PEKIN LAKE STATE FISH AND WILDLIFE AREA

SOUTHERN UNIT

CRITICAL RESTORATION PROJECT

FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

APPENDIX I

VALUE ENGINEERING STUDY

October, 2002

Value Engineering Study

Pekin Lake 519 Study
Southern Unit
Illinois River Ecosystem Restoration
Illinois

Executive Summary

Study Results

This Value Engineering Study identified 24 items for further consideration during their brainstorming session. Subsequent analysis and screenings resulted in the development of 10 VE Proposals and 3 Formulation/Design Ideas, which are summarized below. Inasmuch as this study was performed in the Feasibility Stage of this project, the cost estimates presented were developed with a conceptual design degree of accuracy. Monetary savings, where quantifiable, are listed adjacent to each item. Assumptions pertaining to any cost estimates are given, where possible.

VE Proposals – Southern Unit

- **1S** - Reorient Southern Entrance Channel to reduce maintenance dredging requirements. (Savings would be realized by reduced maintenance dredging needs)
- **4S** - Place submerged training structure upstream of the mouth of the outlet channel to reduce maintenance dredging requirements. (Lifecycle savings $13,400)
- **5S** – Perform the bulk of the channel dredging by utilizing a large clamshell, mechanical dredge with adjacent placement. (Savings $2,250,000)
- **9S** - Move P4 dredged material placement site closer to the dredged channel, make it a different shape and add more P4-type sites to accommodate mechanical dredging. (Savings $220,000)
- **10S** - Use dredged channel maintenance sand for construction of containment dikes for P4 and P2 placement sites. (Savings $738,833)

Formulation/Design Ideas: These were additional ideas that were developed during the VE study that may have merit and potential savings and should be further explored by the planning team.

- **3S** - Hydraulic dredge placement in containment areas using silt curtains.

1. Introduction

The Rock Island District of the U.S. Army Corps of Engineers performed this Value Engineering Study in September/October of 2002. The following is a list of team members.

Name	Office	Phone Number
Dave Bequeaith	ED-C	309-794-5270
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2. Project Information

Southern Unit

Alternative Plan (S5): The selected alternative consists of dredging of channels and areas of varying-depth open water, with on-site placement in the form of islands and areas of relatively higher ground. Channels will be eight feet in depth, using elevation 432.0 +/- as the reference "low winter water" elevation. This eight feet of depth will allow for a recommended six feet of depth required for adequate fish overwintering habitat, including ice cover, plus an additional two feet of depth to account for sedimentation during the life of the project. The channels will continue from the Illinois River into Soldwedel Lake and Lake of the Woods. Adjacent to the channel, additional dredging to four-foot, eight-foot, and twelve-foot depths will be accomplished to add depth diversity to the site. Areas of shallower dredging at the edges of channels and deeper areas are designed to guard against sedimentation due to wind fetch at relatively abrupt changes in depth near the water's surface.

Mechanically dredged material will be placed into two islands designed to be perched wetland areas, two islands designed to be nesting habitat, and one larger island designed to be high enough to support mast tree growth. The two nesting islands will be a maximum of one quarter acre per island such that a predator would not be able to survive on that island. The larger island would have approximately one acre above elevation 444.0, which is the elevation at which mast trees are estimated to survive reliably.

Hydraulically dredged material will be placed into the area between Soldwedel Lake and Lake of the Woods. This area presently has very little environmental benefit, and after placement of dredged material, this area would be at an elevation well above elevation 444.0, and would support mast tree growth for greater environmental diversity and benefits.

3. Information Phase

As a precursor to the actual function-oriented brainstorming session, the VE team was asked to identify the project goals and objectives and what they perceived to be the needs and concerns of the Local Sponsor and the needs and concerns of the Corps of Engineers. These needs and concerns will be used during the analysis phase to screen through the ideas generated during the speculation phase. These project goals and objectives and needs and concerns are listed below.

Goals and Objectives – Southern Unit

- Improve aquatic habitat
  - Overwintering – 6'+ depth off channel
  - Spawning and nursery – 4' to 12' depth – structure variation
- Enhance wetlands – improve migratory waterfowl and shore bird habitat
- Improve terrestrial habitat – forest diversity and mast trees

Local Sponsor Needs

- Aquatic deep water connection to main river channel – S1
- Overwintering fish habitat (6' to 8') –S2
- Sustainable – S3
- Foraging for Great Blue Heron – up to 2' depth – S4
- Avoid dredging in areas where existing ground elevation is greater than Elev. 433 – S5
- Boat access to Southern Unit – S7
- On site placement of dredged material must generate habitat benefits and have added benefits to recreation access – S8
- Water levels cannot be raised above elevation 441 to avoid impacts to Heron habitat (trees) – S9

Corps Needs

- Provide for experimental solutions that could be used on other projects (C1)
- No negative impacts to navigation – strive for aid to navigation (C2)
- Federal cost less than or equal to $5 Million – Cost share 65% Federal, 35% Non-Federal (C3)
- Project must produce habitat benefits – independent/immediate/sustainable (C4)
- No cumulative negative impacts to threatened or endangered species or wetlands (C5)
- 50 year project life (C6)
- Must be cost effective (C7)

4. Speculation Phase – Brainstorming for the Application of Ideas

The brainstorming ideas listed below are largely in as-is format and should be considered in the context that team members were encouraged by the workshop facilitator to "think outside the box" and sometimes propose ideas that although are seemingly ludicrous, would prompt another team member to associate it with a viable idea.

Idea Listing – Southern Unit

- **1S** - Reorient Southern Entrance Channel (Nick Davila)
  a. Past Marina – Thru Bridge
  b. Reorient Western Fish Channel with mouth pointing downstream
  c. Thru marina
  d. Combination of thru marina and past marina.
- **2S** - Install culvert for water flow instead of channel
- **3S** - Hydraulic dredge placement in containment areas using silt curtains
- **4S** - Replace barge at head end of marina with submerged structure to allow flow thru this area resulting in less maintenance dredging of outlet channel
- **5S** - Use large clam shell dredge to do all of the dredging or to build containment berms
- **6S** - Do deep dredging with large clam shell and hydraulic dredge for shallow dredging
- **7S** - Use conveyor instead of hydraulic dredge for material going to quarry
- **8S** - Use concrete pump to pump material to quarry
- **9S** - Move P4 placement area closer to dredged channel and make it a different shape…add more P4's
- **10S** - Use channel maintenance sand for containment dikes… for P4 and P2 placement site berms…sand could also add habitat diversity
- **11S** - Use channel maintenance sand for constructing causeway or to cap clay causeway embankment
- **12S** - Water control structure at lower end to allow water control in the southern unit, include a boat roll over
  - At Bridge
  - At downstream elbow in channel
  - At bridge and marina
- **13S** - Don't raise causeway… Raise & strengthen DNR levee to accomplish northern unit containment
- **14S** - Excavate channels from northern unit to both southern unit channels to allow oxygen rich water into both southern unit channels in winter time

5. Analysis Phase – Identifying the Good Ideas

The Local Sponsor Needs and Corps Needs listed in the Information Phase were used to screen through the ideas and eliminate the infeasible ideas. The code (ie. S1, C3, etc.) written next to each Sponsor and Corps Need is used below to denote deficiencies and

Advantages:

1. Fewer maintenance costs
2. Better flows to and from the fish habitat
3. Better relations with the nearby marina since they would like this

Disadvantages and possible obstacles:
More dredging involved and therefore a higher initial cost

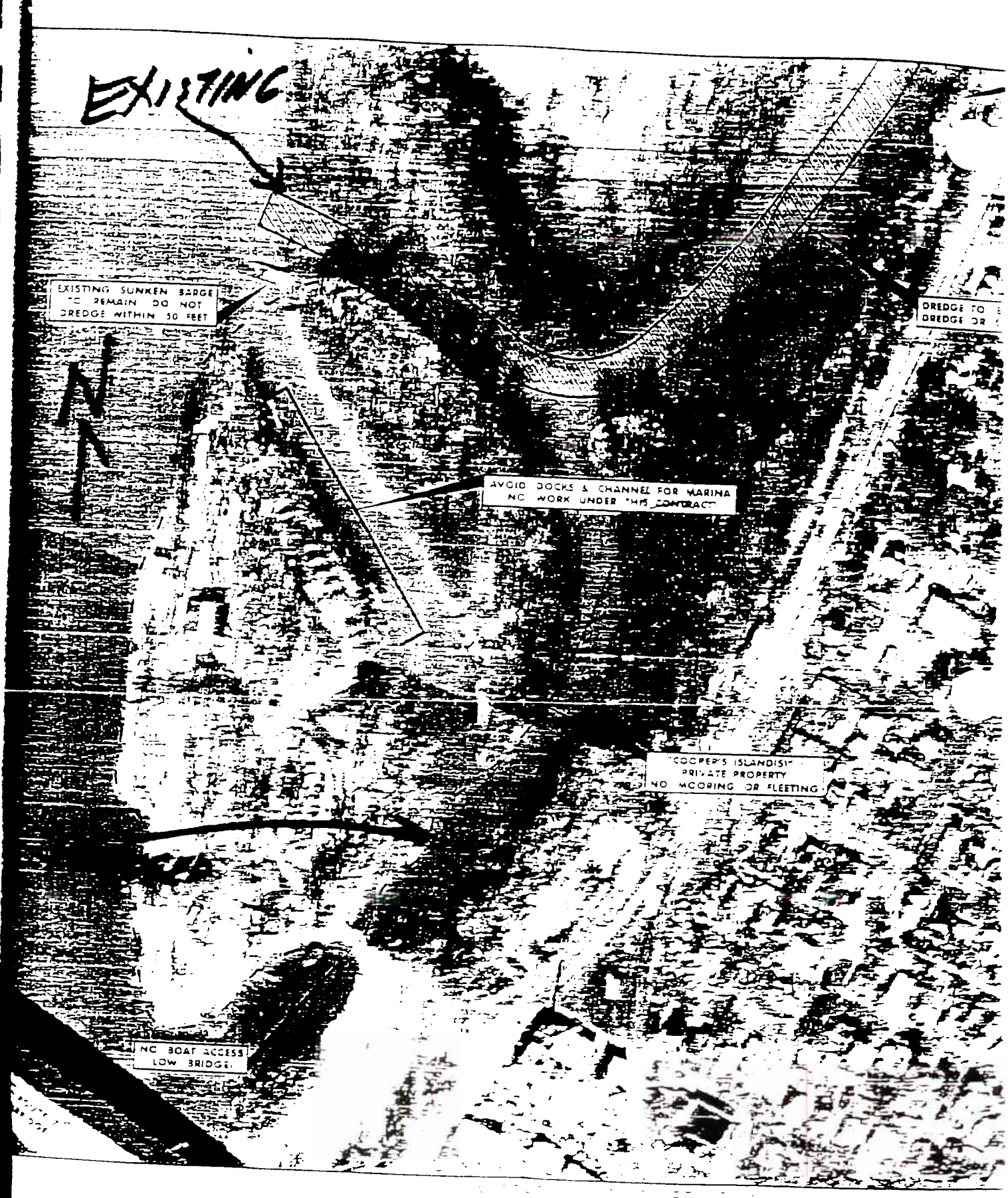
Justification: (Acceptability, constructability, operational ease, etc.)
This proposal is practical. Dredging south of the bridge could be accomplished from the Illinois River side.

Cost Savings (If applicable - show calculations on separate sheets):
There are higher initial costs but maintenance costs would greatly decrease.

Implementation Strategy/Timetable:
An additional 14,700 cy would need to be mechanically dredged

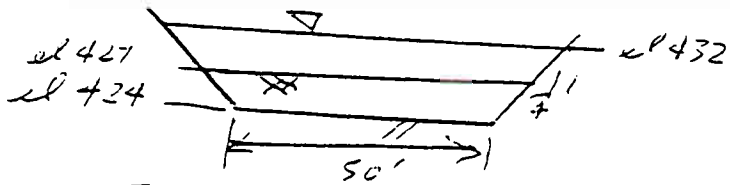
Necessary Coordination:
Coordination would be needed with the nearby Marina. A written agreement allowing the RID access to the portion of the channel by the bridge may also be required.

Assumptions:
Since there is no survey information about existing channel depths south of the bridge area, an assumption was made that this area is silted up to elevation 427'. It is also assumed that the additional material to be dredged can be mechanically dredged (side cast).



PEKIN LAKE VE DISPOSAL #1

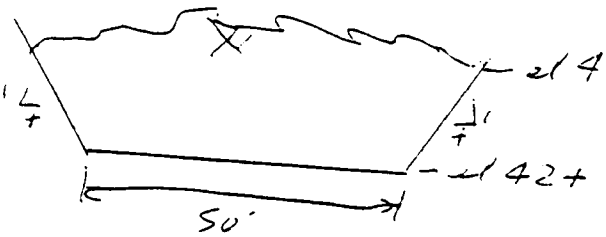
Cost Calculations – Proposal # 1



50' additional channel (more than existing proposal)

[62.43' = 186 sf]

186 sf × 50' = 9,300 cf = 344 cy



500' additional channel, (more than existing proposal

[86' × 9' = 774 sf]

774 sf × 500' = 387,000 cf = 14,333 cy

Total Additional Dredging required:

14,700 cy

Assuming mechanical Dredging + side placement,

INITIAL ADDITIONAL COST: (14,700 cy)($3.50/cy) = $51,500

(Maintenance Cost Savings should be subtracted from this figure)

Value Engineering Proposal # 3S

Title of Proposal : Use of Silt Curtains for Containment of Dredged Material.

Function of Proposal: To contain dredged material during the construction of **SITE(S) P3**, lower (1,500') site and the optional upper (2,840') site, and the four smaller **P9 SITES**, thereby preventing uncontrolled spreading of the dredged material away from the placement site, containing fines, and giving the material a chance to decant.

Existing Situation: No containment is proposed except for the large **P9 SITE**, which proposes the use of Geo-tubes.

Proposed Change: To use silt curtains in one or more free standing containment circles, segmented sections, or abutted to the existing railroad grade, to provide control of the dredged material as opposed to allowing the material to find it's own natural area of repose. It would be possible to hydraulically dredge material into these containment areas as well and allow the material to stack, contain the fines, and (1) allow for the removal of the discharge water by pumping it back into the lake, or (2) let the discharge water return to the lake via small weirs in the silt fence, or (3) if time allows, by evaporation, or (4) a combination of the three.

Another idea would be to use silt curtains only at the lower end of the Southern Unit in the vicinity of the old ice harvesting dam to contain any fines that may be carried downstream during all construction phases of the Southern Unit construction.

Advantages: Containment of dredged material where desired, and the ability to shape the placement sites (circles, ovals, rectangles, squares, etc.) as desired. Possible low cost containment for hydraulic dredging.

Disadvantages and possible obstacles: As opposed to the no containment option there would be the cost of the silt fence, the time to install it, and whether or not it is available in sections taller than three feet. If used only at the lower end of the Southern Unit, it may be necessary as the project moves further along to have to open and close the silt curtain on occasion to allow passage of floating plant and equipment. The curtain at the lower end of the southern unit would also need to be at least three feet taller than the deepest portion of the project at that location (12' + 3' = 15')

Justification: This is a standard technique for controlling soil erosion at construction sites as well as the containment of dredged materials. Also, it is very desirable to be able to control the placement in order to meet the guidelines of the plan for **SITES P3** and **P9**. Some form of fines containment will most likely be needed as most of the project site consists of silts and clay materials which would be easily suspended in the water column.

Cost Savings: There would be no cost savings for mechanically dredged material over the "no containment" option initially, unless the placement sites required re-handling or reshaping at a later date by heavy equipment, or the "no containment" option proved a failure during construction thereby requiring a change of condition and modification of the contract. There is however a potential savings if the use of silt curtains would allow the dredging to be done using a hydraulic dredge instead of a mechanical dredge.

Implementation Strategy/Timetable: Silt curtain placement would have to be initiated prior to dredging and may be extended during the dredging operation. The installation of the silt curtains would have to be done during low water (lower than the height of the curtains) and no ice or frozen ground conditions. It is not anticipated that installation of silt curtains will extend the contract performance period.

Necessary Coordination: This would be a condition (bid item) of the construction contract and as such would not require further coordination with the District other than on site inspection by the District's Construction Inspector.

Assumptions: That the silt curtains would be used only once and left in place upon completion of the project where they would naturally deteriorate. In those areas where the curtains do not have material behind them and are recoverable, the curtains would be removed by the contractor and would become the property of the DNR.

Cost Calculations – Proposal # 3S

Based upon the following dimensional assumptions the following costs are derived:

1. SITE P3 lower: 1,500' x 100' wide (only two sides require containment) = 1,600 feet of silt fence. An additional 600' of silt fence for segmenting the containment site if required. TOTAL LENGTH 2,200'

2. SITE P3 upper: 2,800' x 100' wide (only two sides require containment) = 2,900 feet of silt fence. An additional 600' of silt fence for segmenting the containment site if required. TOTAL LENGTH 3,500'

3. SITES P9 the 4 smaller sites: 125' x 125' = 500' x 4 =2,000' of silt fence. TOTAL LENGTH 2,000'

Total length of silt fence for entire project: **7,700'**

COST:

Three vendors were checked for the following cost data. The figures do not include any discount for the large volume of fencing required. All fencing includes stakes.

1. $30.99 per 3' x 100' section x 770 = $23,863.30

2. $28.93 per 3' x 100' section x 770 = $22,276.10

3. $21.93 per 2' x 100' section x 770 = $16,886.10

Value Engineering Proposal # 4S

Title of Proposal (Be descriptive and concise): Place submerged training structure upstream of the mouth of the outlet channel to protect it and reduce sedimentation and maintenance dredging.

Function of Proposal (Verb/noun-oriented): The function of this proposal is to reduce the amount of maintenance dredging at the mouth of the presently designed upstream oriented outlet channel.

Existing Situation: The present design shows the outlet channel from the Southern Unit oriented slightly upstream. There is also a barge sunk just downstream of the proposed channel that protects the entrance channel to the adjacent downstream recreational boat marina. The sunken barge protects the entrance channel to the marina and helps to reduce maintenance dredging for the marina. However, the barge may actually aggravate sediment deposition in the outlet channel from the Southern unit.

Proposed Change (Show before/after sketches on separate sheets, if applicable): The proposed change is to place an emerged or submerged training structure immediately upstream of the mouth of the outlet channel from the lower unit. This structure could be constructed of rock or geotubes filled with sand dredged from the channel. See the attached sketch.

Advantages: Placement of the training structure would protect the outlet and reduce maintenance dredging costs.

Disadvantages and possible obstacles: This proposal would actually add some first cost to the project but would result in a more sustainable project with lower annual maintenance requirements.

Justification: (Acceptability, constructability, operational ease, etc.) The proposal is a practical and constructable solution and will result in life cycle savings to the project.

Cost Savings (If applicable - show calculations on separate sheets):

Implementation Strategy/Timetable: Addition of this feature to the project should not add to the overall construction schedule.

Necessary Coordination: Section 404 Permit, NEPA, coordination with the navigation industry.

Assumptions: The assumption of this proposal is that there will be a chronic maintenance dredging problem at the outlet channel to the Southern Unit without this structure.

Cost Calculations – Proposal #4S

Cost of 100 foot long rock wing dike. Assume average water depth is 5 feet and that the dike is submerged two feet under the surface. Therefore the dike is 3 feet high.

Rock Volume = $\frac{((10' X\ 3') + (3'\ X\ 4.5'))\ X\ 100'}{27CF/CY}$ = 161 CY

161 CY X 1.6 Tons/CY = 260 Tons

260 Tons X $60/Ton = $15,600

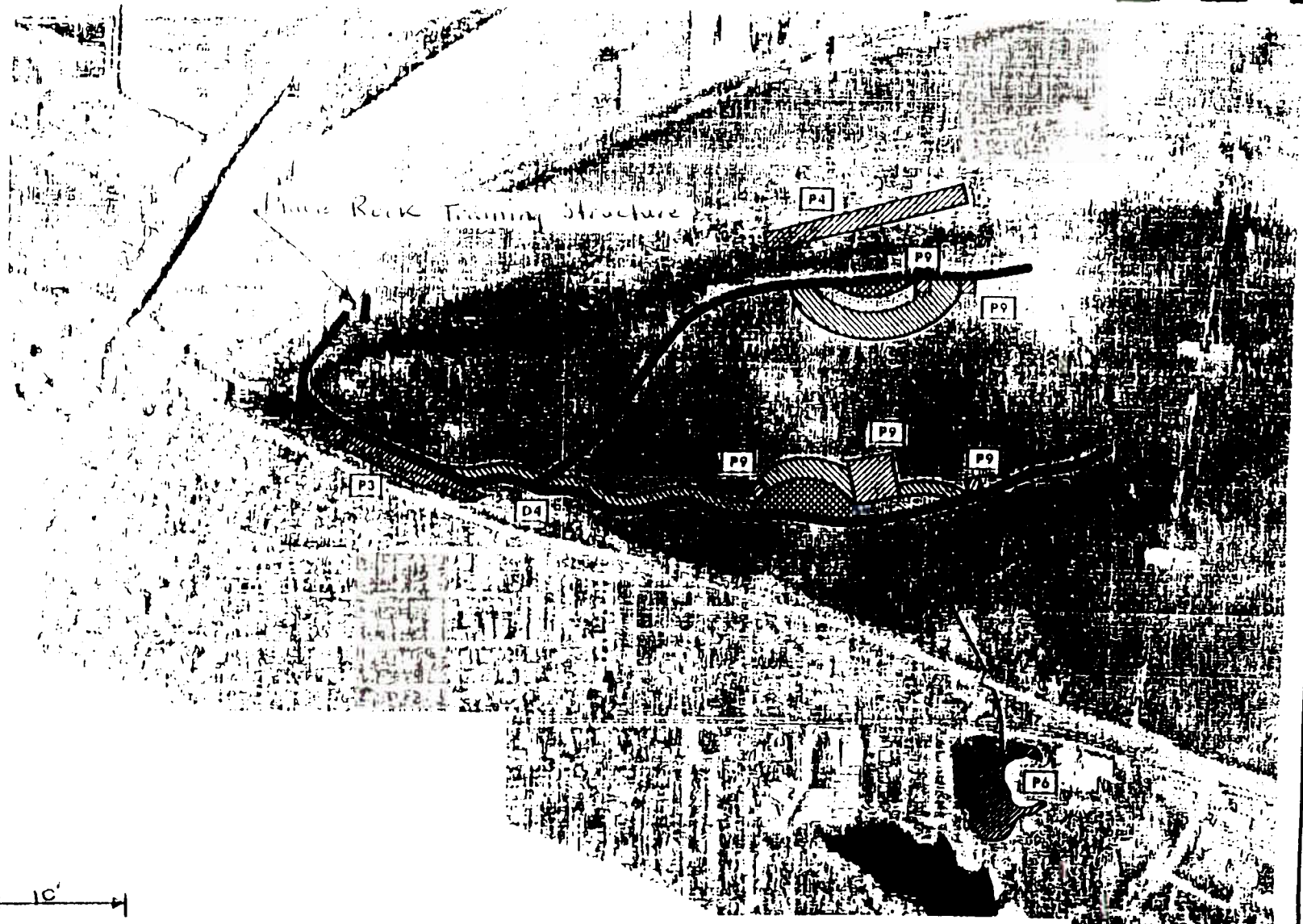
Maintenance Dredging Cost: Assume that entrance channel needs to be dredged once every 3 years – 50 feet wide X 3' deep X 200' long

$\frac{50'\ X\ 3'\ X\ 200'}{27}$ = 1,100 CY

1,100 CY X $6.00/CY = $6,600

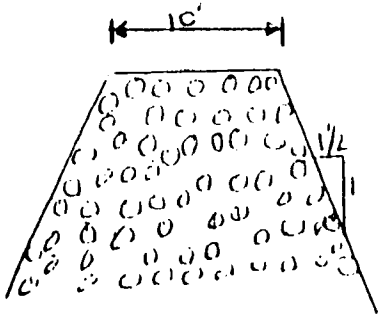
for 50 year life the present value of $6,000 every 3 years at 6 1/8 % discount rate is $29,000. Therefore, the dike is justified based on life cycle cost analysis with a life cycle savings of $13,400.

Sketch of VE Proposal #45



SITE PLAN

600 0 600 1200 1800
SCALE IN FEET



TYPICAL SECTION
ROCK DIKE

NOTE: Training Structure can be constructed of rock or by filling a geotube with dredged material.

Value Engineering Proposal # 5S

Title of Proposal (Be descriptive and concise): Perform the bulk of the channel dredging by utilizing a large clamshell, mechanical dredge with adjacent placement.

Function of Proposal (Verb/noun-oriented): By performing the bulk of the dredging with mechanical dredging, the work can be accomplished expeditiously with minimal water quality issues and at a much lower price per cubic yard.

Existing Situation: The existing situation is to accomplish much of the dredging using hydraulic dredging techniques, confining much of the dredged material to a privately owned quarry near the site. A large portion of the remaining dredging would have to be accomplished with a combination of mechanical and hydraulic dredging. The draft report also recommends using a new "sole source" technique called "Dry dredge" to pump a high percentage of solids, thus minimizing the adverse effects of dredged material confinement areas and space requirements. Due to a lack of competition and and the double handling of material (Clamshell to pump system), this method is expected to cost more than traditional hydraulic or mechanical dredging.

Proposed Change (Show before/after sketches on separate sheets, if applicable): By simplifying the channel dredging to simple excavation and adjacent placement and keeping the quantity of dredging large (on the order of 500,000 CY), there is a large potential of drastically lowering dredging costs. This method of dredging was used in 1994 at the Peoria Lake EMP site as discussed in the draft geotechnical appendix. The cost was about $2.00 per cubic yard.

The drawing and layout would be very similar to that shown except there would be an earth berm next to the channel. The berm could be broken in locations to allow drainage through the berm and to create "islands" for habitat purposes. The project would still include deep areas and areas of wider dredging. Some of the shapes may have to change to allow excavation within the reach of the clamshell and to include enough dredging to entice contractors with large equipment to mobilize to this area.

The islands could be constructed by dredging around them or they could be done during a follow-on "experimental" contract using the more expensive innovative methods such as geotubes and high solids hydraulic dredging as explained in the existing report.

Advantages:

1. Cost reduction
2. Dredge large amount of material

3. Low water quality issues during construction
4. Maintains strength of soft sediments
5. Protects excavated channel from wave wash and sediment accumulation
6. Provides topographic diversity that is beneficial to wildlife habitat
7. Provides additional shoreline to promote the growth of wetland vegetation
8. Avoids the costs and risks of having to coordinate with private land-owner and real estate acquisition
9. Provides opportunity for growth of mast producing trees
10. The larger clamshell dredges work 24 hours a day and can therefore, finish the work in 1 construction season.

Disadvantages and possible obstacles:

1. A limited number of contractors have this size of equipment. Project designers would have to research available equipment and determine availability to ensure successful bid opening
2. The existing project layout has been extensively coordinated and laid out with project sponsors. Several "fish" biologists do not like to place dredged material in open water areas. Convincing sponsors that the lower costs and the habitat benefit of the dredged material is better than the existing plan may be difficult.

Justification: (Acceptability, constructability, operational ease, etc.)

The VE proposal is more straight forward and more easily constructed than the proposed plan with the exception of ensuring that contractors with the required equipment are willing to bid on this project during the proposed construction season.

Cost Savings (If applicable - show calculations on separate sheets):

The total dredging included in the project is 570,000 CY. The average estimated price is $8.00 per yard. Assuming that 500,000 CY would be done using the VE proposed method at $3.50 per yard, a cost savings of $2,250,000.00 would be realized.

Implementation Strategy/Timetable:

This VE proposal could be implemented within the existing project timeline and constructed in 1 year rather then 2 years.

Necessary Coordination:

The new method would have to be coordinated with project sponsors, floodplain regulators, and environmental agencies.

Assumptions: Contractors with required equipment are willing to mobilize to this area as they did in 1994 for the Peoria Lake EMP project.

Value Engineering Proposal # 6S

Title of Proposal: Combination Dredging, Mechanical and Hydraulic.

Function of Proposal: To best optimize the dredging of the Pekin Lake Project based on time, water conditions, and access to the project.

Existing Situation: It has yet to be determined what type or types of dredging will be employed.

Proposed Change: I would propose that the initial dredging to take place be done hydraulically with a 10" or 12" dredge, and that it be brought in by truck and set up at the DNR access area indicated on Plate P3 with the note **"Existing 60" Storm Sewer"**, thereby allowing for the shortest possible pipeline at initial mobilization and setup. Upon completion of the main channel to the river, or in the advent of high water (more than 6'), the mechanical dredge could then be mobilized for work in those areas where material placement sites are located adjacent to the dredge cut(s).

Advantages: The use of both hydraulic and mechanical dredging would allow for continuing operation despite river conditions and water stage. The hydraulic dredge will be able to operate faster than the mechanical dredge, while the water quality issues would be less with the mechanical operation. The hydraulic dredge's pipeline can be moved from placement site to placement site with relative ease, thereby allowing the placed material a chance to consolidate before placing more material upon it.

Disadvantages and possible obstacles: The pipeline of the hydraulic dredge, depending upon its location, may interfere with the operation of the mechanical dredge. The mechanical operation would require the need of a channel from its current dredging location to the placement site if said site is not adjacent to the channel, and this in turn may require extra dredging in order to access the placement sites while increasing the amount of material to be contained.

Justification: Both types of operation are feasible and are currently employed by the District in its channel maintenance program. I favor the hydraulic option over the mechanical based on operational ease and speed of project completion.

Cost Savings: Since the project is dependent upon dredging of some form, cost savings would be derived from rapid conclusion of the project, realistically within one dredging season, thereby saving mobilization costs for a second season. To accomplish this the majority of the dredging would need to be done hydraulically.

Implementation Strategy/Timetable: Since the project is dependent upon dredging, the earliest possible window should be utilized. By utilizing both mechanical and hydraulic dredging we increase the window size and accomplish the project that much sooner.

Necessary Coordination: Coordination would take place via the District's onsite Construction Inspector with the dredging contractor. Prior to start of construction the District will finalize the dredging operation with the DNR and City of Pekin.

Assumptions: I would hope that the dredging contract is paid for by the "station" as opposed to by the cubic yard. Also that the contractor be allowed to bring the type of pipe and quantity of pipe as he sees fit to prosecute the job instead of being restricted by a set quantity in the contract. That the size of bucket used in the mechanical operation be 4 yard or better and that all floating plant not draft more than 4 feet.

Value Engineering Proposal # 9S

Title of Proposal (Be descriptive and concise): Move P4 placement area closer to dredged channel and make it a different shape...add more P4's.

Function of Proposal (Verb/noun-oriented): Moving the P4 placement area closer to the dredged channel should reduce costs by minimizing the distance of moving dredged material and limiting the difficulty of moving the material through the existing trees. Adding additional P4 areas may make the dredging more cost effective by reducing the distance of moving dredged material. The shape of the P4 area should be adjusted to ease the placement of material. A long linear area would be appropriate for mechanically placed material adjacent to the dredged channel to eliminate double handling. An area where hydraulically dredged material is placed could be made circular so that the dredge pipe does not need to be constantly moved.

Existing Situation: The draft report shows the P4 placement area approximately 200 ft from the dredge cut at the south end and 500 ft from the dredge cut at the north end. It is approximately 175 ft into the trees at the south end and 200 ft into the trees on the north end. The shape of the dredged material is a rectangle about 150 ft wide and 1600 feet long.

Proposed Change (Show before/after sketches on separate sheets, if applicable):

Move the placement area adjacent to the dredge cut and keep it at the tree line. A placement area 150 ft wide is acceptable if the mechanical dredge has a 180 ft boom with a horizontal reach approaching 150 ft. (The far side of the placement area will widen out past the reach of the bucket. Generally an offset of 30 to 40 feet is desirable between the top of the excavation and the toe of the placement area.)

Advantages:

1. Less cost
2. Less disruption to the environment
3. Keeps tree clearing to a minimum
4. Easier access to the material for follow-on tree planting and monitoring

Disadvantages and possible obstacles:

The existing placement area has already been coordinated with the project sponsor.

Justification: (Acceptability, constructability, operational ease, etc.)
This proposal is very practical and simplifies both constructability and operability.

Cost Savings (If applicable - show calculations on separate sheets):

Drawing P4 shows a capacity of 43,500 CY in the P4 placement area. Assuming it costs an additional $5 per CY to move the material through the existing trees to the placement site, a savings of $220,000 could be realized by implementing this proposal.

Implementation Strategy/Timetable:

N/A. This would simplify the existing project and construction timetable.

Necessary Coordination:

Coordinate with sponsors and environmental agencies.

Assumptions:

The original placement location requires double handling of material or a more expensive placement method than simple mechanical excavation with adjacent placement.

attachment.

Implementation Strategy/Timetable: Timing would depend on the Environment Assessment of the planned channel maintenance project. Actual construction of the Section 519 project would be shortened due to part of the work being shifted to the maintenance project.

Necessary Coordination: Coordination with OD for the Illinois River would be essential for the two projects to utilize each other.

Assumptions: That the above referenced coordination could occur in a manner that is timely enough for the success of both projects.

Value Engineering Proposal # 10S

Title of Proposal: Use channel maintenance material for containment at sites P4 & P2

Function of Proposal: Cost savings by utilizing material from scheduled dredging that will be paid for under a DMMP project with cost savings for both projects.

Existing Situation: The existing situation is to use mechanically dredged material to construct long regularly shaped containment sites for the onsite dredging to be done.

Proposed Change: This proposal will utilize dredged sand from channel maintenance to construct the containment berms. P2 is a low spot that does not allow separation of the lake from the river during modest high water events, (app: elev. 442.0) which occurs yearly in the Spring. P4 is a placement site that will allow for mast tree plantings and the shape of which is discussed in idea number 9. Utilizing the sand material will reduce the time needed to organize permitting issues for the P4 & P2 sites as it will have been done under a previous project. Additionally, the material used for sand berms constructed from a maintenance DMMP site would be essentially free. The ability to hydraulically dredge material to the CDF would also result in fewer trees having to be removed during construction for the placement of the material resulting in a higher net habitat benefits. The difference in cost would be a complete removal of mechanical dredging required to the mast tree, P4 & P2 sites and an increases of the hydraulically dredged material from the lake. The costs are shown in the cost attachment.

Advantages:

1. cost reduction
2. More existing terrestrial habitat and trees to remain
3. Diversification of terrestrial habitat

Disadvantages and possible obstacles: Permitting of the channel maintenance project might not allow placement of dredged material when or where required for the VE proposal.

Justification: Real benefits would result from; costs savings, increased mast tree planting areas, improved terrestrial habitat, a decrease in the construction duration of the project.

Cost Savings: Cost savings totaling $738,833 are detailed on the cost calculations

Cost Calculations – Proposal # 10S

P4)

The cost of placement site is as follows:

43,500 x 2 = 87,000cy dry dredged

@ $9/cy = $783,000 x 1.25 (contingency, ie: tree clearing, etc)

= $978,758

87,000cy x $3/cy = $261,000

Net savings = $978,758 - $261,000 = $717,758

P2)

5620 cy by traditional earth moving equipment

x $3/cy = $16,860 x 1.25 (contingency, ie: tree clearing, etc)

=$21,075

TOTAL SAVINGS

$717,758 + 21,075 = $738,833