

March 27, 2012

John Zhao, PE
Las Virgenes Municipal Water District
4232 Las Virgenes Road
Calabasas, CA 91302

**Subject: Yager Way Alternative Access to Tank Site C
LVMWD Report No. 2433.04**

Dear John,

Las Virgenes Mutual Water District (District), requested that an access route be analyzed from Yager Way, in the Upper Terrace community of Westlake Village, to the proposed Site C of the 5 million gallon (MG) tank near the Las Virgenes Reservoir. The District has completed analysis of several alternative access routes to Site C, including a route along the northern edge of the reservoir and another from Triunfo Canyon Road. The following design criteria and assumptions were utilized for laying out the previous alignments and were used for development of the Yager Way alignment.

- Centerline grade maximum of 18 percent
- Road centerline radius should be a minimum of 50 feet
- The design road width is 15 feet, no curb and gutter, crowned and shoulders are three foot minimum. No specific road standard was used.
- The design speed was not considered, at this preliminary concept
- All alternatives will have an all weather access road to Tank Site C
- Access road alignments must accommodate maintenance and construction vehicles
- The Evaluation of Blasting Excavation for the Proposed 5 MG Tank at Las Virgenes Reservoir (May 2011) study noted that “controlled blasting methods will almost certainly be required to excavate the hard diabase and agglomerate formations observed at the site”. Although this study focused on the original Tank Site C access road, it is assumed to be consistent for this alternative access study.
- Tributary drainage should be conveyed under the access road, future consideration to the design storm event should consider 100-year flows
- The design vehicle is a WB-40 truck

LVMWD Report No. 2433.04
March 2012

- Pavement widths will be increased where centerline radii are less than 60' in order to accommodate larger construction vehicles such as a WB-40 truck (4 axles or more)
- Cut or fill slopes will daylight at 2:1. Due to the proposed grading of these side slopes, and the assumed geotechnical conditions, retaining walls are not anticipated in most areas.
- The District provided a map (Portion of Lot 3 of Parcel Map No. 10284) illustrating the future extension of Lindero Canyon Road and an existing 40 foot wide easement in the general area of the proposal alternative access. No consideration of coordinating the alignment with either was considered and both are included in the alternative figures for general information. Alignment and grade were the key factors in developing the alternatives.
- The District would have to obtain right-of-way from the Upper Terrace Home Owner's Association and Mountains Recreation and Conservation Authority.

ANALYSIS AND SUMMARY

The proposed alignment from Yager Way required the use of switchbacks and cuts reaching 30 feet to maintain a grade at or below 18 percent. In addition, this alternative is in close proximity to residential units along Yager Way and Jonquilfield Road. To illustrate the proposed alignment, the following three figures were developed and are included as Attachment 1: Figure 1 – Plan View, Figure 2 – Profile, and Figure 2A – Sections. Attachment 2 provides the engineer's opinion of probable cost for the proposed alternative.

In reviewing alternative road alignments, there are several factors that should be considered in making a selection. Some of these factors include the following:

- Construction Cost
- Community and Environmental Impacts
- Easement and Property Acquisition Costs
- Long Term Access
- Road and Pipeline Maintenance
- Ease of Construction and Pipe Selection

Due to the concept level of this analysis, not all of the factors above were considered in the evaluation and additional analysis is required to refine both the design and opinion of probable cost. However, in reviewing the figures and opinions of probable costs provided in Attachment 1 and 2, respectively, the results provide a means of comparing alternatives and determining the optimal alignment. Table 1 provides a summary of key factors collected during the analysis.

**TABLE 1
 ALTERNATIVE SUMMARY**

Description	Yager Way Alternative
Maximum Grade (%)	18.0
Switchbacks	Yes
Estimated Cut (CY)	32,000
Estimate Fill (CY)	5,700
Length (feet)	2,500
Cost (thousands)	\$2,768

Note: Appendix 2 provides details, assumptions and background for development of opinion of probable costs.

The Evaluation of Blasting Excavation for the Proposed 5 MG Tank at Las Virgenes Reservoir (May 2011) study investigated the impacts of blasting on residential units at a distance ranging between 480 and 1,160 feet. Since distance to residential units for the Yager Way alternative is less than 480 feet, further consideration of this alternative should include an investigation of potential blasting impacts, such as direct ground fracturing beyond blasting limits, ground vibration, air-overpressure/noise and flyrock.

Sincerely,



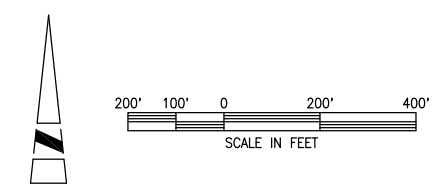
John Coffman, PE
 Project Engineer



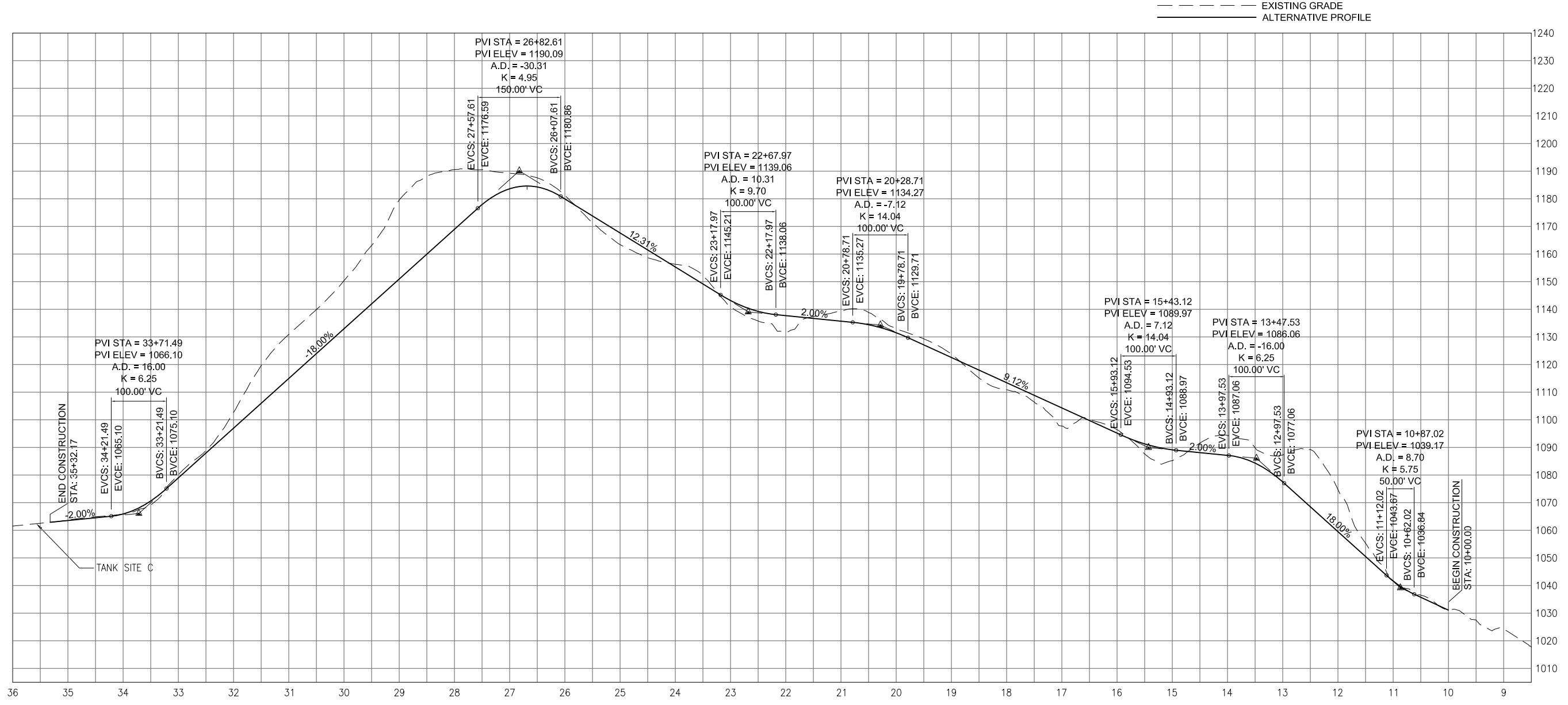
Ryan Gallagher, PE
 Project Manager

- Attachment 1: Figures 1-2A
- Attachment 2: Engineer's Opinion of Probable Cost

DWG: Z:\CURRENT_PROJECTS\LWMD\6061677 - Backbone System PDR & CEQA 23016.01\0001\CAO\Exhibits\Access Road C\FIGURE 8.dwg Layout Name: FIGURE 1 - Plotted by: Pittman, Matthew Date: 3/27/2012 - 10:12 AM
XREFS: C-RP - C-BD FIG - baseparcels(8-25-06) - C-HA-ALT8 IMAGES: WestlakeRes.jpg - AECOM_RCB.jpg -



LAS VIRGENES MUNICIPAL WATER DISTRICT ACCESS ROAD ALTERNATIVE ANALYSIS	
YAGER WAY ALTERNATIVE PLAN VIEW	
MARCH 2012	FIGURE 1

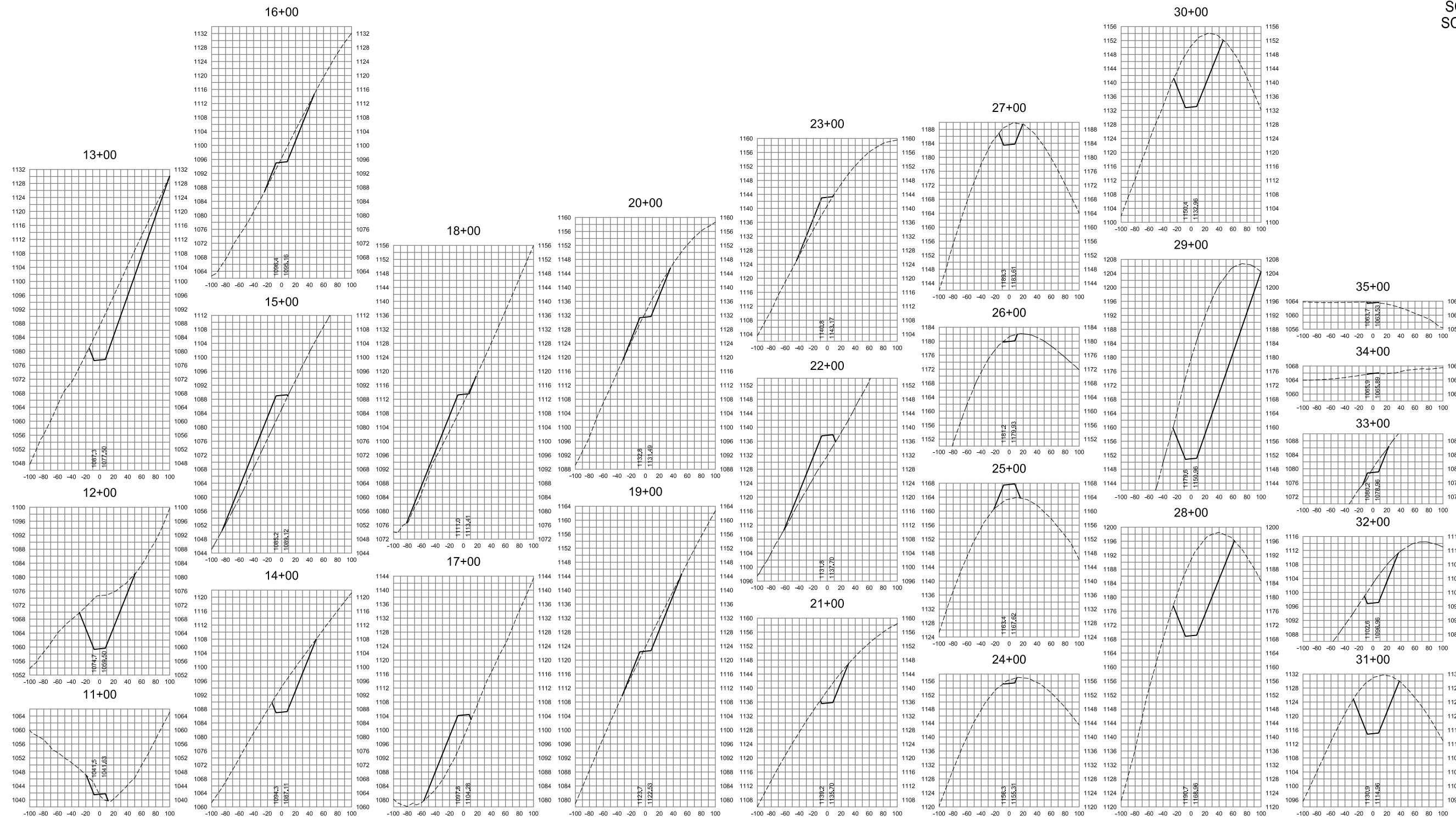


NOTE:
 1. ROAD STATIONING SHOWN IS IN HUNDREDS OF FEET.



LAS VIRGENES MUNICIPAL WATER DISTRICT ACCESS ROAD ALTERNATIVE ANALYSIS	
YAGER WAY ALTERNATIVE PROFILE	
MARCH 2012	FIGURE 2

DWG: Z:\CURRENT_PROJECTS\LWWD\00061677 - Backbone System PDR & CEQA_23016.01\0001\CAO\Exhibits\Access Road C\FIGURE 9.dwg Layout Name: FIGURE 2 - Plotted by: Pittman, Matthew Date: 3/27/2012 - 10:11 AM
 XREFS: C-BD FIG - C-HA-A1B IMAGES: AECOM_RGB.jpg



STATION	VOLUMES Cubic Yards		CUMULATIVE VOLUMES Cubic Yards	
	CUT	FILL	CUT	FILL
11+00	162	13	191	25
12+00	2169	0	3133	25
13+00	1149	0	6542	25
14+00	422	0	7684	25
15+00	0	601	7806	970
16+00	190	108	8098	1353
17+00	6	583	8192	2405
18+00	4	428	8206	3251

TOTAL CUT \approx 32,000 CY
TOTAL FILL \approx 5,700 CY

STATION	VOLUMES Cubic Yards		CUMULATIVE VOLUMES Cubic Yards	
	CUT	FILL	CUT	FILL
19+00	287	41	8606	3535
20+00	211	23	9074	3595
21+00	162	21	9477	3616
22+00	0	593	9528	4516
23+00	60	114	9588	5051
24+00	15	108	9678	5113
25+00	0	161	9678	5442
26+00	89	0	9787	5496

STATION	VOLUMES Cubic Yards		CUMULATIVE VOLUMES Cubic Yards	
	CUT	FILL	CUT	FILL
27+00	564	0	10550	5496
28+00	3654	0	15833	5496
29+00	4070	0	24959	5496
30+00	1361	0	28547	5496
31+00	1139	0	30908	5496
32+00	264	4.3	31892	5540
33+00	42	35	32045	5626
34+00	6	1	32051	5655
35+00	2	1	32062	5657
35+32.17	0	0	32062	5657

LAS VIRGENES MUNICIPAL WATER DISTRICT
ACCESS ROAD ALTERNATIVE ANALYSIS

YAGER WAY ALTERNATIVE
SECTIONS

MARCH 2012 FIGURE 2A



DWG: Z:\CURRENT_PROJECTS\LMW\0061677 - Backbone System PDR & CEQA - 2/21/16\01\0001\CAO\Exhibits\Access Road C:\FIGURE 9A.dwg Layout Name: FIGURE 2 - Plotted By: Pittman, Matthew Date: 3/27/2012 - 10:08 AM
 XREFS: C-BD FIG - C-HA-ALT8 IMAGES: AECOM_RGB.JPG

Yager Way Alternative - Preliminary Opinion of Probable Construction Cost

Item	Description	Quantity	Unit	Price (\$)	Total
1	Mobilization ⁽¹⁾	1	LS	\$ 109,000	\$ 109,000
2	SWPPP Measures ⁽²⁾	1	LS	\$ 40,000	\$ 40,000
3	Clear and Grub ⁽²⁾	1	LS	\$ 25,000	\$ 25,000
4	18" Drainage Culvert ⁽³⁾	63	LF	\$ 60	\$ 3,780
5	Blasting ⁽⁴⁾	32,000	CY	\$ 26	\$ 816,000
6	Fill ⁽⁵⁾	5,700	CY	\$ 40	\$ 228,000
7	Haul off	26,300	CY	\$ 10	\$ 263,000
8	Paving ⁽⁶⁾	37,980	SF	\$ 3	\$ 129,132
9	30" Concrete V - Ditch ⁽⁷⁾	5,064	LF	\$ 45	\$ 227,880
10	Rip rap at base of Concrete V Ditch	44	CY	\$ 175	\$ 7,700
11	Shortload Charges due to steep access road ⁽⁸⁾	440	EA	\$ 75	\$ 33,000
12	Retaining Wall ⁽⁹⁾	1	LS	\$ 40,000	\$ 40,000
Construction Subtotal					\$1,922,492
Contingency (20%)					\$384,498
Total Construction Cost (Yager Way)					\$2,306,990
Design, Geotechnical and Environmental (10%)					\$230,699
Construction Management and Admin (10%)					\$230,699
Total Project Cost (Yager Way)					\$2,768,000

Note

- (1) Mobilization costs = 6 percent of Construction Subtotal.
- (2) SWPPP Measures and Clear and Grub quantities for this alignment will be more than Alternative 1 (from Triunfo Canyon Road) due to the increase in overall disturbed grading area.
- (3) Allowance for three (3) drainage crossings - 21 lineal feet per crossing for a 15 foot wide road to convey flows in existing watershed.
- (4) \$26/CY blasting cost used for blasting quantities more than 1,500 CY. Estimate assumes blasting is an acceptable method of excavation. Due to alignment proximity to residential units, additional investigation into the impacts of direct ground fracturing beyond blasting limits, ground vibration, air-overpressure/noise and flyrock is recommended.
- (5) The raw fill number has been calculated and presented (excludes shrinkage). AECOM has assumed that the rock excavation will not shrink and that rock excavation can be placed in the fill under supervision of the geotechnical engineer.
- (6) Assumed 3" AC on 8" Base road section.
- (7) Permanent concrete V- Ditch along both sides of paved access road to handle existing drainage in cut areas. Sta 10+00 to high point 26+82 drains towards existing residential development. Sta 26+82 to tank site C is all in Cut.
- (8) Due to steep access, cement trucks may only deliver 5 to 7 CY loads versus a standard 9 -10 cubic yard delivery. This will result in a short load fee which is approximately \$75/cement truck load based on discussions with National Ready Mix.
- (9) Retaining wall estimated at 30 feet in length and 5 feet tall. Additional cost included for potential impacts at private property on Jonquilfield Road.