  | 0.98   | 4.8   | 12.18  | 4.86  | 11.83  | 0.37  | 0.59   |
| 0.23  | 0.23  | 1.10   | 5.5   | 13.06  | 5.02  | 12.69  | 0.39  | 0.62   |
| 0.24  | 0.24  | 1.23   | 6.4   | 13.93  | 5.18  | 13.55  | 0.42  | 0.66   |
| 0.25  | 0.25  | 1.37   | 7.3   | 14.81  | 5.34  | 14.41  | 0.44  | 0.69   |
| 0.26  | 0.26  | 1.52   | 8.4   | 15.69  | 5.51  | 15.27  | 0.47  | 0.73   |
| 0.27  | 0.27  | 1.68   | 9.5   | 16.57  | 5.67  | 16.14  | 0.50  | 0.77   |
| 0.28  | 0.28  | 1.84   | 10.8  | 17.45  | 5.83  | 17.00  | 0.53  | 0.81   |
| 0.29  | 0.29  | 2.02   | 12.1  | 18.32  | 6.00  | 17.86  | 0.56  | 0.85   |
| 0.30  | 0.30  | 2.20   | 13.6  | 19.20  | 6.16  | 18.72  | 0.59  | 0.89   |
| 0.31  | 0.31  | 2.39   | 15.1  | 20.08  | 6.32  | 19.59  | 0.62  | 0.93   |
| 0.32  | 0.32  | 2.59   | 16.8  | 20.96  | 6.48  | 20.45  | 0.65  | 0.97   |
| 0.33  | 0.33  | 2.80   | 18.6  | 21.84  | 6.64  | 21.31  | 0.68  | 1.01   |
| 0.34  | 0.34  | 3.02   | 20.5  | 22.71  | 6.80  | 22.17  | 0.72  | 1.06   |
| 0.35  | 0.35  | 3.25   | 22.6  | 23.59  | 6.95  | 23.03  | 0.75  | 1.10   |
| 0.36  | 0.36  | 3.48   | 24.7  | 24.47  | 7.11  | 23.90  | 0.78  | 1.14   |
| 0.37  | 0.37  | 3.72   | 27.0  | 25.35  | 7.26  | 24.76  | 0.82  | 1.19   |
| 0.38  | 0.38  | 3.98   | 29.5  | 26.23  | 7.42  | 25.62  | 0.85  | 1.23   |
| 0.39  | 0.39  | 4.24   | 32.1  | 27.10  | 7.57  | 26.48  | 0.89  | 1.28   |
| 0.40  | 0.40  | 4.50   | 34.8  | 27.98  | 7.72  | 27.35  | 0.93  | 1.33   |
| 0.41  | 0.41  | 4.78   | 37.6  | 28.86  | 7.87  | 28.21  | 0.96  | 1.37   |
| 0.42  | 0.42  | 5.06   | 41.4  | 28.88  | 8.17  | 28.21  | 1.04  | 1.46   |
| 0.43  | 0.43  | 5.35   | 45.3  | 28.90  | 8.47  | 28.22  | 1.11  | 1.54   |

Q<sub>100</sub>STD CURB  
LIMIT

| WSEL | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL  | ENERGY |
|------|-------|--------|-------|--------|-------|--------|------|--------|
| (FT) | INC   | AREA   | RATE  | PER    | VEL   | (FT)   | HEAD | HEAD   |
|      | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) |        | (FT) | (FT)   |
| 0.45 | 0.45  | 5.91   | 53.5  | 28.94  | 9.05  | 28.23  | 1.27 | 1.72   |
| 0.46 | 0.46  | 6.19   | 57.8  | 28.96  | 9.33  | 28.23  | 1.35 | 1.81   |
| 0.47 | 0.47  | 6.48   | 62.2  | 28.98  | 9.61  | 28.24  | 1.43 | 1.90   |
| 0.48 | 0.48  | 6.76   | 66.8  | 29.01  | 9.88  | 28.24  | 1.52 | 2.00   |
| 0.49 | 0.49  | 7.04   | 71.5  | 29.03  | 10.15 | 28.25  | 1.60 | 2.09   |
| 0.50 | 0.50  | 7.32   | 76.3  | 29.05  | 10.41 | 28.25  | 1.68 | 2.18   |
| 0.51 | 0.51  | 7.61   | 81.2  | 29.07  | 10.67 | 28.26  | 1.77 | 2.28   |
| 0.52 | 0.52  | 7.89   | 86.2  | 29.09  | 10.93 | 28.26  | 1.86 | 2.38   |
| 0.53 | 0.53  | 8.17   | 91.4  | 29.11  | 11.19 | 28.27  | 1.94 | 2.47   |
| 0.54 | 0.54  | 8.45   | 96.7  | 29.13  | 11.44 | 28.27  | 2.03 | 2.57   |
| 0.55 | 0.55  | 8.74   | 102.1 | 29.15  | 11.69 | 28.28  | 2.12 | 2.67   |
| 0.56 | 0.56  | 9.02   | 107.6 | 29.17  | 11.93 | 28.28  | 2.21 | 2.77   |
| 0.57 | 0.57  | 9.30   | 113.2 | 29.19  | 12.17 | 28.29  | 2.30 | 2.87   |
| 0.58 | 0.58  | 9.59   | 119.0 | 29.21  | 12.41 | 28.29  | 2.39 | 2.97   |
| 0.59 | 0.59  | 9.87   | 124.8 | 29.23  | 12.65 | 28.30  | 2.48 | 3.07   |
| 0.60 | 0.60  | 10.15  | 130.8 | 29.25  | 12.88 | 28.30  | 2.58 | 3.18   |
| 0.61 | 0.61  | 10.43  | 136.9 | 29.27  | 13.12 | 28.31  | 2.67 | 3.28   |
| 0.62 | 0.62  | 10.72  | 143.0 | 29.29  | 13.35 | 28.31  | 2.77 | 3.39   |
| 0.63 | 0.63  | 11.00  | 149.3 | 29.31  | 13.57 | 28.32  | 2.86 | 3.49   |
| 0.64 | 0.64  | 11.28  | 155.7 | 29.34  | 13.80 | 28.32  | 2.96 | 3.60   |
| 0.65 | 0.65  | 11.57  | 162.2 | 29.36  | 14.02 | 28.33  | 3.05 | 3.70   |
| 0.66 | 0.66  | 11.85  | 168.8 | 29.38  | 14.25 | 28.33  | 3.15 | 3.81   |
| 0.67 | 0.67  | 12.13  | 175.5 | 29.40  | 14.46 | 28.34  | 3.25 | 3.92   |
| 0.68 | 0.68  | 12.42  | 178.3 | 30.44  | 14.35 | 30.30  | 3.20 | 3.88   |
| 0.69 | 0.69  | 12.72  | 181.4 | 31.49  | 14.26 | 31.34  | 3.16 | 3.85   |
| 0.70 | 0.70  | 13.06  | 182.0 | 33.45  | 13.94 | 32.39  | 3.02 | 3.72   |
| 0.71 | 0.71  | 13.39  | 185.9 | 34.50  | 13.88 | 33.44  | 2.99 | 3.70   |
| 0.72 | 0.72  | 13.73  | 190.0 | 35.54  | 13.84 | 34.48  | 2.97 | 3.69   |
| 0.73 | 0.73  | 14.08  | 194.3 | 36.59  | 13.80 | 35.53  | 2.96 | 3.69   |
| 0.74 | 0.74  | 14.44  | 198.9 | 37.64  | 13.78 | 36.58  | 2.95 | 3.69   |
| 0.75 | 0.75  | 14.81  | 203.7 | 38.68  | 13.76 | 37.62  | 2.94 | 3.69   |
| 0.76 | 0.76  | 15.19  | 208.8 | 39.73  | 13.74 | 38.67  | 2.93 | 3.69   |
| 0.77 | 0.77  | 15.58  | 214.1 | 40.78  | 13.74 | 39.72  | 2.93 | 3.70   |
| 0.78 | 0.78  | 15.98  | 219.6 | 41.83  | 13.74 | 40.77  | 2.93 | 3.71   |
| 0.79 | 0.79  | 16.40  | 225.4 | 42.87  | 13.75 | 41.81  | 2.93 | 3.72   |
| 0.80 | 0.80  | 16.82  | 231.5 | 43.92  | 13.76 | 42.86  | 2.94 | 3.74   |
| 0.81 | 0.81  | 17.25  | 237.7 | 44.97  | 13.78 | 43.91  | 2.95 | 3.76   |
| 0.82 | 0.82  | 17.70  | 244.3 | 46.01  | 13.80 | 44.95  | 2.96 | 3.78   |
| 0.83 | 0.83  | 18.15  | 251.0 | 47.06  | 13.83 | 46.00  | 2.97 | 3.80   |

\*\*\*\*\*

PC PROGRAM STREAM

SEPTEMBER 1994

\*\*\*\*\*

HIGH DESERT STREET

MANNING'S N= .017 SLOPE= .0059

| POINT | DIST | ELEV | POINT | DIST  | ELEV | POINT | DIST  | ELEV |
|-------|------|------|-------|-------|------|-------|-------|------|
| 1     | 0.00 | 0.83 | 5     | 11.00 | 0.13 | 9     | 41.17 | 0.67 |
| 2     | 8.38 | 0.67 | 6     | 25.00 | 0.41 | 10    | 41.63 | 0.67 |
| 3     | 8.83 | 0.67 | 7     | 39.00 | 0.13 | 11    | 50.00 | 0.83 |
| 4     | 9.00 | 0.00 | 8     | 41.00 | 0.00 | 12    | 0.00  | 0.00 |

| WSEL | DEPTH | FLOW   | FLOW  | WETTED | FLOW  | TOPWID | VEL  | ENERGY |
|------|-------|--------|-------|--------|-------|--------|------|--------|
| (FT) | INC   | AREA   | RATE  | PER    | VEL   | (FT)   | HEAD | HEAD   |
| (FT) | (FT)  | SQ.FT. | (CFS) | (FT)   | (FPS) | (FT)   | (FT) | (FT)   |
| 0.01 | 0.01  | 0.00   | 0.0   | 0.33   | 0.19  | 0.31   | 0.00 | 0.01   |
| 0.02 | 0.02  | 0.01   | 0.0   | 0.66   | 0.30  | 0.63   | 0.00 | 0.02   |
| 0.03 | 0.03  | 0.01   | 0.0   | 0.99   | 0.39  | 0.94   | 0.00 | 0.03   |
| 0.04 | 0.04  | 0.03   | 0.0   | 1.32   | 0.48  | 1.25   | 0.00 | 0.04   |
| 0.05 | 0.05  | 0.04   | 0.0   | 1.64   | 0.56  | 1.56   | 0.00 | 0.05   |
| 0.06 | 0.06  | 0.06   | 0.0   | 1.97   | 0.63  | 1.88   | 0.01 | 0.07   |
| 0.07 | 0.07  | 0.08   | 0.1   | 2.30   | 0.69  | 2.19   | 0.01 | 0.08   |
| 0.08 | 0.08  | 0.10   | 0.1   | 2.63   | 0.76  | 2.50   | 0.01 | 0.09   |
| 0.09 | 0.09  | 0.13   | 0.1   | 2.96   | 0.82  | 2.81   | 0.01 | 0.10   |
| 0.10 | 0.10  | 0.16   | 0.1   | 3.29   | 0.88  | 3.13   | 0.01 | 0.11   |
| 0.11 | 0.11  | 0.19   | 0.2   | 3.62   | 0.94  | 3.44   | 0.01 | 0.12   |
| 0.12 | 0.12  | 0.23   | 0.2   | 3.95   | 0.99  | 3.75   | 0.02 | 0.14   |
| 0.13 | 0.13  | 0.26   | 0.3   | 4.28   | 1.05  | 4.07   | 0.02 | 0.15   |
| 0.14 | 0.14  | 0.31   | 0.3   | 5.30   | 1.01  | 5.07   | 0.02 | 0.16   |
| 0.15 | 0.15  | 0.37   | 0.4   | 6.32   | 1.00  | 6.08   | 0.02 | 0.17   |
| 0.16 | 0.16  | 0.43   | 0.4   | 7.34   | 1.02  | 7.08   | 0.02 | 0.18   |
| 0.17 | 0.17  | 0.51   | 0.5   | 8.36   | 1.04  | 8.09   | 0.02 | 0.19   |
| 0.18 | 0.18  | 0.59   | 0.6   | 9.38   | 1.07  | 9.09   | 0.02 | 0.20   |
| 0.19 | 0.19  | 0.69   | 0.8   | 10.40  | 1.10  | 10.10  | 0.02 | 0.21   |
| 0.20 | 0.20  | 0.80   | 0.9   | 11.42  | 1.14  | 11.10  | 0.02 | 0.22   |
| 0.21 | 0.21  | 0.91   | 1.1   | 12.44  | 1.18  | 12.11  | 0.02 | 0.23   |
| 0.22 | 0.22  | 1.04   | 1.3   | 13.46  | 1.22  | 13.11  | 0.02 | 0.24   |
| 0.23 | 0.23  | 1.17   | 1.5   | 14.49  | 1.26  | 14.12  | 0.02 | 0.25   |
| 0.24 | 0.24  | 1.32   | 1.7   | 15.51  | 1.30  | 15.12  | 0.03 | 0.27   |
| 0.25 | 0.25  | 1.48   | 2.0   | 16.53  | 1.34  | 16.13  | 0.03 | 0.28   |
| 0.26 | 0.26  | 1.64   | 2.3   | 17.55  | 1.38  | 17.13  | 0.03 | 0.29   |
| 0.27 | 0.27  | 1.82   | 2.6   | 18.57  | 1.43  | 18.14  | 0.03 | 0.30   |
| 0.28 | 0.28  | 2.00   | 2.9   | 19.59  | 1.47  | 19.14  | 0.03 | 0.31   |
| 0.29 | 0.29  | 2.20   | 3.3   | 20.61  | 1.51  | 20.15  | 0.04 | 0.33   |
| 0.30 | 0.30  | 2.41   | 3.7   | 21.63  | 1.55  | 21.15  | 0.04 | 0.34   |
| 0.31 | 0.31  | 2.62   | 4.2   | 22.65  | 1.60  | 22.16  | 0.04 | 0.35   |
| 0.32 | 0.32  | 2.85   | 4.7   | 23.67  | 1.64  | 23.16  | 0.04 | 0.36   |
| 0.33 | 0.33  | 3.09   | 5.2   | 24.69  | 1.68  | 24.17  | 0.04 | 0.37   |
| 0.34 | 0.34  | 3.33   | 5.7   | 25.71  | 1.72  | 25.17  | 0.05 | 0.39   |
| 0.35 | 0.35  | 3.59   | 6.3   | 26.74  | 1.76  | 26.18  | 0.05 | 0.40   |
| 0.36 | 0.36  | 3.86   | 7.0   | 27.76  | 1.80  | 27.18  | 0.05 | 0.41   |
| 0.37 | 0.37  | 4.13   | 7.6   | 28.78  | 1.84  | 28.19  | 0.05 | 0.42   |
| 0.38 | 0.38  | 4.42   | 8.3   | 29.80  | 1.88  | 29.19  | 0.05 | 0.43   |
| 0.39 | 0.39  | 4.72   | 9.1   | 30.82  | 1.92  | 30.20  | 0.06 | 0.45   |
| 0.40 | 0.40  | 5.03   | 9.9   | 31.84  | 1.96  | 31.20  | 0.06 | 0.46   |
| 0.41 | 0.41  | 5.34   | 10.7  | 32.86  | 2.00  | 32.21  | 0.06 | 0.47   |
| 0.42 | 0.42  | 5.66   | 11.8  | 32.88  | 2.08  | 32.21  | 0.07 | 0.49   |
| 0.43 | 0.43  | 5.99   | 12.9  | 32.90  | 2.16  | 32.22  | 0.07 | 0.50   |

□

| WSEL | DEPTH       | FLOW            | FLOW          | WETTED      | FLOW         | TOPWID | VEL          | ENERGY       |
|------|-------------|-----------------|---------------|-------------|--------------|--------|--------------|--------------|
| (FT) | INC<br>(FT) | AREA<br>SQ. FT. | RATE<br>(CFS) | PER<br>(FT) | VEL<br>(FPS) | (FT)   | HEAD<br>(FT) | HEAD<br>(FT) |
| 0.45 | 0.45        | 6.63            | 15.3          | 32.94       | 2.31         | 32.23  | 0.08         | 0.53         |
| 0.46 | 0.46        | 6.95            | 16.5          | 32.96       | 2.38         | 32.23  | 0.09         | 0.55         |
| 0.47 | 0.47        | 7.28            | 17.8          | 32.98       | 2.45         | 32.24  | 0.09         | 0.56         |
| 0.48 | 0.48        | 7.60            | 19.2          | 33.00       | 2.52         | 32.24  | 0.10         | 0.58         |
| 0.49 | 0.49        | 7.92            | 20.5          | 33.03       | 2.59         | 32.25  | 0.10         | 0.59         |
| 0.50 | 0.50        | 8.24            | 21.9          | 33.05       | 2.66         | 32.25  | 0.11         | 0.61         |
| 0.51 | 0.51        | 8.57            | 23.4          | 33.07       | 2.73         | 32.26  | 0.12         | 0.63         |
| 0.52 | 0.52        | 8.89            | 24.8          | 33.09       | 2.80         | 32.26  | 0.12         | 0.64         |
| 0.53 | 0.53        | 9.21            | 26.4          | 33.11       | 2.86         | 32.27  | 0.13         | 0.66         |
| 0.54 | 0.54        | 9.53            | 27.9          | 33.13       | 2.93         | 32.27  | 0.13         | 0.67         |
| 0.55 | 0.55        | 9.86            | 29.5          | 33.15       | 2.99         | 32.28  | 0.14         | 0.69         |
| 0.56 | 0.56        | 10.18           | 31.1          | 33.17       | 3.05         | 32.28  | 0.14         | 0.70         |
| 0.57 | 0.57        | 10.50           | 32.7          | 33.19       | 3.12         | 32.29  | 0.15         | 0.72         |
| 0.58 | 0.58        | 10.83           | 34.4          | 33.21       | 3.18         | 32.29  | 0.16         | 0.74         |
| 0.59 | 0.59        | 11.15           | 36.1          | 33.23       | 3.24         | 32.30  | 0.16         | 0.75         |
| 0.60 | 0.60        | 11.47           | 37.9          | 33.25       | 3.30         | 32.30  | 0.17         | 0.77         |
| 0.61 | 0.61        | 11.79           | 39.7          | 33.27       | 3.36         | 32.31  | 0.18         | 0.79         |
| 0.62 | 0.62        | 12.12           | 41.5          | 33.29       | 3.42         | 32.31  | 0.18         | 0.80         |
| 0.63 | 0.63        | 12.44           | 43.3          | 33.31       | 3.48         | 32.32  | 0.19         | 0.82         |
| 0.64 | 0.64        | 12.76           | 45.2          | 33.33       | 3.54         | 32.32  | 0.19         | 0.83         |
| 0.65 | 0.65        | 13.09           | 47.1          | 33.36       | 3.60         | 32.33  | 0.20         | 0.85         |
| 0.66 | 0.66        | 13.41           | 49.0          | 33.38       | 3.66         | 32.33  | 0.21         | 0.87         |
| 0.67 | 0.67        | 13.73           | 51.0          | 33.40       | 3.71         | 32.34  | 0.21         | 0.88         |
| 0.68 | 0.68        | 14.06           | 52.0          | 34.44       | 3.70         | 34.30  | 0.21         | 0.89         |
| 0.69 | 0.69        | 14.40           | 53.0          | 35.49       | 3.68         | 35.34  | 0.21         | 0.90         |
| 0.70 | 0.70        | 14.78           | 53.4          | 37.45       | 3.61         | 36.39  | 0.20         | 0.90         |
| 0.71 | 0.71        | 15.15           | 54.6          | 38.49       | 3.61         | 37.44  | 0.20         | 0.91         |
| 0.72 | 0.72        | 15.53           | 55.9          | 39.54       | 3.60         | 38.48  | 0.20         | 0.92         |
| 0.73 | 0.73        | 15.92           | 57.3          | 40.59       | 3.60         | 39.53  | 0.20         | 0.93         |
| 0.74 | 0.74        | 16.32           | 58.7          | 41.64       | 3.60         | 40.58  | 0.20         | 0.94         |
| 0.75 | 0.75        | 16.73           | 60.2          | 42.68       | 3.60         | 41.62  | 0.20         | 0.95         |
| 0.76 | 0.76        | 17.15           | 61.7          | 43.73       | 3.60         | 42.67  | 0.20         | 0.96         |
| 0.77 | 0.77        | 17.58           | 63.3          | 44.78       | 3.60         | 43.72  | 0.20         | 0.97         |
| 0.78 | 0.78        | 18.02           | 65.0          | 45.82       | 3.60         | 44.77  | 0.20         | 0.98         |
| 0.79 | 0.79        | 18.48           | 66.7          | 46.87       | 3.61         | 45.81  | 0.20         | 0.99         |
| 0.80 | 0.80        | 18.94           | 68.5          | 47.92       | 3.62         | 46.86  | 0.20         | 1.00         |
| 0.81 | 0.81        | 19.41           | 70.4          | 48.97       | 3.62         | 47.91  | 0.20         | 1.01         |
| 0.82 | 0.82        | 19.90           | 72.3          | 50.01       | 3.63         | 48.95  | 0.20         | 1.02         |
| 0.83 | 0.83        | 20.39           | 74.3          | 51.06       | 3.64         | 50.00  | 0.21         | 1.04         |

Q<sub>100</sub>

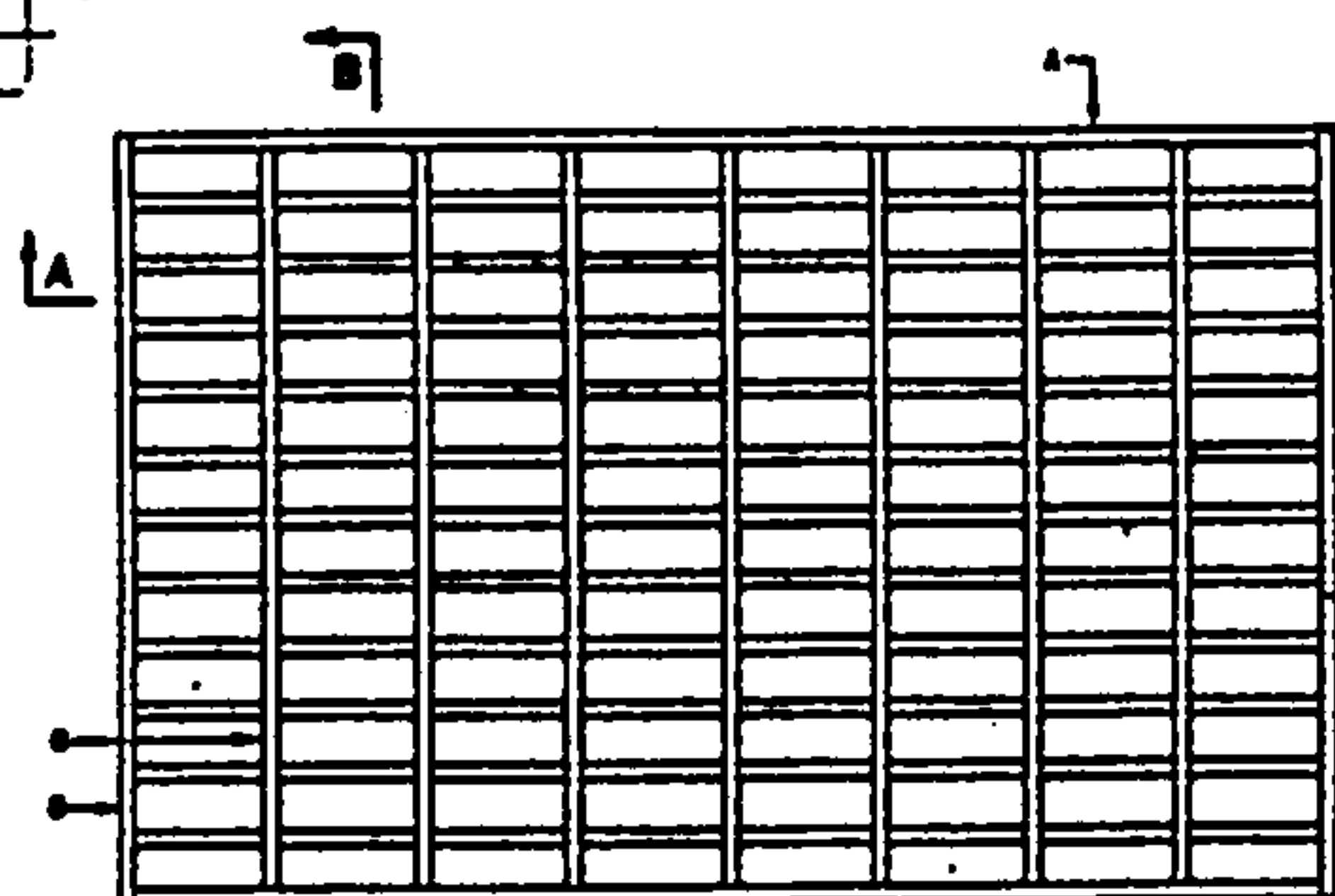
STD CURB  
CAPACITY

60" WING 40" @ TC  
 18.5" 35.5" 18.5" NET OPEN AREA  
 GRATE @ 10" (0.83') BELOW TC

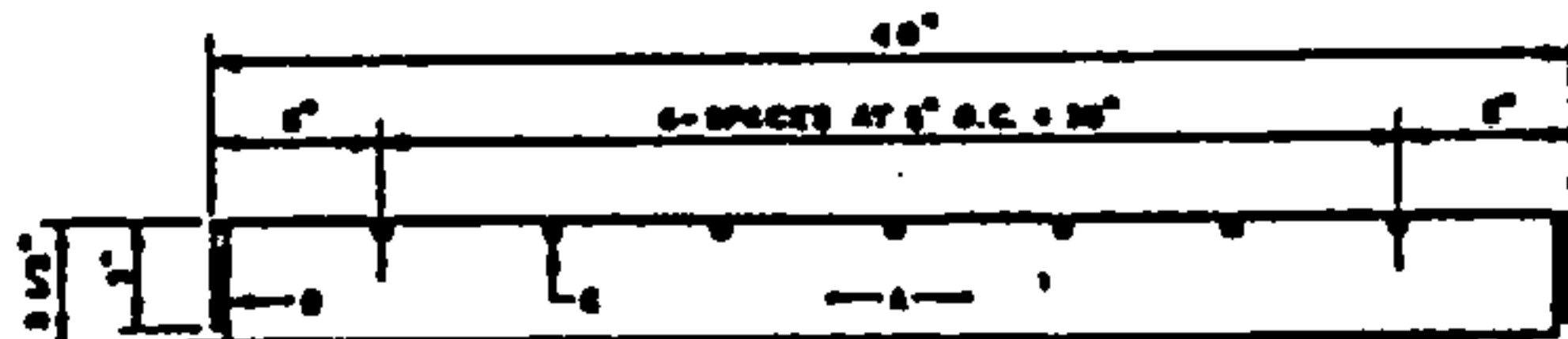
| EQUATION                              | SGL A                              | DBL A                              | TRPL A                             | QDPL A                             |
|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| 1) ORIFICE                            | $22.0 h^{0.5}$<br>$+ 16.5 h^{1.5}$ | $43.9 h^{0.5}$<br>$+ 16.5 h^{1.5}$ | $65.9 h^{0.5}$<br>$+ 16.5 h^{1.5}$ | $87.8 h^{0.5}$<br>$+ 16.5 h^{1.5}$ |
| 2) 3-SIDED WEIR<br>( $h \leq 0.83'$ ) | $36.4 h^{1.5}$                     | $46.2 h^{1.5}$                     | $56.0 h^{1.5}$                     | $65.7 h^{1.5}$                     |
| 3) 4-SIDED WEIR<br>( $h > 0.83'$ )    | ADD TO 2):<br>$11(h-0.83)^{1.5}$   | ADD TO 2):<br>$22(h-0.83)^{1.5}$   | ADD TO 2):<br>$33(h-0.83)^{1.5}$   | ADD TO 2):<br>$44(h-0.83)^{1.5}$   |

1)  $Q = 0.6 A \sqrt{2gh} + 3.3(5') h^{1.5}$   
 2) & 3)  $Q = 3.3 P h^{1.5}$

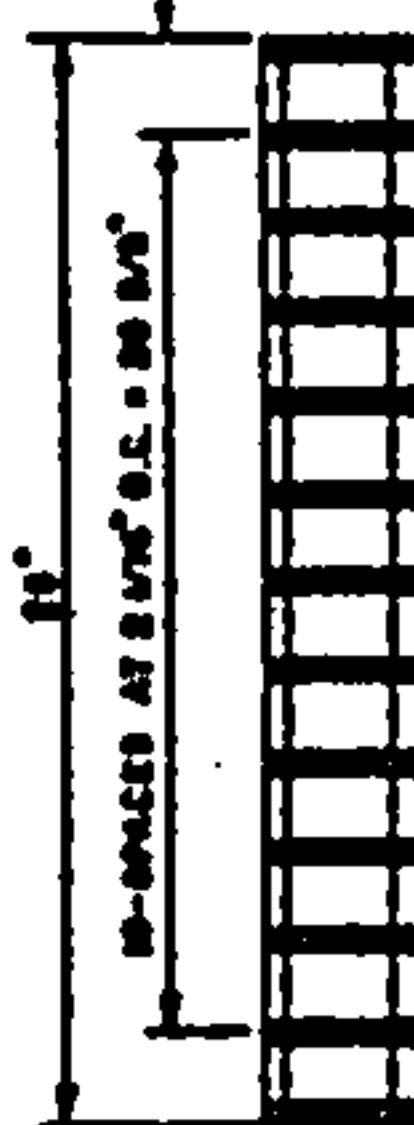
GRATE CAPACITY (Q) IN CFS



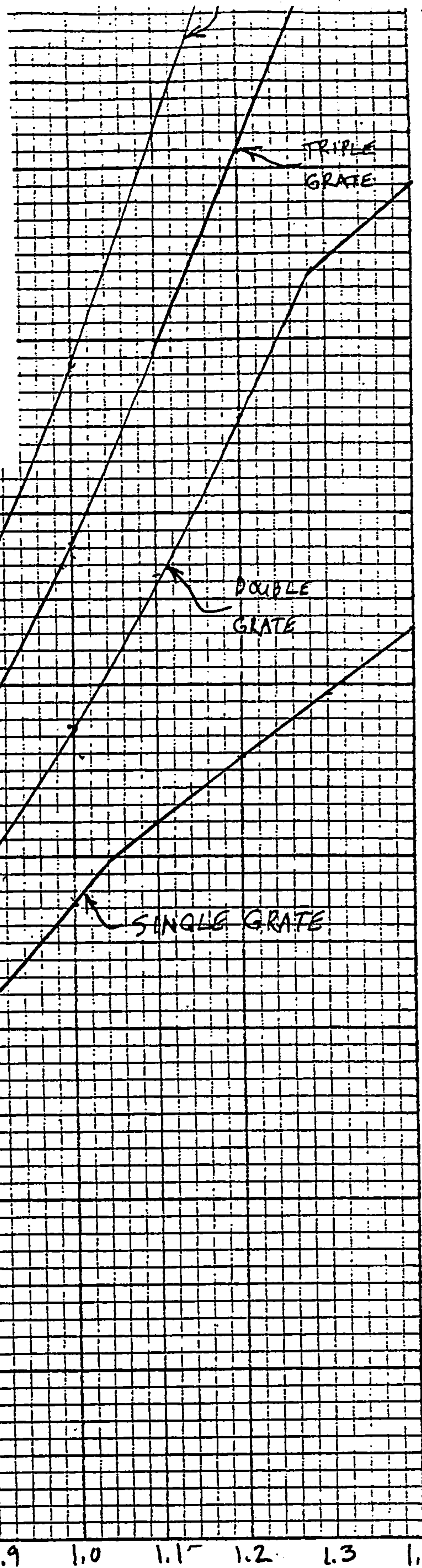
PLAN



SECTION A-A



SECTION B-B



TC 0.83'  
 HEAD (h) IN FEET

BOHANNAN-HUSTON INC.

PROJECT NAME High Density SHEET        OF         
 PROJECT NO.        BY JPK DATE 4/9/92  
 SUBJECT RATING CURVE FOR TYPE A INLETS CH'D        DATE

## **APPENDIX N**

### **SEDIMENTATION POND ANALYSIS**

**HIGH DESERT TRACT 13**  
**Sedimentation Pond Analysis**  
October 03, 2002

**1. SEDIMENTATION ANALYSIS**

The annual sediment load for undeveloped areas in High Desert is estimated by using a 10% sediment-bulking factor. This factor is applied to the 2-year clean water volume for a given basin to estimate the annual sediment volume for the basin. The two (2) and five (5) year sediment volumes are equal to 2 and 5 times the annual sediment volume, respectively. Prior to analyzing the pond hydraulics, the pond storage volume is reduced by the design sediment volume (i.e., 2-year, etc.).

**2. SEDIMENTATION POND #1**

Basins 2E and OS-7 contribute flows to Pond #1.

$$Q_2 = 7.3 \text{ cfs}$$

$$V_2 = 0.20 \text{ acre-feet}$$

Annual sediment load is 10% of the 2-year runoff volume = 0.02 acre-feet.

Pond only has capacity to store sediment equal to the annual volume. See AHYMO pond input (ID 47).

**3. SEDIMENTATION POND #2**

Basins 2G and OS-1 contribute flows to Pond #2.

$$Q_2 = 7.4 \text{ cfs}$$

$$V_2 = 0.22 \text{ acre-feet}$$

Annual sediment load is 10% of the 2-year runoff volume = 0.02 acre-feet.

Pond only has capacity to store sediment equal to the annual volume. See AHYMO pond input (ID 49).

#### 4. SEDIMENTATION POND #3

Basins 2A, OS-4 and OS-5 contribute flows to Pond #3.

$$Q_2 = 18.0 \text{ cfs}$$

$$V_2 = 0.49 \text{ acre-feet}$$

Annual sediment load is 10% of the 2-year runoff volume = 0.05 acre-feet.

Pond has capacity to store sediment equal to the twice the annual volume, 0.10 acre-feet. See AHYMO pond input (ID 62).



## **EXHIBITS**

- EXHIBIT 1: EXISTING DRAINAGE BASINS MAP – DMP
- EXHIBIT 2: 1995 PRUDENT LINE MAP
- EXHIBIT 3: REVISED PRUDENT LINE MAP
- EXHIBIT 4: EXISTING FEMA FLOODPLAIN MAP
- EXHIBIT 5: BULK LAND PLAT
- EXHIBIT 6: PRELIMINARY PLAT
- EXHIBIT 7: DETAILED REVISED PRUDENT LINE MAP
- EXHIBIT 8: PROPOSED BEAR CANYON ARROYO IMPROVEMENTS
- EXHIBIT 9: EMBUDITO ARROYO CROSS-SECTIONS
- EXHIBIT 10: PROPOSED EMBUDITO ARROYO IMPROVEMENTS
- EXHIBIT 11: PROPOSED DRAINAGE BASINS MAP – UNIT 1
- EXHIBIT 12: GRADING AND DRAINAGE PLAN – UNIT 1
- EXHIBIT 13: PROPOSED DRAINAGE BASINS MAP – UNITS 2 & 3
- EXHIBIT 14: GRADING AND DRAINAGE PLAN – UNITS 2 & 3

## **EXHIBIT 1**

EXISTING DRAINAGE BASINS MAP -DMP

## **EXHIBIT 2**

1995 PRUDENT LINE MAP

## **EXHIBIT 3**

REVISED PRUDENT LINE MAP

## **EXHIBIT 4**

EXISTING FEMA FLOODPLAIN MAP

**EXHIBIT 5**

BULK LAND PLAT

**EXHIBIT 6**

PRELIMINARY PLAT

## **EXHIBIT 7**

DETAILED REVISED PRUDENT LINE MAP

## **EXHIBIT 8**

PROPOSED BEAR CANYON ARROYO IMPROVEMENTS

## **EXHIBIT 9**

EMBUDITO ARRYOS CROSS-SECTIONS

## **EXHIBIT 10**

PROPOSED EMBUDITO ARROYO IMPROVEMENTS

## **EXHIBIT 11**

PROPOSED DRAINAGE BASINS MAP – UNIT1

## **EXHIBIT 12**

GRADING AND DRAINAGE PLAN – UNIT 1

## **EXHIBIT 13**

PROPOSED DRAINAGE BASINS MAP – UNIT 2 & 3

## **EXHIBIT 14**

GRADING AND DRAINAGE PLAN – UNITS 2 & 3