

HYDRAULIC ANALYSES
FOR
OMNI LA COSTA RESORT & SPA
CHAMPIONS COURSE RENOVATION

September 18, 2022

Will sign and stamp upon approval

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FOR REVIEW ONLY

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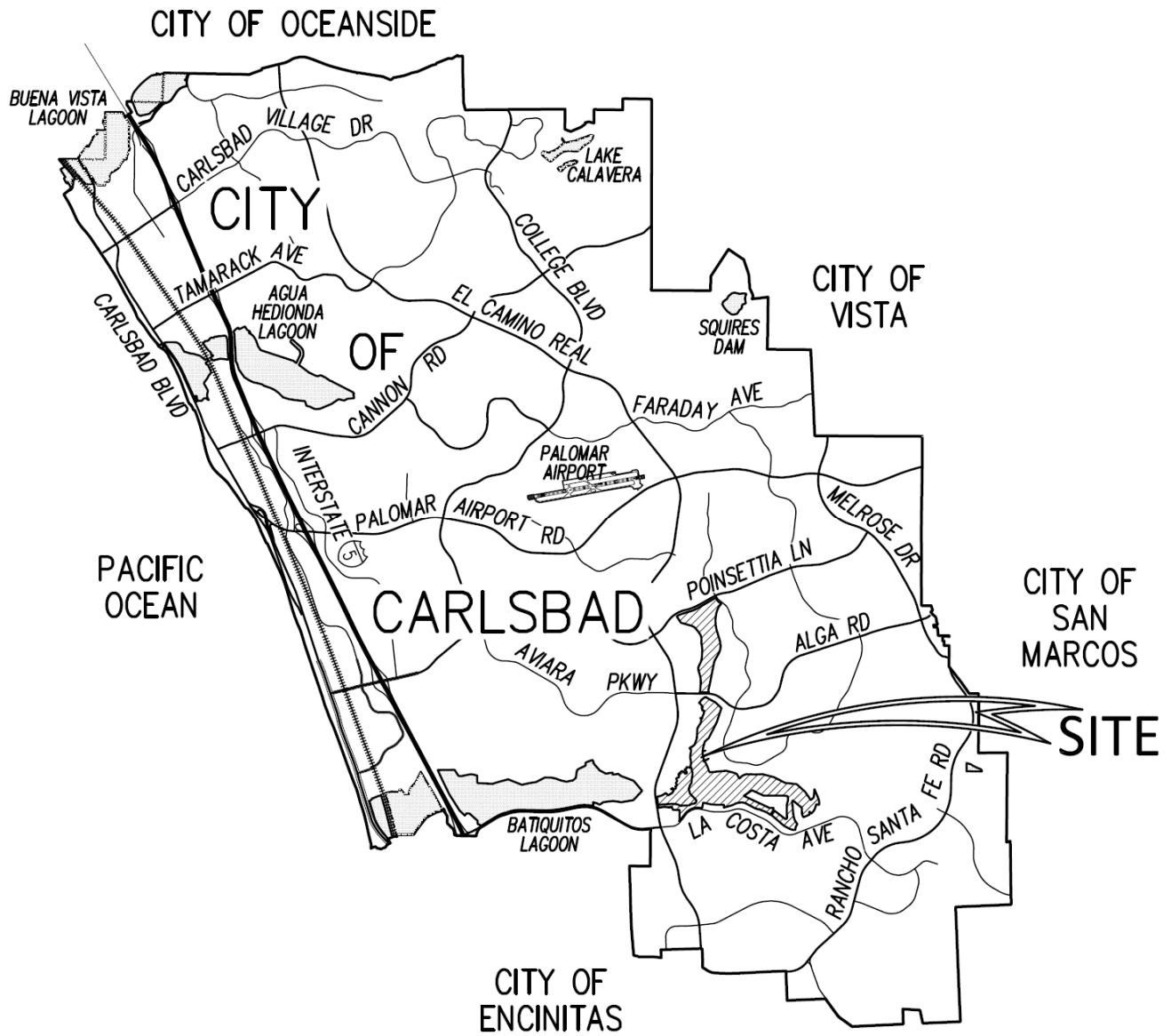
A. Hydraulic Results

MAP POCKET

City of Carlsbad Drawing No. 233-6
HEC-RAS Work Map

INTRODUCTION

The Omni La Costa Resort & Spa is located at 2100 Costa Del Mar Road in the city of Carlsbad (see the Vicinity Map). The resort currently includes a driving range and two 18-hole golf courses: the Champions Course and the Legends Course. The driving range is located southwest of the two golf courses, south of the resort buildings, and north of San Marcos Creek. The Champions Course is aligned in a north-south direction between Poinsettia Lane on the north and San Marcos Creek on the south. A tributary to San Marcos Creek (identified as Unnamed Tributary 1 by FEMA) flows in a southerly direction through the Champions Course. San Marcos Creek flows in an east to west direction through the Legends Course, along the south edge of the driving range, then under El Camino Real, and ultimately into Batiquitos Lagoon.



Vicinity Map

The project grading is being designed by O'Day Consultants and proposes remodeling of the Champions Course. The proposed project will include both cut and fill activities. Graded materials are expected to be balanced on-site. The current submittal is in support of a Special Use Permit.

Under both existing and proposed conditions storm runoff from the Champions Course flows to Unnamed Tributary 1 and then San Marcos Creek. FEMA has mapped a Zone A floodplain along Unnamed Tributary 1 and San Marcos Creek on Flood Insurance Map Numbers 06073C1032H and 06073C1034H dated December 20, 2019. A Zone A floodplain is approximate and not based on detailed engineering analyses. As a result, this report contains detailed existing and proposed condition 100-year hydraulic analyses of Unnamed Tributary 1 and San Marcos Creek through the project site.

HYDRAULIC ANALYSIS

Existing and proposed condition hydraulic analyses were performed using the US Army Corps of Engineers' HEC-RAS model (latest version 6.2). One set of analyses were performed for San Marcos Creek and a second set of analyses were performed for Unnamed Tributary 1. The following describes the HEC-RAS input parameters and results.

The HEC-RAS cross-sections are delineated on the HEC-RAS Work Map in the map pocket. The cross-sections along San Marcos Creek start at 100 and along Unnamed Tributary 1 start at 200. The existing cross-sections were primarily created from November 3, 2021 1-foot contour interval topographic mapping prepared for the project. This was supplemented with SANGIS' 2-foot contour interval topographic mapping for portions of cross-sections 247 and 248. In addition, cross-section 120 is based on the SANGIS mapping. The project mapping is on NGVD 29, while the SANGIS mapping is on NAVD 88. According to O'Day Consultants, NAVD 88 = NGVD 29 + 2.16 feet. The HEC-RAS analyses are on NGVD 29, so the SANGIS elevations were reduced by 2.16 feet. The proposed condition cross-sections are at the same locations as the existing condition cross-sections, but were revised where needed to reflect O'Day Consultants' grading.

FEMA's effective 100-year flow rate of 15,700 cubic feet per second (cfs) was used for San Marcos Creek. This flow rate was discussed with Mr. Scott Lyle from City staff and is being used for the City's El Camino Real pedestrian bridges project. An effective flow rate is not available for Unnamed Tributary 1. The City provided an August 7, 2002 letter report by Rick Engineering Company (excerpts attached in Appendix A), which used a 100-year flow rate of 1,900 cfs. Therefore, 1,900 cfs was modeled for Unnamed Tributary 1.

Average roughness coefficients were assigned to the main channel and overbank areas. The golf course areas were assigned a roughness of 0.030. The remaining natural areas were assigned a roughness varying from 0.030 to 0.060 depending on vegetation density. Paved areas were assigned a roughness of 0.020 to 0.030. The higher range was used when landscaping or other obstructions existing within the paved areas.

The downstream starting water surface elevation in San Marcos Creek was set equal to the 100-year elevation from the El Camino Real pedestrian bridges project at cross-section 9741. City staff provided hydraulic data for their project, which showed an elevation of 10.49 feet NAVD 88 or 8.33 feet NGVD 29. Although this elevation was entered, HEC-RAS increased the elevation to 13.17 feet NGVD 29. The existing and proposed condition downstream starting water surface elevations in Unnamed Tributary 1 were assigned values based on the receiving 100-year water surface elevations in San Marcos Creek, i.e., 18.05 at cross-section 111.

Expansions were assigned at some cross-sections using a 1.3:1 expansion ratio based on Table 6-1 from the HEC-RAS User's Manual (included in Appendix A).

There are multiple culverts under Alga Road along Unnamed Tributary 1. Drawing No. 233-6 shows that there are three 84-inch RCPs and one 14-foot, 3-inch by 9-foot, 7-inch structural plate arch used as a golf cart crossing. The culverts were modeled at cross-section 266.5 based on the drawing.

The existing and proposed condition 100-year results are included in Appendix A and summarized in Table 1. O'Day Consultants plotted the existing and proposed condition floodplains, which are included on the HEC-RAS Work Map.

CONCLUSION

Existing and proposed condition 100-year HEC-RAS hydraulic analyses has been performed for San Marcos Creek and Unnamed Tributary 1 to San Marcos Creek along the Omni La Costa Resort & Spa Champions Course Renovation Project, which also includes the driving range. The results show relatively minor differences in the water surface elevations at most cross-sections. The larger increases occur along the golf course and do not impact existing structures.

San Marcos Creek				Unnamed Tributary to San Marcos Creek			
Cross-Section	Existing Condition	Proposed Condition	Prop.–Exist. Condition	Cross-Section	Existing Condition	Proposed Condition	Prop.–Exist. Condition
120	21.32	21.32	0.00	248	100.84	100.84	0.00
119	20.62	20.62	0.00	247	99.03	99.03	0.00
118	19.52	19.52	0.00	246	96.43	96.43	0.00
117	18.42	18.42	0.00	245	94.66	94.63	-0.03
116	18.40	18.40	0.00	244	92.15	92.15	0.00
115	18.32	18.32	0.00	243	90.47	90.47	0.00
114	18.26	18.25	-0.01	242	89.39	89.18	-0.21
113	18.15	18.15	0.00	241	87.54	88.07	0.53
112	18.12	18.12	0.00	240	86.48	87.28	0.80
111	18.05	18.05	0.00	239	86.08	86.61	0.53
110	18.04	18.04	0.00	238	85.90	86.25	0.35
109	17.98	17.98	0.00	237	84.48	84.68	0.20
108	17.93	17.93	0.00	236	77.74	77.74	0.00
107	17.75	17.75	0.00	235	74.85	73.87	-0.98
106	17.70	17.70	0.00	234	72.93	72.50	-0.43
105	17.59	17.59	0.00	233	70.74	70.75	0.01
104	17.53	17.53	0.00	232	69.11	68.93	-0.18
103	17.40	17.40	0.00	231	66.97	67.34	0.37
102	17.20	17.20	0.00	230	65.12	65.14	0.02
101	16.79	16.79	0.00	229	63.27	63.29	0.02
100	13.17	13.17	0.00	228	62.62	62.62	0.00
				227	62.26	62.26	0.00
				226.5	Alga Road		
				226	58.85	58.85	0.00
				225	56.84	56.84	0.00
				224	53.08	53.19	0.11
				223	48.50	48.54	0.04
				222	46.62	46.61	-0.01
				221	44.54	44.53	-0.01
				220	43.36	43.34	-0.02
				219	39.69	39.69	0.00
				218	38.66	39.42	0.76
				217	38.22	38.84	0.62
				216	37.33	36.92	-0.41
				215	35.67	36.28	0.61
				214	33.42	33.40	-0.02
				213	31.25	31.16	-0.09
				212	29.49	29.49	0.00
				211	27.15	27.22	0.07
				210	25.83	25.55	-0.28
				209	25.18	25.29	0.11
				208	23.92	23.92	0.00
				207	22.14	22.22	0.08
				206	20.07	20.24	0.17
				205	19.46	19.43	-0.03
				204	18.48	18.45	-0.03
				203	18.17	18.18	0.01
				202	18.19	18.19	0.00
				201	18.10	18.12	0.02
				200	18.05	18.05	0.00

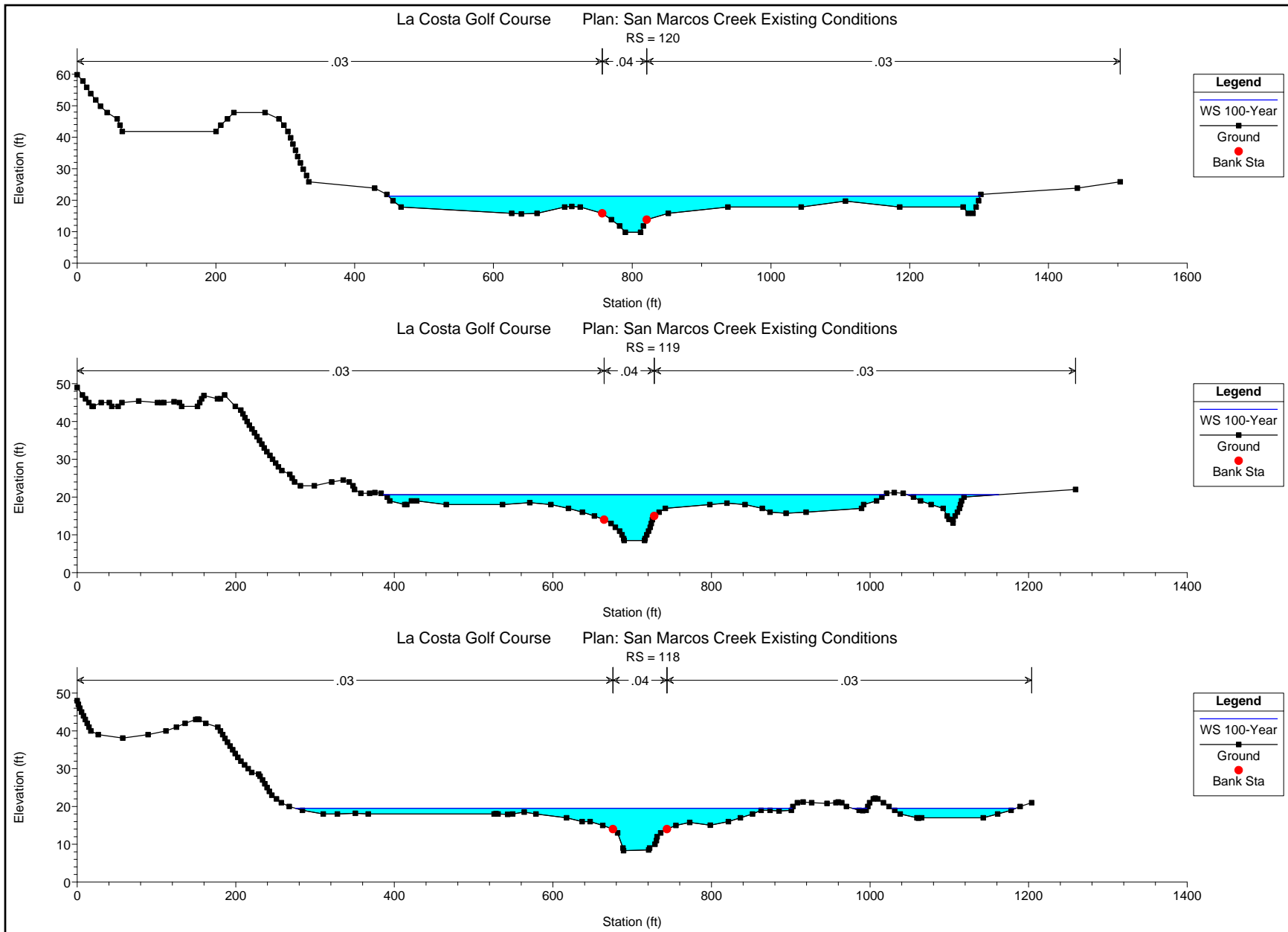
Table 1. Summary of 100-Year HEC-RAS Results

APPENDIX A

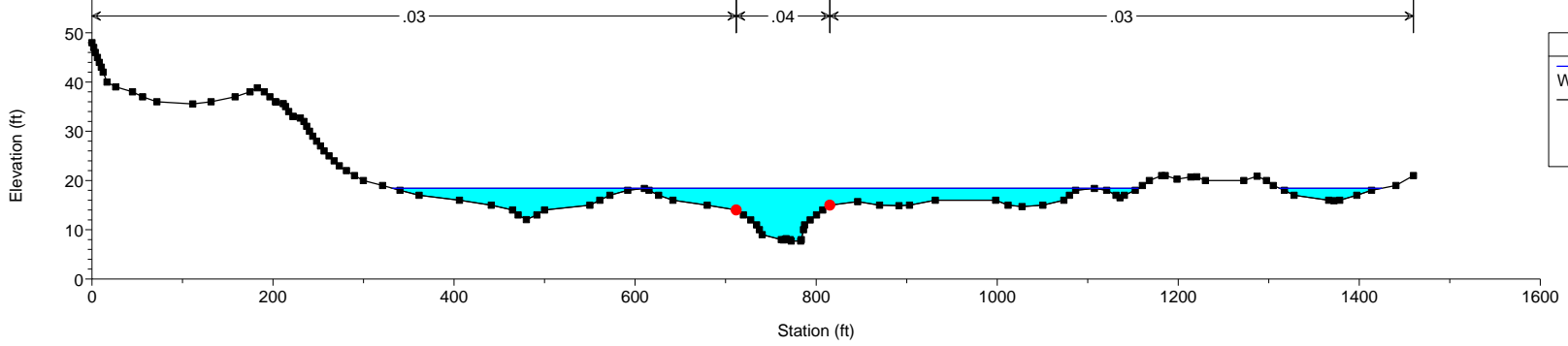
HYDRAULIC DATA AND RESULTS

HEC-RAS Plan: SMC Exist Cond River: RIVER-1 Reach: Reach-1 Profile: 100-Year

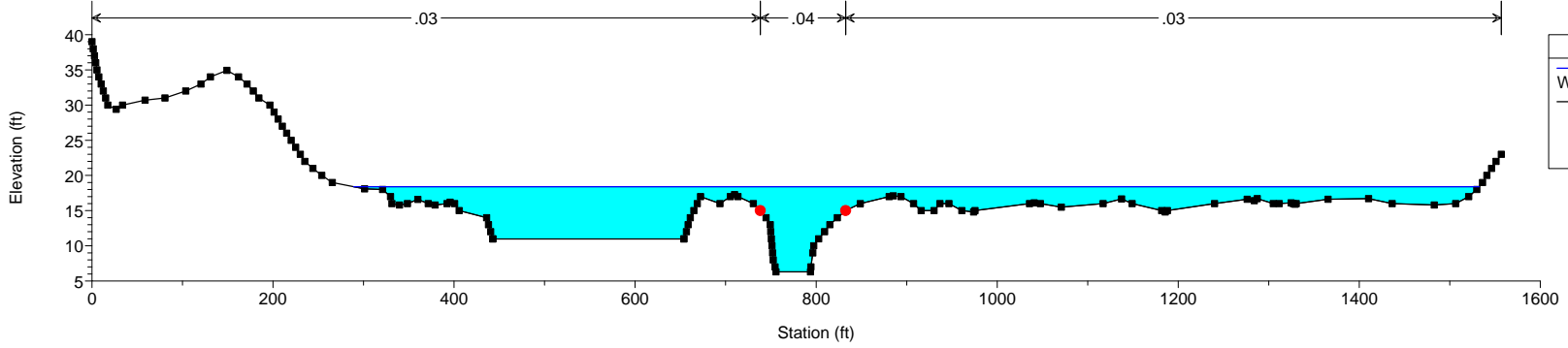
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	120	100-Year	15700.00	9.84	21.32		21.61	0.001074	5.37	3686.71	852.98	0.31
Reach-1	119	100-Year	15700.00	8.50	20.62		21.27	0.002466	8.39	2653.44	748.09	0.47
Reach-1	118	100-Year	15700.00	8.30	19.52	19.52	20.71	0.004904	11.26	2127.46	801.23	0.65
Reach-1	117	100-Year	15700.00	7.70	18.42		18.97	0.002670	7.46	2853.28	936.15	0.47
Reach-1	116	100-Year	15700.00	6.30	18.40		18.60	0.000768	4.14	4618.78	1243.32	0.25
Reach-1	115	100-Year	15700.00	5.70	18.32		18.47	0.000470	2.78	5114.11	1131.84	0.19
Reach-1	114	100-Year	15700.00	5.20	18.26		18.37	0.000402	3.61	5981.02	1393.48	0.19
Reach-1	113	100-Year	15700.00	3.60	18.15		18.28	0.000428	4.04	5711.65	1360.76	0.20
Reach-1	112	100-Year	15700.00	2.19	18.12		18.21	0.000223	3.16	6966.61	1321.10	0.15
Reach-1	111	100-Year	15700.00	2.19	18.05		18.16	0.000293	3.33	6185.65	1247.50	0.16
Reach-1	110	100-Year	15700.00	2.19	18.04		18.11	0.000180	2.45	7654.88	1355.08	0.13
Reach-1	109	100-Year	15700.00	2.19	17.98		18.07	0.000230	2.59	6675.80	1163.31	0.13
Reach-1	108	100-Year	15700.00	2.19	17.93		18.02	0.000235	2.68	6458.13	1048.71	0.13
Reach-1	107	100-Year	15700.00	2.12	17.75		17.94	0.000510	3.75	4506.06	734.65	0.19
Reach-1	106	100-Year	15700.00	2.12	17.70		17.85	0.000349	3.48	5244.57	826.32	0.16
Reach-1	105	100-Year	15700.00	2.10	17.59		17.77	0.000414	3.64	4672.34	685.44	0.17
Reach-1	104	100-Year	15700.00	2.12	17.53		17.68	0.000373	3.46	5222.78	853.26	0.17
Reach-1	103	100-Year	15700.00	2.12	17.40		17.59	0.000511	3.85	4512.57	755.08	0.19
Reach-1	102	100-Year	15700.00	2.12	17.20		17.45	0.000858	4.00	3973.67	716.10	0.22
Reach-1	101	100-Year	15700.00	2.12	16.79	14.90	17.21	0.001571	5.77	3086.41	704.27	0.30
Reach-1	100	100-Year	15700.00	2.10	13.17	13.17	16.17	0.014652	14.73	1232.88	224.61	0.88



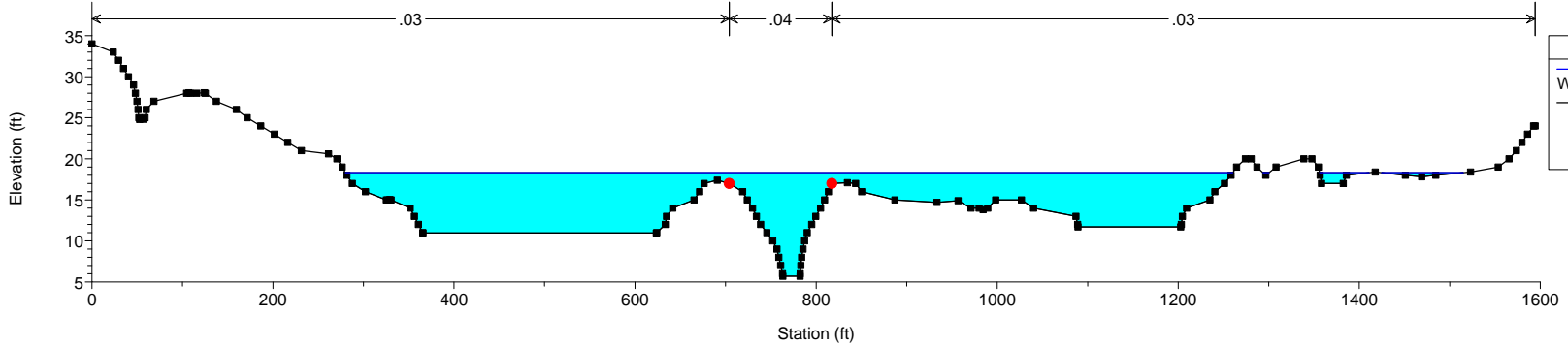
La Costa Golf Course Plan: San Marcos Creek Existing Conditions
RS = 117

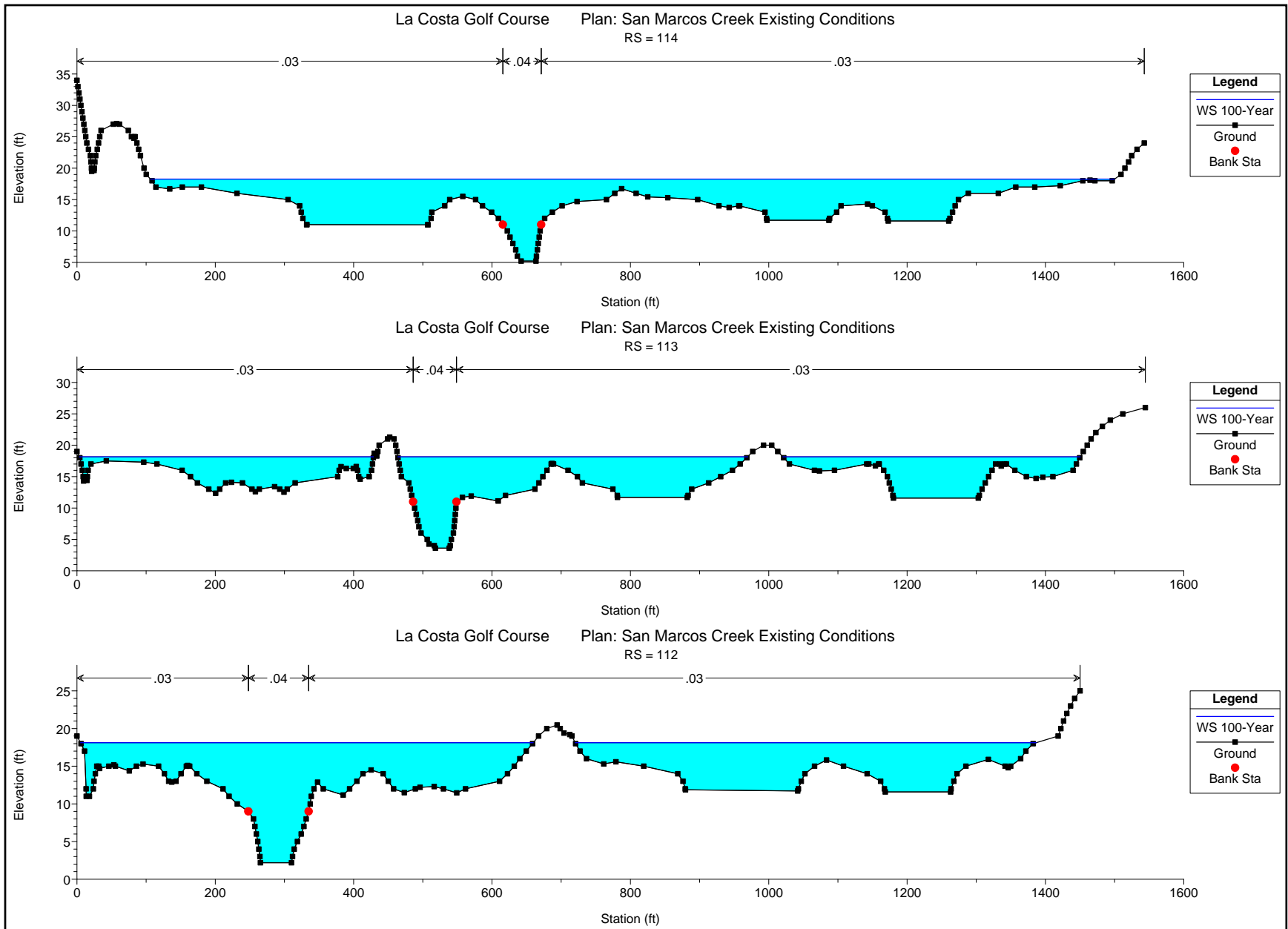


La Costa Golf Course Plan: San Marcos Creek Existing Conditions
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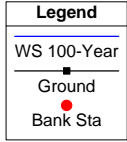
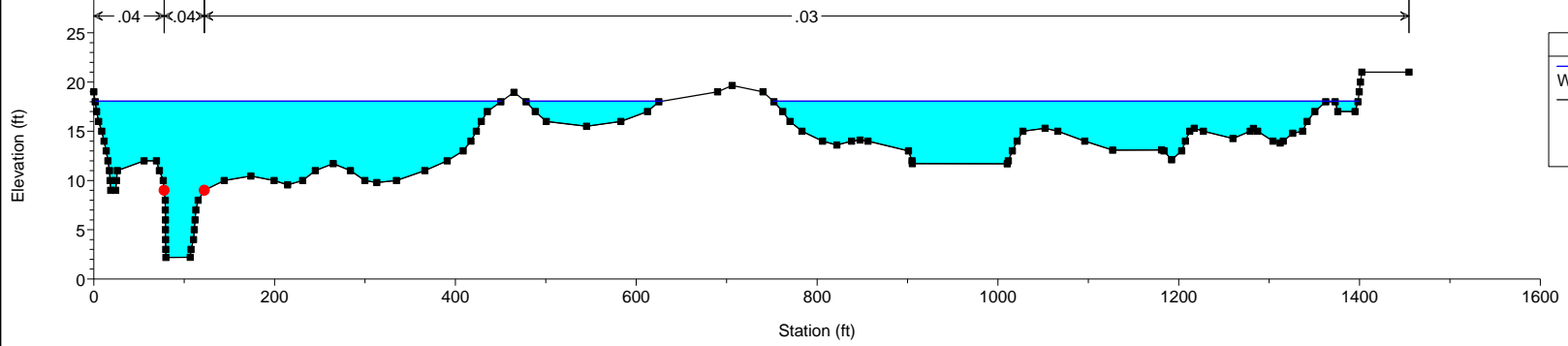


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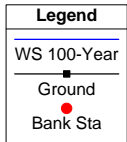
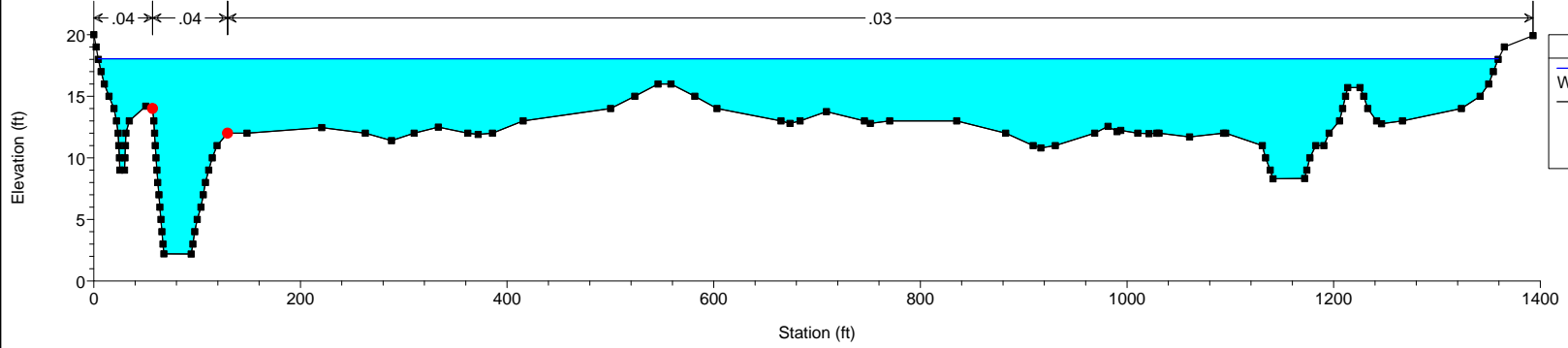




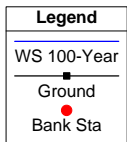
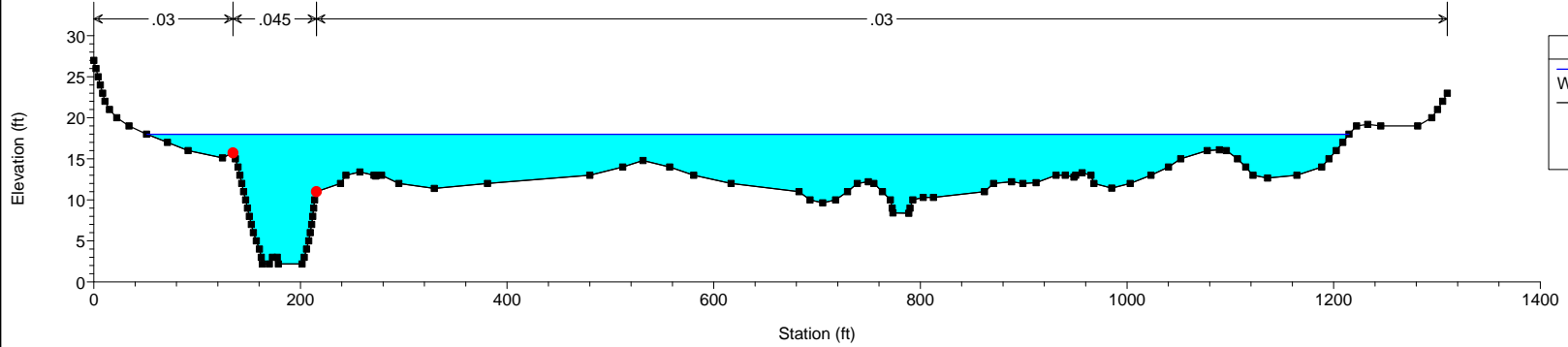
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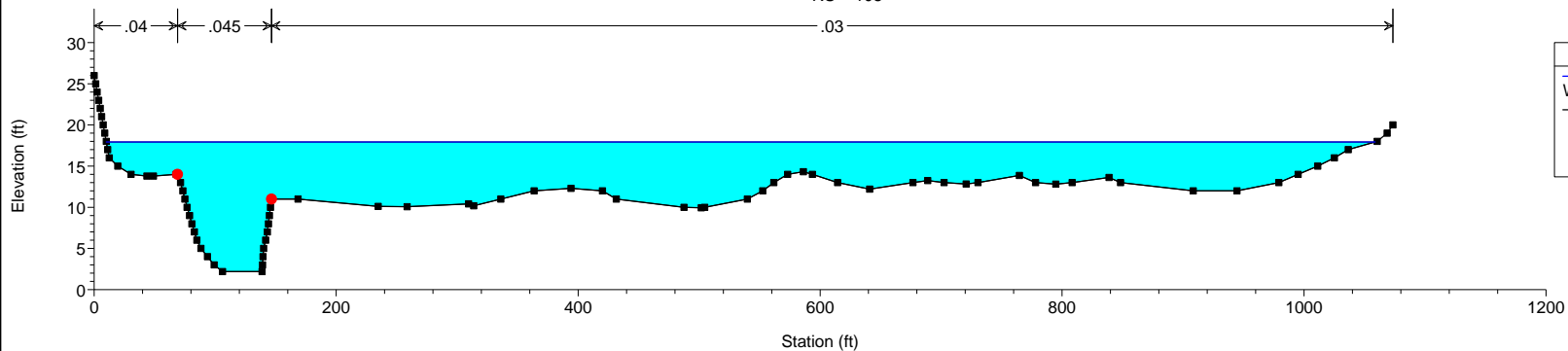
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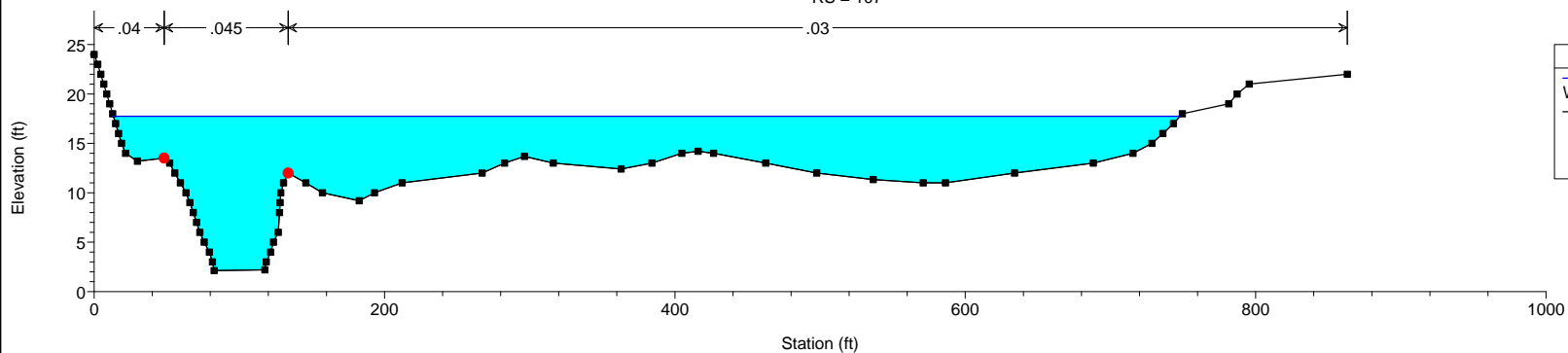
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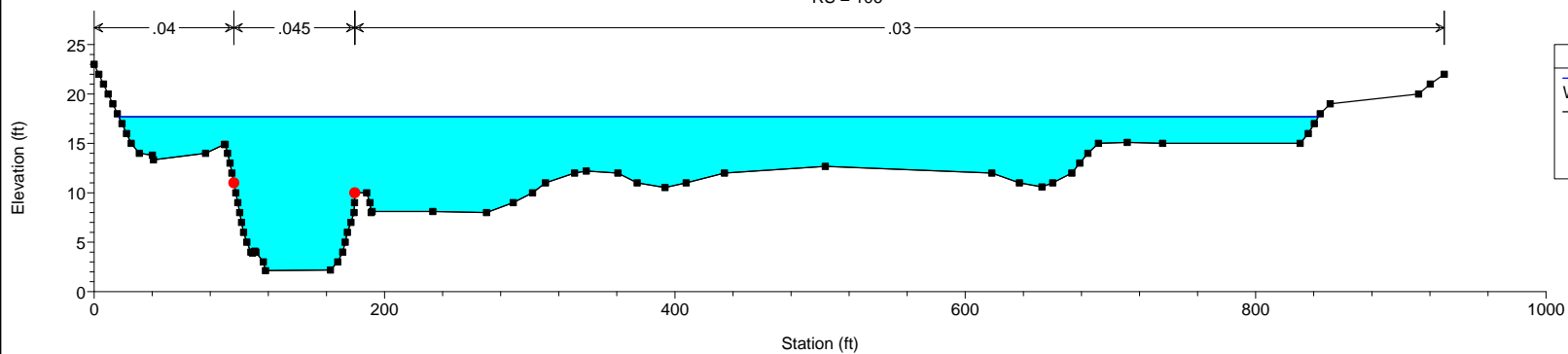
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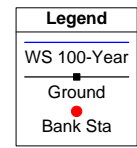
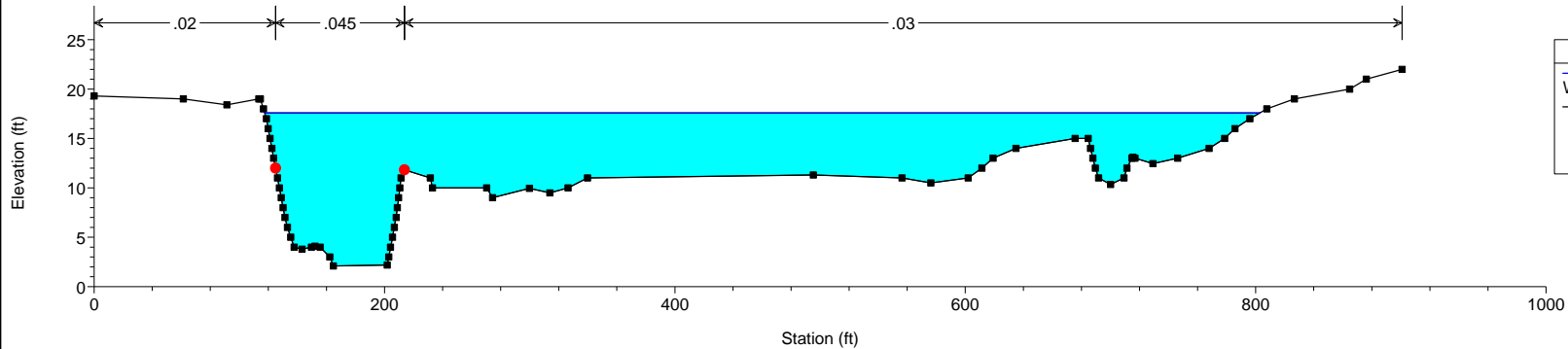
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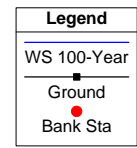
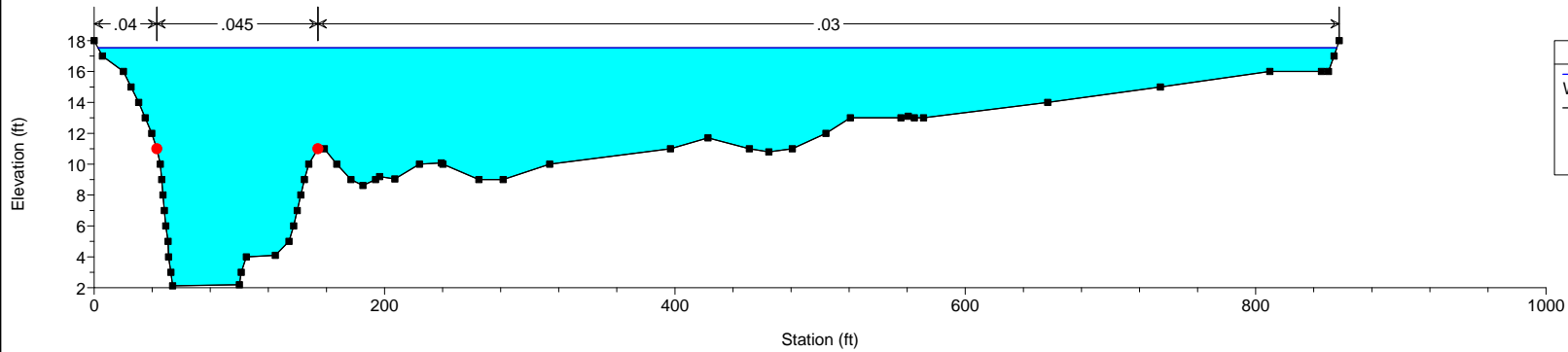
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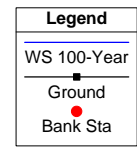
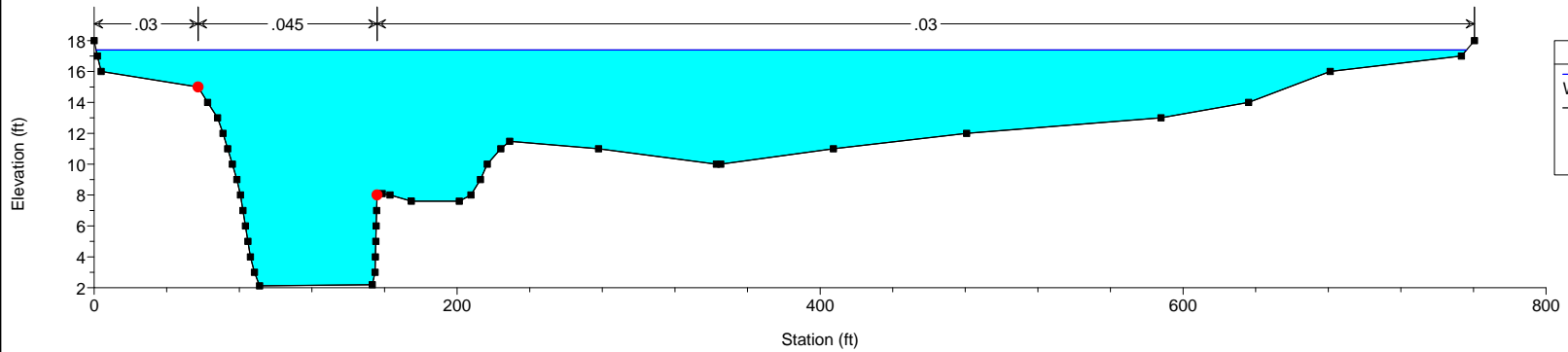
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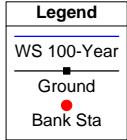
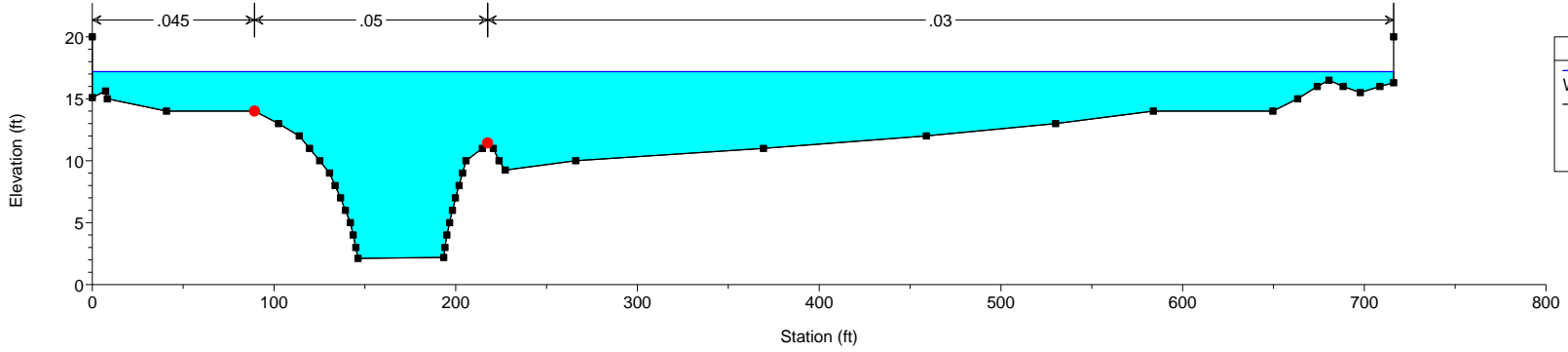
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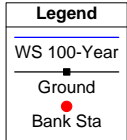
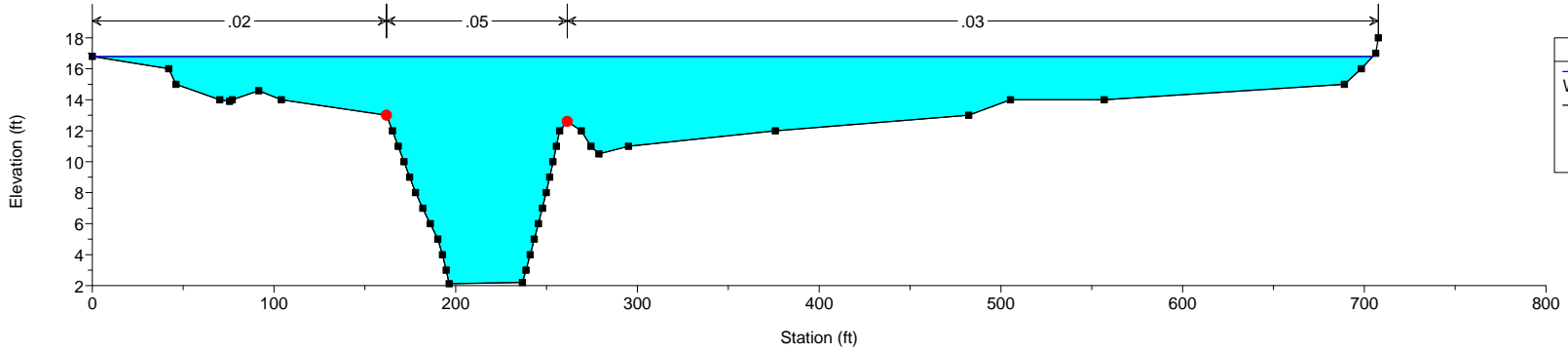
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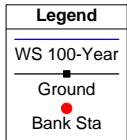
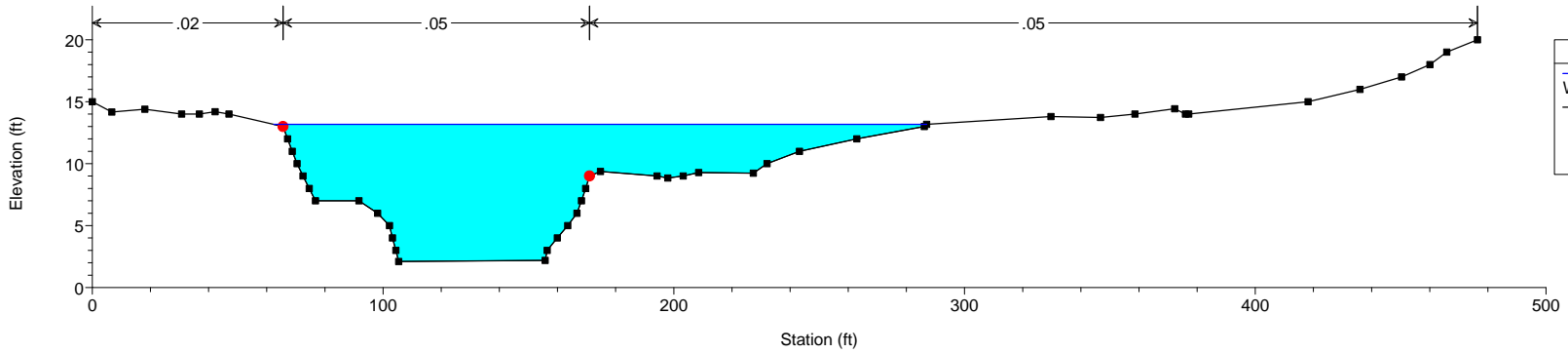
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La Costa Golf Course Plan: San Marcos Creek Existing Conditions
RS = 101



La Costa Golf Course Plan: San Marcos Creek Existing Conditions
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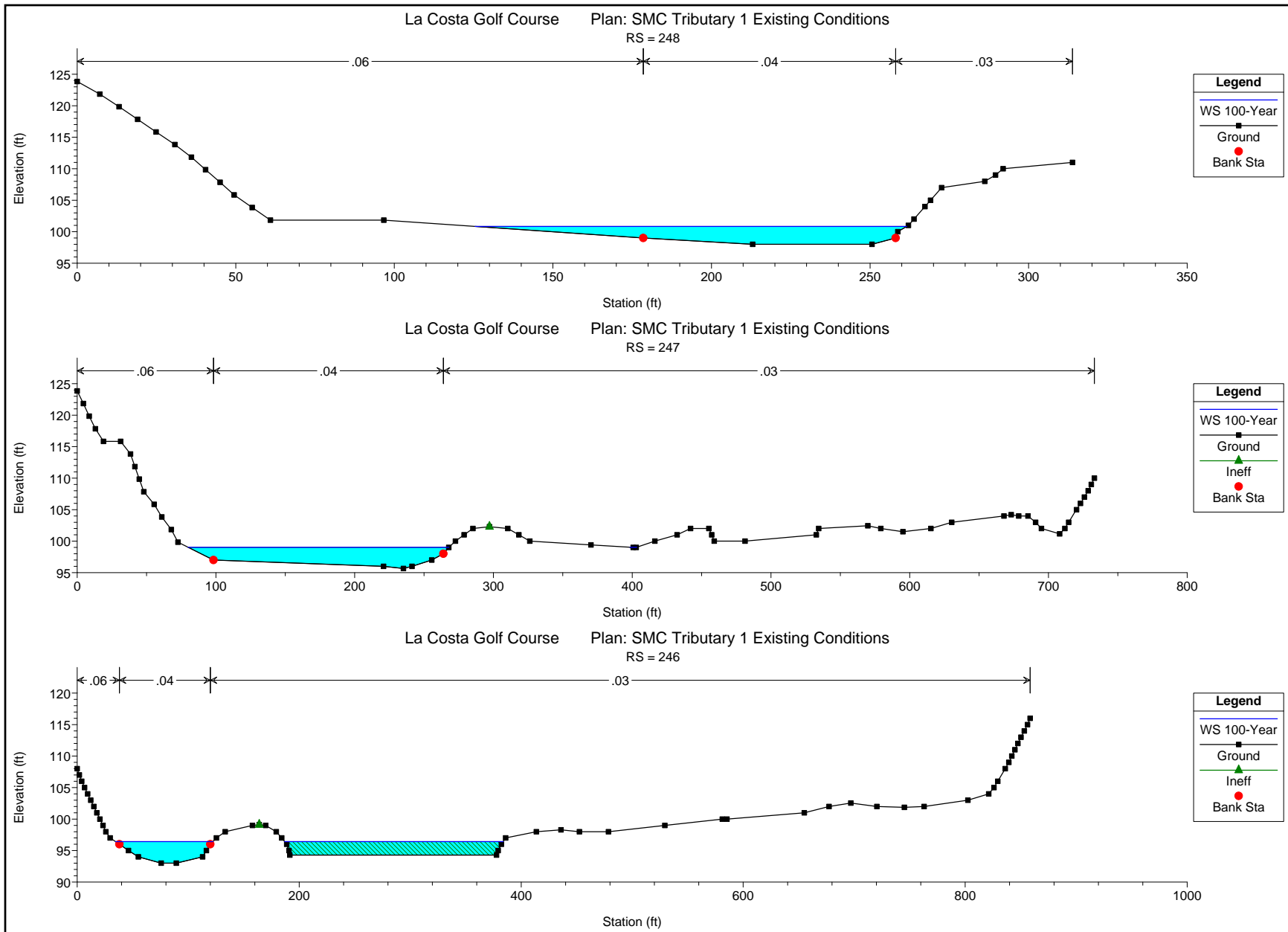


HEC-RAS Plan: SMC Trib 1 Exist Cond River: RIVER-1 Reach: Reach-1 Profile: 100-Year

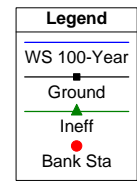
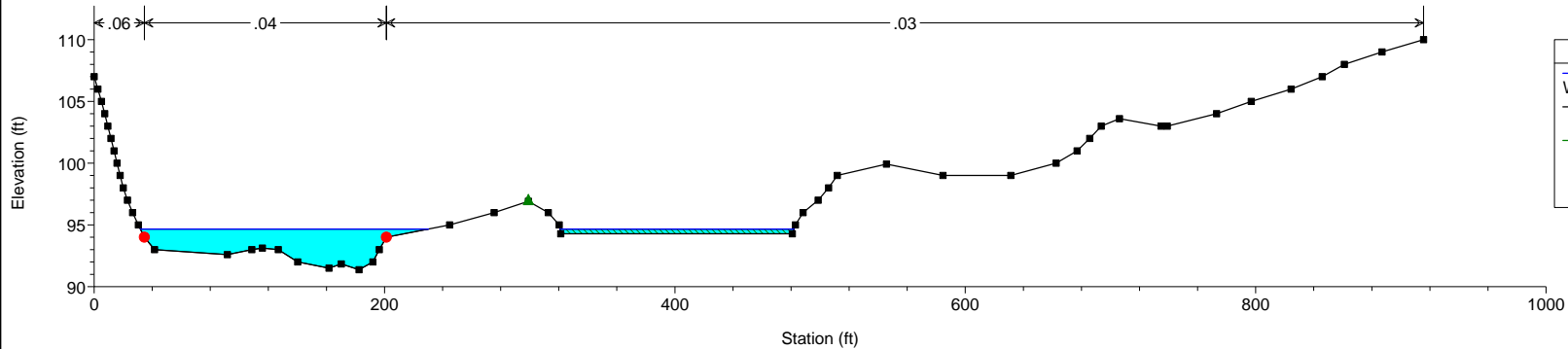
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	248	100-Year	1900.00	98.00	100.84	100.84	101.90	0.014978	8.54	256.03	136.10	0.94
Reach-1	247	100-Year	1900.00	95.67	99.03	98.07	99.33	0.004001	4.40	445.14	192.87	0.48
Reach-1	246	100-Year	1900.00	93.00	96.43	96.43	97.69	0.016769	9.00	212.09	284.76	0.99
Reach-1	245	100-Year	1900.00	91.37	94.66	94.10	95.08	0.007072	5.22	370.92	359.58	0.63
Reach-1	244	100-Year	1900.00	89.00	92.15	92.15	92.73	0.022037	6.07	313.56	287.10	1.00
Reach-1	243	100-Year	1900.00	87.33	90.47	89.68	90.64	0.003663	3.32	572.16	321.97	0.44
Reach-1	242	100-Year	1900.00	85.56	89.39	88.84	89.65	0.006812	4.16	458.81	298.45	0.58
Reach-1	241	100-Year	1900.00	84.33	87.54		87.94	0.010880	5.13	377.69	274.81	0.73
Reach-1	240	100-Year	1900.00	82.75	86.48		86.75	0.003540	2.90	500.55	289.41	0.42
Reach-1	239	100-Year	1900.00	82.03	86.08		86.26	0.001646	2.49	583.11	244.21	0.30
Reach-1	238	100-Year	1900.00	81.30	85.90	84.28	85.99	0.000926	2.00	796.67	364.22	0.23
Reach-1	237	100-Year	1900.00	77.89	84.48	84.48	85.37	0.009777	8.49	276.21	500.38	0.78
Reach-1	236	100-Year	1900.00	74.33	77.74	77.74	78.34	0.013524	6.64	307.51	424.35	0.84
Reach-1	235	100-Year	1900.00	72.00	74.85	74.66	75.52	0.011082	6.74	295.80	326.21	0.79
Reach-1	234	100-Year	1900.00	69.28	72.93	72.55	73.55	0.008633	6.52	307.63	303.44	0.71
Reach-1	233	100-Year	1900.00	68.84	70.74	70.64	71.34	0.014566	6.52	319.63	264.67	0.87
Reach-1	232	100-Year	1900.00	64.74	69.11	68.18	69.58	0.005692	5.46	350.41	394.67	0.58
Reach-1	231	100-Year	1900.00	63.55	66.97	66.91	67.91	0.012317	8.12	252.81	125.69	0.86
Reach-1	230	100-Year	1900.00	61.23	65.12	65.12	65.70	0.009997	6.98	332.72	258.09	0.76
Reach-1	229	100-Year	1900.00	59.70	63.27		63.69	0.005851	5.62	396.23	259.83	0.59
Reach-1	228	100-Year	1900.00	58.47	62.62		62.85	0.002816	3.84	503.37	209.32	0.41
Reach-1	227	100-Year	1900.00	54.26	62.26	57.82	62.55	0.000897	4.32	439.42	339.48	0.28
Reach-1	226.5		Culvert									
Reach-1	226	100-Year	1900.00	50.26	58.85		59.42	0.002047	6.03	315.01	52.16	0.40
Reach-1	225	100-Year	1900.00	47.60	56.84	56.84	58.53	0.010112	11.62	189.60	54.96	0.76
Reach-1	224	100-Year	1900.00	46.80	53.08	53.08	53.62	0.005797	7.91	395.40	458.81	0.62
Reach-1	223	100-Year	1900.00	44.77	48.50		48.81	0.003316	4.53	462.70	276.97	0.45
Reach-1	222	100-Year	1900.00	44.00	46.62	46.62	47.32	0.013937	7.00	284.29	204.20	0.87
Reach-1	221	100-Year	1900.00	41.71	44.54		44.91	0.004822	5.15	412.50	247.44	0.54
Reach-1	220	100-Year	1900.00	36.75	43.36	43.36	43.87	0.005407	7.61	418.86	397.07	0.58
Reach-1	219	100-Year	1900.00	31.90	39.69	39.69	41.50	0.010315	11.03	186.63	60.54	0.82
Reach-1	218	100-Year	1900.00	30.80	38.66	38.66	39.92	0.008211	9.45	234.40	105.92	0.73
Reach-1	217	100-Year	1900.00	30.30	38.22	38.22	39.00	0.006064	8.93	308.73	162.89	0.61
Reach-1	216	100-Year	1900.00	29.80	37.33	37.33	38.12	0.005726	9.03	312.63	180.83	0.61
Reach-1	215	100-Year	1900.00	29.30	35.67	35.67	36.19	0.005883	7.55	396.29	355.32	0.62
Reach-1	214	100-Year	1900.00	25.40	33.42	33.42	34.02	0.006446	8.42	366.58	278.50	0.60
Reach-1	213	100-Year	1900.00	23.00	31.25	31.25	32.19	0.007229	8.95	269.67	124.52	0.65
Reach-1	212	100-Year	1900.00	23.00	29.49	29.49	30.22	0.008555	8.84	302.34	200.09	0.68

HEC-RAS Plan: SMC Trib 1 Exist Cond River: RIVER-1 Reach: Reach-1 Profile: 100-Year (Continued)

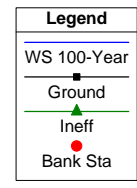
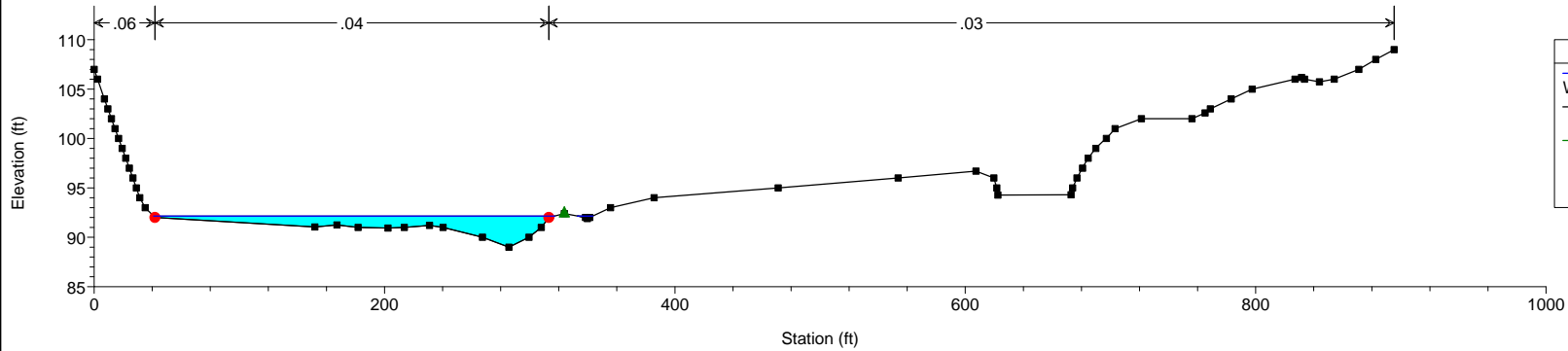
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	211	100-Year	1900.00	17.80	27.15		27.65	0.002344	6.20	390.37	178.58	0.40
Reach-1	210	100-Year	1900.00	16.80	25.83	25.83	27.19	0.006808	9.84	230.74	107.68	0.66
Reach-1	209	100-Year	1900.00	16.50	25.18	25.18	25.79	0.004108	7.69	388.09	278.13	0.49
Reach-1	208	100-Year	1900.00	16.10	23.92	23.92	24.38	0.005095	7.05	435.17	442.21	0.55
Reach-1	207	100-Year	1900.00	15.60	22.14	22.14	22.77	0.005865	7.92	357.22	253.77	0.61
Reach-1	206	100-Year	1900.00	15.59	20.07	19.93	20.51	0.006844	6.87	390.15	435.89	0.64
Reach-1	205	100-Year	1900.00	15.60	19.46	19.34	19.84	0.006320	5.71	422.90	409.83	0.60
Reach-1	204	100-Year	1900.00	15.59	18.48	18.48	19.15	0.006769	5.26	315.58	235.79	0.60
Reach-1	203	100-Year	1900.00	15.59	18.17		18.41	0.002078	4.23	509.94	264.57	0.47
Reach-1	202	100-Year	1900.00	15.60	18.19		18.26	0.000545	2.18	889.60	365.02	0.24
Reach-1	201	100-Year	1900.00	15.60	18.10		18.20	0.000753	2.50	768.57	318.67	0.28
Reach-1	200	100-Year	1900.00	9.80	18.05	16.16	18.13	0.000503	2.73	840.74	281.77	0.18



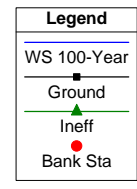
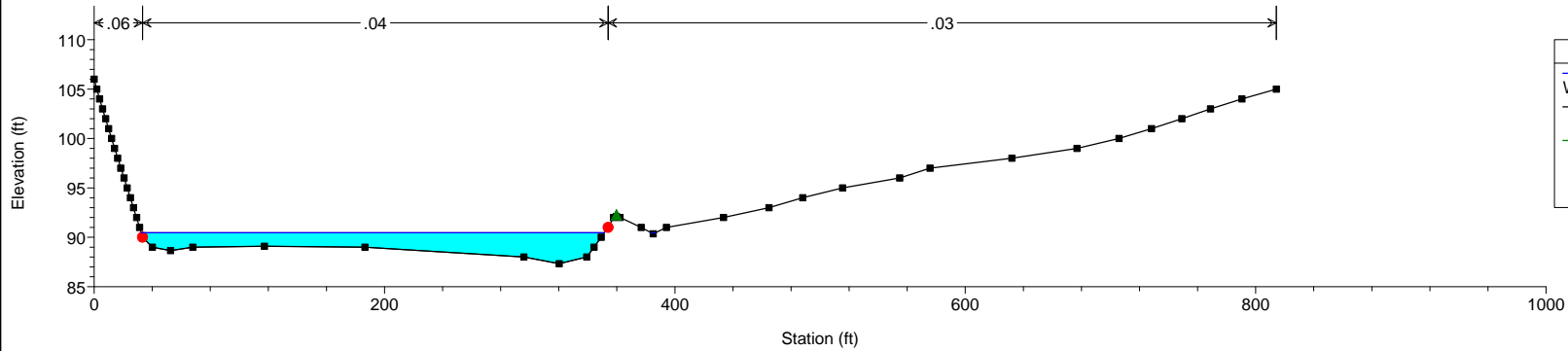
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 245

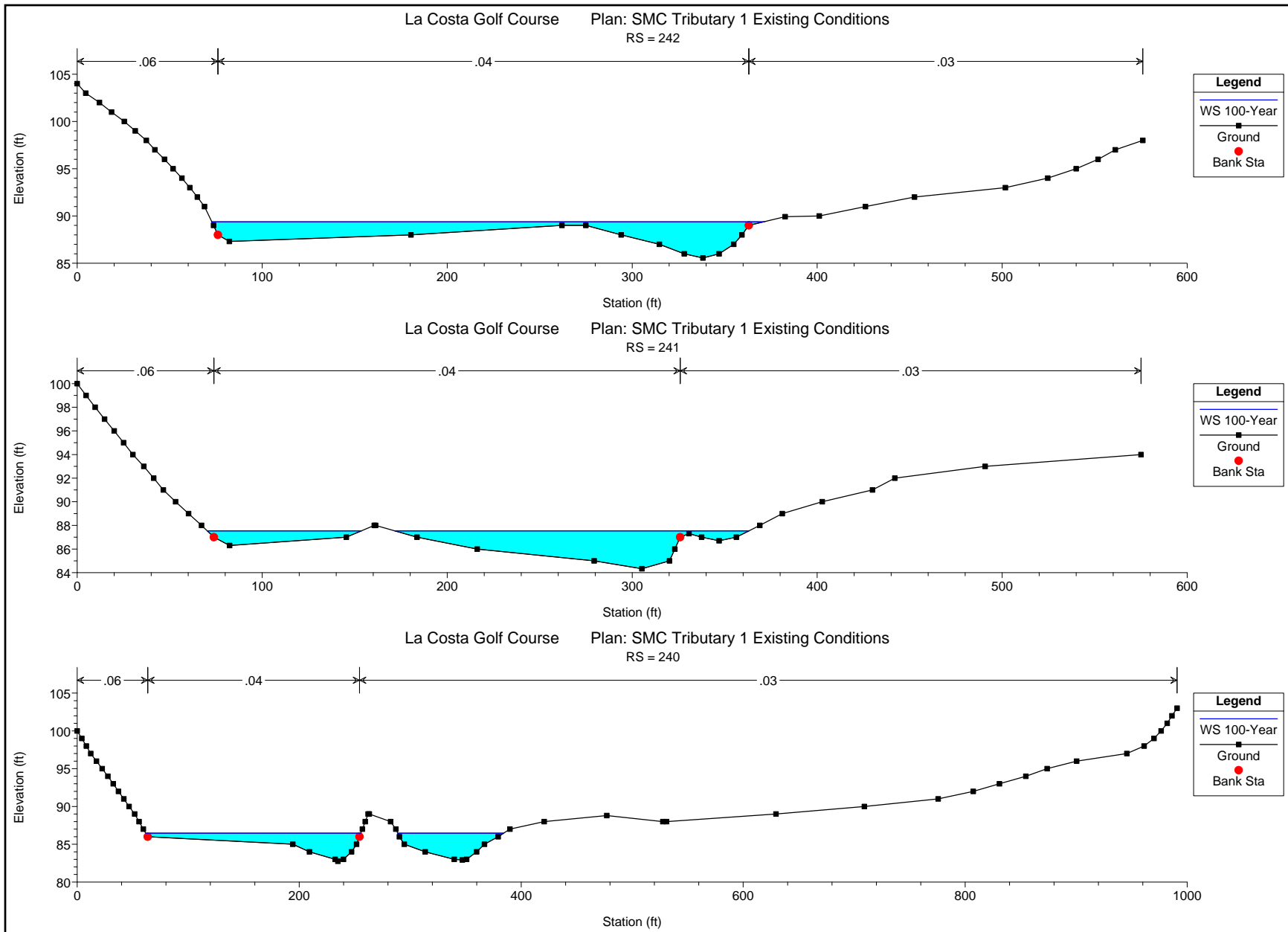


La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 244

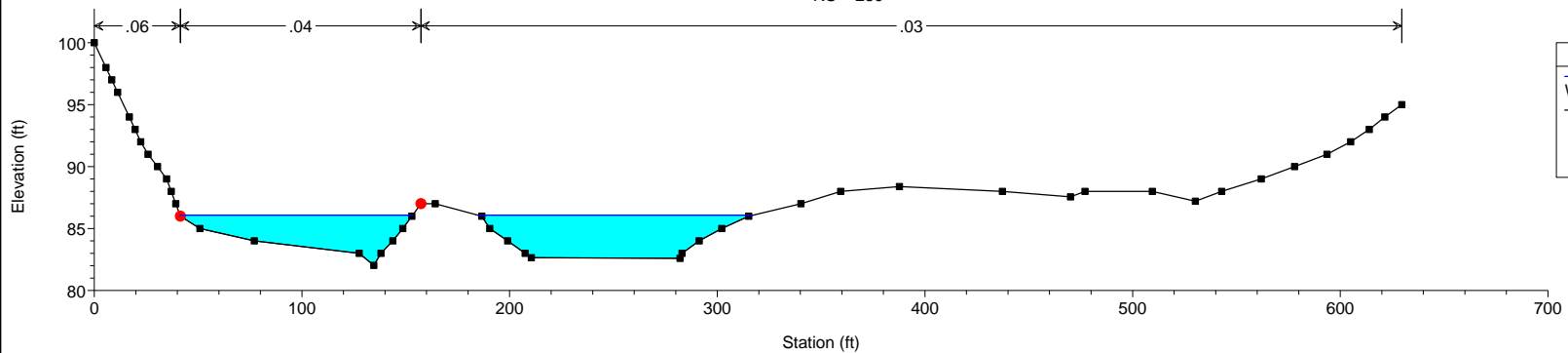


La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 243

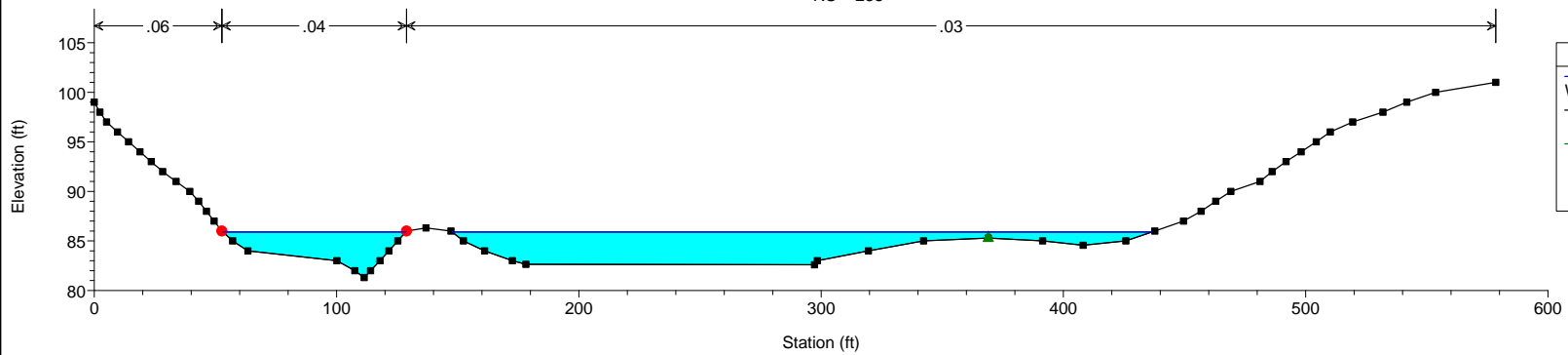




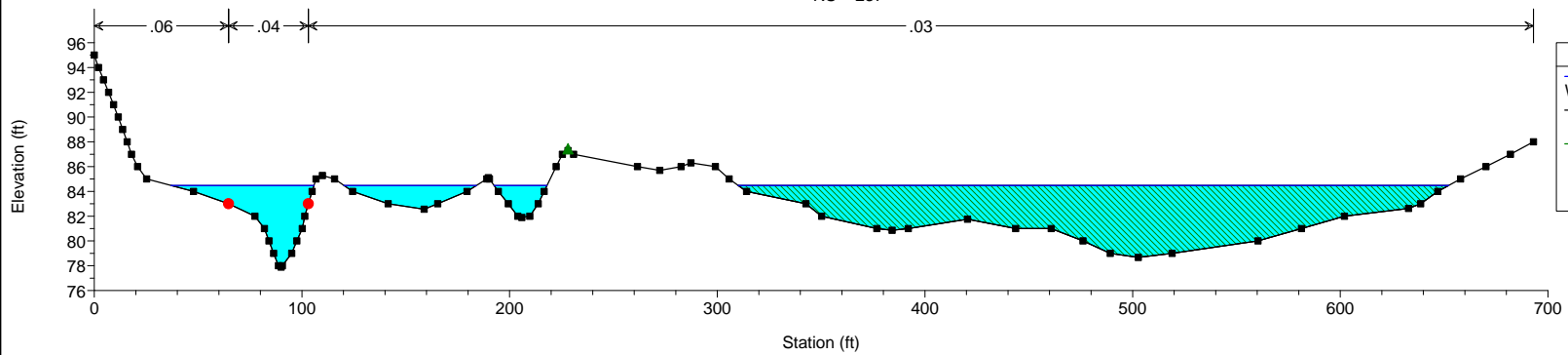
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
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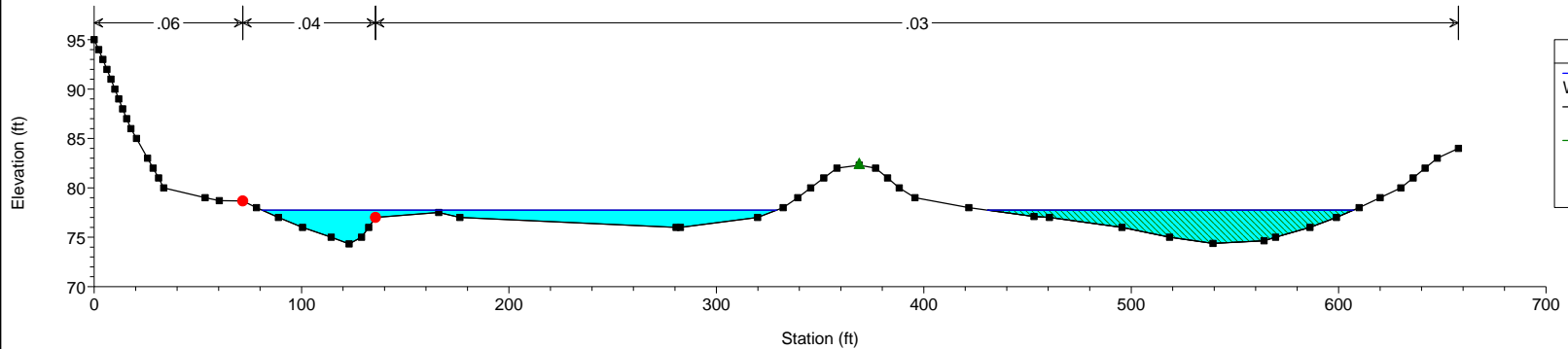
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 238



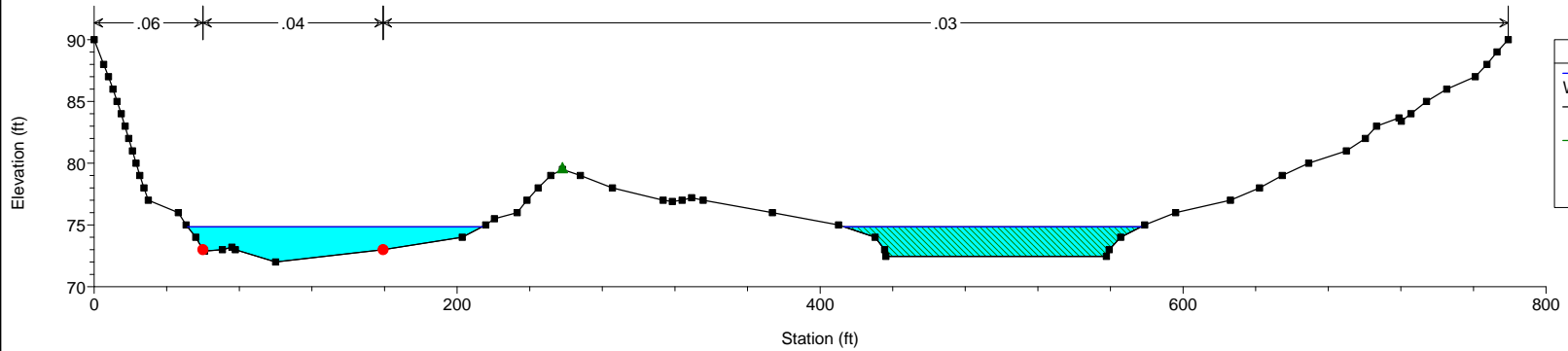
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 237



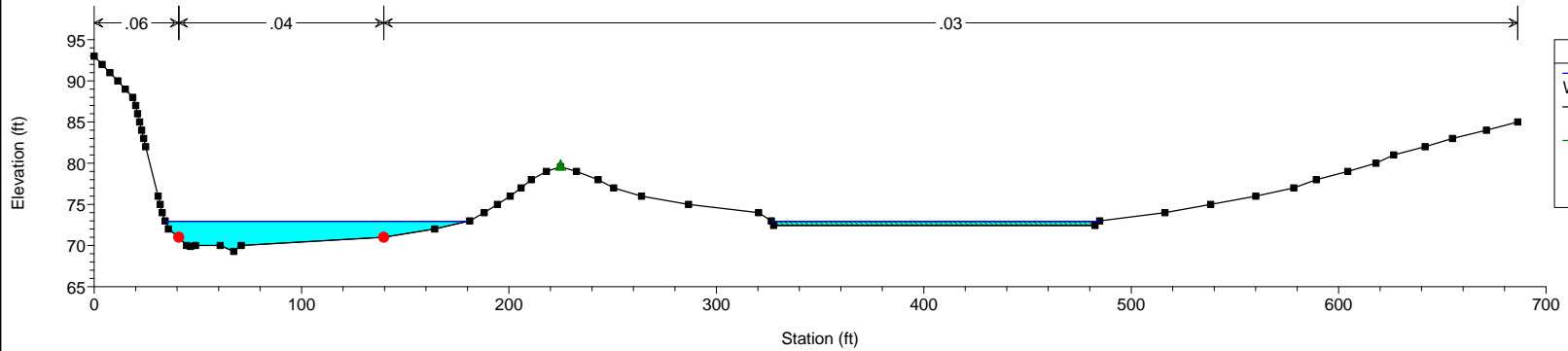
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 236

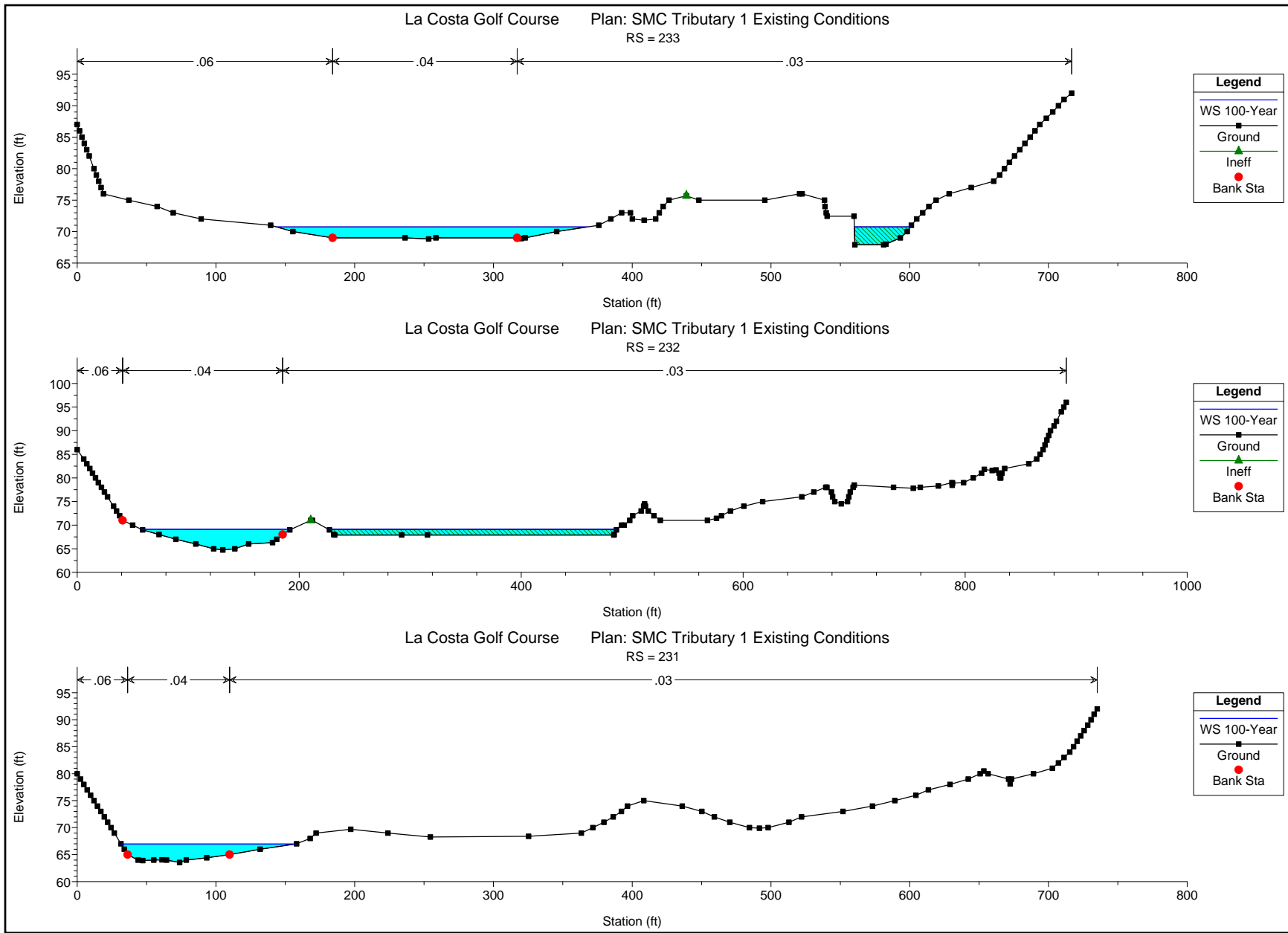


La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 235

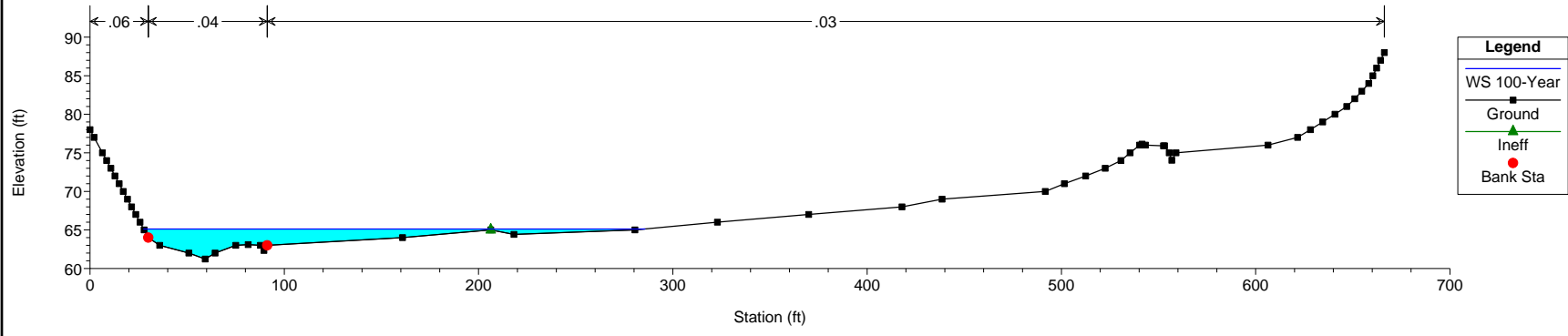


La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 234





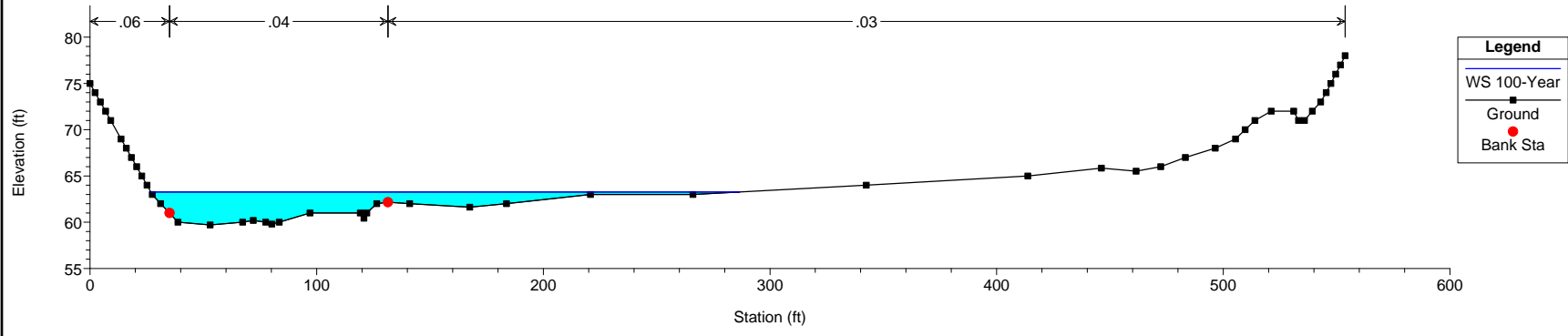
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 230



Legend

- WS 100-Year
- Ground
- Ineff
- Bank Sta

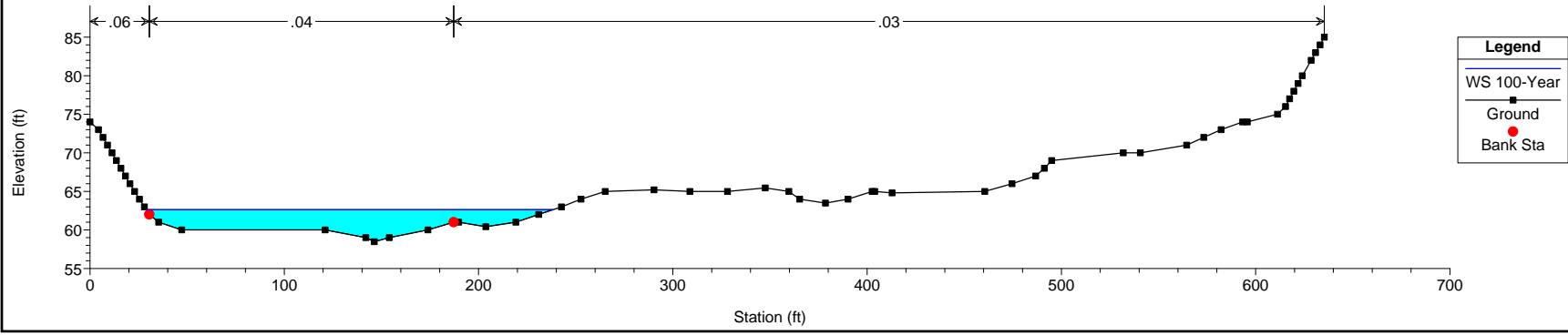
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 229



Legend

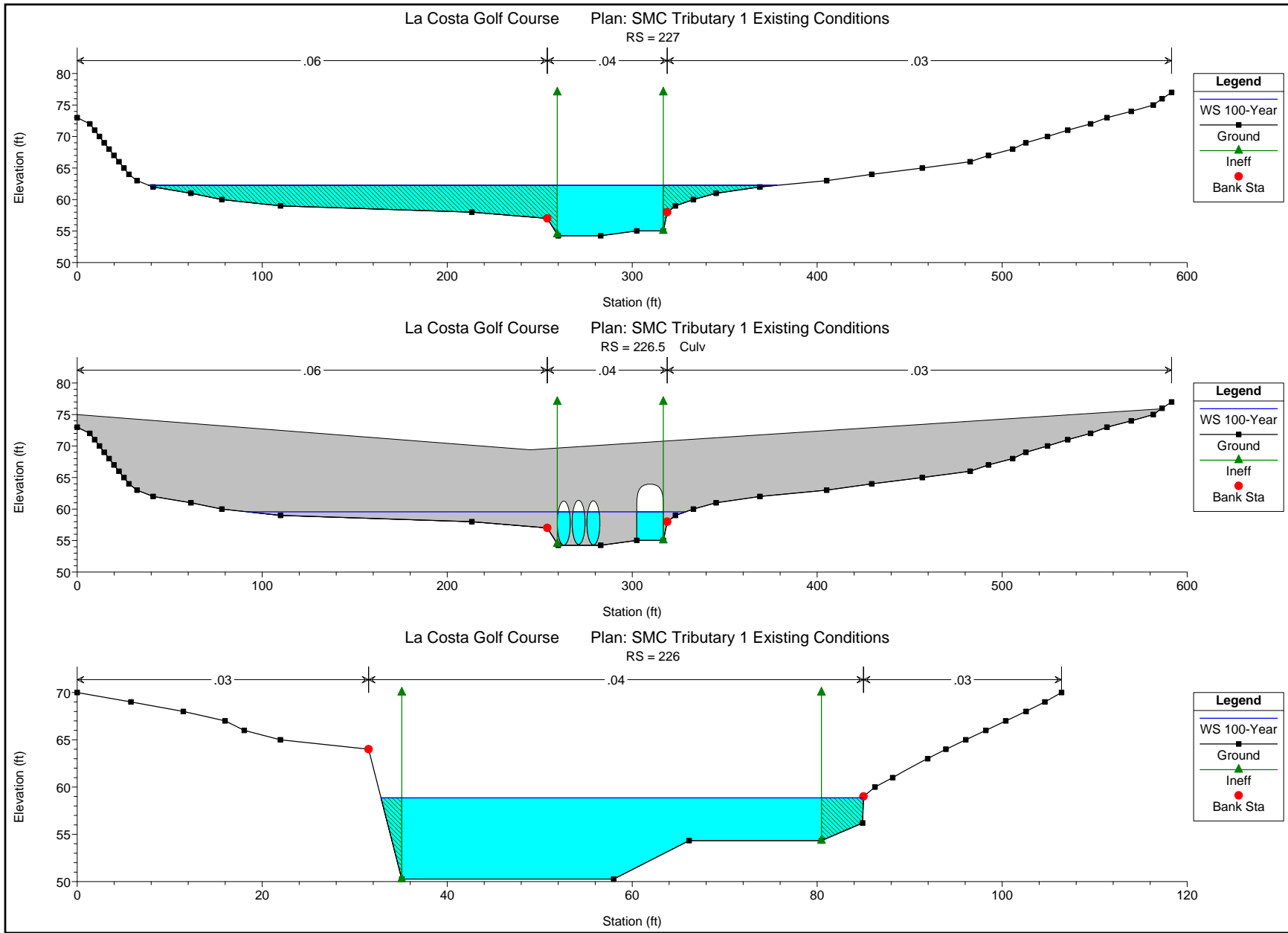
- WS 100-Year
- Ground
- Bank Sta

La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 228

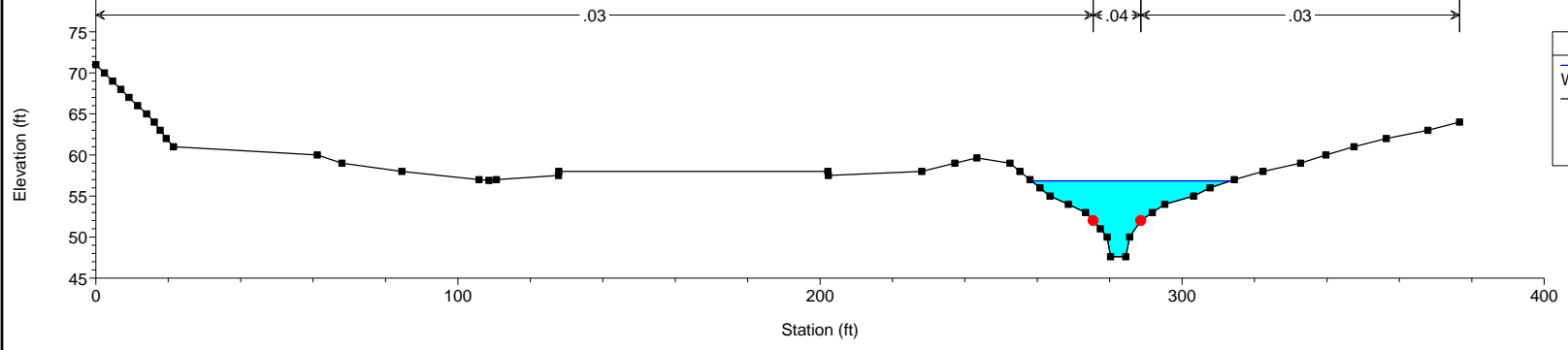


Legend

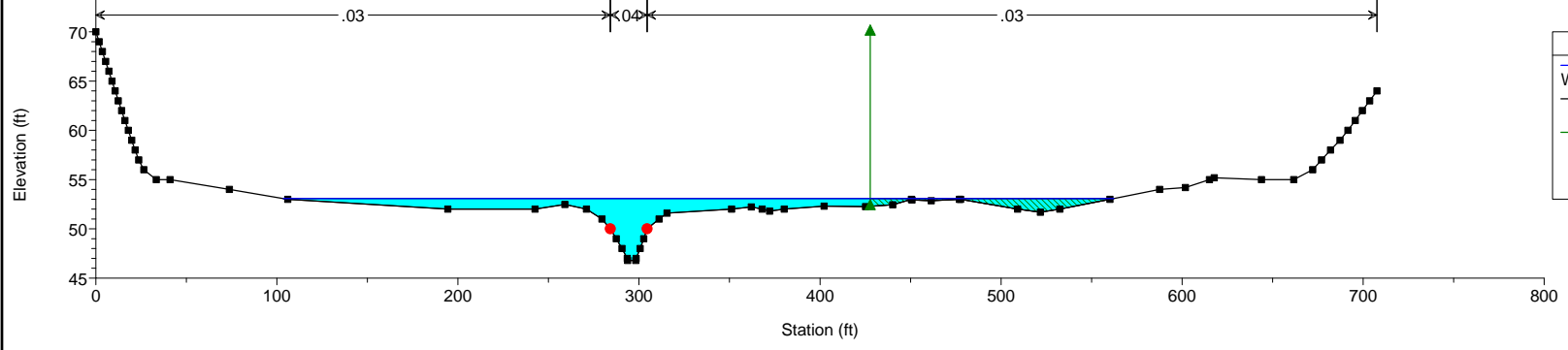
- WS 100-Year
- Ground
- Bank Sta



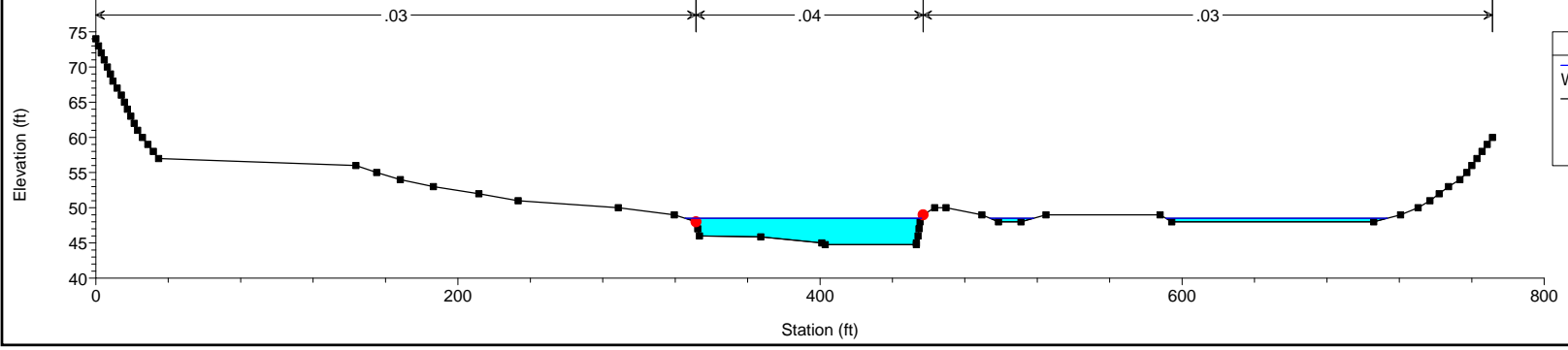
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
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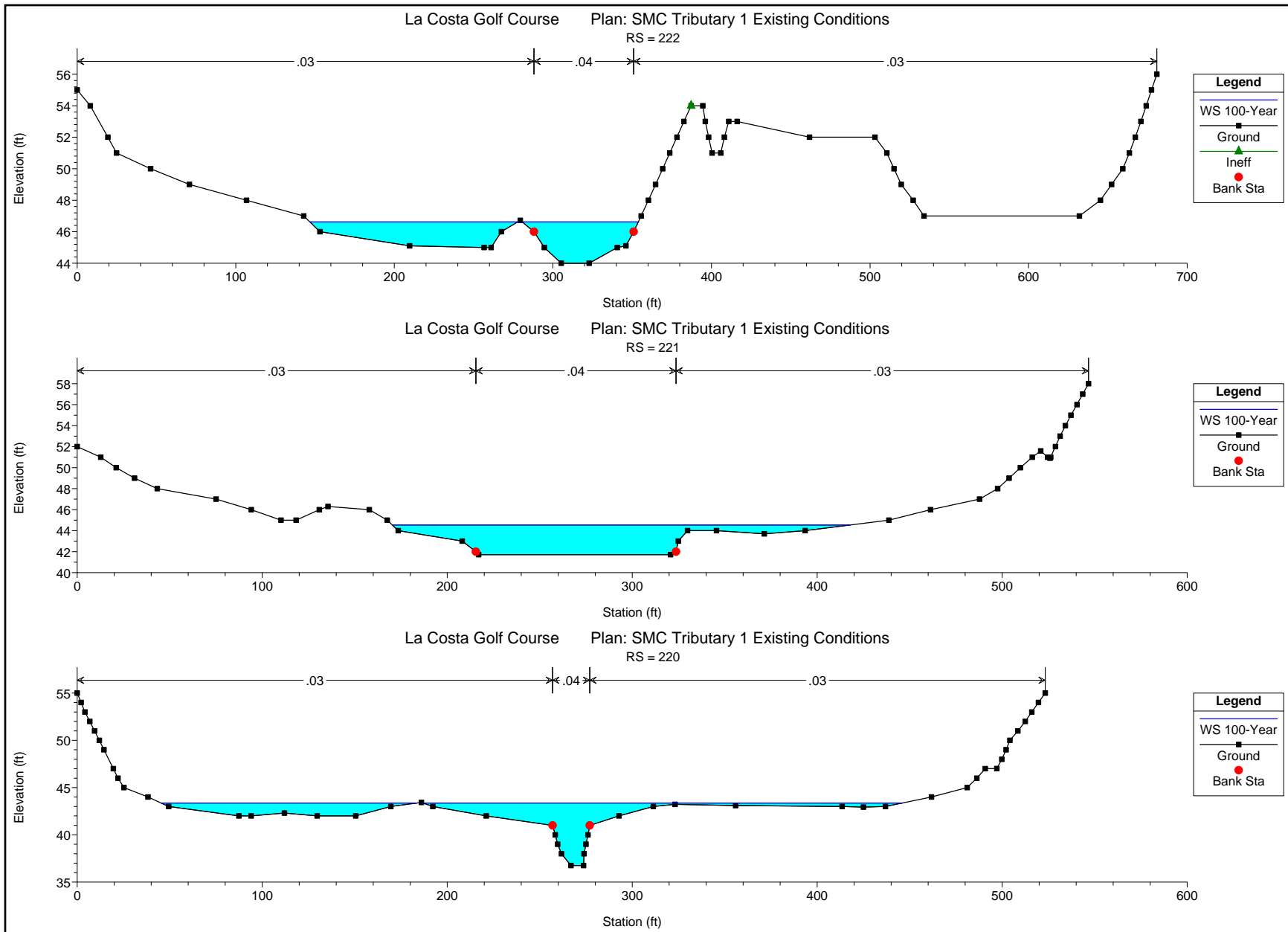


La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 224

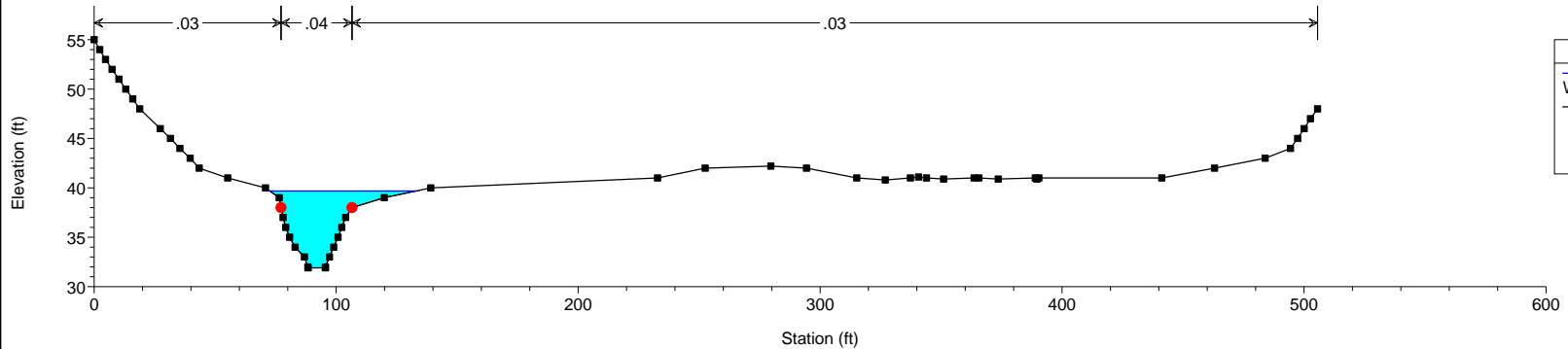


La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 223

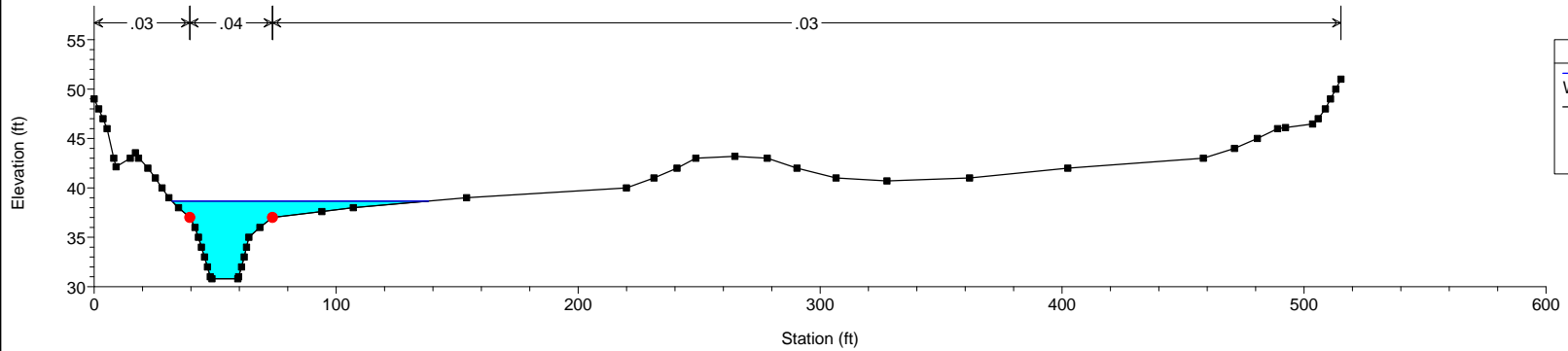




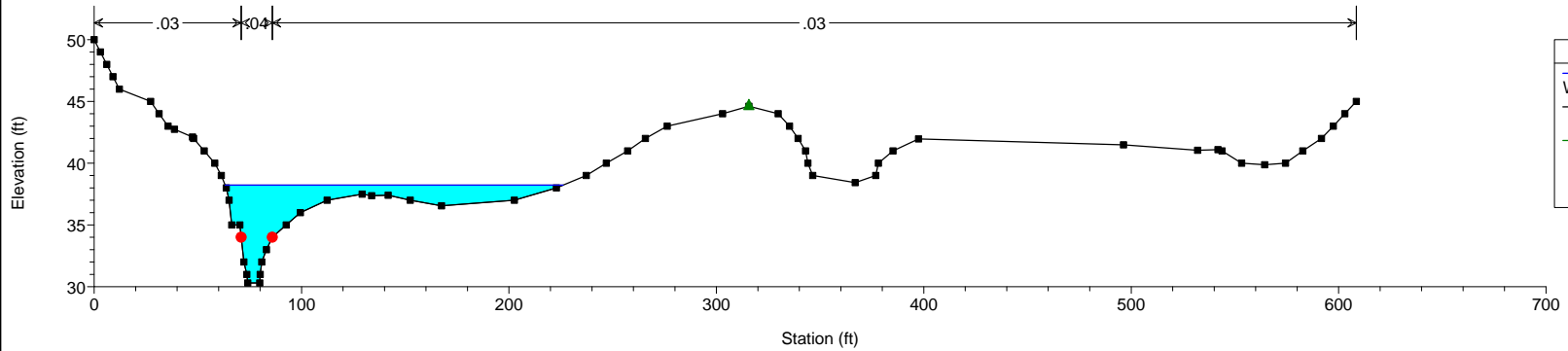
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 219



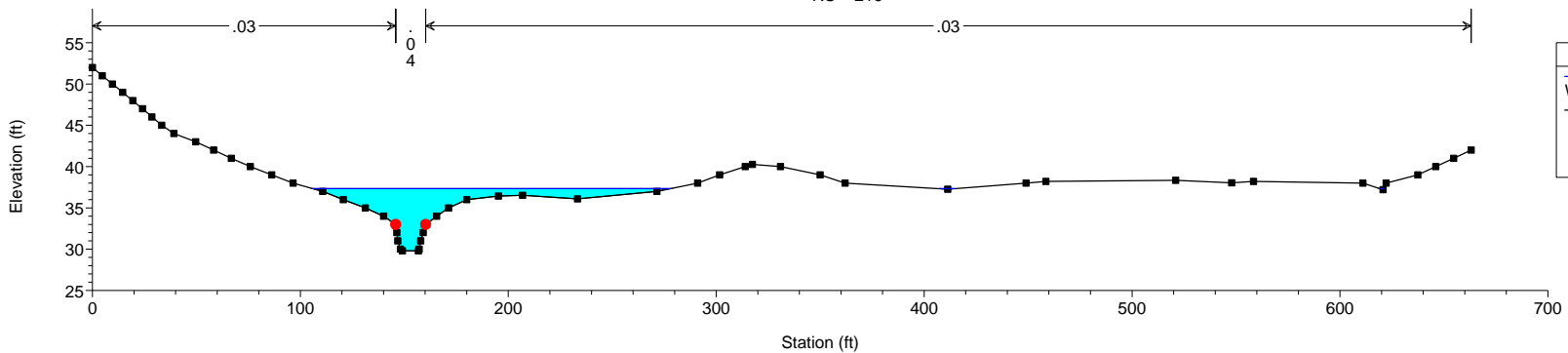
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 218



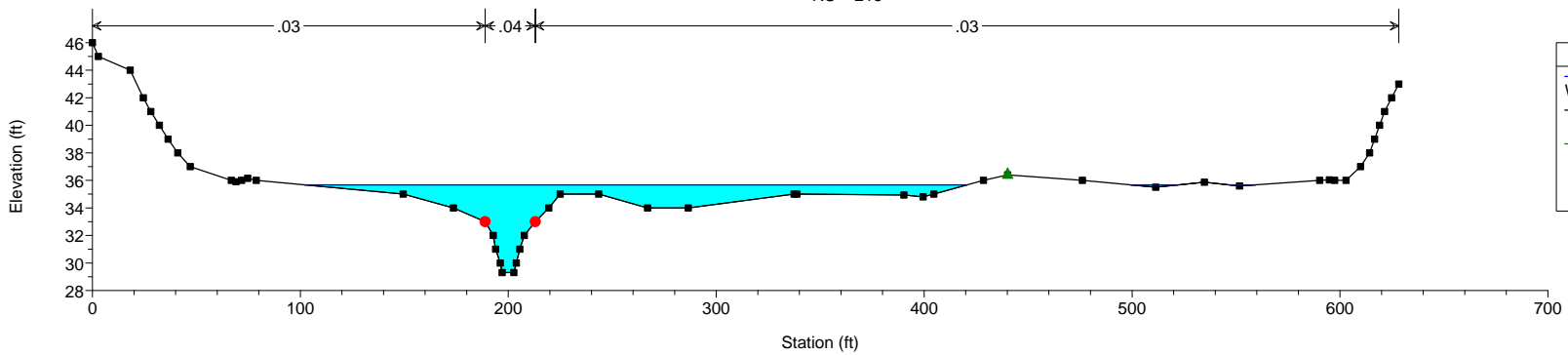
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 217



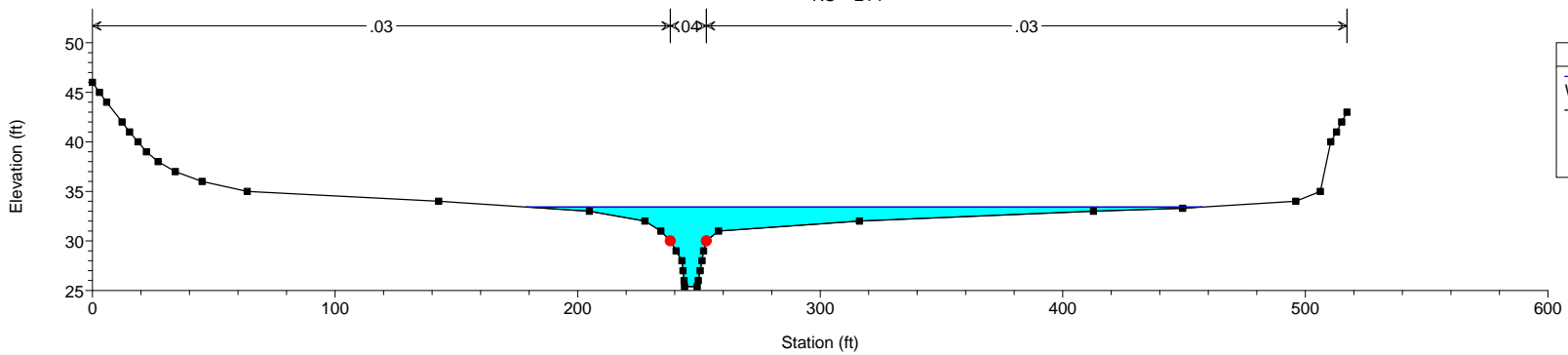
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 216

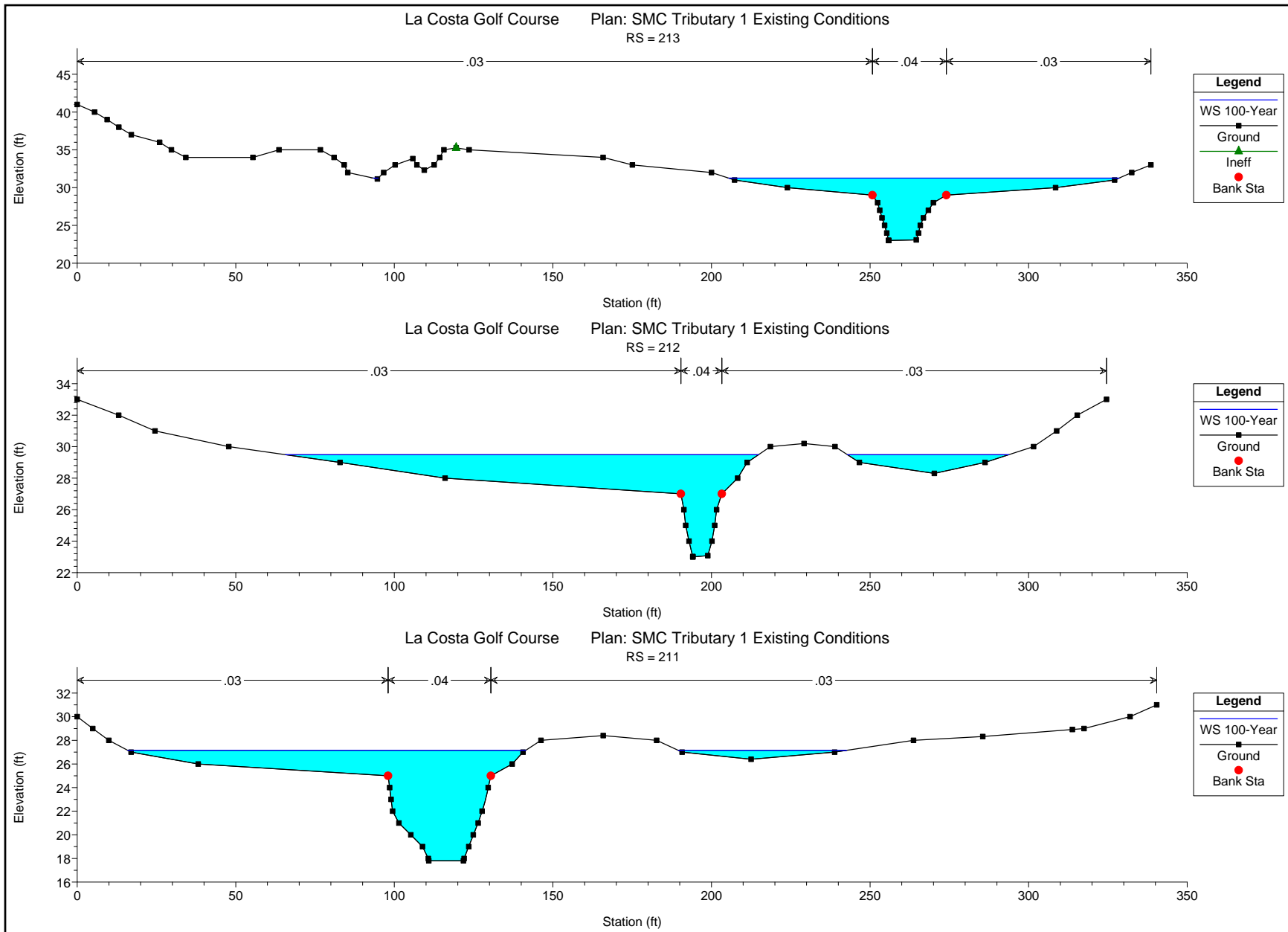


La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 215

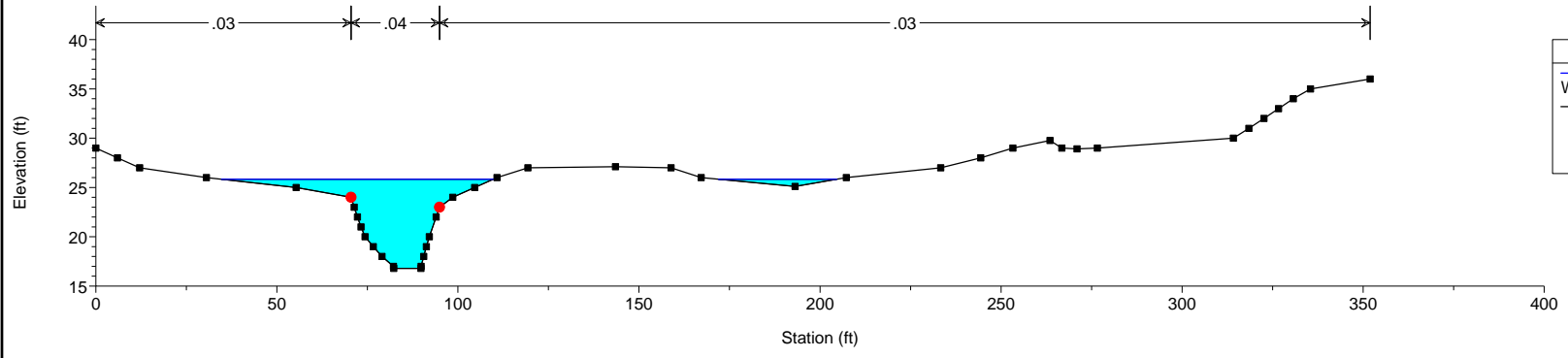


La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 214





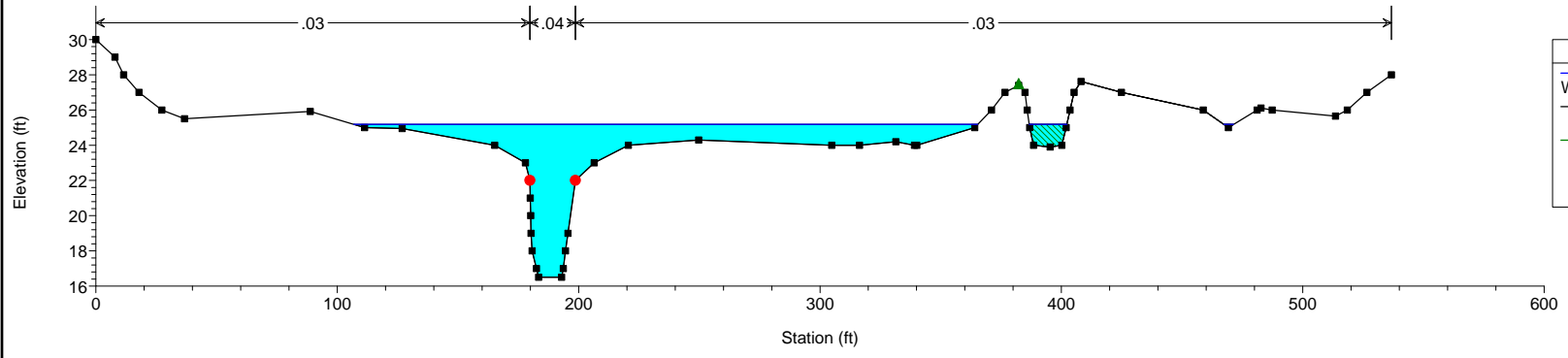
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 210



Legend

- WS 100-Year
- Ground
- Bank Sta

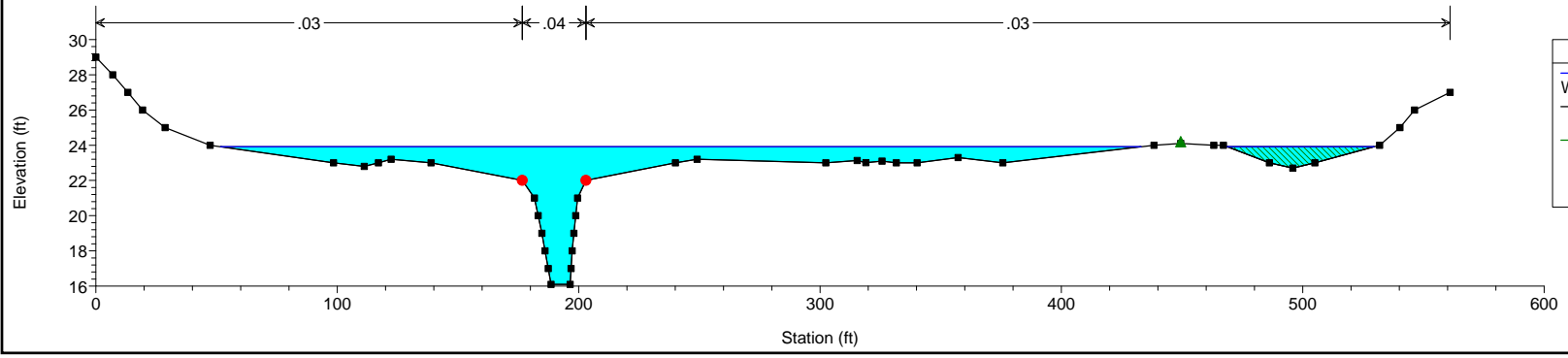
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 209



Legend

- WS 100-Year
- Ground
- Ineff
- Bank Sta

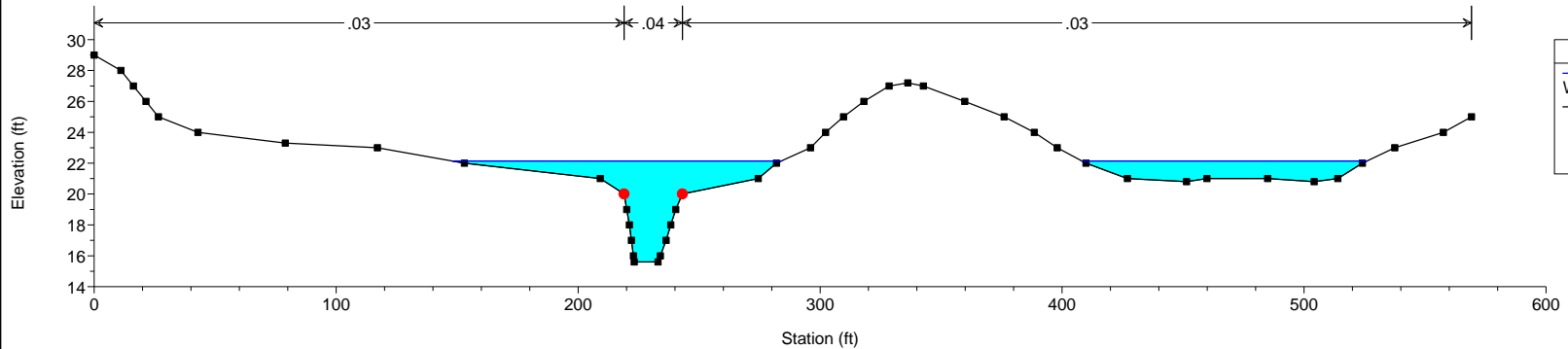
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 208



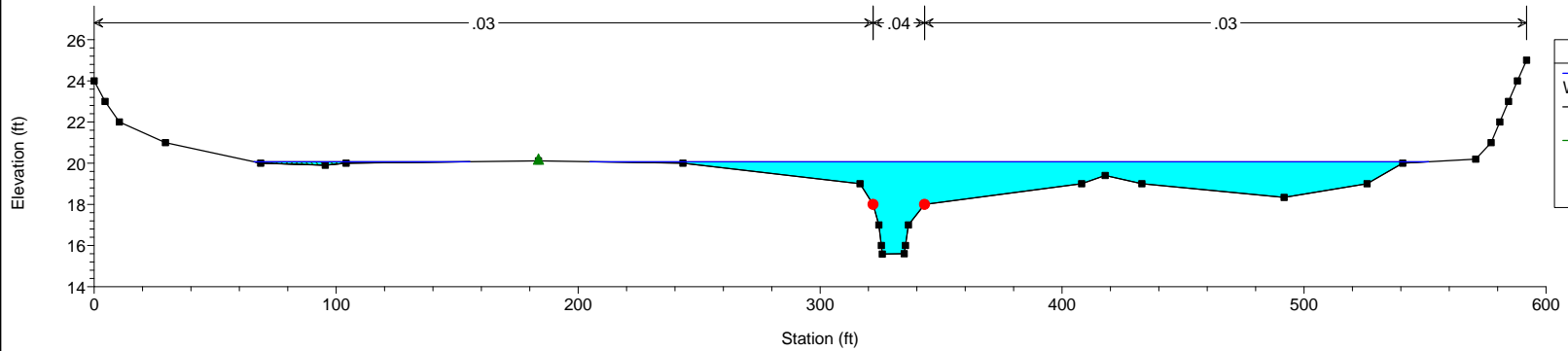
Legend

- WS 100-Year
- Ground
- Ineff
- Bank Sta

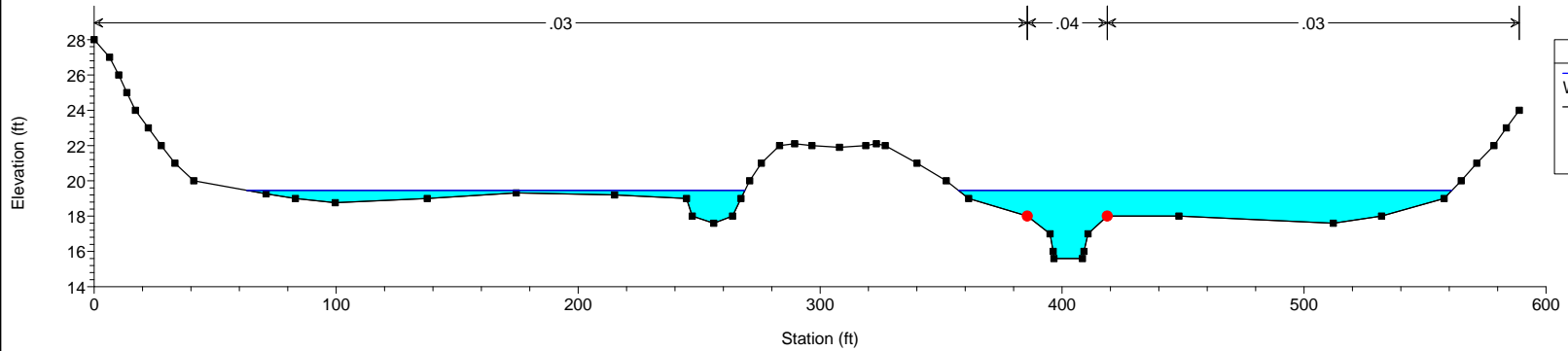
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 207



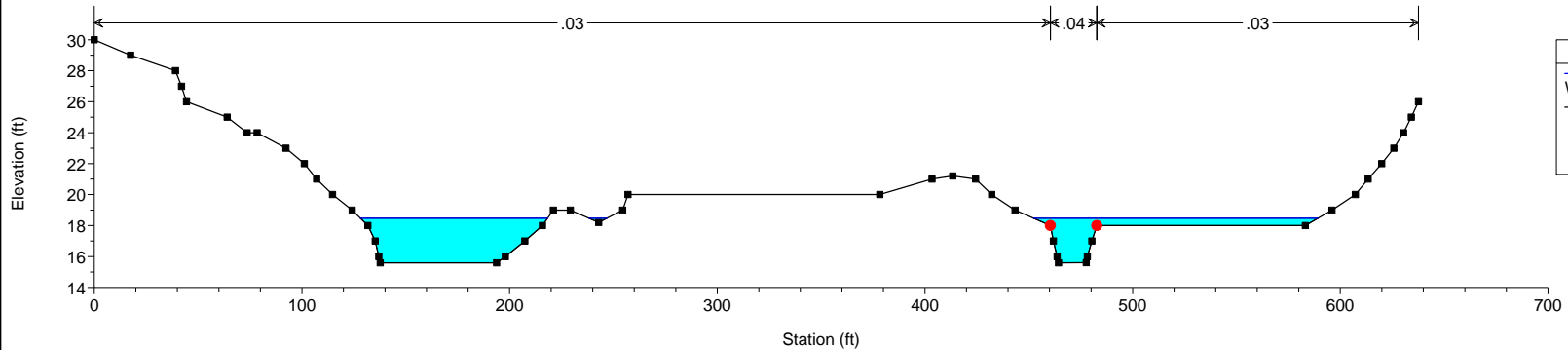
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 206



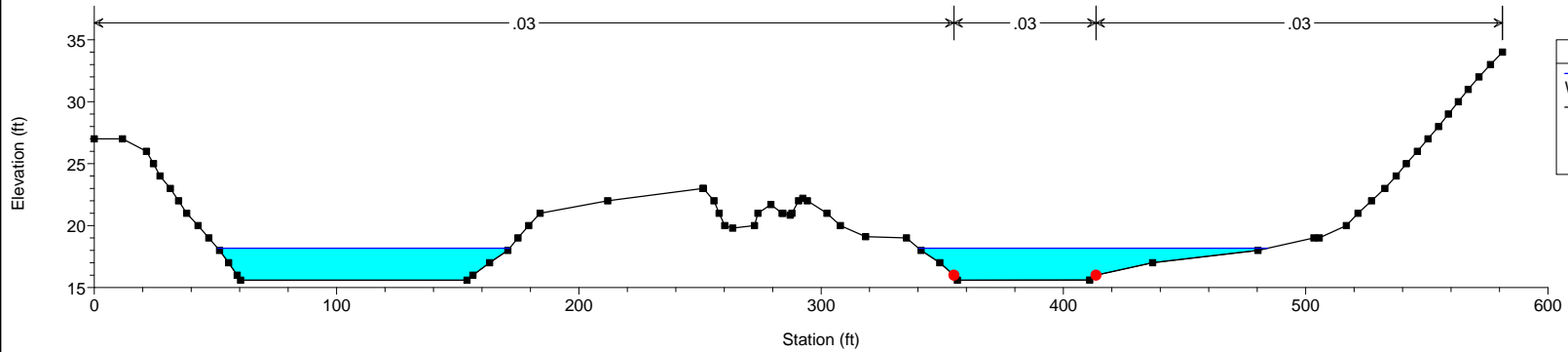
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 205



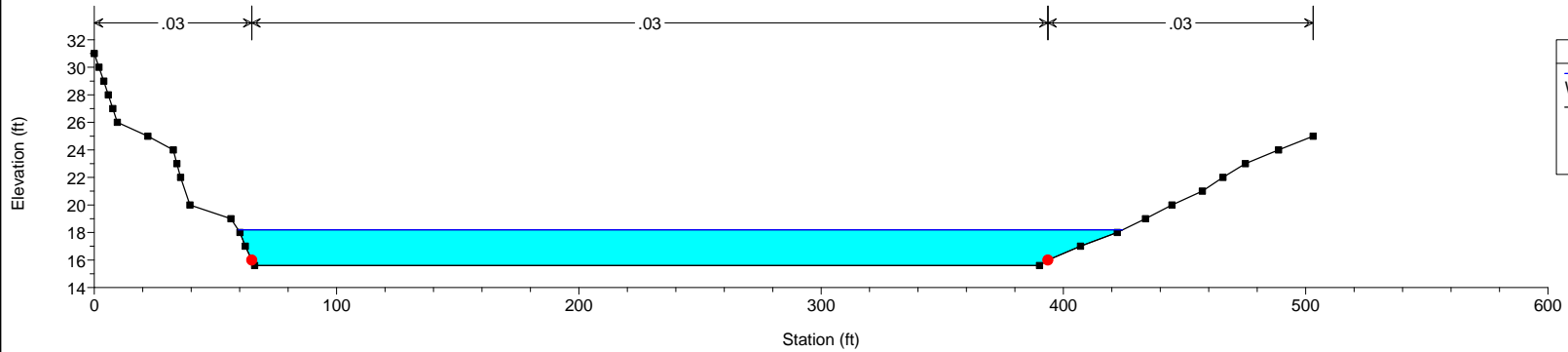
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 204



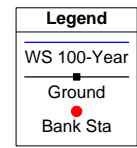
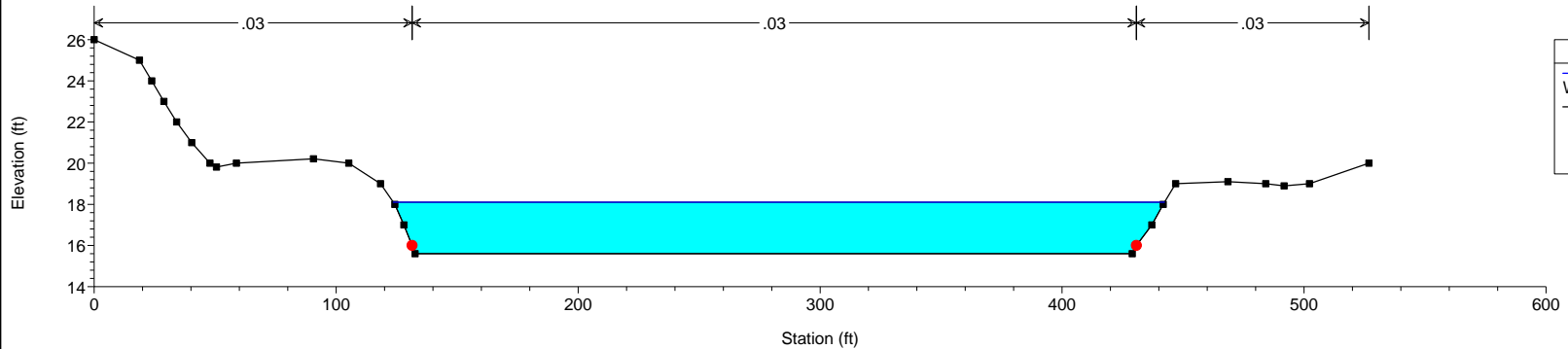
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 203



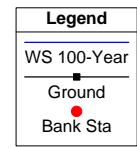
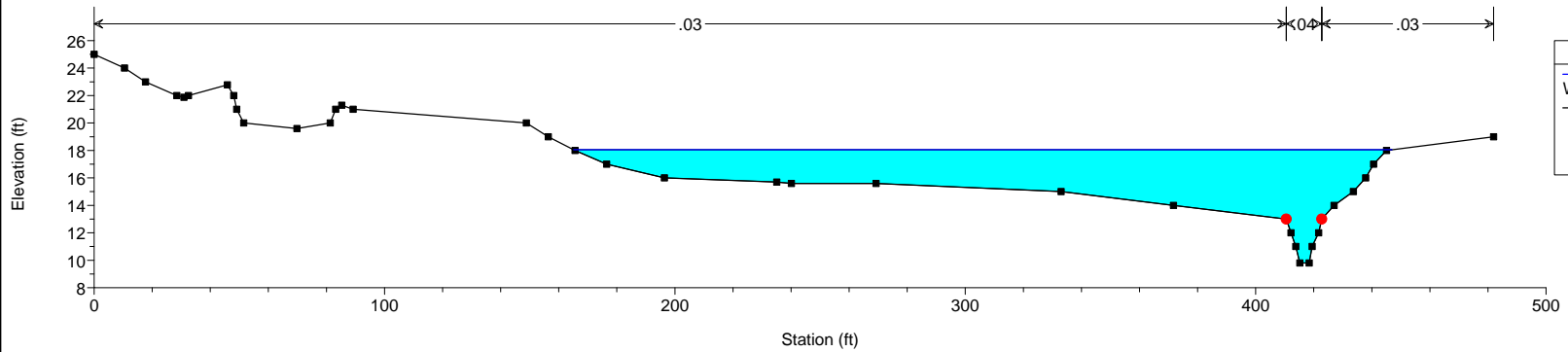
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 202



La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 201

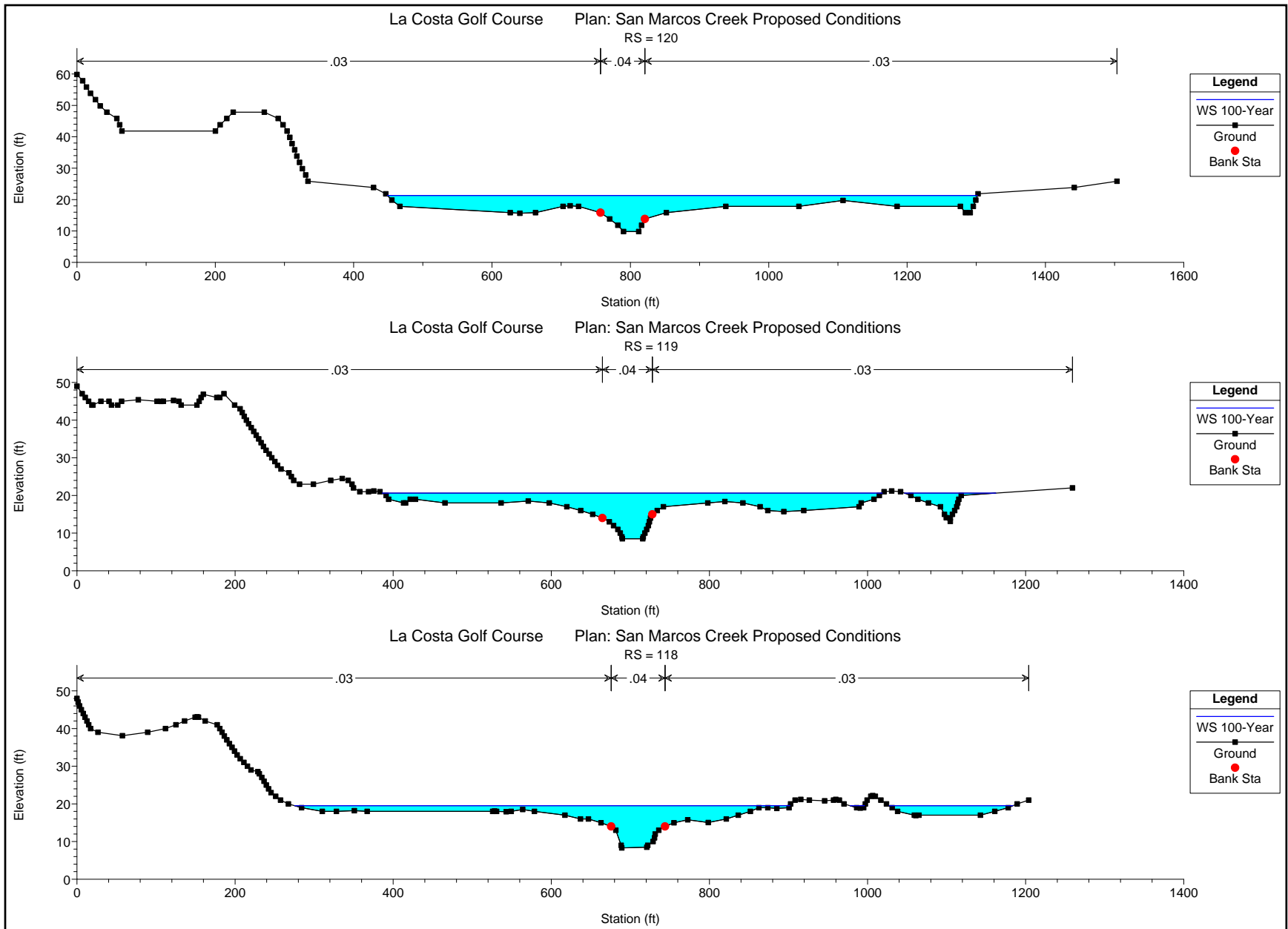


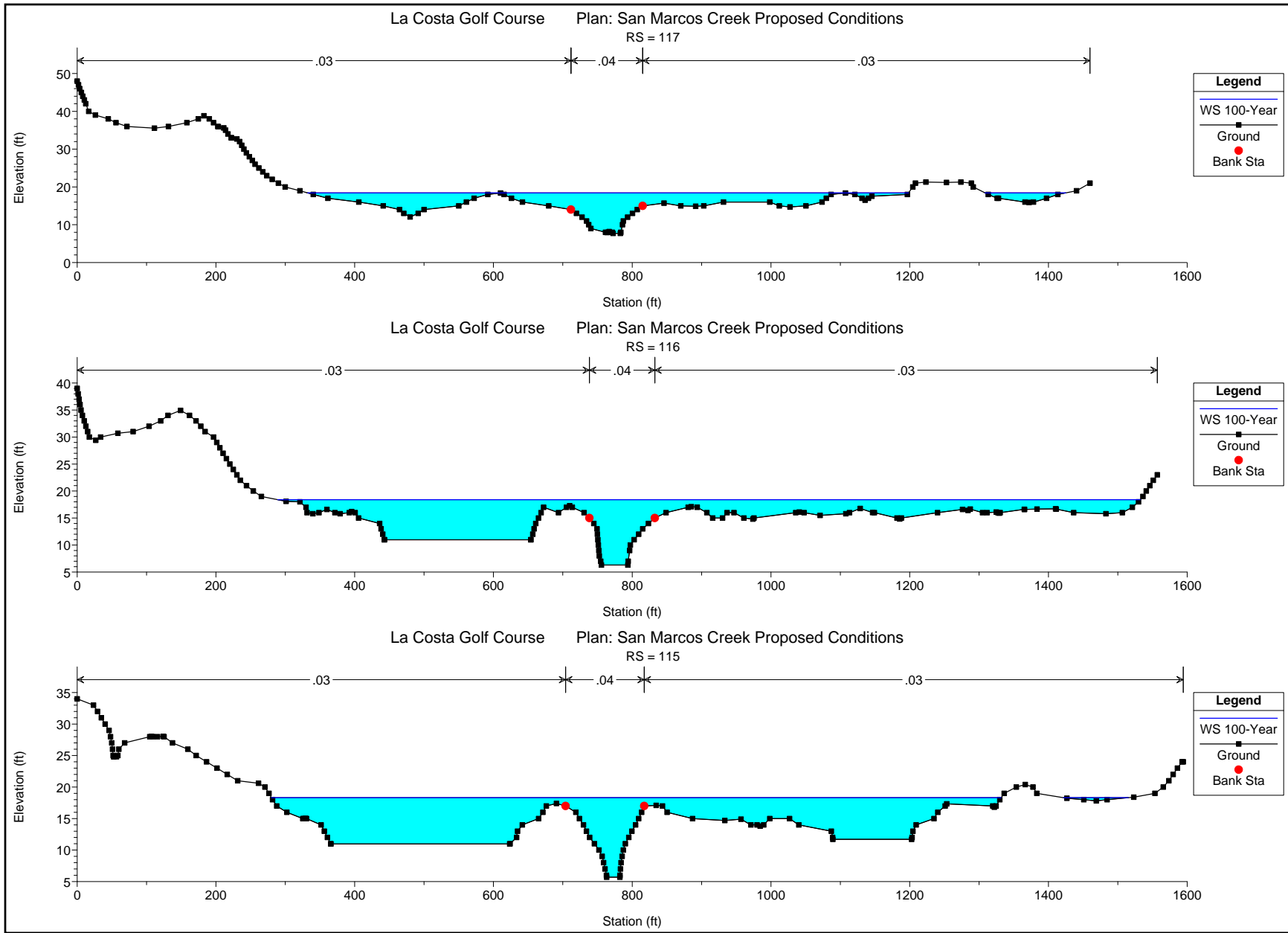
La Costa Golf Course Plan: SMC Tributary 1 Existing Conditions
RS = 200

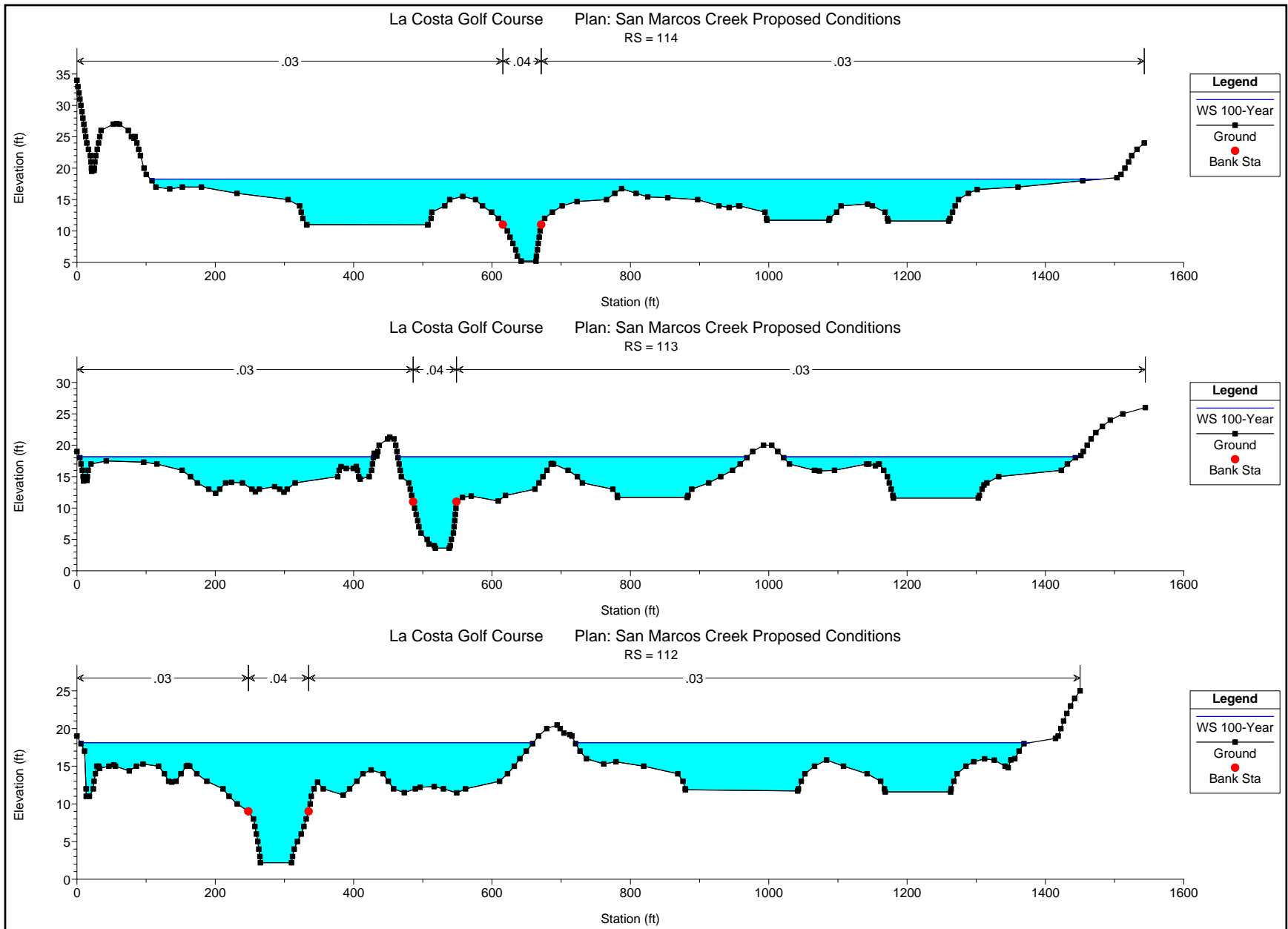


HEC-RAS Plan: SMC Prop Cond River: RIVER-1 Reach: Reach-1 Profile: 100-Year

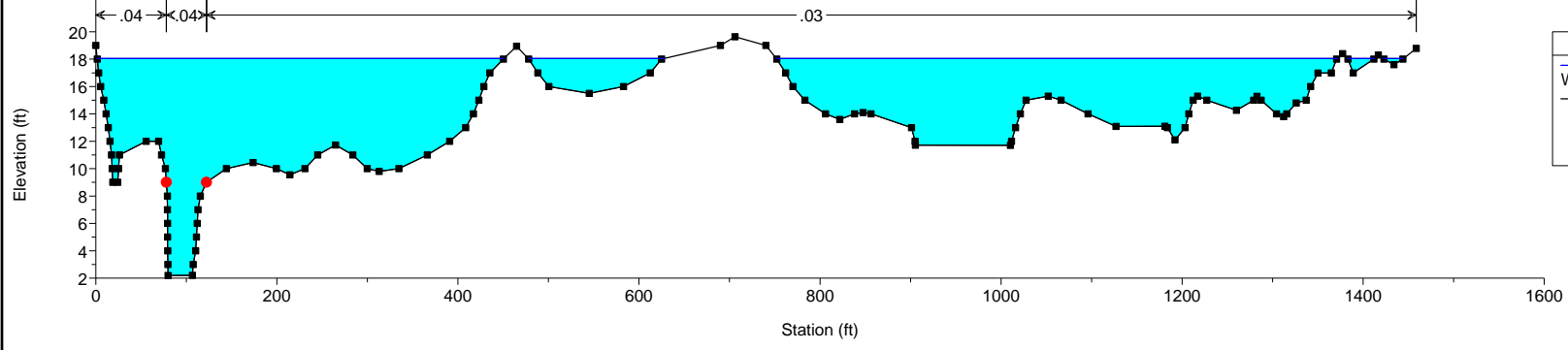
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	120	100-Year	15700.00	9.84	21.32		21.61	0.001074	5.37	3686.71	852.98	0.31
Reach-1	119	100-Year	15700.00	8.50	20.62		21.27	0.002466	8.39	2653.44	748.09	0.47
Reach-1	118	100-Year	15700.00	8.30	19.52	19.52	20.71	0.004904	11.26	2127.46	801.23	0.65
Reach-1	117	100-Year	15700.00	7.70	18.42		18.97	0.002683	7.48	2890.70	982.49	0.47
Reach-1	116	100-Year	15700.00	6.30	18.40		18.60	0.000766	4.14	4622.81	1243.46	0.25
Reach-1	115	100-Year	15700.00	5.70	18.32		18.47	0.000480	2.81	5160.68	1145.31	0.19
Reach-1	114	100-Year	15700.00	5.20	18.25		18.37	0.000410	3.65	5912.02	1373.56	0.19
Reach-1	113	100-Year	15700.00	3.60	18.15		18.28	0.000427	4.04	5708.71	1357.19	0.20
Reach-1	112	100-Year	15700.00	2.19	18.12		18.21	0.000225	3.17	6926.19	1311.48	0.15
Reach-1	111	100-Year	15700.00	2.19	18.05		18.16	0.000288	3.31	6195.25	1274.28	0.16
Reach-1	110	100-Year	15700.00	2.19	18.04		18.11	0.000183	2.47	7601.61	1344.98	0.13
Reach-1	109	100-Year	15700.00	2.19	17.98		18.07	0.000232	2.60	6633.90	1152.14	0.13
Reach-1	108	100-Year	15700.00	2.19	17.93		18.02	0.000235	2.68	6458.13	1048.71	0.13
Reach-1	107	100-Year	15700.00	2.12	17.75		17.94	0.000510	3.75	4506.06	734.65	0.19
Reach-1	106	100-Year	15700.00	2.12	17.70		17.85	0.000349	3.48	5244.57	826.32	0.16
Reach-1	105	100-Year	15700.00	2.10	17.59		17.77	0.000414	3.64	4672.34	685.44	0.17
Reach-1	104	100-Year	15700.00	2.12	17.53		17.68	0.000373	3.46	5222.78	853.26	0.17
Reach-1	103	100-Year	15700.00	2.12	17.40		17.59	0.000511	3.85	4512.57	755.08	0.19
Reach-1	102	100-Year	15700.00	2.12	17.20		17.45	0.000858	4.00	3973.67	716.10	0.22
Reach-1	101	100-Year	15700.00	2.12	16.79	14.90	17.21	0.001571	5.77	3086.41	704.27	0.30
Reach-1	100	100-Year	15700.00	2.10	13.17	13.17	16.17	0.014652	14.73	1232.88	224.61	0.88





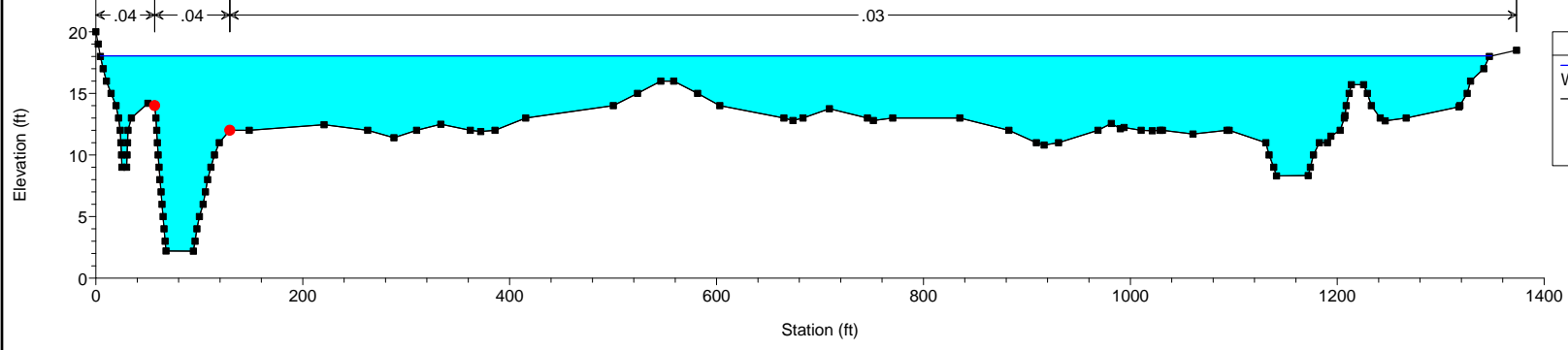


La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 111



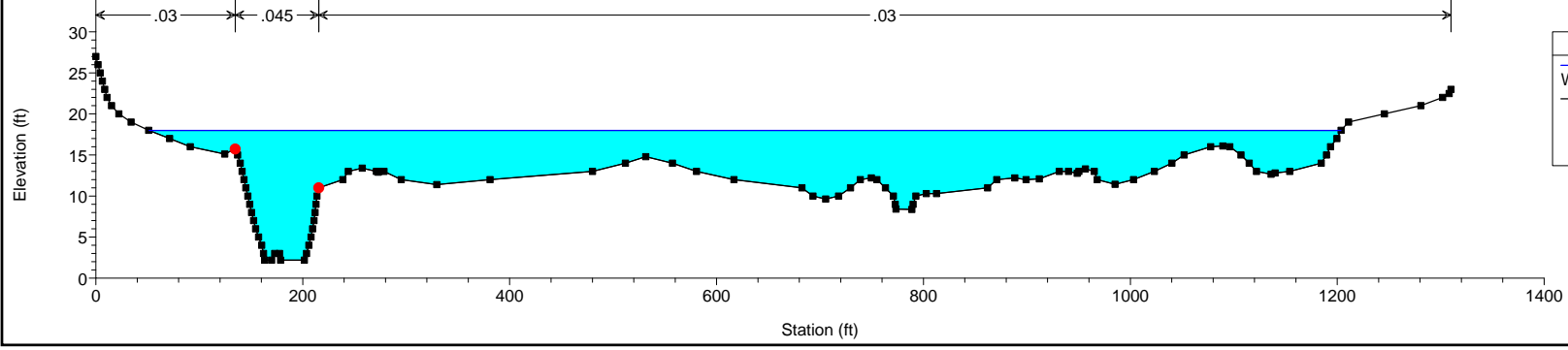
Legend	
WS 100-Year	(Cyan shaded area)
Ground	(Black line with square markers)
Bank Sta	(Red dot)

La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 110



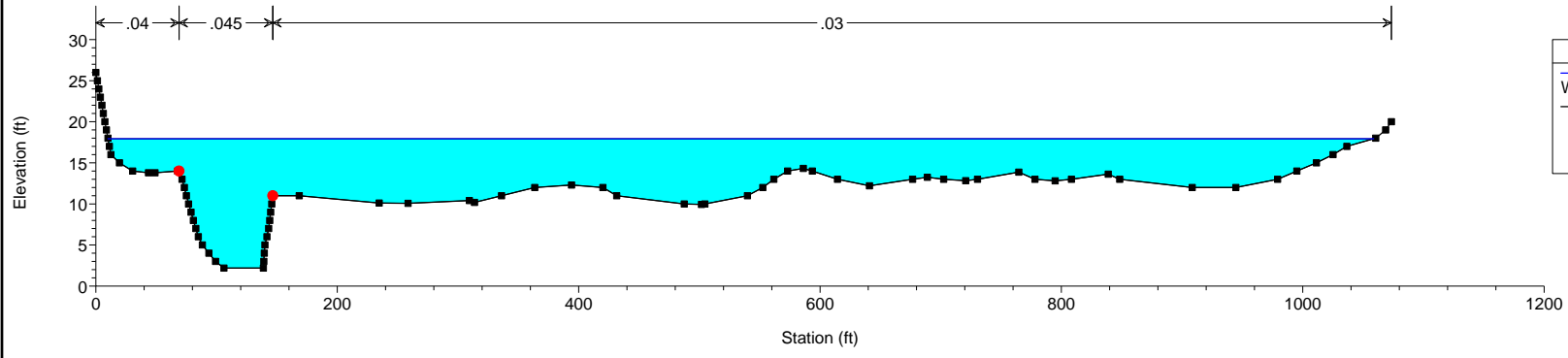
Legend	
WS 100-Year	(Cyan shaded area)
Ground	(Black line with square markers)
Bank Sta	(Red dot)

La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 109

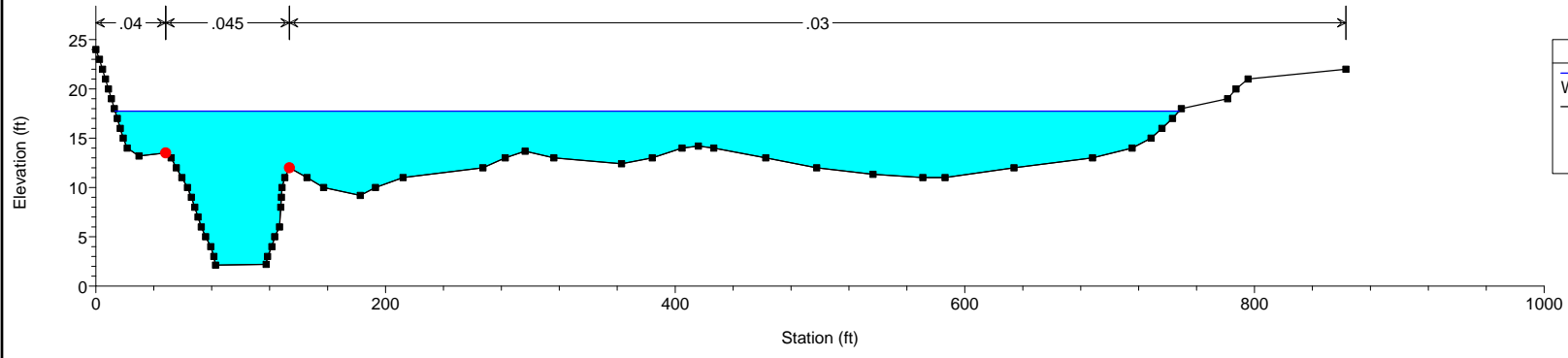


Legend	
WS 100-Year	(Cyan shaded area)
Ground	(Black line with square markers)
Bank Sta	(Red dot)

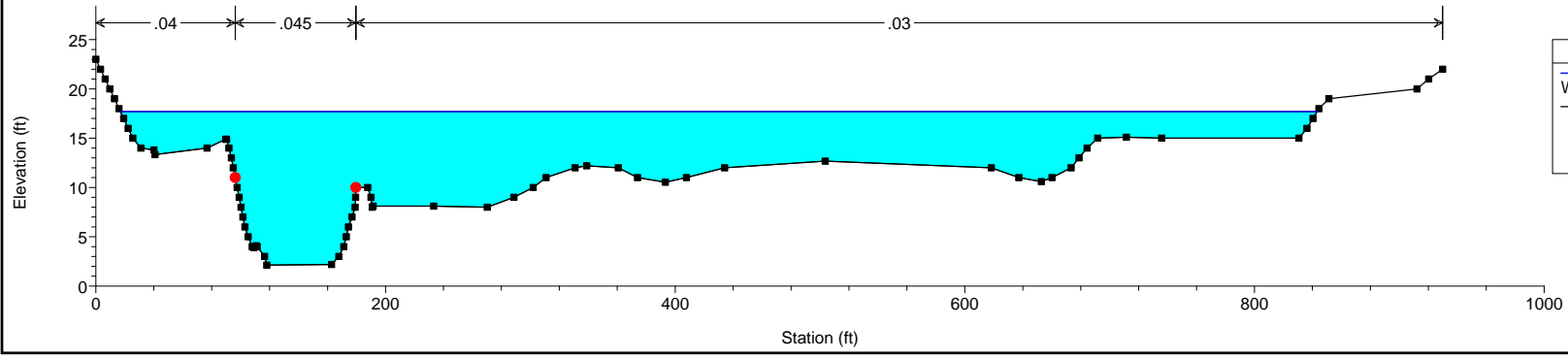
La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 108



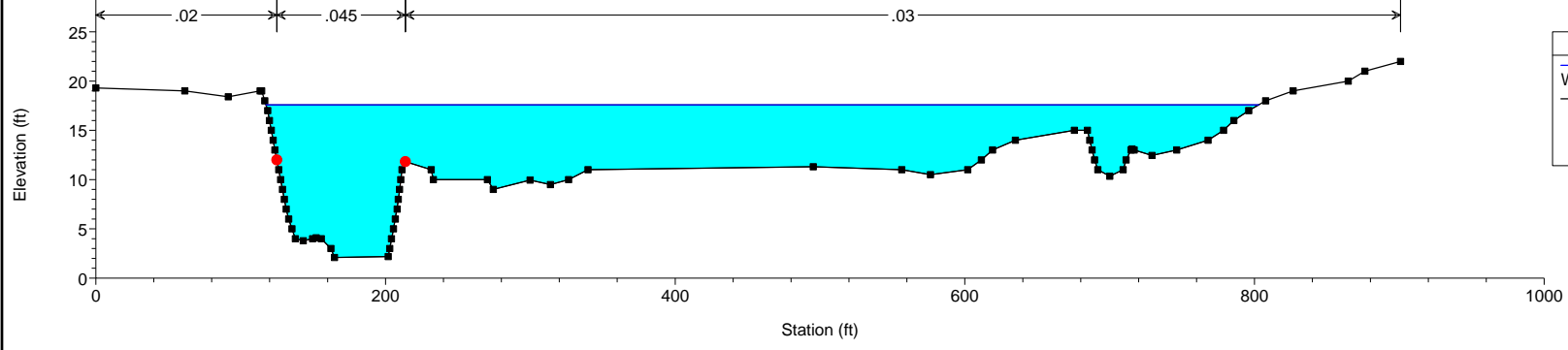
La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 107



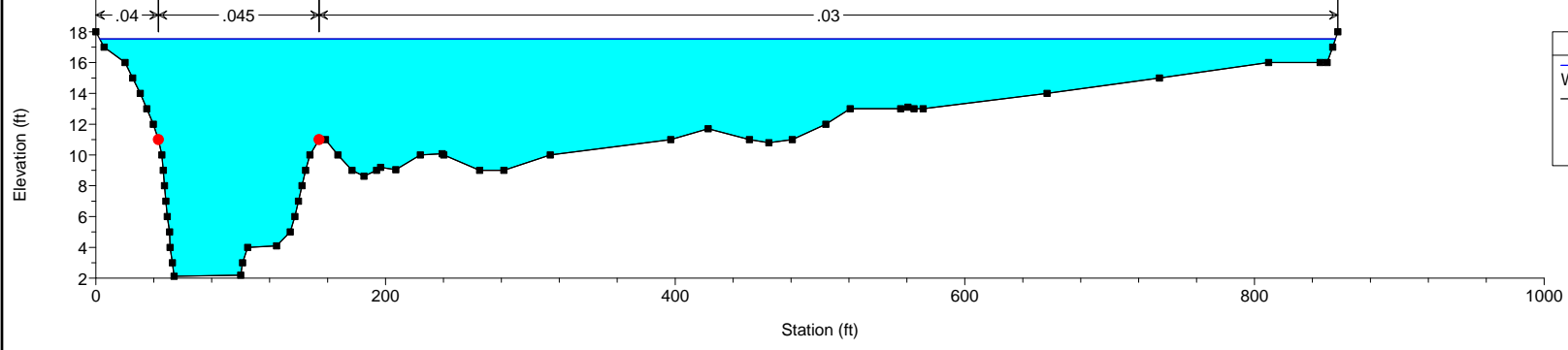
La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 106



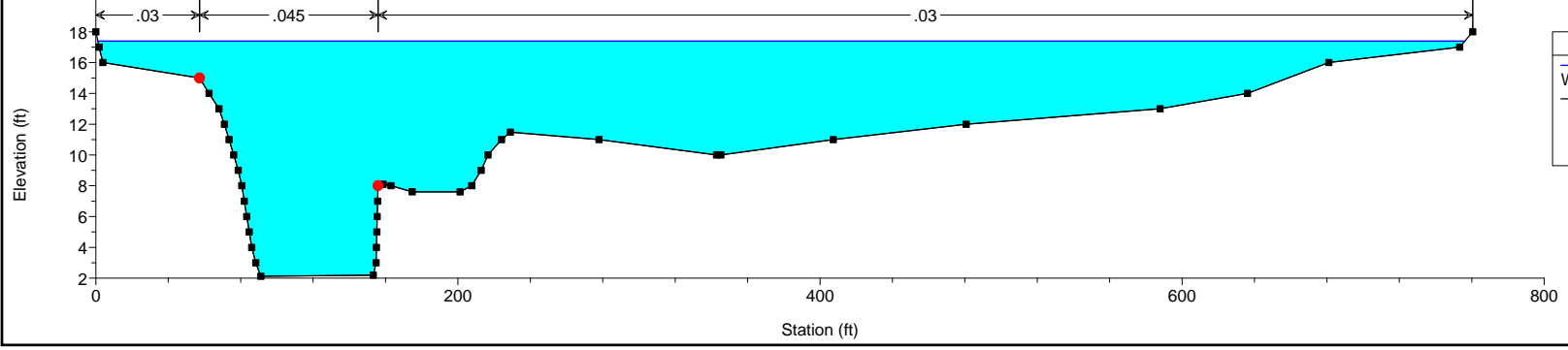
La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 105



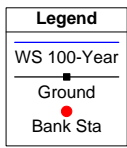
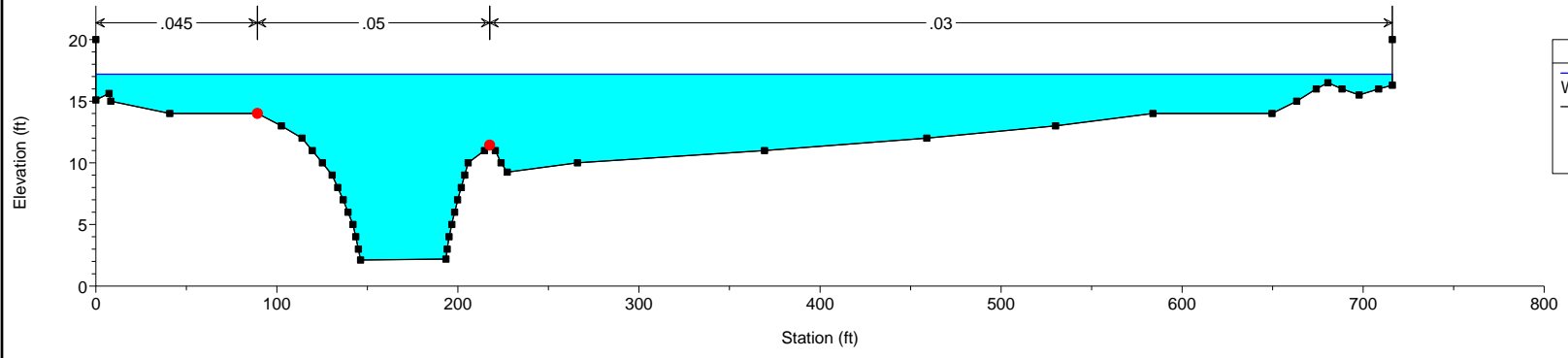
La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 104



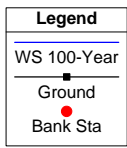
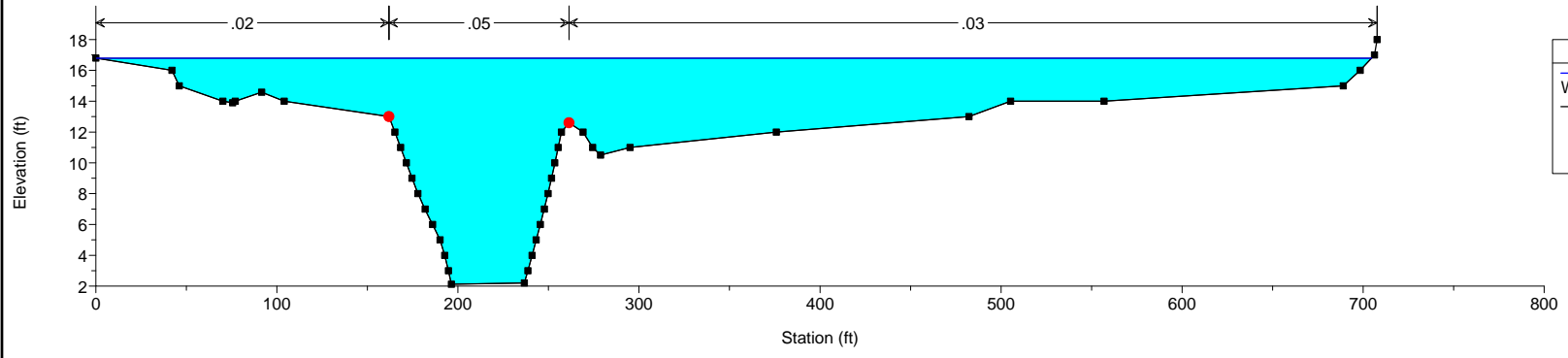
La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 103



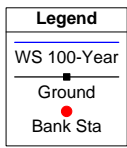
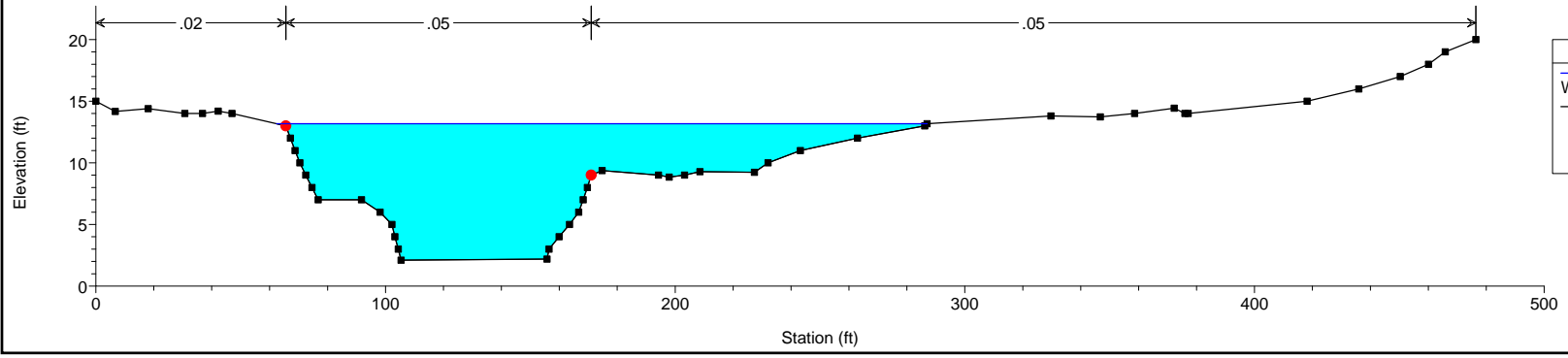
La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 102



La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 101



La Costa Golf Course Plan: San Marcos Creek Proposed Conditions
RS = 100

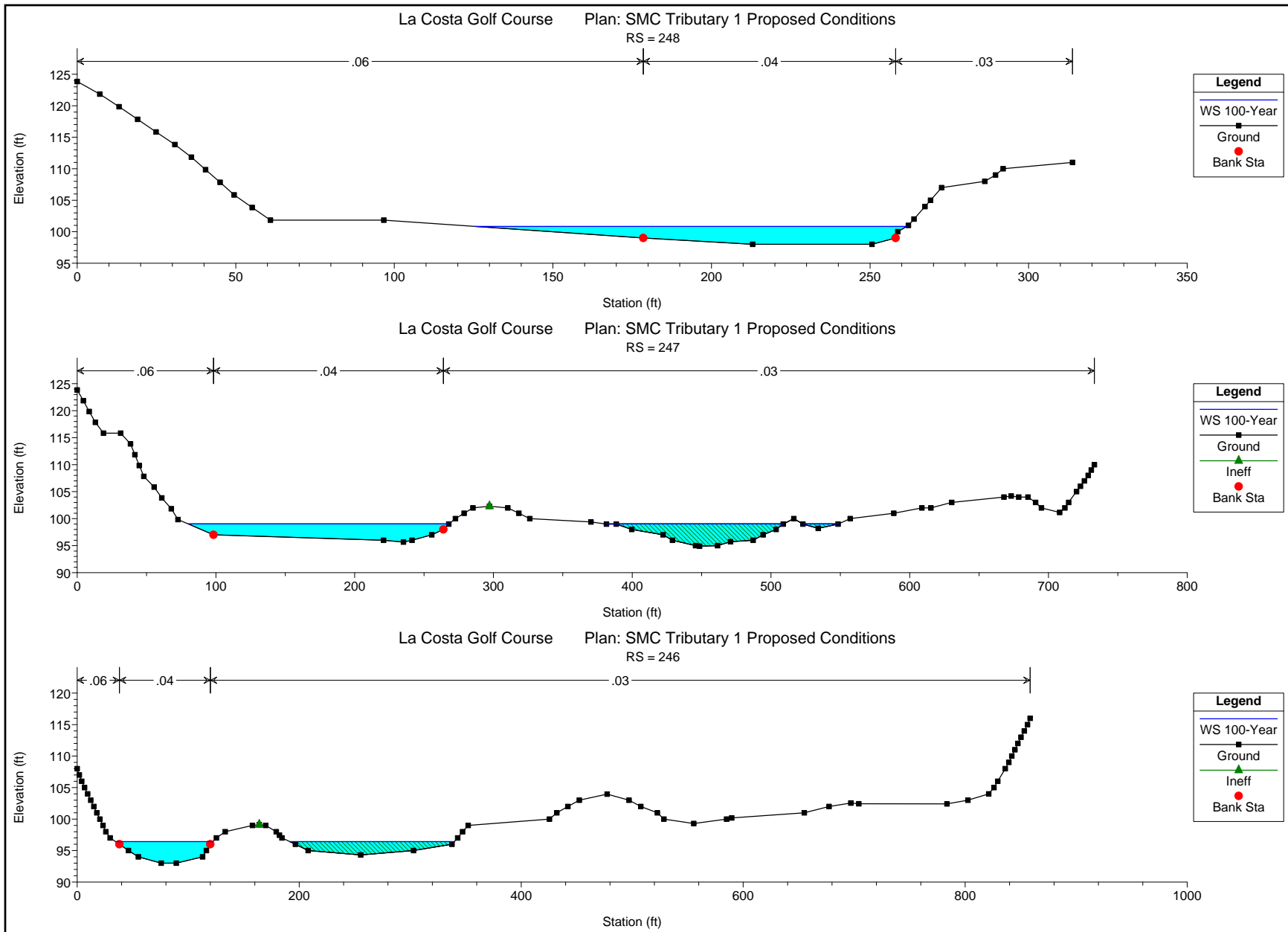


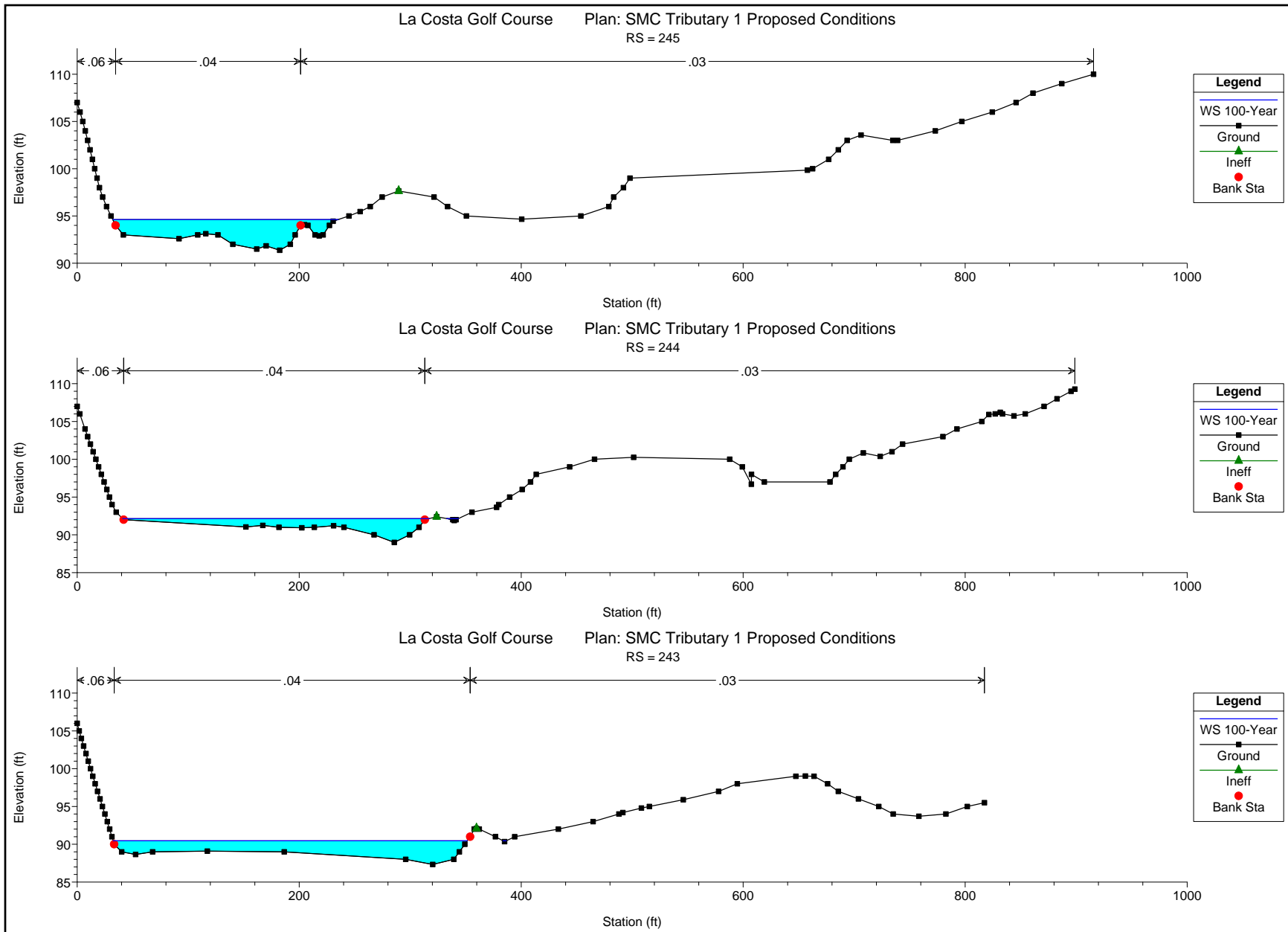
HEC-RAS Plan: SMC Trib 1 Prop Cond River: RIVER-1 Reach: Reach-1 Profile: 100-Year

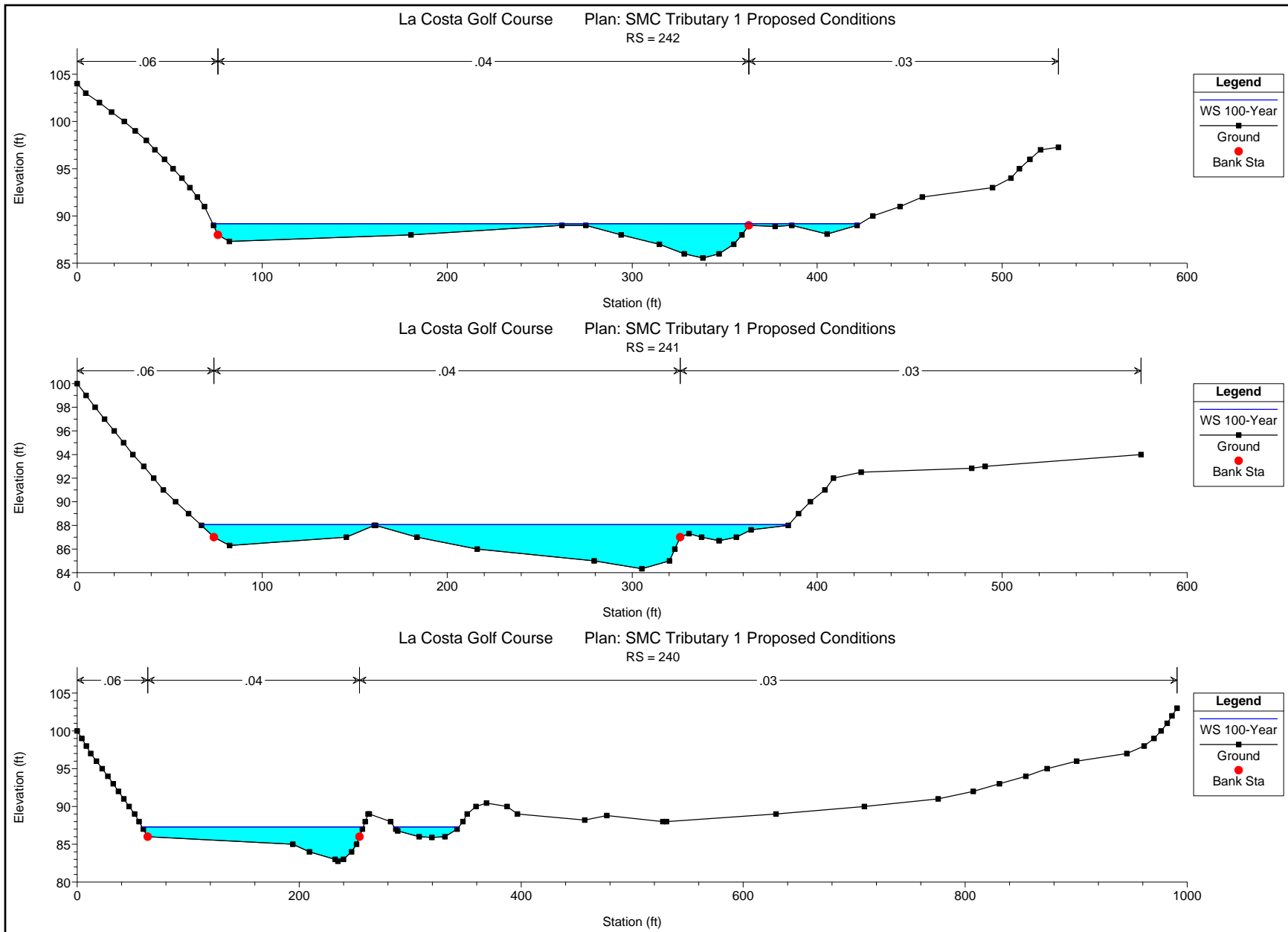
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	248	100-Year	1900.00	98.00	100.84	100.84	101.90	0.014978	8.54	256.03	136.10	0.94
Reach-1	247	100-Year	1900.00	95.67	99.03	98.07	99.32	0.004020	4.40	444.47	342.17	0.49
Reach-1	246	100-Year	1900.00	93.00	96.43	96.43	97.69	0.016769	9.00	212.09	236.29	0.99
Reach-1	245	100-Year	1900.00	91.37	94.63	94.06	95.01	0.006705	5.02	386.54	203.33	0.61
Reach-1	244	100-Year	1900.00	89.00	92.15	92.15	92.73	0.022037	6.07	313.56	287.10	1.00
Reach-1	243	100-Year	1900.00	87.33	90.47	89.68	90.64	0.003670	3.32	571.82	321.94	0.44
Reach-1	242	100-Year	1900.00	85.56	89.18		89.50	0.009834	4.57	426.86	349.90	0.68
Reach-1	241	100-Year	1900.00	84.33	88.07		88.27	0.003991	3.64	537.09	318.09	0.46
Reach-1	240	100-Year	1900.00	82.75	87.28		87.51	0.003644	3.91	503.15	257.12	0.45
Reach-1	239	100-Year	1900.00	82.03	86.61		86.85	0.003026	3.87	487.54	222.71	0.42
Reach-1	238	100-Year	1900.00	81.30	86.25		86.37	0.001691	2.95	678.64	385.06	0.32
Reach-1	237	100-Year	1900.00	77.89	84.68	84.68	85.48	0.008486	8.18	297.69	519.67	0.73
Reach-1	236	100-Year	1900.00	74.33	77.74	77.74	78.34	0.013501	6.64	307.68	427.30	0.84
Reach-1	235	100-Year	1900.00	72.00	73.87	73.87	74.63	0.011408	4.97	292.15	324.38	0.74
Reach-1	234	100-Year	1900.00	69.28	72.50	71.81	72.89	0.005925	5.06	382.07	181.67	0.58
Reach-1	233	100-Year	1900.00	69.00	70.75	70.51	71.25	0.011790	5.86	348.24	263.92	0.78
Reach-1	232	100-Year	1900.00	64.74	68.93	68.19	69.46	0.007046	5.86	325.86	370.64	0.64
Reach-1	231	100-Year	1900.00	63.55	67.34	66.90	68.01	0.007347	6.83	298.19	125.13	0.68
Reach-1	230	100-Year	1900.00	61.23	65.14	65.14	66.12	0.013771	8.23	241.70	170.62	0.90
Reach-1	229	100-Year	1900.00	59.70	63.29		63.72	0.005913	5.67	387.74	242.00	0.60
Reach-1	228	100-Year	1900.00	58.47	62.62		62.85	0.002947	3.92	489.72	198.76	0.42
Reach-1	227	100-Year	1900.00	54.26	62.26	57.82	62.55	0.000897	4.32	439.42	339.48	0.28
Reach-1	226.5		Culvert									
Reach-1	226	100-Year	1900.00	50.26	58.85		59.42	0.002047	6.03	315.01	52.16	0.40
Reach-1	225	100-Year	1900.00	47.60	56.84	56.84	58.53	0.010112	11.62	189.60	54.96	0.76
Reach-1	224	100-Year	1900.00	46.80	53.19	53.19	53.69	0.005162	7.58	409.81	359.97	0.59
Reach-1	223	100-Year	1900.00	44.77	48.54	47.26	48.89	0.003599	4.75	404.62	272.92	0.47
Reach-1	222	100-Year	1900.00	44.00	46.61	46.61	47.32	0.014071	7.03	283.46	204.69	0.87
Reach-1	221	100-Year	1900.00	41.71	44.53		44.90	0.004887	5.17	407.95	237.11	0.54
Reach-1	220	100-Year	1900.00	36.75	43.34	43.34	43.86	0.005478	7.63	415.68	395.06	0.58
Reach-1	219	100-Year	1900.00	31.90	39.69	39.69	41.50	0.010315	11.03	186.63	60.54	0.82
Reach-1	218	100-Year	1900.00	30.80	39.42	38.51	40.36	0.005164	8.20	282.63	150.50	0.59
Reach-1	217	100-Year	1900.00	30.30	38.84	38.84	39.79	0.006221	9.60	291.67	156.06	0.63
Reach-1	216	100-Year	1900.00	29.80	36.92	36.92	38.57	0.010848	11.93	199.83	76.09	0.83
Reach-1	215	100-Year	1900.00	29.30	36.28	36.28	36.74	0.004469	7.14	443.05	529.29	0.55
Reach-1	214	100-Year	1900.00	25.40	33.40		33.91	0.005575	7.81	395.98	298.94	0.56
Reach-1	213	100-Year	1900.00	23.00	31.16	31.16	32.34	0.008765	9.74	235.08	93.88	0.72
Reach-1	212	100-Year	1900.00	23.00	29.49	29.49	30.16	0.007965	8.53	320.39	231.41	0.66

HEC-RAS Plan: SMC Trib 1 Prop Cond River: RIVER-1 Reach: Reach-1 Profile: 100-Year (Continued)

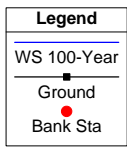
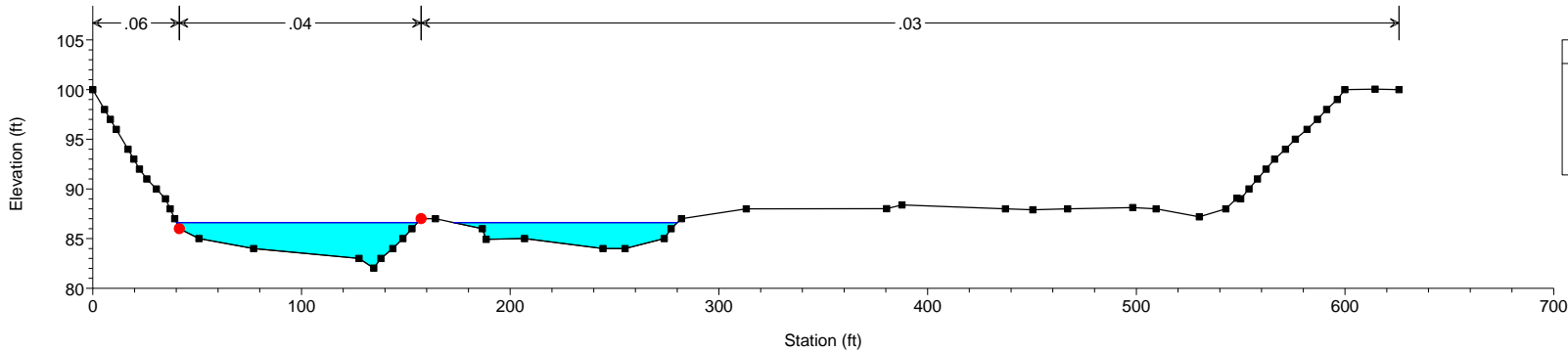
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	211	100-Year	1900.00	17.80	27.22		27.70	0.002233	6.08	405.16	191.61	0.39
Reach-1	210	100-Year	1900.00	16.80	25.55	25.55	27.19	0.008405	10.64	202.73	83.95	0.72
Reach-1	209	100-Year	1900.00	16.50	25.29	25.29	25.91	0.004056	7.71	378.25	264.19	0.49
Reach-1	208	100-Year	1900.00	16.10	23.92	23.92	24.43	0.005338	7.22	410.39	405.94	0.56
Reach-1	207	100-Year	1900.00	15.60	22.22	22.22	22.85	0.005703	7.89	356.91	263.18	0.61
Reach-1	206	100-Year	1900.00	15.59	20.24	19.90	20.62	0.005656	6.44	410.67	404.17	0.59
Reach-1	205	100-Year	1900.00	15.60	19.43	19.43	19.94	0.008085	6.42	366.40	377.93	0.68
Reach-1	204	100-Year	1900.00	15.59	18.45	18.45	19.16	0.007039	5.33	309.26	224.35	0.61
Reach-1	203	100-Year	1900.00	15.59	18.18		18.41	0.002063	4.22	511.25	264.79	0.46
Reach-1	202	100-Year	1900.00	15.60	18.19		18.27	0.000542	2.17	891.40	365.10	0.24
Reach-1	201	100-Year	1900.00	15.60	18.12		18.20	0.000686	2.40	824.45	370.72	0.27
Reach-1	200	100-Year	1900.00	9.80	18.05	16.14	18.14	0.000560	2.88	786.93	297.01	0.19



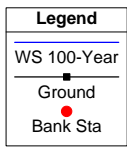
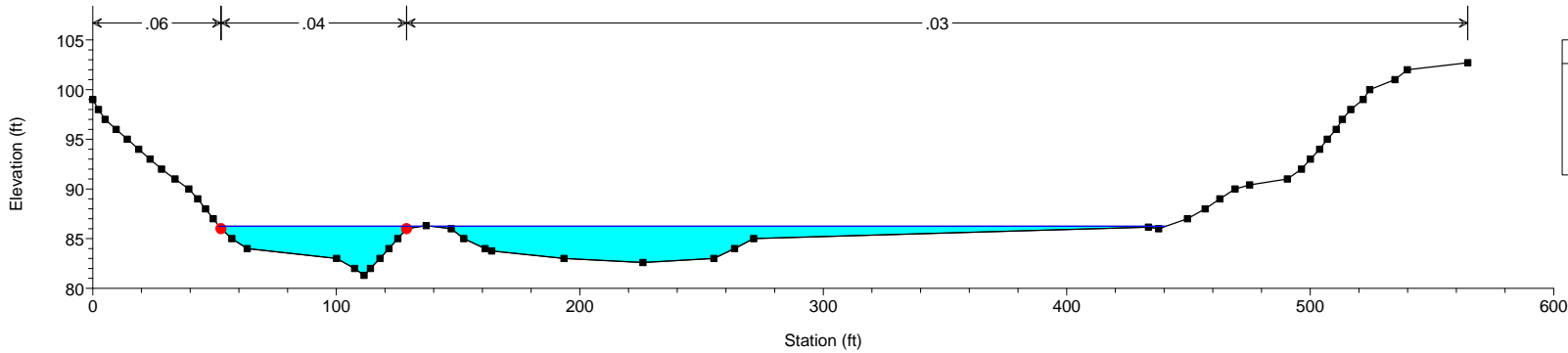




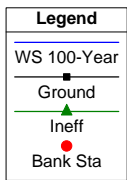
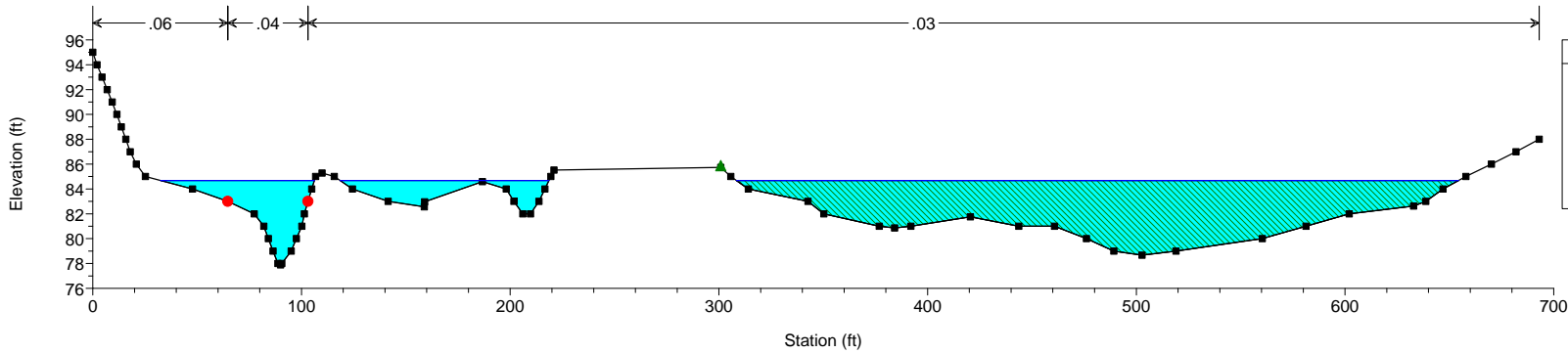
La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 239



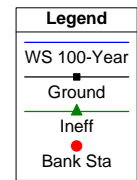
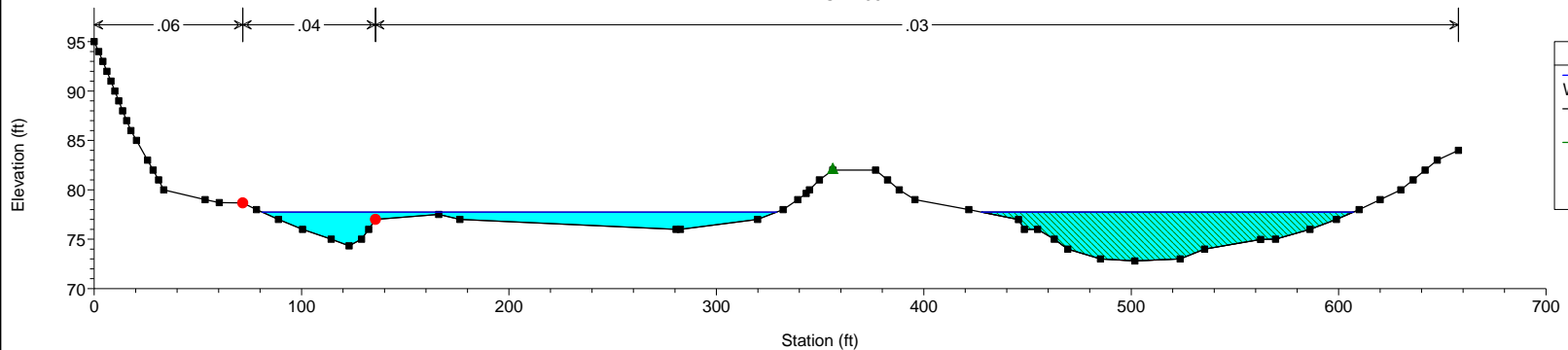
La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 238



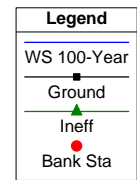
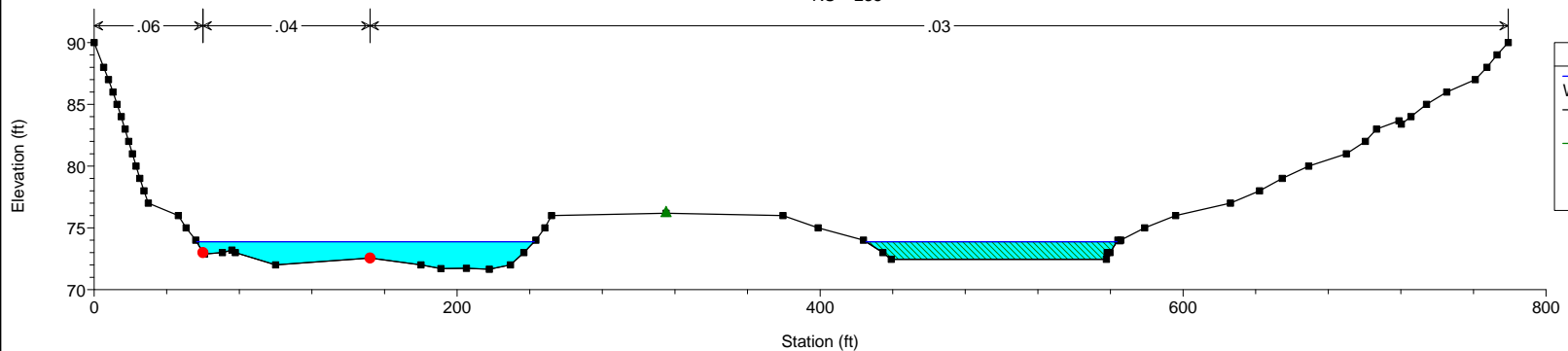
La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 237



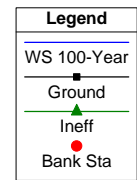
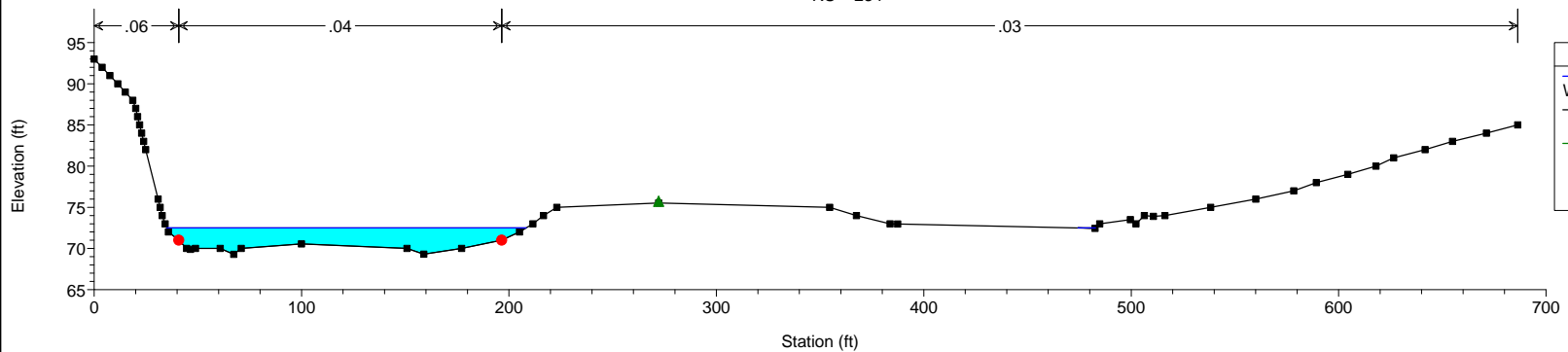
La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 236

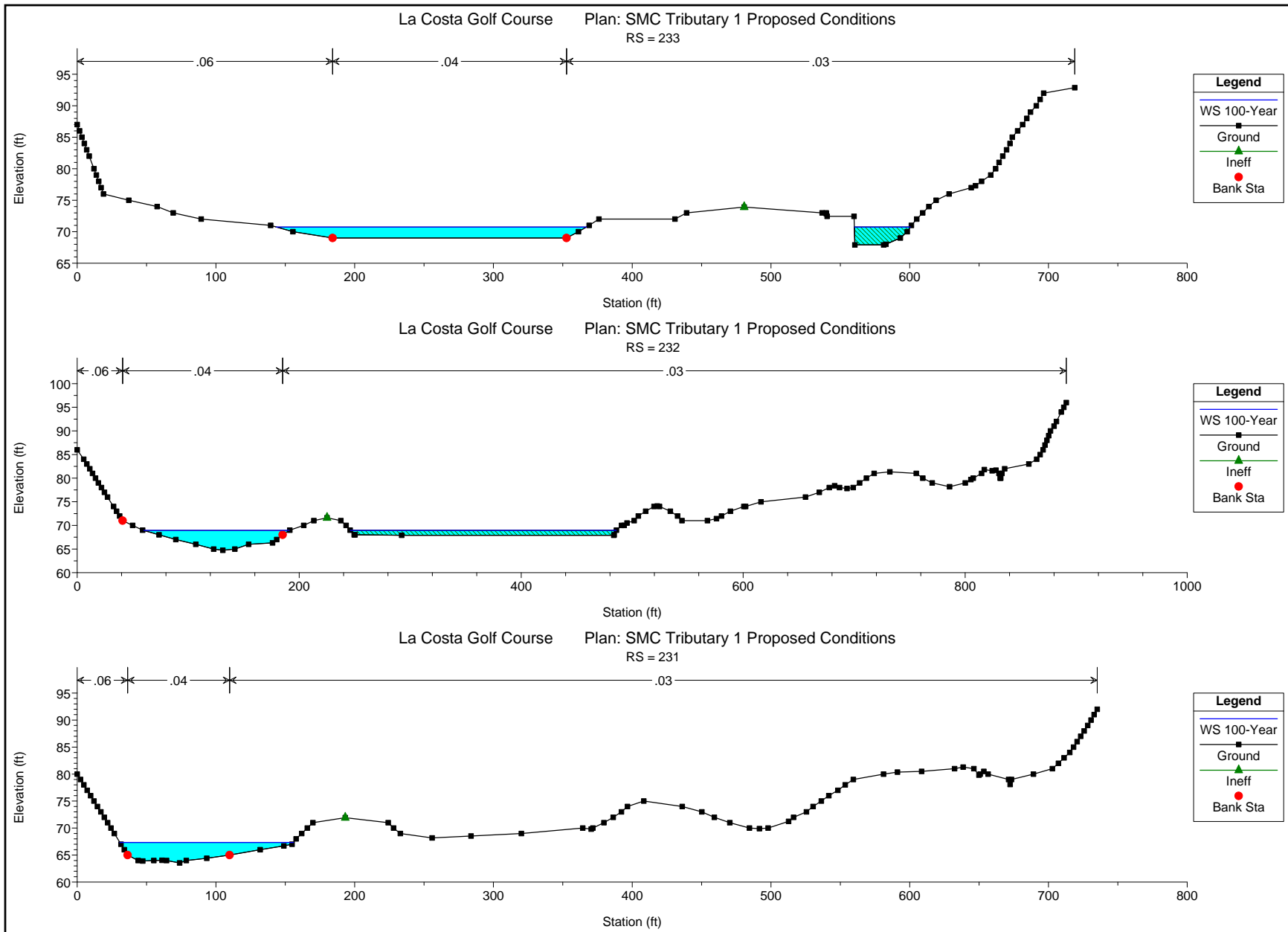


La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
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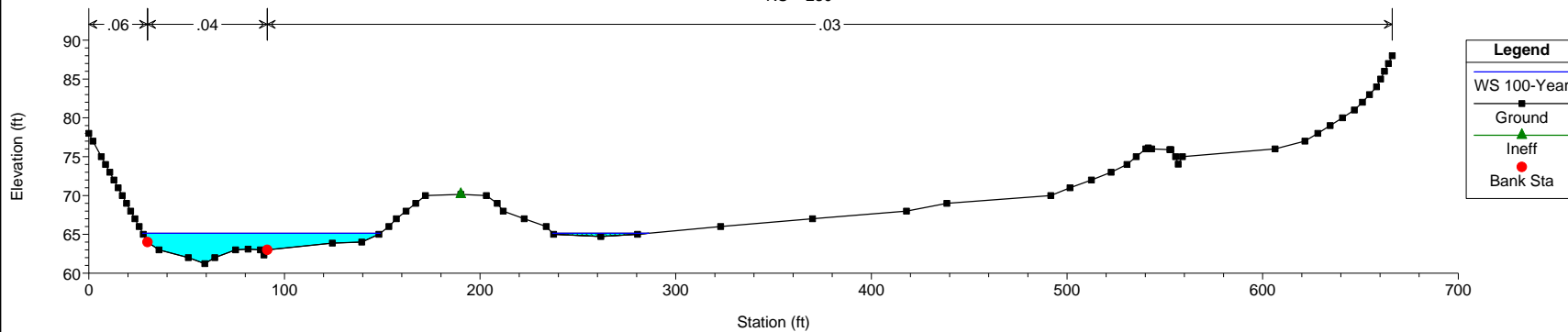


La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 234

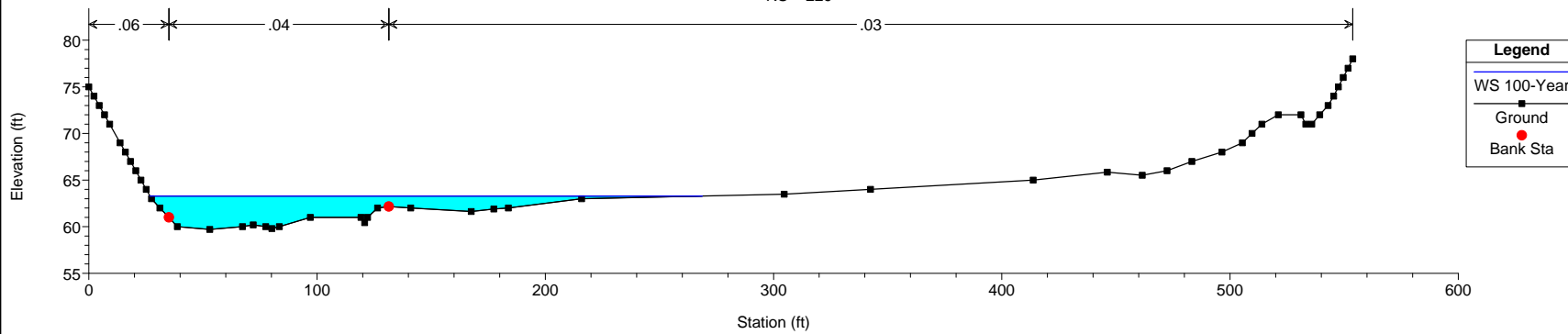




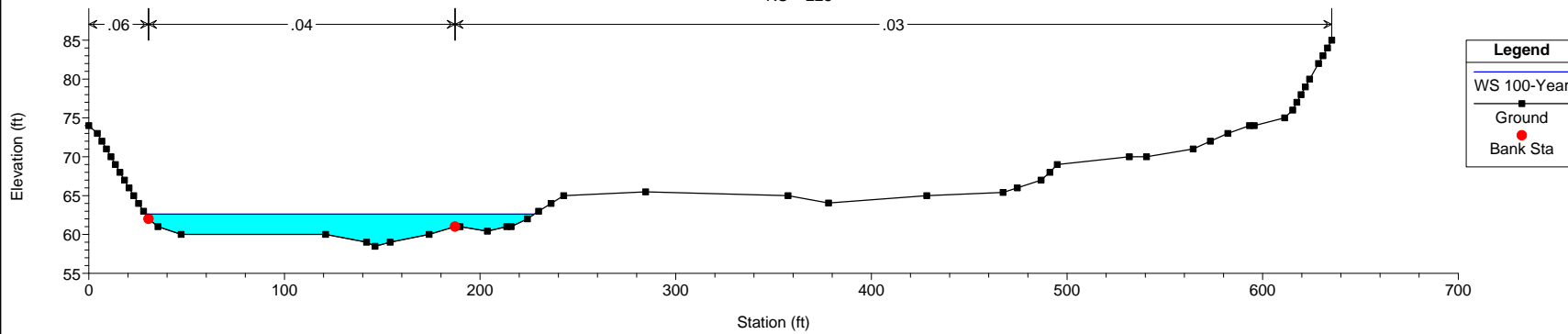
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RS = 230

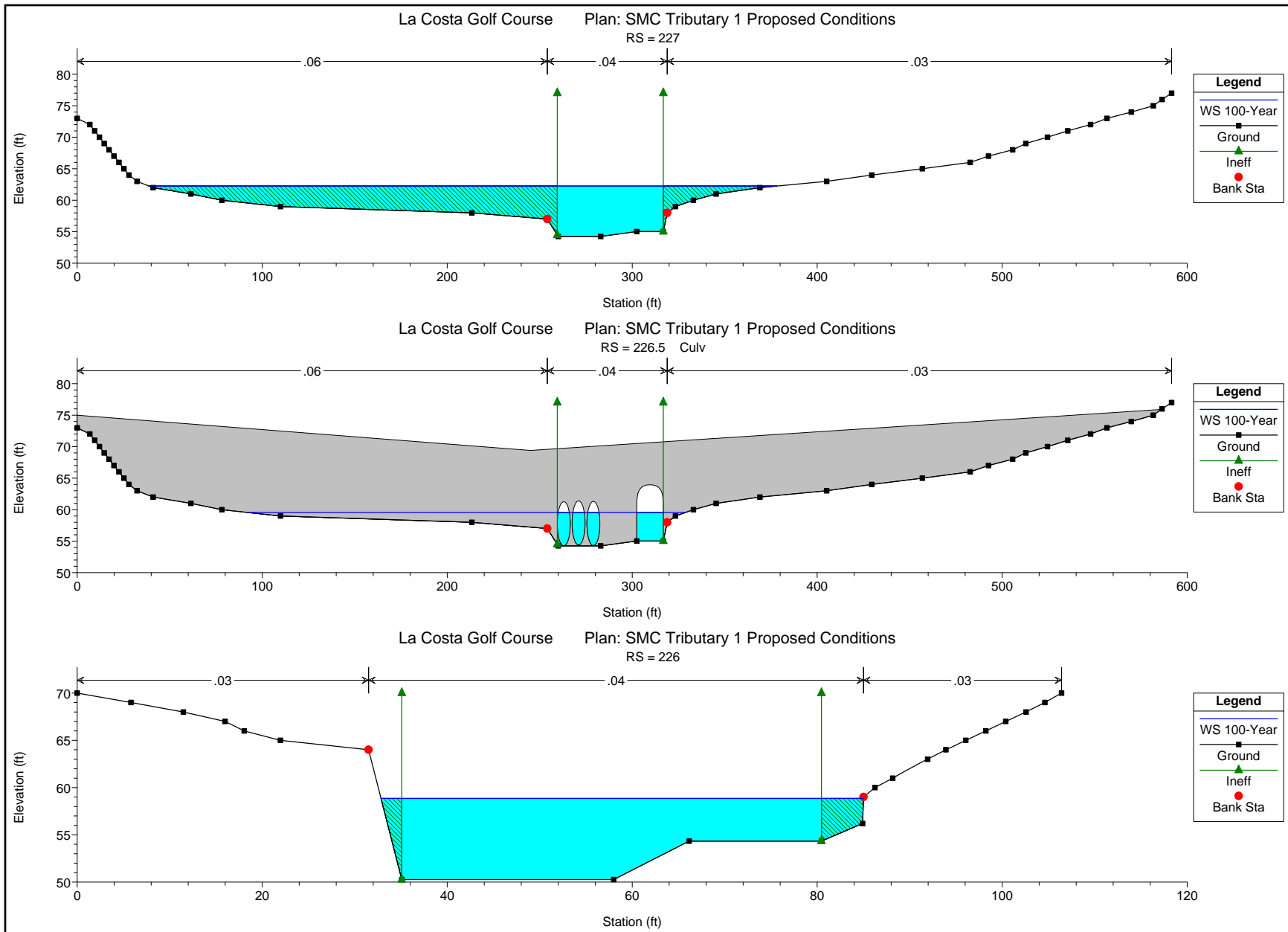


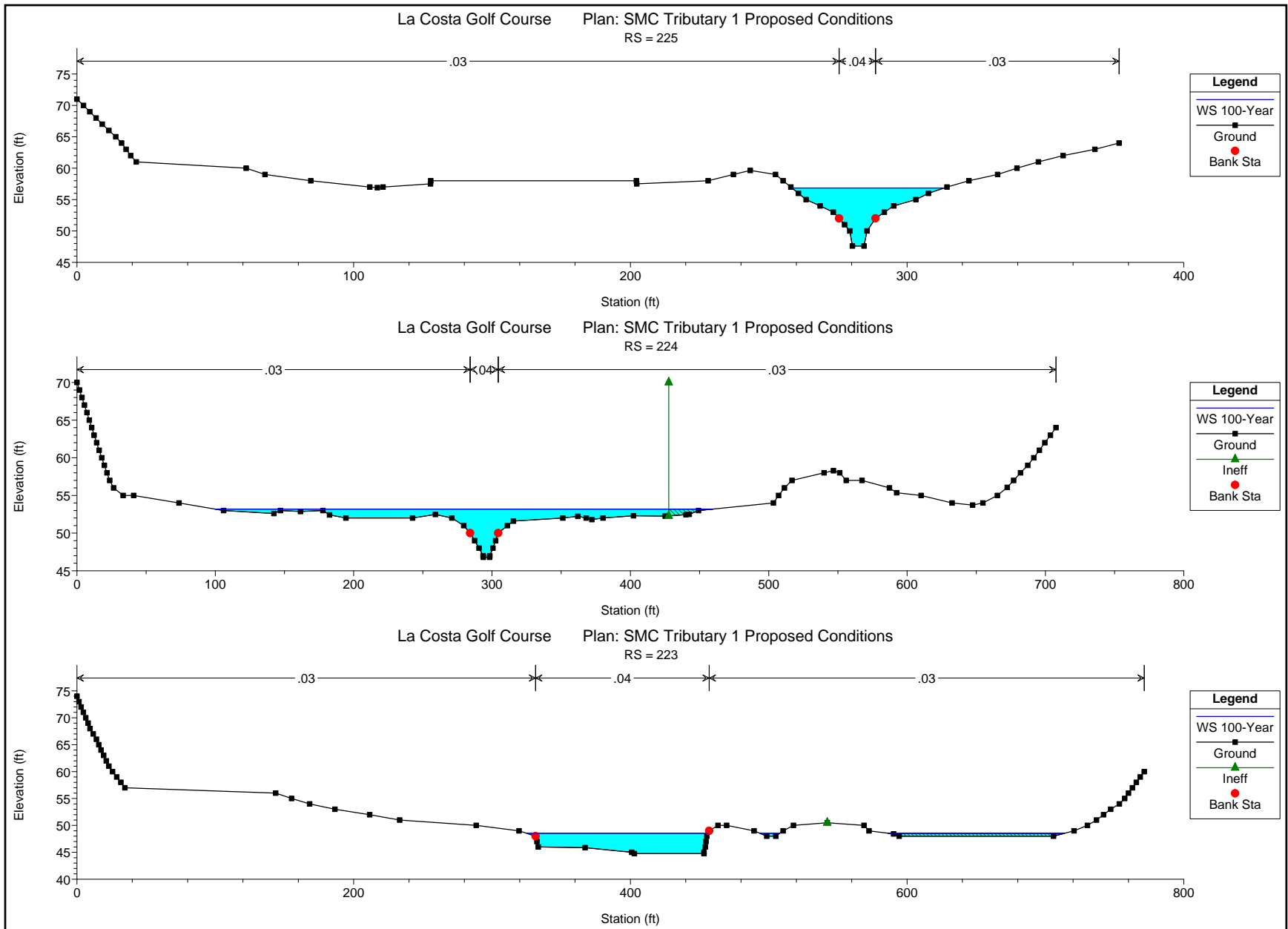
La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
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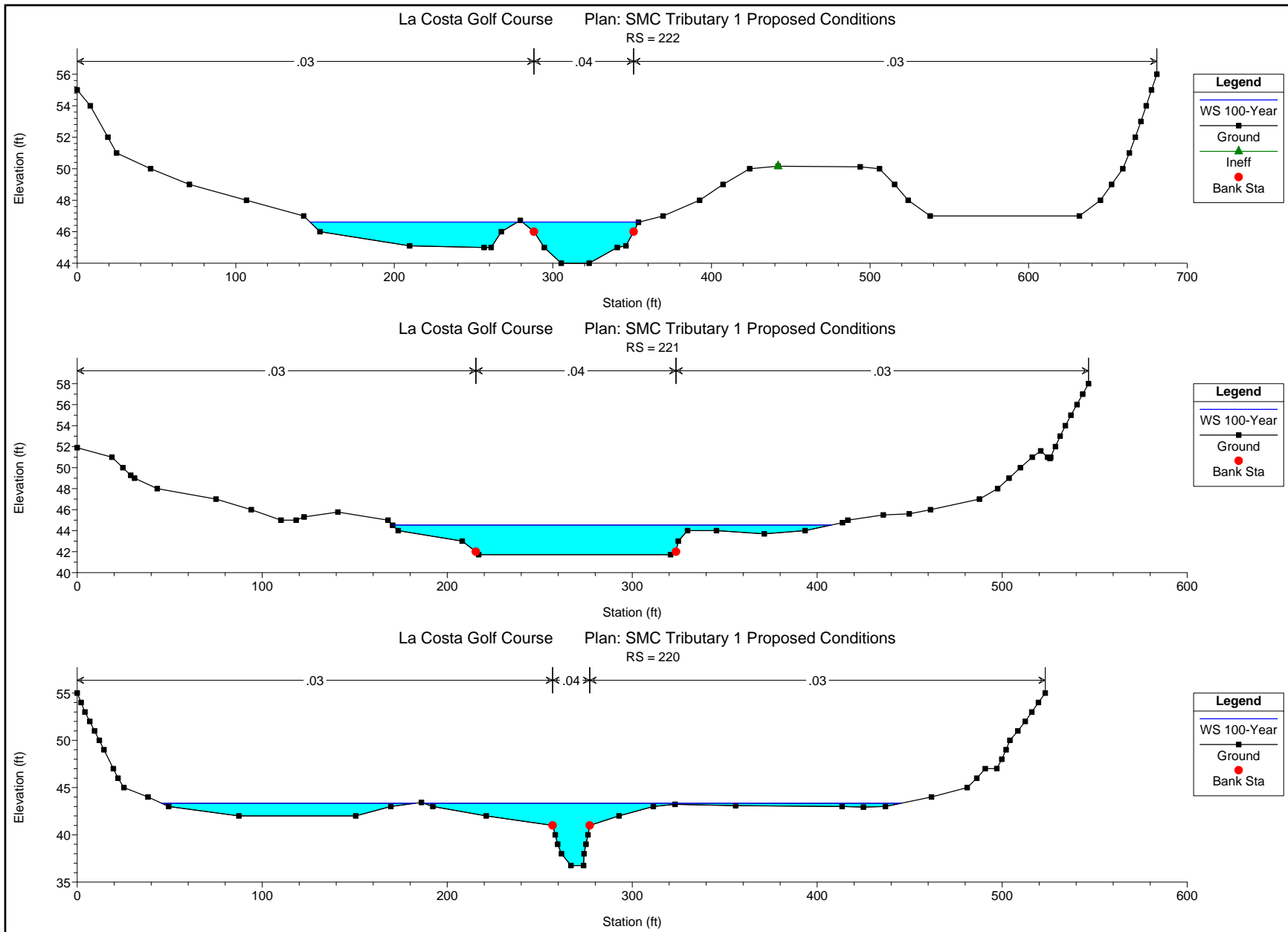


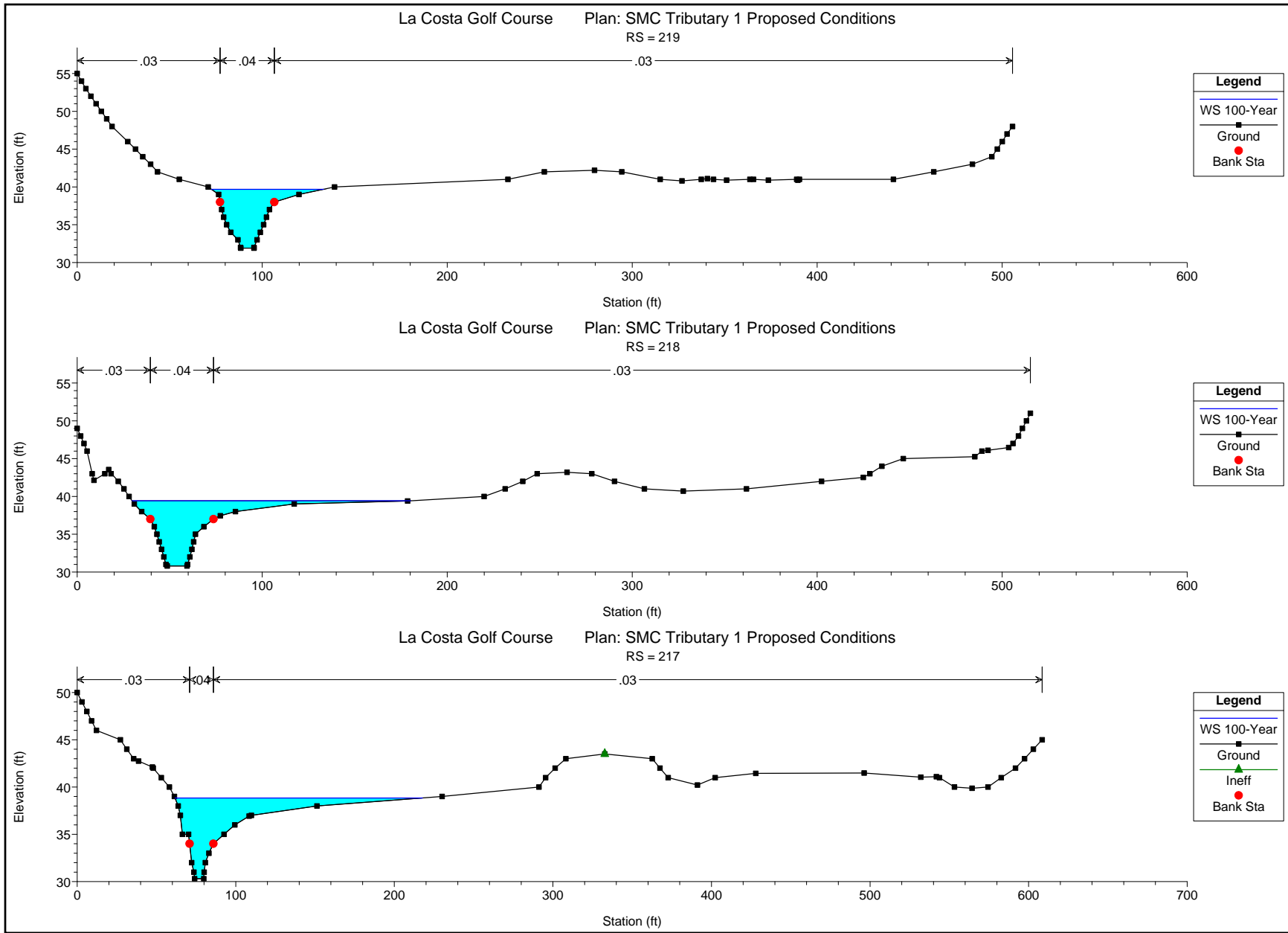
La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 228



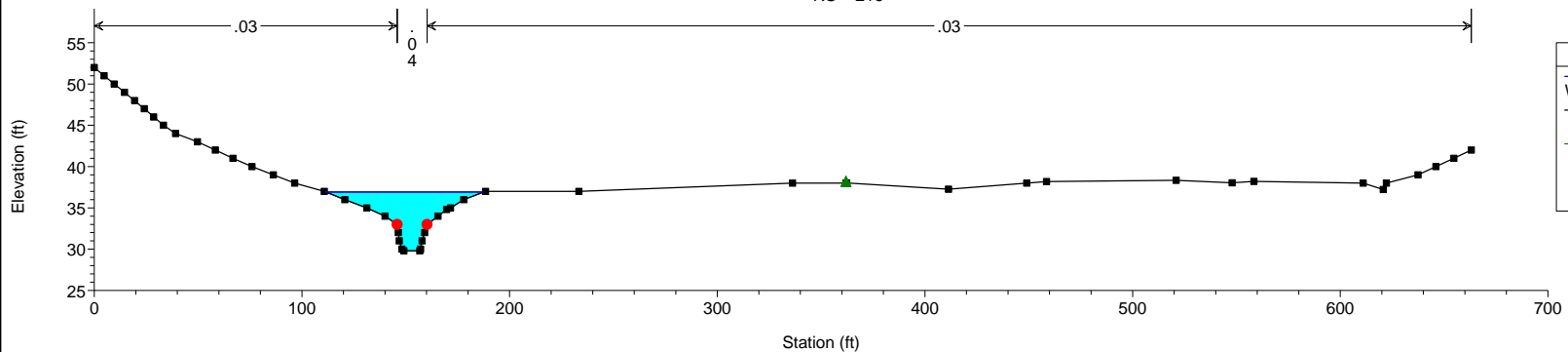




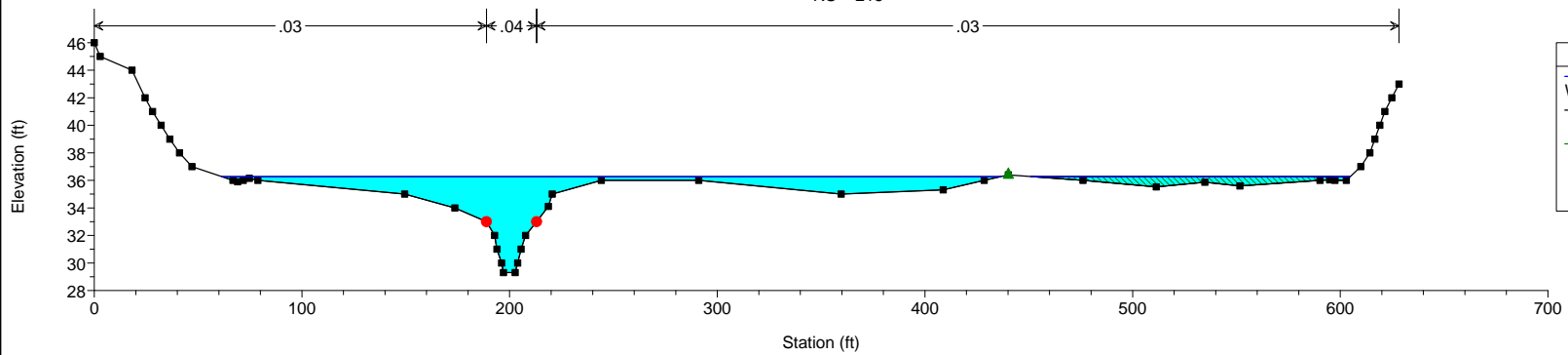




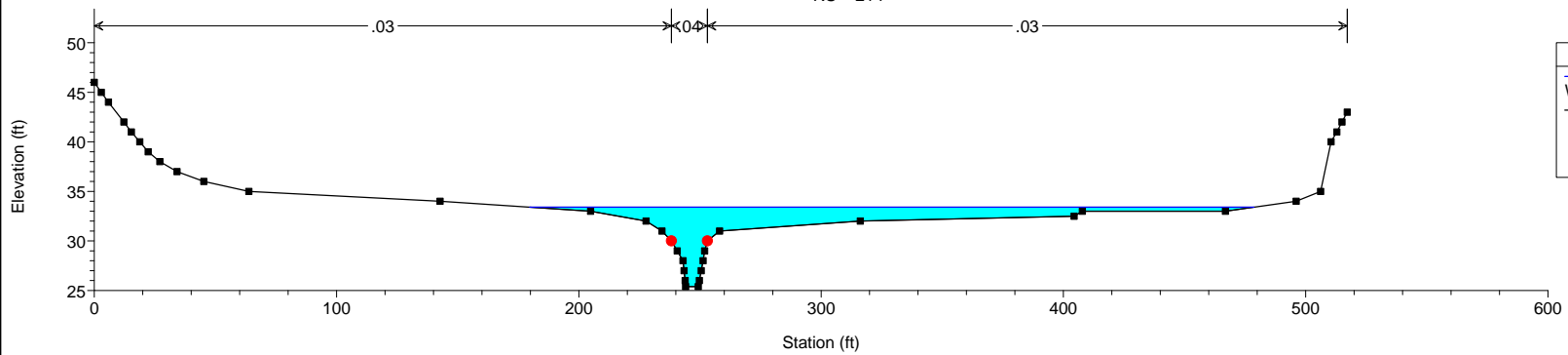
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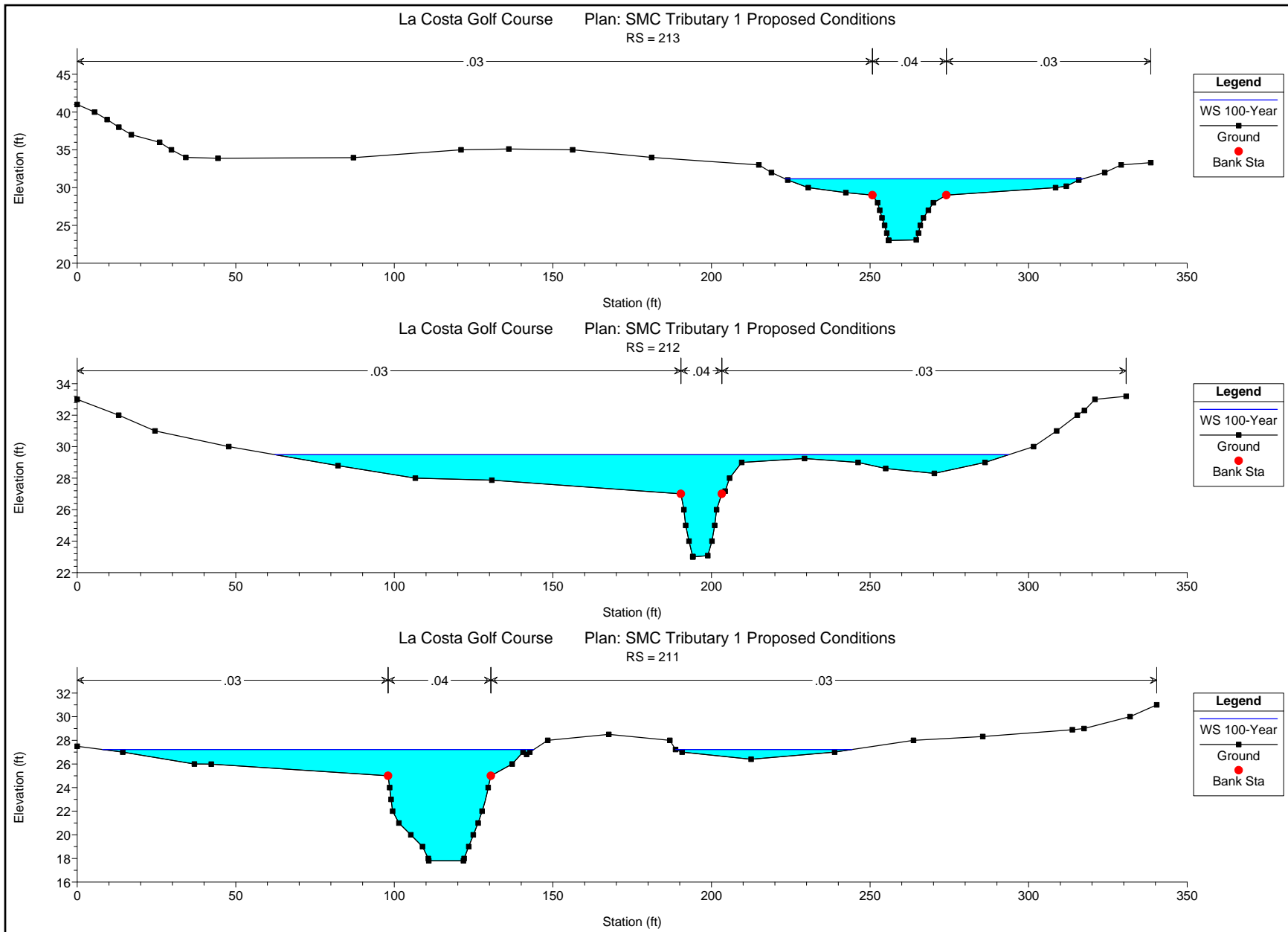


La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 215

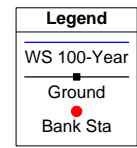
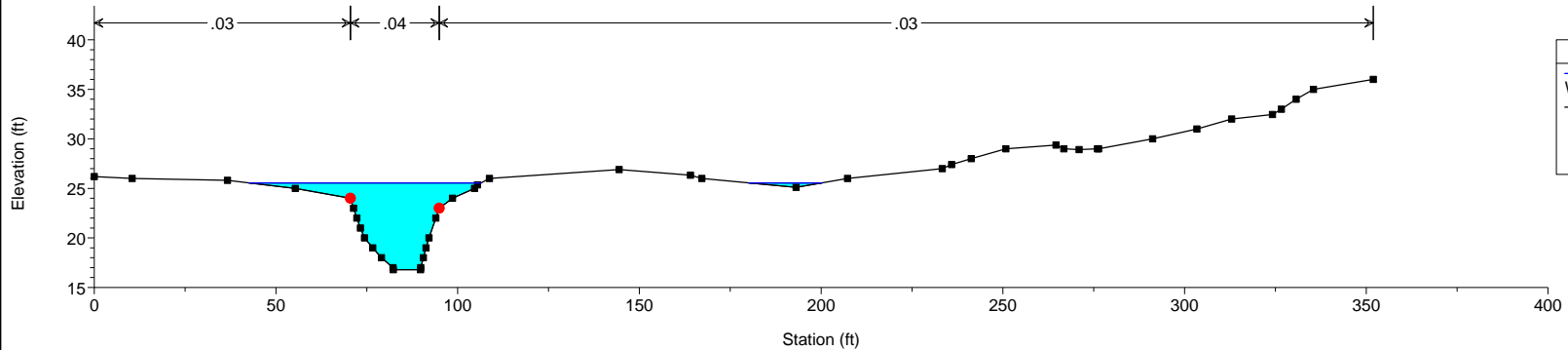


La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 214

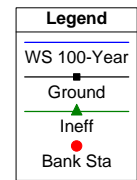
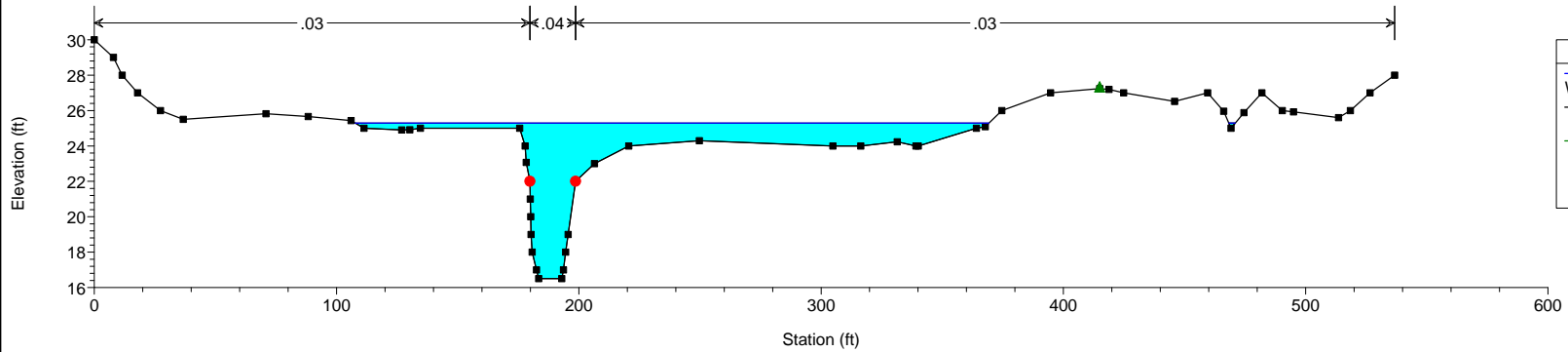




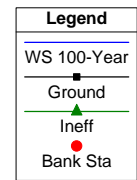
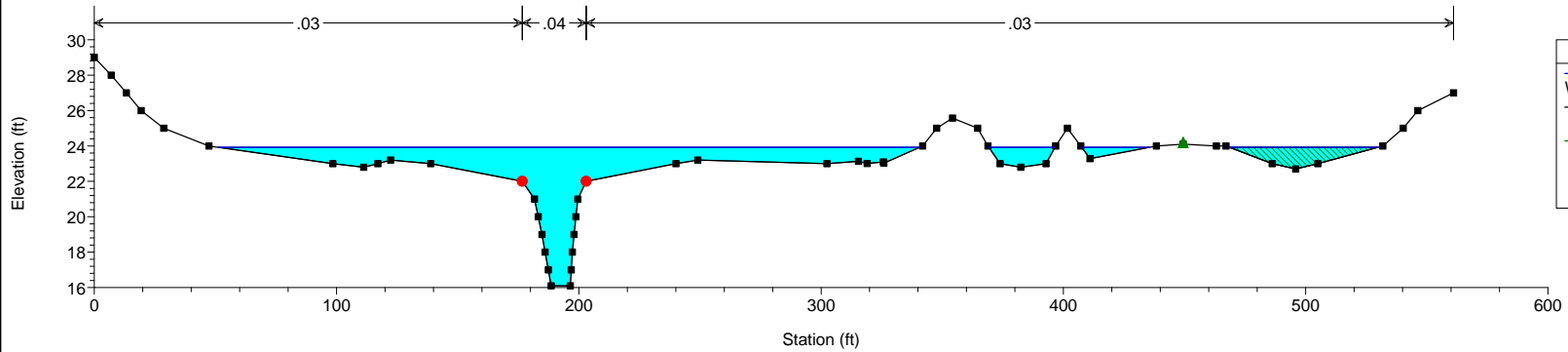
La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 210



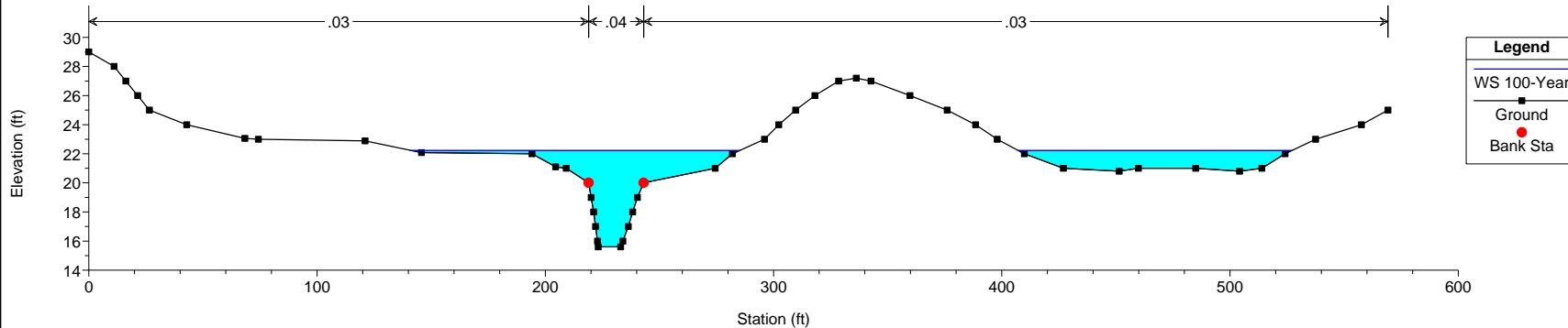
La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 209



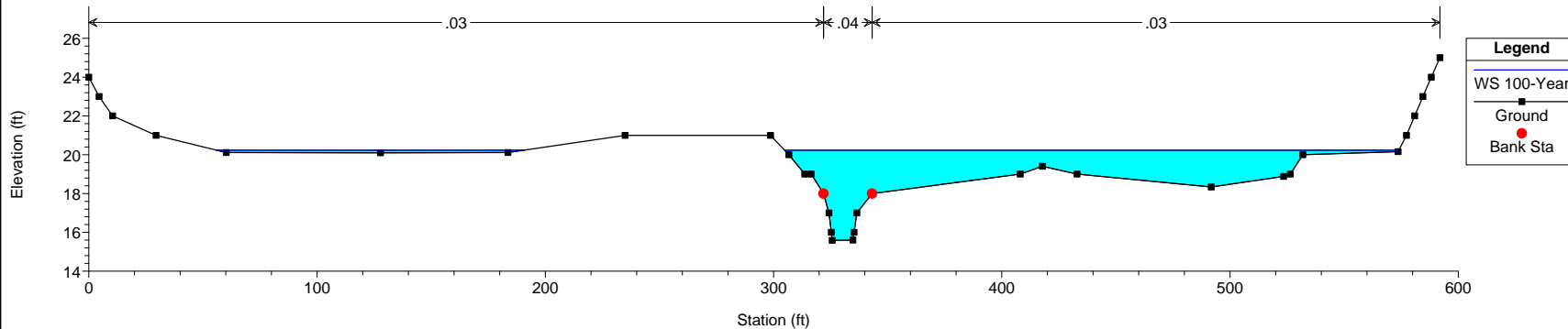
La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 208



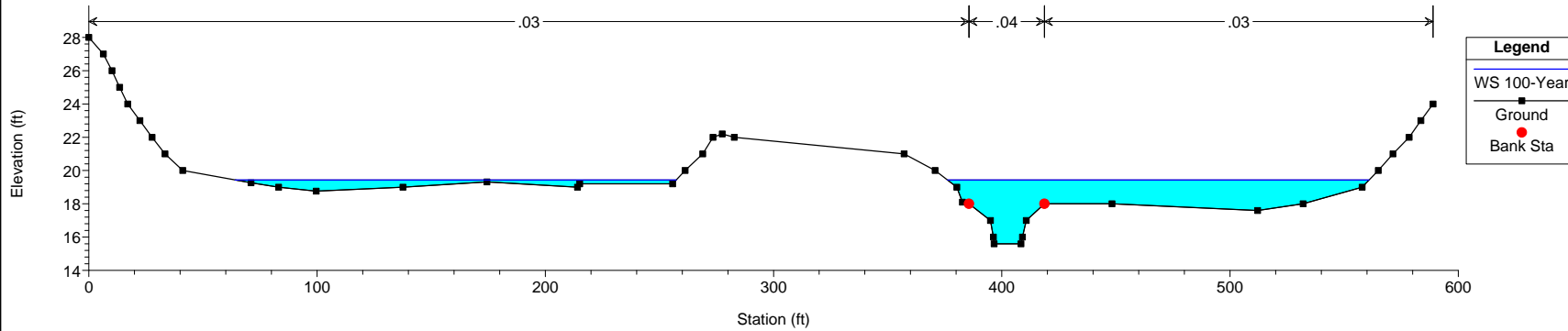
La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 207

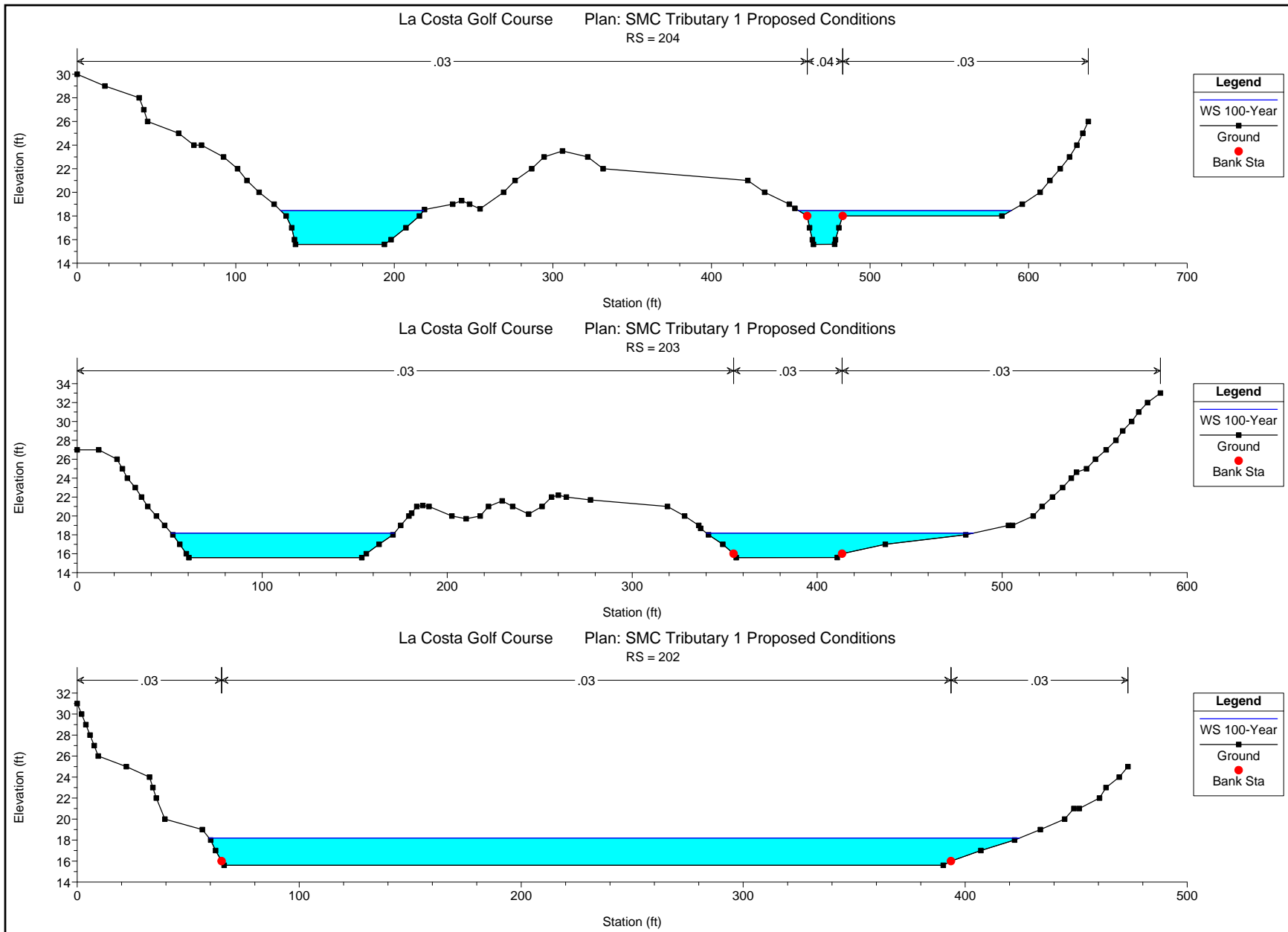


La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 206

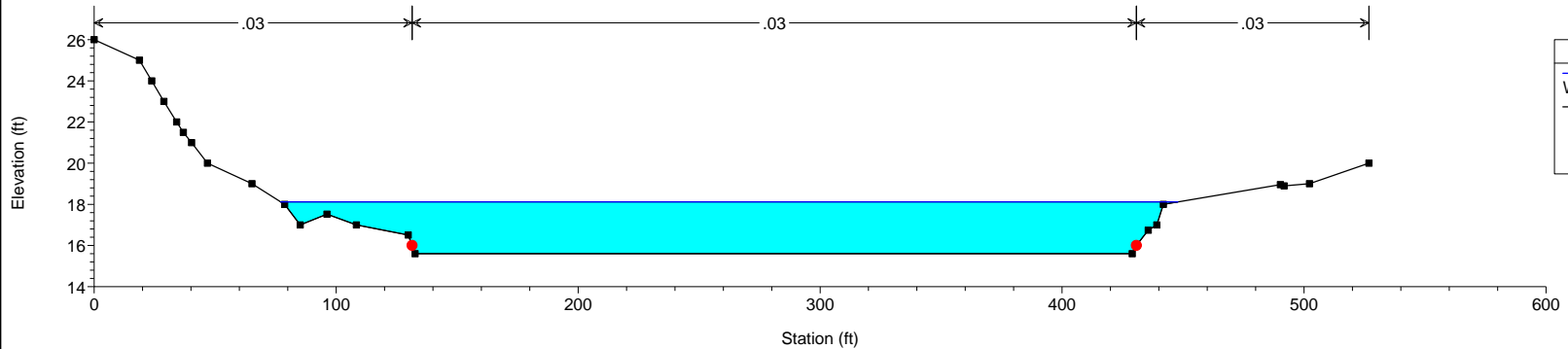


La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 205

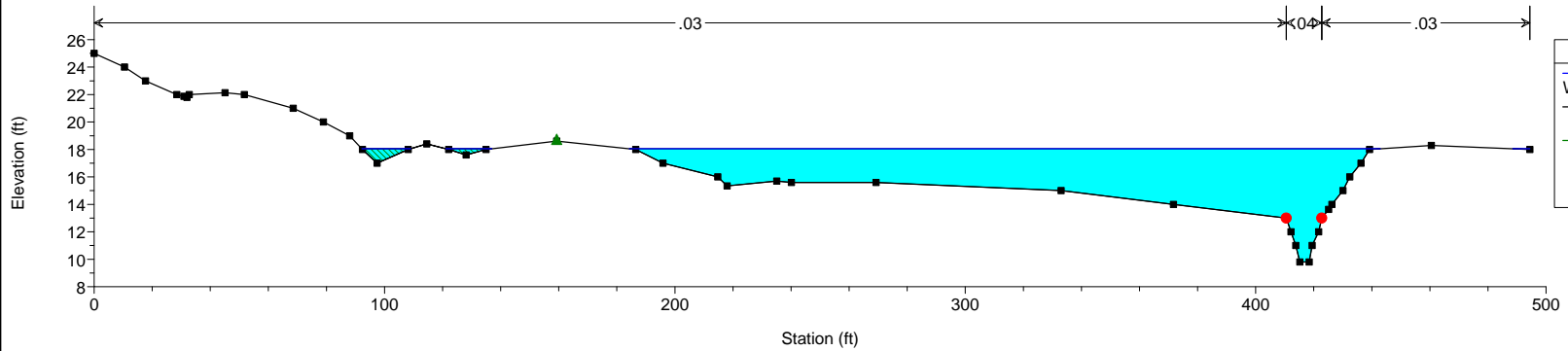


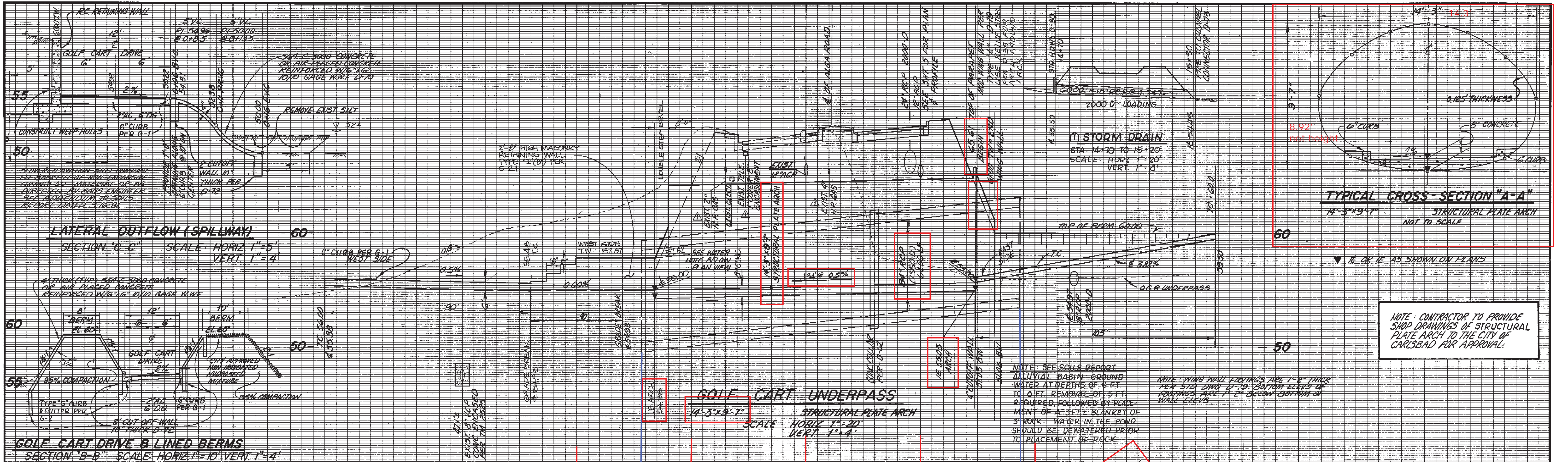


La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 201



La Costa Golf Course Plan: SMC Tributary 1 Proposed Conditions
RS = 200

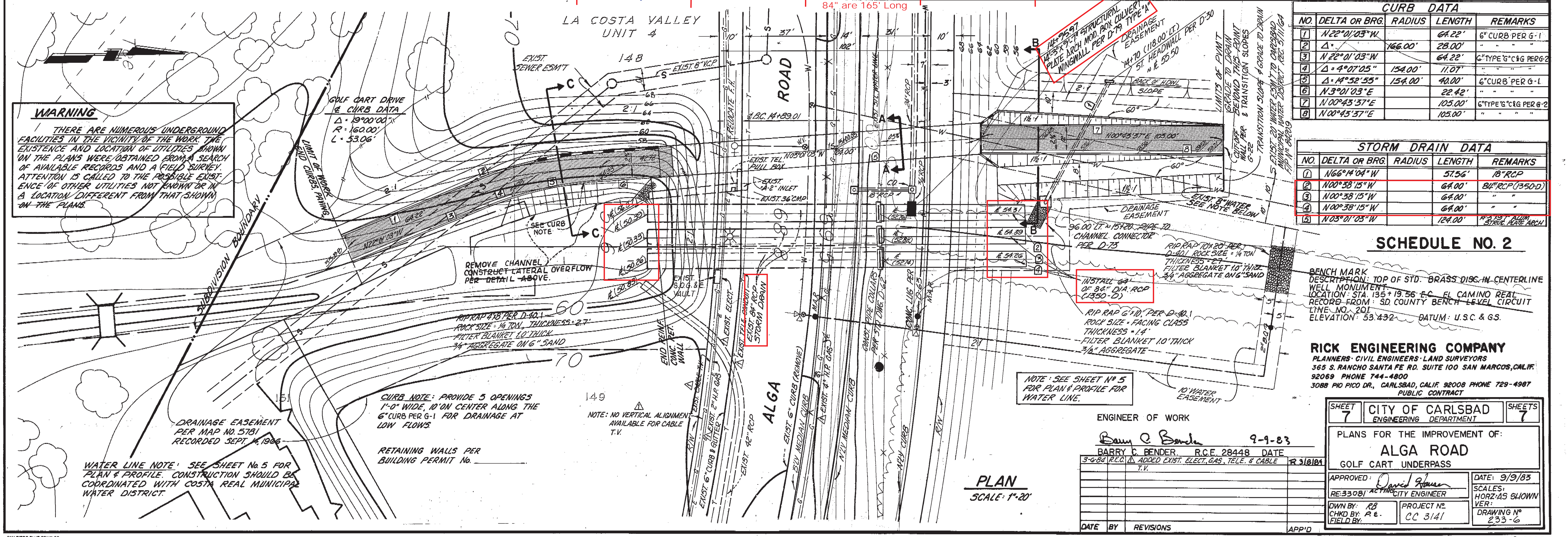




NOTE: CONTRACTOR TO PROVIDE SHOP DRAWINGS OF STRUCTURAL PLATE ARCH TO THE CITY OF CARLSBAD FOR APPROVAL.

NOTE: SEE SOILS REPORT ALLUVIAL BASIN GROUND WATER AT DEPTHS OF 6 FT TO 0 FT. REMOVAL OF 5 FT RIGURED FOLLOWED BY PLACEMENT OF A 3 FT BLANKET OF 3" ROCK WATER IN THE POND SHOULD BE DEWATERED PRIOR TO PLACEMENT OF ROCK.

NOTE: WING WALL FOOTINGS ARE 1'-2" THICK PER 572 DWD D-19. BOTTOM ELEV OF FOOTINGS ARE 1'-2" BELOW BOTTOM OF WALL ELEV.



WARNING

THERE ARE NUMEROUS UNDERGROUND FACILITIES IN THE VICINITY OF THE WORK THE EXISTENCE AND LOCATION OF UTILITIES SHOWN ON THE PLANS WERE OBTAINED FROM A SEARCH OF AVAILABLE RECORDS AND A FIELD SURVEY. ATTENTION IS CALLED TO THE POSSIBLE EXISTENCE OF OTHER UTILITIES NOT SHOWN OR IN A LOCATION DIFFERENT FROM THAT SHOWN ON THE PLANS.

CURB DATA				
NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
1	N 22° 01' 03" W		64.22'	6" CURB PER G-1
2	Δ	166.00'	28.00'	
3	N 22° 01' 03" W		64.22'	6" TYPE G-C&G PER G-2
4	Δ	4° 07' 05"	154.00'	11.07'
5	Δ	N 4° 52' 55"	154.00'	40.00'
6	N 3° 01' 03" E		22.42'	6" CURB PER G-1
7	N 00° 43' 37" E		105.00'	6" TYPE G-C&G PER G-2
8	N 00° 43' 37" E		105.00'	"

STORM DRAIN DATA				
NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
1	N 66° 14' 04" W		57.56'	18" RCP
2	N 00° 38' 15" W		64.00'	18" RCP (1350D)
3	N 00° 38' 15" W		64.00'	"
4	N 00° 38' 15" W		64.00'	"
5	N 03° 01' 03" W		124.00'	18" RCP (1350D) STRIKE PLATE ARCH

SCHEDULE NO. 2

BENCH MARK DESCRIPTION: TOP OF STD. BRASS DISC IN CENTERLINE WELL MONUMENT
 LOCATION: STA. 135+19.56 E.C. EL CAMINO REAL
 RECORD FROM: SD COUNTY BENCH LEVEL CIRCUIT LINE NO. 201
 ELEVATION: 53.432 DATUM: U.S.C. & G.S.

RICK ENGINEERING COMPANY
 PLANNERS CIVIL ENGINEERS LAND SURVEYORS
 365 S. RANCHO SANTA FE RD. SUITE 100 SAN MARCOS, CALIF. 92069 PHONE 744-4800
 3088 PICO PICO DR., CARLSBAD, CALIF. 92008 PHONE 729-4987
 PUBLIC CONTRACT

ENGINEER OF WORK
 Barry C. Bender 9-9-83
 BARRY C. BENDER R.C.E. 28448 DATE
 3-G-84 R.C.E. & ADDED EXIST. ELECT., GAS, TELE. & CABLE T.V. R 318184

SHEET 7	CITY OF CARLSBAD ENGINEERING DEPARTMENT	SHEETS 7
PLANS FOR THE IMPROVEMENT OF:		
ALGA ROAD		
GOLF CART UNDERPASS		
APPROVED: David Hansen RE: 33081 CITY ENGINEER	DATE: 9/9/83	SCALES: HORIZ: AS SHOWN VERT: 1"=4'
OWN BY: RB CHKD BY: R.E.	PROJECT NO: CC 3141	DRAWING NO: 233-6
DATE	BY	REVISIONS

PLAN
 SCALE: 1"=20'



- LEGEND:**
- SANGIS 2-FOOT CONTOUR TOPO (NAVD 88)
 - EXISTING CONDITION 100-YEAR FLOODPLAIN
 - PROPOSED CONDITION 100-YEAR FLOODPLAIN
 - HEC-RAS CROSS-SECTION
 - PROPOSED GRADING

HEC-RAS WORK MAP