WASTEWATER STUDY

For

BONITA CANYON GATEWAY
AND
LOMA BONITA RESIDENCES
SAN DIMAS, CALIFORNIA

February 18, 2008

Job No. U06-754

Prepared For

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I. Introduction

This study was performed to compare line capacities to flows projected at ultimate conditions for the Bonita Canyon Gateway & Loma Bonita Residences.

This study calculates the average daily discharge for residential, commercial, and institutional developments to determine the system flow requirements and discharge, and determines the peak discharge for use in determining the capacity of flow in the existing sewer.

II. Project Location

The proposed Bonita Canyon Gateway & Loma Bonita Residences project is located in the city of San Dimas, Los Angeles County. The project encompasses approximately 8.53 acres and is located at northwest corner of Bonita Avenue and San Dimas Canyon Road.

III. Evaluation Criteria

The following values will be the criteria used in this evaluation. The ASCE Sewer Design Manual was used in determining the residential, commercial and institutional coefficients.

Land Use	Flow Coefficients
Residential	0.00057 cfs/unit
Commercial Retail	0.006 cfs/acre
Parks	0.0005 cfs/acre
School	0.000031 cfs/student
Hospitals	0.006 cfs/acre
PEAKING FACTOR: PF = $2.6/Q^{0.09}$ (Q in cfs)	

IV. Results

The capacities have been calculated using Manning's equation for open channel flow. The "n" value assumed for the pipe section is 0.013 for all pipes. The capacity is rated at a depth of ¾ full for each line.

Based on the calculations presented in this study, the system is adequate to carry the future peak flows as analyzed according to the true size and slope of the existing pipe sections.

It should be noted that the minimum slope is 1.08% in pipe section 7-16 as opposed to the 0.4% stated in Master Sewer Plan. Accordingly, the future peak flow depth in pipe section 7-16 is determined to be 53.8% full, which is below the maximum rated capacity of ¾ full. Additionally it is determined that the future peak flow depth in pipe section 17-19 is 51.5% full, which is below maximum rated capacity of ¾ full. Wastewater Study Summary is presented in Table 1 with Pipe Section Capacity results presented in Table 2.

SECTION V
WASTEWATER STUDY SUMMARY
TABLE 1

Development Resource Consultants, Inc.
February 6, 2008

Bonita Canyon Gateway & Loma Bonita Residences
Waste Water Study
Table 1
Criteria For Projecting Flow

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Node	Tributary Basin (Node)	Reach	Land Use	Area (acre)	Residential Units	Other	Flow Factor	Average Flow (cfs)	Peak Flow (cfs)	Remarks	Reach	Peak Factor	Peak Flow	Slope
2	1-2	1A	MF		120		0.00057	0.06840						
	1-2	1A	RETAIL	1.62			0.00600	0.00972		Peak Flow 0.006 cfs/acre				
	1-2	1A	PARK	0.11			0.00050	0.00006		Peak Flow 0.006 cfs/acre				
			Subtotal Flow at Node 2					0.07818	0.07818					
3	1-2	2A	MF		103		0.00057	0.05871						
	4-3	3A	SF		3		0.00057	0.00171		Peak Flow 0.01 cfs/acre				
			Subtotal Flow at Node 3					0.06042						
			Total Flow at Node 3					0.13860	0.13860	Flow at Node 2 added				
5	3-5	4A	SF		23		0.00057	0.01311						
	6-5	5A	SF		4		0.00057	0.00228						
			Subtotal Flow at Node 5					0.01539						
			Total Flow at Node 5					0.15399	0.15399	Flow at Node 3 added	5-7	3.07681	0.47378	0.01500
11	8-9	1B	HOSPITAL	1.56			0.00600	0.00936						
	9-11	2B	MF		92		0.00057	0.05244						
	10-11	3B	SF		3		0.00057	0.00171						
			Subtotal Flow at Node 11					0.06351	0.06351					
15	14-15	1C	CHURCH	2.17			0.00600	0.01302						
	14-15	2C	MF		102		0.00057	0.05814						
	13-15	3C	SF		22		0.00057	0.01254						
			Subtotal Flow at Node 15					0.08370	0.08370					
12	11-12	4B	SF		17		0.00057	0.00969						
	15-12	4C	SF		4		0.00057	0.00228						
			Subtotal Flow at Node 12					0.01197						
			Total Flow at Node 12					0.07548	0.07548	Flow at Node 11 & 15 added	12-7	3.28071	0.24763	0.00400
7	12-7	5C	SF		2		0.00057	0.00114						
	5-7	6A	SF		2		0.00057	0.00114						
			Subtotal Flow at Node 7					0.00228						
			Total Flow at Node 7					0.23175	0.23175	Flow at Node 5 & 12 added				
22	20-22	1E	SF		5		0.00057	0.00285						
	21-22	2E	SF		14		0.00057	0.00798						
			Subtotal Flow at Node 22					0.01083	0.01083					
25	23-25	4E	SF		22		0.00057	0.01254						
	24-25	5E	SF		11		0.00057	0.00627						
			Subtotal Flow at Node 25					0.01881	0.01881					
26	22-26	3E	SF		12		0.00057	0.00684						
	25-26	6E	SF		3		0.00057	0.00171						
			Subtotal Flow at Node 26					0.00855						
			Total Flow at Node 26					0.03819	0.03819	Flow at Node 22 & 25 added	22-26	3.48817	0.13321	
28	26-28	7E	SF		3		0.00057	0.00171						
	27-28	8E	SF		9		0.00057	0.00513						
			Subtotal Flow at Node 28					0.00684						
			Total Flow at Node 28					0.04503	0.04503	Flow at Node 26 added	26-28	3.43683	0.15476	
16	7-16	1D	SF		12		0.00057	0.00684	0.23859		7-16	2.95791	0.70571	0.01080
	28-16	9E	PARK	9.11			0.00050	0.00456						
	28-16	9E	SCHOOL			300	0.00003	0.00930						
	28-16	9E	SF		13		0.00057	0.00741						
			Subtotal Flow at Node 16					0.02811						
			Total Flow at Node 16					0.30488	0.30488	Flow at Node 7 & 28 added	7-16	2.89336	0.88213	0.01080
17	16-17	2D	SF		3		0.00057	0.00171						
	18-17	3D	SF		18		0.00057	0.01026						
			Subtotal Flow at Node 17					0.01197						
			Total Flow at Node 17					0.31685	0.31685	Flow at Node 16 added	16-17	2.88334	0.91359	0.00640
19	17-19	N/A	N/A		0			0.31685	0.31685					
			Total Flow at Node 19					0.31685	0.31685	Same Flow at Node 17	17-19	2.88334	0.91359	0.00640

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SECTION VI
PIPE SECTION CAPACITY
TABLE 2

U06-754 Bonita Canyon Gateway
Waste Water Study

Table 2: Capacity of Pipe Sections

Pipe Section	Peak Flow (cfs)	Pipe Size (inch)	Slope (%)	% Full
5-7	0.47378	8	1.50	38.7
12-7	0.24763	8	0.40	39.4
7-16	0.70571	8	1.08	53.8
16-19	0.91359	10	0.64	51.5

SECTION VII
HYDRAULICS CALCULATIONS

5-7 REACH
Worksheet for Circular Channel

Project Description	
Project File	m:\2006\u06-754 san dimas residential\eng\sw\waste wa.fm2
Worksheet	BONITA CANYON GATEWAY
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

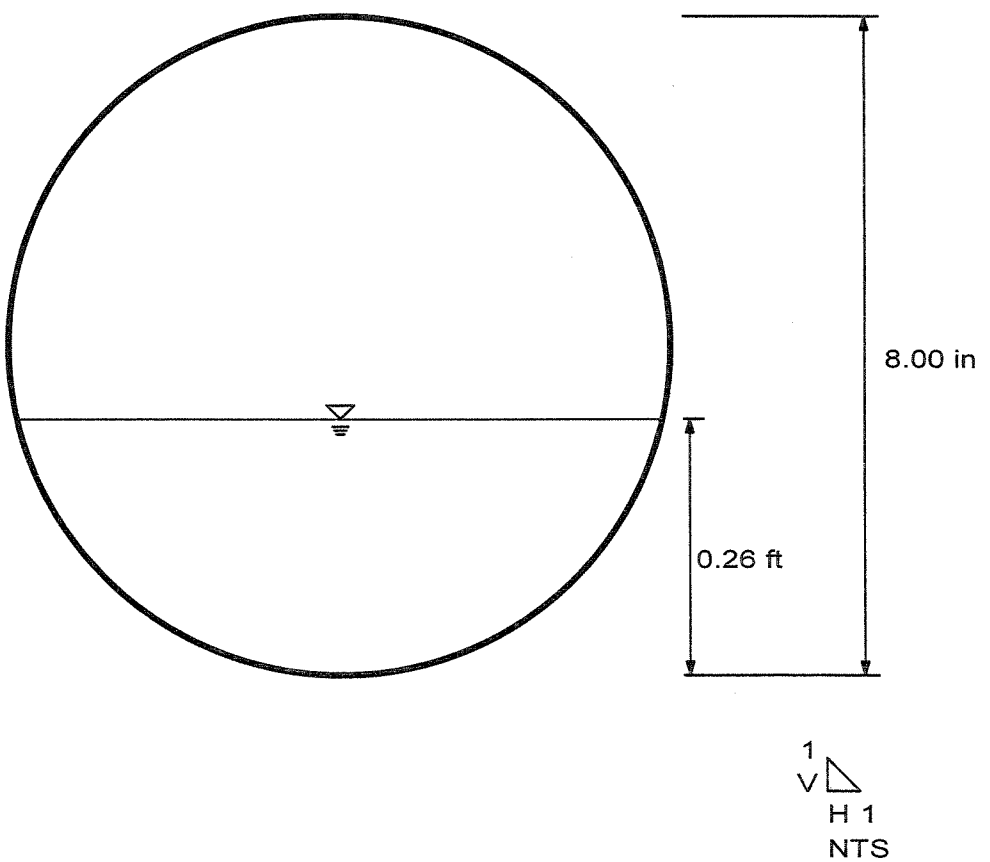
Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.015000	ft/ft
Diameter	8.00	in
Discharge	0.47	cfs

Results		
Depth	0.26	ft
Flow Area	0.12	ft²
Wetted Perimeter	0.90	ft
Top Width	0.65	ft
Critical Depth	0.32	ft
Percent Full	38.73	
Critical Slope	0.006921	ft/ft
Velocity	3.76	ft/s
Velocity Head	0.22	ft
Specific Energy	0.48	ft
Froude Number	1.51	
Maximum Discharge	1.59	cfs
Full Flow Capacity	1.48	cfs
Full Flow Slope	0.001513	ft/ft
Flow is supercritical.		

5-7 REACH
Cross Section for Circular Channel

Project Description	
Project File	m:\2006\u06-754 san dimas residential\eng\sw\waste wa.fm2
Worksheet	BONITA CANYON GATEWAY
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	0.015000	ft/ft
Depth	0.26	ft
Diameter	8.00	in
Discharge	0.47	cfs



12-7 REACH
Worksheet for Circular Channel

Project Description	
Project File	m:\2006\u06-754 san dimas residential\eng\sw\waste wa.fm2
Worksheet	BONITA CANYON GATEWAY
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

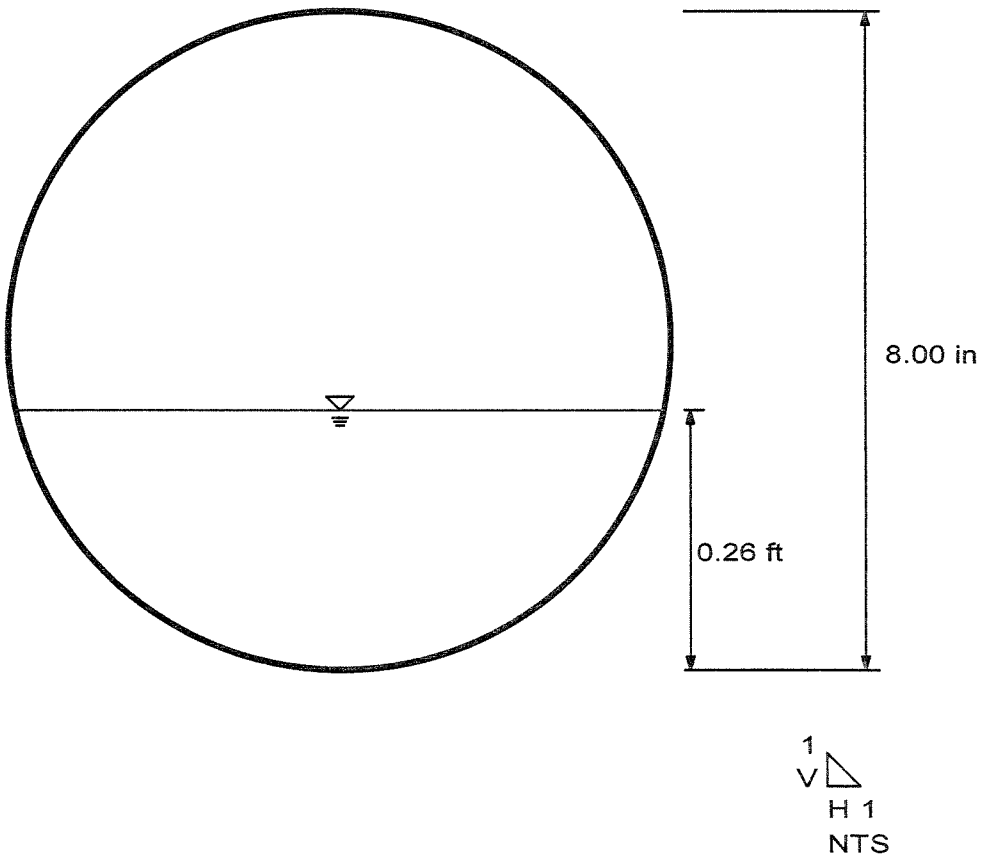
Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.004000	ft/ft
Diameter	8.00	in
Discharge	0.25	cfs

Results		
Depth	0.26	ft
Flow Area	0.13	ft²
Wetted Perimeter	0.90	ft
Top Width	0.65	ft
Critical Depth	0.23	ft
Percent Full	39.36	
Critical Slope	0.006463	ft/ft
Velocity	1.96	ft/s
Velocity Head	0.06	ft
Specific Energy	0.32	ft
Froude Number	0.78	
Maximum Discharge	0.82	cfs
Full Flow Capacity	0.76	cfs
Full Flow Slope	0.000428	ft/ft
Flow is subcritical.		

12-7 REACH
Cross Section for Circular Channel

Project Description	
Project File	m:\2006\u06-754 san dimas residential\eng\sw\waste wa.fm2
Worksheet	BONITA CANYON GATEWAY
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	0.004000	ft/ft
Depth	0.26	ft
Diameter	8.00	in
Discharge	0.25	cfs



7-16 REACH
Worksheet for Circular Channel

Project Description	
Project File	m:\2006\u06-754 san dimas residential\eng\sw\waste wa.fm2
Worksheet	BONITA CANYON GATEWAY
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

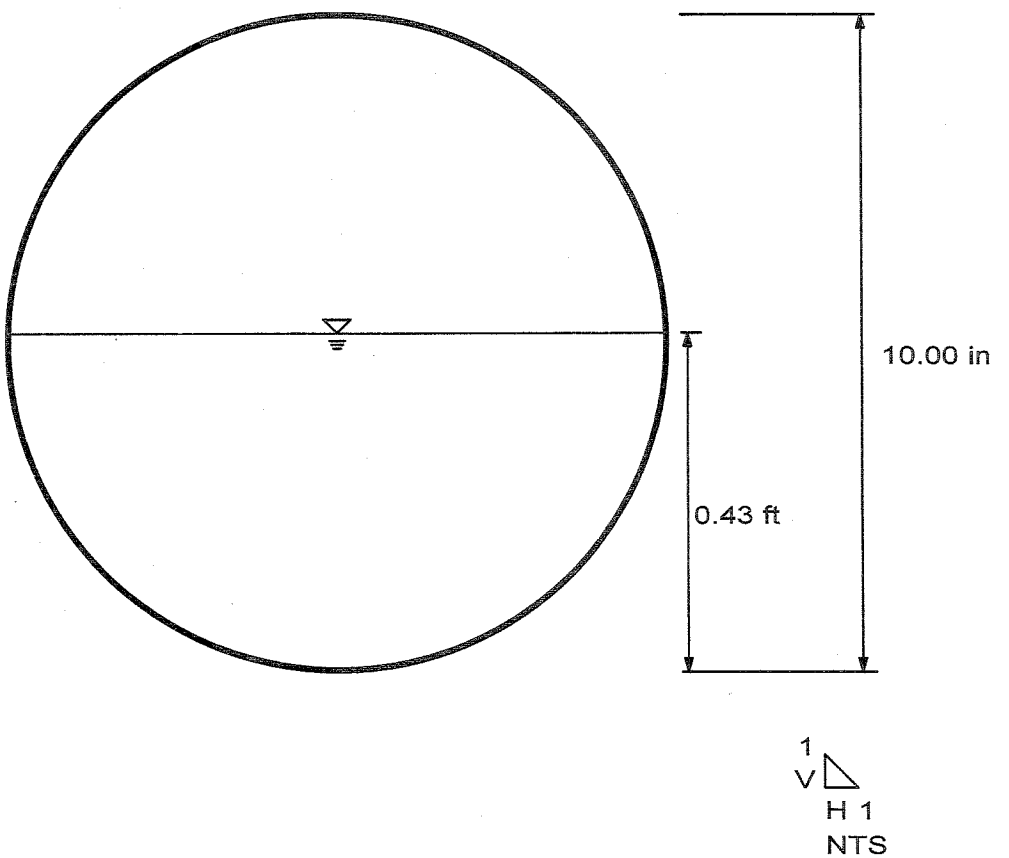
Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.006400	ft/ft
Diameter	10.00	in
Discharge	0.92	cfs

Results		
Depth	0.43	ft
Flow Area	0.28	ft²
Wetted Perimeter	1.33	ft
Top Width	0.83	ft
Critical Depth	0.43	ft
Percent Full	51.46	
Critical Slope	0.006584	ft/ft
Velocity	3.25	ft/s
Velocity Head	0.16	ft
Specific Energy	0.59	ft
Froude Number	0.98	
Maximum Discharge	1.89	cfs
Full Flow Capacity	1.75	cfs
Full Flow Slope	0.001763	ft/ft
Flow is subcritical.		

7-16 REACH
Cross Section for Circular Channel

Project Description	
Project File	m:\2006\u06-754 san dimas residential\eng\sw\waste wa.fm2
Worksheet	BONITA CANYON GATEWAY
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	0.006400	ft/ft
Depth	0.43	ft
Diameter	10.00	in
Discharge	0.92	cfs



SECTION IX
AREA MAPS