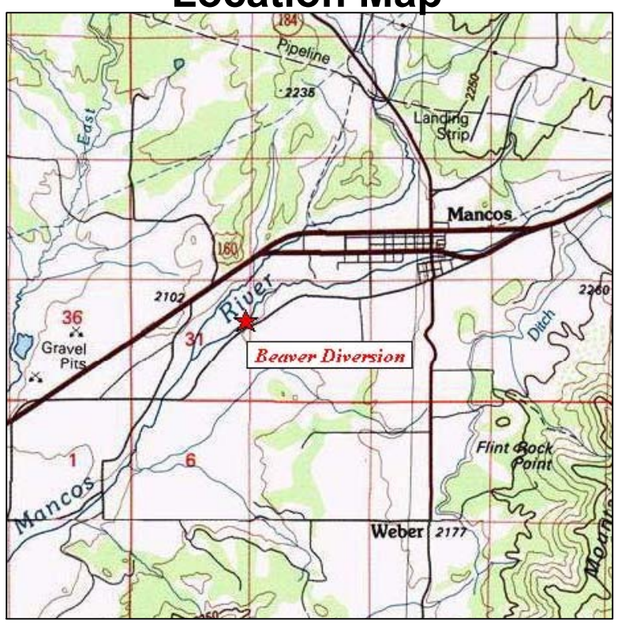
Mancos Valley Beaver Ditch Company

Plans for the Construction of In-Channel Rock Structures to Benefit the Beaver Irrigation Diversion Structure

Location Map



Index of Drawings

1/7 Cover Sheet
2/7 Overview
3/7 Site Plan
4/7 Site Plan - Detail
5/7 Profile & Cross Sections
6/7 Details & Spec's
7/7 Operation & Maintenance Plan

Estimate of Quantities

Item	*Unit*	*Quantity*
Sandstone boulders (171)	CY	154
2'x2'x6' concrete blocks (29)	CY	25.8
2'x2'x3' concrete blocks (4)	CY	1.8
Excavation (pools & berm)	CY	84

Utilities Statement

I realize that as the ditch owner, I and/or the Contractor I hire, may be liable for any damageto utilities during construction. NRCS nor BasinHydrology makes no representation that any utilities shown are exactly located or that all utilities present are shown.

I will provide the NRCS with the Utility Notification Center of Colorado (UNCC) ticket number my contractor has acquired prior to start of construction.

Landowner or Agent _____ Date _____

UNCC Ticket Number _____

Call Utility Notification Center of Colorado (1-800-922-1987. Call 2 business days in Advance before you dig, grade or excavate for the marking of underground utilities.

Owners Statement

This Plan has been discussed with me and I am in agreement with the calculations and design.

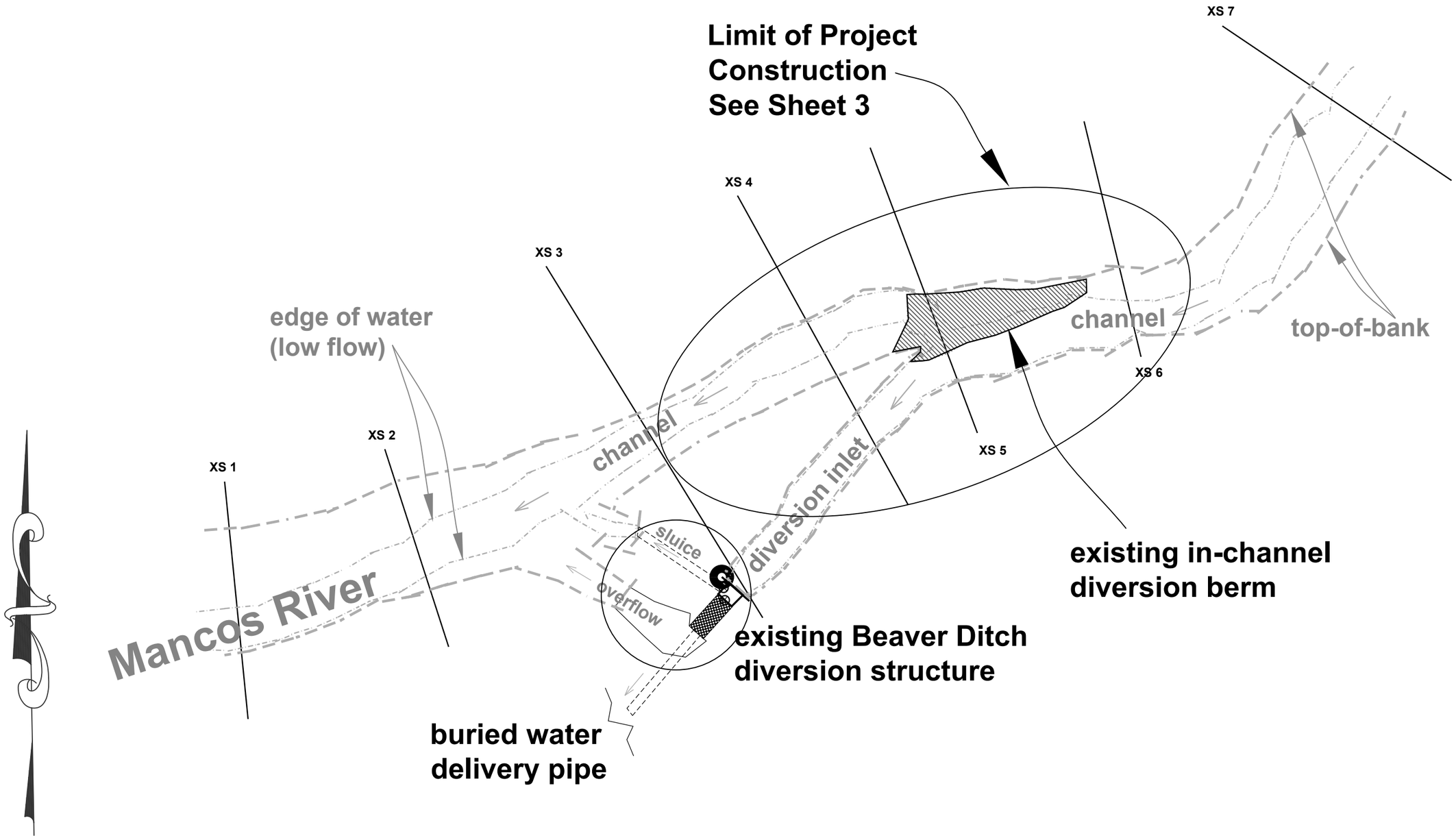
Landowner _____ Date _____

Cover

DATE 11-29-10v Beaver 7-2010.dwg

BASIN HYDROLOGY, INC.
river, watershed & wetland studies
2340 CR 203 Durango, CO 81301
970-903-0366

Mancos River - Beaver Diversion
In-Channel Rock Diversion Structure
Mancos Valley Beaver Ditch Company
SE 1/4 NE 1/4 Sec 31, T36N, R13W
Montezuma County, Colorado



Overview

DATE 11-29-10v Beaver 7-2010.dwg

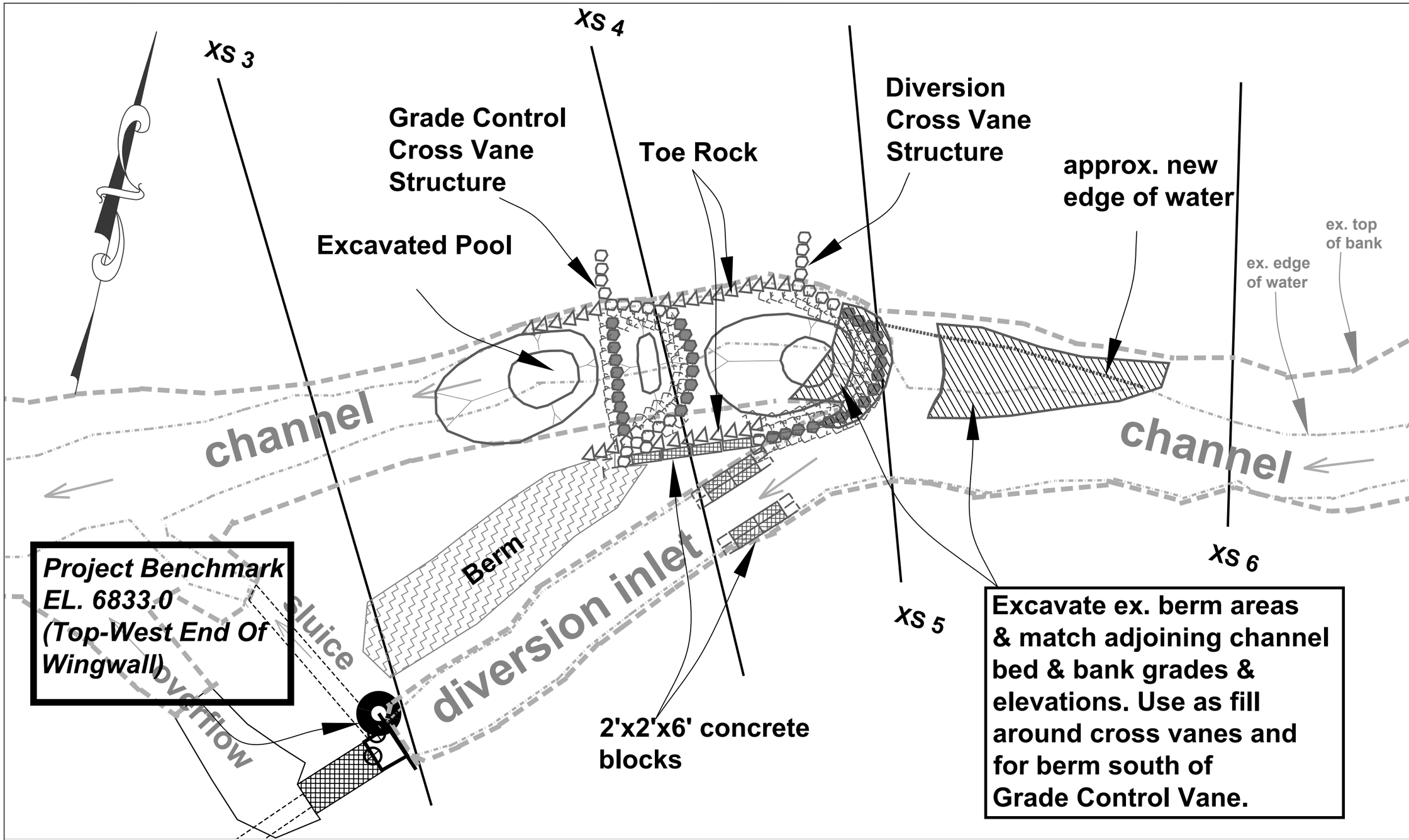
40 20 0 40 80 120

SCALE IN FEET

BASIN HYDROLOGY, INC.
river, watershed & wetland studies
2340 CR 203 Durango, CO 81301
970-903-0366

Mancos River – Beaver Diversion
In-Channel Rock Diversion Structure
Mancos Valley Beaver Ditch Company
SE 1/4 NE 1/4 Sec 31, T36N, R13W
Montezuma County, Colorado

SHT 2 of 7



Site Plan

DATE 11-29-10v Beaver 7-2010.dwg

20 10 0 20 40 60

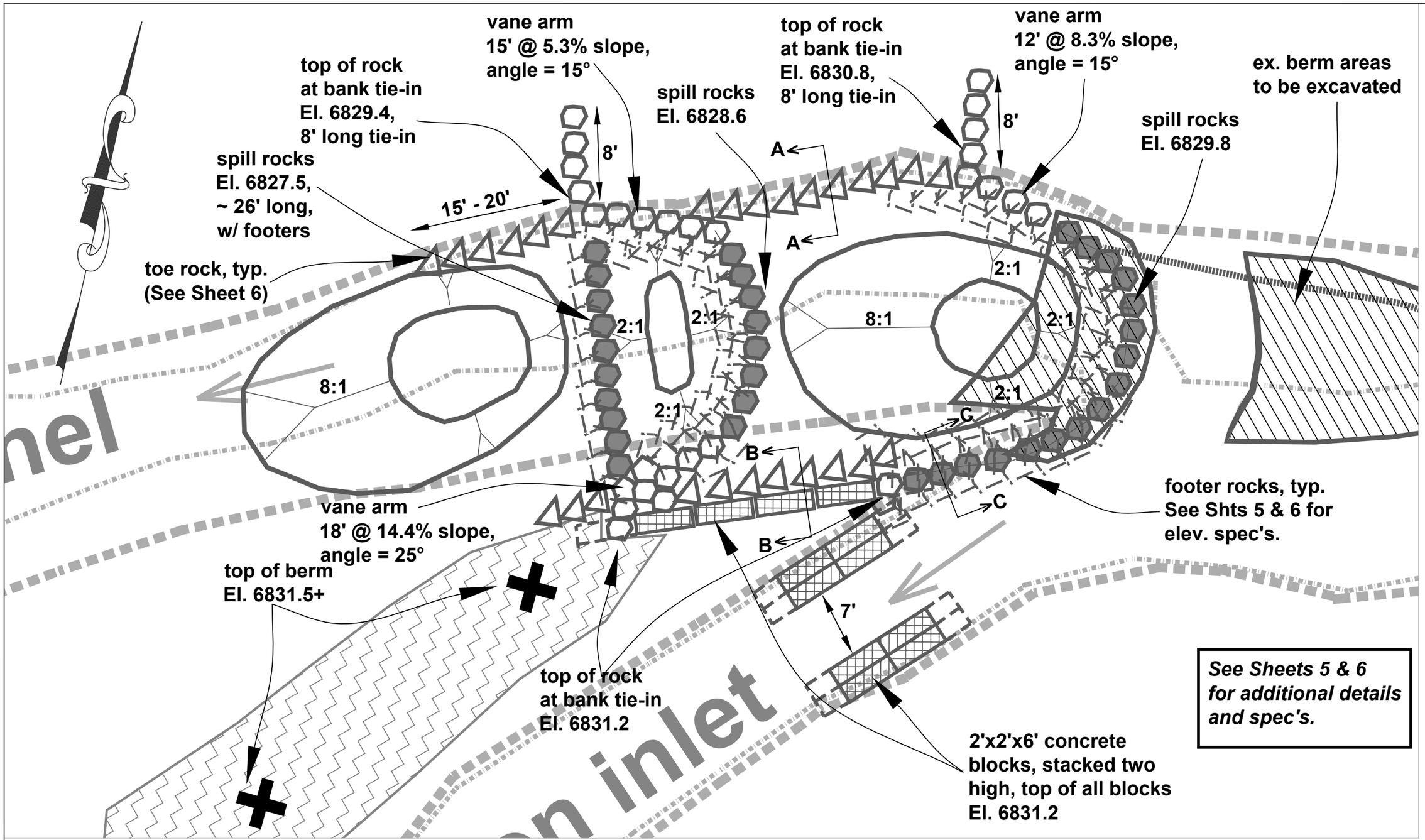
SCALE IN FEET

BASIN HYDROLOGY, INC.
river, watershed & wetland studies
2340 CR 203 Durango, CO 81301
970-903-0366

Mancos River – Beaver Diversion
In-Channel Rock Diversion Structure
Mancos Valley Beaver Ditch Company
SE 1/4 NE 1/4 Sec 31, T36N, R13W
Montezuma County, Colorado

SHT 3 of 7

Site Plan - Detail



DATE 11-29-10v Beaver 7-2010.dwg

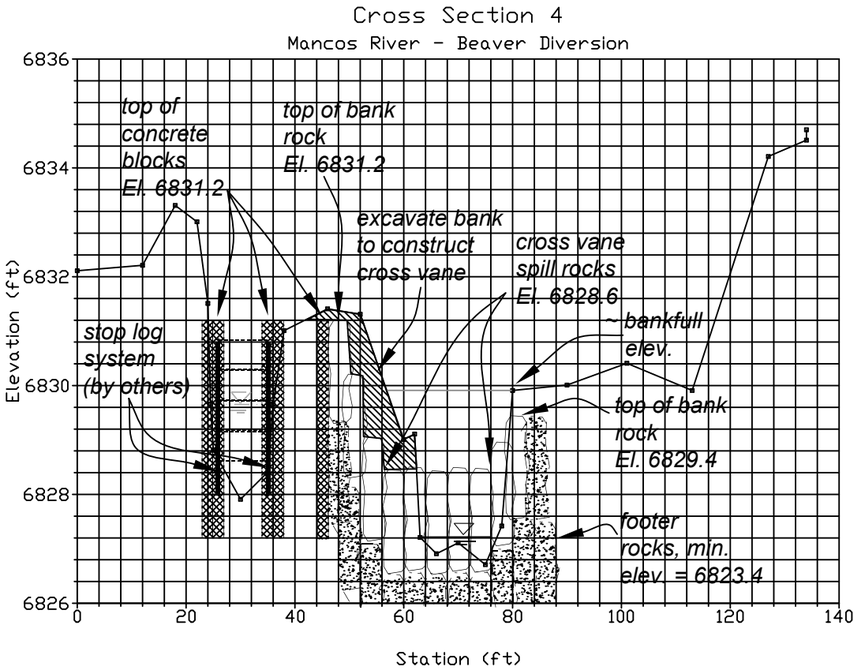
10 5 0 10 20 30

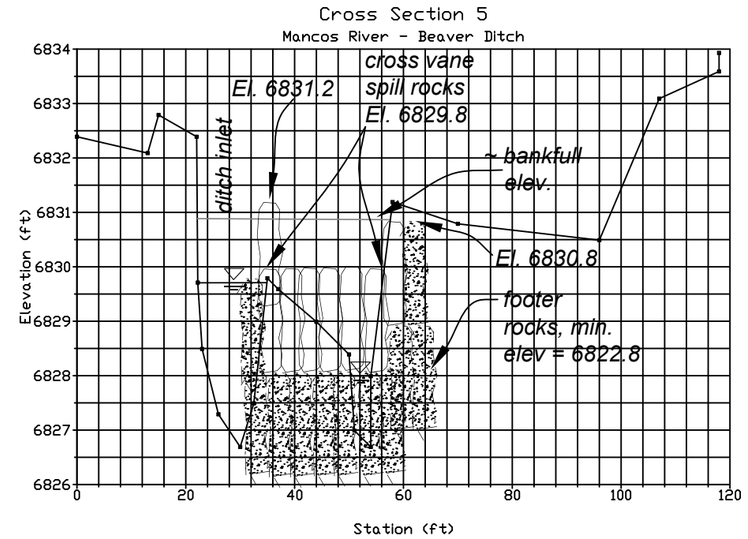
SCALE IN FEET

BASIN HYDROLOGY, INC.
river, watershed & wetland studies
2340 CR 203 Durango, CO 81301
970-903-0366

Mancos River – Beaver Diversion
In-Channel Rock Diversion Structure
Mancos Valley Beaver Ditch Company
SE 1/4 NE 1/4 Sec 31, T36N, R13W
Montezuma County, Colorado

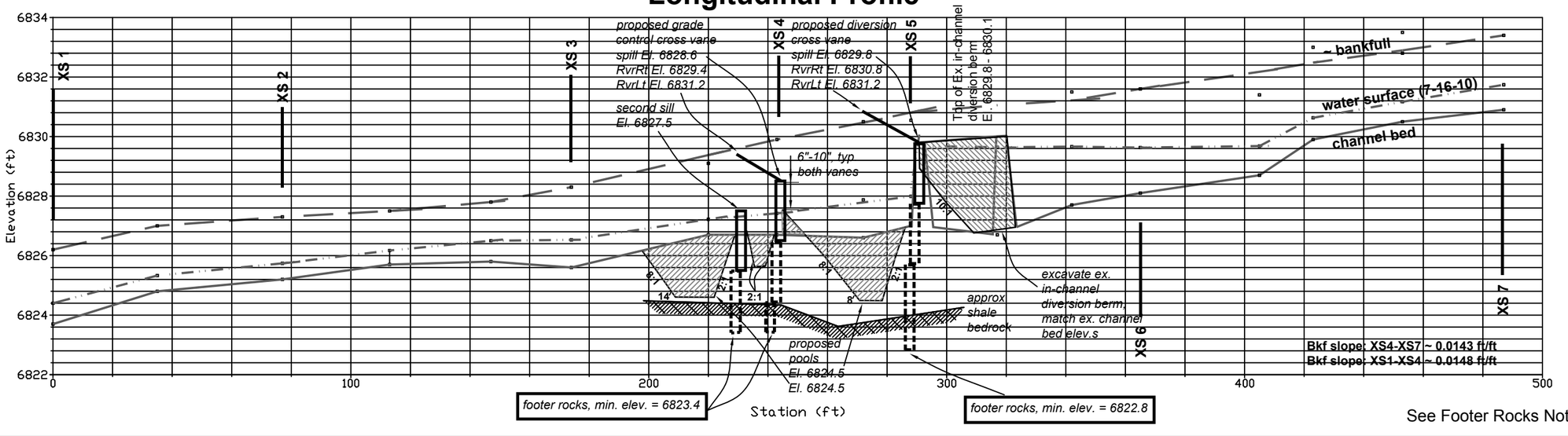
Profile & Cross Sections





See Footer Rocks Note #4, Sht 6

Longitudinal Profile



See Footer Rocks Note #4, Sht 6

DATE 11-29-10v Beaver 7-2010.dwg

Scale as Shown

BASIN HYDROLOGY, INC.
river, watershed & wetland studies
2340 CR 203 Durango, CO 81301
970-903-0366

Mancos River - Beaver Diversion
In-Channel Rock Diversion Structure
Mancos Valley Beaver Ditch Company
SE 1/4 NE 1/4 Sec 31, T36N, R13W
Montezuma County, Colorado

SHT 5 of 7

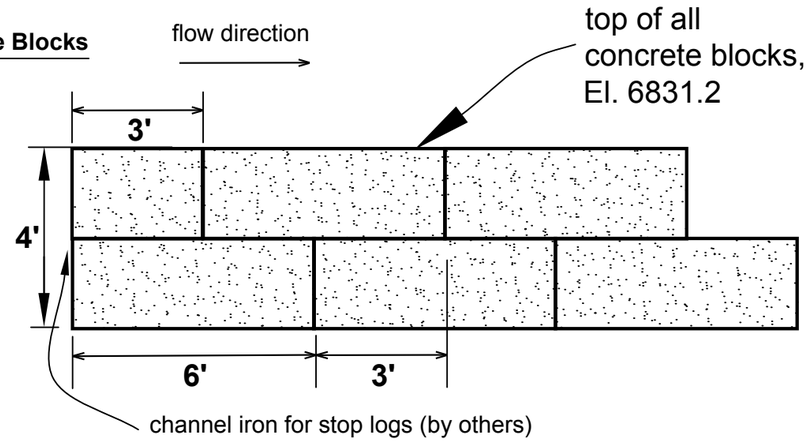
Applicable to All Concrete Blocks

1. Concrete blocks [2'(h) x 2'(w) x 6'(l)], w/ top & side notches for stacking/joining.

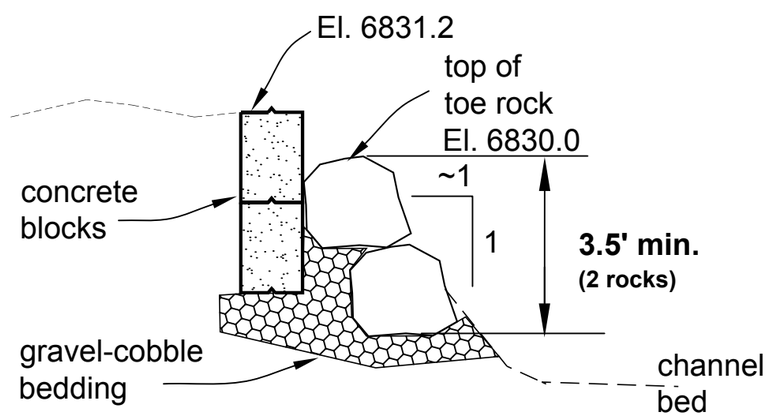
2. Concrete blocks shall be stacked w/ 3' joint offsets.

3. Prior to setting blocks, ensure that their foundation is comprised of compacted gravels & cobbles (i.e., not sand, etc.).

4. Excavate min. width trench necessary to install concrete blocks. Replace excavated material & compact.



Section



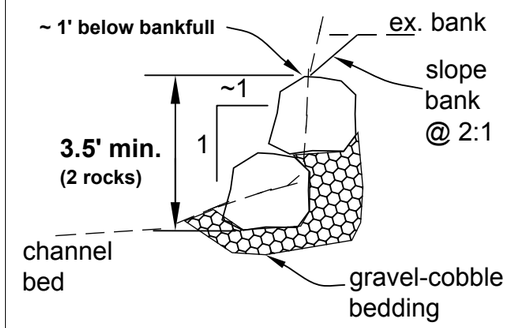
Elevation (w/ Toe Rock)

Concrete Block with Toe Rock Detail

nts

DETAIL B - B

See Footer Rocks Note #4

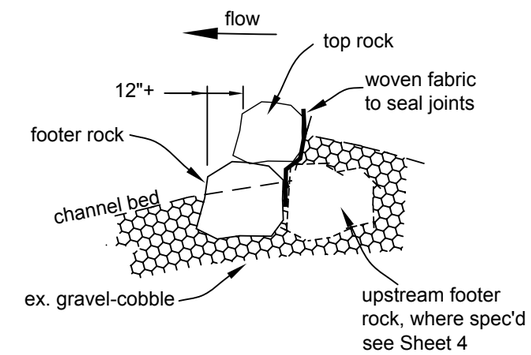


Bank Toe Rock

nts

DETAIL A - A

See Footer Rocks Note #4



Vane Footer Rock

nts

DETAIL C - C

See Footer Rocks Note #4

Specifications

Concrete Blocks

Concrete blocks shall be 2'(h) x 2'(w) x 6'(l) with top & side notches for stacking/joining.

Cross Vane & Toe Rock

1. The smallest acceptable rock shall be 18" thick, 36" long, 30" wide.

2. The majority of rocks shall be approx. 24" thick, 48" long, 36" wide.

3. Only angular rock (shot) rock shall be used (i.e., no round boulders).

4. Ideally, rock shall have a relatively smooth surface along its long axis for stacking and to create a smooth spill surface.

Footer Rocks

1. Footer rocks are required to support every surface rock.

2. Footer rock size shall be equal to or larger than the surface rocks.

3. Footer rocks shall extend downstream of the surface rock a minimum of 12".

4. The bottom elevation of all footer rocks associated with the upstream structure shall be 6822.8 and elevation 6823.4 for the downstream structure.

Cross Vane Structures

1. Spill rocks shall be set to create a uniform elevation surface. Rocks shall be selected and installed so that the amount of water flowing between the spill rocks is minimized.

2. A tightly woven fabric shall be placed on the upstream side of all structure rocks prior to backfilling for the purpose of trapping fines and minimizing the amount of water seeping through rock joints.

3. A mix of fine and coarse materials shall be used as backfill between the cross vane arms and the bank. Compacted fill shall transition from the top of the vane rock up to the adjacent bank.

Details & Specs

DATE 11-29-10v Beaver 7-2010.dwg

Scale as Shown

BASIN HYDROLOGY, INC.
river, watershed & wetland studies
2340 CR 203 Durango, CO 81301
970-903-0366

Mancos River - Beaver Diversion

In-Channel Rock Diversion Structure

Mancos Valley Beaver Ditch Company

SE 1/4 NE 1/4 Sec 31, T36N, R13W

Montezuma County, Colorado

Operations & Maintenance Plan

General

Rock structures, unlike concrete or other engineered structures, require a high degree of maintenance, especially during the establishment period. These structures must receive regular and timely maintenance to continue to function properly. Failure to provide maintenance in a time manner could result in complete failure of the structure. All structures modify the flow regime of the watercourse. The modified flow from the structure results in changes to the channel. As such, each structure will require periodic maintenance. In some cases, additional structures may be required to adequately protect the system. Items to help a good operation and maintenance program include:

1. Stockpile a small quantity of appropriately sized rock at the site or other convenient location to be used for repair.

2. Check structures regularly during and after the first major flow event following installation. Any erosion occurring around the structures should be evaluated and repaired as needed. Some corrective action may be required during the high flow event.

3. After the peak flow recedes, check the structures for signs of damage. Pay particular attention to missing or displaced rocks, bank erosion, and excessive buildup of trash or other debris.

4. Replace missing or dislodged rocks with properly sized material.

5. Check the adjacent banks for signs of excessive erosion that may require additional structures.

6. Remove any debris that collects on the structures or in the channel. Debris in the channel that is not moved can result in the development of vegetative islands that can adversely affect the channel.

7. If revegetation methods are a component of the project, monitor success of the seedings and reseed any areas that have not established successfully. If tree or shrub plantings were used, replace any that have not survived.

8. Take extreme care when excavating accumulated debris or sediment near any structures to avoid dislodging structure rocks or concrete blocks. Care shall also be taken to ensure that any excavation does not disturb the supporting foundation of any structures. The supporting foundation can extend for a relatively long distance from the structure.

Diversion Channel Stop Log-Gate System

A. Bolt channel iron vertically to the upstream face of the concrete blocks for the purpose of sliding 2' x 6" to 2" x 10" stop logs across the channel opening.

B. Install a series of holes 6", 9" and 12" above the channel bed in both channel iron systems for the purpose of installing a bolt to prevent the stop logs from sliding down to the channel bed.

C. During all but low flows, install stop logs so that the stop logs extend from the bottom stop bolt up to the top of the concrete blocks. Open the sluice gate and-or the 24" weir headgate to allow a large amount of water to flow under the stop logs and out the sluice and-or thru the weir headgate.

D. Determine the best elevation of the stop bolt relative to the settings of the sluice gate and-or 24" weir headgate. The goal is to minimize the amount of sediment accumulating upstream of the stop logs and within the diversion channel itself.

E. Remove the stop logs during low flow periods. Take care during the removal of sediments within the channel or diversion channel so as not to move or affect the stability of the concrete blocks.

DATE 11-29-10v Beaver 7-2010.dwg

BASIN HYDROLOGY, INC.
river, watershed & wetland studies
2340 CR 203 Durango, CO 81301
970-903-0366

Mancos River - Beaver Diversion
In-Channel Rock Diversion Structure
Mancos Valley Beaver Ditch Company
SE 1/4 NE 1/4 Sec 31, T36N, R13W
Montezuma County, Colorado