City of Albuquerque

June 16, 2000

Kevin Patton, P.E.
Bohannan-Huston, Inc.
7500 Jefferson NE
Albuquerque, New Mexico 87109

RE: Drainage Report for Spain Road and High Desert Street Extensions, (E23/D8) Submitted for Work Order Approval (Grading and Paving Permit Approval), Engineer's Stamp Dated 5/23/00.

Dear Mr. Patton:

Based on the information provided in the submittal of May 24, 2000, the above referenced Drainage Report is approved for release of the Work Order plans.

Approval from City Transportation is required for the proposed street sections with the cross slope for High Desert Street.

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

Sincerely,

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

c: Jack Eichorn, High Desert Investment Corp.
File

DRAINAGE REPORT
FOR
SPAIN ROAD - HIGH DESERT
STREET EXTENSIONS

MAY 23, 2000

PREPARED BY:

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

PREPARED FOR:

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

PREPARED BY:

Pamela L. Larranaga 5/23/00

Pamela L. Larranaga, P.E. **Date**

UNDER THE SUPERVISION OF:

Kevin Patton, P.E. **Date**

KEVIN G. PATTON
NEW MEXICO
13685
REGISTERED PROFESSIONAL ENGINEER

I. INTRODUCTION

This report pertains to the extension of Spain Road from the existing Imperata Street east to proposed High Desert Street and High Desert Street from proposed Spain Road south to the Michial M. Emery Bear Canyon Trailhead in the High Desert Development. Pinon Point at High Desert is located directly south of Spain Road and the north side is bounded by High Desert Open Space. High Desert Street is surrounded by High Desert Open Space to the east and the Bear Canyon Arroyo to the West.

The High Desert Development is bound by a Sector Development Plan within the City of Albuquerque and Bernalillo County.

The High Desert roadway currently slopes from south to north. A portion of the run-off in High Desert Street will be diverted through curb cuts to be used in a water harvesting system in a portion of the Bear Canyon Arroyo.

The Spain roadway currently slopes from east to west. The run-off in Spain Road will be captured in inlets that will drain to the Spain Road storm drain system built with the Phase I-B work order. A portion of the captured flows will be diverted from the inlets and routed to a water harvesting system located to the north of Spain.

II. PURPOSE OF REPORT

The purpose of this report is to provide site-specific drainage analysis for existing and ultimate conditions for the proposed extension of Spain Road and High Desert Street. This plan is prepared and submitted to support grading & infrastructure design and obtain approval of the construction plans for this project.

III. METHODOLOGIES AND REFERENCES

Site conditions are analyzed for a 100-year, 6-hour storm event in accordance with the City of Albuquerque Drainage Ordinance and the Development Process Manual (DPM), Volume 2, Design Criteria, Section 22.2, Hydrology for the City of Albuquerque, January 1993.

The site, as described in the "Site Location and Characteristics" section below, is approximately 3.5 acres. Therefore, Part A of the DPM, Section 22.2, which provides a simplified procedure for projects with sub-basins smaller than 40 acres, was used.

This drainage report is consistent with a number of approved drainage reports that exist in and around this development. The following City of Albuquerque and Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) approved studies prepared for the High Desert Development may be referenced throughout this report:

High Desert Drainage Management Master Plan, December 1993, prepared by BHI.

Final High Desert Phase I Hydrology and Design Drainage Report, March 1994, prepared by BHI.

Drainage Report for Pinon Point at High Desert, October 22, 1999 prepared by BHI.

Drainage Report for High Desert – Tract 14A The Overlook at High Desert, June 12, 1998, prepared by BHI.

The above referenced reports are associated with the development of these roadways in some manner. Additional information on the above mentioned reports can be found summarized in the paragraphs below.

The *High Desert Drainage Management Master Plan*, dated December 1993, was prepared to support drainage plans for the development of individual land parcels within High Desert and to provide design guidance for the design of primary drainage infrastructure, to be constructed by High Desert. In addition, it provides anticipated fully developed flow rates for basins related to this area.

The *Final High Desert Phase I Hydrology and Design Drainage Report*, dated March 1994, was prepared to provide supplementary hydrology and drainage infrastructure design documentation to the *High Desert Drainage Management Master Plan*, dated December 1993. This report addresses the design of the existing Spain storm drain system as well as capacity calculations from Tramway Blvd. to the intersection of Spain Road and Imperata Street.

The *Drainage Report for Pinon Point at High Desert*, dated October 22, 1999, provides information about the adjacent Pinon Point Subdivision. The existing drainage basins for Spain Road were drawn and calculated in the Pinon Point drainage report. This report also provides existing flow quantities from Pinon Point into the Spain storm drain system.

The *Drainage Report for Tract 14A – The Overlook at High Desert*, dated June 12, 1998, provides information about the adjacent Overlook Subdivision. The existing drainage basin and flow for High Desert Street north of this site were established and provided by this report

IV. SUMMARY OF THE RELATED PLATTING AND EASEMENTS

Please refer to the existing Bulk Land Plat enclosed in the Exhibits section of this report. The existing Bulk Land Plat grants the right-of-way for both Spain Road and High Desert Street. Also shown in the Exhibits section of this report is the Preliminary Plat for Pinon Point at High Desert, which is immediately to the south of Spain Road.

V. SITE LOCATION AND CHARACTERISTICS

For location of the site, please refer to the Vicinity Map on the Grading and Drainage Plan enclosed with this report.

Vegetation currently consists primarily of prairie grasses and a few juniper trees. Slopes in the project site range from 2% to 15%, with the majority of the project sloping at 2% to 8%. The Soil Conservation Service has classified the soils on this site as Embudo-

Tijeras complex, Embudo gravely fine sandy loam and Tijeras gravely fine sandy loam, all of which correspond to a common hydrological soil group classification B.

VI. EXISTING HYDROLOGIC AND SITE DRAINAGE CONDITIONS

The existing drainage basin and patterns for Spain Road is shown graphically on the Drainage Basin Map located in the Exhibits section of this report. A summary table is provided that breaks down this basin and its characteristics in Appendix A of this report. For additional information and comparison, please refer to *Pinon Point at High Desert Drainage Report*, dated October 22, 1999.

The existing Spain Road roadway consists of one drainage basin, labeled Basin EX - P10 consistent with the Pinon Point drainage plan. Basin EX - P10 (Q_{100}= 9.6cfs) contains flows from the backyards of Pinon Point Lots 29, 30, 32, 33, 34, 35, 36, 37, 43 and 44 as well as the Spain Road right-of-way adjacent to Pinon Point Subdivision. Spain Road is currently a dirt road that was constructed with small check dams that redirect run-off towards the existing northern arroyo. This arroyo then carries the flows to an existing pond in the northeast corner of Imperata and Spain Road.

The Spain Road storm drain system currently accepts flows from a storm drain system in Pinon Point that captures the flows from the northern portion of this subdivision. A summary table is provided from the Pinon Point drainage report that breaks down this storm drain and its characteristics in Appendix A of this report. For additional information and comparison, please refer to *Pinon Point at High Desert Drainage Report*, dated October 22, 1999.

The existing drainage basin and patterns for High Desert Street and the offsite basin that drains to High Desert Street are also shown graphically on the Drainage Basin Map located in the Exhibits section of this report. A summary table is provided that breaks down these basins and their characteristics in Appendix A of this report. For additional information and comparison, please refer to *High Desert Drainage Management Master Plan*, dated December 1993.

The existing High Desert Street consists on one drainage basin, labeled HD1 (Q_{100}=3.0cfs). There is one offsite basin, labeled OS-3 consistent with Drainage Management Plan – Phase I Development Conditions from the *Final High Desert Phase I Hydrology and Design Drainage Report*, dated March 1994, shown in the Exhibit portion of this report. Basin OS-3 (Q_{100}=13.4cfs) historically flows to High Desert Street. These flows, along with the flows on High Desert Street drain from the east to the west, and then continue on down the Bear Canyon Arroyo. The existing basin HDST5 (Q_{100}=2.28cfs), which is located immediately north of the proposed High Desert Street, was established with the *Drainage Report for High Desert – Tract 14A The Overlook at High Desert*, June 12, 1998 prepared by BHI.

VII. DEVELOPED HYDROLOGICAL AND HYDRAULIC CONDITIONS

The proposed drainage basins and patterns for Spain Road and High Desert Street are shown graphically on the Drainage Basin Map located in the Exhibits section of this report. For additional information and comparison, please refer to the *High Desert Drainage Management Master Plan*, dated December 1993. A summary table has been provided in Appendix A of this report that provides the calculated treatment types and the peak discharge for the 100-year, 6-hour storm event.

The fully developed conditions consist of 5 basins (see Exhibit 3 for the Drainage Basin Map). These basins flow in a northerly direction for High Desert Street and in a westerly direction along Spain Road.

The offsite flows from Basin OS-3 will sheet flow onto High Desert Street and remain fully contained within the roadway. There will be a series of curb cuts on the west side of High Desert Street that will capture flows (Q_{100}=8.6cfs) in order to establish a water harvesting system for a portion of the Bear Canyon Arroyo immediately to the west of High Desert Street. The remainder of the flows will continue to the north to the Spain Road and High Desert Street intersection. At this point, they will continue down Spain Road, with a residual flow of 3.0cfs continuing north on High Desert Street.

The residual flow (Q_{100}=3.0cfs) from High Desert Street South of Spain Road will flow north and combine with proposed basin HD-3 (Q_{100}=0.87cfs) and be captured by inlets, which will transport the flow (Q_{100}=3.87cfs) to the existing 3 – 36" culverts underneath High Desert Street. Basin HD-2 (Q_{100}=4.63cfs) and existing basin HDST5 (Q_{100}=2.28cfs) will flow to the lowpoint in High Desert Street. The combined flow (Q_{100}=6.91cfs) will be collected by inlets and flow south via storm drain system and into the storm drain system of Desert Mountain at High Desert Unit Two.

The Spain Road storm drain system will pick up flows from a series of inlets in Spain. The first two inlets on the south side of Spain will capture approximately 11.9cfs (100-yr, 6-hr storm). A portion of the captured flow will be diverted from the inlets into a water harvesting system in the northeast corner of the Spain Road and Imperata Street intersection. The remaining three inlets downstream will pick up more of the developed flows in Spain Road, and continue on in the Spain Road storm drain system. A residual 4.93cfs will travel south on Imperata Street to the sump near the southeastern corner of Pinon Point at High Desert, and into the Golden Aster storm drain system.

VIII. CONCLUSION

This report has presented a comprehensive drainage management plan for the proposed roadways. The plan provides safe and adequate drainage protection for the proposed development and is consistent with the previous approved *High Desert Drainage Management Master Plan*, the *Drainage Report for High Desert-Imperata Street Extension*, the *Drainage Report for The Canyons at High Desert*, the *Drainage Report for Pinon Point at High Desert*, and the *Drainage Report for High Desert – Tract 14A The Overlook at High Desert*. Therefore it is recommended that this plan be approved as presented.

SUMMARY OF HYDROLOGIC DATA
FOR SPAIN ROAD AND HIGH DESERT STREET

EXISTING CONDITIONS ON-SITE
100 YR, 6 HR. STORM

PEAK DISCHARGE, CFS/ACRE**				
EVENT	A	B	C	D
100-YR-6hr	2.2	2.92	3.73	5.25

BASIN ID	DISCHARGES TO	AREA AC	AREA SQ.MI.	% LAND TREATMENT*				TIME TO PEAK	100-YR DISCHARGE CFS/AC	Q(100YR) CFS
				A	B	C	D			
EX - P10	Spain Road	2.586	0.0040	0.0	0.0	100.0	0.0	0.1333	3.73	9.6
OS-3	Bear Canyon Arroyo	6.099	0.0095	100.0	0.0	0.0	0.0	0.1333	2.20	13.4
HD1	Bear Canyon Arroyo	0.816	0.0013	0.0	0.0	100.0	0.0	0.1333	3.73	3.0

26.1 CFS

NOTES:

1. Obtained from Section 22.2, Hydrology, of the Development Process Manual, Volume 2, Design Criteria for the City of Albuquerque, July 1997

   * Table A-4

   ** Table A-9

2. Table A-5 Percent Treatment D (Impervious) used for Basin Calculations (for collector and arterial streets)

SUMMARY OF HYDROLOGIC DATA
FOR SPAIN ROAD AND HIGH DESERT STREET

FULLY DEVELOPED CONDITIONS ON-SITE
100 YR, 6 HR. STORM

PEAK DISCHARGE, CFS/ACRE**				
EVENT	A	B	C	D
100-YR-6hr	2.2	2.92	3.73	5.25

BASIN ID	DISCHARGES TO	AREA AC	AREA SQ.MI.	% LAND TREATMENT*				TIME TO PEAK	100-YR DISCHARGE CFS/AC	Q(100YR) CFS
				A	B	C	D			
S1	Spain SD System	0.603	0.0009	0.0	10.0	0.0	90.0	0.1333	5.02	3.0
S2	Spain SD System	0.711	0.0011	0.0	10.0	0.0	90.0	0.1333	5.02	3.6
S3	Spain SD System	0.643	0.0010	0.0	10.0	0.0	90.0	0.1333	5.02	3.2
S4	Spain SD System	0.629	0.0010	0.0	10.0	0.0	90.0	0.1333	5.02	3.2
OS-3	Spain SD System	6.099	0.0095	100.0	0.0	0.0	0.0	0.1333	2.20	13.4
HD1	Spain SD System	0.816	0.0013	0.0	10.0	0.0	90.0	0.1333	5.02	4.1

30.5 CFS

NOTES:

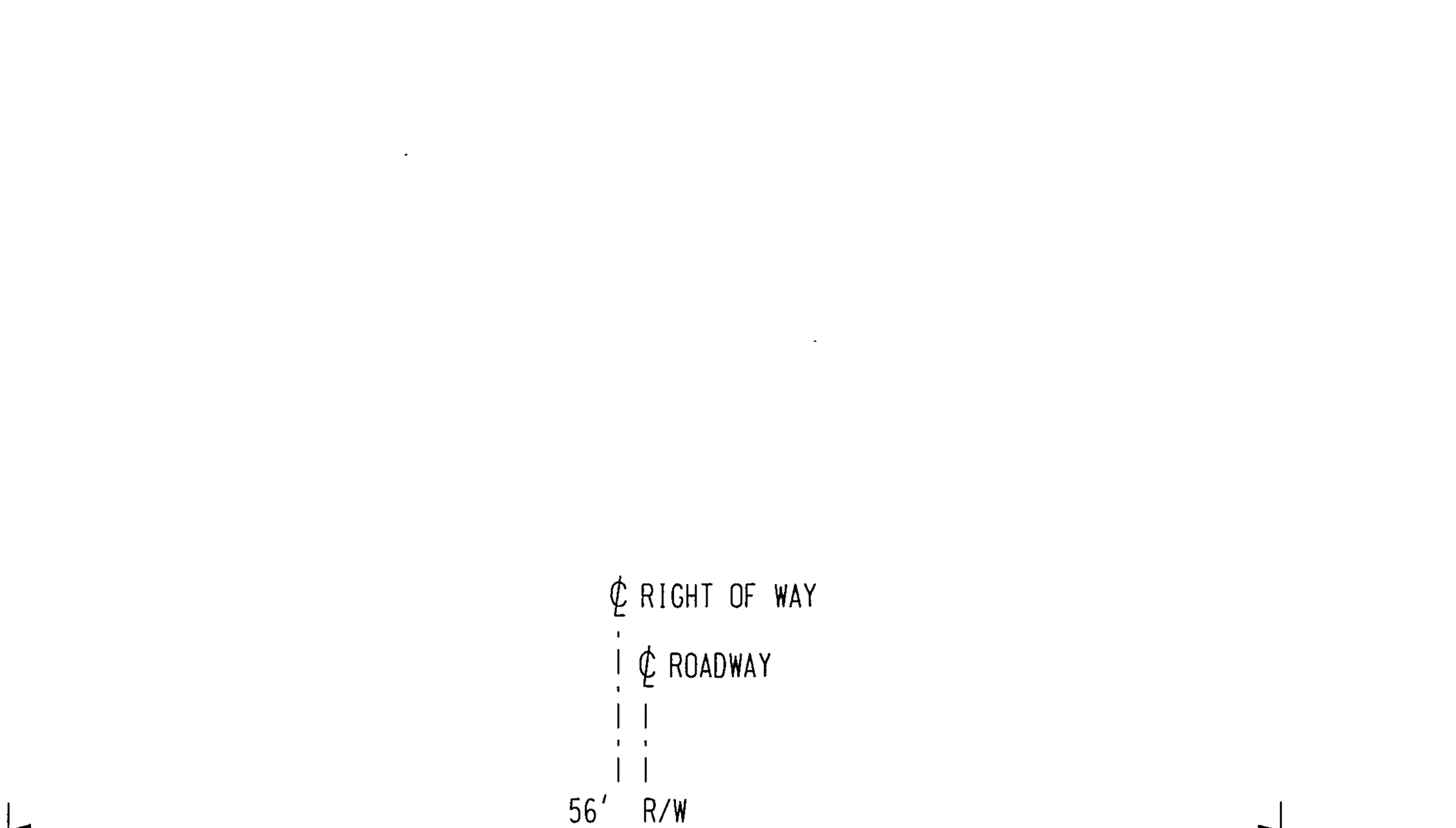
1. Obtained from Section 22.2, Hydrology, of the Development Process Manual, Volume 2, Design Criteria for the City of Albuquerque, July 1997
   * Table A-4
   ** Table A-9

2. Table A-5 Percent Treatment D (Impervious) used for Basin Calculations (for collector and arterial streets)

High Desert Street North of Spain Road

BASIN I.D.	AREA (AC)	% LAND TREATMENT A	B	C	D	RUNOFF (AC-FT) 10 YR	100 YR	DISCHARGE (CFS) 10 YR	100YR
HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (EXISTING)									
HD-2	1.12	97.0%	0.0%	0.0%	3.0%	0.01	0.05	0.37	1.53
HD-3	0.21	97.0%	0.0%	0.0%	3.0%	0.00	0.01	0.07	0.29
HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (DEVELOPED)									
HD-2	1.12	0.0%	10.0%	0.0%	90.0%	0.11	0.17	3.00	4.63
HD-3	0.21	0.0%	10.0%	0.0%	90.0%	0.02	0.03	0.56	0.87
TOTAL	1.12					0.11	0.17	3.00	5.50

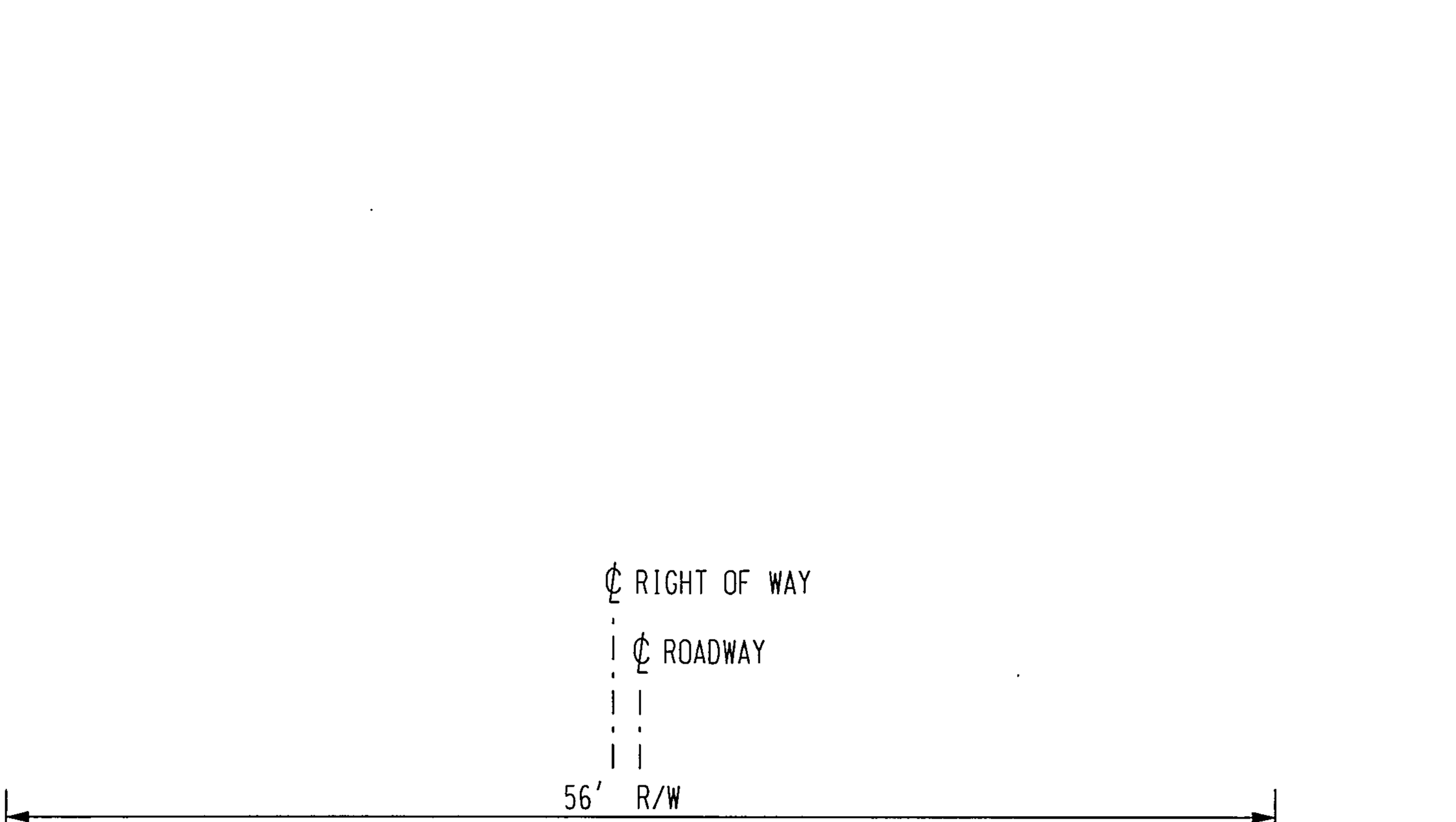
HIGH DESERT STREET NORTH OF SPAIN ROAD			
HYRDOLOGICAL DISCHARGE DATA (DEVELOPED FLOW)			
BASIN	AREA		DISCHARGE (CFS)
I.D.	(AC)		100YR
HD-2	1.12		4.63
HD-3	0.21		0.87
EXISTING-OFFSITE BASINS			
HDST5			2.28
**This basin is north of the proposed High Desert Street			
just in front of the entrance to the Overlook Subdivision			
a Red Yucca Avenue.			
HD-1			3.00
OS-3			13.40
**These basins are collected in the existing High Desert St.			
and will be carried north to the water harvesting pond and			
the existing Spain Rd. with a residual flow of 3.0cfs flowing			
north on the proposed High Desert St.			
TOTAL	1.33		10.78



HIGH DESERT STREET SECTION D-D

NOT TO SCALE

B-1



SPAIN ROAD SECTION B-B

NOT TO SCALE

B-2

SUMMARY OF ROADWAY CAPACITY ANALYSIS
FOR SPAIN ROAD AND HIGH DESERT STREET

FULLY DEVELOPED CONDITIONS ON-SITE
100 YR, 6 HR. STORM

STREET	ROADWAY GRADE %	Q (100YR) IN ROADWAY (cfs)	CURB TYPE	DEPTH OF WATER IN ROADWAY (ft)	VELOCITY OF STORM WATER IN ROADWAY (ft/s)	VELOCITY HEAD (ft)	EGL (ft)	ROW ELEVATION (ft)	COMMENTS	
HIGH DESERT STREET										
Basin HD1	0.50	17.5	std.	0.61	2.48	0.10	0.71	0.96	OK	*
SPAIN ROAD										
Sta. 92+00 to High Desert intersection (Basin S1)	5.97	11.9	std.	0.36	5.83	0.53	0.89	0.96	OK	
Sta. 88+00 to Sta. 92+00 (Basin S2)	5.35	15.5	std.	0.40	5.97	0.55	0.95	0.96	OK	
Sta. 84+00 to Sta. 88+00 (Basin S3)	4.38	18.7	std.	0.44	5.79	0.52	0.96	0.96	OK	**
Sta. 80+04.51 to Sta. 84+00 (Basin S4 - Right side only	3.12	8.4	std.	0.36	4.19	0.27	0.63	0.96	OK	***

NOTES:

* At this point we have curb cuts on the west side of the road to capture at total of 8.6 cfs.
This is used for water harvesting in the Bear Canyon Arroyo adjacent to High Desert Street

** At this point we have 2 double grate inlets on the south side of the road that capture a total of 11.9 cfs.
This is used for water harvesting in the High Desert Open Space on the north side of Spain.

***At this point we have 1 double grate inlet on the south side of the road to absorb a total of 1.12 cfs.
This water continues on in the Spain Storm Drain system.

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

HIGH DESERT STREET @ S=0.5%

MANNING'S N= .017 SLOPE= .005

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	1.23	5	30.63	0.13	9	47.63	0.96
2	0.46	1.23	6	32.63	0.00	10	0.00	0.00
3	0.63	0.56	7	32.79	0.67	11	0.00	0.00
4	2.63	0.69	8	33.25	0.67	12	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.40	0.40	2.59	4.7	16.17	1.82	15.85	0.05	0.45
0.41	0.41	2.75	5.1	16.68	1.86	16.35	0.05	0.46
0.42	0.42	2.91	5.5	17.19	1.89	16.86	0.06	0.48
0.43	0.43	3.08	5.9	17.70	1.93	17.36	0.06	0.49
0.45	0.45	3.44	6.9	18.72	2.00	18.36	0.06	0.51
0.46	0.46	3.63	7.4	19.23	2.03	18.87	0.06	0.52
0.47	0.47	3.82	7.9	19.74	2.07	19.37	0.07	0.54
0.48	0.48	4.01	8.4	20.25	2.10	19.87	0.07	0.55
0.49	0.49	4.22	9.0	20.76	2.14	20.37	0.07	0.56
0.50	0.50	4.42	9.6	21.27	2.17	20.88	0.07	0.57
0.51	0.51	4.63	10.2	21.78	2.20	21.38	0.08	0.59
0.52	0.52	4.85	10.8	22.29	2.24	21.88	0.08	0.60
0.53	0.53	5.07	11.5	22.80	2.27	22.38	0.08	0.61
0.54	0.54	5.30	12.2	23.32	2.30	22.89	0.08	0.62
0.55	0.55	5.53	12.9	23.83	2.33	23.39	0.08	0.63
0.56	0.56	5.77	13.6	24.34	2.37	23.89	0.09	0.65
0.57	0.57	6.01	14.3	25.02	2.39	24.56	0.09	0.66
0.58	0.58	6.26	15.1	25.70	2.41	25.22	0.09	0.67
0.59	0.59	6.51	15.8	26.38	2.43	25.89	0.09	0.68
0.60	0.60	6.77	16.6	27.06	2.46	26.55	0.09	0.69
0.61	0.61	7.04	17.5	27.74	2.48	27.22	0.10	0.71
0.62	0.62	7.32	18.3	28.42	2.50	27.88	0.10	0.72
0.63	0.63	7.60	19.2	29.10	2.53	28.55	0.10	0.73
0.64	0.64	7.89	20.1	29.78	2.55	29.21	0.10	0.74
0.65	0.65	8.19	21.1	30.47	2.57	29.88	0.10	0.75
0.66	0.66	8.49	22.0	31.15	2.60	30.54	0.10	0.76
0.67	0.67	8.80	23.1	31.83	2.62	31.21	0.11	0.78
0.68	0.68	9.11	23.9	33.00	2.62	32.83	0.11	0.79
0.69	0.69	9.44	24.9	33.84	2.64	33.66	0.11	0.80
0.70	0.70	9.79	26.0	34.80	2.65	34.16	0.11	0.81
0.71	0.71	10.13	27.3	35.31	2.69	34.66	0.11	0.82
0.72	0.72	10.48	28.6	35.83	2.72	35.17	0.12	0.84
0.73	0.73	10.84	29.9	36.34	2.76	35.67	0.12	0.85
0.74	0.74	11.20	31.3	36.85	2.79	36.17	0.12	0.86
0.75	0.75	11.56	32.7	37.36	2.83	36.67	0.12	0.87
0.76	0.76	11.93	34.1	37.87	2.86	37.18	0.13	0.89
0.77	0.77	12.31	35.6	38.38	2.90	37.68	0.13	0.90
0.78	0.78	12.68	37.2	38.89	2.93	38.18	0.13	0.91
0.79	0.79	13.07	38.7	39.40	2.96	38.68	0.14	0.93
0.80	0.80	13.46	40.3	39.91	2.99	39.19	0.14	0.94
0.81	0.81	13.85	41.9	40.42	3.03	39.69	0.14	0.95
0.82	0.82	14.25	43.6	40.93	3.06	40.19	0.15	0.97
0.83	0.83	14.66	45.3	41.44	3.09	40.69	0.15	0.98
0.84	0.84	15.07	47.0	41.95	3.12	41.20	0.15	0.99

$Q_{100} = 17.5$ cfs
WSEL = 0.61 ft
V = 2.48 fps
$V_H = 0.1$
$E_H = 0.71$

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

SPAIN ROAD @ S=5.97%

MANNING'S N= .017 SLOPE= .0597

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	1.23	5	30.63	0.13	9	47.63	0.96
2	0.46	1.23	6	32.63	0.00	10	0.00	0.00
3	0.63	0.56	7	32.79	0.67	11	0.00	0.00
4	2.63	0.69	8	33.25	0.67	12	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.01	0.01	0.00	0.0	0.17	0.60	0.16	0.01	0.02
0.02	0.02	0.00	0.0	0.34	0.96	0.33	0.01	0.03
0.03	0.03	0.01	0.0	0.51	1.26	0.49	0.02	0.05
0.04	0.04	0.01	0.0	0.68	1.52	0.65	0.04	0.08
0.05	0.05	0.02	0.0	0.85	1.77	0.81	0.05	0.10
0.06	0.06	0.03	0.1	1.02	2.00	0.98	0.06	0.12
0.07	0.07	0.04	0.1	1.19	2.21	1.14	0.08	0.15
0.08	0.08	0.05	0.1	1.37	2.42	1.30	0.09	0.17
0.09	0.09	0.07	0.2	1.54	2.62	1.46	0.11	0.20
0.10	0.10	0.08	0.2	1.71	2.81	1.63	0.12	0.22
0.11	0.11	0.10	0.3	1.88	2.99	1.79	0.14	0.25
0.12	0.12	0.12	0.4	2.05	3.17	1.95	0.16	0.28
0.13	0.13	0.14	0.4	2.39	3.19	2.28	0.16	0.29
0.14	0.14	0.16	0.5	2.90	3.14	2.79	0.15	0.29
0.15	0.15	0.19	0.6	3.41	3.15	3.29	0.15	0.30
0.16	0.16	0.23	0.7	3.92	3.21	3.79	0.16	0.32
0.17	0.17	0.27	0.9	4.43	3.30	4.29	0.17	0.34
0.18	0.18	0.31	1.1	4.94	3.41	4.80	0.18	0.36
0.19	0.19	0.37	1.3	5.45	3.52	5.30	0.19	0.38
0.20	0.20	0.42	1.5	5.96	3.65	5.80	0.21	0.41
0.21	0.21	0.48	1.8	6.47	3.78	6.30	0.22	0.43
0.22	0.22	0.55	2.1	6.98	3.91	6.81	0.24	0.46
0.23	0.23	0.62	2.5	7.49	4.04	7.31	0.25	0.48
0.24	0.24	0.69	2.9	8.00	4.18	7.81	0.27	0.51
0.25	0.25	0.77	3.3	8.51	4.32	8.31	0.29	0.54
0.26	0.26	0.86	3.8	9.02	4.45	8.82	0.31	0.57
0.27	0.27	0.95	4.4	9.53	4.59	9.32	0.33	0.60
0.28	0.28	1.05	4.9	10.04	4.73	9.82	0.35	0.63
0.29	0.29	1.15	5.6	10.55	4.86	10.32	0.37	0.66
0.30	0.30	1.25	6.3	11.07	5.00	10.83	0.39	0.69
0.31	0.31	1.36	7.0	11.58	5.13	11.33	0.41	0.72
0.32	0.32	1.48	7.8	12.09	5.26	11.83	0.43	0.75
0.33	0.33	1.60	8.6	12.60	5.40	12.33	0.45	0.78
0.34	0.34	1.73	9.5	13.11	5.53	12.84	0.47	0.81
0.35	0.35	1.86	10.5	13.62	5.66	13.34	0.50	0.85
0.36	0.36	1.99	11.5	14.13	5.79	13.84	0.52	0.88
0.37	0.37	2.13	12.6	14.64	5.91	14.34	0.54	0.91
0.38	0.38	2.28	13.8	15.15	6.04	14.85	0.57	0.95
0.39	0.39	2.43	15.0	15.66	6.17	15.35	0.59	0.98
0.40	0.40	2.59	16.3	16.17	6.29	15.85	0.61	1.01
0.41	0.41	2.75	17.6	16.68	6.42	16.35	0.64	1.05
0.42	0.42	2.91	19.1	17.19	6.54	16.86	0.66	1.08
0.43	0.43	3.08	20.5	17.70	6.66	17.36	0.69	1.12
0.45	0.45	3.44	23.8	18.72	6.90	18.36	0.74	1.19

Q_{100} = 11.9 cfs
WSEL = 0.36 ft
V = 5.83 fps
V_H = 0.53 ft
E_H = 0.89 ft

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

SPAIN ROAD @ S=5.35%

MANNING'S N= .017 SLOPE= .0535

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	1.23	5	30.63	0.13	9	47.63	0.96
2	0.46	1.23	6	32.63	0.00	10	0.00	0.00
3	0.63	0.56	7	32.79	0.67	11	0.00	0.00
4	2.63	0.69	8	33.25	0.67	12	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.01	0.01	0.00	0.0	0.17	0.57	0.16	0.01	0.02
0.02	0.02	0.00	0.0	0.34	0.91	0.33	0.01	0.03
0.03	0.03	0.01	0.0	0.51	1.19	0.49	0.02	0.05
0.04	0.04	0.01	0.0	0.68	1.44	0.65	0.03	0.07
0.05	0.05	0.02	0.0	0.85	1.67	0.81	0.04	0.09
0.06	0.06	0.03	0.1	1.02	1.89	0.98	0.06	0.12
0.07	0.07	0.04	0.1	1.19	2.09	1.14	0.07	0.14
0.08	0.08	0.05	0.1	1.37	2.29	1.30	0.08	0.16
0.09	0.09	0.07	0.2	1.54	2.48	1.46	0.10	0.19
0.10	0.10	0.08	0.2	1.71	2.66	1.63	0.11	0.21
0.11	0.11	0.10	0.3	1.88	2.83	1.79	0.12	0.23
0.12	0.12	0.12	0.4	2.05	3.00	1.95	0.14	0.26
0.13	0.13	0.14	0.4	2.39	3.02	2.28	0.14	0.27
0.14	0.14	0.16	0.5	2.90	2.97	2.79	0.14	0.28
0.15	0.15	0.19	0.6	3.41	2.99	3.29	0.14	0.29
0.16	0.16	0.23	0.7	3.92	3.04	3.79	0.14	0.30
0.17	0.17	0.27	0.8	4.43	3.13	4.29	0.15	0.32
0.18	0.18	0.31	1.0	4.94	3.23	4.80	0.16	0.34
0.19	0.19	0.37	1.2	5.45	3.34	5.30	0.17	0.36
0.20	0.20	0.42	1.5	5.96	3.45	5.80	0.19	0.39
0.21	0.21	0.48	1.7	6.47	3.58	6.30	0.20	0.41
0.22	0.22	0.55	2.0	6.98	3.70	6.81	0.21	0.43
0.23	0.23	0.62	2.4	7.49	3.83	7.31	0.23	0.46
0.24	0.24	0.69	2.7	8.00	3.96	7.81	0.24	0.48
0.25	0.25	0.77	3.2	8.51	4.09	8.31	0.26	0.51
0.26	0.26	0.86	3.6	9.02	4.22	8.82	0.28	0.54
0.27	0.27	0.95	4.1	9.53	4.35	9.32	0.29	0.56
0.28	0.28	1.05	4.7	10.04	4.47	9.82	0.31	0.59
0.29	0.29	1.15	5.3	10.55	4.60	10.32	0.33	0.62
0.30	0.30	1.25	5.9	11.07	4.73	10.83	0.35	0.65
0.31	0.31	1.36	6.6	11.58	4.86	11.33	0.37	0.68
0.32	0.32	1.48	7.4	12.09	4.98	11.83	0.39	0.71
0.33	0.33	1.60	8.2	12.60	5.11	12.33	0.41	0.74
0.34	0.34	1.73	9.0	13.11	5.23	12.84	0.43	0.77
0.35	0.35	1.86	9.9	13.62	5.36	13.34	0.45	0.80
0.36	0.36	1.99	10.9	14.13	5.48	13.84	0.47	0.83
0.37	0.37	2.13	11.9	14.64	5.60	14.34	0.49	0.86
0.38	0.38	2.28	13.0	15.15	5.72	14.85	0.51	0.89
0.39	0.39	2.43	14.2	15.66	5.84	15.35	0.53	0.92
0.40	0.40	2.59	15.4	16.17	5.96	15.85	0.55	0.95
0.41	0.41	2.75	16.7	16.68	6.07	16.35	0.57	0.98
0.42	0.42	2.91	18.0	17.19	6.19	16.86	0.60	1.02
0.43	0.43	3.08	19.5	17.70	6.31	17.36	0.62	1.05
0.45	0.45	3.44	22.5	18.72	6.54	18.36	0.66	1.11

Q_{100} = 15.5 cfs
WSEL = 0.4 ft
V = 5.97 fps
V_H = 0.55 ft
E_H = 0.95 ft

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

SPAIN ROAD @ S=4.38%

MANNING'S N= .017 SLOPE= .0438

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	1.23	5	30.63	0.13	9	47.63	0.96
2	0.46	1.23	6	32.63	0.00	10	0.00	0.00
3	0.63	0.56	7	32.79	0.67	11	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.01	0.01	0.00	0.0	0.17	0.52	0.16	0.00	0.01
0.02	0.02	0.00	0.0	0.34	0.82	0.33	0.01	0.03
0.03	0.03	0.01	0.0	0.51	1.08	0.49	0.02	0.05
0.04	0.04	0.01	0.0	0.68	1.30	0.65	0.03	0.07
0.05	0.05	0.02	0.0	0.85	1.51	0.81	0.04	0.09
0.06	0.06	0.03	0.1	1.02	1.71	0.98	0.05	0.11
0.07	0.07	0.04	0.1	1.19	1.90	1.14	0.06	0.13
0.08	0.08	0.05	0.1	1.37	2.07	1.30	0.07	0.15
0.09	0.09	0.07	0.1	1.54	2.24	1.46	0.08	0.17
0.10	0.10	0.08	0.2	1.71	2.40	1.63	0.09	0.19
0.11	0.11	0.10	0.3	1.88	2.56	1.79	0.10	0.21
0.12	0.12	0.12	0.3	2.05	2.71	1.95	0.11	0.23
0.13	0.13	0.14	0.4	2.39	2.73	2.28	0.12	0.25
0.14	0.14	0.16	0.4	2.90	2.69	2.79	0.11	0.25
0.15	0.15	0.19	0.5	3.41	2.70	3.29	0.11	0.26
0.16	0.16	0.23	0.6	3.92	2.75	3.79	0.12	0.28
0.17	0.17	0.27	0.8	4.43	2.83	4.29	0.12	0.29
0.18	0.18	0.31	0.9	4.94	2.92	4.80	0.13	0.31
0.19	0.19	0.37	1.1	5.45	3.02	5.30	0.14	0.33
0.20	0.20	0.42	1.3	5.96	3.12	5.80	0.15	0.35
0.21	0.21	0.48	1.6	6.47	3.23	6.30	0.16	0.37
0.22	0.22	0.55	1.8	6.98	3.35	6.81	0.17	0.39
0.23	0.23	0.62	2.1	7.49	3.46	7.31	0.19	0.42
0.24	0.24	0.69	2.5	8.00	3.58	7.81	0.20	0.44
0.25	0.25	0.77	2.9	8.51	3.70	8.31	0.21	0.46
0.26	0.26	0.86	3.3	9.02	3.81	8.82	0.23	0.49
0.27	0.27	0.95	3.7	9.53	3.93	9.32	0.24	0.51
0.28	0.28	1.05	4.2	10.04	4.05	9.82	0.25	0.53
0.29	0.29	1.15	4.8	10.55	4.16	10.32	0.27	0.56
0.30	0.30	1.25	5.4	11.07	4.28	10.83	0.28	0.58
0.31	0.31	1.36	6.0	11.58	4.39	11.33	0.30	0.61
0.32	0.32	1.48	6.7	12.09	4.51	11.83	0.32	0.64
0.33	0.33	1.60	7.4	12.60	4.62	12.33	0.33	0.66
0.34	0.34	1.73	8.2	13.11	4.73	12.84	0.35	0.69
0.35	0.35	1.86	9.0	13.62	4.85	13.34	0.36	0.71
0.36	0.36	1.99	9.9	14.13	4.96	13.84	0.38	0.74
0.37	0.37	2.13	10.8	14.64	5.07	14.34	0.40	0.77
0.38	0.38	2.28	11.8	15.15	5.17	14.85	0.42	0.80
0.39	0.39	2.43	12.8	15.66	5.28	15.35	0.43	0.82
0.40	0.40	2.59	13.9	16.17	5.39	15.85	0.45	0.85
0.41	0.41	2.75	15.1	16.68	5.50	16.35	0.47	0.88
0.42	0.42	2.91	16.3	17.19	5.60	16.86	0.49	0.91
0.43	0.43	3.08	17.6	17.70	5.71	17.36	0.51	0.94
0.45	0.45	3.44	20.4	18.72	5.91	18.36	0.54	0.99
0.46	0.46	3.63	21.8	19.23	6.02	18.87	0.56	1.02

Q_{100} = 18.7 cfs
WSEL = 0.44 ft
V = 5.79 fps
V_H = 0.52 ft
E_H = 0.96 ft

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

SPAIN ROAD @ S=3.12%

MANNING'S N= .017 SLOPE= .0312

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	1.23	5	30.63	0.13	9	47.63	0.96
2	0.46	1.23	6	32.63	0.00	10	0.00	0.00
3	0.63	0.56	7	32.79	0.67	11	0.00	0.00
4	2.63	0.69	8	33.25	0.67	12	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.01	0.01	0.00	0.0	0.17	0.44	0.16	0.00	0.01
0.02	0.02	0.00	0.0	0.34	0.69	0.33	0.01	0.03
0.03	0.03	0.01	0.0	0.51	0.91	0.49	0.01	0.04
0.04	0.04	0.01	0.0	0.68	1.10	0.65	0.02	0.06
0.05	0.05	0.02	0.0	0.85	1.28	0.81	0.03	0.08
0.06	0.06	0.03	0.0	1.02	1.44	0.98	0.03	0.09
0.07	0.07	0.04	0.1	1.19	1.60	1.14	0.04	0.11
0.08	0.08	0.05	0.1	1.37	1.75	1.30	0.05	0.13
0.09	0.09	0.07	0.1	1.54	1.89	1.46	0.06	0.15
0.10	0.10	0.08	0.2	1.71	2.03	1.63	0.06	0.16
0.11	0.11	0.10	0.2	1.88	2.16	1.79	0.07	0.18
0.12	0.12	0.12	0.3	2.05	2.29	1.95	0.08	0.20
0.13	0.13	0.14	0.3	2.39	2.31	2.28	0.08	0.21
0.14	0.14	0.16	0.4	2.90	2.27	2.79	0.08	0.22
0.15	0.15	0.19	0.4	3.41	2.28	3.29	0.08	0.23
0.16	0.16	0.23	0.5	3.92	2.32	3.79	0.08	0.24
0.17	0.17	0.27	0.6	4.43	2.39	4.29	0.09	0.26
0.18	0.18	0.31	0.8	4.94	2.46	4.80	0.09	0.27
0.19	0.19	0.37	0.9	5.45	2.55	5.30	0.10	0.29
0.20	0.20	0.42	1.1	5.96	2.64	5.80	0.11	0.31
0.21	0.21	0.48	1.3	6.47	2.73	6.30	0.12	0.33
0.22	0.22	0.55	1.5	6.98	2.83	6.81	0.12	0.34
0.23	0.23	0.62	1.8	7.49	2.92	7.31	0.13	0.36
0.24	0.24	0.69	2.1	8.00	3.02	7.81	0.14	0.38
0.25	0.25	0.77	2.4	8.51	3.12	8.31	0.15	0.40
0.26	0.26	0.86	2.8	9.02	3.22	8.82	0.16	0.42
0.27	0.27	0.95	3.2	9.53	3.32	9.32	0.17	0.44
0.28	0.28	1.05	3.6	10.04	3.42	9.82	0.18	0.46
0.29	0.29	1.15	4.0	10.55	3.51	10.32	0.19	0.48
0.30	0.30	1.25	4.5	11.07	3.61	10.83	0.20	0.50
0.31	0.31	1.36	5.1	11.58	3.71	11.33	0.21	0.52
0.32	0.32	1.48	5.6	12.09	3.81	11.83	0.22	0.54
0.33	0.33	1.60	6.2	12.60	3.90	12.33	0.24	0.57
0.34	0.34	1.73	6.9	13.11	4.00	12.84	0.25	0.59
0.35	0.35	1.86	7.6	13.62	4.09	13.34	0.26	0.61
0.36	0.36	1.99	8.3	14.13	4.18	13.84	0.27	0.63
0.37	0.37	2.13	9.1	14.64	4.28	14.34	0.28	0.65
0.38	0.38	2.28	10.0	15.15	4.37	14.85	0.30	0.68
0.39	0.39	2.43	10.8	15.66	4.46	15.35	0.31	0.70
0.40	0.40	2.59	11.8	16.17	4.55	15.85	0.32	0.72
0.41	0.41	2.75	12.7	16.68	4.64	16.35	0.33	0.74
0.42	0.42	2.91	13.8	17.19	4.73	16.86	0.35	0.77
0.43	0.43	3.08	14.9	17.70	4.82	17.36	0.36	0.79
0.45	0.45	3.44	17.2	18.72	4.99	18.36	0.39	0.84

$Q_{100} = 8.4$ cfs
WSEL = 0.36ft
V = 4.19 fps
$V_H = 0.27$ ft
$E_H = 0.63$ ft

High Desert St. North of Spain

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*****          PC PROGRAM STREAM          SEPTEMBER 1994          *****

STREET  @ S=2.50%
 MANNING'S N=   .017  SLOPE=   .025
 POINT    DIST    ELEV     POINT   DIST    ELEV    POINT   DIST    ELEV
  1       0.00    0.67       4     2.63    0.13      7    20.80    0.97
  2       0.46    0.67       5    19.80    0.47      8    21.30    0.97
  3       0.63    0.00       6    20.63    0.47      9     0.00    0.00
 WSEL     DEPTH   FLOW     FLOW  WETTED    FLOW   TOPWID    VEL     ENERGY
           INC     AREA     RATE    PER     VEL              HEAD     HEAD
  (FT)     (FT)   SQ.FT.   (CFS)   (FT)    (FPS)    (FT)    (FT)     (FT)
   0.05    0.05    0.02      0.0    0.85    1.14     0.81    0.02     0.07
   0.10    0.10    0.08      0.1    1.71    1.82     1.63    0.05     0.15
   0.15    0.15    0.19      0.4    3.40    2.04     3.28    0.06     0.21
   0.20    0.20    0.42      1.0    5.94    2.36     5.78    0.09     0.29
   0.25    0.25    0.77      2.2    8.48    2.80     8.28    0.12     0.37
   0.30    0.30    1.25      4.0   11.02    3.24    10.79    0.16     0.46
   0.35    0.35    1.85      6.8   13.57    3.66    13.29    0.21     0.56
   0.40    0.40    2.58     10.5   16.11    4.07    15.79    0.26     0.66
   0.45    0.45    3.43     15.3   18.65    4.47    18.29    0.31     0.76
   0.50    0.50    4.41     21.8   20.55    4.95    20.14    0.38     0.88
   0.55    0.55    5.42     30.7   20.66    5.66    20.17    0.50     1.05
   0.60    0.60    6.43     40.6   20.76    6.32    20.20    0.62     1.22
   0.65    0.65    7.44     51.7   20.87    6.95    20.23    0.75     1.40
   0.70    0.70    8.46     63.0   21.40    7.45    20.71    0.86     1.56
   0.75    0.75    9.50     76.2   21.45    8.03    20.73    1.00     1.75
   0.80    0.80   10.53     90.5   21.51    8.59    20.74    1.15     1.95
   0.85    0.85   11.57    105.6   21.56    9.13    20.76    1.29     2.14
   0.90    0.90   12.61    121.7   21.61    9.65    20.78    1.45     2.35
   0.95    0.95   13.65    138.6   21.67   10.16    20.79    1.60     2.55
   0.97    0.97   14.07    145.7   21.69   10.36    21.30    1.67     2.64
```

Q_T = 3.87 cfs

Q_{100} = 1.94 cfs

V = 2.70 ft/s

d = .24'

HD St. North of Spain

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

STREET @ S=4.00%
MANNING'S N= .017 SLOPE= .04

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.67	4	2.63	0.13	7	20.80	0.97
2	0.46	0.67	5	19.80	0.47	8	21.30	0.97
3	0.63	0.00	6	20.63	0.47	9	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.05	0.05	0.02	0.0	0.85	1.45	0.81	0.03	0.08
0.10	0.10	0.08	0.2	1.71	2.30	1.63	0.08	0.18
0.15	0.15	0.19	0.5	3.40	2.58	3.28	0.10	0.25
0.20	0.20	0.42	1.3	5.94	2.99	5.78	0.14	0.34
0.25	0.25	0.77	2.7	8.48	3.54	8.28	0.19	0.44
0.30	0.30	1.25	5.1	11.02	4.09	10.79	0.26	0.56
0.35	0.35	1.85	8.6	13.57	4.63	13.29	0.33	0.68
0.40	0.40	2.58	13.3	16.11	5.15	15.79	0.41	0.81
0.45	0.45	3.43	19.4	18.65	5.65	18.29	0.50	0.95
0.50	0.50	4.41	27.6	20.55	6.26	20.14	0.61	1.11
0.55	0.55	5.42	38.8	20.66	7.16	20.17	0.80	1.35
0.60	0.60	6.43	51.4	20.76	8.00	20.20	0.99	1.59
0.65	0.65	7.44	65.3	20.87	8.79	20.23	1.20	1.85
0.70	0.70	8.46	79.7	21.40	9.42	20.71	1.38	2.08
0.75	0.75	9.50	96.4	21.45	10.15	20.73	1.60	2.35
0.80	0.80	10.53	114.4	21.51	10.86	20.74	1.83	2.63
0.85	0.85	11.57	133.6	21.56	11.55	20.76	2.07	2.92
0.90	0.90	12.61	153.9	21.61	12.21	20.78	2.31	3.21
0.95	0.95	13.65	175.4	21.67	12.85	20.79	2.56	3.51
0.97	0.97	14.07	184.2	21.69	13.10	21.30	2.66	3.63

$Q_T = 2.28$ cfs

$Q_{\frac{1}{2}100} = 1.14$ cfs

$V = 2.91$ ft/s

$d = .19'$

$Q_T = 4.63$ cfs

$Q_{\frac{1}{2}100} = 2.32$ cfs

$V = 3.39$ ft/s

$d = .24'$

HD St North of Spain

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

STREET @ S=5.75%

MANNING'S N= .017 SLOPE= .0575

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.67	4	2.63	0.13	7	20.80	0.97
2	0.46	0.67	5	19.80	0.47	8	21.30	0.97
3	0.63	0.00	6	20.63	0.47	9	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.05	0.05	0.02	0.0	0.85	1.73	0.81	0.05	0.10
0.10	0.10	0.08	0.2	1.71	2.75	1.63	0.12	0.22
0.15	0.15	0.19	0.6	3.40	3.10	3.28	0.15	0.30
0.20	0.20	0.42	1.5	5.94	3.58	5.78	0.20	0.40
0.25	0.25	0.77	3.3	8.48	4.24	8.28	0.28	0.53
0.30	0.30	1.25	6.1	11.02	4.91	10.79	0.37	0.67
0.35	0.35	1.85	10.3	13.57	5.55	13.29	0.48	0.83
0.40	0.40	2.58	15.9	16.11	6.18	15.79	0.59	0.99
0.45	0.45	3.43	23.2	18.65	6.78	18.29	0.71	1.16
0.50	0.50	4.41	33.1	20.55	7.51	20.14	0.88	1.38
0.55	0.55	5.42	46.5	20.66	8.59	20.17	1.14	1.69
0.60	0.60	6.43	61.6	20.76	9.59	20.20	1.43	2.03
0.65	0.65	7.44	78.3	20.87	10.54	20.23	1.72	2.37
0.70	0.70	8.46	95.5	21.40	11.29	20.71	1.98	2.68
0.75	0.75	9.50	115.6	21.45	12.17	20.73	2.30	3.05
0.80	0.80	10.53	137.2	21.51	13.02	20.74	2.63	3.43
0.85	0.85	11.57	160.2	21.56	13.84	20.76	2.98	3.83
0.90	0.90	12.61	184.6	21.61	14.64	20.78	3.33	4.23
0.95	0.95	13.65	210.3	21.67	15.40	20.79	3.68	4.63
0.97	0.97	14.07	220.9	21.69	15.71	21.30	3.83	4.80

$Q_T = 4.63$ cfs

$Q_{\frac{1}{2}100} = 2.32$ cfs.

$V = 3.88$ ft/s

$d = .22'$

High Desert St. North of Spain

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

STREET @ S=2.00%
MANNING'S N= .017 SLOPE= .02

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.67	4	2.63	0.13	7	20.80	0.97
2	0.46	0.67	5	19.80	0.47	8	21.30	0.97
3	0.63	0.00	6	20.63	0.47	9	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.05	0.05	0.02	0.0	0.85	1.02	0.81	0.02	0.07
0.10	0.10	0.08	0.1	1.71	1.62	1.63	0.04	0.14
0.15	0.15	0.19	0.4	3.40	1.83	3.28	0.05	0.20
0.20	0.20	0.42	0.9	5.94	2.11	5.78	0.07	0.27
0.25	0.25	0.77	1.9	8.48	2.50	8.28	0.10	0.35
0.30	0.30	1.25	3.6	11.02	2.89	10.79	0.13	0.43
0.35	0.35	1.85	6.1	13.57	3.28	13.29	0.17	0.52
0.40	0.40	2.58	9.4	16.11	3.64	15.79	0.21	0.61
0.45	0.45	3.43	13.7	18.65	4.00	18.29	0.25	0.70
0.50	0.50	4.41	19.5	20.55	4.43	20.14	0.30	0.80
0.55	0.55	5.42	27.4	20.66	5.06	20.17	0.40	0.95
0.60	0.60	6.43	36.3	20.76	5.66	20.20	0.50	1.10
0.65	0.65	7.44	46.2	20.87	6.21	20.23	0.60	1.25
0.70	0.70	8.46	56.3	21.40	6.66	20.71	0.69	1.39
0.75	0.75	9.50	68.2	21.45	7.18	20.73	0.80	1.55
0.80	0.80	10.53	80.9	21.51	7.68	20.74	0.92	1.72
0.85	0.85	11.57	94.5	21.56	8.16	20.76	1.04	1.89
0.90	0.90	12.61	108.8	21.61	8.63	20.78	1.16	2.06
0.95	0.95	13.65	124.0	21.67	9.08	20.79	1.28	2.23
0.97	0.97	14.07	130.3	21.69	9.26	21.30	1.33	2.30

$Q_T = 4.63$ cfs

$Q_{\frac{1}{2}100} = 2.32$ cfs

$V = 2.60$ ft/s

$d = .26'$

SUMMARY OF INLET ANALYSIS
FOR SPAIN ROAD AND HIGH DESERT STREET

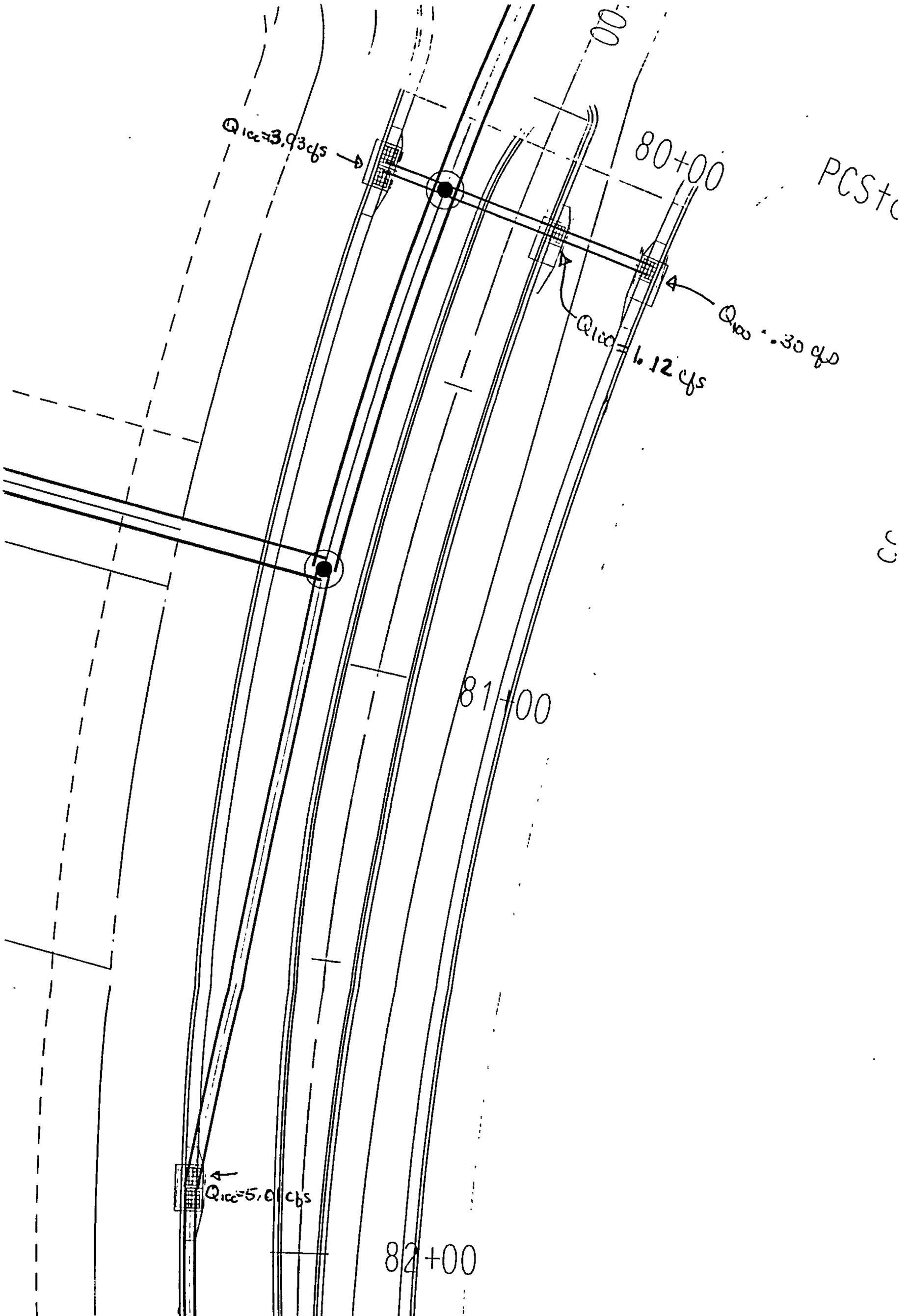
FULLY DEVELOPED CONDITIONS ON-SITE
100 YR, 6 HR. STORM

HYDRAULIC EVALUATION OF INLETS - HEC12 METHOD
100-YEAR STORM - STREET FLOWS W/ 20% CLOGGING FACTOR
15% REDUCTION IN ROUTED Q'S FOR ATTENUATION

Qi = Intercepted Flow
Qb = Bypass Flow
S = Longitudinal Slope
Sx = Cross Slope
Vo = Gutter Velocity where splash-over first occurs

Eo = Ratio of frontal flow to total gutter flow
Rf = Ratio of frontal flow intercepted to total frontal flow
Rs = Ratio of side flow intercepted to total side flow
E = Efficiency

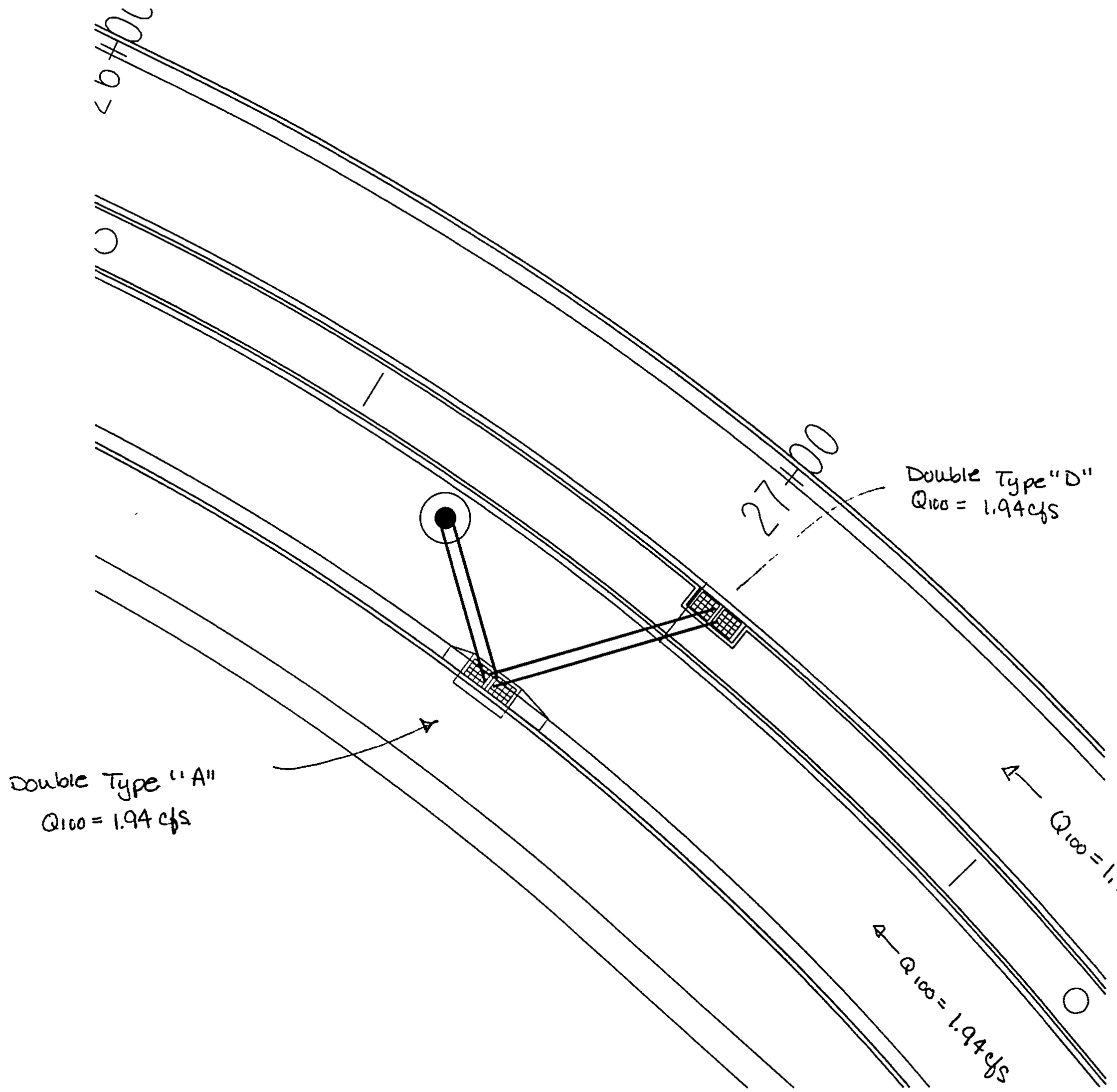
Inlet ID	Total Rtd Q (cfs)	Inlet Width (ft)	Inlet Length (ft)	Ponding Width (ft)	Pond Depth (ft)	Qi (cfs)	Qb (cfs)	S (ft/ft)	Sx (ft/ft)	Vo (fps)	V (fps)	Eo	Rf	Rs	E
BASIN S3															
1	18.70	1.54	5.32	17.49	0.35	6.90	11.80	0.0312	0.0200	9.5	6.1	0.22	1.0	0.2	0.37
2	11.80	1.54	5.32	14.71	0.29	5.01	6.78	0.0312	0.0200	9.5	5.4	0.26	1.0	0.2	0.42
3	8.38	1.54	5.32	12.95	0.26	3.93	4.45	0.0312	0.0200	9.5	5.0	0.29	1.0	0.3	0.47
			Total Intercepted Flow (RT):			***15.85 cfs***									
4	1.60	1.54	5.32	6.96	0.14	1.12	0.48	0.0312	0.0200	9.5	3.3	0.49	1.0	0.4	0.70
			Total Intercepted Flow (LT):			***1.12 cfs***									



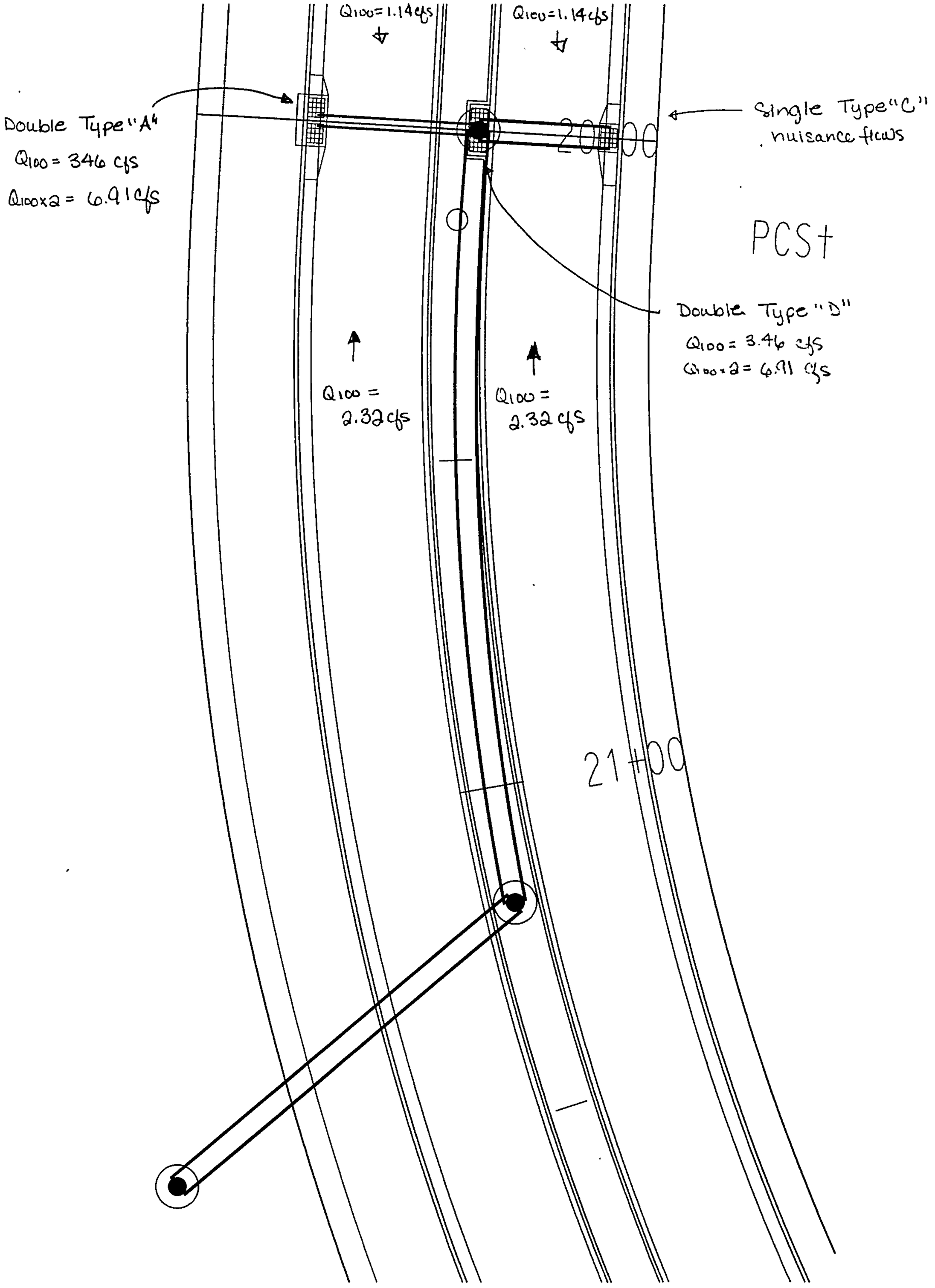
Spain Rd.

PTSta 82+67.60

C-2

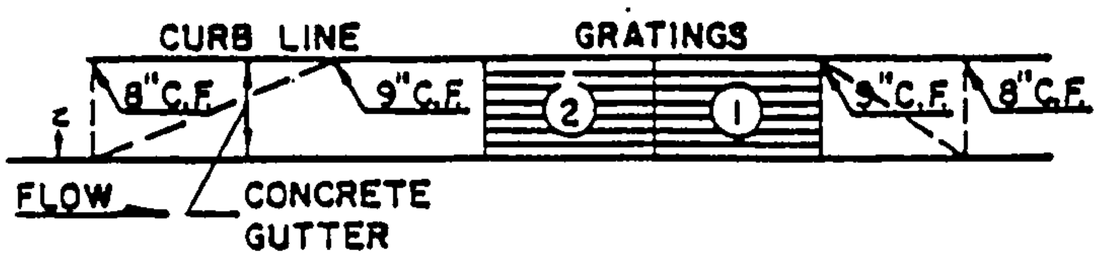


HD St North of Spain

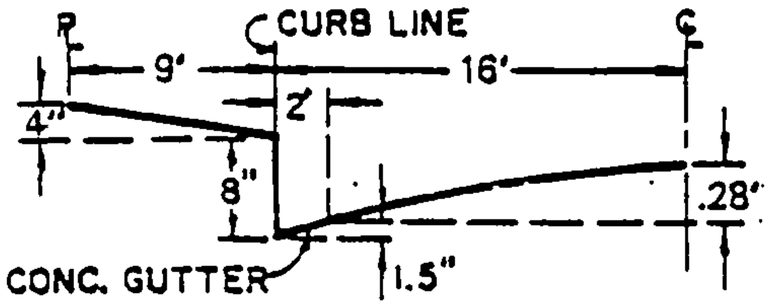


HD St. North of Spain

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



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

HD St. North of Spain

S = 2.50%
Q = 1.94 cfs
d = .24

@ 2% Qi = 2.15
@ 5% Qi = 3.10

@ 2.5% Qi = 2.31 cfs

ANALYSIS OF AN INLET IN A SUMP CONDITION - **Lowpoint in High Desert St. (Lt. & Rt.)**

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

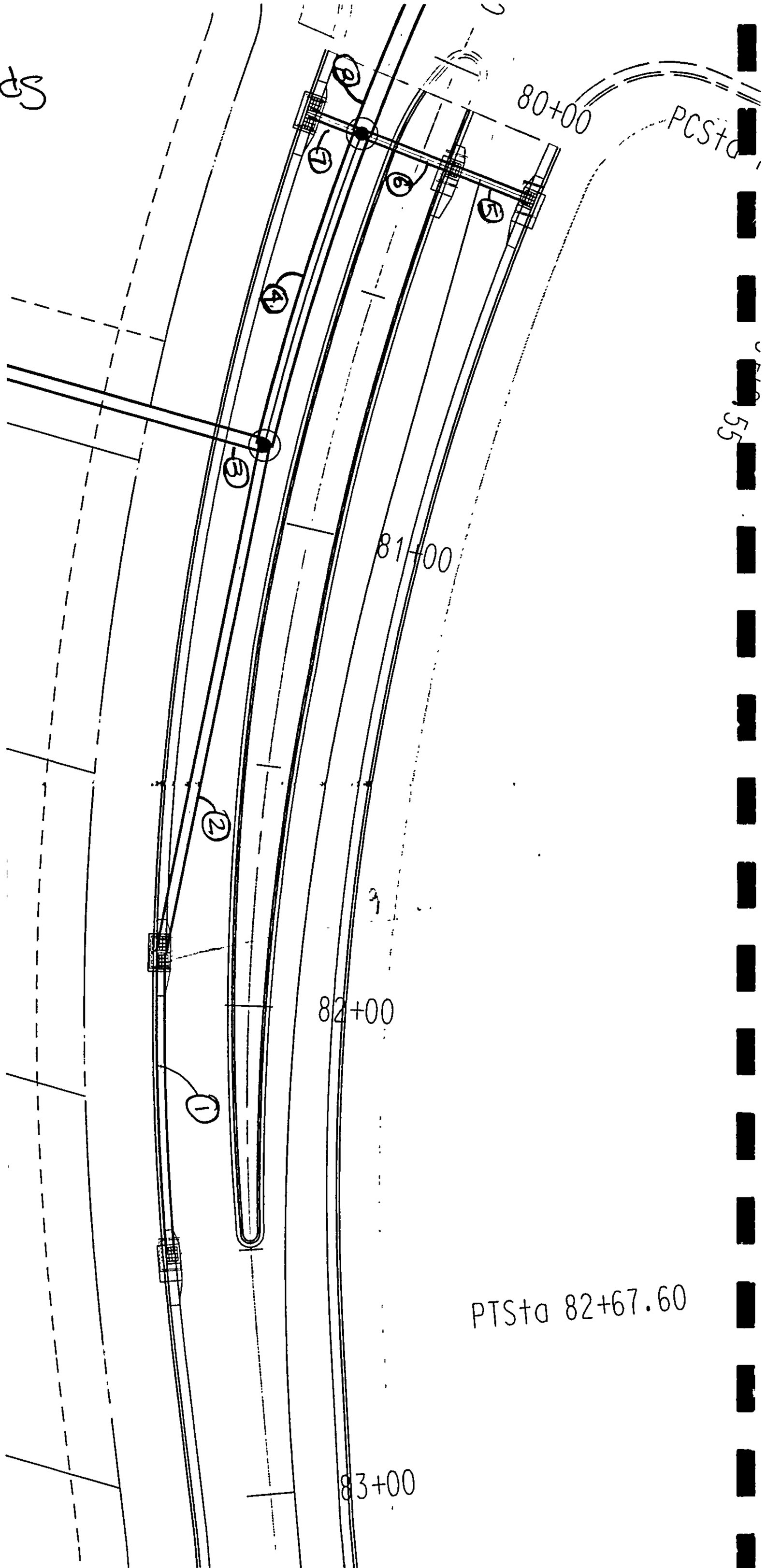
WEIR:	Q=C*L*H^1.5		ORIFICE:	Q=C*A*(2*G*H)**0.5
Wing opening	Grate opeining		Grate opening	Wing opening
C= 3.0	C=3.0		C=0.6	C=0.6
L= 4.0 ft	L(single grate)=[(2.67')+2(1.8')]=6.2'		A(single grate)=4.09 sf	A=2.0 sf
Q=3.0(4.0')H**1.5= 12.0H**1.5	Q=3.0(6.27)H^1.5=18.81*H^1.5		Q=2.46*(64.4*H)^0.5	Q=1.2*(64.4*H)^0.5

	WS ELEVATION	HEIGHT ABOVE INLET	Q (CFS) WEIR WING OPENING	Q (CFS) WEIR SINGLE GRATE	Q (CFS) ORIFICE SINGLE GRATE	TOTAL Q (CFS)	COMMENTS:
~FL @ INLET	0.00	0.00	0.00	0.00	0.00	0.00	Flow at single "A" inlet w/ two wing openings
	0.10	0.10	0.38	0.59	6.24	1.35	Weir controls on grate analysis
	0.20	0.20	1.07	1.68	8.82	3.83	Q(100 yr) = 3.46 cfs is provided at this depth
	0.30	0.30	1.97	3.09	10.80	7.03	Q(2x100 yr) = 6.91 cfs is provided at this depth
	0.40	0.40	3.04	4.76	12.47	10.83	
	0.50	0.50	4.24	6.65	13.94	15.14	
	0.60	0.60	5.58	8.74	15.27	19.90	
TOP OF CURB	0.70	0.70	7.03	11.02	16.50	25.07	
	0.80	0.80	8.59	13.46	17.64	30.63	
	0.90	0.90	10.25	16.06	18.71	36.55	
ROW LIMIT	1.00	1.00	12.00	18.81	19.72	42.81	

NOTE: The total runoff intercepted by the inlet at the low point in the road is:
Q(100) = 2*[(runoff of the wing opening) + (the lesser of the weir or orifice amount taken by the double grate)].
THE 100 YR STORM EVENT = 3.46CFS at the sump condition
THE 2 x 100 YR STORM EVENT = 6.91CFS at the sump condition

D-1

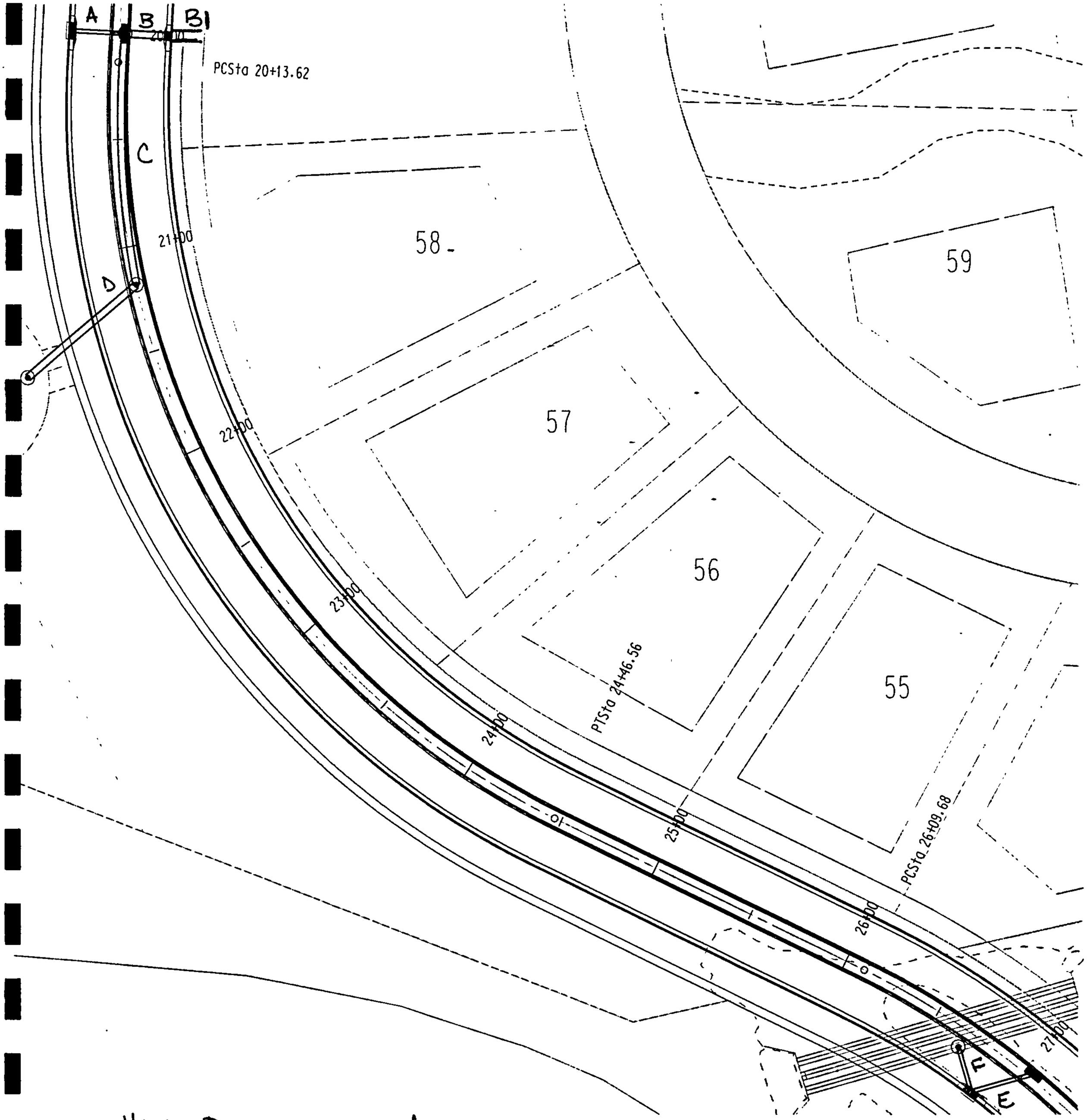
Spain Rd



SUMMARY OF CULVERT ANALYSIS
FOR SPAIN ROAD AND HIGH DESERT STREET

FULLY DEVELOPED CONDITIONS ON-SITE
100 YR, 6 HR. STORM

PIPE NO.	SIZE/TYPE	LENGTH (FT)	PIPE SLOPE (%)	PROPOSED Q (100-yr, CFS)	PIPE CAPACITY (GRAVITY FLOW) (CFS)	PIPE VELOCITY (FPS)	PIPE DEPTH (IN)
1	18" RCP	62.01	6.00	6.90	27.67	12.28	6.34
2	24" RCP	107.42	10.93	11.91	80.45	17.30	6.43
3	42" RCP	25.17	0.20	35.30	48.32	5.18	28.02
4	42" RCP	67.25	0.20	47.21	48.32	5.18	36.80
5	18" RCP	17.59	6.00	0.30	27.67	2.80	0.90
6	18" RCP	20.25	31.33	1.42	63.23	13.23	4.64
7	18" RCP	11.33	62.76	3.93	89.48	22.93	2.52
8 (EXISTING)	42" RCP	96.21	3.86	106.97	212.62	20.95	22.14



High Desert Street
North of Spain Road.

Drainage Structure Analyzer

Pipe Hydraulic Analysis

Date: Friday, May 05, 2000 08:45:57 AM

Pipe A

Input Data

Shape	Circular
Material	RC C76-A
Roughness	0.013000
Method	Manning
Flow Rate	3.46 cfs
Slope	13.51%
Size (W x T):	18.00 x 2.0000

Output Results

Flow Rate	3.46 cfs
Slope	13.51%
d/D	0.20
Capacity	38.61 cfs
Velocity	13.56 ft/s
Depth	0.30 ft
Critical Depth	0.70 ft
Size (W x T):	18.00 x 2.0000

Drainage Structure Analyzer

Pipe Hydraulic Analysis

Date: Tuesday, May 23, 2000 10:39:24 AM

Pipe B & B1

Input Data

Shape	Circular
Material	RC C76-A
Roughness	0.013000
Method	Manning
Flow Rate	50.0000 cfs
Slope	10.450%
Size (W x T):	36.00 x 3.0000

Output Results

Flow Rate	50.0000 cfs
Slope	10.450%
d/D	0.33
Capacity	215.6123 cfs
Velocity	24.85 ft/s
Depth	0.98 ft
Critical Depth	2.30 ft
Size (W x T):	36.00 x 3.0000

Drainage Structure Analyzer

Pipe Hydraulic Analysis

Date: Friday, May 05, 2000 08:47:02 AM

Pipe C

Input Data

Shape	Circular
Material	RC C76-A
Roughness	0.013000
Method	Manning
Flow Rate	67.00 cfs
Slope	1.89%
Size (W x T):	36.00 x 3.0000

Output Results

Flow Rate	67.00 cfs
Slope	1.89%
d/D	0.63
Capacity	91.70 cfs
Velocity	14.17 ft/s
Depth	1.90 ft
Critical Depth	2.61 ft
Size (W x T):	36.00 x 3.0000

Pipe D

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==========================================================================
Drainage Structure Analyzer

Pipe Hydraulic Analysis

Date:  Friday, May 05, 2000 08:47:16 AM
==========================================================================

Input Data
----------
Shape                                    Circular
Material                                 RC C76-A
Roughness                                0.013000
Method                                    Manning
Flow Rate                                   67.00 cfs
Slope                                       1.90%
Size (W x T):                      36.00 x 3.0000

Output Results
--------------
Flow Rate                                   67.00 cfs
Slope                                       1.90%
d/D                                          0.63
Capacity                                    91.94 cfs
Velocity                                    14.20 ft/s
Depth                                        1.90 ft
Critical Depth                               2.61 ft
Size (W x T):                      36.00 x 3.0000
```

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Drainage Structure Analyzer

Pipe Hydraulic Analysis

Date: Friday, May 05, 2000 08:47:45 AM

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Pipe E

Input Data

Shape	Circular	
Material	RC C76-A	
Roughness	0.013000	
Method	Manning	
Flow Rate	1.94	cfs
Slope	1.81%	
Size (W x T):	18.00 x 2.0000	

Output Results

Flow Rate	1.94	cfs
Slope	1.81%	
d/D	0.25	
Capacity	14.13	cfs
Velocity	5.62	ft/s
Depth	0.38	ft
Critical Depth	0.52	ft
Size (W x T):	18.00 x 2.0000	

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Drainage Structure Analyzer

Pipe Hydraulic Analysis

Date: Friday, May 19, 2000 08:38:45 AM

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Pipe F

Input Data

Shape	Circular	
Material	RC C76-A	
Roughness	0.013000	
Method	Manning	
Flow Rate	3.8800	cfs
Slope	12.180%	
Size (W x T):	18.00 x 2.0000	

Output Results

Flow Rate	3.8800	cfs
Slope	12.180%	
d/D	0.22	
Capacity	36.6600	cfs
Velocity	13.52	ft/s
Depth	0.33	ft
Critical Depth	0.75	ft
Size (W x T):	18.00 x 2.0000	