CITY OF
Albuquerque

October 2, 1997

Martin J. Chávez, Mayor

James D. Hughes, P.E.
Mark Goodwin & Assoc.
P.O. Box 90606
Albuquerque, NM 87199

D4

RE: BROADWAY INDUSTRIAL CENTER (M14-D4). DRAINAGE REPORT FOR PRELIMINARY PLAT, FINAL PLAT, AND GRADING PERMIT. ENGINEER'S STAMP DATED 9-24-97,

Dear Mr. Hughes:

Based on the information provided on your September 12, 1997 submittal, City Hydrology has the following comments:

1. Unit three must either utilize a subsurface storm drain with the detention pond or free discharge. A controlled release rate via a sidewalk culvert will not be permitted. If you choose to free discharge Unit 3, your allowable discharge rates for Units 1and 2 must be adjusted.

2. Add a temporary retention pond and storm drain inlet at Bethel and Broadway to the Unit 1 infrastructure list. The inlet is to pick up flows from both Bethel and Broadway.

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

Sincerely,

Lisa Ann Manwill, P.E.
Hydrology

Not applicable anymore
5-10-00
Since plan 9-14-01

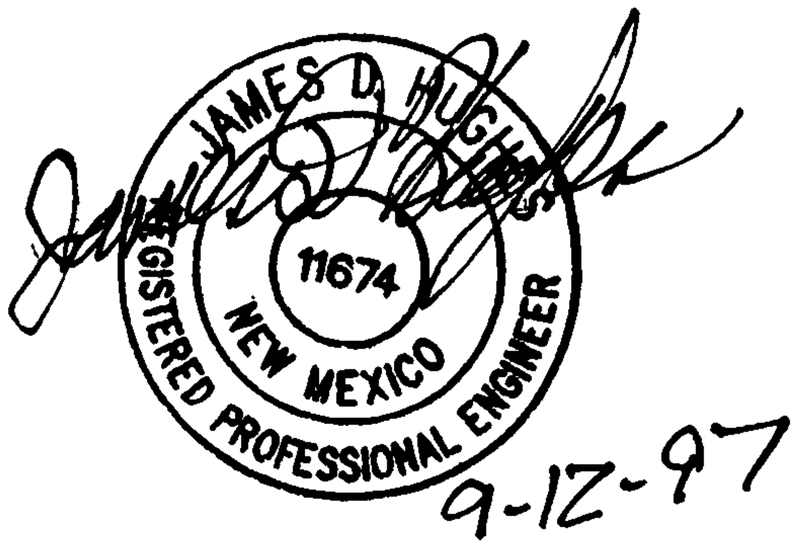
c: Andrew Garcia
File

M-14
D-4

DRAINAGE REPORT

for

BROADWAY INDUSTRIAL CENTER



9-12-97

Prepared For

Broadway Developement Company
PO Box 10005
Albuquerque, NM 87184

September 1997

TABLE OF CONTENTS

GRAPHIC SCALE IN FEET

250 0 500 1000

DRB 97-217

CITY OF Albuquerque

Albuquerque Geographic Information System

PLANNING DEPARTMENT

Map Amended through February 17, 1997

LEGAL DESCRIPTION

T10N

R3E

SEC 33

UNIFORM PROPERTY CODE

1-014-055

M-14-Z

PURPOSE

The purpose of this report is to present the Drainage Management and Grading Plan for final plat and Work Order approvals for the proposed Broadway Industrial Center.

LEGAL DESCRIPTION

A tract of land situate within Sections 28, 29, 32 and 33, Township 10 North, Range 3 East, New Mexico Principal Meridian, City of Albuquerque, Bernalillo County, New Mexico, being a portion of Tracts A and B, McKinney-Apodaca Area as the same is shown and designated on said plat filed for record in the office of the County Clerk of Bernalillo County, New Mexico on January 27, 1953, in volume C2, folio 143, together with all of Tract A, Land of Gordon Zucht as the same is shown and designated on said plat filed for record in the office of the County Clerk of Bernalillo County, New Mexico on June 8, 1977, in volume A6, folio 58, together with a portion of Parcel O, Lands of Schwartzman Packing Company as the same is shown and designated on said plat filed for record in the office of the County Clerk of Bernalillo County, New Mexico on April 17, 1961, in volume D2, folio 133, together with a remaining portion of Small Holding Claim File Number 2534 and 2535, Plat of Small Holding Claims as the same is shown and designated on said plat filed in the General Land Office, in Santa Fe, New Mexico on December 5, 1895, and together with a portion of Vacated High Street and Arno Street S.E. and containing 60.8423 acres, more or less.

EXISTING CONDITIONS

This 60.84 acre site is undeveloped with the exception of a 5.3 acre towing company. This master drainage plan also covers 9.9 additional acres north of the subdivision which are currently undeveloped and owned by others. All 7.07acres covered by the plan generally drains from east to west at approximately 2.5% slope to Broadway via surface drainage. The southerly portion of the site, including existing basins 109 through 115, drains through an existing residential development before it gets to Broadway. Several small upstream off-site basins drain into this property via surface sheet drainage, and four existing culverts under Interstate 25 produce small concentrations of surface drainage at the upstream edge of the site. The AMAFCA owned property discharges concentrated surface drainage into this site at two locations (basins 109 & 110) at the southerly upstream edge of the site. The South Diversion Channel forms the upstream edge of the drainage basin boundaries cutting off all approaching flows from the east and diverting them south. An existing 48" RCP storm sewer runs through the middle of the site from east to west and carries no flow in it under existing conditions because the south diversion channel cut off the upstream watershed, and there are no inlets to the storm sewer between Broadway Ave and the South Diversion Channel.

This development is within the previously approved South Broadway Sector Drainage Management Plan which established 145.70 cfs as the developed flow from this 70.7 acre Master Planed Area. The sector plan used methods of predicting runoff that are no longer acceptable to the City of Albuquerque. The new methodology, AHYMO, predicts substantially higher flows, thus indicating that the capacity of the existing hydraulic structures will be exceeded unless peak flows are decreased by detention ponds through out the sector plan area. The Sector Drainage Management Plan further identifies an existing downstream floodplain in San Jose Ave, and proposes a storm sewer diversion project in Broadway Blvd. and Bethel Ave., to divert both the flows from this site and the flows approaching in Broadway Blvd. from the north of this site, around the flood plain and directly into the San Jose Drain. The City has already constructed several of the other projects identified by the sector plan to reduce flows from the north, and has programming in the current 10 year plan for a $300,000.00 Capital Bond Improvement in 1999, a $1.5 million bond in 2003 and another $1.5 million bond in 2005 for this diversion project and the other projects identified in the sector plan.

PROPOSED MANAGEMENT PLAN

Private temporary retention ponds are to be constructed on each individual lot so that no developed drainage will be added to the downstream floodplain in San Jose Ave. It will be the responsibility of the individual lot owners to convey the surface drainage from the existing upstream off-site basins through their site and to size the individual ponds to accommodate both the existing off-site and proposed on-site drainage. After the City constructs the storm sewer diversion in Broadway Blvd and Bethel Ave to the San Jose Drain, the temporary retention requirement will be dropped and replaced with a permanent private detenion requirement in which each individual lot will only be allowed to discharge at 1.666 cfs per acre, in accordance with the Sector Drainage Management Plan, and this master drainage management plan.

The southerly portion of this site that drained through the existing downstream residential development between this site and Broadway Blvd is to be diverted on-site directly to Broadway Blvd. The increased drainage area to Broadway Blvd has been factored into the allowable discharge rate so that the total peak drainage from this site to Broadway will be the same as that identified in the Sector Drainage Management Plan, and the existing drainage problems in the downstream residential development will thereby be improved.

The public streets will be allowed free discharge of 18.26 cfs into the existing 48" storm sewer at Broadway Blvd. Additionally the 3.5 acre portion of Basin 120 will be allowed Free Discharge of 15.44 cfs to Wheeler Ave, and the remainder of the Master Plan area will compensate for increased flow. The only grading associated with this development is that of the public streets. The responsibility for grading of the lots is being left to the individual private lot owners, at the time of Building Permit.

Summary of Sector Plan Flows to Broadway

Basin #	Area (sq mi)		100 yr. Flow (cfs)	
	Master Plan Contribution	Total from sector Plan	Total from Sector Plan	Prorated Contribution from Master Plan
109 (1/2 3.8 cfs/ac)	0.0312	0.1042	169	50.6
202 1.66 cfs/acre.	0.0304	0.0820	84	31.1
700 3.7 cfs/acre	0.0483	0.0565	134	114.6
Total at Broadway (excluding basin 109)				145.70 cfs

Free Discharge from onsite master planed Right of Ways is 18.26 cfs from 4.14 Acres at 90% impervious. Additional free discharge from the 3.5 acrea undeveloped portion of Basin 120 at 90% impervious is 15.44 cfs. So the remaining allowable discharge is 112.00 cfs from the remaining 67.24 acres of Private Property:

1.666 cfs/ac.

Basin 202 ⇒ Free discharge

18.26
15.44

31.10
64.80

Qree = 80.90 = 1.59 cfs/acre.
50.88

TABLE 2 — SUMMARY OF EXISTING CONDITIONS HYDROLOGY

(from AHYMO and Equation 9 and Table 3 of DPM Sec. 22.2)

BasinNo.	Area (Ac.)	Area (Sq.Mi.)	Tc (hr.)	Land Treatments (%)				100 Year	
				A	B	C	D	Increm. Q (cfs)	Cumulative Q(cfs)
101	1.81	0.00283	—	0	40	0	60	6.60	
102	1.93	0.00302	103	0	40	0	60	7.04	19.20
103	3.79	0.00592	—	0	0	90	10	12.16	
104	4.03	0.00630	—	0	0	90	10	12.94	
105	3.25	0.00508		0	0	70	30	11.45	
106	4.42	0.00691	105	0	0	90	10	14.19	25.64
107	2.53	0.00395	104	0	0	70	30	8.90	21.84
108	1.26	0.00197	101,102,103	0	0	70	30	4.45	30.25
109	3.37	0.00527	—	0	0	90	10	10.83	
110	1.99	0.00310	—	0	0	90	10	6.38	
111	1.99	0.00311	110	90	0	10	0	3.20	9.50
112	0.30	0.00047	—	90	0	10	0	0.49	
113	1.56	0.00244	—	100	0	0	0	2.30	
114	9.15	0.01430	109	90	0	10	0	14.69	25.28
115	10.11	0.01580	—	90	0	10	0	16.22	
116	29.49	0.04608	101-104, 107,108	90	0	10	0	47.30	98.28
117	4.63	0.00723	—	60	0	40	0	9.37	
118	3.61	0.00564	105,106	60	0	40	0	7.31	32.86
119	5.12	0.00800	117	95	0	0	5	8.28	17.65
120	9.50	0.01484	117,119	37	3	3	57	31.36	48.76
121[2]	27.6	0.04313	105,106,118	0	30	10	60	86.08	116.09
122	1.87	0.00292	101-104, 107,108,116	0	30	10	60	6.97	105.25
152[2]	83.51	0.13048	162	0	45	20	35[1]	253.89	285.89
153[2]	32.14	0.05022	153,162,163	0	45	15	40[1]	101.21	476.00
162	10.62	0.01659	—	0	40	35	25	32.76	
163	33.86	0.05291	—	0	40	30	30	107.13	

BasinNo.	Area (Ac.)	Area (Sq.Mi.)	Tc (hr.)	Land Treatments (%)				100 Year	
				A	B	C	D	Increm. Q (cfs)	Cumulative Q(cfs)
200(2)	19.23	0.03004	152,153, 162,163	0	45	15	40	59.95	513.06
202	Sum of 120 & 121		105,106, 117-121,152, 153,162,163	—	—	—	—	—	164.14
700	Cummulative @ 122		101-108, 116-122, 152,153, 162,163,200	—	—	—	—	—	769.60

100 Year Precipitation
(from Figures D, E and F and Eq. 28 of DPM 22.2)
P_{60} = 1.97", P_{360} = 2.29", P_{1440} = 2.65", P_{10days} = 10.0-[24.9/(2.65")$^{1.4}$] = 3.64"

(1) *Basin 152 has approximately 400 lots (4.9 du/ac) which, per DPM 22.2 eqn 4, suggests that 49% impervious may be appropriate instead of the 35% used in the sectore drainage management plan. Basin 153 has approximately 150 lots (4.6 du/ac) so 47% impervious may be appropriate instead of the 40% used in the sector plan.*

(2) *Tp for sector plan is 0.187 hr for basin 121 and 0.147 for basin 152, 0.1412 for basin 153, and 0.1453 hr for basin 200, and less than the AHYMO default minimum for the remaining basins so 0.133 is used for all other existing basins.*

(3) *Existing Development within basin #120 is at about 90% impervious for 6.0 acres and 0.% impervious for the remaining 3.5 acres which has not yet developed. After development the 3.5 ac. will be allowed Free Discharge at 15.44 cfs at 90% impervious to Wheeler Ave. and the remainder of the Master Plan Area will compensate for the increased flow.*

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =09/11/1997
INPUT FILE = broad99.dat USER NO.= M_GOODWN.I01

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= 1										RAIN6= 2.290
COMPUTE NM HYD	101.00	-	1	.00283	6.60	.231	1.52996	1.499	3.644	PER IMP= 60.00
COMPUTE NM HYD	102.00	-	2	.00302	7.04	.246	1.52996	1.499	3.643	PER IMP= 60.00
COMPUTE NM HYD	103.00	-	3	.00592	12.16	.373	1.18095	1.499	3.209	PER IMP= 10.00
ADD HYD	102.10	2& 3	2	.00894	19.20	.619	1.29878	1.499	3.356	
COMPUTE NM HYD	104.00	-	4	.00630	12.94	.397	1.18095	1.499	3.209	PER IMP= 10.00
COMPUTE NM HYD	105.00	-	5	.00508	11.45	.373	1.37541	1.499	3.521	PER IMP= 30.00
COMPUTE NM HYD	106.00	-	6	.00691	14.19	.435	1.18095	1.499	3.209	PER IMP= 10.00
ADD HYD	106.10	5& 6	6	.01199	25.64	.808	1.26329	1.499	3.341	
COMPUTE NM HYD	107.00	-	7	.00395	8.90	.290	1.37541	1.499	3.522	PER IMP= 30.00
ADD HYD	107.10	4& 7	7	.01025	21.84	.687	1.25583	1.499	3.330	
COMPUTE NM HYD	108.00	-	8	.00197	4.45	.145	1.37541	1.499	3.530	PER IMP= 30.00
ADD HYD	108.10	1& 8	8	.00480	11.05	.375	1.46642	1.499	3.597	
ADD HYD	108.20	2& 8	8	.01374	30.25	.995	1.35735	1.499	3.440	
COMPUTE NM HYD	109.00	-	9	.00527	10.83	.332	1.18095	1.499	3.210	PER IMP= 10.00
COMPUTE NM HYD	110.00	-	10	.00310	6.38	.195	1.18095	1.499	3.214	PER IMP= 10.00
COMPUTE NM HYD	111.00	-	11	.00311	3.20	.090	.54195	1.532	1.607	PER IMP= .00
ADD HYD	111.10	10&11	11	.00621	9.50	.285	.86088	1.499	2.390	
COMPUTE NM HYD	112.00	-	12	.00047	.49	.014	.54195	1.532	1.628	PER IMP= .00
COMPUTE NM HYD	113.00	-	13	.00244	2.30	.065	.49889	1.532	1.473	PER IMP= .00
COMPUTE NM HYD	114.00	-	14	.01430	14.69	.413	.54195	1.532	1.605	PER IMP= .00
ADD HYD	114.10	14& 9	14	.01957	25.28	.745	.71401	1.532	2.018	
COMPUTE NM HYD	115.00	-	15	.01580	16.22	.457	.54195	1.532	1.604	PER IMP= .00
COMPUTE NM HYD	116.00	-	16	.04608	47.30	1.332	.54195	1.532	1.604	PER IMP= .00
ADD HYD	116.70	7&16	16	.05633	68.62	2.018	.67185	1.532	1.903	
ADD HYD	116.80	16& 8	16	.07007	98.28	3.013	.80627	1.499	2.192	
COMPUTE NM HYD	117.00	-	17	.00723	9.37	.265	.68597	1.532	2.026	PER IMP= .00
COMPUTE NM HYD	118.00	-	18	.00564	7.31	.206	.68597	1.532	2.026	PER IMP= .00
ADD HYD	118.10	6&18	18	.01763	32.86	1.014	1.07860	1.499	2.912	
COMPUTE NM HYD	119.00	-	19	.00800	8.28	.246	.57675	1.532	1.617	PER IMP= 5.00
ADD HYD	119.10	17&19	19	.01523	17.65	.511	.62857	1.532	1.811	
COMPUTE NM HYD	120.00	-	20	.01484	31.36	1.113	1.40584	1.499	3.302	PER IMP= 57.00
ADD HYD	120.10	19&20	20	.03007	48.76	1.623	1.01215	1.499	2.534	
COMPUTE NM HYD	121.00	-	21	.04313	86.08	3.588	1.55983	1.565	3.118	PER IMP= 60.00
ADD HYD	121.10	18&21	21	.06076	116.09	4.602	1.42019	1.532	2.985	
COMPUTE NM HYD	122.00	-	22	.00292	6.97	.243	1.55983	1.499	3.728	PER IMP= 60.00
ADD HYD	122.10	16&22	22	.07299	105.25	3.256	.83641	1.499	2.253	
COMPUTE NM HYD	152.00	-	1	.13048	253.89	8.780	1.26174	1.532	3.040	PER IMP= 35.00
COMPUTE NM HYD	153.00	-	2	.05022	101.21	3.513	1.31174	1.532	3.149	PER IMP= 40.00
COMPUTE NM HYD	162.00	-	3	.01659	32.76	1.043	1.17826	1.499	3.085	PER IMP= 25.00
ROUTE	162.90	3	6	.01659	32.00	1.043	1.17827	1.532	3.014	
COMPUTE NM HYD	163.00	-	4	.05291	107.13	3.465	1.22797	1.499	3.164	PER IMP= 30.00
COMPUTE NM HYD	200.00	-	5	.03004	59.95	2.102	1.31174	1.532	3.118	PER IMP= 40.00
ADD HYD	152.10	1& 6	1	.14707	285.89	9.823	1.25232	1.532	3.037	

ROUTE	152.90	1	3	.14707	270.91	9.823	1.25233	1.565	2.878
ADD HYD	153.20	2& 4	2	.10313	208.01	6.979	1.26876	1.499	3.151
ADD HYD	153.10	3& 2	1	.25020	476.00	16.801	1.25910	1.532	2.973
ROUTE	153.90	1	3	.25020	457.70	16.801	1.25910	1.565	2.858

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
ADD HYD	200.10	3& 5	1	.28024	513.06	18.903	1.26474	1.565	2.861	
ADD HYD	202.00	20&21	2	.09083	164.14	6.225	1.28511	1.532	2.824	
ADD HYD	202.10	1& 2	1	.37107	671.39	25.128	1.26972	1.565	2.827	
ADD HYD	700.10	1&22	1	.44406	769.60	28.384	1.19850	1.532	2.708	
FINISH										

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START                TIME=0.0
***** SOUTH BROADWAY INDUSTRIAL PARK
***** PRE-DEVELOPED-EXISTING CONDITIONS
***** 100-YEAR 6-HOUR STORM EVENT
***** AUG. 21, 1997
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.97 IN RAIN SIX=2.29 IN
                     RAIN DAY=2.65 IN DT=0.0333 HR
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                     (A,B,C,D)    0 40 0 60
                     TP=0.13333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
COMPUTE NM HYD       ID=2 HYD NO=102.0 AREA=0.00302 SQ MI
                     (A,B,C,D)    0 40 0 60
                     TP=0.13333 HR MASS RAINFALL=-1
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COMPUTE NM HYD       ID=3 HYD NO=103.0 AREA=0.00592 SQ MI
                     (A,B,C,D)    0 0 90 10
                     TP=0.13333 HR MASS RAINFALL=-1
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ADD HYD              ID=2 SUM NO=102.1 IDS=2 & 3
PRINT HYD            ID=2 CODE=1
COMPUTE NM HYD       ID=4 HYD NO=104.0 AREA=0.00630 SQ MI
                     (A,B,C,D)    0 0 90 10
                     TP=0.13333 HR MASS RAINFALL=-1
PRINT HYD            ID=4 CODE=1
COMPUTE NM HYD       ID=5 HYD NO=105.0 AREA=0.00508 SQ MI
                     (A,B,C,D)    0 0 70 30
                     TP=0.13333 HR MASS RAINFALL=-1
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COMPUTE NM HYD       ID=6 HYD NO=106.0 AREA=0.00691 SQ MI
                     (A,B,C,D)    0 0 90 10
                     TP=0.13333 HR MASS RAINFALL=-1
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ADD HYD              ID=6 SUM NO=106.1 IDS=5 & 6
PRINT HYD            ID=6 CODE=1
COMPUTE NM HYD       ID=7 HYD NO=107.0 AREA=0.00395 SQ MI
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                     TP=0.13333 HR MASS RAINFALL=-1
PRINT HYD            ID=7 CODE=1
ADD HYD              ID=7 SUM NO=107.1 IDS=4 & 7
PRINT HYD            ID=7 CODE=1
COMPUTE NM HYD       ID=8 HYD NO=108.0 AREA=0.00197 SQ MI
                     (A,B,C,D)    0 0 70 30
                     TP=0.13333 HR MASS RAINFALL=-1
PRINT HYD            ID=8 CODE=1
ADD HYD              ID=8 SUM NO=108.1 IDS=1 & 8
PRINT HYD            ID=8 CODE=1
ADD HYD              ID=8 SUM NO=108.2 IDS=2 & 8
PRINT HYD            ID=8 CODE=1
COMPUTE NM HYD       ID=9 HYD NO=109.0 AREA=0.00527 SQ MI
                     (A,B,C,D)    0 0 90 10
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                        TP=0.13333 HR MASS RAINFALL=-1
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PRINT HYD               ID=10 CODE=1
COMPUTE NM HYD          ID=11 HYD NO=111.0 AREA=0.00311 SQ MI
                        (A,B,C,D)    90 0 10 0
                        TP=0.13333 HR MASS RAINFALL=-1
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ADD HYD                 ID=11 SUM NO=111.1 IDS=10 & 11
PRINT HYD               ID=11 CODE=1
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                        TP=0.13333 HR MASS RAINFALL=-1
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                        TP=0.13333 HR MASS RAINFALL=-1
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COMPUTE NM HYD          ID=14 HYD NO=114.0 AREA=0.01430 SQ MI
                        (A,B,C,D)    90 0 10 0
                        TP=0.13333 HR MASS RAINFALL=-1
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ADD HYD                 ID=14 SUM NO=114.1 IDS=14 & 9
PRINT HYD               ID=14 CODE=1
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                        TP=0.13333 HR MASS RAINFALL=-1
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                        TP=0.13333 HR MASS RAINFALL=-1
PRINT HYD               ID=16 CODE=1
ADD HYD                 ID=16 SUM NO=116.7 IDS=7 & 16
PRINT HYD               ID=16 CODE=1
ADD HYD                 ID=16 SUM NO=116.8 IDS=16 & 8
PRINT HYD               ID=16 CODE=1
COMPUTE NM HYD          ID=17 HYD NO=117.0 AREA=0.00723 SQ MI
                        (A,B,C,D)    60 0 40 0
                        TP=0.13333 HR MASS RAINFALL=-1
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COMPUTE NM HYD          ID=18 HYD NO=118.0 AREA=0.00564 SQ MI
                        (A,B,C,D)    60 0 40 0
                        TP=0.13333 HR MASS RAINFALL=-1
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ADD HYD                 ID=18 SUM NO=118.1 IDS=6 & 18
PRINT HYD               ID=18 CODE=1
COMPUTE NM HYD          ID=19 HYD NO=119.0 AREA=0.00800 SQ MI
                        (A,B,C,D)    95 0 0 5
                        TP=0.13333 HR MASS RAINFALL=-1
PRINT HYD               ID=19 CODE=1
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ADD HYD             ID=19 SUM NO=119.1 IDS=17 & 19
PRINT HYD           ID=19 CODE=1
COMPUTE NM HYD      ID=20 HYD NO=120.0 AREA=0.01484 SQ MI
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ADD HYD             ID=20 SUM NO=120.1 IDS=19 & 20
PRINT HYD           ID=20 CODE=1
COMPUTE NM HYD      ID=21 HYD NO=121.0 AREA=0.04313 SQ MI
                    (A,B,C,D)    0 30 10 60
                    TP=0.187 HR MASS RAINFALL=-1
PRINT HYD           ID=21 CODE=1
ADD HYD             ID=21 SUM NO=121.1 IDS=18 & 21
PRINT HYD           ID=21 CODE=1
COMPUTE NM HYD      ID=22 HYD NO=122.0 AREA=0.00292 SQ MI
                    (A,B,C,D)    0 30 10 60
                    TP=0.13333 HR MASS RAINFALL=-1
PRINT HYD           ID=22 CODE=1
ADD HYD             ID=22 SUM NO=122.1 IDS=16 & 22
PRINT HYD           ID=22 CODE=1
COMPUTE NM HYD      ID=1 HYD NO=152.0 AREA=0.13048 SQ MI
                    (A,B,C,D)    0 45 20 35
                    TP=0.1476 HR MASS RAINFALL=-1
PRINT HYD           ID=1 CODE=1
COMPUTE NM HYD      ID=2 HYD NO=153.0 AREA=0.05022 SQ MI
                    (A,B,C,D)    0 45 15 40
                    TP=0.1412 HR MASS RAINFALL=-1
PRINT HYD           ID=2 CODE=1
COMPUTE NM HYD      ID=3 HYD NO=162.0 AREA=0.01659 SQ MI
                    (A,B,C,D)    0 40 35 25
                    TP=0.13333 HR MASS RAINFALL=-1
PRINT HYD           ID=3 CODE=1
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.027 DIA=2.5 FT N=.013
COMPUTE TRAVEL TIME ID=6 REACH NO=1 NO VS=1 L=1600 FT SLP=.027
ROUTE               ID=6 HYD NO=162.9 INFLOW ID=3 DT=0 HR
PRINT HYD           ID=6 CODE=1
COMPUTE NM HYD      ID=4 HYD NO=163.0 AREA=0.05291 SQ MI
                    (A,B,C,D)    0 40 30 30
                    TP=0.13333 HR MASS RAINFALL=-1
PRINT HYD           ID=4 CODE=1
COMPUTE NM HYD      ID=5 HYD NO=200.0 AREA=0.03004 SQ MI
                    (A,B,C,D)    0 45 15 40
                    TP=0.1453 HR MASS RAINFALL=-1
PRINT HYD           ID=5 CODE=1
ADD HYD             ID=1 SUM NO=152.1 IDS=1 & 6
PRINT HYD           ID=1 CODE=1
***** ROUTE FLOWS FROM KATHRYN TO THAXTON IN 72" RCP
***** NOTE THAT CAPACITY EXCEEDED (real slope=0.21%)
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.0045 DIA=6.0 FT N=.013
COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 L=1350 FT SLP=.0045
ROUTE               ID=3 HYD NO=152.9 INFLOW ID=1 DT=0 HR
PRINT HYD           ID=3 CODE=1
```

```
ADD HYD              ID=2 SUM NO=153.2 IDS=2 & 4
PRINT HYD            ID=2 CODE=1
ADD HYD              ID=1 SUM NO=153.1 IDS=3 & 2
PRINT HYD            ID=1 CODE=1
***** ROUTE FLOWS FROM KATHRYN TO THAXTON IN 72" RCP
***** NOTE THAT CAPACITY EXCEEDED (real slope=0.21%)
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.012 DIA=6.0 FT N=.013
COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 L=2250 FT SLP=.012
ROUTE                ID=3 HYD NO=153.9 INFLOW ID=1 DT=0 HR
PRINT HYD            ID=3 CODE=1
ADD HYD              ID=1 SUM NO=200.1 IDS=3 & 5
PRINT HYD            ID=1 CODE=1
ADD HYD              ID=2 SUM NO=202.0 IDS=20 & 21
PRINT HYD            ID=2 CODE=1
ADD HYD              ID=1 SUM NO=202.1 IDS=1 & 2
PRINT HYD            ID=1 CODE=1
ADD HYD              ID=1 SUM NO=700.1 IDS=1 & 22
PRINT HYD            ID=1 CODE=1
FINISH
```

```
    AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
         RUN DATE (MON/DAY/YR) = 09/11/1997
         START TIME (HR:MIN:SEC) = 08:07:40     USER NO.= M_GOODWN.I01
         INPUT FILE = broad99.dat

START                TIME=0.0
***** SOUTH BROADWAY INDUSTRIAL PARK
***** PRE-DEVELOPED-EXISTING CONDITIONS
***** 100-YEAR 6-HOUR STORM EVENT
***** AUG. 21, 1997
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.97 IN RAIN SIX=2.29 IN
                     RAIN DAY=2.65 IN DT=0.0333 HR

                  COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
                  DT =     .033300 HOURS       END TIME =     5.994000 HOURS
                     .0000   .0015   .0029   .0045   .0060   .0076   .0092
                     .0109   .0126   .0143   .0161   .0180   .0199   .0218
                     .0238   .0258   .0280   .0302   .0324   .0348   .0372
                     .0397   .0423   .0450   .0479   .0508   .0539   .0572
                     .0606   .0642   .0680   .0734   .0792   .0854   .0982
                     .1277   .1731   .2383   .3276   .4449   .5947   .7813
                    1.0091  1.2279  1.3176  1.3932  1.4602  1.5212  1.5773
                    1.6295  1.6781  1.7238  1.7667  1.8072  1.8455  1.8817
                    1.9160  1.9485  1.9794  2.0087  2.0365  2.0439  2.0498
                    2.0553  2.0606  2.0656  2.0705  2.0751  2.0795  2.0838
                    2.0879  2.0919  2.0958  2.0995  2.1031  2.1067  2.1101
                    2.1134  2.1167  2.1199  2.1230  2.1260  2.1290  2.1319
                    2.1347  2.1375  2.1402  2.1429  2.1455  2.1480  2.1506
                    2.1530  2.1555  2.1579  2.1602  2.1625  2.1648  2.1671
                    2.1693  2.1714  2.1736  2.1757  2.1778  2.1798  2.1819
                    2.1839  2.1858  2.1878  2.1897  2.1916  2.1935  2.1954
                    2.1972  2.1990  2.2008  2.2026  2.2043  2.2060  2.2078
                    2.2095  2.2111  2.2128  2.2144  2.2161  2.2177  2.2193
                    2.2208  2.2224  2.2240  2.2255  2.2270  2.2285  2.2300
                    2.2315  2.2330  2.2344  2.2359  2.2373  2.2387  2.2401
                    2.2415  2.2429  2.2443  2.2456  2.2470  2.2483  2.2496
                    2.2510  2.2523  2.2536  2.2549  2.2562  2.2574  2.2587
                    2.2599  2.2612  2.2624  2.2636  2.2649  2.2661  2.2673
                    2.2685  2.2697  2.2708  2.2720  2.2732  2.2743  2.2755
                    2.2766  2.2778  2.2789  2.2800  2.2811  2.2822  2.2833
                    2.2844  2.2855  2.2866  2.2877  2.2887  2.2898
```

```
COMPUTE NM HYD       ID=1 HYD NO=101.0 AREA=0.00283 SQ MI
                     (A,B,C,D)    0 40 0 60
                     TP=0.13333 HR MASS RAINFALL=-1

    K =   .072665HR    TP =   .133330HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   6.7023    CFS   UNIT VOLUME =    .9975       B =   526.28      P60 = 1.9700
    AREA =      .001698 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


    K =   .131635HR    TP =   .133330HR    K/TP RATIO =   .987285     SHAPE CONSTANT, N =  3.576408
    UNIT PEAK =   2.7667    CFS   UNIT VOLUME =    .9955       B =   325.86      P60 = 1.9700
    AREA =      .001132 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300

PRINT HYD            ID=1 CODE=1

                                   PARTIAL HYDROGRAPH   101.00


    RUNOFF VOLUME =     1.52996 INCHES     =        .2309 ACRE-FEET
    PEAK DISCHARGE RATE =       6.60 CFS  AT   1.499 HOURS   BASIN AREA =   .0028 SQ. MI.
```

```
COMPUTE NM HYD       ID=2 HYD NO=102.0 AREA=0.00302 SQ MI
                     (A,B,C,D)    0 40 0 60
                     TP=0.13333 HR MASS RAINFALL=-1

    K =   .072665HR    TP =   .133330HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   7.1523    CFS   UNIT VOLUME =    .9978       B =   526.28      P60 = 1.9700
    AREA =      .001812 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


    K =   .131635HR    TP =   .133330HR    K/TP RATIO =   .987285     SHAPE CONSTANT, N =  3.576408
    UNIT PEAK =   2.9524    CFS   UNIT VOLUME =    .9955       B =   325.86      P60 = 1.9700
    AREA =      .001208 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300

PRINT HYD            ID=2 CODE=1

                                   PARTIAL HYDROGRAPH   102.00


    RUNOFF VOLUME =     1.52996 INCHES     =        .2464 ACRE-FEET
    PEAK DISCHARGE RATE =       7.04 CFS  AT   1.499 HOURS   BASIN AREA =   .0030 SQ. MI.
```

```
COMPUTE NM HYD       ID=3 HYD NO=103.0 AREA=0.00592 SQ MI
                     (A,B,C,D)    0 0 90 10
                     TP=0.13333 HR MASS RAINFALL=-1

    K =    .072665HR     TP =    .133330HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    2.3367     CFS    UNIT VOLUME =     .9948        B =    526.28       P60 = 1.9700
    AREA =       .000592 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300


    K =    .107019HR     TP =    .133330HR     K/TP RATIO =    .802661      SHAPE CONSTANT, N =  4.461616
    UNIT PEAK =    15.379     CFS    UNIT VOLUME =     .9996        B =    384.85       P60 = 1.9700
    AREA =       .005328 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300

PRINT HYD            ID=3 CODE=1

                                    PARTIAL HYDROGRAPH    103.00


    RUNOFF VOLUME =      1.18095 INCHES      =         .3729 ACRE-FEET
    PEAK DISCHARGE RATE =       12.16 CFS  AT    1.499 HOURS    BASIN AREA =    .0059 SQ. MI.
```

```
ADD HYD              ID=2 SUM NO=102.1 IDS=2 & 3
PRINT HYD            ID=2 CODE=1

                                    PARTIAL HYDROGRAPH    102.10


    RUNOFF VOLUME =      1.29878 INCHES      =         .6193 ACRE-FEET
    PEAK DISCHARGE RATE =       19.20 CFS  AT    1.499 HOURS    BASIN AREA =    .0089 SQ. MI.


COMPUTE NM HYD       ID=4 HYD NO=104.0 AREA=0.00630 SQ MI
                     (A,B,C,D)    0 0 90 10
                     TP=0.13333 HR MASS RAINFALL=-1

    K =    .072665HR     TP =    .133330HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    2.4867     CFS    UNIT VOLUME =     .9948        B =    526.28       P60 = 1.9700
    AREA =       .000630 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300


    K =    .107019HR     TP =    .133330HR     K/TP RATIO =    .802661      SHAPE CONSTANT, N =  4.461616
    UNIT PEAK =    16.366     CFS    UNIT VOLUME =     .9997        B =    384.85       P60 = 1.9700
    AREA =       .005670 SQ MI     IA =     .35000 INCHES     INF =     .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300
```

PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.18095 INCHES = .3968 ACRE-FEET
PEAK DISCHARGE RATE = 12.94 CFS AT 1.499 HOURS BASIN AREA = .0063 SQ. MI.

COMPUTE NM HYD ID=5 HYD NO=105.0 AREA=0.00508 SQ MI
(A,B,C,D) 0 0 70 30
TP=0.13333 HR MASS RAINFALL=-1

K = .072665HR TP = .133330HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 6.0155 CFS UNIT VOLUME = .9975 B = 526.28 P60 = 1.9700
AREA = .001524 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .107019HR TP = .133330HR K/TP RATIO = .802661 SHAPE CONSTANT, N = 4.461616
UNIT PEAK = 10.264 CFS UNIT VOLUME = .9992 B = 384.85 P60 = 1.9700
AREA = .003556 SQ MI IA = .35000 INCHES INF = .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

PRINT HYD ID=5 CODE=1

PARTIAL HYDROGRAPH 105.00

RUNOFF VOLUME = 1.37541 INCHES = .3726 ACRE-FEET
PEAK DISCHARGE RATE = 11.45 CFS AT 1.499 HOURS BASIN AREA = .0051 SQ. MI.

COMPUTE NM HYD ID=6 HYD NO=106.0 AREA=0.00691 SQ MI
(A,B,C,D) 0 0 90 10
TP=0.13333 HR MASS RAINFALL=-1

K = .072665HR TP = .133330HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 2.7275 CFS UNIT VOLUME = .9954 B = 526.28 P60 = 1.9700
AREA = .000691 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .107019HR TP = .133330HR K/TP RATIO = .802661 SHAPE CONSTANT, N = 4.461616
UNIT PEAK = 17.951 CFS UNIT VOLUME = .9997 B = 384.85 P60 = 1.9700
AREA = .006219 SQ MI IA = .35000 INCHES INF = .83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

```
PRINT HYD           ID=6 CODE=1

                                  PARTIAL HYDROGRAPH   106.00

    RUNOFF VOLUME =     1.18095 INCHES     =         .4352 ACRE-FEET
    PEAK DISCHARGE RATE =      14.19 CFS  AT   1.499 HOURS   BASIN AREA =    .0069 SQ. MI.


ADD HYD             ID=6 SUM NO=106.1 IDS=5 & 6
PRINT HYD           ID=6 CODE=1

                                  PARTIAL HYDROGRAPH   106.10

    RUNOFF VOLUME =     1.26329 INCHES     =         .8078 ACRE-FEET
    PEAK DISCHARGE RATE =      25.64 CFS  AT   1.499 HOURS   BASIN AREA =    .0120 SQ. MI.


COMPUTE NM HYD      ID=7 HYD NO=107.0 AREA=0.00395 SQ MI
                    (A,B,C,D)    0 0 70 30
                    TP=0.13333 HR MASS RAINFALL=-1

    K =    .072665HR    TP =    .133330HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    4.6774    CFS   UNIT VOLUME =     .9969       B =    526.28      P60 = 1.9700
    AREA =       .001185 SQ MI    IA =     .10000 INCHES    INF =     .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300


    K =    .107019HR    TP =    .133330HR    K/TP RATIO =    .802661     SHAPE CONSTANT, N =  4.461616
    UNIT PEAK =    7.9810    CFS   UNIT VOLUME =     .9989       B =    384.85      P60 = 1.9700
    AREA =       .002765 SQ MI    IA =     .35000 INCHES    INF =     .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300

PRINT HYD           ID=7 CODE=1

                                  PARTIAL HYDROGRAPH   107.00

    RUNOFF VOLUME =     1.37541 INCHES     =         .2898 ACRE-FEET
    PEAK DISCHARGE RATE =       8.90 CFS  AT   1.499 HOURS   BASIN AREA =    .0040 SQ. MI.
```

```
ADD HYD             ID=7 SUM NO=107.1 IDS=4 & 7
PRINT HYD           ID=7 CODE=1

                                PARTIAL HYDROGRAPH   107.10

    RUNOFF VOLUME =     1.25583 INCHES     =        .6865 ACRE-FEET
    PEAK DISCHARGE RATE =      21.84 CFS  AT   1.499 HOURS   BASIN AREA =    .0103 SQ. MI.


COMPUTE NM HYD      ID=8 HYD NO=108.0 AREA=0.00197 SQ MI
                    (A,B,C,D)   0 0 70 30
                    TP=0.13333 HR MASS RAINFALL=-1

    K =    .072665HR    TP =    .133330HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    2.3328    CFS   UNIT VOLUME =     .9941       B =    526.28      P60 = 1.9700
    AREA =       .000591 SQ MI    IA =     .10000 INCHES    INF =     .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300


    K =    .107019HR    TP =    .133330HR    K/TP RATIO =    .802661     SHAPE CONSTANT, N =  4.461616
    UNIT PEAK =    3.9804    CFS   UNIT VOLUME =     .9972       B =    384.85      P60 = 1.9700
    AREA =       .001379 SQ MI    IA =     .35000 INCHES    INF =     .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300

PRINT HYD           ID=8 CODE=1

                                PARTIAL HYDROGRAPH   108.00

    RUNOFF VOLUME =     1.37541 INCHES     =        .1445 ACRE-FEET
    PEAK DISCHARGE RATE =       4.45 CFS  AT   1.499 HOURS   BASIN AREA =    .0020 SQ. MI.


ADD HYD             ID=8 SUM NO=108.1 IDS=1 & 8
PRINT HYD           ID=8 CODE=1

                                PARTIAL HYDROGRAPH   108.10

    RUNOFF VOLUME =     1.46642 INCHES     =        .3754 ACRE-FEET
    PEAK DISCHARGE RATE =      11.05 CFS  AT   1.499 HOURS   BASIN AREA =    .0048 SQ. MI.
```

```
ADD HYD             ID=8 SUM NO=108.2 IDS=2 & 8
PRINT HYD           ID=8 CODE=1

                                PARTIAL HYDROGRAPH   108.20

    RUNOFF VOLUME =     1.35735 INCHES     =         .9947 ACRE-FEET
    PEAK DISCHARGE RATE =      30.25 CFS  AT   1.499 HOURS   BASIN AREA =    .0137 SQ. MI.


COMPUTE NM HYD      ID=9 HYD NO=109.0 AREA=0.00527 SQ MI
                    (A,B,C,D)   0 0 90 10
                    TP=0.13333 HR MASS RAINFALL=-1

    K =   .072665HR    TP =   .133330HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   2.0802    CFS   UNIT VOLUME =    .9941       B =   526.28       P60 = 1.9700
    AREA =      .000527 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


    K =   .107019HR    TP =   .133330HR    K/TP RATIO =   .802661     SHAPE CONSTANT, N =  4.461616
    UNIT PEAK =   13.690    CFS   UNIT VOLUME =    .9995       B =   384.85       P60 = 1.9700
    AREA =      .004743 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300
PRINT HYD           ID=9 CODE=1

                                PARTIAL HYDROGRAPH   109.00

    RUNOFF VOLUME =     1.18095 INCHES     =         .3319 ACRE-FEET
    PEAK DISCHARGE RATE =      10.83 CFS  AT   1.499 HOURS   BASIN AREA =    .0053 SQ. MI.


COMPUTE NM HYD      ID=10 HYD NO=110.0 AREA=0.00310 SQ MI
                    (A,B,C,D)   0 0 90 10
                    TP=0.13333 HR MASS RAINFALL=-1

    K =   .072665HR    TP =   .133330HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   1.2236    CFS   UNIT VOLUME =    .9896       B =   526.28       P60 = 1.9700
    AREA =      .000310 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


    K =   .107019HR    TP =   .133330HR    K/TP RATIO =   .802661     SHAPE CONSTANT, N =  4.461616
    UNIT PEAK =   8.0531    CFS   UNIT VOLUME =    .9989       B =   384.85       P60 = 1.9700
    AREA =      .002790 SQ MI    IA =    .35000 INCHES    INF =    .83000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300
```

```
PRINT HYD           ID=10 CODE=1

                                PARTIAL HYDROGRAPH   110.00


    RUNOFF VOLUME =     1.18095 INCHES     =        .1952 ACRE-FEET
    PEAK DISCHARGE RATE =       6.38 CFS  AT   1.499 HOURS   BASIN AREA =    .0031 SQ. MI.


COMPUTE NM HYD      ID=11 HYD NO=111.0 AREA=0.00311 SQ MI
                    (A,B,C,D)   90 0 10 0
                    TP=0.13333 HR MASS RAINFALL=-1

    K =   .155781HR    TP =   .133330HR    K/TP RATIO =  1.168387     SHAPE CONSTANT, N =  3.035166
    UNIT PEAK =   6.6402    CFS   UNIT VOLUME =    .9976       B =   284.68      P60 = 1.9700
    AREA =      .003110 SQ MI    IA =    .62000 INCHES    INF =   1.58600 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300

PRINT HYD           ID=11 CODE=1

                                PARTIAL HYDROGRAPH   111.00


    RUNOFF VOLUME =      .54195 INCHES     =        .0899 ACRE-FEET
    PEAK DISCHARGE RATE =       3.20 CFS  AT   1.532 HOURS   BASIN AREA =    .0031 SQ. MI.


ADD HYD             ID=11 SUM NO=111.1 IDS=10 & 11
PRINT HYD           ID=11 CODE=1

                                PARTIAL HYDROGRAPH   111.10


    RUNOFF VOLUME =      .86088 INCHES     =        .2851 ACRE-FEET
    PEAK DISCHARGE RATE =       9.50 CFS  AT   1.499 HOURS   BASIN AREA =    .0062 SQ. MI.


COMPUTE NM HYD      ID=12 HYD NO=112.0 AREA=0.00047 SQ MI
                    (A,B,C,D)   90 0 10 0
                    TP=0.13333 HR MASS RAINFALL=-1

    K =   .155781HR    TP =   .133330HR    K/TP RATIO =  1.168387     SHAPE CONSTANT, N =  3.035166
    UNIT PEAK =   1.0035    CFS   UNIT VOLUME =    .9850       B =   284.68      P60 = 1.9700
    AREA =      .000470 SQ MI    IA =    .62000 INCHES    INF =   1.58600 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300
```

```
PRINT HYD           ID=12 CODE=1

                                  PARTIAL HYDROGRAPH   112.00

    RUNOFF VOLUME =       .54195 INCHES     =         .0136 ACRE-FEET
    PEAK DISCHARGE RATE =         .49 CFS  AT    1.532 HOURS   BASIN AREA =    .0005 SQ. MI.


COMPUTE NM HYD      ID=13 HYD NO=113.0 AREA=0.00244 SQ MI
                    (A,B,C,D)   100 0 0 0
                    TP=0.13333 HR MASS RAINFALL=-1

    K =    .161199HR    TP =    .133330HR    K/TP RATIO =  1.209023     SHAPE CONSTANT, N =  2.940974
    UNIT PEAK =    5.0687    CFS   UNIT VOLUME =     .9968       B =   276.97      P60 = 1.9700
    AREA =       .002440 SQ MI    IA =     .65000 INCHES    INF =   1.67000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300

PRINT HYD           ID=13 CODE=1

                                  PARTIAL HYDROGRAPH   113.00

    RUNOFF VOLUME =       .49889 INCHES     =         .0649 ACRE-FEET
    PEAK DISCHARGE RATE =        2.30 CFS  AT    1.532 HOURS   BASIN AREA =    .0024 SQ. MI.


COMPUTE NM HYD      ID=14 HYD NO=114.0 AREA=0.01430 SQ MI
                    (A,B,C,D)   90 0 10 0
                    TP=0.13333 HR MASS RAINFALL=-1

    K =    .155781HR    TP =    .133330HR    K/TP RATIO =  1.168387     SHAPE CONSTANT, N =  3.035166
    UNIT PEAK =   30.532    CFS   UNIT VOLUME =     .9993       B =   284.68      P60 = 1.9700
    AREA =       .014300 SQ MI    IA =     .62000 INCHES    INF =   1.58600 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300

PRINT HYD           ID=14 CODE=1

                                  PARTIAL HYDROGRAPH   114.00

    RUNOFF VOLUME =       .54195 INCHES     =         .4133 ACRE-FEET
    PEAK DISCHARGE RATE =      14.69 CFS  AT    1.532 HOURS   BASIN AREA =    .0143 SQ. MI.
```

```
ADD HYD             ID=14 SUM NO=114.1 IDS=14 & 9
PRINT HYD           ID=14 CODE=1

                                    PARTIAL HYDROGRAPH   114.10

    RUNOFF VOLUME =      .71401 INCHES     =        .7452 ACRE-FEET
    PEAK DISCHARGE RATE =      25.28 CFS  AT   1.532 HOURS   BASIN AREA =    .0196 SQ. MI.


COMPUTE NM HYD      ID=15 HYD NO=115.0 AREA=0.01580 SQ MI
                    (A,B,C,D)   90 0 10 0
                    TP=0.13333 HR MASS RAINFALL=-1

    K =   .155781HR    TP =   .133330HR    K/TP RATIO =  1.168387     SHAPE CONSTANT, N =  3.035166
    UNIT PEAK =   33.735    CFS   UNIT VOLUME =    .9994       B =   284.68      P60 = 1.9700
    AREA =      .015800 SQ MI    IA =    .62000 INCHES    INF =   1.58600 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300

PRINT HYD           ID=15 CODE=1

                                    PARTIAL HYDROGRAPH   115.00

    RUNOFF VOLUME =      .54195 INCHES     =        .4567 ACRE-FEET
    PEAK DISCHARGE RATE =      16.22 CFS  AT   1.532 HOURS   BASIN AREA =    .0158 SQ. MI.


COMPUTE NM HYD      ID=16 HYD NO=116.0 AREA=0.04608 SQ MI
                    (A,B,C,D)   90 0 10 0
                    TP=0.13333 HR MASS RAINFALL=-1

    K =   .155781HR    TP =   .133330HR    K/TP RATIO =  1.168387     SHAPE CONSTANT, N =  3.035166
    UNIT PEAK =   98.387    CFS   UNIT VOLUME =    .9997       B =   284.68      P60 = 1.9700
    AREA =      .046080 SQ MI    IA =    .62000 INCHES    INF =   1.58600 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300

PRINT HYD           ID=16 CODE=1

                                    PARTIAL HYDROGRAPH   116.00

    RUNOFF VOLUME =      .54195 INCHES     =       1.3319 ACRE-FEET
    PEAK DISCHARGE RATE =      47.30 CFS  AT   1.532 HOURS   BASIN AREA =    .0461 SQ. MI.
```

```
ADD HYD             ID=16 SUM NO=116.7 IDS=7 & 16
PRINT HYD           ID=16 CODE=1

                                PARTIAL HYDROGRAPH   116.70

    RUNOFF VOLUME =      .67185 INCHES     =       2.0184 ACRE-FEET
    PEAK DISCHARGE RATE =      68.62 CFS  AT   1.532 HOURS   BASIN AREA =   .0563 SQ. MI.


ADD HYD             ID=16 SUM NO=116.8 IDS=16 & 8
PRINT HYD           ID=16 CODE=1

                                PARTIAL HYDROGRAPH   116.80

    RUNOFF VOLUME =      .80627 INCHES     =       3.0131 ACRE-FEET
    PEAK DISCHARGE RATE =      98.28 CFS  AT   1.499 HOURS   BASIN AREA =   .0701 SQ. MI.


COMPUTE NM HYD      ID=17 HYD NO=117.0 AREA=0.00723 SQ MI
                    (A,B,C,D)    60 0 40 0
                    TP=0.13333 HR MASS RAINFALL=-1

    K =   .139527HR    TP =   .133330HR    K/TP RATIO =  1.046479     SHAPE CONSTANT, N =  3.373630
    UNIT PEAK =   16.864    CFS   UNIT VOLUME =    .9992       B =   310.99      P60 = 1.9700
    AREA =      .007230 SQ MI    IA =    .53000 INCHES    INF =   1.33400 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300

PRINT HYD           ID=17 CODE=1

                                PARTIAL HYDROGRAPH   117.00

    RUNOFF VOLUME =      .68597 INCHES     =        .2645 ACRE-FEET
    PEAK DISCHARGE RATE =       9.37 CFS  AT   1.532 HOURS   BASIN AREA =   .0072 SQ. MI.


COMPUTE NM HYD      ID=18 HYD NO=118.0 AREA=0.00564 SQ MI
                    (A,B,C,D)    60 0 40 0
                    TP=0.13333 HR MASS RAINFALL=-1

    K =   .139527HR    TP =   .133330HR    K/TP RATIO =  1.046479     SHAPE CONSTANT, N =  3.373630
    UNIT PEAK =   13.155    CFS   UNIT VOLUME =    .9989       B =   310.99      P60 = 1.9700
    AREA =      .005640 SQ MI    IA =    .53000 INCHES    INF =   1.33400 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300
```

```
PRINT HYD           ID=18 CODE=1

                                    PARTIAL HYDROGRAPH   118.00

    RUNOFF VOLUME =      .68597 INCHES     =        .2063 ACRE-FEET
    PEAK DISCHARGE RATE =       7.31 CFS  AT   1.532 HOURS   BASIN AREA =   .0056 SQ. MI.


ADD HYD             ID=18 SUM NO=118.1 IDS=6 & 18
PRINT HYD           ID=18 CODE=1

                                    PARTIAL HYDROGRAPH   118.10

    RUNOFF VOLUME =     1.07860 INCHES     =       1.0142 ACRE-FEET
    PEAK DISCHARGE RATE =      32.86 CFS  AT   1.499 HOURS   BASIN AREA =   .0176 SQ. MI.


COMPUTE NM HYD      ID=19 HYD NO=119.0 AREA=0.00800 SQ MI
                    (A,B,C,D)    95 0 0 5
                    TP=0.13333 HR MASS RAINFALL=-1

    K =   .072665HR    TP =   .133330HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   1.5789    CFS   UNIT VOLUME =    .9922       B =   526.28      P60 = 1.9700
    AREA =      .000400 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


    K =   .161199HR    TP =   .133330HR    K/TP RATIO =  1.209023     SHAPE CONSTANT, N =  2.940974
    UNIT PEAK =   15.788    CFS   UNIT VOLUME =    .9988       B =   276.97      P60 = 1.9700
    AREA =      .007600 SQ MI    IA =    .65000 INCHES    INF =   1.67000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300

PRINT HYD           ID=19 CODE=1

                                    PARTIAL HYDROGRAPH   119.00

    RUNOFF VOLUME =      .57675 INCHES     =        .2461 ACRE-FEET
    PEAK DISCHARGE RATE =       8.28 CFS  AT   1.532 HOURS   BASIN AREA =   .0080 SQ. MI.
```

```
ADD HYD             ID=19 SUM NO=119.1 IDS=17 & 19
PRINT HYD           ID=19 CODE=1

                                  PARTIAL HYDROGRAPH   119.10

    RUNOFF VOLUME =      .62857 INCHES     =        .5106 ACRE-FEET
    PEAK DISCHARGE RATE =      17.65 CFS  AT   1.532 HOURS   BASIN AREA =   .0152 SQ. MI.


COMPUTE NM HYD      ID=20 HYD NO=120.0 AREA=0.01484 SQ MI
                    (A,B,C,D)   37 3 3 57
                    TP=0.13333 HR MASS RAINFALL=-1

    K =   .072665HR    TP =   .133330HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   33.388    CFS . UNIT VOLUME =    .9990       B =   526.28      P60 = 1.9700
    AREA =      .008459 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


    K =   .155356HR    TP =   .133330HR    K/TP RATIO =  1.165202     SHAPE CONSTANT, N =  3.042894
    UNIT PEAK =   13.655    CFS   UNIT VOLUME =    .9988       B =   285.30      P60 = 1.9700
    AREA =      .006381 SQ MI    IA =    .61860 INCHES    INF =   1.58209 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300

PRINT HYD           ID=20 CODE=1

                                  PARTIAL HYDROGRAPH   120.00

    RUNOFF VOLUME =     1.40584 INCHES     =       1.1127 ACRE-FEET
    PEAK DISCHARGE RATE =      31.36 CFS  AT   1.499 HOURS   BASIN AREA =   .0148 SQ. MI.


ADD HYD             ID=20 SUM NO=120.1 IDS=19 & 20
PRINT HYD           ID=20 CODE=1

                                  PARTIAL HYDROGRAPH   120.10

    RUNOFF VOLUME =     1.01215 INCHES     =       1.6232 ACRE-FEET
    PEAK DISCHARGE RATE =      48.76 CFS  AT   1.499 HOURS   BASIN AREA =   .0301 SQ. MI.
```

```
COMPUTE NM HYD       ID=21 HYD NO=121.0 AREA=0.04313 SQ MI
                     (A,B,C,D)    0 30 10 60
                     TP=0.187 HR MASS RAINFALL=-1

    K =    .101915HR    TP =    .187000HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   72.829    CFS   UNIT VOLUME =    .9996       B =   526.28      P60 = 1.9700
    AREA =       .025878 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


    K =    .175991HR    TP =    .187000HR    K/TP RATIO =    .941129     SHAPE CONSTANT, N =  3.757020
    UNIT PEAK =   31.241    CFS   UNIT VOLUME =    .9997       B =   338.63      P60 = 1.9700
    AREA =       .017252 SQ MI    IA =    .46250 INCHES    INF =   1.14500 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300

PRINT HYD            ID=21 CODE=1

                                   PARTIAL HYDROGRAPH   121.00


    RUNOFF VOLUME =     1.55983 INCHES     =       3.5880 ACRE-FEET
    PEAK DISCHARGE RATE =      86.08 CFS  AT   1.565 HOURS   BASIN AREA =    .0431 SQ. MI.

ADD HYD              ID=21 SUM NO=121.1 IDS=18 & 21
PRINT HYD            ID=21 CODE=1

                                   PARTIAL HYDROGRAPH   121.10


    RUNOFF VOLUME =     1.42019 INCHES     =       4.6021 ACRE-FEET
    PEAK DISCHARGE RATE =     116.09 CFS  AT   1.532 HOURS   BASIN AREA =    .0608 SQ. MI.


COMPUTE NM HYD       ID=22 HYD NO=122.0 AREA=0.00292 SQ MI
                     (A,B,C,D)    0 30 10 60
                     TP=0.13333 HR MASS RAINFALL=-1

    K =    .072665HR    TP =    .133330HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   6.9154    CFS   UNIT VOLUME =    .9978       B =   526.28      P60 = 1.9700
    AREA =       .001752 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


    K =    .125481HR    TP =    .133330HR    K/TP RATIO =    .941129     SHAPE CONSTANT, N =  3.757020
    UNIT PEAK =   2.9665    CFS   UNIT VOLUME =    .9956       B =   338.63      P60 = 1.9700
    AREA =       .001168 SQ MI    IA =    .46250 INCHES    INF =   1.14500 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300
```

```
PRINT HYD          ID=22 CODE=1

                                   PARTIAL HYDROGRAPH   122.00

    RUNOFF VOLUME =     1.55983 INCHES     =        .2429 ACRE-FEET
    PEAK DISCHARGE RATE =       6.97 CFS  AT   1.499 HOURS   BASIN AREA =   .0029 SQ. MI.


ADD HYD            ID=22 SUM NO=122.1 IDS=16 & 22
PRINT HYD          ID=22 CODE=1

                                   PARTIAL HYDROGRAPH   122.10

    RUNOFF VOLUME =      .83641 INCHES     =       3.2560 ACRE-FEET
    PEAK DISCHARGE RATE =     105.25 CFS  AT   1.499 HOURS   BASIN AREA =   .0730 SQ. MI.


COMPUTE NM HYD     ID=1 HYD NO=152.0 AREA=0.13048 SQ MI
                   (A,B,C,D)    0 45 20 35
                   TP=0.1476 HR MASS RAINFALL=-1

    K =   .081436HR    TP =   .147600HR    K/TP RATIO =   .551735     SHAPE CONSTANT, N =  6.995647
    UNIT PEAK =   161.21    CFS   UNIT VOLUME =    .9999       B =   521.05      P60 = 1.9700
    AREA =      .045668 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300


    K =   .133830HR    TP =   .147600HR    K/TP RATIO =   .906708     SHAPE CONSTANT, N =  3.906945
    UNIT PEAK =   200.49    CFS   UNIT VOLUME =    1.000       B =   348.92      P60 = 1.9700
    AREA =      .084812 SQ MI    IA =    .45385 INCHES    INF =   1.12077 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033300

PRINT HYD          ID=1 CODE=1

                                   PARTIAL HYDROGRAPH   152.00

    RUNOFF VOLUME =     1.26174 INCHES     =       8.7803 ACRE-FEET
    PEAK DISCHARGE RATE =     253.89 CFS  AT   1.532 HOURS   BASIN AREA =   .1305 SQ. MI.
```

```
COMPUTE NM HYD       ID=2 HYD NO=153.0 AREA=0.05022 SQ MI
                     (A,B,C,D)   0 45 15 40
                     TP=0.1412 HR MASS RAINFALL=-1

    K =    .076954HR     TP =    .141200HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    74.871     CFS    UNIT VOLUME =     1.000        B =    526.28       P60 = 1.9700
    AREA =       .020088 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300


    K =    .132887HR     TP =    .141200HR     K/TP RATIO =    .941129      SHAPE CONSTANT, N =  3.757027
    UNIT PEAK =    72.264     CFS    UNIT VOLUME =     1.000        B =    338.63       P60 = 1.9700
    AREA =       .030132 SQ MI     IA =     .46250 INCHES     INF =    1.14500 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300

PRINT HYD            ID=2 CODE=1

                                    PARTIAL HYDROGRAPH    153.00

    RUNOFF VOLUME =      1.31174 INCHES      =        3.5133 ACRE-FEET
    PEAK DISCHARGE RATE =      101.21 CFS  AT    1.532 HOURS    BASIN AREA =    .0502 SQ. MI.
```

```
COMPUTE NM HYD       ID=3 HYD NO=162.0 AREA=0.01659 SQ MI
                     (A,B,C,D)    0 40 35 25
                     TP=0.13333 HR MASS RAINFALL=-1

    K =    .072665HR     TP =    .133330HR     K/TP RATIO =    .545000      SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =    16.371     CFS    UNIT VOLUME =     .9986        B =    526.28       P60 = 1.9700
    AREA =       .004148 SQ MI     IA =     .10000 INCHES     INF =     .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300


    K =    .120147HR     TP =    .133330HR     K/TP RATIO =    .901127      SHAPE CONSTANT, N =  3.932611
    UNIT PEAK =    32.723     CFS    UNIT VOLUME =     1.000        B =    350.65       P60 = 1.9700
    AREA =       .012443 SQ MI     IA =     .43000 INCHES     INF =    1.05400 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300

PRINT HYD            ID=3 CODE=1

                                    PARTIAL HYDROGRAPH    162.00


    RUNOFF VOLUME =      1.17826 INCHES      =        1.0425 ACRE-FEET
    PEAK DISCHARGE RATE =       32.76 CFS  AT    1.499 HOURS    BASIN AREA =    .0166 SQ. MI.
```

COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.027 DIA=2.5 FT N=.013

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.13	.10	.35	1.11
.26	.27	1.53	1.53
.39	.49	3.57	1.82
.52	.74	6.42	2.03
.65	1.02	10.02	2.19
.78	1.31	14.30	2.32
.91	1.62	19.15	2.41
1.04	1.94	24.49	2.47
1.17	2.26	30.19	2.50
1.30	2.59	36.13	2.50
1.43	2.91	42.18	2.50
1.56	3.23	48.19	2.50
1.69	3.54	54.01	2.50
1.82	3.84	59.46	2.50
1.95	4.12	64.34	2.50
2.08	4.37	68.40	2.50
2.21	4.60	71.31	2.50
2.35	4.78	72.50	2.50
2.50	4.91	72.50	2.50

COMPUTE TRAVEL TIME ID=6 REACH NO=1 NO VS=1 L=1600 FT SLP=.027

TRAVEL TIME TABLE

REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.130	.098	.35	.1227
.261	.271	1.53	.0786
.391	.490	3.57	.0611
.521	.741	6.42	.0514
.651	1.017	10.02	.0451
.782	1.312	14.30	.0408
.912	1.620	19.15	.0376
1.042	1.937	24.49	.0352
1.173	2.261	30.19	.0333
1.303	2.586	36.13	.0318
1.433	2.910	42.18	.0307
1.563	3.229	48.19	.0298
1.694	3.540	54.01	.0291
1.824	3.837	59.46	.0287
1.954	4.117	64.34	.0284
2.084	4.373	68.40	.0284
2.215	4.599	71.31	.0287
2.345	4.783	72.50	.0293
2.500	4.909	72.50	.0301

ROUTE ID=6 HYD NO=162.9 INFLOW ID=3 DT=0 HR
PRINT HYD ID=6 CODE=1

PARTIAL HYDROGRAPH 162.90

RUNOFF VOLUME = 1.17827 INCHES = 1.0425 ACRE-FEET
PEAK DISCHARGE RATE = 32.00 CFS AT 1.532 HOURS BASIN AREA = .0166 SQ. MI.

COMPUTE NM HYD ID=4 HYD NO=163.0 AREA=0.05291 SQ MI
(A,B,C,D) 0 40 30 30
TP=0.13333 HR MASS RAINFALL=-1

K = .072665HR TP = .133330HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 62.653 CFS UNIT VOLUME = .9992 B = 526.28 P60 = 1.9700
AREA = .015873 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

K = .121085HR TP = .133330HR K/TP RATIO = .908161 SHAPE CONSTANT, N = 3.900325
UNIT PEAK = 96.799 CFS UNIT VOLUME = 1.000 B = 348.47 P60 = 1.9700
AREA = .037037 SQ MI IA = .43571 INCHES INF = 1.07000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033300

```
PRINT HYD           ID=4 CODE=1

                                PARTIAL HYDROGRAPH   163.00

     RUNOFF VOLUME =     1.22797 INCHES     =      3.4652 ACRE-FEET
     PEAK DISCHARGE RATE =     107.13 CFS  AT   1.499 HOURS   BASIN AREA =    .0529 SQ. MI.


COMPUTE NM HYD      ID=5 HYD NO=200.0 AREA=0.03004 SQ MI
                    (A,B,C,D)    0 45 15 40
                    TP=0.1453 HR MASS RAINFALL=-1

    K =   .079189HR    TP =   .145300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   43.522    CFS   UNIT VOLUME =    .9998       B =   526.28       P60 = 1.9700
    AREA =      .012016 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300


    K =   .136746HR    TP =   .145300HR    K/TP RATIO =   .941129     SHAPE CONSTANT, N =  3.757027
    UNIT PEAK =   42.006    CFS   UNIT VOLUME =    .9999       B =   338.63       P60 = 1.9700
    AREA =      .018024 SQ MI    IA =    .46250 INCHES    INF =   1.14500 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =    .033300

PRINT HYD           ID=5 CODE=1

                                PARTIAL HYDROGRAPH   200.00

    RUNOFF VOLUME =     1.31174 INCHES     =       2.1016 ACRE-FEET
    PEAK DISCHARGE RATE =      59.95 CFS  AT   1.532 HOURS   BASIN AREA =    .0300 SQ. MI.


ADD HYD             ID=1 SUM NO=152.1 IDS=1 & 6
PRINT HYD           ID=1 CODE=1

                                PARTIAL HYDROGRAPH   152.10

    RUNOFF VOLUME =     1.25232 INCHES     =       9.8228 ACRE-FEET
    PEAK DISCHARGE RATE =     285.89 CFS  AT   1.532 HOURS   BASIN AREA =    .1471 SQ. MI.
```

***** ROUTE FLOWS FROM KATHRYN TO THAXTON IN 72" RCP
***** NOTE THAT CAPACITY EXCEEDED (real slope=0.21%)
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.0045 DIA=6.0 FT N=.013

RATING CURVE PIPE SECTION 1.0

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.31	.56	1.49	2.67
.63	1.56	6.47	3.67
.94	2.82	15.04	4.36
1.25	4.27	27.05	4.87
1.56	5.86	42.23	5.27
1.88	7.55	60.26	5.56
2.19	9.33	80.73	5.78
2.50	11.16	103.22	5.92
2.81	13.02	127.24	5.99
3.13	14.90	152.28	6.00
3.44	16.76	177.78	6.00
3.75	18.60	203.13	6.00
4.06	20.39	227.67	6.00
4.38	22.10	250.65	6.00
4.69	23.71	271.22	6.00
5.00	25.19	288.33	6.00
5.32	26.49	300.57	6.00
5.63	27.55	305.61	6.00
6.00	28.27	305.61	6.00

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 L=1350 FT SLP=.0045

TRAVEL TIME TABLE
REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.313	.562	1.49	.1414
.625	1.564	6.47	.0906
.938	2.824	15.04	.0704
1.251	4.271	27.05	.0592
1.563	5.859	42.23	.0520
1.876	7.554	60.26	.0470
2.189	9.329	80.73	.0433
2.501	11.159	103.22	.0405
2.814	13.022	127.24	.0384
3.127	14.897	152.28	.0367
3.439	16.764	177.78	.0354
3.752	18.601	203.13	.0343
4.065	20.388	227.67	.0336
4.377	22.101	250.65	.0331
4.690	23.712	271.22	.0328
5.003	25.189	288.33	.0328

5.315	26.489	300.57	.0330
5.628	27.547	305.61	.0338
6.000	28.274	305.61	.0347

```
ROUTE              ID=3 HYD NO=152.9 INFLOW ID=1 DT=0 HR
PRINT HYD          ID=3 CODE=1

                                PARTIAL HYDROGRAPH   152.90

    RUNOFF VOLUME =     1.25233 INCHES     =       9.8228 ACRE-FEET
    PEAK DISCHARGE RATE =     270.91 CFS  AT   1.565 HOURS   BASIN AREA =   .1471 SQ. MI.


ADD HYD            ID=2 SUM NO=153.2 IDS=2 & 4
PRINT HYD          ID=2 CODE=1

                                PARTIAL HYDROGRAPH   153.20

    RUNOFF VOLUME =     1.26876 INCHES     =       6.9785 ACRE-FEET
    PEAK DISCHARGE RATE =     208.01 CFS  AT   1.499 HOURS   BASIN AREA =   .1031 SQ. MI.


ADD HYD            ID=1 SUM NO=153.1 IDS=3 & 2
PRINT HYD          ID=1 CODE=1

                                PARTIAL HYDROGRAPH   153.10

    RUNOFF VOLUME =     1.25910 INCHES     =      16.8013 ACRE-FEET
    PEAK DISCHARGE RATE =     476.00 CFS  AT   1.532 HOURS   BASIN AREA =   .2502 SQ. MI.


***** ROUTE FLOWS FROM KATHRYN TO THAXTON IN 72" RCP
***** NOTE THAT CAPACITY EXCEEDED (real slope=0.21%)
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.012 DIA=6.0 FT N=.013

                                RATING CURVE PIPE SECTION  1.0
```

WATER SURFACE ELEV	FLOW AREA SQ FT	FLOW RATE CFS	MAX WIDTH FT
.00	.00	.00	.00
.31	.56	2.43	2.67
.63	1.56	10.56	3.67
.94	2.82	24.56	4.36
1.25	4.27	44.17	4.87
1.56	5.86	68.97	5.27
1.88	7.55	98.40	5.56
2.19	9.33	131.83	5.78

2.50	11.16	168.55	5.92
2.81	13.02	207.78	5.99
3.13	14.90	248.67	6.00
3.44	16.76	290.32	6.00
3.75	18.60	331.72	6.00
4.06	20.39	371.79	6.00
4.38	22.10	409.32	6.00
4.69	23.71	442.90	6.00
5.00	25.19	470.84	6.00
5.32	26.49	490.84	6.00
5.63	27.55	499.05	6.00
6.00	28.27	499.05	6.00

COMPUTE TRAVEL TIME ID=3 REACH NO=1 NO VS=1 L=2250 FT SLP=.012

TRAVEL TIME TABLE

REACH= 1.0

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
.313	.562	2.43	.1443
.625	1.564	10.56	.0925
.938	2.824	24.56	.0719
1.251	4.271	44.17	.0604
1.563	5.859	68.97	.0531
1.876	7.554	98.40	.0480
2.189	9.329	131.83	.0442
2.501	11.159	168.55	.0414
2.814	13.022	207.78	.0392
3.127	14.897	248.67	.0374
3.439	16.764	290.32	.0361
3.752	18.601	331.72	.0350
4.065	20.388	371.79	.0343
4.377	22.101	409.32	.0337
4.690	23.712	442.90	.0335
5.003	25.189	470.84	.0334
5.315	26.489	490.84	.0337
5.628	27.547	499.05	.0345
6.000	28.274	499.05	.0354

ROUTE ID=3 HYD NO=153.9 INFLOW ID=1 DT=0 HR
PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 153.90

RUNOFF VOLUME = 1.25910 INCHES = 16.8013 ACRE-FEET
PEAK DISCHARGE RATE = 457.70 CFS AT 1.565 HOURS BASIN AREA = .2502 SQ. MI.

```
ADD HYD             ID=1 SUM NO=200.1 IDS=3 & 5
PRINT HYD           ID=1 CODE=1

                                        PARTIAL HYDROGRAPH   200.10

              RUNOFF VOLUME =     1.26474 INCHES     =      18.9028 ACRE-FEET
   PEAK DISCHARGE RATE =      513.06 CFS  AT   1.565 HOURS   BASIN AREA =    .2802 SQ. MI.


ADD HYD             ID=2 SUM NO=202.0 IDS=20 & 21
PRINT HYD           ID=2 CODE=1

                                      PARTIAL HYDROGRAPH   202.00

   RUNOFF VOLUME =     1.28511 INCHES     =       6.2254 ACRE-FEET
   PEAK DISCHARGE RATE =      164.14 CFS  AT   1.532 HOURS   BASIN AREA =    .0908 SQ. MI.


ADD HYD             ID=1 SUM NO=202.1 IDS=1 & 2
PRINT HYD           ID=1 CODE=1

                                      PARTIAL HYDROGRAPH   202.10

   RUNOFF VOLUME =     1.26972 INCHES     =      25.1282 ACRE-FEET
   PEAK DISCHARGE RATE =      671.39 CFS  AT   1.565 HOURS   BASIN AREA =    .3711 SQ. MI.


ADD HYD             ID=1 SUM NO=700.1 IDS=1 & 22
PRINT HYD           ID=1 CODE=1

                                     HYDROGRAPH FROM AREA   700.10

   RUNOFF VOLUME =     1.19850 INCHES     =      28.3841 ACRE-FEET
   PEAK DISCHARGE RATE =      769.60 CFS  AT   1.532 HOURS   BASIN AREA =    .4441 SQ. MI.


FINISH

   NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 08:07:46
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STREET CAPACITY

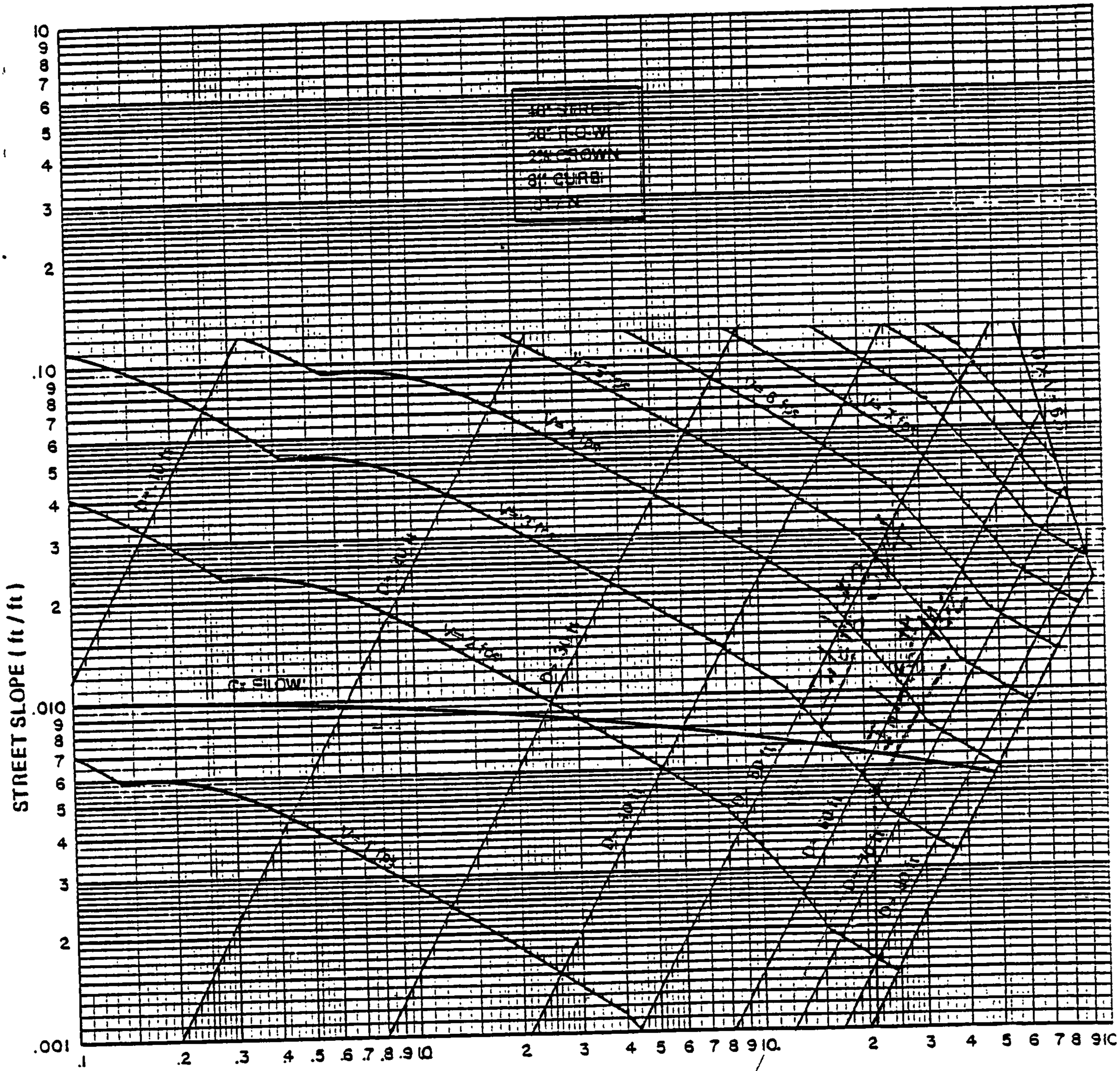
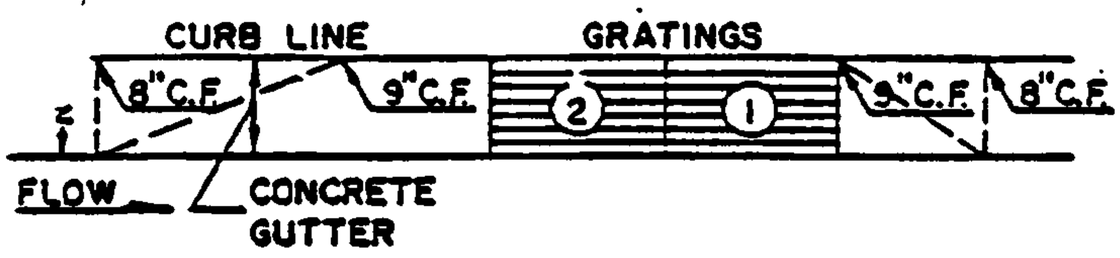


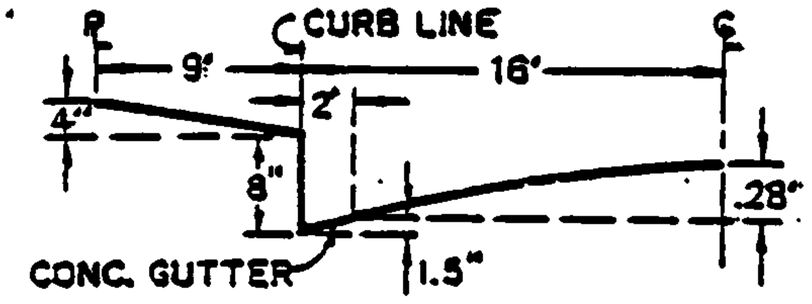
PLATE 22.3 D-2

REV. 3-83

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



GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

D=DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

SOUTH BROADWAY SECTOR DRAINAGE MANAGEMENT PLAN

Developed Conditions Report

SEPTEMBER 1990

BOHANNAN-HUSTON, INC.
7500 JEFFERSON NE
ALBUQUERQUE, NM 87109

1.0 INTRODUCTION

This report presents the results of the Existing and Developed Conditions study for the South Broadway Sector Drainage Management Plan, and is prepared for the City of Albuquerque under the authorization of the Architect/Engineer's Agreement #0259-01.

The South Broadway study area lies between Interstate 25 on the east, the Atchison, Topeka and Santa Fe Railroad on the West, Lomas on the north and the City Limits on the south. The City Limits on the south run east and west parallel to, and approximately 1700 feet south of, Woodward Road. This area was included in the Albuquerque Master Drainage Study, Volume I, prepared by Bohannan-Huston, Inc. in January of 1991. This current drainage study analyzes the area in more detail, paying particular attention to time varying pipe hydraulics and the Bell/Commercial storm water pumping station.

2.0 DESCRIPTION OF THE STUDY AREA

The study area (2.1 square miles) encompasses much more than the South Broadway neighborhood. The northern portion between Lomas and Central includes the southern tip of Martinez Town, although in the last ten years, its once residential character has been impacted by the growth of the St. Joseph's Hospital complex and construction of Senior Citizens housing.

Between Central and Coal lies the Huning/Highland addition, the first suburb to be built on the East Mesa. This area is currently being "gentrified" by rehabilitation of the Victorian houses in the area. The South Broadway neighborhood lies south of Coal, east and west of Broadway, and is almost entirely residential in nature; except for existing commercial uses located on Broadway.

The area south of Gibson and west of Broadway is known as the San Jose Barrio, historically an Hispanic farming community. The area is now primarily residential with scattered commerce and industry. The General Electric Plant in the area is one of Albuquerque's larger employers.

Topographically, the study area slopes from I-25 on the east down to the AT&SF Railroad on the west. The railroad forms a drainage barrier on the west resulting in flooding in the low lying areas just east of the tracks. The north to south slope is slight, with an overall slope of .2%.

3.0 HISTORY OF FLOODING

Construction of Interstate 25 and the South Diversion Channel has effectively diverted most off-site flows from entering the study area from the east. Thus, historic flooding from east-west arroyos passing through the study area is no longer a problem. Present flooding is caused by on-site runoff which collects against the railroad tracks in low lying areas. Approximately half of the study area lies east of Broadway. This portion is characterized by 2% to 3% slopes from east to west, and drains quickly and efficiently.

4.0 AGENCIES/JURISDICTION/PERMITS/AGREEMENTS

Two entities play the major roles in providing drainage for the area--the City of Albuquerque and the Middle Rio Grande Conservancy District (MRGCD). The only outfall for the area is the San Jose Drain, a conveyance facility owned and maintained by the MRGCD. In contrast, all storm sewers in the area were constructed and are maintained by the City, and all empty into the San Jose Drain.

While the drain was constructed to lower the water table in the adjoining agricultural land, an agreement was finalized in September,

1958 between the MRGCD, the Bureau of Reclamation and the City of Albuquerque to allow the City to discharge storm drainage into the San Jose Drain. Subsequently, additional agreements for City discharge into the drain have been consummated, though none as sweeping as the 1958 accord. A record of all agreements and permits concerning the San Jose Drain in the study area can be found in Appendix II, including the historic 1958 document.

It should be noted that the 1958 agreement does not specify an allowable discharge rate. Rather, the permit was attached to an engineering plan set, and authorized discharges as shown on the plan set. These discharges are shown as ditches or pipes emptying into the San Jose Drain. This was the procedure used for several other discharge agreements between the City and MRGCD. The referenced plan sets are archived in the MRGCD library.

Note that the record of permits found in Appendix II contains agreements between the MRGCD and NON-City entities, as well as permits for domestic water lines crossing the San Jose Drain. While these permits do not directly pertain to this drainage study, each one impacts the Drain, and should be considered if improvements to the drain are considered in the future.

The Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) South Diversion Channel crosses the southeast corner of the study area, as shown on Plate H-14 in Appendix I. The portion of the study area east of the South Diversion Channel drains into the Diversion Channel and leaves the study area. This area and the South Diversion Channel are not addressed in this report.

Bernalillo County has no drainage responsibilities in the study area.

5.0 SOURCES OF INFORMATION

Surface drainage patterns were determined from contours on City of Albuquerque topographic orthophoto mapping at a nominal scale of 1"=500'. Information on existing storm drainage facilities was obtained from various sources including:

- o South Broadway Neighborhoods Sector Development Plan, July, 1986.
- o City of Albuquerque Drainage Facilities maps.
- o As-Built drawings of drainage facilities.
- o Albuquerque Master Drainage Study, Volume I, January, 1981.
- o Volume II, Albuquerque Storm Water Pumping Stations.
- o Southeast Valley Drainage Management Plan, San Jose Drain and Vicinity, AMAFCA.
- o Bell Commercial Pump Station #37--Drainage Study, City of Albuquerque, July 15, 1987.
- o Bell Commercial Pump Station logs.
- o Field Reconnaissance by Bohannan-Huston, Inc. personnel.
- o Field Surveys by Albuquerque Surveying Company.
- o Fairbanks - Morse Pump Curves.

6.0 HYDROLOGY

The City of Albuquerque is currently rethinking its hydrologic approach, principally through a collaboration between the University of New Mexico Civil Engineering Department, AMAFCA and City of Albuquerque hydrology staff. While this new hydrology is being used for many drainage studies within the City area, consensus has not been reached and the new hydrologic approach has not been approved by the City. It is anticipated that use of the new hydrology would produce runoff results much different than those obtained in the AMDS report of 1981, the current guiding document for drainage planning in the South Broadway area.

Because of these considerations, the hydrologic approach used for the AMDS Volumes I, II and III has been chosen for this study. It is felt that this approach maintains continuity in drainage philosophy throughout the City and conforms to a hydrologic approach approved by the City of Albuquerque. Details of the hydrologic approach are presented in the following sections.

6.1 Precipitation. The AMDS reports use the following equation to generate a mass rainfall table:

R(T) = QxAxT**B where:

R(T) = Accumulate rainfall at time T (in inches)
Q = Total Rainfall from the storm (in inches)
T = Time elapsed (in hours)
A = Empirical coefficient - determined by linear regression or other means
B = Empirical exponent - determined by linear regression or other means

The following variables were used for the AMDS hydrology and for this study:

	A	B	Q	T
100-year	.85	.090521	2.4	6.0
10-year	.85	.090521	1.6	6.0

The resulting rainfall hyetograph reflects an event with high intensity in the early stages of the storm. It should be kept in mind that runoff is the result of many variables including total precipitation, hyetograph shape, runoff model, curve numbers, etc. It is the combined effect of all these variables that should be compared with field data and previous studies, rather than any single variable.

The modeled storm is the 6-hour event, the storm commonly used in the Albuquerque area for sizing storm sewers and channel capacities. Note that for design of reservoirs with detention times greater than 6 hours, the 24-hour storm should be used for analysis.

6.2 Rainfall-Runoff Model. The previous City study of the area, AMDS Volume I, used a combination of HYMO and RADS, modeling the runoff of basins east of Broadway with HYMO. RADS, developed by Bohannan-Huston, Inc., was written specifically to predict flooding in flat topography. It was used in the AMDS Volume I to generate runoff volumes for the South Broadway basins west of Broadway and to route both the RADS generated flows and HYMO generated flows. It is our opinion that the use of RADS for the basins between Broadway and the Railroad was inappropriate, as these basins have steep (2%) slopes from east to west and cannot be adequately modeled by RADS.

HYMO (Hydrologic Modeling), a computer program developed by the Agricultural Research Service of the U.S. Department of Agriculture, has been used by the Albuquerque engineering community for many years and has been approved by the City of Albuquerque for City hydrologic analysis. Because of the inappropriateness of RADS for the study area and because of City and BHI satisfaction with HYMO in the past, the HYMO model was chosen to model the entire study area.

In order to maintain continuity with the AMDS Volume I study and to allow comparison between the old and new studies, the new study used AMDS Volume I basin boundaries and basin identifications wherever possible. Basin characteristics from AMDS I for basins east of Broadway were also used where appropriate (area, land use, curve numbers, times to peak). However, as opposed to the rest of the AMDS volumes, Volume I combined the impervious and pervious portions of each basin using a composite curve number. In order to bring all the AMDS studies into conformity, this study modeled all basins using separate pervious and impervious modeling.

The hydrologic course of action for the project can be summarized as follows:

1. Runoff for basins previously modeled with RADS were remodeled using HYMO as in AMDS Volumes II-III studies.
2. Runoff for basins previously modeled with HYMO were preserved except that the impervious areas of each basin were modeled separately from the pervious areas.
3. Hydrographs for runoff entering the study area from the east were taken from the AMDS Volume II Restudy without making any adjustments. These hydrographs were generated with HYMO during the Restudy, and used the "Heggen" rainfall distribution. The times-to-peak of the Restudy runoff hydrographs will be later than for the hydrographs generated inside the study area because the Heggen rainfall distribution places the most intense rainfall later in the storm (see Appendix V). However, this mismatch in peaks was considered acceptable because (1) Restudy flows contribute little to the system discharge, (2) reanalysis of the AMDS Volume II using a more compatible rainfall would be a large effort and is outside the scope of the contract.

6.2.1 Runoff Hydrographs. A unit hydrograph approach is used by HYMO for generating runoff hydrographs for each subbasin. Three equations (found in the HYMO Users' Manual) define the rising limb and the recession of the hydrograph. The shape of the unit hydrograph is defined by two variables, the time to peak, T_p, and the recession constant, K. The HYMO program will compute the values of T_p and K or allow the user to specify them. The following equations were used to define these variables:

$$T_c = \frac{.0078 \times L^{.77}}{S^{.385}} \qquad \text{(Kirpich Equation)}$$

T_c = Time of concentration in minutes
L = Length of longest water pathway in feet
S = Slope of longest water pathway

Time to Peak $T_p = 2/3\ T_c$ in minutes

Recession Constant $K = 1/2\ T_p$ in minutes

Next, the depth of runoff in inches is found by applying the Soil Conservation Service (SCS) rainfall-runoff relationship:

$$Q = (P-(200/CN)+2)^2/(P+(800/CN)-8)$$

Where: Q = runoff in inches depth over the drainage area
P = accumulated rainfall in inches
CN = curve number

Storm outflow hydrographs are then computed by merging the accumulated depth of runoff with the unit hydrograph.

In the pervious/impervious approach, a runoff hydrograph is generated for the pervious and impervious portions of each basin separately, then added together to produce the outflow hydrograph for the basin.

Basin boundaries are shown on the Modeling Map in the back pocket of this report. Basin characteristics are tabulated in Table 1 on the following page along with the 10-year and 100-year peak discharges from each basin.

6.2.2 Routing. The South Broadway storm sewer system contains a pumping station and several cross-connections, features not normally modeled in storm sewers. Additionally, analysis of the system trunk lines using pressure flow is desired to see if significant additional capacity is present in the system. While HYMO can model routing of surface flow, street flow, channel flow and pipe flow, it cannot model pumps, pipe networks (interconnections) or pressure flow. Therefore,

we have chosen the Storm Water Management Model (SWMM) developed by the EPA for routing of the hydrographs generated by HYMO or taken from the Volume II Restudy. SWMM can handle not only the surface flow, street flow, channel flow and pipe flow, but also the pumps, pipe cross-connections and pressure flow.

The EXTRAN portion of SWMM is intended for application in systems where the assumption of steady flow, for purposes of computing backwater profiles, cannot be made. The program solves the full dynamic equations for gradually varied flow (St. Venant equations) using an explicit solution technique to step forward in time.

6.2.3 Existing Conditions Curve Numbers. HYMO uses the SCS Curve Number method to determine runoff volumes. The runoff curve numbers account for the combined effect of soil types, vegetative cover, land use and antecedent moisture content. For this project, Antecedent Moisture Conditions II, recommended by SCS, was used. In addition, it was assumed that all commercial and residential areas were free discharging (no on-site ponding).

In this analysis, pervious and impervious areas within a basin were considered separately. The impervious areas were assigned a curve number of 95 and their runoff calculated separately from the pervious areas. The SCS method allows for use of a curve number of 95 in "warmer climates." Additionally, the City of Albuquerque effort to revise its Hydrology procedure is now moving toward abstraction and infiltration values that will reduce the runoff from impervious areas and result in a volume equivalent to the runoff from a CN of 95 at the 6-hour storm.

For the pervious areas, the soil type was determined from the SCS Soil Survey of Bernalillo County. Land use and percentages of impervious areas were determined through windshield surveys and aerial photographs. Table 1 presents these basin characteristics. Note that characteristics for those basins previously modeled with HYMO in the AMDS Volume I study were not available.

6.2.4 Developed Conditions Curve Numbers. While most of the study area was fully developed at the time of the Existing Conditions analysis, further development is expected in 7 of the 28 basins. In keeping with the hydrologic assumptions detailed above, the percents of impervious areas were increased in these basins to reflect increased development. Table 2 presents the changes in basin hydrology for the 7 subbasins where development is expected. Free discharge is assumed from all developing areas.

6.2.5 Modeling Map. The modeling map for the study area can be found in the pocket at the end of this report. Subbasin boundaries, existing drainage facilities and analysis points are shown. Since only the trunk lines are modeled, these lines are accentuated on the map. Surface flow routing is also indicated.

6.2.6 Off-Site Flows. The area to the east of Interstate 25 was analyzed in the AMDS Restudy, Volume II. Possible flow paths into the South Broadway area were investigated during the Restudy with the following results

Analysis Point	Peak 100-Year Discharge (cfs)	Peak 10-Year Discharge (cfs)
APV1	52	20
APW1-SS3	23	9
APW1	0	0
APX1	0	0
APY1	0	0
APZ1SS-2	0	0
APAA1-1	6	0
APAA1-2	11	0
APAA1-3	40	14
APBB1	0	0
APDD1	13	0
APFF1	5	0
APCC1	SOUTH DIVERSION CHANNEL	
APGG1	TO SOUTH DIVERSION CHANNEL	
APHH1	TO SOUTH DIVERSION CHANNEL	

TABLE 1

ASIN HYDROLOGY FOR SOUTH BROADWAY

BASIN	AREA (SQ.MI.)	LENGTH OF LONGEST FLOWPATH	ELEV. @ TOP	ELEV. @ BOTTOM	SLOPE	% SOIL TYPE'A	% SOIL TYPE'B	LAND USE	CN	% IMPERV	IMPERV AREA	PERV AREA	Tc MIN	Tp HRS	K HRS	10-YR Qpk CFS	100-YR Qpk CFS
SJ-1	0.0795	3500	4968.0	4950	0.0051	65	35	RANGE-FAIR	60	30	0.02385	0.05564	31.8	0.3532	0.177	26	48
SJ-2	0.0989	2500	4959.0	4948	0.0044	30	70	RANGE-FAIR	65	35	0.0346	0.06426	26.0	0.2894	0.145	45	88
SJ-3	0.0237	1500	4965.0	4946.5	0.0123	35	65	RANGE-FAIR	64	35	0.0083	0.01541	11.8	0.1313	0.066	22	41
SJ-4	0.1881	2375	4964.0	4946.4	0.0074	28	72	RANGE-FAIR	66	35	0.033	0.0612	20.5	0.2276	0.114	54	105
SJ-5	0.0414	2500	4963.5	4944	0.0078	50	50	RANGE-FAIR	62	40	0.01654	0.02482	20.9	0.2322	0.116	26	48
SJN-6	0.0526	3500	4945.0	4939.8	0.0015	0	100	RANGE-FAIR	70	30	0.01578	0.03682	51.3	0.5697	0.285	12	26
SJN-701	0.0788	2250	4968.0	4944	0.0107	91	9	RANGE-FAIR	69	30	0.02364	0.05516	17.1	0.1898	0.095	46	96
SJ-7	0.0684	2550	4966.0	4943.9	0.0087	30	70	RANGE-FAIR	65	32	0.02188	0.0465	20.4	0.2264	0.113	36	70
SJ-8	0.0460	1125	4960.0	4939	0.0187	10	90	RANGE-POOR	78	20	0.00921	0.03682	10.0	0.1111	0.056	41	99
SJ-9SS	0.0419	1600	4942.0	4938.2	0.0024	0	100	RANGE-POOR	79	35	0.01467	0.02724	23.4	0.2603	0.130	27	58
SJ-9OL	0.0504	2300	4942.0	4936.8	0.0023	0	100	RANGE-POOR	79	35	0.01764	0.03276	31.6	0.3508	0.175	26	54
SJN-10	0.0167	1900	4942.5	4941	0.0008	0	100	RANGE-POOR	79	20	0.00333	0.01332	40.9	0.4540	0.227	5	12
SJN-710	0.0321	1700	5002.5	4938	0.0379	87	13	RANGE-POOR	69	4	0.00128	0.03083	10.0	0.1111	0.056	5	21
SJN-720	0.0409	2225	4996.0	4936.5	0.0267	90	10	RANGE-POOR	69	2	0.00082	0.04008	11.9	0.1321	0.066	3	20
SJN-730	0.0423	1750	4994.0	4945	0.028	70	30	RANGE-FAIR	62	40	0.01693	0.0254	10.0	0.1111	0.056	52	96
SJN-740	0.1302	2100	4941.0	4936	0.0024	0	100	RANGE-FAIR	70	40	0.0521	0.07811	28.9	0.3206	0.160	65	130
SJN-109	0.1042	3200	5017.0	4938.3	0.0245	85	15	RANGE-POOR	70	8	0.00834	0.09587	18.3	0.1806	0.090	70	65
SJN-100*	0.0970								54	60	0.0582	0.0388		0.1755	0.088	118	210
SJN-102*	0.1750								54	40	0.07	0.105		0.2112	0.106	121	215
SJN-105*	0.0710								54	35	0.02485	0.04615		0.1494	0.075	58	103
SJN-106*	0.0950								54	35	0.03325	0.06175		0.1799	0.090	66	117
SJN-150*	0.0750								54	35	0.02625	0.04875		0.1259	0.063	71	126
SJN-152*	0.1320								54	35	0.0462	0.0858		0.1476	0.074	109	194
SJN-151*	0.0620								54	40	0.0248	0.0372		0.1412	0.071	60	103
SJN-200*	0.0550								54	40	0.022	0.033		0.1453	0.073	53	94
SJN-202*	0.0820								54	10	0.0082	0.0738		0.1872	0.094	16	28
SJN-700*	0.0565								69	0	0	0.0565		0.1186	0.059	5	33
BS-134	0.0660	3700	5073.0	4868	0.0554				54	65	0.0429	0.0231	13.3	0.1476	0.074	101	180

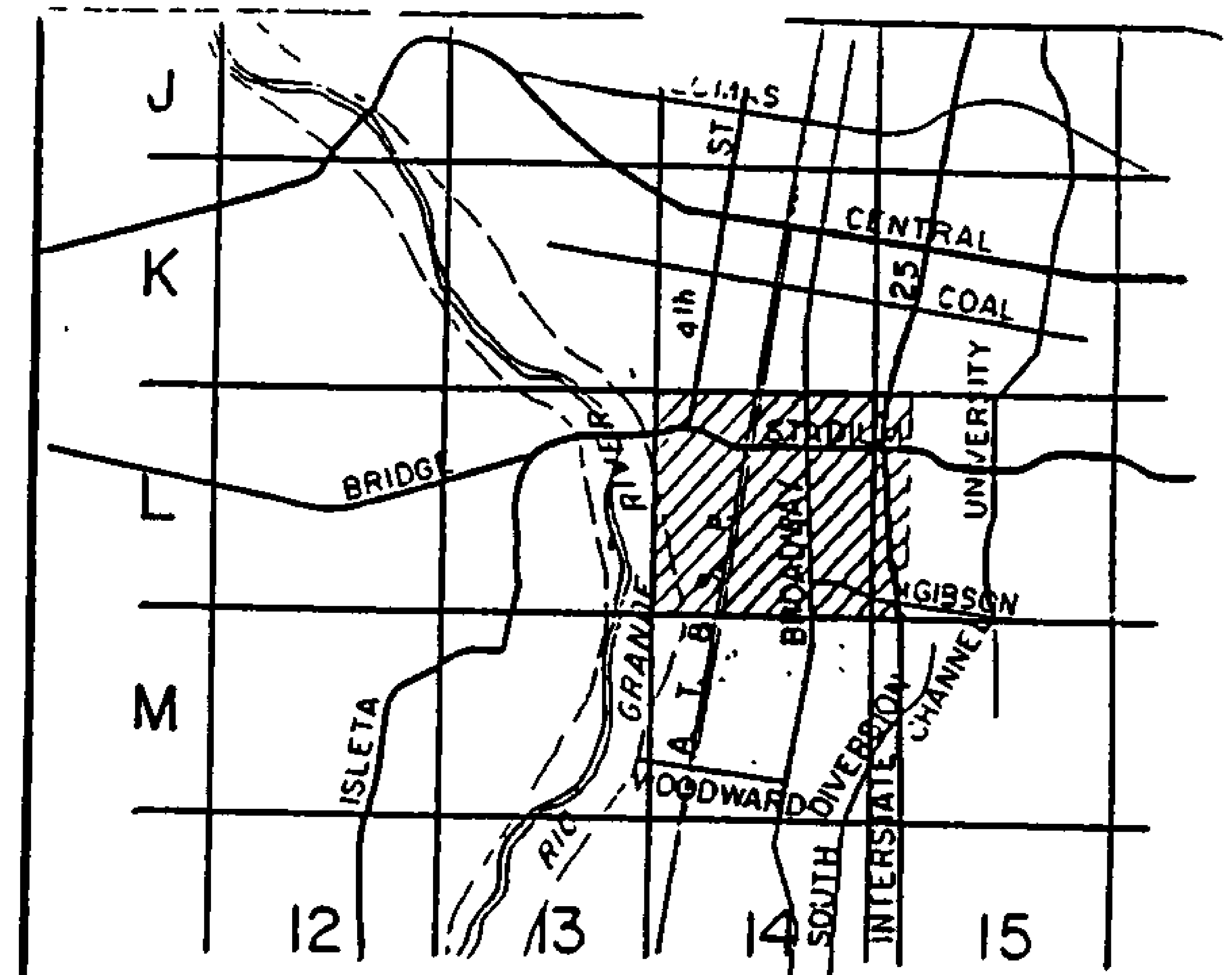
* All basin data except percent impervious taken from original AMDS report.

TABLE 2

HYDROLOGIC COMPARISON
EXISTING VS. FULL DEVELOPMENT

BASIN	AREA (SQ.MI.)	EXISTING DEVELOPMENT CN	% IMPERV	IMPERV AREA	PERV AREA	100-YR Qpk CFS	FULL DEVELOPMENT CN	% IMPERV	IMPERV AREA	PERV AREA	100-YR Qpk CFS
SJ-8	0.0460	78	20	0.00921	0.03682	99	78	30	0.01381	0.03222	118
SJN-10	0.0167	79	20	0.00333	0.01332	12	79	30	0.005	0.01166	13
SJN-710	0.0321	69	4	0.00128	0.03083	21	69	40	0.01284	0.01927	78
SJN-720	0.0409	69	2	0.00082	0.04008	20	69	40	0.01636	0.02454	86
SJN-109	0.1042	70	8	0.00834	0.09587	65	70	40	0.04168	0.06253	169
SJN-202*	0.0820	54	10	0.0082	0.0738	28	54	30	0.0246	0.0574	84
SJN-700*	0.0565	69	0	0	0.0565	33	69	40	0.0226	0.0339	134

* All basin data except percent impervious taken from original AMDS report.



N

MAP KEY

LEGEND

STUDY AREA BOUNDARY
◇ L14552 SWMM ANALYSIS POINT
10 YEAR FLOOD HAZARD AREA
100 YEAR FLOOD HAZARD AREA
PROPOSED STORM SEWER

EXISTING UTILITIES

----SAS---- SANITARY SEWER, SIZE 12" or LARGER
----G---- GAS LINE, SIZE 6" or LARGER
----W---- WATER LINE, SIZE 10" or LARGER
-12"SD—18"SD— STORM DRAIN LINE, SIZE 10" or LARGER (DENOTES CHANGE IN PIPE SIZE)

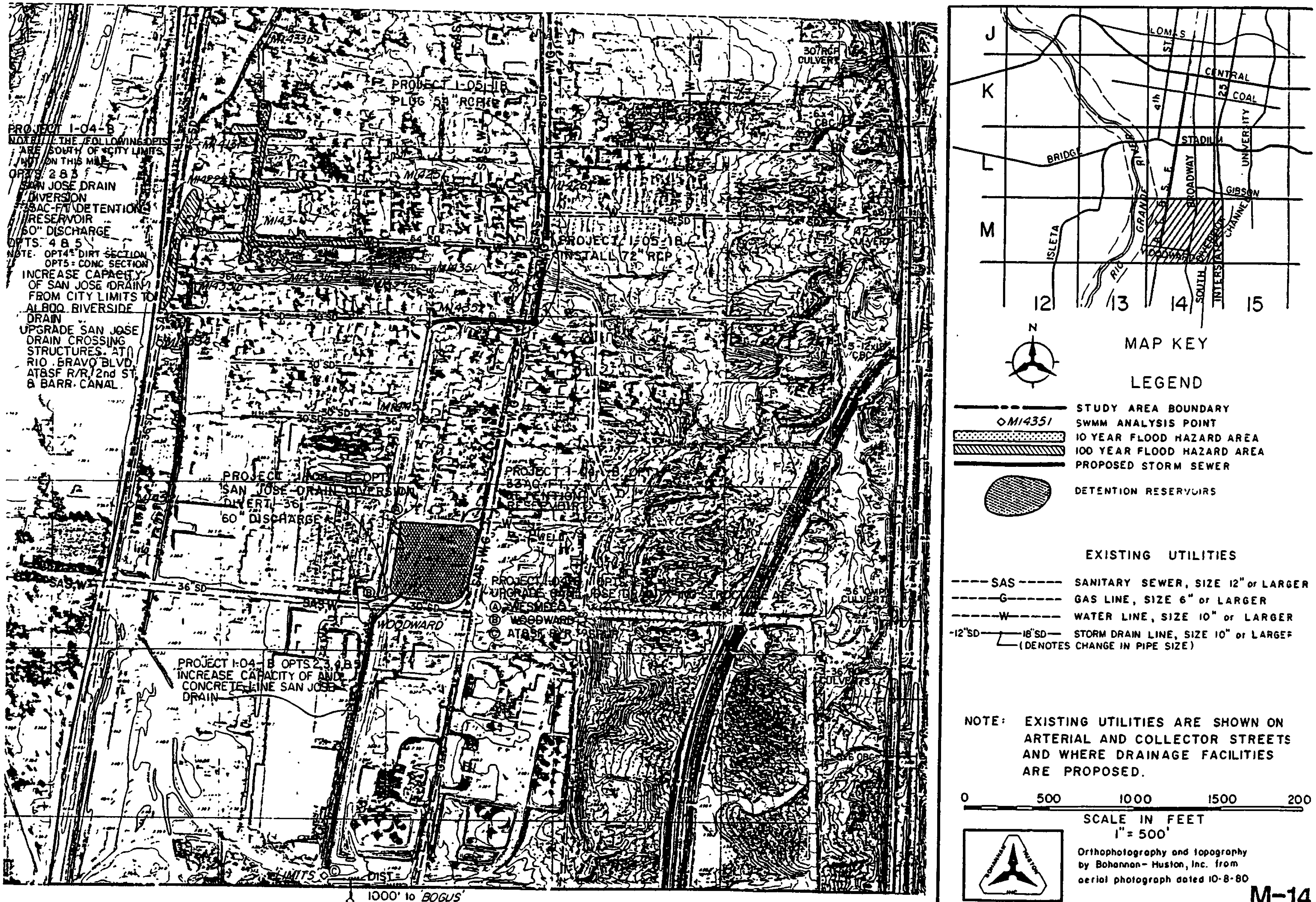
NOTE: EXISTING UTILITIES ARE SHOWN ON ARTERIAL AND COLLECTOR STREETS AND WHERE DRAINAGE FACILITIES ARE PROPOSED.

0 500 1000 1500 2000

SCALE IN FEET
1" = 500'

Orthophotography and topography by Bohannan-Huston, Inc from aerial photograph dated 10-8-80

L-14


PROJECT 1-05-11B
PLUG 30" RCP
30"RCP
CULVERT
PROJECT 1-04-B
NOTE: THE FOLLOWING OPTS ARE SOUTH OF CITY LIMITS, NOT ON THIS MAP
OPTS 2 & 3
SAN JOSE DRAIN DIVERSION
33AC-FT DETENTION RESERVOIR
60" DISCHARGE
OPTS. 4 & 5
NOTE: OPT4: DIRT SECTION
OPT5: CONC SECTION
INCREASE CAPACITY OF SAN JOSE DRAIN FROM CITY LIMITS TO ALBQQ RIVERSIDE DRAIN
UPGRADE SAN JOSE DRAIN CROSSING STRUCTURES AT RIO BRAVO BLVD, ATBSF R/R, 2nd ST & BARR CANAL.
PROJECT 1-05-1B
INSTALL 72" RCP
6x4 CBC
42"RCP CULVERT
5-12x10 CBC
PROJECT 1-04-B OPT
SAN JOSE DRAIN DIVERSION
DIVERT 36"
60" DISCHARGE
36"SD
30"SD
WOODWARD
PROJECT 1-04-B OPTS 2,3,4,&5
INCREASE CAPACITY OF AND CONCRETE LINE SAN JOSE DRAIN
PROJECT 1-04-B OPTS
UPGRADE SAN JOSE DRAIN CROSSING STRUCTURE AT
Ⓐ WESMECO
Ⓑ WOODWARD
Ⓒ ATBSF R/R
36"CMP CULVERT
36" CULVERT
6 CBC
LIMITS
DIST
1000' to 'BOGUS'
J
K
L
M
12
13
14
15
LOMAS
CENTRAL
COAL
STADIUM
BRIDGE
GIBSON
ISLETA
RIO GRANDE
4th
BROADWAY
UNIVERSITY
WOODWARD
SOUTH
INTERSTATE 25
N
MAP KEY
LEGEND
STUDY AREA BOUNDARY
◇M14351 SWMM ANALYSIS POINT
10 YEAR FLOOD HAZARD AREA
100 YEAR FLOOD HAZARD AREA
PROPOSED STORM SEWER
DETENTION RESERVOIRS
EXISTING UTILITIES
----SAS---- SANITARY SEWER, SIZE 12" or LARGER
----G---- GAS LINE, SIZE 6" or LARGER
----W---- WATER LINE, SIZE 10" or LARGER
-12"SD—18"SD— STORM DRAIN LINE, SIZE 10" or LARGER (DENOTES CHANGE IN PIPE SIZE)
NOTE: EXISTING UTILITIES ARE SHOWN ON ARTERIAL AND COLLECTOR STREETS AND WHERE DRAINAGE FACILITIES ARE PROPOSED.
0 500 1000 1500 2000
SCALE IN FEET
1" = 500'
Orthophotography and topography by Bohannan-Huston, Inc. from aerial photograph dated 10-8-80
M-14

MATCH LINE 'Q' SHEET 6

EFCA(AA) S.I.D

THAXTON AVE

ANDERSON AVE

KATHRYN AVE

SOUTHERN AVE

IAN AVE

TRUMBULL AVE

STANHAM HILL

BROADWAY E.

REPLACE 60" RCP w/ 72" RCP

REPLACE 60" RCP w/ 72" RCP

DIVERT 48" RCP TO MH L14S3GJ

PLAN

PROFILE

L14S864 L14S766/JB L14S765 L14S764 L14S661 L14S663 L14S562 L14S461 L14S363 L14S362 L14S263

4970 4965 4960 4955 4950 4945

S=0.0020 S=0.0088 S=0.0008 S=0.0015 S=0.0024 S=0.0018 S=0.0054 S=0.0044

D = 72" Q100 = 168 cfs Q10 = 128 cfs MAP Q100 = 128 cfs

D = 84" Q100 = 206 cfs Q10 = 156 cfs MAP Q100 = 161 cfs

D = 96" Q100 = 99 cfs Q10 = 66 cfs MAP Q100 = 93 cfs

D = 48" Q100 = 123 cfs Q10 = 83 cfs MAP Q100 = 98 cfs

D = 48" Q100 = 15 cfs Q10 = 10 cfs MAP Q100 = 8 cfs

DIVERT TO BETHEL DRIVE IN 72" RCP

PLUG

ALAMO AVE

MATCH LINE 'S' SHEET 7

WHEELER AVE

BROADWAY BLVD

MATCH LINE 'R' SHEET 6

MATCH LINE 'R' SHEET 6

ETHLYN AVE

HUDSON BLVD

BROADWAY BLVD

MATCH LINE 'Q' SHEET 6

M14S261 M14S161 M14S161 M14S61 L14S961 L14S962 L14S864

4970 4965 4960 4955 4950 4945 4940

S=0.0123 S=0.0022 S=0.0015 S=0.0002 S=0.0006 S=0.0018

D = 72" Q100 = 293 cfs Q10 = 168 cfs MAP Q100 = 0 cfs

D = 72" Q100 = 330 cfs Q10 = 200 cfs MAP Q100 = 253 cfs

D = 72" Q100 = 345 cfs Q10 = 105 cfs MAP Q100 = 105 cfs

PLATE 2 DOUBLE PLAN PROFILE

LEGEND

- PROPOSED STD DRAIN
- EXISTING GRADE
- STORM DRAIN LI MANHOLE In PROF
- STORM DRAIN LI MANHOLE In PLAN
- 100 YEAR STORM HYDRAULIC GRAD
- 10 YEAR STORM HYDRAULIC GRAD
- 100 YEAR STORM HYDRAULIC GRADI W/IMPROVEMENT

SOUTH BROADWAY DRAINAGE MANAGEMENT STUD

BROADWAY BLVD & ALAMO AVE

L14N&S, M14N

89208.03	6 of 9
DH6	NOV '89
HB6	HOR 2"=100' VERT 2"=5'

MECHEM ST

MI4S341 JB

MI4S342 JB

MI4S241 JB

MATCH LINE 'P' SHEET 5

MATCH LINE 'U' SHEET 7

ALAMO AVE

SAN JOSE AVE

MATCH LINE 'V' SHEET 7

MI4S352

BROADWAY

MI4S351 JB

MATCH LINE 'U' SHEET 7

MATCH LINE 'T' SHEET 7

MATCH LINE 'T' SHEET 7

MATCH LINE 'S' SHEET 6

MARIA CT

SALAZAR CT

D = 72"
Q100 = 230 cfs
Q10 = 102 cfs
IMP. Q100 = 18 cfs

D = 72"
Q100 = 202 cfs
Q10 = 100 cfs
IMP. Q100 = 0 cfs

MI4S357

MI4T354/JR

MI4S342/JR

MI4S,341/JH

MI4T241/JH

MI4S241/JR

MI4S251/JB

MI4S252

PLAN

4950
4945
4940
4935
4930
4925

L=326'

L=320'

L=48'

L=370'

S=0.0005

S=0.00025

S=0.0004

S=0.0045

S=0.0035

14'6" X 7'-9" CMPA
Q100 = 484 cfs
Q10 = 320 cfs
IMP. Q100 = 355 cfs

D = 3 - 72"
Q100 = 478 cfs
Q10 = 323 cfs
IMP. Q100 = 355 cfs

D = 72
Q100 = 238 cfs
Q10 = 102 cfs
IMP Q100 = 18 cfs

MATCH LINE 'V' SHEET 8

WOODWARD

DIVERT TO SOUTH POND

DIVERT TO SOUTH POND

WESMETO INT

SAN JOSE DRAIN

DESOTO DR

MATCH LINE 'V' SHEET 7

60"RCP

SOUTH DETENTION POND

ANALYSIS POINT "WOODWARD"

MI4S453

MI4S352

PROPOSED 72" RCP

ALAMO

BROADWAY

PROFILE

4940
4935
4930
4925

TOP OF CHANNEL

S=0.00144

S=0.00144

TRAP. CHANNEL
d = 8 b = 197
Q100 = 478 cfs
Q10 = 300 cfs
IMP. Q100 = 510 cfs

TRAP. CHANNEL
d = 8 b = 16
Q100 = 477 cfs
Q10 = 310 cfs
IMP. Q100 = 465 cfs

PLATE 2 DOUBLE PLAN PROFILE

LEGEND

- PROPOSED STORM DRAIN
- EXISTING GRADE
- STORM DRAIN LINE & MANHOLE In PROFILE
- STORM DRAIN LINE & MANHOLE In PLAN
- 100 YEAR STORM HYDRAULIC GRADE LINE
- 10 YEAR STORM HYDRAULIC GRADE LINE
- 100 YEAR STORM HYDRAULIC GRADE LINE W/IMPROVEMENT

SOUTH BROADWAY DRAINAGE MANAGEMENT STUDY

ALAMO AVE, MECHEM ST, OLD SAN JOSE DRAIN & THE SAN JOSE DRAIN

MI4N & S

89208 03	7 9
DWG	NOV '89
HBG	HORIZ 1"=100 VERT 1"=5

SJN-6

SJH-200

SJH-701

SJH-202

Masterplan Area Indicated by Shading

AP-DDI

AP-EEI

AP-FFI

AP-CCI

SJ-7

SJH-700

SJ-955

SJ-8

SJH-109

SJN-10

SJ-90L

SJN-710

SJN-740

SJN-720

M

M

N

Scale: 1"=500'

SECTOR PLAN BASIN MAP

PHASE 1 PARK

PHASE 2

ENGLEWOOD LN

ETHLYN AVE

TORREON

ROMANA RD

WHEELER

ALAMO

HINKLE

MECHEM

MARA

SALAZAR

ALENA ST

BETHEL

ABAJO RD

DESCANSO

WESMECO DR

JOHN ST

BROADWAY

WILLIAM

WOODWARD

'WOODWARD'

GIBSON

EDITH

ARNO

KIRTLAND ADD

TRANSPORT ST

FLIGHTWAY

AVE

RD

DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV. 1/28/2003rd)

M-14 / 04

PROJECT TITLE: Broadway Industrial Center, Unit 3
DRB #: 97-217 EPC#: _____

ZONE MAP/DRG. FILE #: M-14
WORK ORDER#: 610281

LEGAL DESCRIPTION: _____
CITY ADDRESS: 2600 Broadway Blvd NE

ENGINEERING FIRM: Mark Goodwin & Associates, PA
ADDRESS: PO Box 90606
CITY, STATE: Albuquerque, NM

CONTACT: James D. Hughes, PE
PHONE: 828-2200
ZIP CODE: 87199

OWNER: Broadway Development Co.
ADDRESS: PO Box 10005
CITY, STATE: Albuquerque, NM

CONTACT: Ted Waterman
PHONE: 2648-1688
ZIP CODE: 87184

ARCHITECT: _____
ADDRESS: _____
CITY, STATE: _____

CONTACT: _____
PHONE:
ZIP CODE: _____

SURVEYOR: ALS, Inc.
ADDRESS: PO Box 30701
CITY, STATE: Albuquerque, NM

CONTACT: Tim Aldrich
PHONE: 884-1990
ZIP CODE: 87190

CONTRACTOR: _____
ADDRESS: _____
CITY, STATE: _____

CONTACT: _____
PHONE: _____
ZIP CODE: _____

CHECK TYPE OF SUBMITTAL:

- ☐ DRAINAGE REPORT
- ☐ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
- ☐ DRAINAGE PLAN RESUBMITTAL
- ☐ 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

ASAP

RECEIVED
SEP 14 2004
HYDROLOGY SECTION

DATE SUBMITTED: September 14, 2004

BY: James D. Hughes, PE

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.

CITY OF ALBUQUERQUE

September 28, 2004

James D Hughes, PE
Mark Goodwin & Associates
P.O. 90606
Albuquerque, NM 87199

Re: Broadway Industrial Center Unit 3 Grading Certification
Engineer's Stamp dated 9-14-04 (M14/D4)

Dear Mr. Hughes,

Based upon the information provided in your submittal dated 9-14-04, the above referenced certification is approved for Release of SIA and Financial Guarantees.

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

Sincerely,

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

C: Marilyn Maldonado, CPN 610281
file

P.O. Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

D. Mark Goodwin & Associates, P.A.
Consulting Engineers

P.O. BOX 90606, ALBUQUERQUE, NM 87199
(505) 828-2200 FAX 797-9539
e-mail: dmg@swcp.com

October 6, 1997

Ms. Lisa Manwill
Hydrology Department
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Broadway Industrial Center (M14-D4)

Dear Ms. Manwill:

Enclosed please find:

1. *Revised Grading & Drainage Master Plan*
2. *Revised Infrastructure List*
3. *Revised Preliminary Plat*
4. *Drainage Information Sheet*

The comments from the October 2nd letter have been addressed as follows.

1. *Unit 3 has been deleted from the Preliminary Plat and Infrastructure List but the Master Plan still anticipates that future subdivision of lot 4B (formerly lot 5). Free discharge would exceed the street capacity so storm sewer has been added to the Master Plan as requested.*

2. *Inlets have been added to both the master Plan and the Infrastructure List in Broadway Blvd. both at the intersection of San Jose Ave. and near Alamo Ave. The wording of the "Purpose" was also changed on the Master Plan so that it now clearly states, that separate private retention ponds will be required on the individual lots so that the Right of Ways (including Frontage improvements) may free discharge with out increasing the total sight discharge to the existing downstream floodplain.*

If you have any questions please contact our office.

Sincerely,

MARK GOODWIN & ASSOCIATES, PA

James D. Hughes, P.E.
Senior Engineer

xc: Ted Waterman
Clay Latimer
John Davidson

f:/broadway/retpond.ltr

RECEIVED
OCT 07 1997
HYDROLOGY SECTION

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Broadway Industrial Center ZONEATLAS/DRNG.FILE#: M-14 ~~D-004~~ D004

DRB#: 97-217 EPC# WORK ORDER#:

LEGAL DESCRIPTION: See Page 1 of Report or Master Grading Plan

CITY ADDRESS: 2600 Broadway Blvd. NE

ENGINEERING FIRM:	Mark Goodwin & Associates, PA	CONTACT:	James D. Hughes, P.E
ADDRESS:	P.O. Box 90606 Albuq., NM 87199	PHONE:	(505) 828-2200
OWNER.	Broadway Developement Corporation	CONTACT:	Ted Waterman
ADDRESS:	P.O Box 10005 Albuq., NM 87184	PHONE:	(505) 266-6693
ARCHITECT	N/A	CONTACT:	
ADDRESS:		PHONE:	
SURVEYOR	Aldrich Land Surveying, Inc.	CONTACT:	Tim Aldrich
ADDRESS.	P.O. Box 30701 Albuq., NM 87107	PHONE:	(505) 884-1990
CONTACTOR		CONTACT:	
ADDRESS.		PHONE:	

TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- ___ DRAINAGE PLAN
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- X EROSION CONTROL
- ___ ENGINEER'S CERTIFICATION
- ___ OTHER

PRE-DESIGN MEETING:

- ___ YES
- X NO
- ___ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SKETCH PLAT APRROVAL
- X PRELIMINARY PLAT APRROVAL
- ___ S. DEV. PLAN FOR SUB'D APPROVAL
- ___ S DEV PLAN FOR BLDG PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- X FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- ___ BUILDING PERMIT APPROVAL
- ___ CERTIFICATION OF OCCUPANCY APPROVAL
- X GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ S.A.D. DRAINAGE REPORT
- ___ DRAINAGE REQUIREMENTS
- ___ OTHER

DATE SUBMITTED: 10-7-97

BY: James D Hughes
James D Hughes, P.E.

RECEIVED
OCT 07 1997
HYDROLOGY SECTION

D.R.B. Case No. 97-217
D.R.C. Project No. _____
Date Submitted 10/7/97
Prelim. Plat Approved _____
Prelim. Plat Expires _____

Figure 12

EXHIBIT "A"
To Subdivision Improvements Agreement
DEVELOPMENT REVIEW BOARD (DRB) REQUIRED INFRASTRUCTURE LISTING
for Broadway Industrial Center, Units 1 and 2

Following is a summary of Public/Private Infrastructure required to be constructed or financially guaranteed to be constructed for the above development. This summary is not necessarily a complete listing. During the design process, if the City determines that appurtenant items have not been included in the summary, those items will be included in the listing and related financial guarantee, if the items normally are the Subdivider responsibility. In addition, any unforseen items which arise during construction which are necessary to complete the project and which normally are the Subdivider's responsibility are the responsibility of the Subdivider and will be included in the financial guarantee provided to the City.

Size	Type Improvement	Location	From	To
		UNIT I		
	TRANSPORTATION			
6"	Sidewalk Std C & G	Broadway Blvd	N Prop Line	San Jose Ave
12'	Rt turn Ln w/art pvmt Std C & G (per TIS) 6' Sidewalk	Broadway Blvd	San Jose Ave	Bethel Ave
12'	Med modification & art, pvmt for left turn lane per TIS	Broadway Blvd	Alamo Ave	San Jose Ave
N/A	Restriping (per TIS)	Intersection of Broadway Blvd @ Gibson Rd		
40' FF	Industrial pvmt Std C & G 6' Sidewalk (S side)[1]	San Jose Ave	Broadway Blvd	Karstan Ct
24' FE[2]	Res Pvmt (½ section) Std C & G	Bethel Ave	Broadway Blvd	E end cul-de-sac

D.R.B. Case No. 97-217
D.R.C. Project No. _____
Date Submitted 10/7/97
Prelim. Plat Approved _____
Prelim. Plat Expires _____

Size	Type Improvement	Location	From	To
	UTILITIES			
8"	Sanitary Sewer	Broadway Blvd	Bethel Ave	San Jose Ave
8"	Sanitary Sewer	35' Esmt	Exist 8" SAS in Bethel Ave	S end of Karstan Ct
10"	Waterline	San Jose Ave	Exist 20" WL in Broadway Blvd	Karstan Ct
10"	Waterline	Karstan Ct	San Jose Ave	S end Karstan Ct
6"	Waterline	35' Easement	Exist 6" WL in Bethel Ave	S end Karstan Ct
	STORM			
Per Design	Storm Sewer	Intersection of San Jose Ave & Broadway Blvd		
Per Design	Storm Sewer	Intersection of San Jose Ave & Karstan Ct		
Per Design	Storm Sewer	Broadway @ Lot line btw Lot 5 and 6		
		UNIT 2		
	TRANSPORTATION			
40' FF	Industrial pvmt Std C & G 6' Sidewalk (W side)[1]	Karstan Ct	San Jose Ave	S end of cul-de-sac
	STORM DRAINAGE			
Per Design	Storm Sewer	Bethel Ave & storm esmt, Lot 1	Broadway Blvd	Karstan Ct
Per Design	Temp retention pond	Temp esmt, Lot 1		

D.R.B. Case No. 97-217
D.R.C. Project No. ________
Date Submitted 10/7/97
Prelim. Plat Approved ________
Prelim. Plat Expires ________

Stormdrain to include manholes, inlets, riprap and outfall.

Engineer's Certification for Private Grading and Drainage per DPM as shown on the Grading Plan for Release of SIA and Financial Guarantees.

Water infrastructure to include valves, fittings, valveboxes and fire hydrants.

Sanitary sewer to include manholes and service connections.

(1) Interior Sidewalk Construction Deferral
(2) Deferred Construction

Prepared By: ______________________

Print Name: James D. Hughes, PE

Firm: Mark Goodwin & Associates, PA

* *

Development Review Board Member Approvals

Transportation Dev.	Date	Utility Dev.	Date
Parks & General Services	Date	Engineer/AMAFCA	Date
DRB Chairman	Date	NMUI	Date

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CITY OF
Albuquerque

Martin J. Chávez, Mayor

October 24, 1997

James D. Hughes, P.E.
Mark Goodwin & Assoc.
P.O. Box 90606
Albuquerque, NM 87199

RE: BROADWAY INDUSTRIAL CENTER (M14-D4). DRAINAGE REPORT FOR PRELIMINARY PLAT, FINAL PLAT, AND GRADING PERMIT. ENGINEER'S STAMP DATED 10-24-97.

Dear Mr. Hughes:

Based on the information provided on your October 7, 1997 submittal, the above referenced project is approved for Preliminary Plat, Final Plat, and Permit.

An Engineer's Certification will be required upon completion of grading.

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

D.R.B. Case No. 99-08
D.R.C. Project No. _____
Date Submitted 2/9/99
Prelim. Plat Approved _____
Prelim. Plat Expires _____

Figure 12

EXHIBIT "A"
To Subdivision Improvements Agreement
DEVELOPMENT REVIEW BOARD (DRB) REQUIRED INFRASTRUCTURE LISTING
for Broadway Industrial Center, Unit 3

Following is a summary of Public/Private Infrastructure required to be constructed or financially guaranteed to be constructed for the above development. This summary is not necessarily a complete listing. During the design process, if the City determines that appurtenant items have not been included in the summary, those items will be included in the listing and related financial guarantee, if the items normally are the Subdivider responsibility. In addition, any unforseen items which arise during construction which are necessary to complete the project and which normally are the Subdivider's responsibility are the responsibility of the Subdivider and will be included in the financial guarantee provided to the City.

Size	Type Improvement	Location	From	To
TRANSPORTATION				
40' FF	Industrial Pvmt Std C&G 6' Sidewalk(W & S sides only)	Karsten Ct	S side of Lot 6	S side of Lot 11
UTILITIES				
8"	Sanitary Sewer	Karsten Ct	Unit 2	End of Cul-de-Sac
8"	Sanitary Sewer	Tract A	End of Cul de Sac	Lots 8 & 9
Existing	Sanitary Sewer Removal	Lots 6&7		
10"	Waterline	Karsten Ct	Unit 2	End of Cul-de-Sac
10"	Waterline	Tract A	End of Cul de Sac	Lots 8 & 9
10"	Waterline	20' Esmt Lots 7,8&12	Tract A	Existing 10" line in SW corner of Lot 8
10"	Waterline	30' Easement	Existing 6" @ Wheeler Cul de Sac	Karsten Ct
10"	Waterline	20' Easement	Karsten Ct Cul de Sac	Existing 20" Waterline In old Edith Blvd
12"	Water Wall Line Relocation	20' Easement on Lot 11	N. Property Line	S. Property Line
Existing	Water Removal	Lots 6,7&8		

D.R.B. Case No. 99-08
D.R.C. Project No. ________
Date Submitted 2/9/99
Prelim. Plat Approved ________
Prelim. Plat Expires ________

STORM				
24"	Storm Sewer(Public)	Karsten Ct	Existing 36" in Unit 2	Lot 11
24"	Storm Sewer(Private)	Karsten Ct	Existing 36" in Unit 2	Lot 6
24"-36"	Storm Sewer(Private)	Lot 9	E side of Lot 9	Lot 7
24"	Storm Sewer(Private)	Lot 12	Lot 7(Pond)	Existing 48" RCP S side of Lot 12
18"-30"	Storm Sewer(Public)	Wheeler Ave	E. Side of Broadway	Ex. 72" RCP in Broadway
18"	Storm Sewer(Private)	Karsten Ct	Lot 10	Lot 7
2' High	Floodwall & Grate (Private)	Lot 8	S east corner	
5 ac.ft	Temp Retenion Pond & Maintenance Agree.(Private) Granting(Restrictive Covenant)	Lot 7		

Stormdrain to include manholes, inlets, riprap and outfall.

Engineer's Certification for Grading and Drainage per DPM including Perimeter Walls as shown on the Grading Plan for Release of SIA and Financial Guarantees. Financial Guarantee is not required for this item.

Water infrastructure to include valves, fittings, valveboxes and fire hydrants.

Sanitary sewer to include manholes and service connections.

Sidewalks are deferred.

Prepared By: ________________________
Print Name: James D. Hughes, PE
Firm: Mark Goodwin & Associates, PA

* *

Development Review Board Member Approvals

____
Transportation Dev. Date

____
Utility Dev. Date

____
Parks, Design & Development, C.I.P. Date

____
Engineer/AMAFCA Date

____
DRB Chairman Date

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D. Mark Goodwin & Associates, P.A.
Consulting Engineers

P.O. BOX 90606, ALBUQUERQUE, NM 87199
(505) 828-2200 FAX 797-9539
e-mail: dmg@swcp.com

May 20, 1998

Mr. Bernie Montoya
City Of Albuquerque
Hydrology Department
P.O. Box 1293
Albuquerque, NM 87103

Re: Broadway Industrial Center Unit 2

Dear Mr. Montoya:

The infrastructure plans for Unit 2 have been submitted to DRC. The Master Plan for the industrial center and the preliminary plat identified the short term need for this temporary construction pond and showed it schematically only. Following are the final design calcs for the pond.

Karsten Ct. Temporary Pond Calcs

Drainage Area = 1.1 ac (45% C, 55% D)
P_{60} = 1.97" P_{360} = 2.29" P_{1440} = 2.65"
P_{10days} = 10.0 [24.9/(2.65")$^{1.4}$] = 3.64"
Q_{100} = 4.31 cfs
(6hr) V_{100} = 0.1485 ac•ft
(10day) V_{100} = 0.1485 + [(3.64" - 2.29")/12] x (0.55 x 1.1 ac)
= 0.2166 ac•ft
Actual Volume = 0.22 ac•ft @ Elev 84.00

Please call if you have any questions or concerns.

Sincerely,

MARK GOODWIN & ASSOCIATES, PA

James D. Hughes, PE
Senior Engineer

JDH/sb

f:\\broadway\comments.no2

Mark Goodwin
and Associates

MEMO

Updated Grading Plan and Infrastructure List for Hydrology Review. Map M-14

To: Kym Dicome, DRB Chair
Richard Dourte, Transportation
Fred Aguirre, Hydrology Division
Roger Green, Utility Division
Ed Stang, Design and Development, CIP

From: James D. Hughes, PE

Subject: **Broadway Industrial Center (DRB 97-271)**
Revised Plat, Grading Plan and Infrastructure List

Date: September 25, 1997

Enclosed please find a copy of the revised plat, grading plan (dated 9/24/97) and infrastructure list (dated ~~9/24/97~~ 9-29-97). Layout changes include minor shifts in lot lines and rights-of-way on

- Lot 3
- Karstan Court
- Bethel Court
- Arno Street

Infrastructure changes include:

- Deletion of trails and replacement of sidewalks (see separate letter "Re: Revised Request for Sidewalk Variance)
- Addition of looped 10" waterline in all new streets (per meeting with Roger Green and Bob Kane, 9/23/97), and transportation changes (per meeting with Richard Dourte, 9/24/97).

Grading Plan changes include:

- corrections to inlet table
- addition of spot elevations on streets
- minor corrections to flows and drainage capacity calculations
- layout as mentioned above

Also enclosed please find a draft copy of the Unit I final plat (Sheet 5A). Depending on discussion at the hearing on October 7, 1997, we are contemplating any one of the following three scenarios.

- Drop Units 2 and 3 from the request so the Unit 1 plat is the only thing before the Board.
- Drop Unit 3 from the request leaving Karstan Court (south leg) and the frontage improvements on Bethel Ave and Arno St in Unit 2 and put a blanket drainage easement on all of Unit 2 with the Unit 1 final plat that will require vacation by separate action at a later date. Storm sewer may or may not be required in Bethel and Arno depending on more specific site use plans for Unit 2 which are currently unknown. We don't want to

P.O. Box 90606 ⊡ Albuquerque, NM 87199 ⊡ (505) 828-2200 / 797-9539
e-mail: dmg@swcp.com

pave those frontage streets now because of the future (Unit 2) storm sewer in them and the blanket easement will prevent any development of Unit 2 without the frontage improvements.

- Leave all three phases intact and add a line item to the infrastructure list for Unit 3 to include a 40' public street between the existing end of Wheeler Ave and Karstan Ct. As a condition of the Unit 3 final plat, a separate preliminary and final plat or an amendment to this one will obviously have to be approved for the dedication of those off-site rights-of-way. We do not have time to re-advertise this case with an amended legal description right now, so if "Tract A-1-C of the Lands of Broadway..." is to be added it will have to be by separate request at a later date.

In any event, it is desirable to not build frontage improvements on Bethel Ave and Arno St until more specifics are known about the storm sewer there.

xc: JP Darling
Clay Latimer
Ted Waterman
John Davidson

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e-mail: dmg@swcp.com

D.R.B. Case No. 97-217
D.R.C. Project No. _____
Date Submitted 9/29/97
Prelim. Plat Approved _____
Prelim. Plat Expires _____

Figure 12

EXHIBIT "A"
To Subdivision Improvements Agreement
DEVELOPMENT REVIEW BOARD (DRB) REQUIRED INFRASTRUCTURE LISTING
for Broadway Industrial Center, Units 1, 2 and 3

Following is a summary of Public/Private Infrastructure required to be constructed or financially guaranteed to be constructed for the above development. This summary is not necessarily a complete listing. During the design process, if the City determines that appurtenant items have not been included in the summary, those items will be included in the listing and related financial guarantee, if the items normally are the Subdivider responsibility. In addition, any unforseen items which arise during construction which are necessary to complete the project and which normally are the Subdivider's responsibility are the responsibility of the Subdivider and will be included in the financial guarantee provided to the City.

Size	Type Improvement	Location	From	To
		UNIT I		
	TRANSPORTATION			
6"	Sidewalk Std C & G	Broadway Blvd	N Prop Line	San Jose Ave
12'	Rt turn Ln w/art pvmt Std C & G (per TIS) 6' Sidewalk	Broadway Blvd	San Jose Ave	Bethel Ave
12'	Med modification & art, pvmt for left turn lane per TIS	Broadway Blvd	Alamo Ave	San Jose Ave
N/A	Restriping (per TIS)	Intersection of Broadway Blvd @ Gibson Rd		
40' FF	Industrial pvmt Std C & G 6' Sidewalk (S side)[1]	San Jose Ave	Broadway Blvd	Karstan Ct
24' FE[2]	Res Pvmt (½ section) Std C & G	Bethel Ave	Broadway Blvd	E end cul-de-sac

D.R.B. Case No. 97-217
D.R.C. Project No. _____
Date Submitted 9/29/97
Prelim. Plat Approved _____
Prelim. Plat Expires _____

Size	Type Improvement	Location	From	To
	UTILITIES			
8"	Sanitary Sewer	Broadway Blvd	Bethel Ave	San Jose Ave
8"	Sanitary Sewer	35' Esmt	Exist 8" SAS in Bethel Ave	S end of Karstan Ct
10"	Waterline	San Jose Ave	Exist 20" WL in Broadway Blvd	Karstan Ct
10"	Waterline	Karstan Ct	San Jose Ave	S end Karstan Ct
6"	Waterline	35' Easement	Exist 6" WL in Bethel Ave	S end Karstan Ct
	STORM Temp Reten thru Pond.			
Per Design	Storm Sewer	Intersection of San Jose Ave & Broadway Blvd		
Per Design	Storm Sewer	Intersection of San Jose Ave & Karstan Ct		
	TRANSPORTATION	**UNIT 2**		
24' F edge	Res pvmt (½ section) Std C & G	Bethel Ave	Broadway Blvd	E end of cul-de-sac
40' FF	Industrial pvmt Std C & G 6' Sidewalk (W side)(1)	Karstan Ct	San Jose Ave	S end of cul-de-sac
	STORM DRAINAGE			
Per Design	Storm Sewer	Bethel Ave & storm esmt, Lot 1	Broadway Blvd	Karstan Ct
Per Design	Temp retention pond	Temp esmt, Lot 1		

inlet @ Broadway & Bethel.
on Bethel
Pick up flows from both Broadway & Bethel.
7 where

D.R.B. Case No. 97-217
D.R.C. Project No. _____
Date Submitted 9/29/97
Prelim. Plat Approved _____
Prelim. Plat Expires _____

Not going to happen.

UNIT 3

Size	Type Improvement	Location	From	To
	TRANSPORTATION			
40' FF	Industrial pvmt Std C & G 6' Sidewalk(W side)[1]	Karstan Ct	San Jose Ave	Lot 5
40' FF	Industrial pvmt Std C & G 6' Sidewalk(N side)[1]	Wheeler Ave	Broadway Blvd	Karstan Ct
	UTILITIES			
8"	SAS	Karstan Ct	Existing SAS in Wheeler Ave	Lot 5
10"	Waterline	Karstan Ct.	San Jose (10")	Lot 5
10"	Waterline	20' Easement	Karstan Ct	Exist 10" WL on Lot 4
	STORM DRAIN			
Per Design	Storm Sewer	N. Side of Intersection of Karstan Ct & San Jose Ave		
Per Design	Storm Sewer	E side of Intersection of Wheeler Ave & Broadway Blvd.		

D.R.B. Case No. 97-217
D.R.C. Project No. ________
Date Submitted 9/29/97
Prelim. Plat Approved ________
Prelim. Plat Expires ________

Stormdrain to include manholes, inlets, riprap and outfall.

Engineer's Certification for Private Grading and Drainage per DPM as shown on the Grading Plan for Release of SIA and Financial Guarantees.

Water infrastructure to include valves, fittings, valveboxes and fire hydrants.

Sanitary sewer to include manholes and service connections.

(1) Interior Sidewalk Construction Deferral
(2) Deferred Construction

Prepared By: ______________________________

Print Name: James D. Hughes, PE

Firm: Mark Goodwin & Associates, PA

* *

Development Review Board Member Approvals

Transportation Dev.	Date	Utility Dev.	Date
Parks & General Services	Date	Engineer/AMAFCA	Date
DRB Chairman	Date	NMUI	Date

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D. Mark Goodwin & Associates, P.A.
Consulting Engineers

P.O. BOX 90606, ALBUQUERQUE, NM 87199
(505) 828-2200 FAX 797-9539
e-mail: dmg@swcp.com

September 25, 1997

Ms. Kym Dicome
DRB Members
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Broadway Industrial Center DRB 97-271 Amendment to Request for Sidewalk Variance.

Dear Ms. Dicome:

In a meeting on September 17, 1997 with the City's trails coordinator Diane Sena we learned that the Gibson Corridor Trail does not go through this site nor does it or any other master planed trail pass close enough to this site to reasonably make a connection to it. So we would like to amend the request for sidewalk variance. We no longer wish to replace any sidewalks with trails and we propose to build the normal sidewalks along the Broadway frontage and on one side of the interior streets, but we now request that:

1) *The sidewalk installation requirement be waved along this site's frontage on Bethel Avenue and Arno Street because no industrial lots front there. (Note that Lace is not a dedicated right-of-way.)*

2) *The Sidewalk installation requirement be waved on one side of all interior streets and around all cul-de-sacs because we believe that the combination of 40' wide streets and a 6' wide sidewalk on one side of the street will be adequate to handle the pedestrian traffic associated with the industrial uses and the economic burden of building a second sidewalk is unnecessary and unduly excessive.*

3) *The sidewalk installation requirement be deferred on the internal streets until after development of the individual sites to avoid damage to the sidewalks during that construction.*

Please feel free to contact our office with any questions or comments.

Sincerely,

MARK GOODWIN & ASSOCIATES, P.A.

James D. Hughes, P.E.
Senior Engineer

JDH/sb

enclosures

xc: Richard Dourte
Fred Aguirre
Roger Green
Ed Stang
Diane Sena
Ted Waterman
John Davidson
Clay Latimer

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Mark Goodwin
And Associates, P.A.

MEMO

To: Diane Sena - City of Albuquerque Parks & Recreation
From: James D. Hughes, PE
Subject: Broadway Industrial Center
Date: September 19, 1997

Attendies: Doug Hughes, Mark Goodwin & Associates, P.A
Diane Sena, City of Albuquerque Park & Recreation
Mary Hatdison, City of Albuquerque Transportation
Sterling Mathias, City of Albuquerque Transportation

It is my understanding that the City will not require any easements or infrastructure from this subdivision for trails in the area, nor is there any forseable means of connecting trails within this subdivision to the City's master planed trail system. The Gibson Corodore Trail apparently can not be incorporated into this subdivision because it will need to cross I-25 at the Gibson Blvd Interchange instead of crossing I-25 at the intersection of and the South Diversion channel. Furthermore, the City is not inclined to accept the maintenance responsability for the asphalt trails that we previously proposed for the interior streets within this subdivision. The 40' wide streets will be wide enough to accomodate bicycle traffic and the standard 6' concrete sidewalks will be readily accepted by the City of Albuquerque for Maintenance.

CITY OF
Albuquerque

April 21,1998

James J. Hughes PE
Mark Goodwin & Associates
P.O. Box 90606
Albuquerque, New Mexico 87199

RE: DRAINAGE PLAN FOR BROADWAY INDUSTRIAL CENTER FOR WORK ORDER #5807.81 (M14-D25) REVISION DATED 4/2/98

Dear Mr. Hughes:

Based on the information provided on your April 6,1998 submittal, the above referenced site is approved for Work Order.

Please be advised that all the correspondence pertaining to Broadway Industrial Center will now be referred to as file No. M14-D25.

If I can be of further assistance, please feel free to contact me at 924-3986.

C: Andrew Garcia
<File>

Sincerely
Bernie J. Montoya
Bernie J. Montoya CE
Associate Engineer

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

February 18, 1999

James Hughes, P.E.
Mark Goodwin & Associates
P.O. Box 90606
Albuquerque, NM 87199

RE: BROADWAY INDUSTRIAL CENTER, UNIT 3 (M14-D4). Revision TO DRAINAGE AND GRADING MASTER PLAN FOR PRELIMINARY PLAT, FINAL PLAT, AND GRADING PERMIT APPROVALS. ENGINEER'S STAMP DATED JANUARY 26, 1999 with REVISION DATE OF FEBRUARY 4, 1999.

Dear Mr. Hughes:

Based on the information provided on your January 28, 1999 submittal, the above referenced project is approved for both Preliminary and Final Plats and for Grading Permit. See also City Consultant's letter dated 2/5/99 (copy enclosed).

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

Sincerely,

John P. Murray, P.E.
Hydrology

c: Andrew Garcia
√File

SMITH ENGINEERING COMPANY
A Full Service Engineering Company

February 5, 1999

Mr. Fred Aguirre, P.E.
Hydrologist
City of Albuquerque
Public Works Department
P.O. Box 1293
Albuquerque, NM 87103

RE: Broadway Industrial Center - Unit 3 Revision to the Grading and Drainage Master Plan,
Mark Goodwin & Associates, Doug Hughes, P.E. stamped 2-4-99.

Request Approvals for:
Preliminary Plat
Final Plat
Grading Permit

Drainage File M-14 / D-4 SEC Job No. #198624.b28

Dear Mr. Aguirre,

Smith Engineering Company (SEC) is please to review the reference submittal. The scope of the project includes a grading and drainage plan an industrial center development along south Broadway.

I have reviewed the referenced drainage plan, the preliminary plat and the infrastructure list as re-submitted by Doug Hughes, I also met with him on 2-4 and 2-5 and he clarified all of my concerns, and the drainage plan appears to be fine.

I have also reviewed the storm drainage items on the infrastructure list (2-9-1999 post dated) as compared to the grading and drainage plan and it is ok.

Sincerely,

Pat Stovall, P.E.
Smith Engineering Company

O:\100\198624B\b28.

1316 Jackie Rd Suite 850 Rio Rancho, NM 87124 Telephone 505 994-1902 FAX 505 994-1921

E-mail SECRR@worldnet.att.net

LETTER OF TRANSMITTAL

D. Mark Goodwin & Associates, P.A.
Consulting Engineers

P.O. BOX 90606, ALBUQUERQUE, NM 87199
(505) 828-2200 FAX 797-9539
e-mail: dmg@swcp.com

DATE 4-3-98 JOB NO.

TO COA Hydrology

ATTENTION Lisa Manwill

RE: Zone Atlas M-14

Broadway Industrial Center

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
2	4-2-98		Δ Revised Grading and Drainage Master Plan

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval

☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution

☒ As requested @ DRC 5807.81 ☐ Returned for corrections ☐ Return _____ corrected prints

☐ For review and comment ☐ _____

☐ FOR BIDS DUE _____ 19 _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS The previously identified inlets on Broadway Blvd will not function as originally planned because the road is superelevated with no concintrated drainage on our side of the street, and existing inlets on the other side of the street and upstream already do the job of protecting downstream property.

On site Retention with the individual sites ~~with~~ (including Lot 3 already constructed) will eleminate down stream concerns.

Please aprove this revision to the "Master" drainage plan and the Unit I DRC Plans without the two inlets

COPY TO Broadway Development Ted Waterman
Golden Ventures LLC Clay Latimer

SIGNED: Dan Goodwin

If enclosures are not as noted, kindly notify us at once.

D.R.B. Case No. 97-271
D.R.C. Project No. _____
Date Submitted _____
Prelim. Plat Approved _____
Prelim. Plat Expires _____

Figure 12

EXHIBIT "A"
To Subdivision Improvements Agreement
DEVELOPMENT REVIEW BOARD (DRB) REQUIRED INFRASTRUCTURE LISTING
for Broadway Industrial Center, Unit 3

Following is a summary of Public/Private Infrastructure required to be constructed or financially guaranteed to be constructed for the above development. This summary is not necessarily a complete listing. During the design process, if the City determines that appurtenant items have not been included in the summary, those items will be included in the listing and related financial guarantee, if the items normally are the Subdivider responsibility. In addition, any unforseen items which arise during construction which are necessary to complete the project and which normally are the Subdivider's responsibility are the responsibility of the Subdivider and will be included in the financial guarantee provided to the City.

Size	Type Improvement	Location	From	To
TRANSPORTATION				
40' FF	Industrial Pvmt Std C&G 6' Sidewalk(W & S sides only)	Karsten Ct	S side of Lot 6	W side of Lots 8&9
UTILITIES				
8"	Sanitary Sewer	Karsten Ct	Unit 2	End of Cul-de-Sac
Existing	Sanitary Sewer Removal	Lots 6&7		
10"	Waterline	Karsten Ct	Unit 2	End of Cul-de-Sac
10"	Waterline	20' Esmt Lots 7,8&12	Karsten Ct	Existing 10" line in SW corner of Lot 8
Existing	Water Removal	Lots 6,7&8		
STORM				
24"	Storm Sewer	Karsten Ct	Existing 36" in Unit 2	Lot 11
24"	Storm Sewer	Karsten Ct	Existing 36" in Unit 2	Lot 6
24"-36"	Storm Sewer(Private)	Lot 9	E side of Lot 9	Lot 7
24"	Storm Sewer(Private)	Lot 12	Lot 7	Existing 48" RCP S side of Lot 12
18"	Storm Sewer(Private)	Karsten Ct	Lot 10	Lot 7

D.R.B. Case No. _____
D.R.C. Project No. _____
Date Submitted _____
Prelim. Plat Approved _____
Prelim. Plat Expires _____

2' High	Floodwall & Grate (Private)	Lot 8	S east corner
5 ac.ft	Temp Retenion Pond & Maintenance Agree.(Private)	Lot 7	

Stormdrain to include manholes, inlets, riprap and outfall.

Engineer's Certification for Grading and Drainage per DPM including Perimeter Walls as shown on the Grading Plan for Release of SIA and Financial Guarantees. Financial Guarantee is not required for this item.

Water infrastructure to include valves, fittings, valveboxes and fire hydrants.

Sanitary sewer to include manholes and service connections.

Street lights per DPM.

Sidewalks are deferred.

Prepared By: James D Hughes
Print Name: James D. Hughes, PE
Firm: Mark Goodwin & Associates, PA

* *

Development Review Board Member Approvals

Transportation Dev.	Date	Utility Dev.	Date
Parks, Design & Development, C.I.P.	Date	Engineer/AMAFCA	Date
DRB Chairman	Date		

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RECEIVED
DEC 14 1998
HYDROLOGY SECTION

D. Mark Goodwin & Associates, P.A.
Consulting Engineers

P.O. BOX 90606, ALBUQUERQUE, NM 87199
(505) 828-2200 FAX 797-9539
e-mail: dmg@swcp.com

February 5, 1999

Ms. Janet Stephens, Chair
City of Albuquerque
DRB
P.O. Box 1293
Albuquerque, NM 87103

Re: Broadway Industrial Center, DRB #99-8

Dear Ms. Stephens:

Attached please find the grading and drainage plan dated 2-4-99 with some technical clarifications and corrections that have been added to address minor concerns from the hydrology department. Also enclosed is the infrastructure list with hydrology requested corrections to the "Storm" items. With these changes we expect approval of this case, agenda item #10 at the DRB on 2-9-99.

Please call if you have any questions or concerns.

Sincerely,

MARK GOODWIN & ASSOCIATES, PA

James D. Hughes, PE
Senior Engineer

JDH/st

xc: Fred Aguirre
Richard Dourte
Roger Green
Ed Stang
Richard Dineen
Blake Forbes @ PNM
John Davidson
Ted Waterman @ Broadway Development LLC
Roger Paul @ Bernalillo County Public Works
Frank William @ Bernalillo County Public Works
Pat Stoval @ Smith Engineering

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