

Value Engineering Study
December 11-12, 2002



Schenimann Chute Side Channel Habitat Rehabilitation and Enhancement EMP Project

Mississippi River, Miles 57 to 63
Cape Girardeau County, Missouri



*Partners Toward Achieving
A Sustainable Riverine Ecosystem*



**US Army Corps
of Engineers**
St. Louis District®



Executive Summary

This Value Engineering (VE) study was performed on December 11-12, 2002, at the Drury Lodge in Cape Girardeau, Missouri, for the purpose of examining the design and operational/maintenance features of this subject project. The resultant workshop resulted in the following ten VE proposals that are recommended for further consideration:

- Construction Sequencing Scenario – Contains “Jump Start” Item to Provide Low Flow Access into Downstream Confluence of Schenimann Chute
- Use of Pile Dikes in the Downstream End of Schenimann Chute to Reduce Channel Width and Create a Self-Maintaining Flow Channel (Consider in Conjunction with above “Jump Start” Proposal)
- Lower Elevation of Silt Plug at Inlet to Schenimann Chute
- Incorporate Woody Structures into Project
- Use of Cable-Anchored Fallen Trees in Lieu of Stone Revetment
- Modify Rock and Wooden Pile Dikes within Schenimann Chute and the Closing Structures at the Head of Schenimann and Dalrymple Chute
- Create Mini-Islands within Schenimann Chute
- Enhance Multi-stage Chute Flows via the Use of “Benches”
- Use of Movable In-Channel Structures to Create Habitat
- Utilize Concrete “A-Jacks” in Lieu of Rip-Rap
- **“Jump Start” Priority Action Item:** Provide continuous water access to the river within the downstream portion of Schenimann Chute. Depths should be at least six feet during all but the most extreme low river stages. (See report for details.)

Introduction

Background

The draft Planning Design Analysis (PDA) report and Project Management Plan (PMP), dated June and October 2002, respectively, reinvigorated efforts to bring the various interests together (Missouri Department of Conservation (MDOC), US Fish & Wildlife Service, and the Corps of Engineers) and arrive at a consensus for a plan of action for this project. This project will be totally federally funded, with the MDOC serving as project sponsor and providing 100 percent of the operation and maintenance activities. The project's goals and objectives as presented in the PMP were as follows:

Project Location

Schenimann Chute is located in the open river portion of the Upper Mississippi River between river miles 57-63, right descending bank. It lies approximately 5 miles north of the city of Cape Girardeau, Missouri, in Cape Girardeau County, Missouri. The chute is one of only 23 side channels that remain along the 202 miles of open river between St. Louis, Missouri, and Cairo, Illinois, at the mouth of the Ohio River.

Goals and Objectives (As paraphrased from the subject PMP)

- Goal – Immediate and long-term ecosystem improvements
 - Objective – Provide shallow sand bottom water habitat
 - Objective – Create bed scour within the side channel
- Goal – Off-channel habitat for over-wintering, spawning and rearing of fish
 - Objective – Connect scour holes and plunge pools for low water conditions
- Goal - Resting/feeding sites for migratory birds and other wetland and riverine species
- Habitat for micro-invertebrates
 - Objective – Construct stone revetments and wood structures

Proposed Project Features

- “Cutting” notches in existing stone dikes
- Build short stone dikes to serve as hard points
- Construct stone revetments
- Build chevron for dredged material disposal site
- Dredging

VE Study Team

An interdisciplinary team was assembled consisting of the following personnel:

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Workshop Agenda

Wednesday, December 11

- 8:00 a.m. - Assemble in meeting room of Drury Lodge for an orientation briefing prior to departure for a field visit to Schenimann Chute via boat.
Late Noon – Return from field trip
- 1:00 p.m. (approx.) – Assemble in meeting room
 - Overview of VE's Function Analysis tool
 - Discussion of project needs, issues, and problems
 - Begin brainstorming for solutions
- 4:30 p.m. – Adjourn

Thursday, December 12

- 8:00 a.m. – Continue brainstorming
 - Evaluate ideas, prepare brief write-ups
 - Achieve consensus on course of action and implementation
- Late Noon – Adjourn

Field Trip - Gaining an Updated Perspective

The field trip provided an opportunity for the various interests to view the six mile-long side channel from a nearly “dewatered” perspective during this period of low river stages. A number of things became evident and resulted in a de-facto reorientation of the project’s existing design features as will be illustrated in the VE proposals. Four primary observations were noted:

- Stone dikes within the side channel create deep plunge pools downstream; providing desired over-wintering habitat. In contrast, pile dikes create broad, shallow areas of deposition downstream of their location.
- The amount of bankline stone revetment seemed excessive in terms of any scour protection what would be needed.
- If the bankline revetment was to provide micro-invertebrate substrate habitat, this function could be accomplished at a lower cost by the use of woody material placements, mini-island creation, and round points.
- The hydraulics of the side channel could perhaps be effected to a greater extent than thought realized by the mid-length chute inlet [now named], Dalrymple Chute.
- It is imperative that the downstream end of Schenimann Chute be opened. It is felt that the in-chute pile dike at Mile 57.1 is a major contributor to the blockage at low flows.

Pre-Brainstorming Activities

The workshop was facilitated via flipchart input from team members and is presented in the same sequence. Minimal editing was done so as to preserve the tenor of the workshop activities. The bolded items were the questions posed to the workshop participants.

“What do you feel would comprise good, sustainable habitat in Schenimann Chute?”

- Need diversity
- Must be a long-term solution
- Have a variable bottom substrate
- Need biological access
- Should mimic natural processes
- Have a focus on native species
- Be self-maintaining
- Encompass flexibility
- Be capable of accommodating “temporary” trial solutions

“What are the “needs” to achieve our definition of desirable habitat?”

- Off-channel, overwintering areas
- Sand shoal areas
- Gravel bars
- Access
- Good water
- Allow for some bankline erosion
- Accommodate some wildlife benefits, i.e., otters
- Fast water areas
- Range of velocities
- Greater duration of flows
- Reduced water temperatures
- More invertebrate substrate, i.e., woody substrate
- Increased plan species diversity
- Increased flows through intermediate side channel openings
- Reduce habitat opportunities for exotic species
- No adverse effect on navigation channel
- Stay within high water boundaries (or minimize incursion therein)
- Don't affect neighboring landowners
- Ease to bring in equipment
- Have a quality product
- Additional micro-model scenarios

Pre-Brainstorming Activities (cont'd)

“What are the issues/problems?”

- Water quality – oxygen
- Lack of connectivity (stage and seasonal)
- Construction access
- Dredge disposal
- Dredge cut longevity
- Excess bank erosion
- Dike notching design
- Unknown sedimentation patterns (scour/deposition)
- “Are we sure that we are doing the right thing?”
- Northern navigation structures creating flow a flow problem
- Existing dike heights
- Lack of information on flows through the intermediate side channel openings
- “Alternating” dikes may cause sediment problems further down the chute

Brainstorming Activities

“What are your ideas?”

NOTE: Following this brainstorming session, those items in bold italics were deleted from further consideration because they were either beyond the scope of this project; thought to have undetermined results; or just considered to be infeasible. Names behind the “survivor ideas are those of individuals assigned to prepare a VE proposal for further consideration by the Project Delivery Team. It should be noted that the ideas were typically modified upon their incorporation into a VE proposal and thus the titles have been altered. Those items not assigned names were felt to pertain to the modification of the south (downstream) portion of Schenimann Chute and should be discussed as a single entity.

- Modify pile dikes within the chute
- **“Arched” hard points**
- **Eliminate all Hard Points**
- Use Round Points
- Seek alternatives to revetment
- Eliminate plans for revetment
- Use concrete A-Jax’s
- Modify dike 57.1
- **Build reverse chevron at mouth (upper end) of chute and at mouth of intermediate chute entrance (now named Dalrymple Chute)**
- Notch dike 62.2
- Protect adjacent landowners
- Modify pile dike 57.9 to become a rock dike (closure)
- Drive pilings near left descending sand bar downstream of dike 57.9
- Reconfigure riverside portion of dike 57.9 to reduce sedimentation
- Armor land area south of dike 57.1
- Use rock/timber pile dikes
- Review construction sequence
- Reuse rock removed from other dikes
- Remove silt plug at upper entrance to chute and at entrance to Dalrymple Chute
- Incorporate woody structures
- **Build overwintering habitat at different locations**

Brainstorming Activities (cont'd)

“What are your idea?” (continued)

- *Use funds saved by eliminating revetment and use in other chutes*
- *Do something in chute riverside of Windy Bar*
- Use temporary structures, i.e., Geotubes, in pilot areas
- Use mini-dredge to fill Geotubes
- Create mini-islands within chute
- Comment... Investigate the mechanics of Dalrymple Chute
- Eliminate hard points above dike 59.8
- Consider multi-stage chute flows via the use of multi-tiered benches

Post-Brainstorming Activities

Activities Following the formal brainstorming session, the VE team felt it necessary to have a general discussion regarding the ideas just presented, and the needs, issues, and problems that were identified the prior day pertaining to the overall project objective... providing quality, sustainable habitat within Schenimann Chute.

Within this context, four primary areas of attention were identified, as follows:

- Southern (downstream) portion of Schenimann Chute
- Need for aquatic connectivity
- Development of in-channel structures within the chute, i.e., Hard Points, Round Points, etc.
- Re-evaluate need for revetment

“Jump Start” Priority Action Item

The team decided that the downstream portion of Schenimann Chute was a priority item and that they would focus their attention upon this area. The needs for this area are as follows:

- Provide continuous water access to the river with an adjacent sandy bottom area. Depths should be at least six feet during all but the most extreme low river stages.

The following construction activity/sequence was developed for further consideration

(see VE proposal entitled “Construction Sequencing Scenario):

- Notch dike 57.1 and provide protection to adjacent Dusty Bar
- Build L-dike closure to Windy Bar, i.e., reverse chevron
- Cut portion of timber pile dike 57.9 to current ground level.

Value Engineering Proposal

Function of Proposal: Adaptively construct the Schenimann Chute project utilizing empirical information gathered from on-site responses to previously implemented features.

Existing Situation: The current project could be constructed in various stages or phases. This construction could be opportunistic based on water elevations in this specific reach of the Open River. The construction of certain features of the project may be premature or unwarranted if previously constructed features adequately address the projects identified goals and objectives.

Proposed Change: These recommendations simply set forth a potential sequence of construction that takes advantage of features implemented in the beginning of the project that may materially affect other features later in the project's construction life. See accompanying figure. The construction sequence is as follows:

1. Modification of Dike 57.1 (R) – This dike should be modified to promote flow out of the southern end of Schenimann Chute. This modification consists of significantly notching the dike. The start of the notch will be from a determined distance from the Missouri bankline; downstream bank protection will likely be required. The eastern (riverside) limit of the notch should be aligned with the southern tip of Windy Bar Island. The VE team recommends construction of a trail dike from Windy Bar Island to the eastern notch of Dike 57.1 (R). This will result in a L-shape dike beginning at Windy Bar Island heading south to the existing Dike 57.1 (R) and proceeding towards the river with no additional work. The dike's notch will be to elevation 310.0. Rock from the dike should be recycled to construct downstream bank protection and L-shape tie-in to Windy Bar Island.
2. Monitor Dike Performance
 - a. Monitor this feature of work for two high water events to determine what dynamics are happening in the south end of the chute.
 - b. Monitor timber pile dike scour and depositional patterns in vicinity of Dike 57.9 - R. Some notching of this timber pile dike may promote scour within the side channel.
 - c. Monitor affects of channel below Dike 59.5 for flow and sedimentation patterns.