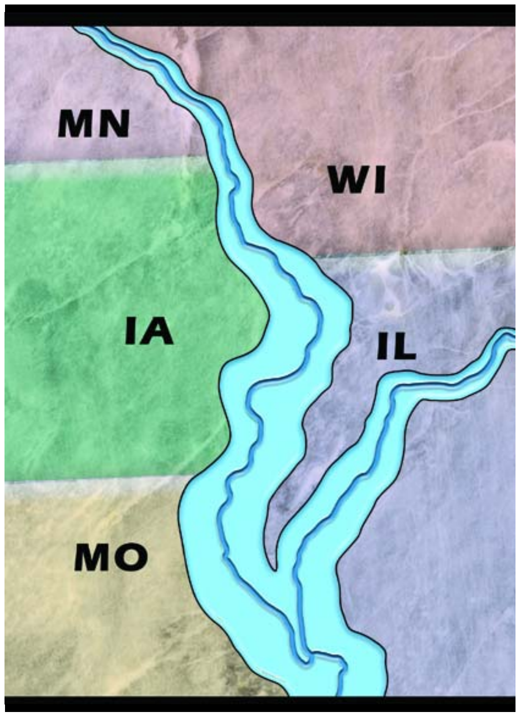
UPPER MISSISSIPPI RIVER COMPREHENSIVE PLAN



APPENDIX D

COST ESTIMATES

Prepared by the
U.S. Army Corps of Engineers
Rock Island, St. Louis, and St. Paul Districts
March 2008

UPPER MISSISSIPPI RIVER COMPREHENSIVE PLAN

APPENDIX D
COST ESTIMATES

CONTENTS

UPPER MISSISSIPPI RIVER COMPREHENSIVE PLAN

APPENDIX D
COST ESTIMATES

I. GEOTECHNICAL STUDIES AND QUANTITIES

Geotechnical studies focused primarily on developing generic quantities associated with levee and berm construction and modifications. Each Corps district performed a different level of effort for geotechnical studies and investigations which are then reflected in quantities calculated.

A. St. Louis District

1. Geotechnical Studies, Analysis, and Calculations. The geotechnical analysis that was performed by the St. Louis District addressed the need for underseepage control measures. Using representative levee districts, both urban and agricultural, a detailed underseepage analysis was performed. As-built and geotechnical data was used to run the underseepage analysis to achieve a landside tow gradient of 0.5 or less. This gradient is the limiting design gradient that is used in current new levee design and deficiency studies by the St. Louis District. After all the data was considered, the results were compiled into two separate categories: urban levees and agricultural levees. For both urban and agricultural levees, a separate analysis evaluated the impacts of a levee raise to the adjusted hydrologic event. Based on the assumptions in Section 2 below, five hydrologic scenarios were evaluated. Each scenario calculated a percentage of needed underseepage control measures into three categories: no berm, minimum design berm, and maximum design berm. Quantities and cost estimates were based on these percentages.

In addition to the seepage berm calculations, the St. Louis District also calculated the extra amount of seepage water that would collect inside the levee and need to be pumped out of the interior of the levee district. This quantity was used to calculate new pump capacities that would need to be met to keep the interior of the levee district from being flooded.

2. Assumptions. The St. Louis District assumed some basic design parameters in its calculations for the underseepage control measures.

a. Underseepage could be controlled by the use of seepage berms only.
b. Levees all have a similar cross-section, whether agricultural or urban.
c. Critical gradient for underseepage analysis is 0.5.
d. Levees are in good condition and structurally sound before any improvements are made.
e. A minimum design berm is 150 feet wide and 5 feet thick.
f. A maximum design berm is 300 feet wide and 10 feet thick.

B. Rock Island District

1. Geotechnical Investigations. Due to the nature of the study, minimal geotechnical efforts were included for this study. The Rock Island District made the assumption that detailed geotechnical investigations will be conducted if the study continues to the feasibility stage. The Rock Island District assumed that if an existing levee had a seepage berm, the berm would be raised the same height as the levee is raised.

2. Assumptions. The Rock Island District has made the basic assumption that the existing levees would be capped with earthen or dredged materials in order to achieve the desired level of protection. The urban levees within the District are built to Corps standards and require minimal work to provide a 500-year level of protection. The majority of the levees in agricultural districts is also built to Corps standards and is considered to be suitable upon which to construct.

a. Levee Design

1. Levee Materials. The levees fronting the Mississippi and Illinois Rivers, within the Rock Island District, are generally constructed of dredged sand. The levees were not topped with topsoil and have minimal vegetative growth. However, the tie-back levees are constructed of impermeable materials. The Rock Island District assumed dredged materials will be used to raise the levees that are constructed of sand and earthen materials will be used to raise the tie-back levees and other fronting earthen levees. However, during a feasibility study sand caps will be evaluated.

2. Levee Construction. In order to remove all organic material, the top 4-inches of material will be stripped from the existing levee based on the footprint of the modified levee. The modified levees will have a 10-foot minimum top width. The side slopes for sand levees will be 1V on 4H riverside and 1V on 5H landside. Earthen levees will have side slopes of 1V on 3H for landside and riverside slopes.

b. Drainage. The Rock Island District assumed additional gravity drains would not be included in this study. Gravity drains are in operation only during normal river conditions and would be inoperable during high stages, which is the focus of this study. Unless the existing interior drainage system is known to be inadequate, the existing configuration will be maintained. Interior drainage will be reviewed in-depth during a feasibility level study. Additional pumping capacity was included due to the additional seepage and pumping head related to added levee heights. See Section IV, paragraphs A.6 and B24 for discussion on additional pumping capacity factors.

C . St. Paul District

1. Geotechnical Studies and Investigations. Geotechnical studies or investigations were not conducted for levees in the St. Paul District. Detailed geotechnical investigations will be conducted if the Upper Mississippi River Comprehensive Plan study continues to the feasibility stage.

2. Assumptions

a. Levee Design. Due to the availability of pervious fill and generally pervious foundation conditions, typical levee configurations were selected for the UMRCP using pervious fill with 1 vertical (V) on 3 horizontal (H)riverside slopes and 1V on 5H landside slopes. The levee sideslopes will be topped with 4 inches of topsoil and seeded. The typical levee top width was selected to be 10 feet except where a wider width was necessary for road construction. For those cases, a weighted average for the top width was used in the quantities spreadsheet (only one levee cross section is used for quantity calculations). Except where paved roads existed on the top of the levee, the levees will be topped with 6 inches of crushed aggregate. Existing paved areas atop federal levees will be repaved after the levee raise is completed. Existing federal levees will be raised after stripping existing topsoil materials. Non-federal levees are not planned to be reused at this time since they likely lack proper levee compaction and are often overgrown. Four inches of stripping was assumed beneath the levee prism.

b. Subdrain Design. The aggradation of the Mississippi River Valley, since the time of the glacial river Warren, has predominantly been with granular materials. Recent deposits of finer grained materials mantle these soils to varying degrees in the St. Paul District. Without sufficient real estate to construct seepage berms, it was assumed that uplift concerns would be addressed by using a drain trench rather than seepage berms. It was also assumed that these trenches would be necessary when the levee height, including 3.5 feet of freeboard, exceeded 8 feet. The subdrain was assumed to be necessary at all floodwall locations. The subdrain configuration was estimated to be 6 feet deep, with a bottom width of 15 feet and top width of 33 feet for both levee and floodwall alignments. The trenches would be backfilled with pervious fill surrounding a collector pipe.

This left intentionally blank.

II. CIVIL ENGINEERING STUDIES AND QUANTITIES

Civil engineering studies focused primarily on developing generic quantities associated with levee construction and levee modifications. Using a spreadsheet format, formulas were developed to compute quantities for levee degradation, new levee materials, berm materials, additional levee right-of-way, acreage of seeding, acreage of clearing and stripping, crushed stone, asphaltic concrete, and other needed items. Each district developed a spreadsheet for its respective levee and floodwall systems in order to calculate and document quantities. Superiority was not included in quantity calculations and one freeboard height was used for each district. Freeboard requirements for agricultural and urban levee districts were established for each plan. However, to ensure minimal additional damage if overtopping occurs, superiority will be incorporated into the final design. Superiority would be applied per Federal Emergency Management Agency (FEMA) guidelines.

A. St. Louis District. A sample quantities sheet for Brevator Drainage and Levee District can be found at the end of this appendix.

1. Levee Materials. The majority of levee raises in the St. Louis District will be accomplished by degrading the entire levee and rebuilding it with a sand core capped with clay on the crown and side slopes. There are also a number of levees that will be capped with a clay layer only along the side slopes and crown. Decisions on whether a levee should be capped or degraded and rebuilt are made on a case-by-case basis for each levee district.

2. Berms. If an existing or new levee is made up entirely of clay, then its berms are to be clay also. If an existing or new levee has a sand core, then its berms are to be sand core with a 1-foot thick clay cap. Berms for the new levees are defined into three cases: no berm, minimum berm, and maximum berm. Based on seepage analysis of selected levees in the Alton-to-Gale system, a percentage of each case was determined for each length of levee. The levee raises are assumed to be the same length as the existing levees. The levee raises have crown width of 16 feet and side slopes of 1V to 4H. All road crossings at the levee raises are assumed to be ramped up and over the levee with no road closure structures included. It is also assumed that the levee raises will have a 12-foot-wide crushed stone road running the entire length for maintenance and flood-fighting purposes, except in cases where there are existing asphalt roads on the levees. In this case, the asphalt roads will be replaced with asphalt roads.

B. Rock Island District. A sample quantities sheet for Des Moines/Mississippi Drainage and Levee District can be found at the end of this appendix.

1. Calculations. The Rock Island District completed an as-built plan search for each levee district within the study area and utilized an in-house spreadsheet to calculate quantities. The levee materials, heights and dimensions varied considerably within each levee district. The Rock Island District felt that one section was not adequate for the calculation of quantities for each levee district and that additional sections could be utilized. The Rock Island District utilized the spreadsheet developed by The St. Louis District to check quantities for quality assurance. The quantity spreadsheet is designed to correlate the levee district stationing to the corresponding river mile. The existing levee information was entered into the quantity spreadsheet using the typical cross sections and profiles provided by the as-built drawings. Then, the river profiles, with freeboard, were graphed using Excel and the profile elevations were input into the quantity spreadsheet by river mile.

2. Verification. The formulas put into the Excel spreadsheet were checked against several typical sections encountered in the as-built drawings. The typical sections were drawn to scale in Microstation and the area tool was used to determine the cross-sectional area. The quantities were within 4 percent between what was drawn and what was calculated in the spreadsheet. There were minor variations when the landside and riverside toe elevations were not equal. The spreadsheet quantities were deemed acceptable.

3. Embankment Fill. Two types of embankment materials were considered for this study: earthen and sand. Earthen materials are considered to be impervious materials suitable for levee construction. Sand consists of hydraulically-dredged material. It was assumed that the material used to cap the levee would be the same as the material used to construct to existing levee. The cross sections were entered by station using the information detailed in the as-built drawings. The beginning section and end section of the typical section range were averaged together to get an average cross sectional area per typical section range. The quantity of material was calculated by subtracting the cross sectional area of the existing levee from that of the improved levee, then multiplied by the length of the section range. Additional embankment quantities for road crossings are included in the embankment fill quantity. Embankment borrow quantities were increased by 25 percent to account for compaction during placement. Measurement quantity is cubic yards (CY).

4. Riprap and Bedding. Riprap and bedding materials were accounted for as identified on the as-built drawings and navigation charts. The cross sections showed that bedding material was placed 6 inches thick, and riprap material was placed 18 inches thick. The existing riprap and bedding would be removed, stockpiled, and then replaced on the modified levee. New bedding material will be required for the placement of riprap on the modified levee. The riprap on the modified levee will be placed to the existing elevation plus an additional height for the modified levee. It was estimated that 25 percent of the existing riprap would be lost during the process, requiring new riprap to be placed on the modified levee. Measurement quantity is cubic yards (CY) and converted into tons for the cost estimate. The conversion factor is 1.4 ton/cy.

5. Roadway Material. Roadway material consists of concrete, asphalt, or crushed stone surfacing located on the levee. A small percentage of levee districts have improved roadways on the levees identified in the as-built drawings. The roadway would be removed and replaced to match the roadways existing configuration. Measurement quantity is cubic yards (CY) and converted to tons for the cost estimate. The conversion factors are as follows:

asphalt	2.04 ton/cy
crushed stone	1.4 ton/cy

6. New Right-of Way. The new right-of-way is defined as the length between the landside and riverside toes plus an additional 10 feet on each side of the toes. The cross section width (feet) was multiplied by the length of the typical section range (feet) and then converted into acres. The unit of measure is acre (AC).

7. Existing Right-of-Way. Existing right-of-way is based on the existing configuration of the levee. It was assumed that the right-of-way included the land from toe to toe plus an additional 10 feet on each side of the toes. The cross section width (feet) was multiplied by the length of the typical section range (feet) and then converted into acres. The unit of measure is acre (AC).

8. Additional Right-of-Way. Additional right-of-way is the area of land required to complete the project. The quantity was calculated by subtracting the existing right-of-way from the new right-of-way. The unit of measure is acre (AC).

9. Temporary Construction Easement. A temporary construction easement of 50 feet was included as a part of the quantity calculation. The easement area was calculated by multiplying the length of levee requiring modification by 50 feet and converting to acres. The quantity was used as a baseline and modified per the site conditions for the Real Estate cost estimates.

10. Clearing. As determined in annual levee inspection reports, the levees within the PL-84-99 are relatively free of woody growth along the levee. The Federal levees are inspected annually to ensure proper maintenance. Clearing will take place in the location of the modified levee footprint and an additional 10 feet outside of the modified levee toe. There is an additional quantity category for clearing the 50-foot temporary easement. The quantity for clearing the easement is based on the length of levee requiring modification. The unit of measure is acre (AC).

11. Seeding. All areas disturbed during construction will require turf re-establishment. The areas to be seeded include the modified levee and the additional 10 feet of right-of-way outside the toes. There is an additional quantity category for seeding the 50-foot temporary easement. The unit of measure is acre (AC).

12. Stripping. All areas to be modified will require the top 4-inches of material to be removed. Stripping the levee and work areas will ensure all vegetative material is removed prior to the placement of additional fill material. No stripping quantities were calculated for floodwall areas. The unity of measure is cubic yard (CY).

C. St. Paul District. A sample quantities sheet for Red Wing, Minnesota can be found at the end of this appendix.

1. General. Earthwork, paving, and real estate quantities were generally computed using the St. Louis District spreadsheet developed for the project. Minor modifications were made to accommodate the St. Paul District conditions. Floodwall lengths and heights were selected for each community, and were used by the St. Paul District Cost Design Section to compute structural quantities for assessing project costs. Hardcopies of all the worksheets are not included in this appendix, but an example sheet is presented at the end of this appendix. Since quantities in each spreadsheet are computed as a function of one flood barrier height, and heights may vary between different community reaches, a weighted average height was found by utilizing Hydraulic Design Section modeling information. Hydraulic cross section geometry was used at specific reaches to find the approximate ground surface elevations along the selected barrier alignment. These elevations were compared to the 500-year water surface elevations at those locations, with an added 3.5 feet of freeboard. The average height for levees and floodwalls was determined simply by dividing the product of the individual reach length and levee/floodwall height by the total community levee/floodwall length. The decision to use 3.5 feet for freeboard was based on an average of 3 feet of freeboard at the downstream end of the flood barrier and 4 feet at the upstream end (to account for superiority).

2. Clearing. Clearing limits associated with Federal projects were based on the area of the additional levee prism footprint. For projects associated with non-Federal levees and unprotected communities, clearing limits were estimated to be the considered levee prism footprint and a 10-foot-wide area along the floodwall alignment. Quantities include an estimate for clearing a 50-foot temporary easement along levee and floodwall alignments.

3. Stripping. Stripping the levee and work areas will ensure all vegetative material is removed prior to the placement of additional fill material. Stripping quantities were based on a 4-inch depth of soil removal beneath the base of the new levee prism. Where Federal levees are raised to accommodate additional required levee height, the levee surface was estimated to require 4 inches of stripping. No stripping quantities were computed for the floodwall or subdrain construction as this was included in the excavation quantities by the Cost Engineering Section.

4. Roadway Materials. Roadway material consists of asphalt or crushed stone surfacing located on the levee. The existing roadways would be removed and replaced to match the roadway's existing configuration. Quantities for asphaltic concrete were only computed in those reaches where it currently exists on federal projects. Crushed stone was estimated for placement on the tops of all levees for access. This may not always be necessary, as access to the levees for maintenance, inspection, and emergency actions can often be accomplished at the landward levee toe for urban areas with smaller levee heights.

5. Demolition of Existing Roads. Demolition of existing roads quantity determinations were similar to those for asphaltic concrete. Quantities were computed in reaches where existing roads currently exist on federal projects.

6. Pervious Embankment. Pervious embankment consists of hydraulically-dredged material. The quantity of material was calculated by subtracting the cross-sectional area of the existing levee from that of the improved levee, then multiplied by the length of the section range. Embankment fill (sand) quantities were estimated for the levee prism or levee raise only, and do not include the subdrain as this was estimated on a lineal foot basis. Estimated fill quantities were increased by 25 percent to account for compaction during placing operations.

7. Seeding. All areas disturbed during construction will require seeding. Seeding quantities were estimated for the levee surface area including 10 feet of right-of-way beyond each levee toe. Seeded floodwall areas were estimated assuming a 30-foot-wide strip along the entire floodwall length. Quantities include an estimate for seeding a 50-foot temporary easement along levee and floodwall alignments.

8. Topsoil. Topsoil quantities were computed assuming a four-inch thickness of topsoil on the levee sideslopes. Estimated topsoil quantities were increased by 25 percent to account for some compaction during placing operations.

III. STRUCTURAL ENGINEERING STUDIES

Structural studies focused on two measures—floodwalls and closure structures. For floodwalls, studies determined the stability and feasibility of raising floodwalls and closure structures by various heights. Generic quantities were developed for new floodwall construction and new closure structures of various heights. Structural units in each Corps district determined the need for new closure structures, closure structure modifications, new floodwalls, or floodwall modifications associated with alternative plans. Additional in-depth studies will be completed during a feasibility study.

A. St. Louis District

1. Calculation of Quantities. The structural section estimated quantities for floodwalls and closures only. Gravity drain quantities and pump station quantities were estimated by Civil Engineering Section and Mechanical Section, respectively. Quantities were not estimated for any other structural work but instead were covered by a lump sum approach. Existing floodwalls and closure structures were assumed to be demolished and built new for any raise. This is due to analysis showing that many existing structures do not meet current stability criteria. Quantities for the rebuilding of existing walls and closures were based on recently constructed structures by scaling to adjust for the required height and opening. The numbers of new railroad closures, where none currently exist, were estimated and quantities calculated.

2. Assumptions. It was assumed that no new floodwalls were required where no walls currently exist. It was assumed that no new highway closures will be required where no highway closures currently exist. It was assumed that highways will be raised to go over levee raises and new levees.

B. Rock Island District

1. Calculation of Quantities. The as-built drawings were reviewed to determine the quantity of structural concrete to be removed. The two types of walls that were encountered were I-walls and T-walls. Measurement quantity is cubic yards (CY).

2. Assumptions. It was assumed that the existing floodwalls were not suitable for adding additional height and would be completely removed and reconstructed. It was assumed that the new structure would be the same basic design but to the appropriate level of protection.

C. St. Paul District Quantities and Assumptions. Floodwall design assumes construction of a sheetpile I-wall with a reinforced concrete cap. The embedment depth for the sheetpile is assumed to be 2.5 times the exposed height of the floodwall. The top elevation of the sheetpile is 3 feet below grade. The reinforced concrete wall is assumed to be 1.5 feet thick with a base elevation 4 feet below grade.

This left intentionally blank.

IV. MECHANICAL/ELECTRICAL ENGINEERING STUDIES

The mechanical/electrical studies focused on the cost of new pump stations or increasing the capacity of existing pump stations to accommodate pumping against higher heads or additional flows from new relief wells. Generic costs were developed for a variety of capacity increases. Mechanical/Electrical Engineering Sections in each Corps district determined the need for pumping capacity increases associated with each of the alternative plans and provided this to the Cost Engineering Section.

IV. COST ENGINEERING

Unit costs were developed for a variety of types and sizes of measures for Civil Engineering Geotechnical Engineering, Structural Engineering, and Mechanical/Electrical Engineering. In some instances the three Corps districts developed individual unit costs because of variation in construction costs for the different geographical areas. The Cost Engineering Sections used the generic quantities provided for alternative plans and developed costs for each plan.

A. St. Louis District. A sample cost sheet for Brevator Drainage and Levee District can be found at the end of this appendix.

1. Mobilization and Demobilization. Mobilization and Demobilization costs were calculated as 4 percent of the construction cost.

2. Care of Water. Care of Water was calculated as 8 percent of the construction cost minus mobilization and demobilization.

3. Impervious Embankment. Impervious Embankment costs were based on recent levee construction for large flood control projects in the St. Louis District. These projects included Valley Park, St. Peters, and Festus/Crystal City.

4. Dredged Sand. Dredged Sand costs were based on the Ste. Genevieve Flood Control Project contract for Levee, Ditching, and Grading.

5. Closure Structures. Closure Structure costs were based on recent flood control projects in the St. Louis District. These projects included Ste. Genevieve and Valley Park.

6. Pump Station Upgrades. Pump Station Upgrade costs were priced on gallon per minute (GPM) based on composite construction for pump station contracts in the St. Louis District.

7. Gravity Drains. Gravity Drain costs were calculated assuming one structural per 1000 acres of protected area for agricultural levees and one structure per 400 acres of protected area for urban levees.

8. Relief Wells. Relief Well costs were based on assuming four relief wells per each gravity drainage structure.

9. Other Structures and Relocations. Pricing for this item was based on actual FY02 Relocation costs for completed flood control projects in the St. Louis District. Costs were calculated using 10 percent for agricultural levees and 15 percent for urban levees. All other unit costs were based on various historical data for the St. Louis District.

10. Real Estate. Real estate needs included additional right-of-way and easements required to modify/construct the levees and floodwalls. See Appendix G, *Real Estate,* for more information.

11. Contingencies. A contingency value of 35 percent was applied to the total construction costs for each levee district. The value is justified due to the reconnaissance assessment for this study.

12. Planning, Engineering, and Design. Planning, engineering, and design is assumed to represent 15 percent of the total construction cost for each levee district.

13. Supervision and Administration. Supervision and administration is assumed to represent 10 percent of the total construction cost for each levee district.

B. Rock Island District. A sample cost sheet for Des Moines/Mississippi Drainage and Levee District can be found at the end of this appendix. Cost estimates were developed for the construction or modification of permanent flood protection features for 45 levee districts and 4 unprotected communities located along the Mississippi, and 21 levee districts located along the Illinois Rivers within The Rock Island District. Due to the reconnaissance nature of this study, most costs were developed from information contained in standard cost references or from data available from previously constructed flood control projects within the St. Louis and Rock Island Districts.

The following paragraphs discuss in detail the assumptions and methodologies used to determine unit costs for each flood control feature. The format of the cost estimates is generally based on a spreadsheet provided by the St. Louis District, although several of the flood control features for which costs were developed were modified to suit the conditions found in The Rock Island District. The unit prices provided by the St. Louis District were reviewed by Cost Engineering in Rock Island and found to be reasonable prices for use in the Rock Island District's cost estimate. Detailed discussions of the individual flood control features can be found in preceding paragraphs of this appendix. The Rock Island District elected not to include the following line items from the cost estimates prepared by the St. Louis District: care of water, degrade existing levee, gravity drain, and relief wells per discussions listed below.

1. Care of Water. The Rock Island District will not be degrading and reconstructing the existing levees therefore the care of water line item was deemed to not be necessary. Existing interior drainage structures will remain in place during construction. The existing levee systems will not be breeched during construction.

2. Degrade Existing Levee. A small percentage of the levee districts included in this study do not meet the PL 84-99 eligibility requirements. Since the majority of the levees are included in the PL 84-99 program and the levee raises average from 2 to 5 feet, the levees are considered to be a suitable base for the modifications required by this study and will not be required to be degraded.

3. Gravity Drain. There are no known deficiencies with interior gravity drainage issues for the levee districts within The Rock Island District. It was assumed that the interior drainage is adequate for normal flow and that the interior drainage would be closed during high water events.

4. Relief Wells. The Rock Island District is including relief well work with the pump station upgrades line item.

5. New Closure Structures and Floodwalls. The Rock Island District did not include unit prices for sheet pile, H-pile, and structural steel. The cost for constructing new floodwalls was based on the quantity of reinforced concrete required, to remain consistent with the level of detail for a reconnaissance report.

6. Mobilization and Demobilization. Mobilization and demobilization is equal to 4 percent of the total construction costs as provided by the St. Louis District.

7. Clearing and Grubbing. Clearing and grubbing is $3,500/acre as provided by the St. Louis District and verified by cost engineering in the Rock Island District.

8. Stripping. Stripping is $2.50/cubic yard as provided by the St. Louis District and verified by cost engineering in the Rock Island District.

9. Remove Existing Surfacing. Removal of the existing surfacing includes removing any improved roadway from the levee. There is a limited amount of removal required, and a unit price of $5.00/square yard was used as provided by the St. Louis District and verified by cost engineering in the Rock Island District.

10. Remove/Replace Riprap and Bedding. The cost for removing, stockpiling and replacing the existing riprap and bedding is $50/ton. The unit cost is based on material handling costs associated with removing, stockpiling and replacing the riprap and bedding.

11. Impervious Material (Earth/Clay). Impervious material is $6.00/cubic yard as provided by the St. Louis District and verified by cost engineering in the Rock Island District. The unit price is based on large flood control projects located in the St. Louis District, including Ste. Genevieve, Valley Park, St. Peters, and Festus/Crystal City.

12. Sand Fill (Dredged). Sand fill is $4.00/cubic yard as provided by the St. Louis District and verified by cost engineering in the Rock Island District. The unit price is based from the Ste. Genevieve flood control project located in the St. Louis District.

13. Crushed Stone Surfacing. Crushed stone surfacing is $15.00/ton as provided by the St. Louis District and verified by cost engineering in the Rock Island District. Crushed stone surfacing will only be placed at locations where the surfacing existed prior to the construction of this project.

14. Asphaltic Concrete Pavement. Asphaltic concrete pavement is $40.00/ton as provided by the St. Louis District and verified by cost engineering in the Rock Island District. Asphaltic concrete pavement will only be placed at locations where the surfacing existed prior to the construction of this project.

15. Portland Concrete Pavement. Portland concrete pavement is $240.00/cubic yard as determined by cost engineering in the Rock Island District. Portland concrete pavement will only be placed at locations where the surfacing existed prior to the construction of this project.

16. New Riprap. Riprap is $60.00/ton as determined by cost engineering in the Rock Island District. Riprap will be placed only at locations where riprap existed prior to the construction of this project.

17. New Bedding. Bedding is $35.00/ton as determined by cost engineering in the Rock Island District. Bedding will be placed only at locations where riprap existed prior to the construction of this project.

18. Establishment of Turf (seeding). Establishment of turf is $1200.00/acre as provided by the St. Louis District and verified by cost engineering in the Rock Island District. The unit price includes work for seeding all disturbed areas and the modified levee.

19. Remove Existing Floodwalls. Removal of existing floodwalls is $250.00/cubic yard of concrete. Unit price is based on information provided by the St. Louis District for removal of closure structures. Unit price was verified by cost engineering in the Rock Island District.

20. Remove Existing Closure Structures. Due to the limited number of closure structures requiring major modifications, this line item was not used.

21. New Floodwalls. New floodwall is $500.00/cubic yard of concrete. Floodwalls are found primarily in urban areas. Most urban areas within the Rock Island District are protected to a 500-year event and require minimal modifications.

22. New Closures. New closures are $200,000/each. Based on the limited information available at this level, there are only a few new closures included in the cost estimate; furthermore, the majority of the closures are located in urban areas, which are currently protected to the 500-year level. Closure structures will not be constructed in agricultural districts because ramps over the levees are more cost effective.

23. Modification of Closures. Modification of closures is $200,000/each. A limited amount of information on the closure structures was available at this stage of the study. An estimate of the amount of work was determined as a baseline for closure modifications.

24. Pump Station Upgrades. Pump Station upgrades are based on the additional levee height required to meet the design flood alternative. The upgrades are $60.00/gallon per minute of the additional pumping capacity. Additional pumping capacity was determined to be 10 percent of the existing capacity per each additional 1 foot of levee height. The upgrades are necessary in order to account for any additional seepage water and pumping capacity incurred from the additional levee height.

25. Other Structures and Relocations. Other structures and relocations is an additional line item for work required that does not fall into one of the above descriptions. Railroad track and bridge raises are examples other structures and relocations.

26. Real Estate Needs. Real estate needs include additional right-of-way and easements required to modify/construct the levee. Real estate needs estimates were prepared for each levee district. See Appendix G, *Real Estate,* for more information.

27. Contingencies. A contingency value of 35 percent was applied to the total construction costs for each levee district. This is the value used in the cost spreadsheet provided by the St. Louis District and is justified due to the reconnaissance assessment for this study.

28. Planning, Engineering, and Design. Planning, engineering, and design is assumed to represent 15 percent of the total construction cost for each levee district. This is consistent with the costs assumed for this item in the spreadsheet provided by the St. Louis District.

29. Supervision and Administration. Supervision and administration is assumed to represent 10 percent of the total construction cost for each levee district. This is consistent with the costs assumed for this item in the spreadsheet provided by the St. Louis District.

C. St. Paul District. A sample cost sheet for Red Wing, Minnesota can be found at the end of this appendix. Cost estimates were developed for construction of permanent flood protection features for twenty-eight communities located along the Mississippi River within the St. Paul District boundaries. These communities are located within a reach bounded by Fridley, Minnesota at the upstream end and Guttenberg, Iowa at the downstream end. Due to the preliminary nature of this study most costs were developed from information contained in standard cost references or from data available from previously constructed flood control projects within the district. The following sections discuss in detail the assumptions and methodologies used to determine unit costs for each flood control feature. The format of the cost estimates is generally based on a spreadsheet provided by the St. Louis District, although several of the flood control features for which costs were developed are unique to the St. Paul District.

1. Mobilization/Demobilization. Mobilization and demobilization costs are assumed to be approximately 1 percent of the total construction costs, based on percentages determined for the Devils Lake Flood Control Project located in North Dakota.

2. Clearing and Grubbing. Unit costs of $5,500/acre for clearing and grubbing were determined based on information contained in *Building Construction Cost Data* published by R S Means. This reflects an average of the unit costs for clearing and grubbing trees up to 6 inches in diameter, and unit costs for clearing and grubbing trees up to 12 inches in diameter.

3. Stripping. Unit costs for stripping were determined based on a comparison of information from *Building Construction Cost Data* with costs associated with flood control projects in Houston, Minnesota and St. Paul, Minnesota. *Building Construction Cost Data* lists unit costs for stripping from $0.60/cy to $1.70/cy depending on equipment and conditions. Stripping costs associated with the Houston and St. Paul flood control projects average about $3.40 when costs were adjusted to present day dollars. Based on the comparison a unit cost of $2.50/cy was selected.

4. Removal of Existing Roads. Removal of existing roads is required only for the community of Winona, Minnesota. A unit cost of $6.00/sy for removal of improved roadways was calculated based on information contained in the *Building Construction Cost Data* reference. For demolition of roadways constructed of crushed stone a unit cost of $3.00/sy was used.

5. Crushed Stone Surfacing. Unit costs for crushed stone surfacing for roadways was estimated to be $20/ton based on information from previous construction projects within the St. Paul District.

6. Asphalt Concrete Pavement. Unit costs of $40/ton for placement of asphalt pavement were developed from the *Building Construction Cost Data* reference.

7. Levees: Pervious Embankment. A unit cost of $6.00/cy was estimated for construction of the pervious fill embankment. This is based on comparisons of costs associated with levee construction for the Grand Forks and East Grand Forks Flood Control Projects.

8. Levees: Inspection Trench. The unit cost for construction of an inspection trench beneath the levees was based on costs associated with the Grand Forks and East Grand Forks Flood Control Projects. A unit cost of $7.00/lf of trench was used.

9. Topsoil. Examination of data from the St. Cloud Section 14 Project resulted in the use of $7.00/cy for a unit cost for placement of topsoil.

10. Seed. Evaluation of projects in Marshall, Minnesota, St. Paul, Minnesota, and Rochester, Minnesota were used to determine an average unit cost of $2,900/acre for seeding.

11. Remove Existing Closure Structures. This item was provided on the St. Louis cost spreadsheet but wasn't required for establishing construction costs for communities in the St. Paul District.

12. New Closure Structures. The estimated cost for construction of new closure structures for roadways was based on evaluation of data from flood control projects in Grand Forks and East Grand Forks. An average unit cost of $700/sf of closure was calculated.

13. Floodwalls: Reinforced Concrete. A unit cost of $500/cy was estimated for construction of the reinforced concrete wall. This is based on costs associated with the flood control project for East Grand Forks. The unit cost covers all costs associated with construction including reinforcing steel and formwork.

14. Floodwalls: Sheetpile. A unit cost of $25/sf was estimated for construction of the sheetpile portion of the wall. This is based on costs associated with the sheetpile work for the St. Cloud Section 14 Project.

15. Structural Steel. This item was provided in the St. Louis cost spreadsheet but wasn't required for establishing construction costs for communities in the St. Paul District. Flood control features requiring structural steel, such as closures, are assumed to reflect the costs associated with the structural steel in their unit costs.

16. Railroad Closure Structures. The estimated cost for construction of new railroad closure structures was based on the evaluation completed for the roadway closures. It was assumed that the railroad closures would have a unit cost approximately 50 percent higher per square foot of closure than the roadway since the railroad closures are narrower. A unit cost of $1,100/sf of closure was assumed.

17. Levee and Floodwall Gravity Drains. A unit cost of $65/lf was calculated for the levee and floodwall gravity drain systems. Work associated with drain construction includes excavation, placement of pervious fill, and construction of the drain system with a perforated PVC pipe encased in a gravel pack, which in turn is wrapped in geotextile. Excavation costs of $3.50/cy were assumed based on costs associated with the East Grand Forks and Grand Forks projects. Pervious fill costs of $6.00/cy were used based on costs developed for the pervious fill levees. A unit cost of $30/cy for the gravel pack was based on unit costs for drain construction for projects at St. Paul and Rochester. The geotextile drainage wrap cost of $1.75/sy was based on a material cost from MCASES of $1.43/sy with approximately 15 percent added for placement costs. A cost of $4.00/lf for the perforated PVC pipe is based on material costs from the *Building Construction Cost Data* reference.

18. Excavation. This item was provided in the St. Louis cost spreadsheet but was not required as a stand-alone feature for establishing construction costs for communities in the St. Paul District. As was discussed in the paragraph above, however, it was required for establishing unit costs for the levee and floodwall drain systems.

19. Relocations. Relocation costs used for the estimate were defined as a percentage of the total construction costs. Based on cost information contained in the project design memorandum for the St. Paul Flood Control Project it is assumed that relocation costs will be approximately 24 percent of the total construction costs.

20. Riprap and Bedding. Riprap and bedding costs used for the estimate were defined as a percentage of the total construction costs, based on cost information for the St. Paul Flood Control Project. The riprap and bedding costs are assumed to be 5 percent of the total construction costs.

21. Interior Flood Control. Interior flood control costs were developed as a percentage of the total construction costs. Data from projects in East Grand Forks and Grand Forks indicate that interior flood control costs on the order of 30 percent of the total construction costs is appropriate. Input from the Hydraulics Section resulted in the use of 25 percent for interior flood control costs for La Crosse, Wisconsin.

22. Hazardous Toxic and Radioactive Waste (HTRW)/Cultural/Recreational. Costs associated with HTRW and cultural investigations and construction of recreational features are assumed to represent 5 percent of the total construction costs. This is based on evaluation of data from the Grand Forks and East Grand Forks Flood Control Projects.

23. Contingencies. A contingency value of 35 percent was applied to the total construction costs for all communities. This is the value used in the cost spreadsheet provided by the St. Louis District and is justified due to the preliminary level of this assessment.

24. Planning, Engineering, and Design. Planning, engineering, and design are assumed to represent 15 percent of the total construction cost for all communities. This is consistent with the costs assumed for this item in the spreadsheet provided by the St. Louis District.

25. Supervision and Administration. Supervision and administration is assumed to represent 10 percent of the total construction cost for all communities. This is consistent with the costs assumed for this item in the spreadsheet provided by the St. Louis District.

VI. SUMMARY OF COSTS

The costs shown in the table below represent construction costs—including contingencies, planning, engineering, design, supervision and administration—and real estate costs.

Table 1. Summary of Costs Per Reach for Alternatives A, B, D, and E

	Alternative A	Alternative B	Alternative D	Alternative E
Reach 1	$640,096,000	$645,262,000	$639,520,000	$638,265,000
Reach 2	$382,209,000	$447,828,000	$319,829,000	$245,511,000
Reach 3	$5,962,355,000	$2,234,004,000	$1,768,519,000	$1,004,526,000
Reach 4	$1,759,922,000	$1,679,664,000	$1,030,817,000	$1,017,209,000
Total	**$8,744,582,000**	**$5,006,758,000**	**$3,758,685,000**	**$2,905,511,000**

Brevator

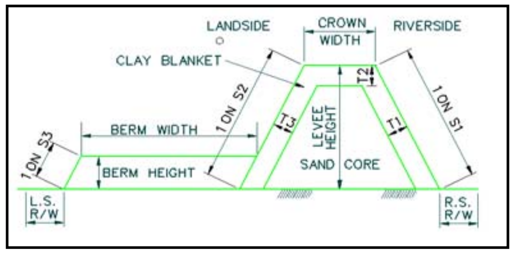
LEVEE DATA:

	Existing Levee	New Levee	
State:	MO		
Type of Construction:	Non-Fed	439.2	:Hydraulics MP Elevation
Urban or Ag:	Ag	-2.8	:Difference from TOL Elev.
River Mile:	238.075	13.17	:Δ Height from Hydraulics
Ave. Top of Levee Elevation:	442		
Ave. Interior Elevation:	433.8		
Sand-Core Levee? (Y/N)	N	Y	
If Yes: T1:	-	5	
T2:	-	4	
T3:	-	3	
Crown width (ft):	7.5	16	
Avg. Ht. (ft)	8.2	18.57	
R.S. slope (S1) - 1 on	2.5	4	
L.S. slope (S2) - 1 on	2.5	4	
R.S. R/W (ft):	10	10	
L.S. R/W (ft):	10	10	
Levee Length(ft):	20,850	20,850	
Existing Berm Width (ft):	0		
Existing Berm Height (ft):	0		
Existing Berm Slope (S3) 1 on	0		
Clearing Length(ft):		20,850	
% Unpaved:	100	0	
% Crushed Stone (6" Deep):	0	100	
% Improved (2" Asphalt):	0	0	
% No Berm:		65	
% Min Berm:		20	
% Max Berm:		15	

Min Berm Stats	
Width (ft):	150
Height (ft):	5
Slope (S3) 1 on:	3

Max Berm Stats	
Width (ft):	300
Height (ft):	10
Slope (S3) 1 on:	3

Seepage Rate (gpm/ft) 3.191



QUANTITIES:

Clearing:		
10' R/W and New Levee Base:	100	acre
Temporary 50' Easement:	24	acre
Total Clearing:	**124**	**acre**
Crushed Stone:	**7,413**	**ton**
Asphaltic Concrete:	**0**	**ton**
Demo Existing Roads:		
Crushed Stone:	0	sq.yd.
Improved:	0	sq.yd.

Stripping (4"):	**66982**	**cu.yd.**
Seeding:		
Levee & 10' R/W:	125	acre
Temporary 50' Easement:	24	acre
	149	**acre**
R/W:		
Existing R/W:	33	acre
New R/W:	123	acre
Addl. R/W:	**90**	**acre**
Temporary 50' Easement:	24	acre
Seepage:	**66,532**	**gpm**

Embankment:	Existing Levee	New Levee
Vol. Clay Materials: (CY)	177300	522400
Vol. Sand Materials: (CY)	0	772200

Total Vol. Difference Clay Levee Materials:	345,100	cu.yd.
Clay Compaction Factor:	1.25	
Clay Borrow Req'd for Levee:	**431,375**	**cu.yd.**
Total Vol. Difference Sand Levee Materials:	772,200	cu.yd.
Sand Compaction Factor:	1.25	
Sand Borrow Req'd for Levee:	**965,250**	**cu.yd.**

	Existing Berm	New Berm
Vol. Clay Materials: (CY)	0	64000
Vol. Sand Materials: (CY)	0	397800

Total Vol. Difference Clay Berm Materials:	64,000	cu.yd.
Compaction Factor:	1.25	
Clay Borrow Req'd for Berm:	**80,000**	**cu.yd.**
Total Vol. Difference Sand Berm Materials:	397,800	cu.yd.
Sand Compaction Factor:	1.25	
Sand Borrow Req'd for Berm:	**497,250**	**cu.yd.**

Total All Clay Materials Req'd:	**511,375**	**cu.yd.**
Total All Sand Materials Req'd:	**1,462,500**	**cu.yd.**
Total All Materials Req'd:	**1,973,875**	**cu.yd.**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: Upper Mississippi River Comprehensive Plan DATE: 27-Apr-2005

SUBJECT: Brevator FILE: Plan U1 - Estimate.xls

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
Mobilization and Demobilization	1	LS		777,000
Care of Water	1	LS		1,439,000
Clearing and Grubbing	120	ACR	3,500.00	420,000
Stripping	67,000	CY	2.50	167,500
Removal of Existing Roads	0	SY	5.00	
Degrade Existing Levee & Place Clay Cap	177,300	CY	4.50	797,850
Impervious Embankment	511,400	CY	6.00	3,068,400
Dredged Sand	1,462,500	CY	4.00	5,850,000
Crushed Stone Surfacing	7,400	TON	15.00	111,000
Asphaltic Concrete Pavement	0	TON	40.00	
Establishment of Turf	150	ACR	1,200.00	180,000
Remove Existing Closure Structures	0	CY	250.00	
New Closure Structures/Floodwalls -				
Reinforced Concrete	410	CY	500.00	205,000
Sheetpile	9,350	SF	25.00	233,750
H Pile	3,130	LF	50.00	156,500
Structural Steel	15,800	LB	4.50	71,100
Railroad Closure Bypass	1	EA	350,000.00	350,000
Pump Station Upgrades	66,500	GPM	60.00	3,990,000
Gravity Drains	2	EA	300,000.00	540,000
Relief Wells	7	EA	30,000.00	216,000
Other Stuctures and Relocations	1	LS		1,636,000

SUBTOTAL:		$20,209,000
CONTINGENCIES: (in %)	35	$7,091,000
SUBTOTAL:-------------------		$27,300,000
P.E. & D. (in %)--------------	15	$4,100,000
S & A (in %)-----------------	10	$2,730,000
TOTAL COST		**$34,130,000**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: UMRCP Plan U1 DATE: 7-Apr-04

SUBJECT: Des Moines Mississippi DDLD FILE:

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED ONSTRUCTION COS
Mobilization and Demobilization	1	LS	N/A	588,000
Clearing and Grubbing	76	ACR	3,500	266,216
Stripping	106015	CY	3	265,037
Remove Existing Surfacing	0	SY	5	
Remove Riprap & Bedding	126649	TON	50	6,332,468
Impervious Material (Earth/Clay)	477320	CY	6	2,863,918
Sand Fill (Dredged)	202283	CY	4	809,132
Crushed Stone Surfacing	0	TON	15	
Asphaltic Concrete Pavement	0	TON	40	
Portland Concrete Pavement	0	CY	240	
New Riprap	3354	TON	65	217,984
New Bedding	59603	TON	35	2,086,093
Establishment of Turf (Seeding)	255	ACR	1,200	306,115
Remove Existing Floodwalls	0	CY	250	
Remove Existing Closure Structures		EA	0	
New Floodwalls	0	CY	1,000	
New Closures	0	EA	200,000	
Modification of Closures	0	EA	200,000	
Pump Station Upgrades	9246	GPM	60	554,760
Other Stuctures and Relocations	2	EA	500,000	1,000,000
	SUBTOTAL:			$15,290,000
	CONTINGENCIES: (%)----------		35	$5,350,000
	SUBTOTAL:-------------------			$20,600,000
	P.E. & D. (%)-----------------------		15	$3,090,000
	S & A (%)--------------------------		10	$2,060,000
	TOTAL COST			**$25,750,000**

Red Wing, MN

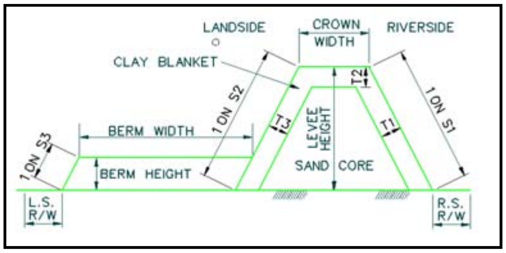
LEVEE DATA:

	Existing Levee	New Levee
State:		
Type of Construction:		
Urban or Ag:		
River Mile:	790.3	**5.8**
Ave. Top of Levee Elevation:	0	
Ave. Interior Elevation:		
Sand-Core Levee? (Y/N)	N	Y
If Yes: T1:	-	0.33
T2:	-	0
T3:	-	0.33
Crown width (ft):	0	10
Avg. Ht. (ft)	0	5.8
R.S. slope (S1) - 1 on	0	3
L.S. slope (S2) - 1 on	0	5
R.S. R/W (ft):	0	10
L.S. R/W (ft):	0	17.6
Levee Length(ft):	0	17,100
Existing Berm Width (ft):	0	
Existing Berm Height (ft):	0	
Existing Berm Slope (S3) 1 on	0	
Clearing Length(ft):		8,550
% Unpaved:	0	0
% Crushed Stone (6" Deep):	0	100
% Improved (2" Asphalt):	0	0
% No Berm:		100
% Min Berm:		
% Max Berm:		

:New Levee Elevation Req'd

Min Berm Stats	
Width (ft):	150
Height (ft):	5
Slope (S3) 1 on:	3

Max Berm Stats	
Width (ft):	300
Height (ft):	10
Slope (S3) 1 on:	3



FLOODWALL DATA:

Avg. Ht. (ft):	6.9
Floodwall Length(ft):	4,788

QUANTITIES (Levee and Floodwall):

Clearing:

10' R/W and New Levee Base:	12	acre
Temporary 50' Easement:	15	acre
Total Clearing:	**27**	**acre**

Crushed Stone: **6,485 ton**

Asphaltic Concrete: **0 ton**

Demo Existing Roads:

Crushed Stone:	0	sq.yd.
Improved:	0	sq.yd.

Stripping (4"): **11907 cu.yd.**

Seeding:

Levee & 10' R/W:	37	acre
Temporary 50' Easement:	25	acre
	62	**acre**

R/W:

Existing R/W:	0	acre
New R/W:	37	acre
Addl. R/W:	**37**	**acre**
Temporary 50' Easement:	25	acre

Embankment:	Existing Levee	New Levee+FW
Vol. Topsoil Materials: (CY)	0	15400
Vol. Sand Materials: (CY)	0	112000

Total Vol. Difference Topsoil Materials:	15,400	cu.yd.
Topsoil Compaction Factor:	1.25	
Topsoil Borrow Req'd for Levee:	**19,250**	**cu.yd.**
Total Vol. Difference Sand Levee Materials:	112,000	cu.yd.
Sand Compaction Factor:	1.25	
Sand Borrow Req'd for Levee:	**140,000**	**cu.yd.**

	Existing Berm	New Berm
Vol. Topsoil Materials: (CY)	0	0
Vol. Sand Materials: (CY)	0	0

Total Vol. Difference Topsoil Materials:	0	cu.yd.
Compaction Factor:	1.25	
Topsoil Borrow Req'd for Berm:	**0**	**cu.yd.**
Total Vol. Difference Sand Berm Materials:	0	cu.yd.
Sand Compaction Factor:	1.25	
Sand Borrow Req'd for Berm:	**0**	**cu.yd.**

Total All Topsoil Materials Req'd:	**19,250**	**cu.yd.**
Total All Sand Materials Req'd:	**140,000**	**cu.yd.**
Total All Materials Req'd:	**159,250**	**cu.yd.**

Redwing, MN

Reach	Exg. Levee (Y/N)	Levee Raise (ft)	Levee Length (ft)	Required Levee Height (ft)	Required Levee Width (ft)	Floodwall Length (ft)	Floodwall Height (ft)	Averaging Levee Length LxH (ft^2)	Averaging Levee Width LxW (ft^2)	Averaging Floodwall Height LxH (ft^2)	Drain Length (ft)
1			680	4	10	1,139	7.0	2,720	6,800	7,973	1,139
2			1,430	6	10			8,580	14,300	0	0
3			3,396	8	10			27,168	33,960	0	3,396
4			11,187	5	10	3,649	6.9	55,935	111,870	25,178	3,649
5								0	0	0	0
6								0	0	0	0
7								0	0	0	0
									0		
									0		
									0		
								94,403	166,930	33,151	
						4,788	Average	5.7	10.0	6.9	8,184

Summaries for MVP Quant.xls	
Levee Length (ft):	**16,693**
Ave. Levee Height (ft):	**5.7**
Ave. Levee Width (ft):	**10.0**
Floodwall Length (ft):	**4,788**
Ave. Floodwall Height (ft):	**6.9**
Subdrain Length (ft):	**8,184**
Road Closures:	**12**
Railroad Closures:	**2**
Ave. L/S ROW (ft):	**18.8**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: Upper Mississippi River Comprehensive Plan DATE: 13-Jun-2005

SUBJECT: Red Wing, MN FILE: ST PAUL 500yr Confined Estin

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
Mobilization / Demobilization (1% total project costs)	1	LS	$224,253	$224,253
Clearing and Grubbing	27	ACRE	5,500.00	$148,500
Stripping	11,907	CY	2.50	$29,768
Removal of Existing Roads	0	SY	6.00	
Crushed Stone Surfacing (includes prep work)	6,485	TON	20.00	$129,700
Asphaltic Concrete Pavement	0	TON	40.00	
Levees: Pervious Embankment	140,000	CY	6.00	$840,000
Levees: Inpsection Trench	16,693	LF	7.00	$116,851
Topsoil	19,250	CY	7.00	$134,750
Seed	62	ACRE	2,900.00	$179,800
Remove Existing Closure Structures	0	CY	250.00	
New Closure Structures	3,420	SF	700.00	$2,394,000
Floodwalls: Reinforced Concrete	2899	CY	500.00	$1,449,700
Floodwalls: Sheetpile	68229	SF	25.00	$1,705,725
Structural Steel	0	LB	4.50	
Railroad Closure	171	SF	1,100.00	$188,100
Levee and Floodwall Gravity Drains	8,184	LF	65.00	$531,960
Excavation	0	CY	3.50	
Relocations (24% total of other costs)	1	LS	$5,382,071	$5,382,071
Riprap and Bedding (5% total project costs)	1	LS	$1,121,265	$1,121,265
Interior Flood Control (30% total project costs)	1	LS	$6,727,589	$6,727,589
HTRW/Cultural/Recreation (5% total project costs)	1	LS	$1,121,265	$1,121,265

SUBTOTAL:		$22,425,000
CONTINGENCIES: (in %)	35	$7,875,000
SUBTOTAL:-------------------		$30,300,000
P.E. & D. (in %)--------------	15	$4,550,000
S & A (in %)-----------------	10	$3,030,000
TOTAL COST		**$37,880,000**