

MEMORANDUM

To: Don Young – City of Redlands
From: Scott Gilbert, P.E.
Date: February 1, 2021
Re: Canyon Ranch – City of Redlands Sewer Alternatives

PROJECT DESCRIPTION:

Canyon Ranch is a proposed residential development in both the Cities of Loma Linda and Redlands encompassing approximately 90 acres. A portion of the Project area (approximately 22 acres) lies within the City of Redlands and is assumed to consist of 27 very low-density residential lots (20,000 SF min) and public streets.

The nearest city sewer is located at the intersection of Nevada St and Barton Rd; approximately 2,100 feet from the Project. In accordance with City of Redlands Municipal code 13.44.080: When Sewer Not Available, several alternatives to provide sewer service to the Project site have been analyzed. For each alternative, a physical description is provided, along with an exhibit, and cost analysis. The alternatives are as follows:

1. 8" gravity sewer main from NW corner of the Project site, north on San Timoteo, east on Barton Road, and north on Nevada Street to the intersection of Nevada Street and Orange Avenue.
2. 8" gravity sewer main from NW corner of the Project site, north on San Timoteo to a lift station at the intersection of San Timoteo/Barton Road, and then a force main to the intersection of Nevada/Barton connecting to an existing gravity sewer main.
3. Gravity Sewer from NW corner of the Project to the west across San Timoteo into a proposed residential development (part of the larger Canyon Ranch Development) in the City of Loma Linda.
4. Septic systems within each individual lot of the Project Site

DESIGN CONSIDERATIONS:

Proposed Land Use	LDR
Dwelling Units	27
Study Area (acres)	21.6
Generation Rate (cfs/ac)	0.0017
Manning's Coefficient, n	0.013

Slope	0.0100
Velocity (ft/s)	2.5

ALTERNATIVES ANALYSIS:

Alternative 1: Gravity Sewer from Project to the intersection of Nevada St and Orange Ave

City of Redlands requested that this alternative be analyzed using a minimum pipe slope of 1% to ensure proper cleaning velocities due to the minimal effluent expected in the network. The existing sewer in Nevada St is not deep enough to accommodate the requested slope and instead would require parallel sewer at 0.4% slope along Nevada St from Barton Rd to Orange Ave. Also, installing 1% sewer from the Project to the intersection of Nevada St and Barton Rd would result in the sewer main being about 40 ft deep at that intersection. See **Exhibit 1 – Nevada St Gravity Sewer Exhibit** for reference.

Alternative 2: Gravity Sewer from Project to San Timoteo/Barton & force main to Barton/Nevada

This alternative requires the installation of a lift station at the intersection of San Timoteo Canyon Rd and Barton Rd. It also requires force main sewer along Barton Rd to the intersection of Nevada St. The location of the lift station would need District’s approval and potentially entail acquiring additional right-of-way to install the lift station. In order to provide 1% slope up to the lift station, the gravity sewer would need to be about 20 ft deep. See **Exhibit 2 – Lift Station Sewer Exhibit** for reference.

Alternative 3: Gravity Sewer from Project to proposed residential development in Loma Linda

Although City of Redlands does not have existing sewer in the vicinity of the Project, City of Loma Linda does have a sewer line in New Jersey St, south of Bermudez St. This existing sewer line is proposed to be extended as part of the Canyon Ranch – Loma Linda improvements as shown in **Exhibit 3 – Loma Linda Gravity Sewer Connection Exhibit**. The onsite Redlands network can be extended across San Timoteo Canyon Rd and connected to the proposed onsite Loma Linda network within an easement. Preliminary slopes have been identified in Exhibit 3 based on record drawings, but existing manhole invert elevations should be verified in the field. City of Loma Linda is currently researching the feasibility of accepting wastewater from the Project. At this point they have not reached a definite conclusion. This alternative will also require review/approval by LAFCO as part of the entitlement of both Projects.

Alternative 4: Septic Sewer on Project Site

Per direction from City of Redlands, septic sewer may be a viable alternative provided that proposed lots are at least 20,000 SF. The current Site Plan meets this minimum requirement so septic tanks can be installed for each individual residential lot. See **Exhibit 4 – Redlands Septic Sewer Exhibit**

CALCULATIONS SUMMARY:

Total Flow (cfs)	0.04
Peaking Factor	3.4*
Peak Wastewater Flow (cfs)	0.1258
Diameter (inches)	8
$k' = Qn / (d^{2.67} s^{0.5})$	0.0483

D/d 0.22
Velocity=Q/Area (ft/s) 2.24

*Peaking Factor is interpolated from Table 4 of the “City of Redlands Sanitary Sewer Systems Standard Specifications Manual”

COST ANALYSIS:

For each alternative analyzed, a preliminary cost estimate has been prepared to identify anticipated construction costs for providing sewer to the Site. These estimates were prepared by Murow Development Consultants and are summarized below. (please refer to Appendix “A” for the detailed breakdowns)

Sewer Alternative	Onsite Cost	Offsite Cost	Total Cost	Cost per Unit
1 - Nevada St Gravity Sewer	\$153,010	\$490,676	\$643,686	\$23,840
2 - Barton Rd Lift Station	\$153,010	\$664,750	\$817,760	\$30,287
3 - Loma Linda Gravity Sewer	\$153,010	\$30,550	\$183,560	\$6,798
4 - Redlands Septic Tanks	\$273,500	\$ 0	\$273,500	\$ 10,129

CONCLUSION/RECOMMENDATION:

Each of the alternatives has pros and cons as it relates to the Project, and the surrounding community. To determine the preferred alternative, consideration has been given to a number of factors including off-site impacts like traffic during construction, construction cost (especially as it relates to the number of units proposed), permitting requirements, and practicality.

Based on these considerations, Alternatives 1 and 2 have significant off-site components that will require extensive traffic control and handling during construction, as a result they also have a significantly higher cost associated with their construction. Alternatives 3 and 4 have a much smaller off-site component, and therefore a lower total cost. In terms of cost difference Alternatives 3 and 4 are roughly 2 to 3 times less expensive on a per lot basis than the other alternatives. Focusing on Alternatives 3 and 4, Alternative 3 provides the most cost-efficient solution for the Project, but will require approval from the City of Loma Linda as well as LAFCO due to the inter-agency handling of sewer flows. Alternative 4 is slightly more expensive than 3, but significantly less than 1 & 2. Considering the rural nature of the proposed Project and zoning of the surrounding area, utilizing septic systems provides an appropriate, cost effective solution with no off-site costs/impacts. Considering all these factors, Alternative 3 produces a standard sewer solution for the Project that results in a lower long term maintenance impact, and has the lowest overall construction cost. However, it does require additional Agency approvals to be realized, and could result in a longer permitting process. Taking all of this into consideration, Alternative 3 is best solution for the Project site, provided the City of Loma Linda will support the proposal. If they are unwilling, then Alternative 4 provides the best solution for the Project.

ORANGE AVE

EXHIBIT 1 CANYON RANCH NEVADA ST GRAVITY SEWER EXHIBIT

(1201.3 RIM)
(1192.94 INV)
(1193.53 EAST INV)
(1206.9 RIM)
(1198.01 INV)

1201.3 RIM
1193.8 INV - OUT
1206.9 RIM
1195.3 INV - OUT

(1222.7 RIM)
(1214.00 INV)

1222.7 RIM
1196.8 INV - OUT

(1229.8 RIM)
(1221.43 INV)

1229.8 RIM
1198.3 INV - OUT

(1238.0 RIM)
(1228.70 INV)
(1241.4 RIM)
(1233.65 INV)
1200.6 INV

1238.0 RIM
1199.7 INV - OUT
1241.5 RIM
1200.3 INV - OUT

1225.0 RIM
1205.1 INV - OUT

1223.5 RIM
1206.3 INV - OUT

1222.0 RIM
1207.7 INV - OUT

1233.5 RIM
1202.8 INV - OUT

1221.0 RIM
1209.7 INV - OUT

1222.5 RIM
1212.9 INV - OUT

1228.0 RIM
1216.0 INV - OUT

1229.0 RIM
1219.6 INV - OUT

1232.0 RIM
1223.0 INV - OUT

1234.0 RIM
1226.0 INV

Legend			
Description	Quantity	Unit	
Length Measurement	250	ft	
Nevada Street - Join Existing	1	Count	
Nevada Street - Manholes (20+ Deep)	4	Count	
Redlands - 8" Sewer Main	1,830	ft	
Redlands - Join Existing Sewer Main	1	Count	
Redlands - Manholes	6	Count	
San Timoteo Road - 8" Sewer Main (0-12' Deep)	1,612	ft	
San Timoteo Road - 8" Sewer Main (12-20' Deep)	1,176	ft	
San Timoteo Road - 8" Sewer Main (20-40' Deep)	723	ft	
San Timoteo Road - Manholes	8	Count	

LEGEND

- TRACT BOUNDARY
- PR. RIGHT-OF-WAY
- EX. SEWER
- EX. WATER

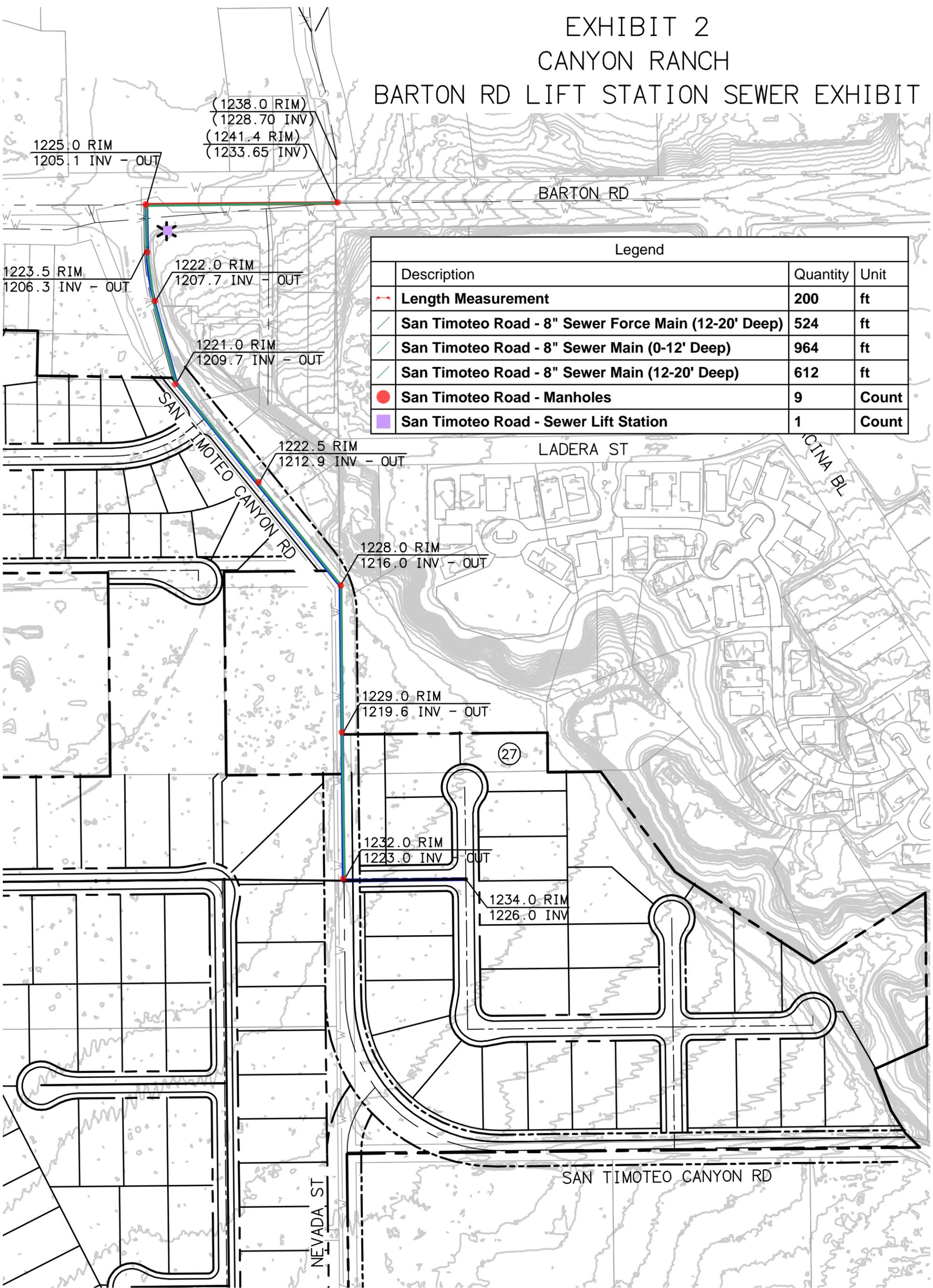
- PR. 8" GRAVITY SEWER @ 1% SLOPE
D/d=0.22, V=2.24 FT/S
- PR. 8" GRAVITY SEWER @ 0.4% SLOPE
D/d=0.27, V=1.62 FT/S

PREPARED FOR:
HIGHPOINTE COMMUNITIES

PREPARED BY:
PROACTIVE
ENGINEERING CONSULTANTS
WWW.PROACTIVEENGINEERING.COM
200 South Main Street, Corona, CA 92682 Suite 300
951-289-5500



EXHIBIT 2 CANYON RANCH BARTON RD LIFT STATION SEWER EXHIBIT



Legend			
Description	Quantity	Unit	
Length Measurement	200	ft	
San Timoteo Road - 8" Sewer Force Main (12-20' Deep)	524	ft	
San Timoteo Road - 8" Sewer Main (0-12' Deep)	964	ft	
San Timoteo Road - 8" Sewer Main (12-20' Deep)	612	ft	
San Timoteo Road - Manholes	9	Count	
San Timoteo Road - Sewer Lift Station	1	Count	

LEGEND	
	TRACT BOUNDARY
	PR. RIGHT-OF-WAY
	EX. SEWER
	EX. WATER

	PR. 8" GRAVITY SEWER @ 1% SLOPE D/d=0.22, V=2.24 FT/S
	PR. FORCE MAIN
	PR. LIFT STATION

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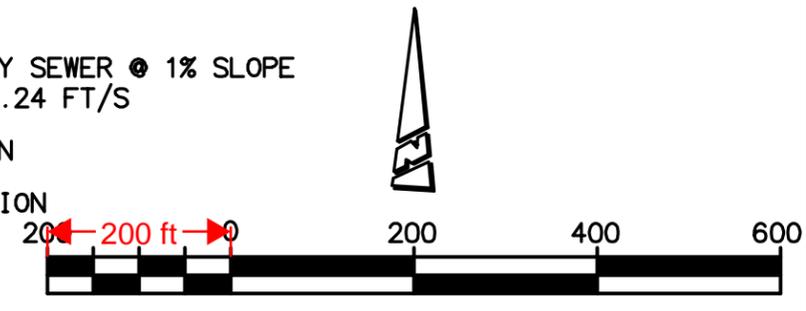
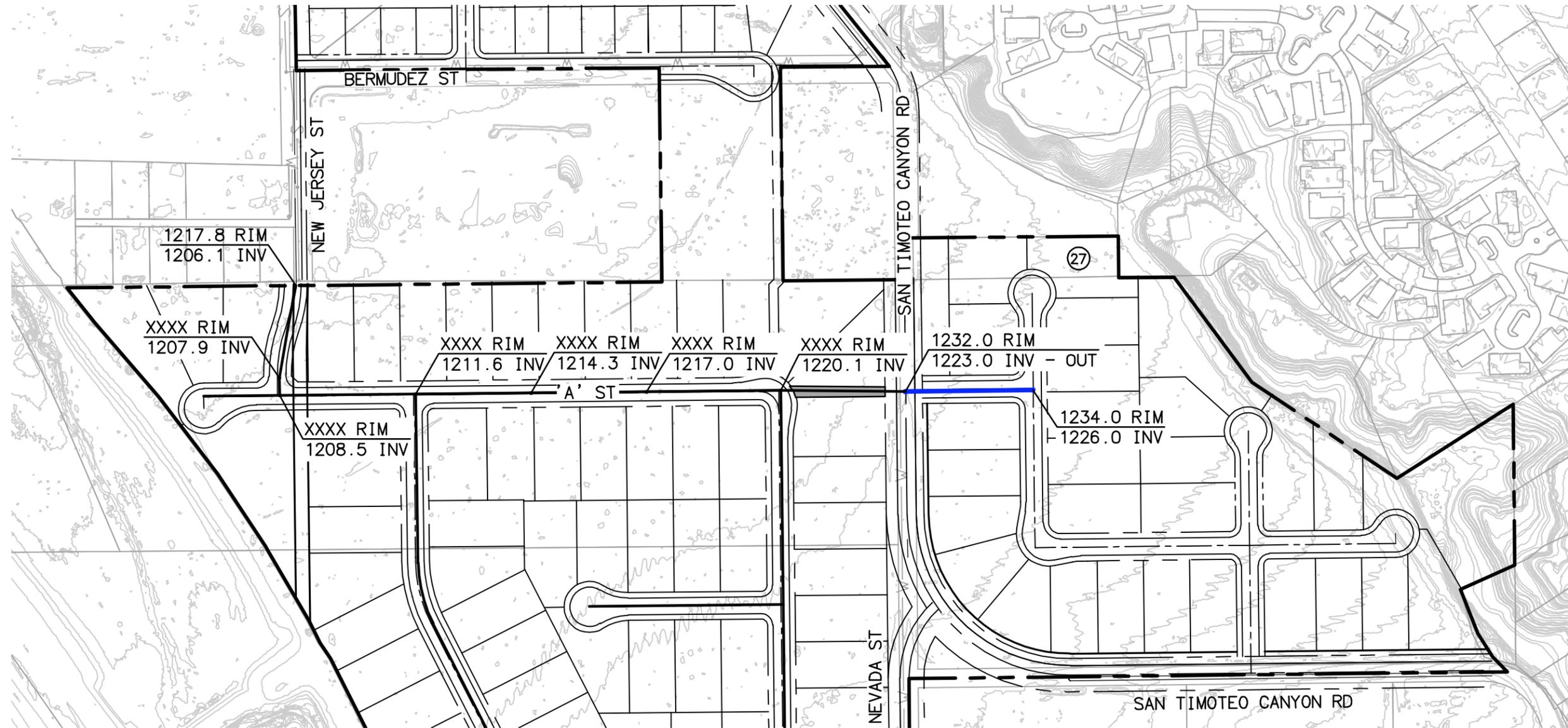


EXHIBIT 3 CANYON RANCH LOMA LINDA GRAVITY SEWER CONNECTION EXHIBIT



LEGEND

- | | | | |
|--|------------------|--|---|
| | TRACT BOUNDARY | | PR. 8" REDLANDS GRAVITY SEWER @ 1.0% SLOPE
D/d=0.22, V=2.24 FT/S |
| | PR. RIGHT-OF-WAY | | PR. 8" LOMA LINDA GRAVITY SEWER @ 1.0% SLOPE |
| | EX. SEWER | | PR. SEWER EASEMENT |
| | EX. WATER | | |

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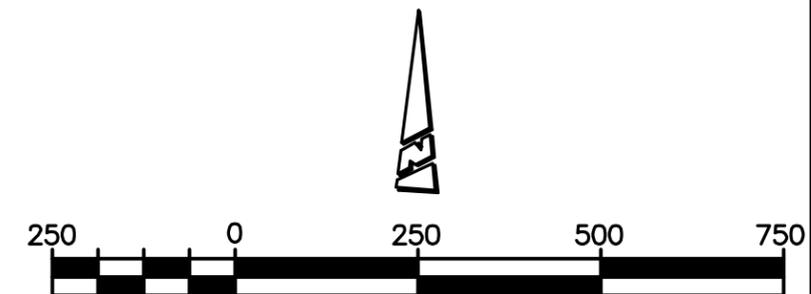


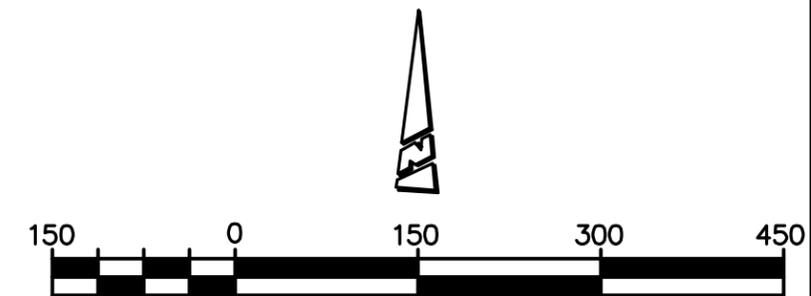
EXHIBIT 4 CANYON RANCH REDLANDS SEPTIC SEWER EXHIBIT



- LEGEND**
- TRACT BOUNDARY
 - PR. RIGHT-OF-WAY
 - S— EX. SEWER
 - W— EX. WATER
 - Ⓢ PR. SEPTIC TANK

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Appendix "A"



1151 Duryea Avenue | Irvine, CA 92614 | Tel: 949-988-3270

Project Documents Utilized	Product Type: SFD	Product Type: Redlands - 27 DU's	Product Type: Loma Linda - 88 DU's	Product Type: Loma Linda - 35 DU's	Offsite
1. Canyon Ranch - Redlands SP (2020-11-19)	No. of Units (DU): 150	No. of Units (DU): 27	No. of Units (DU): 88	No. of Units (DU): 35	
2. Canyon Ranch - Loma Linda 20,000 SP (2020-11-23)	Average per DU SF: -	Average per DU SF: -	Average per DU SF: -	Average per DU SF: -	
3. Canyon Ranch - 7200SF SP (2020-11-20)	Total Product SF: -	Total Product SF: -	Total Product SF: -	Total Product SF: -	
4. Geo Tech DD Report - Leighton re Canyon Ranch 8-14-20	Density: 1.7	Density: 2.2	Density: 1.6	Density: 3.5	
	Net Acres: 85.8	Net Acres: 21.6	Net Acres: 54.3	Net Acres: 9.9	Net Acres: -
	Gross Acres: 85.8	Gross Acres: 21.6	Gross Acres: 54.3	Gross Acres: 9.9	Gross Acres: -

Item No.	SANITARY SEWER	U/M	Price	Total		Redlands - 27 DU's		Loma Linda - 88 DU's		Loma Linda - 35 DU's		Offsite	
				Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
1.	Onsite												
2.	Mobilization	LS	3,500.00	3	10,500	1	3,500	1	3,500	1	3,500	-	-
3.	8" VCP, Mainline, w/Bedding & Backfill	LF	45.00	9,566	430,470	1,830	82,350	6,000	270,000	1,736	78,120	-	-
4.	4" PVC Lateral, w/Bedding & Backfill - Residential	EA	1,000.00	150	150,000	27	27,000	88	88,000	35	35,000	-	-
5.	48" Standard Manholes (Includes 1 Raise)	EA	4,900.00	43	210,700	6	29,400	23	112,700	14	68,600	-	-
6.	Sewer Cleanout	EA	3,100.00	3	9,300	-	-	2	6,200	1	3,100	-	-
7.	Video Sewer Mainline	LF	2.00	9,566	19,132	1,830	3,660	6,000	12,000	1,736	3,472	-	-
8.	Raise Sewer Manhole Cover to Finish Grade	EA	600.00	43	25,800	6	3,600	23	13,800	14	8,400	-	-
9.	Raise Sewer Cleanout Cover to Finish Grade	EA	350.00	3	1,050	-	-	2	700	1	350	-	-
10.	Remove & Replace Existing AC, W=4'	EA	15.00	-	-	-	-	-	-	-	-	-	-
11.	Traffic Control	LS	3,500.00	-	-	-	-	-	-	-	-	-	-
12.	Join Existing Sewer	EA	3,500.00	3	10,500	1	3,500	1	3,500	1	3,500	-	-
13.	Septic Tanks and Appurtenances Incl Installation	DU	10,000.00	-	-	-	-	-	-	-	-	-	-
14.	San Timoteo Canyon Road and Nevada Street (Per Exhibit 1)												
15.	Mobilization	LS	3,500.00	1	3,500	-	-	-	-	-	-	1	3,500
16.	8" VCP, Mainline, w/Bedding & Backfill (0 - 12' Deep)	LF	45.00	1,612	72,540	-	-	-	-	-	-	1,612	72,540
17.	8" VCP, Mainline, w/Bedding & Backfill (12-20' Deep)	LF	65.00	1,176	76,440	-	-	-	-	-	-	1,176	76,440
18.	8" VCP, Mainline, w/Bedding & Backfill (20-40' Deep)	LF	110.00	725	79,750	-	-	-	-	-	-	725	79,750
19.	48" Standard Manholes (12-20' Deep)	EA	5,900.00	8	47,200	-	-	-	-	-	-	8	47,200
20.	48" Standard Manholes (20'+ Deep)	EA	9,500.00	4	38,000	-	-	-	-	-	-	4	38,000
21.	Sewer Cleanout	EA	3,100.00	-	-	-	-	-	-	-	-	-	-
22.	Video Sewer Mainline	LF	2.00	3,513	7,026	-	-	-	-	-	-	3,513	7,026
23.	Raise Sewer Manhole Cover to Finish Grade	EA	600.00	12	7,200	-	-	-	-	-	-	12	7,200
24.	Raise Sewer Cleanout Cover to Finish Grade	EA	350.00	-	-	-	-	-	-	-	-	-	-
25.	Remove & Replace Existing AC, W=4'	EA	10.00	14,052	140,520	-	-	-	-	-	-	14,052	140,520
26.	Traffic Control	LS	15,000.00	1	15,000	-	-	-	-	-	-	1	15,000
27.	Join Existing Sewer	EA	3,500.00	1	3,500	-	-	-	-	-	-	1	3,500
Sub-Total: Sanitary Sewer.....					1,358,128		153,010		510,400		204,042		480,676
Price per DU					9,054		5,667		5,800		5,830		3,271

Notes:

(1)

(2)

Item No.	DOMESTIC WATER	U/M	Price	Total		Redlands - 27 DU's		Loma Linda - 88 DU's		Loma Linda - 35 DU's		Offsite	
				Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
1.	Onsite												
2.	Mobilization	LS	5,000.00	3	15,000	1	5,000	1	5,000	1	5,000	-	-
3.	8" DIP, Mainline, w/Bedding & Backfill	LF	45.00	10,266	461,970	2,288	102,960	6,140	276,300	1,838	82,710	-	-
4.	8" Fall Gate Valves	EA	1,800.00	42	75,600	15	27,000	20	36,000	7	12,600	-	-
5.	1" Domestic Service w/Meter Box - Residential	EA	950.00	150	142,500	27	25,650	88	83,600	35	33,250	-	-
6.	1.5" Landscape & Irrigation Service w/Meter Box	EA	1,500.00	4	6,000	1	1,500	2	3,000	1	1,500	-	-
7.	1" Air Vacuum Release Valves	EA	3,100.00	4	12,400	1	3,100	2	6,200	1	3,100	-	-
8.	6" Fire Hydrant Assembly	EA	5,215.00	29	151,235	6	31,290	17	88,655	6	31,290	-	-
9.	2" Blow off	EA	3,100.00	4	12,400	1	3,100	2	6,200	1	3,100	-	-
10.	Hot Tap Into Existing with GV and 1 Raise	EA	6,500.00	6	39,000	2	13,000	2	13,000	2	13,000	-	-
11.	Remove & Replace Existing Asphalt	SF	10.00	5,219	52,190	3,784	37,840	1,060	10,600	375	3,750	-	-
12.	Traffic Control	LS	5,000.00	3	15,000	1	5,000	1	5,000	1	5,000	-	-
13.	Chlorination & Testing	LF	2.00	10,266	20,532	2,288	4,576	6,140	12,280	1,838	3,676	-	-
14.	Raise Water Gate Valve Cover to Finish Grade	EA	375.00	75	28,125	22	8,250	39	14,625	14	5,250	-	-
Sub-Total: Domestic Water.....					1,031,952		268,266		560,460		203,226		
Price per DU					6,880		9,936		6,369		5,806		

Notes:

(1) Assumed Water Connections on Existing New Jersey Street and Nevada Street

Project Documents Utilized	Product Type: SFD	Product Type: Redlands - 27 DU's	Product Type: Loma Linda - 88 DU's	Product Type: Loma Linda - 35 DU's	Offsite
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2. Canyon Ranch - Loma Linda 20,000 SP (2020-11-23)	Average per DU SF: -	Average per DU SF: -	Average per DU SF: -	Average per DU SF: -	
3. Canyon Ranch - 7205F SP (2020-11-20)	Total Product SF: -	Total Product SF: -	Total Product SF: -	Total Product SF: -	
4. Geo Tech DD Report - Leighton re Canyon Ranch 8-14-20	Density: 1.7	Density: 2.2	Density: 1.6	Density: 3.5	
	Net Acres: 85.8	Net Acres: 21.6	Net Acres: 54.3	Net Acres: 9.9	Net Acres: -
	Gross Acres: 85.8	Gross Acres: 21.6	Gross Acres: 54.3	Gross Acres: 9.9	Gross Acres: -

Item No.	SANITARY SEWER	U/M	Price	Total		Redlands - 27 DU's		Loma Linda - 88 DU's		Loma Linda - 35 DU's		Offsite	
				Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
1.	Onsite												
2.	Mobilization	LS	3,500.00	3	10,500	1	3,500	1	3,500	1	3,500	-	-
3.	8" VCP, Mainline, w/Bedding & Backfill	LF	45.00	9,566	430,470	1,830	82,350	6,000	270,000	1,736	78,120	-	-
4.	4" PVC Lateral, w/Bedding & Backfill - Residential	EA	1,000.00	150	150,000	27	27,000	88	88,000	35	35,000	-	-
5.	48" Standard Manholes (Includes 1 Raise)	EA	4,900.00	43	211,700	6	29,400	23	112,700	14	68,600	-	-
6.	Sewer Cleanout	EA	3,100.00	3	9,300	-	-	2	6,200	1	3,100	-	-
7.	Video Sewer Mainline	LF	2.00	9,566	19,132	1,830	3,660	6,000	12,000	1,736	3,472	-	-
8.	Raise Sewer Manhole Cover to Finish Grade	EA	600.00	43	25,800	6	3,600	23	13,800	14	8,400	-	-
9.	Raise Sewer Cleanout Cover to Finish Grade	EA	350.00	3	1,050	-	-	2	700	1	350	-	-
10.	Remove & Replace Existing AC, W=4"	EA	15.00	-	-	-	-	-	-	-	-	-	-
11.	Traffic Control	LS	3,500.00	-	-	-	-	-	-	-	-	-	-
12.	Join Existing Sewer	EA	3,500.00	3	10,500	1	3,500	1	3,500	1	3,500	-	-
13.	Septic Tanks and Appurtenances Incl Installation	DU	10,000.00	-	-	-	-	-	-	-	-	-	-
14.	San Timoteo Canyon Road and Nevada Street (Per Exhibit 2)												
15.	Mobilization	LS	3,500.00	1	3,500	-	-	-	-	-	-	1	3,500
16.	8" VCP, Mainline, w/Bedding & Backfill (0 - 12' Deep)	LF	45.00	965	43,425	-	-	-	-	-	-	965	43,425
17.	8" VCP, Mainline, w/Bedding & Backfill (12-20' Deep)	LF	65.00	612	39,780	-	-	-	-	-	-	612	39,780
18.	8" VCP Force Mainline, w/Bedding & Backfill (12-20' Deep)	LF	72.00	524	37,728	-	-	-	-	-	-	524	37,728
19.	48" Standard Manholes (12-20' Deep)	EA	5,900.00	9	53,100	-	-	-	-	-	-	9	53,100
20.	48" Standard Manholes (20+ Deep)	EA	9,500.00	-	-	-	-	-	-	-	-	-	-
21.	Sewer Lift Station (DH071/DR071)*	ALLOW	375,075.00 (1)	1	375,075	-	-	-	-	-	-	1	375,075
22.	Sewer Cleanout	EA	3,100.00	-	-	-	-	-	-	-	-	-	-
23.	Video Sewer Mainline	LF	2.00	2,101	4,202	-	-	-	-	-	-	2,101	4,202
24.	Raise Sewer Manhole Cover to Finish Grade	EA	600.00	9	5,400	-	-	-	-	-	-	9	5,400
25.	Raise Sewer Cleanout Cover to Finish Grade	EA	350.00	-	-	-	-	-	-	-	-	-	-
26.	Remove & Replace Existing AC, W=4"	EA	10.00	8,404	84,040	-	-	-	-	-	-	8,404	84,040
27.	Traffic Control	LS	15,000.00	1	15,000	-	-	-	-	-	-	1	15,000
28.	Join Existing Sewer	EA	3,500.00	1	3,500	-	-	-	-	-	-	1	3,500
Sub-Total: Sanitary Sewer.....					1,532,202		153,010		510,400		204,042		664,790
Price per DU					10,215		5,667		5,800		5,830		4,432

Notes:
(1) Price Provided by Civil and e-one sewer systems dated 1/8/21
(2)

Item No.	DOMESTIC WATER	U/M	Price	Total		Redlands - 27 DU's		Loma Linda - 88 DU's		Loma Linda - 35 DU's		Offsite	
				Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
1.	Onsite												
2.	Mobilization	LS	5,000.00	3	15,000	1	5,000	1	5,000	1	5,000	-	-
3.	8" DIP, Mainline, w/Bedding & Backfill	LF	45.00	10,266	461,970	2,288	102,960	6,140	276,300	1,838	82,710	-	-
4.	8" FxH Gate Valves	EA	1,800.00	42	75,600	15	27,000	20	36,000	7	12,600	-	-
5.	1" Domestic Service w/Meter Box - Residential	EA	950.00	150	142,500	27	25,650	88	83,600	35	33,250	-	-
6.	1.5" Landscape & Irrigation Service w/Meter Box	EA	1,500.00	4	6,000	1	1,500	2	3,000	1	1,500	-	-
7.	1" Air Vacuum Release Valves	EA	3,100.00	4	12,400	1	3,100	2	6,200	1	3,100	-	-
8.	6" Fire Hydrant Assembly	EA	5,215.00	29	151,235	6	31,290	17	88,655	6	31,290	-	-
9.	2" Blow off	EA	3,100.00	4	12,400	1	3,100	2	6,200	1	3,100	-	-
10.	Hot Taps Into Existing with GV and 1 Raise	EA	6,500.00	6	39,000	2	13,000	2	13,000	2	13,000	-	-
11.	Remove & Replace Existing Asphalt	SF	10.00	5,219	52,190	3,784	37,840	1,060	10,600	375	3,750	-	-
12.	Traffic Control	LS	5,000.00	3	15,000	1	5,000	1	5,000	1	5,000	-	-
13.	Chlorination & Testing	LF	2.00	10,266	20,532	2,288	4,576	6,140	12,280	1,838	3,676	-	-
14.	Raise Water Gate Valve Cover to Finish Grade	EA	375.00	75	28,125	22	8,250	39	14,625	14	5,250	-	-
Sub-Total: Domestic Water.....					1,031,952		268,256		560,460		203,226		-
Price per DU					6,880		9,936		6,369		5,806		-

Notes:
(1) Assumed Water Connections on Existing New Jersey Street and Nevada Street

Project Documents Utilized	Product Type: SFD	Product Type: Redlands - 27 DU's	Product Type: Loma Linda - 88 DU's	Product Type: Loma Linda - 35 DU's	Offsite
1. Canyon Ranch - Redlands SP (2020-11-19)	No. of Units (DU): 150	No. of Units (DU): 27	No. of Units (DU): 88	No. of Units (DU): 35	
2. Canyon Ranch - Loma Linda 20,000 SP (2020-11-23)	Average per DU SF: -	Average per DU SF: -	Average per DU SF: -	Average per DU SF: -	
3. Canyon Ranch - 7200SF SP (2020-11-20)	Total Product SF: -	Total Product SF: -	Total Product SF: -	Total Product SF: -	
4. Geo Tech DD Report - Leighton re Canyon Ranch 8-14-20	Density: 1.7	Density: 2.2	Density: 1.6	Density: 3.5	
	Net Acres: 85.8	Net Acres: 21.6	Net Acres: 54.3	Net Acres: 9.9	Net Acres: -
	Gross Acres: 85.8	Gross Acres: 21.6	Gross Acres: 54.3	Gross Acres: 9.9	Gross Acres: -

Item No.	SANITARY SEWER	U/M	Price	Total		Redlands - 27 DU's		Loma Linda - 88 DU's		Loma Linda - 35 DU's		Offsite	
				Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
1.	Onsite												
2.	Mobilization	LS	3,500.00	4	14,000	1	3,500	1	3,500	1	3,500	1	3,500
3.	8" VCP, Mainline, w/Bedding & Backfill	LF	45.00	9,871	444,195	1,830	82,350	6,000	270,000	1,736	78,120	305	13,725
4.	4" PVC Lateral, w/Bedding & Backfill - Residential	EA	1,000.00	150	150,000	27	27,000	88	88,000	35	35,000	-	-
5.	48" Standard Manholes (Includes 1 Raise)	EA	4,900.00	44	215,600	6	29,400	23	112,700	14	68,600	1	4,900
6.	Sewer Cleanout	EA	3,100.00	3	9,300	-	-	2	6,200	1	3,100	-	-
7.	Video Sewer Mainline	LF	2.00	9,871	19,742	1,830	3,660	6,000	12,000	1,736	3,472	305	610
8.	Raise Sewer Manhole Cover to Finish Grade	EA	600.00	44	26,400	6	3,600	23	13,800	14	8,400	1	600
9.	Raise Sewer Cleanout Cover to Finish Grade	EA	350.00	3	1,050	-	-	2	700	1	350	-	-
10.	Remove & Replace Existing AC, W=4"	EA	15.00	361	1,215	280	-	-	-	-	-	81	1,215
11.	Traffic Control	LS	2,500.00	2	2,500	1	-	-	-	-	-	1	2,500
12.	Join Existing Sewer	EA	3,500.00	4	14,000	1	3,500	1	3,500	1	3,500	1	3,500
13.	Septic Tanks and Appurtenances Incl Installation	DU	10,000.00	-	-	-	-	-	-	-	-	-	-
Sub-Total: Sanitary Sewer.....					898,002		153,010		510,400		204,042		30,550
Price per DU					5,987		5,667		5,800		5,830		204

Notes:
(1) Join Existing Sewer in New Jersey Road
(2)

Item No.	DOMESTIC WATER	U/M	Price	Total		Redlands - 27 DU's		Loma Linda - 88 DU's		Loma Linda - 35 DU's		Offsite	
				Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
1.	Onsite												
2.	Mobilization	LS	5,000.00	3	15,000	1	5,000	1	5,000	1	5,000	-	-
3.	8" DIP, Mainline, w/Bedding & Backfill	LF	45.00	10,266	461,970	2,288	102,960	6,140	276,300	1,838	82,710	-	-
4.	8" FxH Gate Valves	EA	1,800.00	42	75,600	15	27,000	20	36,000	7	12,600	-	-
5.	1" Domestic Service w/Meter Box - Residential	EA	950.00	150	142,500	27	25,650	88	83,600	35	33,250	-	-
6.	1.5" Landscape & Irrigation Service w/Meter Box	EA	1,500.00	4	6,000	1	1,500	2	3,000	1	1,500	-	-
7.	1" Air Vacuum Release Valves	EA	3,100.00	4	12,400	1	3,100	2	6,200	1	3,100	-	-
8.	6" Fire Hydrant Assembly	EA	5,215.00	29	151,235	6	31,290	17	88,655	6	31,290	-	-
9.	2" Blow off	EA	3,100.00	4	12,400	1	3,100	2	6,200	1	3,100	-	-
10.	Hot Tap Into Existing with GV and 1 Raise	EA	6,500.00	6	39,000	2	13,000	2	13,000	2	13,000	-	-
11.	Remove & Replace Existing Asphalt	SF	10.00	5,219	52,190	3,784	37,840	1,060	10,600	375	3,750	-	-
12.	Traffic Control	LS	5,000.00	3	15,000	1	5,000	1	5,000	1	5,000	-	-
13.	Chlorination & Testing	LF	2.00	10,266	20,532	2,288	4,576	6,140	12,280	1,838	3,676	-	-
14.	Raise Water Gate Valve Cover to Finish Grade	EA	375.00	75	28,125	22	8,250	39	14,625	14	5,250	-	-
Sub-Total: Domestic Water.....					1,031,992		268,266		560,460		203,226		-
Price per DU					6,880		9,936		6,369		5,806		-

Notes:
(1) Assumed Water Connections on Existing New Jersey Street and Nevada Street

Project Documents Utilized	Product Type: SFD	Product Type: Redlands - 27 DU's	Product Type: Loma Linda - 88 DU's	Product Type: Loma Linda - 35 DU's	Offsite
1. Canyon Ranch - Redlands SP (2020-11-19)	No. of Units (DU): 150	No. of Units (DU): 27	No. of Units (DU): 88	No. of Units (DU): 35	
2. Canyon Ranch - Loma Linda 20,000 SP (2020-11-23)	Average per DU SF: -	Average per DU SF: -	Average per DU SF: -	Average per DU SF: -	
3. Canyon Ranch - 7200SF SP (2020-11-20)	Total Product SF: -	Total Product SF: -	Total Product SF: -	Total Product SF: -	
4. Geo Tech DD Report - Leighton re Canyon Ranch 8-14-20	Density: 1.7	Density: 2.2	Density: 1.6	Density: 3.5	
	Net Acres: 85.8	Net Acres: 21.6	Net Acres: 54.3	Net Acres: 9.9	Net Acres: -
	Gross Acres: 85.8	Gross Acres: 21.6	Gross Acres: 54.3	Gross Acres: 9.9	Gross Acres: -

Item No.	SANITARY SEWER	U/M	Price	Total		Redlands - 27 DU's		Loma Linda - 88 DU's		Loma Linda - 35 DU's		Offsite	
				Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
1.	Onsite												
2.	Mobilization	LS	3,500.00	4	14,000	1	3,500	1	3,500	1	3,500	1	3,500
3.	8" VCP, Mainline, w/Bedding & Backfill	LF	45.00	9,566	430,470	1,830	82,350	6,000	270,000	1,736	78,120	-	-
4.	4" PVC Lateral, w/Bedding & Backfill - Residential	EA	1,000.00	150	150,000	27	27,000	88	88,000	35	35,000	-	-
5.	48" Standard Manholes (Includes 1 Raise)	EA	4,900.00	43	210,700	6	29,400	23	112,700	14	68,600	-	-
6.	Sewer Cleanout	EA	3,100.00	3	9,300	-	-	2	6,200	1	3,100	-	-
7.	Video Sewer Mainline	LF	2.00	9,566	19,132	1,830	3,660	6,000	12,000	1,736	3,472	-	-
8.	Raise Sewer Manhole Cover to Finish Grade	EA	600.00	43	25,800	6	3,600	23	13,800	14	8,400	-	-
9.	Raise Sewer Cleanout Cover to Finish Grade	EA	350.00	3	1,050	-	-	2	700	1	350	-	-
10.	Remove & Replace Existing AC, W=4"	EA	15.00	280	4,200	280	4,200	-	-	-	-	-	-
11.	Traffic Control	LS	2,500.00	1	2,500	1	2,500	-	-	-	-	-	-
12.	Join Existing Sewer	EA	3,500.00	3	10,500	1	3,500	1	3,500	1	3,500	-	-
13.	Septic Tanks and Appurtenances Incl Installation	DU	10,000.00	27	270,000	27	270,000	-	-	-	-	27	270,000
Sub-Total: Sanitary Sewer.....					1,147,652		159,710		510,400		204,042		273,500
Price per DU					7,651		5,915		5,800		5,830		1,823

Notes:
(1) Join Existing Sewer in New Jersey Road
(2)

Item No.	DOMESTIC WATER	U/M	Price	Total		Redlands - 27 DU's		Loma Linda - 88 DU's		Loma Linda - 35 DU's		Offsite	
				Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
1.	Onsite												
2.	Mobilization	LS	5,000.00	3	15,000	1	5,000	1	5,000	1	5,000	-	-
3.	8" DIP, Mainline, w/Bedding & Backfill	LF	45.00	10,266	461,970	2,288	102,960	6,140	276,300	1,838	82,710	-	-
4.	8" FxH Gate Valves	EA	1,800.00	42	75,600	15	27,000	20	36,000	7	12,600	-	-
5.	1" Domestic Service w/Meter Box - Residential	EA	950.00	150	142,500	27	25,650	88	83,600	35	33,250	-	-
6.	1.5" Landscape & Irrigation Service w/Meter Box	EA	1,500.00	4	6,000	1	1,500	2	3,000	1	1,500	-	-
7.	1" Air Vacuum Release Valves	EA	3,100.00	4	12,400	1	3,100	2	6,200	1	3,100	-	-
8.	6" Fire Hydrant Assembly	EA	5,215.00	29	151,235	6	31,290	17	88,655	6	31,290	-	-
9.	2" Blow off	EA	3,100.00	4	12,400	1	3,100	2	6,200	1	3,100	-	-
10.	Hot Tap Into Existing with GV and 1 Raise	EA	6,500.00	6	39,000	2	13,000	2	13,000	2	13,000	-	-
11.	Remove & Replace Existing Asphalt	SF	10.00	5,219	52,190	3,784	37,840	1,060	10,600	375	3,750	-	-
12.	Traffic Control	LS	5,000.00	3	15,000	1	5,000	1	5,000	1	5,000	-	-
13.	Chlorination & Testing	LF	2.00	10,266	20,532	2,288	4,576	6,140	12,280	1,838	3,676	-	-
14.	Raise Water Gate Valve Cover to Finish Grade	EA	375.00	75	28,125	22	8,250	39	14,625	14	5,250	-	-
Sub-Total: Domestic Water.....					1,031,952		268,266		560,460		203,226		-
Price per DU					6,880		9,936		6,369		5,806		-

Notes:
(1) Assumed Water Connections on Existing New Jersey Street and Nevada Street