

Relief Ditch Diversion Reconstruction

Design Phase

Final Report

Funds from the grant awarded to the project from the Healthy Rivers Fund were used to employ Crane Associates to identify the legal point of diversion for the Relief Ditch by survey . The river was surveyed to develop existing and proposed hydraulic models using HEC-RAS. Three alternatives were defined for presentation to the Relief Ditch Board of Directors to get their approval for a single design concept. Cost estimates, construction schedules, material locations, and bid packages were prepared.

The first step of the design phase portion of the project was Gunnison Gorge Anglers engaging in discussion with the Relief Ditch Board of Directors to receive their permission to pursue a suitable design for reconstruction of the diversion. That permission was granted. A management committee was established to guide the project consisting of representatives from Gunnison Gorge Anglers, National Trout Unlimited, Grand Valley Anglers, U.S. Bureau of Reclamation, U.S. Bureau of Land Management, Colorado Division of Wildlife and the Relief Ditch Board of Directors. Through a series of meetings a preferred design alternative was selected.

To ensure the integrity of the developed designs Flywater, Inc. was retained to collaborate and peer review the project through the use of additional grant funding received by application to the Gunnison Basin Roundtable Water Supply Reserve Account.

Currently, the management committee is finalizing plans with the BLM to allow us to use a right-of-way for the project governed under historic disturbance conditions guidelines. This will not require the ditch company to pay rent for the right-of-way. The BLM will perform the environmental assessment and NEPA process beginning in the fall of 2011.

The Gunnison Gorge Anglers with the assistance of Crane Associates and Flywater Inc. has made applications and presentations to some granting entities and is in the process of submitting more applications to obtain construction funding.

Submitted by:

George Osborn, project coordinator

Gunnison Gorge Anglers

Relief Ditch Reconstruction Planning Project

Project Budget

September 15, 2010 – May 1, 2011

| Expenses | HRF | Cash Match | In-Kind | Total |
|-------------------------------------|------------------|-------------------|-----------------|------------------|
| Survey point of diversion | \$ 2,000 | \$ 1,000 | | \$ 3,000 |
| Survey Cross Sections | \$ 2,000 | \$ 4,000 | | \$ 6,000 |
| HEC-RAS model | \$ 7,000 | \$ 1,000 | | \$ 8,000 |
| Design Alternatives | \$ 11,000 | \$ 5,000 | | \$ 16,000 |
| Ditch Board coordination | \$ 500 | \$ 100 | | \$ 600 |
| Cost Estimates/Bid Packages | \$ 2,500 | \$ 1,500 | | \$ 4,000 |
| Project Coordination/Administration | | | \$ 2,000 | \$ 2,000 |
| Total | \$ 25,000 | \$ 12,600 | \$ 2,000 | \$ 39,600 |

Match Income Summary

| | |
|--------------------------|-----------------|
| Gunnison Gorge Anglers | \$5,000 |
| Grand Valley Anglers | \$1,000 |
| Colorado Trout Unlimited | \$2,000 |
| BLM | \$1,500 |
| In kind administration | \$2,000 |
| National Trout Unlimited | \$3,100 |
| Total | \$14,600 |

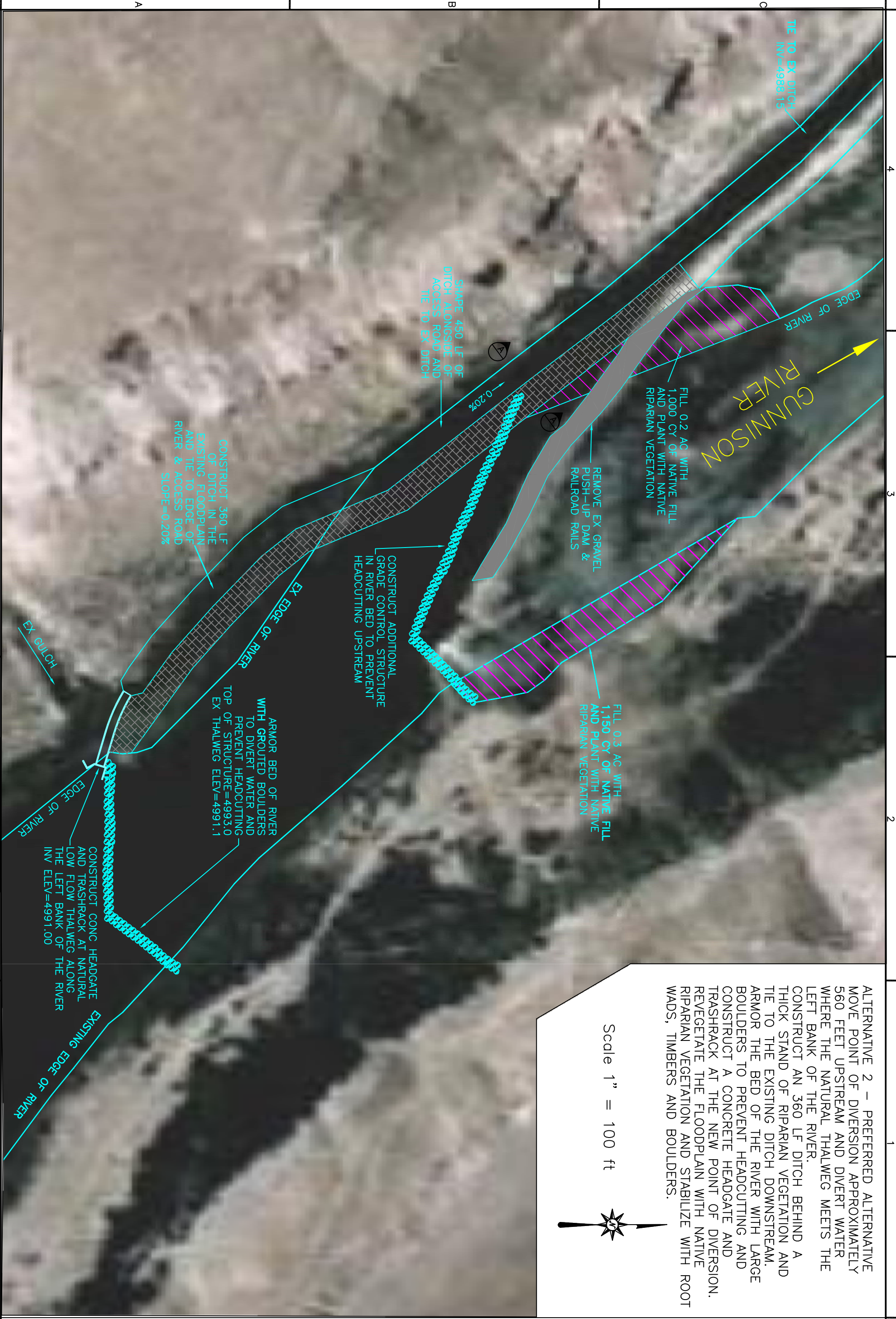
RELIEF DITCH COMPANY
21505 H 75 ROAD
DELTA, COLORADO 81416

To Whom It May Concern:

The Board of the Relief Ditch Company gives permission to pursue alternative designs for a diversion dam.

| | |
|-----------------------------------|--------------|
| Signed: R. Mel Frazier, President | 970 874-7462 |
| Carol Morrell , Secretary | 970 874-4244 |

Dated: April 26, 2010

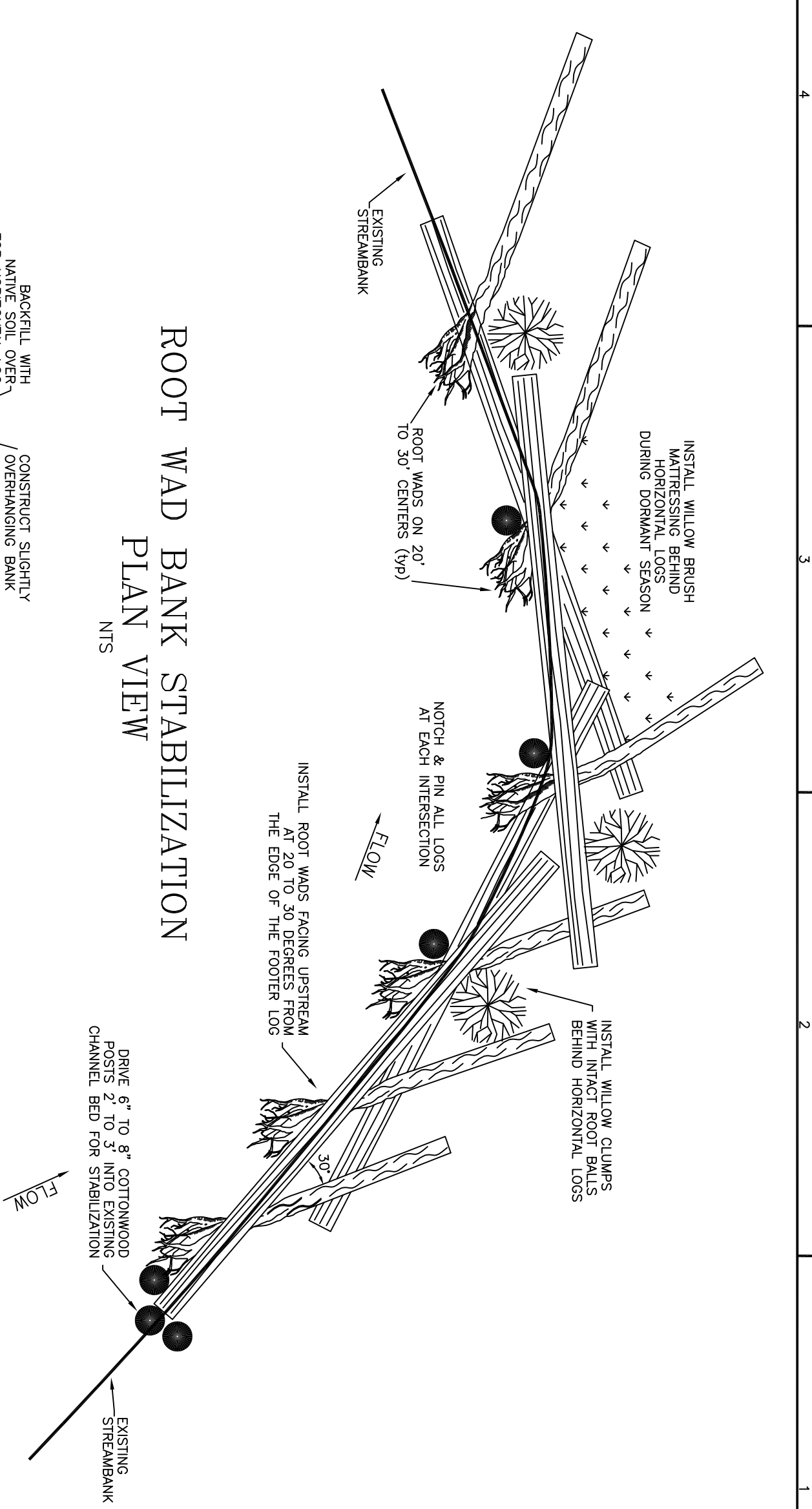


ALTERNATIVE 2 – PREFERRED ALTERNATIVE
MOVE POINT OF DIVERSION APPROXIMATELY
560 FEET UPSTREAM AND DIVERT WATER
WHERE THE NATURAL THALWEG MEETS THE
LEFT BANK OF THE RIVER.
CONSTRUCT AN 360 LF DITCH BEHIND A
THICK STAND OF RIPARIAN VEGETATION AND
TIE TO THE EXISTING DITCH DOWNSTREAM.
ARMOR THE BED OF THE RIVER WITH LARGE
BOULDERS TO PREVENT HEADCUTTING AND
CONSTRUCT A CONCRETE HEADGATE AND
TRASHRACK AT THE NEW POINT OF DIVERSION.
REVEGETATE THE FLOODPLAIN WITH NATIVE
RIPARIAN VEGETATION AND STABILIZE WITH ROOT
WADS, TIMBERS AND BOULDERS.

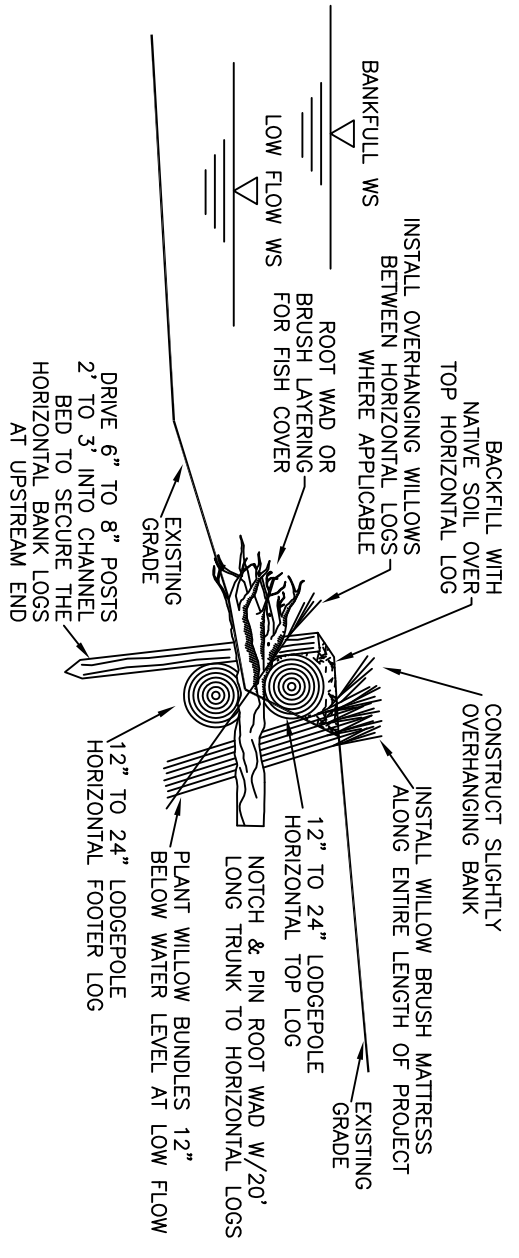
Scale 1" = 100 ft



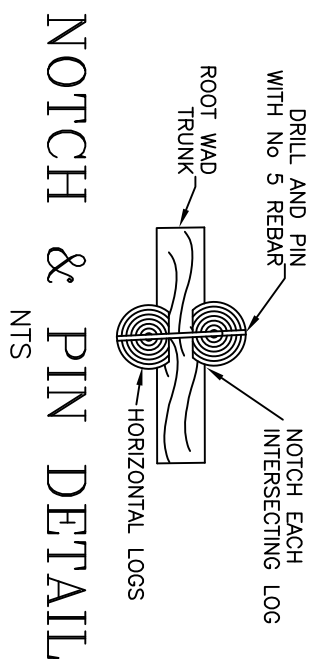
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|---|--|--|----------------------------|-------------|---|----------|
| Sheet reference number: Sheet 2 of 8 UPDATE | RELIEF DITCH RECONSTRUCTION DESIGN ALTERNATIVE GUNNISON RIVER DELTA COUNTY, COLORADO CONCEPTUAL ALTERNATIVE No 2 | CRANE ASSOCIATES 29163 Stingly Gulch Road Hotchkiss, Colorado 81419 Phone (970) 261-5043 jeffcrane@paonia.com | Designed by: JEFF CRANE | | Date: Aug, 2010 | Rev. |
| | | | Dwn by: JPC | Ckd by: | Design file no: | |
| | | | Reviewed by: | | Drawing Code: | |
| | | | Submitted by: | | File name: Plot date: Plot scale: | |
| | | | Symbol | Description | Date | Approved |



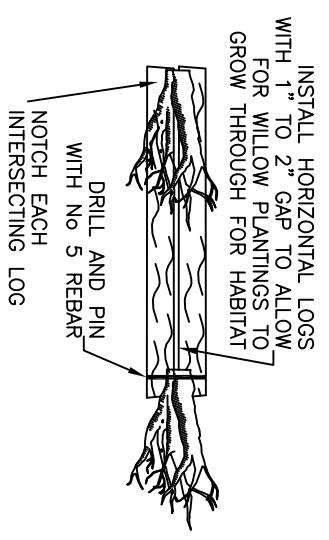
ROOT WAD BANK STABILIZATION
PLAN VIEW
NTS



ROOT WAD BANK STABILIZATION
CROSS SECTION
NTS



NOTCH & PIN DETAIL
NTS



LOG FACE DETAIL
NTS

4

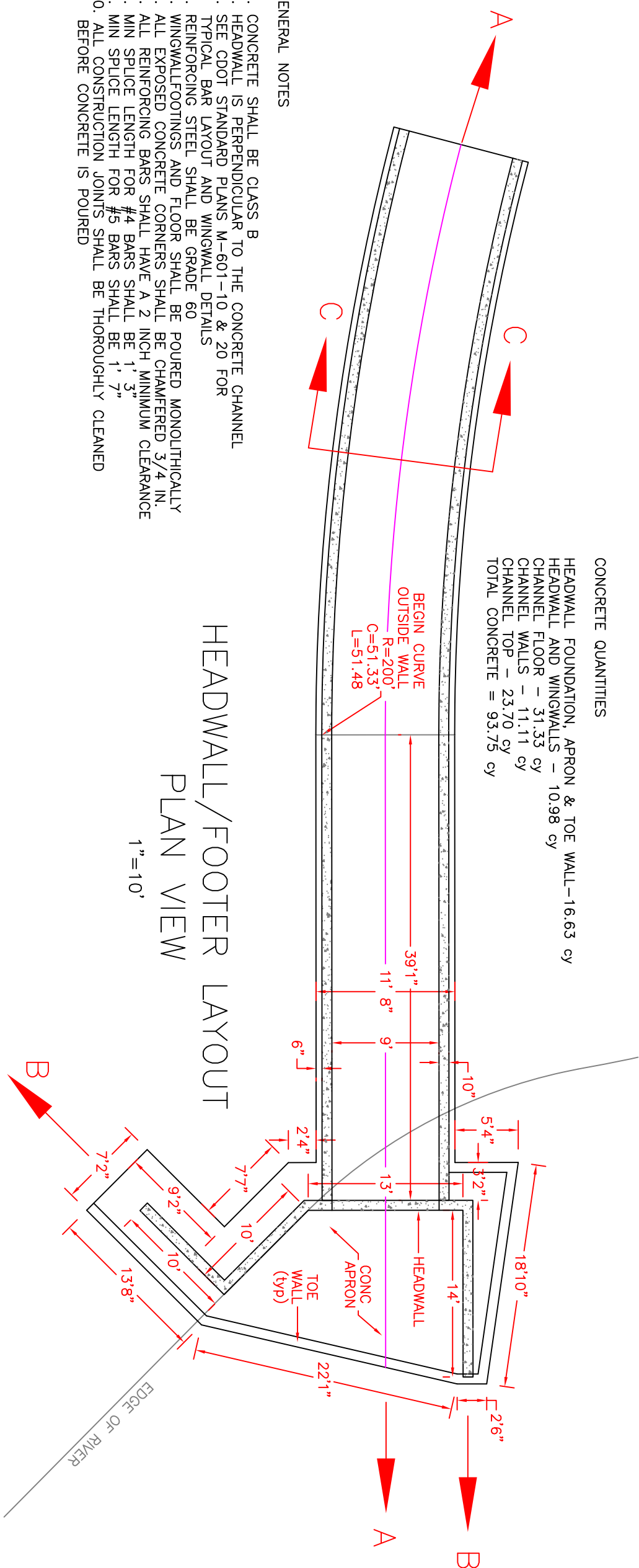
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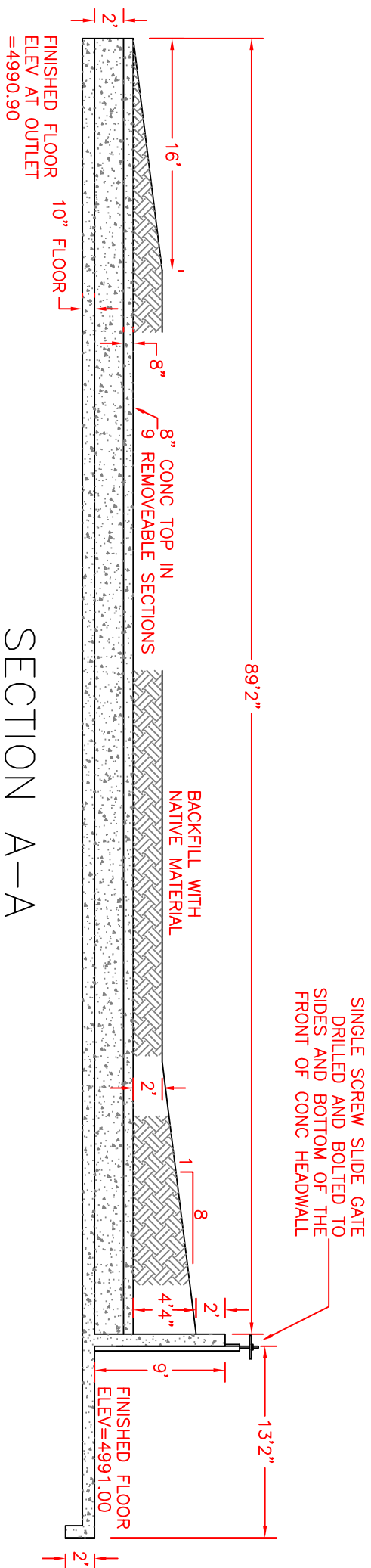
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CONCRETE QUANTITIES

HEADWALL FOUNDATION, APRON & TOE WALL-16.63 cy
HEADWALL AND WINGWALLS - 10.98 cy
CHANNEL FLOOR - 31.33 cy
CHANNEL WALLS - 11.11 cy
CHANNEL TOP - 23.70 cy
TOTAL CONCRETE = 93.75 cy



1. CONCRETE SHALL BE CLASS B
2. HEADWALL IS PERPENDICULAR TO THE CONCRETE CHANNEL
3. SEE CDOT STANDARD PLANS M-601-10 & 20 FOR TYPICAL BAR LAYOUT AND WINGWALL DETAILS
4. REINFORCING STEEL SHALL BE GRADE 60
5. WINGWALLFOOTINGS AND FLOOR SHALL BE POURED MONOLITHICALLY
6. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4 IN.
7. ALL REINFORCING BARS SHALL HAVE A 2 INCH MINIMUM CLEARANCE
8. MIN SPICE LENGTH FOR #4 BARS SHALL BE 1' 3"
9. MIN SPICE LENGTH FOR #5 BARS SHALL BE 1' 7"
10. ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE CONCRETE IS POURED



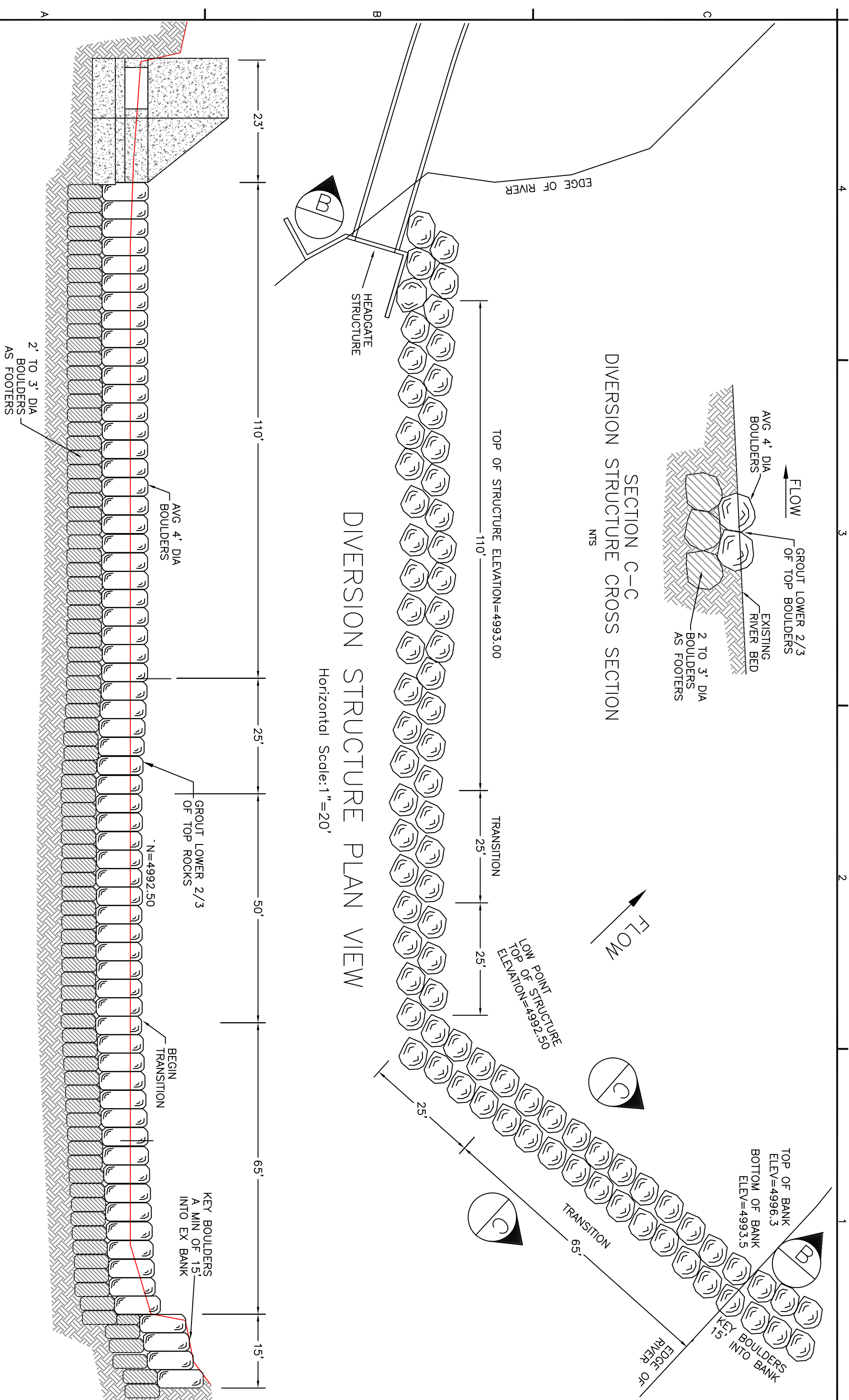
**CRANE
ASSOCIATES**
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Hotchkiss, Colorado 81419
Phone (970) 261-5043
jeffcrane@paonia.com

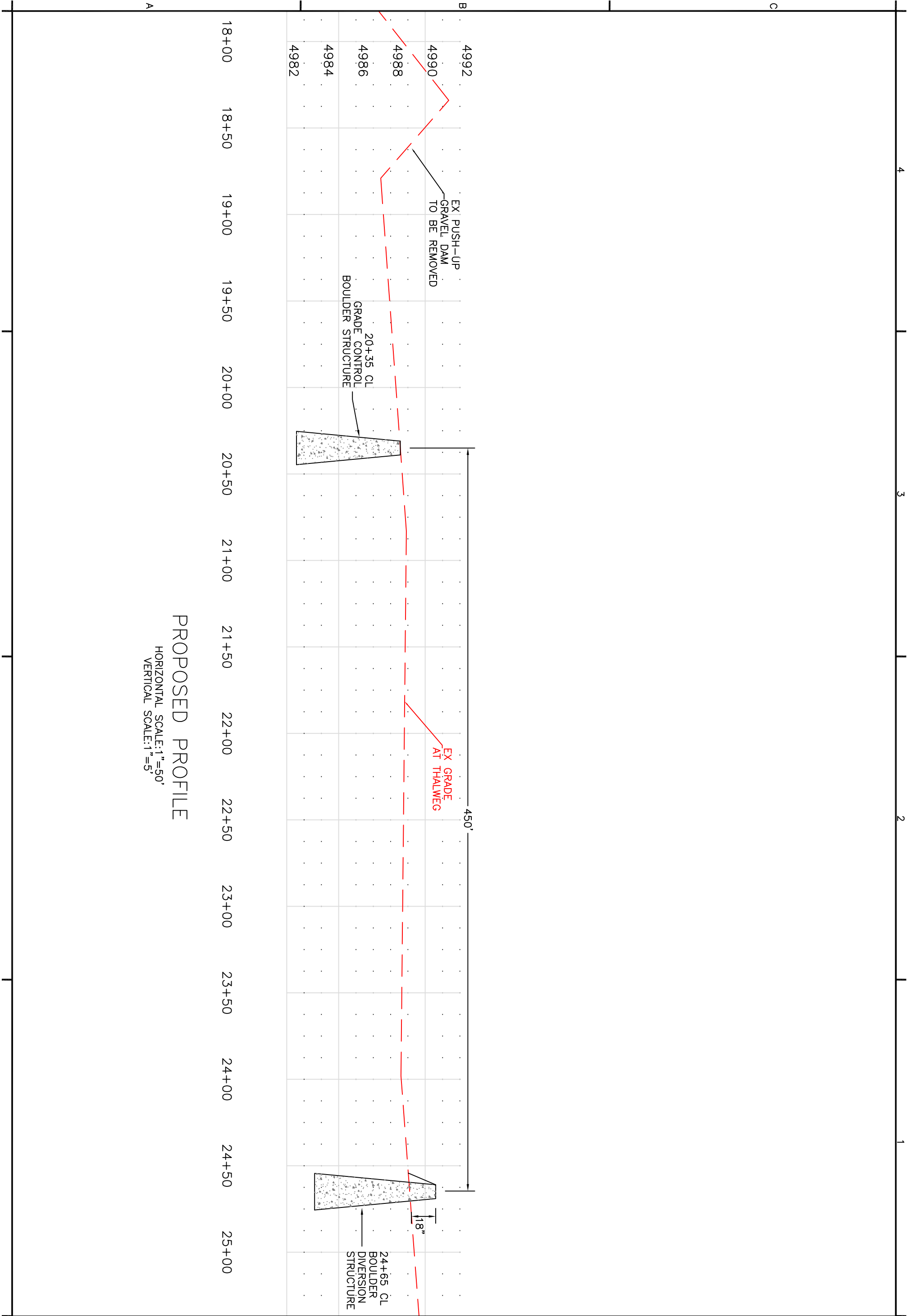
RELIEF DITCH RECONSTRUCTION
DESIGN ALTERNATIVE
GUNNISON RIVER
DELTA COUNTY, COLORADO
HEADGATE DETAILS

Sheet
reference
number:

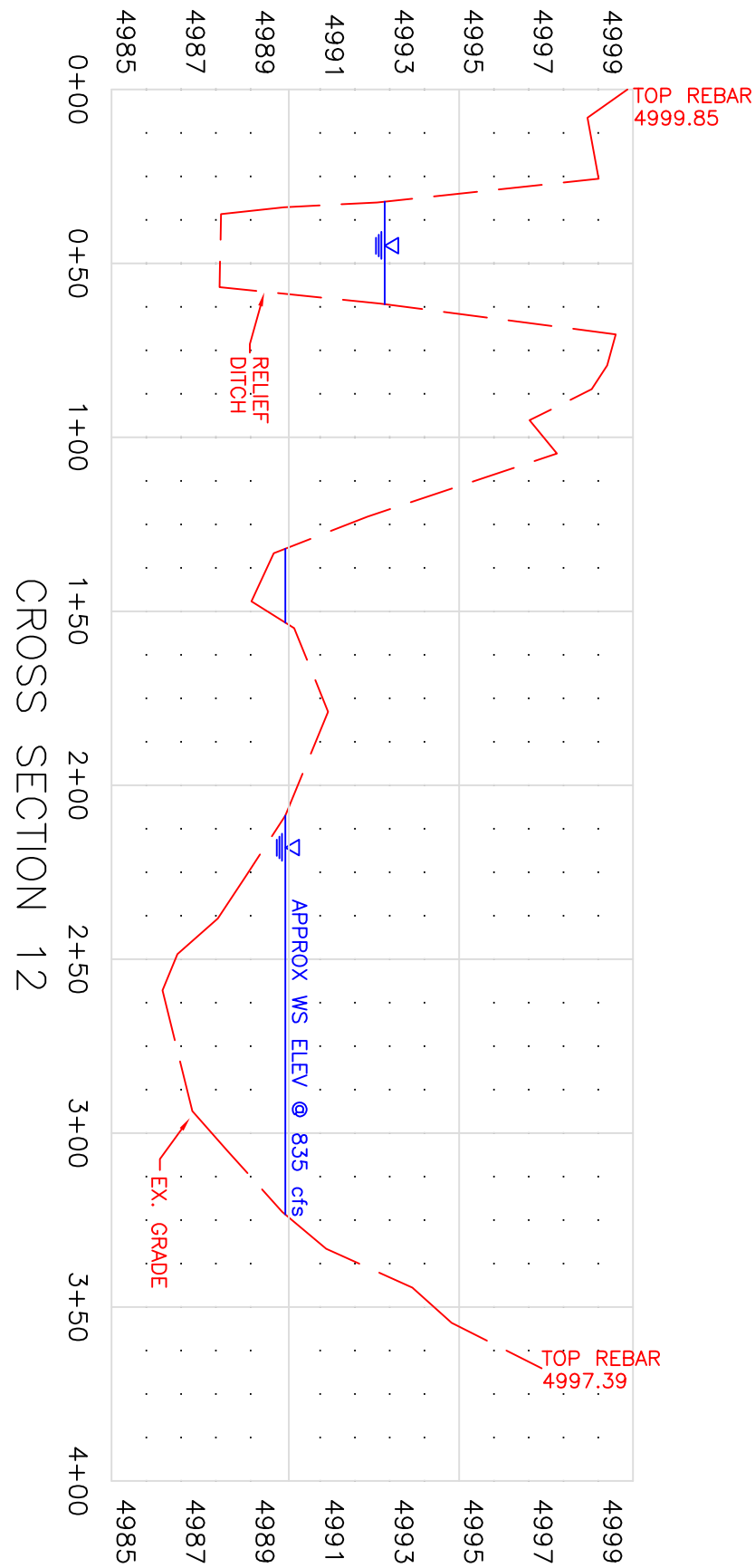
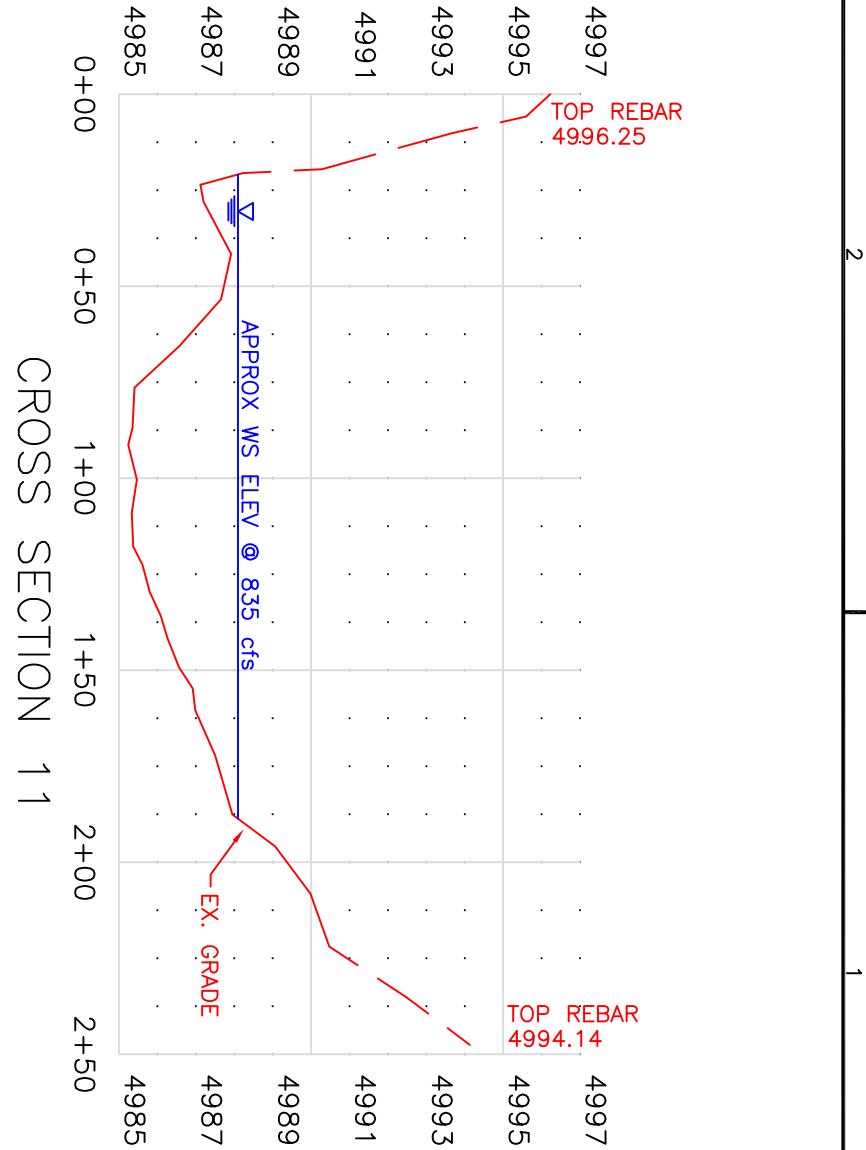
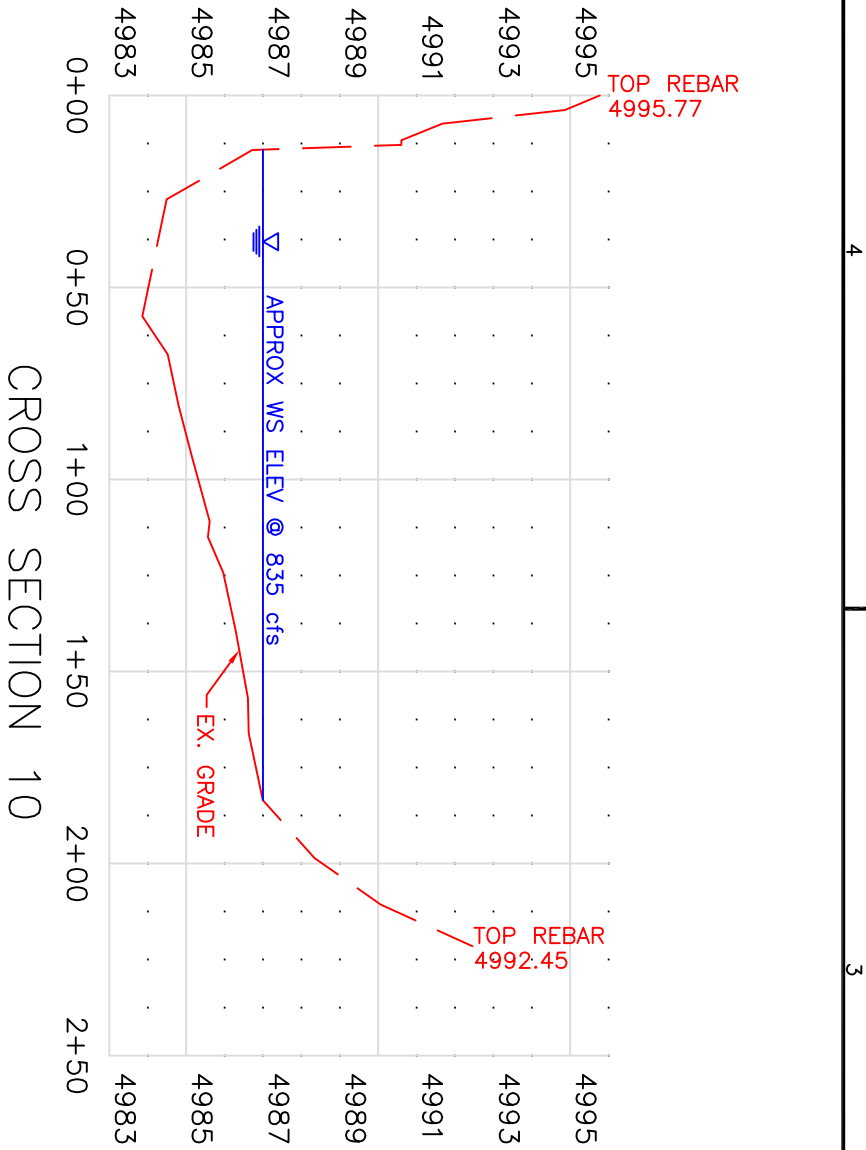
Sheet 6 of 8

UPDATE

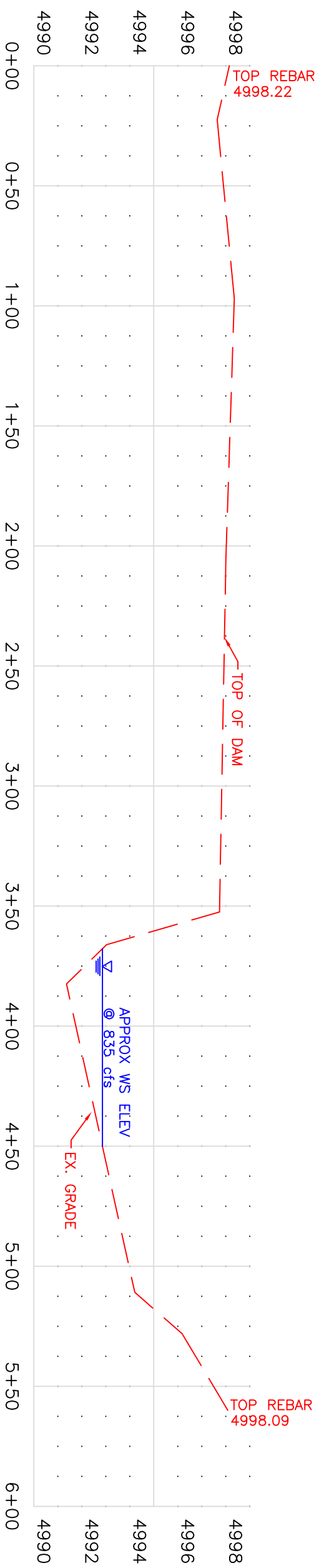
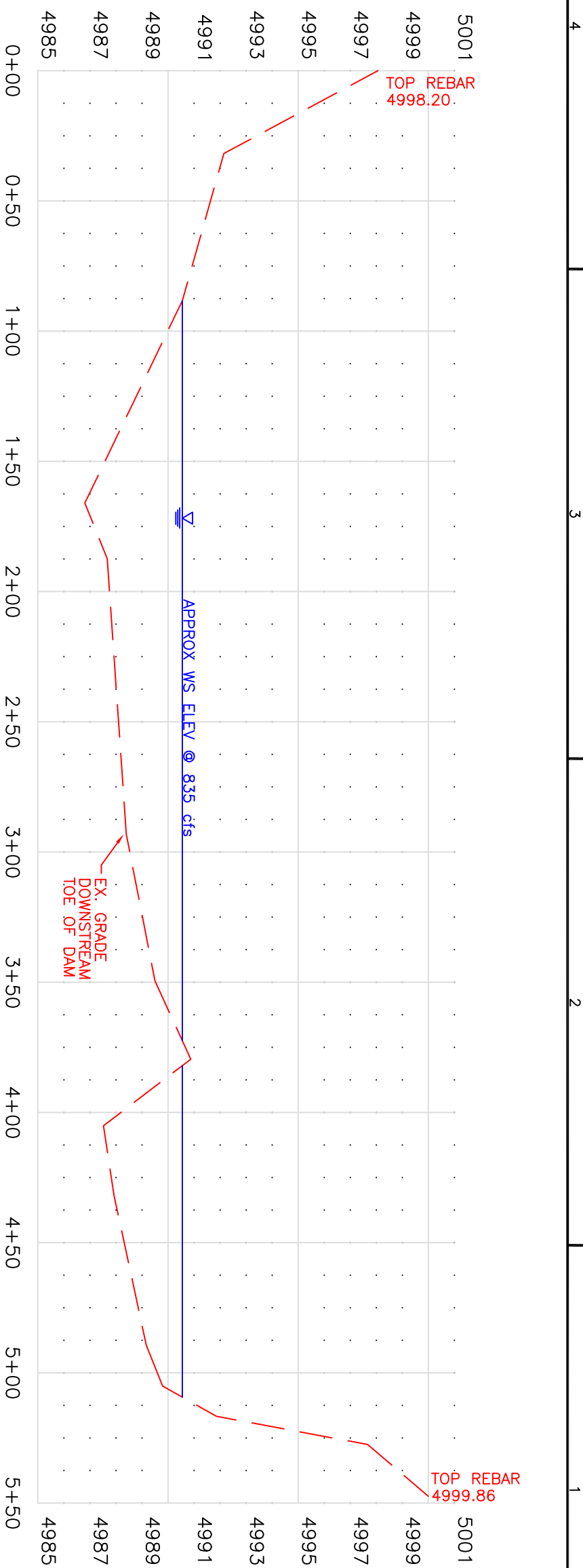
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|---|--|--|----------------------------|-------------|---|----------|
| Sheet reference number: Sheet 8 of 8 | RELIEF DITCH RECONSTRUCTION GUNNISON RIVER DELTA COUNTY, COLORADO DESIGN ALTERNATIVE 3 CHANNEL PROFILE | CRANE ASSOCIATES 29163 Stingly Gulch Road Hotchkiss, Colorado 81419 Phone (970) 261-5043 jeffcrane@paonia.com | Designed by: JEFF CRANE | | Date: Aug, 2010 | Rev. |
| | | | Dwn by: JPC | Ckd by: | Design file no: | |
| | | | Reviewed by: | | Drawing Code: | |
| | | | Submitted by: | | File name: Plot date: Plot scale: | |
| | | | Symbol | Description | Date | Approved |



Horizontal Scale 1" = 50 ft
Vertical Scale 1" = 5 ft



Horizontal Scale 1" = 50 ft
Vertical Scale 1" = 5 ft

Vertical Scale 1" = 5 ft

| | | | |
|----------------------------|---------|---|------|
| Designed by: JEFF CRANE | | Date: Aug, 2010 | Rev. |
| Dwn by: JPC | Ckd by: | Design file no: | |
| Reviewed by: | | Drawing Code: | |
| Submitted by: _____ | | File name: Plot date: Plot scale: | |

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| Design file no: | |
| Drawing Code: | |
| File name: | |
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| Plot scale: | |

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| Dwn by: JPC | Ckd by: |
| Reviewed by: | |
| Submitted by: | |

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| Dwn by: JPC | Ckd by: |
| Reviewed by: | |
| Submitted by: | |

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| Dwn by: JPC | Ckd by: |
| Reviewed by: | |
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| Plot date: | |
| Plot scale: | |

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RELIEF DITCH RECONSTRUCTION
DESIGN ALTERNATIVE
GUNNISON RIVER
DELTA COUNTY, COLORADO
RIVER CROSS SECTIONS

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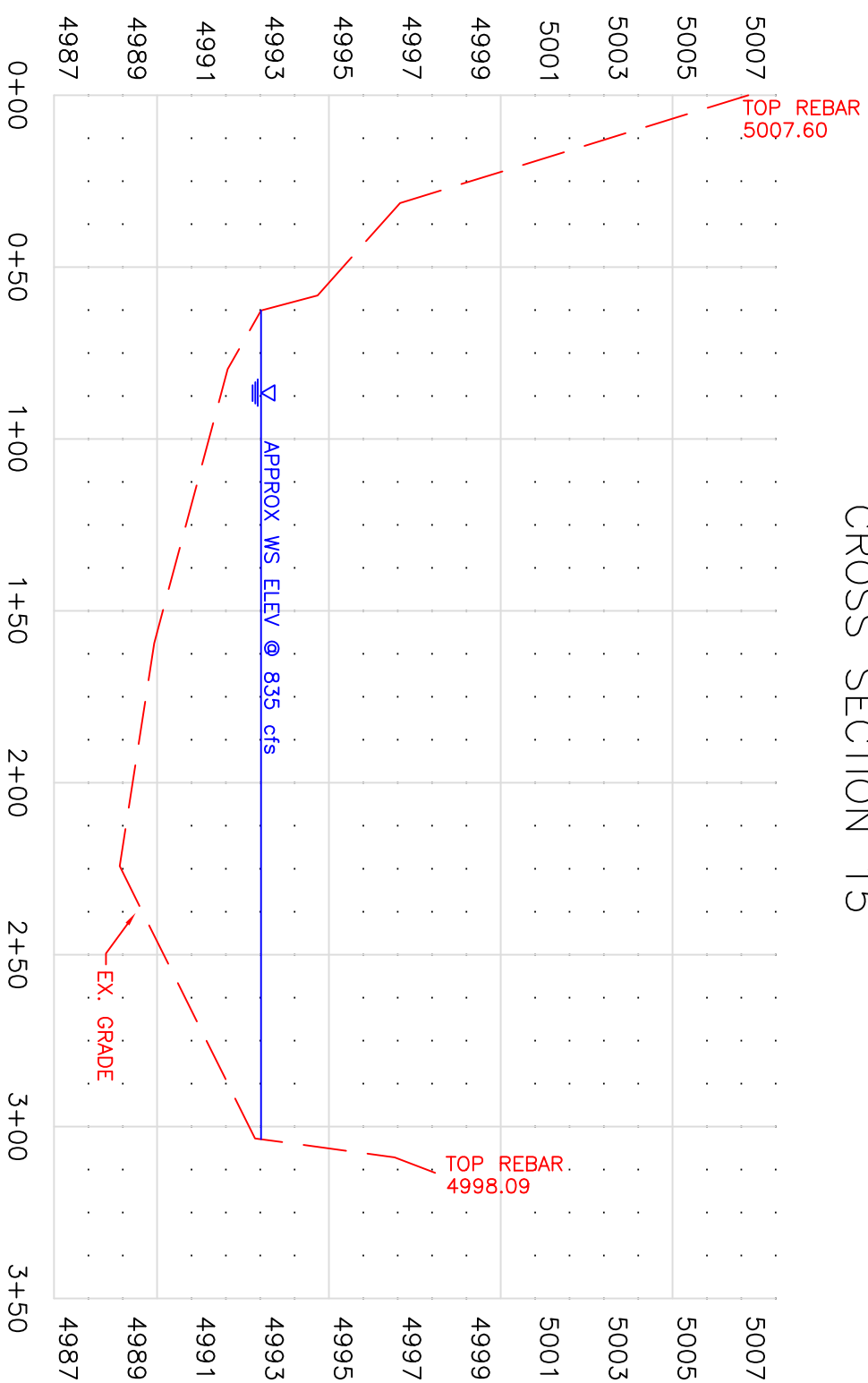
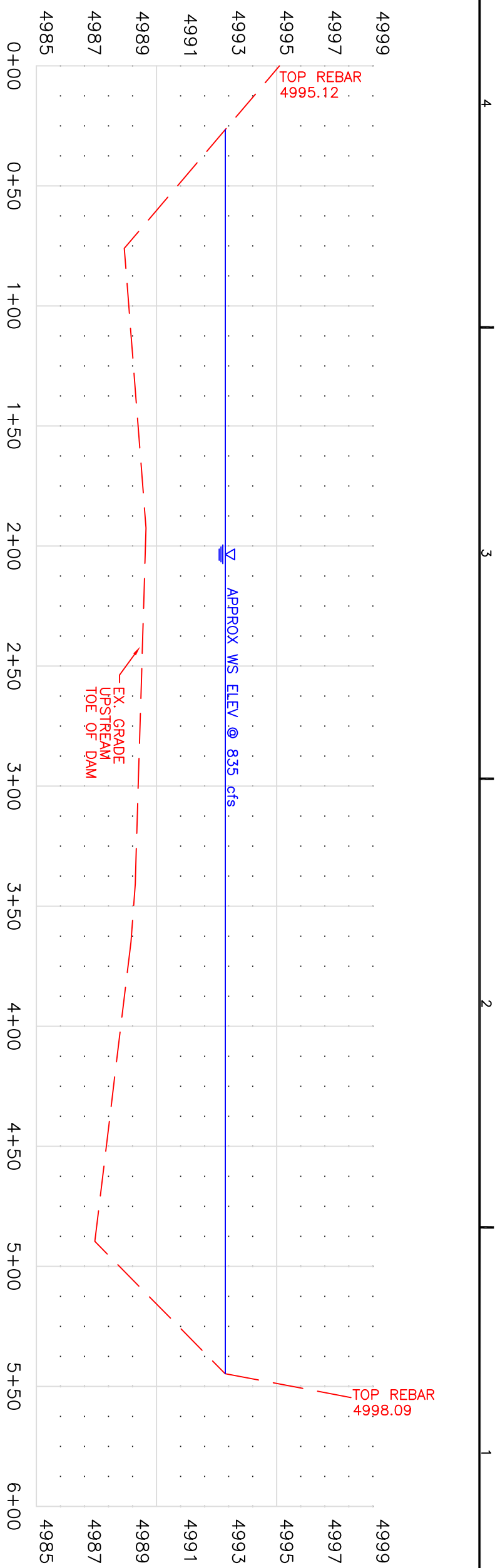
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Sheet
reference
number:Sheet 1 of


UPDATE



CROSS SECTION 16
Horizontal Scale 1" = 50 ft
Vertical Scale 1" = 5 ft

Vertical Scale 1" = 5 ft

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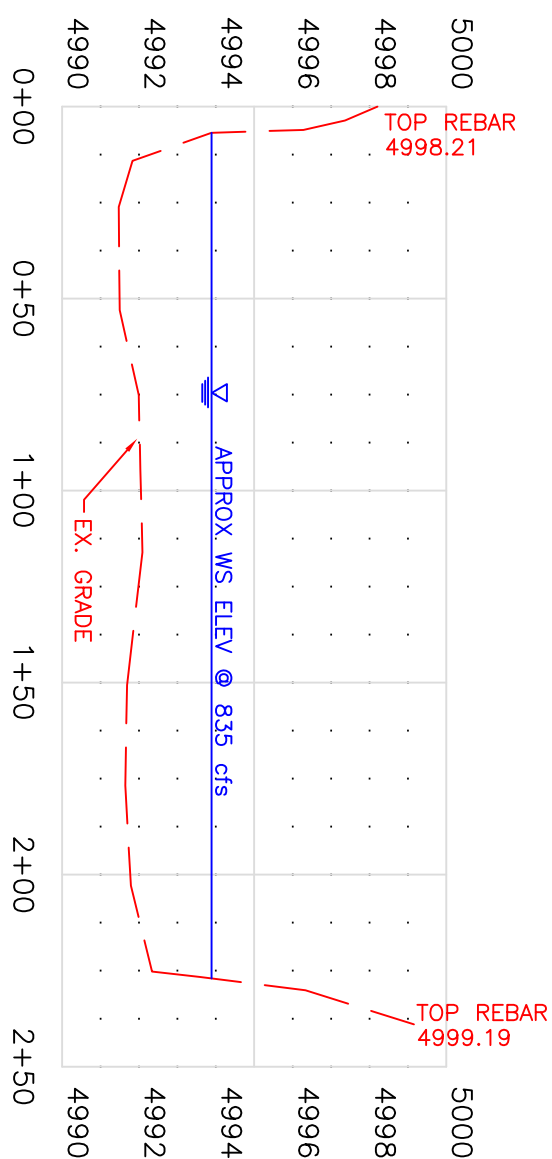
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| Designed by: JEFF CRANE | | Date: Aug, 2010 | Rev.  |
| Dwn by: JPC | Ckd by: | Design file no: | |
| Reviewed by: | | Drawing Code: | |
| Submitted by: _____ | | File name: Plot date: Plot scale: | |

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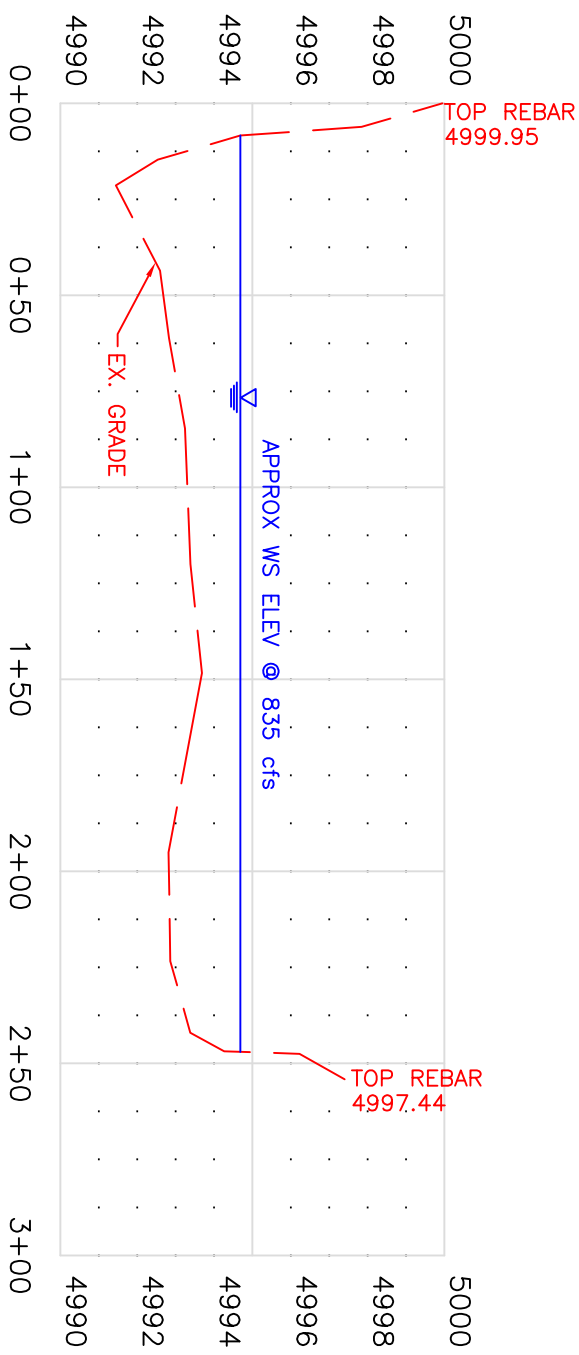
RELIEF DITCH RECONSTRUCTION
DESIGN ALTERNATIVE
GUNNISON RIVER
DELTA COUNTY, COLORADO
RIVER CROSS SECTIONS

Sheet
reference
number:
Sheet 1 of

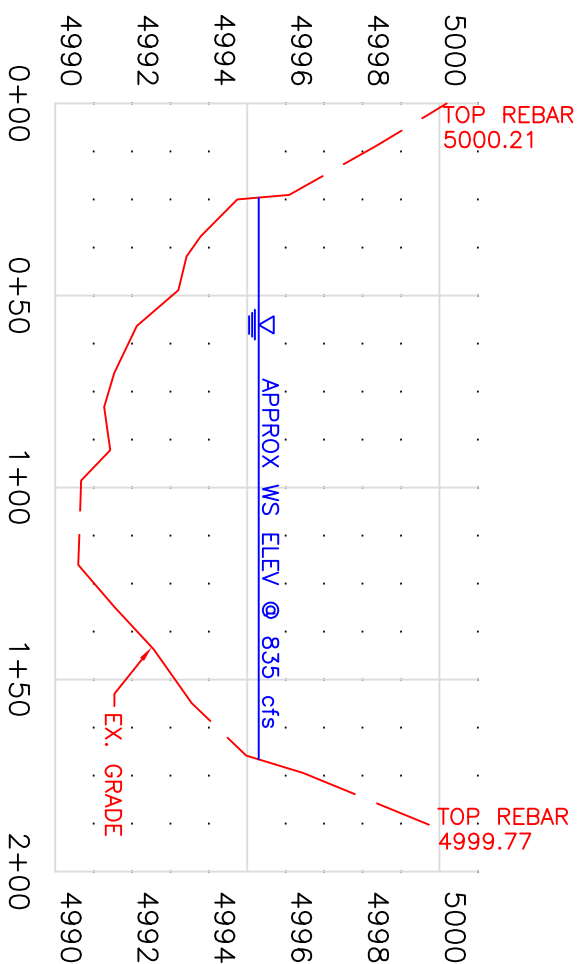
UPDATE



CROSS SECTION 18



CROSS SECTION 19



CROSS SECTION 20

Horizontal Scale 1" = 50 ft
Vertical Scale 1" = 5 ft

HEC-RAS Plan: Plan 01 River: Gunnison Reach: Relief Ditch

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|---------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Relief Ditch | 20 | PF 1 | 350.00 | 4990.60 | 4994.35 | | 4994.37 | 0.000288 | 1.13 | 310.76 | 134.77 | 0.13 |
| Relief Ditch | 20 | PF 2 | 650.00 | 4990.60 | 4995.01 | | 4995.05 | 0.000459 | 1.61 | 403.55 | 145.13 | 0.17 |
| Relief Ditch | 20 | PF 3 | 1200.00 | 4990.60 | 4995.87 | | 4995.95 | 0.000656 | 2.27 | 529.30 | 148.51 | 0.21 |
| Relief Ditch | 20 | PF 4 | 3460.00 | 4990.60 | 4998.10 | | 4998.35 | 0.001071 | 3.98 | 882.16 | 168.62 | 0.29 |
| Relief Ditch | 20 | PF 5 | 4800.00 | 4990.60 | 4999.07 | | 4999.41 | 0.001209 | 4.69 | 1050.36 | 178.34 | 0.32 |
| Relief Ditch | 20 | PF 6 | 7400.00 | 4990.60 | 5000.63 | | 5001.13 | 0.001390 | 5.78 | 1338.02 | 187.80 | 0.35 |
| Relief Ditch | 20 | PF 7 | 11600.00 | 4990.60 | 5002.25 | | 5003.08 | 0.001818 | 7.45 | 1642.56 | 187.80 | 0.42 |
| Relief Ditch | 20 | PF 8 | 21200.00 | 4990.60 | 5005.12 | | 5006.70 | 0.002500 | 10.35 | 2180.92 | 187.80 | 0.51 |
| Relief Ditch | 19 | PF 1 | 350.00 | 4991.45 | 4993.83 | 4993.35 | 4993.88 | 0.003256 | 1.87 | 186.92 | 233.48 | 0.37 |
| Relief Ditch | 19 | PF 2 | 650.00 | 4991.45 | 4994.41 | | 4994.47 | 0.001846 | 2.01 | 323.56 | 237.52 | 0.30 |
| Relief Ditch | 19 | PF 3 | 1200.00 | 4991.45 | 4995.21 | | 4995.30 | 0.001336 | 2.33 | 516.05 | 239.05 | 0.28 |
| Relief Ditch | 19 | PF 4 | 3460.00 | 4991.45 | 4997.38 | | 4997.55 | 0.001096 | 3.35 | 1040.10 | 247.41 | 0.28 |
| Relief Ditch | 19 | PF 5 | 4800.00 | 4991.45 | 4998.34 | | 4998.56 | 0.001076 | 3.79 | 1278.59 | 249.35 | 0.29 |
| Relief Ditch | 19 | PF 6 | 7400.00 | 4991.45 | 4999.90 | | 5000.21 | 0.001074 | 4.50 | 1670.32 | 253.95 | 0.30 |
| Relief Ditch | 19 | PF 7 | 11600.00 | 4991.45 | 5001.35 | | 5001.86 | 0.001382 | 5.80 | 2038.56 | 254.10 | 0.35 |
| Relief Ditch | 19 | PF 8 | 21200.00 | 4991.45 | 5004.05 | | 5005.02 | 0.001789 | 7.96 | 2725.79 | 254.10 | 0.42 |
| Relief Ditch | 18 | PF 1 | 350.00 | 4991.47 | 4993.32 | | 4993.34 | 0.000476 | 1.08 | 323.72 | 217.47 | 0.16 |
| Relief Ditch | 18 | PF 2 | 650.00 | 4991.47 | 4993.97 | | 4994.00 | 0.000495 | 1.39 | 466.04 | 220.30 | 0.17 |
| Relief Ditch | 18 | PF 3 | 1200.00 | 4991.47 | 4994.79 | | 4994.84 | 0.000566 | 1.86 | 647.39 | 221.59 | 0.19 |
| Relief Ditch | 18 | PF 4 | 3460.00 | 4991.47 | 4996.91 | | 4997.06 | 0.000767 | 3.10 | 1121.65 | 227.24 | 0.24 |
| Relief Ditch | 18 | PF 5 | 4800.00 | 4991.47 | 4997.85 | | 4998.05 | 0.000834 | 3.62 | 1337.64 | 233.32 | 0.26 |
| Relief Ditch | 18 | PF 6 | 7400.00 | 4991.47 | 4999.37 | | 4999.68 | 0.000923 | 4.43 | 1698.53 | 239.00 | 0.28 |
| Relief Ditch | 18 | PF 7 | 11600.00 | 4991.47 | 5000.58 | | 5001.13 | 0.001369 | 5.96 | 1986.89 | 239.00 | 0.36 |
| Relief Ditch | 18 | PF 8 | 21200.00 | 4991.47 | 5002.84 | | 5003.97 | 0.002100 | 8.61 | 2526.86 | 239.00 | 0.46 |
| Relief Ditch | 17 | PF 1 | 350.00 | 4988.60 | 4993.28 | | 4993.29 | 0.000059 | 0.62 | 563.13 | 181.18 | 0.06 |
| Relief Ditch | 17 | PF 2 | 650.00 | 4988.60 | 4993.90 | | 4993.92 | 0.000112 | 0.96 | 676.32 | 181.90 | 0.09 |
| Relief Ditch | 17 | PF 3 | 1200.00 | 4988.60 | 4994.68 | | 4994.72 | 0.000204 | 1.47 | 818.61 | 182.80 | 0.12 |
| Relief Ditch | 17 | PF 4 | 3460.00 | 4988.60 | 4996.69 | | 4996.82 | 0.000501 | 2.91 | 1193.26 | 200.58 | 0.20 |
| Relief Ditch | 17 | PF 5 | 4800.00 | 4988.60 | 4997.58 | | 4997.78 | 0.000620 | 3.53 | 1380.43 | 216.08 | 0.23 |
| Relief Ditch | 17 | PF 6 | 7400.00 | 4988.60 | 4999.04 | | 4999.35 | 0.000787 | 4.49 | 1710.18 | 234.50 | 0.27 |
| Relief Ditch | 17 | PF 7 | 11600.00 | 4988.60 | 5000.00 | | 5000.60 | 0.001341 | 6.28 | 1939.03 | 241.32 | 0.35 |
| Relief Ditch | 17 | PF 8 | 21200.00 | 4988.60 | 5001.68 | | 5003.06 | 0.002546 | 9.62 | 2353.52 | 253.21 | 0.50 |
| Relief Ditch | 16 | PF 1 | 350.00 | 4988.91 | 4993.26 | | 4993.27 | 0.000059 | 0.55 | 631.54 | 241.98 | 0.06 |
| Relief Ditch | 16 | PF 2 | 650.00 | 4988.91 | 4993.87 | | 4993.88 | 0.000101 | 0.83 | 779.99 | 244.44 | 0.08 |
| Relief Ditch | 16 | PF 3 | 1200.00 | 4988.91 | 4994.63 | | 4994.66 | 0.000169 | 1.25 | 966.75 | 247.51 | 0.11 |
| Relief Ditch | 16 | PF 4 | 3460.00 | 4988.91 | 4996.59 | | 4996.67 | 0.000367 | 2.39 | 1473.69 | 271.65 | 0.17 |
| Relief Ditch | 16 | PF 5 | 4800.00 | 4988.91 | 4997.47 | | 4997.59 | 0.000440 | 2.87 | 1717.99 | 280.86 | 0.19 |
| Relief Ditch | 16 | PF 6 | 7400.00 | 4988.91 | 4998.92 | | 4999.11 | 0.000536 | 3.61 | 2130.55 | 287.72 | 0.22 |
| Relief Ditch | 16 | PF 7 | 11600.00 | 4988.91 | 4999.80 | | 5000.19 | 0.000925 | 5.07 | 2386.74 | 290.46 | 0.30 |
| Relief Ditch | 16 | PF 8 | 21200.00 | 4988.91 | 5001.33 | | 5002.25 | 0.001809 | 7.86 | 2833.70 | 295.19 | 0.42 |
| Relief Ditch | 15 | PF 1 | 350.00 | 4987.43 | 4993.26 | | 4993.26 | 0.000003 | 0.17 | 2097.74 | 523.64 | 0.01 |
| Relief Ditch | 15 | PF 2 | 650.00 | 4987.43 | 4993.88 | | 4993.88 | 0.000007 | 0.27 | 2420.93 | 532.01 | 0.02 |
| Relief Ditch | 15 | PF 3 | 1200.00 | 4987.43 | 4994.64 | | 4994.64 | 0.000014 | 0.42 | 2831.46 | 542.46 | 0.03 |
| Relief Ditch | 15 | PF 4 | 3460.00 | 4987.43 | 4996.62 | | 4996.63 | 0.000039 | 0.88 | 3919.64 | 551.90 | 0.06 |
| Relief Ditch | 15 | PF 5 | 4800.00 | 4987.43 | 4997.52 | | 4997.54 | 0.000051 | 1.09 | 4416.80 | 553.61 | 0.07 |
| Relief Ditch | 15 | PF 6 | 7400.00 | 4987.43 | 4999.00 | | 4999.03 | 0.000069 | 1.42 | 5237.98 | 554.70 | 0.08 |
| Relief Ditch | 15 | PF 7 | 11600.00 | 4987.43 | 4999.98 | | 5000.04 | 0.000123 | 2.02 | 5778.05 | 554.70 | 0.11 |
| Relief Ditch | 15 | PF 8 | 21200.00 | 4987.43 | 5001.76 | | 5001.91 | 0.000245 | 3.15 | 6768.55 | 554.70 | 0.16 |
| Relief Ditch | 14 | PF 1 | 300.00 | 4991.36 | 4992.87 | 4992.87 | 4993.23 | 0.023401 | 4.82 | 62.23 | 82.62 | 0.98 |
| Relief Ditch | 14 | PF 2 | 600.00 | 4991.36 | 4993.33 | 4993.33 | 4993.83 | 0.021756 | 5.63 | 106.61 | 106.21 | 0.99 |
| Relief Ditch | 14 | PF 3 | 1150.00 | 4991.36 | 4993.93 | 4993.93 | 4994.58 | 0.019952 | 6.47 | 177.74 | 134.57 | 0.99 |
| Relief Ditch | 14 | PF 4 | 3410.00 | 4991.36 | 4995.32 | 4995.32 | 4996.51 | 0.016258 | 8.74 | 390.23 | 161.19 | 0.99 |
| Relief Ditch | 14 | PF 5 | 4750.00 | 4991.36 | 4995.95 | 4995.95 | 4997.39 | 0.015275 | 9.62 | 493.90 | 168.51 | 0.99 |
| Relief Ditch | 14 | PF 6 | 7350.00 | 4991.36 | 4996.97 | 4996.97 | 4998.84 | 0.013805 | 10.97 | 674.16 | 186.68 | 0.98 |
| Relief Ditch | 14 | PF 7 | 11550.00 | 4991.36 | 4998.71 | 4998.71 | 4999.91 | 0.017616 | 9.01 | 1607.19 | 615.10 | 1.03 |
| Relief Ditch | 14 | PF 8 | 21150.00 | 4991.36 | 4999.95 | 4999.94 | 5001.72 | 0.014725 | 10.89 | 2394.50 | 640.00 | 1.01 |
| Relief Ditch | 13 | PF 1 | 300.00 | 4986.81 | 4989.35 | | 4989.36 | 0.000368 | 0.80 | 376.60 | 331.04 | 0.13 |
| Relief Ditch | 13 | PF 2 | 600.00 | 4986.81 | 4990.17 | | 4990.18 | 0.000261 | 0.89 | 675.66 | 390.07 | 0.12 |
| Relief Ditch | 13 | PF 3 | 1150.00 | 4986.81 | 4991.09 | | 4991.11 | 0.000244 | 1.09 | 1058.98 | 442.97 | 0.12 |
| Relief Ditch | 13 | PF 4 | 3410.00 | 4986.81 | 4993.22 | | 4993.26 | 0.000259 | 1.69 | 2075.88 | 493.19 | 0.14 |
| Relief Ditch | 13 | PF 5 | 4750.00 | 4986.81 | 4994.15 | | 4994.20 | 0.000267 | 1.94 | 2535.08 | 499.89 | 0.15 |
| Relief Ditch | 13 | PF 6 | 7350.00 | 4986.81 | 4995.66 | | 4995.74 | 0.000276 | 2.32 | 3298.79 | 510.83 | 0.15 |
| Relief Ditch | 13 | PF 7 | 11550.00 | 4986.81 | 4997.65 | | 4997.76 | 0.000288 | 2.80 | 4329.04 | 525.24 | 0.16 |
| Relief Ditch | 13 | PF 8 | 21150.00 | 4986.81 | 5000.99 | | 5001.19 | 0.000320 | 3.64 | 6138.07 | 547.30 | 0.18 |
| Relief Ditch | 12 | PF 1 | 300.00 | 4986.47 | 4988.92 | 4987.94 | 4989.00 | 0.002261 | 2.35 | 127.61 | 86.15 | 0.34 |
| Relief Ditch | 12 | PF 2 | 600.00 | 4986.47 | 4989.77 | 4988.49 | 4989.89 | 0.002523 | 2.74 | 219.00 | 127.91 | 0.37 |
| Relief Ditch | 12 | PF 3 | 1150.00 | 4986.47 | 4990.64 | 4989.30 | 4990.82 | 0.002829 | 3.35 | 346.16 | 170.44 | 0.40 |
| Relief Ditch | 12 | PF 4 | 3410.00 | 4986.47 | 4992.62 | 4991.00 | 4992.95 | 0.002599 | 4.68 | 752.41 | 217.82 | 0.43 |
| Relief Ditch | 12 | PF 5 | 4750.00 | 4986.47 | 4993.47 | 4991.60 | 4993.88 | 0.002509 | 5.26 | 938.76 | 224.41 | 0.43 |
| Relief Ditch | 12 | PF 6 | 7350.00 | 4986.47 | 4994.83 | 4992.48 | 4995.40 | 0.002448 | 6.18 | 1255.40 | 240.14 | 0.45 |
| Relief Ditch | 12 | PF 7 | 11550.00 | 4986.47 | 4996.62 | 4993.69 | 4997.40 | 0.002400 | 7.29 | 1698.44 | 255.14 | 0.46 |
| Relief Ditch | 12 | PF 8 | 21150.00 | 4986.47 | 4999.91 | 4996.03 | 5000.82 | 0.001911 | 8.24 | 3025.40 | 367.60 | 0.44 |

HEC-RAS Plan: Plan 01 River: Gunnison Reach: Relief Ditch (Continued)

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|---------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Relief Ditch | 11 | PF 1 | 300.00 | 4985.24 | 4987.40 | | 4987.46 | 0.001778 | 1.90 | 157.91 | 122.58 | 0.29 |
| Relief Ditch | 11 | PF 2 | 600.00 | 4985.24 | 4988.13 | | 4988.21 | 0.001895 | 2.25 | 266.52 | 168.17 | 0.32 |
| Relief Ditch | 11 | PF 3 | 1150.00 | 4985.24 | 4988.89 | | 4989.02 | 0.001942 | 2.90 | 396.48 | 174.38 | 0.34 |
| Relief Ditch | 11 | PF 4 | 3410.00 | 4985.24 | 4990.75 | | 4991.09 | 0.002291 | 4.68 | 746.39 | 205.52 | 0.41 |
| Relief Ditch | 11 | PF 5 | 4750.00 | 4985.24 | 4991.56 | | 4992.00 | 0.002381 | 5.38 | 916.34 | 213.07 | 0.43 |
| Relief Ditch | 11 | PF 6 | 7350.00 | 4985.24 | 4992.88 | | 4993.50 | 0.002490 | 6.44 | 1204.64 | 225.71 | 0.45 |
| Relief Ditch | 11 | PF 7 | 11550.00 | 4985.24 | 4994.61 | | 4995.48 | 0.002577 | 7.71 | 1609.39 | 239.53 | 0.48 |
| Relief Ditch | 11 | PF 8 | 21150.00 | 4985.24 | 4997.70 | | 4999.06 | 0.002649 | 9.72 | 2367.28 | 247.60 | 0.52 |
| Relief Ditch | 10 | PF 1 | 300.00 | 4983.86 | 4985.83 | 4985.29 | 4985.95 | 0.005004 | 2.79 | 107.38 | 101.59 | 0.48 |
| Relief Ditch | 10 | PF 2 | 600.00 | 4983.86 | 4986.47 | 4985.79 | 4986.64 | 0.005005 | 3.31 | 181.51 | 133.43 | 0.50 |
| Relief Ditch | 10 | PF 3 | 1150.00 | 4983.86 | 4987.19 | 4986.40 | 4987.42 | 0.005008 | 3.90 | 295.14 | 171.66 | 0.52 |
| Relief Ditch | 10 | PF 4 | 3410.00 | 4983.86 | 4988.76 | 4987.78 | 4989.32 | 0.005009 | 6.00 | 580.42 | 188.59 | 0.58 |
| Relief Ditch | 10 | PF 5 | 4750.00 | 4983.86 | 4989.48 | 4988.35 | 4990.19 | 0.005001 | 6.82 | 716.64 | 194.07 | 0.60 |
| Relief Ditch | 10 | PF 6 | 7350.00 | 4983.86 | 4990.64 | 4989.32 | 4991.62 | 0.005001 | 8.07 | 946.96 | 201.68 | 0.62 |
| Relief Ditch | 10 | PF 7 | 11550.00 | 4983.86 | 4992.18 | 4990.66 | 4993.56 | 0.005001 | 9.60 | 1267.99 | 213.53 | 0.65 |
| Relief Ditch | 10 | PF 8 | 21150.00 | 4983.86 | 4994.94 | 4993.11 | 4997.08 | 0.005000 | 12.07 | 1865.34 | 218.04 | 0.69 |

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|---------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Relief Ditch | 20 | PF 1 | 350.00 | 4990.60 | 4994.39 | | 4994.41 | 0.000275 | 1.11 | 315.78 | 135.50 | 0.13 |
| Relief Ditch | 20 | PF 2 | 650.00 | 4990.60 | 4995.03 | | 4995.07 | 0.000447 | 1.60 | 406.96 | 145.22 | 0.17 |
| Relief Ditch | 20 | PF 3 | 1200.00 | 4990.60 | 4995.85 | | 4995.93 | 0.000665 | 2.28 | 527.19 | 148.45 | 0.21 |
| Relief Ditch | 20 | PF 4 | 3460.00 | 4990.60 | 4997.93 | | 4998.19 | 0.001189 | 4.11 | 852.92 | 166.92 | 0.31 |
| Relief Ditch | 20 | PF 5 | 4800.00 | 4990.60 | 4998.79 | | 4999.17 | 0.001396 | 4.90 | 1001.54 | 175.55 | 0.34 |
| Relief Ditch | 20 | PF 6 | 7400.00 | 4990.60 | 5000.21 | | 5000.78 | 0.001669 | 6.12 | 1260.78 | 190.87 | 0.38 |
| Relief Ditch | 20 | PF 7 | 11600.00 | 4990.60 | 5002.09 | | 5002.95 | 0.001920 | 7.57 | 1642.64 | 214.97 | 0.43 |
| Relief Ditch | 20 | PF 8 | 21200.00 | 4990.60 | 5005.41 | | 5006.80 | 0.002190 | 9.83 | 2426.52 | 257.47 | 0.48 |
| Relief Ditch | 19 | PF 1 | 350.00 | 4991.45 | 4993.94 | | 4993.98 | 0.002116 | 1.64 | 213.08 | 234.38 | 0.30 |
| Relief Ditch | 19 | PF 2 | 650.00 | 4991.45 | 4994.47 | | 4994.53 | 0.001593 | 1.92 | 338.30 | 237.73 | 0.28 |
| Relief Ditch | 19 | PF 3 | 1200.00 | 4991.45 | 4995.18 | | 4995.26 | 0.001413 | 2.37 | 507.42 | 239.01 | 0.29 |
| Relief Ditch | 19 | PF 4 | 3460.00 | 4991.45 | 4997.04 | | 4997.24 | 0.001447 | 3.64 | 955.06 | 245.24 | 0.32 |
| Relief Ditch | 19 | PF 5 | 4800.00 | 4991.45 | 4997.83 | | 4998.10 | 0.001513 | 4.20 | 1152.16 | 250.43 | 0.34 |
| Relief Ditch | 19 | PF 6 | 7400.00 | 4991.45 | 4999.20 | | 4999.59 | 0.001534 | 5.00 | 1504.56 | 262.75 | 0.36 |
| Relief Ditch | 19 | PF 7 | 11600.00 | 4991.45 | 5001.12 | | 5001.66 | 0.001494 | 5.92 | 2025.38 | 281.03 | 0.37 |
| Relief Ditch | 19 | PF 8 | 21200.00 | 4991.45 | 5004.56 | | 5005.38 | 0.001449 | 7.38 | 3051.01 | 315.03 | 0.38 |
| Relief Ditch | 18 | PF 1 | 350.00 | 4991.47 | 4993.68 | | 4993.69 | 0.000234 | 0.87 | 401.85 | 219.15 | 0.11 |
| Relief Ditch | 18 | PF 2 | 650.00 | 4991.47 | 4994.11 | | 4994.14 | 0.000399 | 1.31 | 497.03 | 220.52 | 0.15 |
| Relief Ditch | 18 | PF 3 | 1200.00 | 4991.47 | 4994.72 | | 4994.78 | 0.000612 | 1.90 | 632.13 | 221.48 | 0.20 |
| Relief Ditch | 18 | PF 4 | 3460.00 | 4991.47 | 4996.37 | | 4996.56 | 0.001119 | 3.48 | 999.38 | 224.33 | 0.29 |
| Relief Ditch | 18 | PF 5 | 4800.00 | 4991.47 | 4997.08 | | 4997.35 | 0.001324 | 4.17 | 1159.44 | 228.13 | 0.32 |
| Relief Ditch | 18 | PF 6 | 7400.00 | 4991.47 | 4998.37 | | 4998.78 | 0.001497 | 5.13 | 1460.13 | 237.69 | 0.35 |
| Relief Ditch | 18 | PF 7 | 11600.00 | 4991.47 | 5000.24 | | 5000.83 | 0.001564 | 6.21 | 1932.37 | 274.32 | 0.38 |
| Relief Ditch | 18 | PF 8 | 21200.00 | 4991.47 | 5003.70 | | 5004.58 | 0.001520 | 7.70 | 3038.32 | 365.15 | 0.39 |
| Relief Ditch | 17.4 | PF 1 | 350.00 | 4991.45 | 4993.61 | | 4993.63 | 0.000326 | 1.03 | 341.43 | 187.53 | 0.13 |
| Relief Ditch | 17.4 | PF 2 | 650.00 | 4991.45 | 4993.98 | | 4994.02 | 0.000627 | 1.58 | 412.57 | 193.83 | 0.19 |
| Relief Ditch | 17.4 | PF 3 | 1200.00 | 4991.45 | 4994.51 | | 4994.59 | 0.001075 | 2.32 | 516.34 | 202.68 | 0.26 |
| Relief Ditch | 17.4 | PF 4 | 3460.00 | 4991.45 | 4995.91 | | 4996.19 | 0.002241 | 4.23 | 818.33 | 227.47 | 0.39 |
| Relief Ditch | 17.4 | PF 5 | 4800.00 | 4991.45 | 4996.53 | | 4996.92 | 0.002607 | 5.00 | 962.90 | 243.49 | 0.43 |
| Relief Ditch | 17.4 | PF 6 | 7400.00 | 4991.45 | 4997.79 | | 4998.32 | 0.002515 | 5.87 | 1286.85 | 266.07 | 0.44 |
| Relief Ditch | 17.4 | PF 7 | 11600.00 | 4991.45 | 4999.74 | | 5000.40 | 0.002132 | 6.63 | 1835.43 | 297.62 | 0.43 |
| Relief Ditch | 17.4 | PF 8 | 21200.00 | 4991.45 | 5003.33 | | 5004.20 | 0.001715 | 7.75 | 3004.14 | 353.59 | 0.41 |
| Relief Ditch | 17.3 | PF 1 | 350.00 | 4992.50 | 4993.36 | 4993.32 | 4993.56 | 0.021945 | 3.53 | 99.03 | 199.83 | 0.88 |
| Relief Ditch | 17.3 | PF 2 | 650.00 | 4992.50 | 4993.57 | 4993.56 | 4993.90 | 0.023708 | 4.58 | 142.05 | 206.14 | 0.97 |
| Relief Ditch | 17.3 | PF 3 | 1200.00 | 4992.50 | 4993.91 | 4993.91 | 4994.40 | 0.022563 | 5.65 | 212.24 | 216.04 | 1.01 |
| Relief Ditch | 17.3 | PF 4 | 3460.00 | 4992.50 | 4994.92 | 4994.92 | 4995.88 | 0.018165 | 7.84 | 441.30 | 233.66 | 1.01 |
| Relief Ditch | 17.3 | PF 5 | 4800.00 | 4992.50 | 4995.79 | | 4996.64 | 0.010402 | 7.39 | 649.86 | 247.60 | 0.80 |
| Relief Ditch | 17.3 | PF 6 | 7400.00 | 4992.50 | 4997.34 | | 4998.12 | 0.005248 | 7.09 | 1051.58 | 267.36 | 0.62 |
| Relief Ditch | 17.3 | PF 7 | 11600.00 | 4992.50 | 4999.45 | | 5000.26 | 0.003193 | 7.28 | 1633.81 | 290.55 | 0.51 |
| Relief Ditch | 17.3 | PF 8 | 21200.00 | 4992.50 | 5003.13 | | 5004.10 | 0.002112 | 8.07 | 2812.10 | 349.62 | 0.45 |
| Relief Ditch | 17.1 | PF 1 | 350.00 | 4991.50 | 4992.03 | 4992.03 | 4992.30 | 0.028367 | 4.13 | 84.66 | 163.66 | 1.01 |
| Relief Ditch | 17.1 | PF 2 | 650.00 | 4991.50 | 4992.31 | 4992.31 | 4992.69 | 0.024275 | 5.00 | 129.88 | 167.68 | 1.00 |
| Relief Ditch | 17.1 | PF 3 | 1200.00 | 4991.50 | 4992.71 | 4992.71 | 4993.28 | 0.021243 | 6.06 | 198.03 | 173.56 | 1.00 |
| Relief Ditch | 17.1 | PF 4 | 3460.00 | 4991.50 | 4994.61 | | 4995.24 | 0.006690 | 6.39 | 541.64 | 182.71 | 0.65 |
| Relief Ditch | 17.1 | PF 5 | 4800.00 | 4991.50 | 4995.52 | | 4996.23 | 0.005314 | 6.76 | 709.59 | 183.77 | 0.61 |
| Relief Ditch | 17.1 | PF 6 | 7400.00 | 4991.50 | 4997.00 | | 4997.87 | 0.004307 | 7.53 | 992.84 | 207.27 | 0.57 |
| Relief Ditch | 17.1 | PF 7 | 11600.00 | 4991.50 | 4998.97 | | 5000.06 | 0.003568 | 8.46 | 1433.13 | 242.75 | 0.55 |
| Relief Ditch | 17.1 | PF 8 | 21200.00 | 4991.50 | 5002.57 | | 5003.94 | 0.002758 | 9.71 | 2454.37 | 324.52 | 0.52 |
| Relief Ditch | 17 | PF 1 | 350.00 | 4988.60 | 4991.39 | | 4991.42 | 0.000877 | 1.47 | 238.51 | 160.56 | 0.21 |
| Relief Ditch | 17 | PF 2 | 650.00 | 4988.60 | 4991.98 | | 4992.03 | 0.001030 | 1.94 | 335.24 | 167.55 | 0.24 |
| Relief Ditch | 17 | PF 3 | 1200.00 | 4988.60 | 4992.70 | | 4992.81 | 0.001302 | 2.61 | 460.03 | 175.51 | 0.28 |
| Relief Ditch | 17 | PF 4 | 3460.00 | 4988.60 | 4994.71 | | 4994.98 | 0.001662 | 4.20 | 823.61 | 182.83 | 0.35 |
| Relief Ditch | 17 | PF 5 | 4800.00 | 4988.60 | 4995.62 | | 4995.99 | 0.001754 | 4.84 | 990.85 | 183.89 | 0.37 |
| Relief Ditch | 17 | PF 6 | 7400.00 | 4988.60 | 4997.10 | | 4997.63 | 0.001857 | 5.84 | 1278.34 | 208.88 | 0.39 |
| Relief Ditch | 17 | PF 7 | 11600.00 | 4988.60 | 4999.08 | | 4999.83 | 0.001908 | 7.01 | 1722.73 | 245.22 | 0.42 |
| Relief Ditch | 17 | PF 8 | 21200.00 | 4988.60 | 5002.65 | | 5003.74 | 0.001845 | 8.65 | 2743.15 | 326.31 | 0.43 |
| Relief Ditch | 16 | PF 1 | 350.00 | 4988.91 | 4990.24 | 4990.24 | 4990.60 | 0.025532 | 4.82 | 72.66 | 103.20 | 1.01 |
| Relief Ditch | 16 | PF 2 | 650.00 | 4988.91 | 4990.63 | 4990.62 | 4991.10 | 0.022628 | 5.49 | 118.34 | 126.07 | 1.00 |
| Relief Ditch | 16 | PF 3 | 1200.00 | 4988.91 | 4991.77 | | 4992.02 | 0.006204 | 4.03 | 297.60 | 190.97 | 0.57 |
| Relief Ditch | 16 | PF 4 | 3460.00 | 4988.91 | 4994.11 | | 4994.38 | 0.002243 | 4.14 | 838.71 | 245.41 | 0.39 |
| Relief Ditch | 16 | PF 5 | 4800.00 | 4988.91 | 4995.09 | | 4995.40 | 0.001882 | 4.47 | 1081.16 | 252.91 | 0.37 |
| Relief Ditch | 16 | PF 6 | 7400.00 | 4988.91 | 4996.65 | | 4997.05 | 0.001615 | 5.06 | 1492.29 | 272.51 | 0.36 |
| Relief Ditch | 16 | PF 7 | 11600.00 | 4988.91 | 4998.73 | | 4999.24 | 0.001429 | 5.80 | 2081.41 | 299.81 | 0.36 |
| Relief Ditch | 16 | PF 8 | 21200.00 | 4988.91 | 5002.45 | | 5003.16 | 0.001235 | 6.94 | 3354.60 | 384.85 | 0.36 |

HEC-RAS Plan: Plan 01 River: Gunnison Reach: Relief Ditch (Continued)

| Reach | River Sta | Profile | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|--------------|-----------|---------|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|----------------------|-------------------|--------------|
| Relief Ditch | 15 | PF 1 | 350.00 | 4987.35 | 4989.83 | | 4989.86 | 0.000744 | 1.43 | 250.72 | 164.81 | 0.20 |
| Relief Ditch | 15 | PF 2 | 650.00 | 4987.35 | 4990.73 | | 4990.77 | 0.000637 | 1.61 | 416.02 | 204.17 | 0.19 |
| Relief Ditch | 15 | PF 3 | 1200.00 | 4987.35 | 4991.74 | | 4991.80 | 0.000661 | 1.93 | 645.67 | 248.72 | 0.20 |
| Relief Ditch | 15 | PF 4 | 3460.00 | 4987.35 | 4994.10 | | 4994.22 | 0.000653 | 2.85 | 1273.82 | 276.62 | 0.22 |
| Relief Ditch | 15 | PF 5 | 4800.00 | 4987.35 | 4995.09 | | 4995.24 | 0.000671 | 3.26 | 1581.39 | 337.56 | 0.23 |
| Relief Ditch | 15 | PF 6 | 7400.00 | 4987.35 | 4996.68 | | 4996.89 | 0.000678 | 3.83 | 2135.89 | 359.14 | 0.25 |
| Relief Ditch | 15 | PF 7 | 11600.00 | 4987.35 | 4998.79 | | 4999.07 | 0.000670 | 4.49 | 2914.97 | 375.17 | 0.25 |
| Relief Ditch | 15 | PF 8 | 21200.00 | 4987.35 | 5002.55 | | 5002.97 | 0.000689 | 5.66 | 4419.94 | 439.03 | 0.27 |
| Relief Ditch | 14 | PF 1 | 300.00 | 4987.30 | 4989.74 | | 4989.76 | 0.000440 | 1.18 | 262.52 | 154.71 | 0.16 |
| Relief Ditch | 14 | PF 2 | 600.00 | 4987.30 | 4990.64 | | 4990.67 | 0.000484 | 1.50 | 413.29 | 182.01 | 0.17 |
| Relief Ditch | 14 | PF 3 | 1150.00 | 4987.30 | 4991.64 | | 4991.69 | 0.000557 | 1.98 | 606.69 | 201.32 | 0.19 |
| Relief Ditch | 14 | PF 4 | 3410.00 | 4987.30 | 4993.92 | | 4994.09 | 0.000803 | 3.39 | 1155.55 | 300.17 | 0.25 |
| Relief Ditch | 14 | PF 5 | 4750.00 | 4987.30 | 4994.90 | | 4995.11 | 0.000848 | 3.88 | 1474.82 | 355.65 | 0.27 |
| Relief Ditch | 14 | PF 6 | 7350.00 | 4987.30 | 4996.50 | | 4996.75 | 0.000820 | 4.41 | 2066.78 | 380.16 | 0.27 |
| Relief Ditch | 14 | PF 7 | 11550.00 | 4987.30 | 4998.62 | | 4998.94 | 0.000785 | 5.04 | 2956.62 | 513.16 | 0.28 |
| Relief Ditch | 14 | PF 8 | 21150.00 | 4987.30 | 5002.41 | | 5002.85 | 0.000734 | 6.01 | 5135.54 | 608.00 | 0.28 |
| Relief Ditch | 13 | PF 1 | 300.00 | 4986.64 | 4989.53 | | 4989.61 | 0.002066 | 2.22 | 135.23 | 93.07 | 0.32 |
| Relief Ditch | 13 | PF 2 | 600.00 | 4986.64 | 4990.39 | | 4990.51 | 0.001923 | 2.71 | 221.53 | 106.98 | 0.33 |
| Relief Ditch | 13 | PF 3 | 1150.00 | 4986.64 | 4991.31 | | 4991.50 | 0.002110 | 3.55 | 328.27 | 126.79 | 0.37 |
| Relief Ditch | 13 | PF 4 | 3410.00 | 4986.64 | 4993.26 | | 4993.80 | 0.003029 | 6.00 | 608.40 | 152.93 | 0.48 |
| Relief Ditch | 13 | PF 5 | 4750.00 | 4986.64 | 4994.06 | | 4994.78 | 0.003392 | 7.02 | 732.50 | 158.54 | 0.52 |
| Relief Ditch | 13 | PF 6 | 7350.00 | 4986.64 | 4995.33 | | 4996.40 | 0.003889 | 8.61 | 939.53 | 167.48 | 0.58 |
| Relief Ditch | 13 | PF 7 | 11550.00 | 4986.64 | 4996.96 | | 4998.54 | 0.004436 | 10.59 | 1221.75 | 178.94 | 0.64 |
| Relief Ditch | 13 | PF 8 | 21150.00 | 4986.64 | 4999.37 | | 5002.31 | 0.006147 | 14.70 | 1748.47 | 272.13 | 0.78 |
| Relief Ditch | 12 | PF 1 | 300.00 | 4986.47 | 4988.92 | 4987.94 | 4989.00 | 0.002261 | 2.35 | 127.61 | 86.15 | 0.34 |
| Relief Ditch | 12 | PF 2 | 600.00 | 4986.47 | 4989.77 | 4988.49 | 4989.89 | 0.002523 | 2.74 | 219.00 | 127.91 | 0.37 |
| Relief Ditch | 12 | PF 3 | 1150.00 | 4986.47 | 4990.64 | 4989.30 | 4990.82 | 0.002829 | 3.35 | 346.16 | 170.44 | 0.40 |
| Relief Ditch | 12 | PF 4 | 3410.00 | 4986.47 | 4992.62 | 4991.00 | 4992.95 | 0.002599 | 4.68 | 752.41 | 217.82 | 0.43 |
| Relief Ditch | 12 | PF 5 | 4750.00 | 4986.47 | 4993.47 | 4991.60 | 4993.88 | 0.002509 | 5.26 | 938.76 | 224.41 | 0.43 |
| Relief Ditch | 12 | PF 6 | 7350.00 | 4986.47 | 4994.83 | 4992.48 | 4995.40 | 0.002448 | 6.18 | 1255.40 | 240.14 | 0.45 |
| Relief Ditch | 12 | PF 7 | 11550.00 | 4986.47 | 4996.64 | 4993.69 | 4997.42 | 0.002378 | 7.27 | 1703.79 | 255.31 | 0.46 |
| Relief Ditch | 12 | PF 8 | 21150.00 | 4986.47 | 4999.91 | 4996.03 | 5000.83 | 0.001939 | 8.30 | 3187.13 | 494.98 | 0.44 |
| Relief Ditch | 11 | PF 1 | 300.00 | 4985.24 | 4987.40 | | 4987.46 | 0.001778 | 1.90 | 157.91 | 122.58 | 0.29 |
| Relief Ditch | 11 | PF 2 | 600.00 | 4985.24 | 4988.13 | | 4988.21 | 0.001895 | 2.25 | 266.52 | 168.17 | 0.32 |
| Relief Ditch | 11 | PF 3 | 1150.00 | 4985.24 | 4988.89 | | 4989.02 | 0.001942 | 2.90 | 396.48 | 174.38 | 0.34 |
| Relief Ditch | 11 | PF 4 | 3410.00 | 4985.24 | 4990.75 | | 4991.09 | 0.002291 | 4.68 | 746.29 | 205.52 | 0.41 |
| Relief Ditch | 11 | PF 5 | 4750.00 | 4985.24 | 4991.56 | | 4992.00 | 0.002381 | 5.38 | 916.34 | 213.07 | 0.43 |
| Relief Ditch | 11 | PF 6 | 7350.00 | 4985.24 | 4992.88 | | 4993.50 | 0.002490 | 6.44 | 1204.64 | 225.71 | 0.45 |
| Relief Ditch | 11 | PF 7 | 11550.00 | 4985.24 | 4994.61 | | 4995.49 | 0.002608 | 7.75 | 1612.44 | 251.88 | 0.48 |
| Relief Ditch | 11 | PF 8 | 21150.00 | 4985.24 | 4997.76 | | 4999.07 | 0.002598 | 9.66 | 2566.58 | 361.94 | 0.51 |
| Relief Ditch | 10 | PF 1 | 300.00 | 4983.86 | 4985.83 | 4985.28 | 4985.95 | 0.005004 | 2.79 | 107.38 | 101.59 | 0.48 |
| Relief Ditch | 10 | PF 2 | 600.00 | 4983.86 | 4986.47 | 4985.78 | 4986.64 | 0.005005 | 3.31 | 181.51 | 133.43 | 0.50 |
| Relief Ditch | 10 | PF 3 | 1150.00 | 4983.86 | 4987.19 | 4986.41 | 4987.42 | 0.005008 | 3.90 | 295.14 | 171.66 | 0.52 |
| Relief Ditch | 10 | PF 4 | 3410.00 | 4983.86 | 4988.77 | 4987.77 | 4989.32 | 0.004999 | 5.99 | 580.79 | 188.61 | 0.58 |
| Relief Ditch | 10 | PF 5 | 4750.00 | 4983.86 | 4989.48 | 4988.37 | 4990.19 | 0.005001 | 6.82 | 716.64 | 194.07 | 0.60 |
| Relief Ditch | 10 | PF 6 | 7350.00 | 4983.86 | 4990.64 | 4989.34 | 4991.62 | 0.005003 | 8.07 | 946.86 | 201.68 | 0.62 |
| Relief Ditch | 10 | PF 7 | 11550.00 | 4983.86 | 4992.18 | 4990.66 | 4993.55 | 0.005007 | 9.60 | 1267.47 | 213.52 | 0.65 |
| Relief Ditch | 10 | PF 8 | 21150.00 | 4983.86 | 4994.98 | 4993.03 | 4997.11 | 0.005003 | 12.10 | 1943.47 | 274.06 | 0.69 |

GUNNISON GORGE ANGLERS (GGA) - PROJECT ORGANIZATION

PROJECT: Gunnison River Relief Ditch Reconstruction DATE: Rev 4 Mar 2011

OBJECTIVE: Facilitate a collaborative effort to finance and manage the design and construction of a new, permanent structure on the Gunnison River that would replace the existing Relief Ditch Company's rock/steel structure and not affect their water rights. GGA would serve as the Fiscal Agent for the project and be responsible to collect funds and make authorized disbursements for the project. A management committee will oversee collection of funds, contributions, grants, etc. and expenditures for the Project. A Project Coordinator appointed to facilitate the project by coordinating the work of technical advisors, contractors and interface with members of the Relief Ditch Company.

AUTHORIZATIONS:

- 1) The GGA Board of Directors at their May, 2010 meeting approved the above scope of work for GGA to administer the Project and appointed GGA members George Osborn, Marshall Pendergrass and Gale Douady to serve on the committee. The board also approved the establishment of a separate bank account to collect and disburse funds for the project with Marshall Pendergrass and George Osborn being signators on the account. The board also authorized a contribution of \$5,000 towards the Project with funds to be transferred to project account when needed.
- 2) In April 2010, the Relief Ditch Company gave written permission to GGA to pursue alternative designs for the diversion dam & revised in December 2010.

MANAGEMENT COMMITTEE

A project management committee is established to oversee the project and approve of recommended courses of action, selection of consultants, and disbursements of funds. The committee will have at least three GGA members (two of which are on the GGA Board of Directors) and representatives from other involved parties.

The 2010 Management Committee consists of the following: Contribution

| | | |
|-------------------------------------|----------------------|----------|
| GGA Board Member | Marshall Pendergrass | |
| GGA Board Member | Gale Douady | |
| GGA Member | George Osborn | \$5,000 |
| BLM | Edd Franz | \$1,500 |
| Relief Ditch Company | Mel Frazier | |
| CTU/TU – CO Trout Unlimited | Drew Peternell | \$7,000 |
| Grand Valley Anglers (GVA) | Steve McCall | \$1,000 |
| CWB – Healthy Rivers Fund | ----- | \$25,000 |
| DOW | Dan Kowalski | ----- |
| Gunnison Basin Roundtable (pending) | ----- | \$20,650 |
| Total Contributions | (March 15, 2011) | \$60,250 |

PROJECT COORDINATOR

The management committee has selected George Osborn to be the Project Coordinator for this project.

TECHNICAL ADVISOR

The management committee has selected Jeff Crane of Crane & Associates to be the Technical Advisor for the project due to his involvement with similar projects in the Gunnison River drainage. This does not ensure nor exclude selection of Crane & Associates as paid consultants on specific work packages of the project.

Bid requests were issued to six water/structure consulting firms for the design review and professional engineer certification of the final design selected for the project. Flywater Inc. out of Ft Collins was selected based on qualifications, their proposal and pricing, and their involvement with the San Miguel CC Ditch Project of similar nature.

The Relief Ditch Board in March 2011 has committed to provide \$3500 to the project in the 2013-2014 period from avoided maintenance costs after project completion.

Marshall Pendergrass, President
317 East Main
Montrose Co 81401



INVITATION FOR BIDS

The Gunnison Gorge Anglers is accepting bids from qualified contractors in Western Colorado for the reconstruction of the Relief Ditch irrigation diversion structure in the Gunnison River near Austin, Colorado. The project involves the removal of the existing push-up gravel dam and the associated vertical railroad rails and replacing it with two boulder diversion structures buried into the bed of the river approximately 450 feet apart and the construction of a concrete headgate with an extended access road and ditch. This will require the construction of approximately 900 feet of ditch extension and access road, the excavation of two 6 foot deep trenches approximately 325 feet long each and the placement of approximately 1,600 cubic yards of large boulders. It will also require the construction of a concrete headgate, 90 linear feet of box culvert, the re-grading of approximately 1,100 linear feet of river channel and the import of approximately 7,000 cubic yards of native fill for re-grading and re-planting of the floodplain.

Bid documents, including plans and specifications will be available on _____. Contractors may obtain a set by contacting George Osborn with the Gunnison Gorge Anglers at 970- 872-3564.

A pre-bid walk-through meeting will be held on-site on _____ at ____ AM.

All bids are due by ____ PM on _____. The Gunnison Gorge Anglers has the right to reject any and all bids.

INSTRUCTIONS TO BIDDERS

1.0 DEFINED TERMS

The term “bidder” means one that submits a bid to manager, as distinct from sub-bidder, who submits a bid to bidder. The term “manager” refers to the Gunnison Gorge Anglers who is acting as the project coordinator for this project. The term “successful bidder” means the lowest, qualified, responsible, and responsive bidder to whom manager (based on the manager’s evaluation as hereinafter provided) makes an award. The term “bidding documents” includes the Invitation to Bid, Instructions to Bidders, the Bid Form, and the proposed Contract Documents, Construction Plans, and Specifications.

2.0 COPIES OF BIDDING DOCUMENTS

Complete sets of bidding documents, plans, and specifications may be obtained as stated in the Invitation to Bid. No partial sets will be issued. Complete sets of bidding documents shall be used in the preparation of the bids; the manager assumes any responsibility for errors or misinterpretations resulting from use of incomplete sets.

The submitted bid proposal shall include the Bid Form, Statement of Bidder’s Qualifications, and Schedule of Subcontractors. The manager and engineer, in making copies of bidding documents available on the above terms, do so only for the purpose of obtaining bids on the work and do not confer a license or grant for any other use.

3.0 QUALIFICATION OF BIDDERS

To demonstrate qualifications to perform the work, each bidder must submit a written statement of qualifications including financial data, a summary of previous experience, and previous commitments. The Statement of Qualifications shall be prepared on the form provided.

In determining the bidders qualifications, the following factors will be considered: Work previously completed by the bidder and whether the bidder (a) has adequate plant and equipment to do the work properly and expeditiously, (b) has the financial resources to meet all obligations incidental to the work, and (c) has the appropriate technical experience. Each bidder may be required to show that he has handled former work so that no just claims are pending against such work. No bid will be accepted from a bidder who is engaged in any other work that would impair his ability to perform or finance this work.

4.0 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

It is the responsibility of the bidder before submitting a bid to (a) examine the contract documents thoroughly, (b) visit the site to familiarize themselves with local conditions that may in a manner affect cost, progress or performance of the work, (c) familiarize

themselves with federal, state and local laws, ordinances, rules, and regulations that may in any manner affect cost, progress, or performance of the work, (d) study and carefully correlate bidder's observations with the contract documents, and (e) notify the manager of all conflicts, errors or discrepancies.

5.0 INTERPRETATIONS AND ADDENDA

All questions about the meaning or intent of the bidding documents should be directed to the manager. Addenda may also be issued to modify the bidding documents as deemed advisable by the manager.

6.0 CONTRACT TIME

The contractor will submit a proposed schedule to illustrate how the milestone dates (financial and non-financial) will be met. The work must be substantially complete and ready for final payment by _____. Commencement of work may begin upon issuance of the contract by the Gunnison Gorge Anglers.

7.0 EXISTING AND SUBSTITUTE MATERIAL OR EQUIPMENT

The contract will be on the basis of material and equipment described on the drawings or specified in the specifications. Large boulders for construction of the diversion structure and bank revetment will be obtained from off-site and nearby sources. The manager must approve any substitute material or equipment.

8.0 SUBCONTRACTORS, SUPPLIERS AND OTHERS

Each bidder shall submit a list of major subcontractors he proposes to use in the work. If the manager has reasonable objection to any proposed subcontractor, either may request the apparent successful bidder to submit an acceptable substitute without an increase in bid price. If the apparent successful bidder declines to make any substitution, the manager may award the contract to the next lowest bidder that proposed to use acceptable subcontractors. Subcontractors, suppliers or other persons listed to whom the manager or engineer does not object to will be deemed acceptable.

The contractor shall not be required to employ any subcontractor, supplier or other persons against whom they have reasonable objection. The use of subcontractors listed by the bidder and accepted by the manager will be required in the performance of the work.

9.0 BID FORM

The enclosed bid form shall be used for submission of the bid. Bid forms must be completed in ink or typed.

10.0 SUBMISSION OF BIDS

Bids must be received by ___PM on _____. The bid must include the Bid Form, Statement of Qualifications, Proposed Time Schedule, and Schedule of Subcontractors. Bids can be mailed or e-mailed to:

George Osborn
203 Poplar Way
Hotchkiss, CO 81419
Phone - 872-3564
e-mail – gmosbo@tds.net

11.0 AWARD OF CONTRACT

The manager reserves the right to reject any and all bids, time or changes to the work, and negotiate contract terms with the successful bidder. The contract will be awarded to the lowest responsive, responsible and qualified bidder whose evaluation by the manager indicates that the award will be in the best interest of the project.

The manager will give the successful bidder a notice of award within 20 days after the date of submittal.

12.0 TAXES

The manager is exempt from Colorado State Sales and Use Taxes on materials and equipment to be incorporated in the work. Said taxes shall not be included in the contract price.

13.0 INSURANCE

At its sole cost the contractor shall purchase and maintain in effect through project completion insurance which will protect it and the Gunnison Gorge Anglers from claims which may arise out of, result from or be related to the contractor's performance of the work on the project, whether such performance be by itself or by anyone directly or indirectly retained or employed by the contractor or by anyone whose acts, errors, or omissions any of them may be liable. Such insurances required herein shall be written for limits of liability as follows:

1. General Commercial Liability
 - a. Bodily Injury and Property Damage
 - \$1,000,000 each occurrence
 - \$1,000,000 aggregate

- b. Personal Injury
 - \$1,000,000 each occurrence
 - \$1,000,000 aggregate
- 2. Commercial Automobile Liability
 - a. Bodily Injury and Property Damage
 - \$1,000,000 any one accident or loss
- 3. Workers' Compensation and Employer's Liability
 - a. Workers' Compensation: Statutory
 - b. Employer's Liability
 - \$100,000 each accident
 - \$100,000 disease - each employee
 - \$500,000 disease – policy limit

The Commercial General Liability and Commercial Automobile Liability policies required hereunder shall include the Colorado Water Conservation Board as a named insured. The successful bidder shall supply the manager a certificate of each form of insurance required herein at least 10 days prior to the commencement of the work. The certificates of insurance shall evidence that the premium has been paid and contain a valid provision or endorsement that the policies cannot be cancelled, terminated, changed or modified without thirty (30) days written notice to the Colorado Water Conservation Board.

14.0 BID RESULTS

For information regarding results for individual bids send a self-addressed, stamped envelope to the Gunnison Gorge Anglers and a bid tally will be mailed to you.

15.0 PAYMENT PROCEDURES

The manager shall make progress payments on account of the contract price on the basis of the contractor's application for payment as recommended by the manager. Application for payment will be made on the 30th day of each month during construction. No performance bond will be required, however, 10% of the progress payment will be retained until satisfactory completion of the project as determined by the engineer. Upon final completion and acceptance of the work, the manager shall pay the remainder on the contract price.

Funds for this project have been obtained from a coalition of various partners including federal and state agencies, private foundations, and local contributions. Payments will be made to the contractor within 60 days of submittal of the payment application.

16.0 CONSTRUCTION STAKING

The manager shall provide construction stakes as specified on the construction drawings. The manager will establish construction control and stakes one time. Additional surveying will be at the cost of the contractor.

STATEMENT OF BIDDER'S QUALIFICATIONS

1. Name of Bidder: _____
2. Address: _____
3. How many years have you been engaged in your current contracting business?

4. Schedule of contracts on hand and anticipated dates of completion

5. Have you ever failed to complete any work awarded to you? _____
If so why? _____
6. Have you ever defaulted on a contract? _____
If so why? _____
7. List similar projects completed by your company stating the approximate cost, the month and year completed, and the location and type of construction.

8. List your major equipment available for this contract

9. Available Credit: \$ _____
10. Bank Reference: _____

11. Are you licensed as a General Contractor? _____

What class, license and numbers _____

12. Additional Comments

13. The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the manager in verification of the recital comprising this Statement of Bidder's Qualifications.

Name of Bidder

Signature of Bidder

Date

Relief Ditch Diversion Reconstruction Project
Preliminary Construction Budget
Alternative 2
1/18/2011

| ITEM DESCRIPTION | UNIT | QTY | UNIT COST | EST COST | SUB TOT COST |
|--|-------------------|--|------------|----------|---|
| 1 Mobilization/Demobilization | | | | | |
| Equipment Transport | LS | 1 | \$2,500.00 | \$2,500 | |
| Best Management Practices | | | | | |
| Repair Staging Area | Acre | 2 | 500 | \$1,000 | \$3,500 |
| 2 Channel Reconstruction | | | | | |
| Channel excavation & regrading | LF | 1,100 | \$15 | \$16,500 | |
| Floodplain grading/fill | CY | 7,000 | \$8 | \$52,500 | (\$5.50/cy x 7,000 cy) + (\$2/cy x 7,000 cy placed and compacted) |
| 3' dia boulder installed at toe of fill & ditch | CY | 1,350 | \$50 | \$67,500 | (933 lf river left + 412 lf river right=1,345 lf x 1cy/lf=1,345 cy x \$25/cy delivered+ \$25 cy placed) |
| Remove railroad rails | LS | 1 | \$5,000 | \$5,000 | \$141,500 |
| 3 Bank Stabilization & Revegetation | | | | | |
| Live willow cuttings planted | LF | 1,350 | \$5 | \$6,750 | |
| Cottonwood pole plantings | LF | 1,350 | \$2 | \$2,700 | |
| 4 Diversion Structure Cross Vanes (2) | | | | | |
| Excavation | LF | 650 | \$25 | \$16,250 | 2 trenches @ 325 ft each |
| 4' dia boulders delivered & placed | CY | 1,600 | \$50 | \$80,000 | |
| Grout boulder diversion structure | CY | 40 | \$250 | \$10,000 | \$106,250 |
| 5 Irrigation Diversion | | | | | |
| Construct conc headgate structure | CY | 94 | \$850 | \$79,688 | |
| Install slide gate | LS | 1 | \$7,000 | \$7,000 | |
| Excavate ditch | LF | 950 | \$50 | \$47,500 | |
| Water control | LS | 1 | \$10,000 | \$10,000 | \$144,188 |
| SUBTOTAL | | | | | \$395,438 |
| CONTINGENCY (20%) | | | | | \$79,088 |
| CONSTRUCTION SUBTOTAL | | | | | \$474,525 |
| SUPERVISION & ADMINISTRATION (10%) | | | | | \$47,453 |
| PRELIMINARY PROJECT COST | | | | | \$521,978 |
| MONITORING AND ADAPTIVE MANAGEMENT (2 subsequent years) (10%) | | | | | \$47,453 |
| Total Project Cost | | | | | \$569,430 |
| Match Summary | | | | | |
| DOW-Fishing is Fun | \$ 184,000 | cash-32% of total | | | |
| Watershed Restoration Fund (CWCB) | \$ 100,000 | cash-\$25,000 committed/\$75,000 pending | | | |
| Water Supply Reserve Account | \$ 100,000 | cash pending | | | |
| Colorado River District | \$ 50,000 | cash pending | | | |
| Relief Ditch | \$ 3,400 | cash committed | | | |
| Bureau of Land Management | \$ 25,000 | cash pending | | | |
| Gunnison Gorge Anglers volunteer time | \$ 20,000 | in-kind committed | | | |
| National Trout Unlimited | \$ 17,000 | \$15,000 cash/\$2,000 in-kind committed | | | |
| Private Foundations | \$ 70,030 | cash pending | | | |
| Total | \$ 569,430 | | | | |
| Percent Match | 68% | | | | |

















