



In Association With:



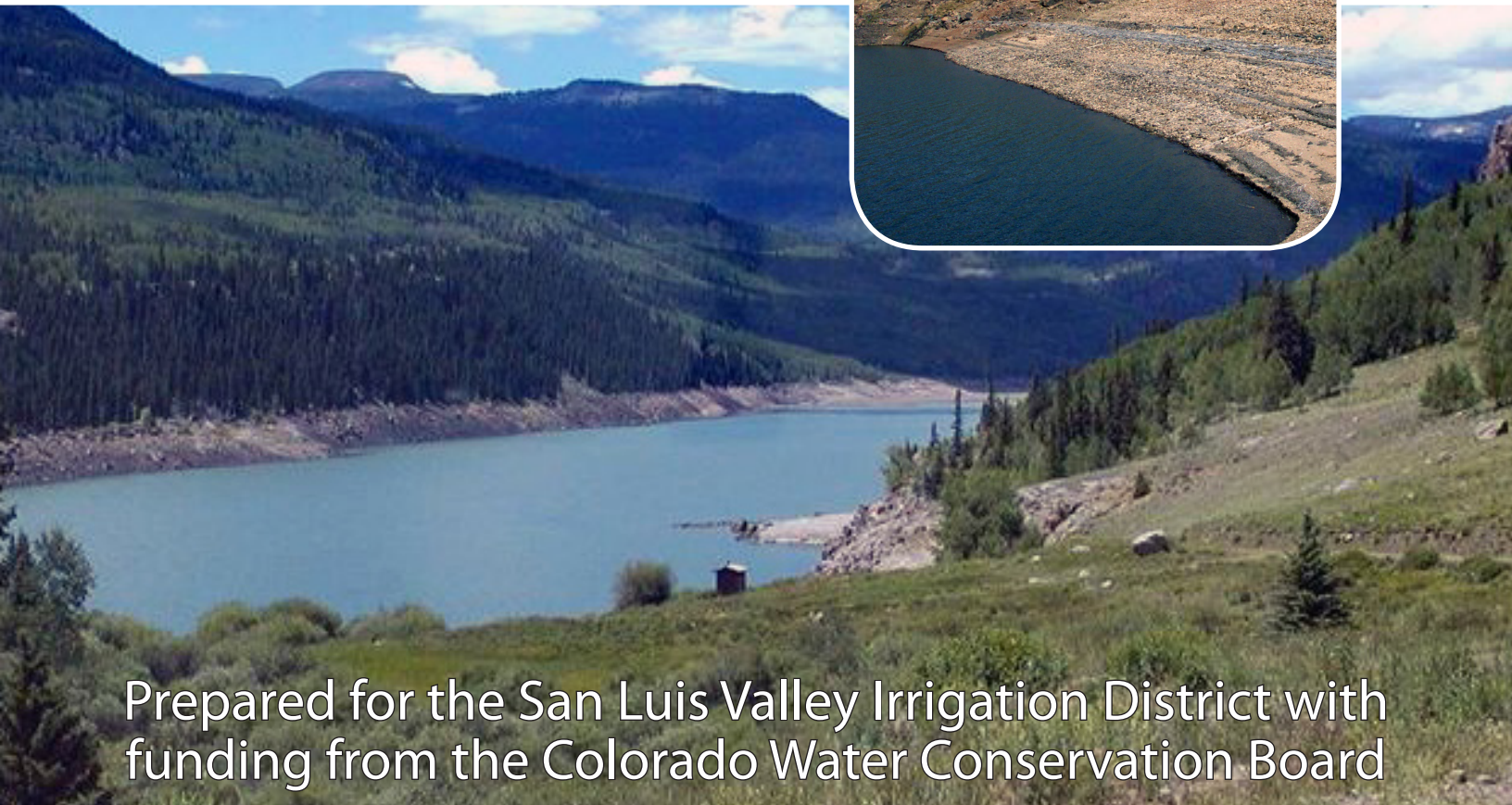
SUGNET & MOORE
ENVIRONMENTAL, INC.

DEERE & AULT
CONSULTANTS, INC.
Water Resources, Civil & Geotechnical Engineering

Rio Grande Reservoir

Multi-Use Rehabilitation and Enlargement Study Phase II Appendices C - F

October 10, 2008



Prepared for the San Luis Valley Irrigation District with
funding from the Colorado Water Conservation Board

Appendix C
Extreme Precipitation Analysis Tool
(EPAT) Results (Volume II)

EPAT Basin Analysis Results

Report Generated on 1/11/2008 at 3:35:08 PM

Project Name: Rio Grande Track

 **General Storm Results: Palisade Lake**

Original Event Historic Data

Storm ID:	23	Storm Source:	HMR
State:	CO	Start Date:	6/26/1927
Originator:	CSU Report	End Date:	6/29/1927
Low Level Wind:	190	Elevation:	
Cloud Level Wind:	190	Col. Gen. X,Y:	2457747.48136,870396.186761
Duration:	84		
Max Precipitation:	5.90" 84 hrs, Palisade Lakes		
Narrative:	Widespread heavy high elevation rain over SW CO		

EPAT Event Transposed and Maximized

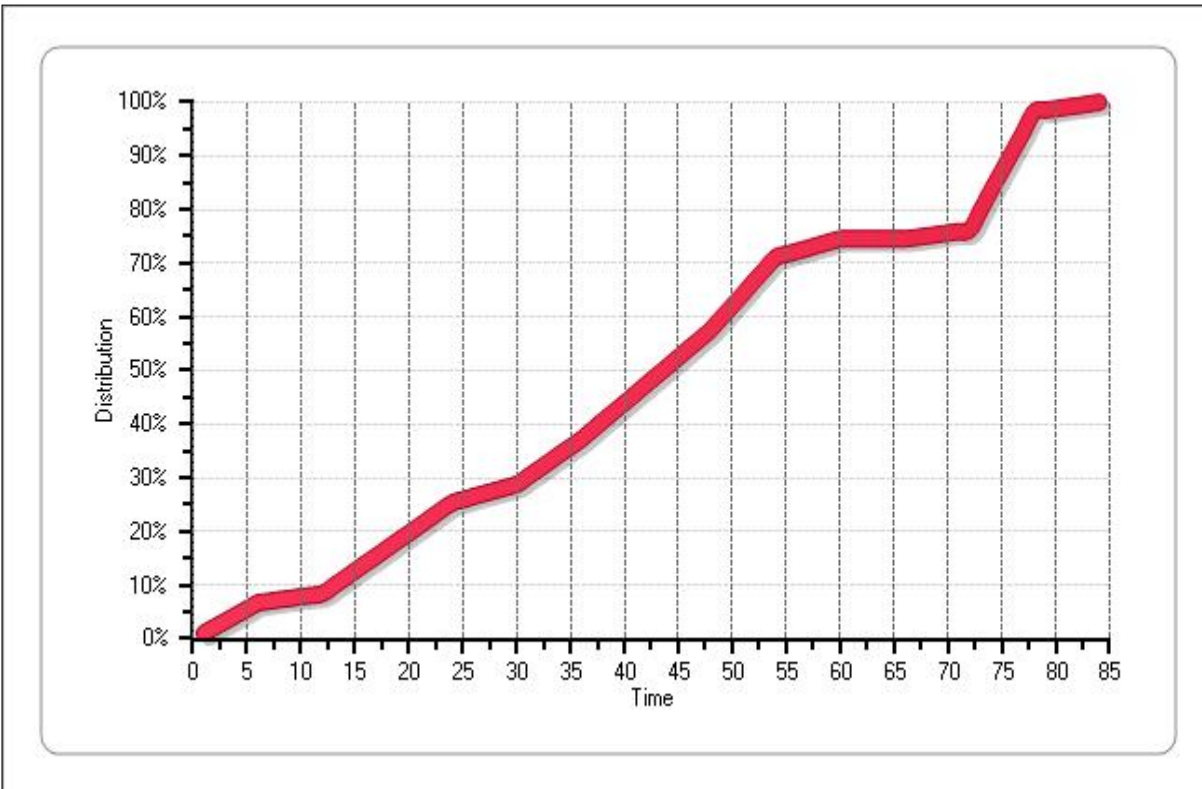
EPAT Report Ranking:	1
Ideal Run #	15
Peak Rainfall (inches):	7.04
Total Rain Volume (acre feet):	52671.62

EPAT Event Basin Average Rainfall

** Volume results may differ from summary results by 0.01 percent due to rounding. Results are well within error range of observation.*

Basin	Rainfall (in.)	Area (sq. mi.)	Volume (acre-ft.)
0	6.22	158.71	52,649.39

EPAT Event Observed Temporal



(Time in Hours | Distribution %)

1	1.13%	2	2.26%	3	3.39%
4	4.52%	5	5.65%	6	6.78%
7	7.06%	8	7.34%	9	7.63%
10	7.91%	11	8.19%	12	8.47%
13	9.89%	14	11.30%	15	12.71%
16	14.12%	17	15.54%	18	16.95%
19	18.36%	20	19.77%	21	21.19%
22	22.60%	23	24.01%	24	25.42%
25	25.99%	26	26.55%	27	27.12%
28	27.68%	29	28.25%	30	28.81%
31	30.23%	32	31.64%	33	33.05%
34	34.46%	35	35.88%	36	37.29%
37	38.98%	38	40.68%	39	42.37%
40	44.07%	41	45.76%	42	47.46%
43	49.15%	44	50.85%	45	52.54%
46	54.24%	47	55.93%	48	57.63%

Project Name: Rio Grande Track

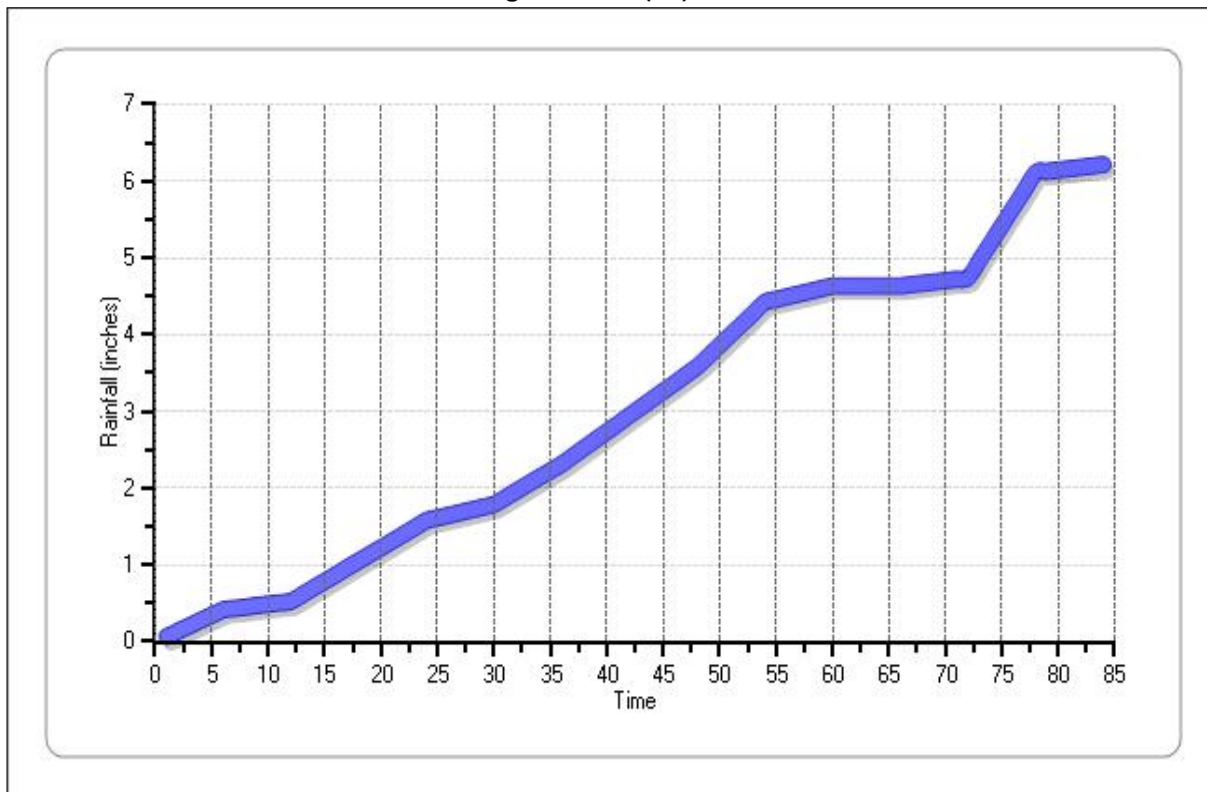
General Storm Results: Palisade Lake

49	59.89%	50	62.15%	51	64.41%
52	66.67%	53	68.93%	54	71.19%
55	71.75%	56	72.32%	57	72.88%
58	73.45%	59	74.01%	60	74.58%
61	74.58%	62	74.58%	63	74.58%
64	74.58%	65	74.58%	66	74.58%
67	74.86%	68	75.14%	69	75.42%
70	75.71%	71	75.99%	72	76.27%
73	79.94%	74	83.62%	75	87.29%
76	90.96%	77	94.63%	78	98.31%
79	98.59%	80	98.87%	81	99.15%
82	99.44%	83	99.72%	84	100.00%

EPAT Event Temporal Basin Average

Basin: 0

Total Average Rainfall (in.): 6.22



(Time in Hours | Rainfall in inches)

1	0.07	2	0.14	3	0.21
4	0.28	5	0.35	6	0.42
7	0.44	8	0.46	9	0.47
10	0.49	11	0.51	12	0.53
13	0.61	14	0.70	15	0.79
16	0.88	17	0.97	18	1.05
19	1.14	20	1.23	21	1.32
22	1.41	23	1.49	24	1.58
25	1.62	26	1.65	27	1.69
28	1.72	29	1.76	30	1.79
31	1.88	32	1.97	33	2.06
34	2.14	35	2.23	36	2.32

Project Name: Rio Grande Track

 General Storm Results: Palisade Lake

37	2.42	38	2.53	39	2.64
40	2.74	41	2.85	42	2.95
43	3.06	44	3.16	45	3.27
46	3.37	47	3.48	48	3.58
49	3.72	50	3.87	51	4.01
52	4.15	53	4.29	54	4.43
55	4.46	56	4.50	57	4.53
58	4.57	59	4.60	60	4.64
61	4.64	62	4.64	63	4.64
64	4.64	65	4.64	66	4.64
67	4.66	68	4.67	69	4.69
70	4.71	71	4.73	72	4.74
73	4.97	74	5.20	75	5.43
76	5.66	77	5.89	78	6.11
79	6.13	80	6.15	81	6.17
82	6.18	83	6.20	84	6.22

Project Name: Rio Grande Track

Local Storm Results: Mesa Verde

Original Event Historic Data

Storm ID:	10	Storm Source:	HMR
State:	CO	Start Date:	8/3/1924
Originator:	CSU Report	End Date:	
Low Level Wind:	330	Elevation:	
Cloud Level Wind:	200	Col. Gen. X,Y:	2115826.42519179,815685.390151274
Duration:	0.75		
Max Precipitation:	3.50" at Mesa Verde NP in 45 minutes		
Narrative:	Cloudburst, elevation - 6,930 ft		

EPAT Event Transposed and Maximized

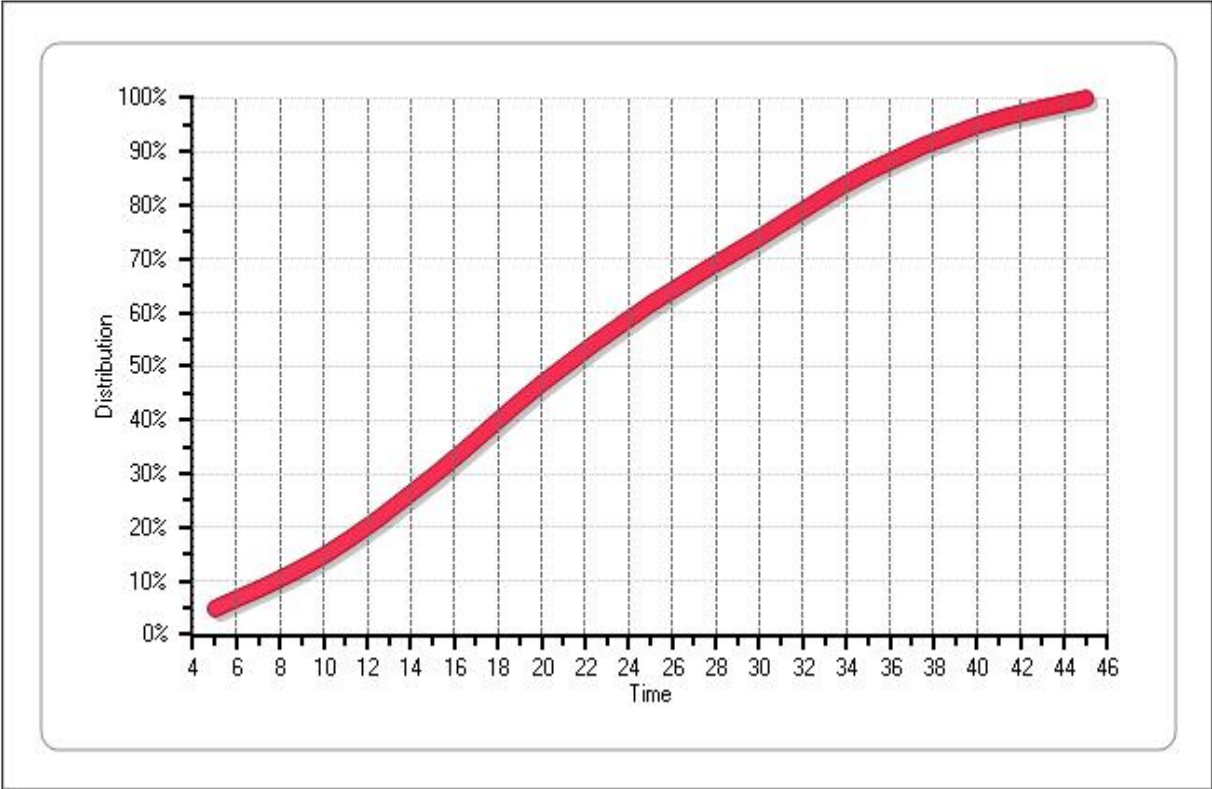
EPAT Report Ranking:	1
Ideal Run #	13
Peak Rainfall (inches):	2.54
Total Rain Volume (acre feet):	13679.83

EPAT Event Basin Average Rainfall

** Volume results may differ from summary results by 0.01 percent due to rounding. Results are well within error range of observation.*

Basin	Rainfall (in.)	Area (sq. mi.)	Volume (acre-ft.)
0	1.62	158.71	13,712.54

EPAT Event Observed Temporal

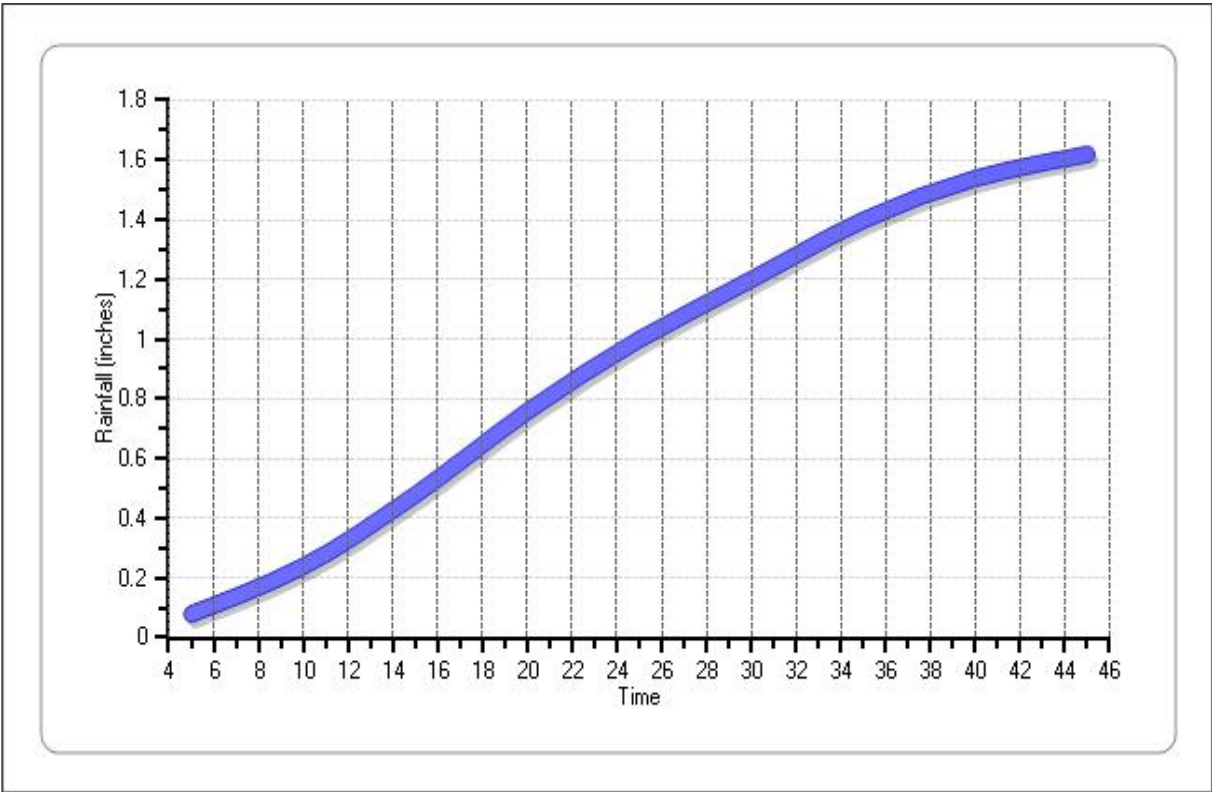


(Time in Minutes | Distribution %)

5	4.94%	10	14.81%	15	29.63%
20	46.91%	25	61.73%	30	74.07%
35	86.42%	40	95.06%	45	100.00%

EPAT Event Temporal Basin Average

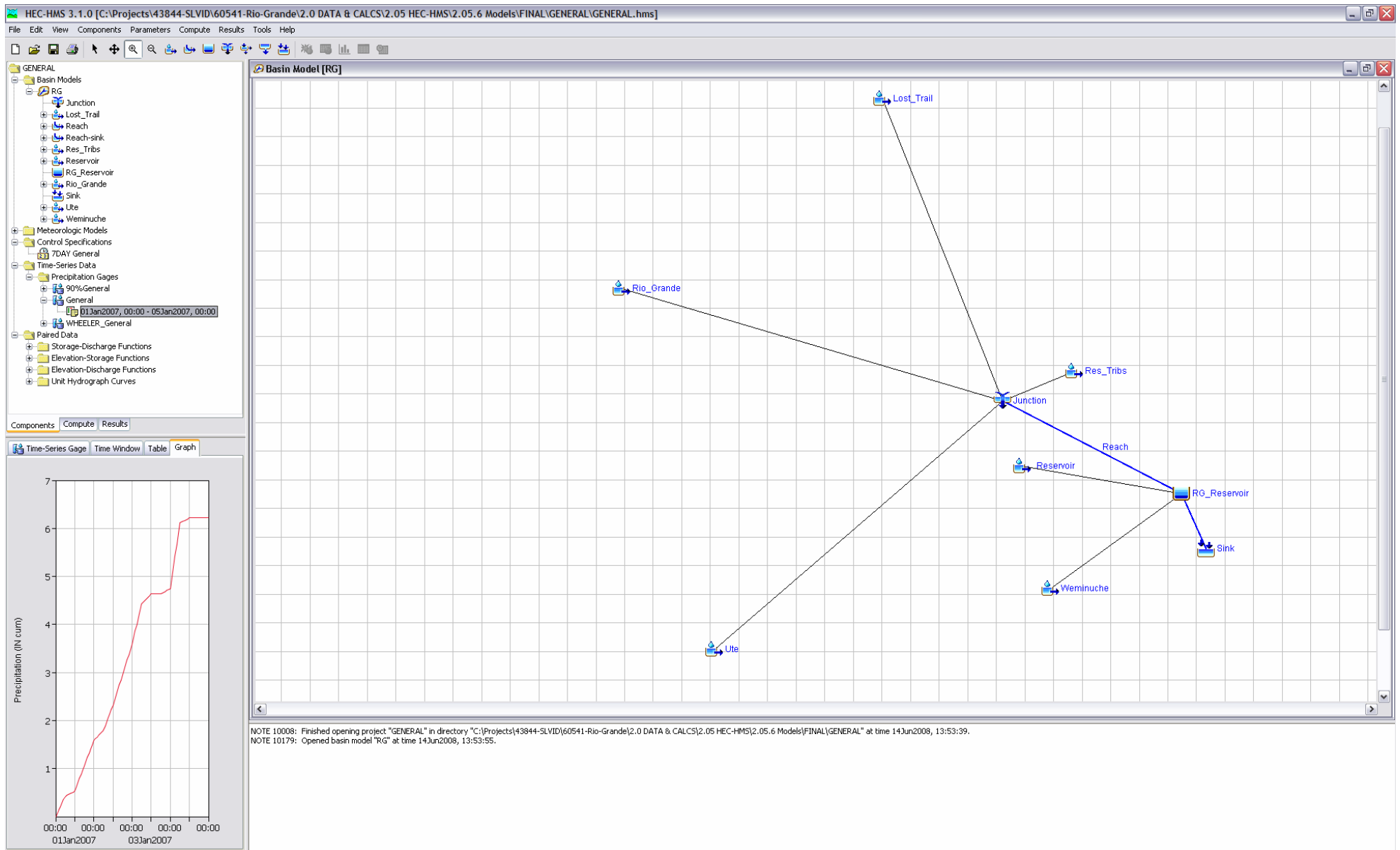
Basin: 0 Total Average Rainfall (in.): 1.62

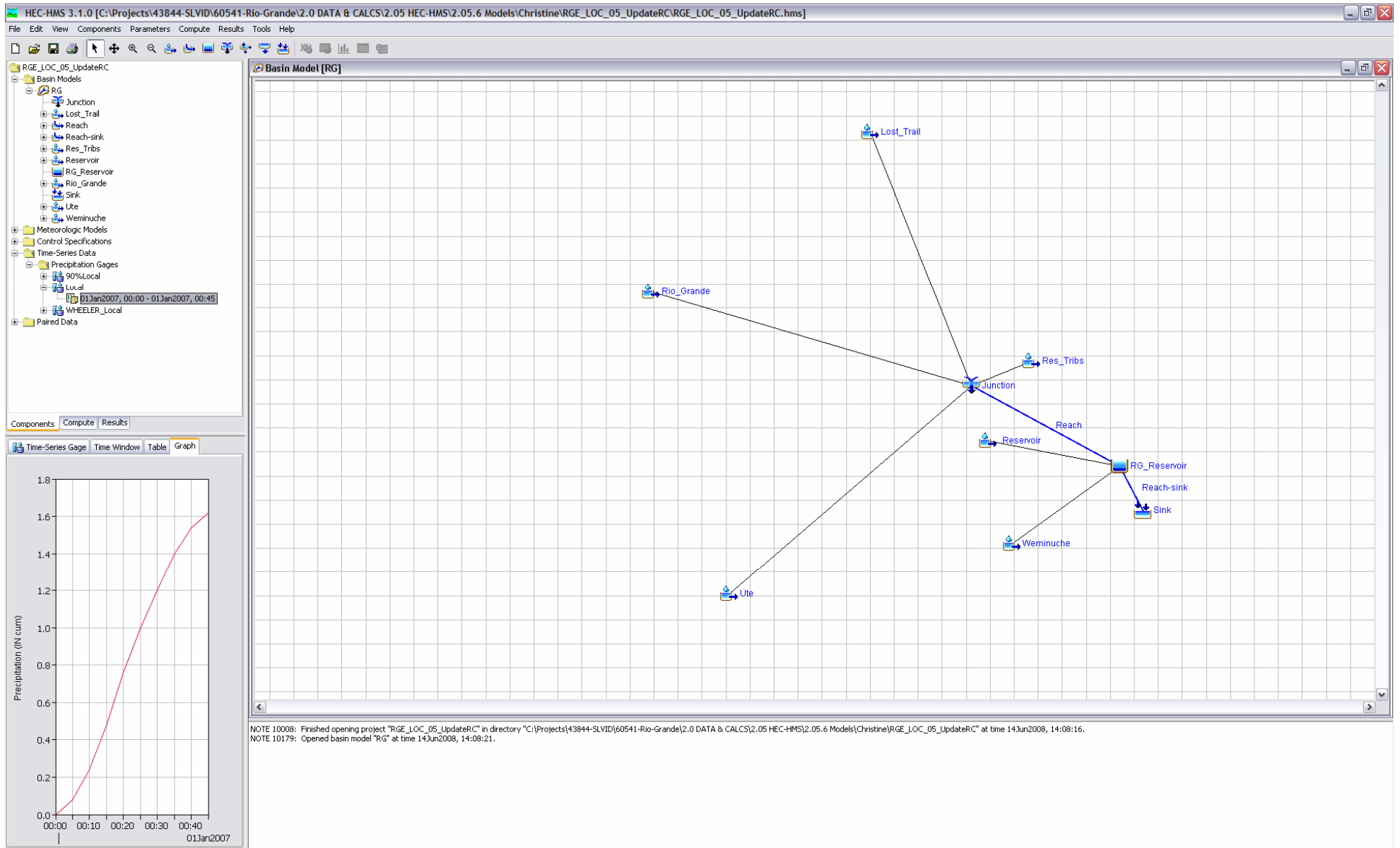


(Time in Minutes | Rainfall in inches)

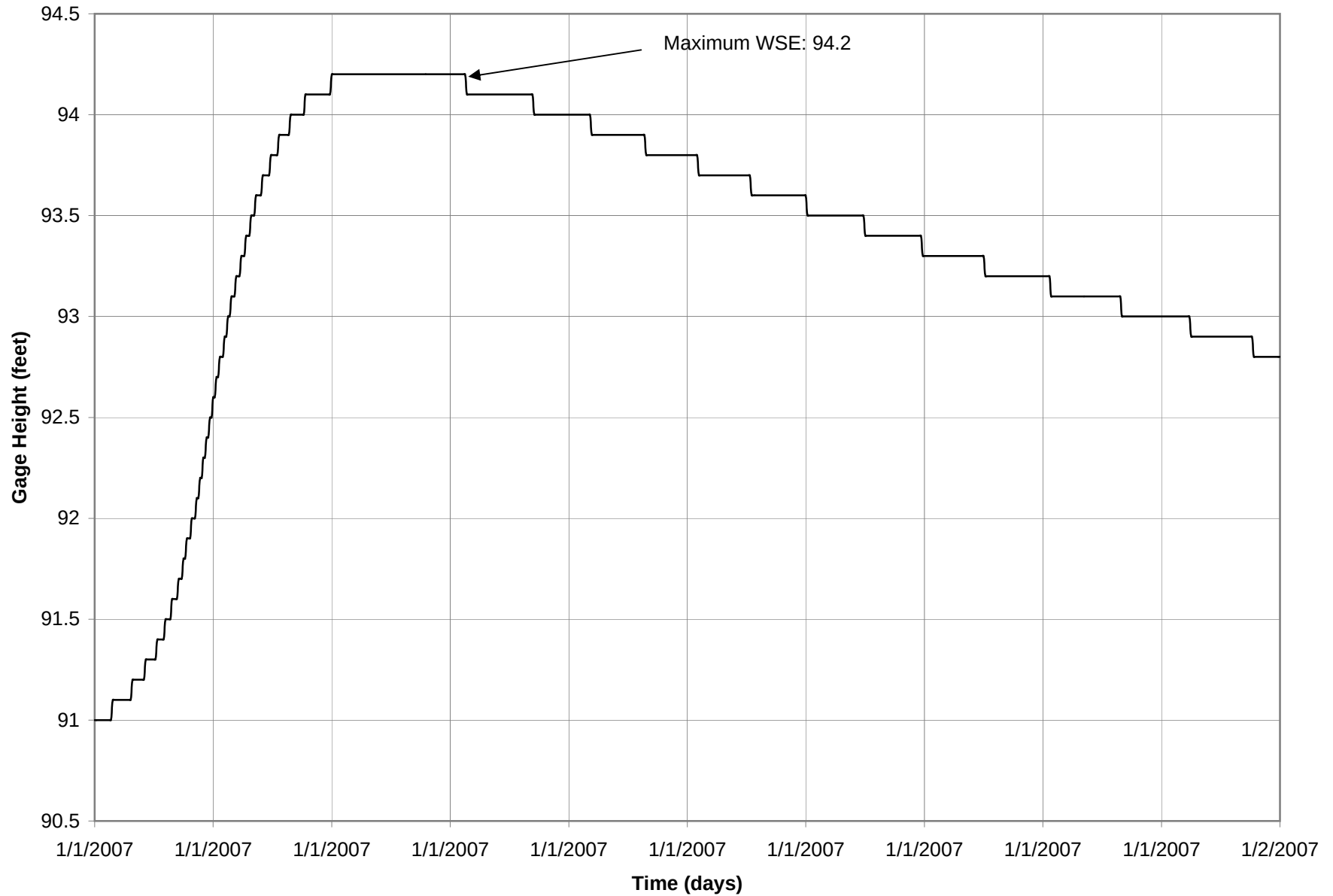
5	0.08	10	0.24	15	0.48
20	0.76	25	1.00	30	1.20
35	1.40	40	1.54	45	1.62

Appendix D
HEC-HMS Flood Routing Model
(Volume II)

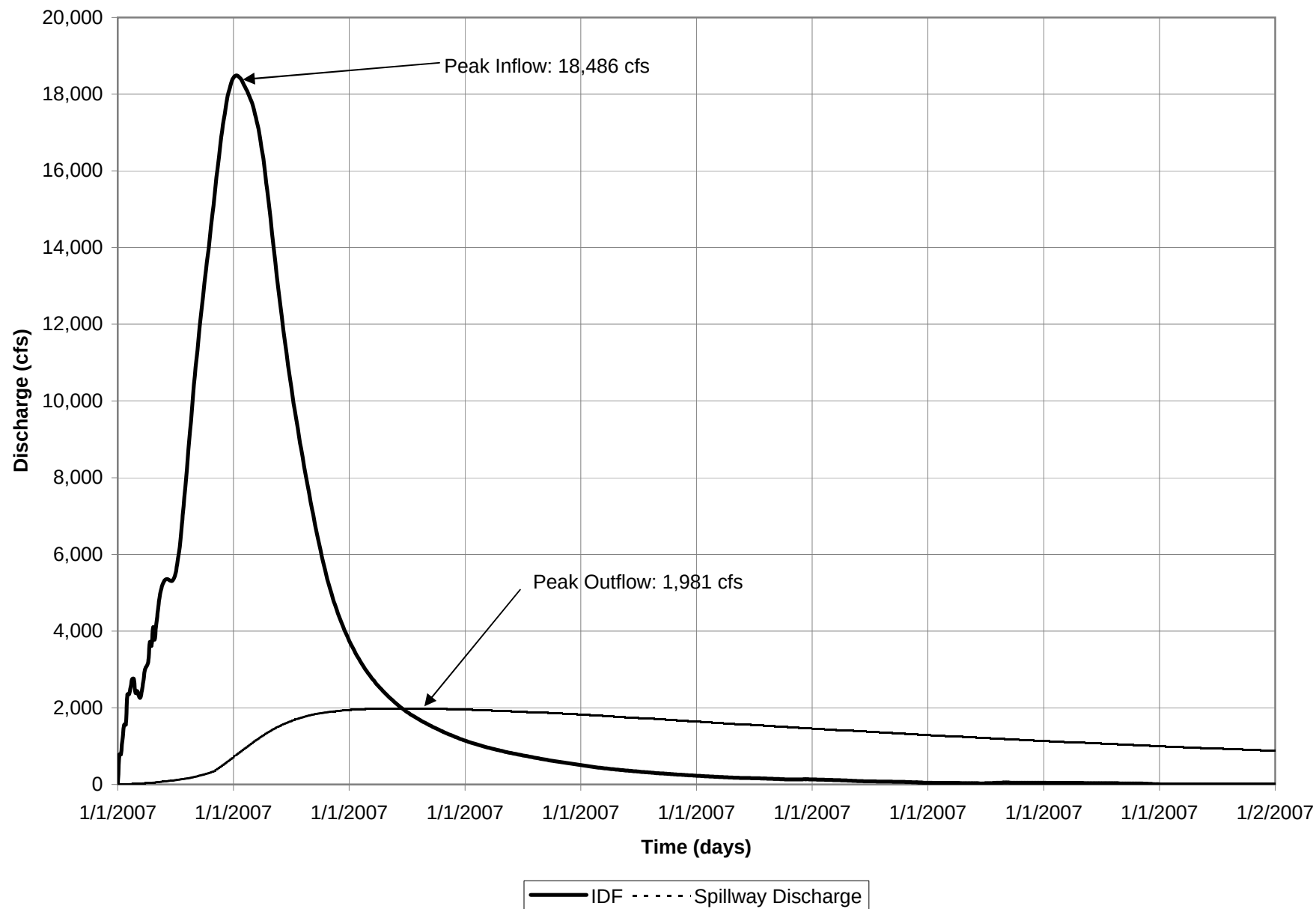




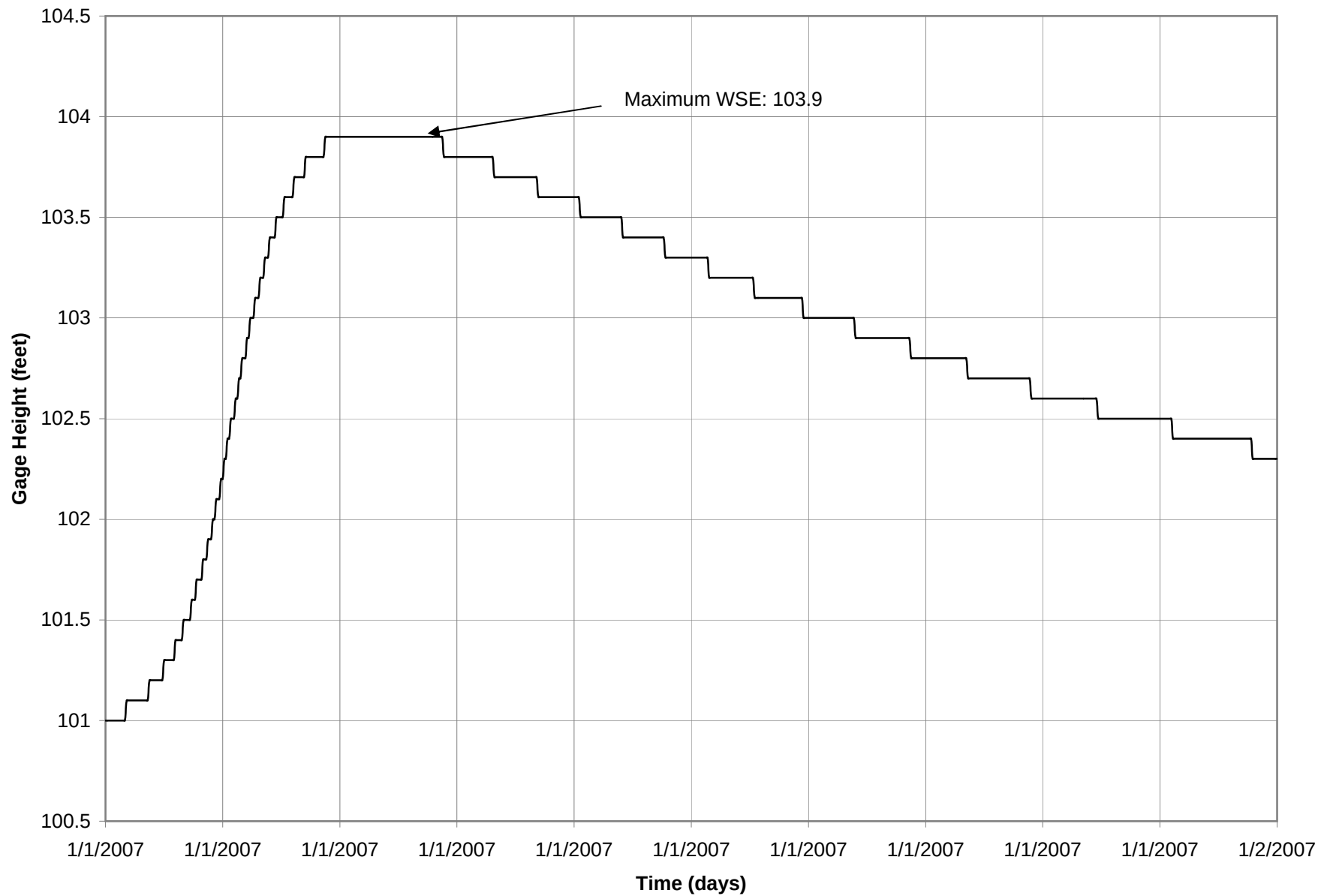
Rio Grande Reservoir - Existing Reservoir
Local Storm Reservoir Stage



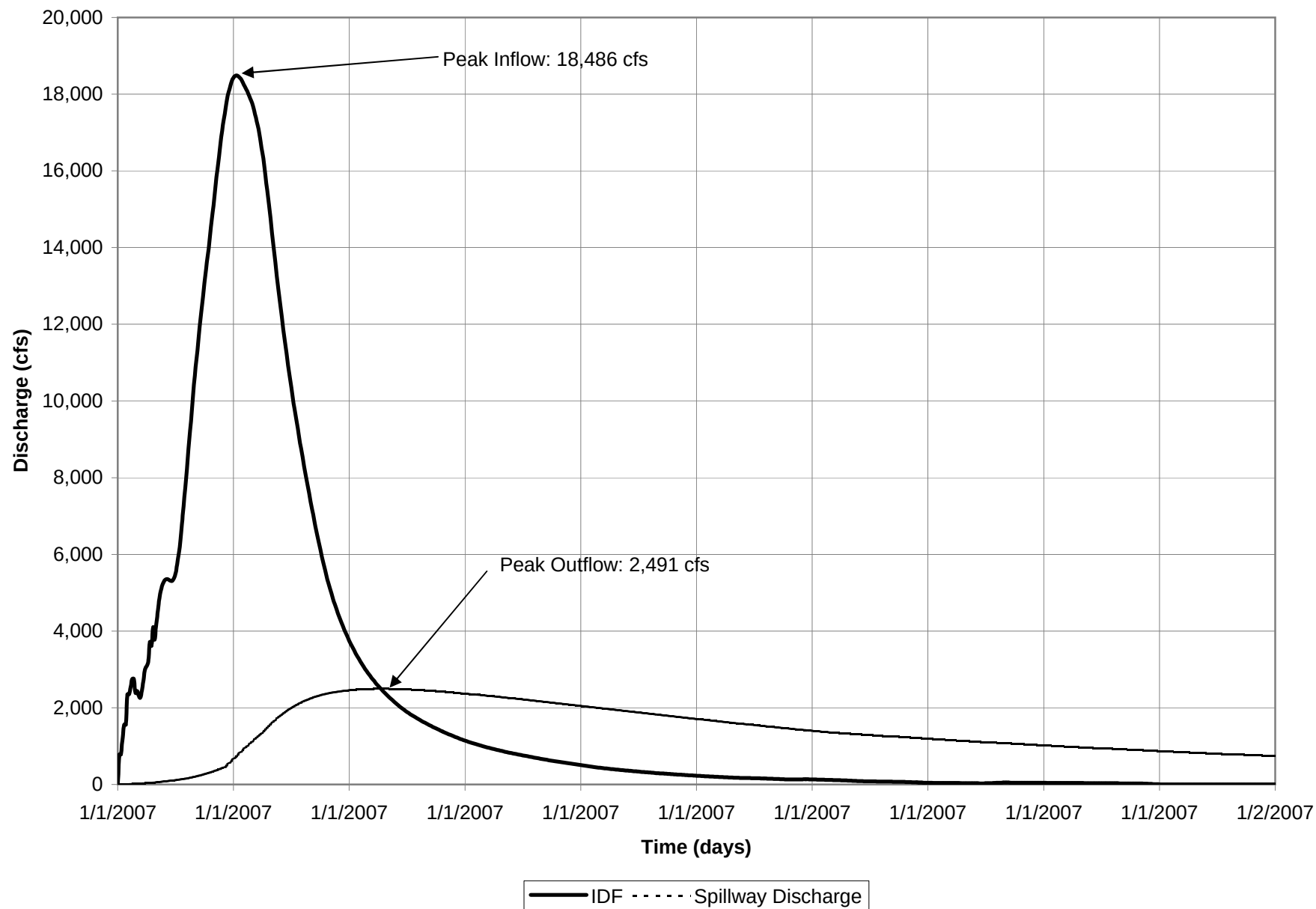
Rio Grande Reservoir - Existing Conditions
Local Storm IDF and Spillway Discharge



Rio Grande Reservoir - Enlarged Reservoir
Local Storm Reservoir Stage



Rio Grande Reservoir - Enlarged Reservoir
Local Storm IDF and Spillway Discharge



Subareas "Basin 1"

Name	Area	CN	% imp	transform	UH Name
Rio_Grande	70.9	85	0.0	User-Specified UH	RG (General)
Lost_Trail	25.4	85	0.0	User-Specified UH	Lost_Trail (General)
Ute	41.3	85	0.0	User-Specified UH	Ute (General)
Weminuche	11.8	85	0.0	User-Specified UH	Weminuche (General)
Res_Tribs	7.6	85	0.0	User-Specified UH	Res_Tribs (General)
Reservoir	2	User-Specified UH	Reservoir		

Reservoirs "Basin 1"

Name	Route Method	Route Curve	Initial Elev	Stor Outflow	Elev Stor
RG_Reservoir	Modified Puls	Storage-Elevation-Outflow	91	RG	above_9450

Current as of

Reservoir Results "EPAT"

Reservoir	Area (sq.mi)	Peak Inflow (CFS)	Peak Outflow (CFS)	Peak Storage (AC-FT)	Peak Elevation
RG_Reservoir	159.0	13307.1	6633.9	12423.5	102.1

Subarea Results "EPAT"

Subarea	Peak Flow (cfs)	Peak Time	Outflow depth (in)	Baseflow depth (in)	Runoff depth (in)	Excess depth (in)	Loss depth (in)	Precip depth (in)
Rio_Grande	5775.1	04Jan2007, 08:58	4.50	0.00	4.50	4.51	1.71	6.22
Lost_Trail	2405.6	04Jan2007, 07:38	4.50	0.00	4.50	4.51	1.71	6.22
Ute	3775.4	04Jan2007, 07:54	4.50	0.00	4.50	4.51	1.71	6.22
Weminuche	1334.1	04Jan2007, 06:38	4.50	0.00	4.50	4.51	1.71	6.22
Res_Tribs	1036.7	04Jan2007, 05:30	4.50	0.00	4.50	4.51	1.71	6.22
Reservoir	187.3	04Jan2007, 00:04	3.93	0.00	3.93	6.22	0.00	6.22

Reach Results "EPAT"

Reach	Area (sq.mi.)	Inflow (cfs)	Outflow (cfs)
Reach-sink	0.0	0.0	0.0
Reach	145.2	12118.9	12118.9

Current as of 05Jun2008, 12:25:23

?xml version="1.0" encoding="UTF-8"?>

Subareas "Basin"

Name	Area	CN	% imp	transform	UH Name
Rio_Grande	70.9	85	0.0	User-Specified UH	RG (Thunder)
Lost_Trail	25.4	85	0.0	User-Specified UH	Lost Trail (Thunder)
Ute	41.3	85	0.0	User-Specified UH	Ute (Thunder)
Weminuche	11.8	85	0.0	User-Specified UH	Weminuche (Thunder)
Res_Tribs	7.6	85	0.0	User-Specified UH	Res_Tribs (Thunder)
Reservoir	2	User-Specified UH	Reservoir		

Reservoirs "Basin"

Name	Route Method	Route Curve	Initial Elev	Stor Outflow	Elev Stor
RG_Reservoir	Modified Puls	Storage-Elevation-Outflow	RG	above_9450	

Current as of

?xml version="1.0" encoding="UTF-8"?>

Reservoir Results "EPAT"

Reservoir	Area (sq.mi)	Peak Inflow (CFS)	Peak Outflow (CFS)	Peak Storage (AC-FT)	Peak Elevation
RG_Reservoir	159.0	18486.1	1980.8	3508.3	94.2

Subarea Results "EPAT"

Subarea	Peak Flow (cfs)	Peak Time	Outflow depth (in)	Baseflow depth (in)	Runoff depth (in)	Excess depth (in)	Loss depth (in)	Precip depth (in)
Rio_Grande	9078.3	01Jan2007, 03:00	0.52	0.00	0.52	0.52	1.09	1.60
Lost_Trail	4477.8	01Jan2007, 02:16	0.52	0.00	0.52	0.52	1.09	1.60
Ute	6750.7	01Jan2007, 02:24	0.52	0.00	0.52	0.52	1.09	1.60
Weminuche	3162.6	01Jan2007, 01:36	0.52	0.00	0.52	0.52	1.09	1.60
Res_Tribs	4144.6	01Jan2007, 00:54	0.52	0.00	0.52	0.52	1.09	1.60
Reservoir	2736.7	01Jan2007, 00:18	1.01	0.00	1.01	1.60	0.00	1.60

Reach Results "EPAT"

Reach	Area (sq.mi.)	Inflow (cfs)	Outflow (cfs)
Reach-sink	159.0	1980.8	1980.8
Reach	145.2	17712.3	17712.3

Current as of 14Jun2008, 14:25:22

?xml version="1.0" encoding="UTF-8"?>

Subareas "Basin"

Name	Area	CN	% imp	transform	UH Name
Rio_Grande	70.9	85	0.0	User-Specified UH	RG (General)
Lost_Trail	25.4	85	0.0	User-Specified UH	Lost_Trail (General)
Ute	41.3	85	0.0	User-Specified UH	Ute (General)
Weminuche	11.8	85	0.0	User-Specified UH	Weminuche (General)
Res_Tribs	7.6	85	0.0	User-Specified UH	Res_Tribs (General)
Reservoir	2	User-Specified UH	Reservoir		

Reservoirs "Basin"

Name	Route Method	Route Curve	Initial Elev	Stor Outflow	Elev Stor
RG_Reservoir	Modified Puls	Storage-Elevation-Outflow	91	RG	above_9450

Current as of

?xml version="1.0" encoding="UTF-8"?>

Reservoir Results "EPAT"

Reservoir	Area (sq.mi)	Peak Inflow (CFS)	Peak Outflow (CFS)	Peak Storage (AC-FT)	Peak Elevation
RG_Reservoir	159.0	13307.1	9050.7	18446.0	107.4

Subarea Results "EPAT"

Subarea	Peak Flow (cfs)	Peak Time	Outflow depth (in)	Baseflow depth (in)	Runoff depth (in)	Excess depth (in)	Loss depth (in)	Precip depth (in)
Rio_Grande	5775.1	04Jan2007, 08:58	4.50	0.00	4.50	4.51	1.71	6.22
Lost_Trail	2405.6	04Jan2007, 07:38	4.50	0.00	4.50	4.51	1.71	6.22
Ute	3775.4	04Jan2007, 07:54	4.50	0.00	4.50	4.51	1.71	6.22
Weminuche	1334.1	04Jan2007, 06:38	4.50	0.00	4.50	4.51	1.71	6.22
Res_Tribs	1036.7	04Jan2007, 05:30	4.50	0.00	4.50	4.51	1.71	6.22
Reservoir	187.3	04Jan2007, 00:04	3.93	0.00	3.93	6.22	0.00	6.22

Reach Results "EPAT"

Reach	Area (sq.mi.)	Inflow (cfs)	Outflow (cfs)
Reach-sink	0.0	0.0	0.0
Reach	145.2	12118.9	12118.9

Current as of 14Jun2008, 14:16:25

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Subareas "Basin"

Name	Area	CN	% imp	transform	UH Name
Rio_Grande	70.9	85	0.0	User-Specified UH	RG (Thunder)
Lost_Trail	25.4	85	0.0	User-Specified UH	Lost Trail (Thunder)
Ute	41.3	85	0.0	User-Specified UH	Ute (Thunder)
Weminuche	11.8	85	0.0	User-Specified UH	Weminuche (Thunder)
Res_Tribs	7.6	85	0.0	User-Specified UH	Res_Tribs (Thunder)
Reservoir	2	User-Specified UH	Reservoir		

Reservoirs "Basin"

Name	Route Method	Route Curve	Initial Elev	Stor Outflow	Elev Stor
RG_Reservoir	Modified Puls	Storage-Elevation-Outflow	RG	above_9450	

Current as of

?xml version="1.0" encoding="UTF-8"?>

Reservoir Results "100%EPAT"

Reservoir	Area (sq.mi)	Peak Inflow (CFS)	Peak Outflow (CFS)	Peak Storage (AC-FT)	Peak Elevation
RG_Reservoir	159.0	18486.1	0.0	4475.5	95.0

Subarea Results "100%EPAT"

Subarea	Peak Flow (cfs)	Peak Time	Outflow depth (in)	Baseflow depth (in)	Runoff depth (in)	Excess depth (in)	Loss depth (in)	Precip depth (in)
Rio_Grande	9078.3	01Jan2007, 03:00	0.52	0.00	0.52	0.52	1.09	1.60
Lost_Trail	4477.8	01Jan2007, 02:16	0.52	0.00	0.52	0.52	1.09	1.60
Ute	6750.7	01Jan2007, 02:24	0.52	0.00	0.52	0.52	1.09	1.60
Weminuche	3162.6	01Jan2007, 01:36	0.52	0.00	0.52	0.52	1.09	1.60
Res_Tribs	4144.6	01Jan2007, 00:54	0.52	0.00	0.52	0.52	1.09	1.60
Reservoir	2736.7	01Jan2007, 00:18	1.01	0.00	1.01	1.60	0.00	1.60

Reach Results "100%EPAT"

Reach	Area (sq.mi.)	Inflow (cfs)	Outflow (cfs)
Reach-sink	159.0	0.0	0.0
Reach	145.2	17712.3	17712.3

Current as of 16Jun2008, 12:41:36

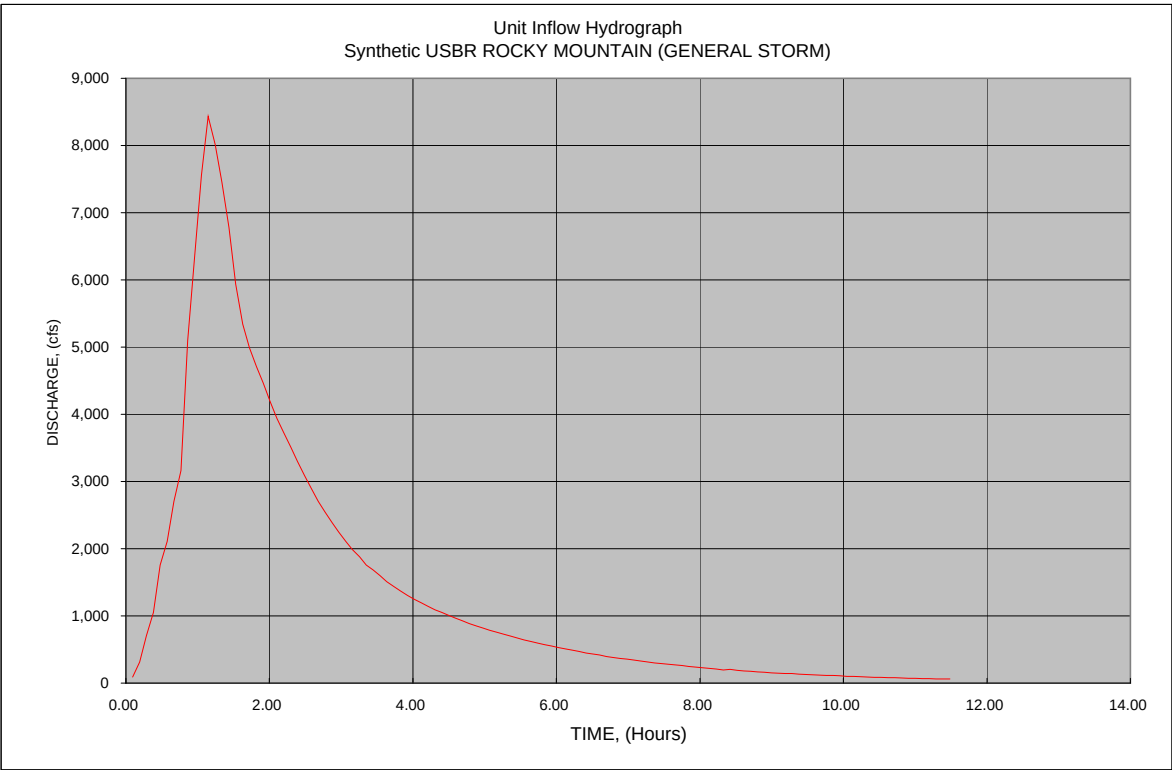
Rio Grande Reservoir -LOST TRAIL TRIBUTARY

Drainage Area =	25 sq. miles	Lg+D/2 =	1.91 Hours
Basin Slope =	395 ft./mile	Basin Factor =	1.50
L =	9.9 mi., Length of Watercourse	V' =	672.25 cfs/Day
Lca =	6.8 mi., Distance to Centroid	Qs =	351.3 * q, cfs
Kn =	0.046 -, Ave. Weighted Manning's n		

PARAMETERS:

Calculated:	Lag Time, Lg =	1.79 Hours	Unit Duration, D =	19.52 minutes
			Calculated Timestep =	5.74 minutes

Data to be used in Analysis Unit Duration, D = 15 minutes, round down to nearest of 5, 10, 15, 30, 60, 120, 180, or 360
Selected Timestep = 2 minutes, integer value evenly divisible into 60



UI Record - Unit Graph

2 minute interval

UI Dataset located in columns P:Q to the right -->

UI See cell Q49 for Interpolated Peak

UI
UI
UI
UI
UI
UI
UI
UI
UI
UI

USBR calculated unitgraph peak = 8434 Interpolated Peak =

Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs	Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs
5.0	0.10	5.7	0.26	91	305.0	5.84	350.2	1.63	573
10.0	0.19	11.5	0.90	316	310.0	5.93	356.0	1.57	551
15.0	0.29	17.2	2.00	703	315.0	6.03	361.7	1.50	527
20.0	0.38	23.0	3.00	1,054	320.0	6.12	367.5	1.45	509
25.0	0.48	28.7	5.00	1,756	325.0	6.22	373.2	1.39	488
30.0	0.57	34.4	6.00	2,108	330.0	6.32	378.9	1.34	471
35.0	0.67	40.2	7.70	2,705	335.0	6.41	384.7	1.28	450
40.0	0.77	45.9	9.00	3,161	340.0	6.51	390.4	1.23	432
45.0	0.86	51.7	14.51	5,097	345.0	6.60	396.2	1.19	418
50.0	0.96	57.4	18.11	6,361	350.0	6.70	401.9	1.13	397
55.0	1.05	63.2	21.51	7,555	355.0	6.79	407.7	1.09	383
60.0	1.15	68.9	24.01	8,434	360.0	6.89	413.4	1.05	369
65.0	1.24	74.6	22.81	8,012	365.0	6.99	419.1	1.01	355
70.0	1.34	80.4	21.21	7,450	370.0	7.08	424.9	0.97	341
75.0	1.44	86.1	19.31	6,783	375.0	7.18	430.6	0.93	327
80.0	1.53	91.9	16.91	5,940	380.0	7.27	436.4	0.90	316
85.0	1.63	97.6	15.21	5,343	385.0	7.37	442.1	0.86	302
90.0	1.72	103.3	14.21	4,991	390.0	7.46	447.8	0.83	292
95.0	1.82	109.1	13.41	4,710	395.0	7.56	453.6	0.80	281
100.0	1.91	114.8	12.71	4,464	400.0	7.66	459.3	0.77	270
105.0	2.01	120.6	11.91	4,183	405.0	7.75	465.1	0.74	260
110.0	2.11	126.3	11.21	3,938	410.0	7.85	470.8	0.71	249
115.0	2.20	132.1	10.61	3,727	415.0	7.94	476.6	0.68	239
120.0	2.30	137.8	10.01	3,516	420.0	8.04	482.3	0.65	228
125.0	2.39	143.5	9.40	3,302	425.0	8.13	488.0	0.63	221
130.0	2.49	149.3	8.80	3,091	430.0	8.23	493.8	0.60	211
135.0	2.58	155.0	8.25	2,898	435.0	8.33	499.5	0.56	197
140.0	2.68	160.8	7.70	2,705	440.0	8.42	505.3	0.58	204
145.0	2.78	166.5	7.25	2,547	445.0	8.52	511.0	0.54	190
150.0	2.87	172.2	6.80	2,389	450.0	8.61	516.7	0.52	183
155.0	2.97	178.0	6.40	2,248	455.0	8.71	522.5	0.50	176
160.0	3.06	183.7	6.00	2,108	460.0	8.80	528.2	0.48	169
165.0	3.16	189.5	5.65	1,985	465.0	8.90	534.0	0.46	162
170.0	3.25	195.2	5.35	1,879	470.0	9.00	539.7	0.44	155
175.0	3.35	201.0	5.00	1,756	475.0	9.09	545.5	0.42	148
180.0	3.44	206.7	4.80	1,686	480.0	9.19	551.2	0.41	144
185.0	3.54	212.4	4.55	1,598	485.0	9.28	556.9	0.40	141
190.0	3.64	218.2	4.30	1,510	490.0	9.38	562.7	0.38	133
195.0	3.73	223.9	4.10	1,440	495.0	9.47	568.4	0.37	130
200.0	3.83	229.7	3.90	1,370	500.0	9.57	574.2	0.35	123
205.0	3.92	235.4	3.72	1,307	505.0	9.67	579.9	0.34	119
210.0	4.02	241.1	3.55	1,247	510.0	9.76	585.6	0.33	116
215.0	4.11	246.9	3.40	1,194	515.0	9.86	591.4	0.32	112
220.0	4.21	252.6	3.25	1,142	520.0	9.95	597.1	0.31	109
225.0	4.31	258.4	3.10	1,089	525.0	10.05	602.9	0.29	102
230.0	4.40	264.1	3.00	1,054	530.0	10.14	608.6	0.28	98
235.0	4.50	269.9	2.87	1,008	535.0	10.24	614.4	0.27	95
240.0	4.59	275.6	2.75	966	540.0	10.33	620.1	0.26	91
245.0	4.69	281.3	2.65	931	545.0	10.43	625.8	0.25	88
250.0	4.78	287.1	2.52	885	550.0	10.53	631.6	0.24	84
255.0	4.88	292.8	2.42	850	555.0	10.62	637.3	0.23	81
260.0	4.98	298.6	2.33	818	560.0	10.72	643.1	0.23	81
265.0	5.07	304.3	2.24	787	565.0	10.81	648.8	0.22	77
270.0	5.17	310.0	2.15	755	570.0	10.91	654.5	0.21	74
275.0	5.26	315.8	2.07	727	575.0	11.00	660.3	0.20	70
280.0	5.36	321.5	1.99	699	580.0	11.10	666.0	0.19	67
285.0	5.45	327.3	1.91	671	585.0	11.20	671.8	0.19	67
290.0	5.55	333.0	1.83	643	590.0	11.29	677.5	0.18	63
295.0	5.65	338.8	1.76	618	595.0	11.39	683.3	0.17	60
300.0	5.74	344.5	1.70	597	600.0	11.48	689.0	0.17	60

NOTES : 1. Methodology used Dimensionless Unit Hydrograph.
2. For values of q use Table 4-9 from Flood Hydrology Manual

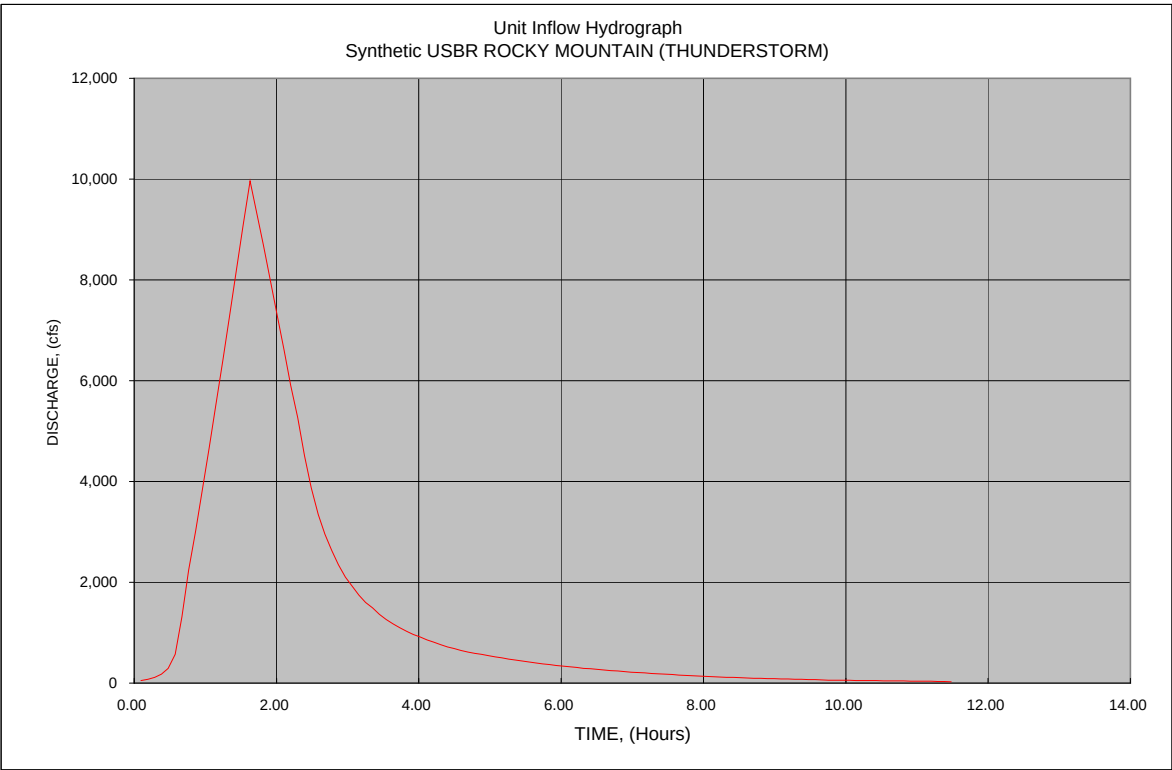
Rio Grande Reservoir -LOST TRAIL TRIBUTARY

Drainage Area =	25 sq. miles	Lg+D/2 =	1.91 Hours
Basin Slope =	395 ft./mile	Basin Factor =	1.50
L =	9.9 mi., Length of Watercourse	V' =	672.25 cfs/Day
Lca =	6.8 mi., Distance to Centroid	Qs =	351.3 * q, cfs
Kn =	0.046 -, Ave. Weighted Manning's n		

PARAMETERS:

Calculated:	Lag Time, Lg =	1.79 Hours	Unit Duration, D =	19.52 minutes
			Calculated Timestep =	5.74 minutes

Data to be used Unit Duration, D = 15 minutes, round down to nearest of 5, 10, 15, 30, 60, 120, 180, or 360
in Analysis Selected Timestep = 2 minutes, integer value evenly divisible into 60



UI Record - Unit Graph

2 minute interval

UI Dataset located in columns P:Q to the right -->

UI See cell Q49 for Interpolated Peak

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USBR calculated unitgraph peak = 9961 Interpolated Peak =

Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs	Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs
5.0	0.10	5.7	0.14	49	305.0	5.84	350.2	1.05	369
10.0	0.19	11.5	0.21	74	310.0	5.93	356.0	1.00	351
15.0	0.29	17.2	0.33	116	315.0	6.03	361.7	0.96	337
20.0	0.38	23.0	0.51	179	320.0	6.12	367.5	0.92	323
25.0	0.48	28.7	0.84	295	325.0	6.22	373.2	0.88	309
30.0	0.57	34.4	1.62	569	330.0	6.32	378.9	0.84	295
35.0	0.67	40.2	3.74	1,314	335.0	6.41	384.7	0.81	285
40.0	0.77	45.9	6.38	2,241	340.0	6.51	390.4	0.77	270
45.0	0.86	51.7	8.61	3,024	345.0	6.60	396.2	0.74	260
50.0	0.96	57.4	10.94	3,843	350.0	6.70	401.9	0.71	249
55.0	1.05	63.2	13.26	4,658	355.0	6.79	407.7	0.68	239
60.0	1.15	68.9	15.70	5,515	360.0	6.89	413.4	0.65	228
65.0	1.24	74.6	18.23	6,403	365.0	6.99	419.1	0.62	218
70.0	1.34	80.4	20.76	7,292	370.0	7.08	424.9	0.59	207
75.0	1.44	86.1	23.30	8,184	375.0	7.18	430.6	0.57	200
80.0	1.53	91.9	25.83	9,073	380.0	7.27	436.4	0.55	193
85.0	1.63	97.6	28.36	9,961	385.0	7.37	442.1	0.52	183
90.0	1.72	103.3	26.53	9,319	390.0	7.46	447.8	0.50	176
95.0	1.82	109.1	24.71	8,679	395.0	7.56	453.6	0.48	169
100.0	1.91	114.8	22.68	7,966	400.0	7.66	459.3	0.46	162
105.0	2.01	120.6	20.76	7,292	405.0	7.75	465.1	0.43	151
110.0	2.11	126.3	18.84	6,618	410.0	7.85	470.8	0.42	148
115.0	2.20	132.1	16.81	5,905	415.0	7.94	476.6	0.40	141
120.0	2.30	137.8	14.99	5,265	420.0	8.04	482.3	0.38	133
125.0	2.39	143.5	12.86	4,517	425.0	8.13	488.0	0.36	126
130.0	2.49	149.3	11.04	3,878	430.0	8.23	493.8	0.35	123
135.0	2.58	155.0	9.52	3,344	435.0	8.33	499.5	0.33	116
140.0	2.68	160.8	8.41	2,954	440.0	8.42	505.3	0.32	112
145.0	2.78	166.5	7.50	2,634	445.0	8.52	511.0	0.31	109
150.0	2.87	172.2	6.69	2,350	450.0	8.61	516.7	0.29	102
155.0	2.97	178.0	5.98	2,100	455.0	8.71	522.5	0.28	98
160.0	3.06	183.7	5.47	1,921	460.0	8.80	528.2	0.27	95
165.0	3.16	189.5	4.97	1,746	465.0	8.90	534.0	0.26	91
170.0	3.25	195.2	4.55	1,598	470.0	9.00	539.7	0.25	88
175.0	3.35	201.0	4.25	1,493	475.0	9.09	545.5	0.24	84
180.0	3.44	206.7	3.89	1,366	480.0	9.19	551.2	0.23	81
185.0	3.54	212.4	3.59	1,261	485.0	9.28	556.9	0.22	77
190.0	3.64	218.2	3.34	1,173	490.0	9.38	562.7	0.21	74
195.0	3.73	223.9	3.13	1,099	495.0	9.47	568.4	0.20	70
200.0	3.83	229.7	2.93	1,029	500.0	9.57	574.2	0.19	67
205.0	3.92	235.4	2.75	966	505.0	9.67	579.9	0.18	63
210.0	4.02	241.1	2.61	917	510.0	9.76	585.6	0.17	60
215.0	4.11	246.9	2.44	857	515.0	9.86	591.4	0.17	60
220.0	4.21	252.6	2.31	811	520.0	9.95	597.1	0.16	56
225.0	4.31	258.4	2.17	762	525.0	10.05	602.9	0.16	56
230.0	4.40	264.1	2.04	717	530.0	10.14	608.6	0.15	53
235.0	4.50	269.9	1.95	685	535.0	10.24	614.4	0.15	53
240.0	4.59	275.6	1.84	646	540.0	10.33	620.1	0.14	49
245.0	4.69	281.3	1.76	618	545.0	10.43	625.8	0.14	49
250.0	4.78	287.1	1.69	594	550.0	10.53	631.6	0.13	46
255.0	4.88	292.8	1.62	569	555.0	10.62	637.3	0.13	46
260.0	4.98	298.6	1.55	544	560.0	10.72	643.1	0.12	42
265.0	5.07	304.3	1.49	523	565.0	10.81	648.8	0.12	42
270.0	5.17	310.0	1.42	499	570.0	10.91	654.5	0.11	39
275.0	5.26	315.8	1.36	478	575.0	11.00	660.3	0.11	39
280.0	5.36	321.5	1.30	457	580.0	11.10	666.0	0.10	35
285.0	5.45	327.3	1.24	436	585.0	11.20	671.8	0.10	35
290.0	5.55	333.0	1.19	418	590.0	11.29	677.5	0.09	32
295.0	5.65	338.8	1.14	400	595.0	11.39	683.3	0.09	32
300.0	5.74	344.5	1.09	383	600.0	11.48	689.0	0.08	28

NOTES : 1. Methodology used Dimensionless Unit Hydrograph.
2. For values of q use Table 4-11 from Flood Hydrology Manual

Rio Grande Reservoir - RESERVOIR TRIBUTARIES

Drainage Area = 8 sq. miles

Basin Slope = 1100 ft./mile

L = 2 mi., Length of Watercourse

Lca = 0.6 mi., Distance to Centroid

Kn = 0.046 -, Ave. Weighted Manning's n

Lg+D/2 = 0.44 Hours

Basin Factor = 0.33

V' = 215.12 cfs/Day

Qs = 487.1 * q, cfs

PARAMETERS:

Calculated:

Lag Time, Lg = 0.40 Hours

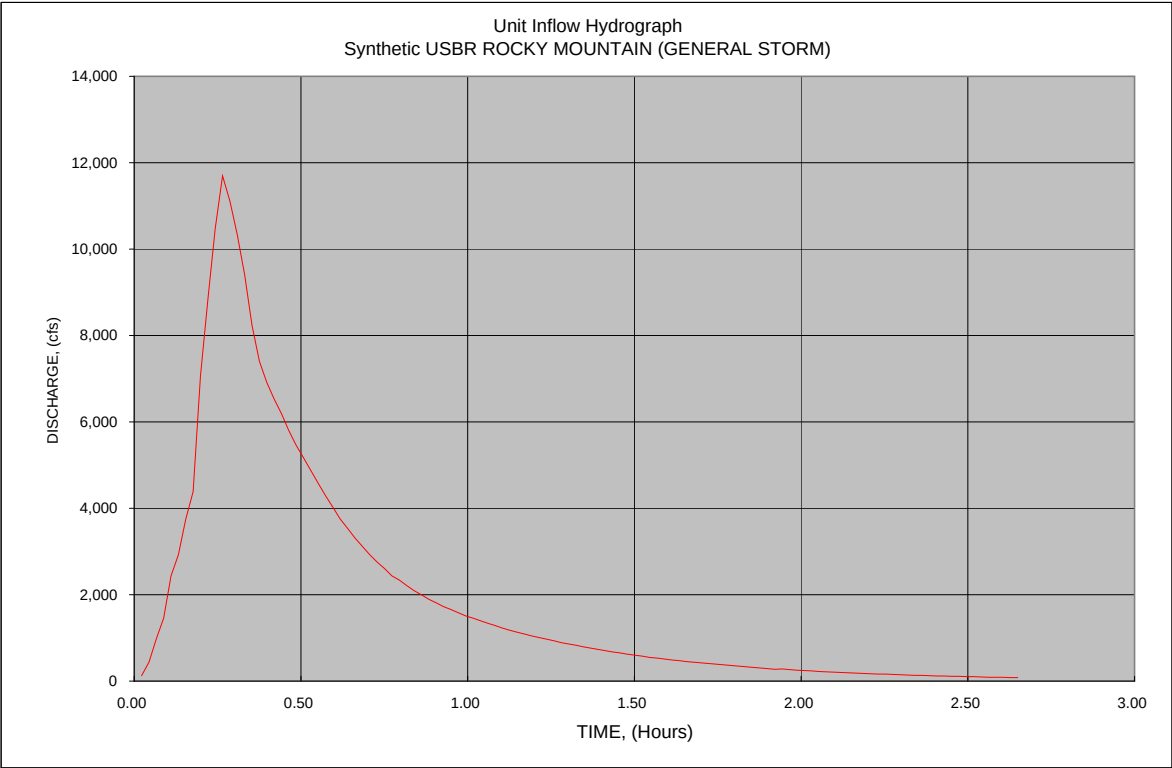
Unit Duration, D = 4.36 minutes

Calculated Timestep = 1.32 minutes

Data to be used in Analysis

Unit Duration, D = 5 minutes, round down to nearest of 5, 10, 15, 30, 60, 120, 180, or 360

Selected Timestep = 2 minutes, integer value evenly divisible into 60



UI Record - Unit Graph

2 minute interval

UI Dataset located in columns P:Q to the right -->

UI See cell Q49 for Interpolated Peak

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UI

USBR calculated unitgraph peak = 11695

Interpolated Peak =

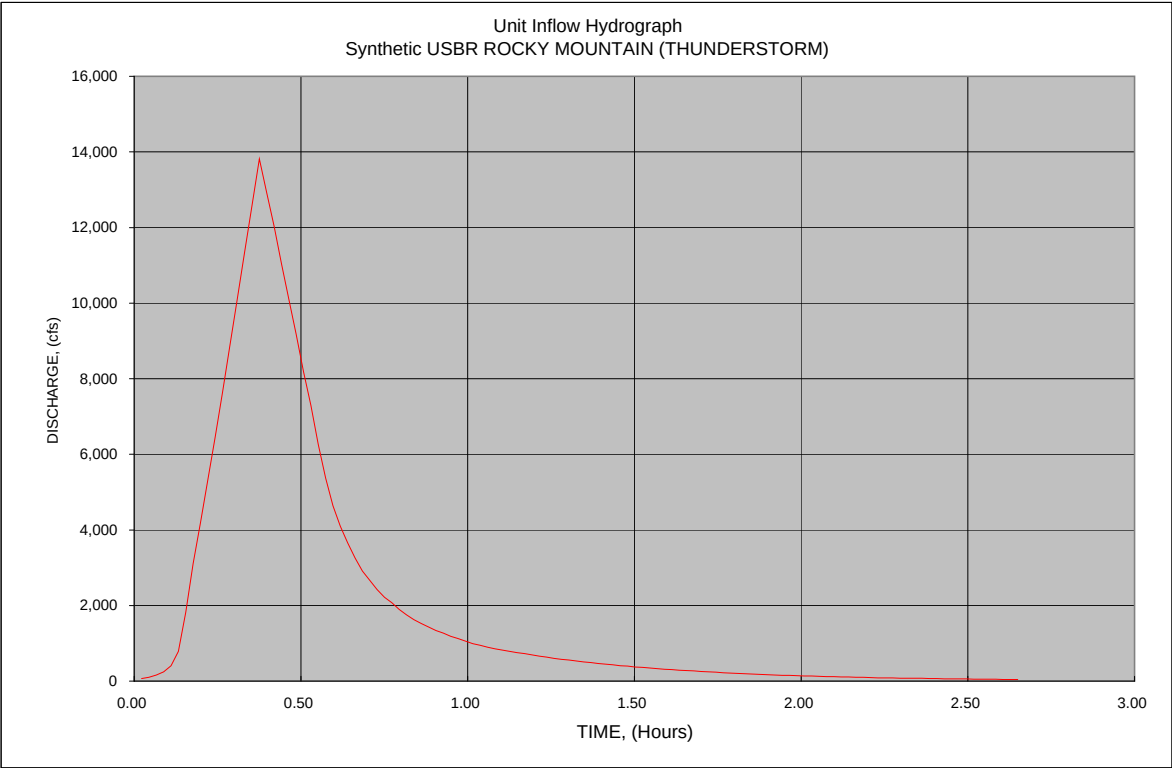
Time t, % of Lg+D/2	----- Hours	----- Min.	q	Qs cfs	Time t, % of Lg+D/2	----- Hours	----- Min.	q	Qs cfs
5.0	0.02	1.3	0.26	127	305.0	1.35	80.8	1.63	794
10.0	0.04	2.6	0.90	438	310.0	1.37	82.1	1.57	765
15.0	0.07	4.0	2.00	974	315.0	1.39	83.5	1.50	731
20.0	0.09	5.3	3.00	1,461	320.0	1.41	84.8	1.45	706

Rio Grande Reservoir - RESERVOIR TRIBUTARIES

Drainage Area =	8 sq. miles	Lg+D/2 =	0.44 Hours
Basin Slope =	1100 ft./mile	Basin Factor =	0.33
L =	2 mi., Length of Watercourse	V' =	215.12 cfs/Day
Lca =	0.6 mi., Distance to Centroid	Qs =	487.1 * q, cfs
Kn =	0.046 -, Ave. Weighted Manning's n		

PARAMETERS:			
Calculated:	Lag Time, Lg =	0.40 Hours	Unit Duration, D = 4.36 minutes
			Calculated Timestep = 1.32 minutes

Data to be used	Unit Duration, D =	5 minutes, round down to nearest of 5, 10, 15, 30, 60, 120, 180, or 360
in Analysis	Selected Timestep =	2 minutes, integer value evenly divisible into 60



UI Record - Unit Graph2 minute interval

UI Dataset located in columns P:Q to the right -->
UI See cell Q49 for Interpolated Peak
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UI
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USBR calculated unitgraph peak = 13814Interpolated Peak =

Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs	Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs
5.0	0.02	1.3	0.14	68	305.0	1.35	80.8	1.05	511
10.0	0.04	2.6	0.21	102	310.0	1.37	82.1	1.00	487
15.0	0.07	4.0	0.33	161	315.0	1.39	83.5	0.96	468
20.0	0.09	5.3	0.51	248	320.0	1.41	84.8	0.92	448
25.0	0.11	6.6	0.84	409	325.0	1.44	86.1	0.88	429
30.0	0.13	7.9	1.62	789	330.0	1.46	87.4	0.84	409
35.0	0.15	9.3	3.74	1,822	335.0	1.48	88.8	0.81	395
40.0	0.18	10.6	6.38	3,108	340.0	1.50	90.1	0.77	375
45.0	0.20	11.9	8.61	4,194	345.0	1.52	91.4	0.74	360
50.0	0.22	13.2	10.94	5,329	350.0	1.55	92.7	0.71	346
55.0	0.24	14.6	13.26	6,459	355.0	1.57	94.1	0.68	331
60.0	0.26	15.9	15.70	7,647	360.0	1.59	95.4	0.65	317
65.0	0.29	17.2	18.23	8,880	365.0	1.61	96.7	0.62	302
70.0	0.31	18.5	20.76	10,112	370.0	1.63	98.0	0.59	287
75.0	0.33	19.9	23.30	11,349	375.0	1.66	99.4	0.57	278
80.0	0.35	21.2	25.83	12,582	380.0	1.68	100.7	0.55	268
85.0	0.38	22.5	28.36	13,814	385.0	1.70	102.0	0.52	253
90.0	0.40	23.8	26.53	12,923	390.0	1.72	103.3	0.50	244
95.0	0.42	25.2	24.71	12,036	395.0	1.74	104.7	0.48	234
100.0	0.44	26.5	22.68	11,047	400.0	1.77	106.0	0.46	224
105.0	0.46	27.8	20.76	10,112	405.0	1.79	107.3	0.43	209
110.0	0.49	29.1	18.84	9,177	410.0	1.81	108.6	0.42	205
115.0	0.51	30.5	16.81	8,188	415.0	1.83	110.0	0.40	195
120.0	0.53	31.8	14.99	7,302	420.0	1.85	111.3	0.38	185
125.0	0.55	33.1	12.86	6,264	425.0	1.88	112.6	0.36	175
130.0	0.57	34.4	11.04	5,378	430.0	1.90	113.9	0.35	170
135.0	0.60	35.8	9.52	4,637	435.0	1.92	115.3	0.33	161
140.0	0.62	37.1	8.41	4,096	440.0	1.94	116.6	0.32	156
145.0	0.64	38.4	7.50	3,653	445.0	1.97	117.9	0.31	151
150.0	0.66	39.7	6.69	3,259	450.0	1.99	119.2	0.29	141
155.0	0.68	41.1	5.98	2,913	455.0	2.01	120.6	0.28	136
160.0	0.71	42.4	5.47	2,664	460.0	2.03	121.9	0.27	132
165.0	0.73	43.7	4.97	2,421	465.0	2.05	123.2	0.26	127
170.0	0.75	45.0	4.55	2,216	470.0	2.08	124.5	0.25	122
175.0	0.77	46.4	4.25	2,070	475.0	2.10	125.9	0.24	117
180.0	0.79	47.7	3.89	1,895	480.0	2.12	127.2	0.23	112
185.0	0.82	49.0	3.59	1,749	485.0	2.14	128.5	0.22	107
190.0	0.84	50.3	3.34	1,627	490.0	2.16	129.8	0.21	102
195.0	0.86	51.7	3.13	1,525	495.0	2.19	131.2	0.20	97
200.0	0.88	53.0	2.93	1,427	500.0	2.21	132.5	0.19	93
205.0	0.91	54.3	2.75	1,340	505.0	2.23	133.8	0.18	88
210.0	0.93	55.6	2.61	1,271	510.0	2.25	135.1	0.17	83
215.0	0.95	57.0	2.44	1,189	515.0	2.27	136.5	0.17	83
220.0	0.97	58.3	2.31	1,125	520.0	2.30	137.8	0.16	78
225.0	0.99	59.6	2.17	1,057	525.0	2.32	139.1	0.16	78
230.0	1.02	60.9	2.04	994	530.0	2.34	140.4	0.15	73
235.0	1.04	62.3	1.95	950	535.0	2.36	141.8	0.15	73
240.0	1.06	63.6	1.84	896	540.0	2.38	143.1	0.14	68
245.0	1.08	64.9	1.76	857	545.0	2.41	144.4	0.14	68
250.0	1.10	66.2	1.69	823	550.0	2.43	145.7	0.13	63
255.0	1.13	67.6	1.62	789	555.0	2.45	147.1	0.13	63
260.0	1.15	68.9	1.55	755	560.0	2.47	148.4	0.12	58
265.0	1.17	70.2	1.49	726	565.0	2.50	149.7	0.12	58
270.0	1.19	71.5	1.42	692	570.0	2.52	151.0	0.11	54
275.0	1.21	72.9	1.36	662	575.0	2.54	152.4	0.11	54
280.0	1.24	74.2	1.30	633	580.0	2.56	153.7	0.10	49
285.0	1.26	75.5	1.24	604	585.0	2.58	155.0	0.10	49
290.0	1.28	76.8	1.19	580	590.0	2.61	156.3	0.09	44
295.0	1.30	78.2	1.14	555	595.0	2.63	157.7	0.09	44
300.0	1.32	79.5	1.09	531	600.0	2.65	159.0	0.08	39

NOTES : 1. Methodology used Dimensionless Unit Hydrograph.
2. For values of q use Table 4-11 from Flood Hydrology Manual

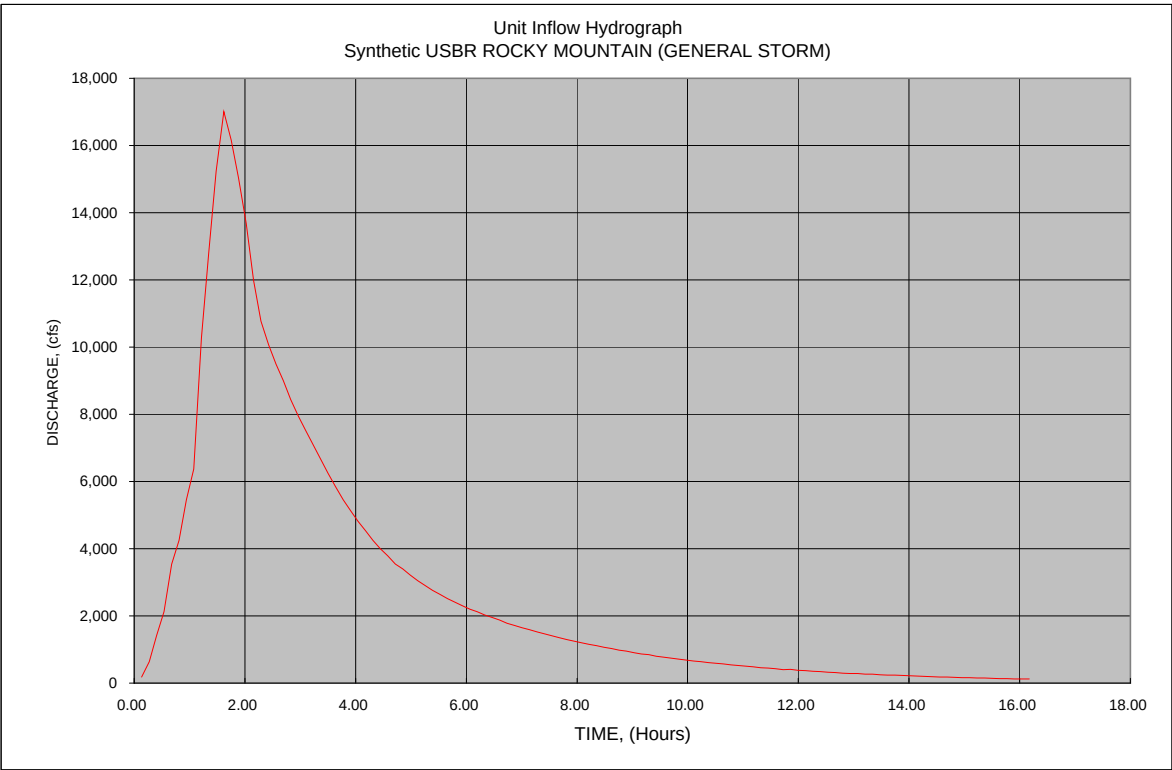
Rio Grande Reservoir - Rio Grande Main Stem

Drainage Area =	71 sq. miles	Lg+D/2 =	2.70 Hours
Basin Slope =	241 ft./mile	Basin Factor =	2.15
L =	16.6 mi., Length of Watercourse	V' =	1909.19 cfs/Day
Lca =	9.5 mi., Distance to Centroid	Qs =	708.3 * q, cfs
Kn =	0.046 -, Ave. Weighted Manning's n		

PARAMETERS:

Calculated:	Lag Time, Lg =	2.57 Hours	Unit Duration, D =	28.04 minutes
			Calculated Timestep =	8.09 minutes

Data to be used in Analysis Unit Duration, D = 15 minutes, round down to nearest of 5, 10, 15, 30, 60, 120, 180, or 360
Selected Timestep = 2 minutes, integer value evenly divisible into 60



UI Record - Unit Graph

2 minute interval

UI Dataset located in columns P:Q to the right -->

UI See cell Q49 for Interpolated Peak

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USBR calculated unitgraph peak = 17007 Interpolated Peak =

Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs	Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs
5.0	0.13	8.1	0.26	184	305.0	8.22	493.2	1.63	1,155
10.0	0.27	16.2	0.90	638	310.0	8.36	501.3	1.57	1,112
15.0	0.40	24.3	2.00	1,417	315.0	8.49	509.4	1.50	1,063
20.0	0.54	32.3	3.00	2,125	320.0	8.62	517.5	1.45	1,027
25.0	0.67	40.4	5.00	3,542	325.0	8.76	525.6	1.39	985
30.0	0.81	48.5	6.00	4,250	330.0	8.89	533.7	1.34	949
35.0	0.94	56.6	7.70	5,454	335.0	9.03	541.8	1.28	907
40.0	1.08	64.7	9.00	6,375	340.0	9.16	549.8	1.23	871
45.0	1.21	72.8	14.51	10,278	345.0	9.30	557.9	1.19	843
50.0	1.35	80.9	18.11	12,828	350.0	9.43	566.0	1.13	800
55.0	1.48	88.9	21.51	15,236	355.0	9.57	574.1	1.09	772
60.0	1.62	97.0	24.01	17,007	360.0	9.70	582.2	1.05	744
65.0	1.75	105.1	22.81	16,157	365.0	9.84	590.3	1.01	715
70.0	1.89	113.2	21.21	15,024	370.0	9.97	598.4	0.97	687
75.0	2.02	121.3	19.31	13,678	375.0	10.11	606.4	0.93	659
80.0	2.16	129.4	16.91	11,978	380.0	10.24	614.5	0.90	638
85.0	2.29	137.5	15.21	10,774	385.0	10.38	622.6	0.86	609
90.0	2.43	145.5	14.21	10,066	390.0	10.51	630.7	0.83	588
95.0	2.56	153.6	13.41	9,499	395.0	10.65	638.8	0.80	567
100.0	2.70	161.7	12.71	9,003	400.0	10.78	646.9	0.77	545
105.0	2.83	169.8	11.91	8,436	405.0	10.92	655.0	0.74	524
110.0	2.96	177.9	11.21	7,941	410.0	11.05	663.0	0.71	503
115.0	3.10	186.0	10.61	7,516	415.0	11.19	671.1	0.68	482
120.0	3.23	194.1	10.01	7,091	420.0	11.32	679.2	0.65	460
125.0	3.37	202.1	9.40	6,658	425.0	11.46	687.3	0.63	446
130.0	3.50	210.2	8.80	6,233	430.0	11.59	695.4	0.60	425
135.0	3.64	218.3	8.25	5,844	435.0	11.72	703.5	0.56	397
140.0	3.77	226.4	7.70	5,454	440.0	11.86	711.6	0.58	411
145.0	3.91	234.5	7.25	5,135	445.0	11.99	719.6	0.54	383
150.0	4.04	242.6	6.80	4,817	450.0	12.13	727.7	0.52	368
155.0	4.18	250.7	6.40	4,533	455.0	12.26	735.8	0.50	354
160.0	4.31	258.7	6.00	4,250	460.0	12.40	743.9	0.48	340
165.0	4.45	266.8	5.65	4,002	465.0	12.53	752.0	0.46	326
170.0	4.58	274.9	5.35	3,790	470.0	12.67	760.1	0.44	312
175.0	4.72	283.0	5.00	3,542	475.0	12.80	768.2	0.42	298
180.0	4.85	291.1	4.80	3,400	480.0	12.94	776.2	0.41	290
185.0	4.99	299.2	4.55	3,223	485.0	13.07	784.3	0.40	283
190.0	5.12	307.3	4.30	3,046	490.0	13.21	792.4	0.38	269
195.0	5.26	315.3	4.10	2,904	495.0	13.34	800.5	0.37	262
200.0	5.39	323.4	3.90	2,763	500.0	13.48	808.6	0.35	248
205.0	5.53	331.5	3.72	2,635	505.0	13.61	816.7	0.34	241
210.0	5.66	339.6	3.55	2,515	510.0	13.75	824.8	0.33	234
215.0	5.79	347.7	3.40	2,408	515.0	13.88	832.8	0.32	227
220.0	5.93	355.8	3.25	2,302	520.0	14.02	840.9	0.31	220
225.0	6.06	363.9	3.10	2,196	525.0	14.15	849.0	0.29	205
230.0	6.20	372.0	3.00	2,125	530.0	14.29	857.1	0.28	198
235.0	6.33	380.0	2.87	2,033	535.0	14.42	865.2	0.27	191
240.0	6.47	388.1	2.75	1,948	540.0	14.55	873.3	0.26	184
245.0	6.60	396.2	2.65	1,877	545.0	14.69	881.4	0.25	177
250.0	6.74	404.3	2.52	1,785	550.0	14.82	889.4	0.24	170
255.0	6.87	412.4	2.42	1,714	555.0	14.96	897.5	0.23	163
260.0	7.01	420.5	2.33	1,650	560.0	15.09	905.6	0.23	163
265.0	7.14	428.6	2.24	1,587	565.0	15.23	913.7	0.22	156
270.0	7.28	436.6	2.15	1,523	570.0	15.36	921.8	0.21	149
275.0	7.41	444.7	2.07	1,466	575.0	15.50	929.9	0.20	142
280.0	7.55	452.8	1.99	1,410	580.0	15.63	938.0	0.19	135
285.0	7.68	460.9	1.91	1,353	585.0	15.77	946.0	0.19	135
290.0	7.82	469.0	1.83	1,296	590.0	15.90	954.1	0.18	128
295.0	7.95	477.1	1.76	1,247	595.0	16.04	962.2	0.17	120
300.0	8.09	485.2	1.70	1,204	600.0	16.17	970.3	0.17	120

NOTES : 1. Methodology used Dimensionless Unit Hydrograph.
2. For values of q use Table 4-9 from Flood Hydrology Manual

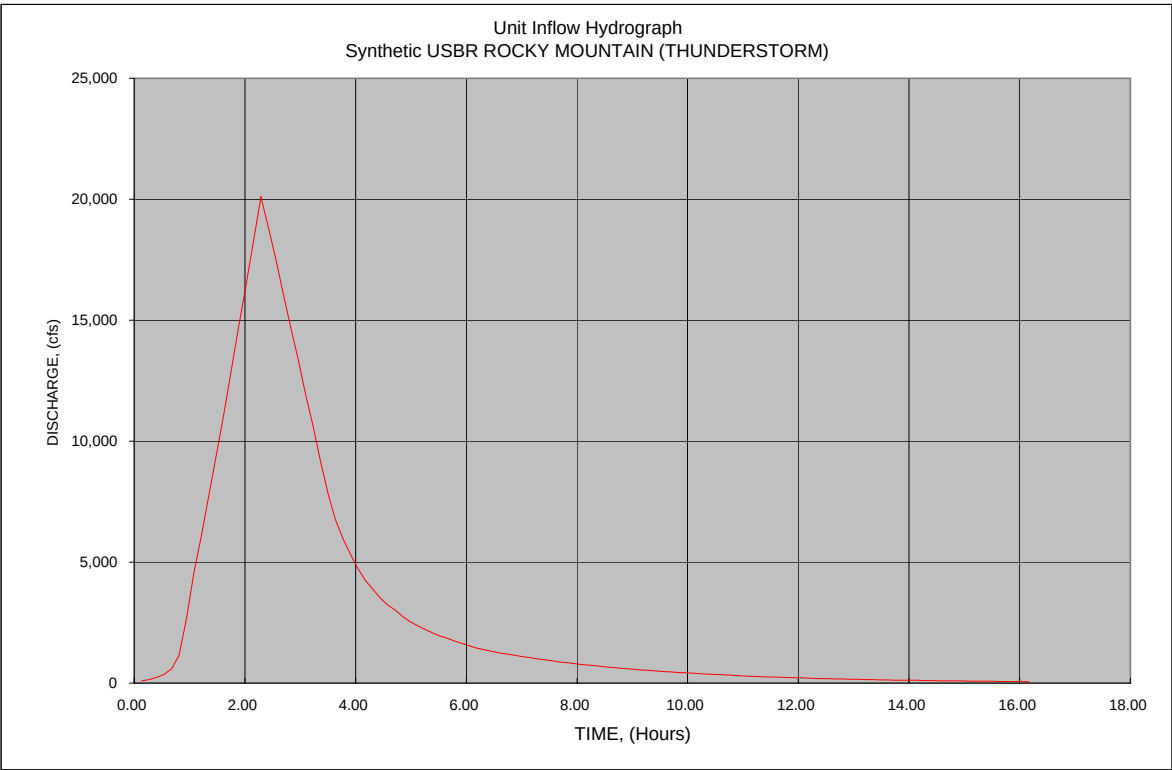
Rio Grande Reservoir - Rio Grande Main Stem

Drainage Area =	71 sq. miles	Lg+D/2 =	2.70 Hours
Basin Slope =	241 ft./mile	Basin Factor =	2.15
L =	16.6 mi., Length of Watercourse	V' =	1909.19 cfs/Day
Lca =	9.5 mi., Distance to Centroid	Qs =	708.3 * q, cfs
Kn =	0.046 -, Ave. Weighted Manning's n		

PARAMETERS:

Calculated:	Lag Time, Lg =	2.57 Hours	Unit Duration, D =	28.04 minutes
			Calculated Timestep =	8.09 minutes

Data to be used Unit Duration, D = 15 minutes, round down to nearest of 5, 10, 15, 30, 60, 120, 180, or 360
in Analysis Selected Timestep = 2 minutes, integer value evenly divisible into 60



UI Record - Unit Graph

2 minute interval

UI Dataset located in columns P:Q to the right -->

UI See cell Q49 for Interpolated Peak

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USBR calculated unitgraph peak = 20089 Interpolated Peak =

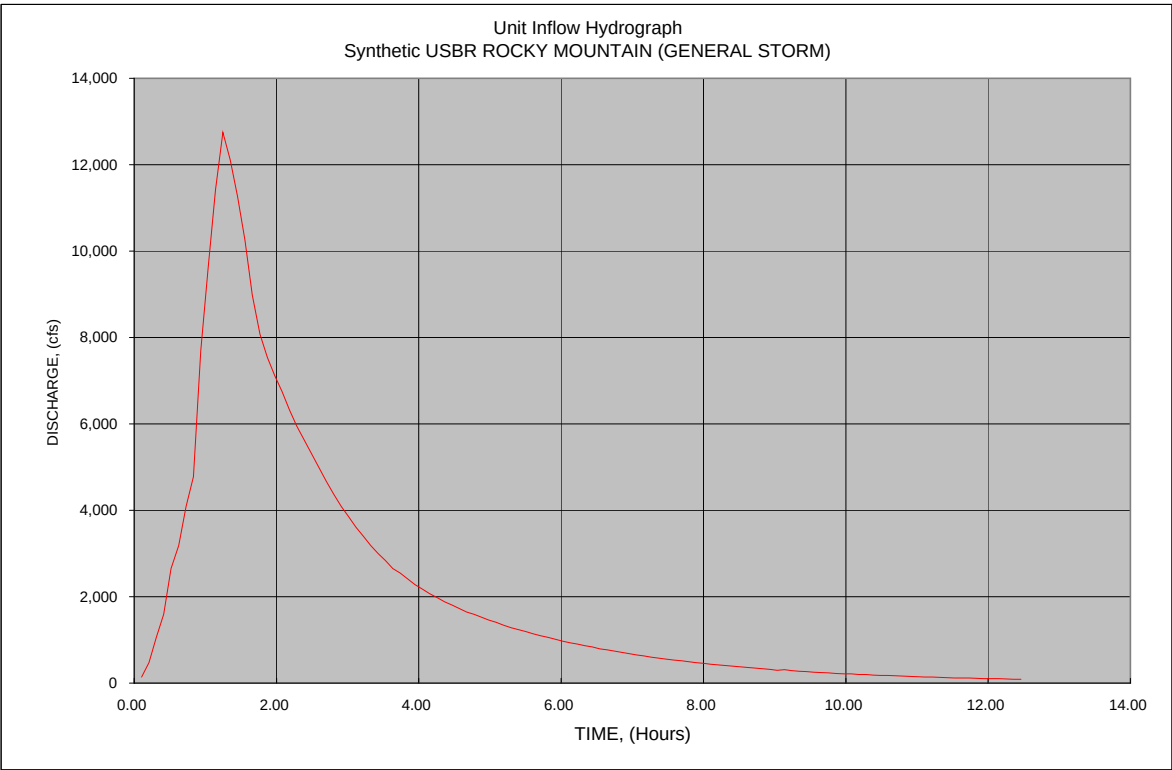
Rio Grande Reservoir -UTE TRIBUTARY

Drainage Area =	41 sq. miles	Lg+D/2 =	2.08 Hours
Basin Slope =	284 ft./mile	Basin Factor =	1.63
L =	11.8 mi., Length of Watercourse	V' =	1102.49 cfs/Day
Lca =	6.3 mi., Distance to Centroid	Qs =	530.9 * q, cfs
Kn =	0.046 -, Ave. Weighted Manning's n		

PARAMETERS:

Calculated:	Lag Time, Lg =	1.95 Hours	Unit Duration, D =	21.29 minutes
			Calculated Timestep =	6.23 minutes

Data to be used Unit Duration, D = 15 minutes, round down to nearest of 5, 10, 15, 30, 60, 120, 180, or 360
in Analysis Selected Timestep = 2 minutes, integer value evenly divisible into 60



UI Record - Unit Graph

2 minute interval

UI Dataset located in columns P:Q to the right -->
UI See cell Q49 for Interpolated Peak
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USBR calculated unitgraph peak = 12746 Interpolated Peak =

Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs	Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs
5.0	0.10	6.2	0.26	138	305.0	6.33	380.1	1.63	865
10.0	0.21	12.5	0.90	478	310.0	6.44	386.3	1.57	833
15.0	0.31	18.7	2.00	1,062	315.0	6.54	392.5	1.50	796
20.0	0.42	24.9	3.00	1,593	320.0	6.65	398.7	1.45	770
25.0	0.52	31.2	5.00	2,654	325.0	6.75	405.0	1.39	738
30.0	0.62	37.4	6.00	3,185	330.0	6.85	411.2	1.34	711
35.0	0.73	43.6	7.70	4,088	335.0	6.96	417.4	1.28	679
40.0	0.83	49.8	9.00	4,778	340.0	7.06	423.7	1.23	653
45.0	0.93	56.1	14.51	7,703	345.0	7.16	429.9	1.19	632
50.0	1.04	62.3	18.11	9,614	350.0	7.27	436.1	1.13	600
55.0	1.14	68.5	21.51	11,419	355.0	7.37	442.4	1.09	579
60.0	1.25	74.8	24.01	12,746	360.0	7.48	448.6	1.05	557

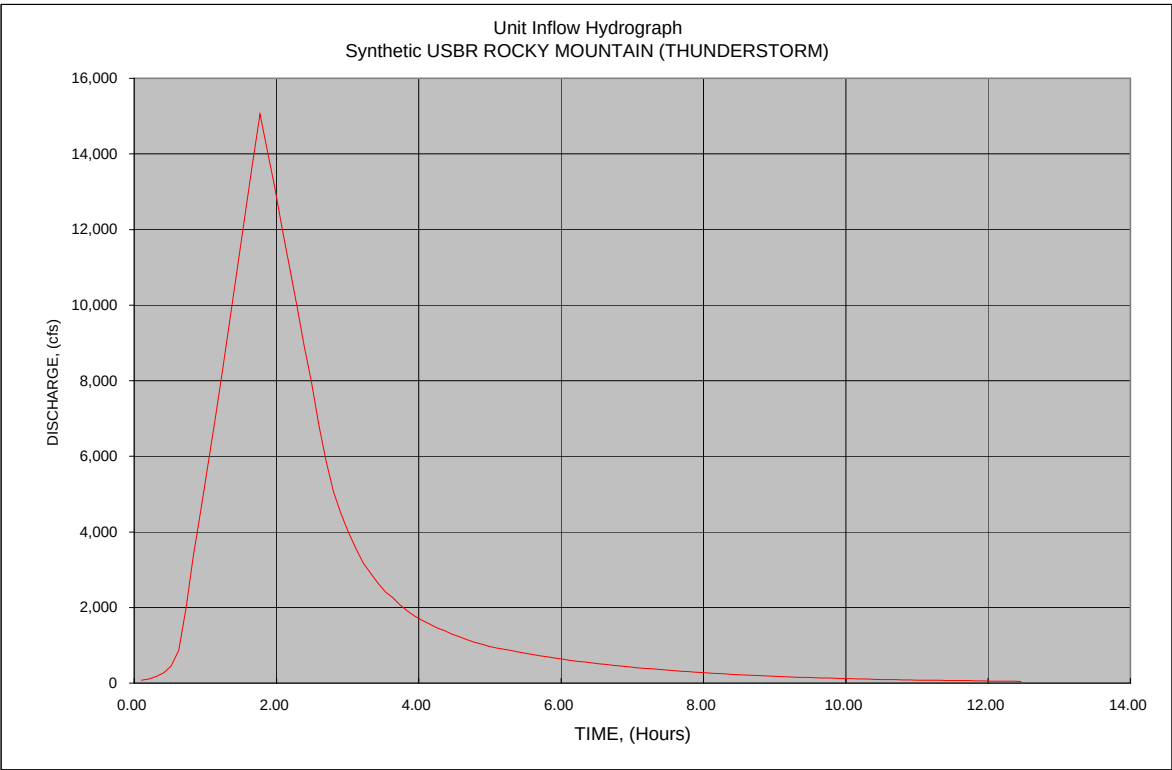
Rio Grande Reservoir -UTE TRIBUTARY

Drainage Area =	41 sq. miles	Lg+D/2 =	2.08 Hours
Basin Slope =	284 ft./mile	Basin Factor =	1.63
L =	11.8 mi., Length of Watercourse	V' =	1102.49 cfs/Day
Lca =	6.3 mi., Distance to Centroid	Qs =	530.9 * q, cfs
Kn =	0.046 -, Ave. Weighted Manning's n		

PARAMETERS:

Calculated:	Lag Time, Lg =	1.95 Hours	Unit Duration, D =	21.29 minutes
			Calculated Timestep =	6.23 minutes

Data to be used Unit Duration, D = 15 minutes, round down to nearest of 5, 10, 15, 30, 60, 120, 180, or 360
in Analysis Selected Timestep = 2 minutes, integer value evenly divisible into 60



UI Record - Unit Graph

2 minute interval

UI Dataset located in columns P:Q to the right -->

UI See cell Q49 for Interpolated Peak

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USBR calculated unitgraph peak = 15055 Interpolated Peak =

Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs	Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs
5.0	0.10	6.2	0.14	74	305.0	6.33	380.1	1.05	557
10.0	0.21	12.5	0.21	111	310.0	6.44	386.3	1.00	531
15.0	0.31	18.7	0.33	175	315.0	6.54	392.5	0.96	510
20.0	0.42	24.9	0.51	271	320.0	6.65	398.7	0.92	488
25.0	0.52	31.2	0.84	446	325.0	6.75	405.0	0.88	467
30.0	0.62	37.4	1.62	860	330.0	6.85	411.2	0.84	446
35.0	0.73	43.6	3.74	1,985	335.0	6.96	417.4	0.81	430
40.0	0.83	49.8	6.38	3,387	340.0	7.06	423.7	0.77	409
45.0	0.93	56.1	8.61	4,571	345.0	7.16	429.9	0.74	393
50.0	1.04	62.3	10.94	5,808	350.0	7.27	436.1	0.71	377
55.0	1.14	68.5	13.26	7,039	355.0	7.37	442.4	0.68	361
60.0	1.25	74.8	15.70	8,334	360.0	7.48	448.6	0.65	345
65.0	1.35	81.0	18.23	9,678	365.0	7.58	454.8	0.62	329
70.0	1.45	87.2	20.76	11,021	370.0	7.68	461.1	0.59	313
75.0	1.56	93.5	23.30	12,369	375.0	7.79	467.3	0.57	303
80.0	1.66	99.7	25.83	13,712	380.0	7.89	473.5	0.55	292
85.0	1.77	105.9	28.36	15,055	385.0	8.00	479.7	0.52	276
90.0	1.87	112.1	26.53	14,084	390.0	8.10	486.0	0.50	265
95.0	1.97	118.4	24.71	13,117	395.0	8.20	492.2	0.48	255
100.0	2.08	124.6	22.68	12,040	400.0	8.31	498.4	0.46	244
105.0	2.18	130.8	20.76	11,021	405.0	8.41	504.7	0.43	228
110.0	2.28	137.1	18.84	10,001	410.0	8.51	510.9	0.42	223
115.0	2.39	143.3	16.81	8,924	415.0	8.62	517.1	0.40	212
120.0	2.49	149.5	14.99	7,958	420.0	8.72	523.4	0.38	202
125.0	2.60	155.8	12.86	6,827	425.0	8.83	529.6	0.36	191
130.0	2.70	162.0	11.04	5,861	430.0	8.93	535.8	0.35	186
135.0	2.80	168.2	9.52	5,054	435.0	9.03	542.0	0.33	175
140.0	2.91	174.5	8.41	4,465	440.0	9.14	548.3	0.32	170
145.0	3.01	180.7	7.50	3,981	445.0	9.24	554.5	0.31	165
150.0	3.12	186.9	6.69	3,551	450.0	9.35	560.7	0.29	154
155.0	3.22	193.1	5.98	3,175	455.0	9.45	567.0	0.28	149
160.0	3.32	199.4	5.47	2,904	460.0	9.55	573.2	0.27	143
165.0	3.43	205.6	4.97	2,638	465.0	9.66	579.4	0.26	138
170.0	3.53	211.8	4.55	2,415	470.0	9.76	585.7	0.25	133
175.0	3.63	218.1	4.25	2,256	475.0	9.86	591.9	0.24	127
180.0	3.74	224.3	3.89	2,065	480.0	9.97	598.1	0.23	122
185.0	3.84	230.5	3.59	1,906	485.0	10.07	604.4	0.22	117
190.0	3.95	236.8	3.34	1,773	490.0	10.18	610.6	0.21	111
195.0	4.05	243.0	3.13	1,662	495.0	10.28	616.8	0.20	106
200.0	4.15	249.2	2.93	1,555	500.0	10.38	623.0	0.19	101
205.0	4.26	255.4	2.75	1,460	505.0	10.49	629.3	0.18	96
210.0	4.36	261.7	2.61	1,386	510.0	10.59	635.5	0.17	90
215.0	4.47	267.9	2.44	1,295	515.0	10.70	641.7	0.17	90
220.0	4.57	274.1	2.31	1,226	520.0	10.80	648.0	0.16	85
225.0	4.67	280.4	2.17	1,152	525.0	10.90	654.2	0.16	85
230.0	4.78	286.6	2.04	1,083	530.0	11.01	660.4	0.15	80
235.0	4.88	292.8	1.95	1,035	535.0	11.11	666.7	0.15	80
240.0	4.98	299.1	1.84	977	540.0	11.21	672.9	0.14	74
245.0	5.09	305.3	1.76	934	545.0	11.32	679.1	0.14	74
250.0	5.19	311.5	1.69	897	550.0	11.42	685.3	0.13	69
255.0	5.30	317.8	1.62	860	555.0	11.53	691.6	0.13	69
260.0	5.40	324.0	1.55	823	560.0	11.63	697.8	0.12	64
265.0	5.50	330.2	1.49	791	565.0	11.73	704.0	0.12	64
270.0	5.61	336.4	1.42	754	570.0	11.84	710.3	0.11	58
275.0	5.71	342.7	1.36	722	575.0	11.94	716.5	0.11	58
280.0	5.82	348.9	1.30	690	580.0	12.05	722.7	0.10	53
285.0	5.92	355.1	1.24	658	585.0	12.15	729.0	0.10	53
290.0	6.02	361.4	1.19	632	590.0	12.25	735.2	0.09	48
295.0	6.13	367.6	1.14	605	595.0	12.36	741.4	0.09	48
300.0	6.23	373.8	1.09	579	600.0	12.46	747.7	0.08	42

NOTES : 1. Methodology used Dimensionless Unit Hydrograph.
2. For values of q use Table 4-11 from Flood Hydrology Manual

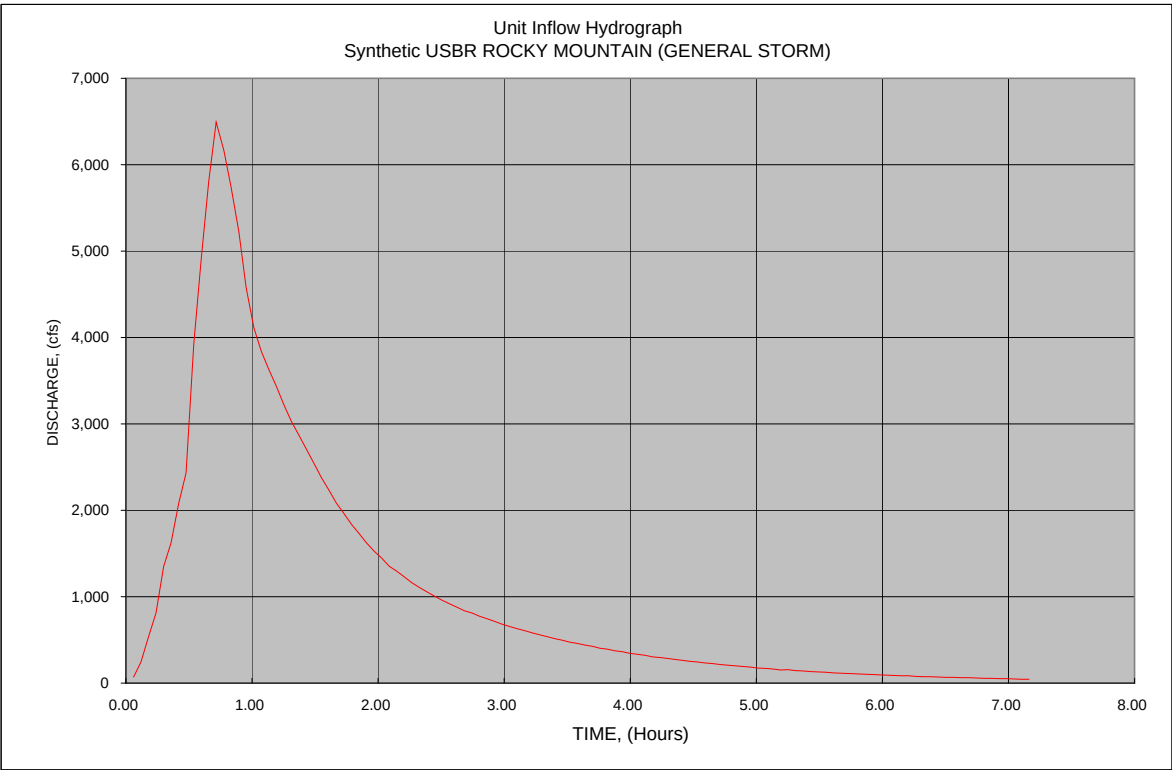
Rio Grande Reservoir -WEMINUCHE TRIBUTARY

Drainage Area =	12 sq. miles	Lg+D/2 =	1.19 Hours
Basin Slope =	618 ft./mile	Basin Factor =	0.93
L =	6.2 mi., Length of Watercourse	V' =	322.68 cfs/Day
Lca =	3.2 mi., Distance to Centroid	Qs =	270.4 * q, cfs
Kn =	0.046 -, Ave. Weighted Manning's n		

PARAMETERS:

Calculated:	Lag Time, Lg =	1.11 Hours	Unit Duration, D =	12.11 minutes
			Calculated Timestep =	3.58 minutes

Data to be used Unit Duration, D = 10 minutes, round down to nearest of 5, 10, 15, 30, 60, 120, 180, or 360
in Analysis Selected Timestep = 2 minutes, integer value evenly divisible into 60



UI Record - Unit Graph

2 minute interval

UI Dataset located in columns P:Q to the right -->

UI See cell Q49 for Interpolated Peak

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USBR calculated unitgraph peak = 6491 Interpolated Peak =

Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs	Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs
5.0	0.06	3.6	0.26	70	305.0	3.64	218.4	1.63	441
10.0	0.12	7.2	0.90	243	310.0	3.70	222.0	1.57	424
15.0	0.18	10.7	2.00	541	315.0	3.76	225.6	1.50	406
20.0	0.24	14.3	3.00	811	320.0	3.82	229.2	1.45	392
25.0	0.30	17.9	5.00	1,352	325.0	3.88	232.7	1.39	376
30.0	0.36	21.5	6.00	1,622	330.0	3.94	236.3	1.34	362
35.0	0.42	25.1	7.70	2,082	335.0	4.00	239.9	1.28	346
40.0	0.48	28.6	9.00	2,433	340.0	4.06	243.5	1.23	333
45.0	0.54	32.2	14.51	3,923	345.0	4.12	247.1	1.19	322
50.0	0.60	35.8	18.11	4,896	350.0	4.18	250.6	1.13	305
55.0	0.66	39.4	21.51	5,815	355.0	4.24	254.2	1.09	295
60.0	0.72	43.0	24.01	6,491	360.0	4.30	257.8	1.05	284
65.0	0.78	46.5	22.81	6,167	365.0	4.36	261.4	1.01	273
70.0	0.84	50.1	21.21	5,734	370.0	4.42	265.0	0.97	262
75.0	0.90	53.7	19.31	5,221	375.0	4.48	268.5	0.93	251
80.0	0.95	57.3	16.91	4,572	380.0	4.54	272.1	0.90	243
85.0	1.01	60.9	15.21	4,112	385.0	4.60	275.7	0.86	233
90.0	1.07	64.5	14.21	3,842	390.0	4.65	279.3	0.83	224
95.0	1.13	68.0	13.41	3,625	395.0	4.71	282.9	0.80	216
100.0	1.19	71.6	12.71	3,436	400.0	4.77	286.5	0.77	208
105.0	1.25	75.2	11.91	3,220	405.0	4.83	290.0	0.74	200
110.0	1.31	78.8	11.21	3,031	410.0	4.89	293.6	0.71	192
115.0	1.37	82.4	10.61	2,868	415.0	4.95	297.2	0.68	184
120.0	1.43	85.9	10.01	2,706	420.0	5.01	300.8	0.65	176
125.0	1.49	89.5	9.40	2,541	425.0	5.07	304.4	0.63	170
130.0	1.55	93.1	8.80	2,379	430.0	5.13	307.9	0.60	162
135.0	1.61	96.7	8.25	2,230	435.0	5.19	311.5	0.56	151
140.0	1.67	100.3	7.70	2,082	440.0	5.25	315.1	0.58	157
145.0	1.73	103.8	7.25	1,960	445.0	5.31	318.7	0.54	146
150.0	1.79	107.4	6.80	1,838	450.0	5.37	322.3	0.52	141
155.0	1.85	111.0	6.40	1,730	455.0	5.43	325.8	0.50	135
160.0	1.91	114.6	6.00	1,622	460.0	5.49	329.4	0.48	130
165.0	1.97	118.2	5.65	1,527	465.0	5.55	333.0	0.46	124
170.0	2.03	121.7	5.35	1,446	470.0	5.61	336.6	0.44	119
175.0	2.09	125.3	5.00	1,352	475.0	5.67	340.2	0.42	114
180.0	2.15	128.9	4.80	1,298	480.0	5.73	343.7	0.41	111
185.0	2.21	132.5	4.55	1,230	485.0	5.79	347.3	0.40	108
190.0	2.27	136.1	4.30	1,163	490.0	5.85	350.9	0.38	103
195.0	2.33	139.6	4.10	1,108	495.0	5.91	354.5	0.37	100
200.0	2.39	143.2	3.90	1,054	500.0	5.97	358.1	0.35	95
205.0	2.45	146.8	3.72	1,006	505.0	6.03	361.6	0.34	92
210.0	2.51	150.4	3.55	960	510.0	6.09	365.2	0.33	89
215.0	2.57	154.0	3.40	919	515.0	6.15	368.8	0.32	87
220.0	2.63	157.5	3.25	879	520.0	6.21	372.4	0.31	84
225.0	2.69	161.1	3.10	838	525.0	6.27	376.0	0.29	78
230.0	2.75	164.7	3.00	811	530.0	6.33	379.5	0.28	76
235.0	2.80	168.3	2.87	776	535.0	6.39	383.1	0.27	73
240.0	2.86	171.9	2.75	743	540.0	6.45	386.7	0.26	70
245.0	2.92	175.5	2.65	716	545.0	6.50	390.3	0.25	68
250.0	2.98	179.0	2.52	681	550.0	6.56	393.9	0.24	65
255.0	3.04	182.6	2.42	654	555.0	6.62	397.5	0.23	62
260.0	3.10	186.2	2.33	630	560.0	6.68	401.0	0.23	62
265.0	3.16	189.8	2.24	606	565.0	6.74	404.6	0.22	59
270.0	3.22	193.4	2.15	581	570.0	6.80	408.2	0.21	57
275.0	3.28	196.9	2.07	560	575.0	6.86	411.8	0.20	54
280.0	3.34	200.5	1.99	538	580.0	6.92	415.4	0.19	51
285.0	3.40	204.1	1.91	516	585.0	6.98	418.9	0.19	51
290.0	3.46	207.7	1.83	495	590.0	7.04	422.5	0.18	49
295.0	3.52	211.3	1.76	476	595.0	7.10	426.1	0.17	46
300.0	3.58	214.8	1.70	460	600.0	7.16	429.7	0.17	46

NOTES : 1. Methodology used Dimensionless Unit Hydrograph.
2. For values of q use Table 4-9 from Flood Hydrology Manual

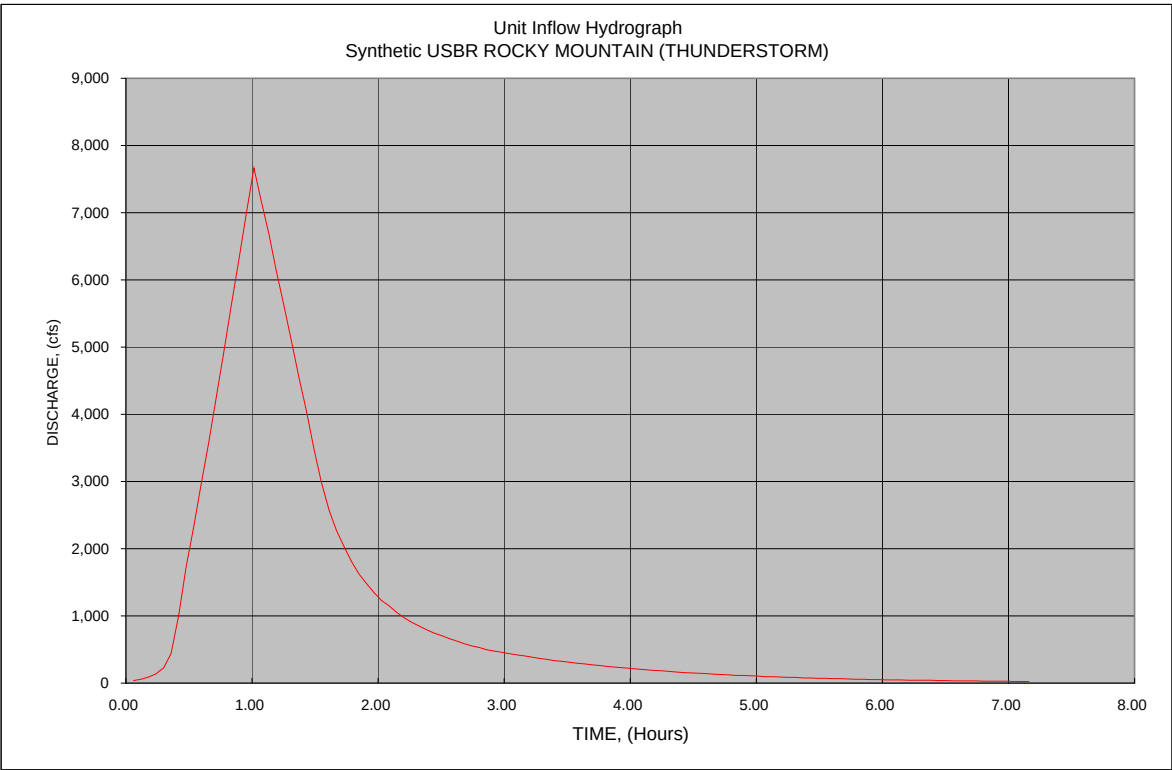
Rio Grande Reservoir -WEMINUCHE TRIBUTARY

Drainage Area =	12 sq. miles	Lg+D/2 =	1.19 Hours
Basin Slope =	618 ft./mile	Basin Factor =	0.93
L =	6.2 mi., Length of Watercourse	V' =	322.68 cfs/Day
Lca =	3.2 mi., Distance to Centroid	Qs =	270.4 * q, cfs
Kn =	0.046 -, Ave. Weighted Manning's n		

PARAMETERS:

Calculated:	Lag Time, Lg =	1.11 Hours	Unit Duration, D =	12.11 minutes
			Calculated Timestep =	3.58 minutes

Data to be used Unit Duration, D = 10 minutes, round down to nearest of 5, 10, 15, 30, 60, 120, 180, or 360
in Analysis Selected Timestep = 2 minutes, integer value evenly divisible into 60



UI Record - Unit Graph

2 minute interval

UI Dataset located in columns P:Q to the right -->

UI See cell Q49 for Interpolated Peak

UI

UI

UI

UI

UI

UI

UI

UI

UI

UI

USBR calculated unitgraph peak = 7667 Interpolated Peak =

Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs	Time t, % of Lg+D/2	Hours	Min.	q	Qs cfs
5.0	0.06	3.6	0.14	38	305.0	3.64	218.4	1.05	284
10.0	0.12	7.2	0.21	57	310.0	3.70	222.0	1.00	270
15.0	0.18	10.7	0.33	89	315.0	3.76	225.6	0.96	260
20.0	0.24	14.3	0.51	138	320.0	3.82	229.2	0.92	249
25.0	0.30	17.9	0.84	227	325.0	3.88	232.7	0.88	238
30.0	0.36	21.5	1.62	438	330.0	3.94	236.3	0.84	227
35.0	0.42	25.1	3.74	1,011	335.0	4.00	239.9	0.81	219
40.0	0.48	28.6	6.38	1,725	340.0	4.06	243.5	0.77	208
45.0	0.54	32.2	8.61	2,328	345.0	4.12	247.1	0.74	200
50.0	0.60	35.8	10.94	2,958	350.0	4.18	250.6	0.71	192
55.0	0.66	39.4	13.26	3,585	355.0	4.24	254.2	0.68	184
60.0	0.72	43.0	15.70	4,245	360.0	4.30	257.8	0.65	176
65.0	0.78	46.5	18.23	4,929	365.0	4.36	261.4	0.62	168
70.0	0.84	50.1	20.76	5,613	370.0	4.42	265.0	0.59	160
75.0	0.90	53.7	23.30	6,299	375.0	4.48	268.5	0.57	154
80.0	0.95	57.3	25.83	6,983	380.0	4.54	272.1	0.55	149
85.0	1.01	60.9	28.36	7,667	385.0	4.60	275.7	0.52	141
90.0	1.07	64.5	26.53	7,172	390.0	4.65	279.3	0.50	135
95.0	1.13	68.0	24.71	6,680	395.0	4.71	282.9	0.48	130
100.0	1.19	71.6	22.68	6,132	400.0	4.77	286.5	0.46	124
105.0	1.25	75.2	20.76	5,613	405.0	4.83	290.0	0.43	116
110.0	1.31	78.8	18.84	5,093	410.0	4.89	293.6	0.42	114
115.0	1.37	82.4	16.81	4,545	415.0	4.95	297.2	0.40	108
120.0	1.43	85.9	14.99	4,053	420.0	5.01	300.8	0.38	103
125.0	1.49	89.5	12.86	3,477	425.0	5.07	304.4	0.36	97
130.0	1.55	93.1	11.04	2,985	430.0	5.13	307.9	0.35	95
135.0	1.61	96.7	9.52	2,574	435.0	5.19	311.5	0.33	89
140.0	1.67	100.3	8.41	2,274	440.0	5.25	315.1	0.32	87
145.0	1.73	103.8	7.50	2,028	445.0	5.31	318.7	0.31	84
150.0	1.79	107.4	6.69	1,809	450.0	5.37	322.3	0.29	78
155.0	1.85	111.0	5.98	1,617	455.0	5.43	325.8	0.28	76
160.0	1.91	114.6	5.47	1,479	460.0	5.49	329.4	0.27	73
165.0	1.97	118.2	4.97	1,344	465.0	5.55	333.0	0.26	70
170.0	2.03	121.7	4.55	1,230	470.0	5.61	336.6	0.25	68
175.0	2.09	125.3	4.25	1,149	475.0	5.67	340.2	0.24	65
180.0	2.15	128.9	3.89	1,052	480.0	5.73	343.7	0.23	62
185.0	2.21	132.5	3.59	971	485.0	5.79	347.3	0.22	59
190.0	2.27	136.1	3.34	903	490.0	5.85	350.9	0.21	57
195.0	2.33	139.6	3.13	846	495.0	5.91	354.5	0.20	54
200.0	2.39	143.2	2.93	792	500.0	5.97	358.1	0.19	51
205.0	2.45	146.8	2.75	743	505.0	6.03	361.6	0.18	49
210.0	2.51	150.4	2.61	706	510.0	6.09	365.2	0.17	46
215.0	2.57	154.0	2.44	660	515.0	6.15	368.8	0.17	46
220.0	2.63	157.5	2.31	625	520.0	6.21	372.4	0.16	43
225.0	2.69	161.1	2.17	587	525.0	6.27	376.0	0.16	43
230.0	2.75	164.7	2.04	552	530.0	6.33	379.5	0.15	41
235.0	2.80	168.3	1.95	527	535.0	6.39	383.1	0.15	41
240.0	2.86	171.9	1.84	497	540.0	6.45	386.7	0.14	38
245.0	2.92	175.5	1.76	476	545.0	6.50	390.3	0.14	38
250.0	2.98	179.0	1.69	457	550.0	6.56	393.9	0.13	35
255.0	3.04	182.6	1.62	438	555.0	6.62	397.5	0.13	35
260.0	3.10	186.2	1.55	419	560.0	6.68	401.0	0.12	32
265.0	3.16	189.8	1.49	403	565.0	6.74	404.6	0.12	32
270.0	3.22	193.4	1.42	384	570.0	6.80	408.2	0.11	30
275.0	3.28	196.9	1.36	368	575.0	6.86	411.8	0.11	30
280.0	3.34	200.5	1.30	351	580.0	6.92	415.4	0.10	27
285.0	3.40	204.1	1.24	335	585.0	6.98	418.9	0.10	27
290.0	3.46	207.7	1.19	322	590.0	7.04	422.5	0.09	24
295.0	3.52	211.3	1.14	308	595.0	7.10	426.1	0.09	24
300.0	3.58	214.8	1.09	295	600.0	7.16	429.7	0.08	22

NOTES : 1. Methodology used Dimensionless Unit Hydrograph.
2. For values of q use Table 4-11 from Flood Hydrology Manual

RMGS

Time t, % of Lg+D/2	Hours	Min.	q	Qs (cfs)		
0	0	0	0	0		
5.0	0.02	1.3	0.26	127		
10.0	0.04	2.6	0.90	438		
15.0	0.07	4.0	2.00	974		
20.0	0.09	5.3	3.00	1461		
25.0	0.11	6.6	5.00	2435		
30.0	0.13	7.9	6.00	2923		
35.0	0.15	9.3	7.70	3751		
40.0	0.18	10.6	9.00	4384		
45.0	0.20	11.9	14.51	7068		
50.0	0.22	13.2	18.11	8821		
55.0	0.24	14.6	21.51	10477		
60.0	0.26	15.9	24.01	11695		
65.0	0.29	17.2	22.81	11111		
70.0	0.31	18.5	21.21	10331		
75.0	0.33	19.9	19.31	9406		
80.0	0.35	21.2	16.91	8237		
85.0	0.38	22.5	15.21	7409		
90.0	0.40	23.8	14.21	6922		
95.0	0.42	25.2	13.41	6532		
100.0	0.44	26.5	12.71	6191		
105.0	0.46	27.8	11.91	5801		
110.0	0.49	29.1	11.21	5460		
115.0	0.51	30.5	10.61	5168		
120.0	0.53	31.8	10.01	4876		
125.0	0.55	33.1	9.40	4579		
130.0	0.57	34.4	8.80	4286		
135.0	0.60	35.8	8.25	4019		
140.0	0.62	37.1	7.70	3751		
145.0	0.64	38.4	7.25	3531		
150.0	0.66	39.7	6.80	3312		
155.0	0.68	41.1	6.40	3117		
160.0	0.71	42.4	6.00	2923		
165.0	0.73	43.7	5.65	2752		
170.0	0.75	45.0	5.35	2606		
175.0	0.77	46.4	5.00	2435		
180.0	0.79	47.7	4.80	2338		
185.0	0.82	49.0	4.55	2216		
190.0	0.84	50.3	4.30	2095		
195.0	0.86	51.7	4.10	1997		

RMGS

200.0	0.88	53.0	3.90	1900		
205.0	0.91	54.3	3.72	1812		
210.0	0.93	55.6	3.55	1729		
215.0	0.95	57.0	3.40	1656		
220.0	0.97	58.3	3.25	1583		
225.0	0.99	59.6	3.10	1510		
230.0	1.02	60.9	3.00	1461		
235.0	1.04	62.3	2.87	1398		
240.0	1.06	63.6	2.75	1340		
245.0	1.08	64.9	2.65	1291		
250.0	1.10	66.2	2.52	1227		
255.0	1.13	67.6	2.42	1179		
260.0	1.15	68.9	2.33	1135		
265.0	1.17	70.2	2.24	1091		
270.0	1.19	71.5	2.15	1047		
275.0	1.21	72.9	2.07	1008		
280.0	1.24	74.2	1.99	969		
285.0	1.26	75.5	1.91	930		
290.0	1.28	76.8	1.83	891		
295.0	1.30	78.2	1.76	857		
300.0	1.32	79.5	1.70	828		
305.0	1.35	80.8	1.63	794		
310.0	1.37	82.1	1.57	765		
315.0	1.39	83.5	1.50	731		
320.0	1.41	84.8	1.45	706		
325.0	1.44	86.1	1.39	677		
330.0	1.46	87.4	1.34	653		
335.0	1.48	88.8	1.28	623		
340.0	1.50	90.1	1.23	599		
345.0	1.52	91.4	1.19	580		
350.0	1.55	92.7	1.13	550		
355.0	1.57	94.1	1.09	531		
360.0	1.59	95.4	1.05	511		
365.0	1.61	96.7	1.01	492		
370.0	1.63	98.0	0.97	472		
375.0	1.66	99.4	0.93	453		
380.0	1.68	100.7	0.90	438		
385.0	1.70	102.0	0.86	419		
390.0	1.72	103.3	0.83	404		
395.0	1.74	104.7	0.80	390		
400.0	1.77	106.0	0.77	375		
405.0	1.79	107.3	0.74	360		

RMGS

410.0	1.81	108.6	0.71	346		
415.0	1.83	110.0	0.68	331		
420.0	1.85	111.3	0.65	317		
425.0	1.88	112.6	0.63	307		
430.0	1.90	113.9	0.60	292		
435.0	1.92	115.3	0.56	273		
440.0	1.94	116.6	0.58	283		
445.0	1.97	117.9	0.54	263		
450.0	1.99	119.2	0.52	253		
455.0	2.01	120.6	0.50	244		
460.0	2.03	121.9	0.48	234		
465.0	2.05	123.2	0.46	224		
470.0	2.08	124.5	0.44	214		
475.0	2.10	125.9	0.42	205		
480.0	2.12	127.2	0.41	200		
485.0	2.14	128.5	0.40	195		
490.0	2.16	129.8	0.38	185		
495.0	2.19	131.2	0.37	180		
500.0	2.21	132.5	0.35	170		
505.0	2.23	133.8	0.34	166		
510.0	2.25	135.1	0.33	161		
515.0	2.27	136.5	0.32	156		
520.0	2.30	137.8	0.31	151		
525.0	2.32	139.1	0.29	141		
530.0	2.34	140.4	0.28	136		
535.0	2.36	141.8	0.27	132		
540.0	2.38	143.1	0.26	127		
545.0	2.41	144.4	0.25	122		
550.0	2.43	145.7	0.24	117		
555.0	2.45	147.1	0.23	112		
560.0	2.47	148.4	0.23	112		
565.0	2.50	149.7	0.22	107		
570.0	2.52	151.0	0.21	102		
575.0	2.54	152.4	0.20	97		
580.0	2.56	153.7	0.19	93		
585.0	2.58	155.0	0.19	93		
590.0	2.61	156.3	0.18	88		
595.0	2.63	157.7	0.17	83		
600.0	2.65	159.0	0.17	83		
NOTES :	1. Methodology used Dimensionless Unit Hydrograph.					
	2. For values of q use Table 4-9 from <i>Flood Hydrology Manual</i>					

RMTS

Time t, % of Lg+D/2	Hours	Min.	q	Qs (cfs)		
0	0	0	0	0		
5.0	0.13	8.1	0.14	99		
10.0	0.27	16.2	0.21	149		
15.0	0.40	24.3	0.33	234		
20.0	0.54	32.3	0.51	361		
25.0	0.67	40.4	0.84	595		
30.0	0.81	48.5	1.62	1148		
35.0	0.94	56.6	3.74	2649		
40.0	1.08	64.7	6.38	4519		
45.0	1.21	72.8	8.61	6099		
50.0	1.35	80.9	10.94	7749		
55.0	1.48	88.9	13.26	9393		
60.0	1.62	97.0	15.70	11121		
65.0	1.75	105.1	18.23	12913		
70.0	1.89	113.2	20.76	14705		
75.0	2.02	121.3	23.30	16504		
80.0	2.16	129.4	25.83	18296		
85.0	2.29	137.5	28.36	20089		
90.0	2.43	145.5	26.53	18792		
95.0	2.56	153.6	24.71	17503		
100.0	2.70	161.7	22.68	16065		
105.0	2.83	169.8	20.76	14705		
110.0	2.96	177.9	18.84	13345		
115.0	3.10	186.0	16.81	11907		
120.0	3.23	194.1	14.99	10618		
125.0	3.37	202.1	12.86	9109		
130.0	3.50	210.2	11.04	7820		
135.0	3.64	218.3	9.52	6743		
140.0	3.77	226.4	8.41	5957		
145.0	3.91	234.5	7.50	5313		
150.0	4.04	242.6	6.69	4739		
155.0	4.18	250.7	5.98	4236		
160.0	4.31	258.7	5.47	3875		
165.0	4.45	266.8	4.97	3520		
170.0	4.58	274.9	4.55	3223		
175.0	4.72	283.0	4.25	3010		
180.0	4.85	291.1	3.89	2755		
185.0	4.99	299.2	3.59	2543		
190.0	5.12	307.3	3.34	2366		
195.0	5.26	315.3	3.13	2217		

RMTS

200.0	5.39	323.4	2.93	2075		
205.0	5.53	331.5	2.75	1948		
210.0	5.66	339.6	2.61	1849		
215.0	5.79	347.7	2.44	1728		
220.0	5.93	355.8	2.31	1636		
225.0	6.06	363.9	2.17	1537		
230.0	6.20	372.0	2.04	1445		
235.0	6.33	380.0	1.95	1381		
240.0	6.47	388.1	1.84	1303		
245.0	6.60	396.2	1.76	1247		
250.0	6.74	404.3	1.69	1197		
255.0	6.87	412.4	1.62	1148		
260.0	7.01	420.5	1.55	1098		
265.0	7.14	428.6	1.49	1055		
270.0	7.28	436.6	1.42	1006		
275.0	7.41	444.7	1.36	963		
280.0	7.55	452.8	1.30	921		
285.0	7.68	460.9	1.24	878		
290.0	7.82	469.0	1.19	843		
295.0	7.95	477.1	1.14	808		
300.0	8.09	485.2	1.09	772		
305.0	8.22	493.2	1.05	744		
310.0	8.36	501.3	1.00	708		
315.0	8.49	509.4	0.96	680		
320.0	8.62	517.5	0.92	652		
325.0	8.76	525.6	0.88	623		
330.0	8.89	533.7	0.84	595		
335.0	9.03	541.8	0.81	574		
340.0	9.16	549.8	0.77	545		
345.0	9.30	557.9	0.74	524		
350.0	9.43	566.0	0.71	503		
355.0	9.57	574.1	0.68	482		
360.0	9.70	582.2	0.65	460		
365.0	9.84	590.3	0.62	439		
370.0	9.97	598.4	0.59	418		
375.0	10.11	606.4	0.57	404		
380.0	10.24	614.5	0.55	390		
385.0	10.38	622.6	0.52	368		
390.0	10.51	630.7	0.50	354		
395.0	10.65	638.8	0.48	340		
400.0	10.78	646.9	0.46	326		
405.0	10.92	655.0	0.43	305		

RMTS

410.0	11.05	663.0	0.42	298		
415.0	11.19	671.1	0.40	283		
420.0	11.32	679.2	0.38	269		
425.0	11.46	687.3	0.36	255		
430.0	11.59	695.4	0.35	248		
435.0	11.72	703.5	0.33	234		
440.0	11.86	711.6	0.32	227		
445.0	11.99	719.6	0.31	220		
450.0	12.13	727.7	0.29	205		
455.0	12.26	735.8	0.28	198		
460.0	12.40	743.9	0.27	191		
465.0	12.53	752.0	0.26	184		
470.0	12.67	760.1	0.25	177		
475.0	12.80	768.2	0.24	170		
480.0	12.94	776.2	0.23	163		
485.0	13.07	784.3	0.22	156		
490.0	13.21	792.4	0.21	149		
495.0	13.34	800.5	0.20	142		
500.0	13.48	808.6	0.19	135		
505.0	13.61	816.7	0.18	128		
510.0	13.75	824.8	0.17	120		
515.0	13.88	832.8	0.17	120		
520.0	14.02	840.9	0.16	113		
525.0	14.15	849.0	0.16	113		
530.0	14.29	857.1	0.15	106		
535.0	14.42	865.2	0.15	106		
540.0	14.55	873.3	0.14	99		
545.0	14.69	881.4	0.14	99		
550.0	14.82	889.4	0.13	92		
555.0	14.96	897.5	0.13	92		
560.0	15.09	905.6	0.12	85		
565.0	15.23	913.7	0.12	85		
570.0	15.36	921.8	0.11	78		
575.0	15.50	929.9	0.11	78		
580.0	15.63	938.0	0.10	71		
585.0	15.77	946.0	0.10	71		
590.0	15.90	954.1	0.09	64		
595.0	16.04	962.2	0.09	64		
600.0	16.17	970.3	0.08	57		
NOTES :	1. Methodology used Dimensionless Unit Hydrograph.					
	2. For values of q use Table 4-11 from <i>Flood Hydrology Manual</i>					

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
10.00	0.03	0.13	0.22	0.32	0.41	0.51	0.60	0.70	0.79	0.89	
0.10	0.98	1.08	1.17	1.27	1.36	1.46	1.55	1.65	1.74	1.84	
0.20	1.93	2.03	2.12	2.22	2.31	2.41	2.51	2.60	2.70	2.79	
0.30	2.89	2.98	3.08	3.17	3.27	3.36	3.46	3.55	3.65	3.74	
0.40	3.84	3.93	4.03	4.12	4.22	4.31	4.41	4.50	4.60	4.69	
0.50	4.79	4.89	4.98	5.08	5.17	5.27	5.36	5.46	5.55	5.65	
0.60	5.74	5.84	5.93	6.03	6.12	6.22	6.31	6.41	6.50	6.60	
0.70	6.69	6.79	6.88	6.98	7.07	7.17	7.27	7.36	7.46	7.55	
0.80	7.65	7.74	7.84	7.93	8.03	8.12	8.22	8.31	8.41	8.50	
0.90	8.60	8.69	8.79	8.88	8.98	9.07	9.17	9.26	9.36	9.45	
11.00	9.55	9.87	10.19	10.51	10.83	11.16	11.48	11.80	12.12	12.44	
0.10	12.76	13.08	13.40	13.72	14.05	14.37	14.69	15.01	15.33	15.65	
0.20	15.97	16.29	16.61	16.94	17.26	17.58	17.90	18.22	18.54	18.86	
0.30	19.18	19.50	19.83	20.15	20.47	20.79	21.11	21.43	21.75	22.07	
0.40	22.39	22.72	23.04	23.36	23.68	24.00	24.32	24.64	24.96	25.28	
0.50	25.61	25.93	26.25	26.57	26.89	27.21	27.53	27.85	28.17	28.49	
0.60	28.82	29.14	29.46	29.78	30.10	30.42	30.74	31.06	31.38	31.71	
0.70	32.03	32.35	32.67	32.99	33.31	33.63	33.95	34.27	34.60	34.92	
0.80	35.24	35.56	35.88	36.20	36.52	36.84	37.16	37.49	37.81	38.13	
0.90	38.45	38.77	39.09	39.41	39.73	40.05	40.38	40.70	41.02	41.34	
12.00	41.66	42.21	42.75	43.30	43.85	44.40	44.94	45.49	46.04	46.58	
0.10	47.13	47.68	48.22	48.77	49.32	49.87	50.41	50.96	51.51	52.05	
0.20	52.60	53.15	53.69	54.24	54.79	55.34	55.88	56.43	56.98	57.52	
0.30	58.07	58.62	59.16	59.71	60.26	60.81	61.35	61.90	62.45	62.99	
0.40	63.54	64.09	64.63	65.18	65.73	66.28	66.82	67.37	67.92	68.46	
0.50	69.01	69.56	70.10	70.65	71.20	71.75	72.29	72.84	73.39	73.93	
0.60	74.48	75.03	75.57	76.12	76.67	77.22	77.76	78.31	78.86	79.40	
0.70	79.95	80.50	81.04	81.59	82.14	82.69	83.23	83.78	84.33	84.87	
0.80	85.42	85.97	86.51	87.06	87.61	88.16	88.70	89.25	89.80	90.34	
0.90	90.89	91.44	91.98	92.53	93.08	93.63	94.17	94.72	95.27	95.81	
13.00	96.36	97.15	97.94	98.73	99.53	100.32	101.11	101.90	102.69	103.48	
0.10	104.27	105.06	105.86	106.65	107.44	108.23	109.02	109.81	110.60	111.39	
0.20	112.19	112.98	113.77	114.56	115.35	116.14	116.93	117.73	118.52	119.31	
0.30	120.10	120.89	121.68	122.47	123.26	124.06	124.85	125.64	126.43	127.22	
0.40	128.01	128.80	129.59	130.39	131.18	131.97	132.76	133.55	134.34	135.13	
0.50	135.93	136.72	137.51	138.30	139.09	139.88	140.67	141.46	142.26	143.05	
0.60	143.84	144.63	145.42	146.21	147.00	147.79	148.59	149.38	150.17	150.96	
0.70	151.75	152.54	153.33	154.12	154.92	155.71	156.50	157.29	158.08	158.87	
0.80	159.66	160.46	161.25	162.04	162.83	163.62	164.41	165.20	165.99	166.79	
0.90	167.58	168.37	169.16	169.95	170.74	171.53	172.32	173.12	173.91	174.70	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
14.00	175.49	176.52	177.56	178.59	179.63	180.66	181.69	182.73	183.76	184.79	
0.10	185.83	186.86	187.90	188.93	189.96	191.00	192.03	193.06	194.10	195.13	
0.20	196.17	197.20	198.23	199.27	200.30	201.34	202.37	203.40	204.44	205.47	
0.30	206.50	207.54	208.57	209.61	210.64	211.67	212.71	213.74	214.77	215.81	
0.40	216.84	217.88	218.91	219.94	220.98	222.01	223.04	224.08	225.11	226.15	
0.50	227.18	228.21	229.25	230.28	231.32	232.35	233.38	234.42	235.45	236.48	
0.60	237.52	238.55	239.59	240.62	241.65	242.69	243.72	244.75	245.79	246.82	
0.70	247.86	248.89	249.92	250.96	251.99	253.03	254.06	255.09	256.13	257.16	
0.80	258.19	259.23	260.26	261.30	262.33	263.36	264.40	265.43	266.46	267.50	
0.90	268.53	269.57	270.60	271.63	272.67	273.70	274.73	275.77	276.80	277.84	
15.00	279	280	281	282	284	285	286	287	288	289	
0.10	291	292	293	294	295	297	298	299	300	301	
0.20	302	304	305	306	307	308	310	311	312	313	
0.30	314	315	317	318	319	320	321	323	324	325	
0.40	326	327	328	330	331	332	333	334	336	337	
0.50	338	339	340	341	343	344	345	346	347	349	
0.60	350	351	352	353	354	356	357	358	359	360	
0.70	362	363	364	365	366	367	369	370	371	372	
0.80	373	375	376	377	378	379	380	382	383	384	
0.90	385	386	387	389	390	391	392	393	395	396	
16.00	397	398	400	401	403	404	405	407	408	410	
0.10	411	412	414	415	417	418	419	421	422	424	
0.20	425	426	428	429	431	432	434	435	436	438	
0.30	439	441	442	443	445	446	448	449	450	452	
0.40	453	455	456	457	459	460	462	463	464	466	
0.50	467	469	470	472	473	474	476	477	479	480	
0.60	481	483	484	486	487	488	490	491	493	494	
0.70	495	497	498	500	501	502	504	505	507	508	
0.80	510	511	512	514	515	517	518	519	521	522	
0.90	524	525	526	528	529	531	532	533	535	536	
17.00	538	539	541	543	544	546	547	549	551	552	
0.10	554	556	557	559	561	562	564	565	567	569	
0.20	570	572	574	575	577	579	580	582	583	585	
0.30	587	588	590	592	593	595	597	598	600	601	
0.40	603	605	606	608	610	611	613	615	616	618	
0.50	619	621	623	624	626	628	629	631	633	634	
0.60	636	637	639	641	642	644	646	647	649	651	
0.70	652	654	655	657	659	660	662	664	665	667	
0.80	668	670	672	673	675	677	678	680	682	683	
0.90	685	686	688	690	691	693	695	696	698	700	

RIO GRANDE RESERVOIR**CAPACITY SUMMARY**

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
18.00	701	703	705	707	709	710	712	714	716	718	
0.10	720	721	723	725	727	729	731	732	734	736	
0.20	738	740	742	743	745	747	749	751	753	754	
0.30	756	758	760	762	764	765	767	769	771	773	
0.40	775	776	778	780	782	784	786	787	789	791	
0.50	793	795	797	798	800	802	804	806	808	809	
0.60	811	813	815	817	819	821	822	824	826	828	
0.70	830	832	833	835	837	839	841	843	844	846	
0.80	848	850	852	854	855	857	859	861	863	865	
0.90	866	868	870	872	874	876	877	879	881	883	
19.00	885	887	889	891	893	895	897	898	900	902	
0.10	904	906	908	910	912	914	916	918	920	922	
0.20	924	926	928	930	932	934	936	938	940	942	
0.30	944	946	948	950	951	953	955	957	959	961	
0.40	963	965	967	969	971	973	975	977	979	981	
0.50	983	985	987	989	991	993	995	997	999	1001	
0.60	1003	1004	1006	1008	1010	1012	1014	1016	1018	1020	
0.70	1022	1024	1026	1028	1030	1032	1034	1036	1038	1040	
0.80	1042	1044	1046	1048	1050	1052	1054	1056	1057	1059	
0.90	1061	1063	1065	1067	1069	1071	1073	1075	1077	1079	
20.00	1081	1083	1085	1087	1089	1091	1094	1096	1098	1100	
0.10	1102	1104	1106	1108	1110	1112	1114	1117	1119	1121	
0.20	1123	1125	1127	1129	1131	1133	1135	1137	1140	1142	
0.30	1144	1146	1148	1150	1152	1154	1156	1158	1160	1162	
0.40	1165	1167	1169	1171	1173	1175	1177	1179	1181	1183	
0.50	1185	1188	1190	1192	1194	1196	1198	1200	1202	1204	
0.60	1206	1208	1210	1213	1215	1217	1219	1221	1223	1225	
0.70	1227	1229	1231	1233	1236	1238	1240	1242	1244	1246	
0.80	1248	1250	1252	1254	1256	1258	1261	1263	1265	1267	
0.90	1269	1271	1273	1275	1277	1279	1281	1284	1286	1288	
21.00	1290	1292	1294	1297	1299	1301	1303	1306	1308	1310	
0.10	1312	1315	1317	1319	1321	1324	1326	1328	1330	1333	
0.20	1335	1337	1339	1342	1344	1346	1348	1351	1353	1355	
0.30	1357	1360	1362	1364	1366	1369	1371	1373	1375	1378	
0.40	1380	1382	1384	1387	1389	1391	1393	1396	1398	1400	
0.50	1402	1405	1407	1409	1411	1414	1416	1418	1420	1423	
0.60	1425	1427	1429	1432	1434	1436	1438	1440	1443	1445	
0.70	1447	1449	1452	1454	1456	1458	1461	1463	1465	1467	
0.80	1470	1472	1474	1476	1479	1481	1483	1485	1488	1490	
0.90	1492	1494	1497	1499	1501	1503	1506	1508	1510	1512	

RIO GRANDE RESERVOIR**CAPACITY SUMMARY**

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
22.00	1515	1517	1520	1522	1525	1527	1530	1532	1535	1537	
0.10	1540	1542	1545	1547	1550	1552	1555	1557	1560	1562	
0.20	1565	1567	1570	1572	1575	1577	1580	1582	1585	1587	
0.30	1590	1592	1595	1597	1600	1602	1605	1607	1610	1612	
0.40	1615	1617	1620	1622	1624	1627	1629	1632	1634	1637	
0.50	1639	1642	1644	1647	1649	1652	1654	1657	1659	1662	
0.60	1664	1667	1669	1672	1674	1677	1679	1682	1684	1687	
0.70	1689	1692	1694	1697	1699	1702	1704	1707	1709	1712	
0.80	1714	1717	1719	1722	1724	1727	1729	1732	1734	1737	
0.90	1739	1742	1744	1747	1749	1752	1754	1757	1759	1762	
23.00	1764	1767	1769	1772	1775	1777	1780	1782	1785	1788	
0.10	1790	1793	1795	1798	1801	1803	1806	1809	1811	1814	
0.20	1816	1819	1822	1824	1827	1829	1832	1835	1837	1840	
0.30	1842	1845	1848	1850	1853	1855	1858	1861	1863	1866	
0.40	1868	1871	1874	1876	1879	1881	1884	1887	1889	1892	
0.50	1894	1897	1900	1902	1905	1908	1910	1913	1915	1918	
0.60	1921	1923	1926	1928	1931	1934	1936	1939	1941	1944	
0.70	1947	1949	1952	1954	1957	1960	1962	1965	1967	1970	
0.80	1973	1975	1978	1980	1983	1986	1988	1991	1993	1996	
0.90	1999	2001	2004	2007	2009	2012	2014	2017	2020	2022	
24.00	2025	2027	2030	2033	2036	2038	2041	2044	2046	2049	
0.10	2052	2055	2057	2060	2063	2065	2068	2071	2074	2076	
0.20	2079	2082	2084	2087	2090	2092	2095	2098	2101	2103	
0.30	2106	2109	2111	2114	2117	2120	2122	2125	2128	2130	
0.40	2133	2136	2138	2141	2144	2147	2149	2152	2155	2157	
0.50	2160	2163	2166	2168	2171	2174	2176	2179	2182	2185	
0.60	2187	2190	2193	2195	2198	2201	2203	2206	2209	2212	
0.70	2214	2217	2220	2222	2225	2228	2231	2233	2236	2239	
0.80	2241	2244	2247	2250	2252	2255	2258	2260	2263	2266	
0.90	2268	2271	2274	2277	2279	2282	2285	2287	2290	2293	
25.00	2296	2298	2301	2304	2307	2310	2313	2316	2319	2321	
0.10	2324	2327	2330	2333	2336	2339	2341	2344	2347	2350	
0.20	2353	2356	2359	2362	2364	2367	2370	2373	2376	2379	
0.30	2382	2385	2387	2390	2393	2396	2399	2402	2405	2407	
0.40	2410	2413	2416	2419	2422	2425	2428	2430	2433	2436	
0.50	2439	2442	2445	2448	2451	2453	2456	2459	2462	2465	
0.60	2468	2471	2473	2476	2479	2482	2485	2488	2491	2494	
0.70	2496	2499	2502	2505	2508	2511	2514	2517	2519	2522	
0.80	2525	2528	2531	2534	2537	2540	2542	2545	2548	2551	
0.90	2554	2557	2560	2562	2565	2568	2571	2574	2577	2580	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
26.00	2583	2586	2589	2592	2595	2598	2601	2604	2607	2610	
0.10	2613	2616	2619	2622	2625	2629	2632	2635	2638	2641	
0.20	2644	2647	2650	2653	2656	2659	2662	2665	2668	2671	
0.30	2674	2678	2681	2684	2687	2690	2693	2696	2699	2702	
0.40	2705	2708	2711	2714	2717	2720	2723	2727	2730	2733	
0.50	2736	2739	2742	2745	2748	2751	2754	2757	2760	2763	
0.60	2766	2769	2772	2776	2779	2782	2785	2788	2791	2794	
0.70	2797	2800	2803	2806	2809	2812	2815	2818	2821	2825	
0.80	2828	2831	2834	2837	2840	2843	2846	2849	2852	2855	
0.90	2858	2861	2864	2867	2871	2874	2877	2880	2883	2886	
27.00	2889	2892	2895	2898	2902	2905	2908	2911	2915	2918	
0.10	2921	2924	2927	2931	2934	2937	2940	2943	2947	2950	
0.20	2953	2956	2959	2963	2966	2969	2972	2975	2979	2982	
0.30	2985	2988	2991	2995	2998	3001	3004	3007	3011	3014	
0.40	3017	3020	3023	3027	3030	3033	3036	3039	3043	3046	
0.50	3049	3052	3055	3059	3062	3065	3068	3071	3075	3078	
0.60	3081	3084	3087	3091	3094	3097	3100	3103	3107	3110	
0.70	3113	3116	3119	3123	3126	3129	3132	3135	3139	3142	
0.80	3145	3148	3151	3155	3158	3161	3164	3168	3171	3174	
0.90	3177	3180	3184	3187	3190	3193	3196	3200	3203	3206	
28.00	3209	3213	3216	3219	3223	3226	3229	3233	3236	3240	
0.10	3243	3246	3250	3253	3256	3260	3263	3267	3270	3273	
0.20	3277	3280	3284	3287	3290	3294	3297	3300	3304	3307	
0.30	3311	3314	3317	3321	3324	3327	3331	3334	3338	3341	
0.40	3344	3348	3351	3354	3358	3361	3365	3368	3371	3375	
0.50	3378	3382	3385	3388	3392	3395	3398	3402	3405	3409	
0.60	3412	3415	3419	3422	3425	3429	3432	3436	3439	3442	
0.70	3446	3449	3453	3456	3459	3463	3466	3469	3473	3476	
0.80	3480	3483	3486	3490	3493	3496	3500	3503	3507	3510	
0.90	3513	3517	3520	3523	3527	3530	3534	3537	3540	3544	
29.00	3547	3551	3554	3558	3562	3565	3569	3572	3576	3580	
0.10	3583	3587	3591	3594	3598	3601	3605	3609	3612	3616	
0.20	3619	3623	3627	3630	3634	3638	3641	3645	3648	3652	
0.30	3656	3659	3663	3667	3670	3674	3677	3681	3685	3688	
0.40	3692	3695	3699	3703	3706	3710	3714	3717	3721	3724	
0.50	3728	3732	3735	3739	3742	3746	3750	3753	3757	3761	
0.60	3764	3768	3771	3775	3779	3782	3786	3790	3793	3797	
0.70	3800	3804	3808	3811	3815	3818	3822	3826	3829	3833	
0.80	3837	3840	3844	3847	3851	3855	3858	3862	3865	3869	
0.90	3873	3876	3880	3884	3887	3891	3894	3898	3902	3905	

Head
5.0
6.0

28.0
ft
8.75

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
30.00	3909	3913	3916	3920	3924	3928	3932	3935	3939	3943	
0.10	3947	3951	3954	3958	3962	3966	3969	3973	3977	3981	
0.20	3985	3988	3992	3996	4000	4004	4007	4011	4015	4019	
0.30	4022	4026	4030	4034	4038	4041	4045	4049	4053	4057	
0.40	4060	4064	4068	4072	4075	4079	4083	4087	4091	4094	
0.50	4098	4102	4106	4110	4113	4117	4121	4125	4129	4132	
0.60	4136	4140	4144	4147	4151	4155	4159	4163	4166	4170	
0.70	4174	4178	4182	4185	4189	4193	4197	4200	4204	4208	
0.80	4212	4216	4219	4223	4227	4231	4235	4238	4242	4246	
0.90	4250	4253	4257	4261	4265	4269	4272	4276	4280	4284	
31.00	4288	4291	4295	4299	4303	4307	4311	4315	4319	4323	
0.10	4327	4331	4335	4338	4342	4346	4350	4354	4358	4362	
0.20	4366	4370	4374	4378	4382	4385	4389	4393	4397	4401	
0.30	4405	4409	4413	4417	4421	4425	4429	4432	4436	4440	
0.40	4444	4448	4452	4456	4460	4464	4468	4472	4476	4479	
0.50	4483	4487	4491	4495	4499	4503	4507	4511	4515	4519	
0.60	4523	4526	4530	4534	4538	4542	4546	4550	4554	4558	
0.70	4562	4566	4570	4573	4577	4581	4585	4589	4593	4597	
0.80	4601	4605	4609	4613	4617	4620	4624	4628	4632	4636	
0.90	4640	4644	4648	4652	4656	4660	4664	4667	4671	4675	
32.00	4679	4683	4687	4691	4695	4700	4704	4708	4712	4716	
0.10	4720	4724	4728	4732	4736	4740	4744	4749	4753	4757	
0.20	4761	4765	4769	4773	4777	4781	4785	4789	4793	4797	
0.30	4802	4806	4810	4814	4818	4822	4826	4830	4834	4838	
0.40	4842	4846	4851	4855	4859	4863	4867	4871	4875	4879	
0.50	4883	4887	4891	4895	4900	4904	4908	4912	4916	4920	
0.60	4924	4928	4932	4936	4940	4944	4948	4953	4957	4961	
0.70	4965	4969	4973	4977	4981	4985	4989	4993	4997	5002	
0.80	5006	5010	5014	5018	5022	5026	5030	5034	5038	5042	
0.90	5046	5050	5055	5059	5063	5067	5071	5075	5079	5083	
33.00	5087	5092	5096	5100	5105	5109	5113	5118	5122	5126	
0.10	5131	5135	5139	5144	5148	5152	5157	5161	5166	5170	
0.20	5174	5179	5183	5187	5192	5196	5200	5205	5209	5213	
0.30	5218	5222	5226	5231	5235	5240	5244	5248	5253	5257	
0.40	5261	5266	5270	5274	5279	5283	5287	5292	5296	5300	
0.50	5305	5309	5314	5318	5322	5327	5331	5335	5340	5344	
0.60	5348	5353	5357	5361	5366	5370	5374	5379	5383	5387	
0.70	5392	5396	5401	5405	5409	5414	5418	5422	5427	5431	
0.80	5435	5440	5444	5448	5453	5457	5461	5466	5470	5475	
0.90	5479	5483	5488	5492	5496	5501	5505	5509	5514	5518	

RIO GRANDE RESERVOIR**CAPACITY SUMMARY**

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
34.00	5522	5527	5532	5537	5541	5546	5551	5555	5560	5565	
0.10	5569	5574	5579	5584	5588	5593	5598	5602	5607	5612	
0.20	5616	5621	5626	5631	5635	5640	5645	5649	5654	5659	
0.30	5663	5668	5673	5678	5682	5687	5692	5696	5701	5706	
0.40	5710	5715	5720	5725	5729	5734	5739	5743	5748	5753	
0.50	5757	5762	5767	5772	5776	5781	5786	5790	5795	5800	
0.60	5804	5809	5814	5819	5823	5828	5833	5837	5842	5847	
0.70	5852	5856	5861	5866	5870	5875	5880	5884	5889	5894	
0.80	5899	5903	5908	5913	5917	5922	5927	5931	5936	5941	
0.90	5946	5950	5955	5960	5964	5969	5974	5978	5983	5988	
35.00	5993	5997	6002	6007	6012	6017	6022	6026	6031	6036	
0.10	6041	6046	6051	6056	6060	6065	6070	6075	6080	6085	
0.20	6090	6094	6099	6104	6109	6114	6119	6124	6128	6133	
0.30	6138	6143	6148	6153	6157	6162	6167	6172	6177	6182	
0.40	6187	6191	6196	6201	6206	6211	6216	6221	6225	6230	
0.50	6235	6240	6245	6250	6254	6259	6264	6269	6274	6279	
0.60	6284	6288	6293	6298	6303	6308	6313	6318	6322	6327	
0.70	6332	6337	6342	6347	6352	6356	6361	6366	6371	6376	
0.80	6381	6385	6390	6395	6400	6405	6410	6415	6419	6424	
0.90	6429	6434	6439	6444	6449	6453	6458	6463	6468	6473	
36.00	6478	6483	6488	6493	6498	6503	6508	6513	6518	6524	
0.10	6529	6534	6539	6544	6549	6554	6559	6564	6569	6574	
0.20	6580	6585	6590	6595	6600	6605	6610	6615	6620	6625	
0.30	6631	6636	6641	6646	6651	6656	6661	6666	6671	6676	
0.40	6682	6687	6692	6697	6702	6707	6712	6717	6722	6727	
0.50	6732	6738	6743	6748	6753	6758	6763	6768	6773	6778	
0.60	6783	6789	6794	6799	6804	6809	6814	6819	6824	6829	
0.70	6834	6840	6845	6850	6855	6860	6865	6870	6875	6880	
0.80	6885	6891	6896	6901	6906	6911	6916	6921	6926	6931	
0.90	6936	6941	6947	6952	6957	6962	6967	6972	6977	6982	
37.00	6987	6993	6998	7004	7009	7014	7020	7025	7031	7036	
0.10	7041	7047	7052	7058	7063	7068	7074	7079	7085	7090	
0.20	7095	7101	7106	7112	7117	7123	7128	7133	7139	7144	
0.30	7150	7155	7160	7166	7171	7177	7182	7187	7193	7198	
0.40	7204	7209	7214	7220	7225	7231	7236	7241	7247	7252	
0.50	7258	7263	7269	7274	7279	7285	7290	7296	7301	7306	
0.60	7312	7317	7323	7328	7333	7339	7344	7350	7355	7360	
0.70	7366	7371	7377	7382	7387	7393	7398	7404	7409	7414	
0.80	7420	7425	7431	7436	7442	7447	7452	7458	7463	7469	
0.90	7474	7479	7485	7490	7496	7501	7506	7512	7517	7523	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
38.00	7528	7534	7539	7545	7551	7556	7562	7568	7573	7579	
0.10	7585	7590	7596	7601	7607	7613	7618	7624	7630	7635	
0.20	7641	7647	7652	7658	7664	7669	7675	7681	7686	7692	
0.30	7697	7703	7709	7714	7720	7726	7731	7737	7743	7748	
0.40	7754	7760	7765	7771	7777	7782	7788	7793	7799	7805	
0.50	7810	7816	7822	7827	7833	7839	7844	7850	7856	7861	
0.60	7867	7873	7878	7884	7889	7895	7901	7906	7912	7918	
0.70	7923	7929	7935	7940	7946	7952	7957	7963	7969	7974	
0.80	7980	7986	7991	7997	8002	8008	8014	8019	8025	8031	
0.90	8036	8042	8048	8053	8059	8065	8070	8076	8082	8087	
39.00	8093	8098	8104	8110	8116	8121	8127	8133	8138	8144	
0.10	8150	8155	8161	8167	8172	8178	8184	8189	8195	8201	
0.20	8207	8212	8218	8224	8229	8235	8241	8246	8252	8258	
0.30	8263	8269	8275	8280	8286	8292	8298	8303	8309	8315	
0.40	8320	8326	8332	8337	8343	8349	8354	8360	8366	8371	
0.50	8377	8383	8388	8394	8400	8406	8411	8417	8423	8428	
0.60	8434	8440	8445	8451	8457	8462	8468	8474	8479	8485	
0.70	8491	8497	8502	8508	8514	8519	8525	8531	8536	8542	
0.80	8548	8553	8559	8565	8570	8576	8582	8587	8593	8599	
0.90	8605	8610	8616	8622	8627	8633	8639	8644	8650	8656	
40.00	8661	8667	8673	8679	8684	8690	8696	8702	8707	8713	
0.10	8719	8724	8730	8736	8742	8747	8753	8759	8765	8770	
0.20	8776	8782	8788	8793	8799	8805	8810	8816	8822	8828	
0.30	8833	8839	8845	8851	8856	8862	8868	8873	8879	8885	
0.40	8891	8896	8902	8908	8914	8919	8925	8931	8937	8942	
0.50	8948	8954	8959	8965	8971	8977	8982	8988	8994	9000	
0.60	9005	9011	9017	9023	9028	9034	9040	9045	9051	9057	
0.70	9063	9068	9074	9080	9086	9091	9097	9103	9109	9114	
0.80	9120	9126	9131	9137	9143	9149	9154	9160	9166	9172	
0.90	9177	9183	9189	9194	9200	9206	9212	9217	9223	9229	
41.00	9235	9240	9246	9252	9258	9264	9269	9275	9281	9287	
0.10	9292	9298	9304	9310	9316	9321	9327	9333	9339	9344	
0.20	9350	9356	9362	9368	9373	9379	9385	9391	9397	9402	
0.30	9408	9414	9420	9425	9431	9437	9443	9449	9454	9460	
0.40	9466	9472	9477	9483	9489	9495	9501	9506	9512	9518	
0.50	9524	9529	9535	9541	9547	9553	9558	9564	9570	9576	
0.60	9582	9587	9593	9599	9605	9610	9616	9622	9628	9634	
0.70	9639	9645	9651	9657	9662	9668	9674	9680	9686	9691	
0.80	9697	9703	9709	9715	9720	9726	9732	9738	9743	9749	
0.90	9755	9761	9767	9772	9778	9784	9790	9795	9801	9807	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
42.00	9813	9819	9824	9830	9836	9842	9848	9854	9860	9865	
0.10	9871	9877	9883	9889	9895	9900	9906	9912	9918	9924	
0.20	9930	9935	9941	9947	9953	9959	9965	9970	9976	9982	
0.30	9988	9994	10,000	10,005	10,011	10,017	10,023	10,029	10,035	10,040	
0.40	10,046	10,052	10,058	10,064	10,070	10,075	10,081	10,087	10,093	10,099	
0.50	10,105	10,111	10,116	10,122	10,128	10,134	10,140	10,146	10,151	10,157	
0.60	10,163	10,169	10,175	10,181	10,186	10,192	10,198	10,204	10,210	10,216	
0.70	10,221	10,227	10,233	10,239	10,245	10,251	10,256	10,262	10,268	10,274	
0.80	10,280	10,286	10,291	10,297	10,303	10,309	10,315	10,321	10,326	10,332	
0.90	10,338	10,344	10,350	10,356	10,361	10,367	10,373	10,379	10,385	10,391	
43.00	10,397	10,403	10,409	10,414	10,420	10,426	10,432	10,438	10,444	10,450	
0.10	10,456	10,462	10,468	10,474	10,480	10,486	10,492	10,498	10,504	10,510	
0.20	10,516	10,522	10,528	10,534	10,540	10,546	10,552	10,558	10,564	10,570	
0.30	10,576	10,582	10,588	10,594	10,600	10,606	10,612	10,618	10,624	10,630	
0.40	10,636	10,642	10,648	10,654	10,660	10,666	10,672	10,678	10,684	10,690	
0.50	10,696	10,702	10,708	10,714	10,720	10,726	10,732	10,738	10,744	10,750	
0.60	10,756	10,762	10,768	10,774	10,780	10,786	10,792	10,798	10,804	10,810	
0.70	10,816	10,822	10,828	10,834	10,840	10,846	10,852	10,858	10,864	10,870	
0.80	10,876	10,882	10,888	10,894	10,900	10,906	10,912	10,918	10,924	10,930	
0.90	10,936	10,942	10,948	10,954	10,960	10,966	10,972	10,978	10,984	10,990	
44.00	10,996	11,002	11,008	11,014	11,021	11,027	11,033	11,039	11,046	11,052	
0.10	11,058	11,064	11,071	11,077	11,083	11,090	11,096	11,102	11,108	11,115	
0.20	11,121	11,127	11,133	11,140	11,146	11,152	11,159	11,165	11,171	11,177	
0.30	11,184	11,190	11,196	11,202	11,209	11,215	11,221	11,227	11,234	11,240	
0.40	11,246	11,253	11,259	11,265	11,271	11,278	11,284	11,290	11,296	11,303	
0.50	11,309	11,315	11,321	11,328	11,334	11,340	11,347	11,353	11,359	11,365	
0.60	11,372	11,378	11,384	11,390	11,397	11,403	11,409	11,415	11,422	11,428	
0.70	11,434	11,441	11,447	11,453	11,459	11,466	11,472	11,478	11,484	11,491	
0.80	11,497	11,503	11,510	11,516	11,522	11,528	11,535	11,541	11,547	11,553	
0.90	11,560	11,566	11,572	11,578	11,585	11,591	11,597	11,604	11,610	11,616	
45.00	11,622	11,629	11,635	11,642	11,648	11,655	11,661	11,668	11,674	11,681	
0.10	11,687	11,694	11,700	11,706	11,713	11,719	11,726	11,732	11,739	11,745	
0.20	11,752	11,758	11,765	11,771	11,778	11,784	11,791	11,797	11,803	11,810	
0.30	11,816	11,823	11,829	11,836	11,842	11,849	11,855	11,862	11,868	11,875	
0.40	11,881	11,888	11,894	11,901	11,907	11,913	11,920	11,926	11,933	11,939	
0.50	11,946	11,952	11,959	11,965	11,972	11,978	11,985	11,991	11,998	12,004	
0.60	12,011	12,017	12,023	12,030	12,036	12,043	12,049	12,056	12,062	12,069	
0.70	12,075	12,082	12,088	12,095	12,101	12,108	12,114	12,120	12,127	12,133	
0.80	12,140	12,146	12,153	12,159	12,166	12,172	12,179	12,185	12,192	12,198	
0.90	12,205	12,211	12,218	12,224	12,230	12,237	12,243	12,250	12,256	12,263	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
46.00	12,269	12,276	12,283	12,289	12,296	12,303	12,309	12,316	12,323	12,329	
0.10	12,336	12,343	12,349	12,356	12,363	12,369	12,376	12,383	12,389	12,396	
0.20	12,403	12,409	12,416	12,423	12,429	12,436	12,443	12,449	12,456	12,463	
0.30	12,469	12,476	12,483	12,489	12,496	12,503	12,509	12,516	12,523	12,529	
0.40	12,536	12,543	12,549	12,556	12,563	12,569	12,576	12,582	12,589	12,596	
0.50	12,602	12,609	12,616	12,622	12,629	12,636	12,642	12,649	12,656	12,662	
0.60	12,669	12,676	12,682	12,689	12,696	12,702	12,709	12,716	12,722	12,729	
0.70	12,736	12,742	12,749	12,756	12,762	12,769	12,776	12,782	12,789	12,796	
0.80	12,802	12,809	12,816	12,822	12,829	12,836	12,842	12,849	12,856	12,862	
0.90	12,869	12,876	12,882	12,889	12,896	12,902	12,909	12,916	12,922	12,929	
47.00	12,936	12,943	12,949	12,956	12,963	12,970	12,977	12,984	12,990	12,997	
0.10	13,004	13,011	13,018	13,025	13,031	13,038	13,045	13,052	13,059	13,066	
0.20	13,072	13,079	13,086	13,093	13,100	13,107	13,113	13,120	13,127	13,134	
0.30	13,141	13,148	13,154	13,161	13,168	13,175	13,182	13,189	13,195	13,202	
0.40	13,209	13,216	13,223	13,230	13,236	13,243	13,250	13,257	13,264	13,271	
0.50	13,277	13,284	13,291	13,298	13,305	13,312	13,318	13,325	13,332	13,339	
0.60	13,346	13,353	13,360	13,366	13,373	13,380	13,387	13,394	13,401	13,407	
0.70	13,414	13,421	13,428	13,435	13,442	13,448	13,455	13,462	13,469	13,476	
0.80	13,483	13,489	13,496	13,503	13,510	13,517	13,524	13,530	13,537	13,544	
0.90	13,551	13,558	13,565	13,571	13,578	13,585	13,592	13,599	13,606	13,612	
48.00	13,619	13,626	13,633	13,640	13,647	13,654	13,661	13,668	13,675	13,682	
0.10	13,689	13,696	13,703	13,710	13,717	13,725	13,732	13,739	13,746	13,753	
0.20	13,760	13,767	13,774	13,781	13,788	13,795	13,802	13,809	13,816	13,823	
0.30	13,830	13,837	13,844	13,851	13,858	13,865	13,872	13,879	13,886	13,893	
0.40	13,900	13,907	13,914	13,921	13,928	13,935	13,942	13,949	13,956	13,963	
0.50	13,970	13,977	13,984	13,991	13,998	14,005	14,012	14,019	14,026	14,033	
0.60	14,040	14,047	14,054	14,061	14,068	14,075	14,082	14,089	14,096	14,103	
0.70	14,110	14,117	14,124	14,131	14,138	14,145	14,152	14,160	14,167	14,174	
0.80	14,181	14,188	14,195	14,202	14,209	14,216	14,223	14,230	14,237	14,244	
0.90	14,251	14,258	14,265	14,272	14,279	14,286	14,293	14,300	14,307	14,314	
49.00	14,321	14,328	14,335	14,342	14,350	14,357	14,364	14,371	14,378	14,386	
0.10	14,393	14,400	14,407	14,414	14,422	14,429	14,436	14,443	14,450	14,458	
0.20	14,465	14,472	14,479	14,486	14,494	14,501	14,508	14,515	14,522	14,530	
0.30	14,537	14,544	14,551	14,558	14,566	14,573	14,580	14,587	14,594	14,602	
0.40	14,609	14,616	14,623	14,630	14,638	14,645	14,652	14,659	14,666	14,674	
0.50	14,681	14,688	14,695	14,702	14,710	14,717	14,724	14,731	14,738	14,745	
0.60	14,753	14,760	14,767	14,774	14,781	14,789	14,796	14,803	14,810	14,817	
0.70	14,825	14,832	14,839	14,846	14,853	14,861	14,868	14,875	14,882	14,889	
0.80	14,897	14,904	14,911	14,918	14,925	14,933	14,940	14,947	14,954	14,961	
0.90	14,969	14,976	14,983	14,990	14,997	15,005	15,012	15,019	15,026	15,033	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
50.00	15,041	15,048	15,055	15,063	15,070	15,077	15,085	15,092	15,099	15,107	
0.10	15,114	15,121	15,129	15,136	15,144	15,151	15,158	15,166	15,173	15,180	
0.20	15,188	15,195	15,202	15,210	15,217	15,224	15,232	15,239	15,246	15,254	
0.30	15,261	15,269	15,276	15,283	15,291	15,298	15,305	15,313	15,320	15,327	
0.40	15,335	15,342	15,349	15,357	15,364	15,371	15,379	15,386	15,394	15,401	
0.50	15,408	15,416	15,423	15,430	15,438	15,445	15,452	15,460	15,467	15,474	
0.60	15,482	15,489	15,497	15,504	15,511	15,519	15,526	15,533	15,541	15,548	
0.70	15,555	15,563	15,570	15,577	15,585	15,592	15,599	15,607	15,614	15,622	
0.80	15,629	15,636	15,644	15,651	15,658	15,666	15,673	15,680	15,688	15,695	
0.90	15,702	15,710	15,717	15,724	15,732	15,739	15,747	15,754	15,761	15,769	
51.00	15,776	15,783	15,791	15,798	15,806	15,813	15,821	15,828	15,836	15,843	
0.10	15,851	15,858	15,866	15,873	15,881	15,888	15,896	15,903	15,911	15,918	
0.20	15,925	15,933	15,940	15,948	15,955	15,963	15,970	15,978	15,985	15,993	
0.30	16,000	16,008	16,015	16,023	16,030	16,038	16,045	16,053	16,060	16,067	
0.40	16,075	16,082	16,090	16,097	16,105	16,112	16,120	16,127	16,135	16,142	
0.50	16,150	16,157	16,165	16,172	16,180	16,187	16,195	16,202	16,209	16,217	
0.60	16,224	16,232	16,239	16,247	16,254	16,262	16,269	16,277	16,284	16,292	
0.70	16,299	16,307	16,314	16,322	16,329	16,337	16,344	16,351	16,359	16,366	
0.80	16,374	16,381	16,389	16,396	16,404	16,411	16,419	16,426	16,434	16,441	
0.90	16,449	16,456	16,464	16,471	16,479	16,486	16,493	16,501	16,508	16,516	
52.00	16,523	16,531	16,539	16,546	16,554	16,561	16,569	16,576	16,584	16,592	
0.10	16,599	16,607	16,614	16,622	16,629	16,637	16,645	16,652	16,660	16,667	
0.20	16,675	16,682	16,690	16,698	16,705	16,713	16,720	16,728	16,736	16,743	
0.30	16,751	16,758	16,766	16,773	16,781	16,789	16,796	16,804	16,811	16,819	
0.40	16,826	16,834	16,842	16,849	16,857	16,864	16,872	16,879	16,887	16,895	
0.50	16,902	16,910	16,917	16,925	16,933	16,940	16,948	16,955	16,963	16,970	
0.60	16,978	16,986	16,993	17,001	17,008	17,016	17,023	17,031	17,039	17,046	
0.70	17,054	17,061	17,069	17,076	17,084	17,092	17,099	17,107	17,114	17,122	
0.80	17,130	17,137	17,145	17,152	17,160	17,167	17,175	17,183	17,190	17,198	
0.90	17,205	17,213	17,220	17,228	17,236	17,243	17,251	17,258	17,266	17,273	
53.00	17,281	17,289	17,296	17,304	17,312	17,320	17,327	17,335	17,343	17,350	
0.10	17,358	17,366	17,373	17,381	17,389	17,396	17,404	17,412	17,420	17,427	
0.20	17,435	17,443	17,450	17,458	17,466	17,473	17,481	17,489	17,497	17,504	
0.30	17,512	17,520	17,527	17,535	17,543	17,550	17,558	17,566	17,573	17,581	
0.40	17,589	17,597	17,604	17,612	17,620	17,627	17,635	17,643	17,650	17,658	
0.50	17,666	17,674	17,681	17,689	17,697	17,704	17,712	17,720	17,727	17,735	
0.60	17,743	17,750	17,758	17,766	17,774	17,781	17,789	17,797	17,804	17,812	
0.70	17,820	17,827	17,835	17,843	17,851	17,858	17,866	17,874	17,881	17,889	
0.80	17,897	17,904	17,912	17,920	17,927	17,935	17,943	17,951	17,958	17,966	
0.90	17,974	17,981	17,989	17,997	18,004	18,012	18,020	18,028	18,035	18,043	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
54.00	18,051	18,058	18,066	18,074	18,082	18,090	18,098	18,105	18,113	18,121	
0.10	18,129	18,137	18,145	18,152	18,160	18,168	18,176	18,184	18,191	18,199	
0.20	18,207	18,215	18,223	18,231	18,238	18,246	18,254	18,262	18,270	18,278	
0.30	18,285	18,293	18,301	18,309	18,317	18,324	18,332	18,340	18,348	18,356	
0.40	18,364	18,371	18,379	18,387	18,395	18,403	18,411	18,418	18,426	18,434	
0.50	18,442	18,450	18,458	18,465	18,473	18,481	18,489	18,497	18,504	18,512	
0.60	18,520	18,528	18,536	18,544	18,551	18,559	18,567	18,575	18,583	18,591	
0.70	18,598	18,606	18,614	18,622	18,630	18,638	18,645	18,653	18,661	18,669	
0.80	18,677	18,684	18,692	18,700	18,708	18,716	18,724	18,731	18,739	18,747	
0.90	18,755	18,763	18,771	18,778	18,786	18,794	18,802	18,810	18,817	18,825	
55.00	18,833	18,841	18,849	18,857	18,865	18,873	18,881	18,889	18,897	18,905	
0.10	18,912	18,920	18,928	18,936	18,944	18,952	18,960	18,968	18,976	18,984	
0.20	18,992	19,000	19,008	19,016	19,024	19,031	19,039	19,047	19,055	19,063	
0.30	19,071	19,079	19,087	19,095	19,103	19,111	19,119	19,127	19,135	19,143	
0.40	19,151	19,158	19,166	19,174	19,182	19,190	19,198	19,206	19,214	19,222	
0.50	19,230	19,238	19,246	19,254	19,262	19,270	19,277	19,285	19,293	19,301	
0.60	19,309	19,317	19,325	19,333	19,341	19,349	19,357	19,365	19,373	19,381	
0.70	19,389	19,396	19,404	19,412	19,420	19,428	19,436	19,444	19,452	19,460	
0.80	19,468	19,476	19,484	19,492	19,500	19,508	19,515	19,523	19,531	19,539	
0.90	19,547	19,555	19,563	19,571	19,579	19,587	19,595	19,603	19,611	19,619	
56.00	19,627	19,635	19,643	19,651	19,659	19,667	19,675	19,683	19,691	19,699	
0.10	19,707	19,715	19,723	19,731	19,739	19,747	19,755	19,763	19,771	19,779	
0.20	19,787	19,795	19,803	19,811	19,819	19,827	19,835	19,843	19,851	19,859	
0.30	19,867	19,875	19,883	19,891	19,899	19,907	19,915	19,923	19,931	19,939	
0.40	19,947	19,955	19,963	19,971	19,979	19,987	19,995	20,003	20,012	20,020	
0.50	20,028	20,036	20,044	20,052	20,060	20,068	20,076	20,084	20,092	20,100	
0.60	20,108	20,116	20,124	20,132	20,140	20,148	20,156	20,164	20,172	20,180	
0.70	20,188	20,196	20,204	20,212	20,220	20,228	20,236	20,244	20,252	20,260	
0.80	20,268	20,276	20,284	20,292	20,300	20,308	20,316	20,324	20,332	20,340	
0.90	20,348	20,356	20,364	20,372	20,380	20,388	20,396	20,404	20,412	20,420	
57.00	20,429	20,437	20,445	20,453	20,461	20,469	20,477	20,485	20,493	20,501	
0.10	20,510	20,518	20,526	20,534	20,542	20,550	20,558	20,566	20,574	20,583	
0.20	20,591	20,599	20,607	20,615	20,623	20,631	20,639	20,647	20,655	20,664	
0.30	20,672	20,680	20,688	20,696	20,704	20,712	20,720	20,728	20,737	20,745	
0.40	20,753	20,761	20,769	20,777	20,785	20,793	20,801	20,809	20,818	20,826	
0.50	20,834	20,842	20,850	20,858	20,866	20,874	20,882	20,891	20,899	20,907	
0.60	20,915	20,923	20,931	20,939	20,947	20,955	20,963	20,972	20,980	20,988	
0.70	20,996	21,004	21,012	21,020	21,028	21,036	21,045	21,053	21,061	21,069	
0.80	21,077	21,085	21,093	21,101	21,109	21,117	21,126	21,134	21,142	21,150	
0.90	21,158	21,166	21,174	21,182	21,190	21,199	21,207	21,215	21,223	21,231	

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
58.00	21,239	21,247	21,255	21,264	21,272	21,280	21,288	21,297	21,305	21,313	
0.10	21,321	21,329	21,338	21,346	21,354	21,362	21,370	21,379	21,387	21,395	
0.20	21,403	21,412	21,420	21,428	21,436	21,444	21,453	21,461	21,469	21,477	
0.30	21,485	21,494	21,502	21,510	21,518	21,527	21,535	21,543	21,551	21,559	
0.40	21,568	21,576	21,584	21,592	21,600	21,609	21,617	21,625	21,633	21,642	
0.50	21,650	21,658	21,666	21,674	21,683	21,691	21,699	21,707	21,715	21,724	
0.60	21,732	21,740	21,748	21,757	21,765	21,773	21,781	21,789	21,798	21,806	
0.70	21,814	21,822	21,830	21,839	21,847	21,855	21,863	21,872	21,880	21,888	
0.80	21,896	21,904	21,913	21,921	21,929	21,937	21,945	21,954	21,962	21,970	
0.90	21,978	21,987	21,995	22,003	22,011	22,019	22,028	22,036	22,044	22,052	
59.00	22,060	22,069	22,077	22,085	22,094	22,102	22,110	22,119	22,127	22,135	
0.10	22,144	22,152	22,160	22,168	22,177	22,185	22,193	22,202	22,210	22,218	
0.20	22,227	22,235	22,243	22,252	22,260	22,268	22,276	22,285	22,293	22,301	
0.30	22,310	22,318	22,326	22,335	22,343	22,351	22,360	22,368	22,376	22,384	
0.40	22,393	22,401	22,409	22,418	22,426	22,434	22,443	22,451	22,459	22,468	
0.50	22,476	22,484	22,492	22,501	22,509	22,517	22,526	22,534	22,542	22,551	
0.60	22,559	22,567	22,576	22,584	22,592	22,600	22,609	22,617	22,625	22,634	
0.70	22,642	22,650	22,659	22,667	22,675	22,684	22,692	22,700	22,708	22,717	
0.80	22,725	22,733	22,742	22,750	22,758	22,767	22,775	22,783	22,792	22,800	
0.90	22,808	22,816	22,825	22,833	22,841	22,850	22,858	22,866	22,875	22,883	
60.00	22,891	22,900	22,908	22,916	22,925	22,933	22,942	22,950	22,958	22,967	
0.10	22,975	22,984	22,992	23,000	23,009	23,017	23,026	23,034	23,042	23,051	
0.20	23,059	23,068	23,076	23,084	23,093	23,101	23,110	23,118	23,126	23,135	
0.30	23,143	23,152	23,160	23,168	23,177	23,185	23,194	23,202	23,210	23,219	
0.40	23,227	23,236	23,244	23,252	23,261	23,269	23,278	23,286	23,294	23,303	
0.50	23,311	23,320	23,328	23,336	23,345	23,353	23,362	23,370	23,378	23,387	
0.60	23,395	23,404	23,412	23,420	23,429	23,437	23,446	23,454	23,463	23,471	
0.70	23,479	23,488	23,496	23,505	23,513	23,521	23,530	23,538	23,547	23,555	
0.80	23,563	23,572	23,580	23,589	23,597	23,605	23,614	23,622	23,631	23,639	
0.90	23,647	23,656	23,664	23,673	23,681	23,689	23,698	23,706	23,715	23,723	
61.00	23,731	23,740	23,748	23,757	23,765	23,774	23,782	23,791	23,799	23,808	
0.10	23,816	23,825	23,833	23,842	23,850	23,859	23,867	23,876	23,884	23,893	
0.20	23,901	23,910	23,918	23,927	23,935	23,944	23,952	23,961	23,969	23,978	
0.30	23,986	23,995	24,003	24,012	24,020	24,029	24,037	24,046	24,054	24,063	
0.40	24,071	24,080	24,088	24,097	24,105	24,114	24,122	24,131	24,139	24,148	
0.50	24,156	24,165	24,173	24,182	24,190	24,199	24,207	24,216	24,224	24,233	
0.60	24,241	24,250	24,258	24,267	24,275	24,284	24,292	24,301	24,309	24,318	
0.70	24,326	24,335	24,343	24,352	24,360	24,369	24,377	24,386	24,394	24,403	
0.80	24,411	24,420	24,428	24,437	24,445	24,454	24,462	24,471	24,479	24,488	
0.90	24,496	24,505	24,513	24,522	24,530	24,539	24,547	24,556	24,564	24,573	

RIO GRANDE RESERVOIR**CAPACITY SUMMARY**

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
62.00	24,581	24,590	24,598	24,607	24,616	24,624	24,633	24,641	24,650	24,659	
0.10	24,667	24,676	24,684	24,693	24,702	24,710	24,719	24,728	24,736	24,745	
0.20	24,753	24,762	24,771	24,779	24,788	24,796	24,805	24,814	24,822	24,831	
0.30	24,840	24,848	24,857	24,865	24,874	24,883	24,891	24,900	24,909	24,917	
0.40	24,926	24,934	24,943	24,952	24,960	24,969	24,977	24,986	24,995	25,003	
0.50	25,012	25,021	25,029	25,038	25,046	25,055	25,064	25,072	25,081	25,089	
0.60	25,098	25,107	25,115	25,124	25,133	25,141	25,150	25,158	25,167	25,176	
0.70	25,184	25,193	25,201	25,210	25,219	25,227	25,236	25,245	25,253	25,262	
0.80	25,270	25,279	25,288	25,296	25,305	25,314	25,322	25,331	25,339	25,348	
0.90	25,357	25,365	25,374	25,382	25,391	25,400	25,408	25,417	25,426	25,434	
63.00	25,443	25,451	25,460	25,469	25,478	25,486	25,495	25,504	25,513	25,521	
0.10	25,530	25,539	25,547	25,556	25,565	25,574	25,582	25,591	25,600	25,608	
0.20	25,617	25,626	25,635	25,643	25,652	25,661	25,669	25,678	25,687	25,696	
0.30	25,704	25,713	25,722	25,731	25,739	25,748	25,757	25,765	25,774	25,783	
0.40	25,792	25,800	25,809	25,818	25,826	25,835	25,844	25,853	25,861	25,870	
0.50	25,879	25,888	25,896	25,905	25,914	25,922	25,931	25,940	25,949	25,957	
0.60	25,966	25,975	25,983	25,992	26,001	26,010	26,018	26,027	26,036	26,044	
0.70	26,053	26,062	26,071	26,079	26,088	26,097	26,106	26,114	26,123	26,132	
0.80	26,140	26,149	26,158	26,167	26,175	26,184	26,193	26,201	26,210	26,219	
0.90	26,228	26,236	26,245	26,254	26,262	26,271	26,280	26,289	26,297	26,306	
64.00	26,315	26,324	26,332	26,341	26,350	26,359	26,368	26,376	26,385	26,394	
0.10	26,403	26,412	26,421	26,429	26,438	26,447	26,456	26,465	26,473	26,482	
0.20	26,491	26,500	26,509	26,517	26,526	26,535	26,544	26,553	26,561	26,570	
0.30	26,579	26,588	26,597	26,606	26,614	26,623	26,632	26,641	26,650	26,658	
0.40	26,667	26,676	26,685	26,694	26,702	26,711	26,720	26,729	26,738	26,746	
0.50	26,755	26,764	26,773	26,782	26,791	26,799	26,808	26,817	26,826	26,835	
0.60	26,843	26,852	26,861	26,870	26,879	26,887	26,896	26,905	26,914	26,923	
0.70	26,932	26,940	26,949	26,958	26,967	26,976	26,984	26,993	27,002	27,011	
0.80	27,020	27,028	27,037	27,046	27,055	27,064	27,072	27,081	27,090	27,099	
0.90	27,108	27,117	27,125	27,134	27,143	27,152	27,161	27,169	27,178	27,187	
65.00	27,196	27,205	27,214	27,223	27,231	27,240	27,249	27,258	27,267	27,276	
0.10	27,285	27,294	27,303	27,312	27,320	27,329	27,338	27,347	27,356	27,365	
0.20	27,374	27,383	27,392	27,401	27,409	27,418	27,427	27,436	27,445	27,454	
0.30	27,463	27,472	27,481	27,490	27,498	27,507	27,516	27,525	27,534	27,543	
0.40	27,552	27,561	27,570	27,579	27,587	27,596	27,605	27,614	27,623	27,632	
0.50	27,641	27,650	27,659	27,668	27,676	27,685	27,694	27,703	27,712	27,721	
0.60	27,730	27,739	27,748	27,757	27,765	27,774	27,783	27,792	27,801	27,810	
0.70	27,819	27,828	27,837	27,846	27,854	27,863	27,872	27,881	27,890	27,899	
0.80	27,908	27,917	27,926	27,935	27,943	27,952	27,961	27,970	27,979	27,988	
0.90	27,997	28,006	28,015	28,024	28,032	28,041	28,050	28,059	28,068	28,077	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
66.00	28,086	28,095	28,104	28,113	28,122	28,131	28,140	28,149	28,158	28,167	
0.10	28,176	28,185	28,194	28,203	28,212	28,221	28,230	28,239	28,248	28,257	
0.20	28,266	28,275	28,284	28,293	28,302	28,311	28,320	28,330	28,339	28,348	
0.30	28,357	28,366	28,375	28,384	28,393	28,402	28,411	28,420	28,429	28,438	
0.40	28,447	28,456	28,465	28,474	28,483	28,492	28,501	28,510	28,519	28,528	
0.50	28,537	28,546	28,555	28,564	28,573	28,582	28,591	28,600	28,609	28,618	
0.60	28,627	28,636	28,645	28,654	28,663	28,672	28,681	28,690	28,699	28,709	
0.70	28,718	28,727	28,736	28,745	28,754	28,763	28,772	28,781	28,790	28,799	
0.80	28,808	28,817	28,826	28,835	28,844	28,853	28,862	28,871	28,880	28,889	
0.90	28,898	28,907	28,916	28,925	28,934	28,943	28,952	28,961	28,970	28,979	
67.00	28,988	28,997	29,006	29,016	29,025	29,034	29,043	29,052	29,061	29,070	
0.10	29,080	29,089	29,098	29,107	29,116	29,125	29,134	29,144	29,153	29,162	
0.20	29,171	29,180	29,189	29,198	29,207	29,217	29,226	29,235	29,244	29,253	
0.30	29,262	29,271	29,281	29,290	29,299	29,308	29,317	29,326	29,335	29,344	
0.40	29,354	29,363	29,372	29,381	29,390	29,399	29,408	29,418	29,427	29,436	
0.50	29,445	29,454	29,463	29,472	29,482	29,491	29,500	29,509	29,518	29,527	
0.60	29,536	29,545	29,555	29,564	29,573	29,582	29,591	29,600	29,609	29,619	
0.70	29,628	29,637	29,646	29,655	29,664	29,673	29,682	29,692	29,701	29,710	
0.80	29,719	29,728	29,737	29,746	29,756	29,765	29,774	29,783	29,792	29,801	
0.90	29,810	29,819	29,829	29,838	29,847	29,856	29,865	29,874	29,883	29,893	
68.00	29,902	29,911	29,920	29,929	29,939	29,948	29,957	29,966	29,976	29,985	
0.10	29,994	30,003	30,013	30,022	30,031	30,040	30,049	30,059	30,068	30,077	
0.20	30,086	30,096	30,105	30,114	30,123	30,133	30,142	30,151	30,160	30,170	
0.30	30,179	30,188	30,197	30,207	30,216	30,225	30,234	30,243	30,253	30,262	
0.40	30,271	30,280	30,290	30,299	30,308	30,317	30,327	30,336	30,345	30,354	
0.50	30,364	30,373	30,382	30,391	30,400	30,410	30,419	30,428	30,437	30,447	
0.60	30,456	30,465	30,474	30,484	30,493	30,502	30,511	30,521	30,530	30,539	
0.70	30,548	30,557	30,567	30,576	30,585	30,594	30,604	30,613	30,622	30,631	
0.80	30,641	30,650	30,659	30,668	30,678	30,687	30,696	30,705	30,715	30,724	
0.90	30,733	30,742	30,751	30,761	30,770	30,779	30,788	30,798	30,807	30,816	
69.00	30,825	30,835	30,844	30,853	30,863	30,872	30,881	30,891	30,900	30,910	
0.10	30,919	30,928	30,938	30,947	30,956	30,966	30,975	30,984	30,994	31,003	
0.20	31,012	31,022	31,031	31,040	31,050	31,059	31,069	31,078	31,087	31,097	
0.30	31,106	31,115	31,125	31,134	31,143	31,153	31,162	31,171	31,181	31,190	
0.40	31,199	31,209	31,218	31,228	31,237	31,246	31,256	31,265	31,274	31,284	
0.50	31,293	31,302	31,312	31,321	31,330	31,340	31,349	31,358	31,368	31,377	
0.60	31,387	31,396	31,405	31,415	31,424	31,433	31,443	31,452	31,461	31,471	
0.70	31,480	31,489	31,499	31,508	31,518	31,527	31,536	31,546	31,555	31,564	
0.80	31,574	31,583	31,592	31,602	31,611	31,620	31,630	31,639	31,648	31,658	
0.90	31,667	31,677	31,686	31,695	31,705	31,714	31,723	31,733	31,742	31,751	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
70.00	31,761	31,770	31,780	31,789	31,799	31,808	31,818	31,827	31,837	31,846	
0.10	31,856	31,865	31,875	31,885	31,894	31,904	31,913	31,923	31,932	31,942	
0.20	31,951	31,961	31,970	31,980	31,989	31,999	32,008	32,018	32,027	32,037	
0.30	32,046	32,056	32,066	32,075	32,085	32,094	32,104	32,113	32,123	32,132	
0.40	32,142	32,151	32,161	32,170	32,180	32,189	32,199	32,208	32,218	32,227	
0.50	32,237	32,246	32,256	32,266	32,275	32,285	32,294	32,304	32,313	32,323	
0.60	32,332	32,342	32,351	32,361	32,370	32,380	32,389	32,399	32,408	32,418	
0.70	32,427	32,437	32,447	32,456	32,466	32,475	32,485	32,494	32,504	32,513	
0.80	32,523	32,532	32,542	32,551	32,561	32,570	32,580	32,589	32,599	32,608	
0.90	32,618	32,628	32,637	32,647	32,656	32,666	32,675	32,685	32,694	32,704	
71.00	32,713	32,723	32,733	32,742	32,752	32,761	32,771	32,781	32,790	32,800	
0.10	32,810	32,819	32,829	32,839	32,848	32,858	32,867	32,877	32,887	32,896	
0.20	32,906	32,916	32,925	32,935	32,945	32,954	32,964	32,974	32,983	32,993	
0.30	33,002	33,012	33,022	33,031	33,041	33,051	33,060	33,070	33,080	33,089	
0.40	33,099	33,109	33,118	33,128	33,137	33,147	33,157	33,166	33,176	33,186	
0.50	33,195	33,205	33,215	33,224	33,234	33,243	33,253	33,263	33,272	33,282	
0.60	33,292	33,301	33,311	33,321	33,330	33,340	33,350	33,359	33,369	33,378	
0.70	33,388	33,398	33,407	33,417	33,427	33,436	33,446	33,456	33,465	33,475	
0.80	33,484	33,494	33,504	33,513	33,523	33,533	33,542	33,552	33,562	33,571	
0.90	33,581	33,591	33,600	33,610	33,619	33,629	33,639	33,648	33,658	33,668	
72.00	33,677	33,687	33,697	33,707	33,716	33,726	33,736	33,745	33,755	33,765	
0.10	33,775	33,784	33,794	33,804	33,814	33,823	33,833	33,843	33,853	33,862	
0.20	33,872	33,882	33,892	33,901	33,911	33,921	33,931	33,940	33,950	33,960	
0.30	33,970	33,979	33,989	33,999	34,009	34,018	34,028	34,038	34,047	34,057	
0.40	34,067	34,077	34,086	34,096	34,106	34,116	34,125	34,135	34,145	34,155	
0.50	34,164	34,174	34,184	34,194	34,203	34,213	34,223	34,233	34,242	34,252	
0.60	34,262	34,272	34,281	34,291	34,301	34,310	34,320	34,330	34,340	34,349	
0.70	34,359	34,369	34,379	34,388	34,398	34,408	34,418	34,427	34,437	34,447	
0.80	34,457	34,466	34,476	34,486	34,496	34,505	34,515	34,525	34,535	34,544	
0.90	34,554	34,564	34,574	34,583	34,593	34,603	34,612	34,622	34,632	34,642	
73.00	34,651	34,661	34,671	34,681	34,691	34,701	34,711	34,720	34,730	34,740	
0.10	34,750	34,760	34,770	34,779	34,789	34,799	34,809	34,819	34,829	34,839	
0.20	34,848	34,858	34,868	34,878	34,888	34,898	34,908	34,917	34,927	34,937	
0.30	34,947	34,957	34,967	34,976	34,986	34,996	35,006	35,016	35,026	35,036	
0.40	35,045	35,055	35,065	35,075	35,085	35,095	35,105	35,114	35,124	35,134	
0.50	35,144	35,154	35,164	35,173	35,183	35,193	35,203	35,213	35,223	35,233	
0.60	35,242	35,252	35,262	35,272	35,282	35,292	35,301	35,311	35,321	35,331	
0.70	35,341	35,351	35,361	35,370	35,380	35,390	35,400	35,410	35,420	35,430	
0.80	35,439	35,449	35,459	35,469	35,479	35,489	35,498	35,508	35,518	35,528	
0.90	35,538	35,548	35,558	35,567	35,577	35,587	35,597	35,607	35,617	35,627	

RIO GRANDE RESERVOIR**CAPACITY SUMMARY**

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
74.00	35,636	35,646	35,656	35,666	35,676	35,686	35,696	35,706	35,716	35,726	
0.10	35,736	35,746	35,756	35,766	35,776	35,786	35,796	35,806	35,816	35,826	
0.20	35,836	35,846	35,856	35,866	35,876	35,886	35,896	35,906	35,916	35,926	
0.30	35,936	35,946	35,956	35,965	35,975	35,985	35,995	36,005	36,015	36,025	
0.40	36,035	36,045	36,055	36,065	36,075	36,085	36,095	36,105	36,115	36,125	
0.50	36,135	36,145	36,155	36,165	36,175	36,185	36,195	36,205	36,215	36,225	
0.60	36,235	36,245	36,255	36,265	36,275	36,285	36,295	36,305	36,315	36,325	
0.70	36,334	36,344	36,354	36,364	36,374	36,384	36,394	36,404	36,414	36,424	
0.80	36,434	36,444	36,454	36,464	36,474	36,484	36,494	36,504	36,514	36,524	
0.90	36,534	36,544	36,554	36,564	36,574	36,584	36,594	36,604	36,614	36,624	
75.00	36,634	36,644	36,654	36,664	36,674	36,684	36,694	36,704	36,714	36,724	
0.10	36,734	36,744	36,754	36,765	36,775	36,785	36,795	36,805	36,815	36,825	
0.20	36,835	36,845	36,855	36,865	36,875	36,885	36,895	36,905	36,915	36,926	
0.30	36,936	36,946	36,956	36,966	36,976	36,986	36,996	37,006	37,016	37,026	
0.40	37,036	37,046	37,056	37,066	37,077	37,087	37,097	37,107	37,117	37,127	
0.50	37,137	37,147	37,157	37,167	37,177	37,187	37,197	37,207	37,217	37,228	
0.60	37,238	37,248	37,258	37,268	37,278	37,288	37,298	37,308	37,318	37,328	
0.70	37,338	37,348	37,358	37,368	37,378	37,389	37,399	37,409	37,419	37,429	
0.80	37,439	37,449	37,459	37,469	37,479	37,489	37,499	37,509	37,519	37,529	
0.90	37,540	37,550	37,560	37,570	37,580	37,590	37,600	37,610	37,620	37,630	
76.00	37,640	37,650	37,660	37,671	37,681	37,691	37,701	37,711	37,721	37,732	
0.10	37,742	37,752	37,762	37,772	37,782	37,792	37,803	37,813	37,823	37,833	
0.20	37,843	37,853	37,863	37,874	37,884	37,894	37,904	37,914	37,924	37,934	
0.30	37,945	37,955	37,965	37,975	37,985	37,995	38,006	38,016	38,026	38,036	
0.40	38,046	38,056	38,066	38,077	38,087	38,097	38,107	38,117	38,127	38,137	
0.50	38,148	38,158	38,168	38,178	38,188	38,198	38,208	38,219	38,229	38,239	
0.60	38,249	38,259	38,269	38,280	38,290	38,300	38,310	38,320	38,330	38,340	
0.70	38,351	38,361	38,371	38,381	38,391	38,401	38,411	38,422	38,432	38,442	
0.80	38,452	38,462	38,472	38,483	38,493	38,503	38,513	38,523	38,533	38,543	
0.90	38,554	38,564	38,574	38,584	38,594	38,604	38,614	38,625	38,635	38,645	
77.00	38,655	38,665	38,676	38,686	38,696	38,706	38,716	38,727	38,737	38,747	
0.10	38,757	38,768	38,778	38,788	38,798	38,809	38,819	38,829	38,839	38,850	
0.20	38,860	38,870	38,880	38,890	38,901	38,911	38,921	38,931	38,942	38,952	
0.30	38,962	38,972	38,983	38,993	39,003	39,013	39,024	39,034	39,044	39,054	
0.40	39,064	39,075	39,085	39,095	39,105	39,116	39,126	39,136	39,146	39,157	
0.50	39,167	39,177	39,187	39,198	39,208	39,218	39,228	39,238	39,249	39,259	
0.60	39,269	39,279	39,290	39,300	39,310	39,320	39,331	39,341	39,351	39,361	
0.70	39,372	39,382	39,392	39,402	39,412	39,423	39,433	39,443	39,453	39,464	
0.80	39,474	39,484	39,494	39,505	39,515	39,525	39,535	39,546	39,556	39,566	
0.90	39,576	39,586	39,597	39,607	39,617	39,627	39,638	39,648	39,658	39,668	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
78.00	39,679	39,689	39,699	39,710	39,720	39,730	39,741	39,751	39,762	39,772	
0.10	39,782	39,793	39,803	39,813	39,824	39,834	39,845	39,855	39,865	39,876	
0.20	39,886	39,897	39,907	39,917	39,928	39,938	39,948	39,959	39,969	39,980	
0.30	39,990	40,000	40,011	40,021	40,031	40,042	40,052	40,063	40,073	40,083	
0.40	40,094	40,104	40,114	40,125	40,135	40,146	40,156	40,166	40,177	40,187	
0.50	40,197	40,208	40,218	40,229	40,239	40,249	40,260	40,270	40,280	40,291	
0.60	40,301	40,312	40,322	40,332	40,343	40,353	40,363	40,374	40,384	40,395	
0.70	40,405	40,415	40,426	40,436	40,446	40,457	40,467	40,478	40,488	40,498	
0.80	40,509	40,519	40,529	40,540	40,550	40,561	40,571	40,581	40,592	40,602	
0.90	40,612	40,623	40,633	40,644	40,654	40,664	40,675	40,685	40,695	40,706	
79.00	40,716	40,727	40,737	40,748	40,758	40,769	40,779	40,790	40,800	40,810	
0.10	40,821	40,831	40,842	40,852	40,863	40,873	40,884	40,894	40,905	40,915	
0.20	40,926	40,936	40,947	40,957	40,968	40,978	40,988	40,999	41,009	41,020	
0.30	41,030	41,041	41,051	41,062	41,072	41,083	41,093	41,104	41,114	41,125	
0.40	41,135	41,146	41,156	41,166	41,177	41,187	41,198	41,208	41,219	41,229	
0.50	41,240	41,250	41,261	41,271	41,282	41,292	41,303	41,313	41,324	41,334	
0.60	41,344	41,355	41,365	41,376	41,386	41,397	41,407	41,418	41,428	41,439	
0.70	41,449	41,460	41,470	41,481	41,491	41,502	41,512	41,522	41,533	41,543	
0.80	41,554	41,564	41,575	41,585	41,596	41,606	41,617	41,627	41,638	41,648	
0.90	41,659	41,669	41,680	41,690	41,700	41,711	41,721	41,732	41,742	41,753	
80.00	41,763	41,774	41,784	41,795	41,806	41,816	41,827	41,837	41,848	41,858	
0.10	41,869	41,879	41,890	41,901	41,911	41,922	41,932	41,943	41,953	41,964	
0.20	41,975	41,985	41,996	42,006	42,017	42,027	42,038	42,049	42,059	42,070	
0.30	42,080	42,091	42,101	42,112	42,122	42,133	42,144	42,154	42,165	42,175	
0.40	42,186	42,196	42,207	42,218	42,228	42,239	42,249	42,260	42,270	42,281	
0.50	42,291	42,302	42,313	42,323	42,334	42,344	42,355	42,365	42,376	42,387	
0.60	42,397	42,408	42,418	42,429	42,439	42,450	42,461	42,471	42,482	42,492	
0.70	42,503	42,513	42,524	42,534	42,545	42,556	42,566	42,577	42,587	42,598	
0.80	42,608	42,619	42,630	42,640	42,651	42,661	42,672	42,682	42,693	42,703	
0.90	42,714	42,725	42,735	42,746	42,756	42,767	42,777	42,788	42,799	42,809	
81.00	42,820	42,830	42,841	42,852	42,862	42,873	42,884	42,894	42,905	42,916	
0.10	42,926	42,937	42,948	42,958	42,969	42,980	42,990	43,001	43,012	43,022	
0.20	43,033	43,044	43,054	43,065	43,076	43,086	43,097	43,108	43,118	43,129	
0.30	43,139	43,150	43,161	43,171	43,182	43,193	43,203	43,214	43,225	43,235	
0.40	43,246	43,257	43,267	43,278	43,289	43,299	43,310	43,321	43,331	43,342	
0.50	43,353	43,363	43,374	43,385	43,395	43,406	43,417	43,427	43,438	43,449	
0.60	43,459	43,470	43,481	43,491	43,502	43,513	43,523	43,534	43,545	43,555	
0.70	43,566	43,577	43,587	43,598	43,609	43,619	43,630	43,641	43,651	43,662	
0.80	43,672	43,683	43,694	43,704	43,715	43,726	43,736	43,747	43,758	43,768	
0.90	43,779	43,790	43,800	43,811	43,822	43,832	43,843	43,854	43,864	43,875	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
82.00	43,886	43,897	43,908	43,919	43,930	43,940	43,951	43,962	43,973	43,984	
0.10	43,995	44,006	44,017	44,028	44,039	44,050	44,061	44,072	44,083	44,094	
0.20	44,105	44,116	44,127	44,138	44,149	44,160	44,171	44,182	44,193	44,204	
0.30	44,215	44,225	44,236	44,247	44,258	44,269	44,280	44,291	44,302	44,313	
0.40	44,324	44,335	44,346	44,357	44,368	44,379	44,390	44,401	44,412	44,423	
0.50	44,434	44,445	44,456	44,467	44,478	44,489	44,500	44,510	44,521	44,532	
0.60	44,543	44,554	44,565	44,576	44,587	44,598	44,609	44,620	44,631	44,642	
0.70	44,653	44,664	44,675	44,686	44,697	44,708	44,719	44,730	44,741	44,752	
0.80	44,763	44,774	44,785	44,796	44,806	44,817	44,828	44,839	44,850	44,861	
0.90	44,872	44,883	44,894	44,905	44,916	44,927	44,938	44,949	44,960	44,971	
83.00	44,982	44,993	45,004	45,015	45,026	45,037	45,048	45,059	45,070	45,081	
0.10	45,092	45,103	45,115	45,126	45,137	45,148	45,159	45,170	45,181	45,192	
0.20	45,203	45,214	45,225	45,236	45,247	45,258	45,269	45,280	45,291	45,302	
0.30	45,313	45,325	45,336	45,347	45,358	45,369	45,380	45,391	45,402	45,413	
0.40	45,424	45,435	45,446	45,457	45,468	45,479	45,490	45,501	45,512	45,524	
0.50	45,535	45,546	45,557	45,568	45,579	45,590	45,601	45,612	45,623	45,634	
0.60	45,645	45,656	45,667	45,678	45,689	45,700	45,711	45,723	45,734	45,745	
0.70	45,756	45,767	45,778	45,789	45,800	45,811	45,822	45,833	45,844	45,855	
0.80	45,866	45,877	45,888	45,899	45,910	45,922	45,933	45,944	45,955	45,966	
0.90	45,977	45,988	45,999	46,010	46,021	46,032	46,043	46,054	46,065	46,076	
84.00	46,087	46,098	46,110	46,121	46,132	46,143	46,154	46,165	46,176	46,188	
0.10	46,199	46,210	46,221	46,232	46,243	46,254	46,265	46,277	46,288	46,299	
0.20	46,310	46,321	46,332	46,343	46,355	46,366	46,377	46,388	46,399	46,410	
0.30	46,421	46,432	46,444	46,455	46,466	46,477	46,488	46,499	46,510	46,522	
0.40	46,533	46,544	46,555	46,566	46,577	46,588	46,599	46,611	46,622	46,633	
0.50	46,644	46,655	46,666	46,677	46,688	46,700	46,711	46,722	46,733	46,744	
0.60	46,755	46,766	46,778	46,789	46,800	46,811	46,822	46,833	46,844	46,855	
0.70	46,867	46,878	46,889	46,900	46,911	46,922	46,933	46,945	46,956	46,967	
0.80	46,978	46,989	47,000	47,011	47,022	47,034	47,045	47,056	47,067	47,078	
0.90	47,089	47,100	47,112	47,123	47,134	47,145	47,156	47,167	47,178	47,189	
85.00	47,201	47,212	47,223	47,234	47,245	47,257	47,268	47,279	47,290	47,302	
0.10	47,313	47,324	47,335	47,346	47,358	47,369	47,380	47,391	47,402	47,414	
0.20	47,425	47,436	47,447	47,459	47,470	47,481	47,492	47,503	47,515	47,526	
0.30	47,537	47,548	47,559	47,571	47,582	47,593	47,604	47,616	47,627	47,638	
0.40	47,649	47,660	47,672	47,683	47,694	47,705	47,716	47,728	47,739	47,750	
0.50	47,761	47,773	47,784	47,795	47,806	47,817	47,829	47,840	47,851	47,862	
0.60	47,873	47,885	47,896	47,907	47,918	47,929	47,941	47,952	47,963	47,974	
0.70	47,986	47,997	48,008	48,019	48,030	48,042	48,053	48,064	48,075	48,086	
0.80	48,098	48,109	48,120	48,131	48,143	48,154	48,165	48,176	48,187	48,199	
0.90	48,210	48,221	48,232	48,243	48,255	48,266	48,277	48,288	48,300	48,311	

RIO GRANDE RESERVOIR

CAPACITY SUMMARY

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
86.00	48,322	48,333	48,345	48,356	48,367	48,379	48,390	48,401	48,413	48,424	
0.10	48,435	48,447	48,458	48,469	48,481	48,492	48,503	48,514	48,526	48,537	
0.20	48,548	48,560	48,571	48,582	48,594	48,605	48,616	48,628	48,639	48,650	
0.30	48,662	48,673	48,684	48,696	48,707	48,718	48,730	48,741	48,752	48,764	
0.40	48,775	48,786	48,798	48,809	48,820	48,832	48,843	48,854	48,866	48,877	
0.50	48,888	48,900	48,911	48,922	48,933	48,945	48,956	48,967	48,979	48,990	
0.60	49,001	49,013	49,024	49,035	49,047	49,058	49,069	49,081	49,092	49,103	
0.70	49,115	49,126	49,137	49,149	49,160	49,171	49,183	49,194	49,205	49,217	
0.80	49,228	49,239	49,251	49,262	49,273	49,285	49,296	49,307	49,319	49,330	
0.90	49,341	49,352	49,364	49,375	49,386	49,398	49,409	49,420	49,432	49,443	
87.00	49,454	49,466	49,477	49,489	49,500	49,511	49,523	49,534	49,546	49,557	
0.10	49,568	49,580	49,591	49,603	49,614	49,625	49,637	49,648	49,660	49,671	
0.20	49,682	49,694	49,705	49,717	49,728	49,739	49,751	49,762	49,774	49,785	
0.30	49,796	49,808	49,819	49,831	49,842	49,853	49,865	49,876	49,888	49,899	
0.40	49,910	49,922	49,933	49,945	49,956	49,967	49,979	49,990	50,002	50,013	
0.50	50,024	50,036	50,047	50,059	50,070	50,082	50,093	50,104	50,116	50,127	
0.60	50,139	50,150	50,161	50,173	50,184	50,196	50,207	50,218	50,230	50,241	
0.70	50,253	50,264	50,275	50,287	50,298	50,310	50,321	50,332	50,344	50,355	
0.80	50,367	50,378	50,389	50,401	50,412	50,424	50,435	50,446	50,458	50,469	
0.90	50,481	50,492	50,503	50,515	50,526	50,538	50,549	50,560	50,572	50,583	
88.00	50,595	50,606	50,618	50,629	50,641	50,652	50,663	50,675	50,686	50,698	
0.10	50,709	50,721	50,732	50,744	50,755	50,767	50,778	50,790	50,801	50,813	
0.20	50,824	50,836	50,847	50,859	50,870	50,882	50,893	50,905	50,916	50,928	
0.30	50,939	50,951	50,962	50,973	50,985	50,996	51,008	51,019	51,031	51,042	
0.40	51,054	51,065	51,077	51,088	51,100	51,111	51,123	51,134	51,146	51,157	
0.50	51,169	51,180	51,192	51,203	51,215	51,226	51,238	51,249	51,261	51,272	
0.60	51,283	51,295	51,306	51,318	51,329	51,341	51,352	51,364	51,375	51,387	
0.70	51,398	51,410	51,421	51,433	51,444	51,456	51,467	51,479	51,490	51,502	
0.80	51,513	51,525	51,536	51,548	51,559	51,571	51,582	51,593	51,605	51,616	
0.90	51,628	51,639	51,651	51,662	51,674	51,685	51,697	51,708	51,720	51,731	
89.00	51,743	51,754	51,766	51,778	51,789	51,801	51,812	51,824	51,835	51,847	
0.10	51,859	51,870	51,882	51,893	51,905	51,917	51,928	51,940	51,951	51,963	
0.20	51,974	51,986	51,998	52,009	52,021	52,032	52,044	52,056	52,067	52,079	
0.30	52,090	52,102	52,113	52,125	52,137	52,148	52,160	52,171	52,183	52,195	
0.40	52,206	52,218	52,229	52,241	52,253	52,264	52,276	52,287	52,299	52,310	
0.50	52,322	52,334	52,345	52,357	52,368	52,380	52,392	52,403	52,415	52,426	
0.60	52,438	52,449	52,461	52,473	52,484	52,496	52,507	52,519	52,531	52,542	
0.70	52,554	52,565	52,577	52,589	52,600	52,612	52,623	52,635	52,646	52,658	
0.80	52,670	52,681	52,693	52,704	52,716	52,728	52,739	52,751	52,762	52,774	
0.90	52,785	52,797	52,809	52,820	52,832	52,843	52,855	52,867	52,878	52,890	

RIO GRANDE RESERVOIR**CAPACITY SUMMARY**

November 17, 1998

Gauge Height (Feet)	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	Comments
90.00	52,901	52,913	52,925	52,937	52,949	52,960	52,972	52,984	52,996	53,008	
0.10	53,019	53,031	53,043	53,055	53,067	53,078	53,090	53,102	53,114	53,126	
0.20	53,137	53,149	53,161	53,173	53,185	53,197	53,208	53,220	53,232	53,244	
0.30	53,256	53,267	53,279	53,291	53,303	53,315	53,326	53,338	53,350	53,362	
0.40	53,374	53,385	53,397	53,409	53,421	53,433	53,445	53,456	53,468	53,480	
0.50	53,492	53,504	53,515	53,527	53,539	53,551	53,563	53,574	53,586	53,598	
0.60	53,610	53,622	53,633	53,645	53,657	53,669	53,681	53,693	53,704	53,716	
0.70	53,728	53,740	53,752	53,763	53,775	53,787	53,799	53,811	53,822	53,834	
0.80	53,846	53,858	53,870	53,881	53,893	53,905	53,917	53,929	53,940	53,952	
0.90	53,964	53,976	53,988	54,000	54,011	54,023	54,035	54,047	54,059	54,070	
91.00	54,082										Spillway

Appendix E

Spillway Rating Curve (Volume II)

Client: SLVID
 Project: Rio Grande Reservoir
 Enlargement
 Facility:
 Detail: Spillway Design

Reviewed By: Sergio Gaitan
 Date: 03-21-2008
 Checked by:
 Date:

Calc No.: 1
 Job #: 43844-60541
 Calc by: Brian Murphy
 Date: 05-05-2008
 Page: 1 of 10

1.0 Purpose/Objective

This calculation brief documents the process used to determine the existing emergency spillway rating curve (head-discharge) for Rio Grande Reservoir. The primary reference for the design of the spillway was the U.S. Bureau of Reclamation (USBR) *Design of Small Dams*. All Figures referenced herein are attached at the end of the document.

The existing spillway appurtenance consists of a side channel spillway, control weir, and trapezoidal channel chute (Figure 1). The side channel spillway consists of an “L-shaped” ogee weir approximately 120 feet long, with an ogee crest elevation at gage height 91 ft. An ogee weir of the same general shape is used in the downstream section of the side channel portion to control flow into the spillway chute and provide proper hydraulic conditions in the side channel portion (Wheeler 1981). The control weir is 32 feet long with an ogee crest elevation of gage height 85 ft. The spillway chute, downstream of the control weir, consists of a trapezoidal channel approximately 32 feet wide and 475 feet long. As-built construction drawings for the side channel spillway, control weir, and chute provided the geometric data.

The presence of the two weirs creates a unique discharge situation. Each weir has a different rating curve and, therefore each weir controls the flow out of the reservoir at different reservoir stages. Following the USBR guidelines (USBR 1987), a spillway rating curve was developed for each weir. The upstream weir controls flow at lower water surface elevations but the flow into the side channel becomes restricted by the lower control weir and partly submerges the flow over the crest at the upstream weir.

2.0 Procedure/Approach

- 1) Calculate the control weir effective crest length, L , using **Equation 1**. The abutments of the control weir cause side contractions of the overflow decreasing the net weir length. The effect of the end contraction was taken into account by reducing the net crest length.

$$(1) \quad L = L' - 2(NK_p + K_a)H_e$$

Where: L = effective length of crest, (ft)

L' = net length of crest, (ft)

N = number of piers

K_p = pier contraction coefficient

K_a = abutment contraction coefficient

H_e = actual head on crest

- 2) Determine the variable discharge coefficient, C_e , for the downstream control ogee weir using the design head, H_o , design discharge coefficient, C_o , and Figures 9-23, 9-24, and 9-27. C_o was

Client:	SLVID	Reviewed By:	Sergio Gaitan	Calc No.:	1
Project:	Rio Grande Reservoir Enlargement	Date:	03-21-2008	Job #:	43844-60541
Facility:		Checked by:		Calc by:	Brian Murphy
Detail:	Spillway Design	Date:		Date:	05-05-2008
				Page:	2 of 10

adjusted to account for changes in head and for the downstream apron effect. See Figure 1 for typical weir layout.

- Based on the ratio of the weir face height, P , to design head, H_o , determine the design discharge coefficient, C_o , from Figure 9-23.
- Calculate the ratio of head on crest, H_e , to design head, H_o .
- Based on the H_e/H_o ratio, determine the ratio of discharge coefficients for heads other than H_o , C , to the design discharge coefficient using Figure 9-24.
- Calculate the position of the downstream apron, $(h_d + d)/H_e$.

Where: h_d = degree of submergence, (ft)

d = water surface elevation downstream of weir, (ft)

- Based on $(h_d + d)/H_e$, determine the ratio of modified coefficient, C_s , to the design discharge coefficient using Figure 9-27.
- Multiply C_o by the ratio values for C and C_s .

3) Calculate downstream control weir rating curve using **Equation 2**.

$$(2) \quad Q = C_e L H_e^{2/3}$$

Where: Q = discharge, (cfs)

C_e = variable discharge coefficient

L = effective length of crest (ft)

H_e = variable head on the crest (ft)

- 4) Calculate the spillway weir effective crest length, L , using **Equation 1**. There is only one abutment that causes flow contraction. The spillway also increases in length due to the sloped bank adjacent to the hillslope. The slope is 1:1. No abutment reduction was taken for the sloped bank.
- 5) Determine C_e for the side channel spillway using the same Figures from Step 1 and Figure 9-28. The control weir creates backwater, which eventually submerges the spillway weir. The spillway weir coefficient must be corrected for the backwater effects using the degree of submergence ratio (h_d/H_e) shown on Figure 9-28.

Client:	SLVID	Reviewed By:	Sergio Gaitan	Calc No.:	1
Project:	Rio Grande Reservoir Enlargement	Date:	03-21-2008	Job #:	43844-60541
Facility:		Checked by:		Calc by:	Brian Murphy
Detail:	Spillway Design	Date:		Date:	05-05-2008
				Page:	3 of 10

- Based on the ratio of the weir face height, P , to design head, H_o , determine the design discharge coefficient, C_o , from Figure 9-23.
- Calculate the ratio of head on crest, H_e , to design head, H_o .
- Based on the H_e/H_o ratio, determine the ratio of discharge coefficients for heads other than H_o , C , to the design discharge coefficient using Figure 9-24.
- Calculate the position of the downstream apron, $(h_d + d)/H_e$.

Where: h_d = degree of submergence, (ft)

d = water surface elevation downstream of weir, (ft)

- Based on $(h_d + d)/H_e$, determine the ratio of modified coefficient, C_s , to the design discharge coefficient using Figure 9-27.
 - Select a water surface elevation above the spillway crest.
 - Assume a discharge for the water surface elevation.
 - Determine the backwater elevation from Figure 2.
 - Calculate h_d by subtracting the backwater elevation from the water surface elevation.
 - Calculate the h_d/H_e ratio for the upstream weir.
 - Determine C_s from Figure 9-28.
 - Multiply C_o by the ratio values for C , C_s , and C_s .
- 6) Solve for H_e in **Equation 2** and compare it to the H_e for the chosen water surface elevation. The calculation was trial and error until calculated H_e value matched within 0.05 of a foot to the H_e for the chosen water surface elevation. The backwater reduction coefficient was revised each iteration.
- 7) Calculate the combined spillway rating curve using **Equation 2**. The rating curve is calculated using the H_e determined in Step 4 until the spillway curve is completely submerged. Once the spillway is completely submerged, the downstream weir controls the discharge and the rating curve reflects only its parameters.



Client:	SLVID	Reviewed By:	Sergio Gaitan	Calc No.:	1
Project:	Rio Grande Reservoir Enlargement	Date:	03-21-2008	Job #:	43844-60541
Facility:		Checked by:		Calc by:	Brian Murphy
Detail:	Spillway Design	Date:		Date:	05-05-2008
		Date:		Page:	4 of 10

- 8) Compare CDM calculated rating curve to previously developed rating curve.

3.0 Data & References

- 1) Wheeler, W.W. and Associates. *Appendices to Rio Grande Dam Rehabilitation Feasibility Report*. 1981.
- 2) U.S. Bureau of Reclamation. *Design of Small Dams*. 3rd Edition, 1987.

4.0 Assumptions/Limitations

- 1) Both weirs are assumed to be ogee in shape with a vertical upstream face.
- 2) $h_d + d$ is assumed to be equal to $P + H_e$
- 3) H_o for the spillway weir is assumed to be 6.20 feet. This height is based on the approximate peak discharge of 6,600 cfs from the HEC-HMS model. It was calculated using **Equation 2** and solving for H . The L used was 116 feet. The C used was 3.55.
- 4) H_o for the control weir is assumed to be 14.7 feet. This height is based on the approximate peak discharge of 6,600 cfs from the HEC-HMS model. It was calculated using **Equation 2** and solving for H . The L used was 32 feet. The C used was 3.65.
- 5) L' is assumed to be 116 feet for the spillway weir and 32 feet for the control weir. This length is based on the 1972 construction drawings.
- 6) P is assumed to be 1 foot for the spillway weir and 4 feet for the control weir. This length is based on the 1972 construction drawings.
- 7) The control weir abutment is assumed to be rounded with headwall at 90° to direction of flow. K_a is assumed to be 0.1.
- 8) The spillway weir abutment is assumed to be rounded with headwall at 90° to direction of flow. No reduction was taken for the sloped bank. K_a is assumed to be 0.1. No piers exist so K_a was set equal to 0.

5.0 Calculations

- 1) Calculate the control weir effective crest length, L .
See Table 1

Client:	SLVID	Reviewed By:	Sergio Gaitan	Calc No.:	1
Project:	Rio Grande Reservoir Enlargement	Date:	03-21-2008	Job #:	43844-60541
Facility:		Checked by:		Calc by:	Brian Murphy
Detail:	Spillway Design	Date:		Date:	05-05-2008
				Page:	5 of 10

2) Determine the variable discharge coefficient, C , for the downstream control ogee weir using Figures 9-23, 9-24, and 9-27:

- Based on the ratio of the weir face height, P , to design head, H_o , determine the design discharge coefficient, C_o , from Figure 9-23.

$$\begin{aligned}P &= 4 \text{ feet} \\H_o &= 14.7 \text{ feet}\end{aligned}$$

$$\frac{P}{H_o} = 0.27$$

From Figure 9-23, $C_o = 3.65$

- Calculate the ratio of H_e/H_o .

See Table 1

- Based on the H_e/H_o ratio, determine the ratio of discharge coefficients for heads other than H_o , C , to the design discharge coefficient using Figure 9-24.

See Table 1

- Calculate the position of the downstream apron, $(h_d + d)/H_e$, ($h_d + d$ is assumed to be equal to $P + H_e$).

See Table 1

- Based on $(h_d + d)/H_e$, determine the ratio of modified coefficient, C_s , to the design discharge coefficient using Figure 9-27.

See Table 1

- Multiply C_o by the ratio values for C and C_s .

See Table 1

3) Calculate downstream control weir rating curve:

See Figure 2

Client: SLVID
Project: Rio Grande Reservoir
Enlargement
Facility: _____
Detail: Spillway Design

Reviewed By: Sergio Gaitan
Date: 03-21-2008
Checked by: _____
Date: _____

Calc No.: 1
Job #: 43844-60541
Calc by: Brian Murphy
Date: 05-05-2008
Page: 6 of 10

- 4) Calculate the spillway weir effective crest length, L .

See Table 2

- 5) Determine C_e for the side channel spillway weir.

- Based on the ratio of the weir face height, P , to design head, H_o , determine the design discharge coefficient, C_o , from Figure 9-23.

$$P = 1 \text{ feet}$$
$$H_o = 6.2 \text{ feet}$$

$$\frac{P}{H_o} = 0.16$$

From Figure 9-23, $C_o = 3.55$

- Calculate the ratio of H_e/H_o .

See Table 2

- Based on the H_e/H_o ratio, determine the ratio of discharge coefficients for heads other than H_o , C , to the design discharge coefficient using Figure 9-24.

See Table 2

- Calculate the position of the downstream apron, $(h_d + d)/H_e$, ($h_d + d$ is assumed to be equal to $P + H_e$).

See Table 2

- Based on $(h_d + d)/H_e$, determine the ratio of modified coefficient, C_s , to the design discharge coefficient using Figure 9-27.

See Table 2

- Select a water surface elevation above the spillway crest.

See Table 2

- Assume a discharge for the water surface elevation.

Client:	SLVID	Reviewed By:	Sergio Gaitan	Calc No.:	1
Project:	Rio Grande Reservoir Enlargement	Date:	03-21-2008	Job #:	43844-60541
Facility:		Checked by:		Calc by:	Brian Murphy
Detail:	Spillway Design	Date:		Date:	05-05-2008
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See Table 2

- Determine the backwater elevation from Figure 1.

See Table 2

- Calculate h_d by subtracting the backwater elevation from the water surface elevation.

See Table 2

- Calculate the h_d/H_e ratio for the upstream weir.

See Table 2

- Determine C_s from Figure 9-28.

See Table 2

- Multiply C_o by the ratio values for C , C_s , and C_s .

See Table 2

- 6) Solve for H_e in **Equation 2** and compare it to the H_e for the chosen water surface elevation.

H_e was adjusted until it matched the H_e shown in Table 2.

- 7) Calculate combined weir rating curve:

See Figure 3. At discharge 3,000 cfs (gage height 95) the spillway weir begins to become submerged. As the water surface increases, the control weir begins to control the discharge. However, the spillway weir does not become completely submerged and therefore the discharge is controlled by the spillway weir and control weir.

- 8) Compare CDM calculated rating curve to previously developed rating curve.

See Figure 4. Wheeler and Associates developed a rating curve for the spillway in 1981 for the Rio Grande Dam Rehabilitation Feasibility Study. Comparison was made to their rating curve for comparison. CDM's curve varies from Wheeler's curve towards the upper end. Recreating Wheeler's curve was attempted but never completed since Wheeler did not provide sufficient documentation on their methodology.



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Project: Rio Grande Reservoir
Enlargement
Facility:
Detail: Spillway Design

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6.0 Conclusions /Results

A combination rating curve was calculated and is shown in Figure 4.



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Facility:
Detail: Spillway Design

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Table 1 Control Weir Discharge Coefficient

Gage Ht	He	L	He/Ho	C/Co (FIG 9-24)	P + He	hd + d	(hd + d)/He	Cs/Co (FIG 9-27)	Ce	Qcalc
85	0	32.0	-	-	4	4	-	-	-	0
86	1	31.8	0.07	0.81	5	5	5.00	1.00	2.96	94
87	2	31.6	0.14	0.84	6	6	3.00	1.00	3.07	274
88	3	31.4	0.20	0.85	7	7	2.33	1.00	3.10	506
89	4	31.2	0.27	0.87	8	8	2.00	1.00	3.18	793
90	5	31.0	0.34	0.89	9	9	1.80	1.00	3.25	1,126
91	6	30.8	0.41	0.91	10	10	1.67	1.00	3.32	1,504
92	7	30.6	0.48	0.92	11	11	1.57	0.99	3.32	1,884
93	8	30.4	0.54	0.93	12	12	1.50	0.98	3.33	2,288
94	9	30.2	0.61	0.94	13	13	1.44	0.97	3.33	2,714
95	10	30.0	0.68	0.95	14	14	1.40	0.96	3.33	3,158
96	11	29.8	0.75	0.96	15	15	1.36	0.95	3.33	3,619
97	12	29.6	0.81	0.97	16	16	1.33	0.95	3.36	4,139
98	13	29.4	0.88	0.98	17	17	1.31	0.94	3.43	4,728
99	14	29.2	0.95	0.99	18	18	1.29	0.94	3.43	5,248
100	15	29.0	1.02	1.00	19	19	1.27	0.93	3.39	5,719
101	16	28.8	1.09	1.01	20	20	1.25	0.92	3.36	6,189
102	17	28.6	1.15	1.02	21	21	1.24	0.92	3.36	6,732
103	18	28.4	1.22	1.03	22	22	1.22	0.91	3.32	7,204
104	19	28.2	1.29	1.04	23	23	1.21	0.90	3.29	7,672
105	20	28.0	1.36	1.05	24	24	1.20	0.90	3.29	8,227



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Table 2 Spillway Weir Discharge Coefficient

Gage Ht	He	L	He/Ho	C/Co (FIG 9-24)	P + He	hd + d	(hd + d)/He	Cs/Co (FIG 9-27)	Qassumed	Backwater Elevation	hd	hd/He	Cs/Co (FIG 9-28)	Ce	Qcalc
91	0	116	0.00	-	1	0	-	-	0	-	-	0.00	-	-	0
92	1	116.8	0.17	0.84	2	11	11.00	1.00	340	87.30	4.70	4.70	1.00	2.98	340
93	2	117.6	0.33	0.89	3	12	6.00	1.00	1,000	89.63	3.37	1.69	1.00	3.16	1,000
94	3	118.4	0.50	0.92	4	13	4.33	1.00	2,000	92.26	1.74	0.58	0.98	3.20	2,000
95	4	119.2	0.67	0.95	5	14	3.50	1.00	2,800	94.15	0.85	0.21	0.86	2.90	2,800
96	5	120	0.83	0.98	6	15	3.00	1.00	3,375	95.37	0.63	0.13	0.73	2.54	3,375

Figure 2
Rio Grande Reservoir Rating Curve for control Weir

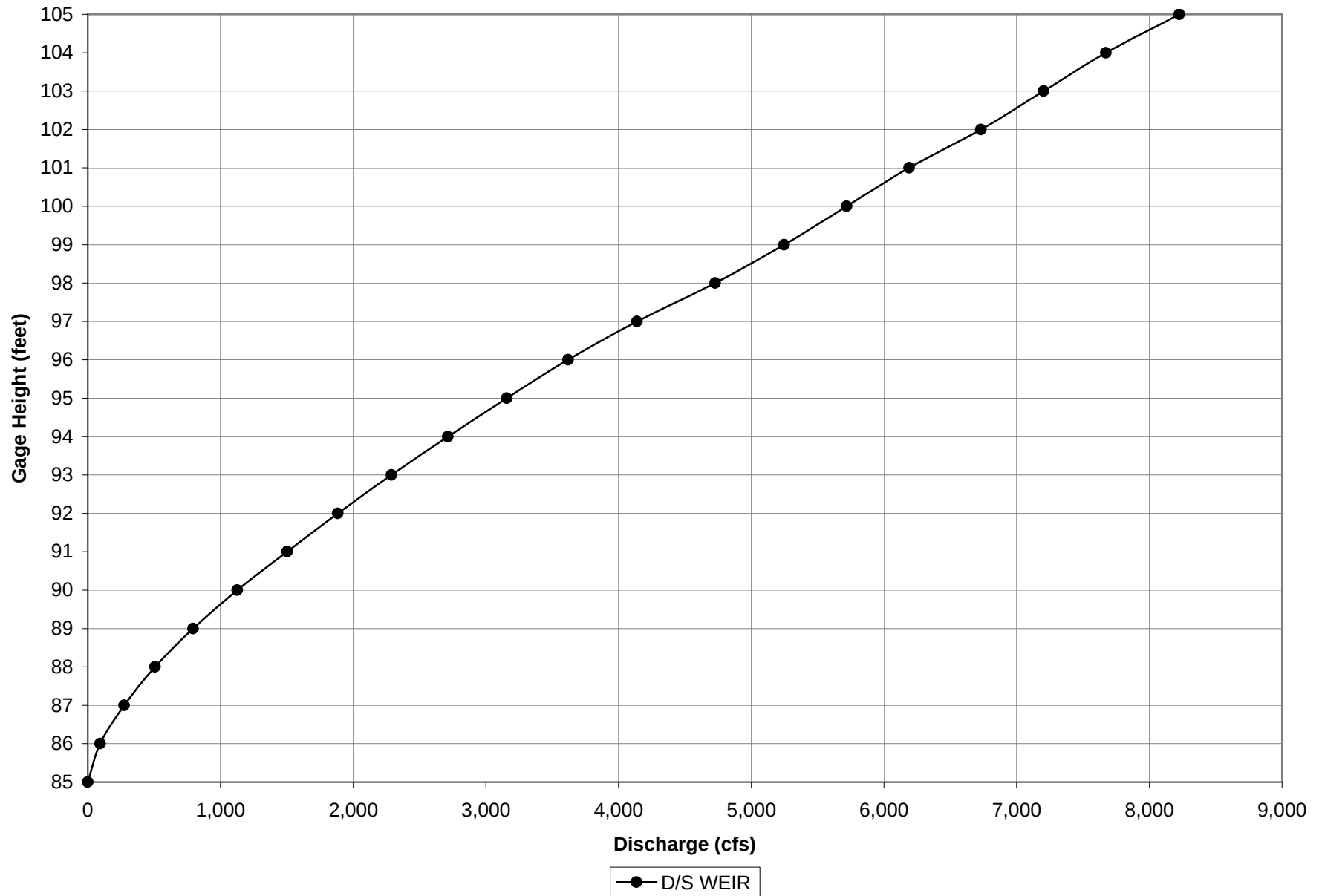


Figure 3
Rio Grande Reservoir Existing Spillway Rating Curve

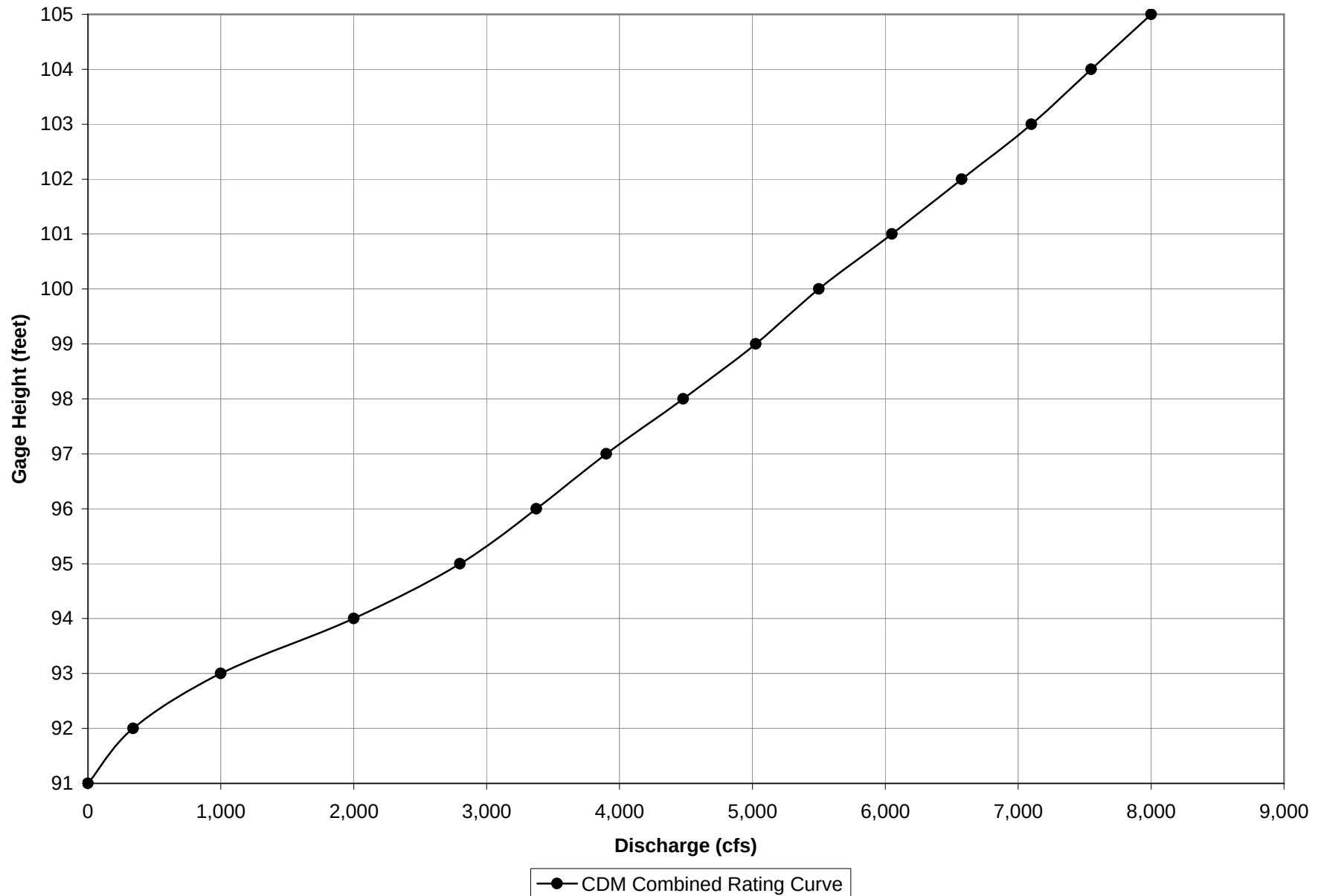
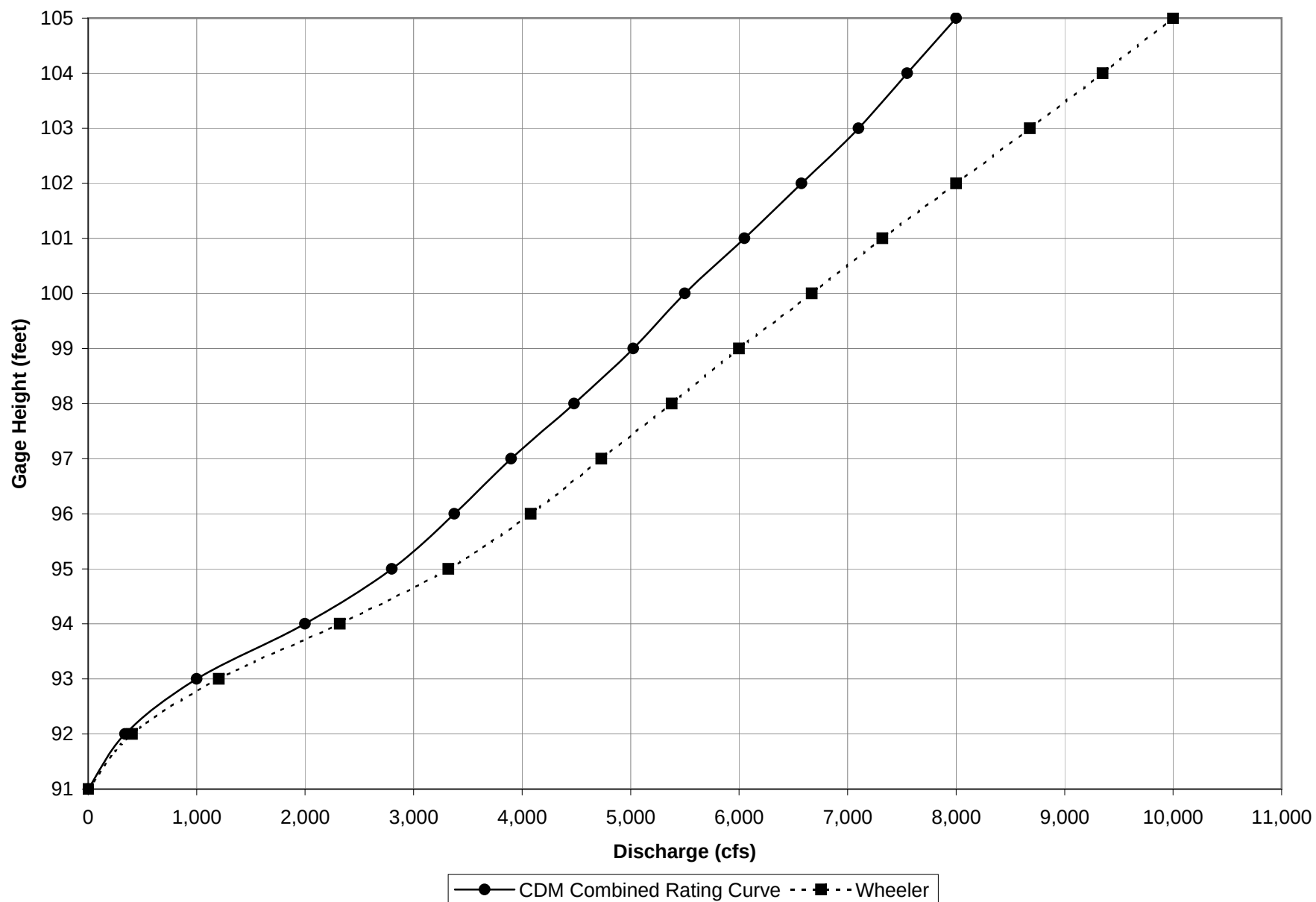


Figure 4
Rio Grande Reservoir Existing Spillway Rating Curves





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1.0 Purpose/Objective

This calculation brief documents the process used to determine the emergency spillway rating curve (head-discharge) for an enlarged Rio Grande Reservoir. The primary reference for the design of the spillway was the U.S. Bureau of Reclamation (USBR) *Design of Small Dams*. All Figures referenced herein are attached at the end of the document.

The enlarged reservoir spillway appurtenance consists of a new uncontrolled gravity spillway that incorporates the existing uncontrolled side channel spillway, trough, control weir, and trapezoidal channel chute (Figure 1). The flow conditions inside the side channel trough would be similar to the existing conditions scenario. It was assumed that the existing spillway has adequate strength; however the strength needs to be verified during final design.

The new side channel spillway would consist of two "L-shaped" ogee weir approximately 135 feet long, with a new ogee crest elevation at gage height 101 feet (Figure 1). The existing ogee weir in the downstream section of the side channel portion would remain to control flow into the spillway chute and provide proper hydraulic conditions in the side channel portion. Preliminary design construction drawings for the new side channel spillway are included in Appendix E.

The presence of the new weir eliminates the unique discharge situation described for the existing reservoir spillway. Although each weir has a different rating curve, the new weir at gage height 101 will control the flow out of the reservoir for all reservoir stages. A spillway rating curve was developed for the new weir. The control weir is not able to partially submerge the flow over the new weir because of the elevation differences between the new weir (gage height 101) and the control weir (gage height 85). Therefore, the new weir controls flow at all water surface elevations.

Following the USBR guidelines (USBR 1987), a spillway rating curve was developed for the new weir.

2.0 Procedure/Approach

- 1) Calculate the spillway weir effective crest length, L , using **Equation 1**. There is only one abutment that causes flow contraction. The spillway also increases in length due to the sloped bank adjacent to the hillslope. The slope is 1:1. No abutment reduction was taken for the sloped bank. The effect of the end contraction was taken into account by reducing the net crest length.

$$(1) \quad L = L' - 2(NK_p + K_a)H_e$$

Where: L = effective length of crest, (ft)

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$L =$ net length of crest, (ft)
 $N =$ number of piers
 $K_p =$ pier contraction coefficient
 $K_a =$ abutment contraction coefficient
 $H_e =$ actual head on crest

- 2) Determine the variable discharge coefficient, C_e , for the spillway ogee weir using the design head, H_o , design discharge coefficient, C_o , and Figures 9-23, 9-24, and 9-27. C_o was adjusted to account for changes in head and for the downstream apron effect. See Figure 1 for typical weir layout.
 - Based on the ratio of the weir face height, P , to design head, H_o , determine the design discharge coefficient, C_o , from Figure 9-23.
 - Calculate the ratio of head on crest, H_e , to design head, H_o .
 - Based on the H_e/H_o ratio, determine the ratio of discharge coefficients for heads other than H_o , C , to the design discharge coefficient using Figure 9-24.
 - Multiply C_o by the ratio values for C and C_s .
- 3) Calculate spillway weir rating curve using **Equation 2**.

$$(2) \quad Q = C_e L H_e^{2/3}$$

Where: $Q =$ discharge, (cfs)
 $C_e =$ variable discharge coefficient
 $L =$ effective length of crest (ft)
 $H_e =$ variable head on the crest (ft)

3.0 Data & References

- 1) U.S. Bureau of Reclamation. *Design of Small Dams*. 3rd Edition, 1987.

4.0 Assumptions/Limitations

- 1) Although each weir has a different rating curve, the new weir at gage height 101 is assumed to control the flow out of the reservoir for all reservoir stages.



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- 2) Spillway weir is assumed to be ogee in shape with a vertical upstream face.
- 3) $h_d + d$ is assumed to be equal to $P + H_e$
- 4) H_o for the spillway weir is assumed to be 6.60 feet. This height is based on the approximate peak discharge of 9,000 cfs from the HEC-HMS model. It was calculated using **Equation 2** and solving for H . The L used was 132 feet. The C used was 3.92.
- 5) L' is assumed to be 132 feet for the spillway weir. This length is based on the site topography and a 1:1 trough bank slope.
- 6) P is assumed to be 10 feet for the spillway weir.
- 7) The spillway weir abutment is assumed to be rounded with headwall at 90° to direction of flow. No reduction was taken for the sloped bank. K_a is assumed to be 0.1. No piers exist so K_a was set equal to 0.

5.0 Calculations

- 1) Calculate the spillway weir effective crest length, L .
See Table 1
- 2) Determine the variable discharge coefficient, C , for the spillway ogee weir using Figures 9-23, 9-24, and 9-27:
 - Based on the ratio of the weir face height, P , to design head, H_o , determine the design discharge coefficient, C_o , from Figure 9-23.

$$\begin{aligned}P &= 10 \text{ feet} \\ H_o &= 6.6 \text{ feet}\end{aligned}$$

$$\frac{P}{H_o} = 1.51$$

From Figure 9-23, $C_o = 3.92$

- Calculate the ratio of H_e/H_o .

See Table 1



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- Based on the H_e/H_o ratio, determine the ratio of discharge coefficients for heads other than H_o , C , to the design discharge coefficient using Figure 9-24.

See Table 1

- Calculate the position of the downstream apron, $(h_d + d)/H_e$, ($h_d + d$ is assumed to be equal to $P + H_e$).

See Table 1

- Based on $(h_d + d)/H_e$, determine the ratio of modified coefficient, C_s , to the design discharge coefficient using Figure 9-27.

See Table 1

- Multiply C_o by the ratio values for C and C_s .

See Table 1

3) Calculate spillway weir rating curve:

See Figure 2

6.0 Conclusions /Results

A rating curve was calculated and is shown in Figure 2.



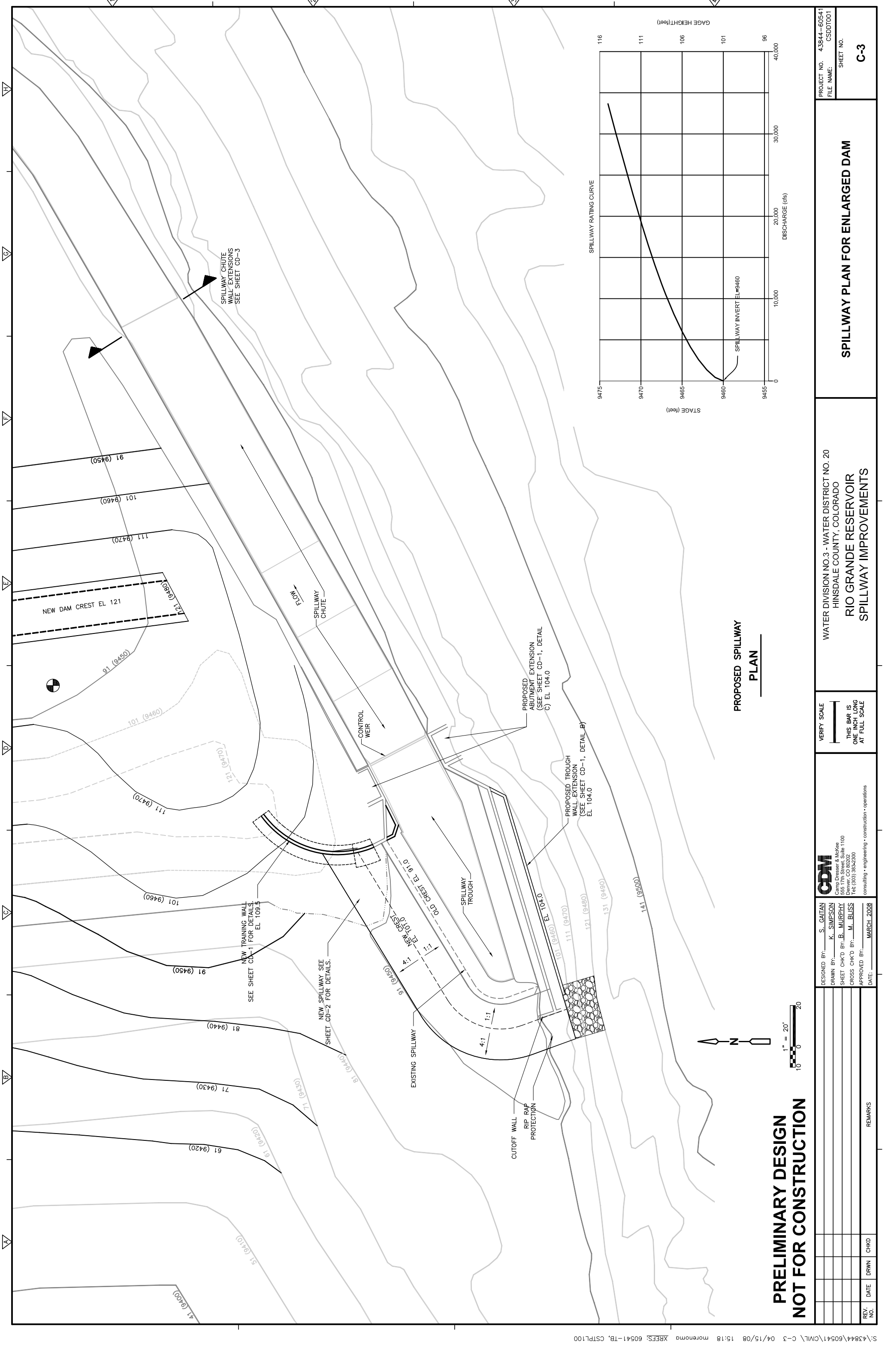
Client: SLVID
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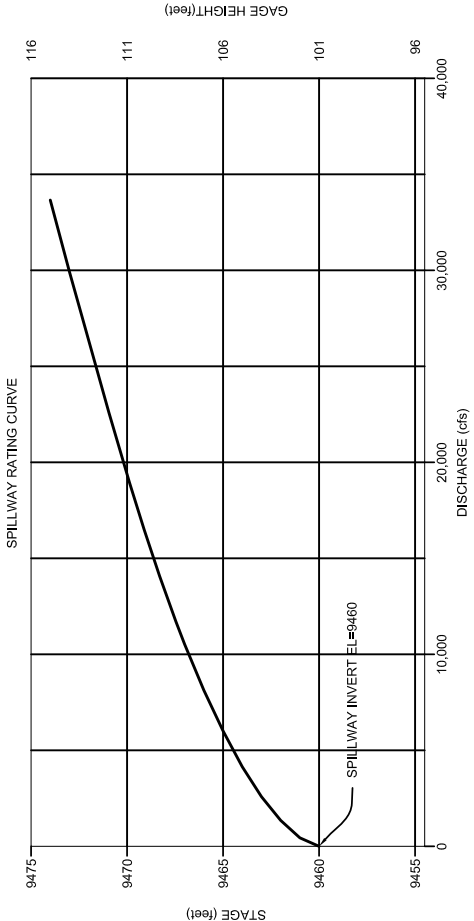
Table 1 Control Weir Discharge Coefficient

Gage Ht	He	L	He/Ho	C/Co (FIG 9-24)	P + He	hd + d	(hd + d)/He	Cs/Co (FIG 9-27)	Q
101	0	135	0.00	-	10	0	-	-	0
102	1	136	0.17	0.84	11	21	21.00	1.00	448
103	2	137	0.33	0.89	12	22	11.00	1.00	1,352
104	3	138	0.50	0.92	13	23	7.67	1.00	2,586
105	4	139	0.67	0.95	14	24	6.00	1.00	4,141
106	5	140	0.83	0.98	15	25	5.00	1.00	6,013
107	6	141	1.00	1	16	26	4.33	1.00	8,123
108	7	142	1.17	1.02	17	27	3.86	1.00	10,515
109	8	143	1.33	1.04	18	28	3.50	1.00	13,191
110	9	144	1.50	1.06	19	29	3.22	1.00	16,155
111	10	145	1.67	1.08	20	30	3.00	1.00	19,412
112	11	146	1.83	1.09	21	31	2.82	1.00	22,759
113	12	147	2.00	1.1	22	32	2.67	1.00	26,349
114	13	148	2.17	1.1	23	33	2.54	1.00	29,913
115	14	149	2.33	1.1	24	34	2.43	1.00	33,656



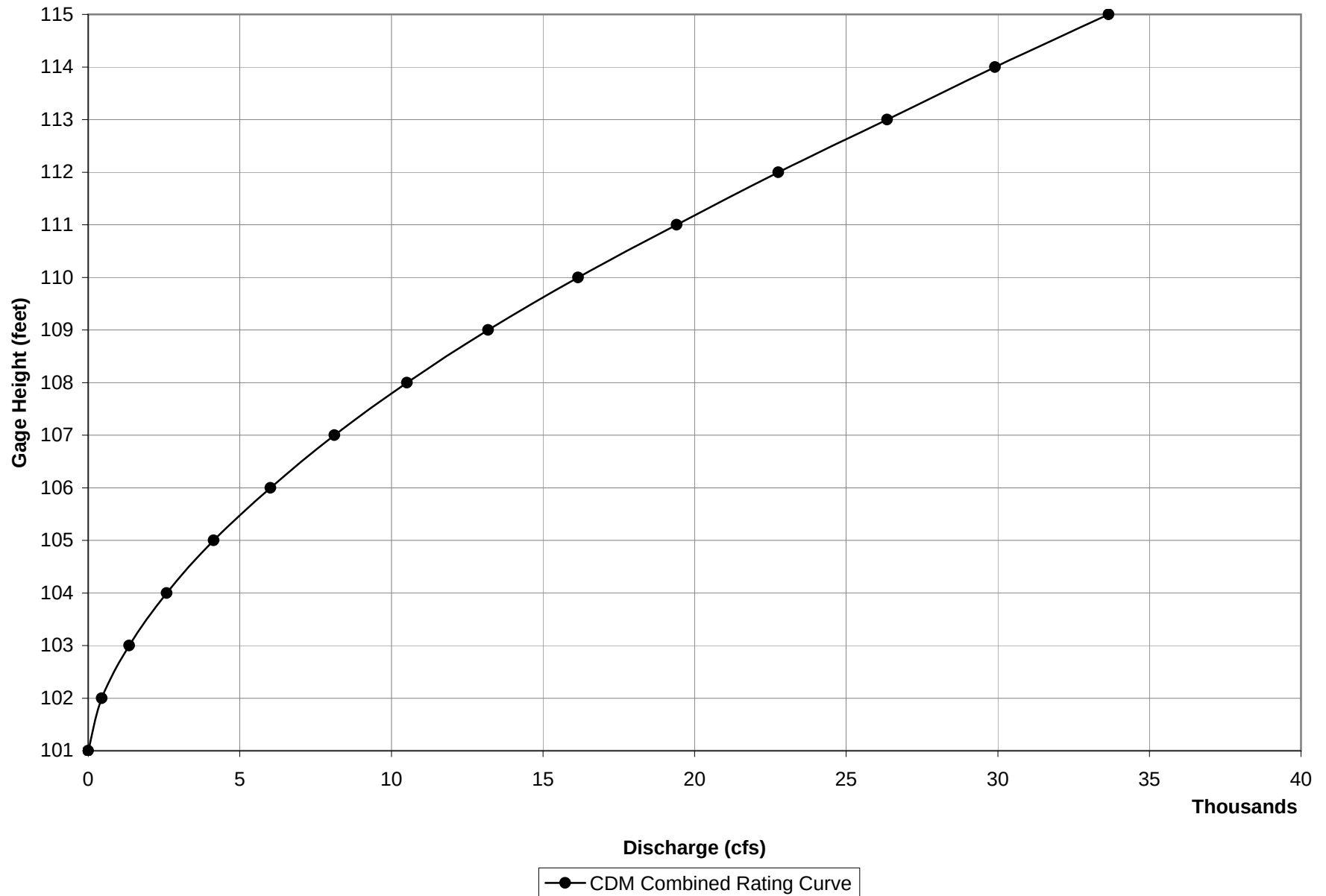
PRELIMINARY DESIGN
NOT FOR CONSTRUCTION

PROPOSED SPILLWAY
PLAN



				DESIGNED BY: S. GAITAN				WATER DIVISION NO.3 - WATER DISTRICT NO. 20 HINSDALE COUNTY, COLORADO		PROJECT NO. 43844-60541	
				DRAWN BY: K. SIMPSON		Camp Dresser & McKee 555 17th Street, Suite 1100 Denver, CO 80202 Tel: (303) 382-2300		RIO GRANDE RESERVOIR		FILE NAME: CSDDT001	
				SHEET CHK'D BY: B. MURPHY		Derived from CSDDT001		SPILLWAY IMPROVEMENTS		SHEET NO.	
				CROSS CHK'D BY: M. BLISS		consulting • engineering • construction • operations				C-3	
REV. NO.		DATE		DRWN		CHKD		REMARKS			

Figure 2
Enlarged Rio Grande Reservoir - Spillway Rating Curve



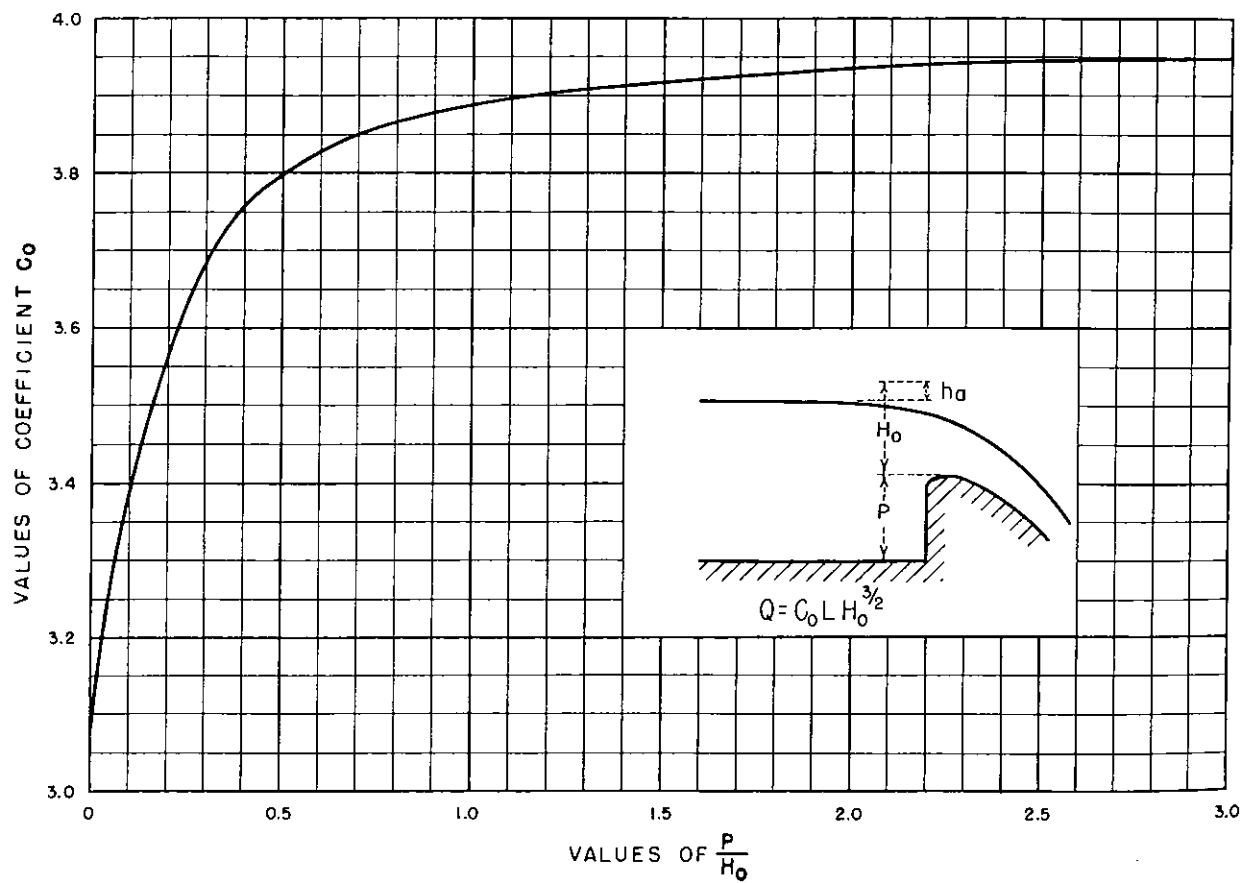


Figure 9-23.—Discharge coefficients for vertical-faced ogee crest. 288-D-2409.

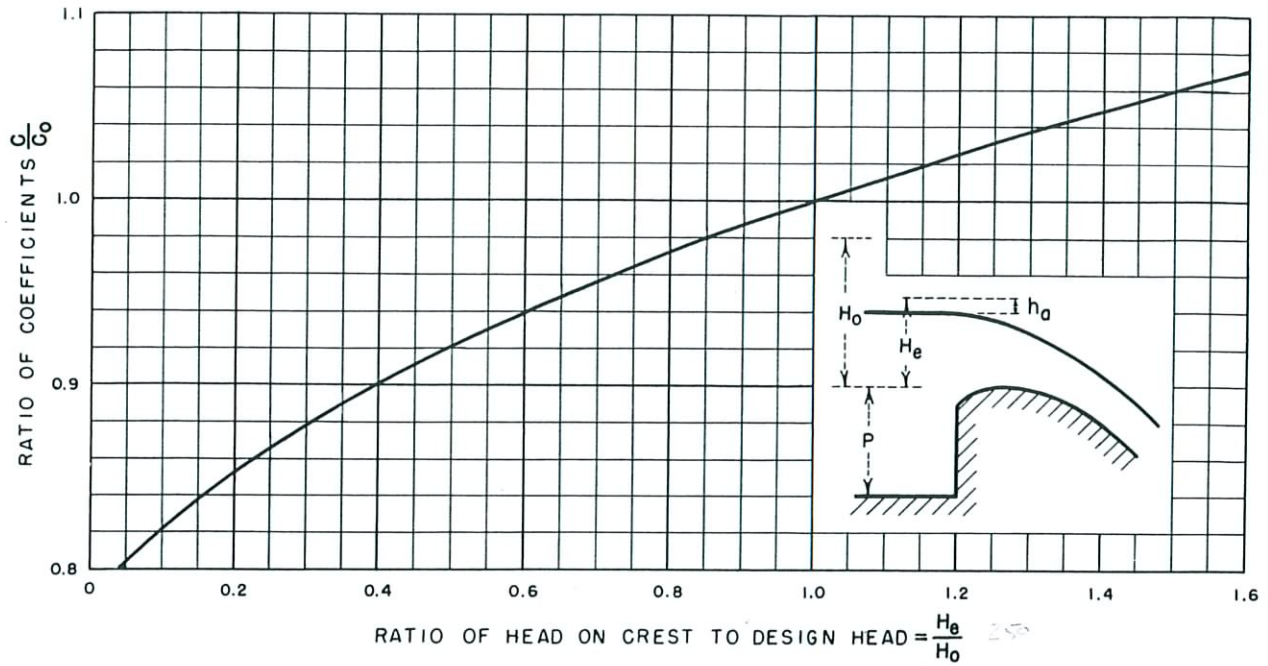


Figure 9-24.—Discharge coefficients for other than the design head. 288-D-2410.

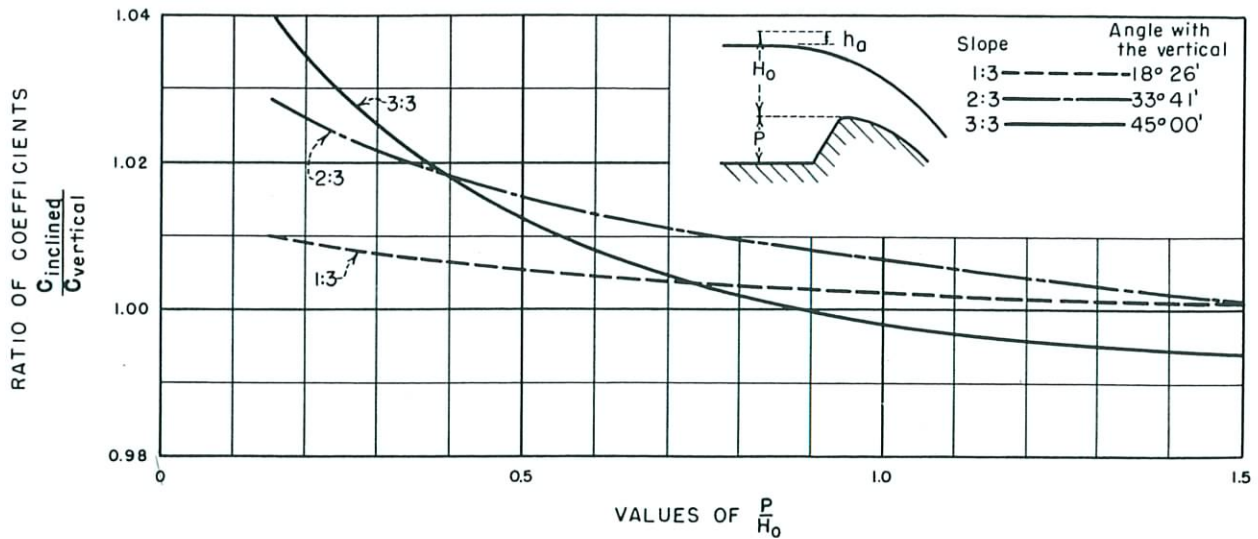


Figure 9-25.—Discharge coefficients for ogee-shaped crest with sloping upstream face. 288-D-2411.

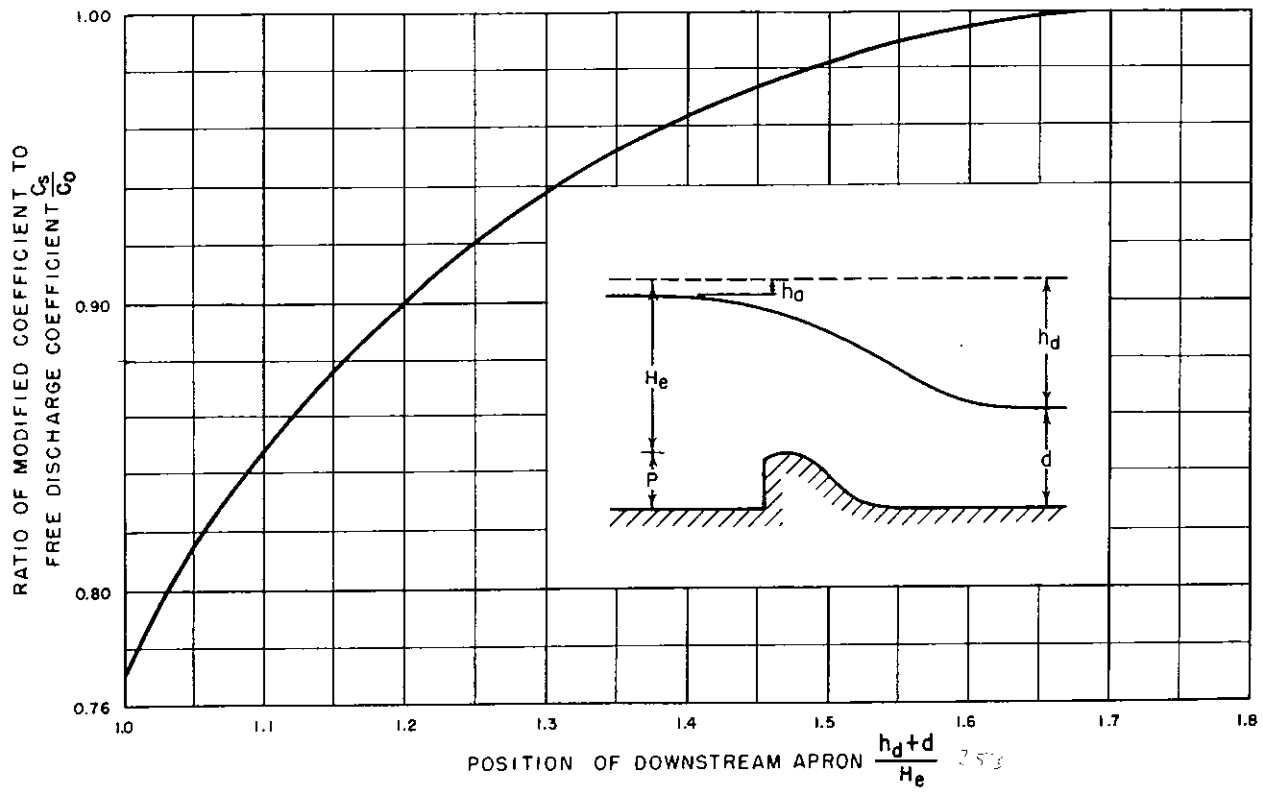


Figure 9-27.—Ratio of discharge coefficients resulting from apron effects. 288-D-2413.

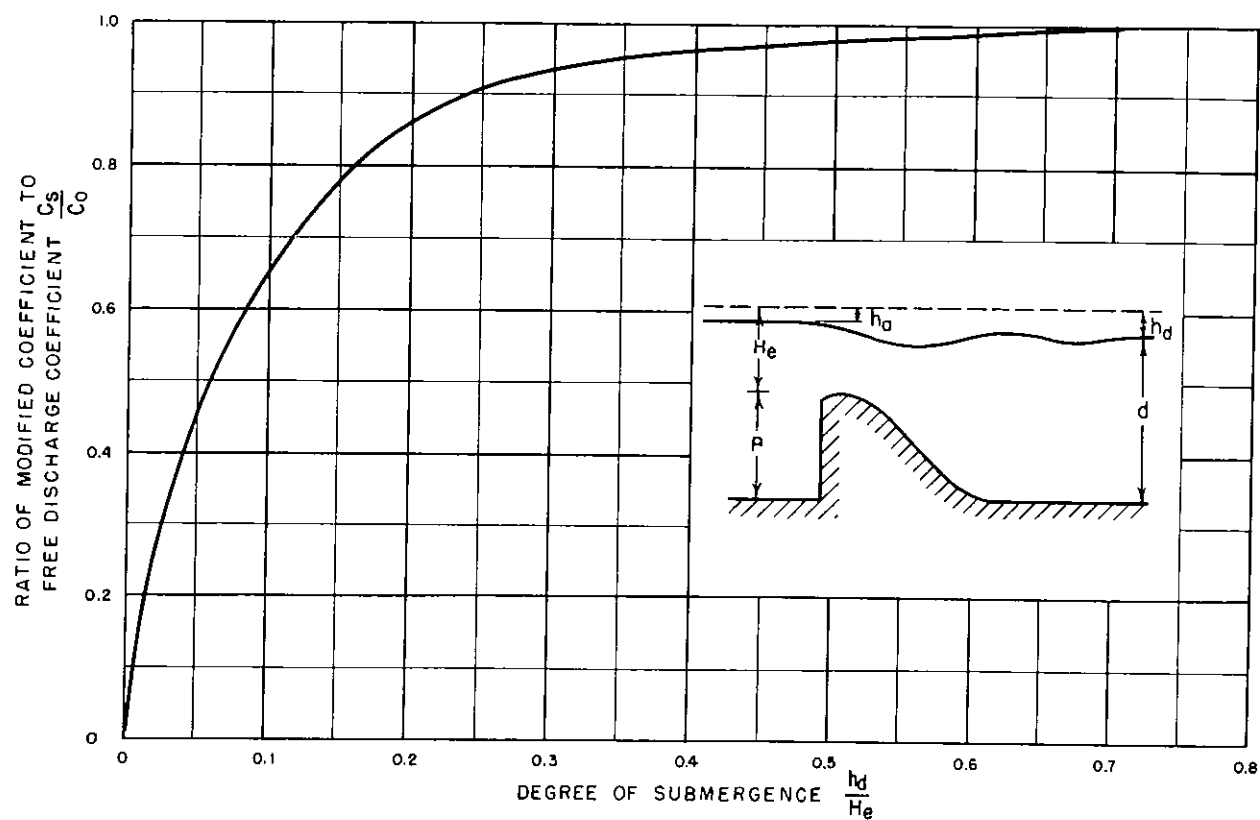


Figure 9-28.—Ratio of discharge coefficients caused by tailwater effects. 288-D-2414.

Appendix F
HEC-RAS Spillway Flow Model
(Volume II)

HEC-RAS RS	Cross Section Description	Discharge	Thalweg Elev	WS Elev	Max Depth	LB Elev**	LB Freeboard***	RB Elev	RB Freeboard	Velocity	Froude Number
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/s)	
283	DS end of US weir	1000	81	89.65	8.65	91	1.35	94.6	4.95	3.06	0.2
		2000	81	92.38	11.38	91	-1.38	94.6	2.22	4.45	0.25
		3000	81	94.8	13.8	91	-3.8	94.6	-0.2	5.31	0.28
		4000	81	96.95	15.95	91	-5.95	94.6	-2.35	5.97	0.28
		5000	81	98.8	17.8	91	-7.8	94.6	-4.2	6.58	0.29
		6000	81	100.93	19.93	91	-9.93	94.6	-6.33	6.95	0.29
		6600	81	102.11	21.11	91	-11.11	94.6	-7.51	7.16	0.29
	DS Weir										
250	Sta. 0+00*	1000	81	84.27	3.27	97.29	13.02	89.09	4.82	9.25	0.91
		2000	81	86.82	5.82	97.29	10.47	89.09	2.27	10.16	0.76
		3000	81	88.8	7.8	97.29	8.49	89.09	0.29	11.18	0.73
		4000	81	90.49	9.49	97.29	6.8	89.09	-1.4	12.06	0.72
		5000	81	92.04	11.04	97.29	5.25	89.09	-2.95	12.81	0.71
		6000	81	93.45	12.45	97.29	3.84	89.09	-4.36	13.49	0.7
		6600	81	94.26	13.26	97.29	3.03	89.09	-5.17	13.85	0.7
225	Sta. 0+25	1000	80.58	83.91	3.33	97.69	13.78	88.19	4.28	10.18	1
		2000	80.58	85.82	5.24	97.69	11.87	88.19	2.37	12.66	1
		3000	80.58	87.4	6.82	97.69	10.29	88.19	0.79	14.32	1
		4000	80.58	88.79	8.21	97.69	8.9	88.19	-0.6	15.59	1
		5000	80.58	90.02	9.44	97.69	7.67	88.19	-1.83	16.74	1
		6000	80.58	91.2	10.62	97.69	6.49	88.19	-3.01	17.65	1
		6600	80.58	91.87	11.29	97.69	5.82	88.19	-3.68	18.16	1
200	Sta. 0+50	1000	79.91	82.38	2.47	93.89	11.51	87.19	4.81	13.74	1.56
		2000	79.91	84.04	4.13	93.89	9.85	87.19	3.15	16.12	1.43
		3000	79.91	85.43	5.52	93.89	8.46	87.19	1.76	17.78	1.38
		4000	79.91	86.68	6.77	93.89	7.21	87.19	0.51	19.06	1.34
		5000	79.91	87.83	7.92	93.89	6.06	87.19	-0.64	20.1	1.31
		6000	79.91	88.9	8.99	93.89	4.99	87.19	-1.71	21.04	1.29
		6600	79.91	89.51	9.6	93.89	4.38	87.19	-2.32	21.55	1.28
175	Sta. 0+75	1000	79.17	81.45	2.28	91.29	9.84	87.29	5.84	15.3	1.81
		2000	79.17	83.06	3.89	91.29	8.23	87.29	4.23	17.61	1.61
		3000	79.17	84.43	5.26	91.29	6.86	87.29	2.86	19.21	1.52
		4000	79.17	85.67	6.5	91.29	5.62	87.29	1.62	20.42	1.47
		5000	79.17	86.81	7.64	91.29	4.48	87.29	0.48	21.42	1.43
		6000	79.17	87.86	8.69	91.29	3.43	87.29	-0.57	22.34	1.4

		6600	79.17	88.46	9.29	91.29	2.83	87.29	-1.17	22.82	1.38
150	Sta. 1+00	1000	78.43	80.52	2.09	91.29	10.77	87.39	6.87	16.63	2.05
		2000	78.43	82.03	3.6	91.29	9.26	87.39	5.36	19.02	1.8
		3000	78.43	83.34	4.91	91.29	7.95	87.39	4.05	20.63	1.69
		4000	78.43	84.53	6.1	91.29	6.76	87.39	2.86	21.85	1.61
		5000	78.43	85.63	7.2	91.29	5.66	87.39	1.76	22.85	1.56
		6000	78.43	86.65	8.22	91.29	4.64	87.39	0.74	23.75	1.52
		6600	78.43	87.24	8.81	91.29	4.05	87.39	0.15	24.22	1.51
125	Sta. 1+25	1000	77.51	79.51	2	91.39	11.88	85.89	6.38	17.92	2.25
		2000	77.51	80.99	3.48	91.39	10.4	85.89	4.9	20.3	1.94
		3000	77.51	82.31	4.8	91.39	9.08	85.89	3.58	21.85	1.79
		4000	77.51	83.54	6.03	91.39	7.85	85.89	2.35	22.97	1.69
		5000	77.51	84.7	7.19	91.39	6.69	85.89	1.19	23.87	1.61
		6000	77.51	85.79	8.28	91.39	5.6	85.89	0.1	24.66	1.56
		6600	77.51	86.43	8.92	91.39	4.96	85.89	-0.54	25.05	1.53
100	Sta. 1+50	1000	76.54	78.31	1.77	87.29	8.98	83.59	5.28	19.28	2.58
		2000	76.54	79.61	3.07	87.29	7.68	83.59	3.98	21.91	2.24
		3000	76.54	80.76	4.22	87.29	6.53	83.59	2.83	23.61	2.08
		4000	76.54	81.81	5.27	87.29	5.48	83.59	1.78	24.88	1.97
		5000	76.54	82.79	6.25	87.29	4.5	83.59	0.8	25.94	1.89
		6000	76.54	83.71	7.17	87.29	3.58	83.59	-0.12	26.86	1.84
		6600	76.54	84.24	7.7	87.29	3.05	83.59	-0.65	27.34	1.81
75	Sta. 1+75	1000	75.6	77.31	1.71	81.19	3.88	81.99	4.68	20.16	2.75
		2000	75.6	78.56	2.96	81.19	2.63	81.99	3.43	22.93	2.39
		3000	75.6	79.68	4.08	81.19	1.51	81.99	2.31	24.65	2.21
		4000	75.6	80.7	5.1	81.19	0.49	81.99	1.29	25.94	2.09
		5000	75.6	81.65	6.05	81.19	-0.46	81.99	0.34	27.01	2
		6000	75.6	82.56	6.96	81.19	-1.37	81.99	-0.57	27.91	1.92
		6600	75.6	83.09	7.49	81.19	-1.9	81.99	-1.1	28.38	1.88
50	Sta. 2+00	1000	74.71	76.38	1.67	80.69	4.31	80.59	4.21	20.85	2.87
		2000	74.71	77.6	2.89	80.69	3.09	80.59	2.99	23.74	2.51
		3000	74.71	78.69	3.98	80.69	2	80.59	1.9	25.51	2.31
		4000	74.71	79.69	4.98	80.69	1	80.59	0.9	26.81	2.18
		5000	74.71	80.63	5.92	80.69	0.06	80.59	-0.04	27.89	2.09
		6000	74.71	81.52	6.81	80.69	-0.83	80.59	-0.93	28.8	2.01
		6600	74.71	82.05	7.34	80.69	-1.36	80.59	-1.46	29.27	1.96
25	Sta. 2+25	1000	73.52	75.15	1.63	80.09	4.94	79.89	4.74	21.85	3.05

		2000	73.52	76.33	2.81	80.09	3.76	79.89	3.56	24.85	2.66
		3000	73.52	77.4	3.88	80.09	2.69	79.89	2.49	26.65	2.45
		4000	73.52	78.39	4.87	80.09	1.7	79.89	1.5	27.95	2.3
		5000	73.52	79.31	5.79	80.09	0.78	79.89	0.58	29.02	2.21
		6000	73.52	80.18	6.66	80.09	-0.09	79.89	-0.29	29.94	2.13
		6600	73.52	80.68	7.16	80.09	-0.59	79.89	-0.79	30.42	2.08
0	Sta. 2+50	1000	72.76	74.35	1.59	77.59	3.24	77.29	2.94	22.16	3.13
		2000	72.76	75.5	2.74	77.59	2.09	77.29	1.79	25.38	2.75
		3000	72.76	76.54	3.78	77.59	1.05	77.29	0.75	27.25	2.53
		4000	72.76	77.51	4.75	77.59	0.08	77.29	-0.22	28.59	2.37
		5000	72.76	78.43	5.67	77.59	-0.84	77.29	-1.14	29.66	2.25
		6000	72.76	79.32	6.56	77.59	-1.73	77.29	-2.03	30.55	2.14
		6600	72.76	79.86	7.1	77.59	-2.27	77.29	-2.57	31	2.09
	Sta. 2+52.2	1000	70.99	72.43	1.44	75.82	3.39	75.52	3.09	24.49	3.63
		2000	70.99	73.52	2.53	75.82	2.3	75.52	2	27.52	3.09
		3000	70.99	74.51	3.52	75.82	1.31	75.52	1.01	29.32	2.81
		4000	70.99	75.44	4.45	75.82	0.38	75.52	0.08	30.61	2.62
		5000	70.99	76.32	5.33	75.82	-0.5	75.52	-0.8	31.66	2.48
		6000	70.99	77.17	6.18	75.82	-1.35	75.52	-1.65	32.53	2.35
		6600	70.99	77.68	6.69	75.82	-1.86	75.52	-2.16	32.97	2.29
	Sta. 3+00	1000	68.19	69.79	1.6	73.02	3.23	72.72	2.93	25.81	3.63
		2000	68.19	70.98	2.79	73.02	2.04	72.72	1.74	29.12	3.13
		3000	68.19	72.08	3.89	73.02	0.94	72.72	0.64	30.93	2.84
		4000	68.19	73.1	4.91	73.02	-0.08	72.72	-0.38	32.17	2.64
		5000	68.19	74.09	5.9	73.02	-1.07	72.72	-1.37	33.15	2.47
		6000	68.19	75.05	6.86	73.02	-2.03	72.72	-2.33	33.93	2.33
		6600	68.19	75.63	7.44	73.02	-2.61	72.72	-2.91	34.32	2.26
	Sta. 3+50	1000	66.93	68.59	1.66	71.76	3.17	71.46	2.87	25.27	3.5
		2000	66.93	69.74	2.81	71.76	2.02	71.46	1.72	29.31	3.14
		3000	66.93	70.81	3.88	71.76	0.95	71.46	0.65	31.33	2.88
		4000	66.93	71.82	4.89	71.76	-0.06	71.46	-0.36	32.68	2.68
		5000	66.93	72.8	5.87	71.76	-1.04	71.46	-1.34	33.72	2.52
		6000	66.93	73.75	6.82	71.76	-1.99	71.46	-2.29	34.55	2.38
		6600	66.93	74.32	7.39	71.76	-2.56	71.46	-2.86	34.96	2.31
	Sta. 4+00	1000	65.02	66.76	1.74	69.85	3.09	69.55	2.79	25.71	3.48
		2000	65.02	67.95	2.93	69.85	1.9	69.55	1.6	30.02	3.16
		3000	65.02	69.06	4.04	69.85	0.79	69.55	0.49	32.14	2.9

		4000	65.02	70.1	5.08	69.85	-0.25	69.55	-0.55	33.54	2.71
		5000	65.02	71.11	6.09	69.85	-1.26	69.55	-1.56	34.6	2.54
		6000	65.02	72.11	7.09	69.85	-2.26	69.55	-2.56	35.41	2.4
		6600	65.02	72.7	7.68	69.85	-2.85	69.55	-3.15	35.82	2.33
-200	Sta. 4+50	1000	64.99	66.92	1.93	69.82	2.9	69.52	2.6	23.13	2.98
		2000	64.99	68.1	3.11	69.82	1.72	69.52	1.42	28.23	2.89
		3000	64.99	69.2	4.21	69.82	0.62	69.52	0.32	30.74	2.72
		4000	64.99	70.25	5.26	69.82	-0.43	69.52	-0.73	32.32	2.56
		5000	64.99	71.27	6.28	69.82	-1.45	69.52	-1.75	33.5	2.42
		6000	64.99	72.28	7.29	69.82	-2.46	69.52	-2.76	34.41	2.3
		6600	64.99	72.88	7.89	69.82	-3.06	69.52	-3.36	34.85	2.23
-225	Sta. 4+75	1000	63.98	66.02	2.04	68.81	2.79	68.51	2.49	23.62	2.96
		2000	63.98	67.28	3.3	68.81	1.53	68.51	1.23	28.61	2.85
		3000	63.98	68.46	4.48	68.81	0.35	68.51	0.05	31.08	2.68
		4000	63.98	69.58	5.6	68.81	-0.77	68.51	-1.07	32.62	2.51
		5000	63.98	70.67	6.69	68.81	-1.86	68.51	-2.16	33.75	2.36
		6000	63.98	71.75	7.77	68.81	-2.94	68.51	-3.24	34.61	2.24
		6600	63.98	72.4	8.42	68.81	-3.59	68.51	-3.89	35.02	2.17
-225.1	Sta. 4+75.1	1000	56.99	58.53	1.54	61.82	3.29	61.52	2.99	31.56	4.54
		2000	56.99	59.68	2.69	61.82	2.14	61.52	1.84	35.55	3.91
		3000	56.99	60.73	3.74	61.82	1.09	61.52	0.79	37.66	3.54
		4000	56.99	61.72	4.73	61.82	0.1	61.52	-0.2	39.04	3.28
		5000	56.99	62.68	5.69	61.82	-0.86	61.52	-1.16	40.09	3.05
		6000	56.99	63.62	6.63	61.82	-1.8	61.52	-2.1	40.91	2.87
		6600	56.99	64.18	7.19	61.82	-2.36	61.52	-2.66	41.33	2.78
-300	Sta. 5+50	1000	46.82	48.51	1.69	51.65	3.14	51.35	2.84	36.54	5.04
		2000	46.82	49.76	2.94	51.65	1.89	51.35	1.59	40.94	4.34
		3000	46.82	50.9	4.08	51.65	0.75	51.35	0.45	43.12	3.92
		4000	46.82	51.99	5.17	51.65	-0.34	51.35	-0.64	44.5	3.6
		5000	46.82	53.04	6.22	51.65	-1.39	51.35	-1.69	45.51	3.33
		6000	46.82	54.09	7.27	51.65	-2.44	51.35	-2.74	46.27	3.11
		6600	46.82	54.72	7.9	51.65	-3.07	51.35	-3.37	46.64	3
-350	Sta. 6+00	1000	39.38	40.94	1.56	44.21	3.27	43.91	2.97	39.6	5.67
		2000	39.38	42.1	2.72	44.21	2.11	43.91	1.81	44.49	4.89
		3000	39.38	43.16	3.78	44.21	1.05	43.91	0.75	46.88	4.41
		4000	39.38	44.17	4.79	44.21	0.04	43.91	-0.26	48.38	4.07
		5000	39.38	45.14	5.76	44.21	-0.93	43.91	-1.23	49.47	3.77

		6000	39.38	46.1	6.72	44.21	-1.89	43.91	-2.19	50.3	3.53
		6600	39.38	46.68	7.3	44.21	-2.47	43.91	-2.77	50.7	3.4

*Based on 1972 spillway replacement plan drawings

**Left bank elevation: top elevation of left wall of spillway chute

***Difference between left bank elevation and water surface elevation

HEC-RAS RS	Cross Section Description	Discharge	Thalweg Elev	WS Elev	Max Depth	LB Elev**	LB Freeboard***	RB Elev	RB Freeboard	Velocity	Froude Number
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/s)	
283	DS end of US weir	1000	81	89.65	8.65	91	1.35	104.11	14.46	3.06	0.2
		2000	81	92.38	11.38	91	-1.38	104.11	11.73	4.45	0.25
		3000	81	94.79	13.79	91	-3.79	104.11	9.32	5.31	0.28
		4000	81	96.94	15.94	91	-5.94	104.11	7.17	5.95	0.29
		5000	81	98.79	17.79	91	-7.79	104.11	5.32	6.51	0.3
		6000	81	100.92	19.92	91	-9.92	104.11	3.19	6.79	0.3
		6600	81	102.11	21.11	91	-11.11	104.11	2	6.95	0.3
		9050	81	101.19	20.19	91	-10.19	104.11	2.92	10.07	0.44
	DS Weir										
250	Sta. 0+00*	1000	81	84.27	3.27	97.29	13.02	96.21	11.94	9.25	0.91
		2000	81	86.82	5.82	97.29	10.47	96.21	9.39	10.16	0.76
		3000	81	88.8	7.8	97.29	8.49	96.21	7.41	11.18	0.73
		4000	81	90.5	9.5	97.29	6.79	96.21	5.71	12.05	0.72
		5000	81	92.03	11.03	97.29	5.26	96.21	4.18	12.8	0.71
		6000	81	93.42	12.42	97.29	3.87	96.21	2.79	13.47	0.71
		6600	81	94.21	13.21	97.29	3.08	96.21	2	13.83	0.71
		9050	81	97.15	16.15	97.29	0.14	96.21	-0.94	15.14	0.71
225	Sta. 0+25	1000	80.58	83.91	3.33	97.69	13.78	93.88	9.97	10.18	1
		2000	80.58	85.82	5.24	97.69	11.87	93.88	8.06	12.66	1
		3000	80.58	87.39	6.81	97.69	10.3	93.88	6.49	14.32	1
		4000	80.58	88.78	8.2	97.69	8.91	93.88	5.1	15.61	1
		5000	80.58	90.04	9.46	97.69	7.65	93.88	3.84	16.67	1
		6000	80.58	91.21	10.63	97.69	6.48	93.88	2.67	17.58	1
		6600	80.58	91.88	11.3	97.69	5.81	93.88	2	18.06	1
		9050	80.58	94.37	13.79	97.69	3.32	93.88	-0.49	19.75	1
200	Sta. 0+50	1000	79.91	82.38	2.47	93.89	11.51	91.53	9.15	13.74	1.56
		2000	79.91	84.04	4.13	93.89	9.85	91.53	7.49	16.12	1.43
		3000	79.91	85.43	5.52	93.89	8.46	91.53	6.1	17.78	1.38
		4000	79.91	86.68	6.77	93.89	7.21	91.53	4.85	19.05	1.34
		5000	79.91	87.84	7.93	93.89	6.05	91.53	3.69	20.09	1.31
		6000	79.91	88.92	9.01	93.89	4.97	91.53	2.61	20.97	1.29
		6600	79.91	89.53	9.62	93.89	4.36	91.53	2	21.45	1.28
		9050	79.91	91.84	11.93	93.89	2.05	91.53	-0.31	23.12	1.25
175	Sta. 0+75	1000	79.17	81.45	2.28	91.29	9.84	90.5	9.05	15.3	1.81
		2000	79.17	83.06	3.89	91.29	8.23	90.5	7.44	17.61	1.61

		3000	79.17	84.43	5.26	91.29	6.86	90.5	6.07	19.21	1.52
		4000	79.17	85.67	6.5	91.29	5.62	90.5	4.83	20.41	1.46
		5000	79.17	86.81	7.64	91.29	4.48	90.5	3.69	21.41	1.42
		6000	79.17	87.88	8.71	91.29	3.41	90.5	2.62	22.25	1.39
		6600	79.17	88.5	9.33	91.29	2.79	90.5	2	22.71	1.38
		9050	79.17	90.81	11.64	91.29	0.48	90.5	-0.31	24.3	1.33
150	Sta. 1+00	1000	78.43	80.52	2.09	91.29	10.77	89.27	8.75	16.63	2.05
		2000	78.43	82.03	3.6	91.29	9.26	89.27	7.24	19.02	1.8
		3000	78.43	83.33	4.9	91.29	7.96	89.27	5.94	20.63	1.69
		4000	78.43	84.53	6.1	91.29	6.76	89.27	4.74	21.84	1.61
		5000	78.43	85.63	7.2	91.29	5.66	89.27	3.64	22.84	1.56
		6000	78.43	86.67	8.24	91.29	4.62	89.27	2.6	23.68	1.52
		6600	78.43	87.27	8.84	91.29	4.02	89.27	2	24.12	1.5
		9050	78.43	89.55	11.12	91.29	1.74	89.27	-0.28	25.67	1.43
125	Sta. 1+25	1000	77.51	79.51	2	91.39	11.88	88.46	8.95	17.92	2.25
		2000	77.51	80.99	3.48	91.39	10.4	88.46	7.47	20.3	1.94
		3000	77.51	82.31	4.8	91.39	9.08	88.46	6.15	21.85	1.79
		4000	77.51	83.54	6.03	91.39	7.85	88.46	4.92	22.96	1.69
		5000	77.51	84.7	7.19	91.39	6.69	88.46	3.76	23.86	1.61
		6000	77.51	85.81	8.3	91.39	5.58	88.46	2.65	24.59	1.55
		6600	77.51	86.46	8.95	91.39	4.93	88.46	2	24.96	1.52
		9050	77.51	88.98	11.47	91.39	2.41	88.46	-0.52	26.18	1.42
100	Sta. 1+50	1000	76.54	78.31	1.77	87.29	8.98	86.25	7.94	19.28	2.58
		2000	76.54	79.61	3.07	87.29	7.68	86.25	6.64	21.91	2.24
		3000	76.54	80.76	4.22	87.29	6.53	86.25	5.49	23.61	2.08
		4000	76.54	81.81	5.27	87.29	5.48	86.25	4.44	24.88	1.97
		5000	76.54	82.79	6.25	87.29	4.5	86.25	3.46	25.92	1.89
		6000	76.54	83.72	7.18	87.29	3.57	86.25	2.53	26.81	1.83
		6600	76.54	84.25	7.71	87.29	3.04	86.25	2	27.28	1.81
		9050	76.54	86.3	9.76	87.29	0.99	86.25	-0.05	28.9	1.72
75	Sta. 1+75	1000	75.6	77.31	1.71	85.07	7.76	85.07	7.76	20.16	2.75
		2000	75.6	78.56	2.96	85.07	6.51	85.07	6.51	22.93	2.39
		3000	75.6	79.68	4.08	85.07	5.39	85.07	5.39	24.65	2.21
		4000	75.6	80.7	5.1	85.07	4.37	85.07	4.37	25.94	2.09
		5000	75.6	81.65	6.05	85.07	3.42	85.07	3.42	27	2.01
		6000	75.6	82.55	6.95	85.07	2.52	85.07	2.52	27.89	1.94
		6600	75.6	83.07	7.47	85.07	2	85.07	2	28.36	1.91

		9050	75.6	85.05	9.45	85.07	0.02	85.07	0.02	29.99	1.81
50	Sta. 2+00	1000	74.71	76.38	1.67	84.03	7.65	84.03	7.65	20.85	2.87
		2000	74.71	77.6	2.89	84.03	6.43	84.03	6.43	23.74	2.51
		3000	74.71	78.69	3.98	84.03	5.34	84.03	5.34	25.51	2.31
		4000	74.71	79.69	4.98	84.03	4.34	84.03	4.34	26.81	2.18
		5000	74.71	80.63	5.92	84.03	3.4	84.03	3.4	27.88	2.09
		6000	74.71	81.52	6.81	84.03	2.51	84.03	2.51	28.77	2.02
		6600	74.71	82.03	7.32	84.03	2	84.03	2	29.24	1.99
		9050	74.71	83.99	9.28	84.03	0.04	84.03	0.04	30.86	1.88
25	Sta. 2+25	1000	73.52	75.15	1.63	82.69	7.54	82.69	7.54	21.85	3.05
		2000	73.52	76.33	2.81	82.69	6.36	82.69	6.36	24.85	2.66
		3000	73.52	77.4	3.88	82.69	5.29	82.69	5.29	26.65	2.45
		4000	73.52	78.39	4.87	82.69	4.3	82.69	4.3	27.95	2.3
		5000	73.52	79.31	5.79	82.69	3.38	82.69	3.38	29.02	2.21
		6000	73.52	80.19	6.67	82.69	2.5	82.69	2.5	29.89	2.13
		6600	73.52	80.69	7.17	82.69	2	82.69	2	30.37	2.09
		9050	73.52	82.63	9.11	82.69	0.06	82.69	0.06	31.98	1.97
0	Sta. 2+50	1000	72.76	74.35	1.59	81.79	7.44	81.79	7.44	22.16	3.13
		2000	72.76	75.5	2.74	81.79	6.29	81.79	6.29	25.38	2.75
		3000	72.76	76.54	3.78	81.79	5.25	81.79	5.25	27.25	2.53
		4000	72.76	77.51	4.75	81.79	4.28	81.79	4.28	28.59	2.38
		5000	72.76	78.42	5.66	81.79	3.37	81.79	3.37	29.67	2.27
		6000	72.76	79.29	6.53	81.79	2.5	81.79	2.5	30.55	2.19
		6600	72.76	79.79	7.03	81.79	2	81.79	2	31.03	2.14
		9050	72.76	81.72	8.96	81.79	0.07	81.79	0.07	32.62	2.02
-2.2	Sta. 2+52.2	1000	70.99	72.43	1.44	79.63	7.2	79.63	7.2	24.49	3.63
		2000	70.99	73.52	2.53	79.63	6.11	79.63	6.11	27.52	3.09
		3000	70.99	74.51	3.52	79.63	5.12	79.63	5.12	29.32	2.81
		4000	70.99	75.44	4.45	79.63	4.19	79.63	4.19	30.6	2.62
		5000	70.99	76.31	5.32	79.63	3.32	79.63	3.32	31.65	2.49
		6000	70.99	77.15	6.16	79.63	2.48	79.63	2.48	32.51	2.39
		6600	70.99	77.63	6.64	79.63	2	79.63	2	32.98	2.34
		9050	70.99	79.5	8.51	79.63	0.13	79.63	0.13	34.55	2.19
-50	Sta. 3+00	1000	68.19	69.79	1.6	77.53	7.74	77.53	7.74	25.81	3.63
		2000	68.19	70.98	2.79	77.53	6.55	77.53	6.55	29.12	3.13
		3000	68.19	72.08	3.89	77.53	5.45	77.53	5.45	30.93	2.84
		4000	68.19	73.1	4.91	77.53	4.43	77.53	4.43	32.17	2.64

		5000	68.19	74.07	5.88	77.53	3.46	77.53	3.46	33.16	2.51
		6000	68.19	74.99	6.8	77.53	2.54	77.53	2.54	33.94	2.4
		6600	68.19	75.53	7.34	77.53	2	77.53	2	34.37	2.34
		9050	68.19	77.6	9.41	77.53	-0.07	77.53	-0.07	35.77	2.18
-100	Sta. 3+50	1000	66.93	68.59	1.66	76.22	7.63	76.22	7.63	25.27	3.5
		2000	66.93	69.74	2.81	76.22	6.48	76.22	6.48	29.31	3.14
		3000	66.93	70.81	3.88	76.22	5.41	76.22	5.41	31.33	2.88
		4000	66.93	71.82	4.89	76.22	4.4	76.22	4.4	32.68	2.69
		5000	66.93	72.78	5.85	76.22	3.44	76.22	3.44	33.73	2.56
		6000	66.93	73.69	6.76	76.22	2.53	76.22	2.53	34.57	2.45
		6600	66.93	74.22	7.29	76.22	2	76.22	2	35	2.39
		9050	66.93	76.27	9.34	76.22	-0.05	76.22	-0.05	36.45	2.23
-150	Sta. 4+00	1000	65.02	66.76	1.74	74.57	7.81	74.57	7.81	25.71	3.48
		2000	65.02	67.95	2.93	74.57	6.62	74.57	6.62	30.02	3.16
		3000	65.02	69.06	4.04	74.57	5.51	74.57	5.51	32.14	2.9
		4000	65.02	70.1	5.08	74.57	4.47	74.57	4.47	33.54	2.72
		5000	65.02	71.08	6.06	74.57	3.49	74.57	3.49	34.61	2.59
		6000	65.02	72.03	7.01	74.57	2.54	74.57	2.54	35.45	2.48
		6600	65.02	72.57	7.55	74.57	2	74.57	2	35.88	2.42
		9050	65.02	74.69	9.67	74.57	-0.12	74.57	-0.12	37.31	2.25
-200	Sta. 4+50	1000	65.02	66.96	1.94	74.77	7.81	74.77	7.81	23.08	2.97
		2000	65.02	68.13	3.11	74.77	6.64	74.77	6.64	28.18	2.88
		3000	65.02	69.24	4.22	74.77	5.53	74.77	5.53	30.67	2.71
		4000	65.02	70.28	5.26	74.77	4.49	74.77	4.49	32.29	2.58
		5000	65.02	71.27	6.25	74.77	3.5	74.77	3.5	33.49	2.47
		6000	65.02	72.22	7.2	74.77	2.55	74.77	2.55	34.42	2.38
		6600	65.02	72.77	7.75	74.77	2	74.77	2	34.89	2.33
		9050	65.02	74.89	9.87	74.77	-0.12	74.77	-0.12	36.43	2.18
-225	Sta. 4+75	1000	63.98	66.02	2.04	74.19	8.17	74.19	8.17	23.61	2.96
		2000	63.98	67.29	3.31	74.19	6.9	74.19	6.9	28.59	2.85
		3000	63.98	68.46	4.48	74.19	5.73	74.19	5.73	31.05	2.68
		4000	63.98	69.56	5.58	74.19	4.63	74.19	4.63	32.64	2.54
		5000	63.98	70.61	6.63	74.19	3.58	74.19	3.58	33.79	2.43
		6000	63.98	71.61	7.63	74.19	2.58	74.19	2.58	34.69	2.34
		6600	63.98	72.19	8.21	74.19	2	74.19	2	35.14	2.29
		9050	63.98	74.42	10.44	74.19	-0.23	74.19	-0.23	36.62	2.14
-225.1	Sta. 4+75.1	1000	56.99	58.53	1.54	66.09	7.56	66.09	7.56	31.56	4.54

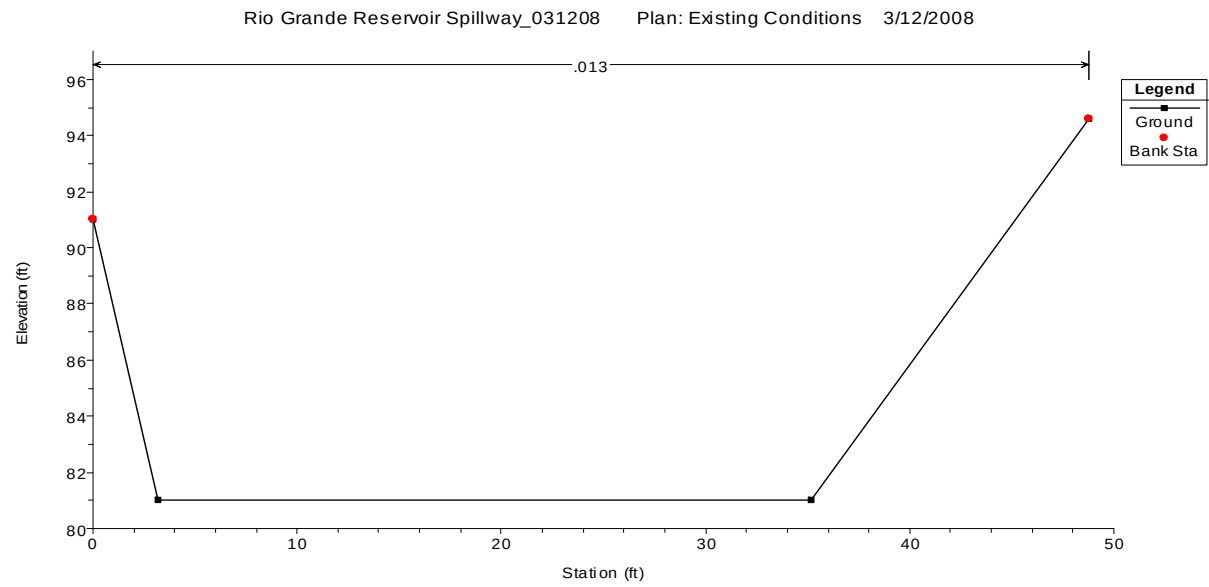
		2000	56.99	59.68	2.69	66.09	6.41	66.09	6.41	35.53	3.9
		3000	56.99	60.73	3.74	66.09	5.36	66.09	5.36	37.63	3.53
		4000	56.99	61.72	4.73	66.09	4.37	66.09	4.37	39.04	3.28
		5000	56.99	62.66	5.67	66.09	3.43	66.09	3.43	40.09	3.1
		6000	56.99	63.56	6.57	66.09	2.53	66.09	2.53	40.92	2.95
		6600	56.99	64.09	7.1	66.09	2	66.09	2	41.34	2.88
		9050	56.99	66.12	9.13	66.09	-0.03	66.09	-0.03	42.74	2.66
-300	Sta. 5+50	1000	46.82	48.51	1.69	56.54	8.03	56.54	8.03	36.54	5.04
		2000	46.82	49.76	2.94	56.54	6.78	56.54	6.78	40.93	4.34
		3000	46.82	50.91	4.09	56.54	5.63	56.54	5.63	43.1	3.91
		4000	46.82	51.98	5.16	56.54	4.56	56.54	4.56	44.5	3.63
		5000	46.82	53	6.18	56.54	3.54	56.54	3.54	45.52	3.42
		6000	46.82	53.97	7.15	56.54	2.57	56.54	2.57	46.3	3.25
		6600	46.82	54.54	7.72	56.54	2	56.54	2	46.7	3.17
		9050	46.82	56.71	9.89	56.54	-0.17	56.54	-0.17	47.99	2.92
-350	Sta. 6+00	1000	39.38	40.94	1.56	48.56	7.62	48.56	7.62	39.6	5.67
		2000	39.38	42.1	2.72	48.56	6.46	48.56	6.46	44.48	4.89
		3000	39.38	43.16	3.78	48.56	5.4	48.56	5.4	46.86	4.41
		4000	39.38	44.17	4.79	48.56	4.39	48.56	4.39	48.37	4.08
		5000	39.38	45.12	5.74	48.56	3.44	48.56	3.44	49.46	3.84
		6000	39.38	46.03	6.65	48.56	2.53	48.56	2.53	50.3	3.65
		6600	39.38	46.56	7.18	48.56	2	48.56	2	50.72	3.56
		9050	39.38	48.6	9.22	48.56	-0.04	48.56	-0.04	52.08	3.27

*Based on 1972 spillway replacement plan drawings

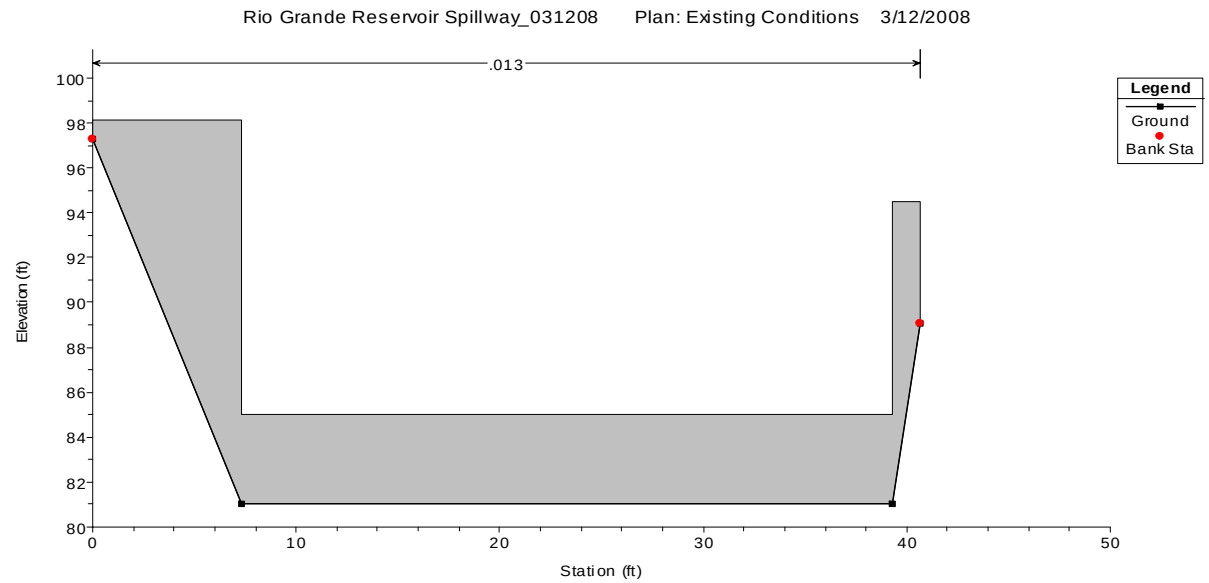
**Left bank elevation: top elevation of left wall of spillway chute

***Difference between left bank elevation and water surface elevation

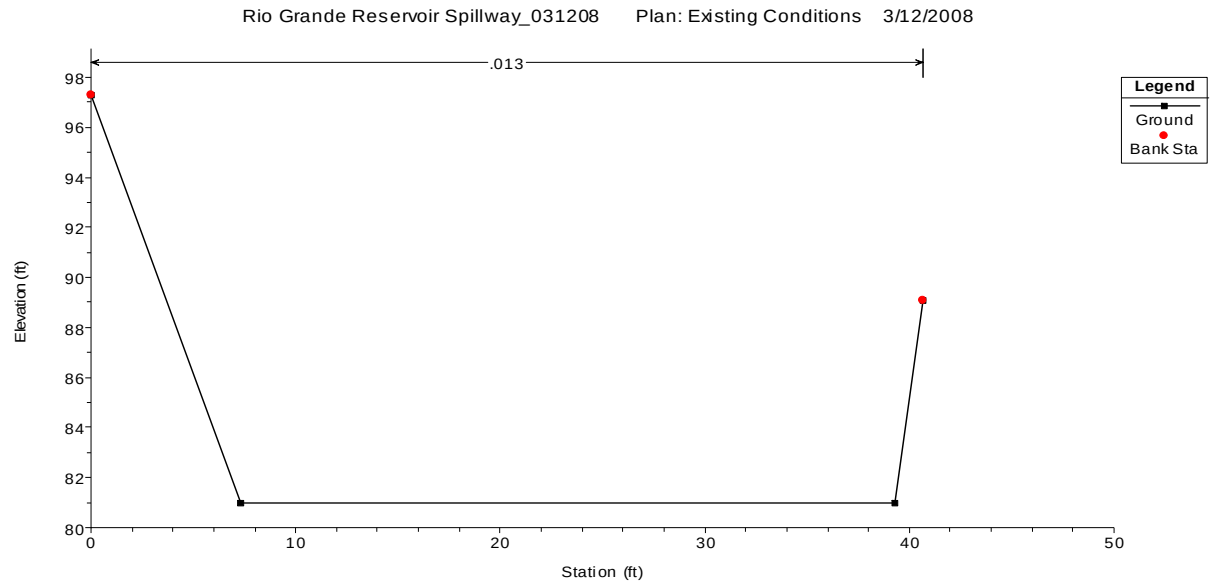
XS @DS End of US Weir



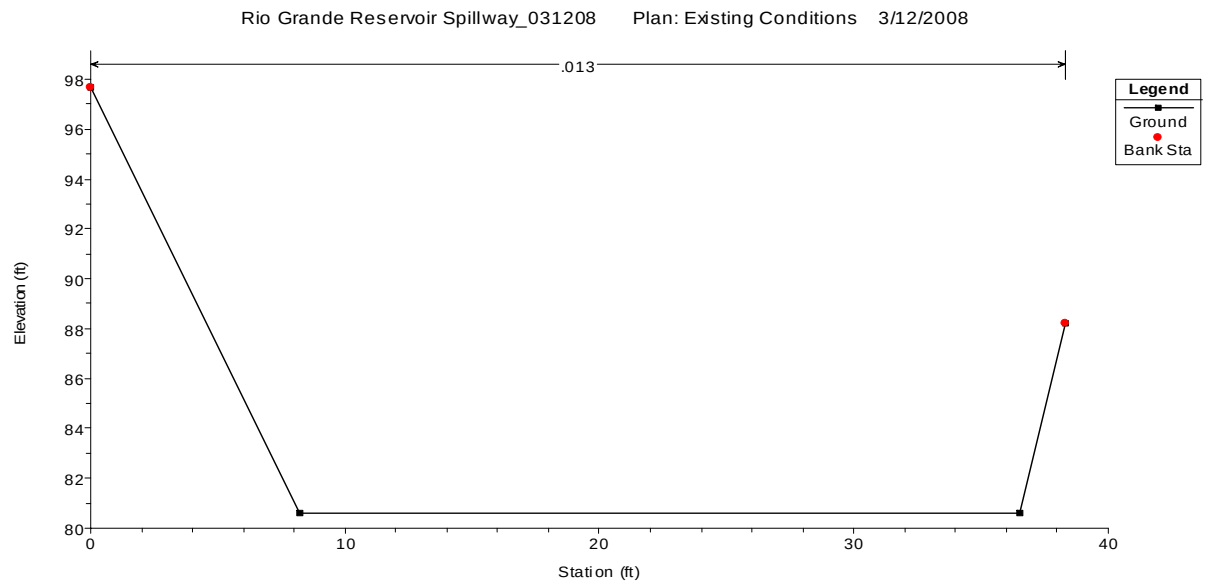
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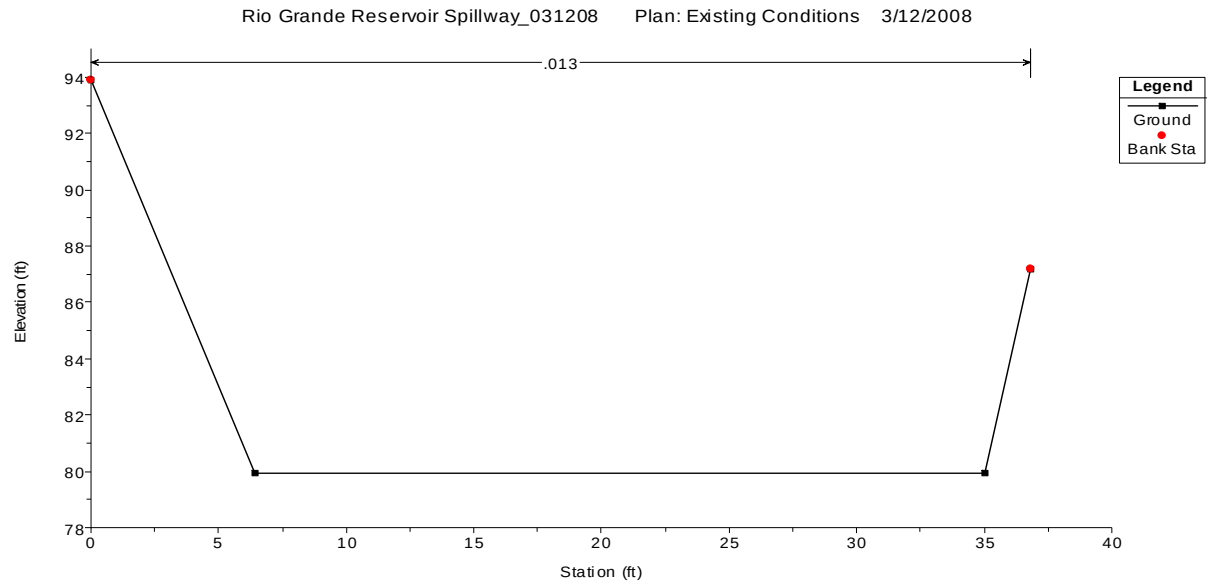
Station 0+00



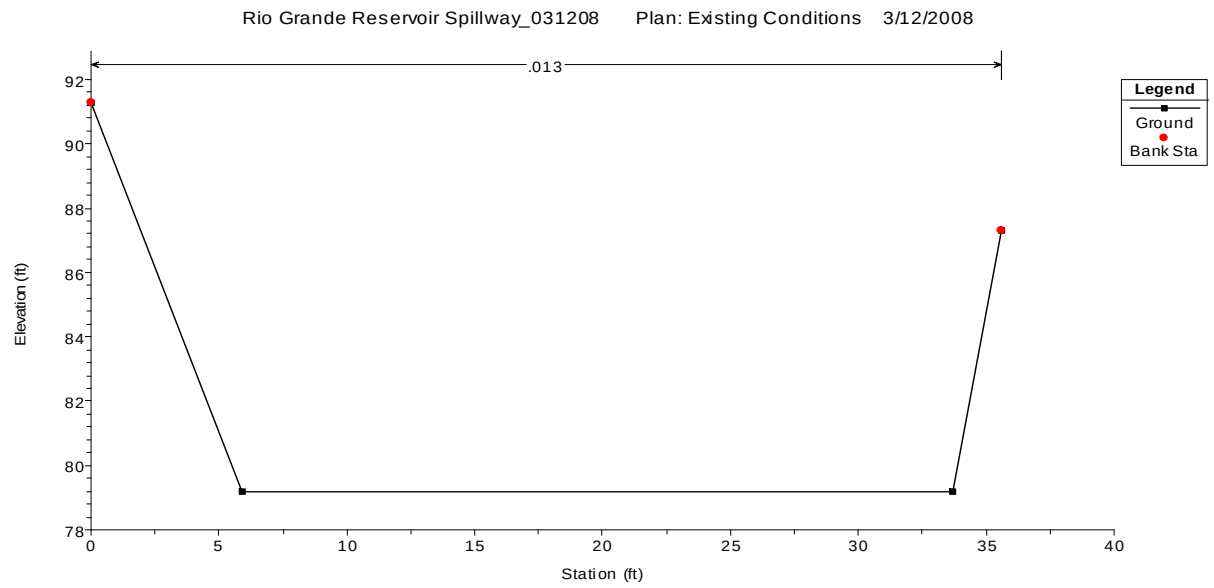
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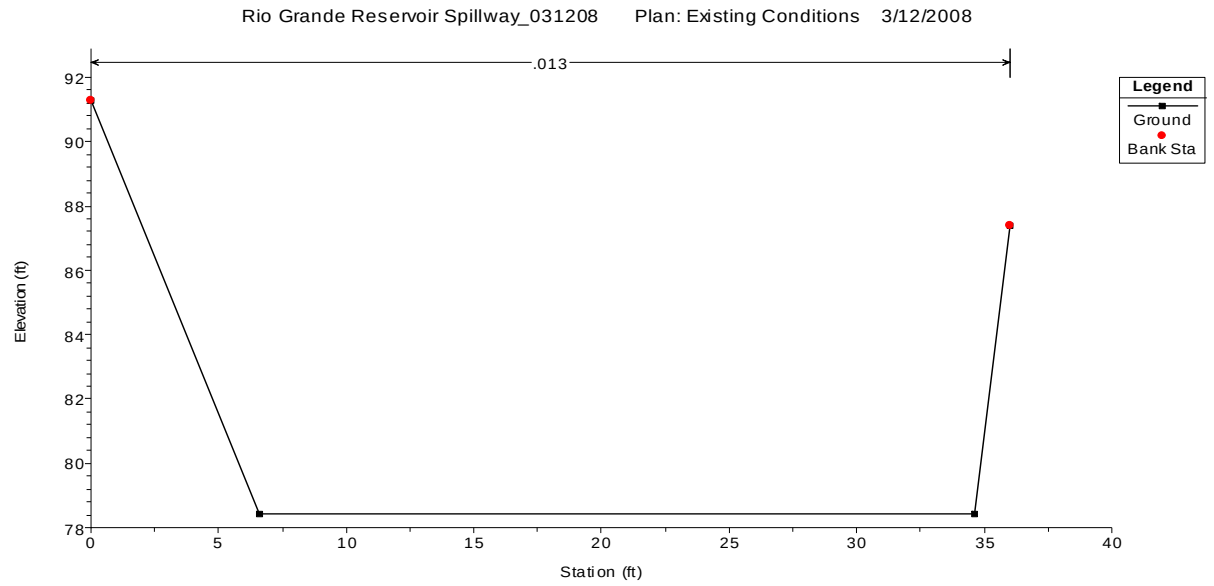
Station 0+50



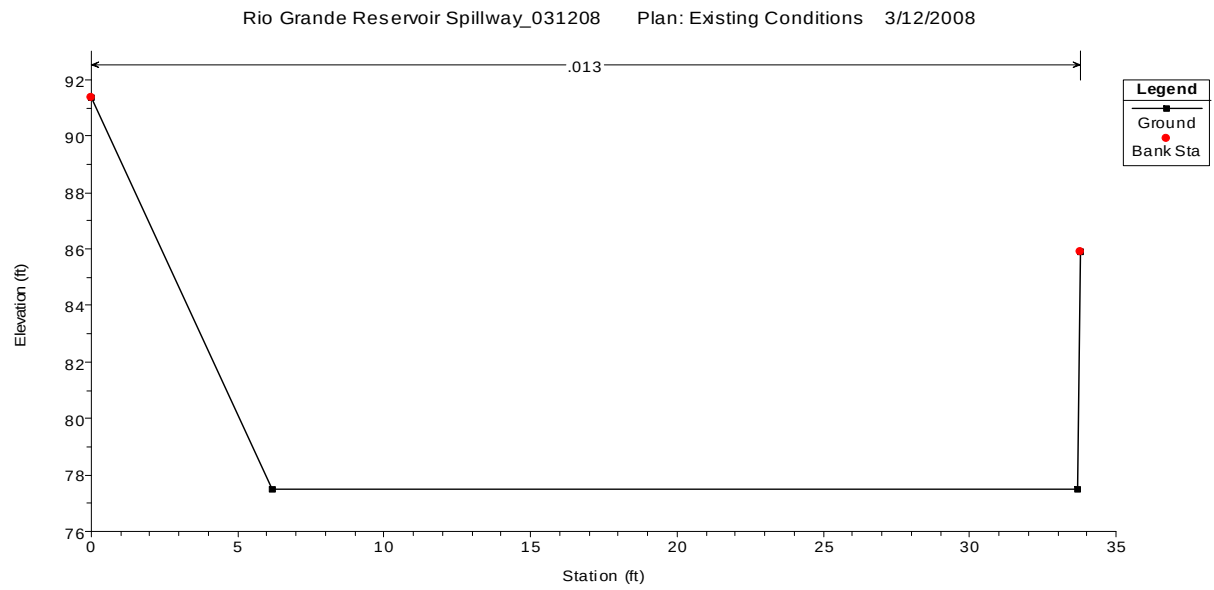
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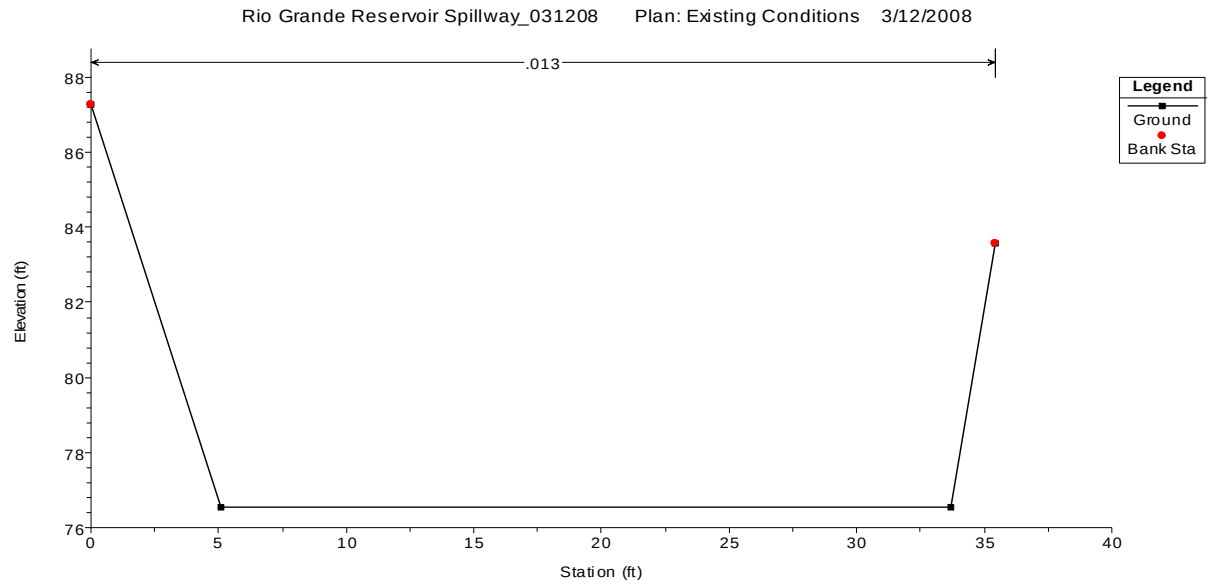
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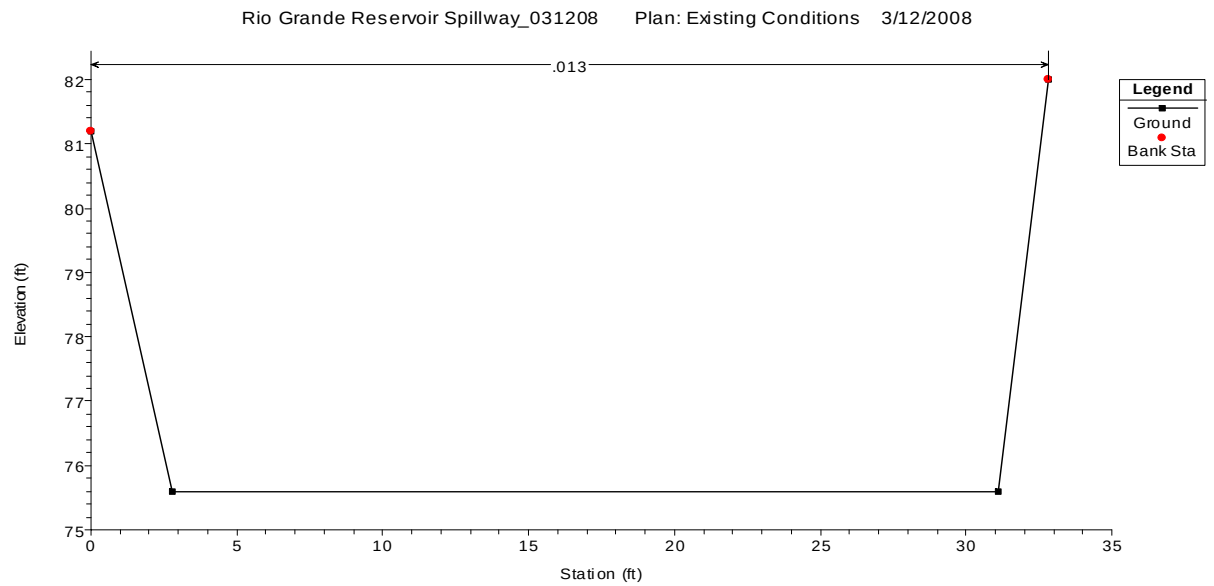
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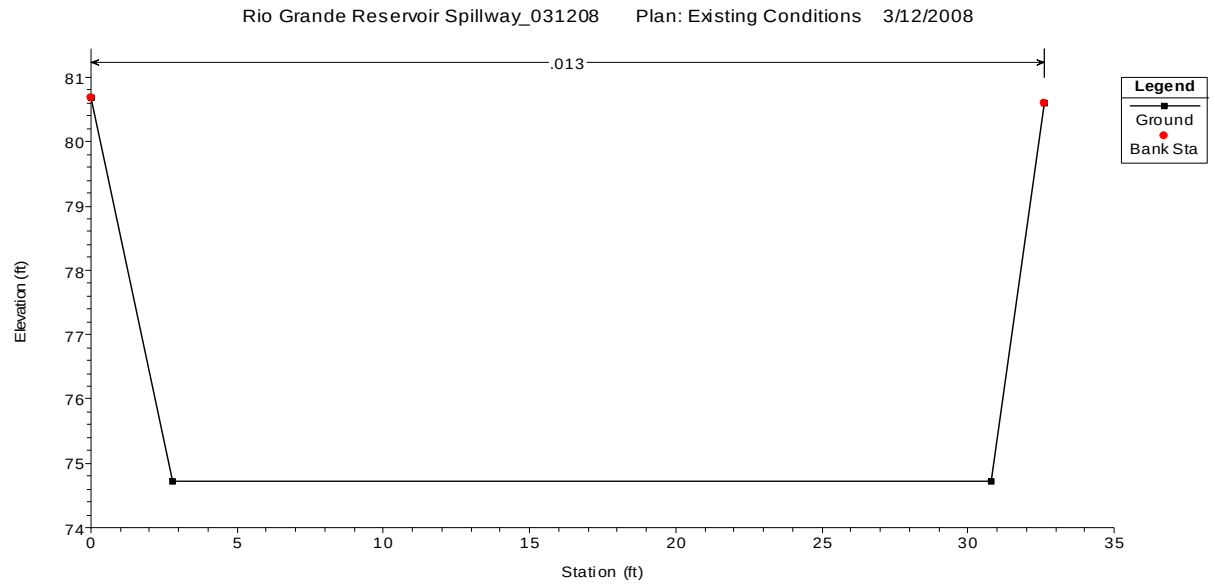
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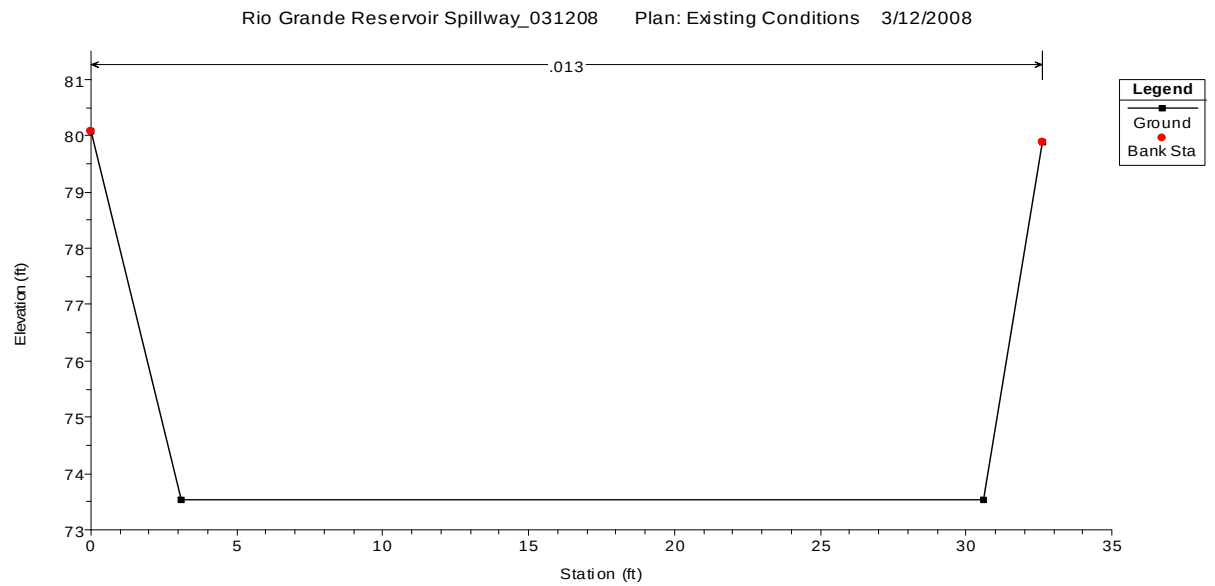
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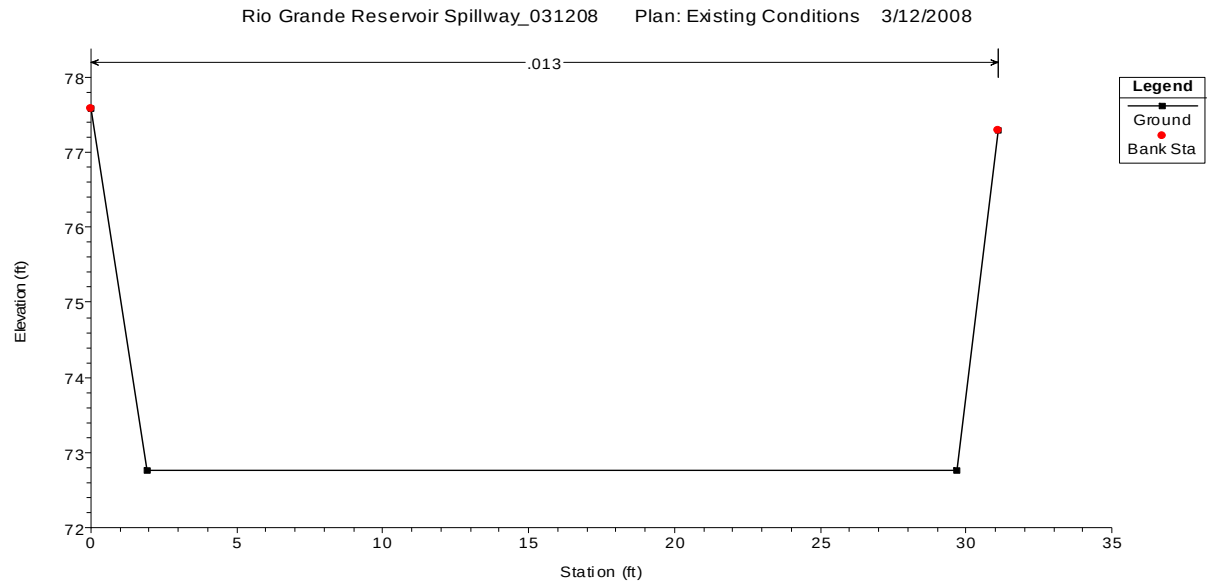
Station 2+00



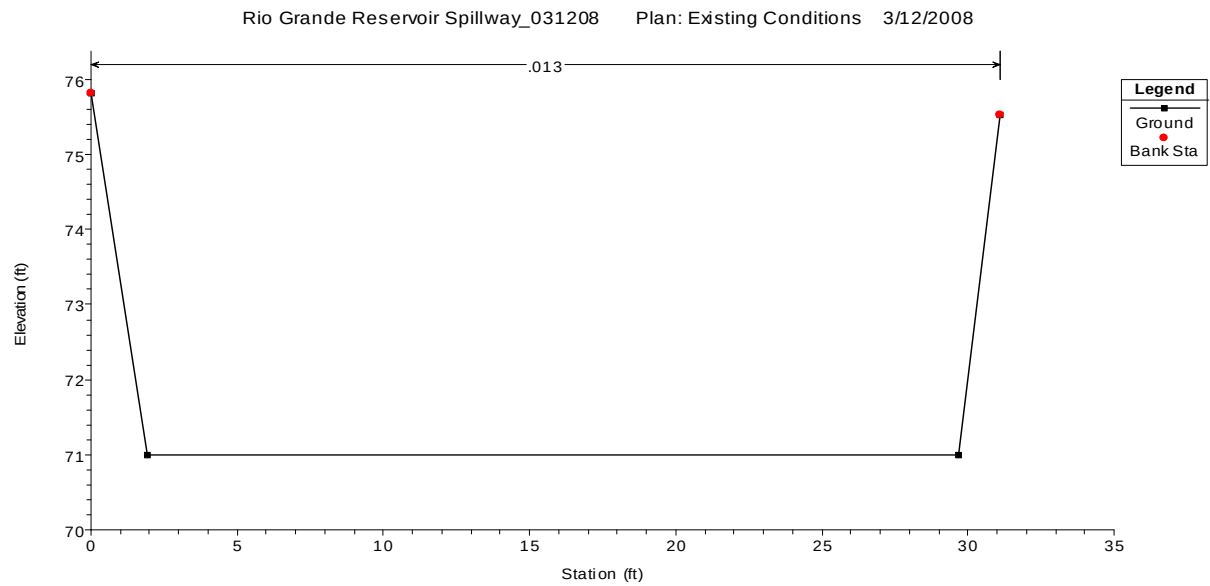
Station 2+25



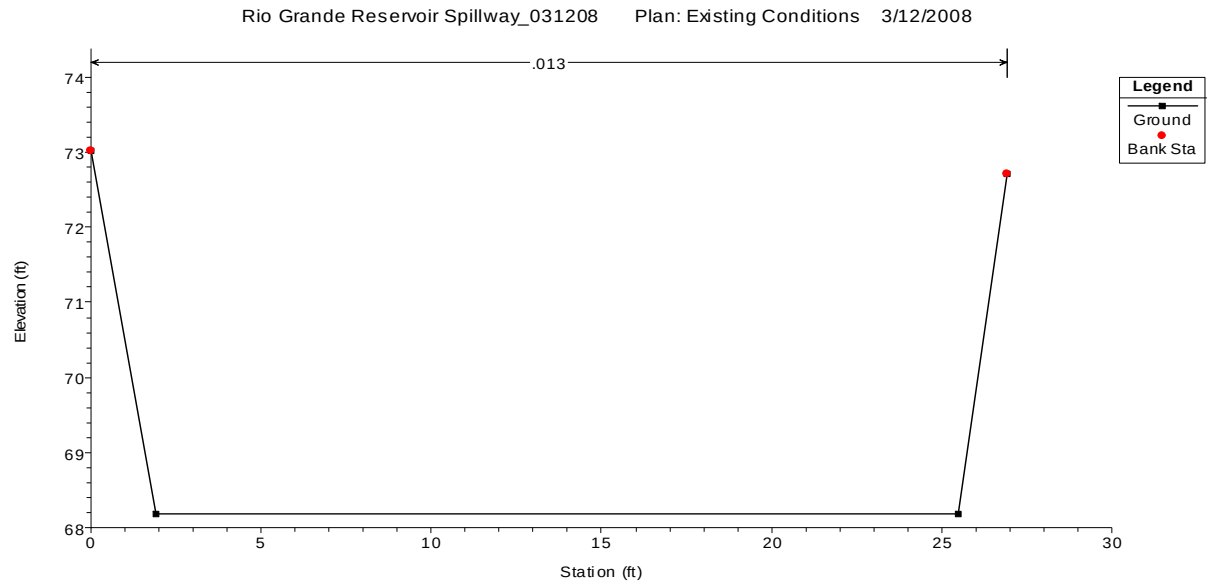
Station 2+50



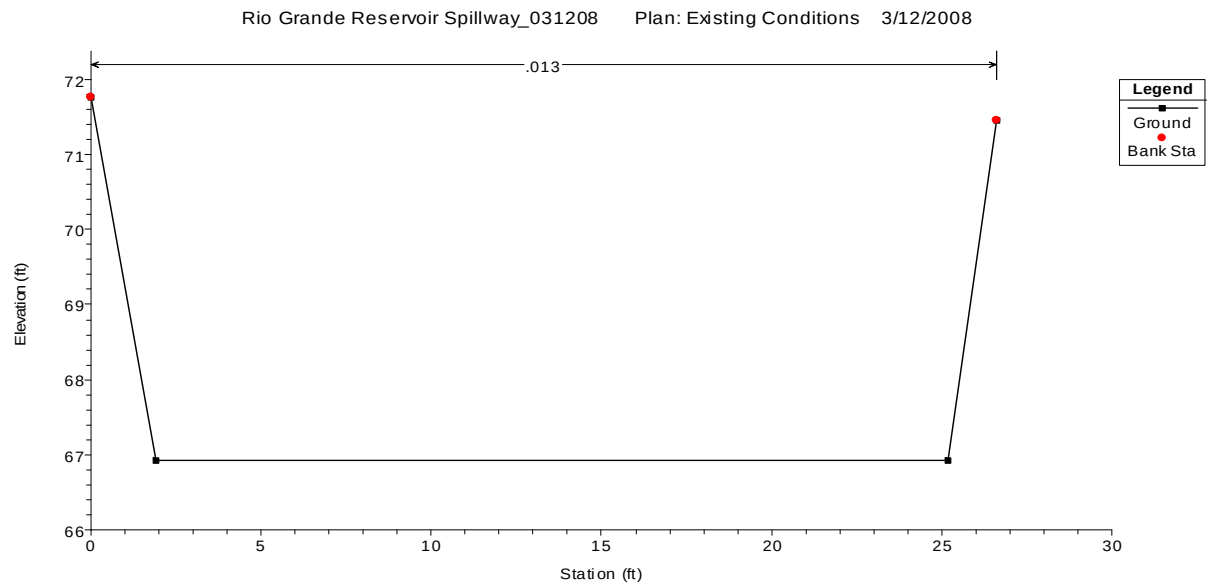
Station 2+52.2



Station 3+00

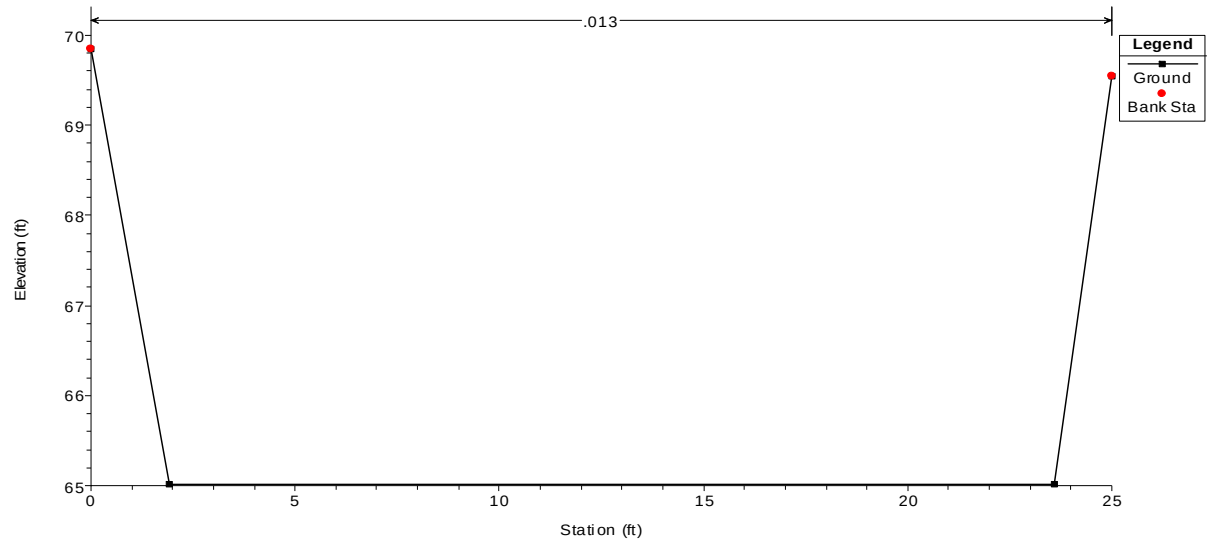


Station 3+50



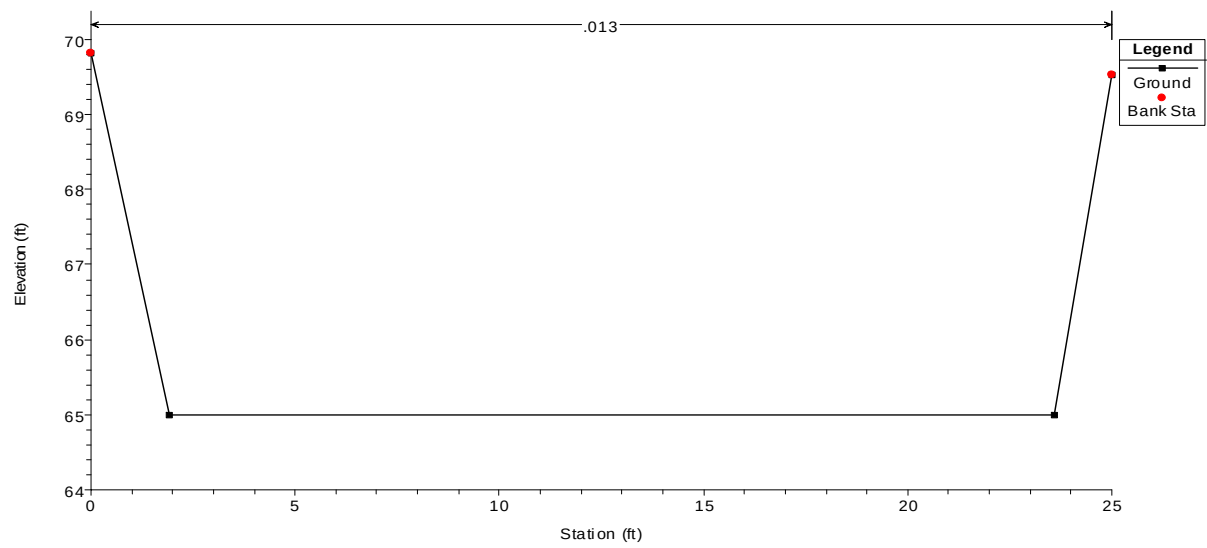
Station 4+00

Rio Grande Reservoir Spillway_031208 Plan: Existing Conditions 3/12/2008

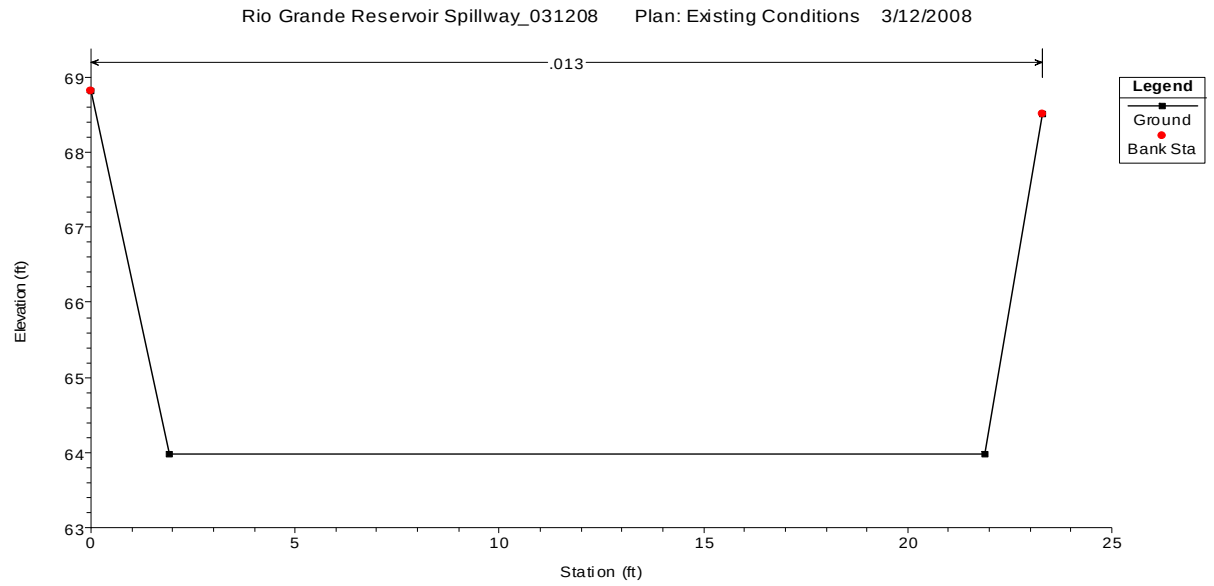


Station 4+50

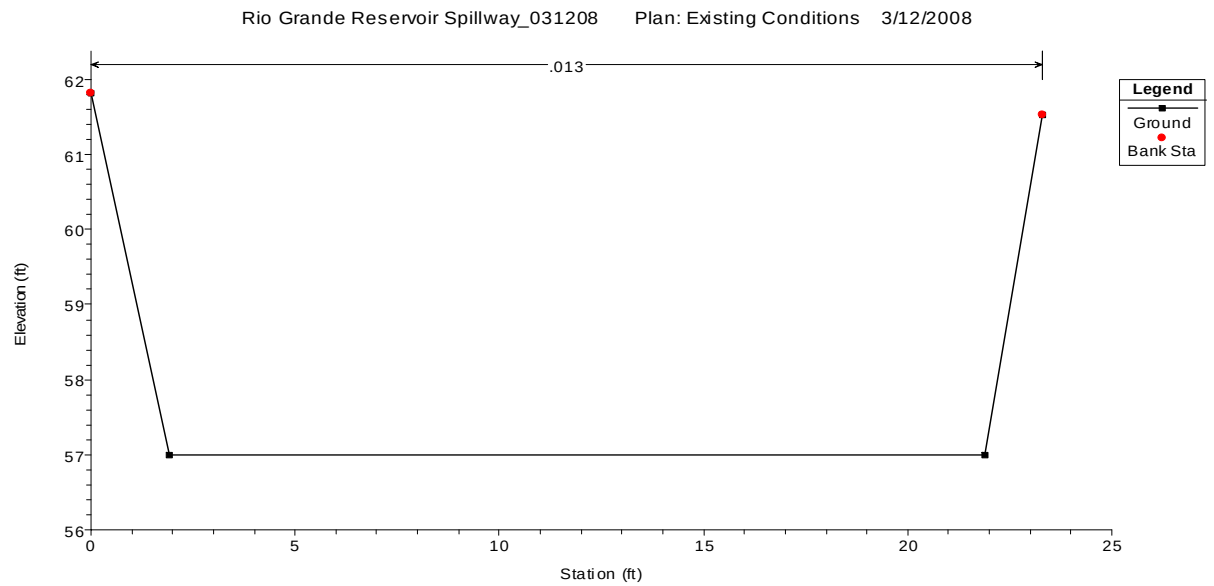
Rio Grande Reservoir Spillway_031208 Plan: Existing Conditions 3/12/2008



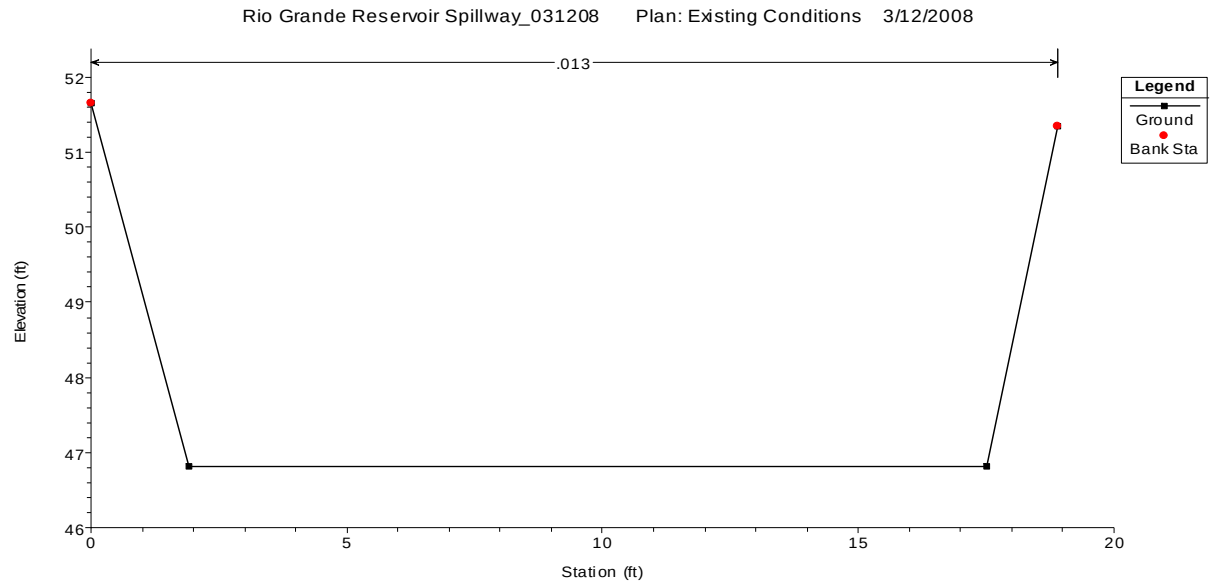
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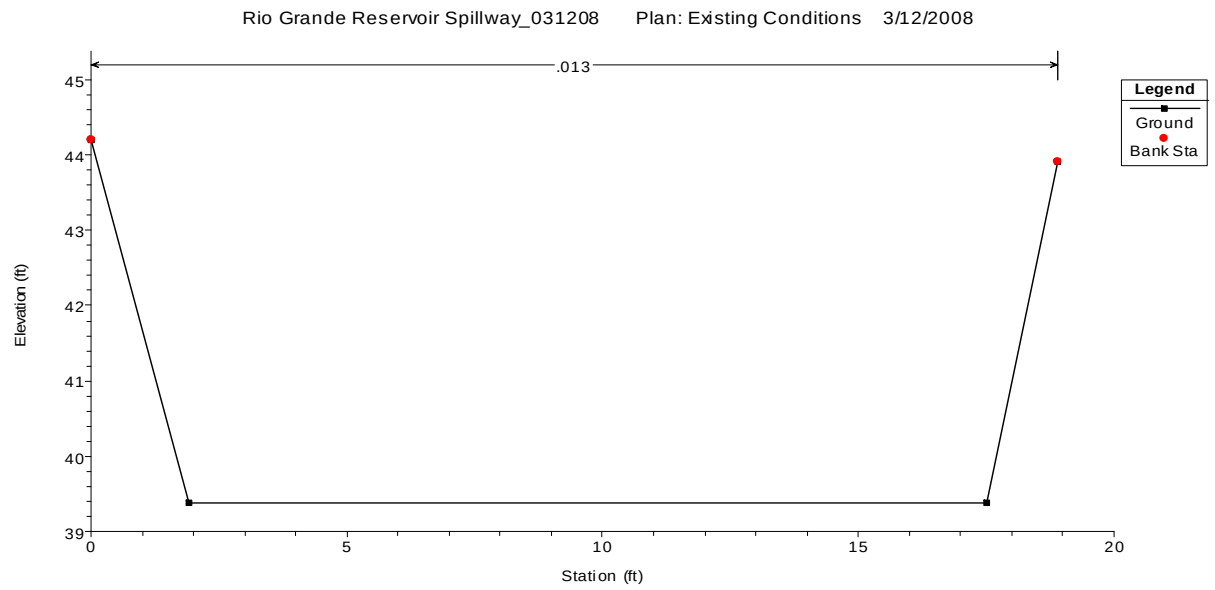
Station 4+75.1



Station 5+50

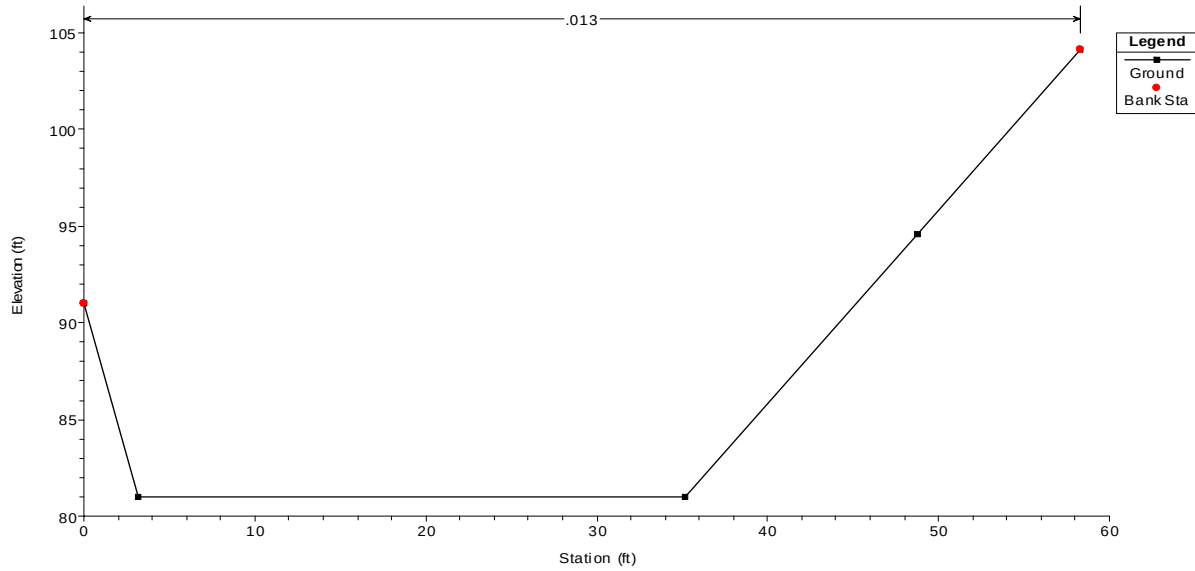


Station 6+00



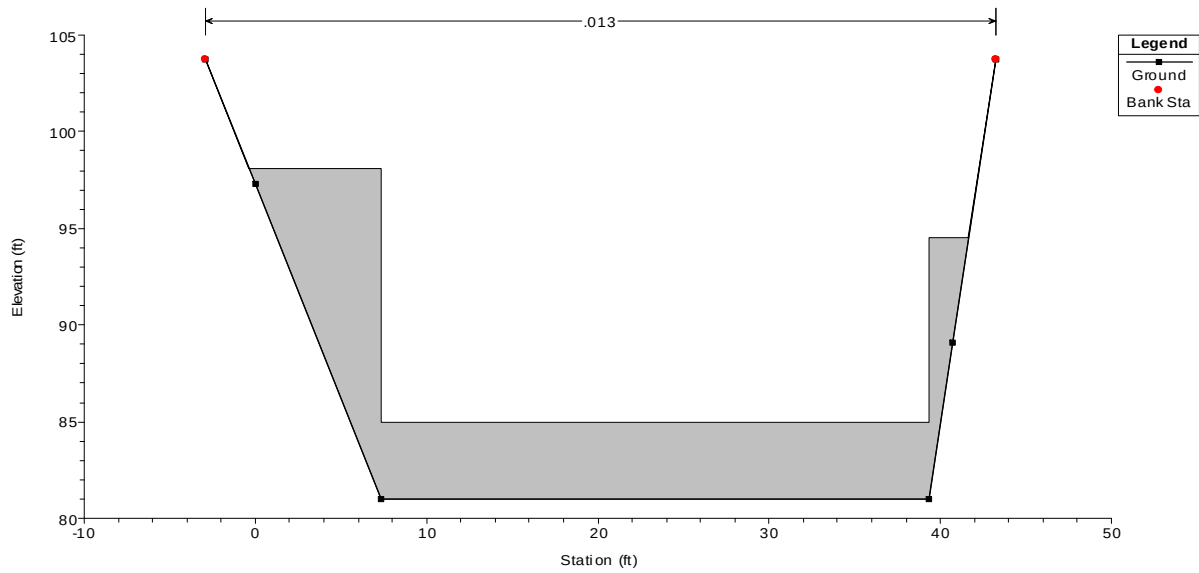
XS @DS End of US Weir

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



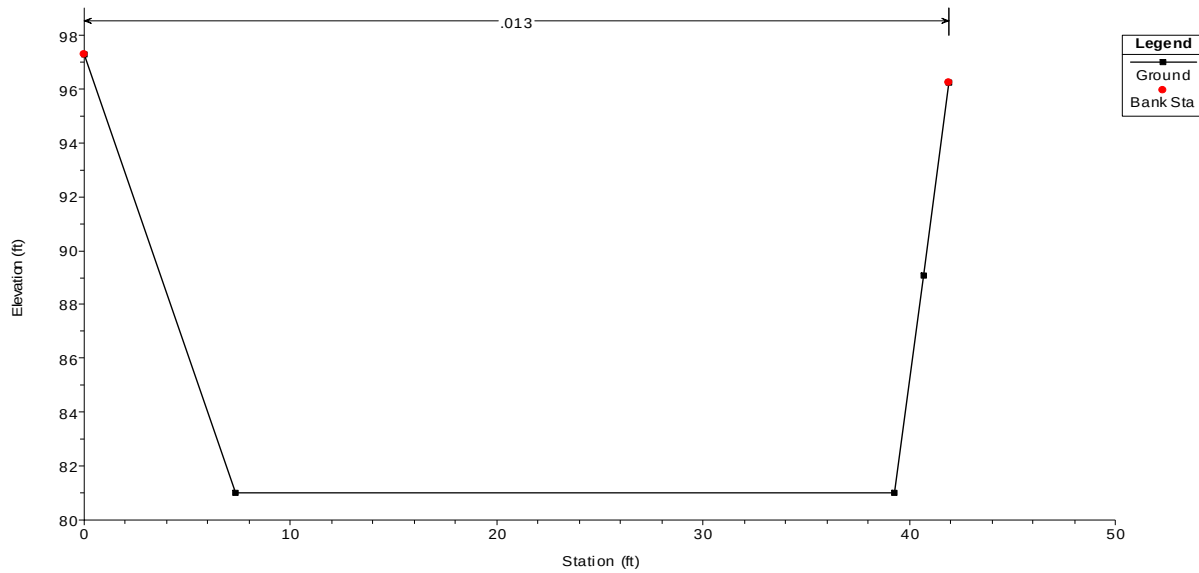
XS @DS Weir

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



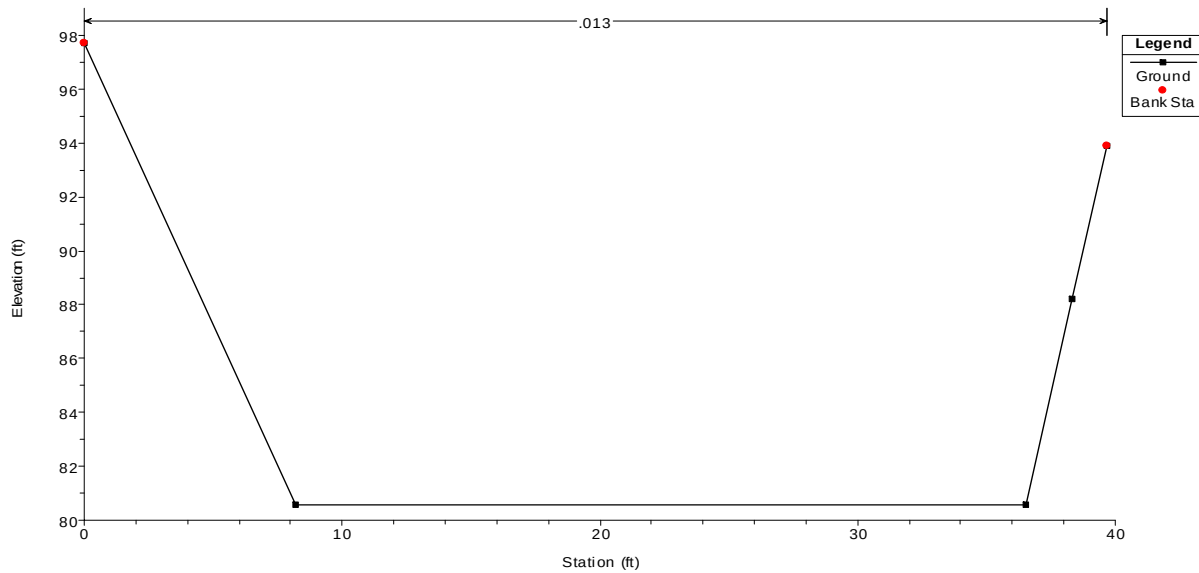
Station 0+00

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



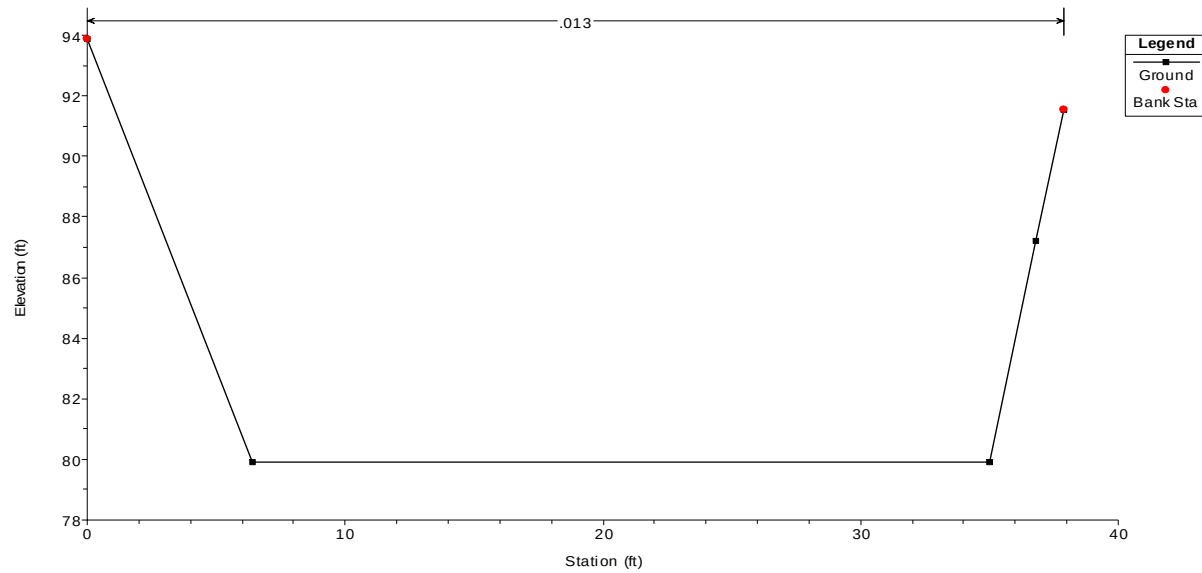
Station 0+25

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



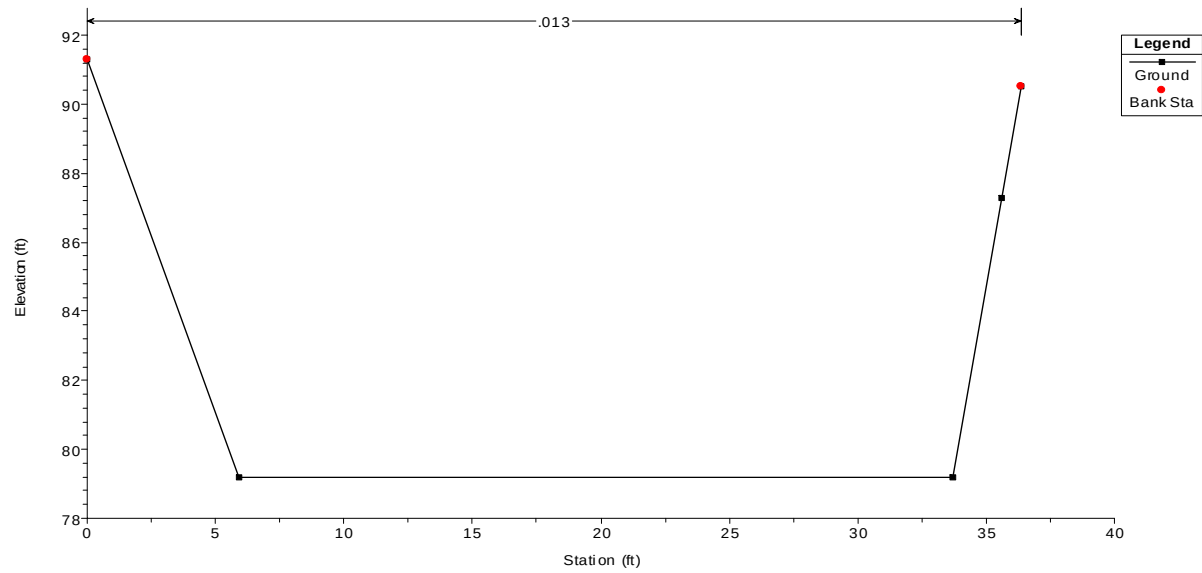
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Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



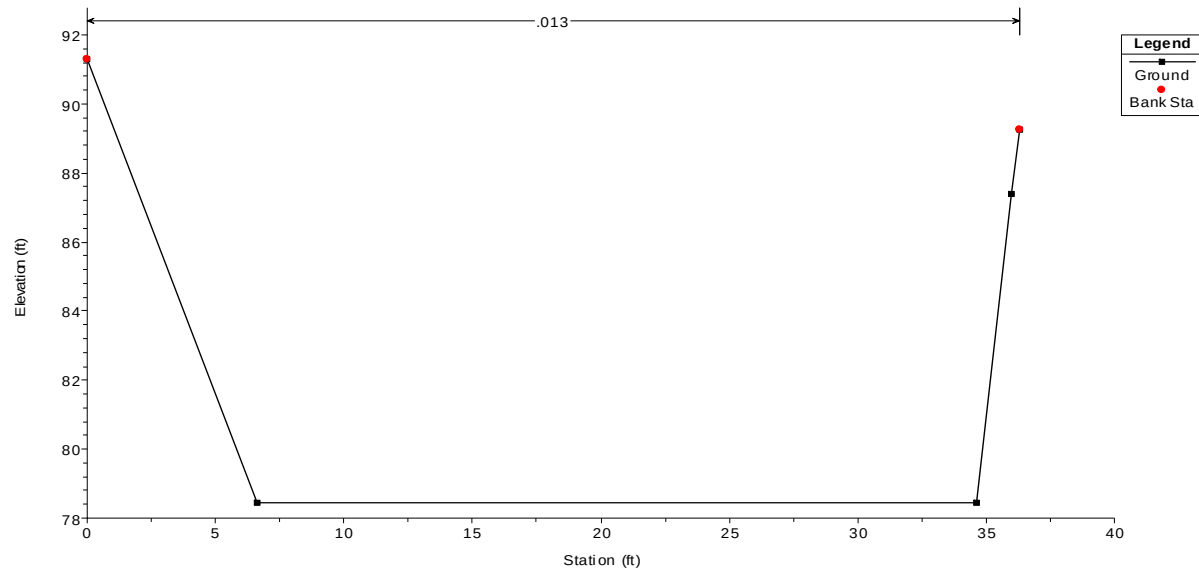
Station 0+75

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



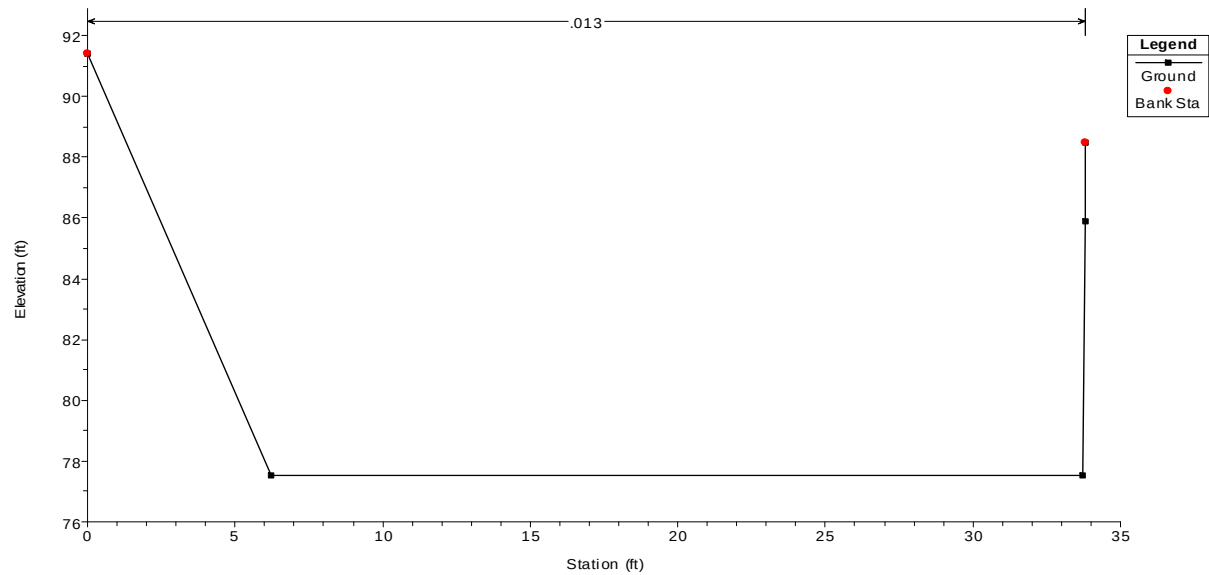
Station 1+00

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



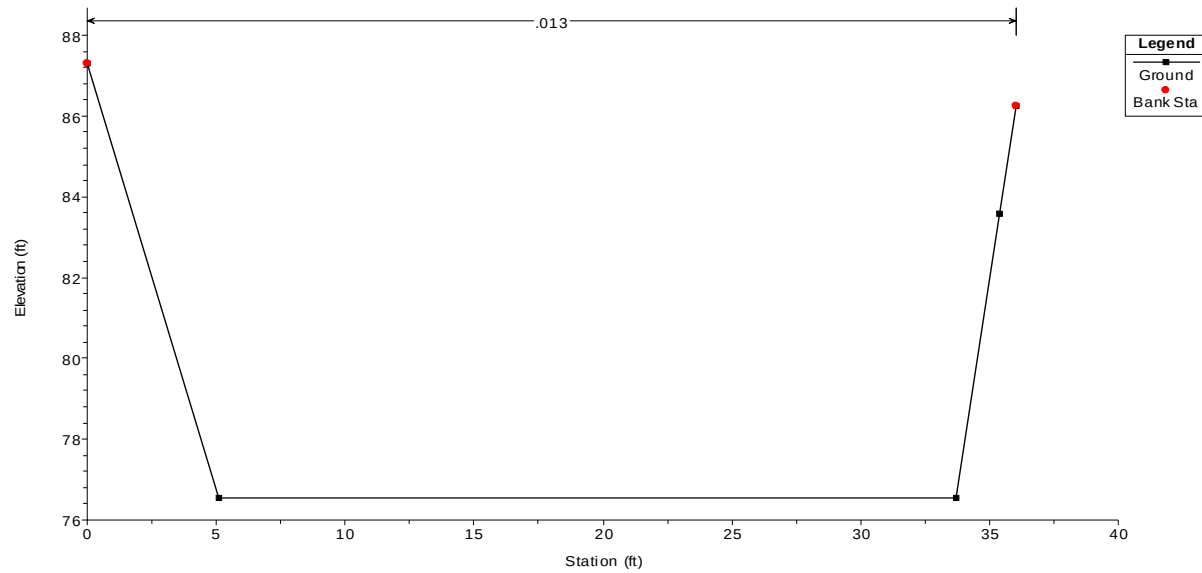
Station 1+25

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



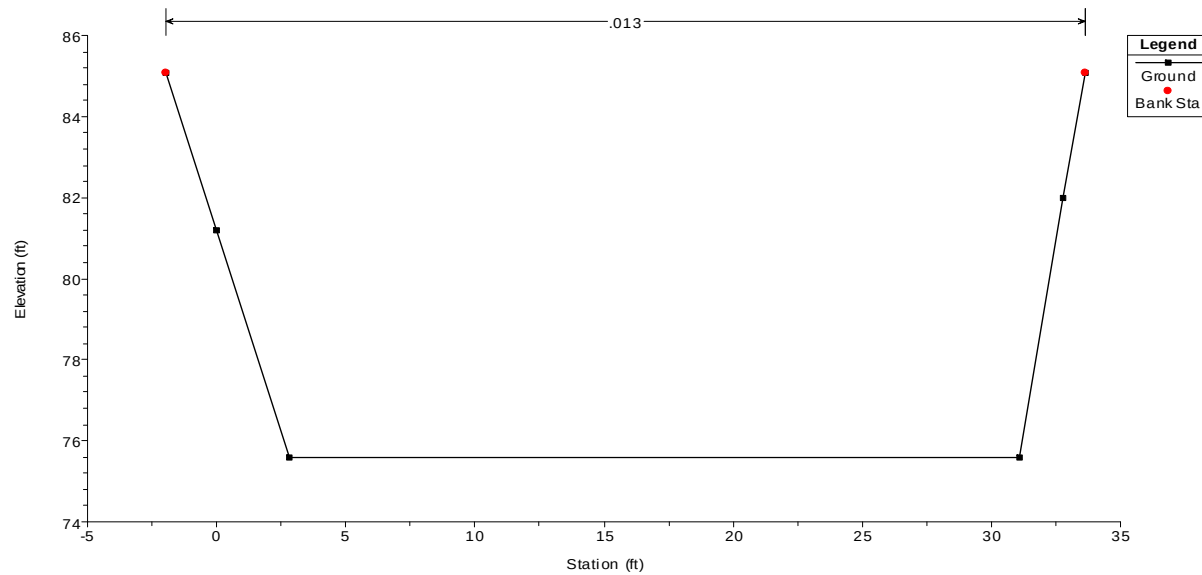
Station 1+50

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



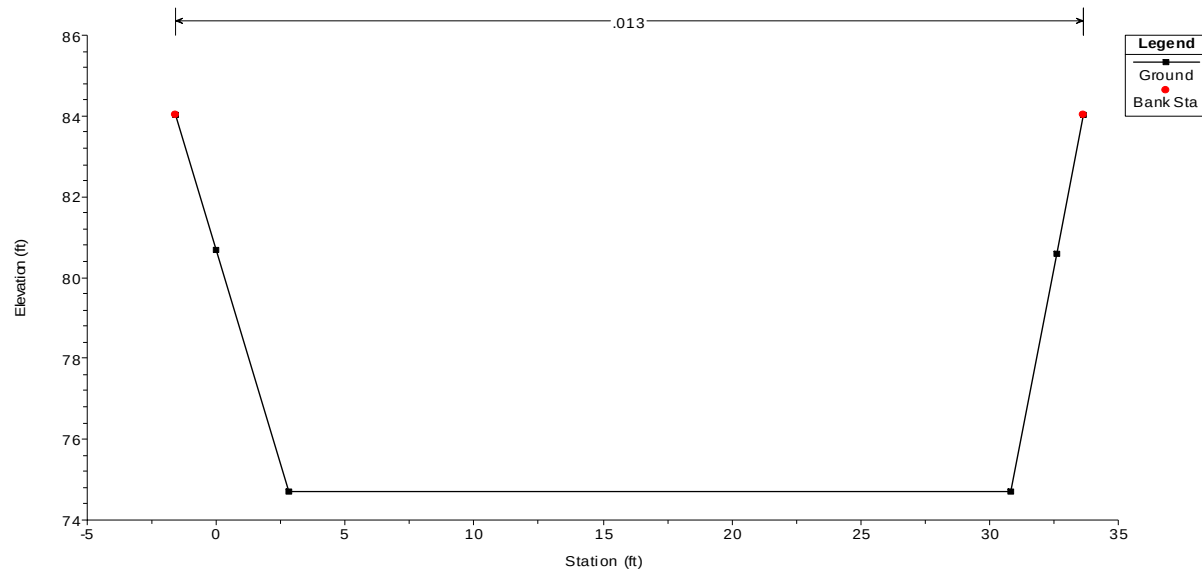
Station 1+75

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



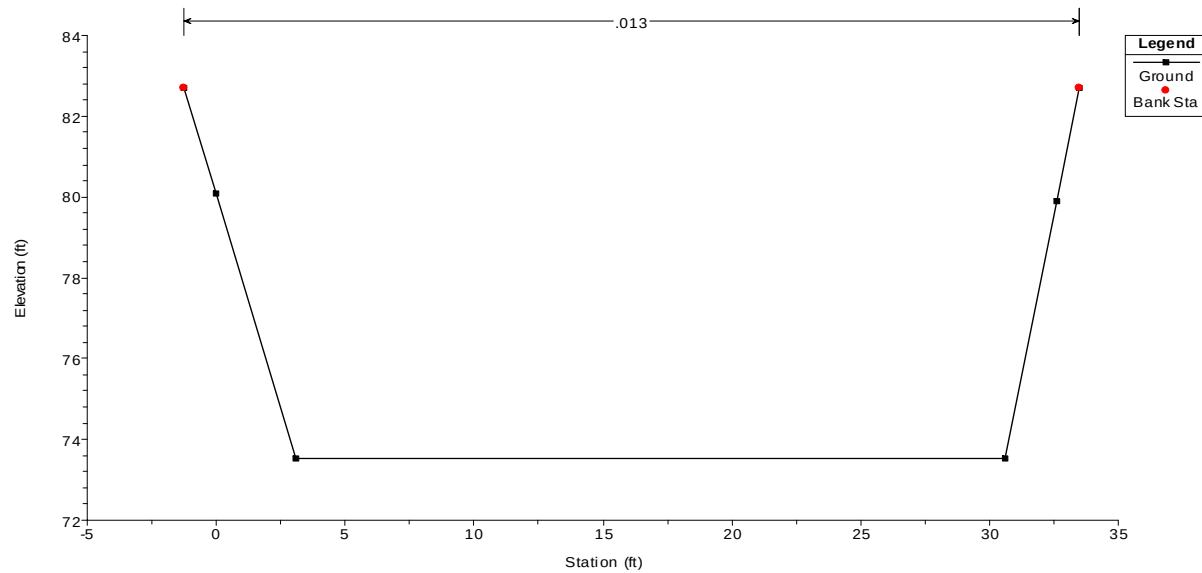
Station 2+00

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



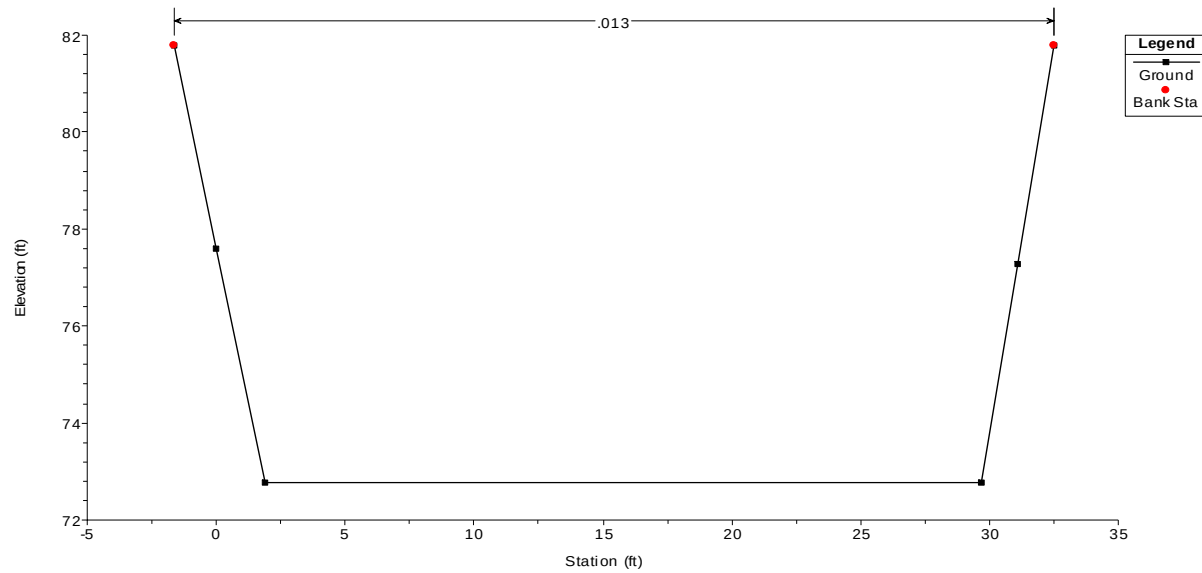
Station 2+25

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



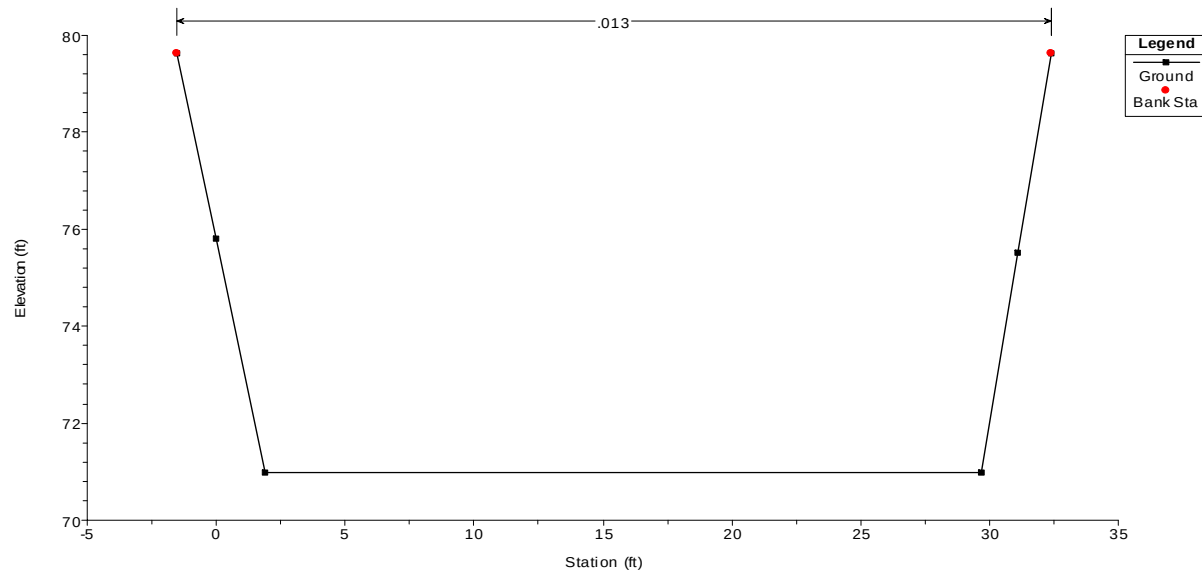
Station 2+50

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



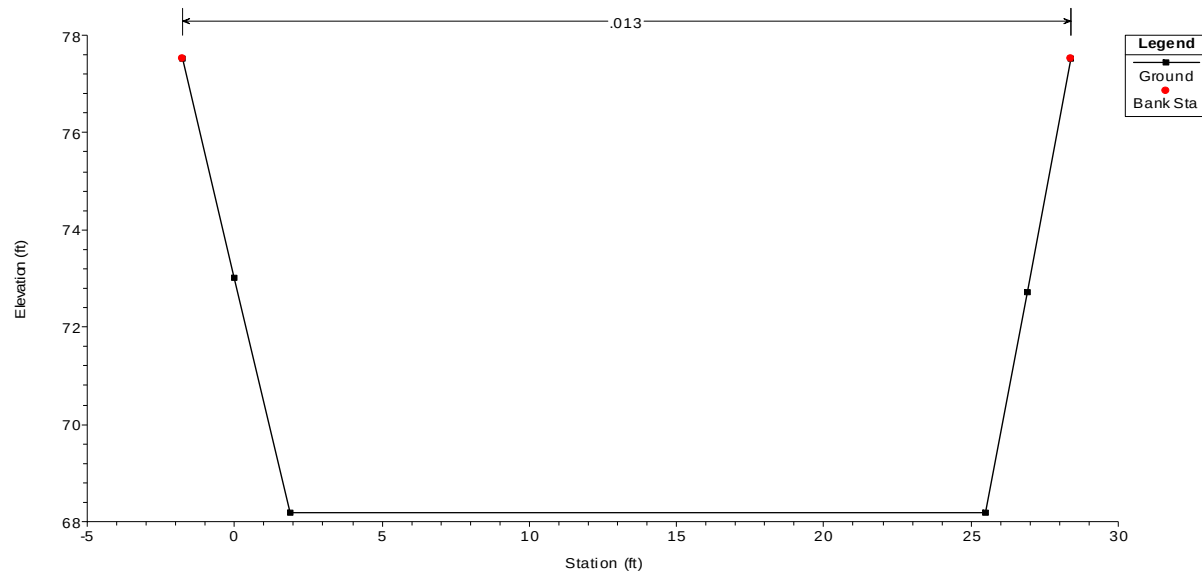
Station 2+52.2

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



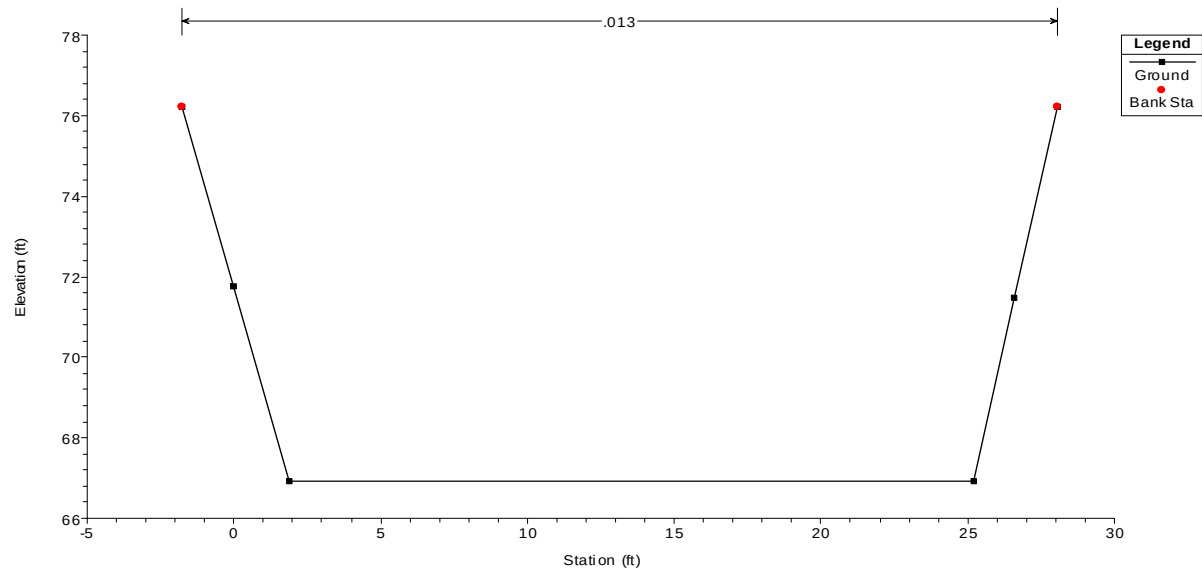
Station 3+00

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



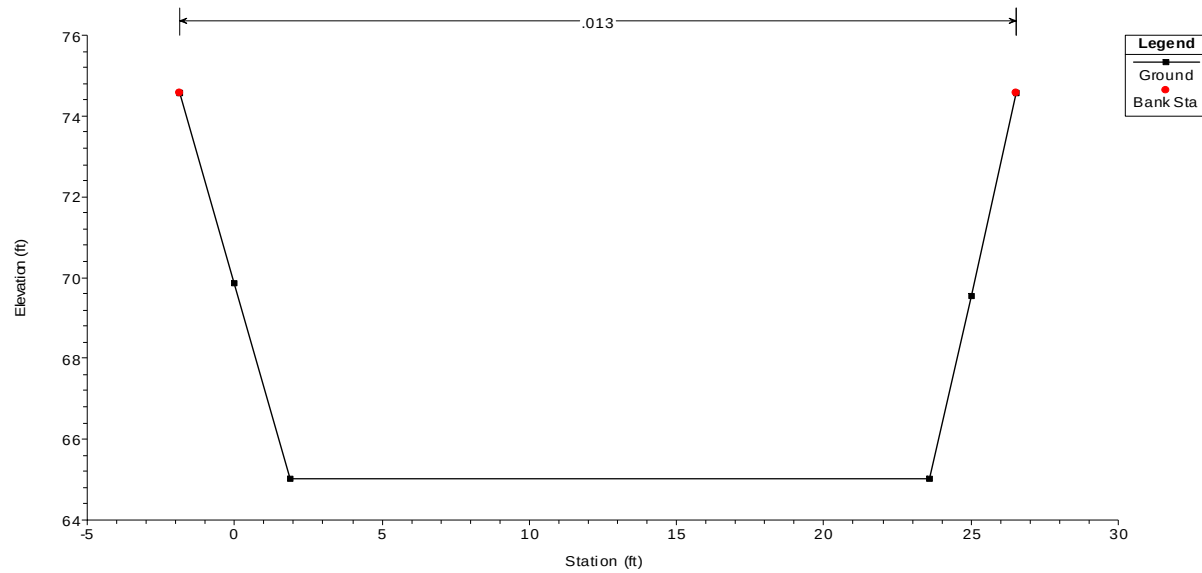
Station 3+50

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



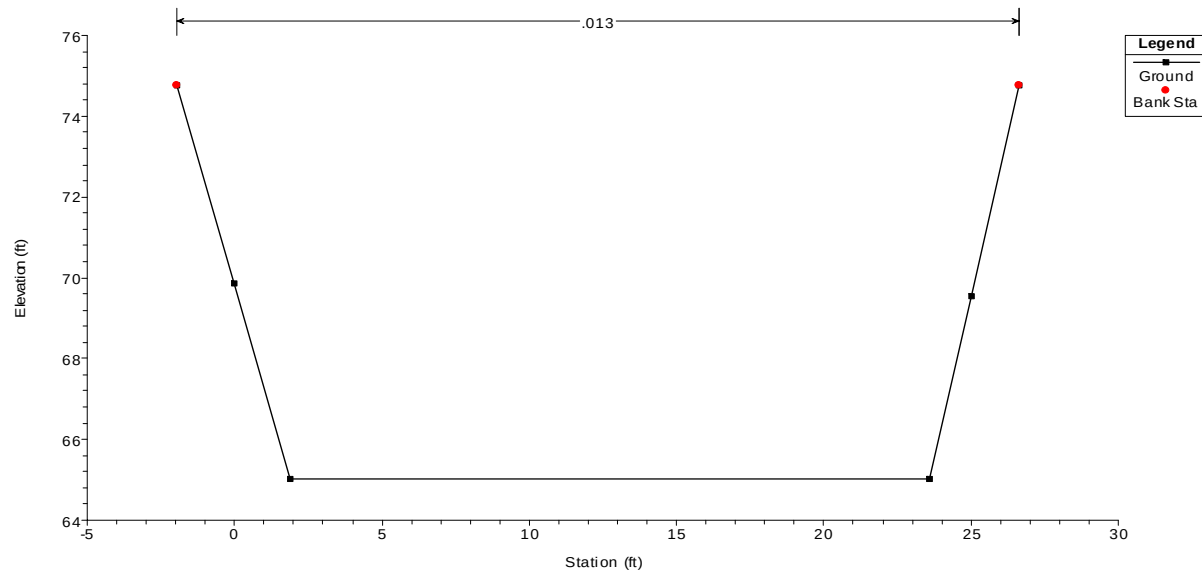
Station 4+00

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



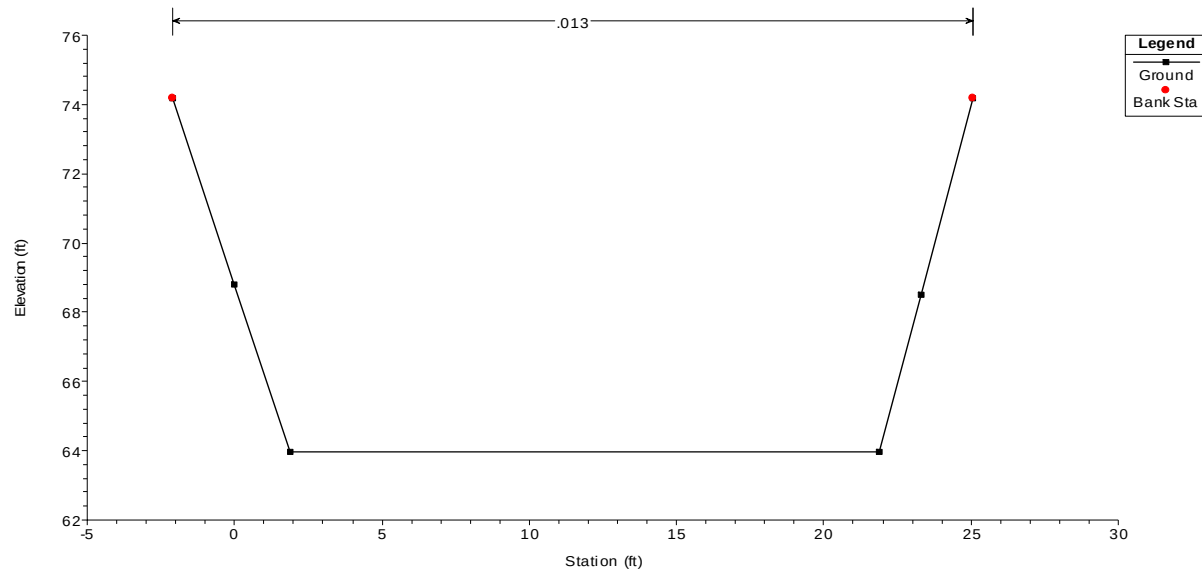
Station 4+50

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



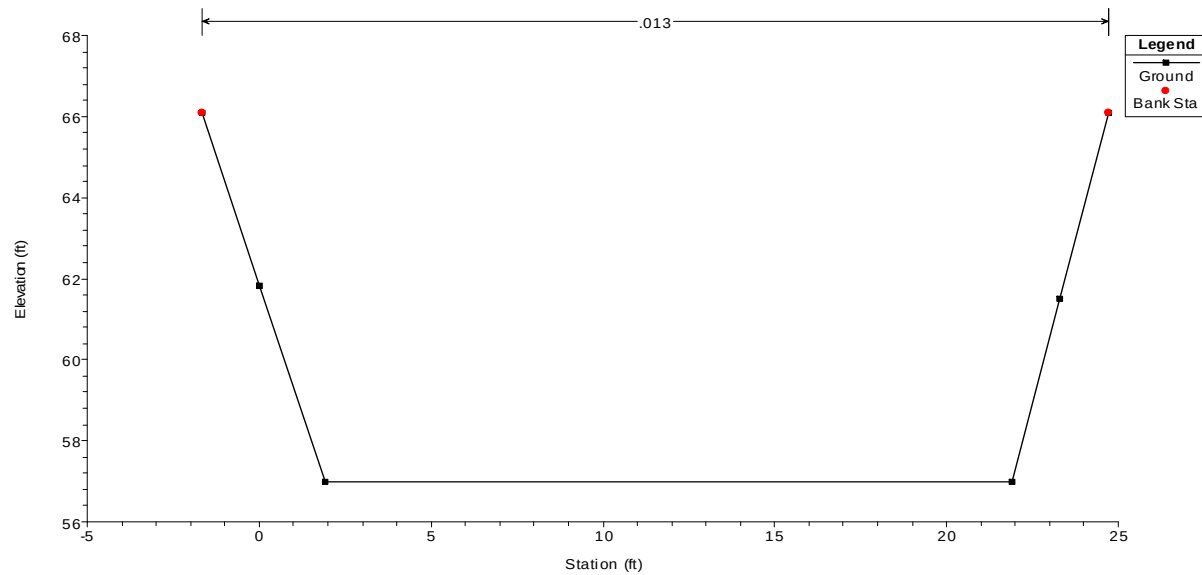
Station 4+75

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



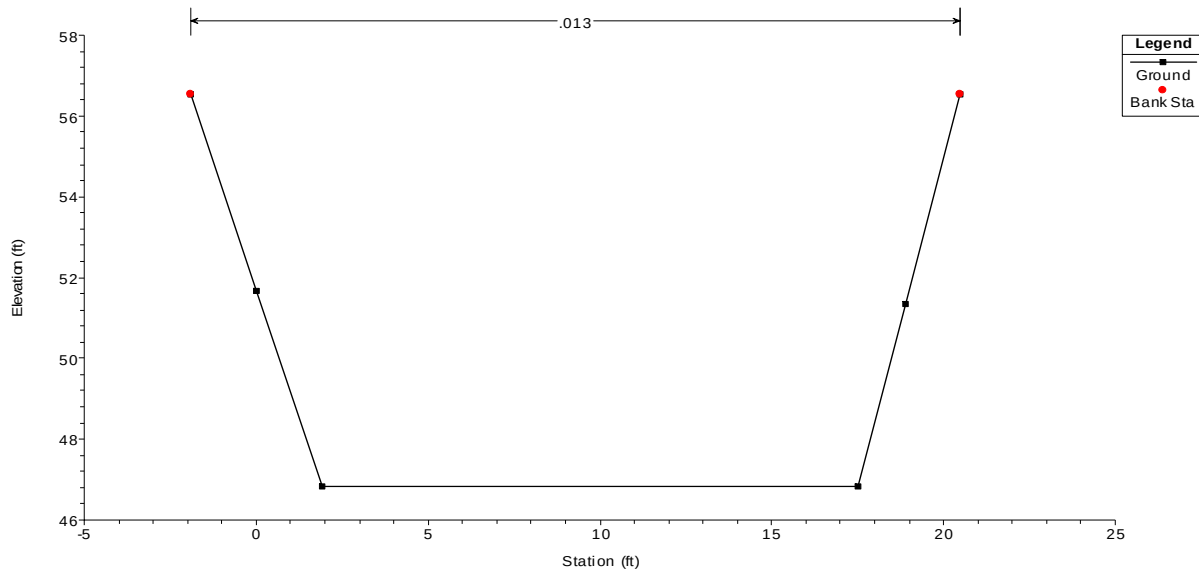
Station 4+75.1

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



Station 5+50

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008



Station 6+00

Rio Grande Reservoir Spillway_031908 Plan: Proposed Conditions 3/20/2008

