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

August 5, 2002

Sara Lavy, P.E.
Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

RE: BOB TURNER FORD EXPANSION **(F-16/D5C)**
(1221Renaissance Blvd NE)
ENGINEERS CERTIFICATION FOR CERTIFICATE OF OCCUPANCY
ENGINEERS STAMP DATED 1/30/2002
ENGINEERS CERTIFICATION DATED 7/29/2002

Dear Ms. Lavy:

Based upon the information provided in your Engineers Certification submittal dated 8/2/2002, and the approval of the SO19 dated8/1/2002, the above referenced site is approved for a Permanent Certificate of Occupancy.

If I can be of further assistance, please contact me at 924-3981.

Sincerely,

Teresa A. Martin
Hydrology Plan Checker
Development & Bldg. Ser. Div.
DLB

C: Vickie Chavez, COA
drainage file
approval file

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

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

February 6, 2002

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

Re: Bob Turner Ford Grading and Drainage Plan
Engineer's Stamp Dated 1-30-02, (F16/D5C)

Dear Mr. Bohannan,

Based on the information contained in your submittal dated 1-30-02, the above referenced plan is approved for Preliminary Plat, Final Plat, Site Plan for Subdivision, and Site Plan for Building Permit Action by the DRB. The SO-19 Permit is also approved, which is required for construction within the City right-of-way.

Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

As a reminder, Platting Action will need to be completed prior to Certificate of Occupancy. If you have any questions, you can contact me at 924-3984.

Sincerely,

Leslie Romero
Engineering Associate, PWD
Development and Building Services

c: Terri Martin, Hydrology
Pam Lujan
File (2)

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

DRAINAGE REPORT
FOR

BOB TURNER FORD
USED CAR SALES EXPANSION

Renaissance
Cor. Hr. 1-B

Prepared by:

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

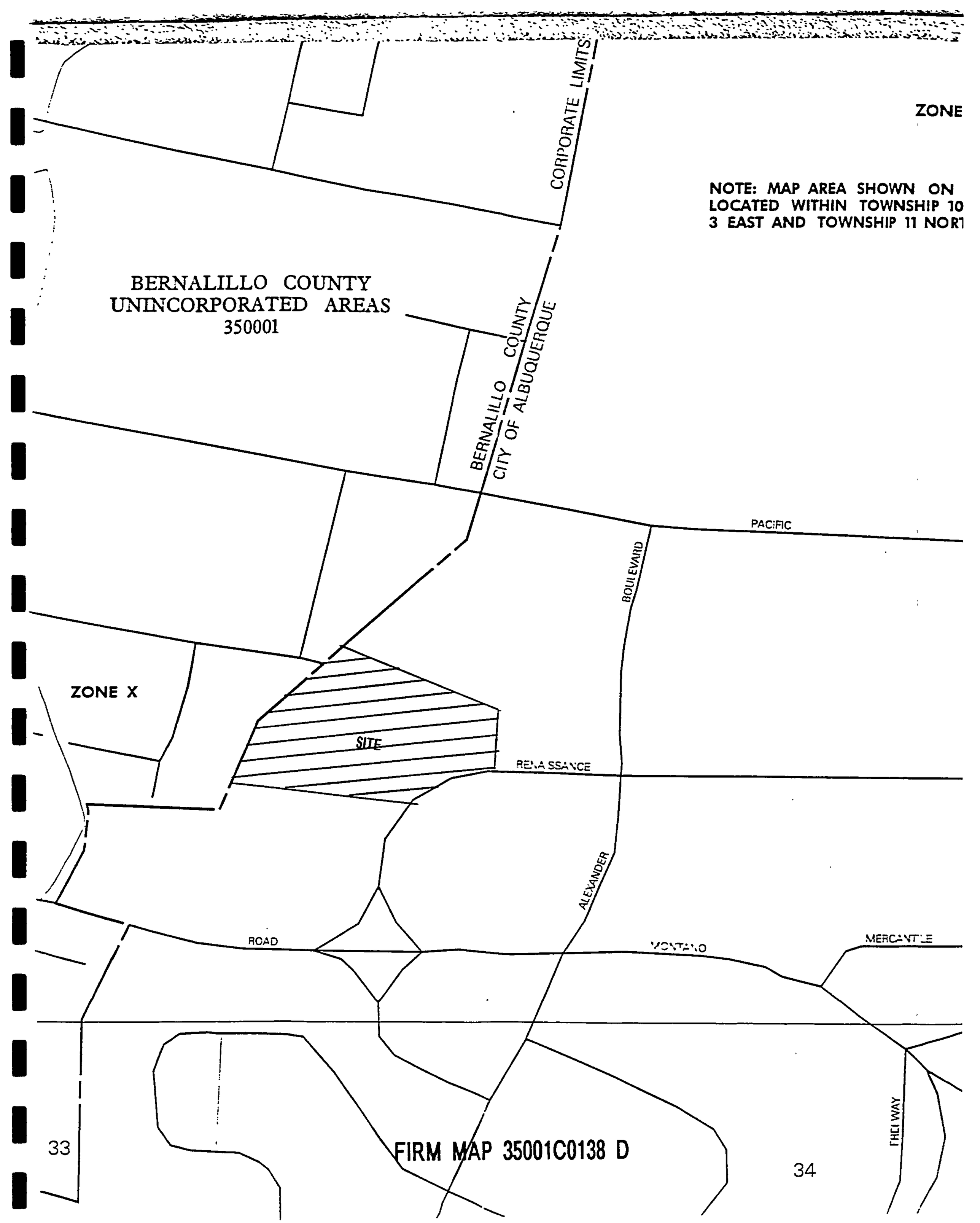
RECEIVED
JAN 3 0 2002
HYDROLOGY SECTION

January 24, 2002

Ronald R. Bohannan
PE NO. 7868

RONALD RAY BOHANNAN
NEW MEXICO
7868
REGISTERED
PROFESSIONAL ENGINEER

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the state of New Mexico in good standing.


ZONE
NOTE: MAP AREA SHOWN ON
LOCATED WITHIN TOWNSHIP 10
3 EAST AND TOWNSHIP 11 NORT
CORPORATE LIMITS
BERNALILLO COUNTY
UNINCORPORATED AREAS
350001
BERNALILLO COUNTY
CITY OF ALBUQUERQUE
PACIFIC
BOULEVARD
ZONE X
SITE
RENASSANCE
ALEXANDER
ROAD
MONTANO
MERCANTILE
THE WAY
33
34
FIRM MAP 35001C0138 D

Location

The expansion of Bob Turner Ford for used car sales is located on Tract 1B1A and 1B1B of the Renaissance Center. This is shown on the attached Zone Atlas Map F-16 and is on the northwest corner of Renaissance and Union Way Drive. The purpose of this report is to provide the drainage management plan for Tracts 1B1A, 1B1B, and 1B1C. Tract 1B1A is the location of the proposed used car sales expansion. Tract 1B1B is the location of a proposed retail building with apartments located on the second story, and Tract 1B1C is a conceptual retail building

Existing Drainage Conditions

include copy of master plan!

The site falls within the Renaissance Drainage Master Plan, and it is currently undeveloped. The Renaissance Master Plan requires each site to limit the runoff to 0.1 cfs/acre. This area was also analyzed in the drainage report for the Renaissance Apartments (F16/D5) and the previous Bob Turner Ford Expansion (F16/D5A). The offsite runoff on the south and east sides is intercepted by Renaissance Boulevard and Union Way Drive. HOW ABOUT OFFSITE RUNOFF FROM THE NORTH AND WEST?

Flood Plain and Soil Condition

The site is located on FIRM Map 35001C0138 D as shown on the attached excerpt. The map shows that the site does not lie within any 100 year flood plains.

The site contains one soil type from the Soil Conservation Service Survey of Bernalillo County. This soil type is Bluepoint-Kokan association. The Bluepoint-Kokan association is a Bluepoint loamy fine sand that has slow runoff, rapid permeability, and moderate to severe hazard of water erosion.

Proposed Conditions and On-Site Drainage Management Plan

The proposed drainage management plan is to collect the runoff in parking lot ponds. A new storm drain system will convey the runoff to an existing 84" storm drain that eventually

drains to the Renaissance Detention Pond. The previously approved drainage report for this area had a single proposed storm drain system that drained to an existing 84" pipe and then to the Renaissance Detention Pond. The new layout for this site prevents the proposed on-site storm drain from connecting to the proposed storm drain for tracts 1B1D, 1B1E and 1B1F.

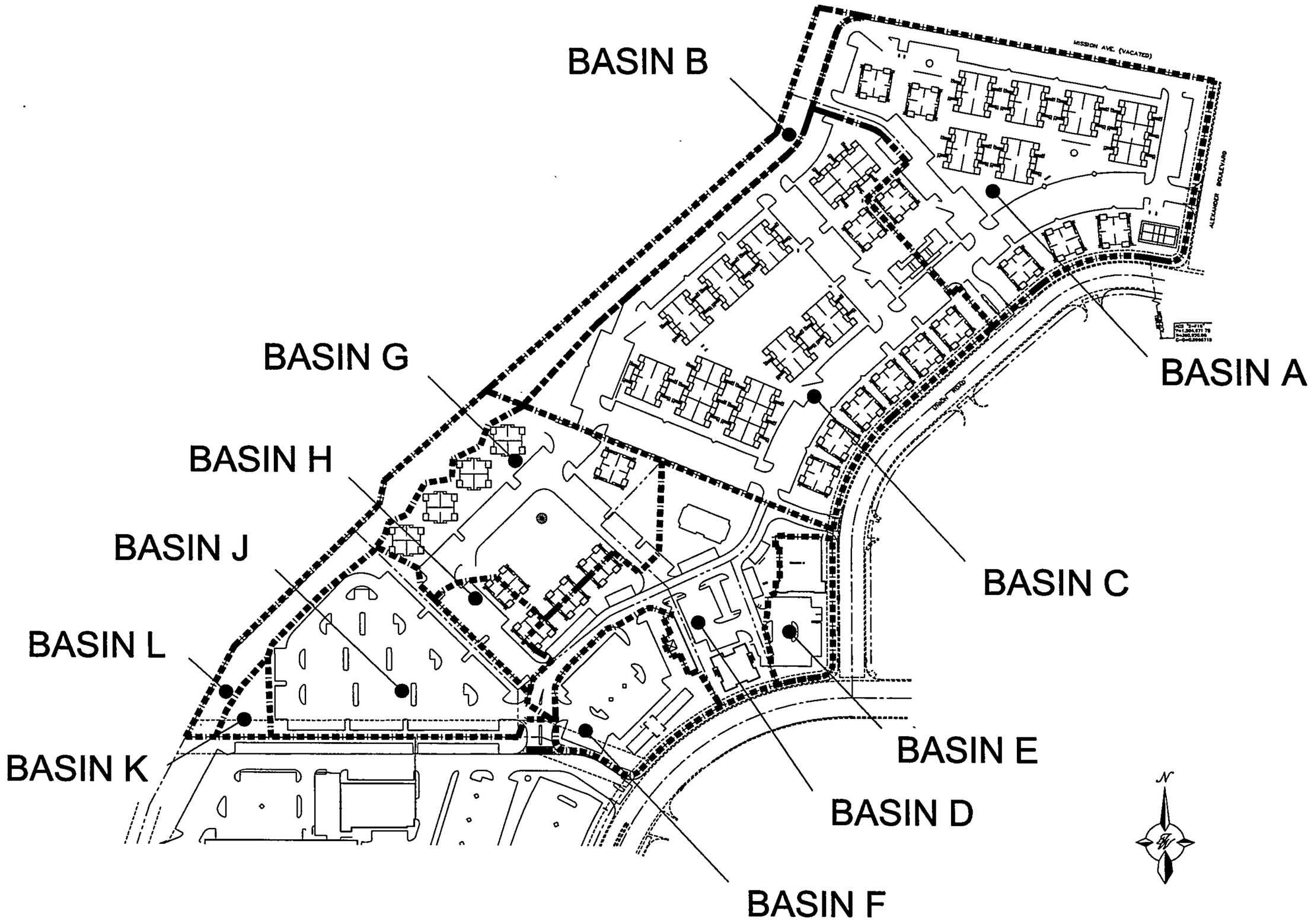
These three tracts (1B1A, 1B1B, and 1B1C) will be a separate storm drain system and will connect to the existing 84" and be conveyed to the Renaissance Detention Pond. The total acreage for the site is 4.19 acres. Therefore, the total allowable discharge from the site is 0.42 cfs.

The three tracts have been divided into 3 basins that roughly correspond to the basins D, E and F of the previous report. Each basin drains to a pond located within that basin. A new storm drain system will connect the ponds together and convey the flow to the Renaissance Detention Pond. Orifice plates within each pond will limit the outflow to the new storm drain system. The existing storm drain will convey the developed flow from the site to the Renaissance Detention Pond.

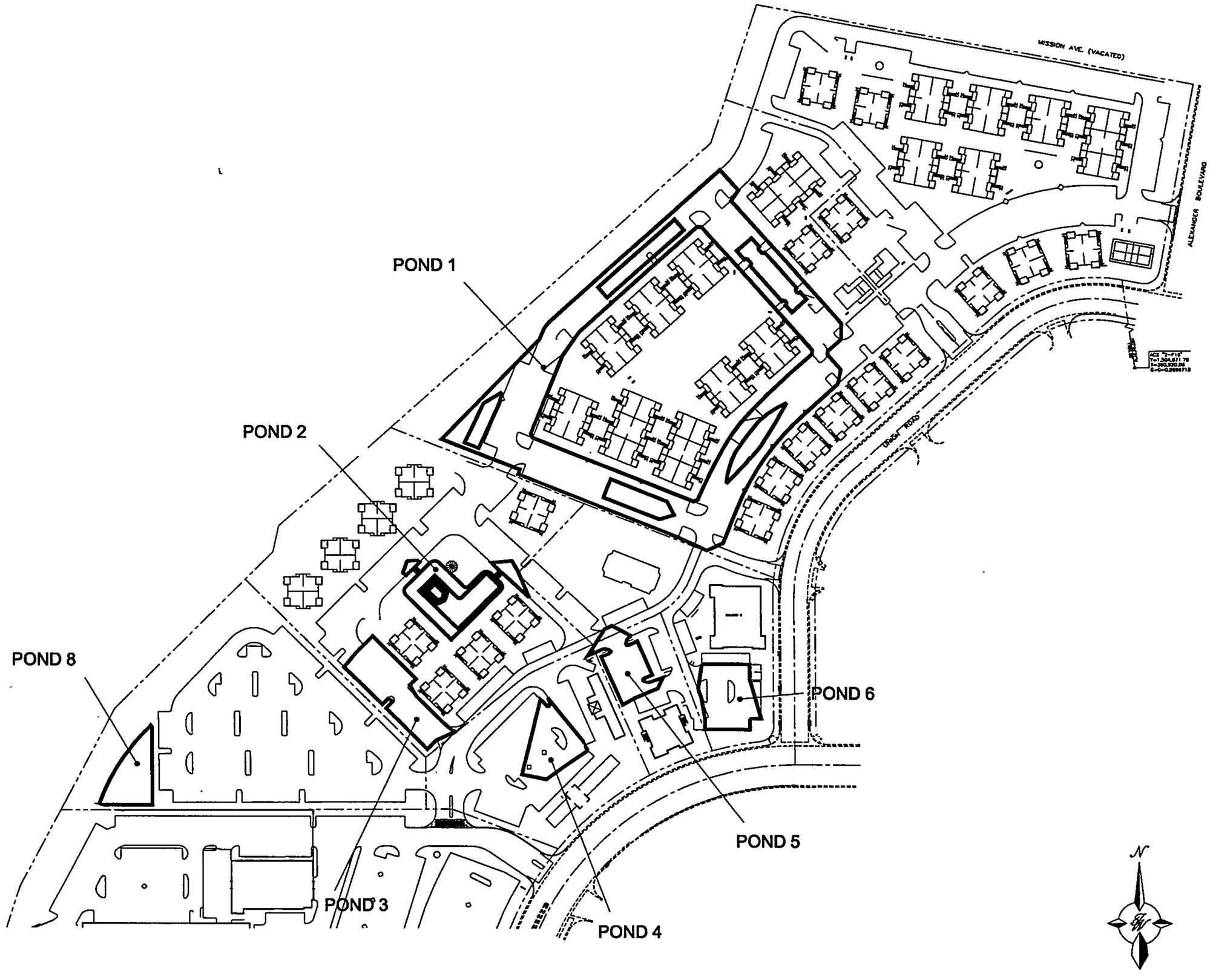
The three on-site ponds to do not limit the flow to the allowable of 0.42 cfs. There is not enough landscape area that would not inpede the views to the car display areas. For this reason, the three tracts will discharge 6.26 cfs or 0.75 ac-ft to the existing 84" pipe. The Renaissance Detention Pond will be enlarged 0.75 ac-ft to account for the runoff from Tracts 1B1A, 1B1B, and 1B1C.

Calculations

The City of Albuquerque, Development Process Manuel, Section 22.2, Hydrology Section, 1997 Revision was used for the runoff calculations. The AHYMO Program was used to calculate the runoff from each basin and for the ponding calculations.



PROPOSED BASIN LAYOUT

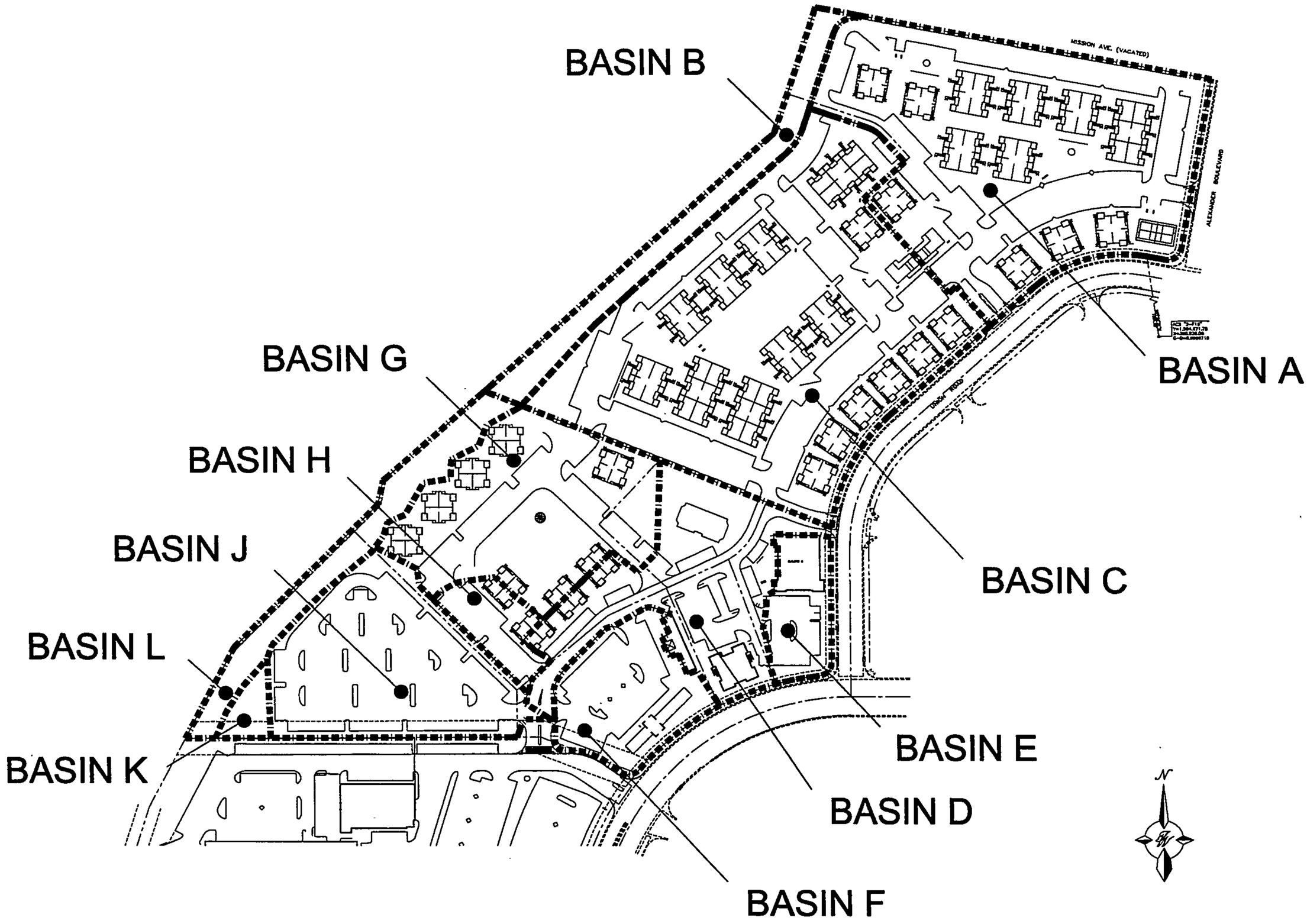

MISSION AVE. (VACATED)
ALEXANDER BOULEVARD
POND 1
POND 2
POND 8
POND 6
POND 5
POND 3
POND 4
N

POND LAYOUT

Summary

This report analyzes the drainage for Tract 1B1A, 1B1B and 1B1C of the Renaissance Center. Tract 1B1A is the location of a proposed expansion of the Bob Turner Ford site to sell used cars. Tract 1B1B and 1B1C are proposed for mixed use of retail buildings and apartments.

The drainage will be constrained in parking lot ponds on the tracts. A new storm drain system will connect the ponds and convey the flow to the existing 84" pipe. The flow will be limited to 6.26 cfs, which does not meet the allowable discharge of 0.42 cfs. The Renaissance Detention Pond will be enlarged 0.75 ac-ft to allow for the additional discharge from these tracts.



PROPOSED BASIN LAYOUT

Drainage Basins

Developed Basins

BASIN	AREA (SF)	AREA (AC)	AREA (MI^2)
A	239573	5.500	0.008593
B	42158	0.968	0.001512
C	300073	6.889	0.010764
D	102041	2.343	0.003660
E	27392	0.629	0.000983
F	53093	1.219	0.001904
G	116186	2.667	0.004168
H	20042	0.460	0.000719
J	107332	2.464	0.003850
K	8041	0.185	0.000288
L	41540	0.954	0.001490
Total	1057471	24.276	0.037932

Allowable Discharge = Basins D, E, and F
2.343 + 0.629 + 1.219
4.191 acres
4.191 acres * 0.1 cfs/acre
0.42 cfs

Runoff Calculation Results

Developed Basins

BASIN	Q-100 CFS	Q-10 CFS	V-100 AC-FT	V-10 AC-FT
A	23.65	15.08	0.861	0.525
B	2.21	0.91	0.063	0.022
C	29.63	18.88	1.079	0.658
D	10.09	6.43	0.367	0.224
E	2.72	1.73	0.099	0.060
F	5.25	3.35	0.191	0.116
G	10.95	6.83	0.392	0.234
H	2.00	1.27	0.072	0.044
J	11.00	7.12	0.407	0.253
K	0.43	0.18	0.012	0.004
L	2.18	0.89	0.062	0.022
Total	100.11	62.67	3.605	2.162

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02a RUN DATE (MON/DAY/YR) =01/23/2002
INPUT FILE = C:\BASIN.DAT 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= 1										RAIN6= 2.350
COMPUTE NM HYD	A	-	1	.00859	23.65	.861	1.87962	1.500	4.301	PER IMP= 80.00
COMPUTE NM HYD	B	-	2	.00151	2.21	.063	.77821	1.533	2.286	PER IMP= .00
COMPUTE NM HYD	C	-	3	.01076	29.63	1.079	1.87962	1.500	4.300	PER IMP= 80.00
COMPUTE NM HYD	D	-	4	.00366	10.09	.367	1.87962	1.500	4.306	PER IMP= 80.00
COMPUTE NM HYD	E	-	5	.00098	2.72	.099	1.87962	1.500	4.327	PER IMP= 80.00
COMPUTE NM HYD	F	-	6	.00190	5.25	.191	1.87962	1.500	4.312	PER IMP= 80.00
COMPUTE NM HYD	G	-	7	.00417	10.95	.392	1.76175	1.500	4.104	PER IMP= 70.00
COMPUTE NM HYD	H	-	8	.00072	2.00	.072	1.87962	1.500	4.337	PER IMP= 80.00
COMPUTE NM HYD	J	-	9	.00385	11.00	.407	1.98165	1.500	4.464	PER IMP= 90.00
COMPUTE NM HYD	K	-	10	.00029	.43	.012	.77821	1.533	2.325	PER IMP= .00
COMPUTE NM HYD	L	-	11	.00149	2.18	.062	.77821	1.533	2.286	PER IMP= .00
RAINFALL TYPE= 1										RAIN6= 1.570
COMPUTE NM HYD	A	-	1	.00859	15.08	.525	1.14633	1.500	2.742	PER IMP= 80.00
COMPUTE NM HYD	B	-	2	.00151	.91	.022	.27828	1.533	.938	PER IMP= .00
COMPUTE NM HYD	C	-	3	.01076	18.88	.658	1.14633	1.500	2.741	PER IMP= 80.00
COMPUTE NM HYD	D	-	4	.00366	6.43	.224	1.14633	1.500	2.744	PER IMP= 80.00
COMPUTE NM HYD	E	-	5	.00098	1.73	.060	1.14633	1.500	2.756	PER IMP= 80.00
COMPUTE NM HYD	F	-	6	.00190	3.35	.116	1.14633	1.500	2.748	PER IMP= 80.00
COMPUTE NM HYD	G	-	7	.00417	6.83	.234	1.05068	1.500	2.560	PER IMP= 70.00
COMPUTE NM HYD	H	-	8	.00072	1.27	.044	1.14633	1.500	2.763	PER IMP= 80.00
COMPUTE NM HYD	J	-	9	.00385	7.12	.253	1.23172	1.500	2.890	PER IMP= 90.00
COMPUTE NM HYD	K	-	10	.00029	.18	.004	.27828	1.533	.954	PER IMP= .00
COMPUTE NM HYD	L	-	11	.00149	.89	.022	.27828	1.533	.938	PER IMP= .00
FINISH										

Pipe Capacity

Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
CB1 to MH1	6	1.45	0.20	0.125	0.68	0.22	1.12
CB2 to MH1	15	0.6	1.23	0.313	5.02	4.78	3.90
MH1 to MH2	15	1	1.23	0.313	6.48	5.00	4.07
MH2 to MH3	15	2	1.23	0.313	9.16	5.00	4.07
CB3 to MH3	8	2	0.35	0.167	1.71	1.27	3.64
MH3 to Ex. 84"	18	3	1.77	0.375	18.24	6.26	3.54

<u>Manning's Equation:</u>

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

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

DROP INLET CALCULATIONS

POND	TYPE OF INLET	AREA (SF)	Q (CFS)	H (FT)	H ALLOW (FT)
4	Single 'D'	2.30	5.25	0.2247	1
5	Single 'D'	2.30	10.09	0.8301	1
6	Single 'D'	2.30	2.72	0.0603	1

ORIFICE EQUATION

Q = CA sqrt(2gH)

C = 0.6

g = 32.2

Pond Summary

Pond	WSE	Max Depth (ft)	Max Storage (ac-ft)	Orifice Size (in)	Outflow (cfs)
4	32.72	0.97	0.0889	5	1.27
5	32.56	0.96	0.0799	9.5	4.78
6	33.84	0.84	0.1008	2	0.22

VOLUME CALCULATIONS

POND 4

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

5034	Ab =	6.80
5035	At =	7,696.25
	Dt =	1.00
	C =	7689.45

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
28.75	0	0.00000	0.000
31.75	3	0.00047	1.097
31.85	3.1	0.00137	1.116
31.95	3.2	0.00403	1.136
32.05	3.3	0.00846	1.154
32.15	3.4	0.01465	1.173
32.25	3.5	0.02261	1.191
32.35	3.6	0.03234	1.209
32.45	3.7	0.04383	1.227
32.55	3.8	0.05708	1.244
32.65	3.9	0.07210	1.261
32.75	4	0.08889	1.278

<u>Orifice Equation</u>
Q = CA SQRT(2gH)

C =		0.6
Diameter (in)		5
Area (ft^2)=		0.136
g =		32.2
H (Ft) =	Depth of water above center of orifice	
Q (CFS)=	Flow	

VOLUME CALCULATIONS

POND 5

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

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

31.5	Ab =	6.80
32.5	At =	6,906.04
	Dt =	1.00
	C =	6899.24

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
28.50	0	0	0.000
31.50	3.50	0.0005	4.176
31.70	3.70	0.0037	4.308
31.90	3.90	0.0133	4.437
32.10	4.10	0.0291	4.562
32.30	4.30	0.0514	4.683
32.50	4.50	0.0799	4.802

<u>Orifice Equation</u>
Q = CA SQRT(2gH)

C =	0.6
Diameter (in)	9.5
Area (ft^2)=	0.492
g =	32.2
H (Ft) =	Depth of water above center of orifice
Q (CFS)=	Flow

VOLUME CALCULATIONS

POND 6

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

5033	Ab =	6.80
5034	At =	8,725.76
	Dt =	1.00
	C =	8718.96

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
30.50	0	0	0.000
33.00	3.50	0.00055	0.194
33.20	3.70	0.00458	0.200
33.40	3.90	0.01662	0.205
33.60	4.10	0.03667	0.211
33.80	4.30	0.06472	0.216
34.00	4.50	0.10078	0.221

<u>Orifice Equation</u>
Q = CA SQRT(2gH)

C =	0.6
Diameter (in)	2
Area (ft^2)=	0.02181662
g =	32.2
H (Ft) =	Depth of water above center of orifice
Q (CFS)=	Flow

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02a RUN DATE (MON/DAY/YR) =01/29/2002
INPUT FILE = c:\pond.dat 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	PAGE = 1 NOTATION
START										TIME= .00
RAINFALL TYPE= 2										RAIN24= 2.750
COMPUTE NM HYD	10d.0	-	3	.00366	10.09	.419	2.14419	1.500	4.306	PER IMP= 80.00
COMPUTE NM HYD	10e.0	-	4	.00098	2.72	.112	2.14423	1.500	4.327	PER IMP= 80.00
COMPUTE NM HYD	10f.0	-	5	.00190	5.25	.218	2.14420	1.500	4.312	PER IMP= 80.00
ROUTE RESERVOIR	PD6.0	4	11	.00098	.22	.112	2.14375	2.200	.345	AC-FT= .073
ROUTE RESERVOIR	PD5.0	3	12	.00366	4.78	.420	2.15234	1.700	2.041	AC-FT= .075
ROUTE RESERVOIR	PD4.0	5	13	.00190	1.27	.218	2.14737	1.966	1.045	AC-FT= .084
ADD HYD	DF	11&12	14	.00464	4.99	.533	2.15052	1.700	1.681	
ADD HYD	ED	13&14	15	.00655	6.26	.751	2.14961	1.700	1.493	
FINISH										

CALCULATIONS FOR RENAISSANCE DRAINAGE POND

RECEIVED
JUN 06 2002
HYDROLOGY SECTION

Drainage Basins 1

AHYMO Input 6

AHYMO Summary Output 19

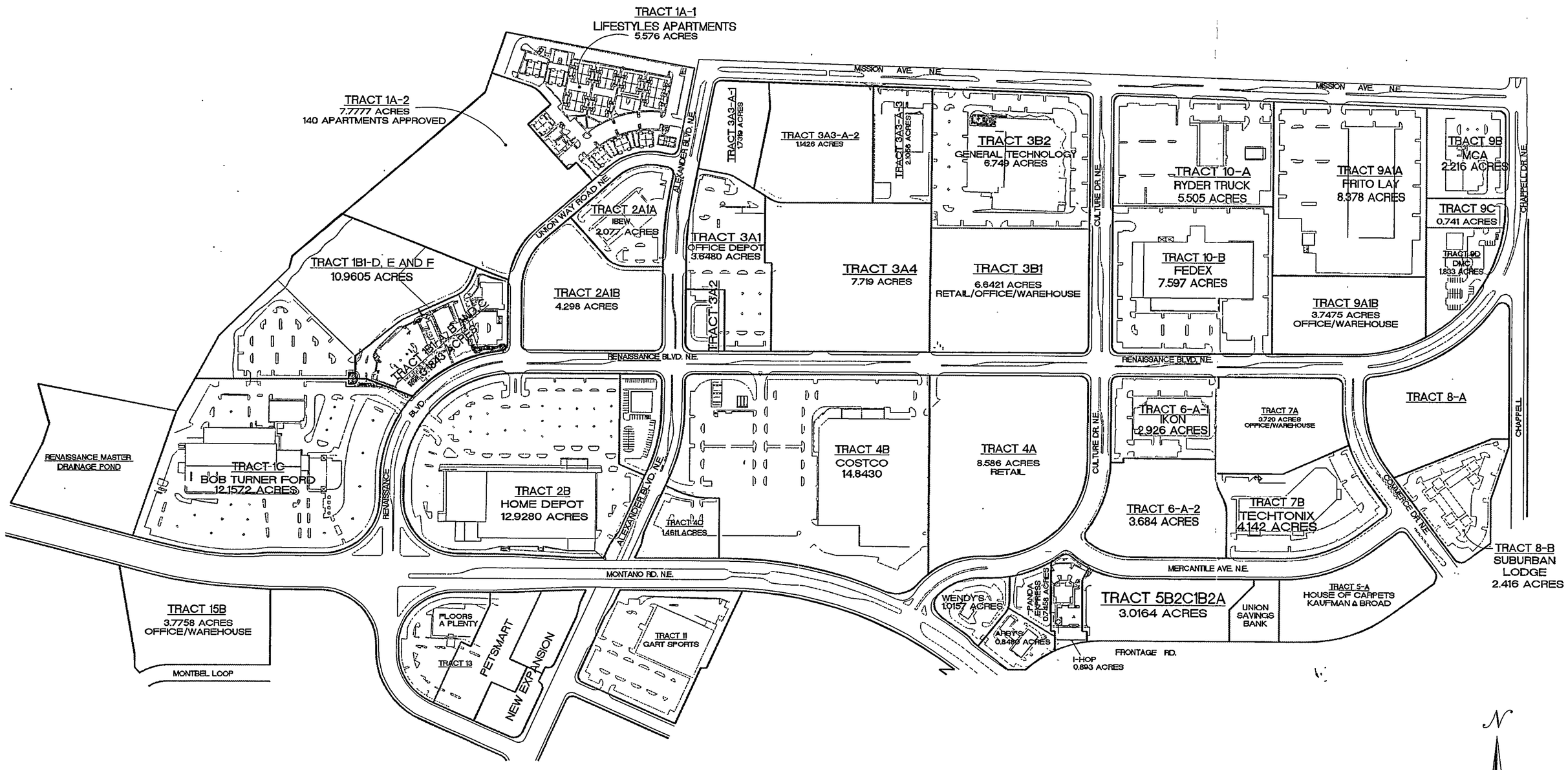
AHYMO Output 24

Drainage Basins

(Current Drainage, 2002)

BASIN	Use	ACTUAL AREA (SF)	ACTUAL AREA (ACRE)	MODEL AREA (SF)	MODEL AREA (ACRE)	AREA (MI²)	DEV Q (CFS)	UNDEV Q (CFS)
OFFSITE								
A-1		2045142			46.95	0.073359	205.90	
A-2 and A-3		683456			15.69	0.024516	68.85	
H-1		900821			20.68	0.032313	47.03	
H-2		253084			5.81	0.009078	13.22	
ONSITE								
1C	Bob Turner Ford	529567.63	12.16	23400	0.54	0.000839	1.23	
1B1-D, E and F	Undeveloped	477439.38	10.96			0.017126		24.93
* 1B1-A, B and C	BTF Expansion	138708.11	3.18			0.000000	6.25	
1A-1	Apartments	242890.56	5.58	10700	0.25	0.000384	0.57	
1A-2	Undeveloped	338809.68	7.78			0.012153		17.69
2A1A	IBEW	90474.12	2.08	4000	0.09	0.000143	0.22	
2A1B	Undeveloped	187308.00	4.30			0.006719		9.78
2B	Home Depot	563143.68	12.93	24600	0.56	0.000882	1.29	
* 3	Tract 3	1328545.15	30.50			0.000000	3.29	
4A	Undeveloped	374180.40	8.59			0.013422		19.53
4B	Costco	646561.08	14.84	28300	0.65	0.001015	1.49	
4C	Costco	63645.52	1.46	2800	0.06	0.000100	0.15	
5B2A	Wendy's	44243.89	1.02	1900	0.04	0.000068	0.11	
5B2B1	Arby's	36938.88	0.85	1600	0.04	0.000057	0.09	
* 5B2C1A1	Panda Express	32487.05	0.75			0.000000	0.07	
5B2C1B1A	IHOP	38899.08	0.89	1700	0.04	0.000061	0.10	
5B2BC1B2A	Undeveloped	131551.20	3.02			0.004719		6.87
5B1	Union Bank	37030.43	0.85			0.001328	3.74	
5A	KB Home	140662.00	3.23			0.005046	14.18	
6A1	IKON	127456.56	2.93	5500	0.13	0.000197	0.57	
6A2	Undeveloped	160300.80	3.68			0.005750		16.18
7A	Undeveloped	162043.20	3.72			0.005813		16.34
7B	Progressive	180425.52	4.14	7900	0.18	0.000283	0.81	
8A	Undeveloped	215622.00	4.95			0.007734		11.27
8B	Suburban Lodge	105240.96	2.42	4600	0.11	0.000165	0.25	
9A1A	Frito Lay	364945.68	8.38	16000	0.37	0.000574	0.84	
9A1B	Undeveloped	163350.00	3.75			0.005859		8.53
9B	MCA	96528.96	2.22	4200	0.10	0.000151	0.23	
9C	Undeveloped	32234.40	0.74			0.001156		1.69
9D	DMC	79845.48	1.83	3500	0.08	0.000126	0.19	
10A	Ryder Truck	239797.80	5.51	10500	0.24	0.000377	0.56	
10B	Fedex	330925.32	7.60	14500	0.33	0.000520	0.76	
TOTAL							371.99	132.81

* Actual pond routing was used showing peak times, all other basins were modeled.



CURRENT RENAISSANCE CENTER

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02a RUN DATE (MON/DAY/YR) =06/05/2002
INPUT FILE = a:\tract.dat 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= 2.750
*S BASIN 1C (BOB TURNER FORD)										
COMPUTE NM HYD	101.00	-	1	.00084	1.23	.035	.77774	1.500	2.288	PER IMP= .00
*S BASIN 1B1-D, E, AND F (UNDEVELOPED)										
COMPUTE NM HYD	102.00	-	2	.01713	24.93	.710	.77774	1.500	2.275	PER IMP= .00
*S********** BASIN 1B1-A, B AND C (BOB TURNER FORD EXPANSION) *********										
COMPUTE NM HYD	10d.0	-	93	.00366	9.94	.430	2.20093	1.500	4.242	PER IMP= 80.00
COMPUTE NM HYD	10e.0	-	94	.00098	2.68	.115	2.20093	1.500	4.259	PER IMP= 80.00
COMPUTE NM HYD	10f.0	-	95	.00190	5.17	.223	2.20093	1.500	4.247	PER IMP= 80.00
ROUTE RESERVOIR	PD6.0	94	96	.00098	.22	.115	2.20060	2.200	.345	AC-FT= .073
ROUTE RESERVOIR	PD5.0	93	97	.00366	4.78	.431	2.20946	1.700	2.039	AC-FT= .074
ROUTE RESERVOIR	PD4.0	95	98	.00190	1.27	.224	2.20561	1.950	1.045	AC-FT= .084
ADD HYD	DF	96&97	3	.00464	4.99	.547	2.20756	1.700	1.680	
ADD HYD	ED	3&98	3	.00655	6.25	.771	2.20699	1.700	1.493	
*S**********										
*S BASIN 1A-1 (APARTMENTS)										
COMPUTE NM HYD	104.00	-	4	.00038	.57	.016	.77774	1.500	2.308	PER IMP= .00
*S BASIN 1A-2 (UNDEVELOPED)										
COMPUTE NM HYD	105.00	-	5	.01215	17.69	.504	.77774	1.500	2.275	PER IMP= .00
*S BASIN 2A1A (IBEW)										
COMPUTE NM HYD	106.00	-	6	.00014	.22	.006	.77774	1.500	2.358	PER IMP= .00
*S BASIN 2A1B (UNDEVELOPED)										
COMPUTE NM HYD	107.00	-	7	.00672	9.78	.279	.77774	1.500	2.276	PER IMP= .00
*S BASIN 2B (HOME DEPOT)										
COMPUTE NM HYD	108.00	-	8	.00088	1.29	.037	.77774	1.500	2.288	PER IMP= .00
*S********** TRACT 3 **********										
COMPUTE NM HYD	101.00	-	91	.00247	6.94	.308	2.34321	1.500	4.397	PER IMP= 90.00
ROUTE RESERVOIR	501.10	91	92	.00247	1.71	.310	2.35812	2.000	1.086	AC-FT= .114
COMPUTE NM HYD	103.00	-	91	.00044	1.26	.055	2.34321	1.500	4.446	PER IMP= 90.00
ROUTE RESERVOIR	503.00	91	93	.00044	1.26	.055	2.34258	1.500	4.448	AC-FT= .000
ADD HYD	103.10	92&93	91	.00291	2.88	.365	2.35574	1.500	1.547	
COMPUTE NM HYD	102.00	-	92	.00187	5.26	.233	2.34321	1.500	4.400	PER IMP= 90.00
ADD HYD	102.10	91&92	93	.00478	8.14	.599	2.35078	1.500	2.663	
ROUTE RESERVOIR	502.00	93	91	.00478	2.95	.600	2.35430	2.100	.965	AC-FT= .130
COMPUTE NM HYD	104.00	-	2	.00034	.97	.043	2.34321	1.500	4.453	PER IMP= 90.00
ADD HYD	104.10	91&92	93	.00665	8.03	.833	2.35114	1.500	1.887	
ROUTE RESERVOIR	504.00	93	95	.00665	.20	.472	1.33159	3.400	.048	AC-FT= .644
COMPUTE NM HYD	105.00	-	91	.00501	14.07	.626	2.34321	1.500	4.392	PER IMP= 90.00
ROUTE RESERVOIR	505.00	91	92	.00501	6.92	.626	2.34316	1.700	2.160	AC-FT= .106

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ADD HYD              105.10 92&95  91      .01165      7.11      1.098    1.76627    1.700     .953
COMPUTE NM HYD       106.00   -    92      .00158      4.46       .198    2.34321    1.500    4.404 PER IMP=  90.00
ROUTE RESERVOIR      506.00   92   93      .00158      2.81       .198    2.34303    1.600    2.777 AC-FT=     .019
ADD HYD              106.10 91&93  96      .01323      9.91      1.295    1.83518    1.650    1.171
COMPUTE NM HYD       107.00   -    91      .00106      3.00       .133    2.34321    1.500    4.410 PER IMP=  90.00
ROUTE RESERVOIR      507.00   91   92      .00106      1.77       .133    2.34292    1.650    2.596 AC-FT=     .014
COMPUTE NM HYD       108.00   -    91      .00419     11.77       .523    2.34321    1.500    4.393 PER IMP=  90.00
ADD HYD              102.10 91&92  93      .00525     13.51       .656    2.34309    1.500    4.021
ROUTE RESERVOIR      508.00   93   91      .00525      1.00       .656    2.34309    2.250     .299 AC-FT=     .421
ADD HYD              108.20 91&96  91      .01848     10.90      1.951    1.97947    1.650     .921
COMPUTE NM HYD       109.00   -    92      .00786     22.08       .982    2.34321    1.500    4.390 PER IMP=  90.00
ADD HYD              109.10 91&93  93      .02374     23.92      2.608    2.05991    1.500    1.575
ROUTE RESERVOIR      509.00   93   99      .02374      2.92      2.608    2.05989    2.350     .192 AC-FT=    1.008
COMPUTE NM HYD       110.00   -    91      .00038      1.07       .047    2.34321    1.500    4.453 PER IMP=  90.00
ROUTE RESERVOIR      510.00   91   92      .00038      1.07       .047    2.34260    1.500    4.455 AC-FT=     .000
COMPUTE NM HYD       112.00   -    91      .00191      5.36       .238    2.34321    1.500    4.400 PER IMP=  90.00
ROUTE RESERVOIR      512.00   91   93      .00191      4.20       .239    2.34873    1.550    3.444 AC-FT=     .010
ADD HYD              112.10 92&93  91      .00228      5.19       .285    2.34772    1.500    3.559
COMPUTE NM HYD       111.00   -    92      .00297      8.35       .371    2.34321    1.500    4.396 PER IMP=  90.00
ADD HYD              109.10 91&92  93      .00525     13.54       .656    2.34512    1.500    4.032
ROUTE RESERVOIR      511.00   93   91      .00525      7.75       .661    2.36072    1.700    2.309 AC-FT=     .090
COMPUTE NM HYD       113.00   -    92      .00048      1.35       .059    2.34321    1.500    4.442 PER IMP=  90.00
ROUTE RESERVOIR      513.00   92   93      .00048      1.35       .059    2.34276    1.500    4.444 AC-FT=     .000
ADD HYD              113.10 91&93  92      .00572      9.01       .720    2.35921    1.500    2.459
COMPUTE NM HYD       114.00   -    91      .00032       .91       .040    2.34321    1.500    4.462 PER IMP=  90.00
ROUTE RESERVOIR      514.00   91   93      .00032       .70       .040    2.34263    1.600    3.424 AC-FT=     .002
ADD HYD              114.10 92&93  91      .00604      9.69       .760    2.35833    1.500    2.507
COMPUTE NM HYD       115.00   -    92      .00553     15.53       .691    2.34321    1.500    4.391 PER IMP=  90.00
ROUTE RESERVOIR      515.00   92   93      .00553       .80       .691    2.34480    2.350     .225 AC-FT=     .466
ADD HYD              115.10 91&93  92      .01157     10.42      1.451    2.35187    1.500    1.408
COMPUTE NM HYD       116.00   -    91      .00278      7.82       .347    2.34321    1.500    4.396 PER IMP=  90.00
ADD HYD              116.10 91&92  93      .01435     18.24      1.798    2.35017    1.500    1.987
ROUTE RESERVOIR      516.00   93   91      .01435     12.19      1.799    2.35179    1.800    1.327 AC-FT=     .836
COMPUTE NM HYD       117.00   -    92      .00818     22.97      1.022    2.34321    1.500    4.390 PER IMP=  90.00
ADD HYD              117.10 91&92  93      .02252     32.87      2.821    2.34867    1.500    2.280
ADD HYD              117.20 93&99  91      .04626     35.43      5.429    2.20049    1.500    1.197
ROUTE RESERVOIR      517.00   91    9      .04626      3.29      5.429    2.20074   10.050     .111 AC-FT=    2.045
*S*****************************************************************
*S BASIN 4A (UNDEVELOPED)
COMPUTE NM HYD       117.00   -    17      .01342     19.53       .556     .77774    1.500    2.275 PER IMP=    .00
*S BASIN 4B (COSTCO)
COMPUTE NM HYD       118.00   -    18      .00102      1.49       .042     .77774    1.500    2.286 PER IMP=    .00
*S BASIN 4C (COSTCO)
COMPUTE NM HYD       119.00   -    19      .00010       .15       .004     .77774    1.500    2.399 PER IMP=    .00
*S BASIN 5B2A (WENDY'S)
COMPUTE NM HYD       120.00   -    20      .00007       .11       .003     .77774    1.500    2.462 PER IMP=    .00
*S BASIN 5B2B1 (ARBY'S)
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COMPUTE NM HYD        121.00   -    21        .00006          .09        .002       .77774    1.500    2.522 PER IMP=    .00
*S***************** BASIN 5B2C1A1 (PANDA EXPRESS)*********************
COMPUTE NM HYD        901.00   -    91        .00038         1.09        .048      2.34321    1.500    4.453 PER IMP=  90.00
COMPUTE NM HYD        902.00   -    92        .00051         1.45        .064      2.34321    1.500    4.442 PER IMP=  90.00
ADD HYD               101.20 91&92  93        .00089         2.54        .112      2.34268    1.500    4.447
ROUTE RESERVOIR       550.10   93   22        .00089          .07        .112      2.34268    2.450     .126 AC-FT=     .081
*S*************************************************************
*S BASIN 5B2C1B1A (IHOP)
COMPUTE NM HYD        123.00   -    23        .00006          .10        .003       .77774    1.500    2.490 PER IMP=    .00
*S BASIN 5B2C1B2A (REMAINDER)
COMPUTE NM HYD        124.00   -    24        .00471         6.87        .195       .77774    1.500    2.277 PER IMP=    .00
*S BASIN 5B1 (UNION BANK)
COMPUTE NM HYD        125.00   -    25        .00133         3.74        .166      2.34321    1.500    4.405 PER IMP=  90.00
*S BASIN 5A (KB HOME)
COMPUTE NM HYD        126.00   -    26        .00505        14.18        .631      2.34322    1.500    4.392 PER IMP=  90.00
*S BASIN 6A1 (IKON)
COMPUTE NM HYD        127.00   -    27        .00020          .57        .025      2.34321    1.500    4.487 PER IMP=  90.00
*S BASIN 6A2 (UNDEVELOPED)
COMPUTE NM HYD        128.00   -    28        .00576        16.18        .719      2.34321    1.500    4.391 PER IMP=  90.00
*S BASIN 7A (UNDEVELOPED)
COMPUTE NM HYD        129.00   -    29        .00581        16.34        .726      2.34321    1.500    4.391 PER IMP=  90.00
*S BASIN 7B (TECHTONIX)
COMPUTE NM HYD        130.00   -    30        .00028          .81        .035      2.34321    1.500    4.462 PER IMP=  90.00
*S BASIN 8A (UNDEVELOPED)
COMPUTE NM HYD        131.00   -    31        .00774        11.27        .321       .77774    1.500    2.276 PER IMP=    .00
*S BASIN 8B (SUBURBAN LODGE)
COMPUTE NM HYD        132.00   -    32        .00017          .25        .007       .77774    1.500    2.348 PER IMP=    .00
*S BASIN 9A1A (FRITO LAY)
COMPUTE NM HYD        133.00   -    33        .00057          .84        .024       .77774    1.500    2.294 PER IMP=    .00
*S BASIN 9A1B (UNDEVELOPED)
COMPUTE NM HYD        134.00   -    34        .00586         8.53        .243       .77774    1.500    2.276 PER IMP=    .00
*S BASIN 9B (MCA)
COMPUTE NM HYD        135.00   -    35        .00015          .23        .006       .77774    1.500    2.358 PER IMP=    .00
*S BASIN 9C (UNDEVELOPED)
COMPUTE NM HYD        136.00   -    36        .00116         1.69        .048       .77774    1.500    2.285 PER IMP=    .00
*S BASIN 9D (DMC)
COMPUTE NM HYD        137.00   -    37        .00013          .19        .005       .77774    1.500    2.370 PER IMP=    .00
*S BASIN 10A (RYDER TRUCK)
COMPUTE NM HYD        138.00   -    38        .00038          .56        .016       .77774    1.500    2.308 PER IMP=    .00
*S BASIN 10B (FEDEX)
COMPUTE NM HYD        139.00   -    39        .00052          .76        .022       .77774    1.500    2.297 PER IMP=    .00
*S BASIN H1 (OFFSITE)
COMPUTE NM HYD           H.1   -    40        .03231        47.03       1.340       .77774    1.500    2.274 PER IMP=    .00
*S BASIN H2 (OFFSITE)
COMPUTE NM HYD           H.2   -    41        .00908        13.22        .377       .77774    1.500    2.275 PER IMP=    .00
*S BASIN A-1 (OFFSITE)
COMPUTE NM HYD           A.1   -    42        .07336       205.90       9.168      2.34321    1.500    4.386 PER IMP=  90.00
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*S BASIN A-2 AND A-3 (OFFSITE)

COMPUTE NM HYD	A2.3	-	43	.02452	68.85	3.064	2.34321	1.500	4.388	PER IMP=	90.00
ADD HYD	200.00	1& 2	1	.00118	2.20	.077	1.22984	1.500	2.914		
ADD HYD	201.00	1& 3	1	.00773	8.22	.848	2.05777	1.500	1.662		
ADD HYD	202.00	1& 4	1	.00811	8.79	.864	1.99716	1.500	1.692		
ADD HYD	203.00	1& 5	1	.02026	26.48	1.368	1.26583	1.500	2.042		
ADD HYD	204.00	1& 6	1	.02041	26.69	1.374	1.26240	1.500	2.044		
ADD HYD	205.00	1& 7	1	.02712	36.48	1.653	1.14239	1.500	2.101		
ADD HYD	206.00	1& 8	1	.02801	37.77	1.689	1.13090	1.500	2.107		
ADD HYD	207.00	1& 9	1	.07426	40.87	7.118	1.79729	1.500	.860		
ADD HYD	215.00	1&17	1	.08768	60.40	7.675	1.64128	1.500	1.076		
ADD HYD	216.00	1&18	1	.08869	61.89	7.717	1.63140	1.500	1.090		
ADD HYD	217.00	1&19	1	.08879	62.04	7.721	1.63043	1.500	1.092		
ADD HYD	218.00	1&20	1	.08886	62.15	7.724	1.62978	1.500	1.093		
ADD HYD	219.00	1&21	1	.08892	62.24	7.726	1.62923	1.500	1.094		
ADD HYD	220.00	1&22	1	.08981	62.31	7.838	1.63632	1.500	1.084		
ADD HYD	221.00	1&23	1	.08987	62.41	7.840	1.63574	1.500	1.085		
ADD HYD	222.00	1&24	1	.09459	69.28	8.036	1.59298	1.500	1.144		
ADD HYD	223.00	1&25	1	.09591	73.02	8.202	1.60337	1.500	1.190		
ADD HYD	224.00	1&26	1	.10096	87.20	8.832	1.64034	1.500	1.350		
ADD HYD	225.00	1&27	1	.10116	87.77	8.857	1.64171	1.500	1.356		
ADD HYD	226.00	1&28	1	.10691	103.94	9.576	1.67948	1.500	1.519		
ADD HYD	227.00	1&29	1	.11273	120.28	10.303	1.71370	1.500	1.667		
ADD HYD	228.00	1&30	1	.11301	121.09	10.338	1.71527	1.500	1.674		
ADD HYD	229.00	1&31	1	.12074	132.36	10.659	1.65521	1.500	1.713		
ADD HYD	230.00	1&32	1	.12091	132.60	10.666	1.65401	1.500	1.714		
ADD HYD	231.00	1&33	1	.12148	133.45	10.690	1.64987	1.500	1.716		
ADD HYD	232.00	1&34	1	.12734	141.98	10.933	1.60976	1.500	1.742		
ADD HYD	233.00	1&35	1	.12749	142.20	10.939	1.60877	1.500	1.743		
ADD HYD	234.00	1&36	1	.12865	143.90	10.987	1.60129	1.500	1.748		
ADD HYD	235.00	1&37	1	.12877	144.09	10.992	1.60048	1.500	1.748		
ADD HYD	236.00	1&38	1	.12915	144.65	11.008	1.59808	1.500	1.750		
ADD HYD	237.00	1&39	1	.12967	145.41	11.029	1.59479	1.500	1.752		
ADD HYD	238.00	1&40	1	.16198	192.44	12.370	1.43180	1.500	1.856		
ADD HYD	239.00	1&41	1	.17106	205.66	12.746	1.39709	1.500	1.879		
ADD HYD	240.00	1&42	1	.24442	411.56	21.914	1.68105	1.500	2.631		
ADD HYD	241.00	1&43	1	.26894	480.41	24.978	1.74142	1.500	2.791		
*S RENAISSANCE DETENTION POND											
ROUTE RESERVOIR	501.10	1	2	.26894	18.58	20.311	1.41605	2.500	.108	AC-FT=	15.094
FINISH											

960083

Drainage
cc: Jim Trup
George Adams

CITY OF
Albuquerque

February 6, 1998

Shahab Biazar, P.E.
Tierra West
4421 McLeod NE
Suite D
Albuquerque, NM 87109

RE: RENAISSANCE APARTMENTS PHASE 1 AND 2 (F16-D5). DRAINAGE REPORT FOR SITE DEVELOPMENT PLAN FOR SUBDIVISION, SITE DEVELOPMENT PLAN FOR BUILDING PERMIT, FINAL PLAT, AND BUILDING PERMIT APPROVALS. ENGINEER'S STAMP DATED FEBRUARY 5, 1998.

Dear Mr. Biazar:

Based on the updated information provided on your January 20, 1998 submittal, the above referenced project is approved for Site Development Plan for Subdivision, Site Development Plan for Building Permit, Final Plat, and Building Permit.

Prior to Certificate of Occupancy approval, and Engineer's Certification will be required.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Hydrology

c: Andrew Garcia
File

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OCT 24 2000
HYDROLOGY SECTION

DRAINAGE REPORT
FOR

TRACT 1A OF RENAISSANCE CENTER

APARTMENT COMPLEX

Prepared by:

Tierra West, LLC
4421 McLeod Rd., NE, Suite D
Albuquerque, New Mexico 87109

RECEIVED
OCT 24 2000
HYDROLOGY SECTION

November 7, 1997
(Revised January 20, 1998)

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the state of New Mexico in good standing.

RONALD RAY BOHANNAN
NEW MEXICO
7868
REGISTERED PROFESSIONAL ENGINEER

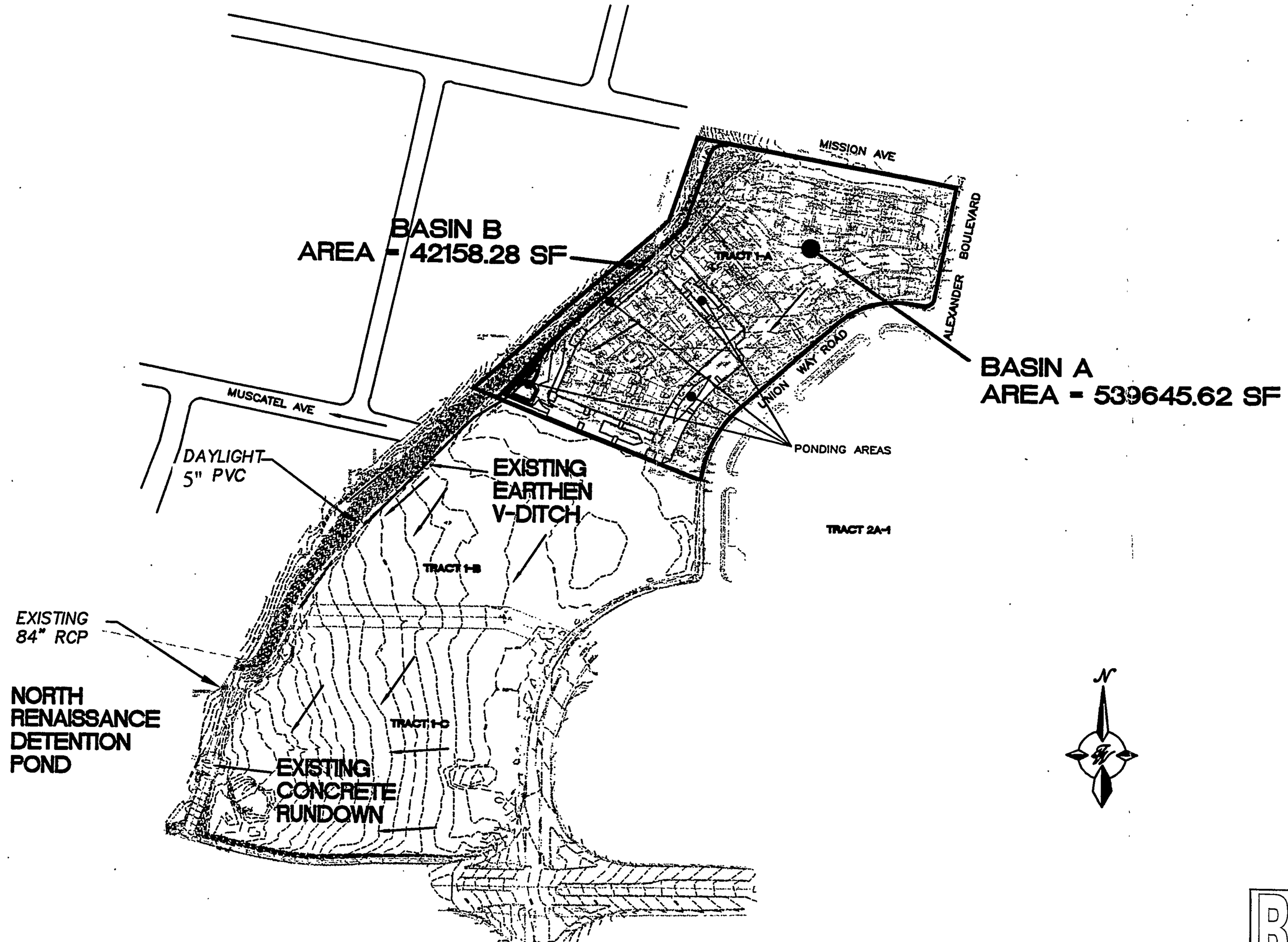
Ronald R. Bohannan
PE No. 7868

Job No 960057

Tracts 1A and 1B. The layout shown for the balance of Tract 1B is conceptual only, and we will not design the drainage for this portion of the site until we have a final site layout.

Ultimate Drainage Management

The entire site runoff will drain per the Renaissance Master Drainage Plan at a 0.1 cfs/acre discharge rate from the site. Therefore, the allowable discharge rate for the this site is (13.35 acres) is 1.33 cfs. The slope area will continue to discharge at the historical rate of 2.21 cfs. The site is divided into two basins - A and B. Basin B will continue draining west to Muscatel Avenue at an undeveloped flow rate of 2.21 cfs. Basin B, at a developed flow rate of 53.26 cfs, will drain to a ponding area on the south side of the project. The ponds consist of a series of parking lot ponds and a detention pond which is located at the southwest corner of the site. The ponds are setup in such way that all the low flow runoff from the parking lot inlets will drain to the detention pond at the southwest corner of the site. During a larger storm all the ponds will act as one pond (to a maximum 100-year water surface elevation of 5037.00 feet). The runoff from Basin B will be detained and discharged at a flow rate of 1.28 cfs which is less than the allowable discharge of 1.33 cfs. The drainage pipe from the pond is sized for a 5" pipe. The pipe has a 4-1/2" orifice plate to detain the runoff and discharge at the allowable discharge rate. The 5" pipe is day-lighted into an earthen V-ditch. The V-ditch has been analyzed and can handle the 1.28 cfs which is considerably less than the 53.26 existing flow rate. The last detention pond will have an emergency overflow weir for events larger than the 100 year storm to continue to drain south to Tract 1C. The runoff then drains to a concrete rundown located on the southwest corner of the Tract 1C and from there to North



PHASE-II (ULTIMATE) BASIN LAYOUT

RECEIVED
OCT 24 2000
HYDROLOGY SECTION

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

November 6, 1987

Carlos Padilla
Bohannan-Huston, Inc.
7500 Jefferson Street, NE
Albuquerque, New Mexico 87109

RE: GRADING & DRAINAGE REPORT FOR RENAISSANCE TRACT 1B RESUBMITTED OCTOBER 28, AND NOVEMBER 3, 1987 FOR BUILDING PERMIT APPROVAL (F-16/D5C)

Dear Mr. Padilla:

Your submittal, referred to above, is approved for building permit sign-off by Hydrology. The two documents to which this approval refers are Sheet 1 of 1, Final Grading and Drainage Plan - Phase I, with a revision date of October 28, 1987, and received by us on November 3, 1987, and Sheet 3 of 9, Developed Condition Grading Plan, Tract 1-B Phase 1, with an engineer's stamp dated August 18, 1987, and received by us on October 18, 1987. In the future, please update the engineer's stamp and signature, or the revision date on all submittals so that we are both clear as to which documents are the final approved documents.

Mr. Jim DeFlon of Hilltop, Inc. landscapers called to explain that he was going to put a clover groundcover and irrigation system on the embankment which forms the west border of the tract. This is an acceptable erosion control measure, but one which we will want to inspect and accept before releasing the Certificate of Occupancy.

If you have any questions, please call me at 768-2650.

Cordially,

Stuart Reeder

G. Stuart Reeder, P.E.
C.E./Hydrology Section

xc: Owner
Architect

GSR/bsj

FINAL DESIGN DRAINAGE COMPS. FOR "The Village AT Renaissance" Apartment complex - Phase One

RECEIVED
OCT 28 1987
HYDROLOGY SECTION

BOHANNAN-HUSTON INC.

PROJECT NAME Renissance - Tract 1B - Phase 1 SHEET _____ OF _____

PROJECT NO. 64582 BY C.G.P. DATE 9/3/87

SUBJECT Drainage CH'D _____ DATE _____

- Runoff Volumes using Plates 22.2 - C2, C3 & C4 D.P.M. (S.C.S. Method)
- Runoff Rates using Rational Method

- Offsite flows - None

- Developed on site flows - 12.49* [AC] Contributing (8.17 - Phase 1, 4.32 - Phase 2)

Note: Area includes Entrance easement or [illegible] 1-C & Area between Property line & Back of curb to the East.

(PLATE 22.2 C-2) Soil group "B" (Phase 1) $CN \simeq \frac{98+61}{2} \simeq \underline{\underline{80}}$
(Phase 2) $CN \simeq \underline{\underline{75}}$

DISC	AREA [AC]	% Total Area	
Impervious (streets, parking roofs, sidewalks)	4.01 [AC]	49 %	Phase 1 Basins A, B, C, D & E
LANDSCAPED	4.16	51 %	
undeveloped	4.32	100 %	Phase 2 Basins F & G

PLATE 22.2 C-3 { Phase 1 % Impervious = 49% ⇒ Curve No. = 88
Phase 2 % Impervious = 0% ⇒ Curve No. = 75

PLATE 22.2 D-1 { Rainfall = 2.2 [IN]

- Individual Basins (No Routing Considered!)

$Vol = \frac{Q}{12}(Area)(43560)$ [ft³]

BASIN	Area [AC]	CN	Q [IN]	Vol [ft³]
A	4.32	88	1.15	18,034* free discharge ✓
B	0.60	88	1.15	2505
C	1.32	88	1.15	5510
D	0.54	88	1.15	2254
E	1.39	88	1.15	5803
F	3.02	75	0.5	5481
G	1.30	75	0.5	2360

BOHANNAN-HUSTON INC.

PROJECT NAME Renaissance - Tract 18 - Phase 1 SHEET 1 OF 9
PROJECT NO. 64582 BY C.G.P. DATE 8/7/97
SUBJECT Drainage CH'D DATE

Pond Capacities: PLANIMETERED from Grading PLAN

Pond	Volume [ft³]	Volume Req'd [ft³]	100 [Yr] Elev
A	— Free discharge	—	—
B	5770	2505 ⊛	5030.3
C	3525	5510 ⊛	5030.3
D	4419	2254	5033.8
E	5807	5803	5032.5

⊛ Excess 1985 [ft³] from Basin "C" to be Routed to Basin "B" through 4" PVC Pipe Connecting ponds.

Free Discharge (Basin "A")

Total Acreage = 12.49 [AC]
BASIN "A" Acreage = 4.32 [AC]

⊛ from Renaissance Drainage report dated Feb. 22, 1985 } $Q_{all} = (0.99\,[cfs/Ac])(12.49\,[AC]) = 12.36\,[cfs]$

Given: $T_c = 10\,[min]$

Rainfall = 2.2 [IN]

$\therefore i = 4.65\,[IN/hr]$

$C = 0.60$ (pg. 3 of 9 - Phase 1 & 2 combined)

$Q = CiA = 0.60(4.65)(4.32) = 12.05\,[cfs]$

BOHANNAN-HUSTON INC.

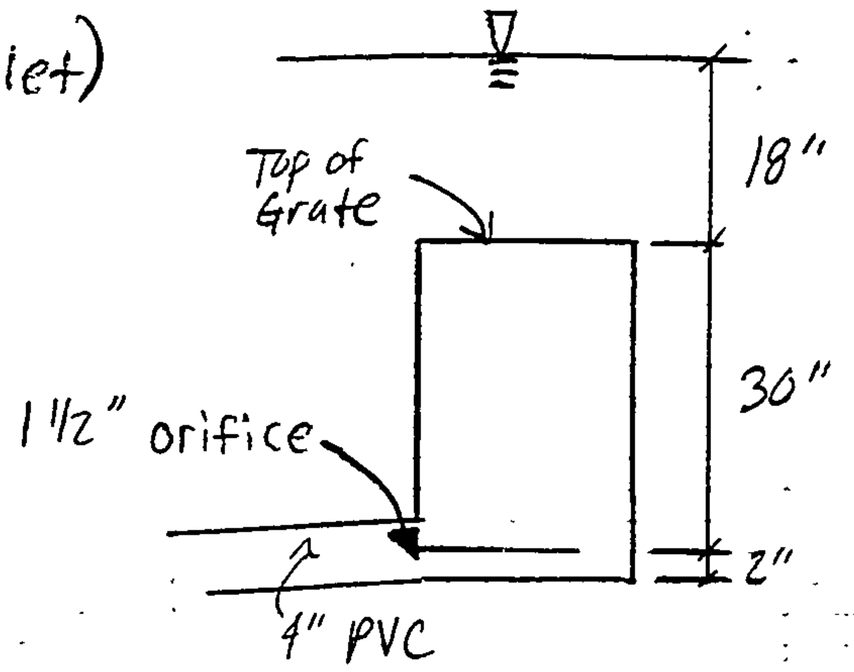
PROJECT NAME Renaissance-Tract 1B-Phase 1 SHEET 2 OF 9
PROJECT NO. 64582 BY C.G.P. DATE 8/7/97
SUBJECT Drainage CH'D DATE

Pond Draining: All ponds limited to drain @ 0.1 [cfs / Acre]

(Orifice eqtn) $[Q = CA\sqrt{2gh}]$ Given: $C = 0.62$
$g = 32.2$ [ft/sec²]

(Time to drain) $[t = V[ft^3] / Q[cfs](60)(60)]$

(TYP. Inlet)



$h = 48" = 4'-0"$

* Assume 1 1/2' depth when ultimately developed!

BASIN	[AC] Area	[ft³] Ponding Vol.	[cfs] Q_{ALL}	[IN²] Orifice Area	[IN] Required Orifice Dia.	⊙ [IN] DIA USED	Q = 0.12 [cfs] [hrs] Time to DRAIN
B	0.60	2505 ⊛	.060	0.87	1.05	1 1/2	5.7
C	1.32	7495 ⊛	.132	1.95	1.58	1 1/2	17.1
D	0.54	2254	.054	0.78	1.00	1 1/2	5.1
E	1.39	5803	.139	2.01	1.60	1 1/2	13.2

⊛ see pg. 2

⊙ $A_{Avg.} = (.6 + 1.35 + 0.54 + 1.39)/4 = 0.97$ [AC]

∴ weighted Orifice Dia. req'd. $= \left[\frac{.6}{.97}(1.05) + \frac{1.35}{.97}(1.58) + \frac{0.54}{.97}(1.00) + \frac{1.39}{.97}(1.60)\right]/$

$= \underline{\underline{1.42 \text{ [IN]}}}$

∴ use: 1 1/2" Ø orifice for all ponds!

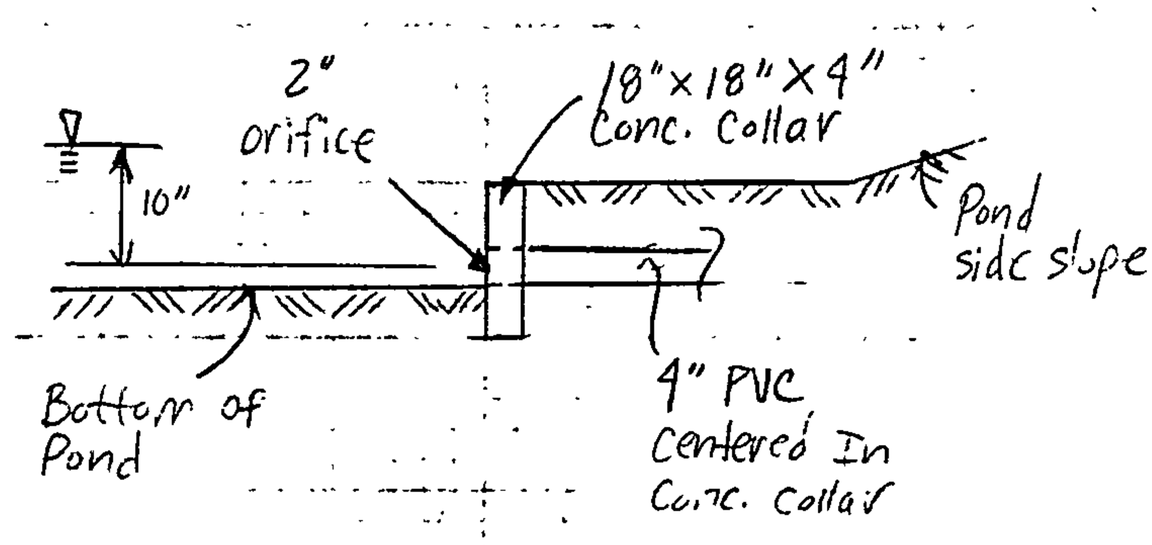
BOHANNAN-HUSTON INC.

PROJECT NAME Renaissance - Tract 1B - Phase 1 SHEET 3 OF 9
PROJECT NO. 64582 BY C.G.P. DATE 8/7/87
SUBJECT Drainage CH'D DATE

Desilting Basins (BASINS F & G)

BASIN	[AC] Area	[ft³] Pond Vol.	[ft³] Pond Vol. req'd	[cfs] Q_{ALL}	100[yr] Elev.	[IN²] Orifice Area	[IN] req'd orifice dia.	* [IN] orifice dia. used	** [hrs] Time Drain
F	3.02	13860	5481	.30	5034.1	9.51	3.5	2.0	15.36
G	1.30	5548	2360	.13	5034.4	4.12	2.30	2.0	6.62

(TYP. INLET DETAIL)



* limit to 0.12 [cfs] (see pg. 4) to Allow routing through respective ponds.

** Cumulative time to drain ponds: D & E

BASIN	[hrs] Independent Drain time	[hrs] Additional time of Basin Contributing	[hrs.] Cumulative Drain time
D	5.1	15.36 (BASIN F)	20.46
E	13.2	6.62 (Basin G)	19.82

BOHANNAN-HUSTON INC.

PROJECT NAME Renaissance - Tract 1B-Phase 1 SHEET 4 OF 9
PROJECT NO. 64582 BY C.G.P. DATE 8/7/97
SUBJECT Drainage CH'D _____ DATE _____

Overflow (Spillway) Calculations:

(Wier Eqtn.) $[Q = C L H^{3/2}]$ $L = \frac{Q}{C H^{3/2}}$

Use: $C = 2.0$

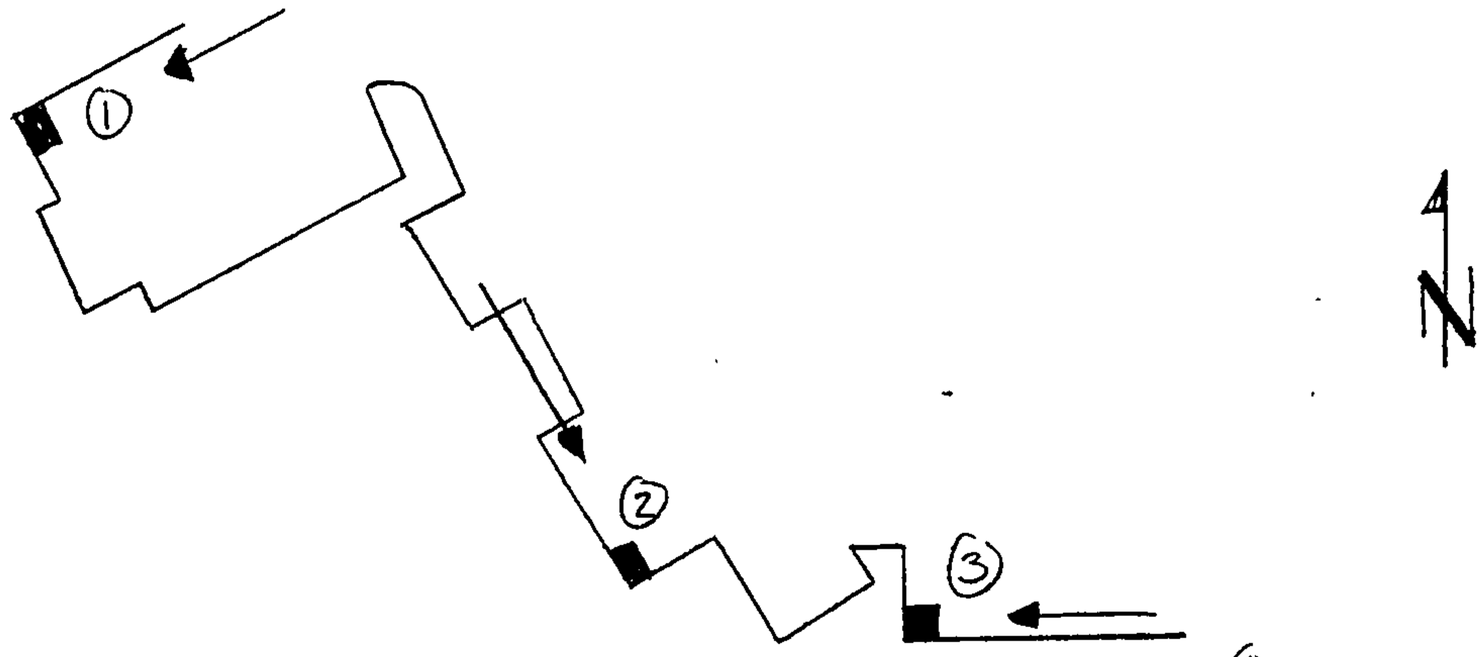
Pond	*Q_{100} [cfs]	Height [ft]	Length req'd [ft]	Spillway Dimensions [ft x ft]
B	1.79	0.5'	2.5'	5' x .5'
C	3.93	0.5'	5.6'	6' x .5'
D	1.61	0.2'	9.0'	9' x .2'
E	4.14	0.5'	5.9'	6' x .5'
F	8.99	0.5'	12.7'	13' x .5'
G	3.87	0.5'	5.5'	6' x .5'

*[Q = CiA] Use: C = .64 (pg. 1 of 9-phases 1 & 2)
i = 4.65

BOHANNAN-HUSTON INC.

PROJECT NAME Renaissance - Tract 1B - Phase 1 SHEET 5 OF 9
PROJECT NO. 64582 BY C.G.P. DATE 8/10/97
SUBJECT Drainage CH'D _____ DATE _____

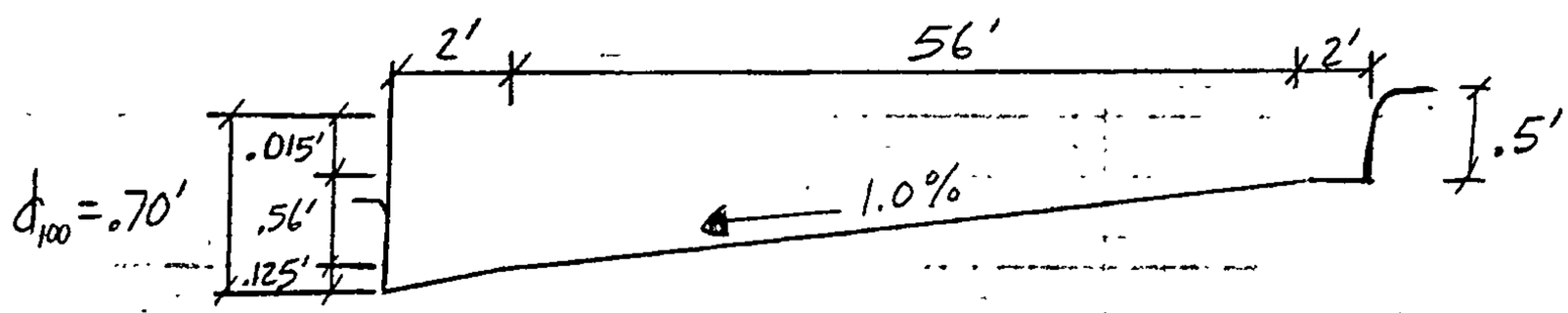
Catch Basin Design: Tributary Areas PLAnimetered from Grading plan.



Catch Basin	[AC] Trib Area (A)	[AC] BASIN Area (A_T)	[cfs] Q_{peak}	⊛ [cfs] Q_{DES}
①	0.73	4.32	12.05	2.04
②	0.48	4.32	12.05	1.33
③	1.48	4.32	12.05	4.13

⊛ $\left[Q_{DES} = \frac{Q_P}{A_T}(A) \right]$

(Worst Case) ③ $Q_{DES} = 4.13$ [cfs] $S = 1.11\%$



TYP. Street Sect.

BOHANNAN-HUSTON INC.

PROJECT NAME Renaissance - Tract 1B - Phase 1 SHEET 6 OF 9
PROJECT NO. 64582 BY C.G.P. DATE 8/10/07
SUBJECT Drainage CH'D DATE

(Mannings Eqtn) $\left[Q = \frac{1.486}{n} A (R_H)^{2/3} (S_f)^{1/2} \right]$

$n = 0.017$

flowing to T.C. only
$$\begin{cases} A \simeq 1/2 (.5)(37.5) = 9.37 \ [ft^2] \\ W.P. \simeq .5 + 37.5 = 38 [ft] \end{cases}$$

$R_H = A/W.P. = 9.37/38 = 0.25 \ [ft]$

$\therefore \ Q_{cap} = \frac{1.486}{.017} (9.37)(.25)^{2/3}(.0111)^{1/2}$

$= 34.2 \ [cfs] > 4.13 \ [cfs]$ OK!

$Q_{DES} = 4.13 \ [cfs]$

$d = 0.5 \ [ft]$ (pools at catch basin to T.C.)

(PLATE 22.3 D-5) $Q_{Inlet} = 5.8 \ [cfs] > 4.13 \ [cfs]$ OK!

$\therefore$ <u>USE</u>: TYPE "A" Inlet at all three locations

(Depth of Catch Basins) * Assumed lateral flowing full.

$\left[V = C.F. + 0.5 + 1.2 \frac{V^2}{2g} + \frac{d}{\cos(s)} \right]$ $Q = VA \Rightarrow V = Q/A = \frac{4.13}{\pi(1.5)^2/4} = \underline{\underline{2.34 \ [ft/s]}}$

$\therefore V = .5 + 0.5 + 1.2 \frac{(2.34)^2}{2(32.2)} + \frac{1.5}{\cos(.03)} = \underline{\underline{2.6 \ [ft]}}$

$V_{min} = \underbrace{0.5}_{\text{curb Ht.}} + \underbrace{1.83}_{\text{1'-10" to soffit}} + \underbrace{1.5}_{\text{I.D. lateral}} = \underline{\underline{3.83 \ [ft]}}$ Controlls!

$\therefore$ <u>USE</u>: Catch basin depth of <u>at least</u> 3.83 [ft] from T.C.

BOHANNAN-HUSTON INC.

PROJECT NAME Renaissance - Tract 1B - Phase 1 SHEET 7 OF 9
PROJECT NO. 64582 BY C.G.P. DATE 8/10/97
SUBJECT Drainage CH'D DATE

Hydrolic Gradelines for 18" RCP from Catch basins.

NOTES: Q_{max} = 0.12 [cfs] for any of the 4" PVC lines (Controlled at Inlet). Non-Pressure flow. H.G.L. ELEV = 5014.5 at M.H. where 4" line terminates, Inv. Elev = 5017.99 (4" Line) ∴ OK!

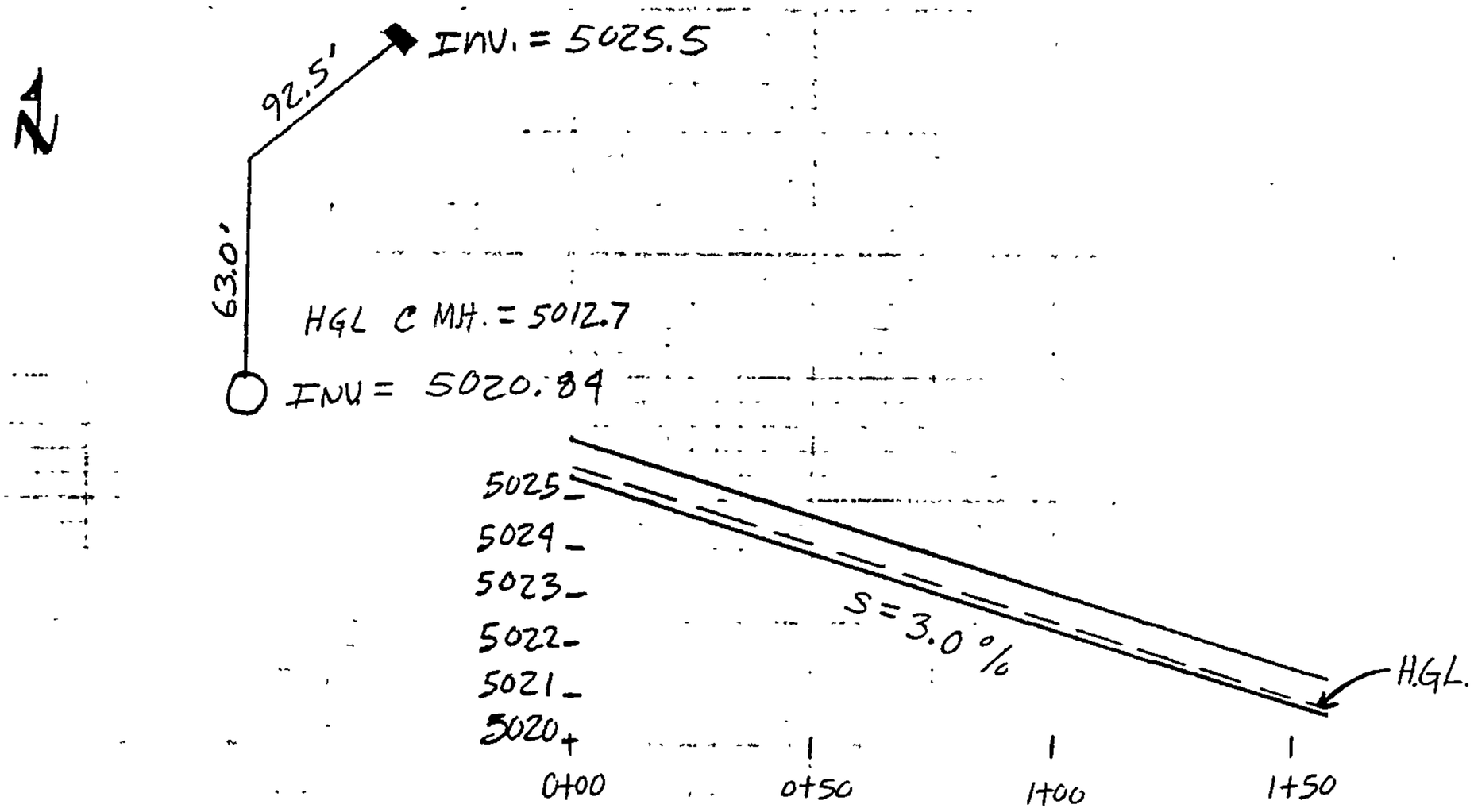
Min. pipe size for all laterals is 18". Critical Q = 4.13 [cfs]. Maximum Slope for pressure flow is:

$$\left[Q = \frac{1.486}{n} A R_H^{2/3} S_f^{1/2}\right] \Rightarrow S_f = \left[\frac{Q \cdot n}{1.486 A R_H^{2/3}}\right]^2 = \left[\frac{4.13(.013)}{1.486(1.77)(.376)^{2/3}}\right]^2$$

$$= \underline{\underline{0.153\ \%}}$$

∴ Design for non-pressure flow!
H.G.L. ELEV. = depth of flow.

(Catch basin ①)



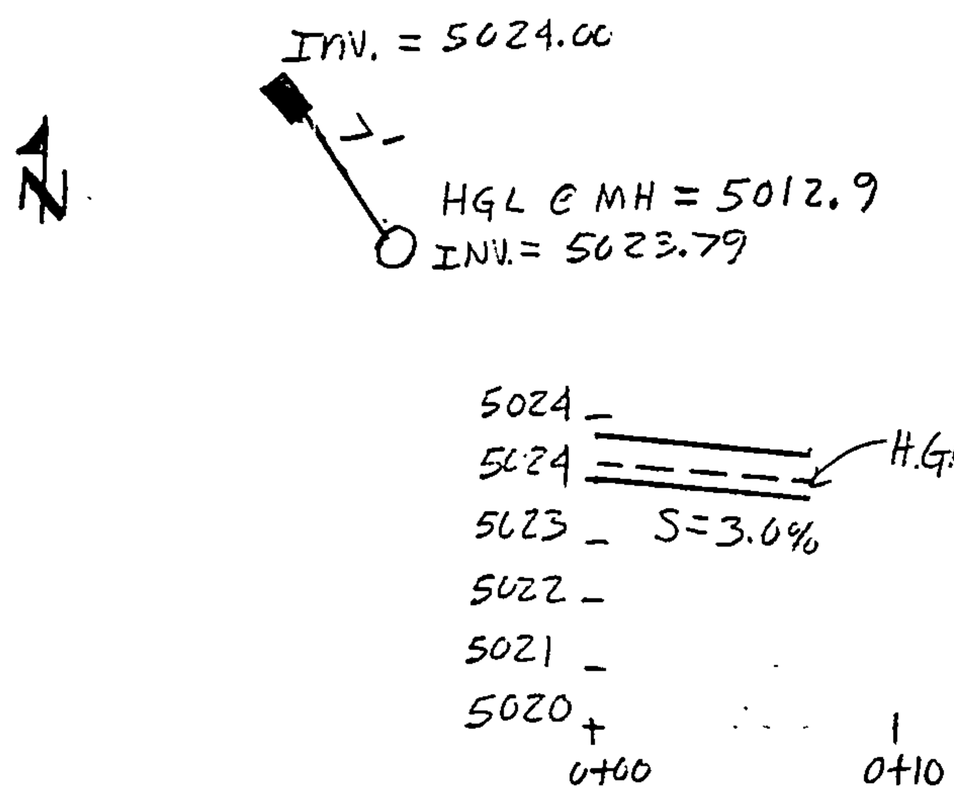
$$\left[Q = \frac{1.486}{n} A R^{2/3} S_f^{1/2}\right] \Rightarrow A = \frac{Q n}{1.486 R_H^{2/3} S_f^{1/2}} \Rightarrow d = \sqrt{\frac{4 Q n}{1.486(\pi)(R_H)^{2/3}(S_f)^{1/2}}}$$

By Trial & Error (Computer Program) $\underline{\underline{d = 0.34\ [ft]}}$

BOHANNAN-HUSTON INC.

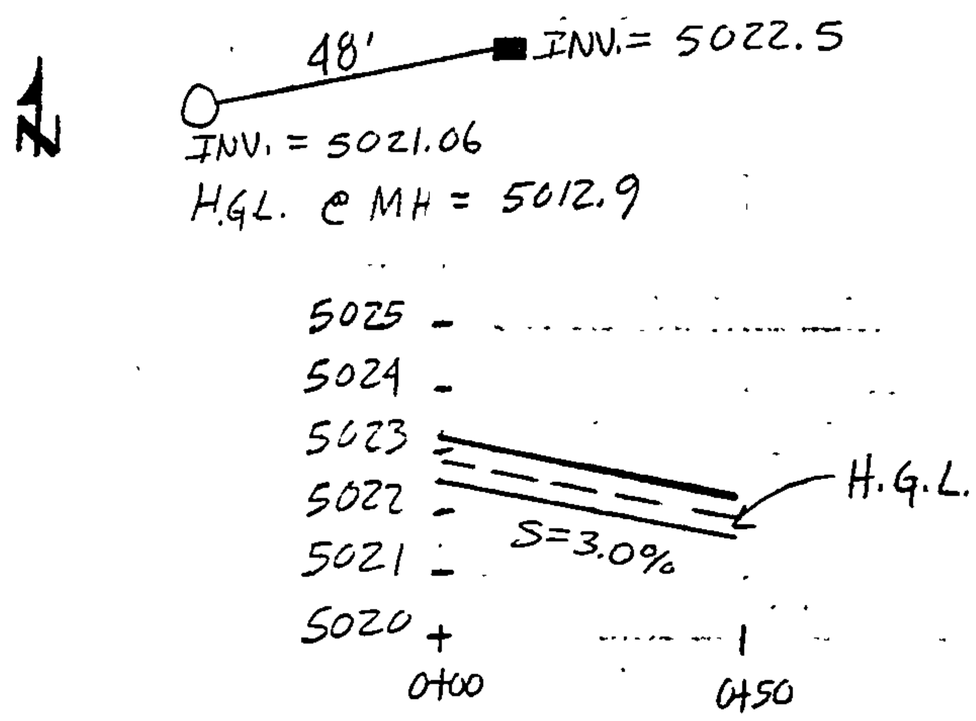
PROJECT NAME Renaissance - Tract 1B - Phase 1 SHEET 8 OF 9
PROJECT NO. 64582 BY C.G.P. DATE 8/12/87
SUBJECT Drainage CH'D DATE

(Catch basin (2))



$d = 0.27$ [ft]

(Catch basin (3))



$d = 0.49$ [ft]

BOHANNAN-HUSTON INC.

PROJECT NAME Renaissance-Tract 1B-Phase 1 SHEET 9 OF 9

PROJECT NO. 64582 BY C.G.P DATE 8/12/97

SUBJECT Drainage CH'D DATE

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
149 Jackson, N.E., Albuquerque, N.M. 87108
Telephone (505) 265-6631

Project RENAISSANCE CENTER Sheet 6A of 11
Job No. 356
By JA Chk'd ✓ Date 2-12-85

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SEP 08 1987
HYDROLOGY SECTION

DETENTION POND STORAGE VOLUME

ELEV.	AREA (Acres)	AVG AREA	DEPTH (Ft.)	ACRE FEET	ACCUM. AC. FT.	
5101.5	0				0	
		0.8572	0.50	0.4286		
5102	1.7143				0.4286	
		1.7602	1.0	1.7602		
5103	1.8061				2.1888	
		1.8520	1.0	1.8520		
5104	1.8980				4.0408	
		1.9210	0.5	0.9605		
5104.5	1.9439				5.0013	
5104.5	2.1694					
		2.1956	0.5	1.0978		
5105	2.2217				6.0991	
		2.2740	1.0	2.2740		
5106	2.3262				8.3731	
		2.3785	1.0	2.3785		
5107	2.4308				10.7516	
5107.5		2.4830	1.0	~~2.4830~~		11.9931
5108	2.5353			1.2415	13.2346	
		2.5876	1.0	2.5876		
5109	2.6399				15.8222	
		2.6922	1.0	2.6922		
5110	2.7444				18.5144	
		2.7706	0.5	1.3853		
5110.5*	2.7967				19.8997	19.8997
		2.8490	1.0	2.8490		
5111.5	2.9012				22.7487	
		2.9535	1.0	2.9535		
5112.5	3.0058				25.7022	
		3.0581	1.0	3.0581		
5113.5	3.1104				28.7603	

3'

7.9066 AC.FT

* Spillway!

Re-calculated Runoff Volumes Using PLATES 22.2-C2, C3 & C4 D.P.M.

*see pgs. 1-9 of Sect. VI Drainage Analysis - Renaissance Center Drainage report revised Feb. 22, 1985

DRAINAGE Area B

Area = 263.54 [Acres]

(PLATE 22.2 C-2) Soil group "B" CN ≈ 75

(PLATE 22.2 C-3)

Impervious = 13% ⇒ Curve No. 78

(PLATE 22.2 C-4)

Rainfall = 2.2 [IN] (from PL 22.2 D-1)

⇒ Q = 0.70 [IN]

$\therefore V_{100} = \left(\frac{0.70}{12}\right)(263.54) = 15.37$ [Ac-ft]

Capacity of pond for retention purposes = 19.90 [Ac-ft]

∴ Additional Storage Available = 19.90 - 15.37 = 4.53 [Ac-ft]

DRAINAGE CALCS. FOR Renaissance Properties & others Draining to S.W. Detension Pond

*(Additional Contributed by Development of Tract 1-B)

Area = 7.49 [Acres] } 12.49 - (3.85 + 1.15) *12.5

CN = 88

Impervious = 57% ⇒ Curve No. 93 ⇒ Q = 1.5 [IN] ⇒ $V_{100} = \left(\frac{1.5}{12}\right)7.49 = 0.94$ [Ac-ft]

4.53 - 0.94 = 3.59 [Ac-ft] *Excess Capacity!

BOHANNAN-HUSTON INC.

PROJECT NAME Renaissance - Tract 1-B SHEET 1 OF 2

PROJECT NO. 64582 BY C.G.P. DATE 6/12/87

SUBJECT Prelim. Drainage CH'D DATE

The Beach Waterpark

Excess Volume being retained = 44,480 [CF] (from Cities Calculations)

= 1.02 [AC-Ft]

∴ % of total Excess Capacity = $\frac{1.02}{4.53}$ = 22.5 %

(Including Waterpark)

Excess Capacity = 3.59 - 1.02

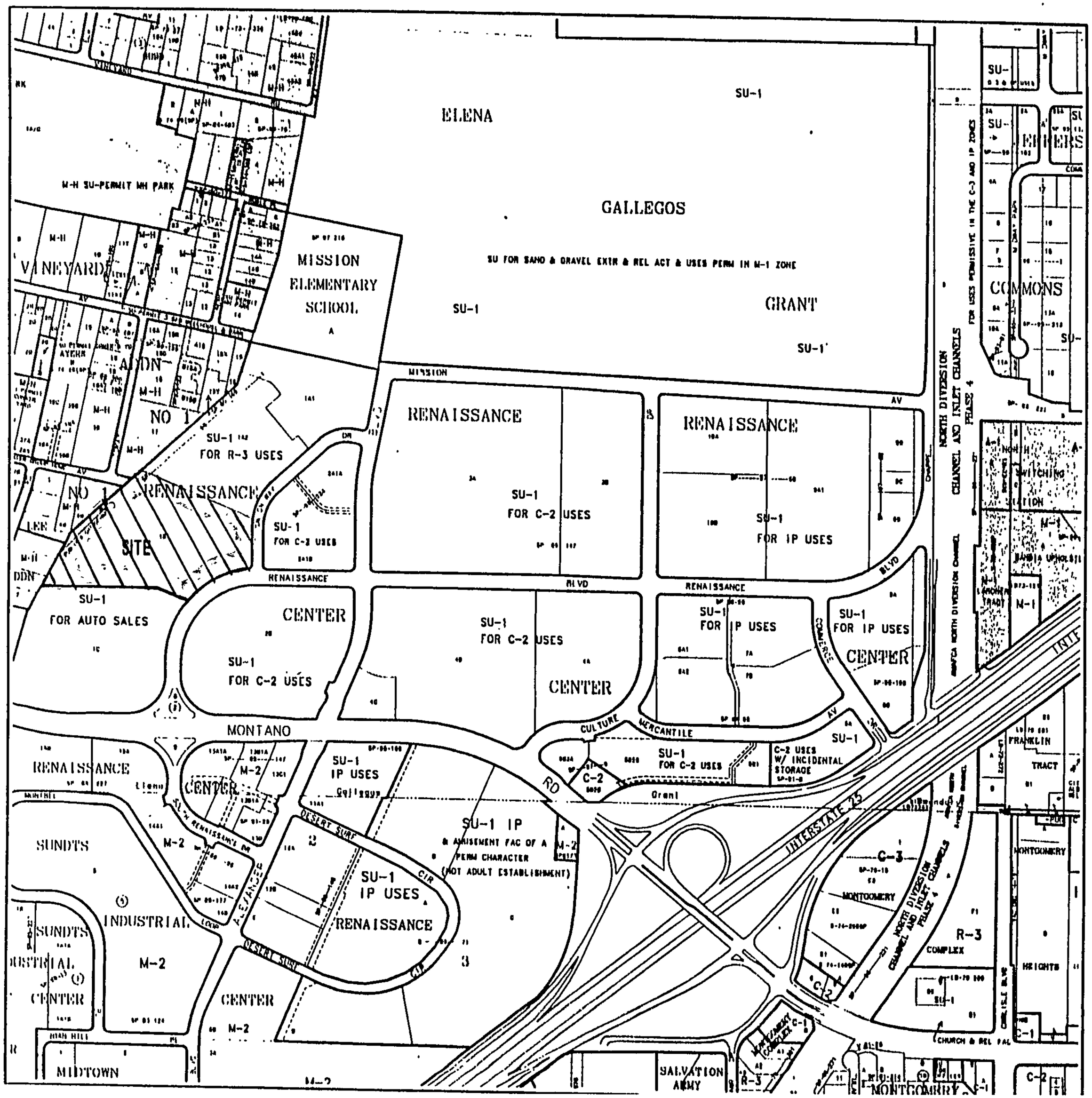
= 2.57 [AC-ft]

BOHANNAN-HUSTON INC.

PROJECT NAME Renaissance - Tract 1-B SHEET 2 OF 2

PROJECT NO. 64582 BY C.G.P. DATE 6/12/87

SUBJECT Prelim. Drainage CH'D DATE



CITY OF Albuquerque

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N W E S

GRAPHIC SCALE IN FEET

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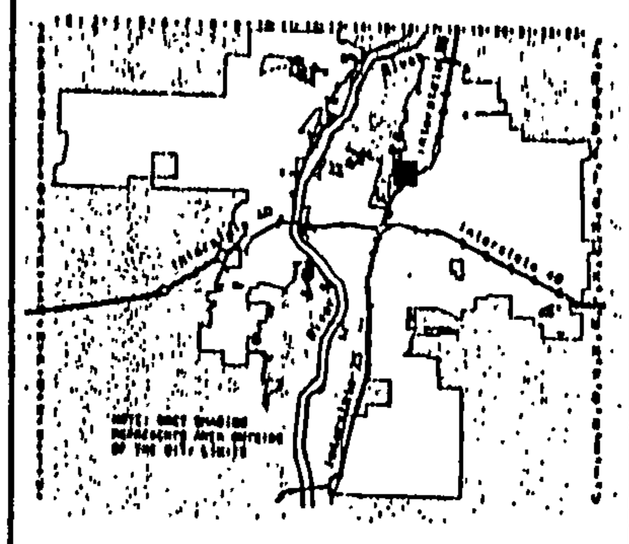
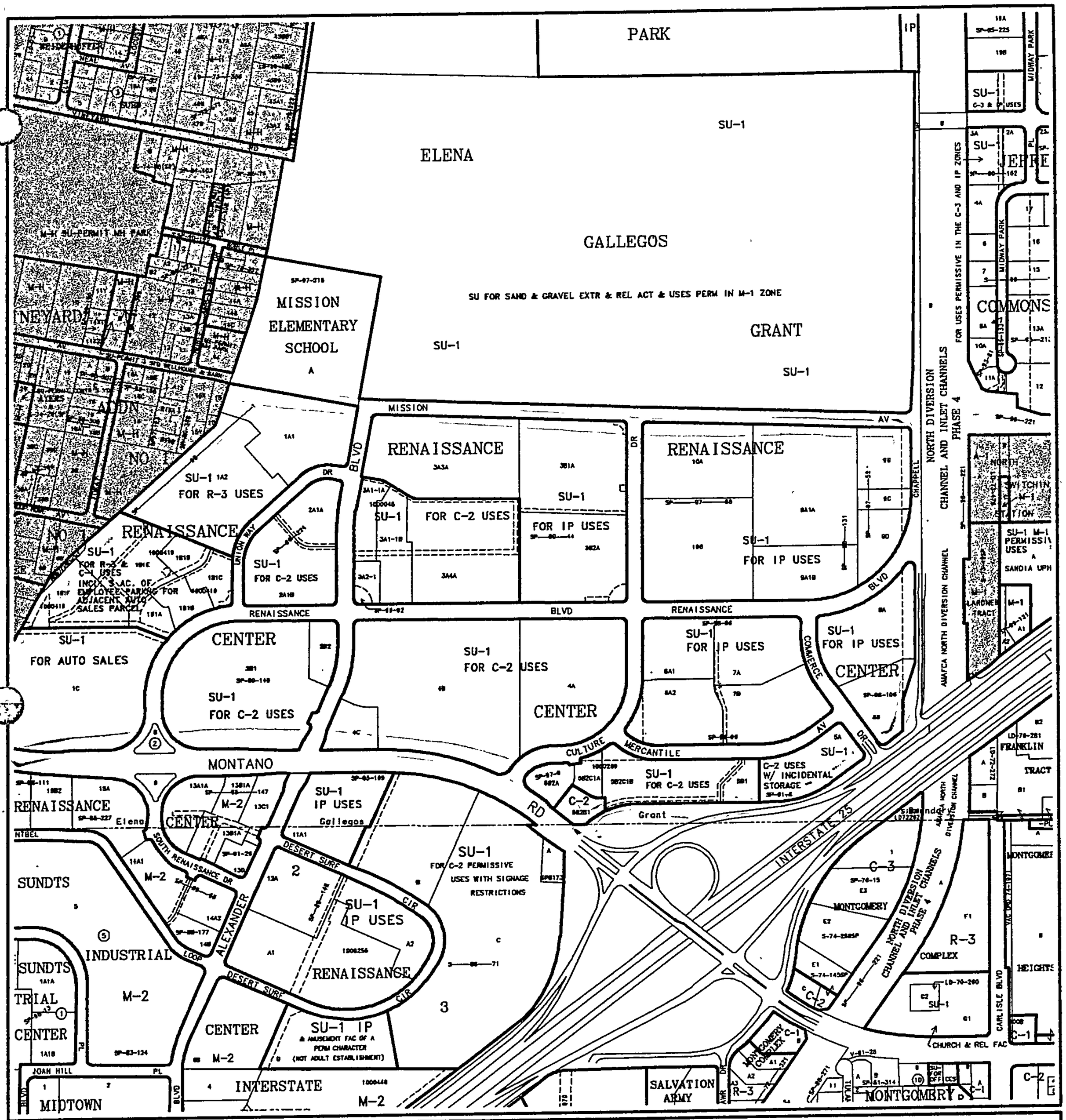
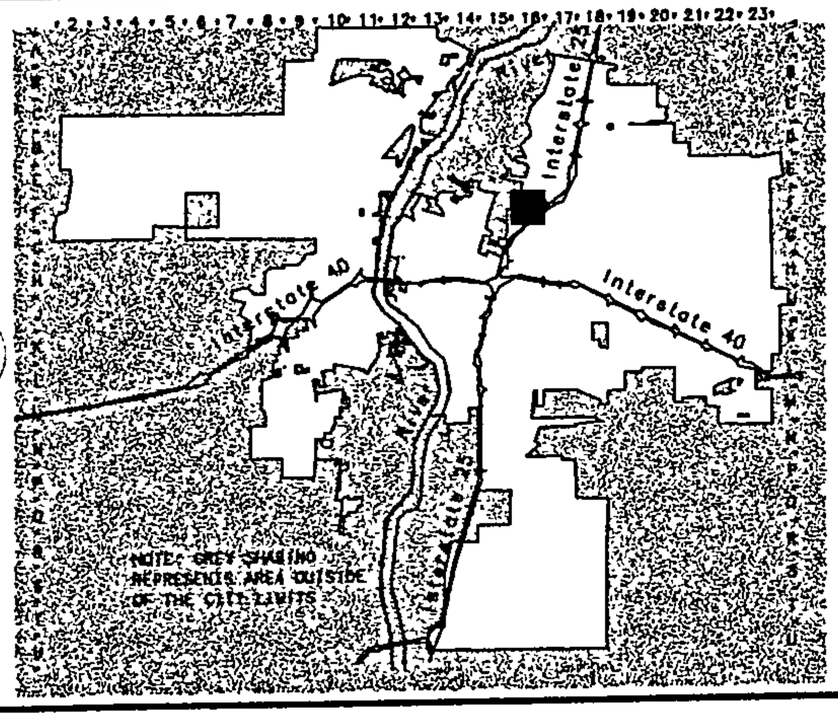


Zone Atlas Page

F-16-Z

Map Amended through July 08, 1998





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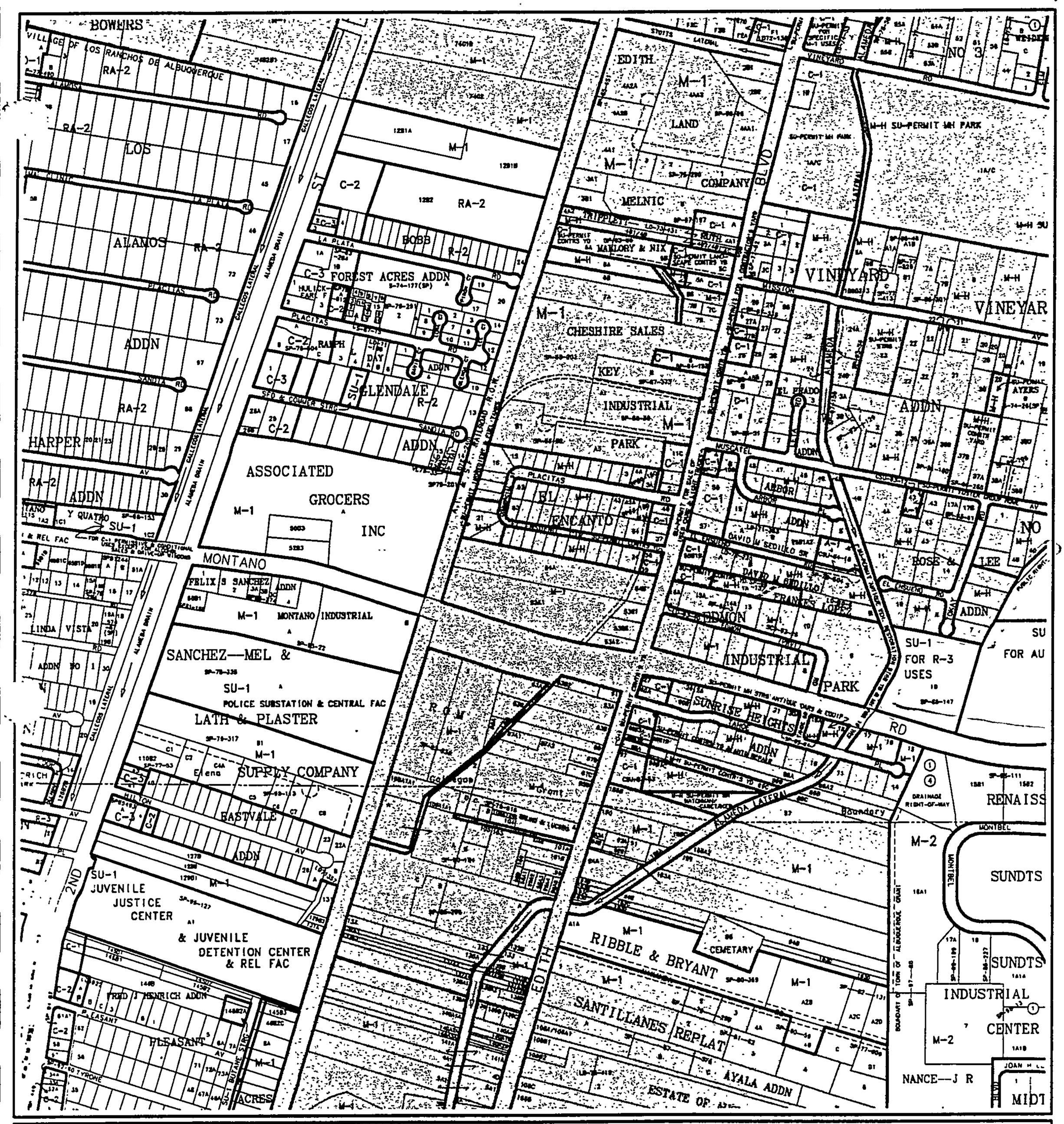
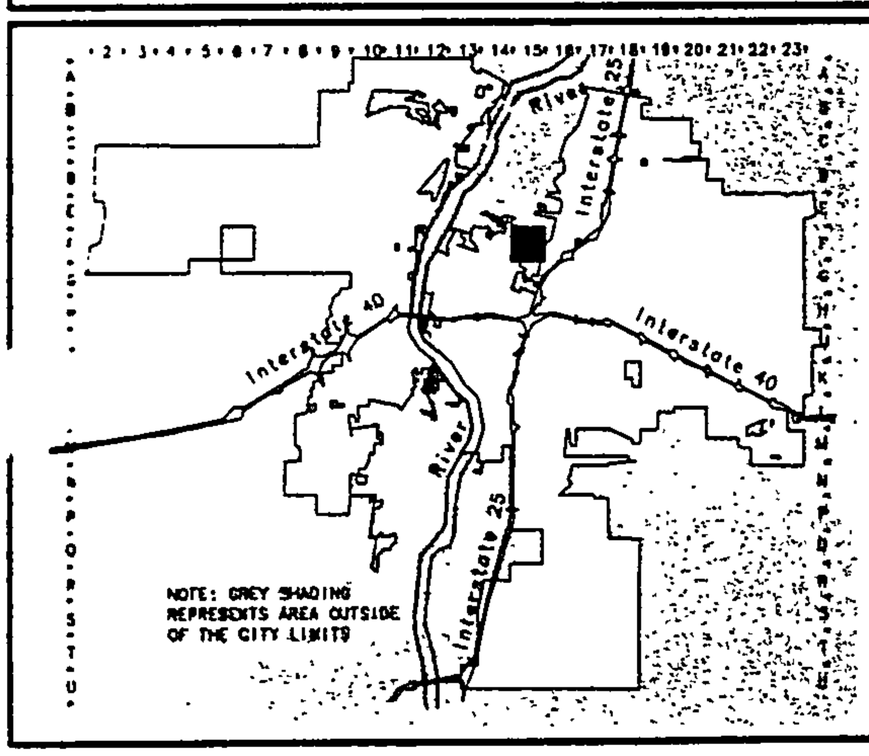
F-16-Z

Map Amended through July 19, 2001





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PLANNING DEPARTMENT

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GRAPHIC SCALE IN FEET

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Zone Atlas Page

F-15-Z

Map Amended through July 28, 2000