Vista Oaks Estates
Blk B, Lots 48-52,55-59
Blk A, Lots 13-15, 19-22,
44,45,59,65 and 71

Floodplain Information Study for Brushy Creek Tributary 5

At
West of FM 1565
City of Royse City
Hunt County, Texas

For
Helmberger Associates, Inc.
1525 Bozman Road
Wylie, Texas 75098

STATE OF TEXAS
MICHAEL H. BOYD
81847
LICENSED
PROFESSIONAL ENGINEER

11–29–2022

BH Job # BH233
November 2022
Boyd Hydrology PLLC
Firm #F-12332

VISTA OAKS ESTATES RESIDENTIAL DEVELOPMENT
FLOODPLAIN INFORMATION ANALYSIS FOR BRUSHY CREEK TRIBUTARY
FLOODPLAIN LOTS BLOCK A, LOTS 13-15, 19-22, 44, 45, 65 and 71
BLOCK B, LOTS 48-52 and 55-59
ROYSE CITY, HUNT COUNTY, TEXAS
Report BH233, Version Date 11/29/2022

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I. ***STUDY METHODOLOGY***

1. ***STUDY SCOPE***

The Vista Oaks Estates development has been completed with lots being taken down by potential home builders. The majority of the lots are sufficiently out of the floodplain and considered as ready to grade the pad are with a finish floor of the structure to be 2-feet above the adjacent flood elevation. However, among the lots that need some additional consideration, there are 22 (twenty-two) lots that will need considerable fill, vertical walls, driveway culverts, and/or channel realignment.

The lots being addressed by this report are Block A lots 44A and 45A on Southern Oaks Drive; Block B lots 48B, 49B, 50B, 51B, and 52B on Willow Oak Bend; Block B lots 55B, 56B, 57B, 58B and 59B on Vista Oak Drive; Block A lots 13A, 14A, and 15A on Weeping Oak; Block A lots 19A, 20A, 21A, and 22A on Blackjack Oak Court; and lots 59 A, 65A on Candy Oak Court and 71A on Post Oak Court.

In order to determine the detailed 100-year flood elevations for the properties, this report uses the initial subdivision drainage report (dated June 5, 2017) watershed hydrology to establish 100-year design discharges and hydraulic modeling to establish the pre-project 100-year elevation at each specific lot location. The proposed lot grading uses detail lot grading provided by Helmberger Associates in a pdf and cad format.

For Hydraulic modeling, this report includes three models labeled as (1) Record model, (2) Revised Existing model, and (3) Proposed Project model.

The Record model is a duplication of the Ras model from the initial design report dated June 5, 2017. This model geometry was from field surveyed topography, the road culverts

were sized, the 100-year developed floodplain elevations were determined and mapped and potential lot pad areas were blocked out of the cross section areas.

The second Revised Existing model is an update of the June 2017 model. Using 2018 USGS Lidar topography, this Ras model, extended the Record model downstream about 1000-feet to reflect the backwater effects from the culvert at FM 1565. Using this Lidar topography, new cross sections were added in the 1000-foot reach downstream for an improved water surface profile at the Vista Oaks north property line Xsection 1. The geometry in Cross Sections 1 and 2 were also replaced to add greater detail on the off-site extensions. Channel and overbank "n" values were revised to reflect a developed condition that would remove debris and vegetation over-growth in the channel, and would thin out the vegetation in the overbanks.

The third Proposed Project is a copy of the Revised Existing model that modifies the geometry at the 22 (twenty-two) lots that will need either/or considerable fill, vertical walls, and/or driveway culverts and channel realignment. The geometry is based on proposed grading that has been provided by Helmberger Associates.

2. ***LOT SPECIFICS***

Lots 59A and 65A front on Candy Oak Court with an adjacent floodplain BFE (base flood elevation) of 526.1 and 528.6. The lots are to be graded/with vertical wall to a minimum finish floor elevation of 528.1 and 530.6, 2-feet above the BFE (per Exhibit 3, sheet 4).

Lots 13A, 14A, and 15A front on Weeping Oak with adjacent floodplain BFE's of 514.7, 515.0, and 516.2. The lots are to be graded to have a minimum finish floor elevation of 516.7, 517.0, and 518.2, 2-feet above the BFE (per Exhibit 3, sheet 2).

Lots 19A, 20A, 21A, and 22A front on Blackjack Oak Court with adjacent floodplain BFE's of 518.9, 518.9, 518.5, and 518.3. The lots are to be graded/ with vertical wall to

have a minimum finish floor elevation of 520.9, 520.9, 520.5 and 520.3, 2-feet above the BFE (per Exhibit 3, sheet 5). Lots 19A and 20A have low flow driveways that cross the stream with the building pad at the rear of the lot. A minimum culvert to be constructed in the existing stream should be 3-30" diameter RCP to keep low flows off the drive, but overflow can be expected for less frequent storm events.

Lots 44A and 45A front on the south side of Southern Oaks Drive with an adjacent floodplain BFE of 513.8. These lots are to be graded to a minimum finish floor elevation of 5158.8, 2-feet above the BFE (per Exhibit 3, sheet 2).

Lots 52B, 51B, and 50B front Willow Oak Bend with adjacent floodplain BFE's of 512.3, 510.7, and 509.7. These lots are to be graded/with vertical wall to minimum finish floor elevations of 514.2, 512.7, and 511.7, 2-feet above the BFE (per Exhibit 3, sheet 1). Note that Lot 51B includes a realigned channel section and entry is from Southern Oaks Drive.

Lots 55B and 56B front Vista Oak Drive, north of Southern Oaks Drive, have adjacent floodplain BFE's of 509.7 and 508.9. These lots are to be graded/with vertical wall to minimum finish floor elevations of 511.7 and 510.9, 2-feet above the BFE (per Exhibit 3, sheet 1). Note that Lot 56B includes a realignment of the channel that will need to extend to lot 55B.

Lots 48B and 49B front Willow Oak Bend with adjacent floodplain BFE's of 511.0 and 509.8. There is a creek that flows through these two lots that compromise the construction of useable house pads. Lot 49B uses a pad grading/with vertical wall on the front of the lot with a realignment of the creek. This realignment extends into lot 48B for about 50-feet. Lot 48B is proposing to place the house pad at the rear of the lot (includes vertical wall) with access on an elevated driveway in conjunction with a 2-10'x5' box culvert that conveys the 100-year storm, with the realigned creek. These lots are to be graded to minimum finish floor elevations of 513.02 and 511.8, 2-feet above the BFE (per Exhibit 3, sheet 1).

Lots 57B, 58B and 59B front Vista Oak Drive, north of Southern Oaks Drive, have adjacent floodplain BFE's of 508.5, 508.5 and 508.6. These lots are to be graded/possible with vertical wall to minimum finish floor elevations of 510.5, 510.5 and 510.7, 2-feet above the BFE (per Exhibit 3, sheet 1).

Lot 71A fronts on Post Oak Court with an adjacent floodplain BFE of 529.3. The lot is to be graded/with vertical wall to a minimum finish floor elevation of 531.3, 2-feet above the BFE (per Exhibit 3, sheet 4).

3. ***STUDY HYDRAULICS***

Using these proposed pad grading provided by Helmberger Associates, the proposed project HEC-RAS model has revised the lot grading geometry from the effective model **(2 Revised Existing),** for the third Hec-Ras model for the Project model **(3 Proposed).** This model modifies the geometry of the pad areas as fill displacement for the subject 22 floodplain lots. 3**Proposed** project model ensures that any fluctuation of the 100-year water surface elevation due to the modifications, are reflected as minor impacts to any adjacent and/or the surrounding lot pads and/or the roadway structures.

The following tables show the computed water surface elevations for these HEC-RAS models.

Table 1- Main Stream Computed Water Surface Elevations

XSectn	100-Year Fully Developed				
	(1) Record CWSEL	Q (cfs)	(1) Revised Exist CWSEL	(2) Prop Post CWSEL	Comment
0.7		3650	507.86	507.86	
0.8		3650	508.01	508.01	
0.9		3650	508.42	508.42	
1	508.26	2996	508.44	508.44	Lot 58B, Lot 57B

2	509.59	2996	508.98	508.93	Lot 56B, has channel re-route
3	510.08	2996	509.66	509.70	Lot 55B, Includes Lot 49 channel re-route
4	510.17	983	509.59	509.65	Lot 50B
5	510.69	983	510.43	510.65	Lot 51B, has a channel re-route
6	511.59	983	511.32	512.28	Lot 52B
6.5	Road Culvert 3-8'x6' mbc Southern Oaks Drive				
7	511.24	983	511.24	512.78	
8	513.73	983	513.54	513.83	Lot 44A, Lot 45A
9	514.62	983	514.15	514.27	
10	516.31	983	516.18	516.13	
11	517.13	983	516.83	516.84	
12	519.92	725	519.80	519.79	
13	521.46	725	521.20	521.20	
14	522.71	725	522.49	522.49	
15	524.50	725	524.28	524.28	
16	525.93	725	526.09	525.09	Lot 59A
16.5	Road Culvert 2-9'x6' mbc Candy Oak Court				
17	527.69	725	526.97	526.97	
18	528.75	725	528.58	528.58	Lot 65A
19	528.81	725	528.63	528.73	Lot 67A
20	528.96	725	528.75	528.75	Downstream Lot 71, Block A
21	529.60	725	529.29	529.29	Upstream Lot 71, Block A

Table 2- NWTrib Computed Water Surface Elevations

XSectn	100-Year Fully Developed				
		Q (cfs)	(2) Revised Exist CWSEL	(3) Prop Post CWSEL	Comment
25	510.22	834	509.36	509.52	Lot 49B
25.1		834			
25.2			Drive Culvert 2-10’x5’ mbc		
25.3		834			
26	510.49	834	510.10	510.29	Lot 48B, has 2-10’x5’ Drive Culvert

Table 3- SWTrib Computed Water Surface Elevations

XSectn	100-Year Fully Developed				
		Q (cfs)	(1) Revised Exist CWSEL	(2) Prop Post CWSEL	Comment
33		1205	512.03	511.95	
33.5	Road Culvert 3-9'x6' mbc		Weeping Oak		
34		1178	513.79	513.22	
35		1178	514.02	514.46	Lot 13A
36		1178	514.28	514.65	Lot 13A, Lot 14A
37		1178	614.79	515.18	Lot 14A
38		1104	516.13	516.19	Lot 15A
39		1104	516.48	516.48	
16.5	Road Culvert 3-9'x6' mbc		Blackjack Oak Court		
40		1104	518.55	518.29	Lot 22A
41		1104	518.52	518.32	Lot 22A, Lot 21A
42		1104	518.74	518.65	Lot 21A, Lot 20A, has 3-30”RCP Drive Culvert, Low flow Drive
43		1104	518.96	518.89	Lot 19A, Lot 20A,, has 3-30”RCP Drive Culvert, Low flow Drive
44		1104	519.39	519.38	

These tables show the computer water surface elevations along Brushy Creek Tributary 5 and its tributary inflows within the project areas. **Exhibit 3, sheets 1-7** floodplain maps show the plotted 100-year floodplain overlay on all the proposed modified lots.

4. ***CONCLUSIONS***

The 22 remaining Vista Oaks Estates Lots have been the focus for a detail analysis to consider the adjustments to the lots topography for pad fill and creek realignments. The parameters for these changes have utilized individual lot grading plans provided by Helmberger Associates. These grading plans allow for greater detail in the hydraulic analysis as is reflected in the third RAS model 3Proposed.

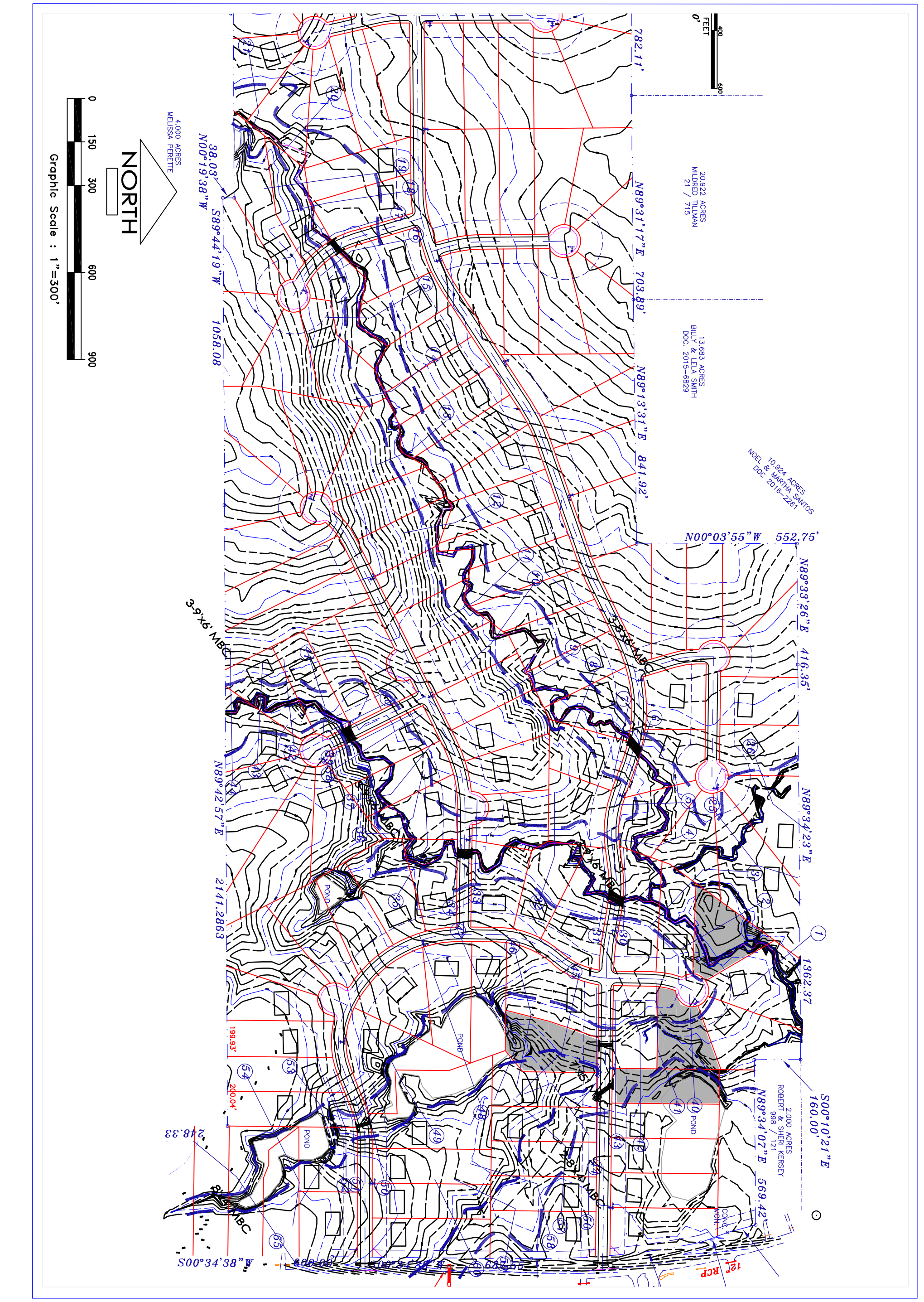
The Vista Oaks plans dated 6-5-18, sheet C20 shows the Minimum Finish Floor elevations for lots along the creek. With this updated study, with an expanded downstream modeling, the southeast tributary starting water surface boundary changes from 507.15 to 508.5. This BFE change has essentially no impact on Block B, Lot 58 pad elevation of 508.7 or Block B, Lot 59 at elevation 510.6 (was 509.5). All the other finish pad elevations remain essentially the same.

It needs to be noted that lots 48B and 49B need to be companion lots since the realignment of the local stream extends across the common lot line. A second set of lots that need to be companion lots are 55B and 56B with the proposed realignment of the local stream that extends across their common lot line.

Attached are exhibits, computer run output and digital files that support the hydraulic numbers in this report.

1. Record Total Floodplain Work Map
2. Drainage Area/ Location Map
3. Floodplain Work Map, Sheets 1-7

II. EXHIBITS



CONTRACT NO.

SHEET NO.
1 OF 1

Exhibit 1–Record Complete FP Work Map
Scale 1" = 300'
Vista Oaks Residential Development
Floodplain Study for Brushy Creek Tributary 5
City of Royse City, Hunt County, Texas
Job # BH233

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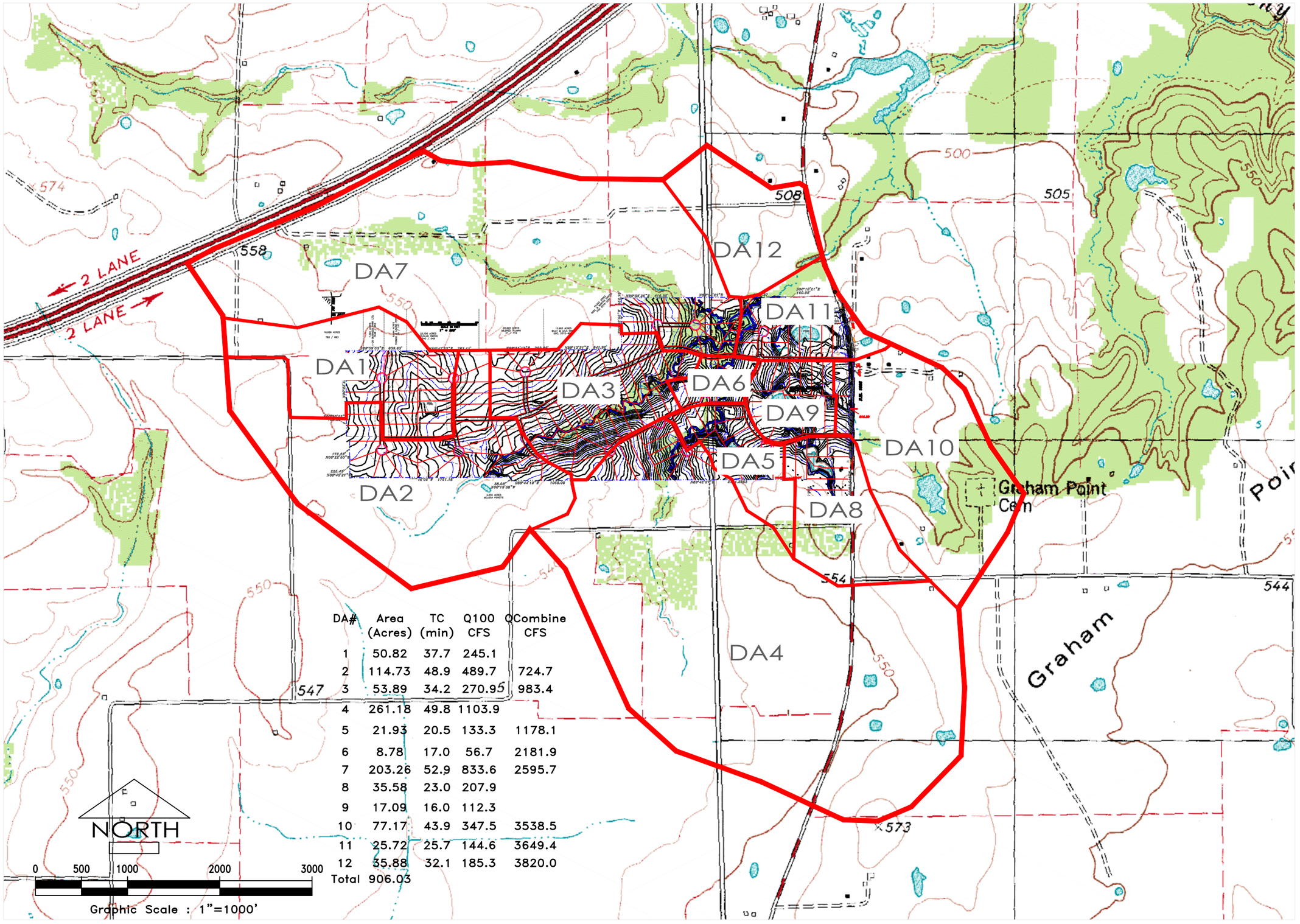

DA#	Area (Acres)	TC (min)	Q100 CFS	QCombine CFS
1	50.82	37.7	245.1	
2	114.73	48.9	489.7	724.7
3	53.89	34.2	270.95	983.4
4	261.18	49.8	1103.9	
5	21.93	20.5	133.3	1178.1
6	8.78	17.0	56.7	2181.9
7	203.26	52.9	833.6	2595.7
8	35.58	23.0	207.9	
9	17.09	16.0	112.3	
10	77.17	43.9	347.5	3538.5
11	25.72	25.7	144.6	3649.4
12	35.88	32.1	185.3	3820.0
Total	906.03			

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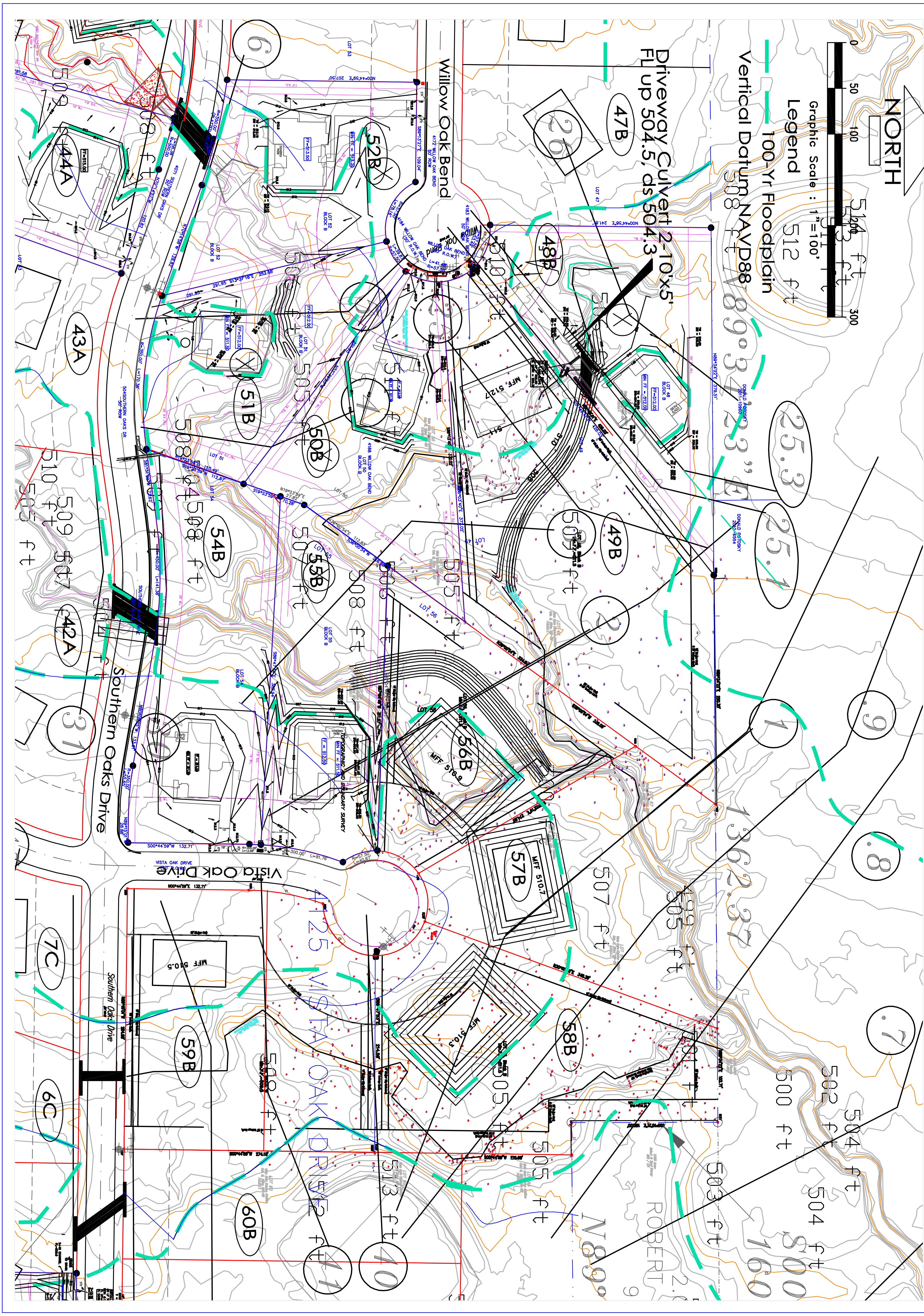
Exhibit 2 – DRAINAGE AREA MAP
Scale 1" = 1000'
Vista Oaks Residential Development
Floodplain Study for Brushy Creek Tributary 5
City of Royse City, Hunt County, Texas
Job # BH233

CONTRACT NO.

SHEET NO.
1 OF 1



CONTRACT NO.
SHEET NO.
1 OF 7

Exhibit 3 – FLOODPLAIN WORK MAP

Scale 1" = 100'

Vista Oaks Residential Development

Floodplain Study for Brushy Creek Tributary 5

City of Royse City, Hunt County, Texas

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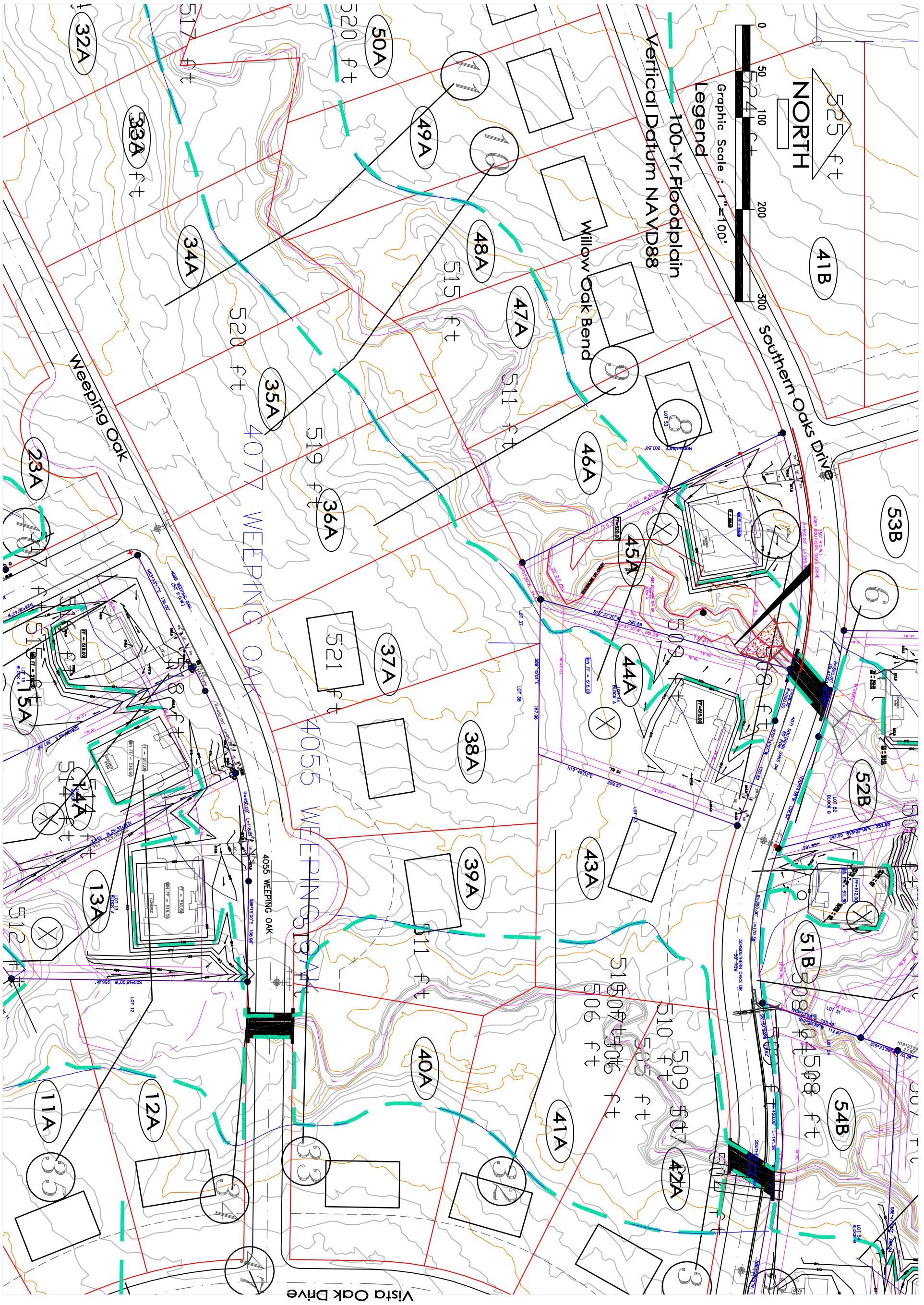

CONTRACT NO.
SHEET NO. 2 OF 7

Exhibit 3 – FLOODPLAIN WORK MAP

Scale 1" = 100'

Vista Oaks Residential Development

Floodplain Study for Brushy Creek Tributary 5

City of Royse City, Hunt County, Texas

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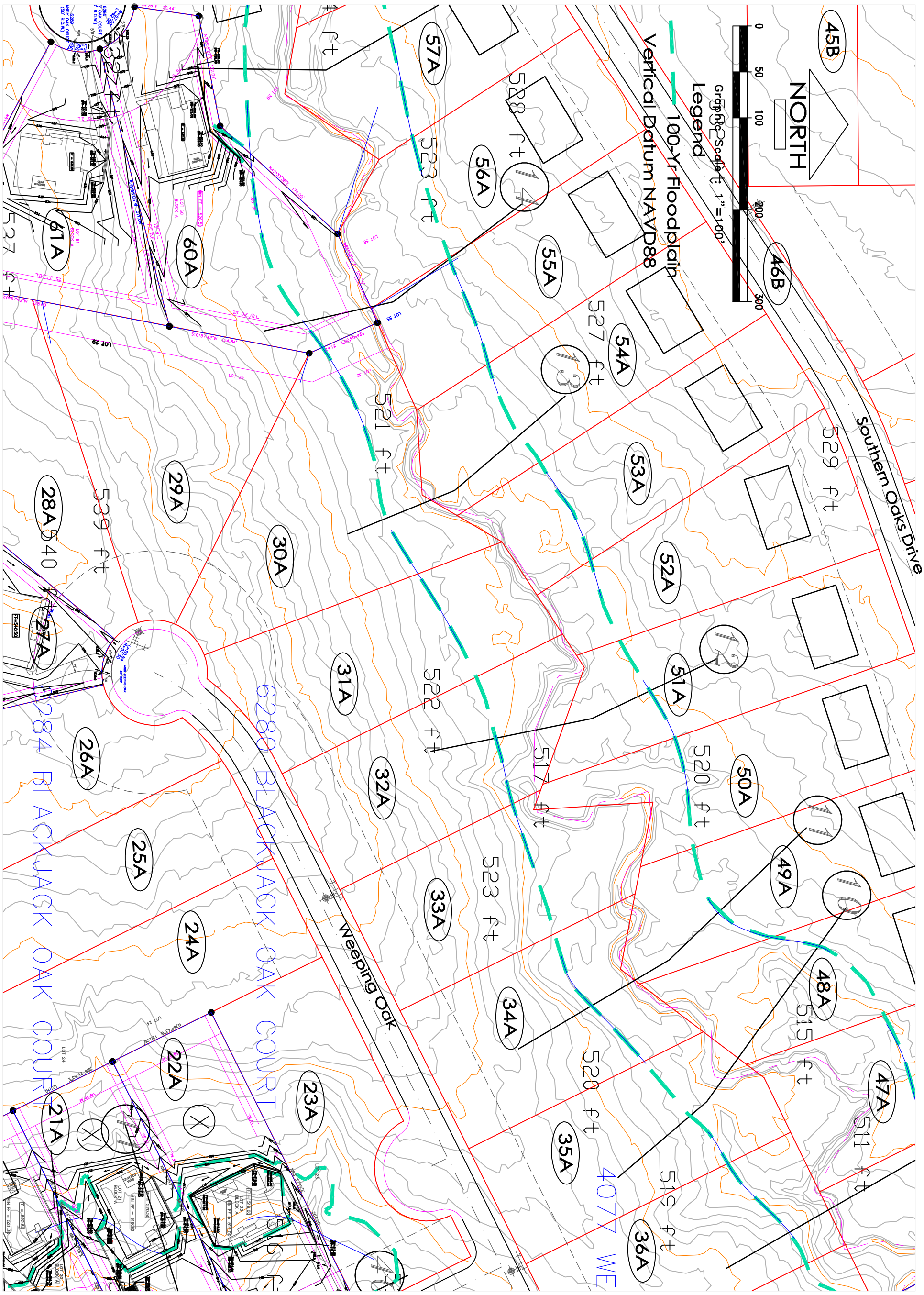

CONTRACT NO.

SHEET NO.
3 OF 7

Exhibit 3 – FLOODPLAIN WORK MAP
Scale 1" = 100'
Vista Oaks Residential Development
Floodplain Study for Brushy Creek Tributary 5
City of Royse City, Hunt County, Texas
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NORTH

0 50 100 200 300

Graphic Scale : 1"=100'

Legend

100-Yr Floodplain

Vertical Datum NAVD88

Southern Oaks Drive

Candy Oak Court

533 ft
531 ft
534 ft
530 ft
528 ft
527 ft
523 ft
521
525 ft
524 ft
537 ft
538
539
541 ft
542 ft
536 ft
535 ft

68A
69A
70A
71A
72A
66A
67A
65A
64A
63A
62A
61A
60A
59A
58A
57A
56A
55A

13
14
15
16
17
18
19
20
21

S89°44'19"W 1058.08'
N00°19'38"W

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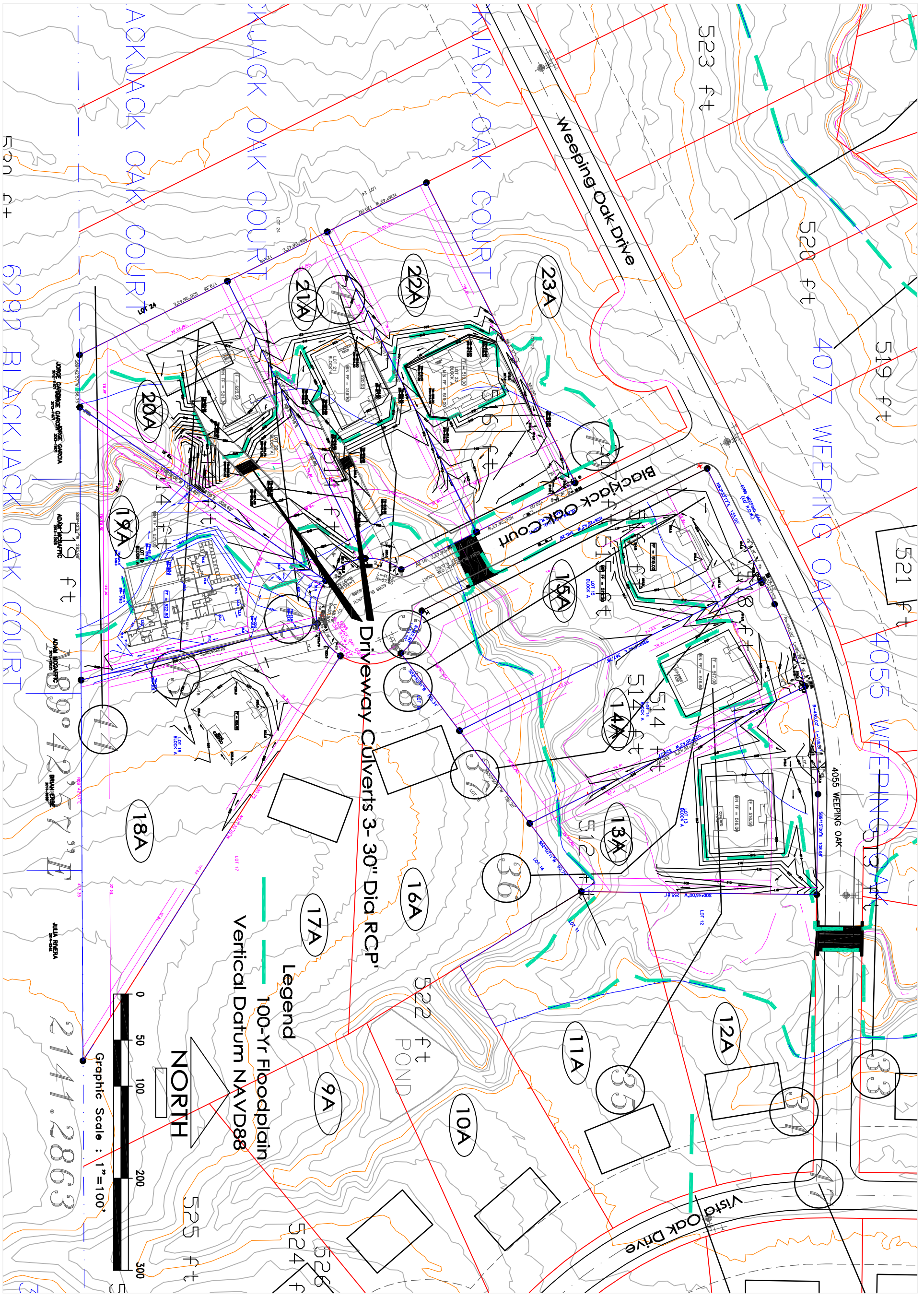
Exhibit 3 – FLOODPLAIN WORK MAP
Scale 1" = 100'
Vista Oaks Residential Development
Floodplain Study for Brushy Creek Tributary 5
City of Royse City, Hunt County, Texas
Job # BH233

CONTRACT NO.

SHEET NO. 4 OF 7



CONTRACT NO.

SHEET NO.
5 OF 7

Exhibit 3 – FLOODPLAIN WORK MAP
Scale 1" = 100'
Vista Oaks Residential Development
Floodplain Study for Brushy Creek Tributary 5
City of Royse City, Hunt County, Texas
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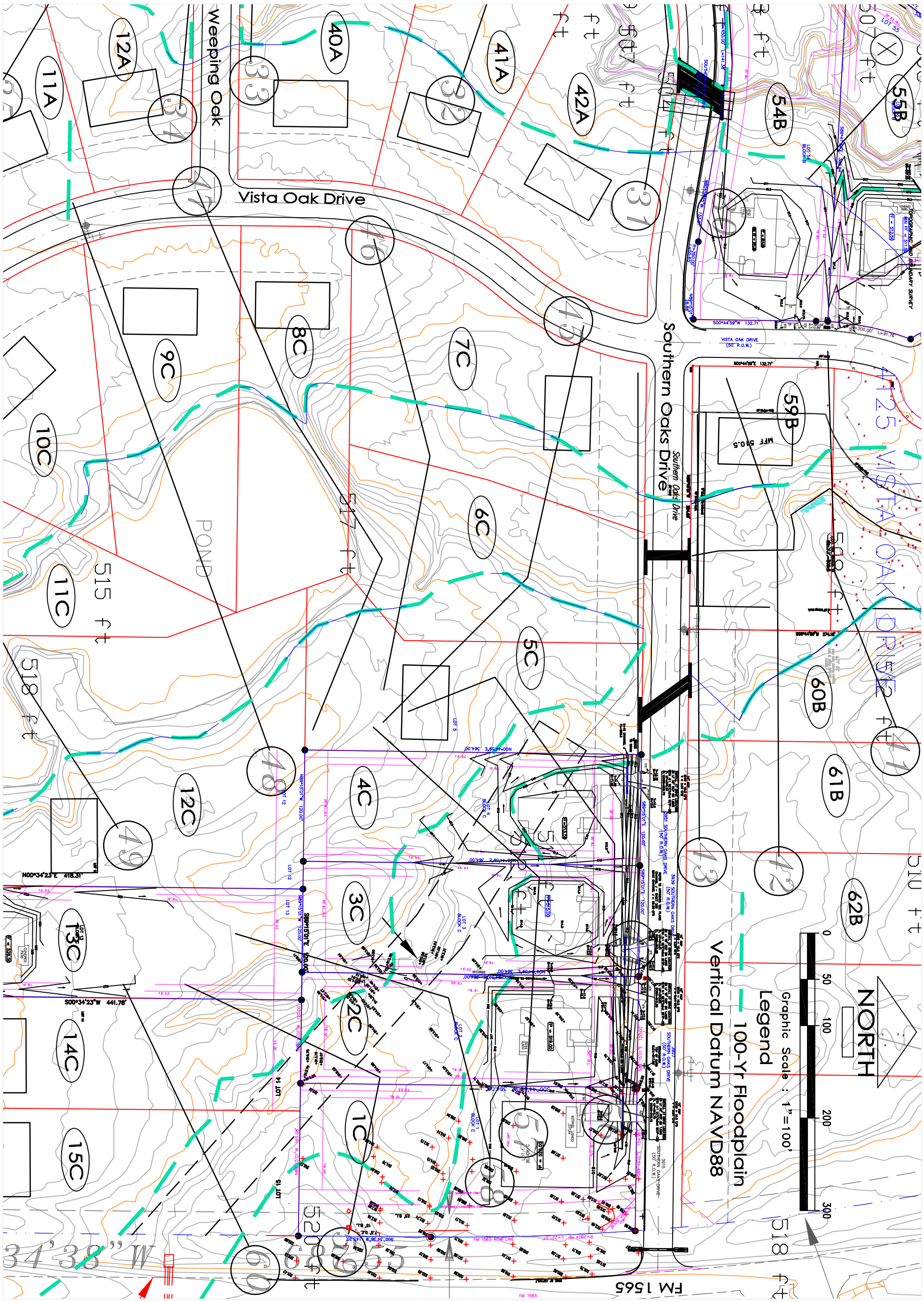

CONTRACT NO.

SHEET NO.
6 OF 7

Exhibit 3 – FLOODPLAIN WORK MAP
Scale 1" = 100'
Vista Oaks Residential Development
Floodplain Study for Brushy Creek Tributary 5
City of Royse City, Hunt County, Texas
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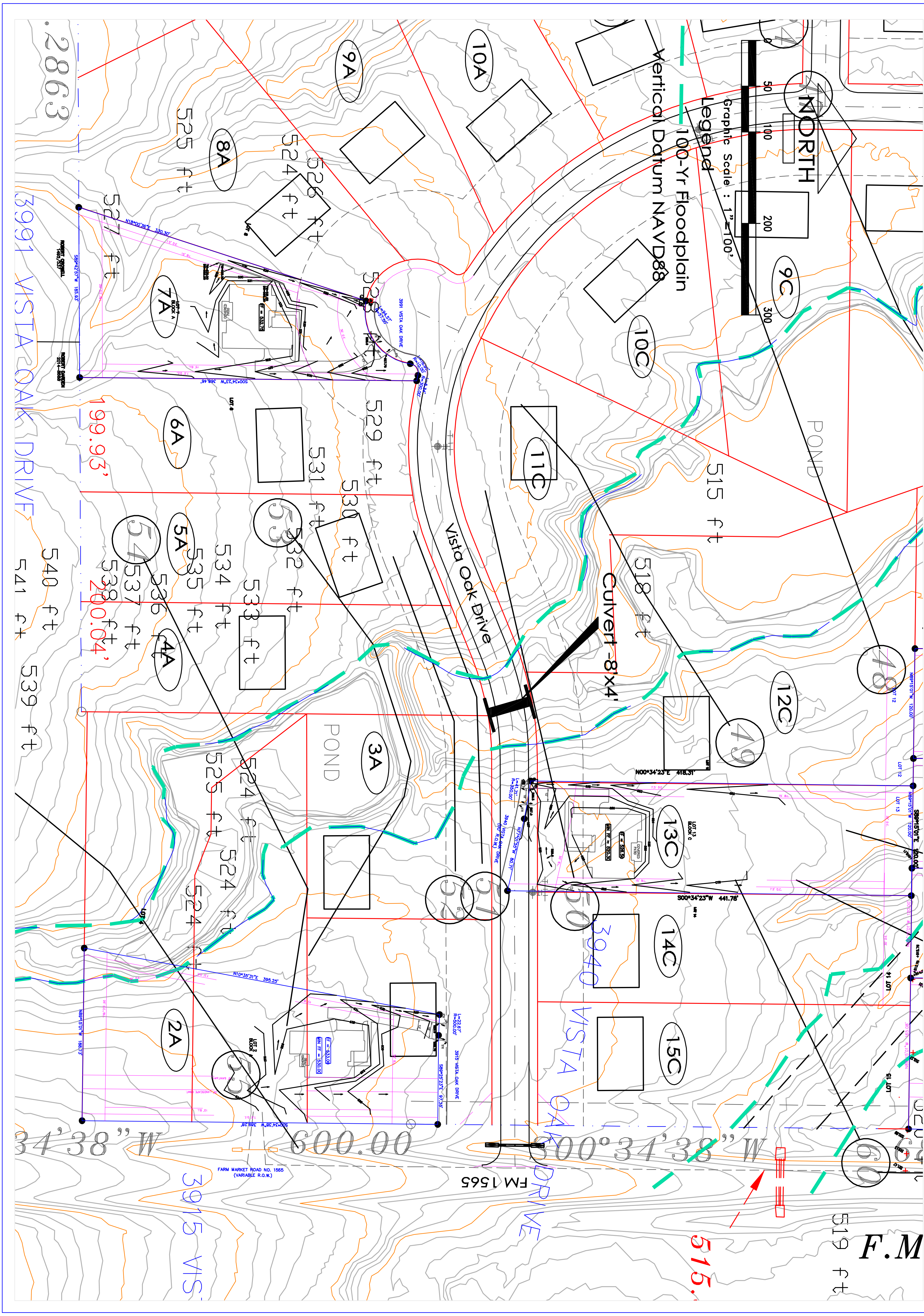
NORTH
Graphic Scale : 1"=100'
0 50 100 200 300
Legend
100-Yr Floodplain
Vertical Datum NAVD88
Vista Oak Drive
Culvert -8'x4'
POND
3991 VISTA OAK DRIVE
3940 VISTA OAK DRIVE
3915 VISTA OAK DRIVE
FARM MARKET ROAD NO. 1565 (VARIABLE R.O.W.)
FM 1565
N18°00'36"E 330.30'
S00°34'23"W 368.46'
N00°34'23"E 418.31'
S00°34'23"W 441.78'
N10°35'31"E 395.25'
S00°34'38"W 389.28'
S00°34'38"W 600.00
199.93'
200.04'
515 ft
518 ft
519 ft
524 ft
525 ft
526 ft
527 ft
529 ft
530 ft
531 ft
532 ft
533 ft
534 ft
535 ft
536 ft
537 ft
538 ft
539 ft
540 ft
541 ft
2A
3A
4A
5A
6A
7A
8A
9A
10A
9C
10C
11C
12C
13C
14C
15C
LOT 7 BLOCK A
LOT 2 BLOCK A
LOT 13 BLOCK C
FF = 532.75
FF = 533.00
MIN FF = 530.00
FF = 528.50
MIN FF = 520.30
F.M

CONTRACT NO.

SHEET NO.
7 OF 7

Exhibit 3 – FLOODPLAIN WORK MAP
Scale 1" = 100'
Vista Oaks Residential Development
Floodplain Study for Brushy Creek Tributary 5
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Job # BH233

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1. Main Stream, Trib1-NE, Trib2-SW
   A Record Original 2017 Study File (plan .p01)
   B. Revised Existing 100-Year File (plan .p02)
   C. Propose Project 100-year File (plan .p03)
2. Trib 3- SE Model (plan .p04)

III. COMPUTER RUNS

HEC-RAS Profile: 100-Year

River	Reach	River Sta	Profile	Plan	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)	
River 1	Main2	0.5	100-Year	REPln 02	3650.00	497.80	507.50	505.03	507.56	0.000582	2.57	2156.99	724.38	0.19
River 1	Main2	0.5	100-Year	PropPln 03	3650.00	497.80	507.50	505.03	507.56	0.000582	2.57	2156.99	724.38	0.19
River 1	Main2	0.6	100-Year	REPln 02	3650.00	498.27	507.72		507.79	0.000745	2.68	1839.72	577.80	0.21
River 1	Main2	0.6	100-Year	PropPln 03	3650.00	498.27	507.72		507.79	0.000745	2.68	1839.72	577.80	0.21
River 1	Main2	0.7	100-Year	REPln 02	3650.00	497.64	507.86		507.96	0.001036	3.30	1659.75	557.40	0.24
River 1	Main2	0.7	100-Year	PropPln 03	3650.00	497.64	507.86		507.96	0.001036	3.30	1659.75	557.40	0.24
River 1	Main2	0.8	100-Year	REPln 02	3650.00	497.97	508.01		508.32	0.002456	5.40	1075.19	445.48	0.37
River 1	Main2	0.8	100-Year	PropPln 03	3650.00	497.97	508.01		508.32	0.002456	5.40	1075.19	445.48	0.37
River 1	Main2	0.9	100-Year	REPln 02	2996.00	498.33	508.42		508.46	0.000414	2.05	2006.43	651.36	0.15
River 1	Main2	0.9	100-Year	PropPln 03	2996.00	498.33	508.42		508.46	0.000414	2.05	2006.43	651.36	0.15
River 1	Main2	1	100-Year	RecordPln 01	3650.00	498.00	508.26	507.29	508.73	0.005002	7.23	831.83	268.10	0.45
River 1	Main2	1	100-Year	REPln 02	2996.00	499.17	508.44		508.55	0.001334	2.86	1161.82	423.76	0.26
River 1	Main2	1	100-Year	PropPln 03	2996.00	499.17	508.44		508.54	0.001225	2.75	1226.23	454.73	0.25
River 1	Main2	2	100-Year	RecordPln 01	3650.00	500.00	509.59		509.76	0.002666	4.81	1154.45	300.00	0.30
River 1	Main2	2	100-Year	REPln 02	2996.00	500.28	508.98		509.31	0.004774	5.77	754.61	330.00	0.49
River 1	Main2	2	100-Year	PropPln 03	2996.00	500.29	508.93		509.35	0.004383	6.36	698.43	279.31	0.49
River 1	Main2	3	100-Year	RecordPln 01	3650.00	500.00	510.08		510.17	0.001669	3.72	1615.88	558.47	0.23
River 1	Main2	3	100-Year	REPln 02	2996.00	500.00	509.66		509.75	0.001199	3.71	1387.37	521.23	0.24
River 1	Main2	3	100-Year	PropPln 03	2996.00	500.00	509.70		509.77	0.001168	3.68	1501.77	575.03	0.24
River 1	Main	4	100-Year	RecordPln 01	983.00	503.00	510.17		510.27	0.002636	4.10	497.25	310.33	0.29
River 1	Main	4	100-Year	REPln 02	983.00	503.00	509.59		509.89	0.004808	6.34	328.07	261.19	0.47
River 1	Main	4	100-Year	PropPln 03	983.00	503.00	509.65		509.90	0.004050	5.86	338.79	233.37	0.44
River 1	Main	5	100-Year	RecordPln 01	983.00	504.00	510.69		510.90	0.004088	4.96	309.52	120.00	0.37
River 1	Main	5	100-Year	REPln 02	983.00	504.00	510.43		510.70	0.003877	5.72	277.25	120.00	0.43
River 1	Main	5	100-Year	PropPln 03	983.00	504.22	510.65	510.45	511.33	0.012031	6.82	165.72	106.53	0.72
River 1	Main	6	100-Year	RecordPln 01	983.00	505.00	511.57	510.53	511.79	0.004230	5.10	328.81	162.46	0.38
River 1	Main	6	100-Year	REPln 02	983.00	505.00	511.32	510.53	512.20	0.008168	8.40	137.49	149.56	0.65
River 1	Main	6	100-Year	PropPln 03	983.00	505.00	512.28	510.53	512.84	0.004052	6.63	171.42	186.15	0.47
River 1	Main	6.5			Culvert									
River 1	Main	7	100-Year	RecordPln 01	983.00	505.00	511.24	511.24	512.76	0.029002	10.38	102.69	135.55	0.92
River 1	Main	7	100-Year	REPln 02	983.00	505.00	511.24	511.24	512.77	0.019485	10.40	102.77	135.63	0.92
River 1	Main	7	100-Year	PropPln 03	983.00	505.00	512.78	511.23	513.44	0.005461	6.86	155.62	182.73	0.52
River 1	Main	8	100-Year	RecordPln 01	983.00	507.00	513.73		513.83	0.001799	3.42	447.29	166.41	0.26

HEC-RAS Profile: 100-Year (Continued)

River	Reach	River Sta	Profile	Plan	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)	
River 1	Main	8	100-Year	REPln 02	983.00	507.00	513.54		513.65	0.001507	3.74	414.64	161.23	0.28
River 1	Main	8	100-Year	PropPln 03	983.00	507.00	513.83		513.92	0.001124	3.35	463.30	168.89	0.25
River 1	Main	9	100-Year	RecordPln 01	983.00	509.00	514.52		514.81	0.008008	6.22	286.50	182.97	0.51
River 1	Main	9	100-Year	REPln 02	983.00	509.00	514.15	514.03	514.67	0.009860	7.98	222.78	159.65	0.68
River 1	Main	9	100-Year	PropPln 03	983.00	509.00	514.27		514.70	0.008112	7.37	242.51	167.21	0.62
River 1	Main	10	100-Year	RecordPln 01	983.00	512.00	516.31		516.46	0.004911	4.27	367.96	231.51	0.40
River 1	Main	10	100-Year	REPln 02	983.00	512.00	516.18		516.36	0.004229	4.71	336.96	222.85	0.45
River 1	Main	10	100-Year	PropPln 03	983.00	512.00	516.13		516.33	0.004589	4.87	326.46	219.85	0.47
River 1	Main	11	100-Year	RecordPln 01	983.00	512.00	517.13		517.51	0.010158	6.18	255.71	180.02	0.58
River 1	Main	11	100-Year	REPln 02	983.00	512.00	516.83	516.78	517.43	0.011339	7.53	205.20	157.55	0.73
River 1	Main	11	100-Year	PropPln 03	983.00	512.00	516.84	516.78	517.43	0.011133	7.48	206.87	158.28	0.73
River 1	Main	12	100-Year	RecordPln 01	725.00	515.00	519.92		520.09	0.004891	4.75	282.08	191.77	0.41
River 1	Main	12	100-Year	REPln 02	725.00	515.00	519.80		520.01	0.004147	5.23	258.37	184.12	0.46
River 1	Main	12	100-Year	PropPln 03	725.00	515.00	519.79		520.00	0.004192	5.26	257.20	183.74	0.46
River 1	Main	13	100-Year	RecordPln 01	725.00	516.00	521.46		521.65	0.004706	4.47	268.13	179.29	0.39
River 1	Main	13	100-Year	REPln 02	725.00	516.00	521.20		521.49	0.004904	5.34	223.70	166.72	0.49
River 1	Main	13	100-Year	PropPln 03	725.00	516.00	521.20		521.49	0.004887	5.33	224.03	166.82	0.49
River 1	Main	14	100-Year	RecordPln 01	725.00	518.00	522.71		522.93	0.005920	4.91	249.58	183.75	0.45
River 1	Main	14	100-Year	REPln 02	725.00	518.00	522.49		522.81	0.005812	5.71	210.99	165.04	0.53
River 1	Main	14	100-Year	PropPln 03	725.00	518.00	522.49		522.81	0.005816	5.71	210.93	165.01	0.53
River 1	Main	15	100-Year	RecordPln 01	725.00	519.00	524.50		524.71	0.006089	5.19	250.37	166.55	0.43
River 1	Main	15	100-Year	REPln 02	725.00	519.00	524.28		524.59	0.006115	6.15	214.47	157.12	0.52
River 1	Main	15	100-Year	PropPln 03	725.00	519.00	524.28		524.59	0.006114	6.15	214.48	157.12	0.52
River 1	Main	16	100-Year	RecordPln 01	725.00	521.00	525.93	525.80	526.08	0.005156	4.40	276.48	184.07	0.40
River 1	Main	16	100-Year	REPln 02	725.00	521.00	526.09	525.97	527.20	0.014710	9.33	92.32	196.77	0.83
River 1	Main	16	100-Year	PropPln 03	725.00	521.00	526.09	526.00	527.22	0.014929	9.41	91.72	196.96	0.83
River 1	Main	16.5			Culvert									
River 1	Main	17	100-Year	RecordPln 01	725.00	522.00	527.69	526.98	528.46	0.012696	7.74	107.81	330.81	0.64
River 1	Main	17	100-Year	REPln 02	725.00	522.00	526.97	526.97	528.25	0.017727	9.97	85.51	254.84	0.90
River 1	Main	17	100-Year	PropPln 03	725.00	522.00	526.97	526.97	528.25	0.017727	9.97	85.51	254.84	0.90
River 1	Main	18	100-Year	RecordPln 01	725.00	524.00	528.75		528.77	0.000718	1.92	704.90	384.38	0.16
River 1	Main	18	100-Year	REPln 02	725.00	524.00	528.58		528.60	0.000644	2.16	640.72	370.30	0.18
River 1	Main	18	100-Year	PropPln 03	725.00	524.00	528.58		528.60	0.000644	2.16	640.72	370.30	0.18
River 1	Main	19	100-Year	RecordPln 01	725.00	525.00	528.81		528.83	0.000701	1.65	711.42	384.02	0.15

HEC-RAS Profile: 100-Year (Continued)

River	Reach	River Sta	Profile	Plan	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)	
River 1	Main	19	100-Year	REPln 02	725.00	525.00	528.63		528.66	0.000635	1.86	645.39	369.88	0.18
River 1	Main	19	100-Year	PropPln 03	725.00	525.00	528.63		528.66	0.000635	1.86	645.39	369.88	0.18
River 1	Main	20	100-Year	RecordPln 01	725.00	525.00	528.96		529.09	0.002970	3.05	281.04	146.54	0.31
River 1	Main	20	100-Year	REPln 02	725.00	525.00	528.75		528.91	0.002691	3.38	250.34	138.01	0.36
River 1	Main	20	100-Year	PropPln 03	725.00	525.00	528.75		528.91	0.002691	3.38	250.34	138.01	0.36
River 1	Main	21	100-Year	RecordPln 01	725.00	526.00	529.60		529.84	0.009592	5.72	227.37	177.93	0.56
River 1	Main	21	100-Year	REPln 02	725.00	526.00	529.29	529.27	529.74	0.013136	7.64	173.53	160.73	0.79
River 1	Main	21	100-Year	PropPln 03	725.00	526.00	529.29	529.27	529.74	0.013136	7.64	173.53	160.73	0.79
Trib 1	NW	25	100-Year	RecordPln 01	834.00	504.00	510.22		510.25	0.000943	2.29	623.45	313.50	0.18
Trib 1	NW	25	100-Year	REPln 02	834.00	504.00	509.75		509.81	0.001320	3.11	478.00	289.50	0.25
Trib 1	NW	25	100-Year	PropPln 03	834.00	504.04	509.68		509.88	0.002650	4.48	316.86	197.35	0.37
Trib 1	NW	25.1	100-Year	PropPln 03	834.00	504.36	509.69	508.23	510.57	0.005365	7.55	120.90	69.66	0.60
Trib 1	NW	25.3	100-Year	PropPln 03	834.00	504.56	509.66	508.52	510.66	0.006434	8.06	112.79	65.61	0.66
Trib 1	NW	26	100-Year	RecordPln 01	834.00	505.00	510.49		510.56	0.002389	3.22	453.87	288.58	0.28
Trib 1	NW	26	100-Year	REPln 02	834.00	505.00	510.11		510.26	0.003406	4.41	349.71	274.51	0.40
Trib 1	NW	26	100-Year	PropPln 03	834.00	505.00	510.95		510.99	0.000775	2.40	591.54	307.62	0.20
Trib2	SW	30	100-Year	RecordPln 01	1205.00	502.00	510.15	508.71	510.29	0.002429	4.24	533.19	256.11	0.28
Trib2	SW	30	100-Year	REPln 02	1205.00	502.00	509.15	508.72	510.44	0.011149	10.04	142.46	188.15	0.71
Trib2	SW	30	100-Year	PropPln 03	1205.00	502.00	509.20	508.72	510.45	0.010783	9.92	144.04	195.41	0.70
Trib2	SW	30.5			Culvert									
Trib2	SW	31	100-Year	RecordPln 01	1205.00	502.00	511.22	508.24	511.52	0.002622	4.92	281.14	309.14	0.31
Trib2	SW	31	100-Year	REPln 02	1205.00	502.00	510.55	508.26	510.95	0.002600	5.63	249.79	300.29	0.37
Trib2	SW	31	100-Year	PropPln 03	1205.00	502.00	510.57	508.26	510.96	0.002573	5.61	250.59	300.88	0.37
Trib2	SW	32	100-Year	RecordPln 01	1205.00	504.00	512.02		512.06	0.000801	2.36	829.51	298.91	0.17
Trib2	SW	32	100-Year	REPln 02	1205.00	504.00	511.49		511.55	0.000963	2.98	676.90	276.22	0.22
Trib2	SW	32	100-Year	PropPln 03	1205.00	504.00	511.50		511.56	0.000954	2.96	679.36	276.60	0.22
Trib2	SW	33	100-Year	RecordPln 01	1205.00	506.00	512.52	512.00	512.69	0.003874	4.68	417.97	182.22	0.36
Trib2	SW	33	100-Year	REPln 02	1205.00	506.00	511.95	511.95	513.51	0.017064	11.13	128.03	168.05	0.90
Trib2	SW	33	100-Year	PropPln 03	1205.00	506.00	511.95	511.95	513.51	0.017064	11.13	128.03	168.05	0.90
Trib2	SW	33.5			Culvert									
Trib2	SW	34	100-Year	RecordPln 01	1178.00	506.00	512.87	512.43	513.83	0.015123	8.98	161.91	285.74	0.69
Trib2	SW	34	100-Year	REPln 02	1178.00	506.00	513.22	512.45	514.00	0.007589	8.12	178.67	323.02	0.61
Trib2	SW	34	100-Year	PropPln 03	1178.00	506.00	513.22	512.45	514.00	0.007589	8.12	178.67	323.02	0.61

HEC-RAS Profile: 100-Year (Continued)

River	Reach	River Sta	Profile	Plan	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)	
Trib2	SW	35	100-Year	RecordPln 01	1178.00	507.00	514.67		514.76	0.001941	3.52	622.10	345.60	0.26
Trib2	SW	35	100-Year	REPln 02	1178.00	507.00	514.43		514.51	0.001036	3.06	551.57	184.37	0.23
Trib2	SW	35	100-Year	PropPln 03	1178.00	507.00	514.43		514.51	0.001036	3.06	551.57	184.37	0.23
Trib2	SW	36	100-Year	RecordPln 01	1178.00	508.00	515.00		515.09	0.001913	3.43	603.00	308.81	0.26
Trib2	SW	36	100-Year	REPln 02	1178.00	508.00	514.62		514.76	0.001816	3.88	499.51	245.65	0.31
Trib2	SW	36	100-Year	PropPln 03	1178.00	508.00	514.62		514.76	0.001816	3.88	499.51	245.65	0.31
Trib2	SW	37	100-Year	RecordPln 01	1178.00	509.00	515.32		515.49	0.004192	4.57	405.54	189.44	0.37
Trib2	SW	37	100-Year	REPln 02	1178.00	509.00	514.90		515.20	0.005298	5.90	328.34	185.64	0.50
Trib2	SW	37	100-Year	PropPln 03	1178.00	509.00	514.90		515.20	0.005298	5.90	328.34	185.64	0.50
Trib2	SW	38	100-Year	RecordPln 01	1104.00	510.00	516.42		516.59	0.004628	4.62	376.66	186.17	0.38
Trib2	SW	38	100-Year	REPln 02	1104.00	510.00	516.19		516.42	0.004474	5.36	334.57	183.11	0.46
Trib2	SW	38	100-Year	PropPln 03	1104.00	510.00	516.19		516.42	0.004474	5.36	334.57	183.11	0.46
Trib2	SW	39	100-Year	RecordPln 01	1104.00	510.00	516.62	516.50	516.76	0.003487	4.04	412.30	188.31	0.34
Trib2	SW	39	100-Year	REPln 02	1104.00	510.00	516.48	516.48	518.06	0.016923	10.64	115.63	186.67	0.90
Trib2	SW	39	100-Year	PropPln 03	1104.00	510.00	516.48	516.48	518.06	0.016923	10.64	115.63	206.67	0.90
Trib2	SW	39.1			Culvert									
Trib2	SW	40	100-Year	RecordPln 01	1104.00	510.00	517.49	513.87	517.76	0.002271	4.24	276.23	97.08	0.30
Trib2	SW	40	100-Year	REPln 02	1104.00	510.00	518.25	513.89	518.45	0.001020	3.74	313.73	106.09	0.25
Trib2	SW	40	100-Year	PropPln 03	1104.00	510.00	518.25	513.89	518.45	0.001020	3.74	313.73	106.09	0.25
Trib2	SW	41	100-Year	RecordPln 01	1104.00	510.00	517.71		518.01	0.004887	5.32	318.25	160.46	0.41
Trib2	SW	41	100-Year	REPln 02	1104.00	510.00	518.40		518.55	0.001545	3.97	438.37	183.31	0.29
Trib2	SW	41	100-Year	PropPln 03	1104.00	510.00	518.40		518.55	0.001545	3.97	438.37	183.31	0.29
Trib2	SW	42	100-Year	RecordPln 01	1104.00	511.00	518.39		518.55	0.002821	4.30	421.79	181.37	0.32
Trib2	SW	42	100-Year	REPln 02	1104.00	511.00	518.64		518.77	0.001472	3.90	467.84	187.36	0.28
Trib2	SW	42	100-Year	PropPln 03	1104.00	511.00	518.64		518.77	0.001472	3.90	467.84	187.36	0.28
Trib2	SW	43	100-Year	RecordPln 01	1104.00	512.00	518.84		519.01	0.003263	4.48	376.83	143.00	0.33
Trib2	SW	43	100-Year	REPln 02	1104.00	512.00	518.88		519.05	0.002141	4.46	382.32	143.00	0.33
Trib2	SW	43	100-Year	PropPln 03	1104.00	512.00	518.88		519.05	0.002098	4.42	396.85	163.00	0.33
Trib2	SW	44	100-Year	RecordPln 01	1104.00	512.00	519.52		519.72	0.004488	5.26	414.75	261.45	0.37
Trib2	SW	44	100-Year	REPln 02	1104.00	512.00	519.33		519.61	0.004024	5.96	367.46	245.79	0.43
Trib2	SW	44	100-Year	PropPln 03	1104.00	512.00	519.32		519.60	0.004072	5.99	365.47	245.11	0.43

HEC-RAS Plan: RecordPln 04 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)	
1	40	100-Year	596.00	504.00	508.50	505.92	508.53	0.000459	1.49	493.86	190.08	0.13
1	41	100-Year	596.00	504.00	508.56		508.59	0.000670	1.70	488.25	196.00	0.15
1	42	100-Year	348.00	505.20	508.62		508.63	0.000254	0.91	481.98	228.52	0.09
1	43	100-Year	348.00	506.30	508.56	507.86	508.82	0.009053	4.13	86.41	229.86	0.51
1	43.5		Culvert									
1	44	100-Year	348.00	507.00	512.92	508.62	512.96	0.000368	1.65	210.76	458.63	0.12
3	56	100-Year	348.00	510.30	512.95		513.00	0.001188	2.02	232.89	175.82	0.23
3	57	100-Year	348.00	511.00	513.12		513.18	0.002071	2.21	187.74	166.94	0.29
3	58	100-Year	348.00	514.00	515.16	515.16	515.58	0.028905	5.22	67.71	89.80	0.97
3	59	100-Year	348.00	515.00	516.35		516.41	0.002786	1.96	179.43	161.17	0.32
3	60	100-Year	348.00	517.00	518.08	518.08	518.46	0.032923	4.94	70.57	97.79	1.01
2	45	100-Year	314.00	507.60	512.97		512.97	0.000052	0.59	668.84	177.70	0.05
2	46	100-Year	314.00	508.60	512.98		512.99	0.000117	0.74	500.75	180.05	0.06
2	47	100-Year	314.00	516.00	517.28	517.28	517.54	0.026611	4.38	92.80	194.76	0.78
2	48	100-Year	314.00	516.00	517.73		517.74	0.000264	0.63	502.82	304.50	0.08
2	49	100-Year	208.00	516.00	517.82		517.84	0.000923	1.19	213.98	182.83	0.16
2	50	100-Year	208.00	517.00	518.84	518.84	519.70	0.036433	7.46	27.89	65.04	1.00
2	50.5		Culvert									
2	51	100-Year	208.00	519.00	523.80	520.22	523.83	0.000341	1.39	149.42	183.32	0.11
2	52	100-Year	208.00	519.00	523.83		523.83	0.000055	0.54	481.31	163.87	0.05
2	53	100-Year	208.00	525.00	527.37	527.37	527.63	0.018509	4.56	67.13	133.39	0.68
2	54	100-Year	208.00	526.00	527.96		527.98	0.000712	1.12	202.88	127.63	0.14
2	55	100-Year	208.00	526.00	528.18		528.25	0.002155	2.09	108.29	61.93	0.25

COMPUTER RUN

1. Main Stream, Trib1-NE, Trib2-SW
   A Record Original 2017 Study File (plan .p01)

HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X     X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X      X    X        X
X     X  X        X    X      X   X     X    X        X
X     X  XXXXXX    XXXX       X    X    X    X   XXXXX
```

PROJECT DATA
Project Title: Vista Oaks, Royse City
Project File : HE.prj
Run Date and Time: 11/30/2022 9:09:07 AM

Project in English units

PLAN DATA

Plan Title: Record Plan 01
Plan File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.p01

Geometry Title: Record /Enc Project
Geometry File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.g01

Flow Title : 100-Year Flow
Flow File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.f01

Plan Summary Information:
Number of: Cross Sections = 38 Multiple Openings = 0
Culverts = 5 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: 100-Year Flow
Flow File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.f01

Flow Data (cfs)

River	Reach	RS	100-Year
River 1	Main	21	725
River 1	Main	11	983
River 1	Main2	3	3650
Trib 1	NW	26	834

Trib2	SW	44	1104
Trib2	SW	37	1178
Trib2	SW	33	1205

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River 1	Main2	100-Year		Normal S = 0.005

GEOMETRY DATA

Geometry Title: Record /Enc Project
Geometry File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.g01

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
River 1	Main		tr1
River 1	Main2	tr1	
Trib 1	NW		tr1
Trib2	SW		tr1

JUNCTION INFORMATION

Name: tr1
Description:
Energy computation Method

Length across Junction		Tributary			
River	Reach	River	Reach	Length	Angle
River 1	Main	to River 1	Main2	50	
Trib 1	NW	to River 1	Main2	50	
Trib2	SW	to River 1	Main2	50	

CROSS SECTION

RIVER: River 1
REACH: Main RS: 21

INPUT
Description: Station 4946
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-281	534	-240	533	-199	532	-166.5	531	-124.4	530
-76.8	529	19.1	528	41.4	527	44.5	526	48	526
54	527	62	528	75	530	91	531	113	532
174	534	215	535						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-281	.06	41.4	.055	54	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
41.4	54	157	143	128	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 20

INPUT
Description: Station 4803
Station Elevation Data num= 16

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     531      57     530     143     530     180     529     223     527
     244     526     264     525     268     525     278     526     291     527
     310     528     328     529     342     530     358     531     407     532
     484     533

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06     223    .055     291     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           223     291              190     185     122             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 19

INPUT
Description: Station 4618
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -76     530       0     529      66     528     122     527     332     526
     336     525     344     525     348     526     370     527     429     531
     452     532     526     533

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -76     .06     332    .055     348     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           332     348               81      90      88             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 18

INPUT
Description: Station 4528
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     529      65     528     137     527   317.6     526   330.9     525
   333.3     524   337.5     524     341     525     352     526     423     530
     459     531     546     532     571     533

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   330.9    .055     341     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         330.9     341              109     138     144             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 17

INPUT
Description: Station 4390
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -351     530    -302     529    -248     528    -168     527  -121.6     526
   -85.2     525   -34.4     525    23.9     525      28     522    31.2     522
    37.7     525    62.6     526      89     527     116     528     141     529
     166     530

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
    -351     .06    23.9    .055    37.7     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          23.9    37.7               86      86      86             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -351      14   528.5       F
      45     166   528.5       F

CULVERT


RIVER: River 1
REACH: Main               RS: 16.5

INPUT
Description:
Distance from Upstream XS =      25
Deck/Roadway Width        =      28
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -307     529             148     529

Upstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -351     530    -302     529    -248     528    -168     527  -121.6     526
   -85.2     525   -34.4     525    23.9     525      28     522    31.2     522
    37.7     525    62.6     526      89     527     116     528     141     529
     166     530

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -351     .06    23.9    .055    37.7     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
          23.9    37.7             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -351      14   528.5       F
      45     166   528.5       F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -240     528             150     528

Downstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -290.3     529    -238     528    -179     527  -110.9     526   -81.8     525
   -48.3     524   -10.5     524    17.7     524    23.8     521    27.4     521
    31.8     524    46.9     525    77.3     526   109.6     527     144     528
     175     529

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -290.3     .06    17.7    .055    31.8     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
          17.7    31.8             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -290.3      10   525.8       F
      42     175   525.8       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
```

```
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 18      48     .013     .013        0                  .5                1
Number of Barrels =  2
Upstream   Elevation =  522
Centerline Stations
    Sta.    Sta.
      26      36
Downstream Elevation =  521.1
Centerline Stations
    Sta.    Sta.
      22      32

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 16

INPUT
Description: Station 4304
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -290.3     529    -238     528    -179     527  -110.9     526   -81.8     525
   -48.3     524   -10.5     524    17.7     524    23.8     521    27.4     521
    31.8     524    46.9     525    77.3     526   109.6     527     144     528
     175     529

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -290.3     .06    17.7    .055    31.8     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          17.7    31.8             241     253     212             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -290.3      10   525.8       F
      42     175   525.8       F

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 15

INPUT
Description: Station 4051
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -297     529    -248     528    -196     527  -125.8     526   -91.7     525
   -65.6     524   -29.7     523    17.3     523    39.4     522    42.7     519
    47.4     519    51.1     522    63.4     523     129     527     146     528
     178     529

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -297     .06    39.4    .055    51.1     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          39.4    51.1             266     326     287             .1       .3

CROSS SECTION
```

RIVER: River 1
REACH: Main RS: 14

INPUT
Description: Station 3725
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-211	527	-181.8	526	-150.2	525	-118.5	524	-85.4	523
-47.6	522	-10.3	521	16.7	520	22.9	518	28.5	518
36.8	521	76.2	522	123	523	188	526		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-211	.06	16.7	.055	36.8	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
16.7	36.8	203	273	228	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 13

INPUT
Description: Station 3452
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-222.3	526	-172.8	524	-78.9	521	-45.7	520	12.9	520
24.5	516	29	516	34.4	519	52.7	520	78.1	521
131	524	148	525						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-222.3	.06	12.9	.055	34.4	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
12.9	34.4	304	355	279	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 12

INPUT
Description: Station 3097
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-199	523	-158	522	-117	521	-81	520	-36.5	519
44.3	518	57.8	517	61.6	515	65.8	515	71.1	517
83.3	518	180	524	199	525				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-199	.06	57.8	.055	71.1	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
57.8	71.1	242	464	310	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 11

INPUT
Description: Station 2633
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
    -273     522    -248     521  -221.6     520    -189     519    -133     518
   -68.1     517   -19.5     516      36     515    42.1     512    46.2     512
    50.8     514    60.4     515      81     516     101     517   136.9     519
     172     522     195     523

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -273     .06      36    .055    60.4     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            36    60.4              115     169     158             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 10

INPUT
Description: Station 2464
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -337     521    -279     519    -251     518  -232.2     517  -197.6     516
  -169.2     515   -38.3     514   -34.8     512   -25.1     512   -15.6     515
      14     516    42.8     517      65     518    85.6     519     110     520
     138     521

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -337     .06   -38.3    .055   -15.6     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -38.3   -15.6              236     333     210             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 9

INPUT
Description: Station 2131
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     516    59.5     515   109.1     514   167.2     513   204.4     512
   209.3     509   213.4     509     216     511   231.4     512   259.2     514
   272.3     515     333     519     367     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   204.4    .055     216     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         204.4     216              174     397     253             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 8

INPUT
Description: Station 1734
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     515    28.4     514    56.7     513    86.1     512   112.8     511
     142     510   150.5     507   154.2     507   159.5     510     208     511
     231     512     283     514     306     515

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06     142    .055   159.5     .06
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          142   159.5              159     221     180             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
   29.68  109.68  514.05

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 7

INPUT
Description: Station 1513
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514       1     513      30     512      62     511    84.5     511
    97.8     505   101.6     505   104.5     509     192     510     224     511
     256     512     276   512.5     277     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06    84.5    .055   104.5     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          84.5   104.5              91      99      81             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      81     513       F
     115     277     513       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     190     280   513.5

CULVERT


RIVER: River 1
REACH: Main               RS: 6.5

INPUT
Description:
Distance from Upstream XS =      30
Deck/Roadway Width        =      30
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     514             277     514

Upstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514       1     513      30     512      62     511    84.5     511
    97.8     505   101.6     505   104.5     509     192     510     224     511
     256     512     276   512.5     277     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06    84.5    .055   104.5     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
          84.5   104.5             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      81     513       F
     115     277     513       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     190     280   513.5
```

```
Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     514             286     514

Downstream Bridge Cross Section Data
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    34.6     513    57.5     512    81.1     511   104.2     510
   117.7     509   129.8     508     135     505     139     505   144.5     508
   164.6     509     233     511     285     512     286     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   129.8    .055   144.5     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
         129.8   144.5             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     120   511.5       F
     155     286   511.5       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      52     100     512

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 20      48     .013     .013        0                   .5                1
Number of Barrels =  3
Upstream   Elevation =  505.2
Centerline Stations
    Sta.    Sta.    Sta.
      89      98     107
Downstream Elevation =  505.1
Centerline Stations
    Sta.    Sta.    Sta.
     128     137     146

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 6

INPUT
Description: Station 1414
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    34.6     513    57.5     512    81.1     511   104.2     510
   117.7     509   129.8     508     135     505     139     505   144.5     508
   164.6     509     233     511     285     512     286     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   129.8    .055   144.5     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
```

```
         129.8   144.5              244     235     140             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     120   511.5       F
     155     286   511.5       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      52     100     512

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 5

INPUT
Description: Station 1179
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     510      50     509      86     508   104.1     507     109     504
     113     504   116.2     507     149     510     251     511

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   104.1    .055   116.2     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         104.1   116.2              170     218     170             .1       .3
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
       0      20     511     140     220     511

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 4

INPUT
Description: Station 961
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -195   510.5  -177.8     510   -32.3     509    51.4     508    66.3     507
      74     506    77.4     503    80.7     503    84.5     506      95     507
     134     509     155   510.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -195     .06      74    .055    84.5     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            74    84.5              150     357     290             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    -230    -160   510.5

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 3

INPUT
Description: Station 604
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -395   510.5    -275     509    -205     508     -86     507     -15     507
      -3     507      43     506      56     505      59     502      64     502
      68     505      79     506     105     507     160     507   183.3     506
   188.4     500   189.7     500   192.7     501   198.9     505     215     506
     258     509     270   510.5
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -395     .06   183.3    .055   198.9     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         183.3   198.9              200     189     145             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    -260    -190   510.5

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 2

INPUT
Description: Station 415
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -20   509.7       0     508      35     507      59     506      84     505
    90.3     504    91.6     500    92.2     500    96.1     501    99.8     504
   113.2     505     134     506     195     507     219     507     247     506
   271.2     505   276.7     500   282.7     500   287.4     505   300.8     506
     338     508     358     509     371   509.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -20     .06   271.2    .055   287.4     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         271.2   287.4              202     415     284             .1       .3
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
     -70      30   509.7     330     390   509.7

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 1

INPUT
Description: Station 1
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      13   508.6      22     508      41     507      67     506     100     505
     125     504   143.1     503   159.4     498   165.5     498   171.7     504
     191     505     215     506     350   506.8     370   508.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      13     .06   143.1    .055   171.7     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         143.1   171.7                0       0       0             .1       .3
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
     270     350   508.7     380     470   508.7

CROSS SECTION


RIVER: Trib 1
REACH: NW                 RS: 26

INPUT
Description: Station 1074
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -157     511    -155     510     -93     509       0     508    13.4     509
      35     509      47     508      52     505      57     505      64     509
```

```
     113     510     150  510.92     177     512

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -157     .06      47    .055      64     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           47      64              192     245     213             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     -50    -130     511

CROSS SECTION


RIVER: Trib 1
REACH: NW                RS: 25

INPUT
Description: Station 829
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -143     510     -94     509    -2.5     508    86.1     507    90.6     504
    94.7     504     100     507   138.6     508   175.4     509   220.5     510

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -143     .06    86.1    .055     100     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          86.1     100              225     225     225             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     -80     -30     511

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 44

INPUT
Description: Station 3058
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     524    24.1     523    47.6     522    71.2     521   105.2     520
   145.4     519   174.5     518   204.2     517   226.6     516   231.2     512
   235.7     512   239.3     516     250     517   269.7     518   363.4     519
   407.2     520   443.6     521   468.4     522

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   226.6    .055   239.3     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         226.6   239.3              190     184     180             .1       .3

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 43

INPUT
Description: Station 2874
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     522    21.4     521    39.6     520    58.5     519      78     518
   101.8     517   107.5     516     112     512     116     512  123.96  514.98
     132     516   179.3     516   202.6     517   223.2     518   242.8     519
   268.8     520     332     521   375.4     522
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   107.5    .055  123.96     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         107.5  123.96              150     151     150             .1       .3
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
      35      85   519.5     228     320   519.5

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 42

INPUT
Description: Station 2723
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     522    30.8     521      52     520    69.8     519    89.8     518
   116.8     517   141.2     516   150.4     515   160.5     511   163.8     511
   169.4     515   218.8     516   248.1     517   271.9     518   295.9     519
   317.8     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   150.4    .055   169.4     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         150.4   169.4              140     145     145             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      70     100     519

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 41

INPUT
Description: Station 2578
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -200.4     522  -170.6     521  -132.3     519  -103.6     518   -75.2     517
     -36     516     7.1     515    13.5     514    23.2     510    26.8     510
    32.3     515      40     516    52.2     517    70.5     518    91.2     519
     119     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -200.4     .06     7.1    .055    32.3     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           7.1    32.3                75      75      75             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 -134.57 -104.57  518.64

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 40

INPUT
Description: Station 2503
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     519    47.1     517    73.3     516   194.1     515   223.9     515
   232.4     510   254.3     510   262.1     515   270.5     516   280.9     517
```

```
   293.4     518   304.3     519   323.7     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   223.9    .055   262.1     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         223.9   262.1               75      76      75             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     218     518       F
     270   323.7     518       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      25     190   517.9

CULVERT


RIVER: Trib2
REACH: SW                 RS: 39.1

INPUT
Description:
Distance from Upstream XS =      25
Deck/Roadway Width        =      35
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
      20     518             300     518

Upstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     519    47.1     517    73.3     516   194.1     515   223.9     515
   232.4     510   254.3     510   262.1     515   270.5     516   280.9     517
   293.4     518   304.3     519   323.7     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   223.9    .055   262.1     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
         223.9   262.1             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     218     518       F
     270   323.7     518       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      25     190   517.9

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     518             285     518

Downstream Bridge Cross Section Data
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     518    28.8     517    58.1     516    92.7     515   228.7     514
   233.7     510   235.7     510   248.5     515     261     516     308     520
   319.4     521

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   228.7    .055   248.5     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
         228.7   248.5             .3       .5
Ineffective Flow     num=       2
```

```
   Sta L   Sta R    Elev  Permanent
       0     220   516.5       F
     255   319.4   516.5       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      20      80   517.2

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                23      48     .012     .012        0                  .5                1
Number of Barrels =  3
Upstream   Elevation =  510
Centerline Stations
    Sta.    Sta.    Sta.
     234     244     254
Downstream Elevation =  510
Centerline Stations
    Sta.    Sta.    Sta.
     228     238     248

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 39

INPUT
Description: Station 2427
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     518    28.8     517    58.1     516    92.7     515   228.7     514
   233.7     510   235.7     510   248.5     515     261     516     308     520
   319.4     521

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   228.7    .055   248.5     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         228.7   248.5               40      40      40             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     220   516.5       F
     255   319.4   516.5       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      20      80   517.2

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 38

INPUT
Description: Station 2387
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
       0     518    28.7     517    62.7     516   100.9     515   232.6     514
   237.6     510   240.6     510   245.7     513   250.3     514   262.7     515
   275.6     516     289     517   302.4     518   325.2     520   354.1     522

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   232.6    .055   250.3     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         232.6   250.3              250     252     250             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      35      95   516.8

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 37

INPUT
Description: Station 2135
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -255     517    -230     516    -207     515    -178     514    29.6     513
      40     509    43.4     509    48.8     513    57.3     514      85     517
   112.8     521

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -255     .06    29.6    .055    48.8     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          29.6    48.8              135     138     135             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    -240    -120   515.5

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 36

INPUT
Description: Station 1997
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -183.6     515  -144.6     514   -89.6     513    19.4     512    36.4     508
    39.5     508    46.2     512    68.1     513    99.6     514   125.3     515
   144.6     516     161     517   179.8     518

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -183.6     .06    19.4    .055    46.2     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          19.4    46.2              170     173     170             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    -200    -130   514.8

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 35

INPUT
Description: Station 1824
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
    -250   514.7  -232.7     514  -165.7     513   -41.5     512      35     511
    58.9     511    66.8     507    71.8     507      83     513    90.7     514
    99.3     515   132.1     516     174     517   221.4     518

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -250     .06    58.9    .055      83     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          58.9      83              200     206     200             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    -248     -90   514.5

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 34

INPUT
Description: Station 1655
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -244.4     515  -190.7     514  -130.4     513   -87.5     512   -48.2     511
    21.7     510    30.2     506    32.9     506    36.6     510    44.3     511
    70.1     512     174     513   197.6     514   222.1     515   241.1     516
   268.1     517

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -244.4     .06    21.7    .055    36.6     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          21.7    36.6              74      74      74             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -244.4       0     514       F
      48   268.1     514       F

CULVERT


RIVER: Trib2
REACH: SW                RS: 33.5

INPUT
Description:
Distance from Upstream XS =      25
Deck/Roadway Width        =      35
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -195     514             200     514

Upstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -244.4     515  -190.7     514  -130.4     513   -87.5     512   -48.2     511
    21.7     510    30.2     506    32.9     506    36.6     510    44.3     511
    70.1     512     174     513   197.6     514   222.1     515   241.1     516
   268.1     517

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -244.4     .06    21.7    .055    36.6     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
          21.7    36.6             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
```

```
  -244.4       0     514       F
      48   268.1     514       F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     514             318     514

Downstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    44.4     513    70.9     512    97.4     511     160     510
   170.7     510   177.2     506   182.2     506   186.1     509   221.2     510
   255.9     511   279.2     512   304.2     513   328.6     514   352.9     515
   384.4     516

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   170.7    .055   186.1     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
         170.7   186.1            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     160     512       F
     196   384.4     512       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      45     110   512.8

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 13      48     .012     .012        0                  .5                1
Number of Barrels =  3
Upstream   Elevation =  506
Centerline Stations
    Sta.    Sta.    Sta.
      21      31      41
Downstream Elevation =  506
Centerline Stations
    Sta.    Sta.    Sta.
     170     180     190

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 33

INPUT
Description: Station 1581
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    44.4     513    70.9     512    97.4     511     160     510
   170.7     510   177.2     506   182.2     506   186.1     509   221.2     510
   255.9     511   279.2     512   304.2     513   328.6     514   352.9     515
   384.4     516
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   170.7    .055   186.1     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         170.7   186.1              375     378     375             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     160     512       F
     196   384.4     512       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      45     110   512.8

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 32

INPUT
Description: Station 1203
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -218.5     515  -182.2     514  -151.8     513    -132     512  -111.5     511
   -92.4     510   -70.6     509   -52.4     508   -45.9     504   -44.5     504
   -37.5     508    91.7     509   124.8     510     144     511     166     512
     196     513     223     514     256     515

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -218.5     .06   -52.4    .055   -37.5     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -52.4   -37.5              380     384     380             .1       .3

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 31

INPUT
Description: Station 819
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -175     512    -174     510  -128.8     509   -26.3     508       0     507
    22.1     506    24.7     502    29.4     502    40.8     506    55.3     507
    75.9     508    97.4     509   116.3     510   134.4     511     135     512

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -175     .06    22.1    .055    40.8     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          22.1    40.8               75      75      75             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -175       5   511.8       F
      52     135   511.8       F

CULVERT


RIVER: Trib2
REACH: SW                RS: 30.5

INPUT
Description:
Distance from Upstream XS =      25
Deck/Roadway Width        =      38
Weir Coefficient          =     2.6
```

```
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -175     512             135     512

Upstream Bridge Cross Section Data
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -175     512    -174     510  -128.8     509   -26.3     508       0     507
    22.1     506    24.7     502    29.4     502    40.8     506    55.3     507
    75.9     508    97.4     509   116.3     510   134.4     511     135     512

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -175     .06    22.1    .055    40.8     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
          22.1    40.8             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -175       5   511.8       F
      52     135   511.8       F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -150     512             125     512

Downstream Bridge Cross Section Data
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -150     512  -145.5   509.5     -74     509   -27.5     508    18.2     507
    27.2     506      31     502      38     502    41.2     506      55     507
    72.8     508    89.4     509   106.8     510   123.8     511     125     512

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -150     .06    27.2    .055    41.2     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
          27.2    41.2             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -150      17     510       F
      52     125     510       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                18      48     .012     .012        0                  .5                1
Number of Barrels =  3
Upstream   Elevation =  502
Centerline Stations
    Sta.    Sta.    Sta.
      19      29      39
Downstream Elevation =  502
Centerline Stations
    Sta.    Sta.    Sta.
      25      35      45
```

CROSS SECTION

RIVER: Trib2
REACH: SW RS: 30

INPUT
Description: Station 744
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-150	512	-145.5	509.5	-74	509	-27.5	508	18.2	507
27.2	506	31	502	38	502	41.2	506	55	507
72.8	508	89.4	509	106.8	510	123.8	511	125	512

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-150	.06	27.2	.055	41.2	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
27.2	41.2	90	90	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-150	17	510	F
52	125	510	F

SUMMARY OF MANNING'S N VALUES

River:River 1

Reach	River Sta.	n1	n2	n3
Main	21	.06	.055	.06
Main	20	.06	.055	.06
Main	19	.06	.055	.06
Main	18	.06	.055	.06
Main	17	.06	.055	.06
Main	16.5	Culvert		
Main	16	.06	.055	.06
Main	15	.06	.055	.06
Main	14	.06	.055	.06
Main	13	.06	.055	.06
Main	12	.06	.055	.06
Main	11	.06	.055	.06
Main	10	.06	.055	.06
Main	9	.06	.055	.06
Main	8	.06	.055	.06
Main	7	.06	.055	.06
Main	6.5	Culvert		
Main	6	.06	.055	.06
Main	5	.06	.055	.06
Main	4	.06	.055	.06
Main2	3	.06	.055	.06
Main2	2	.06	.055	.06
Main2	1	.06	.055	.06

River:Trib 1

Reach	River Sta.	n1	n2	n3
NW	26	.06	.055	.06
NW	25	.06	.055	.06

River:Trib2

Reach	River Sta.	n1	n2	n3
SW	44	.06	.055	.06

SW	43	.06	.055	.06
SW	42	.06	.055	.06
SW	41	.06	.055	.06
SW	40	.06	.055	.06
SW	39.1	Culvert		
SW	39	.06	.055	.06
SW	38	.06	.055	.06
SW	37	.06	.055	.06
SW	36	.06	.055	.06
SW	35	.06	.055	.06
SW	34	.06	.055	.06
SW	33.5	Culvert		
SW	33	.06	.055	.06
SW	32	.06	.055	.06
SW	31	.06	.055	.06
SW	30.5	Culvert		
SW	30	.06	.055	.06

SUMMARY OF REACH LENGTHS

River: River 1

Reach	River Sta.	Left	Channel	Right
Main	21	157	143	128
Main	20	190	185	122
Main	19	81	90	88
Main	18	109	138	144
Main	17	86	86	86
Main	16.5	Culvert		
Main	16	241	253	212
Main	15	266	326	287
Main	14	203	273	228
Main	13	304	355	279
Main	12	242	464	310
Main	11	115	169	158
Main	10	236	333	210
Main	9	174	397	253
Main	8	159	221	180
Main	7	91	99	81
Main	6.5	Culvert		
Main	6	244	235	140
Main	5	170	218	170
Main	4	150	357	290
Main2	3	200	189	145
Main2	2	202	415	284
Main2	1	0	0	0

River: Trib 1

Reach	River Sta.	Left	Channel	Right
NW	26	192	245	213
NW	25	225	225	225

River: Trib2

Reach	River Sta.	Left	Channel	Right
SW	44	190	184	180
SW	43	150	151	150
SW	42	140	145	145
SW	41	75	75	75
SW	40	75	76	75
SW	39.1	Culvert		
SW	39	40	40	40
SW	38	250	252	250

SW	37	135	138	135
SW	36	170	173	170
SW	35	200	206	200
SW	34	74	74	74
SW	33.5	Culvert		
SW	33	375	378	375
SW	32	380	384	380
SW	31	75	75	75
SW	30.5	Culvert		
SW	30	90	90	90

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River 1

Reach	River Sta.	Contr.	Expan.
Main	21	.1	.3
Main	20	.1	.3
Main	19	.1	.3
Main	18	.1	.3
Main	17	.3	.5
Main	16.5	Culvert	
Main	16	.3	.5
Main	15	.1	.3
Main	14	.1	.3
Main	13	.1	.3
Main	12	.1	.3
Main	11	.1	.3
Main	10	.1	.3
Main	9	.1	.3
Main	8	.1	.3
Main	7	.3	.5
Main	6.5	Culvert	
Main	6	.3	.5
Main	5	.1	.3
Main	4	.1	.3
Main2	3	.1	.3
Main2	2	.1	.3
Main2	1	.1	.3

River: Trib 1

Reach	River Sta.	Contr.	Expan.
NW	26	.1	.3
NW	25	.1	.3

River: Trib2

Reach	River Sta.	Contr.	Expan.
SW	44	.1	.3
SW	43	.1	.3
SW	42	.1	.3
SW	41	.1	.3
SW	40	.3	.5
SW	39.1	Culvert	
SW	39	.3	.5
SW	38	.1	.3
SW	37	.1	.3
SW	36	.1	.3
SW	35	.1	.3
SW	34	.3	.5
SW	33.5	Culvert	
SW	33	.3	.5
SW	32	.1	.3

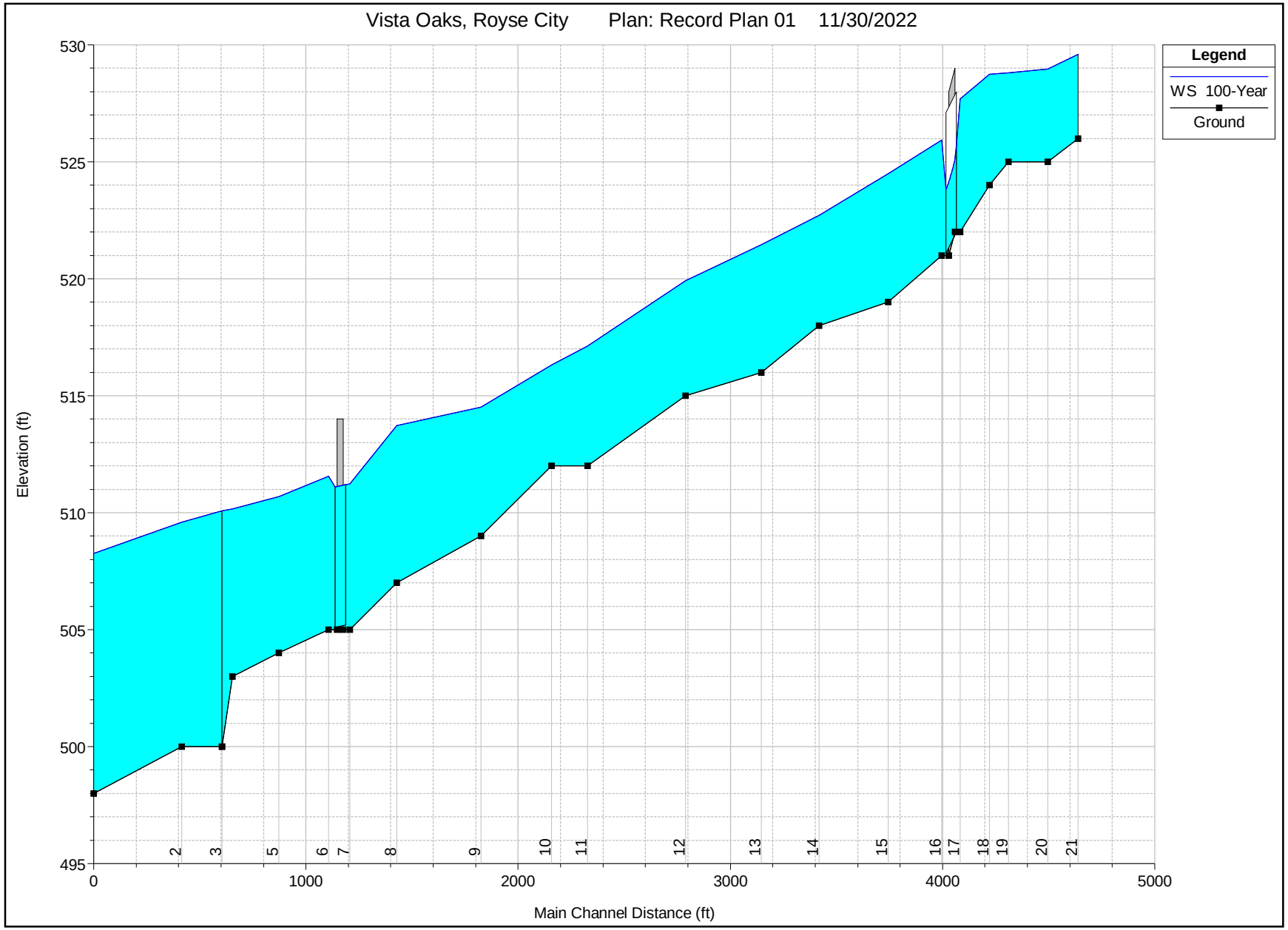
SW	31		.3	.5
SW	30.5	Culvert		
SW	30		.3	.5

HEC-RAS Plan: RecordPln 01 Profile: 100-Year

River	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)	
River 1	Main2	1	100-Year	3650.00	498.00	508.26	507.29	508.73	0.005002	7.23	831.83	268.10	0.45
River 1	Main2	2	100-Year	3650.00	500.00	509.59		509.76	0.002666	4.81	1154.45	300.00	0.30
River 1	Main2	3	100-Year	3650.00	500.00	510.08		510.17	0.001669	3.72	1615.88	558.47	0.23
River 1	Main	4	100-Year	983.00	503.00	510.17		510.27	0.002636	4.10	497.25	310.33	0.29
River 1	Main	5	100-Year	983.00	504.00	510.69		510.90	0.004088	4.96	309.52	120.00	0.37
River 1	Main	6	100-Year	983.00	505.00	511.57	510.53	511.79	0.004230	5.10	328.81	162.46	0.38
River 1	Main	6.5		Culvert									
River 1	Main	7	100-Year	983.00	505.00	511.24	511.24	512.76	0.029002	10.38	102.69	135.55	0.92
River 1	Main	8	100-Year	983.00	507.00	513.73		513.83	0.001799	3.42	447.29	166.41	0.26
River 1	Main	9	100-Year	983.00	509.00	514.52		514.81	0.008008	6.22	286.50	182.97	0.51
River 1	Main	10	100-Year	983.00	512.00	516.31		516.46	0.004911	4.27	367.96	231.51	0.40
River 1	Main	11	100-Year	983.00	512.00	517.13		517.51	0.010158	6.18	255.71	180.02	0.58
River 1	Main	12	100-Year	725.00	515.00	519.92		520.09	0.004891	4.75	282.08	191.77	0.41
River 1	Main	13	100-Year	725.00	516.00	521.46		521.65	0.004706	4.47	268.13	179.29	0.39
River 1	Main	14	100-Year	725.00	518.00	522.71		522.93	0.005920	4.91	249.58	183.75	0.45
River 1	Main	15	100-Year	725.00	519.00	524.50		524.71	0.006089	5.19	250.37	166.55	0.43
River 1	Main	16	100-Year	725.00	521.00	525.93	525.80	526.08	0.005156	4.40	276.48	184.07	0.40
River 1	Main	16.5		Culvert									
River 1	Main	17	100-Year	725.00	522.00	527.69	526.98	528.46	0.012696	7.74	107.81	330.81	0.64
River 1	Main	18	100-Year	725.00	524.00	528.75		528.77	0.000718	1.92	704.90	384.38	0.16
River 1	Main	19	100-Year	725.00	525.00	528.81		528.83	0.000701	1.65	711.42	384.02	0.15
River 1	Main	20	100-Year	725.00	525.00	528.96		529.09	0.002970	3.05	281.04	146.54	0.31
River 1	Main	21	100-Year	725.00	526.00	529.60		529.84	0.009592	5.72	227.37	177.93	0.56
Trib 1	NW	25	100-Year	834.00	504.00	510.22		510.25	0.000943	2.29	623.45	313.50	0.18
Trib 1	NW	26	100-Year	834.00	505.00	510.49		510.56	0.002389	3.22	453.87	288.58	0.28
Trib2	SW	30	100-Year	1205.00	502.00	510.15	508.71	510.29	0.002429	4.24	533.19	256.11	0.28
Trib2	SW	30.5		Culvert									
Trib2	SW	31	100-Year	1205.00	502.00	511.22	508.24	511.52	0.002622	4.92	281.14	309.14	0.31
Trib2	SW	32	100-Year	1205.00	504.00	512.02		512.06	0.000801	2.36	829.51	298.91	0.17
Trib2	SW	33	100-Year	1205.00	506.00	512.52	512.00	512.69	0.003874	4.68	417.97	182.22	0.36
Trib2	SW	33.5		Culvert									
Trib2	SW	34	100-Year	1178.00	506.00	512.87	512.43	513.83	0.015123	8.98	161.91	285.74	0.69
Trib2	SW	35	100-Year	1178.00	507.00	514.67		514.76	0.001941	3.52	622.10	345.60	0.26
Trib2	SW	36	100-Year	1178.00	508.00	515.00		515.09	0.001913	3.43	603.00	308.81	0.26
Trib2	SW	37	100-Year	1178.00	509.00	515.32		515.49	0.004192	4.57	405.54	189.44	0.37
Trib2	SW	38	100-Year	1104.00	510.00	516.42		516.59	0.004628	4.62	376.66	186.17	0.38
Trib2	SW	39	100-Year	1104.00	510.00	516.62	516.50	516.76	0.003487	4.04	412.30	188.31	0.34
Trib2	SW	39.1		Culvert									
Trib2	SW	40	100-Year	1104.00	510.00	517.49	513.87	517.76	0.002271	4.24	276.23	97.08	0.30
Trib2	SW	41	100-Year	1104.00	510.00	517.71		518.01	0.004887	5.32	318.25	160.46	0.41
Trib2	SW	42	100-Year	1104.00	511.00	518.39		518.55	0.002821	4.30	421.79	181.37	0.32

HEC-RAS Plan: RecordPln 01 Profile: 100-Year (Continued)

River	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)	
Trib2	SW	43	100-Year	1104.00	512.00	518.84		519.01	0.003263	4.48	376.83	143.00	0.33
Trib2	SW	44	100-Year	1104.00	512.00	519.52		519.72	0.004488	5.26	414.75	261.45	0.37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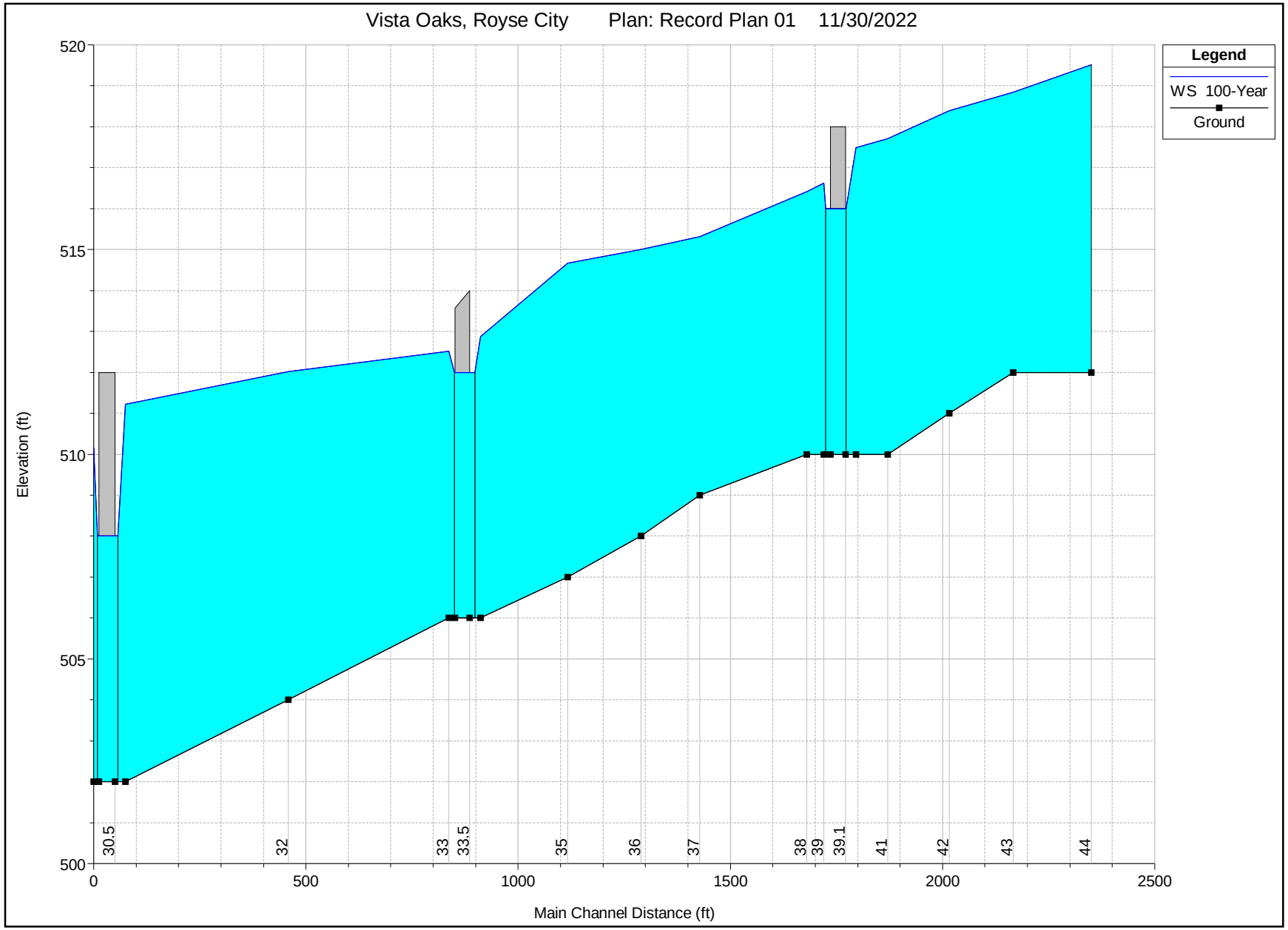
Legend
WS 100-Year
Ground
Elevation (ft)
Main Channel Distance (ft)
530
525
520
515
510
505
500
495
0
1000
2000
3000
4000
5000
2
3
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21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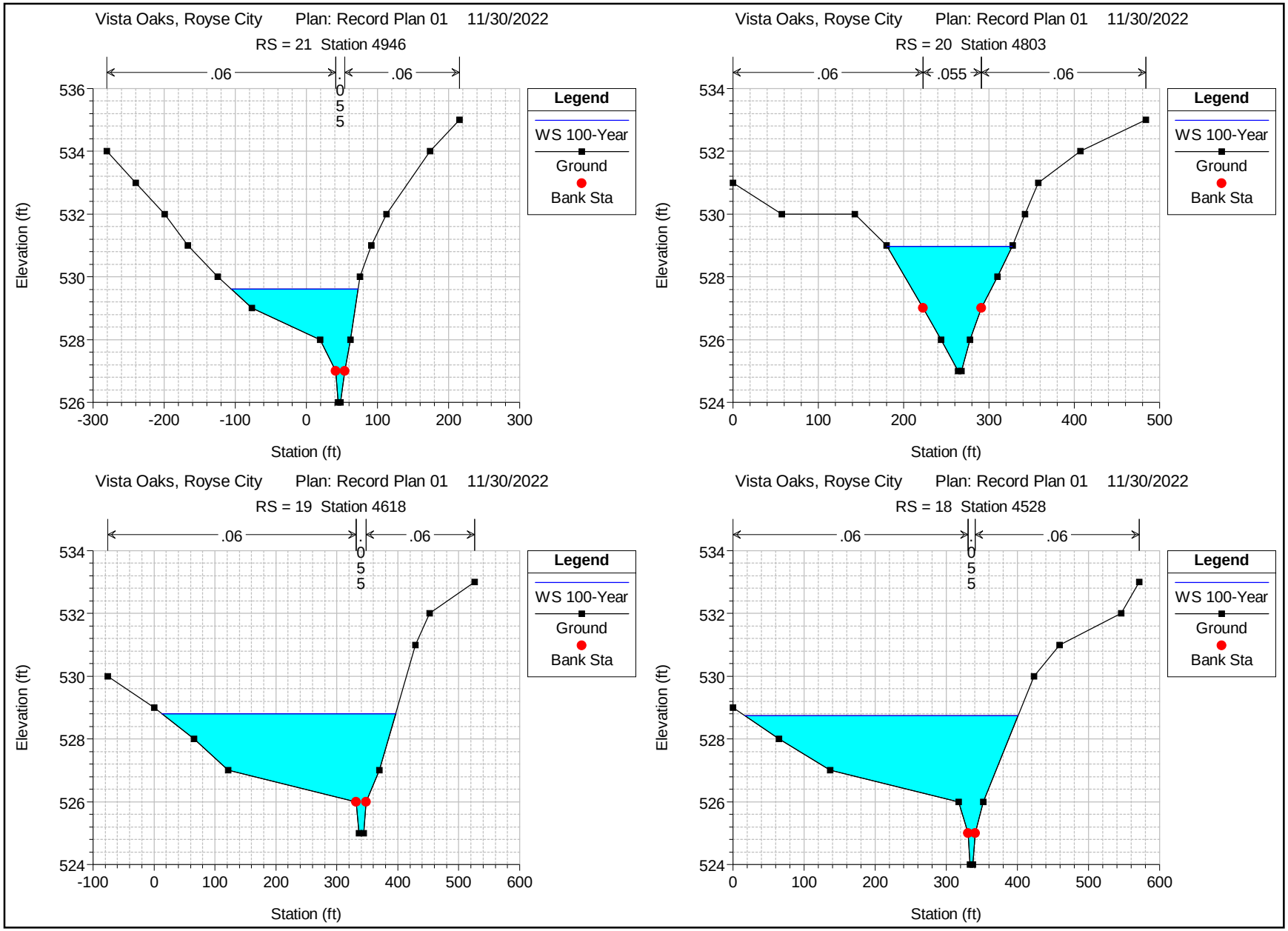
Legend
WS 100-Year
Ground
Elevation (ft)
Main Channel Distance (ft)
520
515
510
505
500
0
500
1000
1500
2000
2500
30.5
32
33
33.5
35
36
37
38
39
39.1
41
42
43
44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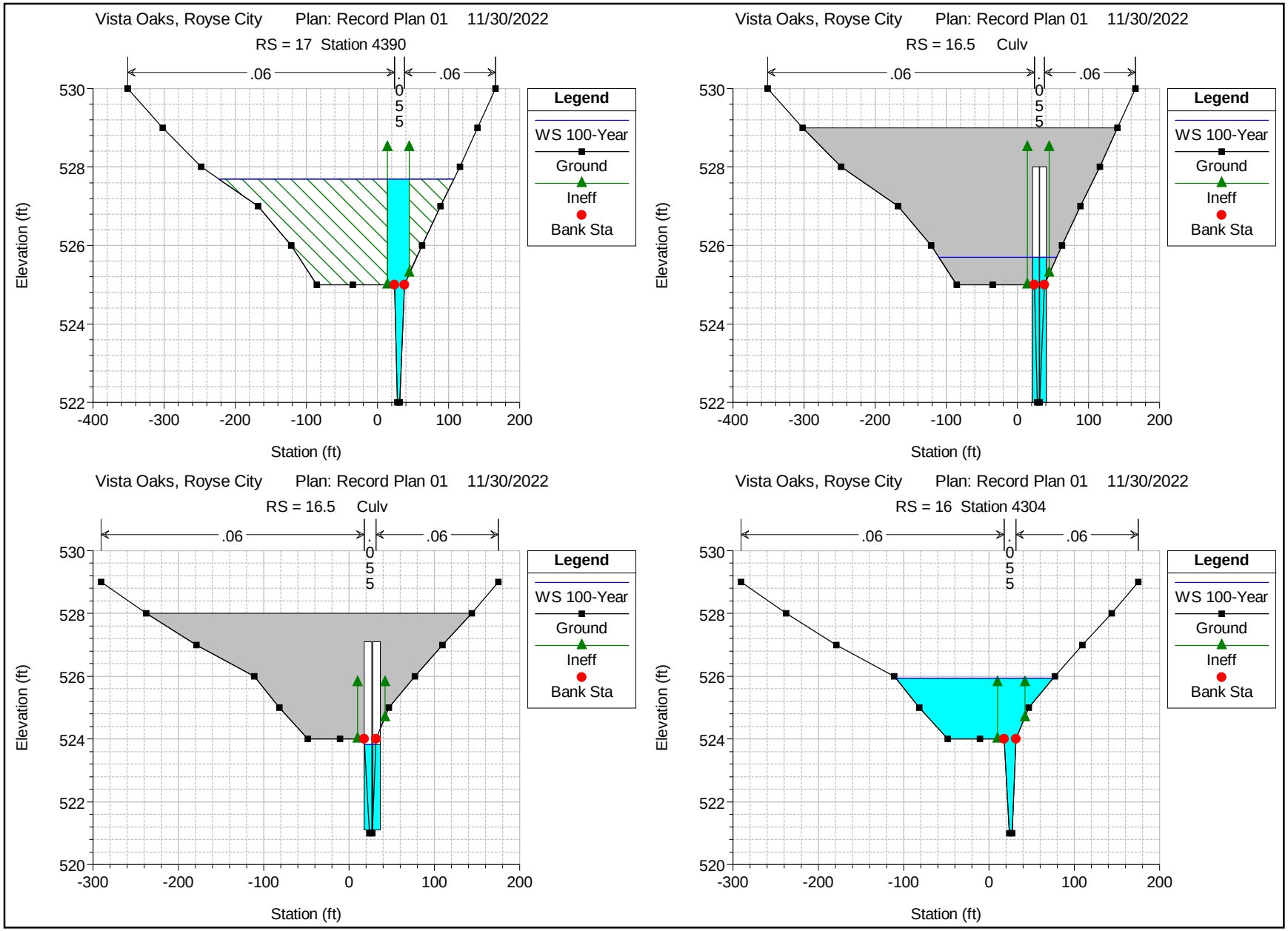
RS = 21 Station 4946
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 20 Station 4803
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 19 Station 4618
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 18 Station 4528
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)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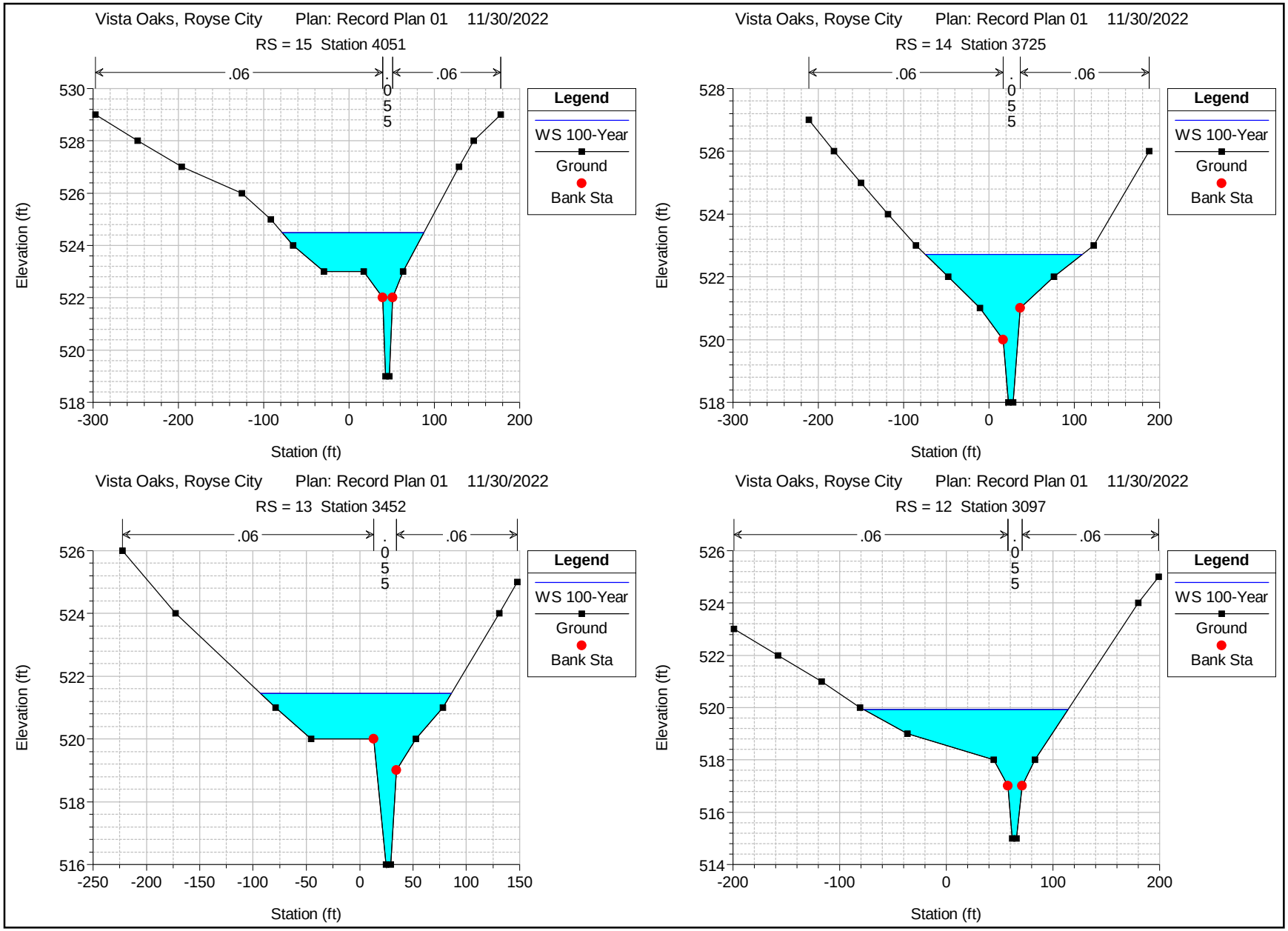
RS = 17 Station 4390
.06
.055
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
-400
-300
-200
-100
0
100
200
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 16.5 Culv
.06
.055
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
-400
-300
-200
-100
0
100
200
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 16.5 Culv
.06
.055
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
520
-300
-200
-100
0
100
200
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 16 Station 4304
.06
.055
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
520
-300
-200
-100
0
100
200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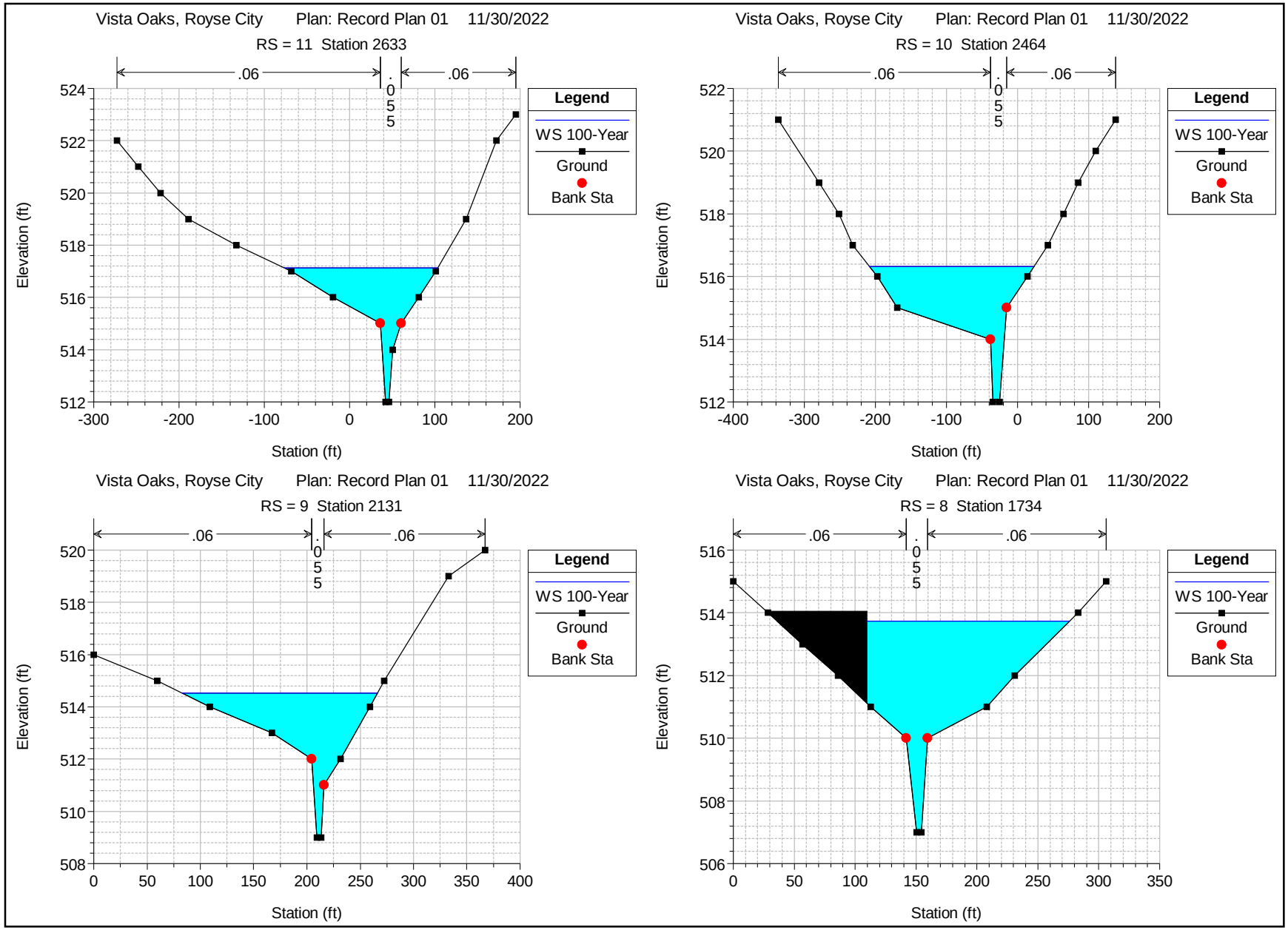
RS = 15 Station 4051
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 14 Station 3725
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 13 Station 3452
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 12 Station 3097
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)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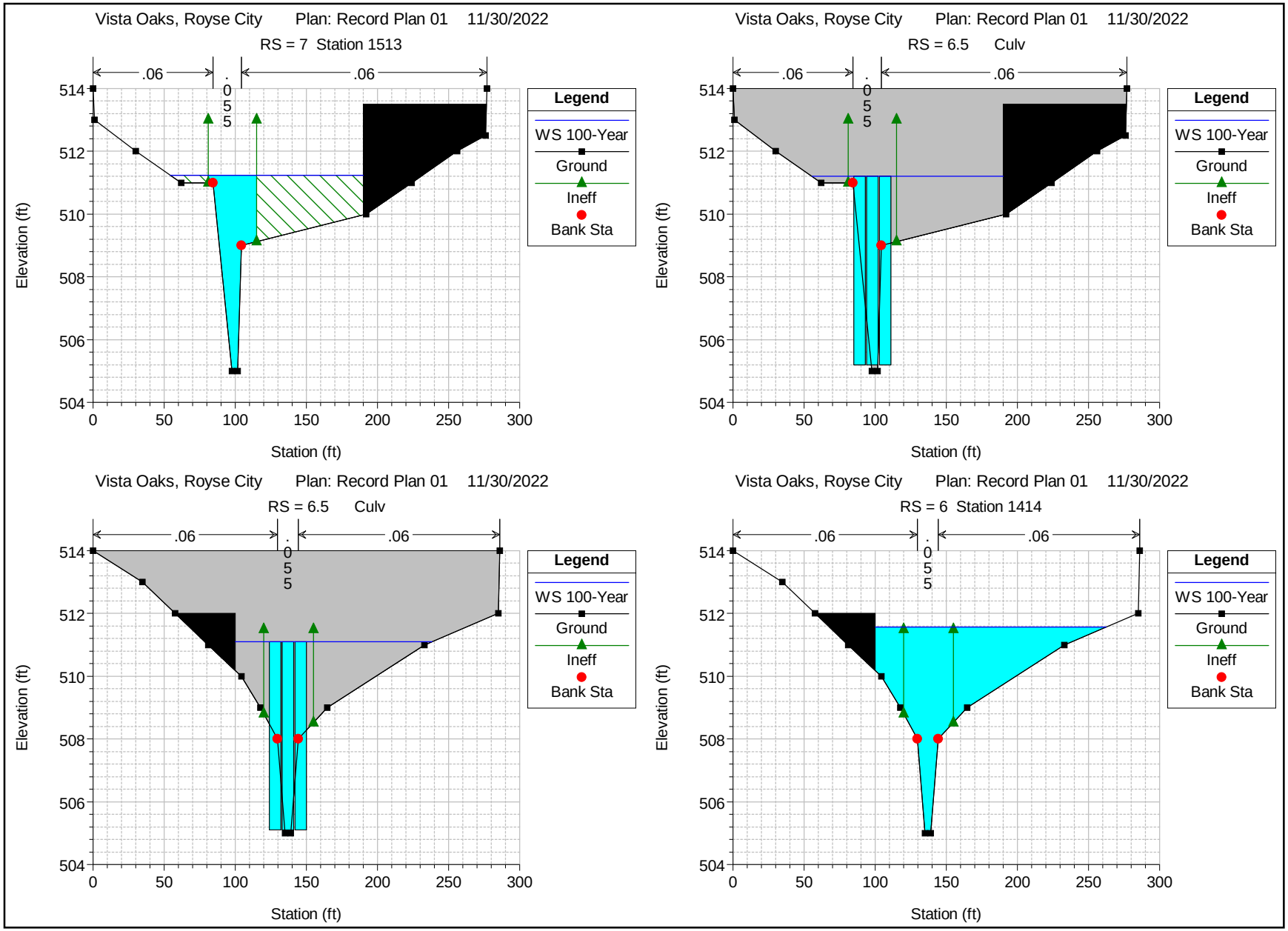
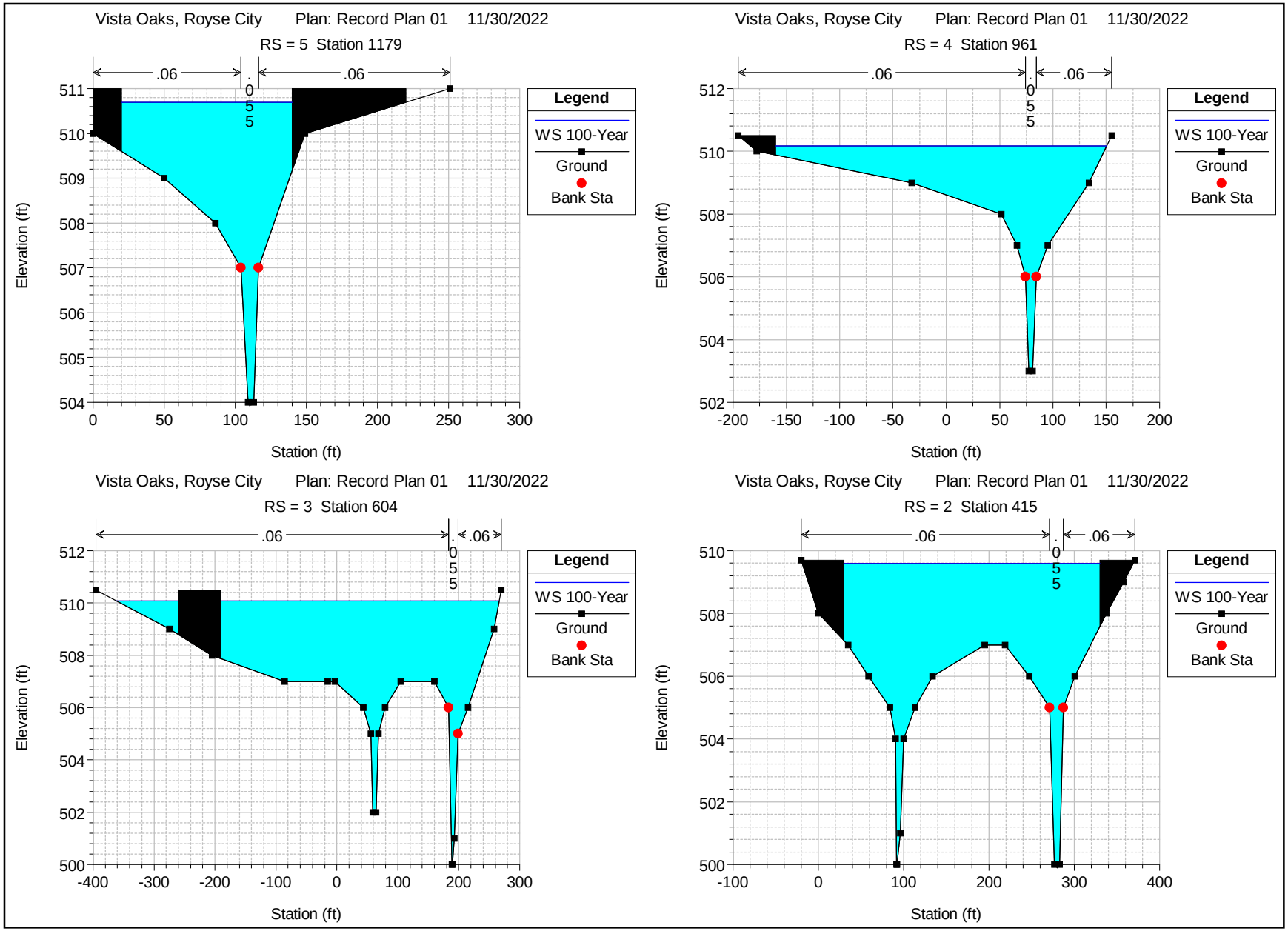
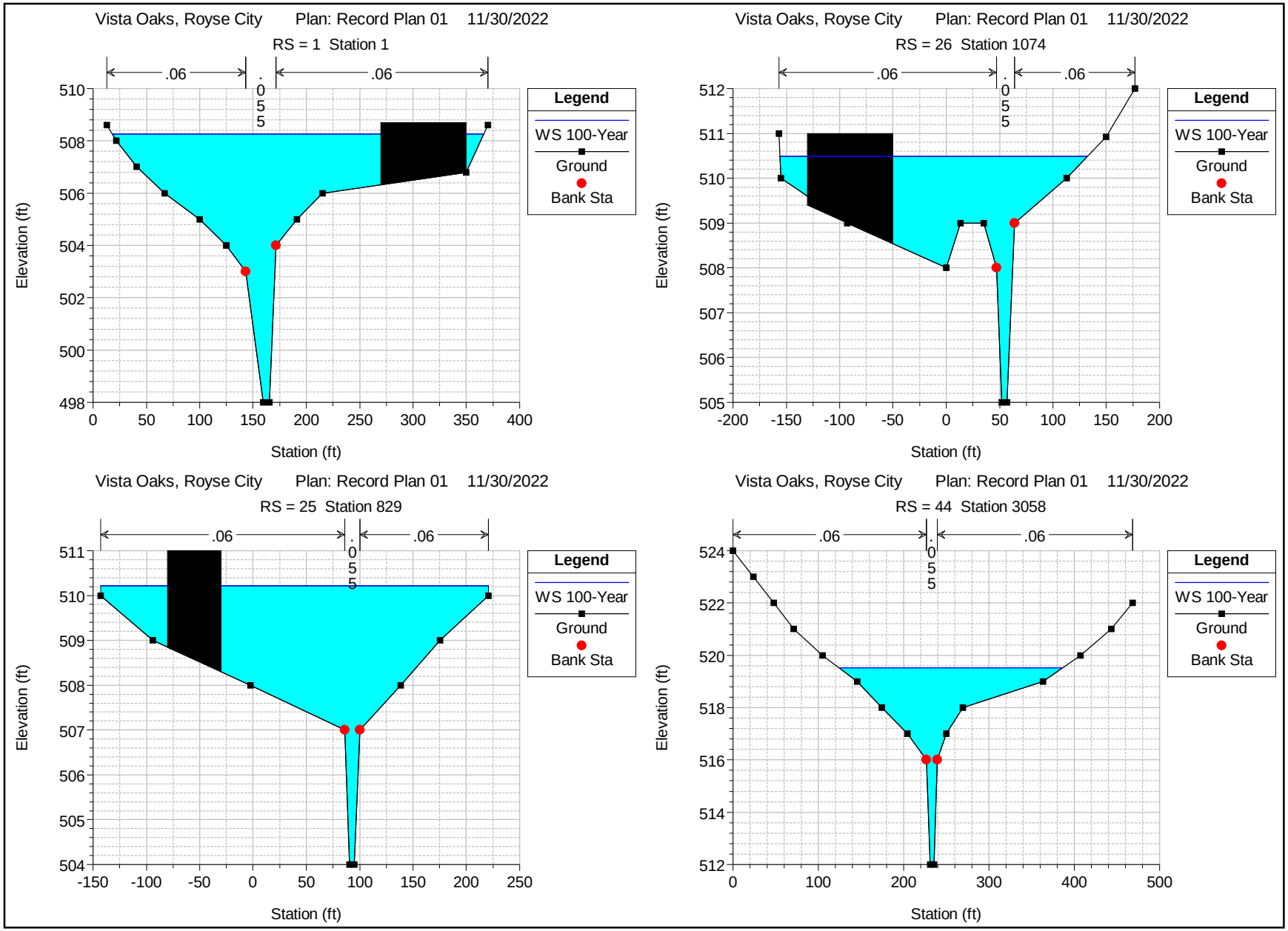
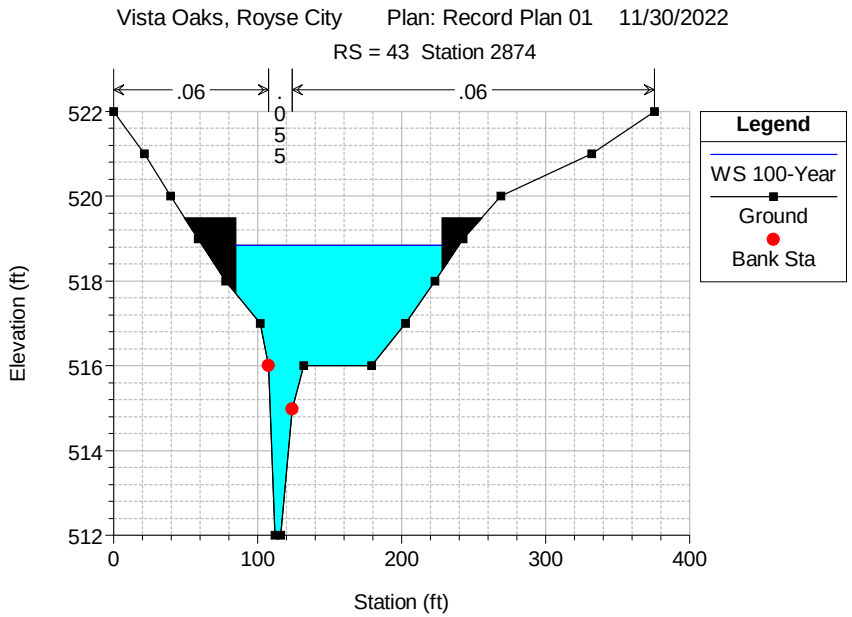
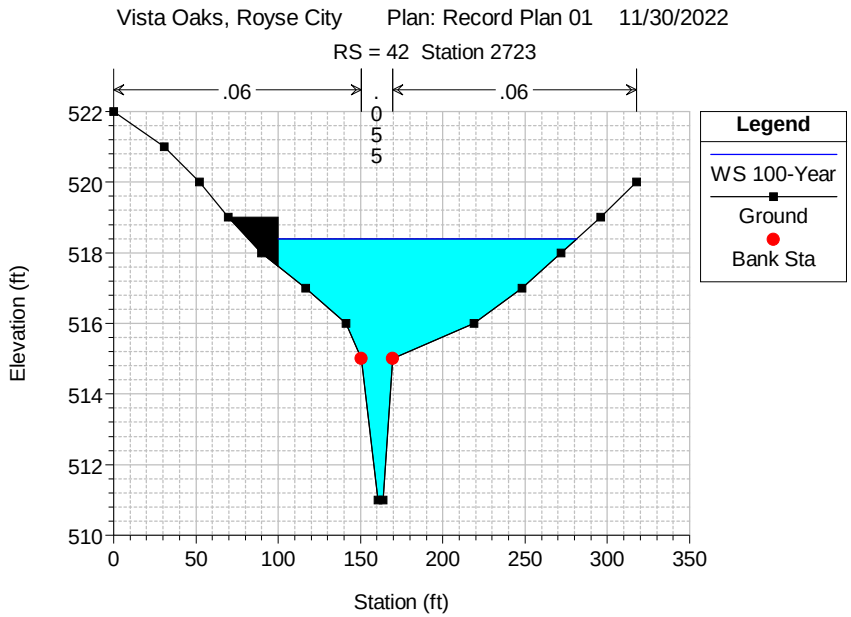
RS = 11 Station 2633
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 10 Station 2464
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 9 Station 2131
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 8 Station 1734
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

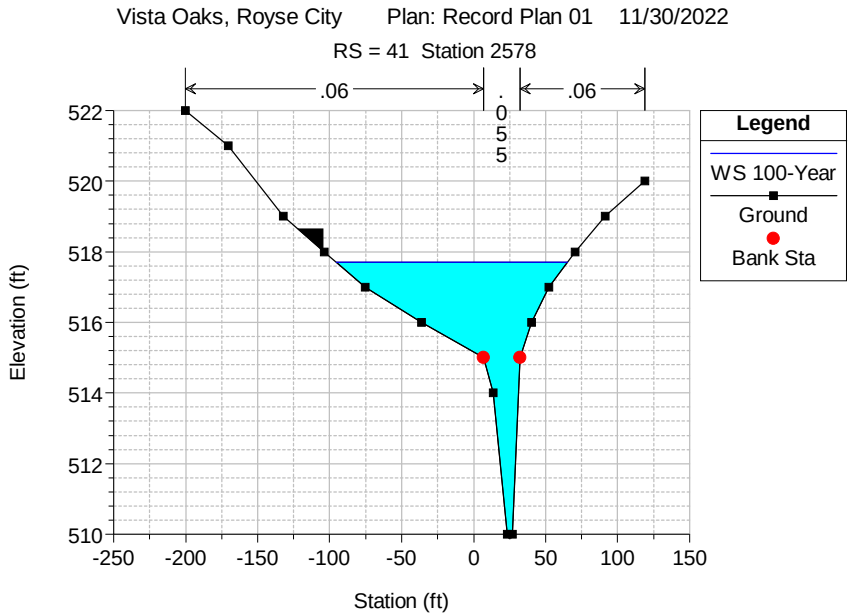

Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 7 Station 1513
.06
.055
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 6.5 Culv
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 6.5 Culv
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 6 Station 1414

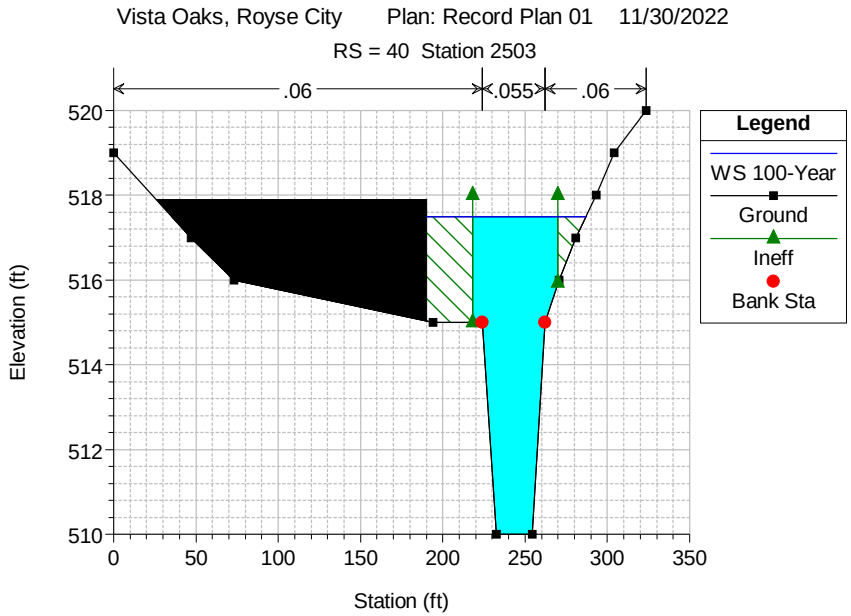

Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 5 Station 1179
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 4 Station 961
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 3 Station 604
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 2 Station 415
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

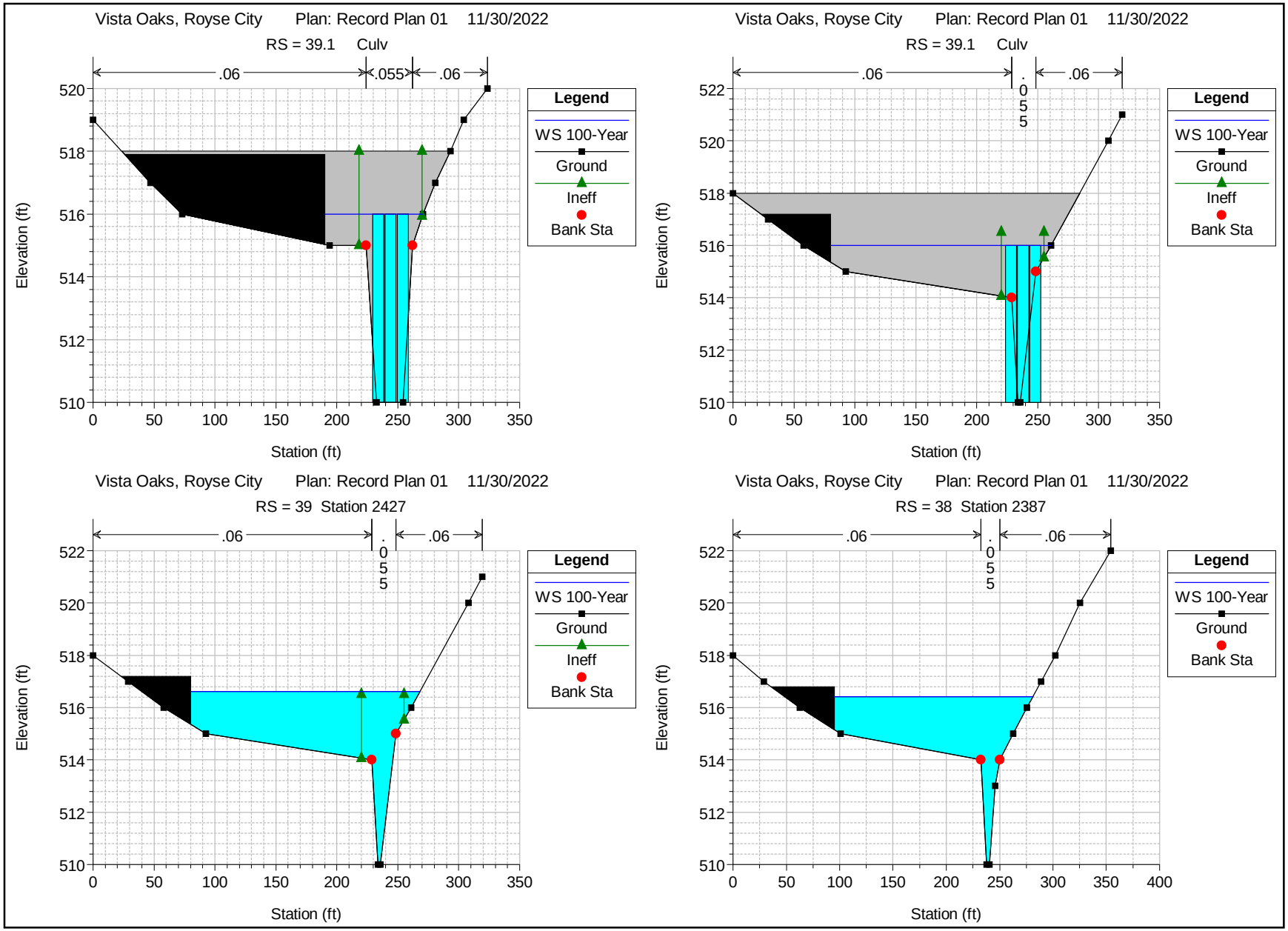

Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 1 Station 1
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 26 Station 1074
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 25 Station 829
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 44 Station 3058
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta

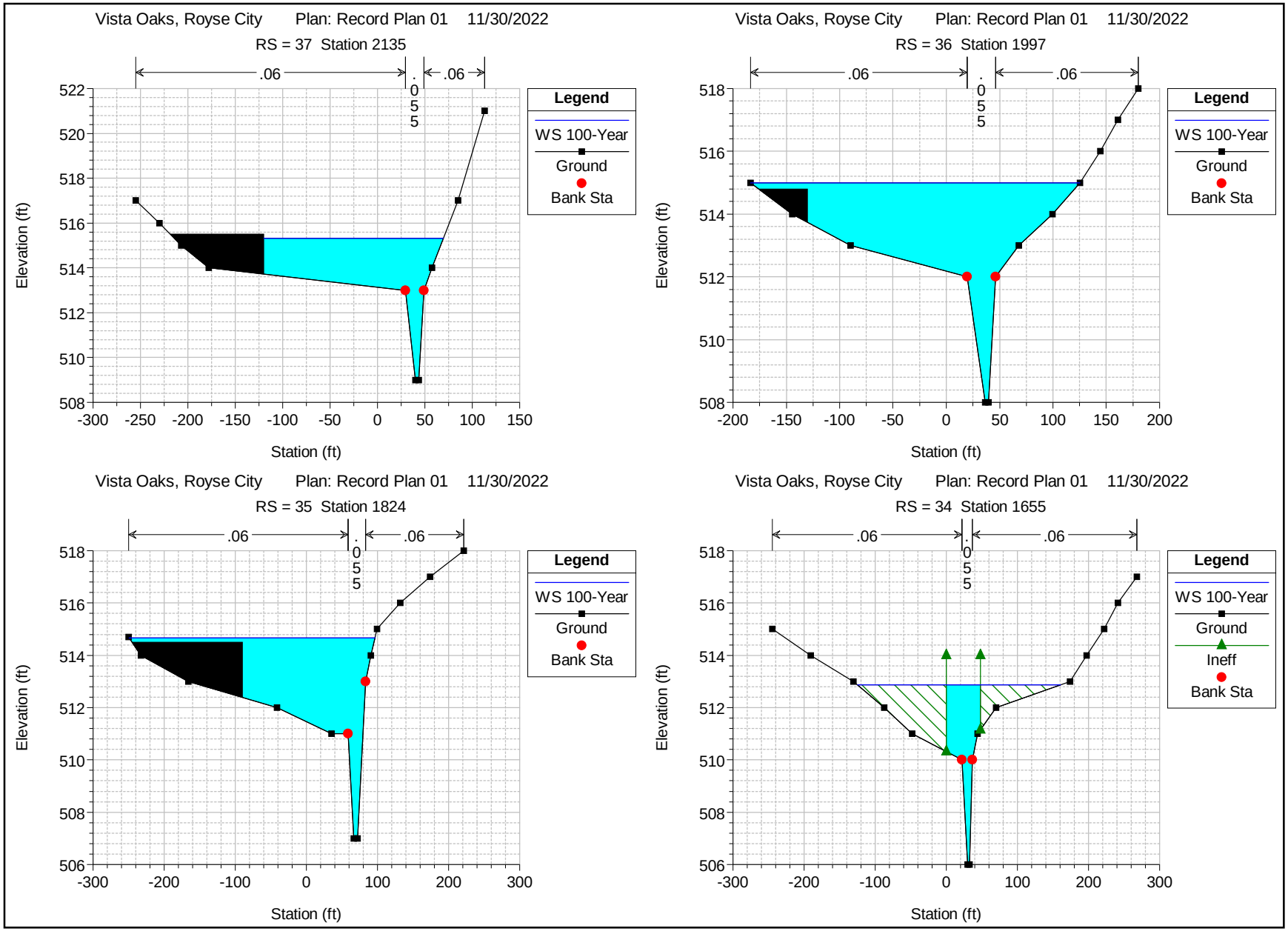

Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 43 Station 2874
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

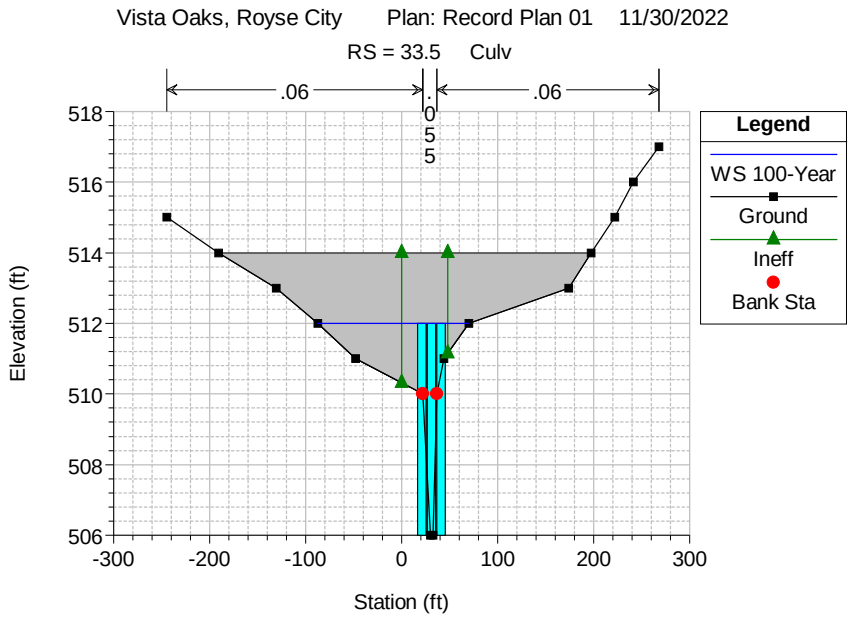

Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 42 Station 2723
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

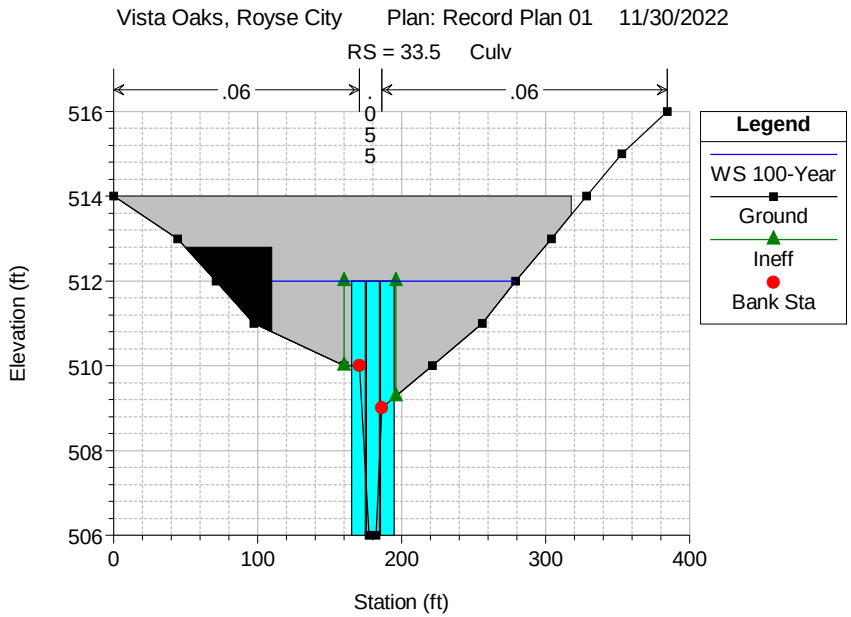

Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 41 Station 2578
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

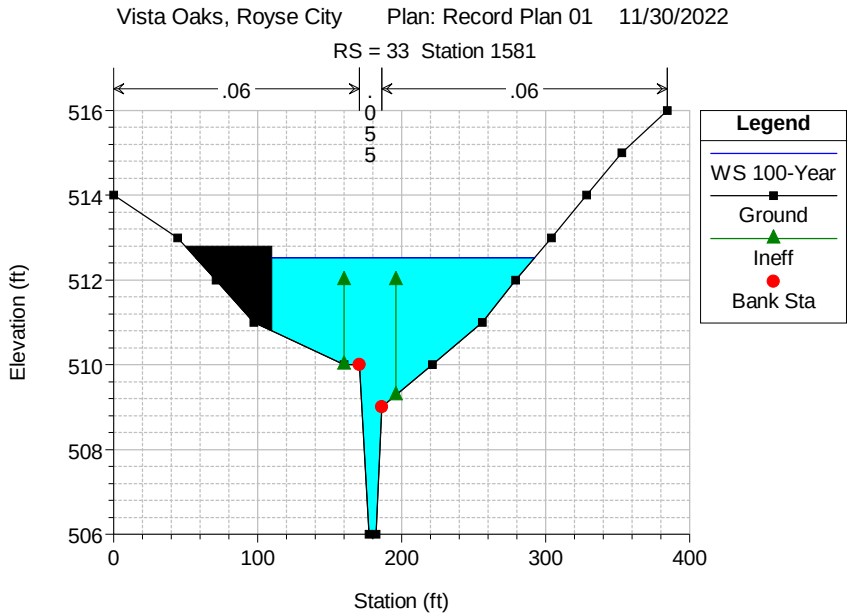

Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 40 Station 2503
.06
.055
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

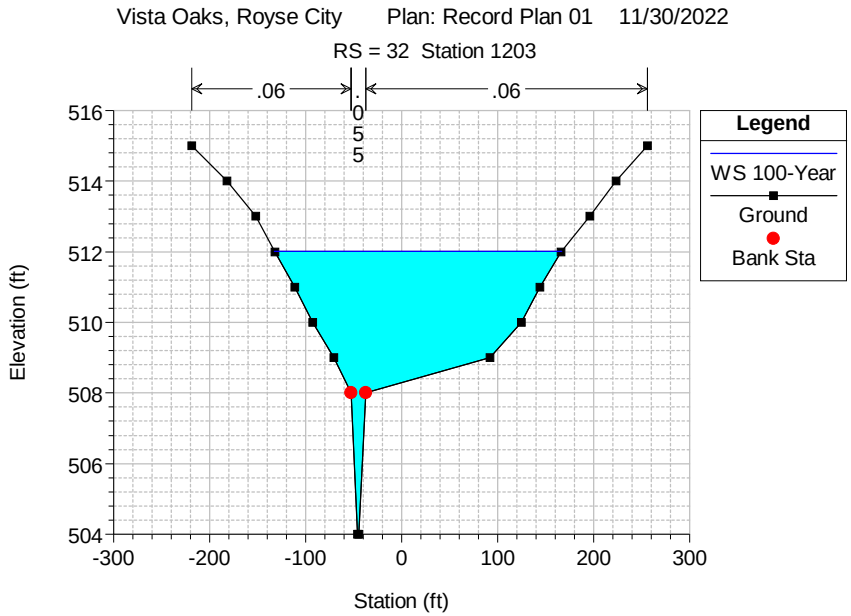

Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 39.1 Culv
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 39.1 Culv
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 39 Station 2427
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 38 Station 2387
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta

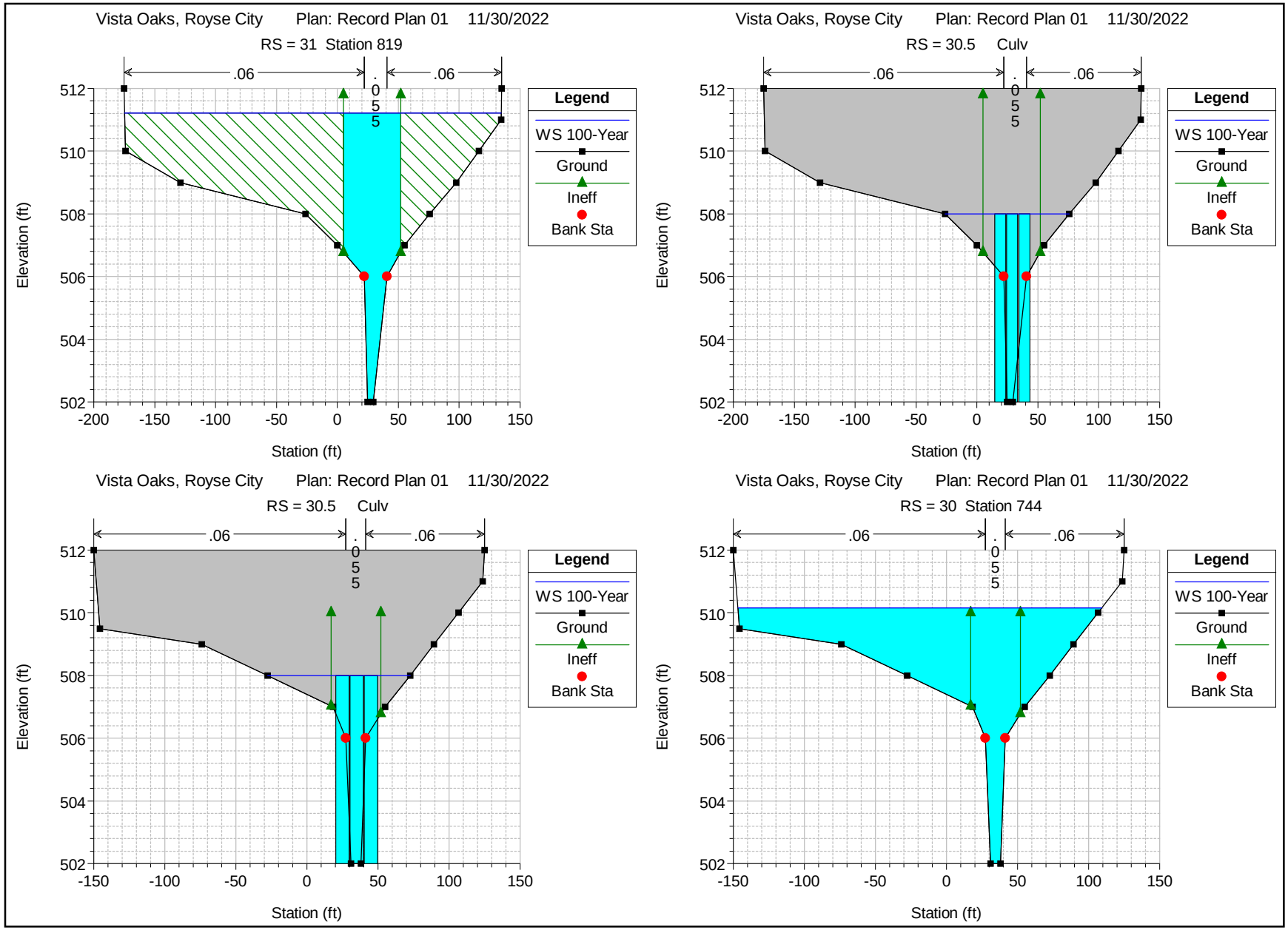

Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 37 Station 2135
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 36 Station 1997
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 35 Station 1824
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 34 Station 1655
.06
.055
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 33.5 Culv
.06
.055
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 33.5 Culv
.06
.055
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 33 Station 1581
.06
.055
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 32 Station 1203
.06
.055
.06
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)


Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 31 Station 819
.06
.06
.055
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
512
510
508
506
504
502
-200
-150
-100
-50
0
50
100
150
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 30.5 Culv
.06
.06
.055
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 30.5 Culv
.06
.06
.055
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Record Plan 01 11/30/2022
RS = 30 Station 744
.06
.06
.055
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

COMPUTER RUN

1. Main Stream, Trib1-NE, Trib2-SW
   B. Revised Existing 100-Year File (plan .p02)

HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X     X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X      X    X        X
X     X  X        X    X      X   X     X    X        X
X     X  XXXXXX    XXXX       X    X    X    X   XXXXX
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PROJECT DATA
Project Title: Vista Oaks, Royse City
Project File : HE.prj
Run Date and Time: 11/30/2022 9:24:20 AM

Project in English units

PLAN DATA

Plan Title: Revised Existing Plan 02
Plan File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.p02

Geometry Title: Revised Record Update
Geometry File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.g03

Flow Title : Record 100-Year
Flow File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.f03

Plan Summary Information:
Number of: Cross Sections = 43 Multiple Openings = 0
Culverts = 5 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Record 100-Year
Flow File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.f03

Flow Data (cfs)

River	Reach	RS	100-Year
River 1	Main	21	725
River 1	Main	11	983
River 1	Main	4	983
River 1	Main2	3	2996

River 1	Main2	1	2996
River 1	Main2	0.8	3650
Trib 1	NW	26	834
Trib2	SW	44	1104
Trib2	SW	37	1178
Trib2	SW	33	1205

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River 1	Main2	100-Year		Known WS = 507.5

GEOMETRY DATA

Geometry Title: Revised Record Update
Geometry File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.g03

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
River 1	Main		tr1
River 1	Main2	tr1	
Trib 1	NW		tr1
Trib2	SW		tr1

JUNCTION INFORMATION

Name: tr1
Description:
Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length	Angle
River 1	Main	to River 1	Main2	50	
Trib 1	NW	to River 1	Main2	50	
Trib2	SW	to River 1	Main2	50	

CROSS SECTION

RIVER: River 1
REACH: Main RS: 21

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-281	534	-240	533	-199	532	-166.5	531	-124.4	530
-76.8	529	19.1	528	41.4	527	44.5	526	48	526
54	527	62	528	75	530	91	531	113	532
174	534	215	535						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-281	.05	41.4	.045	54	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
41.4	54	157	143	128	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 20

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	531	57	530	143	530	180	529	223	527
244	526	264	525	268	525	278	526	291	527
310	528	328	529	342	530	358	531	407	532
484	533								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	223	.045	291	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
223	291	190	185	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 19

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-76	530	0	529	66	528	122	527	332	526
336	525	344	525	348	526	370	527	429	531
452	532	526	533						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-76	.05	332	.045	348	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
332	348	81	90	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 18

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	529	65	528	137	527	317.6	526	330.9	525
333.3	524	337.5	524	341	525	352	526	423	530
459	531	546	532	571	533				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	330.9	.045	341	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
330.9	341	109	138	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 17

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-351	530	-302	529	-248	528	-168	527	-121.6	526
-85.2	525	-34.4	525	23.9	525	28	522	31.2	522
37.7	525	62.6	526	89	527	116	528	141	529
166	530								

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -351     .05    23.9    .045    37.7     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          23.9    37.7               86      86      86             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -351      14   528.5       F
      45     166   528.5       F

CULVERT


RIVER: River 1
REACH: Main               RS: 16.5

INPUT
Description:
Distance from Upstream XS =      35
Deck/Roadway Width        =      28
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -307     529             148     529

Upstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -351     530    -302     529    -248     528    -168     527  -121.6     526
   -85.2     525   -34.4     525    23.9     525      28     522    31.2     522
    37.7     525    62.6     526      89     527     116     528     141     529
     166     530

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -351     .05    23.9    .045    37.7     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          23.9    37.7             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -351      14   528.5       F
      45     166   528.5       F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -240     528             150     528

Downstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -290.3     529    -238     528    -179     527  -110.9     526   -81.8     525
   -48.3     524   -10.5     524    17.7     524    23.8     521    27.4     521
    31.8     524    46.9     525    77.3     526   109.6     527     144     528
     175     529

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -290.3     .05    17.7    .045    31.8     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          17.7    31.8             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -290.3    8.64  526.63       F
   41.75     175  526.63       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
```

```
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 18      48     .013     .013        0                  .5               1
Number of Barrels =  2
Upstream   Elevation =  522
Centerline Stations
    Sta.    Sta.
      26      36
Downstream Elevation =  521.1
Centerline Stations
    Sta.    Sta.
      22      32

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 16

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -290.3     529    -238     528    -179     527  -110.9     526   -81.8     525
   -48.3     524   -10.5     524    17.7     524    23.8     521    27.4     521
    31.8     524    46.9     525    77.3     526   109.6     527     144     528
     175     529

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -290.3     .05    17.7    .045    31.8     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          17.7    31.8              241     253     212             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -290.3    8.64  526.63       F
   41.75     175  526.63       F

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 15

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -297     529    -248     528    -196     527  -125.8     526   -91.7     525
   -65.6     524   -29.7     523    17.3     523    39.4     522    42.7     519
    47.4     519    51.1     522    63.4     523     129     527     146     528
     178     529

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -297     .05    39.4    .045    51.1     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
```

```
          39.4    51.1              266     326     287             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 14

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -211     527  -181.8     526  -150.2     525  -118.5     524   -85.4     523
   -47.6     522   -10.3     521    16.7     520    22.9     518    28.5     518
    36.8     521    76.2     522     123     523     188     526

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -211     .05    16.7    .045    36.8     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          16.7    36.8              203     273     228             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 13

INPUT
Description:
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -222.3     526  -172.8     524   -78.9     521   -45.7     520    12.9     520
    24.5     516      29     516    34.4     519    52.7     520    78.1     521
     131     524     148     525

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -222.3     .05    12.9    .045    34.4     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          12.9    34.4              304     355     279             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 12

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -199     523    -158     522    -117     521     -81     520   -36.5     519
    44.3     518    57.8     517    61.6     515    65.8     515    71.1     517
    83.3     518     180     524     199     525

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -199     .05    57.8    .045    71.1     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.8    71.1              242     464     310             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 11

INPUT
```

Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-273	522	-248	521	-221.6	520	-189	519	-133	518
-68.1	517	-19.5	516	36	515	42.1	512	46.2	512
50.8	514	60.4	515	81	516	101	517	136.9	519
172	522	195	523						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-273	.05	36	.045	60.4	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
36	60.4	115	169	158	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 10

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-337	521	-279	519	-251	518	-232.2	517	-197.6	516
-169.2	515	-38.3	514	-34.8	512	-25.1	512	-15.6	515
14	516	42.8	517	65	518	85.6	519	110	520
138	521								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-337	.05	-38.3	.045	-15.6	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-38.3	-15.6	236	333	210	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 9

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	516	59.5	515	109.1	514	167.2	513	204.4	512
209.3	509	213.4	509	216	511	231.4	512	259.2	514
272.3	515	333	519	367	520				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	204.4	.045	216	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
204.4	216	174	397	253	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 8

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	515	28.4	514	56.7	513	86.1	512	112.8	511
142	510	150.5	507	154.2	507	159.5	510	208	511
231	512	283	514	306	515				

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05     142    .045   159.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          142   159.5              159     221     180             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
   29.68  109.68  514.05

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 7

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514       1     513      30     512      62     511    84.5     511
    97.8     505   101.6     505   104.5     509     192     510     224     511
     256     512     276   512.5     277     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    84.5    .045   104.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          84.5   104.5              91      99      81             .3       .4
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      81     513       F
     115     277     513       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     190     280   513.5

CULVERT


RIVER: River 1
REACH: Main               RS: 6.5

INPUT
Description:
Distance from Upstream XS =      30
Deck/Roadway Width        =      30
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     514             277     514

Upstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514       1     513      30     512      62     511    84.5     511
    97.8     505   101.6     505   104.5     509     192     510     224     511
     256     512     276   512.5     277     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    84.5    .045   104.5     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          84.5   104.5             .3       .4
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0      81     513       F
     115     277     513       F
Blocked Obstructions     num=       1
```

```
   Sta L   Sta R    Elev
     190     280   513.5

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     514             289     514

Downstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    34.6     513    57.5     512    81.1     511   104.2     510
   117.7     509   129.8     508     135     505     139     505   144.5     508
   164.6     509     233     511     285     512

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   129.8    .045   144.5     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         129.8   144.5             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     120   511.5       F
     155     285   511.5       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      52     100     514

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 20      48     .013     .013        0                  .5                1
Number of Barrels =  3
Upstream   Elevation =  505.2
Centerline Stations
    Sta.    Sta.    Sta.
      89      98     107
Downstream Elevation =  505.1
Centerline Stations
    Sta.    Sta.    Sta.
     128     137     146

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 6

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    34.6     513    57.5     512    81.1     511   104.2     510
   117.7     509   129.8     508     135     505     139     505   144.5     508
   164.6     509     233     511     285     512

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
       0     .05   129.8    .045   144.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         129.8   144.5              244     235     140             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     120   511.5       F
     155     285   511.5       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      52     100     514

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 5

INPUT
Description:
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     510      50     509      86     508   104.1     507     109     504
     113     504   116.2     507     149     510     251     511

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   104.1    .045   116.2     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         104.1   116.2              170     218     170             .1       .3
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
       0      20     511     140     220     511

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 4

INPUT
Description:
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -195   510.5  -177.8     510   -32.3     509    51.4     508    66.3     507
      74     506    77.4     503    80.7     503    84.5     506      95     507
     134     509     155   510.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -195     .05      74    .045    84.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            74    84.5              150     357     290             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    -230    -160   510.8

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 3

INPUT
Description:
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -395   510.5    -275     509    -205     508     -86     507     -15     507
      -3     507      43     506      56     505      59     502      64     502
      68     505      79     506     105     507     160     507   183.3     506
```

```
   188.4     500   189.7     500   192.7     501   198.9     505     215     506
     258     509     270   510.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -395     .05   183.3    .045   198.9     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         183.3   198.9              200     189     145             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    -260    -190   510.5

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 2

INPUT
Description:
Station Elevation Data    num=      41
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     5.5  513.47   49.48   512.8    91.1  512.37  124.87  511.82  158.64  510.83
  191.62  510.75   214.4  510.27  228.53  510.23  256.02  509.72  278.79   508.6
     289  508.53  313.35  508.16  329.84  508.45  354.18   508.2  379.32  507.54
  394.24  506.76  403.66  505.67  428.01  506.12  436.64   501.2  440.57  501.57
   444.5  504.82  451.57  505.26  462.56  507.36  474.34   508.1  511.25  507.59
  536.38  507.81  552.09  507.57   567.8  507.84  586.64  507.67  599.21  507.05
  607.06  505.88  624.34  500.28  628.27  500.75  632.19  505.19  658.11  507.32
  663.61  508.34  687.95  510.07  716.22  510.46  740.57  511.13  764.13  511.16
  803.39  511.94

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     5.5     .05  599.21    .045  658.11     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        599.21  658.11              200     390     225             .1       .3
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
     5.5     331   509.8     661  803.39   509.8

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 1

INPUT
Description:
Station Elevation Data    num=      41
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    6.04  513.37   49.35  512.79   93.66  511.68  196.39  509.76  229.63  509.38
   267.9  508.58  317.25   508.3  346.45  508.44  370.62   507.8  375.66  506.99
  419.97  504.72  455.22  505.03  468.32  503.42  475.37  499.17  493.49  504.82
  510.62  505.37  518.67  504.35  540.83  506.69  554.93  507.08  582.12  506.97
  602.26  506.76  615.36  506.07  631.47  506.02  657.66  507.48  702.98  508.35
  730.17  508.57  751.32  508.21  775.49  504.74  799.66  504.88  826.85  505.51
  844.98  505.55  858.08  505.49  877.21  504.68  894.33  504.48  923.54  504.61
  930.59  503.41  951.74  505.57  975.91  512.49  985.98  512.96  1003.1  509.07
  1030.3  508.95

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    6.04     .05  375.66    .045  540.83     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        375.66  540.83               85      95      95             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     578     822     511
```

CROSS SECTION

RIVER: River 1
REACH: Main2 RS: 0.9

INPUT
Description: sectn5
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5.68	515.92	54.53	515.62	85.2	515.19	110.19	514.33	226.06	511.38
330.57	508.83	365.79	508.86	397.6	508.48	415.77	508.67	453.26	508.18
471.43	508.37	522.55	507.96	603.21	506.27	620.25	506.34	639.56	504.69
655.46	501.97	671.37	498.33	685	503.62	696.36	505.15	716.81	505.3
744.07	504.63	763.38	505.36	782.69	505.08	790.65	504.48	829.27	504.32
849.72	505.03	867.89	505.22	875.85	504.7	909.92	504.31	956.5	504.78
989.44	504.75	1015.6	504.77	1049.7	504.57	1063.3	502.61	1079.2	506.14
1096.2	511.6	1105.3	513.36	1109.9	513.08	1117.8	510.5	1126.9	508.99
1162.1	508.93								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5.68	.05	620.25	.045	696.36	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
620.25	696.36	105	135	135	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main2 RS: 0.8

INPUT
Description: sectn 4
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4.63	517.57	50.97	516.59	75.29	515.75	96.14	515.48	110.04	514.39
134.37	513.29	235.15	511.01	269.9	510.78	355.62	509.27	383.42	509.23
404.27	508.72	443.65	508.27	494.62	507.98	539.8	507.56	571.08	507.01
588.45	507.15	647.53	505.98	682.28	506.23	720.5	505.87	732.09	505.84
749.46	504.3	765.68	503.7	770.31	497.97	773.79	498.4	781.9	503.15
790.01	501.9	802.75	501.66	810.86	498.75	815.49	502.4	827.07	504
840.97	504	869.93	504.87	902.37	506.85	919.74	507.14	939.44	508.33
963.76	508.92	1010.1	509.15	1059.9	509.92	1092.3	510.16	1117.8	510.76
1130.6	510.59	1167.6	511.06	1185	511.83				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4.63	.05	765.68	.045	827.07	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
765.68	827.07	200	210	165	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main2 RS: 0.7

INPUT
Description: sectn 3
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
3.16	516.79	45.24	515.93	89.42	513.96	125.19	512.96	160.96	511.77
221.98	510.64	271.43	509.99	281.95	509.62	345.07	508.53	361.9	508.61
400.83	508.35	439.75	507.72	491.3	507.41	508.14	507.01	515.5	506.36
550.22	505.88	589.14	505.49	631.23	505.39	675.41	504.86	689.09	505.03
749.05	504.23	757.47	502.87	776.41	503.87	783.77	497.93	787.98	497.64
800.6	504.2	846.89	504.04	885.82	503.57	910.02	503.86	934.21	502.61
953.15	503.35	973.14	505.73	991.02	508.26	1002.6	509.31	1014.2	511.61

```
  1025.7  509.42  1032.1  509.06  1076.2  509.91

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    3.16     .05  749.05    .045   800.6     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        749.05   800.6              150     160     270             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 0.6

INPUT
Description: sectn 2
Station Elevation Data    num=      39
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    2.19  518.53   41.61  517.21   82.13   516.9  114.98  516.95  150.02  514.21
  189.44  512.92  202.59   512.8  233.25  511.41  329.61  509.99  350.42  509.25
  386.55  508.52  413.93  508.66   464.3  508.15  500.44  507.69   554.1  507.09
  581.47  506.74  631.85  504.39   663.6  503.81  705.22  504.09  745.73  503.43
   775.3  502.97  787.35  503.63  808.15  503.95  837.72  503.45  854.14  501.89
   862.9  502.17  877.14  503.76  890.28  503.59  900.14  498.96  905.61  498.27
  909.99  501.17  918.75  502.92   951.6  502.54  971.31  504.39  993.22  504.75
  1012.9  505.84  1050.2  507.01  1091.8  508.14  1120.2  508.79

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    2.19     .05  837.72    .045  971.31     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        837.72  971.31              280     430     185             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 0.5

INPUT
Description: sectn 1
Station Elevation Data    num=      40
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     .94  510.92   37.63  509.87   79.97  508.98   97.85  508.26  129.84  506.34
  164.65  506.04  185.35     506  231.45  504.96  270.96  504.34  304.83  504.08
     334  504.12   359.4  504.51  381.04  504.12  412.09  504.16  450.67   504.2
  504.29  503.95  514.64  504.35  528.76  506.26   539.1  506.86  546.63  505.63
  564.51   497.9  571.09   497.8  578.62  501.96  591.79  501.42  603.08  500.09
  610.61  501.79  620.96  503.16  631.31  501.57  637.89   501.5  645.42  503.02
  655.77   503.8  676.47     504  698.11  504.98  732.92   505.3  795.96  506.33
  844.88   507.8  887.22  508.52  906.98   508.6  933.32  509.14  962.49  509.28

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     .94     .05  546.63    .045  655.77     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        546.63  655.77                0       0       0             .1       .3

CROSS SECTION


RIVER: Trib 1
REACH: NW                 RS: 26

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -157     511    -157     510     -93     509       0     508    13.4     509
```

```
      35     509      47     508      52     505      57     505      64     509
     113     510     150  510.92     177     512

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -157     .05      47    .045      64     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           47      64              192     245     213             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     -50    -130     511

CROSS SECTION


RIVER: Trib 1
REACH: NW                RS: 25

INPUT
Description:
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -143     510     -94     509    -2.5     508    86.1     507    90.6     504
    94.7     504     100     507   138.6     508   175.4     509   220.5     510

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -143     .05    86.1    .045     100     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          86.1     100              225     225     225             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     -80     -30     511

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 44

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     524    24.1     523    47.6     522    71.2     521   105.2     520
   145.4     519   174.5     518   204.2     517   226.6     516   231.2     512
   235.7     512   239.3     516     250     517   269.7     518   363.4     519
   407.2     520   443.6     521   468.4     522

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   226.6    .045   239.3     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         226.6   239.3              190     184     180             .1       .3

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 43

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     522    21.4     521    39.6     520    58.5     519      78     518
   101.8     517   107.5     516     112     512     116     512  123.96  514.98
     132     516   179.3     516   202.6     517   223.2     518   242.8     519
   268.8     520     332     521   375.4     522
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   107.5    .045  123.96     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         107.5  123.96              150     151     150             .1       .3
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
      35      85   519.5     228     320   519.5

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 42

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     522    30.8     521      52     520    69.8     519    89.8     518
   116.8     517   141.2     516   150.4     515   160.5     511   163.8     511
   169.4     515   218.8     516   248.1     517   271.9     518   295.9     519
   317.8     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   150.4    .045   169.4     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         150.4   169.4              140     145     145             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      70     100     519

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 41

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -200.4     522  -170.6     521  -132.3     519  -103.6     518   -75.2     517
     -36     516     7.1     515    13.5     514    23.2     510    26.8     510
    32.3     515      40     516    52.2     517    70.5     518    91.2     519
     119     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -200.4     .05     7.1    .045    32.3     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           7.1    32.3               75      75      75             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 -134.57 -104.57  518.64

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 40

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     519    47.1     517    73.3     516   194.1     515   223.9     515
```

```
   232.4     510   254.3     510   262.1     515   270.5     516   280.9     517
   293.4     518   304.3     519   323.7     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   223.9    .045   262.1     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         223.9   262.1               75      76      75             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  218.41  518.72       F
  269.87   323.7  518.75       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       3     190   518.9

CULVERT


RIVER: Trib2
REACH: SW                RS: 39.1

INPUT
Description:
Distance from Upstream XS =      25
Deck/Roadway Width        =      35
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
      20     518             300     518

Upstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     519    47.1     517    73.3     516   194.1     515   223.9     515
   232.4     510   254.3     510   262.1     515   270.5     516   280.9     517
   293.4     518   304.3     519   323.7     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   223.9    .045   262.1     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         223.9   262.1             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  218.41  518.72       F
  269.87   323.7  518.75       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       3     190   518.9

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     518             285     518

Downstream Bridge Cross Section Data
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     518    28.8     517    58.1     516    92.7     515   228.7     514
   233.7     510   235.7     510   248.5     515     261     516     308     520
   319.4     521

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   228.7    .045   248.5     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         228.7   248.5             .3       .5
```

```
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     220   517.2       F
     255   319.4   517.2       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      20      80   517.2

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
               23      48     .012     .012        0                  .5                1
Number of Barrels =  3
Upstream   Elevation =  510
Centerline Stations
    Sta.    Sta.    Sta.
     234     244     254
Downstream Elevation =  510
Centerline Stations
    Sta.    Sta.    Sta.
     228     238     248

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 39

INPUT
Description:
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     518    28.8     517    58.1     516    92.7     515   228.7     514
   233.7     510   235.7     510   248.5     515     261     516     308     520
   319.4     521

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   228.7    .045   248.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         228.7   248.5               40      40      40              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     220   517.2       F
     255   319.4   517.2       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      20      80   517.2

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 38

INPUT
Description:
Station Elevation Data    num=      15
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     518    28.7     517    62.7     516   100.9     515   232.6     514
   237.6     510   240.6     510   245.7     513   250.3     514   262.7     515
   275.6     516     289     517   302.4     518   325.2     520   354.1     522

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   232.6    .045   250.3     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         232.6   250.3              250     252     250             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      35      95   516.8

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 37

INPUT
Description:
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -255     517    -230     516    -207     515    -178     514    29.6     513
      40     509    43.4     509    48.8     513    57.3     514      85     517
   112.8     521

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -255     .05    29.6    .045    48.8     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          29.6    48.8              135     138     135             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    -240    -120   515.5

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 36

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -183.6     515  -144.6     514   -89.6     513    19.4     512    36.4     508
    39.5     508    46.2     512    68.1     513    99.6     514   125.3     515
   144.6     516     161     517   179.8     518

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -183.6     .05    19.4    .045    46.2     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          19.4    46.2              170     173     170             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    -200    -130   514.8

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 35

INPUT
Description:
Station Elevation Data    num=      13
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -232.7     514  -165.7     513   -41.5     512      35     511    58.9     511
    66.8     507    71.8     507      83     513    90.7     514    99.3     515
   132.1     516     174     517   221.4     518

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -232.7     .05    58.9    .045      83     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          58.9      83              200     206     200             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    -240     -90   514.5

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 34

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -244.4     515  -190.7     514  -130.4     513   -87.5     512   -48.2     511
    21.7     510    30.2     506    32.9     506    36.6     510    44.3     511
    70.1     512     174     513   197.6     514   222.1     515   241.1     516
   268.1     517

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -244.4     .05    21.7    .045    36.6     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          21.7    36.6              74      74      74             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -244.4       0     514       F
      48   268.1     514       F

CULVERT


RIVER: Trib2
REACH: SW                RS: 33.5

INPUT
Description:
Distance from Upstream XS =      25
Deck/Roadway Width        =      35
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -195     514             200     514

Upstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -244.4     515  -190.7     514  -130.4     513   -87.5     512   -48.2     511
    21.7     510    30.2     506    32.9     506    36.6     510    44.3     511
    70.1     512     174     513   197.6     514   222.1     515   241.1     516
   268.1     517

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -244.4     .05    21.7    .045    36.6     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          21.7    36.6             .3       .5
Ineffective Flow     num=       2
```

```
   Sta L   Sta R    Elev  Permanent
  -244.4       0     514       F
      48   268.1     514       F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     514             318     514

Downstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    44.4     513    70.9     512    97.4     511     160     510
   170.7     510   177.2     506   182.2     506   186.1     509   221.2     510
   255.9     511   279.2     512   304.2     513   328.6     514   352.9     515
   384.4     516

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   170.7    .045   186.1     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         170.7   186.1             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     162     513       F
     200   384.4     513       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      45     110   512.8

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 13      48     .012     .012        0                  .5               1
Number of Barrels =  3
Upstream   Elevation =  506
Centerline Stations
    Sta.    Sta.    Sta.
      21      31      41
Downstream Elevation =  506
Centerline Stations
    Sta.    Sta.    Sta.
     170     180     190

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 33

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    44.4     513    70.9     512    97.4     511     160     510
   170.7     510   177.2     506   182.2     506   186.1     509   221.2     510
   255.9     511   279.2     512   304.2     513   328.6     514   352.9     515
   384.4     516
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   170.7    .045   186.1     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         170.7   186.1              375     378     375             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     162     513       F
     200   384.4     513       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      45     110   512.8

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 32

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -218.5     515  -182.2     514  -151.8     513    -132     512  -111.5     511
   -92.4     510   -70.6     509   -52.4     508   -45.9     504   -44.5     504
   -37.5     508    91.7     509   124.8     510     144     511     166     512
     196     513     223     514     256     515

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -218.5     .05   -52.4    .045   -37.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -52.4   -37.5              380     384     380             .1       .3

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 31

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -174     510  -128.8     509   -26.3     508       0     507    22.1     506
    24.7     502    29.4     502    40.8     506    55.3     507    75.9     508
    97.4     509   116.3     510   134.4     511

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -174     .05    22.1    .045    40.8     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          22.1    40.8                75      75      75             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -174       5   511.8       F
      52   134.4   511.8       F

CULVERT


RIVER: Trib2
REACH: SW                RS: 30.5

INPUT
Description:
Distance from Upstream XS =      25
Deck/Roadway Width        =      38
```

```
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -175     512             135     512

Upstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -174     510  -128.8     509   -26.3     508       0     507    22.1     506
    24.7     502    29.4     502    40.8     506    55.3     507    75.9     508
    97.4     509   116.3     510   134.4     511

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -174     .05    22.1    .045    40.8     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          22.1    40.8             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -174       5   511.8       F
      52   134.4   511.8       F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -150     512             125     512

Downstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -145.5   509.5     -74     509   -27.5     508    18.2     507    27.2     506
      31     502      38     502    41.2     506      55     507    72.8     508
    89.4     509   106.8     510   123.8     511

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -145.5     .05    27.2    .045    41.2     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          27.2    41.2             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -145.5      17     510       F
      52   123.8     510       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                18      48     .012     .012        0                  .5                1
Number of Barrels =  3
Upstream   Elevation =  502
Centerline Stations
    Sta.    Sta.    Sta.
      19      29      39
Downstream Elevation =  502
Centerline Stations
    Sta.    Sta.    Sta.
```

25 35 45

CROSS SECTION

RIVER: Trib2
REACH: SW RS: 30

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-145.5	509.5	-74	509	-27.5	508	18.2	507	27.2	506
31	502	38	502	41.2	506	55	507	72.8	508
89.4	509	106.8	510	123.8	511				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-145.5	.05	27.2	.045	41.2	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
27.2	41.2	90	90	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-145.5	17	510	F
52	123.8	510	F

SUMMARY OF MANNING'S N VALUES

River:River 1

Reach	River Sta.	n1	n2	n3
Main	21	.05	.045	.05
Main	20	.05	.045	.05
Main	19	.05	.045	.05
Main	18	.05	.045	.05
Main	17	.05	.045	.05
Main	16.5	Culvert		
Main	16	.05	.045	.05
Main	15	.05	.045	.05
Main	14	.05	.045	.05
Main	13	.05	.045	.05
Main	12	.05	.045	.05
Main	11	.05	.045	.05
Main	10	.05	.045	.05
Main	9	.05	.045	.05
Main	8	.05	.045	.05
Main	7	.05	.045	.05
Main	6.5	Culvert		
Main	6	.05	.045	.05
Main	5	.05	.045	.05
Main	4	.05	.045	.05
Main2	3	.05	.045	.05
Main2	2	.05	.045	.05
Main2	1	.05	.045	.05
Main2	0.9	.05	.045	.05
Main2	0.8	.05	.045	.05
Main2	0.7	.05	.045	.05
Main2	0.6	.05	.045	.05
Main2	0.5	.05	.045	.05

River:Trib 1

Reach	River Sta.	n1	n2	n3
NW	26	.05	.045	.05
NW	25	.05	.045	.05

River:Trib2

Reach	River Sta.	n1	n2	n3
SW	44	.05	.045	.05
SW	43	.05	.045	.05
SW	42	.05	.045	.05
SW	41	.05	.045	.05
SW	40	.05	.045	.05
SW	39.1	Culvert		
SW	39	.05	.045	.05
SW	38	.05	.045	.05
SW	37	.05	.045	.05
SW	36	.05	.045	.05
SW	35	.05	.045	.05
SW	34	.05	.045	.05
SW	33.5	Culvert		
SW	33	.05	.045	.05
SW	32	.05	.045	.05
SW	31	.05	.045	.05
SW	30.5	Culvert		
SW	30	.05	.045	.05

SUMMARY OF REACH LENGTHS

River: River 1

Reach	River Sta.	Left	Channel	Right
Main	21	157	143	128
Main	20	190	185	122
Main	19	81	90	88
Main	18	109	138	144
Main	17	86	86	86
Main	16.5	Culvert		
Main	16	241	253	212
Main	15	266	326	287
Main	14	203	273	228
Main	13	304	355	279
Main	12	242	464	310
Main	11	115	169	158
Main	10	236	333	210
Main	9	174	397	253
Main	8	159	221	180
Main	7	91	99	81
Main	6.5	Culvert		
Main	6	244	235	140
Main	5	170	218	170
Main	4	150	357	290
Main2	3	200	189	145
Main2	2	200	390	225
Main2	1	85	95	95
Main2	0.9	105	135	135
Main2	0.8	200	210	165
Main2	0.7	150	160	270
Main2	0.6	280	430	185
Main2	0.5	0	0	0

River: Trib 1

Reach	River Sta.	Left	Channel	Right
NW	26	192	245	213
NW	25	225	225	225

River: Trib2

Reach	River Sta.	Left	Channel	Right
SW	44	190	184	180
SW	43	150	151	150
SW	42	140	145	145
SW	41	75	75	75
SW	40	75	76	75
SW	39.1	Culvert		
SW	39	40	40	40
SW	38	250	252	250
SW	37	135	138	135
SW	36	170	173	170
SW	35	200	206	200
SW	34	74	74	74
SW	33.5	Culvert		
SW	33	375	378	375
SW	32	380	384	380
SW	31	75	75	75
SW	30.5	Culvert		
SW	30	90	90	90

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River 1

Reach	River Sta.	Contr.	Expan.
Main	21	.1	.3
Main	20	.1	.3
Main	19	.1	.3
Main	18	.1	.3
Main	17	.3	.5
Main	16.5	Culvert	
Main	16	.3	.5
Main	15	.1	.3
Main	14	.1	.3
Main	13	.1	.3
Main	12	.1	.3
Main	11	.1	.3
Main	10	.1	.3
Main	9	.1	.3
Main	8	.1	.3
Main	7	.3	.4
Main	6.5	Culvert	
Main	6	.3	.5
Main	5	.1	.3
Main	4	.1	.3
Main2	3	.1	.3
Main2	2	.1	.3
Main2	1	.1	.3
Main2	0.9	.1	.3
Main2	0.8	.1	.3
Main2	0.7	.1	.3
Main2	0.6	.1	.3
Main2	0.5	.1	.3

River: Trib 1

Reach	River Sta.	Contr.	Expan.
NW	26	.1	.3
NW	25	.1	.3

River: Trib2

Reach	River Sta.	Contr.	Expan.

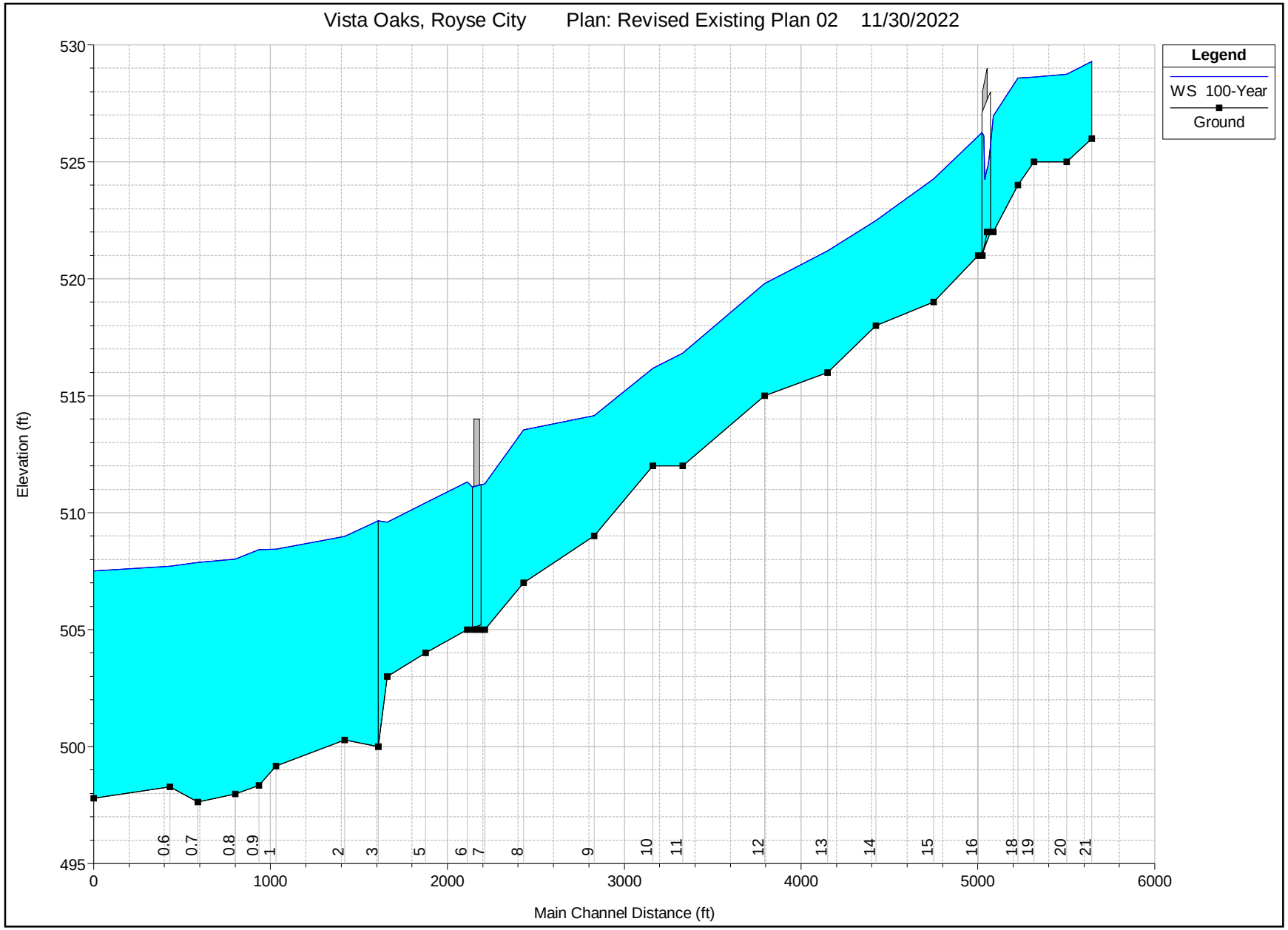
SW	44		.1	.3
SW	43		.1	.3
SW	42		.1	.3
SW	41		.1	.3
SW	40		.3	.5
SW	39.1	Culvert		
SW	39		.3	.5
SW	38		.1	.3
SW	37		.1	.3
SW	36		.1	.3
SW	35		.1	.3
SW	34		.3	.5
SW	33.5	Culvert		
SW	33		.3	.5
SW	32		.1	.3
SW	31		.3	.5
SW	30.5	Culvert		
SW	30		.3	.5

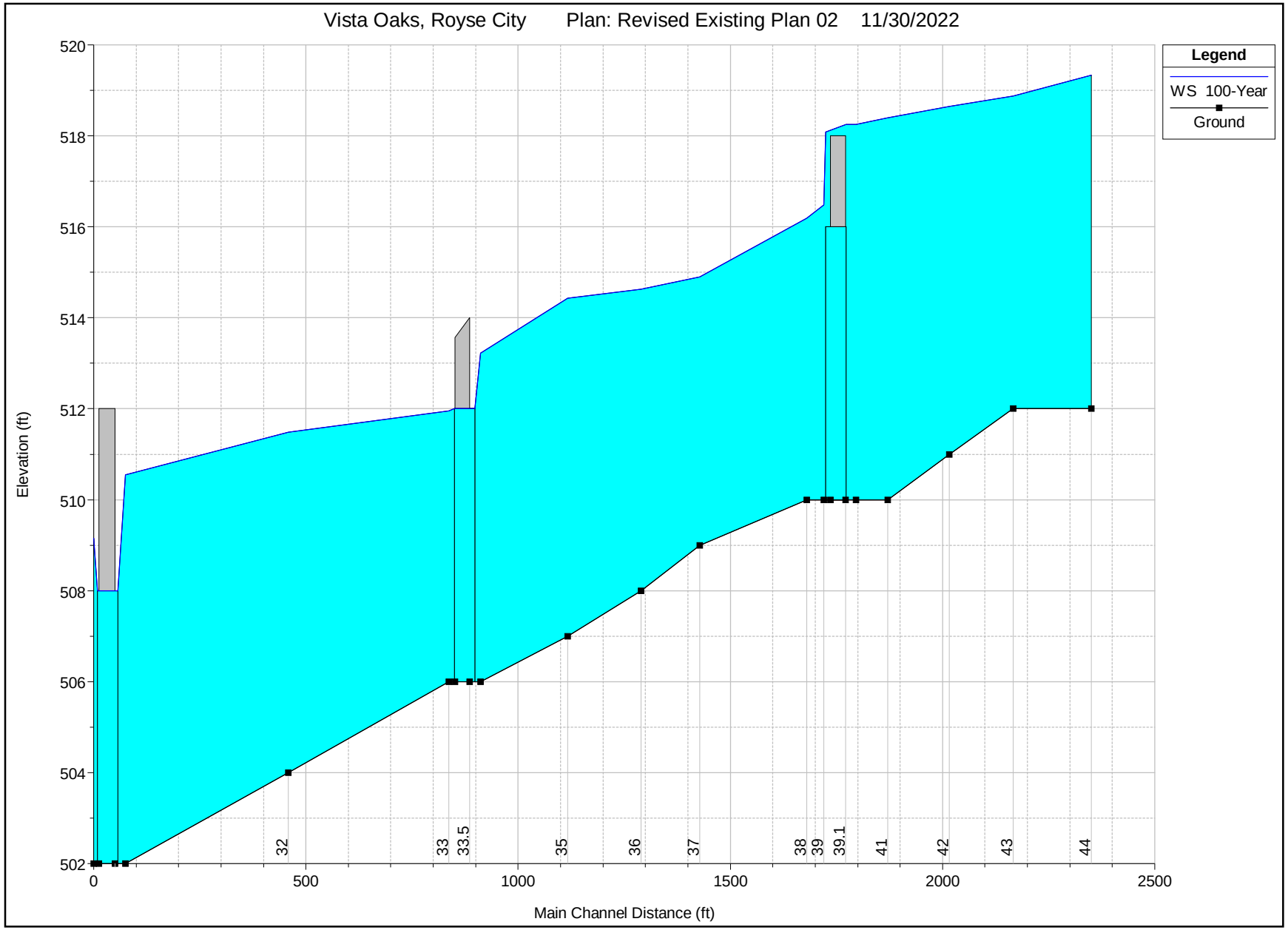
HEC-RAS Plan: REPln 02 Profile: 100-Year

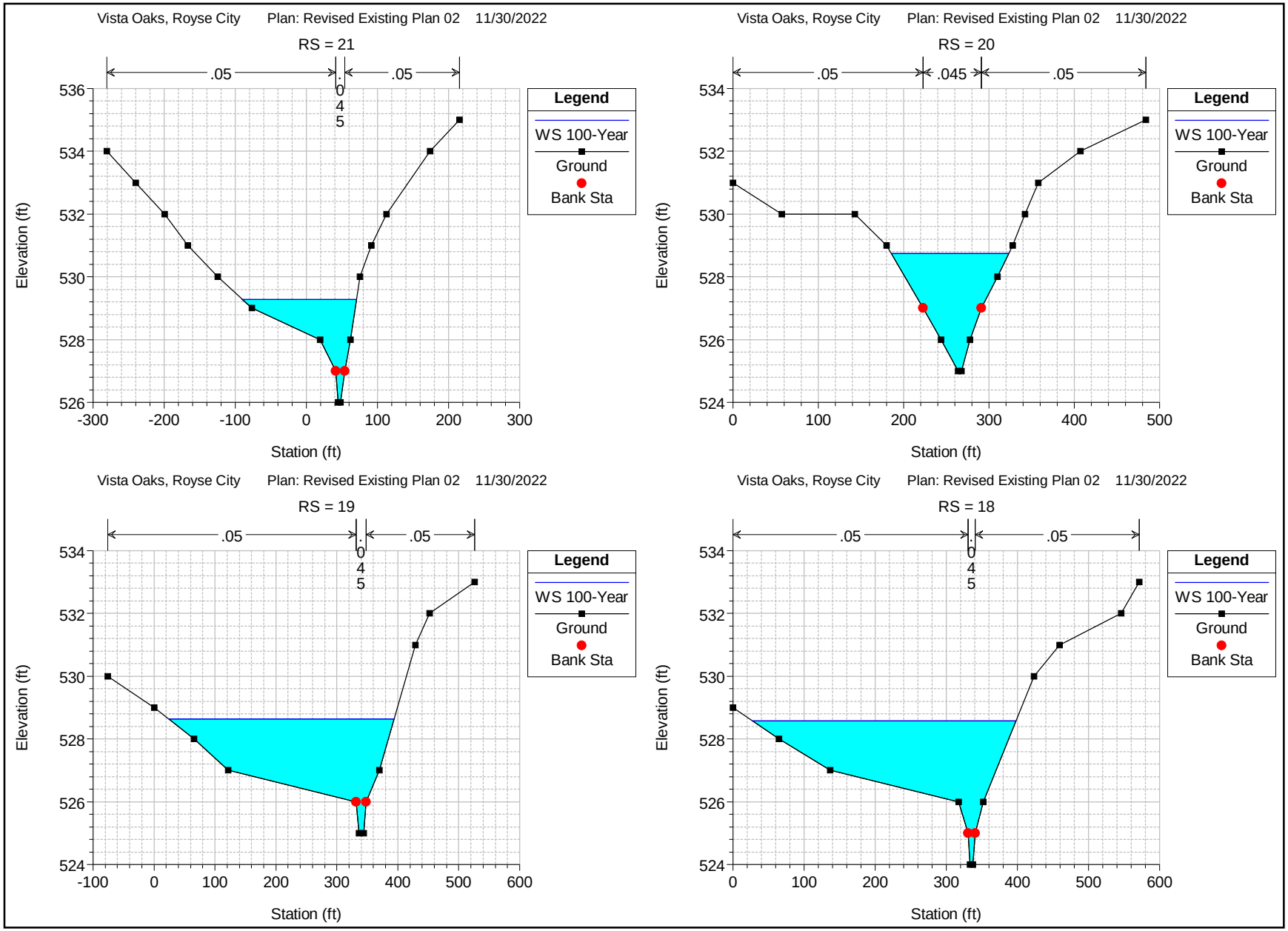
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
River 1	Main2	0.5	100-Year	3650.00	497.80	507.50	505.03	507.56	0.000582	2.57	2156.99	724.38	0.19
River 1	Main2	0.6	100-Year	3650.00	498.27	507.72		507.79	0.000745	2.68	1839.72	577.80	0.21
River 1	Main2	0.7	100-Year	3650.00	497.64	507.86		507.96	0.001036	3.30	1659.75	557.40	0.24
River 1	Main2	0.8	100-Year	3650.00	497.97	508.01		508.32	0.002456	5.40	1075.19	445.48	0.37
River 1	Main2	0.9	100-Year	2996.00	498.33	508.42		508.46	0.000414	2.05	2006.43	651.36	0.15
River 1	Main2	1	100-Year	2996.00	499.17	508.44		508.55	0.001334	2.86	1161.82	423.76	0.26
River 1	Main2	2	100-Year	2996.00	500.28	508.98		509.31	0.004774	5.77	754.61	330.00	0.49
River 1	Main2	3	100-Year	2996.00	500.00	509.66		509.75	0.001199	3.71	1387.37	521.23	0.24
River 1	Main	4	100-Year	983.00	503.00	509.59		509.89	0.004808	6.34	328.07	261.19	0.47
River 1	Main	5	100-Year	983.00	504.00	510.43		510.70	0.003877	5.72	277.25	120.00	0.43
River 1	Main	6	100-Year	983.00	505.00	511.32	510.53	512.20	0.008168	8.40	137.49	149.56	0.65
River 1	Main	6.5		Culvert									
River 1	Main	7	100-Year	983.00	505.00	511.24	511.24	512.77	0.019485	10.40	102.77	135.63	0.92
River 1	Main	8	100-Year	983.00	507.00	513.54		513.65	0.001507	3.74	414.64	161.23	0.28
River 1	Main	9	100-Year	983.00	509.00	514.15	514.03	514.67	0.009860	7.98	222.78	159.65	0.68
River 1	Main	10	100-Year	983.00	512.00	516.18		516.36	0.004229	4.71	336.96	222.85	0.45
River 1	Main	11	100-Year	983.00	512.00	516.83	516.78	517.43	0.011339	7.53	205.20	157.55	0.73
River 1	Main	12	100-Year	725.00	515.00	519.80		520.01	0.004147	5.23	258.37	184.12	0.46
River 1	Main	13	100-Year	725.00	516.00	521.20		521.49	0.004904	5.34	223.70	166.72	0.49
River 1	Main	14	100-Year	725.00	518.00	522.49		522.81	0.005812	5.71	210.99	165.04	0.53
River 1	Main	15	100-Year	725.00	519.00	524.28		524.59	0.006115	6.15	214.47	157.12	0.52
River 1	Main	16	100-Year	725.00	521.00	526.09	525.97	527.20	0.014710	9.33	92.32	196.77	0.83
River 1	Main	16.5		Culvert									
River 1	Main	17	100-Year	725.00	522.00	526.97	526.97	528.25	0.017727	9.97	85.51	254.84	0.90
River 1	Main	18	100-Year	725.00	524.00	528.58		528.60	0.000644	2.16	640.72	370.30	0.18
River 1	Main	19	100-Year	725.00	525.00	528.63		528.66	0.000635	1.86	645.39	369.88	0.18
River 1	Main	20	100-Year	725.00	525.00	528.75		528.91	0.002691	3.38	250.34	138.01	0.36
River 1	Main	21	100-Year	725.00	526.00	529.29	529.27	529.74	0.013136	7.64	173.53	160.73	0.79
Trib 1	NW	25	100-Year	834.00	504.00	509.75		509.81	0.001320	3.11	478.00	289.50	0.25
Trib 1	NW	26	100-Year	834.00	505.00	510.11		510.26	0.003406	4.41	349.71	274.51	0.40
Trib2	SW	30	100-Year	1205.00	502.00	509.15	508.72	510.44	0.011149	10.04	142.46	188.15	0.71
Trib2	SW	30.5		Culvert									
Trib2	SW	31	100-Year	1205.00	502.00	510.55	508.26	510.95	0.002600	5.63	249.79	300.29	0.37
Trib2	SW	32	100-Year	1205.00	504.00	511.49		511.55	0.000963	2.98	676.90	276.22	0.22
Trib2	SW	33	100-Year	1205.00	506.00	511.95	511.95	513.51	0.017064	11.13	128.03	168.05	0.90
Trib2	SW	33.5		Culvert									
Trib2	SW	34	100-Year	1178.00	506.00	513.22	512.45	514.00	0.007589	8.12	178.67	323.02	0.61
Trib2	SW	35	100-Year	1178.00	507.00	514.43		514.51	0.001036	3.06	551.57	184.37	0.23
Trib2	SW	36	100-Year	1178.00	508.00	514.62		514.76	0.001816	3.88	499.51	245.65	0.31
Trib2	SW	37	100-Year	1178.00	509.00	514.90		515.20	0.005298	5.90	328.34	185.64	0.50
Trib2	SW	38	100-Year	1104.00	510.00	516.19		516.42	0.004474	5.36	334.57	183.11	0.46

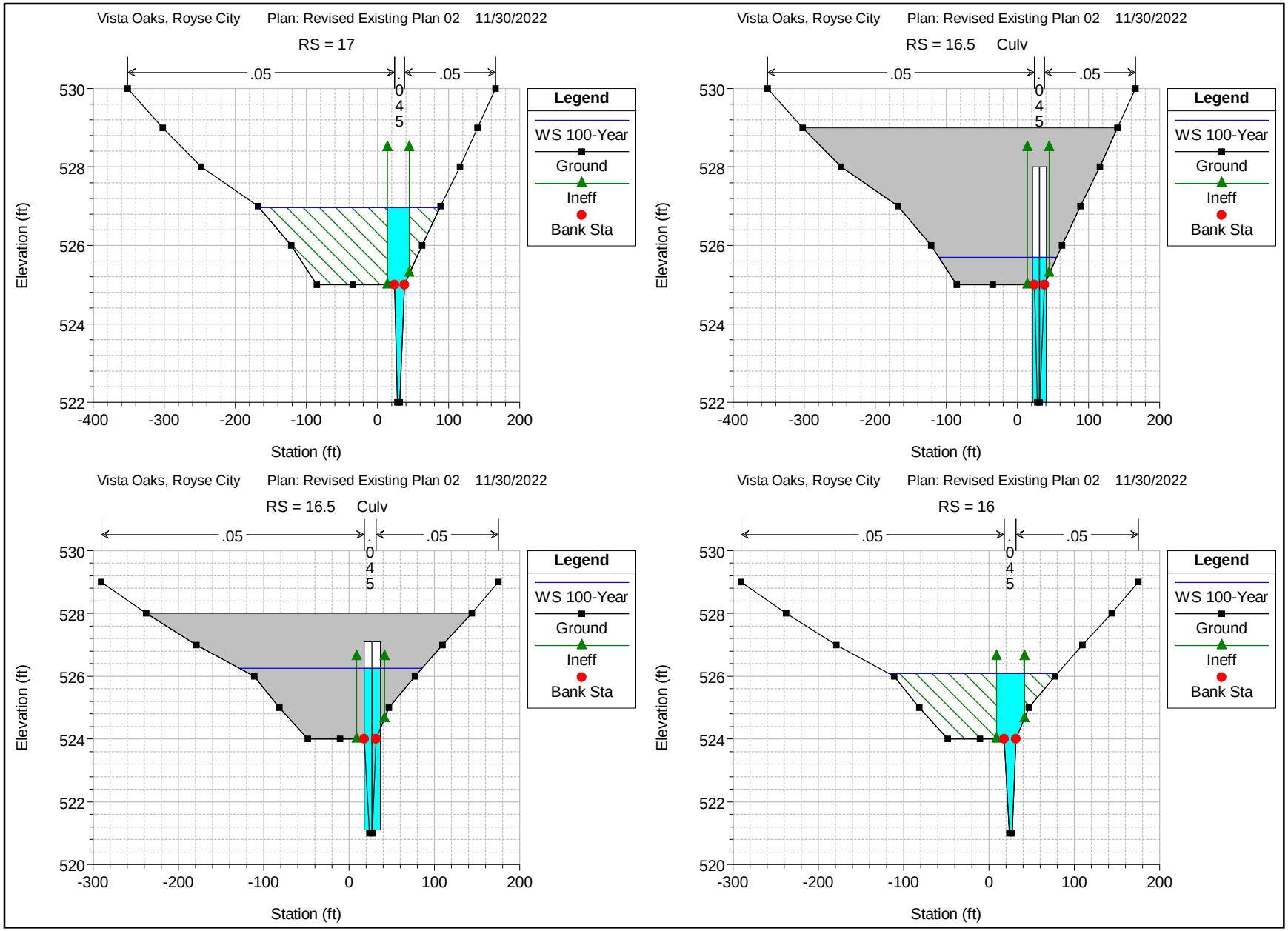
HEC-RAS Plan: REPln 02 Profile: 100-Year (Continued)

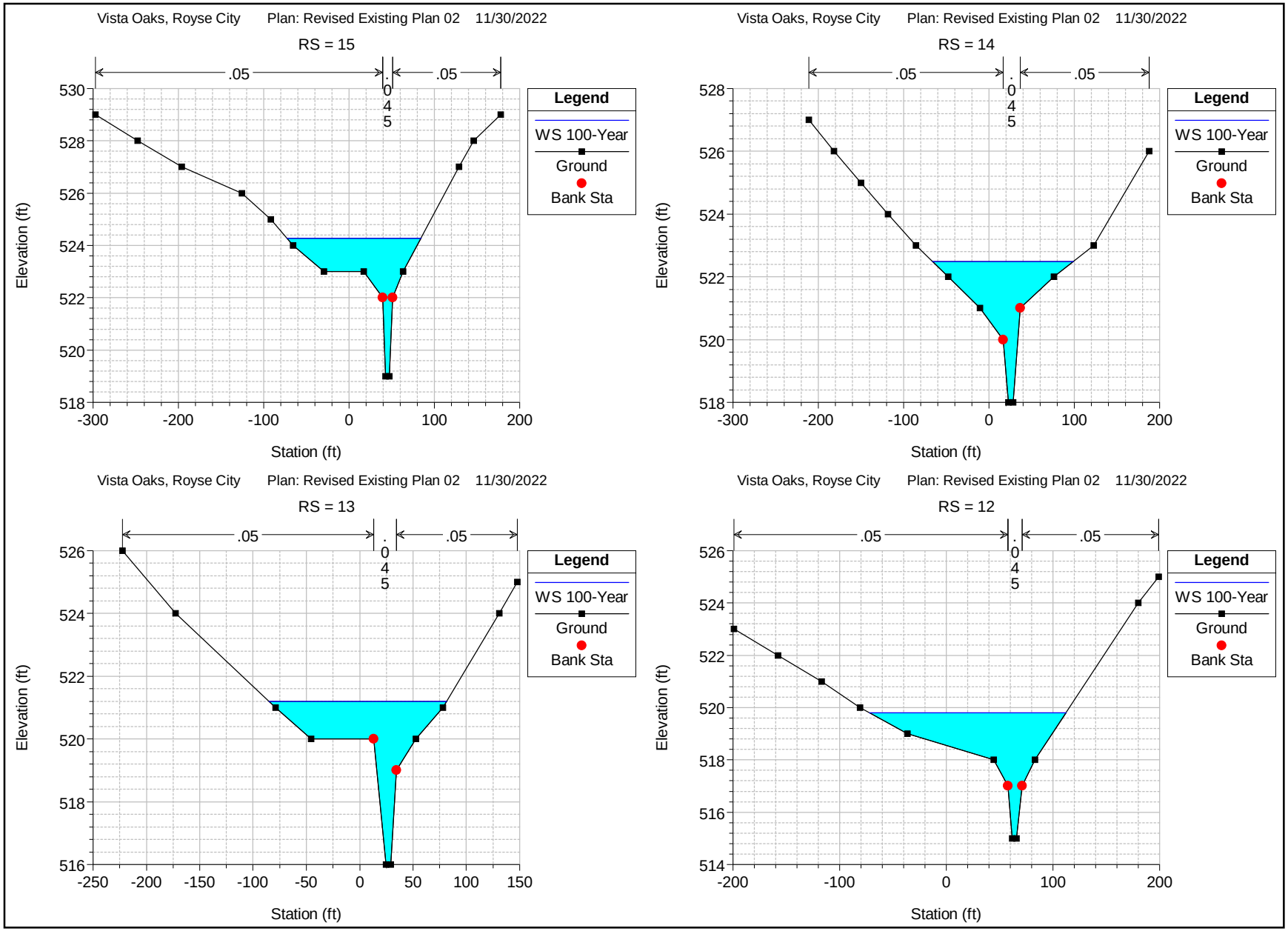
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib2	SW	39	100-Year	1104.00	510.00	516.48	516.48	518.06	0.016923	10.64	115.63	186.67	0.90
Trib2	SW	39.1		Culvert									
Trib2	SW	40	100-Year	1104.00	510.00	518.25	513.89	518.45	0.001020	3.74	313.73	106.09	0.25
Trib2	SW	41	100-Year	1104.00	510.00	518.40		518.55	0.001545	3.97	438.37	183.31	0.29
Trib2	SW	42	100-Year	1104.00	511.00	518.64		518.77	0.001472	3.90	467.84	187.36	0.28
Trib2	SW	43	100-Year	1104.00	512.00	518.88		519.05	0.002141	4.46	382.32	143.00	0.33
Trib2	SW	44	100-Year	1104.00	512.00	519.33		519.61	0.004024	5.96	367.46	245.79	0.43

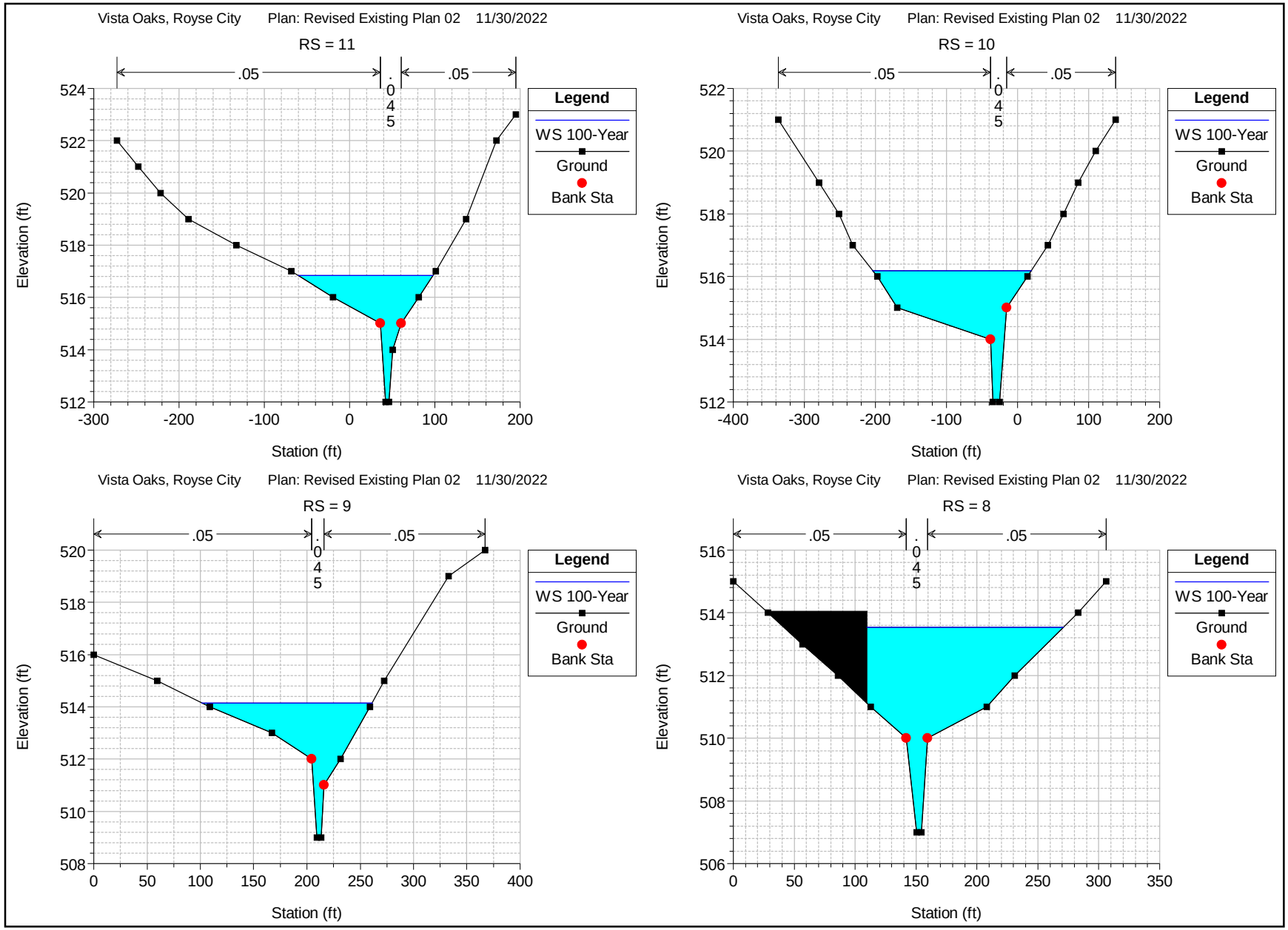

Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
Legend
WS 100-Year
Ground
Elevation (ft)
Main Channel Distance (ft)
530
525
520
515
510
505
500
495
0
1000
2000
3000
4000
5000
6000
0.6
0.7
0.8
0.9
1
2
3
5
6
7
8
9
10
11
12
13
14
15
16
18
19
20
21

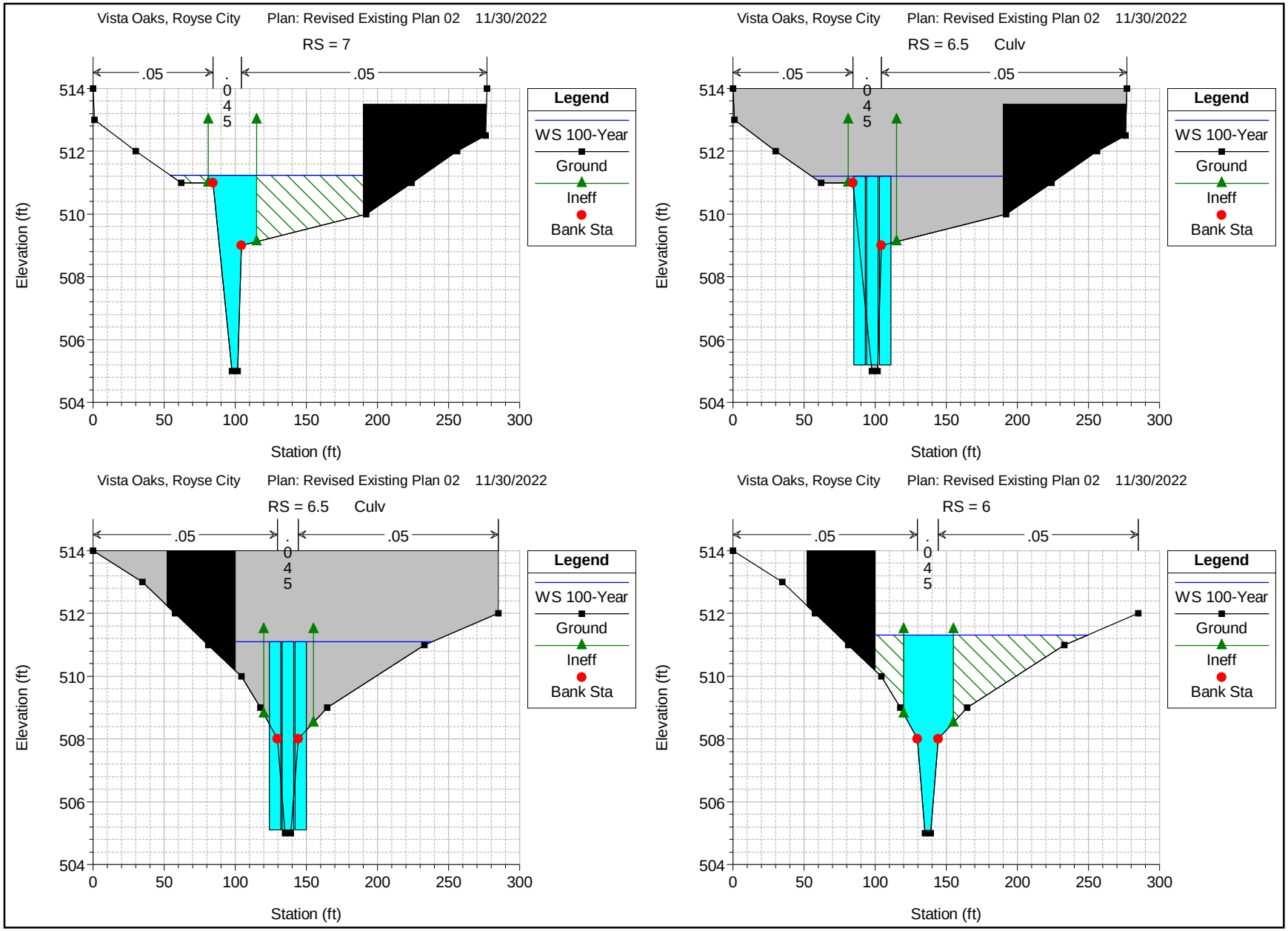

Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
Legend
WS 100-Year
Ground
Elevation (ft)
Main Channel Distance (ft)
520
518
516
514
512
510
508
506
504
502
0
500
1000
1500
2000
2500
32
33
33.5
35
36
37
38
39
39.1
41
42
43
44

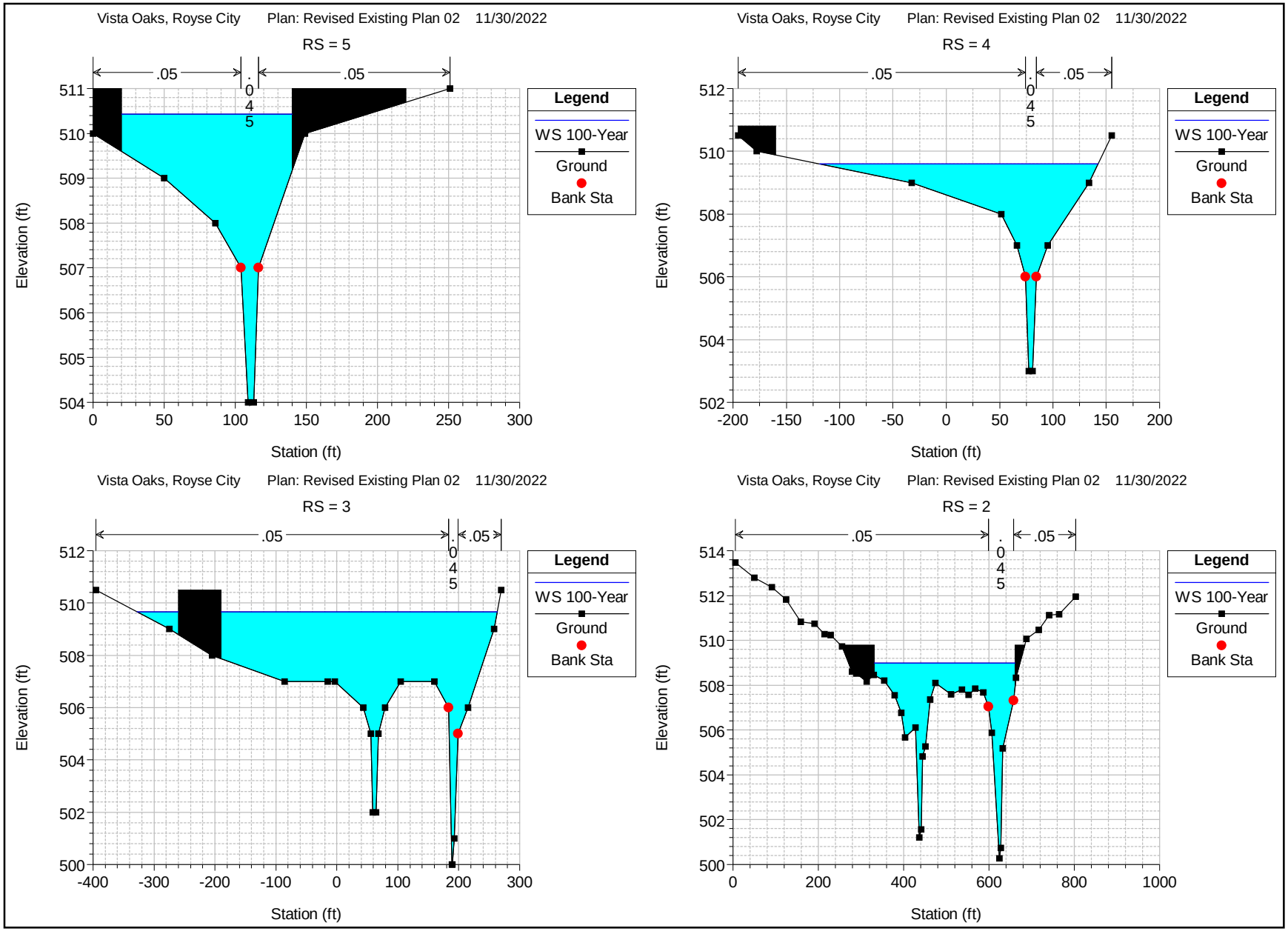

Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 21
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 20
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 19
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 18
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

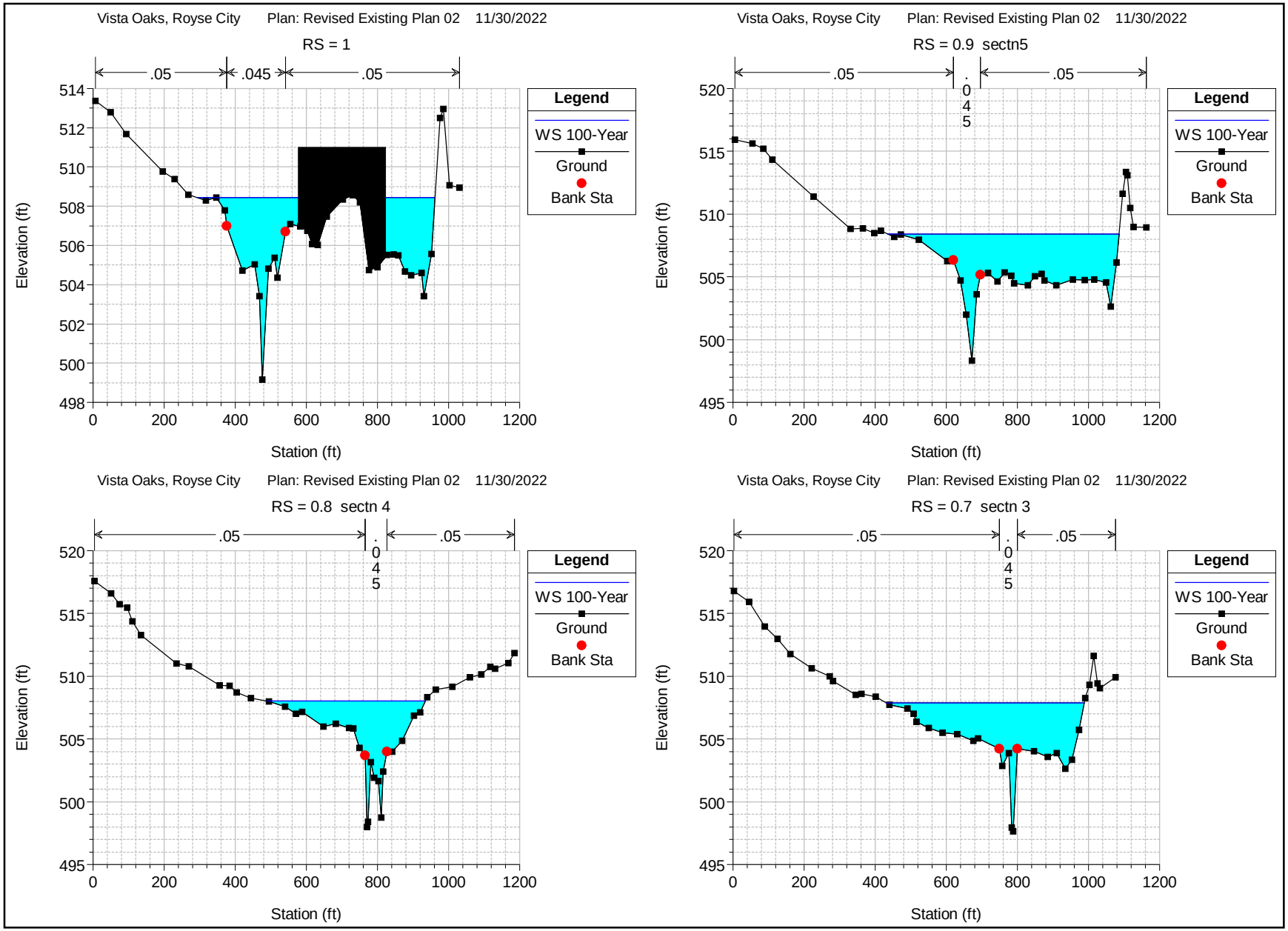

Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 17
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
-400
-300
-200
-100
0
100
200
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 16.5 Culv
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
-400
-300
-200
-100
0
100
200
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 16.5 Culv
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
520
-300
-200
-100
0
100
200
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 16
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
520
-300
-200
-100
0
100
200


Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 15
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 14
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 13
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 12
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)


Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 11
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 10
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 9
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 8
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)


Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 7
.05
.045
.05
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 6.5 Culv
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 6.5 Culv
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 6


Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 5
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 4
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 3
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 2
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)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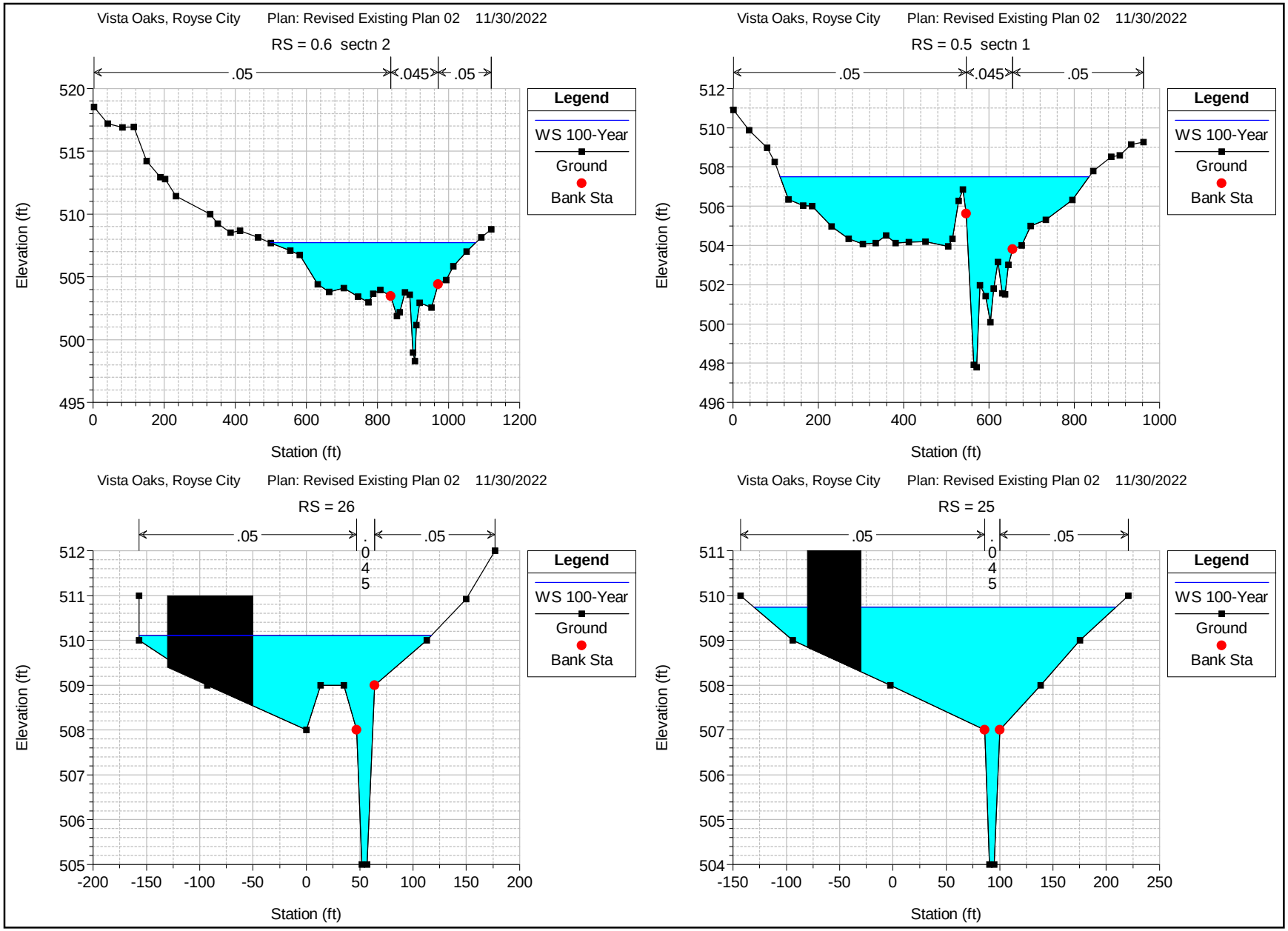
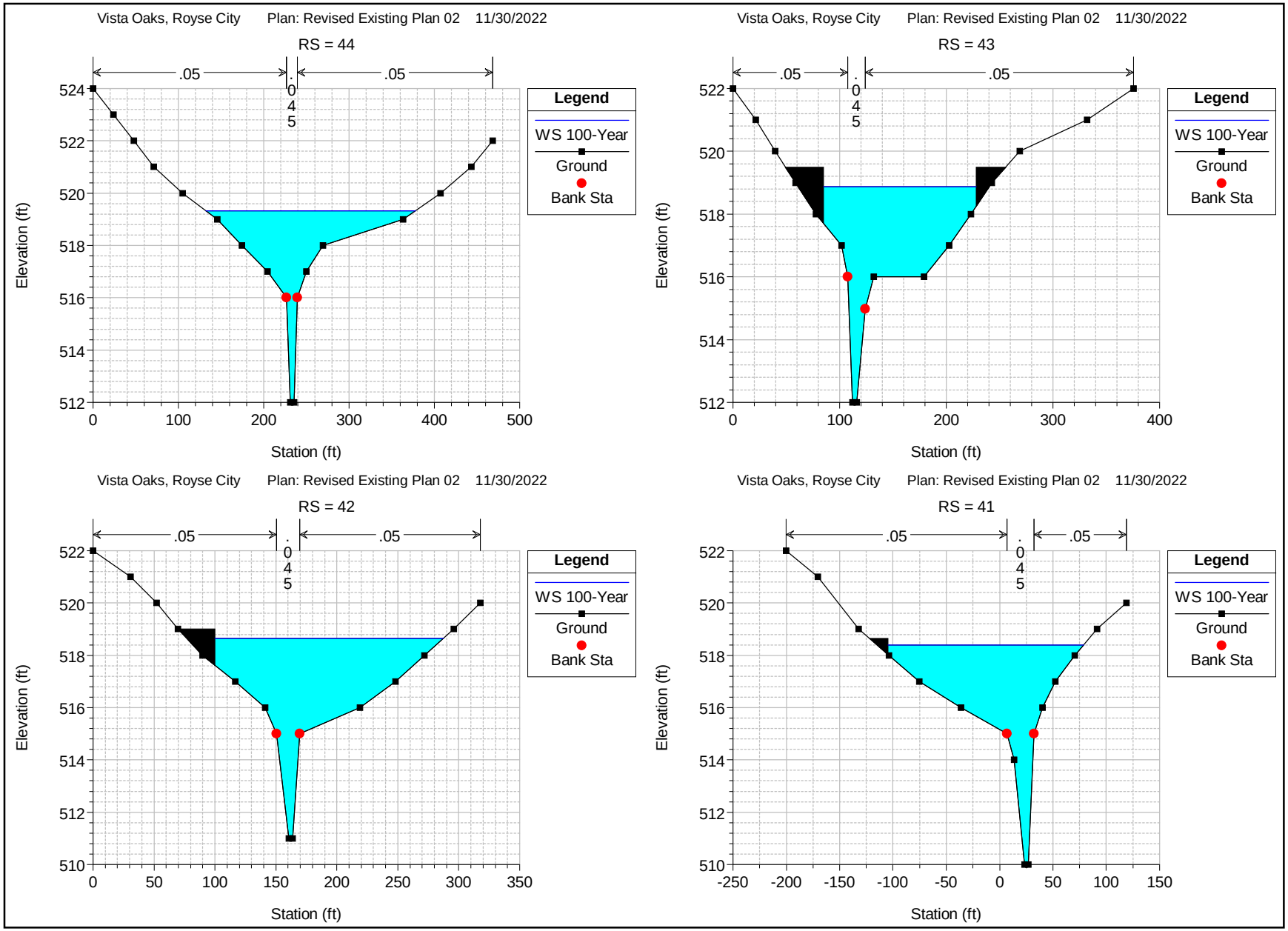
RS = 1
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 0.9 sectn5
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 0.8 sectn 4
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 0.7 sectn 3
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)


Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 0.6 sectn 2
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 0.5 sectn 1
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 26
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 25
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta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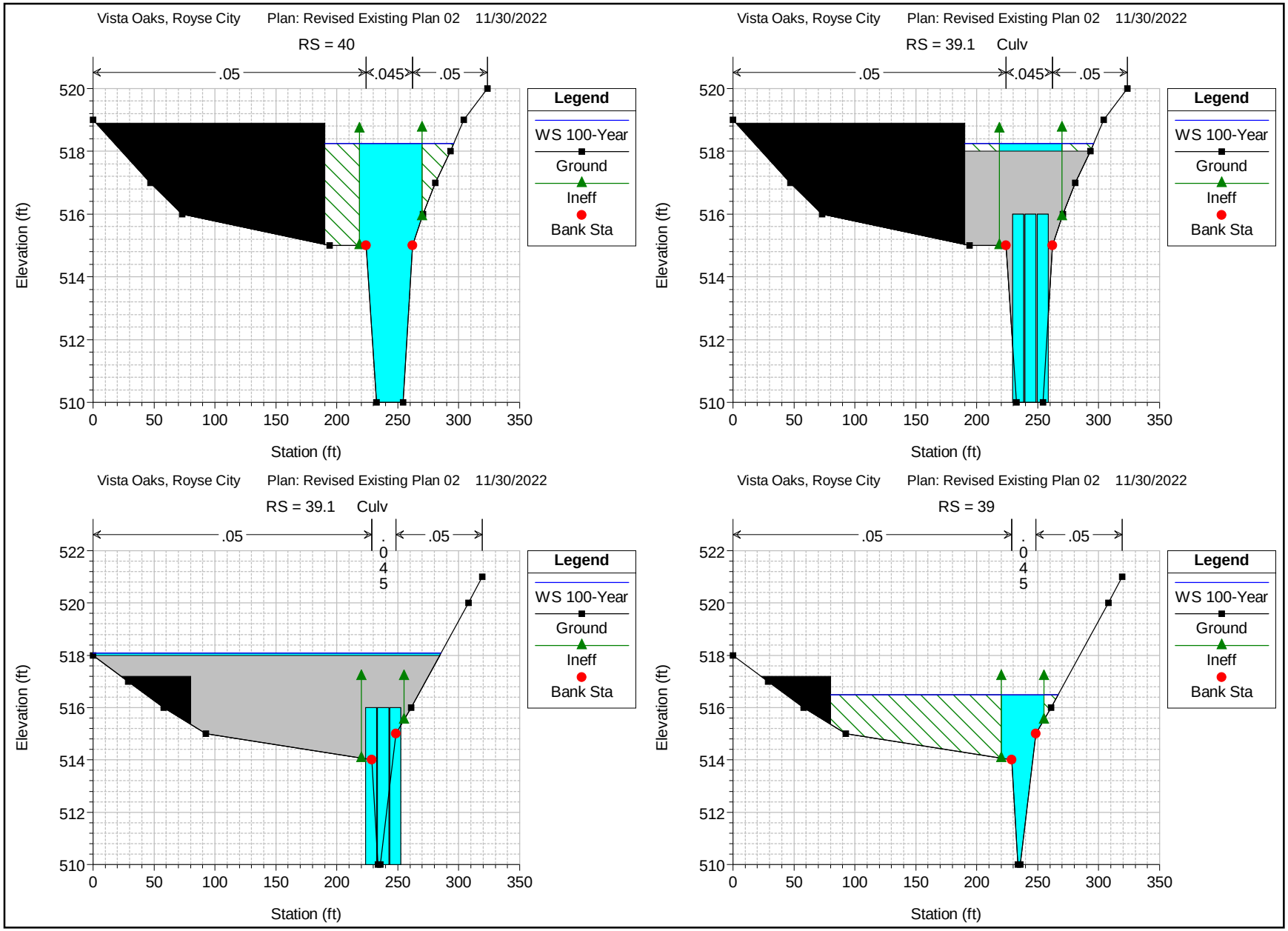
RS = 44
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 43
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 42
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 41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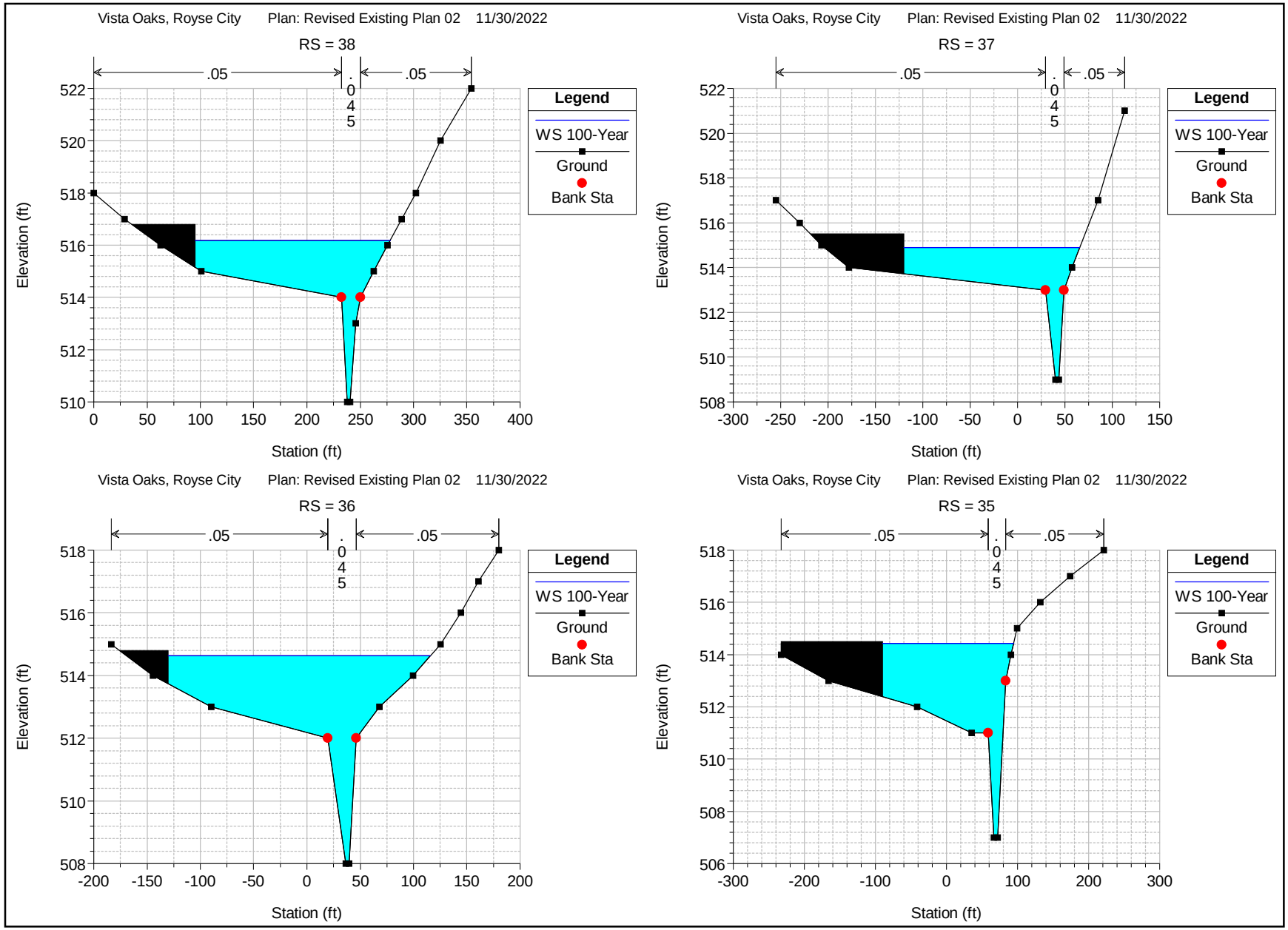
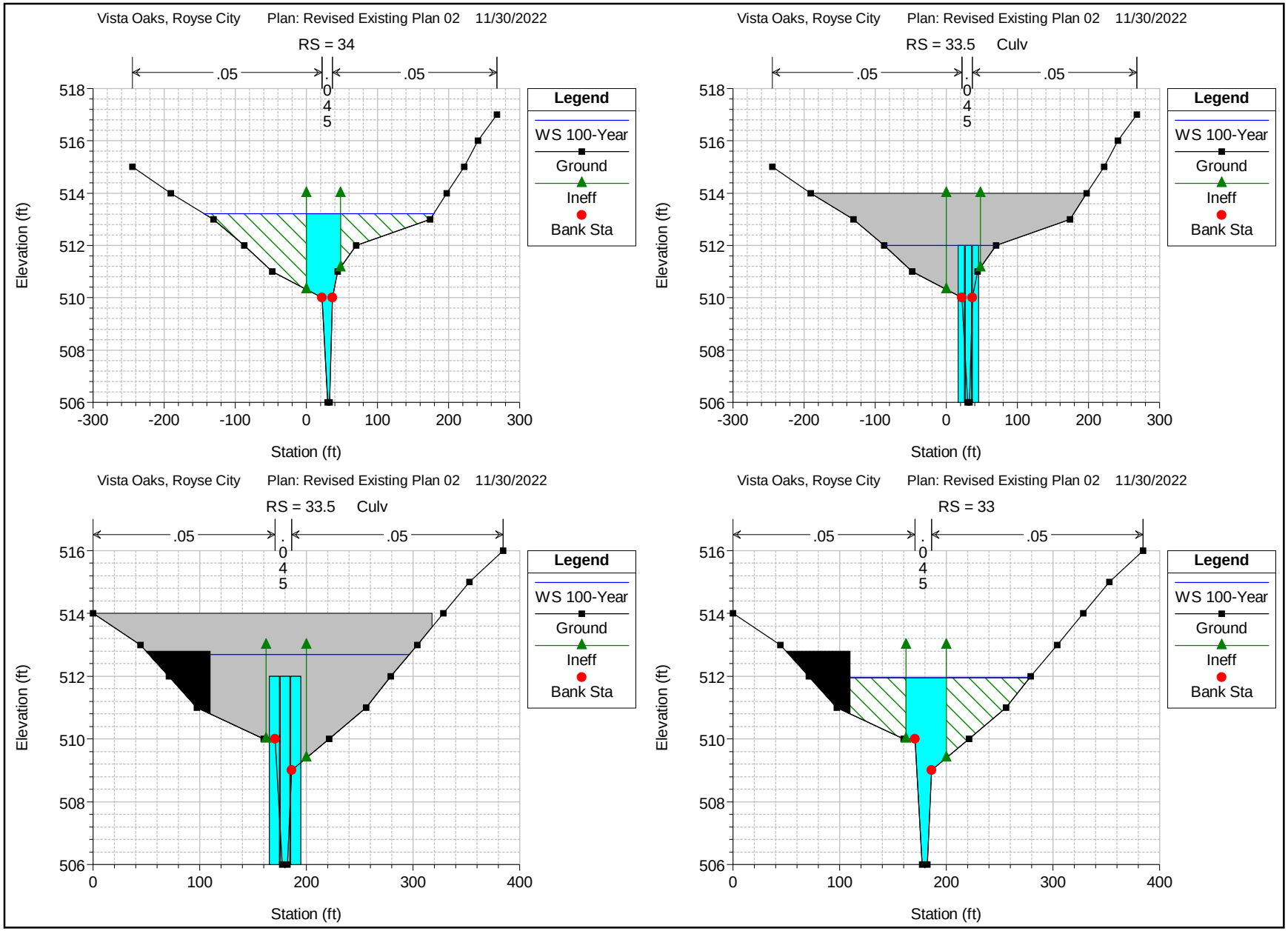
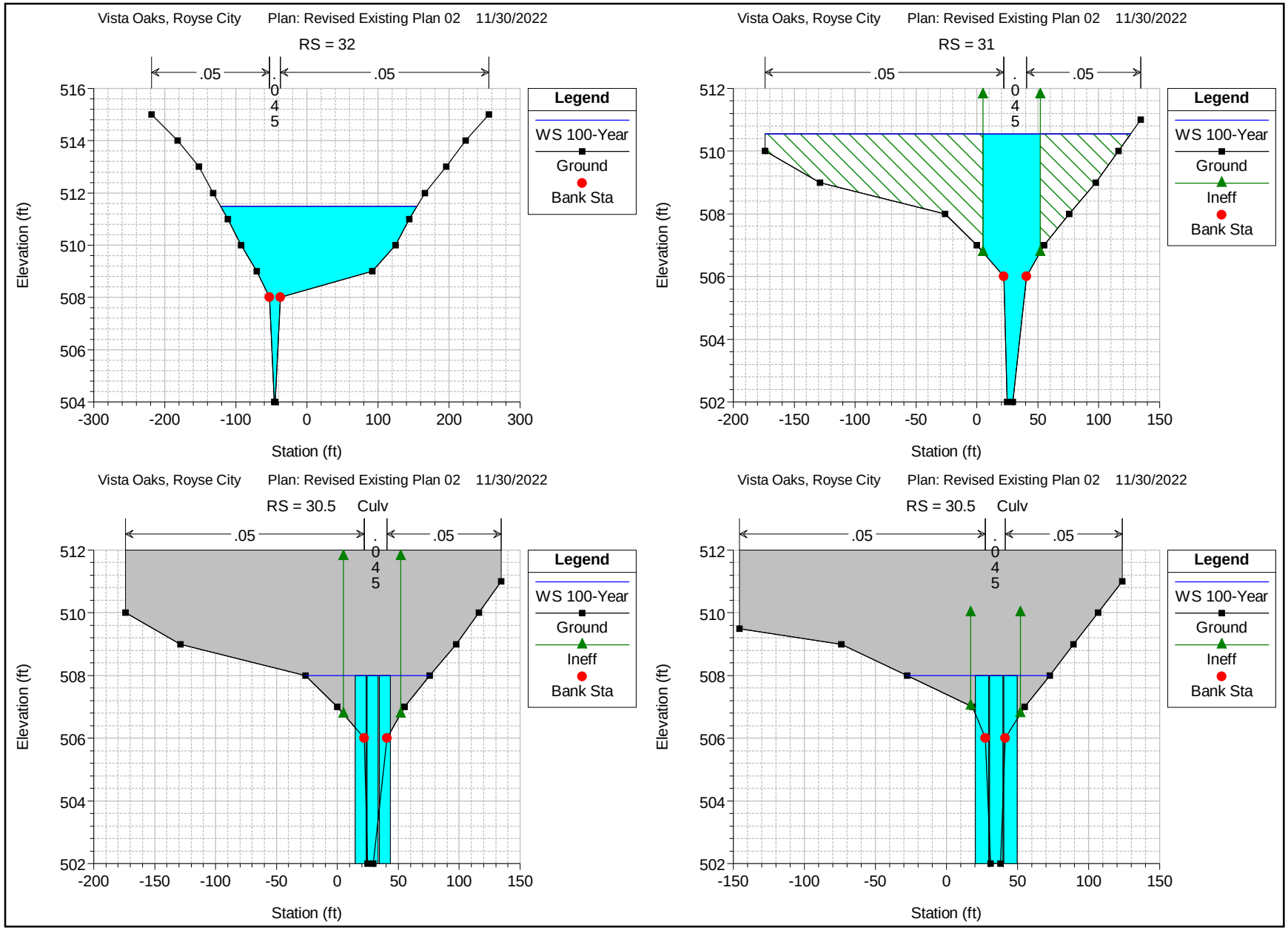
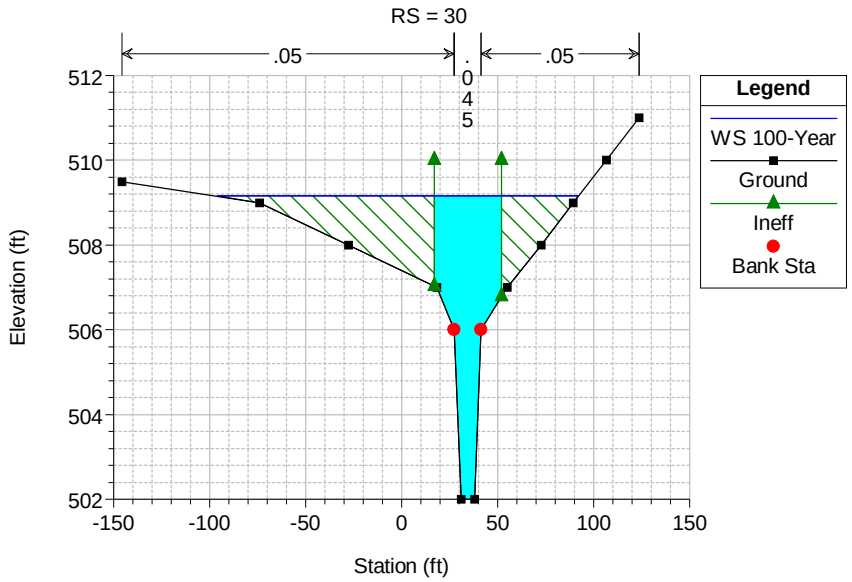
RS = 40
.05
.045
.05
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 39.1 Culv
.05
.045
.05
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 39.1 Culv
.05
.045
.05
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 39
.05
.045
.05
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 38
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 37
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 36
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 35


Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 34
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 33.5 Culv
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 33.5 Culv
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 33
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 32
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 31
.05
.045
.05
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 30.5 Culv
.05
.045
.05
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022
RS = 30.5 Culv
.05
.045
.05
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

Vista Oaks, Royse City Plan: Revised Existing Plan 02 11/30/2022



COMPUTER RUN

1. Main Stream, Trib1-NE, Trib2-SW
   C. Propose Project 100-year File (plan .p03)

HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X     X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X      X    X        X
X     X  X        X    X      X   X     X    X        X
X     X  XXXXXX    XXXX       X    X    X    X   XXXXX
```

PROJECT DATA
Project Title: Vista Oaks, Royse City
Project File : HE.prj
Run Date and Time: 11/30/2022 9:40:39 AM

Project in English units

PLAN DATA

Plan Title: Proposed Plan 03
Plan File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.p03

Geometry Title: Proposed Post-Project
Geometry File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.g02

Flow Title : Record 100-Year
Flow File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.f03

Plan Summary Information:

Number of:	Cross Sections	= 45	Multiple Openings	=	0
	Culverts	= 6	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Record 100-Year
Flow File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.f03

Flow Data (cfs)

River	Reach	RS	100-Year
River 1	Main	21	725
River 1	Main	11	983
River 1	Main	4	983
River 1	Main2	3	2996

River 1	Main2	1	2996
River 1	Main2	0.8	3650
Trib 1	NW	26	834
Trib2	SW	44	1104
Trib2	SW	37	1178
Trib2	SW	33	1205

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River 1	Main2	100-Year		Known WS = 507.5

GEOMETRY DATA

Geometry Title: Proposed Post-Project
Geometry File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\HE.g02

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
River 1	Main		tr1
River 1	Main2	tr1	
Trib 1	NW		tr1
Trib2	SW		tr1

JUNCTION INFORMATION

Name: tr1
Description:
Energy computation Method

Length across Junction		Tributary			
River	Reach	River	Reach	Length	Angle
River 1	Main	to River 1	Main2	50	
Trib 1	NW	to River 1	Main2	50	
Trib2	SW	to River 1	Main2	50	

CROSS SECTION

RIVER: River 1
REACH: Main RS: 21

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-281	534	-240	533	-199	532	-166.5	531	-124.4	530
-76.8	529	19.1	528	41.4	527	44.5	526	48	526
54	527	62	528	75	530	91	531	113	532
174	534	215	535						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-281	.05	41.4	.045	54	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
41.4	54	157	143	128	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 20

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	531	57	530	143	530	180	529	223	527
244	526	264	525	268	525	278	526	291	527
310	528	328	529	342	530	358	531	407	532
484	533								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	223	.045	291	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
223	291	190	185	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 19

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-76	530	0	529	66	528	122	527	332	526
336	525	344	525	348	526	370	527	429	531
452	532	526	533						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-76	.05	332	.045	348	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
332	348	81	90	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 18

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	529	65	528	137	527	317.6	526	330.9	525
333.3	524	337.5	524	341	525	352	526	423	530
459	531	546	532	571	533				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	330.9	.045	341	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
330.9	341	109	138	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 17

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-351	530	-302	529	-248	528	-168	527	-121.6	526
-85.2	525	-34.4	525	23.9	525	28	522	31.2	522
37.7	525	62.6	526	89	527	116	528	141	529
166	530								

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -351     .05    23.9    .045    37.7     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          23.9    37.7               86      86      86             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -351      14   528.5       F
      45     166   528.5       F

CULVERT


RIVER: River 1
REACH: Main               RS: 16.5

INPUT
Description:
Distance from Upstream XS =      25
Deck/Roadway Width        =      28
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -307     529             148     529

Upstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -351     530    -302     529    -248     528    -168     527  -121.6     526
   -85.2     525   -34.4     525    23.9     525      28     522    31.2     522
    37.7     525    62.6     526      89     527     116     528     141     529
     166     530

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -351     .05    23.9    .045    37.7     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          23.9    37.7             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -351      14   528.5       F
      45     166   528.5       F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -240     528             150     528

Downstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -290.3     529    -238     528    -179     527  -110.9     526   -81.8     525
   -48.3     524   -10.5     524    17.7     524    23.8     521    27.4     521
    31.8     524    46.9     525    77.3     526   109.6     527     144     528
     175     529

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -290.3     .05    17.7    .045    31.8     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          17.7    31.8             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -290.3    9.64  526.28       F
   42.77     175  526.31       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
```

```
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 18      48     .012     .012        0                  .5               1
Number of Barrels =  2
Upstream   Elevation =  522
Centerline Stations
    Sta.    Sta.
      26      36
Downstream Elevation =  521.1
Centerline Stations
    Sta.    Sta.
      22      32

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 16

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -290.3     529    -238     528    -179     527  -110.9     526   -81.8     525
   -48.3     524   -10.5     524    17.7     524    23.8     521    27.4     521
    31.8     524    46.9     525    77.3     526   109.6     527     144     528
     175     529

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -290.3     .05    17.7    .045    31.8     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          17.7    31.8             241     253     212             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -290.3    9.64  526.28       F
   42.77     175  526.31       F

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 15

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -297     529    -248     528    -196     527  -125.8     526   -91.7     525
   -65.6     524   -29.7     523    17.3     523    39.4     522    42.7     519
    47.4     519    51.1     522    63.4     523     129     527     146     528
     178     529

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -297     .05    39.4    .045    51.1     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
```

```
          39.4    51.1              266     326     287             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 14

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -211     527  -181.8     526  -150.2     525  -118.5     524   -85.4     523
   -47.6     522   -10.3     521    16.7     520    22.9     518    28.5     518
    36.8     521    76.2     522     123     523     188     526

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -211     .05    16.7    .045    36.8     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          16.7    36.8              203     273     228             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 13

INPUT
Description:
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -222.3     526  -172.8     524   -78.9     521   -45.7     520    12.9     520
    24.5     516      29     516    34.4     519    52.7     520    78.1     521
     131     524     148     525

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -222.3     .05    12.9    .045    34.4     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          12.9    34.4              304     355     279             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 12

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -199     523    -158     522    -117     521     -81     520   -36.5     519
    44.3     518    57.8     517    61.6     515    65.8     515    71.1     517
    83.3     518     180     524     199     525

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -199     .05    57.8    .045    71.1     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          57.8    71.1              242     464     310             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 11

INPUT
```

Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-273	522	-248	521	-221.6	520	-189	519	-133	518
-68.1	517	-19.5	516	36	515	42.1	512	46.2	512
50.8	514	60.4	515	81	516	101	517	136.9	519
172	522	195	523						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-273	.05	36	.045	60.4	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
36	60.4	115	169	158	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 10

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-337	521	-279	519	-251	518	-232.2	517	-197.6	516
-169.2	515	-38.3	514	-34.8	512	-25.1	512	-15.6	515
14	516	42.8	517	65	518	85.6	519	110	520
138	521								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-337	.05	-38.3	.045	-15.6	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-38.3	-15.6	236	333	210	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 9

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	516	59.5	515	109.1	514	167.2	513	204.4	512
209.3	509	213.4	509	216	511	231.4	512	259.2	514
272.3	515	333	519	367	520				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	204.4	.045	216	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
204.4	216	174	397	253	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main RS: 8

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	515	28.4	514	56.7	513	86.1	512	112.8	511
142	510	150.5	507	154.2	507	159.5	510	208	511
231	512	283	514	306	515				

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05     142    .045   159.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          142   159.5              159     221     180             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      22  109.68  514.05

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 7

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514       1     513      30     512      62     511    84.5     511
    97.8     505   101.6     505   104.5     509     192     510     224     511
     256     512     276   512.5     277     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    84.5    .045   104.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          84.5   104.5              91      99      81             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   81.14   513.5       F
  115.15     277  513.47       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     190     277     514

CULVERT


RIVER: River 1
REACH: Main               RS: 6.5

INPUT
Description:
Distance from Upstream XS =      30
Deck/Roadway Width        =      30
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     514             277     514

Upstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514       1     513      30     512      62     511    84.5     511
    97.8     505   101.6     505   104.5     509     192     510     224     511
     256     512     276   512.5     277     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05    84.5    .045   104.5     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          84.5   104.5             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   81.14   513.5       F
  115.15     277  513.47       F
Blocked Obstructions     num=       1
```

```
   Sta L   Sta R    Elev
     190     277     514

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     514             286     514

Downstream Bridge Cross Section Data
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    34.6     513    57.5     512    81.1     511   104.2     510
   117.7     509   129.8     508     135     505     139     505   144.5     508
   164.6     509     233     511     285     512     286     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   129.8    .045   144.5     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         129.8   144.5             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   120.2  512.67       F
  155.22     286  512.69       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      52     100     514

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                20      48     .012     .012        0                  .5               1
Number of Barrels =  3
Upstream   Elevation =  505.2
Centerline Stations
    Sta.    Sta.    Sta.
      89      98     107
Downstream Elevation =  505.1
Centerline Stations
    Sta.    Sta.    Sta.
     128     137     146

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 6

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    34.6     513    57.5     512    81.1     511   104.2     510
   117.7     509   129.8     508     135     505     139     505   144.5     508
   164.6     509     233     511     285     512     286     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
       0     .05   129.8    .045   144.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         129.8   144.5              244     235     140             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   120.2  512.67       F
  155.22     286  512.69       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      52     100     514

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 5

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     512      10     511      46     511      76     510  114.48     510
     128     509     141     508     146     507  148.82  506.03  152.86  504.22
   156.9  506.03     158     507     162     508     163     511     164     512
     176     512     588   512.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05  114.48    .045     163     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        114.48     163              170     218     170             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main               RS: 4

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -197.64  510.78 -177.61  511.05 -102.58  510.98  -92.76  509.41   -32.3     509
    51.4     508    66.3     507      74     506    77.4     503    80.7     503
    84.5     506      95     507     134     509  148.43  510.86

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -197.64     .05      74    .045    84.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            74    84.5              150     357     290             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 3

INPUT
Description:
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -295.29  509.66    -275     509    -205     508 -147.81  507.45  -137.4  507.18
  -121.8  502.01 -116.84  502.01  -101.8  507.01     -86     507     -15     507
      -3     507      43     506      56     505      59     502      64     502
      68     505      79     506     105     507     160     507   183.3     506
   188.4     500   189.7     500   192.7     501   198.9     505     215     506
     258     509  283.84  509.83
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -295.29     .05   183.3    .045   198.9     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         183.3   198.9              200     189     145             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
    -7.2     112   506.9       T

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 2

INPUT
Description:
Station Elevation Data    num=      36
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     5.5  513.47   49.48   512.8    91.1  512.37  124.87  511.82  158.64  510.83
  191.62  510.75   214.4  510.27  228.53  510.23  256.02  509.72  278.79   508.6
     289  508.53  313.35  508.16  329.84  508.45  354.18   508.2  379.32  507.54
  394.24  506.76  403.66  505.67  414.74  505.05  436.64   501.2  440.57  501.57
   444.5  504.82  451.57  505.26  462.56  507.36  474.34   508.1   494.2  507.81
   516.7  500.29   521.7   500.3   544.8     508  552.19  509.05  562.16  510.24
  606.16  510.67  657.87  511.05  712.87   511.1  740.57  511.13  764.13  511.16
  803.39  511.94

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     5.5     .05   494.2    .045   544.8     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         494.2   544.8              202     415     284             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 1

INPUT
Description: sectn 6
Station Elevation Data    num=      41
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    6.04  513.37   49.35  512.79   93.66  511.68  196.39  509.76  229.63  509.38
   267.9  508.58  317.25   508.3  346.45  508.44  370.62   507.8  375.66  506.99
  419.97  504.72  455.22  505.03  468.32  503.42  475.37  499.17  493.49  504.82
  510.62  505.37  518.67  504.35  540.83  506.69  554.93  507.08  582.12  506.97
  588.78  509.48  628.38  509.76  678.55  510.03  689.11  509.92  704.95  510.03
  720.79  509.97  757.76  509.86  797.36  509.65  810.56  505.07  826.85  505.51
  844.98  505.55  858.08  505.49  877.21  504.68  894.33  504.48  923.54  504.61
  930.59  503.41  951.74  505.57  975.91  512.49  985.98  512.96  1003.1  509.07
  1030.3  508.95

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    6.04     .05  375.66    .045  540.83     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        375.66  540.83              85      95      95             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 0.9

INPUT
Description: sectn 5
Station Elevation Data    num=      41
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    5.68  515.92   54.53  515.62    85.2  515.19  110.19  514.33  226.06  511.38
  330.57  508.83  365.79  508.86   397.6  508.48  415.77  508.67  453.26  508.18
  471.43  508.37  522.55  507.96  603.21  506.27  620.25  506.34  639.56  504.69
  655.46  501.97  671.37  498.33     685  503.62  696.36  505.15  716.81   505.3
  744.07  504.63  763.38  505.36  782.69  505.08  790.65  504.48  829.27  504.32
  849.72  505.03  867.89  505.22  875.85   504.7  909.92  504.31   956.5  504.78
  989.44  504.75  1015.6  504.77  1049.7  504.57  1063.3  502.61  1079.2  506.14
  1096.2   511.6  1105.3  513.36  1109.9  513.08  1117.8   510.5  1126.9  508.99
  1162.1  508.93

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    5.68     .05  620.25    .045  696.36     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        620.25  696.36              105     135     135             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 0.8

INPUT
Description: sectn 4
Station Elevation Data    num=      43
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    4.63  517.57   50.97  516.59   75.29  515.75   96.14  515.48  110.04  514.39
  134.37  513.29  235.15  511.01   269.9  510.78  355.62  509.27  383.42  509.23
  404.27  508.72  443.65  508.27  494.62  507.98   539.8  507.56  571.08  507.01
  588.45  507.15  647.53  505.98  682.28  506.23   720.5  505.87  732.09  505.84
  749.46   504.3  765.68   503.7  770.31  497.97  773.79   498.4   781.9  503.15
  790.01   501.9  802.75  501.66  810.86  498.75  815.49   502.4  827.07     504
  840.97     504  869.93  504.87  902.37  506.85  919.74  507.14  939.44  508.33
  963.76  508.92  1010.1  509.15  1059.9  509.92  1092.3  510.16  1117.8  510.76
  1130.6  510.59  1167.6  511.06    1185  511.83

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    4.63     .05  765.68    .045  827.07     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        765.68  827.07              200     210     165             .1       .3

CROSS SECTION


RIVER: River 1
REACH: Main2              RS: 0.7

INPUT
Description: sectn 3
Station Elevation Data    num=      38
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    3.16  516.79   45.24  515.93   89.42  513.96  125.19  512.96  160.96  511.77
  221.98  510.64  271.43  509.99  281.95  509.62  345.07  508.53   361.9  508.61
  400.83  508.35  439.75  507.72   491.3  507.41  508.14  507.01   515.5  506.36
  550.22  505.88  589.14  505.49  631.23  505.39  675.41  504.86  689.09  505.03
  749.05  504.23  757.47  502.87  776.41  503.87  783.77  497.93  787.98  497.64
   800.6   504.2  846.89  504.04  885.82  503.57  910.02  503.86  934.21  502.61
  953.15  503.35  973.14  505.73  991.02  508.26  1002.6  509.31  1014.2  511.61
  1025.7  509.42  1032.1  509.06  1076.2  509.91

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    3.16     .05  749.05    .045   800.6     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        749.05   800.6              150     160     270             .1       .3

CROSS SECTION
```

RIVER: River 1
REACH: Main2 RS: 0.6

INPUT
Description: sectn 2
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
2.19	518.53	41.61	517.21	82.13	516.9	114.98	516.95	150.02	514.21
189.44	512.92	202.59	512.8	233.25	511.41	329.61	509.99	350.42	509.25
386.55	508.52	413.93	508.66	464.3	508.15	500.44	507.69	554.1	507.09
581.47	506.74	631.85	504.39	663.6	503.81	705.22	504.09	745.73	503.43
775.3	502.97	787.35	503.63	808.15	503.95	837.72	503.45	854.14	501.89
862.9	502.17	877.14	503.76	890.28	503.59	900.14	498.96	905.61	498.27
909.99	501.17	918.75	502.92	951.6	502.54	971.31	504.39	993.22	504.75
1012.9	505.84	1050.2	507.01	1091.8	508.14	1120.2	508.79		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
2.19	.05	837.72	.045	971.31	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
837.72	971.31	280	430	185	.1	.3

CROSS SECTION

RIVER: River 1
REACH: Main2 RS: 0.5

INPUT
Description: sectn 1
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
.94	510.92	37.63	509.87	79.97	508.98	97.85	508.26	129.84	506.34
164.65	506.04	185.35	506	231.45	504.96	270.96	504.34	304.83	504.08
334	504.12	359.4	504.51	381.04	504.12	412.09	504.16	450.67	504.2
504.29	503.95	514.64	504.35	528.76	506.26	539.1	506.86	546.63	505.63
564.51	497.9	571.09	497.8	578.62	501.96	591.79	501.42	603.08	500.09
610.61	501.79	620.96	503.16	631.31	501.57	637.89	501.5	645.42	503.02
655.77	503.8	676.47	504	698.11	504.98	732.92	505.3	795.96	506.33
844.88	507.8	887.22	508.52	906.98	508.6	933.32	509.14	962.49	509.28

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
.94	.05	546.63	.045	655.77	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
546.63	655.77	0	0	0	.1	.3

CROSS SECTION

RIVER: Trib 1
REACH: NW RS: 26

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-157	511	-155	510	-93	509	0	508	13.4	509
35	509	47	508	52	505	57	505	64	509
113	510	150	510.92	177	512				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-157	.05	47	.045	64	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
47	64	92	160	113	.1	.3

CROSS SECTION

RIVER: Trib 1
REACH: NW RS: 25.3

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	513	66	512	140	511	156	510	169	509.6
187	509	193.07	509.53	249	510	286.58	509.99	288.23	509.09
292.08	504.56	300.33	504.56	309.68	504.58	310.23	509.07	310.78	509.99
368	510	452.5	510.5	484	511.5	500	512		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	288.23	.035	310.23	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
288.23	310.23	42	42	.3	.5

CULVERT

RIVER: Trib 1
REACH: NW RS: 25.2

INPUT
Description:
Distance from Upstream XS = 4
Deck/Roadway Width = 24
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
249	510	368	510

Upstream Bridge Cross Section Data
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	513	66	512	140	511	156	510	169	509.6
187	509	193.07	509.53	249	510	286.58	509.99	288.23	509.09
292.08	504.56	300.33	504.56	309.68	504.58	310.23	509.07	310.78	509.99
368	510	452.5	510.5	484	511.5	500	512		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	288.23	.035	310.23	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
288.23	310.23	.3	.5

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
249	510	368	510

Downstream Bridge Cross Section Data
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	513	66	512	140	511	156	510	169	509.6
187	509	193.07	509.53	249	510	286.58	509.99	288.23	509.09
290.98	504.39	299.78	504.36	309.68	504.39	310.23	509.07	310.78	509.99
368	510	452.5	510.5	484	511.5	500	512		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	288.23	.035	310.23	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
288.23	310.23	.3	.5

```
Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       5      10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  4      34     .013     .013        0                  .4                1
Number of Barrels =  2
Upstream   Elevation =  504.5
Centerline Stations
    Sta.    Sta.
     297     303
Downstream Elevation =  504.3
Centerline Stations
    Sta.    Sta.
     297     303

CROSS SECTION


RIVER: Trib 1
REACH: NW                RS: 25.1

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     513      66     512     140     511     156     510     169   509.6
     187     509  193.07  509.53     249     510  286.58  509.99  288.23  509.09
  290.98  504.39  299.78  504.36  309.68  504.39  310.23  509.07  310.78  509.99
     368     510   452.5   510.5     484   511.5     500     512

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05  288.23    .035  310.23     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        288.23  310.23               95      95      95             .3       .5

CROSS SECTION


RIVER: Trib 1
REACH: NW                RS: 25

INPUT
Description:
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -143     510     -94     509    -2.5     508   41.69  507.41   47.08  504.04
   54.26  504.04   64.14  507.14   70.43  509.96   220.5     510

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -143     .05   41.69    .045   64.14     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         41.69   64.14              225     225     225             .1       .3

CROSS SECTION
```

RIVER: Trib2
REACH: SW RS: 44

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	524	24.1	523	47.6	522	71.2	521	105.2	520
145.4	519	174.5	518	204.2	517	226.6	516	231.2	512
235.7	512	239.3	516	250	517	269.7	518	363.4	519
407.2	520	443.6	521	468.4	522				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	226.6	.045	239.3	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
226.6	239.3	190	184	180	.1	.3

CROSS SECTION

RIVER: Trib2
REACH: SW RS: 43

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	522	21.4	521	39.6	520	58.5	519	78	518
101.8	517	107.5	516	112	512	116	512	123.96	514.98
132	516	179.3	516	202.6	517	223.2	518	242.8	519
268.8	520	332	521	375.4	522				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	107.5	.045	123.96	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
107.5	123.96	150	151	150	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
35	65	519.5	228	320	519.5

CROSS SECTION

RIVER: Trib2
REACH: SW RS: 42

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	522	30.8	521	52	520	69.8	519	89.8	518
116.8	517	141.2	516	150.4	515	160.5	511	163.8	511
169.4	515	218.8	516	248.1	517	271.9	518	295.9	519
317.8	520								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	150.4	.045	169.4	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
150.4	169.4	140	145	145	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
70	100	519

CROSS SECTION

```
RIVER: Trib2
REACH: SW                RS: 41

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -200.4     522  -170.6     521  -132.3     519  -103.6     518   -75.2     517
     -36     516     7.1     515    13.5     514    23.2     510    26.8     510
    32.3     515      40     516    52.2     517    70.5     518    91.2     519
     119     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -200.4     .05     7.1    .045    32.3     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          7.1    32.3               75      75      75             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 -134.57 -104.57  518.64

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 40

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     519    47.1     517    73.3     516   194.1     515   223.9     515
   232.4     510   254.3     510   262.1     515   270.5     516   280.9     517
   293.4     518   304.3     519   323.7     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   223.9    .045   262.1     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         223.9   262.1               75      76      75             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  218.41  518.72       F
  269.87   323.7  518.75       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       3     190   518.9

CULVERT


RIVER: Trib2
REACH: SW                RS: 39.1

INPUT
Description:
Distance from Upstream XS =      25
Deck/Roadway Width        =      35
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
      20     518             300     518

Upstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     519    47.1     517    73.3     516   194.1     515   223.9     515
   232.4     510   254.3     510   262.1     515   270.5     516   280.9     517
```

```
   293.4     518   304.3     519   323.7     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   223.9    .045   262.1     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         223.9   262.1            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0  218.41  518.72       F
  269.87   323.7  518.75       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       3     190   518.9

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     518             285     518

Downstream Bridge Cross Section Data
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     518    28.8     517    58.1     516    92.7     515   228.7     514
   233.7     510   235.7     510   248.5     515     261     516     308     520
   319.4     521

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   228.7    .045   248.5     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         228.7   248.5            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     220   517.2       F
     255   319.4   517.2       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      20      60   517.2

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                23      48     .012     .012        0                  .5                1
Number of Barrels =  3
Upstream   Elevation =  510
Centerline Stations
    Sta.    Sta.    Sta.
     234     244     254
Downstream Elevation =  510
Centerline Stations
    Sta.    Sta.    Sta.
     228     238     248

CROSS SECTION
```

RIVER: Trib2
REACH: SW RS: 39

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	518	28.8	517	58.1	516	92.7	515	228.7	514
233.7	510	235.7	510	248.5	515	261	516	308	520
319.4	521								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	228.7	.045	248.5	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
228.7	248.5	40	40	40	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	220	517.2	F
255	319.4	517.2	F

Blocked Obstructions num= 1

Sta L	Sta R	Elev
20	60	517.2

CROSS SECTION

RIVER: Trib2
REACH: SW RS: 38

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	518	28.7	517	62.7	516	100.9	515	232.6	514
237.6	510	240.6	510	245.7	513	250.3	514	262.7	515
275.6	516	289	517	302.4	518	325.2	520	354.1	522

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	232.6	.045	250.3	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
232.6	250.3	250	252	250	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
35	95	516.8

CROSS SECTION

RIVER: Trib2
REACH: SW RS: 37

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-255	517	-230	516	-207	515	-178	514	29.6	513
40	509	43.4	509	48.8	513	57.3	514	85	517
112.8	521								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-255	.05	29.6	.045	48.8	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
29.6	48.8	135	138	135	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
-240	-120	515.5

CROSS SECTION

RIVER: Trib2
REACH: SW RS: 36

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-183.6	515	-144.6	514	-89.6	513	19.4	512	36.4	508
39.5	508	46.2	512	68.1	513	99.6	514	125.3	515
144.6	516	161	517	179.8	518				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-183.6	.05	19.4	.045	46.2	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
19.4	46.2	170	173	170	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
-200	-130	514.8

CROSS SECTION

RIVER: Trib2
REACH: SW RS: 35

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-232.7	514	-165.7	513	-41.5	512	35	511	58.9	511
66.8	507	71.8	507	83	513	90.7	514	99.3	515
132.1	516	174	517	221.4	518				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-232.7	.05	58.9	.045	83	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
58.9	83	200	206	200	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
-240	-90	514.5

CROSS SECTION

RIVER: Trib2
REACH: SW RS: 34

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-244.4	515	-190.7	514	-130.4	513	-87.5	512	-48.2	511
21.7	510	30.2	506	32.9	506	36.6	510	44.3	511
70.1	512	174	513	197.6	514	222.1	515	241.1	516
268.1	517								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-244.4	.05	21.7	.045	36.6	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
21.7	36.6	74	74	74	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent

```
  -244.4       0     514       F
      48   268.1     514       F

CULVERT


RIVER: Trib2
REACH: SW                RS: 33.5

INPUT
Description:
Distance from Upstream XS =      25
Deck/Roadway Width        =      35
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -195     514             200     514

Upstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -244.4     515  -190.7     514  -130.4     513   -87.5     512   -48.2     511
    21.7     510    30.2     506    32.9     506    36.6     510    44.3     511
    70.1     512     174     513   197.6     514   222.1     515   241.1     516
   268.1     517

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -244.4     .05    21.7    .045    36.6     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          21.7    36.6             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  -244.4       0     514       F
      48   268.1     514       F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     514             318     514

Downstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    44.4     513    70.9     512    97.4     511     160     510
   170.7     510   177.2     506   182.2     506   186.1     509   221.2     510
   255.9     511   279.2     512   304.2     513   328.6     514   352.9     515
   384.4     516

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   170.7    .045   186.1     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         170.7   186.1             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     162     513       F
     200   384.4     513       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      45     110   512.8

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested
```

```
Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 13      48     .012     .012        0                  .5                1
Number of Barrels =  3
Upstream   Elevation =  506
Centerline Stations
    Sta.    Sta.    Sta.
      21      31      41
Downstream Elevation =  506
Centerline Stations
    Sta.    Sta.    Sta.
     170     180     190

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 33

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514    44.4     513    70.9     512    97.4     511     160     510
   170.7     510   177.2     506   182.2     506   186.1     509   221.2     510
   255.9     511   279.2     512   304.2     513   328.6     514   352.9     515
   384.4     516

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   170.7    .045   186.1     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         170.7   186.1              375     378     375             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     162     513       F
     200   384.4     513       F
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
      45     110   512.8

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 32

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  -218.5     515  -182.2     514  -151.8     513    -132     512  -111.5     511
   -92.4     510   -70.6     509   -52.4     508   -45.9     504   -44.5     504
   -37.5     508    91.7     509   124.8     510     144     511     166     512
     196     513     223     514     256     515

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  -218.5     .05   -52.4    .045   -37.5     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -52.4   -37.5              380     384     380             .1       .3

CROSS SECTION
```

RIVER: Trib2
REACH: SW RS: 31

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-175	512	-174	510	-128.8	509	-26.3	508	0	507
22.1	506	24.7	502	29.4	502	40.8	506	55.3	507
75.9	508	97.4	509	116.3	510	134.4	511	135	512

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-175	.05	22.1	.045	40.8	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
22.1	40.8	75	75	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-175	5	511.8	F
52	135	511.8	F

CULVERT

RIVER: Trib2
REACH: SW RS: 30.5

INPUT
Description:
Distance from Upstream XS = 25
Deck/Roadway Width = 38
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
-175	512	135	512

Upstream Bridge Cross Section Data
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-175	512	-174	510	-128.8	509	-26.3	508	0	507
22.1	506	24.7	502	29.4	502	40.8	506	55.3	507
75.9	508	97.4	509	116.3	510	134.4	511	135	512

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-175	.05	22.1	.045	40.8	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
22.1	40.8	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-175	5	511.8	F
52	135	511.8	F

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
-150	512	125	512

Downstream Bridge Cross Section Data
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-150	512	-145.5	509.5	-74	509	-27.5	508	18.2	507
27.2	506	31	502	38	502	41.2	506	55	507
72.8	508	89.4	509	106.8	510	123.8	511	125	512

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
    -150     .05    27.2    .045    41.2     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          27.2    41.2             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -150      17     510       F
      52     125     510       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6       9
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                18      48     .012     .012        0                  .5                1
Number of Barrels =  3
Upstream   Elevation =  502
Centerline Stations
    Sta.    Sta.    Sta.
      19      29      39
Downstream Elevation =  502
Centerline Stations
    Sta.    Sta.    Sta.
      25      35      45

CROSS SECTION


RIVER: Trib2
REACH: SW                RS: 30

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -150     512  -145.5   509.5     -74     509   -27.5     508    18.2     507
    27.2     506      31     502      38     502    41.2     506      55     507
    72.8     508    89.4     509   106.8     510   123.8     511     125     512

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -150     .05    27.2    .045    41.2     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          27.2    41.2               90      90      90             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -150      17     510       F
      52     125     510       F



SUMMARY OF MANNING'S N VALUES

River:River 1

      Reach          River Sta.       n1        n2        n3

 Main                 21                .05      .045       .05
 Main                 20                .05      .045       .05
 Main                 19                .05      .045       .05
```

Main	18		.05	.045	.05
Main	17		.05	.045	.05
Main	16.5	Culvert			
Main	16		.05	.045	.05
Main	15		.05	.045	.05
Main	14		.05	.045	.05
Main	13		.05	.045	.05
Main	12		.05	.045	.05
Main	11		.05	.045	.05
Main	10		.05	.045	.05
Main	9		.05	.045	.05
Main	8		.05	.045	.05
Main	7		.05	.045	.05
Main	6.5	Culvert			
Main	6		.05	.045	.05
Main	5		.05	.045	.05
Main	4		.05	.045	.05
Main2	3		.05	.045	.05
Main2	2		.05	.045	.05
Main2	1		.05	.045	.05
Main2	0.9		.05	.045	.05
Main2	0.8		.05	.045	.05
Main2	0.7		.05	.045	.05
Main2	0.6		.05	.045	.05
Main2	0.5		.05	.045	.05

River:Trib 1

Reach	River Sta.	n1	n2	n3
NW	26	.05	.045	.05
NW	25.3	.05	.035	.05
NW	25.2	Culvert		
NW	25.1	.05	.035	.05
NW	25	.05	.045	.05

River:Trib2

Reach	River Sta.	n1	n2	n3
SW	44	.05	.045	.05
SW	43	.05	.045	.05
SW	42	.05	.045	.05
SW	41	.05	.045	.05
SW	40	.05	.045	.05
SW	39.1	Culvert		
SW	39	.05	.045	.05
SW	38	.05	.045	.05
SW	37	.05	.045	.05
SW	36	.05	.045	.05
SW	35	.05	.045	.05
SW	34	.05	.045	.05
SW	33.5	Culvert		
SW	33	.05	.045	.05
SW	32	.05	.045	.05
SW	31	.05	.045	.05
SW	30.5	Culvert		
SW	30	.05	.045	.05

SUMMARY OF REACH LENGTHS

River: River 1

Reach	River Sta.	Left	Channel	Right
Main	21	157	143	128
Main	20	190	185	122

Main	19	81	90	88
Main	18	109	138	144
Main	17	86	86	86
Main	16.5	Culvert		
Main	16	241	253	212
Main	15	266	326	287
Main	14	203	273	228
Main	13	304	355	279
Main	12	242	464	310
Main	11	115	169	158
Main	10	236	333	210
Main	9	174	397	253
Main	8	159	221	180
Main	7	91	99	81
Main	6.5	Culvert		
Main	6	244	235	140
Main	5	170	218	170
Main	4	150	357	290
Main2	3	200	189	145
Main2	2	202	415	284
Main2	1	85	95	95
Main2	0.9	105	135	135
Main2	0.8	200	210	165
Main2	0.7	150	160	270
Main2	0.6	280	430	185
Main2	0.5	0	0	0

River: Trib 1

Reach	River Sta.	Left	Channel	Right
NW	26	92	160	113
NW	25.3	42	42	42
NW	25.2	Culvert		
NW	25.1	95	95	95
NW	25	225	225	225

River: Trib2

Reach	River Sta.	Left	Channel	Right
SW	44	190	184	180
SW	43	150	151	150
SW	42	140	145	145
SW	41	75	75	75
SW	40	75	76	75
SW	39.1	Culvert		
SW	39	40	40	40
SW	38	250	252	250
SW	37	135	138	135
SW	36	170	173	170
SW	35	200	206	200
SW	34	74	74	74
SW	33.5	Culvert		
SW	33	375	378	375
SW	32	380	384	380
SW	31	75	75	75
SW	30.5	Culvert		
SW	30	90	90	90

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River 1

Reach	River Sta.	Contr.	Expan.
Main	21	.1	.3

Main	20		.1	.3
Main	19		.1	.3
Main	18		.1	.3
Main	17		.3	.5
Main	16.5	Culvert		
Main	16		.3	.5
Main	15		.1	.3
Main	14		.1	.3
Main	13		.1	.3
Main	12		.1	.3
Main	11		.1	.3
Main	10		.1	.3
Main	9		.1	.3
Main	8		.1	.3
Main	7		.3	.5
Main	6.5	Culvert		
Main	6		.3	.5
Main	5		.1	.3
Main	4		.1	.3
Main2	3		.1	.3
Main2	2		.1	.3
Main2	1		.1	.3
Main2	0.9		.1	.3
Main2	0.8		.1	.3
Main2	0.7		.1	.3
Main2	0.6		.1	.3
Main2	0.5		.1	.3

River: Trib 1

Reach	River Sta.	Contr.	Expan.
NW	26	.1	.3
NW	25.3	.3	.5
NW	25.2	Culvert	
NW	25.1	.3	.5
NW	25	.1	.3

River: Trib2

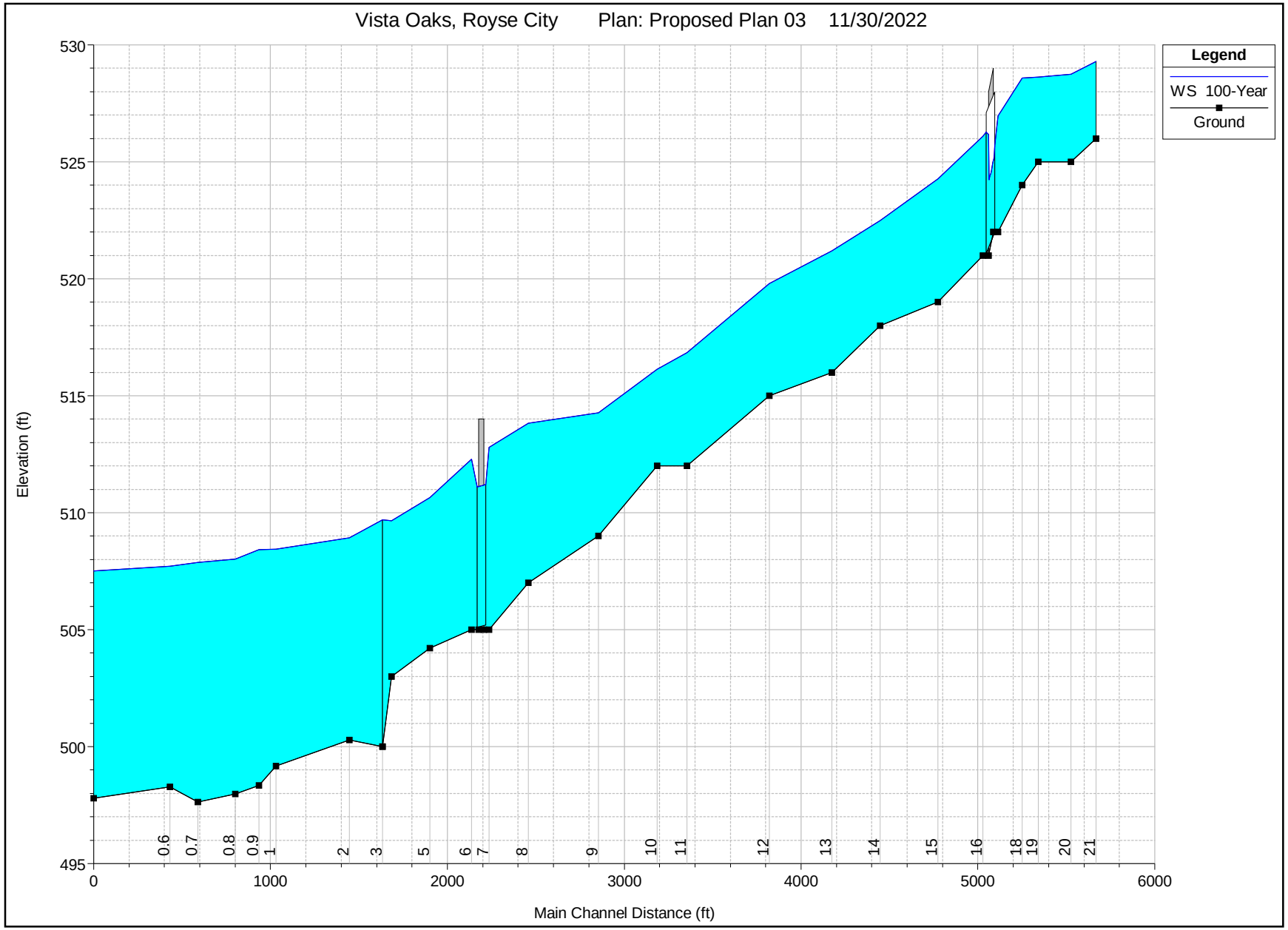
Reach	River Sta.	Contr.	Expan.
SW	44	.1	.3
SW	43	.1	.3
SW	42	.1	.3
SW	41	.1	.3
SW	40	.3	.5
SW	39.1	Culvert	
SW	39	.3	.5
SW	38	.1	.3
SW	37	.1	.3
SW	36	.1	.3
SW	35	.1	.3
SW	34	.3	.5
SW	33.5	Culvert	
SW	33	.3	.5
SW	32	.1	.3
SW	31	.3	.5
SW	30.5	Culvert	
SW	30	.3	.5

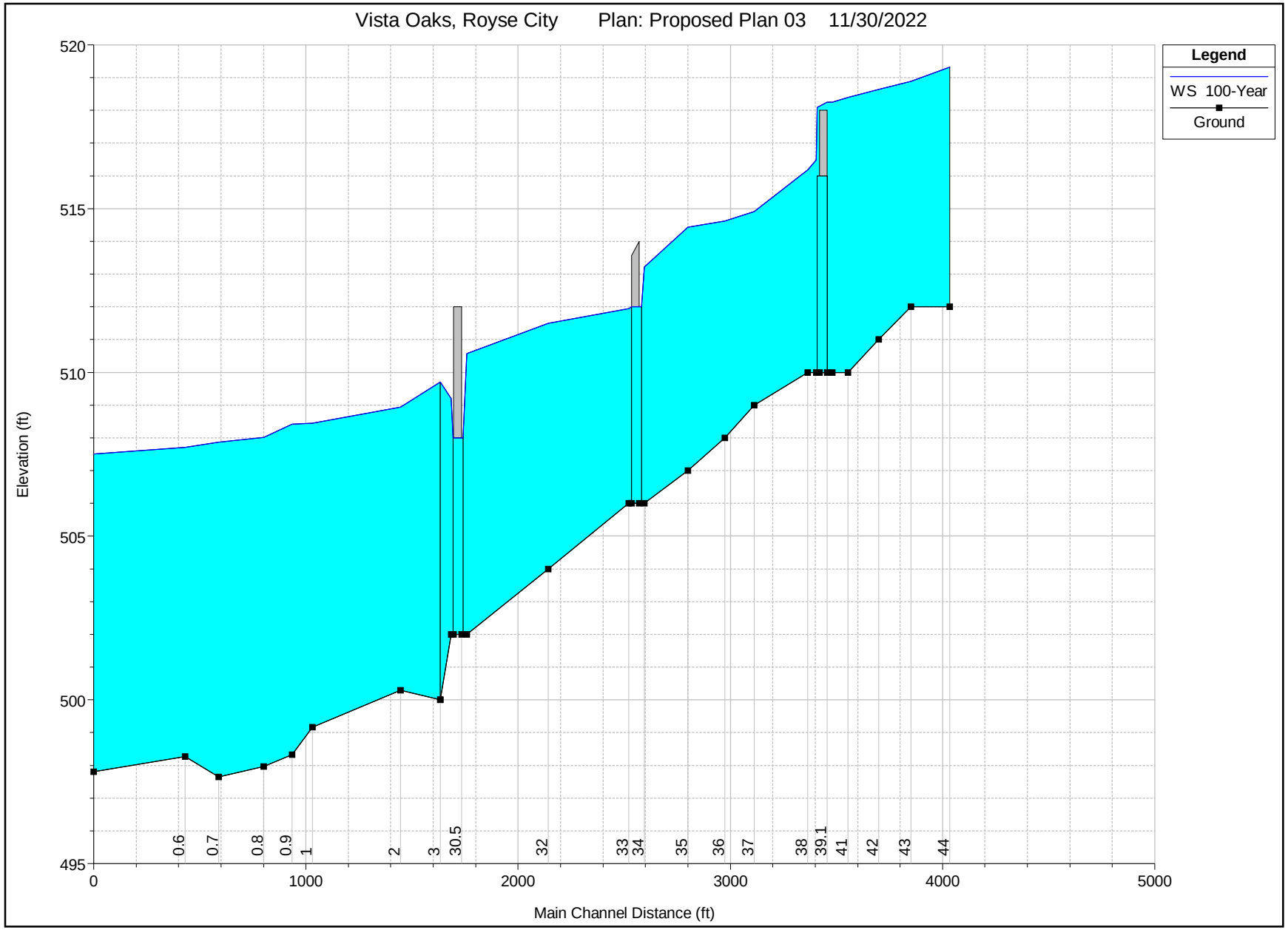
HEC-RAS Plan: PropPln 03 Profile: 100-Year

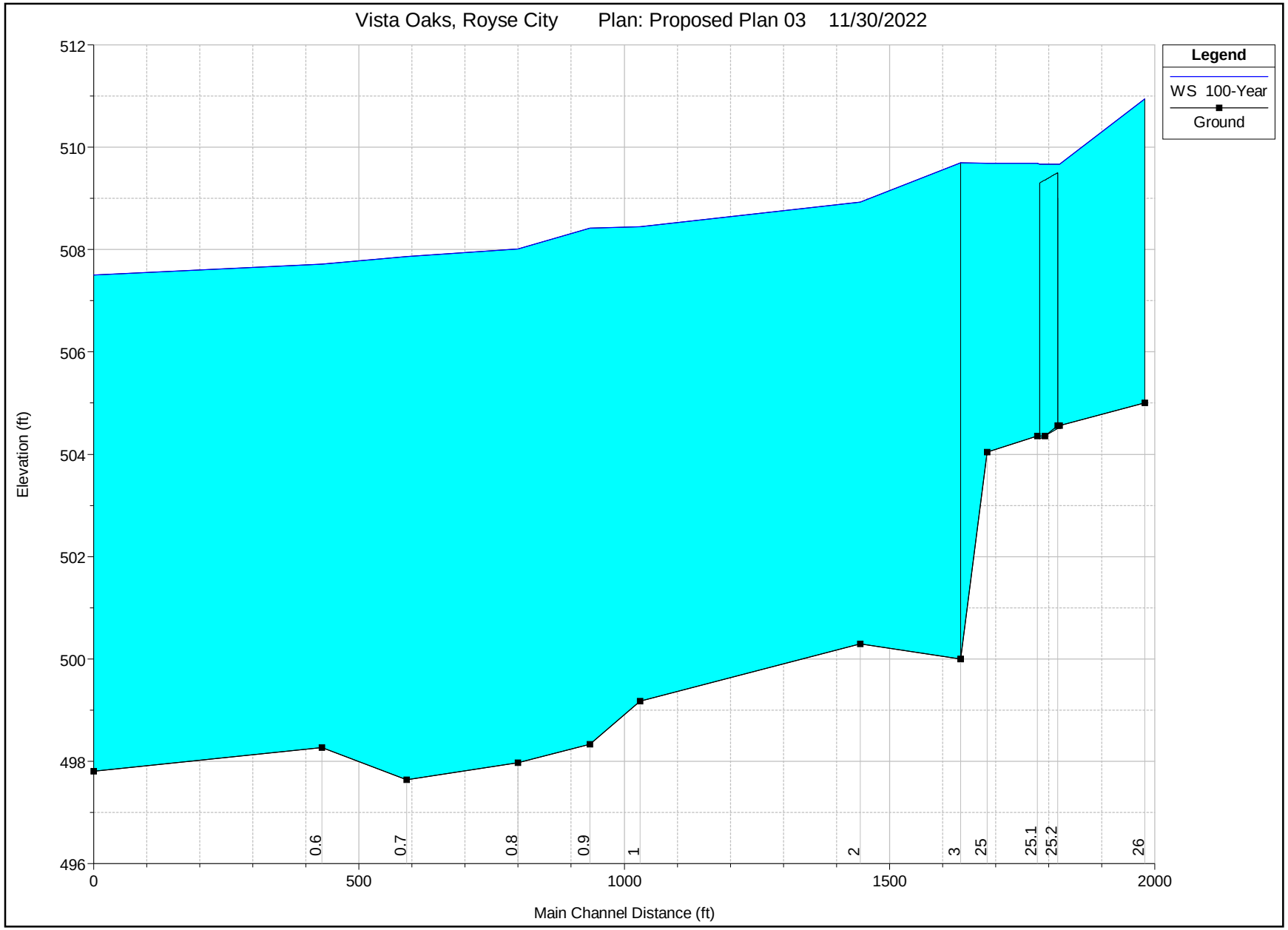
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
River 1	Main2	0.5	100-Year	3650.00	497.80	507.50	505.03	507.56	0.000582	2.57	2156.99	724.38	0.19
River 1	Main2	0.6	100-Year	3650.00	498.27	507.72		507.79	0.000745	2.68	1839.72	577.80	0.21
River 1	Main2	0.7	100-Year	3650.00	497.64	507.86		507.96	0.001036	3.30	1659.75	557.40	0.24
River 1	Main2	0.8	100-Year	3650.00	497.97	508.01		508.32	0.002456	5.40	1075.19	445.48	0.37
River 1	Main2	0.9	100-Year	2996.00	498.33	508.42		508.46	0.000414	2.05	2006.43	651.36	0.15
River 1	Main2	1	100-Year	2996.00	499.17	508.44		508.54	0.001225	2.75	1226.23	454.73	0.25
River 1	Main2	2	100-Year	2996.00	500.29	508.93		509.35	0.004383	6.36	698.43	279.31	0.49
River 1	Main2	3	100-Year	2996.00	500.00	509.70		509.77	0.001168	3.68	1501.77	575.03	0.24
River 1	Main	4	100-Year	983.00	503.00	509.65		509.90	0.004050	5.86	338.79	233.37	0.44
River 1	Main	5	100-Year	983.00	504.22	510.65	510.45	511.33	0.012031	6.82	165.72	106.53	0.72
River 1	Main	6	100-Year	983.00	505.00	512.28	510.53	512.84	0.004052	6.63	171.42	186.15	0.47
River 1	Main	6.5		Culvert									
River 1	Main	7	100-Year	983.00	505.00	512.78	511.23	513.44	0.005461	6.86	155.62	182.73	0.52
River 1	Main	8	100-Year	983.00	507.00	513.83		513.92	0.001124	3.35	463.30	168.89	0.25
River 1	Main	9	100-Year	983.00	509.00	514.27		514.70	0.008112	7.37	242.51	167.21	0.62
River 1	Main	10	100-Year	983.00	512.00	516.13		516.33	0.004589	4.87	326.46	219.85	0.47
River 1	Main	11	100-Year	983.00	512.00	516.84	516.78	517.43	0.011133	7.48	206.87	158.28	0.73
River 1	Main	12	100-Year	725.00	515.00	519.79		520.00	0.004192	5.26	257.20	183.74	0.46
River 1	Main	13	100-Year	725.00	516.00	521.20		521.49	0.004887	5.33	224.03	166.82	0.49
River 1	Main	14	100-Year	725.00	518.00	522.49		522.81	0.005816	5.71	210.93	165.01	0.53
River 1	Main	15	100-Year	725.00	519.00	524.28		524.59	0.006114	6.15	214.48	157.12	0.52
River 1	Main	16	100-Year	725.00	521.00	526.09	526.00	527.22	0.014929	9.41	91.72	196.96	0.83
River 1	Main	16.5		Culvert									
River 1	Main	17	100-Year	725.00	522.00	526.97	526.97	528.25	0.017727	9.97	85.51	254.84	0.90
River 1	Main	18	100-Year	725.00	524.00	528.58		528.60	0.000644	2.16	640.72	370.30	0.18
River 1	Main	19	100-Year	725.00	525.00	528.63		528.66	0.000635	1.86	645.39	369.88	0.18
River 1	Main	20	100-Year	725.00	525.00	528.75		528.91	0.002691	3.38	250.34	138.01	0.36
River 1	Main	21	100-Year	725.00	526.00	529.29	529.27	529.74	0.013136	7.64	173.53	160.73	0.79
Trib 1	NW	25	100-Year	834.00	504.04	509.68		509.88	0.002650	4.48	316.86	197.35	0.37
Trib 1	NW	25.1	100-Year	834.00	504.36	509.69	508.23	510.57	0.005365	7.55	120.90	69.66	0.60
Trib 1	NW	25.2		Culvert									
Trib 1	NW	25.3	100-Year	834.00	504.56	509.66	508.52	510.66	0.006434	8.06	112.79	65.61	0.66
Trib 1	NW	26	100-Year	834.00	505.00	510.95		510.99	0.000775	2.40	591.54	307.62	0.20
Trib2	SW	30	100-Year	1205.00	502.00	509.20	508.72	510.45	0.010783	9.92	144.04	195.41	0.70
Trib2	SW	30.5		Culvert									
Trib2	SW	31	100-Year	1205.00	502.00	510.57	508.26	510.96	0.002573	5.61	250.59	300.88	0.37
Trib2	SW	32	100-Year	1205.00	504.00	511.50		511.56	0.000954	2.96	679.36	276.60	0.22
Trib2	SW	33	100-Year	1205.00	506.00	511.95	511.95	513.51	0.017064	11.13	128.03	168.05	0.90
Trib2	SW	33.5		Culvert									
Trib2	SW	34	100-Year	1178.00	506.00	513.22	512.45	514.00	0.007589	8.12	178.67	323.02	0.61
Trib2	SW	35	100-Year	1178.00	507.00	514.43		514.51	0.001036	3.06	551.57	184.37	0.23

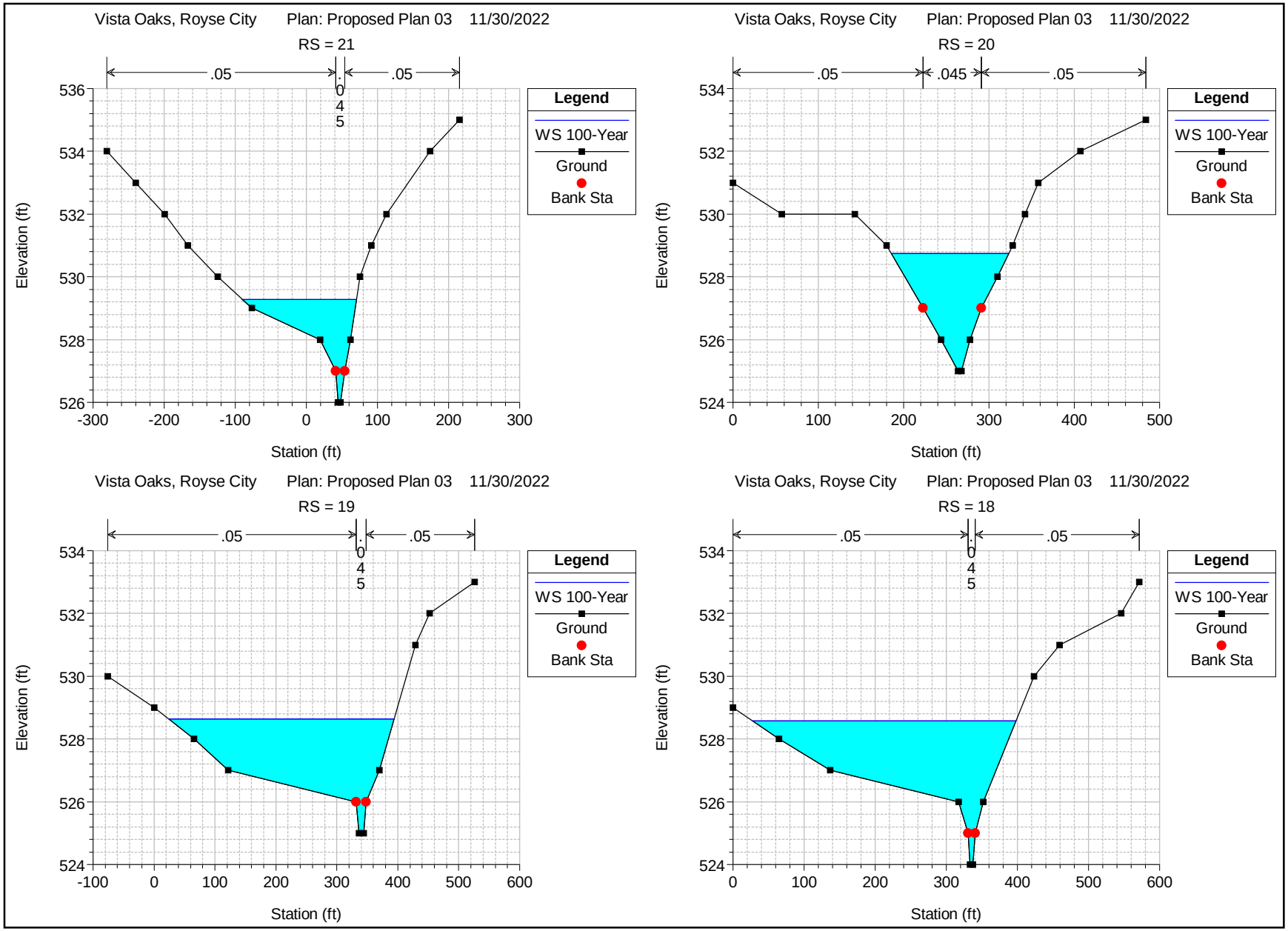
HEC-RAS Plan: PropPln 03 Profile: 100-Year (Continued)

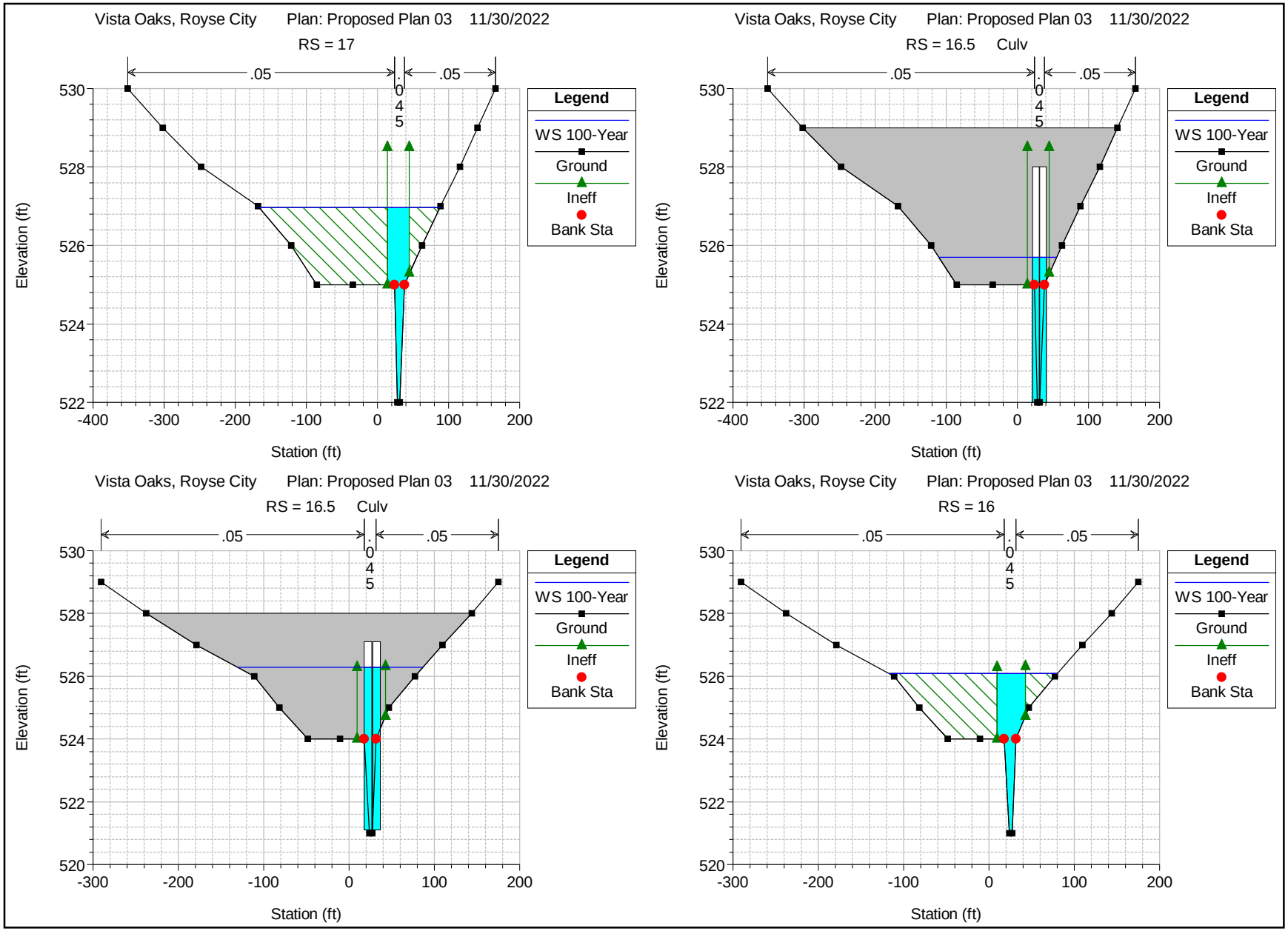
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Trib2	SW	36	100-Year	1178.00	508.00	514.62		514.76	0.001816	3.88	499.51	245.65	0.31
Trib2	SW	37	100-Year	1178.00	509.00	514.90		515.20	0.005298	5.90	328.34	185.64	0.50
Trib2	SW	38	100-Year	1104.00	510.00	516.19		516.42	0.004474	5.36	334.57	183.11	0.46
Trib2	SW	39	100-Year	1104.00	510.00	516.48	516.48	518.06	0.016923	10.64	115.63	206.67	0.90
Trib2	SW	39.1		Culvert									
Trib2	SW	40	100-Year	1104.00	510.00	518.25	513.89	518.45	0.001020	3.74	313.73	106.09	0.25
Trib2	SW	41	100-Year	1104.00	510.00	518.40		518.55	0.001545	3.97	438.37	183.31	0.29
Trib2	SW	42	100-Year	1104.00	511.00	518.64		518.77	0.001472	3.90	467.84	187.36	0.28
Trib2	SW	43	100-Year	1104.00	512.00	518.88		519.05	0.002098	4.42	396.85	163.00	0.33
Trib2	SW	44	100-Year	1104.00	512.00	519.32		519.60	0.004072	5.99	365.47	245.11	0.43

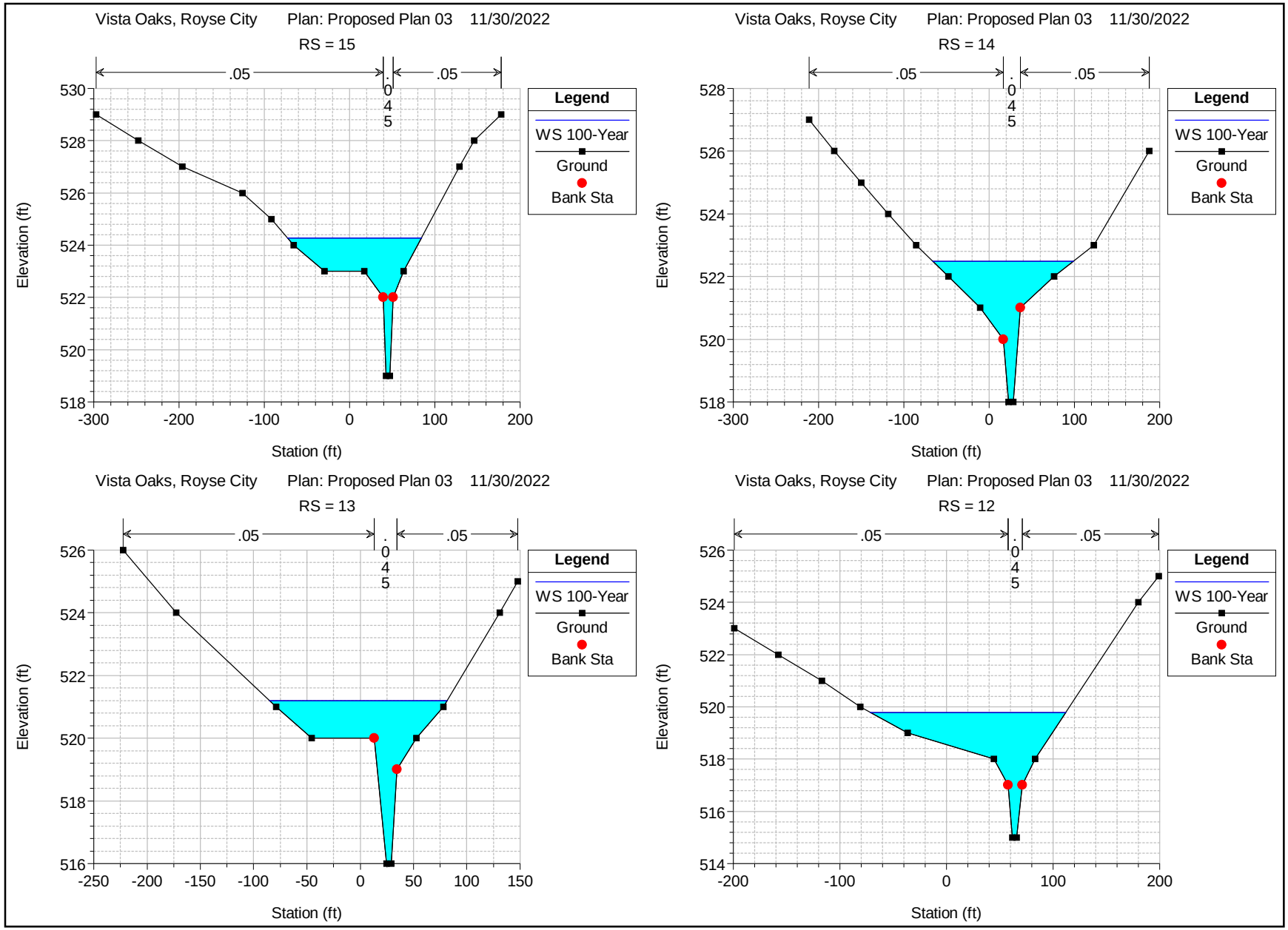

Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
Legend
WS 100-Year
Ground
Elevation (ft)
Main Channel Distance (ft)
530
525
520
515
510
505
500
495
0
1000
2000
3000
4000
5000
6000
0.6
0.7
0.8
0.9
1
2
3
5
6
7
8
9
10
11
12
13
14
15
16
18
19
20
21

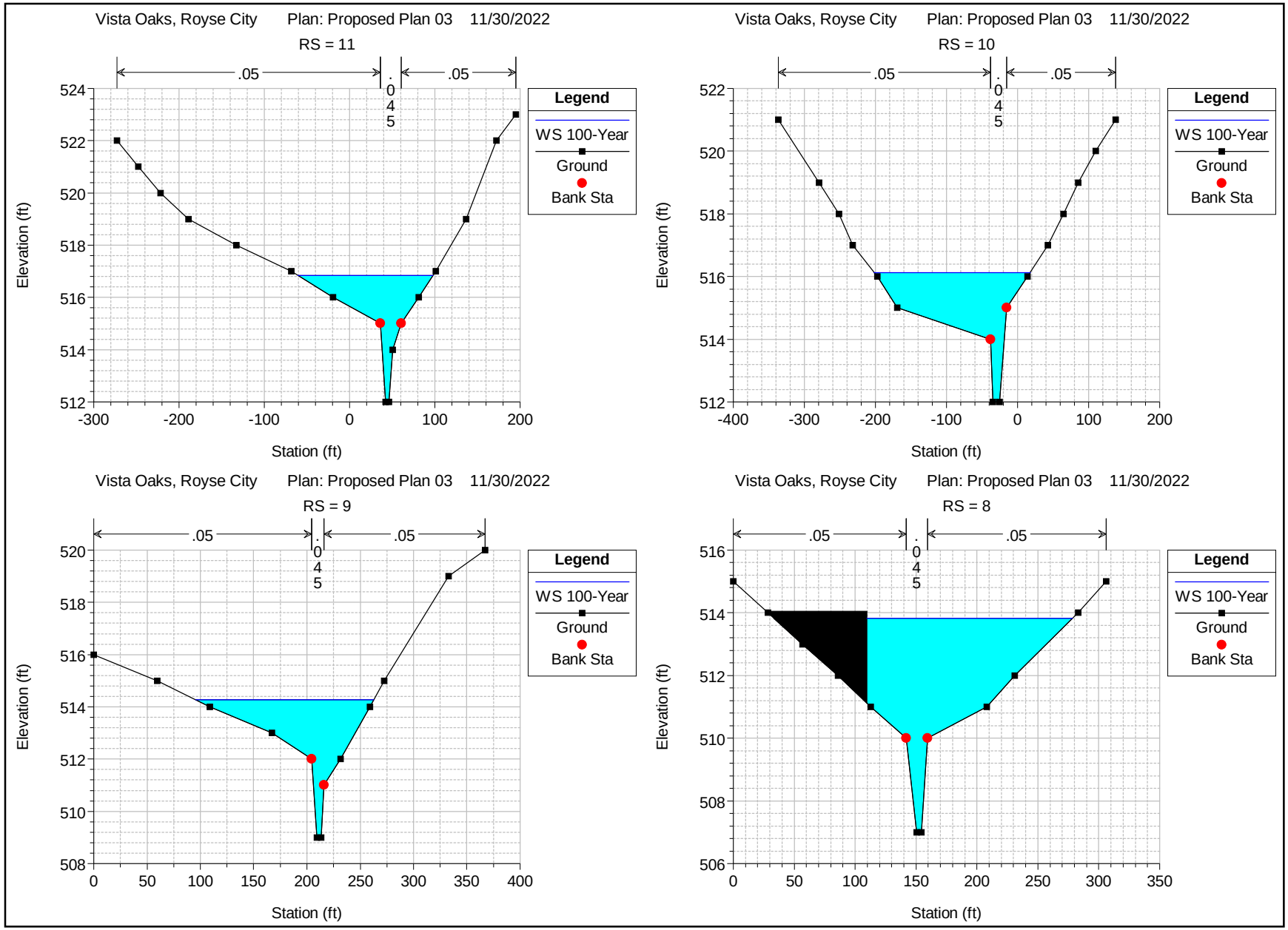

Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
Legend
WS 100-Year
Ground
Elevation (ft)
Main Channel Distance (ft)
520
515
510
505
500
495
0
1000
2000
3000
4000
5000
0.6
0.7
0.8
0.9
1
2
3
30.5
32
33
34
35
36
37
38
39.1
41
42
43
44

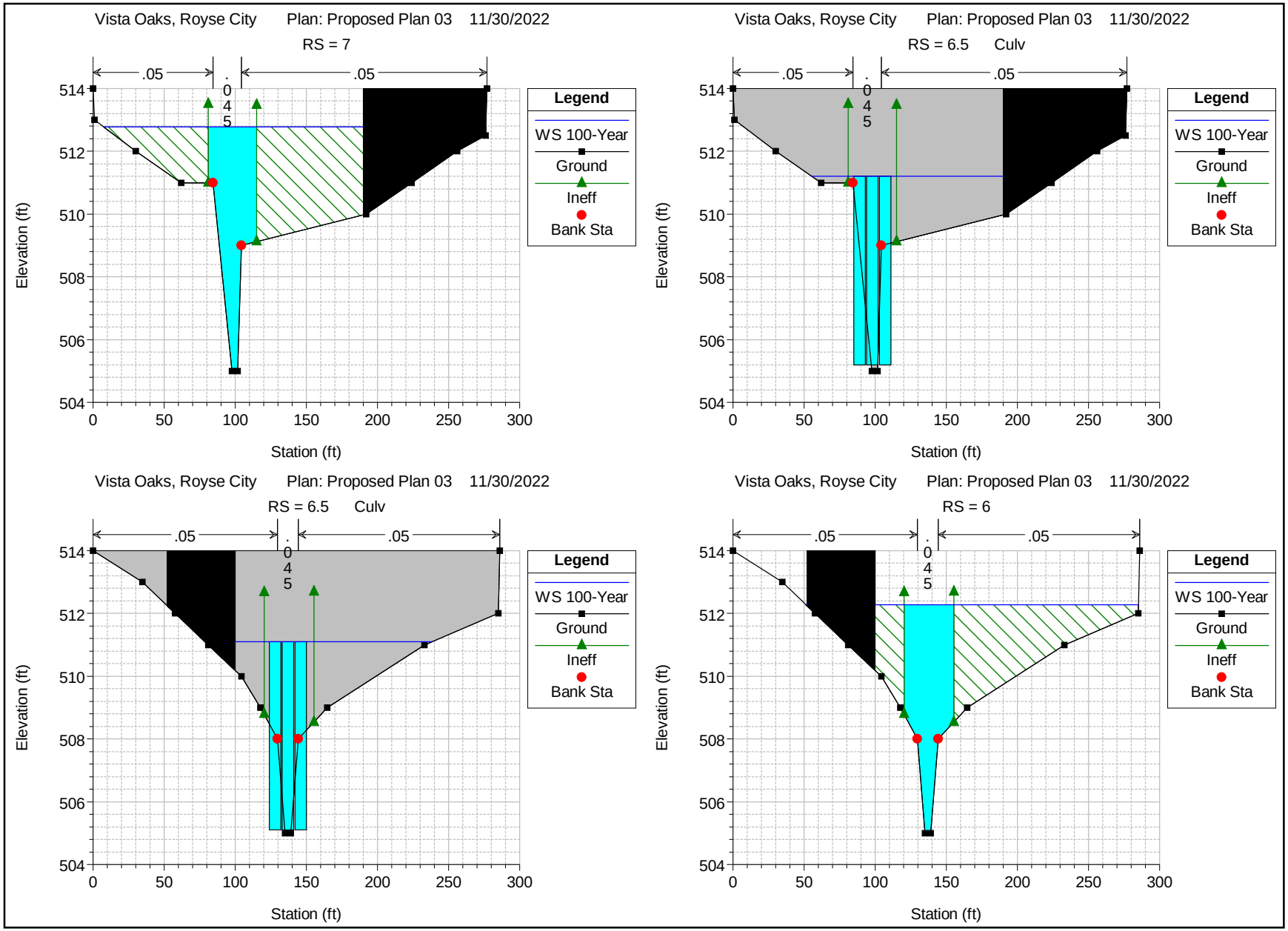

Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
Legend
WS 100-Year
Ground
Elevation (ft)
512
510
508
506
504
502
500
498
496
0
500
1000
1500
2000
Main Channel Distance (ft)
0.6
0.7
0.8
0.9
1
2
3
25
25.1
25.2
26

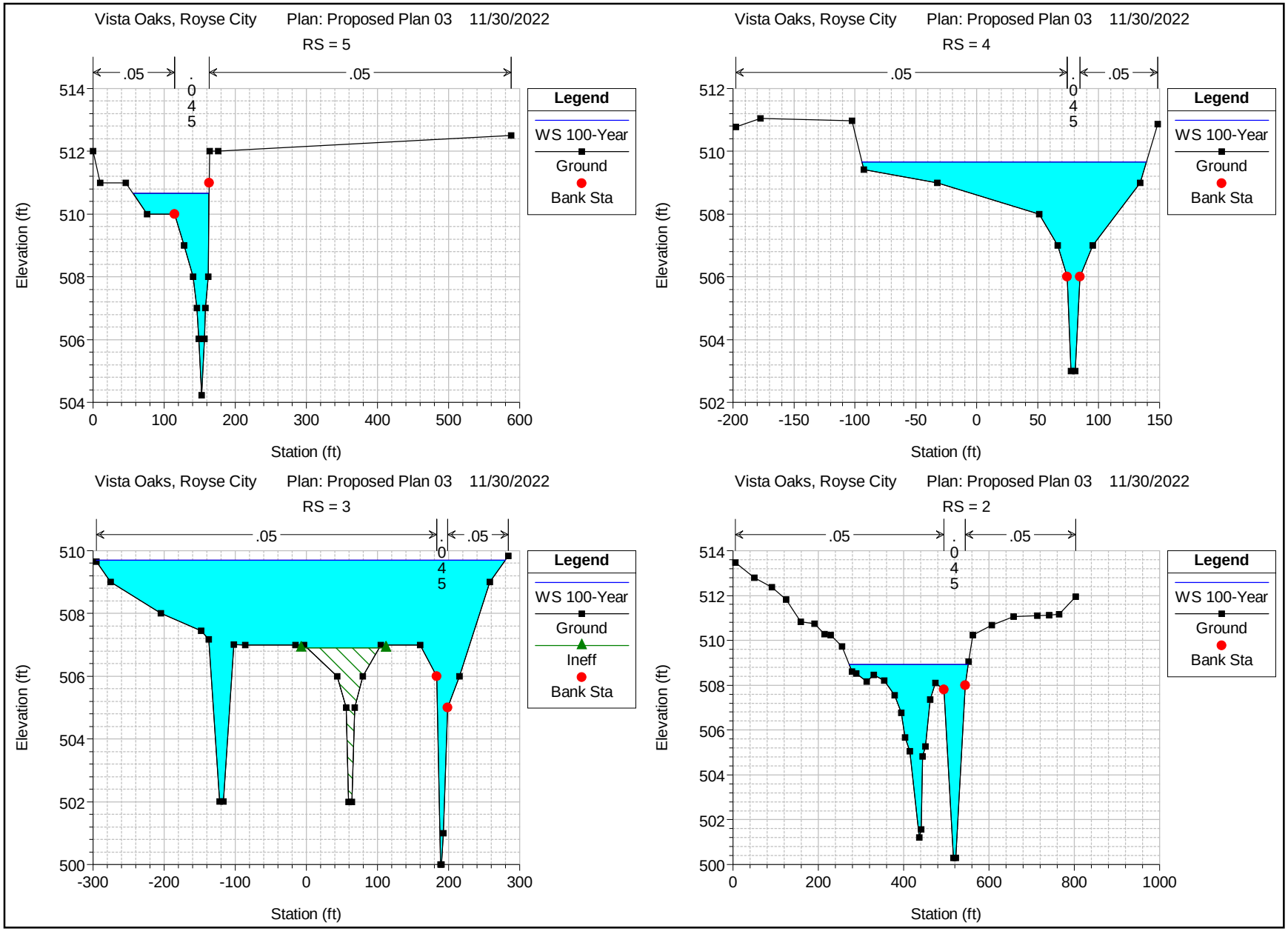

Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 21
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 20
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 19
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 18
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

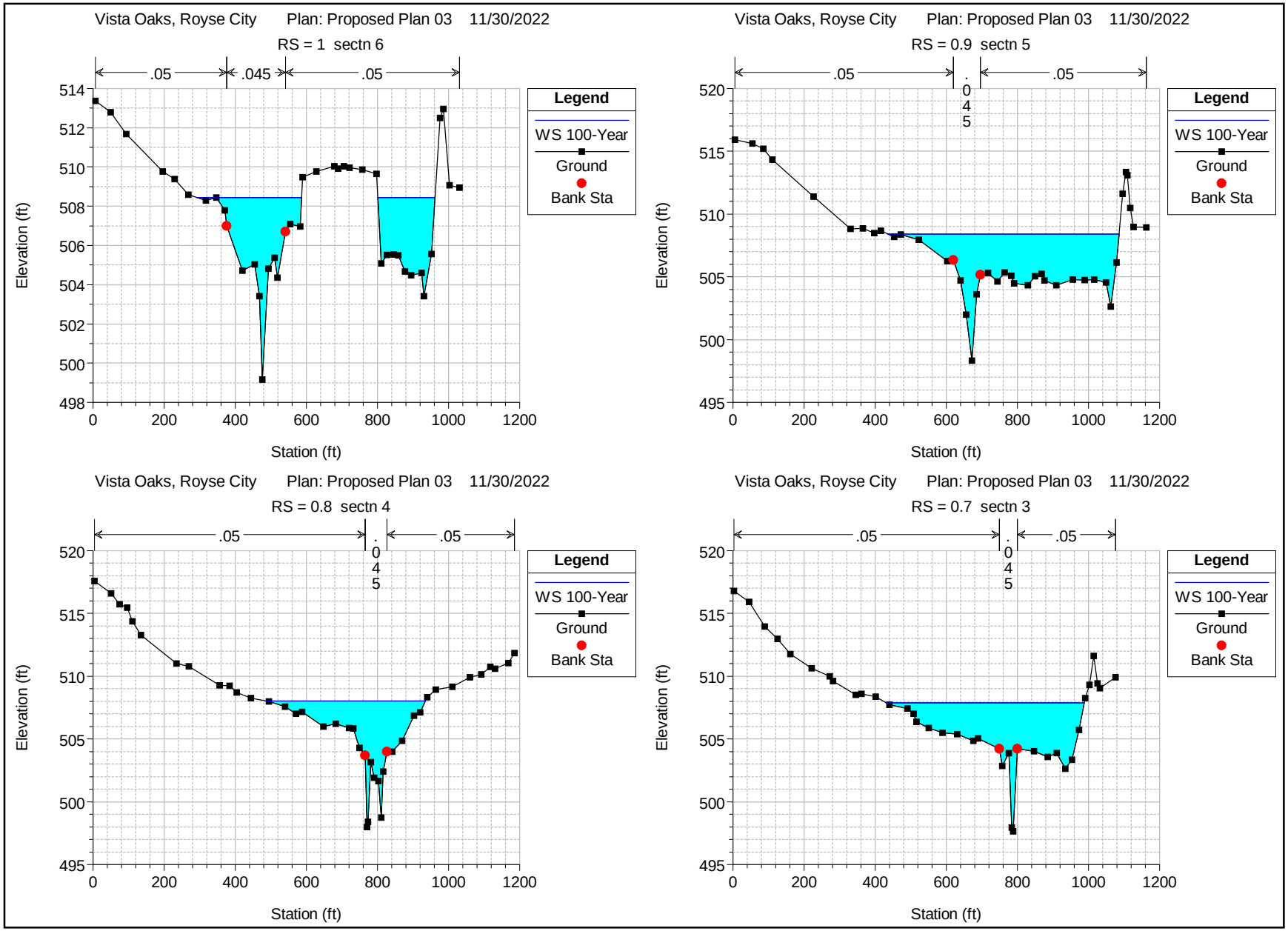

Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 17
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
-400
-300
-200
-100
0
100
200
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 16.5 Culv
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
-400
-300
-200
-100
0
100
200
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 16.5 Culv
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
520
-300
-200
-100
0
100
200
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 16
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
530
528
526
524
522
520
-300
-200
-100
0
100
200

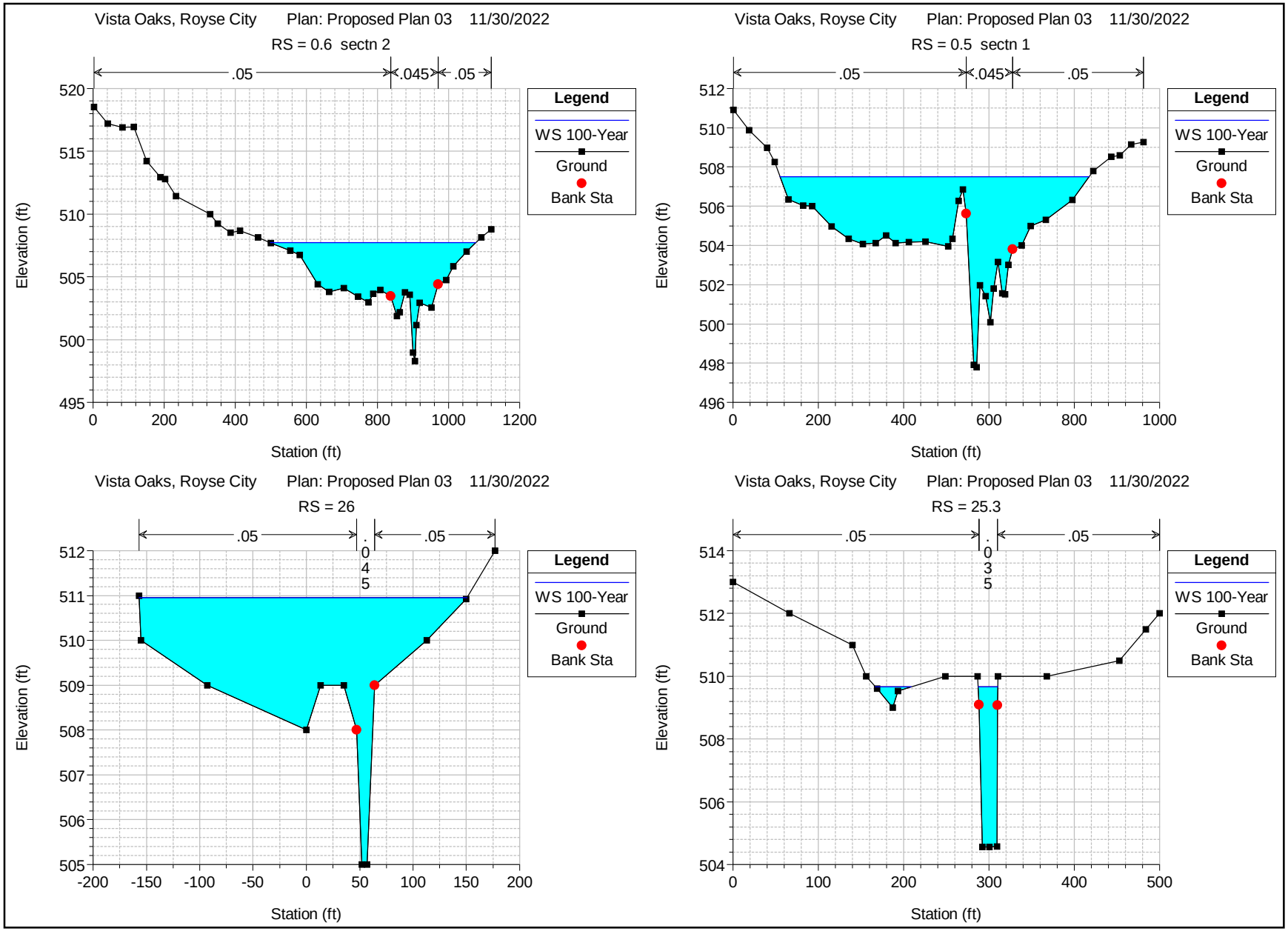

Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 15
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 14
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 13
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 12

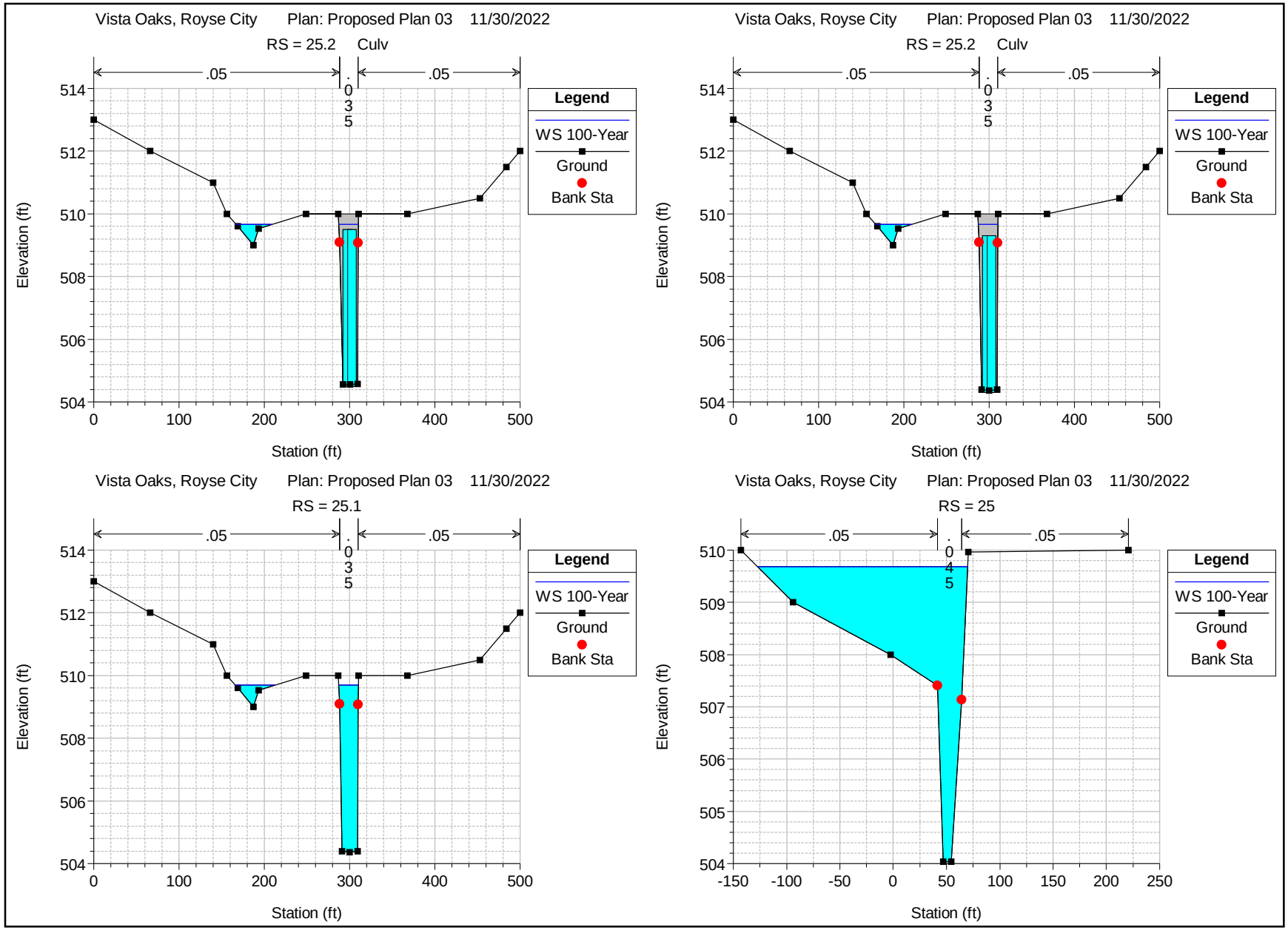

Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 11
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 10
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 9
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 8

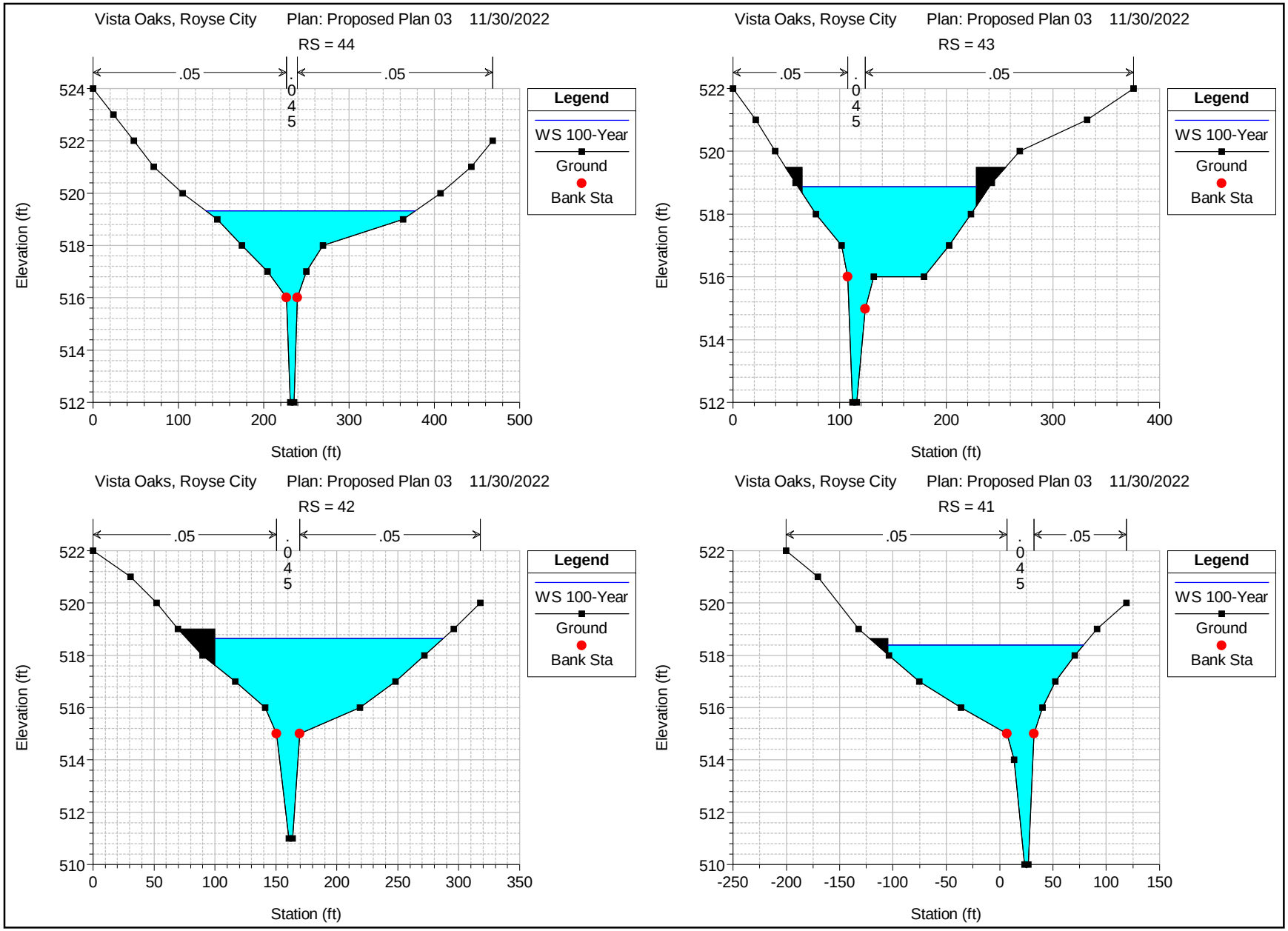

Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 7
.05
.045
.05
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 6.5 Culv
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 6.5 Culv
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 6


Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 5
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 4
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 3
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 2
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 1 sectn 6
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 0.9 sectn 5
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 0.8 sectn 4
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 0.7 sectn 3
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 0.6 sectn 2
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 0.5 sectn 1
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 26
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 25.3
.05
.035
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 25.2 Culv
.05
.05
.035
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 25.2 Culv
.05
.05
.035
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 25.1
.05
.05
.035
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 25
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)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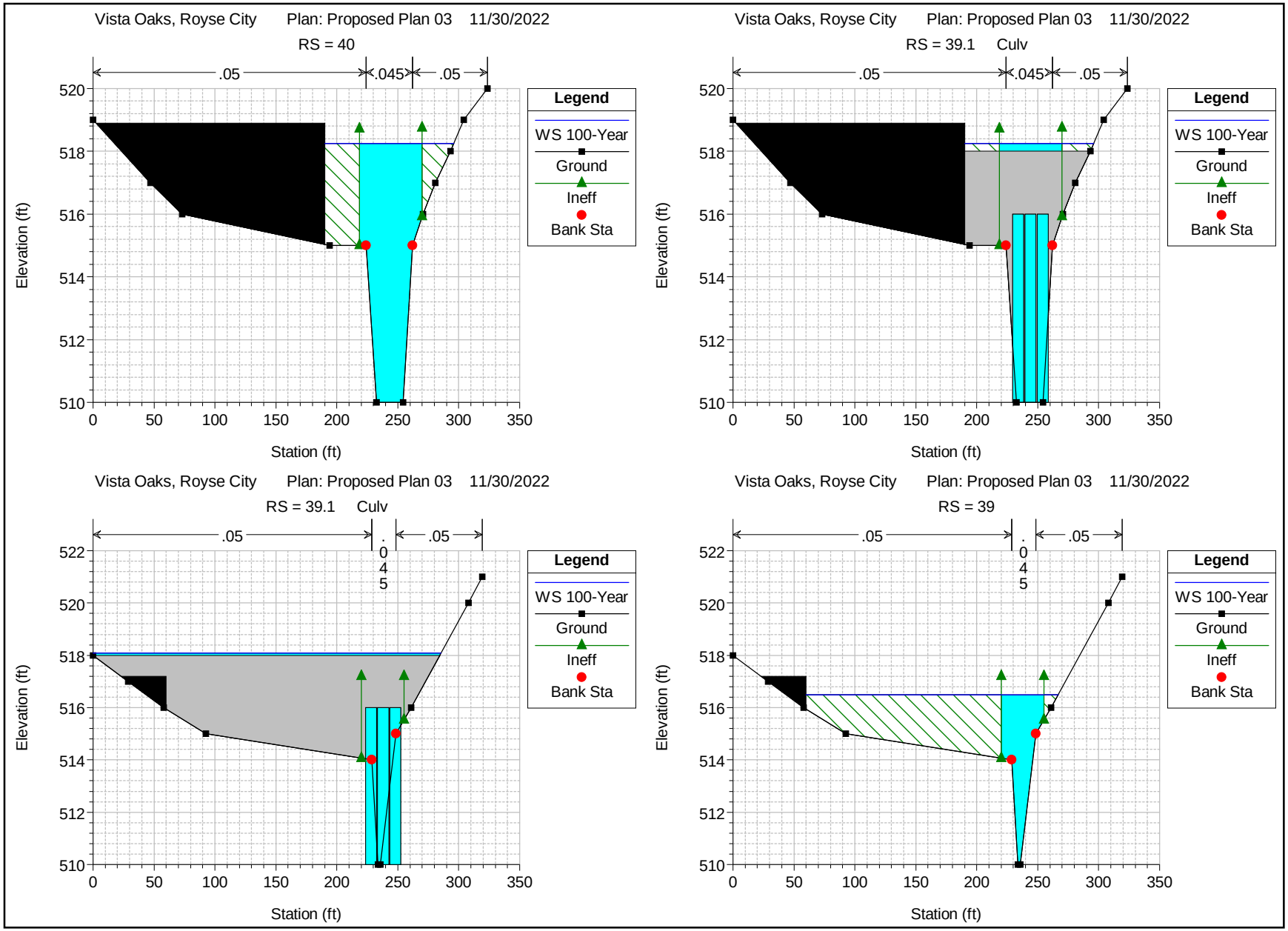
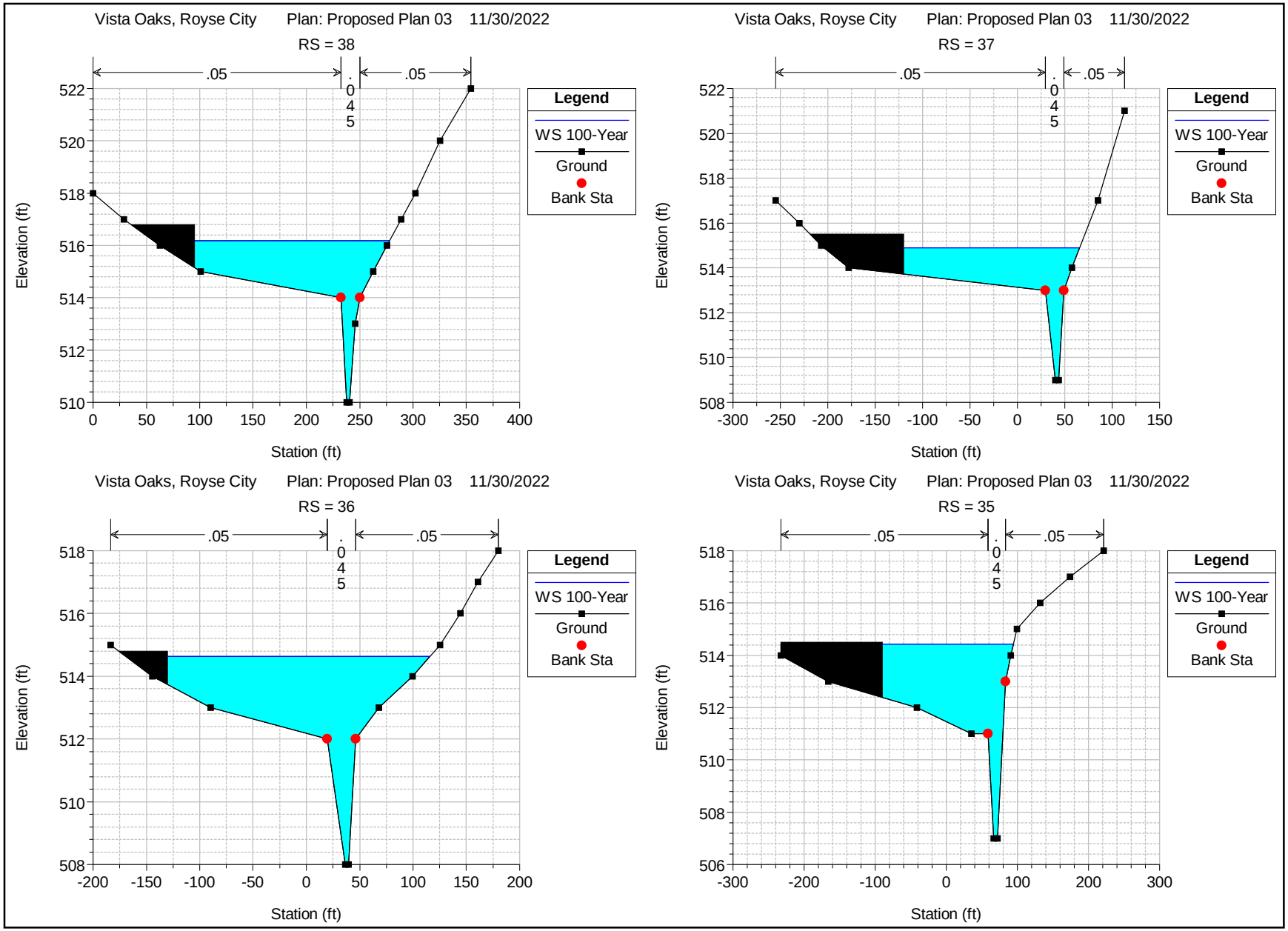
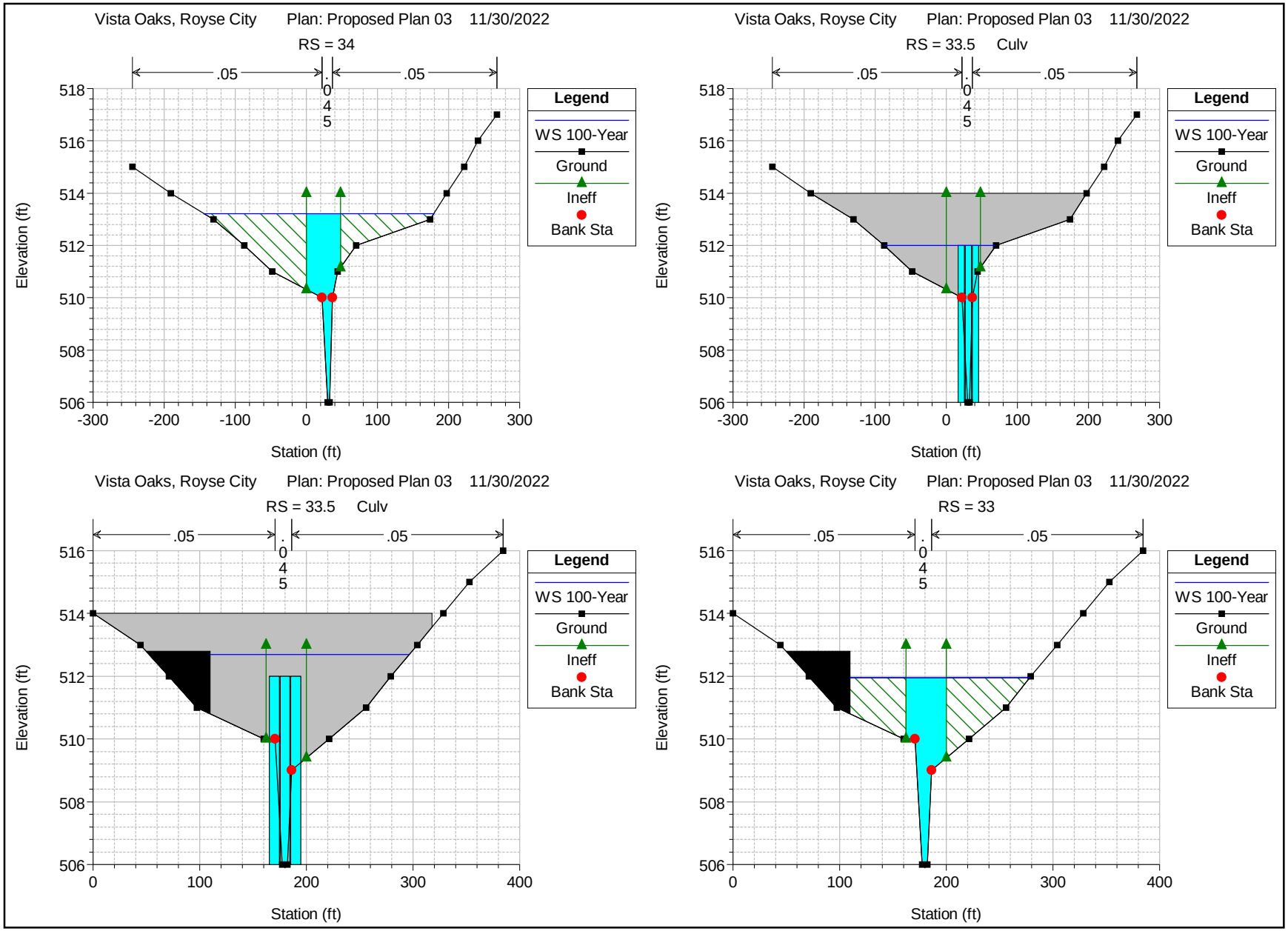
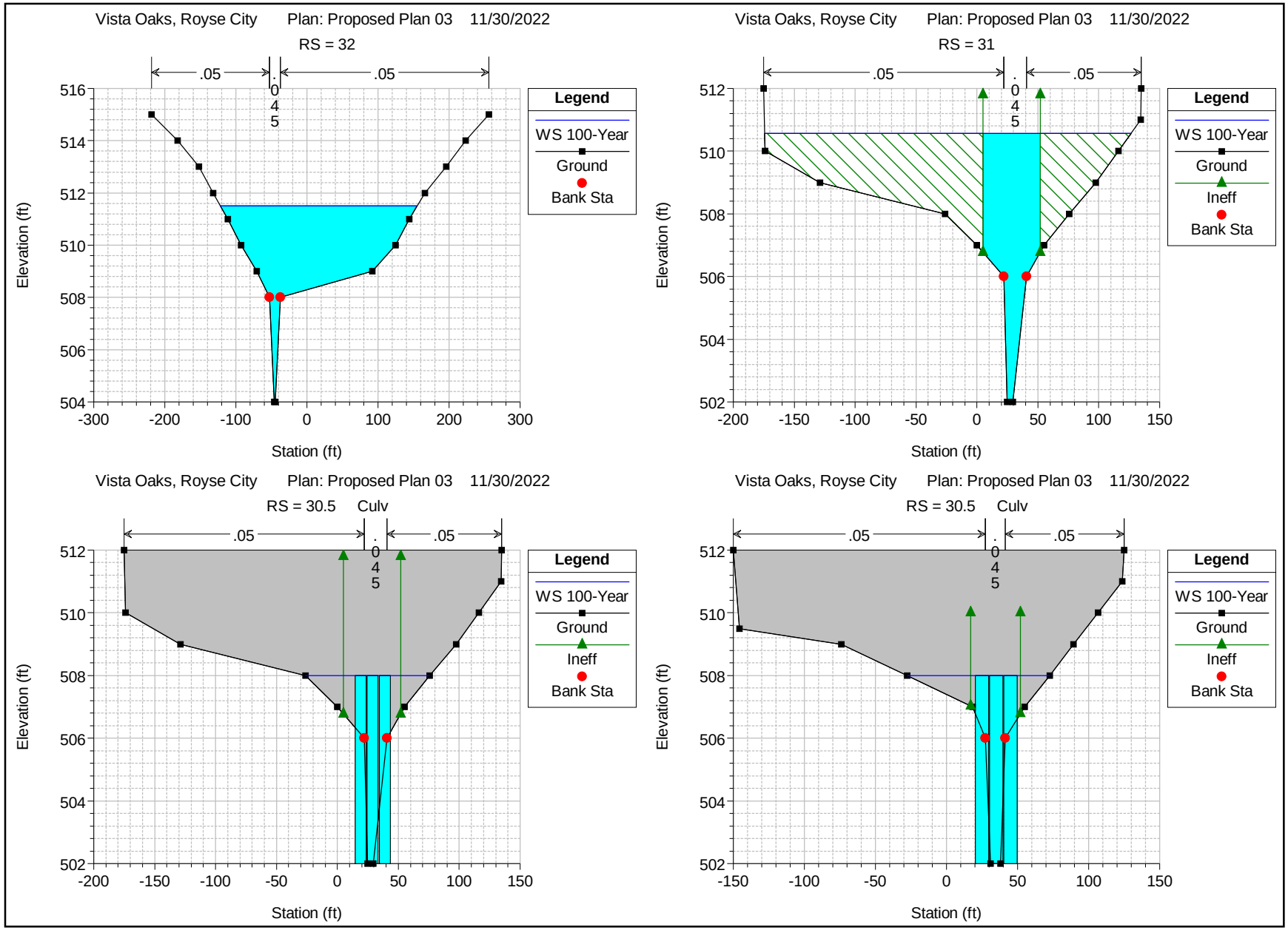
RS = 44
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 43
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 42
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 41

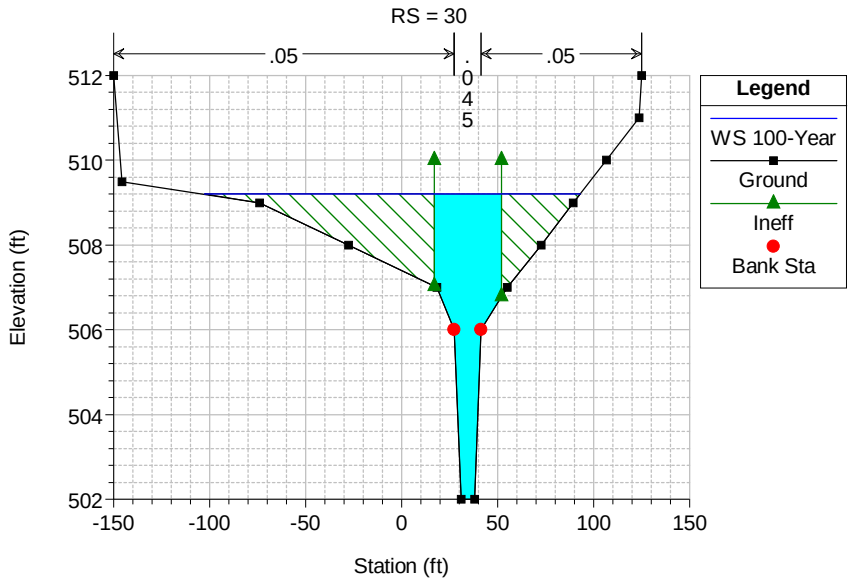

Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 40
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 39.1 Culv
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 39.1 Culv
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 39
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta


Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 38
.05
.045
.05
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 37
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 36
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 35


Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 34
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 33.5 Culv
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 33.5 Culv
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 33
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta


Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 32
.05
.05
.045
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 31
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 30.5 Culv
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022
RS = 30.5 Culv
.05
.05
.045
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

Vista Oaks, Royse City Plan: Proposed Plan 03 11/30/2022



COMPUTER RUN

2. Trib 3- SE Model (plan .p04)

HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X     X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X      X    X        X
X     X  X        X    X      X   X     X    X        X
X     X  XXXXXX    XXXX       X    X    X    X   XXXXX
```

PROJECT DATA
Project Title: Vista Oaks SE Trib
Project File : SETrib.prj
Run Date and Time: 11/30/2022 8:25:23 AM

Project in English units

PLAN DATA

Plan Title: Record SET Plan 04
Plan File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\SETrib.p04

Geometry Title: Geom Lot Fill SE Trib
Geometry File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\SETrib.g02

Flow Title : Record 100-Year Flow
Flow File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\SETrib.f02

Plan Summary Information:
Number of: Cross Sections = 21 Multiple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Record 100-Year Flow
Flow File : C:\jobs_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\SETrib.f02

Flow Data (cfs)

River	Reach	RS	100-Year
SE Trib	2	55	208
SE Trib	2	48	314
SE Trib	3	60	348
SE Trib	1	44	348

```
  SE Trib         1               42                    348
  SE Trib         1               41                    596


Boundary Conditions

  River           Reach           Profile                       Upstream                 Downstream

  SE Trib         1               100-Year                                               Known WS = 508.5



GEOMETRY DATA

Geometry Title: Geom Lot Fill SE Trib
Geometry File : C:\jobs\_bh233 Vista Oaks RoyseCity\PDF Report6\hh3\SETrib.g02

Reach Connection Table

  River            Reach               Upstream Boundary    Downstream Boundary

  SE Trib          2                                          A
  SE Trib          3                                          A
  SE Trib          1                    A


JUNCTION INFORMATION

Name: A
Description:
Energy computation Method

    Length across Junction             Tributary
     River           Reach               River           Reach        Length   Angle
SE Trib               2         to SE Trib                1             50
SE Trib               3         to SE Trib                1             50

CROSS SECTION


RIVER: SE Trib
REACH: 2                  RS: 55

INPUT
Description:
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     531    21.6     530    39.6     529   60.42   526.4    63.6     526
   100.8     526  102.29   526.4     114     530   129.6     531

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   60.42    .055  102.29     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         60.42  102.29              230     220     210             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 2                  RS: 54

INPUT
Description:
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     531    14.4     530   33.61  526.43      36     526   109.2     526
  119.78   526.4     138     527   153.6     528     162     529   242.4     530
   291.6     531
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   33.61    .055  119.78     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         33.61  119.78              160     168     150             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 2                  RS: 53

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     531    32.4     530    56.4     529      84     528     114     527
     180     527     240     528     276     528     288     525   292.8     525
     306     528     336     529     354     527   370.8     528     390     529
     480     530   518.4     531

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06     276    .055     306     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           276     306              70      60      70             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 2                  RS: 52

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     527    26.4     526    51.6     525    74.4     524     108     521
     138     520   169.2     519   183.6     519   195.6     520     216     522
   242.4     524   262.8     525   308.4     526     354     527   373.2     528

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06     138    .055   195.6     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           138   195.6              24      24      24             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 2                  RS: 51

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     527      24     526    49.2     525    75.6     524    93.6     523
   106.8     522   130.8     521   158.4     520   184.8     519   200.4     519
   211.2     520   224.4     521   238.8     522     252     523   265.2     524
   278.4     525   313.2     526   385.2     527

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   158.4    .055   211.2     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         158.4   211.2              60      60      60             .3       .5
Ineffective Flow     num=       2
```

```
   Sta L   Sta R    Elev  Permanent
       0     176   524.5       F
     208   385.2   524.5       F

CULVERT


RIVER: SE Trib
REACH: 2                  RS: 50.5

INPUT
Description:
Distance from Upstream XS =      15
Deck/Roadway Width        =      35
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     524             300     524

Upstream Bridge Cross Section Data
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     527      24     526    49.2     525    75.6     524    93.6     523
   106.8     522   130.8     521   158.4     520   184.8     519   200.4     519
   211.2     520   224.4     521   238.8     522     252     523   265.2     524
   278.4     525   313.2     526   385.2     527

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   158.4    .055   211.2     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
         158.4   211.2            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     176   524.5       F
     208   385.2   524.5       F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     524             295     524

Downstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     525    26.4     524    50.4     523    68.4     522    93.6     521
   105.6     520   122.4     519   147.6     518     156     517   163.2     517
   182.4     518   193.2     519   205.2     520   237.6     522   273.6     524
   297.6     525

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   147.6    .055   182.4     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
         147.6   182.4            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     152     519       F
     168   297.6     519       F

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins        =
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  1
```

```
Culvert Name     Shape      Rise    Span
Culvert #1           Box       4       8
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  8      48     .013     .013        0                  .5                1
Upstream   Elevation =  519
           Centerline Station =  192
Downstream Elevation =  517
           Centerline Station =  160

CROSS SECTION


RIVER: SE Trib
REACH: 2                  RS: 50

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     525    26.4     524    50.4     523    68.4     522    93.6     521
   105.6     520   122.4     519   147.6     518     156     517   163.2     517
   182.4     518   193.2     519   205.2     520   237.6     522   273.6     524
   297.6     525

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   147.6    .055   182.4     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         147.6   182.4              156     240     186             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     152     519       F
     168   297.6     519       F

CROSS SECTION


RIVER: SE Trib
REACH: 2                  RS: 49

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     525     102     524     126     523   196.8     522  212.82  517.28
   217.2     516     282     516     288     517     384     517     396     518
   418.8     519   441.6     520   471.6     521

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06  212.82    .055     288     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        212.82     288              240     235     205             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 2                  RS: 48

INPUT
Description:
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   520.5    67.2     520    98.4     519     114     518   127.2     517
   134.4     516   165.6     516   412.8     516   417.6     517   423.6     518
```

```
     432     519     462     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   127.2    .055   417.6     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         127.2   417.6              156     210     144             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 2                  RS: 47

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   519.5      84     519   110.4     518     162     517     264     517
   290.4     518     318     518   326.4     517   338.4     516   363.6     516
   386.4     517   416.4     518   488.4     519     534     520

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   326.4    .055   386.4     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         326.4   386.4              144     120      36             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 2                  RS: 46

INPUT
Description:
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     517    25.2     516    45.6     515    63.6     514    82.8     513
    92.4     512   110.4     511   133.2     510   158.4     509   182.4   508.6
     192   508.6     204     509     222     510   255.6     512   278.4     515
   309.6     516     336     515   352.8     516   381.6     517     438     518
     480     519

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   158.4    .055     222     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         158.4     222              174     150      96             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 2                  RS: 45

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     513    26.4     512    52.8     511    86.4     510     108     509
   135.6     508   158.4   507.6     168   507.6   189.6     508   206.4     509
     228     510   241.2     511   254.4     512   271.2     513   286.8     514
   308.4     515   338.4     516   374.4     517   434.4     518

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   135.6    .055   189.6     .06
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         135.6   189.6               90     108     192             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
       0      93   513.5

CROSS SECTION


RIVER: SE Trib
REACH: 3                  RS: 60

INPUT
Description:
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     522      63     521     102     520     128     519     146     518
     162     517     194     517     240     518     270     519

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05     146    .045     240     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           146     240              160     210     170             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 3                  RS: 59

INPUT
Description:
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     521      12     520      26     519      40     518      52     517
      63     516      78     515     180     515     212     516     236     517
     258     518     281     519

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05      63    .045     212     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           63     212               95     120     125             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 3                  RS: 58

INPUT
Description:
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     520      50     519      62     518      76     517     118     516
     168     515     175     514     210     514     242     515     290     516
     340     517

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05     168    .045     242     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           168     242              205     170     130             .1       .3

CROSS SECTION


RIVER: SE Trib
```

```
REACH: 3                  RS: 57

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     518      18     517      38     516      60     515      71     514
     102     513     122     512     160     511     185     511     198     512
     262     513     290     514     328     515     347     516     382     517

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05     122    .045     198     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           122     198             110     125      90             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 3                  RS: 56

INPUT
Description:
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     517      30     516      60     515      77     514     108     512
     122     511     152   510.3     162   510.3     171     511     215     512
     272     513     309     514     495     515     535     516

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05     122    .045     171     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           122     171             140     100      45             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 1                  RS: 44

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   514.3       1     513    37.2     512      78     511    99.6     510
   121.2     509     144     508   163.2     507   175.2     507   195.6     508
   217.2     509   237.6     510   267.6     511     300     510   338.4     509
   350.4   508.8     360   508.8   367.2     509     390     510     414     511
   439.2     512   464.4     513     558     514     560   514.3

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06     144    .055   195.6     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           144   195.6              65      65      65             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     148   514.3       F
     185     560   514.3       F

CULVERT


RIVER: SE Trib
REACH: 1                  RS: 43.5

INPUT
```

```
Description:
Distance from Upstream XS =      15
Deck/Roadway Width        =      42
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   514.5             558   514.5

Upstream Bridge Cross Section Data
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   514.3       1     513    37.2     512      78     511    99.6     510
   121.2     509     144     508   163.2     507   175.2     507   195.6     508
   217.2     509   237.6     510   267.6     511     300     510   338.4     509
   350.4   508.8     360   508.8   367.2     509     390     510     414     511
   439.2     512   464.4     513     558     514     560   514.3

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06     144    .055   195.6     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
          144   195.6             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     148   514.3       F
     185     560   514.3       F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   514.5           571.2   514.5

Downstream Bridge Cross Section Data
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514       1     513    69.6     512    98.4     511   118.8     510
   135.6     509   157.2     508   177.6     507   182.4   506.3     192   506.3
     222     507   284.4     508     324   507.7   333.6   507.7     348     508
     396     509     420     510   441.6     511   464.4     512     504     513
   571.2     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   177.6    .055     222     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
         177.6     222             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     172   511.5       F
     216   571.2   511.5       F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       5      10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                10      48     .013     .013        0                  .5                1
Upstream   Elevation =  507.1
```

```
          Centerline Station =  168
Downstream Elevation =  506.4
          Centerline Station =  189

CROSS SECTION


RIVER: SE Trib
REACH: 1                  RS: 43

INPUT
Description:
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     514       1     513    69.6     512    98.4     511   118.8     510
   135.6     509   157.2     508   177.6     507   182.4   506.3     192   506.3
     222     507   284.4     508     324   507.7   333.6   507.7     348     508
     396     509     420     510   441.6     511   464.4     512     504     513
   571.2     514

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   177.6    .055     222     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         177.6     222              72      84      84             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     172   511.5       F
     216   571.2   511.5       F

CROSS SECTION


RIVER: SE Trib
REACH: 1                  RS: 42

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     513    57.6     512      96     511     114     510     126     509
     138     508     150     507   165.6     506   206.4   505.2     216   505.2
     240     506   321.6     507   345.6     508   367.2     509   410.4     510
   489.6     511   518.4     512

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   165.6    .055     240     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         165.6     240              72     120      94             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
     100     129   508.2

CROSS SECTION


RIVER: SE Trib
REACH: 1                  RS: 41

INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   511.3    38.4     511    86.4     510   116.4     509   121.2     508
   129.6     507   137.3  505.66   141.6     505   146.4     504   153.6     505
     258     506   286.8     507   302.4     508     324     509   338.4     510
     348     512

Manning's n Values        num=       3
```

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   137.3    .055   153.6     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         137.3   153.6              114     120      96             .1       .3

CROSS SECTION


RIVER: SE Trib
REACH: 1                  RS: 40

INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     510      60     509    99.6     508   121.2     507     138     506
   159.6     505   177.6     504   190.8     504   214.8     505     252     506
   265.2     507   280.8     512   289.2     513

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .06   159.6    .055   214.8     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         159.6   214.8              300     280     260             .1       .3


SUMMARY OF MANNING'S N VALUES

River:SE Trib

      Reach          River Sta.       n1        n2        n3

 2                    55                 .06      .055       .06
 2                    54                 .06      .055       .06
 2                    53                 .06      .055       .06
 2                    52                 .06      .055       .06
 2                    51                 .06      .055       .06
 2                    50.5         Culvert
 2                    50                 .06      .055       .06
 2                    49                 .06      .055       .06
 2                    48                 .06      .055       .06
 2                    47                 .06      .055       .06
 2                    46                 .05      .055       .06
 2                    45                 .06      .055       .06
 3                    60                 .05      .045       .05
 3                    59                 .05      .045       .05
 3                    58                 .05      .045       .05
 3                    57                 .05      .045       .05
 3                    56                 .05      .045       .05
 1                    44                 .06      .055       .06
 1                    43.5         Culvert
 1                    43                 .06      .055       .06
 1                    42                 .06      .055       .06
 1                    41                 .06      .055       .06
 1                    40                 .06      .055       .05


SUMMARY OF REACH LENGTHS

River: SE Trib

      Reach          River Sta.      Left     Channel    Right

 2                    55                230       220       210
 2                    54                160       168       150
 2                    53                 70        60        70
 2                    52                 24        24        24
```

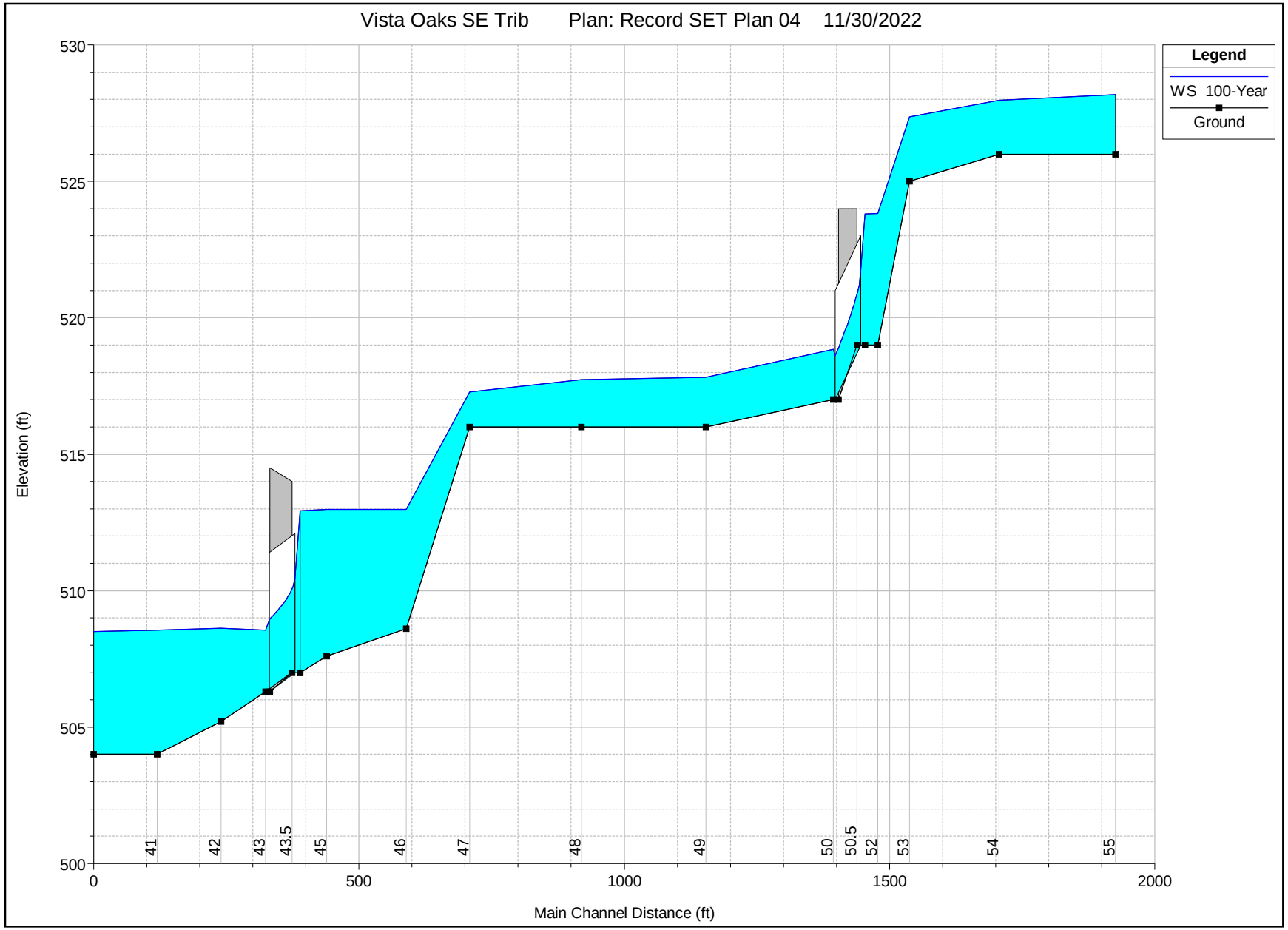
2	51	60	60	60
2	50.5	Culvert		
2	50	156	240	186
2	49	240	235	205
2	48	156	210	144
2	47	144	120	36
2	46	174	150	96
2	45	90	108	192
3	60	160	210	170
3	59	95	120	125
3	58	205	170	130
3	57	110	125	90
3	56	140	100	45
1	44	65	65	65
1	43.5	Culvert		
1	43	72	84	84
1	42	72	120	94
1	41	114	120	96
1	40	300	280	260

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: SE Trib

Reach	River Sta.	Contr.	Expan.
2	55	.1	.3
2	54	.1	.3
2	53	.1	.3
2	52	.1	.3
2	51	.3	.5
2	50.5	Culvert	
2	50	.3	.5
2	49	.1	.3
2	48	.1	.3
2	47	.1	.3
2	46	.1	.3
2	45	.1	.3
3	60	.1	.3
3	59	.1	.3
3	58	.1	.3
3	57	.1	.3
3	56	.1	.3
1	44	.3	.5
1	43.5	Culvert	
1	43	.3	.5
1	42	.1	.3
1	41	.1	.3
1	40	.1	.3

HEC-RAS Plan: RecordPln 04 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)	
1	40	100-Year	596.00	504.00	508.50	505.92	508.53	0.000459	1.49	493.86	190.08	0.13
1	41	100-Year	596.00	504.00	508.56		508.59	0.000670	1.70	488.25	196.00	0.15
1	42	100-Year	348.00	505.20	508.62		508.63	0.000254	0.91	481.98	228.52	0.09
1	43	100-Year	348.00	506.30	508.56	507.86	508.82	0.009053	4.13	86.41	229.86	0.51
1	43.5		Culvert									
1	44	100-Year	348.00	507.00	512.92	508.62	512.96	0.000368	1.65	210.76	458.63	0.12
3	56	100-Year	348.00	510.30	512.95		513.00	0.001188	2.02	232.89	175.82	0.23
3	57	100-Year	348.00	511.00	513.12		513.18	0.002071	2.21	187.74	166.94	0.29
3	58	100-Year	348.00	514.00	515.16	515.16	515.58	0.028905	5.22	67.71	89.80	0.97
3	59	100-Year	348.00	515.00	516.35		516.41	0.002786	1.96	179.43	161.17	0.32
3	60	100-Year	348.00	517.00	518.08	518.08	518.46	0.032923	4.94	70.57	97.79	1.01
2	45	100-Year	314.00	507.60	512.97		512.97	0.000052	0.59	668.84	177.70	0.05
2	46	100-Year	314.00	508.60	512.98		512.99	0.000117	0.74	500.75	180.05	0.06
2	47	100-Year	314.00	516.00	517.28	517.28	517.54	0.026611	4.38	92.80	194.76	0.78
2	48	100-Year	314.00	516.00	517.73		517.74	0.000264	0.63	502.82	304.50	0.08
2	49	100-Year	208.00	516.00	517.82		517.84	0.000923	1.19	213.98	182.83	0.16
2	50	100-Year	208.00	517.00	518.84	518.84	519.70	0.036433	7.46	27.89	65.04	1.00
2	50.5		Culvert									
2	51	100-Year	208.00	519.00	523.80	520.22	523.83	0.000341	1.39	149.42	183.32	0.11
2	52	100-Year	208.00	519.00	523.83		523.83	0.000055	0.54	481.31	163.87	0.05
2	53	100-Year	208.00	525.00	527.37	527.37	527.63	0.018509	4.56	67.13	133.39	0.68
2	54	100-Year	208.00	526.00	527.96		527.98	0.000712	1.12	202.88	127.63	0.14
2	55	100-Year	208.00	526.00	528.18		528.25	0.002155	2.09	108.29	61.93	0.25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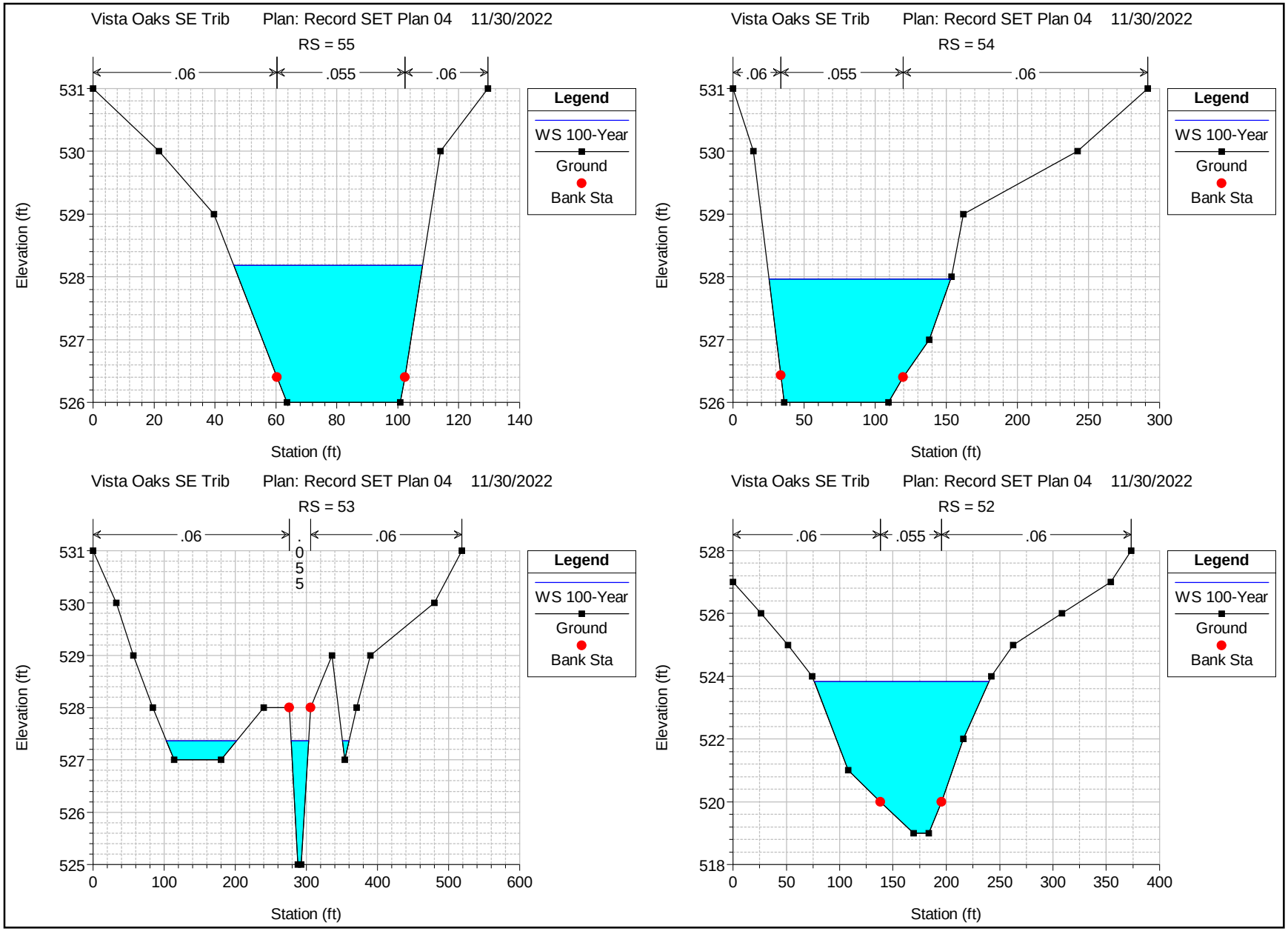
Legend
WS 100-Year
Ground
Elevation (ft)
530
525
520
515
510
505
500
0
500
1000
1500
2000
Main Channel Distance (ft)
41
42
43
43.5
45
46
47
48
49
50
50.5
52
53
54
55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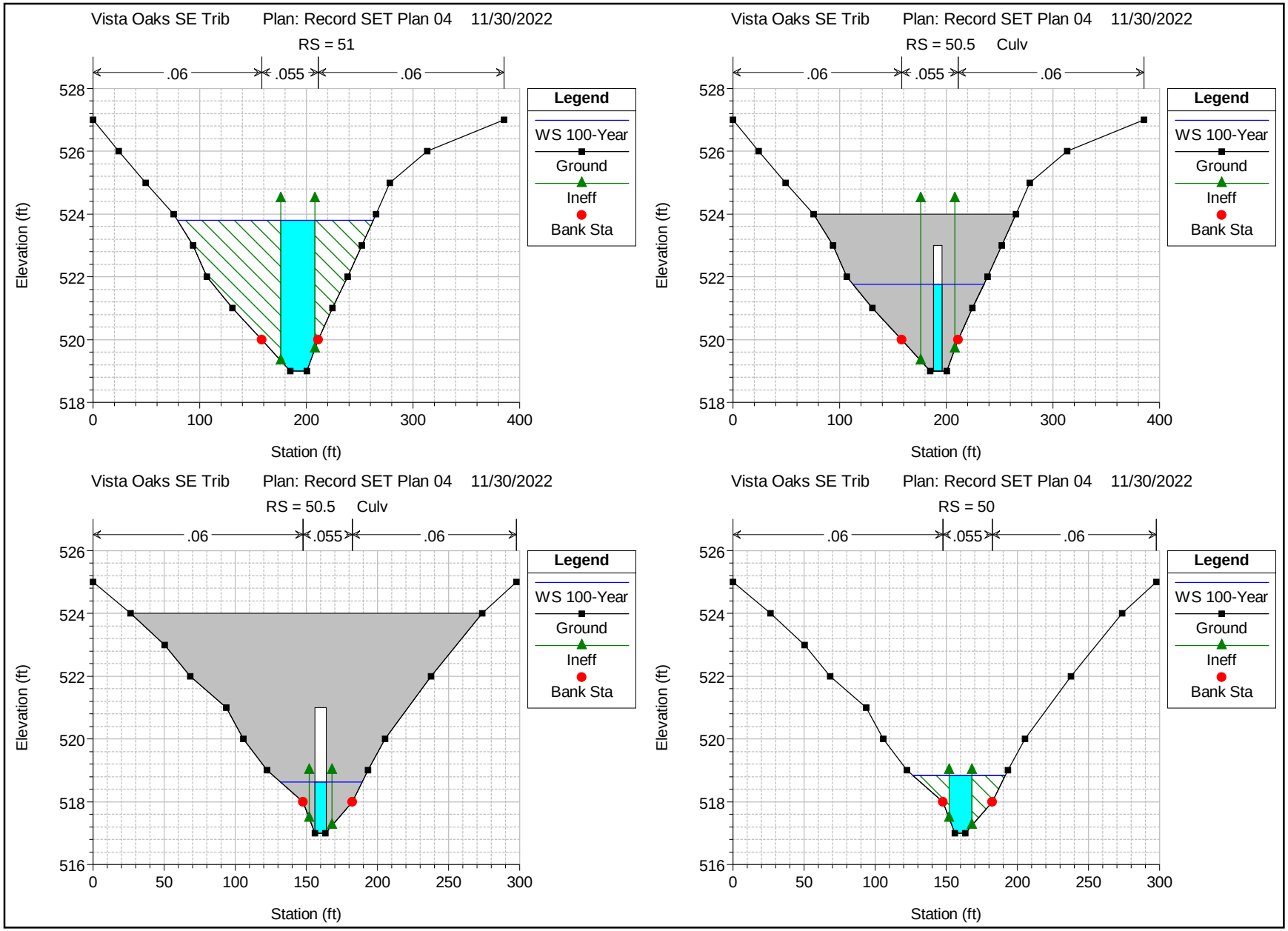
Plan: Record SET Plan 04
11/30/2022
RS = 55
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks SE Trib
Plan: Record SET Plan 04
11/30/2022
RS = 54
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks SE Trib
Plan: Record SET Plan 04
11/30/2022
RS = 53
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks SE Trib
Plan: Record SET Plan 04
11/30/2022
RS = 52
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta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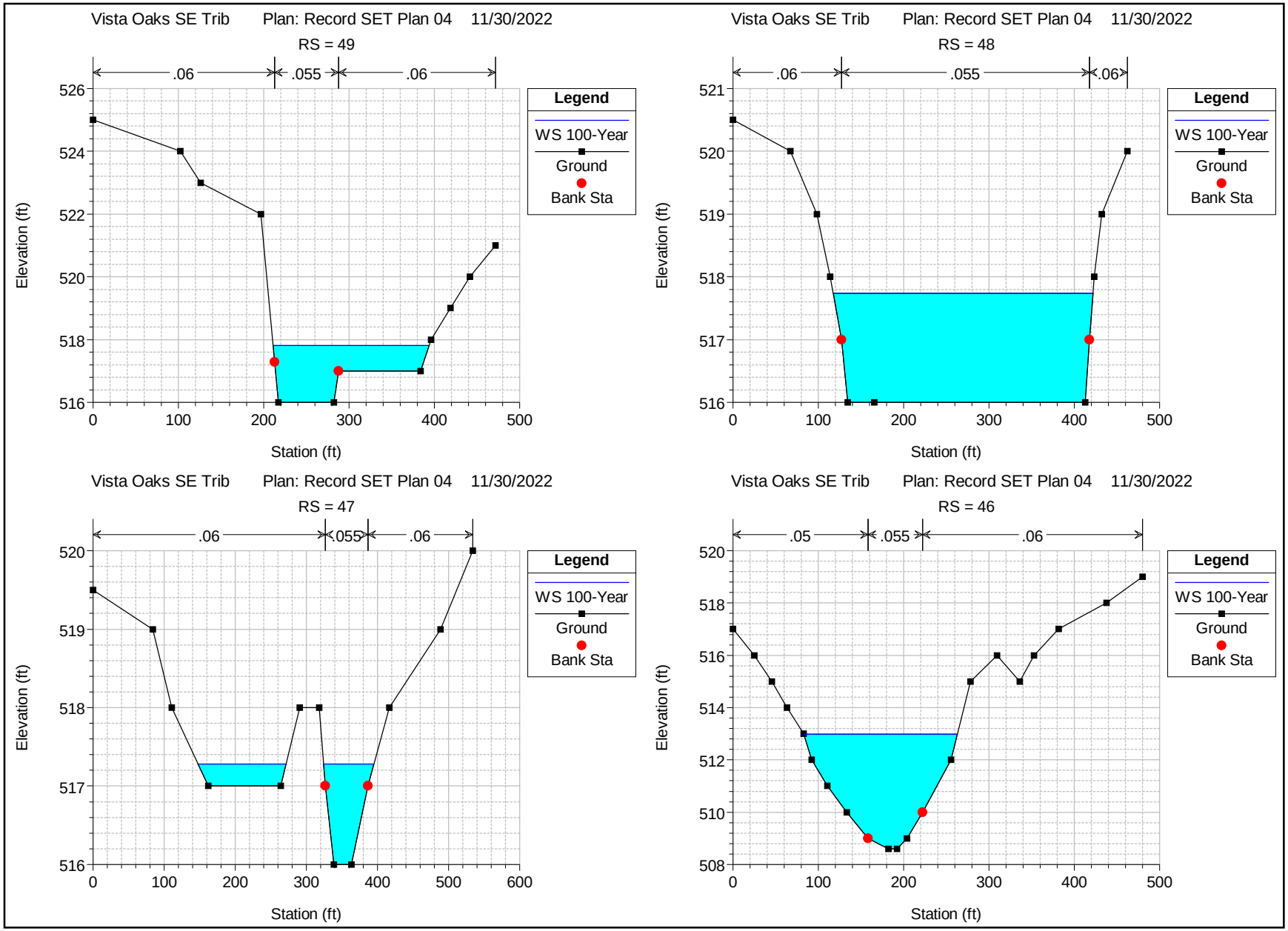
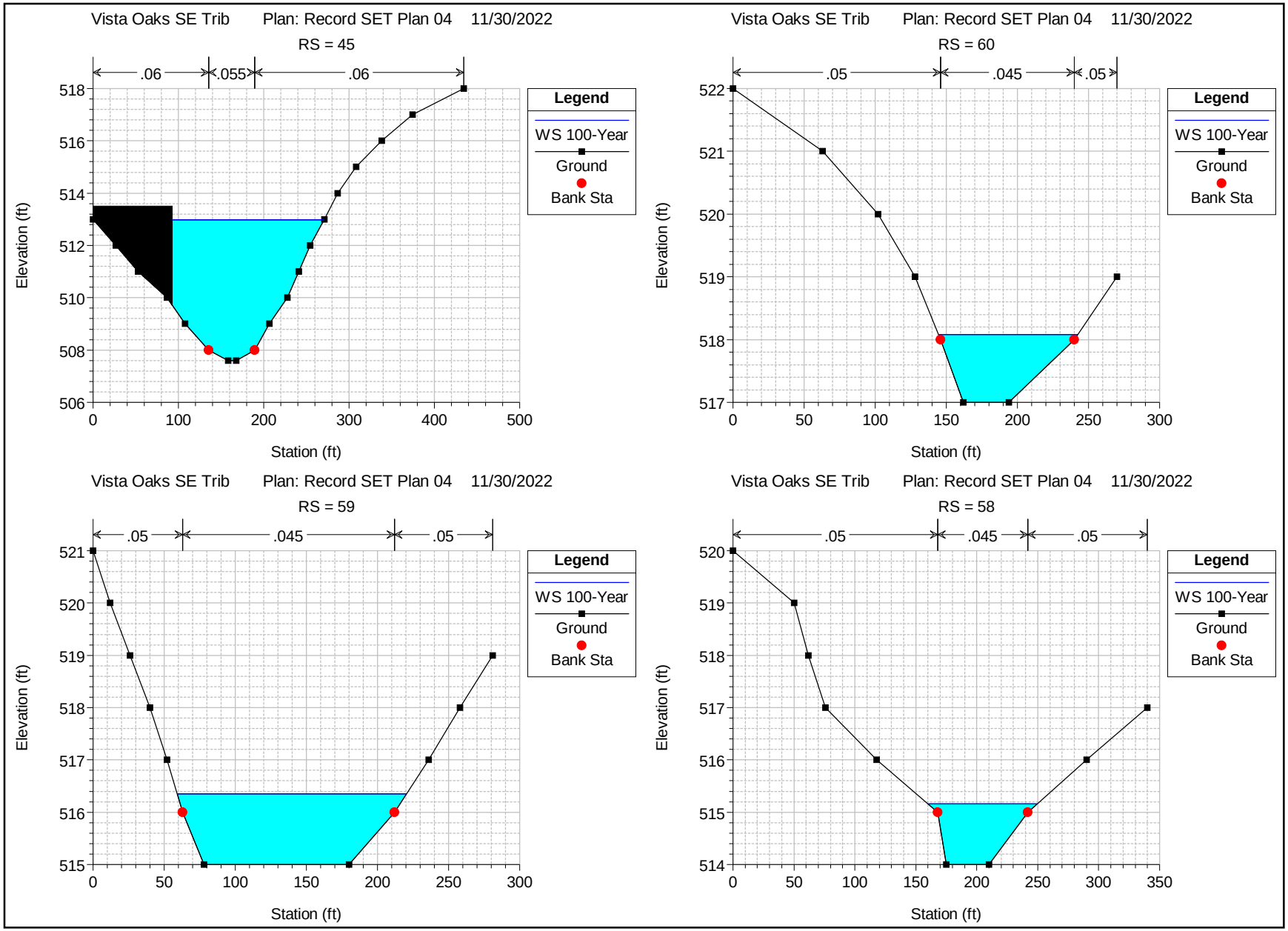
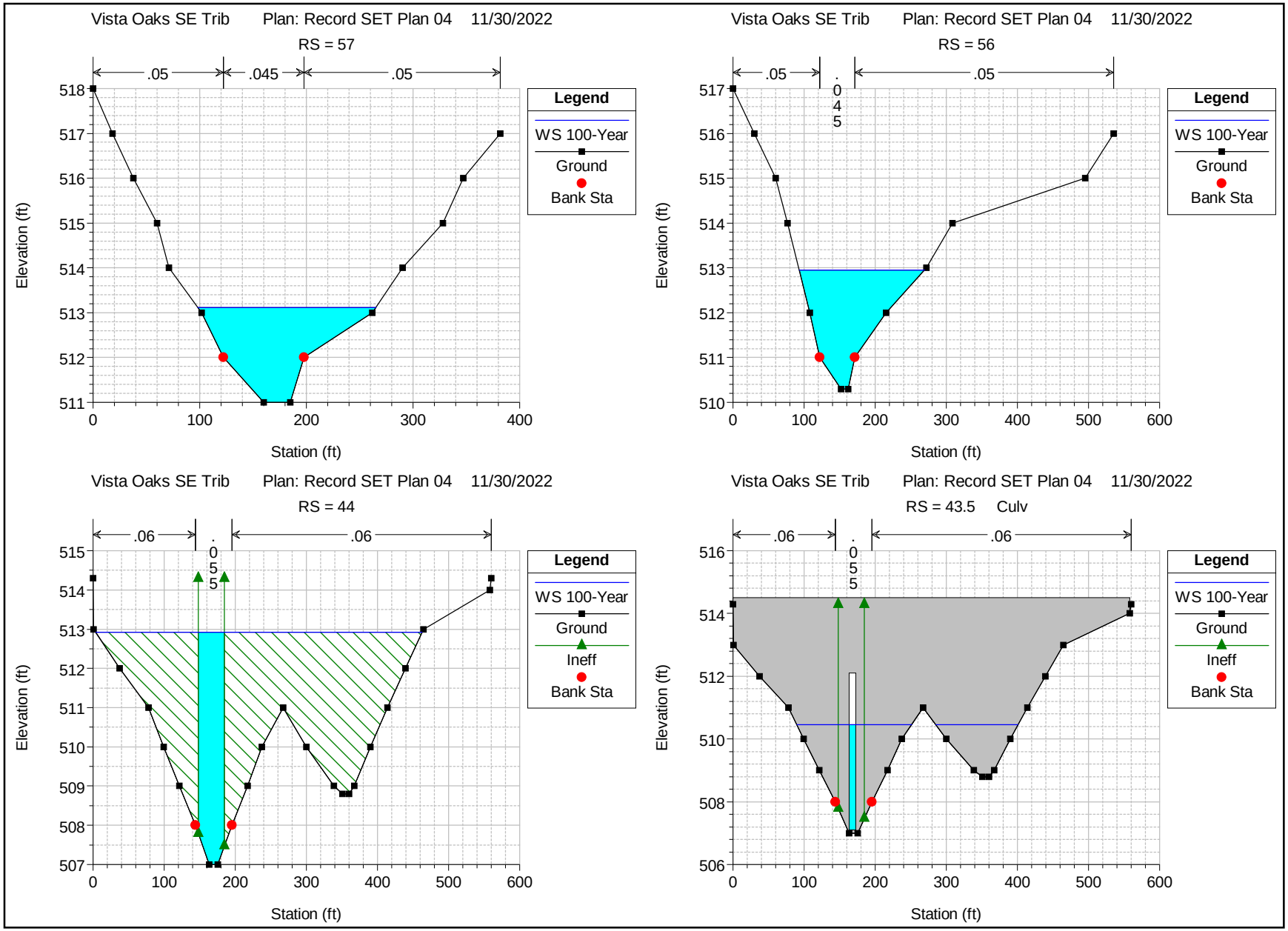
RS = 51
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 50.5 Culv
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 50.5 Culv
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 50
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta


Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 49
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 48
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 47
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 46
.05
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta


Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 45
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 60
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 59
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 58
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta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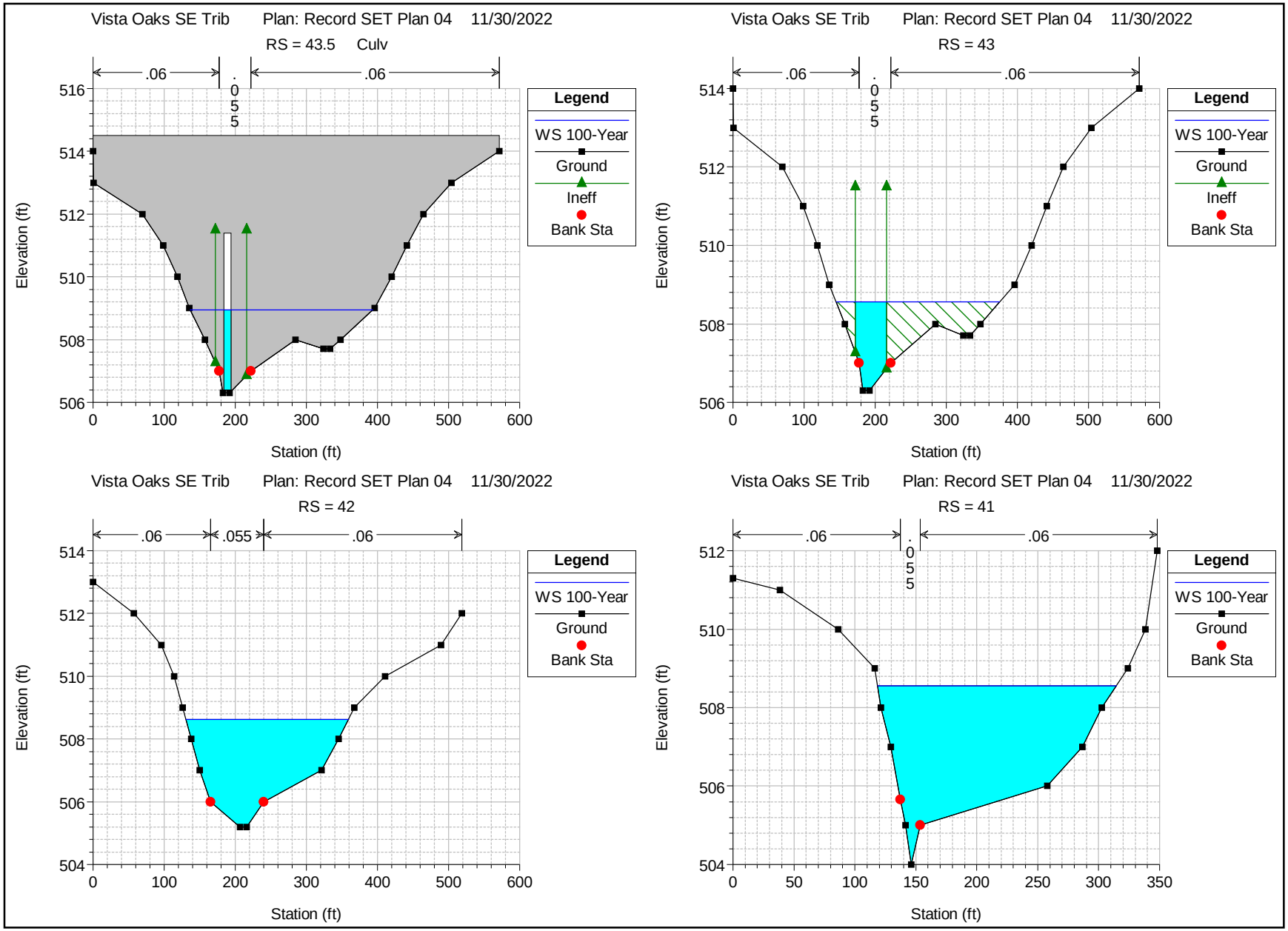
RS = 57
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 56
.05
.045
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 44
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 43.5 Culv
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta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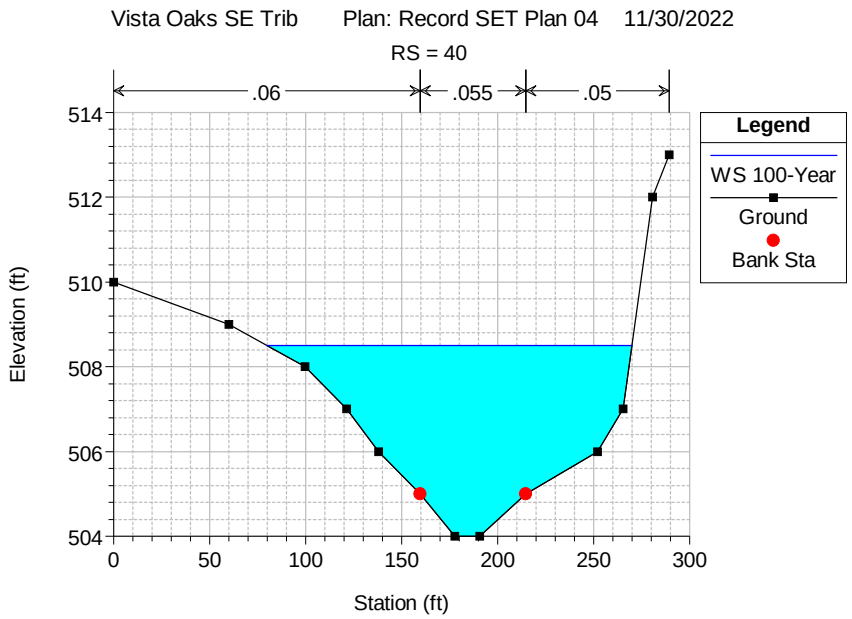
RS = 43.5 Culv
.06
.055
.06
Elevation (ft)
Station (ft)
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 43
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 42
.06
.055
.06
Vista Oaks SE Trib Plan: Record SET Plan 04 11/30/2022
RS = 41


Vista Oaks SE Trib
Plan: Record SET Plan 04
11/30/2022
RS = 40
.06
.055
.05
514
512
510
508
506
504
Elevation (ft)
0
50
100
150
200
250
300
Station (ft)
Legend
WS 100-Year
Ground
Bank Sta

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