Scour Analysis

of

Box Springs Canyon

at

Quail Run

Prepared for:

SDH & Associates, Inc.

March 31, 2015

Prepared by:

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CHAPTER 1 - BACKGROUND

1.1 Project Description

The proposed Project is the Quail Run Apartments, a multi-family residential development generally located at the northwest corner of Central Avenue and Quail Run Court. See Figure 1 below. The total project site encompasses approximately 31 acres, with the apartment complex being developed on approximately 16 acres of the southerly portions of APNs 253-240-020 and 253-240-028. The apartment complex will consist of 13 apartment buildings. The Project also includes 9.9 acres of common open space areas, of which approximately 7.1 acres are is set aside as scenic open space. The remaining approximately 2.8 acres of common open space will be located throughout the complex for resident enjoyment. See Figure 2.

The Project is designed to integrate not only with the surrounding urban development, but also with the existing on-site biological resources, which will be preserved and enhanced. Amenities include two raised viewing decks and space with interpretive signage explaining the wildlife viewshed, a walking nature trail, bench seating and picnic tables throughout the apartment complex, a large open space turf area, pool and spa, a recreation center with a separate BBQ area, a covered pavilion, par-course exercise stations, an indoor workout room, and a business center at the project's leasing building..

The northern portion of the project site will be used as a borrow area for this Project. The Project's grading plan has been designed to completely avoid sensitive riparian vegetarian as well as provide full mitigation for temporary impacts to willow-mulefat, woodland, mulefat scrub, riverine, and alluvial fan sage scrub habitat.

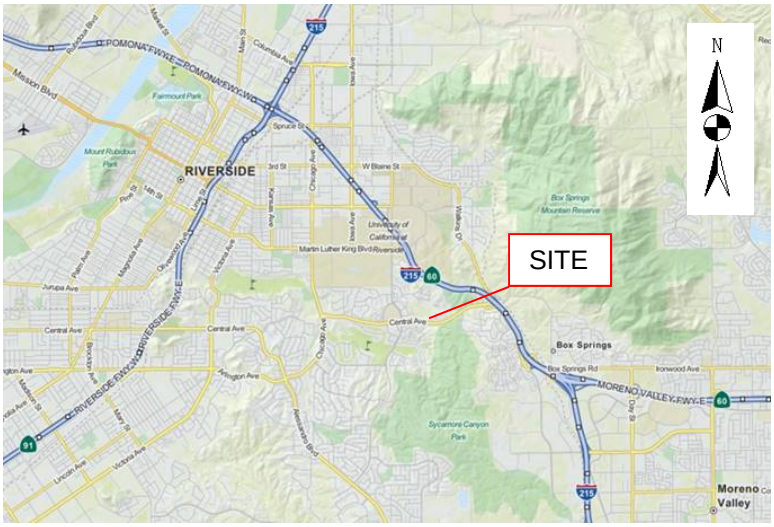


Figure 1. Vicinity Map

1.2 – Purpose of Study

Proposed grading associated with the Project would modify Box Springs Canyon topography, and thus flow patterns, within the flood detention area of the Box Springs Dam (see Figure 2). The purpose of this study is to determine the hydraulic impacts and potential scour due to the proposed grading within the detention area of the dam.

Figure 2. Proposed Site Exhibit

CHAPTER 2 – HYDRAULIC & SCOUR ANALYSIS

2.1 – Hydraulic Analysis

In the "Hydrologic and Hydraulic Analysis of Box Springs Dam" prepared by Tory R. Walker Engineering (TRWE) on March 30, 2015, a hydrology study of the 4 square mile tributary watershed analyzed 10-year 6-hour and 10-year 24-hour storms to determine peak flowrates into the Box Springs Dam. These are summarized in Table 1 below.

TABLE 1 – Peak Flows per Storm Event

Storm Event	Peak Flow (cfs)
10-year 6-hour	1554
10-year 24-hour	806

In the current study, we used these flowrates to hydraulically model flows in both the existing and proposed (with grading) conditions. We assumed worst-case scenarios associated with each storm event: for the 10-year 6-hour storm, we assumed the Box Springs Dam detention basin was empty; for the 10-year 24-hour storm, we assumed the detention basin was at the flood stage associated with that storm event.

We prepared HEC-RAS models for each condition based on current (2008) topography and the proposed grading plan for the Project. HEC-RAS cross sections were cut through the area of potential impact (see Figures 3 and 4), and appropriate hydraulic characteristics were assigned to each cross section.

Consistent with assumptions noted above, normal depth was assumed for the most downstream cross section in the 10-year 6-hour storms, and flood stage was assumed for the 10-year 24-hour storms.

This current study only analyzes the 10-year storms, as those are generally understood to be channel-forming events. Also, the 100-year storm events, modeled in the March 30, 2015 report, will result in the basin area being inundated prior to the arrival of peak flows, so potential scour will be better represented by the 10-year storms.

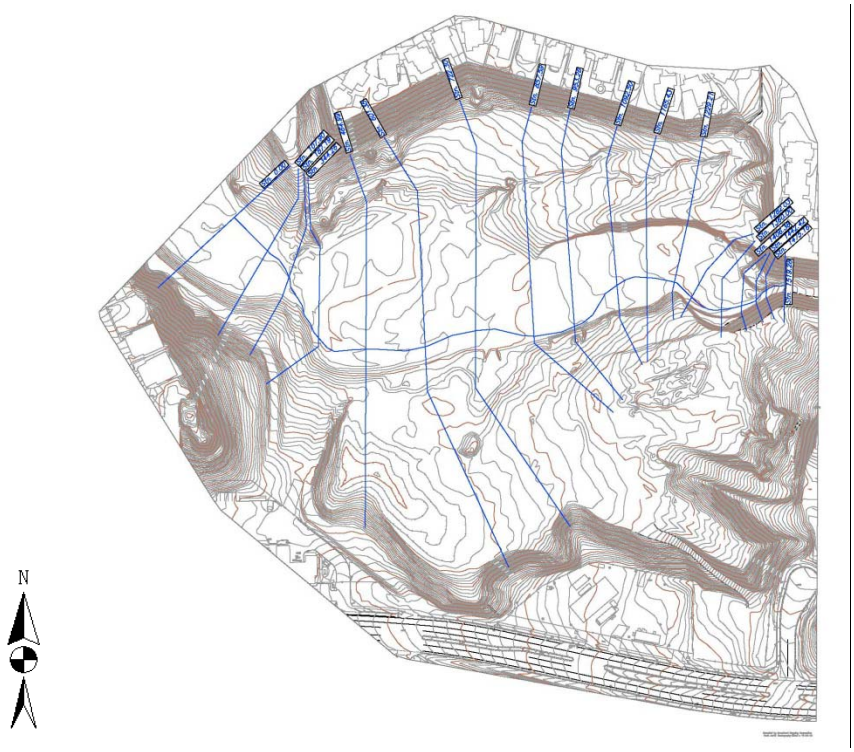


Figure 3. Pre-Project HEC-RAS Cross Sections

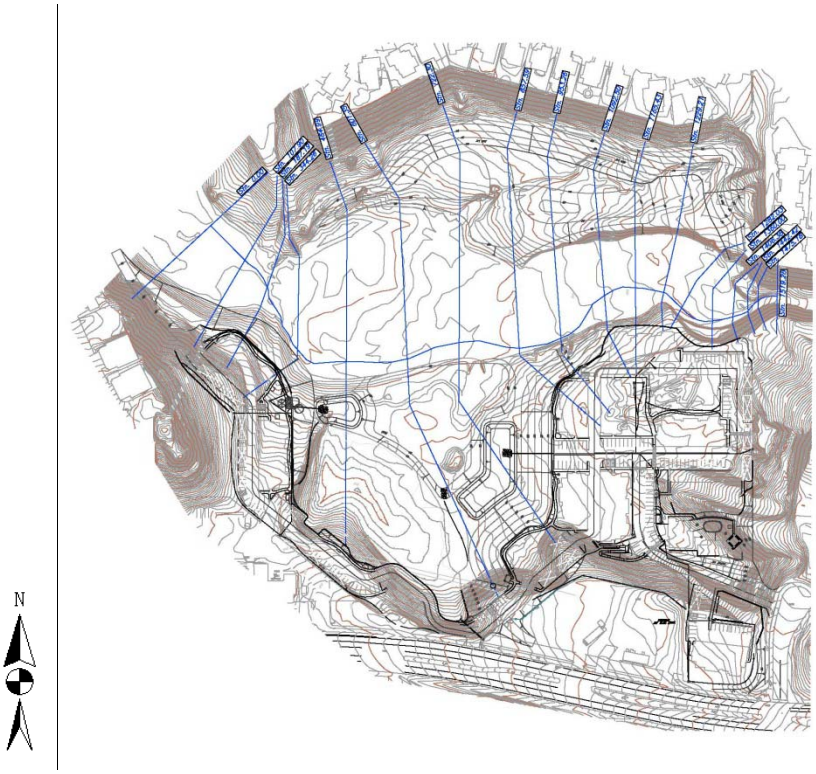


Figure 4. Post-Project HEC-RAS Cross Sections

2.2 – Results of Hydraulic Analysis

Results of the HEC-RAS hydraulic models are summarized in Tables 2 and 3 below. Detailed HEC-RAS results are contained in Appendix 2 and inundation maps are included in Appendix 1.

TABLE 2 – 10-year 6-hour HEC-RAS Results

River Stations	Water Surface Elevation (ft)		Average Channel Velocity (ft/s)	
	Existing	Proposed	Existing	Proposed
1519.28	1125.54	1125.54	15.67	15.67
1475.16	1121.65	1121.65	18.78	18.78
1442.42	1120.23	1120.23	18.10	18.10
1406.38	1118.97	1118.97	13.06	13.06
1360	1118.86	1118.90	5.83	5.72
1282.03	1117.66	1117.59	6.41	6.66
1229.21	1116.69	1116.39	6.23	6.46
1165.43	1115.63	1107.13	5.61	18.90
1092.5	1114.68	1108.83	5.09	4.35
953.26	1112.93	1107.55	5.02	6.13
857.59	1111.94	1107.29	4.51	3.30
722.3	1110.36	1107.18	3.38	2.07
601.35	1108.17	1107.09	2.81	1.34
464.99	1106.91	1106.83	1.78	1.45
344.26	1106.06	1106.13	3.06	2.96
187.19	1104.31	1104.35	6.56	6.40
107.9	1103.59	1103.52	6.26	6.63
0	1102.84	1102.68	4.90	5.43

TABLE 3 – 10-year 24-hour HEC-RAS Results

River Stations	Water Surface Elevation(ft)		Average Channel Velocity (ft/s)	
	Existing	Proposed	Existing	Proposed
1519.28	1124.29	1124.29	12.43	12.43
1475.16	1125.38	1125.38	3.93	3.93
1442.42	1125.47	1125.47	2.39	2.39
1406.38	1125.49	1125.49	1.02	1.02
1360	1125.50	1125.50	0.53	0.53
1282.03	1125.50	1125.50	0.51	0.46
1229.21	1125.50	1125.50	0.46	0.25
1165.43	1125.50	1125.50	0.37	0.14
1092.5	1125.50	1125.50	0.32	0.12
953.26	1125.50	1125.50	0.22	0.09
857.59	1125.50	1125.50	0.17	0.07
722.3	1125.50	1125.50	0.07	0.03
601.35	1125.50	1125.50	0.05	0.05
464.99	1125.50	1125.50	0.05	0.05
344.26	1125.50	1125.50	0.10	0.11
187.19	1125.50	1125.50	0.17	0.18
107.9	1125.50	1125.50	0.15	0.16
0	1125.50	1125.50	0.13	0.13

2.3 – Analysis of Results for Scour Potential

It is evident from the results in Tables 2 and 3 that the hydraulic impacts and potential scour due to the proposed grading are insignificant for all but Section 1165.43. One of the potential concerns with the proposed grading is the increased scour potential, especially along the north edge of the project area; the (one-dimensional) HEC-RAS model was prepared to hydraulically model the approximate behavior of the flow, including average velocities, which give an indication of scour potential.

A closer examination of the proposed grading at Sections 1165.43 and 1229.21 (immediately upstream) illustrates the limitation of a one-dimensional model, in that it cannot accurately represent the very localized unstable flow condition that will exist between these sections at the interface of the proposed grading and the existing topography, where the grade will drop several feet. Fortunately, a closer look at downstream sections, beginning with Section 1092.5 immediately downstream, gives a clearer picture of the actual flow characteristics at Section 1165.43. The average velocities of these sections are moderately erosive to non-erosive, indicating no need for scour protection along the north edge of the project area.

Another limitation of the one-dimensional hydraulic model is the inability to accurately represent the continuity of the flow in the existing channel. The model indicates all flow would take a sharp right turn, which of course it would not. Due to momentum, much of the flow will continue in the same direction, spreading out and spilling into the lower graded area over several sections.

Finally, as noted in the "Hydrologic and Hydraulic Analysis of Box Springs Dam" report, the gated outlet of the dam is at elevation 1106 feet, the same as the lowest elevation in Cross Section 1165.43. As there will very likely be several feet of ponded water in the detention basin when the 10-year 6-hour peak flow arrives (the report indicates an elevation of 1120 feet, or a depth of 14 feet), that ponded water will serve to dissipate the energy of potentially erosive flows.

CHAPTER 3 – CONCLUSION

As previously noted, the intent of this study was to model worst-case scenarios; in taking this approach, the modeling anomaly at HEC-RAS Cross Section 1165.43 therefore requires some reasonable explanation. A more complex two-dimensional model could more accurately represent these flow characteristics, but such a model is not warranted for this type of analysis. Indeed, in light of the mitigating factors discussed above, a more complex model is not necessary. The above analysis of results, which considers results from the upstream and downstream cross sections, the understanding of flow characteristics, and the operations of the dam is adequate evidence to conclude that the proposed grading will not pose a significant threat to scour within the detention basin area, including the north edge of the project area.

References

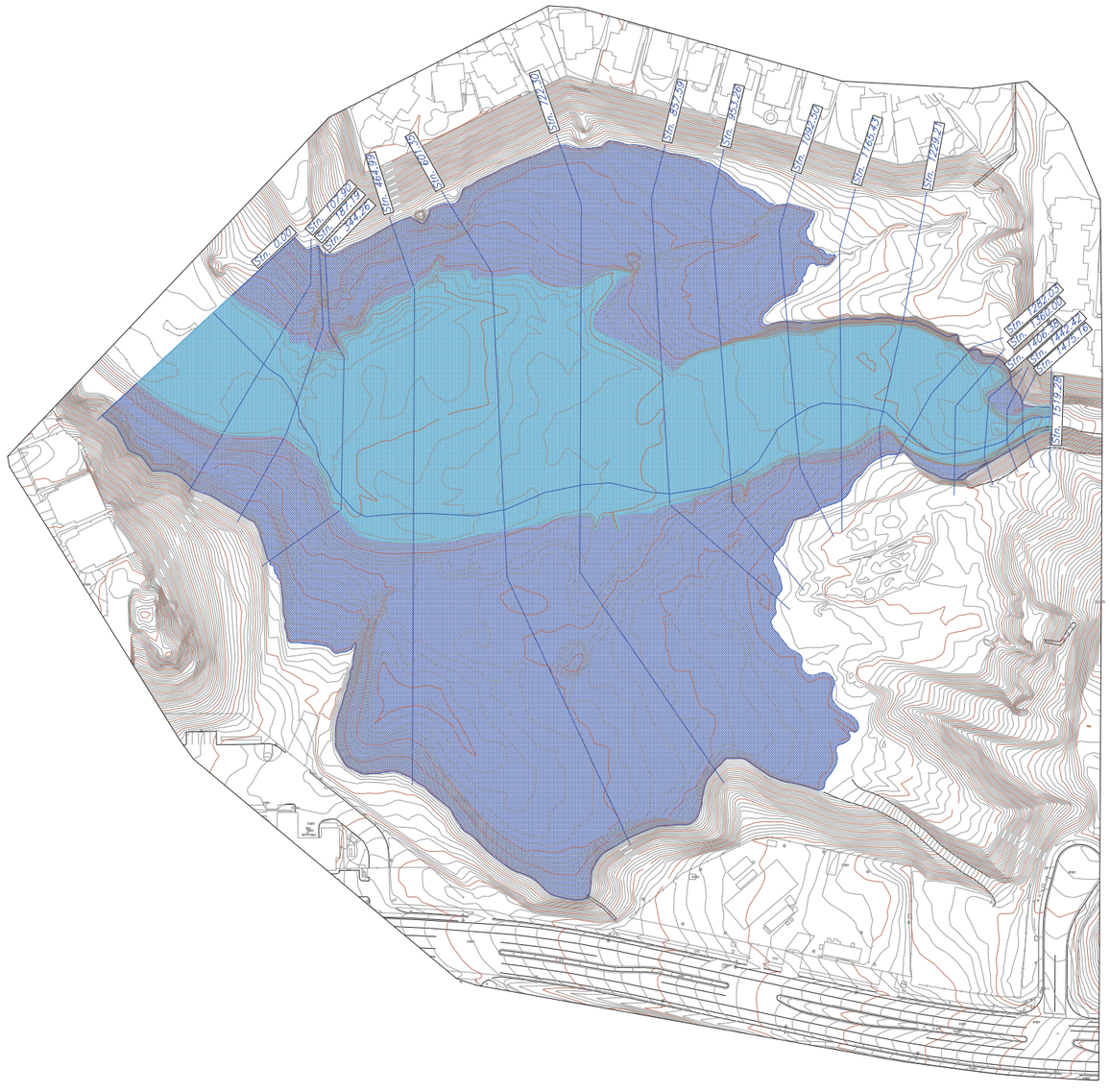
"Hydrologic and Hydraulic Analysis of Box Springs Dam" prepared by Tory R. Walker Engineering (TRWE) on March 30, 2015

APPENDIX 1

HEC-RAS Workmaps

PRE-PROJECT HEC-RAS WORKMAP

TOPOGRAPHIC SOURCE:
1. Arrowhead Mapping Corporation – NOV 2014 – NAVD88



LEGEND

HEC-RAS X-SECTION	
10-YR, 6-HR INUNDATION	
10-YR, 24-HR INUNDATION	

N

MAP SCALE 1" = 100'

0 100 500

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APPROVED CHANGES

No.	Description	Approved By	Date

BENCH MARK
Description:
Location:
Record From:
Elev: Datum:

SHEET 1	CITY OF RIVERSIDE	1 SHEETS

EXISTING CONDITIONS HEC-RAS WORKMAP FOR:
QUAIL RUN

Approved

ENGINEER OF WORK
ENGINEER RCE

Checked by
Approval date

POST–PROJECT HEC–RAS WORKMAP

TOPOGRAPHIC SOURCE:
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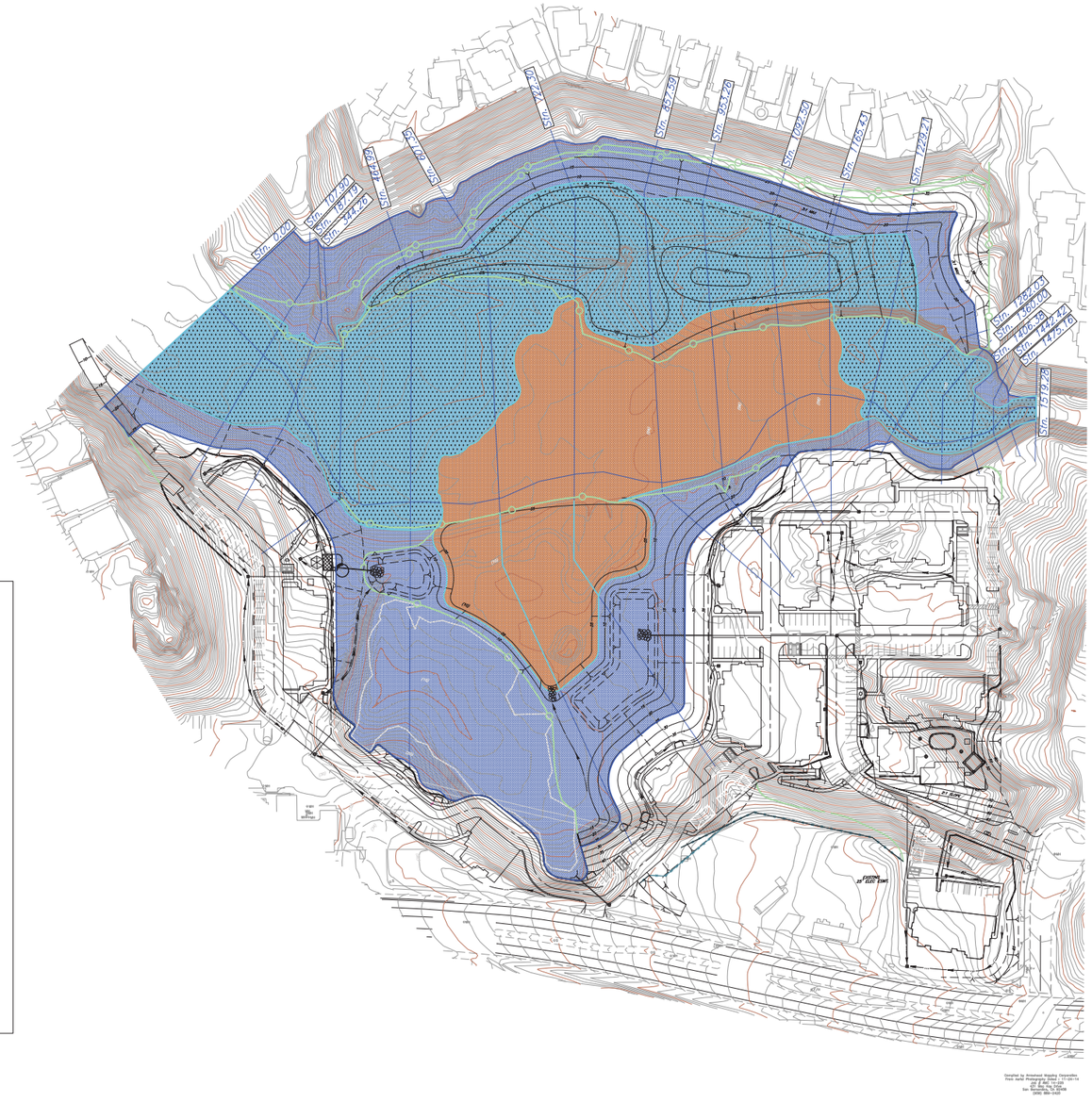

MAP SCALE 1" = 100'

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LEGEND

HEC–RAS X–SECTION	———
10–YR, 6–HR INUNDATION	
10–YR, 24–HR INUNDANTION	
10–YR, 6–HR MODERATE FLOODING	

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No.	Description	Approved By	Date

BENCH MARK
Description: _____
Location: _____
Record From: _____
Elev: _____ Datum: _____

SHEET 1	CITY OF RIVERSIDE	1 SHEETS

PROPOSED CONDITIONS HEC–RAS WORKMAP FOR: QUAIL RUN

Approved

ENGINEER OF WORK
ENGINEER RCE

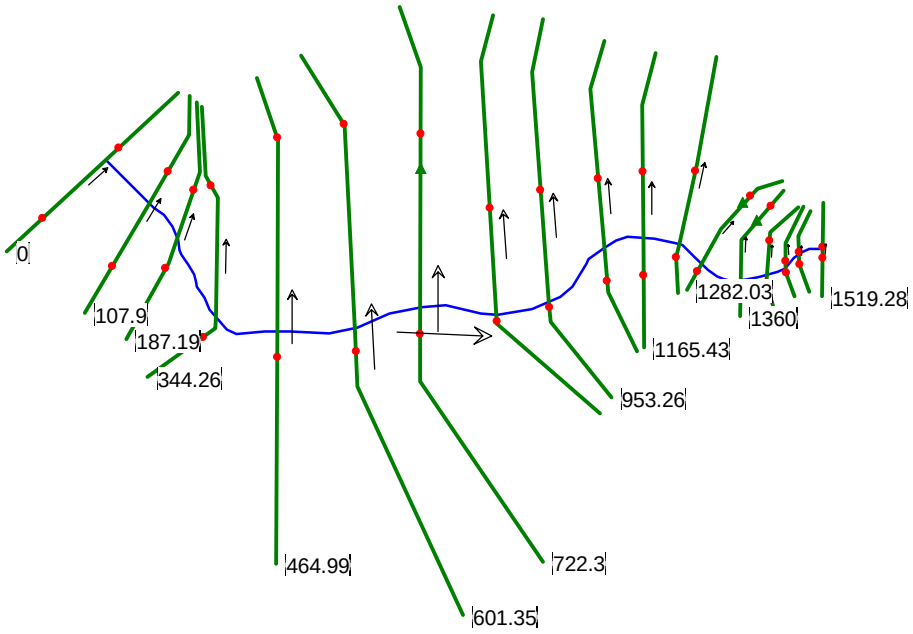
Checked by

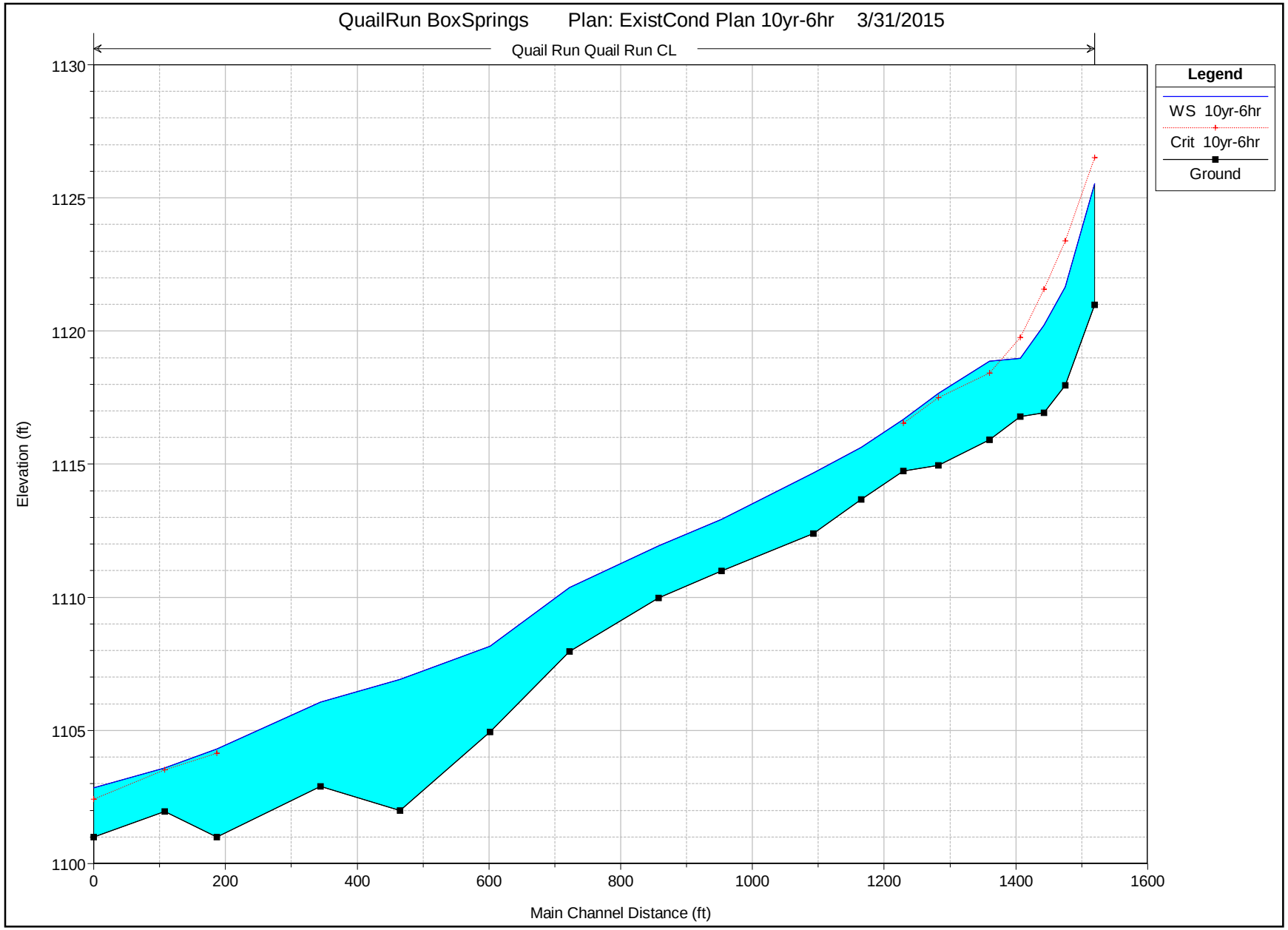
Approval date

APPENDIX 2

HEC-RAS Schematic, Output Tables, Cross Sections & Profiles

HEC-RAS Model

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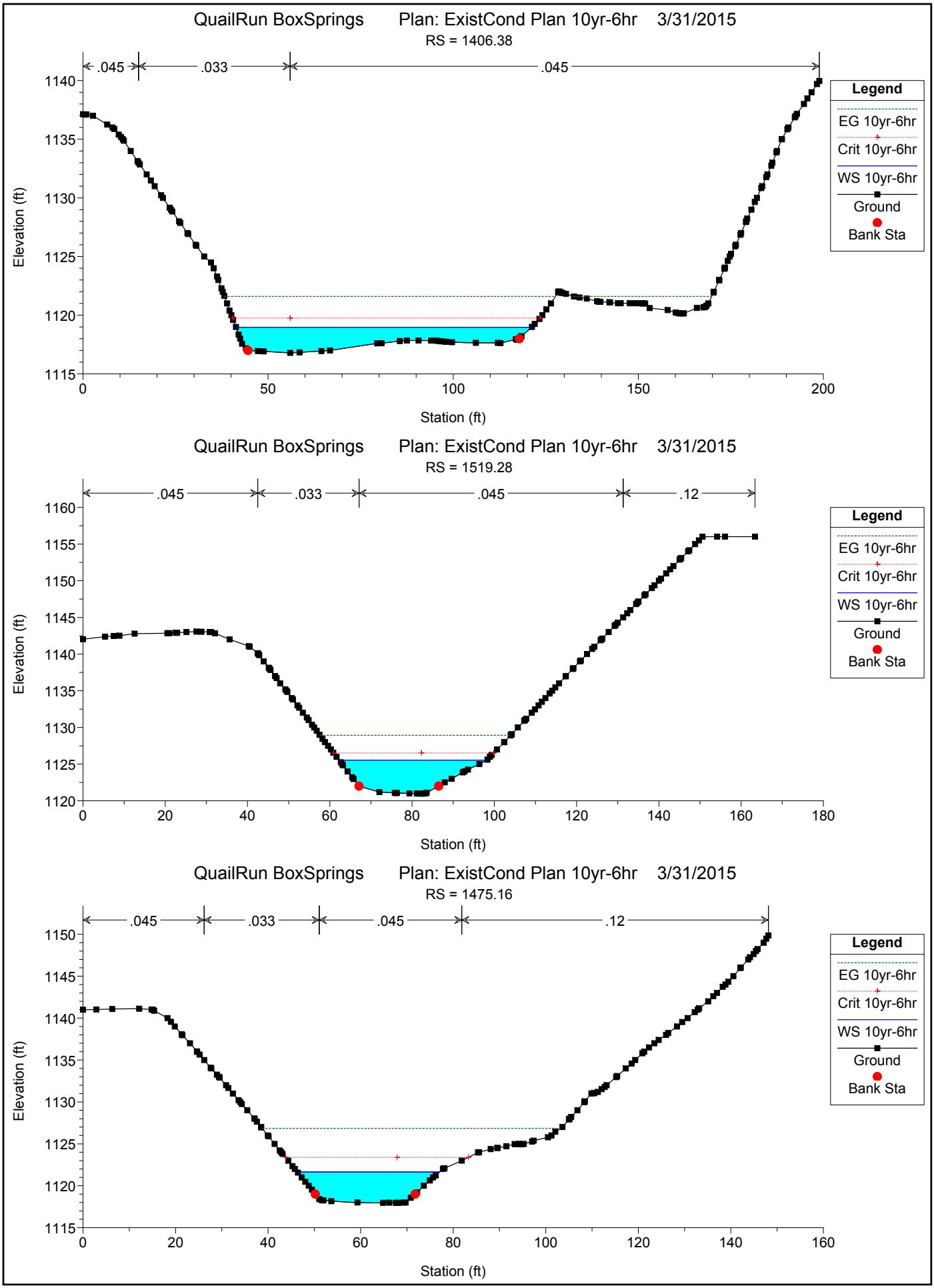
Quail Run Quail Run CL
Legend
WS 10yr-6hr
Crit 10yr-6hr
Ground
Elevation (ft)
1130
1125
1120
1115
1110
1105
1100
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)

HEC-RAS Plan: ExCond 1006 River: Quail Run Reach: Quail Run CL Profile: 10yr-6hr

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)	
Quail Run CL	1519.28	10yr-6hr	1553.60	1120.98	1125.54	1126.52	1128.93	0.033022	15.67	111.35	35.84	1.34
Quail Run CL	1475.16	10yr-6hr	1553.60	1117.96	1121.65	1123.39	1126.83	0.060282	18.78	88.24	30.76	1.76
Quail Run CL	1442.42	10yr-6hr	1553.60	1116.93	1120.23	1121.57	1124.53	0.063923	18.10	97.74	40.84	1.81
Quail Run CL	1406.38	10yr-6hr	1553.60	1116.79	1118.97	1119.76	1121.60	0.071063	13.06	120.16	79.85	1.84
Quail Run CL	1360	10yr-6hr	1553.60	1115.91	1118.86	1118.43	1119.39	0.010829	5.83	267.27	168.40	0.71
Quail Run CL	1282.03	10yr-6hr	1553.60	1114.96	1117.66	1117.50	1118.29	0.018631	6.41	243.13	166.16	0.87
Quail Run CL	1229.21	10yr-6hr	1553.60	1114.75	1116.69	1116.54	1117.28	0.019117	6.23	251.27	160.66	0.87
Quail Run CL	1165.43	10yr-6hr	1553.60	1113.68	1115.63		1116.12	0.016562	5.61	278.36	185.85	0.80
Quail Run CL	1092.5	10yr-6hr	1553.60	1112.40	1114.68		1115.08	0.011811	5.09	306.94	184.54	0.69
Quail Run CL	953.26	10yr-6hr	1553.60	1110.99	1112.93		1113.32	0.013392	5.02	309.62	205.59	0.72
Quail Run CL	857.59	10yr-6hr	1553.60	1109.98	1111.94		1112.25	0.009099	4.51	347.90	212.07	0.61
Quail Run CL	722.3	10yr-6hr	1553.60	1107.97	1110.36		1110.54	0.017784	3.38	460.29	343.12	0.47
Quail Run CL	601.35	10yr-6hr	1553.60	1104.94	1108.17		1108.29	0.019217	2.81	553.87	377.76	0.41
Quail Run CL	464.99	10yr-6hr	1553.60	1102.00	1106.91		1106.96	0.005718	1.78	870.99	383.57	0.21
Quail Run CL	344.26	10yr-6hr	1553.60	1102.89	1106.06		1106.20	0.006699	3.06	507.66	242.36	0.37
Quail Run CL	187.19	10yr-6hr	1553.60	1101.00	1104.31	1104.14	1104.98	0.008383	6.56	236.70	135.02	0.87
Quail Run CL	107.9	10yr-6hr	1553.60	1101.96	1103.59	1103.52	1104.20	0.011165	6.26	248.22	178.98	0.94
Quail Run CL	0	10yr-6hr	1553.60	1101.00	1102.84	1102.42	1103.21	0.006603	4.90	319.56	191.01	0.66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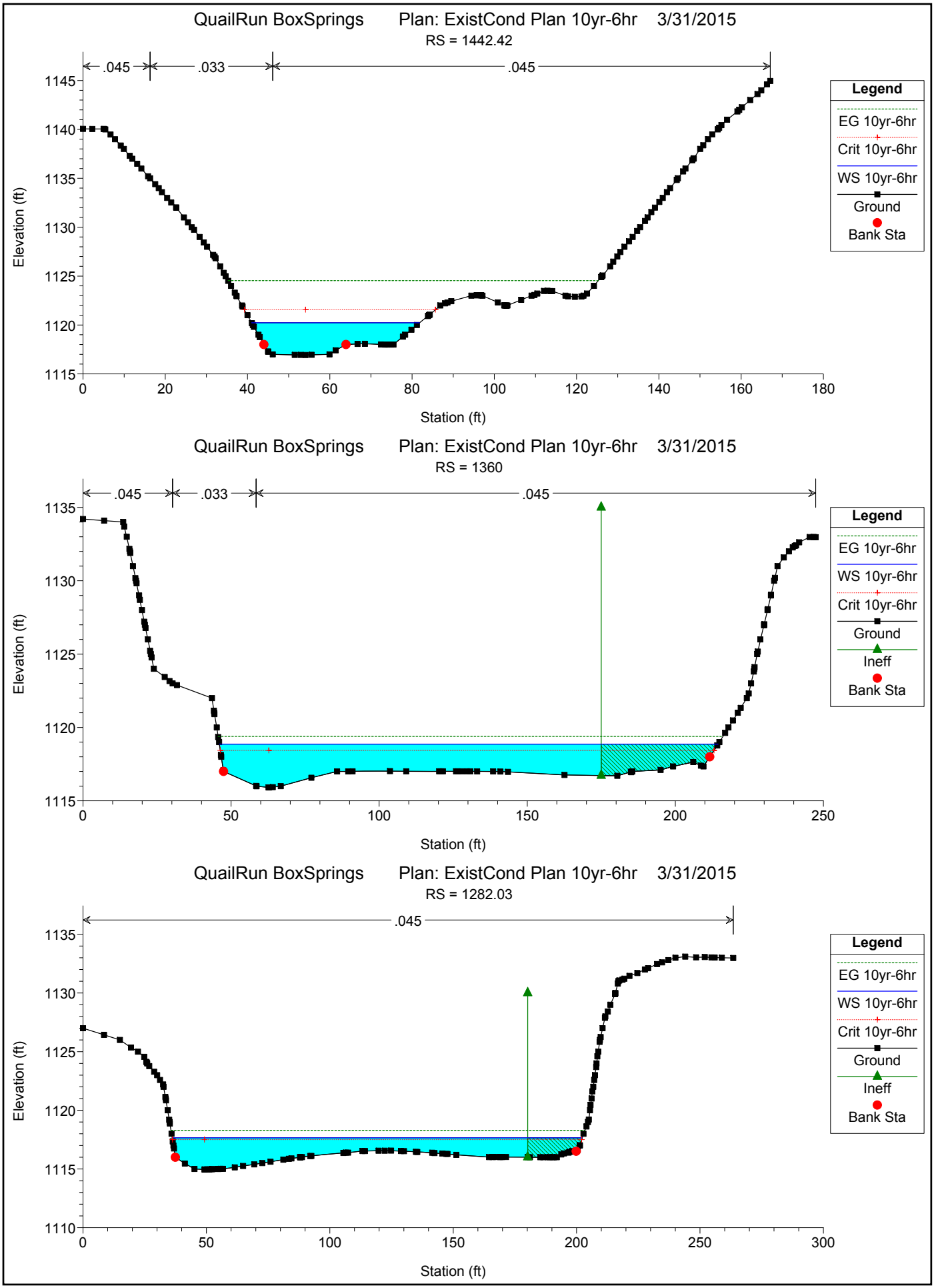
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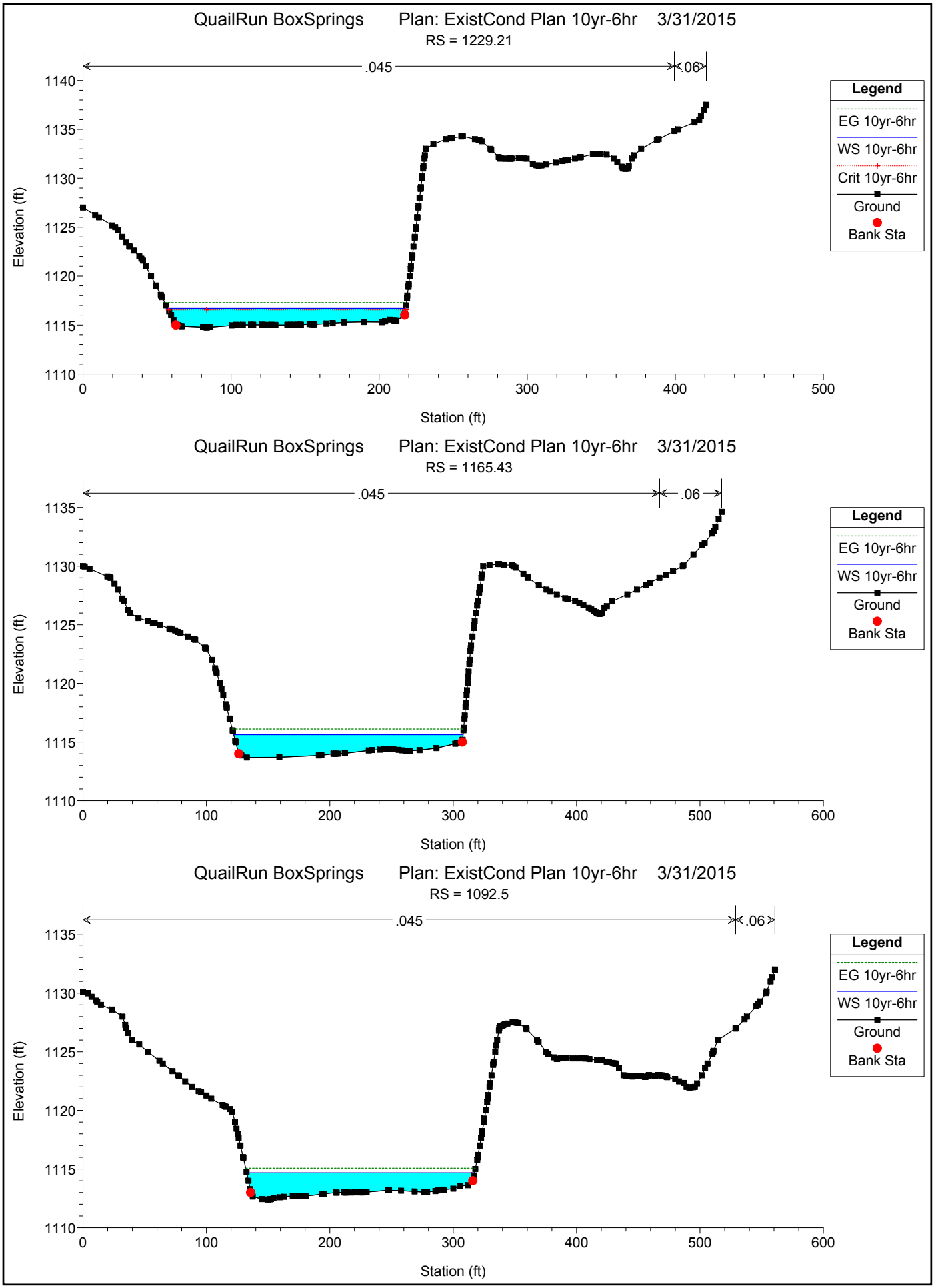
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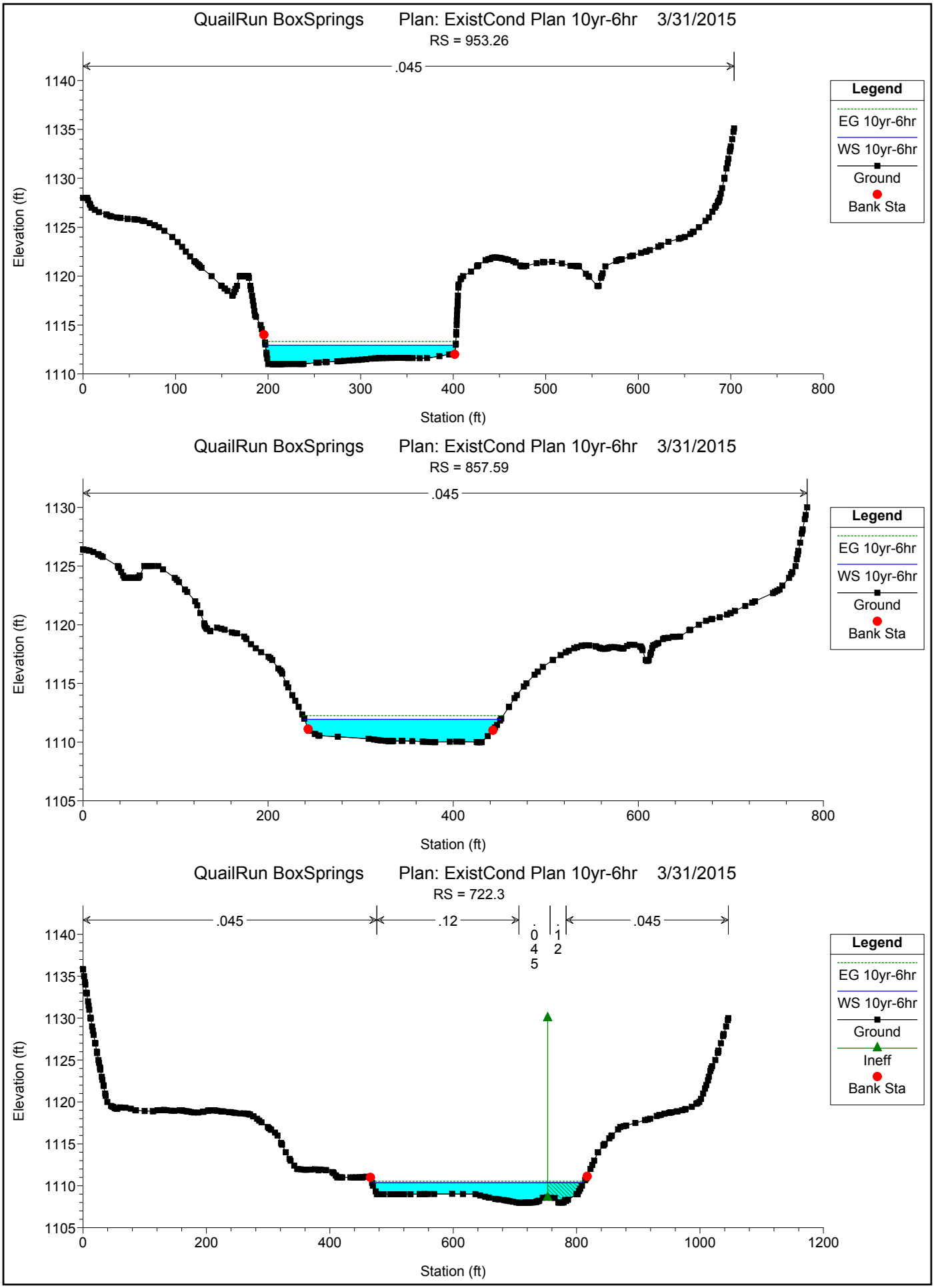
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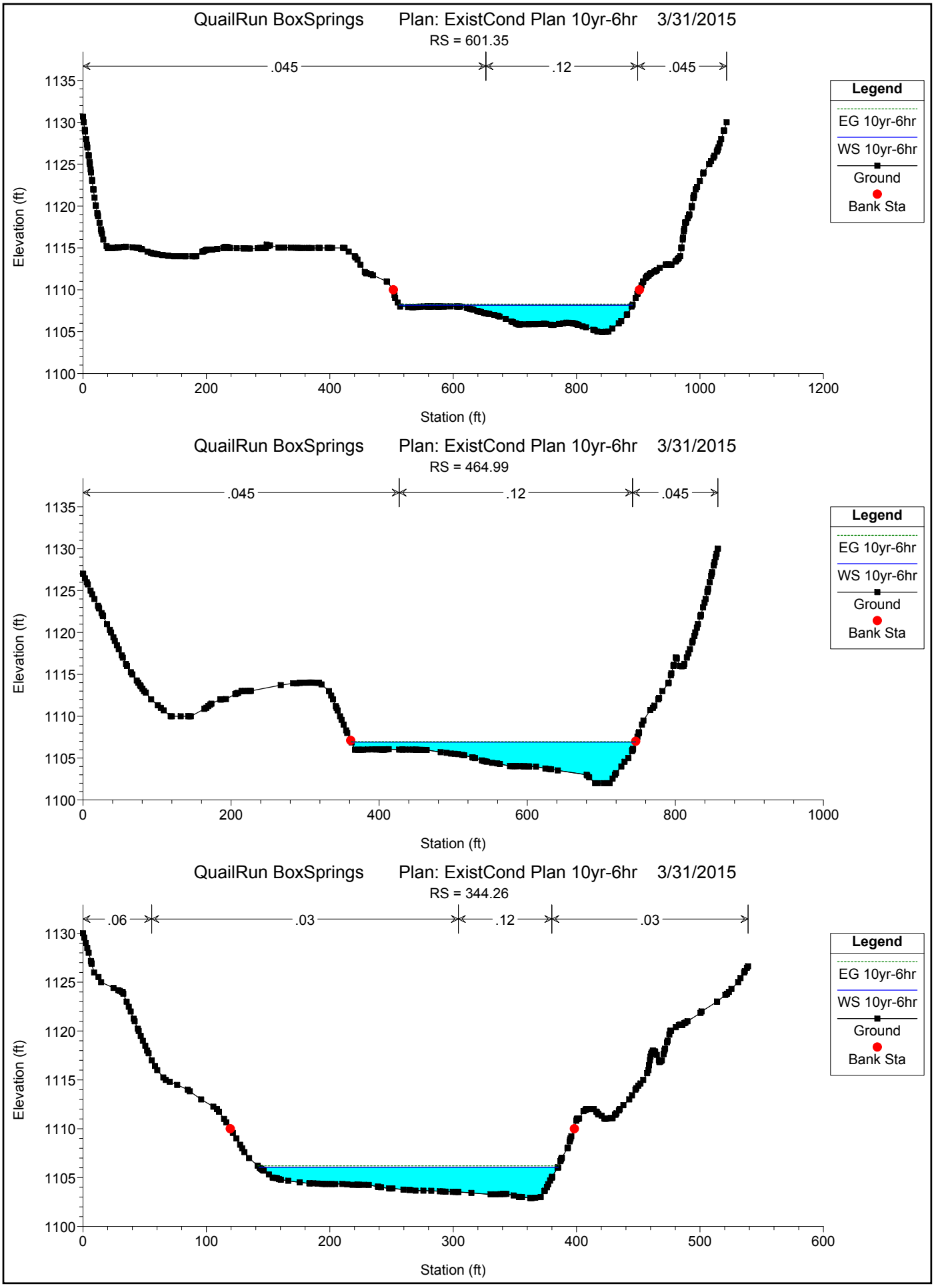
Bank Sta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WS 10yr-6hr
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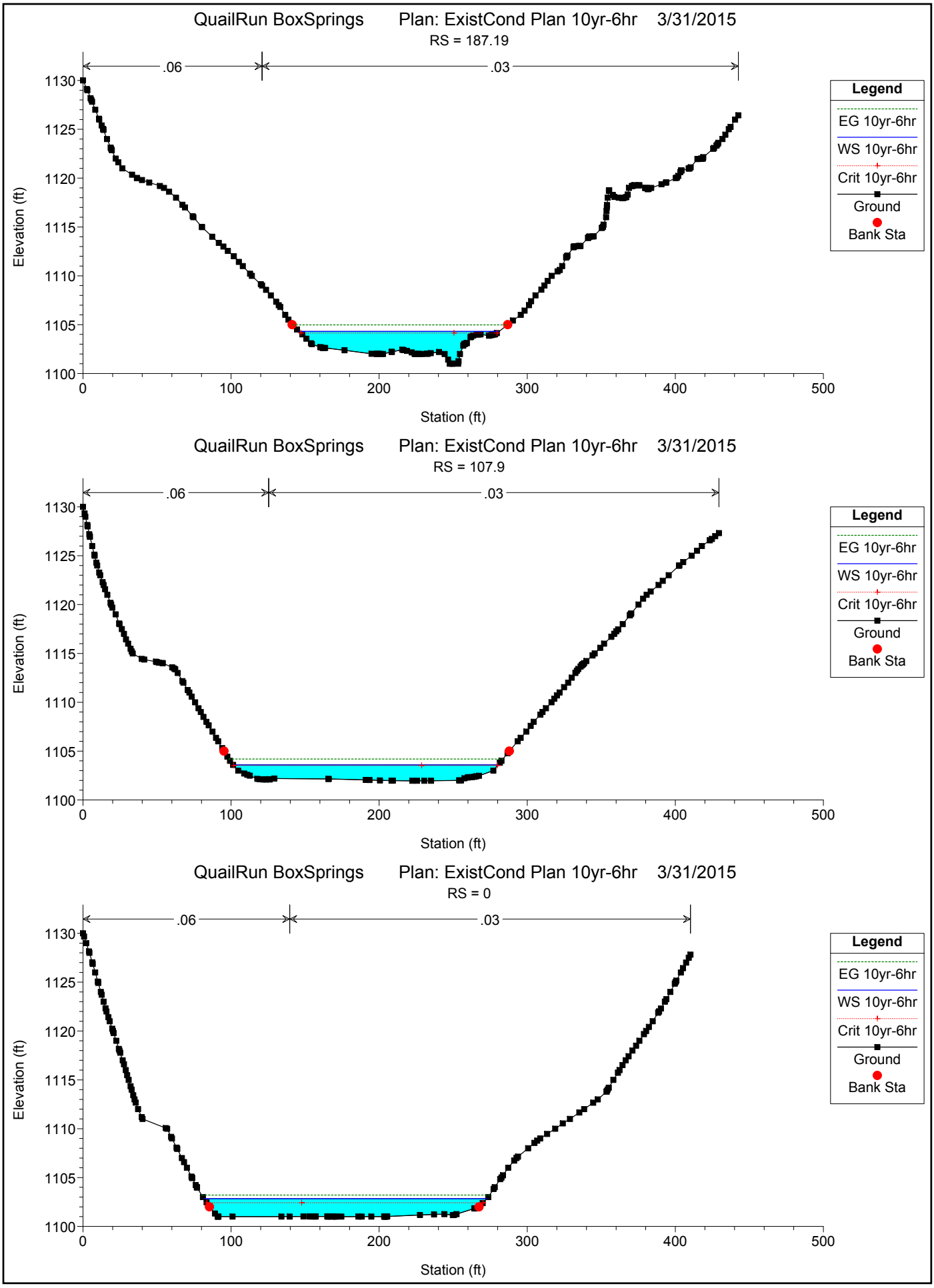
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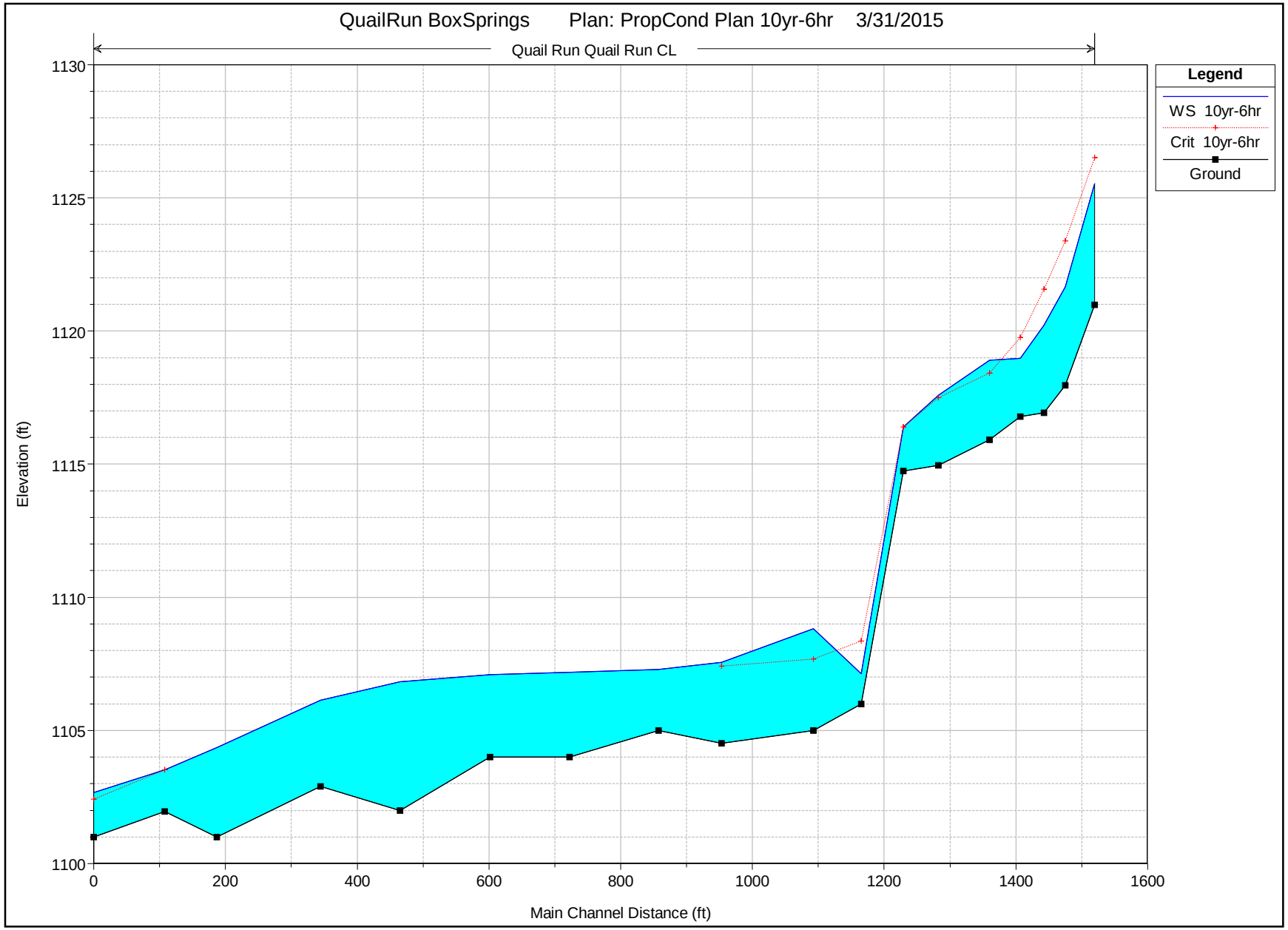
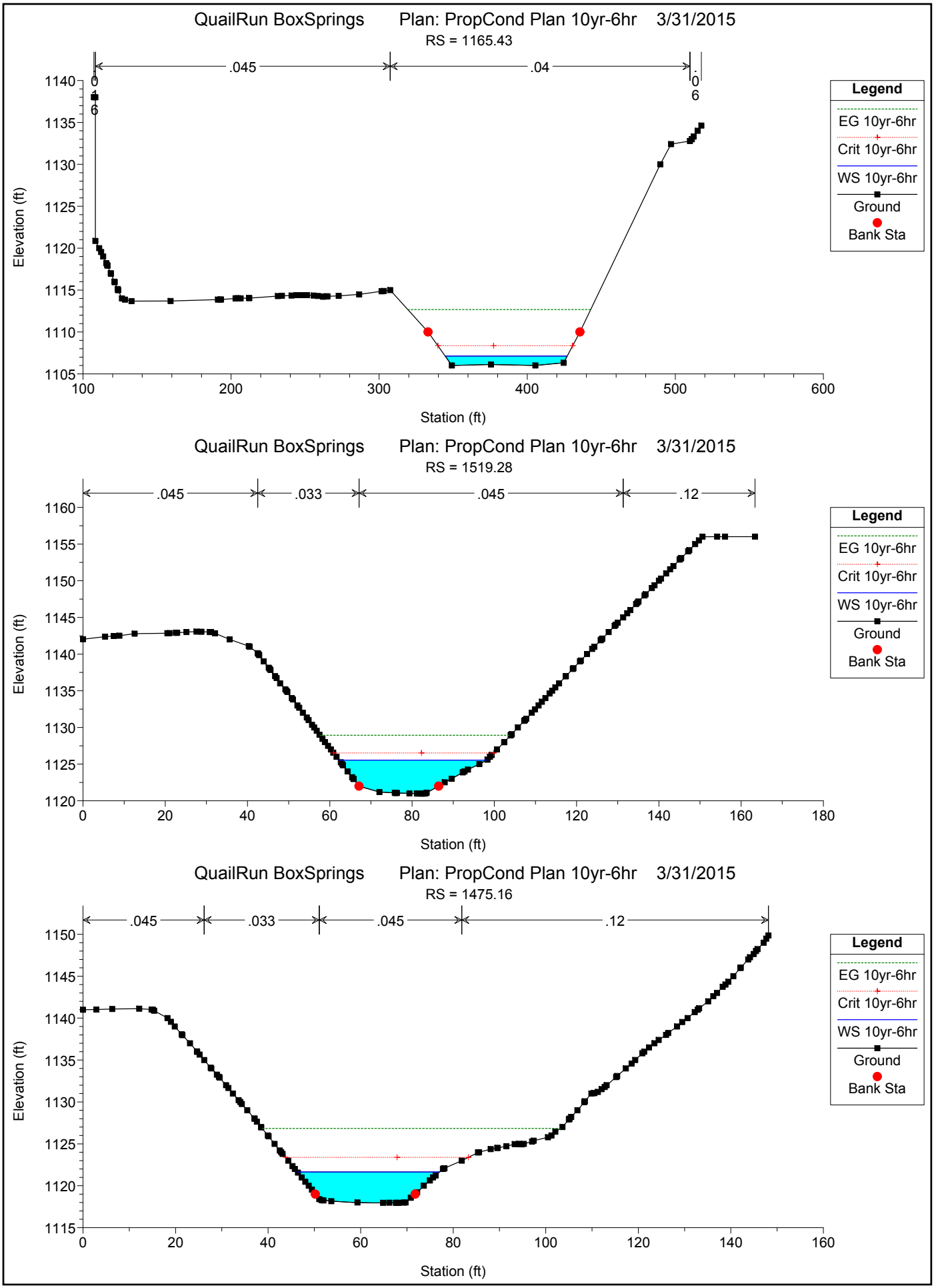
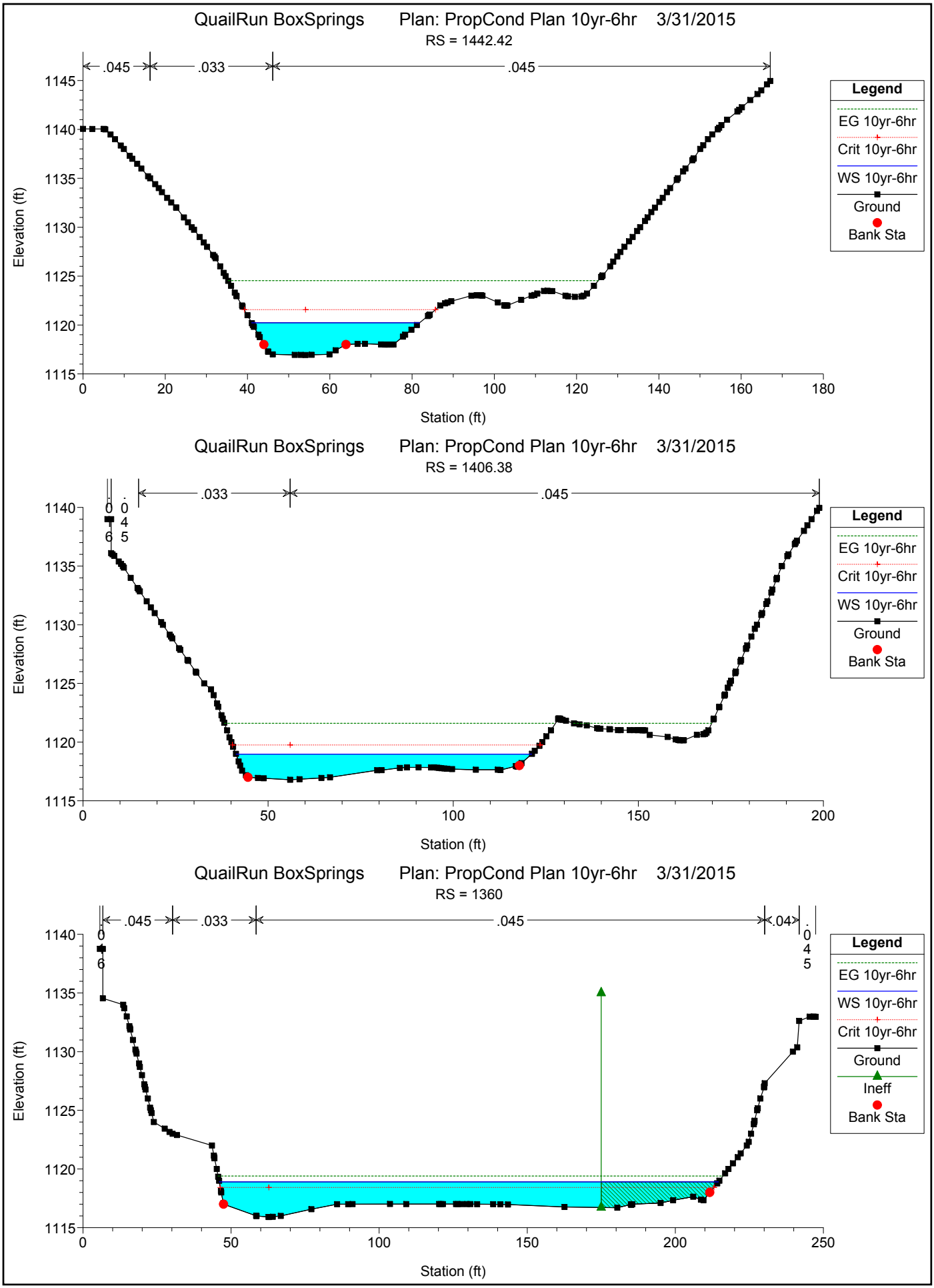
Ground
Bank Sta

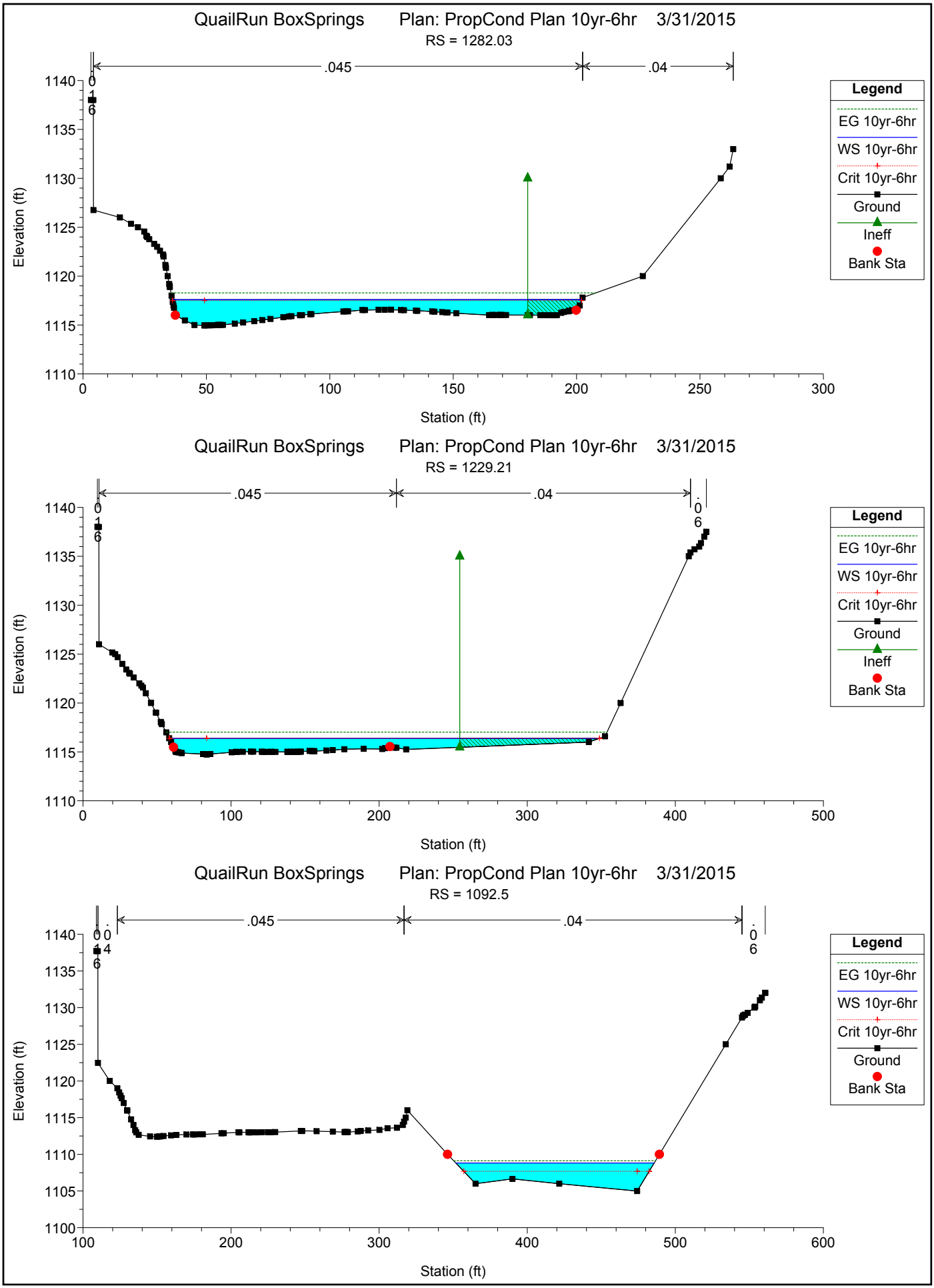

QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
Quail Run Quail Run CL
Legend
WS 10yr-6hr
Crit 10yr-6hr
Ground
Elevation (ft)
1130
1125
1120
1115
1110
1105
1100
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)

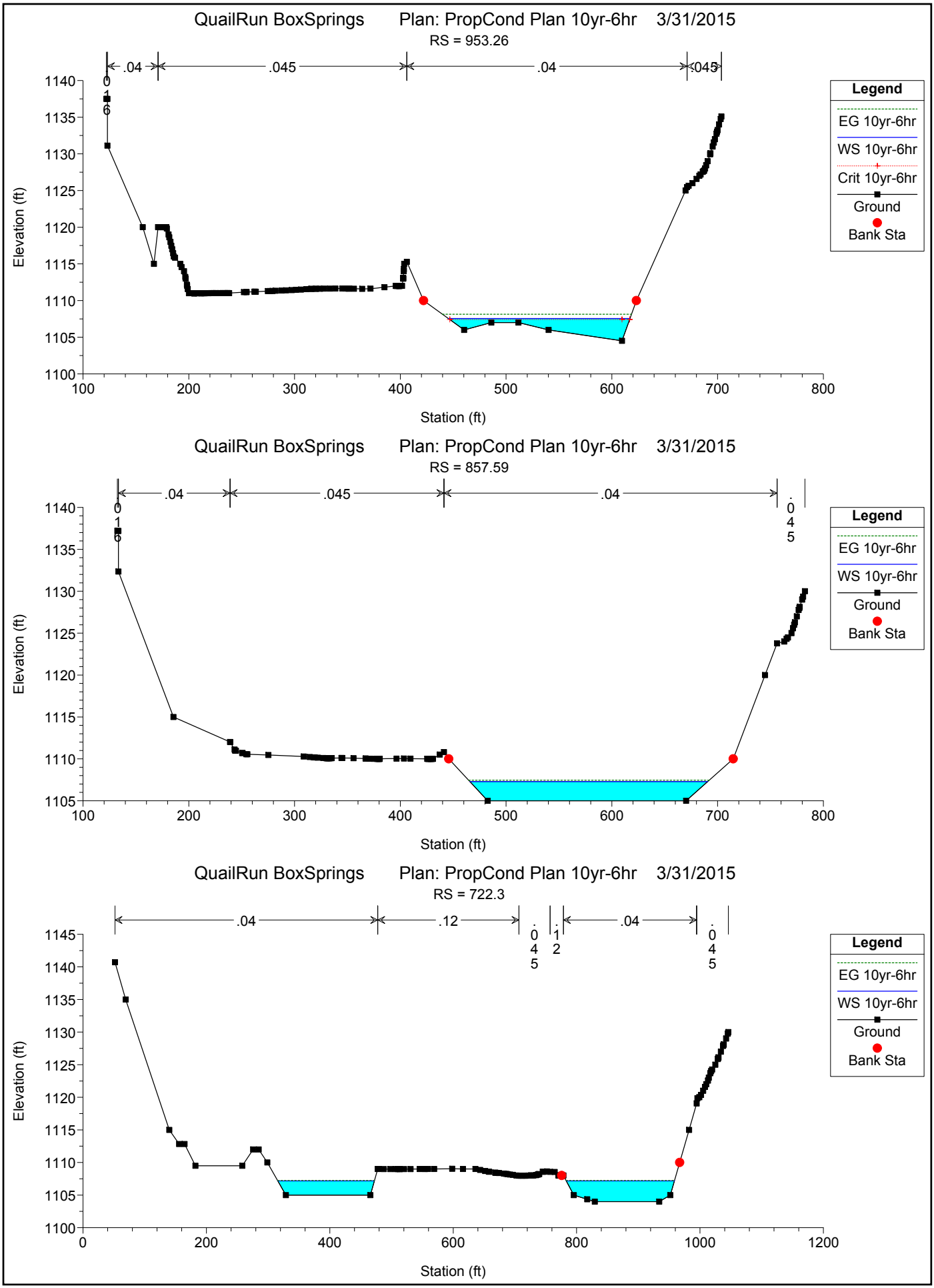
HEC-RAS Plan: PropCond 1006 River: Quail Run Reach: Quail Run CL Profile: 10yr-6hr

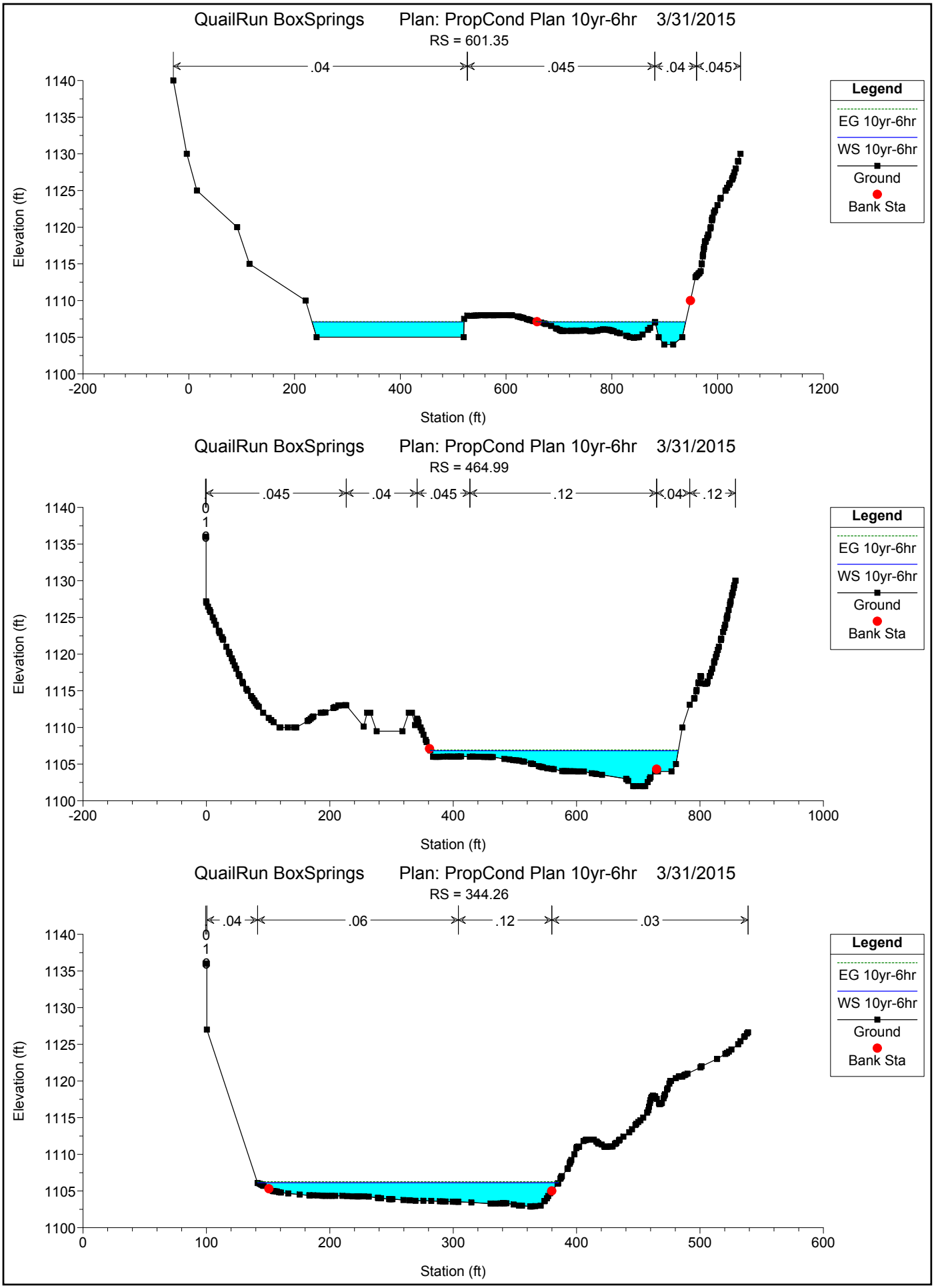
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Quail Run CL	1519.28	10yr-6hr	1553.60	1120.98	1125.54	1126.52	1128.93	0.033022	15.67	111.35	35.84	1.34
Quail Run CL	1475.16	10yr-6hr	1553.60	1117.96	1121.65	1123.39	1126.83	0.060282	18.78	88.24	30.76	1.76
Quail Run CL	1442.42	10yr-6hr	1553.60	1116.93	1120.23	1121.57	1124.53	0.063923	18.10	97.74	40.84	1.81
Quail Run CL	1406.38	10yr-6hr	1553.60	1116.79	1118.97	1119.76	1121.60	0.071063	13.06	120.16	79.85	1.84
Quail Run CL	1360	10yr-6hr	1553.60	1115.91	1118.90	1118.43	1119.41	0.010201	5.72	272.15	168.55	0.69
Quail Run CL	1282.03	10yr-6hr	1553.60	1114.96	1117.59	1117.50	1118.28	0.021172	6.66	233.95	165.98	0.92
Quail Run CL	1229.21	10yr-6hr	1553.60	1114.75	1116.39	1116.39	1117.02	0.026191	6.46	244.08	290.53	0.99
Quail Run CL	1165.43	10yr-6hr	1553.60	1106.00	1107.13	1108.36	1112.68	0.260990	18.90	82.18	82.39	3.34
Quail Run CL	1092.5	10yr-6hr	1553.60	1104.99	1108.83	1107.68	1109.12	0.003737	4.35	357.38	134.00	0.47
Quail Run CL	953.26	10yr-6hr	1553.60	1104.51	1107.55	1107.42	1108.13	0.016325	6.13	253.27	171.67	0.89
Quail Run CL	857.59	10yr-6hr	1553.60	1105.00	1107.29		1107.45	0.002939	3.30	471.38	224.85	0.40
Quail Run CL	722.3	10yr-6hr	1553.60	1104.00	1107.18		1107.24	0.000789	2.07	811.18	331.87	0.22
Quail Run CL	601.35	10yr-6hr	1553.60	1104.00	1107.09		1107.13	0.000819	1.34	993.64	566.75	0.20
Quail Run CL	464.99	10yr-6hr	1553.60	1102.00	1106.83		1106.92	0.003869	1.45	904.02	401.87	0.17
Quail Run CL	344.26	10yr-6hr	1553.60	1102.89	1106.13		1106.27	0.007934	2.96	526.45	243.91	0.35
Quail Run CL	187.19	10yr-6hr	1553.60	1101.00	1104.35		1104.99	0.007744	6.40	242.92	135.74	0.84
Quail Run CL	107.9	10yr-6hr	1553.60	1101.96	1103.52	1103.52	1104.20	0.013022	6.63	234.84	174.54	1.00
Quail Run CL	0	10yr-6hr	1553.60	1101.00	1102.68	1102.42	1103.13	0.006606	5.43	287.72	189.23	0.76

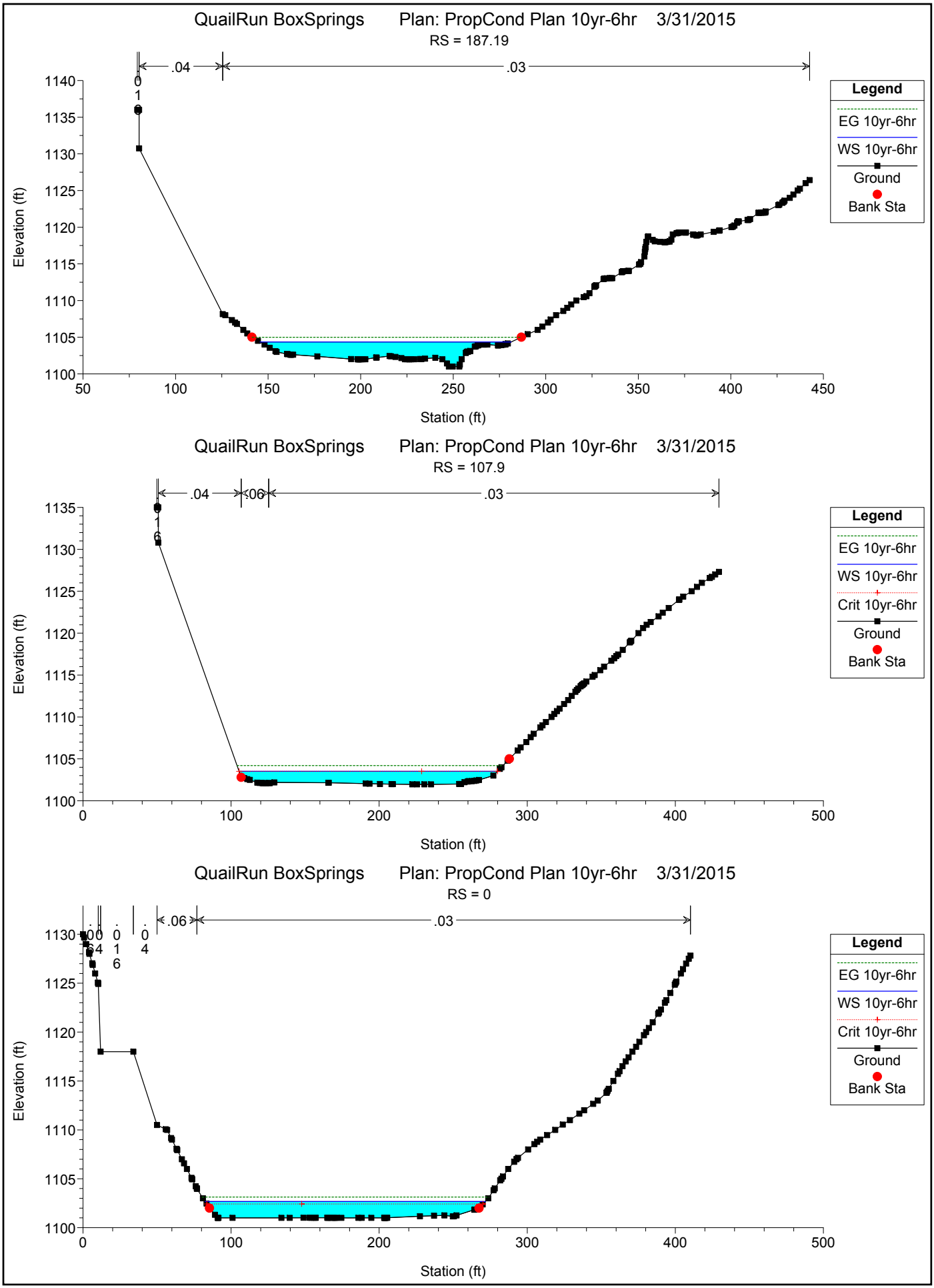

QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 1165.43
.045
.04
0
6
0
6
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
Crit 10yr-6hr
WS 10yr-6hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 1519.28
.045
.033
.045
.12
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
Crit 10yr-6hr
WS 10yr-6hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 1475.16
.045
.033
.045
.12
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
Crit 10yr-6hr
WS 10yr-6hr
Ground
Bank Sta

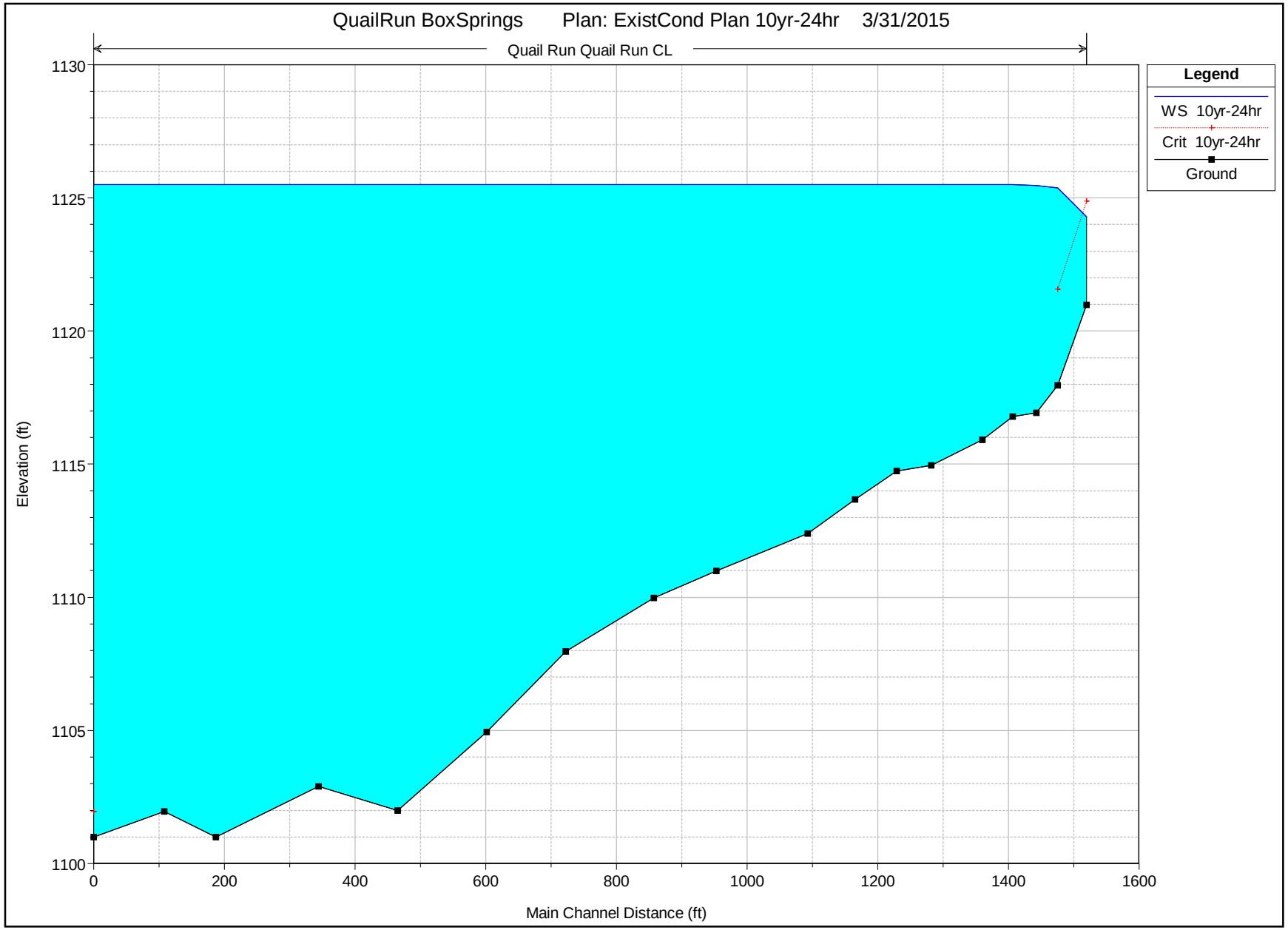

QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 1442.42
.045
.033
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
Crit 10yr-6hr
WS 10yr-6hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 1406.38
.033
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
Crit 10yr-6hr
WS 10yr-6hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 1360
.045
.033
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Crit 10yr-6hr
Ground
Ineff
Bank Sta


QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 1282.03
.045
.04
0.16
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Crit 10yr-6hr
Ground
Ineff
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 1229.21
.045
.04
0.16
0.06
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Crit 10yr-6hr
Ground
Ineff
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 1092.5
.045
.04
0.04
0.16
0.06
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Crit 10yr-6hr
Ground
Bank Sta


QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 953.26
.04
.045
.04
.045
.016
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
100
200
300
400
500
600
700
800
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Crit 10yr-6hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 857.59
.04
.045
.04
.016
.045
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
100
200
300
400
500
600
700
800
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 722.3
.04
.12
.045
.12
.04
.045
Elevation (ft)
1145
1140
1135
1130
1125
1120
1115
1110
1105
1100
0
200
400
600
800
1000
1200
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Ground
Bank Sta

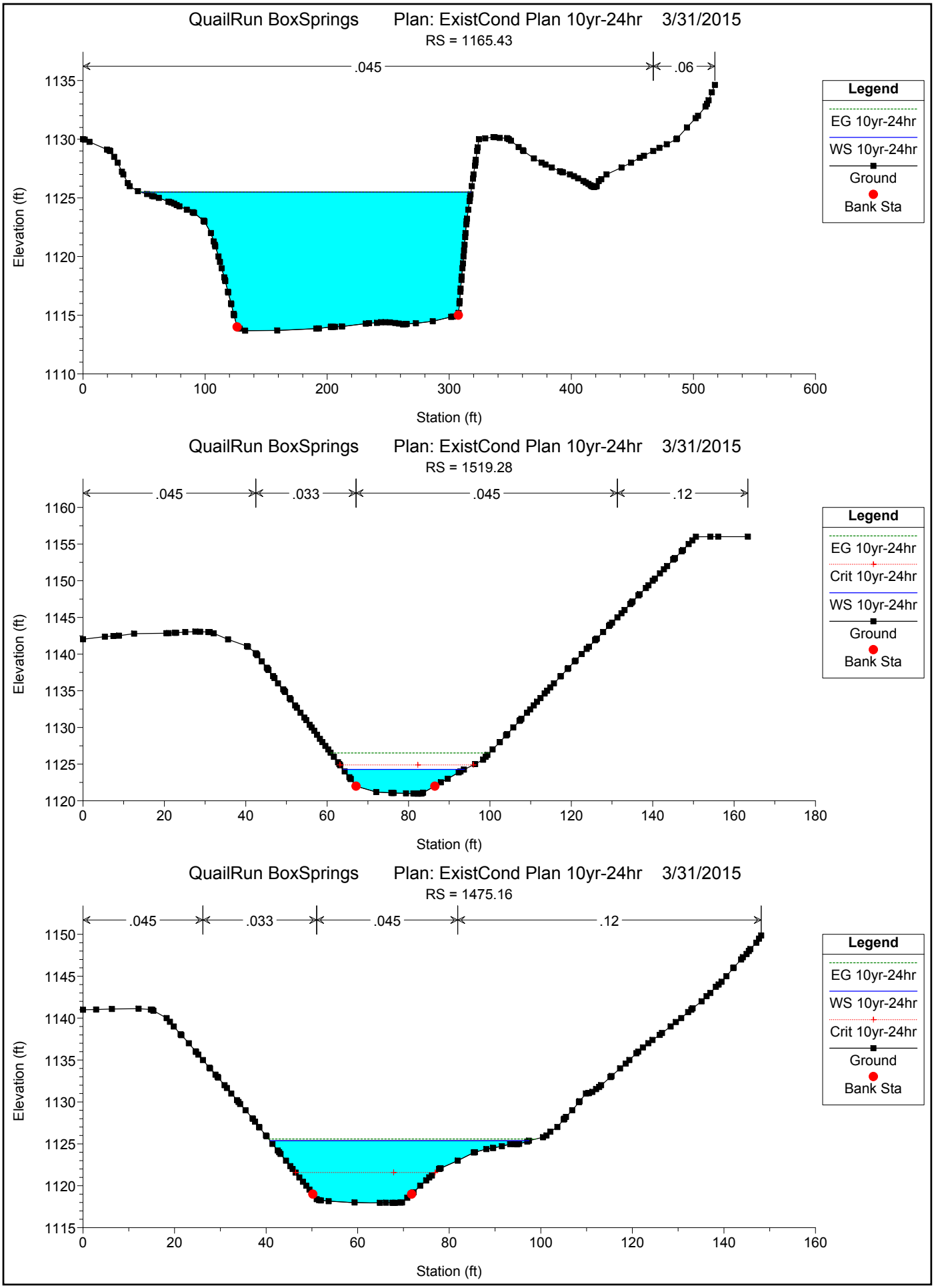

QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 601.35
.04
.045
.04
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 464.99
.045
.04
.045
.12
.04
.12
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 344.26
.04
.06
.12
.03
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Ground
Bank Sta

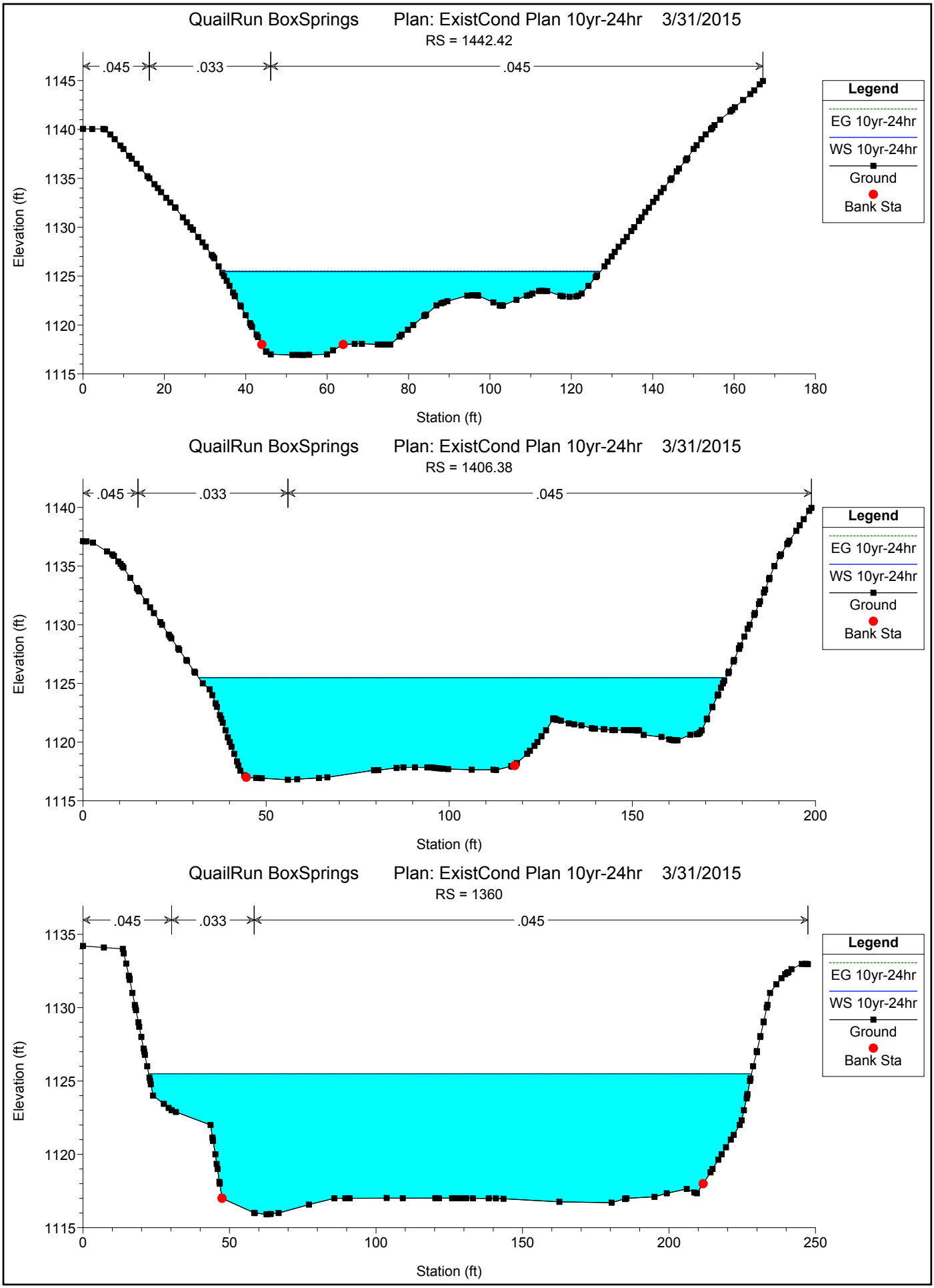

QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 187.19
.04
.03
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 107.9
.04
.06
.03
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Crit 10yr-6hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr-6hr 3/31/2015
RS = 0
.06
.03
Elevation (ft)
Station (ft)
Legend
EG 10yr-6hr
WS 10yr-6hr
Crit 10yr-6hr
Ground
Bank Sta

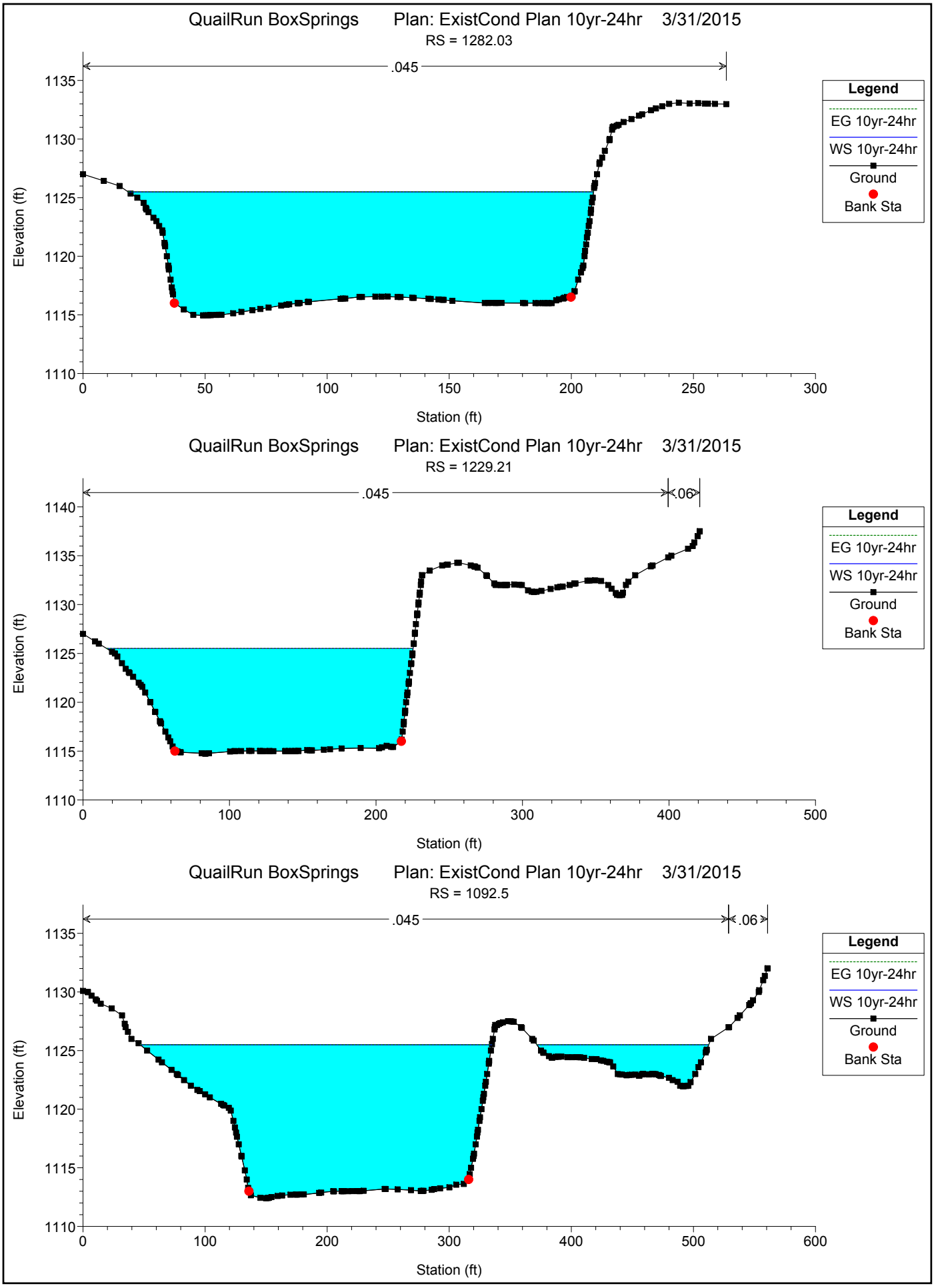

QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
Quail Run Quail Run CL
Legend
WS 10yr-24hr
Crit 10yr-24hr
Ground
Elevation (ft)
1130
1125
1120
1115
1110
1105
1100
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)

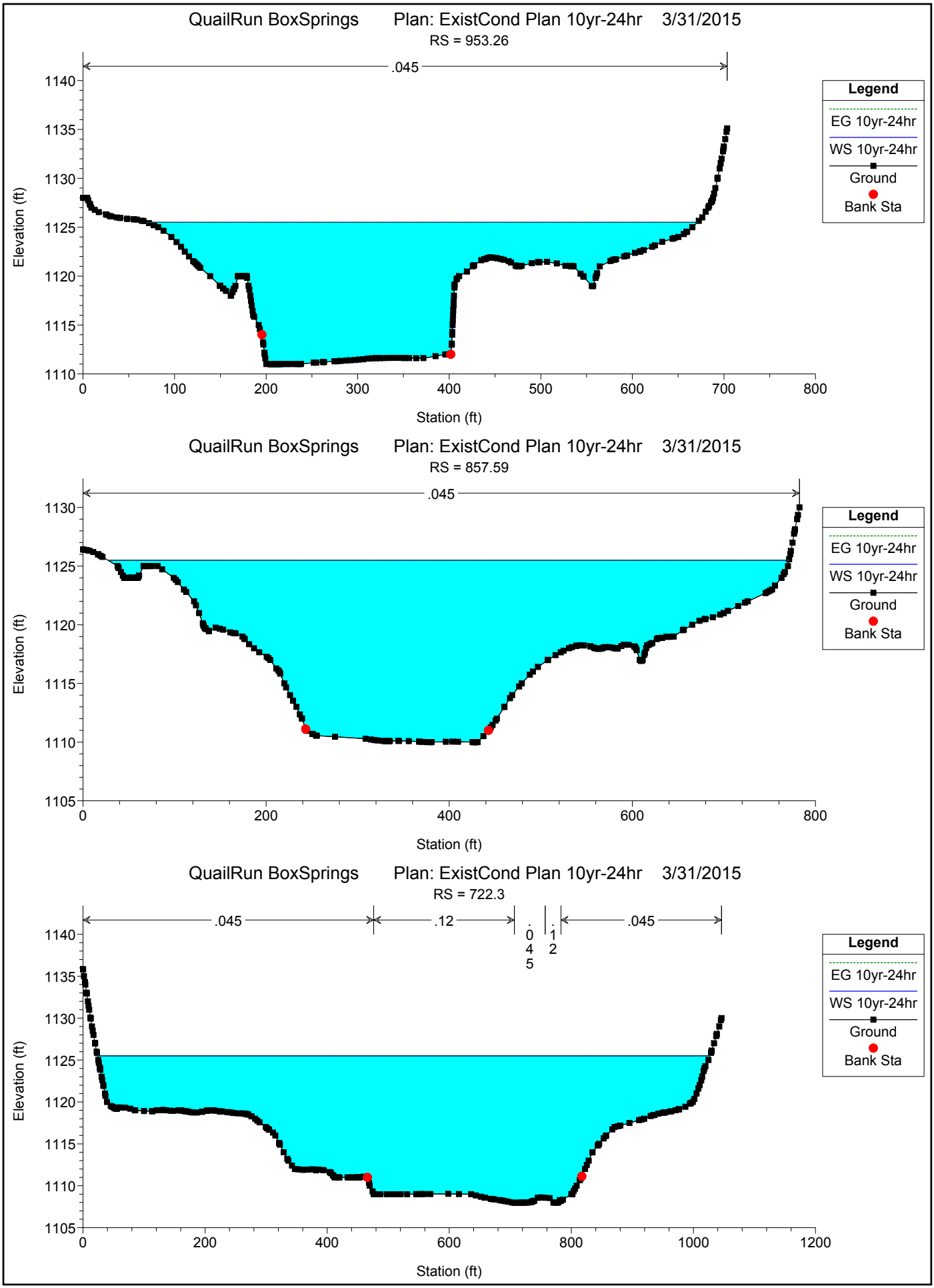
HEC-RAS Plan: ExCond 1024 River: Quail Run Reach: Quail Run CL Profile: 10yr-24hr

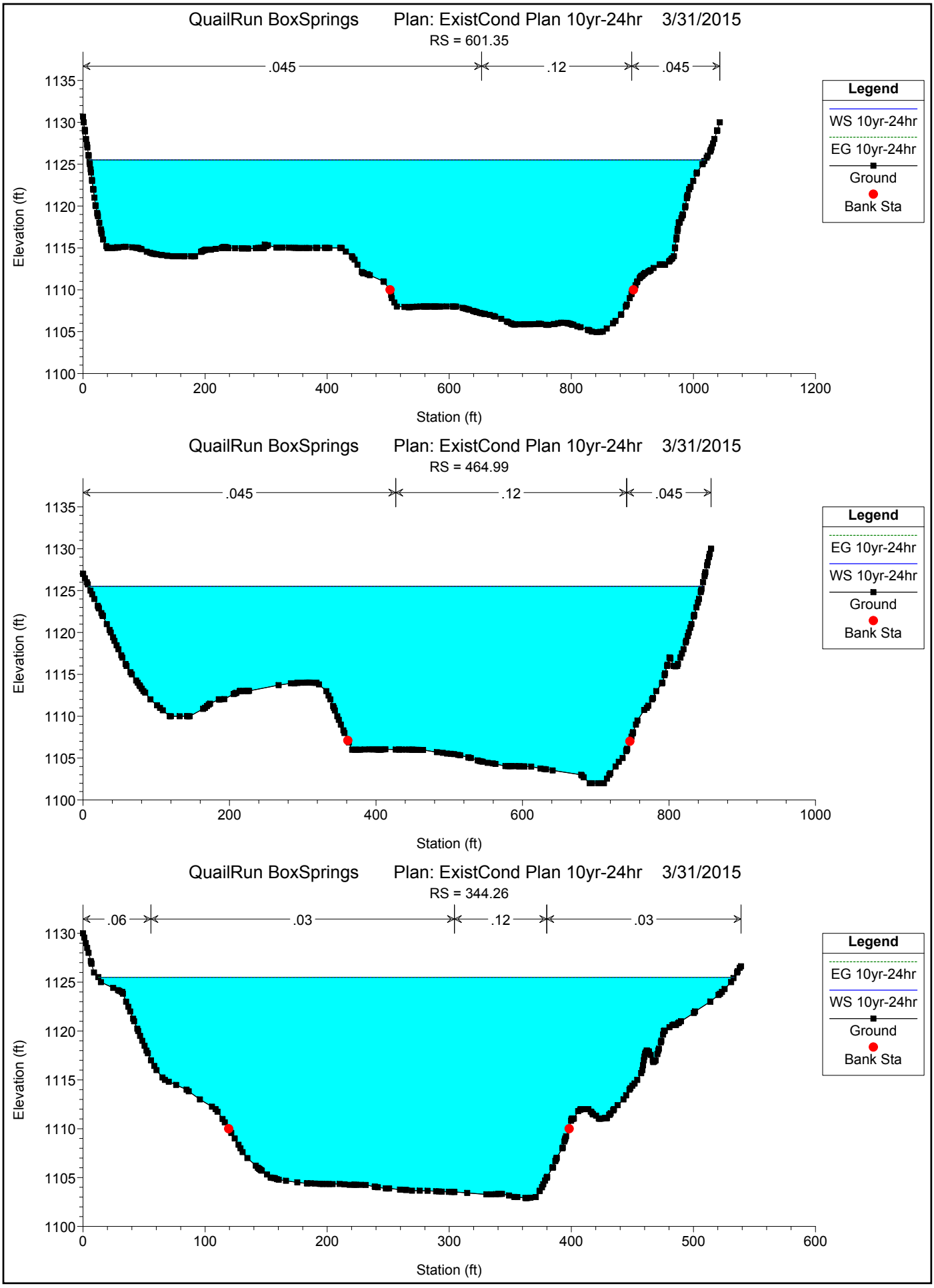
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Quail Run CL	1519.28	10yr-24hr	805.90	1120.98	1124.29	1124.88	1126.52	0.033009	12.43	70.20	29.79	1.26
Quail Run CL	1475.16	10yr-24hr	805.90	1117.96	1125.38	1121.58	1125.59	0.001007	3.93	242.61	56.57	0.26
Quail Run CL	1442.42	10yr-24hr	805.90	1116.93	1125.47		1125.53	0.000298	2.39	452.62	93.06	0.15
Quail Run CL	1406.38	10yr-24hr	805.90	1116.79	1125.49		1125.51	0.000052	1.02	903.67	143.94	0.06
Quail Run CL	1360	10yr-24hr	805.90	1115.91	1125.50		1125.50	0.000014	0.53	1572.67	205.80	0.03
Quail Run CL	1282.03	10yr-24hr	805.90	1114.96	1125.50		1125.50	0.000012	0.51	1649.14	190.67	0.03
Quail Run CL	1229.21	10yr-24hr	805.90	1114.75	1125.50		1125.50	0.000009	0.46	1851.03	209.10	0.03
Quail Run CL	1165.43	10yr-24hr	805.90	1113.68	1125.50		1125.50	0.000005	0.37	2338.86	270.60	0.02
Quail Run CL	1092.5	10yr-24hr	805.90	1112.40	1125.50		1125.50	0.000003	0.32	2987.27	428.90	0.02
Quail Run CL	953.26	10yr-24hr	805.90	1110.99	1125.50		1125.50	0.000001	0.22	4500.21	601.07	0.01
Quail Run CL	857.59	10yr-24hr	805.90	1109.98	1125.50		1125.50	0.000001	0.17	6376.36	743.82	0.01
Quail Run CL	722.3	10yr-24hr	805.90	1107.97	1125.50		1125.50	0.000000	0.07	11418.85	1003.47	0.00
Quail Run CL	601.35	10yr-24hr	805.90	1104.94	1125.50		1125.50	0.000000	0.05	13880.95	1008.92	0.00
Quail Run CL	464.99	10yr-24hr	805.90	1102.00	1125.50		1125.50	0.000000	0.05	13283.67	837.39	0.00
Quail Run CL	344.26	10yr-24hr	805.90	1102.89	1125.50		1125.50	0.000000	0.10	7866.16	520.61	0.00
Quail Run CL	187.19	10yr-24hr	805.90	1101.00	1125.50		1125.50	0.000000	0.17	6078.02	426.07	0.01
Quail Run CL	107.9	10yr-24hr	805.90	1101.96	1125.50		1125.50	0.000000	0.15	6707.06	407.46	0.01
Quail Run CL	0	10yr-24hr	805.90	1101.00	1125.50	1101.95	1125.50	0.000000	0.13	7225.91	392.75	0.00

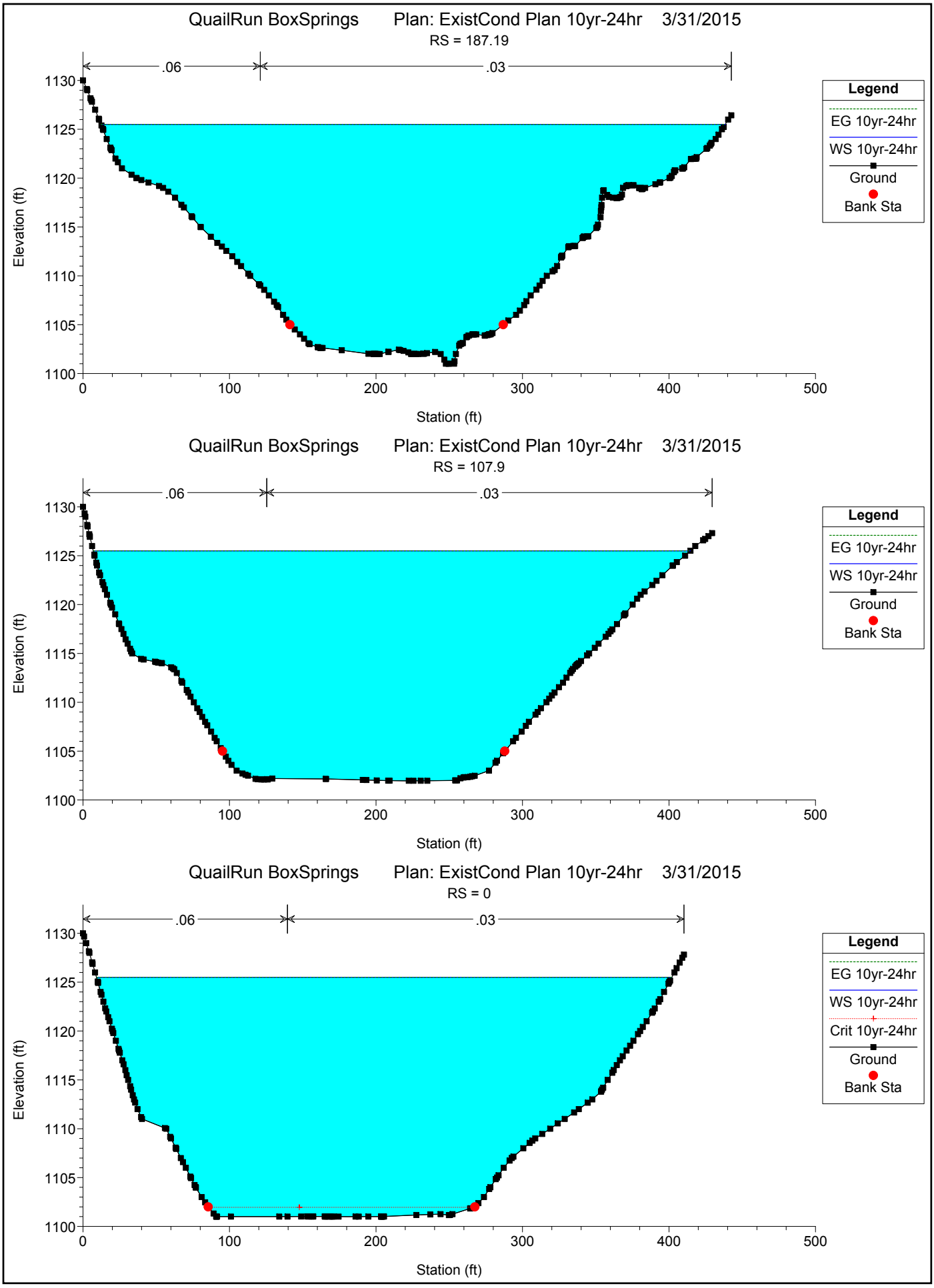

QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 1165.43
.045
.06
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 1519.28
.045
.033
.045
.12
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
Crit 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 1475.16
.045
.033
.045
.12
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Crit 10yr-24hr
Ground
Bank Sta

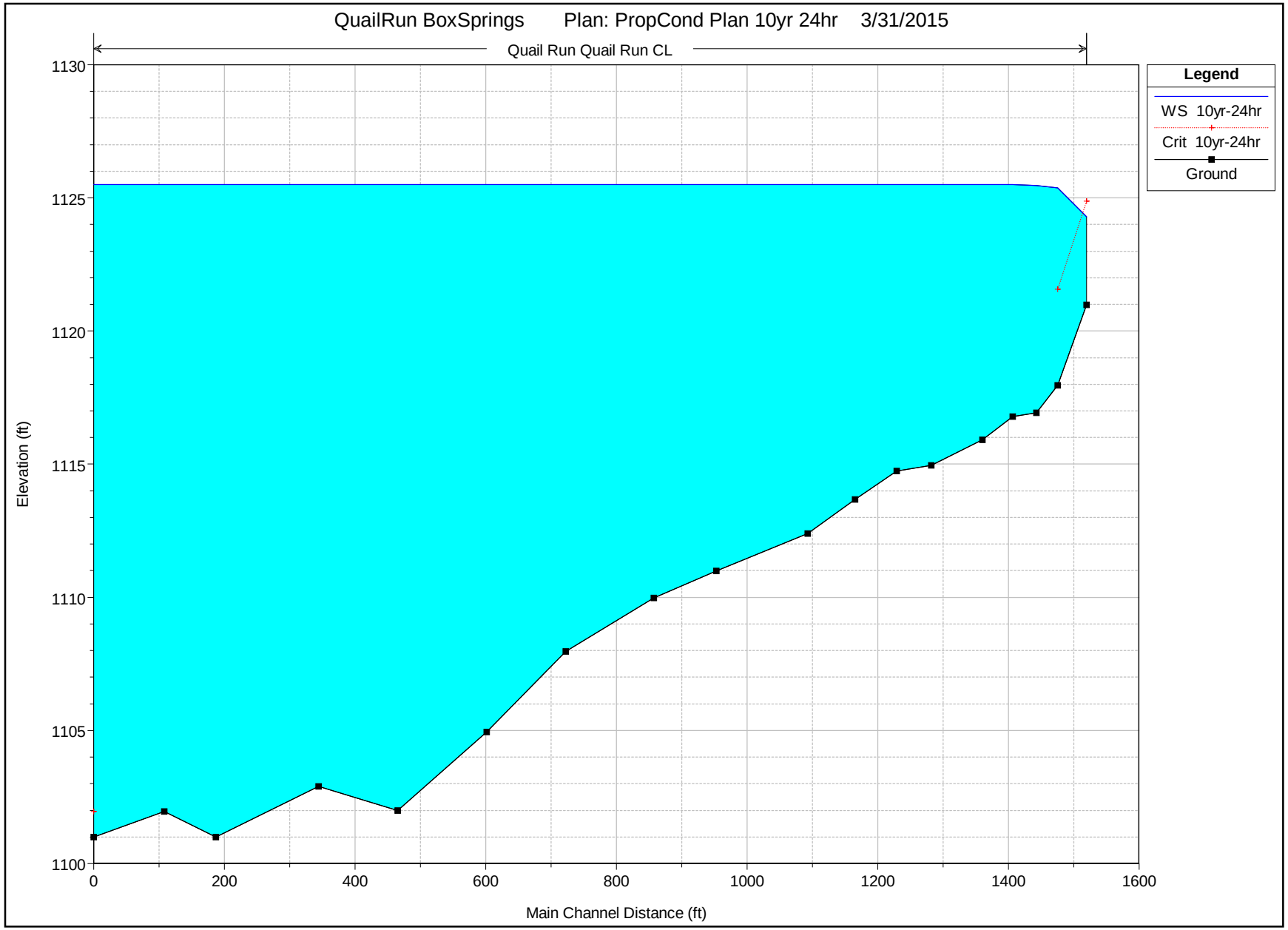

QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 1442.42
.045
.033
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 1406.38
.045
.033
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 1360
.045
.033
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta


QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 1282.03
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 1229.21
.045
.06
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 1092.5
.045
.06
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta


QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 953.26
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 857.59
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 722.3
.045
.12
.045
.045
.12
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta

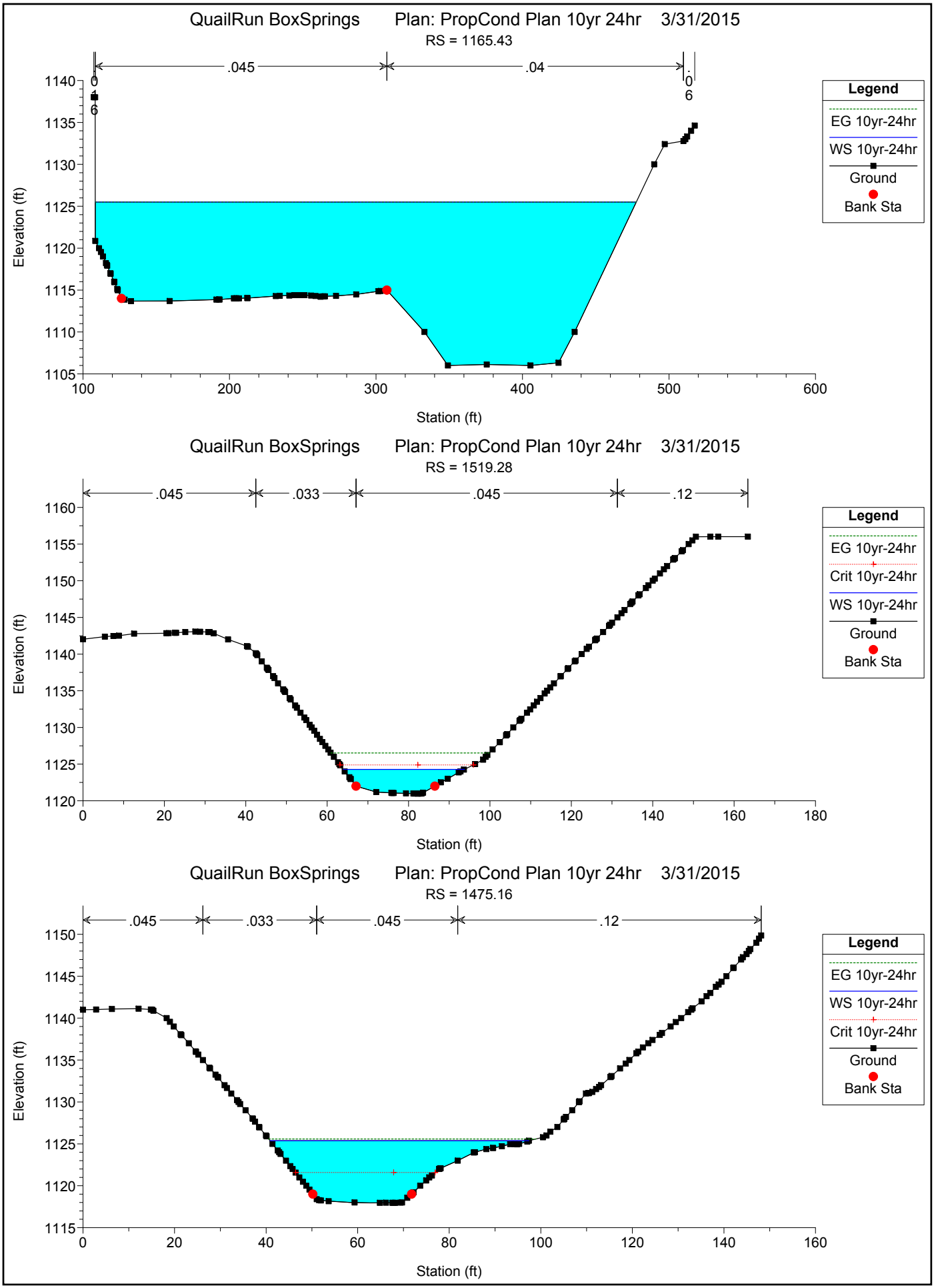

QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 601.35
.045
.12
.045
Elevation (ft)
Station (ft)
Legend
WS 10yr-24hr
EG 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 464.99
.045
.12
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 344.26
.06
.03
.12
.03
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta

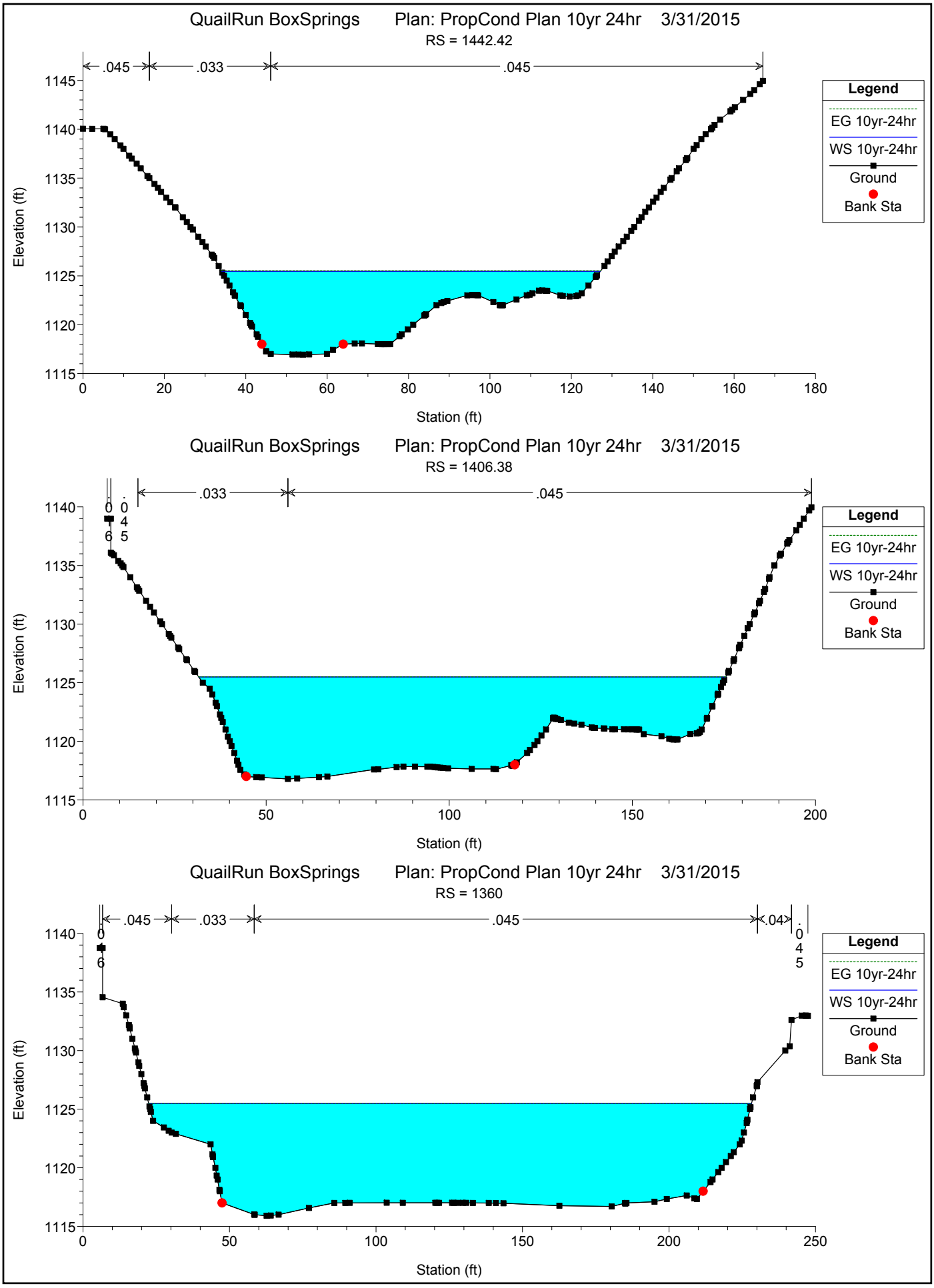

QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 187.19
.06
.03
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
Elevation (ft)
Station (ft)
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 107.9
.06
.03
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
Elevation (ft)
Station (ft)
QuailRun BoxSprings Plan: ExistCond Plan 10yr-24hr 3/31/2015
RS = 0
.06
.03
Legend
EG 10yr-24hr
WS 10yr-24hr
Crit 10yr-24hr
Ground
Bank Sta
Elevation (ft)
Station (ft)


QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
Quail Run Quail Run CL
Legend
WS 10yr-24hr
Crit 10yr-24hr
Ground
Elevation (ft)
1130
1125
1120
1115
1110
1105
1100
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)

HEC-RAS Plan: PropCond 1024 River: Quail Run Reach: Quail Run CL Profile: 10yr-24hr

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)	
Quail Run CL	1519.28	10yr-24hr	805.90	1120.98	1124.29	1124.88	1126.52	0.033009	12.43	70.20	29.79	1.26
Quail Run CL	1475.16	10yr-24hr	805.90	1117.96	1125.38	1121.58	1125.58	0.001008	3.93	242.54	56.56	0.26
Quail Run CL	1442.42	10yr-24hr	805.90	1116.93	1125.47		1125.53	0.000298	2.39	452.50	93.06	0.15
Quail Run CL	1406.38	10yr-24hr	805.90	1116.79	1125.49		1125.51	0.000052	1.02	903.49	143.94	0.06
Quail Run CL	1360	10yr-24hr	805.90	1115.91	1125.50		1125.50	0.000014	0.53	1572.42	205.79	0.03
Quail Run CL	1282.03	10yr-24hr	805.90	1114.96	1125.50		1125.50	0.000010	0.46	1827.33	225.76	0.03
Quail Run CL	1229.21	10yr-24hr	805.90	1114.75	1125.50		1125.50	0.000003	0.25	3265.78	363.73	0.01
Quail Run CL	1165.43	10yr-24hr	805.90	1113.68	1125.50		1125.50	0.000001	0.14	4802.04	369.34	0.01
Quail Run CL	1092.5	10yr-24hr	805.90	1112.40	1125.50		1125.50	0.000000	0.12	5906.20	425.49	0.01
Quail Run CL	953.26	10yr-24hr	805.90	1110.99	1125.50		1125.50	0.000000	0.09	7711.96	531.44	0.00
Quail Run CL	857.59	10yr-24hr	805.90	1109.98	1125.50		1125.50	0.000000	0.07	9646.64	617.04	0.00
Quail Run CL	722.3	10yr-24hr	805.90	1107.97	1125.50		1125.50	0.000000	0.03	15509.77	924.44	0.00
Quail Run CL	601.35	10yr-24hr	805.90	1104.94	1125.50		1125.50	0.000000	0.05	16518.99	1005.60	0.00
Quail Run CL	464.99	10yr-24hr	805.90	1102.00	1125.50		1125.50	0.000000	0.05	13745.41	837.39	0.00
Quail Run CL	344.26	10yr-24hr	805.90	1102.89	1125.50		1125.50	0.000000	0.11	6950.15	429.92	0.00
Quail Run CL	187.19	10yr-24hr	805.90	1101.00	1125.50		1125.50	0.000000	0.18	5348.03	347.57	0.01
Quail Run CL	107.9	10yr-24hr	805.90	1101.96	1125.50		1125.50	0.000000	0.16	5953.89	353.04	0.01
Quail Run CL	0	10yr-24hr	805.90	1101.00	1125.50	1101.95	1125.50	0.000000	0.13	7198.88	392.75	0.00


QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 1165.43
.045
.04
.06
.06
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 1519.28
.045
.033
.045
.12
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
Crit 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 1475.16
.045
.033
.045
.12
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Crit 10yr-24hr
Ground
Bank Sta


QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 1442.42
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Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 1406.38
.033
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 1360
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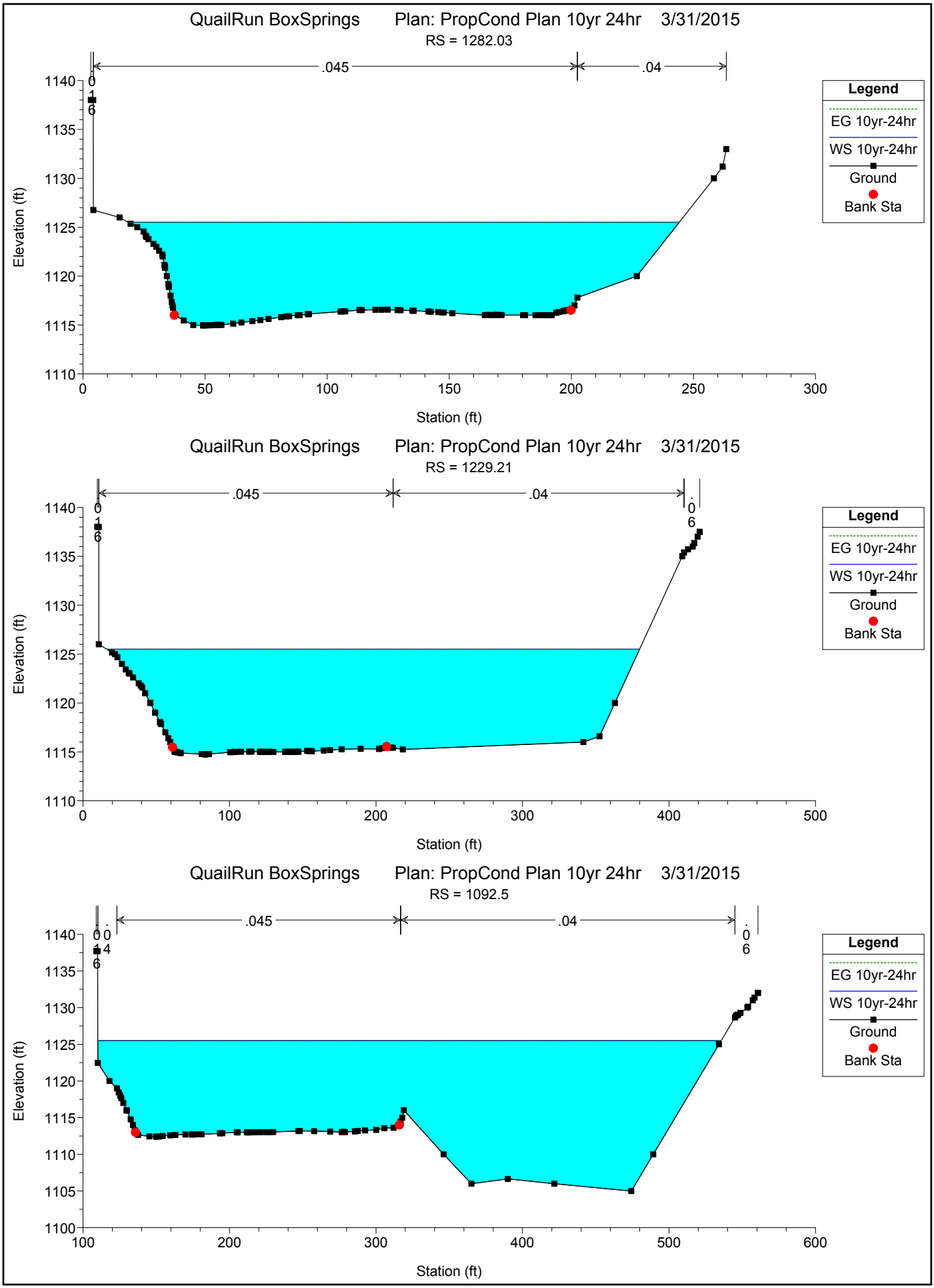
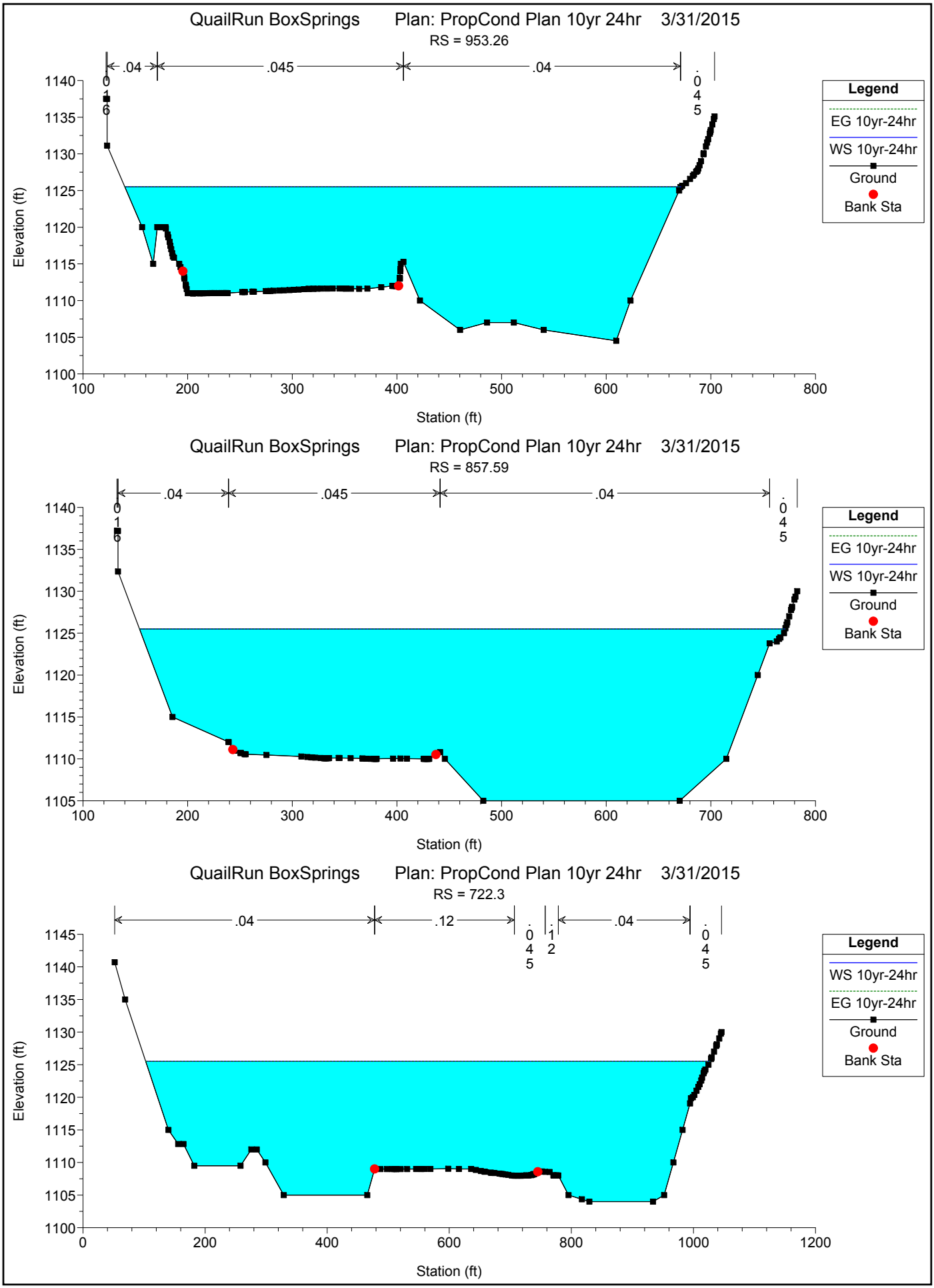
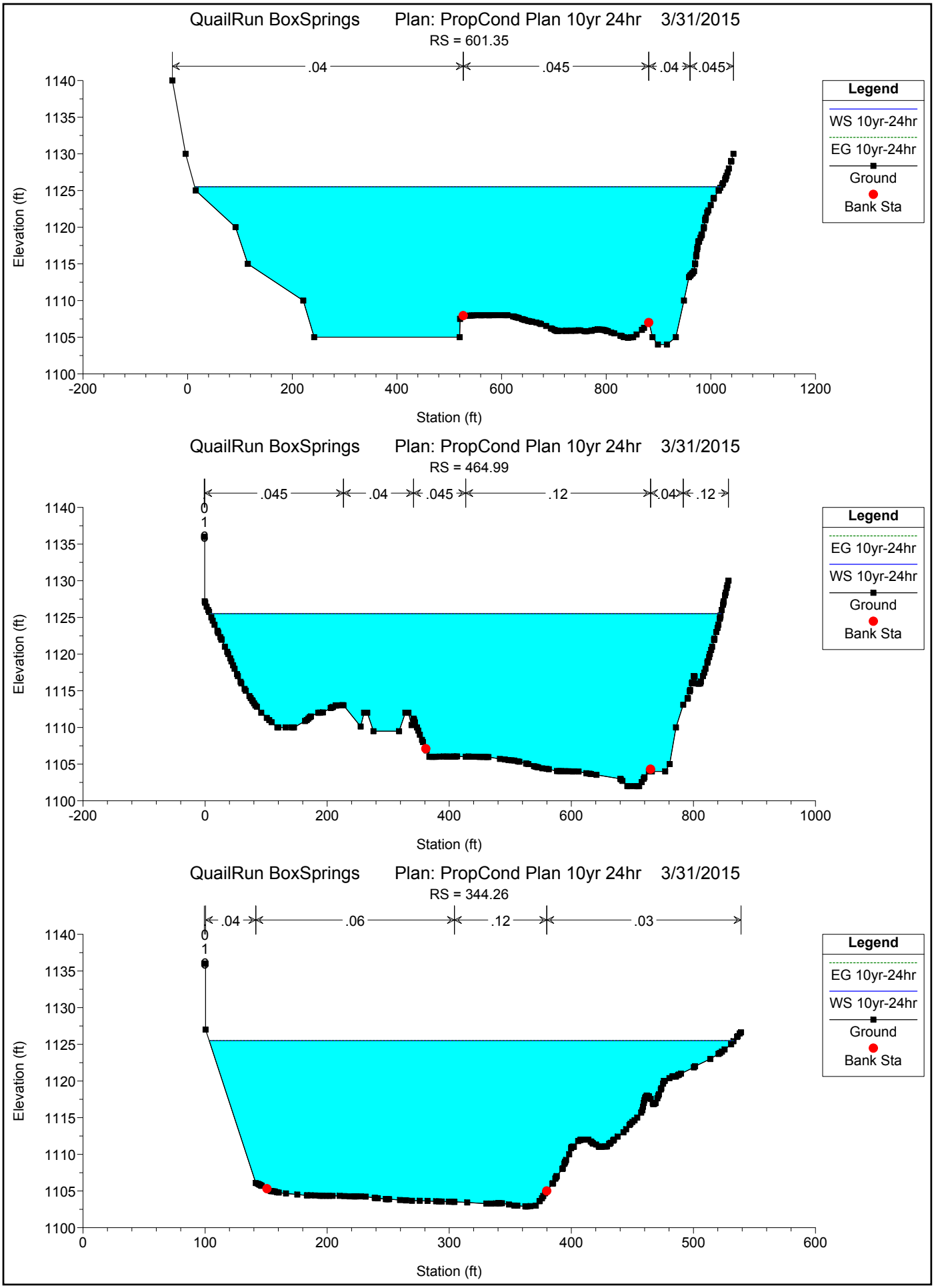
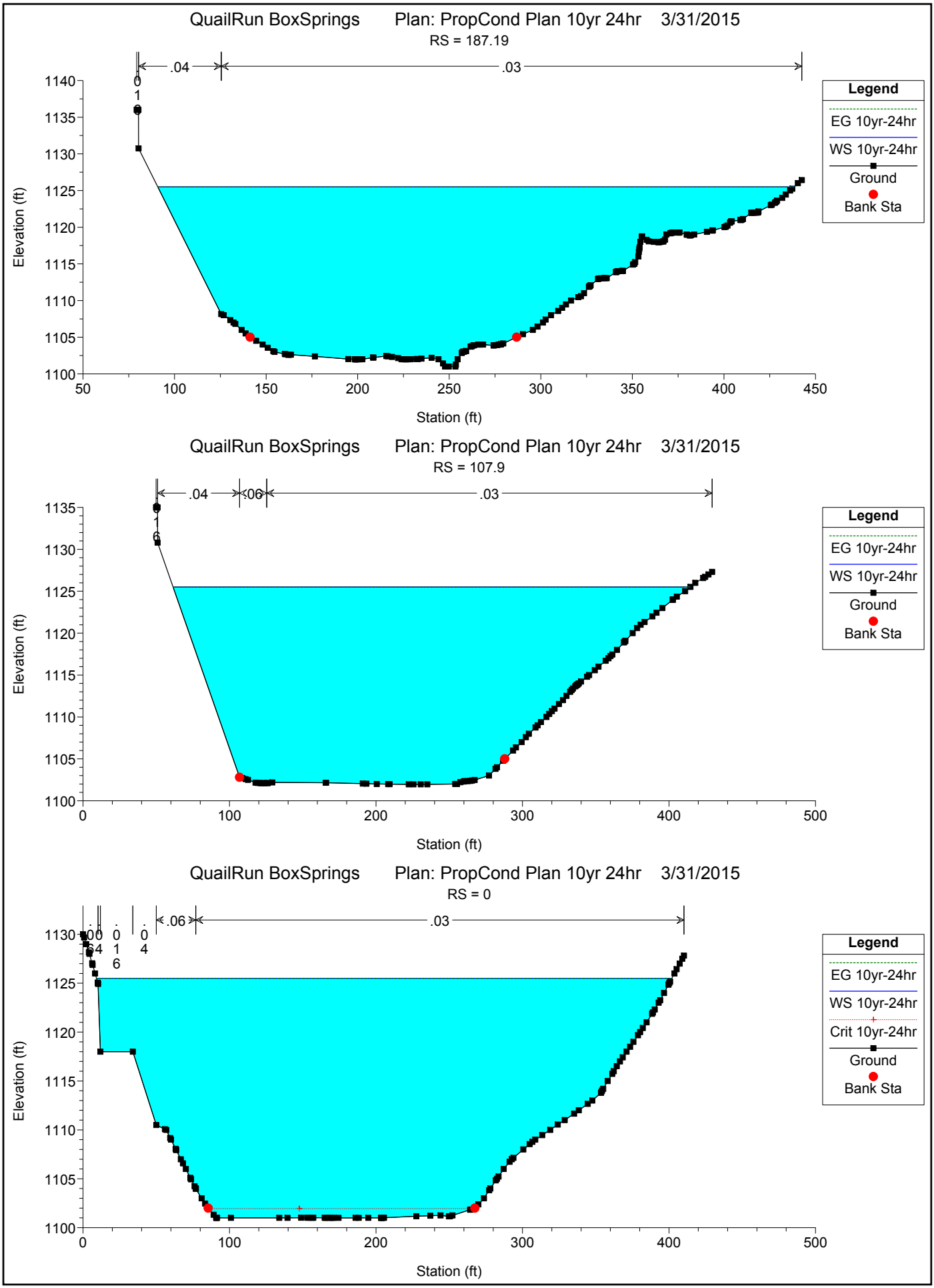
.033
.045
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta


QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 1282.03
.045
.04
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
Elevation (ft)
Station (ft)
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 1229.21
.045
.04
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
Elevation (ft)
Station (ft)
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 1092.5
.045
.04
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
Elevation (ft)
Station (ft)


QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 953.26
.04
.045
.04
.045
.045
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
Elevation (ft)
Station (ft)
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 857.59
.04
.045
.04
.045
.045
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
Elevation (ft)
Station (ft)
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 722.3
.04
.12
.045
.12
.04
.045
Legend
WS 10yr-24hr
EG 10yr-24hr
Ground
Bank Sta
Elevation (ft)
Station (ft)


QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 601.35
.04
.045
.04
.045
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
-200
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS 10yr-24hr
EG 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 464.99
.045
.04
.045
.12
.04
.12
0
1
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
-200
0
200
400
600
800
1000
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 344.26
.04
.06
.12
.03
0
1
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
0
100
200
300
400
500
600
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta


QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 187.19
.04
.03
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 107.9
.04
.06
.03
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Ground
Bank Sta
QuailRun BoxSprings Plan: PropCond Plan 10yr 24hr 3/31/2015
RS = 0
.06
.03
Elevation (ft)
Station (ft)
Legend
EG 10yr-24hr
WS 10yr-24hr
Crit 10yr-24hr
Ground
Bank Sta

APPENDIX 3

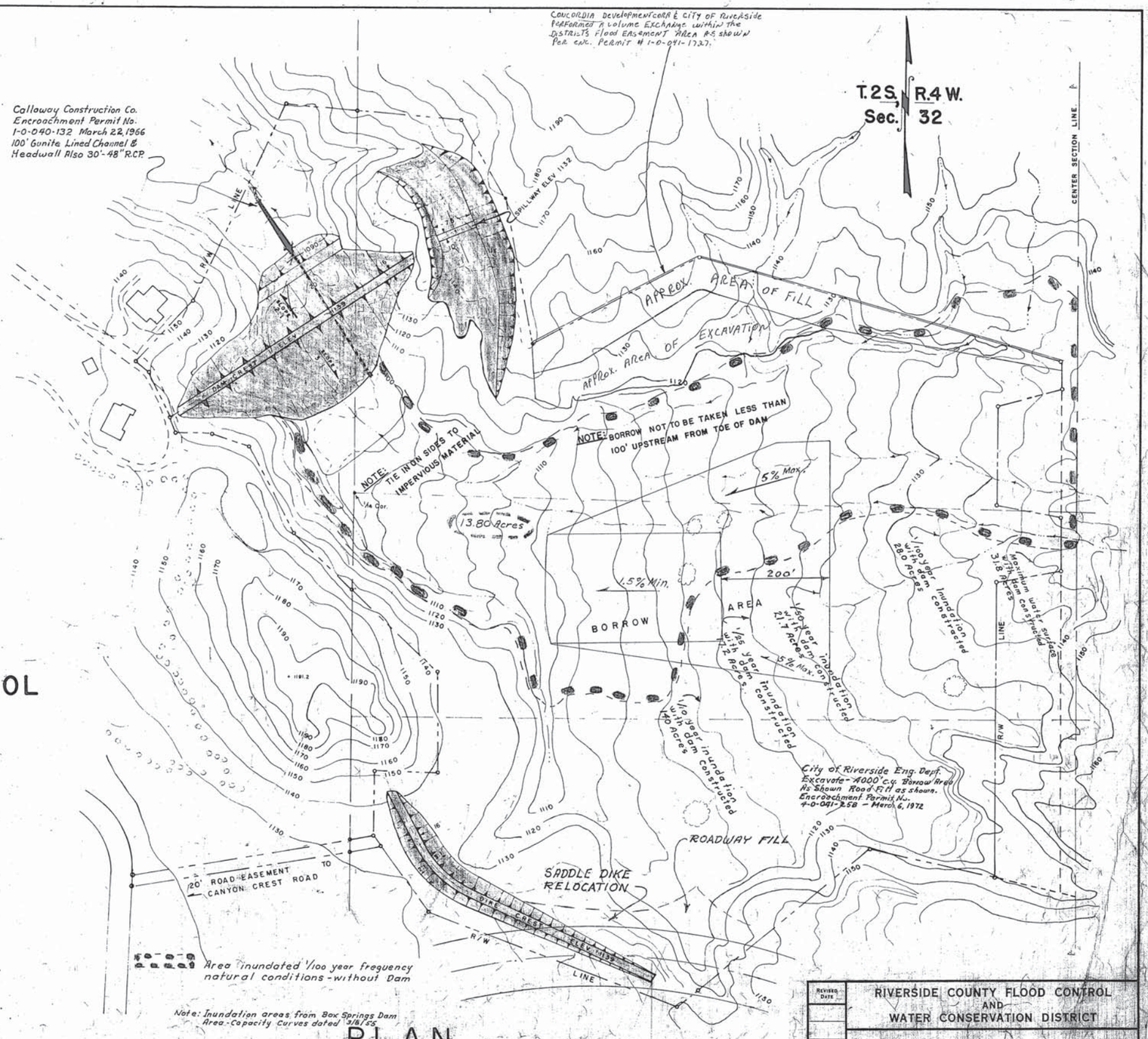
Box Springs Dam Drawings

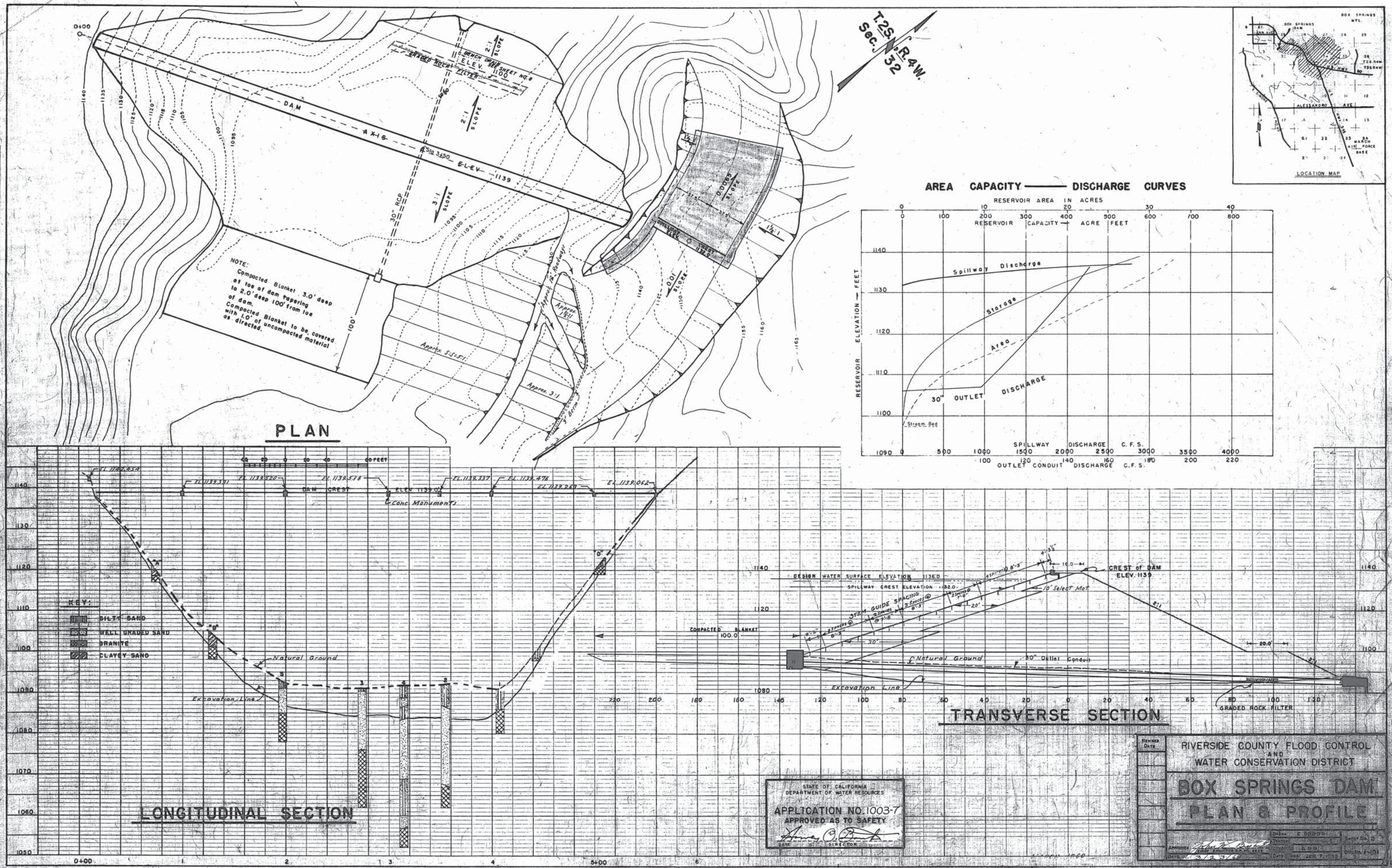
CONSTRUCTION DRAWINGS

BOX SPRINGS DAM AND DIKE

PREPARED BY

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT



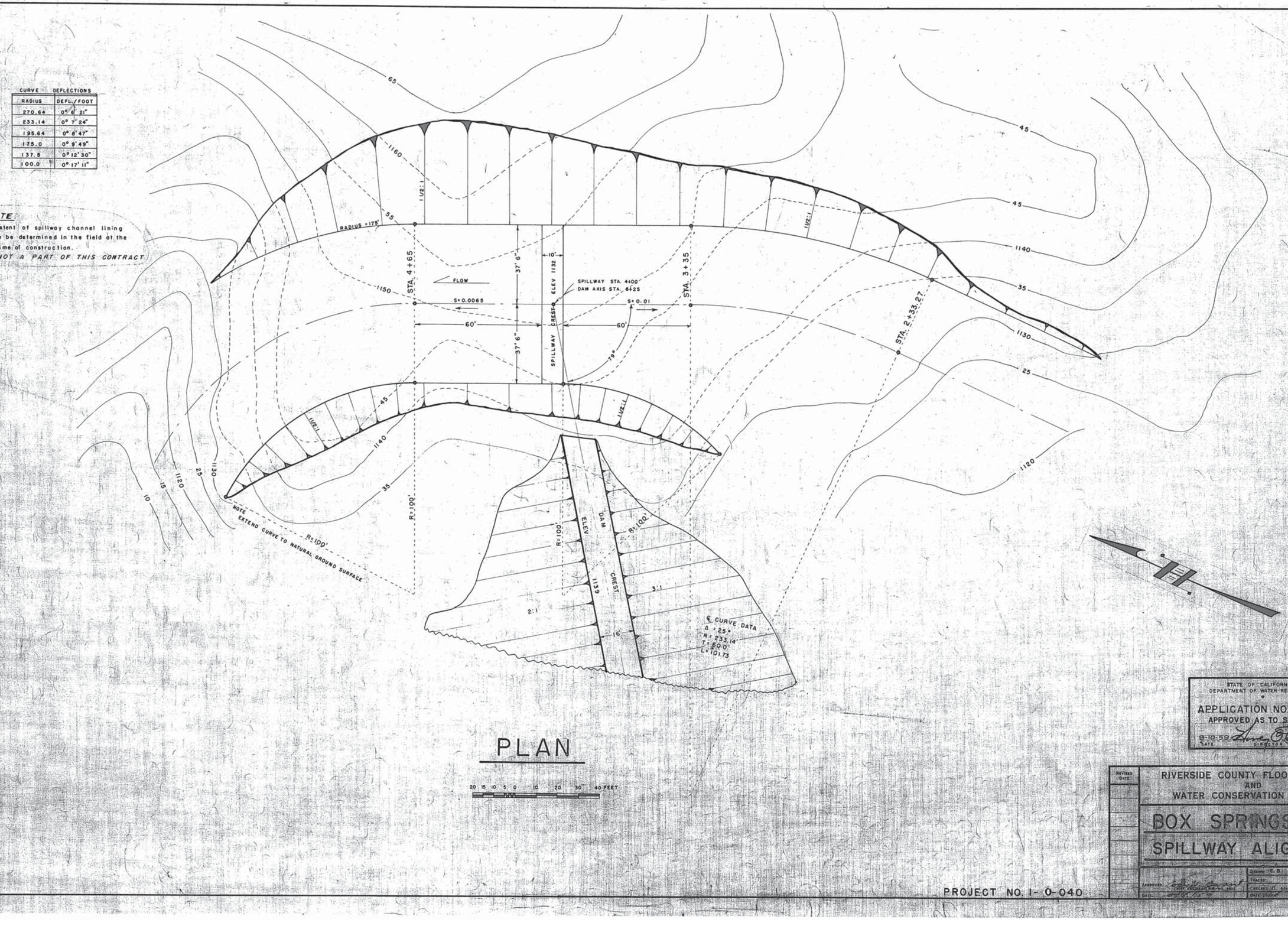

PLAN
T.2S. R.4W.
Sec. 32
DAM AXIS ELEV. 1139
30" RCP
NOTE:
Compacted Blanket 3.0' deep at toe of dam tapering to 2.0' deep 100' from toe of dam.
Compacted Blanket to be covered with 1.0' of uncompacted material as directed.
LOCATION MAP
BOX SPRINGS DAM
ALESSANDRO AVE
MARCH AIR FORCE BASE
AREA CAPACITY — DISCHARGE CURVES
RESERVOIR AREA IN ACRES
RESERVOIR CAPACITY — ACRE FEET
RESERVOIR ELEVATION — FEET
Spillway Discharge
Storage
Area
30" OUTLET DISCHARGE
Stream Bed
SPILLWAY DISCHARGE C.F.S.
OUTLET CONDUIT DISCHARGE C.F.S.
DAM CREST ELEV. 1139.0
Conc. Monuments
KEY:
SILTY SAND
WELL GRADED SAND
GRANITE
CLAYEY SAND
Natural Ground
Excavation Line
LONGITUDINAL SECTION
DESIGN WATER SURFACE ELEVATION 1136.0
SPILLWAY CREST ELEVATION 1132.0
CREST of DAM ELEV. 1139
COMPACTED BLANKET 100.0'
10' Select Mat.
30" Outlet Conduit
GRADED ROCK FILTER
TRANSVERSE SECTION
STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
APPLICATION NO. 1003-7
APPROVED AS TO SAFETY
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
BOX SPRINGS DAM
PLAN & PROFILE
PROJECT NO. 1-0-04

CURVE	DEFLECTIONS
RADIUS	DEFL./FOOT
270.64	0° 6' 21"
233.14	0° 7' 24"
195.64	0° 8' 47"
175.0	0° 9' 49"
137.5	0° 12' 30"
100.0	0° 17' 11"

NOTE

Extent of spillway channel lining to be determined in the field at the time of construction.

NOT A PART OF THIS CONTRACT



PLAN

20 15 10 5 0 10 20 30 40 FEET

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
APPLICATION NO. 1003-7
APPROVED AS TO SAFETY
2-10-59
DATE DIRECTOR

REVISED DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

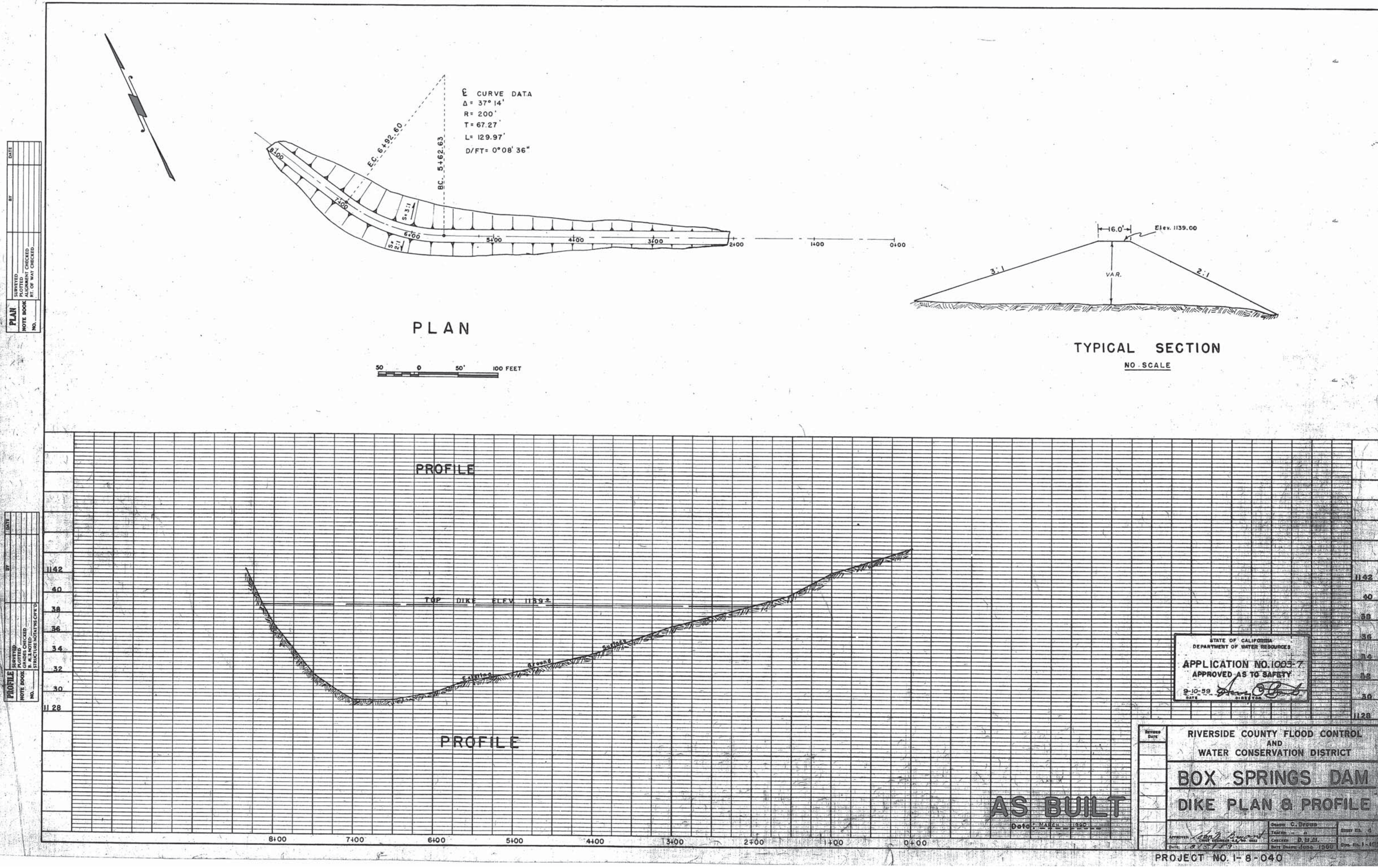
BOX SPRINGS DAM SPILLWAY ALIGNMENT

APPROVED
CITY ENGINEER R.C.F.C. & W.C.D.
DATE

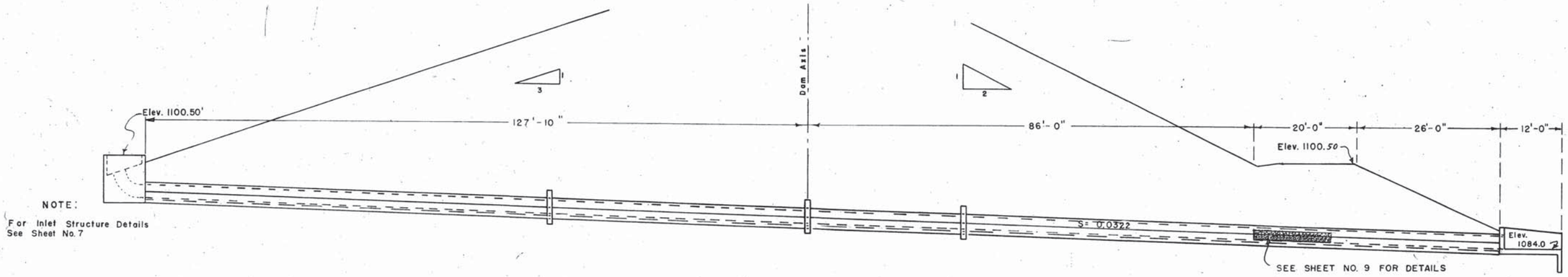
DESIGNED C. D.
TRACED
CHECKED D. P.
DATE 1-1959

SCALE 1" = 40'

PROJECT NO. I-0-040



PLAN
NOTE BOOK
NO.
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
BY
DATE
℄ CURVE DATA
Δ = 37° 14'
R = 200'
T = 67.27'
L = 129.97'
D/FT = 0°08' 36"
E.C. 6+92.60
B.C. 5+62.63
S = 3:1
S = 2:1
8+00
7+00
6+00
5+00
4+00
3+00
2+00
1+00
0+00
PLAN
50 0 50' 100 FEET
16.0'
Elev. 1139.00
3:1
2:1
VAR.
TYPICAL SECTION
NO SCALE
PROFILE
TOP DIKE ELEV. 1139±
Existing Ground Surface
1142
40
38
36
34
32
30
1128
PROFILE
PROFILE
NOTE BOOK
NO.
SURVEYED
PLOTTED
GRADES CHECKED
B.M.'S NOTED
STRUCTURE NOTATIONS CHK'D
BY
DATE
STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
APPLICATION NO. 1003-7
APPROVED AS TO SAFETY
9-10-59
DATE
DIRECTOR
AS BUILT
Date: MARCH 1960
REVISED DATE
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
BOX SPRINGS DAM
DIKE PLAN & PROFILE
APPROVED:
CHIEF ENGINEER
DATE:
DRAWN C. Brown
TRACED
CHECKED D.M.M.
DATE DRAWN June 1960
SHEET NO. 4
PROJECT NO. 1-8-040

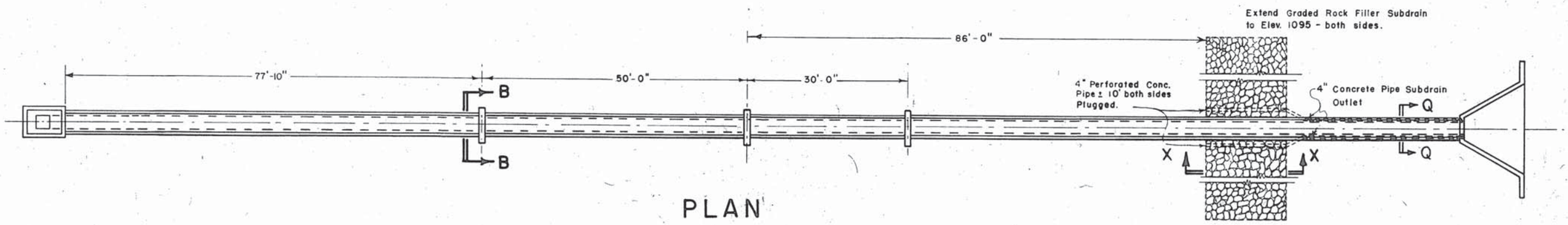


NOTE:
For Inlet Structure Details
See Sheet No. 7

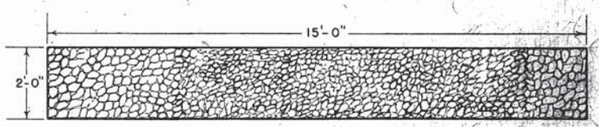
ELEVATION

10 0 10 20 FEET

NOTE:
For Outlet Structure Details
See Sheet No. 6



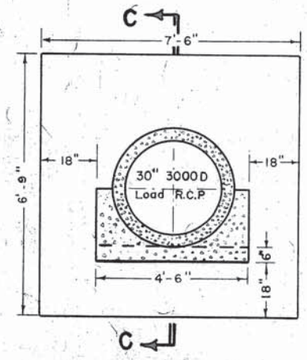
PLAN



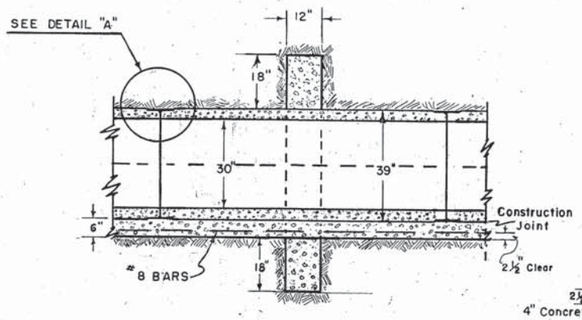
SECTION X-X

GRADED ROCK FILTER REQUIREMENTS

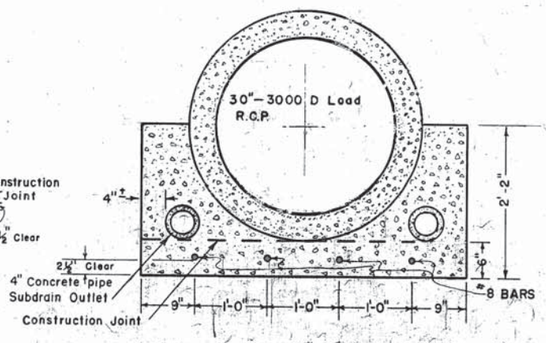
Sieve No.	% Passing
1½"	50-80
1"	-----
¾"	30-55
½"	-----
⅜"	20-40
#4	15-30
#8	0-10
#16	0



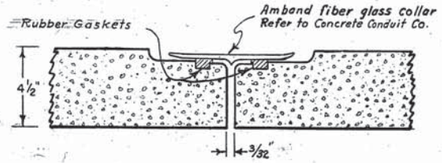
SECTION B-B



SECTION C-C



SECTION Q-Q



DETAIL - A

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
APPLICATION NO. 1003-7
APPROVED AS TO SAFETY
SAC. 7-11-60 DIRECTOR

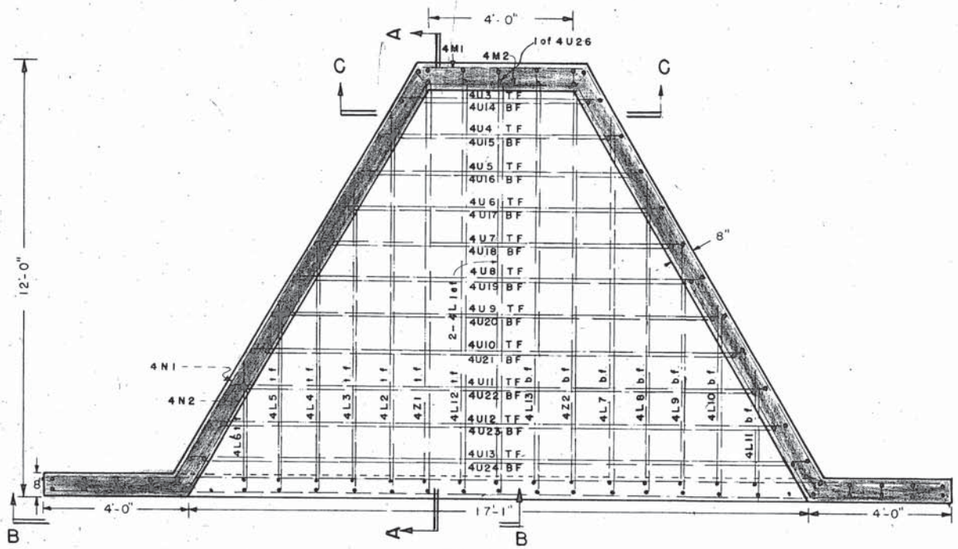
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

BOX SPRINGS DAM
--- DETAILS ---
30" OUTLET PIPE

APPROVED: Chief Engineer, R.C.F.C. & W.C.D.
DATE: 12/28/60
DESIGNED BY: C.B.B. K.R.D.
CHECKED BY: B.B.B. D.N.
DATE DRAWN: July 1959
SHEET NO. 5
DR. NO. 1-101

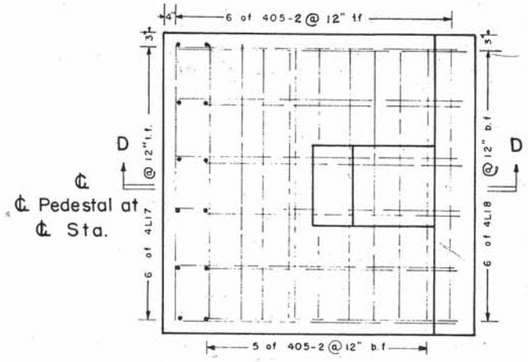
MARCH 1960

PROJECT NO 1-0-040



PLAN

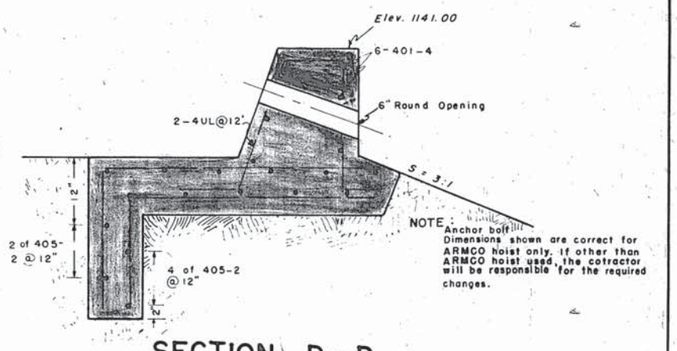
OUTLET STRUCTURE



PLAN

GATE HOIST PEDESTAL

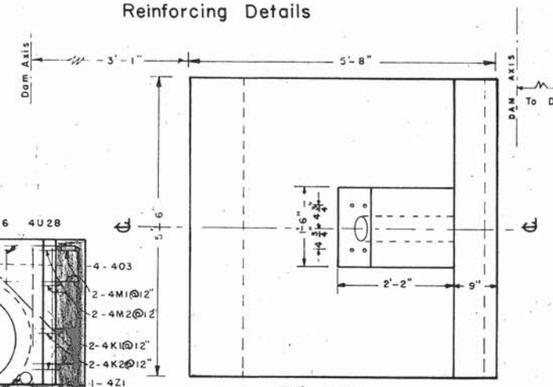
Reinforcing Details



SECTION D-D

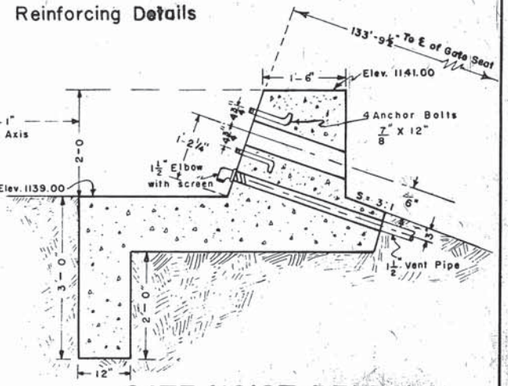
GATE HOIST PEDESTAL

Reinforcing Details



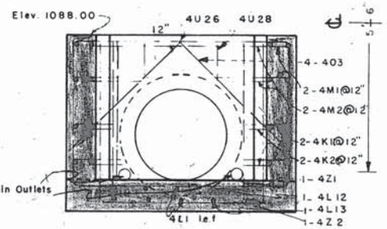
PLAN

GATE HOIST PEDESTAL



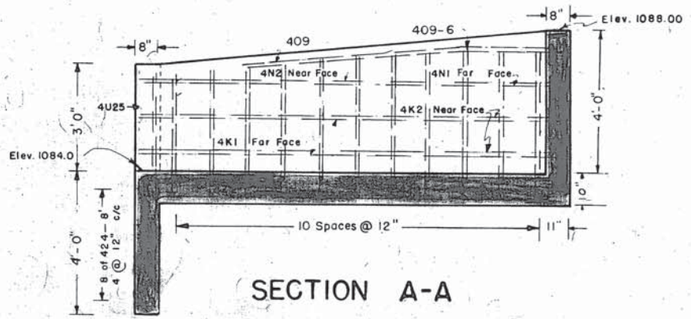
GATE HOIST PEDESTAL

Transverse Section



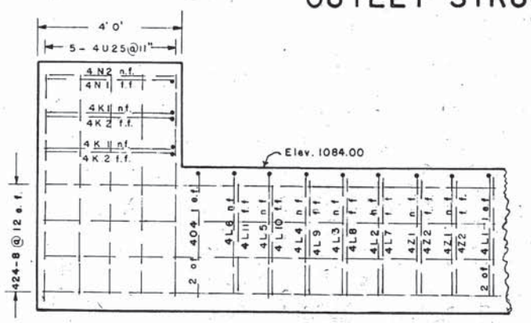
SECTION C-C

OUTLET STRUCTURE



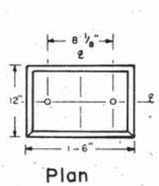
SECTION A-A

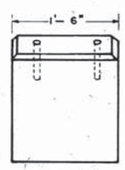
OUTLET STRUCTURE

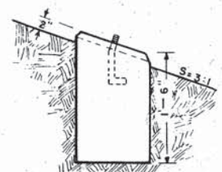


SECTION B-B

OUTLET STRUCTURE







2" Gate Stem Guide Supports

TO BE INSTALLED AT 10 FOOT CENTERS OR AS DIRECTED BY THE ENGINEER

NOTE: Dimensions of 2" Stem Guide Supports are typical for ARMCO fully adjustable stem guide Type I. The Contractor will be responsibe for necessary adjustments if an other type is used.

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
APPLICATION NO. 1003-7
APPROVED AS TO SAFETY
9-10-59
DATE
DIRECTOR

AS BUILT
Date: MARCH 1960

Revised Date

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

BOX SPRINGS DAM

DETAILS OF OUTLET STRUCTURE, GATE HOIST PEDESTAL & GATE STEM GUIDE SUPPORTS

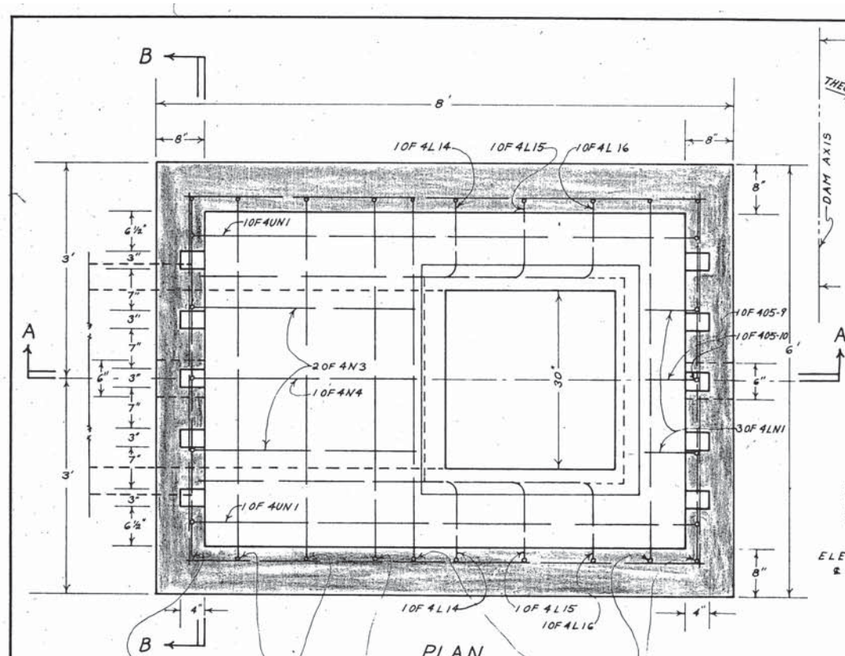
Approved ... CHIEF ENGINEER R.C.F.C.&W.C.D. 4933

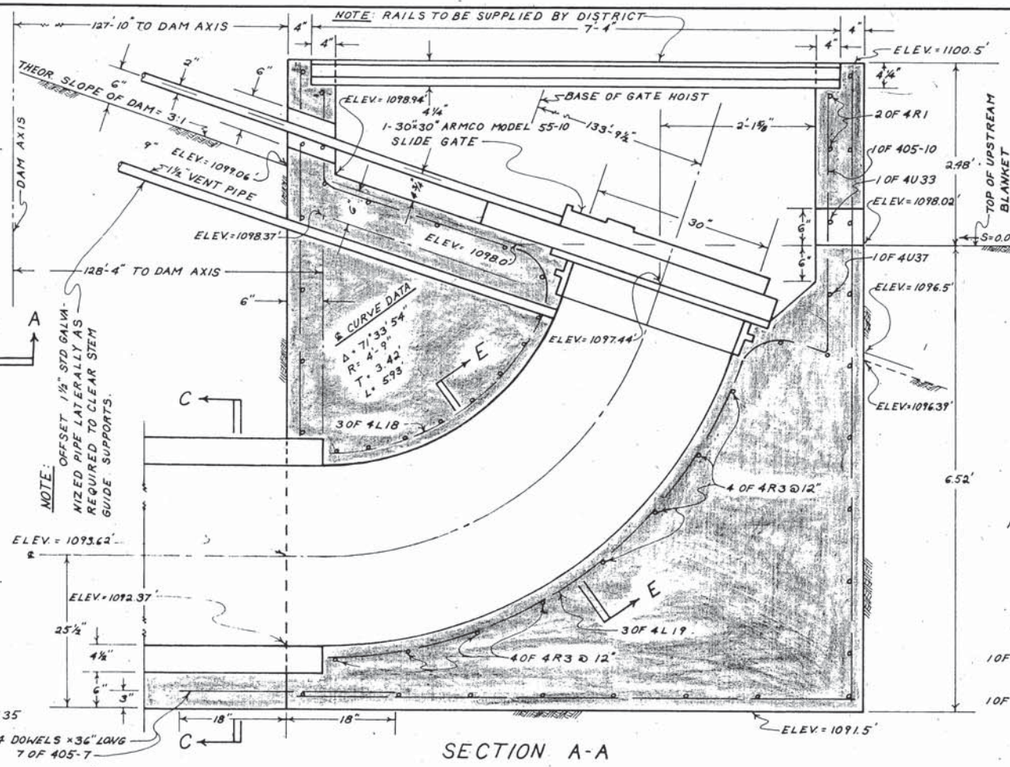
Drawn: C. Brown
Traced:
Checked: D. M. M.
Date Drawn: June 1959

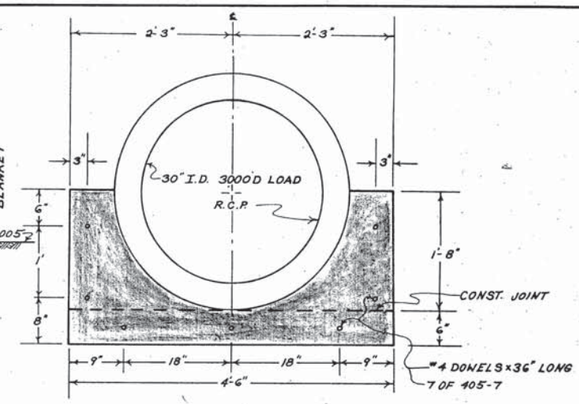
Sheet No. 6

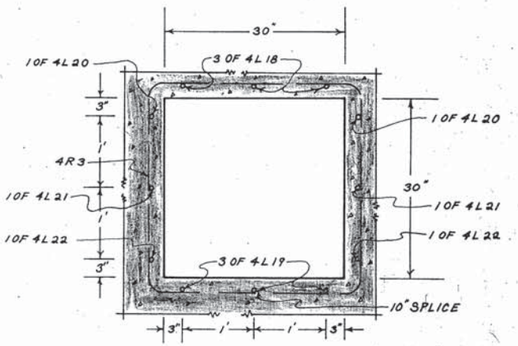
Dwg. No. I-101

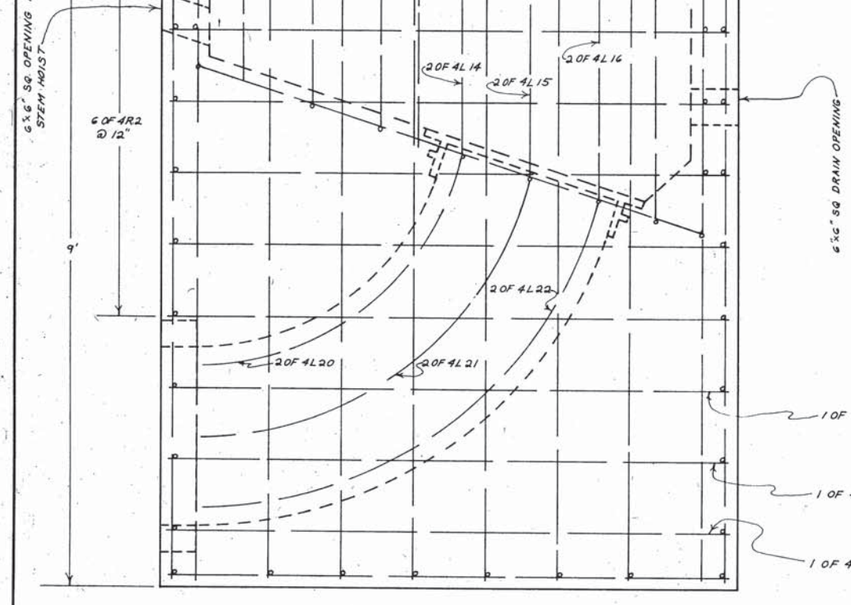
PROJECT NO. I-0-040

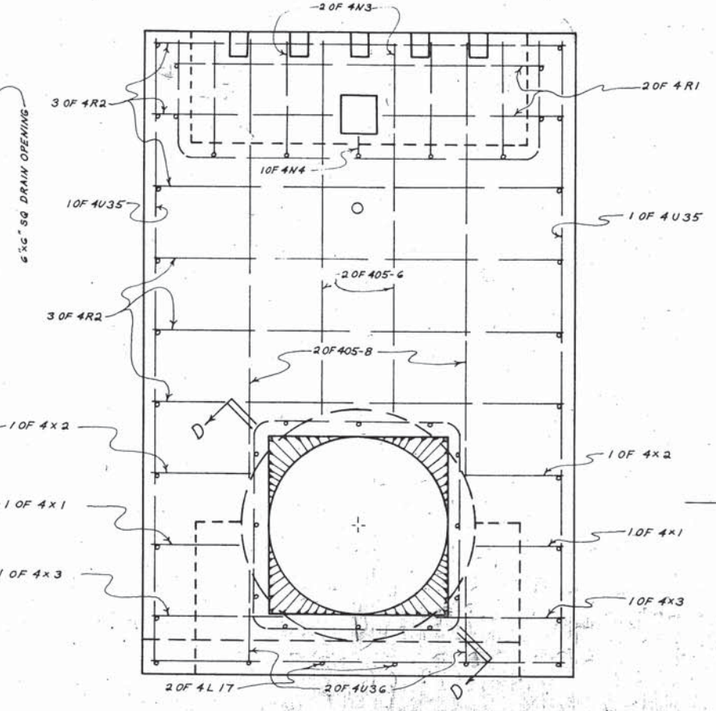


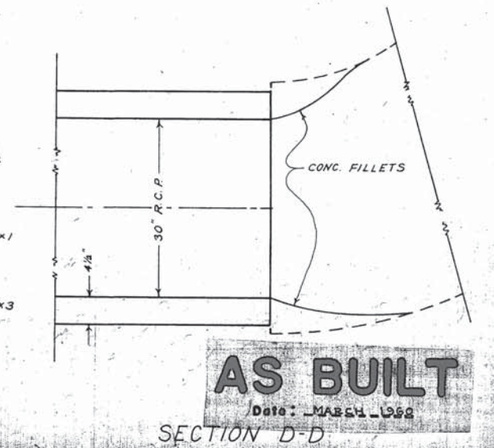












STATE OF CALIFORNIA
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APPLICATION NO. 1003-7
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9-10-59
DATE
DIRECTOR

NOTE

1. ALL REINF. STEEL HAS 2" CONC. COVER TO ℄ OF OUTER MOST BARS UNLESS OTHERWISE SHOWN.
2. STEEL BENDS = 4" RADIUS.
3. REINF. STEEL BAR SPLICES = 10" OVERLAP.

APPROX. QUAN. OF MATERIALS

1. VOL. CONCRETE =	11.6 CY.
2. QUAN. OF REINF. STEEL =	660.93#
3. NO. STEEL RAILS - 7'-4" LONG =	5
4. NO. OF 30"x30" ARMCO MODEL 55-10 SLIDE GATES =	1

SCALE

1' 0 1' 2' 3' 4'

AS BUILT
Date: MARCH 1962

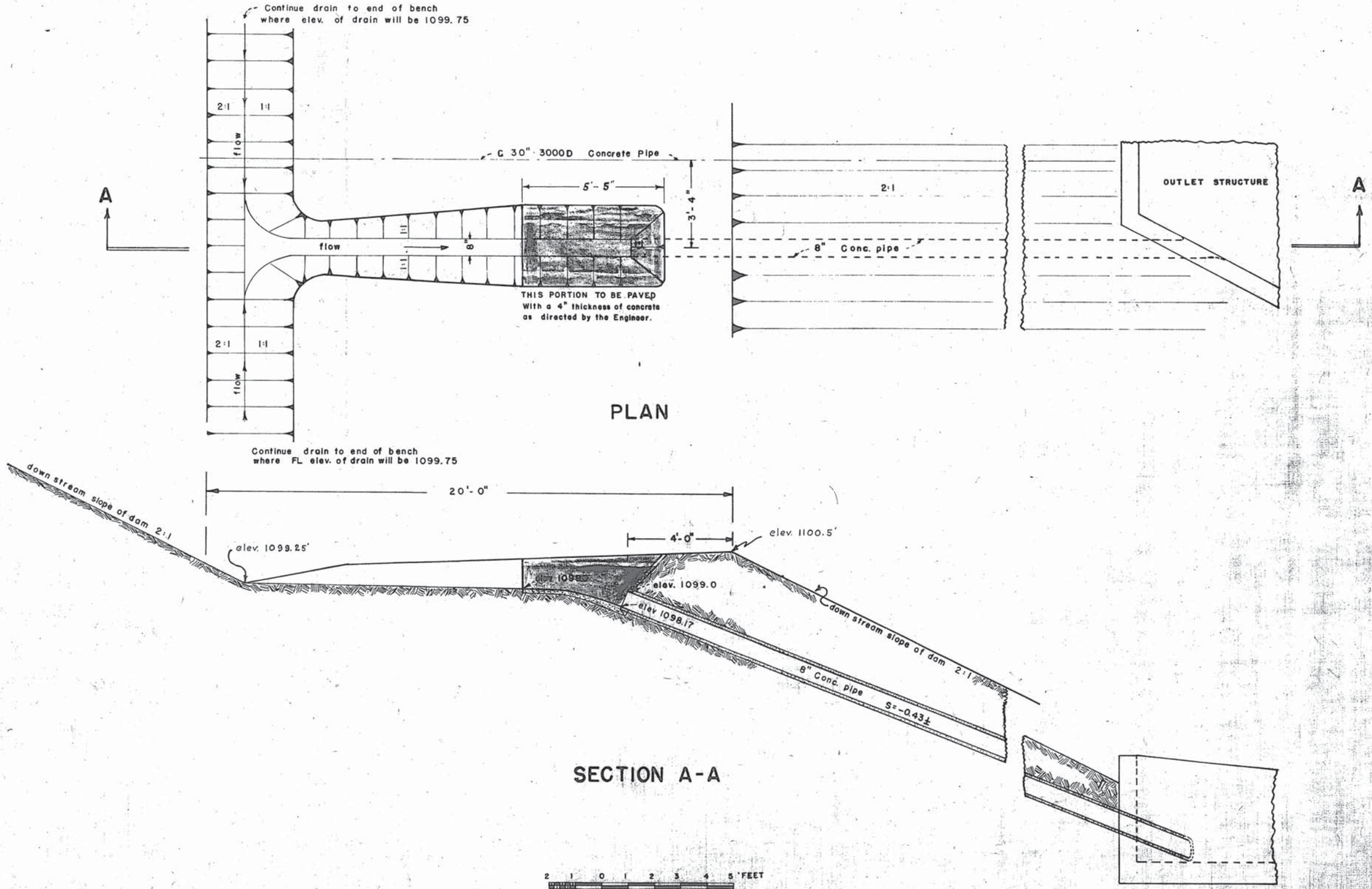
REVISED DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

BOX SPRINGS DAM
INLET STRUCTURE DETAILS

APPROVED: [illegible] CHIEF ENGINEER & GEN. MGR.	DRAWN: R. DAVIS	SHEET NO. 7
DATE:	TRACED: R. DAVIS	DWG. NO. 1-101
	CHECKED:	
	DATE DRAWN: JULY 22 1957	

PROJECT NO. 1-0-040



STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
APPLICATION NO. 1003-7
APPROVED AS TO SAFETY
DATE 2-16-60 DISTRICT ENGINEER

AS BUILT
Date: MARCH 1960

Date	
3/15/60	

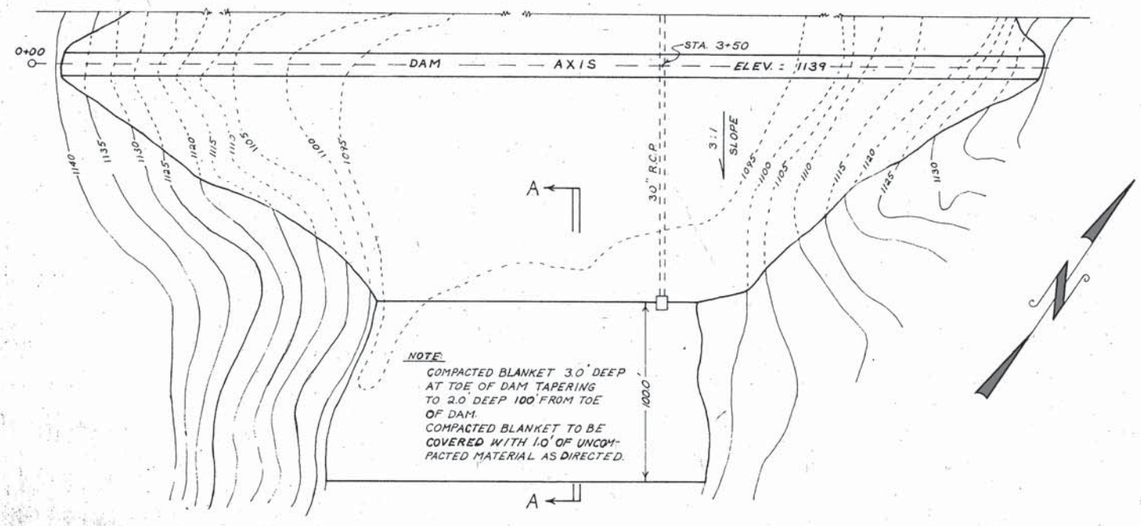
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

BOX SPRINGS DAM

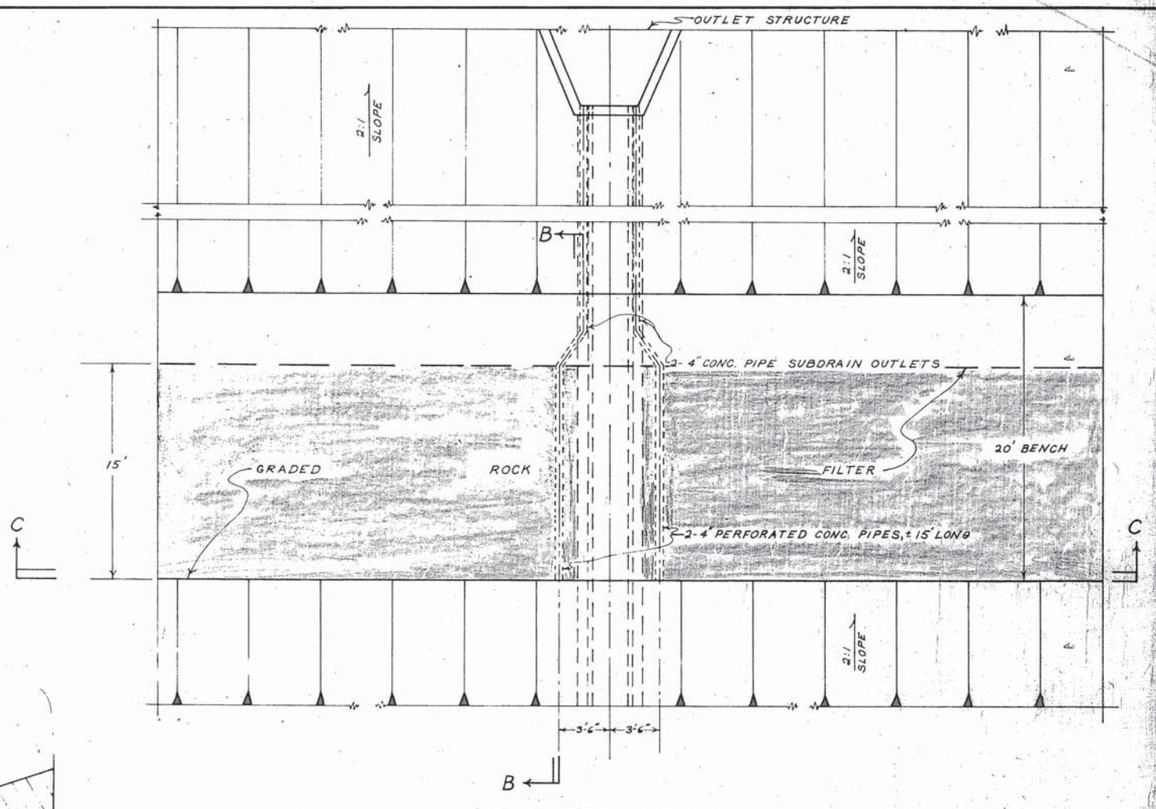
BENCH DRAIN DETAIL

Approved: John W. Bryant, CHIEF ENGINEER R.E. NO. 9855
Date: 4/23/60
Designed: C. Dreiss
Traced: " "
Checked: O. M. M.
Date Drawn: June 1959
Sheet No. 8
Spec. No. I-101

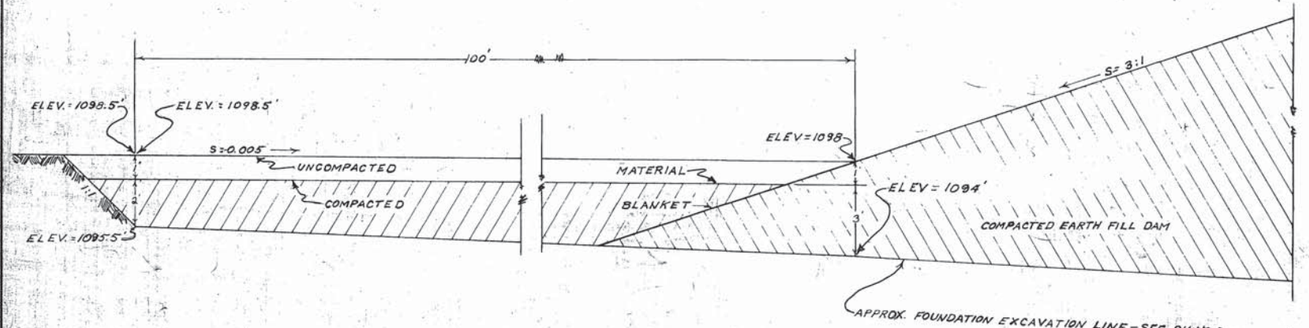
PROJECT NO. I-0-040



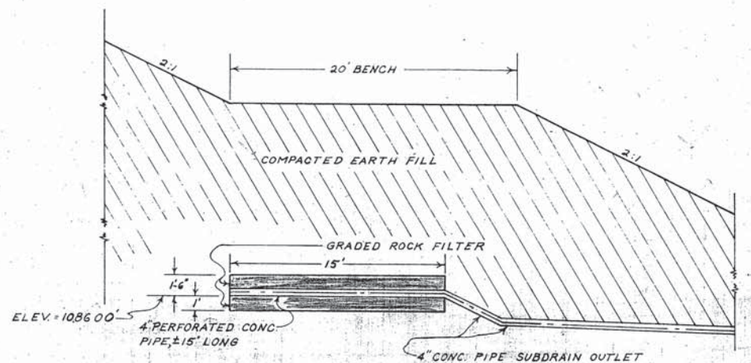
PLAN
SCALE: 1"=40'



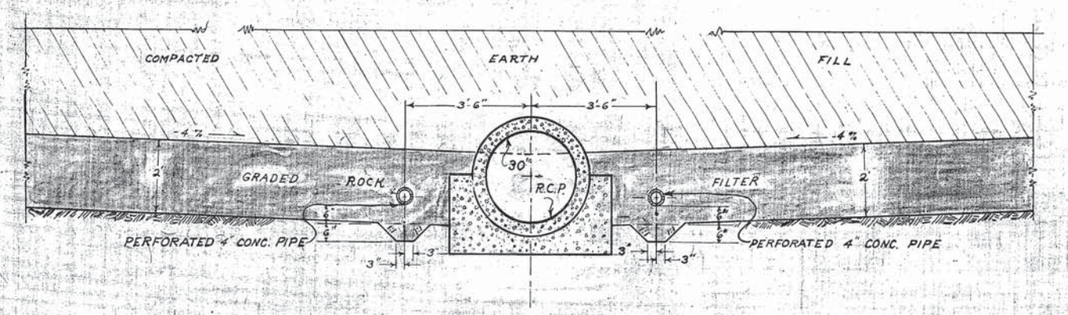
DOWN STREAM PLAN
SCALE: 1"=5'



SECTION A-A
SCALE: 1"=3'



SECTION B-B
SCALE: 1"=5'



SECTION C-C
SCALE: 1"=2'

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
APPLICATION NO. 1003-7
APPROVED AS TO SAFETY
DATE 2-2-60

AS BUILT
Date: MARCH 1960 JWB

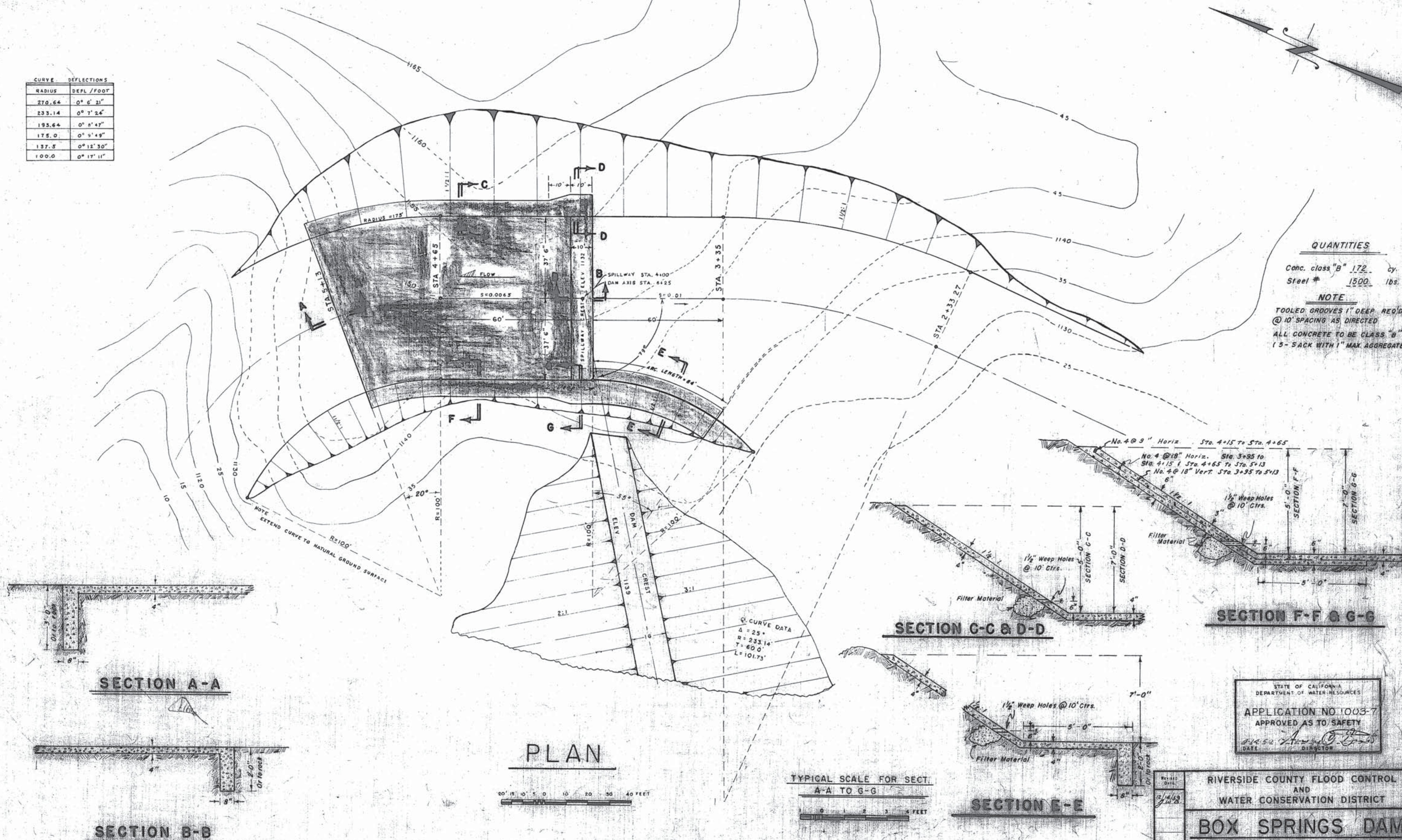
REVISED DATE
2nd 3/11/60

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

BOX SPRINGS DAM
BLANKET & SUBDRAINAGE DETAILS

APPROVED: [illegible] CHIEF ENGINEER & GEN. MGR.	DESIGN: R. DAVIS	SHEET NO. 9
	TRACED: R. DAVIS	
DATE: 3/31/60	CHECKED:	DWG. NO. 1-101
	DATE DRAWN: 7/28/57	

PROJECT NO. 1-0-040



CURVE	DEFLECTIONS
RADIUS	DEFL /FOOT
270.64	0° 6' 21"
233.14	0° 7' 24"
193.64	0° 8' 47"
175.0	0° 9' 49"
137.5	0° 12' 30"
100.0	0° 17' 11"

QUANTITIES

Conc. class "B" 172 cy.
Steel # 1500 lbs.

NOTE

TOOLED GROOVES 1" DEEP REQ'D. @ 10' SPACING AS DIRECTED
ALL CONCRETE TO BE CLASS "B" (5-SACK WITH 1" MAX. AGGREGATE.

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
APPLICATION NO. 1003-7
APPROVED AS TO SAFETY
DATE 4-14-52 DIRECTOR

S BUILT
Date: 12-14-1959 JWB

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

BOX SPRINGS DAM

SPILLWAY LINING DETAILS

Revised Date: 12/14/59 JWB

Approved: Chief Engineer R.E. No. 2821

Drawn: C.G.
Traced: K.R.B.
Checked: D.M.B.
Date Drawn: DEC. 1, 1959
Sheet No. 10
Dwg. No. 1-101

PROJECT NO. 1-0-040