# Appendix F: Cost Engineering

Mississippi River, Dubuque County Illinois
CAP Section 14 Emergency Streambank Protection

**Dubuque Forced Sewer Main**

Feasibility Phase

Doc Version: Draft Feasibility Report
**16 September 2021**

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## 1. INTRODUCTION

This appendix contains a Total Project Cost Summary prepared for the CAP Section 14 Project. The Dubuque Forced Sewer Main, which runs along the right descending riverbank of the Mississippi River, is located on the southern edge of the City of Dubuque in Dubuque County, Iowa. The Local Sponsor, The City of Dubuque, is concerned that the continued erosion would result in the failure of the Main which provides critical infrastructure for Dubuque. Additionally, the continued erosion would threaten the rail line directly adjacent to the Forced Sewer Main.
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## 2. PROJECT DESCRIPTION

The objective of the feasibility study is to review and analyze data to develop a plan to protect the Dubuque forced sewer main from failure due to erosion of the right descending bank on the Mississippi River. The Project consists of tree clearing and placing riprap and stone bedding along each eroded bank line. The revetment does not include a weighted toe. A maintenance access drive will not be feasible due the limited space available to avoid impacts to the sewer main and keeping a buffer with the railroad tracks.

### 2.1. Tree and Brush Clearing

The contractor is required to remove all trees and brush from the bankline slope of the project limits before placing the stone protection on the bankline. Excavator will clear area and move debris to the side barge which will be offloaded on shore, chipped, and then transported to a recycle center.

### 2.2. Bedding Stone and Riprap

The Bedding Stone and Riprap is placed on the bank that is experiencing erosion. A floating plant is proposed for placement of bedding and riprap along the entire length of the Project. The staging area is proposed to be at Ice Harbor on city-owned property.

### 2.3. Other Construction

Survey work is also necessary to locate where the riprap and bedding stone are to be constructed.

## 3. COST METHODOLOGY

**3.1. General.** This Fully Funded Estimate (FFE) has been prepared to June 2021 price levels. The costs are considered to be fair and reasonable to a well-equipped and capable contractor and include overhead and profit. The preparation of this estimate was created in accordance with Engineering Regulation (ER) 110-1-1300, *Cost Engineering Policy and General Requirements* (26 March 1993) and ER 1110-2-1302, *Civil Works Cost Engineering* (30 June 2016). The FFE was completed in accordance with Engineering Manual 110-2-1304, *Civil Works Construction Cost Index System (CWCCIS)*, revised 30 March 2021.

The estimate was developed using Micro Computer Aided Cost Estimate System MII v4.4 cost estimating software. Applicable crews and equipment were applied in the estimate to correspond with the work being performed. Material prices were developed using the MII Cost Book, R.S. Means references, and quotes obtained from suppliers. The midpoint of construction is anticipated to be the 2nd quarter of 2023, which was used to determine the FFE.

This Project is assumed to be an unrestricted competitive bid, although the possibility of this being a restricted Small Business type contract is possible.

**3.2. Direct Cost.** Direct costs are based on the anticipated material, equipment, and labor necessary to construct the Project based on the current scope of work. A material price quote was obtained for both the bedding stone and riprap. Direct costs were calculated independent of the contractor assigned to perform the work. Contractor assignments were determined after the formulation of the direct costs. The majority of the work is assumed to be done by a Prime Contractor, with the remaining specialized work being performed by several subcontractors. It is assumed the Prime Contractor will perform the project coordination and oversight with construction work.

**3.2.1. Labor-Rate Determination.** Labor Rates are based on 2021 Davis-Bacon Wage Rates General Decision IA20210002 07-09-2021 Heavy River Work Dubuque County, IA.

**3.2.2. Equipment Rates.** All equipment costs are from MII Equipment Region 5 2020 and MII English Cost Book.

**3.2.3. Fuel Rates.** Rates have been updated as of September 2021. Current fuel prices are based on Midwest averages from www.eia.gov/petroleum/gasdiesel. This includes gasoline, on-road diesel, and off-road diesel.

**3.2.4. Overtime Considerations.** Overtime was not considered for the project.

**3.2.5. Sales Tax.** Sales tax has not been included for material costs.

**3.2.6. Productivity.** Production rates were created based on historical rates used in the Rock Island District' Cost Engineering Section and on what was determined reasonable by the Cost Estimator. In addition, user crews were created using the estimator's judgment.

**3.3. Indirect Costs.** Contractor assignments were determined after the formulation of the direct costs. The contract assigned includes a Prime Contractor with associated subcontractors:

***Prime Contractor:*** Will perform Tree Clearing on shore and haul tree chip debris offsite. Will arrange purchase and delivery of the bedding stone and riprap.

***Floating Plant Subcontractor:*** Will perform Tree Clearing work from offshore and Place Bedding Stone and Riprap.

***Surveying Subcontractor:*** Will perform all Surveying Work.

***QC Subcontractor:*** Will perform all Quality Control Work.

**3.3.1. Prime Contractor**

**a. Job Office Overhead.** Overhead rate for Job Office Overhead (JOOH) was determined based on the developed construction schedule and each contract's scope of work. In this case, a value of 15% was assigned for the Prime Contractor.

**b. Home Office Overhead.** Overhead rate for Home Office Overhead (HOOH) was applied as a running percentage. In this case, a value of 6% was applied for the Prime Contractor. Home Office Overhead includes such items as office rental/ownership costs, utilities, office equipment ownership/maintenance, office staff (managers, accountants, clerical, etc.), insurance, and miscellaneous costs. In reality, the range of home office overhead can be quite broad and depends largely on the contractor's annual volume of work and the type of work that is generally performed by the contractor (own work and subcontracted work).

**c. Profit.** Profit has been included. In this case, a value of 7.5% was calculated for the Prime Contractor (own work and subcontracted work).

**d. Bond.** Bond was included based on the Bond Table as class B. In this case, a value of just over 1% was calculated for the Prime Contractor (own work and subcontracted work).

**e. Insurance.** Insurance was included at a value of 3%.

**3.3.2. Subcontractors**

**a. Job Office Overhead.** Overhead rates for JOOH were applied as a running percentage. In this case, a value of 8% was applied to the subcontractors.

**b. Home Office Overhead.** Overhead rates for HOOH were applied as a running percentage. In this case, a value of 8% was applied to the subcontractors.

**c. Profit.** Profit has been included and was applied as a running percentage. In this case, a value of 9% was assumed for the subcontractors.

**3.4. Escalation.** The Project costs have been escalated to the midpoint of construction,

assumed to be the 2nd quarter of 2023.

**3.5. Contingency.** After review of Project documents and discussion with members of the Project Development Team involved in the design of the Project, an informal risk analysis was conducted resulting in the development of a contingency. The average contingency for all Project construction features is 22%. This contingency was developed reflecting the uncertainty associated with the work features. This includes the development of the contingencies applied to Planning, Engineering, and Design (PED) as well as Construction Management feature accounts. Appendix F shows the Contingency Determination.

**3.6. Other Assumptions**

**3.6.1. Mobilization.** Equipment needs were identified from work items in the MII estimate. Equipment was assumed to be mobilized within 120 river miles for marine-based equipment.

**3.6.2. Government Furnished Materials.** The estimate is based on no government furnished materials.

**3.6.3. Site Access.** It is assumed that the site can be accessible all year, except in the event of high water conditions.

**3.6.4. Waste Disposal**. Trees and brush debris cleared on the site will be chipped and hauled offsite. Disposal fees are not necessary.

**3.6.5. Construction Restraints.** To avoid direct impacts to federally-listed bat species that could potentially occur in the Project vicinity, clearing of trees in the repair area will be restricted to the period November 15 through March 31, when bats are unlikely to be present.

**4. PROJECT FEATURE ACCOUNTS**

**4.1. (01) Lands and Damages.** The estimated lands and damages is $96,000, which represents the Sponsor's cost for necessary real estate interest. It does not include the incidental costs associated with acquiring the interest (survey, title, appraisal, negotiations, etc.). Real estate acquisition costs amount to $33,600.

The Real Estate costs associated with lands and damages total $162,000 for the TPCS Project First Cost. The $162,000 Real Estate cost is broken down in the TPCS (and Risk Contingency Determination file) as follows: The $96,000 in real estate costs are located in the 01 LANDS AND DAMAGES row with the contingency immediately added to it. This is $120,000 for this project. The acquisition costs totaling $33,600 are placed in the 30 PLANNING, ENGINEERING, & DESIGN SECTION and multiplied by the revised contingency of 25% (Table F-1) . It is then escalated in the Total Project First Cost (Fully Funded) section.

**4.2. (16) Bank Stabilization.** The items included in this account are tree clearing, bedding stone, and riprap.

**4.3. (30) Planning, Engineering, and Design.** The work covered under this account includes the Project Management and the PED costs spent to date as well as the remaining estimated costs that will be associated with the engineering and design for this Project. The Project Engineer and Project Manager determined the percentages for PED.

**4.4. (31) Construction Management.** The work covered under this account includes the expected costs for contract supervision, contract and construction administration, technical management activities, district office supervision, and administration costs. The Project Engineer and Project Manager determined the percentages for Construction Management.

**4.5. (32 01) Mob., Demob. & Preparatory Work.** The work covered under this account includes the expected costs for mobilization and demobilization of the floating plant.

## 5. PROJECT SCHEDULE

The estimated duration of the project is from 2022 to 2023, or about 170 days (including construction, submittals, notice to proceed, and project award time), which is based on the notice to proceed starting in FY 22 and construction ending in FY 23. The schedule was created following the durations for crews and equipment in the MII estimate. Any clearing or construction dates take into account the restrictions to construction activity because of the potential impacts on federally-listed bat species that potentially use the Project area or vicinity. Appendix F shows the Project Schedule.

## 6. TOTAL PROJECT COST SUMMARY

**6.1. Project First Cost.** Table F-1 shows the Project First Cost.

**Table F-1.** Project First Cost (Federal and Non-Federal) Estimate for Alternative 1 Program Year 2022

| Item | Cost | Contingency | Project First Cost |
|---|---|---|---|
| LERRDs (not incl. Real Estate Acquisition) | $130,000 | $0 | $130,000 |
| Construction | $2,922,855 | $718,438 | $3,641,293 |
| PED | $817,000 | $141,995 | $958,995 |
| (Real Estate Acquisition) | $33,600 | $8,400 | $42,000 |
| Construction Management | $350,000 | $55,615 | $405,615 |
| **TOTAL** | **$4,253,455** | **$924,448** | **$5,177,903** |

The Real Estate Acquisition cost is separated from the LEERDs cost and is a part of the PED in the Table above and in the Risk Contingency and TPCS spreadsheets.

## 6.2 Total Project Cost (Fully Funded)

The Total Project Cost (fully funded Federal and Non-Federal) is $5,455,550 at 2021 fiscal year pricing (includes LEERDs, contingency, and escalation). See Section 3.7 in the Main Report for additional details.

Based on the construction schedule, work will commence in March 2023. There is cost sharing on this Project between the U.S. Army Corps of Engineers and Dubuque County, the local Sponsor. Table F-1 shows the Total Project Cost Summary.