CITY OF
Albuquerque

Martin J. Chávez, Mayor

November 21, 1997

John C. Alexander, P.E.
Bohannan Huston Inc.
7500 Jefferson NE
Albuquerque, New Mexico 87109

RE: Engineer's Certification of the Jewel Osco at Academy (E22/D18), Submitted for Certificate of Occupancy, Certification Date 11/18/97.

Dear Mr. Alexander:

The above referenced Engineer's Certification for the Jewel Osco located at Academy Road and Tramway Boulevard is acceptable for release of the Permanent Certificate of Occupancy.

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

Sincerely,

Susan Calongne

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

c: Andrew Garcia, City Hydrology
File

CITY OF
Albuquerque

Martin J. Chávez, Mayor

December 30, 1996

James Topmiller, P.E.
Bohannan Huston Inc.
7500 Jefferson NE
Albuquerque, New Mexico 87109

RE: DRAINAGE PLAN FOR JEWEL OSCO STORE, TRACT M-1, TANOAN PROPERTIES (E22/D18)
SUBMITTED FOR BUILDING PERMIT AND ROUGH GRADING PERMIT APPROVAL,
ENGINEER'S STAMP DATE 12/13/96.

Dear Mr. Topmiller:

Based on the information provided in the submittal of December 20, 1996, the above referenced plan is approved for Building Permit and Rough Grading Permit release.

As you are aware, the Engineer's Certification will be required prior to release of the Certificate of Occupancy for this site.

If you should have any questions, or if I may be of further assistance to you, please call me at 768-2666.

Sincerely,

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

c: Kurt Browning, AMAFCA
Andrew Garcia, City Hydrology
File

ACADEMY DOWNSTREAM ANALYSIS

At Carruthers/Academy Intersection:

Condition	Q 10-year (cfs)	10-YR Academy Depth@Curb (from FL)	Q 100-yr (cfs)	100-YR Academy Depth@Curb (from FL)
Total Existing Flow (w/Undeveloped Jewel Osco Flows)	147	0.69'	234	0.83'
Developed Jewel Osco Site w/Full Retention	122	0.65'	190	0.77'
Developed Jewel Osco Site w/ 16cfs Discharge	133	0.66'	206	0.79'

Assumptions:

- Hydrology based on Rational Method & Precipitation Zone 4 (see Summary of Hydrologic Data)
- Basin Boundaries are based on a site visit (Saturday Nov 23 1996) and grading plans where available. Grading Plans were available for Country Club Estates, Inverness at Tanoam, Broadmoor at Tanoan, Antelope Run and Jewel/Osco (proposed). Developments South of Academy discharge to the south & west. For Basin Boundaries, see attached Basin Map.
- Percentage Impervious area for Basin A was based upon 80% Type D for R.O.W of major roads and 40% Type D for All other areas. The composite was 61% Type D
- Average Slope of Academy = $4\% \approx \frac{5970 - 5783}{5010} \times 100\% = 3.7\%$ (TC@Tennyson, TC@Carruthers)

BOHANNAN-HUSTON INC.
ALBUQUERQUE LAS CRUCES SANTA FE

PROJECT NAME Jewel Osco @ SHEET 1 OF 5
PROJECT NO. Academy & Tramway BY MSJ DATE 11/25/96
SUBJECT CH'D DATE

100-YEAK

SUMMARY OF HYDROLOGIC DATA

BASIN ID	AREA AC	AREA SQ.MI.	% LAND TREATMENT A	B	C	D	TIME TO PEAK	DISCHARGE CFS/AC	Q (R) CFS	
EXISTING CONDITIONS (ZONE 4: 100% LAND TREATMENT B)										
SITE	10.0	0.0156	0.0	100.0	0.0	0.0	0.1333	2.92	29.2	
OS-1	5.8	0.0090	0.0	100.0	0.0	0.0	0.1333	2.92	16.9	
OS-2	1.2	0.0019	0.0	100.0	0.0	0.0	0.1333	2.92	3.6	
	17.0								49.7	
PROPOSED CONDITIONS (ZONE 4: 83% LAND TREATMENT D)										
1	3.2	0.0050	0.0	8.5	8.5	83.0	0.1333	4.92	15.7	
2	3.4	0.0053	0.0	8.5	8.5	83.0	0.1333	4.92	16.7	
3	2.0	0.0031	0.0	8.5	8.5	83.0	0.1333	4.92	9.8	
4	0.6	0.0009	0.0	8.5	8.5	83.0	0.1333	4.92	2.9	
5A	0.6	0.0009	0.0	0.0	20.0	80.0	0.1333	4.95	3.0	
5B	0.7	0.0011	0.0	0.0	20.0	80.0	0.1333	4.95	3.5	TENNYSON
OS-1	5.8	0.0090	0.0	8.5	8.5	83.0	0.1333	4.92	28.5	
OS-2	1.2	0.0019	0.0	8.5	8.5	83.0	0.1333	4.92	5.9	
	17.5								86.0	
ACADEMY ROAD BASIN (INCLUDING ALL OFFSITE FLOWS EXCEPT JEWEL OSCO)										
A	42.2	0.0659	0.0	19.5	19.5	61.0	0.1333	4.50	189.9	

PROPOSED DISCHARGE TO ACADEMY ROW

Q= 16 CFS NOT INCLUDING TENNYSON ROW (BASIN 3+4+5A)
Q= 19 CFS INCLUDING TENNYSON ROW (BASIN 3+4+5A+5B)

10-YEAR

SUMMARY OF HYDROLOGIC DATA

BASIN ID	AREA AC	AREA SQ.MI.	% LAND TREATMENT A	B	C	D	TIME TO PEAK	DISCHARGE CFS/AC	Q (R) CFS	
EXISTING CONDITIONS (ZONE 4: 100% LAND TREATMENT B)										
SITE	10.0	0.0156	0.0	100.0	0.0	0.0	0.1333	1.45	14.5	
OS-1	5.8	0.0090	0.0	100.0	0.0	0.0	0.1333	1.45	8.4	
OS-2	1.2	0.0019	0.0	100.0	0.0	0.0	0.1333	1.45	1.8	
	17.0								24.7	
PROPOSED CONDITIONS (ZONE 4: 83% LAND TREATMENT D)										
1	3.2	0.0050	0.0	8.5	8.5	83.0	0.1333	3.28	10.5	
2	3.4	0.0053	0.0	8.5	8.5	83.0	0.1333	3.28	11.1	
3	2.0	0.0031	0.0	8.5	8.5	83.0	0.1333	3.28	6.6	
4	0.6	0.0009	0.0	8.5	8.5	83.0	0.1333	3.28	1.9	
5A	0.6	0.0009	0.0	0.0	20.0	80.0	0.1333	3.31	2.0	
5B	0.7	0.0011	0.0	0.0	20.0	80.0	0.1333	3.31	2.3	TENNYSON
OS-1	5.8	0.0090	0.0	8.5	8.5	83.0	0.1333	3.28	19.0	
OS-2	1.2	0.0019	0.0	8.5	8.5	83.0	0.1333	3.28	3.9	
	17.5								57.3	
ACADEMY ROAD BASIN (INCLUDING ALL OFFSITE FLOWS EXCEPT JEWEL OSCO)										
A	42.2	0.0659	0.0	19.5	19.5	61.0	0.1333	2.90	122.4	

PROPOSED DISCHARGE TO ACADEMY ROW

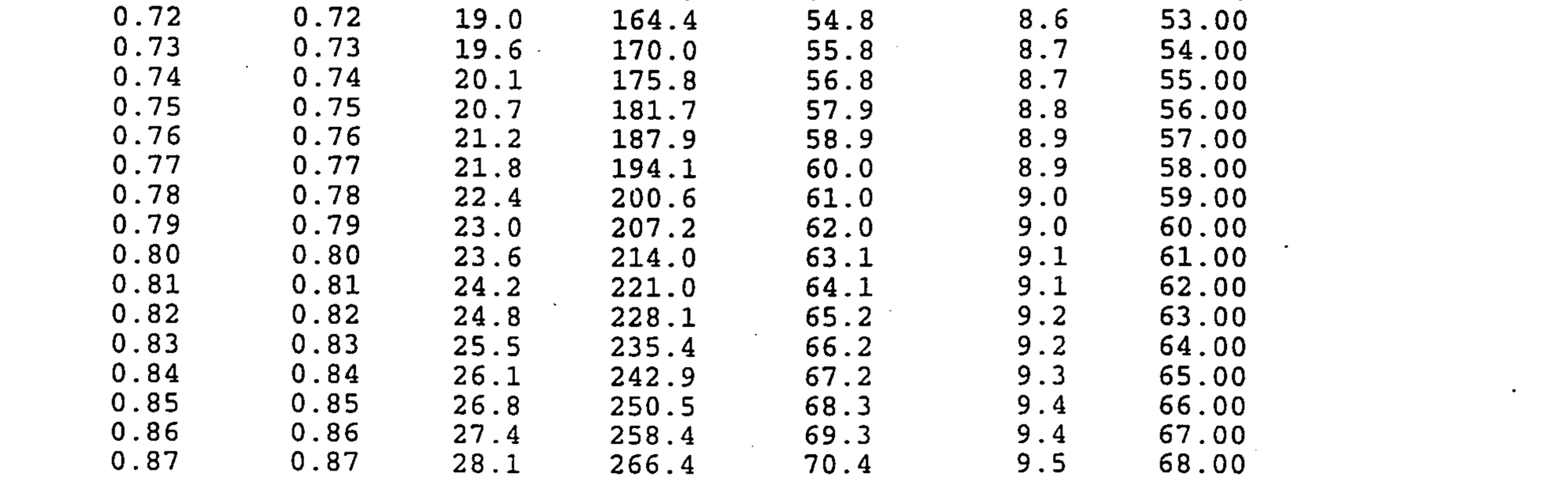
Q= 10 CFS NOT INCLUDING TENNYSON ROW (BASIN 3+4+5A)
Q= 13 CFS INCLUDING TENNYSON ROW (BASIN 3+4+5A+5B)

Academy Road

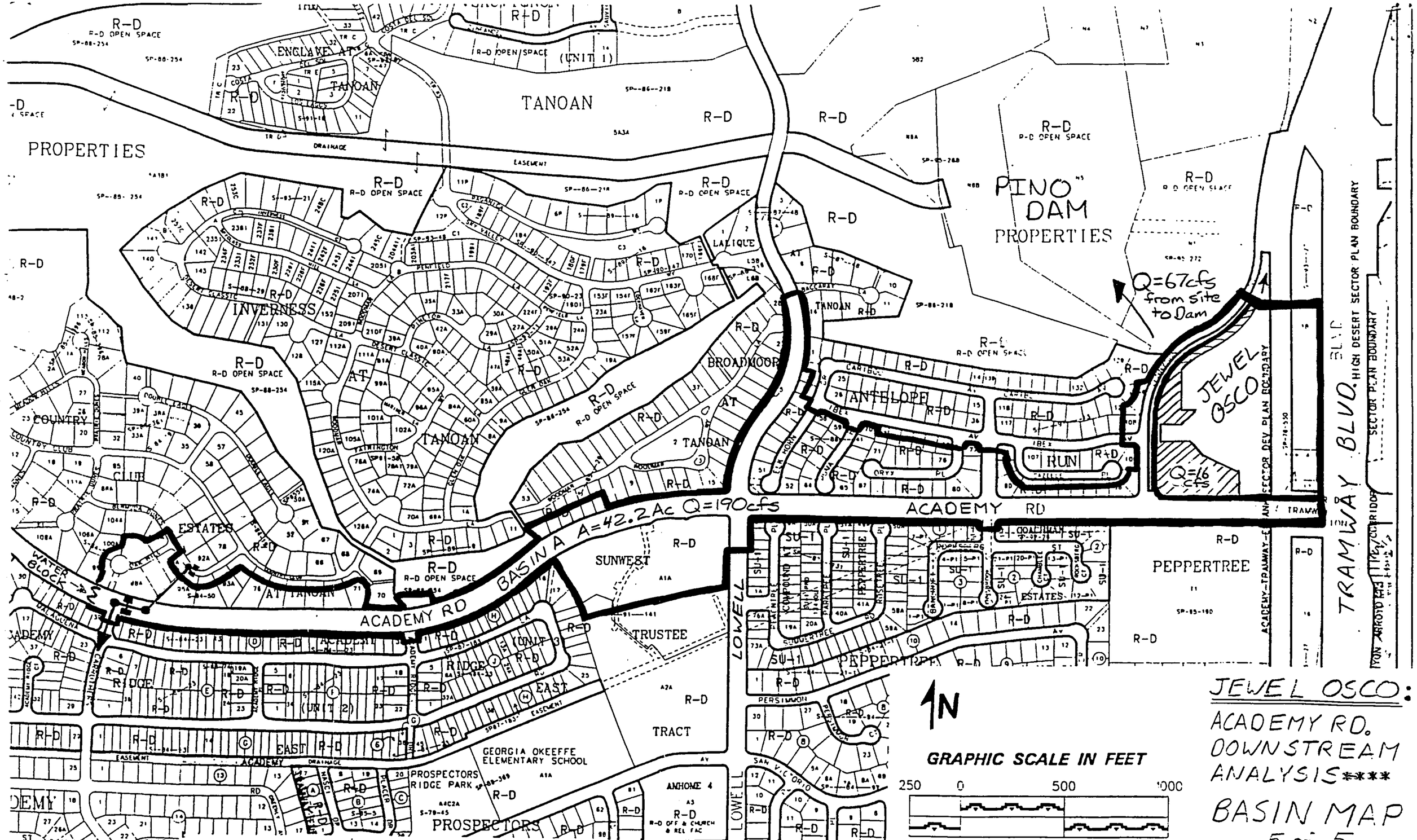
MANNING'S N = .0170 SLOPE = .0400

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	1.50	6	34.00	0.57	11	96.00	0.00
2	0.00	0.87	7	34.00	1:07	12	96.00	0.67
3	10.00	0.67	8	72.00	1.07	13	106.00	0.87
4	10.00	0.00	9	72.00	0.57	14	106.00	1.50
5	12.00	0.13	10	94.00	0.13			

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.60	0.60	13.1	95.2	49.3	7.2	48.00
0.61	0.61	13.6	101.0	49.3	7.4	48.00
0.62	0.62	14.1	106.9	49.4	7.6	48.00
0.63	0.63	14.6	113.0	49.4	7.8	48.00
0.64	0.64	15.1	119.2	49.4	7.9	48.00
0.65	0.65	15.5	125.5	49.5	8.1	48.00
0.66	0.66	16.0	132.0	49.5	8.2	48.00
0.67	0.67	16.5	138.6	49.6	8.4	48.00
0.68	0.68	17.0	143.4	50.6	8.4	49.00
0.69	0.69	17.5	148.4	51.6	8.5	50.00
0.70	0.70	18.0	153.6	52.7	8.5	51.00
0.71	0.71	18.5	158.9	53.7	8.6	52.00
0.72	0.72	19.0	164.4	54.8	8.6	53.00
0.73	0.73	19.6	170.0	55.8	8.7	54.00
0.74	0.74	20.1	175.8	56.8	8.7	55.00
0.75	0.75	20.7	181.7	57.9	8.8	56.00
0.76	0.76	21.2	187.9	58.9	8.9	57.00
0.77	0.77	21.8	194.1	60.0	8.9	58.00
0.78	0.78	22.4	200.6	61.0	9.0	59.00
0.79	0.79	23.0	207.2	62.0	9.0	60.00
0.80	0.80	23.6	214.0	63.1	9.1	61.00
0.81	0.81	24.2	221.0	64.1	9.1	62.00
0.82	0.82	24.8	228.1	65.2	9.2	63.00
0.83	0.83	25.5	235.4	66.2	9.2	64.00
0.84	0.84	26.1	242.9	67.2	9.3	65.00
0.85	0.85	26.8	250.5	68.3	9.4	66.00
0.86	0.86	27.4	258.4	69.3	9.4	67.00
0.87	0.87	28.1	266.4	70.4	9.5	68.00
0.88	0.88	28.8	277.1	70.4	9.6	68.00
0.89	0.89	29.5	287.9	70.5	9.8	68.00
0.90	0.90	30.1	298.9	70.5	9.9	68.00
0.91	0.91	30.8	310.1	70.6	10.1	68.00
0.92	0.92	31.5	321.4	70.7	10.2	68.00
0.93	0.93	32.2	332.8	70.7	10.3	68.00
0.94	0.94	32.9	344.4	70.8	10.5	68.00
0.95	0.95	33.5	356.2	70.8	10.6	68.00
0.96	0.96	34.2	368.1	70.9	10.8	68.00
0.97	0.97	34.9	380.2	71.0	10.9	68.00
0.98	0.98	35.6	392.4	71.0	11.0	68.00
0.99	0.99	36.3	404.7	71.1	11.2	68.00
1.00	1.00	36.9	417.2	71.1	11.3	68.00



Typical X-Section Looking West



JEWEL OSCO:

ACADEMY RD.
DOWNSTREAM
ANALYSIS***

BASIN MAP
5 of 5

FINAL
HIGH DESERT SUBDIVISION
ACADEMY STORM DRAIN
DESIGN REPORT

Prepared for:

High Desert Investment Corporation
6400 Wyoming Boulevard NE
Albuquerque, NM 87109

Prepared by:

BOHANNAN-HUSTON INC.
ENGINEERS ARCHITECTS PHOTOGRAMMETRISTS SURVEYORS
COURTYARD I. 7500 JEFFERSON NE ALBUQUERQUE, NM 87109 TEL 505 823-1000 FAX 505 821-0892

1

- OUTPUT FOR INDY 8 FULLY DEVELOPED CONDITIONS NO DETENTION POND.

HYMO SUMMARY TABLE

0 DESCRIPTION	HYDROGRAPH LABEL	FROM ID NO	TO ID NO	AREA SQ MI	DISCHARGE CFS	CURVE NO	TIME TO PEAK HR	CFS PER ACRE
HYDROGRAPH AT	SBT1	1	-	0.1386	267.4	NA	1.53	3.01
ROUTED		1	2					
	SBT1	1		0.1386	267.4		1.53	
	RSBT1	2		0.1386	261.5		1.57	
HYDROGRAPH AT	SBT2A	3	-	0.0260	57.5	NA	1.50	3.46
HYDROGRAPH AT	SBT2B	4	-	0.0700	155.1	NA	1.50	3.46
COMBINED FLOW AT	PONDINA	2& 3	3	0.1646	313.6		1.53	
COMBINED FLOW AT	AP19	4& 3	4	0.2346	464.3		1.53	
ROUTED 66"		4	5					
	AP19	4		0.2346	464.3		1.53	
	RAP19	5		0.2346	459.7		1.53	
HYDROGRAPH AT	NBT1A	6	-	0.0210	39.9	NA	1.50	2.97
HYDROGRAPH AT	NBT1B	7	-	0.0490	90.2	NA	1.50	2.88
COMBINED FLOW AT	AP20	7& 6	6	0.0700	130.1		1.50	
ROUTED 42"		6	7					
	AP20	6		0.0700	130.1		1.50	
	RAP19	7		0.0700	129.9		1.53	
COMBINED FLOW AT	AP20A	7& 5	7	0.3046	589.6		1.53	
ROUTED 66".		7	8					
	AP20A	7		0.3046	589.6		1.53	
	RAP20	8		0.3046	585.6		1.57	
HYDROGRAPH AT	NBT2A	9	-	0.0230	45.2	NA	1.50	3.07
COMBINED FLOW AT	NBT2A+	8& 9	10	0.3276	625.4		1.57	
HYDROGRAPH AT	NBT2B	1	-	0.0330	89.8	NA	1.50	4.25
COMBINED FLOW AT	NBT2B+	1&10	2	0.3606	705.4		1.53	
HYDROGRAPH AT	SBT3	3	-	0.0370	95.7	NA	1.50	4.04
COMBINED FLOW AT	AP21	2& 3	4	0.3976	797.5		1.53	
ROUTED 78"		4	5					
	AP21	4		0.3976	797.5		1.53	
	RAP21	5		0.3976	793.2		1.57	
HYDROGRAPH AT	SBT4	6	-	0.0240	66.0	NA	1.50	4.30
ROUTED 84"		6	1					
	SBT4	6		0.0240	66.0		1.50	
	RSBT4	1		0.0240	65.8		1.50	
COMBINED FLOW AT	WYE	1& 5	7	0.4216	851.9		1.53	
HYDROGRAPH AT	NBT4	8	-	0.0030	6.2	NA	1.50	3.22
HYDROGRAPH AT	NBT3A	9	-	0.0140	28.5	NA	1.50	3.19
COMBINED FLOW AT	NBT3A&4	8& 9	10	0.0170	34.7		1.50	
COMBINED FLOW AT	BEEHIVE	7&10	11	0.4386	885.7		1.53	
HYDROGRAPH AT	NBT3B	12	-	0.0270	74.1	NA	1.50	4.29
COMBINED FLOW AT	AP22	11&12	13	0.4656	956.8		1.53	

↳ This is only 1cfs different than current AHYMO run

****

Based on the first criteria, enabling water-harvesting for the Bear Tributary Dry Arroyo, the storm drain line is required to have approximately 10'-13' of cover. The above normal depth of the main is necessary to enable the crossing of the dry arroyo with small storm drain laterals as part of the water harvesting system. It should be noted that no reduction in flow rates has been credited for any water-harvesting. The design flow rates represent the total fully developed 100-year runoff flow rate.

C. Design Summary

In Appendix E, a copy of the design spreadsheet used to set the profile grades to enable future water-harvesting to north is provided. This spreadsheet checks the storm drain horizontal and vertical locations with respect to the back of curb along the north side of Academy and the flowline elevation of the existing Bear Tributary Arroyo at projected future water-harvesting locations. The spreadsheet then provides minimum offset locations from the back of curb to insure OSHA trenching requirements are met and it provides minimum storm drain invert elevations to insure future water-harvesting is possible. (Please reference Appendix E for specific invert and offset distances at key stations along the storm drain.)

As previously noted, the storm drain sizes were obtained from the second criteria above. A summary of the design flow rates at key analysis points and the corresponding minimum downstream non-pressure flow pipe capacity is shown in Table 2 below. Table 2 shows that storm drain has been designed in accordance with the above criteria, with the exception of flow downstream of the South Bear Tributary Desiltation Pond (AP19). Additionally, the connection to the existing storm drain at Tramway Boulevard for a short reach non-pressure flow will exist. However, as can be seen in Plate 3 - Academy Storm Drain Plan and Profile Sheets, for both of these reaches, where the flow is under pressure, the HGL is below finished grade. (Please refer to Appendix F for copies of the HGL spreadsheet calculations for each reach of pipe that is under pressure flow conditions.)

TABLE 2
STORM DRAIN HYDRAULICS

ANALYSIS POINT	CONTRIB. BASINS	COMBINED Q (100) (cfs)	STORM DRAIN SIZE	MIN. PIPE SLOPE (%)	STORM DRAIN CAPACITY *	COMMENTS
AP18	20	268	N/A	N/A	N/A	Flow from basin 20.
AP19	21	465	84"	1.73	840	Flow in storm drain below South Bear Trib. Desiltation Pond
AP20	24	130	48"	1.38	169	Flow in storm drain below North Bear Trib. Desiltation Pond
AP20A	20,21,24	590	66"	4.5	712	Total flow in storm drain at confluence of storm drains from pond #'s 3 & 4.
AP21	20-22,24-26	798	78"	3.4	967	Total flow in storm drain at Academy and Cordateria.
AP22	21-29	957	Ex. 96" Culvert	1.94	** 1269	Total flow at Tramway. Pipe to pipe connection required.

*Capacity based on Manning's Equation for non-pressure full pipe conditions - n=0.014.
**n=0.013

Normal Depth Capacity of 96" Storm Drain Academy & Tramway Intersection
Q_{Total} = 958cfs
Flow is 300cfs below capacity

Drainage Report
Jewel Osco Store
at Academy/Tramway

Sept. 1996

DRAINAGE REPORT
JEWEL OSCO STORE
AT ACADEMY/TRAMWAY

Prepared for:

Camburas & Theodore, Ltd. Architecture
2454 Dempster Street
Des Plaines, IL 60016

9/27/96

Prepared By:

BOHANNAN-HUSTON INC.
ENGINEERS ▪ PLANNERS ▪ PHOTOGRAMMETRISTS ▪ SURVEYORS ▪ LANDSCAPE ARCHITECTS
COURTYARD I, 7500 JEFFERSON NE, ALBUQUERQUE, NM 87109 TEL (505) 823-1000 FAX (505) 821-0892
ALBUQUERQUE — LAS CRUCES — SANTA FE

GRADING/DRAINAGE PLAN

PURPOSE

The purpose of this report is to provide a grading and drainage plan for a proposed commercial development at the northeast corner of Tennyson Street and Academy Road NE. The site is legally described as Tract M-1, Tanoan Properties. It consists of approximately 10 acres. This plan is submitted for EPC and DRB review for the purpose of obtaining site development plan approval.

EXISTING CONDITIONS

Currently, the site is a vacant parcel of land. It is bounded on the south by Academy Road (a paved minor arterial with four lanes), on the north and west by Tennyson Ave. (a partially developed collector street), and on the east by predominantly vacant land holding PNM facilities and overhead power lines. This site is lightly vegetated with natural grasses and sage brush. A FEMA floodplain does not encumber the property.

Existing site drainage is directed with a westerly and slightly southerly flow pattern toward Tennyson Street and Academy Road. In its undeveloped condition, the site produces approximately 26.6 cfs in a 100-year, 6-hour storm event. Offsite flows from basins OS-1 and OS-2 provide offsite flows to the site. OS-1 generates 16.9 cfs in its undeveloped condition and impacts the site at a single point approximately 60' north of Academy Road. Basin OS-2 is a small basin located north and east of the site and drains approximately 3.6 cfs onto the site in its undeveloped condition.

An existing 96" storm drain is located in Academy and Tennyson. Its outfall is at the Pino Dam north of the site. Due to the pressure condition of much of the pipe, neither Academy nor Tennyson are served by any inlets connected to this 96" pipe. The approved Drainage Report for Antelope Run Subdivision, December 1988 states: "All lands east of the proposed Tennyson Street, as well as the Tennyson right of way, will discharge to Academy Boulevard," page 2.

Tennyson Street at this time is paved on its west side only, from Academy to Ibex Ave. This portion of the street was constructed with Antelope Run, Phase III Subdivision (COA work order # 3749.92). An apartment project (located north of the site on the west side of Tennyson Ave.) is currently under construction. It will construct the west half of Tennyson Ave. from Ibex Ave. to the apartment site.

PROPOSED CONDITIONS

Under proposed conditions, the site proposes to construct a Jewel Osco grocery store, and several smaller retail pads and shop pads. The remainder of the site will primarily consist of parking and landscaping. Due to neighborhood concerns about Academy drainage, the primary drainage concepts is discharge of developed flows to the Tennyson 96" storm drain. However, a small portion of the site (southwest corner) will drain to Academy due to grading constraints. Offsite flows, assuming development, will continue to be accepted by the site.

The developed site is comprised of five separate drainage basins. Basin 1, in its developed condition generates a 100-year, 6-hour storm flow of 15.7 cfs. This flow is directed northerly to the rear of the main buildings to a storm drain system which uses inlets and underground piping to collect flows and transfer them to a connection point on the 96" storm drain in Tennyson. This point of connection is far enough north that the hydraulic grade line has dipped well below the proposed Tennyson ground surface. Accordingly, the connection can be made without pressure flow lifting manhole lids in Tennyson.

Basin 2, generates 16.7 cfs in a 100-year, 6-hour storm event. This Basin primarily drains the front of the stores, including the main parking area. These flows, along with flows from offsite Basin OS-1 will drain in a northwesterly direction and be collected by a storm drainage system. This storm drain system collects its flows and transfers them in a northwesterly direction to the same storm drain system proposed for Basin 1.

Basin 3 generates approximately 9.8 cfs. These flows are discharged to Academy using sidewalk culverts. Basin 4 generates approximately 2.9 cfs. This flow is discharged to Tennyson at the west entrance to the site. Basin 5 generates approximately 6.4 cfs. These flows are generated by the east half of Tennyson and the adjacent landscaping. The total flow from the site and Tennyson that discharges to Academy is 19.1 cfs. This is significantly less than the allowable master plan discharge to Academy of Q=52 cfs (as identified by the Drainage Report for Antelope Run, December 1988).

All proposed storm drainage inlets will be set at locations where the grade elevations will equal or exceed an elevation of 5980'. This elevation is the elevation of the Pino Dam spillway. All storm drain system manholes that have a rim elevation less than 5980' will be constructed with sealed manhole lids.

CONCLUSION

With this presentation of a grading and drainage plan for the referenced site, we request site development plan approval.

SUMMARY OF HYDROLOGIC DATA

BASIN ID	AREA AC	AREA SQ.MI.	% LAND TREATMENT A	B	C	D	TIME TO PEAK	DISCHARGE CFS/AC	Q (R) CFS
EXISTING CONDITIONS (ZONE 4: 100% LAND TREATMENT B)									
*SITE	9.1	0.0142	0.0	100.0	0.0	0.0	0.1333	2.92	26.6
OS-1	5.8	0.0090	0.0	100.0	0.0	0.0	0.1333	2.92	16.9
OS-2	1.2	0.0019	0.0	100.0	0.0	0.0	0.1333	2.92	3.6
PROPOSED CONDITIONS (ZONE 4: 83% LAND TREATMENT D)									
1	3.2	0.0050	0.0	8.5	8.5	83.0	0.1333	4.92	15.7
2	3.4	0.0053	0.0	8.5	8.5	83.0	0.1333	4.92	16.7
3	2.0	0.0031	0.0	8.5	8.5	83.0	0.1333	4.92	9.8
4	0.6	0.0009	0.0	8.5	8.5	83.0	0.1333	4.92	2.9
5	1.3	0.0020	0.0	0.0	20.0	80.0	0.1333	4.95	6.4
OS-1	5.8	0.0090	0.0	8.5	8.5	83.0	0.1333	4.92	28.5
OS-2	1.2	0.0019	0.0	8.5	8.5	83.0	0.1333	4.92	5.9

* SITE = TRACT M-1 LESS TENNYSON R.O.W.

HYDRAULIC GRADE LINE COMPUTATIONS FOR JEWEL OSCO AND 96" STORM DRAIN
100-YEAR DEVELOPED FLOWS
DISCHARGING INTO THE PINO DAM

AT TIME = 1.33 HRS

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	Di	Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Pipe Soffit	Low Point #	HV	EGL(dn)	EGL(up)
100.00	Pino Dam											0.00	0.00	0.00	0.00	0.00		40.70	40.70	40.70	0.07	40.70	40.77
		96	108.0	50.27	2.15	9121	0.0001	400.00			0.06												
500.00	EX MH								8	45		0.01	0.00	0.00	0.00	0.01	40.76	40.77	27.09	80.00	0.07	40.83	40.84
		96	108.0	50.27	2.15	9121	0.0001	475.00			0.07												
975.00	TEE MH								8	0		0.00	0.00	0.00	0.00	0.00	40.84	40.86	32.00	80.00	0.05	40.91	40.91
		96	87.0	50.27	1.73	9121	0.0001	450.00			0.04												
																		40.86	40.86	40.86	0.14	40.86	41.00
		36	21.0	7.07	2.97	667	0.0010	69.37			0.07												
1044.37	MH 1								8	30		0.01	0.07	0.01	0.00	0.08	40.93	41.08	32.00	80.00	0.07	41.07	41.15
		36	15.0	7.07	2.12	667	0.0005	157.27			0.08												
1201.64	SGL D								8	20		0.01	0.00	0.00	0.01	0.03	41.16	41.13	32.00	80.00	0.13	41.23	41.26
		30	14.0	4.91	2.85	410	0.0012	135.08			0.16												
1336.72	QUAD D								8	0		0.00	0.00	0.01	0.01	0.01	41.29		32.00	80.00	0.16	41.42	41.43
		~~24~~	~~10.0~~	~~3.14~~	~~3.18~~	~~226~~	~~0.0020~~	~~1.00~~			0.00												

Alternate to

AT TIME = 1.33 HRS

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	Di	Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Pipe Soffit	Low Point #	HV	EGL(dn)	EGL(up)
100.00	Pino Dam											0.00	0.00	0.00	0.00	0.00		40.70	40.70	40.70	0.07	40.70	40.77
		96	108.0	50.27	2.15	9121	0.0001	400.00			0.06												
500.00	EX MH								8	45		0.01	0.00	0.00	0.00	0.01	40.76	40.77	27.09	80.00	0.07	40.83	40.84
		96	108.0	50.27	2.15	9121	0.0001	475.00			0.07												
975.00	TEE MH								8	60		0.02	0.09	0.01	0.01	0.12	40.84	40.89	28.41	80.00	0.14	40.91	41.03
		36	21.0	7.07	2.97	667	0.0010	69.37			0.07												
1044.37	MH 1								8	30		0.01	0.07	0.01	0.00	0.08	40.96	41.11	30.09	80.00	0.07	41.10	41.18
		36	15.0	7.07	2.12	667	0.0005	157.27			0.08												
1201.64	SGL D								8	20		0.01	0.00	0.00	0.01	0.03	41.19	41.16	32.00	80.00	0.13	41.26	41.29
		30	14.0	4.91	2.85	410	0.0012	135.08			0.16												
1336.72	QUAD D								8	0		0.00	0.00	0.01	0.01	0.01	41.32		32.00	80.00	0.16	41.44	41.46
		~~24~~	~~10.0~~	~~3.14~~	~~3.18~~	~~226~~	~~0.0020~~	~~1.00~~			0.00												

AT TIME = 1.50 HRS — Peak flow from Jewel Osco occurs here

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	Di	Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Pipe Soffit	Low Point #	HV	EGL(dn)	EGL(up)
100.00	Pino Dam											0.00	0.00	0.00	0.00	0.00		44.40	44.40	44.40	5.06	44.40	49.46
		96	907.0	50.27	18.04	9121	0.0099	400.00			3.96												
500.00	EX MH								8	45		0.71	0.00	0.25	0.00	0.97	48.36	49.32	27.09	80.00	5.06	53.41	54.38
		96	907.0	50.27	18.04	9121	0.0099	475.00			4.70												
975.00	TEE MH								8	60		0.48	-1.83	0.15	0.00	-1.20	54.02	56.48	28.41	80.00	1.4	59.08	57.88
		36	67.0	7.07	9.48	667	0.0101	69.37			0.70												
1044.37	MH 1								8	30		0.11	0.76	0.05	0.00	0.92	57.18	58.86	30.09	80.00	0.63	58.58	59.50
		36	45.2	7.07	6.39	667	0.0046	157.27			0.72												
1201.64	SGL D								8	20		0.08	0.00	0.04	0.10	0.23	59.59	59.31	32.00	80.00	1.14	60.22	60.45
		30	42.0	4.91	8.56	410	0.0105	135.08			1.42												
1336.72	QUAD D								8	0		0.00	0.00	0.03	0.00	0.03	60.73		32.00	80.00	0.16	61.86	61.89
		~~24~~	~~10.0~~	~~3.14~~	~~3.18~~	~~226~~	~~0.0020~~	~~1.00~~			0.00												

@Peak flow from Jewel Osco, HGL @ New Tee Manhole is 23.5' below Nearest Inlet Grate and Dam spillway elevations. OK. Pipes flow @ Normal Depth (HGL=56.48 Inv 36"=60.29)

8 sht. 1ms

Filename: C95342a2400.Hydro.HGL-30.WK4

AT TIME = 1.57HRS Peak flow in 96"SD

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	Di	Angle	Hf	Hb	Hj	Hmh	Ht	Losses	HGL(dn)	HGL(up)	Soffit	Point #	HV	EGL(dn)	EGL(up)
100.00	Pino Dam											0.00	0.00	0.00	0.00	0.00		46.90	46.90	46.90	6.31	46.90	53.21
		96	1013.0	50.27	20.15	9121	0.0123	400.00			4.93												
500.00	EX MH								8	45		0.89	0.00	0.32	0.00	1.21	51.83	53.04	27.09	80.00	6.31	58.14	59.35
		96	1013.0	50.27	20.15	9121	0.0123	475.00			5.86												
975.00	TEE MH								8	0		0.00	0.00	0.30	0.00	0.30	58.90	59.85	32.00	80.00	5.65	65.21	65.51
		96	959.0	50.27	19.08	9121	0.0111	450.00			4.97												
																		59.85	59.85	59.85	1.01	59.85	60.86
		36	57.0	7.07	8.06	667	0.0073	69.37			0.51												
1044.37	MH 1								8	30		0.08	0.56	0.04	0.00	0.68	60.36	61.60	32.00	80.00	0.45	61.37	62.05
		36	38.0	7.07	5.38	667	0.0032	157.27			0.51												
1201.64	SGL D								8	20		0.06	0.00	0.03	0.07	0.16	62.11	61.92	32.00	80.00	0.79	62.56	62.71
		30	35.0	4.91	7.13	410	0.0073	135.08			0.98												
1336.72	QUAD D								8	0		0.00	0.00	0.02	0.00	0.02	62.91		32.00	80.00	0.16	63.70	63.72
		~~24~~	~~10.0~~	~~3.14~~	~~3.18~~	~~226~~	~~0.0020~~	~~1.00~~			0.00												

Alternate #2

AT TIME = 1.57 HRS Peak flow in 96" SD

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	Di	Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Pipe Soffit	Low Point #	HV	EGL(dn)	EGL(up)
100.00	Pino Dam											0.00	0.00	0.00	0.00	0.00		46.90	46.90	46.90	6.31	46.90	53.21
		96	1013.0	50.27	20.15	9121	0.0123	400.00			4.93												
500.00	EX MH								8	45		0.89	0.00	0.32	0.00	1.21	51.83	53.04	27.09	80.00	6.31	58.14	59.35
		96	1013.0	50.27	20.15	9121	0.0123	475.00			5.86												
975.00	TEE MH								8	0		0.00	-3.38	0.15	0.00	-3.22	58.90	60.98	28.41	80.00	1.01	65.21	61.99
		36	57.0	7.07	8.06	667	0.0073	69.37			0.51												
1044.37	MH 1								8	30		0.08	0.56	0.04	0.00	0.68	61.48	62.72	30.09	80.00	0.45	62.49	63.17
		36	38.0	7.07	5.38	667	0.0032	157.27			0.51												
1201.64	SGL D								8	20		0.06	0.00	0.03	0.07	0.16	63.23	63.05	32.00	80.00	0.79	63.68	63.84
		30	35.0	4.91	7.13	410	0.0073	135.08			0.98												
1336.72	QUAD D								8	0		0.00	0.00	0.02	0.00	0.02	64.03		32.00	80.00	0.16	64.82	64.84
		~~24~~	~~10.0~~	~~3.14~~	~~3.18~~	~~226~~	~~0.0020~~	~~1.00~~			0.00												

@ Peak flow in 96"SD HGL @ New MH is 19' lower than grate elev

AT TIME = 1.67 HRS

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	Di	Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Pipe Soffit	Low Point #	HV	EGL(dn)	EGL(up)
100.00	Pino Dam											0.00	0.00	0.00	0.00	0.00		51.10	51.10	51.10	3.2	51.10	54.30
		96	722.0	50.27	14.36	9121	0.0063	400.00			2.51												
500.00	EX MH								8	45		0.45	0.00	0.16	0.00	0.61	53.61	54.22	27.09	80.00	3.2	56.81	57.42
		96	722.0	50.27	14.36	9121	0.0063	475.00			2.98												
975.00	TEE MH								8	60		0.23	-1.99	0.07	0.00	-1.68	57.20	58.36	28.41	80.00	0.36	60.40	58.72
		36	34.0	7.07	4.81	667	0.0026	69.37			0.18												
1044.37	MH 1								8	30		0.03	0.19	0.01	0.00	0.24	58.54	58.97	30.09	80.00	0.16	58.90	59.13
		36	23.0	7.07	3.25	667	0.0012	157.27			0.19												
1201.64	SGL D								8	20		0.02	0.00	0.01	0.03	0.06	59.16	59.07	32.00	80.00	0.31	59.32	59.38
		30	22.0	4.91	4.48	410	0.0029	135.05			0.39												
1336.69	QUAD D								8	0		0.00	0.00	0.01	0.00	0.01	59.46		32.00	80.00	0.16	59.77	59.78
		~~24~~	~~10.0~~	~~3.14~~	~~3.18~~	~~226~~	~~0.0020~~	~~1.00~~			0.00												

AT TIME = 1.87 HRS

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	Di	Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Pipe Soffit	Low Point #	HV	EGL(dn)	EGL(up)
100.00	Pino Dam											0.00	0.00	0.00	0.00	0.00		57.70	57.70	57.70	0.65	57.70	58.35
		96	325.0	50.27	6.47	9121	0.0013	400.00			0.51												
500.00	EX MH								8	45		0.09	0.00	0.03	0.00	0.12	58.21	58.33	27.09	80.00	0.65	58.86	58.98
		96	325.0	50.27	6.47	9121	0.0013	475.00			0.60												
975.00	TEE MH								8	60		0.06	-0.29	0.02	0.00	-0.22	58.94	59.23	28.41	80.00	0.14	59.58	59.36
		36	21.0	7.07	2.97	667	0.0010	69.37			0.07												
1044.37	MH 1								8	30		0.01	0.07	0.00	0.00	0.09	59.29	59.46	30.09	80.00	0.06	59.43	59.52
		36	14.2	7.07	2.01	667	0.0005	157.27			0.07												
1201.64	SGL D								8	20		0.01	0.00	0.00	0.01	0.02	59.53	59.50	32.00	80.00	0.11	59.59	59.62
		30	13.1	4.91	2.67	410	0.0010	135.05			0.14												
1336.69	QUAD D								8	0		0.00	0.00	0.01	0.01	0.02	59.64		32.00	80.00	0.16	59.75	59.77
		~~24~~	~~10.0~~	~~3.14~~	~~3.18~~	~~226~~	~~0.0020~~	~~1.00~~			0.00												

87

AT TIME = 2.0 HRS

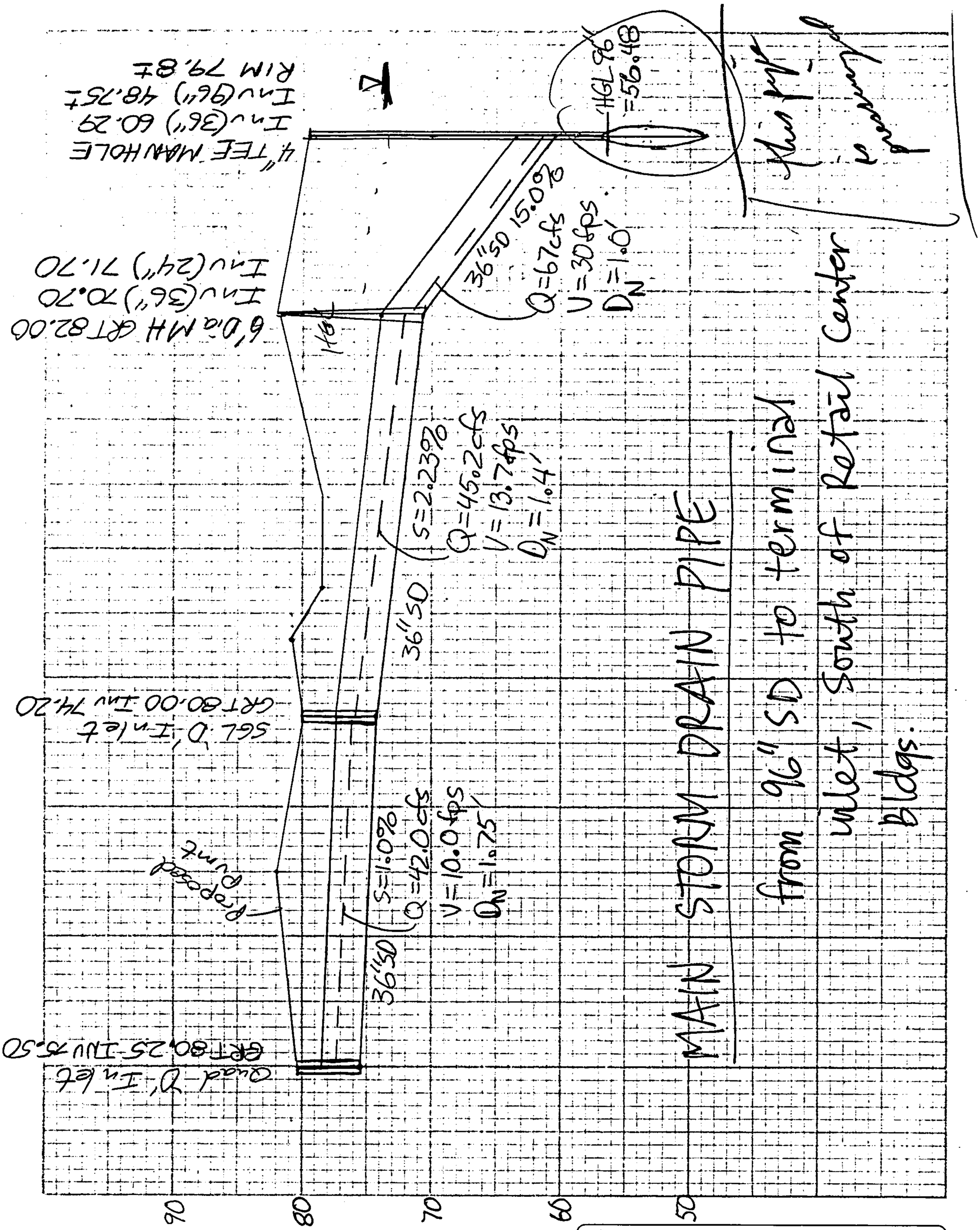
Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	Di	Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Pipe Soffit	Low Point #	HV	EGL(dn)	EGL(up)
100.00	Pino Dam											0.00	0.00	0.00	0.00	0.00		61.20	61.20	61.20	0.29	61.20	61.49
		96	216.0	50.27	4.30	9121	0.0006	400.00			0.22												
500.00	EX MH								8	45		0.04	0.00	0.01	0.00	0.05	61.42	61.48	27.09	80.00	0.29	61.71	61.77
		96	216.0	50.27	4.30	9121	0.0006	475.00			0.27												
975.00	TEE MH								8	60		0.03	-0.10	0.01	0.00	-0.07	61.75	61.89	28.41	80.00	0.08	62.03	61.97
		36	16.0	7.07	2.26	667	0.0006	69.37			0.04												
1044.37	MH 1								8	30		0.01	0.04	0.00	0.00	0.05	61.93	62.02	30.09	80.00	0.04	62.00	62.06
		36	11.0	7.07	1.56	667	0.0003	157.27			0.04												
1201.64	SGL D								8	20		0.00	0.00	0.00	0.01	0.01	62.06	62.05	32.00	80.00	0.06	62.10	62.11
		30	10.0	4.91	2.04	410	0.0006	135.05			0.08												
1336.69	QUAD D								8	0		0.00	0.00	0.01	0.02	0.02	62.13		32.00	80.00	0.16	62.19	62.22
		~~24~~	~~10.0~~	~~3.14~~	~~3.18~~	~~226~~	~~0.0020~~	~~1.00~~			0.00												

4.0

AT PEAK ELEVATION (~~0.00~~ HRS)

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	Di	Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Pipe Soffit	Low Point #	HV	EGL(dn)	EGL(up)
100.00	Pino Dam											0.00	0.00	0.00	0.00	0.00		71.10	71.10	71.10	0.00	71.10	71.10
		96	12.0	50.27	0.24	9121	0.0000	400.00			0.00												
500.00	EX MH								8	45		0.00	0.00	0.00	0.00	0.00	71.10	71.10	27.09	80.00	0.00	71.10	71.10
		96	12.0	50.27	0.24	9121	0.0000	475.00			0.00												
975.00	TEE MH								8	60		0.00	-0.00	0.00	0.00	-0.00	71.10	71.10	28.41	80.00	0.00	71.10	71.10
		36	1.0	7.07	0.14	667	0.0000	69.37			0.00												
1044.37	MH 1								8	30		0.00	0.00	0.00	0.00	0.00	71.10	71.10	30.09	80.00	0.00	71.10	71.10
		36	1.0	7.07	0.14	667	0.0000	157.27			0.00												
1201.64	SGL D								8	20		0.00	0.00	0.00	0.00	0.00	71.10	71.10	32.00	80.00	0.00	71.10	71.10
		30	1.0	4.91	0.20	410	0.0000	135.05			0.00												
1336.69	QUAD D								8	0		0.00	0.00	0.00	0.00	0.00	71.10		32.00	80.00	0.00	71.10	71.10
		~~24~~	~~1.0~~	~~3.14~~	~~0.32~~	~~226~~	~~0.0000~~	~~1.00~~			0.00												

Peak Pino Dam elevation is 8.90' below GRATE elevation and spillway elevation

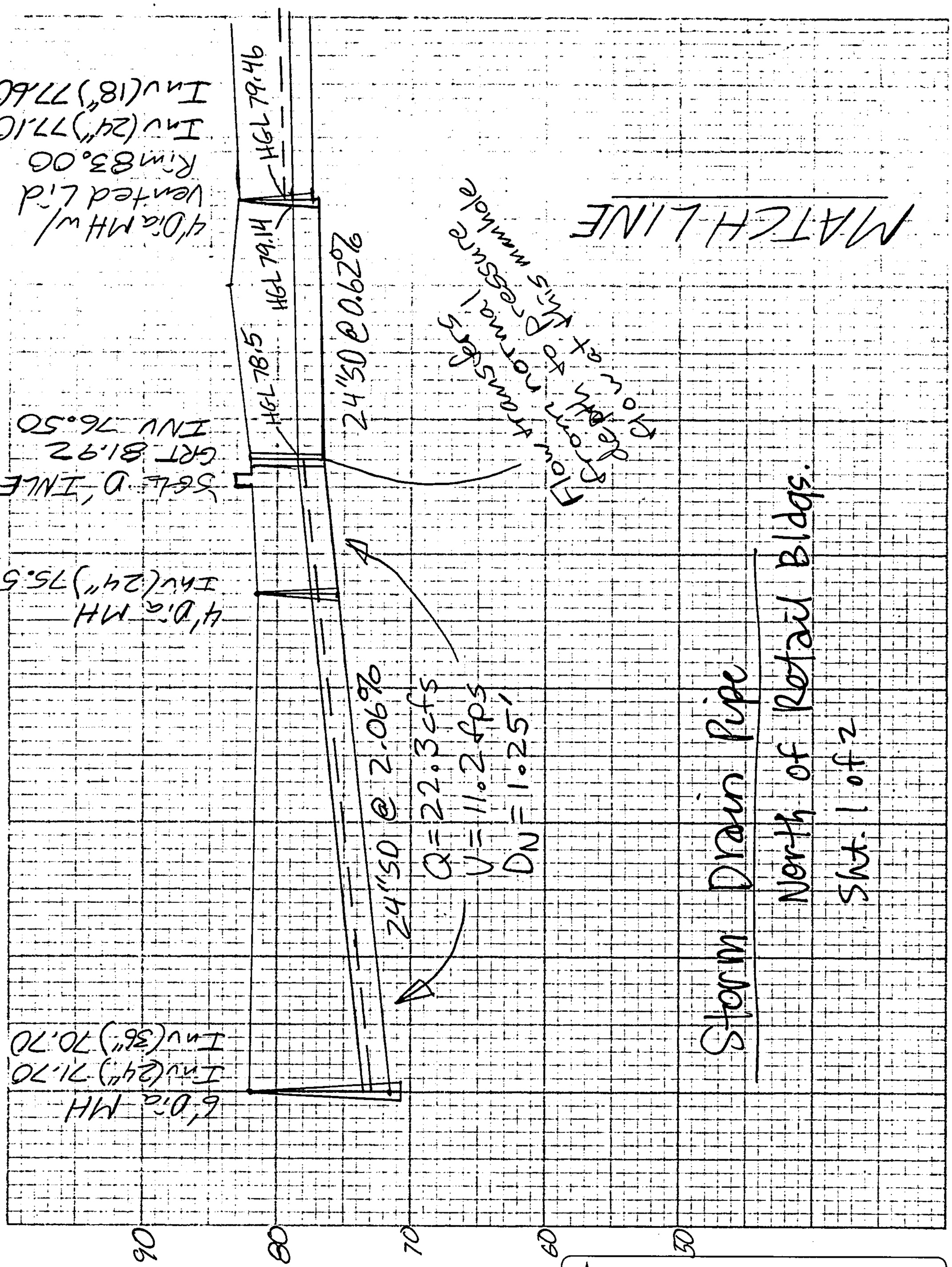


BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
ALBUQUERQUE _____ LAS CRUCES _____ SANTA FE

PROJECT NAME Jewel Osco 435 SHEET 10 OF _____

PROJECT NO. 96238a2421 BY _____ DATE _____

SUBJECT SD Profile w/ HGL CH'D _____ DATE _____

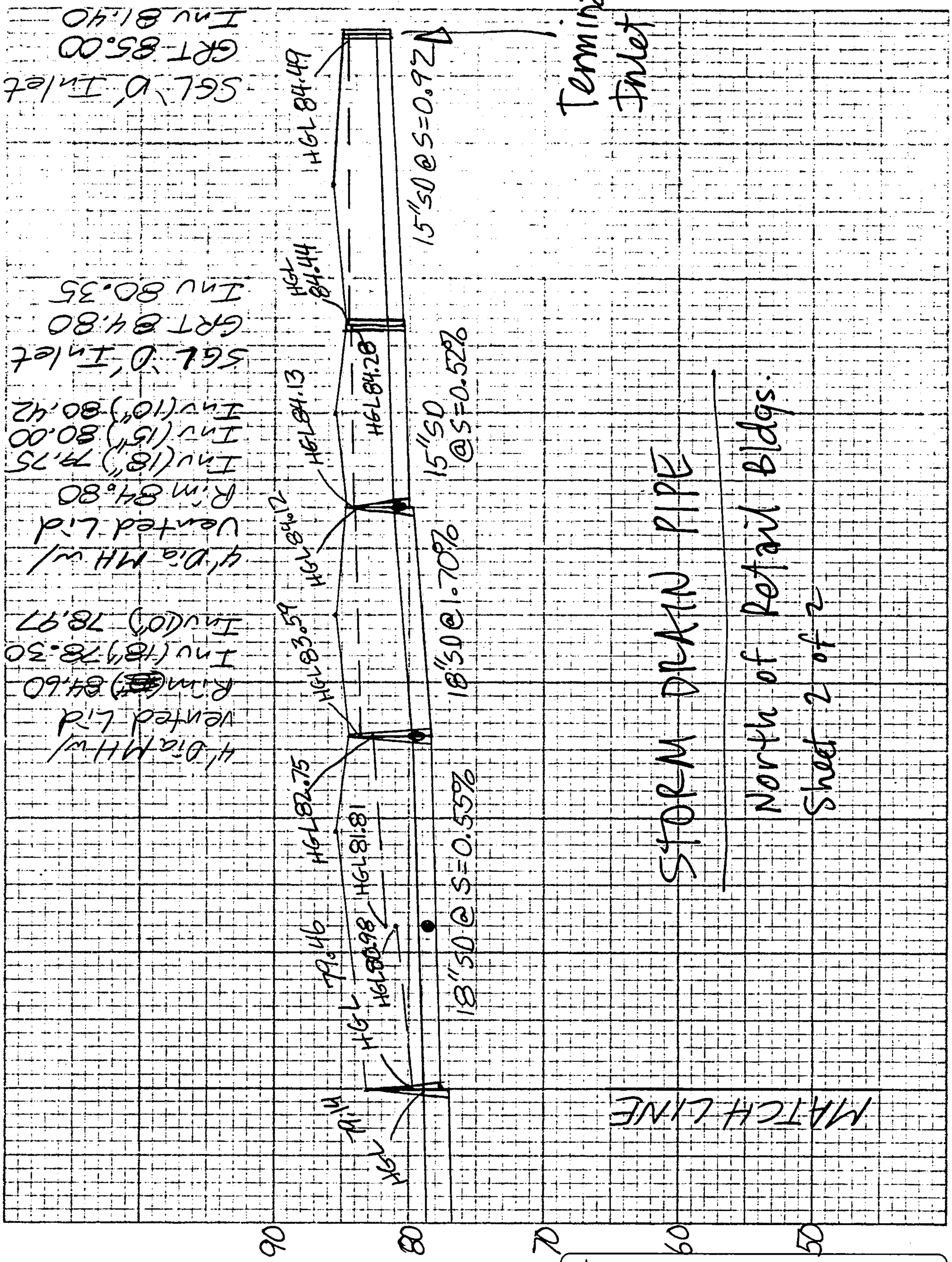


BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
ALBUQUERQUE _____ LAS CRUCES _____ SANTA FE

PROJECT NAME Jewel Osco 435 SHEET 20 OF _____

PROJECT NO. _____ BY _____ DATE _____

SUBJECT SD Profile w/ HGL CH'D _____ DATE _____



BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
ALBUQUERQUE LAS CRUCES SANTA FE

PROJECT NAME Jewel Osco 435 SHEET 30 OF

PROJECT NO. BY DATE

SUBJECT SD Profile w/HGL CH'D DATE

Inlet Calculations*

#	INLET	TC ELEV	D	Q	A	VEL	K	Sf	LENGTH CONNECTOR	Hf	1.2V^2 2g	C.F.	FREE-BOARD	MAX. ALLOW HGL IN DS MH	Vmin	H based on Vmin	Qmax from ORIFICE	H req'd based on Q	Vmin based on H	WHICH CONDITION CONTROL	Vcont.
		VELOCITY HEAD CALCS.														ORIFICE EQUATION CALCS.					
1	QUAD D	80.25	36	42.0	7.07	5.94	667	0.0040	135.00	0.54	0.66	0.00	0.5	78.56	4.16	2.66	55.49	1.52	3.02	VEL HEAD	4.16
2	SGL D	80.00	36	45.2	7.07	6.39	667	0.0046	157.00	0.72	0.76	0.00	0.5	77.07	5.21	3.71	65.51	1.76	3.26	VEL HEAD	5.21

B

A

	Quad 'D'	SGL 'D'
A. Controling U-depth	4.16'	5.21'
Actual U-depth	4.70'	5.80'

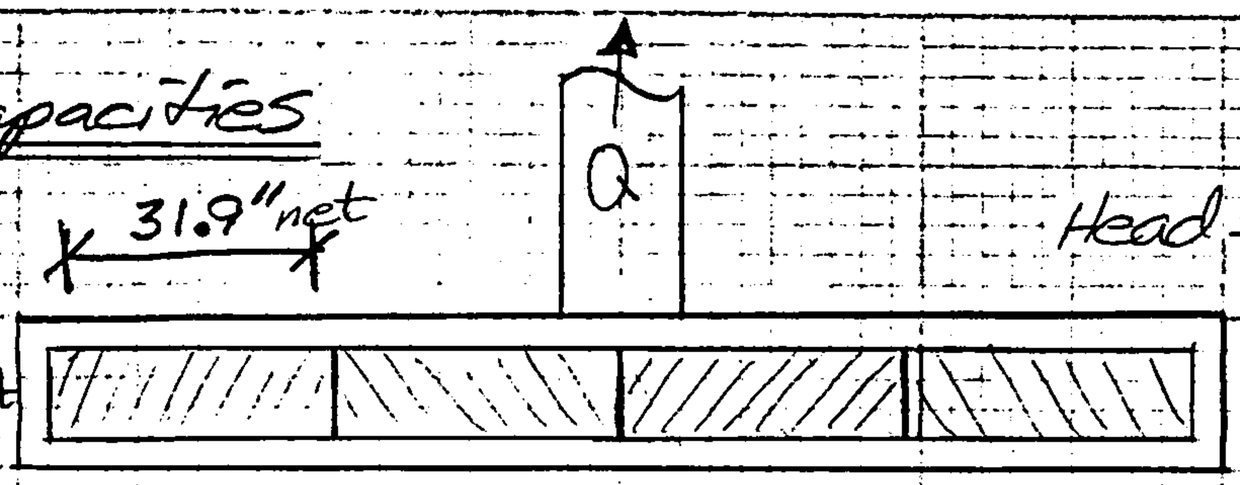
∴ OK

Max. Allowable HGL = 77.07 vs. max HGL = 58.86

* Based on Peak Jewel Osco flows (t = 1.50 hrs)

D

Inlet Grate Capacities



Quad 'D'

Head = .85'

WEIR EQUATION

$Q_i = 2.68 P_{NET} (H^{1.5})$

$2.68 \left[\frac{2(18.5)+8(31.9)}{12''/'}\right] (.85)^{1.5}$

$Q = 51.1 cfs$

$Q_{reqd} = 42.0 cfs$

121% capacity

Orifice Equation

$Q_i = .6 A_{NET} \sqrt{2gH}$

$Q_i = .6\ 4(4.15f) \sqrt{64.4(.85')}$

$Q = 72.8 cfs$

⟸ weir controls

SGL 'D'

Head = .50'

$Q = 2.68 \left[\frac{2(18.5'') + 2(31.9'')}{12''/'}\right] (.50)^{1.5}$

$= 8.0 cfs$ vs $Q_{reqd} = 3.2 cfs$ max.

248% capacity

Vented Lid

Head .50'

$A_{net} = 1.3 sq ft$ ⟸ Based on Neenah grate #4370-9 (similar to COA Vented Lid)

$P_{net} = 22'' \times \frac{1}{2} \times \pi = 2.8'$

$Q_{weir} = 2.68 (2.8')(.5)^{1.5}$

$= 2.7 cfs$ ⟸ weir controls

$Q_{orifice} = .6 (1.3sf) \sqrt{64.4(.5')}$

$= 4.0 cfs$

$Q_{reqd} = 1.0 cfs$

∴ 270% capacity

BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
ALBUQUERQUE _____ LAS CRUCES _____ SANTA FE

PROJECT NAME Jewel Osco 435 SHEET _____ OF _____

PROJECT NO. 96238a2421 BY _____ DATE _____

SUBJECT Inlet Grate Capacities CH'D _____ DATE _____

36" RCP -- SLOPE=15%

CULVERT RATING TABLE

36. INCH DIAMETER PIPE

N = 0.01300 INCREMENT = 1.00 SLOPE = 0.15000

FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
1.00000	0.05509	0.35199	6.38955
2.00000	0.15449	1.55307	10.05312
3.00000	0.28134	3.67277	13.05437
4.00000	0.42932	6.72679	15.66848
5.00000	0.59457	10.70847	18.01052
6.00000	0.77437	15.59784	20.14268
7.00000	0.96662	21.36560	22.10337
8.00000	1.16962	27.97540	23.91837
9.00000	1.38191	35.38525	25.60599
10.00000	1.60224	43.54842	27.17978
11.00000	1.82946	52.41407	28.65006
12.00000	2.06255	61.92767	30.02483
13.00000	2.30056	72.03136	31.31043
14.00000	2.54258	82.66412	32.51189
15.00000	2.78778	93.76188	33.63322
16.00000	3.03532	105.25768	34.67762
17.00000	3.28442	117.08157	35.64759
18.00000	3.53429	129.16071	36.54503
19.00000	3.78416	141.41908	37.37132
20.00000	4.03326	153.77750	38.12735
21.00000	4.28080	166.15305	38.81353
22.00000	4.52600	178.45917	39.42980
23.00000	4.76802	190.60472	39.97562
24.00000	5.00603	202.49347	40.44991
25.00000	5.23912	214.02316	40.85097
26.00000	5.46634	225.08417	41.17638
27.00000	5.68667	235.55766	41.42281
28.00000	5.89896	245.31250	41.58574
29.00000	6.10196	254.20149	41.65902
30.00000	6.29421	262.05417	41.63416
31.00000	6.47401	268.66528	41.49905
32.00000	6.63926	273.77283	41.23545
33.00000	6.78723	277.01169	40.81364
34.00000	6.91409	277.79437	40.17801
35.00000	7.01349	274.87399	39.19218
36.00000	7.06858	258.32162	36.54505

@Q=67cfs
D_N=1.0'
V=30 fps

36" RCP -- SLOPE=2.23%

CULVERT RATING TABLE

36. INCH DIAMETER PIPE

N = 0.01300 INCREMENT = 1.00 SLOPE = 0.02230

FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
1.00000	0.05509	0.13572	2.46364
2.00000	0.15449	0.59882	3.87621
3.00000	0.28134	1.41612	5.03341
4.00000	0.42932	2.59367	6.04135
5.00000	0.59457	4.12890	6.94437
6.00000	0.77437	6.01411	7.76648
7.00000	0.96662	8.23800	8.52247
8.00000	1.16962	10.78656	9.22228
9.00000	1.38191	13.64360	9.87298
10.00000	1.60224	16.79110	10.47979
11.00000	1.82946	20.20946	11.04669
12.00000	2.06255	23.87765	11.57677
13.00000	2.30056	27.77336	12.07246
14.00000	2.54258	31.87307	12.53571
15.00000	2.78778	36.15206	12.96807
16.00000	3.03532	40.58454	13.37076
17.00000	3.28442	45.14351	13.74475
18.00000	3.53429	49.80090	14.09078
19.00000	3.78416	54.52740	14.40938
20.00000	4.03326	59.29247	14.70088
21.00000	4.28080	64.06416	14.96545
22.00000	4.52600	68.80906	15.20307
23.00000	4.76802	73.49206	15.41353
24.00000	5.00603	78.07604	15.59640
25.00000	5.23912	82.52158	15.75104
26.00000	5.46634	86.78642	15.87651
27.00000	5.68667	90.82470	15.97152
28.00000	5.89896	94.58591	16.03434
29.00000	6.10196	98.01327	16.06260
30.00000	6.29421	101.04106	16.05302
31.00000	6.47401	103.59012	16.00092
32.00000	6.63926	105.55945	15.89928
33.00000	6.78723	106.80827	15.73664
34.00000	6.91409	107.11005	15.49156
35.00000	7.01349	105.98403	15.11145
36.00000	7.06858	99.60188	14.09079

@Q=45cfs
D_N=1.4
V=13.7 fps

40

36" RCP -- SLOPE=1.0%

CULVERT RATING TABLE

36. INCH DIAMETER PIPE

N = 0.01300 INCREMENT = 1.00 SLOPE = 0.01000

FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
1.00000	0.05509	0.09088	1.64978
2.00000	0.15449	0.40100	2.59570
3.00000	0.28134	0.94831	3.37062
4.00000	0.42932	1.73685	4.04559
5.00000	0.59457	2.76491	4.65030
6.00000	0.77437	4.02735	5.20082
7.00000	0.96662	5.51657	5.70707
8.00000	1.16962	7.22322	6.17570
9.00000	1.38191	9.13643	6.61144
10.00000	1.60224	11.24415	7.01779
11.00000	1.82946	13.53325	7.39741
12.00000	2.06255	15.98966	7.75238
13.00000	2.30056	18.59842	8.08432
14.00000	2.54258	21.34379	8.39453
15.00000	2.78778	24.20921	8.68406
16.00000	3.03532	27.17742	8.95372
17.00000	3.28442	30.23033	9.20417
18.00000	3.53429	33.34915	9.43589
19.00000	3.78416	36.51425	9.64923
20.00000	4.03326	39.70518	9.84444
21.00000	4.28080	42.90054	10.02161
22.00000	4.52600	46.07796	10.18073
23.00000	4.76802	49.21393	10.32166
24.00000	5.00603	52.28359	10.44412
25.00000	5.23912	55.26054	10.54768
26.00000	5.46634	58.11649	10.63170
27.00000	5.68667	60.82072	10.69532
28.00000	5.89896	63.33942	10.73739
29.00000	6.10196	65.63454	10.75631
30.00000	6.29421	67.66210	10.74990
31.00000	6.47401	69.36908	10.71501
32.00000	6.63926	70.68784	10.64695
33.00000	6.78723	71.52412	10.53804
34.00000	6.91409	71.72620	10.37392
35.00000	7.01349	70.97216	10.11938
36.00000	7.06858	66.69835	9.43589

@Q=42cfs

D_N=1.75'

V=10.5fps

24" RCP -- SLOPE=2.06%

CULVERT RATING TABLE

24. INCH DIAMETER PIPE

N = 0.01300 INCREMENT = 1.00 SLOPE = 0.02060

FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
1.00000	0.04479	0.10559	2.35744
2.00000	0.12504	0.46164	3.69190
3.00000	0.22665	1.08129	4.77067
4.00000	0.34416	1.96054	5.69654
5.00000	0.47417	3.08799	6.51248
6.00000	0.61418	4.44768	7.24161
7.00000	0.76224	6.02029	7.89811
8.00000	0.91669	7.78388	8.49130
9.00000	1.07605	9.71426	9.02767
10.00000	1.23901	11.78522	9.51179
11.00000	1.40432	13.96866	9.94691
12.00000	1.57079	16.23460	10.33528
13.00000	1.73727	18.55114	10.67834
14.00000	1.90258	20.88428	10.97683
15.00000	2.06554	23.19764	11.23081
16.00000	2.22490	25.45202	11.43962
17.00000	2.37935	27.60464	11.60178
18.00000	2.52741	29.60796	11.71476
19.00000	2.66742	31.40759	11.77450
20.00000	2.79743	32.93840	11.77453
21.00000	2.91494	34.11644	11.70401
22.00000	3.01655	34.81845	11.54248
23.00000	3.09680	34.80872	11.24021
24.00000	3.14159	32.46923	10.33528

Q=22.3 cfs → Q_N=1.25 V=11.2 fps

Full pipe flow occurs when 24" RCP goes to 0.62%

NORTH BRANCH
NORMAL DEPTH FLOWS OCCUR UNTIL SINGLE D AT LIFT GRATE

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	Di Angle		Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Pipe Soffit	Low Point #	HV	EGL(dn)	EGL(up)
100.00	SGL D											0.00	0.00	0.00	0.00	0.00		78.50	78.50	82.00	0.53	78.50	79.03
		24	18.4	3.14	5.86	226	0.0066	96.71			0.64												
196.71	MH w/GRT								4	30		0.11	0.85	0.05	0.17	1.18	79.14	79.46	79.10	83.00	1.39	79.67	80.85
		18	16.7	1.77	9.45	105	0.0253	60.00			1.52												
256.71	JUNCT								0	0		0.00	0.20	0.00	0.00	0.20	80.98	81.81	79.50	82.20	0.75	82.36	82.57
		18	12.3	1.77	6.96	105	0.0137	68.05			0.93												
324.76	MH w/GRT								4	0		0.00	0.41	0.03	0.00	0.44	82.75	83.59	79.80	84.60	0.34	83.50	83.93
		18	8.3	1.77	4.70	105	0.0062	85.25			0.53												
410.01	MH w/GRT								4	0		0.00	-0.25	0.01	0.00	-0.24	84.12	84.13	81.25	84.80	0.09	84.47	84.23
		15	3.0	1.23	2.44	65	0.0022	66.93			0.14												
476.94	SGL D								4	80		0.01	0.07	0.00	0.00	0.08	84.28	84.44	81.60	84.80	0.02	84.37	84.46
		15	1.4	1.23	1.14	65	0.0005	113.88			0.05												
590.82	SGL D								4	0		0.00	-0.02	0.00	0.00	-0.02	84.49		82.65	85.00	0	84.51	84.49

7b

Filename: C95342a2400.hydro.hgl_30.wk4

Pino Dam Stage-Storage Revised for Jewel Osco

Existing Conditions

Based on Wilson & Company's Pino Dam Revisions report dated June 1991 and revised 11-4-92 and 11-13-92 the stage-storage table is as follows:

Table #1

STAGE	DISCHARGE (CFS)	STORAGE (AC-FT)	EXISTING	PROPOSED STORAGE
5940	0	0		0
5945	8	38	-16	22
5950	18	80	-16	64
5955	74	150	-16	134
5960	132	234	-16	218
5965	160	326	-16	310
5970	180	424	-16	408
5975	200	524-524	-16	508
5980	218	600-600	-16	584
5981	1,100	650	-16	634
5982	2,750	670	-16	654
5983	4,930	700	-16	684
5985	10,600	746		
5988	21,700	820		
5991	35,400	910		

Recently approximately 50,000 CY was removed from the Dam Basin when grading the Desert Heights Apartments Complex to the east. Additional Storage Area below the principal spillway elevation (5940) ranges between 20 and 40 Ac-ft. (For this analysis this storage area will not be included.)

Proposed Conditions

Jewel Osco will have approximately 75,000 CY of excess dirt, and would like to place it in the Pino Dam. Based on the above this results in a maximum excess of 25,000 CY or 15.5 Ac-ft ≈ 16 Ac-ft

BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
ALBUQUERQUE LAS CRUCES SANTA FE

PROJECT NAME Jewel Osco #435 SHEET 1E OF

PROJECT NO. 96238a2421 BY DATE

SUBJECT CH'D DATE

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

2600 PROSPECT N.E. - ALBUQUERQUE, N. M. 87107
TELEPHONE (505) 884-2215

SUSAN

April 24, 1996

Mr. James Topmiller, P.E.
Bohannan-Huston, Inc.
7500 Jefferson St. NE
Albuquerque, NM 87109

RE: Letter dated 4-17-96 addressing 96 inch storm drain, Jewel Osco

Dear James:

As you are aware, the 96 inch storm drain (constructed by a City SAD) has a long history. Contrary to your letter, we feel that the functionalism of this pipe is a "truly significant issue" when looking at the entire system. After reviewing older files, it appears the issues with this pipe have not been completely resolved. I have no doubt that the flows from Jewel Osco are "gone" prior to the peak in the pipe, however, we are more concerned with the "big picture" issues with this pipe. The storm drain is sufficient for discharge from Jewel-Osco due to the proximity of the site.

It is important to not completely focus on a singular site and disregard off site issues or past history that directly affect facilities. What is the status of the LOMR for this floodplain? Although not the responsibility of this developer, it appears it should be resurrected or at least addressed. What are the back water affects on the pipe from the Pino Dam? Fred Aguirre mentioned that a flap gate was discussed in the past with Easterling (?) studies. Have elevations been checked all the way to Academy?

I have included a few notes from our file (by Cliff Anderson) that brought some of these issues to the forefront. Please note the pipe design discharge. Coordination on the LOMR should be pursued with the City or possibly AMAFCA. I have briefed the City and the Floodplain Administrator. Also, there are errors in the AHYMO run regarding the sum of land treatments.

Seeing that this pipe is City operated and maintained, we have raised potential concerns and will defer review and approval to City Hydrology and our Designee. As stated in my EPC comments, we have no objection to the proposed amendment.

Sincerely,
AMAFCA

Kurt Browning, P.E.
Drainage Engineer

c: Fred Aguirre, COA Hydrology
Lawrence Kline, Herb Denish & Assoc.