CITY OF
Albuquerque

Martin J. Chávez, Mayor

August 18 , 1997

Mark Werner
1031 Salinas SE
Albuquerque, New Mexico 87123

Dear Mr Werner:

It has come to our attention that water run-off from your property has been damaging the adjacent property owner to the west of you. A field inspection was conducted on August 13,1997. The inspection revealed that your back yard was landscaped in a manner that it did not allow the developed run-off to exit your property the way that the approved grading and drainage plan on file in our office was designed. According to the approved grading and drainage plan, all developed rain run-off is to be routed to the front of your property and should exit through the drive pad. If grading does not allow for positive grading to the front, then we recommend that you gutter the roof area to the front of the dwelling.

If you should have any questions, please feel free to contact me at 924-3330.

Andrew Garcia
Andrew Garcia
Drainage Inspector

c: Jim Duncan, Investigator-Building and Safety
Kenneth Scoopmire

D.R.B. Case No. 92-106
S-92-22
D.R.C. Project No. 92-0106
Date Submitted July 30, 1992
Submitted by: AVID Engineering, Inc.
By: 4/19/94
Revisions: 3/2/93 shts 2, 5, 12 & 13
4/19/94 shts 2, 6, 7, 7A, 8, 9-13

Figure II

EXHIBIT "D"
to Subdivision Improvements Agreement

DEVELOPMENT REVIEW BOARD (D.R.B.)
REQUIRED INFRASTRUCTURE LISTING
for WILLOWWOOD SUBDIVISION
for PRELIMINARY PLAT APPROVAL
UNITS I THROUGH VIII
JULY 30, 1992

Following is a summary of Public/Private Infrastructure required to be constructed or financially guaranteed to be constructed for the above development.

UNIT I

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving				
A. 28' Residential paving, standard curb & gutter, 4' sidewalk. (Both sides)	Glacier Bay	Isle Royale	Kings Canyon	Interior Residential streets. Approximately 1550 LF
	Kings Canyon Place	Cul-de-sac	Glacier Bay	
	Kings Canyon Road	Glacier Bay	800' west of Glacier Bay	
	Jewel Cave	Kings Canyon	200' South of Kings Canyon	
B. 40' Residential paving, standard curb & gutter, 4' sidewalk. (Both sides)	Herman Roser	Juan Tabo	600' west of Glacier Bay	Approximately 950 LF

Figure II
EXHIBIT "D"
Page 2

UNIT I

ITEM	LOCATION	FROM	TO	DESCRIPTION
C. 6' Sidewalk	Juan Tabo	Herman Roser	South Property Line	
2. Sanitary Sewer				
A. 8" Sanitary Sewer	Glacier Bay	Isle Royale	Kings Canyon	Approximately 3850 LF
	Kings Canyon Place	Cul-de-sac	Glacier Bay	
	Jewel Cave	Kings Canyon	200' South	
	Kings Canyon	Wind River	Glacier Bay	
	Wind River	Jewel Cave	Herman Roser	
	Jewel Cave	Tony Sanchez	Wind River	
	Herman Roser	Glacier Bay	Wind River	
B. 10" Sanitary Sewer	Tony Sanchez	Jewel Cave	Gibson	Approximately 160 LF
C. 10" Sanitary Sewer: (Off-site)	Gibson	Tony Sanchez	Existing MH	Approximately 600 LF
3. Waterlines				
A. 6" Waterline	Glacier Bay	Joshua Tree	Kings Canyon	
	Kings Canyon Place	Cul-de-sac	Glacier Bay	
	Kings Canyon Road	Glacier Bay	Steamboat St.	
	Herman Roser	Wind River	Juan Tabo	Existing 8" CI
	Jewel Cave	Kings Canyon	200' South and 50' West	
	Joshua Tree	Glacier Bay	Juan Tabo	
4. Drainage				
A. Drainage Pond	Tract F (APS Owned)			Excavated for Unit I Drainage. Includes conveyance channel.

UNIT I

ITEM	LOCATION	FROM	TO	DESCRIPTION
B. Storm Drain: 78"*	Elizabeth Street	Park site	Eubank	Guaranteed by APS
5. Miscellaneous				
A. Street Trees	Juan Tabo	Herman Roser	500' South	
B. Retaining Walls	Throughout Subdivision			Approximately 380 LF

NOTES:
1) Waterlines include valves, fittings and services.
2) Sanitary Sewer lines include manholes and services.
3) Storm drains include manholes, inlets and 24" connector pipe.
4) Paving items include street lighting.

Notes apply to Units I through VIII

*Deferred: To be constructed upon the earlier of construction of the Eubank Storm Drain System AMDS (Project 2-03-18) or development adjacent to Elizabeth Street or development requiring paving improvements in Elizabeth Street.

UNIT II

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving				
A. 26' Residential paving, standard curb & gutter, 4' sidewalk. (Both sides)	Canyonlands Place	Cul-de-sac	Glacier Bay	
	Joshua Tree Place	Cul-de-sac	Glacier Bay	
	Isle Royale Place	Cul-de-sac	Glacier Bay	
B. 28' Residential paving, standard curb & gutter, 4' sidewalk. (Both sides)	Canyonlands Road	Bryce Canyon	Canyonlands Place	Approximately 2700 LF
	Isle Royale	100' West of	Glacier Bay	
	Glacier Bay	Wind River	Isle Royale	
	Bryce Canyon	Canyonlands	N. Property Line	
		Isle Royale		
C. Temporary Access Pavement (28' wide)	Easement	Bryce Canyon	Juan Tabo	Approximately 950 LF
D. 6' Sidewalk	Juan Tabo	Herman Roser	N. Property Line	
2. Sanitary Sewer				
A. 8" Sanitary sewer	Canyonlands Road	Bryce Canyon	Canyonlands Place	Approximately 2900 LF
	Isle Royale	Wind River	Glacier Bay	
	Canyonlands Place	Cul-de-sac	Glacier Bay	
	Joshua Tree Place	Cul-de-sac	Glacier Bay	
	Isle Royale Place	Cul-de-sac	Glacier Bay	
	Glacier Bay	Canyonlands	Isle Royale	
	Bryce Canyon	Isle Royale	N. Property Line	
	Wind River	Isle Royale	Herman Roser	

UNIT II

ITEM	LOCATION	FROM	TO	DESCRIPTION
3. Waterlines				
A. 6" Waterline	Glacier Bay	Joshua Tree	Canyonlands Place	
	Canyonlands Road	Bryce Canyon	Canyonlands Place	
	Isle Royale	Wind River	Glacier Bay	
	Canyonlands Place	Cul-de-sac	Glacier Bay	
	Isle Royale	Cul-de-sac	Glacier Bay	
	Bryce Canyon	N. Property Line	Isle Royale	
	Wind River	Isle Royale	Herman Roser	
	20' Public W/L Easement	Canyonlands Pl.	Juan Tabo	
4. Drainage				
A. Drainage Pond	Tract F (APS Owned)			Excavate to full depth (33 A-F) includes conveyance to pond.
5. Miscellaneous				
A. Retaining Walls	Throughout Subdivision			Approximately 120 LF
B. Street Trees	Juan Tabo	Herman Roser	900' North	

UNIT III

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving				
A. 28' Residential paving, standard curb & gutter, 4' sidewalk. (Both sides)	Canyonlands Road	Bryce Canyon	100' South of Herman Roser	Approximately 2700 LF
	Wind River	Isle Royale	100' South of Herman Roser	
	Isle Royale	Canyonlands	100' West of Wind River	
	Canyonlands Court	Cul-de-sac	Canyonlands	
B. 40' Residential paving, standard curb & gutter, 4' sidewalk. (Both sides)	Herman Roser	200' East of Wind River	Wind River	Approximately 600 LF
	Herman Roser	Canyonlands	Tony Sanchez	
C. 6' Sidewalk	Block 9	Wind River	Canyonlands	
2. Sanitary Sewer				
A. Sanitary sewer 8"	Tony Sanchez	Jewel Cave	Herman Roser	Approximately 3280 LF
	Canyonlands	Bryce Canyon	Kings Canyon	
	Kings Canyon	Salinas	Canyonlands	
	Salinas	Jewel Cave	Kings Canyon	
	Isle Royale Court	Beginning	End	
	Herman Roser	Canyonlands	Tony Sanchez	
3. Waterlines				
A. 6" Waterline	Canyonlands Road	Bryce Canyon	100' South of Herman Roser	Approximately 1520 LF
	Isle Royale Court	Canyonlands Rd.	End of Cul-de-sac	
	Herman Roser	Canyonlands	Tony Sanchez	

Figure II
EXHIBIT "D"
Page 7

Phase IV

UNIT IV

ITEM	LOCATION	FROM	TO	DESCRIPTION
4. Storm Drain				
1. Paving				
A. 28' Residential paving, standard curb & gutter, 4' sidewalk. (Both sides)	Canyonlands Court	Cul-de-sac	Arches	Approximately 3350 LF
	Arches Road	Tony Sanchez	Wind River	
	Salinas Street	Arches	Kings Canyon	
	Canyonlands Road	Arches	100' South of Herman Roser	
	Kings Canyon	Salinas	50' East of Steamboat	
	Wind River	Arches	100' South of Herman Roser	
2. Sanitary Sewer				
A. 8" Sanitary Sewer	Canyonlands Road	Arches	Kings Canyon	Approximately 750 LF
	Arches	Salinas	Canyonlands	
	Canyonlands Court	Arches	End of Cul-de-sac	
3. Waterline				
A. 6" waterline	Arches Road	Tony Sanchez	Wind River	
	Salinas Street	Arches	Kings Canyon	
	Canyonlands Road	Arches	100' South of Herman Roser	
	Kings Canyon	Salinas	Canyonlands	
	Canyonlands Court	Arches	End of Cul-de-sac	

Figure II
EXHIBIT "D"
Page 7A

UNIT IV

ITEM	LOCATION	FROM	TO	DESCRIPTION
4. Drainage				
A. 24" Storm drain	Kings Canyon	Canyonlands	Cedar Breaks	Approximately 350 LF
*B. 78" Storm drain	Easement	Pond	Elizabeth	Approximately 600 LF
*C. 60" & 72"	Arches & Easement	Salinas	Pond	2200 LF
*D. 54"	Arches	Canyonlands	Salinas	300 LF
*E. 42" & 24"	Canyonlands	Arches	Kings Canyon	700 LF

*Items deleted from Unit III and added to Unit IV.

Figure II
EXHIBIT "D"
Page 8

UNIT V

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving				
A. 28" Residential, paving, standard curb & gutter, 4' sidewalk. (Both sides)	Jewel Cave	Tony Sanchez	Wind River	Approximately 2530 LF
	Salinas Street	Jewel Cave	Arches	
	Wind River	Jewel Cave	Arches	
	Jewel Cave	Steamboat	200' south of Kings Canyon	
	Steamboat	Kings Canyon	Jewel Cave	
2. Sanitary Sewer				
A. 8" Sanitary sewer	Jewel Cave	Steamboat	200' south of Kings Canyon	Approximately 1200 LF
	Steamboat	Kings Canyon	Jewel Cave	
	20' Public Easement	Wind River	Steamboat	
3. Waterlines				
A. 6" waterline	Jewel Cave	Tony Sanchez	Wind River	Approximately 2530 LF
	Salinas Street	Jewel Cave	Arches	
	Wind River	Jewel Cave	Arches	
	Jewel Cave	Steamboat	200' south of Kings Canyon	
	Steamboat	Kings Canyon	Jewel Cave	
4. Miscellaneous				
A. Retaining Walls	Throughout Subdivision			Approximately 1000 LF

UNIT V

ITEM	LOCATION	FROM	TO	DESCRIPTION
5. Drainage				
A. 30" Storm drain	Arches Road	Canyonlands	Wind River	
B. 30" Storm drain	Wind River	Arches	Jewel Cave	
C. 30" Storm drain	Alley	Jewel Cave	Jewel Cave	Approximately 200 LF

Figure II
EXHIBIT "D"

UNIT VI

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving				
A. 40' Residential paving, standard curb & gutter, 4' sidewalk. (Both sides)	Tony Sanchez	Gibson Ave.	Herman Roser	Approximately 1740 LF
B. Temporary Access (28' wide)	Easement	Tony Sanchez	Juan Tabo	Approximately 1400 LF
C. Temporary Intersection Configuration	Easement Intersection			
2. Waterline				
A. 6" waterline	Tony Sanchez	Arches	Herman Roser	Approximately 900 LF
3. Drainage				
A. 30" storm drain	Tony Sanchez	Arches	50' South	Approximately 50 LF

Phase V

UNIT VII

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving				
A. 28' Residential paving, standard curb & gutter, 4' sidewalk. (Both sides)	Chiricahua Street	Wolf Creek	Thunder Basin	Approximately 2490 LF
	Wasatch Road	Chiricahua	Wolf Creek	
	Chiricahua Court	Wolf Creek	Cul-de-sac	
	Wolf Creek Road	Chiricahua	Los Padres	
	Los Padres Street	Thunder Basin	Arches	
	Arches Road	Los Padres	Tony Sanchez	
2. Sanitary Sewer				
A. 8" Sanitary sewer	Chiricahua Street	Wolf Creek	Jewel Cave	Approximately 3570 LF
	Wasatch Road	Chiricahua	Wolf Creek	
	Chiricahua Court	Wolf Creek	End of Cul-de-sac	
	Wolf Creek Road	Chiricahua	Los Padres	
	Los Padres Street	Thunder Basin	Arches	
	Thunder Basin	Los Padres	Chiricahua	
	Easement	Gibson	Chiricahua	
3. Waterlines				
A. 6" waterline	Chiricahua Street	Wolf Creek	Thunder Basin	Approximately 3810 LF
	Wasatch Road	Chiricahua	Wolf Creek	
	Chiricahua Court	Wolf Creek	End of Cul-de-sac	
	Wolf Creek Road	Chiricahua	Los Padres	
	Los Padres Street	Jewel Cave	Arches	
	Arches Road	Los Padres	Tony Sanchez	
	Thunder Basin	Los Padres	Chiricahua	

UNIT VII

ITEM	LOCATION	FROM	TO	DESCRIPTION
4. Drainage				
A. 60" & 54" storm drain	Chiricahua	Wasatch	Pond	Approximately 600 LF
5. Miscellaneous				
A. Retaining wall	South Boundary			Approximately 480 LF

UNIT VIII

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving				
A. 28' Residential paving, standard curb & gutter, 4' sidewalk. (Both sides)	Chiricahua Street	Thunder Basin	Jewel Cave	Approximately 1820 LF
	Thunder Basin	Chiricahua	Los Padres	
	Jewel Cave	Chiricahua	Tony Sanchez	
	Los Padres Street	Jewel Cave	Thunder Basin	
	Gibson	Tony Sanchez	W. Property Line**	
2. Sanitary Sewer				
A. 8" Sanitary sewer	Jewel Cave	Chiricahua	Tony Sanchez	Approximately 800 LF
	Los Padres Street	Jewel Cave	Thunder Basin	
3. Waterlines				
A. 6" waterline	Chiricahua Street	Thunder Basin	Jewel Cave	Approximately 700 LF
	Jewel Cave	Chiricahua	Tony Sanchez	
4. Drainage				
A. 42" Storm drain	Chiricahua	Jewel Cave	Wasatch	Approximately 520 LF
5. Miscellaneous				
A. Retaining walls	Throughout Subdivision			Approximately 600 LF

**16' Pavement, curb and gutter, (north side only).
Certification for grading includes retaining walls and private drainage improvements required for financial guarantee release. Financial guarantees are not required for these items.

NOTES

*Temporary turnarounds with temporary curb and gutter as required.

WILLOWWOOD SUBDIVISION
INFRASTRUCTURE LIST
JULY 28, 1992
FOR PRELIMINARY PLAT APPROVAL

DRB-92-106
S-92-22

Approved on 4-19-94, by the Development Review Board

Jack Cloud — 4-19-94
Planning Department — Date

Robert W. Kane — 4-19-94
Utility Development Division, City Engineer — Date

Michael Baker — 4-19-94
Transportation Development Division, Traffic Engineer — Date

Carmen M. Chavez — 4-19-94
Parks and Recreation Department — Date

Fred J. Aguirre — 4-19-94
City Engineer/AMAFCA — Date

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

July 7, 1995

CERTIFICATE OF COMPLETION AND ACCEPTANCE

Manzano Mesa Limited Partnership
6301 Indian School Road
Albuquerque, NM 87110

RE: PROJECT NO. 4604.83 WILLOWWOOD SUB'D PHASE IV (MAP L-21)

Dear Sir:

This is to certify that the City of Albuquerque accepts Project No. 4604.83 as being completed according to approved plans and construction specifications.
Please be advised this certificate of completion and acceptance shall only become effective upon final plat approval and filing in the office of the Bernalillo County Clerk's Office.

The project is described as follows:

- The project consisted of installation of new 8" sanitary sewer line on Salinas Street, Canyonlands Road, Jewel Cave Road, and Steamboat Street, Archas Road. Also installed a new 4" sanitary sewer services for above streets and on Tony Sanchez Drive, Jewel Cave Road from Wind River Street to Tony Sanchez, Wind River Street and on Kings Canyon Road.
- Placed new 6" waterline with 3/4" on the above streets except on Tony Sanchez where we placed new 3/4" services to the existing waterline.
- Placed a new storm drain systems which included new 18", 24", 30" 36", 42", 60", 72 and 84" RCP class III which drains to an off site pond west of the project.
- Placed new residential paving (3") on above streets, curb and gutter and wheel chair ramps. Temporary asphalt was placed east of the subdivision on access road 1 & 2.

RECEIVED
JUL 14 1995
HYDROLOGY DIVISION

The contractor's correction period begins the date of this letter and will be effective for a period of one (1) year.

Sincerely,

Rick Roybal, P.E.
City Engineer,
Engineering Group
Public Works Department

Sincerely,

Russell B. Givler, P.E.
Chief Construction Engineer,
Engineering Group
Public Works Department

cc: Avid Engineering
Tom Lakeman, New Concepts
Fred Aguirre, Engineering Group, PWD
Lynda Michelle DeVanti, Engineering Group, PWD
Terri Martin, Engineering Group, PWD
Martin Barker, Engineering Group, PWD
Steve Gonzales, Special Assessments, DFM
Sam Hall, Operations Group, PWD
Jim Fink, Operations Group, PWD
Dean Wall, Engineering Group, PWD
Stuart Reeder, Water/Wastewater Group, PWD
Ray Chavez, Traffic Engineering, PWD
Josie Gutierrez, New Meter Sales, Finance Group, PWD
Richard Zamora, Engineering Group, PWD
f/Project No. 4604.83
f/Readers
f/Warranty:Contract

[redacted]

AVID ENGINEERING, INC.

DRAINAGE REPORT
FOR
WILLOWWOOD SUBDIVISION

PREPARED FOR:

MANZANO MESA LIMITED PARTNERSHIP
6301 INDIAN SCHOOL, NE SUITE 208
ALBUQUERQUE, NM 87111

PREPARED BY:

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

RECEIVED
OCT 1 9 1995

MAY 1992
REVISED OCTOBER 1994

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Willow Wood Subdivision ZONE ATLAS/DRAINAGE FILE # L-21/D37A

LEGAL DESCRIPTION: Tract D-1, Manzano Mesa

CITY ADDRESS: West of Juan Tabo, North of Gibson

ENGINEERING FIRM: AVID ENGINEERING, INC. CONTACT: Rick Beltramo

ADDRESS: 6100 Seagull Ln., NE, Suite 102, 87109 PHONE: 881-5357

OWNER: Manzano Mesa Limited Partnership CONTACT: Stan Strickman

ADDRESS: 6301 Indian School, NE, Suite 208 PHONE: 242-6375

ARCHITECT: None CONTACT:

ADDRESS: PHONE:

SURVEYOR: AVID ENGINEERING, INC. CONTACT: Ruan Bacigalupa

ADDRESS: Same as Above PHONE: 881-5357

CONTRACTOR: None CONTACT:

ADDRESS: PHONE:

PRE-DESIGN MEETING:

X YES DRB NO. DRB-92-0106

___ NO EPC NO.

___ COPY OF CONFERENCE RECAP SHEET PROVIDED PROJECT NO. 4604.90-94

TYPE OF SUBMITTAL:

X DRAINAGE REPORT

___ DRAINAGE PLAN

___ CONCEPTUAL GRADING & DRAIN PLAN

___ GRADING PLAN

___ EROSION CONTROL PLAN

___ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

___ SECTOR PLAN APPROVAL

___ SKETCH PLAT APPROVAL

___ PRELIMINARY PLAT APPROVAL

___ SITE DEVELOPMENT PLAN APPROVAL

X FINAL PLAT APPROVAL

___ BUILDING PERMIT APPROVAL

___ FOUNDATION PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY APPROVAL

___ ROUGH GRADING PERMIT APPROVAL

___ GRADING/PAVING PERMIT APPROVAL

___ OTHER _____ (SPECIFY)

DATE SUBMITTED: 10/18/95

BY: Rick Beltramo

TABLE OF CONTENTS

PAGE

Transmittal Letter - March 1994 Revisions 1
Introduction and Project Description 1
Purpose and Scope 1
Site Location and Description 7
Existing Drainage Conditions 8
Approved Drainage Master Plan for Manzano Mesa 10
Interim Outfall Plan for WillowWood (W.W. Unit 9, APS School Site) 12
External Properties 13
Summary 15
Summary Tables
Recommendations 15
References 17

APPENDICES

Appendix A	Revised Infrastructure List
Appendix B	Notice of Emergency Rule/Retention Ponding
Appendix C	Draft Agreement by APS
Appendix D	Computations
Appendix E	Units 7 & 8 Construction Plans (11"x17")

LIST OF FIGURES AND EXHIBITS

Figure I	Vicinity Map	2
Figure II	Location Map	3
Figure III	Project Area Map	4
Figure IV	Lot Layout Map	5
Figure V	Phase I Development	6
Figure VI	Soils Map	9
Exhibit VI	WillowWood Unit 9	

Manzano Mesa Drainage Master Plan - Exhibit I (Pocket)
WillowWood Drainage Plan - Exhibit II (Pocket)
WillowWood Drainage Plan - Exhibit III (Pocket)

AVID ENGINEERING, INC.

Civil • Structural • Transportation

October 18, 1995

Mr. John Curtin, P.E.
City Hydrologist
City of Albuquerque
Public Works Department
P.O. Box 1293
Albuquerque, NM 87103

Re: WillowWood Subdivision
Master Drainage Plan Revision

Dear John:

Submitted for your review is the Revised Drainage Report for WillowWood Subdivision. Revisions to the March 1994 report are as follows:

- Hydraulic Gradeline (HGL) analysis revised to incorporate developed flows from the Albuquerque Public Schools (APS) future site;
- Hydrologic Hydraulic Gradeline analysis revised to incorporate developed flows from future Unit 9 (Phase 6); and
- Revised hydraulic gradeline and inlet analysis for construction plans for Units 7 and 8 (Phase 5).

APS Future School Site

This report more formerly addresses the issue of downstream capacity available to the APS school site (Basin C-1-A). The storm drain collection system, storm drain mainline and temporary retention pond is designed to accept fully developed, free discharge from the proposed APS school site. Under City Work Order #4604.93, WillowWood Phase 4 (Units 7 & 8), a storm drain line has been extended to the APS property for connection of future inlets. It is intended that when the school site is developed, free discharge will be made available and that no additional analysis of downstream capacity be required.

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

WillowWood Unit 9

WillowWood, Unit 9, is under consideration for development. Unit 9 consists of approximately 25 lots and is a cul-de-sac extension of Los Padres Street from Arches Road. Unit 9 is not within the original 98 acre WillowWood Subdivision, but is within Manzano Mesa. The logical outfall for Unit 9 is the WillowWood Subdivision storm drain. The pond and storm drain has been designed to accept fully developed runoff from Unit 9. Under City Work Order #4604.93, WillowWood Phase 4 (Units 7 & 8), a 30" diameter storm drain has been extended to serve Unit 9.

Approval of Unit 9 requires a separate drainage plan submittal. This report recommends free discharge of developed flows from Unit 9 to the WillowWood storm drain.

WillowWood Units 7 & 8

Also included within this revised report are the final design calculations for Units 7 & 8 (Phase 5) construction plans. Included are inlet design calculations and hydraulic gradeline calculations used to determine the HGL shown on the construction plans. Please note that the system has a low point, sump condition, at the north end of Chiricahua Street. 100% of the flows reaching this point must be intercepted. No overflow channel is provided. As a matter of added protection, the storm drain has been designed to greater than the standard 100-year 6-hour design storm. This analysis assumes that a portion (the largest subbasin) of the collection system fails to collect any runoff. This assumption is conservative because, in the event that any of the inlet systems would fail, the additional flow would be partially collected by other downstream inlets. The recommended design provides approximately 150% of the 100-year event. Due to the geometry of the subdivision, and the fact that the sanitary sewer outfalls to the south and the storm drain outfalls to the north, it is proving to be difficult to meet the standard 2 x 100-year design criteria. In light of the adverse conditions, 1.5 times the 100-year appears to be appropriate.

Should you have any questions or need additional information, please call any time. I am available to meet with you to discuss this project at your convenience.

Sincerely,

Rick Beltramo, P.E.
Project Manager

RB/cs
Enclosure

INTRODUCTION AND PROJECT DESCRIPTION

This report is the master drainage report for Willowwood subdivision. Willowwood is a planned residential development of approximately 98 acres, which will be developed in several phases over a period of time. The development is in southeast Albuquerque, as shown on Figure I (Vicinity Map) and Figure II (Location Map). It will consist of approximately 500 single family (R-1) lots when fully developed.

Willowwood is part of a larger master planned area known as Manzano Mesa. Within Manzano Mesa, there is approximately 210 acres zoned for residential use. Manzano Mesa is owned by the Albuquerque Public Schools (APS) which is in the process of subdividing the 98 acre parcel for Willowwood from a larger 210 acre parcel. The 98 acre parcel to be developed into Willowwood is shown in Figure III as Tract D-1. The remaining residential area in Manzano Mesa is shown as Tract D-2 on that Exhibit; it is not included as part of this drainage plan.

Willowwood will be developed in phases, with each phase of development consisting of a final plat for an area of 20 acres or less. It is the intent of the developer to plan the entire 98 acres to be subdivided, and obtain approval of the preliminary plat for the entire 98 acres. They will then prepare a final plat to separate each phase of development from the remaining larger parcel and subdivide it into lots. It is understood that, at the approval stage for each phase of development, the City will require that the infrastructure be guaranteed such that the phase can stand independent of any future planned phases. Figure IV shows the general layout of the entire 98 acre development, including all phases of construction. Figure V shows the layout of the planned first phase of development, which consists of approximately 15.5 acres.

PURPOSE AND SCOPE

The purpose of this Drainage Report is to provide a graphic and written presentation of the proposed grading, drainage and erosion control criteria for the proposed Willowwood subdivisions. The proposed drainage improvements are to be developed in a manner which is in accordance with the regulations of the City of Albuquerque and the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA). The plan studies the existing and developed conditions of Willowwood and analyzes the 100-year, 6-hour storm event and 100-year 10-day duration event.

The scope of the report is to describe the detailed drainage plan for the 98 acre site which is part of the overall Manzano Mesa master plan area. The plan reviews the approved drainage master plan for the site and demonstrates the conformance of the proposed development with that plan. It then describes the plan for the overall development, including the ultimate connection to the future City facilities, as well as the interim plan until those facilities are constructed. Finally, it describes the general drainage and grading proposal for the first subdivision proposed for platting at this time, and shows how it will integrate with subsequent phases, while being able to stand independently of the other phases.

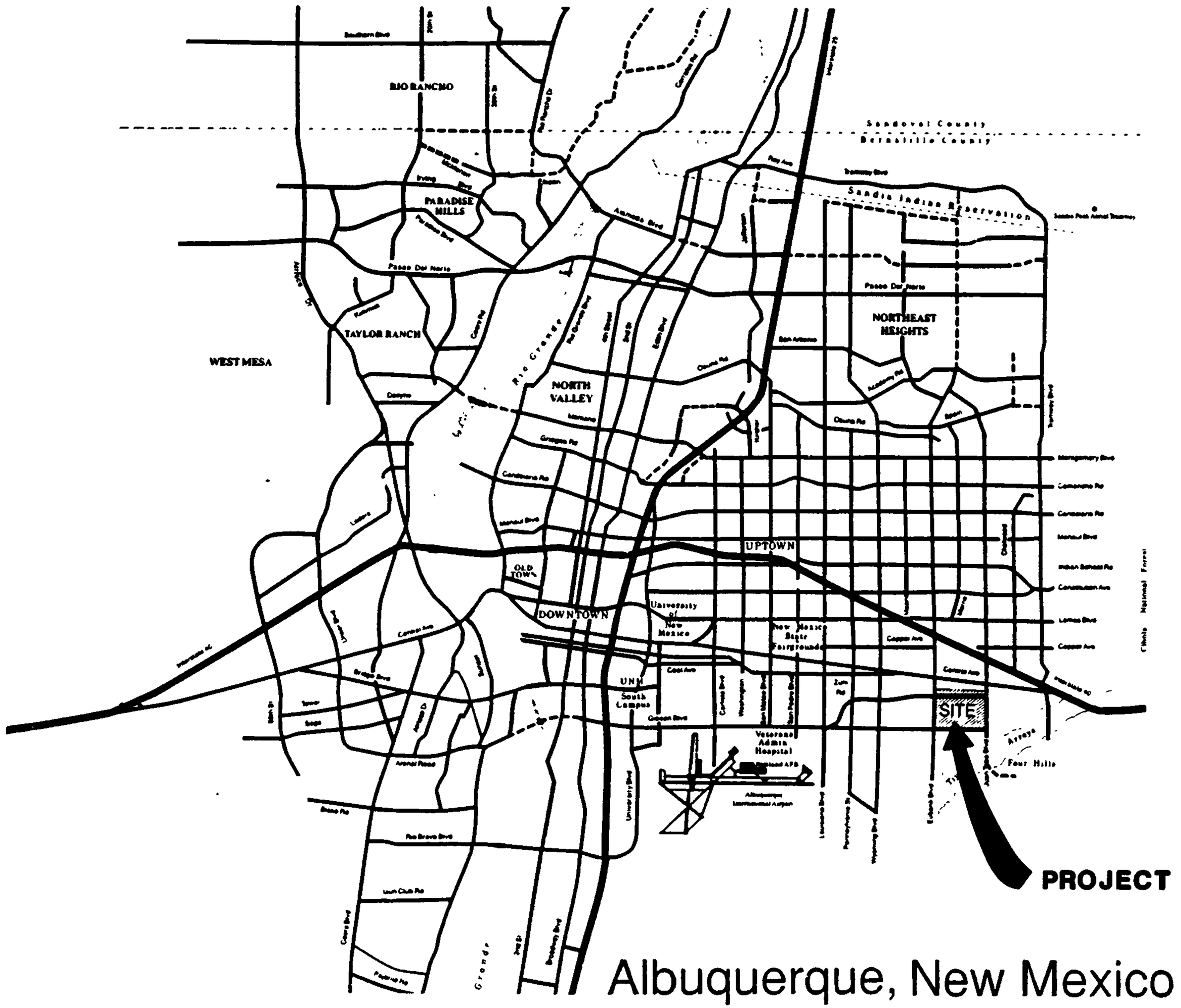
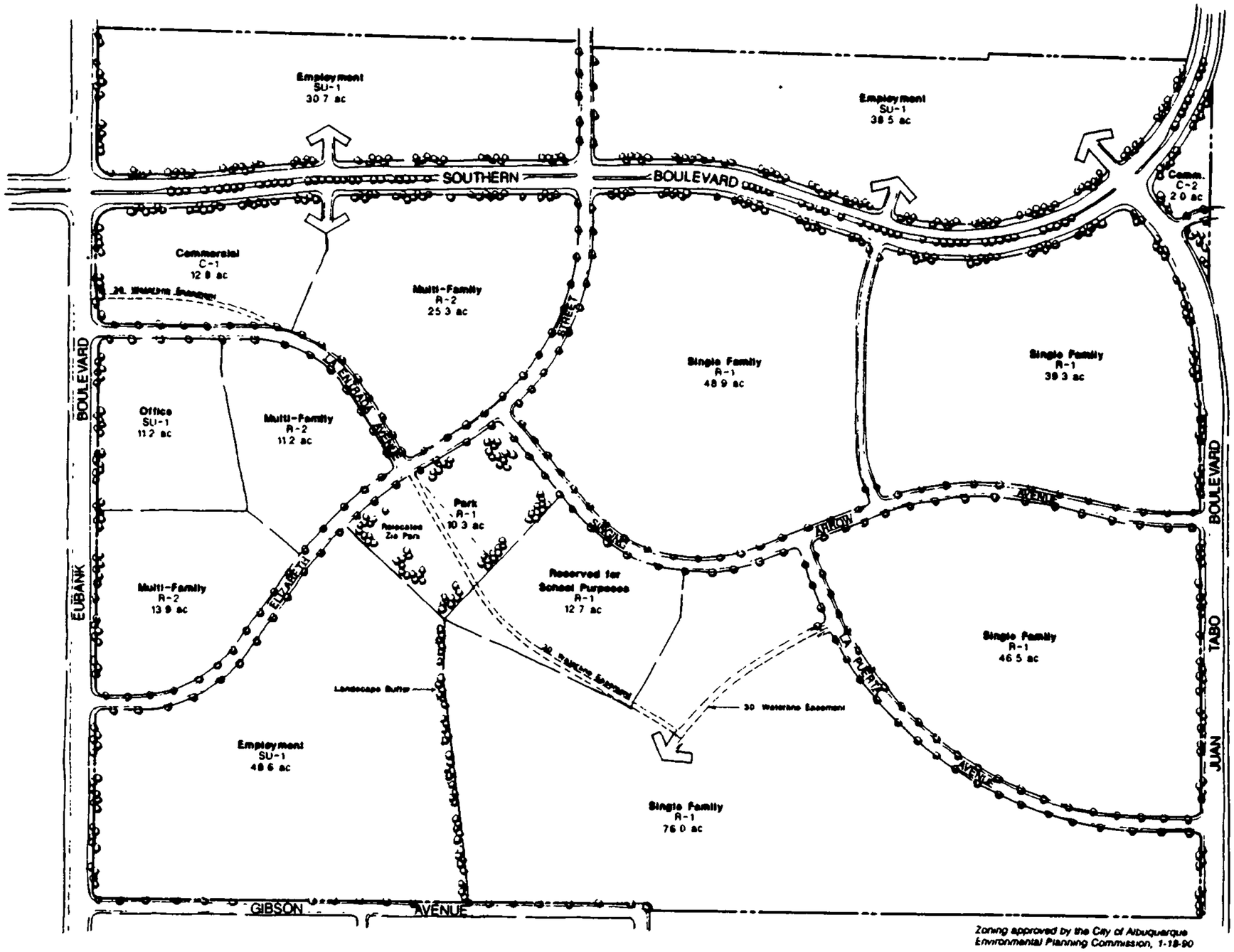


FIGURE I
VICINITY MAP



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

SITE DATA

LAND USE	ZONING	ACRES	DENSITY	UNITS
• Single Family	R-1	210.7	3.5 du/ac	737
• Multi-Family	R-2	50.4	24.0 du/ac	1209
Commercial	C-1	12.8		
Commercial	C-2	2.0		
Office	SU-1	11.2		
Employment	SU-1	117.8		
• Park	R-1	10.3		
• Reserved for School Purposes	R-1	12.7		
• Interior R.O.W.		20.1		
Arterial R.O.W.		32.0		
TOTAL		480.0	(n) 6.38 du/ac (g) 4.05 du/ac	1946

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

MASTER PLAN

Manzano Mesa

ALBUQUERQUE PUBLIC SCHOOLS

9/11/89

0 100 200 400 800
SCALE IN FEET- 1"=200

A. WAYNE SMITH & ASSOCIATES
A Subsidiary of Carnegie Realty
610 GOLD SOUTHWEST #210
ALBUQUERQUE, NEW MEXICO
(505) 764-9801

SMITH HUERTA & ASSOCIATES, INC.
ENGINEERING & CONSTRUCTION CONSULTANTS
317 GRANDE BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87123
PHONE: (505) 292-7293

FIGURE II
LOCATION MAP

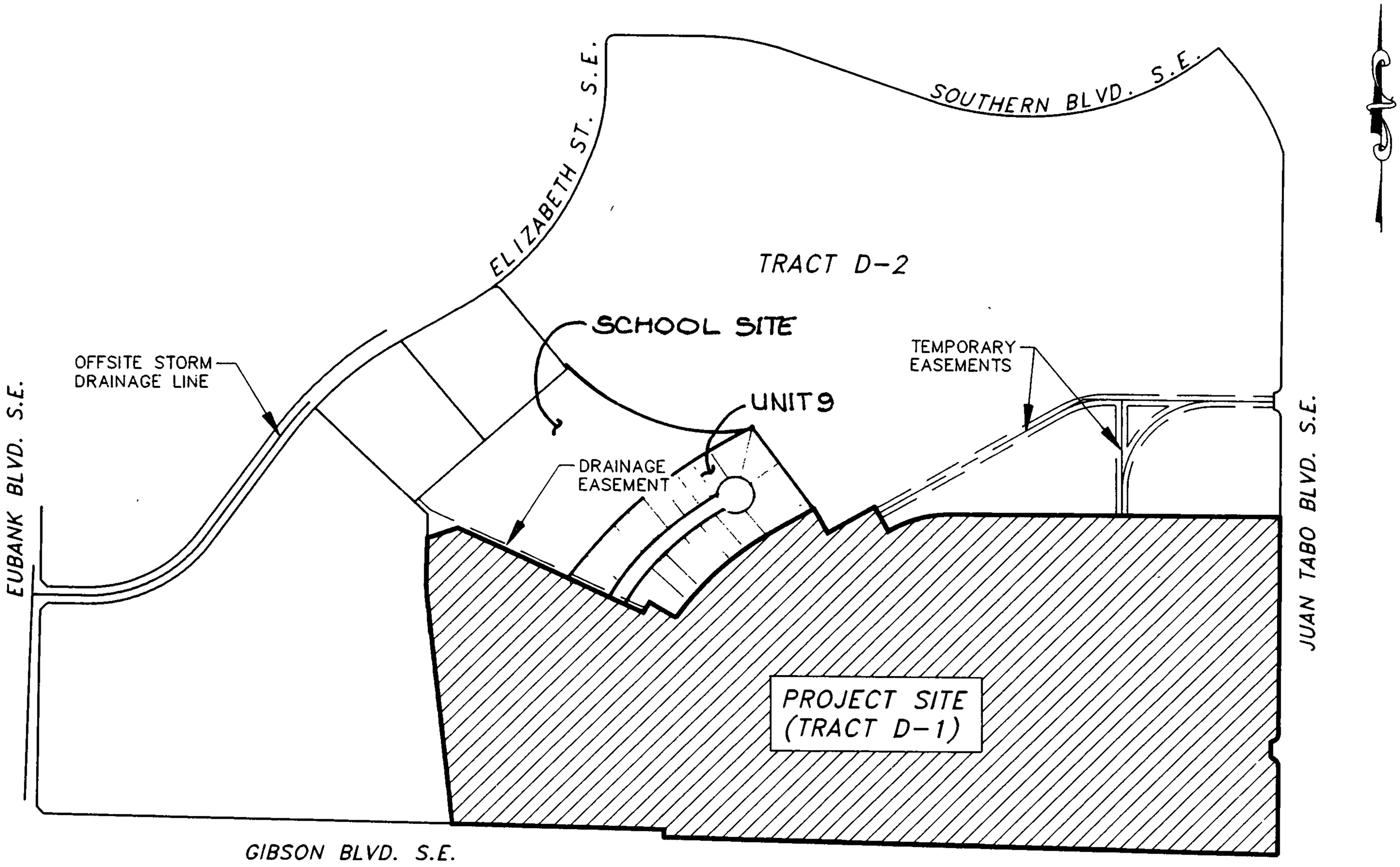


FIGURE III
PROJECT SITE MAP

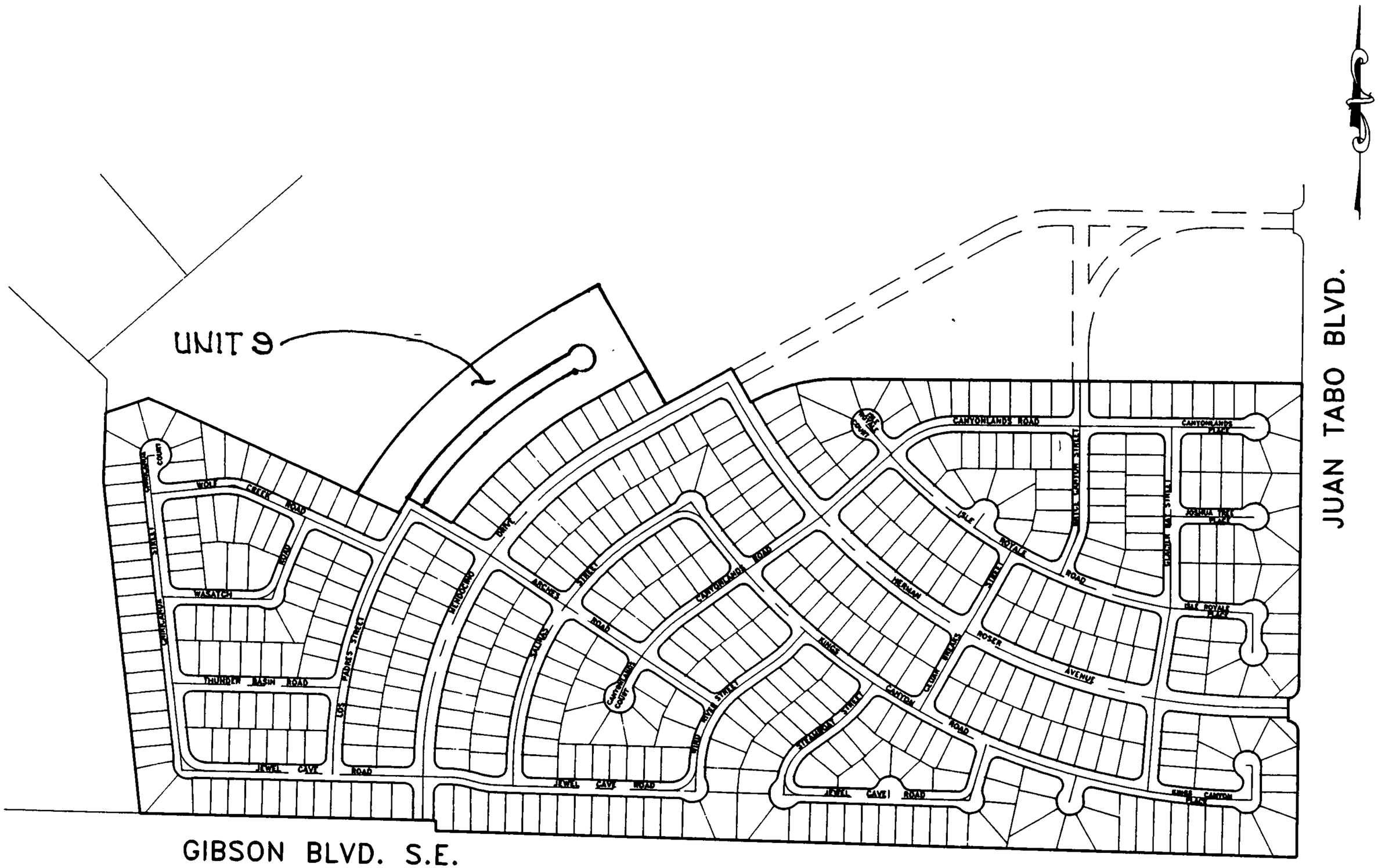


FIGURE IV
WILLOWWOOD LOT LAYOUT
(98 Acres +/-)

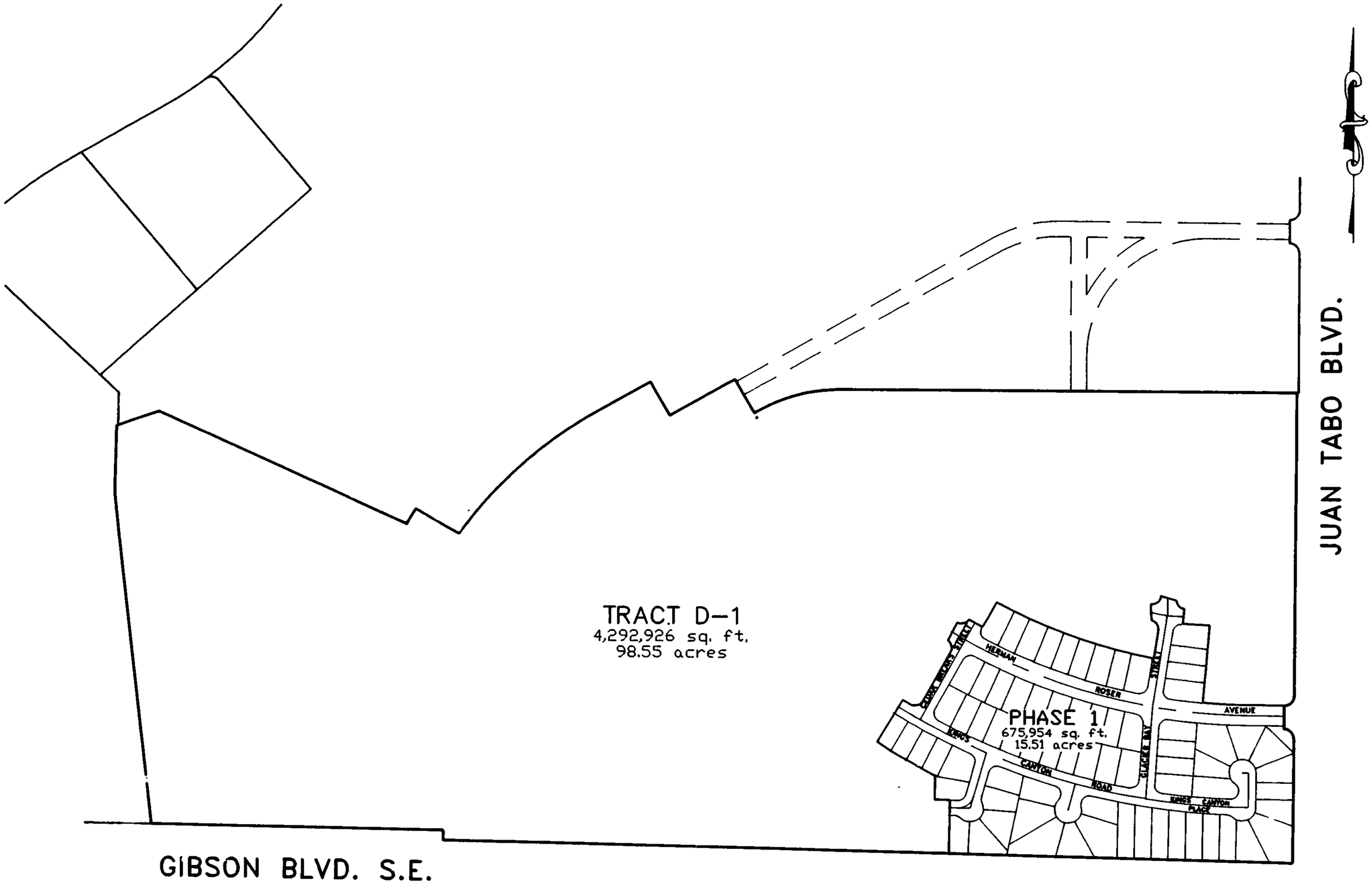


FIGURE V
WILLOWWOOD LOT LAYOUT
PHASE 1 DEVELOPMENT

The plan includes the sizing and capacity analysis for the roads and other drainage facilities needed for all phases of development. Preliminary building pad elevations have been shown for the purpose of determining the locations where retaining walls will be required. Final lot grading is not included for any of the subdivision at this time. Each phase to be platted and developed will require an approved final grading and drainage plan prior to final plat approval. The final grading and drainage plan will include detailed site grading and retaining wall design.

Approval of this Drainage Report shall facilitate Preliminary Plat Approval for 98 acres of residential land within the Manzano Mesa Master plan area. Final platting for each phase will require complete grading plans and backup information to confirm compliance with the criteria established in this report.

SITE LOCATION AND DESCRIPTION

Willowwood subdivision is located in the southeast quadrant of the Manzano Mesa Plan area (see Vicinity map, Figure I). Manzano Mesa is bounded by Juan Tabo on the East; Opportunity Avenue, Shaw Mobile Home Park and Four Hills Mobile Home Park on the South; Eubank Boulevard on the West; and developed commercial properties on the North. The Manzano Mesa Plan area contains approximately 480 acres.

Manzano Mesa has been developed as a master plan area with approximately 261 acres dedicated to residential purposes. Tract D contains approximately 210 acres zoned for R-1 purposes, in those areas shown on Figure II. Willowwood subdivision is planned to constitute 98 acres of this residential area. The area to be developed is shown on Figure III.

The unimproved areas of the site are vegetated with typical native grasses and shrubs. The plant community covers approximately 15 percent of the topsoil surface. The dominant native grasses found on the site include:

Black Gramma	Alkali Sacaton
Sand Dropseed	Bush Muhly
Spike Dropseed	Fluffgrass
Mesa Dropseed	Galleta
Blue Gramma	Indian Ricegrass

The major types of shrubs indigenous to the area are:

Fourwing Saltbrush	Winterfat
Wolfberry	Mormon Tea
Apache-Plume	Chamisa

Site topography is relatively uniform with slopes typically 1.5% from east to west and less than 0.5% from north to south. No significant drainage courses traverse the site.

On-site soils consist mainly of Embudo and Tijeras, which are classified by the Soil Conservation Service as hydrological group "B" soils. The soils units are described by SCS as follows:

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

TgB-Tijeras gravelly fine sandy loam; 1-5% slopes. These are generally deep, well drained soils formed in decomposed granitic alluvium. Runoff and water erosion are moderate.

Figure VI is a reproduction of the SCS soils maps showing the location of the various soils units within the subdivision.

EXISTING DRAINAGE CONDITIONS

An extensive analysis of existing drainage was recently completed as part of the drainage master plan for the 480 acre Manzano Mesa area (Espey, Huston & Assoc., Drainage Master Plan for Manzano Mesa). That study described the existing situation in detail and the reader is referred to that report for an in-depth analysis. The following is a summary of the existing conditions.

Willowwood will be protected from offsite flows originating east of the site by the new storm drain system which was recently constructed in Juan Tabo Boulevard (AMDS Project 2-07-1D). This system was designed to pick up all runoff which previously drained across Juan Tabo Avenue and eventually across the Willowwood site.

The FEMA floodplain maps and the Manzano Mesa drainage master plan identify a number of FEMA floodplains within Manzano Mesa. Although the intent of the new storm drain in Eubank was to eliminate flood potential in this area, a Letter of Map Revision for the area has not yet been issued by FEMA, so any development within the designated floodplains will be subject to those restrictions.

Willowwood is largely outside the area of these floodplains. Exhibit I (the Manzano Mesa Master plan) shows their location, and the majority are north of the development. There is a small area of floodplain at the Juan Tabo entrance to the subdivision which is within the designated floodplain, and it affects 8 of the proposed lots. All other floodplains are north of the area considered by this drainage report.

CLOMR TO BE SUBMITTED BY CITY. JUAN TABO SD

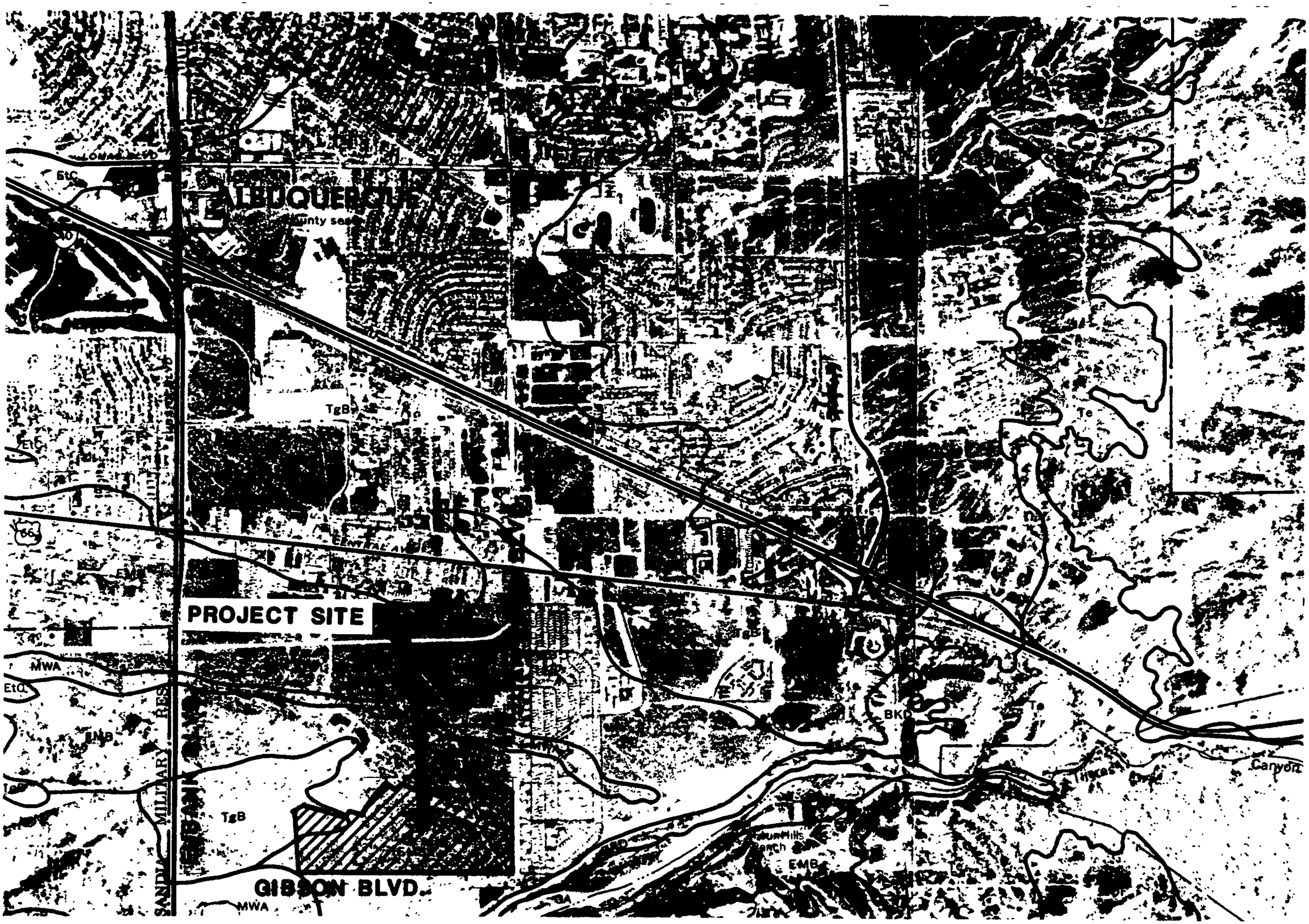


FIGURE VI
SOILS MAP

APPROVED DRAINAGE MASTER PLAN FOR MANZANO MESA

The Drainage master plan for Manzano Mesa specifies that the primary drainage outfall for Willowwood will be the Eubank Storm Drain. Due to the pressing need for this improvement, the project has been programmed for funding in 1995 by way of a $3.45 million bond issue which will be presented to the voters. Assuming the bond issue is approved, construction should follow in 1996. It has been mutually agreed by APS and the City that APS will assist the City on this project by providing financial support. APS has provided a financial guarantee to the City for their equitable portion of the cost of the Eubank system.

The approved, ultimate drainage management plan for Manzano Mesa is provided in the back pocket of this document for review by the reader (Exhibit I). The intent of the plan is to illustrate the drainage management criteria and to outline the infrastructure required to implement the plan when the area is completely developed and all downstream facilities are in place. As shown by the plan, the entire project area will drain to the future Eubank storm drain. It also shows that additional storm drainage facilities are required to convey flows to Eubank. These facilities have been sized for 100-year developed conditions.

City is disch. Eubank

The Manzano Mesa plan identifies the Willowwood area as an individual basin which will drain to the future 72" storm drain in Elizabeth Street near the park site. That plan shows a 100 year peak flow rate of 220 cfs originating from the site and using free discharge to the storm drain. The Willowwood drainage plan is developed in compliance with the criteria established in the master plan, for the ultimate condition. However, since the downstream facilities are not yet constructed, interim measures will be needed to handle the runoff.

INTERIM OUTFALL PLAN FOR OVERALL WILLOWWOOD DRAINAGE

Willowwood's drainage is designed to have uncontrolled discharge to the future Elizabeth Street and Eubank systems. This plan is in conformance with existing City policy which discourages ponding of stormwater runoff. However, Mayor Saavedra has issued a notice of Emergency Rule for temporary retention ponding which applies in this case. This rule allows temporary ponding of runoff until downstream capacity is obtained. This Emergency Rule is particularly pertinent in this instance, where the developer of the property (APS) has provided financial guarantees for their share of the downstream infrastructure. A copy of the Notice of Emergency Rule is contained in Appendix A.

The Emergency Rule directs that retention ponding be designed for the 100 year, 10 day storm, to provide additional safety over the 6-hour storm used for discharging facility design. From our meetings with City staff, we have come to the agreement on several other criteria for the temporary retention pond for this development.

1. City staff has expressed a preference for a single pond for the entire development, rather than multiple ponds developed in concert with each phase of development. Based on these discussions, a singe pond will be located near the future point of discharge to the Elizabeth Street Storm Drain.

   Further, staff has requested the developer to provide assurances that the remaining residential area could be developed without constructing a second pond within Manzano Mesa. The reason for this is that if the Eubank system is delayed for some time, staff would like to be sure the remaining 112 acre parcel could be required to expand the Willowwood pond if it were to develop, and use that expanded pond for its outfall. The Willowwood pond will use only a portion of the designated park area, and the pond could be expanded into the remaining area to accommodate the remaining R-1 area. In order to use the adjacent area for a temporary pond, permission from the city would be required.

   The pond for Willowwood will be located on the southern park site as shown on Exhibit IV. This site is currently owned by the City, but they have agreed to trade the parcel to APS for the northern site. The pond will be located south of the waterline easement which crosses the northern part of the site, as shown on Exhibit IV.

2. Staff expressed the need for a guarantee for the maintenance and operation of the pond. They preferred adequate financial guarantees, or that a public agency guarantee the maintenance. APS has agreed to be ultimately responsible for the maintenance, operation, and reclamation of the pond.

3. Approval of the temporary retention pond has been granted by the State Engineer's office.

WILLOW WOOD
PROPOSED PHASING PLAN

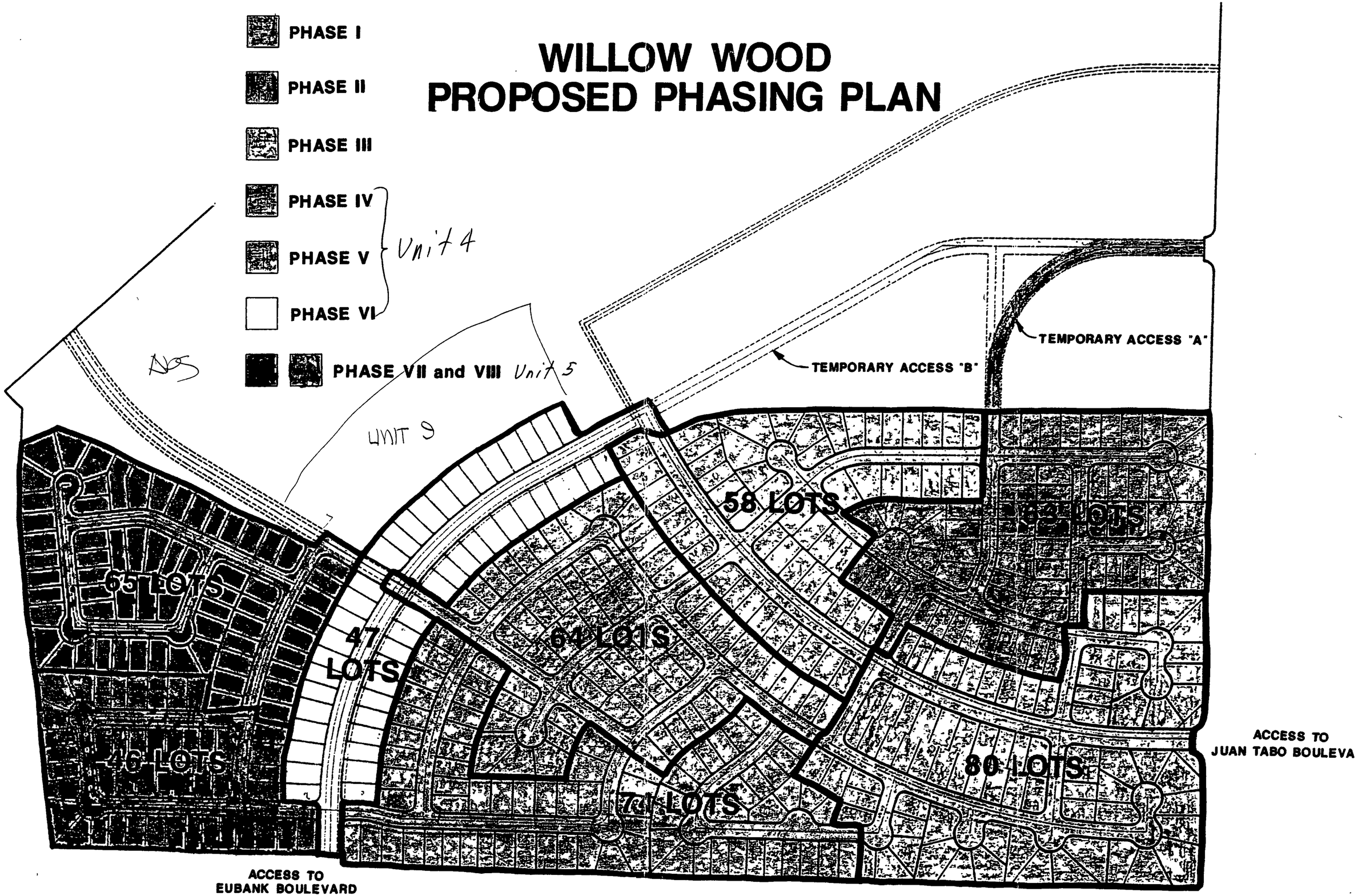


FIGURE VII

The internal hydrology was developed using the current version of AHYMO, in accordance with the interim City guidelines. Street and storm drain capacities are based on Manning's formula, as described in the Development Process Manual. Computations are included in Appendix C.

This overall drainage plan provides a preliminary design for the streets and internal grading of the subdivision. It sets the parameters under which public infrastructure and private lot grading will be designed, but it is not a substitude for the final grading plan for each development, which will have to be submitted to City staff for review and approval on each phase.

EXTERNAL PROPERTIES

Properties outside the WillowWood subdivision are identified which to be served by the subdivision storm drain improvemnets. These areas currently are undeveloped basins which drain through Willow Wood. The same areas are planned to be developed at some time as the future APS future school site and as Willow Wood, Unit 9.

APS Future School Site

The masterplanned facilities and temporary retention pond have been designed to accept fully developed runoff from the future school site. The design allows for the school site to discharge into the storm drain at the southwest corner of the school site or directly into the retention pond. A pipe has been extended to the school site for future storm drain connections.

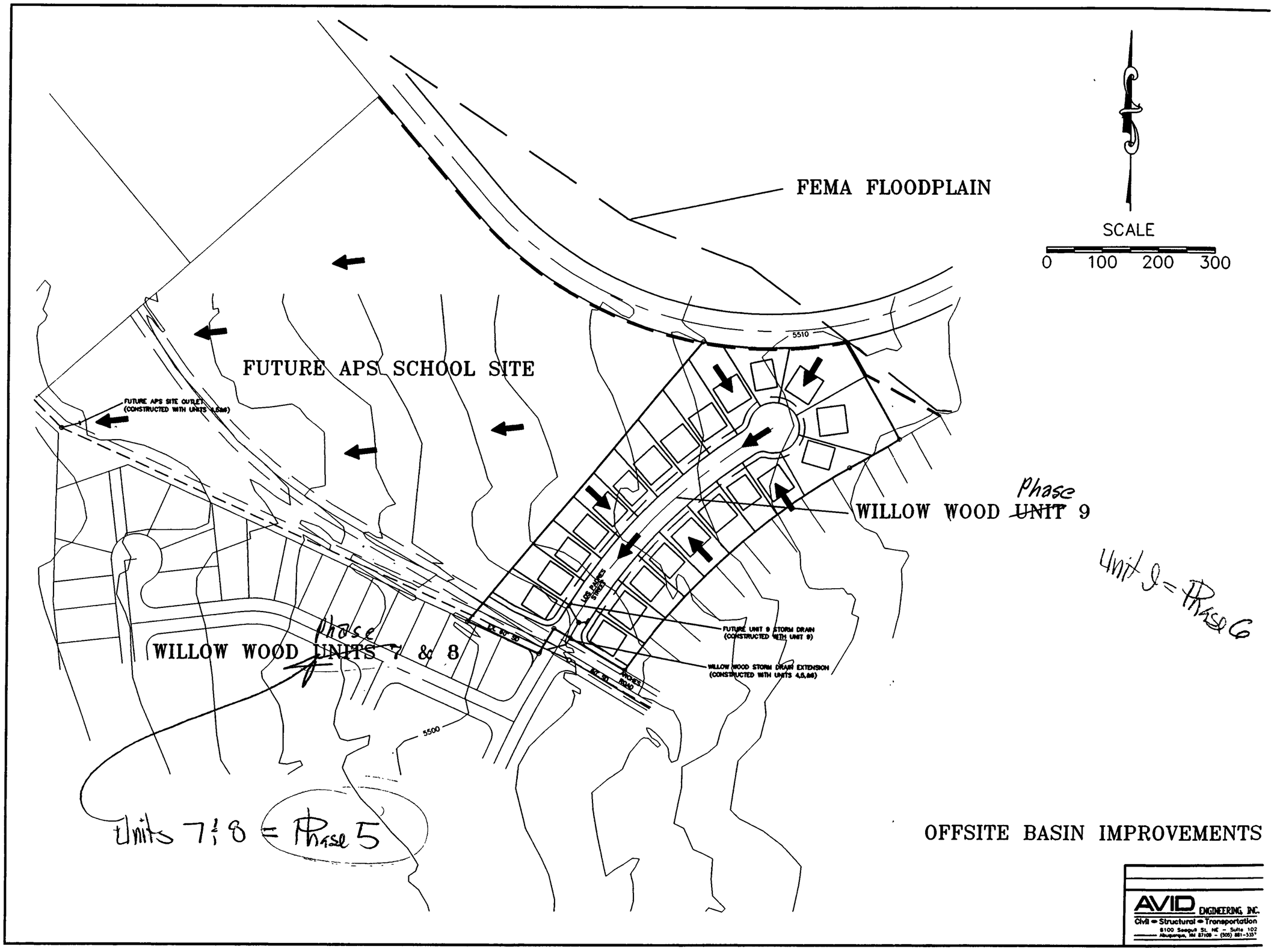
By this report free discharge is allowed from the school site into the WillowWood storm sewer system and retention pond. Future hydrologic or hydrologic analysis is not required.

Willow Wood, Unit 9

Recently areas outside the 98 Acre WillowWood subdivision, but within the Manzano Mesa masterplan, have been submitted for sketch plat review as "WillowWood, Unit 9". This proposed subdividion is an extension of Los Padres Street, north from Arches Road. This report allows free discharge of developed runoff from Unit 9. A 30" diameter storm drain has been constructed and extended to the boundary for this purpose. It is intended that no additional hydrology or storm drain analysis be required in the future to demonstrate downstream capacity. However submittals for the grading plan and storm drain analysis will be required. Approval is subject to resolution of floodlpain issues and other plat issues.

PHASING

Figure VII is a conceptual plan for the phasing of the subdivision. This represents a "best guess" of how the project will proceed, with each Unit being a separate platting action. However, the exact configuration and size of each Unit will depend on market forces and other factors. Therefore, the development of each phase of the project will require an update to this plan showing the grading and drainage design.



OFFSITE BASIN IMPROVEMENTS

AVID ENGINEERING, INC.
Civil • Structural • Transportation
8100 Seagull St. NE - Suite 102
Albuquerque, NM 87109 - (505) 881-1337

SUMMARY

1. Willowwood subdivision is being developed in conformance with the approved master plan developed for the area by APS, and approved by the City in 1991.

2. Since downstream facilities are planned but not yet in place, the Emergency Rule is appropiate and will be used to allow temporary retention ponding of the storm runoff.

3. The temporary retention pond will be in compliance with all state regulations, and adequate provision has been made for its safety, operation and maintenance.

4. The overall plan for the subdivision's internal drainage is in conformance to the City Development Process Manual. Major conveyances have been properly sized and located to permit the subsequent design of the final grading for each phase of development.

5. Financial guarantees for the required downstream infrastructure have been provided.

RECOMMENDATIONS

1. That this document serve as the basis for approval of the preliminary plat for Willowwood Subdivision. The preliminary plat is for the entire 98 acre development.

2. That the approval process for each phase of Willow Wood require a complete grading and drainage plan approval prior to final plat sign-off. The purpose of the detailed grading and drainge plan will be to assure compliance with the plan.

3. That free discharge of developed flows be allowed from the APS future school site, either to the storm drain or directly to the retention pond, at APS option. It is intended that no additional analysis be required to demonstrate downstream capacity.

4. That Unit 9 be allowed free discharge or developed flows to the 30" storm provided. It is intended that no additional analysis be required to demonstrate downstream capacity.

REFERENCES

DEVELOPMENT PROCESS MANUAL, VOLUME II, City of Albuquerque, Chapter 22

SOIL SURVEY OF BERNALILLO COUNTY, NEW MEXICO, U.S. Soil Conservation Service

ALBUQUERQUE MASTER DRAINAGE STUDY, VOLUME II, Bohannan-Huston Inc.

JUAN TABO STORM DRAIN DESIGN ANALYSIS REPORT, for the City of Albuquerque Public Works Department, Holmes and Narver, June 26, 1989

ALBUQUERQUE MASTER DRAINAGE STUDY - RESTUDY, Volume II, Bohannan-Huston Inc.

DESIGN ANALYSIS REPORT, EUBANK STORM DRAINAGE SYSTEM 201-03C, Scanlon & Associates, December 1983

DRAINAGE MASTER PLAN FOR MANZANO MESA, Espey, Huston and Associates, Inc., 1990

HYDROLOGIC MODELING AND DRAINAGE CRITERIA - USING THE AHYMO COMPUTER PROGRAM, Short Course Manual, UNM, 1992

APPENDIX A

INFRASTRUCTURE LIST
REVISION MARCH 1994

D.R.B. Case No. 92-106
S-92-22
D.R.C. Project No. 92-0106
Date Submitted July 30, 1992
Submitted by: Avid Engineering
By: [signature]
REVISIONS 3-2-93, SHTS 2&5
REVISIONS 4-4-94, SHTS 7,8,9 & 10

Figure II

EXHIBIT "D"
to Subdivision Improvements Agreement

DEVELOPMENT REVIEW BOARD (D.R.B.)
REQUIRED INFRASTRUCTURE LISTING
for WILLOWWOOD SUBDIVISION
for PRELIMINARY PLAT APPROVAL
UNITS I THROUGH VIII

JULY 30, 1992

Following is a summary of Public/Private Infrastructure required to be constructed or financially guaranteed to be constructed for the above development.

UNIT I

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving *				
A. 28' Residential paving, standard curb & gutter, 4' sidewalk. (BOTH SIDES)	Glacier Bay	Isle Royale	Kings Canyon	Interior Residential streets. Approximately 1550 LF
	Kings Canyon Place	Cul-de-sac	Glacier Bay	
	Kings Canyon Road	Glacier Bay	800 ~~500~~' west of Glacier Bay	
	Jewel Cave	Kings Canyon	200' South OF KINGS CANYON	
B. 40' Residential paving, standard curb & gutter, 4' sidewalk. BOTH SIDES	Herman Roser	Juan Tabo	600' west of Glacier Bay	Approximately 950 LF
C. 6' SIDEWALK	JUAN TABO	HERMAN ROSER	SOUTH P/L	

Figure II
EXHIBIT "D"
Page 2

UNIT I

ITEM	LOCATION	FROM	TO	DESCRIPTION
2. Sanitary Sewer				
A. 8" sanitary sewer.	Glacier Bay Kings Canyon Place Jewel Cave Kings Canyon Wind River Jewel Cave Herman Roser	Isle Royale Cul-de-sac Kings Canyon Wind River Jewel Cave Mendocino Glacier Bay	Kings Canyon Glacier Bay 200' South Glacier Bay Herman Roser Wind River Wind River	Approximately 3850 LF
B. 10" Sanitary Sewer	Mendocino	Jewel Cave	Gibson	Approximately 160 LF
C. 10" Sanitary Sewer: (Offsite)	Gibson	Mendocino	Existing MH	Approximately 600 LF
3. Water Lines				
A. 6" Waterline	Glacier Bay Kings Canyon Place Kings Canyon Road Herman Roser Jewel Cave ~~Wind River~~ ~~JEWEL CAVE~~ Joshua Tree	~~Isle Royale~~ Joshua Tree 3/2/93 Cul-de-sac Glacier Bay Wind River Kings Canyon ~~Herman Roser~~ ~~WIND RIVER~~ Glacier Bay	Kings Canyon Glacier Bay ~~Wind River~~ Steamboat St 3/2/93 ~~Glacier Bay~~ JUAN TABO EXISTING 8" CI 200' South and 50' West ~~Kings Canyon~~ ~~JEWEL CAVE~~ 3/2/93 ~~MENDOCINO~~ ~~(EXISTING 10" PVC)~~ 3/2/9 Juan Tabo 3/2/93	~~Approximately 3430 LF~~

UNIT I

ITEM	LOCATION	FROM	TO	DESCRIPTION
4. Drainage				
A. Drainage Pond	Tract F (APS OWNED)			Excavated for Unit I Drainage. Includes conveyance channel.
B. Storm Drain: 78"*	Elizabeth Street	Park site	Eubank	Guaranteed by APS
5. Miscellaneous				
A. Street Trees	Juan Tabo	Herman Roser	500 Feet South	
B. Retaining Walls	Throughout Subdivision			Approximately 380 LF

NOTES:
1). Waterlines include valves, fittings and services.
2). Sanitary Sewer lines include manholes and services.
3). Storm drains include manholes, inlets and 24" connector pipe.
4). Paving items include street lighting

NOTES APPLY TO UNITS I THROUGH VIII

* Deferred: To be constructed upon the earlier of construction of the Eubank Storm Drain System AMDS (Project 2-03-18) or development adjacent to Elizabeth Street or development requiring paving improvements in Elizabeth Street.

Figure II
EXHIBIT "D"
Page 4

UNIT II

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving				
A. 26' Residential paving, standard curb & gutter, 4' sidewalk (BOTH SIDES)	Canyonlands Place Joshua Tree Place Isle Royale Place	Cul-de-sac Cul-de-sac Cul-de-sac	Glacier Bay Glacier Bay Glacier Bay	
B. 28' Residential paving, standard curb & gutter, 4' sidewalk (BOTH SIDES)	Canyonlands Road Isle Royale Glacier Bay Bryce Canyon	Bryce Canyon 103' W. of Wind River Canyonlands Isle Royale	Canyonlands Place Glacier Bay Isle Royale N. Property Line	Approximately 2700 LF
C. Temporary Access Pavement (28' wide)	Easement	Bryce Canyon	Juan Tabo	Approximately 950 LF
D. 6' SIDEWALK	JUAN TABO	ROSER	N. PROP LINE	
2. Sanitary Sewer				
A. 8" sanitary sewer	Canyonlands Road Isle Roayle Canyonlands Place Joshua Tree Place Isle Royale Place Glacier Bay Bryce Canyon Wind River	Bryce Canyon Wind River Cul-de-sac Cul-de-sac Cul-de-sac Canyonlands Isle Royale Isle Royale	Canyonlands Place Glacier Bay Glacier Bay Glacier Bay Glacier Bay Isle Royale ~~Canyonlands~~ NORTH PROPERTY LINE Herman Roser	Approximately 2900 LF

Figure II
EXHIBIT "D"
Page 5

UNIT II

ITEM	LOCATION	FROM	TO	DESCRIPTION
3. Water Lines	Glacier Bay	Joshua Tree	Canyonlands PL	3/2/93
A. 6" Waterline	Canyonlands Road	Bryce Canyon	Canyonlands Place	~~Approximately 3050 LF~~
	Isle Royale	Wind River	Glacier Bay	
	Canyonlands Place	Cul-de-sac	Glacier Bay	
	~~Joshua Tree Place~~	~~Cul-de-sac~~	~~Glacier Bay~~	3/2/93
	~~Glacier Bay~~ ISLE ROYALE	Cul-de-sac	Glacier Bay	
	Bryce Canyon N. P/L	~~Canyonlands~~	Isle Royale	
	~~Wind River~~ ~~GLACIER BAY~~	~~Isle Royale~~	~~Canyonlands~~	3/2/93
	WIND RIVER	Isle Royale	Herman Roser	
	20' PUBLIC W/L EASEMENT	CANYONLANDS PLACE	JUAN TABO	
4. Drainage				
A. Drainage Pond	Tract F (APS OWNED)			Excavate to full depth (33 A-F) includes conveyance to pond.
5. Miscellaneous				
A. Retaining Walls	Throughout Subdivision			Approximately 120 LF
B. Street Trees	Juan Tabo	Herman Roser	900' North	

UNIT III

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving *				
A. 28' Residential paving, standard curb & gutter, 4' sidewalk. (BOTH SIDES)	Canyonlands Road	Bryce Canyon	100' South of Herman Roser	Approximately 2700 LF
	Wind River	Isle Royale	100' South of Herman Roser	
	Isle Royale	Canyonlands	100' WEST Wind River	
	Canyonlands Court	~~Beginning~~ CUL DE SAC	~~End~~ CANYONLANDS	
B. 40' Residential paving, standard curb & gutter, 4' sidewalk. BOTH SIDES	Herman Roser	200 East of Wind River	Wind River	Approximately 600 LF
	Herman Roser	Canyonlands	Mendocino	
C. 6' SIDEWALK	BLOCK 9	WIND RIVER	CANYONLANDS	
2. Sanitary Sewer				
A. Sanitary Sewer 8"	Mendocino	Jewel Cave	Herman Roser	Approximately 3280 LF
	Canyonlands	Bryce Canyon	Kings Canyon	
	Kings Canyon	Salinas	Canyonlands	
	Salinas	Jewel Cave	Kings Canyon	
	Isle Royale Court	Beginning	End	
	Herman Roser	Canyonlands	Mendocino	
3. Water Lines				
A. 6" water line	Canyonlands Road	Bryce Canyon	100' South of Herman Roser	Approximately 1520 LF
	Isle Royale Court	~~Beginning~~ CANYONLANDS RD	End OF CUL DE SAC	
	Herman Roser	Canyonlands	Mendocino	

UNIT III

ITEM	LOCATION	FROM	TO	DESCRIPTION
4. Storm Drain	DELETE FROM UNIT III AND ADDED TO UNIT IV			
* ~~A. 78"~~	~~Easement~~	~~Pond~~	~~Elizabeth~~	~~Approximately 600 LF~~ (Future Elizabeth Street connection)
* ~~B. 60" & 72"~~	~~Drainage Easement~~ and Arches	~~Salinas~~	~~Pond~~	~~Approximately 2200 LF~~
* ~~C. 54"~~	~~Arches~~	~~Canyonlands~~	~~Salinas~~	~~Approximately 300 LF~~
* ~~D. 42"~~	~~Canyonlands~~	~~Arches~~	~~Herman Roser~~	~~Approximately 700 LF~~
* ~~E. 24"~~	~~Canyonlands~~	~~Herman Roser~~	~~Isle Royale~~	~~Approximately 350 LF~~

Figure II
EXHIBIT "D"
Page 8

UNIT IV

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving *				
A. 28' Residential paving, standard curb & gutter, 4' sidewalk. (BOTH SIDES)	Canyonlands Court	CUL DE SAC ~~Beginning~~	ARCHES ~~End~~	Approximately 3350 LF
	Arches Road	Mendocino	Wind River	
	Salinas Street	Arches	Kings Canyon	
	Canyonlands Road	Arches	100' South of Herman Roser	
	Kings Canyon	Salinas	50' East of Steamboat	
	Wind River	Arches	100' South of Herman Roser	
2. Sanitary Sewer				
A. 8" Sanitary Sewer	Canyonlands Road	Arches	Kings Canyon	Approximately 750 LF
	Arches	Salinas	Canyonlands	
	Canyonlands Court	~~Beginning~~ ARCHES	End OF CUL DE SAC	
3. Water Line				
A. 6" water line	Arches Road	Mendocino	Wind River	
	Salinas Street	Arches	Kings Canyon	
	Canyonlands Road	Arches	100' South of Herman Roser	
	Kings Canyon	Salinas	Canyonlands	
	~~Wind River~~	~~Arches~~	~~Kings Canyon~~	
	Canyonlands Court	~~Beginning~~ ARCHES	End OF CUL DE SAC	
4. Drainage				
~~A. 24" Storm Drain~~	Kings Canyon	Canyonlands	Cedar Breaks	Approximately ~~350 LF~~
* B. 78"	~~EASEMENT~~	POND	ELIZABETH	Approximately 600 LF
* C. 60" & 72"	ARCHES + EASEMENT	SALINAS	POND	2200 LF
* D. 54"	ARCHES	CANYONLANDS	SALINAS	300 LF
* E. 42" & 24"	CANYONLANDS	ARCHES	KINGS CANYON	700 LF

* ITEMS DELETED FROM UNIT III

UNIT V

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving *				
A. 28' Residential. paving, standard curb & gutter, 4' sidewalk. (BOTH SIDES)	Jewel Cave	Mendocino	Wind River	Approximately 2530 LF
	Salinas Street	Jewel Cave	Arches	
	Wind River	Jewel Cave	Arches	
	Jewel Cave	Steamboat	200' south of Kings Canyon	
	Steamboat	Kings Canyon	Jewel Cave	
2. Sanitary Sewer				
A. 8" sanitary sewer.	Jewel Cave	Steamboat	200' South of Kings Canyon	Approximately 1200 LF
	Steamboat	Kings Canyon	Jewel Cave	
20' PUBLIC	Easement	Wind River	Steamboat	
3. Water Lines				
A. 6" water line.	Jewel Cave	Mendocino	Wind River	Approximately 2530 LF
	Salinas Street	Jewel Cave	Arches	
	Wind River	Jewel Cave	Arches	
	Jewel Cave	Steamboat	200' South of Kings Canyon	
	~~Steamboat~~ STEAMBOAT	~~Kings Canyon~~ KINGS CANYON	Jewel Cave	
4. Miscellaneous				
A. Retaining Walls	Throughout Subdivision			Approximately 1000 LF
5. DRAINAGE				
A. 30" STORM DRAIN	ARCHES RD	CANYONLANDS ST (RD)	WIND RIVER	
B. 30" STORM DRAIN	WIND RIVER ST	ARCHES ROADS	JEWEL CAVE RD.	
C. 30" STORM DRAIN	JEWEL CAVE RD ALLEY			APPROXIMATELY 200 LF

Figure II
EXHIBIT "D"
Page 10

UNIT VI

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving				
A. 40' Residential paving, standard curb & gutter, 4' sidewalk. BOTH SIDES	Mendocino	Gibson AVE	Herman Roser	Approximately 1740 LF
B. Temporary Access (28' wide)	Easement	Mendocino	Juan Tabo	Approximately 1400 LF
C. TEMP INTESECTION CONFIG	EASEMENT INTERSECTION			
2. Water Line				
A. 6" water line.	Mendocino	Arches	Herman Roser	Approximately 900 LF
3. Drainage				
A. 30" storm drain.	Mendocino	Arches	50' ~~250'~~ South	Approximately 50 ~~250~~ LF

UNIT VII

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving				
A. 28' Residential paving, standard curb & gutter, 4' sidewalk. (BOTH SIDES)	Chiricahua Street	Wolf Creek	Thunder Basin	Approximately 2490 LF
	Wasatch Road	Chiricahua	Wolf Creek	
	Chiricahua Court	Wolf Creek	~~North End~~ CUL DE SAC	
	Wolf Creek Road	Chiricahua	Los Padres	
	Los Padres Street	Thunder Basin	Arches	
	Arches Road	Los Padres	Mendocino	
2. Sanitary Sewer				
A. 8" sanitary sewer.	Chiricahua Street	Wolf Creek	Jewel Cave	Approximately 3570 LF
	Wasatch Road	Chiricahua	Wolf Creek	
	Chiricahua Court	Wolf Creek	~~North~~ End OF CUL DE SAC	
	Wolf Creek Road	Chiricahua	Los Padres	
	Los Padres Street	Thunder Basin	Arches	
	Thunder Basin	Los Padres	Chiricahua	
	Easement	Gibson	Chiricahua	
3. Water Lines				
A. 6" water line.	Chiricahua Street	Wolf Creek	Thunder Basin	Approximately 3810 LF
	Wasatch Road	Chiricahua	Wolf Creek	
	Chiricahua Court	Wolf Creek	~~North~~ End OF CUL DE SAC	
	Wolf Creek Road	Chiricahua	Los Padres	
	Los Padres Street	Jewel Cave	Arches	
	Arches Road	Los Padres	Mendocino	
	Thunder Basin	Los Padres	Chiricahua	
4. Drainage				
A. 60" & 54" storm drain.	Chiricahua	Wasatch	Pond	Approximately 600 LF
5. Miscellaneous				
A. Retaining Wall	South Boundary			Approximately 480 LF

Figure II
EXHIBIT "D"
Page 12

UNIT VIII

ITEM	LOCATION	FROM	TO	DESCRIPTION
1. Paving *				
A. 28' Residential paving, standard curb & gutter, 4' sidewalk. BOTH SIDES	Chiricahua Street Thunder Basin Jewel Cave Los Padres Street GIBSON	Thunder Basin Chiricahua Chiricahua Jewel Cave MENDOCINO	Jewel Cave Los Padres Mendocino Thunder Basin W. PROP LINE **	Approximately 1820 LF
2. Sanitary Sewer				
A. 8" sanitary sewer.	Jewel Cave Los Padres Street	Chiricahua Jewel Cave	Mendocino Thunder Basin	Approximately 800 LF
3. Water Lines				
A. 6" water line.	Chiricahua Street Jewel Cave	Thunder Basin Chiricahua	Jewel Cave ~~Los Padres~~ MENDOCINO	Approximately 700 LF
4. Drainage				
A. 42" storm drain.	Chiricahua	Jewel Cave	Wasatch	Approximately 520 LF
5. Miscellaneous				
A. Retaining Walls	Throughout Subdivision			Approximately 600 LF

* TEMP TURNAROUNDS W TEMP C+G AS REQ'D

** 16' ~~40'~~ PAVEMENT, C+G, ~~4' SIDEWALK~~
(NORTH SIDE ONLY)

3/2/93 Certification for Grading includes retainning walls & private drainage improvems required for Financial Guarantee Release. Financial Guarantees are not required for Misc. items

DRB-92-106
S-92-22

WILLOWWOOD SUBDIVISION
INFRASTRUCTURE LIST
JULY 28, 1992
FOR PRELIMINARY PLAT APPROVAL

Approved on 8-4-92. by the Development Review Board

Jack Cloud — 8-4-92 — 3-2-93
Planning Department — Date

Robert W. Kane — 8-4-92 — RWK 3-2-93
Utility Development Division, City Engineer — Date

[illegible] — 8-04-92 — TD-3.02-93
Transportation Development Division, Traffic Engineer — Date

Julie M. Stone — 8/4/92 — JMS 3/2/93
Parks and Recreation Department — Date

Fred J. Cizquin — 8/4/92 — 3/2/93
City Engineer/AMAFCA — Date

APPENDIX B

NOTICE OF EMERGENCY RULE / RETENTION PONDING

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE

REF. NO._____

February 28, 1991

TO: Louis E. Saavedra, Mayor

FROM: Robert E. Gurule, Director, Public Works Department REG

SUBJECT: NOTICE OF EMERGENCY RULE/RETENTION PONDING

At the request of Mr. Kevin Murphy, the Hydrology Division has prepared a Notice Of Emergency Rule for your consideration. The purpose of this Emergency Rule is to formalize the City's policy.

Under the City's policy, retention ponding is allowed on a temporary basis only. We have found that the permanent retention ponds, a policy of the 1970's, became mosquito breeding areas and quickly failed as they became clogged with silt. We remedied this by allowing retention ponding as a temporary solution until proper drainage facilities were installed.

The DPM Steering Committee has created a drainage sub-committee to look into the retention pond question. The committee consists of private and public engineers and one professor from the university. The members are:

Dr. Richard Heggen, Civil Engineering Professor, UNM
Chuck Easterling, P.E., Easterling & Associates, Inc.
Brian Burnett, P.E., Bohannan-Huston, Inc.
Dwayne Sheppard, P.E., Public Works Department
Bob Foglesong, P.E., Bernalillo County Public Works
Cliff E. Anderson, P.E., AMAFCA
Fred Aguirre, P.E., Public Works Department

With the issuance of this Emergency Rule, we can approve plans which require retention on a temporary basis without creating a burden on the development community or the City. This rule will serve until the drainage sub-committee recommendations are adopted by the DPM Steering Committee.

Concur:

Walter H. Nickerson, Jr., P.E.

Concur:

Daniel W. Hogan 3/1/91

Daniel W. Hogan, P.E.

xc: Kevin Murphy

FJA:REG/bsj

NOTICE OF EMERGENCY RULE

Pursuant to Article XI, Chapter 7 of the Revised Ordinances of Albuquerque, 1974:

I, Louis E. Saavedra, Mayor of the City of Albuquerque, have determined that there are urgent and compelling reasons to include certain rules in the Development Process Manual relating to the Minimum Standards for the design of Subdivisions.

This modification of rules is necessary to preclude possible inaccuracies and inconsistencies in the application of certain design criteria for the design of drainage management and flood control systems within the platting and planning jurisdiction of the City of Albuquerque.

I, therefore, declare that the following modifications to the Development Process Manual of the City of Albuquerque shall become effective immediately:

Volume II, of the Development Process Manual shall be modified as follows:

Chapter 22, page 7. Expand part C.3. to include the following:

All Detention ponds must be evacuated in 24 hours or less. Ponds that take more than six hours to drain will be designed for a 24 hour storm. Credit for evacuation by means of percolation will not be taken into account.

Retention ponds will only be permitted on a temporary basis and will only be allowed on a case by case basis as determined by the City Engineer. The criteria for temporary ponds may include but are not limited to the following:

Design of the pond volume will be based on a 100 year 10 day storm with no percolation credit for volume reduction;

The inclusion of an emergency spillway with the pond to carry the 100 year design flow which enters the pond;

The acceptance by the owner of maintenance responsibilities and legal liabilities of the pond;

Approval by the State Engineer if the pond comes under that agent's jurisdiction; and,

Fencing as required by the City Engineer.

Additional modifications may be incorporated into the next periodic update of the Development Process Manual.

For further information regarding this matter, contact the City Engineer at telephone number 768-2650 or by mail at City/County Government Center, One Civic Plaza, Public Works Department, Engineering Group, 3rd Floor, 87103.

LEsaavedra

Louis E. Saavedra, Mayor

TO BE PUBLISHED IN THE ALBUQUERQUE JOURNAL AND ALBUQUERQUE TRIBUNE ON _____.
date

APPENDIX C

DRAFT AGREEMENT REGARDING INFRASTRUCTURE

ADDENDUM #1

TO THE SUBDIVISION IMPROVEMENTS AGREEMENT FOR MANZANO MESA/AGREEMENT TO CONSTRUCT AND GUARANTEE PUBLIC IMPROVEMENTS

THIS ADDENDUM amends the Subdivision Improvements Agreement for Manzano Mesa dated May 22, 1991 and is made this _____ day of _____, 1992 by and between the City of Albuquerque, New Mexico ("City"), a municipal corporation, whose address is P.O. Box 1293, Albuquerque, New Mexico 87103 and Albuquerque Public Schools ("APS"), New Mexico Municipal School District #12, whose address is P.O. Box 25704, Albuquerque, New Mexico 87102, is made in Albuquerque, New Mexico, and is entered into as of the date of final execution of this agreement.

1. Recital

WHEREAS APS and the City have previously entered into a Subdivision Improvements Agreement dated May 22, 1991 regarding improvements for the Manzano Mesa Subdivision, and

WHEREAS the City requires an additional agreement regarding two additional storm drainage improvements related to development of Manzano Mesa prior to approving a plat for major subdivision, and.

WHEREAS the additional improvements can best be agreed to in an addendum to the original agreement dated May 22, 1991 so that all other provisions of the original agreement may still apply, and now therefore the City and APS agree as follows:

2. Improvements and Responsibility

A. At the time that the City's Eubank Storm Drain System (AMDS Project 2-03-18) is constructed, APS will bear the cost and responsibility for the construction of that portion of the Elizabeth Street storm drain system (as identified in the approved Drainage Master Plan for Manzano Mesa) between Eubank Boulevard and the Park site (Tract F, Manzano Mesa Replat).

B. Until such time as the Eubank and Elizabeth storm drains are in place, a temporary retention pond will be located in Tract F, the park site of Manzano Mesa, said pond to be constructed by the subdivision developer at the time of development. APS, as a public entity, agrees to accept responsibility for the maintenance of the pond, until such time as it is no longer needed due to the Eubank and Elizabeth storm drain systems availability for use.

3. Entire Addendum

This addendum contains the entire addendum to the agreement of the parties and supersedes any and all other agreements or understandings, oral or written, whether previous to the execution hereof or contemporaneous herewith.

4. Terms of Original Agreement/Severability

All other terms and conditions of the original agreement dated May 22, 1991 still apply. If any part of this Addendum is held to be invalid or unenforceable, the remainder of the Addendum and the original Agreement will remain valid and enforceable if the remainder is reasonably capable of completion.

Executed on the date stated in the first paragraph of this Addendum.

ALBUQUERQUE PUBLIC SCHOOLS	CITY OF ALBUQUERQUE
By [Signature]:_____	_____
Name:_____	Arthur A. Blumenfeld
Title:_____	Chief Administrative Officer
Dated:_____	Dated:_____

Approved by:

_____
Director of Public Works

APS'S NOTARY

STATE OF NEW MEXICO)
) SS.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me on this _____ day of _____, 1992, by _____, _____, of Albuquerque Public Schools.

_____
Notary Public

My Commission Expires:

_____

CITY'S NOTARY

STATE OF NEW MEXICO)
) SS.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me on this _____ day of _____, 1992, by _____, Chief Administrative Officer of the City of Albuquerque, a municipal corporation, on behalf of said corporation.

_____
Notary Public

My Commission Expires:

_____

APPENDIX D

COMPUTATIONS

AVID ENGINEERING, INC.

Willow Wood - Hydrology

ASSUMPTIONS:

1.) Use 100 yr, 6 hr storm for finding peak flows.

2.) Use Albuquerque version of HYMO (AHYMO392) for hydrologic calculations. (See assumption #4)

3.) Use NOAA Atlas 2 raintall distributions: The site is on zone map L-21.

$P_{60} = 2.07''$

$P_{360} = 2.54''$

4.) For initial drainage structure sizing, calculate the peak flows from basins with the rational method:

Zone 3: 100 yr peak flow

Treatment:	A	B	C	D
Q_p (cfs/acre)	1.87	2.60	3.45	5.02

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO _____ BY JB DATE 6-27-92

SUBJECT _____ CHKD _____ DATE _____

AVID ENGINEERING, INC.

4.) continued

For single family residential, with 5 units/acre,

$\% D = 7\sqrt{5^2+5^2} = 49.5$ say .50 % D

assume remaining area is 25% B, 25% C.

$Q_{P/1\,acre} = 0.25(2.60) + 0.25(3.45) + .5(5.02)$

$= 4.02$ cfs/acre

For undeveloped conditions, area is 100% treatment A → $Q_{P/acre} = 1.87$ cfs/acre

For Basin C-1, the future school site,

% D = 50%, assume 25% B, 25% C

$Q_{P/ac} = 4.02$ cfs/acre

Assume pond is impervious → 100% D

PROJECT NAME

PROJECT NO

SUBJECT

BY JB DATE

DATE

AVID ENGINEERING, INC.

WILLOW WOOD - STREET & INLET CAPACITY CALCULATIONS

ASSUMPTIONS

1.) Use flows calculated with rational method and AHYM0392 version of HYMO for the 100 yr storm

2.) Use street capacities from Albuquerque DPM vol 2, plates 22.3 D-1 + D-2.

3.) Use inlet capacities from DPM vol. 2 plates D-5 to D-7.

4.) Use rough grade slopes from topography.

~~5.) Since we use 28' and 36' sections, while the DPM charts for street capacity apply to 32' and 40' sections, convert flows to equivalent flows so we can use DPM charts:~~

~~$Q_{40} = 1.15\, Q_{32}$~~

~~$Q_{40} = 1.11\, Q_{36}$~~

Street flow depths computed using ALYMD Code.

STREET/INLET CALCULATIONS

A.P.	Contributing Basins	Qpeak in street (cfs)	Street: Width	S	D	V	Inlets / Analysis
1	A-1	34.2	28'	~~1.1%~~ 0.85%	~~.55'~~ .53	~~4.0 ft/s~~ 3.7 ft/s	~~Try 2 type A inlets~~ ~~Q_{in} = 2(7.4) = 14.8 cfs~~ ~~$Q_{carry\ over}$ = 34.2 − 14.8 = 19.4~~ ~~Use 2 type A inlets~~ ⚠
	⚠ DELETE STORM						
2	A-2	25.7	28'	1.1%	.50'	3.7 ft/s	OK
5A	A-1, A-2 ~~(carryover from A.P. 1)~~ ⚠	~~45.1~~ 62	28'	~~0.6%~~ 0.85%	~~.67'~~ 0.67'	~~3.8 ft/s~~ 4.76	~~Try 2 type 66 inlets~~ ⚠ ~~Q_{in} = 2(.85)(10) = 17 cfs~~ ~~(capacity reduced 15% for clogging)~~ ~~Try 2 A's Q_{in} = 2(6.2) = 16.4~~ ~~Use 2 66's Q_{co} = 45.1 − 17~~ ~~= 28.1 cfs~~
		$F_1 = \frac{4.7}{\sqrt{32.2 \times .46}} = 1.21$					
		ALTERNATE DEPTH $= \frac{d_1}{2}\left(\sqrt{1+8F_1^2} - 1\right)$					
				$= .86 < .87$		[OK]	
	(carryover	28.1	28'	0.5'	0.57'		Now try ~~2 66's~~ ~~Q_{in} = 2(7.0) = 14.0 cfs~~ Q_{co} = 12.5 cfs ~~Total interception = 49.6~~

⚠ Denotes Mod. 1994

PROJECT NAME Willow Wood
PROJECT NO.
SUBJECT Street and inlet capacity
BY
DATE

AVID ENGINEERING, INC.

STREET/INLET CALCULATIONS

A.P.	Contributing Basins	Qpeak in street (cfs)	Street: Width	S	D	V	Inlets / Analysis
3	A-3	30.6	28'	0.5%	.60'	3.0 f/s	OK Subcritical – no jump should occur at Herman Roser
4	A-3,4	~~51.9~~ 46	36'	~~1.2%~~ .85%	~~.60'~~ .60'	~~4.4 f/s~~ 4.4 f/s	Check for hydraulic jump at entrance to easement: $D_1 = .6'$ $F_1 = \frac{V_1}{\sqrt{gD_1}} = \frac{4.4}{\sqrt{32.2 \cdot .6}} = 1.0$ critical depth. $TW/D_1 \simeq 1.0$ (DPM, plate 22.3, E-1). Jump should not change the depth significantly
	△ Weir Analysis		$Q = CLH^{3/2}$ $46 = 3.0 \times 28 \times H^{3/2}$ $H = 0.67 ft \leq 0.67$ (ok)				
	△ Build 4" Conc. Pavement Between SW and Back of Curb, For erosion protection.						
5b	A-3,4,5	~~58.7~~ 0 cfs △	Alley width = 30'	~~1.1%~~	~~.6'~~	~~4.1 f/s~~	~~See next page~~ △ Alley channel deleted. Alley sections maintained for emergency overflow.

PROJECT NAME
PROJECT NO.
SUBJECT

SHEET 2 OF
BY TB DATE
CHKD BY DATE

AVID ENGINEERING, INC.

STREET/INLET CALCULATIONS

A.P.	Contributing Basins	Qpeak in street (cfs)	Street: Width	S	D	V	Inlets / Analysis
5C	Carryover from A.P. 5A, 5B	12.5 + 50.1 = 62.6 cfs	~~36'~~ 28'	~~1.1%~~ 0.85%	~~.66'~~ 0.67'	~~4.6'/s~~ 4.76'/sec	Try 2 U's – Q_{in} = 2(12) = 24 cfs (don't reduce for clogging because of inlets @ 5A and 5B) OK. Q_{co} = 38.6 cfs Total interception at 5A, B, C = ~~80 cfs~~ 62.6 cfs △
	△ SO inlets relocated to Unit IV						
6	A-6, ~~t.a. from 5C~~	~~38.6+12.5 = 51.1~~ 13 cfs	~~36'~~ 40'	~~1.0%~~ 0.6%	~~.62'~~ .41'	~~4.1'/s~~ 2.1'/s	Check for curb overtopping around the corner from Herman Racer to Mendocino $F_1 = \frac{4.1}{\sqrt{32.2 \cdot 0.62}} = 2.91 < 1.0$ subcritical, so flow should not overtop curb
	△ Weir		$Q = CLH^{3/2}$ $13 = 3.0 \times 40' \times H^{3/2}$ $H = 0.23' < 0.67'$ OK				

AVID ENGINEERING, INC.
PROJECT NAME
PROJECT NO.
SUBJECT
SHEET 4 OF 8
DATE
BY
CHKD

STREET/INLET CALCULATIONS

A.P.	Contributing Basins	Qpeak in street (cfs)	Street: Width	S	D	V	Inlets / Analysis
7a	A-6, 7, carryover from A.P 5C	36 cfs ~~46~~ from AHYMO; 33 cfs 3 cfs	~~16'~~ 40'; interceptor by SD. Inc. Over	1.6%	~~.55'~~ .51'	4.6 ft/s 4.0	~~Try 2 A inlets → Qin = 2×8.2 = 16.4 cfs~~ ~~Try 2 CC inlets → Qin = 2×.85(9.6) = 16.3 cfs~~ ~~Use 2 A inlets~~ ~~Qin = 19.6 cfs~~ USE 2-double grate Type "A" 2-double grate Type "C" = 33 cfs
8	A-8	43.4	28'	~~1.0%~~ 0.67%	~~.61'~~ 0.62	~~4.3~~ 3.7 ft/s 3.73	$F_1 = \frac{4.3}{\sqrt{32.2 \cdot .61}} = 0.97$ (1.02 supercritical) → ~~subcritical~~ (.41) OK $Y_2 = \frac{Y_1}{2}\left(\sqrt{1+8F_1^2}-1\right) = .64 < .57'$ LOE
9A	A-8, A-9	~~49.0~~ 43.0	28'	~~.59~~ 1.0%	~~.73'~~ .56'	~~3.5~~ 4.3 ft/s	~~D > 0.67 → place inlets at point 8, upstream~~ (see AP 5C) ~~Try 2 type A inlets Qin = 2×9.2 = 18.4 cfs~~ ~~Try 2 type CC inlets Qin = 2×.85(11.5) = 19.6 cfs →~~ $F_1 = \frac{4.3}{\sqrt{32.2 \cdot .56}} = 1.02$ $Y_2 = 0.57$ (OK)

AVID ENGINEERING, INC.

PROJECT NAME
PROJECT NO.
SUBJECT

JB

STREET/INLET CALCULATIONS

A.P.	Contributing Basins	Qpeak in street (cfs)	Street: Width	S	D	V	Inlets / Analysis
9A cont. from prev. page							~~Use 2 CC inlets~~ → ~~Q_{co} = 49 - 19.6 = 29.4 cfs~~ △1 SEE AP 5C
△1 9B	carryover from AP 9A	~~≈36~~ 43	28'	~~.59~~ 1.0%	~~.65'~~ .56'	~~3.3'/s~~ 4.3'/s	~~Subcritical - should not over top curb around corner~~ △1
					F = 1.01	d_2 = .57 [ok]	
10	A-10, carryover from 9A	~~46.7~~ 57	28'	~~1.4%~~ 1.0%	~~.59'~~ .63'	~~5.0'/s~~ 4.9	~~Try 2A's → Q_{in} = 2×9 = 18 cfs~~ △1 ~~Try 2CC's → Q_{in} = 2(.85)(10.1) = 17.2~~ ~~Use 2A's~~ ~~Q_{co} = 46.7 - 18 = 28.7 cfs~~ ~~Next, try 2CC's → Q_{in} = 2(9.2) = 18.4~~ ~~Try 2 C's → Q_{in} = 2(7.8) = 15.2~~ ~~Use 2CC's~~ ~~Q_{co} = 10.3 cfs~~ ~~Total interception = 36.4 cfs~~
	~~inlet carryover~~	~~28.7~~	~~28'~~	~~1.4%~~	~~.50'~~	~~4.1'/s~~	
	△1	USE 2-Type Double Grate Inlet's = 24cfs 57-24 = 33cfs by-pass to Arroyo					

PROJECT NAME
PROJECT NO.
SUBJECT
SHEET 9 OF
BY JB DATE
CHKD DATE

AVID ENGINEERING, INC.

STREET/INLET CALCULATIONS

A.P.	Contributing Basins	Qpeak in street (cfs)	Street: Width	S	D	V	Inlets / Analysis
11	A-11	23	~~15' alley~~	~~1.5%~~	~~.46'~~ .34'	~~4.9'/s~~ 5.8 '/s	~~See previous page for depth computations.~~
	△ Eliminate Channel Design. Use Storm Drain. Design to 2x100YR Storm = 46 cfs Sump Condition design. Use 1 — Teide Grate, Double Wing, Type "A"						~~Check for jump at 12 outlet into Jewel Cave Rd.~~ △
							~~$F_1 = \frac{4.9\ 5.8}{\sqrt{32.2 \cdot \cancel{0.49}\ 0.34}} = \cancel{1.24}\ 1.75'$~~
							~~Jump is possible. Check tailwater depth (TW).~~
							~~$TW/D_1 = \cancel{1.25}\ 2.0$ $TW = \cancel{.58'}\ .68'$ OK~~
12	A-11, A-12	~~54~~ 12 cfs	28'	1.0%	~~.66'~~ .38'	~~4.7'/s~~ 2.7'/s	~~Try 2 A's → $Q_{IN} = 2 \times 9 = 18$ cfs~~ △
							~~Try 2 CC's → $Q_{IN} = 2(.85)(11) = 18.7$~~
							~~Use 2 A's for debris removal. $Q_{CO} = 36$~~
△	~~inlet carryover~~	~~36~~	~~28'~~	~~1.0%~~	~~.59'~~	~~4.1'/s~~	~~Try 2 C's → $Q_{IN} = 2(7.8) = 15.2$~~
							~~Try 2 CC's → $Q_{IN} = 2 \times 9.2 = 18.4$~~
							~~Use 2 C's $Q_{CO} = 20.0$ cfs~~
							~~Total interception = 33.2~~

AVID ENGINEERING, INC.

PROJECT NAME
PROJECT NO.
SUBJECT
SHEET 8 OF
BY JB DATE
CHKD DATE

STREET / INLET ANALYSIS

A.P.	Contributing Basins	Qpeak in street (cfs)	Street: Width	S	D	V	Inlets / Analysis
13	A-13, C.O. from A.P. 10, 12	~~32~~ 37	28'	~~.54~~ 1.0%	~~.63'~~ .53'	~~3.1 ft/s~~ 4.1 ft/s	~~Try 2 A's Qin = 2(7.4) = 14.8~~ ~~Try 2 CC's Qin = 2(.85)(9.6) = 16.3~~ ~~Use 2 CC's Qio = 32 - 16 = 16 cfs~~ E = 0.79' < .39' [ok]
7c ~~7b~~	Carryover from 7a, 13	~~46~~ 36	~~36'~~ 40'	1.0	~~[illegible]~~ 0.53'	~~4.0 ft/s~~ 3.9 ft/s	~~Design for 50 yr conditions (S = .002) D = .67'~~ ~~with CC inlets: Qcapacity = 9 cfs/inlet~~ ~~for C inlet: Qcapa. = 7.2 cfs/inlet~~ ~~Use 4 CC inlets + 2 C inlets~~ ~~Qin = 36 cfs~~ ~~Qin = 14 cfs~~ ~~50 > 46 ok~~ ~~Note: dont reduce capacity for clogging because of upstream inlets within 150'.~~
	Intercept 100% flows at this point. Use 2-A's d = 0.53'				36 - 16 = 20		
	2-Double Grate C's d = 0.40'				9 = 11 cfs		
	Intercept 100% of remaining 11 cfs with sump inlet located at intersection of Los Padres and Arches.						

PROJECT NAME
PROJECT NO.
SUBJECT
SHEET 9 OF
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DWN
DATE

AVID ENGINEERING, INC.

STREET/INLET ANALYSIS

A.P.	Contributing Basins	Qpeak in street (cfs)	Street: Width	S	D	V	Inlets / Analysis
15	A-14, 15	29	28'	1.4%	.50'	4.1 ft/s	Check jump: $F_1 = \frac{4.1}{\sqrt{32.7 \cdot 0.5}}$ = 1.02 critical depth Jump possible at grade change $TW/D_1 = 1 \rightarrow TW \approx D_1$ OK
16	A-14, 15, B-4	44	28'	1.0% ~~0.5%~~	0.56 ~~.69~~	3.7 ft/s ~~3.5 ft/s~~	Try 2 A's $Q_{IN} = 2(9) = 18$ Try 2 CC's $Q_{IN} = 2(.85)(11) = 18.7$ $\boxed{\text{Use 2 A's}}$ $Q_{co} = 44 - \cancel{18}\ 24 = \cancel{26}\ 20$
	~~inlet c.o.~~	~~26~~	~~28'~~	~~.5%~~	~~.58'~~	~~2.4 ft/s~~	~~Try 2 CC's~~ ~~$Q_{IN} = 2(8.2) = 16.4$~~ ~~$\boxed{\text{Use 2 CC's}}$~~ ~~$Q_{co} = 26 - 16 = 10$ cfs~~
				USE 2-Single Grate Type 'A's 2-Single Grate Type 'C's			Total interception = ~~34~~ 24 cfs
	Bi-Pass = 20 cfs						
17	B-3, ~~c.o. from A.P. 16~~	27 ~~37~~	28'	0.6 ~~.5%~~	0.54 .65'	3.4 ft/s ~~3.2 ft/s~~	~~Try 2 A's $Q_{IN} = 2 \times 7.6 = 15.2$~~ Try 2 CC's $Q_{IN} = 2(.85)(9.4) = 16.0$ ~~$\boxed{\text{Use 2 CC's}}$ $Q_{co} = 37 - 16 = 21$~~
	THUNDER BASIN			USE 2-Single Grate Grate Type 'A' CB's 2-Single Grate Type 'C' CB's			

AVID ENGINEERING, INC.

PROJECT NAME
PROJECT NO
SUBJECT

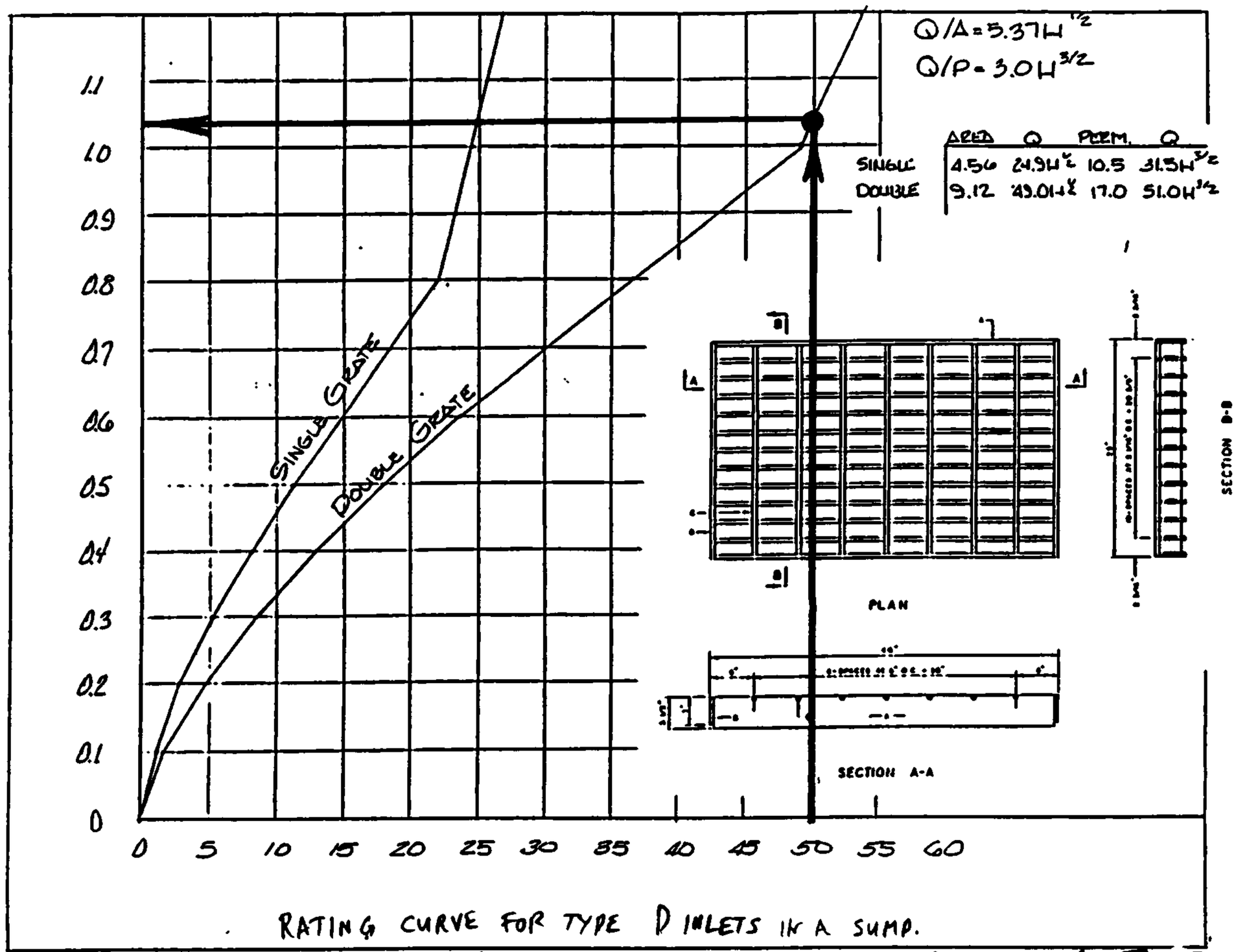
SHEET 10 OF
BY JB DATE
CHKD BY DATE

STREET/INLET CALCULATIONS

A.P.	Contributing Basins	Qpeak in street (cfs)	Street: Width	S	D	V	Inlets / Analysis
18a WOLF CREEK	B-~~X~~1	28	2 28'	0.6% ~~1.0%~~	0.55 ~~.52'~~	2.4 ft/s ~~3.6 ft/s~~	~~Try 2 A's Qin = 2(6.2) 12.4~~ ~~Try 2 CC's Qin = 2(.15)(7.2) = 12.2~~ ~~Use 2 A's Qin = 28 - 12.4 = 15.6~~
		2	USE 2-SINGLE GRATE TYPE 'A' CB's 2-SINGLE GRATE TYPE 'C' CB's				
18b	From south: B-~~X~~2, C.O. from A.P. 17 CHIRICAHUA	~~36~~ 26	28'	.5% 2	~~.65'~~ 0.55'	~~3.2 ft/s~~ 2.26	~~Design for a sag (S=.002, D=.67')~~ ~~CC inlet capacity = 9 cfs/inlet~~ ~~C inlet capacity = 4.2 cfs/inlet~~
	~~From north: B-4~~	15.6	"	.5%	.58'	2.9 ft/s	~~Use 4 CC's - Qin = 36 cfs~~ ~~+ 2 C's - Qin = 14.4 cfs~~ ~~50.4 ≈ 51.6~~
		~~Tot. = 51.6~~					
			2	USE 2-Single Grate, Type 'A' CB's 2-Single Grate, Type 'C' CB's			~~OK~~
18c	END OF Cul-De-Sac CHIRICAHUA COURT	6 cfs + 44 cfs (OVERFLOW)	SUMP CONDITION				

USE Double Grate, Single Curb Opening Type 'A' inlet
dn = 1.05' < dallowable = 1.17'

AVID ENGINEERING, INC.
PROJECT NAME
PROJ. NO.
SHEET



RATING CURVE FOR TYPE D INLETS IN A SUMP.

Q100=50cfs d available = 10" + 4" = 14" = 1.17' < 1.05' [ok]
Capacity Based on Grate only, Curb Opening not included.

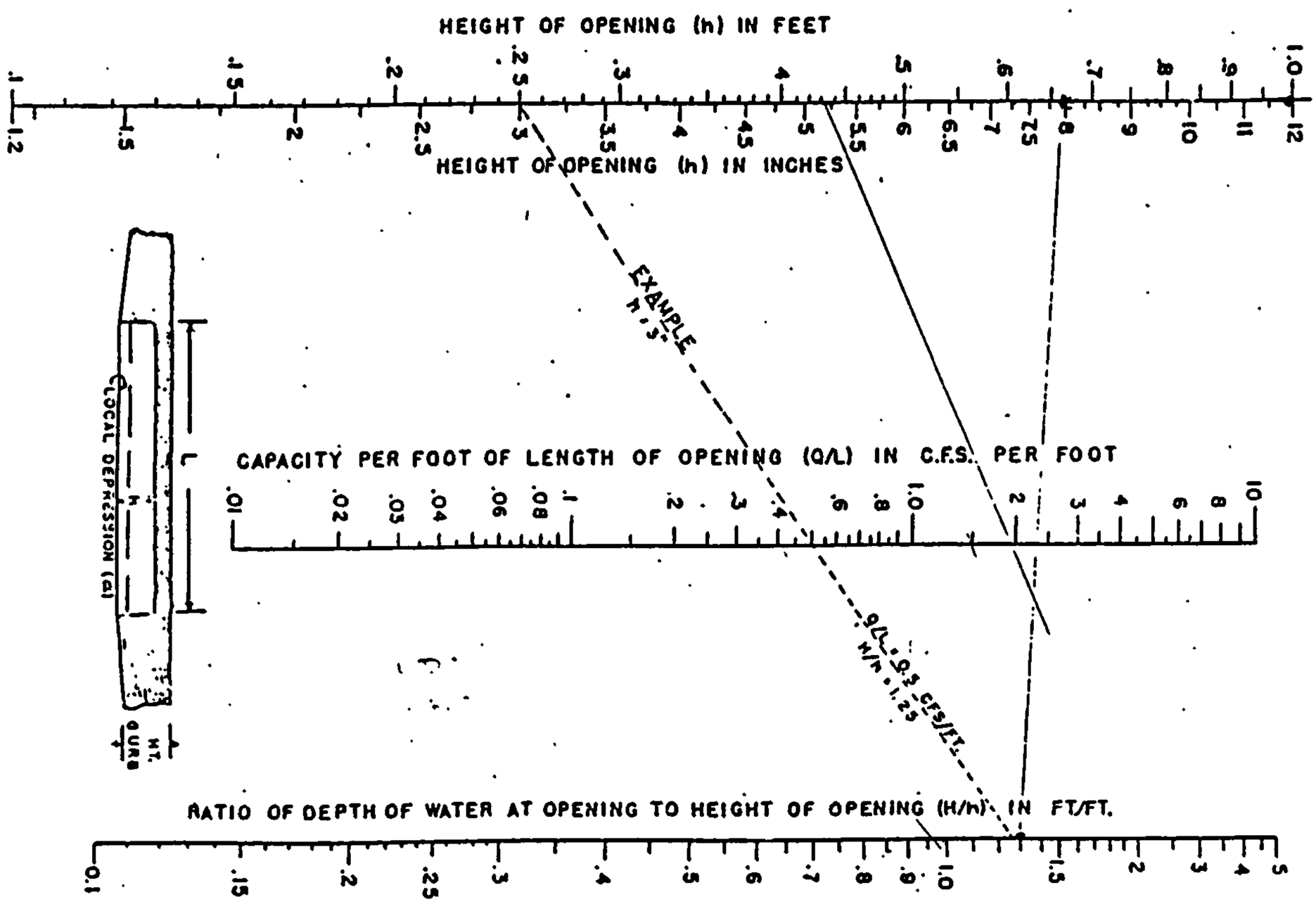
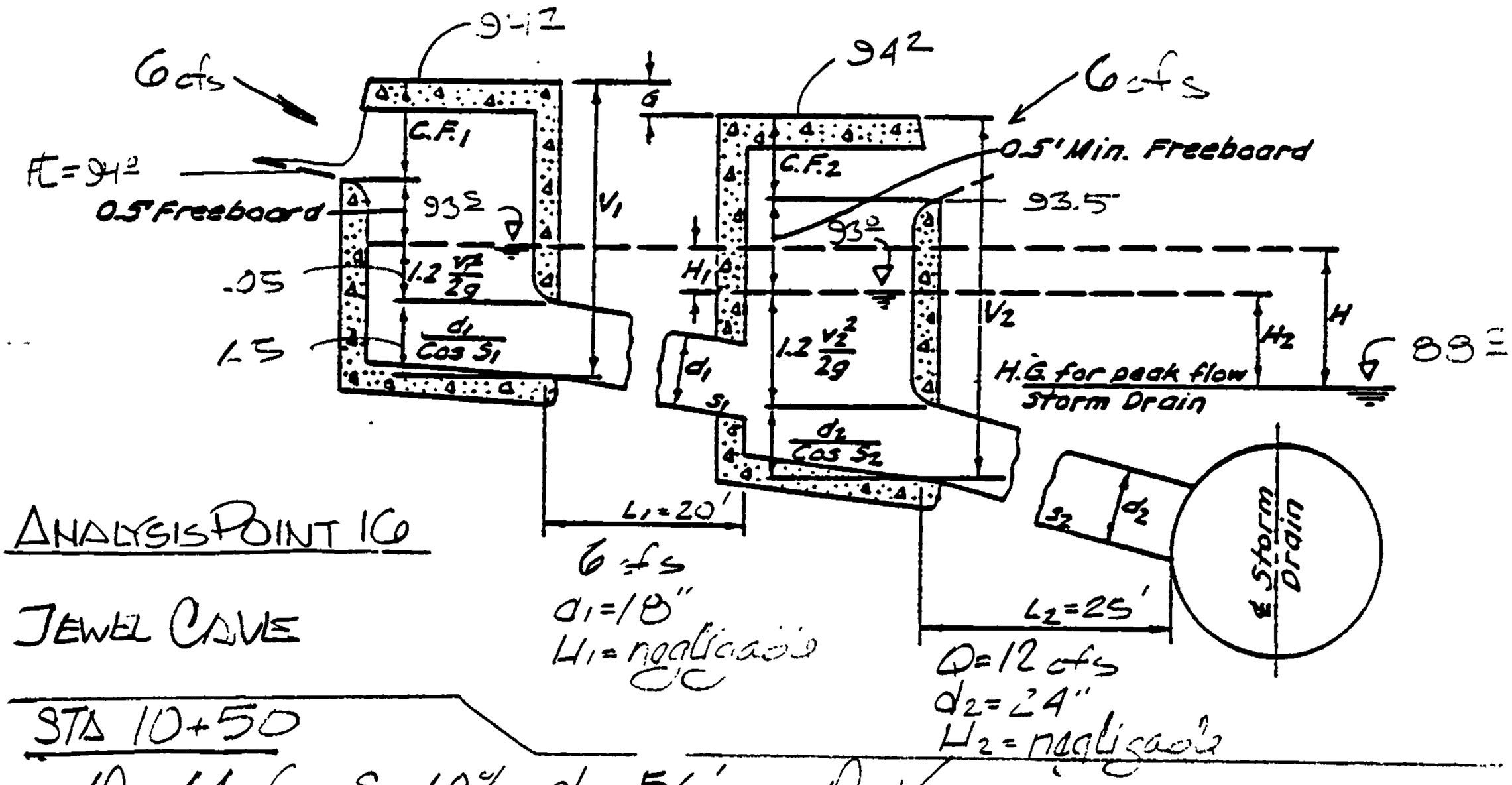


FIGURE 6

NOMOGRAPH FOR CAPACITY OF CURB OPENING INLETS AT LOW POINTS

AVID ENGINEERING, INC.



ANALYSIS POINT 16

JEWEL CAVE

STA 10+50

Q = 44 cfs S = 1.0% dn = .56' $Q_{int/2-'C'}$ = 6 cfs

H_{avail} = 0.5 >> .05

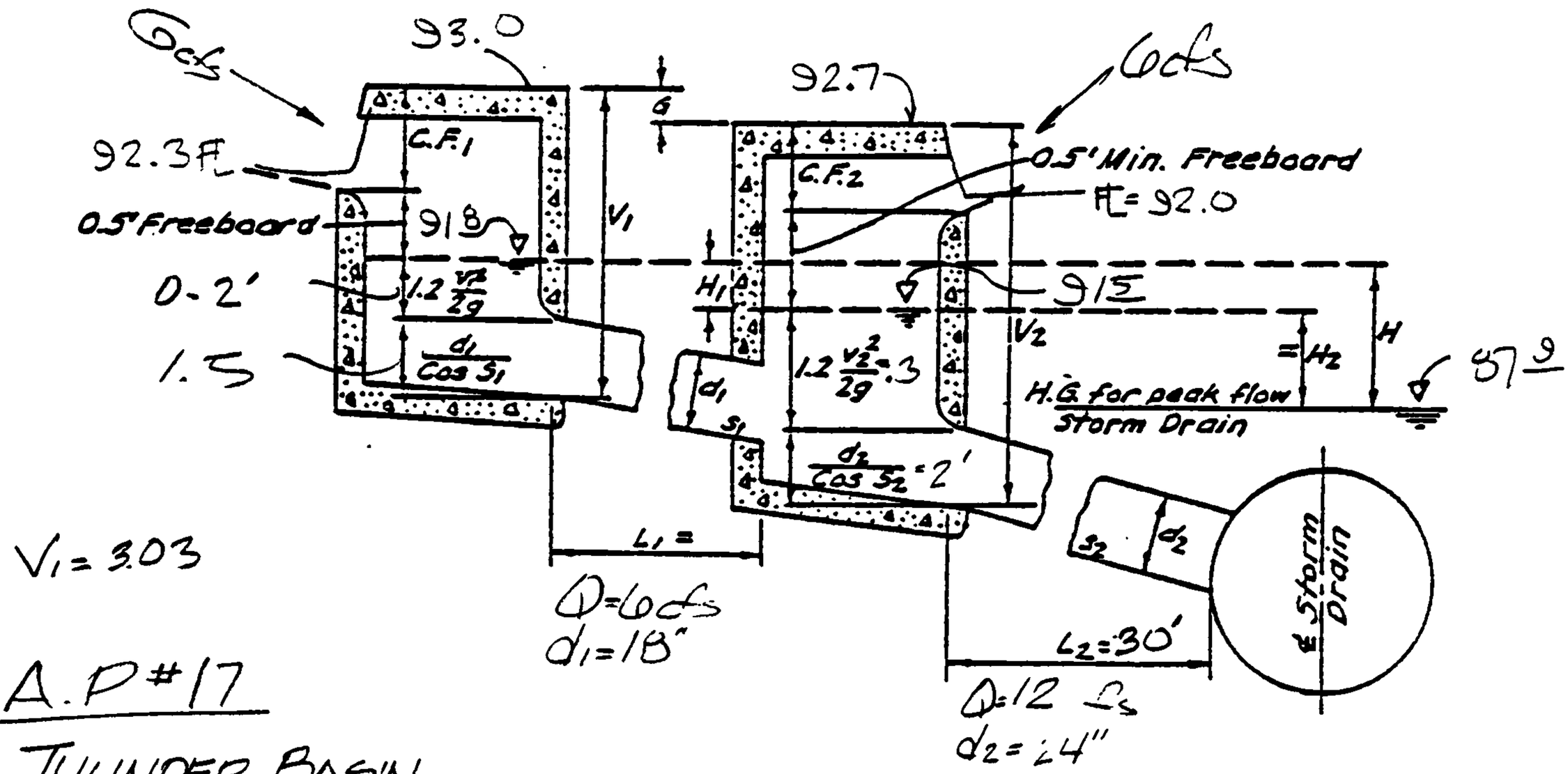
$H_{2\,avail}$ = 93.2 - 89.2 - .48 [OK]

H_{avail} = .53 [OK] >> $H_{req'd}$.

24 cfs intercepted by 4- Single Grate "A" & "C" Blocks.

20 cfs bypass flow.

AVID ENGINEERING, INC.



A.P #17

THUNDER BASIN

Q_{100} = 27cfs S = 0.6% dn = 0.54' Q = 6cfs/Basin

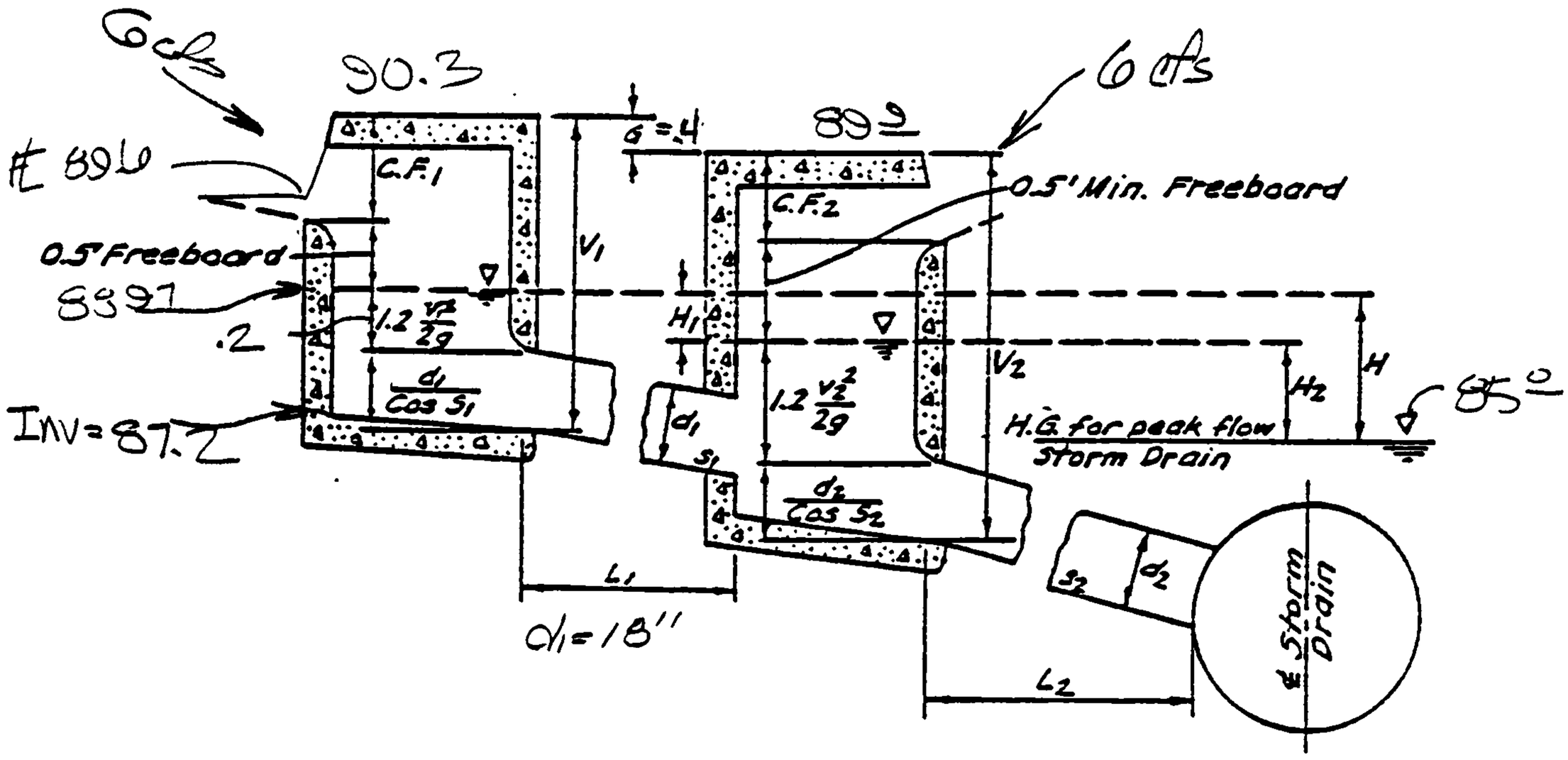
6 × 4 = 24cfs collected, 3 cfs bypass flow

H_1 = 0.3' $H_{REQ'D}$ = >> 0.1'

H = 91.8 − 89.9 = 1.9' >> $H_1 + H_2$ [ok]

NOTE: INLETS SHOWN ON CHIRICAHUA MOVED TO THUNDER BASIN

AVID ENGINEERING, INC.



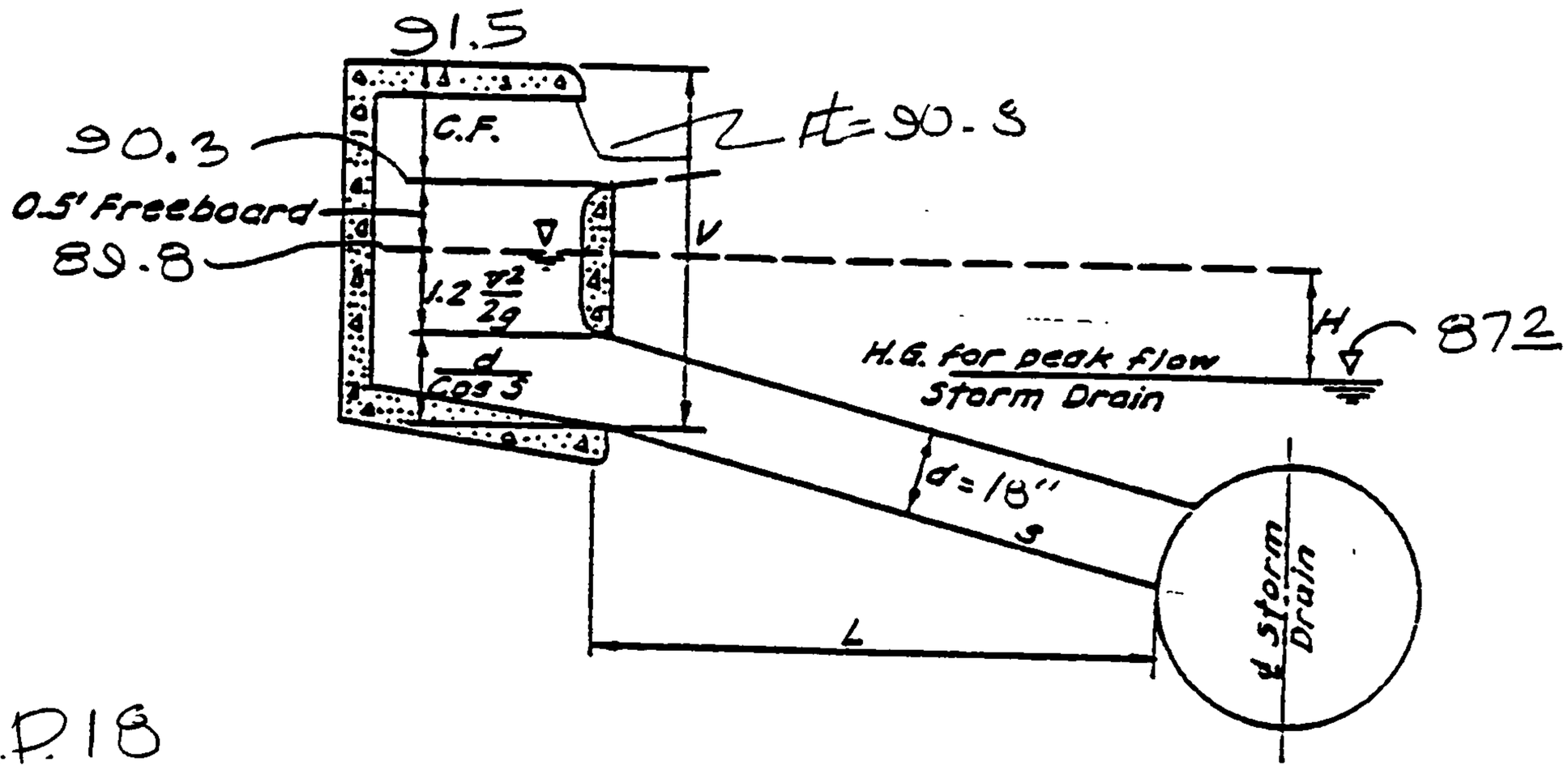
WOLF CREEK

Q_{100} = 28 cfs S = 0.6% dn = 0.55' Qint = 6 cfs/inlet

USE 4 - single grate = 24 cfs collected

= 4 cfs bypass

AVID ENGINEERING, INC.



A.P. 18

WASTACH

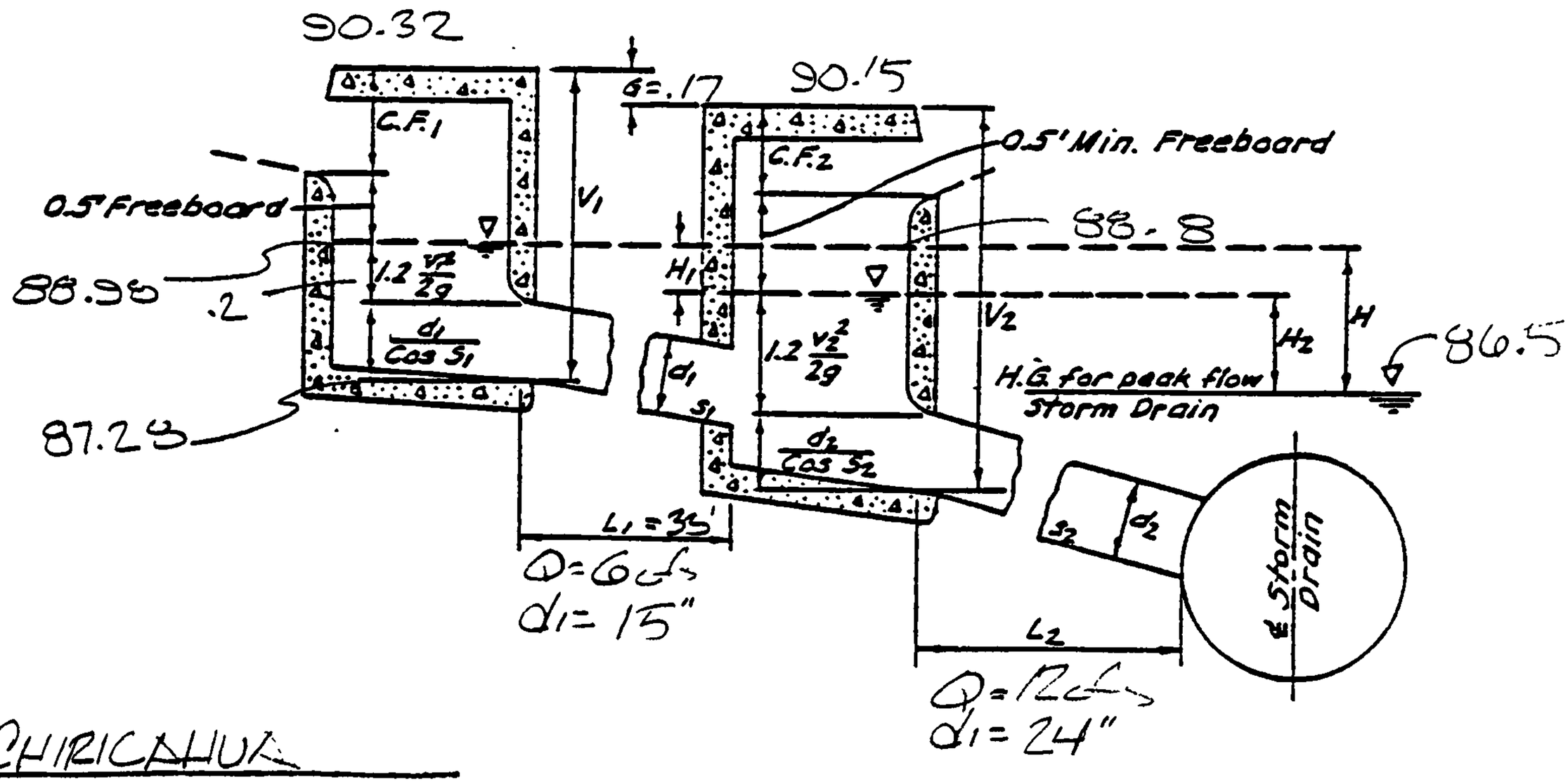
Q=15cfs S=0.6% dh=0.54' Qint.=6cfs/Basin

USE 2 Sump Grate Type "L" Catch Basins.
. 12 cfs intercepted.
3cfs By Pass flow.

HREQ'D << H AVAILABLE
0.2' 2.6' [ok]

INLETS ADDED TO WASTACH

AVID ENGINEERING, INC.



CHIRICAHUA

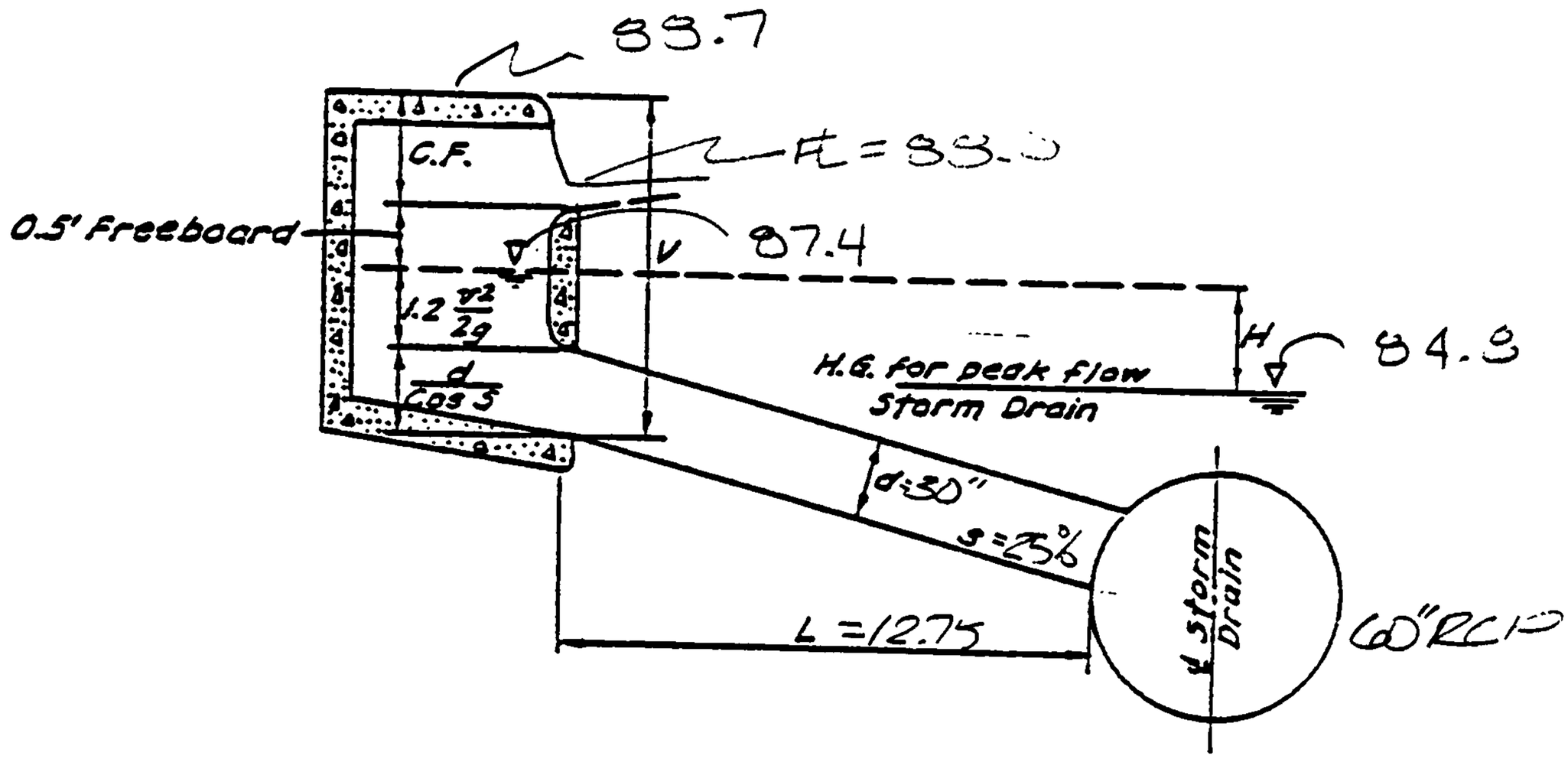
Q= 26 cfs (bypass flow)

S=0.5% dn=.55 ft ⟹ 6 cfs/inlet = 24 cfs
2 cfs BY PASS FLOW

USE 4 TYPE 'C' Single Grate Inlet Basins

H1 REQ'D = << .5'

AVID ENGINEERING, INC.



CHECK AT END OF CUL-DE-SAC

Q = 6cfs + 44cfs (Sight issue)

= 50cfs

SUMP CONDITION DESIGN

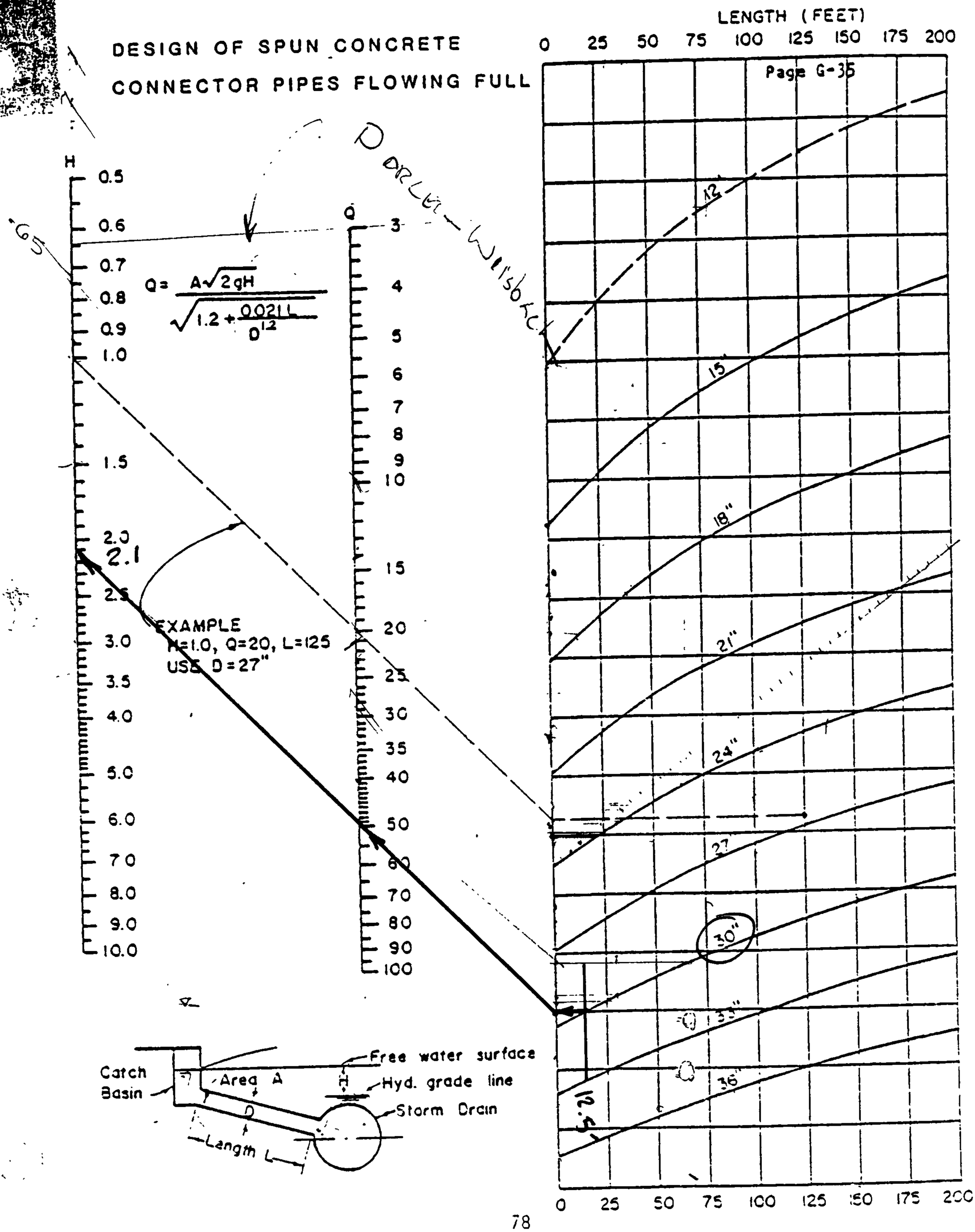
AVAILABLE DEPTH OF PONDING = 1.0 ft

USE DOUBLE GRATE, TYPE "A".

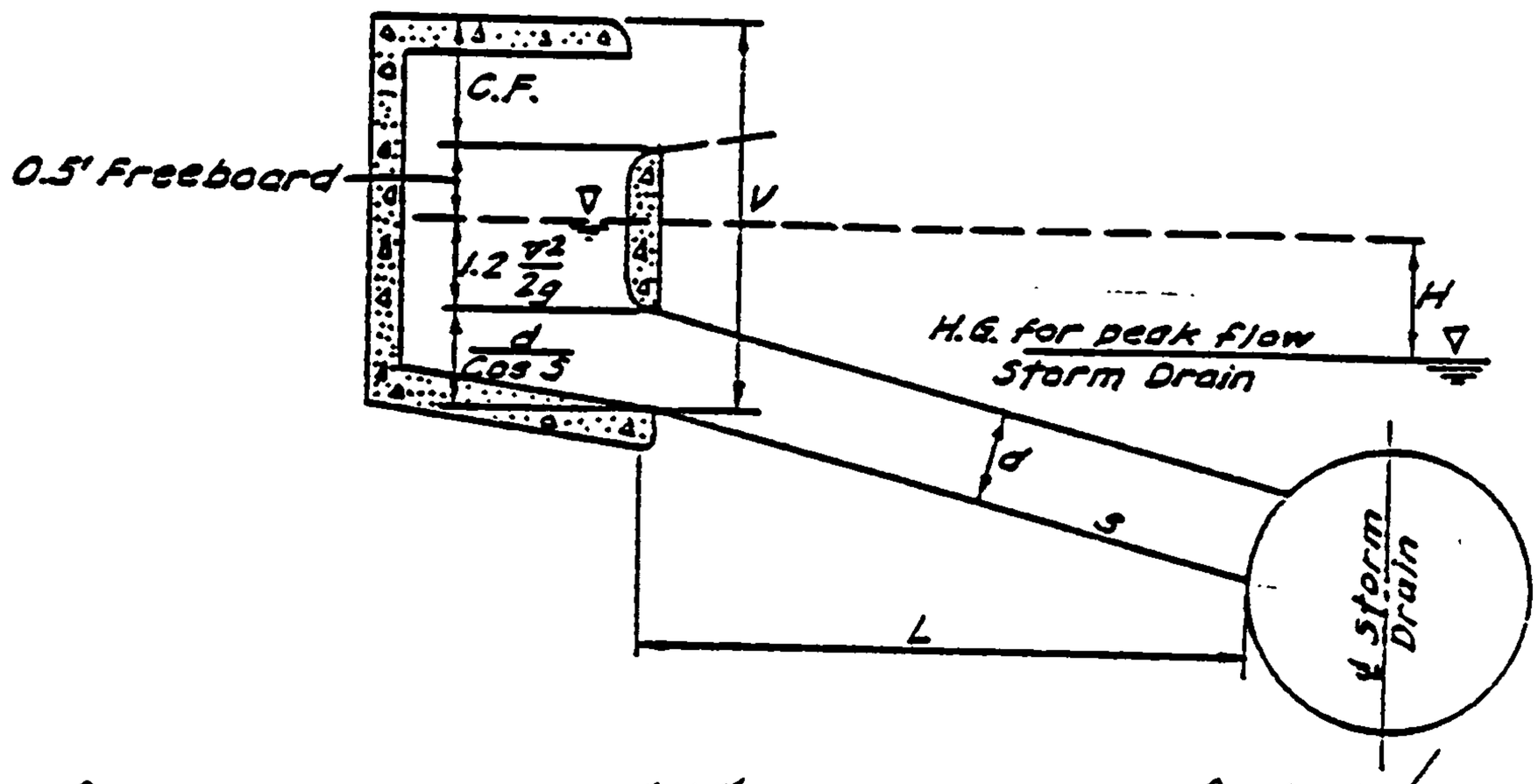
$H_{available}$ = 87.4 - 84.9 = 2.57'

$H_{required}$ = 2.1 [ok]

DESIGN OF SPUN CONCRETE CONNECTOR PIPES FLOWING FULL

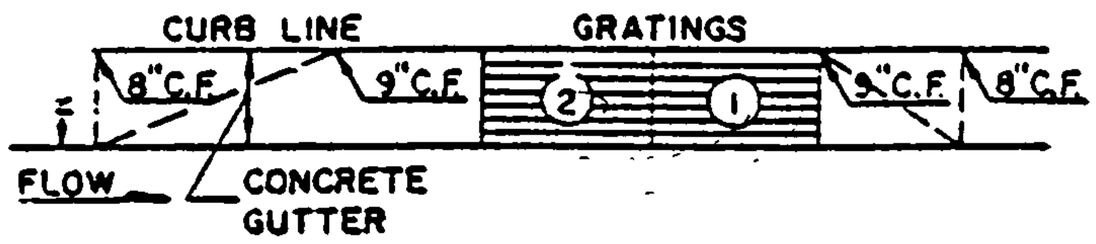


AVID ENGINEERING, INC.

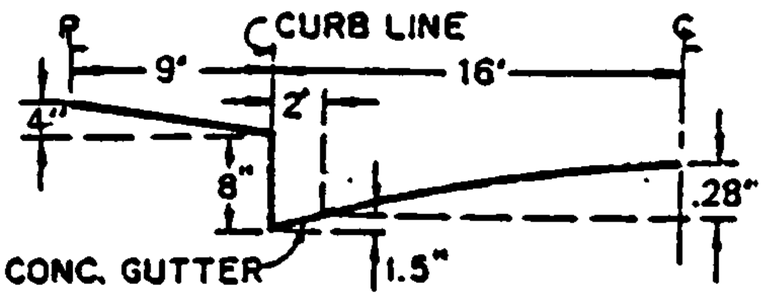


$Q_{100} = 27$ cfs $S = 0.6\%$ $L = 254'$ $Q = 6$ cfs/Basin

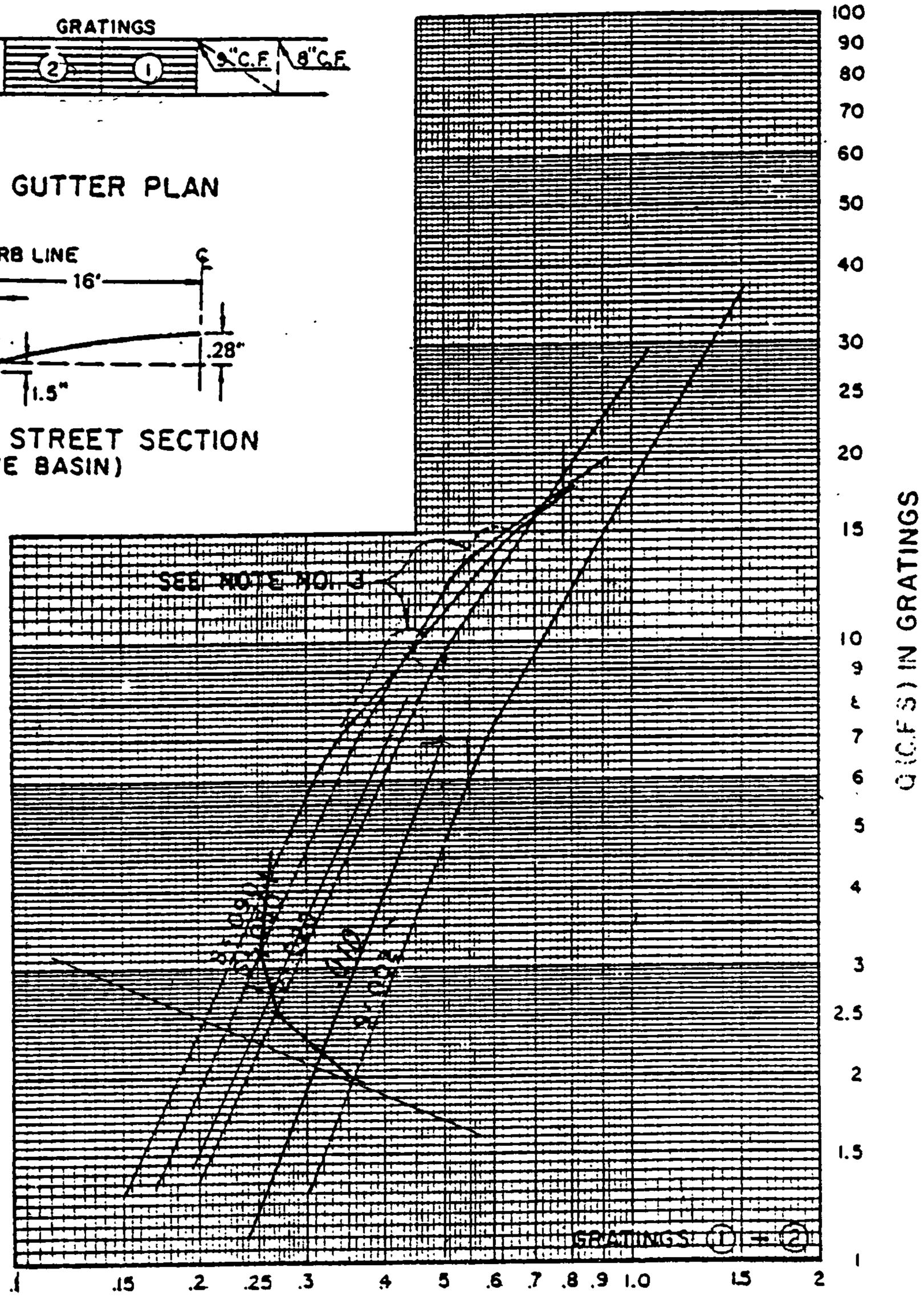
GRATING CAPACITIES FOR TYPE DOUBLE "A", "C," AND "D"



GRATING & GUTTER PLAN

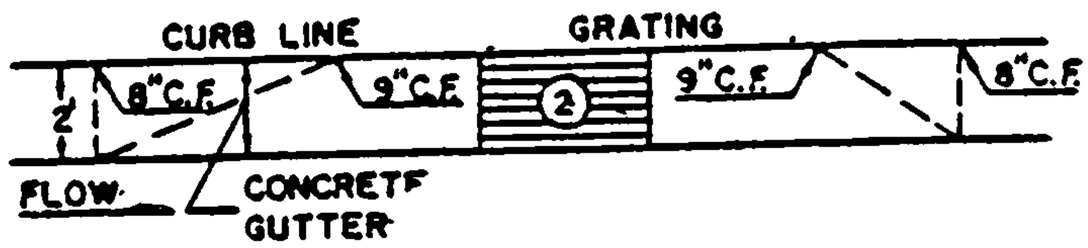


TYPICAL HALF STREET SECTION
(ABOVE BASIN)

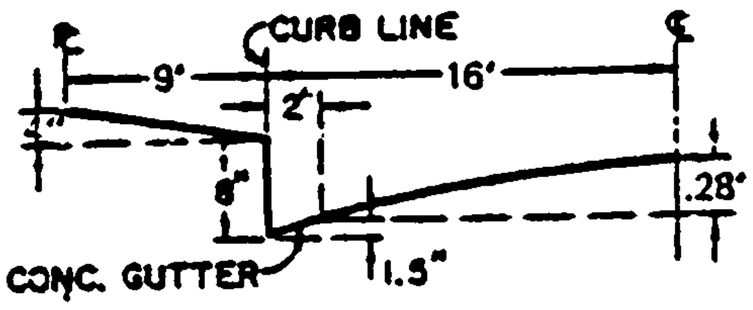


D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

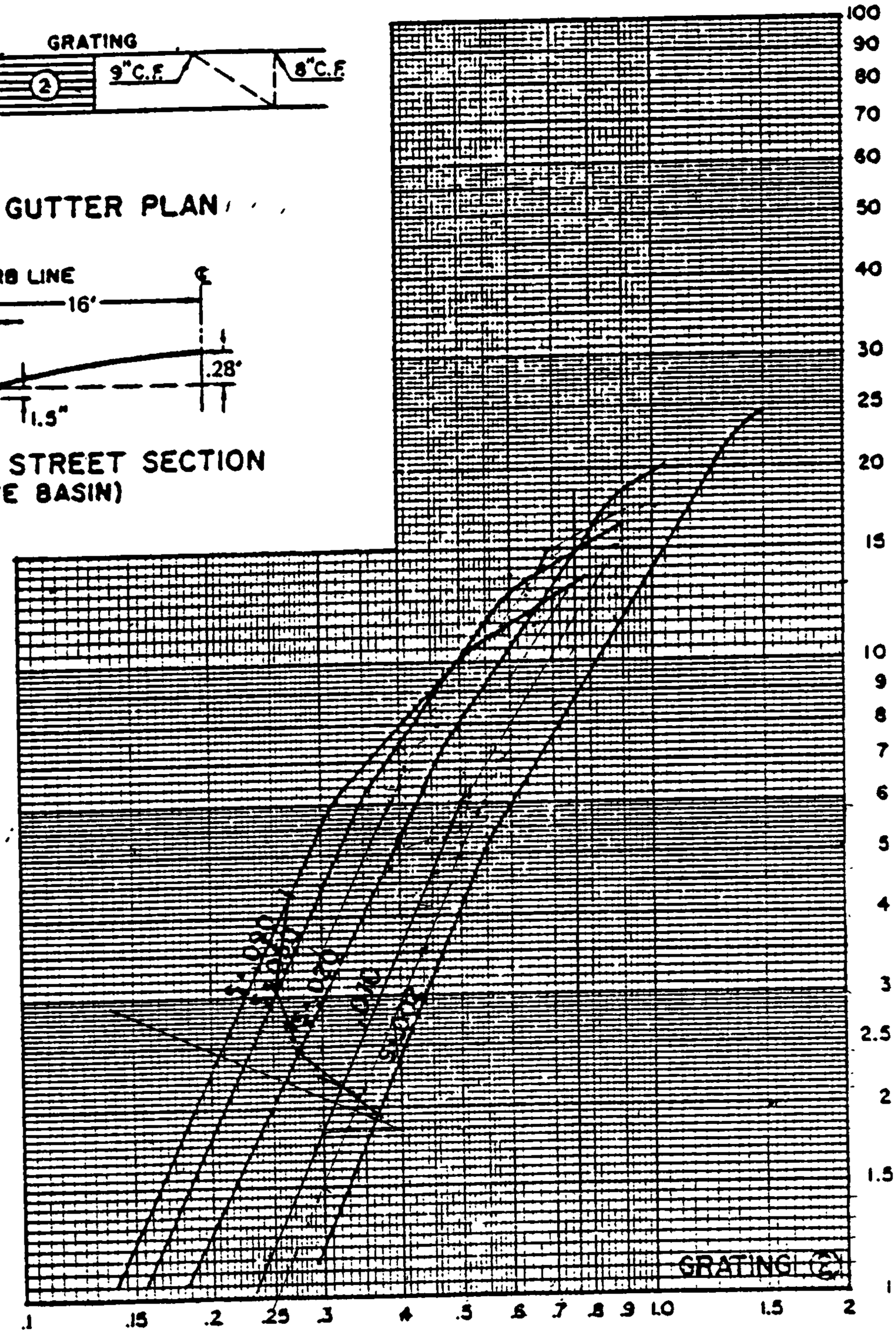
GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)



STREET CAPACITY

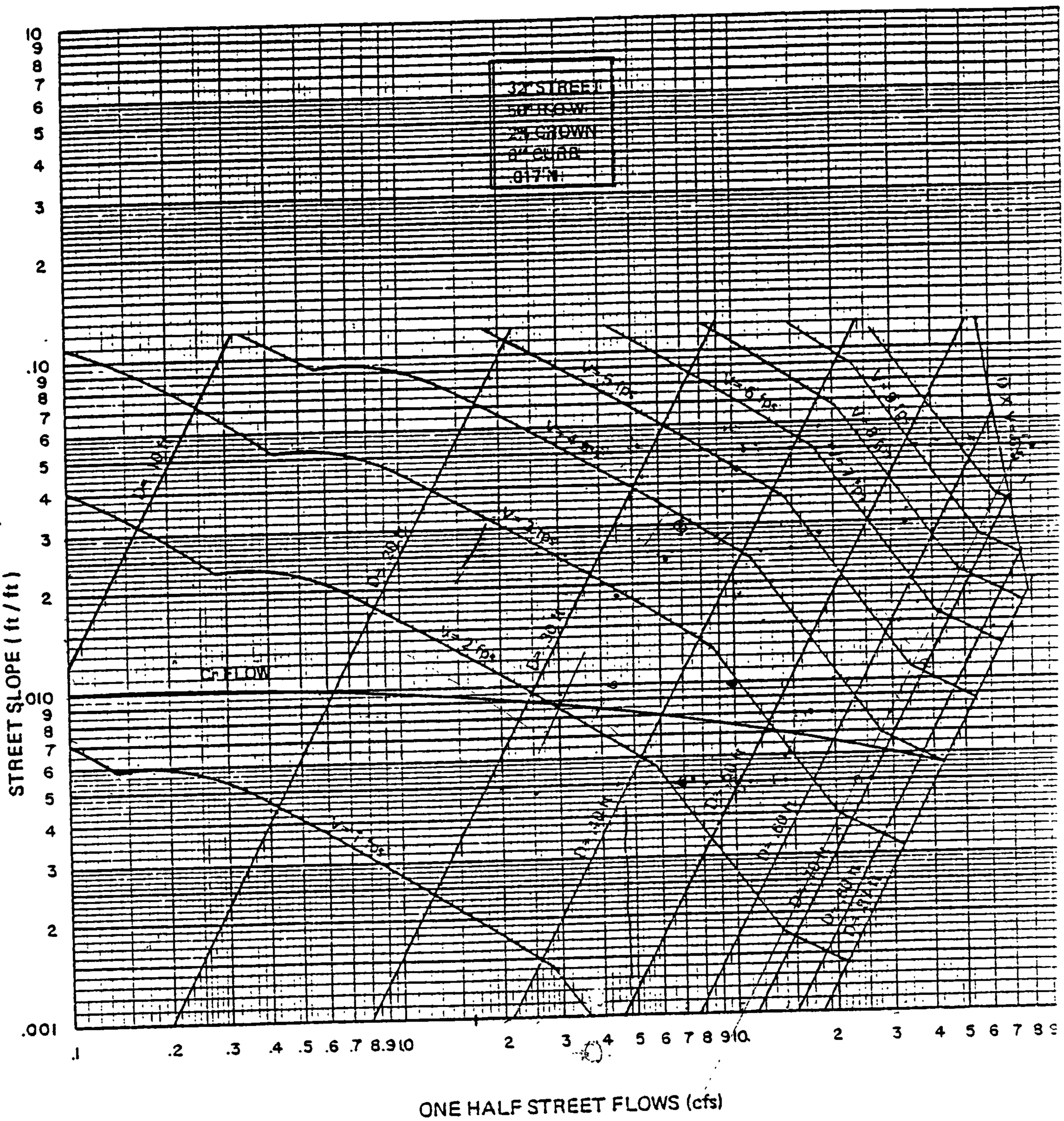
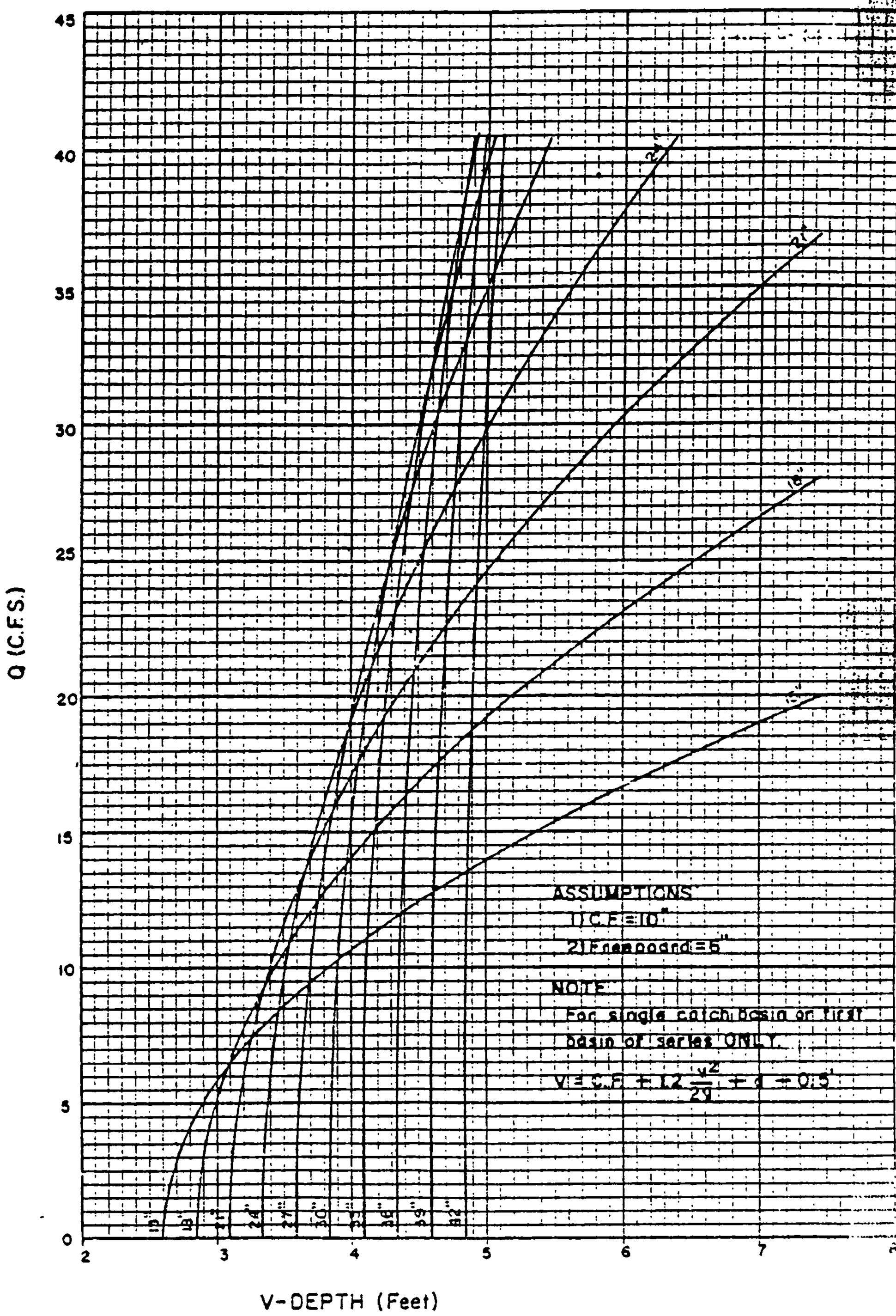


PLATE 22.3 D-1

REV. 3-83

CATCH BASIN V-DEPTH



SUMMARY OF HYDRAULIC CALCULATIONS, CHIRICAHUA ST
CLOSED CONDUIT

REVISED HGL ANALYSIS BASED ON REVISED HYMO, MAY 9, 1995
PROJECT WILLOWWOOD
BY: RLB
FILE:PROJECTS\WILLOW\HYD\HGL95.WB1

1	2	3	4	5	6	7	8	9	10		11	12	13	14		15	16	17	18	19	20	21	22	Comments
											JUNCTION		LOSSES											
STATION	STRUCT	D	Q	A	V	K	Sf	L	DELTA	Q	D	ANGLE	hf	hb	Aavg	hj	hmh	ht	hmisc	SUM	E.G	hv	H G.	
																					5484 56	0.94	5483 62	(1) AND (2)
OUTFALL	MH	AP 19																0 01		0.01	5484.57	0.94	5483.63	
		60	153	19.64	7 79	2604	0 0035	159					0 55							0.55	5485.12	0.94	5484 18	
STA 19+11	WYE	45 D CONF							5	44	30	45			19 64	0 15				0 15	5485.27	0 48	5484.79	(3)
		60	109	19 64	5 55	2604	0 0018	57					0.10							0 10	5485.37	0 48	5484 89	
STA 18+54	'A' MH	7 D BEND							7	0				0.03	19 64		0 02	0.01		0.06	5485 43	0 48	5484 95	
		60	109	19 64	5 55	2604	0 0018	108					0 19							0.19	5485.62	0 48	5485.14	
STA 17+46	'A' MH	90 D CONF								20	30	90			16 10	0 03	0 03			0.07	5485 69	0 68	5485.01	
		48	83	12 57	6 60	1436	0 0033	146					0.49							0 49	5486.17	0 68	5485 50	
STA 16+00	2-WYES	45 D CONF								22	24	45			12 57	0 62	0 02			0 64	5486.82	0 37	5486 45	
		48	61	12 57	4 85	1436	0 0018	161					0 29							0.29	5487 11	0 37	5486 74	
STA 14+39	MH	90 D CONF								14	30	90			12 57	0 30	0 01			0.31	5487 41	0 22	5487.20	
		48	47	12 57	3 74	1436	0 0011	258					0 28							0 28	5487 69	0 22	5487 47	
STA 11+81	MH	90 D CONF								25	30	90			9 82	0 34	0 01			0 35	5488 04	0.15	5487.89	
		36	22	7 07	3 11	667	0 0011	206					0.22							0 22	5488 26	0 15	5488 11	
STA 9+75	MH	45 D BEND							45	0				0 02	7 07		0 01			0 03	5488 29	0.15	5488.14	
		36	22	7 07	3.11	667	0 0011	75			45		0 08							0 08	5488.37	0 15	5488.22	
STA 10+50	MH	45 D BEND							45					0 02	3 53		0.01			0 03	5488.40	0 15	5488.25	

NOTES:
(1) MAINLINE FLOW = 387 cfs @ Tp=1.567 hrs
(2) CONFLUENCE AT MAINLINE IS NON-PRESSURE FLOW, USE 0.8D FOR STARTING WSEL.
(3) ASSUMES 1 BATTERY OF INLETS BYPASSES INLETS AND SURFACE FLOWS TO END OF CHIRICAHUA ST , APPROXIMATELY 44 cfs

Chiricahua St
Storm Drain

SUMMARY OF HYDRAULIC CALCULATIONS, MAINLINE STORM DRAIN
CLOSED CONDUIT

DATE: RE

REVISED HGL ANALYSIS BASED ON REVISED HYMO, MAY 9, 1995
PROJECT: WILLOWWOOD LINE: CHIRICAHUA ST
BY: RLB

1	2	3	4	5	6	7	8	9	10		11	12	13	14		15	16	17	18	19	20	21	22
											JUNCTION		LOSSES										
STATION	STRUCT	D	Q	A	V	K	Sf	L	DELTA	Q	D	ANGLE	hf	hb	Aavg	hj	hmh	ht	hmisc	SUM	E.G.	hv	H.G.
STA 9+67	POND																				5482.40	0.00	5482.40
		84	387	38.4846	10.056	6388	0.00367	75					0.28							0.28	5482.68	1.57	5482.40
STA 10+42	BEND								45					0.22	38.48	0.00	0.08			0.30	5482.98	1.57	5481.11
		84	387	38 4846	10.056	6388	0 00367	111					0.41							0.41	5483.38	1.57	5481.41
STA 11+44	MH/BEND								10					0.10	38.48	0.00	0.08			0.18	5483.57	1.57	5481.81
		84	387	38.4846	10.056	6388	0.00367	30					0.11							0.11	5483.68	1.57	5482.00
STA 11+74	MH/JUNCTION								0		36	45		0.00	38.48	0.44	0 08			0.52	5484.20	1.57	5482.11
		84	352	38 4846	9 146516	6388	0.00304	60					0.18							0.18	5484.38	1.57	5482.63
STA 12+40	MH/JUNCTION								0		60	45		0.00	19.24	1.00	0.08			1.08	5485.46	1.57	5482.81

Mainline Analysis @ Q_{100}= 387 @ Tp= 1.567 hrs

SUMMARY OF SUBBASIN FLOWS BY THE RATIONAL METHOD

	EXISTING:			FUTURE:		
BASIN I.D.	AREA ACRES	PEAK FLOW CFS/ACRE	RUNOFF CFS	AREA ACRES	PEAK FLOW CFS/ACRE	RUNOFF CFS
A-1	8.5	1.87	16	8.5	4.02	34
A-2	6.4	1.87	12	6.4	4.02	26
A-3	7.6	1.87	14	7.6	4.02	30
A-4	5.5	1.87	10	5.5	4.02	22
A-5	1.3	1.87	02	1.3	4.02	05
A-6	3.4	1.87	07	3.3	4.02	13
A-7	5.8	1.87	11	5.8	4.02	23
A-8	10.8	1.87	20	10.8	4.02	43
A-9	1.4	1.87	03	1.4	4.02	06
A-10	4.3	1.87	08	4.3	4.02	17
A-11	5.7	1.87	11	5.7	4.02	23
A-12	7.7	1.87	14	7.7	4.02	31
A-13	1.9	1.87	04	0.9	4.02	04
A-14	4.3	1.87	08	5.3	4.02	21
A-15	3.0	1.87	06	3.0	4.02	12
B-1	7.0	1.87	13	7.0	4.02	28
B-2	3.8	1.87	07	3.8	4.02	15
B-3	6.8	1.87	13	6.8	4.02	27
B-4	4.8	1.87	09	4.8	4.02	19
C-1	25.0	1.87	29	--	--	--
[1] C-1-A	--	--	--	15.5	3.35	52.0
[2] C-1-B	--	--	--	05.0	4.02	20.1
[3] C-1-C	--	--	--	04.5	--	--

REVISIONS:
[1] APS future school site hydrologic parameters per aps request @ 3.35cfs/ac.
[2] Unit 9, add to WillowWood Units 1-8.
[3] Off-site, undeveloped flow intecepted by future streets.

AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
RUN DATE (MON/DAY/YR) = 03/25/1995
START TIME (HR:MIN:SEC) = 16:53:47 USER NO.= AVID__NM.I01
INPUT FILE = OHYM95.IN

*WILLOW WOOD 23MARCH95
*COMPUTATIONS FOR 6 HR STORM (TYPE 1), ZONE 3
*ALL AREAS ARE 5 UNITS/ACRE: 50% D, 25% C, 25% B ASSUMED
*FILE: C:\PROJECTS\WILLOW\HYM95.IN
*REVISIONS [1] SCHOOL SITE PARAMETERS PER APS, BASIN C-1-A
* [2] PHASE 6, UNIT 9 ADDED TO WILLOW WOOD, C-1-B
* [3] OFFSITE DIVERTED BY FUTURE IMPROVEMENTS, C-1-C
START TIME=0.0 HR PUNCH CODE=0
RAINFALL TYPE=1 (SIX HR STORM) RAIN QUARTER=0.0 IN
RAIN ONE=2.07 IN RAIN SIX=2.54 IN
RAIN DAY=0.0 IN DT=0.0333333 HRS

COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.

DT = .033333 HOURS END TIME = 5.999995 HOURS

.0000	.0029	.0059	.0090	.0121	.0154	.0186
.0220	.0254	.0289	.0325	.0362	.0400	.0439
.0479	.0520	.0562	.0606	.0651	.0698	.0746
.0796	.0848	.0902	.0958	.1016	.1077	.1141
.1209	.1280	.1355	.1412	.1473	.1539	.1679
.1994	.2478	.3173	.4122	.5369	.6959	.8938
1.1353	1.3587	1.4522	1.5311	1.6013	1.6652	1.7240
1.7786	1.8297	1.8775	1.9225	1.9650	2.0051	2.0431
2.0791	2.1132	2.1456	2.1763	2.2055	2.2128	2.2197
2.2263	2.2327	2.2388	2.2446	2.2502	2.2557	2.2610
2.2661	2.2710	2.2759	2.2805	2.2851	2.2896	2.2939
2.2982	2.3023	2.3064	2.3103	2.3142	2.3181	2.3218
2.3255	2.3291	2.3326	2.3361	2.3395	2.3429	2.3462
2.3495	2.3527	2.3559	2.3590	2.3621	2.3651	2.3681
2.3711	2.3740	2.3768	2.3797	2.3825	2.3853	2.3880
2.3907	2.3934	2.3960	2.3987	2.4012	2.4038	2.4063
2.4088	2.4113	2.4138	2.4162	2.4186	2.4210	2.4234
2.4257	2.4280	2.4303	2.4326	2.4349	2.4371	2.4393
2.4415	2.4437	2.4459	2.4480	2.4501	2.4522	2.4543
2.4564	2.4585	2.4605	2.4626	2.4646	2.4666	2.4686
2.4705	2.4725	2.4744	2.4764	2.4783	2.4802	2.4821
2.4840	2.4858	2.4877	2.4895	2.4913	2.4932	2.4950
2.4968	2.4986	2.5003	2.5021	2.5038	2.5056	2.5073
2.5090	2.5107	2.5125	2.5141	2.5158	2.5175	2.5192
2.5208	2.5225	2.5241	2.5257	2.5273	2.5290	2.5306
2.5322	2.5337	2.5353	2.5369	2.5384	2.5400	

*
*
*
*COMPUTE HYDROGRAPH FOR BASINS A3
COMPUTE NM HYD ID=1 HYD NO=3 DA=0.0119 SQ MI
%A=0.0 %B=25.0 %C=25.0 %D=50.0

TP=0.1333 HR
MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 23.491 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 2.0700
AREA = .005950 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .120467HR TP = .133300HR K/TP RATIO = .903729 SHAPE CONSTANT, N = 3.920589
UNIT PEAK = 15.616 CFS UNIT VOLUME = .9996 B = 349.84 P60 = 2.0700
AREA = .005950 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 3.00

RUNOFF VOLUME = 1.66364 INCHES = 1.0559 ACRE-FEET
PEAK DISCHARGE RATE = 29.55 CFS AT 1.500 HOURS BASIN AREA = .0119 SQ. MI.

*
*
*
*CHANNEL ROUTE (STREET) HERMAN ROSER
*40' SECTION, S=0.016
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=100.67
CH SLP=0.016 FP SLP=0.016 N=0.017
DIST=40.0
00.0 100.67 0.0 100.00 2.0 100.13
20.0 100.49 38.0 100.13 40.0 100.00
40.0 100.67

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.04	.02	.01	1.09
100.07	.08	.09	2.17
100.11	.17	.26	3.26
100.14	.31	.52	5.11
100.18	.55	.96	8.63
100.21	.92	1.80	12.16
100.25	1.41	3.09	15.68
100.28	2.03	4.95	19.21
100.32	2.76	7.43	22.74
100.35	3.63	10.63	26.26

100.39	4.62	14.60	29.79
100.42	5.73	19.42	33.32
100.46	6.97	25.16	36.84
100.49	8.33	32.07	40.00
100.53	9.74	41.60	40.00
100.56	11.15	52.09	40.00
100.60	12.56	63.50	40.00
100.63	13.97	75.78	40.00
100.67	15.38	88.91	40.00

COMPUTE TRAVEL TIME ID=2 REACH NO=1 NO VS=1 L=1000 SLP=0.016

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.035	.019	.01	.3794
.071	.077	.09	.2390
.106	.172	.26	.1824
.141	.310	.52	.1657
.176	.553	.96	.1592
.212	.919	1.80	.1422
.247	1.410	3.09	.1266
.282	2.025	4.95	.1137
.317	2.765	7.43	.1033
.353	3.629	10.63	.0949
.388	4.617	14.60	.0879
.423	5.730	19.42	.0819
.458	6.967	25.16	.0769
.494	8.327	32.07	.0721
.529	9.738	41.60	.0650
.564	11.148	52.09	.0594
.599	12.559	63.50	.0549
.635	13.969	75.78	.0512
.670	15.380	88.91	.0481

ROUTE ID=2 HYD NO=4 INFLOW ID=1
PRINT HYD ID=2 CODE=1

OUTFLOW HYDROGRAPH REACH 4.00

RUNOFF VOLUME = 1.66367 INCHES = 1.0559 ACRE-FEET
PEAK DISCHARGE RATE = 25.43 CFS AT 1.567 HOURS BASIN AREA = .0119 SQ. MI.

*
*
*
*COMPUTE HYDROGRAPH FOR BASINS A4
COMPUTE NM HYD ID=1 HYD NO=4 DA=0.0086 SQ MI
%A=0.0 %B=25.0 %C=25.0 %D=50.0
TP=0.1333 HR

```
                MASS RAINFALL=-1

     K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =  16.977   CFS  UNIT VOLUME =   .9987      B =  526.28      P60 = 2.0700
     AREA =     .004300 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333


     K =  .120467HR   TP =  .133300HR   K/TP RATIO =  .903729    SHAPE CONSTANT, N =  3.920589
     UNIT PEAK =  11.285   CFS  UNIT VOLUME =   .9993      B =  349.84      P60 = 2.0700
     AREA =     .004300 SQ MI   IA =   .42500 INCHES   INF =  1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333

   PRINT HYD         ID=1  CODE=1

                    OUTFLOW HYDROGRAPH REACH    4.00


     RUNOFF VOLUME =    1.66365 INCHES    =       .7631 ACRE-FEET
     PEAK DISCHARGE RATE =     21.36 CFS  AT   1.500 HOURS   BASIN AREA =   .0086 SQ. MI.



*
*
*
*ADD HYDROGRAPHS
ADD HYD          ID=3  HYD=4  ID I=2  ID II=1
PRINT HYD         ID=3  CODE=1

                    OUTFLOW HYDROGRAPH REACH    4.00


     RUNOFF VOLUME =    1.66361 INCHES    =     · 1.8189 ACRE-FEET
     PEAK DISCHARGE RATE =     45.27 CFS  AT   1.533 HOURS   BASIN AREA =   .0205 SQ. MI.


*
*
*COMPUTE DEPTH OF FLOW ONLY
*HERMAN ROSER AT WIND RIVER
*40' SECTION, S=0.0059
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
            MIN ELEV=100.00 MAX ELEV=100.67
            CH SLP=0.0059  FP SLP=0.0059  N=0.017
            DIST=40.0
            00.0   100.67  0.0   100.00   2.0   100.13
            20.0   100.49 38.0   100.13  40.0   100.00
            40.0   100.67
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.04	.02	.01	1.09
100.07	.08	.05	2.17
100.11	.17	.16	3.26
100.14	.31	.32	5.11
100.18	.55	.59	8.63
100.21	.92	1.09	12.16
100.25	1.41	1.88	15.68
100.28	2.03	3.00	19.21
100.32	2.76	4.51	22.74
100.35	3.63	6.45	26.26
100.39	4.62	8.87	29.79
100.42	5.73	11.79	33.32
100.46	6.97	15.28	36.84
100.49	8.33	19.47	40.00
100.53	9.74	25.26	40.00
100.56	11.15	31.63	40.00
100.60	12.56	38.56	40.00
100.63	13.97	46.02	40.00
100.67	15.38	53.99	40.00

```
*
*
*WIND RIVER, AP4 BEFORE STORM DRAIN
*COMPUTE STREET FLOW DEPTHS ONLY
*40' SECTION, S=0.0092
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=100.67
          CH SLP=0.0092  FP SLP=0.0092  N=0.017
          DIST=28.0
          00.0  100.67  0.0  100.00  2.0  100.13
          14.0  100.33 26.0  100.13  28.0  100.00
          28.0  100.67
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.04	.02	.01	1.09
100.07	.08	.07	2.17
100.11	.17	.20	3.26
100.14	.31	.39	5.33
100.18	.57	.73	9.56
100.21	.99	1.41	13.79
100.25	1.55	2.50	18.02
100.28	2.26	4.08	22.25
100.32	3.12	6.22	26.48
100.35	4.09	9.44	28.00
100.39	5.08	13.53	28.00
100.42	6.07	18.17	28.00

100.46	7.06	23.34	28.00
100.49	8.04	29.01	28.00
100.53	9.03	35.16	28.00
100.56	10.02	41.76	28.00
100.60	11.01	48.80	28.00
100.63	11.99	56.27	28.00
100.67	12.98	64.15	28.00

```
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS A-8
COMPUTE NM HYD     ID=1  HYD NO=8  DA=0.0169 SQ MI
           %A=0.0  %B=25.0  %C=25.0  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

    K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =  33.361   CFS  UNIT VOLUME =  .9990     B =  526.28     P60 = 2.0700
    AREA =    .008450 SQ MI   IA =  .10000 INCHES   INF =  .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333


    K =  .120467HR   TP =  .133300HR   K/TP RATIO =  .903729    SHAPE CONSTANT, N =  3.920589
    UNIT PEAK =  22.177   CFS  UNIT VOLUME =  .9998     B =  349.84     P60 = 2.0700
    AREA =    .008450 SQ MI   IA =  .42500 INCHES   INF =  1.04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333

  PRINT HYD        ID=1 CODE=1

                    OUTFLOW HYDROGRAPH REACH    8.00


    RUNOFF VOLUME =    1.66365 INCHES    =     1.4995 ACRE-FEET
    PEAK DISCHARGE RATE =    41.96 CFS  AT   1.500 HOURS   BASIN AREA =  .0169 SQ. MI.


*
*
*
*ADD HYDROGRAPHS
ADD HYD          ID=3  HYD=8  ID I=3  ID II=1
PRINT HYD        ID=3  CODE=1

                    OUTFLOW HYDROGRAPH REACH    8.00


  RUNOFF VOLUME =    1.66362 INCHES    =     3.3184 ACRE-FEET
  PEAK DISCHARGE RATE =    85.61 CFS  AT   1.533 HOURS   BASIN AREA =  .0374 SQ. MI.
```

```
*
*
*
*SPLIT HYDROGRAPH--STORM DRAIN INTERCEPTION AT AP8
DIVIDE HYD        ID=3  Q=50.0  ID I=4  HYD I=8 TO PIPE
                  ID II=3  HYD II=8 IN STREET
*S  AP8 PIPE FINAL
PRINT HYD         ID=4  CODE=1

                    OUTFLOW HYDROGRAPH REACH    8.00


  RUNOFF VOLUME =    1.66362 INCHES    =      2.8641 ACRE-FEET
  PEAK DISCHARGE RATE =     50.00 CFS  AT   1.433 HOURS   BASIN AREA =   .0323 SQ. MI.


*S  AP8 STREET FINAL
PRINT HYD         ID=3  CODE=1

                    OUTFLOW HYDROGRAPH REACH    8.00


  RUNOFF VOLUME =    1.66362 INCHES    =       .4543 ACRE-FEET
  PEAK DISCHARGE RATE =     35.61 CFS  AT   1.533 HOURS   BASIN AREA =   .0051 SQ. MI.


*
*
*KINGS CANYON
*CHANNEL ROUTE (STREET)
*28' SECTION
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=100.67
          CH SLP=0.0342  FP SLP=0.0342  N=0.017
          DIST=28.0
          00.0  100.67  0.0  100.00  2.0  100.13
          14.0  100.33 26.0  100.13  28.0  100.00
          28.0  100.67
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.04	.02	.02	1.09
100.07	.08	.13	2.17
100.11	.17	.38	3.26
100.14	.31	.74	5.33
100.18	.57	1.40	9.56
100.21	.99	2.72	13.79
100.25	1.55	4.82	18.02
100.28	2.26	7.86	22.25

100.32	3.12	11.99	26.48
100.35	4.09	18.21	28.00
100.39	5.08	26.08	28.00
100.42	6.07	35.03	28.00
100.46	7.06	45.00	28.00
100.49	8.04	55.93	28.00
100.53	9.03	67.78	28.00
100.56	10.02	80.51	28.00
100.60	11.01	94.09	28.00
100.63	11.99	108.49	28.00
100.67	12.98	123.68	28.00

COMPUTE TRAVEL TIME ID=5 REACH NO=1 NO VS=1 L=270 SLP=0.0342

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.035	.019	.02	.0701
.071	.077	.13	.0441
.106	.172	.38	.0337
.141	.312	.74	.0314
.176	.574	1.40	.0306
.212	.986	2.72	.0272
.247	1.547	4.82	.0241
.282	2.257	7.86	.0215
.317	3.116	11.99	.0195
.353	4.094	18.21	.0169
.388	5.081	26.08	.0146
.423	6.068	35.03	.0130
.458	7.056	45.00	.0118
.494	8.043	55.93	.0108
.529	9.031	67.78	.0100
.564	10.018	80.51	.0093
.599	11.005	94.09	.0088
.635	11.993	108.49	.0083
.670	12.980	123.68	.0079

ROUTE ID=5 HYD NO=8 INFLOW ID=3
*S ROUTE STREET FLOW AP8 TO AP9
PRINT HYD ID=5 CODE=1

OUTFLOW HYDROGRAPH REACH 8.00

RUNOFF VOLUME = 1.66463 INCHES = .4546 ACRE-FEET
PEAK DISCHARGE RATE = 37.46 CFS AT 1.533 HOURS BASIN AREA = .0051 SQ. MI.

*
*
*
*COMPUTE HYDROGRAPH FOR BASINS A-9

```
COMPUTE NM HYD     ID=1  HYD NO=9  DA=0.0022 SQ MI
           %A=0.0  %B=25.0  %C=25.0  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  4.3429   CFS  UNIT VOLUME =   .9969      B =  526.28      P60 = 2.0700
  AREA =     .001100 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333


  K =  .120467HR   TP =  .133300HR   K/TP RATIO =  .903729    SHAPE CONSTANT, N =  3.920589
  UNIT PEAK =  2.8869   CFS  UNIT VOLUME =   .9959      B =  349.84      P60 = 2.0700
  AREA =     .001100 SQ MI   IA =   .42500 INCHES   INF =  1.04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333

PRINT HYD        ID=1 CODE=1

                    OUTFLOW HYDROGRAPH REACH    9.00


  RUNOFF VOLUME =    1.66364 INCHES    =      .1952 ACRE-FEET
  PEAK DISCHARGE RATE =     5.48 CFS  AT   1.500 HOURS   BASIN AREA =   .0022 SQ. MI.


*
*
*
*S  AP9 STREET FLOW FROM AP8
*ADD HYDROGRAPHS
ADD HYD          ID=5  HYD=9  ID I=5  ID II=1
PRINT HYD        ID=5  CODE=1

                    OUTFLOW HYDROGRAPH REACH    9.00


  RUNOFF VOLUME =    1.66423 INCHES    =      .6497 ACRE-FEET
  PEAK DISCHARGE RATE =    42.73 CFS  AT   1.533 HOURS   BASIN AREA =   .0073 SQ. MI.


*
*
*
*COMPUTE HYDROGRAPH FOR BASINS A-1
COMPUTE NM HYD     ID=1  HYD NO=12.51  DA=0.0133 SQ MI
           %A=0.0  %B=25.0  %C=25.0  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

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

UNIT PEAK = 26.255 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 2.0700
AREA = .006650 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .120467HR TP = .133300HR K/TP RATIO = .903729 SHAPE CONSTANT, N = 3.920589
UNIT PEAK = 17.453 CFS UNIT VOLUME = .9997 B = 349.84 P60 = 2.0700
AREA = .006650 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 12.51

RUNOFF VOLUME = 1.66365 INCHES = 1.1801 ACRE-FEET
PEAK DISCHARGE RATE = 33.03 CFS AT 1.500 HOURS BASIN AREA = .0133 SQ. MI.

*
*
*
*COMPUTE HYDROGRAPH FOR BASINS A-2
COMPUTE NM HYD ID=2 HYD NO=12.52 DA=0.01 SQ MI
%A=0.0 %B=25.0 %C=25.0 %D=50.0
TP=0.1333 HR
MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 19.740 CFS UNIT VOLUME = .9988 B = 526.28 P60 = 2.0700
AREA = .005000 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .120467HR TP = .133300HR K/TP RATIO = .903729 SHAPE CONSTANT, N = 3.920589
UNIT PEAK = 13.122 CFS UNIT VOLUME = .9994 B = 349.84 P60 = 2.0700
AREA = .005000 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=2 CODE=1

OUTFLOW HYDROGRAPH REACH 12.52

RUNOFF VOLUME = 1.66365 INCHES = .8873 ACRE-FEET
PEAK DISCHARGE RATE = 24.84 CFS AT 1.500 HOURS BASIN AREA = .0100 SQ. MI.

```
*
*
*ROUTE A2 THROUGH A1
*CHANNEL ROUTE (STREET)
*28' SECTION, S=0.0062
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=100.67
          CH SLP=0.0062  FP SLP=0.0062  N=0.017
          DIST=28.0
          00.0  100.67  0.0  100.00  2.0  100.13
          14.0  100.33 26.0  100.13  28.0  100.00
          28.0  100.67
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.04	.02	.01	1.09
100.07	.08	.06	2.17
100.11	.17	.16	3.26
100.14	.31	.32	5.33
100.18	.57	.60	9.56
100.21	.99	1.16	13.79
100.25	1.55	2.05	18.02
100.28	2.26	3.35	22.25
100.32	3.12	5.11	26.48
100.35	4.09	7.75	28.00
100.39	5.08	11.10	28.00
100.42	6.07	14.92	28.00
100.46	7.06	19.16	28.00
100.49	8.04	23.82	28.00
100.53	9.03	28.86	28.00
100.56	10.02	34.28	28.00
100.60	11.01	40.06	28.00
100.63	11.99	46.19	28.00
100.67	12.98	52.66	28.00

```
COMPUTE TRAVEL TIME ID=3  REACH NO=1  NO VS=1 L=400 SLP=0.0062
```

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.035	.019	.01	.2438
.071	.077	.06	.1536
.106	.172	.16	.1172
.141	.312	.32	.1091
.176	.574	.60	.1066
.212	.986	1.16	.0947
.247	1.547	2.05	.0838
.282	2.257	3.35	.0749
.317	3.116	5.11	.0678

.353	4.094	7.75	.0587
.388	5.081	11.10	.0508
.423	6.068	14.92	.0452
.458	7.056	19.16	.0409
.494	8.043	23.82	.0375
.529	9.031	28.86	.0348
.564	10.018	34.28	.0325
.599	11.005	40.06	.0305
.635	11.993	46.19	.0288
.670	12.980	52.66	.0274

```
ROUTE          ID=3  HYD NO=2  INFLOW ID=2
PRINT HYD        ID=3  CODE=1
```

OUTFLOW HYDROGRAPH REACH 2.00

RUNOFF VOLUME = 1.66367 INCHES = .8873 ACRE-FEET
PEAK DISCHARGE RATE = 24.28 CFS AT 1.533 HOURS BASIN AREA = .0100 SQ. MI.

```
*
*
*
*ADD HYDROGRAPHS
ADD HYD          ID=2  HYD=2  ID I=1  ID II=3
PRINT HYD         ID=2  CODE=1
```

OUTFLOW HYDROGRAPH REACH 2.00

RUNOFF VOLUME = 1.66362 INCHES = 2.0673 ACRE-FEET
PEAK DISCHARGE RATE = 56.03 CFS AT 1.533 HOURS BASIN AREA = .0233 SQ. MI.

```
*
*
*ROUTE A1 AND A2 THROUGH A5 TO AP9
*CHANNEL ROUTE (STREET)
*28' SECTION, S=0.0085
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=100.67
          CH SLP=0.0085  FP SLP=0.0085  N=0.017
          DIST=28.0
          00.0  100.67  0.0  100.00  2.0  100.13
          14.0  100.33 26.0  100.13  28.0  100.00
          28.0  100.67
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00

100.04	.02	.01	1.09
100.07	.08	.06	2.17
100.11	.17	.19	3.26
100.14	.31	.37	5.33
100.18	.57	.70	9.56
100.21	.99	1.35	13.79
100.25	1.55	2.40	18.02
100.28	2.26	3.92	22.25
100.32	3.12	5.98	26.48
100.35	4.09	9.08	28.00
100.39	5.08	13.00	28.00
100.42	6.07	17.46	28.00
100.46	7.06	22.43	28.00
100.49	8.04	27.88	28.00
100.53	9.03	33.79	28.00
100.56	10.02	40.14	28.00
100.60	11.01	46.91	28.00
100.63	11.99	54.09	28.00
100.67	12.98	61.66	28.00

COMPUTE TRAVEL TIME ID=1 REACH NO=1 NO VS=1 L=400 SLP=0.0085

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.035	.019	.01	.2082
.071	.077	.06	.1312
.106	.172	.19	.1001
.141	.312	.37	.0932
.176	.574	.70	.0911
.212	.986	1.35	.0809
.247	1.547	2.40	.0715
.282	2.257	3.92	.0640
.317	3.116	5.98	.0579
.353	4.094	9.08	.0501
.388	5.081	13.00	.0434
.423	6.068	17.46	.0386
.458	7.056	22.43	.0349
.494	8.043	27.88	.0320
.529	9.031	33.79	.0297
.564	10.018	40.14	.0277
.599	11.005	46.91	.0261
.635	11.993	54.09	.0246
.670	12.980	61.66	.0234

ROUTE ID=1 HYD NO=9 INFLOW ID=2
PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 9.00

RUNOFF VOLUME = 1.66364 INCHES = 2.0673 ACRE-FEET
PEAK DISCHARGE RATE = 56.73 CFS AT 1.533 HOURS BASIN AREA = .0233 SQ. MI.

```
*
*
*
*COMPUTE HYDROGRAPH FOR BASINS A-5
COMPUTE NM HYD     ID=2  HYD NO=12.55  DA=0.0020 SQ MI
           %A=0.0  %B=25.0  %C=25.0  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  3.9481   CFS  UNIT VOLUME =   .9965      B =  526.28      P60 = 2.0700
  AREA =     .001000 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333

  K =  .120467HR   TP =  .133300HR   K/TP RATIO =  .903729    SHAPE CONSTANT, N =  3.920589
  UNIT PEAK =  2.6245   CFS  UNIT VOLUME =   .9954      B =  349.84      P60 = 2.0700
  AREA =     .001000 SQ MI   IA =   .42500 INCHES   INF =  1.04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333

PRINT HYD        ID=2 CODE=1

                    OUTFLOW HYDROGRAPH REACH   12.55


  RUNOFF VOLUME =    1.66365 INCHES    =      .1775 ACRE-FEET
  PEAK DISCHARGE RATE =     4.98 CFS  AT   1.500 HOURS   BASIN AREA =   .0020 SQ. MI.


*
*
*
*ADD HYDROGRAPHS
ADD HYD          ID=1  HYD=9  ID I=1  ID II=2
PRINT HYD        ID=1  CODE=1

                    OUTFLOW HYDROGRAPH REACH    9.00


  RUNOFF VOLUME =    1.66362 INCHES    =      2.2448 ACRE-FEET
  PEAK DISCHARGE RATE =    61.52 CFS  AT   1.533 HOURS   BASIN AREA =   .0253 SQ. MI.


*
*
*COMPUTE FLOW DEPTHS AT AP9 NORTH ONLY
*CHANNEL ROUTE (STREET)
*28' SECTION, S=0.0085
```

```
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
        MIN ELEV=100.00 MAX ELEV=100.67
        CH SLP=0.0085  FP SLP=0.0085  N=0.017
        DIST=28.0
        00.0  100.67  0.0  100.00  2.0  100.13
        14.0  100.33 26.0  100.13  28.0  100.00
        28.0  100.67
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.04	.02	.01	1.09
100.07	.08	.06	2.17
100.11	.17	.19	3.26
100.14	.31	.37	5.33
100.18	.57	.70	9.56
100.21	.99	1.35	13.79
100.25	1.55	2.40	18.02
100.28	2.26	3.92	22.25
100.32	3.12	5.98	26.48
100.35	4.09	9.08	28.00
100.39	5.08	13.00	28.00
100.42	6.07	17.46	28.00
100.46	7.06	22.43	28.00
100.49	8.04	27.88	28.00
100.53	9.03	33.79	28.00
100.56	10.02	40.14	28.00
100.60	11.01	46.91	28.00
100.63	11.99	54.09	28.00
100.67	12.98	61.66	28.00

```
*
*
*ST DR FLOW COLLECTED AT AP9, CANYONLANDS
DIVIDE HYD        ID=1  Q=70.0  ID I=6  HYD I=9.2 TO PIPE
                   ID II=7  HYD II=9.1 IN STREET
PRINT HYD         ID=6  CODE=1
```

OUTFLOW HYDROGRAPH REACH 9.20

RUNOFF VOLUME = 1.66362 INCHES = 2.2448 ACRE-FEET
PEAK DISCHARGE RATE = 61.52 CFS AT 1.533 HOURS BASIN AREA = .0253 SQ. MI.

```
PRINT HYD         ID=7  CODE=1
```

OUTFLOW HYDROGRAPH REACH 9.10

RUNOFF VOLUME = .00000 INCHES = .0000 ACRE-FEET
PEAK DISCHARGE RATE = .00 CFS AT -.033 HOURS BASIN AREA = .0000 SQ. MI.

```
*
*
*
*S  STREET FLOW FROM AP9 FINAL
*ADD HYDROGRAPHS
ADD HYD          ID=7  HYD=9  ID I=7  ID II=5
PRINT HYD        ID=7  CODE=1

                    OUTFLOW HYDROGRAPH REACH    9.00


  RUNOFF VOLUME =    1.66423 INCHES    =      .6497 ACRE-FEET
  PEAK DISCHARGE RATE =    42.73 CFS  AT   1.533 HOURS   BASIN AREA =   .0073 SQ. MI.


*
*
*
*CHANNEL ROUTE (STREET), ap9 to ap10
*28' SECTION, S=0.010
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
            MIN ELEV=100.00 MAX ELEV=100.67
            CH SLP=0.010  FP SLP=0.010  N=0.017
            DIST=28.0
            00.0  100.67  0.0  100.00  2.0  100.13
            14.0  100.33 26.0  100.13  28.0  100.00
            28.0  100.67
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.04	.02	.01	1.09
100.07	.08	.07	2.17
100.11	.17	.21	3.26
100.14	.31	.40	5.33
100.18	.57	.76	9.56
100.21	.99	1.47	13.79
100.25	1.55	2.61	18.02
100.28	2.26	4.25	22.25
100.32	3.12	6.49	26.48
100.35	4.09	9.85	28.00
100.39	5.08	14.10	28.00
100.42	6.07	18.94	28.00
100.46	7.06	24.33	28.00
100.49	8.04	30.25	28.00
100.53	9.03	36.65	28.00
100.56	10.02	43.54	28.00
100.60	11.01	50.88	28.00
100.63	11.99	58.66	28.00

100.67 12.98 66.88 28.00

COMPUTE TRAVEL TIME ID=9 REACH NO=1 NO VS=1 L=800 SLP=0.010

TRAVEL TIME TABLE

REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.035	.019	.01	.3839
.071	.077	.07	.2418
.106	.172	.21	.1846
.141	.312	.40	.1719
.176	.574	.76	.1679
.212	.986	1.47	.1492
.247	1.547	2.61	.1319
.282	2.257	4.25	.1179
.317	3.116	6.49	.1068
.353	4.094	9.85	.0924
.388	5.081	14.10	.0801
.423	6.068	18.94	.0712
.458	7.056	24.33	.0644
.494	8.043	30.25	.0591
.529	9.031	36.65	.0548
.564	10.018	43.54	.0511
.599	11.005	50.88	.0481
.635	11.993	58.66	.0454
.670	12.980	66.88	.0431

ROUTE ID=9 HYD NO=10 INFLOW ID=7

*S ROUTE STREET FLOW AP9 TO AP10, SALINAS ST

PRINT HYD ID=9 CODE=1

OUTFLOW HYDROGRAPH REACH 10.00

RUNOFF VOLUME = 1.66430 INCHES = .6497 ACRE-FEET

PEAK DISCHARGE RATE = 36.60 CFS AT 1.567 HOURS BASIN AREA = .0073 SQ. MI.

*

*

*

*S PIPE FLOW FROM AP9 FINAL

*ADD HYDROGRAPHS

ADD HYD ID=4 HYD=9 ID I=4 ID II=6

PRINT HYD ID=4 CODE=1

OUTFLOW HYDROGRAPH REACH 9.00

RUNOFF VOLUME = 1.66362 INCHES = 5.1088 ACRE-FEET

PEAK DISCHARGE RATE = 111.52 CFS AT 1.533 HOURS BASIN AREA = .0576 SQ. MI.

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*
*
*
*ROUTE PIPE AP9 TO AP12
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=-1 (PIPE)
          SLOPE=0.011  DIA=3.5 FEET
          N=0.015
```

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.18	.19	.48	1.56
.36	.53	2.08	2.14
.55	.96	4.84	2.54
.73	1.45	8.71	2.84
.91	1.99	13.59	3.07
1.09	2.57	19.40	3.25
1.28	3.17	25.99	3.37
1.46	3.80	33.23	3.45
1.64	4.43	40.96	3.49
1.82	5.07	49.02	3.50
2.01	5.70	57.23	3.50
2.19	6.33	65.39	3.50
2.37	6.94	73.29	3.50
2.55	7.52	80.69	3.50
2.74	8.07	87.31	3.50
2.92	8.57	92.81	3.50
3.10	9.01	96.75	3.50
3.28	9.37	98.37	3.50
3.50	9.62	98.37	3.50

```
COMPUTE TRAVEL TIME ID=6  REACH NO=1  VS NO=1  L=400 FEET
          SLOPE=0.011
```

TRAVEL TIME TABLE

REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.182	.191	.48	.0443
.365	.532	2.08	.0284
.547	.961	4.84	.0221
.730	1.453	8.71	.0185
.912	1.994	13.59	.0163
1.094	2.571	19.40	.0147
1.277	3.175	25.99	.0136
1.459	3.797	33.23	.0127
1.641	4.431	40.96	.0120
1.824	5.069	49.02	.0115
2.006	5.704	57.23	.0111
2.189	6.330	65.39	.0108

2.371	6.938	73.29	.0105
2.553	7.520	80.69	.0104
2.736	8.069	87.31	.0103
2.918	8.571	92.81	.0103
3.101	9.014	96.75	.0104
3.283	9.374	98.37	.0106
3.500	9.621	98.37	.0109

ROUTE ID=6 HYD NO=12 INFLOW ID=4
TRAVEL TIME TABLE EXCEEDED
PRINT HYD ID=6 CODE=1

OUTFLOW HYDROGRAPH REACH 12.00

RUNOFF VOLUME = 1.66363 INCHES = 5.1088 ACRE-FEET
PEAK DISCHARGE RATE = 111.00 CFS AT 1.533 HOURS BASIN AREA = .0576 SQ. MI.

*
*
*
*COMPUTE HYDROGRAPH FOR BASINS A-11,A-12
COMPUTE NM HYD ID=1 HYD NO=11.12 DA=0.0209 SQ MI
%A=0.0 %B=25.0 %C=25.0 %D=50.0
TP=0.1333 HR
MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 41.257 CFS UNIT VOLUME = .9991 B = 526.28 P60 = 2.0700
AREA = .010450 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .120467HR TP = .133300HR K/TP RATIO = .903729 SHAPE CONSTANT, N = 3.920589
UNIT PEAK = 27.426 CFS UNIT VOLUME = .9999 B = 349.84 P60 = 2.0700
AREA = .010450 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 11.12

RUNOFF VOLUME = 1.66365 INCHES = 1.8544 ACRE-FEET
PEAK DISCHARGE RATE = 51.89 CFS AT 1.500 HOURS BASIN AREA = .0209 SQ. MI.

*
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*

```
*ST DR FLOW COLLECTED AT AP12
DIVIDE HYD        ID=1  Q=40.0  ID I=8  HYD I=12 TO PIPE
                   ID II=3  HYD II=12 IN STREET
PRINT HYD         ID=8  CODE=1

                    OUTFLOW HYDROGRAPH REACH    12.00


  RUNOFF VOLUME =    1.66363 INCHES    =      1.7633 ACRE-FEET
  PEAK DISCHARGE RATE =    40.00 CFS  AT   1.467 HOURS   BASIN AREA =   .0199 SQ. MI.


PRINT HYD         ID=3  CODE=1

                    OUTFLOW HYDROGRAPH REACH    12.00


  RUNOFF VOLUME =    1.66363 INCHES    =       .0911 ACRE-FEET
  PEAK DISCHARGE RATE =    11.89 CFS  AT   1.500 HOURS   BASIN AREA =   .0010 SQ. MI.


*
*
*CHANNEL ROUTE (STREET)
*28' SECTION, S=0.010
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=1
          MIN ELEV=100.00 MAX ELEV=100.67
          CH SLP=0.01  FP SLP=0.01  N=0.017
          DIST=28.0
          00.0   100.67  0.0   100.00   2.0   100.13
          14.0   100.33 26.0   100.13  28.0   100.00
          28.0   100.67
```

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.04	.02	.01	1.09
100.07	.08	.07	2.17
100.11	.17	.21	3.26
100.14	.31	.40	5.33
100.18	.57	.76	9.56
100.21	.99	1.47	13.79
100.25	1.55	2.61	18.02
100.28	2.26	4.25	22.25
100.32	3.12	6.49	26.48
100.35	4.09	9.85	28.00
100.39	5.08	14.10	28.00
100.42	6.07	18.94	28.00
100.46	7.06	24.33	28.00
100.49	8.04	30.25	28.00

100.53	9.03	36.65	28.00
100.56	10.02	43.54	28.00
100.60	11.01	50.88	28.00
100.63	11.99	58.66	28.00
100.67	12.98	66.88	28.00

COMPUTE TRAVEL TIME ID=11 REACH NO=1 NO VS=1 L=270 SLP=0.0100

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.035	.019	.01	.1296
.071	.077	.07	.0816
.106	.172	.21	.0623
.141	.312	.40	.0580
.176	.574	.76	.0567
.212	.986	1.47	.0503
.247	1.547	2.61	.0445
.282	2.257	4.25	.0398
.317	3.116	6.49	.0360
.353	4.094	9.85	.0312
.388	5.081	14.10	.0270
.423	6.068	18.94	.0240
.458	7.056	24.33	.0217
.494	8.043	30.25	.0199
.529	9.031	36.65	.0185
.564	10.018	43.54	.0173
.599	11.005	50.88	.0162
.635	11.993	58.66	.0153
.670	12.980	66.88	.0146

ROUTE ID=11 HYD NO=12 INFLOW ID=3
*S ROUTE STREET FLOW AP12 TO AP10, ARCHES RD
PRINT HYD ID=11 CODE=1

OUTFLOW HYDROGRAPH REACH 12.00

RUNOFF VOLUME = 1.66866 INCHES = .0914 ACRE-FEET
PEAK DISCHARGE RATE = 10.81 CFS AT 1.533 HOURS BASIN AREA = .0010 SQ. MI.

*
*
*
*S PIPE FLOW FINAL AP12
*ADD HYDROGRAPHS
ADD HYD ID=10 HYD=12 ID I=8 ID II=6
PRINT HYD ID=10 CODE=1

OUTFLOW HYDROGRAPH REACH 12.00

RUNOFF VOLUME = 1.66362 INCHES = 6.8721 ACRE-FEET
PEAK DISCHARGE RATE = 151.00 CFS AT 1.533 HOURS BASIN AREA = .0775 SQ. MI.

*
*
*
*ROUTE PIPE AP12 TO AP10
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=-1 (PIPE)
SLOPE=0.011 DIA=4.0 FEET
N=0.015

RATING CURVE PIPE SECTION 1.0

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

COMPUTE TRAVEL TIME ID=12 REACH NO=1 VS NO=1 L=270 FEET
SLOPE=0.011

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.208	.250	.68	.0274
.417	.695	2.97	.0175
.625	1.255	6.91	.0136
.834	1.898	12.43	.0115
1.042	2.604	19.41	.0101
1.251	3.358	27.69	.0091
1.459	4.146	37.10	.0084
1.668	4.960	47.44	.0078

1.876	5.788	58.48	.0074
2.084	6.621	69.99	.0071
2.293	7.451	81.71	.0068
2.501	8.267	93.36	.0066
2.710	9.062	104.63	.0065
2.918	9.823	115.20	.0064
3.127	10.539	124.65	.0063
3.335	11.195	132.51	.0063
3.544	11.773	138.14	.0064
3.752	12.243	140.45	.0065
4.000	12.566	140.45	.0067

ROUTE ID=12 HYD NO=10 INFLOW ID=10
TRAVEL TIME TABLE EXCEEDED
PRINT HYD ID=12 CODE=1

OUTFLOW HYDROGRAPH REACH 10.00

RUNOFF VOLUME = 1.66363 INCHES = 6.8721 ACRE-FEET
PEAK DISCHARGE RATE = 150.28 CFS AT 1.533 HOURS BASIN AREA = .0775 SQ. MI.

*
*
*
*COMPUTE HYDROGRAPH FOR BASIN A-10
COMPUTE NM HYD ID=1 HYD NO=10 DA=0.0067 SQ MI
%A=0.0 %B=25.0 %C=25.0 %D=50.0
TP=0.1333 HR
MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 13.226 CFS UNIT VOLUME = .9985 . B = 526.28 P60 = 2.0700
AREA = .003350 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .120467HR TP = .133300HR K/TP RATIO = .903729 SHAPE CONSTANT, N = 3.920589
UNIT PEAK = 8.7919 CFS UNIT VOLUME = .9989 B = 349.84 P60 = 2.0700
AREA = .003350 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 10.00

RUNOFF VOLUME = 1.66365 INCHES = .5945 ACRE-FEET
PEAK DISCHARGE RATE = 16.65 CFS AT 1.500 HOURS BASIN AREA = .0067 SQ. MI.

```
*
*
*
*S  STREET FLOW AP10, SALINAS
*ADD HYDROGRAPHS
ADD HYD          ID=13  HYD=10  ID I=1  ID II=9
PRINT HYD        ID=13  CODE=1

                    OUTFLOW HYDROGRAPH REACH    10.00

  RUNOFF VOLUME =    1.66393 INCHES    =     1.2442 ACRE-FEET
  PEAK DISCHARGE RATE =    50.68 CFS  AT   1.567 HOURS   BASIN AREA =   .0140 SQ. MI.

*
*
*
*S  STREET FLOW AP10, SALINAS
*ADD HYDROGRAPHS
ADD HYD          ID=13  HYD=10  ID I=13  ID II=11
PRINT HYD        ID=13  CODE=1

                    OUTFLOW HYDROGRAPH REACH    10.00

  RUNOFF VOLUME =    1.66422 INCHES    =     1.3355 ACRE-FEET
  PEAK DISCHARGE RATE =    58.24 CFS  AT   1.567 HOURS   BASIN AREA =   .0150 SQ. MI.

*
*
*
*COMPUTE HYDROGRAPH FOR BASINS A-13
COMPUTE NM HYD     ID=1  HYD NO=13  DA=0.0014 SQ MI
          %A=0.0  %B=25.0  %C=25.0  %D=50.0
          TP=0.1333 HR
          MASS RAINFALL=-1

    K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =  2.7636   CFS  UNIT VOLUME =  .9955     B =  526.28     P60 = 2.0700
    AREA =    .000700 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333

    K =  .120467HR   TP =  .133300HR   K/TP RATIO =  .903729    SHAPE CONSTANT, N =  3.920589
    UNIT PEAK =  1.8371   CFS  UNIT VOLUME =  .9932     B =  349.84     P60 = 2.0700
    AREA =    .000700 SQ MI   IA =   .42500 INCHES   INF =  1.04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333
```

```
PRINT HYD        ID=1 CODE=1

                    OUTFLOW HYDROGRAPH REACH    13.00


  RUNOFF VOLUME =    1.66364 INCHES    =      .1242 ACRE-FEET
  PEAK DISCHARGE RATE =     3.49 CFS  AT   1.500 HOURS   BASIN AREA =   .0014 SQ. MI.


*
*
*
*S  STREET FLOW AP10, BEFORE SD
*ADD HYDROGRAPHS
ADD HYD          ID=13  HYD=10  ID I=1  ID II=13
PRINT HYD        ID=13  CODE=1

                    OUTFLOW HYDROGRAPH REACH    10.00


  RUNOFF VOLUME =    1.66415 INCHES    =     1.4597 ACRE-FEET
  PEAK DISCHARGE RATE =    61.20 CFS  AT   1.567 HOURS   BASIN AREA =   .0164 SQ. MI.


*
*
*
*ST DR FLOW COLLECTED AT AP10
DIVIDE HYD       ID=13  Q=24.0  ID I=14  HYD I=10 TO PIPE
                  ID II=15  HYD II=10 IN STREET
*S  FINAL STREET FLOW AP10, ARCHES & SALINAS
PRINT HYD        ID=15  CODE=1

                    OUTFLOW HYDROGRAPH REACH    10.00


  RUNOFF VOLUME =    1.66416 INCHES    =      .3852 ACRE-FEET
  PEAK DISCHARGE RATE =    37.20 CFS  AT   1.567 HOURS   BASIN AREA =   .0043 SQ. MI.


*S FINAL PIPE FLOW AP10, ARCHES RD & SALINAS
PRINT HYD        ID=14  CODE=1

                    OUTFLOW HYDROGRAPH REACH    10.00


  RUNOFF VOLUME =    1.66416 INCHES    =     1.0745 ACRE-FEET
  PEAK DISCHARGE RATE =    24.00 CFS  AT   1.467 HOURS   BASIN AREA =   .0121 SQ. MI.
```

```
*
*
*
*ADD HYD FINAL STORM AP10
ADD HYD          ID=16  HYD=7  ID I=12  ID II=14
PRINT HYD        ID=16  CODE=1

                    OUTFLOW HYDROGRAPH REACH    7.00


  RUNOFF VOLUME =    1.66369 INCHES    =     7.9466 ACRE-FEET
  PEAK DISCHARGE RATE =    174.28 CFS  AT   1.533 HOURS   BASIN AREA =   .0896 SQ. MI.


*
*
*
*ROUTE PIPE AP10 TO AP7
COMPUTE RATING CURVE CID=1  VS NO=1  NO SEGS=-1 (PIPE)
          SLOPE=0.011  DIA=5.0 FEET
          N=0.015

                RATING CURVE PIPE SECTION  1.0
                 WATER     FLOW      FLOW      MAX
                SURFACE    AREA      RATE      WIDTH
                 ELEV      SQ FT     CFS       FT
                  .00       .00       .00       .00
                  .26       .39      1.24      2.22
                  .52      1.09      5.39      3.06
                  .78      1.96     12.53      3.63
                 1.04      2.97     22.54      4.06
                 1.30      4.07     35.19      4.39
                 1.56      5.25     50.21      4.64
                 1.82      6.48     67.27      4.81
                 2.08      7.75     86.01      4.93
                 2.35      9.04    106.03      4.99
                 2.61     10.35    126.89      5.00
                 2.87     11.64    148.14      5.00
                 3.13     12.92    169.27      5.00
                 3.39     14.16    189.72      5.00
                 3.65     15.35    208.87      5.00
                 3.91     16.47    226.00      5.00
                 4.17     17.49    240.26      5.00
                 4.43     18.39    250.46      5.00
                 4.69     19.13    254.66      5.00
                 5.00     19.63    254.66      5.00
COMPUTE TRAVEL TIME ID=18  REACH NO=1  VS NO=1  L=270 FEET
          SLOPE=0.011

              TRAVEL TIME TABLE
                     REACH=  1.0

              WATER     AVERAGE    FLOW      TRAVEL
```

DEPTH FEET	AREA SQ.FT.	RATE CFS	TIME HRS
.261	.390	1.24	.0236
.521	1.086	5.39	.0151
.782	1.961	12.53	.0117
1.042	2.966	22.54	.0099
1.303	4.069	35.19	.0087
1.563	5.246	50.21	.0078
1.824	6.479	67.27	.0072
2.084	7.749	86.01	.0068
2.345	9.043	106.03	.0064
2.606	10.345	126.89	.0061
2.866	11.641	148.14	.0059
3.127	12.918	169.27	.0057
3.387	14.159	189.72	.0056
3.648	15.348	208.87	.0055
3.908	16.467	226.00	.0055
4.169	17.492	240.26	.0055
4.429	18.395	250.46	.0055
4.690	19.130	254.66	.0056
5.000	19.635	254.66	.0058

ROUTE ID=18 HYD NO=10 INFLOW ID=16
PRINT HYD ID=18 CODE=1

OUTFLOW HYDROGRAPH REACH 10.00

RUNOFF VOLUME = 1.66370 INCHES = 7.9466 ACRE-FEET
PEAK DISCHARGE RATE = 175.05 CFS AT 1.567 HOURS BASIN AREA = .0896 SQ. MI.

*
*
*CHANNEL ROUTE (STREET)
*28' SECTION, S=0.010
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=100.67
CH SLP=0.010 FP SLP=0.010 N=0.017
DIST=28.0
00.0 100.67 0.0 100.00 2.0 100.13
14.0 100.33 26.0 100.13 28.0 100.00
28.0 100.67

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.04	.02	.01	1.09
100.07	.08	.07	2.17
100.11	.17	.21	3.26
100.14	.31	.40	5.33
100.18	.57	.76	9.56

100.21	.99	1.47	13.79
100.25	1.55	2.61	18.02
100.28	2.26	4.25	22.25
100.32	3.12	6.49	26.48
100.35	4.09	9.85	28.00
100.39	5.08	14.10	28.00
100.42	6.07	18.94	28.00
100.46	7.06	24.33	28.00
100.49	8.04	30.25	28.00
100.53	9.03	36.65	28.00
100.56	10.02	43.54	28.00
100.60	11.01	50.88	28.00
100.63	11.99	58.66	28.00
100.67	12.98	66.88	28.00

COMPUTE TRAVEL TIME ID=17 REACH NO=1 NO VS=1 L=270 SLP=0.010

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.035	.019	.01	.1296
.071	.077	.07	.0816
.106	.172	.21	.0623
.141	.312	.40	.0580
.176	.574	.76	.0567
.212	.986	1.47	.0503
.247	1.547	2.61	.0445
.282	2.257	4.25	.0398
.317	3.116	6.49	.0360
.353	4.094	9.85	.0312
.388	5.081	14.10	.0270
.423	6.068	18.94	.0240
.458	7.056	24.33	.0217
.494	8.043	30.25	.0199
.529	9.031	36.65	.0185
.564	10.018	43.54	.0173
.599	11.005	50.88	.0162
.635	11.993	58.66	.0153
.670	12.980	66.88	.0146

ROUTE ID=17 HYD NO=10 INFLOW ID=15
*S ROUTE STREET FLOW AP10 TO AP7, ARCHES RD
PRINT HYD ID=17 CODE=1

OUTFLOW HYDROGRAPH REACH 10.00

RUNOFF VOLUME = 1.66534 INCHES = .3855 ACRE-FEET
PEAK DISCHARGE RATE = 40.69 CFS AT 1.567 HOURS BASIN AREA = .0043 SQ. MI.

*

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*
*
*COMPUTE HYDROGRAPH FOR BASINS A-6 AND A-7
COMPUTE NM HYD     ID=1  HYD NO=6.7  DA=0.0143 SQ MI
           %A=0.0  %B=25.0  %C=25.0  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  28.229   CFS  UNIT VOLUME =   .9990     B =  526.28     P60 = 2.0700
  AREA =    .007150 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333

  K =  .120467HR   TP =  .133300HR   K/TP RATIO =  .903729    SHAPE CONSTANT, N =  3.920589
  UNIT PEAK =  18.765   CFS  UNIT VOLUME =   .9997     B =  349.84     P60 = 2.0700
  AREA =    .007150 SQ MI   IA =   .42500 INCHES   INF =  1.04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333

PRINT HYD        ID=1  CODE=1

                    OUTFLOW HYDROGRAPH REACH    6.70

  RUNOFF VOLUME =    1.66365 INCHES    =     1.2688 ACRE-FEET
  PEAK DISCHARGE RATE =    35.51 CFS  AT   1.500 HOURS   BASIN AREA =   .0143 SQ. MI.


*
*
*
* ADD A6 &A7 AND AP10 STREET FLOW, AP7
ADD HYD          ID=19  HYD=7  ID I=1  ID II=17
PRINT HYD        ID=19  CODE=1

                    OUTFLOW HYDROGRAPH REACH    7.00

  RUNOFF VOLUME =    1.66401 INCHES    =     1.6543 ACRE-FEET
  PEAK DISCHARGE RATE =    70.72 CFS  AT   1.567 HOURS   BASIN AREA =   .0186 SQ. MI.


*
*
*
*ST DR FLOW COLLECTED AT AP7
DIVIDE HYD        ID=19  Q=33.0  ID I=2  HYD I=7 TO PIPE
                  ID II=3  HYD II=7 IN STREET
*S  FINAL STREET FLOW AP7, ARCHES AND MENDOCINO
PRINT HYD        ID=3  CODE=1
```

OUTFLOW HYDROGRAPH REACH 7.00

RUNOFF VOLUME = 1.66401 INCHES = .2911 ACRE-FEET
PEAK DISCHARGE RATE = 37.72 CFS AT 1.567 HOURS BASIN AREA = .0033 SQ. MI.

*S PIPE FLOW COLLECTED AT AP7, ARCHES RD AND MENDOCINO
PRINT HYD ID=2 CODE=1

OUTFLOW HYDROGRAPH REACH 7.00

RUNOFF VOLUME = 1.66401 INCHES = 1.3632 ACRE-FEET
PEAK DISCHARGE RATE = 33.00 CFS AT 1.500 HOURS BASIN AREA = .0154 SQ. MI.

*
*
*
*S FINAL PIPE FLOW, AP7
ADD HYD ID=4 HYD=7 ID I=2 ID II=18
PRINT HYD ID=4 CODE=1

OUTFLOW HYDROGRAPH REACH 7.00

RUNOFF VOLUME = 1.66374 INCHES = 9.3098 ACRE-FEET
PEAK DISCHARGE RATE = 208.05 CFS AT 1.567 HOURS BASIN AREA = .1049 SQ. MI.

*
*
*
*ROUTE PIPE AP7 TO AP15
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=-1 (PIPE)
SLOPE=0.011 DIA=5.0 FEET
N=0.015

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.26	.39	1.24	2.22
.52	1.09	5.39	3.06
.78	1.96	12.53	3.63
1.04	2.97	22.54	4.06
1.30	4.07	35.19	4.39
1.56	5.25	50.21	4.64
1.82	6.48	67.27	4.81

2.08	7.75	86.01	4.93
2.35	9.04	106.03	4.99
2.61	10.35	126.89	5.00
2.87	11.64	148.14	5.00
3.13	12.92	169.27	5.00
3.39	14.16	189.72	5.00
3.65	15.35	208.87	5.00
3.91	16.47	226.00	5.00
4.17	17.49	240.26	5.00
4.43	18.39	250.46	5.00
4.69	19.13	254.66	5.00
5.00	19.63	254.66	5.00

COMPUTE TRAVEL TIME ID=6 REACH NO=1 VS NO=1 L=300 FEET
SLOPE=0.011

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.261	.390	1.24	.0262
.521	1.086	5.39	.0168
.782	1.961	12.53	.0130
1.042	2.966	22.54	.0110
1.303	4.069	35.19	.0096
1.563	5.246	50.21	.0087
1.824	6.479	67.27	.0080
2.084	7.749	86.01	.0075
2.345	9.043	106.03	.0071
2.606	10.345	126.89	.0068
2.866	11.641	148.14	.0065
3.127	12.918	169.27	.0064
3.387	14.159	189.72	.0062
3.648	15.348	208.87	.0061
3.908	16.467	226.00	.0061
4.169	17.492	240.26	.0061
4.429	18.395	250.46	.0061
4.690	19.130	254.66	.0063
5.000	19.635	254.66	.0064

ROUTE ID=6 HYD NO=15 INFLOW ID=4
PRINT HYD ID=6 CODE=1

OUTFLOW HYDROGRAPH REACH 15.00

RUNOFF VOLUME = 1.66374 INCHES = 9.3098 ACRE-FEET
PEAK DISCHARGE RATE = 208.26 CFS AT 1.567 HOURS BASIN AREA = .1049 SQ. MI.

*
*
*CHANNEL ROUTE (STREET)

*28' SECTION, S=0.010
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1
MIN ELEV=100.00 MAX ELEV=100.67
CH SLP=0.010 FP SLP=0.010 N=0.017
DIST=28.0
00.0 100.67 0.0 100.00 2.0 100.13
14.0 100.33 26.0 100.13 28.0 100.00
28.0 100.67

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.04	.02	.01	1.09
100.07	.08	.07	2.17
100.11	.17	.21	3.26
100.14	.31	.40	5.33
100.18	.57	.76	9.56
100.21	.99	1.47	13.79
100.25	1.55	2.61	18.02
100.28	2.26	4.25	22.25
100.32	3.12	6.49	26.48
100.35	4.09	9.85	28.00
100.39	5.08	14.10	28.00
100.42	6.07	18.94	28.00
100.46	7.06	24.33	28.00
100.49	8.04	30.25	28.00
100.53	9.03	36.65	28.00
100.56	10.02	43.54	28.00
100.60	11.01	50.88	28.00
100.63	11.99	58.66	28.00
100.67	12.98	66.88	28.00

COMPUTE TRAVEL TIME ID=5 REACH NO=1 NO VS=1 L=300 SLP=0.010

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.035	.019	.01	.1440
.071	.077	.07	.0907
.106	.172	.21	.0692
.141	.312	.40	.0645
.176	.574	.76	.0630
.212	.986	1.47	.0559
.247	1.547	2.61	.0495
.282	2.257	4.25	.0442
.317	3.116	6.49	.0400
.353	4.094	9.85	.0346
.388	5.081	14.10	.0300
.423	6.068	18.94	.0267
.458	7.056	24.33	.0242

```
                    .494     8.043     30.25     .0222
                    .529     9.031     36.65     .0205
                    .564    10.018     43.54     .0192
                    .599    11.005     50.88     .0180
                    .635    11.993     58.66     .0170
                    .670    12.980     66.88     .0162
ROUTE           ID=5  HYD NO=15  INFLOW ID=3
*S  ROUTE STREET FLOW AP7 TO AP15, ARCHES RD
PRINT HYD       ID=5  CODE=1

                    OUTFLOW HYDROGRAPH REACH    15.00


  RUNOFF VOLUME =    1.66558 INCHES    =      .2914 ACRE-FEET
  PEAK DISCHARGE RATE =     33.63 CFS  AT   1.567 HOURS   BASIN AREA =   .0033 SQ. MI.


*
*
*
*S ALL STREET AND PIPE FLOW COMBINED, AP15
ADD HYD         ID=8  HYD=15  ID I=5  ID II=6
PRINT HYD       ID=8  CODE=1

                    OUTFLOW HYDROGRAPH REACH    15.00


  RUNOFF VOLUME =    1.66379 INCHES    =      9.6011 ACRE-FEET
  PEAK DISCHARGE RATE =    241.89 CFS  AT   1.567 HOURS   BASIN AREA =   .1082 SQ. MI.


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*
*REVISIONS [2], MARCH 25, 1995, ADD PHASE 6
*COMPUTE HYDROGRAPH FOR BASIN C-1-B
*PHASE 6, UNIT 9, WILLOWWOOD
COMPUTE NM HYD     ID=1  HYD NO=1  DA=0.0078 SQ MI
           %A=0.0  %B=25.0  %C=25.0  %D=50.0
           TP=0.1333 HR
           MASS RAINFALL=-1

  K =  .072649HR   TP =  .133300HR   K/TP RATIO =  .545000    SHAPE CONSTANT, N =  7.106420
  UNIT PEAK =  15.397   CFS   UNIT VOLUME =   .9987      B =  526.28      P60 = 2.0700
  AREA =     .003900 SQ MI   IA =   .10000 INCHES   INF =   .04000 INCHES PER HOUR
  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033333


  K =  .120467HR   TP =  .133300HR   K/TP RATIO =  .903729    SHAPE CONSTANT, N =  3.920589
  UNIT PEAK =  10.235   CFS   UNIT VOLUME =   .9992      B =  349.84      P60 = 2.0700
  AREA =     .003900 SQ MI   IA =   .42500 INCHES   INF =  1.04000 INCHES PER HOUR
```

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

PRINT HYD ID=1 CODE=1

OUTFLOW HYDROGRAPH REACH 1.00

RUNOFF VOLUME = 1.66364 INCHES = .6921 ACRE-FEET
PEAK DISCHARGE RATE = 19.38 CFS AT 1.500 HOURS BASIN AREA = .0078 SQ. MI.

*
*
*
*S ALL STREET AND PIPE FLOW COMBINED, AP15
ADD HYD ID=9 HYD=15 ID I=8 ID II=1
PRINT HYD ID=9 CODE=2

OUTFLOW HYDROGRAPH REACH 15.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.667	188.6	3.333	2.6	5.000	1.6	6.667	.1
.067	.0	1.733	141.4	3.400	2.5	5.067	1.6	6.733	.1
.133	.0	1.800	110.2	3.467	2.3	5.133	1.6	6.800	.1
.200	.0	1.867	90.1	3.533	2.2	5.200	1.6	6.867	.1
.267	.0	1.933	75.4	3.600	2.1	5.267	1.6	6.933	.1
.333	.0	2.000	63.8	3.667	2.0	5.333	1.6	7.000	.0
.400	.0	2.067	54.1	3.733	1.9	5.400	1.6	7.067	.0
.467	.0	2.133	42.1	3.800	1.9	5.467	1.6	7.133	.0
.533	.0	2.200	30.1	3.867	1.8	5.533	1.6	7.200	.0
.600	.0	2.267	22.5	3.933	1.8	5.600	1.6	7.267	.0
.667	.0	2.333	17.9	4.000	1.7	5.667	1.6	7.333	.0
.733	.0	2.400	14.7	4.067	1.7	5.733	1.6	7.400	.0
.800	.0	2.467	12.1	4.133	1.7	5.800	1.6	7.467	.0
.867	.0	2.533	10.3	4.200	1.6	5.867	1.7	7.533	.0
.933	.3	2.600	8.8	4.267	1.6	5.933	1.7	7.600	.0
1.000	1.2	2.667	7.6	4.333	1.6	6.000	1.7	7.667	.0
1.067	2.7	2.733	6.6	4.400	1.6	6.067	1.7	7.733	.0
1.133	4.2	2.800	5.7	4.467	1.6	6.133	1.5	7.800	.0
1.200	5.6	2.867	5.0	4.533	1.6	6.200	1.2	7.867	.0
1.267	13.3	2.933	4.5	4.600	1.6	6.267	.8	7.933	.0
1.333	40.3	3.000	4.0	4.667	1.6	6.333	.6	8.000	.0
1.400	107.7	3.067	3.6	4.733	1.6	6.400	.4	8.067	.0
1.467	200.5	3.133	3.3	4.800	1.6	6.467	.3		
1.533	236.3	3.200	3.0	4.867	1.6	6.533	.2		
1.600	248.5	3.267	2.8	4.933	1.6	6.600	.2		

RUNOFF VOLUME = 1.66378 INCHES = 10.2932 ACRE-FEET
PEAK DISCHARGE RATE = 258.28 CFS AT 1.567 HOURS BASIN AREA = .1160 SQ. MI.

*
*
*
*ROUTE FLOWS THROUGH APS EASEMENT TO DETENTION POND IN PIPE
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=-1 (PIPE)
SLOPE=0.010 DIA=5.0 FEET
N=0.013

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.26	.39	1.37	2.22
.52	1.09	5.93	3.06
.78	1.96	13.79	3.63
1.04	2.97	24.80	4.06
1.30	4.07	38.72	4.39
1.56	5.25	55.24	4.64
1.82	6.48	74.01	4.81
2.08	7.75	94.62	4.93
2.35	9.04	116.65	4.99
2.61	10.35	139.60	5.00
2.87	11.64	162.98	5.00
3.13	12.92	186.22	5.00
3.39	14.16	208.72	5.00
3.65	15.35	229.78	5.00
3.91	16.47	248.64	5.00
4.17	17.49	264.32	5.00
4.43	18.39	275.55	5.00
4.69	19.13	280.16	5.00
5.00	19.63	280.16	5.00

COMPUTE TRAVEL TIME ID=10 REACH NO=2 VS NO=1 L=870 FEET
SLOPE=0.010

TRAVEL TIME TABLE
REACH= 2.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.261	.390	1.37	.0690
.521	1.086	5.93	.0442
.782	1.961	13.79	.0344
1.042	2.966	24.80	.0289
1.303	4.069	38.72	.0254
1.563	5.246	55.24	.0230
1.824	6.479	74.01	.0212
2.084	7.749	94.62	.0198
2.345	9.043	116.65	.0187
2.606	10.345	139.60	.0179
2.866	11.641	162.98	.0173
3.127	12.918	186.22	.0168

3.387	14.159	208.72	.0164
3.648	15.348	229.78	.0161
3.908	16.467	248.64	.0160
4.169	17.492	264.32	.0160
4.429	18.395	275.55	.0161
4.690	19.130	280.16	.0165
5.000	19.635	280.16	.0169

ROUTE ID=10 HYD NO=204.1 INFLOW ID=9
PRINT HYD ID=10 CODE=1

PARTIAL HYDROGRAPH 204.10

RUNOFF VOLUME = 1.66378 INCHES = 10.2932 ACRE-FEET
PEAK DISCHARGE RATE = 253.32 CFS AT 1.600 HOURS BASIN AREA = .1160 SQ. MI.

*
*
*
*COMPUTE HYDROGRAPH FOR BASINS A-14,A-15
COMPUTE NM HYD ID=1 HYD NO=105.0 DA=0.0128 SQ MI
%A=0.0 %B=25.0 %C=25.0 %D=50.0
TP=0.1333 HR
MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 25.268 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 2.0700
AREA = .006400 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .120467HR TP = .133300HR K/TP RATIO = .903729 SHAPE CONSTANT, N = 3.920589
UNIT PEAK = 16.797 CFS UNIT VOLUME = .9997 B = 349.84 P60 = 2.0700
AREA = .006400 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 1.66364 INCHES = 1.1357 ACRE-FEET
PEAK DISCHARGE RATE = 31.79 CFS AT 1.500 HOURS BASIN AREA = .0128 SQ. MI.

*
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*
*ROUTE DOWN JEWEL CAVE TO CHIRICAHUA

*28' SECTION, S=0.5%
COMPUTE RATING CURVE CID=1 VS NO=1 NO SEGS=1 MIN ELEV=100.00
MAX ELEV=100.67 CH SLP=0.005 FP SLP=0.005

N=0.017 DIST=28.0
00.0 100.67 0.0 100.00 2.0 100.13
14.0 100.33 26.0 100.13 28.0 100.00
28.0 100.67

RATING CURVE VALLEY SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	TOP WIDTH FT
100.00	.00	.00	.00
100.04	.02	.01	1.09
100.07	.08	.05	2.17
100.11	.17	.15	3.26
100.14	.31	.28	5.33
100.18	.57	.54	9.56
100.21	.99	1.04	13.79
100.25	1.55	1.84	18.02
100.28	2.26	3.01	22.25
100.32	3.12	4.59	26.48
100.35	4.09	6.96	28.00
100.39	5.08	9.97	28.00
100.42	6.07	13.39	28.00
100.46	7.06	17.21	28.00
100.49	8.04	21.39	28.00
100.53	9.03	25.92	28.00
100.56	10.02	30.79	28.00
100.60	11.01	35.98	28.00
100.63	11.99	41.48	28.00
100.67	12.98	47.29	28.00

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 L=700 SLP=0.005

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.035	.019	.01	.4750
.071	.077	.05	.2993
.106	.172	.15	.2284
.141	.312	.28	.2127
.176	.574	.54	.2078
.212	.986	1.04	.1846
.247	1.547	1.84	.1632
.282	2.257	3.01	.1459
.317	3.116	4.59	.1321
.353	4.094	6.96	.1143
.388	5.081	9.97	.0991
.423	6.068	13.39	.0881
.458	7.056	17.21	.0797

.494	8.043	21.39	.0731
.529	9.031	25.92	.0678
.564	10.018	30.79	.0633
.599	11.005	35.98	.0595
.635	11.993	41.48	.0562
.670	12.980	47.29	.0534

ROUTE ID=3 HYD NO=105.1 INFLOW ID=1
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 105.10

RUNOFF VOLUME = 1.66366 INCHES = 1.1357 ACRE-FEET
PEAK DISCHARGE RATE = 28.73 CFS AT 1.533 HOURS BASIN AREA = .0128 SQ. MI.

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*
*COMPUTE HYDROGRAPH FOR BASINS B-1,B-2,B-3,B-4
COMPUTE NM HYD ID=1 HYD NO=106.0 DA=0.03496 SQ MI
%A=0.0 %B=25.0 %C=25.0 %D=50.0
TP=0.1333 HR
MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 69.012 CFS UNIT VOLUME = .9992 B = 526.28 P60 = 2.0700
AREA = .017480 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .120467HR TP = .133300HR K/TP RATIO = .903729 SHAPE CONSTANT, N = 3.920589
UNIT PEAK = 45.876 CFS UNIT VOLUME = 1.000 B = 349.84 P60 = 2.0700
AREA = .017480 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 106.00

RUNOFF VOLUME = 1.66364 INCHES = 3.1019 ACRE-FEET
PEAK DISCHARGE RATE = 86.79 CFS AT 1.500 HOURS BASIN AREA = .0350 SQ. MI.

*ADD HYDROGRAPH TO TOTAL
ADD HYD ID=1 HYD=206.0 ID I=1 ID II=3
PRINT HYD ID=1 CODE=1

PARTIAL HYDROGRAPH 206.00

RUNOFF VOLUME = 1.66363 INCHES = 4.2376 ACRE-FEET
PEAK DISCHARGE RATE = 112.38 CFS AT 1.500 HOURS BASIN AREA = .0478 SQ. MI.

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*
*S ROUTE PIPE FLOWS TO AP 19
*ROUTE FLOW IN PIPE FROM INLETS ON CHIRICAHUA TO DETENTION POND
COMPUTE RATING CURVE CID=-1 VS NO=1 NO SEGS=-1 (PIPE)
SLOPE=0.005 DIA=4.0 FEET
N=0.013
COMPUTE TRAVEL TIME ID=3 REACH NO=3 VS NO=1 L=950 FEET
SLOPE=0.005

TRAVEL TIME TABLE
REACH= 3.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.208	.250	.53	.1237
.417	.695	2.31	.0793
.625	1.255	5.38	.0616
.834	1.898	9.67	.0518
1.042	2.604	15.10	.0455
1.251	3.358	21.54	.0411
1.459	4.146	28.86	.0379
1.668	4.960	36.90	.0355
1.876	5.788	45.49	.0336
2.084	6.621	54.44	.0321
2.293	7.451	63.56	.0309
2.501	8.267	72.62	.0300
2.710	9.062	81.40	.0294
2.918	9.823	89.61	.0289
3.127	10.539	96.97	.0287
3.335	11.195	103.08	.0287
3.544	11.773	107.46	.0289
3.752	12.243	109.26	.0296
4.000	12.566	109.26	.0304

ROUTE ID=3 HYD NO=206.1 INFLOW ID=1
TRAVEL TIME TABLE EXCEEDED
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 206.10

RUNOFF VOLUME = 1.66364 INCHES = 4.2376 ACRE-FEET
PEAK DISCHARGE RATE = 109.04 CFS AT 1.533 HOURS BASIN AREA = .0478 SQ. MI.

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*
*ADD HYDROGRAPH TO TOTAL FROM BASINS A1 THRU A13, AP19
ADD HYD        ID=3  HYD=206.2  ID I=10  ID II=3
PRINT HYD      ID=3  CODE=2
```

PARTIAL HYDROGRAPH 206.20

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.733	206.5	3.467	3.5	5.200	2.2	6.933	.1
.067	.0	1.800	160.5	3.533	3.3	5.267	2.2	7.000	.1
.133	.0	1.867	131.0	3.600	3.1	5.333	2.2	7.067	.1
.200	.0	1.933	109.6	3.667	3.0	5.400	2.2	7.133	.1
.267	.0	2.000	92.7	3.733	2.9	5.467	2.2	7.200	.0
.333	.0	2.067	79.0	3.800	2.7	5.533	2.2	7.267	.0
.400	.0	2.133	63.1	3.867	2.7	5.600	2.3	7.333	.0
.467	.0	2.200	46.1	3.933	2.6	5.667	2.3	7.400	.0
.533	.0	2.267	34.4	4.000	2.5	5.733	2.3	7.467	.0
.600	.0	2.333	26.9	4.067	2.5	5.800	2.3	7.533	.0
.667	.0	2.400	22.2	4.133	2.4	5.867	2.3	7.600	.0
.733	.0	2.467	18.4	4.200	2.4	5.933	2.3	7.667	.0
.800	.0	2.533	15.3	4.267	2.3	6.000	2.4	7.733	.0
.867	.0	2.600	13.2	4.333	2.3	6.067	2.4	7.800	.0
.933	.2	2.667	11.4	4.400	2.3	6.133	2.2	7.867	.0
1.000	1.0	2.733	10.0	4.467	2.3	6.200	1.9	7.933	.0
1.067	2.5	2.800	8.7	4.533	2.2	6.267	1.5	8.000	.0
1.133	4.6	2.867	7.5	4.600	2.2	6.333	1.1	8.067	.0
1.200	6.9	2.933	6.6	4.667	2.2	6.400	.8	8.133	.0
1.267	14.5	3.000	6.0	4.733	2.2	6.467	.6	8.200	.0
1.333	44.7	3.067	5.4	4.800	2.2	6.533	.5	8.267	.0
1.400	129.4	3.133	4.9	4.867	2.2	6.600	.3	8.333	.0
1.467	268.2	3.200	4.5	4.933	2.2	6.667	.3	8.400	.0
1.533	338.9	3.267	4.2	5.000	2.2	6.733	.2		
1.600	349.8	3.333	3.9	5.067	2.2	6.800	.2		
1.667	274.4	3.400	3.7	5.133	2.2	6.867	.1		

```
RUNOFF VOLUME =    1.66374 INCHES    =    14.5308 ACRE-FEET
PEAK DISCHARGE RATE =    356.35 CFS  AT   1.567 HOURS   BASIN AREA =   .1638 SQ. MI.


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* REVISION [1], MARCH 25, 1995  BASIN PARAMETERS PER APS
*COMPUTE HYDROGRAPH FOR FUTURE SCHOOL SITE
COMPUTE NM HYD     ID=2  HYD NO=107.0  DA=0.0244 SQ MI
           %A=23.0  %B=29.0  %C=15.0  %D=33.0
           TP=0.1333 HR
           MASS RAINFALL=-1
```

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 31.790 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 2.0700
AREA = .008052 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .136151HR TP = .133300HR K/TP RATIO = 1.021390 SHAPE CONSTANT, N = 3.455979
UNIT PEAK = 38.890 CFS UNIT VOLUME = .9999 B = 317.10 P60 = 2.0700
AREA = .016348 SQ MI IA = .51791 INCHES INF = 1.30015 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=2 CODE=2

PARTIAL HYDROGRAPH 107.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.467	45.4	2.933	.7	4.400	.2	5.867	.2
.067	.0	1.533	48.7	3.000	.6	4.467	.2	5.933	.2
.133	.0	1.600	37.1	3.067	.5	4.533	.2	6.000	.2
.200	.0	1.667	27.0	3.133	.5	4.600	.2	6.067	.2
.267	.0	1.733	20.2	3.200	.4	4.667	.2	6.133	.1
.333	.0	1.800	15.4	3.267	.4	4.733	.2	6.200	.1
.400	.0	1.867	12.2	3.333	.4	4.800	.2	6.267	.0
.467	.0	1.933	10.1	3.400	.4	4.867	.2	6.333	.0
.533	.0	2.000	8.7	3.467	.3	4.933	.2	6.400	.0
.600	.0	2.067	7.3	3.533	.3	5.000	.2	6.467	.0
.667	.0	2.133	5.3	3.600	.3	5.067	.2	6.533	.0
.733	.0	2.200	3.8	3.667	.3	5.133	.2	6.600	.0
.800	.0	2.267	2.9	3.733	.3	5.200	.2	6.667	.0
.867	.0	2.333	2.4	3.800	.3	5.267	.2	6.733	.0
.933	.2	2.400	2.0	3.867	.3	5.333	.2	6.800	.0
1.000	.5	2.467	1.7	3.933	.3	5.400	.2	6.867	.0
1.067	.7	2.533	1.5	4.000	.2	5.467	.2	6.933	.0
1.133	.7	2.600	1.3	4.067	.2	5.533	.2	7.000	.0
1.200	1.2	2.667	1.1	4.133	.2	5.600	.2		
1.267	3.5	2.733	1.0	4.200	.2	5.667	.2		
1.333	9.2	2.800	.8	4.267	.2	5.733	.2		
1.400	24.6	2.867	.7	4.333	.2	5.800	.2		

RUNOFF VOLUME = 1.31608 INCHES = 1.7126 ACRE-FEET
PEAK DISCHARGE RATE = 50.11 CFS AT 1.500 HOURS BASIN AREA = .0244 SQ. MI.

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*
*ADD HYDROGRAPH TO TOTAL
ADD HYD ID=1 HYD=207 ID I=2 ID II=3
PRINT HYD ID=1 CODE=2

PARTIAL HYDROGRAPH 207.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.733	226.6	3.467	3.8	5.200	2.4	6.933	.1
.067	.0	1.800	175.9	3.533	3.6	5.267	2.4	7.000	.1
.133	.0	1.867	143.2	3.600	3.4	5.333	2.4	7.067	.1
.200	.0	1.933	119.7	3.667	3.3	5.400	2.4	7.133	.1
.267	.0	2.000	101.3	3.733	3.1	5.467	2.5	7.200	.0
.333	.0	2.067	86.4	3.800	3.0	5.533	2.5	7.267	.0
.400	.0	2.133	68.4	3.867	2.9	5.600	2.5	7.333	.0
.467	.0	2.200	49.8	3.933	2.8	5.667	2.5	7.400	.0
.533	.0	2.267	37.3	4.000	2.8	5.733	2.5	7.467	.0
.600	.0	2.333	29.3	4.067	2.7	5.800	2.5	7.533	.0
.667	.0	2.400	24.3	4.133	2.6	5.867	2.6	7.600	.0
.733	.0	2.467	20.1	4.200	2.6	5.933	2.6	7.667	.0
.800	.0	2.533	16.8	4.267	2.6	6.000	2.6	7.733	.0
.867	.0	2.600	14.5	4.333	2.5	6.067	2.6	7.800	.0
.933	.4	2.667	12.5	4.400	2.5	6.133	2.4	7.867	.0
1.000	1.5	2.733	10.9	4.467	2.5	6.200	2.0	7.933	.0
1.067	3.2	2.800	9.6	4.533	2.5	6.267	1.5	8.000	.0
1.133	5.3	2.867	8.2	4.600	2.4	6.333	1.2	8.067	.0
1.200	8.0	2.933	7.2	4.667	2.4	6.400	.9	8.133	.0
1.267	18.0	3.000	6.5	4.733	2.4	6.467	.6	8.200	.0
1.333	53.9	3.067	5.9	4.800	2.4	6.533	.5	8.267	.0
1.400	153.9	3.133	5.4	4.867	2.4	6.600	.4	8.333	.0
1.467	313.6	3.200	5.0	4.933	2.4	6.667	.3	8.400	.0
1.533	387.5	3.267	4.6	5.000	2.4	6.733	.2		
1.600	386.9	3.333	4.3	5.067	2.4	6.800	.2		
1.667	301.4	3.400	4.0	5.133	2.4	6.867	.1		

RUNOFF VOLUME = 1.61865 INCHES = 16.2434 ACRE-FEET
PEAK DISCHARGE RATE = 399.70 CFS AT 1.567 HOURS BASIN AREA = .1882 SQ. MI.

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*
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*
*PLOT TOTAL HYDROGRAPH
PLOT HYD        ID=1
FLOW RATE (CFS)
400..----------------------*-------------------------------------------------------------------------------------.
  .                                                                                                          .
  .                **                                                                                         .
  .                                                                                                          .
  .                *                                                                                         .
  .                                                                                                          .
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  .                                                                                                          .
320..-----------------------------------------------------------------------------------------------------------.
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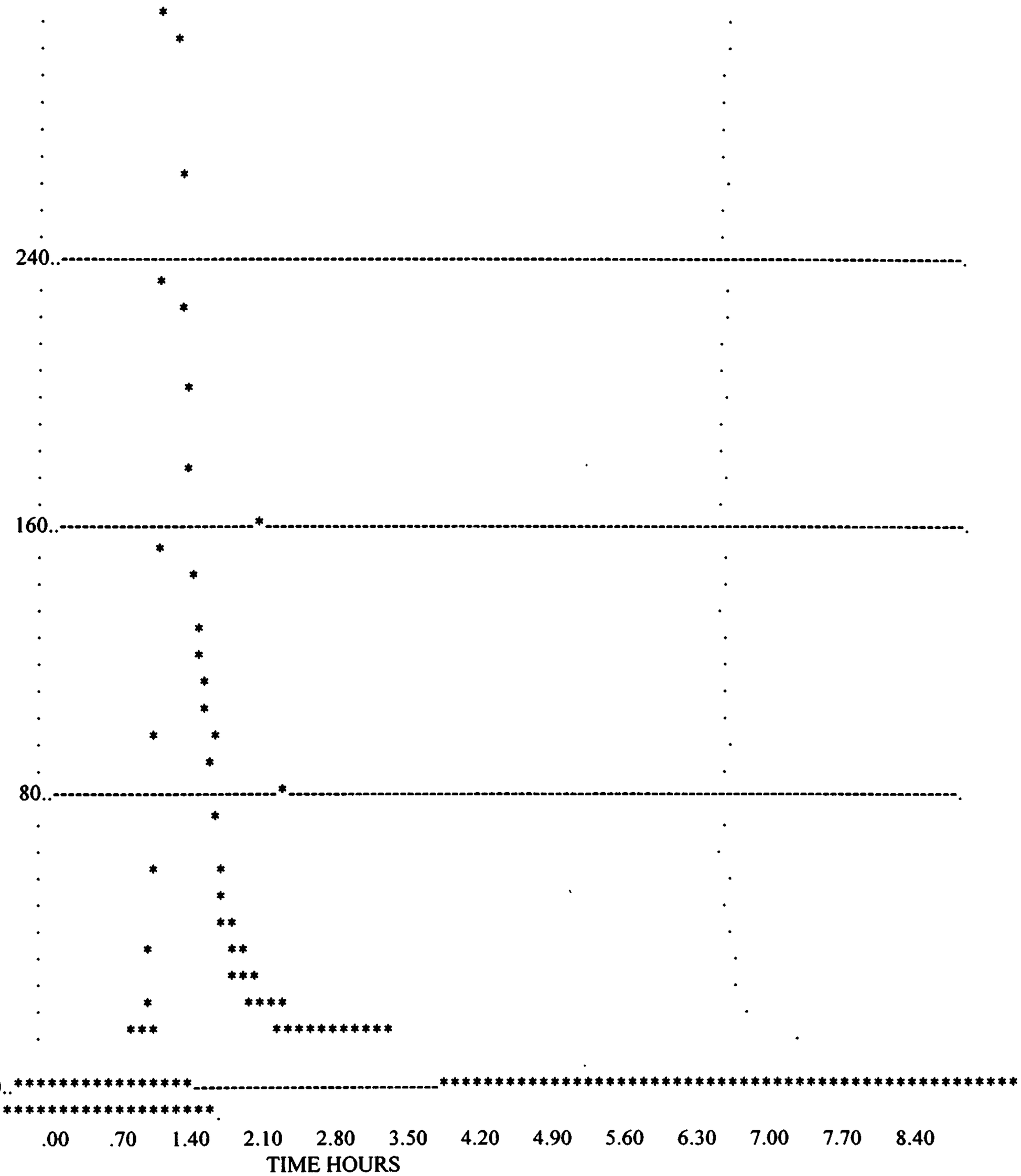


FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 16:53:53

AVID ENGINEERING INC

COMPUTE DEPTH OF FLOW AT POINT WHERE FLOW TURNS THE CORNER AT HERMAN ROSER & WIND RIVER ST. (AP4)

COMPUTE FLOW DEPTH ASSUMING PONDING CONDITION WITH Velocity = 0, and weir-flow condition.

$Q = 46 cfs = CLH^{3/2}$

$46 cfs = 3.0 \times 28' \times H^{3/2}$

$H = 0.67 ft$

C = 3.00 (KING & BEATED)
L = 28 ft F-F
H = ponded depth

COMPUTE HYDRAULIC JUMP, slope at intersection is at subcritical, use approach upstream of 1.2%.

$Q = 46 cfs \Rightarrow d = .49 ft$

$V = 3.96 fps$

$F = \frac{V}{\sqrt{gD}} = 1.29$

$$Y_2 = \frac{Y_1}{2}\left(\sqrt{1 + \frac{8q^2}{gY_1^3}} - 1\right) \quad \text{where } q = \frac{46 cfs}{40 ft} = 1.15 cfs/ft$$

$$= \frac{.49}{2}\left(\sqrt{1 + \frac{8\ 1.15^2}{32.2\ (.49)^3}} - 1\right)$$

$Y_2 = 0.68 \approx .67$ [OK]

12/93

AVID ENGINEERING INC

NOTE: The intersection is designed such that any flows exceeding the top of curb depth can continue to flow west in a Drainage/ Landscape Easement.

The area between back of curb and SW, is to be paved with 4" concrete. This is recommended to protect against erosion.

AVID ENGINEERING

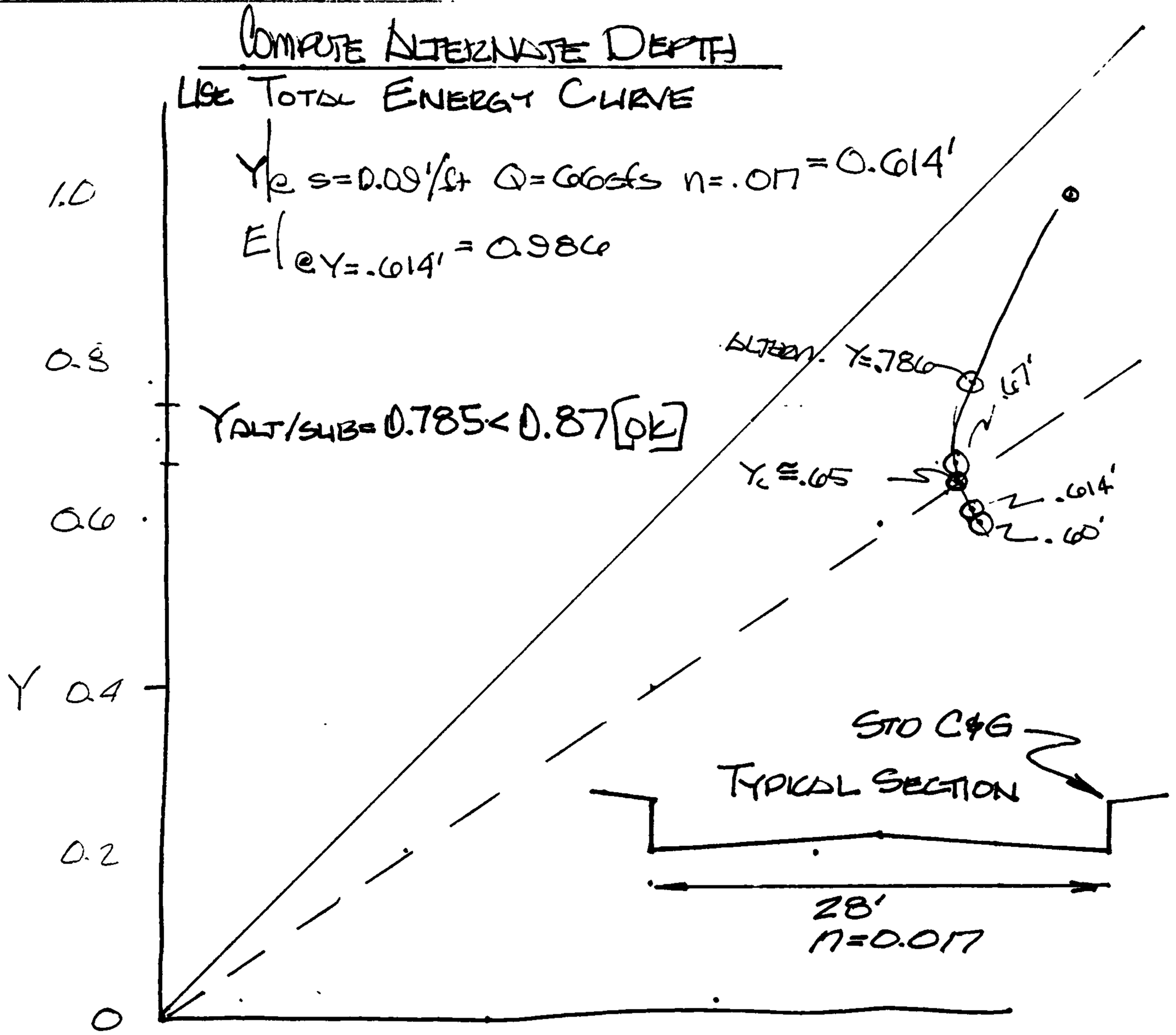
Compute Alternate Depth

Use Total Energy Curve

Y_c @ $s = 0.09'/ft$ $Q = 606 cfs$ $n = .017 = 0.614'$

$E|_{@Y=.614'} = 0.986$

$Y_{ALT/SUB} = 0.785 < 0.87$ [OK]



Sub Crit. Points

Y	A	V	E
.77	17.64	3.68	0.981
.78	17.92	3.63	0.984
.79	18.20	3.57	0.988
.785	18.06	3.59	0.986

.785 < .87

← Alternate Depth →

Super Crit. Points

Y	A	V	E
.4	7.28	8.93	
.67	14.84	4.38	0.97
.614	13.27	4.898	0.986
1.0	24.0	2.70	1.11
0.6	12.88	5.05	1.0
0.65	14.28	4.55	.9715
.64			.975

AVID ENGINEERING, INC.

MANZANO MESA SUBDIVISION (WILLOWWOOD)

SIZE DRAINAGE POND RETENTION

USE DPM SEC 22.2 REVISED JAN '91

A.1) PRECIP ZONE 3

A.2) DESIGN STORM = 100 YR 10 DAY STORM, IN ACCORDANCE WITH "NOTICE OF EMERGENCY RULE — RETENTION PONDING"

$P_{10\,DAY} = 4.9''$

A.3) LAND TREATMENT

THIS PROJECT IS R-1, WITH 5 DU/AC.

THE % IMPERVIOUS (TREATMENT D) IS CALC'D FROM TABLE 5.

$$\% \text{ IMP} = 7\sqrt{(5)(5)+(5)(5)} = 50\%$$

PROJECT NAME MANZANO MESA SHEET 1 OF
PROJECT NO. BY JD DATE 3/92
SUBJECT DRAINAGE (PONDS)

$$V_{10DAY} = 0.1394 + 0.5\,\frac{(4.9 - 2.6)}{12}$$

$$= 0.2352 \text{ A-F/ACRE}$$

RUNOFF

38 + 5 = 103 △2

THE DEVELOPED AREA IS ~~98~~ ACRES,

SO THE RUNOFF VOLUME FROM IT IS

$$V = (0.2352)(\cancel{98}\ 103) = \cancel{23.04}\ 24.22 \text{ A-F}$$

△2

THE SCHOOL SITE ALSO DRAINS TO THE POND, AND RAINFALL WHICH FALLS ON THE POND ALSO CONTRIBUTES TO THE VOLUME. THE SCHOOL SITE IS SHOWN AS BASIN C-1.

BASIN	AREA (AC)	TREATMENT	V_{360}	V_{10DAY}
C-1	~~25~~ 20	A	0.57"	2.87"
POND	5	D	2.33"	4.66"

AVID ENGINEERING, INC.

BASIN	AREA (AC)	$V_{10\ DAY}$ (INCHES)	$V_{10\ DAY}$ (A-F)
C-1	~~25~~ 20	2.87	~~5.97~~ 4.78 (2)
POND	5	4.66	1.94

∴ VOLUME NEEDED FOR POND

= ~~23.04~~ 24.22 + ~~5.97~~ 4.78 + 1.94 (2)

= ~~30.95~~ 30.94 A-F (2)

USE 31 A-F

(2) REVISIONS TO INCORP. UNIT 9 5/95

PROJECT NAME MANZANO MESA 4 4
PROJECTING JD 5/92
POND

ASSUME THE REMANING AREA IS EVENLY DIVIDED BETWEEN TREATMENTS B AND C.

∴ TREATMENT B — 25%
TREATMENT C — 25%
TREATMENT D — 50%

A.5) CALCULATE EXCESS PRECIP.

	INCHES	TREATMENT
V_{360}:	0.83	B
	1.20	C
	2.33	D

TABLE 8

WEIGHTED $E = (.25)(.83) + (0.25)(1.2) + (0.5)(2.33)$
$= 1.67''$

$$\text{VOLUME}_{360} = 1\,AC \; \frac{1.67}{12} = 0.1394 \text{ A-F/ACRE}$$

AVID ENGINEERING, INC.

PHASE 1 RUNOFF CALCS

DEVELOPED AREA = 15.5 AC

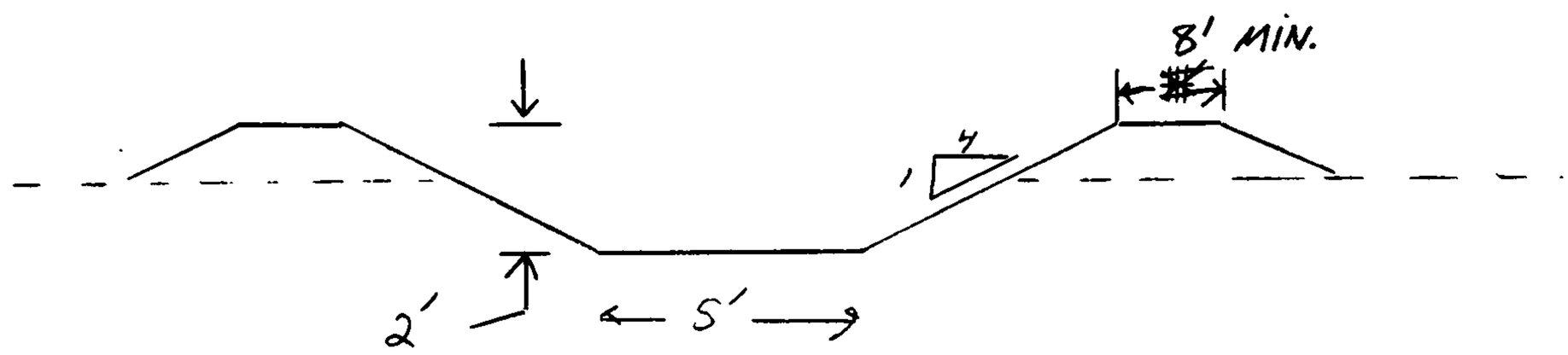
1) PEAK FLOW

Q_p = 4.02 cfs/AC, BASED ON LAND USE & DPM. (FROM PREVIOUS PART OF THIS REPORT)

$Q_p = (15.5)(4.02) = 62.31$ cfs

USE 65 cfs

THESE MUST BE CONVEYED TO THE POND. USE A GRADED EARTH CHANNEL



PROJECT NAME WILLOWOOD
PROJECT PHASE 1
SHEET 1 OF 3
BY JD
DATE 5/92

AVID ENGINEERING, INC.

USING:

$n = 0.035$ 5' BOTTOM WIDTH

$S = 0.015$ 4:1 SIDESLOPES

$Q = 65$ CFS

FLOW DEPTH = 1.34 FT

VEL = 4.7 FT/SEC

OK

2) 10-DAY VOLUME

THE AREAS WHICH WILL GET DRAINED TO THE POND ONLY INCLUDE BASIN C-1, THE POND ITSELF AND THE PHASE 1 DEVELOPMENT. THE AREAS TO BE DEVELOPED IN FUTURE PHASES WILL DRAIN SOUTH OF THE POND (EXISTING CONDITION) UNTIL THE ARE DEVELOPED.

AVID ENGINEERING, INC.

BASIN	(AC) AREA	V 10 DAY (INCHES)	V 10 DAY (A-F)
C-1	25	2.87	5.97
POND	5	4.66	1.94
PHASE 1	16	(12)(.2352)	3.76
TOTAL	———		11.67 A-F

USE 12 A-F FOR PHASE I.

PROJECT NAME WILLOWWOOD
PROJECT NO.
TITLE PHASE 1

BY JD
DATE 5-93

CHANNEL CAPACITY BASED ON NORMAL DEPTH
TRAPEZOIDAL CHANNEL WITH UNEVEN SIDESLOPES

INPUT DATA

n	0.0350	AREA	13.88
SLOPE	0.0150	WP	16.05
BOTTOM WIDTH	5.00	R	0.86
SIDESLOPE 1	4.0	R^.667	0.91
SIDESLOPE 2	4.0	VEL	4.72
DEPTH	1.34		
		RADIUS	0.00
Q-CALC	65.53	SE	0.00
		FROUDE	0.78

Note: On curved alignments, use Sideslope 1 for OUTSIDE of curve.
(For Superelevation calculations.)

SCALE: 1"=50'

STA: 10+00.00 CHIRICAHUA STREET =
STA: 9+46.02 JEWEL CAVE ROAD

STA: 11+92.53 CHIRICAHUA STREET =
STA: 10+00.00 THUNDER BASIN ROAD

STA: 14+50.78 CHIRICAHUA STREET =
STA: 10+00.00 WASATCH ROAD

STA: 17+55.93 CHIRICAHUA STREET =
STA: 10+00.00 WOLF CREEK ROAD

STA: 18+68.93 CHIRICAHUA COURT

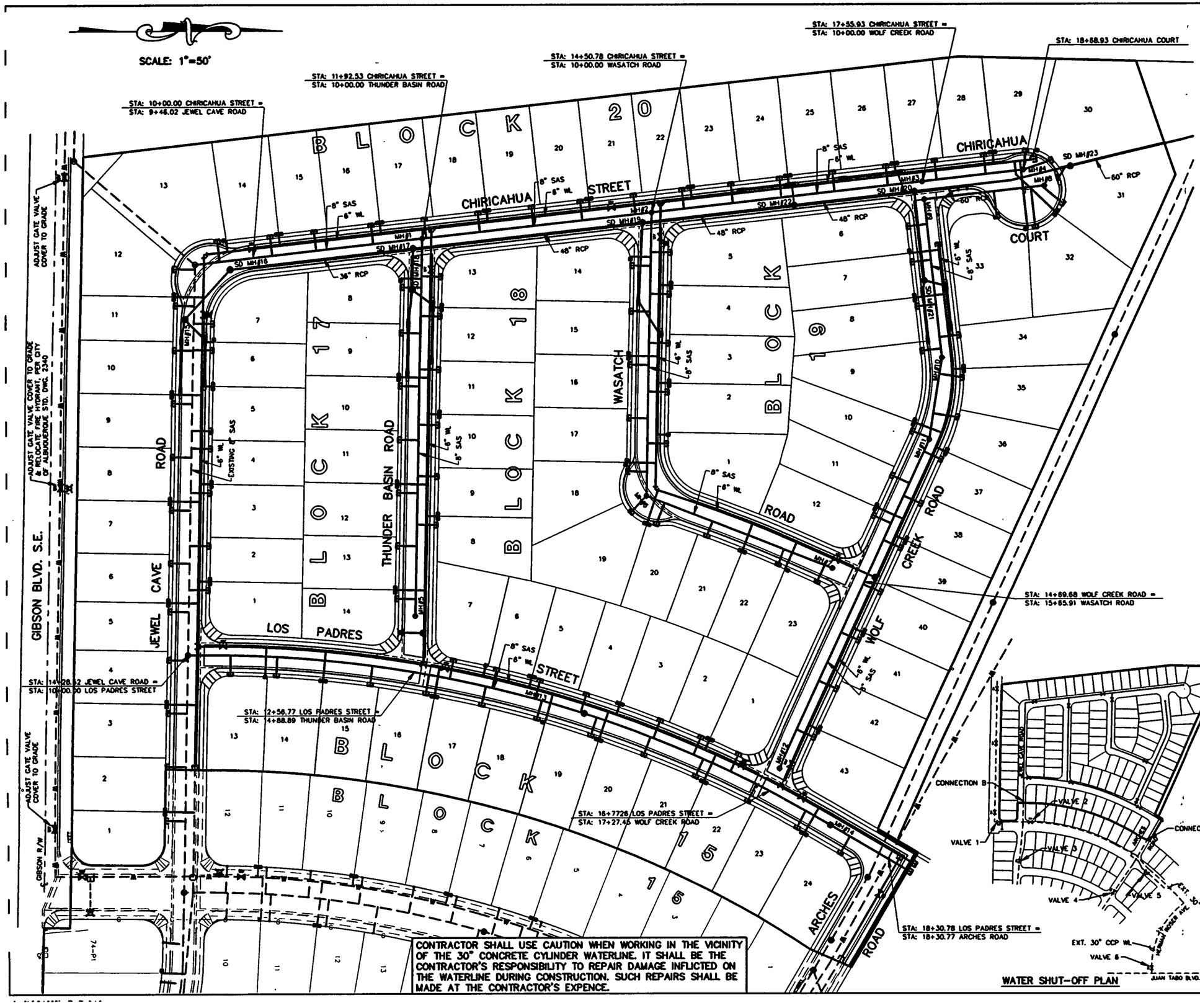
STA: 14+28.62 JEWEL CAVE ROAD =
STA: 10+00.00 LOS PADRES STREET

STA: 2+56.77 LOS PADRES STREET =
STA: 14+88.89 THUNDER BASIN ROAD

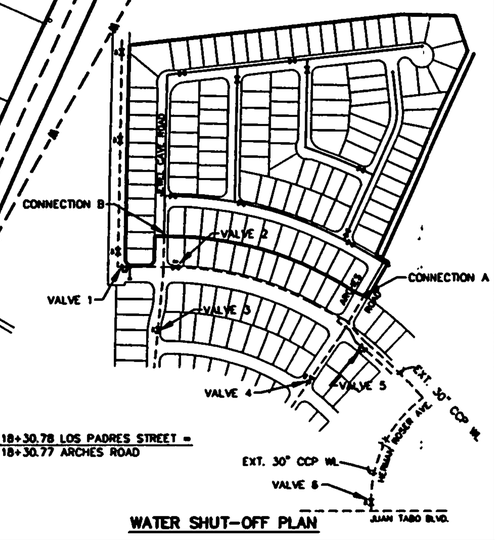
STA: 16+77.26 LOS PADRES STREET =
STA: 17+27.46 WOLF CREEK ROAD

STA: 14+69.68 WOLF CREEK ROAD =
STA: 15+65.91 WASATCH ROAD

STA: 18+30.78 LOS PADRES STREET =
STA: 18+30.77 ARCHES ROAD



CONTRACTOR SHALL USE CAUTION WHEN WORKING IN THE VICINITY OF THE 30" CONCRETE CYLINDER WATERLINE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR DAMAGE INFLICTED ON THE WATERLINE DURING CONSTRUCTION. SUCH REPAIRS SHALL BE MADE AT THE CONTRACTOR'S EXPENCE.



WATER SHUT-OFF PLAN

GENERAL NOTES

1. ALL STATIONING AND OFFSET DIMENSIONS ARE BASED ON CENTERLINE OF RIGHT-OF-WAY.
2. REFER TO CITY OF ABQ. STANDARD DRAWINGS FOR WATER AND SANITARY SEWER CONSTRUCTION.

WATER SHUT-OFF REQUIREMENTS

CONTRACTOR WILL BE RESPONSIBLE FOR THE TIMING AND COORDINATION OF THE WATER SHUT-OFF REQUIREMENTS IN CONJUNCTION WITH THE COMPLETION OF THIS PROJECT.

AT LEAST THREE (3) WORKING DAYS PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL CONTACT PWD/WATER SYSTEMS DIVISION (857-8200) TO INITIATE IMPLEMENTATION OF THIS WATER SHUT-OFF PLAN.

ALL NEW WATERLINE/FIRE HYDRANT INSTALLATIONS MUST BE FLUSHED PRIOR TO BACKFILLING OF LINES..

WATER SHUT-OFF PLAN

CONNECTION	CLOSE VALVES
A. ARCHES ROAD NON-PRESSURE CONNECTION	2, 4, 5 & 6
B. JEWEL CAVE ROAD NON-PRESSURE CONNECTION	1, 2 & 3

LEGEND

—W—	EXISTING WATERLINE
—SD—	EXISTING STORM DRAIN
—SAS—	EXISTING SANITARY SEWER
	EXISTING MANHOLE
	EXISTING FIRE HYDRANT
	EXISTING GATE VALVE
—w—	PROPOSED WATERLINE
—SD—	PROPOSED STORM DRAIN
—SAS—	PROPOSED SANITARY SEWER
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED GATE VALVE
	PROPOSED CAP OR PLUG
	PROPOSED SINGLE METER, WATER SERVICE LINE
	PROPOSED DOUBLE METER, WATER SERVICE LINES
	PROPOSED SANITARY SEWER SERVICE LINE
	PROPOSED CROSS, TEE, OR ELBOW
	PROPOSED STORM INLET

AVID ENGINEERING, INC.
Civil • Structural • Transportation
6100 Sequoia St. NE - Suite 102
Albuquerque, NM 87109 - (505) 881-5257

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

BENCH MARKS
THE STATION MARK IS A STANDARD ACS BRASS TABLET, STAMPED "1-L21 RESET 1994", LOCATED 7.8 MILES EAST OF DOWNTOWN ALBUQUERQUE, AT THE INTERSECTION OF CENTRAL AVE. AND JUAN TABO BLVD. THE STATION IS ON THE MEDIAN STRIP OF CENTRAL AVE., 81' WEST OF THE CENTERLINE OF JUAN TABO BLVD. AND FLUSH WITH THE TOP OF CURB. SLD ELEVATION 5534.63

SURVEY INFORMATION
FIELD NOTES
NO. | BY | DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY

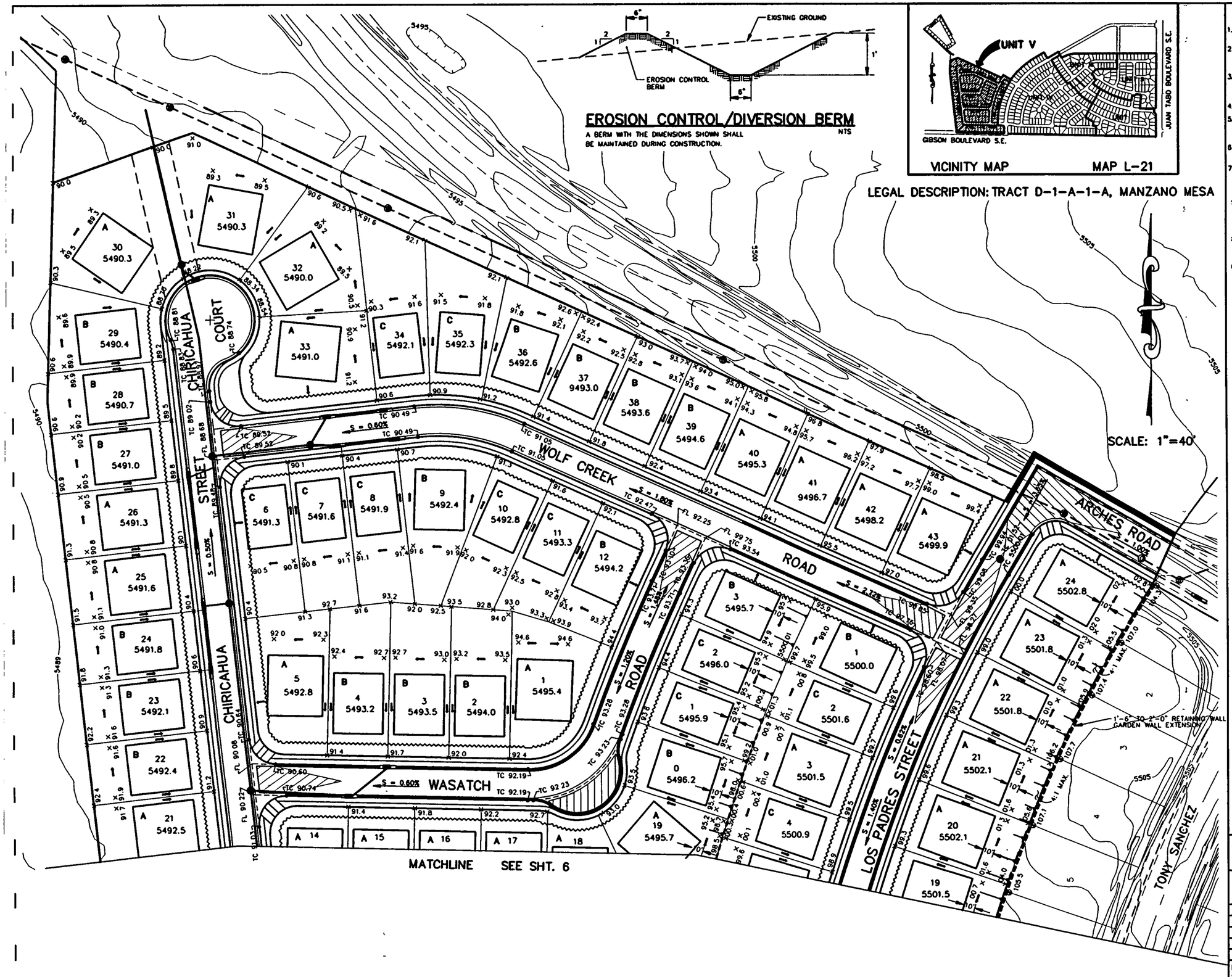
DESIGN
DESIGNED BY DA DATE 11/94
DRAWN BY RAYJ DATE 11/94
CHECKED BY RLB DATE 11/94

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: WILLOW WOOD - UNIT V
OVERALL UTILITY PLAN

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair			Water		
Transportation			Waste Water		
Hydrology					

DRAWING NO. 4604.94 | MAP NO. L-21-Z | SHEET 4 OF 24



EROSION CONTROL/DIVERSION BERM

A BERM WITH THE DIMENSIONS SHOWN SHALL BE MAINTAINED DURING CONSTRUCTION.

NTS

VICINITY MAP MAP L-21

LEGAL DESCRIPTION: TRACT D-1-A-1-A, MANZANO MESA

GENERAL NOTES

1. ALL CURB ELEVATIONS SHOWN ARE TOP OF CURB UNLESS OTHERWISE NOTED.
2. GRADE PADS TO WITHIN 5' OF THE PROPERTY LINE EXCEPT AT SIDESTREETS GRADE PADS TO WITHIN 10' OF PROPERTY LINE.
3. CONTRACTOR TO PROVIDE AS-BUILT INFORMATION NECESSARY FOR CITY GRADING & DRAINAGE CERTIFICATION.
4. SEE TYPICAL LOT GRADING DETAILS
5. CONTRACTOR SHALL OBTAIN A TOP SOIL DISTURBANCE PERMIT PRIOR TO BEGINNING ANY EARTHWORK CONSTRUCTION.
6. CONTRACTOR REQUIRED TO REMOVE SEDIMENT IN STREET WITHIN 24 HOURS.
7. GRADING & DRAINAGE NOTES AND EROSION CONTROL PLAN ON GRADING DETAIL SHT.

LEGEND

- EXISTING STANDARD CURB & GUTTER
- PROPOSED STANDARD CURB & GUTTER
- PROPOSED MOUNTABLE CURB & GUTTER
- EXISTING GROUND CONTOUR
- PROPOSED CONCRETE VALLEY GUTTER
- TRANSITION SECTION FROM FULL CROWN TO NO CROWN SECTION (50')
- PROPOSED WHEELCHAIR RAMP
- ×98.6 PROPOSED SPOT ELEVATION
- ⊗107.0 EXISTING SPOT ELEVATION
- PROPOSED FLOW DIRECTION
- PROPOSED WATER BLOCK
- 136.90 BUILDING PAD & ELEVATION
- TEMPORARY EROSION CONTROL BERM
- PROPOSED MANHOLE
- PROPOSED DROP INLET

A	B	C
50'X55'	45'X55'	40'X55'

PADS

AVID ENGINEERING, INC.
Civil • Structural • Transportation
8100 Seagull St. NE - Suite 102
Albuquerque, NM 87109 - (505) 881-3357

AS BUILT INFORMATION

CONTRACTOR	DATE
WORK STAKED BY	DATE
FIELD VERIFICATION BY	DATE
DRAWINGS CORRECTED BY	DATE

MICRO-FILM INFORMATION

RECORDED BY DATE

NO

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SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY

DESIGN

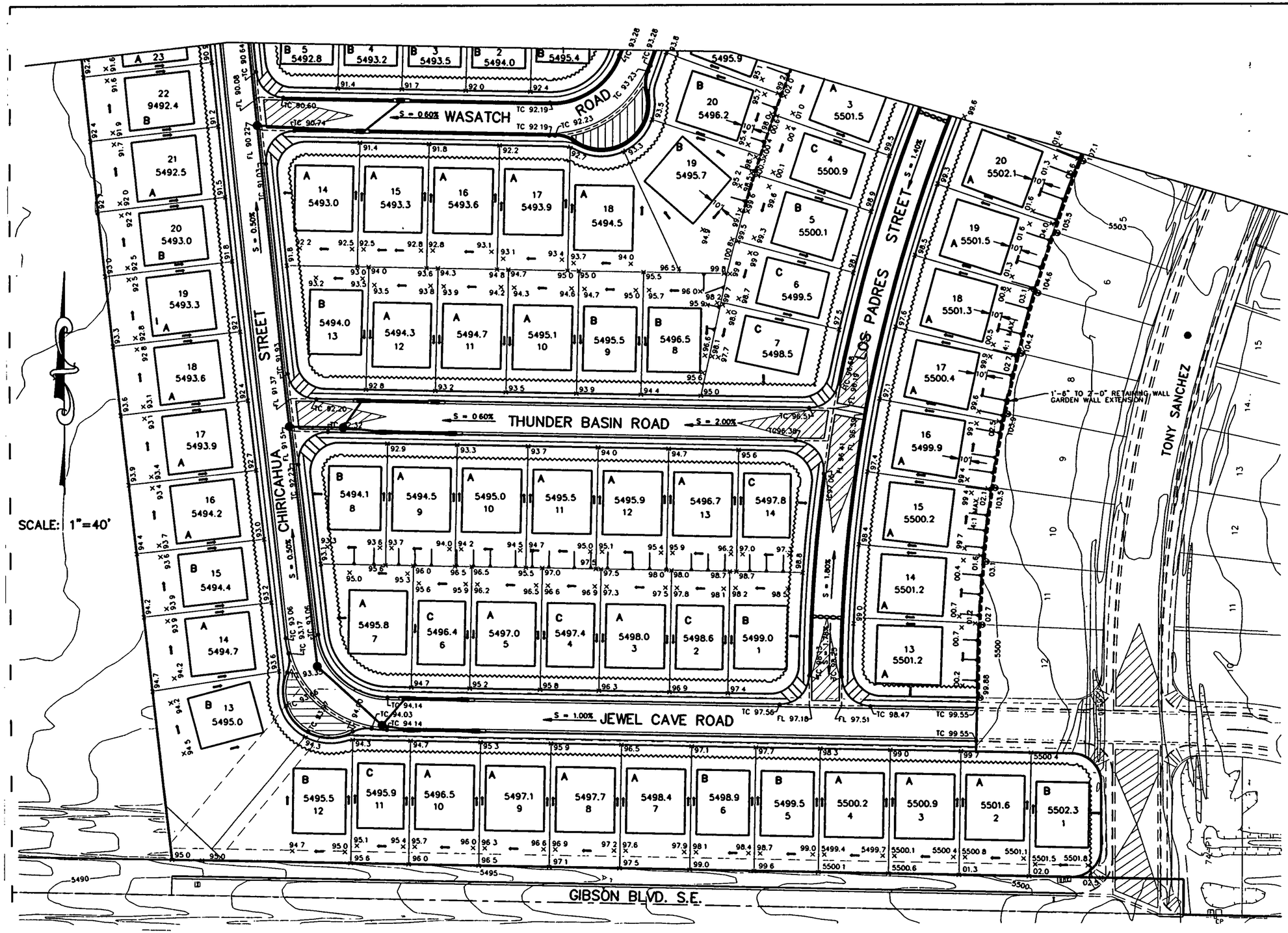
DESIGNED BY DA DATE 11/94
DRAWN BY RAYJ DATE 11/94
CHECKED BY JD DATE 11/94

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: WILLOW WOOD - UNIT V
GRADING & DRAINAGE PLAN
SHEET 1

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair			Water		
Transportation			Waste Water		
Hydrology					

DRAWING NO.	MAP NO.	SHEET	OF
4604.94	L-21-Z	5	22



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7. GRADING & DRAINAGE NOTES AND EROSION CONTROL PLAN ON GRADING DETAIL SHT.

LEGEND

- EXISTING STANDARD CURB & GUTTER
- PROPOSED STANDARD CURB & GUTTER
- PROPOSED MOUNTABLE CURB & GUTTER
- EXISTING GROUND CONTOUR
- PROPOSED CONCRETE VALLEY GUTTER
- TRANSITION SECTION FROM FULL CROWN TO NO CROWN SECTION (50')
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- ⊗107.0 EXISTING SPOT ELEVATION
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- RETAINING WALL
- PROPOSED WATER BLOCK
- 136.90 BUILDING PAD & ELEVATION
- TEMPORARY EROSION CONTROL BERM
- PROPOSED MANHOLE
- PROPOSED DROP INLET

A	B	C
50'X55'	45'X55'	45'X55'

PADS

AVID ENGINEERING, INC.
Civil • Structural • Transportation
6100 Seagull St. NE - Suite 102
Albuquerque, NM 87109 - (505) 881-3357

AS BUILT INFORMATION

CONTRACTOR
WORK STAKED BY
INSPECTOR'S ACCEPTANCE BY
FIELD VERIFICATION BY
DRAWINGS CORRECT BY
DATE
DATE
DATE
DATE
CENTERLINE OF JUAN TABO BLVD. AND FLUSH WITH THE TOP OF CURB. SLD ELEV. 5534.63
MICRO-FILM INFORMATION
RECORDED BY
DATE
NO

BENCH MARKS

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SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY

DESIGN

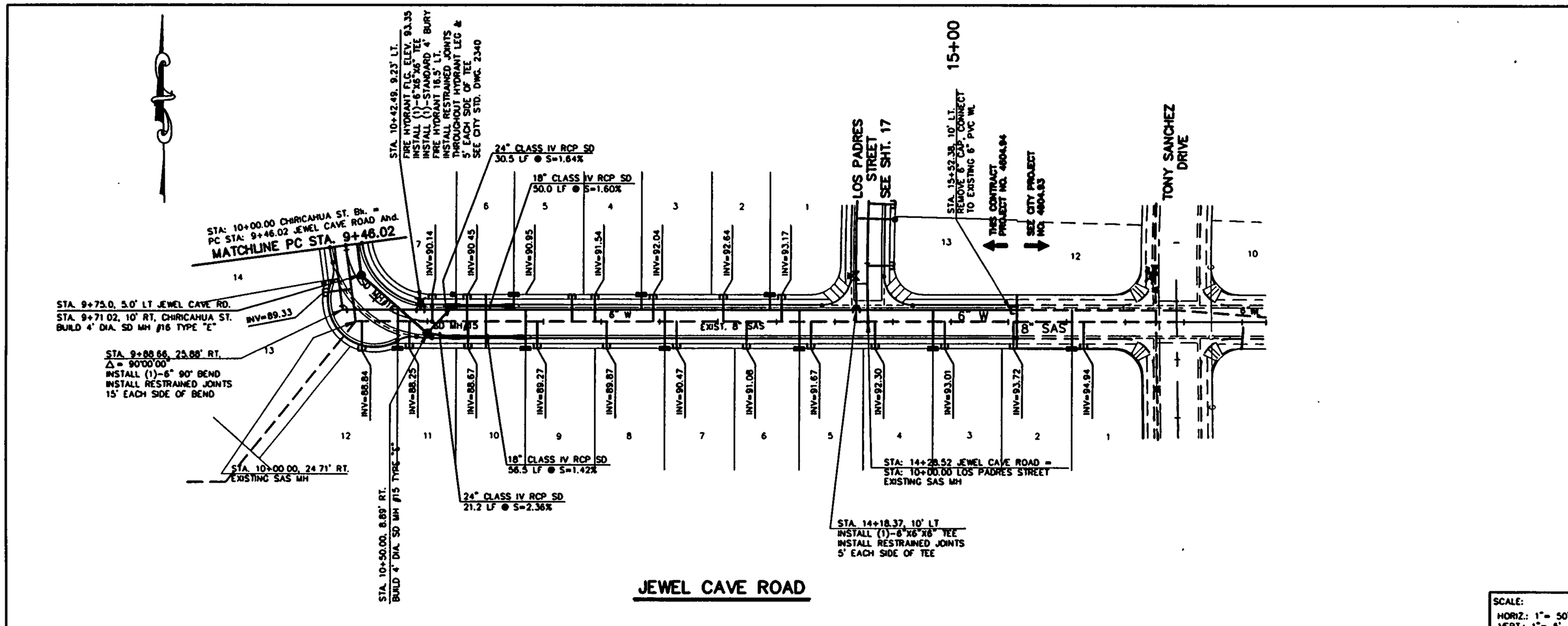
DESIGNED BY DA — DATE 11/94
DRAWN BY RAYJ — DATE 11/94
CHECKED BY JD — DATE 11/94

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: WILLOW WOOD - UNIT V
GRADING & DRAINAGE PLAN
SHEET 2

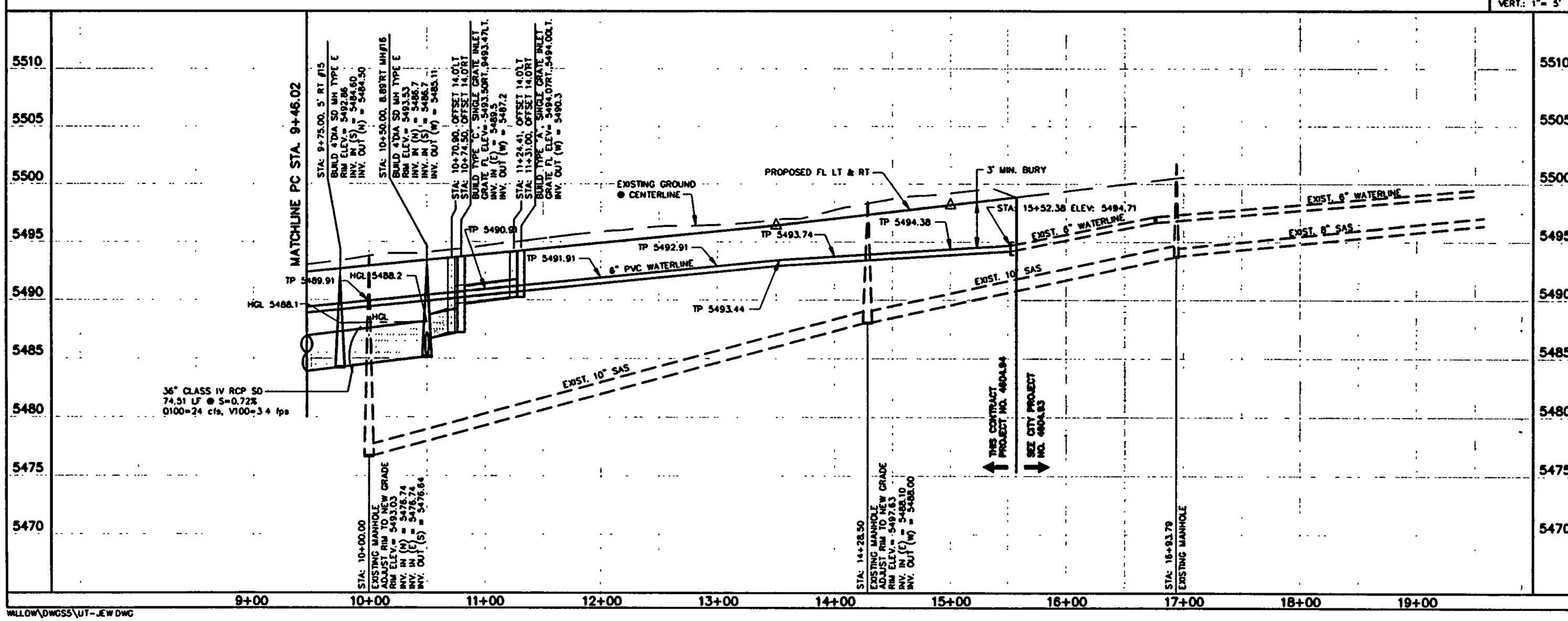
APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair			Water		
Transportation			Waste Water		
Hydrology					

DRAWING NO.	MAP NO.	SHEET	OF
4604.94	L-21-Z	6	22



JEWEL CAVE ROAD

SCALE:
HORIZ.: 1"= 50'
VERT.: 1"= 5'



WILLOW\DWGS5\UT-JEW.DWG

UTILITY NOTES

1.) STATIONING ALONG ℄ OF STREET UNLESS OTHERWISE NOTED.

2.) SANITARY SEWER LINE LENGTHS COMPUTED FROM MH ℄ TO MH ℄.

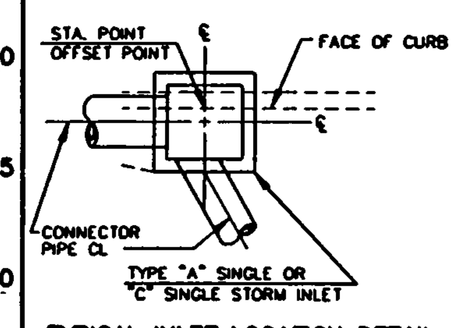
3.) SLOPES ARE COMPUTED INVERT TO INVERT. MH RIM ELEVATIONS GIVEN ARE APPROXIMATE. CONTRACTOR SHALL ADJUST ALL RIMS TO FINAL GRADE.

4.) CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH UTILITY COMPANIES.

5.) CONTRACTOR SHALL VERIFY ALL EXISTING UTILITIES AND UTILITY CONNECTIONS PRIOR TO BEGINNING CONSTRUCTION. SHOULD A CONFLICT EXIST OR DESIGN REVISIONS BE REQUIRED FOR ANY REASON, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND ALLOW SUFFICIENT TIME FOR DESIGN REVISIONS SO AS TO NOT DELAY THE CONSTRUCTION SCHEDULE.

LEGEND

- EXISTING WATERLINE
- EXISTING STORM DRAIN
- EXISTING SANITARY SEWER
- EXISTING MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING GATE VALVE
- PROPOSED WATERLINE
- PROPOSED STORM DRAIN
- PROPOSED SANITARY SEWER
- PROPOSED MANHOLE
- PROPOSED FIRE HYDRANT
- PROPOSED GATE VALVE
- PROPOSED CAP OR PLUG
- PROPOSED SINGLE METER, WATER SERVICE LINE
- PROPOSED DOUBLE METER, WATER SERVICE LINES
- PROPOSED SANITARY SEWER SERVICE LINE
- PROPOSED CROSS, TEE, OR ELBOW
- PROPOSED STORM INLET



TYPICAL INLET LOCATION DETAIL

AVID ENGINEERING, INC.
Civil • Structural • Transportation
6100 Seagull St. NE - Suite 102
Albuquerque, NM 87109 - (505) 881-5357

AS BUILT INFORMATION

CONTRACTOR		DATE
WORK STAKED BY		
INSPECTOR'S FIELD CHANGE BY		DATE
VERIFICATION BY CITY		DATE
CORRECTED BY		DATE
MICRO-FILM INFORMATION		
RECORDED BY		DATE
NO		

BENCH MARKS

THE STATION MARK IS A STANDARD ACS BRASS TABLET, STAMPED "1-L21 RESET 1994", LOCATED 7.8 MILES EAST OF DOWNTOWN ALBUQUERQUE, AT THE INTERSECTION OF CENTRAL AVE. AND JUAN TABO BLVD. THE STATION IS ON THE MEDIAN STRIP OF CENTRAL AVE., 81' WEST OF THE CENTERLINE OF JUAN TABO BLVD. AND FLUSH WITH THE TOP OF CURB. SLD ELEVATION 5534.63

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

REMARKS

NO.	DATE	BY

DESIGN

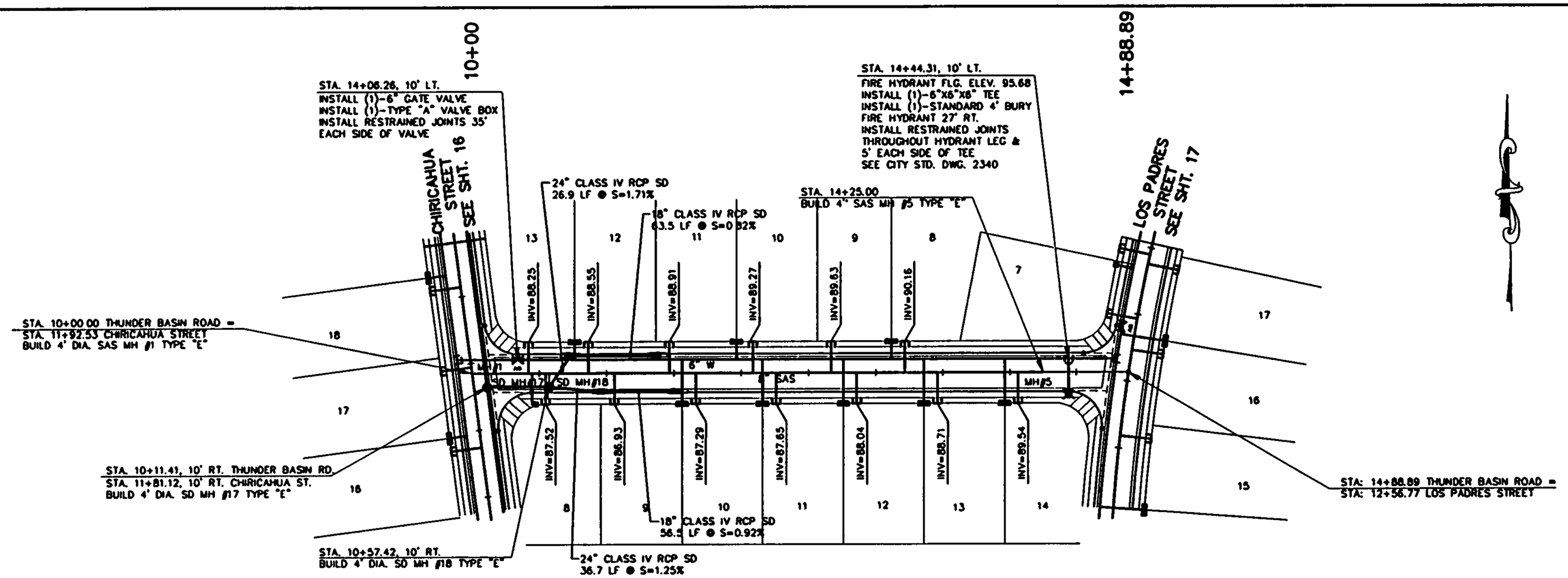
DESIGNED BY	DA	DATE 11/94
DRAWN BY	RAYJ	DATE 11/94
CHECKED BY	JD	DATE 11/94

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: WILLOW WOOD - UNIT V
JEWEL CAVE ROAD
UTILITY PLAN AND PROFILE

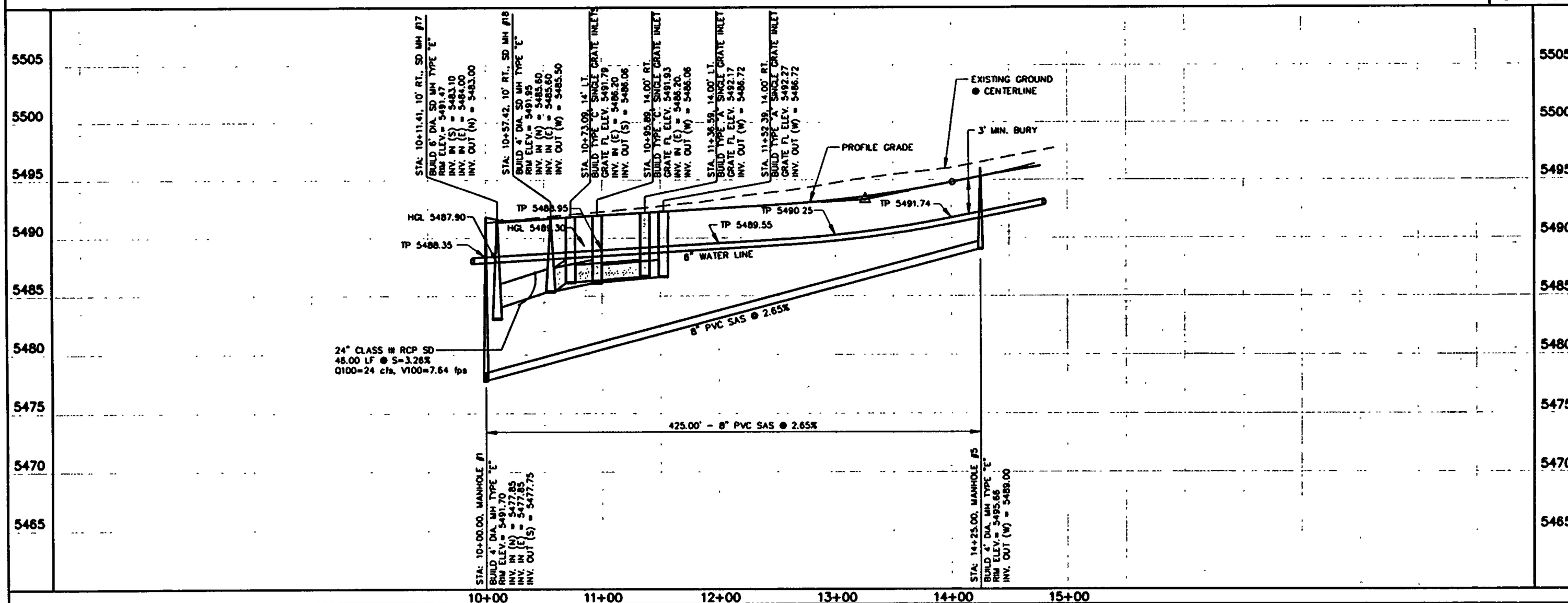
APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair			Water		
Transportation			Waste Water		
Hydrology					

DRAWING NO.	MAP NO.	SHEET	OF
4604.94	L-21-Z	18	24



THUNDER BASIN ROAD

SCALE:
HORIZ.: 1"= 50'
VERT.: 1"= 5'



WILLOW\DWGS5\UT-THUN.DWG

UTILITY NOTES

1.) STATIONING ALONG ℄ OF STREET UNLESS OTHERWISE NOTED.

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LEGEND

- EXISTING WATERLINE
- EXISTING STORM DRAIN
- EXISTING SANITARY SEWER
- EXISTING MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING GATE VALVE
- PROPOSED WATERLINE
- PROPOSED STORM DRAIN
- PROPOSED SANITARY SEWER
- PROPOSED MANHOLE
- PROPOSED FIRE HYDRANT
- PROPOSED GATE VALVE
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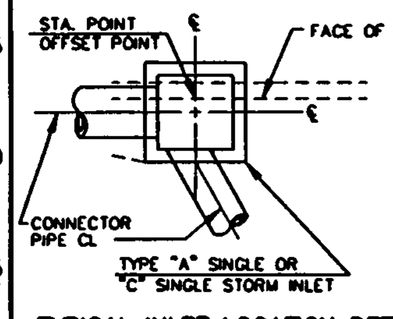
- PROPOSED SINGLE METER, WATER SERVICE LINE
- PROPOSED DOUBLE METER, WATER SERVICE LINES
- PROPOSED SANITARY SEWER SERVICE LINE
- PROPOSED CROSS, TEE, OR ELBOW
- PROPOSED STORM INLET



TYPICAL INLET LOCATION DETAIL

AVID ENGINEERING, INC.
Civil • Structural • Transportation
6100 Seagull St. NE - Suite 102
Albuquerque, NM 87109 - (505) 881-5357

AS BUILT INFORMATION

CONTRACTOR	DATE
STAKE BY	
INSPECTOR'S FIELD TASKS BY	DATE
VERIFICATION BY FIELD TASKS	DATE
CORRECTED BY	
MICRO-FILM INFORMATION	
RECORDED BY:	DATE
NO	

BENCH MARKS

THE STATION MARK IS A STANDARD ACS BRASS TABLET, STAMPED "1-L21 RESET 1994", LOCATED 7.8 MILES EAST OF DOWNTOWN ALBUQUERQUE, AT THE INTERSECTION OF CENTRAL AVE. AND JUAN TABO BLVD. THE STATION IS ON THE MEDIAN STRIP OF CENTRAL AVE., 81' WEST OF THE CENTERLINE OF JUAN TABO BLVD. AND FLUSH WITH THE TOP OF CURB. SLD ELEVATION 5534.63

SURVEY INFORMATION

NO.	BY	DATE	FIELD NOTES

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY

DESIGN

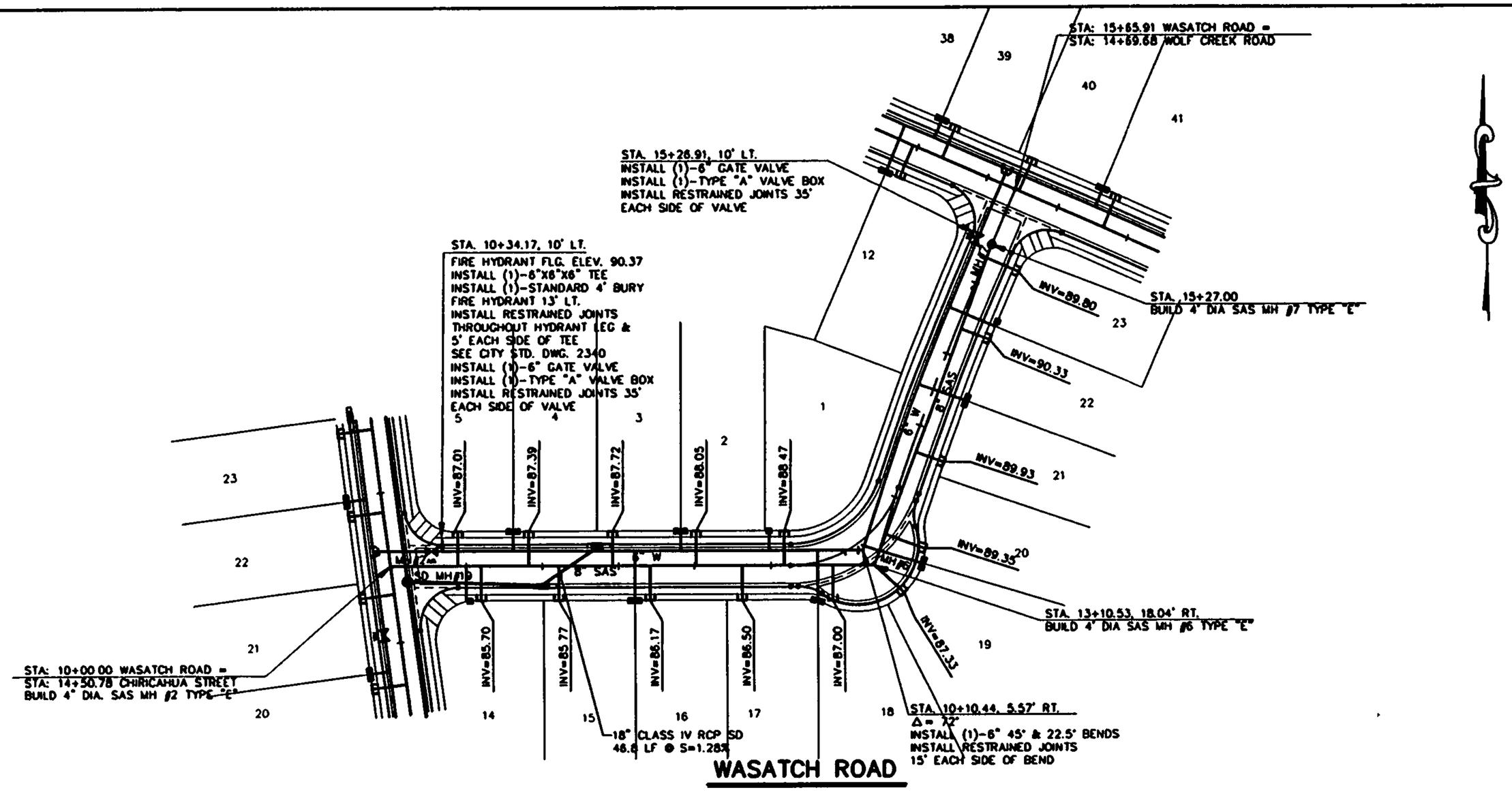
DESIGNED BY DA DATE 11/94
DRAWN BY RAYJ DATE 11/94
CHECKED BY JD DATE 11/94

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

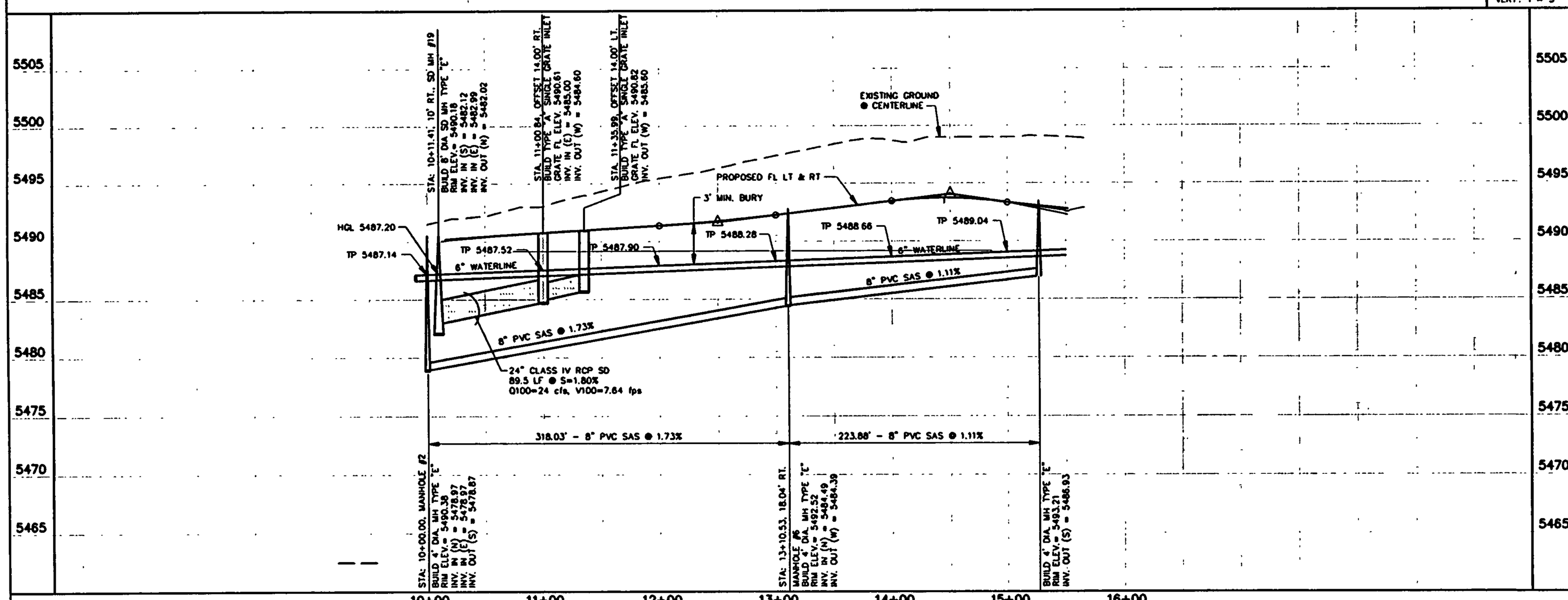
TITLE: WILLOW WOOD - UNIT V
THUNDER BASIN ROAD
UTILITY PLAN AND PROFILE

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair			Water		
Transportation			Waste Water		
Hydrology					

DRAWING NO.	MAP NO.	SHEET OF
4604.94	L-21-Z	19 24



SCALE:
HORIZ.: 1"= 50'
VERT: 1"= 5'



WILLOW\DWGS5\UT-WASA.DWG

UTILITY NOTES

1.) STATIONING ALONG ℄ OF STREET UNLESS OTHERWISE NOTED.

2.) SANITARY SEWER LINE LENGTHS COMPUTED FROM MH ℄ TO MH ℄.

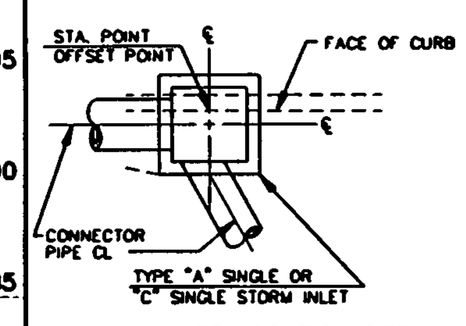
3.) SLOPES ARE COMPUTED INVERT TO INVERT. MH RIM ELEVATIONS GIVEN ARE APPROXIMATE. CONTRACTOR SHALL ADJUST ALL RIMS TO FINAL GRADE.

4.) CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH UTILITY COMPANIES.

5.) CONTRACTOR SHALL VERIFY ALL EXISITING UTILITIES AND UTILITY CONNECTIONS PRIOR TO BEGINNING CONSTRUCTION. SHOULD A CONFLICT EXIST OR DESIGN REVISIONS BE REQUIRED FOR ANY REASON, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND ALLOW SUFFICIENT TIME FOR DESIGN REVISIONS SO AS TO NOT DELAY THE CONSTRUCTION SCHEDULE.

LEGEND

— —W— —	EXISTING WATERLINE
— — SD — —	EXISTING STORM DRAIN
— —SAS— —	EXISTING SANITARY SEWER
	EXISTING MANHOLE
	EXISTING FIRE HYDRANT
	EXISTING GATE VALVE
W	PROPOSED WATERLINE
SD	PROPOSED STORM DRAIN
SAS	PROPOSED SANITARY SEWER
●	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED GATE VALVE
	PROPOSED CAP OR PLUG
	PROPOSED SINGLE METER, WATER SERVICE LINE
	PROPOSED DOUBLE METER, WATER SERVICE LINES
	PROPOSED SANITARY SEWER SERVICE LINE
	PROPOSED CROSS, TEE, OR ELBOW
	PROPOSED TYPE DOUBLE "A" STORM INLET



TYPICAL INLET LOCATION DETAIL

AVID ENGINEERING, INC.
Civil • Structural • Transportation
8100 Seagull St. NE – Suite 102
Albuquerque, NM 87109 – (505) 881-3357

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

BENCH MARKS
THE STATION MARK IS A STANDARD ACS BRASS TABLET, STAMPED "T-L21 RESET 1994", LOCATED 7.8 MILES EAST OF DOWNTOWN ALBUQUERQUE, AT THE INTERSECTION OF CENTRAL AVE. AND JUAN TABO BLVD. THE STATION IS ON THE MEDIAN STRIP OF CENTRAL AVE., 81' WEST OF THE CENTERLINE OF JUAN TABO BLVD. AND FLUSH WITH THE TOP OF CURB. SLD ELEVATION 5534.63

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY

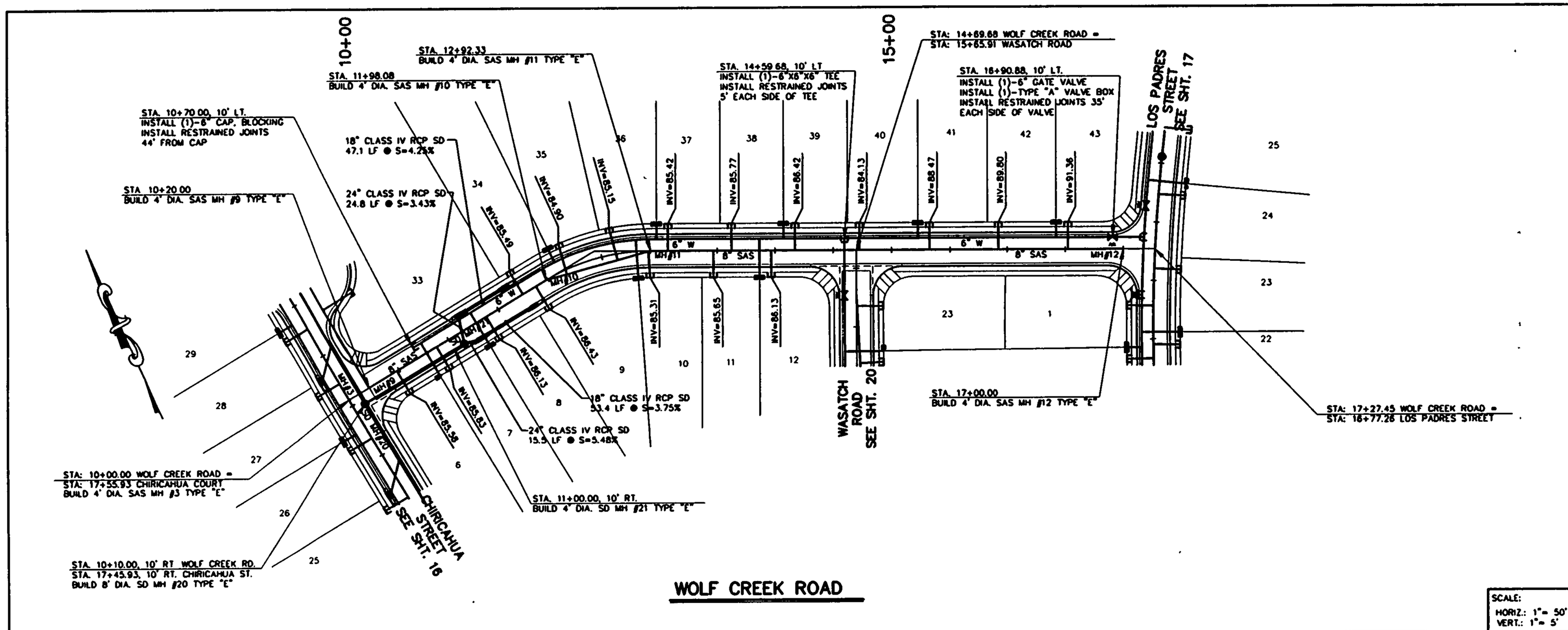
DESIGN
DESIGNED BY DA DATE 11/94
DRAWN BY RAYJ DATE 11/94
CHECKED BY JD DATE 11/94

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: WILLOW WOOD – UNIT V
WASATCH ROAD
UTILITY PLAN AND PROFILE

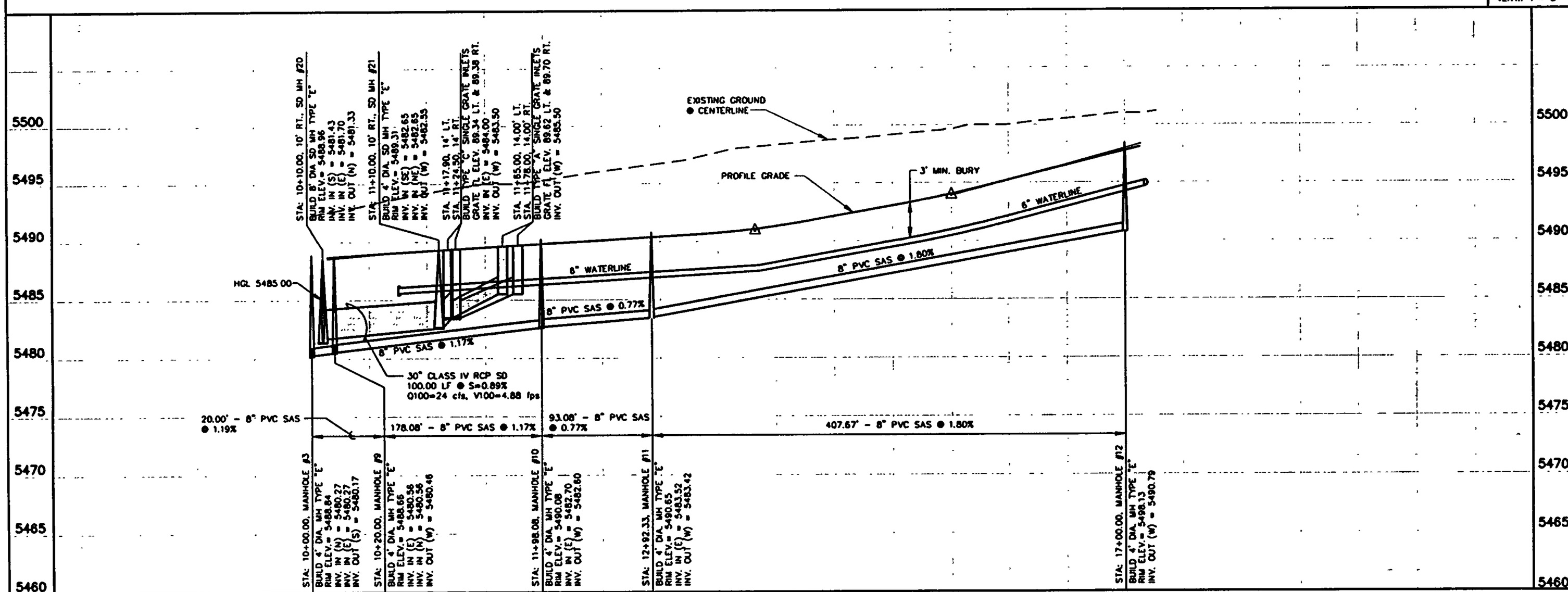
APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair			Water		
Transportation			Waste Water		
Hydrology					

DRAWING NO.	MAP NO.	SHEET	OF
4604.94	L-21-Z	20	24



WOLF CREEK ROAD

SCALE:
HORIZ.: 1"= 50'
VERT.: 1"= 5'



WILLOW\DWGSS\UT-WOLF.DWG

UTILITY NOTES

1.) STATIONING ALONG ℄ OF STREET UNLESS OTHERWISE NOTED.

2.) SANITARY SEWER LINE LENGTHS COMPUTED FROM MH ℄ TO MH ℄.

3.) SLOPES ARE COMPUTED INVERT TO INVERT. MH RIM ELEVATIONS GIVEN ARE APPROXIMATE. CONTRACTOR SHALL ADJUST ALL RIMS TO FINAL GRADE.

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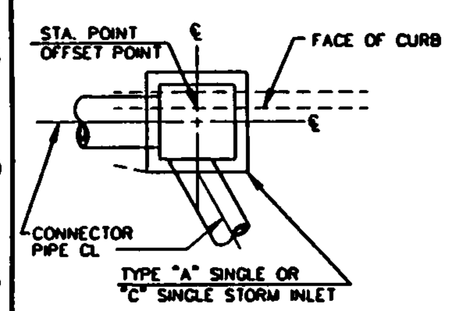
LEGEND

—W—	EXISTING WATERLINE
— SD —	EXISTING STORM DRAIN
—SAS—	EXISTING SANITARY SEWER
	EXISTING MANHOLE
	EXISTING FIRE HYDRANT
	EXISTING GATE VALVE
W	PROPOSED WATERLINE
SD	PROPOSED STORM DRAIN
SAS	PROPOSED SANITARY SEWER
	PROPOSED MANHOLE
	PROPOSED FIRE HYDRANT
	PROPOSED GATE VALVE
	PROPOSED CAP OR PLUG
	PROPOSED SINGLE METER, WATER SERVICE LINE
	PROPOSED DOUBLE METER, WATER SERVICE LINES
	PROPOSED SANITARY SEWER SERVICE LINE
	PROPOSED CROSS, TEE, OR ELBOW
	PROPOSED TYPE DOUBLE "A" STORM INLET



TYPICAL INLET LOCATION DETAIL

AVID ENGINEERING, INC.
Civil • Structural • Transportation
6100 Seagull St. NE - Suite 102
Albuquerque, NM 87109 - (505) 881-3357

AS BUILT INFORMATION

		DATE
CONTRACTOR		
WORK STAKED BY		
INSPECTOR'S ACCEPTANCE		DATE
FIELD VERIFICATION BY		DATE
DRAWINGS CORRECTED BY		DATE

MICRO-FILM INFORMATION

		DATE
RECORDED BY		
NO.		

BENCH MARKS

THE STATION MARK IS A STANDARD ACS BRASS TABLET, STAMPED "1-L21 RESET 1994", LOCATED 7.8 MILES EAST OF DOWNTOWN ALBUQUERQUE, AT THE INTERSECTION OF CENTRAL AVE. AND JUAN TABO BLVD. THE STATION IS ON THE MEDIAN STRIP OF CENTRAL AVE., 81' WEST OF THE CENTERLINE OF JUAN TABO BLVD. AND FLUSH WITH THE TOP OF CURB. SLD ELEVATION 5534.63

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY

DESIGN

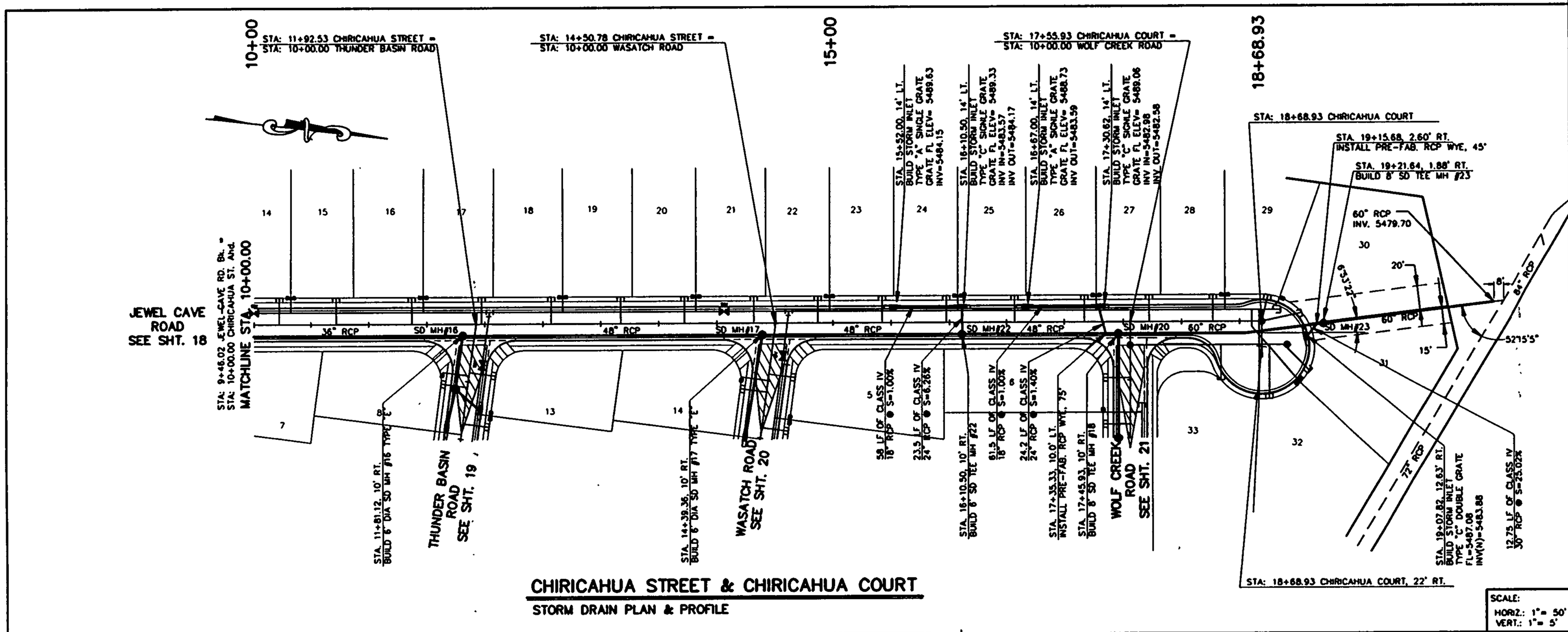
		DATE
DESIGNED BY	DA	11/94
DRAWN BY	RAYJ	11/94
CHECKED BY	JD	11/94

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: WILLOW WOOD - UNIT V
WOLF CREEK ROAD
UTILITY PLAN AND PROFILE

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair			Water		
Transportation			Waste Water		
Hydrology					

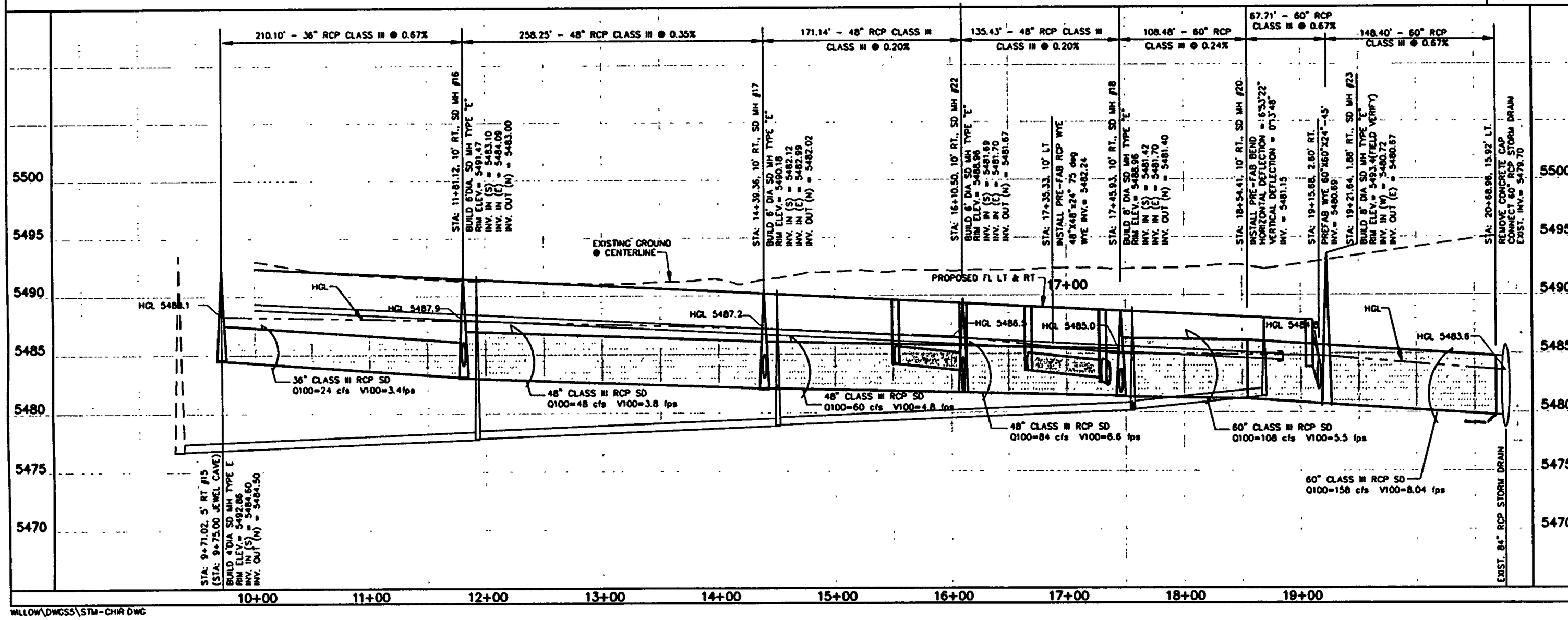
DRAWING NO.	MAP NO.	SHEET	OF
4604.94	L-21-Z	21	24



CHIRICAHUA STREET & CHIRICAHUA COURT

STORM DRAIN PLAN & PROFILE

SCALE:
HORIZ.: 1"= 50'
VERT.: 1"= 5'



WILLOW\DWGS5\STM-CHIR DWG

UTILITY NOTES

1.) STATIONING ALONG ℄ OF STREET UNLESS OTHERWISE NOTED.

2.) STORM SEWER LINE LENGTHS COMPUTED FROM MH ℄ TO MH ℄.

3.) SLOPES ARE COMPUTED INVERT TO INVERT. MH RIM ELEVATIONS GIVEN ARE APPROXIMATE. CONTRACTOR SHALL ADJUST ALL RIMS TO FINAL GRADE.

4.) INLET INVERTS AND CONNECTOR PIPE SLOPES AND LENGTHS ARE COMPUTED FROM STA./OFFSET TO STA./OFFSET SHOWN ON PLANS.

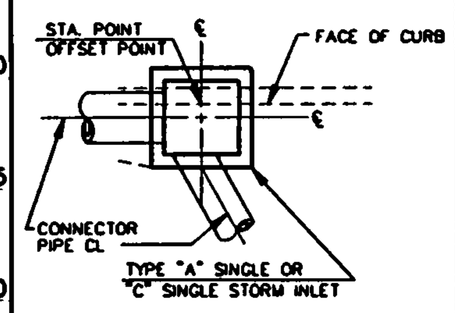
5.) CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH UTILITY COMPANIES.

6.) CONTRACTOR SHALL VERIFY ALL EXISITING UTILITIES AND UTILITY CONNECTIONS PRIOR TO BEGINNING CONSTRUCTION. SHOULD A CONFLICT EXIST OR DESIGN REVISIONS BE REQUIRED FOR ANY REASON, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND ALLOW SUFFICIENT TIME FOR DESIGN REVISIONS SO AS TO NOT DELAY THE CONSTRUCTION SCHEDULE.

7.) CONTRACTOR SHALL SUBMIT DETAILED SHOP DRAWINGS OF PRE FABRICATED RCP PIPE FOR APPROVAL BY THE CONSTRUCTION INSPECTOR.

LEGEND

- SD — PROPOSED STORM DRAIN
- ● — PROPOSED MANHOLE
- PROPOSED STORM INLET



TYPICAL INLET LOCATION DETAIL

AVID ENGINEERING, INC.
Civil ⇔ Structural ⇔ Transportation
6100 Seagull St. NE - Suite 102
Albuquerque, NM 87109 - (505) 881-3357

AS BUILT INFORMATION

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

BENCH MARKS

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SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY

DESIGN

DESIGNED BY	DA	DATE 11/94
DRAWN BY	RAYJ	DATE 11/94
CHECKED BY	JD	DATE 11/94

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: WILLOW WOOD - UNIT V
CHIRICAHUA STREET & CHIRICAHUA COURT
STORM DRAIN PLAN AND PROFILE

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D.R.C. Chair			Water		
Transportation			Waste Water		
Hydrology					

DRAWING NO.	MAP NO.	SHEET	OF
4604.94	L-21-Z	22	24

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

July 14, 1995

Rick Beltramo, P.E.
AVID Engineering
6100 Seagull Ln NE Suite 102
Albuquerque, NM 87109

RE: ENGINEER'S CERTIFICATION FOR WILLOW WOOD UNIT 4 (L-21/D37A1)
RECEIVED JUNE 30, 1995 FOR SUBDIVISION CERTIFICATION
ENGINEER'S STAMP REVISED 6/29/95

Dear Mr. Beltramo:

Based on the information included in the submittal referenced above, City Hydrology accepts the Engineer's Certification of grading & drainage for Subdivision Certification. Contact the DRC Chairman, Billy Goolsby, to obtain the Financial Guaranty Release for City Project Number 4604.93.

If I can be of further assistance, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia
Billy Goolsby, CPN 4604.93
Stan Strickman, Manzano Mesa Ltd, 6301 Indian School NE Suite 208, 87110

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

DRAINAGE INFORMATION SHEET

PROJECT TITLE: WillowWood Subdivision ZONE ATLAS/DRAINAGE FILE# L-21/D37A

LEGAL DESCRIPTION: Tract D-1, Manzano Mesa

CITY ADDRESS: West of Juan Tabo, North of Gibson

ENGINEERING FIRM: AVID ENGINEERING, INC. CONTACT: Dave Aube

ADDRESS: 6100 Seagull Ln., NE, Suite 102, 87109 PHONE: 881-5357

OWNER: Manzano Mesa Limited Partnership CONTACT: Stan Strickman

ADDRESS: 6301 Indian School NE, Suite 208 PHONE: 242-6375

ARCHITECT: None CONTACT:

ADDRESS: PHONE:

SURVEYOR: AVID ENGINEERING, INC. CONTACT: Ruan Bacigalupa

ADDRESS: Same as Above PHONE: 881-5357

CONTRACTOR: None CONTACT:

ADDRESS: PHONE:

PRE-DESIGN MEETING:

X YES DRB NO. DRB-92-0106

___ NO EPC NO.

___ COPY OF CONFERENCE RECAP SHEET PROVIDED PROJECT NO. 4604.90-93

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT

X DRAINAGE PLAN

___ CONCEPTUAL GRADING & DRAIN PLAN

___ GRADING PLAN

___ EROSION CONTROL PLAN

W.O. ___ ENGINEER'S CERTIFICATION

Revision signed 11-10-94 JPC

NOV 10

CHECK TYPE OF APPROVAL SOUGHT:

___ SECTOR PLAN APPROVAL

___ SKETCH PLAT APPROVAL

___ PRELIMINARY PLAT APPROVAL

___ SITE DEVELOPMENT PLAN APPROVAL

___ FINAL PLAT APPROVAL

___ BUILDING PERMIT APPROVAL

___ FOUNDATION PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY APPROVAL

___ ROUGH GRADING PERMIT APPROVAL

___ GRADING/PAVING PERMIT APPROVAL

X OTHER Revised (SPECIFY)

DATE SUBMITTED: 11/09/94

BY: David A Aube...

AVID ENGINEERING, INC.

Civil • Structural • Transportation

November 7, 1994

Mr. John Curtin
City of Albuquerque
Hydrology
Public Works Department
P.O. Box 1293
Albuquerque, NM 87103

Re: WillowWood Unit IV, Drainage Plan & Construction Plan Revisions

Dear Mr. Curtin:

Enclosed are the latest revisions to WillowWood IV, including plans and revised HGL calculations. The storm line near the drainage pond has been relocated and extended. Manhole #1 has been relocated to the downstream side of the 20° horizontal bend. The alignment of the storm line between Manhole #1 and outlet has been changed to minimize reconstruction of the existing cutoff wall. The hydraulic grade line calculations are enclosed. Please note that the only changes occur between Manhole #2 and outlet. The lengths of pipes between manholes has changed as well as the additional bend. The maximum change in the HGL is .24'. A quick look at the plans will show that this increase will not require any design changes upstream.

Sheet 34 was revised to show new drop inlet depths to allow connector pipes to avoid conflicts with other utilities. Manhole #14 has been removed. All utilities are now shown in both plan and profile.

Sheet 35 shows new layout for storm line near outlet to pond. Hydraulic grade line values have not been updated on profiles due to the relatively insignificant change.

The plans have been modified in a manner acceptable to Billy Goolsby. Please initial changes so that the surveyors can begin construction staking.

If you have any questions or comments, please contact Rick Beltramo or me at 881-5357.

Sincerely,

David A Aube...

Dave Aube

No. 10

DA/cs
Enclosures

6100 Seagull St. NE • Suite 102 • Albuquerque, New Mexico 87109 • (505) 881-5357

SUMMARY OF HYDRAULIC CALCULATIONS
CLOSED CONDUIT

BY: DAA
DATE 6-21-94
SHEET: 1 OF 3

PROJECT: WILLOWWOOD LINE: ARCHES/WIND RIVER

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
										JUNCTION		LOSSES									
STATION	STRUCT	D	Q	A	V	K	Sf	L	DELTA	D	ANGLE	hf	hb	hj	hmh	ht	hmisc	SUM	E.G.	hv	H.G.
																					5480.25
	OUTFALL																2.17	2.17	5484.59	2.17	5482.42
		84	455	38.48	11.82	6388	0.0051	75				0.38						0.38	5484.97	2.17	5482.80
	BEND								45				0.31					0.31	5485.28	2.17	5483.11
		84	455	38.48	11.82	6388	0.0051	79				0.40						0.40	5485.68	2.17	5483.51
	MH 1								20	42	45		0.14	1.03				1.17	5486.85	1.45	5485.40
		84	372	38.48	9.67	6388	0.0034	116				0.39						0.39	5487.24	1.45	5485.79
	MH 21									60	52			0.57				0.57	5487.81	1.48	5486.33
		72	276	28.27	9.76	4236	0.0042	210				0.89						0.89	5488.70	1.48	5487.22
	MH 2														0.15	0.32		0.47	5489.17	3.07	5486.10
		60	276	19.64	14.06	2604	0.0112	324				3.64						3.64	5492.81	3.07	5489.74
	MH 3														0.15			0.15	5492.97	3.07	5489.90
		60	276	19.64	14.06	2604	0.0112	324				3.64						3.64	5496.61	3.07	5493.54
	MH 4									30	45			1.18				1.18	5497.78	2.34	5495.45
		60	241	19.64	12.27	2604	0.0086	125				1.07						1.07	5498.86	2.34	5496.52
	MH 5									30	45			0.48				0.48	5499.34	2.08	5497.26
		60	227	19.64	11.56	2604	0.0076	129				0.98						0.98	5500.32	2.08	5498.24
	MH 6									30	90			0.99				0.99	5501.31	1.58	5499.73
		60	198	19.64	10.08	2604	0.0058	263				1.52						1.52	5502.83	1.58	5501.25
	MH 8									30	90			0.96				0.96	5503.80	1.10	5502.70
		60	165	19.64	8.40	2604	0.0040	266				1.07						1.07	5504.86	1.10	5503.77
	MH 10									48	90			2.75				2.75	5507.61	0.45	5507.17
		36	38	7.07	5.38	666.9	0.0032	266				0.86						0.86	5508.48	0.45	5508.03
	MH 11								90	24	90		0.06	0.34				0.39	5508.87	0.28	5508.59
		36	30	7.07	4.24	666.9	0.0020	233				0.47						0.47	5509.34	0.28	5509.06
	MH 12								90	24	90		0.07	0.10				0.17	5509.51	0.34	5509.17
		30	23	4.91	4.69	410.1	0.0031	19				0.06						0.06	5509.57	0.34	5509.23
	MH 13								20				0.03		0.02			0.05	5509.62	0.34	5509.28
		30	23	4.91	4.69	410.1	0.0031	178				0.56						0.56	5510.18	0.34	5509.84
	MH 37								45	45	80		0.03	0.46				0.50	5510.68	0.23	5510.45
		24	12	3.14	3.82	226.2	0.0028	--													

UNCHANGED ← LENGTHS OF PIPES/MH LOCATIONS / BEND IN PIPE CHANGED.

ADDED HGL .24'

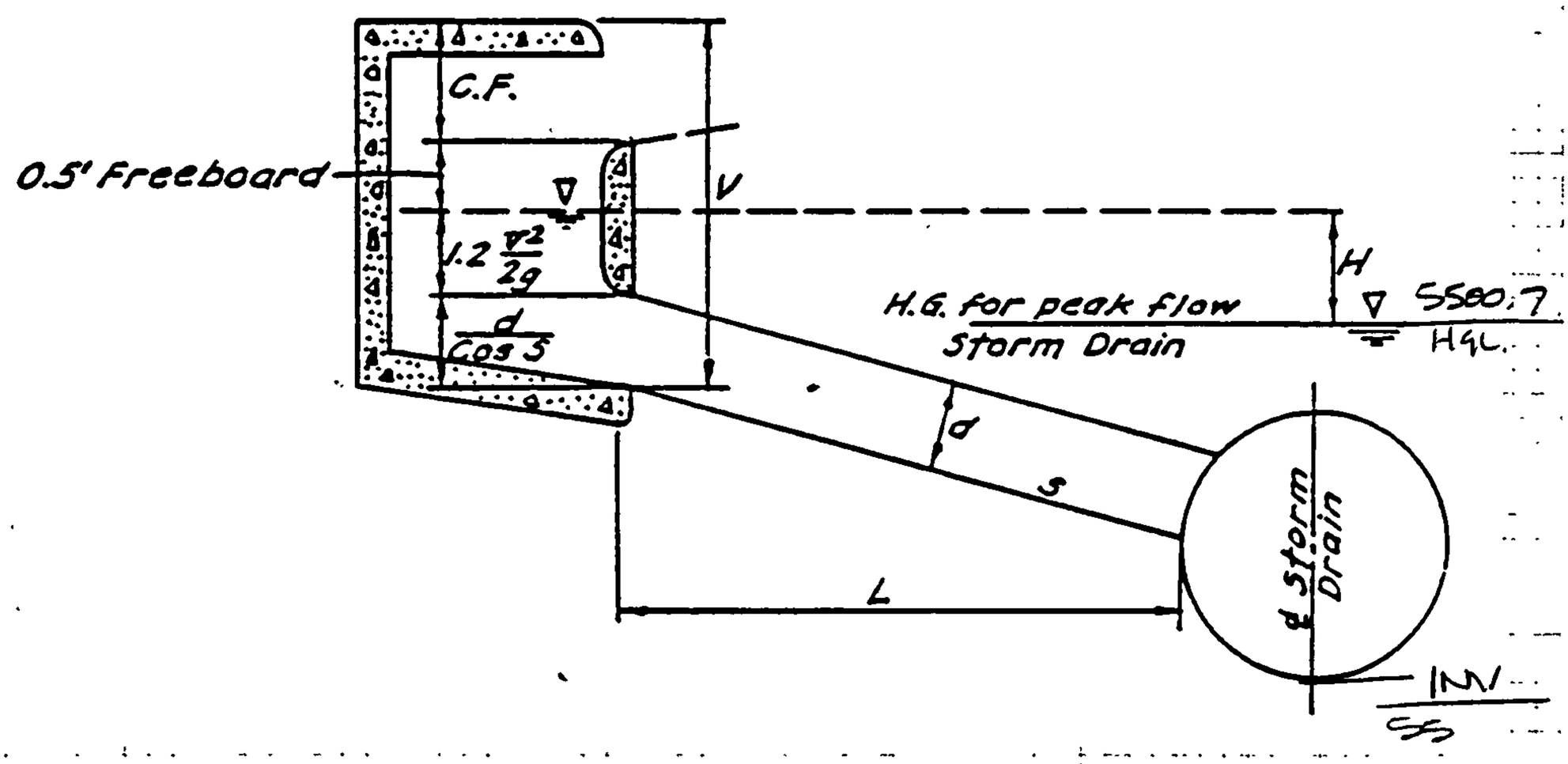
REMARKS:

Manning's n: 0.013

AVILA ENGINEERING, INC.

WILLOW WOOD IV

TONY SANCHEZ @ ARCHEZ.



L = 125.50 V_1 = 5.91 ft/sec

d = 30" Q = 29 cfs V = 10.69 ft

S = 2.60% = .026

STA 29+43.56 20.00' RT

$$V = 1.33 + \frac{V_1^2}{2g} + d_1 = 1.33 + \frac{5.91^2}{2(32.2)} + 2.5' = 4.4'$$

H = 1.2 FROM PAGE 78 DPM FIG 22.3.

HGL IN INLET 5501.9.

Revised HGL ok, sheet 34.

NOV 10

PROJECT NAME WILLOW WOOD IV SHEET 1 OF 1

PROJECT NO BY DAA DATE 10/10/94

SUBJECT TONY SANCHEZ INLET REWORK CH'D DATE

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

July 1, 1994

Rick Beltramo, P.E.
AVID ENGINEERING, INC.
6100 Seagull Ln. NE, Ste 102
Albuquerque, N.M. 87109

RE: WORK ORDER PLANS FOR WILLOW WOOD - UNIT IV (L-21/D37A1)
RECEIVED JUNE 21, 1994 FOR WORK ORDER & FINAL PLAT APPROVAL
ENGINEER'S STAMP DATED 6/17/94

Dear Mr. Beltramo:

Based on the information included in the submittal referenced above, City Hydrology approves the Work Order & Final Plat for this project.

City Hydrology approves the use of Cast-In-Place Concrete Pipe on a case by case basis. We have two basic criteria for approval:

1. Do not use CIP pipe in the right of way where the soils support could be compromised by trenching for other utilities.

2. The HGL must be below the top of pipe. The pipe must be designed as an unsealed line.

Currently this project does not meet both criteria. If you believe there are special conditions that would justify the use of CIP concrete pipe on this project, then You may present your justification to Dan Hogan at 768-2778.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Billy Goolsby, Project No. 4604.93

WPHYD/8469/jpc

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

AVID ENGINEERING, INC.
Civil • Structural • Transportation
6100 Seagull Lane NE • Suite 102
Albuquerque, NM 87109 • (505) 881-5357

LETTER OF TRANSMITTAL

TO: City Hydrology Dept.	DATE: ~~6-31-94~~ 7-1-94
	PROJECT: Willowwood Unit IV
	PROJECT NO.: 4005
ATTN: John Curtain	
RE: Design Calculations for Willowwood Phase IV drainage.	

WE ARE SENDING:

QTY.	DESCRIPTION	FOR
1	Inlet calculations summary	your review
1	HGL calculations summary	
	& supporting comps for	
	the above	
1	24x36 blueline of overall storm	
	drain layout	

REMARKS: Here are the design calculations for Willowwood phase IV drainage as per our discussion on 6-30-94 at the DRC meeting. If you have any questions or need more info, please call me, Rick Beltramo, or Dave Aube at AVID, 881-5357. Thank you.

JUL - 1 1994
HYDROLOGY DIVISION

BY: Jim Buckman

RECEIVED: [signature] DATE: 7-1-94

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

WILLOW WOOD UNIT IV
STREET FLOW DEPTHS
INLET CAPACITY CALCULATION
SUMMARY SHEET

DATE 7/1/94

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18A	KINGS CANYON	21 5	0.67	0 62	DOUBLE "A"	9	12.5
18B	KINGS CANYON	21.5	0.67	0.62	DOUBLE "A"	9	12.5
19A	WIND RIVER	14 5	1.92	0.45	DOUBLE "C"	7.8	6.7
19B	WIND RIVER	25	1.92	0.54	DOUBLE "A"	10.5	14.5
19C	WIND RIVER	14.5	1 92	0 45	DOUBLE "C"	7.8	6.7
19D	WIND RIVER	25	1.92	0.54	DOUBLE "A"	10.5	14.5
17 5A	KINGS CANYON	9 6	1.30	0 48	DOUBLE "C"	6	3.6
17.5B	KINGS CANYON	19.2	1.30	0.53	DOUBLE "A"	9 6	9.6
17 5C	KINGS CANYON	9 6	1.30	0.48	DOUBLE "C"	6	3.6
17.5D	KINGS CANYON	19 2	1.30	0 53	DOUBLE "A"	9.6	9.6
20A	CANYONLANDS	19	1.85	0.59	DOUBLE "C"	9	10
20B	CANYONLANDS	30.5	1.85	0 59	DOUBLE "A"	11.5	19
20C	CANYONLANDS	19	1.85	0.59	DOUBLE "C"	9	10
20D	CANYONLANDS	30.5	1.85	0 59	DOUBLE "A"	11.5	19
37A	JEWEL/STEAM	23	SUMP	0.67	DOUBLE "A"	23* (3)	0
37B	JEWEL/STEAM	23	SUMP	0.67	DOUBLE "A"	23* (3)	0
11A	WIND RIVER	4	3 00	0.29	DOUBLE "A"	3 7	0 3
11B	WIND RIVER	4	3.00	0 29	DOUBLE "A"	3 7	0 3
12A	JEWEL CAVE	3.8	1 60	0 33	DOUBLE "A"	3.8	0
12B	JEWEL CAVE	3 8	1.60	0.33	DOUBLE "A"	3 8	0
16A	SALINAS	10.7	1 00	0.57	DOUBLE "C"	6 4	4.3
16B	SALINAS	20 7	1 00	0.57	DOUBLE "A"	10	10 7
16C	SALINAS	10.7	1.00	0 57	DOUBLE "C"	6 4	4 3
16D	SALINAS	20.7	1.00	0.57	DOUBLE "A"	10	10.7
14A	TONY SANCHEZ	9	1 66	0.42	DOUBLE "C"	5.5	3 5
14B	TONY SANCHEZ	18	1.66	0 50	DOUBLE "A"	9	9
14C	TONY SANCHEZ	9	1.66	0 42	DOUBLE "C"	5 5	3.5
14D	TONY SANCHEZ	18	1.66	0 50	DOUBLE "A"	9	9
5A	ARCHES	2 8	1.00	0.43	DOUBLE "C"	2 8	0
5B	ARCHES	8 8	1.00	0 43	DOUBLE "A"	6	2.8
5C	ARCHES	2.8	1 00	0 43	DOUBLE "C"	2 8	0
5D	ARCHES	8.8	1 00	0 43	DOUBLE "A"	6	2 8

Note:s

1) Calculated using Manning's or DPM Plates 22 3 D-1, D-2
2) Calculated with charts Plate 22.3 D-6 from DPM. Double "A" Inlet capacity is calculated using Plate 22.3 D-6 from DPM for Double "C" Inlets
3) Calculated using wier and orifice equations

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HYDROLOGY DIVISION

SUMMARY OF HYDRAULIC CALCULATIONS
CLOSED CONDUIT

BY: DAA
DATE 6-21-94
SHEET: 1 OF 3

PROJECT: WILLOWWOOD LINE: ARCHES/WIND RIVER

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
										JUNCTION		LOSSES									
STATION	STRUCT	D	Q	A	V	K	Sf	L	DELTA	D	ANGLE	hf	hb	hj	hmh	ht	hmisc	SUM	E.G.	hv	H.G.
																					5480.25
	OUTFALL																2.17	2.17	5484.59	2.17	5482.42
		84	455	38.48	11.82	6388	0.0051	164				0.83						0.83	5485.42	2.17	5483.25
	MH 1								40	42	45		0.19	1.03				1.22	5486.65	1.45	5485.20
		84	372	38.48	9.67	6388	0.0034	104				0.35						0.35	5487.00	1.45	5485.55
	MH 9									60	59			0.61				0.61	5487.61	1.48	5486.13
		72	276	28.27	9.76	4236	0.0042	200				0.85						0.85	5488.46	1.48	5486.98
	MH 2														0.15	0.32		0.47	5488.93	3.07	5485.87
		60	276	19.64	14.06	2604	0.0112	324				3.64						3.64	5492.57	3.07	5489.51
	MH 3														0.15			0.15	5492.73	3.07	5489.66
		60	276	19.64	14 06	2604	0.0112	324				3.64						3.64	5496.37	3.07	5493.30
	MH 4									30	45			1.18				1.18	5497.55	2.34	5495.21
		60	241	19.64	12.27	2604	0.0086	125				1.07						1.07	5498.62	2.34	5496.28
	MH 5									30	45			0.48				0.48	5499.10	2.08	5497.02
		60	227	19.64	11.56	2604	0.0076	129				0.98						0.98	5500.08	2.08	5498.00
	MH 6									30	90			0.99				0.99	5501.07	1.58	5499.49
		60	198	19.64	10.08	2604	0.0058	263				1.52						1.52	5502.59	1.58	5501.01
	MH 8									30	90			0.96				0.96	5503.56	1.10	5502.46
		60	165	19.64	8.40	2604	0.0040	266				1.07						1.07	5504.63	1.10	5503.53
	MH 10									48	90			2.75				2.75	5507.38	0.45	5506.93
		36	38	7.07	5.38	666.9	0.0032	266				0.86						0.86	5508.24	0.45	5507.79
	MH 11								90	24	90		0.06	0.34				0.39	5508.63	0.28	5508.35
		36	30	7.07	4.24	666.9	0.0020	233				0.47						0.47	5509.11	0.28	5508.83
	MH 12								90	24	90		0.07	0.10				0.17	5509.27	0.34	5508.93
		30	23	4.91	4.69	410.1	0.0031	19				0.06						0.06	5509.33	0.34	5508.99
	MH 13								20				0.03		0.02			0.05	5509.38	0.34	5509.04
		30	23	4.91	4.69	410.1	0.0031	178				0.56						0.56	5509.94	0.34	5509.60
	MH 37								45	45	80		0.03	0.46				0.50	5510.44	0.23	5510.21
		24	12	3.14	3.82	226.2	0.0028	--													

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REMARKS:

Manning's n: 0.013

SUMMARY OF HYDRAULIC CALCULATIONS
CLOSED CONDUIT

BY: JHB
DATE 6-31-94
SHEET: 2 OF 3

PROJECT: WILLOWWOOD LINE: ARCHES/WIND RIVER

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
										JUNCTION		LOSSES									
STATION	STRUCT	D	Q	A	V	K	Sf	L	DELTA	D	ANGLE	hf	hb	hj	hmh	ht	hmisc	SUM	E.G.	hv	H.G.
	MH 6																		5501.07	0.23	5500.85
		36	27	7.07	3.82	666.9	0.0016	50				0.08						0.08	5501.15	0.23	5500.93
	MH 14									24	90			0.25				0.25	5501.40	0.31	5501.09
		24	14	3.14	4.46	226.2	0.0038														
	MH 8																		5503.56	0.70	5502.86
		30	33	4.91	6.72	410.1	0.0065	80				0.52						0.52	5504.08	0.70	5503.37
	MH 16									24	75			0.62				0.62	5504.70	0.63	5504.07
		24	20	3.14	6.37	226.2	0.0078														
	MH 11																		5508.63	0.10	5508.53
		24	8	3.14	2.55	226.2	0.0013	42				0.05						0.05	5508.69	0.10	5508.59
	MH 21									24	90			0.15				0.15	5508.84	0.03	5508.81
		24	4	3.14	1.27	226.2	0.0003														

REMARKS:

Manning's n: 0.013

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SUMMARY OF HYDRAULIC CALCULATIONS
CLOSED CONDUIT

BY: JHB
DATE 6-31-94
SHEET: 3 OF 3

PROJECT: WILLOWWOOD LINE: CANYONLANDS/CANYON

1	2	3	4	5	6	7	8	9	10		11	12	13	14		15	16	17	18	19	20	21	22
											JUNCTION		LOSSES										
STATION	STRUCT	D	Q	A	V	K	Sf	L	DELTA	Q	D	ANGLE	hf	hb	Aavg	hj	hmh	ht	hmisc	SUM	E.G.	hv	H.G.
	MH 10																				5507.38	1.59	5505.79
		48	127	12.57	10.11	1436	0.0078	398					3.11							3.11	5510.49	1.59	5508.90
	MH 17									86	42	90			9.82	3.31				3.31	5513.80	0.52	5513.27
		36	41	7.07	5.80	666.9	0.0038	27					0.10							0.10	5513.90	0.52	5513.38
	MH 20									20	24	45			5.11	0.05				0.05	5513.94	0.69	5513.25
		24	21	3.14	6.68	226.2	0.0086	--															
	MH 17																				5513.80	1.24	5512.56
		42	86	9.62	8.94	1006	0.0073	127					0.93							0.93	5514.73	1.24	5513.48
	MH 17.5									31	24	45			8.34	0.46				0.46	5515.19	0.94	5514.25
		36	55	7.07	7.78	666.9	0.0068	142					0.97							0.97	5516.15	0.94	5515.21
	MH 18									37	36	75			5.11	1.67				1.67	5517.83	0.51	5517.32
		24	18	3.14	5.73	226.2	0.0063	--															
	MH 18														3.53		0.02			0.02	5517.83	0.43	5517.40
		36	37	7.07	5.23	666.9	0.0031	37					0.11							0.11	5517.94	0.43	5517.51
	MH 19									19	24	90			5.11	0.55				0.55	5518.49	0.51	5517.98
		24	18	3.14	5.73	226.2	0.0063	--															

REMARKS:

Manning's n: 0.013

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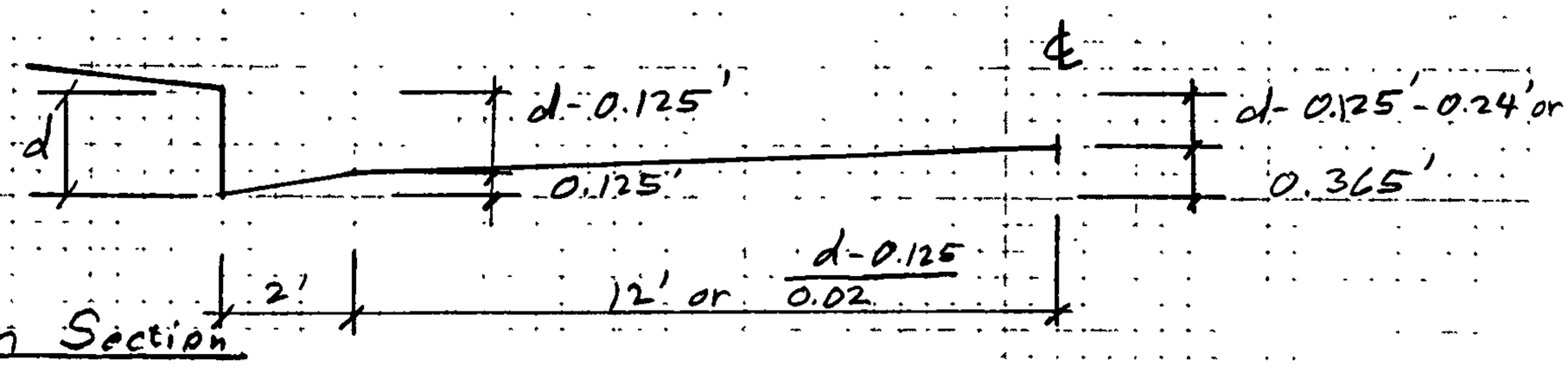
Inlet Capacities



Over Crown Section

$$\frac{1}{2}A = \left(\frac{d+d-0.125}{2}\right)2' + \left[\frac{(d-0.125)2-0.24}{2}\right]12'$$

$$A = 28d - 6.13$$

$$\frac{1}{2}P = d + 2 + 12$$

$$P = 2d + 28$$

$$Q = \left(\frac{1.486}{0.017}\right)\frac{[28d-6.13]^{5/3}}{[2d+28]^{2/3}}(s)^{\frac{1}{2}}$$

"d" Below Crown Section

$$\frac{1}{2}A = \left(\frac{2d-0.125}{2}\right)2' + \frac{1}{2}(d-0.125)\left(\frac{d-0.125}{0.02}\right)$$

$$A = 4d - 0.25 + 50(d-0.125)^2$$

$$\frac{1}{2}P = d + 2 + \frac{d-0.125}{0.02}$$

$$P = 102d - 8.50$$

$$Q = \left(\frac{1.486}{0.017}\right)\frac{[4d-0.25+50(d-0.125)^2]^{5/3}}{[102d-8.50]^{2/3}}(s)^{\frac{1}{2}}$$

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PROJECT NAME WILLOW WOOD Unit III SHEET 1 OF 6
PROJECT NO BY E. S DATE 6-15-94
SUBJECT INLET CAPACITY CH'D DATE

AVID ENGINEERING, INC.

INLET CAPACITY

WIND RIVER STREET

Q = 8 cfs S = 3.0% = .03 d = .29 ft ✓

Q = 4 cfs / SIDE

Q = 3.7 cfs FROM GRATING CAPACITY

CARRYOVER 4 - 3.7 = .3 cfs PER SIDE

∴ .6 CFS CARRYOVER ✓

JEWEL CAVE ROAD

Q = 7 cfs + .6 cfs CARRY OVER = 7.6 cfs ⇒ $\frac{7.6}{2}$ = 3.8 cfs

S = 1.6% = .016 d = .33 ft

Q_{INLET} = 3.7 cfs ✓

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PROJECT NAME WILLOW WOOD SHEET 2 OF 6
PROJECT NO BY DAA DATE 6-19-94
SUBJECT CH'D DATE

AVID ENGINEERING, INC.

WIND RIVER NE OF KING'S CANYON INLETS

$Q = 50$ cfs $\quad S = 1.92\%$

$\Rightarrow d_1 = .54$ ft

FIRST BATTERY OF INLETS

$Q_{INLET} = (2 \text{ INLETS})(10.5 \text{ cfs/INLET}) = 21.0$ cfs

$Q_{CARRYOVER} = 50 - 21 = 29$ cfs

$\Rightarrow d_2 = .45$ ft

AT SECOND BATTERY OF INLETS

$Q_{INLET} = (2 \text{ INLETS})(7.8 \text{ cfs/INLET}) = 15.6$ cfs

$Q_{CARRYOVER} = 29 - 15.6 = 13.4$ cfs.

CANYONLANDS AT KINGS CANYON

$Q = 61$ cfs

$S = 1.85\%$

$\Rightarrow d_1 = 0.59$ ft

$Q_{INLET} = (2 \text{ INLETS})\left(\frac{11.5 \text{ cfs}}{\text{INLET}}\right) = 23$ cfs.

$Q_{CARRYOVER} = 61 - 23 = 38$ cfs

$\Rightarrow d_2 = .49$ ft.

$Q_{INLET} = (2 \text{ INLETS})\left(\frac{9.0 \text{ cfs}}{\text{INLET}}\right) = 18$ cfs.

$Q_{CARRYOVER} = 38 - 18 = 20$ cfs.

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HYDROLOGY DIVISION

PROJECT NAME WILLOW WEST UNIT IV SHEET 3 OF 6
PROJECT NO BY DAA DATE 6-19-94
SUBJECT INLET CAPACITIES CH'D DATE

AVID ENGINEERING, INC.

INLET ANALYSIS

KINGS CANYON ROAD @ CEDAR BREAKS & WIND RIVER

$Q = 43$ cfs $\quad S = .67\%$

$\Rightarrow d_1 = .623$ ft ✓

$Q_{INLET} = (2 \text{ INLETS})\left(\frac{9.0 \text{ cfs}}{\text{INLET}}\right) = 18.0$ cfs

$Q_{CARRYOVER} = 43 - 18 = 25$ cfs ✓

KINGS CANYON ROAD @ CANYONLANDS ROAD

$Q = 38.4$ cfs $\quad S = 1.3\%$ @STATION ≈ 15+00 FIRST BATTERY

$\Rightarrow d_1 = .53$ ft ✓

$Q_{INLET} = (2 \text{ INLETS})\left(\frac{9.6 \text{ cfs}}{\text{INLET}}\right) = 19.2$ cfs

$Q_{CARRYOVER} = 38.4 - 19.2 = 19.2$ cfs

$S = .6\%$ SECOND BATTERY OF INLETS

$\Rightarrow d_2 = .48$ ft

$Q_{INLET} = (2 \text{ INLETS})\left(\frac{6.0 \text{ cfs}}{\text{INLET}}\right) = 12.0$ cfs

$Q_{CARRYOVER} = 19.2 - 12.0 = 7.2$ cfs ✓

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HYDROLOGY DIVISION

PROJECT NAME WILLOW WOOD SHEET 4 OF 6
PROJECT NO BY DAA DATE 6-19-94
SUBJECT CH'D DATE

AVID ENGINEERING, INC.

TONY SANCHEZ DRIVE

Q = 36 cfs w/ 3cfs CARRY OVER

40' WIDE STREET

3 SETS OF INLETS

≈ 29+75 S = 1.66%

29+20 S = 1.40%

28+75 S = 1.30%

FIRST SET OF INLETS

$Q_{\frac{1}{2}} = \frac{36 cfs}{2} = 18 cfs$ S = 1.66 d = .50 ft. STREET CAPACITY

GRATE CAPACITY 9 cfs

∴ 9 cfs CARRY OVER

STREET CAPACITY 9 cfs S = 1.40% d = .42 ft

GRATE CAPACITY 5.5 cfs

∴ 3.5 cfs CARRY OVER

TOTAL CARRYOVER = (3.5 cfs/SIDE)(2 SIDES) = 7.0 cfs

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PROJECT NAME WILLOW WOOD SHEET 5 OF 6

PROJECT NO BY DAA DATE 6-16-94

SUBJECT CH'D DATE

AVID ENGINEERING, INC.

SALINAS @ ARCHES

$Q = 41.4$ cfs $\quad S = 1\%$

$\Rightarrow d_1 = .57$ FIRST BATTERY

$Q_{INLET} = (2 \text{ INLETS})\left(\frac{10.0 \text{ cfs}}{\text{INLET}}\right) = 20$ cfs

$Q_{CARRYOVER} = 41.4 - 20 = 21.4$ cfs

$\Rightarrow d_2 = .45$

$Q_{INLET} = (2 \text{ INLETS})\left(\frac{6.4 \text{ cfs}}{\text{INLET}}\right) = 12.8$ cfs

$Q_{CARRYOVER} = 21.4 \text{ cfs} - 12.8 \text{ cfs} = 8.6$ cfs ✓

ARCHES ROAD WEST OF TONY SANCHEZ DRIVE

$Q = 17.6$ cfs $\quad S = 1.0\%$

$\Rightarrow d = .43$

$Q_{INLET} = (2 \text{ INLETS})\left(\frac{6.0 \text{ cfs}}{\text{INLET}}\right) = 12$ cfs

$Q_{CARRYOVER} = 5.6$ cfs

$\Rightarrow d = .31$

$Q_{INLET} = (2 \text{ INLETS})\left(\frac{3.0 \text{ cfs}}{\text{INLET}}\right) = 6.0$ cfs $> Q_{CARRYOVER}$

OK.

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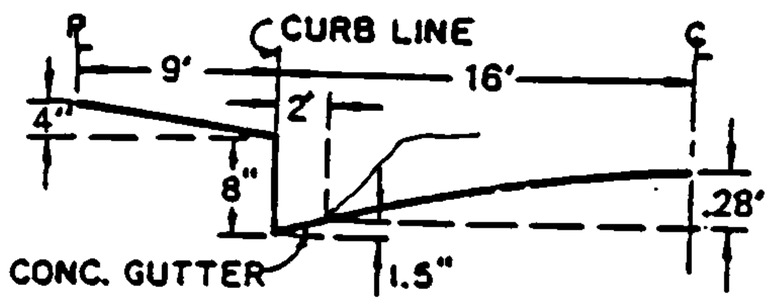
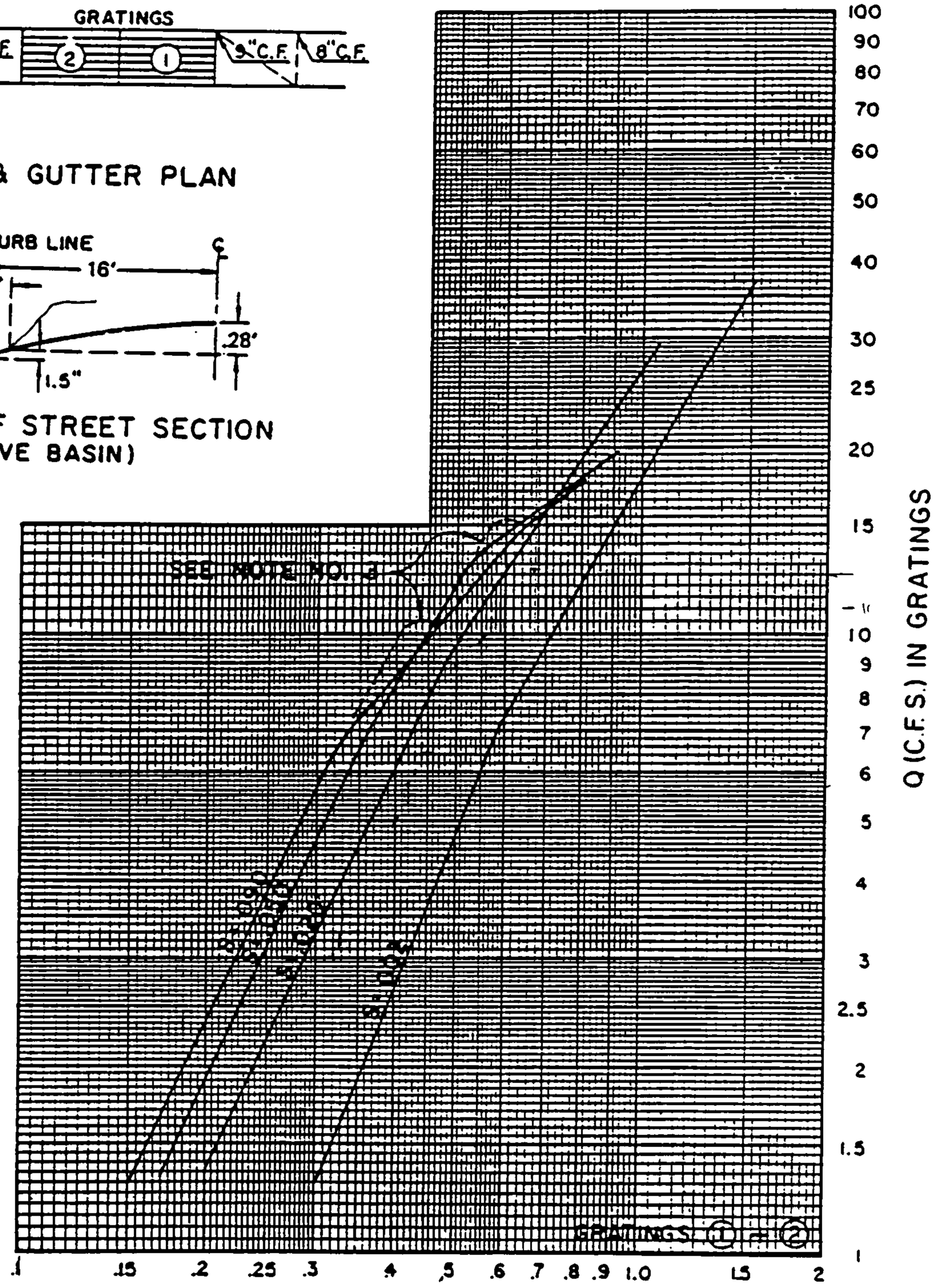
PROJECT NAME WILLOW WOOD SHEET 6 OF 6
PROJECT NO BY DAA DATE 6-19-94
SUBJECT CH'D DATE

GRATING CAPACITIES FOR TYPE DOUBLE "A", "C," AND "D"

GRATING & GUTTER PLAN

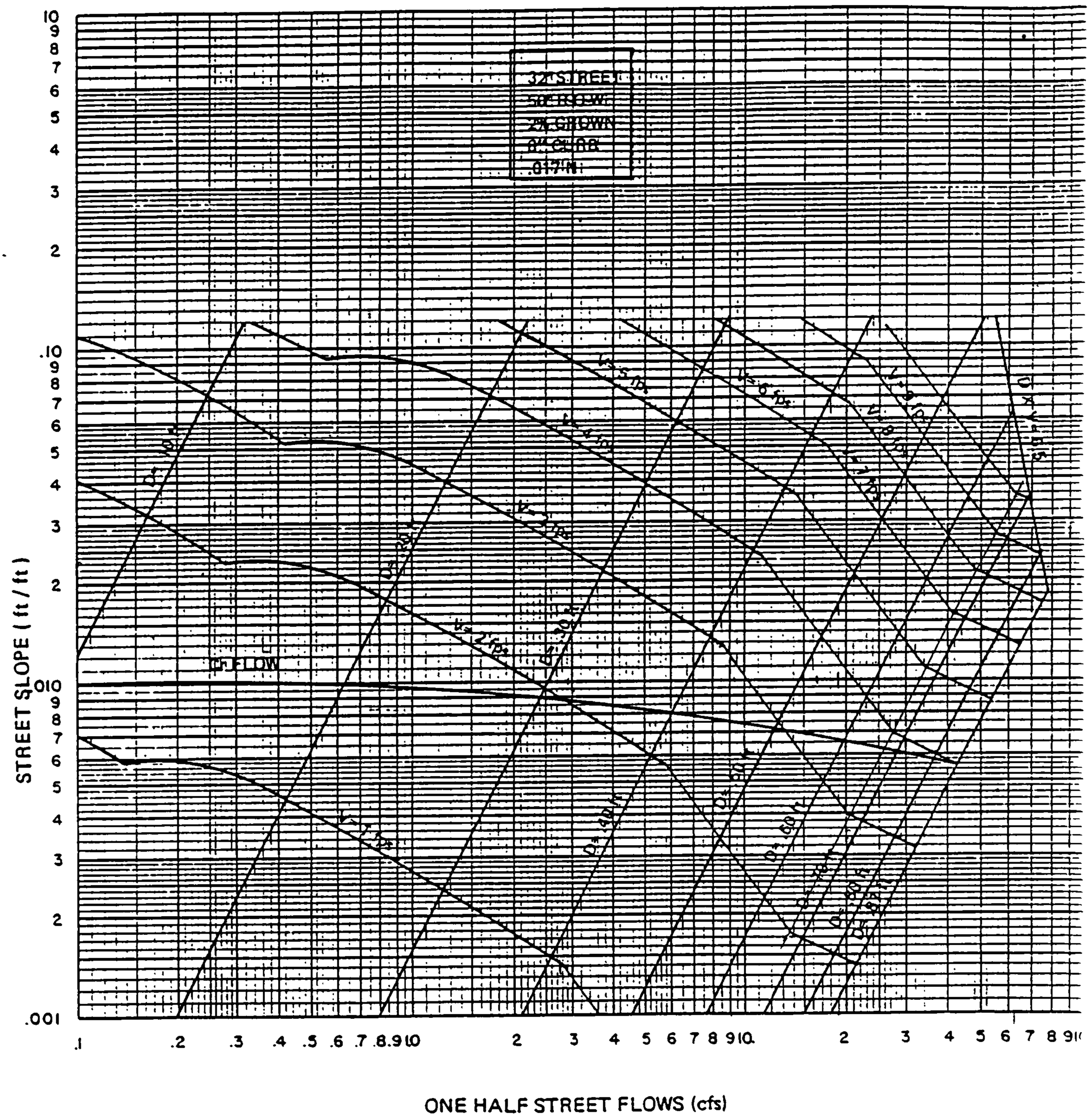


TYPICAL HALF STREET SECTION
(ABOVE BASIN)

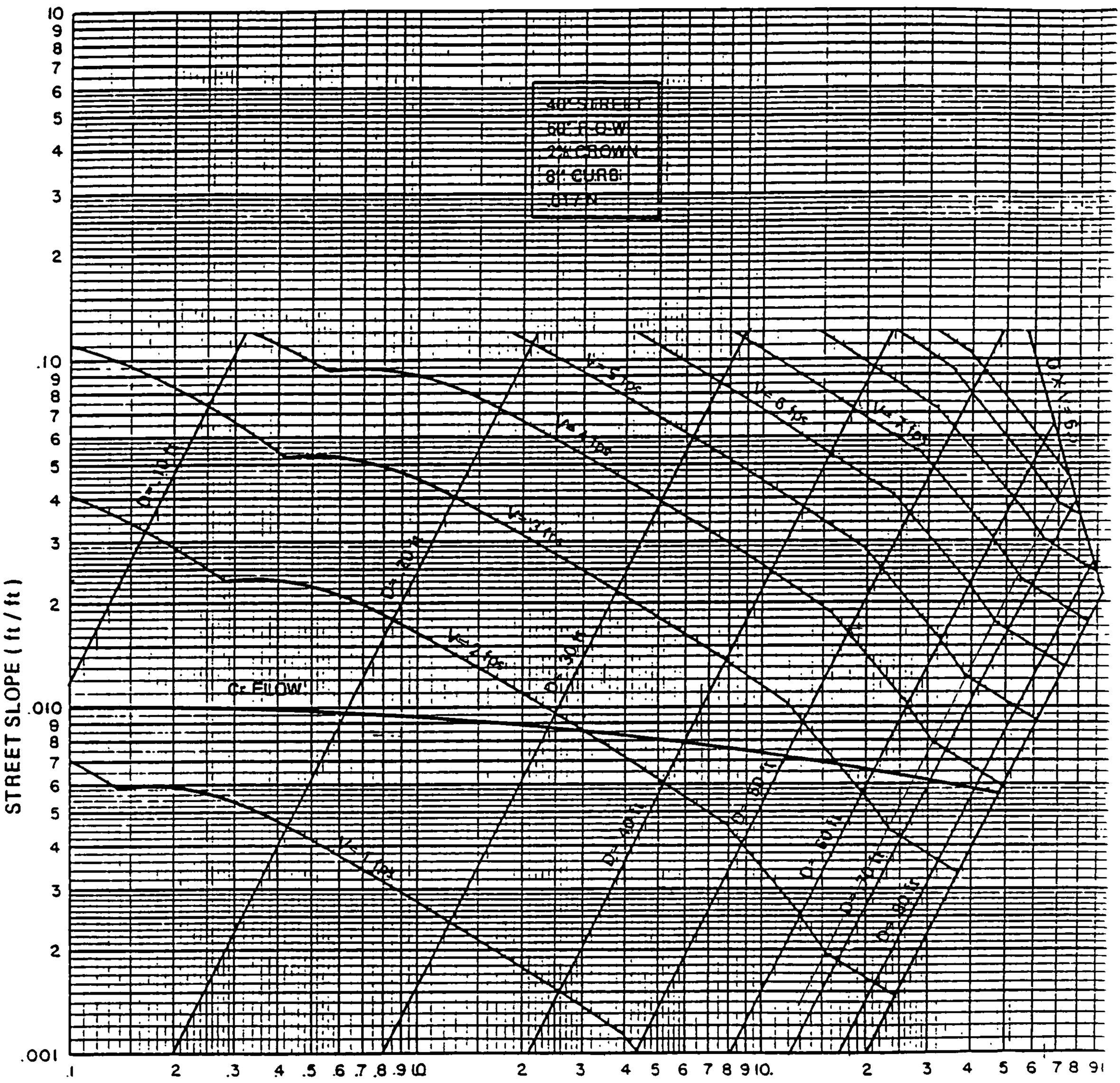


D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

STREET CAPACITY



STREET CAPACITY



REV. 3-83

PLATE 22.3 D-2

AVID ENGINEERING, INC.

INLET CAPACITY

FOR JEWEL CAVE / STEAMBOAT

Q(S) = 46 CFS (2 x 100 YR FLOW)

EACH TYPE DOUBLE "A"

DEPTH AT 37a = .67 ft MAX
DEPTH AT 37b = .50 ft MAX

GRATE CAPACITY 37a = 26 cfs
37b = 17 cfs

CURB OPENINGS 6" OPENING 37a = 1.2 cfs/ft x 5'/WING x 1 WING = 6.0
37b = 1.1 cfs/ft x 5'/WING x 1 WING = 5.5

INLET CAPACITY

37a = .85 GRATE + CURB OPENING
= .85 (26) + 6 = 28.1

37b = .85(17) + 5.5 = 20.0

48.1 cfs > 46 cfs OK!

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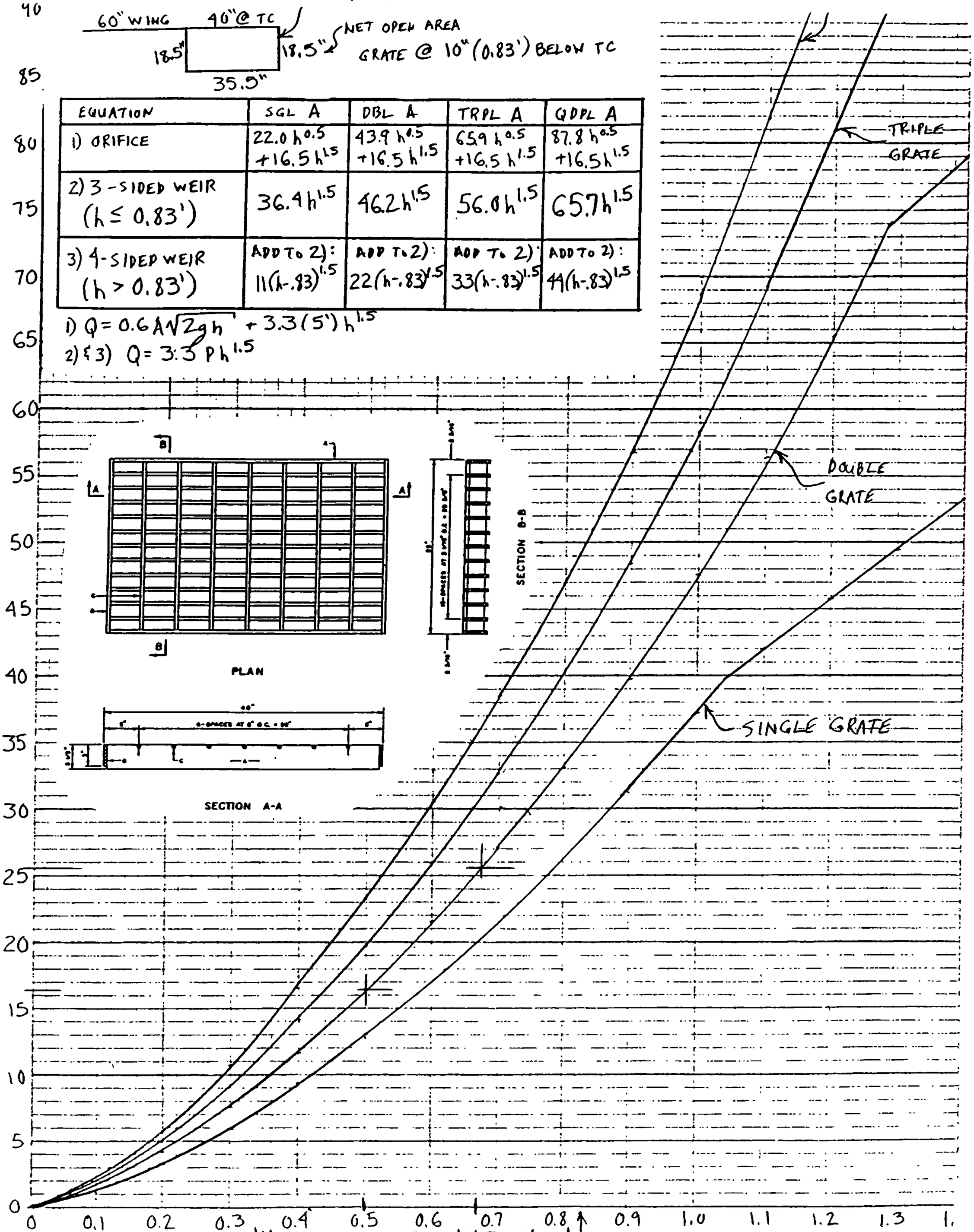
PROJECT NAME WILLOWWOOD UNIT IV. SHEET ____ OF ____
PROJECT NO ____ BY DAA DATE 6-23-94.
SUBJECT ____ CH'D ____ DATE ____

AVILA ENGINEER, INC.

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 ($h \le 0.83'$)	$36.4\,h^{1.5}$	$46.2\,h^{1.5}$	$56.0\,h^{1.5}$	$65.7\,h^{1.5}$
3) 4-SIDED WEIR ($h > 0.83'$)	ADD TO 2): $11(h-.83)^{1.5}$	ADD TO 2): $22(h-.83)^{1.5}$	ADD TO 2): $33(h-.83)^{1.5}$	ADD TO 2): $44(h-.83)^{1.5}$

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

2) & 3) $Q = 3.3\,P\,h^{1.5}$



PROJECT NAME WILLOW WOOD UNIT IV SHEET ____ OF ____

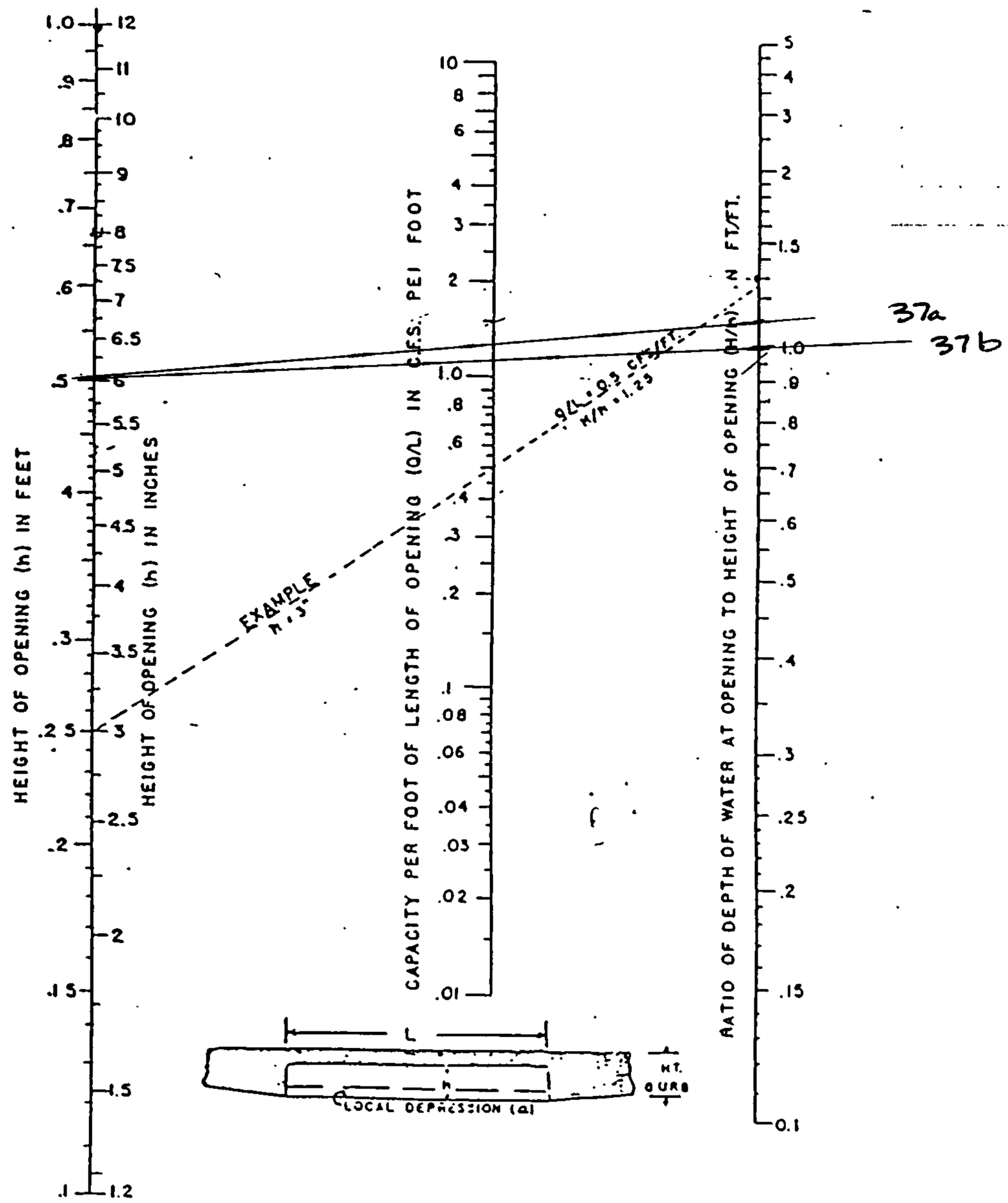
PROJECT NO ____ BY DAA DATE 6-23-91

SUBJECT ____ CH'D ____ DATE ____

AVILA ENGINEERING, INC.

CURB OPENING INLET CAPACITY

FIGURE 6

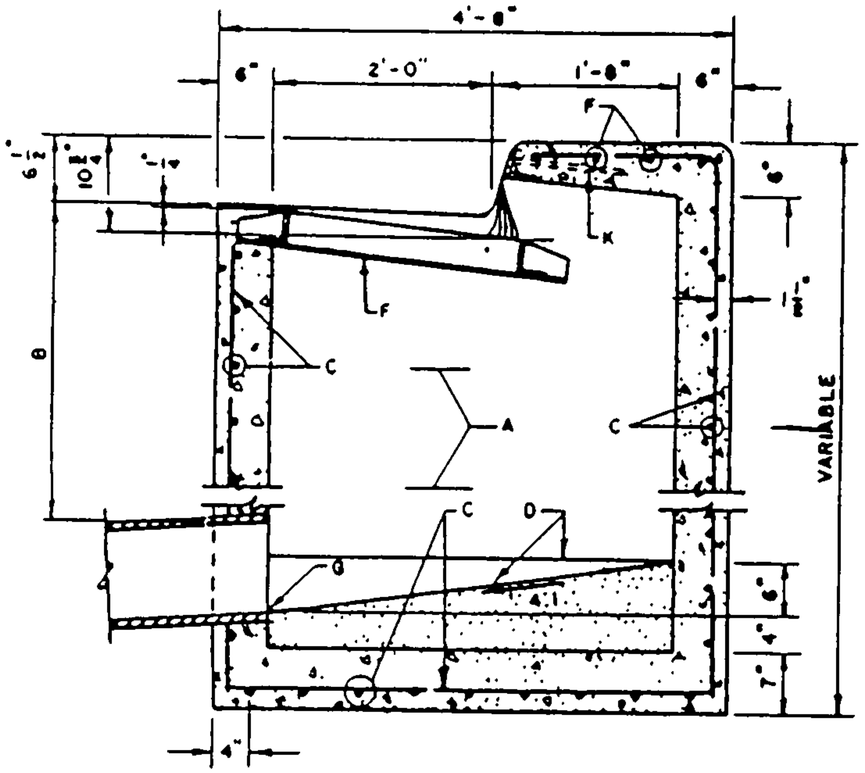


NOMOGRAPH FOR CAPACITY OF CURB OPENING INLETS AT LOW POINTS

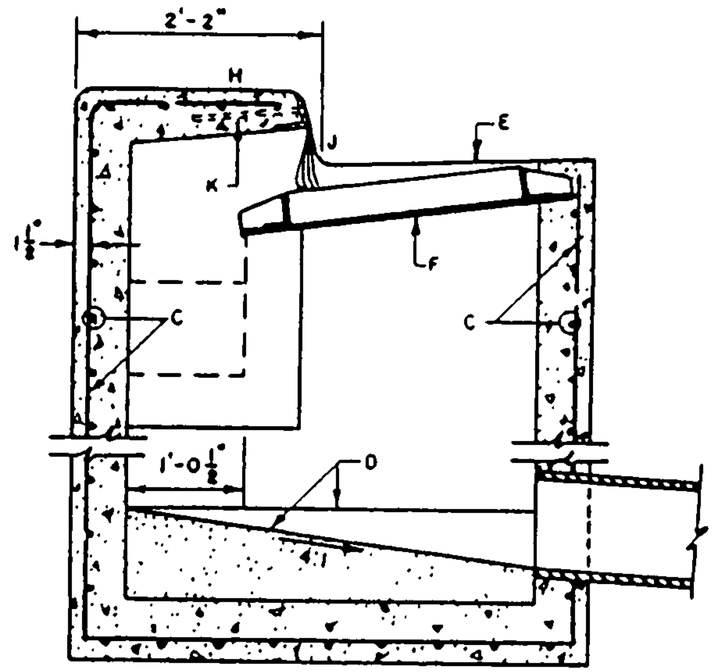
PROJECT NAME WILLOWWOOD UNIT 14 SHEET ____ OF ____

PROJECT NO ____ BY DAA DATE 6-23-94

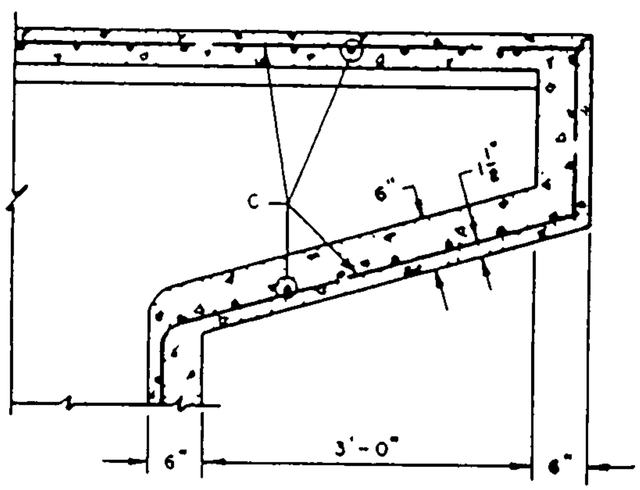
SUBJECT ____ CH'D ____ DATE ____



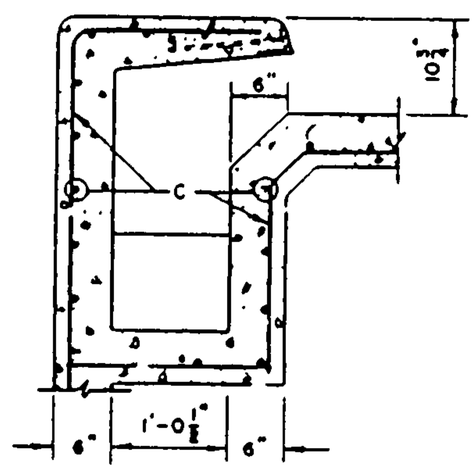
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

GENERAL NOTES:

1. SEE DWG 2201 FOR PLAN AND SECTION A-A
2. GENERAL NOTES 2, 3 & 4 ON DWG 2201 ALSO APPLY TO THIS DWG.
3. FOR ANCHOR DETAIL, SEE DWG 2204

CONSTRUCTION NOTES:

A. STORM INLET STEPS, SEE DWG 2229 FOR SPACING.

B. 1'-10" MIN UNLESS OTHER WISE DIRECTED

C. NO. 4 BARS AT 6" O C. EACH WAY.

D. CONCRETE FILL, MINIMUM SLOPES SHOWN IN SECTIONS.

E. NORMAL GUTTER.

F. GRATE FRAME

G. INVERT ELEVATION PER DESIGN

H. TOP OF CURB.

J. FLOWLINE.

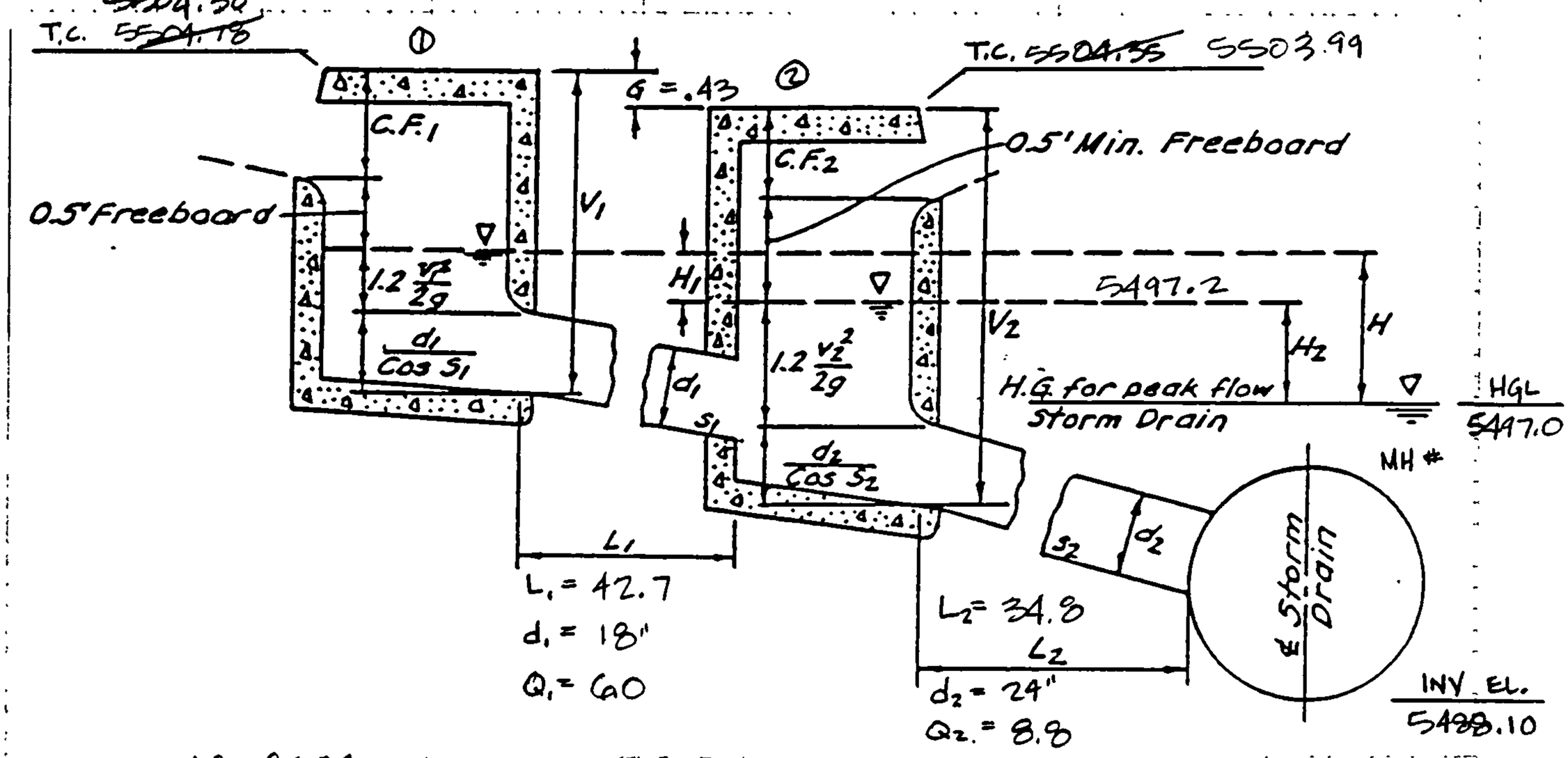
K. ANGLE ANCHOR

REVISIONS	CITY OF ALBUQUERQUE DRAINAGE STORM INLET TYPE "A" SECTIONS B-B, C-C, D-D & E-E DWG. 2202 AUG. 1986

AVILA ENGINEERING, INC.

ARCHES ROAD

WEST OF TONY SANCHEZ DRIVE (LEFT)



① STA. ~~20+45.87~~ 19+96.94, 16'L, FL = ~~5504.11~~ 5503.63 TYPE "DOUBLE A"

② STA. ~~20+03.20~~ 19+66.94, 16'L, FL = ~~5503.68~~ 5503.32 TYPE "DOUBLE C"

MH # 5, STA. 19+80.10, 10'R, 8' DIA, INV = 5490.80

$Q_2 = 8.8$ cfs $d_2 = 24"$ $v = \frac{Q}{A} = \frac{8.8}{\pi(1)^2} = 2.80$ ft/sec

$V_2 = 1.33 + \frac{1.2(v_2^2)}{2g} + d_2 = 1.33 + \frac{1.2(2.80)^2}{2(32.2)} + 2.0 = 3.48'$

$V_{2min} = 1'-10" + d_2 = 3.83'$ STRUCTURE CONTROLS.

$H_2 = .20$

INV. EL = ~~5504.55~~ 3.99 - 4.00 = ~~5500.55~~ 5499.99

$V_2 = 4.00'$ MINIMUM

$Q_1 = 6.0$ cfs $d_1 = 18"$ $v_1 = \frac{Q_1}{A_1} = \frac{6.0}{\pi(.75)^2} = 3.39'$

$V_1 = 1.33 + \frac{1.2(v_1)^2}{2g} + d_1 = 1.33 + \frac{1.2(3.39)^2}{2(32.2)} + 1.5 = 3.04'$

$V_{1min} = 1'-10" + d_1 = 3.33'$ STRUCTURE CONTROLS

$H_1 = .35$

INV EL. = ~~5504.78~~ 4.30 - 4.00 = ~~5500.78~~ 5500.30

$V_1 = 4.00'$

RECEIVED
JUL - 1 1994
HYDROLOGY DIVISION

PROJECT NAME WILLOW WOOD UNIT IV SHEET 1 OF 15

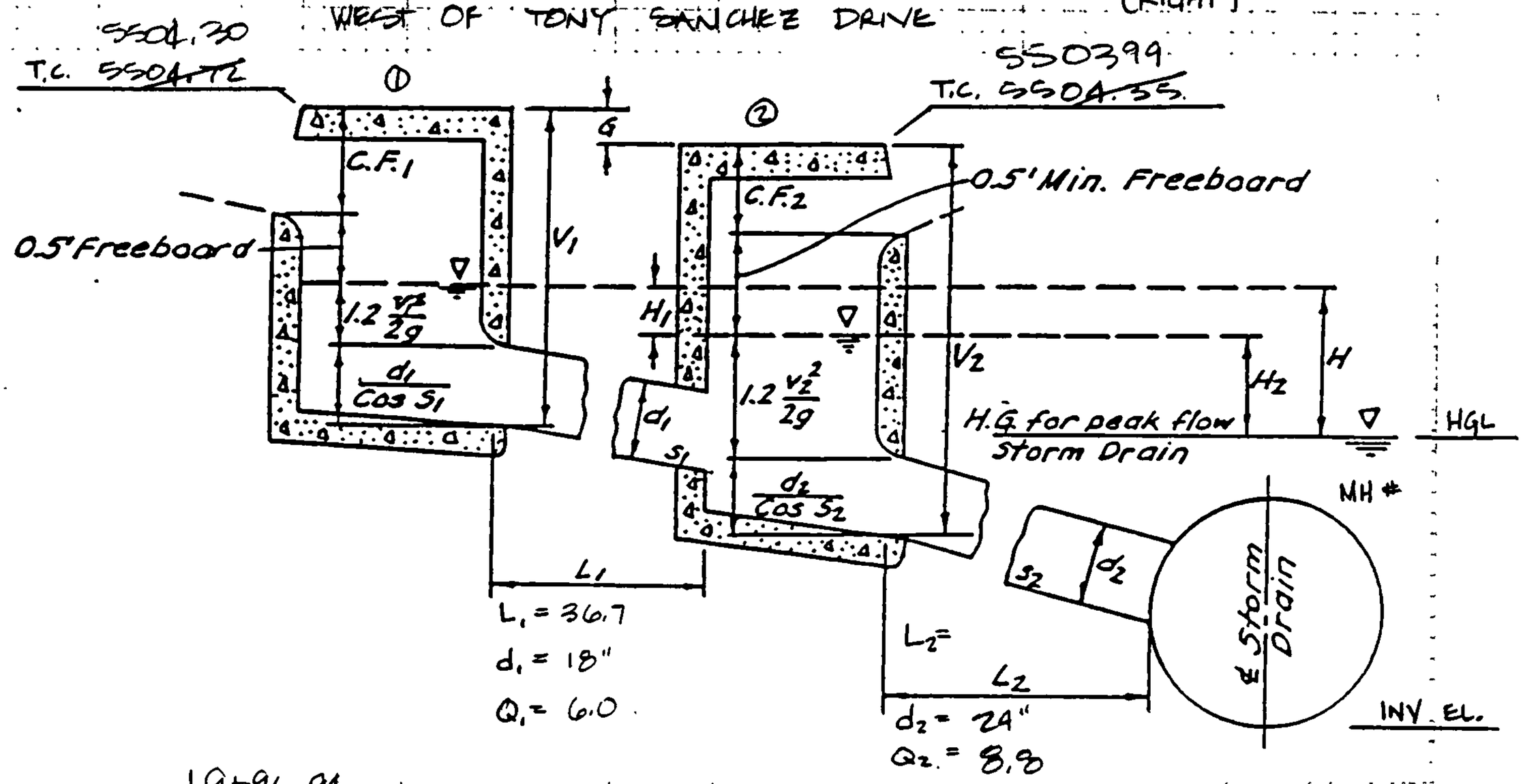
PROJECT NO. BY DAA DATE 6-22-94

SUBJECT CH'D DATE

AVILA ENGINEER, INC.

ARCHES ROAD

WEST OF TONY SANCHEZ DRIVE (RIGHT)



① STA. ~~20+39.87~~ 19+96.94, 16' R, FL = ~~5504.05~~ 5503.63 TYPE "DOUBLE A"

② STA. ~~20+05.20~~ 19+66.94, 16' R, FL = ~~5503.68~~ 5503.32 TYPE "DOUBLE C"

MH # 5, STA. 19+80.10, 10' R, 8' DIA, INV = 5490.80

SAME ANALYSIS AS LEFT W/ LOWER HEADLOSS IN PIPE 2

$V_2 = 4.00'$ MINIMUM

INV = ~~5504.55~~ 5503.99 - 4.00 = ~~5500.55'~~ 5499.99

$V_1 = 4.00'$

INV = ~~5504.72~~ 5504.30 - 4.00 = ~~5500.72~~ 5500.30

PROJECT NAME WILLOW WOOD UNIT IV SHEET 2 OF 15

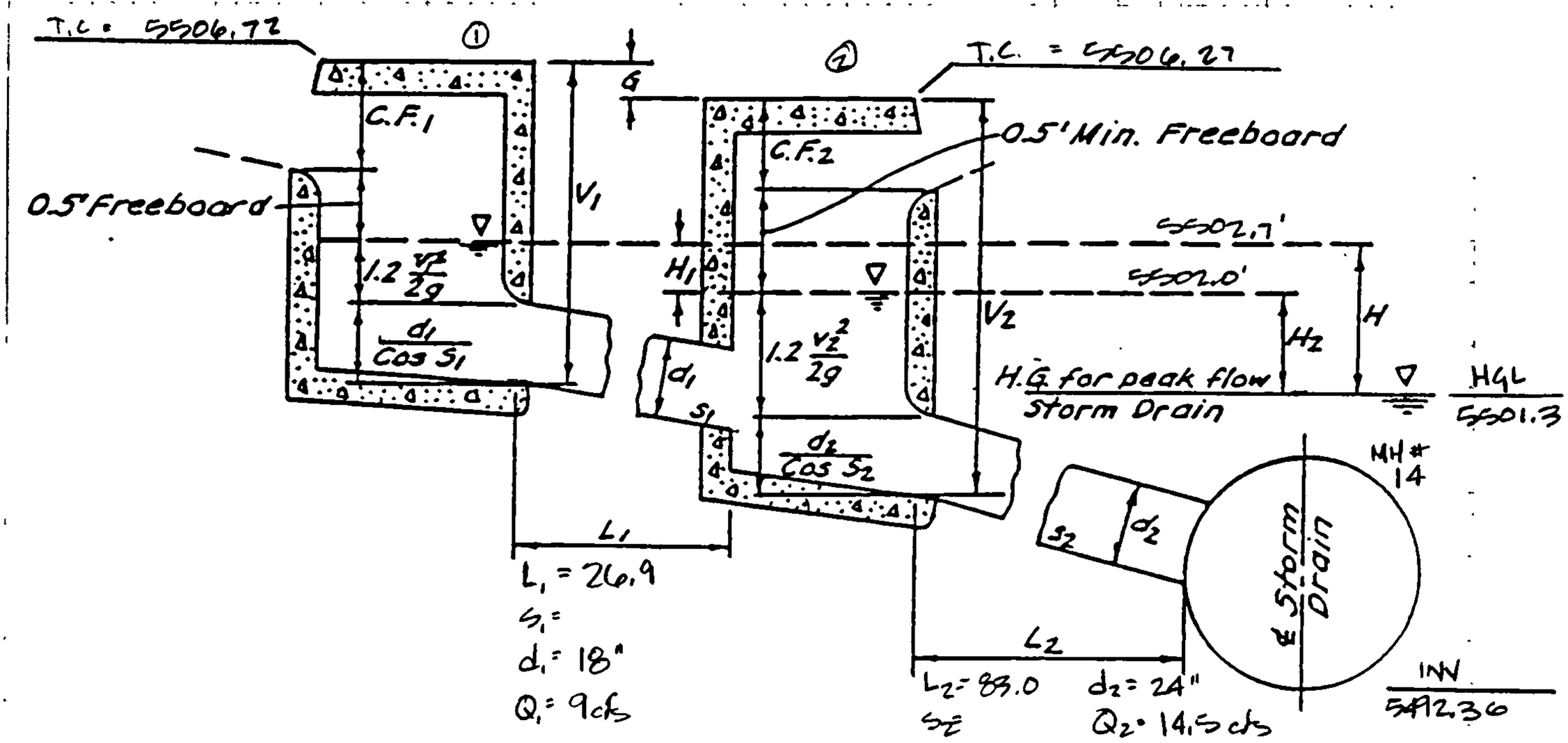
PROJECT NO _____ BY DAA DATE 6-22-94

SUBJECT _____ CH'D _____ DATE _____

AVILA ENGINEERING, INC.

TONY SANCHEZ DRIVE (LEFT)

@ ARCHERS ROAD



① STA 29+72.60, 20'L, FL = 5506.05', TYPE "DOUBLE A"

② STA 29+45.69, 20'L, FL = 5505.60, TYPE "DOUBLE C"

MH # 14 STA 28+68.33, 10' R, 4' DIA, TYPE "E", INV = 5492.36, HGL = 5501.3

$Q_2 = 14.5$ cfs $\quad d_2 = 24"$ $\quad V_2 = \frac{Q_2}{A_2} = \frac{14.5 \text{ cfs}}{\pi(1)^2} = 4.62$ ft/sec

$V_2 = 1.33 + \frac{1.2(V_2^2)}{2g} + d_2 = 1.33 + \frac{1.2(4.62)^2}{2(32.2)} + 2.0 = 3.73$ ft

$V_{2MIN} = 1'\text{-}10" + 6\tfrac{1}{2}" + d_2 = 4.38'$ STRUCTURE CONTROLS

$H_2 = .70'$ $\qquad$ $\underline{V_2 = 4.50'}$ MINIMUM

INV. EL. = T.C. − V_2 = 5506.27 − 4.50 = 5501.77'

$Q_1 = 9.0$ cfs $\quad d_2 = 18"$ $\quad V_1 = \frac{Q_1}{A_1} = \frac{9.0}{\pi(.75)^2} = 5.09$ ft/sec

$V_1 = 1.33 + \frac{1.2 V_1^2}{2g} + d_1 = 1.33 + \frac{1.2(5.09)^2}{2(32.2)} + 1.5 = 3.31$ ft

$V_{1MIN} = 1'\text{-}10" + d_1 = 3.33'$ STRUCTURE CONTROLS

$H_1 = .65'$ $\qquad$ $\underline{V_1 = 4.00'}$

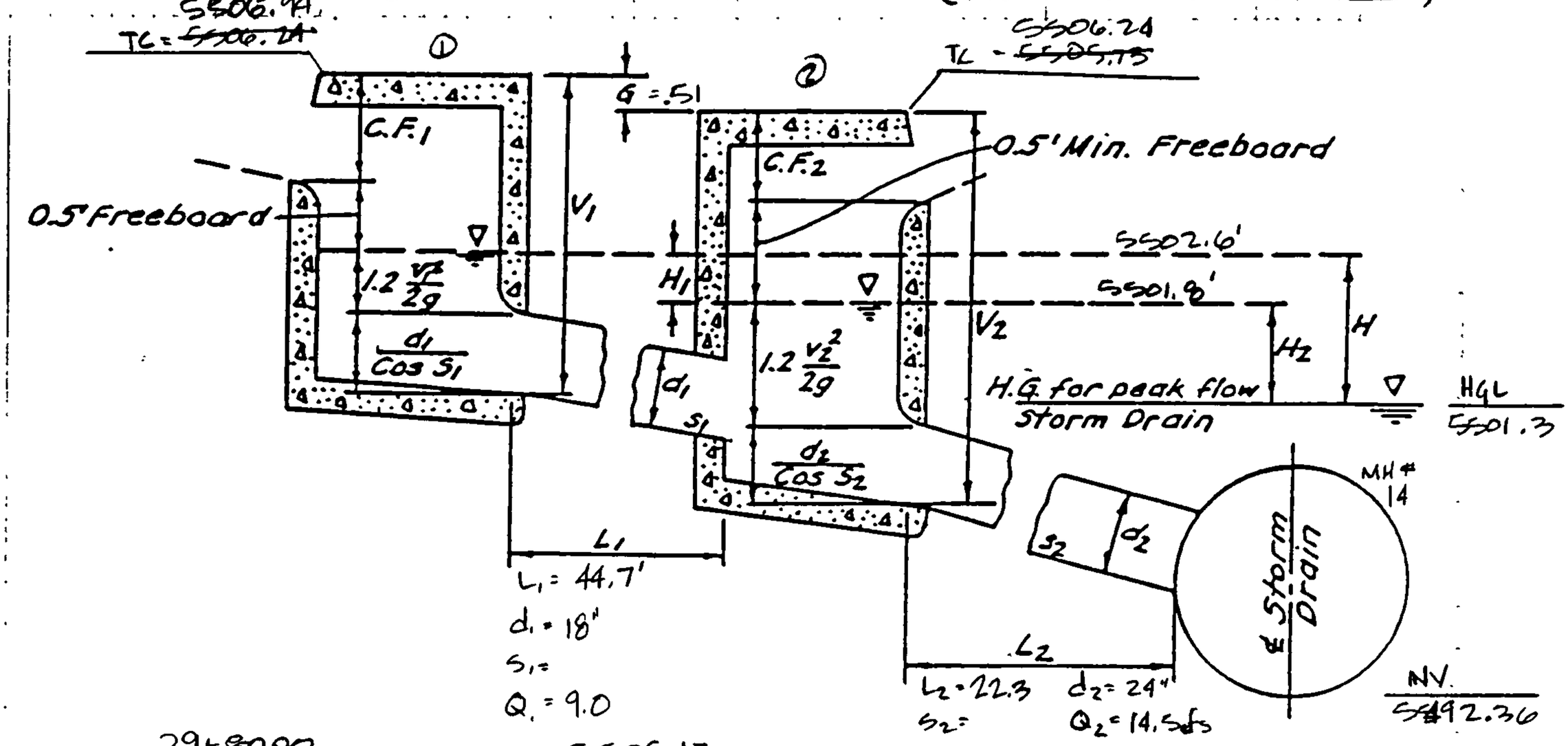
INV. EL = T.C. − V_1 = 5506.72 − 4.00 = 5502.72'

PROJECT NAME	WILLOW WOOD UNIT IV	SHEET 3	OF 15
PROJECT NO		BY DAA	DATE 6-22-94
SUBJECT		CH'D	DATE

TONY SANCHEZ DRIVE

@ ARCHES (RIGHT)

(SEE CALCS ON SHEET —)



① STA ~~29+43.56~~ 29+80.00, 20'R, ℄ = ~~5505.57~~ 5506.17, TYPE "DOUBLE A"

② STA ~~29+80.29~~ 29+43.56, 20'R, ℄ = ~~5505.06~~ 5505.57, TYPE "DOUBLE C"

MH # 14, STA 28+68.33, 10'R, 4' DIA, TYPE "E", INV = 5492.36, HGL = 5501.3

$Q_2 = 14.5$ cfs $d_2 = 24''$ $v_2 = 4.62$ ft/sec.

$V_2 = 4.50'$ MINIMUM

INV. ELEV. = ~~5505.73~~ 5506.24 − 4.50 = ~~5501.23~~ 5501.74'

$H_2 = .50'$

$Q_1 = 9.0$ cfs $d = 18''$ $v_1 = 5.09$ ft/sec.

$V_1 = 4.00$

INV. ELEV = ~~5506.24~~ 5506.94 − 4.00 = ~~5502.24~~ 5502.94.

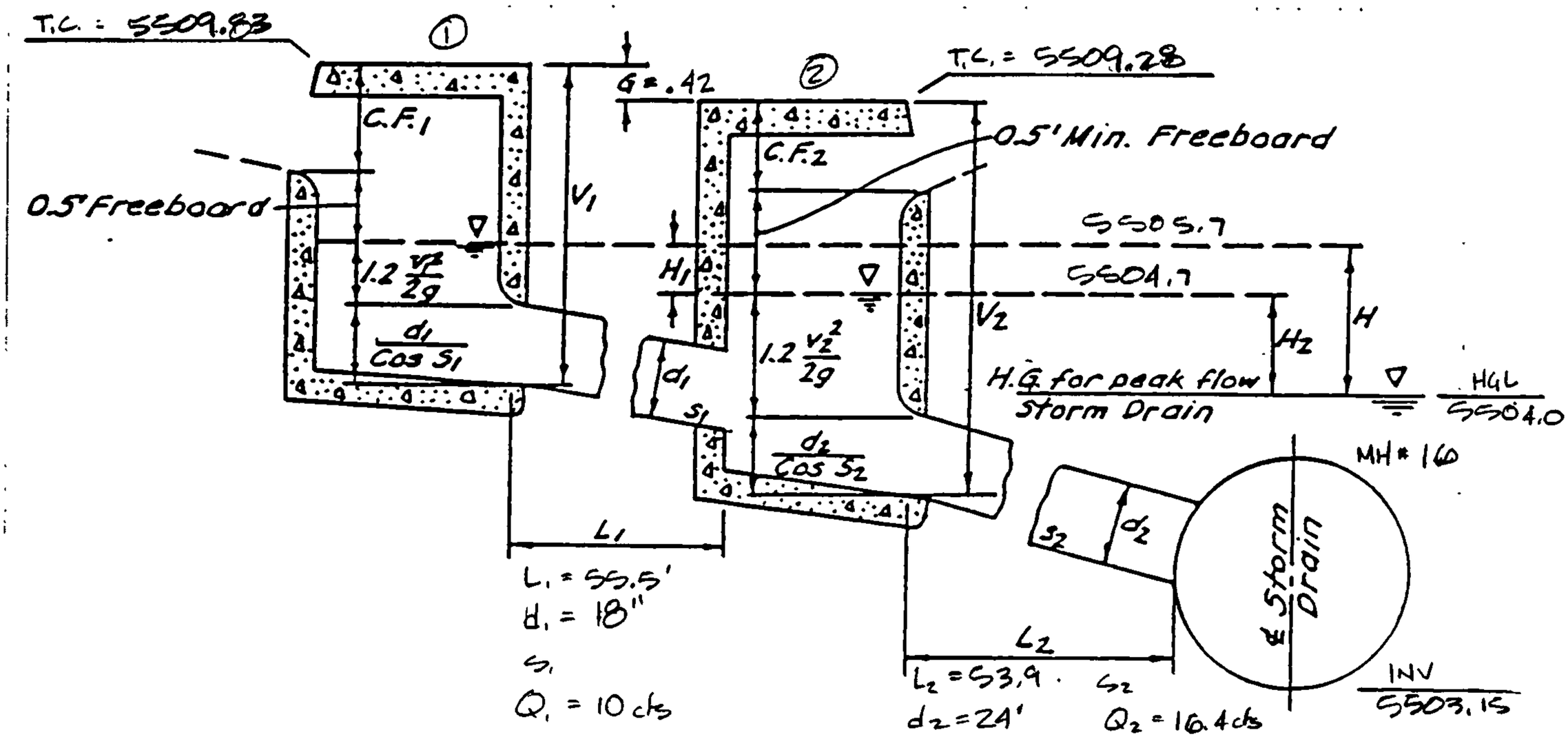
$H_1 = .77'$

PROJECT NAME	WILLOW WOOD UNIT IV	SHEET 4	OF 15
PROJECT NO.		BY DAA	DATE 6-22-94
SUBJECT		CH'D	DATE

AVILA ENGINEERING, INC.

SALINAS STREET (RIGHT)

@ ARCHERS ROAD



① STA. 9+15.00, 14' R, FL = 5509.16 TYPE "DOUBLE A"

② STA 8+60.00, 14' R, FL = 5508.61 TYPE "DOUBLE C"

MH # 16 STA 8+06.26 10' RT, TYPE E, INV = 5503.15, HGL = 5504.00

$Q_2 = 16.4$ cfs $\quad d_2 = 24'' \quad V_2 = \frac{16.4}{\pi(1)^2} = 5.22$ ft/sec

$V_2 = 1.33 + \frac{1.2(V_2)^2}{2g} + d_2 = 1.33 + \frac{1.2(5.22)^2}{2(32.2)} + 2.0 = 3.75$ ft

$V_{2MIN} = 1'\text{-}10'' + d_2 + 6\tfrac{1}{2}'' = 4.38$ ft STRUCTURE CONTROLS

$H_2 = .73$ $\quad$ **$V_2 = 4.50'$** MINIMUM

INVERT ELEV = T.C. − V_2 = 5509.28 − 4.50 = **5504.78'**

$Q_1 = 10.0$ cfs $\quad d_1 = 18'' \quad V_1 = \frac{Q_1}{A_1} = \frac{10.0}{\pi(.75)^2} = 5.66$ ft/sec.

$V_1 = 1.33 + \frac{1.2(V_1)^2}{2(32.2)} + d_1 = 1.33 + \frac{1.2(5.66)^2}{2(32.2)} + 1.5 = 2.93'$

$V_{1\,MIN} = 1'\text{-}10'' + d_1 = 3.33$ STRUCTURE CONTROLS.

$H_1 = .98$ $\quad$ **$V_1 = 4.00'$**

INV. ELEV = T.C. − V_1 = 5509.83 − 4.00 = **5505.83**

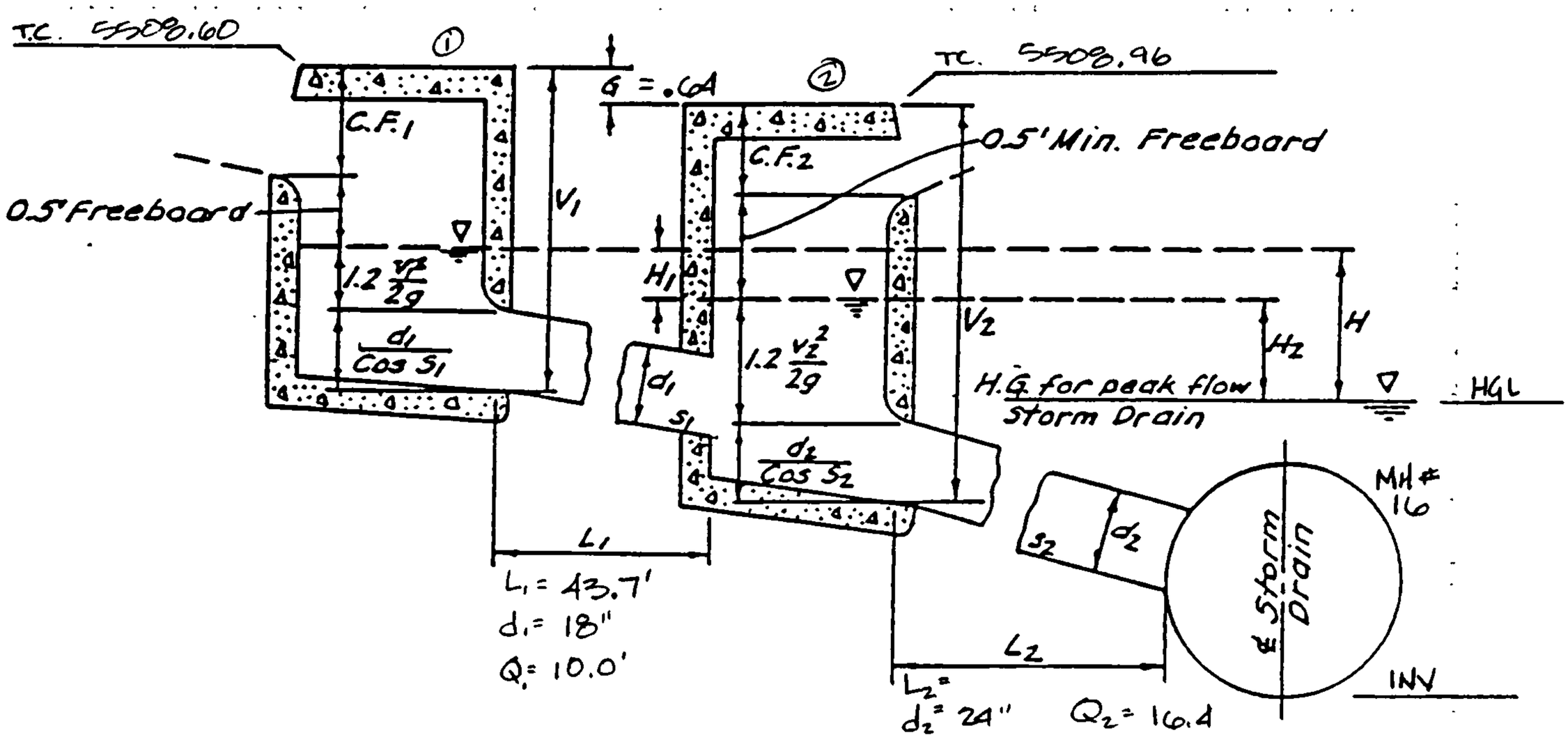
PROJECT NAME WILLOW WOOD UNIT IV SHEET 5 OF 15

PROJECT NO BY DAA DATE 6-22-94.

SUBJECT CH'D DATE

SALINAS STREET (LEFT)

@ ARCHERS ROAD



① STA 8+85.00, 14' L, FL = 5508.86, TYPE "DOUBLE A"
② STA 8+40.00, 14' L, FL = 5508.41, TYPE "DOUBLE C"

MH # 16,

$Q_2 = 16.4'$ $\quad d_2 = 24''$ $\quad V_2 = \frac{Q_2}{A_2} = \frac{16.4}{\pi(1)^2} = 5.22$ ft/sec.

$V_2 = 1.33 + \frac{1.2(V_2)^2}{2g} + d_2 = 1.33 + \frac{1.2(5.22)^2}{2(32.2)} + 2.0 = 3.75'$

$V_{2\,min} = 1'\text{-}10'' + 6\tfrac{1}{2}'' + d_2 = 4.38'$ STRUCTURE CONTROLS.

$H_2 =$ $\qquad$ $\underline{V_2 = 4.50'}$ MINIMUM

INV. EL. = T.C. − V_2 = ~~5508.96~~ 5508.41 − 4.50 = ~~5503.46'~~ 5503.91'

$Q_1 = 10.0'$ $\quad d_1 = 18''$ $\quad V_1 = \frac{Q_1}{A_1} = \frac{10.0}{\pi(.75)^2} = 5.66'$

$V_1 = 1.33 + \frac{1.2(V_1)^2}{2g} + d_1 = 1.33 + \frac{1.2(5.66)^2}{2(32.2)} + 1.5 = 2.93'$

$V_{1\,min} = 1'\text{-}10'' + d_1 = 3.33'$ STRUCTURE CONTROLS

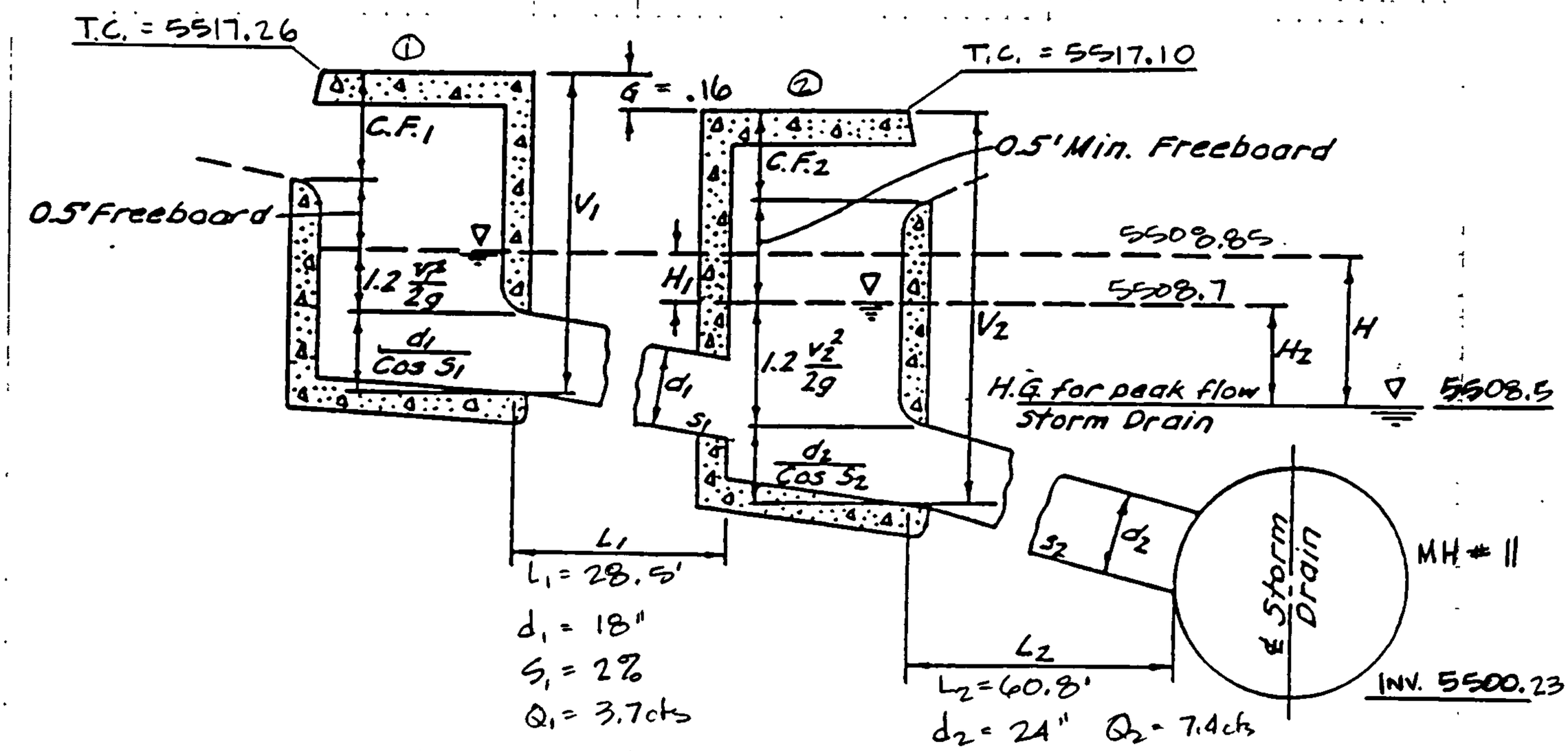
$H_1 = .94$ $\qquad$ $\underline{V_1 = 4.00'}$

INV. EL = TC − V_1 = ~~5508.60~~ 5509.53 − 4.00' = ~~5504.60'~~ 5505.53'

PROJECT NAME	WILLOW WOOD UNIT IV	SHEET 6	OF 15
PROJECT NO		BY DAA	DATE 6-22-94
SUBJECT		CH'D	DATE

WIND RIVER STREET

@ ARCHES ROAD



① STA. 27+77.25 14' L FL = 5516.59 TYPE "DOUBLE A"
② STA 27+71.81 14' R FL = 5516.43 TYPE "DOUBLE A"

MANHOLE #11, STA 27+11.11 10' RT 6' DIA., TYPE "E", INV = 5500.23, HGL = 5508.5

$Q_1 = 3.7$ cfs $d_1 = 18"$ $V_1 = \frac{Q_1}{A_1} = \frac{3.7\text{cfs}}{\pi(.75)^2} = 2.09$ ft/sec

$V_1 = 1.33 + \frac{1.2V_1^2}{2g} + d_1 = 1.33 + \frac{1.2(2.09)^2}{2(32.2)} + 1.5 = 2.91'$

$V_{1\,MIN} = 6\frac{1}{2}" + 1'\text{-}10" + d_1 = 3.88'$ USE $V_1 = 4.00'$

INVERT ELEV. = T.C. - 4.00' = 5517.26' - 4.00' = 5513.26'

$Q_2 = 3.7 + 3.7 = 7.4$ cfs $d_2 = 24"$ $V_2 = \frac{Q_2}{A_2} = \frac{7.4}{\pi(1)^2} = 2.36'$

$V_2 = 1.33 + H_1 + \frac{1.2V_2^2}{2g} + d_2 - G$

$H_1 = .15$

$V_2 = 1.33 + .5 + \frac{1.2(2.36)^2}{2(32.2)} + 2.0 - .16 = 3.78$

$V_{2\,MIN} = 6\frac{1}{2} + 1'\text{-}10" + d_1 + L_1(S_1) = 4.44'$ USING 2% SLOPE IN CONNECTOR

SET $V_2 = 5.00'$ INVERT = TC - V_2 = 5517.10' - 5.00' = 5512.10'

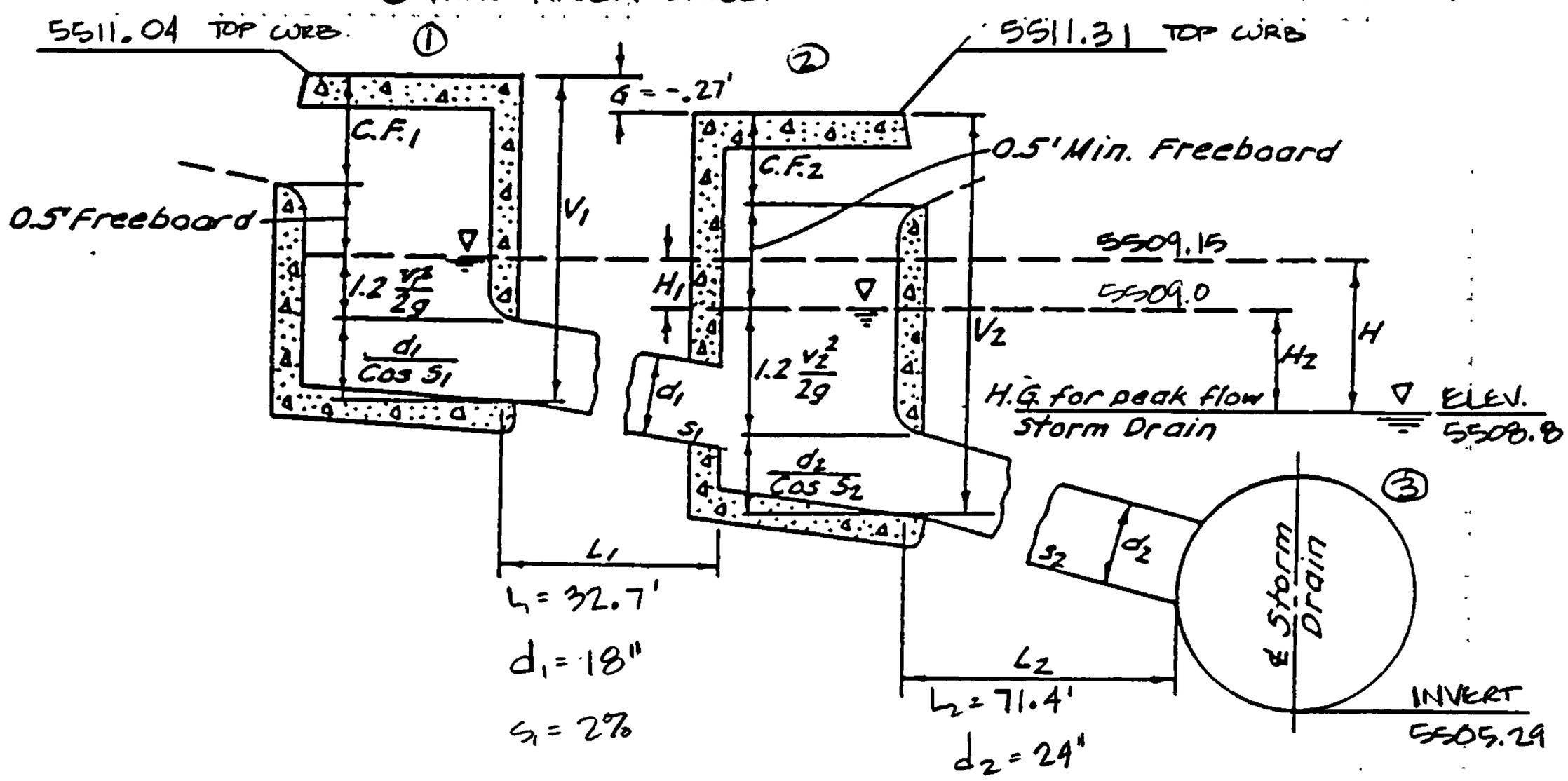
$H_2 = .20$

PROJECT NAME WILLOW WOOD UNIT IV SHEET 7 OF 15
PROJECT NO BY DAA DATE 6-22-91
SUBJECT CH'D DATE

AVILA ENGINEERING, INC.

JEWEL CAVE ROAD

@ WIND RIVER STREET



① STATION 24+11.35 14' L ⌖ 5510.37 TYPE "DOUBLE A"

② STATION 24+28.31 14' R ⌖ 5510.64 TYPE "DOUBLE A"

③ MANHOLE #12, STA. 24+99.59, 10' R, 4' DIA, TYPE "E", INV. 5505.29

$Q_1 = 3.8$ cfs $\quad d_1 = 18"$ $\quad V_1 = \frac{Q_1}{A_1} = \frac{3.8}{\pi(1)^2} = 1.21$ ft/sec

$V_1 = 1.33 + 1.2\frac{v_1^2}{2g} + d_1 = 1.33 + 1.2\left(\frac{1.21^2}{2(32.2)}\right) + 1.5' = 2.86'$

MINIMUM $V_1 = 6\frac{1}{2}" + 1'\text{-}10" + d_1 = 3.88"$ $\quad$ SET $V_1 = 4.00'$ $\quad$ INV. = 5507.04'

$Q_2 = 3.8 + 3.8 = 7.6$ cfs $\quad d_2 = 24"$ $\quad v_2 = \frac{Q_2}{A_2} = \frac{7.6}{\pi(1)^2} = 2.42$ ft/sec

$V_2 = 1.33 + H_1 + \frac{1.2 v_2^2}{2g} + d_2 - G$

$H_1 = .15$

$V_2 = 1.33 + .5 + \frac{1.2(2.42)^2}{2(32.2)} + 2.0 - (-.27) = 4.21'$

SET $V_2 = V_1 - G' + L(S) = 4.00 - (-.27) + .02(33') = 4.93 \Rightarrow$ USE $V_2 = 5.00'$

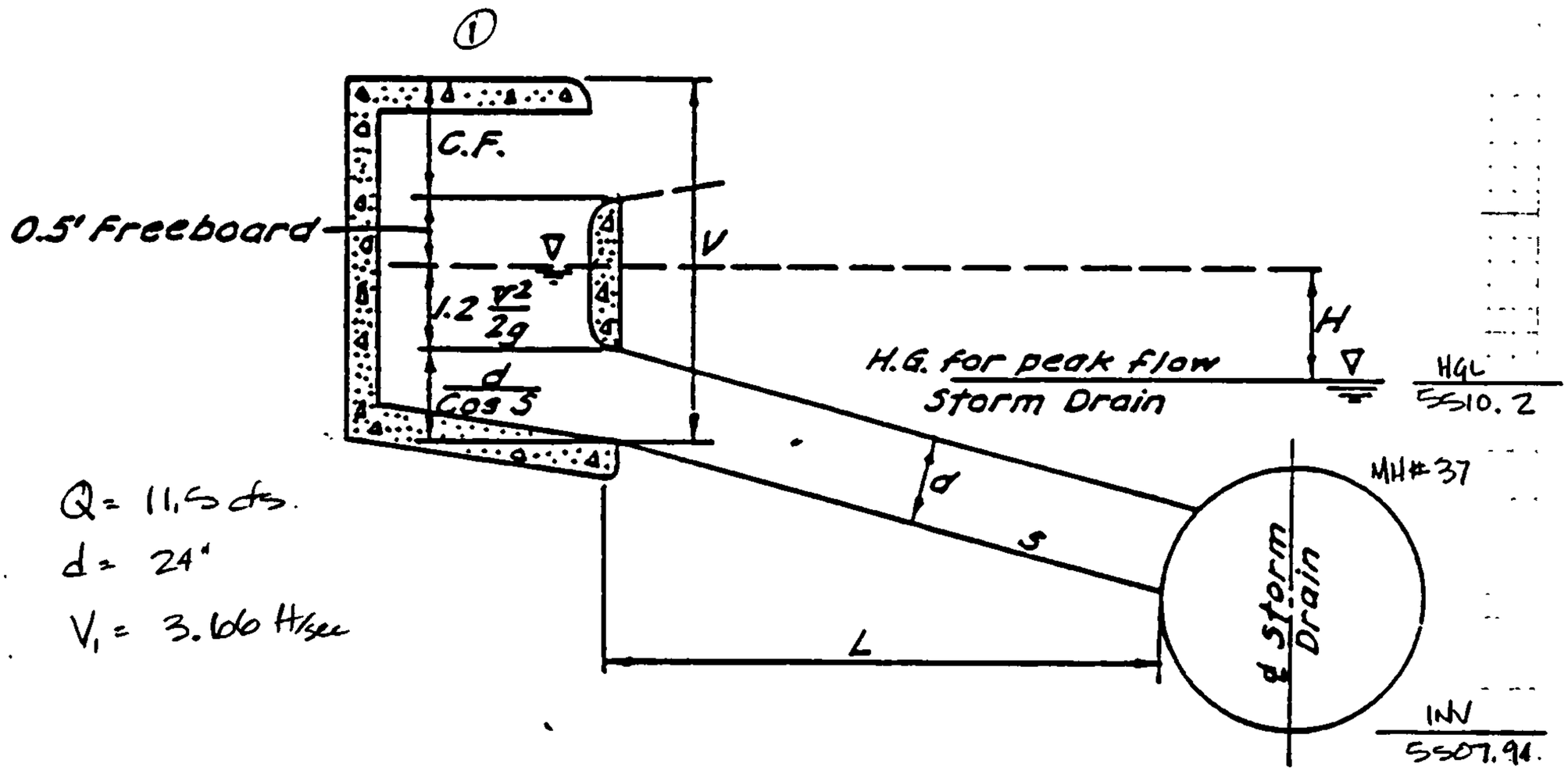
$H_2 = .20$

INV. = 5506.31'

PROJECT NAME	WILLOW WOOD UNIT IV	SHEET	8	OF	15
PROJECT NO		BY	DKA	DATE	6-22-94
SUBJECT		CH'D		DATE	

AVILA ENGINEER, INC.

JEWEL CAVE @ STEAMBOAT



Q = 11.5 cfs.

d = 24"

V_1 = 3.66 ft/sec

MH#37, STA 27+41.46, 4' DIA, TYPE "E", INV. = 5507.94, HGL = 5510.2

① STA 10+86.20, 38.18' L, FL = 5514.34, TYPE "DOUBLE A"

L = 30'

$V_1 = 1.33 + \frac{1.2(3.66)^2}{2(32.2)} + 2.0 = 3.58'$

V_{1MIN} = 1'-10" + d_1 = 3.83' STRUCTURE CONTROLS **V = 4.00'**

H_1 = .35

INV. EL = 5515.01 - 4.00 = **5511.01'**

① STA 10+71.69, 55.00' L, FL = 5513.75, TYPE "DOUBLE A"

L = 12'

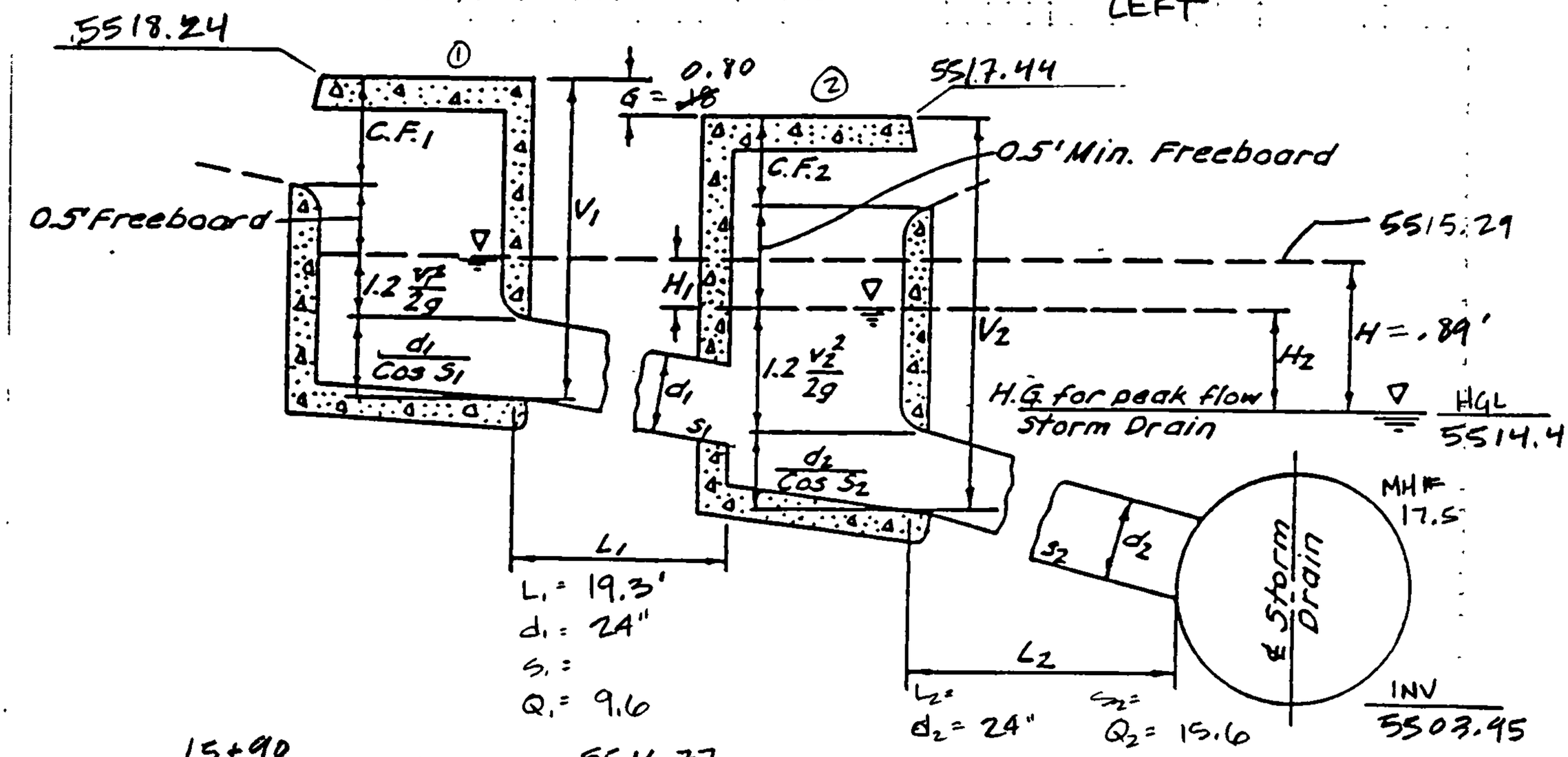
H_1 = .30

INV. ELEV. = 5514.42 - 4.00 = **5510.42'**

PROJECT NAME	WILLOW WOOD UNIT IV	SHEET 9	OF 15
PROJECT NO		BY DKA	DATE 6-22-94
SUBJECT		CH'D	DATE

KINGS CANYON ROAD

@ CANYONLANDS ROAD (RIGHT & LEFT)



① STA ~~14+97.05~~ 15+90, 14' R, FL = ~~5514.45~~ 5516.77, TYPE "DOUBLE A"

② STA ~~14+77.78~~ 16+15, 14' R, FL = ~~5514.27~~ 5517.57 Double "C"

MH # 17.5, STA 14+48.34, 10' R, TYPE "E", 6' DIA, INV = 5503.95, HGL 5514.4

$Q_2 = 15.6$ cfs $d_2 = 24"$ $V_2 = \frac{Q_2}{A_2} = \frac{15.6}{\pi} = 4.97'$

$V_2 = 1.33 + \frac{1.2(V_2)^2}{2g} + d_2 = 1.33 + \frac{1.2(4.97)^2}{2(32.2)} + 2.0 = 3.79'$

$V_{2MIN} = 1'10" + d_2 = 3.83'$ STRUCTURE CONTROLS

$H_2 = .64$ SET $V_2 = 4.00'$ Minimum

INV. ELEV = T.C. − V_2 = 5518.24 − 4.00 = 5514.24 MAX.

$Q_1 = 9.6$ cfs $d_1 = 24"$ $V_1 = \frac{Q_1}{A_1} = \frac{9.6}{3.14} = 3.09$ ft/sec

$V_1 = 1.33 + \frac{1.2(V_1^2)}{2g} + d_1 = 1.33 + \frac{1.2(3.09)^2}{2(32.2)} + 2.0 = 3.48'$

$V_{1MIN} = 1'-10" + d_1 = 3.83'$ SET $V_1 = 4.00'$ Minimum

$H_1 = .25$

INV EL = T.C. − V_1 = 5517.44 − 4.00 = 5513.44 MAX. OK

PROJECT NAME WILLOW WOOD UNIT IV SHEET 11 OF 15

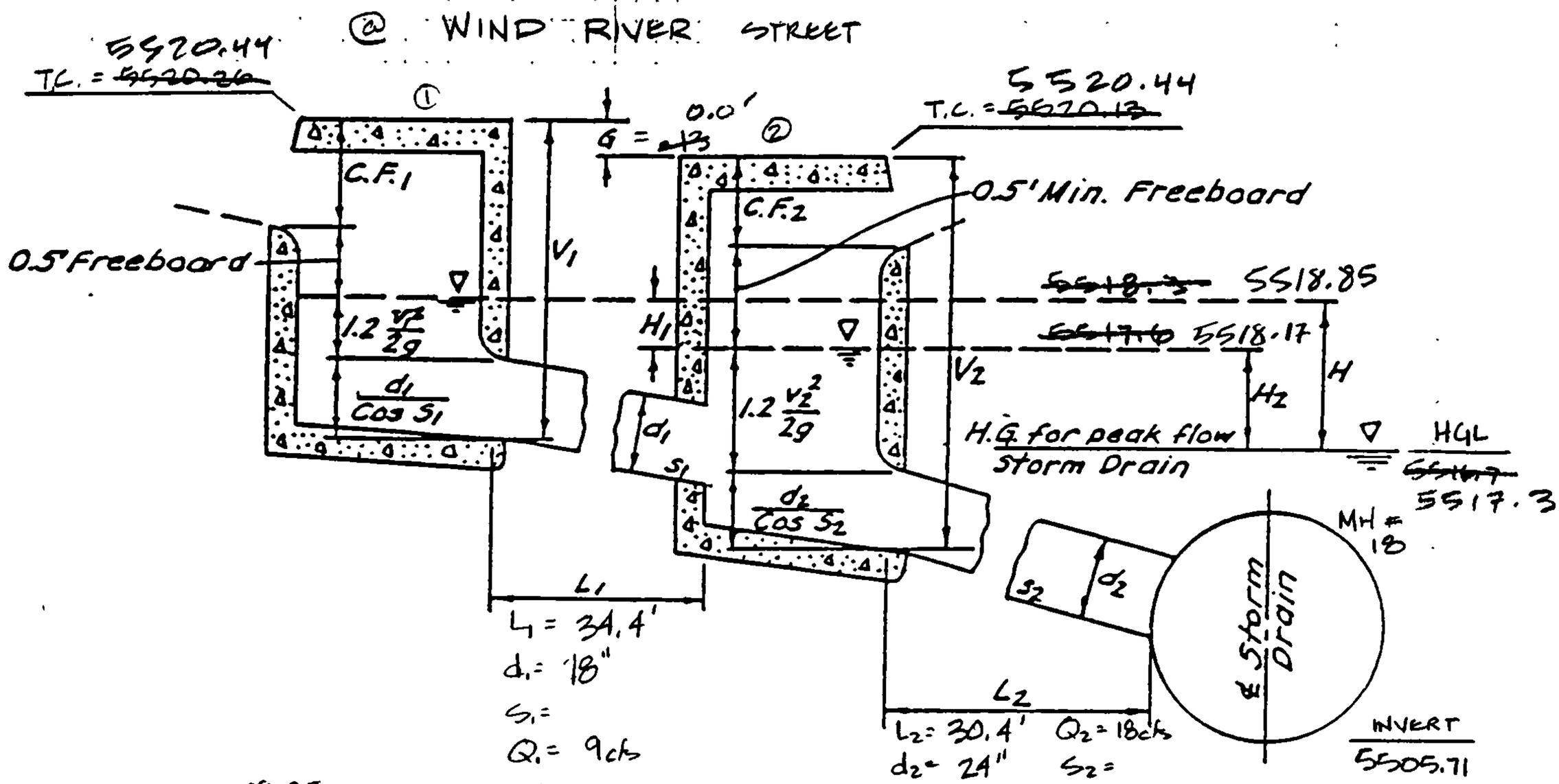
PROJECT NO. BY DAA DATE 6-22-94

SUBJECT CH'D DATE

AVILA ENGINEER, INC.

KINGS CANYON ROAD

@ WIND RIVER STREET



① STA 17+~~63.01~~ 89.28, 14' L, FL = ~~5519.54~~ 5519.77 TYPE "DOUBLE A"

② STA 17+~~43.02~~ 89.28, 14' R, FL = ~~5519.46~~ 5519.77 TYPE "DOUBLE A"

MH # 18 STA 17+16.87, 10' RT, 6' DIA, TYPE "E", INVERT = 5505.71, HGL = 551

$Q_2 = 18$ cfs $\quad d_2 = 24"$ $\quad V_2 = \frac{Q_2}{A_2} = \frac{18 \text{ cfs}}{\pi(1)^2} = 5.73$ ft/sec

$V_2 = 1.33 + \frac{1.2 v_2^2}{2g} + d_2 = 1.33 + \frac{1.2(5.73)^2}{2(32.2)} + 2.0 = 3.94'$

$V_{2MIN} = 1'\text{-}10" + 6\tfrac{1}{2}" + d_1 = 3.86$ ft.

$H_2 = .87$

$V_2 = 4.50'$ Min.

INVERT ELEV = T.C. − V_2 = ~~5520.13~~ 5520.44 − 4.50 = ~~5515.63~~ 5515.94'

$Q_1 = 9$ cfs $\quad d_1 = 18"$ $\quad V_1 = \frac{Q_1}{A_1} = \frac{9 \text{ cfs}}{\pi(.75)^2} = 5.09$ ft/sec.

$V_1 = 1.33 + \frac{1.2(V_1^2)}{2g} + d_1 = 3.31$ ft.

$V_{1MIN} = 1'\ 10" + d_1 = 3.33'$ STRUCTURE CONTROLS

$V_1 = 4.00'$ Min

$H_1 = .68$

INVERT ELEV = T.C. − V_1 = ~~5520.26~~ 5520.44 − 4.00 = ~~5516.26~~ 5516.44' OK

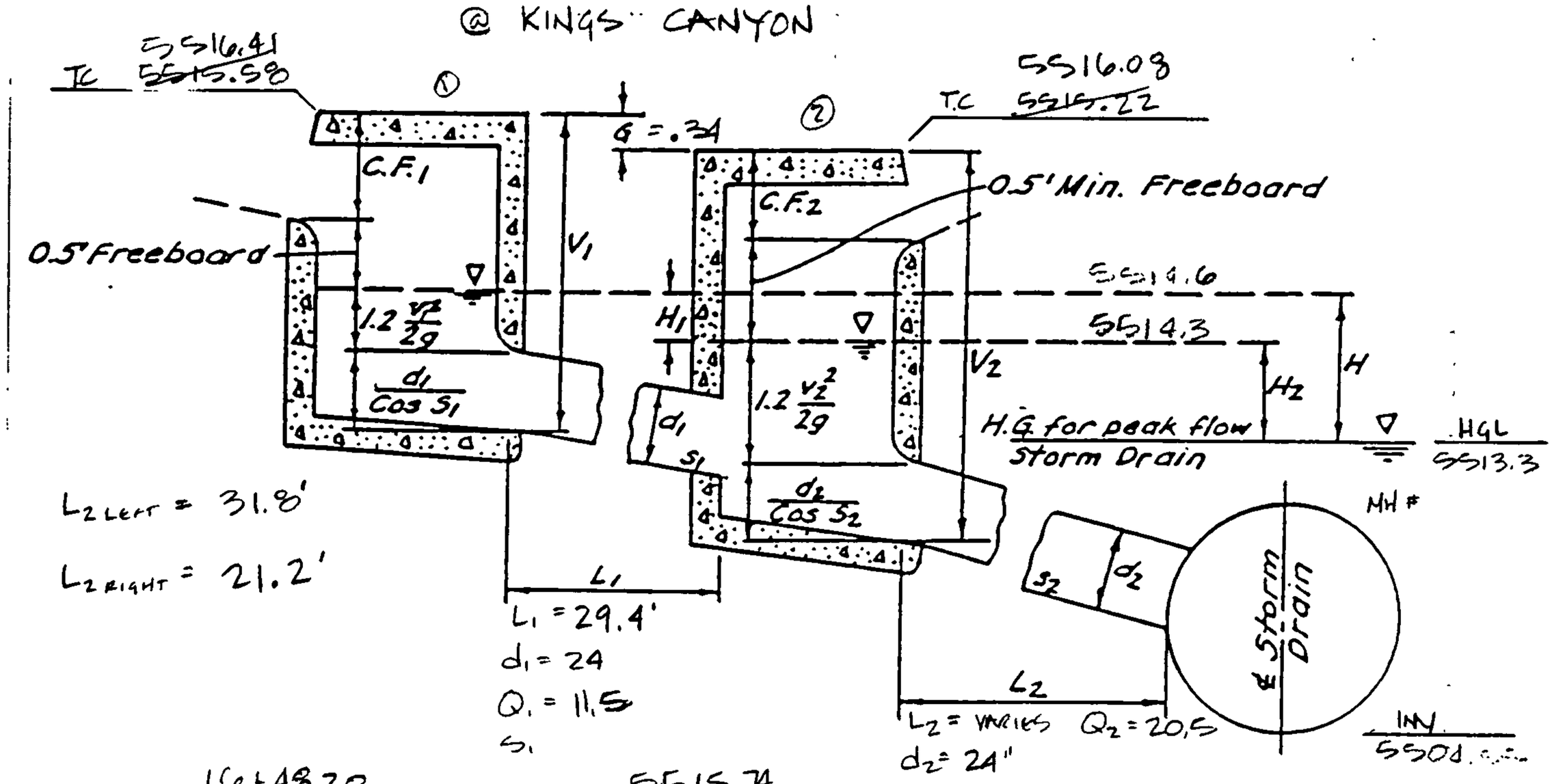
PROJECT NAME WILLOW WOOD UNIT IV SHEET 12 OF 15

PROJECT NO. BY DAA DATE 6-22-94

SUBJECT CH'D DATE

CANYON LANDS ROAD

@ KINGS CANYON



① STA 16+48.20 ~~16+05.06~~, 14' L, FL = 5515.74 ~~5514.91~~, TYPE "DOUBLE A"

② STA ~~15+85.66~~ 16+30.00, 14' L, FL = ~~5514.55~~ 5515.41, TYPE "DOUBLE C".

MH # 20, STA. 15+62.80, 10' R, 6' DIA, TYPE "E", INV. = 5504.~~55~~, HGL =

Q_2 = 20.5 cfs d_2 = 24" $V_2 = \frac{Q}{A} = \frac{20.5}{\pi(1)^2} = 6.53$ ft/sec

$V_2 = 1.33 + \frac{1.2(V_2)^2}{2(g)} + d_2 = 1.33 + \frac{1.2(6.53)^2}{2(32.2)} + 2.0 = 4.12$ ft

V_{2MIN} = 1'-10" + d_2 = 3.83'

$H_{2\,LEFT}$ = .97 $H_{2\,RIGHT}$ = .93 V_2 = 4.50' MINIMUM

INV. EL = T.C. − V_2 = ~~5515.22~~ 5506.08 − 4.50 = ~~5510.72'~~ 5511.58'

Q_1 = 11.5 cfs d_1 = 24" $V_1 = \frac{Q_1}{A_1} = \frac{11.5}{\pi(1)^2} = 3.66$ ft/sec

$V_1 = 1.33 + \frac{1.2(V_1)^2}{2g} + d_1 = 1.33 + \frac{1.2(3.66)^2}{2(32.2)} + 2.0 = 3.58'$

V_{1MIN} = 1'-10" + d_1 = 3.83' STRUCTURE CONTROL

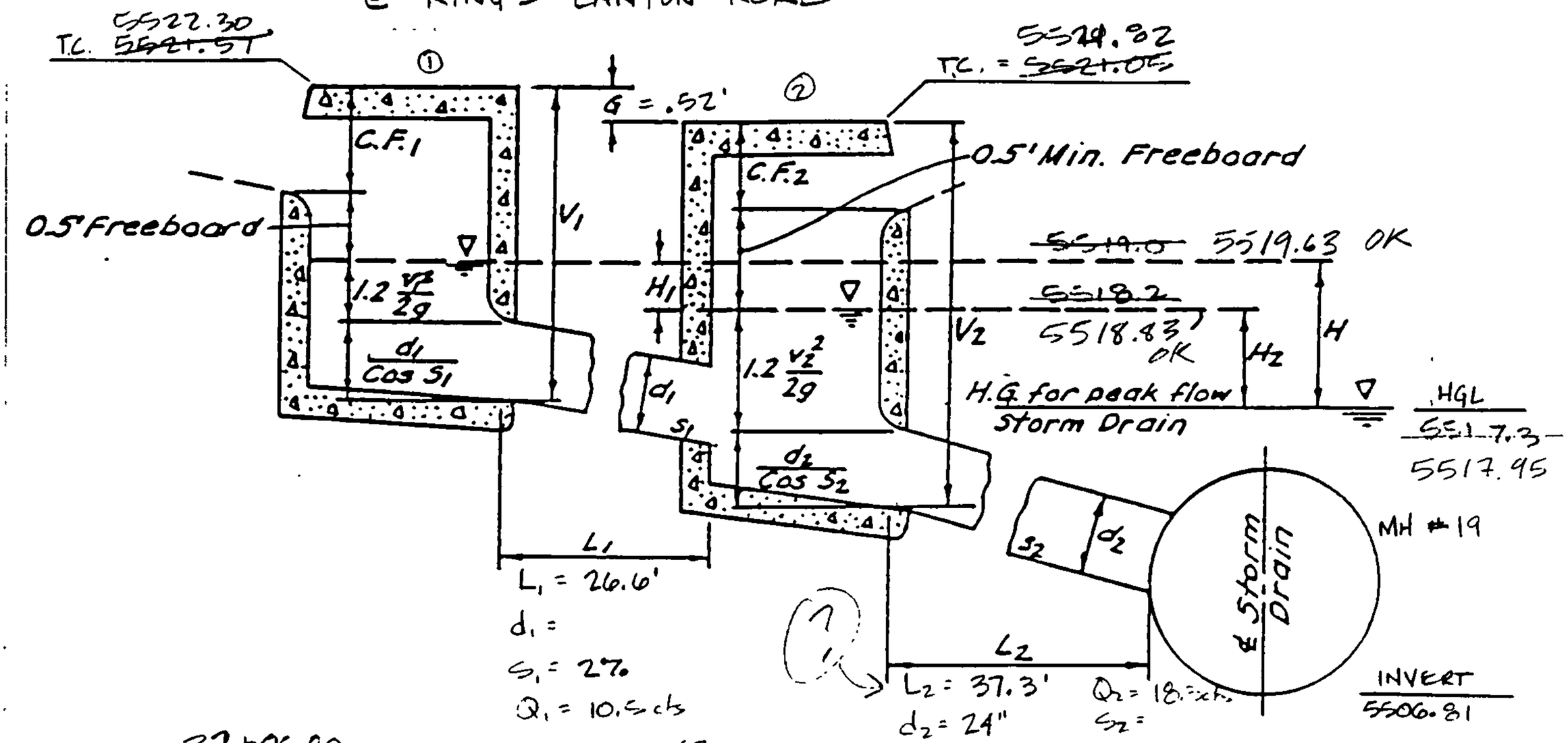
$H_{1\,LEFT}$ = .30 $H_{1\,RIGHT}$ = .30 V_1 = 4.00'

INV. EL = T.C − V_1 = ~~5515.58~~ 5516.08 − 4.00' = ~~5511.58'~~ 5512.08

PROJECT NAME	WILLOW WOOD UNIT IV	SHEET 13	OF 15
PROJECT NO		BY DAA	DATE 6-22-94
SUBJECT		CH'D	DATE

CEDAR BREAKS STREET (LEFT) & (RIGHT)

@ KINGS CANYON ROAD



① STA. ~~31+66.14~~ 32+05.00, 14' L, FL = ~~5520.90~~ 5521.63 TYPE "DOUBLE A"

② STA ~~31+29.51~~ 31+80.00, 14' L, FL = ~~5520.38~~ 5521.15 TYPE "DOUBLE C"

MH# 19, STA 31+02.44, 10' R, 4' DIA, TYPE "E", INV. = 5506.81, HGL = 5517.3

Q_1 = 10.5 cfs d_1 = 18" $V_1 = \frac{Q_1}{\pi(d/2)^2} = \frac{10.5}{\pi(1.5)^2} = 5.94$ ft/sec

$V_1 = 1.33 + \frac{1.2 V_1^2}{2g} + d_1 = 1.33 + \frac{1.2(5.94)^2}{2(32.2)} + 2.0 = 3.98'$

$V_{1\,MIN}$ = 1'-10" + d_1 = $\frac{22"}{12"/ft}$ + 2.0' = 3.83' SET V_1 = 4.00' MINIMUM

H_1 = .80

INVERT ELEV = T.C. − V_1 = ~~5521.57~~ 5522.30 − 4.00 = ~~5517.57'~~ 5518.30'

Q_2 = 10.5 + 7.8 = 18.3 cfs d_2 = 24" $V_2 = \frac{Q_2}{A_2} = \frac{18.3}{\pi(1)^2} = 5.83$ ft/sec

$V_2 = 1.33 + H_1 + \frac{1.2 V_2^2}{2g} + d_2 - G = 1.33 + .5 + \frac{1.2(5.83)^2}{2(32.2)} + 2.0 - .52 = 3.94'$

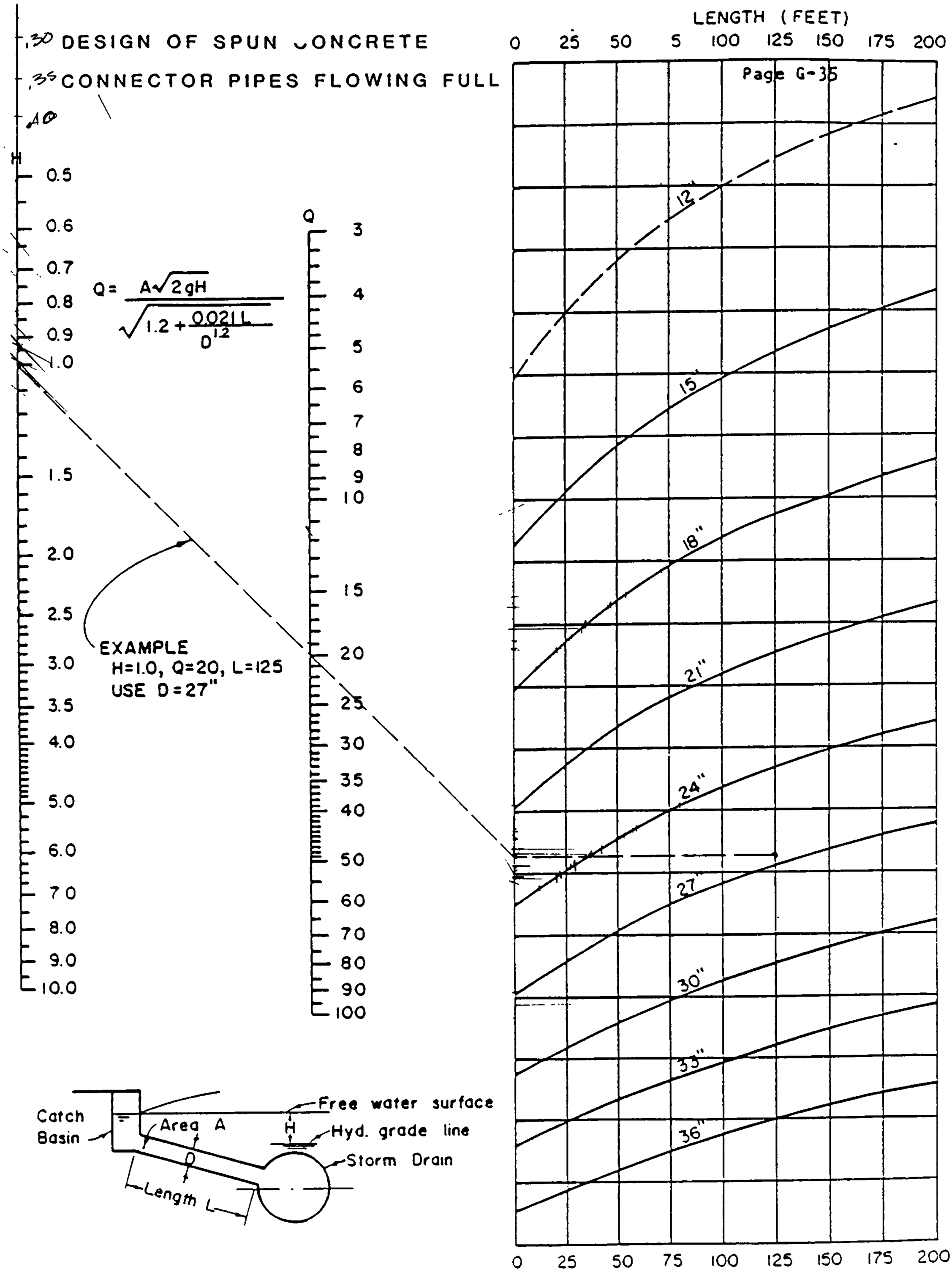
$V_{2\,MIN}$ = 1'10" + d_2 = 3.83' SET V_2 = 4.50'

H_2 = .88 (FROM NOMOGRAPH)

INV. ELEV = T.C. − V_2 = ~~5521.05~~ 5521.82 − 4.50' = ~~5516.55'~~ 5517.32'

PROJECT NAME	WILLOW WOOD UNIT IV	SHEET 14	OF 15
PROJECT NO		BY TONY	DATE
SUBJECT		CH'D	DATE

DESIGN OF SPUN CONCRETE CONNECTOR PIPES FLOWING FULL



DRAINAGE INFORMATION SHEET

PROJECT TITLE: Willow Wood Unit IV

ZONE ATLAS/DRAINAGE FILE# L-21/D37A1

LEGAL DESCRIPTION: Tract D-1-A-1-B, Manzano Mesa

CITY ADDRESS: West of Juan Tabo, North of Gibson

ENGINEERING FIRM: AVID ENGINEERING, INC.

CONTACT: James V. Domenick

ADDRESS: 6100 Seagull Ln., NE, Suite 102, 87109

PHONE: 881-5357

OWNER: Manzano Mesa Limited Partnership

CONTACT: Stan Strickman

ADDRESS: 6301 Indian School NE, Suite 208

PHONE: 242 - 6375

ARCHITECT: None

CONTACT:

ADDRESS:

PHONE:

SURVEYOR: AVID ENGINEERING, INC.

CONTACT: Ruan Bacigalupa

ADDRESS: Same as Above

PHONE: 881-5357

CONTRACTOR: None

CONTACT:

ADDRESS:

PHONE:

PRE-DESIGN MEETING:

____ YES

____ NO

____ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. DRB - 92 - 0106

EPC NO.

PROJECT NO.

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

X DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAIN PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

____ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

____ SECTOR PLAN APPROVAL

____ SKETCH PLAT APPROVAL

____ PRELIMINARY PLAT APPROVAL

____ SITE DEVELOPMENT PLAN APPROVAL

X FINAL PLAT APPROVAL

____ BUILDING PERMIT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ CERTIFICATE OF OCCUPANCY APPROVAL

____ ROUGH GRADING PERMIT APPROVAL

X GRADING/PAVING PERMIT APPROVAL

____ OTHER W.O. (SPECIFY)

2 1 1994

DATE SUBMITTED: 6-17-94

BY: Eric Stump

AVID ENGINEERING, INC.

Civil • Structural • Transportation

June 17, 1994

Mr. John Curtin, P.E.
Project Manager
Hydrology Division
P.O. Box 1293
Albuquerque, NM 87103

RE: WILLOWWOOD, UNIT IV SUBDIVISION
PROJECT NUMBER 4604.93
SUBMITTAL OF SUBDIVISION STORM DRAINAGE INFORMATION AND PLANS FOR REVIEW

Dear John:

At the May 26, 1994 DRC meeting for the Willowwood, Unit IV project, you requested we provide additional information to aid in the review of the final storm drainage design. The following items are enclosed for your use in reviewing the design.

- One set of storm drain plans, which are now approximately 90% complete.
- An overall storm drain plan exhibit showing flows, manhole numbers, etc.
- Calculations of hydraulic grade line and velocities.
- A copy of the letter approving the subdivision drainage plan update, which defined the flows and drainage basins.
- A copy of our proposed specification calling for cast-in-place concrete pipe, which we propose to consider as an alternate to RCP on this project.

The storm drain plans submitted with this package are also included with the construction plan set, which is being concurrently resubmitted for DRC review. You will receive that set through the standard DRC process.

Please call me if you have questions or need any additional information to review the project.

Sincerely,

James V. Domenick, P.E.
Principal

Enclosure

cc: Stan Strickman

JUN 21 1994

6100 Seagull St. NE • Suite 102 • Albuquerque, New Mexico 87109 • (505) 881-5357

— -3164. 111-PROJECT FILE
RCA

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

RECEIVED APR 2 0 1994

April 14, 1994

Rick Beltramo
AVID Engineering
6100 Seagull NE Suite 102
Albuquerque, NM 87109

RE: WILLOW WOOD SUBDIVISION (L21-D37A) MASTER DRAINAGE PLAN FOR UNITS III, IV, V, AND VI ENGINEER'S STAMP DATED 4/1/94.

Dear Mr. Beltramo:

The revised drainage report, grading plan and infrastructure list is approved for the amended preliminary scheduled for DRB on 4/12/94. However, Final Plat sign-off will require an executed SIA with Financial Guarantees.

Please provide me with a copy of the final grading plan for Unit III. If you should have any questions, please contact me at 768-2668.

Sincerely,

Fred J. Aguirre, P.E.
PWD/Hydrology Division

FJA/dl/WPHYD/3434

c: File

JUN 2 1 1994

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

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

DESIGN REVIEW COMMITTEE MEETING 05-26-94 1:30 P.M.

PROJECT: Willow Wood Subdivision Unit 4 Project No. 4604.93

CONSULTANT: AVID, Engineering

PRESENT: Billy Goolsby, DRC Chairman
Richard Dourte, Transportation Development
Robert Kane, Utility Development
John Curtin, Hydrology
Jim Domenik, Consultant
Eric Stump, Consultant
Stan Strickman, Trails Management
c: Rick Roybal, City Engineer

COMMENTS:

1. The plans are preliminary and much of the required information is missing. Another review session will be required.

2. Richard Dourte provided mark-ups and discussion of his review.

3. John Curtin and the Chairman provided mark-ups and discussion of their review. John said that a separate design submittal will be required.

4. Robert Kane said that the design was not far enough along to provide comments.

The Consultant will make the appropriate corrections to the mylars and submit these, five (5) sets of prints and all mark-ups to the Master Scheduler to schedule a final review/signature session.

BG:vgl(WP+125699)

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

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

April 20, 1994

James V. Domenick, P.E.
AVID ENGINEERING, INC.
6100 Seagull Ln. NE, Ste 102
Albuquerque, N.M. 87109

RE: GRADING PLAN FOR WILLOW WOOD IV (L-21/D37A1)
RECEIVED APRIL 7, 1994 FOR ROUGH GRADING PERMIT & FINAL PLAT APPROVAL
ENGINEER'S STAMP DATED 4/5/94

Dear Mr. Domenick:

Based on the information included in the submittal referenced above, City Hydrology approves the Rough Grading Permit for this project.

The following comments must be addressed prior to Final Plat & Work Order approval:

1. A cover letter would help expedite the review of this project. Include in the cover letter a summary of the hydrologic conditions (flood plains, off-site flows, downstream capacity, etc); current copy of the Infrastructure List for this phase; summary table of street hydraulics & storm drain hydraulics and a discussion of any interim improvements required.

2. Label all storm drain lines. It is difficult to follow the storm drain when it merges with the curb & gutter line. Submit final design for the storm drain system including hydraulic grade line calculations.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia

WPHYD/8469/jpc

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

Master in Unit 3?

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Willow Wood Unit IV ZONE ATLAS/DRAINAGE FILE# L-21-Z / D37A1

LEGAL DESCRIPTION: D-1-A-1

CITY ADDRESS: Approximately Juan Tabo & Herman Roser Ave

ENGINEERING FIRM: AVID ENGINEERING, INC. CONTACT: James V. Domenick

ADDRESS: 6100 Seagull Ln., NE, Suite 102, 87109 PHONE: 881-5357

OWNER: Manzano Mesa CONTACT: Stan Strickman

ADDRESS: 6301 Indian School Rd. NE Ste 630 PHONE: 766-9104

ARCHITECT: CONTACT:

ADDRESS: PHONE:

SURVEYOR: AVID ENGINEERING, INC. CONTACT: Ruan Bacigalupa

ADDRESS: Same as Above PHONE: 881-5357

CONTRACTOR: None CONTACT:

ADDRESS: PHONE:

PRE-DESIGN MEETING:

____ YES DRB NO.

X NO EPC NO.

____ COPY OF CONFERENCE RECAP SHEET PROVIDED PROJECT NO. 4604.93

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAIN PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

____ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

____ SECTOR PLAN APPROVAL

____ SKETCH PLAT APPROVAL

____ PRELIMINARY PLAT APPROVAL

____ SITE DEVELOPMENT PLAN APPROVAL

X FINAL PLAT APPROVAL

____ BUILDING PERMIT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ CERTIFICATE OF OCCUPANCY APPROVAL

X ROUGH GRADING PERMIT APPROVAL

____ GRADING/PAVING PERMIT APPROVAL

____ OTHER _____ (SPECIFY)

RECEIVED APR - 7 1994

DATE SUBMITTED: 4-6-94

BY: Eric Stump

REV. 10/85

8469