REVISED
DRAINAGE MASTER PLAN
SEVEN BAR NORTH
SUBDIVISION

APRIL 1994
revised JUNE 6, 1994

DRAINAGE MASTER PLAN
SEVEN BAR NORTH SUBDIVISION

Prepared for:

BROWN/NZD DEVELOPMENT JOINT VENTURE
C/O BROWN & ASSOCIATES
3411 CANDELARIA
ALBUQUERQUE, NEW MEXICO

JUN - 7 1994

Job No. 93217.48

Prepared by:

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6/8/94

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I. INTRODUCTION

This Drainage Master Plan is prepared to support the development of approximately 158 acres of vacant land on Albuquerque's west side. The property is currently described as Tracts B-5A and B-7A, and Seven Bar Loop Road right-of-way, Seven Ranch. The property is proposed for residential development, possibly encompassing up to 625 lots, and related street and infrastructure improvements. The property is bounded by Westside Boulevard on the north, Rio Rancho Boulevard/NM 528 and Seven Bar/Skyview Channel on the east, Black's Arroyo Channel on the south, and vacant land on the west. Please reference the Vicinity Map on the Drainage Master Plan in the rear pocket of this report.

II. PURPOSE OF REPORT

The purpose of this Drainage Master Plan is to 1) obtain approval of a Bulk Land Plat request before the Development Review Board (which required conceptual plan review only) and 2) obtain approval of this Master Drainage Plan in order to provide guidance to future individual development of the nine tracts proposed by the Bulk Land Plat.

III. METHODOLOGY

Undeveloped existing conditions and proposed developed conditions will be analyzed for the 100-year, 6-hours storm event in accordance with the City of Albuquerque's revised Section 22.2, Hydrology of the Development Process Manual, January 1993 (DPM).

Street hydraulics have been analyzed using Manning's flow computer techniques. Pipe hydraulics provided in this report are pressure flow conditions analyzed by computer methods.

IV. EXISTING CONDITIONS

Site Characteristics

The site is currently undeveloped property with slopes ranging from 2 - 8% in a southwesterly direction. The ground is only lightly vegetated with grasses and small sagebrush. Soils are highly absorptive sandy soils with occasional clay lenses.

The site is not located within a FEMA floodplain, as identified on the Floodplain Map provided on the Drainage Master Plan sheet in the rear pocket of this report.

Onsite Drainage Basins

In its undeveloped condition, the site consists of three existing onsite basins. These basins lie across both Tract B-5A and B-7A. The westernmost basin, basin E1, comprises approximately 73 acres and drains in a southwesterly direction to the Black's Arroyo Channel. This basin, in the 100-year storm event, generates approximately 72.5 cfs.

Basin E2, approximately 70.6 acres, drains in a southwesterly direction, but impacts the existing Seven Bar Channel. This drainage, as with Basin E1, occurs in a sheet flow manner with little or no concentrated flow points.

Existing Basin E3, approximately 10 acres, generates approximately 12.4 cfs in the 100-year storm event. This basin drains in a southwesterly direction in a sheet flow manner. Drainage is discharged into the Seven Bar/Skyview Channel at an existing side channel inlet.

Offsite Drainage Basins

There is only one significant offsite drainage basin that impacts the site. This basin, Basin 1, lies north of Westside Boulevard in the City of Rio Rancho. This basin, comprising approximately 50 acres within Rio Rancho, is identified pictorially and in text in the Appendix of this report. The appendix provides the text and basin information excerpted from the Rio Rancho Special Assessment District Drainage Report prepared by Wilson & Company. This basin, under this report, drains approximately 24.9 cfs in the 6-hour, 100-year storm event under developed conditions. These flows are discharged to Westside Boulevard via pipe and exits onto the onsite Basin E1.

Other minor basins occur along the north side of Westside boulevard, from the backyards of the developed lots in adjacent Rio Rancho. These basins are small and can be referenced on the Drainage Master Plan sheet for flows and areas.

V. PROPOSED DEVELOPED CONDITIONS

Drainage Master Plan - Concepts

The proposed Drainage Master Plan, enclosed in the rear pockets of this report, for the developed property will continue to utilize existing discharge points and continue to accept existing offsite drainage. The 157 acres is proposed to be subdivided into approximately nine large tracts of land, plus right-of-way for Seven Bar Loop Road and a new major local called Sierrita Road. Please also reference the enclosed Bulk Land Plat. Flows from the future development of these individual tracts will be carried by both the proposed streets and the proposed underground storm drain systems with street inlets. Offsite flows from north of Westside Boulevard (from Rio Rancho) will be collected by a storm drain extension in Seven Bar Loop Road and transferred to Black's Arroyo.

The enclosed Drainage Master Plan sheet identifies the areas, basin boundaries and flow rates of individual drainage watersheds within the Master Plan area. The direction of drainage and ultimate handling of the outfall from the basin is identified. Typically, each basin discharges either directly to existing concrete-lined channels or to proposed streets. Occasionally, due to the severe topography of this Master Plan area, street drainage will be discharged across public drainage easements to an adjacent street. Exactly how the drainage will be transferred will be determined at the time of development of that parcel.

Seven Bar Loop Road, being a designated collector street, has had flows confined to depths no greater than 0.5 feet in the 10-year storm event. The calculations for the hydrology of this property in its developed condition are provided in the Appendix of this report. These calculations support the data shown on the Master Drainage Plan sheet. Street calculations and hydraulics, and storm drain hydraulics, are provided in the Appendix of this report. For further reference, the Appendix includes Plan and Profile sheets for the street grades on Sierrita Road and Seven Bar Loop Road. The profiles identify proposed flows and storm drain and the hydraulic grade line associated with this, along with velocities in the pipe.

Offsite Drainage Management

As indicated previously, the only offsite flows occur on the north side of the property along Westside Boulevard. These flows exit the municipal boundaries of Rio Rancho. The Master Plan shows that these flows will continue to be accepted, collected and discharged by proposed infrastructure of this Master Plan. The most significant concentrated flow, approximately 25 cfs, from the pipe outlet will be collected at the intersection of Westside Boulevard and Seven Bar Loop Road via pipe and eventually discharged to Black's Arroyo Channel. The other minor offsite basins will be collected in a sheet flow manner on the constructed Westside Boulevard and eventually discharged by storm drain inlet.

Seven Bar (Skyview) Channel

This major channel was studied under previous studies and is anticipated to provide the required capacity for free discharge of onsite developed flows. This concrete-lined channel will accept flows from Seven Bar North at several locations identified on the Master Drainage Plan sheet. It is anticipated that these connections generally will be pipe-to-channel connections. Coordination with AMAFCA for connection and review of construction plans will be required. The connection from Basin A1B (Tract B-1) will be a pipe connection to the channel's vertical wall. Other connections, in the trapezoidal section of the channel, may be either surface, side-channel inlets or piped connections, depending on individual design circumstances.

Black's Arroyo Channel

This Master Plan identifies two major direct connections to Black's Arroyo Channel, a major concrete-lined channel located on the southwest portion of the Master Plan area. Seven Bar Loop Road storm drain system will be the most significant connection, however, an existing stub-out from the channel will be available for this connection. An additional connection will be made via an existing stub-out, near the Master Plan's southwest corner. This connection will require review and approval by AMAFCA. Again, as with Seven Bar/Skyview Channel, this channel was designed with the future development of this Master Plan area in mind. Capacity is not anticipated to be a concern.

Phasing

The development of the Master Plan area will occur in phases. The Drainage Master Plan plate shows the development of drainage infrastructure on a phase-by-phase basis. Each proposed phase will be required to provide site-specific subdivision layouts and normal hydrology/hydraulic calculations for City review and approval.

Unless justified otherwise, each proposed phased development will adhere to the requirements of this Master Plan.

Channel Capacities

This section and its accompanying appendix "Development Impact on Black's Arroyo and Seven-Bar Channel" are included in this revised report (June 3, 1994) to address comments arising out of reviews by both AMAFCA and the City of Albuquerque.

In Seven-Bar Channel, analysis in the appendix shows that when the individual basins discharging into the channel are at peak flow, the channel flow is small due to the attenuation from planned upstream detention. When the flow in the channel is at its peak, only residual flows (1 - 7 cfs) are entering from the adjacent basins.

In Black's Arroyo Channel, analysis in the appendix shows that when the two piped flows from the existing penetrations discharging into the channel are at their peak flows, the channel flow is below its peak due to the attenuation from the upstream detention in Black's Dam. When the flow in the channel is at its peak, only residual flows (10 - 38 cfs) are entering from the pipes.

The appendix shows that, under fully developed, free discharge conditions in Seven Bar North, the proposed peak flow in Black's Arroyo Channel is 2511.4 cfs, which is only 6.9 cfs (or 0.3%) above the 2504.5 cfs taken from the SCS approved AHYMO analysis for Black Arroyo Dam. We consider this 0.3% difference to be negligible. The proposed peak flow in Seven Bar Channel is 1042.4 cfs, which is 21.3 cfs less than the 1063.7 cfs peak anticipated with the improvements north of the county line (excerpts from the Intel Study have been in the appendix). At the confluence, the proposed peak flow is 3527.4 cfs, which is 28.3 cfs less than the 3555.7 cfs peak anticipated in the Intel Study.

The AHYMO analysis that was as input and model for both the Intel Study and this Master Plan Study assumes that: the Black Arroyo Dam discharges into the Black Arroyo Channel as approved by the SCS; the flows ~~form~~ from Rio Ranch Estates drain into the canal adjacent to NM528 and onto Seven Bar North as off-site flows; the Intel site is fully developed; and there is a pond west of the NM528 crossing that limits flow ~~form~~ Intel and Rio Rancho into Seven Bar Channel to 1000 cfs.

In both the Black Arroyo and Seven Bar Channels, the peak discharges from the developed basins occur between 42 and 51 minutes prior to the peak flows in the channels. The depths of flow in the channels at the peak from the basins are between 0.7' and 3.9' and are such that the impacts from the wave run-up on the opposite banks and thus the freeboard, are minimal. Conversely, when the channels are peaking, the flows from the developed Seven Bar North basins are from 0.1% to 1.5% (Seven Bar Loop Road flow (7BAROUT) entering the Black Arroyo Channel) of the flows in the channel. Again, the impacts of the side flows are considered negligible. Further analyses of wave actions in the channels are considered unnecessary.

VI. CONCLUSION

This report has provided hydrologic and hydraulic considerations of the proposed development of Seven Bar North Subdivision. This information should provide adequate supporting documentation and guidance for approval of:

- Conceptual Plan approval for the proposed Bulk Land Plat
- Master Plan approval to guide future development and phasing of the Master Plan area

APPENDICES

EXISTING CONDITIONS - FLOWRATE CALCULATIONS

STREET FLOW/CAPACITY CALCULATIONS

STORM DRAIN FLOWS/CAPACITY CALCULATIONS

EXCERPTS FROM RIO RANCHO SAD DRAINAGE REPORT

PROPOSED DEVELOPED CONDITIONS - FLOWRATE CONDITIONS

STREET GRADES & STORM DRAIN DESIGN - SEVEN BAR LOOP ROAD & SIERRITA ROAD

DEVELOPMENT IMPACT ON BLACK'S ARROYO AND 7-BAR CHANNEL

- CHANNEL FLOW COMPARISONS
- BASIN MAP
- PROPOSED HYMO RUN
- "INTEL" HYMO RUN
- EXCERPTS FROM INTEL STUDY

EXISTING CONDITIONS - FLOWRATE CALCULATIONS

(SEE EXISTING CONDITIONS MAP)

HYDROLOGY - FORMULAS USED

FROM SECTION 22.2 OF DPM - JANUARY 93 UPDATE

EXISTING CONDITIONS:

TIME OF CONCENTRATION, $t_c = \left(\frac{L_1}{V_1} + \frac{L_2}{V_2} + \cdots + \frac{L_x}{V_x}\right) / 3600 \text{ sec/hr}$

WHERE $V = K\sqrt{S}$

K FROM TABLE B-1

S IS SLOPE IN PERCENT

$L_1 + L_2 + \ldots L_x < 4000$ FT

INTENSITY ; $I = 0.726(\log(24.6 \times t_c))\frac{P_{60}}{t_c}$

RATIONAL METHOD "C" = %A(.27) + %B(.43) + %C(.61) + %D(.93)
(ZONE 1, 100 YR, 6 HR STORM)

$\boxed{Q_p = CIA}$

DEVELOPED CONDITIONS

FOR SMALL WATERSHEDS $t_p = 8$ MINUTES

$t_c = 12$ MINUTES

RATIONAL METHOD "C" = %A(.27) + %B(.43) + %C(.61) + %D(.93)
(ZONE 1, 100 YR, 6 HR STORM)

"C" = %A(.08) + %B(.24) + %C(.47) + %D(.92)
(ZONE 1, 10 YR, 6-HR STORM)

EXCESS PRECIPITATION, E_c = %A(.44) + %B(.67) + %C(.99) + %D(1.97)

VOLUME = AREA(E_c)

BOHANNAN-HUSTON INC.

PROJECT NAME TRACTS A&D SHEET ____ OF ____

PROJECT NO. C9321740 BY PR DATE 3/31/94

SUBJECT HYDROLOGY CH'D ____ DATE ____

EXISTING DRAINAGE:

BASIN	%A (S<10%, UNDEVELOPED, PRIMARILY SHEET FLOW)
E1	100
E2	95
E3	95

CALCULATION OF t_c:

t_c (SUBBASIN E1): 2400' (PRIMARILY SHEET FLOW)

$$t_c = \frac{\frac{2000}{0.7\sqrt{6}} + \frac{400}{3\sqrt{6}}}{3600} \quad (6\% \text{ AVG}) \qquad P_{60} = 1.87''$$

$= 0.34$ HRS $\quad I = 0.726(\log(246)(.34))\left(\frac{1}{.34}\right)(1.87) = 3.68$ IN/HR

t_c (BASIN E2): 3000' (PRIMARILY SHEET FLOW)

$$t_c = \frac{\frac{2000}{0.7\sqrt{5}} + \frac{1000}{3\sqrt{5}}}{3600} \quad (5\% \text{ AVG})$$

$= 0.40$ HRS $\quad I = 3.37$ IN/HR

t_c (BASIN E3): 1400' (PRIMARILY SHEET FLOW)

$$t_c = \frac{\frac{1400}{0.7\sqrt{6}}}{3600} \quad (6\% \text{ AVG})$$

$= 0.23$ HRS $\quad I = 4.44$ IN/HR

BASIN	C	I	A	Q_p
E1	0.27	3.68	73	72.5
E_2	0.28	3.37	70.6	6666
E_3	0.28	4.44	10	12.4

BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

SUBJECT _____ CH'D _____ DATE _____

STREET FLOW/CAPACITY CALCULATIONS

HYDRAULIC GRADE LINE ANALYSIS - EQUATIONS USED:

FROM DPM CHP 22.3 EXCEPT WHERE NOTED

CONVEYANCE, $K = \frac{1.486 A R^{2/3}}{n}$

$= \frac{1.486 A \left(\frac{A}{P}\right)^{2/3}}{0.013}$ PRESSURE FLOW, RCP

FRICTION SLOPE, $S_F = \left(\frac{Q}{K}\right)^2$

ENERGY LOSSES

FRICTION LOSS, $H_F = S_F L$

BEND LOSS; $H_B = 0.2 \left(\frac{\Delta}{90°}\right)^{1/2} \frac{\bar{V}^2}{2g}$

- JUNCTION LOSS, $H_J = \frac{Q_2 V_2 - Q_1 V_1 - Q_3 V_3 \cos\theta}{\left(\frac{A_1 + A_2}{2}\right) g} + HV_1 - HV_2 \geq 0$

MANHOLE LOSS, $H_{MH} = 0.05 \frac{\bar{V}^2}{2g}$

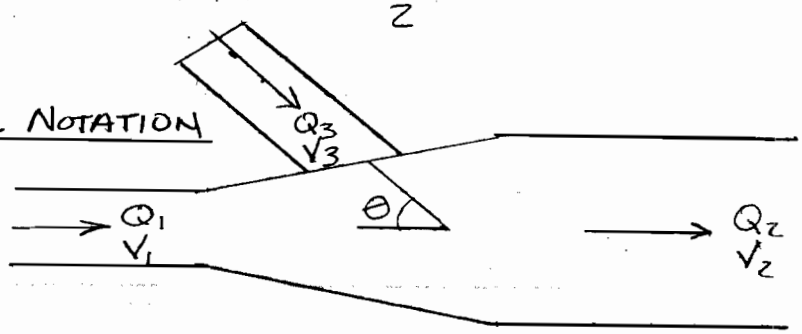
TRANSITION LOSS, $H_T = 0.1 \frac{(V_1 - V_2)^2}{2g}$ (CONTRACTION)

$= 0.2 \frac{(V_1 - V_2)^2}{2g}$ (EXPANSION)

VELOCITY HEAD, $HV = \frac{V^2}{2g}$

AVERAGE VELOCITY, $\bar{V} = \frac{V_1 + V_2}{2}$

TYPICAL NOTATION



BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY PR DATE 3/31/94

SUBJECT _____ CH'D _____ DATE _____

STREET CAPACITY ANALYSIS

SEVEN BAR TRACTS A&D

ANALYSIS POINT	SLOPE, %	Q-100YR (CFS)	DEPTH (FT)	V-100YR (FPS)	E-100YR (FT)	E<0.87'?	Q-10YR (CFS)	DEPTH (FT)	V-10YR	D X V	D<6.5?	D < 0.5?
7BAR LOOP												
S2B	4.66	7.0	0.27	4.0	0.52	YES	3.8	0.23	3.4	0.8	YES	YES
S2C	3.00	18.8	0.38	4.2	0.65	YES	11.6	0.33	3.8	1.3	YES	YES
S2D	2.26	22.8	0.42	4.0	0.67	YES	14.3	0.37	3.6	1.3	YES	YES
MAJ. LOCAL												
S3B	2.84	5.1	0.27	3.3	0.44	YES	2.8	0.22	2.8	0.6	YES	
S3C	0.50	9.1	0.43	2.0	0.49	YES	6.0	0.37	1.7	0.6	YES	
RESIDENTIAL												
A6B	3.28	19.8	0.40	4.8	0.76	YES	10.7	0.33	4.1	1.4	YES	
A5A	3.28	27.4	0.44	5.1	0.84	YES	15.9	0.38	4.6	1.7	YES	
A5B	2.56	30.2	0.48	5.0	0.87	YES	16.4	0.40	4.2	1.7	YES	
A5C	2.56	30.2	0.48	5.0	0.87	YES	16.4	0.40	4.2	1.7	YES	
A5D	2.56	24.6	0.45	4.6	0.78	YES	13.3	0.37	4.0	1.5	YES	
												D < 0.43? ((
WESTSIDE												
S1A	2.83	8.1	0.30	3.4	0.48	YES	4.7	0.26	3.0	0.8	YES	YES
S1C	0.50	15.2	0.49	2.1	0.56	YES	8.8	0.40	1.8	0.7	YES	YES
S1D	1.91	23.7	0.44	3.8	0.66	YES	14.4	0.38	3.4	1.3	YES	YES

BASIN S-2: (7BAR LOOP RD) STD CURB/ 48'F-F/ 68'R/W.

MANNING'S N = .0170 SLOPE = .0466

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.87	4	12.00	0.13	7	58.00	0.00
2	9.83	0.67	5	34.00	0.57	8	58.17	0.67
3	10.00	0.00	6	56.00	0.13	9	68.00	0.87

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.01	0.01	0.0	0.0	0.3	0.5	0.31
0.02	0.02	0.0	0.0	0.7	0.8	0.63
0.03	0.03	0.0	0.0	1.0	1.1	0.94
0.04	0.04	0.0	0.0	1.3	1.3	1.25
0.05	0.05	0.0	0.1	1.6	1.6	1.56
0.06	0.06	0.1	0.1	2.0	1.8	1.88
0.07	0.07	0.1	0.1	2.3	2.0	2.19
0.08	0.08	0.1	0.2	2.6	2.1	2.50
0.09	0.09	0.1	0.3	3.0	2.3	2.81
0.10	0.10	0.2	0.4	3.3	2.5	3.13
0.11	0.11	0.2	0.5	3.6	2.6	3.44
0.12	0.12	0.2	0.6	3.9	2.8	3.75
0.13	0.13	0.3	0.8	4.3	2.9	4.07
0.14	0.14	0.3	0.9	5.3	2.8	5.07
0.15	0.15	0.4	1.0	6.3	2.8	6.08
0.16	0.16	0.4	1.2	7.3	2.9	7.08
0.17	0.17	0.5	1.5	8.4	2.9	8.09
0.18	0.18	0.6	1.8	9.4	3.0	9.09
0.19	0.19	0.7	2.1	10.4	3.1	10.10
0.20	0.20	0.8	2.5	11.4	3.2	11.10
0.21	0.21	0.9	3.0	12.4	3.3	12.11
0.22	0.22	1.0	3.5	13.5	3.4	13.11
0.23	0.23	1.2	4.1	14.5	3.5	14.12
0.24	0.24	1.3	4.8	15.5	3.7	15.12
0.25	0.25	1.5	5.6	16.5	3.8	16.13
0.26	0.26	1.6	6.4	17.5	3.9	17.13
0.27	0.27	1.8	7.3	18.6	4.0	18.14
0.28	0.28	2.0	8.3	19.6	4.1	19.14
0.29	0.29	2.2	9.4	20.6	4.2	20.15
0.30	0.30	2.4	10.5	21.6	4.4	21.15
0.31	0.31	2.6	11.8	22.7	4.5	22.16
0.32	0.32	2.9	13.1	23.7	4.6	23.16
0.33	0.33	3.1	14.6	24.7	4.7	24.17
0.34	0.34	3.3	16.1	25.7	4.8	25.17
0.35	0.35	3.6	17.8	26.7	4.9	26.18
0.36	0.36	3.9	19.5	27.8	5.1	27.18
0.37	0.37	4.1	21.4	28.8	5.2	28.19
0.38	0.38	4.4	23.4	29.8	5.3	29.19
0.39	0.39	4.7	25.5	30.8	5.4	30.20
0.40	0.40	5.0	27.7	31.8	5.5	31.20
0.41	0.41	5.3	30.0	32.9	5.6	32.21
0.42	0.42	5.7	32.5	33.9	5.7	33.21
0.43	0.43	6.0	35.1	34.9	5.8	34.22
0.44	0.44	6.4	37.8	35.9	5.9	35.22
0.45	0.45	6.7	40.6	36.9	6.1	36.23
0.46	0.46	7.1	43.6	38.0	6.2	37.23
0.47	0.47	7.5	46.7	39.0	6.3	38.24
0.48	0.48	7.8	49.9	40.0	6.4	39.24

Q_{10}

$Q_{100}(S2B) = 7.0$

BASIN S-2: (7BAR LOOP RD) STD CURB/ 48'F-F/ 68'R/W.

MANNINGS N=.0170 SLOPE =.0300

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.87	4	12.00	0.13	7	58.00	0.00
2	9.83	0.67	5	34.00	0.57	8	58.17	0.67
3	10.00	0.00	6	56.00	0.13	9	68.00	0.87

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP
0.01	0.01	0.0	0.0	0.3	0.4	.31
0.02	0.02	0.0	0.0	0.7	0.7	.63
0.03	0.03	0.0	0.0	1.0	0.9	.94
0.04	0.04	0.0	0.0	1.3	1.1	1.25
0.05	0.05	0.0	0.0	1.6	1.3	1.56
0.06	0.06	0.1	0.1	2.0	1.4	1.88
0.07	0.07	0.1	0.1	2.3	1.6	2.19
0.08	0.08	0.1	0.2	2.6	1.7	2.50
0.09	0.09	0.1	0.2	3.0	1.9	2.81
0.10	0.10	0.2	0.3	3.3	2.0	3.13
0.11	0.11	0.2	0.4	3.6	2.1	3.44
0.12	0.12	0.2	0.5	3.9	2.2	3.75
0.13	0.13	0.3	0.6	4.3	2.4	4.07
0.14	0.14	0.3	0.7	5.3	2.3	5.07
0.15	0.15	0.4	0.8	6.3	2.3	6.08
0.16	0.16	0.4	1.0	7.3	2.3	7.08
0.17	0.17	0.5	1.2	8.4	2.3	8.09
0.18	0.18	0.6	1.4	9.4	2.4	9.09
0.19	0.19	0.7	1.7	10.4	2.5	10.10
0.20	0.20	0.8	2.0	11.4	2.6	11.10
0.21	0.21	0.9	2.4	12.4	2.6	12.11
0.22	0.22	1.0	2.8	13.5	2.7	13.11
0.23	0.23	1.2	3.3	14.5	2.8	14.12
0.24	0.24	1.3	3.9	15.5	2.9	15.12
0.25	0.25	1.5	4.5	16.5	3.0	16.13
0.26	0.26	1.6	5.1	17.5	3.1	17.13
0.27	0.27	1.8	5.8	18.6	3.2	18.14
0.28	0.28	2.0	6.6	19.6	3.3	19.14
0.29	0.29	2.2	7.5	20.6	3.4	20.15
0.30	0.30	2.4	8.4	21.6	3.5	21.15
0.31	0.31	2.6	9.4	22.7	3.6	22.16
Q_{10} 0.32	0.32	2.9	10.5	23.7	3.7	23.16
0.33	0.33	3.1	11.7	24.7	3.8	24.17
0.34	0.34	3.3	12.9	25.7	3.9	25.17
0.35	0.35	3.6	14.3	26.7	4.0	26.18
0.36	0.36	3.9	15.7	27.8	4.1	27.18
0.37	0.37	4.1	17.2	28.8	4.2	28.19
$C_{100}(S2) = 18.8$ 0.38	0.38	4.4	18.8	29.8	4.2	29.19
0.39	0.39	4.7	20.4	30.8	4.3	30.20
0.40	0.40	5.0	22.2	31.8	4.4	31.20
0.41	0.41	5.3	24.1	32.9	4.5	32.21
0.42	0.42	5.7	26.1	33.9	4.6	33.21
0.43	0.43	6.0	28.1	34.9	4.7	34.22
0.44	0.44	6.4	30.3	35.9	4.8	35.22
0.45	0.45	6.7	32.6	36.9	4.9	36.23
0.46	0.46	7.1	35.0	38.0	4.9	37.23
0.47	0.47	7.5	37.5	39.0	5.0	38.24
0.48	0.48	7.8	40.1	40.0	5.1	39.24

BASIN S-2: (7BAR LOOP RD) STD CURB/ 48'F-F/ 68'R/W.

MANNINGS N=.0170 SLOPE =.0226

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.87	4	12.00	0.13	7	58.00	0.00
2	9.83	0.67	5	34.00	0.57	8	58.17	0.67
3	10.00	0.00	6	56.00	0.13	9	68.00	0.87

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP
0.01	0.01	0.0	0.0	0.3	0.4	0.31
0.02	0.02	0.0	0.0	0.7	0.6	0.63
0.03	0.03	0.0	0.0	1.0	0.8	0.94
0.04	0.04	0.0	0.0	1.3	0.9	1.25
0.05	0.05	0.0	0.0	1.6	1.1	1.56
0.06	0.06	0.1	0.1	2.0	1.2	1.88
0.07	0.07	0.1	0.1	2.3	1.4	2.19
0.08	0.08	0.1	0.1	2.6	1.5	2.50
0.09	0.09	0.1	0.2	3.0	1.6	2.81
0.10	0.10	0.2	0.3	3.3	1.7	3.13
0.11	0.11	0.2	0.3	3.6	1.8	3.44
0.12	0.12	0.2	0.4	3.9	1.9	3.75
0.13	0.13	0.3	0.5	4.3	2.1	4.07
0.14	0.14	0.3	0.6	5.3	2.0	5.07
0.15	0.15	0.4	0.7	6.3	2.0	6.08
0.16	0.16	0.4	0.9	7.3	2.0	7.08
0.17	0.17	0.5	1.0	8.4	2.0	8.09
0.18	0.18	0.6	1.2	9.4	2.1	9.09
0.19	0.19	0.7	1.5	10.4	2.2	10.10
0.20	0.20	0.8	1.8	11.4	2.2	11.10
0.21	0.21	0.9	2.1	12.4	2.3	12.11
0.22	0.22	1.0	2.5	13.5	2.4	13.11
0.23	0.23	1.2	2.9	14.5	2.5	14.12
0.24	0.24	1.3	3.4	15.5	2.5	15.12
0.25	0.25	1.5	3.9	16.5	2.6	16.13
0.26	0.26	1.6	4.4	17.5	2.7	17.13
0.27	0.27	1.8	5.1	18.6	2.8	18.14
0.28	0.28	2.0	5.8	19.6	2.9	19.14
0.29	0.29	2.2	6.5	20.6	3.0	20.15
0.30	0.30	2.4	7.3	21.6	3.0	21.15
0.31	0.31	2.6	8.2	22.7	3.1	22.16
0.32	0.32	2.9	9.1	23.7	3.2	23.16
0.33	0.33	3.1	10.1	24.7	3.3	24.17
0.34	0.34	3.3	11.2	25.7	3.4	25.17
0.35	0.35	3.6	12.4	26.7	3.4	26.18
Q_{10} 0.36	0.36	3.9	13.6	27.8	3.5	27.18
0.37	0.37	4.1	14.9	28.8	3.6	28.19
0.38	0.38	4.4	16.3	29.8	3.7	29.19
0.39	0.39	4.7	17.7	30.8	3.8	30.20
0.40	0.40	5.0	19.3	31.8	3.8	31.20
0.41	0.41	5.3	20.9	32.9	3.9	32.21
$Q_{100}(S2D)=22.8$ 0.42	0.42	5.7	22.6	33.9	4.0	33.21
0.43	0.43	6.0	24.4	34.9	4.1	34.22
0.44	0.44	6.4	26.3	35.9	4.1	35.22
0.45	0.45	6.7	28.3	36.9	4.2	36.23
0.46	0.46	7.1	30.4	38.0	4.3	37.23
0.47	0.47	7.5	32.5	39.0	4.4	38.24
0.48	0.48	7.8	34.8	40.0	4.4	39.24

BASIN S-3: (MAJOR LOCAL) STD CURB/ 28'F-F/ 48'R/W.

MANNINGS N=.0170 SLOPE =.0284

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.87	4	12.00	0.13	7	38.00	0.00
2	9.83	0.67	5	24.00	0.46	8	38.17	0.67
3	10.00	0.00	6	36.00	0.13	9	48.00	0.87

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP
0.01	0.01	0.0	0.0	0.3	0.4	0.31
0.02	0.02	0.0	0.0	0.7	0.7	0.63
0.03	0.03	0.0	0.0	1.0	0.9	0.94
0.04	0.04	0.0	0.0	1.3	1.0	1.25
0.05	0.05	0.0	0.0	1.6	1.2	1.56
0.06	0.06	0.1	0.1	2.0	1.4	1.88
0.07	0.07	0.1	0.1	2.3	1.5	2.19
0.08	0.08	0.1	0.2	2.6	1.7	2.50
0.09	0.09	0.1	0.2	3.0	1.8	2.81
0.10	0.10	0.2	0.3	3.3	1.9	3.13
0.11	0.11	0.2	0.4	3.6	2.1	3.44
0.12	0.12	0.2	0.5	3.9	2.2	3.75
0.13	0.13	0.3	0.6	4.3	2.3	4.07
0.14	0.14	0.3	0.7	5.0	2.3	4.80
0.15	0.15	0.4	0.8	5.8	2.3	5.53
0.16	0.16	0.4	1.0	6.5	2.4	6.26
0.17	0.17	0.5	1.2	7.3	2.4	7.00
0.18	0.18	0.6	1.4	8.0	2.5	7.73
0.19	0.19	0.6	1.6	8.8	2.6	8.46
0.20	0.20	0.7	1.9	9.5	2.7	9.19
0.21	0.21	0.8	2.3	10.3	2.7	9.92
0.22	0.22	0.9	2.6	11.0	2.8	10.66
Q_{10} 0.23	0.23	1.0	3.0	11.8	2.9	11.39
0.24	0.24	1.2	3.5	12.5	3.0	12.12
0.25	0.25	1.3	4.0	13.3	3.1	12.85
0.26	0.26	1.4	4.5	14.0	3.2	13.59
$Q_{100}=5.1$ CFS 0.27	0.27	1.6	5.1	14.8	3.3	14.32
0.28	0.28	1.7	5.7	15.5	3.4	15.05
0.29	0.29	1.9	6.4	16.2	3.5	15.78
0.30	0.30	2.0	7.2	17.0	3.6	16.52
0.31	0.31	2.2	8.0	17.7	3.6	17.25
0.32	0.32	2.4	8.8	18.5	3.7	17.98
0.33	0.33	2.5	9.7	19.2	3.8	18.71
0.34	0.34	2.7	10.7	20.0	3.9	19.45
0.35	0.35	2.9	11.7	20.7	4.0	20.18
0.36	0.36	3.1	12.8	21.5	4.1	20.91
0.37	0.37	3.3	14.0	22.2	4.2	21.64
0.38	0.38	3.6	15.2	23.0	4.3	22.37
0.39	0.39	3.8	16.5	23.7	4.3	23.11
0.40	0.40	4.0	17.8	24.5	4.4	23.84
0.41	0.41	4.3	19.3	25.2	4.5	24.57
0.42	0.42	4.5	20.8	26.0	4.6	25.30
0.43	0.43	4.8	22.4	26.7	4.7	26.04
0.44	0.44	5.0	24.0	27.5	4.8	26.77
0.45	0.45	5.3	25.7	28.2	4.8	27.50
0.46	0.46	5.6	27.5	29.0	4.9	28.23
0.47	0.47	5.9	29.9	29.0	5.1	28.24
0.48	0.48	6.2	32.3	29.0	5.2	28.24

BASIN S-3: (MAJOR LOCAL) STD CURB/ 28'F-F/ 48'R/W

MANNING'S N = .0170 SLOPE = .0050

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.87	4	12.00	0.13	7	38.00	0.00
2	9.83	0.67	5	24.00	0.46	8	38.17	0.67
3	10.00	0.00	6	36.00	0.13	9	48.00	0.87

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.01	0.01	0.0	0.0	0.3	0.2	0.31
0.02	0.02	0.0	0.0	0.7	0.3	0.63
0.03	0.03	0.0	0.0	1.0	0.4	0.94
0.04	0.04	0.0	0.0	1.3	0.4	1.25
0.05	0.05	0.0	0.0	1.6	0.5	1.56
0.06	0.06	0.1	0.0	2.0	0.6	1.88
0.07	0.07	0.1	0.0	2.3	0.6	2.19
0.08	0.08	0.1	0.1	2.6	0.7	2.50
0.09	0.09	0.1	0.1	3.0	0.8	2.81
0.10	0.10	0.2	0.1	3.3	0.8	3.13
0.11	0.11	0.2	0.2	3.6	0.9	3.44
0.12	0.12	0.2	0.2	3.9	0.9	3.75
0.13	0.13	0.3	0.3	4.3	1.0	4.07
0.14	0.14	0.3	0.3	5.0	1.0	4.80
0.15	0.15	0.4	0.4	5.8	1.0	5.53
0.16	0.16	0.4	0.4	6.5	1.0	6.26
0.17	0.17	0.5	0.5	7.3	1.0	7.00
0.18	0.18	0.6	0.6	8.0	1.0	7.73
0.19	0.19	0.6	0.7	8.8	1.1	8.46
0.20	0.20	0.7	0.8	9.5	1.1	9.19
0.21	0.21	0.8	0.9	10.3	1.2	9.92
0.22	0.22	0.9	1.1	11.0	1.2	10.66
0.23	0.23	1.0	1.3	11.8	1.2	11.39
0.24	0.24	1.2	1.5	12.5	1.3	12.12
0.25	0.25	1.3	1.7	13.3	1.3	12.85
0.26	0.26	1.4	1.9	14.0	1.3	13.59
0.27	0.27	1.6	2.1	14.8	1.4	14.32
0.28	0.28	1.7	2.4	15.5	1.4	15.05
0.29	0.29	1.9	2.7	16.2	1.5	15.78
0.30	0.30	2.0	3.0	17.0	1.5	16.52
0.31	0.31	2.2	3.3	17.7	1.5	17.25
0.32	0.32	2.4	3.7	18.5	1.6	17.98
0.33	0.33	2.5	4.1	19.2	1.6	18.71
0.34	0.34	2.7	4.5	20.0	1.6	19.45
0.35	0.35	2.9	4.9	20.7	1.7	20.18
0.36	0.36	3.1	5.4	21.5	1.7	20.91
0.37	0.37	3.3	5.9	22.2	1.7	21.64
0.38	0.38	3.6	6.4	23.0	1.8	22.37
0.39	0.39	3.8	6.9	23.7	1.8	23.11
0.40	0.40	4.0	7.5	24.5	1.9	23.84
0.41	0.41	4.3	8.1	25.2	1.9	24.57
0.42	0.42	4.5	8.7	26.0	1.9	25.30
0.43	0.43	4.8	9.4	26.7	2.0	26.04
0.44	0.44	5.0	10.1	27.5	2.0	26.77
0.45	0.45	5.3	10.8	28.2	2.0	27.50
0.46	0.46	5.6	11.6	29.0	2.1	28.23
0.47	0.47	5.9	12.5	29.0	2.1	28.24
0.48	0.48	6.2	13.5	29.0	2.2	28.24

Q_{10}

$Q_{100}(53C) = 9.1$

BASIN XX: (RESIDENTIAL STREETS) STD CURB/ 28'F-F/ 46'R/W.

MANNING'S N = .0170 SLOPE = .0328

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.85	4	11.00	0.13	7	37.00	0.00
2	8.83	0.67	5	23.00	0.46	8	37.17	0.67
3	9.00	0.00	6	35.00	0.13	9	46.00	0.85

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.01	0.01	0.0	0.0	0.3	0.4	0.31
0.02	0.02	0.0	0.0	0.7	0.7	0.63
0.03	0.03	0.0	0.0	1.0	0.9	0.94
0.04	0.04	0.0	0.0	1.3	1.1	1.25
0.05	0.05	0.0	0.1	1.6	1.3	1.56
0.06	0.06	0.1	0.1	2.0	1.5	1.88
0.07	0.07	0.1	0.1	2.3	1.6	2.19
0.08	0.08	0.1	0.2	2.6	1.8	2.50
0.09	0.09	0.1	0.2	3.0	1.9	2.81
0.10	0.10	0.2	0.3	3.3	2.1	3.13
0.11	0.11	0.2	0.4	3.6	2.2	3.44
0.12	0.12	0.2	0.5	3.9	2.3	3.75
0.13	0.13	0.3	0.7	4.3	2.5	4.07
0.14	0.14	0.3	0.8	5.0	2.5	4.80
0.15	0.15	0.4	0.9	5.8	2.5	5.53
0.16	0.16	0.4	1.1	6.5	2.5	6.26
0.17	0.17	0.5	1.3	7.3	2.6	7.00
0.18	0.18	0.6	1.5	8.0	2.7	7.73
0.19	0.19	0.6	1.8	8.8	2.8	8.46
0.20	0.20	0.7	2.1	9.5	2.9	9.19
0.21	0.21	0.8	2.4	10.3	2.9	9.92
0.22	0.22	0.9	2.8	11.0	3.0	10.66
0.23	0.23	1.0	3.3	11.8	3.1	11.39
0.24	0.24	1.2	3.7	12.5	3.2	12.12
0.25	0.25	1.3	4.3	13.3	3.3	12.85
0.26	0.26	1.4	4.8	14.0	3.4	13.59
0.27	0.27	1.6	5.5	14.8	3.5	14.32
0.28	0.28	1.7	6.2	15.5	3.6	15.05
0.29	0.29	1.9	6.9	16.2	3.7	15.78
0.30	0.30	2.0	7.7	17.0	3.8	16.52
0.31	0.31	2.2	8.5	17.7	3.9	17.25
0.32	0.32	2.4	9.5	18.5	4.0	17.98
0.33	0.33	2.5	10.4	19.2	4.1	18.71
0.34	0.34	2.7	11.5	20.0	4.2	19.45
0.35	0.35	2.9	12.6	20.7	4.3	20.18
0.36	0.36	3.1	13.8	21.5	4.4	20.91
0.37	0.37	3.3	15.0	22.2	4.5	21.64
0.38	0.38	3.6	16.3	23.0	4.6	22.37
0.39	0.39	3.8	17.7	23.7	4.7	23.11
0.40	0.40	4.0	19.2	24.5	4.8	23.84
0.41	0.41	4.3	20.7	25.2	4.8	24.57
0.42	0.42	4.5	22.3	26.0	4.9	25.30
0.43	0.43	4.8	24.0	26.7	5.0	26.04
0.44	0.44	5.0	25.8	27.5	5.1	26.77
0.45	0.45	5.3	27.6	28.2	5.2	27.50
0.46	0.46	5.6	29.6	29.0	5.3	28.23
0.47	0.47	5.9	32.1	29.0	5.5	28.24
0.48	0.48	6.2	34.7	29.0	5.6	28.24

$Q_{10}(AGB)$

$Q_{10}(ASA)$

$Q_{100}(AGB) = 19.8$

$Q_{100}(ASA) = 27.4$

BASIN XX: (RESIDENTIAL STREETS) STD CURB/ 28'F-F/ 46'R/W.

MANNING'S N = .0170 SLOPE = .0256

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.85	4	11.00	0.13	7	37.00	0.00
2	8.83	0.67	5	23.00	0.46	8	37.17	0.67
3	9.00	0.00	6	35.00	0.13	9	46.00	0.85

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.01	0.01	0.0	0.0	0.3	0.4	0.31
0.02	0.02	0.0	0.0	0.7	0.6	0.63
0.03	0.03	0.0	0.0	1.0	0.8	0.94
0.04	0.04	0.0	0.0	1.3	1.0	1.25
0.05	0.05	0.0	0.0	1.6	1.2	1.56
0.06	0.06	0.1	0.1	2.0	1.3	1.88
0.07	0.07	0.1	0.1	2.3	1.4	2.19
0.08	0.08	0.1	0.2	2.6	1.6	2.50
0.09	0.09	0.1	0.2	3.0	1.7	2.81
0.10	0.10	0.2	0.3	3.3	1.8	3.13
0.11	0.11	0.2	0.4	3.6	2.0	3.44
0.12	0.12	0.2	0.5	3.9	2.1	3.75
0.13	0.13	0.3	0.6	4.3	2.2	4.07
0.14	0.14	0.3	0.7	5.0	2.2	4.80
0.15	0.15	0.4	0.8	5.8	2.2	5.53
0.16	0.16	0.4	0.9	6.5	2.2	6.26
0.17	0.17	0.5	1.1	7.3	2.3	7.00
0.18	0.18	0.6	1.3	8.0	2.4	7.73
0.19	0.19	0.6	1.6	8.8	2.4	8.46
0.20	0.20	0.7	1.8	9.5	2.5	9.19
0.21	0.21	0.8	2.1	10.3	2.6	9.92
0.22	0.22	0.9	2.5	11.0	2.7	10.66
0.23	0.23	1.0	2.9	11.8	2.8	11.39
0.24	0.24	1.2	3.3	12.5	2.9	12.12
0.25	0.25	1.3	3.8	13.3	2.9	12.85
0.26	0.26	1.4	4.3	14.0	3.0	13.59
0.27	0.27	1.6	4.8	14.8	3.1	14.32
0.28	0.28	1.7	5.4	15.5	3.2	15.05
0.29	0.29	1.9	6.1	16.2	3.3	15.78
0.30	0.30	2.0	6.8	17.0	3.4	16.52
0.31	0.31	2.2	7.5	17.7	3.5	17.25
0.32	0.32	2.4	8.4	18.5	3.5	17.98
0.33	0.33	2.5	9.2	19.2	3.6	18.71
0.34	0.34	2.7	10.1	20.0	3.7	19.45
0.35	0.35	2.9	11.1	20.7	3.8	20.18
0.36	0.36	3.1	12.2	21.5	3.9	20.91
0.37	0.37	3.3	13.3	22.2	4.0	21.64
0.38	0.38	3.6	14.4	23.0	4.0	22.37
0.39	0.39	3.8	15.7	23.7	4.1	23.11
0.40	0.40	4.0	16.9	24.5	4.2	23.84
0.41	0.41	4.3	18.3	25.2	4.3	24.57
0.42	0.42	4.5	19.7	26.0	4.4	25.30
0.43	0.43	4.8	21.2	26.7	4.4	26.04
0.44	0.44	5.0	22.8	27.5	4.5	26.77
0.45	0.45	5.3	24.4	28.2	4.6	27.50
0.46	0.46	5.6	26.1	29.0	4.7	28.23
0.47	0.47	5.9	28.4	29.0	4.8	28.24
0.48	0.48	6.2	30.7	29.0	5.0	28.24

Q_{10} (ASD)

Q_{10} (ASB)

Q_{100} (ASD) = 24.6

Q_{100} (ASB) = 30.7

BASIN S-1: (WESTSIDE BLVD.) STD CURB/ 76'F-F/ 98'R/W.

MANNING'S N = .0170 SLOPE = .0283

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.89	4	13.00	0.13	7	87.00	0.00
2	10.83	0.67	5	49.00	0.85	8	87.17	0.67
3	11.00	0.00	6	85.00	0.13	9	98.00	0.89

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.01	0.01	0.0	0.0	0.3	0.4	0.31
0.02	0.02	0.0	0.0	0.7	0.7	0.63
0.03	0.03	0.0	0.0	1.0	0.9	0.94
0.04	0.04	0.0	0.0	1.3	1.0	1.25
0.05	0.05	0.0	0.0	1.6	1.2	1.56
0.06	0.06	0.1	0.1	2.0	1.4	1.88
0.07	0.07	0.1	0.1	2.3	1.5	2.19
0.08	0.08	0.1	0.2	2.6	1.7	2.50
0.09	0.09	0.1	0.2	3.0	1.8	2.81
0.10	0.10	0.2	0.3	3.3	1.9	3.13
0.11	0.11	0.2	0.4	3.6	2.1	3.44
0.12	0.12	0.2	0.5	3.9	2.2	3.75
0.13	0.13	0.3	0.6	4.3	2.3	4.07
0.14	0.14	0.3	0.7	5.3	2.2	5.07
0.15	0.15	0.4	0.8	6.3	2.2	6.08
0.16	0.16	0.4	1.0	7.3	2.2	7.08
0.17	0.17	0.5	1.2	8.4	2.3	8.09
0.18	0.18	0.6	1.4	9.4	2.3	9.09
0.19	0.19	0.7	1.7	10.4	2.4	10.10
0.20	0.20	0.8	2.0	11.4	2.5	11.10
0.21	0.21	0.9	2.3	12.4	2.6	12.11
0.22	0.22	1.0	2.8	13.5	2.7	13.11
0.23	0.23	1.2	3.2	14.5	2.8	14.12
0.24	0.24	1.3	3.8	15.5	2.8	15.12
0.25	0.25	1.5	4.3	16.5	2.9	16.13
0.26	0.26	1.6	5.0	17.5	3.0	17.13
0.27	0.27	1.8	5.7	18.6	3.1	18.14
0.28	0.28	2.0	6.5	19.6	3.2	19.14
0.29	0.29	2.2	7.3	20.6	3.3	20.15
0.30	0.30	2.4	8.2	21.6	3.4	21.15
0.31	0.31	2.6	9.2	22.7	3.5	22.16
0.32	0.32	2.9	10.2	23.7	3.6	23.16
0.33	0.33	3.1	11.4	24.7	3.7	24.17
0.34	0.34	3.3	12.6	25.7	3.8	25.17
0.35	0.35	3.6	13.9	26.7	3.9	26.18
0.36	0.36	3.9	15.2	27.8	3.9	27.18
0.37	0.37	4.1	16.7	28.8	4.0	28.19
0.38	0.38	4.4	18.2	29.8	4.1	29.19
0.39	0.39	4.7	19.9	30.8	4.2	30.20
0.40	0.40	5.0	21.6	31.8	4.3	31.20
0.41	0.41	5.3	23.4	32.9	4.4	32.21
0.42	0.42	5.7	25.3	33.9	4.5	33.21
0.43	0.43	6.0	27.3	34.9	4.5	34.22
0.44	0.44	6.4	29.4	35.9	4.6	35.22
0.45	0.45	6.7	31.7	36.9	4.7	36.23
0.46	0.46	7.1	34.0	38.0	4.8	37.23
0.47	0.47	7.5	36.4	39.0	4.9	38.24
0.48	0.48	7.8	38.9	40.0	5.0	39.24

Q_{10}

$Q_{100}(SIA) = 8.1$

BASIN S-1: (WESTSIDE BLVD.) STD CURB/ 76'F-F/ 98'R/W.

MANNING'S N = .0170 SLOPE = .0050

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.89	4	13.00	0.13	7	87.00	0.00
2	10.83	0.67	5	49.00	0.85	8	87.17	0.67
3	11.00	0.00	6	85.00	0.13	9	98.00	0.89

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.01	0.01	0.0	0.0	0.3	0.2	0.31
0.02	0.02	0.0	0.0	0.7	0.3	0.63
0.03	0.03	0.0	0.0	1.0	0.4	0.94
Q.04	0.04	0.0	0.0	1.3	0.4	1.25
0.05	0.05	0.0	0.0	1.6	0.5	1.56
0.06	0.06	0.1	0.0	2.0	0.6	1.88
0.07	0.07	0.1	0.0	2.3	0.6	2.19
0.08	0.08	0.1	0.1	2.6	0.7	2.50
0.09	0.09	0.1	0.1	3.0	0.8	2.81
0.10	0.10	0.2	0.1	3.3	0.8	3.13
0.11	0.11	0.2	0.2	3.6	0.9	3.44
0.12	0.12	0.2	0.2	3.9	0.9	3.75
0.13	0.13	0.3	0.3	4.3	1.0	4.07
0.14	0.14	0.3	0.3	5.3	0.9	5.07
0.15	0.15	0.4	0.3	6.3	0.9	6.08
0.16	0.16	0.4	0.4	7.3	0.9	7.08
0.17	0.17	0.5	0.5	8.4	1.0	8.09
0.18	0.18	0.6	0.6	9.4	1.0	9.09
0.19	0.19	0.7	0.7	10.4	1.0	10.10
0.20	0.20	0.8	0.8	11.4	1.0	11.10
0.21	0.21	0.9	1.0	12.4	1.1	12.11
0.22	0.22	1.0	1.2	13.5	1.1	13.11
0.23	0.23	1.2	1.4	14.5	1.2	14.12
0.24	0.24	1.3	1.6	15.5	1.2	15.12
0.25	0.25	1.5	1.8	16.5	1.2	16.13
0.26	0.26	1.6	2.1	17.5	1.3	17.13
0.27	0.27	1.8	2.4	18.6	1.3	18.14
0.28	0.28	2.0	2.7	19.6	1.4	19.14
0.29	0.29	2.2	3.1	20.6	1.4	20.15
0.30	0.30	2.4	3.4	21.6	1.4	21.15
0.31	0.31	2.6	3.9	22.7	1.5	22.16
0.32	0.32	2.9	4.3	23.7	1.5	23.16
0.33	0.33	3.1	4.8	24.7	1.5	24.17
0.34	0.34	3.3	5.3	25.7	1.6	25.17
0.35	0.35	3.6	5.8	26.7	1.6	26.18
0.36	0.36	3.9	6.4	27.8	1.7	27.18
0.37	0.37	4.1	7.0	28.8	1.7	28.19
0.38	0.38	4.4	7.7	29.8	1.7	29.19
Q_{10} 0.39	0.39	4.7	8.3	30.8	1.8	30.20
0.40	0.40	5.0	9.1	31.8	1.8	31.20
0.41	0.41	5.3	9.8	32.9	1.8	32.21
0.42	0.42	5.7	10.6	33.9	1.9	33.21
0.43	0.43	6.0	11.5	34.9	1.9	34.22
0.44	0.44	6.4	12.4	35.9	1.9	35.22
0.45	0.45	6.7	13.3	36.9	2.0	36.23
$Q_{100}(S1B) = 15.2$ 0.46	0.46	7.1	14.3	38.0	2.0	37.23
0.47	0.47	7.5	15.3	39.0	2.1	38.24
0.48	0.48	7.8	16.4	40.0	2.1	39.24

BASIN S-1: (WESTSIDE BLVD.) STD CURB/ 76'F-F/ 98'R/W.

MANNING'S N = .0170 SLOPE = .0191

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.89	4	13.00	0.13	7	87.00	0.00
2	10.83	0.67	5	49.00	0.85	8	87.17	0.67
3	11.00	0.00	6	85.00	0.13	9	98.00	0.89

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.01	0.01	0.0	0.0	0.3	0.3	0.31
0.02	0.02	0.0	0.0	0.7	0.5	0.63
0.03	0.03	0.0	0.0	1.0	0.7	0.94
0.04	0.04	0.0	0.0	1.3	0.9	1.25
0.05	0.05	0.0	0.0	1.6	1.0	1.56
0.06	0.06	0.1	0.1	2.0	1.1	1.88
0.07	0.07	0.1	0.1	2.3	1.2	2.19
0.08	0.08	0.1	0.1	2.6	1.4	2.50
0.09	0.09	0.1	0.2	3.0	1.5	2.81
0.10	0.10	0.2	0.2	3.3	1.6	3.13
0.11	0.11	0.2	0.3	3.6	1.7	3.44
0.12	0.12	0.2	0.4	3.9	1.8	3.75
0.13	0.13	0.3	0.5	4.3	1.9	4.07
0.14	0.14	0.3	0.6	5.3	1.8	5.07
0.15	0.15	0.4	0.7	6.3	1.8	6.08
0.16	0.16	0.4	0.8	7.3	1.8	7.08
0.17	0.17	0.5	0.9	8.4	1.9	8.09
0.18	0.18	0.6	1.1	9.4	1.9	9.09
0.19	0.19	0.7	1.4	10.4	2.0	10.10
0.20	0.20	0.8	1.6	11.4	2.0	11.10
0.21	0.21	0.9	1.9	12.4	2.1	12.11
0.22	0.22	1.0	2.3	13.5	2.2	13.11
0.23	0.23	1.2	2.7	14.5	2.3	14.12
0.24	0.24	1.3	3.1	15.5	2.3	15.12
0.25	0.25	1.5	3.6	16.5	2.4	16.13
0.26	0.26	1.6	4.1	17.5	2.5	17.13
0.27	0.27	1.8	4.7	18.6	2.6	18.14
0.28	0.28	2.0	5.3	19.6	2.6	19.14
0.29	0.29	2.2	6.0	20.6	2.7	20.15
0.30	0.30	2.4	6.7	21.6	2.8	21.15
0.31	0.31	2.6	7.5	22.7	2.9	22.16
0.32	0.32	2.9	8.4	23.7	2.9	23.16
0.33	0.33	3.1	9.3	24.7	3.0	24.17
0.34	0.34	3.3	10.3	25.7	3.1	25.17
0.35	0.35	3.6	11.4	26.7	3.2	26.18
0.36	0.36	3.9	12.5	27.8	3.2	27.18
Q_{10} 0.37	0.37	4.1	13.7	28.8	3.3	28.19
0.38	0.38	4.4	15.0	29.8	3.4	29.19
0.39	0.39	4.7	16.3	30.8	3.5	30.20
0.40	0.40	5.0	17.7	31.8	3.5	31.20
0.41	0.41	5.3	19.2	32.9	3.6	32.21
0.42	0.42	5.7	20.8	33.9	3.7	33.21
$Q_{100}(SID) = 23.7$ 0.43	0.43	6.0	22.5	34.9	3.7	34.22
0.44	0.44	6.4	24.2	35.9	3.8	35.22
0.45	0.45	6.7	26.0	36.9	3.9	36.23
0.46	0.46	7.1	27.9	38.0	3.9	37.23
0.47	0.47	7.5	29.9	39.0	4.0	38.24
0.48	0.48	7.8	32.0	40.0	4.1	39.24

STORM DRAIN FLOWS/CAPACITY CALCULATIONS

***** HYDRAULIC GRADE LINE CALCULATIONS *****
SEVEN BAR LOOP ROAD-100 YEAR

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	MH Dia.	JNCT Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Low Point	HV	EGL(dn)	EGL(up)
SEVEN BAR LOOP																						
9+60	OUTLET								0.00	0.00		0.00	0.00	0.00	0.00	0.00	5116.30	5116.30	5122.15	5.66	5121.96	5121.96
		48	239.9	12.57	19.09	1436	0.0279	72.40			2.02					2.02						
10+06.84	MH								8.00	45.00		0.19	0.00	0.00	0.00	0.19	5118.32	5118.86	5122.15	5.30	5123.98	5124.17
		48	232.2	12.57	18.48	1436	0.0261	86.49			2.26					2.26						
10+93.33	MH								8.00	0.00		0.00	1.21	0.00	0.00	1.21	5121.12	5122.26	5124.41	5.38	5126.43	5127.64
		42	179.1	9.62	18.62	1006	0.0317	31.51			1.00					1.00						
11+24.84	WYE								0.00	0.00		0.00	0.31	0.00	0.00	0.31	5123.26	5123.93	5125.00	5.02	5126.64	5126.95
		42	173.0	9.62	17.98	1006	0.0296	24.00			0.71					0.71						
11+48.84	MH								8.00	0.00		0.00	0.53	0.00	0.00	0.53	5124.64	5125.51	5125.67	4.67	5129.66	5130.19
		42	166.9	9.62	17.35	1006	0.0275	392.39			10.80					10.80						
15+40	MH								6.00	15.00		0.41	0.00	0.00	0.00	0.41	5136.31	5136.72	5142.58	4.67	5140.98	5141.39
		42	166.9	9.62	17.35	1006	0.0275	242.08			6.66					6.66						
17+78.42	MH								8.00	10.00		0.27	2.90	0.00	0.01	3.18	5143.38	5147.66	5152.15	3.58	5148.06	5151.24
		36	107.4	7.07	15.19	667	0.0259	102.45			2.66					2.66						
18+79.31	MH								8.00	30		0.24	-1.61	0.00	0.00	-1.38	5150.31	5151.58	5155.48	0.94	5153.90	5152.52
		36	55.0	7.07	7.78	667	0.0068	450.00			3.06					3.06						
23+22.49	MH								8.00	25.00		0.26	0.00	0.00	0.29	0.56	5154.64	5151.38	5175.60	4.76	5155.58	5156.14
		24	55.0	3.14	17.51	226	0.0591	376.92			22.28					22.28						

***** HYDRAULIC GRADE LINE CALCULATIONS *****
SEVEN BAR LOOP ROAD-100 YEAR

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	MH Dia.	JNCT Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Low Point	HV	EGL(dn)	EGL(up)
MAJOR COLLECTOR																						
10+09.58	MH								8.00	60.00		0.43	1.14	0.00	0.12	1.69	5143.38	5148.56	5152.15	1.18	5148.06	5149.74
		36	61.6	7.07	8.71	667	0.0085	26.49			0.23					0.23						
10+32.91	MH								6.00	55.00		0.18	0.00	0.06	0.00	0.24	5148.79	5149.03	5152.85	1.18	5149.97	5150.21
		36	61.6	7.07	8.71	667	0.0085	420.33			3.59					3.59						
14+50	MH								4.00	15.00		0.14	0.00	0.00	0.05	0.19	5152.62	5151.54	5154.94	2.45	5153.80	5153.99
		30	61.6	4.91	12.55	410	0.0226	403.60			9.10					9.10						
18+50	MH								4.00	15.00		0.25	0.00	0.00	0.03	0.28	5160.64	5159.64	5166.97	3.73	5163.09	5163.37
		27	61.6	3.98	15.49	310	0.0396	302.70			11.98					11.98						
21+50	MH								4.00	10.00		0.25	0.00	0.19	0.00	0.43	5171.61	5172.05	5184.14	3.73	5175.34	5175.78
		27	61.6	3.98	15.49	310	0.0396	203.15			8.04					8.04						
23+51.34	MH								4.00	10.00		0.25	0.00	0.19	0.00	0.43	5180.09	5180.52	5189.44	3.73	5183.81	5184.25
		27	61.6	3.98	15.49	310	0.0396	195.00			7.71					7.71						
INFLOW	MH																					

***** HYDRAULIC GRADE LINE CALCULATIONS *****
RESIDENTIAL STREETS IN TRACTS B-5 & B-6 -100 YEAR STORM
FILE: CDP:[C9321740.HYDRO]HGLRES5.WK3

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	MH Dia.	JNCT Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Low Point	HV	EGL(dn)	EGL(up)
P.O.B.	OUTLET								0.00	0.00		0.00	0.00	0.00	0.00	0.00	5127.33	5127.33	5200.00	3.40	5130.73	5130.73
		42	142.4	9.62	14.80	1006	0.0200	48.00			0.96					0.96						
0+35	MH								6.00	10.00		0.23	0.00	0.17	0.00	0.40	5128.29	5128.69	5200.00	3.40	5131.69	5132.09
		42	142.4	9.62	14.80	1006	0.0200	15.00			0.30					0.30						
0+50	WYE								0.00	0.00		0.00	0.06	0.00	0.00	0.06	5128.99	5129.12	5200.00	3.34	5132.39	5132.45
		42	141.0	9.62	14.66	1006	0.0196	65.00			1.28					1.28						
1+15	MH								6.00	40.00		0.52	1.32	0.00	0.01	1.85	5130.40	5131.14	5138.09	4.45	5133.73	5135.58
		36	119.6	7.07	16.92	667	0.0322	282.00			9.07					9.07						
3+97	WYE								0.00	0.00		0.00	0.00	0.00	0.00	0.00	5140.21	5140.21	5145.31	4.45	5144.65	5144.65
		36	119.6	7.07	16.92	667	0.0322	8.00			0.26					0.26						
4+05	WYE								0.00	0		0.00	0.00	0.00	0.00	0.00	5140.46	5140.46	5145.51	4.45	5144.91	5144.91
		36	119.6	7.07	16.92	667	0.0322	50.00			1.61					1.61						
4+55	MH (1)								6.00	0.00		0.00	1.66	0.00	0.00	1.66	5142.07	5145.60	5146.79	2.58	5146.52	5148.18
		36	91.1	7.07	12.89	667	0.0187	100.00			1.87					1.87						
5+55	MH								6.00	60.00		0.35	0.00	0.00	0.02	0.37	5147.47	5148.65	5149.70	1.76	5150.04	5150.41
		30	52.3	4.91	10.65	410	0.0163	45.00			0.73					0.73						
6+25	WYE								0.00	0		0.00	0.27	0.00	0.00	0.27	5149.38	5150.05	5151.93	1.37	5151.14	5151.42
		30	46.1	4.91	9.39	410	0.0126	15.00			0.19					0.19						
6+40	MH								6.00	30		0.14	0.29	0.00	0.00	0.43	5150.24	5151.02	5152.40	1.02	5151.61	5152.04
		30	39.8	4.91	8.11	410	0.0094	105.00			0.99					0.99						
7+45	MH								4.00	0.00		0.00	2.33	0.00	0.02	2.34	5152.01	5153.72	5155.74	1.65	5153.03	5155.37
		24	32.4	3.14	10.31	226	0.0205	15.00			0.31					0.31						
7+60	WYE								0.00	0.00		0.00	0.00*	0.00	0.00	0.00	5154.03	5154.00	5156.22	1.68	5155.68	5155.68
		21	25.0	2.41	10.39	158	0.0249	320.00			7.97					7.97						
10+80	MH								4.00	15		0.19	0.00	0.00	0.04	0.23	5161.97	5160.77	5166.39	3.11	5163.64	5163.88
		18	25.0	1.77	14.15	105	0.0566	320.00			18.13					18.13						
14+00	INFLOW																5178.90		5182.13		5182.00	

*** Manning's n = 0.013 for pipe

(1) - ENTRY OF FLOWS FROM SEVEN BAR LOOP ROAD/WESTSIDE BLVD STORM DRAIN SYSTEM

***** HYDRAULIC GRADE LINE CALCULATIONS *****

RESIDENTIAL STREETS IN TRACTS B-5 & B-6 AND ADDITIONAL OFFSITE FLOW-100 YEAR STORM

FILE: CDP:[C9321740.HYDRO]HGLRES6.WK3

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	MH Dia.	JNCT Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Low Point	HV	EGL(dn)	EGL(up)
P.O.B.	OUTLET (2)								0.00	0.00		0.00	0.00	0.00	0.00	0.00	5127.33	5127.33	5200.00	4.32	5131.65	5131.65
		42	160.4	9.62	16.67	1006	0.0254	48.00			1.22					1.22						
0+35	MH (2)								6.00	10.00		0.26	0.00	0.00	0.00	0.26	5128.55	5129.72	5200.00	3.40	5132.87	5133.12
		42	142.4	9.62	14.80	1006	0.0200	15.00			0.30					0.30						
0+50	WYE								0.00	0.00		0.00	0.06	0.00	0.00	0.06	5130.02	5130.15	5200.00	3.34	5133.42	5133.49
		42	141.0	9.62	14.66	1006	0.0196	65.00			1.28					1.28						
1+15	MH								6.00	40.00		0.52	1.32	0.00	0.01	1.85	5131.43	5132.17	5138.09	4.45	5134.76	5136.62
		36	119.6	7.07	16.92	667	0.0322	282.00			9.07					9.07						
3+97	WYE								0.00	0.00		0.00	0.00	0.00	0.00	0.00	5141.24	5141.24	5145.31	4.45	5145.68	5145.68
		36	119.6	7.07	16.92	667	0.0322	8.00			0.26					0.26						
4+05	WYE								0.00	0		0.00	0.00	0.00	0.00	0.00	5141.50	5141.50	5145.51	4.45	5145.94	5145.94
		36	119.6	7.07	16.92	667	0.0322	50.00			1.61					1.61						
4+55	MH (1)								6.00	0.00		0.00	1.66	0.00	0.00	1.66	5143.10	5146.63	5146.79	2.58	5147.55	5149.21
		36	91.1	7.07	12.89	667	0.0187	100.00			1.87					1.87						
5+55	MH								6.00	60.00		0.35	0.00	0.00	0.02	0.37	5148.50	5149.68	5149.70	1.76	5151.08	5151.45
		30	52.3	4.91	10.65	410	0.0163	45.00			0.73					0.73						
6+25	WYE								0.00	0		0.00	0.27	0.00	0.00	0.27	5150.41	5151.08	5151.93	1.37	5152.18	5152.45
		30	46.1	4.91	9.39	410	0.0126	15.00			0.19					0.19						
6+40	MH								6.00	30		0.14	0.29	0.00	0.00	0.43	5151.27	5152.05	5152.40	1.02	5152.64	5153.07
		30	39.8	4.91	8.11	410	0.0094	105.00			0.99					0.99						
7+45	MH								4.00	0.00		0.00	2.33	0.00	0.02	2.34	5153.04	5154.75	5155.74	1.65	5154.06	5156.40
		24	32.4	3.14	10.31	226	0.0205	15.00			0.31					0.31						
7+60	WYE								0.00	0.00		0.00	0.00*	0.00	0.00	0.00	5155.06	5155.03	5156.22	1.68	5156.71	5156.71
		21	25.0	2.41	10.39	158	0.0249	320.00			7.97					7.97						
10+80	MH								4.00	15		0.19	0.00	0.00	0.04	0.23	5163.00	5161.80	5166.39	3.11	5164.68	5164.91
		18	25.0	1.77	14.15	105	0.0566	320.00			18.13					18.13						
14+00	INFLOW																5179.93		5182.13		5183.04	

*** Manning's n = 0.013 for pipe

(1) - ENTRY OF FLOWS FROM SEVEN BAR LOOP ROAD/WESTSIDE BLVD STORM DRAIN SYSTEM

(1) - MAXIMUM FLOW ALLOWABLE FOR HYDRAULIC DESIGN - ADDING 18.0 cfs FROM TRACT WEST OF SEVEN BAR NORTH

CATCH BASIN CALCULATION SHEET

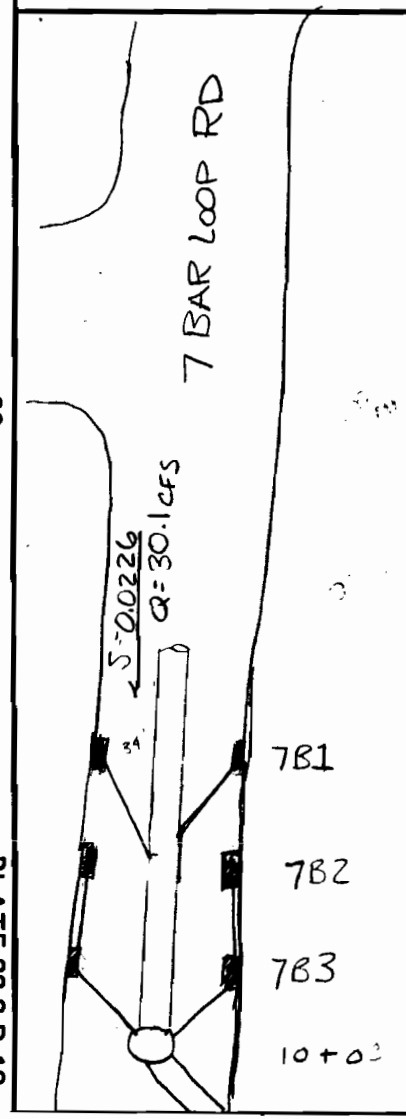
Sht.__ of__

PROJECT TRACTS A&D

CALCULATED BY PR

DESIGN FREQUENCY 100-YR

DATE 3/14/94



Sym.	Drain. Area	Q Total	Q Inter.	Cap. of ½ Street	Gutter "d"	C.B. No.	C.B. Size	Connector Pipe Head	Connector Pipe L	Connector Pipe Dia.	V Depth
7B1		22.8	2x6.1 = 12.2	10.2 CFS	0.42	"A"	SGL				
7B2		10.6	2x4.3 = 8.6	10.2	0.34	"C"	SGL				
7B3		2.0	2x1.4 ALL	10.2	0.21	"C"	SGL				

4-82

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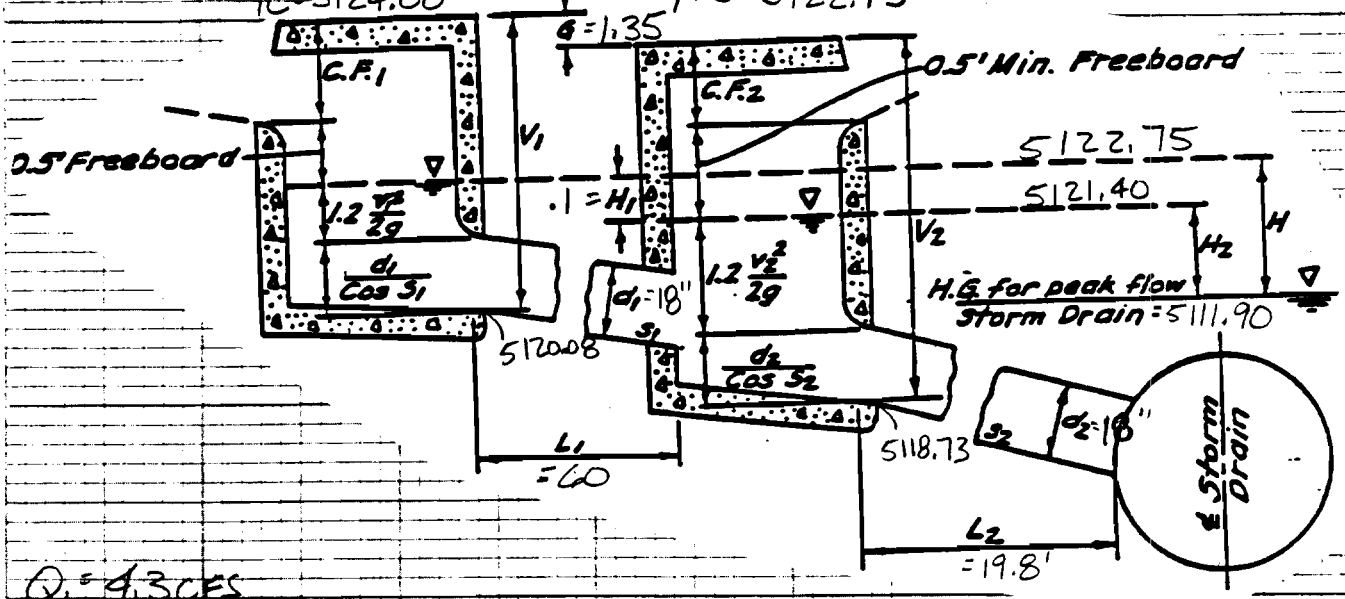
PLATE 22.3 D-10

22.3

SEVEN BAR LOOP CATCH BASINS

STA 10+78.84(78.2RT)
TYPE "C" SINGLE
TC=5124.08

STA 10+18.84(76.3RT)
TYPE "C" SINGLE
TC=5122.73



$Q_1 = 4.3$ CFS
$V_1 = 2.4$ FPS
$\frac{1.2V^2}{2g} = 0.11'$
$V_1 = 1.33 + 0.11 + 1.5 = 2.94'$
USE 4' MIN SIZE
INV. = 5124.08 − 4 = 5120.08
$H_f = \left(\frac{Q_1}{K}\right)^2 L = \left(\frac{4.3}{105}\right)^2 60 = 0.10'$

$H_{1\,TOTAL} = 1.5$ ✓

$Q_2 = 4.3 + 1 = 5.3$
$V_2 = 3.0$ FPS
$\frac{1.2V_2^2}{2g} = 0.17$
$V_2 = 1.33 + 0.10 + 0.17 + 1.5 - 1.35$
$= 1.75'$
USE 4'
INV = 5118.73
$H_f = \left(\frac{5.3}{105}\right)^2 (19.8) = 0.05'$

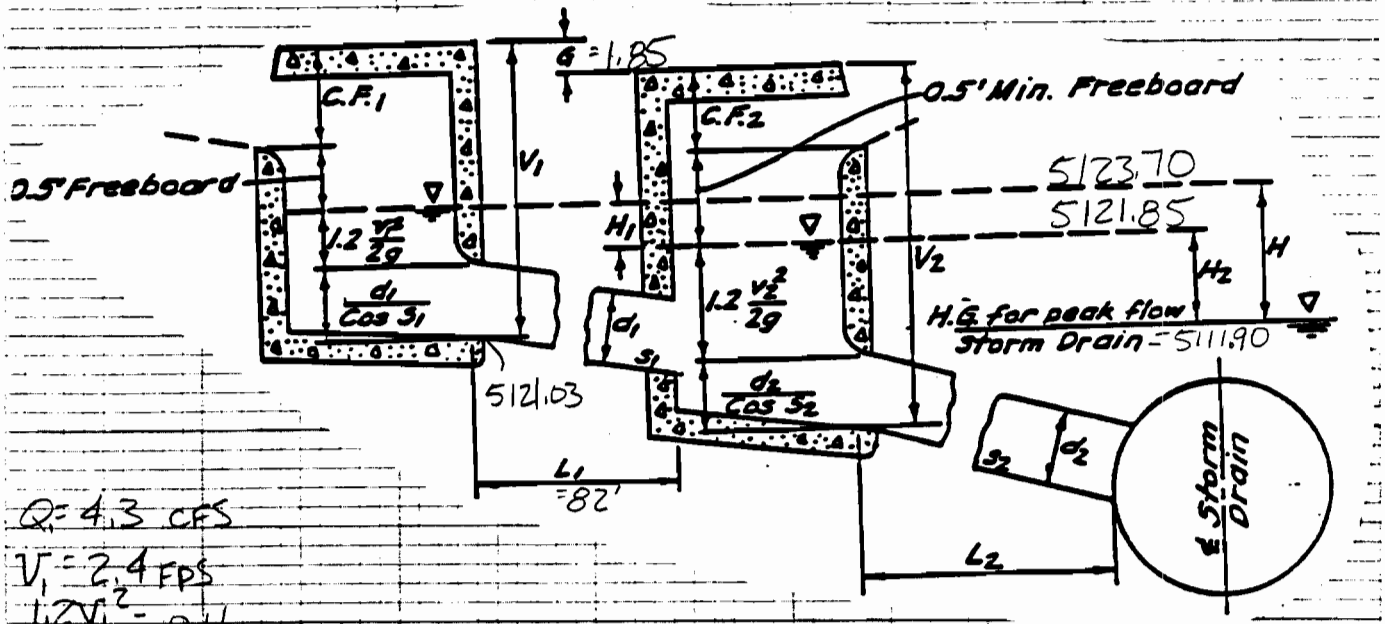
$Y_2 - 0.5 > V_1 - G$
$4 - .5 > 4 - 1.35$ ✓

BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____
PROJECT NO. _____ BY _____ DATE _____
SUBJECT _____ CH'D _____ DATE _____

STA 11+20.84 (7B2 LT)
TYPE "C" SINGLE
TC = 5125.03

STA 10+38.84 (7B3 LT)
TYPE "C" SINGLE
TC = 5123.18



$Q_1 = 4.3$ CFS

$V_1 = 2.4$ FPS

$\frac{1.2V_1^2}{2g} = 0.11$

$V_1 = 1.33 + 0.11 + 1.5 = 2.94$ USE 4'

INV = 5121.03

$H_f = \left(\frac{4.3}{105}\right)^2 82 = 0.14'$

$H_{f\,TOT} = .26$ ✓

$Q_2 = 5.3$ CFS

$V_2 = 3.0$ FPS

$\frac{1.2V_2^2}{2g} = 0.17$

$V_2 = 1.33 + 0.14 + 0.17 + 1.5 - 1.85$

1.29 USE 4'

INV = 5119.18

$H_f = \left(\frac{5.3}{105}\right)^2 48.08 = 0.12'$

$V_2 - .05 > V_1 - G$

$4 - 0.5 > 4 - 1.85$ ✓

BOHANNAN-HUSTON INC.

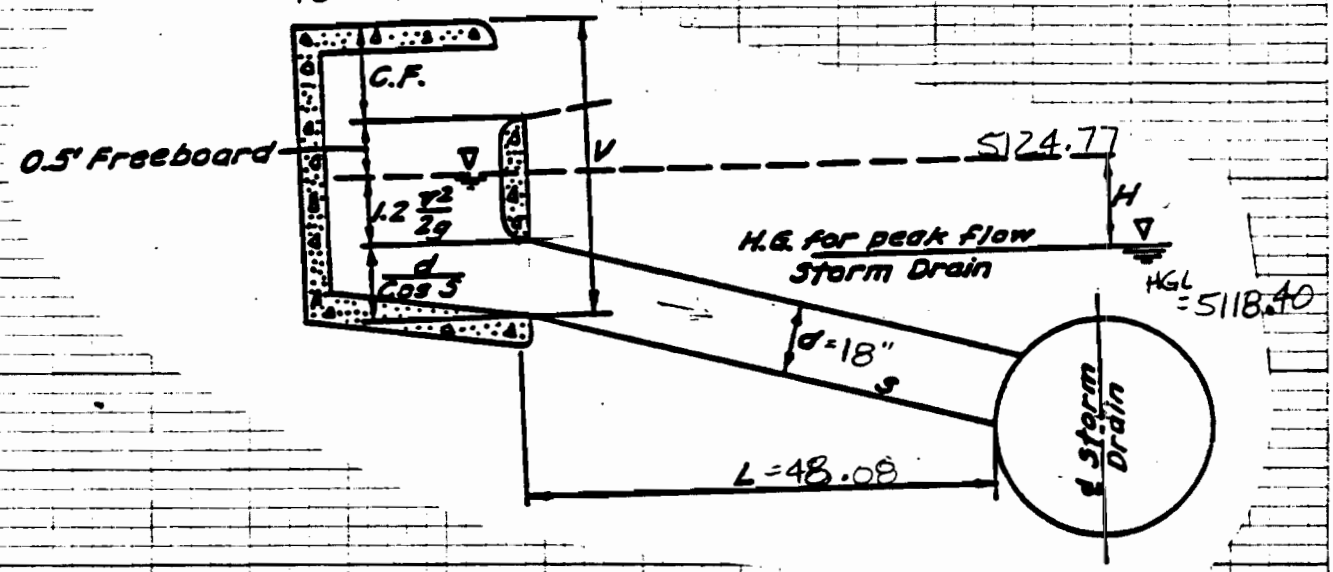
PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

SUBJECT _____ CH'D _____ DATE _____

SEVEN BAR LOOP ROAD - CATCH BASINS (CONT'D)

STA 11+80.84 (76.1-L)
TYPE "A"
TC = 5126.10



$Q = 6.1$ cfs
$V = 3.5$ FPS $\Rightarrow 1.2V^2/2g = 0.23'$
$V_{MIN} = 1.33 + 0.23 + 1.5 = 3.06$

USE 4'

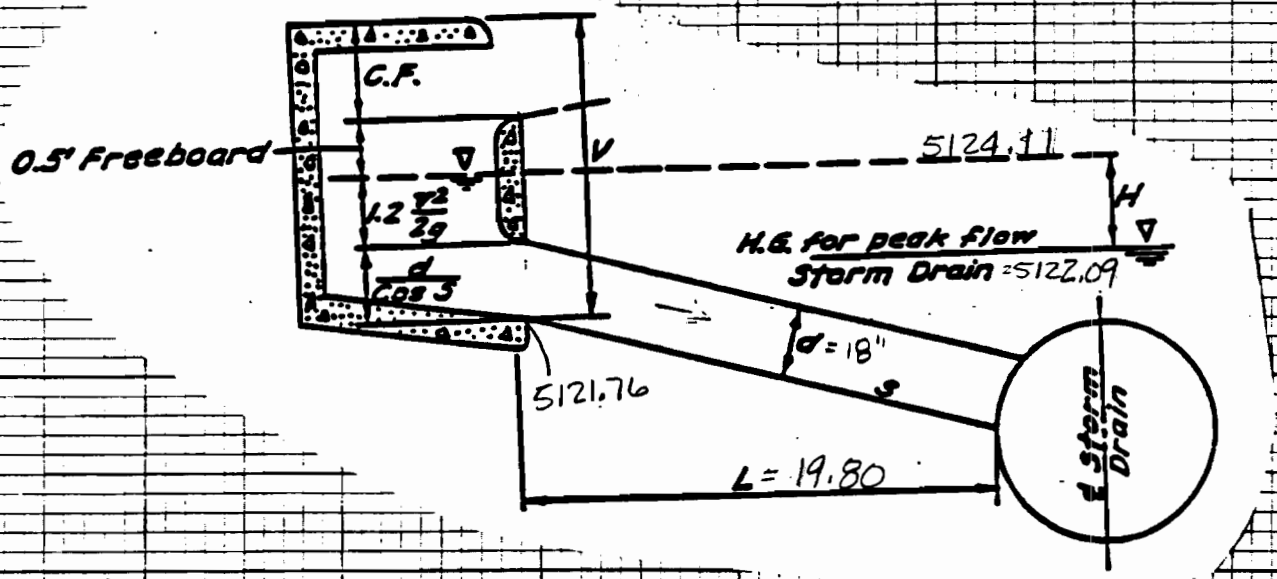
$H_c = \left(\frac{6.1}{10.5}\right)^2 48 = 0.16$ ✓

FREEBOARD = 5125.58 − 0.83 − 5118.33
= 6.42 > 0.5 ✓

BOHANNAN-HUSTON INC.

PROJECT NAME TRACTS A & D SHEET 1 OF 2
PROJECT NO. 9321740 BY PR DATE 3/21/94
SUBJECT CATCH BASINS - TRAP CH'D DATE

STA 11+38.88 (TBL-R)
TYPE "A"
TC: 5125.11



$Q = 6.1$ CFS

$V = 3.5$ FPS

$\frac{1.2V^2}{2g} = 0.23$

$H = 0.07$ ✓

$V_{MIN} = 1.33 + .23 + 1.5 = 3.06$

USE 4'

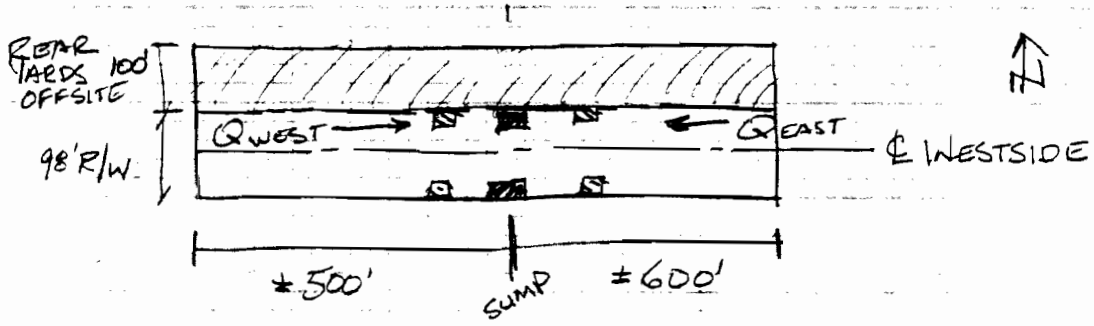
BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

INLETS FOR BASIN S1B: MAXIMUM HEAD = 0.83' (CURB)

$Q_{100} = 17.4$ CFS



Q_{100} ON NORTH SIDE OF STREET $= \frac{3}{4} Q_{TOTAL} = \frac{3}{4}(17.4) = 13.0$ CFS

$S = 0.50\%$

$Q_{WEST} = \frac{500}{1100}(13.0) = 5.9$ CFS

NORMAL DEPTH = 0.40'

CAPACITY OF SINGLE "A" CB: 3.0 CFS

$S = 2.58\%$

$Q_{EAST} = \frac{600}{1100}(13.0) = 7.1$ CFS

NORMAL DEPTH = 0.32'

CAPACITY OF SINGLE "A" CB: 3.5 CFS

TOTAL Q INTERCEPTED = 3.0 + 3.5 = 6.5 CFS

$Q_{REMAINING} = 13.0 - 6.5 = 6.5$ CFS

USE SGL TYPE "C" IN SUMP;

ORIFICE EQN:

$Q = 0.6 A_{NET} \sqrt{2gH}$

$A_{NET} = \frac{31(18.5)}{144} = 3.98$ SF

$Q = 17.5$ CFS

WEIR EQN:

$Q = 2.68 P_{NET} H^{1.5}$

$P_{NET} = \frac{2(18.5)+31}{12} = 5.67'$

$Q = 2.68(5.67)(0.83)^{1.5}$

$= 11.5$ CFS

$Q_{REQD} = 6.5(1.15) = 7.5$ CFS ✓

1 clogging factor

BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY PR DATE 4/12/94

SUBJECT HYDRAULICS - 7 BAR CH'D _____ DATE _____

INLETS TO BLACK'S ARROYO

CATCH BASIN CALCULATION SHEET

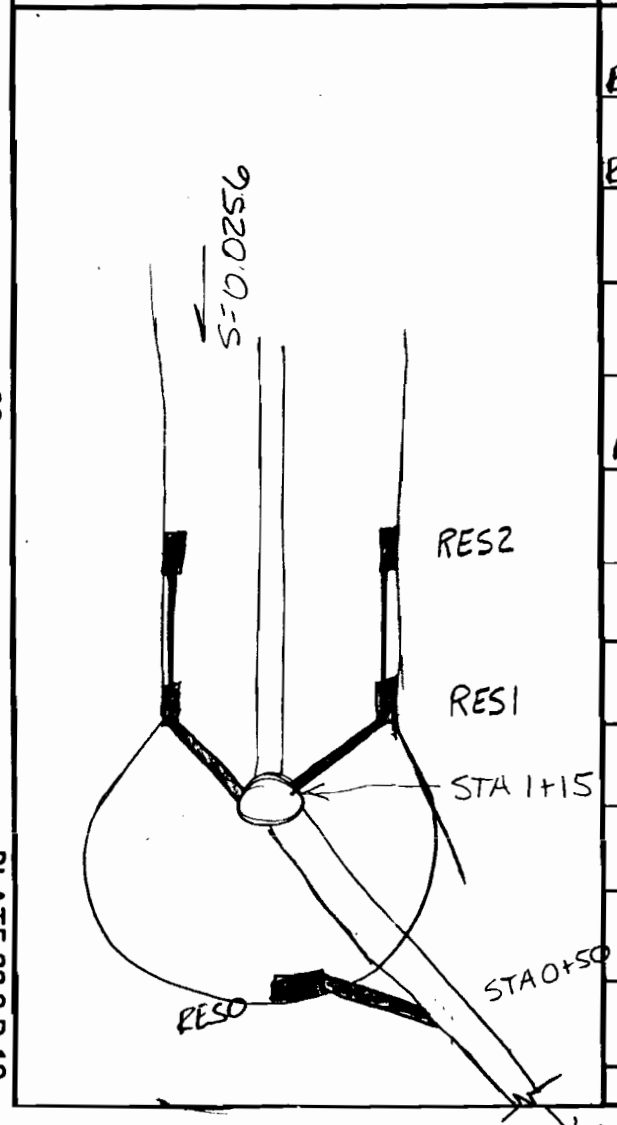
Sht.__ of__

PROJECT TRACTS A & D - UNIT B-5

CALCULATED BY PR

DESIGN FREQUENCY 100-YR

DATE 3/22/94



Sym.	Drain. Area	Q Total	Q Inter.	Cap. of ½ Street (CFS)	Gutter "d"	C.B. No.	C.B. Size	Connector Pipe Head	Connector Pipe L	Connector Pipe Dia.	V Depth
RES2		30.9	2x8.0 = 16.0	67.7	0.48	"A"					
RES1		14.9	2x8.0 + ALL	67.7	0.39	"B"					
RES0		1.3	ALL			"A"	USE 18" AT	4' V. DEPTH WITH CONNECTOR PIPE STA C+35			TO MANHOLE

4-82

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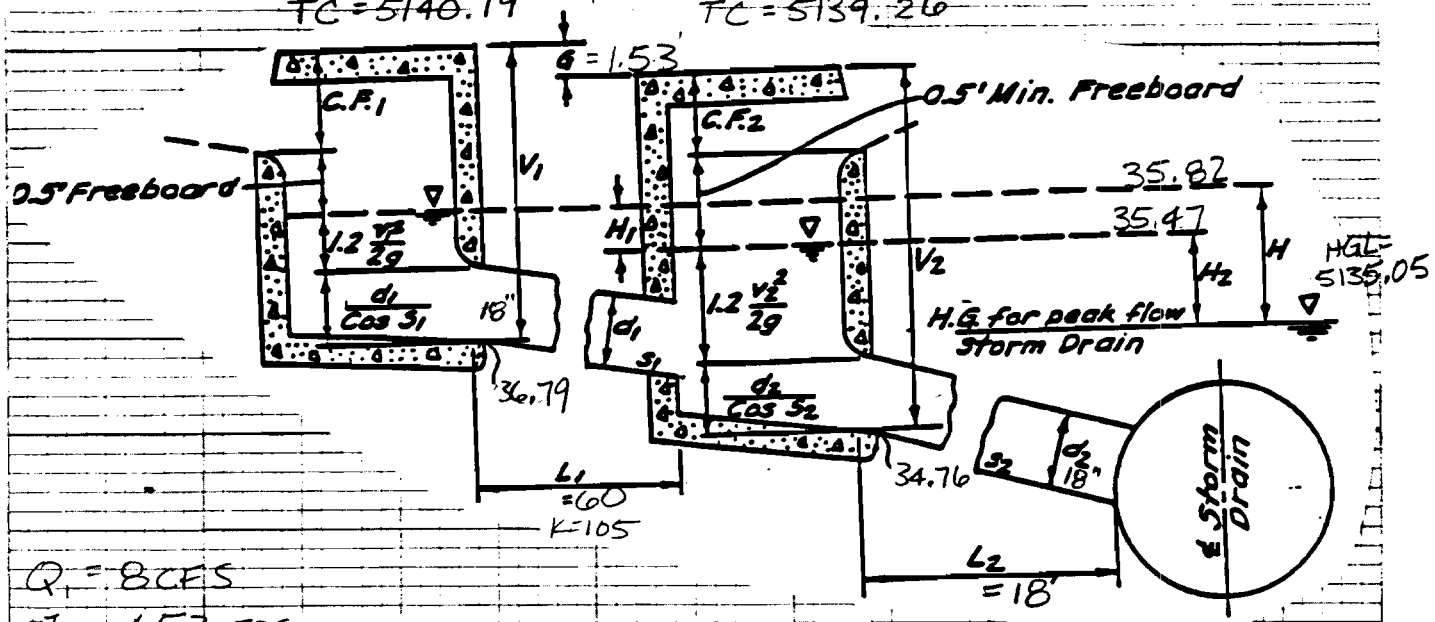
PLATE 22.3 D-10

22.3

RESIDENTIAL STREET CATCH BASINS

STA 1+90 (RES2)
TYPE "A"
TC = 5140.79

STA 1+30 (RES1)
TYPE "B"
TC = 5139.26



$Q_1 = 8$ CFS

$V_1 = 4.53$ FPS

$\frac{1.2V_1^2}{2g} = 0.38'$

$V_1 = 1.33 + 0.38 + 1.5 = 3.21$

USE 4.0' (MIN SIZE)

INV = 5140.79 − 4 = 5136.79

$H_1 = \left(\frac{Q_1}{K_1}\right)^2 L = \left(\frac{8}{105}\right)^2 60 = 0.35'$

$Q_2 = 8 + 8 = 16$ CFS

$V_2 = 9.05$ FPS

$\frac{1.2V_2^2}{2g} = 1.53'$

$V_2 = 1.83 + 0.35 + 1.53 + 1.5 - 1.53$

$= 3.18$

USE 4.5

INV = 5139.26 4.5 = 5134.76

$FB_2 = 4.5 - 1.5 - 1.53 - 0.83 = 0.64 > 0.5$ ✓

$V_2 - 0.5 > V_1 - G$?

$4.5 - 0.5 > 4 - 1.53$?

$4 > 2.47$ ✓

$H_2 = \left(\frac{16}{105}\right)^2 18 = 0.42$

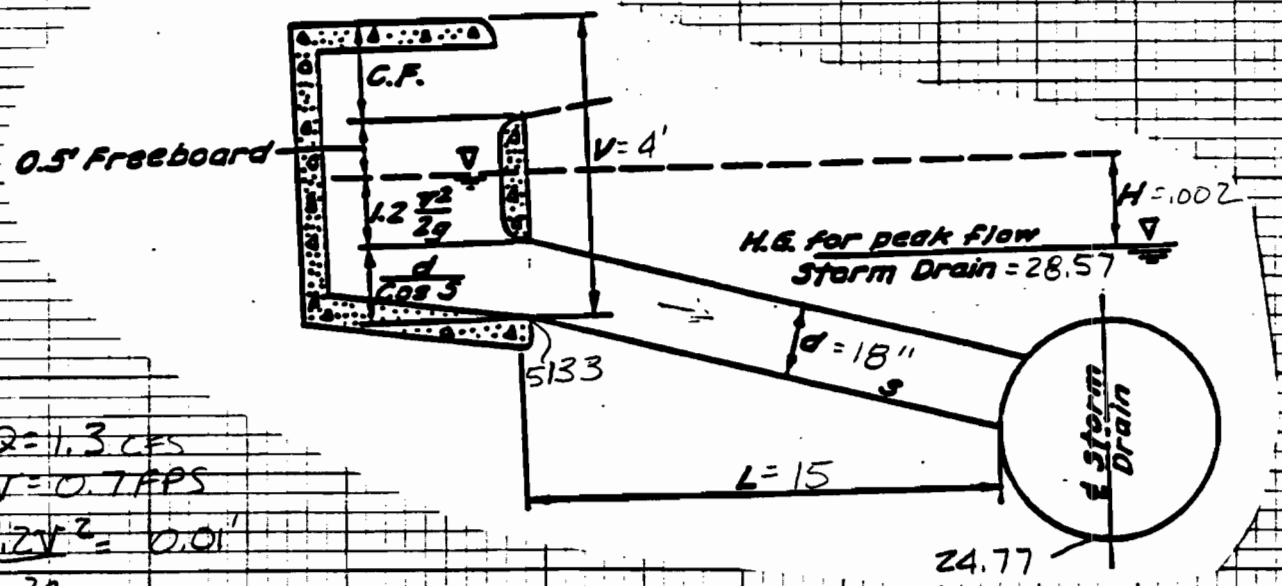
BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

SUBJECT _____ CH'D _____ DATE _____

STA 0+65 (RES 2)
TYPE "A"
TC = 5137.59



Q = 1.3 CFS
V = 0.7 FPS
1.2V²/2g = 0.01'

USE 4' V

BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

CATCH BASIN CALCULATION SHEET

Sht.___ of___

PROJECT TRACTS A&D - UNIT B-5

CALCULATED BY PR

DESIGN FREQUENCY 100-YR

DATE 3/22/94

4-82

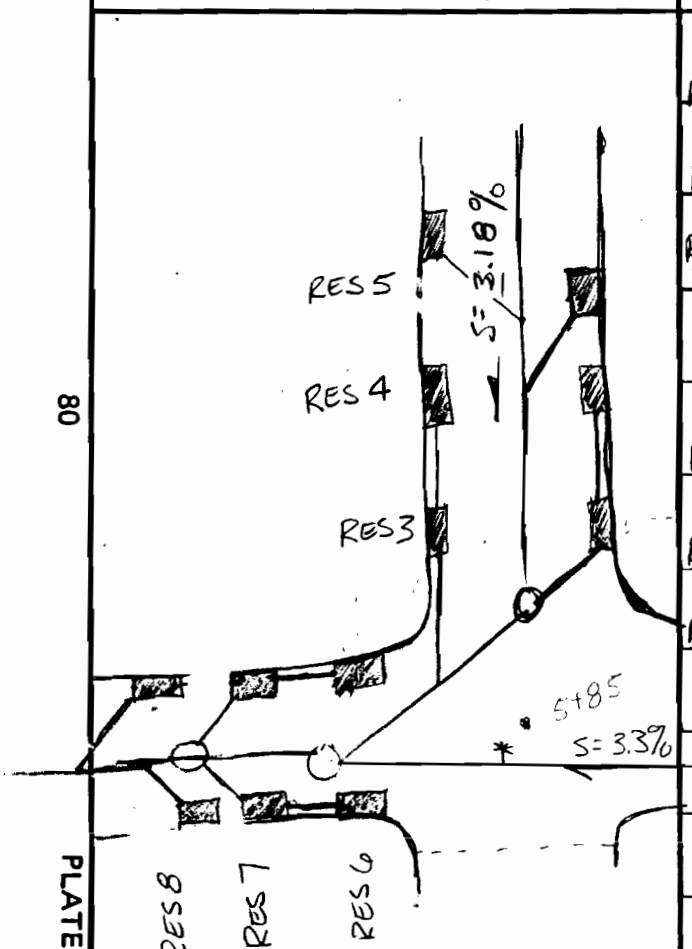


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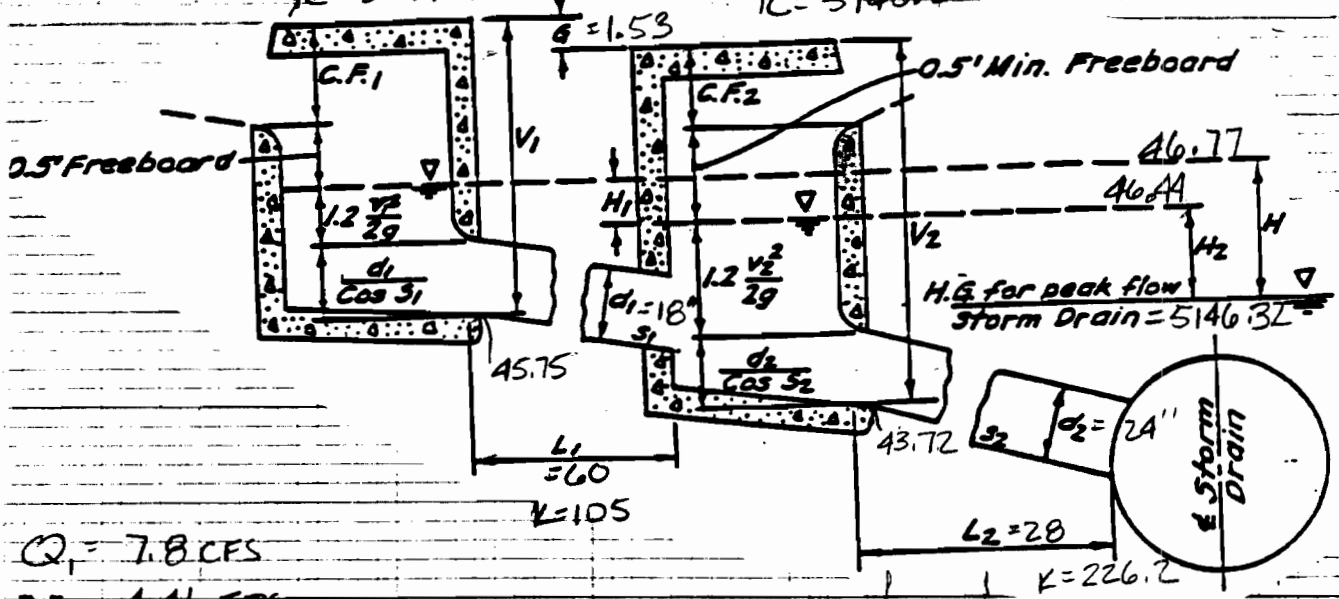
PLATE 22.3 D-10

FLOW DIAGRAM (Indicate street slopes)	Sym.	Drain. Area	Q Total	Q Inter.	Cap. of ½ Street	Gutter "d"	C.B. No.	C.B. Size	Connector Pipe Head	Connector Pipe L	Connector Pipe Dia.	V Depth
	RES5		27.1	2x7.4 :14.8		0.45	"A"			60		
	RES4		12.3	2x6.2 ALL		0.35	"B"					
	RES3	ADD 50% MORE INLETS IF SLOPE >3%					"C"					
	RES6		30.2	2x7.8 15.6		0.46	"A"					
	RES7		14.6	2x7.4 ALL		0.37	"B"					
	RES8	ADD 50% MORE INLETS IF SLOPE >3%					"C"					

22.3

STA 5+40 (RES 6)
TYPE "A"
TC = 5149.75

STA 4+80 (RES 7)
TYPE B
TC = 5148.22



$Q_1 = 7.8$ CFS

$V_1 = 4.41$ FPS

$\frac{1.2V_1^2}{2g} = 0.36'$

$V_1 = 1.33 + 0.36 + 1.5 = 3.19'$

USE 4'

INV = 5149.75 - 4 = 5145.75

$H_f = \left(\frac{Q}{K}\right)^2 L = \left(\frac{7.8}{105}\right)^2 60 = 0.33'$

$Q_2 = 7.8 + 7.3 = 15.1$ CFS

$V_2 = 4.81$ FPS

$\frac{1.2V_2^2}{2g} = 0.43'$

$V_2 = 1.33 + 0.33 + .43 + 1.5 - 1.53$

$= 2.06'$

USE 4.5'

INV = 5148.22 - 4.5 = 5143.72

$FB_2 = 5148.22 - 0.83 - 5146.44 = 0.95 > 0.5$ ✓

$V_2 - 0.5 > V_1 - 6$?

$4.5 - 0.5 > 4 - 1.54$?

$4 > 2.46$ ✓

$H_{f_2} = \left(\frac{15.1}{226.2}\right)^2 28 = 0.12$

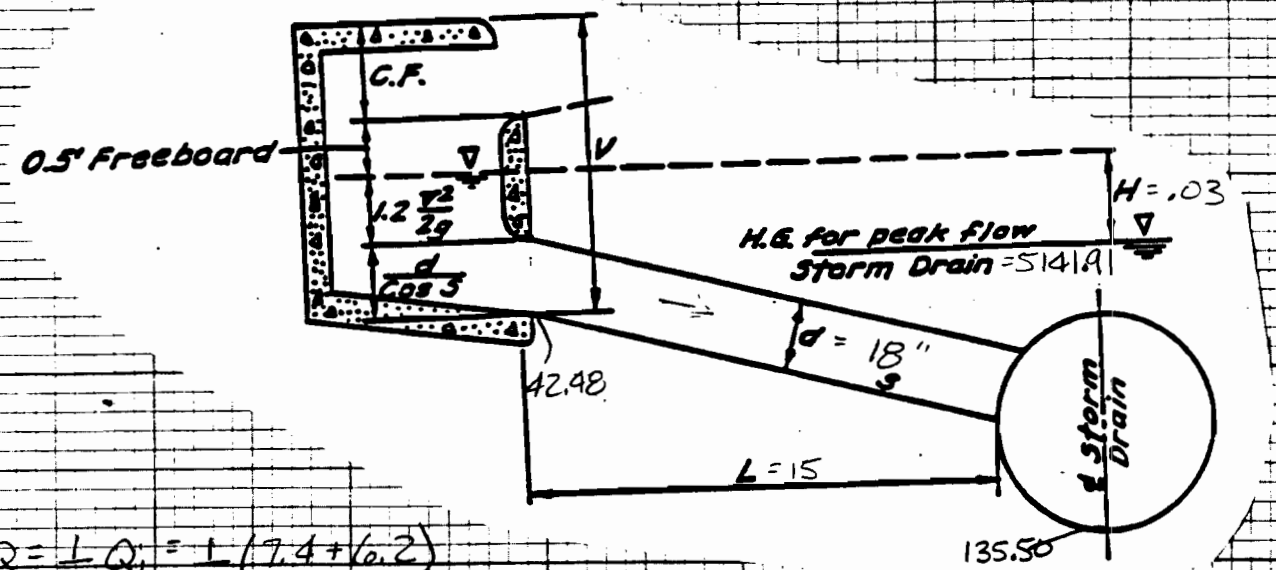
BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

SUBJECT _____ CH'D _____ DATE _____

STA 4+12 (RES 8-L)
TYPE "C"
TC = 5146.48



$Q = \frac{1}{3} Q_L = \frac{1}{3}(7.4 + 6.2)$

$= 4.53$ CFS

$V = 2.6$ FPS

$\frac{1.2 V^2}{2g} = 0.12'$

$V_{MIN} = 1.33 + 0.12 + 1.5 = 2.95$

USE 4'

INV = 5142.36

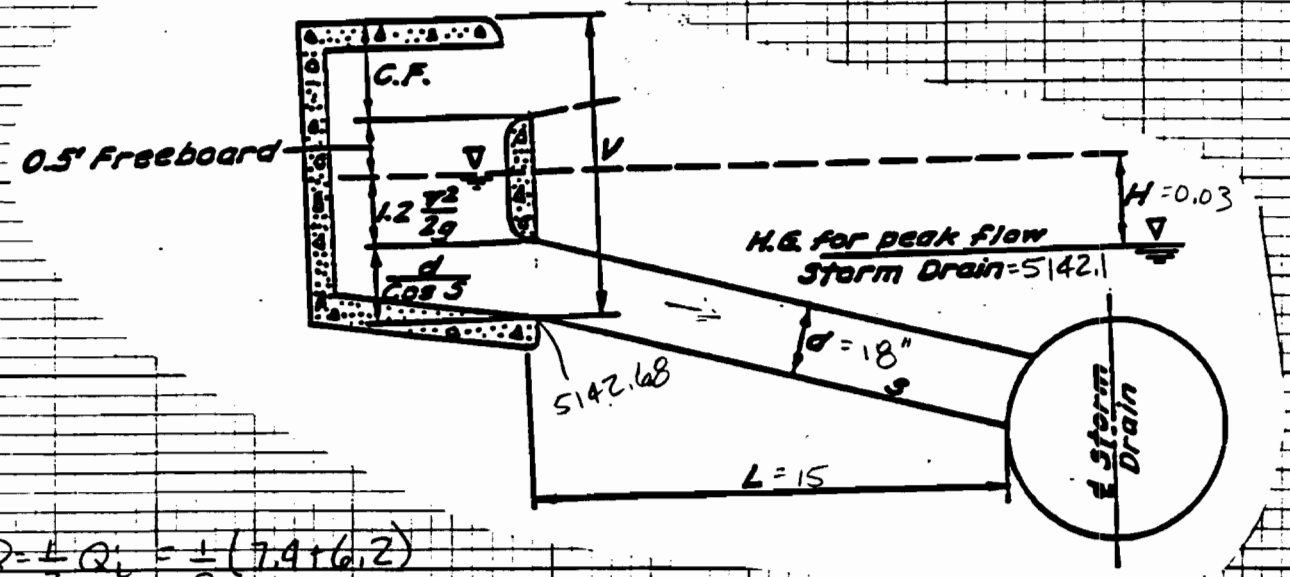
BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY PR DATE 3/24/94

SUBJECT _____ CH'D _____ DATE _____

STA 4+20 (RT & B-R)
TYPE "C"
T_c = ~~5146.68~~



$Q = \frac{1}{3}Q_t = \frac{1}{3}(7.9+6.2)$
$= 4.53$ CFS

$V = 2.6$ FPS

$\frac{1.2V^2}{2g} = 0.12'$

$V_{MIN} = 1.33 + 0.12 + 1.5 = 2.95$
USE 4'

INV = 5142.57

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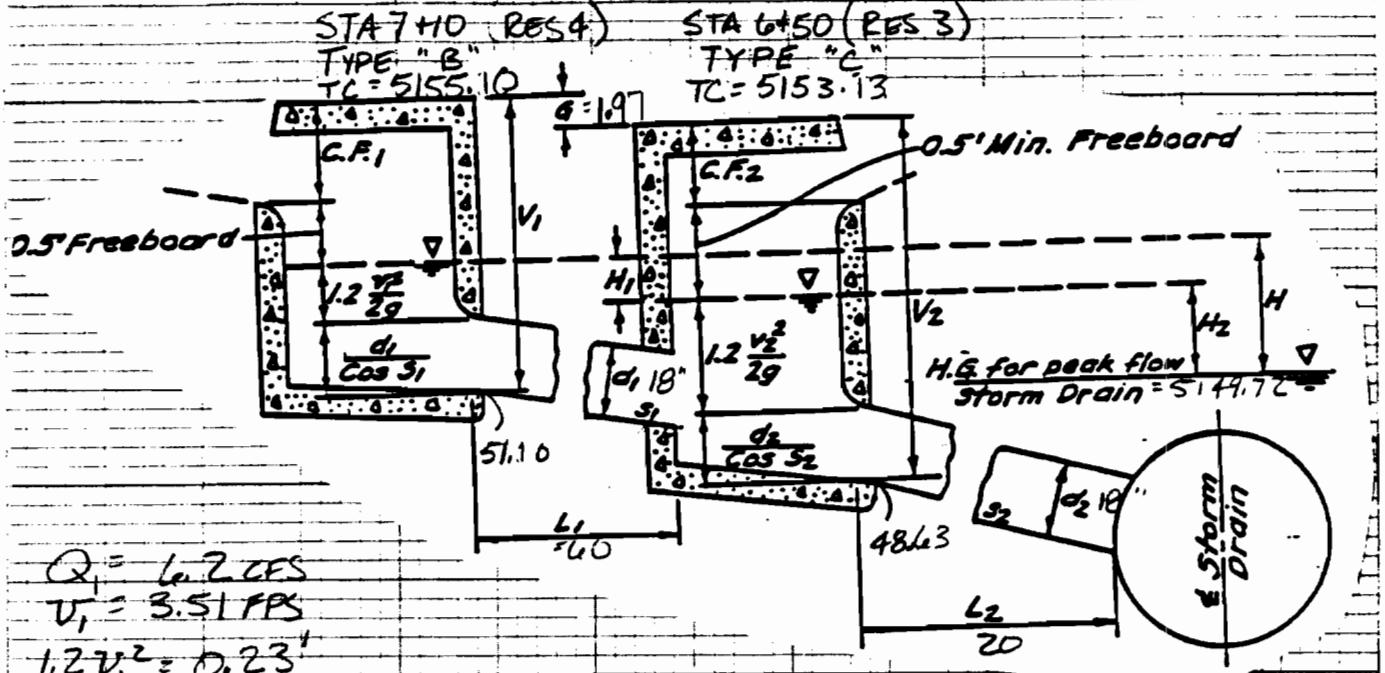
(LEFT)



$Q_1 = 6.2$ CFS

$V_1 = 3.51$ FPS

$\frac{1.2V_1^2}{2g} = 0.23'$

$V_1 = 1.33 + 0.23 + 1.5 = 3.06$

USE 4'

INV = 5155.10 − 4 = 5151.10

$H_f = \left(\frac{Q}{K}\right)^2 L = \left(\frac{6.2}{105}\right)^2 60 = 0.21'$

$Q_2 = 6.2 + \frac{1}{3}Q_1 = 8.7$

$V_2 = 4.9$ FPS

$\frac{1.2V_2^2}{2g} = 0.45'$

$V_1 = 1.33 + 0.21 + 0.45 + 1.5 - 1.97$

$= 1.52$

USE 4.5

INV = 5153.13 − 4.5

= 5148.63

$FB_2 = 4.5 - 1.5 - 0.45 - 0.83 = 1.72 > 0.5$ ✓

$V_2 - 0.5 > V_1 - 6$?

$4 > 2.03$ ✓

$H_{f2} = \left(\frac{6.2}{105}\right)^2 (20)$

$= 0.07'$

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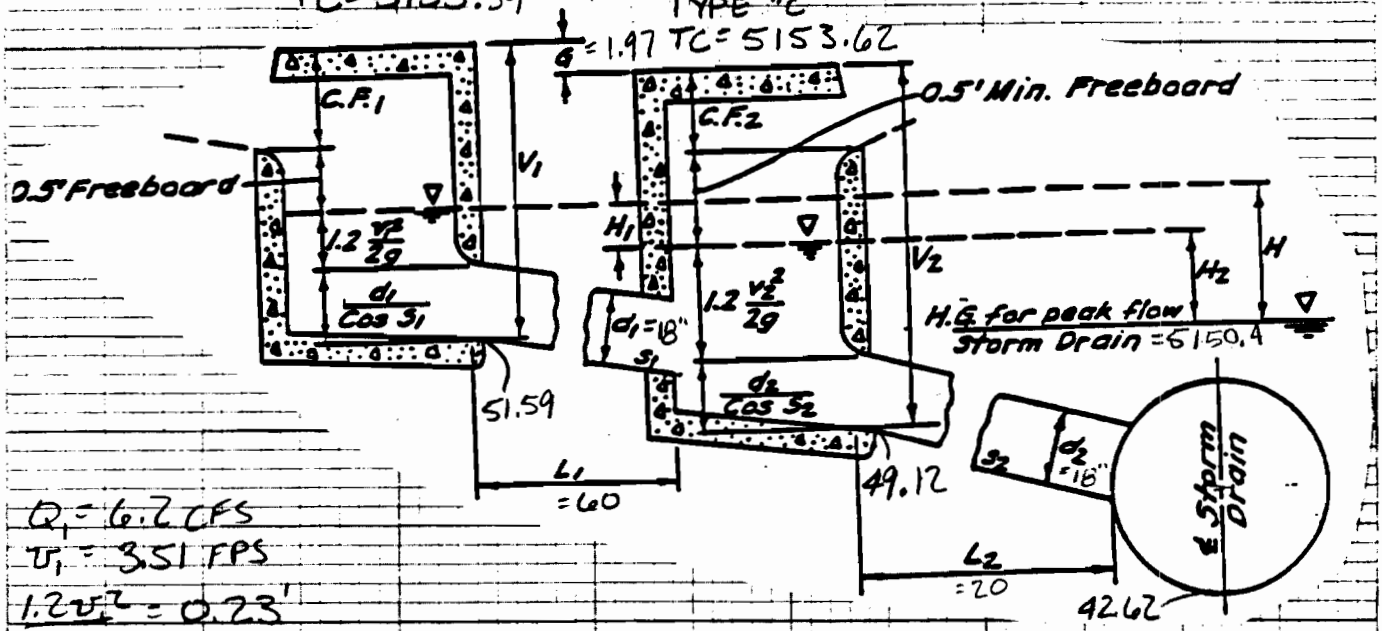
STA 7+25 (RES 4-RT)
TYPE "B"
TC = 5155.59

STA 6+65 (RES 3-RT)
TYPE "C"
TC = 5153.62



$Q_1 = 6.2$ CFS

$V_1 = 3.51$ FPS

$\frac{1.2V_1^2}{2g} = 0.23'$

$V_1 = 1.33 + 0.23 + 1.5 = 3.06'$

USE 4'

INV = 5155.59 − 4 = 5151.59

$H_f = \left(\frac{Q}{K}\right)^2 L = \left(\frac{6.2}{105}\right)^2 (60) = 0.21'$

$Q_2 = 6.2 + \frac{1}{3}Q_1 = 8.7$

$V_2 = 4.9$ FPS

$\frac{1.2V_2^2}{2g} = 0.45'$

$V_1 = 1.33 + 0.21 + 0.45 + 1.5 - 1.97$

$= 1.52$

USE 4.5'

INV = 5153.62 − 4.5 = 5149.12

$FB_2 = 4.5 - 1.5 - 0.45 - 0.83 = 1.72 > 0.5$ ✓

$V_2 = 0.5 > V_1 - G$?

$4 > 2.03$ ✓

$H_f = \left(\frac{8.7}{105}\right)^2 20 = 0.14'$

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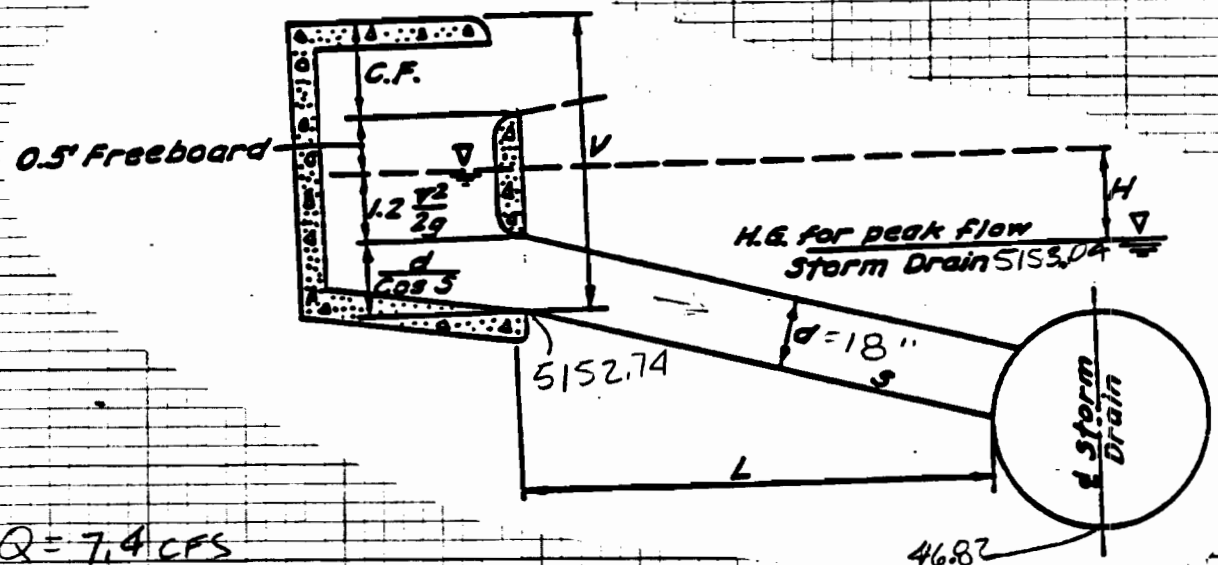
STA 7+60 (RES 5-LT)
TYPE "A"
TC = 5156.74



Q = 7.4 CFS
V = 4.19 FPS
$\frac{1.2V^2}{2g} = 0.33'$

$V_{MIN} = 1.33 + 0.33 + 1.5 = 3.16$

USE 4'

FREEBOARD = 4 − 1.5 − 0.33 − 0.83
= 1.34 > 0.5 ✓

$H_f = \left(\frac{7.4}{105}\right)^2 15 = 0.07$

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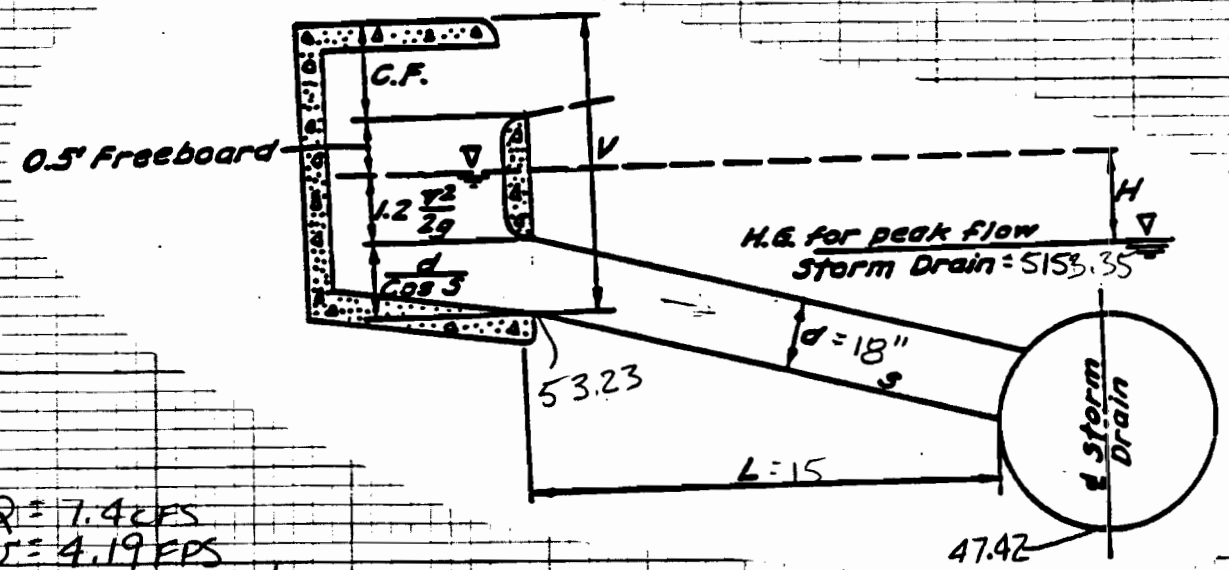
STA 7+75 (RES 5-PT)
TYPE "A"
TC = 5157.23



Q = 7.4 CFS
V = 4.19 FPS
$\frac{1.2V^2}{2g} = 0.33'$

$V_{MIN} = 1.33 + 0.33 + 1.5 = 3.16$
USE 4'

FREEBOARD = 4 - 1.5 - 0.33 = 0.85
= 1.34 > 0.5 ✓

$H_f = \left(\frac{7.4}{105}\right)^2 15 = 0.07$

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