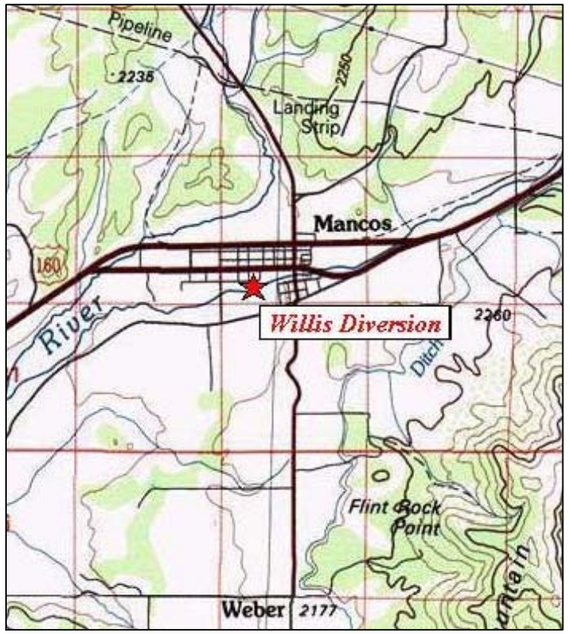
Mancos River - Willis Ditch Group

Construction Plans for Various Irrigation Diversion Improvements for the Willis Irrigation Ditch



Index of Drawings

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Estimate of Quantities

Item	*Unit*	*Quantity*
sandstone boulders (40)	CY	36
2'x2'x6' concrete blocks (30)	CY	26.7
2'x2'x3' concrete blocks (6)	CY	2.7
bankfull bench fill	CY	30
pool excavation	CY	20
"Rubberneck" caulking	Roll	15

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.

Ditch Co. Representative _____ Date _____

Designers Statement

To the best of my professional knowledge, judgment and belief, these plans meet applicable NRCS standards.

T. Mark Oliver, Basin Hydrology, Inc. _____ Date _____

Cover

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Mancos River - Willis Diversion
In-Channel Rock Diversion Structure
Mancos Valley Willis Ditch Company
SW 1/4 SW 1/4 Sec 28, T36N, R13W
Montezuma County, Colorado

Limit of Project Construction See Sheet 3

ex. top of bank

ex. bankfull

ex. edge of water (low flow)

proposed rock diversion structure & scour pool

XS 5

Mancos River

XS 4

remove existing diversion inlet containment berm

XS 1

remove existing diversion rocks

proposed concrete block diversion inlet & containment berm (w/openings)

remove ex. heading works (15" pipe & steel plate headwall)

proposed bankfull bench

XS 3 Hub Project Benchmark El = 6992.00

XS 3

new heading structure moved 22' upstream from ex. heading

XS 2

Overview

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20 10 0 20 40 60

SCALE IN FEET

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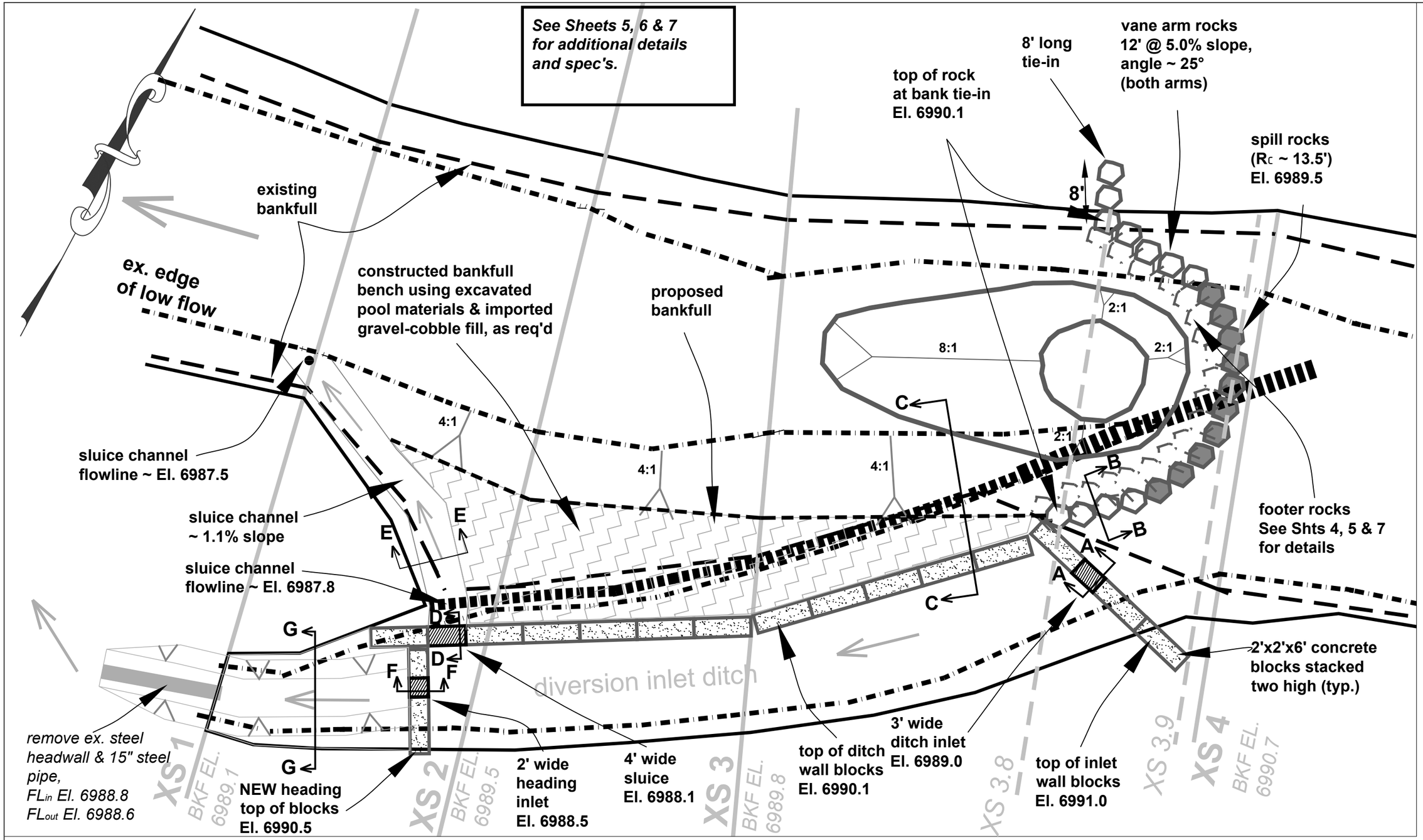
Site Plan - Detail



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10 5 0 10 20 30

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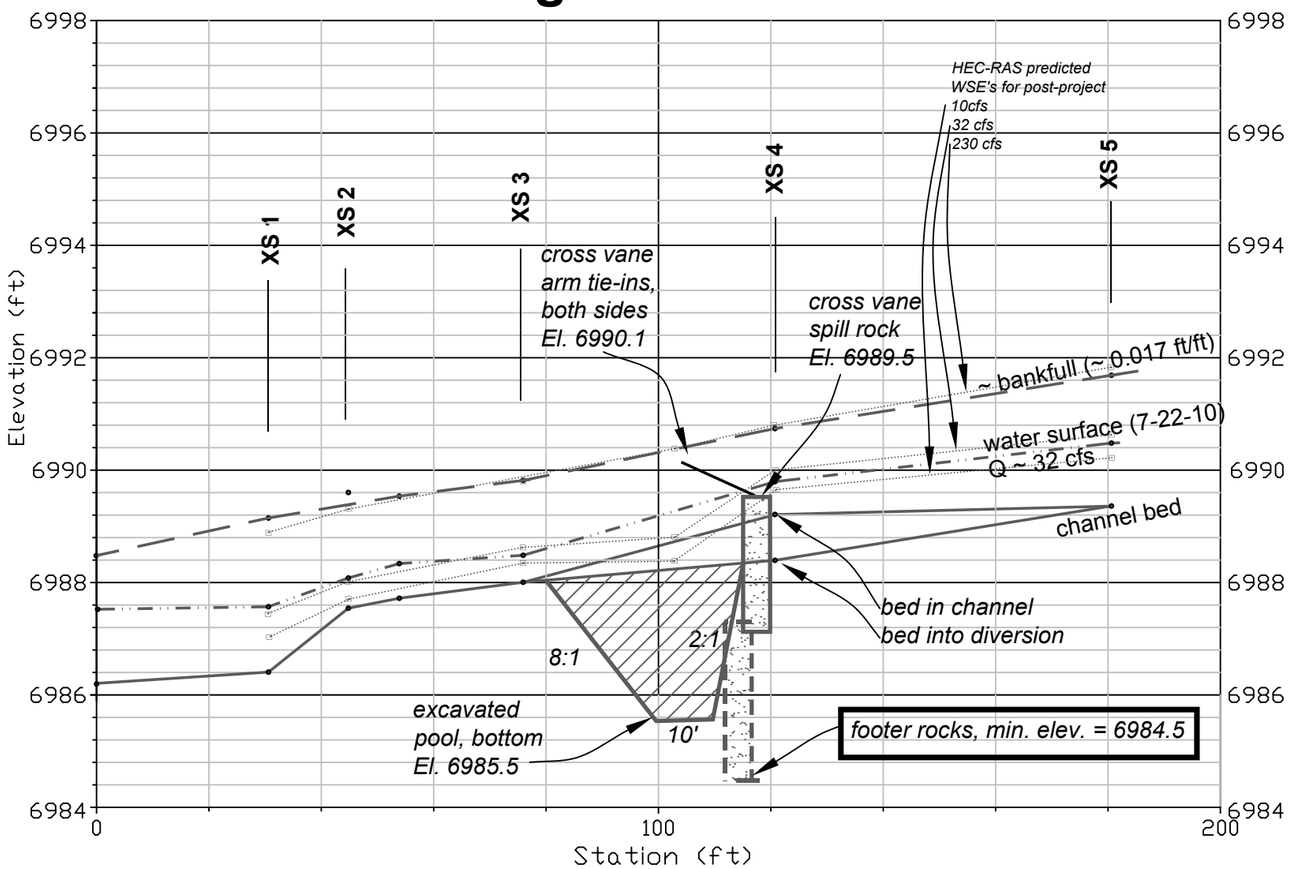
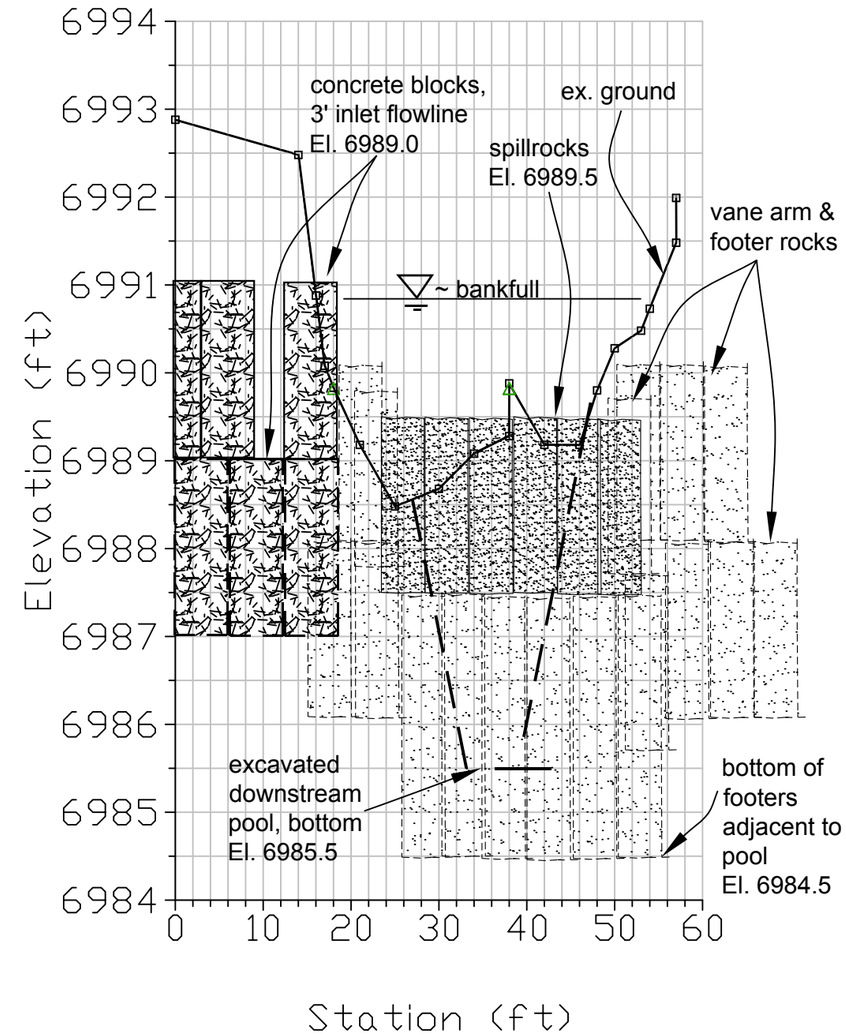
Longitudinal Profile



CROSS SECTION 3.9

(interpolated from XS 4 to show cross vane)



Long. Profile & Cross Section

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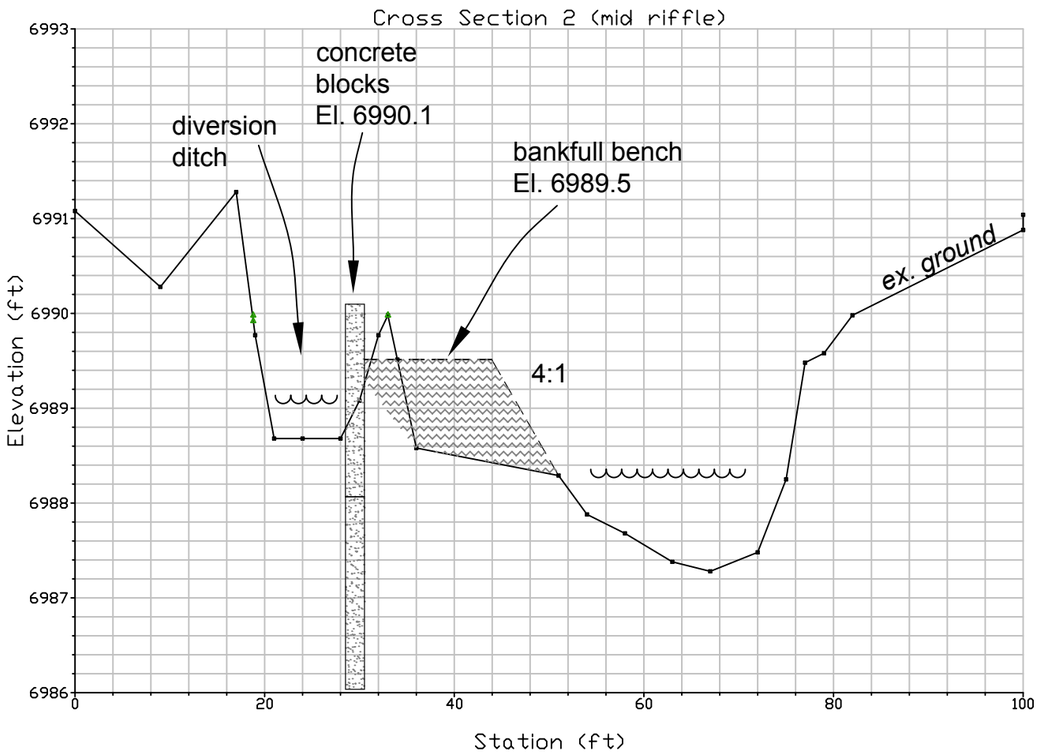
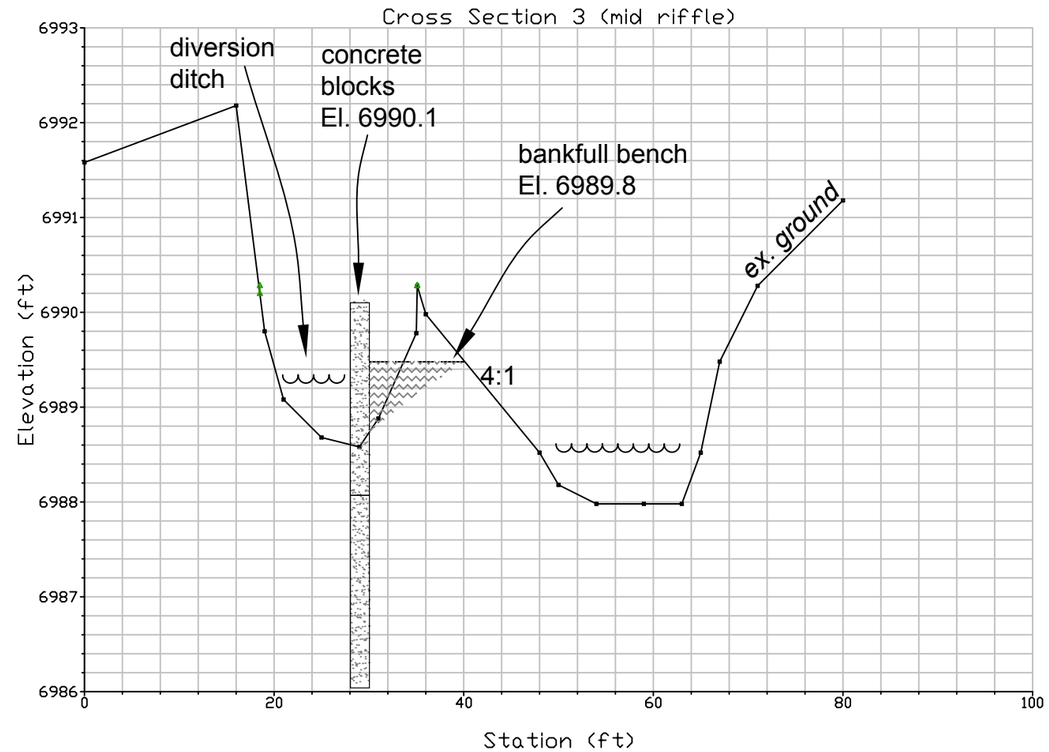
In-Channel Rock Diversion Structure
Mancos Valley Willis Ditch Company
SW 1/4 SW 1/4 Sec 28, T36N, R13W
Montezuma County, Colorado

SHT
4
of
9

CROSS SECTION 2



CROSS SECTION 3



Cross Sections - 2

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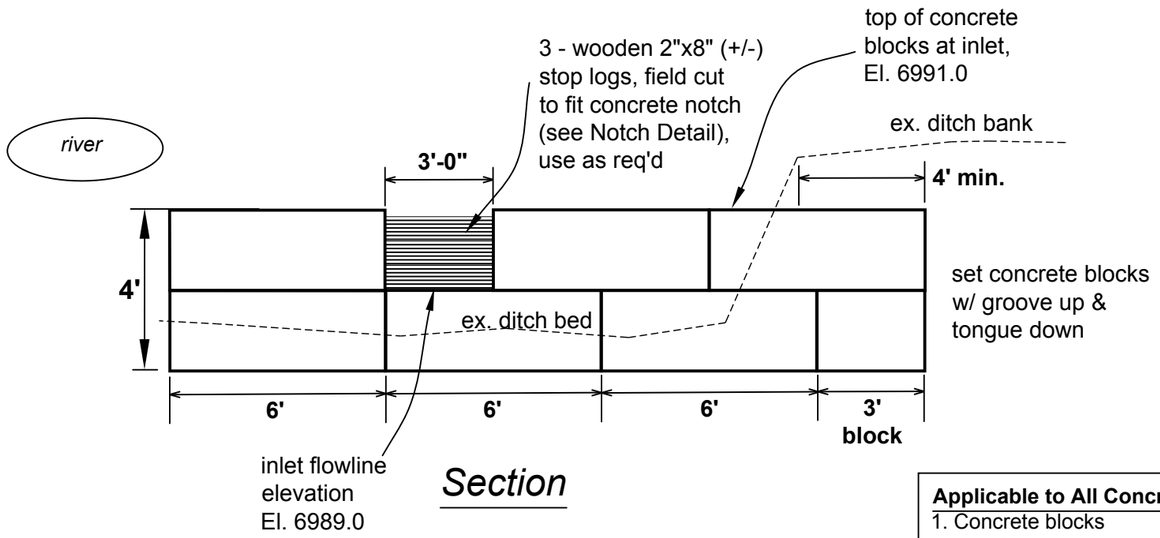
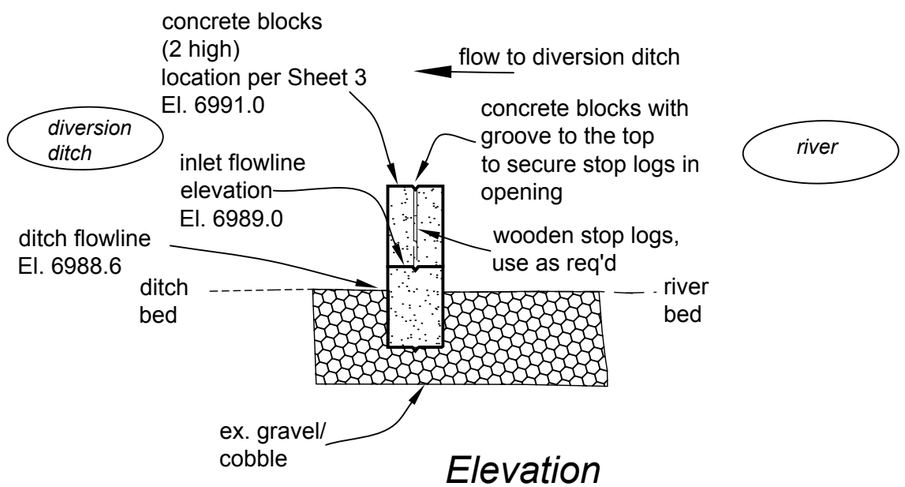


Section



Elevation

Diversion Ditch Inlet Structure

nts

DETAIL A - A

Applicable to All Concrete Blocks

1. Concrete blocks [2'(h) x 2'(w) x 6'(l)], w/ top & side tongue & groove for stacking/joining, except as shown.

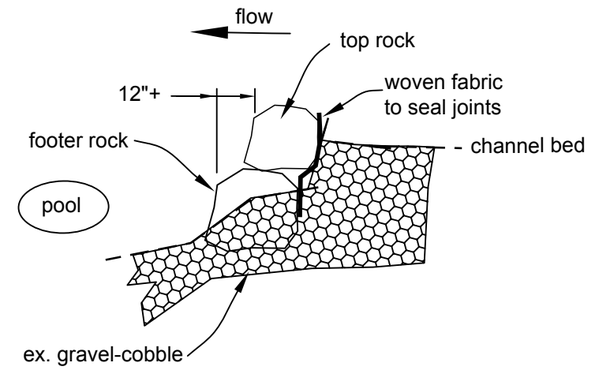
2. Concrete blocks shall be stacked w/ 3' joint offsets, except as shown.

3. Blocks shall be set so that groove is up & groove shall be on both sides of inlet and sluice openings.

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

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

6. Place continuous strip of Rubberneck bitumen tape, or equiv., on top & sides of joining blocks to minimize water leakage.

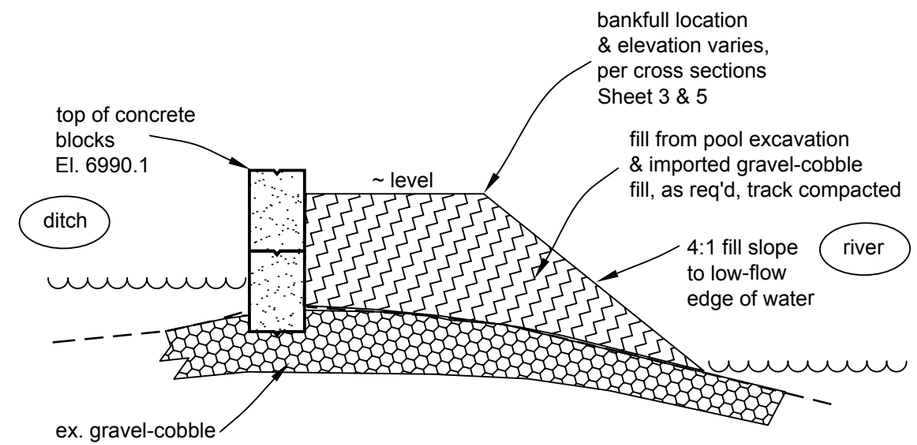


Vane Footer Rock

nts

DETAIL B - B

See Footer Rocks Note, Sheet 8



Constructed Bankfull Bench

nts

DETAIL C - C

Details & Spec's - 1

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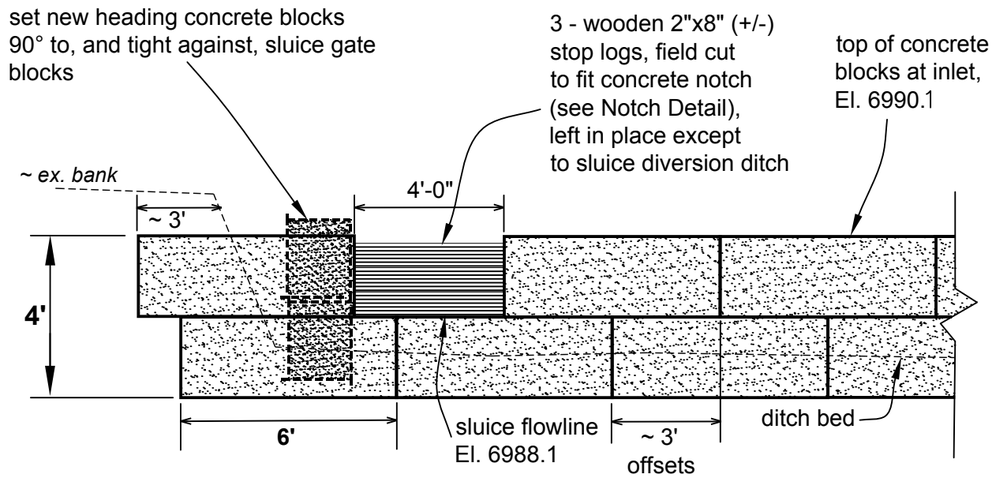
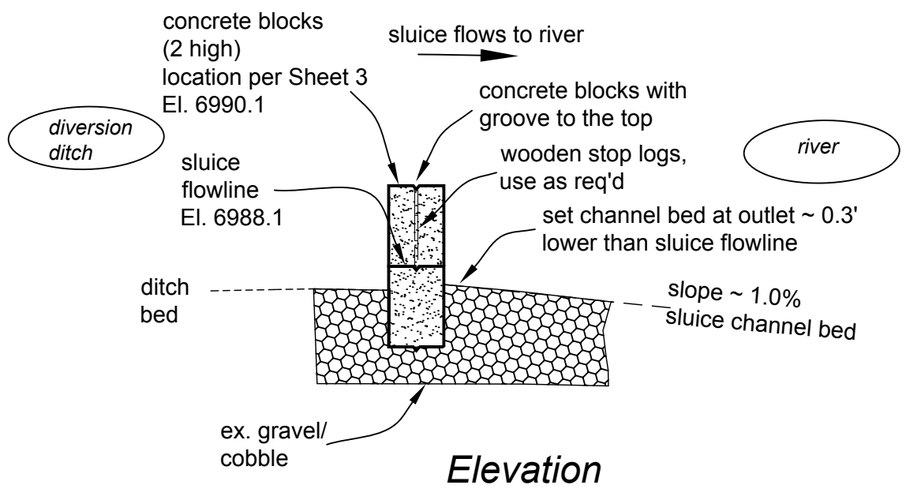
Mancos Valley Willis Ditch Company
SW 1/4 SW 1/4 Sec 28, T36N, R13W
Montezuma County, Colorado



Section

See Concrete Block Notes at Detail A-A

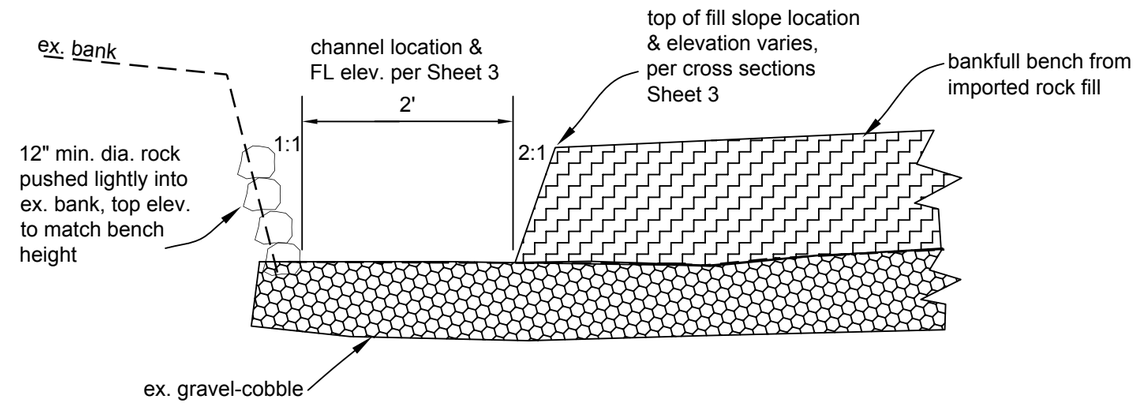


Elevation

Sluice Gate Structure

nts

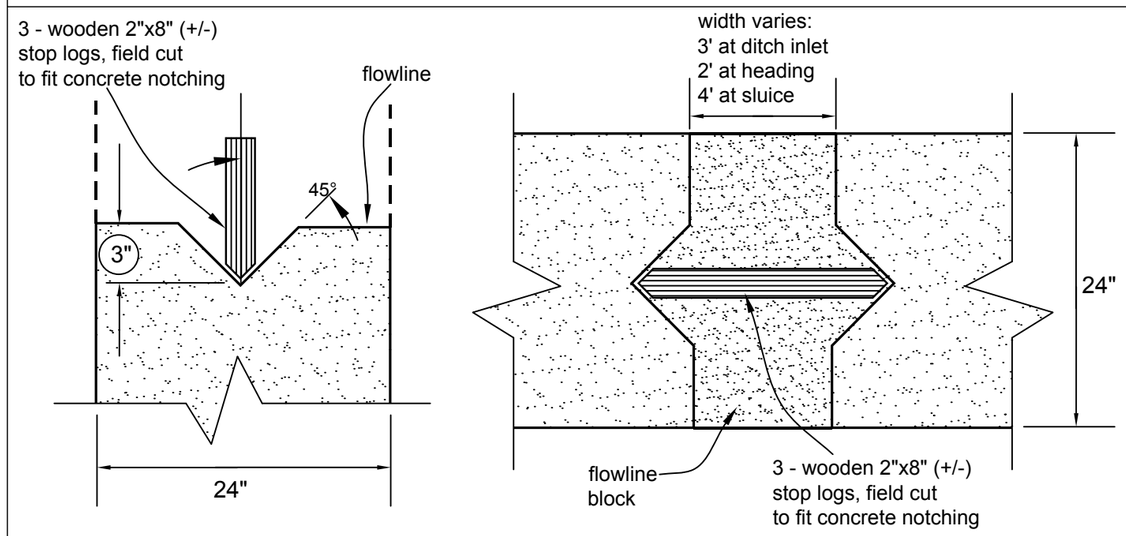
DETAIL D - D



Sluice Return Channel

nts

DETAIL E - E



Elevation

Plan View

Stop Log Notch Detail

nts

NOTE: *stop logs provided & constructed by Willis Ditch Group*

Details & Spec's - 2

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In-Channel Rock Diversion Structure

Mancos Valley Willis Ditch Company

SW 1/4 SW 1/4 Sec 28, T36N, R13W

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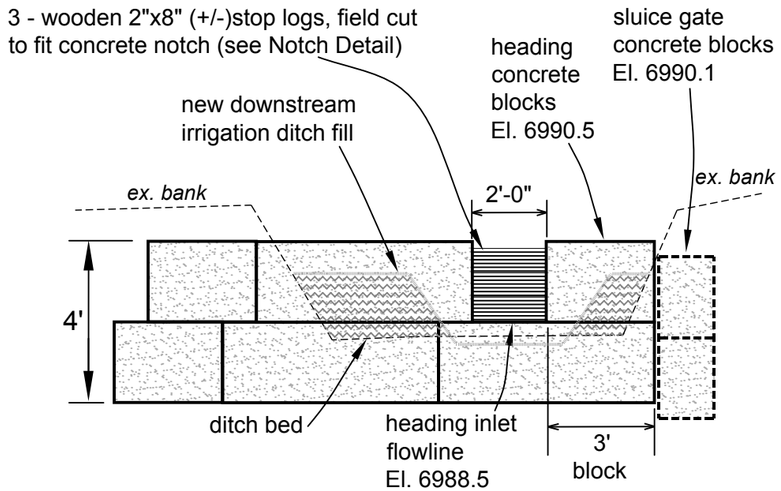
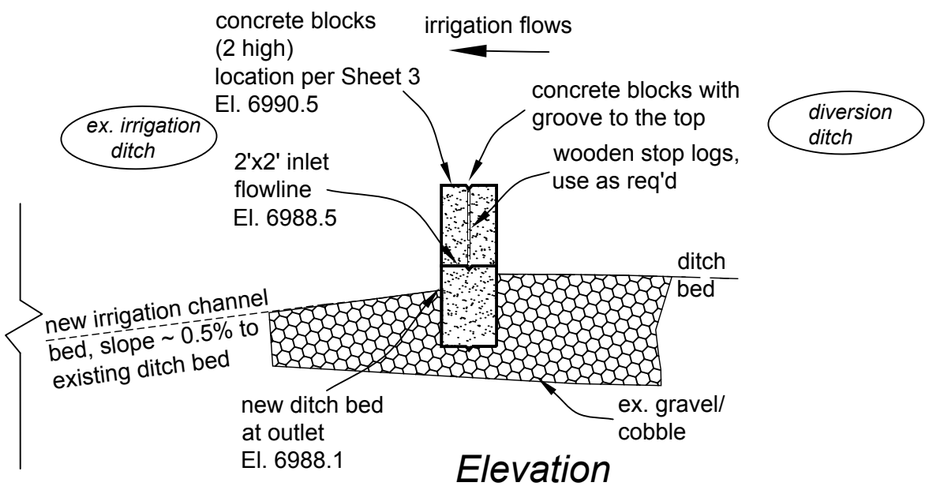


Section

See Concrete Block Notes at Detail A-A

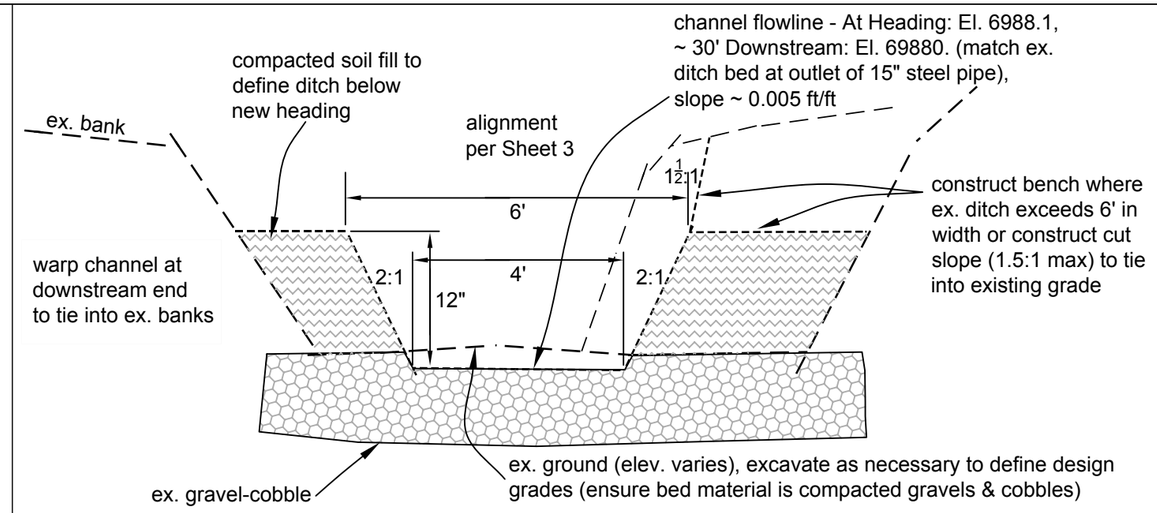


Elevation

New Heading Structure

nts

DETAIL F-F



New Heading Discharge Channel

nts

DETAIL G - G

Specifications

Concrete Blocks

Concrete blocks shall be 2'(h) x 2'(w) x 6'(l) with top & side notches for stacking/joining (except 3' lengths as shown).

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 shall be 6984.5.

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 & Spec's - 3

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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 any remaining appropriately sized rock at the site for repair needs.

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, displaced or leaning concrete blocks, 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 work.

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.

Ditch Inlet & Sluice Stop Log-Gate Systems

A. Ensure concrete blocks are set so that the groove forms the bottom and both sides of the opening.

B. Remove any excess concrete from within the grooves to create a smooth sliding surface and to create a snug fit for stop logs.

C. Field cut stop logs AFTER step B to determine the exact length of the stop log and the groove angles. Additional "2 bys" may be attached to the bottom stop log and to each end of a stop log to fill more of the notch space and to improve the seal.

C. DITCH INLET - It is anticipated that stop logs will not be used except maybe during very high river flows to limit sediment deposition in ditch. During high flows, the ditch operator may determine that 1 or 2 stop logs set 6"+/- above the inlet flowline may limit sediment deposition near the inlet.

D. SLUICE - The stop logs should be installed during low river flows as the sluice will prevent adequate delivery of water to the existing heading structure. The stop logs should be removed during moderate to high river flows to create scouring conditions within the diversion ditch. Use of the sluice could result in insufficient water delivery to the heading. Therefore, the ditch operator should always deliver 0.5 cfs to the heading to satisfy water rights, and notify all users of sluicing operations and temporary decreased flows.

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