

537 ICR U2
Design Report

INSCRIPTION CANYON RANCH SUBDIVISION

UNIT TWO

ENGINEER'S DESIGN REPORT

JULY 16, 1997



INSCRIPTION CANYON RANCH SUBDIVISION - UNIT TWO

ENGINEER'S DESIGN REPORT

PROJECT SCOPE:

Inscription Canyon Ranch Subdivision - Unit Two is located in Yavapai County approximately 13 miles northwest of Prescott, Arizona, along Williamson Valley Road in portions of Sections 27 and 28, Township 16 North, Range 3 West, Gila and Salt River Base and Meridian. A Preliminary Plat consisting of 174 residential lots over 470 acres was approved by the Yavapai County Board of Supervisors on July 5, 1995. Unit Two consists of the remaining 80 residential lots and will be constructed in two phases.

ROADWAY DESIGN:

All roadways for Unit Two will be dedicated to the public and have been designed to Yavapai County Standards, as specified in Resolution 1036 and amended by *The Revised Petition for Variance from Road Standards* dated May 25, 1995, and *The Petition for Variance From Road Standards* dated May 9, 1995. Copies of the petition are included.

Inscription Canyon Drive has been designated as a residential collector with a minimum pavement width of 28 feet in a 68-foot right-of-way. Warbonnet Lane, Indian Pony Trail and Court, White Cloud Road, Wagon Box Place, Blackfoot Trail, Box Canyon Place, Singing Wolf Lane, Leaning Bear Trail, Standing Bear Trail, and Sitting Bear Trail are designated as low volume residential streets with minimum pavement widths of 20 feet in 50-foot rights-of-way. All roads have 4-foot wide shoulders and, where necessary, roadside "V" shaped drainage channels of 1 to 1-1/2 foot depth.

On the assumption that soils will not change significantly, the structural sections for Unit Two were based on the results documented in the Soil Survey - Inscription Canyon Ranch - Unit One prepared by Engineering & Testing Consultants, Inc., on June 9, 1995, and amended by their September 18, 1996, letter. The pavement sections consist of three inches (3") asphaltic concrete (AC) over nine inches (9") of aggregate base course (ABC) for Inscription Canyon Drive, and two inches (2") AC over nine inches (9") of ABC for the residential streets. Copies of the surveys are included. E.T.C. will verify the conditions during subgrade construction and recommend any modifications to the sections if warranted.

The alignment of Warbonnet Lane south of Inscription Canyon Drive was adjusted to keep east of the broad swale as opposed to cutting across the swale. The swale carries a significant amount of stormwater runoff during the 100-year event, which requires the delineation of a 100-year floodplain by approximate methods. Crossing this swale with the roadway required a large number of culverts whose headwater requirements flooded more property than that which exists naturally. The culverts would also concentrate the broad shallow flow creating additional problems. It was decided to leave this swale intact as much as possible. A cul-de-sac, Indian Pony Court, was added to provide access to those lots, 169, 170, and 171, cut off by a flood condition.

In the western portion of the property where the terrain gets more severe, minor adjustments to alignments were made to provide additional access to the adjacent property further west, and to comply with the recently

passed Resolution 1036. Some of these roadways were originally laid out using a maximum grade of 15% allowed under Resolution 460, but not under 1036. All roadway designs now conform to Resolution 1036. An additional road was added, Leaning Bear Trail, to shorten the lengths of dead-end roads to less than the maximum 1320 feet.

SITE DRAINAGE:

Stormwater runoff through and from Unit Two in the eastern portion drains into an unnamed wash flowing north through Hootenanny holler on its way to Mint Wash. A small drainageway flows South out of the property and then westerly to Mint Wash. Two other small drainage ways flow west out of the property to Mint Wash. The installation of roadway culverts will generally hold back or delay stormwater runoff enough to offset increases in peak discharges resulting from the development of this low density residential area.

The broad swale through the eastern portion of the property drains an area greater than 40 acres, but less than 160 acres, requiring delineation of the 100-year floodplain by approximate methods. Restricted building envelopes have been designated for those lots crossed by the approximate floodplains. These floodplains and building envelopes have been delineated on the Final Plat for the subdivision.

All structures in Unit Two are sized to accommodate runoff generated by the 100-year event. A Phase III Drainage Report has been prepared and will be submitted separately.

WATER SUPPLY:

Water will be supplied to Inscription Canyon Ranch - Unit Two by the ICR Water User's Association. The Association's initial system consists of a well (ADWR #55-542062), a water transmission main, and a storage tank. The construction of this system has been approved by the Arizona Department of Environmental Quality (ADEQ) under the file number of 95-0481. Extensions to the system have been built for Phases One through Three of ICR Unit One and approved by the Yavapai County Environmental Services (YCES). An extension to Phase Four of Unit One is currently being constructed.

Extensions to the system will be constructed to serve Unit Two. The hydropneumatic pumping system constructed as part of Unit One's improvements will distribute water through eight inch (8") and six (6") inch PVC mains. According to the analysis done on the Cybernet computer program from Haested for flow in a pipe network, domestic demand is satisfied with line pressure in excess of 40 psi, and all fire hydrants are capable of producing flows in excess of 500 gpm with line pressure above 20 psi. A separate report on the water system analysis will be submitted.

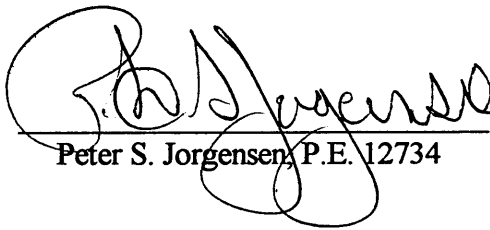
SEWAGE DISPOSAL:

Approval of Construction for the wastewater treatment plant constructed as part of Unit One's improvements has been issued by ADEQ. This plant will serve Unit Two. A Low Pressure Sanitary Sewer System (LPSS) has been selected to service Unit Two as in Unit One. The procedures and computations for the design of the LPSS are included with this report.

The Low Pressure Sewer System (LPSS) branch analysis is based upon the assumption that each core pump delivers 11 gpm to the system and that a certain number of pumps are pumping simultaneously. Sizing all branches to keep velocities over 3.5 fps drives the maximum total head due to accumulated friction loss in the extreme ends of the system higher than an individual pump's capability (approximately 108 psi or 250 feet). The design balances the need to keep velocities above 2 fps and total head in all parts of the system below 200 feet. Velocities do not drop below 2 fps, the minimum velocity allowed by ADEQ guidelines.

CERTIFICATION:

I, Peter S. Jorgensen, hereby certify that I am a Registered Professional Engineer in the State of Arizona, and that this report was prepared under my direction.


Peter S. Jorgensen, P.E. 12734



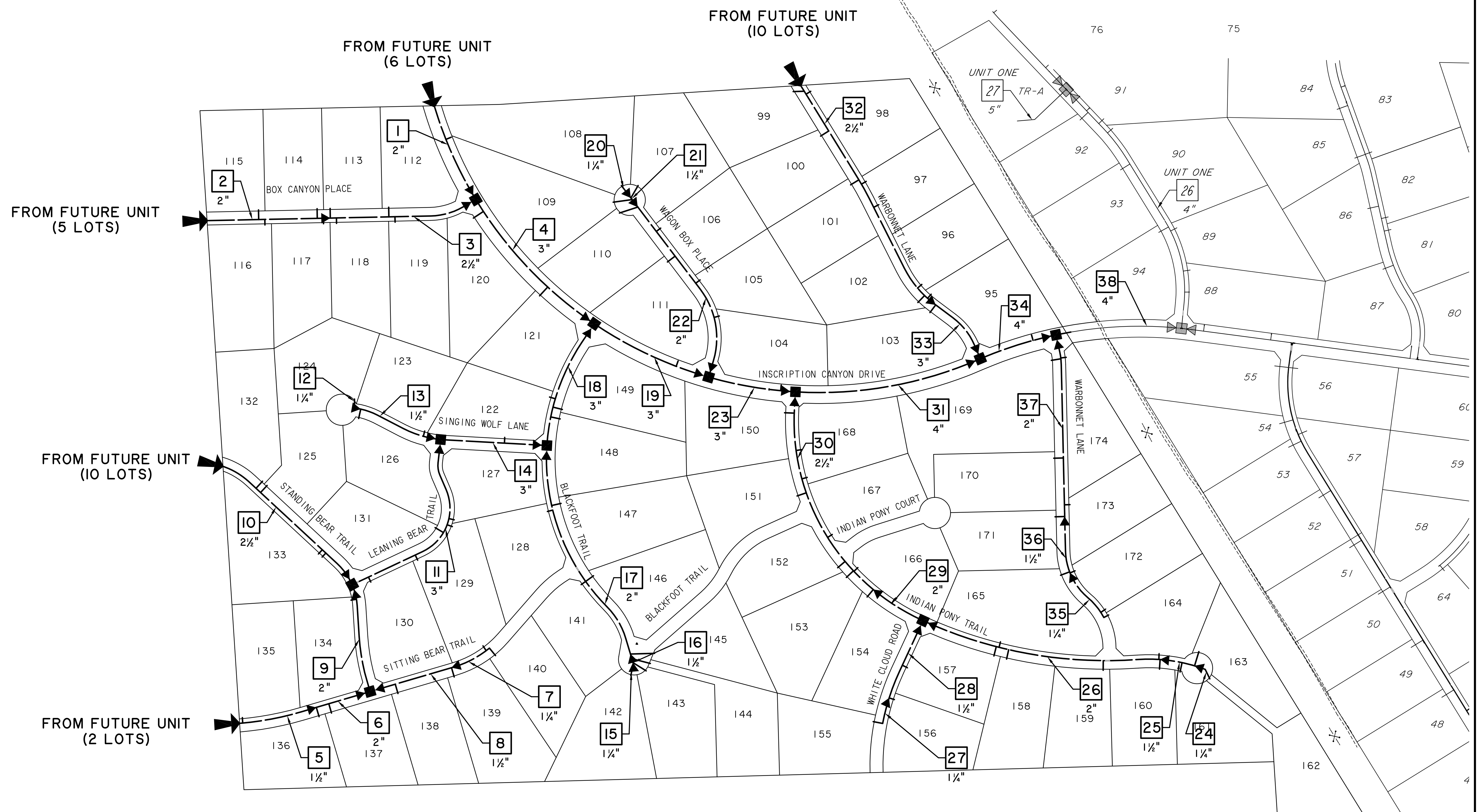
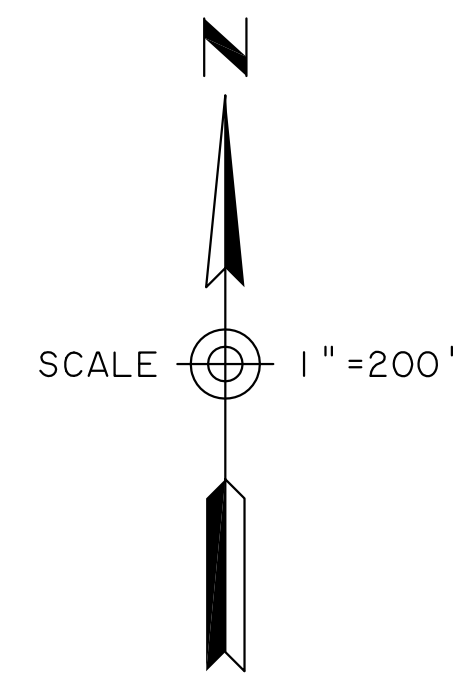
By: AAR			LOW PRESSURE SEWER SYSTEM		
Date: 11-Jul-97			PIPE SCHEDULE AND BRANCH ANALYSIS		
Pipe: SDR 21 PVC			Project: Inscription Canyon Ranch - Including Future Units		
Prepared for: Williamson Valley Investors, Ltd.			Dava Proj. No.: 537ICR		
1 BRANCH NUMBER	BRANCH MIN. ELEV. (ft)	BRANCH MAX. ELEV. (ft)	BRANCHES IN LINE TO POINT OF DISCHARGE	12 MAXIMUM MAIN ELEV (ft)	13 MINIMUM PUMP ELEV (ft)
1	5003.1	5016.0	1,4,19,23,31,34,38,U1-26,U1-27	5062.2	5003.1
2	4944.7	4985.9	2,3,4,19,23,31,34,38,U1-26,U1-27	5062.2	4944.7
3	4942.0	5008.5	3,4,19,23,31,34,38,U1-26,U1-27	5062.2	4942.0
4	5001.7	5028.1	4,19,23,31,34,38,U1-26,U1-27	5062.2	5001.7
5	4982.0	4988.8	5,6,9,11,14,18,19,23,31,34,38,U1-26,U1-27	5062.2	4982.0
6	4984.9	4997.0	6,9,11,14,18,19,23,31,34,38,U1-26,U1-27	5062.2	4984.9
7	5037.2	5053.9	7,8,9,11,14,18,19,23,31,34,38,U1-26,U1-27	5062.2	5037.2
8	4997.0	5037.2	8,9,11,14,18,19,23,31,34,38,U1-26,U1-27	5062.2	4997.0
9	4967.1	4997.0	9,11,14,18,19,23,31,34,38,U1-26,U1-27	5062.2	4967.1
10	4979.8	5006.0	10,11,14,18,19,23,31,34,38,U1-26,U1-27	5062.2	4979.8
11	4986.4	5018.0	11,14,18,19,23,31,34,38,U1-26,U1-27	5062.2	4986.4
12	4965.8	4972.9	12,13,14,18,19,23,31,34,38,U1-26,U1-27	5062.2	4965.8
13	4972.9	5009.9	13,14,18,19,23,31,34,38,U1-26,U1-27	5062.2	4972.9
14	5009.9	5029.9	14,18,19,23,31,34,38,U1-26,U1-27	5062.2	5009.9
15	5087.3	5092.6	15,16,17,18,19,23,31,34,38,U1-26,U1-27	5098.0	5087.3
16	5092.6	5095.3	16,17,18,19,23,31,34,38,U1-26,U1-27	5098.0	5092.6
17	5026.4	5098.0	17,18,19,23,31,34,38,U1-26,U1-27	5098.0	5026.4
18	5008.0	5028.1	18,19,23,31,34,38,U1-26,U1-27	5062.2	5008.0
19	5028.1	5044.5	19,23,31,34,38,U1-26,U1-27	5062.2	5028.1
20	5002.1	5005.0	20,21,22,23,31,34,38,U1-26,U1-27	5062.2	5002.1
21	5005.0	5007.5	21,22,23,31,34,38,U1-26,U1-27	5062.2	5005.0
22	5007.5	5042.5	22,23,31,34,38,U1-26,U1-27	5062.2	5007.5
23	5042.5	5062.2	23,31,34,38,U1-26,U1-27	5062.2	5042.5
24	5043.6	5047.3	24,25,26,29,30,31,34,38,U1-26,U1-27	5063.4	5043.6
25	5040.0	5043.6	25,26,29,30,31,34,38,U1-26,U1-27	5063.4	5040.0
26	5033.5	5049.4	26,29,30,31,34,38,U1-26,U1-27	5063.4	5033.5
27	5056.0	5060.5	27,28,29,30,31,34,38,U1-26,U1-27	5063.4	5056.0
28	5049.4	5062.0	28,29,30,31,34,38,U1-26,U1-27	5063.4	5049.4
29	5049.4	5059.1	29,30,31,34,38,U1-26,U1-27	5063.4	5049.4
30	5045.8	5063.4	30,31,34,38,U1-26,U1-27	5063.4	5045.8
31	5026.7	5061.4	31,34,38,U1-26,U1-27	5061.4	5026.7
32	5018.6	5041.7	32,33,34,38,U1-26,U1-27	5041.7	5018.6
33	5018.6	5028.6	33,34,38,U1-26,U1-27	5039.6	5018.6
34	5013.4	5026.7	34,38,U1-26,U1-27	5039.6	5013.4
35	5032.2	5034.6	35,36,37,38,U1-26,U1-27	5039.6	5032.2
36	5030.3	5033.4	36,37,38,U1-26,U1-27	5039.6	5030.3
37	5014.4	5030.3	37,38,U1-26,U1-27	5039.6	5014.4
38	5014.4	5039.6	38,U1-26,U1-27	5039.6	5014.4
U1-26	5006.6	5036.4	U1-26,U1-27	5036.4	5006.6
U1-27	5008.7	5008.7	U1-27	5008.7	5008.7

By: AAR		Date: 11-Jul-97		LOW PRESSURE SEWER SYSTEM PIPE SCHEDULE AND BRANCH ANALYSIS						Project: Inscription Canyon Ranch Unit Two including Future Units						
Pipe: SDR 21 PVC		Prepared for: Williamson Valley Investors, Ltd.								Dava Proj. No.: 537ICR						
						Sheet No. 1 of 3			Rev.							
1 BRANCH NUMBER	2 NO. OF PUMPS	3 ACCUM. TOTAL	4 MAXIMUM NO. "ON"	5 MAXIMUM FLOW (gpm)	6 PIPE SIZE (in)	7 MAXIMUM VELOCITY (fps)	8 LENGTH (ft)	9 FRICTION LOSS (ft/100 ft)	10 FRICTION LOSS TOTAL (ft)	11 ACCUM. FRICTION LOSS (ft)	12 MAXIMUM MAIN ELEV. (ft)	13 MINIMUM PUMP ELEV. (ft)	14 ELEV. DIFF. (ft)	15 MAXIMUM TOTAL HEAD (ft)	16 VELOCITY ≥ 2 fps	17 TOTAL HEAD ≤ 200 ft
1	0	6	3	33	2	2.92	388	1.54	5.98	45.68	5062	5003	59	104.68	YES	YES
2	4	9	3	33	2	2.92	455	1.54	7.01	52.80	5062	4945	117	169.80	YES	YES
3	4	13	4	44	2½	2.66	586	1.04	6.09	45.79	5062	4942	120	165.79	YES	YES
4	2	21	5	55	3	2.24	665	0.6	3.99	39.70	5062	5002	60	99.70	YES	YES
5	1	3	2	22	1½	3.04	299	2.15	6.43	63.35	5062	4982	80	143.35	YES	YES
6	2	5	3	33	2	2.92	215	1.54	3.31	56.92	5062	4985	77	133.92	YES	YES
7	1	1	1	11	1¼	1.99	168	1.15	1.93	63.28	5062	5037	25	88.28	NO	YES
8	2	3	2	22	1½	3.04	360	2.15	7.74	61.35	5062	4997	65	126.35	YES	YES
9	1	9	3	33	2	2.92	418	1.54	6.44	53.61	5062	4967	95	148.61	YES	YES
10	3	13	4	44	2½	2.66	678	1.04	7.05	54.22	5062	4980	82	136.22	YES	YES
11	4	26	5	55	3	2.24	780	0.6	4.68	47.17	5062	4986	76	123.17	YES	YES
12	1	1	1	11	1¼	1.99	58	1.15	0.67	50.27	5062	4966	96	146.27	NO	YES
13	2	3	2	22	1½	3.04	331	2.15	7.12	49.61	5062	4973	89	138.61	YES	YES

By: AAR		Date: 11-Jul-97		LOW PRESSURE SEWER SYSTEM PIPE SCHEDULE AND BRANCH ANALYSIS						Project: Inscription Canyon Ranch Unit Two including Future Units							
Pipe: SDR 21 PVC										Dava Proj. No.: 537ICR							
Prepared for: Williamson Valley Investors, Ltd.										Sheet No. 2		of 3		Rev.			
1 BRANCH NUMBER	2 NO. OF PUMPS	3 ACCUM. TOTAL	4 MAXIMUM NO. "ON"	5 MAXIMUM FLOW (gpm)	6 PIPE SIZE (in)	7 MAXIMUM VELOCITY (fps)	8 LENGTH (ft)	9 FRICTION LOSS (ft/100 ft)	10 FRICTION LOSS TOTAL (ft)	11 ACCUM. FRICTION LOSS (ft)	12 MAXIMUM MAIN ELEV. (ft)	13 MINIMUM PUMP ELEV. (ft)	14 ELEV. DIFF. (ft)	15 MAXIMUM TOTAL HEAD (ft)	16 VELOCITY ≥ 2 fps	17 TOTAL HEAD ≤ 200 ft	
14	0	29	5	55	3	2.24	409	0.6	2.45	42.49	5062	5010	52	94.49	YES	YES	
15	1	1	1	11	1¼	1.99	51	1.15	0.59	55.01	5098	5087	11	66.01	NO	YES	
16	2	3	2	22	1½	3.04	34	2.15	0.73	54.43	5098	5093	5	59.43	YES	YES	
17	5	8	3	33	2	2.92	887	1.54	13.66	53.70	5098	5026	72	125.70	YES	YES	
18	3	40	6	66	3	2.69	509	0.85	4.33	40.04	5062	5008	54	94.04	YES	YES	
19	0	61	7	77	3	3.14	487	1.12	5.45	35.71	5062	5028	34	69.71	YES	YES	
20	1	1	1	11	1¼	1.99	60	1.15	0.69	43.47	5062	5002	60	103.47	NO	YES	
21	2	3	2	22	1½	3.04	44	2.15	0.95	42.78	5062	5005	57	99.78	YES	YES	
22	5	8	3	33	2	2.92	752	1.54	11.58	41.84	5062	5008	54	95.84	YES	YES	
23	0	69	7	77	3	3.14	339	1.12	3.80	30.26	5062	5042	20	50.26	YES	YES	
24	1	1	1	11	1¼	1.99	93	1.15	1.07	56.94	5063	5044	19	75.94	NO	YES	
25	2	3	2	22	1½	3.04	126	2.15	2.71	55.87	5063	5040	23	78.87	YES	YES	
26	4	7	3	33	2	2.92	933	1.54	14.37	53.16	5063	5034	29	82.16	YES	YES	
27	1	1	1	11	1¼	1.99	281	1.15	3.23	48.99	5063	5056	7	55.99	NO	YES	
28	1	2	2	22	1½	3.04	324	2.15	6.97	45.76	5063	5049	14	59.76	YES	YES	

By: AAR		Date: 11-Jul-97		LOW PRESSURE SEWER SYSTEM PIPE SCHEDULE AND BRANCH ANALYSIS						Project: Inscription Canyon Ranch							
Pipe: SDR 21 PVC										Unit Two including Future Units							
Prepared for: Williamson Valley Investors, Ltd.										Dava Proj. No.: 537ICR				Sheet No. 3 of 3 Rev.			
1 BRANCH NUMBER	2 NO. OF PUMPS	3 ACCUM. TOTAL	4 MAXIMUM NO. "ON"	5 MAXIMUM FLOW (gpm)	6 PIPE SIZE (in)	7 MAXIMUM VELOCITY (fps)	8 LENGTH (ft)	9 FRICTION LOSS (ft/100 ft)	10 FRICTION LOSS TOTAL (ft)	11 ACCUM. FRICTION LOSS (ft)	12 MAXIMUM MAIN ELEV (ft)	13 MINIMUM PUMP ELEV (ft)	14 ELEV. DIFF. (ft)	15 MAXIMUM TOTAL HEAD (ft)	16 VELOCITY ≥ 2 fps	17 TOTAL HEAD ≤ 200 ft	
29	0	9	3	33	2	2.92	226	1.54	3.48	38.79	5063	5049	14	52.79	YES	YES	
30	8	17	4	44	2½	2.66	851	1.04	8.85	35.31	5063	5046	17	52.31	YES	YES	
31	0	86	8	88	4	2.17	728	0.42	3.06	26.46	5061	5027	34	60.46	YES	YES	
32	8	18	4	44	2½	2.66	994	1.04	10.34	35.36	5042	5019	23	58.36	YES	YES	
33	1	19	5	55	3	2.24	270	0.6	1.62	25.02	5040	5019	21	46.02	YES	YES	
34	0	105	8	88	4	2.17	305	0.42	1.28	23.40	5040	5013	27	50.40	YES	YES	
35	1	1	1	11	1¼	1.99	253	1.15	2.91	40.27	5040	5032	8	48.27	NO	YES	
36	2	3	2	22	1½	3.04	217	2.15	4.67	37.37	5040	5030	10	47.37	YES	YES	
37	5	8	3	33	2	2.92	687	1.54	10.58	32.70	5040	5014	26	58.70	YES	YES	
38	0	113	8	88	4	2.17	484	0.42	2.03	22.12	5040	5014	26	48.12	YES	YES	
U1-26	7	407	17	187	4	4.61	1062	1.71	18.16	20.09	5036	5007	29	49.09	YES	YES	
U1-27	0	500	20	220	5	3.55	235	0.82	1.93	1.93	5000	5000	0	1.93	YES	YES	

INSCRIPTION CANYON RANCH - UNIT TWO
 LOW PRESSURE SEWER SYSTEM (LPSS)
 BRANCH CONNECTIONS



LEGEND

- - INLINE FLUSHING CONNECTION
- ▲ - BRANCH DIVIDER & FLOW INDICATOR
- NN - BRANCH NUMBER
- NX" - LPSS MAIN DIAMETER

INSCRIPTION CANYON RANCH			
DAVA & ASSOCIATES, INC.	DES.	AR	
310 E. UNION ST., PRESCOTT, AZ	DRW.	JG 14 JUL 97	
86303 (520) 778-7587	CHK.	GMB	
UNIT TWO IMPROVEMENTS			
SEWER EXHIBIT			