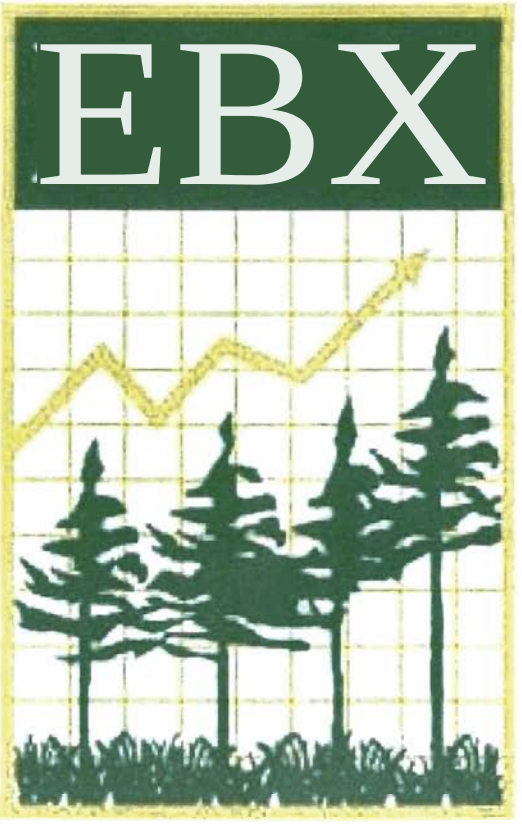
Neu-Con Umbrella Wetland and Stream Mitigation Bank

Casey/King Wetland Mitigation Site
As-Built Report



Environmental Banc & Exchange, LLC
Managers, Bankers, and Traders of Environmental Rights

"Finding Environmental Solutions through Economic Incentives"

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SUMMARY

This report is submitted to document completion of construction on the Casey/King wetland mitigation site, and to provide a description of the construction activities. This report will also serve as a baseline for future monitoring reports to be submitted pursuant to the requirements set forth in the Neu-Con Mitigation Banking Instrument (MBI).

The design for the Casey/King property involved the restoration of mainly a "non-riverine wet hardwood forest" and a small portion of "Coastal Plain small stream swamp", as described by Schafale and Weakley, 1990. Restoration involved the filling of drainage ditches and topographic manipulation to raise the local water table and restore site hydrology. Surface water flow was routed from the upstream end of the site through a series of wide saturated swamp flats connected by more narrow areas of shallow flow following multi-thread channels. At the downstream end of the site, several natural grade control structures were used to create a step-pool section of channel to connect flow from the restored wetland with the existing channel of Heath Branch downstream.

All grading activities and restoration practices were completed on March 7, 2002. Planting of bare root trees was completed on March 19, 2002. A total of 37.3 acres of wetland were restored on the site. Initial site observations and well data indicate that the site is performing as a wetland system.

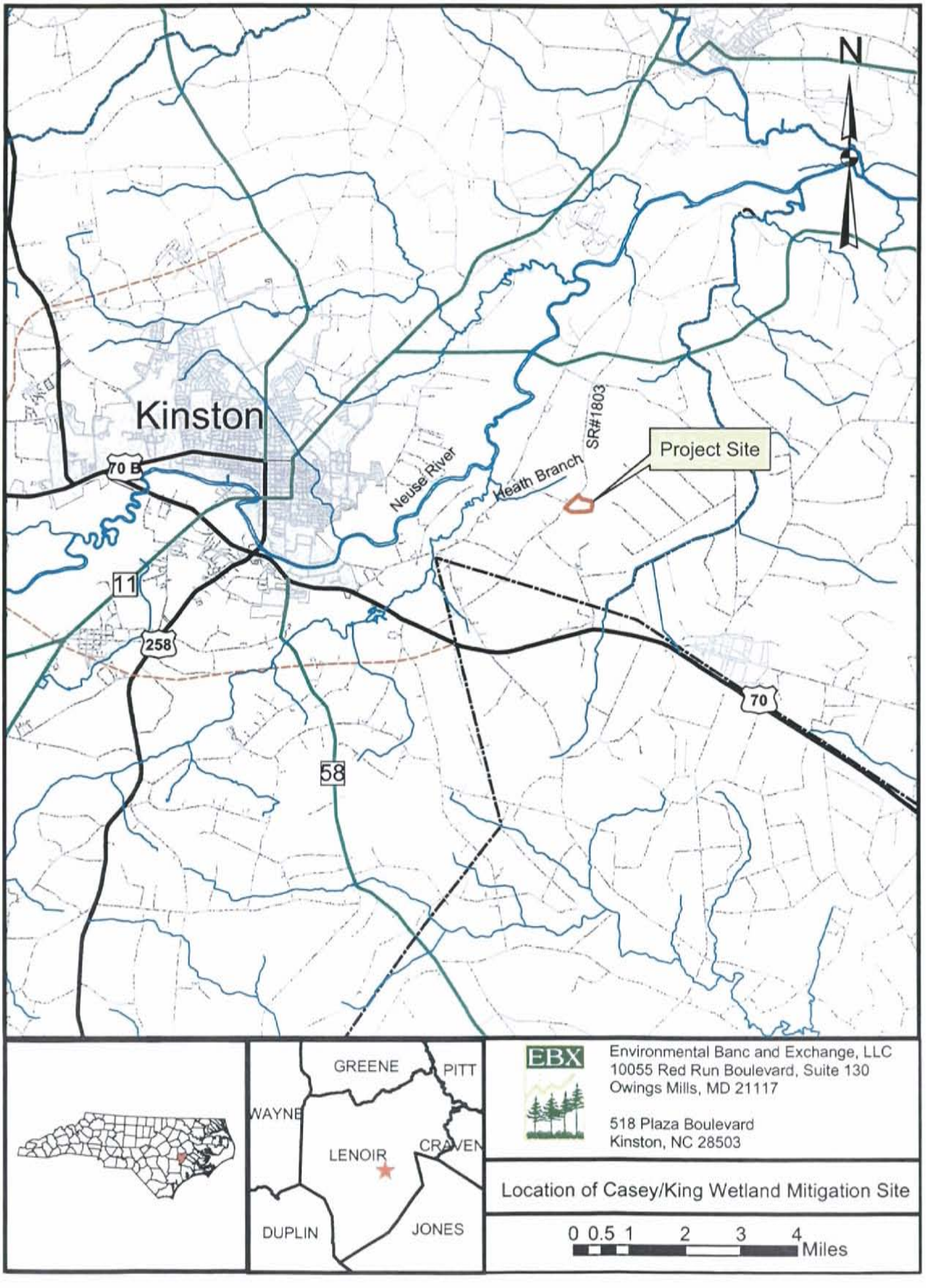
INTRODUCTION

The Casey/King wetland mitigation site is located in Lenoir County, approximately four (4) miles east of the town of Kinston, North Carolina. The site has a past history of agricultural use, consisting primarily of row crop agriculture. Approximately 10,900 ft of ditches existed on the site prior to restoration and were used to promote drainage when the land was under agricultural production. The entire tract, owned by the bank sponsor, is approximately 81 acres in size.

The design for the Casey/King property involved the restoration of a "non-riverine wet hardwood forest" and a small portion of "Coastal Plain small stream swamp", as described by Schafale and Weakley (1990). The wet hardwood flats are dominated by bottomland hardwood species that are found on flats not typically flooded by rivers or tides. These communities may grade to small stream swamp at the head of drainages. The coastal plain small stream swamp communities exist as the floodplains of small blackwater streams in which separate fluvial features and associated vegetation are too small or poorly developed to distinguish.

Table 1. Project History

May 2000	Monitoring Wells Installed
Fall 2001	Approved Mitigation Plan, Monitoring Wells Installed
December 17, 2001	Construction Began
March 7, 2002	Construction Completed
March 19, 2002	Planting Completed
March 19, 2002	Post-Construction Monitoring Wells Installed
November 30, 2002 (scheduled)	1st Monitoring Report


N
Kinston
70 B
11
258
58
70
Neuse River
Heath Branch
SR#1803
Project Site
GREENE
PITT
WAYNE
LENOIR
CRAVEN
DUPLIN
JONES
EBX
Environmental Banc and Exchange, LLC
10055 Red Run Boulevard, Suite 130
Owings Mills, MD 21117
518 Plaza Boulevard
Kinston, NC 28503
Location of Casey/King Wetland Mitigation Site
0 0.5 1 2 3 4
Miles

AS-BUILT REPORT

Construction

Construction of the site commenced on December 17, 2001. Initial activities included minor grading in areas away from channels and ditches to achieve design grades. Cut soil material was stockpiled near existing drainage ditches on site which would later be filled. Excess cut material was spread as spoil in the areas shown on the as-built drawing. After rough grading had been completed in an area, stockpiled soil was used to fill the drainage ditches and the area was smoothed to reach design grades.

On the eastern side of the site, three lateral ditches ran from east to west through the fields. These ditches were blocked on the downstream end to raise the local water table. In the upstream locations where the channel blocks began, new level spreader ditches were cut along the topographic contour to distribute water to the hydric soil areas at a higher elevation.

The main drainage ditch through the site was filled and the bottomland area was graded to restore a series of wide saturated areas connected by more narrow areas of shallow flow following multi-thread channels. At the downstream end of the main drainage ditch, four rock cross-vane structures were constructed to connect the restored wetland with the channelized ditch system downstream, before flowing underneath NCSR 1803 (British Road). A typical design detail for the cross-vane structures is provided in Appendix B, and several pictures of the cross-vanes, during construction and after completion, are provided in Appendix A.

After grading activities were completed across the site, tillage equipment was used to rough the site, breaking any plow pans and increasing surface storage. A dirt access road was constructed around the northern and eastern edge of the property (outside the restoration area). Permanent culverts were installed to cross drainage ditches in the locations shown on the as-built drawing. Prior to demobilization of construction equipment from the site, erosion control matting, mulch, and temporary seeding were used to stabilize any areas of disturbed soil that were susceptible to erosion.

Vegetation

Construction was completed on March 7, 2002. Planting of bare root trees and spreading of the permanent seed mixture was completed on March 19, 2002. Two distinct wetness zones were delineated after construction. Zone A makes up the majority of the site and included areas where high water table conditions would be common, but ponding of water would be minimal. Zone B is wetter than Zone A and includes areas where ponding of water is common. Species planted in each zone are given in Table 1 below. Approximately 21,900 trees were planted over 37.3 acres.

CAUSEY ROAD
SR 1816

SR 1803 BRITISH ROAD 60' PUBLIC RIGHT-OF-WAY

WATER TABLE ELEVATIONS APRIL 15, 2002	
WELL #1	501.7' (0.5' BELOW GROUND ELEVATION)
WELL #2	499.6' (0.5' BELOW GROUND ELEVATION)
WELL #3	504.1' (0.1' BELOW GROUND ELEVATION)
WELL #4	504.9' (0.1' BELOW GROUND ELEVATION)
WELL #5	504.3' (0.2' BELOW GROUND ELEVATION)

NO	SUBMITTALS / REVISIONS	DES	DRN	CHK	DATE
1	DRAFT AS-BUILT DRAWING	KLT	DOW	KLT	04-23-2002
2	FINAL AS-BUILT PLANS	KLT	DOW	KLT	05-09-2002
3	REVISED FINAL PLANS	KLT	DOW	KLT	08-6-2002

NAD 83

LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- RIGHT-OF-WAY
- TOP OF DITCH BANK
- APPROXIMATE TOP OF DITCH BANK
- PROPERTY LINE
- TREELINE
- EDGE OF PAVEMENT
- CROSS VANE
- PROPERTY CORNER
- POWER POLE
- MITIGATION PLAN PROPOSED RESTORATION AREA
- ACTUAL PROPOSED RESTORATION AREA
- CONSERVATION EASEMENT BOUNDARY
- VEGETATION ZONE PLANTING BOUNDRY

SUMMARY OF WETLAND MITIGATION ACREAGE	
WETLAND RESTORATION AREA AS PROPOSED IN MITIGATION PLAN	28 ACRES
PROPOSED ACTUAL RESTORATION AREA	37.28 ACRES

VEGETATION SELECTION	
ZONE A	ZONE B
BARE ROOT PLANTINGS	BARE ROOT PLANTINGS
WATER OAK *(QUERCUS NIGRA)*	BALD CYPRESS (TAXODIUM DISTICHUM)
SWAMP CHESTNUT OAK *(QUERCUS MICHAUXII)*	SWAMP CHESTNUT OAK (QUERCUS MICHAUXII)
LAUREL OAK *(QUERCUS LAURIFOLIA)*	LAUREL OAK (QUERCUS LAURIFOLIA)
BLACKGUM *(NYSSA SYLVATICA)*	OVERCUP OAK (QUERCUS LYRATA)
SYCAMORE *(PLATANUS OCCIDENTALIS)*	SWAMP BLACKGUM (NYSSA BIFLORA)

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BUCK ENGINEERING

AS-BUILT DRAWING

WETLAND RESTORATION PROJECT
EBX CASEY / KING
LENOIR COUNTY

DATE	8-6-2002
PROJECT NO	024
FILENAME	Design\Asbuilt\Casey asb.asb
SCALE	FULL SIZE 1"=100' HALF SIZE 1"=200'
SHEET NO	2

Table 2. Tree species planted over the Casey/King restoration site.

Zone A	Zone B
Water Oak (*Quercus nigra*)	Swamp Chestnut Oak (*Quercus michauxii*)
Swamp Chestnut Oak (*Quercus michauxii*)	Laurel Oak (*Quercus laurifolia*)
Laurel Oak (*Quercus laurifolia*)	Swamp Blackgum (*Nyssa biflora*)
Blackgum (*Nyssa sylvatica*)	Overcup Oak (*Quercus lyrata*)
Sycamore (*Platanus occidentalis*)	Bald Cypress (*Taxodium distichum*)

General Observations

Construction of the site proceeded with very few problems or changes to the proposed plans. Construction activities required more time than previously planned due to a number of rainfall events that delayed the grading work. However, the rainfall allowed the designer and contractor to make observations regarding the site hydrology and make minor adjustments to grades based on those observations.

The level spreader ditches worked well at distributing water across the sloped area on the eastern side of the restoration site. During wet times, water would fill these ditches and overtop the banks, flowing down the slope toward the wetter bottomland areas. The cross-vane structures at the outlet end of the project performed well and handled one sizable rainfall event near the end of construction with no loss of structural stability or function. Restoration of the site was successful at establishing a diversity of hydrologic conditions, ranging from saturated areas with little ponding to areas where inundation will occur for extended periods of time.

The original mitigation plan predicted that approximately 28 acres of restoration were available on the site. This number was based on evaluation of topographic gradients and modeling data. During construction, it was observed that the soil conditions (dark chromas and high water table) outside the planned restoration boundary indicated that wetland hydrology could be restored to areas outside the original proposed restoration boundary. Therefore, the boundary of the restoration project was extended by scarifying these areas and planting trees. Monitoring wells were installed such that these extended areas of restoration could be evaluated for hydrologic success criteria over the monitoring period. The total area, where restoration practices were implemented, was surveyed after the completion of construction and found to equal 37.28 acres.

Monitoring

The five-year monitoring period for the Casey/King restoration site includes vegetation plots, water table monitoring wells, and photograph points. The specific locations of the vegetation plots, monitoring wells, and photograph points are shown on the as-built drawing.

Consistent with the Casey/King site specific mitigation plan, three vegetation plots, 0.05 acres in size, and three automated monitoring wells (Wells #1, #2, and #3) were established in areas that would represent a range of hydrologic conditions and community types across the restoration site. Two additional manual monitoring wells (Wells #4 and #5) were installed in restored areas outside the original restoration plan to document the restoration of site hydrology in these areas. Monitoring success criteria applied to the Casey/King site are given in the site specific mitigation plan. Monitoring data will be provided in the monitoring report for Year 1.

REFERENCE

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina, Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, NCDEHNR, Raleigh, North Carolina.

APPENDIX A. - PHOTOGRAPHS

Photo 1. Site grading with laser level equipped pan excavator.

Photo 2. Completed grading on the west side of the site.

Photo 3. Breaking the plow pan and increasing surface storage.

Photo 4. Restoration area after grading and tillage operations were completed.

Photo 5. Restored topography.

Photo 6. Same location as Photo 5 on August 24,2002.

Photo 7. Cross-vane construction with footer rocks.

Photo 8. Sealing of cross-vane structure.

Photo 9. Completed cross-vanes with protective erosion control matting.

Photo 10. Same location as Photo 9 on August 24, 2002.

Photo 11. Monitoring plot #1 on March 20, 2002 after a rainfall event.

Photo 12. Monitoring plot #1 on June 24, 2002.

Photo 13. Monitoring plot #1 on June 24, 2002.

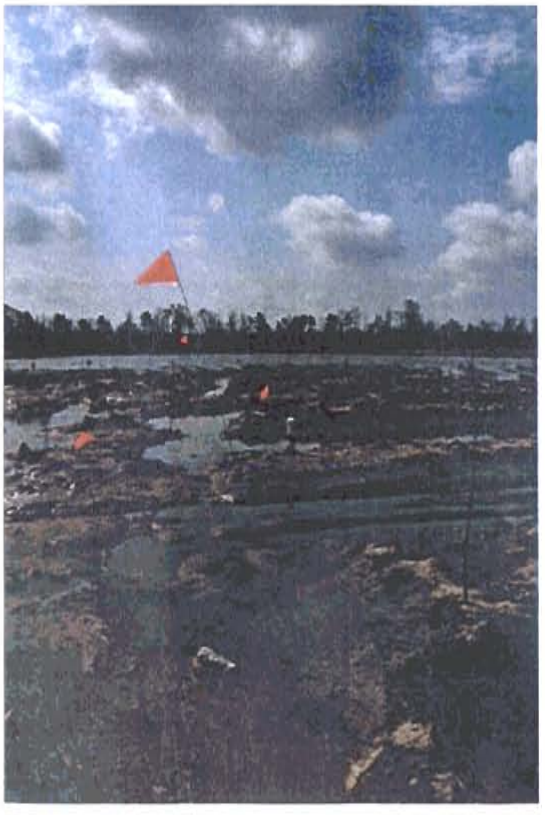


Photo 14. Monitoring plot #2 on March 20, 2002 after a rainfall event.

Photo 15. Monitoring plot #2 on June 24, 2002.

Photo 16. Monitoring plot #2 on June 24, 2002.

Photo 17. Monitoring plot #3 on March 20, 2002 after rainfall event.

Photo 18. Monitoring plot #3 on June 24, 2002.

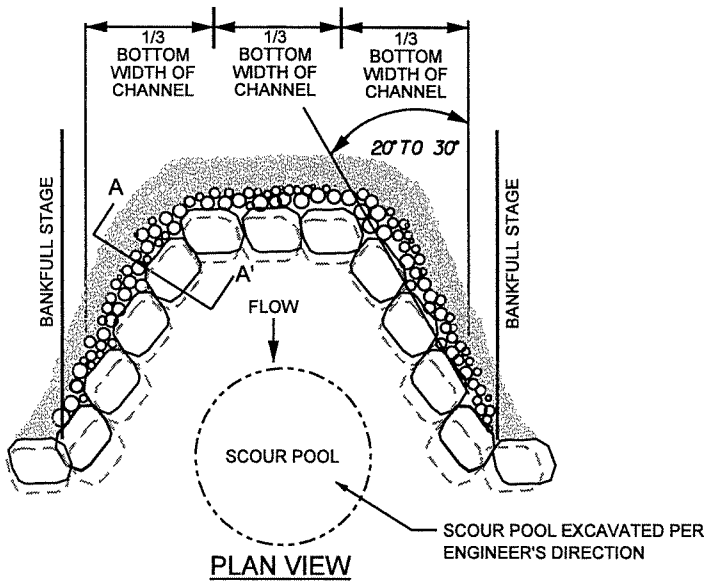
Photo 19. Monitoring plot #3 on June 24,2002.

Photo 20. Monitoring plot #4 on June 24,2002.

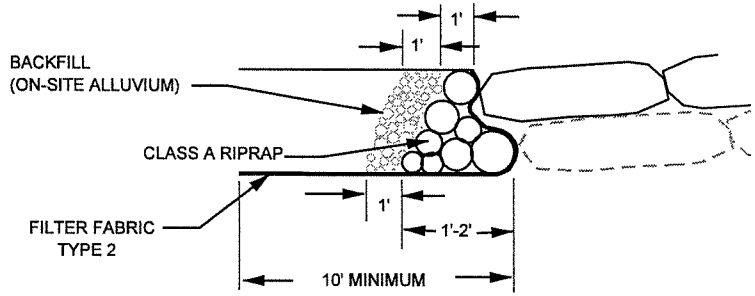
Photo 21. Monitoring plot #4 on June 24, 2002.

Photo 22. Monitoring plot #5 on June 24, 2002.

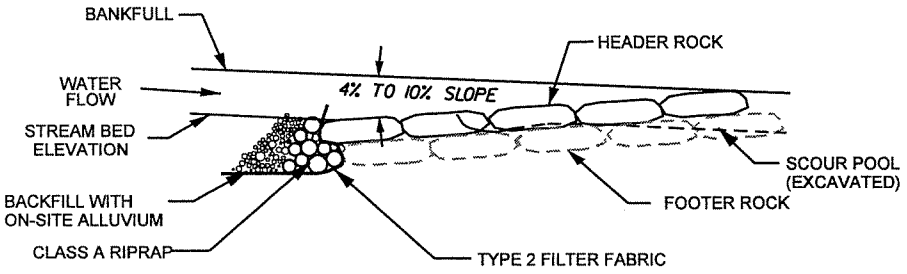
APPENDIX B. – TYPICAL DESIGN DETAIL FOR CROSS-VANE STRUCTURES



PLAN VIEW



SECTION A-A'



PROFILE VIEW

NOTES FOR ALL VANE STRUCTURES:

1. BOULDERS MUST BE AT LEAST 4' x 3' x 2'.
2. INSTALL FILTER FABRIC BEGINNING AT THE MIDDLE OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM TO A MINIMUM OF TEN FEET.
3. DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAM BANK.
4. START AT BANKFULL AND PLACE FOOTER ROCKS FIRST AND THEN HEADER (TOP) ROCK.
5. CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
6. HEADER ROCKS MUST TOUCH WITHOUT GAPS.
7. AN EXTRA BOULDER CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
8. USE CLASS A RIPRAP TO FILL GAPS ON UPSTREAM SIDE OF BOULDERS.
9. AFTER ALL STONE HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH SOIL TO THE ELEVATION OF THE TOP OF THE HEADER ROCKS.

BUCK ENGINEERING

TYPICAL DESIGN
(NOT FOR CONSTRUCTION)

ROCK CROSS VANE