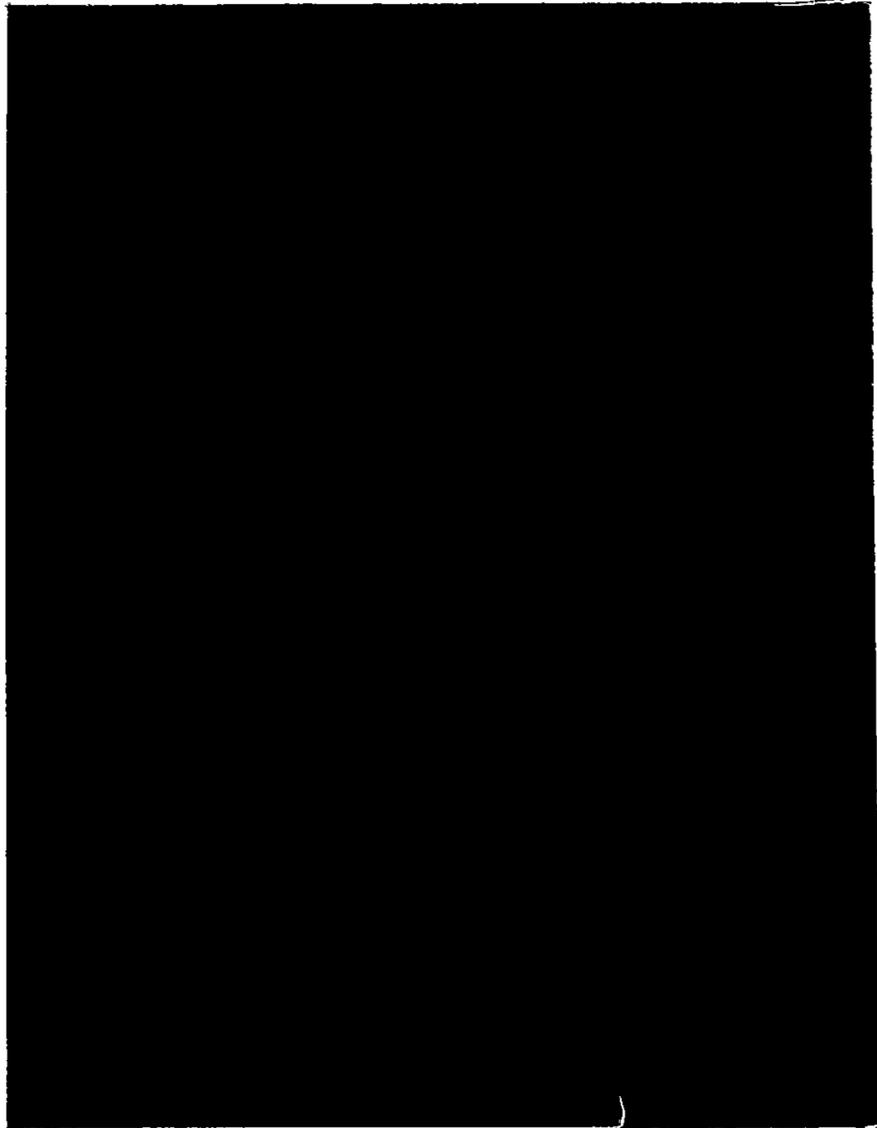


ISAACSON & ARFMAN, P.A.

Consulting Engineering Associates

Albuquerque, NM



1996
17
1996



DRAINAGE REPORT

FOR

**ROLLING HILLS SUBDIVISION
UNITS TWO & THREE**

**A 39 & 48 LOT (TWO PHASE) SINGLE
FAMILY RESIDENTIAL SUBDIVISION**

**ALBUQUERQUE NEW MEXICO
SEPTEMBER 1996**

RECEIVED
SEP 14 1996
127 D. VIKING

Prepared by:

**ISAACSON & ARFMAN, P.A.
128 Monroe Street, NE
Albuquerque, NM 87108
(505) 268-8828**



Fred C. Arfman, P.E. Date

Fred C. Arfman 09-09-96

INTRODUCTION

The Rolling Hills Subdivision is a masterplan community consisting of multiple phases. Unit One has been approved for development and is currently under construction. Units Two and Three, consisting of 39 and 48 lots respectfully, are being designed and processed simultaneously and the following study will offer the drainage and grading solution for each. In addition, interim drainage improvements will be purposed to accommodate the continued phased development of this community.

I. PROJECT INFORMATION

LEGAL DESCRIPTION: A parcel of land comprising of Tract A, Rolling Hills Subdivision, Unit One (05-28-96, Volume 96S, Folio 113) together with a portion of Unplatted Remainder of Tract KK (08-09-73, Book D947, Pages 898-901) consisting of 18.00 acres.

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SURVEYOR: Aldrich Land Surveying, Inc.
Attn: Tim Aldrich, NMPLS No. 7719
(505) 884-1990

BENCHMARK: ACS Monument "1-M10" located at the southeast quadrant of Sage Road and Unser Blvd. SW.
Elevation: 5079.88

ZONING: R-D (R-1) and R-1

NUMBER OF EXISTING TRACTS: 2

NUMBER OF PROPOSED LOTS:

Unit Two: 39

Unit Three: 47

TOTAL AREA: 18.00 Ac.

784,080 Sq. Ft.

II. SITE CHARACTERISTICS

FLOOD HAZARD: No part of this development is affected nor contributes to a flood hazard area as determined by Panel No. 350002-0033 of the October 14, 1983 Edition of the F.E.M.A. Maps.

EXISTING CONDITIONS: This site is currently undeveloped and mostly undisturbed with native ground cover, typical of the City's west side (Land Treatment B). The site has a slope downward toward the southeast at slopes ranging from 3 to 5 percent. Unit One abuts Unit Two to the north and Unit Three to the east. Storm waters generated from the Unit One improvements currently are released from the Unit One streets and are then conveyed by an earthen swale to an offsite detention pond. Flows are slowly released and are allowed to overland flow to a side entrance of the Amole del Norte Diversion Channel. Additionally, undeveloped overland flows from the future commercial tract to the northwest and from the easterly

portion of Unit Three, both cross over onto the westerly portion of Unit Two.

Unit Three accepts those previously mentioned storm water flows from the adjacent commercial tract to the north. Unser Blvd. (28' edge-edge) rural paving within a 134' R.O.W. is adjacent to the west. No flows are accepted from the Unser Blvd. corridor.

PROPOSED CONDITIONS:

Unit Two: The development of the 39 lots of this phase will require the construction of a storm drain from the westerly end of the east-west street to the Amole del Norte Channel. This system was identified and analyzed in the previously mentioned Rolling Hills Drainage Management Plan, on file with the City Hydrology Division.

The storm drain has the following hydraulic and hydrological characteristics:

- A. West Terminus - (Fox Hill Drive and Rockwood Road): A battery of Type "A" and "C" drop inlets have the capacity of accepting 27.7 cfs into the 24' RCP (see Flowmaster Worksheet in Appendix).

Interim: Prior to the development of Unit Three, the upstream overland flows will be directed to a combination collection/desiltation pond at the entrance to Unit Two at Fox Hill Drive (see Grading Plan for detail).

Ultimate: The fully developed upstream basin has a 19.9 cfs discharge rate from a portion of the commercial tract entering into Unit Three via a City standard concrete drainage rundown. All pre-commercial development runoff shall be routed through a similar desiltation pond at the pond entrance.

- B. Rockwood Road and Quiet Desert Drive: Two Type 'A' inlets will accept 100% of the flow generated by the contributing portion of Unit One. The storm drain remains at a 24" diameter capable of conveying 40.5 cfs at the projected 3.2% slope (see Flowmaster Worksheet No. 2).

The remaining 28.5 cfs is conveyed by the 32' F.F. street at a flow depth of 0.18' (EGL = 0.56').

- C. Rockwood Road and Secret Valley Drive: A battery of Type "A" and "C" drop inlets will accept the majority of the Unit One storm waters entering onto the Unit Two improvements. The

storm drain increases to a 30" diameter RCP with a corresponding capacity of 82.0 cfs. That portion of Rockwood Road between Secret Valley Drive and the Amole del Norte Channel will convey 39 cfs as streetflow (see Flowmaster Worksheet No. 3).

CONCLUSIONS & RECOMMENDATIONS

The Drainage Study for Rolling Hills Subdivision, Units Two and Three is consistent with the Rolling Hills Drainage Management Plan previously submitted and on file at the Hydrology Division, P.W.D., City of Albuquerque. Unit One is currently under construction and conforms to the same DMP. The individual recommendations for Units Two and Three are presented below:

Unit Two:

1. Interim desiltation pond is required at the north roadway stub of Fox Hill Drive until Unit Three improvements are in place.
2. A temporary detention pond is required at the southerly terminus of Secret Valley Drive.
3. Both ponds identified above shall be covered by a City of Albuquerque Covenant and Maintenance Agreement.
4. Downstream offsite runoff is allowed per the previously recorded blanket drainage easement.

*Board Jan
Antero Sept 2011*

5. The entire reach of the Rockwood Road storm drain should be constructed as part of the Unit Two improvements.
6. Developer should have the option of constructing the hard lined connection between the storm drain outfall to the Amole del Norte Diversion Channel as temporary, permanent or a combination of both.
7. No rear yard ponding shall be allowed in this portion of the development (see Typical Lot Grading Detail).
8. Adjacent lots may share a common lot line drainage swale (see Typical Lot Grading Detail).

Unit Three:

1. Offsite grading approval from the Owners of Tract A, Albuquerque South, Unit Two shall be secured to perform the required grading operation along the common property line as shown on the Grading Plan enclosed.
2. Offsite grading shall include the creation of a temporary desiltation pond situated at the entrance to the 15-foot wide drainage rundown between Lots 29 and 30. This shall be the only point of storm water acceptance of the existing offsite drainage basin as well as the future development of the commercial tract.
3. A temporary retention pond is required at the southerly end of Rolling Rock Place.

4. Ponds identified above shall be covered by a City of Albuquerque Covenant Maintenance Agreement.
5. Discharging of developed, detained storm waters across downstream properties is allowable per the previously recorded blanket drainage easement secured as a requirement of Unit One development.
6. No rear yard ponding shall be allowed in Unit Three (see Typical Lot Grading Plan).
7. Adjacent lots may share a common lot line drainage swale (see Typical Lot Grading Plan).

APPENDIX

TABLE 1

FLows AT ANALYSIS POINTS

AP	Q ₁₀₀ (CFS)	OUTFALL
1	11.7	24"RCP @ S=1.5%
2	41.1	30"RCP @ S=2.5% & STREET FLOW
3	49.9	24"RCP @ S=1.5% & STREET FLOW
4	128.0	30"RCP DISCHARGES TO RUNDOWN TO AMOLE
5	30.0	24"RCP @ S=2%
6	64.3	30"RCP @ S=2.2% & STREET FLOW
7	91.8	36"RCP @ S=2.7% & STREET FLOW
8	121.8	36"RCP @ S=3.0% DISCHARGES TO RUNDOWN TO AMOLE

BASIN AREAS & FLOWS

BASIN ID	AREA (AC)	Q ₁₀₀ (CFS)
1A	3.31	10.7
1B	1.86	6.1
1C	2.69	8.7
1D	1.66	5.4
1E	2.28	7.4
1F	2.28	7.4
1G	1.86	6.1
2A	9.11	29.6
2B	9.11	29.6
2C	5.18	16.8
2D	3.73	12.1
2E	1.45	4.7
2F	2.28	7.4
2G	3.93	12.8
2H	4.14	13.5
2I	3.52	11.4
2J	1.86	6.1
2K	6.62	21.5
2L	2.69	8.7



FLOWMASTER WORKSHEETS

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: master

Description: North Storm Drain, First Reach

Solve For Full Flow Capacity

Given Constant Data;

Diameter..... 2.00
Slope..... 0.0150
Mannings n..... 0.013
Discharge..... 27.71

Variable Input Data		Minimum	Maximum	Increment By		
		COMPUTED	COMPUTED	COMPUTED	COMPUTED	
Diameter	Channel	Mannings	Discharge	Depth	Velocity	Capacity
ft	Slope	'n'	cfs	ft	fps	Full
	ft/ft					cfs
2.00	0.0150	0.013	27.71	2.00	8.82	27.71

North First Reach = > Total Q = 49.9 cfs
24" SD Capacity = 27.7 cfs, Δ = 22.2 cfs

Assume street is 32' FF with standard C&G, S = 1.5%
Flow Depth = 0.20', V = 3.63 fps
EGL = 0.20 + (3.63)²/2(32.3) = 0.41'

Open Channel Flow Module, Version 3.43 (c)
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

F.M. #1

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: master

Description: North Storm Drain, Second Reach

Solve For Full Flow Capacity

Given Constant Data;

Diameter..... 2.00
Slope..... 0.0320
Mannings n..... 0.013
Discharge..... 40.47

Variable Input Data		Minimum	Maximum	Increment By		
=====		=====	=====	=====		
		COMPUTED COMPUTED COMPUTED COMPUTED				
Diameter	Channel	Mannings	Discharge	Depth	Velocity	Capacity
ft	Slope	'n'	cfs	ft	fps	Full
	ft/ft					cfs
=====						
2.00	0.0320	0.013	40.47	2.00	12.88	40.47

North Second Reach = > Total Q = 69 cfs of which 7.5 cfs is contributed in Basin 2F
24" SD Capacity = 40.5 cfs, Δ = 28.5 cfs

Assume street is 32' FF with standard C&G, S = 3.2%
Flow Depth = 0.18', V = 4.95 fps
EGL = 0.18 + (4.95)²/2(32.2) = 0.56'

Open Channel Flow Module, Version 3.43 (c)
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

F.M. # 2

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: master

Description: North Storm Drain, Third Reach

Solve For Full Flow Capacity

Given Constant Data;

Diameter..... 2.50
Slope..... 0.0400
Mannings n..... 0.013
Discharge..... 82.03

Variable Input Data		Minimum	Maximum	Increment By		
		COMPUTED	COMPUTED	COMPUTED	COMPUTED	
Diameter	Channel	Mannings	Discharge	Depth	Velocity	Capacity
ft	Slope	'n'	cfs	ft	fps	Full
	ft/ft					cfs
2.50	0.0400	0.013	82.03	2.50	16.71	82.03

North Third Reach = > Total Q = 120.9 cfs of which 11.7 cfs is contributed in Basin 2I
30" SD Capacity = 82.0 cfs, Δ = 38.9 cfs

Assume street is 32' FF with standard C&G, S = 4.0%
Flow Depth = 0.21', V = 6.12 fps
EGL = 0.21 + (6.12)²/2(32.2) = 0.79' < 0.85', OK

F.M. #3

AHYMO SUMMARY & OUTPUT FILES

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
 INPUT FILE = RHMP.DAT

RUN DATE (MON/DAY/YR) =01/17/1996
 USER NO.= ISCARFNM.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= 2.200
*S **BASIN A										
COMPUTE NM HYD	100.00	-	1	.00517	10.94	.373	1.35334	1.500	3.306	PER IMP= 50.00
*S **BASIN B										
COMPUTE NM HYD	200.00	-	2	.00291	6.16	.210	1.35334	1.500	3.310	PER IMP= 50.00
*S **BASIN C										
COMPUTE NM HYD	300.00	-	3	.00420	8.89	.303	1.35334	1.500	3.307	PER IMP= 50.00
ADD HYD	300.10	1&	3 4	.00937	19.83	.676	1.35328	1.500	3.306	
*S **BASIN D										
COMPUTE NM HYD	400.00	-	5	.00259	5.49	.187	1.35334	1.500	3.310	PER IMP= 50.00
ADD HYD	400.10	2&	5 6	.00550	11.65	.397	1.35324	1.500	3.310	
*S TOTAL FLOW AP1										
*S **BASIN E										
COMPUTE NM HYD	500.00	-	7	.00356	7.54	.257	1.35334	1.500	3.308	PER IMP= 50.00
ADD HYD	500.10	4&	7 8	.01293	27.37	.933	1.35327	1.500	3.307	
*S **BASIN F										
COMPUTE NM HYD	600.00	-	9	.00356	7.54	.257	1.35334	1.500	3.308	PER IMP= 50.00
ADD HYD	600.10	8&	9 10	.01649	34.90	1.190	1.35327	1.500	3.307	
*S **BASIN G										
COMPUTE NM HYD	700.00	-	11	.00291	6.16	.210	1.35334	1.500	3.310	PER IMP= 50.00
ADD HYD	700.10	10&	11 12	.01940	41.07	1.400	1.35327	1.500	3.308	
*S TOTAL FLOW @ AP2										
*S **BASIN 2A										
COMPUTE NM HYD	200.A	-	13	.01420	30.02	1.025	1.35334	1.500	3.303	PER IMP= 50.00
*S TOTAL FLOW @ AP5										
*S **OFFSITE BASIN TO THE NORTH (COMMERCIAL)										
COMPUTE NM HYD	300.00	-	14	.00750	19.86	.734	1.83567	1.500	4.138	PER IMP= 90.00
*S **BASIN 2B										
COMPUTE NM HYD	200.B	-	15	.01420	30.02	1.025	1.35334	1.500	3.303	PER IMP= 50.00
ADD HYD	200.B1	14&	15 16	.02170	49.88	1.759	1.52002	1.500	3.591	
*S ADD FLOW FROM BASINS 1B & 1C										
ADD HYD	200.B2	6&	16 16	.02720	61.53	2.156	1.48629	1.500	3.535	
*S TOTAL FLOW @ AP3										
*S **BASIN 2C										
COMPUTE NM HYD	200.C	-	17	.00810	17.13	.585	1.35334	1.500	3.304	PER IMP= 50.00
ADD HYD	200.C1	13&	17 18	.02230	47.15	1.610	1.35332	1.500	3.303	
*S **BASIN 2D										
COMPUTE NM HYD	200.D	-	19	.00580	12.27	.419	1.35334	1.500	3.305	PER IMP= 50.00
ADD HYD	200.D1	18&	19 20	.02810	59.42	2.028	1.35331	1.500	3.304	
*S **BASIN 2E										
COMPUTE NM HYD	200.E	-	1	.00230	4.87	.166	1.35334	1.500	3.312	PER IMP= 50.00

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 = 2	NOTATION
ADD HYD	200.E1	20&	1 2	.03040	64.29	2.194	1.35330	1.500	3.304		
*S **TOTAL FLOW @ AP6											
*S **BASIN 2F											
COMPUTE NM HYD	200.F	-	3	.00360	7.62	.260	1.35334	1.500	3.308	PER IMP=	50.00
ADD HYD	200.F1	16&	3 4	.03080	69.15	2.416	1.47075	1.500	3.508		
*S ADD FLOW FROM BASINS 1A,1C,1E,1F, &1G											
ADD HYD	200.F2	12&	4 5	.05020	110.22	3.816	1.42534	1.500	3.431		
*S **BASIN 2G											
COMPUTE NM HYD	200.G	-	6	.00610	12.90	.440	1.35334	1.500	3.305	PER IMP=	50.00
ADD HYD	200.G1	2&	6 7	.03650	77.19	2.634	1.35330	1.500	3.305		
*S **BASIN 2H											
COMPUTE NM HYD	200.H	-	8	.00690	14.59	.498	1.35334	1.500	3.305	PER IMP=	50.00
ADD HYD	200.H1	7&	8 9	.04340	91.79	3.132	1.35330	1.500	3.305		
*S TOTAL FLOW @ AP7											
*S **BASIN 2I											
COMPUTE NM HYD	200.I	-	10	.00550	11.64	.397	1.35334	1.500	3.306	PER IMP=	50.00
ADD HYD	200.I1	5&10	11	.05570	121.85	4.213	1.41823	1.500	3.418		
*S **BASIN 2J											
COMPUTE NM HYD	200.J	-	12	.00290	6.14	.209	1.35334	1.500	3.310	PER IMP=	50.00
ADD HYD	200.J1	11&12	13	.05860	128.00	4.422	1.41501	1.500	3.413		
*S TOTAL FLOW @ AP4 (ENTRANCE TO AMOLE DEL NORTE CHANNEL)											
*S **BASIN 2K											
COMPUTE NM HYD	200.K	-	14	.01000	21.14	.722	1.35334	1.500	3.304	PER IMP=	50.00
ADD HYD	200.K1	9&14	15	.05340	112.93	3.854	1.35331	1.500	3.304		
*S **BASIN 2L											
COMPUTE NM HYD	200.L	-	16	.00420	8.89	.303	1.35334	1.500	3.307	PER IMP=	50.00
ADD HYD	200.L1	15&16	17	.05760	121.82	4.157	1.35330	1.500	3.305		
*S TOTAL FLOW @ AP8 (ENTRANCE TO AMOLE DEL NORTE CHANNEL)											
FINISH											

FUTURE PHASES**

*S **BASIN 2A

COMPUTE NM HYD

ID=13 HYD NO=200.A AREA=0.0142 SQ MI
 PER A=0 PER B=37 PER C=13 PER D=50
 TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 28.031 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 1.8700
 AREA = .007100 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .124459HR TP = .133300HR K/TP RATIO = .933679 SHAPE CONSTANT, N = 3.788292
 UNIT PEAK = 18.152 CFS UNIT VOLUME = .9995 B = 340.80 P60 = 1.8700
 AREA = .007100 SQ MI IA = .46100 INCHES INF = 1.14080 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

*S TOTAL FLOW @ AP5

PRINT HYD

ID=13 CODE=5

HYDROGRAPH FROM AREA 200.A

TIME HRS	FLOW CFS								
.000	.0	1.500	30.0	3.000	.3	4.500	.1	5.999	.1
.167	.0	1.667	15.6	3.166	.2	4.666	.1	6.166	.1
.333	.0	1.833	8.7	3.333	.2	4.833	.1	6.333	.0
.500	.0	2.000	5.9	3.500	.2	4.999	.1	6.499	.0
.667	.0	2.166	2.8	3.666	.1	5.166	.1	6.666	.0
.833	.0	2.333	1.4	3.833	.1	5.333	.1	6.833	.0
1.000	.0	2.500	.9	4.000	.1	5.499	.1		
1.167	.1	2.666	.6	4.166	.1	5.666	.1		
1.333	6.4	2.833	.4	4.333	.1	5.833	.1		

RUNOFF VOLUME = 1.35334 INCHES = 1.0249 ACRE-FEET
 PEAK DISCHARGE RATE = 30.02 CFS AT 1.500 HOURS BASIN AREA = .0142 SQ. MI.

*S **OFFSITE BASIN TO THE NORTH (COMMERCIAL)
 COMPUTE NM HYD ID=14 HYD NO=300.00 AREA=0.0075 SQ MI
 PER A=0 PER B=10 PER C=0 PER D=90
 TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 26.649 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8700
 AREA = .006750 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .130992HR TP = .133300HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593448
 UNIT PEAK = 1.8403 CFS UNIT VOLUME = .9932 B = 327.09 P60 = 1.8700
 AREA = .000750 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=14 CODE=5

HYDROGRAPH FROM AREA 300.00

TIME HRS	FLOW CFS								
.000	.0	1.500	19.9	3.000	.2	4.500	.1	5.999	.1
.167	.0	1.667	10.1	3.166	.2	4.666	.1	6.166	.1
.333	.0	1.833	6.5	3.333	.1	4.833	.1	6.333	.0
.500	.0	2.000	4.8	3.500	.1	4.999	.1	6.499	.0
.667	.0	2.166	2.2	3.666	.1	5.166	.1	6.666	.0
.833	.0	2.333	1.0	3.833	.1	5.333	.1	6.833	.0
1.000	.0	2.500	.6	4.000	.1	5.499	.1		
1.167	.1	2.666	.4	4.166	.1	5.666	.1		
1.333	5.8	2.833	.3	4.333	.1	5.833	.1		

RUNOFF VOLUME = 1.83567 INCHES = .7343 ACRE-FEET
 PEAK DISCHARGE RATE = 19.86 CFS AT 1.500 HOURS BASIN AREA = .0075 SQ. MI.

*S **BASIN 2B
 COMPUTE NM HYD ID=15 HYD NO=200.B AREA=0.0142 SQ MI
 PER A=0 PER B=37 PER C=13 PER D=50
 TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 28.031 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 1.8700
 AREA = .007100 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .124459HR TP = .133300HR K/TP RATIO = .933679 SHAPE CONSTANT, N = 3.788292
 UNIT PEAK = 18.152 CFS UNIT VOLUME = .9995 B = 340.80 P60 = 1.8700
 AREA = .007100 SQ MI IA = .46100 INCHES INF = 1.14080 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=15 CODE=5

HYDROGRAPH FROM AREA 200.B

TIME HRS	FLOW CFS								
.000	.0	1.500	30.0	3.000	.3	4.500	.1	5.999	.1
.167	.0	1.667	15.6	3.166	.2	4.666	.1	6.166	.1
.333	.0	1.833	8.7	3.333	.2	4.833	.1	6.333	.0
.500	.0	2.000	5.9	3.500	.2	4.999	.1	6.499	.0
.667	.0	2.166	2.8	3.666	.1	5.166	.1	6.666	.0
.833	.0	2.333	1.4	3.833	.1	5.333	.1	6.833	.0
1.000	.0	2.500	.9	4.000	.1	5.499	.1		
1.167	.1	2.666	.6	4.166	.1	5.666	.1		
1.333	6.4	2.833	.4	4.333	.1	5.833	.1		

RUNOFF VOLUME = 1.35334 INCHES = 1.0249 ACRE-FEET
 PEAK DISCHARGE RATE = 30.02 CFS AT 1.500 HOURS BASIN AREA = .0142 SQ. MI.

ADD HYD ID=16 HYD NO=200.B1 ID=14 ID=15
PRINT HYD ID=16 CODE=5

HYDROGRAPH FROM AREA 200.B1

TIME HRS	FLOW CFS								
.000	.0	1.500	49.9	3.000	.5	4.500	.2	5.999	.3
.167	.0	1.667	25.7	3.166	.4	4.666	.2	6.166	.1
.333	.0	1.833	15.2	3.333	.3	4.833	.2	6.333	.0
.500	.0	2.000	10.6	3.500	.3	4.999	.2	6.499	.0
.667	.0	2.166	5.0	3.666	.3	5.166	.2	6.666	.0
.833	.0	2.333	2.4	3.833	.2	5.333	.2	6.833	.0
1.000	.0	2.500	1.5	4.000	.2	5.499	.3		
1.167	.1	2.666	1.0	4.166	.2	5.666	.3		
1.333	12.2	2.833	.7	4.333	.2	5.833	.3		

RUNOFF VOLUME = 1.52002 INCHES = 1.7592 ACRE-FEET
 PEAK DISCHARGE RATE = 49.88 CFS AT 1.500 HOURS BASIN AREA = .0217 SQ. MI.

*S ADD FLOW FROM BASINS 1B & 1C
 ADD HYD ID=16 HYD NO=200.B2 ID=6 ID=16
 *S TOTAL FLOW @ AP3
 PRINT HYD ID=16 CODE=5

HYDROGRAPH FROM AREA 200.B2

TIME HRS	FLOW CFS								
.000	.0	1.500	61.5	3.000	.6	4.500	.3	5.999	.3
.167	.0	1.667	31.8	3.166	.5	4.666	.3	6.166	.1
.333	.0	1.833	18.6	3.333	.4	4.833	.3	6.333	.0
.500	.0	2.000	12.9	3.500	.3	4.999	.3	6.499	.0
.667	.0	2.166	6.1	3.666	.3	5.166	.3	6.666	.0
.833	.0	2.333	2.9	3.833	.3	5.333	.3	6.833	.0
1.000	.0	2.500	1.8	4.000	.3	5.499	.3		
1.167	.1	2.666	1.2	4.166	.3	5.666	.3		
1.333	14.7	2.833	.8	4.333	.3	5.833	.3		

RUNOFF VOLUME = 1.48629 INCHES = 2.1561 ACRE-FEET
 PEAK DISCHARGE RATE = 61.53 CFS AT 1.500 HOURS BASIN AREA = .0272 SQ. MI.

HYDROGRAPH FROM AREA 200.F1

TIME HRS	FLOW CFS								
.000	.0	1.500	69.1	3.000	.7	4.500	.3	5.999	.4
.167	.0	1.667	35.8	3.166	.5	4.666	.3	6.166	.1
.333	.0	1.833	20.8	3.333	.4	4.833	.3	6.333	.0
.500	.0	2.000	14.4	3.500	.4	4.999	.3	6.499	.0
.667	.0	2.166	6.8	3.666	.3	5.166	.3	6.666	.0
.833	.0	2.333	3.3	3.833	.3	5.333	.3	6.833	.0
1.000	.0	2.500	2.1	4.000	.3	5.499	.3		
1.167	.1	2.666	1.4	4.166	.3	5.666	.3		
1.333	16.3	2.833	.9	4.333	.3	5.833	.4		

RUNOFF VOLUME = 1.47075 INCHES = 2.4159 ACRE-FEET
 PEAK DISCHARGE RATE = 69.15 CFS AT 1.500 HOURS BASIN AREA = .0308 SQ. MI.

*S ADD FLOW FROM BASINS 1A,1C,1E,1F,&1G
 ADD HYD ID=5 HYD NO=200.F2 ID=12 ID=4
 PRINT HYD ID=5 CODE=5

HYDROGRAPH FROM AREA 200.F2

TIME HRS	FLOW CFS								
.000	.0	1.500	110.2	3.000	1.1	4.500	.4	5.999	.6
.167	.0	1.667	57.2	3.166	.8	4.666	.4	6.166	.2
.333	.0	1.833	32.7	3.333	.7	4.833	.5	6.333	.1
.500	.0	2.000	22.4	3.500	.6	4.999	.5	6.499	.0
.667	.0	2.166	10.6	3.666	.5	5.166	.5	6.666	.0
.833	.0	2.333	5.2	3.833	.5	5.333	.5	6.833	.0
1.000	.0	2.500	3.2	4.000	.5	5.499	.5		
1.167	.2	2.666	2.1	4.166	.5	5.666	.5		
1.333	25.1	2.833	1.5	4.333	.4	5.833	.6		

RUNOFF VOLUME = 1.42534 INCHES = 3.8161 ACRE-FEET
 PEAK DISCHARGE RATE = 110.22 CFS AT 1.500 HOURS BASIN AREA = .0502 SQ. MI.

*S **BASIN 2F
 COMPUTE NM HYD

ID=3 HYD NO=200.F AREA=0.0036 SQ MI
 PER A=0 PER B=37 PER C=13 PER D=50
 TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 7.1065 CFS UNIT VOLUME = .9978 B = 526.28 P60 = 1.8700
 AREA = .001800 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .124459HR TP = .133300HR K/TP RATIO = .933679 SHAPE CONSTANT, N = 3.788292
 UNIT PEAK = 4.6019 CFS UNIT VOLUME = .9975 B = 340.80 P60 = 1.8700
 AREA = .001800 SQ MI IA = .46100 INCHES INF = 1.14080 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=3 CODE=5

HYDROGRAPH FROM AREA 200.F

TIME HRS	FLOW CFS								
.000	.0	1.333	1.6	2.666	.1	4.000	.0	5.333	.0
.167	.0	1.500	7.6	2.833	.1	4.166	.0	5.499	.0
.333	.0	1.667	4.0	3.000	.1	4.333	.0	5.666	.0
.500	.0	1.833	2.2	3.166	.1	4.500	.0	5.833	.0
.667	.0	2.000	1.5	3.333	.0	4.666	.0	5.999	.0
.833	.0	2.166	.7	3.500	.0	4.833	.0	6.166	.0
1.000	.0	2.333	.4	3.666	.0	4.999	.0	6.333	.0
1.167	.0	2.500	.2	3.833	.0	5.166	.0	6.499	.0

RUNOFF VOLUME = 1.35334 INCHES = .2598 ACRE-FEET
 PEAK DISCHARGE RATE = 7.62 CFS AT 1.500 HOURS BASIN AREA = .0036 SQ. MI.

ADD HYD ID=4 HYD NO=200.F1 ID=16 ID=3
 PRINT HYD ID=4 CODE=5

*S **BASIN 2H
 COMPUTE NM HYD

ID=8 HYD NO=200.H AREA=0.0069 SQ MI
 PER A=0 PER B=37 PER C=13 PER D=50
 TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 13.621 CFS UNIT VOLUME = .9985 B = 526.28 P60 = 1.8700
 AREA = .003450 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .124459HR TP = .133300HR K/TP RATIO = .933679 SHAPE CONSTANT, N = 3.788292
 UNIT PEAK = 8.8204 CFS UNIT VOLUME = .9988 B = 340.80 P60 = 1.8700
 AREA = .003450 SQ MI IA = .46100 INCHES INF = 1.14080 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=8 CODE=5

HYDROGRAPH FROM AREA 200.H

TIME HRS	FLOW CFS								
.000	.0	1.500	14.6	3.000	.1	4.500	.1	5.999	.1
.167	.0	1.667	7.6	3.166	.1	4.666	.1	6.166	.0
.333	.0	1.833	4.2	3.333	.1	4.833	.1	6.333	.0
.500	.0	2.000	2.9	3.500	.1	4.999	.1	6.499	.0
.667	.0	2.166	1.4	3.666	.1	5.166	.1	6.666	.0
.833	.0	2.333	.7	3.833	.1	5.333	.1		
1.000	.0	2.500	.4	4.000	.1	5.499	.1		
1.167	.0	2.666	.3	4.166	.1	5.666	.1		
1.333	3.1	2.833	.2	4.333	.1	5.833	.1		

RUNOFF VOLUME = 1.35334 INCHES = .4980 ACRE-FEET
 PEAK DISCHARGE RATE = 14.59 CFS AT 1.500 HOURS BASIN AREA = .0069 SQ. MI.

ADD HYD ID=9 HYD NO=200.H1 ID=7 ID=8
 *S TOTAL FLOW @ AP7
 PRINT HYD ID=9 CODE=5

HYDROGRAPH FROM AREA 200.H1

TIME HRS	FLOW CFS								
.000	.0	1.500	91.8	3.000	.9	4.500	.3	5.999	.4
.167	.0	1.667	47.8	3.166	.7	4.666	.3	6.166	.2
.333	.0	1.833	26.5	3.333	.5	4.833	.4	6.333	.0
.500	.0	2.000	17.9	3.500	.5	4.999	.4	6.499	.0
.667	.0	2.166	8.5	3.666	.4	5.166	.4	6.666	.0
.833	.0	2.333	4.3	3.833	.4	5.333	.4	6.833	.0
1.000	.0	2.500	2.7	4.000	.4	5.499	.4		
1.167	.2	2.666	1.8	4.166	.4	5.666	.4		
1.333	19.6	2.833	1.2	4.333	.3	5.833	.4		

RUNOFF VOLUME = 1.35330 INCHES = 3.1324 ACRE-FEET
 PEAK DISCHARGE RATE = 91.79 CFS AT 1.500 HOURS BASIN AREA = .0434 SQ. MI.

*S **BASIN 2I
 COMPUTE NM HYD

ID=10 HYD NO=200.I AREA=0.0055 SQ MI
 PER A=0 PER B=37 PER C=13 PER D=50
 TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 10.857 CFS UNIT VOLUME = .9984 B = 526.28 P60 = 1.8700
 AREA = .002750 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .124459HR TP = .133300HR K/TP RATIO = .933679 SHAPE CONSTANT, N = 3.788292
 UNIT PEAK = 7.0307 CFS UNIT VOLUME = .9983 B = 340.80 P60 = 1.8700
 AREA = .002750 SQ MI IA = .46100 INCHES INF = 1.14080 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=10 CODE=5

HYDROGRAPH FROM AREA 200.I

TIME HRS	FLOW CFS								
.000	.0	1.500	11.6	3.000	.1	4.500	.0	5.999	.1
.167	.0	1.667	6.1	3.166	.1	4.666	.0	6.166	.0
.333	.0	1.833	3.4	3.333	.1	4.833	.0	6.333	.0
.500	.0	2.000	2.3	3.500	.1	4.999	.0	6.499	.0
.667	.0	2.166	1.1	3.666	.1	5.166	.0	6.666	.0
.833	.0	2.333	.5	3.833	.0	5.333	.0		
1.000	.0	2.500	.3	4.000	.0	5.499	.0		
1.167	.0	2.666	.2	4.166	.0	5.666	.1		

1.333 2.5 2.833 .2 4.333 .0 5.833 .1

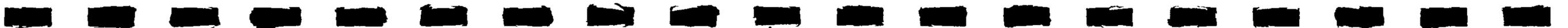
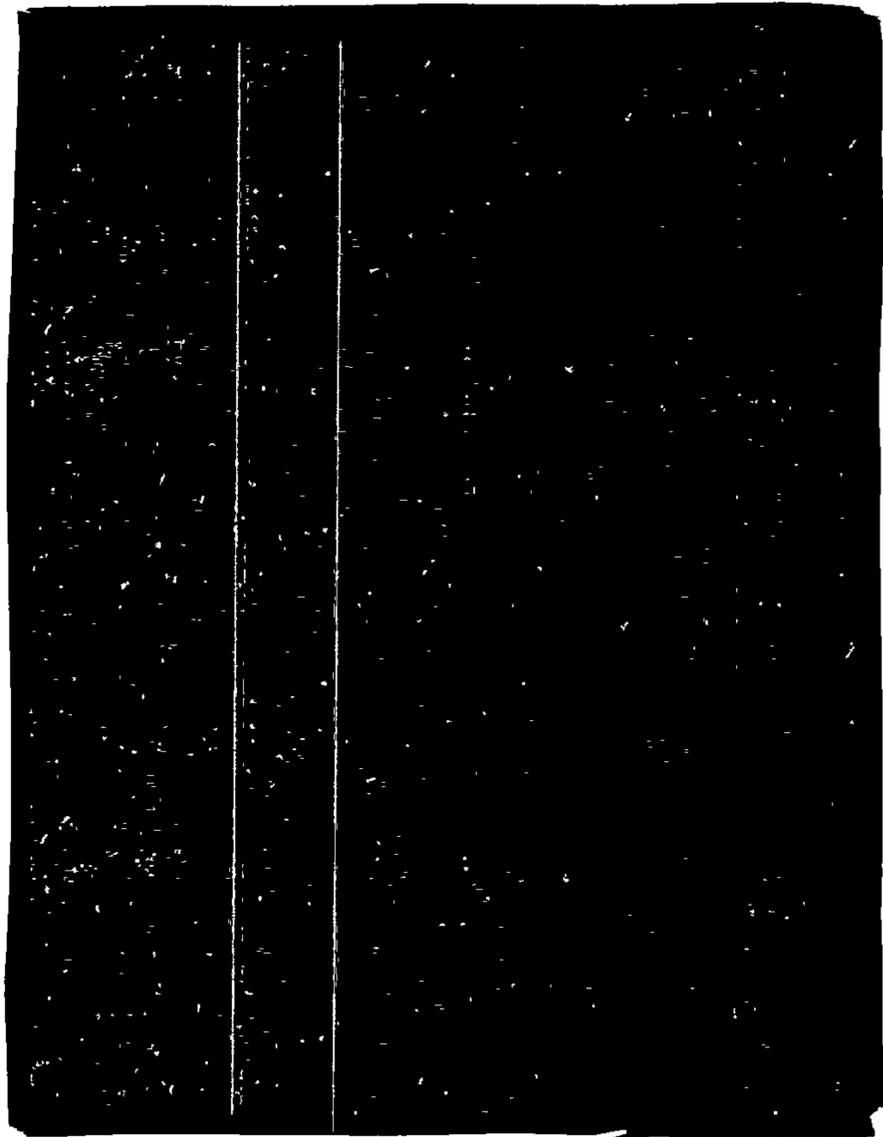
RUNOFF VOLUME = 1.35334 INCHES = .3970 ACRE-FEET
 PEAK DISCHARGE RATE = 11.64 CFS AT 1.500 HOURS BASIN AREA = .0055 SQ. MI.

ADD HYD ID=11 HYD NO=200.I1 ID=5 ID=10
 PRINT HYD ID=11 CODE=5

HYDROGRAPH FROM AREA 200.I1

TIME HRS	FLOW CFS								
.000	.0	1.500	121.9	3.000	1.2	4.500	.5	5.999	.6
.167	.0	1.667	63.2	3.166	.9	4.666	.5	6.166	.3
.333	.0	1.833	36.0	3.333	.7	4.833	.5	6.333	.1
.500	.0	2.000	24.7	3.500	.6	4.999	.5	6.499	.0
.667	.0	2.166	11.7	3.666	.6	5.166	.5	6.666	.0
.833	.0	2.333	5.7	3.833	.5	5.333	.5	6.833	.0
1.000	.0	2.500	3.6	4.000	.5	5.499	.6		
1.167	.2	2.666	2.3	4.166	.5	5.666	.6		
1.333	27.6	2.833	1.6	4.333	.5	5.833	.6		

RUNOFF VOLUME = 1.41823 INCHES = 4.2131 ACRE-FEET
 PEAK DISCHARGE RATE = 121.85 CFS AT 1.500 HOURS BASIN AREA = .0557 SQ. MI.



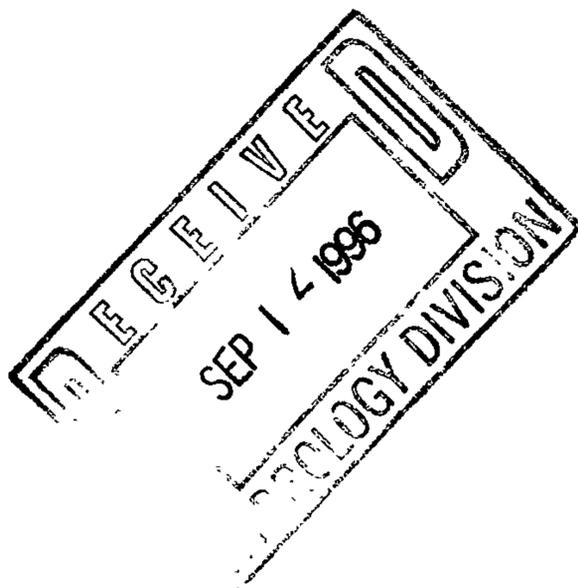
DRAINAGE REPORT

FOR

**ROLLING HILLS SUBDIVISION
UNITS TWO & THREE**

**A 39 & 48 LOT (TWO PHASE) SINGLE
FAMILY RESIDENTIAL SUBDIVISION**

**ALBUQUERQUE NEW MEXICO
SEPTEMBER 1996**



Prepared by:

**ISAACSON & ARFMAN, P.A.
128 Monroe Street, NE
Albuquerque, NM 87108
(505) 268-8828**



Fred C. Arfman 09-09-96
Fred C. Arfman, P.E. Date

INTRODUCTION

The Rolling Hills Subdivision is a masterplan community consisting of multiple phases. Unit One has been approved for development and is currently under construction. Units Two and Three, consisting of 39 and 48 lots respectfully, are being designed and processed simultaneously and the following study will offer the drainage and grading solution for each. In addition, interim drainage improvements will be purposed to accommodate the continued phased development of this community.

I. PROJECT INFORMATION

LEGAL DESCRIPTION: A parcel of land comprising of Tract A, Rolling Hills Subdivision, Unit One (05-28-96, Volume 96S, Folio 113) together with a portion of Unplatted Remainder of Tract KK (08-09-73, Book D947, Pages 898-901) consisting of 18.00 acres.

ENGINEER: Isaacson & Arfman, P.A.
128 Monroe Street NE
Albuquerque, NM 87108
Attn: Fred C. Arfman, P.E.
(505) 268-8828

SURVEYOR: Aldrich Land Surveying, Inc.
Attn: Tim Aldrich, NMPLS No. 7719
(505) 884-1990

BENCHMARK: ACS Monument "1-M10" located at the southeast quadrant of Sage Road and Unser Blvd. SW.
Elevation: 5079.88

ZONING: R-D (R-1) and R-1

NUMBER OF EXISTING TRACTS: 2

NUMBER OF PROPOSED LOTS:

Unit Two: 39

Unit Three: 47

TOTAL AREA: 18.00 Ac.

784,080 Sq. Ft.

II. SITE CHARACTERISTICS

FLOOD HAZARD: No part of this development is affected nor contributes to a flood hazard area as determined by Panel No. 350002-0033 of the October 14, 1983 Edition of the F.E.M.A. Maps.

EXISTING CONDITIONS: This site is currently undeveloped and mostly undisturbed with native ground cover, typical of the City's west side (Land Treatment B). The site has a slope downward toward the southeast at slopes ranging from 3 to 5 percent. Unit One abuts Unit Two to the north and Unit Three to the east. Storm waters generated from the Unit One improvements currently are released from the Unit One streets and are then conveyed by an earthen swale to an offsite detention pond. Flows are slowly released and are allowed to overland flow to a side entrance of the Amole del Norte Diversion Channel. Additionally, undeveloped overland flows from the future commercial tract to the northwest and from the easterly

portion of Unit Three, both cross over onto the westerly portion of Unit Two.

Unit Three accepts those previously mentioned storm water flows from the adjacent commercial tract to the north. Unser Blvd. (28' edge-edge) rural paving within a 134' R.O.W. is adjacent to the west. No flows are accepted from the Unser Blvd. corridor.

PROPOSED CONDITIONS:

Unit Two: The development of the 39 lots of this phase will require the construction of a storm drain from the westerly end of the east-west street to the Amole del Norte Channel. This system was identified and analyzed in the previously mentioned Rolling Hills Drainage Management Plan, on file with the City Hydrology Division.

The storm drain has the following hydraulic and hydrological characteristics:

- A. West Terminus - (Fox Hill Drive and Rockwood Road): A battery of Type "A" and "C" drop inlets have the capacity of accepting 27.7 cfs into the 24' RCP (see Flowmaster Worksheet in Appendix).

Interim: Prior to the development of Unit Three, the upstream overland flows will be directed to a combination collection/desiltation pond at the entrance to Unit Two at Fox Hill Drive (see Grading Plan for detail).

Ultimate: The fully developed upstream basin has a 19.9 cfs discharge rate from a portion of the commercial tract entering into Unit Three via a City standard concrete drainage rundown. All pre-commercial development runoff shall be routed through a similar desiltation pond at the pond entrance.

- B. Rockwood Road and Quiet Desert Drive: Two Type 'A' inlets will accept 100% of the flow generated by the contributing portion of Unit One. The storm drain remains at a 24" diameter capable of conveying 40.5 cfs at the projected 3.2% slope (see Flowmaster Worksheet No. 2).

The remaining 28.5 cfs is conveyed by the 32' F.F. street at a flow depth of 0.18' (EGL = 0.56').

- C. Rockwood Road and Secret Valley Drive: A battery of Type "A" and "C" drop inlets will accept the majority of the Unit One storm waters entering onto the Unit Two improvements. The

storm drain increases to a 30" diameter RCP with a corresponding capacity of 82.0 cfs. That portion of Rockwood Road between Secret Valley Drive and the Amole del Norte Channel will convey 39 cfs as streetflow (see Flowmaster Worksheet No. 3).

CONCLUSIONS & RECOMMENDATIONS

The Drainage Study for Rolling Hills Subdivision, Units Two and Three is consistent with the Rolling Hills Drainage Management Plan previously submitted and on file at the Hydrology Division, P.W.D., City of Albuquerque. Unit One is currently under construction and conforms to the same DMP. The individual recommendations for Units Two and Three are presented below:

Unit Two:

1. Interim desiltation pond is required at the north roadway stub of Fox Hill Drive until Unit Three improvements are in place.
2. A temporary detention pond is required at the southerly terminus of Secret Valley Drive.
3. Both ponds identified above shall be covered by a City of Albuquerque Covenant and Maintenance Agreement.
4. Downstream offsite runoff is allowed per the previously recorded blanket drainage easement.

*Basal for
entire system*

5. The entire reach of the Rockwood Road storm drain should be constructed as part of the Unit Two improvements.
6. Developer should have the option of constructing the hard lined connection between the storm drain outfall to the Amole del Norte Diversion Channel as temporary, permanent or a combination of both.
7. No rear yard ponding shall be allowed in this portion of the development (see Typical Lot Grading Detail).
8. Adjacent lots may share a common lot line drainage swale (see Typical Lot Grading Detail).

Unit Three:

1. Offsite grading approval from the Owners of Tract A, Albuquerque South, Unit Two shall be secured to perform the required grading operation along the common property line as shown on the Grading Plan enclosed.
2. Offsite grading shall include the creation of a temporary desiltation pond situated at the entrance to the 15-foot wide drainage rundown between Lots 29 and 30. This shall be the only point of storm water acceptance of the existing offsite drainage basin as well as the future development of the commercial tract.
3. A temporary retention pond is required at the southerly end of Rolling Rock Place.

4. Ponds identified above shall be covered by a City of Albuquerque Covenant Maintenance Agreement.
5. Discharging of developed, detained storm waters across downstream properties is allowable per the previously recorded blanket drainage easement secured as a requirement of Unit One development.
6. No rear yard ponding shall be allowed in Unit Three (see Typical Lot Grading Plan).
7. Adjacent lots may share a common lot line drainage swale (see Typical Lot Grading Plan).

APPENDIX

TABLE 1

FLows AT ANALYSIS POINTS

AP	Q ₁₀₀ (CFS)	OUTFALL
1	11.7	24"RCP @ S=1.5%
2	41.1	30"RCP @ S=2.5% & STREET FLOW
3	49.9	24"RCP @ S=1.5% & STREET FLOW
4	128.0	30"RCP DISCHARGES TO RUNDOWN TO AMOLE
5	30.0	24"RCP @ S=2%
6	64.3	30"RCP @ S=2.2% & STREET FLOW
7	91.8	36"RCP @ S=2.7% & STREET FLOW
8	121.8	36"RCP @ S=3.0% DISCHARGES TO RUNDOWN TO AMOLE

BASIN AREAS & FLOWS

BASIN ID	AREA (AC)	Q ₁₀₀ (CFS)
1A	3.31	10.7
1B	1.86	6.1
1C	2.69	8.7
1D	1.66	5.4
1E	2.28	7.4
1F	2.28	7.4
1G	1.86	6.1
2A	9.11	29.6
2B	9.11	29.6
2C	5.18	16.8
2D	3.73	12.1
2E	1.45	4.7
2F	2.28	7.4
2G	3.93	12.8
2H	4.14	13.5
2I	3.52	11.4
2J	1.86	6.1
2K	6.62	21.5
2L	2.69	8.7

FLOWMASTER WORKSHEETS

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: master

Description: North Storm Drain, First Reach

Solve For Full Flow Capacity

Given Constant Data;

Diameter..... 2.00
Slope..... 0.0150
Mannings n..... 0.013
Discharge..... 27.71

Variable Input Data		Minimum	Maximum	Increment By		
		COMPUTED	COMPUTED	COMPUTED	COMPUTED	COMPUTED
Diameter	Channel	Mannings	Discharge	Depth	Velocity	Capacity
ft	Slope	'n'	cfs	ft	fps	Full
	ft/ft					cfs
2.00	0.0150	0.013	27.71	2.00	8.82	27.71

North First Reach = > Total Q = 49.9 cfs
24" SD Capacity = 27.7 cfs, Δ = 22.2 cfs

Assume street is 32' FF with standard C&G, S = 1.5%
Flow Depth = 0.20', V = 3.63 fps
EGL = 0.20 + (3.63)²/2(32.3) = 0.41'

F.M. #1

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: master

Description: North Storm Drain, Second Reach

Solve For Full Flow Capacity

Given Constant Data;

Diameter..... 2.00
Slope..... 0.0320
Mannings n..... 0.013
Discharge..... 40.47

Variable Input Data			Minimum	Maximum	Increment By	
			COMPUTED	COMPUTED	COMPUTED	COMPUTED
Diameter	Channel	Mannings	Discharge	Depth	Velocity	Capacity
ft	Slope	'n'	cfs	ft	fps	Full
	ft/ft					cfs
2.00	0.0320	0.013	40.47	2.00	12.88	40.47

North Second Reach = > Total Q = 69 cfs of which 7.5 cfs is contributed in Basin 2F
24" SD Capacity = 40.5 cfs, Δ = 28.5 cfs

Assume street is 32' FF with standard C&G, S = 3.2%
Flow Depth = 0.18', V = 4.95 fps
EGL = 0.18 + (4.95)²/2(32.2) = 0.56'

Open Channel Flow Module, Version 3.43 (c)
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

F.M. # 2

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: master

Description: North Storm Drain, Third Reach

Solve For Full Flow Capacity

Given Constant Data;

Diameter..... 2.50
Slope..... 0.0400
Mannings n..... 0.013
Discharge..... 82.03

Variable Input Data		Minimum	Maximum	Increment By		
		COMPUTED	COMPUTED	COMPUTED	COMPUTED	
Diameter	Channel	Mannings	Discharge	Depth	Velocity	Capacity
ft	Slope	'n'	cfs	ft	fps	Full
	ft/ft					cfs
2.50	0.0400	0.013	82.03	2.50	16.71	82.03

North Third Reach = > Total Q = 120.9 cfs of which 11.7 cfs is contributed in Basin 2I
30" SD Capacity = 82.0 cfs, Δ = 38.9 cfs

Assume street is 32' FF with standard C&G, S = 4.0%
Flow Depth = 0.21', V = 6.12 fps
EGL = 0.21 + (6.12)²/2(32.2) = 0.79' < 0.85', OK

F.M. #3

AHYMO SUMMARY & OUTPUT FILES

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
 INPUT FILE = RHMP.DAT

RUN DATE (MON/DAY/YR) =01/17/1996
 USER NO.= ISCARFNM.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= 2.200
*S **BASIN A										
COMPUTE NM HYD	100.00	-	1	.00517	10.94	.373	1.35334	1.500	3.306	PER IMP= 50.00
*S **BASIN B										
COMPUTE NM HYD	200.00	-	2	.00291	6.16	.210	1.35334	1.500	3.310	PER IMP= 50.00
*S **BASIN C										
COMPUTE NM HYD	300.00	-	3	.00420	8.89	.303	1.35334	1.500	3.307	PER IMP= 50.00
ADD HYD	300.10	1& 3	4	.00937	19.83	.676	1.35328	1.500	3.306	
*S **BASIN D										
COMPUTE NM HYD	400.00	-	5	.00259	5.49	.187	1.35334	1.500	3.310	PER IMP= 50.00
ADD HYD	400.10	2& 5	6	.00550	11.65	.397	1.35324	1.500	3.310	
*S TOTAL FLOW AP1										
*S **BASIN E										
COMPUTE NM HYD	500.00	-	7	.00356	7.54	.257	1.35334	1.500	3.308	PER IMP= 50.00
ADD HYD	500.10	4& 7	8	.01293	27.37	.933	1.35327	1.500	3.307	
*S **BASIN F										
COMPUTE NM HYD	600.00	-	9	.00356	7.54	.257	1.35334	1.500	3.308	PER IMP= 50.00
ADD HYD	600.10	8& 9	10	.01649	34.90	1.190	1.35327	1.500	3.307	
*S **BASIN G										
COMPUTE NM HYD	700.00	-	11	.00291	6.16	.210	1.35334	1.500	3.310	PER IMP= 50.00
ADD HYD	700.10	10&11	12	.01940	41.07	1.400	1.35327	1.500	3.308	
*S TOTAL FLOW @ AP2										
*S **BASIN 2A										
COMPUTE NM HYD	200.A	-	13	.01420	30.02	1.025	1.35334	1.500	3.303	PER IMP= 50.00
*S TOTAL FLOW @ AP5										
*S **OFFSITE BASIN TO THE NORTH (COMMERCIAL)										
COMPUTE NM HYD	300.00	-	14	.00750	19.86	.734	1.83567	1.500	4.138	PER IMP= 90.00
*S **BASIN 2B										
COMPUTE NM HYD	200.B	-	15	.01420	30.02	1.025	1.35334	1.500	3.303	PER IMP= 50.00
ADD HYD	200.B1	14&15	16	.02170	49.88	1.759	1.52002	1.500	3.591	
*S ADD FLOW FROM BASINS 1B & 1C										
ADD HYD	200.B2	6&16	16	.02720	61.53	2.156	1.48629	1.500	3.535	
*S TOTAL FLOW @ AP3										
*S **BASIN 2C										
COMPUTE NM HYD	200.C	-	17	.00810	17.13	.585	1.35334	1.500	3.304	PER IMP= 50.00
ADD HYD	200.C1	13&17	18	.02230	47.15	1.610	1.35332	1.500	3.303	
*S **BASIN 2D										
COMPUTE NM HYD	200.D	-	19	.00580	12.27	.419	1.35334	1.500	3.305	PER IMP= 50.00
ADD HYD	200.D1	18&19	20	.02810	59.42	2.028	1.35331	1.500	3.304	
*S **BASIN 2E										
COMPUTE NM HYD	200.E	-	1	.00230	4.87	.166	1.35334	1.500	3.312	PER IMP= 50.00

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 = 2 NOTATION
ADD HYD	200.E1	20& 1	2	.03040	64.29	2.194	1.35330	1.500	3.304	
*S **TOTAL FLOW @ AP6										
*S **BASIN 2F										
COMPUTE NM HYD	200.F	-	3	.00360	7.62	.260	1.35334	1.500	3.308	PER IMP= 50.00
ADD HYD	200.F1	16& 3	4	.03080	69.15	2.416	1.47075	1.500	3.508	
*S ADD FLOW FROM BASINS 1A, 1C, 1E, 1F, & 1G										
ADD HYD	200.F2	12& 4	5	.05020	110.22	3.816	1.42534	1.500	3.431	
*S **BASIN 2G										
COMPUTE NM HYD	200.G	-	6	.00610	12.90	.440	1.35334	1.500	3.305	PER IMP= 50.00
ADD HYD	200.G1	2& 6	7	.03650	77.19	2.634	1.35330	1.500	3.305	
*S **BASIN 2H										
COMPUTE NM HYD	200.H	-	8	.00690	14.59	.498	1.35334	1.500	3.305	PER IMP= 50.00
ADD HYD	200.H1	7& 8	9	.04340	91.79	3.132	1.35330	1.500	3.305	
*S TOTAL FLOW @ AP7										
*S **BASIN 2I										
COMPUTE NM HYD	200.I	-	10	.00550	11.64	.397	1.35334	1.500	3.306	PER IMP= 50.00
ADD HYD	200.I1	5&10	11	.05570	121.85	4.213	1.41823	1.500	3.418	
*S **BASIN 2J										
COMPUTE NM HYD	200.J	-	12	.00290	6.14	.209	1.35334	1.500	3.310	PER IMP= 50.00
ADD HYD	200.J1	11&12	13	.05860	128.00	4.422	1.41501	1.500	3.413	
*S TOTAL FLOW @ AP4 (ENTRANCE TO AMOLE DEL NORTE CHANNEL)										
*S **BASIN 2K										
COMPUTE NM HYD	200.K	-	14	.01000	21.14	.722	1.35334	1.500	3.304	PER IMP= 50.00
ADD HYD	200.K1	9&14	15	.05340	112.93	3.854	1.35331	1.500	3.304	
*S **BASIN 2L										
COMPUTE NM HYD	200.L	-	16	.00420	8.89	.303	1.35334	1.500	3.307	PER IMP= 50.00
ADD HYD	200.L1	15&16	17	.05760	121.82	4.157	1.35330	1.500	3.305	
*S TOTAL FLOW @ AP8 (ENTRANCE TO AMOLE DEL NORTE CHANNEL)										
FINISH										

FUTURE PHASES**

*S **BASIN 2A

COMPUTE NM HYD

ID=13 HYD NO=200.A AREA=0.0142 SQ MI
 PER A=0 PER B=37 PER C=13 PER D=50
 TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 28.031 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 1.8700
 AREA = .007100 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .124459HR TP = .133300HR K/TP RATIO = .933679 SHAPE CONSTANT, N = 3.788292
 UNIT PEAK = 18.152 CFS UNIT VOLUME = .9995 B = 340.80 P60 = 1.8700
 AREA = .007100 SQ MI IA = .46100 INCHES INF = 1.14080 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

*S TOTAL FLOW @ AP5

PRINT HYD

ID=13 CODE=5

HYDROGRAPH FROM AREA 200.A

TIME HRS	FLOW CFS								
.000	.0	1.500	30.0	3.000	.3	4.500	.1	5.999	.1
.167	.0	1.667	15.6	3.166	.2	4.666	.1	6.166	.1
.333	.0	1.833	8.7	3.333	.2	4.833	.1	6.333	.0
.500	.0	2.000	5.9	3.500	.2	4.999	.1	6.499	.0
.667	.0	2.166	2.8	3.666	.1	5.166	.1	6.666	.0
.833	.0	2.333	1.4	3.833	.1	5.333	.1	6.833	.0
1.000	.0	2.500	.9	4.000	.1	5.499	.1		
1.167	.1	2.666	.6	4.166	.1	5.666	.1		
1.333	6.4	2.833	.4	4.333	.1	5.833	.1		

RUNOFF VOLUME = 1.35334 INCHES = 1.0249 ACRE-FEET
 PEAK DISCHARGE RATE = 30.02 CFS AT 1.500 HOURS BASIN AREA = .0142 SQ. MI.

*S **OFFSITE BASIN TO THE NORTH (COMMERCIAL)
 COMPUTE NM HYD ID=14 HYD NO=300.00 AREA=0.0075 SQ MI
 PER A=0 PER B=10 PER C=0 PER D=90
 TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 26.649 CFS UNIT VOLUME = .9989 B = 526.28 P60 = 1.8700
 AREA = .006750 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .130992HR TP = .133300HR K/TP RATIO = .982685 SHAPE CONSTANT, N = 3.593448
 UNIT PEAK = 1.8403 CFS UNIT VOLUME = .9932 B = 327.09 P60 = 1.8700
 AREA = .000750 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=14 CODE=5

HYDROGRAPH FROM AREA 300.00

TIME HRS	FLOW CFS								
.000	.0	1.500	19.9	3.000	.2	4.500	.1	5.999	.1
.167	.0	1.667	10.1	3.166	.2	4.666	.1	6.166	.1
.333	.0	1.833	6.5	3.333	.1	4.833	.1	6.333	.0
.500	.0	2.000	4.8	3.500	.1	4.999	.1	6.499	.0
.667	.0	2.166	2.2	3.666	.1	5.166	.1	6.666	.0
.833	.0	2.333	1.0	3.833	.1	5.333	.1	6.833	.0
1.000	.0	2.500	.6	4.000	.1	5.499	.1		
1.167	.1	2.666	.4	4.166	.1	5.666	.1		
1.333	5.8	2.833	.3	4.333	.1	5.833	.1		

RUNOFF VOLUME = 1.83567 INCHES = .7343 ACRE-FEET
 PEAK DISCHARGE RATE = 19.86 CFS AT 1.500 HOURS BASIN AREA = .0075 SQ. MI.

*S **BASIN 2B
 COMPUTE NM HYD ID=15 HYD NO=200.B AREA=0.0142 SQ MI
 PER A=0 PER B=37 PER C=13 PER D=50
 TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 28.031 CFS UNIT VOLUME = .9990 B = 526.28 P60 = 1.8700
 AREA = .007100 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .124459HR TP = .133300HR K/TP RATIO = .933679 SHAPE CONSTANT, N = 3.788292
 UNIT PEAK = 18.152 CFS UNIT VOLUME = .9995 B = 340.80 P60 = 1.8700
 AREA = .007100 SQ MI IA = .46100 INCHES INF = 1.14080 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=15 CODE=5

HYDROGRAPH FROM AREA 200.B

TIME HRS	FLOW CFS								
.000	.0	1.500	30.0	3.000	.3	4.500	.1	5.999	.1
.167	.0	1.667	15.6	3.166	.2	4.666	.1	6.166	.1
.333	.0	1.833	8.7	3.333	.2	4.833	.1	6.333	.0
.500	.0	2.000	5.9	3.500	.2	4.999	.1	6.499	.0
.667	.0	2.166	2.8	3.666	.1	5.166	.1	6.666	.0
.833	.0	2.333	1.4	3.833	.1	5.333	.1	6.833	.0
1.000	.0	2.500	.9	4.000	.1	5.499	.1		
1.167	.1	2.666	.6	4.166	.1	5.666	.1		
1.333	6.4	2.833	.4	4.333	.1	5.833	.1		

RUNOFF VOLUME = 1.35334 INCHES = 1.0249 ACRE-FEET
 PEAK DISCHARGE RATE = 30.02 CFS AT 1.500 HOURS BASIN AREA = .0142 SQ. MI.

ADD HYD ID=16 HYD NO=200.B1 ID=14 ID=15
PRINT HYD ID=16 CODE=5

HYDROGRAPH FROM AREA 200.B1

TIME HRS	FLOW CFS								
.000	.0	1.500	49.9	3.000	.5	4.500	.2	5.999	.3
.167	.0	1.667	25.7	3.166	.4	4.666	.2	6.166	.1
.333	.0	1.833	15.2	3.333	.3	4.833	.2	6.333	.0
.500	.0	2.000	10.6	3.500	.3	4.999	.2	6.499	.0
.667	.0	2.166	5.0	3.666	.3	5.166	.2	6.666	.0
.833	.0	2.333	2.4	3.833	.2	5.333	.2	6.833	.0
1.000	.0	2.500	1.5	4.000	.2	5.499	.3		
1.167	.1	2.666	1.0	4.166	.2	5.666	.3		
1.333	12.2	2.833	.7	4.333	.2	5.833	.3		

RUNOFF VOLUME = 1.52002 INCHES = 1.7592 ACRE-FEET
 PEAK DISCHARGE RATE = 49.88 CFS AT 1.500 HOURS BASIN AREA = .0217 SQ. MI.

*S ADD FLOW FROM BASINS 1B & 1C
 ADD HYD ID=16 HYD NO=200.B2 ID=6 ID=16
 *S TOTAL FLOW @ AP3
 PRINT HYD ID=16 CODE=5

HYDROGRAPH FROM AREA 200.B2

TIME HRS	FLOW CFS								
.000	.0	1.500	61.5	3.000	.6	4.500	.3	5.999	.3
.167	.0	1.667	31.8	3.166	.5	4.666	.3	6.166	.1
.333	.0	1.833	18.6	3.333	.4	4.833	.3	6.333	.0
.500	.0	2.000	12.9	3.500	.3	4.999	.3	6.499	.0
.667	.0	2.166	6.1	3.666	.3	5.166	.3	6.666	.0
.833	.0	2.333	2.9	3.833	.3	5.333	.3	6.833	.0
1.000	.0	2.500	1.8	4.000	.3	5.499	.3		
1.167	.1	2.666	1.2	4.166	.3	5.666	.3		
1.333	14.7	2.833	.8	4.333	.3	5.833	.3		

RUNOFF VOLUME = 1.48629 INCHES = 2.1561 ACRE-FEET
 PEAK DISCHARGE RATE = 61.53 CFS AT 1.500 HOURS BASIN AREA = .0272 SQ. MI.

HYDROGRAPH FROM AREA 200.F1

TIME HRS	FLOW CFS								
.000	.0	1.500	69.1	3.000	.7	4.500	.3	5.999	.4
.167	.0	1.667	35.8	3.166	.5	4.666	.3	6.166	.1
.333	.0	1.833	20.8	3.333	.4	4.833	.3	6.333	.0
.500	.0	2.000	14.4	3.500	.4	4.999	.3	6.499	.0
.667	.0	2.166	6.8	3.666	.3	5.166	.3	6.666	.0
.833	.0	2.333	3.3	3.833	.3	5.333	.3	6.833	.0
1.000	.0	2.500	2.1	4.000	.3	5.499	.3		
1.167	.1	2.666	1.4	4.166	.3	5.666	.3		
1.333	16.3	2.833	.9	4.333	.3	5.833	.4		

RUNOFF VOLUME = 1.47075 INCHES = 2.4159 ACRE-FEET
 PEAK DISCHARGE RATE = 69.15 CFS AT 1.500 HOURS BASIN AREA = .0308 SQ. MI.

*S ADD FLOW FROM BASINS 1A,1C,1E,1F,&1G
 ADD HYD ID=5 HYD NO=200.F2 ID=12 ID=4
 PRINT HYD ID=5 CODE=5

HYDROGRAPH FROM AREA 200.F2

TIME HRS	FLOW CFS								
.000	.0	1.500	110.2	3.000	1.1	4.500	.4	5.999	.6
.167	.0	1.667	57.2	3.166	.8	4.666	.4	6.166	.2
.333	.0	1.833	32.7	3.333	.7	4.833	.5	6.333	.1
.500	.0	2.000	22.4	3.500	.6	4.999	.5	6.499	.0
.667	.0	2.166	10.6	3.666	.5	5.166	.5	6.666	.0
.833	.0	2.333	5.2	3.833	.5	5.333	.5	6.833	.0
1.000	.0	2.500	3.2	4.000	.5	5.499	.5		
1.167	.2	2.666	2.1	4.166	.5	5.666	.5		
1.333	25.1	2.833	1.5	4.333	.4	5.833	.6		

RUNOFF VOLUME = 1.42534 INCHES = 3.8161 ACRE-FEET
 PEAK DISCHARGE RATE = 110.22 CFS AT 1.500 HOURS BASIN AREA = .0502 SQ. MI.

*S **BASIN 2F
 COMPUTE NM HYD

ID=3 HYD NO=200.F AREA=0.0036 SQ MI
 PER A=0 PER B=37 PER C=13 PER D=50
 TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 7.1065 CFS UNIT VOLUME = .9978 B = 526.28 P60 = 1.8700
 AREA = .001800 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .124459HR TP = .133300HR K/TP RATIO = .933679 SHAPE CONSTANT, N = 3.788292
 UNIT PEAK = 4.6019 CFS UNIT VOLUME = .9978 B = 340.80 P60 = 1.8700
 AREA = .001800 SQ MI IA = .46100 INCHES INF = 1.14080 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=3 CODE=5

HYDROGRAPH FROM AREA 200.F

TIME HRS	FLOW CFS								
.000	.0	1.333	1.6	2.666	.1	4.000	.0	5.333	.0
.167	.0	1.500	7.6	2.833	.1	4.166	.0	5.499	.0
.333	.0	1.667	4.0	3.000	.1	4.333	.0	5.666	.0
.500	.0	1.833	2.2	3.166	.1	4.500	.0	5.833	.0
.667	.0	2.000	1.5	3.333	.0	4.666	.0	5.999	.0
.833	.0	2.166	.7	3.500	.0	4.833	.0	6.166	.0
1.000	.0	2.333	.4	3.666	.0	4.999	.0	6.333	.0
1.167	.0	2.500	.2	3.833	.0	5.166	.0	6.499	.0

RUNOFF VOLUME = 1.35334 INCHES = .2598 ACRE-FEET
 PEAK DISCHARGE RATE = 7.62 CFS AT 1.500 HOURS BASIN AREA = .0036 SQ. MI.

ADD HYD ID=4 HYD NO=200.F1 ID=16 ID=3
 PRINT HYD ID=4 CODE=5

*S **BASIN 2H
COMPUTE NM HYD

ID=8 HYD NO=200.H AREA=0.0069 SQ MI
PER A=0 PER B=37 PER C=13 PER D=50
TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 13.621 CFS UNIT VOLUME = .9985 B = 526.28 P60 = 1.8700
AREA = .003450 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .124459HR TP = .133300HR K/TP RATIO = .933679 SHAPE CONSTANT, N = 3.788292
UNIT PEAK = 8.8204 CFS UNIT VOLUME = .9988 B = 340.80 P60 = 1.8700
AREA = .003450 SQ MI IA = .46100 INCHES INF = 1.14080 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=8 CODE=5

HYDROGRAPH FROM AREA 200.H

TIME HRS	FLOW CFS								
.000	.0	1.500	14.6	3.000	.1	4.500	.1	5.999	.1
.167	.0	1.667	7.6	3.166	.1	4.666	.1	6.166	.0
.333	.0	1.833	4.2	3.333	.1	4.833	.1	6.333	.0
.500	.0	2.000	2.9	3.500	.1	4.999	.1	6.499	.0
.667	.0	2.166	1.4	3.666	.1	5.166	.1	6.666	.0
.833	.0	2.333	.7	3.833	.1	5.333	.1		
1.000	.0	2.500	.4	4.000	.1	5.499	.1		
1.167	.0	2.666	.3	4.166	.1	5.666	.1		
1.333	3.1	2.833	.2	4.333	.1	5.833	.1		

RUNOFF VOLUME = 1.35334 INCHES = .4980 ACRE-FEET
PEAK DISCHARGE RATE = 14.59 CFS AT 1.500 HOURS BASIN AREA = .0069 SQ. MI.

ADD HYD ID=9 HYD NO=200.H1 ID=7 ID=8
*S TOTAL FLOW @ AP7
PRINT HYD ID=9 CODE=5

HYDROGRAPH FROM AREA 200.H1

TIME HRS	FLOW CFS								
.000	.0	1.500	91.8	3.000	.9	4.500	.3	5.999	.4
.167	.0	1.667	47.8	3.166	.7	4.666	.3	6.166	.2
.333	.0	1.833	26.5	3.333	.5	4.833	.4	6.333	.0
.500	.0	2.000	17.9	3.500	.5	4.999	.4	6.499	.0
.667	.0	2.166	8.5	3.666	.4	5.166	.4	6.666	.0
.833	.0	2.333	4.3	3.833	.4	5.333	.4	6.833	.0
1.000	.0	2.500	2.7	4.000	.4	5.499	.4		
1.167	.2	2.666	1.8	4.166	.4	5.666	.4		
1.333	19.6	2.833	1.2	4.333	.3	5.833	.4		

RUNOFF VOLUME = 1.35330 INCHES = 3.1324 ACRE-FEET
 PEAK DISCHARGE RATE = 91.79 CFS AT 1.500 HOURS BASIN AREA = .0434 SQ. MI.

*S **BASIN 2I
 COMPUTE NM HYD

ID=10 HYD NO=200.I AREA=0.0055 SQ MI
 PER A=0 PER B=37 PER C=13 PER D=50
 TP=-0.1333 HR MASSRAIN=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = 10.857 CFS UNIT VOLUME = .9984 B = 526.28 P60 = 1.8700
 AREA = .002750 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

K = .124459HR TP = .133300HR K/TP RATIO = .933679 SHAPE CONSTANT, N = 3.788292
 UNIT PEAK = 7.0307 CFS UNIT VOLUME = .9983 B = 340.80 P60 = 1.8700
 AREA = .002750 SQ MI IA = .46100 INCHES INF = 1.14080 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033330

PRINT HYD ID=10 CODE=5

HYDROGRAPH FROM AREA 200.I

TIME HRS	FLOW CFS								
.000	.0	1.500	11.6	3.000	.1	4.500	.0	5.999	.1
.167	.0	1.667	6.1	3.166	.1	4.666	.0	6.166	.0
.333	.0	1.833	3.4	3.333	.1	4.833	.0	6.333	.0
.500	.0	2.000	2.3	3.500	.1	4.999	.0	6.499	.0
.667	.0	2.166	1.1	3.666	.1	5.166	.0	6.666	.0
.833	.0	2.333	.5	3.833	.0	5.333	.0		
1.000	.0	2.500	.3	4.000	.0	5.499	.0		
1.167	.0	2.666	.2	4.166	.0	5.666	.1		

1.333 2.5 2.833 .2 4.333 .0 5.833 .1

RUNOFF VOLUME = 1.35334 INCHES = .3970 ACRE-FEET
 PEAK DISCHARGE RATE = 11.64 CFS AT 1.500 HOURS BASIN AREA = .0055 SQ. MI.

ADD HYD ID=11 HYD NO=200.I1 ID=5 ID=10
 PRINT HYD ID=11 CODE=5

HYDROGRAPH FROM AREA 200.I1

TIME HRS	FLOW CFS								
.000	.0	1.500	121.9	3.000	1.2	4.500	.5	5.999	.6
.167	.0	1.667	63.2	3.166	.9	4.666	.5	6.166	.3
.333	.0	1.833	36.0	3.333	.7	4.833	.5	6.333	.1
.500	.0	2.000	24.7	3.500	.6	4.999	.5	6.499	.0
.667	.0	2.166	11.7	3.666	.6	5.166	.5	6.666	.0
.833	.0	2.333	5.7	3.833	.5	5.333	.5	6.833	.0
1.000	.0	2.500	3.6	4.000	.5	5.499	.6		
1.167	.2	2.666	2.3	4.166	.5	5.666	.6		
1.333	27.6	2.833	1.6	4.333	.5	5.833	.6		

RUNOFF VOLUME = 1.41823 INCHES = 4.2131 ACRE-FEET
 PEAK DISCHARGE RATE = 121.85 CFS AT 1.500 HOURS BASIN AREA = .0557 SQ. MI.

DEVELOPMENT & BUILDING SERVICE CENTER
ONE STOP SHOP
600 SECOND ST. N.W.

ATTENTION: Sanvaly
505-924-3900

Records Withdrawal Form

Project No. M10-D7A Date: 08-16-06

Project Title: Rolling Hills U 283

a. File b. Mylars c. Redlines/Comments
d. Other Drawings

Requested by: Cherie Tuzillo JMA Phone No.: 3454282
Name and Company

Comments:

Anticipated Return Date: _____

I hereby accept full responsibility for the security of the above noted records/plans until return receipt acknowledgement is completed. Records/plans will be returned to the Development and Building Services Center on or before the indicated anticipated return date.

Delivery Picked Up By:

Name: Paul Naber Organization: ABQ Reprographics
Print

Signed: Paul Naber Date: 8-16-06

Office Use Only

Return Acknowledged:

Received By: RD Date: 8/17/06
Print



SCALE: 1" = 1000'



LEGEND

- DRAINAGE BOUNDARY
- SUBBASIN BOUNDARY
- 24D** SUBBASIN NUMBER
- EXIST. CULVERTS
- FUTURE STORM SEWER
- OUTFLOW LOCATIONS
- COMBINED SUBBASIN BOUNDARY

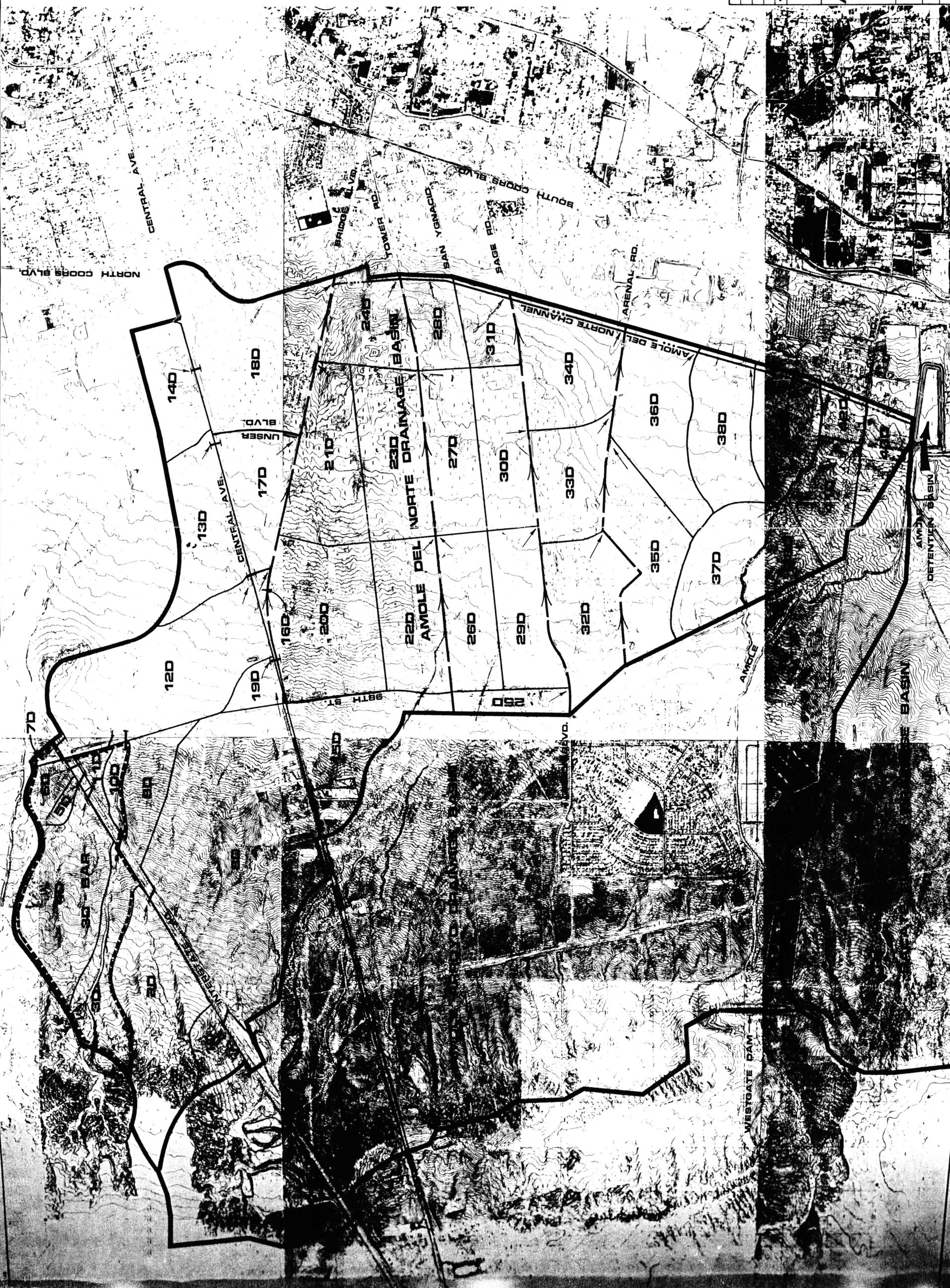
REVISION	DATE	DESCRIPTION	APPROVED

PLATE I

**AMOLE DETENTION BASIN
UPLAND DRAINAGE
AREAS**

B *Bouie Engineering Corporation*
consulting engineers

APPROVED: _____ SHEET NO. _____
 CHECKED: J.D.M. T.D.S. DATE: FEB. 85 DRAWING NO. _____
 T.W.P. _____





September 30, 1997

Martin J. Chávez, Mayor

Melissa Combs
Isaacson & Arfman
128 Monroe St. NE
Albuquerque, NM 87108

RE: *ROLLING HILLS UNIT 4 AND 5 (M10-D7B). GRADING AND DRAINAGE PLAN FOR GRADING PERMIT APPROVAL. ENGINEER'S STAMP DATED SEPTEMBER 9, 1997 (GRADING DETAILS ONLY).*

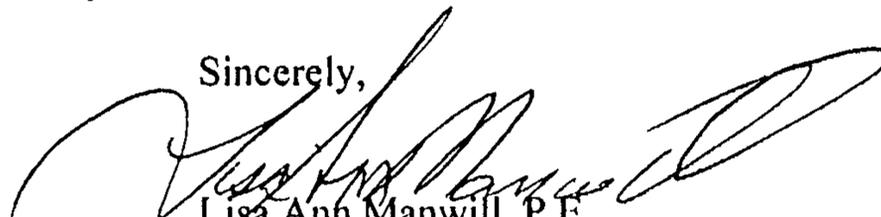
Dear Ms. Combs:

Based on the information provided on your September 9, 1997 submittal, City Hydrology has the following comments:

1. The Engineer's seal for the grading and drainage plan must be dated.
2. I assume there is a master plan that came up with allowable flow rates. Please discuss how this plan relates to an approved master plan.
3. What are the flows for this subdivision. Show me your calculations. Provide a narrative.
4. Indicate that all roof flow is directed to the front yard.
5. Garden walls or header walls will be required along each lot's side yard. A fence is allowed to be constructed on top of a 12-inch (min) header wall.
6. I assume there is a wall at the top of the back yard berm. Show a section

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

Sincerely,

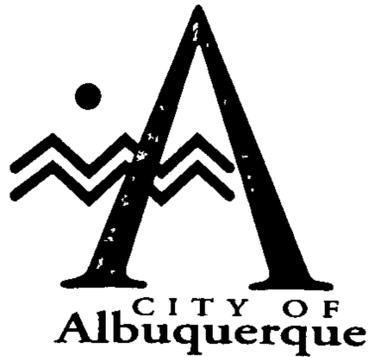


Lisa Ann Manwill, P.E.
Hydrology

c: Andrew Garcia
File

Good for You - Albuquerque!





October 9, 1996

Martin J. Chávez, Mayor

Fred Arfman
Isaacson & Arfman
128 Monroe St. NE
Albuquerque, NM

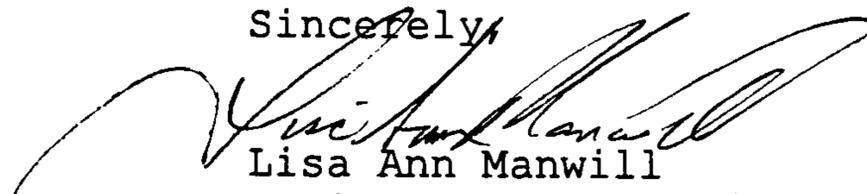
**RE: ROLLING HILLS SUBDIVISION, UNITS 2 AND 3 (M10-D7A). DRAINAGE
REPORT FOR PRELIMINARY AND FINAL PLAT APPROVALS. ENGINEER'S
STAMP DATED SEPTEMBER 9, 1996.**

Dear Mr. Arfman:

Based on the information provided on your September 14, 1996
submittal, the above referenced project is approved for Final Plat.

If I can be of further assistance, please feel free to contact me at
768-3622.

Sincerely,



Lisa Ann Manwill
Engineering Assoc./Hyd.

c: Andrew Garcia
[File]

Good for You. Albuquerque!



DRAINAGE INFORMATION SHEET

PROJECT TITLE: ROLLING HILLS S/D, UNIT 23 ZONE ATLAS/DRNG. FILE #: M-19/47A
 DRB #: 96-290 EPC #: _____ WORK ORDER #: _____
 LEGAL DESCRIPTION: TR. "A", ROLLING HILLS S/D, UNIT 1
 CITY ADDRESS: N/A
 ENGINEERING FIRM: ISAACSON & ARFMAN, P.A. CONTACT: FRED C. ARFMAN
 ADDRESS: 128 MONROE ST. NE PHONE: 268-8828
 OWNER: LONGFORD HOMES OF NM CONTACT: SCOTT ROWE
 ADDRESS: _____ PHONE: 889-4586
 ARCHITECT: N/A. CONTACT: _____
 ADDRESS: _____ PHONE: _____
 SURVEYOR: ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH
 ADDRESS: _____ PHONE: 884-1990
 CONTRACTOR: N/A. CONTACT: _____
 ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

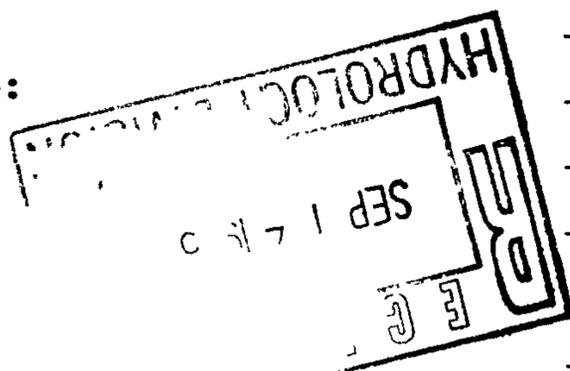
- DRAINAGE REPORT
- DRAINAGE PLAN
- CONCEPTUAL GRADING & DRAINAGE PLAN
- GRADING PLAN
- EROSION CONTROL PLAN
- ENGINEER'S CERTIFICATION
- OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- SKETCH PLAT APPROVAL
- PRELIMINARY PLAT APPROVAL
- S. DEV. PLAN FOR SUB'D. APPROVAL
- S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- SECTOR PLAN APPROVAL
- FINAL PLAT APPROVAL
- FOUNDATION PERMIT APPROVAL
- BUILDING PERMIT APPROVAL
- CERTIFICATE OF OCCUPANCY APPROVAL
- GRADING PERMIT APPROVAL
- PAVING PERMIT APPROVAL
- S.A.D. DRAINAGE REPORT
- DRAINAGE REQUIREMENTS
- OTHER _____ (SPECIFY)

PRE-DESIGN MEETING:

- YES
- NO
- COPY PROVIDED



DATE SUBMITTED: SEPT. 09, 1996

BY: FRED C. ARFMAN

FOR: ISAACSON & ARFMAN, P.A.



CITY OF
Albuquerque
November 13, 1996

Martin J. Chávez, Mayor

Fred Arfman
Isaacson & Arfman
128 Monroe St. NE
Albuquerque, NM

**RE: ROLLING HILLS SUBDIVISION, UNITS 2 AND 3 (M10-D7A). DRAINAGE
PLAN FOR GRADING PERMIT APPROVAL. ENGINEER'S STAMP DATED
SEPTEMBER 9, 1996.**

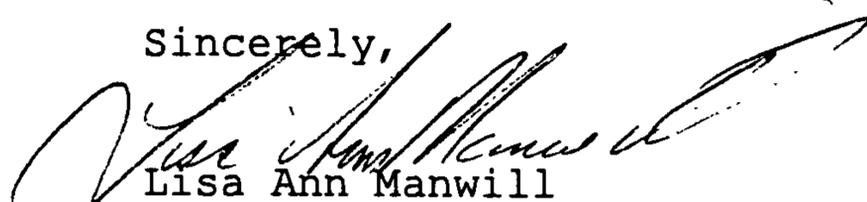
Dear Mr. Arfman:

Based on the information provided on your November 6, 1996
submittal, the above referenced project is approved for Grading
Permit.

Please provide this office with an Engineer's Certification upon
completion.

If I can be of further assistance, please feel free to contact me at
768-3622.

Sincerely,



Lisa Ann Manwill
Engineering Assoc./Hyd.

c: Andrew Garcia
File



DR DRAINAGE INFORMATION SHEET

PROJECT TITLE: ROLLING HILLS S/D, UNIT 2 & 3 ZONE ATLAS/DRNG. FILE #: M-10/D7A
 DRB #: 96-290 EPC #: _____ WORK ORDER #: _____
 LEGAL DESCRIPTION: TR. "A", ROLLING HILLS S/D, UNIT 1
 CITY ADDRESS: N/A
 ENGINEERING FIRM: ISAACSON & ARFMAN, P.A. CONTACT: FRED C. ARFMAN
87108
 ADDRESS: 128 MONROE ST. NE PHONE: 268-8828
 OWNER: LONGWOOD HOMES OF NM CONTACT: SCOTT FOWE
 ADDRESS: _____ PHONE: 889-4586
 ARCHITECT: N/A. CONTACT: _____
 ADDRESS: _____ PHONE: _____
 SURVEYOR: ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH
 ADDRESS: _____ PHONE: 884-1990
 CONTRACTOR: N/A. CONTACT: _____
 ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

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

PRE-DESIGN MEETING:

- YES
- NO
- COPY PROVIDED

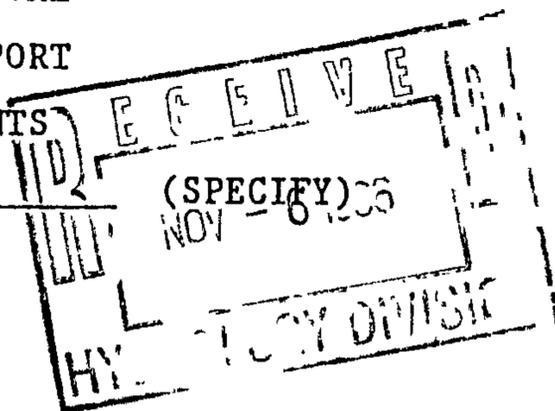
CHECK TYPE OF APPROVAL SOUGHT:

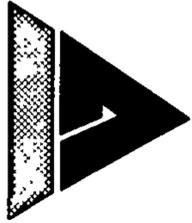
- SKETCH PLAT APPROVAL
- PRELIMINARY PLAT APPROVAL
- S. DEV. PLAN FOR SUB'D. APPROVAL
- S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- SECTOR PLAN APPROVAL
- FINAL PLAT APPROVAL
- FOUNDATION PERMIT APPROVAL
- BUILDING PERMIT APPROVAL
- CERTIFICATE OF OCCUPANCY APPROVAL
- GRADING PERMIT APPROVAL
- PAVING PERMIT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

DATE SUBMITTED: 11.4.96

BY: FRED C. ARFMAN

FOR: ISAACSON & ARFMAN, P.A.





PROJECT MEMORANDUM

10/8/96

TO: Hydrology Division, City of Albuquerque,
Public Works Department

FROM: Jud Lee, Isaacson & Arfman, P.A. 

REF: Rolling Hills Unit II Subdivision **PROJ NO:** I&A 917

SUBJ: Clarification of Hydrology Issues for Preliminary Plat Approval

1. The Master Drainage Report for Rolling Hills Unit One and Future Phases, dated January 1996 analyzed the hydrology for a 76 acre parcel of land between Sage Road and Arenal Road on the north and south, and Unser Blvd. and the Amole del Norte Channel on the west and east. The AHYMO model generated flows totalling 250 cfs at two entrances to the channel. This flow includes 20 cfs of developed waters from the commercial Tract A at the southeast corner of the Sage/Unser intersection. It does not include approximately 20 acres between Rolling Hills and the Channel at the northeast corner of the tract. The Boyle Engineering Corporation Design Development Report for the Amole del Norte Storm Diversion Facility of June 1984 identified the area as Basin 34D with a 100-year discharge of 306 cfs. The 250 cfs discharge from the Rolling Hills project is well below the 306 cfs allowing for the undeveloped area to discharge up to 56 cfs. Copies of the drainage basin map and the corresponding table of flows are enclosed with this submittal.
2. There will be a small detention area graded out at the interim terminus of Secret Valley Drive. This detention pond will accept the street flows from Secret Valley Drive and drain them to the Amole del Norte Channel via a 4" (minimum) PE drain line. (See attached Pond Grading Plan).
3. Longford Homes is a participant in the Arenal/Unser Drainage Management Plan. This plan calls for large diameter RCP storm drains in Sapphire Street, Unser Blvd., and Kimela Drive, a regional storm water detention facility at the southeast corner of Unser and Arenal, and a 1997 CIP funded 72" RCP in Arenal Road from the pond to the Amole del Norte Channel.

TABLE 4
DATA SUMMARY

100-YEAR STORM DEVELOPED CONDITIONS

Area No.	Basin Length (Feet)	Elev. Drop (Feet)	Slope	Area (Acres)	CN	T _p (Min.)	Direct Runoff (Inches)	Runoff Volume (Acre-ft.)	Peak Flow (cfs)
21D	4015	52	0.0130	128.8	82	24	0.78	8.33	191
22D	3550	82	0.0231	119.6	83	18	0.84	8.25	252
23D	3910	36	0.0092	137.0	83	28	0.84	9.45	186
24D	2010	57	0.0284	89.0	77	10	0.56	4.11	226
25D	2600	40	0.0154	36.0	77	16	0.56	1.66	57
26D	3450	72	0.0209	90.5	80	18	0.69	5.14	157
27D	3840	23	0.0060	99.2	85	32	0.94	7.74	133
28D	2030	57	0.0281	57.0	79	10	0.64	3.03	166
29D	3630	68	0.0187	98.1	79	20	0.64	5.21	143
30D	2430	26	0.0107	97.1	85	18	0.94	7.58	231
31D	1900	62	0.0326	52.0	77	10	0.56	2.40	132
32D	4140	83	0.0200	126.9	79	22	0.64	6.74	168
33D	3650	74	0.0203	93.9	79	20	0.64	4.99	137
34D	3180	76	0.0239	137.5	82	16	0.78	8.90	306
35D	5200	100	0.0192	127.3	77	26	0.56	5.88	124
36D	4300	70	0.0163	140.8	77	24	0.56	6.50	149
37D	3850	86	0.0223	102.5	77	20	0.56	4.74	130
38D	3100	58	0.0187	131.5	77	18	0.56	6.07	186
39D	2670	50	0.0187	52.2	77	16	0.56	2.41	83
40D	2750	50	0.0182	64.5	77	16	0.56	2.98	102

2.2-25 cfs
-Ac

DRB Case No. 96-290
 DRC Project No.:
 Date Submitted: 07-26-96
 Revised Date:
 Prelim. Plat Approved:
 Prelim. Plat Expires:

**FIGURE 12
 EXHIBIT "A"
 TO SUBDIVISION IMPROVEMENT AGREEMENT
 DEVELOPMENT REVIEW BOARD
 REQUIRED INFRASTRUCTURE LISTING
 DRB 96-290
 TRACT A, ROLLING HILLS, UNIT ONE & A PORTION OF TRACT 'KK'
 BEING REPLATED AS**

ROLLING HILLS SUBDIVISION, UNIT TWO

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 Subdivider responsibility. In addition, any unforeseen 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.

<u>UNIT TWO SIZE</u>	<u>IMPROVEMENT</u>	<u>LOCATION</u>	<u>FROM</u>	<u>TO</u>
28'FF MOUNT	Res. Paving Curb & Gutter (Both Sides)	Rolling Hills Rolling Hills Dr.	Cul-de-Sac	Lot 62/Blk A
4"	Waterline	"	"	"
8"	Sanitary Sewer	"	"	"
4'	*PCC Sidewalk	"	Lot 58/54, Blk A	"
28'FF MOUNT	Res. Paving Curb & Gutter (Both Sides)	Autumn Canyon Road	Rolling Hills Rolling Hills Dr.	Fox Hill Dr.
4"	Waterline	"	"	"
8"	Sanitary Sewer	"	"	"
4'	*PCC Sidewalk	"	"	"
28'FF MOUNT	Res. Paving Curb & Gutter (Both Sides)	Windsong Place	Cul-de-Sac	Lot 28/Blk A
4"	Waterline	"	"	Fox Hill Dr.
6"	Waterline	"	Fox Hill Dr.	Lot 28/Blk A
8"	Sanitary Sewer	"	Cul-de-Sac	"
4'	*PCC Sidewalk	"	Lot 39/40, Blk A	"

<u>SIZE</u>	<u>IMPROVEMENT</u>	<u>LOCATION</u>	<u>FROM</u>	<u>TO</u>
32'FF STD	Res. Paving Curb & Gutter (Both Sides)	Fox Hill Drive	Windsong Place	Rockwood Road
6"	Waterline	"	"	"
8"	Waterline	"	Autumn Canyon	Autumn Canyon Rockwood Road
8"	Sanitary Sewer	"	"	"
4'	*PCC Sidewalk	"	"	"
32'FF STD	Res. Paving Curb & Gutter (Both Sides)	Rockwood Road	Fox Hill Drive	Lot 7/Blk F
8"	Waterline	"	"	"
6"	Waterline	"	Secret Valley	Secret Valley Lot 7/Blk F
8"	Sanitary Sewer	"	Fox Hill Drive	Secret Valley
4'	*PCC Sidewalk	"	"	Lot 7/Blk F
24'36"	Storm Drain	"	"	<i>Amolee?</i>
28'FF STD	Res. Paving Curb & Gutter (Both Sides)	Quiet Desert	Lot 14/Blk E	Lot 44/Blk H
6"	Waterline	"	"	"
4'	*PCC Sidewalk	"	"	"
8"	Sanitary Sewer	"	"	Rockwood Road
32'FF STD	Res. Paving Curb & Gutter (Both Sides)	Secret Valley	Lot 6/Blk F	Lot 34/Blk H
4'	*PCC Sidewalk	"	"	"
8"	Waterline	"	"	"
8"	Waterline	Unser Blvd.	Sage Road	Lot 62/Blk A
24' STD	**Art. Paving **Curb & Gutter (Ea. R/W)	"	Lot 57/Blk A	"
MED	**Curb & Gutter (Ea. R/W)	"	"	"
10'	**Asphaltic Trail	"	"	"

MISCELLANEOUS

Street lighting per DPM.

Grading & Drainage: Certification per DPM (prior to release of financial guarantees). To include private perimeter and retaining walls as required on the approved Grading Plan.

All water to include fire hydrants, valves, and appurtenances per DPM.

All storm drains to include catch basins, manholes, connector pipes, and other appurtenances per DPM and final DRC approved plans.

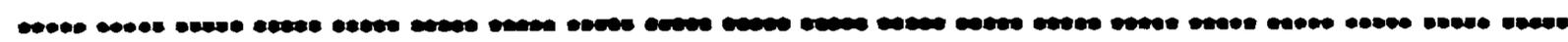
* To be deferred under Sidewalk Deferral Agreement.

**To be deferred to Unit Three Improvements and financially guaranteed under a separate agreement for Unit Two.

*Need to include
All Detention/Retention ponds
& Retention ponds
on this list*

Prepared By: Fred C. Arfman
Fred C. Arfman, P.E.
Isaacson & Arfman, P.A.

07-26-96
Date



Development Review Board Member Approval

Transportation Development Division

Date

Utility Development Division

Date

Parks Design & Development/CIP

Date

City Engineer/AMAFCA

Date

DRB Chairman

Date

768-3629
3/22

DEVELOPMENT & BUILDING SERVICE CENTER
ONE STOP SHOP

600 SECOND ST. N.W.

ATTENTION: Sandy
505-924-3900

Records Withdrawal Form

Project No. M10-D7A Date: 08-16-06

Project Title: Rolling Hills U 283

a. File
b. Mylars
c. Redlines/Comments
d. Other Drawing

Requested by: Olivia Taylor JMA Phone No.: 3454280
Name and Company

Comments:

Anticipated Return Date: _____

I hereby accept full responsibility for the security of the above noted records/plans until return receipt acknowledgement is completed. Records/plans will be returned to the Development and Building Services Center on or before the indicated anticipated return date.

Delivery Picked Up By:

Name: Paul Naber
Print

Organization: ABQ Reprographics

Signed: Paul Naber

Date: 8-16-06

Office Use Only

Return Acknowledged:

Received By: RD
Print

Date: 8/17/06

DEVELOPMENT & BUILDING SERVICE CENTER
ONE STOP
600 SECOND ST. N.W./2ND FLOOR
ATTENTION: _____
505-924-3900

Records Withdrawal Form

Project No. M10/D7A

Date: 6-3-99

Project Title: ROLLING HILLS UNITS 2 & 3

- a. File b. Mylars c. Redlines/Comments
d. Other _____

Requested By: TIERRA WEST Phone No.: 883-7512
Company

Comments: _____

Anticipated Return Date: _____

Receipt Acknowledged

I here by accept full responsibility for the security of the above noted records/plans until return receipt acknowledgement is completed. Records/plans will be returned to the Development & Building Services Center on or before the indicated anticipated return date.

Delivery Picked Up By:

Name: RAY Sedillo
Print

Organization: SUNGRAPHICS

Signed: Ray Sedillo
Phone No. 884-2080

Date: 6-3-99

Office Use Only

Return Acknowledged

Received by: EILEEN RIVERA Date: 6-4-99
Print

DRAINAGE INFORMATION SHEET

PROJECT TITLE: ROLLING HILLS SUBD, UNIT TWO ZONE ATLAS/DRNG. FILE #: M10/D7A
DRB #: 96-290 EPC #: _____ WORK ORDER #: 5379-92

LEGAL DESCRIPTION: ROLLING HILLS SUBD, UNIT TWO

CITY ADDRESS: N/A

ENGINEERING FIRM: ISAACSON & ARMAN, P.A. CONTACT: FRED C. ARMAN

ADDRESS: 128 MAURICE ST. NE 87108 PHONE: 268-8828

OWNER: LONGFORD HOMES OF NEW MEXICO CONTACT: SCOTT FOWLE

ADDRESS: 7404 CRYSTAL RIDGE RD. SW. 87121 PHONE: 831-3331

ARCHITECT: N/A CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH

ADDRESS: _____ PHONE: 884-1990

CONTRACTOR: FRANKON'S CONTACT: JOAN ELLES

ADDRESS: _____ PHONE: 884-6947

TYPE OF SUBMITTAL:

- DRAINAGE REPORT
- DRAINAGE PLAN
- CONCEPTUAL GRADING & DRAINAGE PLAN,
- GRADING PLAN
- EROSION CONTROL PLAN
- ENGINEER'S CERTIFICATION
- OTHER _____

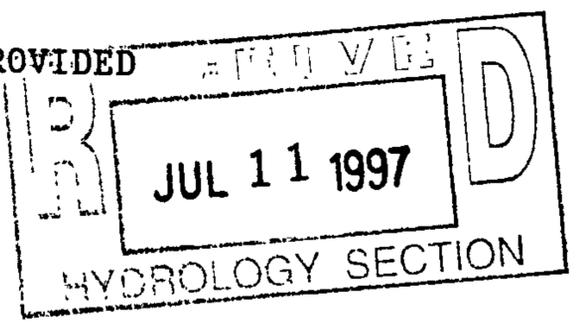
CHECK TYPE OF APPROVAL SOUGHT:

- SKETCH PLAT APPROVAL
- PRELIMINARY PLAT APPROVAL
- S. DEV. PLAN FOR SUB'D. APPROVAL
- S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- SECTOR PLAN APPROVAL
- FINAL PLAT APPROVAL
- FOUNDATION PERMIT APPROVAL
- BUILDING PERMIT APPROVAL
- CERTIFICATE OF OCCUPANCY APPROVAL
- GRADING PERMIT APPROVAL
- PAVING PERMIT APPROVAL
- S.A.D. DRAINAGE REPORT
- DRAINAGE REQUIREMENTS
- SUBDIVISION CERTIFICATION
- OTHER _____ (SPECIFY)

PRE-DESIGN MEETING:

- YES
- NO

COPY PROVIDED _____



DATE SUBMITTED: JULY 11, 1997

BY: FRED C. ARMAN

FOR: ISAACSON & ARMAN, P.A.

FIGURE 6
CITY OF ALBUQUERQUE
NOTICE OF D.R.C. MEETING
5-17-97
(DATE)

DRB NO: 96-290
PROJECT NO: 537992
ZONE ATLAS: m-10

PROJECT NAME: Rolling Hills, Unit 3
LOCATION: (Stinson & Sage)

TYPE OF PROJECT: AHBA CIP PWC SAD ALL PRIVATE

Contact Person: Fred Aylman Phone: 8268-8828
Firm: Isaacson & Aylman

Scheduled with the D.R.C. on 5-16-97 at 11:30 Plaza Del Sol/2nd Fl.
 No DRC Meeting Scheduled. Please return any comments by _____

The Project Is Scheduled For:

// Design Report Review // Final Plan Review
// Pre-Design Meeting Signoff of Plans
// Preliminary Plan Review // _____

The Project Relates To:

Water San. Sewer Paving // Storm Drainage // _____

The Attached Package Includes:

/D/ Drawings /S/ Spec's /E/ Estimate /R/ Report /M/ Memo Only

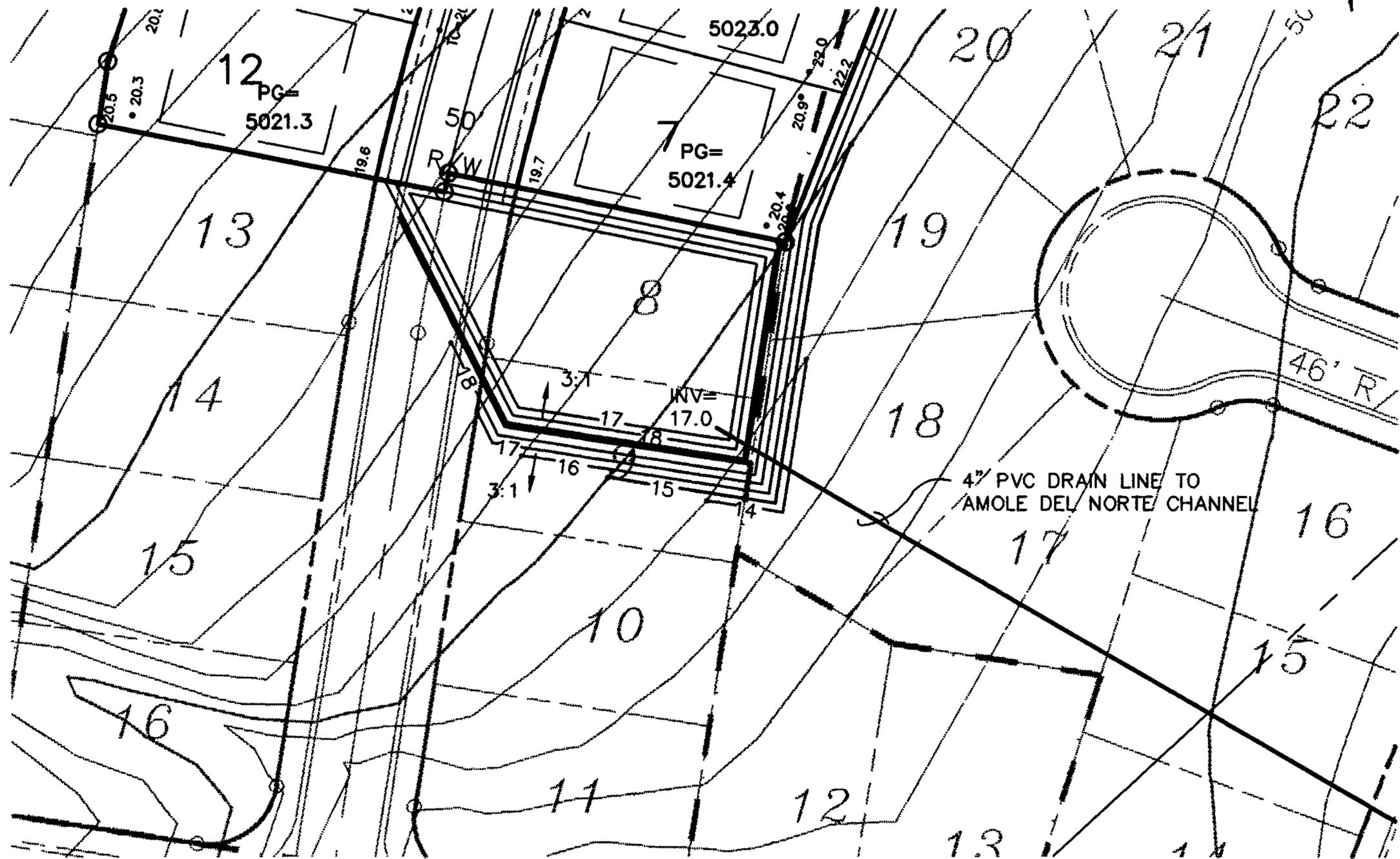
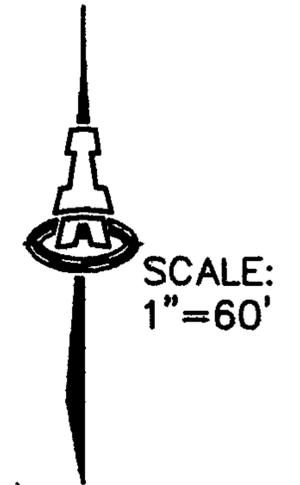
Indicated below are the Departments/Divisions that have received project documents and/or are invited to attend. It will be the Project Managers responsibility to notify consulting engineering firms of date and time of scheduled meetings.

<input checked="" type="checkbox"/> DRC Chairman	Project Review Section	All Drawings
* <input checked="" type="checkbox"/> Traffic Repres	Transportation Development	All Drawings
* <input checked="" type="checkbox"/> Water Repres.	Utility Design	All Drawings
<input checked="" type="checkbox"/> Hydro. Repres. <u>Susan</u>	Hydrology	All Drawings
* <input checked="" type="checkbox"/> Const. Repres.	Construction	All Drawings
<input checked="" type="checkbox"/> Ray Chavez	Traffic Operations	All Drawings
<input checked="" type="checkbox"/> Sergio Miranda	Water (Shutoff Plan)	All Water Shutoff
<input checked="" type="checkbox"/> Parks Repres.	Parks & Recreation	All Landscaping
// Andre Houle	Street Maintenance	All Paving
// _____	Utility Coordinator	All PWC & CIP
// Jim Hamel	Transit Department	CIP/Memo
// Rick Roybal	Construction Coordinator	CIP/Memo
// Jim Fink	Line Maintenance	CIP & SAS/Memo
// John Rupley	City Architect	Arch. Drawings
// Lee Lunsford	SAD Engineer	SAD/Memo
// Joe Luehring	Transportation Develop.	CIP/Memo
// Roger Green	Utility Design	CIP/Water & SAS
// Gene Bustamante	General Services Dept.	Arch. Drawings
// Greg Smith	PWD/Legal	Specs & Dwgs.
// Richard Sertich	Planning Department	CIP/Memos
// CIP Manager	CIP	CIP/Memos
// Donald Bartlett	Risk Management	Arch. Drawings
// _____	_____	_____

* mark-ups distributed. Clean set with Dilly.
Please bring to meeting.

EL.	AREA (FT ²)	STORAGE (FT ²)
17	5363	0
18	7700	6531
19	9635	15200

FROM MASTER REPORT, THE RUNOFF VOLUME
 FROM 20 LOTS = 0.50 AF, SO 12 LOTS
 FROM UNIT 2 = 0.3 AF
 $15200/43560 = 0.35 \text{ AF} > 0.3 \text{ AF}$, OK



DE PAGE INFORMATION SHEET

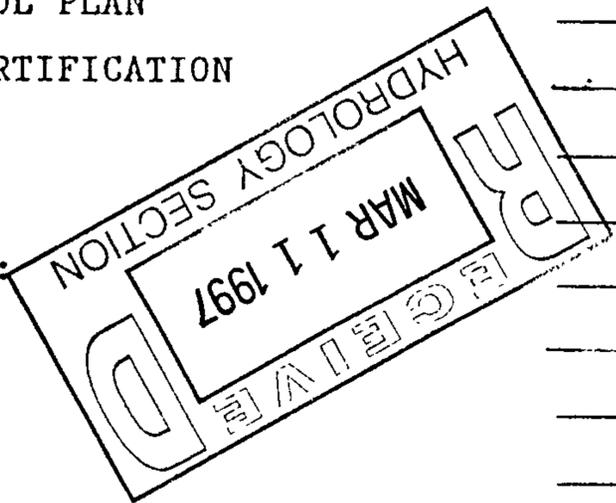
PROJECT TITLE: Rolling Hills S/D, Unit 2 ZONE ATLAS/DRNG. FILE #: M-10/D7A
 DRB #: 96-290 EPC #: _____ WORK ORDER #: 5379.91
 LEGAL DESCRIPTION: Tr. "A", Rolling Hills S/D, Unit 1
 CITY ADDRESS: N/A
 ENGINEERING FIRM: ISAACSON & ARMAN, P.A. CONTACT: FRED C. ARMAN
 ADDRESS: 128 MONROE ST. NE PHONE: 268-8828
 OWNER: LONGFORD HOMES OF NM CONTACT: SCOTT ROWE
 ADDRESS: _____ PHONE: 889-4586
 ARCHITECT: N/A. CONTACT: _____
 ADDRESS: _____ PHONE: _____
 SURVEYOR: ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH
 ADDRESS: _____ PHONE: 884-1990
 CONTRACTOR: N/A. CONTACT: _____
 ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

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

PRE-DESIGN MEETING:

- YES
- NO
- COPY PROVIDED



CHECK TYPE OF APPROVAL SOUGHT:

- SKETCH PLAT APPROVAL
- PRELIMINARY PLAT APPROVAL
- S. DEV. PLAN FOR SUB'D. APPROVAL
- S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- SECTOR PLAN APPROVAL
- FINAL PLAT APPROVAL
- FOUNDATION PERMIT APPROVAL
- BUILDING PERMIT APPROVAL
- CERTIFICATE OF OCCUPANCY APPROVAL
- GRADING PERMIT APPROVAL
- PAVING PERMIT APPROVAL
- S.A.D. DRAINAGE REPORT
- DRAINAGE REQUIREMENTS
- OTHER w.o. APPROVAL (SPECIFY)

No letter, the client needs this approval. Spoke w/ Fred on 3/24/97

This was approved for grading. I just need the w.o. drawings for signatures. Ask Fred

DATE SUBMITTED: MAR. 10, 1997
 BY: FRED C. ARMAN
 FOR: ISAACSON & ARMAN, P.A.

DRAINAGE INFORMATION SHEET

PROJECT TITLE: ROLLING HILLS SUBD, UNIT THREE

ZONE ATLAS/DRNG. FILE#: M-10/078^A

DRB # 96-290

EPC # _____

WORK ORDER # 537992

LEGAL DESCRIPTION: ROLLING HILLS SUBD, UNIT THREE

CITY ADDRESS: N/A.

ENGINEERING FIRM: Isaacson & Arfman, P.A.

CONTACT: FRED ARFMAN

ADDRESS: 128 Monroe Street NE

PHONE: 268-8828

CITY, STATE: Albuquerque, NM

ZIP CODE: 87108

OWNER: LONGFORD HOMES OF NEW MEXICO

CONTACT: JOHN MURTAGH

ADDRESS: 7301 G, JEFFERSON ST. NE

PHONE: 761-9911

CITY, STATE: ALBUQ., NM 87109

ZIP CODE: 87109

ARCHITECT: N/A.

CONTACT: _____

ADDRESS: _____

PHONE: _____

CITY, STATE: _____

ZIP CODE: _____

SURVEYOR: ALDRICH LAND SURVEYING

CONTACT: TIM ALDRICH

ADDRESS: P.O. Box 30701

PHONE: 884-1990

CITY, STATE: ABQ. NM

ZIP CODE: 87190-0701

CONTRACTOR: FRANKLIN CONSTRUCTION

CONTACT: JOHN ELLS

ADDRESS: _____

PHONE: _____

CITY, STATE: _____

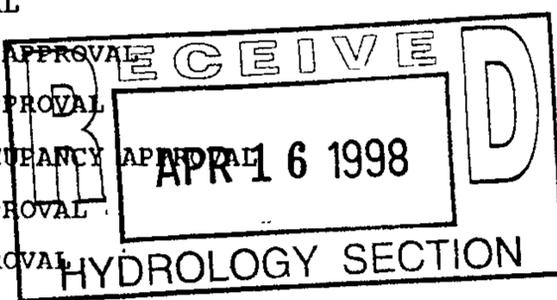
ZIP CODE: _____

TYPE OF SUBMITTAL:

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

CHECK TYPE OF APPROVAL SOUGHT:

- SKETCH PLAT APPROVAL
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- SECTOR PLAN APPROVAL
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- FOUNDATION PERMIT APPROVAL
- BUILDING PERMIT APPROVAL
- CERTIFICATE OF OCCUPANCY APPROVAL
- GRADING PERMIT APPROVAL
- PAVING PERMIT APPROVAL
- S.A.D. DRAINAGE REPORT
- DRAINAGE REQUIREMENTS
- OTHER (SPECIFY) RELEASE OF F.G. CLOSE-OUT PACKAGE

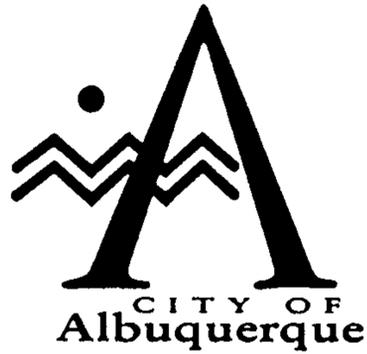


PRE-DESIGN MEETING:

- YES
- NO
- COPY PROVIDED

DATE SUBMITTED: APRIL 16, 1998

BY: FRED C. ARFMAN
FOR ISAACSON & ARFMAN, P.A.



May 4, 1998

Fred C. Arfman, P.E.
Isaacson & Arfman
128 Monroe St. NE
Albuquerque, New Mexico 87108

**RE: Engineer's Certification for Rolling Hills Subdivision, Unit Three, (M10/D7A)
Submitted for Release of Financial Guarantees, Engineer's Stamp Dated 4/16/98.**

Dear Mr. Arfman:

The above referenced Engineer's Certification for Rolling Hills Subdivision Unit 3 is adequate to satisfy the Grading and Drainage certification requirements per the Infrastructure List dated January 7, 1997, and revised on April 22, 1997 for the release of Financial Guarantees.

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

Sincerely,

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

c: Terri Martin, DRB 96-290

File

Good for You, Albuquerque!





June 5, 1998

CERTIFICATE OF COMPLETION AND ACCEPTANCE

John K. Murtagh, President
LONGFORD AT ALBUQUERQUE I, LP
3200 Carlisle Blvd. NE, Suite 219
Albuquerque, NM 87110

RE: ROLLING HILLS UNIT 3; CITY PROJECT NO. 5379.92; MAP NO. M-10

Dear Mr. Murtagh:

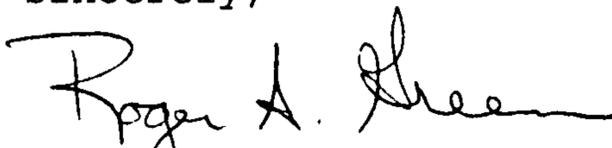
This is to certify that the City of Albuquerque accepts the construction of the infrastructure provided in the Work Order Construction Plans, City Project No. 5379.92 in compliance with the completion of the required public infrastructure listed in the Subdivision Improvements Agreement (SIA) between Longford at Albuquerque I, LP and the City of Albuquerque executed on May 22, 1997.

Having satisfied the requirements referenced above, the SIA and any associated Financial Guaranty, held by the City, can now be released (Processing the release paperwork will take approximately 2 weeks). The Contractors one-year warranty period started at the date of acceptance by the City Engineer, dated June 5, 1998.

Please be advised this Certificate of Completion and Acceptance shall only become effective upon final plat approval and filing in the office of the Bernalillo County Clerk's Office.

Should you have any questions or issues regarding this project, please contact me.

Sincerely,


For Ricardo B. Roybal, P.E.
City Engineer
Dev. & Bld. Services Div.
Public Works Department

Good for You, Albuquerque!



Rolling Hills Unit 3, Proj. #5379.92

Page 2

June 5, 1998

- c. Fred Arfman, Isaacson & Arfman, P.A.
- James E. Mary, AIF, Developers Surety and Indemnity Company
- Mary Sandoval, Construction, PWD
- Fred Aguirre, Hydrology, PWD
- Richard Dourte, Transportation Development, PWD
- Roger Green, Utility Development, PWD
- f/Project file



October 9, 1996

Martin J. Chávez, Mayor

Fred Arfman
Isaacson & Arfman
128 Monroe St. NE
Albuquerque, NM

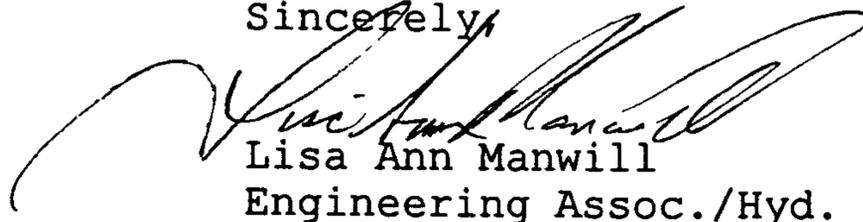
**RE: ROLLING HILLS SUBDIVISION, UNITS 2 AND 3 (M10-D7A). DRAINAGE
REPORT FOR PRELIMINARY AND FINAL PLAT APPROVALS. ENGINEER'S
STAMP DATED SEPTEMBER 9, 1996.**

Dear Mr. Arfman:

Based on the information provided on your September 14, 1996
submittal, the above referenced project is approved for Final Plat.

If I can be of further assistance, please feel free to contact me at
768-3622.

Sincerely,



Lisa Ann Manwill
Engineering Assoc./Hyd.

c: Andrew Garcia

~~File~~

Good for You. Albuquerque!



DRAINAGE INFORMATION SHEET

PROJECT TITLE: Rolling Hills S/D, Unit 283 ZONE ATLAS/DRNG. FILE #: M-10/47A

DRB #: 96-290 EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: Tr. "A", Rolling Hills S/D, Unit 1

CITY ADDRESS: N/A

ENGINEERING FIRM: ISAACSON & ARMAN, P.A. CONTACT: FRED C. ARMAN

ADDRESS: 128 MARQUE ST. NE PHONE: 268-8828

OWNER: LONGFORD HOMES OF NM CONTACT: SCOTT ROWE

ADDRESS: _____ PHONE: 889-4586

ARCHITECT: N/A CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH

ADDRESS: _____ PHONE: 884-1990

CONTRACTOR: N/A CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

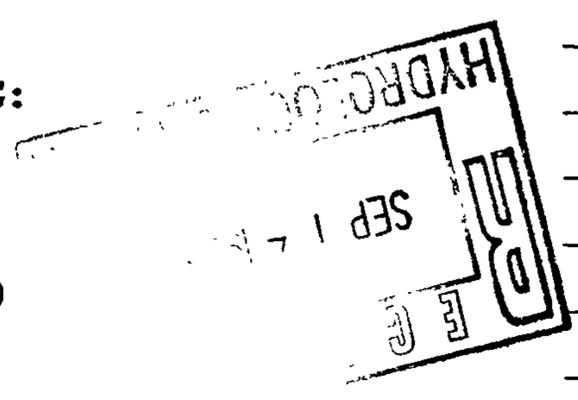
- DRAINAGE REPORT
- DRAINAGE PLAN
- CONCEPTUAL GRADING & DRAINAGE PLAN
- GRADING PLAN
- EROSION CONTROL PLAN
- ENGINEER'S CERTIFICATION
- OTHER

CHECK TYPE OF APPROVAL SOUGHT:

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- PRELIMINARY PLAT APPROVAL
- S. DEV. PLAN FOR SUB'D. APPROVAL
- S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
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- GRADING PERMIT APPROVAL
- PAVING PERMIT APPROVAL
- S.A.D. DRAINAGE REPORT
- DRAINAGE REQUIREMENTS
- OTHER _____ (SPECIFY)

PRE-DESIGN MEETING:

- YES
- NO
- COPY PROVIDED



DATE SUBMITTED: SEPT. 09, 1996

BY: FRED C. ARMAN

FOR: ISAACSON & ARMAN, P.A.



CITY OF
Albuquerque
November 13, 1996

Martin J. Chávez, Mayor

Fred Arfman
Isaacson & Arfman
128 Monroe St. NE
Albuquerque, NM

**RE: ROLLING HILLS SUBDIVISION, UNITS 2 AND 3 (M10-D7A). DRAINAGE
PLAN FOR GRADING PERMIT APPROVAL. ENGINEER'S STAMP DATED
SEPTEMBER 9, 1996.**

Dear Mr. Arfman:

Based on the information provided on your November 6, 1996
submittal, the above referenced project is approved for Grading
Permit.

Please provide this office with an Engineer's Certification upon
completion.

If I can be of further assistance, please feel free to contact me at
768-3622.

Sincerely,

Lisa Ann Manwill
Engineering Assoc./Hyd.

c: Andrew Garcia
File

Good for You, Albuquerque!



DR DRAINAGE INFORMATION SHEET

PROJECT TITLE: ROLLING HILLS S/D, UNIT 2 & 3 ZONE ATLAS/DRNG. FILE #: M-10/D7A

DRB #: 96-290 EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: TR. "A", ROLLING HILLS S/D, UNIT 1

CITY ADDRESS: N/A

ENGINEERING FIRM: ISAACSON & ARMAN, P.A. CONTACT: FRED C. ARMAN

ADDRESS: 128 MONROE ST. NE PHONE: 268-8828

OWNER: LOWMEYER HOMES OF NM CONTACT: SCOTT ROWE

ADDRESS: _____ PHONE: 889-4586

ARCHITECT: N/A CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH

ADDRESS: _____ PHONE: 884-1990

CONTRACTOR: N/A CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

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- DRAINAGE PLAN
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- PAVING PERMIT APPROVAL
- S.A.D. DRAINAGE REPORT
- DRAINAGE REQUIREMENTS
- OTHER _____ (SPECIFY)

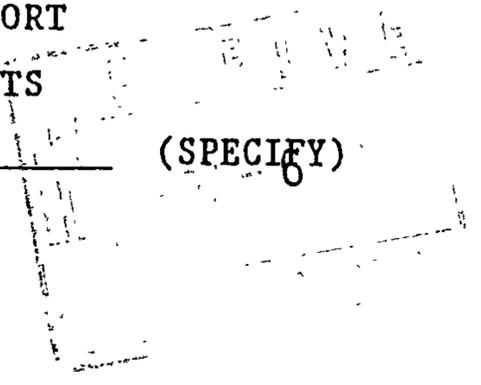
PRE-DESIGN MEETING:

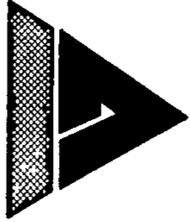
- YES
- NO
- COPY PROVIDED

DATE SUBMITTED: 11.4.96

BY: FRED C. ARMAN

FOR: ISAACSON & ARMAN, P.A.





PROJECT MEMORANDUM

10/8/96

TO: Hydrology Division, City of Albuquerque,
Public Works Department

FROM: Jud Lee, Isaacson & Arfman, P.A. 

REF: Rolling Hills Unit II Subdivision **PROJ NO:** I&A 917

SUBJ: Clarification of Hydrology Issues for Preliminary Plat Approval

1. The Master Drainage Report for Rolling Hills Unit One and Future Phases, dated January 1996 analyzed the hydrology for a 76 acre parcel of land between Sage Road and Arenal Road on the north and south, and Unser Blvd. and the Amole del Norte Channel on the west and east. The AHYMO model generated flows totalling 250 cfs at two entrances to the channel. This flow includes 20 cfs of developed waters from the commercial Tract A at the southeast corner of the Sage/Unser intersection. It does not include approximately 20 acres between Rolling Hills and the Channel at the northeast corner of the tract. The Boyle Engineering Corporation Design Development Report for the Amole del Norte Storm Diversion Facility of June 1984 identified the area as Basin 34D with a 100-year discharge of 306 cfs. The 250 cfs discharge from the Rolling Hills project is well below the 306 cfs allowing for the undeveloped area to discharge up to 56 cfs. Copies of the drainage basin map and the corresponding table of flows are enclosed with this submittal.
2. There will be a small detention area graded out at the interim terminus of Secret Valley Drive. This detention pond will accept the street flows from Secret Valley Drive and drain them to the Amole del Norte Channel via a 4" (minimum) PE drain line. (See attached Pond Grading Plan).
3. Longford Homes is a participant in the Arenal/Unser Drainage Management Plan. This plan calls for large diameter RCP storm drains in Sapphire Street, Unser Blvd., and Kimela Drive, a regional storm water detention facility at the southeast corner of Unser and Arenal, and a 1997 CIP funded 72" RCP in Arenal Road from the pond to the Amole del Norte Channel.

TABLE 4
DATA SUMMARY

100-YEAR STORM DEVELOPED CONDITIONS

Area No.	Basin Length (Feet)	Elev. Drop (Feet)	Slope	Area (Acres)	CN	T _p (Min.)	Direct Runoff (Inches)	Runoff Volume (Acre-ft.)	Peak Flow (cfs)
21D	4015	52	0.0130	128.8	82	24	0.78	8.33	191
22D	3550	82	0.0231	119.6	83	18	0.84	8.25	252
23D	3910	36	0.0092	137.0	83	28	0.84	9.45	186
24D	2010	57	0.0284	89.0	77	10	0.56	4.11	226
25D	2600	40	0.0154	36.0	77	16	0.56	1.66	57
26D	3450	72	0.0209	90.5	80	18	0.69	5.14	157
27D	3840	23	0.0060	99.2	85	32	0.94	7.74	133
28D	2030	57	0.0281	57.0	79	10	0.64	3.03	166
29D	3630	68	0.0187	98.1	79	20	0.64	5.21	143
30D	2430	26	0.0107	97.1	85	18	0.94	7.58	231
31D	1900	62	0.0326	52.0	77	10	0.56	2.40	132
32D	4140	83	0.0200	126.9	79	22	0.64	6.74	168
33D	3650	74	0.0203	93.9	79	20	0.64	4.99	137
34D	3180	76	0.0239	137.5	82	16	0.78	8.90	306
35D	5200	100	0.0192	127.3	77	26	0.56	5.88	124
36D	4300	70	0.0163	140.8	77	24	0.56	6.50	149
37D	3850	86	0.0223	102.5	77	20	0.56	4.74	130
38D	3100	58	0.0187	131.5	77	18	0.56	6.07	186
39D	2670	50	0.0187	52.2	77	16	0.56	2.41	83
40D	2750	50	0.0182	64.5	77	16	0.56	2.98	102

*2.225 cfs
Ac*

DRB Case No. 96-290
 DRC Project No.:
 Date Submitted: 07-26-96
 Revised Date:
 Prelim. Plat Approved:
 Prelim. Plat Expires:

**FIGURE 12
 EXHIBIT "A"
 TO SUBDIVISION IMPROVEMENT AGREEMENT
 DEVELOPMENT REVIEW BOARD
 REQUIRED INFRASTRUCTURE LISTING
 DRB 96-290
 TRACT A, ROLLING HILLS, UNIT ONE & A PORTION OF TRACT 'KK'
 BEING REPLATED AS**

ROLLING HILLS SUBDIVISION, UNIT TWO

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 Subdivider responsibility. In addition, any unforeseen 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.

<u>UNIT TWO SIZE</u>	<u>IMPROVEMENT</u>	<u>LOCATION</u>	<u>FROM</u>	<u>TO</u>
28'FF MOUNT	Res. Paving Curb & Gutter (Both Sides)	Rolling Hills Rolling Hills Dr.	Cul-de-Sac	Lot 62/Blk A
4"	Waterline	"	"	"
8"	Sanitary Sewer	"	"	"
4'	*PCC Sidewalk	"	Lot 58/54, Blk A	"
28'FF MOUNT	Res. Paving Curb & Gutter (Both Sides)	Rolling Hills Autumn Canyon Road	Rolling Hills Rolling Hills Dr.	Fox Hill Dr.
8"	Waterline	"	"	"
8"	Sanitary Sewer	"	"	"
4'	*PCC Sidewalk	"	"	"
28'FF MOUNT	Res. Paving Curb & Gutter (Both Sides)	Windsong Place	Cul-de-Sac	Lot 28/Blk A
4"	Waterline	"	"	Fox Hill Dr.
6"	Waterline	"	Fox Hill Dr.	Lot 28/Blk A
8"	Sanitary Sewer	"	Cul-de-Sac	"
4'	*PCC Sidewalk	"	Lot 39/40, Blk A	"

<u>SIZE</u>	<u>IMPROVEMENT</u>	<u>LOCATION</u>	<u>FROM</u>	<u>TO</u>
32'FF STD	Res. Paving Curb & Gutter (Both Sides)	Fox Hill Drive	Windsong Place	Rockwood Road
6"	Waterline	"	"	"
8"	Waterline	"	Autumn Canyon	Autumn Canyon Rockwood Road
8"	Sanitary Sewer	"	"	"
4'	*PCC Sidewalk	"	"	"
32'FF STD	Res. Paving Curb & Gutter (Both Sides)	Rockwood Road	Fox Hill Drive	Lot 7/Blk F
8"	Waterline	"	"	"
6"	Waterline	"	Secret Valley	Secret Valley Lot 7/Blk F
8"	Sanitary Sewer	"	Fox Hill Drive	Secret Valley
4'	*PCC Sidewalk	"	"	Lot 7/Blk F
24-36"	Storm Drain	"	"	<i>Amolee?</i>
28'FF STD	Res. Paving Curb & Gutter (Both Sides)	Quiet Desert	Lot 14/Blk E	Lot 44/Blk H
6"	Waterline	"	"	"
4'	*PCC Sidewalk	"	"	"
8"	Sanitary Sewer	"	"	Rockwood Road
32'FF STD	Res. Paving Curb & Gutter (Both Sides)	Secret Valley	Lot 6/Blk F	Lot 34/Blk H
4'	*PCC Sidewalk	"	"	"
8"	Waterline	"	"	"
8"	Waterline	Unser Blvd.	Sage Road	Lot 62/Blk A
24' STD	**Art. Paving **Curb & Gutter (Ea. R/W)	"	Lot 57/Blk A	"
MED	**Curb & Gutter (Ea. R/W)	"	"	"
10'	**Asphaltic Trail	"	"	"

MISCELLANEOUS

Street lighting per DPM.

Grading & Drainage: Certification per DPM (prior to release of financial guarantees). To include private perimeter and retaining walls as required on the approved Grading Plan.

All water to include fire hydrants, valves, and appurtenances per DPM.

All storm drains to include catch basins, manholes, connector pipes, and other appurtenances per DPM and final DRC approved plans.

* To be deferred under Sidewalk Deferral Agreement.

**To be deferred to Unit Three Improvements and financially guaranteed under a separate agreement for Unit Two.

*Need to include
All Detention/Retention ponds
+ Retention ponds
on this list*

Prepared By: Fred C. Arfman
Fred C. Arfman, P.E.
Isaacson & Arfman, P.A.

07-26-86
Date



Development Review Board Member Approval

Transportation Development Division

Date

Utility Development Division

Date

Parks Design & Development/CIP

Date

City Engineer/AMAFCA

Date

DRB Chairman

Date

768-3629
5/22

DEVELOPMENT & BUILDING SERVICE CENTER
ONE STOP
600 SECOND ST. N.W./2ND FLOOR
ATTENTION: _____
505-924-3900

Records Withdrawal Form

Project No. M16/D7A

Date: 6-3-99

Project Title: ROLLING HILLS UNITS 2 & 3

- a. File b. Mylars c. Redlines/Comments
d. Other _____

Requested By: TERRA WEST Phone No.: 883-7512
Company

Comments: _____

Anticipated Return Date: _____

Receipt Acknowledged

I here by accept full responsibility for the security of the above noted records/plans until return receipt acknowledgement is completed. Records/plans will be returned to the Development & Building Services Center on or before the indicated anticipated return date.

Delivery Picked Up By:

Name: RAY Sedillo
Print

Organization: SUNGRAPHICS

Signed: Ray Sedillo
Phone No. 884-2080

Date: 6-3-99

Office Use Only

Return Acknowledged

Received by: EILEEN RIVERA
Print

Date: 6-4-99

DEVELOPMENT & BUILDING SERVICE CENTER
ONE STOP SHOP
600 SECOND ST. N.W.

ATTENTION: Sandy
505-924-3900

Records Withdrawal Form

Project No. M10-D7A Date: 08-16-06

Project Title: Rolling Hills U 283

a. File
b. Mylars
c. Redlines/Comments
d. Other Drawing

Requested by: Olkie Tuzlo JMA Phone No.: 3454280
Name and Company

Comments:

Anticipated Return Date: _____

I hereby accept full responsibility for the security of the above noted records/plans until return receipt acknowledgement is completed. Records/plans will be returned to the Development and Building Services Center on or before the indicted anticipated return date.

Delivery Picked Up By:

Name: Paul Naber
Print

Organization: ABQ Reprographics

Signed: Paul Naber

Date: 8-16-06

Office Use Only

Return Acknowledged:

Received By: RD
Print

Date: 8/17/06

DEVELOPMENT & BUILDING SERVICE CENTER

ONE STOP SHOP

600 SECOND ST. N.W.

ATTENTION: Sandy

505-924-3900

Records Withdrawal Form

Project No. M10-D7A

Date: 08-16-06

Project Title: Rolling Hills U 283

a. File b. Mylars c. Redlines/Comments
d. Other Drawings

Requested by: Olivia Taylor JMA Phone No.: 3454280
Name and Company

Comments:

Anticipated Return Date: _____

I hereby accept full responsibility for the security of the above noted records/plans until return receipt acknowledgement is completed. Records/plans will be returned to the Development and Building Services Center on or before the indicted anticipated return date.

Delivery Picked Up By:

Name: Paul Naber
Print

Organization: ABQ Reprographics

Signed: Paul Naber

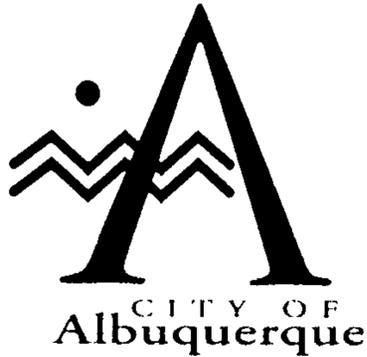
Date: 8-16-06

Office Use Only

Return Acknowledged:

Received By: RD
Print

Date: 8/17/06



July 22, 1997

Martin J. Chávez, Mayor

Fred Arfman, P.E.
Isaacson & Arfman
128 Monroe St. NE
Albuquerque, NM 87108

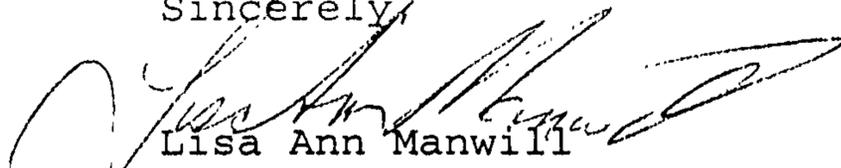
**RE: ROLLING HILLS SUBDIVISION, UNIT 2 (M10-D7A). ENGINEER'S
CERTIFICATION FOR SUBDIVISION CERTIFICATION. ENGINEER'S
CERTIFICATION DATED JULY 10, 1997.**

Dear Mr. Arfman:

Based on the information provided on your July 11, 1997 submittal, City Hydrology accepts the Engineer's Certification of grading and drainage for the release of financial guaranty (Unit 2 only).

If I can be of further assistance, please feel free to contact me at 768-3622.

Sincerely,



Lisa Ann Manwill
Engineering Assoc./Hyd.

c: Terri Martin
Andrew Garcia
~~File~~





June 5, 1998

CERTIFICATE OF COMPLETION AND ACCEPTANCE

John K. Murtagh, President
LONGFORD AT ALBUQUERQUE I, LP
3200 Carlisle Blvd. NE, Suite 219
Albuquerque, NM 87110

RE: ROLLING HILLS UNIT 3; CITY PROJECT NO. 5379.92; MAP NO. M-10

Dear Mr. Murtagh:

This is to certify that the City of Albuquerque accepts the construction of the infrastructure provided in the Work Order Construction Plans, City Project No. 5379.92 in compliance with the completion of the required public infrastructure listed in the Subdivision Improvements Agreement (SIA) between Longford at Albuquerque I, LP and the City of Albuquerque executed on May 22, 1997.

Having satisfied the requirements referenced above, the SIA and any associated Financial Guaranty, held by the City, can now be released (Processing the release paperwork will take approximately 2 weeks). The Contractors one-year warranty period started at the date of acceptance by the City Engineer, dated June 5, 1998.

Please be advised this Certificate of Completion and Acceptance shall only become effective upon final plat approval and filing in the office of the Bernalillo County Clerk's Office.

Should you have any questions or issues regarding this project, please contact me.

Sincerely,

Roger A. Green
for Ricardo B. Roybal, P.E.
City Engineer
Dev. & Bld. Services Div.
Public Works Department

Good for You, Albuquerque!



Rolling Hills Unit 3, Proj. #5379.92

Page 2

June 5, 1998

- c. Fred Arfman, Isaacson & Arfman, P.A.
- James E. Mary, AIF, Developers Surety and Indemnity Company
- Mary Sandoval, Construction, PWD
- ~~Fred Aguirre, Hydrology, PWD~~
- Richard Dourte, Transportation Development, PWD
- Roger Green, Utility Development, PWD
- f/Project file



May 4, 1998

Fred C. Arfman, P.E.
Isaacson & Arfman
128 Monroe St. NE
Albuquerque, New Mexico 87108

**RE: Engineer's Certification for Rolling Hills Subdivision, Unit Three, (M10/D7A)
Submitted for Release of Financial Guarantees, Engineer's Stamp Dated 4/16/98.**

Dear Mr. Arfman:

The above referenced Engineer's Certification for Rolling Hills Subdivision Unit 3 is adequate to satisfy the Grading and Drainage certification requirements per the Infrastructure List dated January 7, 1997, and revised on April 22, 1997 for the release of Financial Guarantees.

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

Sincerely,

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

c: Terri Martin, DRB 96-290

File

Good for You, Albuquerque!



DRAINAGE INFORMATION SHEET

PROJECT TITLE: ROLLING HILLS SUBD, UNIT THREE ZONE ATLAS/DRNG. FILE#: M-10/078^A

DRB # 96-290 EPC # _____ WORK ORDER # 537992

LEGAL DESCRIPTION: ROLLING HILLS SUBD, UNIT THREE

CITY ADDRESS: N/A.

ENGINEERING FIRM: Isaacson & Arfman, P.A. CONTACT: FRED ARFMAN
ADDRESS: 128 Monroe Street NE PHONE: 268-8828
CITY, STATE: Albuquerque, NM ZIP CODE: 87108

OWNER: LONGFORD HOMES OF NEW MEXICO CONTACT: JOHN MURTAGH
ADDRESS: 7301 G, JEFFERSON ST. NE PHONE: 761-9911
CITY, STATE: ALBUQ., NM 87109 ZIP CODE: 87109

ARCHITECT: N/A. CONTACT: _____
ADDRESS: _____ PHONE: _____
CITY, STATE: _____ ZIP CODE: _____

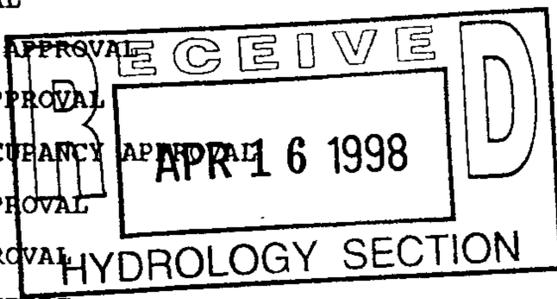
SURVEYOR: ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH
ADDRESS: P.O. Box 30701 PHONE: 884-1990
CITY, STATE: ABQ. NM ZIP CODE: 87190-0701

CONTRACTOR: FRANKLIN CONSTRUCTION CONTACT: JOHN ELLIS
ADDRESS: _____ PHONE: _____
CITY, STATE: _____ ZIP CODE: _____

- TYPE OF SUBMITTAL:
- DRAINAGE REPORT
 - DRAINAGE PLAN
 - CONCEPTUAL GRADING & DRAINAGE PLAN
 - GRADING PLAN
 - EROSION CONTROL PLAN
 - ENGINEER'S CERTIFICATION
 - OTHER

- PRE-DESIGN MEETING:
- YES
 - NO
 - COPY PROVIDED

- CHECK TYPE OF APPROVAL SOUGHT:
- SKETCH PLAT APPROVAL
 - PRELIMINARY PLAT APPROVAL
 - S.DEV. PLAN FOR SUB'D. APPROVAL
 - S.DEV. PLAN FOR BLDG. PERMIT APPROVAL
 - SECTOR PLAN APPROVAL
 - FINAL PLAT APPROVAL
 - FOUNDATION PERMIT APPROVAL
 - BUILDING PERMIT APPROVAL
 - CERTIFICATE OF OCCUPANCY APPROVAL
 - GRADING PERMIT APPROVAL
 - PAVING PERMIT APPROVAL
 - S.A.D. DRAINAGE REPORT
 - DRAINAGE REQUIREMENTS
 - OTHER (SPECIFY) RELEASED F.G.
CLOSE-OUT PACKAGE



DATE SUBMITTED: APRIL 16, 1998
BY: FRED C. ARFMAN
FOR ISAACSON & ARFMAN, P.A.

FIGURE 6
CITY OF ALBUQUERQUE
NOTICE OF D.R.C. MEETING
5-17-97
(DATE)

DRB NO: 96-290
PROJECT NO: 53799Z
ZONE ATLAS: M-10

PROJECT NAME: Rolling Hills, Unit 3
LOCATION: (Stinson & Sage)

TYPE OF PROJECT: AHBA CIP PWC SAD ALL PRIVATE

Contact Person: Fred Arfman Phone: 8268-8828
Firm: Isaacson & Arfman

Scheduled with the D.R.C. on 5-16-97 at 11:30 Plaza Del Sol/2nd Fl.
 No DRC Meeting Scheduled. Please return any comments by _____

The Project Is Scheduled For:

- | | |
|--|--|
| <input type="checkbox"/> / / Design Report Review | <input type="checkbox"/> / / Final Plan Review |
| <input type="checkbox"/> / / Pre-Design Meeting | <input checked="" type="checkbox"/> / / Signoff of Plans |
| <input type="checkbox"/> / / Preliminary Plan Review | <input type="checkbox"/> / / _____ |

The Project Relates To:

- / / Water / / / San. Sewer / / / Paving / / Storm Drainage / / _____

The Attached Package Includes:

- /D/ Drawings / /S/ Spec's / /E/ Estimate / /R/ Report / /M/ Memo Only

Indicated below are the Departments/Divisions that have received project documents and/or are invited to attend. It will be the Project Managers responsibility to notify consulting engineering firms of date and time of scheduled meetings.

<input checked="" type="checkbox"/> DRC Chairman	Project Review Section	All Drawings
* <input checked="" type="checkbox"/> Traffic Repres	Transportation Development	All Drawings
* <input checked="" type="checkbox"/> Water Repres.	Utility Design	All Drawings
<input checked="" type="checkbox"/> Hydro. Repres. <i>Susan</i>	Hydrology	All Drawings
* <input checked="" type="checkbox"/> Const. Repres.	Construction	All Drawings
<input checked="" type="checkbox"/> Ray Chavez	Traffic Operations	All Drawings
<input checked="" type="checkbox"/> Sergio Miranda	Water (Shutoff Plan)	All Water Shutoff
<input checked="" type="checkbox"/> Parks Repres.	Parks & Recreation	All Landscaping
/ / Andre Houle	Street Maintenance	All Paving
/ / _____	Utility Coordinator	All PWC & CIP
/ / Jim Hamel	Transit Department	CIP/Memo
/ / Rick Roybal	Construction Coordinator	CIP/Memo
/ / Jim Fink	Line Maintenance	CIP & SAS/Memo
/ / John Rupley	City Architect	Arch. Drawings
/ / Lee Lunsford	SAD Engineer	SAD/Memo
/ / Joe Luehring	Transportation Develop.	CIP/Memo
/ / Roger Green	Utility Design	CIP/Water & SAS
/ / Gene Bustamante	General Services Dept.	Arch. Drawings
/ / Greg Smith	PWD/Legal	Specs & Dwgs.
/ / Richard Sertich	Planning Department	CIP/Memos
/ / CIP Manager	CIP	CIP/Memos
/ / Donald Bartlett	Risk Management	Arch. Drawings
/ / _____	_____	_____

* mark-ups distributed. Clean set with Billy.
Please bring to meeting.

DRAINAGE INFORMATION SHEET

PROJECT TITLE: ROLLING HILLS SUBD, UNIT TWO ZONE ATLAS/DRNG. FILE #: M10/D7A
DRB #: 16-290 EPC #: _____ WORK ORDER #: 5379-92

LEGAL DESCRIPTION: ROLLING HILLS SUBD, UNIT TWO

CITY ADDRESS: N/A

ENGINEERING FIRM: ISAACSON & ARMAN, P.A. CONTACT: FRED C. ARMAN

ADDRESS: 128 MONROE ST. NE 87108 PHONE: 268-8828

OWNER: LONGFORD HOMES OF NEW MEXICO CONTACT: SCOTT FOWE

ADDRESS: 7404 CRYSTAL RIDGE RD. SW. 87121 PHONE: 831-3331

ARCHITECT: N/A CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH

ADDRESS: _____ PHONE: 884-1990

CONTRACTOR: FRANKLIN'S CONTACT: JOAN ELLES

ADDRESS: _____ PHONE: 884-6947

TYPE OF SUBMITTAL:

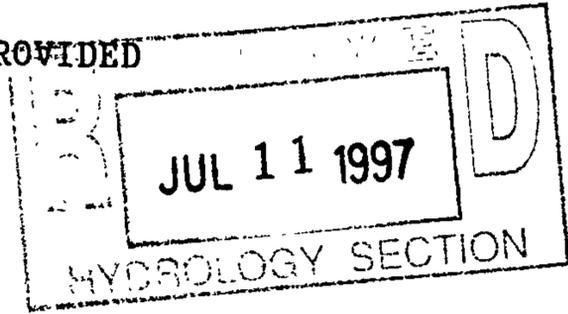
- DRAINAGE REPORT
- DRAINAGE PLAN
- CONCEPTUAL GRADING & DRAINAGE PLAN
- GRADING PLAN
- EROSION CONTROL PLAN
- ENGINEER'S CERTIFICATION
- OTHER _____

CHECK TYPE OF APPROVAL SOUGHT:

- SKETCH PLAT APPROVAL
- PRELIMINARY PLAT APPROVAL
- S. DEV. PLAN FOR SUB'D. APPROVAL
- S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- SECTOR PLAN APPROVAL
- FINAL PLAT APPROVAL
- FOUNDATION PERMIT APPROVAL
- BUILDING PERMIT APPROVAL
- CERTIFICATE OF OCCUPANCY APPROVAL
- GRADING PERMIT APPROVAL
- PAVING PERMIT APPROVAL
- S.A.D. DRAINAGE REPORT
- DRAINAGE REQUIREMENTS
- SUBDIVISION CERTIFICATION
- OTHER _____ (SPECIFY)

PRE-DESIGN MEETING:

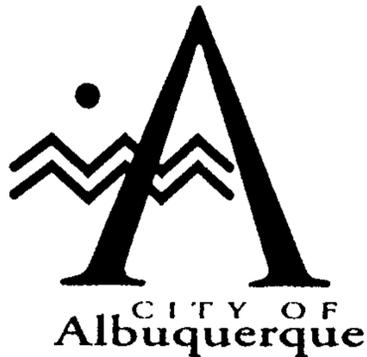
- YES
- NO
- COPY PROVIDED



DATE SUBMITTED: JULY 11, 1997

BY: FRED C. ARMAN

FOR: ISAACSON & ARMAN, P.A.



July 22, 1997

Martin J. Chávez, Mayor

Fred Arfman, P.E.
Isaacson & Arfman
128 Monroe St. NE
Albuquerque, NM 87108

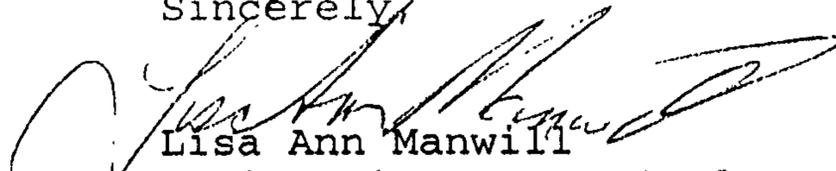
**RE: ROLLING HILLS SUBDIVISION, UNIT 2 (M10-D7A). ENGINEER'S
CERTIFICATION FOR SUBDIVISION CERTIFICATION. ENGINEER'S
CERTIFICATION DATED JULY 10, 1997.**

Dear Mr. Arfman:

Based on the information provided on your July 11, 1997 submittal, City Hydrology accepts the Engineer's Certification of grading and drainage for the release of financial guaranty (Unit 2 only).

If I can be of further assistance, please feel free to contact me at 768-3622.

Sincerely,



Lisa Ann Manwill
Engineering Assoc./Hyd.

c: Terri Martin
Andrew Garcia
File



DI VAGE INFORMATION SHEET

PROJECT TITLE: ROLLING HILLS S/D, UNIT 2 ZONE ATLAS/DRNG. FILE #: M-10/D7A
 DRB #: 96-290 EPC #: _____ WORK ORDER #: 5379.91
 LEGAL DESCRIPTION: TR. A, ROLLING HILLS S/D, UNIT 1
 CITY ADDRESS: N/A
 ENGINEERING FIRM: ISAACSON & ARMAN, P.A. CONTACT: FRED C. ARMAN
 ADDRESS: 128 MONROE ST. NE PHONE: 268-8828
 OWNER: LONGFORD HOMES OF NM CONTACT: SCOTT ROWE
 ADDRESS: _____ PHONE: 889-4586
 ARCHITECT: N/A. CONTACT: _____
 ADDRESS: _____ PHONE: _____
 SURVEYOR: ALDRICH LAND SURVEYING CONTACT: TIM ALDRICH
 ADDRESS: _____ PHONE: 884-1990
 CONTRACTOR: N/A. CONTACT: _____
 ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

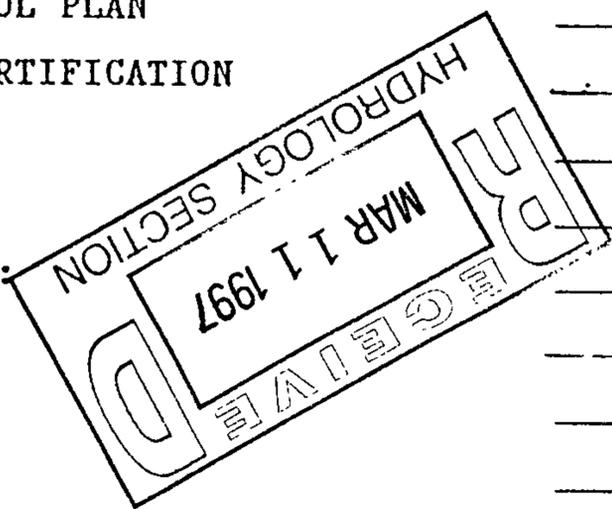
- DRAINAGE REPORT
- DRAINAGE PLAN
- CONCEPTUAL GRADING & DRAINAGE PLAN
- GRADING PLAN
- EROSION CONTROL PLAN
- ENGINEER'S CERTIFICATION
- OTHER

PRE-DESIGN MEETING:

- YES
- NO
- COPY PROVIDED

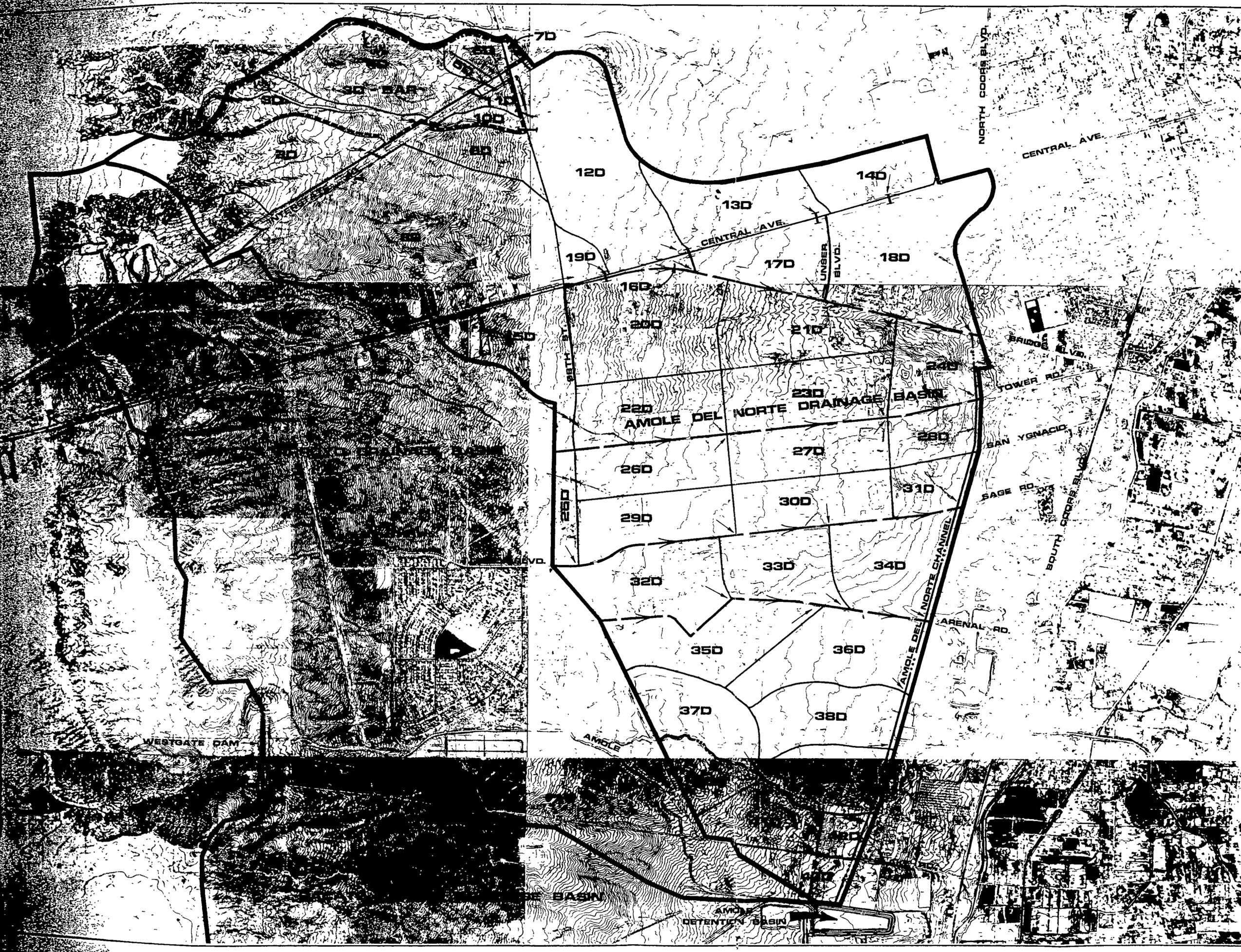
CHECK TYPE OF APPROVAL SOUGHT:

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- S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- SECTOR PLAN APPROVAL
- FINAL PLAT APPROVAL
- FOUNDATION PERMIT APPROVAL
- BUILDING PERMIT APPROVAL
- CERTIFICATE OF OCCUPANCY APPROVAL
- GRADING PERMIT APPROVAL
- PAVING PERMIT APPROVAL
- S.A.D. DRAINAGE REPORT
- DRAINAGE REQUIREMENTS
- OTHER W.O. APPROVAL (SPECIFY)

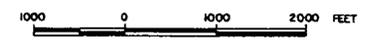


DATE SUBMITTED: MAR. 10, 1997
 BY: FRED C. ARMAN
 FOR: ISAACSON & ARMAN, P.A.

No letter, he doesn't need this approval.
Spoke w/ Fred on 3/24/97
This is approved for grading. I just need the w.o. drawings for signatures.
Art



SCALE: 1" = 1000'



LEGEND

- DRAINAGE BOUNDARY
- SUBBASIN BOUNDARY
- 24D** SUBBASIN NUMBER
- EXIST. CULVERTS
- FUTURE STORM SEWER
- OUTFLOW LOCATIONS
- COMBINED SUBBASIN BOUNDARY

REVISION	DATE	DESCRIPTION	APPROVED

PLATE I

**AMOLE DETENTION BASIN
UPLAND DRAINAGE
AREAS**

B Boise Engineering Corporation
consulting engineers

APPROVED	DATE	BY	DATE	BY
T.W.P.	J.D.M.	T.D.S.	FEB. 85	