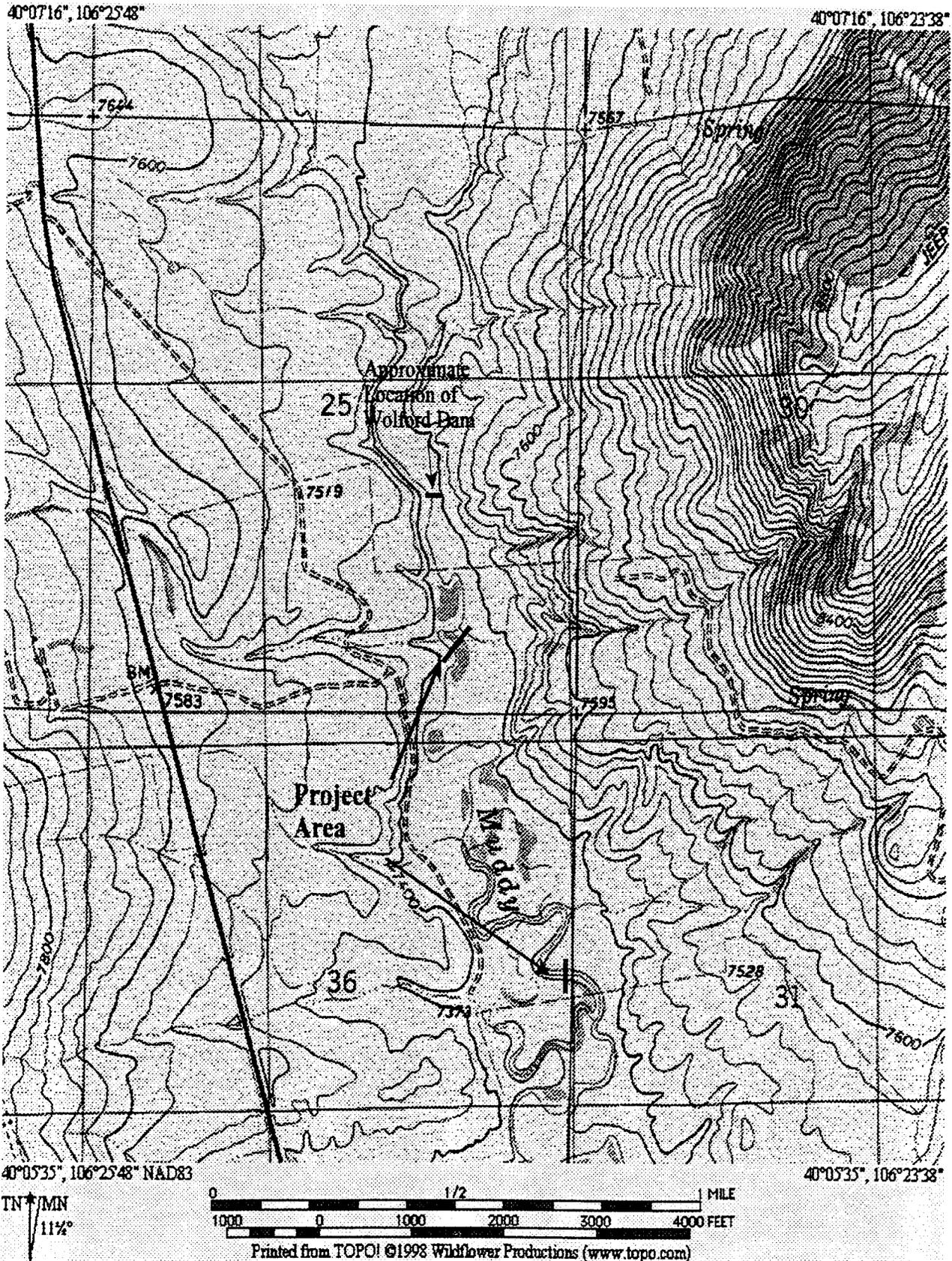
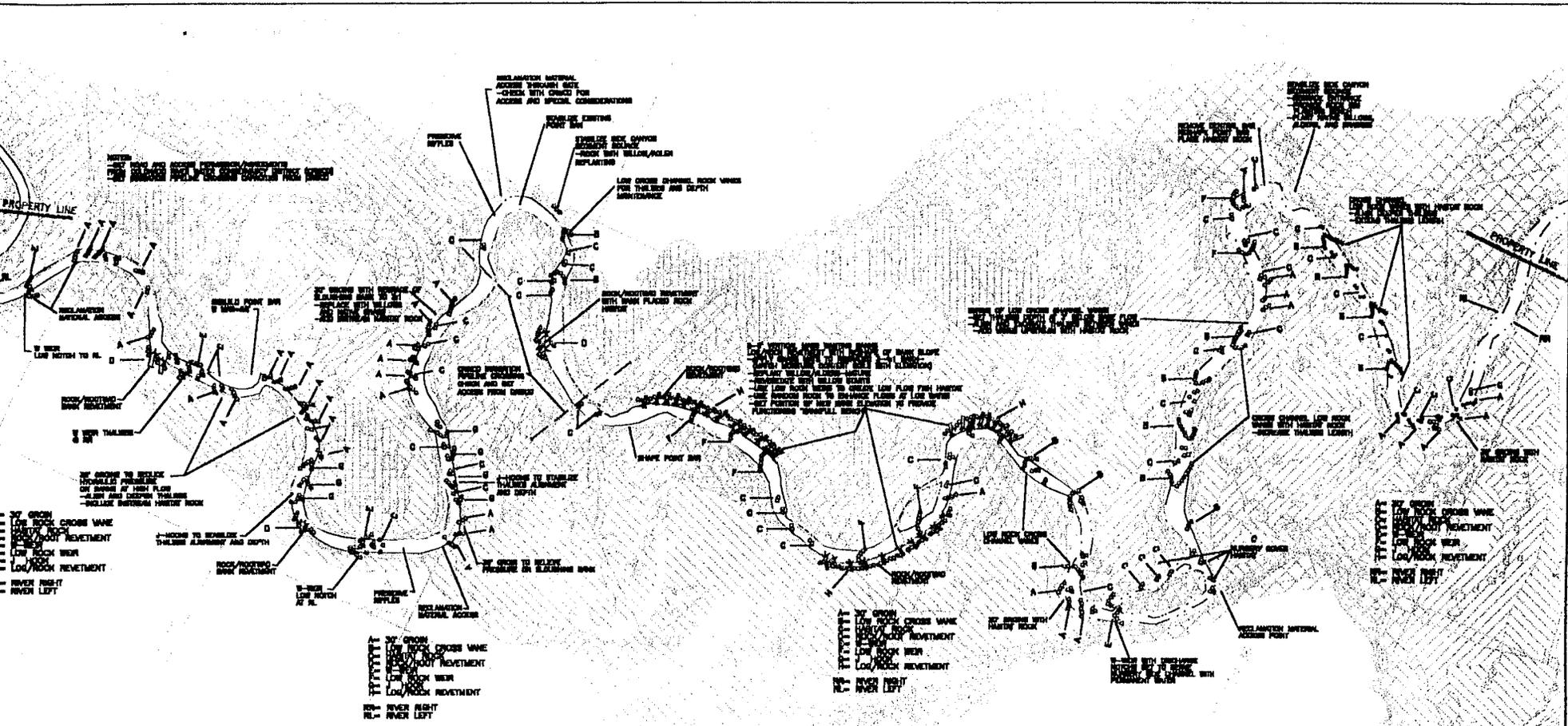


Muddy Creek Project Area Map; Gallagher Ranch, Grand County, Colorado.

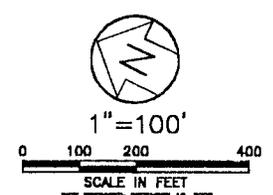




- LEGEND**
- TREE/VEGETATION LINE
 - EDGE OF CHANNEL
 - FENCE
 - TRAIL
 - DITCH
 - BORING LOCATION OR MONITORING WELL
 - PZ-28 PIEZOMETER
 - PMP-3 PHOTOMONITORING POINT
 - WATER (AS DESIGNED)
 - WATER (AS BUILT)
 - UNINSTALLED SECTION
 - MONITORING TRANSECT
 - PIPELINE ABSORPTION FIELD
 - BLOW OFF
 - VALVE BOX

- RIPARIAN FOREST
- AQUATIC BED
- WET MEADOW
- RIPARIAN SCRUB
- MARSH
- NATURAL WILLOW RECRUITMENT
- MIXED DESERT SCRUB

COVER TYPE MAPPING PROVIDED BY ECOTONE ENVIRONMENTAL CONSULTING, INC.

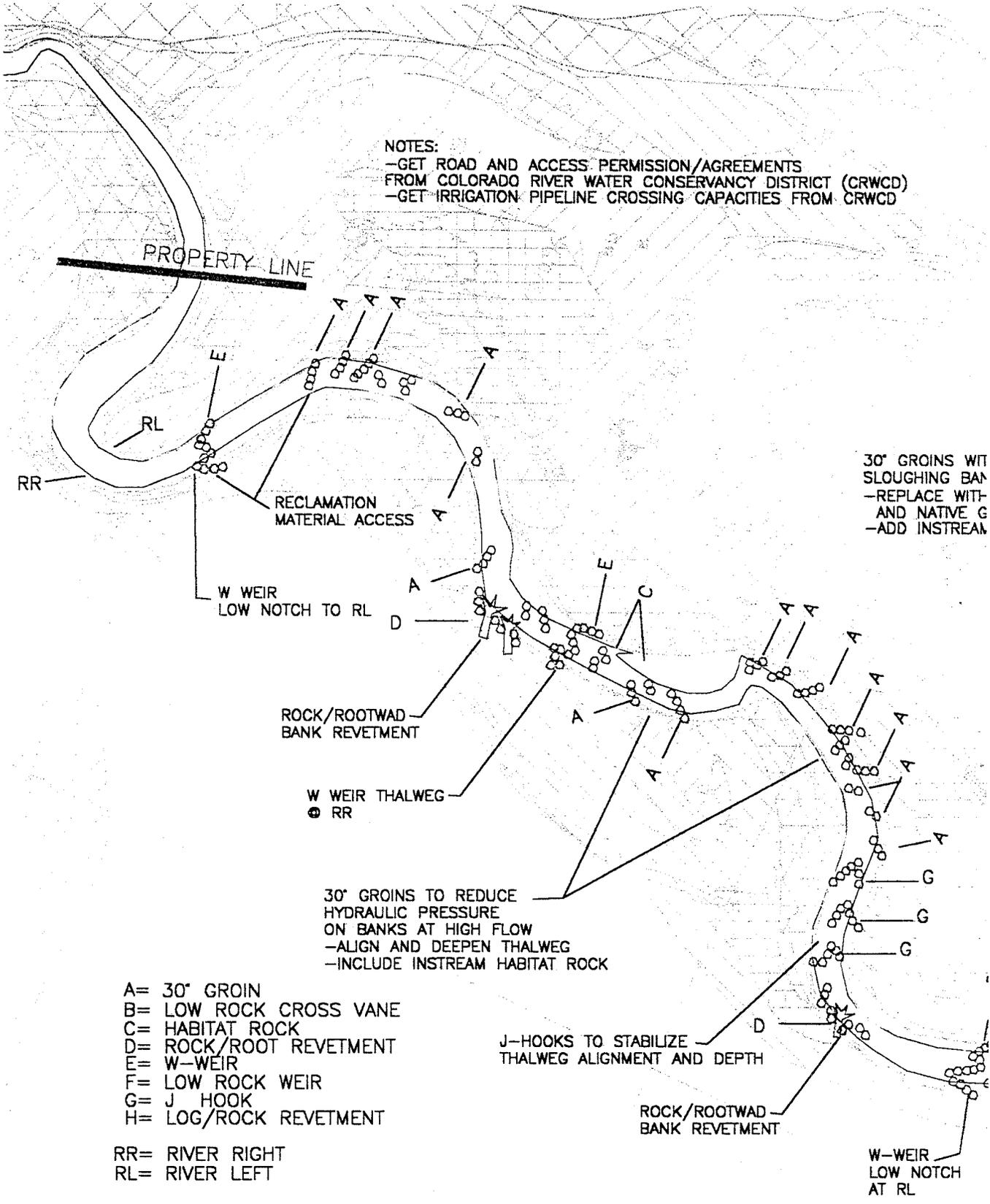


AMERICAN LAKE DOCTORS
 13810 N. 116TH
 LONGMONT, COLORADO 80501
 1-800-422-2514
(AN OFFICE OF STATE OF THE SOILS FOR CO., LLC)

REVISIONS		
NO.	DESCRIPTION	DATE

GALLAGHER RANCH
Muddy Creek Channel Stabilization
AND FISH HABITAT ENHANCEMENT

DESIGNED BY: JAC
 DRAWN BY: JAC
 CHECKED BY: JAC
 DATE: 10/18/00
 80-2891018.00
 1 of 2



NOTES:
 -GET ROAD AND ACCESS PERMISSION/AGREEMENTS FROM COLORADO RIVER WATER CONSERVANCY DISTRICT (CRWCD)
 -GET IRRIGATION PIPELINE CROSSING CAPACITIES FROM CRWCD

30° GROINS WIT SLOUGHING BAN
 -REPLACE WITH AND NATIVE G
 -ADD INSTREAM

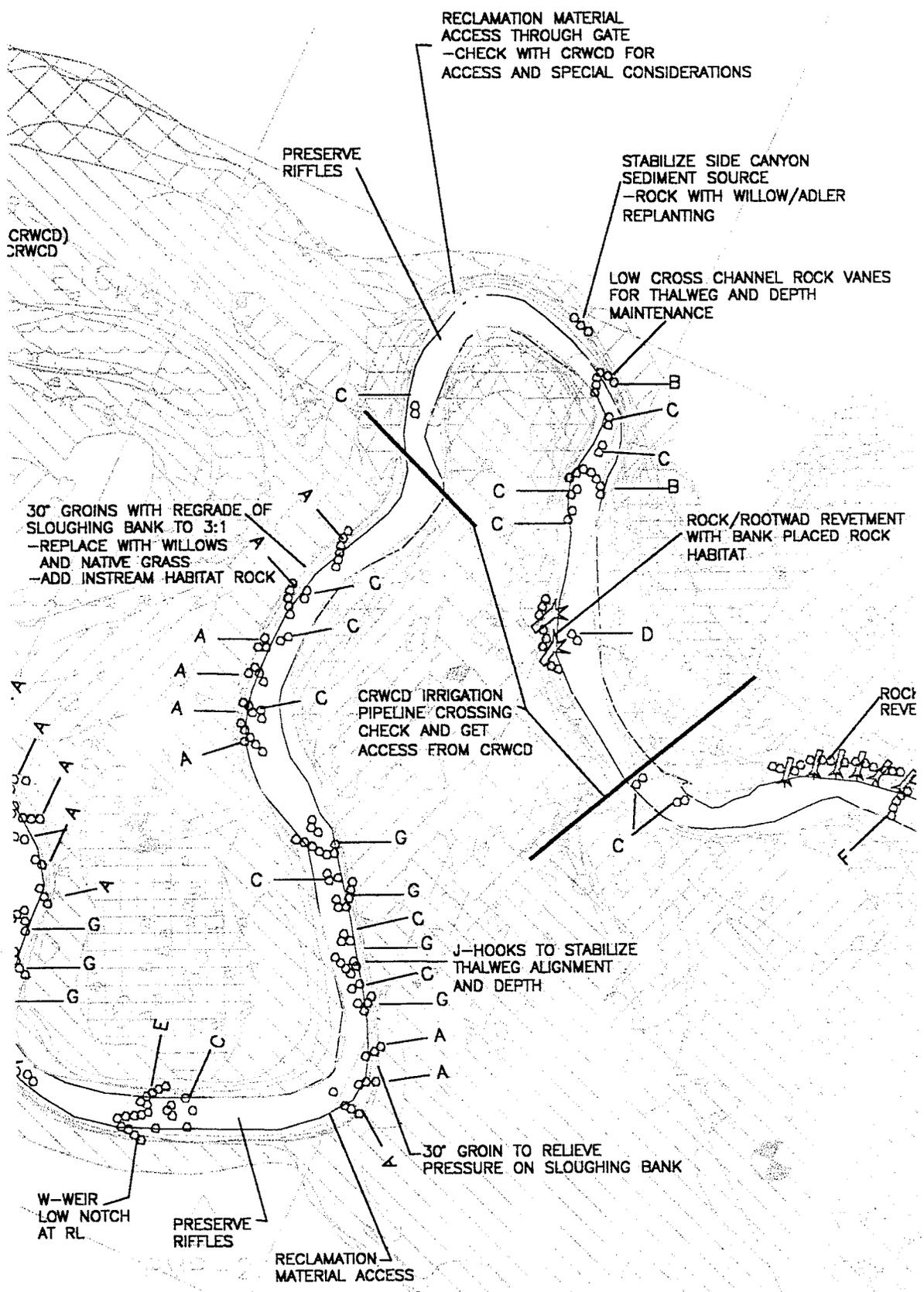
30° GROINS TO REDUCE HYDRAULIC PRESSURE ON BANKS AT HIGH FLOW
 -ALIGN AND DEEPEN THALWEG
 -INCLUDE INSTREAM HABITAT ROCK

- A= 30° GROIN
- B= LOW ROCK CROSS VANE
- C= HABITAT ROCK
- D= ROCK/ROOT REVETMENT
- E= W-WEIR
- F= LOW ROCK WEIR
- G= J HOOK
- H= LOG/ROCK REVETMENT

RR= RIVER RIGHT
 RL= RIVER LEFT

J-HOOKS TO STABILIZE THALWEG ALIGNMENT AND DEPTH

W-WEIR LOW NOTCH AT RL



RECLAMATION MATERIAL
ACCESS THROUGH GATE
-CHECK WITH CRWCD FOR
ACCESS AND SPECIAL CONSIDERATIONS

PRESERVE
RIFFLES

STABILIZE SIDE CANYON
SEDIMENT SOURCE
-ROCK WITH WILLOW/ADLER
REPLANTING

CRWCD)
CRWCD

LOW CROSS CHANNEL ROCK VANES
FOR THALWEG AND DEPTH
MAINTENANCE

30° GROINS WITH REGRADE OF
SLOUGHING BANK TO 3:1
-REPLACE WITH WILLOWS
AND NATIVE GRASS
-ADD INSTREAM HABITAT ROCK

ROCK/ROOTWAD REVETMENT
WITH BANK PLACED ROCK
HABITAT

CRWCD IRRIGATION
PIPELINE CROSSING
CHECK AND GET
ACCESS FROM CRWCD

ROCK
REVE

J-HOOKS TO STABILIZE
THALWEG ALIGNMENT
AND DEPTH

30° GROIN TO RELIEVE
PRESSURE ON SLOUGHING BANK

W-WEIR
LOW NOTCH
AT RL

PRESERVE
RIFFLES

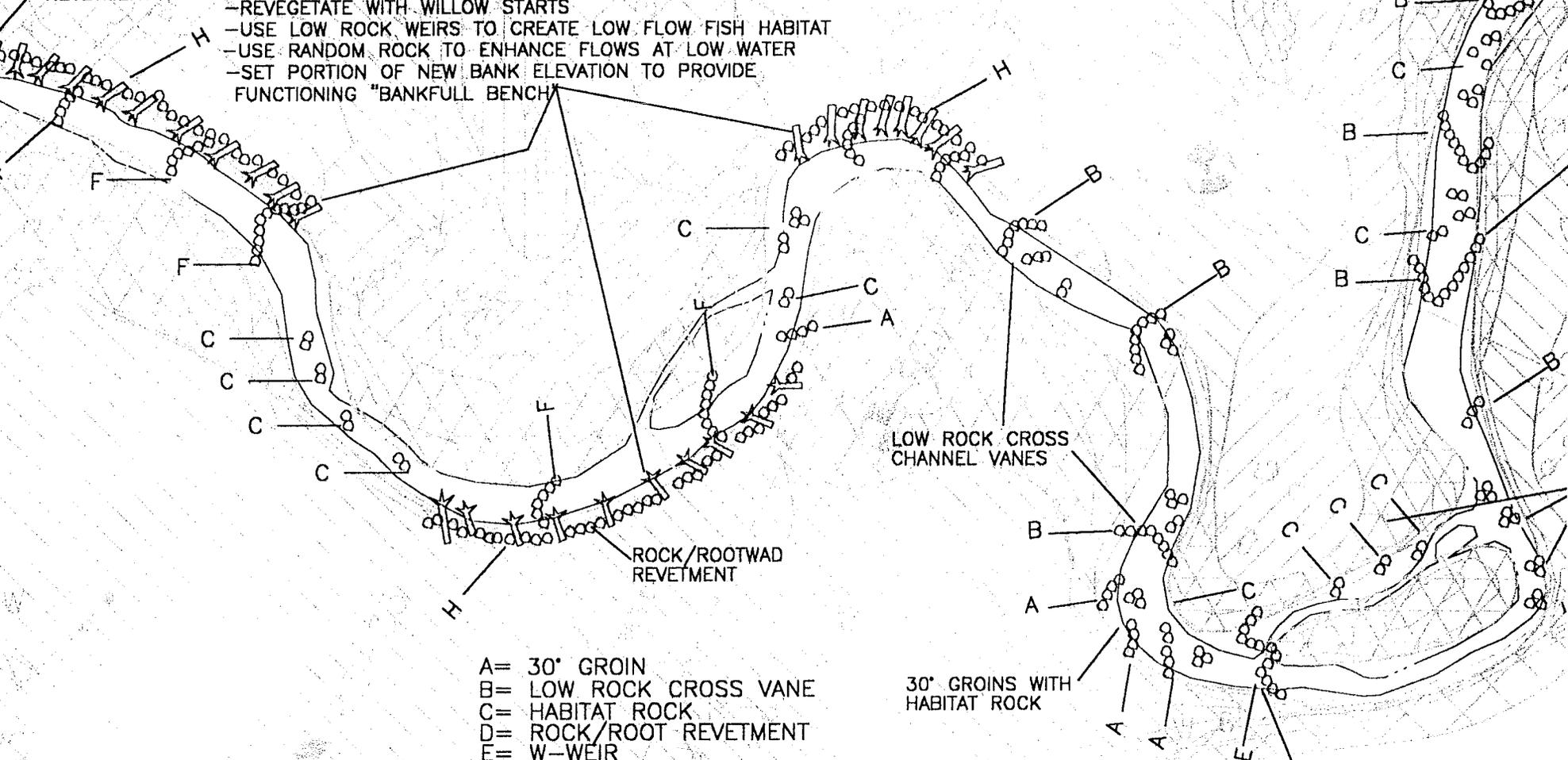
RECLAMATION
MATERIAL ACCESS

- A= 30° GROIN
 - B= LOW ROCK CROSS VANE
 - C= HABITAT ROCK
 - D= ROCK/ROOT REVETMENT
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5-6' VERTICAL MASS WASTING BANKS
 LOG/ROCK REVETMENT WITH RESHAPE OF BANK SLOPE

- APPLY GRASS MATS TO REGRADED 3-4:1 BANK-
- (MATCH MOISTURE CONTENT SOILS WITH ELEVATION)
- REPLANT WILLOW/ALDERS-MATURE
- REVEGETATE WITH WILLOW STARTS
- USE LOW ROCK WEIRS TO CREATE LOW FLOW FISH HABITAT
- USE RANDOM ROCK TO ENHANCE FLOWS AT LOW WATER
- SET PORTION OF NEW BANK ELEVATION TO PROVIDE FUNCTIONING "BANKFULL BENCH"

ROCK/ROOTWAD REVETMENT



LOW ROCK CROSS CHANNEL VANES

- A= 30° GROIN
- B= LOW ROCK CROSS VANE
- C= HABITAT ROCK
- D= ROCK/ROOTWAD REVETMENT
- E= W-WEIR
- F= LOW ROCK WEIR
- G= J HOOK
- H= LOG/ROCK REVETMENT

RR= RIVER RIGHT
 RL= RIVER LEFT

30° GROINS WITH HABITAT ROCK

W-WEIR WITH DISCHARGE NOTCHS SET TO SERVE NURSERY SIDE CHANNEL WITH PERMANENT WATER

STABILIZE SIDE CANYON
 SEDIMENT SOURCE
 -REGRADE ENTRANCE
 -PROVIDE ROCK RIM
 PLANTING BENCH
 -PLANT NATIVE WILLOWS,
 ALDERS, AND GRASSES

CROSS CHANNEL
 LOW ROCK VANES WITH HABITAT ROCK
 -ALIGN DEEPER THALWEG
 -EXTEND THALWEG LENGTH

SERIES OF LOW CROSS CHANNEL VANES
 -SET THALWEG DEPTH AT 3' BELOW BASE FLOW
 -ALIGN AND EXCAVATE THALWEG BETWEEN VANES
 -ADD VANES UPSTREAM WITH HABITAT ROCK

CROSS CHANNEL LOW ROCK
 VANES WITH HABITAT ROCK
 -INCREASE THALWEG LENGTH

PROPERTY LINE

RL
 RR

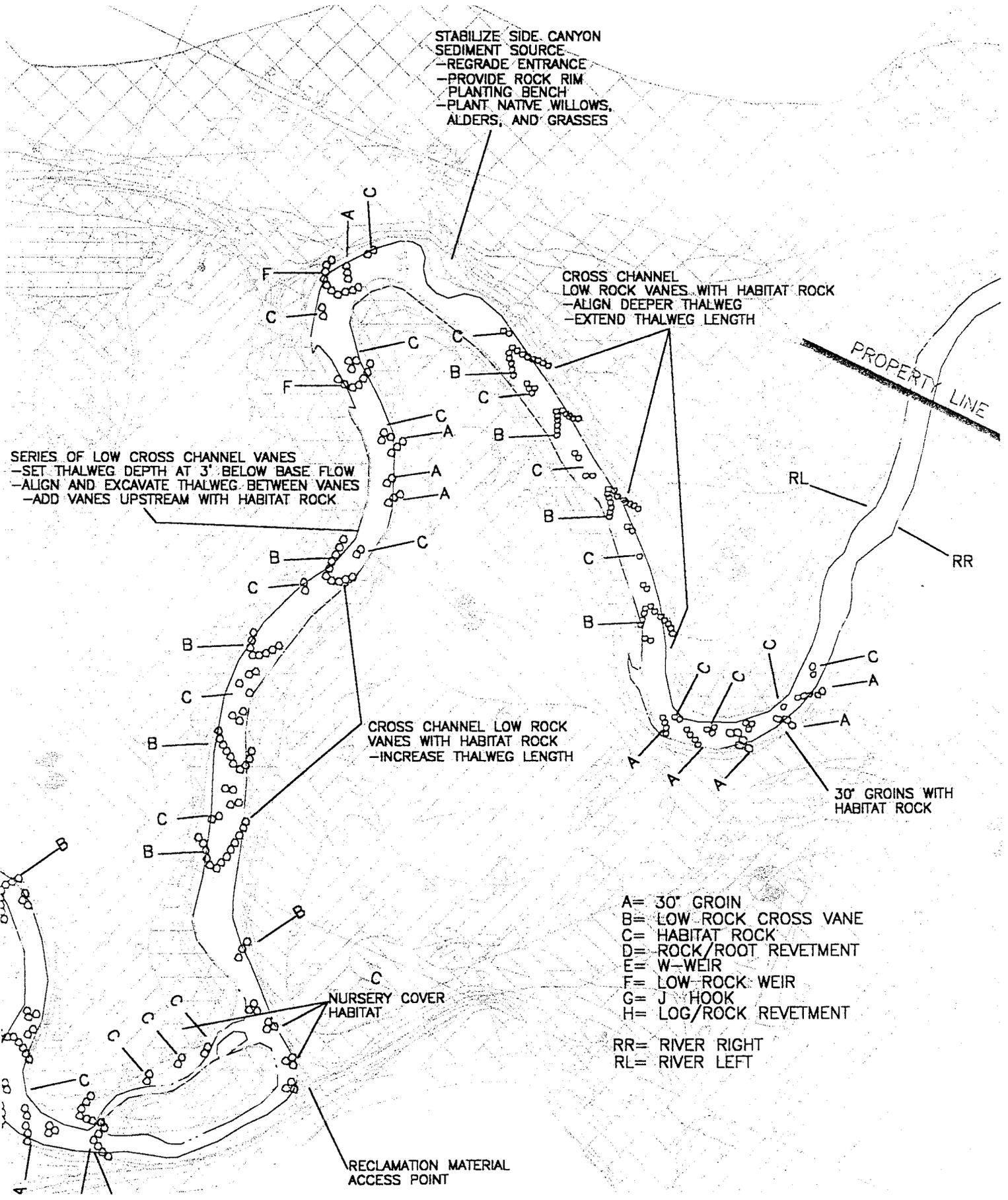
30° GROINS WITH
 HABITAT ROCK

NURSERY COVER
 HABITAT

RECLAMATION MATERIAL
 ACCESS POINT

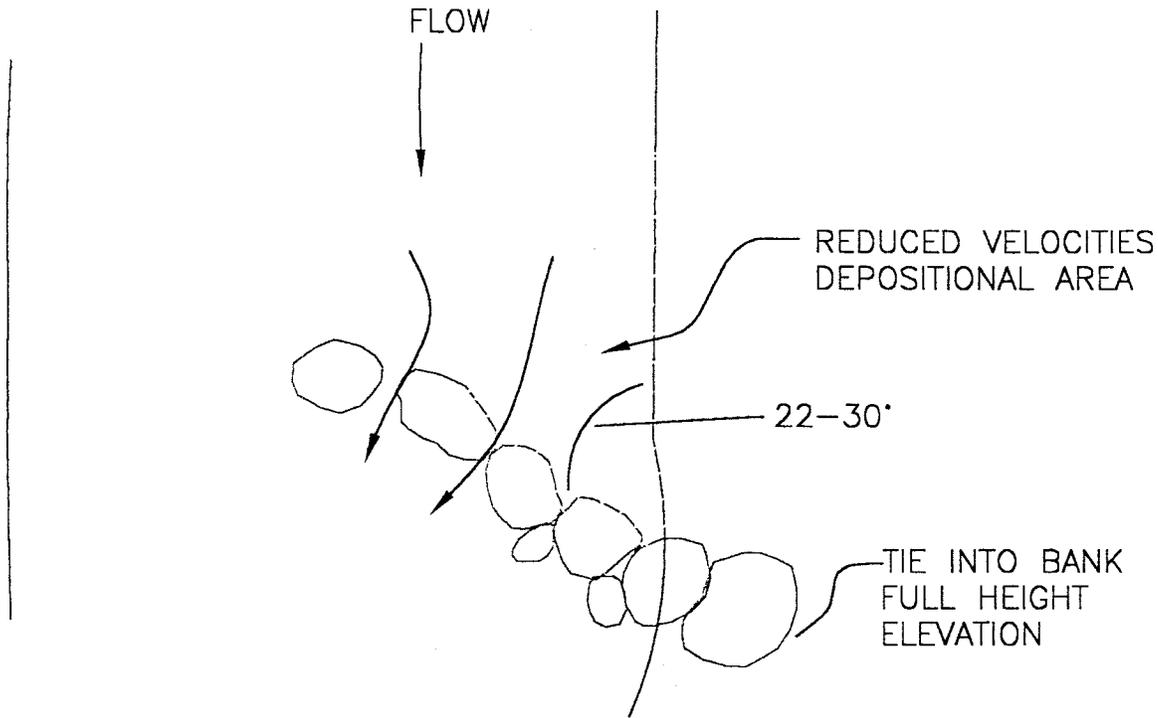
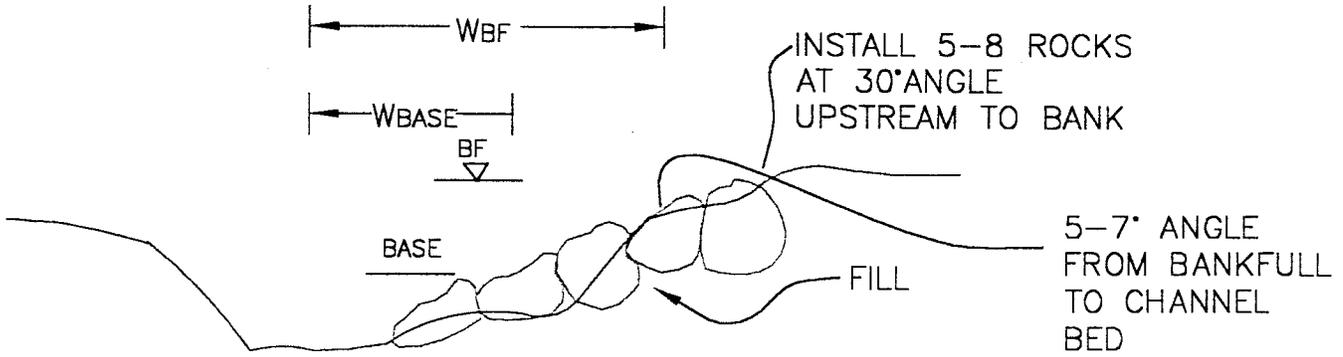
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- E= W-WEIR
- F= LOW ROCK WEIR
- G= J HOOK
- H= LOG/ROCK REVETMENT

RR= RIVER RIGHT
 RL= RIVER LEFT



A.

STRUCTURE FUNCTION: TO ALLOW SEDIMENT TRANSPORT NEAR BANK VELOCITIES ON UNARMORED BANKS AND INCREASE VELOCITIES AND SCOUR ON PROTECTED BANK. CREATE UNDERCUT BANKFILL HABITAT.



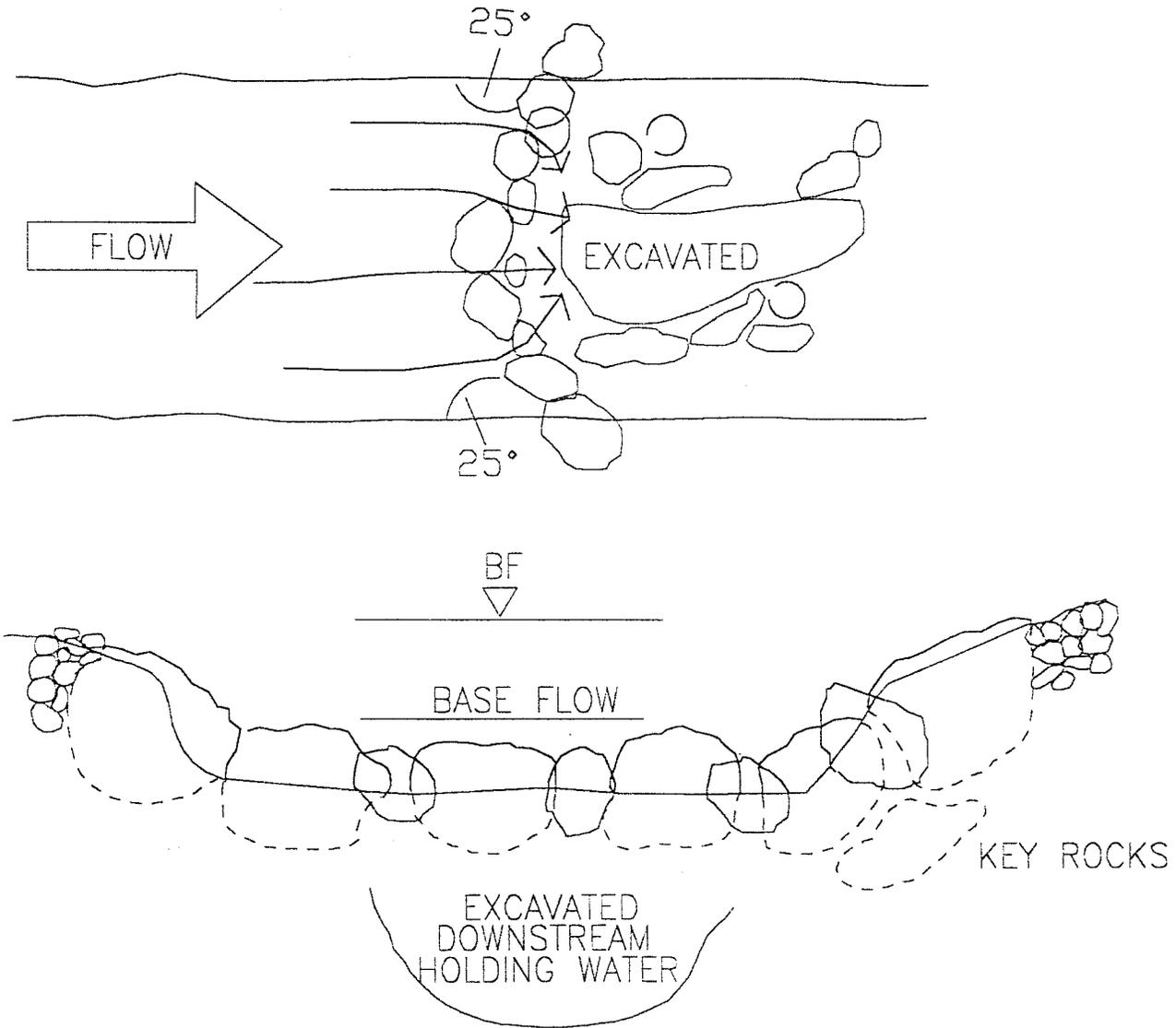
BF = OHWL

BANK STRUCTURES INSTALLED AND REINFORCED AT BANK FULL ELEVATION

30° UPSTREAM GROIN

B.

ROCKS IN VANE ARE KEYED INTO SUBSTRATE
WITHOUT GAPS IN BETWEEN

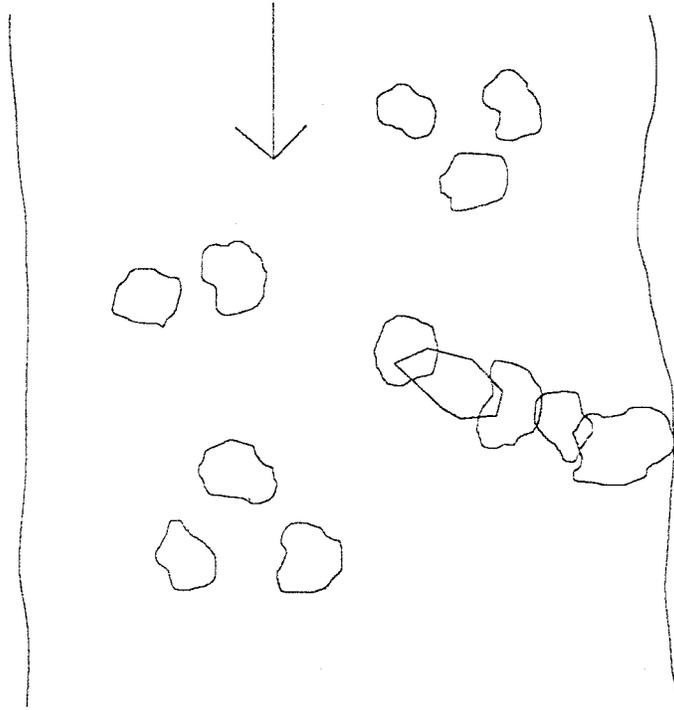


BANK STRUCTURES INSTALLED AND REINFORCED AT
BANK FULL ELEVATION

LOW ROCK VANE WITH RANDOM ROCK

C.

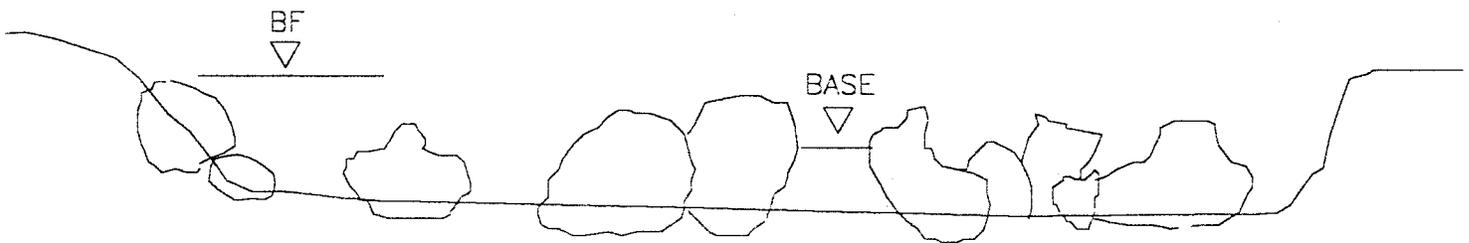
BANK STRUCTURES INSTALLED AND REINFORCED AT
BANK FULL ELEVATION



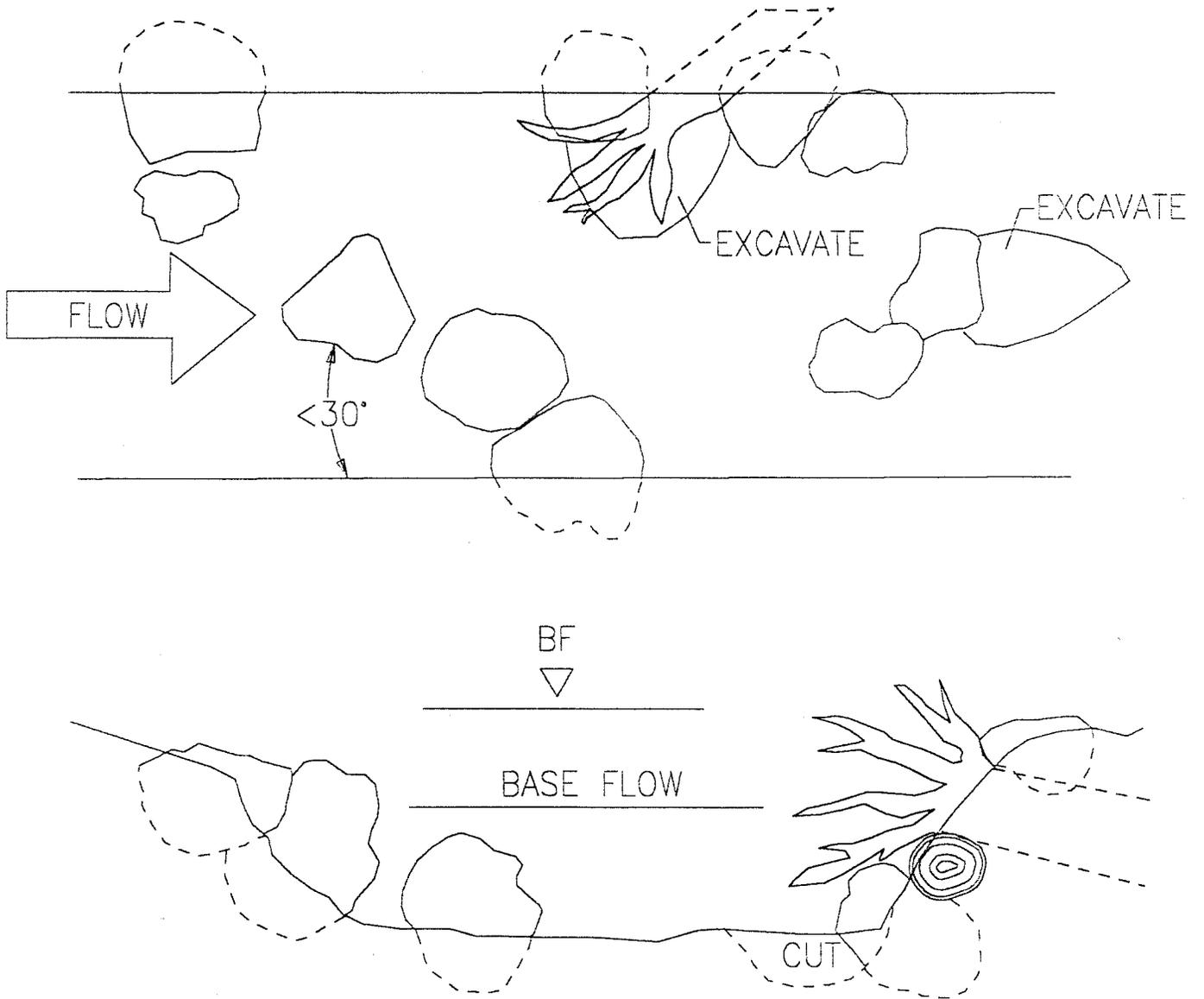
SOME CLUSTERS
TIGHT TO ALLOW
BACK UP OF STAGE
AND SLOW WATER
DOWNSTREAM

SOME CLUSTERS
INSTALLED WITH
GAPS BETWEEN
HABITAT ROCKS
TO ALLOW SEDIMENT
TRANSPORT

HABITAT ROCK RANDOM ROCK CLUSTERS



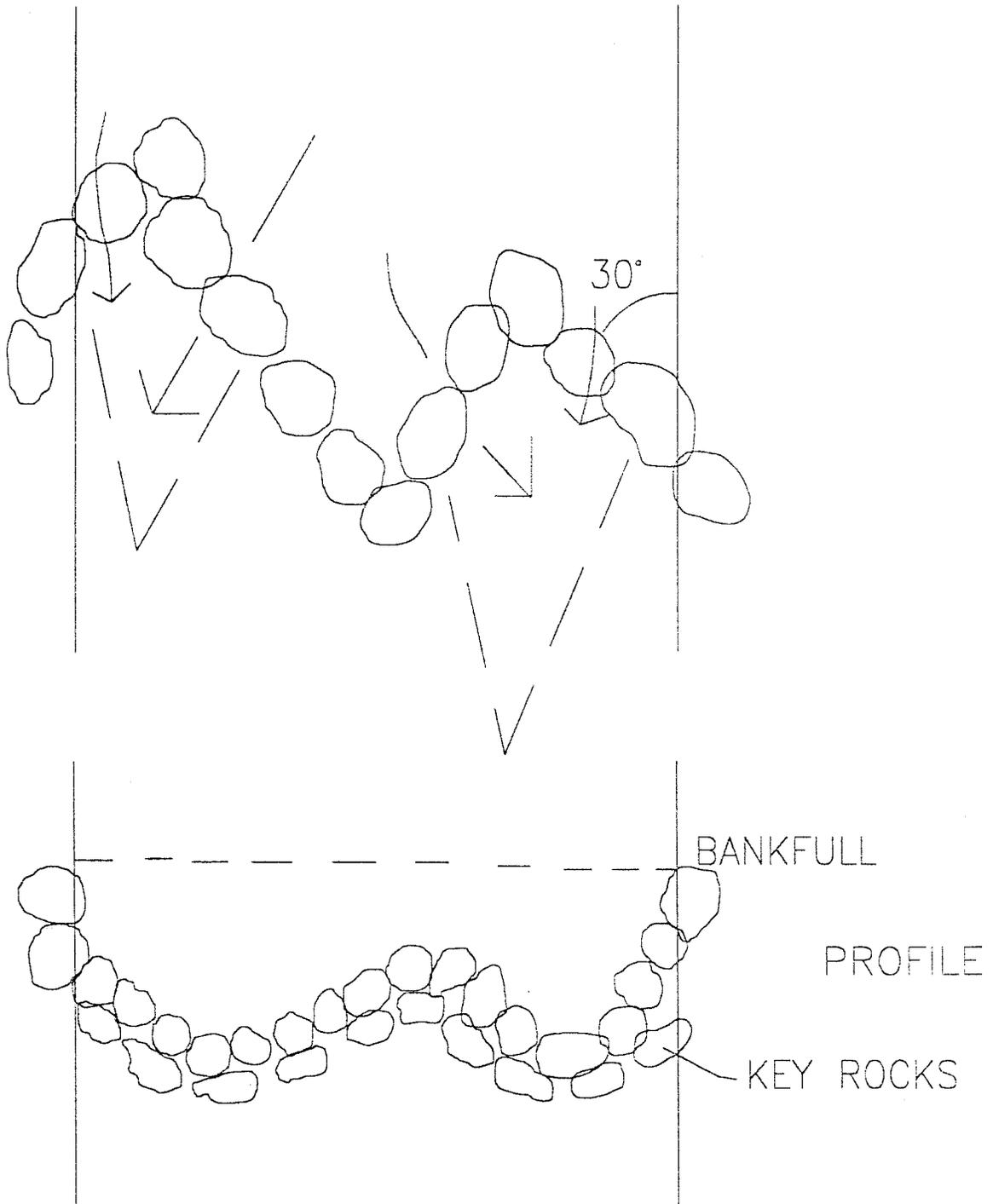
D.



BANK STRUCTURES INSTALLED AND REINFORCED AT
BANK FULL ELEVATION

BANK PLACED ROCK, ROCK/ROOTWAD
REVTMENT

E.

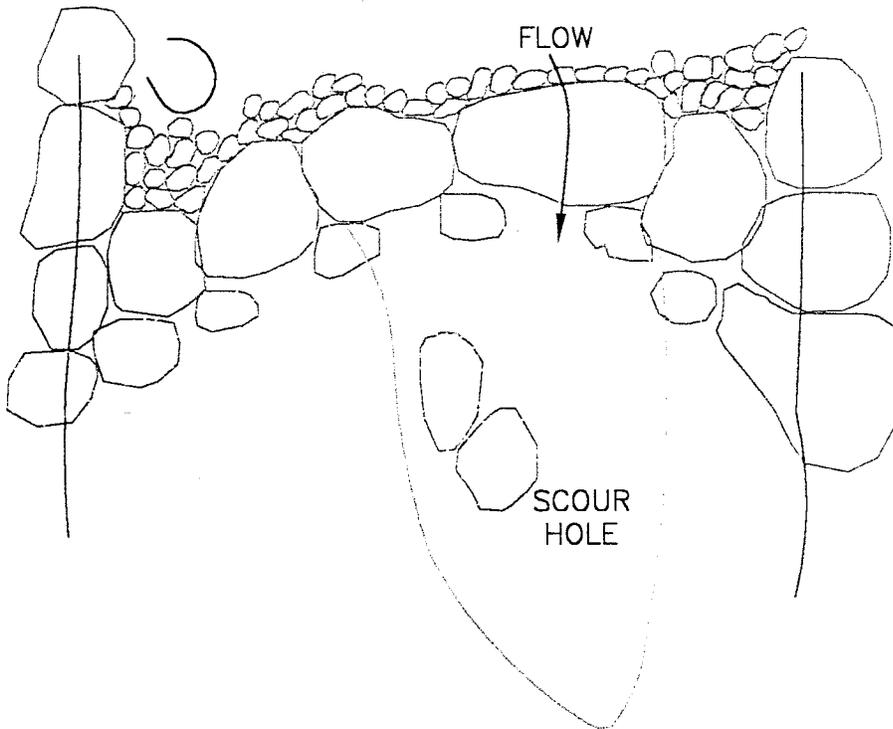
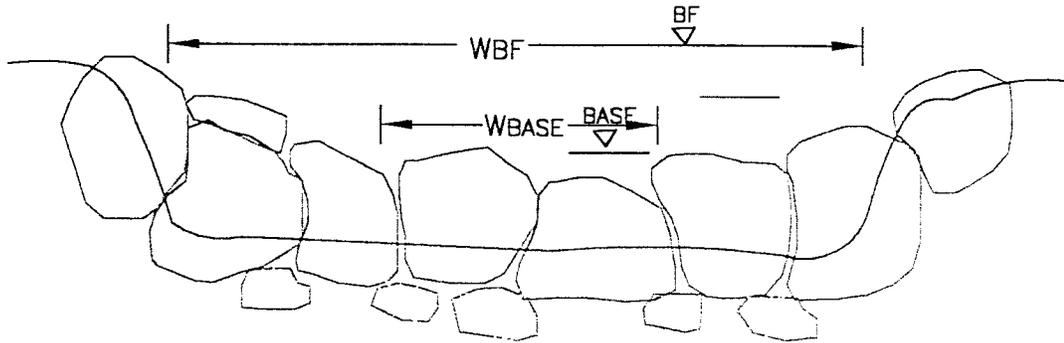


BANK STRUCTURES INSTALLED AND REINFORCED AT
BANK FULL ELEVATION

W-WEIR

F.

FUNCTION: GRADE CONTROL; SEDIMENT TRAP, DISSIPATE
STREAM ENERGY; CREATE SCOUR POOL.

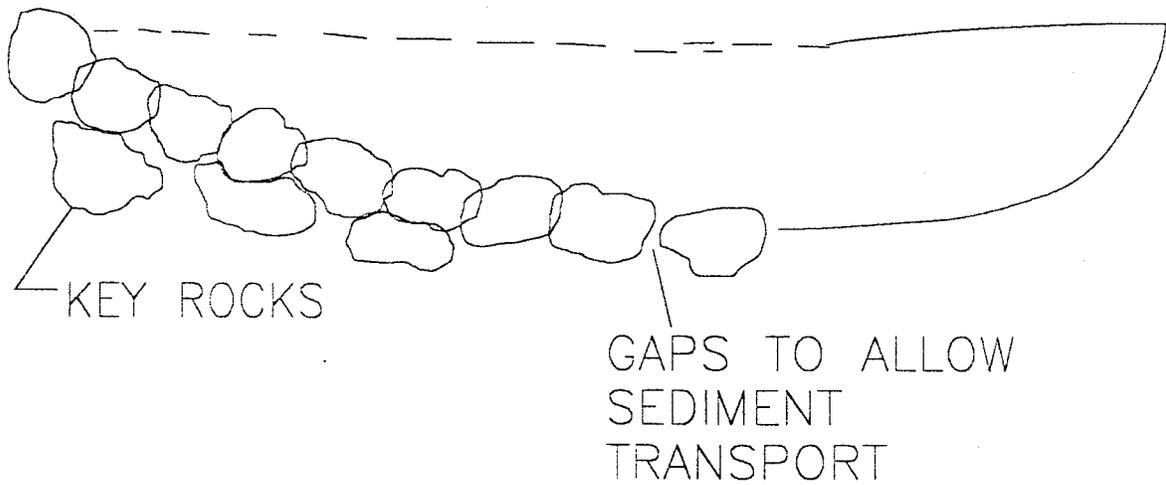
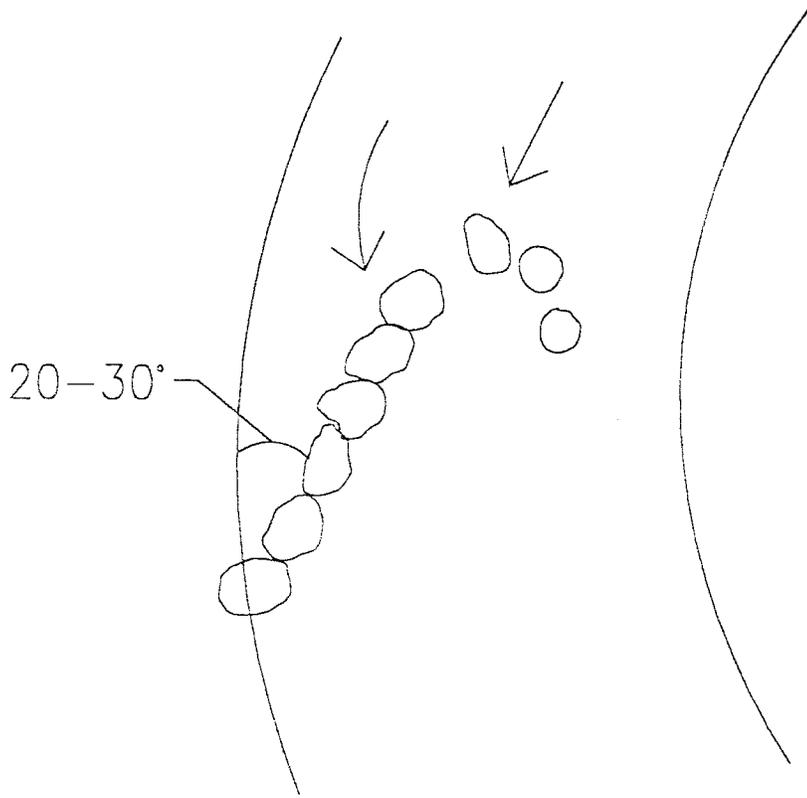


BF = OHWL

BANK STRUCTURES INSTALLED AND REINFORCED AT
BANK FULL ELEVATION

UPSTREAM CRESENT LOW ROCK WEIR

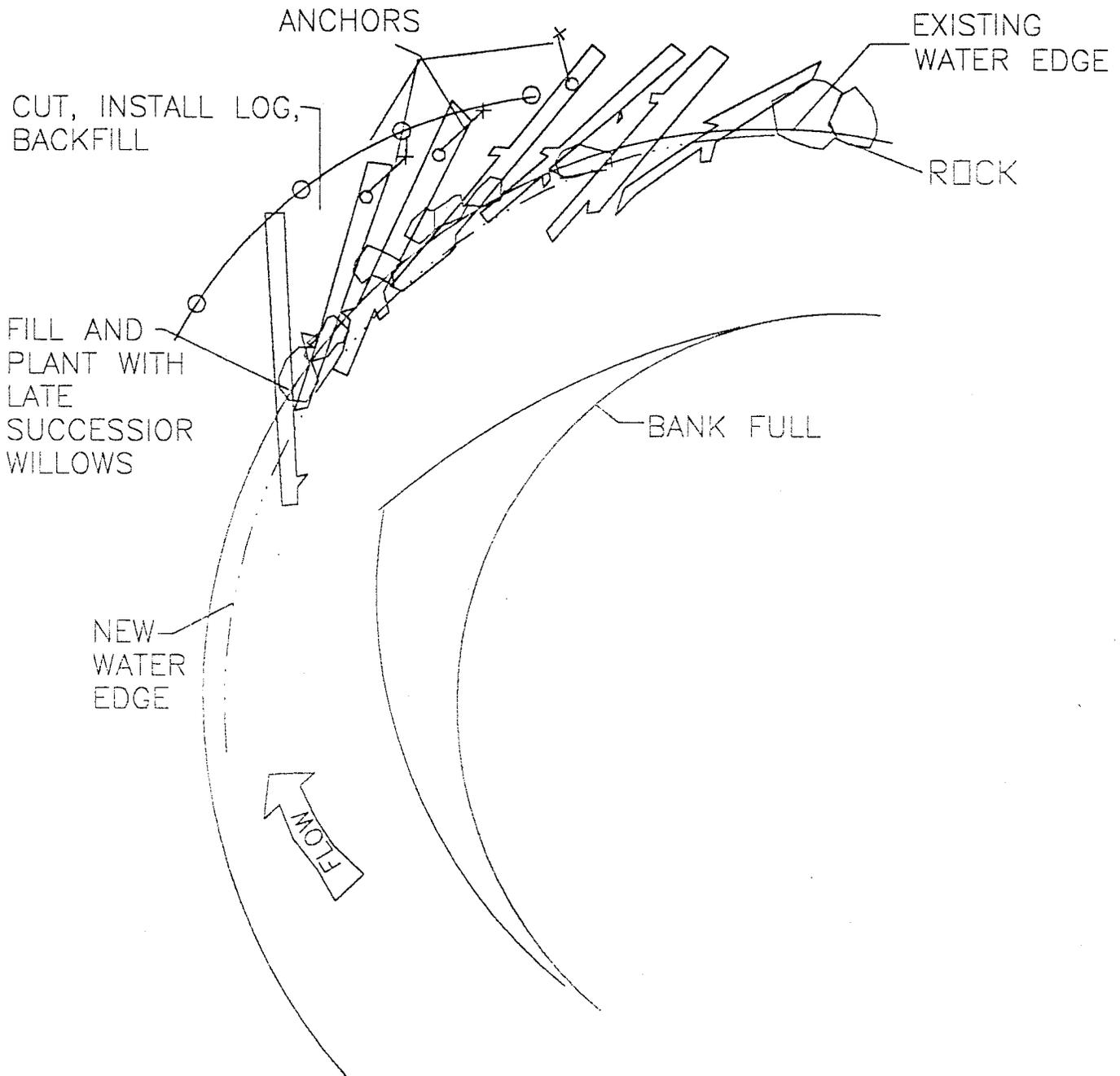
G.



BANK STRUCTURES INSTALLED AND REINFORCED AT BANK FULL ELEVATION

J-HOOK VANE

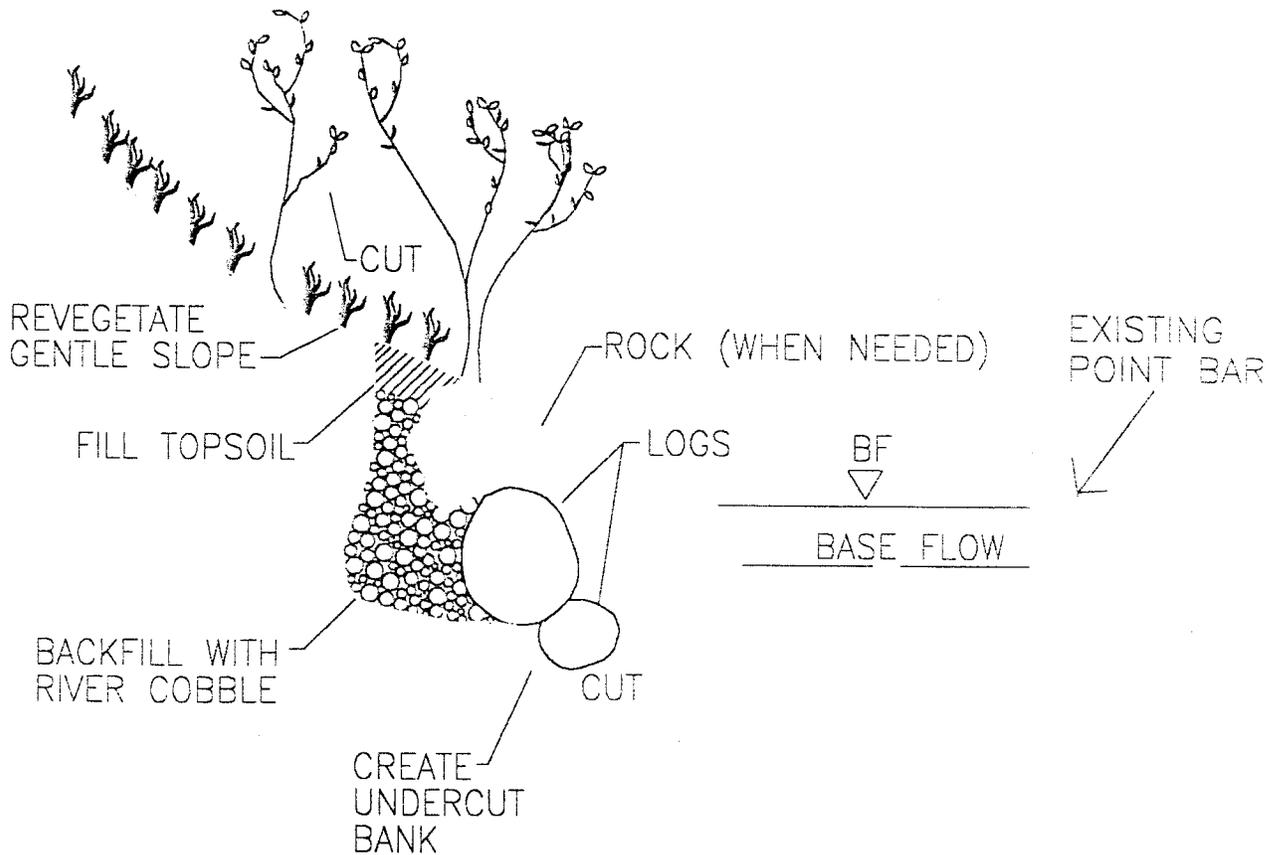
H1.



BANK STRUCTURES INSTALLED AND REINFORCED AT BANK FULL ELEVATION

LOG OVERLAP REVETMENT—
LONGITUDINAL LAYOUT USED TO
RECLAIM BANK SLOPE ON
MASS WASTING VERTICAL BANKS

H2.



BANK STRUCTURES INSTALLED AND REINFORCED AT BANK FULL ELEVATION

LOG OVERLAP REVETMENT—PROFILE

FUNCTIONS TO ELIMINATE VERTICAL MASS WASTING BANK ON OUTSIDE OF MEANDER AND ENHANCE USE OF POINT BAR BY RIVER DURING NORMAL FLOW EVENTS. REDUCES EROSION FROM MASS WASTING BANK AND ENHANCES DEPOSITION IN FLOODPLAIN ON AND ADJACENT TO POINT BAR.