

DR-64
#304
DR 66-3

HYDRAULIC DRAINAGE STUDY

For

West Branch Channel

*Rio Rancho Estates Unit 16
Rio Rancho, New Mexico*

for

**Sandia View, LLC
9595 Wilshire Boulevard, Suite 1000
Beverly Hills, CA 90212**

November 2008

Prepared By:

**HUITT-ZOLLARS, Inc.
333 RIO RANCHO DRIVE NE, SUITE 101, RIO RANCHO, NEW MEXICO
(505) 892-5141**

**HYDRAULIC DRAINAGE STUDY
FOR
WEST BRANCH CHANNEL**

Approvals

City of
Rio Rancho

*Department of Public Works
City Engineer or Designee*

Date

SSCAFCA

Executive Director

Date

AMAFCA

Executive Director

Date



I, Robert J. Demeule, being first duly sworn, upon my oath state that I am a registered professional engineer, qualified in Civil engineering, and that the accompanying report was prepared by me or under my supervision and is true and correct to the best of my knowledge and belief.



Registered Professional Engineer

HYDRAULIC DRAINAGE STUDY FOR WEST BRANCH CHANNEL

PURPOSE

This drainage report analyzes the conveyance of the storm water discharge from the existing concrete box culvert extension (CBCE) at Westside Blvd. and Unser Blvd. through a proposed concrete box culvert extension and a proposed open channel along Westside Blvd. in the Cabezon Subdivision. This report will demonstrate that the proposed storm water conveyance system is capable of safely conveying the recommended flow rates from the Cabezon Subdivision Tracts 13A, 14A-1 and 14A-2 Drainage Management Plan (October 2007, Huitt-Zollars, Inc.).

PROJECT LOCATION

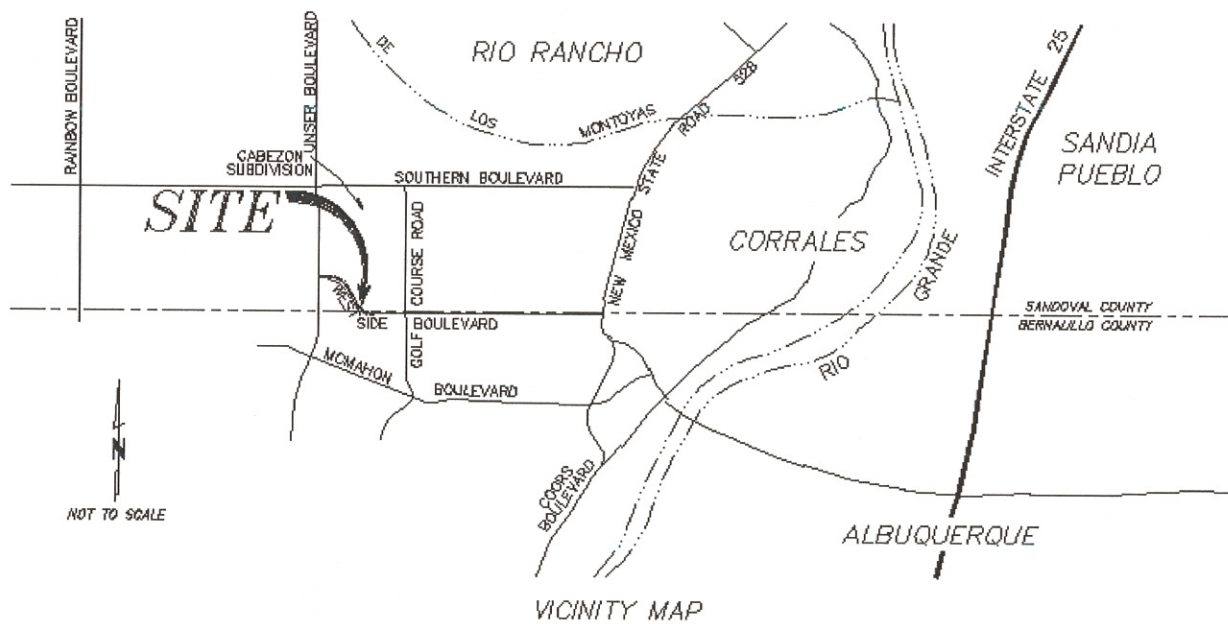


Exhibit 1 – Vicinity Map

The project is located south of the intersection of Westside Blvd. & Unser Blvd. and is part of the master planned Cabezon development. The project site is currently undeveloped and in its natural condition. The existing CBCE under Westside Blvd. is a four-barrel ten foot span by eight foot height culvert (4-10'x8' CBC).

RELATED REPORTS

The Cabezon Subdivision Tracts 13A, 14A-1 and 14A-2 Drainage Management Plan (October 2007, Huitt-Zollars, Inc.) (DMP) provides the following data concerning the proposed channel:

From the Cabezon Subdivision Tracts 13A, 14A-1 and 14A-2 Drainage Management Plan:

“Appendix D - Drainage Implementation Plan (Exhibit 6)”

Analysis Point	Description	HEC-RAS XS LOCATION	Developed Discharge
G	Upstream end of proposed channel	5400	2731
H	Confluence of proposed Storm Drain in Healthy Way and proposed channel	2200	2866
I	Confluence of flows from proposed Hospital Site and proposed channel	1200	3012

JURISDICTIONS OF PUBLIC AGENCIES

Local

This project is located entirely within the City of Rio Rancho (CoRR) Municipal Limits and is therefore within their jurisdiction and must comply with the City's development requirements.

Regional

This project is located within the jurisdiction of both Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) and Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) and is therefore subject to their review.

METHODOLOGY

This report analyzes a proposed open channel along Westside Blvd. The final channel design was created in a digital terrain model (DTM). Cross sections were then exported into HEC-RAS, and a final hydraulic model was created. Due to the varied channel slopes and velocities in the channel, the model was run in a mixed flow regime. The hydraulic model results are presented in this report. The model was used to ensure that the final channel shape and the associated hydraulic connections could safely convey the 100-yr peak flowrates safely, and that the system would satisfy local flood control authority requirements. The following assumptions are included in the hydraulic model:

- Manning's n value = 0.019 for shotcrete channel
- Manning's n value = 0.019 for concrete bridge structures
- Mixed flow regime flow conditions for HEC-RAS modeling.

The design flow rates used for the analysis were taken from the Appendix D of the DMP as shown in the Related Reports section.

RESULTS

The hydraulic model includes cross sections upstream of the proposed CBC extension and downstream of the proposed channel. The results from HEC-RAS are shown in Appendix A which includes: profile, cross-sections and output table. The typical cross-section for the trapezoidal channel is a 15' bottom width, 9' deep with 2:1 side slopes. This channel section has 3' of freeboard throughout the length of the channel which is required by the DMP.

The downstream end of the proposed shotcrete channel provides a constructed junction and directs flows into the existing Black's Dam Water Quality Feature. At this junction the channel section has a 90' bottom width to create a jump to Sub-critical flow. This jump decreases the velocity to approximately 5 feet/second which will reduce the degradation of the natural arroyo.

CONCLUSION

The final hydraulic model provides confirmation of the following:

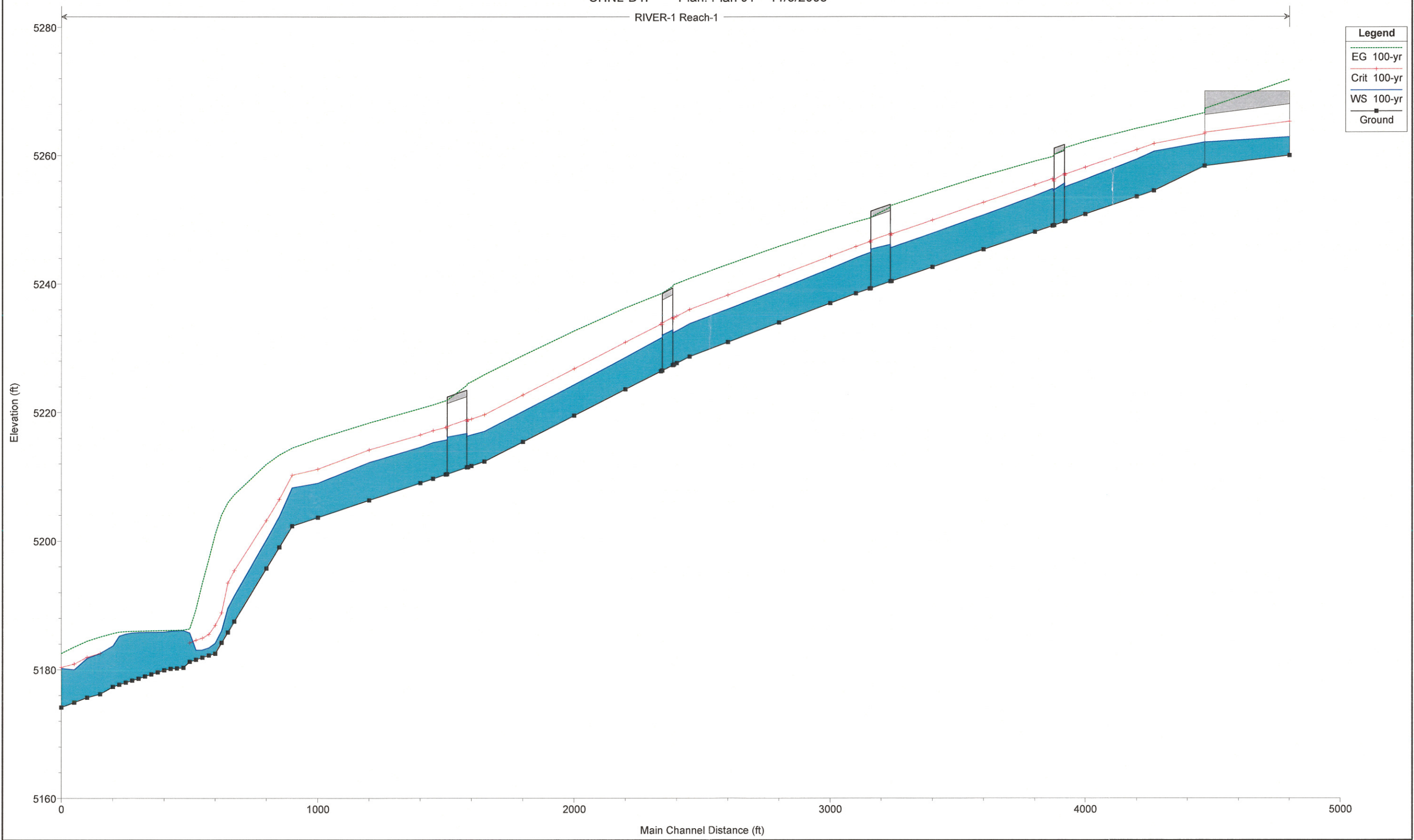
- All proposed systems satisfy the requirements of the DMP for this area
- The channel conveys fully developed onsite flows with adequate freeboard
- Future development will have storm drain connections to facilitate connection to the backbone drainage system.

This report recommends that the proposed channel will safely and effectively convey the design event through the design reach.

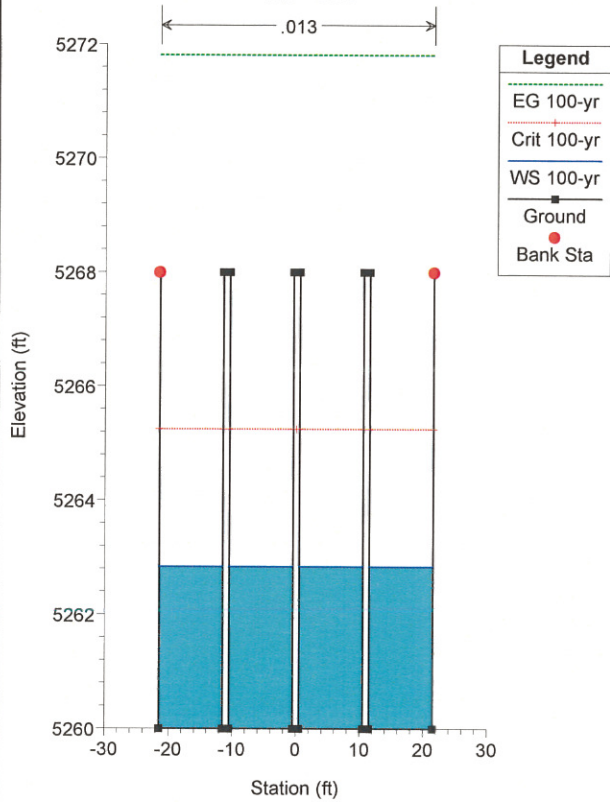
HEC-RAS Plan: 1 River: RIVER-1 Reach: Reach-1 Profile: 100-yr

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	5600	2731.00	5260.00	5262.84	5265.25	5271.81	0.020030	24.04	113.61	40.00	2.51
Reach-1	5350	Culvert									
Reach-1	5267.92	2731.00	5258.34	5262.04	5263.33	5266.61	0.010389	17.16	159.17	43.00	2.51
Reach-1	5067.92	2731.00	5254.50	5260.62	5261.80	5264.79	0.007086	16.40	166.52	39.46	1.41
Reach-1	5000	2731.00	5253.57	5259.40	5260.87	5264.20	0.008593	17.60	155.20	38.29	1.54
Reach-1	4800	2731.00	5250.83	5256.26	5258.13	5262.13	0.011310	19.45	140.44	36.72	1.75
Reach-1	4721.58	2731.00	5249.76	5255.13	5257.06	5261.20	0.011863	19.79	138.03	36.46	1.79
Reach-1	4717.52	2731.00	5249.70	5255.06	5256.86	5261.15	0.011876	19.79	137.98	36.45	1.79
Reach-1	4700	Bridge									
Reach-1	4675.52	2731.00	5249.12	5254.27	5255.98	5260.10	0.011950	19.38	140.94	39.00	1.80
Reach-1	4670.03	2731.00	5249.05	5254.79	5256.36	5259.80	0.009094	17.96	152.04	37.96	1.58
Reach-1	4600	2731.00	5248.09	5253.68	5255.39	5259.09	0.010104	18.66	146.32	37.36	1.66
Reach-1	4400	2731.00	5245.35	5250.70	5252.66	5256.83	0.011994	19.86	137.48	36.40	1.80
Reach-1	4200	2731.00	5242.61	5247.86	5249.91	5254.31	0.012873	20.38	134.00	36.01	1.86
Reach-1	4039.92	2731.00	5240.42	5245.64	5247.73	5252.21	0.013219	20.58	132.72	35.87	1.89
Reach-1	4036.15	2731.00	5240.37	5245.59	5247.53	5252.16	0.013214	20.57	132.73	35.87	1.88
Reach-1	4025	Bridge									
Reach-1	3958.14	2731.00	5239.30	5244.91	5246.48	5250.26	0.009963	18.57	147.07	37.44	1.65
Reach-1	3953.91	2731.00	5239.24	5244.84	5246.54	5250.22	0.010025	18.61	146.74	37.40	1.66
Reach-1	3900	2731.00	5238.50	5244.02	5245.80	5249.64	0.010651	19.03	143.54	37.06	1.70
Reach-1	3800	2731.00	5236.99	5242.34	5244.30	5248.46	0.011965	19.85	137.61	36.41	1.80
Reach-1	3600	2731.00	5233.97	5239.16	5241.28	5245.85	0.013551	20.76	131.53	35.74	1.91
Reach-1	3400	2731.00	5230.95	5236.06	5238.25	5243.03	0.014315	21.18	128.94	35.45	1.96
Reach-1	3250	2731.00	5228.69	5233.77	5236.00	5240.85	0.014622	21.34	127.95	35.34	1.98
Reach-1	3200	2731.00	5227.67	5232.68	5234.97	5240.06	0.015520	21.81	125.22	35.03	2.03
Reach-1	3189.97	2731.00	5227.46	5232.46	5234.77	5239.90	0.015656	21.89	124.76	34.93	2.04
Reach-1	3185.17	2731.00	5227.37	5232.36	5234.53	5239.82	0.015744	21.92	124.57	34.95	2.05
Reach-1	3175	Bridge									
Reach-1	3143.17	2731.00	5226.51	5231.64	5233.67	5238.53	0.014095	21.06	129.67	35.53	1.94
Reach-1	3138.37	2731.00	5226.41	5231.53	5233.71	5238.46	0.014199	21.12	129.32	35.49	1.95
Reach-1	3000	2731.00	5223.59	5228.51	5230.89	5236.25	0.016556	22.33	122.33	34.69	2.10
Reach-1	2800	2731.00	5219.50	5224.28	5226.80	5232.68	0.018541	23.26	117.42	34.12	2.21
Reach-1	2600	2731.00	5215.42	5220.14	5222.73	5228.85	0.019496	23.68	115.31	33.88	2.26
Reach-1	2450	2731.00	5212.36	5217.06	5219.67	5225.88	0.019864	23.84	114.54	33.78	2.28
Reach-1	2400	2731.00	5211.69	5216.50	5218.99	5224.78	0.018188	23.10	118.24	34.22	2.19
Reach-1	2387.15	2731.00	5211.52	5216.35	5218.83	5224.52	0.017851	22.94	119.04	34.31	2.17
Reach-1	2382.35	2731.00	5211.46	5216.30	5218.62	5224.43	0.017719	22.88	119.36	34.35	2.16
Reach-1	2350	Bridge									
Reach-1	2304.35	2731.00	5210.41	5215.76	5217.59	5221.89	0.011994	19.86	137.48	36.40	1.80
Reach-1	2299.55	2731.00	5210.35	5215.70	5217.65	5221.83	0.011994	19.86	137.48	36.40	1.80
Reach-1	2249.55	2866.00	5209.68	5215.29	5217.17	5221.19	0.010976	19.49	147.05	37.44	1.73
Reach-1	2200	2866.00	5209.02	5214.59	5216.51	5220.61	0.011305	19.70	145.48	37.27	1.76
Reach-1	2000	2866.00	5206.35	5212.20	5214.16	5218.38	0.010836	19.96	143.62	34.13	1.71
Reach-1	1800	2866.00	5203.67	5208.98	5211.16	5215.88	0.013632	21.09	135.92	36.23	1.92
Reach-1	1700	2866.00	5202.34	5208.26	5210.24	5214.47	0.010709	20.00	143.31	33.42	1.70
Reach-1	1650	2866.00	5199.04	5203.75	5206.48	5213.39	0.021616	24.91	115.03	33.84	2.38
Reach-1	1600	2866.00	5195.74	5200.11	5203.18	5211.94	0.028696	27.59	103.87	32.50	2.72
Reach-1	1475	2866.00	5187.49	5191.42	5195.38	5207.20	0.042922	31.88	89.90	30.72	3.28
Reach-1	1450	2866.00	5185.80	5189.52	5193.47	5205.98	0.049469	32.56	88.03	32.85	3.50
Reach-1	1425	2866.00	5184.19	5186.01	5188.85	5204.07	0.107023	34.11	84.02	54.01	4.82
Reach-1	1400	2866.00	5182.50	5184.09	5186.90	5201.03	0.109256	33.03	86.76	59.34	4.81
Reach-1	1375	2866.00	5182.22	5183.38	5185.50	5197.16	0.125449	29.80	96.17	85.65	4.96
Reach-1	1350	2866.00	5181.89	5183.06	5184.91	5193.46	0.092756	25.89	110.71	97.16	4.27
Reach-1	1325	2866.00	5181.56	5183.06	5184.58	5189.37	0.146373	20.16	142.15	99.57	2.97
Reach-1	1300	2866.00	5181.24	5185.73	5184.16	5186.33	0.003404	6.25	458.84	105.92	0.53
Reach-1	1275	2866.00	5180.30	5186.06		5186.15	0.000523	2.45	1169.06	277.39	0.21
Reach-1	1250	2866.00	5180.20	5186.03		5186.14	0.000501	2.62	1095.53	236.48	0.21
Reach-1	1225	2866.00	5180.12	5185.97		5186.12	0.000651	3.12	918.76	186.55	0.25
Reach-1	1200	2866.00	5179.92	5185.85		5186.09	0.001054	3.95	726.33	147.97	0.31
Reach-1	1175	2866.00	5179.60	5185.82		5186.06	0.000965	3.91	732.08	140.78	0.30
Reach-1	1150	2866.00	5179.28	5185.81		5186.03	0.000877	3.80	754.21	140.29	0.29
Reach-1	1125	2866.00	5178.96	5185.80		5186.01	0.000766	3.71	772.78	134.25	0.27
Reach-1	1100	3012.00	5178.60	5185.78		5185.99	0.000721	3.71	811.02	134.14	0.27
Reach-1	1075	3012.00	5178.30	5185.69		5185.96	0.001018	4.23	712.76	126.19	0.31
Reach-1	1050	3012.00	5177.98	5185.51		5185.92	0.001370	5.13	586.60	95.50	0.37
Reach-1	1025	3012.00	5177.66	5185.20		5185.85	0.002212	6.51	462.73	74.55	0.46
Reach-1	1000	3012.00	5177.33	5183.68		5185.63	0.008553	11.19	269.06	51.24	0.86
Reach-1	950	3012.00	5176.20	5182.52	5182.52	5185.07	0.011811	12.82	235.01	46.73	1.01
Reach-1	900	3012.00	5175.64	5181.77	5181.94	5184.45	0.012969	13.14	229.16	47.37	1.05
Reach-1	850	3012.00	5174.90	5179.98	5180.86	5183.54	0.021330	15.14	198.92	49.80	1.34
Reach-1	800	3012.00	5174.13	5180.18	5180.34	5182.51	0.013067	12.24	246.01	58.36	1.05

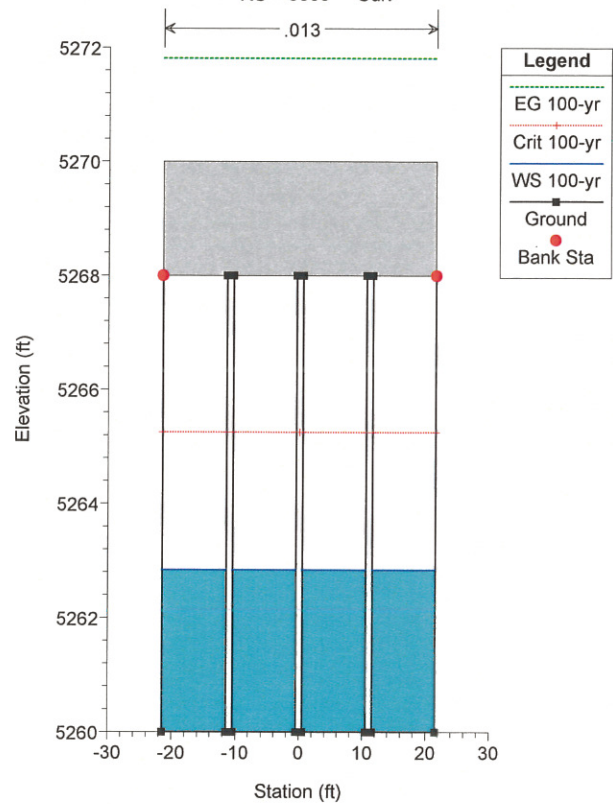
RIVER-1 Reach-1



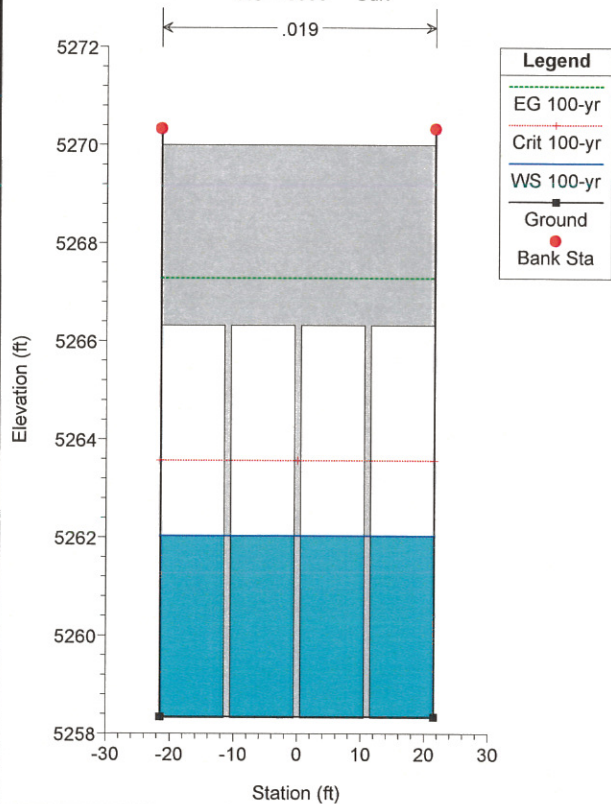
CHNL-D1F Plan: Plan 01 11/5/2008
RS = 5600



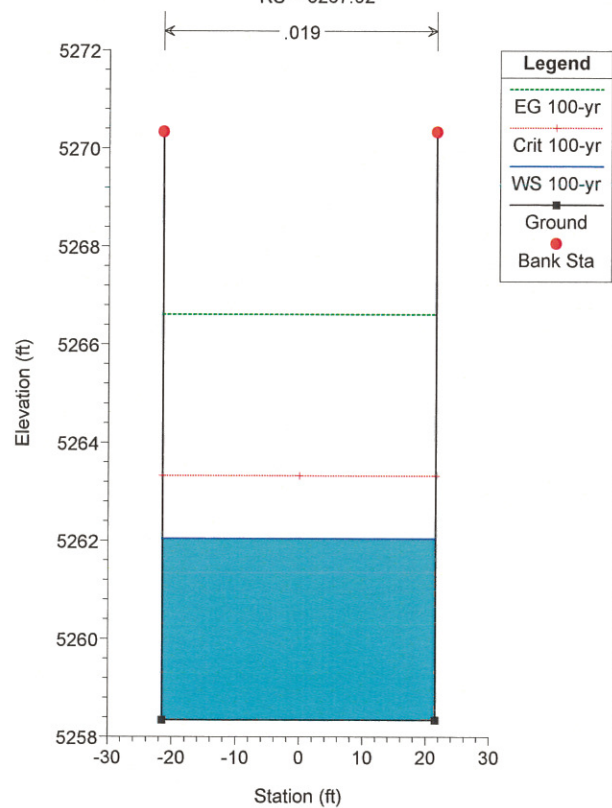
CHNL-D1F Plan: Plan 01 11/5/2008
RS = 5350 Culv



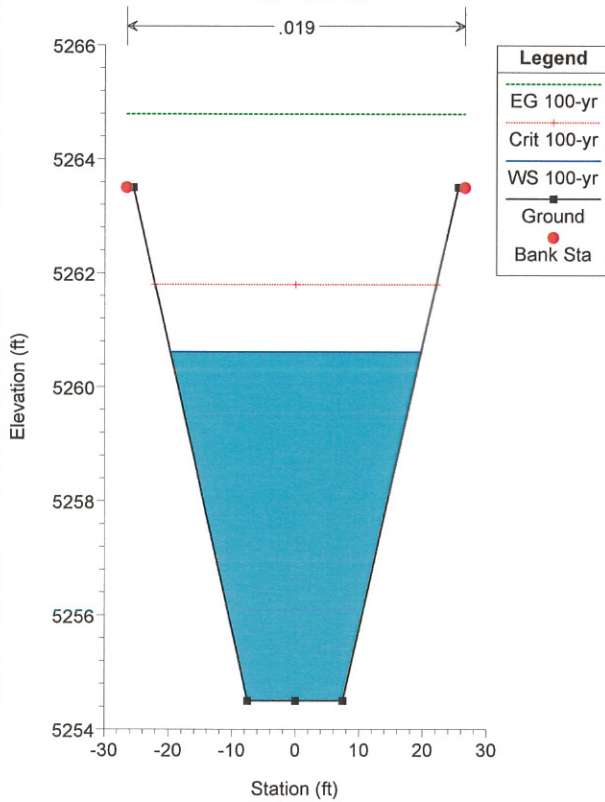
CHNL-D1F Plan: Plan 01 11/5/2008
RS = 5350 Culv



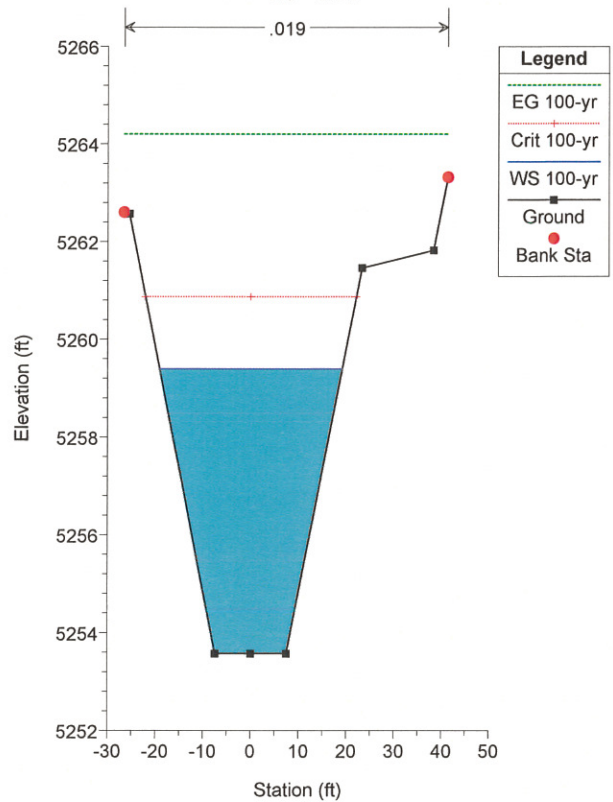
CHNL-D1F Plan: Plan 01 11/5/2008
RS = 5267.92



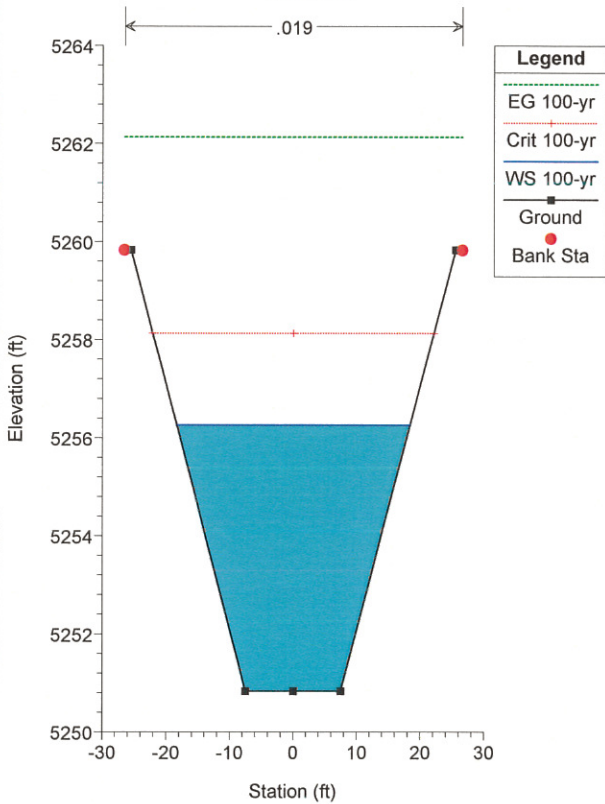
CHNL-D1F Plan: Plan 01 11/5/2008
RS = 5067.92



CHNL-D1F Plan: Plan 01 11/5/2008
RS = 5000



CHNL-D1F Plan: Plan 01 11/5/2008
RS = 4800



CHNL-D1F Plan: Plan 01 11/5/2008
RS = 4721.58

