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:

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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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Attn: Tim Aldrich, NMPLS No. 7719
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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 offiste 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:

Bond for Septer

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.

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 ft	Channel Slope ft/ft	Mannings 'n'	Discharge cfs	Depth ft	Velocity fps	Capacity Full 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 ft	Channel Slope ft/ft	Mannings 'n'	Discharge cfs	Depth ft	Velocity fps	Capacity Full 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 ft	Channel Slope ft/ft	Mannings 'n'	Discharge cfs	Depth ft	Velocity fps	Capacity Full 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

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

F.M. #3

AHYMO SUMMARY & OUTPUT FILES

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =01/17/1996
INPUT FILE = RHMP.DAT 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	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	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										

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**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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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.

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*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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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     FLOW      TIME     FLOW      TIME     FLOW      TIME     FLOW      TIME     FLOW
   HRS      CFS       HRS      CFS       HRS      CFS       HRS      CFS       HRS      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      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS       CFS           HRS       CFS           HRS       CFS           HRS       CFS           HRS       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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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 STATE OF NEW MEXICO 7322 REGISTERED PROFESSIONAL ENGINEER

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 offiste 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.

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 ft	Channel Slope ft/ft	Mannings 'n'	Discharge cfs	Depth ft	Velocity fps	Capacity Full 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 ft	Channel Slope ft/ft	Mannings 'n'	Discharge cfs	Depth ft	Velocity fps	Capacity Full 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 ft	Channel Slope ft/ft	Mannings 'n'	Discharge cfs	Depth ft	Velocity fps	Capacity Full 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

Open Channel Flow Module, Version 3.43 (c)
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F.M. #3

AHYMO SUMMARY & OUTPUT FILES

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =01/17/1996
INPUT FILE = RHMP.DAT 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	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	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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     FLOW      TIME     FLOW      TIME     FLOW      TIME     FLOW      TIME     FLOW
   HRS      CFS       HRS      CFS       HRS      CFS       HRS      CFS       HRS      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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	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: Angela

505-924-3900

Records Withdrawal Form

Project No. MC-D7A **Date:** 08-16-06

Project Title: Rolling Hills U-283

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

Requested by: Chris Trujillo JMA **Phone No.:** 3454252
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:

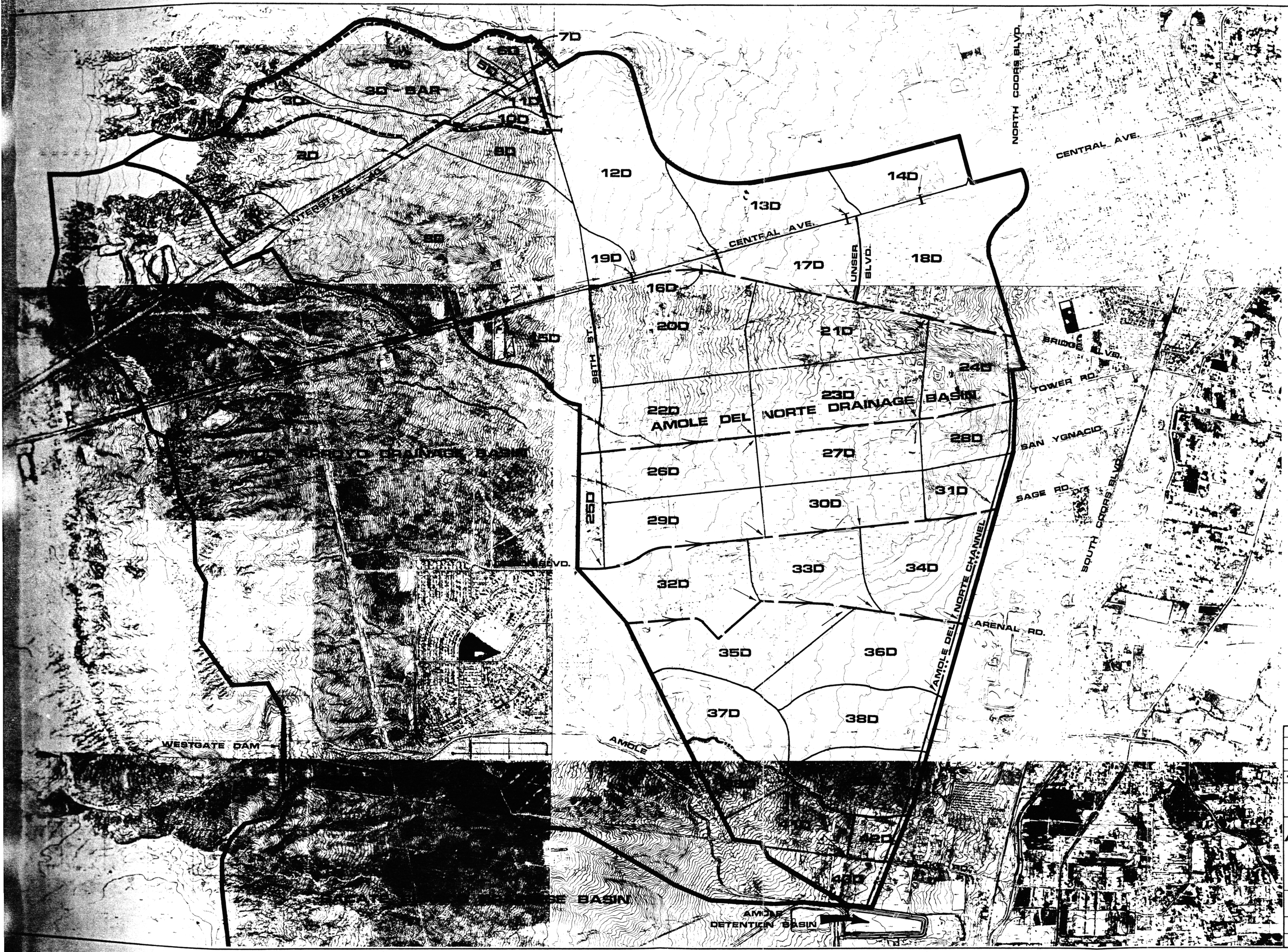
Name: Paul Naber **Organization:** ABQ Reprographics
Print

Signed: Paul Naber **Date:** 8-16-06

Office Use Only

Return Acknowledged:

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



N

SCALE: 1" = 1000'

1000 0 1000 2000 FEET

LEGEND

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

REVISION	DATE	DESCRIPTION	APPROVED

PLATE 1

AMOLE DETENTION BASIN UPLAND DRAINAGE AREAS

Boyle Engineering Corporation
consulting engineers

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

CITY OF
Albuquerque

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 APPRCVAL. 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 lots 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

CITY OF
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

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Rolling Hills S/D, Unit 2&3 ZONE ATLAS/DRNG. FILE #: M-10/W174

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:

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

HYDROLOGY SECTION
SEP 17 '96
C
E

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

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. 87108 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
- X GRADING PLAN
- X 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
- X GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ S.A.D. DRAINAGE REPORT
- ___ DRAINAGE REQUIREMENTS
- ___ OTHER (SPECIFY)

RECEIVED
NOV - 6 1996
HYDROLOGY DIVISION

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

2.225 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.

UNIT TWO

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

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

Need to include All detention/detetpond or. + Retention Ponds on this list

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.

Prepared By: Fred C. Arfman 07-26-96

Fred C. Arfman, P.E. Date
Isaacson & Arfman, P.A.

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

768-3620
Sht

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

ATTENTION: Laurdy

505-924-3900

Records Withdrawal Form

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

Project Title: Rolling Hills U 2&3

a. ~~File~~ b. Mylars c. Redlines/Comments
d. Other Drainage

Requested by: Ollie Trujillo 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 **Organization:** ABQ Reprographics
Print

Signed: Paul Naber **Date:** 8-16-06

Office Use Only

Return Acknowledged:

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

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 Organization: SUNGRAPHICS
Print

Signed: Ray Sedillo Date: 6-3-99
Phone No. 884-2080

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 & ARFMAN, P.A. CONTACT: FRED C. ARFMAN

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

OWNER: LONGFORD HOMES OF NEW MEXICO CONTACT: SCOTT ROWE

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: DAN ELLIS

ADDRESS: _____ PHONE: 884-6947

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAINAGE PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

X ENGINEER'S CERTIFICATION

____ OTHER _____

PRE-DESIGN MEETING:

____ YES

____ NO

____ COPY PROVIDED

RECEIVED
JUL 11 1997
HYDROLOGY SECTION

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

X SUBDIVISION CERTIFICATION

____ OTHER _____ (SPECIFY)

DATE SUBMITTED: JULY 11, 1997

BY: FRED C. ARFMAN

FOR: ISAACSON & ARFMAN, P.A.

FIGURE 6

CITY OF ALBUQUERQUE

NOTICE OF D.R.C. MEETING

5-7-97

(DATE)

DRB NO: 96-290

PROJECT NO: 537992

ZONE ATLAS: B-10

PROJECT NAME: Rolling Hills, Unit 3

LOCATION: (Stinson & Sage)

TYPE OF PROJECT: AHBA X CIP ____ PWC ____ SAD ____ ALL PRIVATE ___

Contact Person: Fred Cuilman Phone: 268-8828

Firm: Isaacson & Cuilman

X Scheduled with the D.R.C. on 5/6/97 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
/ / Pre-Design Meeting
/ / Preliminary Plan Review
/ / Final Plan Review
X Signoff of Plans
/ / _____

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 responsiblity to notify consulting engineering firms of date and time of scheduled meetings.

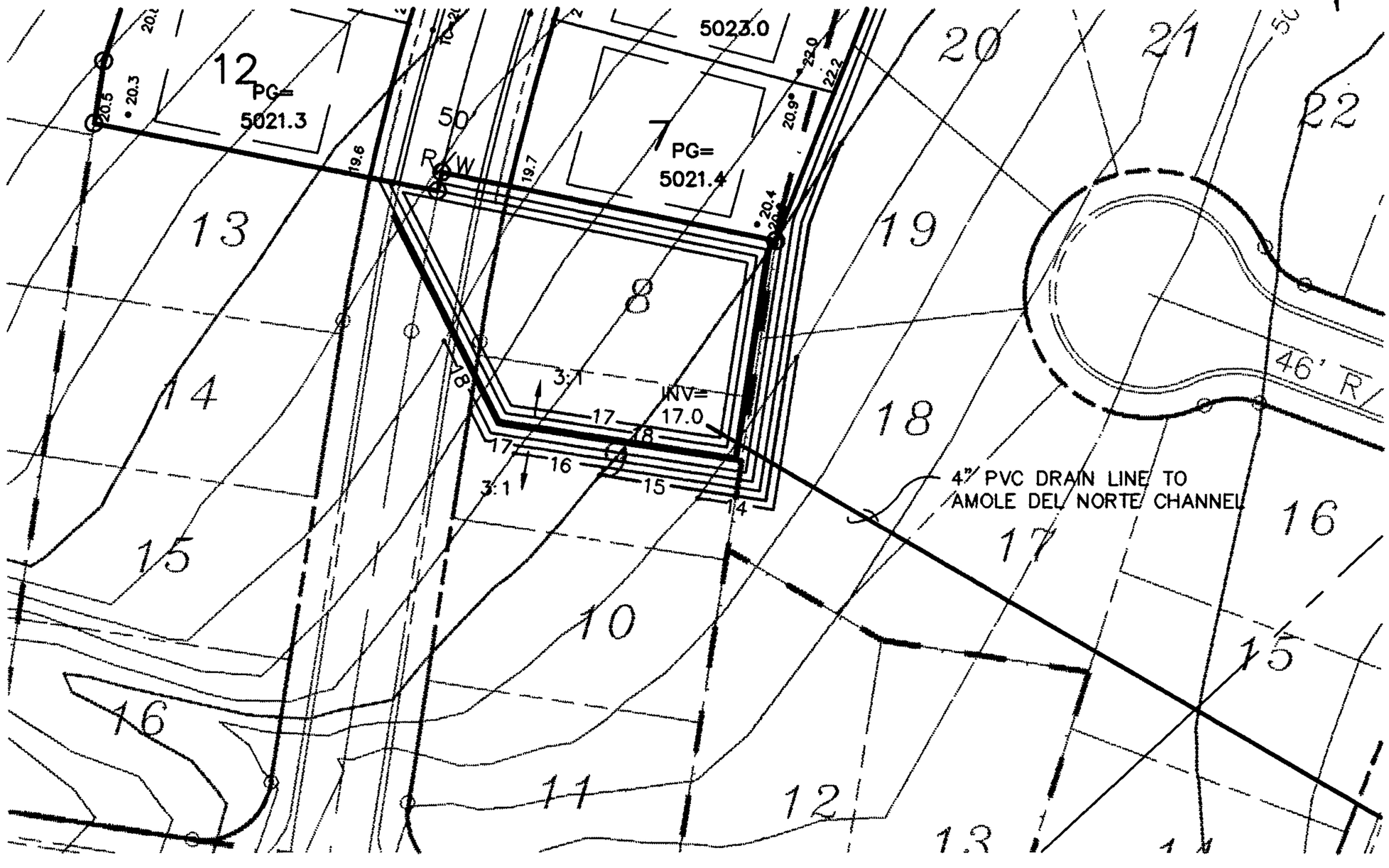
X DRC Chairman	Project Review Section	All Drawings
* X Traffic Repres	Transportation Development	All Drawings
* X Water Repres.	Utility Design	All Drawings
X Hydro Repres. Susan	Hydrology	All Drawings
* X Const. Repres.	Construction	All Drawings
X Ray Chavez	Traffic Operations	All Drawings
X Sergio Miranda	Water (Shutoff Plan)	All Water Shutoff
X 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.

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 AF > 0.3 AF, OK

SCALE:
1"=60'



917EXH.DWGanw 10/8/96

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

PRE-DESIGN MEETING:

- ___ YES
- ___ NO
- ___ COPY PROVIDED

HYDROLOGY SECTION RECEIVED MAR 11 1997

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
- X OTHER W.O. APPROVAL (SPECIFY)

No letter needed. This approval spoke w/ Fred on 3/24/97

This was approved for Grading. I just need the WO drawings for signature. AHB

DATE SUBMITTED: MAR. 10, 1997

BY: FRED C. ARFMAN

FOR: ISAACSON & ARFMAN, P.A.

DRAINAGE INFORMATION SHEET

PROJECT TITLE: ROLLING HILLS SUBD, UNIT THREE

ZONE ATLAS/DRNG. FILE#: M-10/D78 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
X 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
X OTHER (SPECIFY) RELEASE OF F.G. CLOSE-OUT PACKAGE

RECEIVED
APR 16 1998
HYDROLOGY SECTION

DATE SUBMITTED: APRIL 16, 1998

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

CITY OF
Albuquerque

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 Calongne

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

c: Terri Martin, DRB 96-290
File

CITY OF
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,

Roger A. Green

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

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

CITY OF
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
[redacted]

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Rolling Hills S/D, Unit 2&3 ZONE ATLAS/DRNG. FILE #: M-19/W174

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:

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

HYDROLOGY SEP 17 '96

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

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. 87108 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
- X GRADING PLAN
- X 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
- X GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ S.A.D. DRAINAGE REPORT
- ___ DRAINAGE REQUIREMENTS
- ___ OTHER _____ (SPECIFY)

DATE SUBMITTED: 11-4-96

BY: Fred C. Arfman

FOR: Isaacson & Arfman, P.A.

6

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.

UNIT TWO

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

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

MISCELLANEOUS

Street lighting per DPM.

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

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.

Prepared By: Fred C. Arfman 07-26-96

Fred C. Arfman, P.E. Date
Isaacson & Arfman, P.A.

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

768-5629
Sue

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 Organization: SUNGRAPHICS
Print

Signed: Ray Sedillo Date: 6-3-99
Phone No. 884-2080

Office Use Only

Return Acknowledged

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

DEVELOPMENT & BUILDING SERVICE CENTER
ONE STOP SHOP
600 SECOND ST. N.W.
ATTENTION: Sandy
505-924-3900

Records Withdrawal Form

Project No. MIO-D7A **Date:** 08-16-06

Project Title: Rolling Hills U 2&3

a. ~~File~~ b. Mylars c. Redlines/Comments
d. Other Drainage

Requested by: Ollie Trujillo 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 **Organization:** ABQ Reprographics
Print

Signed: Paul Naber **Date:** 8-16-06

Office Use Only

Return Acknowledged:

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

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 2&3

a. ~~File~~ b. Mylars c. Redlines/Comments
d. Other Drainage

Requested by: Debbie Trujillo 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 **Organization:** ABQ Reprographics
Print

Signed: Paul Naber **Date:** 8-16-06

Office Use Only

Return Acknowledged:

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

CITY OF
Albuquerque

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

CITY OF
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,

Roger A. Green

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

Good for You, Albuquerque!

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

CITY OF
Albuquerque

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 Calongne

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

c: Terri Martin, DRB 96-290
File

DRAINAGE INFORMATION SHEET

PROJECT TITLE: ROLLING HILLS SUBD, UNIT THREE

ZONE ATLAS/DRNG. FILE#: M-10/D78 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

X 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

X OTHER (SPECIFY) RELEASE OF F.G. CLOSE-OUT PACKAGE

RECEIVED
APR 16 1998
HYDROLOGY SECTION

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

5-7-97

(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 X CIP ___ PWC ___ SAD ___ ALL PRIVATE ___

Contact Person: Fred Arfman Phone: 268-8828

Firm: Isaacson & Arfman

X Scheduled with the D.R.C. on 5/16/97 at 1:30 Plaza Del Sol/2nd Fl.

___ No DRC Meeting Scheduled. Please return any comments by _____

The Project Is Scheduled For:

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

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 responsiblity to notify consulting engineering firms of date and time of scheduled meetings.

X	DRC Chairman	Project Review Section	All Drawings
* X	Traffic Repres	Transportation Development	All Drawings
* X	Water Repres.	Utility Design	All Drawings
X	Hydro Repres. Susan	Hydrology	All Drawings
* X	Const. Repres.	Construction	All Drawings
X	Ray Chavez	Traffic Operations	All Drawings
X	Sergio Miranda	Water (Shutoff Plan)	All Water Shutoff
X	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 #: 96-290 EPC #: _____ WORK ORDER #: 537292

LEGAL DESCRIPTION: ROLLING HILLS SUBD, UNIT TWO

CITY ADDRESS: N/A

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

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

OWNER: LONGFORD HOMES OF NEW MEXICO CONTACT: SCOTT POWE

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: DAN ELLIS

ADDRESS: _____ PHONE: 884-6947

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT
____ DRAINAGE PLAN
____ CONCEPTUAL GRADING & DRAINAGE PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
(X) ENGINEER'S CERTIFICATION
____ OTHER _____

PRE-DESIGN MEETING:

____ YES
____ NO
____ COPY PROVIDED

RECEIVED
JUL 11 1997
HYDROLOGY SECTION

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
(X) SUBDIVISION CERTIFICATION
____ OTHER _____ (SPECIFY)

DATE SUBMITTED: JULY 11, 1997

BY: FRED C. ARFMAN

FOR: ISAACSON & ARFMAN, P.A.

CITY OF
Albuquerque

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 IAGE 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 & Arfman, P.A. CONTACT: Fred C. Arfman

ADDRESS: 128 Monroe St. NE PHONE: 268-8828

OWNER: Longford Homes of NM CONTACT: Scott Powe

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
X GRADING PLAN
X 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
X OTHER W.O. APPROVAL (SPECIFY)

RECEIVED
HYDROLOGY SECTION
MAR 11 1997

No letter of approval needed. This approval spoke w/ Fred on 3/24/97

This was approved for Grading. I first met the W.O drawings for signature. [illegible]

DATE SUBMITTED: MAR. 10, 1997

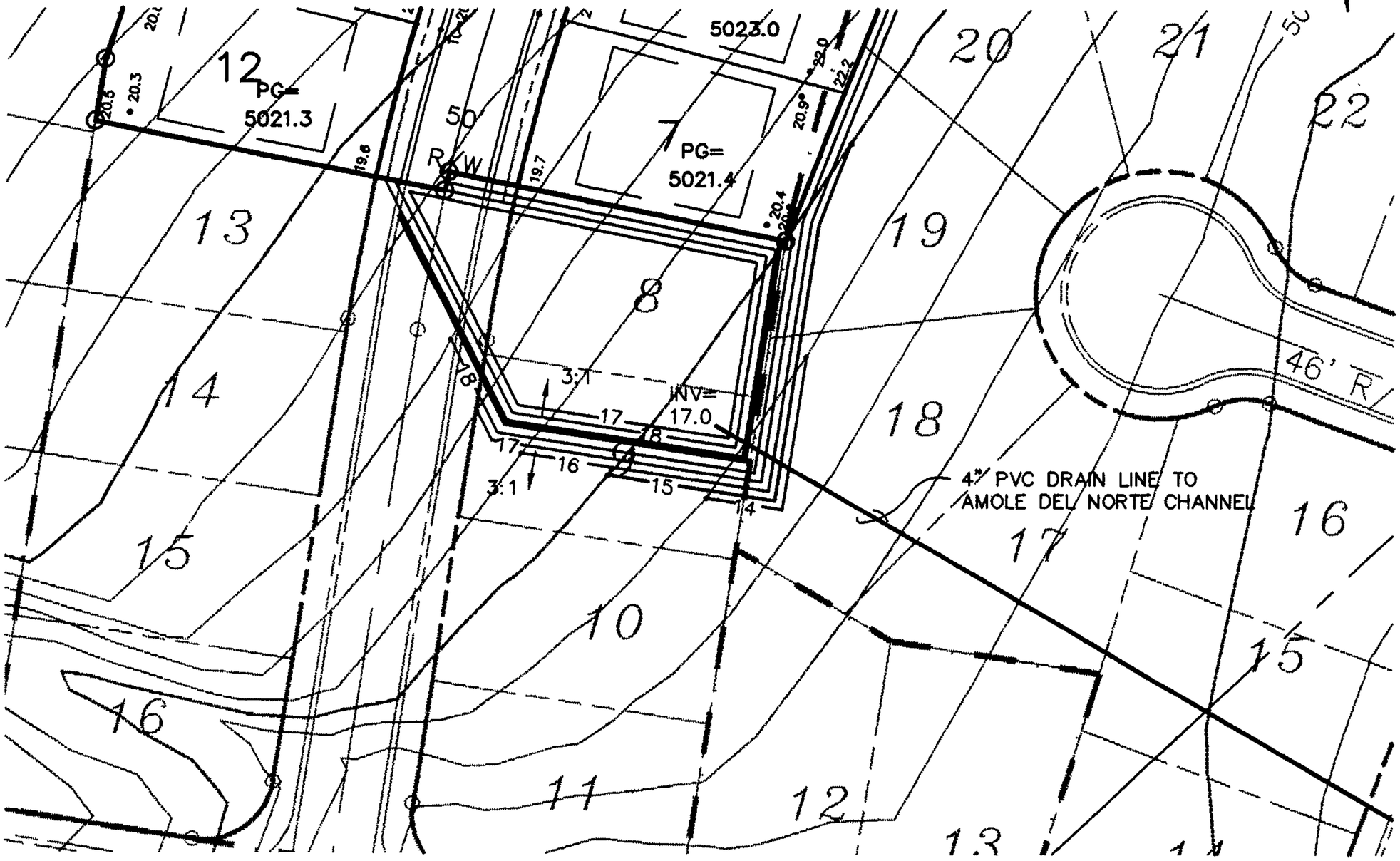
BY: FRED C. ARFMAN

FOR: ISAACSON & ARFMAN, P.A.

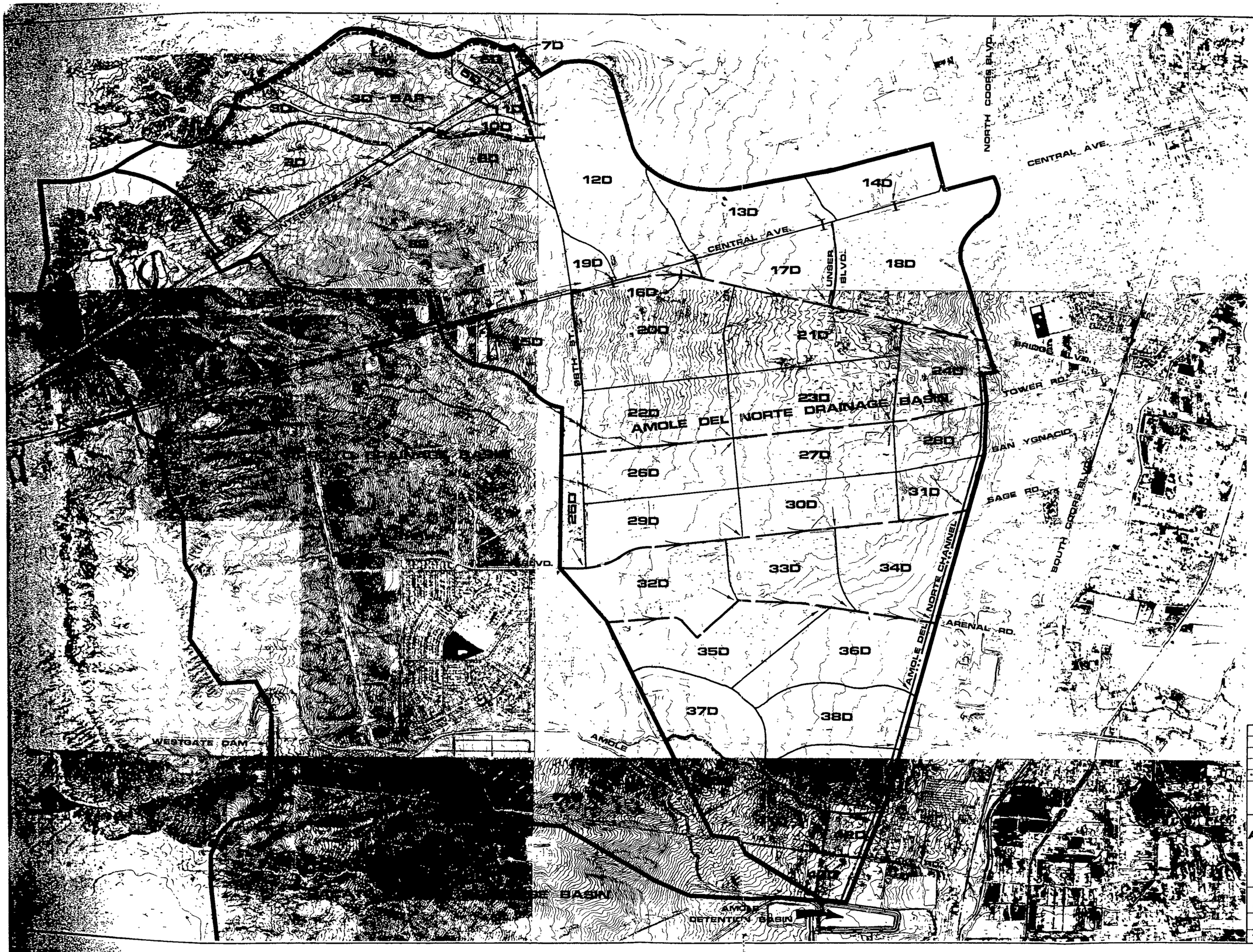
EL.	AREA (FT^2)	STORAGE (FT^2)
17	5363	0
18	7700	6531
19	9635	15200

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 AF > 0.3 AF, OK

SCALE:
1"=60'



917EXH.DWGanw 10/8/96



REVISION	DATE	DESCRIPTION	APPROVED

PLATE 1

AMOLE DETENTION BASIN UPLAND DRAINAGE AREAS

Boyle Engineering Corporation
consulting engineers

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