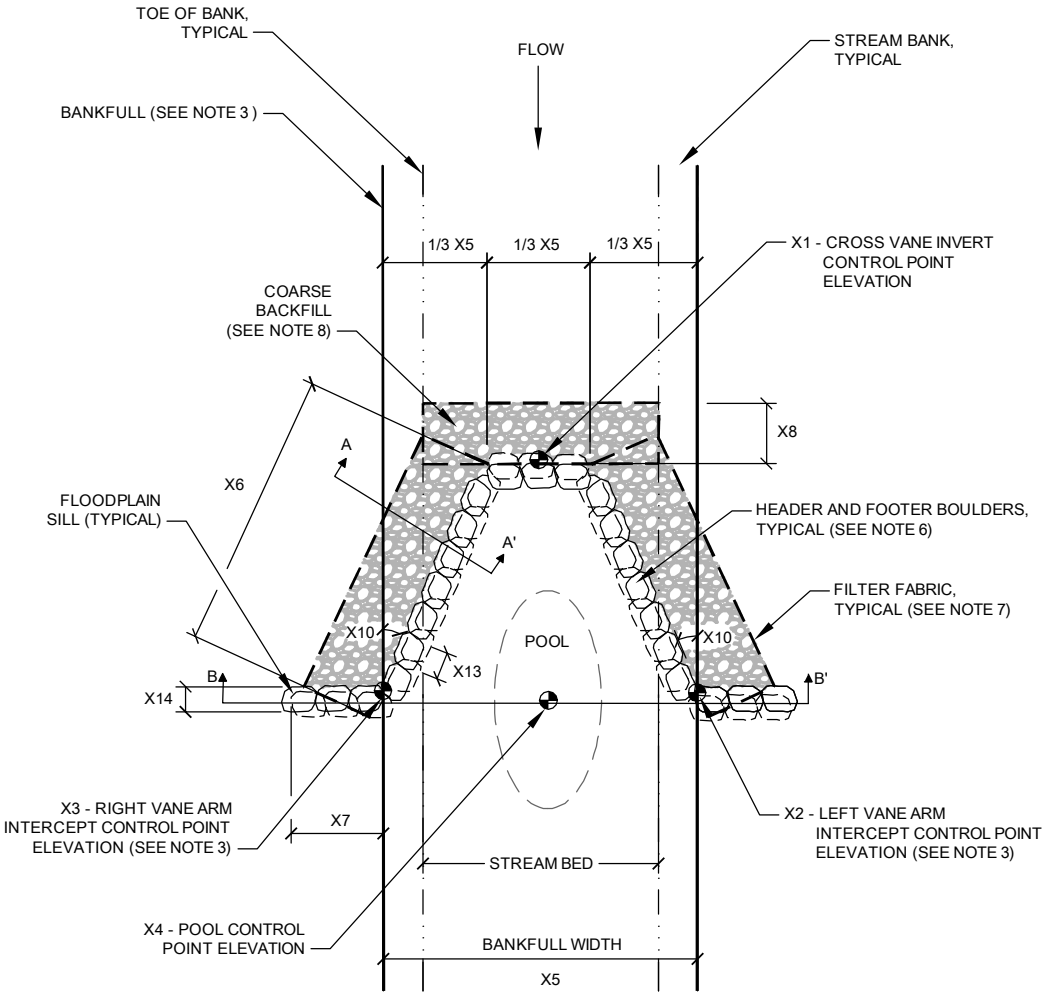
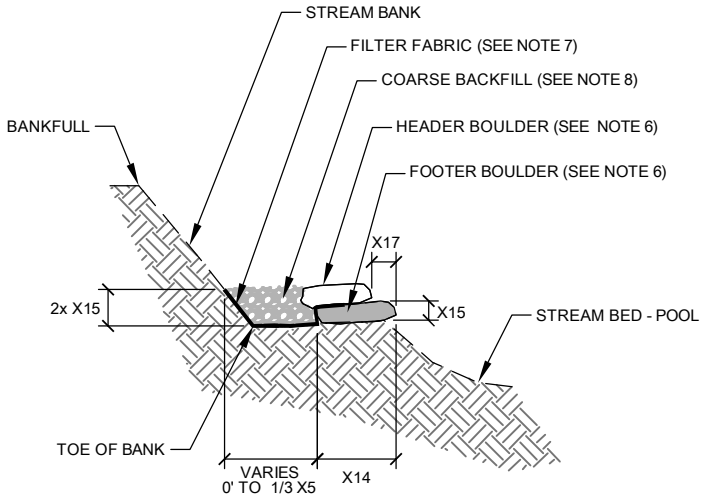


PLAN VIEW

PHOTO: CROSS VANE PLAN VIEW



VANE ARM SECTION A - A'

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NOT TO SCALE

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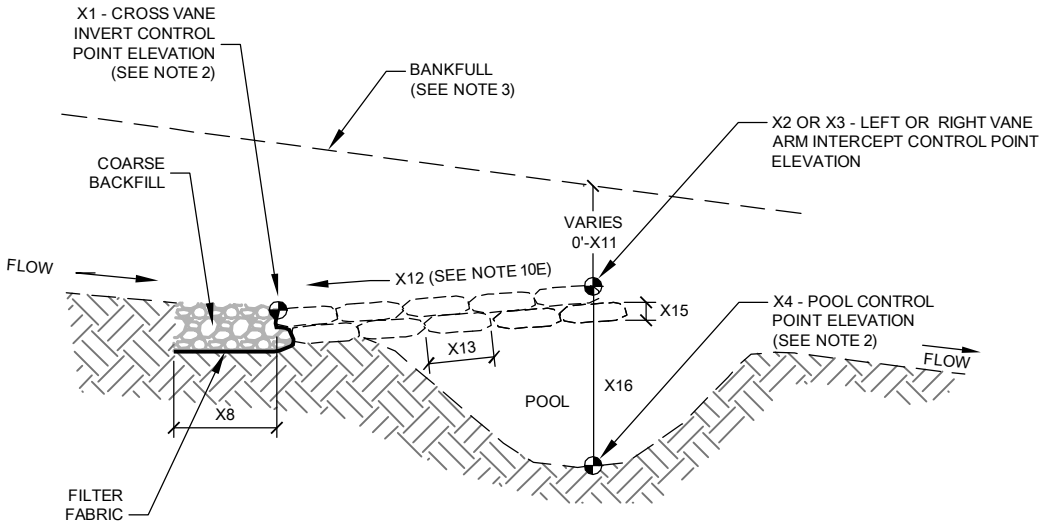
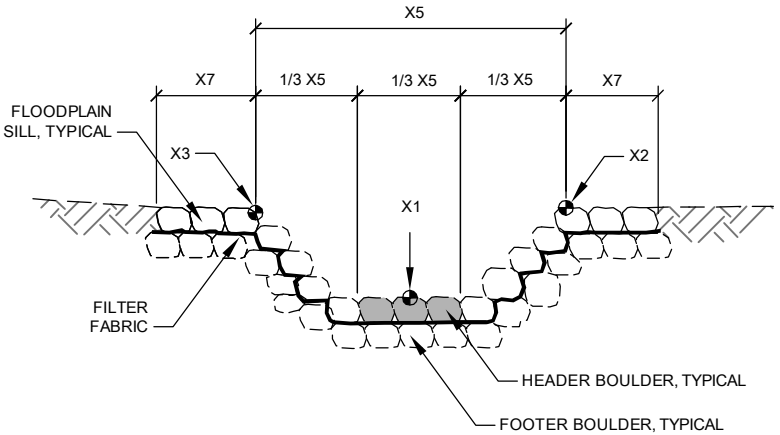


PROFILE VIEW

PHOTO: CROSS VANE PROFILE VIEW



CROSS SECTION B-B'

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DIMENSIONS (VALUES TO BE PROVIDED BY DESIGNER)			
VARIABLE	**VALUES**	**TYPICAL UNIT**	**DESCRIPTION**
X1		FT. (NAVD)	CROSS VANE INVERT CONTROL POINT ELEVATION
X2		FT. (NAVD)	LEFT VANE ARM INTERCEPT CONTROL POINT ELEVATION
X3		FT. (NAVD)	RIGHT VANE ARM INTERCEPT CONTROL POINT ELEVATION
X4		FT. (NAVD)	POOL CONTROL POINT ELEVATION
X5		FT.	BANKFULL WIDTH
X6		FT.	VANE ARM LENGTH
X7		FT.	FLOODPLAIN SILL LENGTH
X8		FT.	LENGTH OF COARSE BACKFILL
X9		IN.	D50 OF COARSE BACKFILL
X10		DEGREES	VANE ARM ANGLE WITH STREAM BANK
X11		IN. OR FT.	DIFFERENCE BETWEEN TOP OF BANK (BANKFULL) AND VANE ARM INTERCEPT POINT
X12		PERCENT	VANE ARM SLOPE
X13		IN. OR FT.	BOULDER LENGTH
X14		IN. OR FT.	BOULDER WIDTH
X15		IN. OR FT.	BOULDER THICKNESS
X16		FT.	MAXIMUM POOL DEPTH
X17		IN.	HEADER BOULDER SET BACK

NOTES:

1. A BOULDER CROSS VANE IS A GRADE CONTROL, IN-STREAM STRUCTURE THAT DIRECTS STREAM FLOW AWAY FROM THE STREAM BANKS AND IN TOWARD THE CENTER OF THE CHANNEL.
2. ELEVATION CONTROL POINTS SHALL BE DESIGNATED AT THE UPSTREAM INVERT (CENTER) OF THE CROSS VANE TO ESTABLISH PART OF THE PROFILE. POOL ELEVATION CONTROL POINTS OR EXCAVATION TO A SPECIFIED MAXIMUM POOL DEPTH SHALL BE DESIGNATED TO ESTABLISH THE REMAINING PROFILE. SURVEY OF CONTROL POINTS SHALL BE REQUIRED TO ESTABLISH ACCURATE CROSS VANE INSTALLATION WITHIN THE TOLERANCE SPECIFIED BY THE DESIGNER.
3. THE VANE ARM SHALL INTERCEPT THE STREAM BANK AT A HEIGHT EQUAL TO BETWEEN ½ BANKFULL STAGE AND BANKFULL STAGE. ELEVATION CONTROL POINTS MAY BE ESTABLISHED AT THE LEFT AND RIGHT STREAM BANK/VANE ARM INTERCEPT POINTS. THE VANE ARM INTERCEPT LOCATION MAY BE OTHERWISE DESCRIBED BY ITS RELATIONSHIP TO BANKFULL STAGE OR BY THE LENGTH AND SLOPE OF THE VANE ARM. BANKFULL IS NOT NECESSARILY THE TOP OF THE STREAM BANK SLOPE.
4. IF PLANS DESIGNATE THE USE OF MULTIPLE BOULDER CROSS VANES , A TABLE OF ALL STATION LOCATIONS AND CONTROL POINT ELEVATIONS SHALL BE PROVIDED IN THIS DETAIL OR PROVIDED ELSEWHERE IN THE PLANS AND REFERENCED HEREIN.
5. TYPICAL RIFFLE AND POOL CROSS SECTIONS SHALL BE PROVIDED ELSEWHERE IN THE PLANS TO ESTABLISH THE DIMENSIONS OF THE CHANNEL GRADING INTO WHICH THE BOULDER CROSS VANES ARE TO BE INSTALLED.
6. THE CROSS VANE SHALL BE CONSTRUCTED WITH FLAT-SIDED BOULDERS OF A SIZE (LENGTH, WIDTH, AND DEPTH) AS SPECIFIED BY THE DESIGNER.
7. FILTER FABRIC OF A TYPE AND SIZE SPECIFIED BY THE DESIGNER SHALL BE USED TO SEAL THE GAPS BETWEEN THE BOULDERS AND UNDER THE COARSE BACKFILL MATERIAL. THERE SHALL BE NO FILTER FABRIC VISIBLE IN THE FINISHED WORK; EDGES SHALL BE FOLDED, TUCKED, OR TRIMMED AS NEEDED.
8. COARSE BACKFILL OF THE BOULDER CROSS VANE SHALL BE OF A TYPE, SIZE, AND GRADATION AS SPECIFIED BY THE DESIGNER. COARSE BACKFILL SHALL BE PLACED TO A THICKNESS EQUAL TO THE DEPTH OF THE HEADER AND FOOTER BOULDERS AND SHALL EXTEND OUT FROM THE VANE ARMS TO THE STREAM BANK AND UPSTREAM A DISTANCE SPECIFIED BY THE DESIGNER.
9. THE INVERT (CENTER) OF THE BOULDER CROSS VANE SHALL BE CONSTRUCTED FIRST, FOLLOWED BY ONE VANE ARM AND THEN THE OTHER VANE ARM. THE FLOODPLAIN SILLS SHALL BE CONSTRUCTED LAST.
10. BOULDER CROSS VANE SHALL BE BUILT TYPICALLY AS FOLLOWS:
    - A. OVER-EXCAVATE STREAM BED TO A DEPTH EQUAL TO THE TOTAL THICKNESS OF THE HEADER AND FOOTER BOULDERS.
    - B. PLACE FOOTER BOULDERS. THERE SHALL BE NO GAPS BETWEEN BOULDERS.
    - C. INSTALL FILTER FABRIC.
    - D. PLACE COURSE BACKFILL BEHIND THE FOOTER BOULDERS.
    - E. INSTALL HEADER BOULDERS ON TOP OF AND SET SLIGHTLY BACK FROM THE FOOTER BOULDERS (SUCH THAT PART OF THE HEADER BOULDER IS RESTING ON THE COARSE BACKFILL). HEADER BOULDERS SHALL SPAN THE SEAMS OF THE FOOTER BOULDERS. THERE SHALL BE NO GAPS BETWEEN BOULDERS. THE SLOPE OF THE VANE ARM IS MEASURED ALONG THE VANE ARM WHICH IS INSTALLED AT AN ANGLE TO THE STREAM BANK AND PROFILE.
    - F. PLACE COARSE BACKFILL BEHIND HEADER BOULDERS ENSURING THAT ANY VOIDS BETWEEN THE BOULDERS ARE FILLED.
11. IF ANY EROSION CONTROL MATTING IS SPECIFIED FOR USE IN THE VICINITY OF THE VANE ARM INTERCEPT POINTS AND FLOODPLAIN SILLS ALL MATTING EDGES SHALL BE NEATLY SECURED AROUND THE BOULDERS.

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NOT TO SCALE

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