0000 0000 0613

L9/D14

25×10 32×10

0000 0000 0614

DRAINAGE REPORT
SUNRISE MEADOWS SUBDIVISION

Prepared for **AMERICAN SOUTHWEST HOMES LTD.,CO.**

By **RYALS ENGINEERING AND CONSTRUCTION SERVICES CO.**

Prepared by

ROBERT B. RYALS, P. E.

3-29-96
Date

ROBERT RYALS
8436
REGISTERED PROFESSIONAL ENGINEER

RECEIVED
APR - 4 1996
HYDROLOGY DIVISION

25×10 32×10

0000 0000 0615

SUNRISE MEADOWS SUBDIVISION
DRAINAGE REPORT
MAP: L-9-Z
MARCH 29, 1996

LEGAL DESCRIPTION

West of Westland, Row 4, Unit B, Tract 3 and a portion of Tract 2 together with Snow Vista Diversion right-of-way 8 and Tract C, Unit 2-Phase A, Sunrise Terrace.

FLOOD HAZARD

The site is on FEMA FIRM Panel 33 (October 14, 1983).

Show site on Firm

Tower Road at the north end of the project is in Zone AO (Depth 1). See discussion below on the **Snow Vista Diversion Channel** under **PRESENT CONDITIONS**. The rest of the project is in Zone C.

fp note on Plat?

PRESENT CONDITIONS

The total area of the proposed subdivision site is 21.14 acres and it will be located on land that is presently undeveloped. The site lies between the Snow Vista Channel and 98th Street just south of Tower Road. The site varies in elevation from 5,174 ft. at its southeast corner to 5,202 ft at its northwest corner. The surrounding area is almost entirely residential consisting mainly of single family homes interspersed with town homes, a mobile home park, and some commercial development.

A hydrologic analysis for existing conditions was conducted. Section 22.2 of the City of Albuquerque Design Process Manual (Jan. 93) was used to determine runoff quantities. The area is located in precipitation zone 1. Since the total drainage basin area is less than 40 acres, the simplified procedure in Part A of the DPM was applied. Exhibit No. 1 contains the input data and the results of the hydrologic calculations. In summary, the on-site, existing peak discharge rate from the 100-year, 6-hour storm event is 42.7 cfs. The corresponding runoff volume is 52,054 cu.ft. (1.195 ac.ft.).

SNOW VISTA DIVERSION CHANNEL

Since the FIRM was issued, a major flood control project, the Snow Vista Diversion Channel, was constructed just to the west of the proposed project. The diversion channel effectively cuts off most offsite flow into the project area. The offsite drainage

25×10 32×10

0000 0000 0616

off-site basins?
Done from Tower Road

area was reduced from approximately 84 acres to 4.6 acres. All drainage flow from the 4.6 acres is contained within the right-of-way of Tower Road. A Conditional Letter of Map Revision (CLOMR) will be filed with FEMA through the City/County Floodplain Administrator to remove this area from the Zone AO designation.

PROPOSED CONDITIONS AND HYDROLOGIC/HYDRAULIC ANALYSIS

ONSITE DRAINAGE

The site will be developed in two phases. Phase 1 will consist of the construction of 60 single family residences and a temporary retention pond on a total area of 11.17 acres. Phase 2 will consist of the construction of 46 single family residences and a permanent detention pond. Final total development will consist of 106 single family residences on 18.6 acres. 2.5 acres will be set aside on the south end of the site for the development of a future park by the City of Albuquerque. The housing density is 5.7 dwelling units per acre. Lots will vary in size from 5,000 sf. to 6,350 sf. The lots along the eastern boundary will have a 21' wide area that will contain backyard ponds. These ponds will contain only the runoff from the backyard and not from the roofs. don't count ok

During phase 1, a temporary retention pond with a surface area of approximately 0.5 acre will be constructed. During phase 2, the temporary retention pond will be filled in and a permanent detention pond with a surface area of 0.46 acre will be provided at the southeast corner of the site. See below for more information on how the retention and detention ponds were sized. Street Capacity Calcs? provided in 5/96

Phase 1 - Retention Pond Sizing

During phase 1, a temporary retention pond will be constructed that will contain the entire runoff from the 100-year, 10-day storm event. The pond will not have an outlet. Section 22.2 of the DPM was used to determine runoff volume. The simplified procedure was applied. Exhibit No. 1 contains the input data and the results of the hydrologic calculations for phase 1. In summary, the total runoff volume for the 100-year, 10-day event is 88,979 cu.ft. (2.043 ac.ft.). ?

Pond Capacity Calcs.
See Appmo

25×10 32×10

0000 0000 0617

Combined Phase 1 and Phase 2 - Detention Pond Sizing

A hydrologic analysis was conducted to determine the impact of the entire project. Section 22.2 of the DPM was used to determine runoff volume. The simplified procedure was applied. Exhibit No. 1 contains the input data and the results of the hydrologic calculations for the combined phases. In summary, the total peak discharge rate and runoff volume for the 100-year, 6-hour event are 61.8 cfs. and 93,713 cu. ft. (2.15 ac.ft.), respectively. The runoff per acre of land is 3.3 cfs.

All-onsite drainage flow will eventually outflow into the Snow Vista Diversion Channel. It was assumed in this analysis that the maximum allowable discharge into the diversion channel is 1.3 cfs. per acre of land. For the 18.64 acre study area, the allowable discharge is 24.2 cfs. To attenuate the peak discharge of 3.3 cfs. per acre, a detention pond will be constructed. The detention pond will be located at the southeast corner of the site. All drainage flow will be conveyed overland to and routed through the pond. The pond will drain by gravity through an approximately 1,060 ft. Long reinforced concrete pipe on a minimum slope of 0.2 percent. In order to limit the peak outflow, a vertical orifice will be placed in the outlet structure.

A hydraulic analysis was conducted to determine the size of the detention pond and the diameter of the orifice. Depth-discharge relationships were developed for orifices of various sizes. The relationships were based on the orifice equation recommended in Section 22.3 of the D.P.M. A depth-discharge table for an 18" and 21" orifice is shown in Exhibit No. 2. The size of the detention pond was determined by utilizing the ROUTE RESERVOIR feature of the AHYMO computer program. The storage-discharge table was developed based on the depth-discharge table, a pond bottom elevation of 5177.0 ft., 2:1 side slopes, and available land area. It was determined that a 21" diameter orifice was the optimal size based on a 24-hour, 100-year event. The input data and summarized output information are contained in Exhibit No. 3.

It was then necessary to size the storm drain pipe from the pond outlet to the inlet at the Snow Vista Diversion Channel. A minimum pipe slope of 0.2 percent and pipe diameter of 24" were assumed. A hydraulic grade line (HGL) analysis was performed from the outlet to the orifice per the City of Albuquerque's D.P.M. The ten-year water surface elevation in the diversion channel was assumed to be the starting water surface elevation. In order to ensure that the pond's volume is not exceeded, the

25×10 32×10

0000 0000 0618

HGL just downstream of the orifice should neither exceed the water surface elevation in the pond that produces the maximum allowable discharge of 24.2 cfs nor the maximum allowable water surface elevation of 5181.5 ft.

The conveyance capacity of a 24" diameter pipe was found to be restrictive. Several iterations were undertaken with pipes of various diameter to determine the optimal sizes and lengths. The final solution is shown in Exhibit 4.

The total volume of the pond will approximately 1.0 ac.ft. A 27" pipe will convey storm water from the pond. The pipe will extend to the southwest corner of the site. It will then head south in an easement parallel to the Snow Vista Diversion Channel. Approximately 400 feet south of the southwest property corner at about Snow Diversion Snow Vista Diversion Channel Sta. 65+00, its invert (5274 ft.) matches the invert of the diversion channel. At this point, the inlet to the diversion will be constructed.

Exhibit No. 5 contains the Grading and Drainage Plan.

OFFSITE DRAINAGE

As mentioned above, offsite drainage will be contained to the right-of-way of Tower Rd. and, thus, it will not impact the subdivision site directly. Improvements to the Tower Road right-of-way that are part of this project will ensure that the offsite runoff will stay within the right-of-way and not impact this project.

SUMMARY OF HYDROLOGY

1. **METHODOLOGY:** Albuquerque DPM method for 40 Acres or less (JAN.93).

2. **DESIGN STORM:** 100-Year, 6-Hour, Rain Zone 1 = 2.69" **(TABLE A2)**

3. **LAND TREATMENTS AND PEAK RUNOFF RATES (Qp) IN CFS/ACRE (TABLES A4 & A9)**
   TREATMENT A = NATURAL, Qp = 1.29
   TREATMENT B = LANDSCAPING, Qp = 2.03
   TREATMENT C = PACKED EARTH, DIRT ROADS, Qp = 2.87
   TREATMENT D = IMPERMEABLE, Qp = 4.37

25×10 32×10

0000 0000 0619

4. SUMMARY OF RESULTS

		EXISTING	PROPOSED (Phase 1 & 2)	OFFSITE
TREATMENT A	AC, %	0, 0	0, 0	N/A
TREATMENT B	AC, %	12.9, 69	8.4, 45	
TREATMENT C	AC, %	5.8, 31	0, 0	
TREATMENT D	AC, %	0, 0	10.3, 55	
TOTAL	AC, %	18.7, 100	18.7, 100	
Qpeak, CFS		42.7	61.8	
VOLUME, 6-HOUR, CU FT		52,054	93,713	
VOLUME, 6-HOUR, AC FT		1.195	2.544	

25×10 32×10

0000 0000 0620

SUNRISE MEADOWS SUBDIVISION, CITY OF ALBUQUERQUE

HYDROLOGICAL CALCULATIONS

FILE = SM.WQ1
ALBUQUERQUE, NM, DPM (1/93) CRITERIA - SIMPLE PROCEDURE FOR <= 40 ACRES
PX100-6 = PRECIPITATION EXCESS FROM 100-YEAR 6-HOUR STORM
VOL10D = VOLUME OF RUNOFF FROM 100-YEAR 10-DAY STORM
TRTMT CLASS A=UNDISTURBED, B=LAWNS, C=UNPAVED ROADS, D=ROOFS,PAVEMENT: SEE DPM P 22.5-5

****** PROJECT INFO ******
SUN MEADOWS
CITY OF ALBUQUERQUE
EXISTING AND PROPOSED CONDITIONS

RAIN ZC 1 SEE DPM P 22.2-2
100-YEAR PRECIPTATION (P) DEPTHS, INCHES

1 HR	6 HR	24 HR	4 DAY	10 DAY
1.87	2.20	2.66	3.12	3.67

03/29/96 03:47 PM EXISTING CONDITIONS

TRTMT CLASS	AREA SQ. FT.	AREA AC.	PX100-6 IN/AC	QP100-6 CFS/AC	QP100-6 CFS	VOL6HR AC-FT	VOL1D AC-FT	VOL4D AC-FT	VOL10D AC-FT	TRTMT PERCENT
A	0.00	0.00	0.44	1.29	0.00	0.00	0.00	0.00	0.00	0.00
B	559,982.00	12.86	0.67	2.03	26.10	0.72	0.72	0.72	0.72	68.97
C	251,976.00	5.78	0.99	2.87	16.60	0.48	0.48	0.48	0.48	31.03
D	0.00	0.00	1.97	4.37	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	811,958.00	18.64			42.70	1.19	1.19	1.19	1.19	100.00
					CU FT	52,053.68	52,053.68	52,053.68	52,053.68	

03/29/96 35,153.66 PROPOSED CONDITIONS - PHASE 1 DWELLING UNITS AND STREETS

TRTMT CLASS	AREA SQ. FT.	AREA AC.	PX100-6 IN/AC	QP100-6 CFS/AC	QP100-6 CFS	VOL6HR AC-FT	VOL1D AC-FT	VOL4D AC-FT	VOL10D AC-FT	TRTMT PERCENT
A	0.00	0.00	0.44	1.29	0.00	0.00	0.00	0.00	0.00	0.00
B	219,050.00	5.03	0.67	2.03	10.21	0.28	0.28	0.28	0.28	45.00
C	0.00	0.00	0.99	2.87	0.00	0.00	0.00	0.00	0.00	0.00
D	267,728.00	6.15	1.97	4.37	26.86	1.01	1.24	1.48	1.76	55.00
TOTAL	486,778.00	11.17			37.07	1.29	1.53	1.76	2.04	100.00
					CU FT	56,182.31	66,445.21	76,708.12	88,978.99	

03/29/96 35,153.66 PROPOSED CONDITIONS - PHASE 1 AND PHASE 2 - DWELLING UNITS AND STREETS

TRTMT CLASS	AREA SQ. FT.	AREA AC.	PX100-6 IN/AC	QP100-6 CFS/AC	QP100-6 CFS	VOL6HR AC-FT	VOL1D AC-FT	VOL4D AC-FT	VOL10D AC-FT	TRTMT PERCENT
A	0.00	0.00	0.44	1.29	0.00	0.00	0.00	0.00	0.00	0.00
B	365,381.00	8.39	0.67	2.03	17.03	0.47	0.47	0.47	0.47	45.00
C	0.00	0.00	0.99	2.87	0.00	0.00	0.00	0.00	0.00	0.00
D	446,577.00	10.25	1.97	4.37	44.80	1.68	2.08	2.47	2.94	55.00
TOTAL	811,958.00	18.64			61.83	2.15	2.54	2.94	3.41	100.00
					CU FT	93,713.50	110,832.28	127,951.07	148,419.18	

Storm drain needed?

EXHIBIT NO. 1

25×10 32×10

0000 0000 0621

ORIFICE EQUATION

$$Q = CA\sqrt{2gH}$$

Where;

Q = discharge in cfs.
C = discharge coefficient (0.60 for circular, sharp edged orifices)
A = area of the opening in sf.
g = 32.2 ft./sec.^{2}
H = head in ft. (depth of flow as measured from the middle of the orifice)

HEAD (FT.)	DISCHARGE (CFS.) (18" DIAM.)	DISCHARGE (CFS.) (21" DIAM.)
0.13	3.01	4.09
0.25	4.25	5.79
0.63	6.73	9.16
0.75	7.37	10.03
1.13	9.02	12.28
1.25	9.51	12.95
1.63	10.85	14.76
1.75	11.26	15.32
2.13	12.40	16.88
2.25	12.76	17.37
2.63	13.79	18.76
2.75	14.11	19.21

25×10 32×10

DETENTION POND SIZING

```
AHYMO PROGRAM (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992
     RUN DATE (MON/DAY/YR) = 04/03/1996
     START TIME (HR:MIN:SEC) = 08:58:55      USER NO.= RYALS_NM.I01
     INPUT FILE = f:\work\nick\hydro\sm24_2.hym

START                 0.0 HRS '          0
*
*S            FILE: SM.HYM
*//////////////////////////////////////////////////////////////////////////////
*
*             SUNRISE MEADOWS SUBDIVISION - HYDROLOGY
*
*//////////////////////////////////////////////////////////////////////////////
*
*
*   PROPOSED  CONDITIONS
*   ZONE 1 (MAP #: L-7)
RAINFALL              TYPE=2  RAIN QUARTER=0.0
                      RAIN ONE=1.89 IN  RAIN=2.19 IN
                      RAIN DAY=2.69 IN  DT=0.033333 HRS


COMPUTE NM HYD        ID=1  HYD NO=1  AREA=0.0292 SQ MI
                      PER A=0.00 PER B=45.0 PER C=0.0 PER D=55.0
                      TP=-.1667  HR  MASS RAIN=-1

    K =   .090852HR    TP =   .166700HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
    UNIT PEAK =   50.702    CFS   UNIT VOLUME =    1.000       B =   526.28       P60 = 1.8900
    AREA =      .016060 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


    K =   .163374HR    TP =   .166700HR    K/TP RATIO =   .980045     SHAPE CONSTANT, N =  3.603328
    UNIT PEAK =   25.838    CFS   UNIT VOLUME =    .9996       B =   327.79       P60 = 1.8900
    AREA =      .013140 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD             ID=1     CODE=10
```

OUTFLOW HYDROGRAPH REACH 1.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	4.000	.3	8.000	.4	12.000	.3	16.000	.3
.333	.0	4.333	.2	8.333	.4	12.333	.3	16.333	.3
.667	.0	4.667	.2	8.667	.4	12.667	.3	16.667	.3
1.000	.0	5.000	.2	9.000	.4	13.000	.3	17.000	.3
1.333	9.1	5.333	.2	9.333	.4	13.333	.3	17.333	.3
1.667	37.6	5.667	.3	9.667	.4	13.667	.3	17.666	.2
2.000	14.1	6.000	.3	10.000	.3	14.000	.3	18.000	.2
2.333	3.9	6.333	.4	10.333	.3	14.333	.3	18.333	.2
2.667	1.7	6.667	.4	10.667	.3	14.667	.3	18.666	.2
3.000	.8	7.000	.4	11.000	.3	15.000	.3	19.000	.2
3.333	.5	7.333	.4	11.333	.3	15.333	.3	19.333	.2
3.667	.3	7.667	.4	11.667	.3	15.667	.3	19.666	.2

```
RUNOFF VOLUME =      1.60525 INCHES      =        2.4999 ACRE-FEET
PEAK DISCHARGE RATE =       55.53 CFS  AT   1.533 HOURS   BASIN AREA =   .0292 SQ. MI.
```

25 X

32 X

2280 0000 0000 0000

```
*
* 21" ORIFICE (2:1 POND SIDE SLOPES)
*
ROUTE RESERVOIR        ID=2        HYD=500   INFLOW ID=1 CODE=10
                       OUTFLOW(CFS)  STORAGE(AC FT)  ELEV(FT)
                          0             0              77.0
                          4.09          0.173          78.0
                          9.16          0.268          78.5
                         12.28          0.362          79.0
                         14.76          0.465          79.5
                         16.88          0.5686         80.0
                         18.76          0.6805         80.5
                         20.47          0.792          81.0
                         22.01          0.913          81.5
                         23.52          1.034          82.0

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

 PEAK DISCHARGE =        21.740 CFS - PEAK OCCURS AT HOUR    1.83
 MAXIMUM WATER SURFACE ELEVATION =        81.412
 MAXIMUM STORAGE =          .8918 AC-FT       INCREMENTAL TIME=     .033333HRS

PRINT HYD                 ID=2            CODE=10

                                OUTFLOW HYDROGRAPH RESERVOIR   500.00

     TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW          TIME      FLOW
      HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS            HRS      CFS
      .000       .0          4.000       .8          8.000       .4         12.000       .3         16.000       .3
      .333       .0          4.333       .5          8.333       .4         12.333       .3         16.333       .3
      .667       .0          4.667       .4          8.667       .4         12.667       .3         16.667       .3
     1.000       .0          5.000       .3          9.000       .4         13.000       .3         17.000       .3
     1.333       .8          5.333       .3          9.333       .4         13.333       .3         17.333       .3
     1.667     20.6          5.667       .3          9.667       .4         13.667       .3         17.666       .3
     2.000     21.0          6.000       .3         10.000       .4         14.000       .3         18.000       .3
     2.333     16.3          6.333       .3         10.333       .4         14.333       .3         18.333       .2
     2.667      8.9          6.667       .4         10.667       .3         14.667       .3         18.666       .2
     3.000      3.5          7.000       .4         11.000       .3         15.000       .3         19.000       .2
     3.333      2.1          7.333       .4         11.333       .3         15.333       .3         19.333       .2
     3.667      1.3          7.667       .4         11.667       .3         15.667       .3         19.666       .2

    RUNOFF VOLUME =     1.59890 INCHES      =       2.4900 ACRE-FEET
    PEAK DISCHARGE RATE =      21.74 CFS  AT   1.833 HOURS   BASIN AREA =   .0292 SQ. MI.

*
FINISH

    NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 08:58:57
```

25X
32X

HYDRAULIC GRADE LINE CALCULATIONS

PIPE DIAM. (FT.)	PIPE AREA (SQ.FT.)	HYDRAULIC RADIUS (FT.)	CONV. K	PIPE LENGTH (FT.)	Q (CFS)	HEADLOSS (FT)	VELOCITY (FPS.)	MANHOLE HEADLOSS (FT.)	BEND HEADLOSS (FT.)	TOTAL HEADLOSS (FT.)	H.G.L. (FT.)	E.G.L. (FT.)
1st Iterration												
2	3.14	0.50	226.17	45	22	0.43	7.00	0.04	45° 0.14	0.61	76.61	76.61
2	3.14	0.50	226.17	450	22	4.26	7.00	0.04	0 0.00	4.30	80.90	81.66
2	3.14	0.50	226.17	170	22	1.61	7.00	0.04	90° 0.20	1.85	82.75	83.51
2	3.14	0.50	226.17	333	22	3.15	7.00	0.04	10° 0.07	3.26	86.00	86.76
2	3.14	0.50	226.17	60	22	0.57	7.00	0.04	0 0.00	0.61	86.61	87.37
					Actual Q							
2nd Iteration												
3	7.07	0.75	666.92	45	22	0.05	3.11	0.01	0.14	0.20	76.20	76.20
2.5	4.91	0.63	410.11	450	22	1.29	0.00	0.00	0.00	1.29	77.49	77.64
2.25	3.98	0.56	309.64	170	22	0.86	5.53	0.02	0.20	1.08	78.57	78.57
2.25	3.98	0.56	309.64	333	22	1.68	5.53	0.02	0.07	1.77	80.35	80.82
2.25	3.98	0.56	309.64	60	22	0.30	5.53	0.02	0.00	0.33	80.67	81.15
					Max Q							
3rd Iteration												
3	7.07	0.75	666.92	45	24.2	0.06	3.42	0.01	0.14	0.21	76.21	76.21
2.5	4.91	0.63	410.11	450	24.2	1.57	0.00	0.00	0.00	1.57	77.78	77.96
2.25	3.98	0.56	309.64	170	24.2	1.04	6.09	0.03	0.20	1.27	79.04	79.04
2.25	3.98	0.56	309.64	333	24.2	2.03	6.09	0.03	0.07	2.13	81.17	81.75
2.25	3.98	0.56	309.64	60	24.2	0.37	6.09	0.03	0.00	0.40	81.57	82.14
4th Iteration												
3	7.07	0.75	666.92	45	24.2	0.06	3.42	0.01	0.14	0.21	76.21	76.21
2.5	4.91	0.63	410.11	450	24.2	1.57	0.00	0.00	0.00	1.57	77.78	77.96
2.25	3.98	0.56	309.64	170	24.2	1.04	6.09	0.03	0.20	1.27	79.04	79.04
2.25	3.98	0.56	309.64	333	22.6	1.77	5.68	0.03	0.07	1.87	80.91	81.48
2.25	3.98	0.56	309.64	60	22.6	0.32	5.68	0.03	0.00	0.34	81.25	81.76
5th Iteration												
2.25	3.98	0.56	309.64	45	24.2	0.27	6.09	0.03	0.14	0.45	76.45	76.45
2.25	3.98	0.56	309.64	450	24.2	2.75	0.00	0.00	0.00	2.75	79.19	79.77
2.25	3.98	0.56	309.64	170	24.2	1.04	6.09	0.03	0.20	1.27	80.46	80.46
2	3.14	0.50	226.17	333	22.6	3.32	7.19	0.04	0.07	3.43	83.89	84.47
2	3.14	0.50	226.17	60	22.6	0.60	7.19	0.04	0.00	0.64	84.53	85.34
6th Iteration												
2.5	4.91	0.63	410.11	45	24.2	0.16	4.93	0.02	0.14	0.32	76.32	76.32
2.25	3.98	0.56	309.64	450	24.2	2.75	0.00	0.00	0.00	2.75	79.07	79.44
2.25	3.98	0.56	309.64	170	24.2	1.04	6.09	0.03	0.20	1.27	80.33	80.33
2	3.14	0.50	226.17	333	22.6	3.32	7.19	0.04	0.07	3.43	83.76	84.34
2	3.14	0.50	226.17	60	22.6	0.60	7.19	0.04	0.00	0.64	84.40	85.21

Optimum

> Max. Water Surf. Elevation

< Max. Water Surface Elevation

= Max. Water Surface Elevation

EXHIBIT NO. 4

25 × □

32 × □

0000 0000 0625

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sunrise Meadows-Unit 1 ZONE ATLAS/DRNG. FILE #: L-9/1114

DRB #: 96-41 EPC #: Z-96-72 WORK ORDER #: _____

LEGAL DESCRIPTION: West of Wetland Row 4, Unit B, Tract 3 and a portion of

CITY ADDRESS: Tract C, Unit 2-Phase A, Sunrise Terrace

ENGINEERING FIRM: Ryals Engineering CONTACT: Robert Ryals

ADDRESS: 5301 Central PHONE: 256-4701

OWNER: American Southwest Homes CONTACT: Nick Bell

ADDRESS: 9001 Menaul, Suite 6 87112 PHONE: 254-9655

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

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

PRE-DESIGN MEETING:

___ YES
___ NO
___ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

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

DATE SUBMITTED: 5/17/96

BY: B Ryals

RECEIVED
MAY 20 1996
HYDROLOGY DIVISION

25×10 32×10

0000 0000 0626

RYALS engineering & construction services
5301 Central Ave. NE • Suite 913 • Albuquerque, New Mexico 87108
(505) 256-4701

May 15, 1996

City of Albuquerque
Hydrology Division
Susan M. Calogne
City/County Floodplain Administrator
One Civic Plaza
Albuquerque, New Mexico 87102

RE: Sunrise Meadows Subdivision Units I & II- Grading and Drainage Plans

Dear Ms. Calogne:

To receive final plat approval, I am resubmitting for your review the grading and drainage plan for Sunrise Meadows Subdivision Units I & II(now on two sheets). The following changes have been made to the plan since the approved plan dated March 29,1996 was submitted.

1. A single retaining wall along the eastern boundary of the property has replaced the double retaining wall.

2. The entrance to the subdivision was moved to the east to comply with City of Albuquerque's clear-sight distance requirements.

3. The rundowns to the temporary retention pond are more clearly shown. Also, an access ramp to that pond has been added.

If you have further questions, please contact me at 256-4701.

Sincerely,

Robert B. Ryals, P. E.

RECEIVED
MAY 20
HYD

25×10 32×10

0000 0000 0627

CITY OF
Albuquerque

April 23, 1996

Martin J. Chávez, Mayor

Bob Ryals, P.E.
5301 Central Ave. NE
Albuquerque, New Mexico 87108

RE: GRADING AND DRAINAGE PLAN FOR SUNRISE MEADOWS UNITS I & II (L9/D14), SUBMITTED FOR PRELIMINARY PLAT APPROVAL AND GRADING PERMIT APPROVAL, ENGINEER'S STAMP DATED 3/29/96.

Dear Mr. Ryals:

The concepts presented in the above referenced drainage report are acceptable for Units I & II. The above referenced grading and drainage plan is approved for Preliminary Plat action and for Grading permit release **for Unit I only**. As you are aware, a top-soil disturbance permit must be obtained before any grading may occur.

Please be advised that the temporary retention pond for Unit I must be located within a drainage easement, and a covenant must be in place to assure that this pond will be privately maintained. This must be identified on the final plat, unless construction of Unit II commences and the pond is relocated.

Prior to approval for Unit II, a resubmittal will be required. At that time either the study by AMAFCA will identify the release rate into the Snow Vista Channel from your subdivision, or the proposed detention pond will have to be sized as a temporary retention pond.

I may require additional information and details for Unit I prior to approval of your work order plans. If you should have any questions, please feel free to call me at 768-2666.

Sincerely,

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

c: Andrew Garcia, City Hydrology
Larry Caudill, Environmental Health
File

25×10 32×10

0000 0000 0628

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sunrise Meadows I & II ZONE ATLAS/DRNG. FILE #: ~~A~~ L-9/A14

DRB #: 96-41 EPC #: WORK ORDER #:

LEGAL DESCRIPTION: West of Westland RW 4, Unit B, Tract 3 & Portion of

CITY ADDRESS: Tract with Sun Vista RW 8) & TRACT C Sunrise Terrace Unit B Phase A

ENGINEERING FIRM: Rybb Eng CONTACT: Bob Rybb

ADDRESS: 5301 Central Ave NE 87108 PHONE: 256-4701

OWNER: American Southwest Homes CONTACT:

ADDRESS: 7004 Menaul PHONE:

ARCHITECT: CONTACT:

ADDRESS: PHONE:

SURVEYOR: CONTACT:

ADDRESS: PHONE:

CONTRACTOR: CONTACT:

ADDRESS: PHONE:

TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- X DRAINAGE PLAN
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- X 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
- ___ 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
- ___ SUBDIVISION CERTIFICATION
- ___ OTHER ___ (SPECIFY)

RECEIVED APR - 4 1996 HYDROLOGY DIVISION

DATE SUBMITTED: 4-4-96

BY: [signature]

25×10 32×10

0000 0000 0629

CITY OF
Albuquerque

Martin J. Chávez, Mayor

June 19, 1996

Bob Ryals, P.E.
5301 Central Ave. NE
Albuquerque, New Mexico 87108

RE: REVISED GRADING AND DRAINAGE PLAN FOR SUNRISE MEADOWS UNIT I (L9/D14), SUBMITTED FOR FINAL PLAT APPROVAL, ENGINEER'S STAMP DATED 5/16/96.

Dear Mr. Ryals:

Based on the information provided in the submittal of May 20, 1996 the above referenced revised grading plan is approved for Final Plat action.

Please be advised that the Engineer's Certification must be in compliance with this approved plan.

If you should have any questions, or if I may be of further assistance to you, please call me.

Sincerely,

Susan Calongne

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

c: File

25×10 32×10

0000 0000 0630

DRAINAGE INFORMATION SHEET

PROJECT TITLE: SUNRISE MEADOWS III ZONE ATLAS/DRNG. FILE #: L9/D14
DRB #: 96-41 EPC #: _____ WORK ORDER #: 545682
LEGAL DESCRIPTION: _____
CITY ADDRESS: _____

ENGINEERING FIRM: Ryals Engineering CONTACT: Bob Ryals
ADDRESS: 5301 Central NE #913 PHONE: 256-4701
OWNER: American Southwest Homes CONTACT: Nick Bell
ADDRESS: 416 Girard SE PHONE: 254-9655
ARCHITECT: n/a CONTACT: _____
ADDRESS: _____ PHONE: _____
SURVEYOR: Albuch Land Surveying CONTACT: 884-1990
ADDRESS: _____ PHONE: _____
CONTRACTOR: Hydrosystems, Inc CONTACT: _____
ADDRESS: _____ PHONE: _____

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

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

W E D
AUG 29 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
✓ OTHER Release of Financial Guarantees (SPECIFY)

DATE SUBMITTED: 7/27/97
BY: Ryals Engineering

25×10 32×10

0000 0000 0631

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sunrise Meadows Unit II ZONE ATLAS/DRNG. FILE #: 291 A14

DRB #: 96-41 EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: Tracts A & B Sunrise Meadows Unit I

CITY ADDRESS: _____

ENGINEERING FIRM: Rabs Engineering CONTACT: Bob Rabs

ADDRESS: 5301 Central Ave NE PHONE: 256-4701

OWNER: American Southwest Homes CONTACT: Mick Bell

ADDRESS: 9504 Menaul PHONE: 254-9655

ARCHITECT: - CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: - CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: - CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT
X DRAINAGE PLAN
___ CONCEPTUAL GRADING & DRAINAGE PLAN
X 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
___ 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)

AUG 14 1996

DATE SUBMITTED: 8-14-96

BY: B Rabs

25×10 32×10

```
AHYMO PROGRAM (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992
   RUN DATE (MON/DAY/YR) = 08/15/1996
   START TIME (HR:MIN:SEC) = 11:44:47     USER NO.= RYALS_NM.I01
   INPUT FILE = sm24_3.hym

START              0.0 HRS        0
*
*S        FILE: SM.HYM
*//////////////////////////////////////////////////////////////////////////////
*
*         SUNRISE MEADOWS SUBDIVISION - HYDROLOGY
*
*//////////////////////////////////////////////////////////////////////////////
*                                                                          *
*
*  PROPOSED  CONDITIONS
*  ZONE 1 (MAP #: L-7)
RAINFALL          TYPE=2  RAIN QUARTER=0.0
                RAIN ONE=1.89 IN  RAIN=2.19 IN
                RAIN DAY=2.69 IN  DT=0.033333 HRS

          COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 -
PEAK AT 1.40 HR.
          DT =   .033333 HOURS      END TIME =   19.966470 HOURS
            .0000  .0013  .0027  .0041  .0055  .0070  .0085
            .0100  .0116  .0132  .0148  .0165  .0182  .0200
            .0218  .0237  .0257  .0277  .0298  .0319  .0342
            .0365  .0389  .0414  .0440  .0467  .0495  .0525
            .0557  .0590  .0625  .0678  .0733  .0793  .0922
            .1209  .1651  .2285  .3152  .4290  .5741  .7548
            .9753 1.1793 1.2647 1.3368 1.4009 1.4592 1.5129
           1.5628 1.6094 1.6531 1.6942 1.7330 1.7696 1.8043
           1.8371 1.8683 1.8978 1.9259 1.9525 1.9584 1.9639
           1.9692 1.9742 1.9789 1.9835 1.9879 1.9921 1.9961
           2.0000 2.0038 2.0074 2.0110 2.0144 2.0177 2.0210
           2.0241 2.0272 2.0302 2.0331 2.0360 2.0388 2.0415
           2.0442 2.0468 2.0493 2.0519 2.0543 2.0567 2.0591
           2.0615 2.0637 2.0660 2.0682 2.0704 2.0725 2.0747
           2.0767 2.0788 2.0808 2.0828 2.0848 2.0867 2.0886
           2.0905 2.0923 2.0942 2.0960 2.0978 2.0996 2.1013
           2.1030 2.1047 2.1064 2.1081 2.1097 2.1114 2.1130
           2.1146 2.1161 2.1177 2.1192 2.1208 2.1223 2.1238
           2.1253 2.1267 2.1282 2.1296 2.1311 2.1325 2.1339
           2.1353 2.1367 2.1380 2.1394 2.1407 2.1421 2.1434
           2.1447 2.1460 2.1473 2.1485 2.1498 2.1511 2.1523
           2.1536 2.1548 2.1560 2.1572 2.1584 2.1596 2.1608
           2.1620 2.1632 2.1643 2.1655 2.1666 2.1677 2.1689
           2.1700 2.1711 2.1722 2.1733 2.1744 2.1755 2.1766
           2.1776 2.1787 2.1798 2.1808 2.1819 2.1829 2.1839
           2.1850 2.1860 2.1870 2.1880 2.1890 2.1900 2.1914
           2.1928 2.1942 2.1956 2.1970 2.1984 2.1998 2.2012
```

25×10 32×10

0000 0000 0633

2.2026	2.2040	2.2054	2.2067	2.2081	2.2095	2.2109
2.2122	2.2136	2.2149	2.2163	2.2177	2.2190	2.2203
2.2217	2.2230	2.2244	2.2257	2.2270	2.2284	2.2297
2.2310	2.2323	2.2337	2.2350	2.2363	2.2376	2.2389
2.2402	2.2415	2.2428	2.2441	2.2454	2.2467	2.2480
2.2492	2.2505	2.2518	2.2531	2.2544	2.2556	2.2569
2.2582	2.2594	2.2607	2.2619	2.2632	2.2644	2.2657
2.2669	2.2682	2.2694	2.2707	2.2719	2.2731	2.2744
2.2756	2.2768	2.2781	2.2793	2.2805	2.2817	2.2829
2.2841	2.2854	2.2866	2.2878	2.2890	2.2902	2.2914
2.2926	2.2938	2.2950	2.2961	2.2973	2.2985	2.2997
2.3009	2.3021	2.3032	2.3044	2.3056	2.3067	2.3079
2.3091	2.3102	2.3114	2.3126	2.3137	2.3149	2.3160
2.3172	2.3183	2.3195	2.3206	2.3217	2.3229	2.3240
2.3252	2.3263	2.3274	2.3285	2.3297	2.3308	2.3319
2.3330	2.3342	2.3353	2.3364	2.3375	2.3386	2.3397
2.3408	2.3419	2.3430	2.3441	2.3452	2.3463	2.3474
2.3485	2.3496	2.3507	2.3518	2.3529	2.3540	2.3550
2.3561	2.3572	2.3583	2.3593	2.3604	2.3615	2.3626
2.3636	2.3647	2.3658	2.3668	2.3679	2.3689	2.3700
2.3710	2.3721	2.3732	2.3742	2.3752	2.3763	2.3773
2.3784	2.3794	2.3805	2.3815	2.3825	2.3836	2.3846
2.3856	2.3867	2.3877	2.3887	2.3897	2.3908	2.3918
2.3928	2.3938	2.3948	2.3958	2.3969	2.3979	2.3989
2.3999	2.4009	2.4019	2.4029	2.4039	2.4049	2.4059
2.4069	2.4079	2.4089	2.4099	2.4109	2.4118	2.4128
2.4138	2.4148	2.4158	2.4168	2.4177	2.4187	2.4197
2.4207	2.4216	2.4226	2.4236	2.4246	2.4255	2.4265
2.4275	2.4284	2.4294	2.4303	2.4313	2.4323	2.4332
2.4342	2.4351	2.4361	2.4370	2.4380	2.4389	2.4399
2.4408	2.4418	2.4427	2.4436	2.4446	2.4455	2.4465
2.4474	2.4483	2.4493	2.4502	2.4511	2.4520	2.4530
2.4539	2.4548	2.4557	2.4567	2.4576	2.4585	2.4594
2.4603	2.4613	2.4622	2.4631	2.4640	2.4649	2.4658
2.4667	2.4676	2.4685	2.4694	2.4703	2.4712	2.4721
2.4730	2.4739	2.4748	2.4757	2.4766	2.4775	2.4784
2.4793	2.4802	2.4811	2.4820	2.4828	2.4837	2.4846
2.4855	2.4864	2.4873	2.4881	2.4890	2.4899	2.4908
2.4916	2.4925	2.4934	2.4942	2.4951	2.4960	2.4968
2.4977	2.4986	2.4994	2.5003	2.5012	2.5020	2.5029
2.5037	2.5046	2.5054	2.5063	2.5072	2.5080	2.5089
2.5097	2.5106	2.5114	2.5122	2.5131	2.5139	2.5148
2.5156	2.5165	2.5173	2.5181	2.5190	2.5198	2.5206
2.5215	2.5223	2.5231	2.5240	2.5248	2.5256	2.5265
2.5273	2.5281	2.5289	2.5298	2.5306	2.5314	2.5322
2.5331	2.5339	2.5347	2.5355	2.5363	2.5371	2.5379
2.5388	2.5396	2.5404	2.5412	2.5420	2.5428	2.5436
2.5444	2.5452	2.5460	2.5468	2.5476	2.5484	2.5492
2.5500	2.5508	2.5516	2.5524	2.5532	2.5540	2.5548
2.5556	2.5564	2.5572	2.5580	2.5588	2.5595	2.5603
2.5611	2.5619	2.5627	2.5635	2.5642	2.5650	2.5658
2.5666	2.5674	2.5681	2.5689	2.5697	2.5705	2.5712

25×10 32×10

2.5720 2.5728 2.5736 2.5743 2.5751 2.5759 2.5766
2.5774 2.5782 2.5789 2.5797 2.5805 2.5812 2.5820
2.5827 2.5835 2.5843 2.5850 2.5858 2.5865 2.5873
2.5880 2.5888 2.5895 2.5903 2.5910 2.5918 2.5925
2.5933 2.5940 2.5948 2.5955 2.5963 2.5970 2.5978
2.5985 2.5993 2.6000 2.6007 2.6015 2.6022 2.6030
2.6037 2.6044 2.6052 2.6059 2.6066

COMPUTE NM HYD ID=1 HYD NO=1 AREA=0.0292 SQ MI
PER A=0.00 PER B=45.0 PER C=0.0 PER D=55.0
TP=-.1667 HR MASS RAIN=-1

K = .090852HR TP = .166700HR K/TP RATIO = .545000 SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 50.702 CFS UNIT VOLUME = 1.000 B = 526.28 P60 = 1.8900

AREA = .016060 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .163374HR TP = .166700HR K/TP RATIO = .980045 SHAPE CONSTANT, N = 3.603328
UNIT PEAK = 25.838 CFS UNIT VOLUME = .9996 B = 327.79 P60 = 1.8900

AREA = .013140 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=1 CODE=10

OUTFLOW HYDROGRAPH REACH 1.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	4.000	.3	8.000	.4	12.000	.3	16.000	.3
.333	.0	4.333	.2	8.333	.4	12.333	.3	16.333	.3
.667	.0	4.667	.2	8.667	.4	12.667	.3	16.667	.3
1.000	.0	5.000	.2	9.000	.4	13.000	.3	17.000	.3
1.333	9.1	5.333	.2	9.333	.4	13.333	.3	17.333	.3
1.667	37.6	5.667	.3	9.667	.4	13.667	.3	17.666	.2
2.000	14.1	6.000	.3	10.000	.3	14.000	.3	18.000	.2
2.333	3.9	6.333	.4	10.333	.3	14.333	.3	18.333	.2
2.667	1.7	6.667	.4	10.667	.3	14.667	.3	18.666	.2

3.000	.8	7.000	.4	11.000	.3	15.000	.3	19.000	.2
3.333	.5	7.333	.4	11.333	.3	15.333	.3	19.333	.2
3.667	.3	7.667	.4	11.667	.3	15.667	.3	19.666	.2

RUNOFF VOLUME = 1.60525 INCHES = 2.4999 ACRE-FEET
PEAK DISCHARGE RATE = 55.53 CFS AT 1.533 HOURS BASIN AREA = .0292 SQ. MI.

PUNCH HYD ID=1
*
*
* 21" ORIFICE (new 2:1 slope)
*
*
ROUTE RESERVOIR ID=2 HYD=500 INFLOW ID=1 CODE=10

OUTFLOW(CFS)	STORAGE(AC FT)	ELEV(FT)
0	0	76.0
4.09	0.1784	77.0
9.16	0.2783	77.5
12.28	0.3781	78.0
14.76	0.489	78.5
16.88	0.5999	79.0
18.76	0.722	79.5
20.47	0.8441	80.0
22.01	1.1084	81.0
23.52	1.2506	81.5

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

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	76.00	.000	.00
.33	.00	76.00	.000	.00
.67	.00	76.00	.000	.00
1.00	.00	76.00	.000	.00
1.33	9.05	76.19	.034	.77
1.67	37.56	79.87	.812	20.02
2.00	14.08	80.06	.861	20.57
2.33	3.87	78.89	.575	16.41
2.67	1.66	77.54	.287	9.44
3.00	.82	76.89	.159	3.65
3.33	.47	76.54	.097	2.22
3.67	.32	76.33	.059	1.36
4.00	.26	76.21	.037	.85
4.33	.23	76.14	.025	.56
4.67	.22	76.10	.018	.41

25× 32×

5.00	.23	76.08	.014	.32
5.33	.25	76.07	.012	.28
5.67	.27	76.07	.012	.27
6.00	.29	76.07	.012	.28
6.33	.41	76.08	.014	.31
6.67	.42	76.09	.016	.36
7.00	.42	76.10	.017	.39
7.33	.41	76.10	.017	.40
7.67	.40	76.10	.017	.40
8.00	.39	76.10	.017	.40
8.33	.38	76.10	.017	.39
8.67	.38	76.09	.017	.39
9.00	.37	76.09	.017	.38
9.33	.36	76.09	.016	.37
9.67	.36	76.09	.016	.37
10.00	.35	76.09	.016	.36
10.33	.35	76.09	.015	.35
10.67	.34	76.08	.015	.35
11.00	.33	76.08	.015	.34
11.33	.33	76.08	.015	.33
11.67	.32	76.08	.014	.33
12.00	.32	76.08	.014	.32
12.33	.31	76.08	.014	.32
12.67	.30	76.08	.014	.31
13.00	.30	76.08	.013	.31
13.33	.30	76.07	.013	.30
13.67	.29	76.07	.013	.30
14.00	.29	76.07	.013	.29
14.33	.28	76.07	.013	.29
14.67	.28	76.07	.012	.29
15.00	.28	76.07	.012	.28
15.33	.27	76.07	.012	.28
15.67	.27	76.07	.012	.27
16.00	.26	76.07	.012	.27
16.33	.26	76.07	.012	.27
16.67	.26	76.06	.011	.26
17.00	.25	76.06	.011	.26
17.33	.25	76.06	.011	.26
17.67	.25	76.06	.011	.25
18.00	.24	76.06	.011	.25
18.33	.24	76.06	.011	.25
18.67	.24	76.06	.011	.24
19.00	.24	76.06	.011	.24
19.33	.23	76.06	.010	.24
19.67	.23	76.06	.010	.24

PEAK DISCHARGE = 20.864 CFS - PEAK OCCURS AT HOUR 1.83
MAXIMUM WATER SURFACE ELEVATION = 80.256
MAXIMUM STORAGE = 9117 AC-FT INCREMENTAL TIME= .033333HRS

PRINT HYD ID=2 CODE=10

OUTFLOW HYDROGRAPH RESERVOIR 500.00

25×10 32×10

0000 0000 0637

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	4.000	.9	8.000	.4	12.000	.3	16.000	.3
.333	.0	4.333	.6	8.333	.4	12.333	.3	16.333	.3
.667	.0	4.667	.4	8.667	.4	12.667	.3	16.667	.3
1.000	.0	5.000	.3	9.000	.4	13.000	.3	17.000	.3
1.333	.8	5.333	.3	9.333	.4	13.333	.3	17.333	.3
1.667	20.0	5.667	.3	9.667	.4	13.667	.3	17.666	.3
2.000	20.6	6.000	.3	10.000	.4	14.000	.3	18.000	.3
2.333	16.4	6.333	.3	10.333	.4	14.333	.3	18.333	.2
2.667	9.4	6.667	.4	10.667	.3	14.667	.3	18.666	.2
3.000	3.6	7.000	.4	11.000	.3	15.000	.3	19.000	.2
3.333	2.2	7.333	.4	11.333	.3	15.333	.3	19.333	.2
3.667	1.4	7.667	.4	11.667	.3	15.667	.3	19.666	.2

RUNOFF VOLUME = 1.59870 INCHES = 2.4897 ACRE-FEET
PEAK DISCHARGE RATE = 20.86 CFS AT 1.833 HOURS BASIN AREA = .0292 SQ. MI.

< 1.3 cfs per acre ✓

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 11:44:49

25×10 32×10

0000 0000 0638

PARADISE MEADOWS UNIT II

WEIR CONDITION: $Q = CLH^{3/2}$

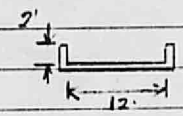
$Q_{100} = 61.8$ cfs , $Q_{WEIR} = 56.5$ cfs

AT THROAT ENTRANCE WHERE $L = 40'$,

$56.5 \text{ cfs} = 2.65(40')H^{3/2}$

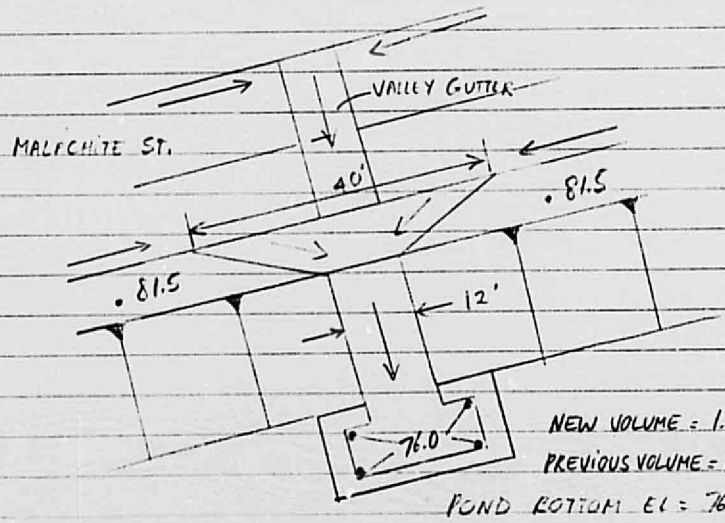
$H = 0.66'$

WHERE $L = 12'$



$56.5 \text{ cfs} = 2.65(12')H^{3/2}$

$H = 1.47'$



NEW VOLUME = 1.25 AC·FT

PREVIOUS VOLUME = 1.03 AC·FT

POND BOTTOM EL = 76.0

$Q_{100} = 61.8$ cfs

MAX W.S. EL = 80.25

25×10 32×10

0000 0000 0639

```
1*****************************************
*****************************************
* HEC-2 WATER SURFACE PROFILES          *                    * U.S. ARMY
CORPS OF ENGINEERS     *
*                      *                 * HYDROLOGIC ENGINEERING
CENTER     *
* Version  4.6.2;  May 1991             *                    * 609 SECOND STREET,
SUITE D     *
*                      *                 * DAVIS, CALIFORNIA
95616-4687     *
* RUN DATE   14JUN95   TIME   05:04:01 *                      *      (916)
756-1104     *
*****************************************
*****************************************
```

```
X   X XXXXXXX  XXXXX       XXXXX
X   X X    X   X      X   X
X   X X    X            X
XXXXXXX XXXX   X     XXXXX  XXXXX
X   X X    X        X
X   X X    X   X      X
X   X XXXXXXX  XXXXX       XXXXXXX
```

```
1
  14JUN95     05:04:01                                          PAGE   1


                                   THIS RUN EXECUTED 14JUN95

05:04:01
*************************************
 HEC-2 WATER SURFACE PROFILES

 Version  4.6.2;  May 1991
*************************************


T1     SUNRISE MEADOW UNIT II
T2     SUPERCRITICAL ANALYSIS
T3     MELACHITE, STATION

J1 ICHECK  INQ    NINV   IDIR   STRT   METRIC  HVINS  Q     WSEL   FQ

     2.0          1.0   0.01                  0.3

J2 NPROF   IPLOT  PRFVS  XSECV  XSECH  FN    ALLDC  IBW   CHNIM
```

25×10 32×10

0000 0000 0640

```
ITRACE

  1.0          1.                    -1.

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

  43    1     2     26     25     4     3     68

NC   0.017   0.017   0.017
QT    6.0   28.0    30.0    31.4    28.0    30.0    31.4
X1   0.00   7.00    0.00    28.34   0.01    0.01    0.01
GR   0.67   0.00    0.00    0.17    0.125   2.17    0.365   14.17   0.125
26.17
GR   0.00   28.17   0.67    28.34
1
  14JUN95    05:04:01                                          PAGE  2

   SECNO   DEPTH   CWSEL   CRIWS   WSELK   EG      HV      HL      OLOSS
L-BANK ELEV
   Q       QLOB    QCH     QROB    ALOB    ACH     AROB    VOL     TWA
R-BANK ELEV
   TIME    VLOB    VCH     VROB    XNL     XNCH    XNR     WTN     ELMIN   SSTA
   SLOPE   XLOBL   XLCH    XLOBR   ITRIAL  IDC     ICONT   CORAR   TOPWID
ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

*SECNO  .000
    .000    .49     .49     .53     .30     .70     .20     .00     .00     .67
    28.0     .0    28.0      .0      .0     7.7      .0      .0      .0     .67
     .00    .00    3.62     .00    .000    .017    .000    .000     .00     .04
  .010008     0.      0.      0.       0      17       7     .00   28.25   28.30

1
  14JUN95    05:04:01                                          PAGE  3

T1    SUNRISE MEADOW UNIT II
T2    SUPERCRITICAL ANALYSIS
T3    MELACHITE  STATION

J1  ICHECK   INQ    NINV    IDIR    STRT    METRIC  HVINS   Q       WSEL    FQ

      3.0            1.0     0.01                    0.3

J2  NPROF    IPLOT   PRFVS   XSECV   XSECH   FN      ALLDC   IBW     CHNIM
```

25×10 32×10

0000 0000 0641

```
ITRACE
  2.0        -1.                        -1.
1
  14JUN95    05:04:01                                          PAGE  4

  SECNO   DEPTH   CWSEL   CRIWS   WSELK   EG      HV      HL      OLOSS
L-BANK ELEV
  Q       QLOB    QCH     QROB    ALOB    ACH     AROB    VOL     TWA
R-BANK ELEV
  TIME    VLOB    VCH     VROB    XNL     XNCH    XNR     WTN     ELMIN   SSTA
  SLOPE   XLOBL   XLCH    XLOBR   ITRIAL  IDC     ICONT   CORAR   TOPWID
ENDST

*PROF 2

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

*SECNO  .000
   .000    .50    .50    .54    .30    .72    .21    .00    .00    .67
  30.0     .0   30.0     .0     .0    8.1     .0     .0     .0    .67
   .00    .00   3.72    .00   .000   .017   .000   .000    .00    .04
 .010007    0.     0.     0.      0     17      7    .00  28.26  28.30

1
  14JUN95    05:04:01                                          PAGE  5

T1    SUNRISE MEADOW UNIT II
T2    SUPERCRITICAL ANALYSIS
T3    MELACHITE  STATION

J1 ICHECK   INQ     NINV    IDIR    STRT    METRIC  HVINS   Q       WSEL    FQ

     4.0            1.0     0.01                    0.3

J2 NPROF    IPLOT   PRFVS   XSECV   XSECH   FN      ALLDC   IBW     CHNIM
ITRACE
  3.0        -1.                        -1.
1
  14JUN95    05:04:01                                          PAGE  6

  SECNO   DEPTH   CWSEL   CRIWS   WSELK   EG      HV      HL      OLOSS
L-BANK ELEV
  Q       QLOB    QCH     QROB    ALOB    ACH     AROB    VOL     TWA
```

25×10 32×10

0000 0000 0642

```
R-BANK ELEV
   TIME    VLOB    VCH     VROB    XNL     XNCH    XNR     WTN     ELMIN   SSTA
   SLOPE   XLOBL   XLCH    XLOBR   ITRIAL  IDC     ICONT   CORAR   TOPWID
ENDST

*PROF 3

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

*SECNO  .000
    .000    .51    .51    .55    .30    .74    .22    .00    .00    .67
   31.4     .0   31.4     .0     .0    8.3     .0     .0     .0    .67
    .00    .00   3.79    .00   .000   .017   .000   .000    .00    .04
  .010007    0.     0.     0.      0     17      7    .00  28.26  28.30


1
  14JUN95    05:04:01                                                    PAGE  7

T1    SUNRISE MEADOW UNIT II
T2    SUPERCRITICAL ANALYSIS
T3    TERRA  STATION

J1 ICHECK   INQ     NINV    IDIR    STRT    METRIC  HVINS   Q       WSEL    FQ

      5.0           1.0    0.005                   0.3

J2 NPROF    IPLOT   PRFVS   XSECV   XSECH   FN      ALLDC   IBW     CHNIM
ITRACE

  4.0         -1.                     -1.

1
  14JUN95    05:04:01                                                    PAGE  8

   SECNO   DEPTH   CWSEL   CRIWS   WSELK   EG      HV      HL      OLOSS
L-BANK ELEV
   Q       QLOB    QCH     QROB    ALOB    ACH     AROB    VOL     TWA
R-BANK ELEV
   TIME    VLOB    VCH     VROB    XNL     XNCH    XNR     WTN     ELMIN   SSTA
   SLOPE   XLOBL   XLCH    XLOBR   ITRIAL  IDC     ICONT   CORAR   TOPWID
ENDST

*PROF 4

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

*SECNO  .000
```

25×10 32×10

0000 0000 0643

```
3720 CRITICAL DEPTH ASSUMED
    .000     .53     .53     .53     .30     .69     .16     .00     .00     .67
    28.0      .0    28.0      .0      .0     8.7      .0      .0      .0     .67
     .00     .00    3.20     .00    .000    .017    .000    .000     .00     .04
  .006689      0.      0.      0.       0      17       7     .00   28.27   28.30

1
  14JUN95     05:04:01                                                    PAGE  9

T1     SUNRISE MEADOW UNIT II
T2     SUPERCRITICAL ANALYSIS
T3     TERRA  STATION

J1 ICHECK   INQ     NINV    IDIR    STRT    METRIC  HVINS   Q       WSEL    FQ

       6.0          1.0    0.005                   0.3

J2 NPROF    IPLOT   PRFVS   XSECV   XSECH   FN      ALLDC   IBW     CHNIM
ITRACE

  5.0        -1.                     -1.

1
  14JUN95     05:04:01                                                    PAGE 10

   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL      OLOSS
L-BANK ELEV
   Q       QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA
R-BANK ELEV
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN    SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID
ENDST

*PROF 5

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

*SECNO  .000
3720 CRITICAL DEPTH ASSUMED
    .000     .54     .54     .54     .30     .71     .17     .00     .00     .67
    30.0      .0    30.0      .0      .0     9.2      .0      .0      .0     .67
     .00     .00    3.27     .00    .000    .017    .000    .000     .00     .03
  .006544      0.      0.      0.       0      17       7     .00   28.28   28.31

1
  14JUN95     05:04:01                                                    PAGE 11
```

25×10 32×10

0000 0000 0644

```
T1    SUNRISE MEADOW UNIT II
T2    SUPERCRITICAL ANALYSIS
T3    TERRA  STATION

J1 ICHECK   INQ     NINV    IDIR    STRT    METRIC  HVINS   Q       WSEL    FQ

       7.0          1.0     0.005                   0.3

J2 NPROF    IPLOT   PRFVS   XSECV   XSECH   FN      ALLDC   IBW     CHNIM
ITRACE

  15.0        -1.                     -1.


1
  14JUN95     05:04:01                                                PAGE  12


   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS
L-BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA
R-BANK ELEV
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN    SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID
ENDST


*PROF 6

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

*SECNO  .000
3720 CRITICAL DEPTH ASSUMED
    .000     .55     .55     .55     .30     .73     .17     .00     .00     .67
   31.4      .0    31.4      .0      .0     9.5      .0      .0      .0     .67
    .00     .00    3.32     .00    .000    .017    .000    .000     .00     .03
  .006442     0.      0.      0.       0      17       7     .00   28.28   28.31


1
  14JUN95     05:04:01                                                PAGE  13


                                                THIS RUN EXECUTED 14JUN95
05:04:01
*****************************************
 HEC-2 WATER SURFACE PROFILES
```

25×10 32×10

0000 0000 0645

Version 4.6.2; May 1991

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

MELACHITE, STATION

SUMMARY PRINTOUT

	Q	CWSEL	CRIWS	VCH	AREA	TOPWID	EG	FRCH
	28.000	.49	.53	3.62	7.73	28.25	.70	1.22
	30.000	.50	.54	3.72	8.06	28.26	.72	1.23
	31.400	.51	.55	3.79	8.29	28.26	.74	1.23
*	28.000	.53	.53	3.20	8.74	28.27	.69	1.02
*	30.000	.54	.54	3.27	9.17	28.28	.71	1.01
*	31.400	.55	.55	3.32	9.47	28.28	.73	1.01

1
14JUN95 05:04:01 PAGE 14

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 28.000 PROFILE= 4 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 28.000 PROFILE= 5 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 28.000 PROFILE= 6 CRITICAL DEPTH ASSUMED

25×10 32×10

0000 0000 0646

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sunrise Meadows Unit I ZONE ATLAS/DRNG. FILE #: L9/D14

LEGAL DESCRIPTION: Sunrise Meadows Unit I

CITY ADDRESS:

ENGINEERING FIRM: Ryals Engineering CONTACT: Robert Ryals

ADDRESS: 5301 Central NE #913 PHONE: 256-4701

OWNER: American Southwest Homes CONTACT: Nick Bell

ADDRESS: 9004 Menaul #6 PHONE: 254-9655

ARCHITECT: N/A CONTACT:

ADDRESS: PHONE:

SURVEYOR: Aldrich Land Surveying CONTACT: Tim Aldrich

ADDRESS: PHONE: 884-1990

CONTRACTOR: Hydro Systems, Inc. CONTACT: Lee Smith

ADDRESS: PHONE: 344-3840

PRE-DESIGN MEETING:

___ YES DRB NO. 96-41

___ NO EPC NO.

___ COPY OF CONFERENCE RECAP SHEET PROVIDED PROJ. NO.

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT

___ DRAINAGE PLAN

___ CONCEPTUAL GRADING AND DRAINAGE PLAN

___ GRADING PLAN

___ EROSION CONTROL PLAN

X ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

___ SKETCH PLAT APPROVAL

___ PRELIMINARY PLAT APPROVAL

___ SITE DEVELOPMENT PLAN APPROVAL

___ FINAL PLAT APPROVAL

___ BUILDING PERMIT APPROVAL

___ FOUNDATION PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY APPROVAL

___ ROUGH GRADING PERMIT APPROVAL

___ GRADING/PAVING PERMIT APPROVAL

OTHER Financial Guarantee Release (SPECIFY)

DATE SUBMITTED: 10-25-96

BY: [signature]

RECEIVED OCT 28 HYDROLOGY DIVISION

25×10 32×10

0000 0000 0647

SUNRISE MEADOWS
L9/D14

AMAFCA STORM SEWER PERMIT

This permit is for connection of publicly maintained storm sewers and drainage rundowns to AMAFCA facilities. Privately maintained facilities require separate license agreement. The following information must be filled in, with this form and certificate of insurance returned to AMAFCA prior to construction.

AMAFCA Facility Name: SNOW VISTA CHANNEL
Station #, L or R: 66+60 RIGHT
100 Yr Flowrate: 774 cfs per As builts

Connection Details:
Size & Type: 30" RCP
Peak Flow Rate: 24 cfs
100yr 6hr Volume: N/A

Drainage Report Approved by AMAFCA? Y/N: YES
By: KB, Jack Kelly
Date: 10/96

Maintenance Details:
Reach in AMAFCA Right of Way to be Maintained by: CITY of ALBUQUERQUE
Concurrence By Agency: Glenn Jurgensen
Title: Superintendent Storm Drainage Maint.
Upstream Reach Maintained by: CITY of ALBUQUERQUE
Concurrence by Agency: Glenn Jurgensen
Title: Superintendent Storm drainage Maint.

Construction Plans Approved by AMAFCA? Y/N: YES
By: Jack Kelly
Date: 11/8/96

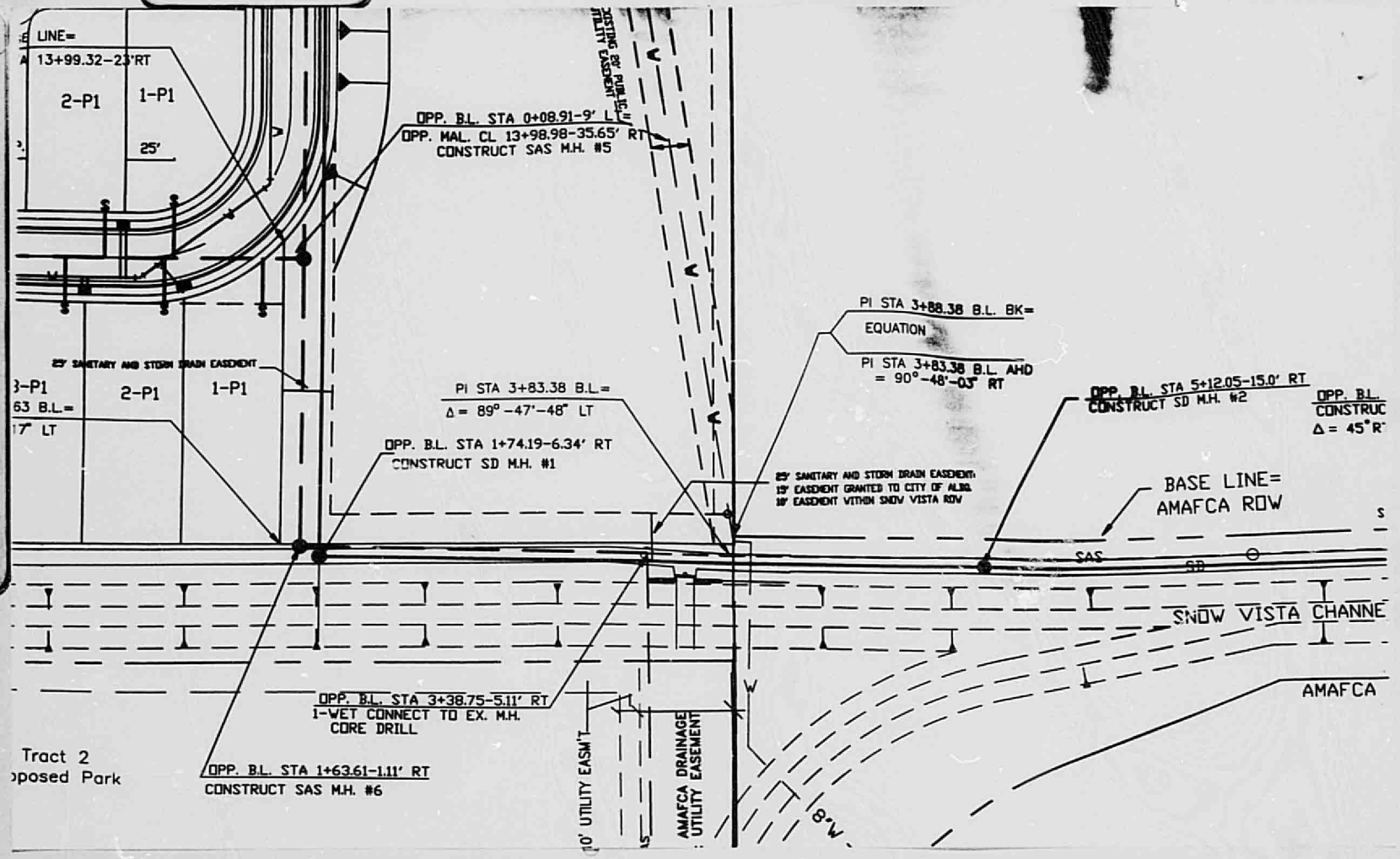
Developer Name: _____
Contact: _____
Phone # _____

Contractor Name: _____
Superintendent: _____
Phone #'s: Office _____
Mobile _____

Attach Certificate of Insurance from Contractor, naming AMAFCA as additional insured for Comprehensive or Commercial General Liability Insurance for Bodily Injury and Property Damage, occurrence form, in the amount of a combined single limit of $1,000,000 each occurrence. Certificate not required if work is by Public Agency forces.

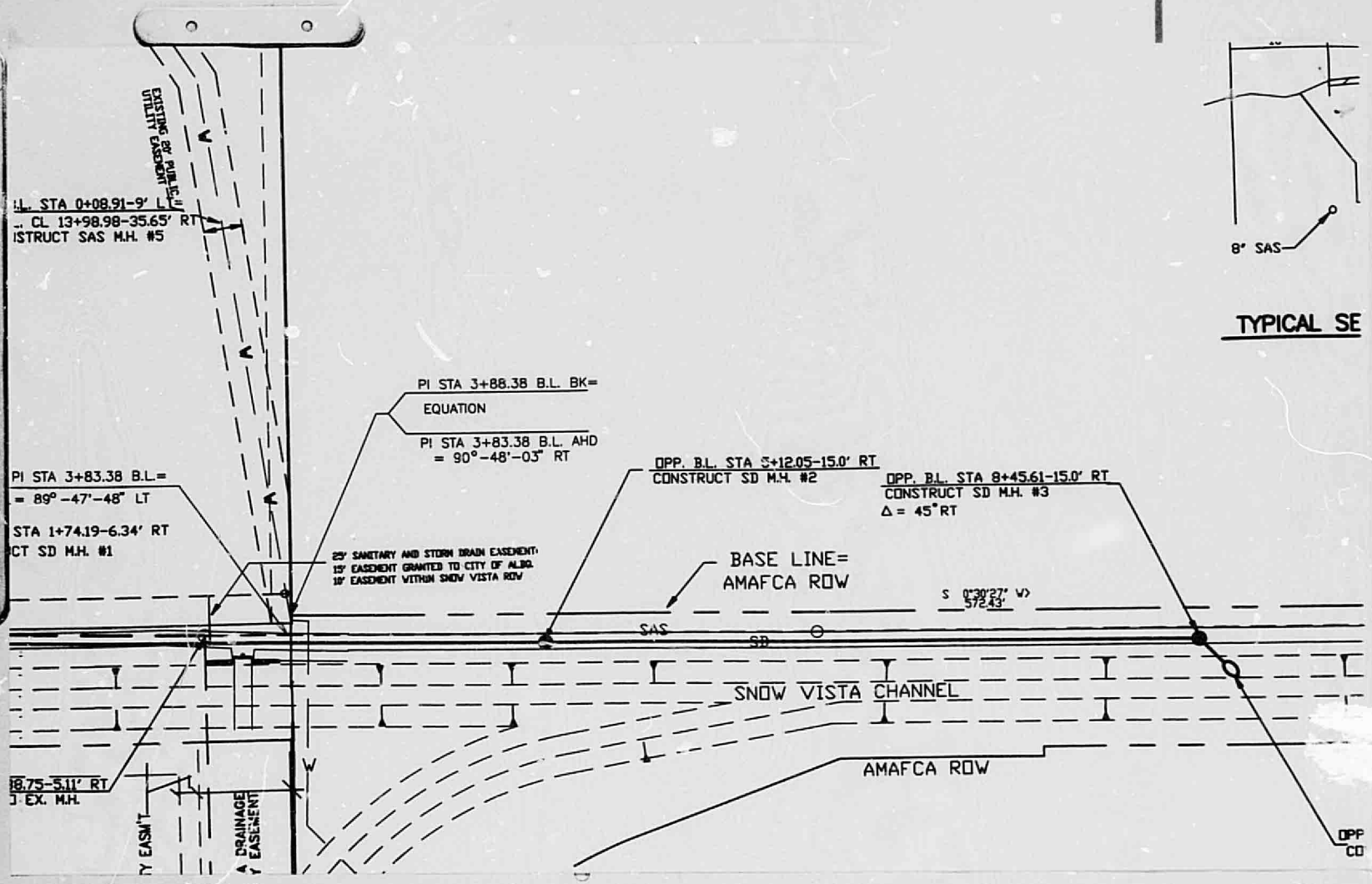
Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 PROSPECT N.E. · ALBUQUERQUE, N.M. 87107

25×10 32×10


LINE=
13+99.32-23'RT
2-P1
1-P1
25'
OPP. B.L. STA 0+08.91-9' LT
OPP. MAL. CL 13+98.98-35.65' RT
CONSTRUCT SAS M.H. #5
25' SANITARY AND STORM DRAIN EASEMENT
3-P1
63 B.L.=
17' LT
2-P1
1-P1
PI STA 3+83.38 B.L.=
Δ = 89°-47'-48" LT
OPP. B.L. STA 1+74.19-6.34' RT
CONSTRUCT SD M.H. #1
PI STA 3+88.38 B.L. BK=
EQUATION
PI STA 3+83.38 B.L. AHD
= 90°-48'-03" RT
25' SANITARY AND STORM DRAIN EASEMENT
15' EASEMENT GRANTED TO CITY OF ALBQ.
10' EASEMENT WITHIN SNOW VISTA ROW
OPP. B.L. STA 5+12.05-15.0' RT
CONSTRUCT SD M.H. #2
OPP. B.L.
CONSTRUC
Δ = 45°R
BASE LINE=
AMAFCA ROW
SAS
SD
SNOW VISTA CHANNE
AMAFCA
OPP. B.L. STA 3+38.75-5.11' RT
1-WET CONNECT TO EX. M.H.
CORE DRILL
Tract 2
pposed Park
OPP. B.L. STA 1+63.61-1.11' RT
CONSTRUCT SAS M.H. #6
10' UTILITY EASM'T
AMAFCA DRAINAGE
UTILITY EASEMENT
8"W

25 X 10

32 X 10


EXISTING 80' PUBLIC UTILITY EASEMENT
L. STA 0+08.91-9' LT
CL 13+98.98-35.65' RT
STRUCT SAS M.H. #5
PI STA 3+88.38 B.L. BK=
EQUATION
PI STA 3+83.38 B.L. AHD
= 90°-48'-03" RT
PI STA 3+83.38 B.L.=
= 89°-47'-48" LT
STA 1+74.19-6.34' RT
CT SD M.H. #1
25' SANITARY AND STORM DRAIN EASEMENT
15' EASEMENT GRANTED TO CITY OF ALBQ.
10' EASEMENT WITHIN SNOW VISTA ROW
OPP. B.L. STA 3+12.05-15.0' RT
CONSTRUCT SD M.H. #2
OPP. B.L. STA 8+45.61-15.0' RT
CONSTRUCT SD M.H. #3
Δ = 45° RT
BASE LINE=
AMAFCA ROW
S 0°30'27" W
572.43'
SAS
SD
SNOW VISTA CHANNEL
AMAFCA ROW
8.75-5.11' RT
EX. M.H.
DRAINAGE
EASEMENT
OPP
CO
8" SAS
TYPICAL SE

25 X

32 X

0000 0000 0650

CITY OF
Albuquerque

Martin J. Chávez, Mayor

November 7, 1996

Bob Ryals, P.E.
5301 Central Ave. NE
Albuquerque, New Mexico 87108

RE: ENGINEER'S CERTIFICATION FOR SUNRISE MEADOWS UNIT I (L9/D14), ENGINEER'S STAMP DATE 10/25/96.

Dear Mr. Ryals:

Based on the information provided in the submittal of October 28, 1996, the above referenced plan is adequate to satisfy the requirement for Subdivision Certification.

The construction of the temporary pond shown in Unit I may be waived if the pond shown in Unit II has either been financially guaranteed or accepted through the Work Order process.

If you should have any questions, or if I may be of further assistance to you, please call me at 768-2666.

Sincerely,

Susan Calongne

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

c: Terri Martin
File

25×10 32×10

0000 0000 0651

CITY OF
Albuquerque

August 29, 1997

Martin J. Chávez, Mayor

Bob Ryals, P.E.
5301 Central Ave. NE, Suite 913
Albuquerque, New Mexico 87108

RE: Engineer's Certification for Sunrise Meadows Unit II, (L9/D14) Submitted for Release of Financial Guarantees, Engineer's Stamp Dated 7/27/97.

Dear Mr. Ryals:

The above referenced Engineer's Certification for Sunrise Meadows Unit II is adequate to satisfy the requirement for Grading and Drainage Certification for release of financial guarantees per the Infrastructure List signed on September 10, 1996.

If you should 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 (Project No. 545682)
File

25×10 32×10

0000 0000 0652

CITY OF
Albuquerque

Martin J. Chávez, Mayor

September 4, 1996

Bob Ryals, P.E.
5301 Central Ave. NE
Albuquerque, New Mexico 87108

RE: GRADING AND DRAINAGE PLAN FOR SUNRISE MEADOWS UNIT II (L9/D14), SUBMITTED FOR PRELIMINARY PLAT APPROVAL AND GRADING PERMIT APPROVAL, ENGINEER'S STAMP DATED 8/13/96.

Dear Mr. Ryals:

Based on the information provided in the submittal of August 14, 1996, the above referenced grading and drainage plan is approved for Preliminary Plat action and for Grading permit release.

As you are aware, a top-soil disturbance permit must be obtained before any grading may occur.

Please be advised that the Engineer's Certification of this approved plan will be required prior to release of the financial guarantees.

If you should have any questions, please do not hesitate to call me.

Sincerely,

Susan Calongne

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

c: Andrew Garcia, City Hydrology
Larry Caudill, Environmental Health
File

25×10 32×10

0000 0000 0653

CITY OF
Albuquerque

Martin J. Chávez, Mayor

June 19, 1996

Bob Ryals, P.E.
5301 Central Ave. NE
Albuquerque New Mexico 87108

RE: REVISED GRADING AND DRAINAGE PLAN FOR SUNRISE MEADOWS UNIT I (L9/D14), SUBMITTED FOR FINAL PLAT APPROVAL, ENGINEER'S STAMP DATED 5/16/96.

Dear Mr. Ryals:

Based on the information provided in the submittal of May 20, 1996 the above referenced revised grading plan is approved for Final Plat action.

Please be advised that the Engineer's Certification must be in compliance with this approved plan.

If you should have any questions, or if I may be of further assistance to you, please call me.

Sincerely,

Susan Calongne

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

c: File

25×10 32×10

0000 0000 0654

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sunrise Meadows ZONE ATLAS/DRNG. FILE #: L-9/W14

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: West of Westland, Row 4, Unit B, Tract 3 & a Portion of Tract 2 Together with Snow Vista Diversion Channel Row 8, and Tract C, Unit 2 Phase A Sunrise Terrace

CITY ADDRESS: _____

ENGINEERING FIRM: Ryals Engineering CONTACT: Bob Ryals

ADDRESS: 5301 Central Ave NE PHONE: 256 4701

OWNER: American Southwest Homes CONTACT: Nick Bell

ADDRESS: 7004 Menaul PHONE: 254-9655

ARCHITECT: N/A CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: N/A CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: N/A CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- X DRAINAGE PLAN
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- X 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
- ___ 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)

DATE SUBMITTED: 2-18-96

BY: Bob Ryals

RECEIVED FEB 20 1996 HYDROLOGY

25×10 32×10

0000 0000 0655

DRAINAGE REPORT
SUNRISE MEADOWS SUBDIVISION

Prepared for AMERICAN SOUTHWEST HOMES, LTD.

By RYALS ENGINEERING AND CONSTRUCTION SERVICES, CO.

Prepared by

ROBERT RYALS NEW MEXICO 9436 REGISTERED PROFESSIONAL ENGINEER

2-19-96

ROBERT B. RYALS, P. E. *Date*

FEB 20 1996

25×10 32×10

0000 0000 0656

SUNRISE MEADOWS SUBDIVISION
DRAINAGE REPORT
FEBRUARY 19, 1996

MAP: L-9-Z

LEGAL DESCRIPTION

West of Westland, Row 4, Unit B, Tract 3 and a portion of Tract 2 together with Snow Vista Diversion right-of-way 8 and Tract C, Unit 2-Phase A, Sunrise Terrace.

FLOOD HAZARD

The site is on FEMA FIRM Panel 33 (October 14, 1983).

Tower Road at the north end of the project is in Zone AO (Depth 1). See discussion below on the **Snow Vista Diversion Channel** under **PRESENT CONDITIONS**. The rest of the project is in Zone C.

PRESENT CONDITIONS

The total area of the proposed subdivision is 21.14 acres and it will be located on land that is presently undeveloped. It lies between the Snow Vista Channel and 98th Street just south of Tower Road. The site varies in elevation from 5,174 ft. at its southeast corner to 5,202 ft at its northwest corner. The surrounding area is almost entirely residential consisting mainly of single family homes interspersed with town homes, a mobile home park, and some commercial development.

A hydrologic analysis for existing conditions was conducted. Section 22.2 of the City of Albuquerque Design Process Manual (Jan. 93) was used to determine runoff quantities. The area is located in precipitation zone 1. Since the total drainage basin area is less than 40 acres, the simplified procedure in Part A of the DPM was applied. Exhibit No. 1 contains the input data and the results of the hydrologic calculations. In summary, the on-site, existing peak discharge rate from the 100-year, 6-hour storm event is 42.7 cfs. The corresponding runoff volume is 52,054 cu.ft. (1.195 ac.ft.).

Snow Vista Diversion Channel

Since the FIRM was issued, a major flood control project, the Snow Vista Diversion Channel, was constructed just to the west of the proposed project. The diversion channel effectively cuts off

25×10 32×10

most offsite flow into the project area. The offsite drainage area was reduced from approximately 84 acres to 4.6 acres. All drainage flow from the 4.6 acres is contained within the right-of-way of Tower Road. A Conditional Letter of Map Revision (CLOMR) will be filed with FEMA through the City/County Floodplain Administrator to remove this area from the Zone AO designation.

PROPOSED CONDITIONS AND HYDROLOGIC/HYDRAULIC ANALYSIS

The site will be developed with 106 single family residences. The housing density is 5.7 dwelling units per acre. Lots will vary in size from 5,000 sf. to 6,350 sf. The lots along the eastern boundary will have a 21' wide area that will contain backyard ponds. These ponds will contain only the runoff from the backyard and not from the roofs. A detention pond with a surface area of 0.46 acre will also be provided. See below for more information on the detention pond. An area of 2.5 acres on the south end of the site will be set aside for a park to be constructed in the future. This park will not drain into the subdivision and, therefore, its area is not part of this analysis.

A hydrological study was conducted to determine the impacts of the proposed subdivision. Section 22.2 of the DPM was used to determine runoff quantities. The simplified procedure was applied. Exhibit No. 1 contains the input data and the results of the hydrologic calculations. In summary, the total peak discharge rate and runoff volume for the 6-hour, 100-year event are 61.8 cfs. and 93,713 cu.ft. (2.15 ac.ft.), respectively. The runoff per acre of land is 3.3 cfs.

All onsite drainage flow will eventually outflow into the Snow Vista Diversion Channel. It was assumed in this analysis that the maximum allowable discharge into the diversion channel is 1.3 cfs. per acre of land. For the 18.64 acre study area, the allowable discharge is 24.2 cfs. To attenuate the peak discharge of 3.3 cfs. per acre, a detention pond will be constructed. The detention pond will be located at the southeast corner of the site. All drainage flow will be conveyed overland and routed through the pond. The pond will drain by gravity through a 24" diameter pipe on a slope of 0.2 percent slope. In order to limit the peak outflow, a vertical orifice will be placed in the outlet structure.

A hydraulic analysis was conducted to determine the size of the detention pond and the diameter of the orifice. Depth-discharge

relationships were developed for orifices of various sizes. The relationships were based on the orifice equation recommended in Section 22.3 of the D.P.M. A depth-discharge table for an 18" and 21" orifice is shown in Exhibit No. 2. The size of the detention pond was determined by utilizing the ROUTE RESERVOIR feature of the AHYMO computer program. The storage-discharge table was developed based on the depth-discharge table, an invert elevation (5177.0 ft.), and available land area. It was determined that a 21" diameter orifice was the optimal size based on a 24-hour, 100-year event. A copy of the input and summary output are contained in Exhibit No. 3.

The total volume of the pond will be 0.973 ac.ft. A 24" pipe will convey storm water from the pond. The pipe will extend to the southwest corner of the site. It will then head south in an easement parallel to the Snow Vista Diversion Channel. Approximately 400 feet south of the southwest property corner, its invert matches the invert of the diversion channel. Here it will outlet into the diversion channel.

Exhibit No. 4 contains the Conceptual Grading and Drainage Plan.

SUMMARY OF HYDROLOGY

1. **METHODOLOGY:** Albuquerque DPM method for 40 Acres or less (JAN.93).

2. **DESIGN STORM:** 100-Year, 24-Hour, Rain Zone 1 = 2.69" **(TABLE A2)**

3. **LAND TREATMENTS AND PEAK RUNOFF RATES (Qp) IN CFS/ACRE (TABLES A4 & A9)**
   TREATMENT A = NATURAL, Qp = 1.29
   TREATMENT B = LANDSCAPING, Qp = 2.03
   TREATMENT C = PACKED EARTH, DIRT ROADS, Qp = 2.87
   TREATMENT D = IMPERMEABLE, Qp = 4.37

4. **SUMMARY OF RESULTS**

		EXISTING	PROPOSED	OFFSITE
TREATMENT A	AC, %	0, 0	0, 0	N/A
TREATMENT B	AC, %	12.9, 69	8.4, 45	
TREATMENT C	AC, %	5.8, 31	0, 0	
TREATMENT D	AC, %	0, 0	10.3, 55	
TOTAL	AC, %	18.7, 100	18.7, 100	
Qpeak, CFS		42.7	61.8	
VOLUME, 6-HOUR, CU FT		52,054	93,713	
VOLUME, 6-HOUR, AC FT		1.195	2.544	

FILE = SM.WQ1
ALBUQUERQUE, NM, DPM (1/93) CRITERIA - SIMPLE PROCEDURE FOR <= 40 ACRES
PX100-6 = PRECIPITATION EXCESS FROM 100-YEAR 6-HOUR STORM
VOL10D = VOLUME OF RUNOFF FROM 100-YEAR 10-DAY STORM
TRTMT CLASS A=UNDISTURBED, B=LAWNS, C=UNPAVED ROADS, D=ROOFS,PAVEMENT: SEE DPM P 22.5-5

****** PROJECT INFO ******
SUN MEADOWS SUBDIVISION
CITY OF ALBUQUERQUE
EXISTING AND PROPOSED CONDITIONS

RAIN ZONE 1 SEE DPM P 22.2-2
100-YEAR PRECIPTATION (P) DEPTHS, INCHES

1 HR	6 HR	24 HR	4 DAY	10 DAY
1.87	2.20	2.66	3.12	3.67

02/16/96 03:39 PM EXISTING CONDITIONS

TRTMT CLASS	AREA SQ. FT.	AREA ACRES	PX100-6 IN/AC	QP100-6 CFS/AC	QP100-6 CFS	VOL6HR AC-FT	VOL1D AC-FT	VOL4D AC-FT	VOL10D AC-FT	TRTMT PERCENT
A	0.00	0.0000	0.44	1.29	0.000	0.000	0.000	0.000	0.000	0.00
B	559982.00	12.8554	0.67	2.03	26.096	0.718	0.718	0.718	0.718	68.97
C	251976.00	5.7846	0.99	2.87	16.602	0.477	0.477	0.477	0.477	31.03
D	0.00	0.0000	1.97	4.37	0.000	0.000	0.000	0.000	0.000	0.00
TOTAL	811958.00	18.6400			42.698	1.195	1.195	1.195	1.195	100.00
					CU FT	52054	52054	52054	52054	

02/16/96 03:39 PM PROPOSED CONDITIONS - DWELLING UNITS AND STREETS

TRTMT CLASS	AREA SQ. FT.	AREA ACRES	PX100-6 IN/AC	QP100-6 CFS/AC	QP100-6 CFS	VOL6HR AC-FT	VOL1D AC-FT	VOL4D AC-FT	VOL10D AC-FT	TRTMT PERCENT
A	0.00	0.0000	0.44	1.29	0.000	0.000	0.000	0.000	0.000	0.00
B	365381.00	8.3880	0.67	2.03	17.028	0.468	0.468	0.468	0.468	45.00
C	0.00	0.0000	0.99	2.87	0.000	0.000	0.000	0.000	0.000	0.00
D	446577.00	10.2520	1.97	4.37	44.801	1.683	2.076	2.469	2.939	55.00
TOTAL	811958.00	18.6400			61.829	2.151	2.544	2.937	3.407	100.00
					CU FT	93713	110832	127951	148419	

EXHIBIT NO. 1

25×10 32×10

ORIFICE EQUATION

$$Q = CA\sqrt{2gH}$$

Where;

Q = discharge in cfs.
C = discharge coefficient (0.60 for circular, sharp edged orifices)
A = area of the opening in sf.
g = 32.2 ft./sec.^{2}
H = head in ft. (depth of flow as measured from the middle of the orifice)

HEAD (FT.)	DISCHARGE (CFS.) (18" DIAM.)	DISCHARGE (CFS.) (21" DIAM.)
0.13	3.01	4.09
0.25	4.25	5.79
0.63	6.73	9.16
0.75	7.37	10.03
1.13	9.02	12.28
1.25	9.51	12.95
1.63	10.85	14.76
1.75	11.26	15.32
2.13	12.40	16.88
2.25	12.76	17.37
2.63	13.79	18.76
2.75	14.11	19.21

EXHIBIT NO. 2

25×10 32×10

```
AHYMO PROGRAM (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992
     RUN DATE (MON/DAY/YR) = 02/19/1996
     START TIME (HR:MIN:SEC) = 17:08:20      USER NO.= RYALS_NM.I01
     INPUT FILE = F:\WORK\NICK\SM24_2.HYM

START                 0.0 HRS          0
*
*S          FILE: SM.HYM
*////////////////////////////////////////////////////////////////////////////
*
*           SUNRISE MEADOWS SUBDIVISION - HYDROLOGY
*
*////////////////////////////////////////////////////////////////////////////
*
*   PROPOSED  CONDITIONS
*   ZONE 1 (MAP #: L-7)
RAINFALL              TYPE=2  RAIN QUARTER=0.0
                      RAIN ONE=1.89 IN  RAIN=2.19 IN
                      RAIN DAY=2.69 IN  DT=0.033333 HRS
COMPUTE NM HYD        ID=1  HYD NO=1  AREA=0.0292 SQ MI
                      PER A=0.00 PER B=45.0 PER C=0.0 PER D=55.0
                      TP=-.1667  HR  MASS RAIN=-1

   K =   .090852HR    TP =   .166700HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
   UNIT PEAK =   50.702    CFS   UNIT VOLUME =    1.000       B =   526.28      P60 = 1.8900
   AREA =      .016060 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


   K =   .163374HR    TP =   .166700HR    K/TP RATIO =   .980045     SHAPE CONSTANT, N =  3.603328
   UNIT PEAK =   25.838    CFS   UNIT VOLUME =    .9996       B =   327.79      P60 = 1.8900
   AREA =      .013140 SQ MI    IA =    .50000 INCHES    INF =   1.25000 INCHES PER HOUR
   RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD             ID=1     CODE=10
```

OUTFLOW HYDROGRAPH REACH 1.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	4.000	.3	8.000	.4	12.000	.3	16.000	.3
.333	.0	4.333	.2	8.333	.4	12.333	.3	16.333	.3
.667	.0	4.667	.2	8.667	.4	12.667	.3	16.667	.3
1.000	.0	5.000	.2	9.000	.4	13.000	.3	17.000	.3
1.333	9.1	5.333	.2	9.333	.4	13.333	.3	17.333	.3
1.667	37.6	5.667	.3	9.667	.4	13.667	.3	17.666	.2
2.000	14.1	6.000	.3	10.000	.3	14.000	.3	18.000	.2
2.333	3.9	6.333	.4	10.333	.3	14.333	.3	18.333	.2
2.667	1.7	6.667	.4	10.667	.3	14.667	.3	18.666	.2
3.000	.8	7.000	.4	11.000	.3	15.000	.3	19.000	.2
3.333	.5	7.333	.4	11.333	.3	15.333	.3	19.333	.2
3.667	.3	7.667	.4	11.667	.3	15.667	.3	19.666	.2

```
RUNOFF VOLUME =      1.60525 INCHES      =       2.4999 ACRE-FEET
PEAK DISCHARGE RATE =      55.53 CFS  AT   1.533 HOURS   BASIN AREA =   .0292 SQ. MI.
```

EXHIBIT NO. 3

25X

32X

```
*
* 21" ORIFICE
*
ROUTE RESERVOIR        ID=2       HYD=500   INFLOW ID=1 CODE=10
                       OUTFLOW(CFS)  STORAGE(AC FT)  ELEV(FT)
                          0              0             77.0
                          4.09           0.185         78.0
                          9.16           0.277         78.5
                         12.28           0.370         79.0
                         14.76           0.4623        79.5
                         16.88           0.5548        80.0
                         18.76           0.6472        80.5
                         20.47           0.740         81.0
                         22.01           0.832         81.5
                         23.52           0.9246        82.0
                         24.92           1.017         82.5

 PEAK DISCHARGE =       22.743 CFS - PEAK OCCURS AT HOUR    1.80
 MAXIMUM WATER SURFACE ELEVATION =        81.743
 MAXIMUM STORAGE =          .8769 AC-FT       INCREMENTAL TIME=     .033333HRS

PRINT HYD                 ID=2             CODE=10
```

OUTFLOW HYDROGRAPH RESERVOIR 500.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	4.000	.8	8.000	.4	12.000	.3	16.000	.3
.333	.0	4.333	.6	8.333	.4	12.333	.3	16.333	.3
.667	.0	4.667	.4	8.667	.4	12.667	.3	16.667	.3
1.000	.0	5.000	.3	9.000	.4	13.000	.3	17.000	.3
1.333	.7	5.333	.3	9.333	.4	13.333	.3	17.333	.3
1.667	21.5	5.667	.3	9.667	.4	13.667	.3	17.666	.3
2.000	21.5	6.000	.3	10.000	.4	14.000	.3	18.000	.3
2.333	15.9	6.333	.3	10.333	.4	14.333	.3	18.333	.2
2.667	7.8	6.667	.4	10.667	.3	14.667	.3	18.666	.2
3.000	3.4	7.000	.4	11.000	.3	15.000	.3	19.000	.2
3.333	2.1	7.333	.4	11.333	.3	15.333	.3	19.333	.2
3.667	1.3	7.667	.4	11.667	.3	15.667	.3	19.666	.2

```
    RUNOFF VOLUME =     1.59845 INCHES     =       2.4893 ACRE-FEET
    PEAK DISCHARGE RATE =      22.74 CFS  AT   1.800 HOURS   BASIN AREA =   .0292 SQ. MI.
*
FINISH

    NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 17:08:21
```

EXHIBIT NO. 3

25X
32X
2880 0000 0000

0000 0000 0663

PLANS/PLATS ON FILE

FILE DESC: L9/D14

PLANS/PLATS 11

25×10 32×10

0000 0000 0664