City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 21, 2003

Ron Bohannan, PE
Tierra West LLC
8509 Jefferson NE
Albuquerque, NM 87113

Re: Home Depot at Montgomery/Eubank Drainage Report
Engineer Stamp date 12-23-03 (G20/D2J)

Dear Mr. Bohannan,

Based on information provided in your submittal dated 12-23-03, the above referenced report is approved for Preliminary Plat, Site Development Plan for Building Permit and Site Development Plan for Subdivision action by the DRB. Prior to Building Permit approval, please resubmit the grading plan denoting what is to be built with the Permit and what will be built with the City Work Order process.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Planning Dept.
Development and Building Services

C: file

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

DRAINAGE AND TRANSPORTATION SHEET

(REV. 1/11/2002)

PROJECT TITLE: Home Depot
ZONE MAP/DRG. FILE #: G-20/D2J
DRB #:
EPC #:
WORK ORDER #:

LEGAL DESCRIPTION: Sierra Vista Shopping Center
CITY ADDRESS: Southwest corner of Montogomery Blvd and Eubank Blvd

ENGINEERING FIRM:	Tierra West, LLC	CONTACT:	RONALD R. BOHANNAN OR SARA LAVY
ADDRESS:	8509 Jefferson NE	PHONE:	(505) 858-3100
CITY, STATE:	Albuquerque, NM	ZIP CODE:	87113
OWNER:	The Home Depot	CONTACT:	Emilou Barnes
ADDRESS:	2800 Forest Lane	PHONE:	(972)402-3937
CITY, STATE:	Dallas, Texas	ZIP CODE:	75234
ARCHITECT:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	
SURVEYOR:	Precision Surveys	CONTACT:	Larry Medrano
ADDRESS:	8414-D Jefferson Street, NE	PHONE:	856-5700
CITY, STATE:	Albuquerque, NM	ZIP CODE:	87113
CONTRACTOR:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	

CHECK TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- ___ DRAINAGE PLAN
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- ___ GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ___ CLOMR/LOMR
- ___ TRAFFIC CIRCULATION LAYOUT (TCL)
- ___ ENGINEERS CERTIFICATION (TCL)
- ___ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ___ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SIA / FINANACIAL GUARANTEE RELEASE
- X PRELIMINARY PLAT APPROVAL
- X S. DEV. PLAN FOR SUB'D. APPROVAL
- X S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- X FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- X BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY (PERM.)
- ___ CERTIFICATE OF OCCUPANCY (TEMP.)
- X GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ WORK ORDER APPROVAL
- ___ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ___ YES
- X NO
- ___ COPY PROVIDED

RECEIVED
DEC 23 2003
HYDROLOGY SECTION

DATE SUBMITTED: 12/22/2003 BY: Sara Lavy

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a dranage submittal. The particular nature, location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of sumbittal may be required based on the following:

1. **Conceptual Grading and Drainage Plans** Required for approval of Site Development Plans greater than five (5) acres
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report** Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

TIERRA WEST, LLC

8509 Jefferson NE
Albuquerque, NM 87113

(505) 858-3100
fax (505) 858-1118

twllc@tierrawestllc.com
1-800-245-3102

December 23, 2003

Mr. Brad Bingham
Hydrology Department
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

RE: Home Depot @ Eubank and Montgomery
Sierra Vista Shopping Center (G-20/D2J)

Dear Mr. Bingham:

We are resubmitting the Drainage Report and Grading and Drainage Plan based on our recent phone conversation. I revised the AHYMO run to have the flows from Basins OS-2, 7 and 12 enter the pond/channel at the correct location. The orifice equations were changed to weir equations to better approximate the flows through the notches. The Grading Plan was revised to remove the slope tie over the proposed storm drain. The area is now flat to provide access to the manholes. Also the existing pipe size of 42" has been noted on the plan.

If you have any questions or need additional information, please to not hesitate to contact me.

Sincerely,

Sara Lavy

Sara Lavy, PE

Enclosure/s

cc: Emilou Barnes

JN 220005
scl

RECEIVED
DEC 23 2003
HYDROLOGY SECTION

220005: 2205 hydrology resubmittal ltr 2.doc

DRAINAGE REPORT

for

Home Depot
at Montgomery/ Eubank

Prepared by

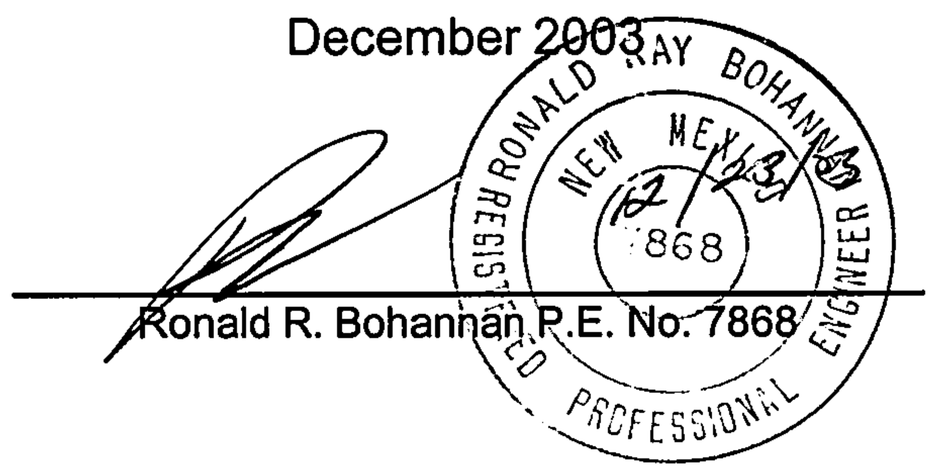
Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

Prepared for

The Home Depot
2800 Forest Lane
Dallas, Texas 75234

RECEIVED
DEC 23 2003
HYDROLOGY SECTION

December 2003



Ronald R. Bohannan P.E. No. 7868

TABLE OF CONTENTS

Zone Atlas Map G-20 1

Location 2

Existing Drainage Conditions 2

FIRM Map and Soil Conditions 2

FIRM Map 35001C0143 D 3

On-Site Drainage Management Plan 4

Developed Basin Layout 5

Calculations 6

Summary 6

Runoff Calculations 7

Storm Sewer Calculations 10

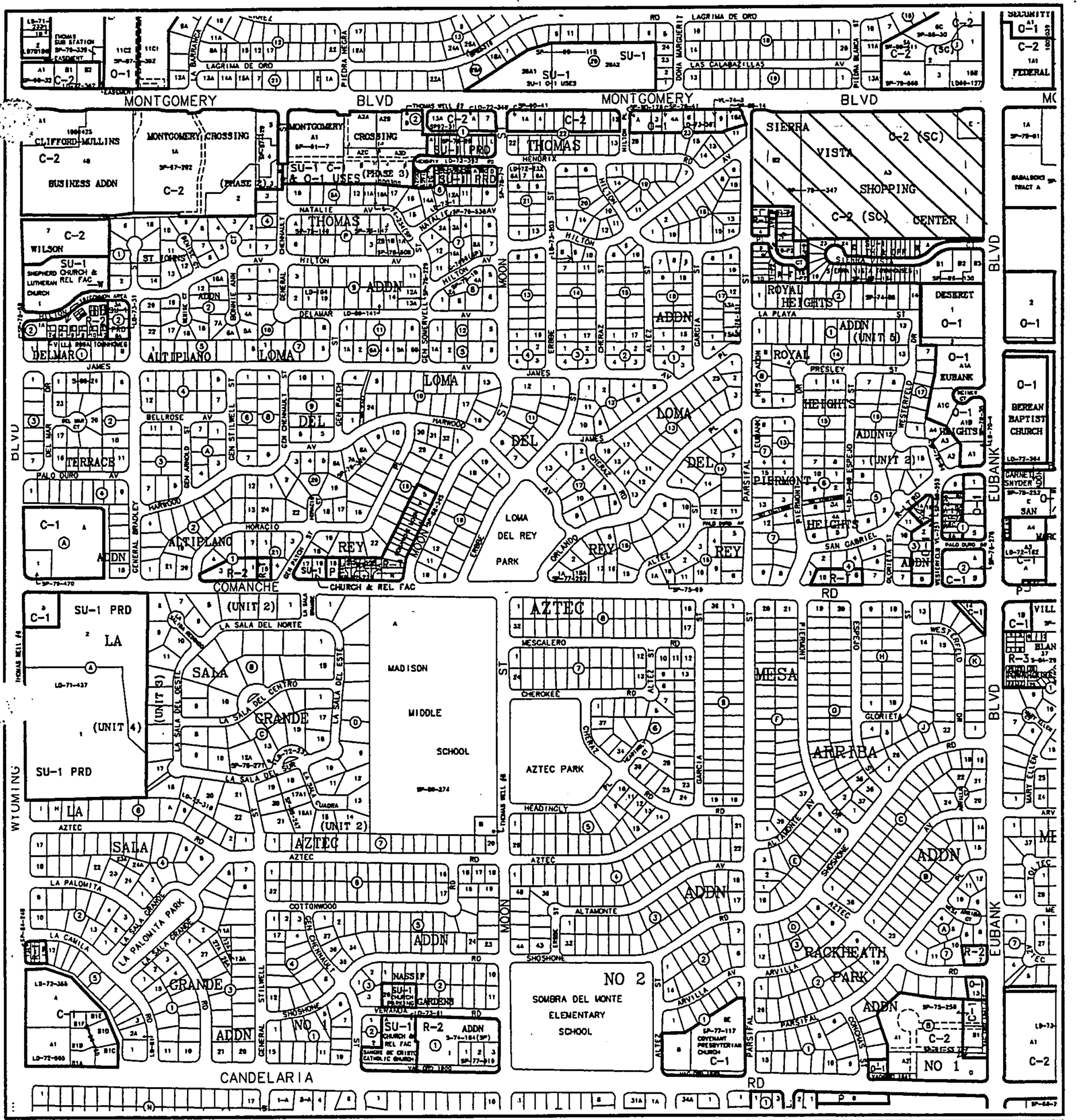
Channel Analysis 16

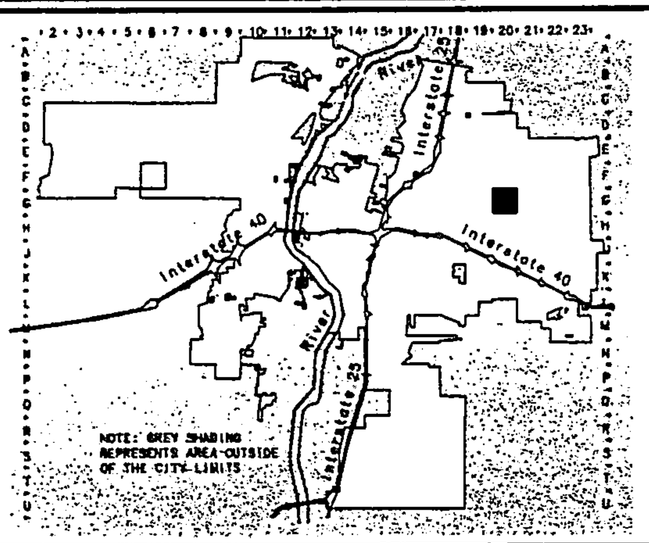
Pond Calculations 20

AHYMO Input and Output 24

Scanlon & Associates Letter 42

Photographs of Existing Channel 48





CITY OF
Albuquerque

A Albuquerque G Geographic I Information S System

PLANNING DEPARTMENT

© Copyright 2000

GRAPHIC SCALE IN FEET

250 0 750 1000

Zone Atlas Page

G-20-Z

Map Amended through July 28, 2000

Location

The site is identified as Tract B-2 and a portion of Tract A-3 Sierra Vista Shopping Center. It is located on the southwest corner of Montgomery Blvd and Eubank Blvd. Currently, the site consists of an existing Kmart store and an office complex. We are proposing to demolish the existing Kmart store and office complex and build a new Home Depot store in the same location. The property will be subdivided into two parcels, with the Home Depot on one parcel and the balance of the subdivision on the other parcel. The site is shown on Zone Atlas Map G-17 and contains approximately 11.14 acres. The purpose of this report is to provide the drainage analysis and management plan for the proposed retail development.

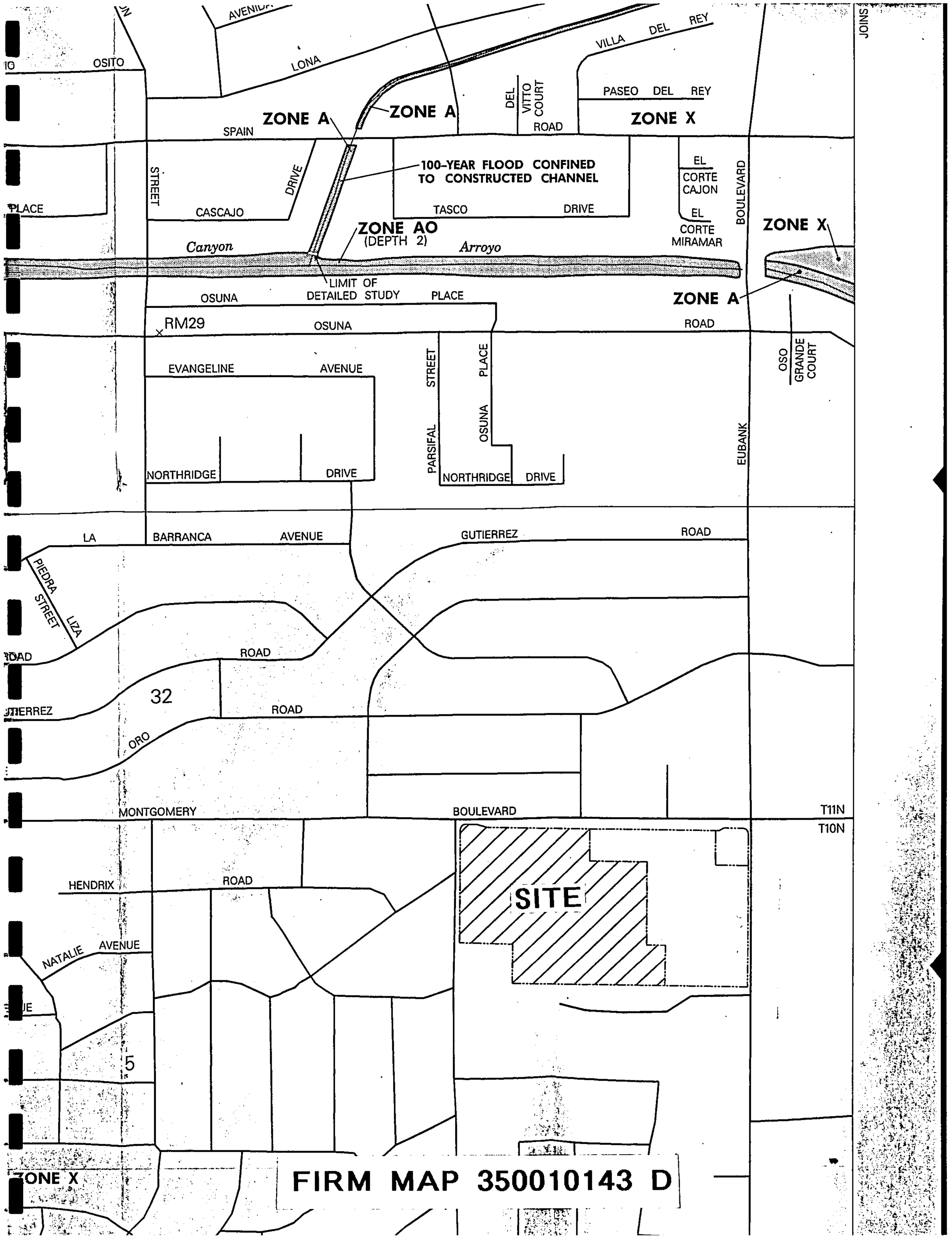
Existing Drainage Conditions

The site is currently developed with an office complex, a Kmart store, and other miscellaneous retail uses. There is an existing concrete channel in the rear of the shopping center. The channel has a series of weir structures that detain the water and limit the outflow to the historical flow. An offsite basin that drains approximately 85 cfs from the east enters the channel via a 36" concrete pipe. This flow is allowed to pass through the site and exit the area via a storm drain system in Parsifal.

A Super Kmart store was proposed for this site, and a drainage report was prepared by Great Basin Engineering (G20/D2J). This drainage report was approved by the City, but the Super Kmart was never developed due to the developer's financial difficulties. According to the study by Great Basin, 104.32 cfs was allowed to discharge from the site (this included the 85 cfs from the offsite basin).

FIRM Map

The site is located on FIRM map 35001C0143 D as shown on the attached excerpt. The map shows that the site does not lie within any 100-year flood plains.


AVENIDA
LONA
VILLA DEL REY
JOINS
10
OSITO
DEL VITTO COURT
ROAD
PASEO DEL REY
ZONE A
ZONE A
ZONE X
SPAIN
STREET
DRIVE
100-YEAR FLOOD CONFINED TO CONSTRUCTED CHANNEL
EL CORTE CAJON
BOULEVARD
PLACE
CASCAJO
TASCO
DRIVE
EL CORTE MIRAMAR
ZONE AO
(DEPTH 2)
ZONE X
Canyon
Arroyo
LIMIT OF DETAILED STUDY
OSUNA
PLACE
ZONE A
RM29
OSUNA
ROAD
OSO GRANDE COURT
EVANGELINE
AVENUE
STREET
PLACE
PARSIFAL
OSUNA
NORTHRIDGE
DRIVE
NORTHRIDGE
DRIVE
EUBANK
LA
BARRANCA
AVENUE
GUTIERREZ
ROAD
PIEDRA
STREET
LIZA
ROAD
ROAD
32
ORO
MONTGOMERY
BOULEVARD
T11N
T10N
HENDRIX
ROAD
SITE
NATALIE
AVENUE
5
ZONE X
FIRM MAP 350010143 D

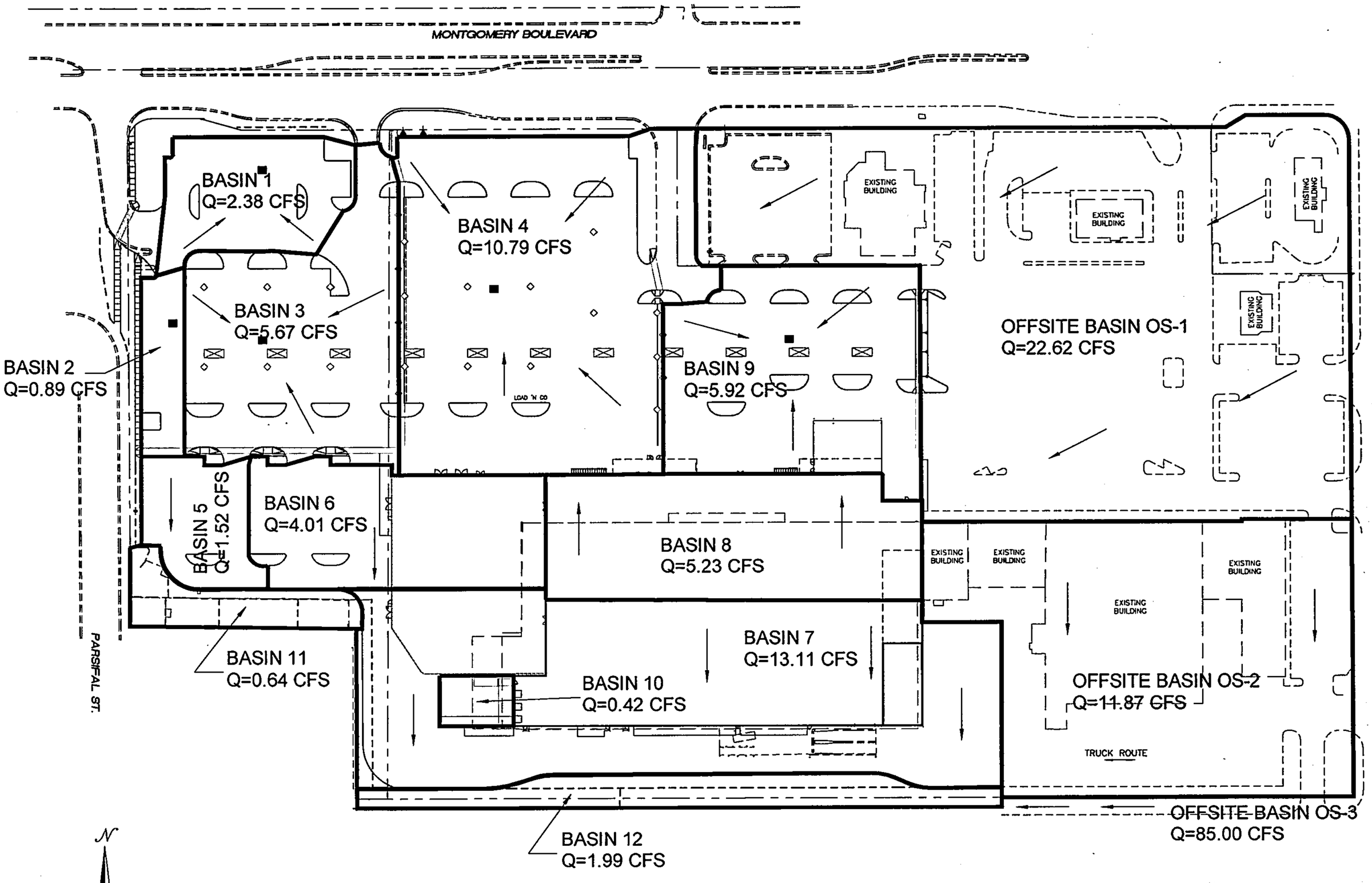
On-Site Drainage Management Plan

The site has been divided into twelve developed basins, which generate a total of 52.57 cfs of developed flows. There are also three offsite basins that impact the site. Offsite basins OS-1 and OS-2 consist of the remainder of the existing developed shopping center. Offsite basin OS-3, with a flow rate of 85 cfs, enters the site from the east through an existing 36" storm drain and consists of the flows in Eubank Boulevard.

Basins 1-6, 8-11 and OS-1 will drain to a new storm drain system in the parking lot of the Home Depot. Basins 7, 12, and OS-3 will drain to the existing channel in the back of the store. A portion of the existing channel in the rear of the site will be removed and replaced with a 42" storm drain. We are proposing to modify the weir structures in the existing channel to store more water and continue to release the water at the historic rate. This will make up for the volume lost in the portion of the channel that is being replaced with storm drain pipe.

The existing channel has weir structures that cause the channel to also act as a detention pond. The weirs currently have 12" diameter openings in the bottom of the walls to allow nuisance flows to pass. During a severe storm event the water passes over the tops of the weir walls. We reanalyzed the channel/pond using AHYMO to route the ponds. According to Scanlon & Associates (See Appendix) Offsite Basin OS-3 has a flow rate of 85.00 cfs. There is no background information on how large this basin is or what the land treatments are. Consequently, the AHYMO data for OS-3 has been manipulated to create a basin with a flow rate of approximately 85.00. The land treatments and area of the basin are not accurate and are only used to create a basin of 85.00 cfs.

The southern channel has three ponding areas that will remain with modifications. We are proposing to raise the weir walls to eliminate the weir structures. A notch will be cut in the walls and the 12" diameter openings removed to better control the flows leaving the ponding areas. The weir walls will be raised to provide more ponding capacity. These minor



DEVELOPED BASIN EXHIBIT

modifications will limit the flow to 96.95 cfs which is less than the allowable discharge rate of 104.32 cfs. This channel accepts public waters from Eubank, but a public easement does not extend to Parsifal. Home Depot will dedicate public easements for the channel and the new storm drain on the south property line.

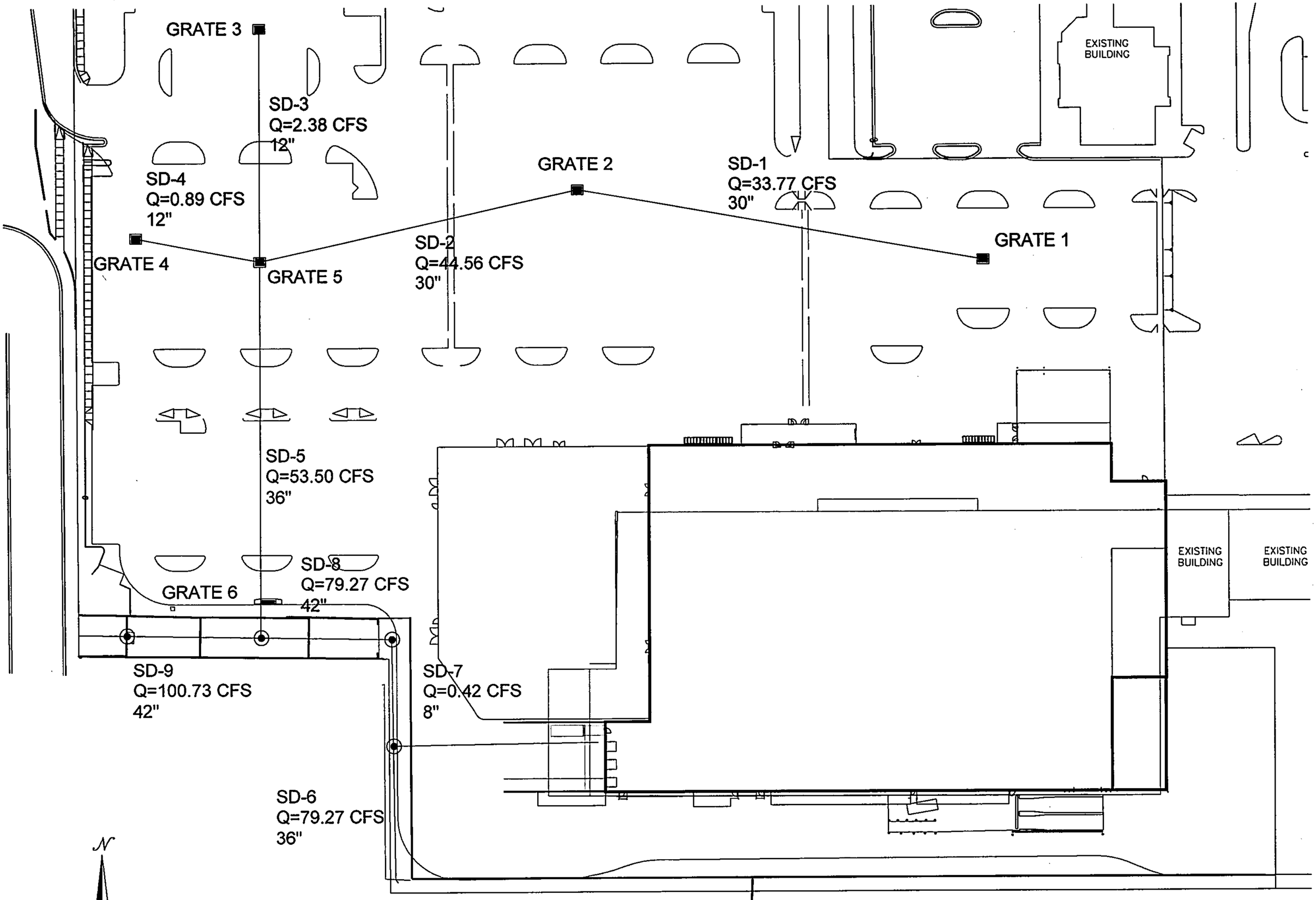
In the case of an emergency or an event greater than the 100-year storm, the site would drain out the entrances to Montgomery before flooding the building. However, the channel in the back of the building that drains Basins OS-2 and 7 was designed for twice the 100-year flow as back up. The area will overflow towards Montgomery before flooding the building, but the grades are close to the finished floor and the channel has been over-designed as a result.

Calculations

The following is an explanation of the storm sewer and pond calculations. The pond capacity was established using AHYMO in accordance with DPM criteria. The stage-storage-discharge charts for the ponds were developed using a spreadsheet and can be found in the "Ponding Calculations" section of the report. The discharge rate from the ponds was calculated using the orifice equation.

Summary

There are twelve proposed basins on the site. Most of these basins will drain to a new storm drain system that will discharge to the existing channel located in the rear of the store. A portion of the channel will be removed and replaced with a 42" storm drain pipe. Modifications will be made to the existing channel to increase the storage volume and better control the discharge from each ponding area. The discharge from the site is 96.95 cfs, which is less than the historical discharge of 104.32 cfs.



PROPOSED STORM DRAIN EXHIBIT

Runoff
Calculations

Weighted E Method

											100-Year			10-Year		
Basin	Area (sf)	Area (acres)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
On-Site Basins																
1	21,743	0.50	0%	0	10%	0.05	0%	0.00	90%	0.45	2.216	0.092	2.38	1.386	0.058	1.58
2	8,125	0.19	0%	0	10%	0.02	0%	0.00	90%	0.17	2.216	0.034	0.89	1.386	0.022	0.59
3	51,650	1.19	0%	0	10%	0.12	0%	0.00	90%	1.07	2.216	0.219	5.67	1.386	0.137	3.76
4	98,389	2.26	0%	0	10%	0.23	0%	0.00	90%	2.03	2.216	0.417	10.79	1.386	0.261	7.16
5	13,831	0.32	0%	0	10%	0.03	0%	0.00	90%	0.29	2.216	0.059	1.52	1.386	0.037	1.01
6	36,556	0.84	0%	0	10%	0.08	0%	0.00	90%	0.76	2.216	0.155	4.01	1.386	0.097	2.66
7	119,506	2.74	0%	0	10%	0.27	0%	0.00	90%	2.47	2.216	0.507	13.11	1.386	0.317	8.70
8	47,641	1.09	0%	0	10%	0.11	0%	0.00	90%	0.98	2.216	0.202	5.23	1.386	0.126	3.47
9	53,931	1.24	0%	0	10%	0.12	0%	0.00	90%	1.11	2.216	0.229	5.92	1.386	0.143	3.92
10	3,863	0.09	0%	0	10%	0.01	0%	0.00	90%	0.08	2.216	0.016	0.42	1.386	0.010	0.28
11	10,806	0.25	0%	0	100%	0.25	0%	0.00	0%	0.00	0.920	0.019	0.64	0.360	0.007	0.30
12	18,111	0.42	0%	0	10%	0.04	0%	0.00	90%	0.37	2.216	0.077	1.99	1.386	0.048	1.32
Total	484,151	11.11		0		1.33		0.00		9.78		2.026	52.57		1.263	34.74
Off-Site Basins																
OS-1	206,181	4.73	0%	0	10%	0.47	0%	0.00	90%	4.26	2.216	0.874	22.62	1.386	0.547	15.00
OS-2	108,186	2.48	0%	0	10%	0.25	0%	0.00	90%	2.24	2.216	0.459	11.87	1.386	0.287	7.87
OS-3	877,000	20.13	0%	0	20%	4.03	20%	4.03	60%	12.08	1.858	3.117	85.00	1.096	1.839	53.80

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted D * Total Area

Flow = Qa * Aa + Qb * Ab + Qc * Ac + Qd * Ad

Excess Precipitation, E (inches)		
Zone 3	100-Year	10 - Year
E_a	0.66	0.19
E_b	0.92	0.36
E_c	1.29	0.62
E_d	2.36	1.50

Peak Discharge (cfs/acre)		
Zone 3	100-Year	10 - Year
Q_a	1.87	0.58
Q_b	2.6	1.19
Q_c	3.45	2.00
Q_d	5.02	3.39

MONTGOMERY BOULEVARD

BASIN 1
Q=2.38 CFS

BASIN 4
Q=10.79 CFS

BASIN 3
Q=5.67 CFS

BASIN 2
Q=0.89 CFS

BASIN 9
Q=5.92 CFS

OFFSITE BASIN OS-1
Q=22.62 CFS

EXISTING BUILDING

EXISTING BUILDING

EXISTING BUILDING

EXISTING BUILDING

LOAD 'N GO

BASIN 5
Q=1.52 CFS

BASIN 6
Q=4.01 CFS

BASIN 8
Q=5.23 CFS

EXISTING BUILDING

EXISTING BUILDING

EXISTING BUILDING

EXISTING BUILDING

BASIN 7
Q=13.11 CFS

BASIN 11
Q=0.64 CFS

BASIN 10
Q=0.42 CFS

OFFSITE BASIN OS-2
Q=11.87 CFS

TRUCK ROUTE

PARSIFAL ST.

OFFSITE BASIN OS-3
Q=85.00 CFS

BASIN 12
Q=1.99 CFS

N

DEVELOPED BASIN EXHIBIT

Storm Sewer

Pipe Capacity

Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
1	30	1	4.91	0.625	41.13	33.77	6.88
2	30	1.37	4.91	0.625	48.14	44.56	9.08
3	12	0.6	0.79	0.250	2.77	2.38	3.03
4	12	1.56	0.79	0.250	4.46	0.89	1.13
5	36	1	7.07	0.750	66.88	53.50	7.57
6	36	4.98	7.07	0.750	149.24	79.27	11.21
7	8	5	0.35	0.167	2.71	0.42	1.20
8	42	1	9.62	0.875	100.88	79.27	8.24
9	42	1	9.62	0.875	100.88	100.73	10.47

Manning's Equation:

$Q = 1.49/n * A * R^{(2/3)} * S^{(1/2)}$

A = Area
R = D/4
S = Slope
n = 0.013

DROP INLET CALCULATIONS

	TYPE OF INLET	AREA (SF)	Q (CFS)	H (FT)	H ALLOW (FT)
1	2-Double 'D'	8.42	28.54	0.4956	0.5
2	Double 'D'	4.21	10.79	0.2833	0.5
3	Single 'D'	2.30	2.38	0.0462	0.5
4	Single 'D'	2.30	0.89	0.0065	0.5
5	Single 'D'	2.30	5.67	0.2621	0.5
6	Single 'C'	4.36	5.53	0.0694	0.5

ORIFICE EQUATION

Q = CA sqrt(2gH)

C = 0.6

g = 32.2

1. Basins OS-1 and 9 = 28.54
2. Basin 4
3. Basin 1
4. Basin 2
5. Basin 3
6. Basin 5 and 6 = 5.53

STORM DRAIN INLET
EFFECTIVE AREA ASSUMING A 50% CLOGGING FACTOR

DOUBLE D:

Area at the grate:

L = 76.75" - 14 (1/2" middle bars) - 6" center piece
= 63.75"
= 5.3125'

W = 25.5" - 13 (1/2 middle bars)
= 19"
= 1.583'

Area = 1.583' x 5.3125'
= 8.410 ft^2

Effective Area = 8.410 - .5 (8.410)
= 4.205 ft^2

Single 'C" Drop Inlet
EFFECTIVE AREA

Area at the grate:

L = 38.375" - 7(2@ middle bars)
= 34.875"
= 2.906'

W = 25.5" - 13(2@ middle bars)
= 19"
= 1.583'

Area = 1.583' x 2.906'
= 4.601 ft^2

Effective Area: = 4.601- 4.601 (0.5 clogging factor)
= 2.30 ft^2 at the grate

Area at the throat:

L = 47.375@
= 3.95'

H = 10:@ - 42@
= 63@
= 0.5208'

Area = 3.95' x 0.5208'
= 2.06 ft^2 at the throat

Total Area:

Area = 2.30_{grate} + 2.06_{throat}
= 4.36 ft^2

Channel Analysis

Channel Capacity

	Top Width	Bottom Width	Depth	Area	WP	R	Slope	Q Provided	Q Required	Velocity
	(ft)	(ft)	(ft)	(ft^2)	(ft)		(%)	(cfs)	(cfs)	(ft/s)
Channel	6	6	3	18.00	12.00	1.5000	30	1480.71	49.96	2.78

Manning's Equation:

Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area
W= Wetted Perimeter
R = A/WP
S = Slope
n = 0.013

Offsite Basin O2 = 11.87 cfs
Basin 7 = 13.11 cfs
Total flow into channel = 24.98
No emergency overflow use 2(24.98) = 49.96 cfs

Channel Inlet Capacity

Weir Equation:

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

Q= 49.96 cfs
C = 2.95
H = 1.00 ft
L = Length of weir

$$L = \frac{49.96}{2.95 * 1.0^{3/2}}$$

L = 16.94 ft
Use 17.00 feet for length of inlet

Hydraulic Jump

$$y_2 = \frac{y_1}{2} * \sqrt{1+8N_F^2} - 1$$

$$N_F = \frac{V}{\sqrt{g y_H}}$$

$$y_h = \frac{A}{T}$$

6' channel

$y_h = 0.31'$

$$N_F = \frac{49.96/1.86}{\sqrt{32.2(0.31)}} = 8.50$$

$$y_2 = \frac{0.31}{2} * \sqrt{1+8(8.50)^2} - 1$$

$= 2.73'$

make channel 3' deep to compensate for hydraulic jump

VOLUME CALCULATIONS

POND 1

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = Ab * D

Ab = 1,166.00

D = 4.60

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
42.48	0	0	0.00
42.90	0.42	0.0112	2.57
43.40	0.92	0.0246	8.33
43.90	1.42	0.0380	15.97
44.40	1.92	0.0514	25.11
44.90	2.42	0.0648	35.54
45.40	2.92	0.0782	47.10
45.90	3.42	0.0915	59.71
46.40	3.92	0.1049	73.27
46.90	4.42	0.1183	87.72
47.08	4.60	0.1231	93.13

Weir Equation: Q=CLH^(3/2)

C = 3.2
Length (ft) 3.2
Height (ft) 4.6
Q (CFS)= Flow

VOLUME CALCULATIONS

POND 2

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = Ab * D
C = (At - Ab) / Dt

Ab = 6,945.48
D = 5.50

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
40.39	0	0	0.00
40.89	0.50	0.0797	2.26
41.39	1.00	0.1594	6.40
41.89	1.50	0.2392	11.76
42.39	2.00	0.3189	18.10
42.89	2.50	0.3986	25.30
43.39	3.00	0.4783	33.26
43.89	3.50	0.5581	41.91
44.39	4.00	0.6378	51.20
44.89	4.50	0.7175	61.09
45.39	5.00	0.7972	71.55
45.89	5.50	0.8770	82.55

Weir Equation: Q=CLH^(3/2)

C = 3.2
Length (ft) 2
Height (in) 5.5
Q (CFS)= Flow

VOLUME CALCULATIONS

POND 3

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = Ab * D

	Upper	Middle	Lower
Ab =	1,030.00	2,195.28	1534.62
Dt =	1.53	3.15	4.8

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
35.11	0	0	0.00
35.50	0.39	0.0137	1.50
36.00	0.89	0.0314	5.00
36.50	1.39	0.0490	10.00
36.76	1.65	0.0712	15.00
37.00	1.89	0.0918	17.33
37.50	2.39	0.1346	37.06
38.00	2.89	0.1774	49.46
38.38	3.27	0.2099	57.11
38.50	3.39	0.2231	59.33
39.00	3.89	0.2777	67.77
39.50	4.39	0.3323	75.27
39.91	4.80	0.3771	80.90

Orifice Equation: Q=CA sqrt(2gH)

C =	0.6
Diameter (in)	42
Area (ft^2)=	9.621
g =	32.2
H (Ft) =	Depth of water above center of orifice
Q (CFS)=	Flow

AHYMO
Input and Output

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02a RUN DATE (MON/DAY/YR) =12/09/2003
INPUT FILE = c:\hd pond.txt USER NO.= AHYMO-I-9702a0100011K-SH

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	
START										TIME=	.00
RAINFALL TYPE= 2										RAIN24=	3.100
COMPUTE NM HYD	OS1	-	1	.00740	22.26	1.051	2.66348	1.500	4.703	PER IMP=	90.00
COMPUTE NM HYD	OS2	-	2	.00388	11.69	.551	2.66348	1.500	4.707	PER IMP=	90.00
COMPUTE NM HYD	OS3	-	3	.03146	83.68	3.607	2.14977	1.500	4.156	PER IMP=	60.00
COMPUTE NM HYD	101.00	-	4	.00078	2.36	.111	2.66348	1.500	4.737	PER IMP=	90.00
COMPUTE NM HYD	102.00	-	5	.00029	.89	.041	2.66348	1.500	4.783	PER IMP=	90.00
COMPUTE NM HYD	103.00	-	6	.00185	5.59	.263	2.66348	1.500	4.714	PER IMP=	90.00
COMPUTE NM HYD	104.00	-	7	.00353	10.63	.501	2.66348	1.500	4.707	PER IMP=	90.00
COMPUTE NM HYD	105.00	-	8	.00050	1.51	.070	2.66348	1.500	4.761	PER IMP=	90.00
COMPUTE NM HYD	106.00	-	9	.00131	3.96	.186	2.66348	1.500	4.722	PER IMP=	90.00
COMPUTE NM HYD	107.00	-	10	.00429	12.91	.609	2.66348	1.500	4.706	PER IMP=	90.00
COMPUTE NM HYD	108.00	-	11	.00171	5.16	.243	2.66348	1.500	4.715	PER IMP=	90.00
COMPUTE NM HYD	109.00	-	12	.00194	5.84	.275	2.66348	1.500	4.714	PER IMP=	90.00
COMPUTE NM HYD	110.00	-	13	.00014	.43	.020	2.66348	1.500	4.828	PER IMP=	90.00
COMPUTE NM HYD	111.00	-	14	.00039	.65	.019	.91991	1.500	2.625	PER IMP=	.00
COMPUTE NM HYD	112.00	-	15	.00065	1.97	.092	2.66348	1.500	4.747	PER IMP=	90.00
DIVIDE HYD	112.10	15	16	.00021	.65	.030	2.66302	1.500	4.747		
	112.20	and	17	.00044	1.32	.062	2.66302	1.500	4.747		
DIVIDE HYD	112.21	17	18	.00022	.66	.031	2.66288	1.500	4.747		
	112.22	and	19	.00022	.66	.031	2.66288	1.500	4.747		
ADD HYD	100.00	16& 3	30	.03167	84.33	3.637	2.15323	1.500	4.160		
ROUTE RESERVOIR	501.00	30	31	.03167	83.20	3.637	2.15323	1.500	4.104	AC-FT=	.114
ADD HYD	102.00	31&18	32	.03189	83.86	3.668	2.15670	1.500	4.109		
ROUTE RESERVOIR	502.00	32	33	.03189	63.52	3.668	2.15671	1.600	3.112	AC-FT=	.736
ADD HYD	103.00	33& 2	34	.03577	71.45	4.219	2.21166	1.600	3.121		
ADD HYD	104.00	34&10	35	.04006	80.20	4.828	2.26000	1.600	3.128		
ADD HYD	105.00	35&19	36	.04028	80.65	4.859	2.26218	1.600	3.129		
ROUTE RESERVOIR	503.00	36	37	.04028	74.25	4.859	2.26218	1.650	2.881	AC-FT=	.325
ADD HYD	106.00	37& 4	38	.04106	75.52	4.970	2.26980	1.650	2.874		
ADD HYD	107.00	38& 5	39	.04135	76.00	5.011	2.27256	1.650	2.872		
ADD HYD	108.00	39& 6	40	.04320	79.01	5.275	2.28932	1.650	2.858		
ADD HYD	109.00	40& 7	41	.04673	84.99	5.776	2.31757	1.600	2.842		
ADD HYD	110.00	41& 8	42	.04723	86.01	5.846	2.32120	1.600	2.846		
ADD HYD	111.00	42& 9	43	.04854	88.70	6.033	2.33044	1.600	2.855		
ADD HYD	112.00	43&11	44	.05025	92.19	6.275	2.34176	1.600	2.867		
ADD HYD	113.00	44&12	45	.05218	96.15	6.550	2.35369	1.600	2.879		
ADD HYD	114.00	45&13	46	.05232	96.44	6.570	2.35451	1.600	2.880		
ADD HYD	115.00	46&14	47	.05271	96.95	6.589	2.34394	1.600	2.874		
FINISH											

```
**********************************************************************
*                        HOME DEPOT AT EUBANK                        *
**********************************************************************
*          100-YEAR, 24-HR STORM  (PONDING CALCULATIONS)             *
**********************************************************************
START                   TIME=0.0
*
*
*
RAINFALL                TYPE=2 RAIN QUARTER=0.0 IN
                        RAIN ONE=2.14 IN RAIN SIX=2.60 IN
                        RAIN DAY=3.10 IN DT=0.05 HR

*
* OFFSITE BASIN OS-1
*
COMPUTE NM HYD          ID=1 HYD NO=OS1 AREA=0.007396 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*
* OFFSITE BASIN OS-2
*
COMPUTE NM HYD          ID=2 HYD NO=OS2 AREA=0.003881 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=2 CODE=1
*
* OFFSITE BASIN OS-3
*
COMPUTE NM HYD          ID=3 HYD NO=OS3 AREA=0.031458 SQ MI
                        PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=3 CODE=1
*
* BASIN 1
*
COMPUTE NM HYD          ID=4 HYD NO=101 AREA=0.000780 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=4 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD          ID=5 HYD NO=102 AREA=0.000291 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=5 CODE=1
*
* BASIN 3
*
COMPUTE NM HYD          ID=6 HYD NO=103 AREA=0.001853 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=6 CODE=1
*
* BASIN 4
```

```
*
COMPUTE NM HYD       ID=7 HYD NO=104 AREA=0.003529 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=7 CODE=1
*
* BASIN 5
*
COMPUTE NM HYD       ID=8 HYD NO=105 AREA=0.000496 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=8 CODE=1
*
* BASIN 6
*
COMPUTE NM HYD       ID=9 HYD NO=106 AREA=0.001311 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=9 CODE=1
*
* BASIN 7
*
COMPUTE NM HYD       ID=10 HYD NO=107 AREA=0.004287 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=10 CODE=1
*
* BASIN 8
*
COMPUTE NM HYD       ID=11 HYD NO=108 AREA=0.001709 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=11 CODE=1
*
* BASIN 9
*
COMPUTE NM HYD       ID=12 HYD NO=109 AREA=0.001935 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=12 CODE=1
*
* BASIN 10
*
COMPUTE NM HYD       ID=13 HYD NO=110 AREA=0.000139 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=13 CODE=1
*
* BASIN 11
*
COMPUTE NM HYD       ID=14 HYD NO=111 AREA=0.000388 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=14 CODE=1
*
* BASIN 12
*
```

```
COMPUTE NM HYD      ID=15 HYD NO=112 AREA=0.000650 SQ MI
                    PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                    TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD           ID=15 CODE=1
*
DIVIDE HYD           ID=15 PER=-33 ID I=16 HYD NO=112.1
                                   ID II=17 HYD NO=112.2
DIVIDE HYD            ID=17 PER=-50 ID I=18 HYD NO=112.21
                                    ID II=19 HYD NO=112.22
*
ADD HYD             ID=30 HYD=100 ID=16 ID=3
PRINT HYD           ID=30 CODE=1
*
* POND 1
*
ROUTE RESERVOIR     ID=31 HYD NO=501.0 INFLOW ID=30 CODE=24
                    OUTFLOW(CFS)       STORAGE(AC-FT)  ELEVATION(FT)
                       0.00              0.0000          42.48
                       2.37              0.0112          42.90
                       8.33              0.0246          43.40
                      15.97              0.0380          43.90
                      25.11              0.0514          44.40
                      35.54              0.0648          44.90
                      47.10              0.0782          45.40
                      59.71              0.0915          45.90
                      73.27              0.1049          46.40
                      87.72              0.1183          46.90
                      93.13              0.1231          47.08
PRINT HYD           ID=31 CODE=1
*
*
*POND 2
*
ADD HYD             ID=32 HYD=102 ID=31 ID=18
PRINT HYD           ID=32 CODE=1
*
ROUTE RESERVOIR     ID=33 HYD NO=502.0 INFLOW ID=32 CODE=24
                    OUTFLOW(CFS)       STORAGE(AC-FT)  ELEVATION(FT)
                       0.00              0.0000          40.39
                       2.26              0.0797          40.89
                       6.40              0.1594          41.39
                      11.76              0.2392          41.89
                      18.10              0.3189          42.39
                      25.30              0.3986          42.89
                      33.26              0.4783          43.39
                      41.91              0.5581          43.89
                      51.20              0.6378          44.39
                      61.09              0.7175          44.89
                      71.55              0.7972          45.39
                      82.55              0.8770          45.89
PRINT HYD           ID=33 CODE=1
*
* POND 3
*
ADD HYD             ID=34 HYD=103 ID=33 ID=2
ADD HYD             ID=35 HYD=104 ID=34 ID=10
ADD HYD             ID=36 HYD=105 ID=35 ID=19
```

```
PRINT HYD          ID=36 CODE=1
*
ROUTE RESERVOIR    ID=37 HYD NO=503.0 INFLOW ID=36 CODE=24
                   OUTFLOW(CFS)      STORAGE(AC-FT)  ELEVATION(FT)
                        0.00            0.0000           35.11
                        1.50            0.0137           35.50
                        5.00            0.0314           36.00
                       10.00            0.0490           36.50
                       15.00            0.0712           36.76
                       17.33            0.0918           37.00
                       37.06            0.1346           37.50
                       49.46            0.1774           38.00
                       57.11            0.2099           38.38
                       59.33            0.2231           38.50
                       67.77            0.2777           39.00
                       75.27            0.3323           39.50
                       80.90            0.3771           39.91
PRINT HYD          ID=37 CODE=1
*
ADD HYD            ID=38 HYD=106 ID=37 ID=4
ADD HYD            ID=39 HYD=107 ID=38 ID=5
ADD HYD            ID=40 HYD=108 ID=39 ID=6
ADD HYD            ID=41 HYD=109 ID=40 ID=7
ADD HYD            ID=42 HYD=110 ID=41 ID=8
ADD HYD            ID=43 HYD=111 ID=42 ID=9
ADD HYD            ID=44 HYD=112 ID=43 ID=11
ADD HYD            ID=45 HYD=113 ID=44 ID=12
ADD HYD            ID=46 HYD=114 ID=45 ID=13
ADD HYD            ID=47 HYD=115 ID=46 ID=14
PRINT HYD          ID=47 CODE=1
*
*
*
FINISH
```

```
      AHYMO PROGRAM (AHYMO_97) -                              - Version:  1997.02a
           RUN DATE (MON/DAY/YR) = 12/09/2003
           START TIME (HR:MIN:SEC) = 13:47:43     USER NO.= AHYMO-I-
9702a0100011K-SH
           INPUT FILE = c:\hd pond.txt

     **********************************************************
     *                    HOME DEPOT AT EUBANK                *
     **********************************************************
     *          100-YEAR, 24-HR STORM  (PONDING CALCULATIONS)  *
     **********************************************************
     START                TIME=0.0
     *
     *
     *
     RAINFALL             TYPE=2 RAIN QUARTER=0.0 IN
                          RAIN ONE=2.14 IN RAIN SIX=2.60 IN
                          RAIN DAY=3.10 IN DT=0.05 HR


                     COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2
- PEAK AT 1.40 HR.
                     DT =     .050000 HOURS        END TIME =    24.000000 HOURS
                        .0000   .0041   .0084   .0128   .0173   .0220   .0269
                        .0319   .0372   .0427   .0484   .0543   .0606   .0672
                        .0741   .0814   .0892   .0975   .1063   .1159   .1263
                        .1353   .1453   .1742   .2424   .3597   .5412   .8026
                       1.1599  1.4418  1.5691  1.6754  1.7685  1.8518  1.9272
                       1.9960  2.0591  2.1173  2.1709  2.2204  2.2663  2.2773
                       2.2875  2.2971  2.3061  2.3146  2.3226  2.3303  2.3377
                       2.3447  2.3515  2.3580  2.3643  2.3704  2.3763  2.3820
                       2.3875  2.3929  2.3982  2.4033  2.4083  2.4132  2.4179
                       2.4226  2.4271  2.4316  2.4360  2.4403  2.4445  2.4486
                       2.4526  2.4566  2.4605  2.4644  2.4682  2.4719  2.4755
                       2.4792  2.4827  2.4862  2.4897  2.4931  2.4964  2.4998
                       2.5030  2.5063  2.5094  2.5126  2.5157  2.5188  2.5218
                       2.5248  2.5278  2.5307  2.5336  2.5365  2.5393  2.5421
                       2.5449  2.5477  2.5504  2.5531  2.5558  2.5584  2.5610
                       2.5636  2.5662  2.5688  2.5713  2.5738  2.5763  2.5787
                       2.5812  2.5836  2.5860  2.5884  2.5907  2.5931  2.5954
                       2.5977  2.6000  2.6021  2.6043  2.6064  2.6085  2.6106
                       2.6127  2.6148  2.6169  2.6190  2.6211  2.6231  2.6252
                       2.6272  2.6293  2.6313  2.6333  2.6354  2.6374  2.6394
                       2.6414  2.6434  2.6454  2.6474  2.6493  2.6513  2.6533
                       2.6552  2.6572  2.6591  2.6611  2.6630  2.6649  2.6668
                       2.6688  2.6707  2.6726  2.6745  2.6763  2.6782  2.6801
                       2.6820  2.6838  2.6857  2.6876  2.6894  2.6912  2.6931
                       2.6949  2.6967  2.6986  2.7004  2.7022  2.7040  2.7058
                       2.7076  2.7094  2.7111  2.7129  2.7147  2.7165  2.7182
                       2.7200  2.7217  2.7235  2.7252  2.7270  2.7287  2.7304
                       2.7321  2.7339  2.7356  2.7373  2.7390  2.7407  2.7424
                       2.7441  2.7457  2.7474  2.7491  2.7508  2.7524  2.7541
                       2.7558  2.7574  2.7591  2.7607  2.7623  2.7640  2.7656
                       2.7672  2.7688  2.7705  2.7721  2.7737  2.7753  2.7769
                       2.7785  2.7801  2.7817  2.7832  2.7848  2.7864  2.7880
                       2.7895  2.7911  2.7927  2.7942  2.7958  2.7973  2.7989
```

2.8004	2.8019	2.8035	2.8050	2.8065	2.8081	2.8096
2.8111	2.8126	2.8141	2.8156	2.8171	2.8186	2.8201
2.8216	2.8231	2.8245	2.8260	2.8275	2.8290	2.8304
2.8319	2.8334	2.8348	2.8363	2.8377	2.8392	2.8406
2.8421	2.8435	2.8449	2.8464	2.8478	2.8492	2.8506
2.8520	2.8535	2.8549	2.8563	2.8577	2.8591	2.8605
2.8619	2.8633	2.8647	2.8660	2.8674	2.8688	2.8702
2.8716	2.8729	2.8743	2.8757	2.8770	2.8784	2.8797
2.8811	2.8824	2.8838	2.8851	2.8865	2.8878	2.8892
2.8905	2.8918	2.8931	2.8945	2.8958	2.8971	2.8984
2.8997	2.9011	2.9024	2.9037	2.9050	2.9063	2.9076
2.9089	2.9102	2.9115	2.9127	2.9140	2.9153	2.9166
2.9179	2.9191	2.9204	2.9217	2.9229	2.9242	2.9255
2.9267	2.9280	2.9292	2.9305	2.9317	2.9330	2.9342
2.9355	2.9367	2.9380	2.9392	2.9404	2.9416	2.9429
2.9441	2.9453	2.9465	2.9478	2.9490	2.9502	2.9514
2.9526	2.9538	2.9550	2.9562	2.9574	2.9586	2.9598
2.9610	2.9622	2.9634	2.9646	2.9658	2.9669	2.9681
2.9693	2.9705	2.9717	2.9728	2.9740	2.9752	2.9763
2.9775	2.9787	2.9798	2.9810	2.9821	2.9833	2.9844
2.9856	2.9867	2.9879	2.9890	2.9902	2.9913	2.9924
2.9936	2.9947	2.9958	2.9970	2.9981	2.9992	3.0003
3.0014	3.0026	3.0037	3.0048	3.0059	3.0070	3.0081
3.0092	3.0103	3.0114	3.0126	3.0137	3.0147	3.0158
3.0169	3.0180	3.0191	3.0202	3.0213	3.0224	3.0235
3.0245	3.0256	3.0267	3.0278	3.0289	3.0299	3.0310
3.0321	3.0331	3.0342	3.0353	3.0363	3.0374	3.0384
3.0395	3.0406	3.0416	3.0427	3.0437	3.0448	3.0458
3.0469	3.0479	3.0489	3.0500	3.0510	3.0521	3.0531
3.0541	3.0552	3.0562	3.0572	3.0582	3.0593	3.0603
3.0613	3.0623	3.0634	3.0644	3.0654	3.0664	3.0674
3.0684	3.0694	3.0704	3.0715	3.0725	3.0735	3.0745
3.0755	3.0765	3.0775	3.0785	3.0795	3.0804	3.0814
3.0824	3.0834	3.0844	3.0854	3.0864	3.0874	3.0883
3.0893	3.0903	3.0913	3.0922	3.0932	3.0942	3.0952
3.0961	3.0971	3.0981	3.0990	3.1000		

```
*
* OFFSITE BASIN OS-1
*
COMPUTE NM HYD       ID=1 HYD NO=OS1 AREA=0.007396 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =   26.280    CFS   UNIT VOLUME =    .9987        B =
526.28       P60 = 2.1400
          AREA =       .006656 SQ MI    IA =    .10000 INCHES    INF =    .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR    TP =    .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
```

```
          UNIT PEAK =   1.7857    CFS   UNIT VOLUME =    .9936        B =
321.84      P60 = 2.1400
          AREA =      .000740 SQ MI    IA =    .50000 INCHES    INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=   .050000

     PRINT HYD           ID=1 CODE=1

                                                HYDROGRAPH FROM AREA OS1


          RUNOFF VOLUME =     2.66348 INCHES     =       1.0506 ACRE-FEET
          PEAK DISCHARGE RATE =      22.26 CFS  AT   1.500 HOURS   BASIN AREA =
.0074 SQ. MI.

     *
     * OFFSITE BASIN OS-2
     *
     COMPUTE NM HYD      ID=2 HYD NO=OS2 AREA=0.003881 SQ MI
                         PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                         TP=-0.1333 HR MASS RAINFALL=-1

          K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =   13.790    CFS   UNIT VOLUME =    .9983        B =
526.28      P60 = 2.1400
          AREA =      .003493 SQ MI    IA =    .10000 INCHES    INF =    .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=   .050000


          K =   .133656HR    TP =   .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =   .93704    CFS   UNIT VOLUME =    .9873        B =
321.84      P60 = 2.1400
          AREA =      .000388 SQ MI    IA =    .50000 INCHES    INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=   .050000

     PRINT HYD           ID=2 CODE=1

                                                HYDROGRAPH FROM AREA OS2


          RUNOFF VOLUME =     2.66348 INCHES     =        .5513 ACRE-FEET
          PEAK DISCHARGE RATE =      11.69 CFS  AT   1.500 HOURS   BASIN AREA =
.0039 SQ. MI.


     *
     * OFFSITE BASIN OS-3
```

```
     *
     COMPUTE NM HYD       ID=3 HYD NO=OS3 AREA=0.031458 SQ MI
                          PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                          TP=-0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =   74.519    CFS   UNIT VOLUME =    .9990        B =
526.28       P60 = 2.1400
          AREA =       .018875 SQ MI    IA =    .10000 INCHES    INF =    .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .121284HR    TP =    .133300HR    K/TP RATIO =    .909858
SHAPE CONSTANT, N =  3.892621
          UNIT PEAK =   32.845    CFS   UNIT VOLUME =    1.001        B =
347.95       P60 = 2.1400
          AREA =       .012583 SQ MI    IA =    .42500 INCHES    INF =   1.04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

     PRINT HYD            ID=3 CODE=1

                                                HYDROGRAPH FROM AREA OS3


          RUNOFF VOLUME =     2.14977 INCHES      =       3.6068 ACRE-FEET
          PEAK DISCHARGE RATE =      83.68 CFS  AT   1.500 HOURS   BASIN AREA =
.0315 SQ. MI.



     *
     * BASIN 1
     *
     COMPUTE NM HYD       ID=4 HYD NO=101 AREA=0.000780 SQ MI
                          PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                          TP=-0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =   2.7715    CFS   UNIT VOLUME =    .9951        B =
526.28       P60 = 2.1400
          AREA =       .000702 SQ MI    IA =    .10000 INCHES    INF =    .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR    TP =    .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =   .18833    CFS   UNIT VOLUME =    .9321        B =
321.84       P60 = 2.1400
```

```
          AREA =       .000078 SQ MI    IA =     .50000 INCHES    INF =    1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

     PRINT HYD            ID=4 CODE=1

                                          PARTIAL HYDROGRAPH   101.00


          RUNOFF VOLUME =     2.66348 INCHES      =         .1108 ACRE-FEET
          PEAK DISCHARGE RATE =       2.36 CFS  AT    1.500 HOURS   BASIN AREA =
.0008 SQ. MI.


     *
     * BASIN 2
     *
     COMPUTE NM HYD       ID=5 HYD NO=102 AREA=0.000291 SQ MI
                          PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                          TP=-0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =   1.0340    CFS   UNIT VOLUME =     .9891        B =
526.28       P60 = 2.1400
          AREA =       .000262 SQ MI    IA =     .10000 INCHES    INF =     .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR    TP =    .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =   .70260E-01CFS   UNIT VOLUME =     .8725        B =
321.84       P60 = 2.1400
          AREA =       .000029 SQ MI    IA =     .50000 INCHES    INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

     PRINT HYD            ID=5 CODE=1

                                          PARTIAL HYDROGRAPH   102.00


          RUNOFF VOLUME =     2.66348 INCHES      =         .0413 ACRE-FEET
          PEAK DISCHARGE RATE =        .89 CFS  AT    1.500 HOURS   BASIN AREA =
.0003 SQ. MI.


     *
     * BASIN 3
     *
     COMPUTE NM HYD       ID=6 HYD NO=103 AREA=0.001853 SQ MI
```

```
                    PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                    TP=-0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =    6.5842    CFS   UNIT VOLUME =    .9975       B =
526.28      P60 = 2.1400
          AREA =       .001668 SQ MI    IA =    .10000 INCHES    INF =    .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR    TP =    .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =    .44740    CFS   UNIT VOLUME =    .9722       B =
321.84      P60 = 2.1400
          AREA =       .000185 SQ MI    IA =    .50000 INCHES    INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

     PRINT HYD           ID=6 CODE=1

                                        PARTIAL HYDROGRAPH   103.00


          RUNOFF VOLUME =     2.66348 INCHES     =         .2632 ACRE-FEET
          PEAK DISCHARGE RATE =       5.59 CFS  AT   1.500 HOURS   BASIN AREA =
.0019 SQ. MI.



     *
     * BASIN 4
     *
     COMPUTE NM HYD      ID=7 HYD NO=104 AREA=0.003529 SQ MI
                         PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                         TP=-0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =    12.539    CFS   UNIT VOLUME =    .9983       B =
526.28      P60 = 2.1400
          AREA =       .003176 SQ MI    IA =    .10000 INCHES    INF =    .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR    TP =    .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =    .85206    CFS   UNIT VOLUME =    .9855       B =
321.84      P60 = 2.1400
          AREA =       .000353 SQ MI    IA =    .50000 INCHES    INF =   1.25000
INCHES PER HOUR
```

```
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

     PRINT HYD           ID=7 CODE=1

                                        PARTIAL HYDROGRAPH   104.00


          RUNOFF VOLUME =     2.66348 INCHES     =         .5013 ACRE-FEET
          PEAK DISCHARGE RATE =      10.63 CFS  AT    1.500 HOURS   BASIN AREA =
.0035 SQ. MI.


     *
     * BASIN 5
     *
     COMPUTE NM HYD      ID=8 HYD NO=105 AREA=0.000496 SQ MI
                         PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                         TP=-0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =   1.7624    CFS   UNIT VOLUME =    .9928        B =
526.28       P60 = 2.1400
          AREA =       .000446 SQ MI    IA =    .10000 INCHES    INF =    .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR    TP =    .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =   .11976    CFS   UNIT VOLUME =    .8875        B =
321.84       P60 = 2.1400
          AREA =       .000050 SQ MI    IA =    .50000 INCHES    INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

     PRINT HYD           ID=8 CODE=1

                                        PARTIAL HYDROGRAPH   105.00


          RUNOFF VOLUME =     2.66348 INCHES     =         .0705 ACRE-FEET
          PEAK DISCHARGE RATE =       1.51 CFS  AT    1.500 HOURS   BASIN AREA =
.0005 SQ. MI.


     *
     * BASIN 6
     *
     COMPUTE NM HYD      ID=9 HYD NO=106 AREA=0.001311 SQ MI
                         PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                         TP=-0.1333 HR MASS RAINFALL=-1
```

```
          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =    4.6583    CFS   UNIT VOLUME =     .9966        B =
526.28       P60 = 2.1400
          AREA =       .001180 SQ MI    IA =     .10000 INCHES    INF =     .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR    TP =    .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =    .31653    CFS   UNIT VOLUME =     .9591        B =
321.84       P60 = 2.1400
          AREA =       .000131 SQ MI    IA =     .50000 INCHES    INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

     PRINT HYD            ID=9 CODE=1

                                          PARTIAL HYDROGRAPH   106.00


          RUNOFF VOLUME =     2.66348 INCHES      =         .1862 ACRE-FEET
          PEAK DISCHARGE RATE =       3.96 CFS  AT   1.500 HOURS   BASIN AREA =
.0013 SQ. MI.



     *
     * BASIN 7
     *
     COMPUTE NM HYD       ID=10 HYD NO=107 AREA=0.004287 SQ MI
                          PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                          TP=-0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =    15.233    CFS   UNIT VOLUME =     .9985        B =
526.28       P60 = 2.1400
          AREA =       .003858 SQ MI    IA =     .10000 INCHES    INF =     .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR    TP =    .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =    1.0351    CFS   UNIT VOLUME =     .9889        B =
321.84       P60 = 2.1400
          AREA =       .000429 SQ MI    IA =     .50000 INCHES    INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000
```

```
     PRINT HYD            ID=10 CODE=1

                                        PARTIAL HYDROGRAPH   107.00


          RUNOFF VOLUME =     2.66348 INCHES     =         .6090 ACRE-FEET
          PEAK DISCHARGE RATE =      12.91 CFS  AT    1.500 HOURS   BASIN AREA =
.0043 SQ. MI.



     *
     * BASIN 8
     *
     COMPUTE NM HYD       ID=11 HYD NO=108 AREA=0.001709 SQ MI
                          PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                          TP=-0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =   6.0725    CFS   UNIT VOLUME =    .9975        B =
526.28      P60 = 2.1400
          AREA =       .001538 SQ MI    IA =    .10000 INCHES    INF =    .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR    TP =    .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =   .41263    CFS   UNIT VOLUME =    .9683        B =
321.84      P60 = 2.1400
          AREA =       .000171 SQ MI    IA =    .50000 INCHES    INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

      PRINT HYD            ID=11 CODE=1

                                        PARTIAL HYDROGRAPH   108.00


          RUNOFF VOLUME =     2.66348 INCHES     =         .2428 ACRE-FEET
          PEAK DISCHARGE RATE =      5.16 CFS  AT    1.500 HOURS   BASIN AREA =
.0017 SQ. MI.



     *
     * BASIN 9
     *
     COMPUTE NM HYD       ID=12 HYD NO=109 AREA=0.001935 SQ MI
                          PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                          TP=-0.1333 HR MASS RAINFALL=-1

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

```
          UNIT PEAK =    6.8755    CFS    UNIT VOLUME =     .9975        B =
526.28       P60 = 2.1400
          AREA =       .001742 SQ MI     IA =     .10000 INCHES     INF =     .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR     TP =    .133300HR     K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =    .46719    CFS    UNIT VOLUME =     .9722        B =
321.84       P60 = 2.1400
          AREA =       .000194 SQ MI     IA =     .50000 INCHES     INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

     PRINT HYD            ID=12 CODE=1

                                        PARTIAL HYDROGRAPH   109.00


          RUNOFF VOLUME =     2.66348 INCHES     =         .2749 ACRE-FEET
          PEAK DISCHARGE RATE =       5.84 CFS  AT    1.500 HOURS    BASIN AREA =
.0019 SQ. MI.



     *
     * BASIN 10
     *
     COMPUTE NM HYD       ID=13 HYD NO=110 AREA=0.000139 SQ MI
                          PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                          TP=-0.1333 HR MASS RAINFALL=-1

          K =    .072649HR     TP =    .133300HR     K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =    .49390    CFS    UNIT VOLUME =     .9791        B =
526.28       P60 = 2.1400
          AREA =       .000125 SQ MI     IA =     .10000 INCHES     INF =     .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR     TP =    .133300HR     K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =    .33561E-01CFS    UNIT VOLUME =     .8725        B =
321.84       P60 = 2.1400
          AREA =       .000014 SQ MI     IA =     .50000 INCHES     INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

      PRINT HYD            ID=13 CODE=1

                                         PARTIAL HYDROGRAPH   110.00
```

```
          RUNOFF VOLUME =      2.66348 INCHES      =          .0197 ACRE-FEET
          PEAK DISCHARGE RATE =          .43 CFS  AT    1.500 HOURS   BASIN AREA =
.0001 SQ. MI.


     *
     * BASIN 11
     *
     COMPUTE NM HYD       ID=14 HYD NO=111 AREA=0.000388 SQ MI
                          PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                          TP=-0.1333 HR MASS RAINFALL=-1

          K =    .133656HR    TP =    .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =    .93680    CFS   UNIT VOLUME =     .9873        B =
321.84       P60 = 2.1400
          AREA =       .000388 SQ MI    IA =     .50000 INCHES    INF =   1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

     PRINT HYD            ID=14 CODE=1

                                        PARTIAL HYDROGRAPH   111.00


          RUNOFF VOLUME =       .91991 INCHES      =          .0190 ACRE-FEET
          PEAK DISCHARGE RATE =          .65 CFS  AT    1.500 HOURS   BASIN AREA =
.0004 SQ. MI.


     *
     * BASIN 12
     *
     COMPUTE NM HYD       ID=15 HYD NO=112 AREA=0.000650 SQ MI
                          PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                          TP=-0.1333 HR MASS RAINFALL=-1

          K =    .072649HR    TP =    .133300HR    K/TP RATIO =    .545000
SHAPE CONSTANT, N =  7.106420
          UNIT PEAK =    2.3096    CFS   UNIT VOLUME =     .9941        B =
526.28       P60 = 2.1400
          AREA =       .000585 SQ MI    IA =     .10000 INCHES    INF =     .04000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000


          K =    .133656HR    TP =    .133300HR    K/TP RATIO =  1.002670
SHAPE CONSTANT, N =  3.520804
          UNIT PEAK =    .15694    CFS   UNIT VOLUME =     .9126        B =
321.84       P60 = 2.1400
```

```
          AREA =       .000065 SQ MI    IA =     .50000 INCHES    INF =    1.25000
INCHES PER HOUR
          RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT
=    .050000

     PRINT HYD            ID=15 CODE=1

                                          PARTIAL HYDROGRAPH   112.00


          RUNOFF VOLUME =     2.66348 INCHES     =         .0923 ACRE-FEET
          PEAK DISCHARGE RATE =       1.97 CFS  AT    1.500 HOURS   BASIN AREA =
.0007 SQ. MI.


     *
     DIVIDE HYD            ID=15 PER=-33 ID I=16 HYD NO=112.1
                                         ID II=17 HYD NO=112.2
     DIVIDE HYD             ID=17 PER=-50 ID I=18 HYD NO=112.21
                                          ID II=19 HYD NO=112.22
     *
     ADD HYD              ID=30 HYD=100 ID=16 ID=3
     PRINT HYD            ID=30 CODE=1

                                          PARTIAL HYDROGRAPH   100.00


          RUNOFF VOLUME =     2.15323 INCHES     =        3.6372 ACRE-FEET
          PEAK DISCHARGE RATE =      84.33 CFS  AT    1.500 HOURS   BASIN AREA =
.0317 SQ. MI.



     *
     * POND 1
     *
     ROUTE RESERVOIR      ID=31 HYD NO=501.0 INFLOW ID=30 CODE=24
                          OUTFLOW(CFS)      STORAGE(AC-FT)   ELEVATION(FT)
                              0.00              0.0000           42.48
                              2.37              0.0112           42.90
                              8.33              0.0246           43.40
                             15.97              0.0380           43.90
                             25.11              0.0514           44.40
                             35.54              0.0648           44.90
                             47.10              0.0782           45.40
                             59.71              0.0915           45.90
                             73.27              0.1049           46.40
                             87.72              0.1183           46.90
                             93.13              0.1231           47.08

  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *

    TIME        INFLOW     ELEV       VOLUME     OUTFLOW
    (HRS)       (CFS)      (FEET)     (AC-FT)    (CFS)

     .00          .00      42.48         .000         .00
```

1.20	3.35	42.86	.010	2.14
2.40	3.54	43.02	.014	3.82
3.60	.64	42.60	.003	.66
4.80	.51	42.57	.002	.51
6.00	.56	42.58	.003	.56
7.20	.49	42.57	.002	.49
8.40	.45	42.56	.002	.46
9.60	.43	42.56	.002	.43
10.80	.40	42.55	.002	.40
12.00	.37	42.55	.002	.38
13.20	.35	42.54	.002	.35
14.40	.33	42.54	.002	.33
15.60	.31	42.54	.002	.32
16.80	.30	42.53	.001	.30
18.00	.29	42.53	.001	.29
19.20	.28	42.53	.001	.28
20.40	.26	42.53	.001	.27
21.60	.26	42.53	.001	.26
22.80	.25	42.52	.001	.25
24.00	.24	42.52	.001	.24

PEAK DISCHARGE = 83.197 CFS - PEAK OCCURS AT HOUR 1.50
MAXIMUM WATER SURFACE ELEVATION = 46.743
MAXIMUM STORAGE = .1141 AC-FT INCREMENTAL TIME= .050000HRS

PRINT HYD ID=31 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 501.00

RUNOFF VOLUME = 2.15323 INCHES = 3.6372 ACRE-FEET
PEAK DISCHARGE RATE = 83.20 CFS AT 1.500 HOURS BASIN AREA = .0317 SQ. MI.

*
*
*POND 2
*
ADD HYD ID=32 HYD=102 ID=31 ID=18
PRINT HYD ID=32 CODE=1

PARTIAL HYDROGRAPH 102.00

RUNOFF VOLUME = 2.15670 INCHES = 3.6681 ACRE-FEET
PEAK DISCHARGE RATE = 83.86 CFS AT 1.500 HOURS BASIN AREA = .0319 SQ. MI.

*
ROUTE RESERVOIR ID=33 HYD NO=502.0 INFLOW ID=32 CODE=24

OUTFLOW(CFS)	STORAGE(AC-FT)	ELEVATION(FT)
0.00	0.0000	40.39
2.26	0.0797	40.89

6.40	0.1594	41.39
11.76	0.2392	41.89
18.10	0.3189	42.39
25.30	0.3986	42.89
33.26	0.4783	43.39
41.91	0.5581	43.89
51.20	0.6378	44.39
61.09	0.7175	44.89
71.55	0.7972	45.39
82.55	0.8770	45.89

* * * * * * * * * * * * * * * * *

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	40.39	.000	.00
1.20	2.17	40.50	.018	.50
2.40	3.85	41.57	.187	8.29
3.60	.67	40.64	.041	1.15
4.80	.52	40.52	.020	.57
6.00	.56	40.51	.019	.54
7.20	.50	40.50	.018	.51
8.40	.46	40.49	.017	.47
9.60	.43	40.49	.016	.44
10.80	.40	40.48	.015	.41
12.00	.38	40.48	.014	.39
13.20	.36	40.47	.013	.36
14.40	.34	40.47	.012	.34
15.60	.32	40.46	.012	.33
16.80	.31	40.46	.011	.31
18.00	.30	40.46	.011	.30
19.20	.28	40.45	.010	.29
20.40	.27	40.45	.010	.27
21.60	.26	40.45	.009	.26
22.80	.25	40.45	.009	.25
24.00	.24	40.44	.009	.24
25.20	.00	40.40	.001	.03
26.40	.00	40.39	.000	.00

PEAK DISCHARGE = 63.525 CFS - PEAK OCCURS AT HOUR 1.60
MAXIMUM WATER SURFACE ELEVATION = 45.006
MAXIMUM STORAGE = .7361 AC-FT INCREMENTAL TIME= .050000HRS

PRINT HYD ID=33 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 502.00

RUNOFF VOLUME = 2.15671 INCHES = 3.6681 ACRE-FEET
PEAK DISCHARGE RATE = 63.52 CFS AT 1.600 HOURS BASIN AREA = .0319 SQ. MI.

*
* POND 3

```
*
ADD HYD              ID=34 HYD=103 ID=33 ID=2
ADD HYD              ID=35 HYD=104 ID=34 ID=10
ADD HYD              ID=36 HYD=105 ID=35 ID=19
PRINT HYD            ID=36 CODE=1

                                        PARTIAL HYDROGRAPH   105.00


      RUNOFF VOLUME =     2.26218 INCHES     =       4.8593 ACRE-FEET
      PEAK DISCHARGE RATE =      80.65 CFS  AT   1.600 HOURS   BASIN AREA =
.0403 SQ. MI.


*
ROUTE RESERVOIR      ID=37 HYD NO=503.0 INFLOW ID=36 CODE=24
                  OUTFLOW(CFS)       STORAGE(AC-FT)   ELEVATION(FT)
                       0.00              0.0000           35.11
                       1.50              0.0137           35.50
                       5.00              0.0314           36.00
                      10.00              0.0490           36.50
                      15.00              0.0712           36.76
                      17.33              0.0918           37.00
                      37.06              0.1346           37.50
                      49.46              0.1774           38.00
                      57.11              0.2099           38.38
                      59.33              0.2231           38.50
                      67.77              0.2777           39.00
                      75.27              0.3323           39.50
                      80.90              0.3771           39.91

* * * * * * * * * * * * * * * * * *

  TIME        INFLOW     ELEV       VOLUME     OUTFLOW
  (HRS)       (CFS)      (FEET)     (AC-FT)    (CFS)

   .00          .00      35.11         .000        .00
  1.20         1.83      35.35         .008        .92
  2.40         9.43      36.58         .056      11.50
  3.60         1.39      35.50         .014       1.48
  4.80          .77      35.32         .007        .79
  6.00          .77      35.31         .007        .76
  7.20          .71      35.30         .007        .71
  8.40          .65      35.28         .006        .66
  9.60          .61      35.27         .006        .61
 10.80          .57      35.26         .005        .57
 12.00          .53      35.25         .005        .54
 13.20          .50      35.24         .005        .51
 14.40          .48      35.23         .004        .48
 15.60          .45      35.23         .004        .46
 16.80          .43      35.22         .004        .43
 18.00          .41      35.22         .004        .41
 19.20          .39      35.21         .004        .40
 20.40          .38      35.21         .003        .38
 21.60          .36      35.21         .003        .37
 22.80          .35      35.20         .003        .35
```

```
          24.00          .34      35.20          .003          .34
          25.20          .03      35.12          .000          .04
          26.40          .00      35.11          .000          .00
       PEAK DISCHARGE =          74.250 CFS - PEAK OCCURS AT HOUR     1.65
       MAXIMUM WATER SURFACE ELEVATION =         39.432
       MAXIMUM STORAGE =            .3249 AC-FT       INCREMENTAL TIME=
.050000HRS

     PRINT HYD             ID=37 CODE=1

                                          OUTFLOW HYDROGRAPH RESERVOIR   503.00


          RUNOFF VOLUME =      2.26218 INCHES      =         4.8593 ACRE-FEET
          PEAK DISCHARGE RATE =       74.25 CFS  AT    1.650 HOURS   BASIN AREA =
.0403 SQ. MI.


          *
          ADD HYD               ID=38 HYD=106 ID=37 ID=4
          ADD HYD               ID=39 HYD=107 ID=38 ID=5
          ADD HYD               ID=40 HYD=108 ID=39 ID=6
          ADD HYD               ID=41 HYD=109 ID=40 ID=7
          ADD HYD               ID=42 HYD=110 ID=41 ID=8
          ADD HYD               ID=43 HYD=111 ID=42 ID=9
          ADD HYD               ID=44 HYD=112 ID=43 ID=11
          ADD HYD               ID=45 HYD=113 ID=44 ID=12
          ADD HYD               ID=46 HYD=114 ID=45 ID=13
          ADD HYD               ID=47 HYD=115 ID=46 ID=14
          PRINT HYD             ID=47 CODE=1

                                          PARTIAL HYDROGRAPH   115.00


          RUNOFF VOLUME =      2.34394 INCHES      =         6.5889 ACRE-FEET
          PEAK DISCHARGE RATE =       96.95 CFS  AT    1.600 HOURS   BASIN AREA =
.0527 SQ. MI.


          *
          *
          *
          FINISH

               NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 13:47:44
```

Scanlon & Associates Letter

Scanlon & associates, inc.
engineers and planners

May 9, 1977

(1)7702

Mr. Bill Waters
Long & Waters
8009 Mountain Rd. Pl.
Albuquerque, N.M. 87110

Re: Sierra Vista Shopping Center Drainage Plan

Dear Bill:

After reviewing and analyzing the available data in the vicinity of Montgomery and Eubank Boulevards, we developed the following drainage plan for the Sierra Vista Shopping Center.

1. The location of the shopping center and the surrounding area is shown in Figure 1. The drainage basins that contribute stormwater flows to the property are also shown in Figure 1.

2. The existing topography at the shopping center site is shown in Figure 2.

3. The proposed shopping center site plan is shown in Figure 3.

4. Jacob A. Vigil, Consulting Engineer, prepared the following drainage report, "Design of Storm Sewer for Eubank Boulevard Widening Between Candelaria and Montgomery Boulevards" (1-4067(1)) Albuquerque, New Mexico, August 1976. I have compared the stormwater quantities that we computed with those computed by Mr. Vigil and found them to be comparable. I will use the quantities from the Vigil report since that report has already been submitted and approved.

The Vigil report indicates that the flow entering the site from the east from a 100 year frequency storm will be approximately 85 cubic feet per second (cfs).

ALBUQUERQUE, NEW MEXICO 87110 7811 MOUNTAIN ROAD, NE TELEPHONE (505) 265-6841

4. The calculations for the shopping center site are as follows:

Area - shopping center ≈ 817,000 s.f. ≈ 16.75 ac.
Area - R-2 ≈ 221,000 s.f. ≈ 5.1 ac.
Landscaped Area - shopping center ≈ 2.0 ac.

Time of Concentration = $T_c = \frac{k l^{.37}}{s^{.2}}$ (soil conservation service overland flow method)

where

k = coefficient of ground surface = 1.57 undeveloped
= 0.85 developed
l = length of overland flow = 1400 ft.
s = slope = 3.3%

therefore T_c = 18 minutes (undeveloped)
T_c = 10 minutes (developed)

From the Intensity/Duration/Frequency Curve (Master Plan of Drainage, City of Albuquerque, New Mexico and Environs 1963)

$$I = \frac{189}{T_c + 25}$$

$$I = \frac{189}{18 + 25} = 4.4 \text{ inches/hour (undeveloped)}$$

$$I = \frac{189}{10 + 25} = 5.4 \text{ inches/hour (developed)}$$

Using the Rational Method

$$Q = cia$$

where Q = flow in cfs
c = runoff coefficient
i = intensity in inches/hour
a = area in acres

c = 1.0 asphalt covered
c = 0.6 multiple family residences
c = 0.15 undeveloped

Q_{100} = 1(5.4)16.75 = 90.45
= .15(5.4)2.0 = 1.62
= 0.6(5.4)5.1 = 16.52

Q_{100} = 108.59 cfs (developed)

Q_{100} = .15(5.4)23.85 = 19.32 cfs (undeveloped)

Q_{100} that must be retained on property = 89.27 cfs

Q_{100} that can leave property = 104.32 cfs

Volume of storage = 89.27 x 10 x 60 = 53,600 cf

$\frac{53600}{1415 \times 2}$ = 19'

The drainage could be handled in the following manner. A landscaped depression measuring approximately 2 feet deep by 20 feet in width could be developed along the property line between the R-2/SU-1 properties and the proposed shopping center. Check structures would have to be incorporated in the design to assure ponding. This volume of ponding would provide the required storeage of stormwaters.

Essentially what would occur would be the retention of all stormwaters generated off site and the retention of only that amount of stormwater generated on site necessary to satisfy the drainage ordinance. Trying to convey off-site waters through the site or ponding on-site waters is impracticable. The proposed solution has the same net effect downstream of the shopping center as allowing all off-site water to pass through the site.

As you proceed further with your design, a grading plan will be needed to demonstrate that the proposed solution can be implemented.

Sincerely,

Thomas T. Mann, Jr. P.E.
Project Manager

TM:sj
attachments

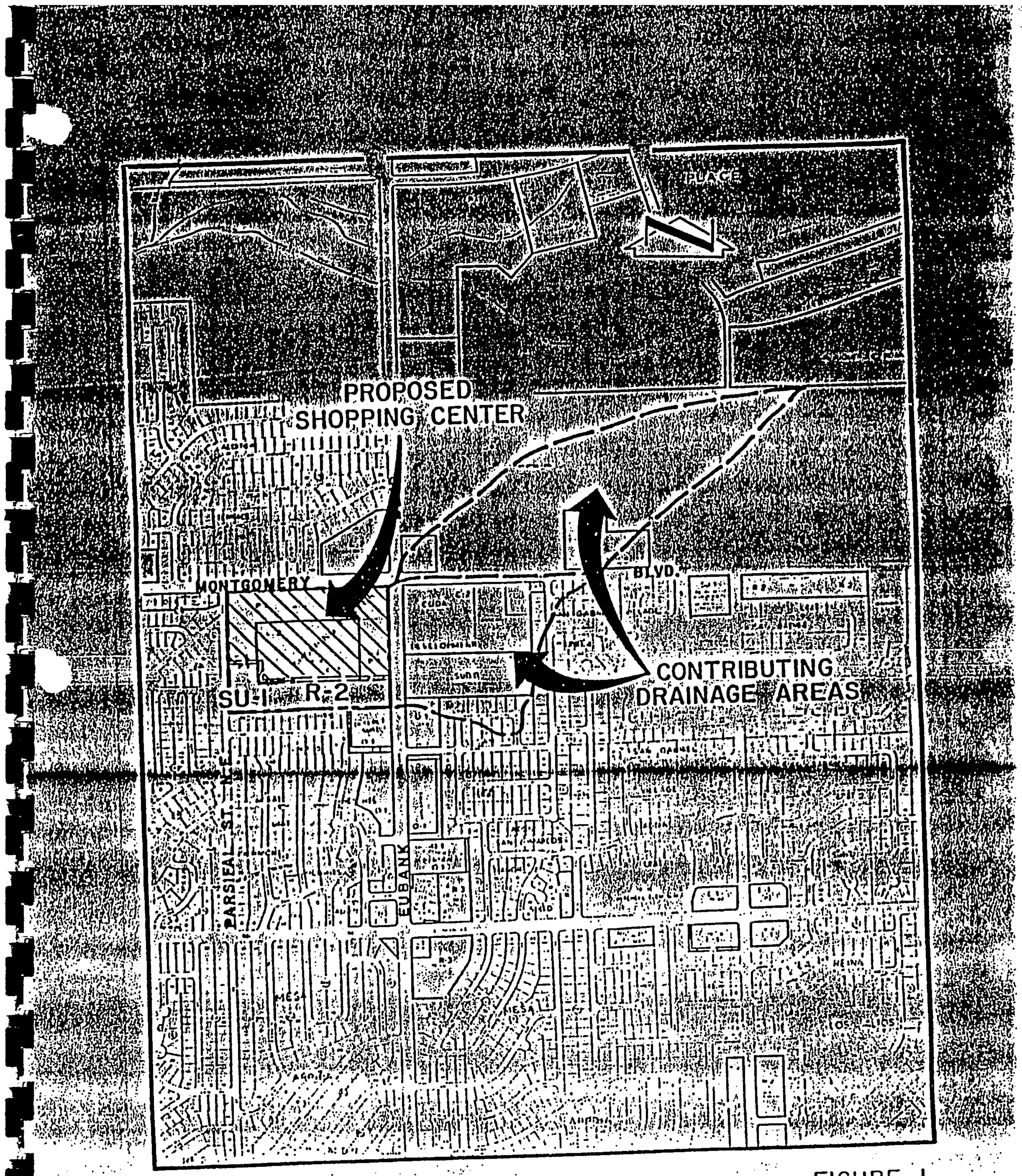

PROPOSED
SHOPPING CENTER
MONTGOMERY
BLVD.
CONTRIBUTING
DRAINAGE AREAS
SU-1
R-2
PARSIFAL ST.
EUBANK
MESA
LOS LIOS

FIGURE 1

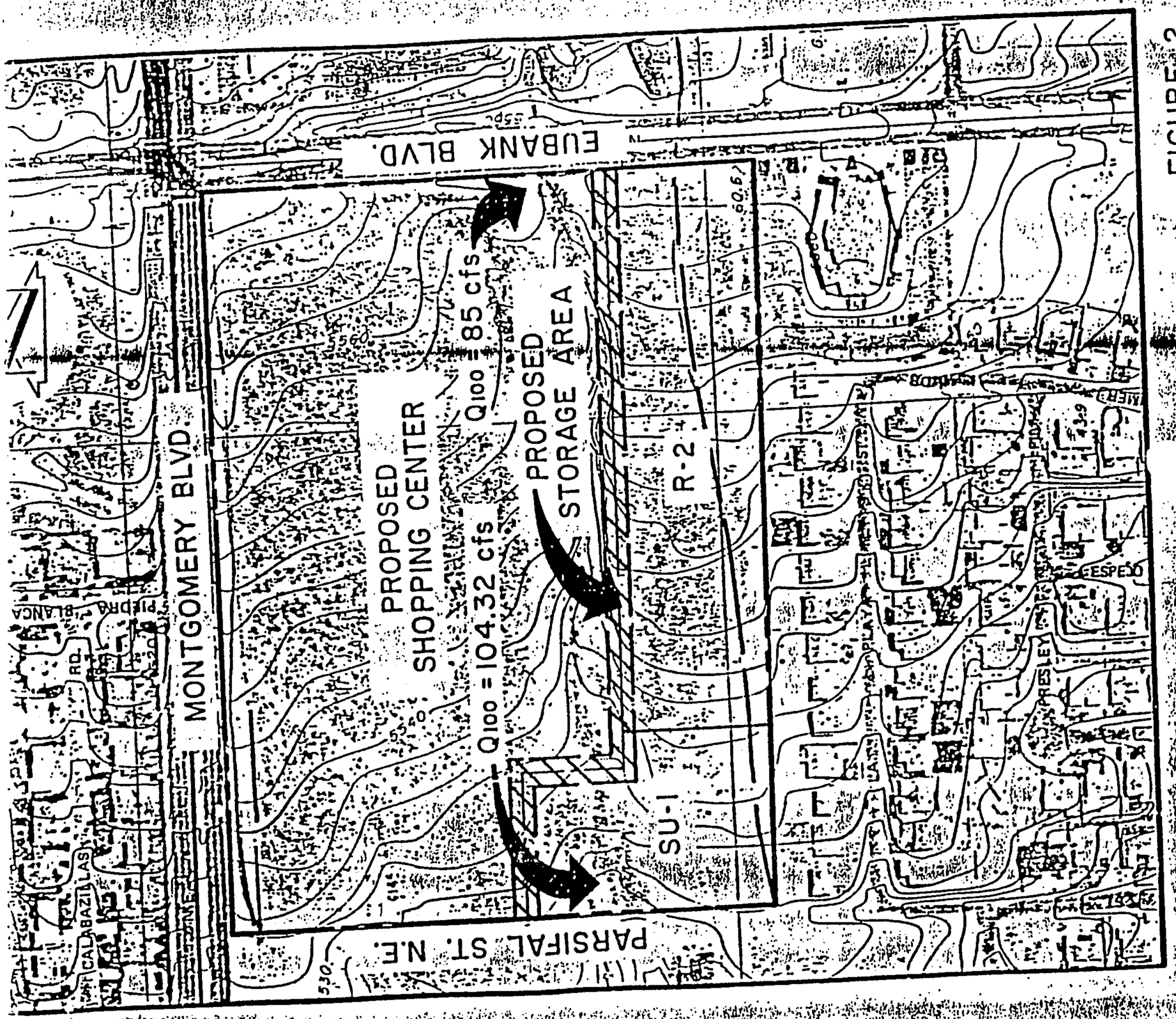
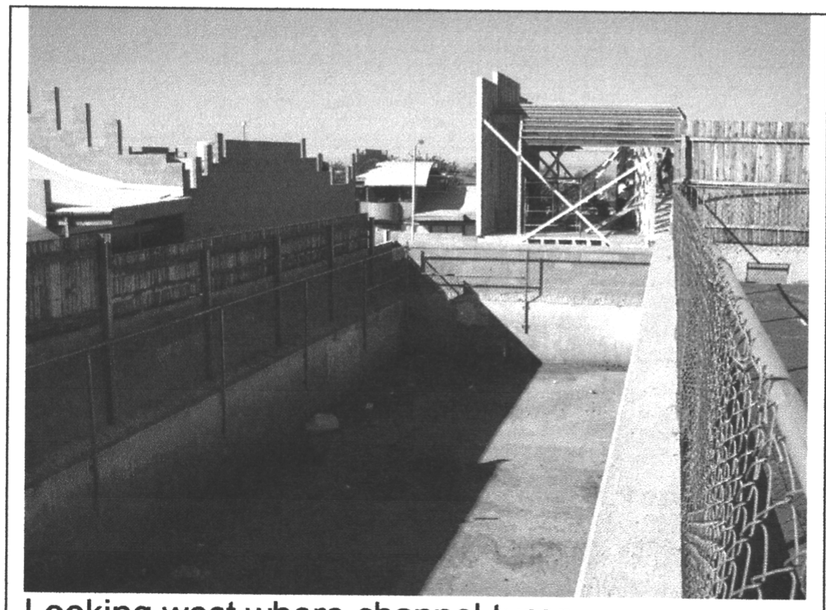

EUBANK BLVD.
MONTGOMERY BLVD.
PARSIFAL ST. N.E.
PROPOSED SHOPPING CENTER
PROPOSED STORAGE AREA
Q_{100} = 104.32 cfs
Q_{100} = 85 cfs
SU-1
R-2
R-2
ESPEJO
PLAZA
CALABAZILLAS RD.
PIEDRA BLANCA
550
560
540
530

FIGURE 2

Photographs of Existing Channel



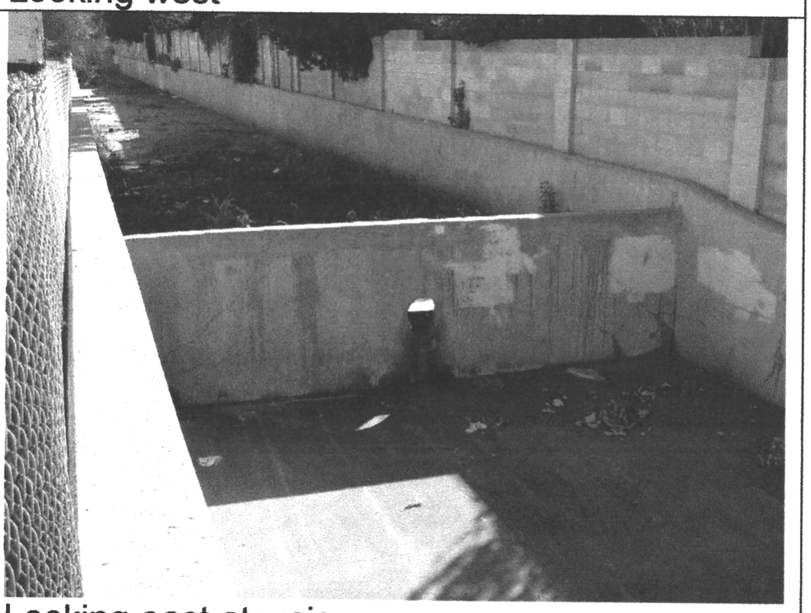
Looking west where channel turns



Looking west



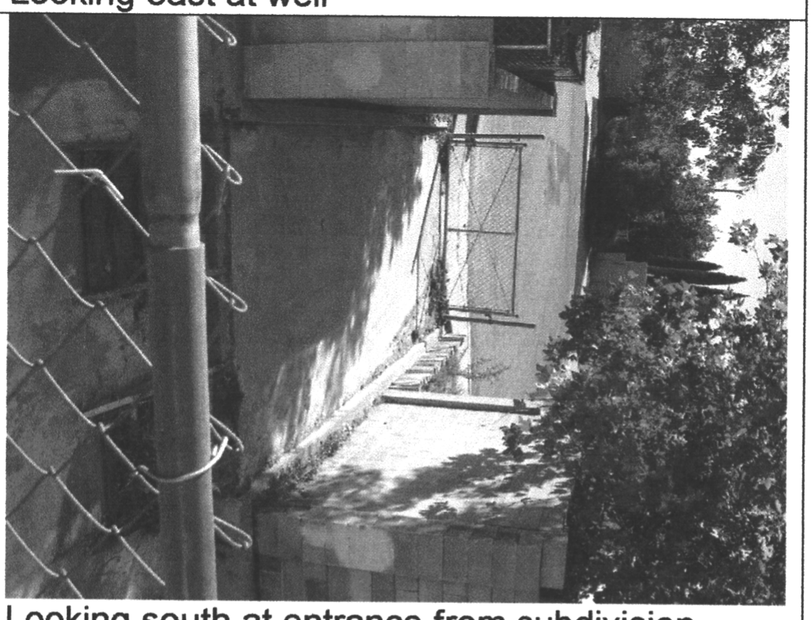
Looking south at weir



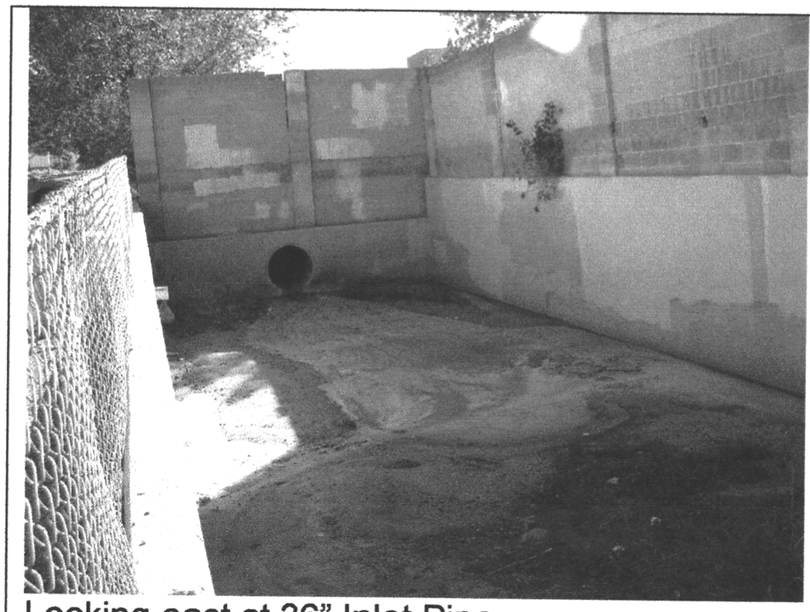
Looking east at weir



Looking east at entrance to channel from subdivision



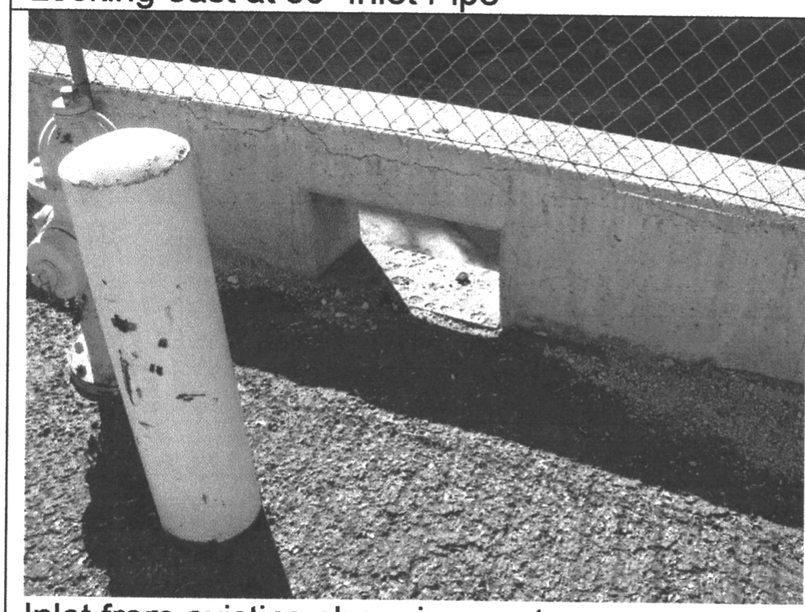
Looking south at entrance from subdivision



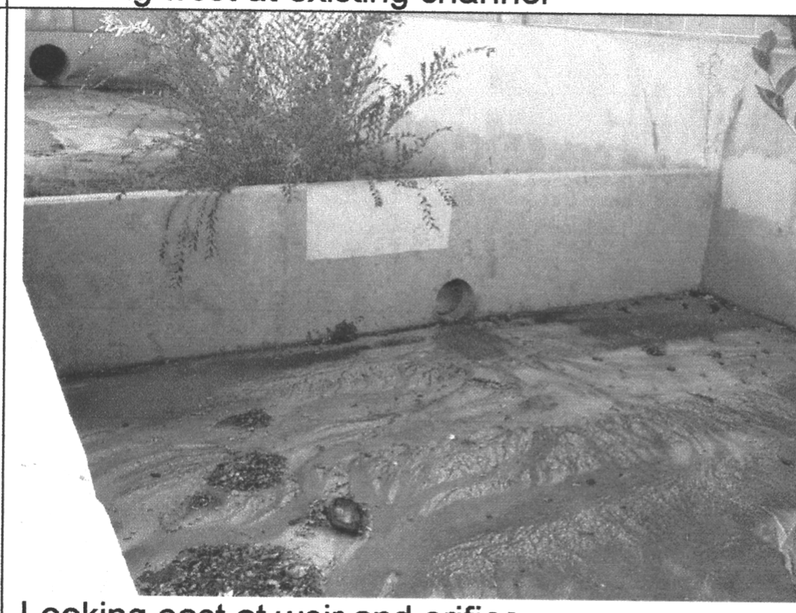
Looking east at 36" Inlet Pipe



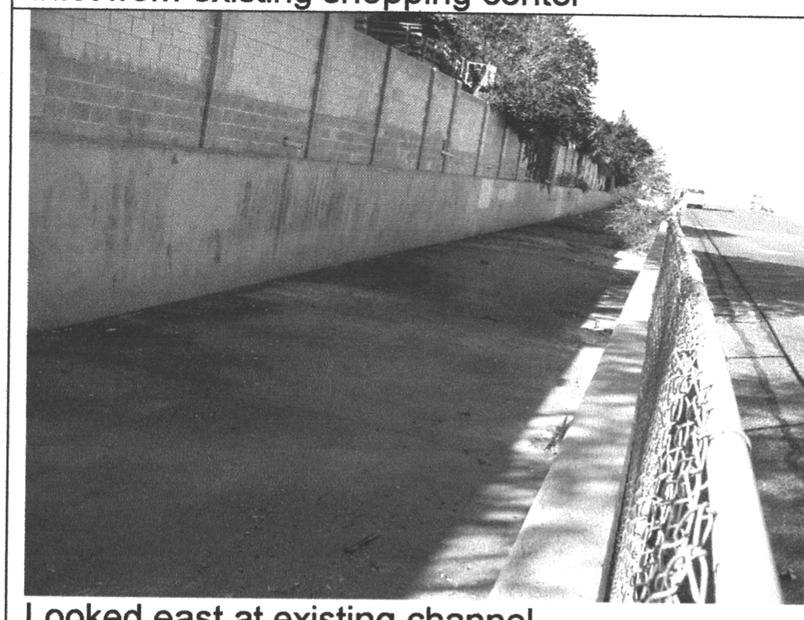
Looking west at existing channel



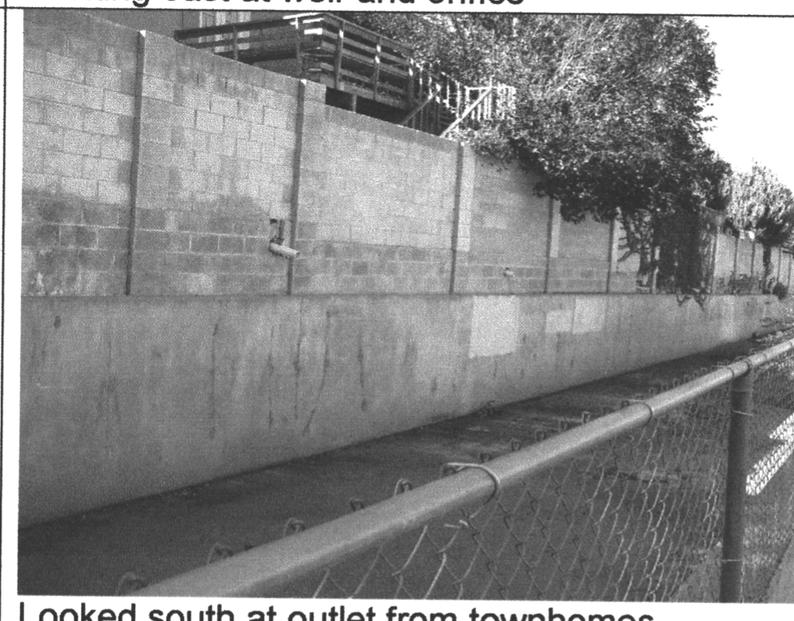
Inlet from existing shopping center



Looking east at weir and orifice



Looked east at existing channel



Looked south at outlet from townhomes

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 4, 2001

Bret Wahlen
Great Basin Engineering, South
P.O. Box 16747
Salt Lake City, Utah 84116

G 20/D2J

RE: Grading and Drainage Plan for Sierra Vista Shopping Center (Super K) (G-20-D)
Dated August 28, 2001
(KMART)

Dear Mr. Wahlen:

The above referenced plan received August 29, 2001 is approved for Site Development Plan for Building Permit. Prior to the release of the Building Permit the following will need to be addressed.

1. Please show the existing channel at a larger scale. I was unable to read some of the elevations and symbols. Please give more details at the weirs in the box channel.
2. An option may be to enter the storm drain from areas ON 7, 8, and 9 at the bottom of the existing trash grate.
3. Please try to use another alternative for the 4-inch orifice plate. This orifice plate will plug and cause a maintenance problem.
4. Please discuss how you started the HGL at the concrete box for each storm drain.
5. Figure 6 HGL needs to be reviewed.
6. Please address how the City will maintain access for maintenance in the concrete box.
7. The public easement area (new 48 inch storm drain) will need to be processed through DRC.

If you have any questions please call me at 924-3982.

Sincerely,

Carlos A. Montoya
City Floodplain Administrator

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

DRAINAGE INFORMATION SHEET

G20/D2J

PROJECT TITLE: Sierra Vista Shopping Center ZONE MAP/DRG. FILE #: G-20
DRB #: 1000980 EPC#: 01128-00000-00731 WORK ORDER#:

LEGAL DESCRIPTION: Tracts A-3, B-2 & E, Sierra Vista Shopping Center
CITY ADDRESS: 9500 Montgomery, NE

ENGINEERING FIRM: Great Basin Engineering, South
ADDRESS: Po Box 16747
CITY, STATE: Salt Lake City, Ut. 84116
CONTACT: Bret Wahlen / Kirk Randall
PHONE: 801-521-8529
~~ZIP CODE~~: Fax 521-9551

~~OWNER~~: Applicant: Kmart Corp.
ADDRESS: 380 North 200 West, Suite 110
CITY, STATE: Bountiful, Ut 84010
CONTACT: Carl Pitt
PHONE: 801-295-0062
~~ZIP CODE~~: Fax 296-0170

ARCHITECT: HMR Architects
ADDRESS: 2130 - 21st Street
CITY, STATE: Sacramento, CA 95818
CONTACT: Eric Mifkovic
PHONE: (916) 736-2724
~~ZIP CODE~~: Fax 736-0610

SURVEYOR: Surveys Southwest
ADDRESS 333 Lomas Blvd, NE
CITY, STATE: Albuquerque, NM. 87102
CONTACT: Dan Graney
PHONE: (505) 998-0303
ZIP CODE: Fax 998-0306

CONTRACTOR:
ADDRESS:
CITY, STATE:
CONTACT:
PHONE:
ZIP CODE:

TYPE OF SUBMITTAL:
- ✓ DRAINAGE REPORT
- ____ DRAINAGE PLAN
- ✓ CONCEPTUAL GRADING & DRAINAGE PLAN
- ____ GRADING PLAN
- ____ EROSION CONTROL PLAN
- ____ ENGINEER'S CERTIFICATION
- ____ CLOMR/LOMR
- ____ OTHER

WAS A PRE-DESIGN CONFERENCE ATTENDED:
- ____ YES
- ____ NO
- ____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:
- ____ SIA / FINANCIAL GUARANTEE RELEASE
- ____ PRELIMINARY PLAT APPROVAL
- ____ S. DEV. PLAN FOR SUB'D. APPROVAL
- ✓ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ____ SECTOR PLAN APPROVAL
- ____ FINAL PLAT APPROVAL
- ____ FOUNDATION PERMIT APPROVAL
- ____ BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY APPROVAL
- ✓ GRADING PERMIT APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ WORK ORDER APPROVAL
- ____ OTHER (SPECIFY)

DATE SUBMITTED: 8-30-01 BY:

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope ot the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

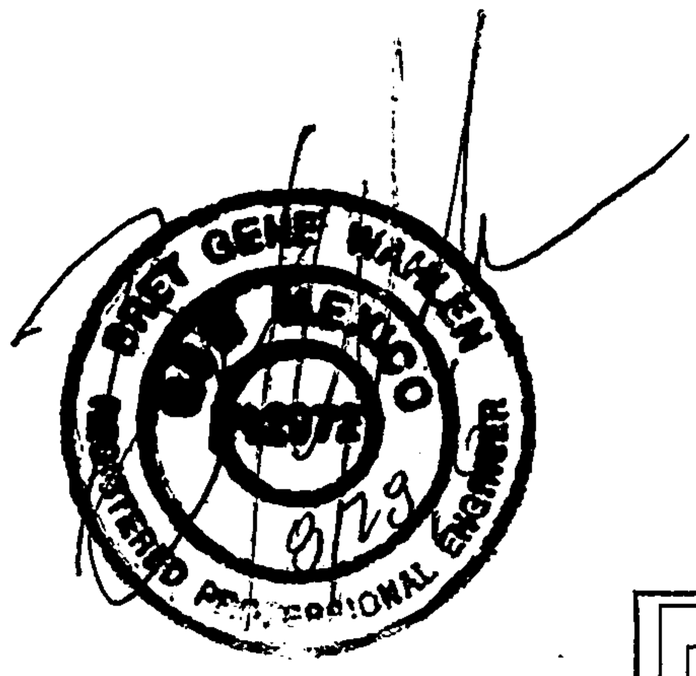
1. **Conceptual Grading and Drainage Plan**: Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report**: Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

RECEIVED
AUG 29 2001
HYDROLOGY SECTION

OLD
6-20-2025

Storm Water Study
Kmart #9827 – Sierra Vista Shopping Center
Albuquerque, New Mexico

August 29, 2001



RECEIVED
AUG 29 2001
HYDROLOGY SECTION

Prepared For:
Kmart Corporation
3100 West Big Beaver Road
Troy, Michigan 48084

CONSULTING ENGINEERS &
LAND SURVEYORS

GREAT BASIN ENGINEERING - South

2010 North Redwood Road • P.O. Box 16747 • Salt Lake City, Utah 84116
(801) 521-8529 • (801) 394-7288 • Fax (801) 521-9551 • E-mail gbes@xmission.com

TABLE OF CONTENTS

Introduction 1

Purpose 1

Existing Conditions 1

Hydrologic Analysis 2

Proposed Conditions 2

Site Map 3

Conclusions 9

References 10

Map Pocket
Grading and Drainage Plan

Appendix A
Peak Flow Rate Calculations
Storm Drain Hydraulic Calculations – HGL's
Orifice Calculations

Appendix B
Referenced Studies

I. Introduction

Kmart has been approved by the EPC to remove its existing store and an existing office / tire store and construct a new superstore on the westerly portion of the Sierra Vista Shopping Center which currently exists at the SW corner of Montgomery Boulevard and Eubank Boulevard. The easterly portion of the existing center will essentially remain, as it exists. The westerly portion of the site will be re-graded and a new storm water collection system installed to accommodate the new Kmart Store. All storm water generated does and will continue to drain to an existing concrete channel that borders along the South side of the shopping center, which also collects water from the Sierra Vista Townhouses directly to the South of the center.

The City of Albuquerque in previous meetings has directed us to maintain the amount of existing detention, replacing any lost detention. Lost detention is due to the removal of a portion of the channel to accommodate a truck driveway.

II. Purpose

The purpose of this report is to verify that any detention lost with the removal of a portion of the channel will be replaced and that the total amount of detention provided with the existing center will remain unchanged, size the new collection system to insure the needed volume of water will be carried to the channel without ponding in the parking lot except where desired, review the existing drainage patterns of the site, and develop and propose a grading and drainage plan that will be consistent with development of surrounding properties and the existing storm drain system.

III. Existing Conditions

The existing Sierra Vista Shopping Center contains 18.42 acres and includes an existing Kmart, Marshalls, Firestone Tire Center, Office and Retail space, a Restaurant and a Drive-thru restaurant. It is bound on the north by Montgomery Boulevard, on the East by Eubank Boulevard, on the West by Parsifal Street and on the South by the Sierra Vista Townhouses and the Parsifal Town homes.

The Sierra Vistá Shopping Center along with the Sierra Vista Townhouses adjacent to the South currently all drain into an existing concrete drainage channel that runs along the South side of the shopping center and the North side of the townhouses. This channel is constructed with weir walls and orifice openings to detain the flow generated from the shopping center and townhouses and at the same time pass the flow from a drainage area to the Northeast of the center, which is collected in a storm drain system and piped to the channel. In the event of a large storm, this water passes over the weir walls and recollects in a 30-inch outlet pipe at the bottom of the channel.

This site is located within Zone X, designating areas determined to be outside the 500 year flood plain as identified by the FIRM Map #35001C0143 D effective Sept. 20, 1996.

IV. Hydrologic Analysis

As shown on the enclosed drainage plan, we are proposing to construct a new weir wall and extend the storm drain from Parsifal Street to a new inlet structure. The detention lost by closing this portion of the channel and lowering the weir wall to elev. 37.50 is 10,104 c.f. The detention areas being created behind and to the South of the Kmart store will contain 17,984 c.f. which provides an additional 7,880 c.f. of detention over and above the original capacity of the channel besides offsetting what was lost. Also, there will be over 80,000 sq. ft. of new landscape area added to the re-developed center, which will reduce overall runoff. The reason for lowering the weir wall is to maintain the volume of water capable of passing over it to match the existing weir and not overflow the existing walls along the side of the channel.

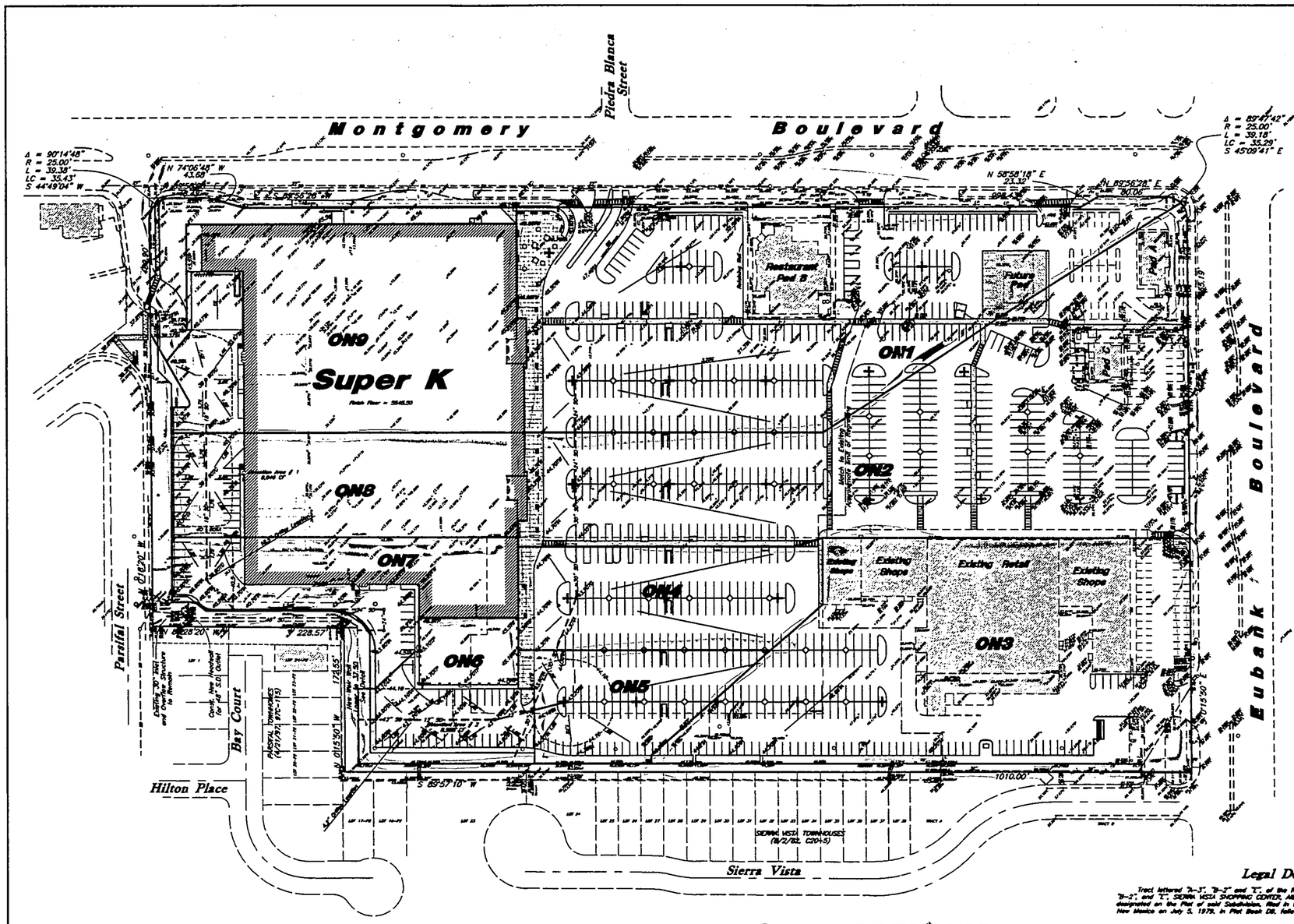
Section 22.2 of the DPM was used to obtain peak flow rates for use in designing the on-site storm drain system. (See Appendix A)

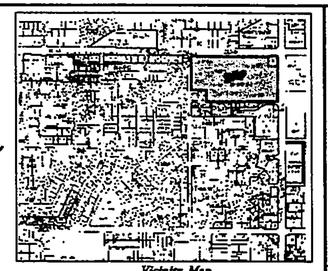
V. Proposed Conditions and On-Site Storm Water Management Plan

The site has been designed to sheet flow to the west from Eubank Boulevard. Peak flows have been calculated using the methods in Section 22.2. A large storm drain has been designed to intercept the flows at low spots placed along the westerly portion of the parking lot. Figure 1 indicates the areas contributing to each catch basin. The areas contributing to the storm drain system along the front of the store are designated as ON1, ON2, and ON4. The storm drain in the front of the store has been sized for the 100-year event in order to eliminate any ponding in the main parking lot area. The attached hydraulic grade line profile in Figure 2 indicates the top of water elevation for the front of the store in the event of a design storm. (See Appendix A for HGL analysis results.)

The roof drains from the store and the paved areas west of the store will be collected in a series of catch basins and storm drain piping. These areas are designated ON7, ON8, and ON9 on Figure 1. This portion of the parking areas will contain ponding. Using the hydrograph procedures outlined in Section 22.2 a release rate was calculated based on the amount of storage available. Figure 3 is the hydrograph for this portion of the site. The hydraulic grade line was analyzed using the calculated release rate. A 18.5-inch orifice plate will be installed to hold the excess water back to the design elevation of the ponds. The grading plan indicates the top of water elevation. Figure 4 is the HGL profile for the storm drain on the west side of the store. (See Appendix A for HGL analysis results).

The garden area and parking areas immediately around the garden center will contribute to a series of inlets and catch basins. Ponding will occur on this portion of the site also. These areas are designated as ON5 and ON6. Again, a hydrograph was created and a release rate calculated based on the amount of water contributing and the amount of storage available. The hydraulic grade line was analyzed based on the release rate. A 4.2" orifice plate will be installed on this line to back excess water up to the design top of water elevation, which is shown on the grading plan. Figure 5 is the hydrograph for ON5 and ON6 and Figure 6 is the HGL profile. (See Appendix A for HGL analysis results.)





Vicinity Map
City of Albuquerque Zone Atlas Page: G-20-Z

Scale : 1" = 50'

Legend

Direction of Drainage
Top of Asphalt
Top of Walk
Edge of Curb
Flowline
Top of Curb
Top of Grade
Top of Pavement
Retaining Wall
Existing Pavement
Ground

Legal Description

Tract lettered "A-1", "B-1" and "C" of the Revised and Amended Plat of Tracts lettered "A-1", "B-1", and "C", SIERRA VISTA SHOPPING CENTER, Albuquerque, New Mexico, as the same is shown and designated on the Plat of said Subdivision filed in the Office of the County Clerk of Bernalillo County, New Mexico on July 3, 1979, in Plat Book D8, folio 146.

Flood Zone

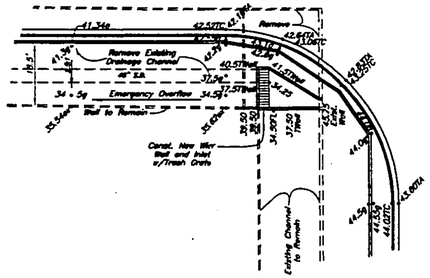
Property is located within Zone X, designating areas determined to be outside 500-year flood plain per Flood Insurance Rate Map, Bernalillo County, New Mexico and Incorporated Areas, Map Number 3500100143 D, effective date September 20, 1996.

Benchmark

THE BASIS OF ELEVATIONS FOR THIS SURVEY IS ACS BENCHMARK 34-F21, THE UNPUBLISHED ELEVATION OF WHICH IS 5076.231 PER THE CITY SURVEYOR OF ALBUQUERQUE, NM, AND IS LOCATED IN THE NORTHEAST CORNER OF THE INTERSECTION OF EUBANK BOULEVARD NE WITH MONTGOMERY BOULEVARD NE.

Notes:

- Detention lost with removal of portion of drainage channel and lowering of weir wall = 10,104 C.F.
- Total replacement detention provided in area #1 & #2 = 17,984 C.F.
- Decreased hard surface from existing center to proposed is estimated at 80,000 S.F.



Drainage Channel Detail

Figure 1

Store #0827 (#3444)
Albuquerque, New Mexico
Montgomery & Eubank

NO	DATE	DESCRIPTION
1	8 July 2001	Addl Sheets, City Submittal & DRB Comments
2	3 July 2001	DRC Comments
3	21 June 2001	DRC Comments

GREAT BASIN ENGINEERING - SOUTH
CONSULTING ENGINEERS and LAND SURVEYORS
2010 North Redwood Road, P.O. Box 16747
Salt Lake City, Utah 84116
Tel (801) 521-8529 (801) 972-6132 Fax (801) 521-8530

Preliminary Grading and Drainage Plan
Sierra Vista Shopping Center
9300 Montgomery Boulevard N.E.
Albuquerque, New Mexico

5 Jul. 2001

SHEET NO.
C4

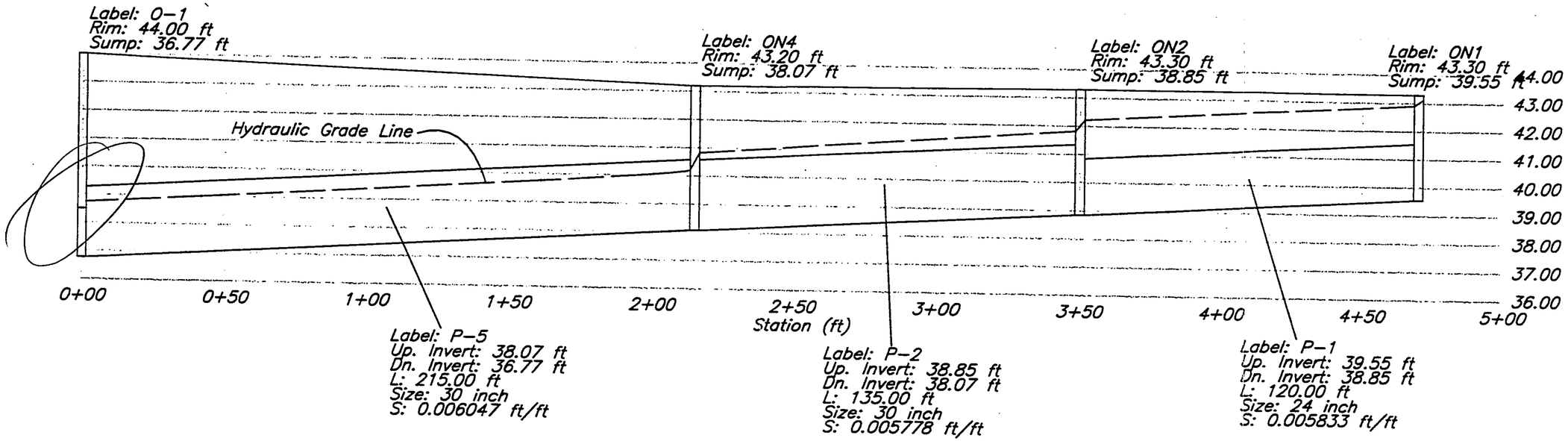

Label: O-1
Rim: 44.00 ft
Sump: 36.77 ft
Label: ON4
Rim: 43.20 ft
Sump: 38.07 ft
Label: ON2
Rim: 43.30 ft
Sump: 38.85 ft
Label: ON1
Rim: 43.30 ft
Sump: 39.55 ft
Hydraulic Grade Line
44.00
43.00
42.00
41.00
40.00
39.00
38.00
37.00
36.00
Elevation (ft)
0+00
0+50
1+00
1+50
2+00
2+50
3+00
3+50
4+00
4+50
5+00
Station (ft)
Label: P-5
Up. Invert: 38.07 ft
Dn. Invert: 36.77 ft
L: 215.00 ft
Size: 30 inch
S: 0.006047 ft/ft
Label: P-2
Up. Invert: 38.85 ft
Dn. Invert: 38.07 ft
L: 135.00 ft
Size: 30 inch
S: 0.005778 ft/ft
Label: P-1
Up. Invert: 39.55 ft
Dn. Invert: 38.85 ft
L: 120.00 ft
Size: 24 inch
S: 0.005833 ft/ft

Figure 2

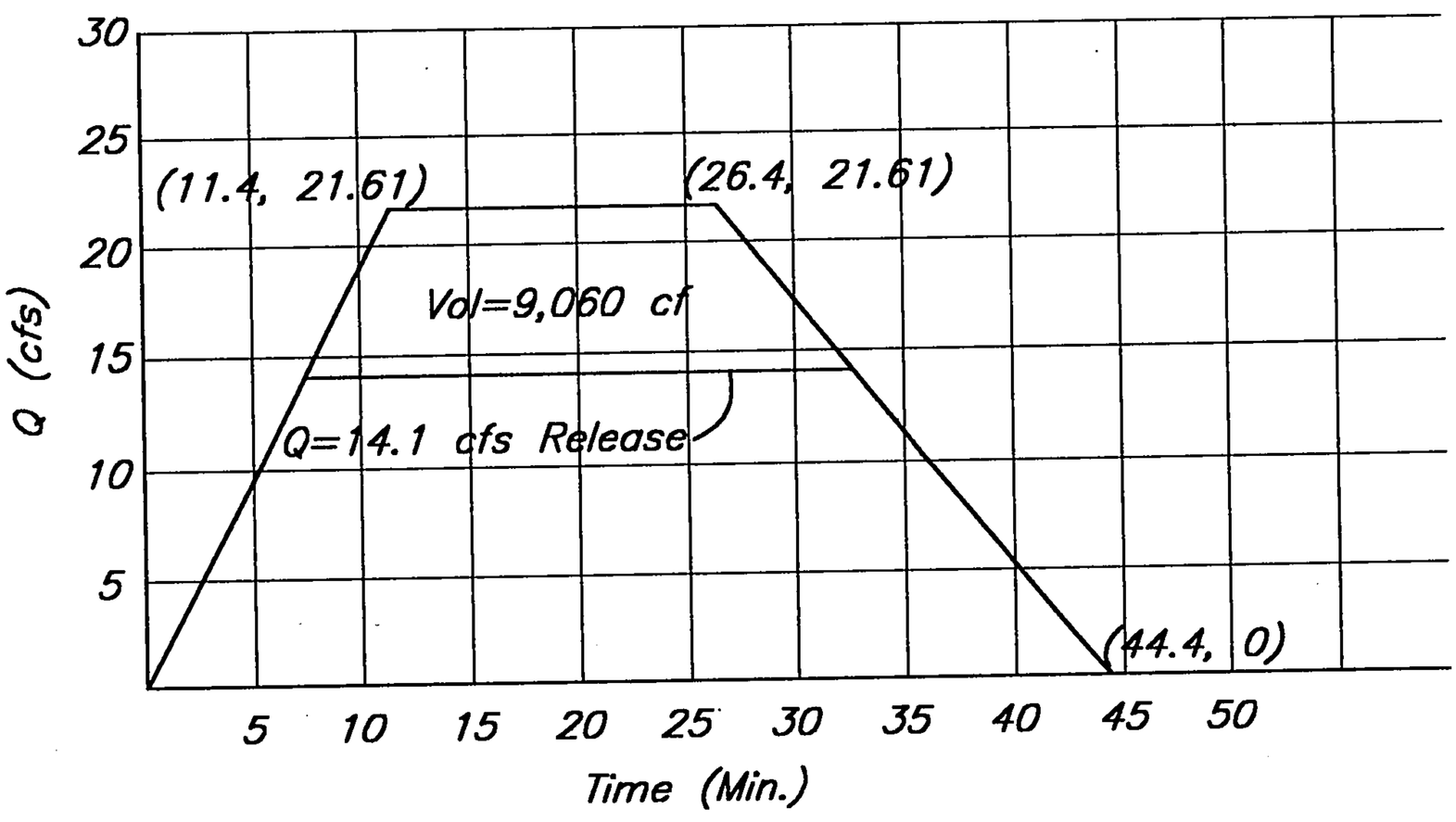


Figure 3

ON7, ON8, ON9
Sierra Vista Shopping Center

18.5 orifice plate ?

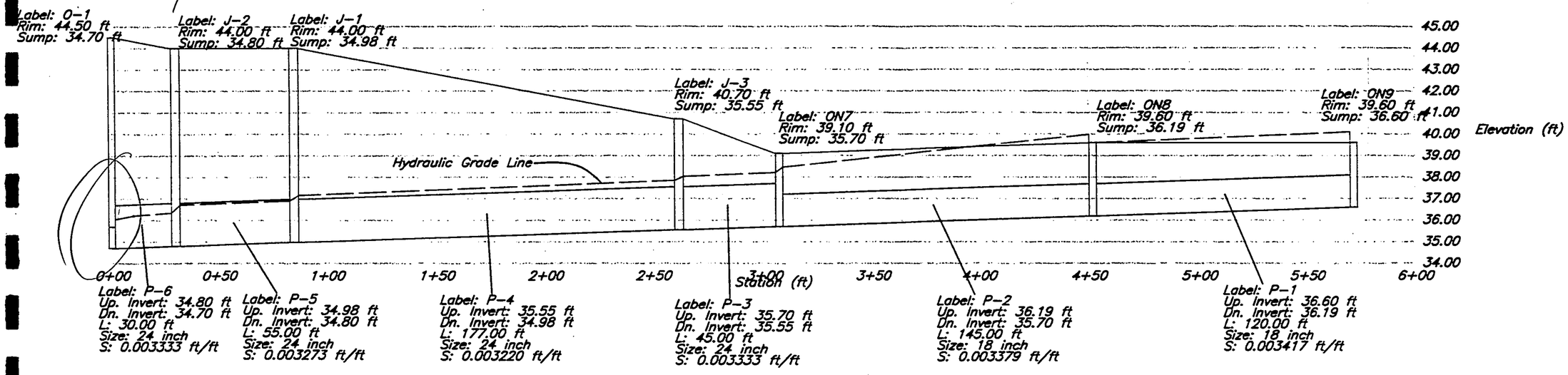


Figure 4

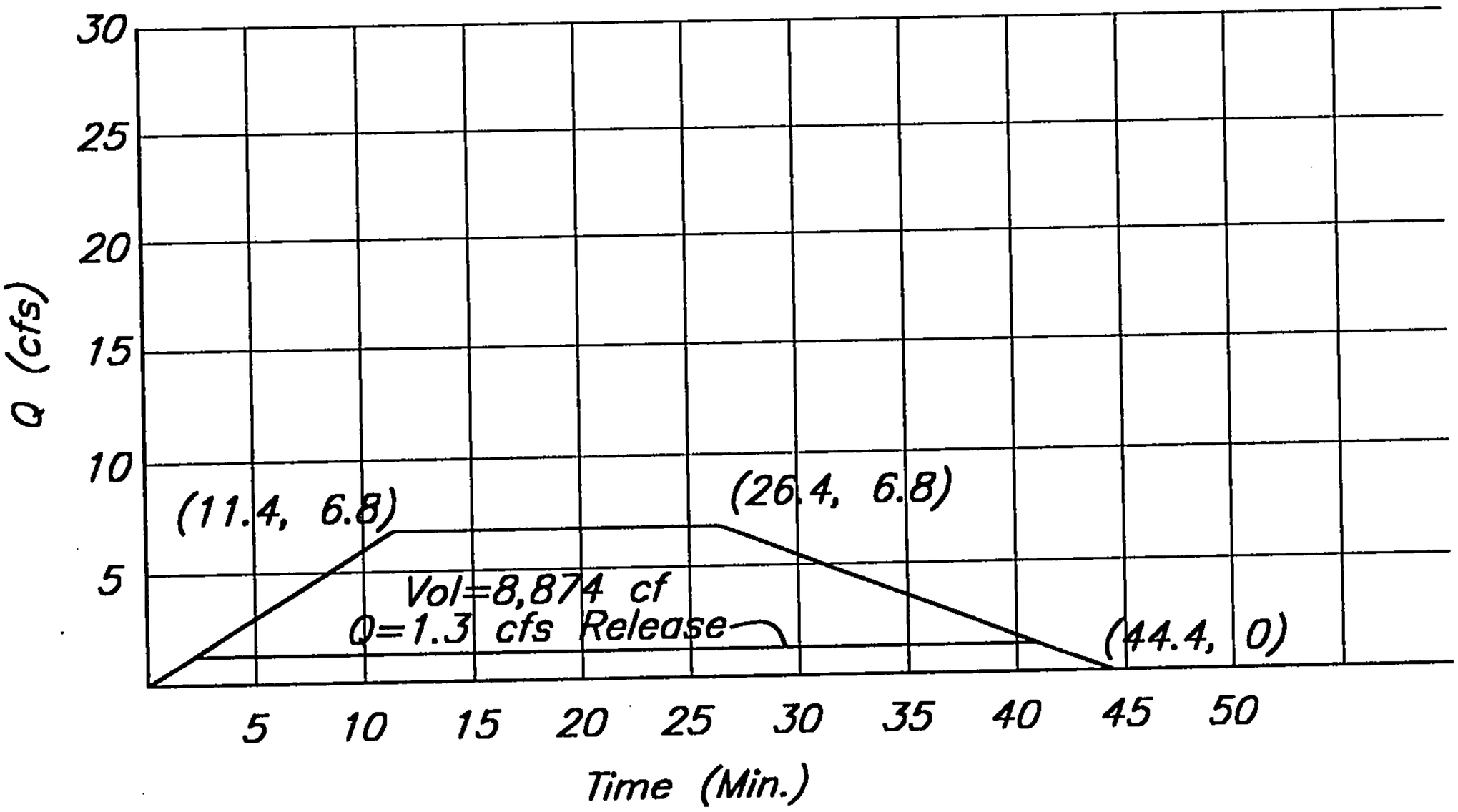


Figure 5

ON5, ON6
Sierra Vista Shopping Center

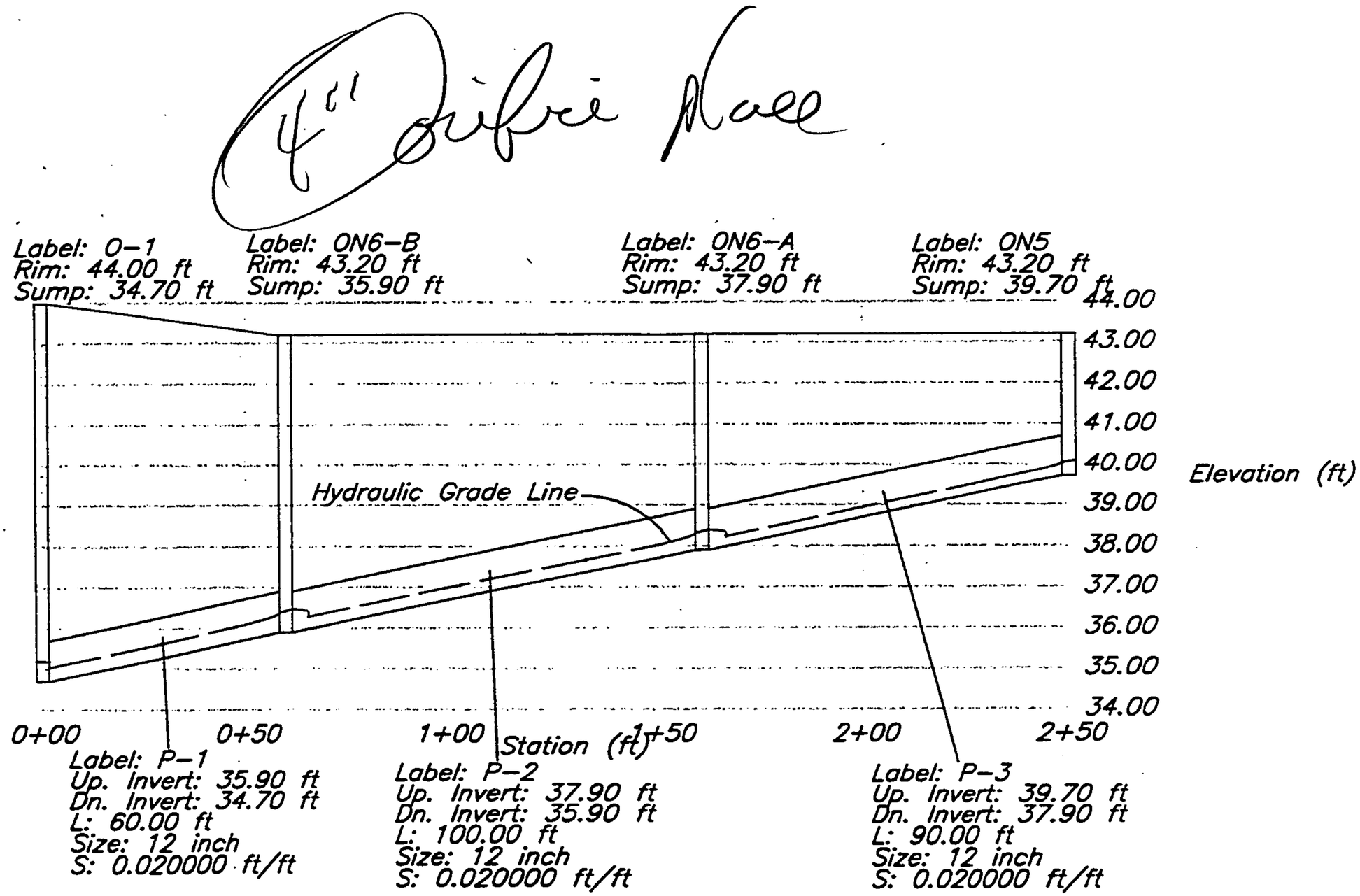

Label: O-1
Rim: 44.00 ft
Sump: 34.70 ft
Label: ON6-B
Rim: 43.20 ft
Sump: 35.90 ft
Label: ON6-A
Rim: 43.20 ft
Sump: 37.90 ft
Label: ON5
Rim: 43.20 ft
Sump: 39.70 ft
44.00
43.00
42.00
41.00
40.00
39.00
38.00
37.00
36.00
35.00
34.00
Elevation (ft)
Hydraulic Grade Line
0+00
0+50
1+00
1+50
2+00
2+50
Station (ft)
Label: P-1
Up. Invert: 35.90 ft
Dn. Invert: 34.70 ft
L: 60.00 ft
Size: 12 inch
S: 0.020000 ft/ft
Label: P-2
Up. Invert: 37.90 ft
Dn. Invert: 35.90 ft
L: 100.00 ft
Size: 12 inch
S: 0.020000 ft/ft
Label: P-3
Up. Invert: 39.70 ft
Dn. Invert: 37.90 ft
L: 90.00 ft
Size: 12 inch
S: 0.020000 ft/ft

Figure 6

In the original storm water study for this site performed by Thomas T. Mann of Scanlon and Associates, it is indicated that 104.32 cfs were to pass through the site. (See Appendix B) Of the 104.32 cfs, 85 cfs was coming under Eubank via a 36-inch culvert. As part of the design of the new K-mart a portion of the existing channel will be removed as has been mentioned above. A new weir wall will be constructed with the dimensions discussed in Section IV of this report. The new weir wall will be capable of passing the same amount of water, which is approximately 160 cfs, as the weir wall which is being removed. A 48-inch pipe will then be installed downstream of the new head wall. This 48-inch pipe is capable of passing roughly 200 cfs. When the new 48-inch pipe reaches the existing 30-inch pipe the existing channel will be left in place, thus allowing any water that is unable to enter the 30-inch to bubble up and flow into the street, as it has done in the past. The purpose of the 48-inch is to safely transfer water where the old drainage channel used to exist. It is not anticipated that the 48-inch will ever flow at or near capacity. A wide trash grate will prevent plugging of the 48-inch pipe.

VI. Conclusions

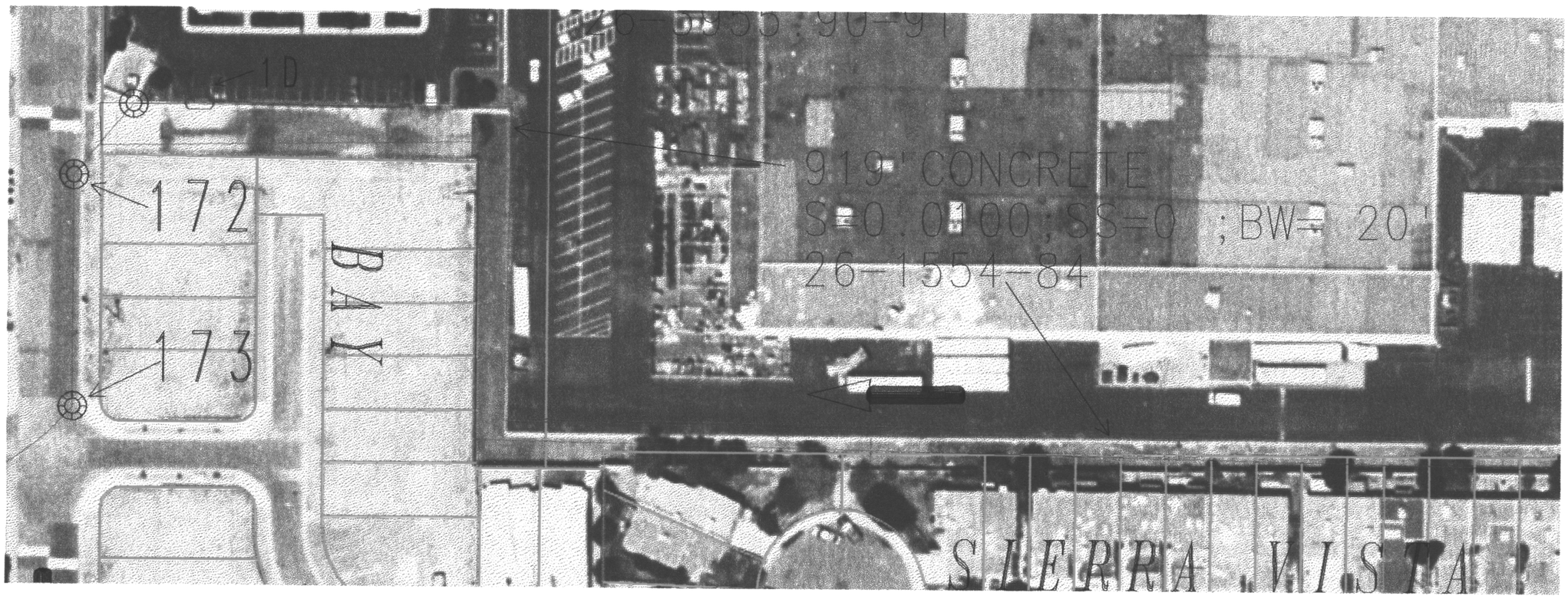
The grading and drainage plan for this project has been prepared and designed to maintain the existing conditions found at the Sierra Vista Shopping Center. Particularly the amount of detention has remained the same and all storm water is collected by the channel.

VII. References

1. Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map, Bernalillo County, New Mexico and Incorporated Areas, Map No. 35001C0143 D, Effective Date: September 20, 1996.

2. D.P.M. Drainage Design Criteria Committee, *Section 22.2, Hydrology, January 1993.*

3. Scanlon & Associates, *Sierra Vista Shopping Center Drainage Plan,* May 9, 1977.



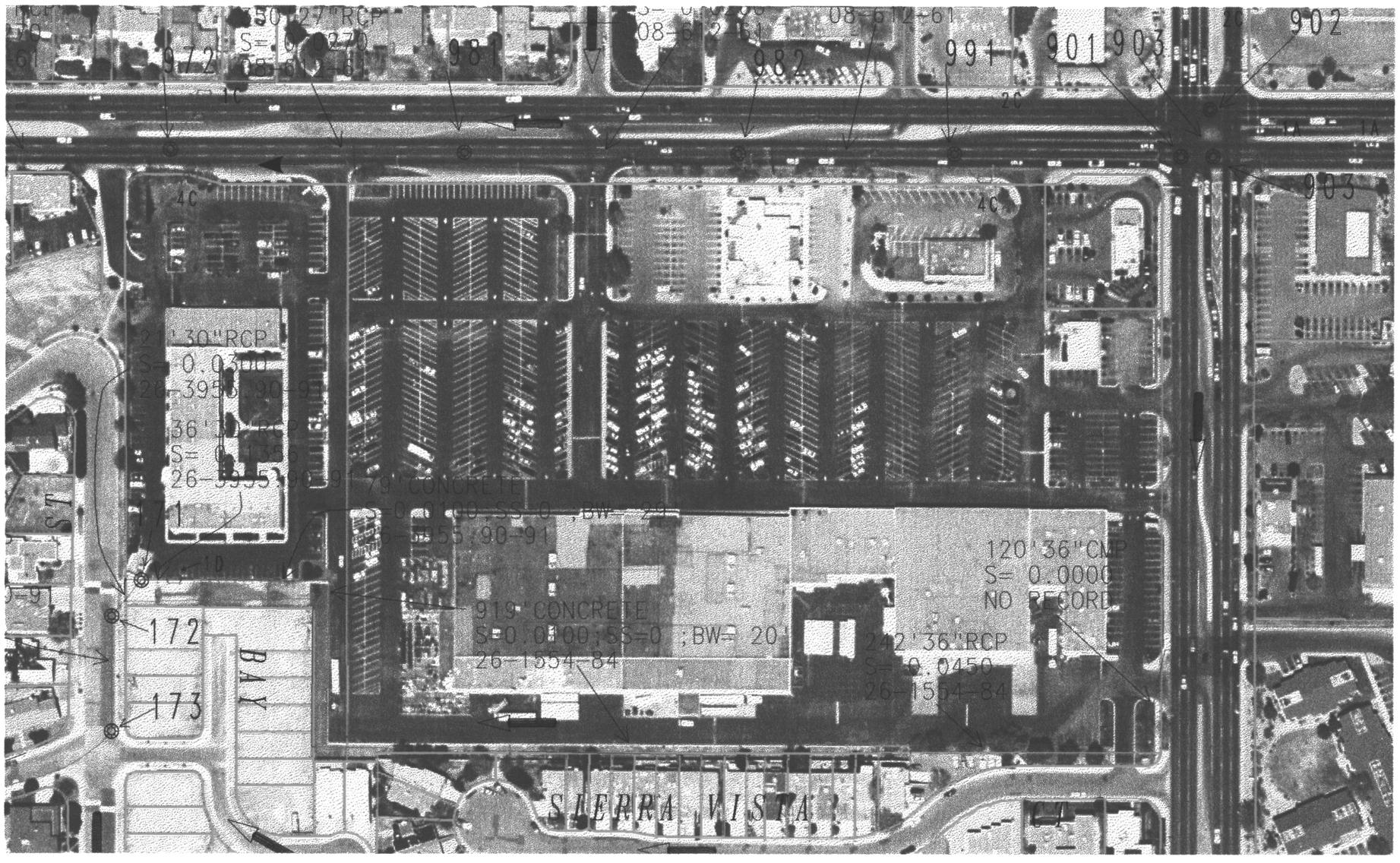
GIS PRODUCT REFERENCE: TILE G-28 OPTIONS 68 31 61 PWPRV PWDCAM #WW.GRA

N

W E

S

1"=200'



GIS PRODUCT REFERENCE: TILE G-20 OPTIONS 08 31 01 PWPRV PWDCAM #QQGRA

Appendix A

Peak Flow Calculations
Sierra Vista Shopping Center
Albuquerque, New Mexico
8/21/01

Treatment type	Q cfs/acre 10-year	Q cfs/acre 100-year
B	1.19	2.6
D	3.39	5.02

ON1

	S.F.	Acres
Total Area=	155848	3.58
Landscape (10%)	15584.8	0.36
Hardsurface (90%)	140263.2	3.22

Q_{10}= 11.34
Q_{100}= 17.09

ON2

	S.F.	Acres
Total Area=	165697	3.80
Landscape (10%)	16569.7	0.38
Hardsurface (90%)	149127.3	3.42

Q_{10}= 12.06
Q_{100}= 18.17

ON3

	S.F.	Acres
Total Area=	139833	3.21
Landscape (10%)	13983.3	0.32
Hardsurface (90%)	125849.7	2.89

Q_{10}= 10.18
Q_{100}= 15.34

ON4

	S.F.	Acres
Total Area=	43500	1.00
Landscape (10%)	4350	0.10
Hardsurface (90%)	39150	0.90

Q_{10}= 3.17
Q_{100}= 4.77

ON5

	S.F.	Acres
Total Area=	28972	0.67
Landscape (0%)		0.00
Hardsurface (100%)	28972	0.67

$Q_{10=}$ 2.25

$Q_{100=}$ 3.34

ON6

	S.F.	Acres
Total Area=	29997	0.69
Landscape (0%)		
Hardsurface (100%)	29997	0.69

$Q_{10=}$ 2.33

$Q_{100=}$ 3.46

ON7

	S.F.	Acres
Total Area=	44495	1.02
Landscape (0%)		0.00
Hardsurface (100%)	44495	1.02

$Q_{10=}$ 3.46

$Q_{100=}$ 5.13

ON8

	S.F.	Acres
Total Area=	52687	1.21
Landscape (0%)		0.00
Hardsurface (100%)	52687	1.21

$Q_{10=}$ 4.10

$Q_{100=}$ 6.07

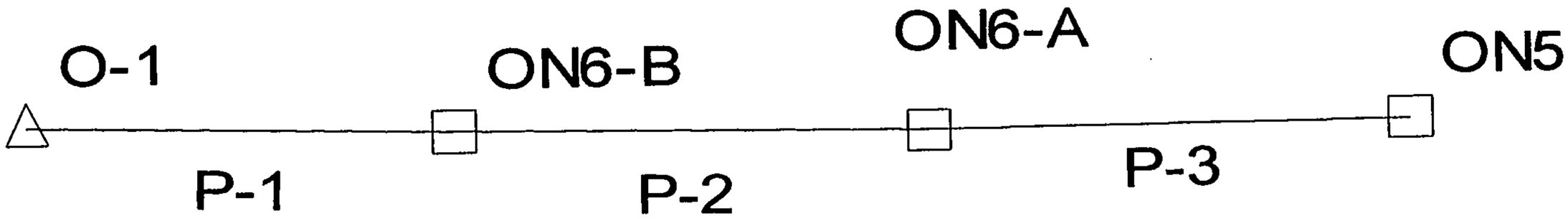
ON9

	S.F.	Acres
Total Area=	90350	2.07
Landscape (0%)		0.00
Hardsurface (100%)	90350	2.07

$Q_{10=}$ 7.03

$Q_{100=}$ 10.41

Scenario: Base



© Haestad Methods, Inc.
Great Basin Engineering
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

Pipe Report

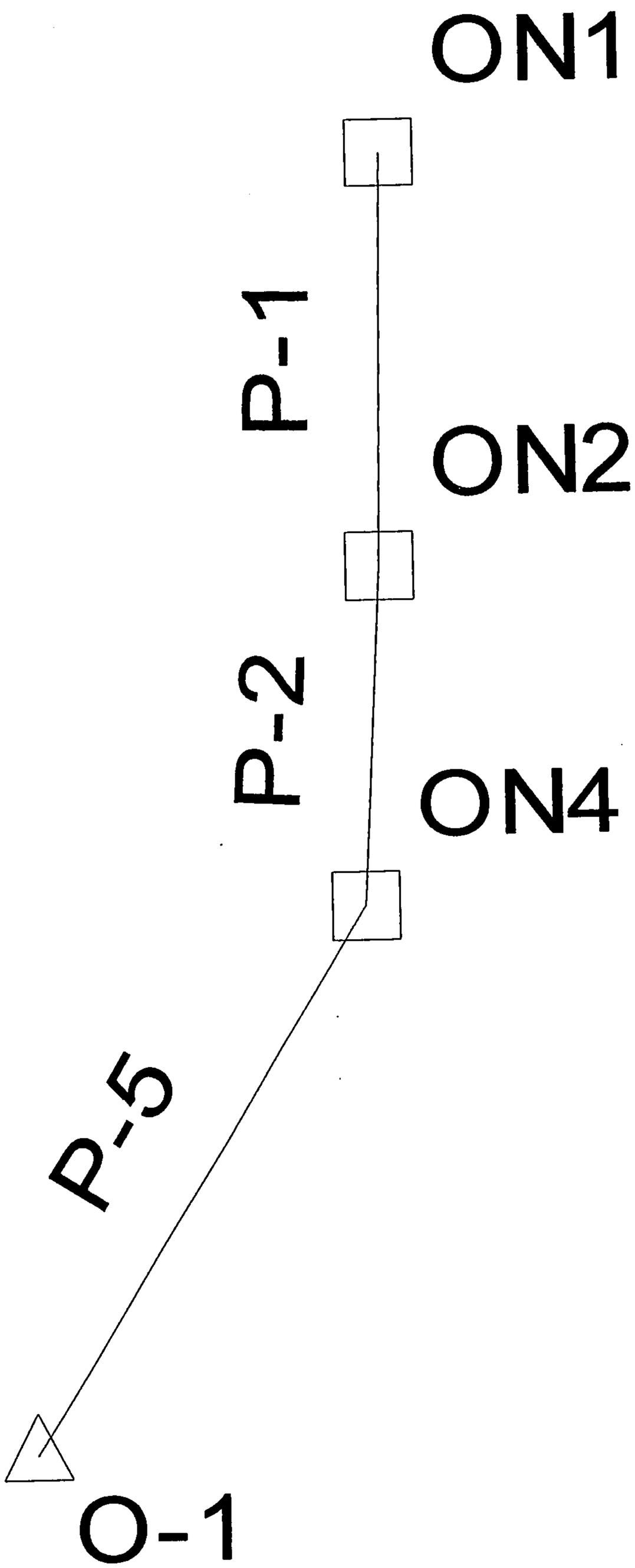
Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)
P-3	ON5	ON6-A	0.00	0.00	0.00	0.00	0.00	0.64	90.00	0.020000
P-2	ON6-A	ON6-B	0.00	0.00	0.00	0.00	0.00	0.97	100.00	0.020000
P-1	ON6-B	O-1	0.00	0.00	0.00	0.00	0.00	1.29	60.00	0.020000

Scenario: Base

Pipe Report

Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
12 inch	0.013	5.04	39.70	37.90	43.20	43.20	2.50	4.30	40.03	38.39
12 inch	0.013	5.04	37.90	35.90	43.20	43.20	4.30	6.30	38.31	36.47
12 inch	0.013	5.04	35.90	34.70	43.20	44.00	6.30	8.30	36.38	35.20

Scenario: Base



© Haestad Methods, Inc.
Great Basin Engineering
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)
P-1	ON1	ON2	0.00	0.00	0.00	0.00	0.00	17.09	120.00	0.005833
P-2	ON2	ON4	0.00	0.00	0.00	0.00	0.00	35.26	135.00	0.005778
P-5	ON4	O-1	0.00	0.00	0.00	0.00	0.00	40.03	215.00	0.006047

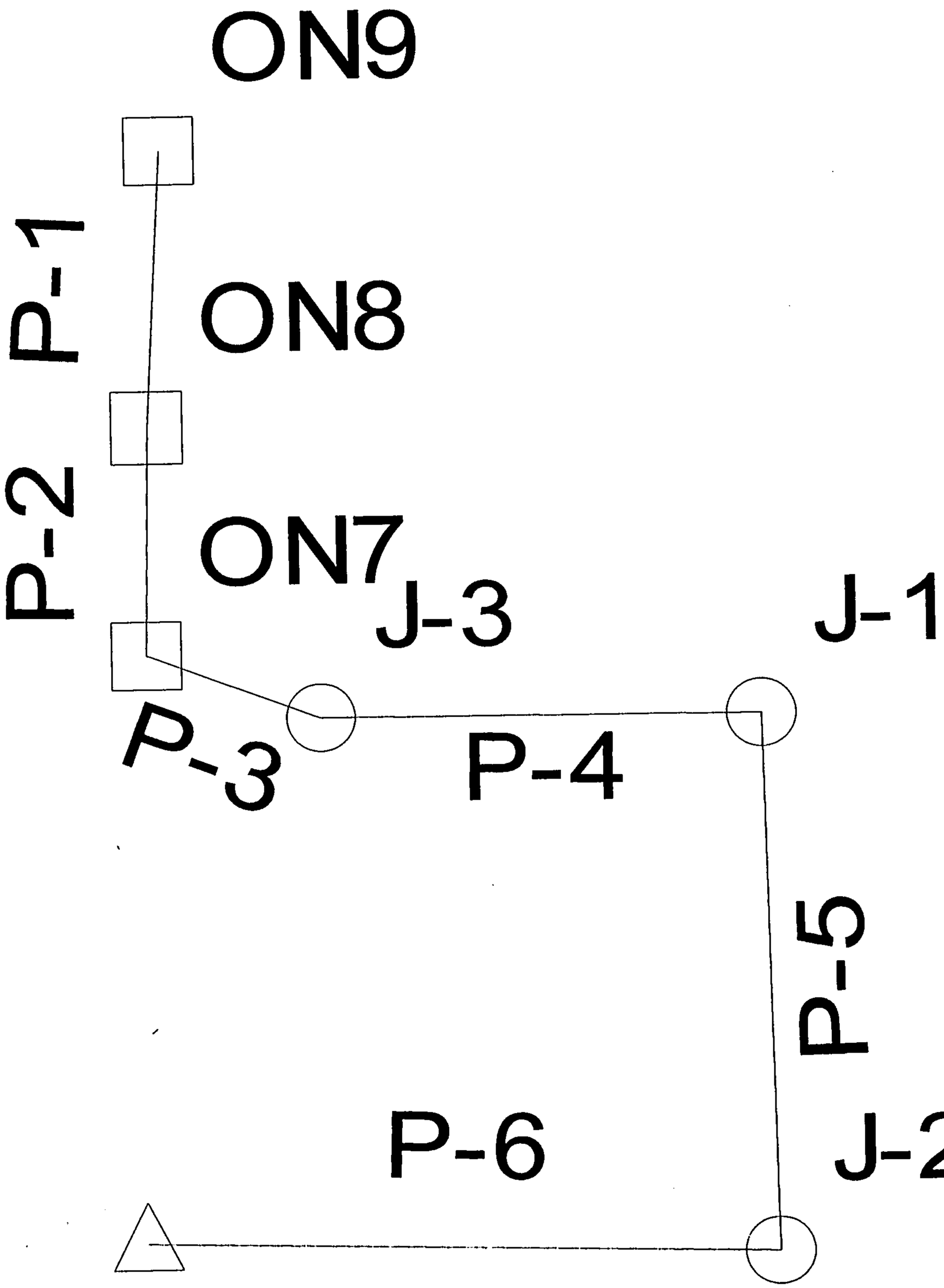
© Haestad Methods, Inc.
Great Basin Engineering
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

Pipe Report

Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
24 inch	0.013	17.28	39.55	38.85	43.30	43.30	1.75	2.45	42.91	42.23
30 inch	0.013	31.18	38.85	38.07	43.30	43.20	1.95	2.63	41.82	40.83
30 inch	0.010	41.46	38.07	36.77	43.20	44.00	2.63	4.73	40.20	38.75

Scenario: Base



Title: K-mart Sierra Vista - West Side Storm Drain
u:\haestad\stmc\kmrtsravsta\west.stm
08/29/01 11:15:12 AM · © Haestad Methods, Inc.

Great Basin Engineering
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Robert Schmidt
StormCAD v4.1.1 [4.2014]

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)
P-1	ON9	ON8	0.00	0.00	0.00	0.00	0.00	6.80	120.00	0.003417
P-2	ON8	ON7	0.00	0.00	0.00	0.00	0.00	10.76	145.00	0.003379
P-3	ON7	J-3	0.00	0.00	0.00	0.00	0.00	14.11	45.00	0.003333
P-4	J-3	J-1	N/A	N/A	N/A	0.00	0.00	14.11	177.00	0.003220
P-5	J-1	J-2	N/A	N/A	N/A	0.00	0.00	14.11	55.00	0.003273
P-6	J-2	O-1	N/A	N/A	N/A	0.00	0.00	14.11	30.00	0.003333

© Haestad Methods, Inc.
Great Basin Engineering
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

Pipe Report

Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
18 inch	0.013	6.14	36.60	36.19	39.60	39.60	1.50	1.91	40.10	39.60
18 inch	0.013	6.11	36.19	35.70	39.60	39.10	1.91	1.90	39.98	38.46
24 inch	0.013	13.06	35.70	35.55	39.10	40.70	1.40	3.15	38.21	38.03
24 inch	0.013	12.84	35.55	34.98	40.70	44.00	3.15	7.02	37.85	37.16
24 inch	0.013	12.94	34.98	34.80	44.00	44.00	7.02	7.20	36.90	36.71
24 inch	0.013	13.06	34.80	34.70	44.00	44.50	7.20	7.80	36.35	36.05

Hydrograph Areas ON 7, ON 8, ON 9
From Section 22.2 DPM

A_T = 4.3 Acres
A_D = 4.3 Acres
E = 2.36 "
Q_p = 21.61 cfs
t_p = 0.19 hr. ⇒ 11.4 min
t_B = 0.74 hr ⇒ 44.4 min
duration Peak = 0.25 ⇒ 15 min

Hydrograph Areas ON5, ON6

A_T = 1.30 Acres
A_D = 1.36 Acres
E = 2.36
Q_p = 6.60 cfs
t_p = 0.19 ⇒ 11.4 min
t_B = 0.74 hr ⇒ 44.4 min
duration Pk = 0.25 ⇒ 15 min

Orifice Calc's

ON 7, 8, 9

$Q = C_1 \cdot A \cdot \sqrt{2 \cdot g \cdot H}$

Q = 14.1 cfs
H = 40.5 - 38.21 = 2.29' (Top Water to top inlet at Box ON 7)
C_1 = 0.62

Diam = 1.54', ⇒ 18.5"

ON 5, 6

Q = 1.3 cfs
H = 44.1 - 36.4 = 7.7' (Top Water to ℄ outlet at Box ON 6-B)
C_1 = 0.62

Diam = 0.35' ⇒ 4.2"

Appendix B

Scanlon & associates, inc.
engineers and planners

May 9, 1977 (#7702)

Mr. Bill Waters
Long & Waters
8009 Mountain Rd. Pl.
Albuquerque, N.M. 87110

Re: Sierra Vista Shopping Center Drainage Plan

Dear Bill:

After reviewing and analyzing the available data in the vicinity of Montgomery and Eubank Boulevards, we developed the following drainage plan for the Sierra Vista Shopping Center.

1. The location of the shopping center and the surrounding area is shown in Figure 1. The drainage basins that contribute stormwater flows to the property are also shown in Figure 1.

2. The existing topography at the shopping center site is shown in Figure 2.

3. The proposed shopping center site plan is shown in Figure 3.

4. Jacob A. Vigil, Consulting Engineer, prepared the following drainage report: "Design of Storm Sewer for Eubank Boulevard Widening Between Candelaria and Montgomery Boulevards" (1-4067(1), Albuquerque, New Mexico, August 1976. I have compared the stormwater quantities that we computed with those computed by Mr. Vigil and found them to be comparable. We will use the quantities from the Vigil report since that report has already been submitted and approved.

The Vigil report indicates that the flow entering the site from the east from a 100 year frequency storm will be approximately 85 cubic feet per second (cfs).

ALBUQUERQUE, NEW MEXICO 87110 7811 MOUNTAIN ROAD NE TELEPHONE (505) 265-4811

4. The calculations for the shopping center site are as follows:

Area - shopping center ≈ 817,000 s.f. ≈ 16.75 ac.
Area - R-2 ≈ 221,000 s.f. ≈ 5.1 ac.
Landscaped Area - shopping center ≈ 2.0 ac.

Time of Concentration = $T_c = \frac{k1 \cdot 37}{s \cdot 2}$ (soil conservation service overland flow method)

where
k = coefficient of ground surface = 1.57 undeveloped
= 0.85 developed
l = length of overland flow = 1400 ft.
s = slope = 3.38

therefore T_c = 18 minutes (undeveloped)
T_c = 10 minutes (developed)

From the Intensity/Duration/Frequency Curve (Master Plan of Drainage, City of Albuquerque, New Mexico and Environs 1963)

$$I = \frac{189}{T_c + 25}$$

$$I = \frac{189}{18 + 25} = 4.4 \text{ inches/hour (undeveloped)}$$

$$I = \frac{189}{10 + 25} = 5.4 \text{ inches/hour (developed)}$$

Using the Rational Method

$$Q = cia$$

where Q = flow in cfs
c = runoff coefficient
i = intensity in inches/hour
a = area in acres

c = 1.0 asphalt covered
c = 0.6 multiple family residences
c = 0.15 undeveloped

$Q_{100} = 1(5.4)16.75 = 90.45$
$= .15(5.4)2.0 = 1.62$
$= 0.6(5.4)5.1 = 16.52$

$Q_{100} = 108.59$ cfs (developed)

$Q_{100} = .15(5.4)23.85 = 19.32$ cfs (undeveloped)

Q_{100} that must be retained on property = 89.27 cfs

Q_{100} that can leave property = 104.32 cfs

Volume of storage = 89.27 x 10 x 60 = 53,600 cf

$\frac{53600}{1415 \times 2} = 19'$

The drainage could be handled in the following manner. A landscaped depression measuring approximately 2 feet deep by 20 feet in width could be developed along the property line between the R-2/SU-1 properties and the proposed shopping center. Check structures would have to be incorporated in the design to assure ponding. This volume of ponding would provide the required storeage of stormwaters.

Essentially what would occur would be the retention of all stormwaters generated off site and the retention of only that amount of stormwater generated on site necessary to satisfy the drainage ordinance. Trying to convey off-site waters through the site or ponding on-site waters is impracticable. The proposed solution has the same net effect downstream of the shopping center as allowing all off-site water to pass through the site.

As you proceed further with your design, a grading plan will be needed to demonstrate that the proposed solution can be implemented.

Sincerely,

Thomas T. Mann, Jr. P.E.
Project Manager

TM:sj
attachments

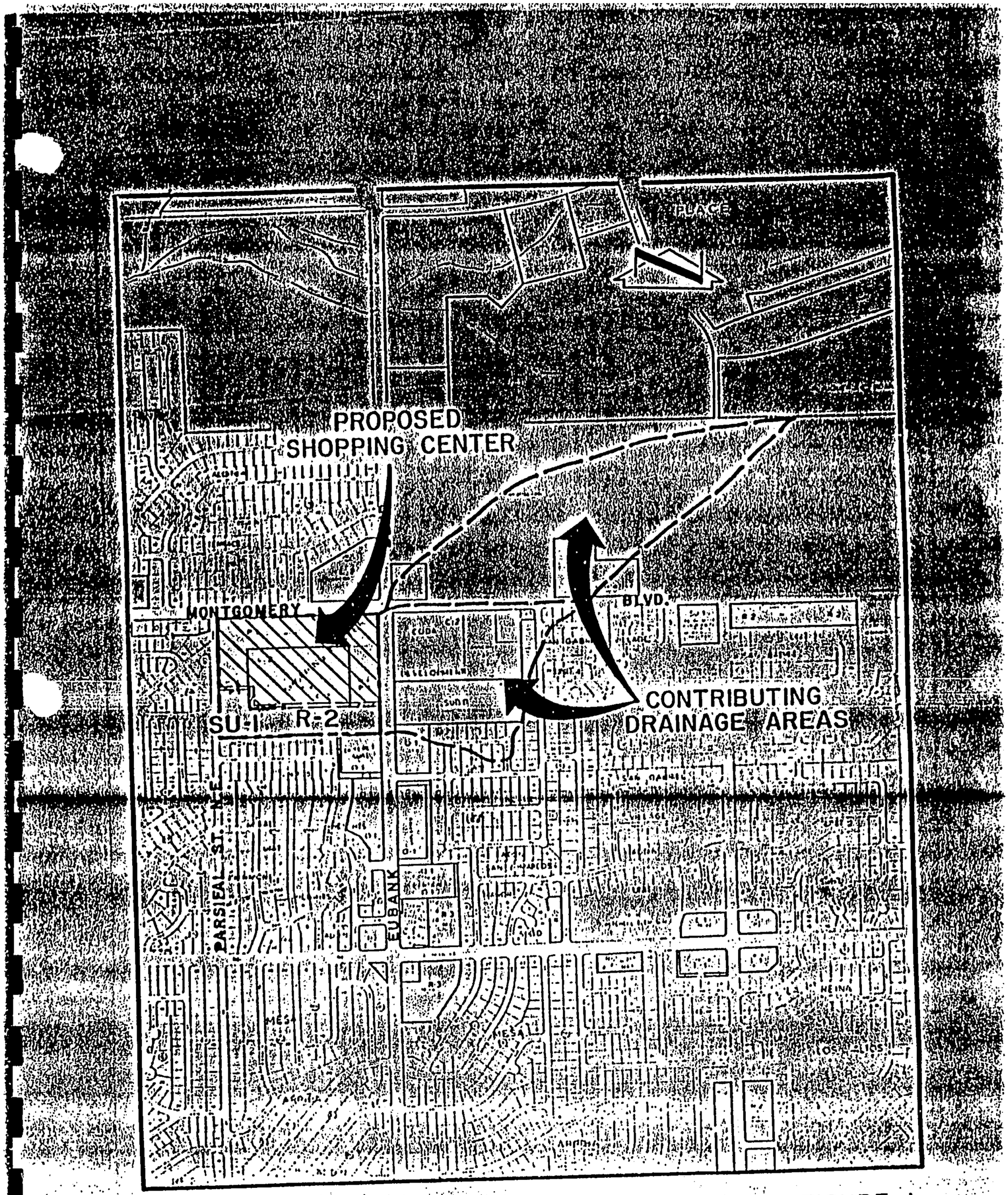

PLACE
PROPOSED
SHOPPING CENTER
MONTGOMERY
BLVD.
CONTRIBUTING
DRAINAGE AREAS
SU-1
R-2
PARSIFAL ST.
EUBANK
MESA
LOS LOBOS

FIGURE 1

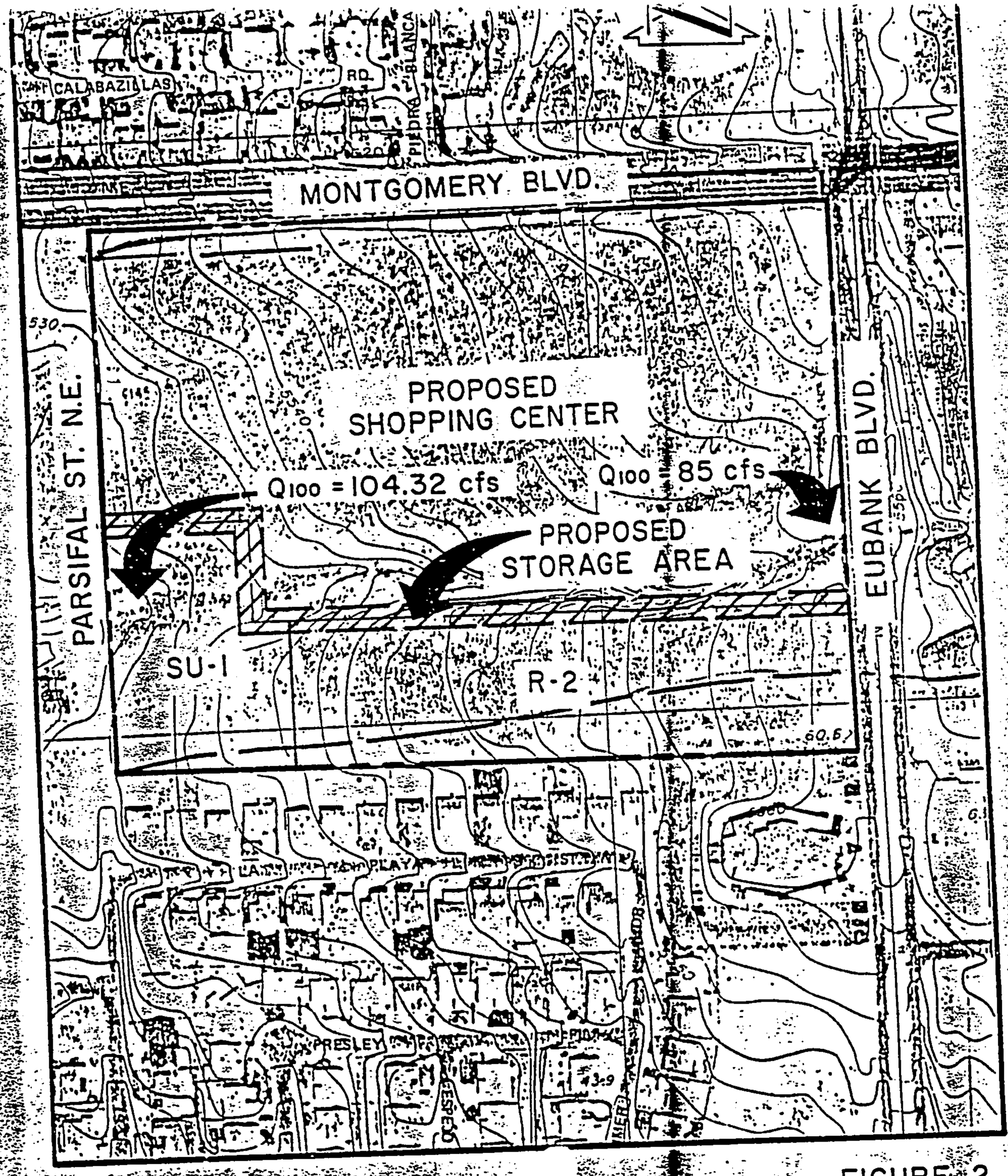

CALABAZILLAS RD.
PIEDRA BLANCA
MONTGOMERY BLVD.
PARSIFAL ST. N.E.
EUBANK BLVD.
530
PROPOSED
SHOPPING CENTER
Q100 = 104.32 cfs
Q100 = 85 cfs
PROPOSED
STORAGE AREA
SU-1
R-2
60.67
LA PLAYA
PRESLEY
DESEADO
MERIDOR

FIGURE 2

GREAT BASIN ENGINEERING - South
2010 North Redwood Road • P.O. Box 16747 • Salt Lake City, Utah 84116
(801) 521-8529 • (801) 394-7288 • Fax (801) 521-9551

CONSULTING ENGINEERS
AND LAND SURVEYORS

November 5, 2001

Carlos A. Montoya
City Flood Plain Administrator
City of Albuqueruqe
P.O. Box 1293
Albuquerque, NM 87103

Re: Comments dated September 4th with regard to Sierra Vista Shopping Center (G-20-D)

Dear Carlos,

We appreciate your comments in the above referenced letter. In response we offer the following:

Comment 1: *Please show the existing channel at a larger scale. I was unable to read some of the elevations and symbols. Please give more details at the weirs in the box channel.*

Response: Enclosed is an enlarged drawing of the portion of the channel we are removing as well as a copy of the surveyor's topographic exhibit of the site. We are also enclosing some pictures of the channel that may be of some help.

Comment 2: *An option may be to enter the storm drain from areas ON7, 8, and 9 at the bottom of the existing trash grate.*

Response: We will go ahead and do as you suggested, putting the storm drain at the location of the existing trash grate. The HGL has been re-evaluated and included for your review. The revised HGL should replace figure four in the original study.

Comment 3: *Please try another alternative for the 4-inch orifice plate. This orifice plate will plug and cause a maintenance problem.*

Response: Unfortunately we cannot think of another alternative to replace the 4-inch plate. We will put a down-turned pipe or "snout" with a sumped box to settle solids and keep floatable trash from interfering with the outlet. We do recognize that it will be a maintenance issue, but one that will be the responsibility of Kmart.

Comment 4: *Please discuss how you started the HGL at the concrete box for each storm drain.*

Response: The HGL for the revised line serving areas ON7, 8, and 9 was established at the crown of the outlet pipe. This was done as an estimate and a conservative tool to evaluate the effectiveness of the pipe. Based on the HGL which was generated an orifice will then be placed on the junction box directly downstream of ON7. Since the flow in the pipe between the outlet and the junction box becomes

critical at this point the orifice equation can be used with confidence and the pipeline will be more than adequate to handle the flow.

The line serving areas ON 5 and 6 was evaluated with a beginning HGL of 37.50, which is the top of the channel weir wall. This was revised from the original submittal and is included here for your review. The revised HGL does not affect the orifice calculations.

The line serving areas ON1, 2, 3, and 4 was evaluated with a beginning HGL of 38.50. This is based on a top of weir wall of 37.50 and water 1-foot deep over the top of the weir wall. This was done as a conservative calculation in order to prevent water from ponding along the front of the store.

We consider these calculations to be conservative, however, we do not know how the hydrograph from upstream will route through the channel, thus we don't know the exact elevations of the water in the channel at the time the K-mart areas will discharge. But since the K-mart site is situated on the downstream end of the channel we anticipate that most of the storm water from the K-mart will have passed before the peak from upstream arrives.

Comment 5: *Figure 6 HGL needs to be reviewed.*

Response: See response from comment 4.

Comment 6: *Please address how the City will maintain access for maintenance in the concrete box.*

Response: Access for maintenance will remain as it exists, there is a gate in the chain link fence near the overflow structure on Parsifal that will remain in place. Access to the upper portion will remain through the Sierra Vista Townhouses, which provides access down to the new weir wall.

Comment 7: *The public easement area (new 48-inch storm drain) will need to be processed through DRC.*

Response: Attached are copies of the completed drainage plans and details being submitted to DRC. Structural details and calculations of the walls is forthcoming.

With this submittal we will be applying for Grading Permit, Building Permit, Certification and Review for Work Order Approval if I understand how this all works, If you have any questions or need additional information, please feel free to contact me.

Sincerely,

Bret Wahlen, P.E.
Vice President

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

April 25, 2003

Ron Bohannan
Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

RE: Grading and Drainage Plan for Sierra Vista Shopping Center Home Depot (G-20-D2J) Dated January 25, 2003

Dear Mr. Bohannan:

I have reviewed the referenced drainage plan and forward the following comments.

1. The City accepted the 104.3 cfs release from the site as shown by Great Basin Engineering because they were not changing the volume of storage on site. Great Basin Engineering used this number because it was the historic outfall and they were not changing the runoff or the volume of storage. However, your drainage plan is removing storage volume from the concrete pond and replacing it with a pipe.
2. Again Great Basin Engineering was not changing the volume on site so the offsite flows were not reviewed. They kept the historic volumes.
3. If volumes are going to be changed on site then the downstream capacity and the offsite flows need to be analyzed. Please call and set up a meeting to discuss these issues. I feel if we can keep the volumes and outfall to historic values we may not need to check downstream and offsite flows.

If you have any questions please call me at 924-3982.

Sincerely,

Carlos A. Montoya
City Floodplain Administrator

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

DRAINAGE AND TRANSPORTATION SHEET

(REV. 1/11/2002)

G-20/D2J

PROJECT TITLE: Home Depot
DRB #: _____ EPC #: _____
ZONE MAP/DRG. FILE #: G-20
WORK ORDER #: _____

LEGAL DESCRIPTION: Sierra Vista Shopping Center
CITY ADDRESS: Southwest corner of Montogomery Blvd and Eubank Blvd

ENGINEERING FIRM: Tierra West, LLC
ADDRESS: 8509 Jefferson NE
CITY, STATE: Albuquerque, NM
CONTACT: RONALD R. BOHANNAN OR SARA LAVY
PHONE: (505) 858-3100
ZIP CODE: 87113

OWNER: The Home Depot
ADDRESS: 2800 Forest Lane
CITY, STATE: Dallas, Texas
CONTACT: Emilou Barnes
PHONE: (972)402-3937
ZIP CODE: 75234

ARCHITECT: _____
ADDRESS: _____
CITY, STATE: _____
CONTACT: _____
PHONE: _____
ZIP CODE: _____

SURVEYOR: Precision Surveys
ADDRESS: 8414-D Jefferson Street, NE
CITY, STATE: Albuquerque, NM
CONTACT: Larry Medrano
PHONE: 856-5700
ZIP CODE: 87113

CONTRACTOR: _____
ADDRESS: _____
CITY, STATE: _____
CONTACT: _____
PHONE: _____
ZIP CODE: _____

CHECK TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- ___ DRAINAGE PLAN
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- ___ GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ___ CLOMR/LOMR
- ___ TRAFFIC CIRCULATION LAYOUT (TCL)
- ___ ENGINEERS CERTIFICATION (TCL)
- ___ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ___ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SIA / FINANACIAL GUARANTEE RELEASE
- X PRELIMINARY PLAT APPROVAL
- X S. DEV. PLAN FOR SUB'D. APPROVAL
- X S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- X FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- X BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY (PERM.)
- ___ CERTIFICATE OF OCCUPANCY (TEMP.)
- X GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ WORK ORDER APPROVAL
- ___ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ___ YES
- X NO
- ___ COPY PROVIDED

RECEIVED
JAN 28 2003
HYDROLOGY SECTION

DATE SUBMITTED: 1/27/2003 BY: Sara Lavy

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a dranage submittal. The particular nature, location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of sumbittal may be required based on the following:

1. **Conceptual Grading and Drainage Plans** Required for approval of Site Development Plans greater than five (5) acres
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report** Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

DRAINAGE REPORT

for

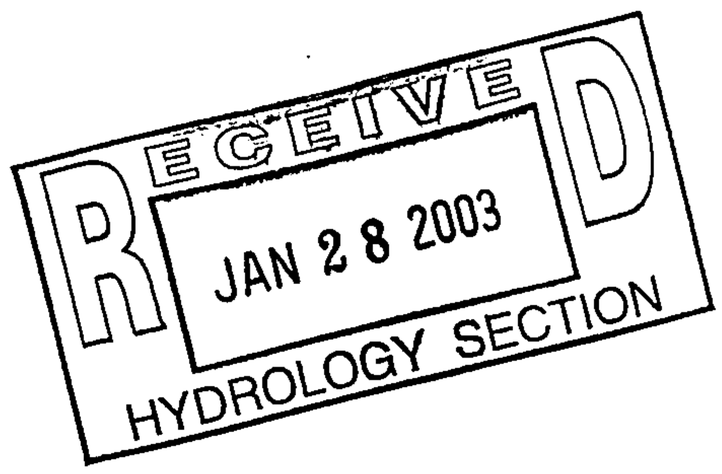
Home Depot
at Montgomery/ Eubank

Prepared by

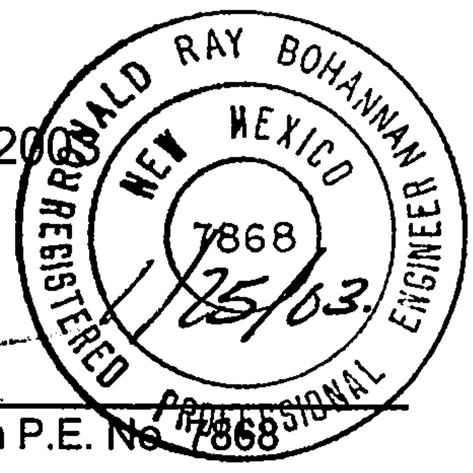
Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

Prepared for

The Home Depot
2800 Forest Lane
Dallas, Texas 75234



January 2003



Ronald R. Bohannan P.E. No. 7868

TABLE OF CONTENTS

Zone Atlas Map G-20 1

Location 2

Existing Drainage Conditions 2

FIRM Map and Soil Conditions 2

FIRM Map 35001C0143 D 3

On-Site Drainage Management Plan 4

Developed Basin Layout 5

Calculations 6

Summary 6

Runoff Calculations 7

Storm Sewer Calculations 10

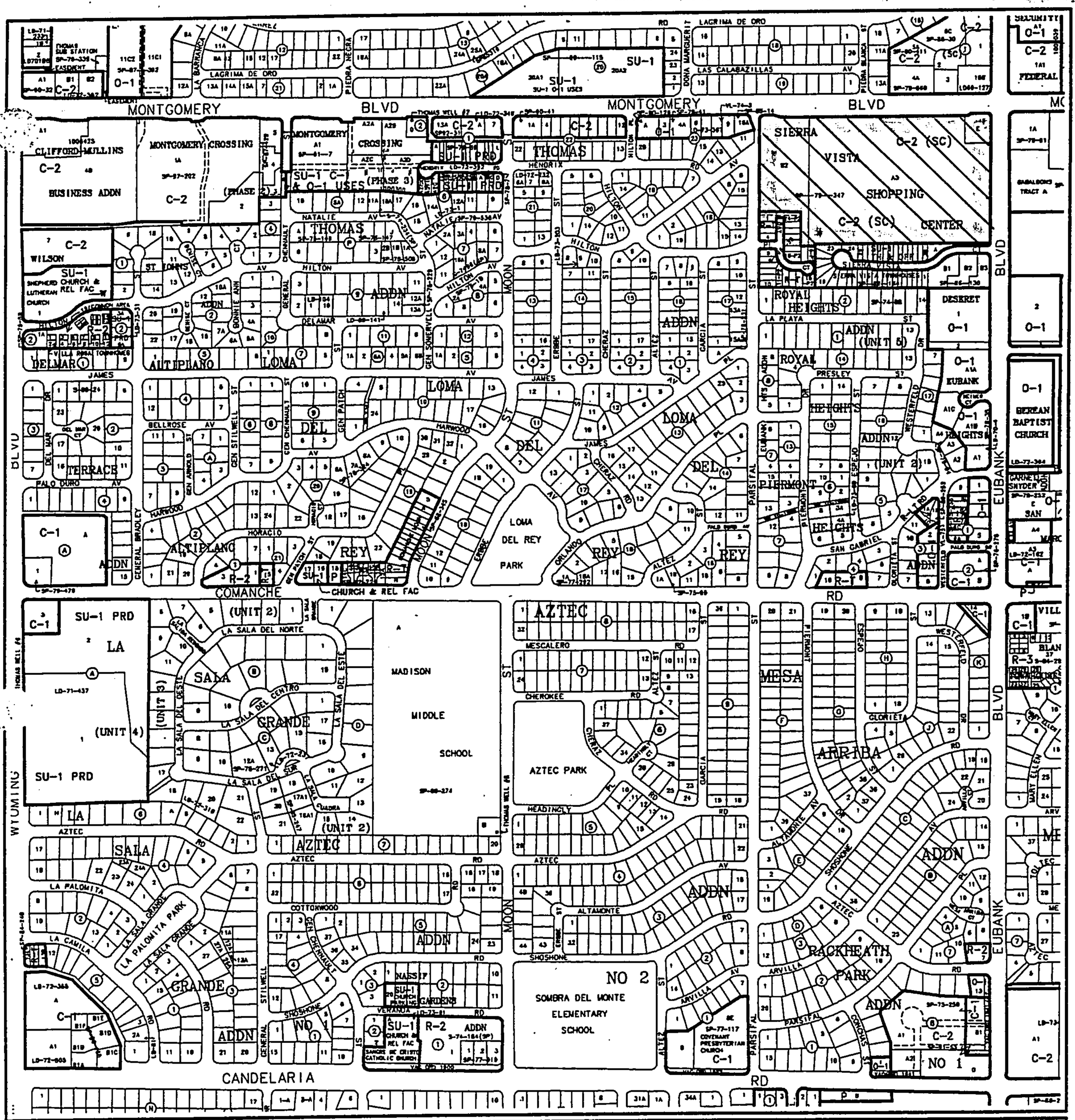
Channel Analysis 16

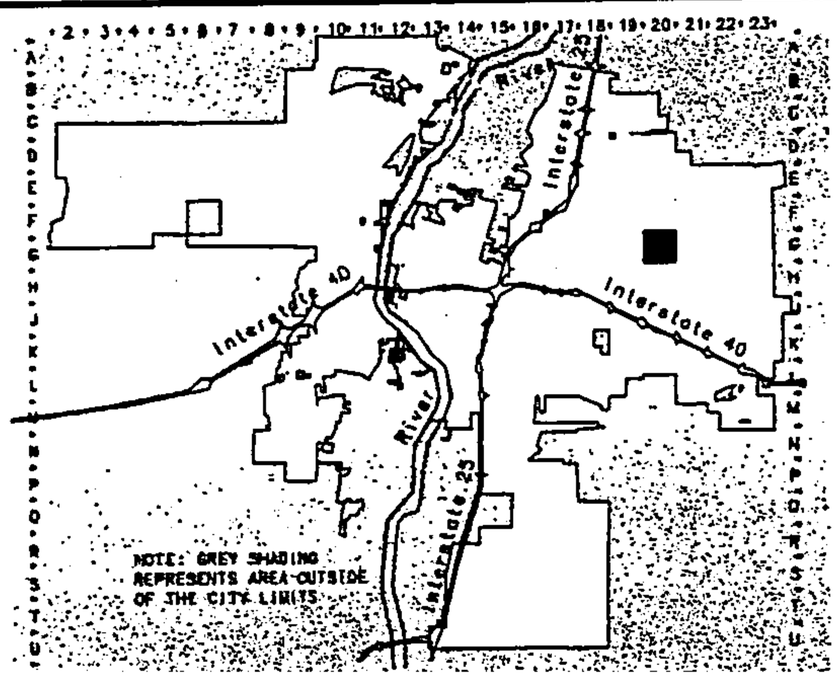
Pond Calculations 20

AHYMO Input and Output 24

Scanlon & Associates Letter 42

Photographs of Existing Channel 48





CITY OF
Albuquerque

Albuquerque Geographic Information System
PLANNING DEPARTMENT

© Copyright 2000

GRAPHIC SCALE IN FEET
250 0 750 1000

Zone Atlas Page

G-20-Z

Map Amended through July 28, 2000

Location

The site is identified as Tract B-2 and a portion of Tract A-3 Sierra Vista Shopping Center. It is located on the southwest corner of Montgomery Blvd and Eubank Blvd. Currently, the site consists of an existing Kmart store and an office complex. We are proposing to demolish the existing Kmart store and office complex and build a new Home Depot store in the same location. The property will be subdivided into two parcels, with the Home Depot on one parcel and the balance of the subdivision on the other parcel. The site is shown on Zone Atlas Map G-17 and contains approximately 11.14 acres. The purpose of this report is to provide the drainage analysis and management plan for the proposed retail development.

Existing Drainage Conditions

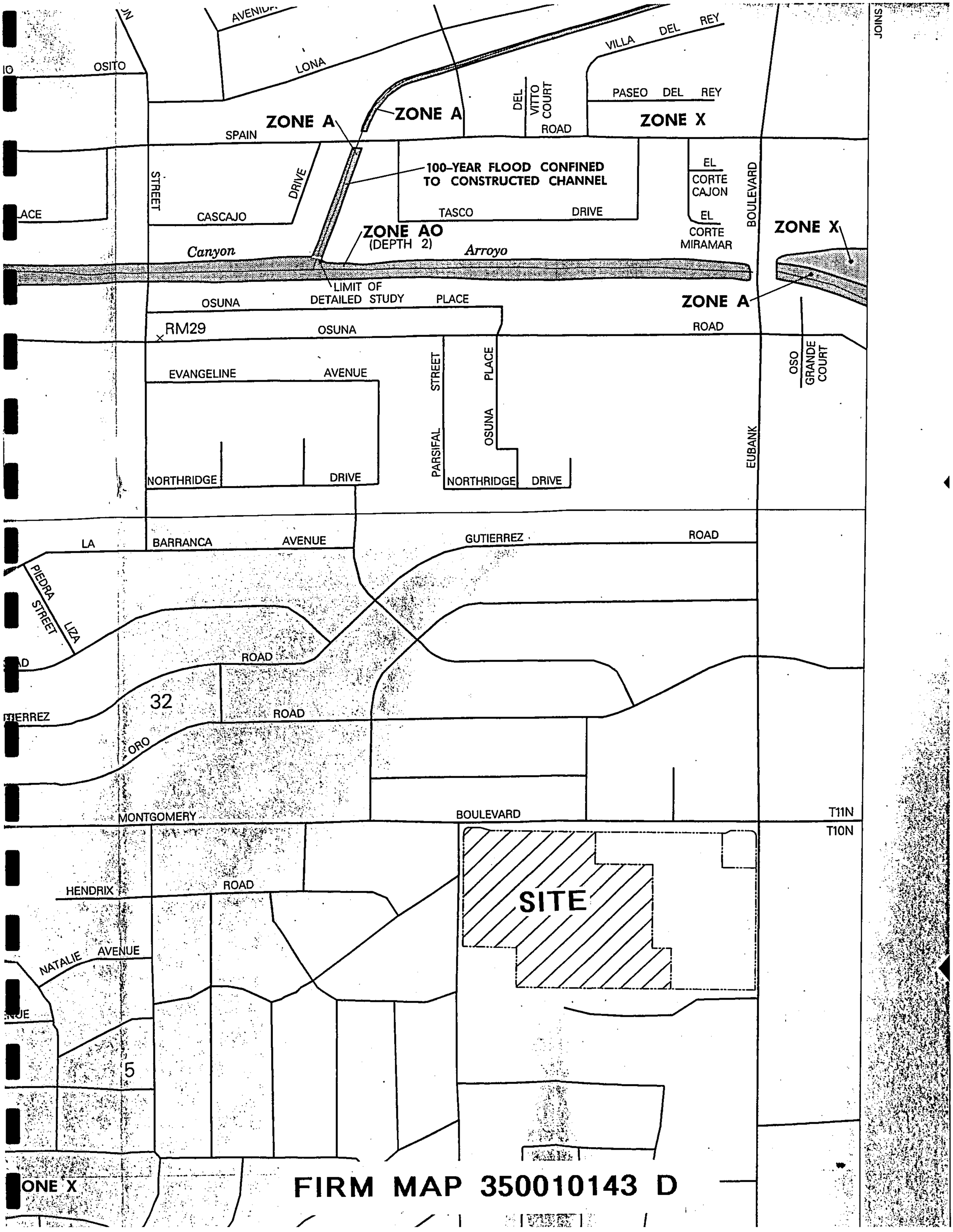
The site is currently developed with an office complex, a Kmart store, and other miscellaneous retail uses. There is an existing concrete channel in the rear of the shopping center. The channel has a series of weir structures that detain the water and limit the outflow to the historical flow. An offsite basin that drains approximately 85 cfs from the east enters the channel via a 36" concrete pipe. This flow is allowed to pass through the site and exit the area via a storm drain system in Parsifal.

A Super Kmart store was proposed for this site, and a drainage report was prepared by Great Basin Engineering (G20/D2J). This drainage report was approved by the City, but the Super Kmart was never developed due to the developer's financial difficulties. According to the study by Great Basin, 104.32 cfs was allowed to discharge from the site (this included the 85 cfs from the offsite basin).

No Reductions

FIRM Map

The site is located on FIRM map 35001C0143 D as shown on the attached excerpt. The map shows that the site does not lie within any 100-year flood plains.


ZONE A
ZONE A
ZONE A
ZONE X
ZONE X
ZONE AO
(DEPTH 2)
100-YEAR FLOOD CONFINED
TO CONSTRUCTED CHANNEL
LIMIT OF
DETAILED STUDY
Canyon
Arroyo
SPAIN
STREET
DRIVE
CASCAJO
TASCO
DRIVE
DEL
VITTO
COURT
ROAD
PASEO DEL REY
VILLA DEL REY
LONA
OSITO
EL
CORTE
CAJON
EL
CORTE
MIRAMAR
BOULEVARD
OSUNA
PLACE
RM29
OSUNA
ROAD
EVANGELINE
AVENUE
STREET
PLACE
PARSIFAL
OSUNA
NORTHRIDGE
DRIVE
NORTHRIDGE
DRIVE
OSO
GRANDE
COURT
EUBANK
LA
BARRANCA
AVENUE
GUTIERREZ
ROAD
PIEDRA
STREET
LIZA
ROAD
32
ROAD
ORO
MONTGOMERY
BOULEVARD
T11N
T10N
HENDRIX
ROAD
NATALIE
AVENUE
5
SITE
FIRM MAP 350010143 D

On-Site Drainage Management Plan

The site has been divided into twelve developed basins, which generate a total of 52.57 cfs of developed flows. There are also three offsite basins that impact the site. Offsite basins OS-1 and OS-2 consist of the remainder of the existing developed shopping center. Offsite basin OS-3, with a flow rate of 85 cfs, enters the site from the east and consists of the flows in Eubank Boulevard.

Basins 1-6, 8-11 and OS-1 will drain to a new storm drain system in the parking lot of the Home Depot. Basins 7, 12, and OS-3 will drain to the existing channel in the back of the store. A portion of the existing channel in the rear of the site will be removed and replaced with a 36" - 42" storm drain. We are proposing to modify the weir structures in the existing channel to store more water and release the water at the historic rate. This will allow the existing channel to detain the water without creating ponds in the Home Depot parking lot.

The existing channel has weir structures that cause the channel to also act as a detention pond. The weirs currently have 12" openings in the bottom of the walls to allow nuisance flows to pass. During a severe storm event the water would pass over the tops of the weir walls. We reanalyzed the channel/pond using AHYMO to route the ponds. According to Scanlon & Associates (See Appendix) Offsite Basin OS-3 has a flow rate of 85.00 cfs. There is no background information on how large this basin is or what the land treatments are. Consequently, the AHYMO data for OS-3 has been manipulated to create a basin with a flow rate of approximately 85.00. The land treatments and area of the basin are not accurate and are only used to create a basin of 85.00 cfs.

The southern channel has three ponding areas that will remain with modifications. We are proposing to raise the weir walls to eliminate the weir structures. A notch will be cut in the walls instead to better control the flows leaving the ponding areas. The weir walls will be raised and to provide more ponding capacity. These minor modifications will limit the flow to 100.73 cfs

MONTGOMERY BOULEVARD

BASIN 1
Q=2.38 CFS

BASIN 4
Q=10.79 CFS

BASIN 3
Q=5.67 CFS

BASIN 2
Q=0.89 CFS

BASIN 9
Q=5.92 CFS

OFFSITE BASIN OS-1
Q=22.62 CFS

EXISTING BUILDING

EXISTING BUILDING

EXISTING BUILDING

EXISTING BUILDING

LOAD 'N GO

BASIN 5
Q=1.52 CFS

BASIN 6
Q=4.01 CFS

BASIN 8
Q=5.23 CFS

EXISTING BUILDING

EXISTING BUILDING

EXISTING BUILDING

EXISTING BUILDING

PARSIFAL ST.

BASIN 11
Q=0.64 CFS

BASIN 7
Q=13.11 CFS

BASIN 10
Q=0.42 CFS

OFFSITE BASIN OS-2
Q=11.87 CFS

TRUCK ROUTE

OFFSITE BASIN OS-3
Q=85.00 CFS

BASIN 12
Q=1.99 CFS

N

DEVELOPED BASIN EXHIBIT

which is less than the allowable discharge rate of 104.32 cfs. This channel accepts public waters from Eubank, but a public easement does not extend to Parsifal. Home Depot will dedicate public easements for the channel and the new storm drain on the south property line.

In the case of an emergency or an event greater than the 100-year storm, the site would drain out the entrances before flooding the building. However, the channel in the back of the building that drains Basins OS-2, 7 and 12 was designed for twice the 100-year flow as back up. The area should overflow towards Montgomery before flooding the building, but the grades are close to the finished floor and the channel has been over-designed as a result.

Calculations

The following is an explanation of the storm sewer and pond calculations. The pond capacity was established using AHYMO in accordance with DPM criteria. The stage-storage-discharge charts for the ponds were developed using a spreadsheet and can be found in the "Ponding Calculations" section of the report. The discharge rate from the ponds was calculated using the orifice equation.

Summary

There are twelve proposed basins on the site. Most of these basins will drain to a new storm drain system that will discharge to the existing channel located in the rear of the store. A portion of the channel will be removed and replaced with a 42" storm drain pipe. Modifications will be made to the existing channel to increase the ponding capacity and better control the discharge from each ponding area. The discharge from the site is 100.73 cfs, which is less than the allowable discharge of 104.32 cfs.

Runoff
Calculations

Weighted E Method

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year			10-Year		
			%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
On-Site Basins																
1	21,743	0.50	0%	0	10%	0.05	0%	0.00	90%	0.45	2.216	0.092	2.38	1.386	0.058	1.58
2	8,125	0.19	0%	0	10%	0.02	0%	0.00	90%	0.17	2.216	0.034	0.89	1.386	0.022	0.59
3	51,650	1.19	0%	0	10%	0.12	0%	0.00	90%	1.07	2.216	0.219	5.67	1.386	0.137	3.76
4	98,389	2.26	0%	0	10%	0.23	0%	0.00	90%	2.03	2.216	0.417	10.79	1.386	0.261	7.16
5	13,831	0.32	0%	0	10%	0.03	0%	0.00	90%	0.29	2.216	0.059	1.52	1.386	0.037	1.01
6	36,556	0.84	0%	0	10%	0.08	0%	0.00	90%	0.76	2.216	0.155	4.01	1.386	0.097	2.66
7	119,506	2.74	0%	0	10%	0.27	0%	0.00	90%	2.47	2.216	0.507	13.11	1.386	0.317	8.70
8	47,641	1.09	0%	0	10%	0.11	0%	0.00	90%	0.98	2.216	0.202	5.23	1.386	0.126	3.47
9	53,931	1.24	0%	0	10%	0.12	0%	0.00	90%	1.11	2.216	0.229	5.92	1.386	0.143	3.92
10	3,863	0.09	0%	0	10%	0.01	0%	0.00	90%	0.08	2.216	0.016	0.42	1.386	0.010	0.28
11	10,806	0.25	0%	0	100%	0.25	0%	0.00	0%	0.00	0.920	0.019	0.64	0.360	0.007	0.30
12	18,111	0.42	0%	0	10%	0.04	0%	0.00	90%	0.37	2.216	0.077	1.99	1.386	0.048	1.32
Total	484,151	11.11		0		1.33		0.00		9.78		2.026	52.57		1.263	34.74
Off-Site Basins																
OS-1	206,181	4.73	0%	0	10%	0.47	0%	0.00	90%	4.26	2.216	0.874	22.62	1.386	0.547	15.00
OS-2	108,186	2.48	0%	0	10%	0.25	0%	0.00	90%	2.24	2.216	0.459	11.87	1.386	0.287	7.87
OS-3	877,000	20.13	0%	0	20%	4.03	20%	4.03	60%	12.08	1.858	3.117	85.00	1.096	1.839	53.80

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted D * Total Area

Flow = Qa * Aa + Qb * Ab + Qc * Ac + Qd * Ad

Excess Precipitation, E (inches)		
Zone 3	100-Year	10 - Year
E_a	0.66	0.19
E_b	0.92	0.36
E_c	1.29	0.62
E_d	2.36	1.50

Peak Discharge (cfs/acre)		
Zone 3	100-Year	10 - Year
Q_a	1.87	0.58
Q_b	2.6	1.19
Q_c	3.45	2.00
Q_d	5.02	3.39

MONTGOMERY BOULEVARD

BASIN 1
Q=2.38 CFS

BASIN 4
Q=10.79 CFS

BASIN 3
Q=5.67 CFS

BASIN 2
Q=0.89 CFS

BASIN 9
Q=5.92 CFS

OFFSITE BASIN OS-1
Q=22.62 CFS

EXISTING BUILDING

BASIN 5
Q=1.52 CFS

BASIN 6
Q=4.01 CFS

BASIN 8
Q=5.23 CFS

BASIN 7
Q=13.11 CFS

BASIN 11
Q=0.64 CFS

BASIN 10
Q=0.42 CFS

OFFSITE BASIN OS-2
Q=11.87 CFS

TRUCK ROUTE

PARSIFAL ST.

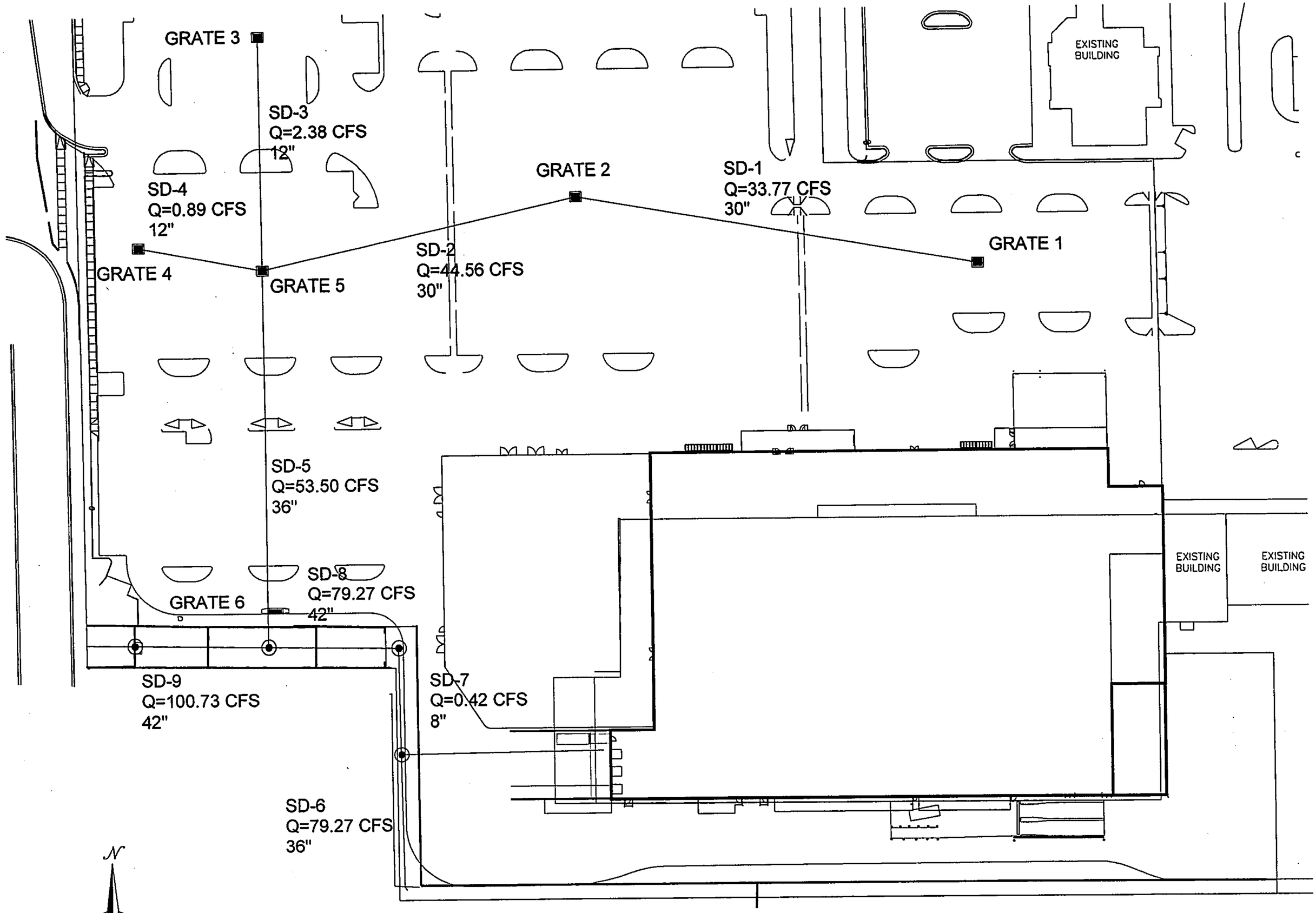
BASIN 12
Q=1.99 CFS

OFFSITE BASIN OS-3
Q=85.00 CFS

N

DEVELOPED BASIN EXHIBIT

Storm Sewer



PROPOSED STORM DRAIN EXHIBIT

Pipe Capacity

Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
1	30	1	4.91	0.625	41.13	33.77	6.88
2	30	1.37	4.91	0.625	48.14	44.56	9.08
3	12	0.6	0.79	0.250	2.77	2.38	3.03
4	12	1.56	0.79	0.250	4.46	0.89	1.13
5	36	1	7.07	0.750	66.88	53.50	7.57
6	36	4.98	7.07	0.750	149.24	79.27	11.21
7	8	5	0.35	0.167	2.71	0.42	1.20
8	42	1	9.62	0.875	100.88	79.27	8.24
9	42	1	9.62	0.875	100.88	100.73	10.47

Manning's Equation:

$Q = 1.49/n * A * R^{(2/3)} * S^{(1/2)}$

A = Area
R = D/4
S = Slope
n = 0.013

DROP INLET CALCULATIONS

	TYPE OF INLET	AREA (SF)	Q (CFS)	H (FT)	H ALLOW (FT)
1	2-Double 'D'	8.42	28.54	0.4956	0.5
2	Double 'D'	4.21	10.79	0.2833	0.5
3	Single 'D'	2.30	2.38	0.0462	0.5
4	Single 'D'	2.30	0.89	0.0065	0.5
5	Single 'D'	2.30	5.67	0.2621	0.5
6	Single 'C'	4.36	5.53	0.0694	0.5

ORIFICE EQUATION

Q = CA sqrt(2gH)

C = 0.6

g = 32.2

1. Basins OS-1 and 9 = 28.54
2. Basin 4
3. Basin 1
4. Basin 2
5. Basin 3
6. Basin 5 and 6 = 5.53

STORM DRAIN INLET
EFFECTIVE AREA ASSUMING A 50% CLOGGING FACTOR

DOUBLE D:

Area at the grate:

L = 76.75" - 14 (1/2" middle bars) - 6" center piece
= 63.75"
= 5.3125'

W = 25.5" - 13 (1/2 middle bars)
= 19"
= 1.583'

Area = 1.583' x 5.3125'
= 8.410 ft^2

Effective Area = 8.410 - .5 (8.410)
= 4.205 ft^2

Single 'C" Drop Inlet
EFFECTIVE AREA

Area at the grate:

L = 38.375" - 7(2@ middle bars)
= 34.875"
= 2.906'

W = 25.5" - 13(2@ middle bars)
= 19"
= 1.583'

Area = 1.583' x 2.906'
= 4.601 ft^2

Effective Area: = 4.601- 4.601 (0.5 clogging factor)
= 2.30 ft^2 at the grate

Area at the throat:

L = 47.375@
= 3.95'

H = 10:@ - 42@
= 63@
= 0.5208'

Area = 3.95' x 0.5208'
= 2.06 ft^2 at the throat

Total Area:

Area = 2.30_{grate} + 2.06_{throat}
= 4.36 ft^2

Channel Analysis

Channel Capacity

	Top Width	Bottom Width	Depth	Area	WP	R	Slope	Q Provided	Q Required	Velocity
	(ft)	(ft)	(ft)	(ft^2)	(ft)		(%)	(cfs)	(cfs)	(ft/s)
Channel	6	6	3	18.00	12.00	1.5000	30	1480.71	49.96	2.78

Manning's Equation:

Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area
W= Wetted Perimeter
R = A/WP
S = Slope
n = 0.013

Offsite Basin O2 = 11.87 cfs
Basin 7 = 13.11 cfs
Total flow into channel = 24.98
No emergency overflow use 2(24.98) = 49.96 cfs

Channel Inlet Capacity

Weir Equation:

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

Q= 49.96 cfs
C = 2.95
H = 1.00 ft
L = Length of weir

$$L = \frac{49.96}{2.95 * 1.0^{3/2}}$$

L = 16.94 ft
Use 17.00 feet for length of inlet

Hydraulic Jump

$$y_2 = \frac{y_1}{2} * \sqrt{1+8N_F^2} - 1$$

$$N_F = \frac{V}{\sqrt{g y_H}}$$

$$y_n = \frac{A}{T}$$

6' channel

$y_n = 0.31'$

$$N_F = \frac{49.96/1.86}{\sqrt{32.2(0.31)}} = 8.50$$

$$y_2 = \frac{0.31}{2} * \sqrt{1+8(8.50)^2} - 1$$

$= 2.73'$

make channel 3' deep to compensate for hydraulic jump

Ponding
Calculations

VOLUME CALCULATIONS

POND 1

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = $Ab * D + 0.5 * C * D^2$

C = (At - Ab) / Dt

Ab =	1,166.00
At =	1,166.00
Dt =	4.60
C =	0.00

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
42.48	0	0	0.00
42.90	0.42	0.0112	#NUM!
43.40	0.92	0.0246	#NUM!
43.90	1.42	0.0380	#NUM!
44.40	1.92	0.0514	#NUM!
44.90	2.42	0.0648	20.40
45.40	2.92	0.0782	54.92
45.90	3.42	0.0915	74.94
46.40	3.92	0.1049	90.64
46.90	4.42	0.1183	104.00
47.08	4.60	0.1231	108.40

Orifice Equation: Q=CA sqrt(2gH)

C =	0.6
Length (ft)	3.2
Height (ft)	4.68
Area (ft^2)=	14.976
g =	32.2
H (Ft) =	Depth of water above center of orifice
Q (CFS)=	Flow

VOLUME CALCULATIONS

POND 2

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = Ab * D + 0.5 * C * D^2

C = (At - Ab) / Dt

Ab =	6,945.48
At =	6,945.48
Dt =	5.50
C =	0.00

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
40.39	0	0	0.00
40.89	0.50	0.0797	#NUM!
41.39	1.00	0.1594	#NUM!
41.89	1.50	0.2392	#NUM!
42.39	2.00	0.3189	#NUM!
42.89	2.50	0.3986	#NUM!
43.39	3.00	0.4783	26.48
43.89	3.50	0.5581	45.87
44.39	4.00	0.6378	59.22
44.89	4.50	0.7175	70.07
45.39	5.00	0.7972	79.45
45.89	5.50	0.8770	87.83

Orifice Equation: Q=CA sqrt(2gH)

C =	0.6
Length (ft)	2
Height (in)	5.5
Area (ft^2)=	11.000
g =	32.2
H (Ft) =	Depth of water above center of orifice
Q (CFS)=	Flow

VOLUME CALCULATIONS

POND 3

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = $Ab * D + 0.5 * C * D^2$
C = (At - Ab) / Dt

	Upper	Middle	Lower
Ab =	1,030.00	2,195.28	1534.62
At =	1,030.00	2,195.28	1534.62
Dt =	1.53	3.15	4.8
C =	0.00	0.00	0.00

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
35.11	0	0	0.0000
35.50	0.39	0.0137	#NUM!
36.00	0.89	0.0314	#NUM!
36.50	1.39	0.0490	#NUM!
36.76	1.65	0.0712	#NUM!
37.00	1.89	0.0918	17.3334
37.50	2.39	0.1346	37.0604
38.00	2.89	0.1774	49.4621
38.38	3.27	0.2099	57.1139
38.50	3.39	0.2231	59.3256
39.00	3.89	0.2777	67.7684
39.50	4.39	0.3323	75.2700
39.91	4.80	0.3771	80.9040

Orifice Equation: Q=CA sqrt(2gH)

C =	0.6
Diameter (in)	42
Area (ft^2)=	9.621
g =	32.2
H (Ft) =	Depth of water above center of orifice
Q (CFS)=	Flow

AHYMO
Input and Output

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02a RUN DATE (MON/DAY/YR) =12/16/2002
INPUT FILE = a:hd pond.txt USER NO.= AHYMO-I-9702a0100011K-SH

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	
START										TIME=	.00
RAINFALL TYPE= 2										RAIN24=	3.100
COMPUTE NM HYD	OS1	-	1	.00740	22.26	1.051	2.66348	1.500	4.703	PER IMP=	90.00
COMPUTE NM HYD	OS2	-	2	.00388	11.69	.551	2.66348	1.500	4.707	PER IMP=	90.00
COMPUTE NM HYD	OS3	-	3	.03146	83.68	3.607	2.14977	1.500	4.156	PER IMP=	60.00
COMPUTE NM HYD	101.00	-	4	.00078	2.36	.111	2.66348	1.500	4.737	PER IMP=	90.00
COMPUTE NM HYD	102.00	-	5	.00029	.89	.041	2.66348	1.500	4.783	PER IMP=	90.00
COMPUTE NM HYD	103.00	-	6	.00185	5.59	.263	2.66348	1.500	4.714	PER IMP=	90.00
COMPUTE NM HYD	104.00	-	7	.00353	10.63	.501	2.66348	1.500	4.707	PER IMP=	90.00
COMPUTE NM HYD	105.00	-	8	.00050	1.51	.070	2.66348	1.500	4.761	PER IMP=	90.00
COMPUTE NM HYD	106.00	-	9	.00131	3.96	.186	2.66348	1.500	4.722	PER IMP=	90.00
COMPUTE NM HYD	107.00	-	10	.00429	12.91	.609	2.66348	1.500	4.706	PER IMP=	90.00
COMPUTE NM HYD	108.00	-	11	.00171	5.16	.243	2.66348	1.500	4.715	PER IMP=	90.00
COMPUTE NM HYD	109.00	-	12	.00194	5.84	.275	2.66348	1.500	4.714	PER IMP=	90.00
COMPUTE NM HYD	110.00	-	13	.00014	.43	.020	2.66348	1.500	4.828	PER IMP=	90.00
COMPUTE NM HYD	111.00	-	14	.00039	.65	.019	.91991	1.500	2.625	PER IMP=	.00
COMPUTE NM HYD	112.00	-	15	.00065	1.97	.092	2.66348	1.500	4.747	PER IMP=	90.00
ADD HYD	100.00	2& 3	30	.03534	95.37	4.158	2.20617	1.500	4.217		
ADD HYD	101.00	30&10	31	.03963	108.28	4.767	2.25563	1.500	4.270		
ADD HYD	103.00	31&15	32	.04028	110.25	4.859	2.26221	1.500	4.277		
ROUTE RESERVOIR	501.00	32	33	.04028	107.98	4.859	2.26221	1.500	4.189	AC-FT=	.123
ROUTE RESERVOIR	502.00	33	34	.04028	87.37	4.859	2.26217	1.600	3.389	AC-FT=	.873
ROUTE RESERVOIR	503.00	34	35	.04028	79.27	4.859	2.26216	1.650	3.075	AC-FT=	.364
ADD HYD	104.00	35& 4	36	.04106	80.54	4.970	2.26978	1.650	3.065		
ADD HYD	105.00	36& 5	37	.04135	81.02	5.011	2.27254	1.650	3.062		
ADD HYD	106.00	37& 6	38	.04320	84.03	5.275	2.28930	1.650	3.039		
ADD HYD	107.00	38& 7	39	.04673	89.75	5.776	2.31755	1.650	3.001		
ADD HYD	108.00	39& 8	40	.04723	90.56	5.846	2.32118	1.650	2.996		
ADD HYD	109.00	40& 9	41	.04854	92.69	6.033	2.33042	1.650	2.984		
ADD HYD	110.00	41&11	42	.05025	95.97	6.275	2.34175	1.600	2.984		
ADD HYD	111.00	42&12	43	.05218	99.93	6.550	2.35367	1.600	2.992		
ADD HYD	112.00	43&14	44	.05257	100.43	6.569	2.34308	1.600	2.985		
ADD HYD	113.00	44&15	45	.05322	101.77	6.661	2.34699	1.600	2.988		
FINISH											

```
**********************************************************
*                    HOME DEPOT AT EUBANK                *
**********************************************************
*          100-YEAR, 24-HR STORM  (PONDING CALCULATIONS)  *
**********************************************************
START                   TIME=0.0
*
*
*
RAINFALL                TYPE=2 RAIN QUARTER=0.0 IN
                        RAIN ONE=2.14 IN RAIN SIX=2.60 IN
                        RAIN DAY=3.10 IN DT=0.05 HR

*
* OFFSITE BASIN OS-1
*
COMPUTE NM HYD          ID=1 HYD NO=OS1 AREA=0.007396 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=1 CODE=1
*
* OFFSITE BASIN OS-2
*
COMPUTE NM HYD          ID=2 HYD NO=OS2 AREA=0.003881 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=2 CODE=1
*
* OFFSITE BASIN OS-3
*
COMPUTE NM HYD          ID=3 HYD NO=OS3 AREA=0.031458 SQ MI
                        PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=3 CODE=1
*
* BASIN 1
*
COMPUTE NM HYD          ID=4 HYD NO=101 AREA=0.000780 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=4 CODE=1
*
* BASIN 2
*
COMPUTE NM HYD          ID=5 HYD NO=102 AREA=0.000291 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=5 CODE=1
*
* BASIN 3
*
COMPUTE NM HYD          ID=6 HYD NO=103 AREA=0.001853 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=6 CODE=1
*
* BASIN 4
*
COMPUTE NM HYD          ID=7 HYD NO=104 AREA=0.003529 SQ MI
                        PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                        TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD               ID=7 CODE=1
*
```

```
* BASIN 5
*
COMPUTE NM HYD       ID=8 HYD NO=105 AREA=0.000496 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=8 CODE=1
*
* BASIN 6
*
COMPUTE NM HYD       ID=9 HYD NO=106 AREA=0.001311 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=9 CODE=1
*
* BASIN 7
*
COMPUTE NM HYD       ID=10 HYD NO=107 AREA=0.004287 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=10 CODE=1
*
* BASIN 8
*
COMPUTE NM HYD       ID=11 HYD NO=108 AREA=0.001709 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=11 CODE=1
*
* BASIN 9
*
COMPUTE NM HYD       ID=12 HYD NO=109 AREA=0.001935 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=12 CODE=1
*
* BASIN 10
*
COMPUTE NM HYD       ID=13 HYD NO=110 AREA=0.000139 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=13 CODE=1
*
* BASIN 11
*
COMPUTE NM HYD       ID=14 HYD NO=111 AREA=0.000388 SQ MI
                     PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=14 CODE=1
*
* BASIN 12
*
COMPUTE NM HYD       ID=15 HYD NO=112 AREA=0.000650 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=15 CODE=1
*
ADD HYD              ID=30 HYD=100 ID=2 ID=3
ADD HYD              ID=31 HYD=101 ID=30 ID=10
ADD HYD              ID=32 HYD=103 ID=31 ID=15
PRINT HYD            ID=32 CODE=1
*
* POND 1
*
```

```
ROUTE RESERVOIR     ID=33 HYD NO=501.0 INFLOW ID=32 CODE=24
                    OUTFLOW(CFS)       STORAGE(AC-FT)   ELEVATION(FT)
                        0.00             0.0000           42.48
                        1.00             0.0112           42.90
                        2.00             0.0246           43.40
                        3.00             0.0380           43.90
                        4.00             0.0514           44.40
                       20.40             0.0648           44.90
                       54.92             0.0782           45.40
                       74.94             0.0915           45.90
                       90.64             0.1049           46.40
                      104.00             0.1183           46.90
                      108.40             0.1231           47.08
PRINT HYD           ID=33 CODE=1
*
* POND 2
*
ROUTE RESERVOIR     ID=34 HYD NO=502.0 INFLOW ID=33 CODE=24
                    OUTFLOW(CFS)       STORAGE(AC-FT)   ELEVATION(FT)
                        0.00             0.0000           40.39
                        1.00             0.0797           40.89
                        2.00             0.1594           41.39
                        3.00             0.2392           41.89
                        4.00             0.3189           42.39
                        5.00             0.3986           42.89
                       26.48             0.4783           43.39
                       45.87             0.5581           43.89
                       59.22             0.6378           44.39
                       70.07             0.7175           44.89
                       79.45             0.7972           45.39
                       87.83             0.8770           45.89
PRINT HYD           ID=34 CODE=1
*
* POND 3
*
ROUTE RESERVOIR     ID=35 HYD NO=503.0 INFLOW ID=34 CODE=24
                    OUTFLOW(CFS)       STORAGE(AC-FT)   ELEVATION(FT)
                        0.00             0.0000           35.11
                        1.00             0.0137           35.50
                        2.00             0.0314           36.00
                        3.00             0.0490           36.50
                        4.00             0.0712           36.76
                       17.33             0.0918           37.00
                       37.06             0.1346           37.50
                       49.46             0.1774           38.00
                       57.11             0.2099           38.38
                       59.33             0.2231           38.50
                       67.77             0.2777           39.00
                       75.27             0.3323           39.50
                       80.90             0.3771           39.91
PRINT HYD           ID=35 CODE=1*
*
ADD HYD             ID=36 HYD=104 ID=35 ID=4
ADD HYD             ID=37 HYD=105 ID=36 ID=5
ADD HYD             ID=38 HYD=106 ID=37 ID=6
ADD HYD             ID=39 HYD=107 ID=38 ID=7
ADD HYD             ID=40 HYD=108 ID=39 ID=8
ADD HYD             ID=41 HYD=109 ID=40 ID=9
ADD HYD             ID=42 HYD=110 ID=41 ID=11
ADD HYD             ID=43 HYD=111 ID=42 ID=12
ADD HYD             ID=44 HYD=112 ID=43 ID=13
ADD HYD             ID=45 HYD=113 ID=44 ID=14
PRINT HYD           ID=45 CODE=1
```

*
*
*
FINISH

```
    AHYMO PROGRAM (AHYMO_97) -                          - Version:  1997.02a
         RUN DATE (MON/DAY/YR) = 12/16/2002
         START TIME (HR:MIN:SEC) = 16:15:51     USER NO.= AHYMO-I-9702a0100011K-SH
         INPUT FILE = a:hd pond.txt

**********************************************************
*                    HOME DEPOT AT EUBANK                *
**********************************************************
*          100-YEAR, 24-HR STORM  (PONDING CALCULATIONS)  *
**********************************************************
START                TIME=0.0
*
*
*
RAINFALL             TYPE=2 RAIN QUARTER=0.0 IN
                     RAIN ONE=2.14 IN RAIN SIX=2.60 IN
                     RAIN DAY=3.10 IN DT=0.05 HR
```

COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.

DT = .050000 HOURS END TIME = 24.000000 HOURS

.0000	.0041	.0084	.0128	.0173	.0220	.0269
.0319	.0372	.0427	.0484	.0543	.0606	.0672
.0741	.0814	.0892	.0975	.1063	.1159	.1263
.1353	.1453	.1742	.2424	.3597	.5412	.8026
1.1599	1.4418	1.5691	1.6754	1.7685	1.8518	1.9272
1.9960	2.0591	2.1173	2.1709	2.2204	2.2663	2.2773
2.2875	2.2971	2.3061	2.3146	2.3226	2.3303	2.3377
2.3447	2.3515	2.3580	2.3643	2.3704	2.3763	2.3820
2.3875	2.3929	2.3982	2.4033	2.4083	2.4132	2.4179
2.4226	2.4271	2.4316	2.4360	2.4403	2.4445	2.4486
2.4526	2.4566	2.4605	2.4644	2.4682	2.4719	2.4755
2.4792	2.4827	2.4862	2.4897	2.4931	2.4964	2.4998
2.5030	2.5063	2.5094	2.5126	2.5157	2.5188	2.5218
2.5248	2.5278	2.5307	2.5336	2.5365	2.5393	2.5421
2.5449	2.5477	2.5504	2.5531	2.5558	2.5584	2.5610
2.5636	2.5662	2.5688	2.5713	2.5738	2.5763	2.5787
2.5812	2.5836	2.5860	2.5884	2.5907	2.5931	2.5954
2.5977	2.6000	2.6021	2.6043	2.6064	2.6085	2.6106
2.6127	2.6148	2.6169	2.6190	2.6211	2.6231	2.6252
2.6272	2.6293	2.6313	2.6333	2.6354	2.6374	2.6394
2.6414	2.6434	2.6454	2.6474	2.6493	2.6513	2.6533
2.6552	2.6572	2.6591	2.6611	2.6630	2.6649	2.6668
2.6688	2.6707	2.6726	2.6745	2.6763	2.6782	2.6801
2.6820	2.6838	2.6857	2.6876	2.6894	2.6912	2.6931
2.6949	2.6967	2.6986	2.7004	2.7022	2.7040	2.7058
2.7076	2.7094	2.7111	2.7129	2.7147	2.7165	2.7182
2.7200	2.7217	2.7235	2.7252	2.7270	2.7287	2.7304
2.7321	2.7339	2.7356	2.7373	2.7390	2.7407	2.7424
2.7441	2.7457	2.7474	2.7491	2.7508	2.7524	2.7541
2.7558	2.7574	2.7591	2.7607	2.7623	2.7640	2.7656
2.7672	2.7688	2.7705	2.7721	2.7737	2.7753	2.7769
2.7785	2.7801	2.7817	2.7832	2.7848	2.7864	2.7880
2.7895	2.7911	2.7927	2.7942	2.7958	2.7973	2.7989
2.8004	2.8019	2.8035	2.8050	2.8065	2.8081	2.8096
2.8111	2.8126	2.8141	2.8156	2.8171	2.8186	2.8201
2.8216	2.8231	2.8245	2.8260	2.8275	2.8290	2.8304
2.8319	2.8334	2.8348	2.8363	2.8377	2.8392	2.8406
2.8421	2.8435	2.8449	2.8464	2.8478	2.8492	2.8506
2.8520	2.8535	2.8549	2.8563	2.8577	2.8591	2.8605
2.8619	2.8633	2.8647	2.8660	2.8674	2.8688	2.8702
2.8716	2.8729	2.8743	2.8757	2.8770	2.8784	2.8797

```
2.8811  2.8824  2.8838  2.8851  2.8865  2.8878  2.8892
2.8905  2.8918  2.8931  2.8945  2.8958  2.8971  2.8984
2.8997  2.9011  2.9024  2.9037  2.9050  2.9063  2.9076
2.9089  2.9102  2.9115  2.9127  2.9140  2.9153  2.9166
2.9179  2.9191  2.9204  2.9217  2.9229  2.9242  2.9255
2.9267  2.9280  2.9292  2.9305  2.9317  2.9330  2.9342
2.9355  2.9367  2.9380  2.9392  2.9404  2.9416  2.9429
2.9441  2.9453  2.9465  2.9478  2.9490  2.9502  2.9514
2.9526  2.9538  2.9550  2.9562  2.9574  2.9586  2.9598
2.9610  2.9622  2.9634  2.9646  2.9658  2.9669  2.9681
2.9693  2.9705  2.9717  2.9728  2.9740  2.9752  2.9763
2.9775  2.9787  2.9798  2.9810  2.9821  2.9833  2.9844
2.9856  2.9867  2.9879  2.9890  2.9902  2.9913  2.9924
2.9936  2.9947  2.9958  2.9970  2.9981  2.9992  3.0003
3.0014  3.0026  3.0037  3.0048  3.0059  3.0070  3.0081
3.0092  3.0103  3.0114  3.0126  3.0137  3.0147  3.0158
3.0169  3.0180  3.0191  3.0202  3.0213  3.0224  3.0235
3.0245  3.0256  3.0267  3.0278  3.0289  3.0299  3.0310
3.0321  3.0331  3.0342  3.0353  3.0363  3.0374  3.0384
3.0395  3.0406  3.0416  3.0427  3.0437  3.0448  3.0458
3.0469  3.0479  3.0489  3.0500  3.0510  3.0521  3.0531
3.0541  3.0552  3.0562  3.0572  3.0582  3.0593  3.0603
3.0613  3.0623  3.0634  3.0644  3.0654  3.0664  3.0674
3.0684  3.0694  3.0704  3.0715  3.0725  3.0735  3.0745
3.0755  3.0765  3.0775  3.0785  3.0795  3.0804  3.0814
3.0824  3.0834  3.0844  3.0854  3.0864  3.0874  3.0883
3.0893  3.0903  3.0913  3.0922  3.0932  3.0942  3.0952
3.0961  3.0971  3.0981  3.0990  3.1000

*
* OFFSITE BASIN OS-1
*
COMPUTE NM HYD       ID=1 HYD NO=OS1 AREA=0.007396 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1

     K =   .072649HR   TP =   .133300HR   K/TP RATIO =   .545000    SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   26.280   CFS   UNIT VOLUME =    .9987      B =   526.28      P60 = 2.1400
     AREA =      .006656 SQ MI   IA =    .10000 INCHES   INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =   .133656HR   TP =   .133300HR   K/TP RATIO =  1.002670    SHAPE CONSTANT, N =  3.520804
     UNIT PEAK =   1.7857   CFS   UNIT VOLUME =    .9936      B =   321.84      P60 = 2.1400
     AREA =      .000740 SQ MI   IA =    .50000 INCHES   INF =   1.25000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD            ID=1 CODE=1

                                   HYDROGRAPH FROM AREA OS1

     RUNOFF VOLUME =     2.66348 INCHES     =       1.0506 ACRE-FEET
     PEAK DISCHARGE RATE =      22.26 CFS  AT   1.500 HOURS   BASIN AREA =    .0074 SQ. MI.


*
* OFFSITE BASIN OS-2
*
COMPUTE NM HYD       ID=2 HYD NO=OS2 AREA=0.003881 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
```

```
      K =    .072649HR     TP =    .133300HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
      UNIT PEAK =    13.790     CFS    UNIT VOLUME =     .9983        B =    526.28       P60 = 2.1400
      AREA =       .003493 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000


      K =    .133656HR     TP =    .133300HR     K/TP RATIO =  1.002670      SHAPE CONSTANT, N =  3.520804
      UNIT PEAK =    .93704     CFS    UNIT VOLUME =     .9873        B =    321.84       P60 = 2.1400
      AREA =       .000388 SQ MI     IA =     .50000 INCHES     INF =    1.25000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

PRINT HYD             ID=2 CODE=1

                                                HYDROGRAPH FROM AREA OS2

     RUNOFF VOLUME =      2.66348 INCHES      =          .5513 ACRE-FEET
     PEAK DISCHARGE RATE =       11.69 CFS   AT    1.500 HOURS    BASIN AREA =    .0039 SQ. MI.



*
* OFFSITE BASIN OS-3
*
COMPUTE NM HYD        ID=3 HYD NO=OS3 AREA=0.031458 SQ MI
                      PER A=0.00 PER B=20.00 PER C=20.00 PER D=60.00
                      TP=-0.1333 HR MASS RAINFALL=-1

      K =    .072649HR     TP =    .133300HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
      UNIT PEAK =    74.519     CFS    UNIT VOLUME =     .9990        B =    526.28       P60 = 2.1400
      AREA =       .018875 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000


      K =    .121284HR     TP =    .133300HR     K/TP RATIO =    .909858      SHAPE CONSTANT, N =  3.892621
      UNIT PEAK =    32.845     CFS    UNIT VOLUME =     1.001        B =    347.95       P60 = 2.1400
      AREA =       .012583 SQ MI     IA =     .42500 INCHES     INF =    1.04000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

PRINT HYD             ID=3 CODE=1

                                                HYDROGRAPH FROM AREA OS3

     RUNOFF VOLUME =      2.14977 INCHES      =         3.6068 ACRE-FEET
     PEAK DISCHARGE RATE =       83.68 CFS   AT    1.500 HOURS    BASIN AREA =    .0315 SQ. MI.



*
* BASIN 1
*
COMPUTE NM HYD        ID=4 HYD NO=101 AREA=0.000780 SQ MI
                      PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                      TP=-0.1333 HR MASS RAINFALL=-1

      K =    .072649HR     TP =    .133300HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
      UNIT PEAK =    2.7715     CFS    UNIT VOLUME =     .9951        B =    526.28       P60 = 2.1400
      AREA =       .000702 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000
```

```
      K =    .133656HR     TP =    .133300HR    K/TP RATIO =  1.002670     SHAPE CONSTANT, N =  3.520804
      UNIT PEAK =    .18833    CFS   UNIT VOLUME =     .9321       B =   321.84       P60 = 2.1400
      AREA =       .000078 SQ MI    IA =     .50000 INCHES    INF =   1.25000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

PRINT HYD             ID=4 CODE=1

                                      PARTIAL HYDROGRAPH   101.00

    RUNOFF VOLUME =      2.66348 INCHES      =         .1108 ACRE-FEET
    PEAK DISCHARGE RATE =       2.36 CFS  AT   1.500 HOURS   BASIN AREA =    .0008 SQ. MI.


*
* BASIN 2
*
COMPUTE NM HYD        ID=5 HYD NO=102 AREA=0.000291 SQ MI
                      PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                      TP=-0.1333 HR MASS RAINFALL=-1

      K =    .072649HR     TP =    .133300HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
      UNIT PEAK =    1.0340    CFS   UNIT VOLUME =     .9891       B =   526.28       P60 = 2.1400
      AREA =       .000262 SQ MI    IA =     .10000 INCHES    INF =    .04000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000


      K =    .133656HR     TP =    .133300HR    K/TP RATIO =  1.002670     SHAPE CONSTANT, N =  3.520804
      UNIT PEAK =    .70260E-01CFS   UNIT VOLUME =     .8725       B =   321.84       P60 = 2.1400
      AREA =       .000029 SQ MI    IA =     .50000 INCHES    INF =   1.25000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

PRINT HYD             ID=5 CODE=1

                                      PARTIAL HYDROGRAPH   102.00


    RUNOFF VOLUME =      2.66348 INCHES      =         .0413 ACRE-FEET
    PEAK DISCHARGE RATE =        .89 CFS  AT   1.500 HOURS   BASIN AREA =    .0003 SQ. MI.


*
* BASIN 3
*
COMPUTE NM HYD        ID=6 HYD NO=103 AREA=0.001853 SQ MI
                      PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                      TP=-0.1333 HR MASS RAINFALL=-1

      K =    .072649HR     TP =    .133300HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
      UNIT PEAK =    6.5842    CFS   UNIT VOLUME =     .9975       B =   526.28       P60 = 2.1400
      AREA =       .001668 SQ MI    IA =     .10000 INCHES    INF =    .04000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000


      K =    .133656HR     TP =    .133300HR    K/TP RATIO =  1.002670     SHAPE CONSTANT, N =  3.520804
      UNIT PEAK =    .44740    CFS   UNIT VOLUME =     .9722       B =   321.84       P60 = 2.1400
      AREA =       .000185 SQ MI    IA =     .50000 INCHES    INF =   1.25000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

PRINT HYD             ID=6 CODE=1
```

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 2.66348 INCHES = .2632 ACRE-FEET
PEAK DISCHARGE RATE = 5.59 CFS AT 1.500 HOURS BASIN AREA = .0019 SQ. MI.

```
*
* BASIN 4
*
COMPUTE NM HYD       ID=7 HYD NO=104 AREA=0.003529 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
```

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 12.539 CFS UNIT VOLUME = .9983 B = 526.28 P60 = 2.1400
AREA = .003176 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .133656HR TP = .133300HR K/TP RATIO = 1.002670 SHAPE CONSTANT, N = 3.520804
UNIT PEAK = .85206 CFS UNIT VOLUME = .9855 B = 321.84 P60 = 2.1400
AREA = .000353 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

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

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 2.66348 INCHES = .5013 ACRE-FEET
PEAK DISCHARGE RATE = 10.63 CFS AT 1.500 HOURS BASIN AREA = .0035 SQ. MI.

```
*
* BASIN 5
*
COMPUTE NM HYD       ID=8 HYD NO=105 AREA=0.000496 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
```

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 1.7624 CFS UNIT VOLUME = .9928 B = 526.28 P60 = 2.1400
AREA = .000446 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .133656HR TP = .133300HR K/TP RATIO = 1.002670 SHAPE CONSTANT, N = 3.520804
UNIT PEAK = .11976 CFS UNIT VOLUME = .8875 B = 321.84 P60 = 2.1400
AREA = .000050 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

```
PRINT HYD            ID=8 CODE=1
```

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 2.66348 INCHES = .0705 ACRE-FEET
PEAK DISCHARGE RATE = 1.51 CFS AT 1.500 HOURS BASIN AREA = .0005 SQ. MI.

```
*
* BASIN 6
*
COMPUTE NM HYD       ID=9 HYD NO=106 AREA=0.001311 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1

     K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   4.6583    CFS   UNIT VOLUME =    .9966       B =   526.28      P60 = 2.1400
     AREA =      .001180 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =   .133656HR    TP =   .133300HR    K/TP RATIO =  1.002670     SHAPE CONSTANT, N =  3.520804
     UNIT PEAK =   .31653    CFS   UNIT VOLUME =    .9591       B =   321.84      P60 = 2.1400
     AREA =      .000131 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD            ID=9 CODE=1

                                   PARTIAL HYDROGRAPH   106.00


     RUNOFF VOLUME =     2.66348 INCHES     =         .1862 ACRE-FEET
     PEAK DISCHARGE RATE =       3.96 CFS  AT   1.500 HOURS   BASIN AREA =    .0013 SQ. MI.



*
* BASIN 7
*
COMPUTE NM HYD       ID=10 HYD NO=107 AREA=0.004287 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1

     K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   15.233    CFS   UNIT VOLUME =    .9985       B =   526.28      P60 = 2.1400
     AREA =      .003858 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =   .133656HR    TP =   .133300HR    K/TP RATIO =  1.002670     SHAPE CONSTANT, N =  3.520804
     UNIT PEAK =   1.0351    CFS   UNIT VOLUME =    .9889       B =   321.84      P60 = 2.1400
     AREA =      .000429 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD            ID=10 CODE=1

                                   PARTIAL HYDROGRAPH   107.00


     RUNOFF VOLUME =     2.66348 INCHES     =         .6090 ACRE-FEET
     PEAK DISCHARGE RATE =      12.91 CFS  AT   1.500 HOURS   BASIN AREA =    .0043 SQ. MI.



*
* BASIN 8
*
COMPUTE NM HYD       ID=11 HYD NO=108 AREA=0.001709 SQ MI
                     PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                     TP=-0.1333 HR MASS RAINFALL=-1
```

```
      K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
      UNIT PEAK =   6.0725    CFS   UNIT VOLUME =    .9975       B =   526.28      P60 = 2.1400
      AREA =      .001538 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


      K =   .133656HR    TP =   .133300HR    K/TP RATIO =  1.002670     SHAPE CONSTANT, N =  3.520804
      UNIT PEAK =   .41263    CFS   UNIT VOLUME =    .9683       B =   321.84      P60 = 2.1400
      AREA =      .000171 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD           ID=11 CODE=1

                                  PARTIAL HYDROGRAPH   108.00

    RUNOFF VOLUME =     2.66348 INCHES      =         .2428 ACRE-FEET
    PEAK DISCHARGE RATE =       5.16 CFS  AT   1.500 HOURS   BASIN AREA =    .0017 SQ. MI.


*
* BASIN 9
*
COMPUTE NM HYD      ID=12 HYD NO=109 AREA=0.001935 SQ MI
                    PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                    TP=-0.1333 HR MASS RAINFALL=-1

      K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
      UNIT PEAK =   6.8755    CFS   UNIT VOLUME =    .9975       B =   526.28      P60 = 2.1400
      AREA =      .001742 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


      K =   .133656HR    TP =   .133300HR    K/TP RATIO =  1.002670     SHAPE CONSTANT, N =  3.520804
      UNIT PEAK =   .46719    CFS   UNIT VOLUME =    .9722       B =   321.84      P60 = 2.1400
      AREA =      .000194 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD           ID=12 CODE=1

                                  PARTIAL HYDROGRAPH   109.00

    RUNOFF VOLUME =     2.66348 INCHES      =         .2749 ACRE-FEET
    PEAK DISCHARGE RATE =       5.84 CFS  AT   1.500 HOURS   BASIN AREA =    .0019 SQ. MI.


*
* BASIN 10
*
COMPUTE NM HYD      ID=13 HYD NO=110 AREA=0.000139 SQ MI
                    PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                    TP=-0.1333 HR MASS RAINFALL=-1

      K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
      UNIT PEAK =   .49390    CFS   UNIT VOLUME =    .9791       B =   526.28      P60 = 2.1400
      AREA =      .000125 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000
```

```
      K =    .133656HR     TP =    .133300HR     K/TP RATIO =  1.002670      SHAPE CONSTANT, N =  3.520804
      UNIT PEAK =    .33561E-01CFS    UNIT VOLUME =     .8725        B =    321.84       P60 = 2.1400
      AREA =       .000014 SQ MI     IA =     .50000 INCHES     INF =   1.25000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

PRINT HYD             ID=13 CODE=1

                                      PARTIAL HYDROGRAPH   110.00


     RUNOFF VOLUME =      2.66348 INCHES      =         .0197 ACRE-FEET
     PEAK DISCHARGE RATE =         .43 CFS  AT    1.500 HOURS   BASIN AREA =    .0001 SQ. MI.


*
* BASIN 11
*
COMPUTE NM HYD        ID=14 HYD NO=111 AREA=0.000388 SQ MI
                      PER A=0.00 PER B=100.00 PER C=0.00 PER D=0.00
                      TP=-0.1333 HR MASS RAINFALL=-1

      K =    .133656HR     TP =    .133300HR     K/TP RATIO =  1.002670      SHAPE CONSTANT, N =  3.520804
      UNIT PEAK =    .93680    CFS    UNIT VOLUME =     .9873        B =    321.84       P60 = 2.1400
      AREA =       .000388 SQ MI     IA =     .50000 INCHES     INF =   1.25000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

PRINT HYD             ID=14 CODE=1

                                      PARTIAL HYDROGRAPH   111.00


     RUNOFF VOLUME =       .91991 INCHES      =         .0190 ACRE-FEET
     PEAK DISCHARGE RATE =         .65 CFS  AT    1.500 HOURS   BASIN AREA =    .0004 SQ. MI.


*
* BASIN 12
*
COMPUTE NM HYD        ID=15 HYD NO=112 AREA=0.000650 SQ MI
                      PER A=0.00 PER B=10.00 PER C=0.00 PER D=90.00
                      TP=-0.1333 HR MASS RAINFALL=-1

      K =    .072649HR     TP =    .133300HR     K/TP RATIO =   .545000      SHAPE CONSTANT, N =  7.106420
      UNIT PEAK =    2.3096    CFS    UNIT VOLUME =     .9941        B =    526.28       P60 = 2.1400
      AREA =       .000585 SQ MI     IA =     .10000 INCHES     INF =    .04000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000


      K =    .133656HR     TP =    .133300HR     K/TP RATIO =  1.002670      SHAPE CONSTANT, N =  3.520804
      UNIT PEAK =    .15694    CFS    UNIT VOLUME =     .9126        B =    321.84       P60 = 2.1400
      AREA =       .000065 SQ MI     IA =     .50000 INCHES     INF =   1.25000 INCHES PER HOUR
      RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .050000

PRINT HYD             ID=15 CODE=1

                                      PARTIAL HYDROGRAPH   112.00


     RUNOFF VOLUME =      2.66348 INCHES      =         .0923 ACRE-FEET
     PEAK DISCHARGE RATE =        1.97 CFS  AT    1.500 HOURS   BASIN AREA =    .0007 SQ. MI.
```

```
*
ADD HYD              ID=30 HYD=100 ID=2 ID=3
ADD HYD              ID=31 HYD=101 ID=30 ID=10
ADD HYD              ID=32 HYD=103 ID=31 ID=15
PRINT HYD            ID=32 CODE=1

                                   PARTIAL HYDROGRAPH   103.00


    RUNOFF VOLUME =     2.26221 INCHES     =       4.8593 ACRE-FEET
    PEAK DISCHARGE RATE =     110.25 CFS  AT   1.500 HOURS   BASIN AREA =   .0403 SQ. MI.



*
* POND 1
*
ROUTE RESERVOIR      ID=33 HYD NO=501.0 INFLOW ID=32 CODE=24
                     OUTFLOW(CFS)       STORAGE(AC-FT)   ELEVATION(FT)
                         0.00               0.0000           42.48
                         1.00               0.0112           42.90
                         2.00               0.0246           43.40
                         3.00               0.0380           43.90
                         4.00               0.0514           44.40
                        20.40               0.0648           44.90
                        54.92               0.0782           45.40
                        74.94               0.0915           45.90
                        90.64               0.1049           46.40
                       104.00               0.1183           46.90
                       108.40               0.1231           47.08

  *   *   *   *   *   *   *   *   *   *   *   *   *   *   *   *   *

    TIME        INFLOW     ELEV       VOLUME     OUTFLOW
    (HRS)       (CFS)      (FEET)     (AC-FT)    (CFS)

     .00          .00      42.48        .000        .00
    1.20         4.71      43.40        .025       2.01
    2.40         4.71      44.43        .052       4.83
    3.60          .89      42.90        .011       1.00
    4.80          .72      42.78        .008        .72
    6.00          .79      42.81        .009        .77
    7.20          .69      42.77        .008        .70
    8.40          .64      42.75        .007        .64
    9.60          .60      42.73        .007        .60
   10.80          .56      42.72        .006        .56
   12.00          .52      42.70        .006        .53
   13.20          .50      42.69        .006        .50
   14.40          .47      42.68        .005        .47
   15.60          .44      42.67        .005        .45
   16.80          .43      42.66        .005        .43
   18.00          .41      42.65        .005        .41
   19.20          .39      42.64        .004        .39
   20.40          .37      42.64        .004        .38
   21.60          .36      42.63        .004        .36
   22.80          .35      42.63        .004        .35
   24.00          .33      42.62        .004        .34
PEAK DISCHARGE =       107.979 CFS - PEAK OCCURS AT HOUR    1.50
MAXIMUM WATER SURFACE ELEVATION =       47.063
MAXIMUM STORAGE =          .1226 AC-FT      INCREMENTAL TIME=     .050000HRS
```

PRINT HYD ID=33 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 501.00

RUNOFF VOLUME = 2.26221 INCHES = 4.8593 ACRE-FEET
PEAK DISCHARGE RATE = 107.98 CFS AT 1.500 HOURS BASIN AREA = .0403 SQ. MI.

*
* POND 2
*
ROUTE RESERVOIR ID=34 HYD NO=502.0 INFLOW ID=33 CODE=24

OUTFLOW(CFS)	STORAGE(AC-FT)	ELEVATION(FT)
0.00	0.0000	40.39
1.00	0.0797	40.89
2.00	0.1594	41.39
3.00	0.2392	41.89
4.00	0.3189	42.39
5.00	0.3986	42.89
26.48	0.4783	43.39
45.87	0.5581	43.89
59.22	0.6378	44.39
70.07	0.7175	44.89
79.45	0.7972	45.39
87.83	0.8770	45.89

* * * * * * * * * * * * * * * * *

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	40.39	.000	.00
1.20	2.01	40.50	.018	.22
2.40	4.83	42.90	.401	5.57
3.60	1.00	41.79	.224	2.81
4.80	.72	41.07	.108	1.36
6.00	.77	40.85	.073	.92
7.20	.70	40.78	.062	.78
8.40	.64	40.74	.056	.70
9.60	.60	40.71	.051	.64
10.80	.56	40.69	.047	.60
12.00	.53	40.67	.044	.56
13.20	.50	40.65	.042	.52
14.40	.47	40.64	.039	.49
15.60	.45	40.62	.037	.47
16.80	.43	40.61	.036	.45
18.00	.41	40.60	.034	.43
19.20	.39	40.59	.032	.41
20.40	.38	40.58	.031	.39
21.60	.36	40.58	.030	.37
22.80	.35	40.57	.029	.36
24.00	.34	40.56	.028	.35
25.20	.00	40.46	.011	.14
26.40	.00	40.41	.003	.04
27.60	.00	40.40	.001	.01
28.80	.00	40.39	.000	.00

PEAK DISCHARGE = 87.369 CFS - PEAK OCCURS AT HOUR 1.60
MAXIMUM WATER SURFACE ELEVATION = 45.862
MAXIMUM STORAGE = .8726 AC-FT INCREMENTAL TIME= .050000HRS

PRINT HYD ID=34 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 502.00

RUNOFF VOLUME = 2.26217 INCHES = 4.8592 ACRE-FEET
PEAK DISCHARGE RATE = 87.37 CFS AT 1.600 HOURS BASIN AREA = .0403 SQ. MI.

```
*
* POND 3
*
ROUTE RESERVOIR      ID=35 HYD NO=503.0 INFLOW ID=34 CODE=24
```

OUTFLOW(CFS)	STORAGE(AC-FT)	ELEVATION(FT)
0.00	0.0000	35.11
1.00	0.0137	35.50
2.00	0.0314	36.00
3.00	0.0490	36.50
4.00	0.0712	36.76
17.33	0.0918	37.00
37.06	0.1346	37.50
49.46	0.1774	38.00
57.11	0.2099	38.38
59.33	0.2231	38.50
67.77	0.2777	39.00
75.27	0.3323	39.50
80.90	0.3771	39.91

* * * * * * * * * * * * * * * * * *

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	35.11	.000	.00
1.20	.22	35.14	.001	.08
2.40	5.57	36.79	.074	5.91
3.60	2.81	36.58	.055	3.29
4.80	1.36	35.77	.023	1.54
6.00	.92	35.48	.013	.96
7.20	.78	35.42	.011	.80
8.40	.70	35.39	.010	.71
9.60	.64	35.36	.009	.65
10.80	.60	35.34	.008	.60
12.00	.56	35.33	.008	.56
13.20	.52	35.32	.007	.53
14.40	.49	35.30	.007	.50
15.60	.47	35.29	.006	.47
16.80	.45	35.29	.006	.45
18.00	.43	35.28	.006	.43
19.20	.41	35.27	.006	.41
20.40	.39	35.26	.005	.39
21.60	.37	35.26	.005	.38
22.80	.36	35.25	.005	.36
24.00	.35	35.25	.005	.35
25.20	.14	35.18	.002	.17
26.40	.04	35.13	.001	.05
27.60	.01	35.12	.000	.01
28.80	.00	35.11	.000	.00

PEAK DISCHARGE = 79.270 CFS - PEAK OCCURS AT HOUR 1.65
MAXIMUM WATER SURFACE ELEVATION = 39.791
MAXIMUM STORAGE = .3641 AC-FT INCREMENTAL TIME= .050000HRS

```
PRINT HYD            ID=35 CODE=1*
```

OUTFLOW HYDROGRAPH RESERVOIR 503.00

RUNOFF VOLUME = 2.26216 INCHES = 4.8592 ACRE-FEET
PEAK DISCHARGE RATE = 79.27 CFS AT 1.650 HOURS BASIN AREA = .0403 SQ. MI.

```
*
ADD HYD              ID=36 HYD=104 ID=35 ID=4
ADD HYD              ID=37 HYD=105 ID=36 ID=5
ADD HYD              ID=38 HYD=106 ID=37 ID=6
ADD HYD              ID=39 HYD=107 ID=38 ID=7
ADD HYD              ID=40 HYD=108 ID=39 ID=8
ADD HYD              ID=41 HYD=109 ID=40 ID=9
ADD HYD              ID=42 HYD=110 ID=41 ID=11
ADD HYD              ID=43 HYD=111 ID=42 ID=12
ADD HYD              ID=44 HYD=112 ID=43 ID=13
ADD HYD              ID=45 HYD=113 ID=44 ID=14
PRINT HYD            ID=45 CODE=1
```

PARTIAL HYDROGRAPH 113.00

RUNOFF VOLUME = 2.34393 INCHES = 6.5888 ACRE-FEET
PEAK DISCHARGE RATE = 100.73 CFS AT 1.600 HOURS BASIN AREA = .0527 SQ. MI.

```
*
*
*
FINISH
```

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 11:37:33

Scanlon & Associates Letter

Scanlon & associates, inc.
engineers and planners

Dec. 9, 1977

(77027)

Mr. Bill Waters
Long Waters
8009 Mountain Rd. Pl.
Albuquerque, N.M. 87110

Re: Sierra Vista Shopping Center Drainage Plan

Dear Bill:

After reviewing and analyzing the available data in the vicinity of Montgomery and Eubank Boulevards, we developed the following drainage plan for the Sierra Vista Shopping Center.

1. The location of the shopping center and the surrounding area is shown in Figure 1. The drainage basins that contribute stormwater flows to the property are also shown in Figure 1.

2. The existing topography at the shopping center site is shown in Figure 2.

3. The proposed shopping center site plan is shown in Figure 3.

4. Jacob A. Vigil, Consulting Engineer, prepared the following drainage report, "Design of Storm Sewer for Eubank Boulevard Widening Between Candelaria and Montgomery Boulevards, H-4067(1)," Albuquerque, New Mexico, August 1976. I have compared the stormwater quantities that we computed with those computed by Mr. Vigil and found them to be comparable. I will use the quantities from the Vigil report since that report has already been submitted and approved.

The Vigil report indicates that the flow entering the site from the east from a 100-year frequency storm will be approximately 85 cubic feet per second (cfs).

ALBUQUERQUE, NEW MEXICO 87110 [illegible] MOUNTAIN ROAD NE TELEPHONE [illegible]

The calculations for the shopping center site are as follows:

Area - shopping center ≅ 817,000 s.f. ≅ 18.75 ac
Area - R-2 ≅ 221,000 s.f. ≅ 5.1 ac
Landscaped Area = shopping center ≅ 2.0 ac

Time of Concentration = $T_c = \frac{K1.37}{S^{.2}}$ (soil conservation service overland flow method)

where

K = coefficient of ground surface = 1.57 undeveloped
= 0.85 developed

L = length of overland flow = 1400 ft.
S = slope = 3.3%

therefore T_c = 18 minutes (undeveloped)
T_c = 10 minutes (developed)

From the Intensity/Duration/Frequency Curve (Master Plan of Drainage, City of Albuquerque, New Mexico and Environs 1963)

$$I = \frac{189}{T_c + 25}$$

$$I = \frac{189}{18 + 25} = 4.4 \text{ inches/hour (undeveloped)}$$

$$I = \frac{189}{10 + 25} = 5.4 \text{ inches/hour (developed)}$$

Using the Rational Method:

$$Q = cIA$$

where Q = flow in cfs
c = runoff coefficient
I = intensity in inches/hour
A = area in acres

$c = 1.0$ asphalt covered
$c = 0.6$ multiple family residences
$c = 0.15$ undeveloped

$$Q_{100} = 1(5.4)16.75 = 90.45$$
$$Q_{100} = .15(5.4)2.0 = 1.62$$
$$= 0.6(5.4)5.1 = \underline{16.52}$$
$$Q_{100} = 108.59 \text{ cfs (developed)}$$

$$Q_{100} = .15(5.4)23.85 = 19.32 \text{ cfs (undeveloped)}$$

Q_{100} that must be retained on property = 89.27 cfs

Q_{100} that can leave property = 104.32 cfs

Volume of storage = 89.27 x 10 x 60 = 53,600 cf

$$\frac{53600}{1415 \times 2} = 19'$$

The drainage could be handled in the following manner. A landscaped depression measuring approximately 2 feet deep by 20 feet in width could be developed along the property line between the R-2/SU-1 properties and the proposed shopping center. Check structures would have to be incorporated in the design to assure ponding. This volume of ponding would provide the required storage of stormwaters.

Essentially what would occur would be the retention of all stormwaters generated off site and the retention of only that amount of stormwater generated on site necessary to satisfy the drainage ordinance. Trying to convey off-site waters through the site or ponding on-site waters is impractical. The proposed solution has the same net effect downstream of the shopping center as allowing all off-site water to pass through the site.

As you proceed further with your design, a grading plan will be needed to demonstrate that the proposed solution can be implemented.

Sincerely,

Thomas T. Mann, Jr., P.E.
Project Manager

TM:sj
attachments

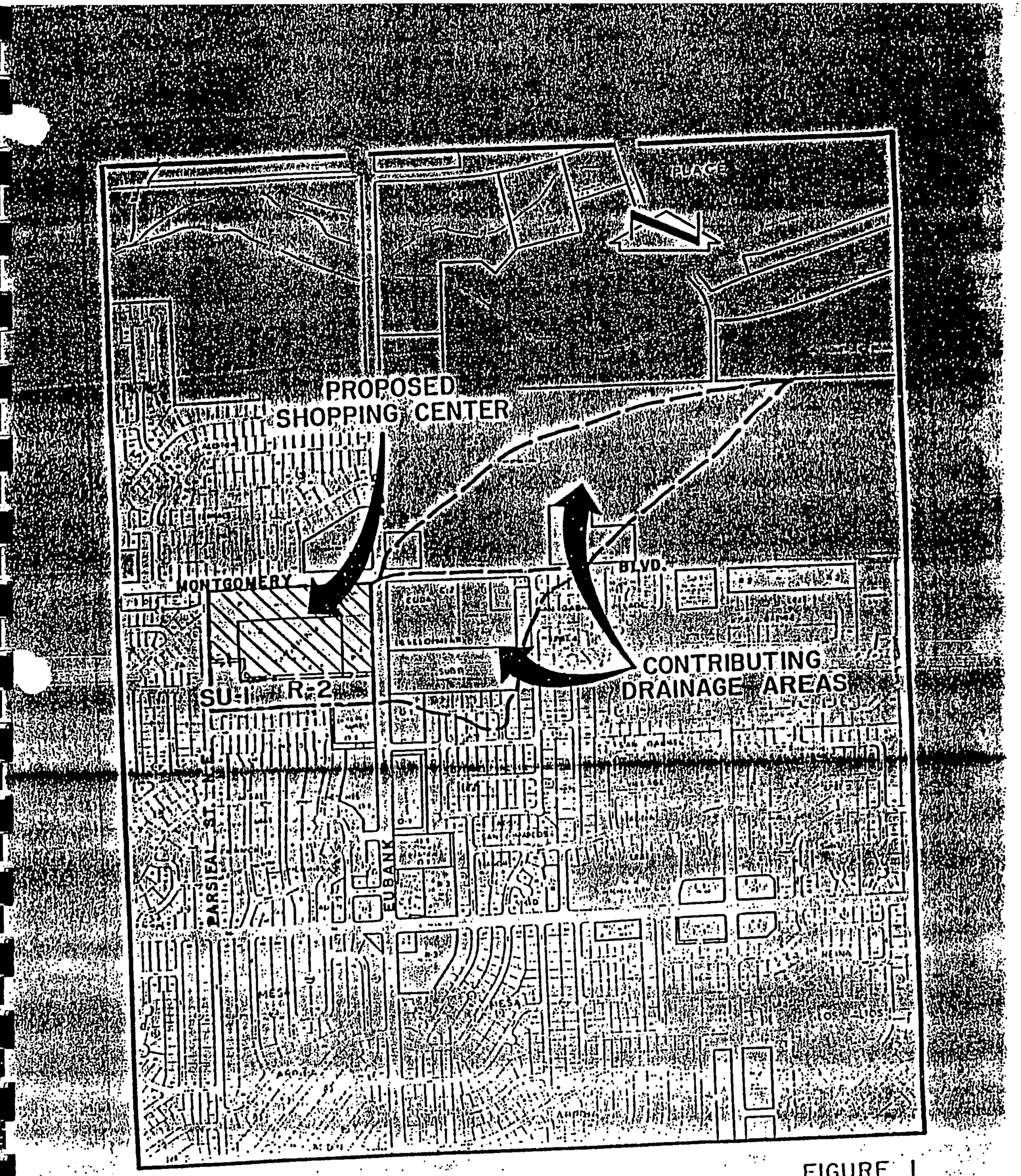

PROPOSED
SHOPPING CENTER
CONTRIBUTING
DRAINAGE AREAS
MONTGOMERY
SU-1 R-2
PARSIFAL ST.
EUBANK
BLVD.
PLACE

FIGURE 1

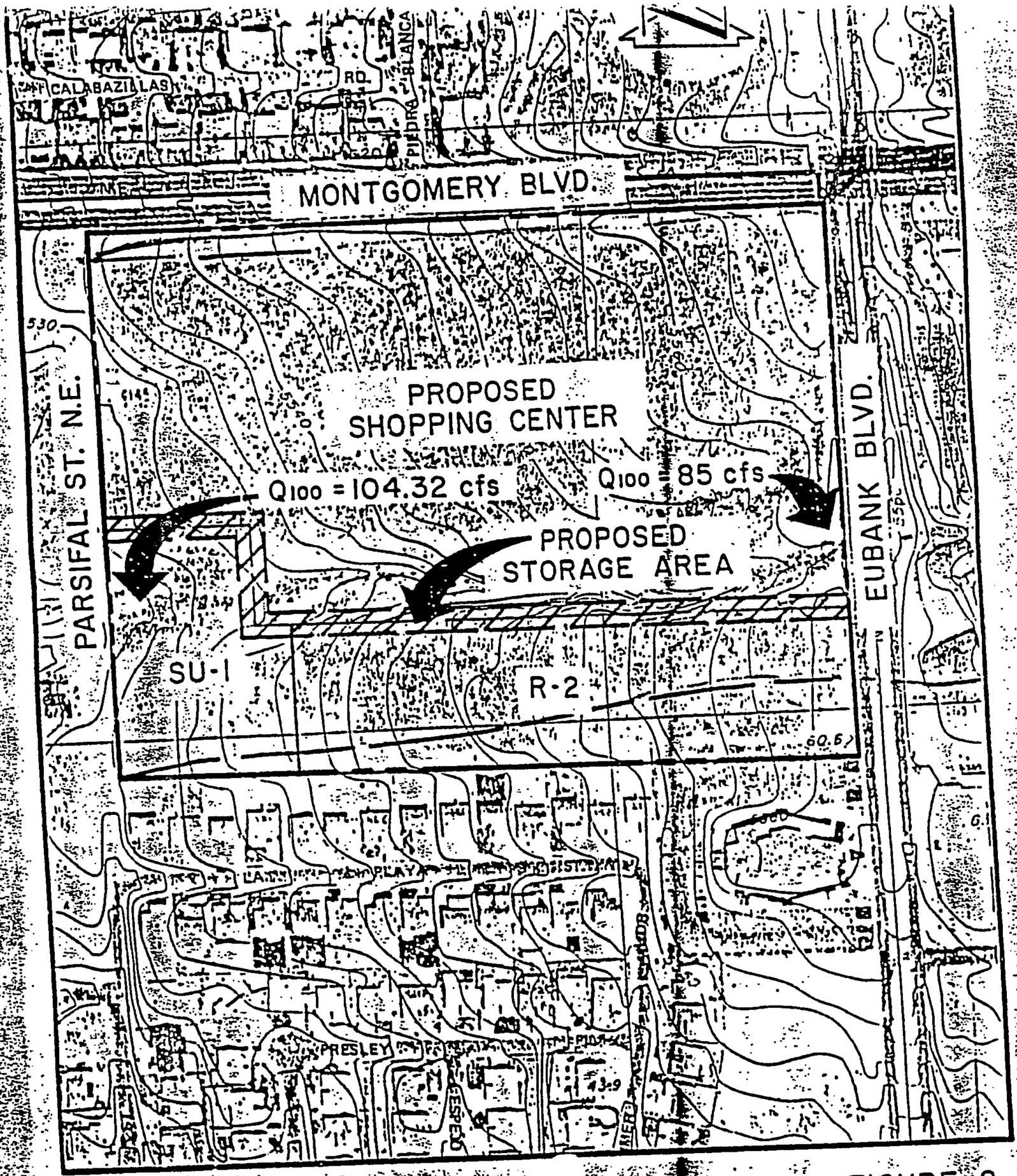
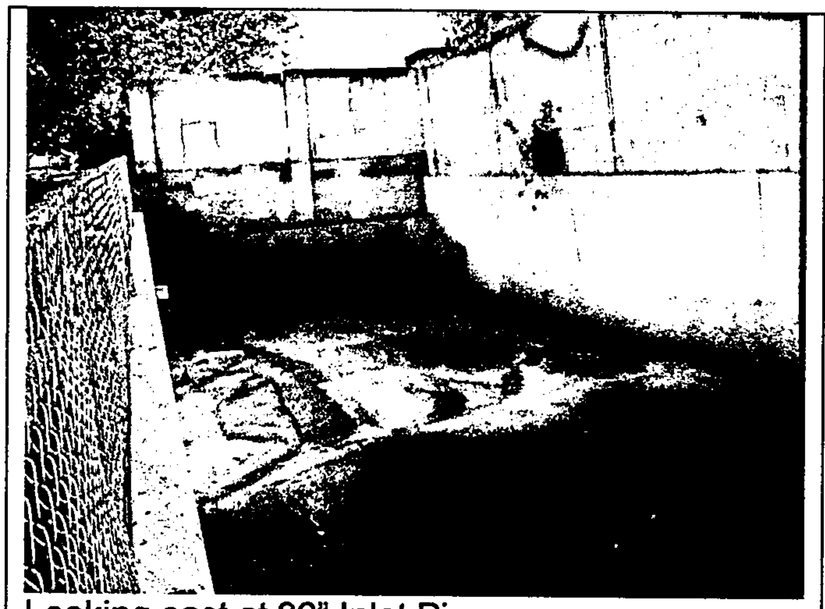

MONTGOMERY BLVD.
CALABAZILLAS RD.
PIEDRA BLANCA
PARSIFAL ST. N.E.
EUBANK BLVD.
PROPOSED
SHOPPING CENTER
Q100 = 104.32 cfs
Q100 = 85 cfs
PROPOSED
STORAGE AREA
SU-1
R-2
530
60.67
PRESLEY
43.9

FIGURE 2

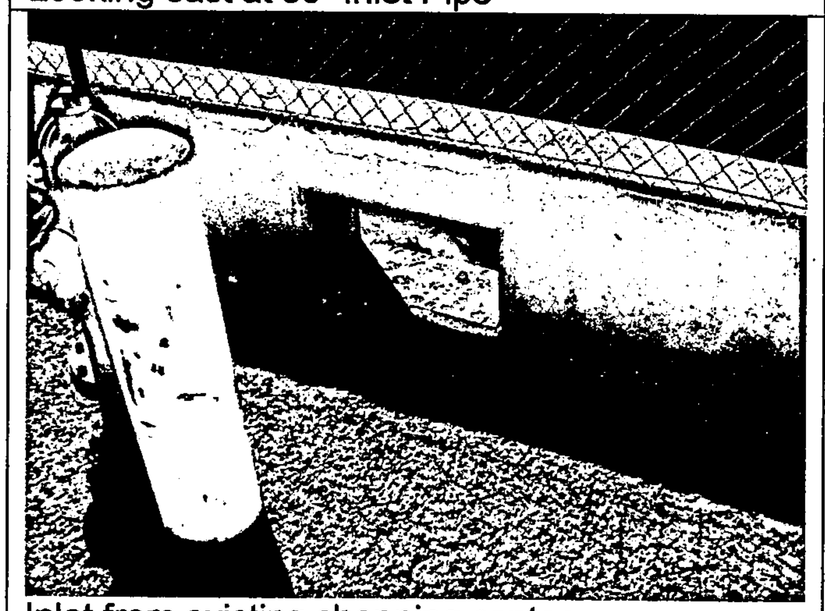
Photographs of Existing Channel



Looking east at 36" Inlet Pipe



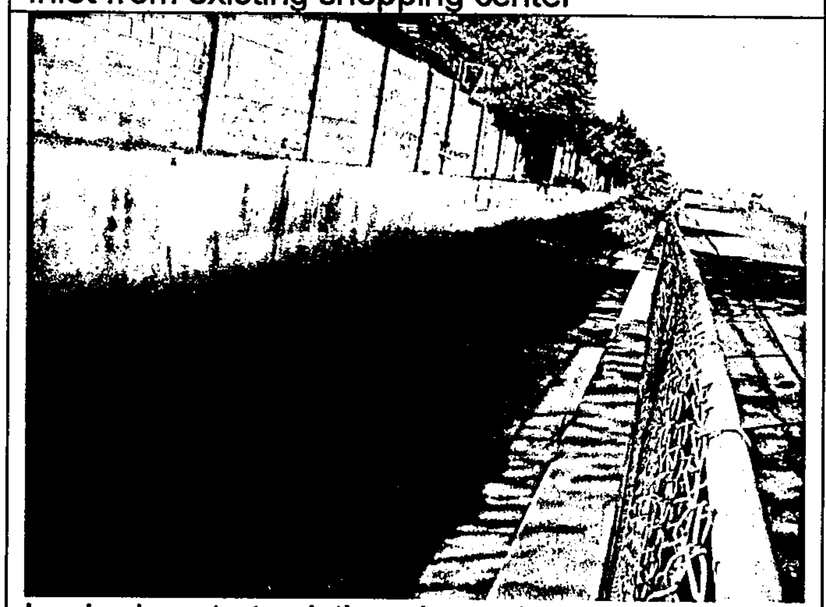
Looking west at existing channel



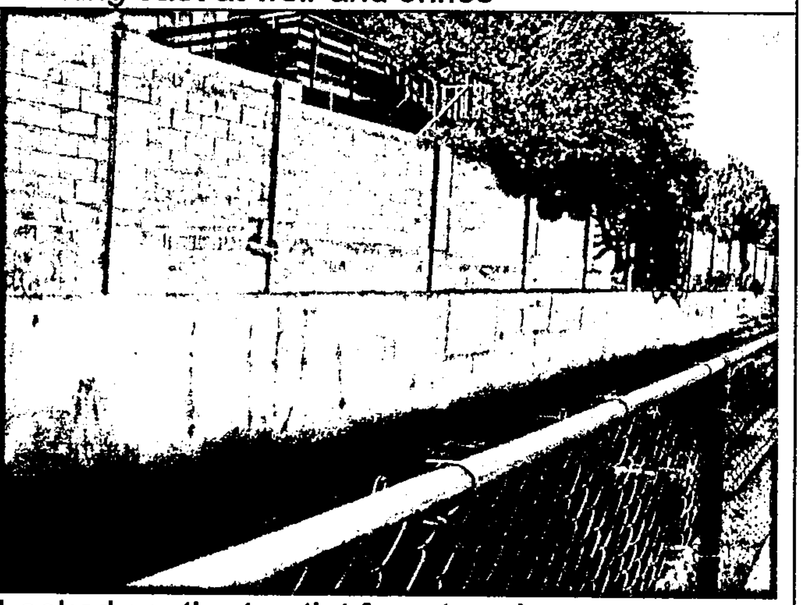
Inlet from existing shopping center



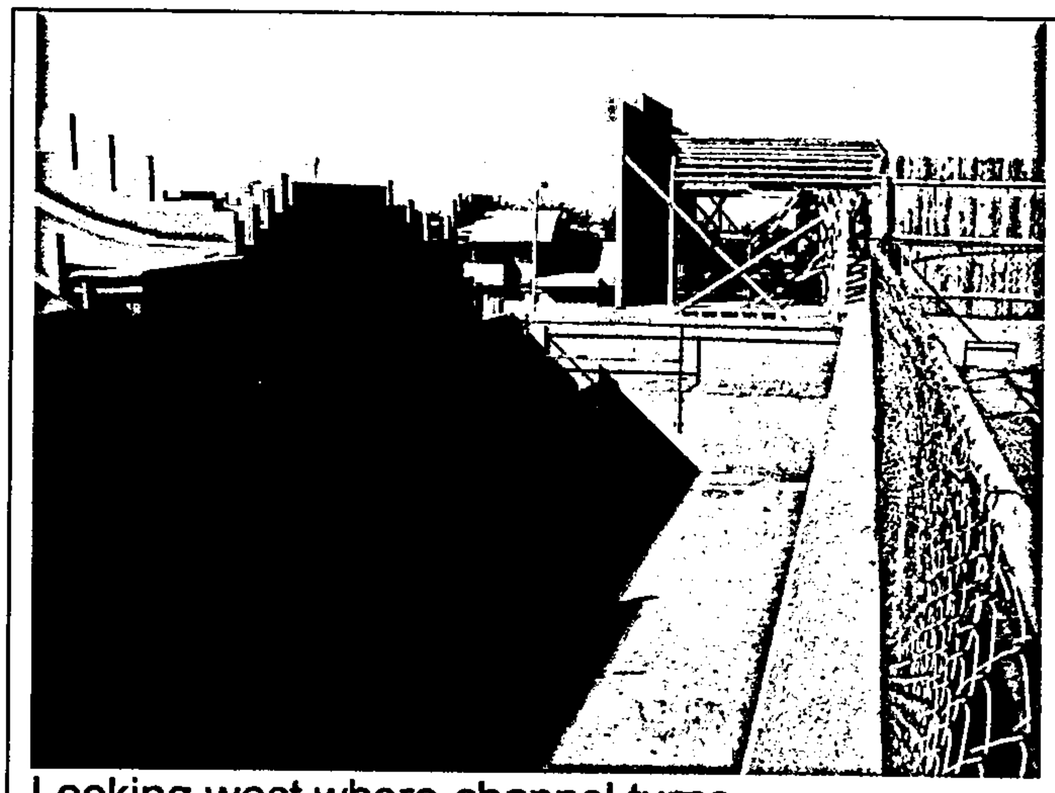
Looking east at weir and orifice



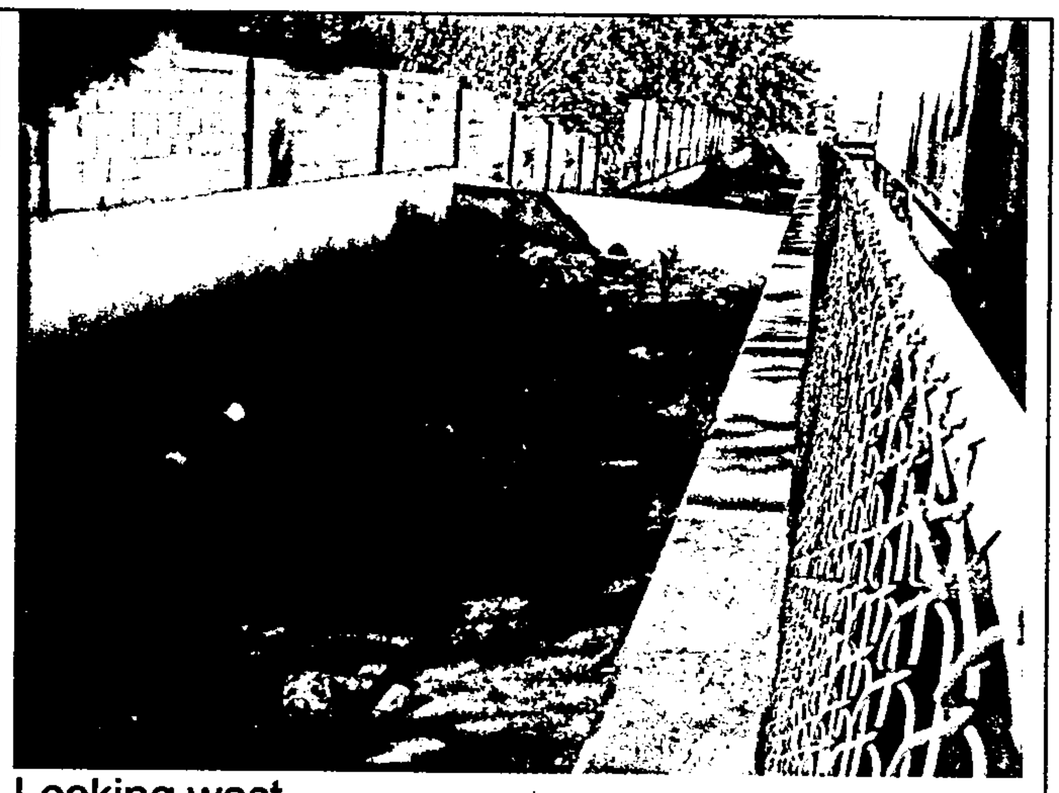
Looked east at existing channel



Looked south at outlet from townhomes



Looking west where channel turns



Looking west



Looking south at weir



Looking east at weir



Looking east at entrance to channel from subdivision



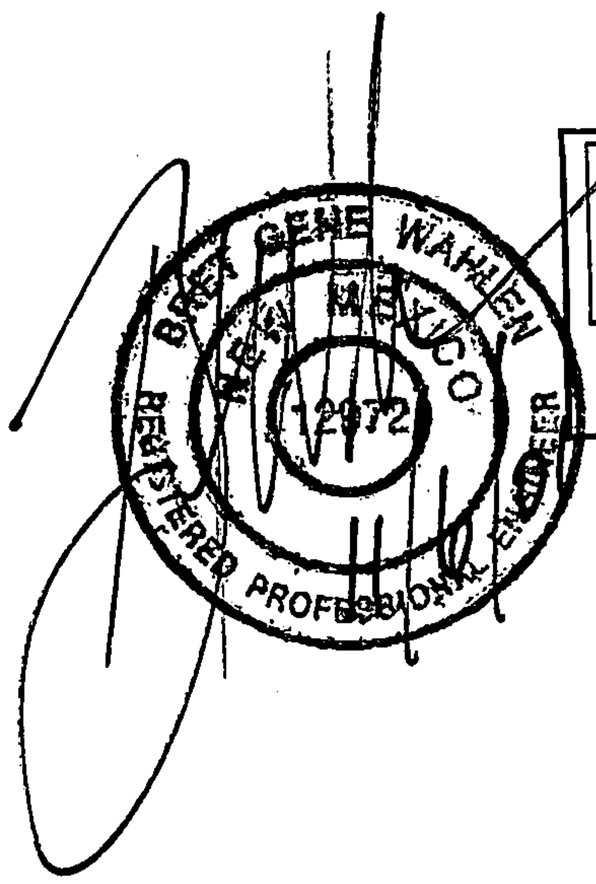
Looking south at entrance from subdivision

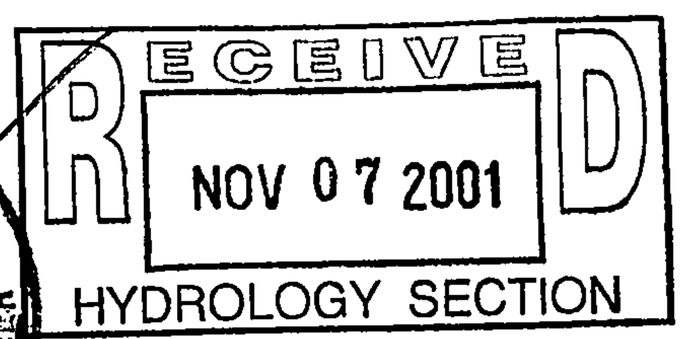
Storm Water Study
Kmart #9827 – Sierra Vista Shopping Center
Albuquerque, New Mexico

August 29, 2001

Addendum

November 6, 2001



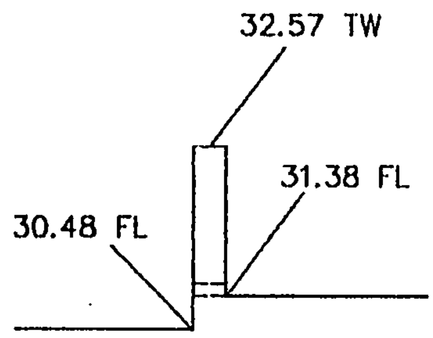


Prepared For:
Kmart Corporation
3100 West Big Beaver Road
Troy, Michigan 48084

CONSULTING ENGINEERS &
LAND SURVEYORS

GREAT BASIN ENGINEERING - South
2010 North Redwood Road • P.O. Box 16747 • Salt Lake City, Utah 84116
(801) 521-8529 ∞ (801) 394-7288 ∞ Fax (801) 521-9551 ∞ E-mail
gbes@xmission.com

PARSIFAL STREET NE
(60' PUBLICLY DEDICATED RIGHT-OF-W
DRIVEWAY
DRIVEWAY
DRIVEWAY
WATER
18" WATER LINE
GAS
SEWER
STORM
5 SPACES
2 SPACES
17 SPACES
STAIRS
STAIRS
COVERED ENTRANCE
COMMERCIAL BUILDING
9500 MONTGOMERY BOULEVARD NE
28.4' ABOVE FINISH FLOOR (2-STORY)
4,955 SQUARE FEET
4" ROOF DRAIN
4" ROOF DRAIN
SEE DETAIL A
SEE DETAIL A
N89°28'20"W
(N89°28'20"W)
228.57'
(228.73')
N00°15'50"W
(N00°15'50"W)
LOT 1
LOT 24-P2
LOT 23-P2
TOWNHOUSE
CURB (TYPICAL)
27.42 RIM
19.42 INV
26.85 RIM
19.45 INV



DETAIL A
PONDING AREA (TYP.)
NOT TO SCALE

DRIVEWAY

27.4
19.4

DRIVEWAY

DRIVEWAY

26.
19.

(60' PUBLICLY DEDICATED RIGHT-OF-WAY

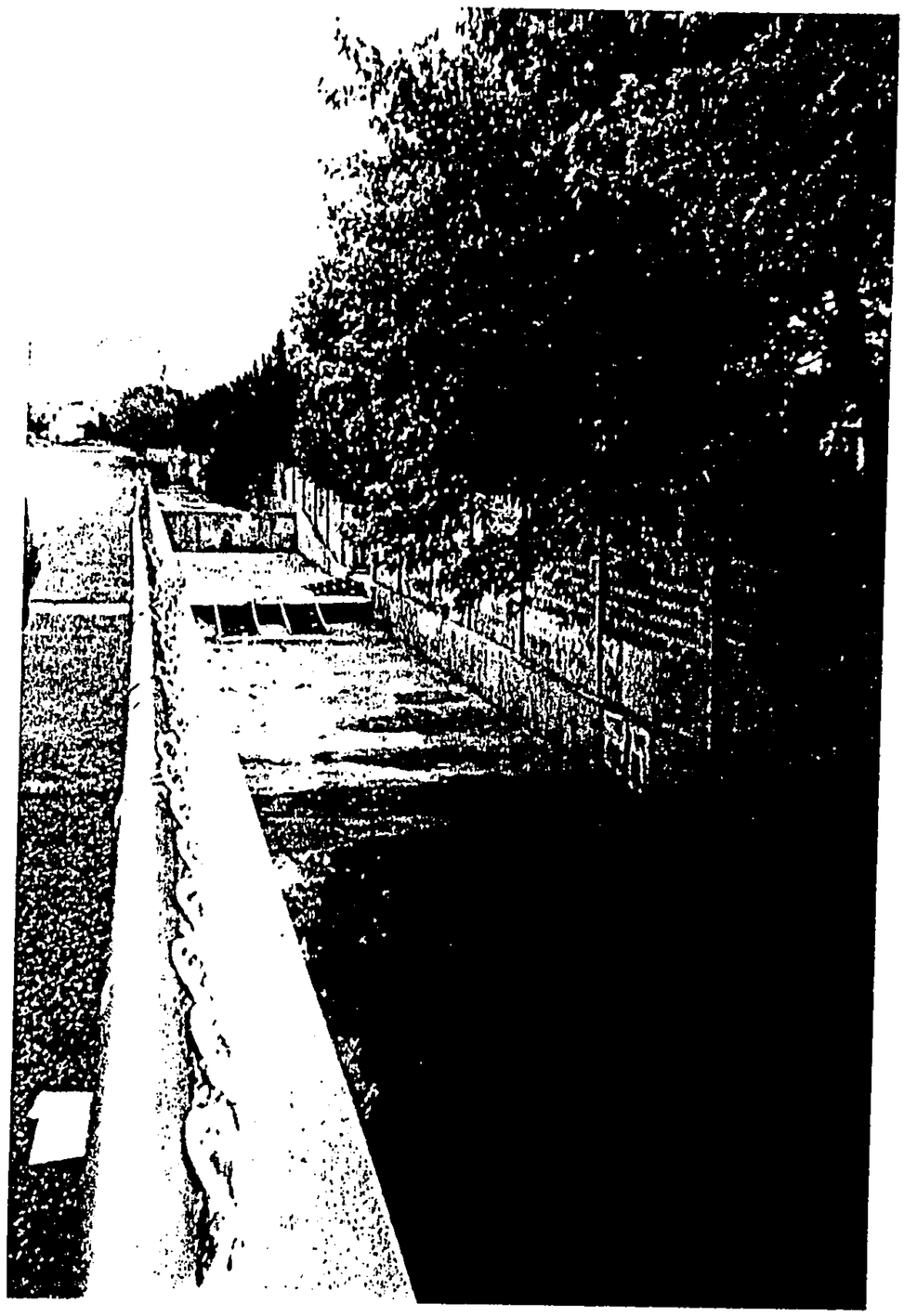
SPOT ELEVATION LEGEND

ADD 5500 TO SPOT ELEVATIONS SHOWN TO OBTAIN MEAN SEA LEVEL ELEVATIONS.

- 00.0 = ELEVATION AT GROUND
- 00.00 = ELEVATION AT TOP OF ASPHALT OR CONCRETE
- 00.00 BC = ELEVATION AT BACK OF CURB
- 00.00 FL = ELEVATION AT FLOWLINE OF CURB
- 00.00 TW = ELEVATION AT TOP OF

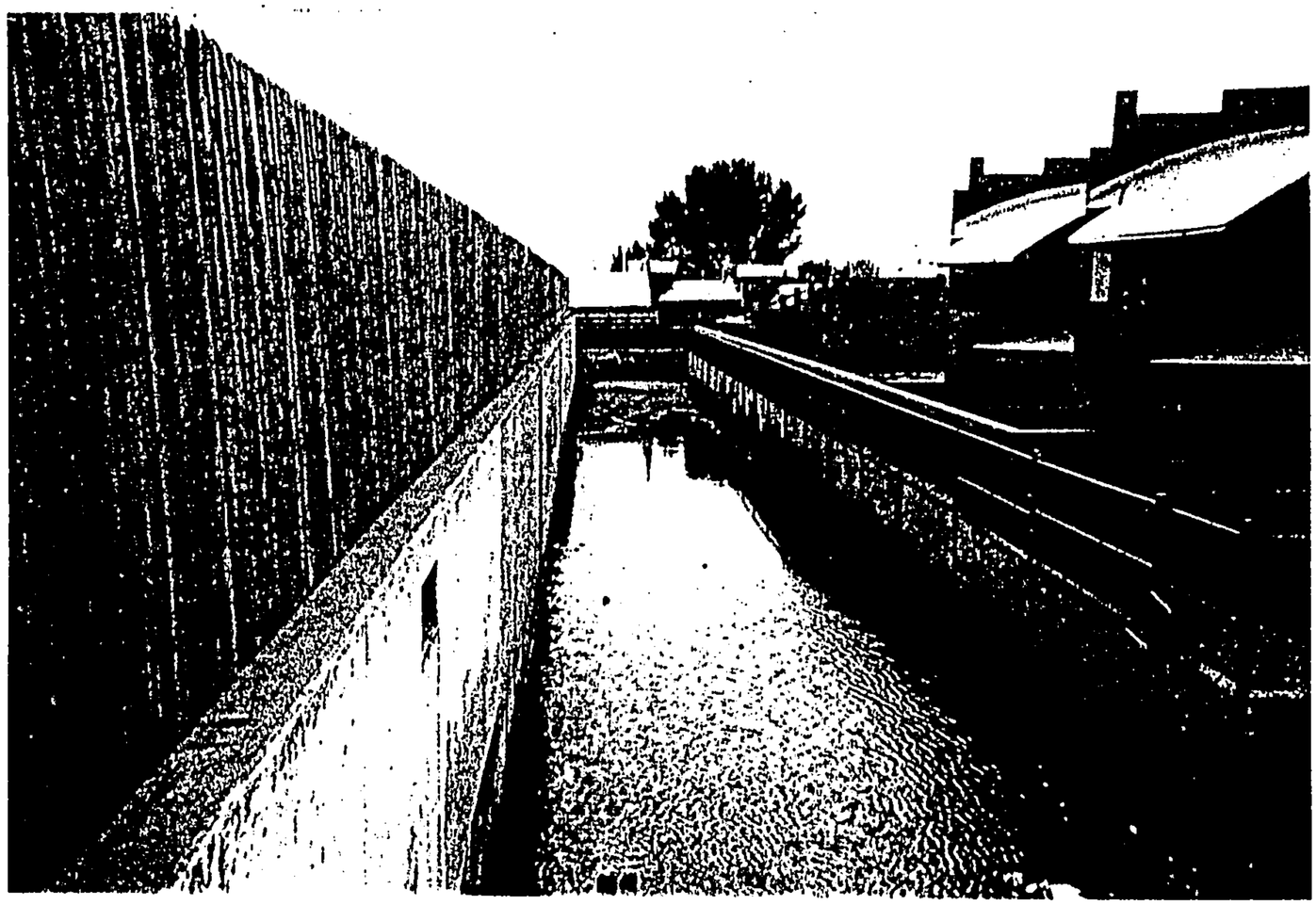


ACCESS POINT FROM TOWNHOUSE



LOOKING EAST TOWARD ACCESS POINT

SIERRA VISTA SHOPPING CENTER

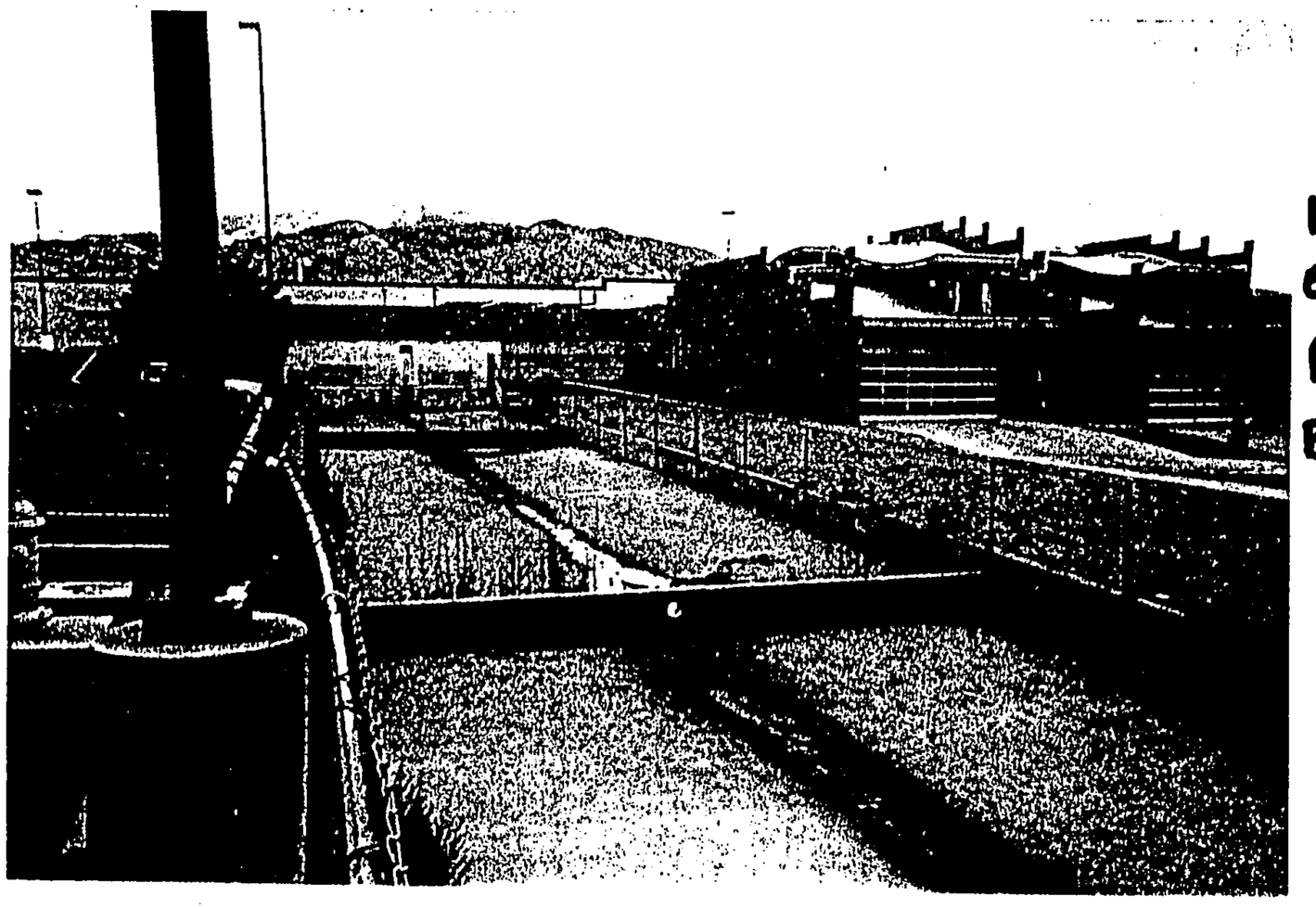


LOOKING SOUTH AT NEW WEIR WALL LOCATION

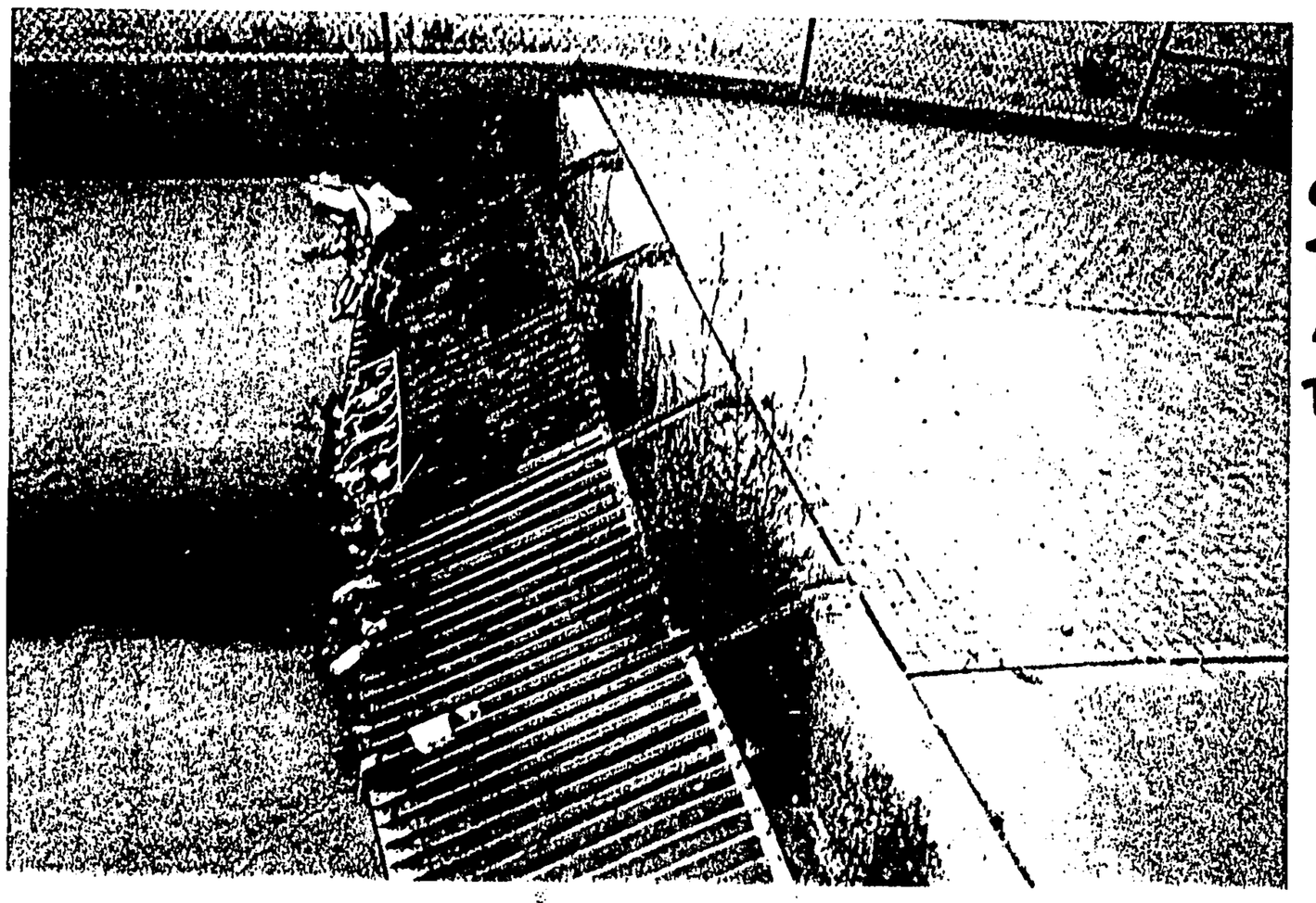


LOOKING WEST ALONG PORTION TO BE REMOVED

SIERRA VISTA SHOPPING CENTER



LOOKING EAST ALONG PORTION TO BE REMOVED



OVERFLOW STRUCTURE AND GRATE TO REMAIN

SIERRA VISTA SHOPPING CENTER

Revised Orifice Calc's

ON 7, 8, 9

$Q = C_1 \sqrt{2 \cdot g \cdot H}$

$Q = 14.1$ cfs

$H = 40.5 - 33.26$ (℄ of Junction Box - point where flow goes critical @ outlet)

$C_1 = 0.62$

Diam: 13.89 ⇒ 14"

chk on ON 5 + 6

$Q = 1.3$ cfs

$H = 41.1 - 37.5$ (bp of weir wall in channel)

Diam = 4.3"

500 SHEETS, FILLER 5 SQUARE
500 SHEETS EYE-EASE® 5 SQUARE
100 SHEETS EYE-EASE® 5 SQUARE
200 SHEETS EYE-EASE® 5 SQUARE
100 RECYCLED WHITE 5 SQUARE
200 RECYCLED WHITE 5 SQUARE
National® Brand

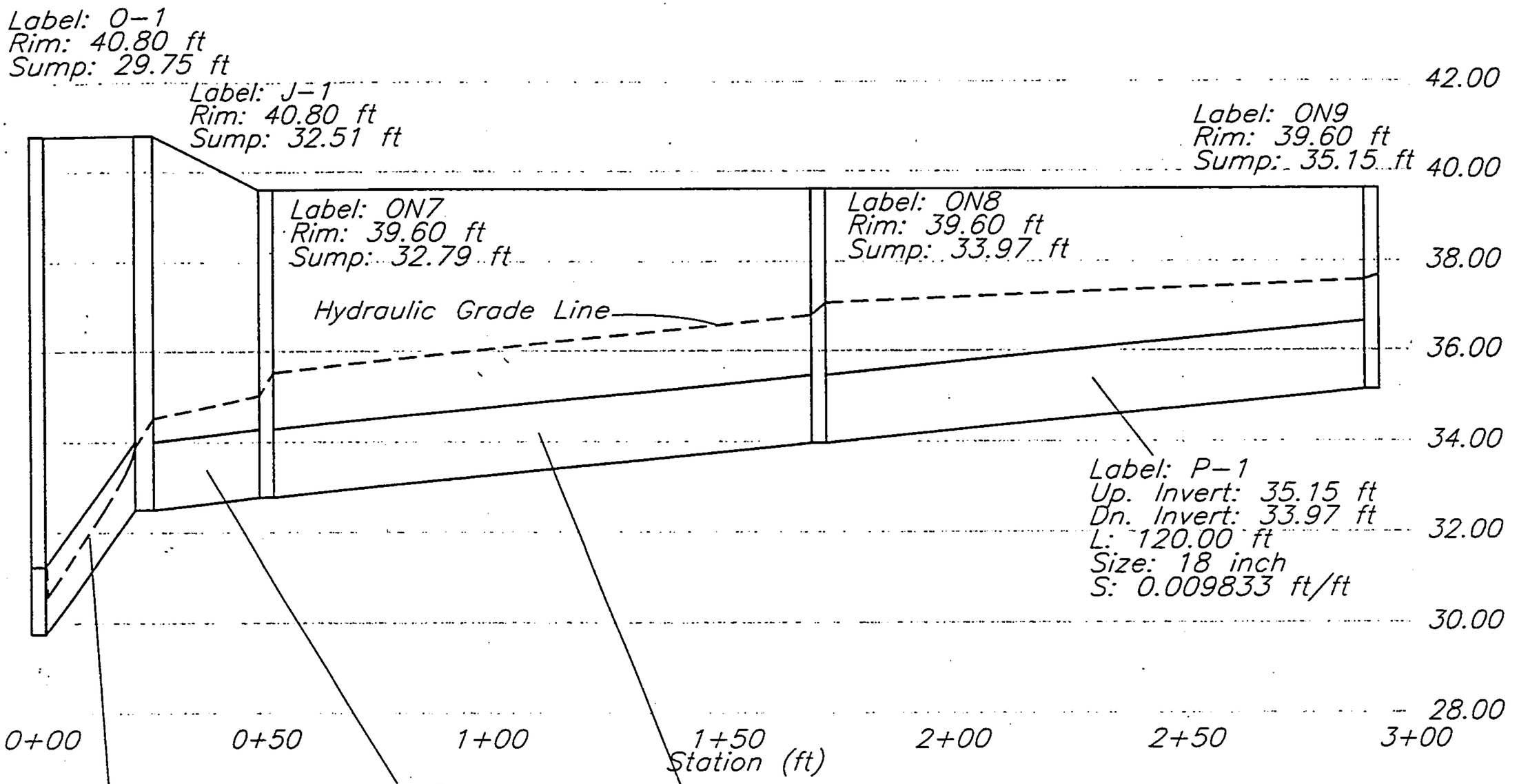


Figure 4

GREAT BASIN ENGINEERING - SOUTH
CONSULTING ENGINEERS and LAND SURVEYORS
2010 North Redwood Road, P.O. Box 16747
Salt Lake City, Utah 84116
Salt Lake City (801)521-8529 Ogden (801)394-7288 Fax (801)521-9551

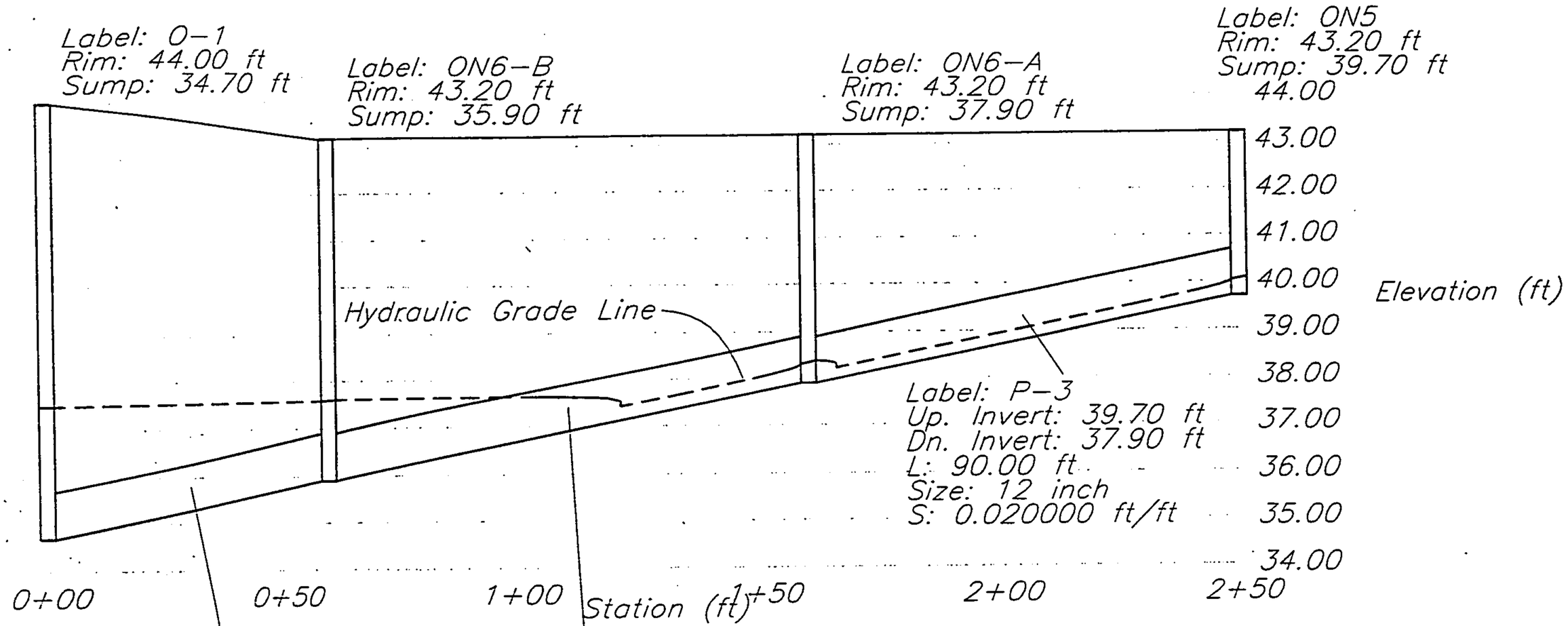


Figure 6

GREAT BASIN ENGINEERING - SOUTH
CONSULTING ENGINEERS and LAND SURVEYORS
2010 North Redwood Road, P.O. Box 16747
Salt Lake City, Utah 84116
Salt Lake City (801)521-8529 Ogden (801)394-7288 Fax (801)521-9551

DRAINAGE INFORMATION SHEET

(REV. 11/01/2001)

G-20/J2J

PROJECT TITLE: KMART - SIERRA VISTA SHOPPING CTR ZONE MAP/DRG. FILE #: G-20
DRB #: 01450-0000-01131 EPC#: 01128-00000-00731 WORK ORDER#:

LEGAL DESCRIPTION: TRACTS A-3, B-2, AND E, SIERRA VISTA SHOPPING CENTER
CITY ADDRESS: 9500 MONTGOMERY BLVD. N.E.

ENGINEERING FIRM: GREAT BASIN ENGINEERING, SOUTH
ADDRESS: 2010 NORTH REDWOOD ROAD
CITY, STATE: SALT LAKE CITY, UT. 84116

CONTACT: BRET WAHLEN/KIRK LANDALL
PHONE: 801-521-8529
ZIP CODE:

OWNER:
ADDRESS:
CITY, STATE:

CONTACT:
PHONE:
ZIP CODE:

ARCHITECT:
ADDRESS:
CITY, STATE:

CONTACT:
PHONE:
ZIP CODE:

SURVEYOR:
ADDRESS
CITY, STATE:

CONTACT:
PHONE:
ZIP CODE:

CONTRACTOR:
ADDRESS:
CITY, STATE:

CONTACT:
PHONE:
ZIP CODE:

CHECK TYPE OF SUBMITTAL:

- ✓ DRAINAGE REPORT AMENDED
- ____ DRAINAGE PLAN
- ____ CONCEPTUAL GRADING & DRAINAGE PLAN
- ✓ GRADING PLAN
- ____ EROSION CONTROL PLAN
- ____ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ____ CLOMR/LOMR
- ____ TRAFFIC CIRCULATION LAYOUT (TCL)
- ____ ENGINEERS CERTIFICATION (TCL)
- ____ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ____ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- ____ SIA / FINANCIAL GUARANTEE RELEASE
- ____ PRELIMINARY PLAT APPROVAL
- ____ S. DEV. PLAN FOR SUB'D. APPROVAL
- ____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ____ SECTOR PLAN APPROVAL
- ____ FINAL PLAT APPROVAL
- ____ FOUNDATION PERMIT APPROVAL
- ✓ BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY (PERM.)
- ____ CERTIFICATE OF OCCUPANCY (TEMP.)
- ✓ GRADING PERMIT APPROVAL
- ____ PAVING PERMIT APPROVAL
- ✓ WORK ORDER APPROVAL
- ____ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- ✓ YES
- ____ NO
- ____ COPY PROVIDED

RECEIVED
NOV 07 2001
HYDROLOGY SECTION

DATE SUBMITTED: 11-7-01 BY: KIRK LANDALL

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope ot the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan**: Required for approval of Site Development Plans greater than five
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5)
3. **Drainage Report**: Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

November 19, 2001

Bret Wahlen
Great Basin Engineering, South
P.O. Box 16747
Salt Lake City, Utah 84116

RE: Grading and Drainage Plan for Sierra Vista Shopping Center (Super K) (G-20-D2J) Dated November 6, 2001

Dear Mr. Wahlen:

The above referenced plan received November 7, 2001 is approved for Building Permit. Prior to Certificate of Occupancy release the Work Order will need finalized and the engineer will need to certify the project. At the DRC process I will have minor comments, which I will give you at that time.

Sincerely,

Carlos A. Montoya
City Floodplain Administrator

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

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 14, 2001

Bret Wahlen
Great Basin Engineering, South
P.O. Box 16747
Salt Lake City, Utah 84116

RE: Grading and Drainage Plan for Sierra Vista Shopping Center (Super K) (G-20-D2J) Dated December 4, 2001

Dear Mr. Wahlen:

The above referenced plan received December 10, 2001 is approved for Building Permit. Prior to Certificate of Occupancy release the Work Order will need finalized and the engineer will need to certify the project. I just waned to remind you that the drainage easement for the channel has not been finalized. The drainage easements will have to be found in other documents or they will have to be dedicated.
If you have any questions please call me at 924-3982.

Sincerely,

Carlos A. Montoya
City Floodplain Administrator

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

DRAINAGE INFORMATION SHEET
(REV. 11/01/2001)

G-20/D25

PROJECT TITLE: KMART #9827 - SIERRA VISTA SHOP CTR ZONE MAP/DRG. FILE #: G-20
DRB #: 01450-00000-01131 EPC#: 01128-00000-00731 WORK ORDER#: 677081

LEGAL DESCRIPTION: TRACTS A-3, B-2 AND E, SIERRA VISTA SHOPPING CENTER
CITY ADDRESS: 9500 MONTGOMERY BLVD. NE

ENGINEERING FIRM: GREAT BASIN ENGINEERING - SOUTH — CONTACT: BRET WAHLEN / KIRK RANDALL
ADDRESS: 2010 NORTH REDWOOD ROAD — PHONE: 801-521-8529
CITY, STATE: SALT LAKE CITY, UT 84116 — ZIP CODE:

OWNER: — CONTACT:
ADDRESS: — PHONE:
CITY, STATE: — ZIP CODE:

ARCHITECT: — CONTACT:
ADDRESS: — PHONE:
CITY, STATE: — ZIP CODE:

SURVEYOR: — CONTACT:
ADDRESS — PHONE:
CITY, STATE: — ZIP CODE:

CONTRACTOR: — CONTACT:
ADDRESS: — PHONE:
CITY, STATE: — ZIP CODE:

CHECK TYPE OF SUBMITTAL:
- ✓ DRAINAGE REPORT
- ✓ DRAINAGE PLAN
- ____ CONCEPTUAL GRADING & DRAINAGE PLAN
- ____ GRADING PLAN
- ____ EROSION CONTROL PLAN
- ____ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ____ CLOMR/LOMR
- ____ TRAFFIC CIRCULATION LAYOUT (TCL)
- ____ ENGINEERS CERTIFICATION (TCL)
- ____ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ____ OTHER

CHECK TYPE OF APPROVAL SOUGHT:
- ____ SIA / FINANCIAL GUARANTEE RELEASE
- ____ PRELIMINARY PLAT APPROVAL
- ____ S. DEV. PLAN FOR SUB'D. APPROVAL
- ____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ____ SECTOR PLAN APPROVAL
- ____ FINAL PLAT APPROVAL
- ____ FOUNDATION PERMIT APPROVAL
- ✓ BUILDING PERMIT APPROVAL
- ____ CERTIFICATE OF OCCUPANCY (PERM.)
- ____ CERTIFICATE OF OCCUPANCY (TEMP.)
- ____ GRADING PERMIT APPROVAL
- ____ PAVING PERMIT APPROVAL
- ____ WORK ORDER APPROVAL
- ____ OTHER (SPECIFY)

UPDATED PLANS TO MATCH BUILDING PERMIT SET # DATE FOR YOUR FILE

WAS A PRE-DESIGN CONFERENCE ATTENDED:
- ____ YES
- ____ NO
- ____ COPY PROVIDED

RECEIVED
DEC 10 2001
HYDROLOGY SECTION

DATE SUBMITTED: 12-10-01 BY: KIRK LANDALL

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope ot the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan**: Required for approval of Site Development Plans greater than five
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5)
3. **Drainage Report**: Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or