DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, MISSISSIPPI VALLEY DIVISION
P.O. BOX 80
VICKSBURG, MISSISSIPPI 39181-0080

13 JUN 2019

CEMVD-ZA

MEMORANDUM FOR Commander, Rock Island District

SUBJECT: Cedar River, Cedar Rapids, Iowa, Flood Risk Management Project, Review Plan

1.s References:s

a.s Memorandum, CEMVR-PM, 21 March 2019, subject as above (encl).s

b.s EC 1165-2-217, Review Policy for Civil Works, 20 February 2018.s

2.s The enclosed Review Plan (RP) has been prepared in accordance withs EC 1165-2-217. It has been coordinated between the MVD Business Technical Divisions and the Program Support Division. I hereby approve this RP, which is subject tos change as circumstances require, consistent with project development under the Projects Delivery Business Process. Subsequent revisions to this RP or its execution will requires new written approval from this office. Non-substantive changes to this RP do nots require further approval. The district should post the approved RP to its web site.s

3.s The MVD point of contact is Ms. LeeAnn Riggs, CEMVD-PDM, [redacted].s

Encl

RICHARD G. KAISER
Major General, USA
Commanding

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, ROCK ISLAND DISTRICT
PO BOX 2004 CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61204-2004

MAR 2 1 2015

CEMVR-PM

MEMORANDUM FOR Commander, U.S. Army Corps of Engineers, Mississippi Valley Division (CEMVD-PD-SP/Kendall Smith), PO Box 80, 1400 Walnut Street, Vicksburg, Mississippi 39181-0080

SUBJECT: Cedar River, Cedar Rapids, Iowa, Flood Risk Management Project, Review Plan

1. Enclosed for MVD's review and approval is the Subject Review Plan (RP). The RP was prepared in accordance with EC-1165-2-217.

2. The Risk Management Center has endorsed this RP. MVD Chief, Business Technical Director, Michael Turner must also endorse before MVD command approval.

3. The project is in the implementation phase. Engineering, design, and construction will be accomplished by a combination of resources from Corps Districts, engineering consultants hired by the Corps, and engineering consultants hired by the non-Federal sponsor. The project is divided into nine design and construction packages to expedite delivery.

4. All required reviews for Implementation Products will be performed and no exemptions are requested.

5. The Dam Safety Modification MCX, Huntington District (Mike Robinette Lead), will perform the ATR.

6. A Type II IEPR SAR effort is recommended for this project. The RP contains information on life and safety risk and draft milestones for this review.

7. The Points of Contact for this action are Mr. Toby Hunemuller, Technical Manager, [redacted] and Mr. Andrew Goodall, Project Manager, [redacted]

ENCL

STEVEN S SATTINGER
COL, EN
Commanding

US Army Corps of Engineers.

Prepared by:

Rock Island District
Mississippi Valley Division

Cedar River, Cedar Rapids, Iowa, Flood Risk Management Project

Review Plan

02/25/2019

PREPARED BY

Toby Hunemuller, P.E.

Digitally signed by HUNEMULLER.TOBY.J.1258323862
Date: 2019.02.26 11:42:35 -06'00'

Toby Hunemuller, P.E.
Technical Manager
USACE, Rock Island District

DATE

ENDORSED BY:

David E. Carlson

Digitally signed by CARLSON.DAVID.ERIC.1228954302
Reason: RMO Representative for Dam & Levee Safety Projects
Date: 2019.03.13 16:02:38 -04'00'

David E. Carlson, P.E.
Chief, Eastern Division
USACE, Risk Management Center

DATE

ENDORSED BY:

Michael. A. Turner P.E.
Chief, Business Technical Director
Mississippi Valley Division

4 Jun 2019
DATE

APPROVED BY:

RICHARD G. KAISER
Major General, U.S. Army
Commanding

13 June 2019
DATE

This information is distributed solely for the purpose of pre-dissemination review under applicable information quality guidelines. It has not been formally disseminated by USACE. It does not represent and should not be construed to represent any agency determination or policy.

US Army Corps of Engineers®

Prepared by:

Rock Island District
Mississippi Valley Division

MSC Approval Date: 13 June 2019

Last Revision Date: None

TABLE OF CONTENTS

ATTACHMENTS

Attachments 2, 3, and 5 have been removed. Information in those attachments are For Official Use Only.

Section 1
Introduction

1.1 Purpose

The purpose of this Review Plan (RP) for the Cedar River, Cedar Rapids, Iowa, Flood Risk Management (FRM) Project (P2#120063) is to ensure a quality-engineering Project is developed by the Corps of Engineers in accordance with Engineering Circular (EC) 1165-2-217, "Review Policy for Civil Works". As part of the Project Management Plan (PMP), this RP establishes an accountable, comprehensive life-cycle review strategy for Civil Works products, lays out a value-added process, and describes the scope of review for the current phase of work. The EC outlines five general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Review, Safety Assurance Review (Independent External Peer Review Type II), and Policy and Legal Compliance Review. This RP will be coordinated with the Project Sponsor and provided to Project Delivery Team (PDT), DQC, ATR, BCOES, and SAR Teams. The technical review efforts addressed in this RP, DQC, and ATR are to augment and complement the policy review processes. The District Chief of Engineering has assessed that the life safety risk of this Project is significant; therefore, a Safety Assurance Review (SAR) will be required. This RP is a stand-alone document and serves as an appendix to the Project Management Plan (PMP). '

1.2 References

- EC 1165-2-217, Water Resources Policies and Authorities Review Policy For Civil Works, 28 February 2018
- Engineer Regulation (ER) 1110-1-12, Quality Management, 31 Mar 2011
- ER 415-1-11, Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Reviews, 31 Jul, 2018
- ER 1110-2-1156, Safety of Dams – Policy and Procedure, 31 Mar 2014
- ER 1110-2-112, Required Visits to Construction Sites by Design Personnel, 15 Apr 1992
- ER 1180-1-6, Construction Quality Management, 30 September 1995
- ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 Aug 1999
- Engineering Manual (EM) 1110-2-1913 Design, Construction, and Evaluation of Levees, 30 April 2000
- PMP for subject Project dated November 2018

- Project Partnership Agreement (PPA) Between the Department of the Army and City of Cedar Rapids Iowa, 27 November 2018
- Report of the Chief of Engineers for the Cedar Rapids, Iowa Flood Risk Management Project (Chiefs Report), 2011
- Operations and Deployment Risk Assessment Report for the City of Cedar Rapids, Iowa, Alternative and Sequencing Optimization for Removable Flood Barriers, draft report dated Nov 2018.
- Memorandum, Assistant Secretary of the Army, Civil Works, 9 August 2018, subject: Policy Guidance on Implementation of Supplemental Appropriations in the Bipartisan Budget Act of 2018.
- Review Plan for Cedar River, Cedar Rapids, Iowa, Flood Risk Management Project, dated 29 July 2011.
- District Quality Management Plan (Quality Management Plan (QMP) - 19990901.pdf)
- Interim Guidance on Streamlining Independent External Review (IEPR) for Improved Civil Works Product Delivery" dated 5 Apr 2019.

1.3 Review Management Organization

The USACE Risk Management Center (RMC) is the Review Management Organization (RMO) for this Project.

Section 2
Project Description

2.1 Project Description

Location. The City of Cedar Rapids is located in Linn County, Iowa on the Cedar River. The City of Cedar Rapids is located in Northeastern, Iowa, approximately 70 miles west of Dubuque, Iowa; 30 miles north of Iowa City, Iowa; and 130 miles northeast of Des Moines, Iowa. The drainage area of the Cedar River is 6,997 square miles.

Flood History. The City of Cedar Rapids experienced record flooding in June of 2008, which was nearly 12 feet higher than the previous flood of record based on 100 years of record. This flood was the result of rainfall on top of a flood wave, which maximized the flood intensity at Cedar Rapids. In Cedar Rapids, the Cedar River crested on June 13, 2008, at an elevation of 731.1 ft NGVD, roughly 4 feet above the FEMA 0.2% Annual Chance Exceedance (500-year) flood stage at the gage, and a discharge of

approximately 140,000 cfs. The flood caused damage to many buildings, both public and private. Hospitals, schools, public transit, and businesses were negatively impacted by the flooding event. Nearly 1,300 City blocks were impacted, displacing approximately 25,000 people.

Feasibility Study. The Study was authorized by House Resolution adopted April 5, 2006, by the Committee on Transportation and Infrastructure, and Senate Resolution adopted May 23, 2006, by the Committee on Environment and Public Works. The Feasibility Study was completed on November 2, 2010 (revised January 2011), and evaluated FRM measures for the entire Cedar River Corridor through downtown Cedar Rapids. The Project area included both the east and west sides of the Cedar River, through the City. The Recommended Plan provides flood risk management for the east side (left descending bank) of downtown Cedar Rapids and is comprised of a system of approximately 3 miles of levees, floodwalls, closure structures and pump stations. Flood risk management for the west side of the Cedar River was not justified as a part of the Federal project but will be constructed by the City and is expected to be completed approximately 10 years after the east side construction is complete. The design height will be constructed to a profile to contain the June 2008 flood crest and includes consideration of the hydraulic impacts resulting from the City constructing the west side system.

The cost estimate for the Recommended Plan during the feasibility study was $99,004,000 (October 2010 prices). The protected area includes a resident population of over 500 people and approximately 9,000 employees. Important public facilities protected include the U.S. Federal Courthouse, the U.S. Post Office, the Ground Transportation Center, the Science Museum, Mercy Hospital, US Cellular Center, and the City Administration Building. The Water Resources Reform and Development Act of 2014 authorized construction of the Cedar Rapids FRM Project.

2011-2018. USACE received advanced local cost sharing Preconstruction, Engineering and Design funding in 2011 that allowed design work to be completed through 35% levels to include quality reviews for the entire authorized Project. Early in 2013, USACE halted all design efforts to wait for Federal funding for the Project to come through before continuing with design. During 2013 through 2018 when no Federal funds for PED were received, the City of Cedar Rapids continued to advance segments and features of the Project utilizing local and state funding.

The City and USACE, Rock Island District, entered into a Memorandum of Understanding (MOU) on February 14, 2011, that initially covered the advancement of design and construction select Project features identified in the approved Project. Since 2011, five separate amendments in the following years occurred to the original MOU to cover additional Work-In-Kind (WIK) items. An Integral Determination Report was completed on August 29, 2018, to ensure that the City is eligible to receive credits for the WIK outlined in the MOU, as amended. The Integral Determination Report was required to be approved prior to signing of the PPA.

No Federal funds were provided after 2012 to advance design so the City paid its full share of the design costs to assure USACE involvement in NEPA coordination and various other basic Project functions. During this six- year window, the City successfully obtained grant funding from other Federal agencies to advance buy-outs, HTRW clean up, and construction of levee segments, a portion of the pump stations, and detention basin features. All of these items were approved for WIK as part of the amended MOU, but since the City used Federal funds, it may not be reimbursed unless USACE provides a letter indicating that these funds may be used as a match to other Federal funds. Also during this six-year period, the City engaged with Canadian National (CN) Railway regarding the upstream tie-off and the six railroad closures structures located on its property. CN Railway told the City it was not accepting of these features on its property. Because the City does not believe it has condemnation power over CN Railway without USACE involvement in the Project, it began revisiting alternative alignments through a formal feasibility process, including public involvement sessions.

This process resulted in a new preferred alignment for Reach 1 that runs along Cedar Lake and ties off at I-380. This alignment avoids the CN Railway area of concern and protects approximately 80 more structures, including two large industrial facilities. This alignment was explored during feasibility phase but was screened out due to HTRW concerns. The City-led feasibility study conducted a Phase II HTRW evaluation and determined that contaminant levels are below action levels and so this alternative is a viable option. This new alignment has been approved by the City Council as part of the Flood Risk Management Master Plan.

Current Status. Appropriations for the Project were provided in August 2018 as part of Supplemental Bipartisan Budget Act of 2018, Public Law 112-123. A PPA between the Department of the Army and City was signed on November 27, 2018. The current Project is divided into four reaches and nine contracts as outlined in Table 1 and Attachment 1. The design and construction responsibilities vary by contract and are outlined in Table 1. Design work and quality reviews have been completed to the 35% level for all these contracts with the exception of the work in Reach 1. The Reach 1 alignment was altered from the authorized Project at the time of the PPA signing and is at approximately a 10% design level. The design work being accomplished by the city is following USACE standards and will be subjected to the requirements of this Review Plan. Construction costs for the Project as of November 2018 are projected to be $117,480,000. An Environmental Assessment has been completed and a Finding of No Significant Impact has been signed. Additional environmental work is underway to Reach 1 alignment changes to insure they meet NEPA requirements. Pertinent State and Federal permits are under preparation.

Table 1. List of Contracts and Responsibilities

Contract	Design Responsibility	Construction Responsibility	Description
Existing Pump Station Outfitting and New Gatewells, Reaches 2 and 3	Cedar Rapids A/E	Cedar Rapids	35% Complete. 2 new pumps at Sinclair PS, 2 new pumps at 10th Ave PS, new GW at Avenue A, and add gates to CRST gatewell.
16th Ave Closure Structure	Cedar Rapids A/E	USACE	35% Complete. 65' W X 12' H Roller Gate, 100' W X 12' H Floodwall, and street modifications.
Reach 3	USACE Rock Island	USACE	35% Partially complete. 1000' W X 12' H earthen levee and Sinclair levee/pump station
Reach 4	USACE St Paul	USACE	35% Complete. 3000' W X 15 H Floodwalls and Levee Embankment, gatewells, 72" twin culverts w/ gatewells, and utility relocations
New Pump Station and Gatewells	USACE Rock Island A/E	USACE	35% Complete. 4 New PS and 5 Gatewells located throughout project reaches.
Road Closures	USACE Rock Island A/E	USACE	35% Complete. 8 Road Closures. F Ave 110' W X 5' H; E Ave 60' W X 5' H; Hydrodam Access Rd. 30' W X 9' H; 1st Ave 120' W X 11' H; 2nd Ave 120' W X 12' H; 3rd Ave 155' W X 12' H; 12th Ave 80' W X 8' H; Otis Rd. 60' W X 12' H
Railroad Closures	USACE Rock Island A/E	USACE	35% Complete. 4 RR Closures, UP Rail Yard 3 Tracks, Reach 1 70'W X 12' H; Quaker Oats 1 Track, Reach 1 22" W X 12' H; CRANDIC 1 Track, Reach 3 22" W X 12' H;UP 1 Track, Reach 4 22" W X 12' H
Reach 1	USACE Rock Island A/E	USACE	0% Complete. 4300 W X 5' to 12'H levee, 2300' W X 12 H floodwall, channel widening, & new PS,
Reach 2	Cedar Rapids A/E	USACE	35%Complete. 3000' W X 6' to 12' H removable and permanent floodwalls.
8th Avenue Bridge Replacement	Cedar Rapids A/E	Cedar Rapids	0% Complete. New bridge at 8th Ave and tie-in walls to FRM Project.

2.2 Project Sponsor

The City of Cedar Rapids, Iowa is the project sponsor. The products and analyses provided by the City as in-kind services will undergo DQC, ATR, policy and legal compliance, BCOES, and SAR reviews. The City will be providing in-kind services as outlined in Table 1.

Section 3
District Quality Control

3.1 Requirements

Standard quality checks and reviews will be conducted during the development process and are carried out as routine management practice. Quality checks will be performed by staff responsible for the work, such as supervisors, work leaders, team leaders, designated individuals from the senior staff, or other qualified personnel. However, they will not be performed by the same people who performed the original work, including managing/reviewing the work in the case of contracted efforts. Design calculation checks will be performed on all design work by an independent source.

Project Delivery Team (PDT) reviews will be performed by members of the PDT to ensure consistency and effective coordination across all project disciplines. Additionally, the PDT is responsible for a complete reading of any design documents to assure the overall coherence and integrity of the documentation.

Design Documentation Reports, Risk Assessments, Plans and Specifications, and Operations and Maintenance manuals will undergo formal DQC at the 35% (Reach 1), 65% and 95% level in accordance with the District Quality Management Plan (Quality Management Plan (QMP) - 19990901.pdf) and EC 1165-2-217. Products produced by Architect-Engineers (A/E) will undergo DQC review in addition to the quality review process performed by the A/E. The A/E quality review includes checking of all computations by an independent source and over the shoulder review by senior staff. USACE will review the comments from the A/E to insure they are complying with their own QC process. See Attachment 2 for the DQC Lead, reviewers, and reviewers' disciplines for all stages of work.

3.2 Documentation

DQC comments will be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

1. The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures;
2. The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not be properly followed;
3. The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and

4. The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern.

Documentation of DQC activities will be accomplished through DrChecks in accordance with the District Quality Management Plan. DQC certifications will be filled out after completion of each design package in accordance with EC 1165-2-217. Documents that will undergo DQC include:

- Design Documentation Reports
- Plans and Specifications
- Operations and Deployment Risk Assessment Report for the City of Cedar Rapids, Iowa, Alternative and Sequencing Optimization for Removable Flood Barriers
- Project Risk Assessment Report
- Construction Schedule Estimates
- Operations Manuals

A copy of all comments and responses from DQC will be provided to the ATR team at each review. The intent is for the review process to be transparent for all reviewers. All reviewers will have access to the Dr Checks comments from all reviews. ATR will have access to the DQC comments in process, but will not delay finalizing their comments. The DQC certification process will be completed prior to submission for ATR Technical Review Certification. This will allow time for the ATR to assess the District Quality Control (DQC) documentation and make the determination that the DQC activities employed appear to be appropriate and effective.

Biddability, Constructability, Operability, Environmental Review. BCOES Reviews will take place early in the development of design documents. Reviews will take place at 35% (Reach 1), 65%, and 95% level for each contract.

3.3 DQC/BCOES Schedule and Estimated Cost

DQC/BCOES Review Schedules are outlined in Attachment 4. The cost for the DQC/BCOES is approximately $700,000.

Section 4
Landowner / Stakeholder Technical Review

4.1 Requirements

The City of Cedar Rapids and select landowners and Stakeholders have requested to review Plans and Specifications in accordance with their mission and legal requirements. Part of this review is to identify any operational constraints or considerations, before, during or after construction, on these large industrial or public works operated properties.

Currently, the select landowners and stakeholders that will participate in this review are Cargill, Union Pacific Railroad, Alliant Energy, and Iowa DOT. This review is not intended to engage all landowners but only those who have complex operations and real estate acquisition processes. These reviews will follow the same review intervals as the DQCR and ATR reviews [currently 35% (Reach 1), 65%, 95% review].

4.2 Documentation

Documentation of Landowner and Stakeholder Technical Review (LSTR) activities will be accomplished through DrChecks in accordance with the District Quality Management Plan. Documents that will undergo LSTR include Plans and Specifications.

4.3 Landowner and Stakeholder Technical Review Schedule and Estimated Cost

LSTR Review Schedules will align with the review schedules as outlined in Attachment 4. The cost for the LSTR is part of the Reviews estimated cost.

Section 5
Agency Technical Review

5.1 Requirements

All implementation documents shall undergo ATR in accordance EC 1165-2-217. ATRs will occur seamlessly, including early involvement of the ATR team for validation of key design decisions, and at the scheduled milestones as shown in Attachment 4. A site visit will be scheduled for the ATR Team in 3rd Q 2019.

5.2 Documentation of ATR

Documentation of ATR activities will be accomplished through DrChecks. ATR certifications will be filled out at the completion of each design package in accordance with EC 1165-2-217.

5.3 Products to Undergo ATR

- Design Documentation Reports
- Plans and Specifications
- Operations and Deployment Risk Assessment Report for the City of Cedar Rapids, Iowa, Alternative and Sequencing Optimization for Removable Flood Barriers
- Project Risk Assessment Report
- Construction Schedule Estimates
- Operations Manuals

5.4 Required Team Expertise and Requirements

The ATR team has been established in accordance with EC 1165-2-217 and will include the disciplines and expertise as outlined below. All members will be professionally registered. The ATR Team names and their credentials are included in Attachment 3.

ATR Lead: The ATR team lead is a senior professional outside the home MSC with extensive experience in preparing Civil Works documents and conducting ATRs. The lead has the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead will also serve as a reviewer for Geotechnical.

Geotechnical Engineer shall have experience in the field of geotechnical engineering, analysis, design, and construction of (floodwalls, relief wells closure structures, etc.) for FRM projects. The geotechnical engineer shall have experience in subsurface investigations, rock and soil mechanics, internal erosion (seepage and piping), slope stability evaluations, erosion protection design, and earthwork construction. The geotechnical engineer shall have knowledge and experience in the forensic investigation of seepage, relief well design, settlement, stability, and deformation problems associated with FRM projects constructed on rock and soil foundations.

Hydraulic & Hydrologic Engineer shall have experience in the analysis and design of hydraulic structures related to complex FRM Projects (e.g., interior drainage, channels, pump stations, gatewells, flow frequency analysis, river hydraulics and hydrology)., Corps application of risk and uncertainty analyses in flood damage reduction studies, and standard Corps hydrologic (HEC-HMS) and hydraulic (HEC-RAS) computer models used in FRM Projects.

Mechanical Engineer shall have experience in pump station design and familiarity with design of mechanical gates and controls for flood control structures.

Electrical Engineer shall have experience in pump station design including the design of pump controls.

Structural Engineer shall have experience and be proficient in performing stability analysis, finite element analysis, seismic time history studies, and external stability analysis including foundations and gates (HSS structures) on FRM systems. The structural engineer shall have specialized experience in the design, construction and analysis of FRM projects.

Civil Engineer shall have experience in design, layout, and construction of a large urban FRM projects to include knowledge regarding levees, interior drainage facilities, earthwork, concrete placement, design of access roads, and relocation of underground utilities. The reviewer must be familiar with USACE regulations and standards.

Construction Engineer Reviewer should be a senior level, professionally registered engineer with extensive experience in the engineering construction field with particular emphasis on FRM Projects with similar scopes to this Project. The Construction reviewer should have a minimum of 10 years of construction experience.

Cost Engineer The reviewer for cost estimating shall be a registered or certified cost engineer with a BS degree or higher in engineering or construction management. Reviewer shall have a minimum of 10 years in cost estimating and have experience with estimating large urban FRM projects. The reviewer shall have extensive knowledge of MII software and the Total Project Cost Summary as required during ATR.

5.5 Statement of Technical Review Report

At the conclusion of each ATR effort, the ATR team will prepare a certification memo. A final report will be prepared at the end of the project in accordance with EC 1165-2-217. The RMC's Statement of Technical Review Report template will be used with the ATR Completion of Agency Technical Review showing David E. Carlson, P.E., Chief, Eastern Division, CEIWR-RMC-E, signing for the RMO.

5.6 ATR Schedule and Estimated Cost

The preliminary ATR milestone schedule and required disciplines per contract are listed in Attachment 4. The cost for the ATR is approximately $700,000.

Section 6
Safety Assurance Review

6.1 Decision on SAR

The protected area includes a resident population of over 500 people and approximately 9,000 employees. Important public facilities protected include the U.S. Federal Courthouse, the U.S. Post Office, the Ground Transportation Center, the Science Museum, Mercy Hospital, US Cellular Center, and the City Administration Building. This project will reduce the risks of significant flooding from the Cedar River; however, there will still be some residual risk to the City. The primary risk will be the City's ability to efficiently and effectively make gate closures, and install the removable walls in a timely manner. There is also some risk from relying on tie-ins to existing infrastructure. Risks during construction will also need to be assessed and managed. The construction sequencing and interim operations and maintenance manuals will be critical to mitigate risks. Based on these risk factors, the District Chief of Engineering has made a risk-informed decision that this Project poses a significant threat to human life (public safety) and therefore an SAR will be performed.

6.2 Products to Undergo SAR

The scope of work and charge for the SAR will be based on the risks identified above and information contained in Attachment 5. The scope does not include detailed review of each contract. The scope is following the intent of "Interim Guidance on Streamlining Independent External Review (IEPR) for Improved Civil Works Product Delivery" dated 5 Apr 2019. This guidance allows the reviews and number of reviewers to be scalable to the risk and uncertainty for the project. The SAR scope is focusing on the high risk areas of the project, which are contained in Reach 1 and 2 contracts. The first review will however, be a project overview and include all products completed at that time. Products that will be available for reference or review include:

- Design Documentation Reports
- Plans and Specifications
- Operations and Deployment Risk Assessment Report for the City of Cedar Rapids, Iowa, Alternative and Sequencing Optimization for Removable Flood Barriers
- Project Risk Assessment Report

6.3 Required SAR Panel Expertise

SAR panels will be established in accordance with EC 1165-2-217. The following disciplines will be required for SAR of this Project:

Geotechnical Engineer – The Geotechnical Engineering panel member will be a senior-level geotechnical engineer with experience in the field of geotechnical engineering, analysis, design, resiliency/robustness/redundancy and construction of FRM systems. The Panel Member will have knowledge and experience in the forensic investigation and evaluation of seepage and piping, settlement, slope stability, and deformations problems associated with embankments constructed on weathered and jointed rock and alluvial soils. The Panel Member will have experience in the design and construction of seepage barriers or cutoff walls. The Panel Member will have experience in failure mode analysis, and risk assessment of FRM systems. The Panel Member will also have engineering construction experience on FRM Projects.

Hydraulic Engineer – The Panel Member will have experience with engineering analysis related to FRM. The Panel Member must demonstrate knowledge and experience with the routing of inflow hydrographs for designing FRM Projects.

Structural Engineer – shall have experience and be proficient in performing stability analysis, finite element analysis, and external stability analysis for floodwalls and closure structures. The structural engineer shall have specialized experience in the design, construction, resiliency/robustness/redundancy and analysis of FRM Projects. The Panel Member will also have engineering construction experience on FRM Projects.

SAR Panel member names will be added to the Review Plan at a later date.

6.4 Documentation of SAR

Documentation of SAR will be prepared in accordance with EC 1165-2-217 and RMC SAR Report template.

6.5 Scope, Schedule, and Estimated Cost of SARs

The tentative schedule for SAR review is shown in Table 2. The estimated cost for the SARs of this Project are $600,000 to $800,000. This estimate will be refined when the Scope of Work for the SAR task order is completed.

Table 2. Scheduled Milestone Reviews with Required Reviewers and Site Visit Duration

Milestone Reviews	Geotech	H&H	Structural		Site Visit Duration (days)	Review Start Date	Review End Date
Project Overview Review of H & H Appendix Review of Time and Motion Study	X	X	X		1	Jul 19	Aug 19
65% Review of Reach 1 & 2	X	X	X		1	Dec 19	Feb 20
95% Review Reach 1 & 2 Construction visits for other stages	X		X		1	May 20	Jul 20
Construction Visit	X		X		1	Dec 20	Jan 21
Construction Visit	X		X		1	Jul 21	Aug 21
Construction Visit	X		X		1	Dec 21	Jan 22
Construction Visit, O & M Manuals	X		X		1	Jul 21	Sep 21

Section 7

Public Posting of Review Plan

The approved RP will be posted on the District public website (http://www.mvr.usace.army.mil/pm/pmPeerReview.html). This is not a formal comment period and there is no set timeframe for the opportunity for public comment. If and when comments are received, the PDT will consider them and decide if revisions to the RP are necessary.

Section 8

Review Plan Approval and Updates

The MSC Commander, or delegated official, is responsible for approving this RP. The Commander's approval reflects vertical team input (involving the District, MSC, and RMC) as to the appropriate scope, level of review, and endorsement by the RMC. The RP is a living document and will be updated in accordance with EC 1165-2-217. All changes made to the approved RP will be documented in Attachment 6 RP Revisions. The latest version of the RP and the Commanders' approval memorandum, will be posted on the District's webpage and linked to the HQUSACE webpage. The approved RP will be provided to the RMO.

Section 9
Engineering Models

The following engineering models, software, and tools are anticipated to be used:

Model Name	Version	Validation Date
MCACES (MII)	MII 4.4.2.	Release date 16 Nov 2018
HEC-SSP	2.1.00.137	July 2016
HEC-RAS	5.0.5	June 2018
HEC-HMS	4.2.1	March 2017
Mathcad 15	15.0 (M030)	
CSETT		
GeoStudio	2018	September 2017
CPGA	10.4.2011	October 2011
CFRAME	03.05.2012	March 2012
CWALSHT	11.09.2007	November 2007
STAAD.Pro	20.07.11.70	November 2007
RISA-3D	17.0.0	
Ensoft GROUP 2016	10.12	May 2018

Section 10
Review Plan Points of Contact

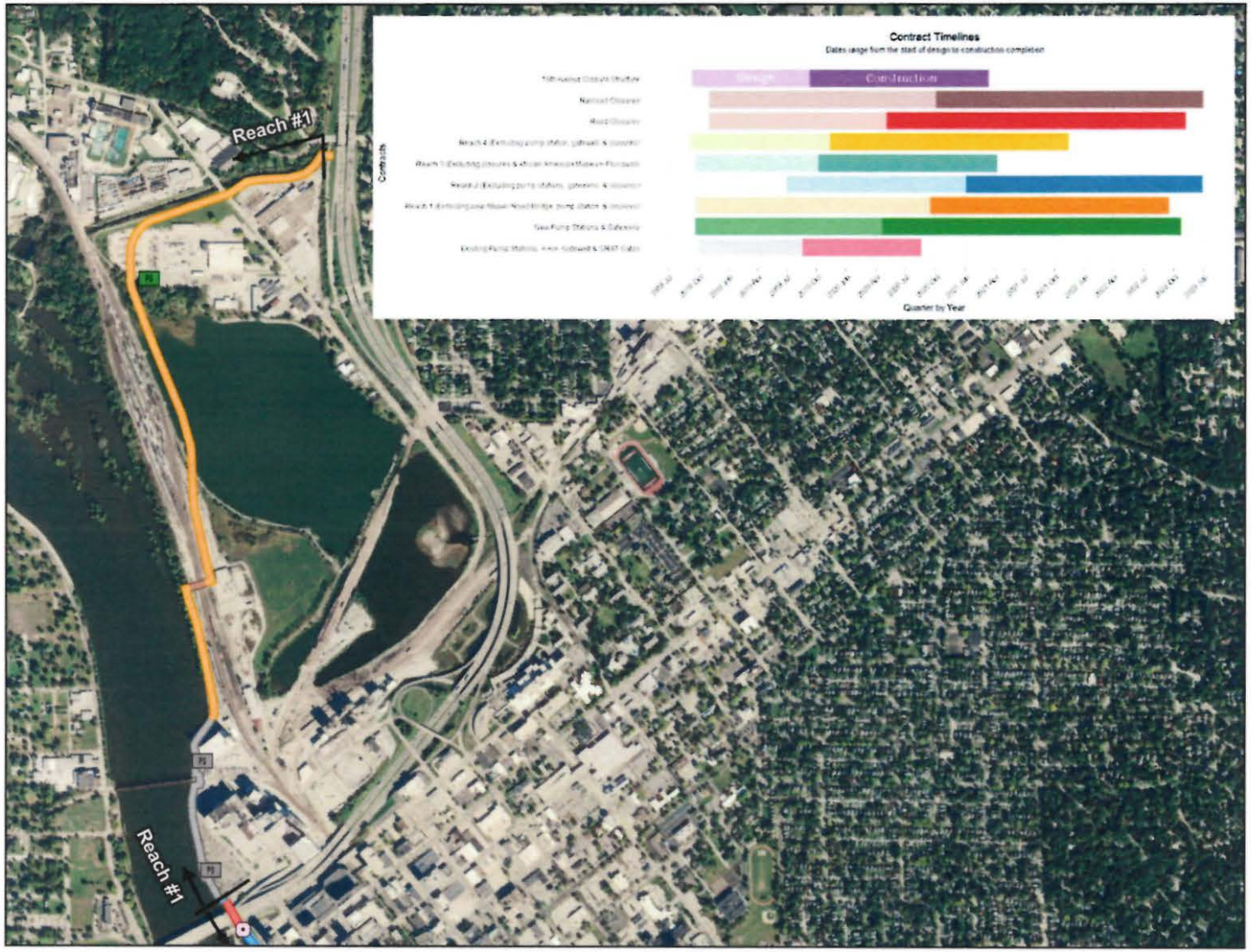
Title	Organization	Phone
Jason Smith	MVR Flood Risk Program Manager MVR Senior Project Manager (co-lead)	[redacted]
Andrew Goodall	MVR Senior Project Manager (co-lead)	[redacted]
Kirk Sunderman	MVR Technical Manager/ Technical Lead (co-lead)	[redacted]
Toby Hunemuller	MVR Technical Manager/ Technical Lead (co-lead)	[redacted]

ATTACHMENT 1

General Plan

US Army Corps of Engineers
Rock Island District

Cedar Rapids - Flood Risk Management Project (2018 - 2022)



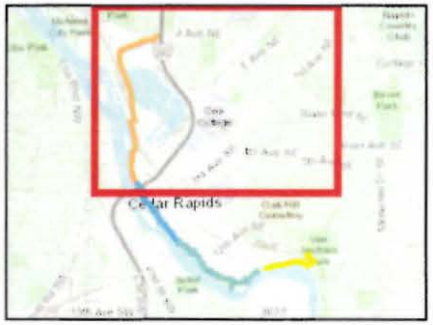
Contracts

- Existing Pump Stations
- A Avenue Gatewell
- New Pump Stations
- New Gatewells
- Completed Work - Pump Stations
- Reach 1
- Reach 2
- Reach 3
- Reach 4
- Road Closures
- Railroad Closures
- 16th Avenue Closure
- Other Contracts/Completed Work

N

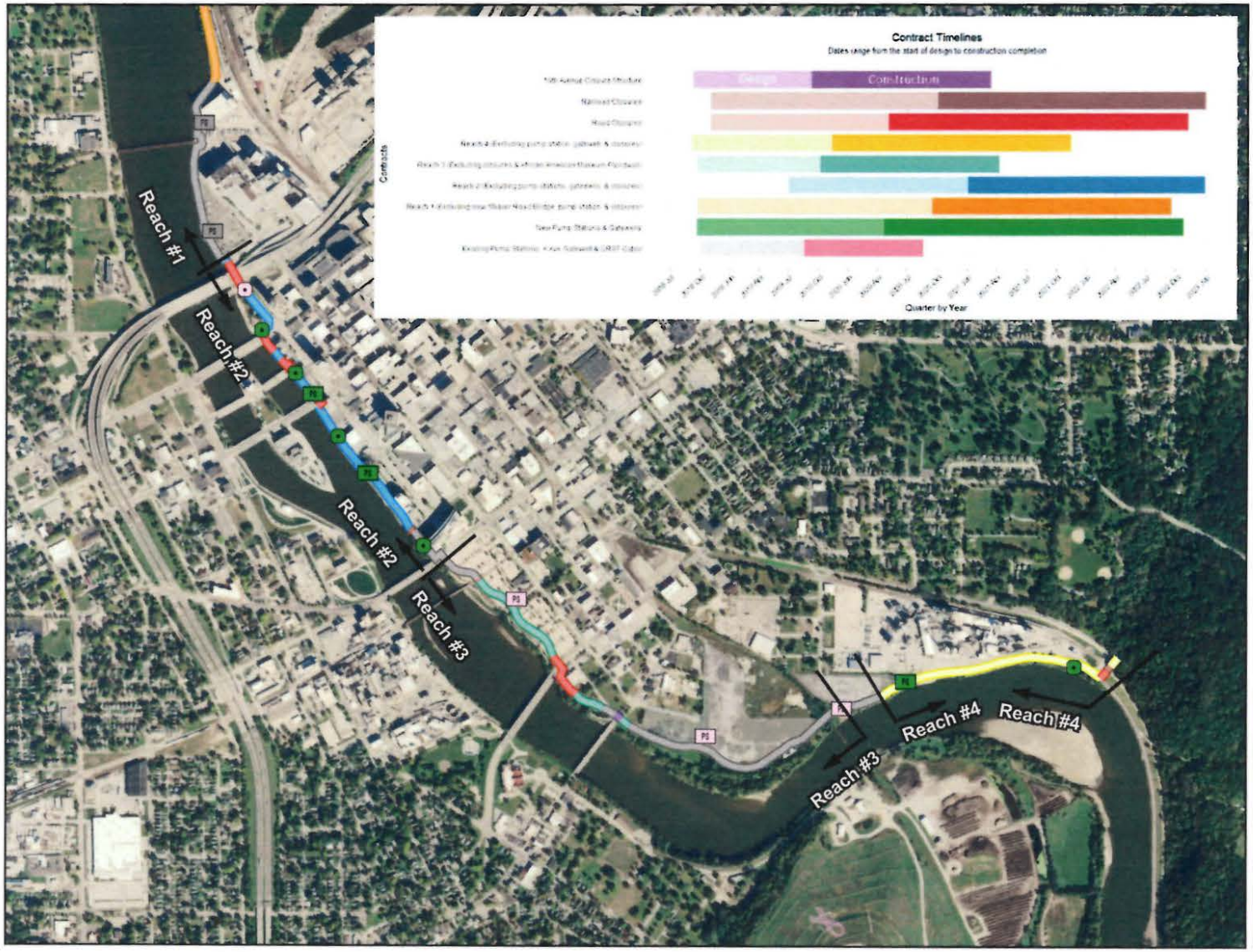
0 750 1,500 Feet

Last Updated: 2018.12.20
Coordinate System:
State Plane Iowa North FIPS 1401 Feet
Imagery:
2015 National Agricultural Imagery Program (NAIP)



US Army Corps of Engineers
Rock Island District

Cedar Rapids - Flood Risk Management Project (2018 - 2022)



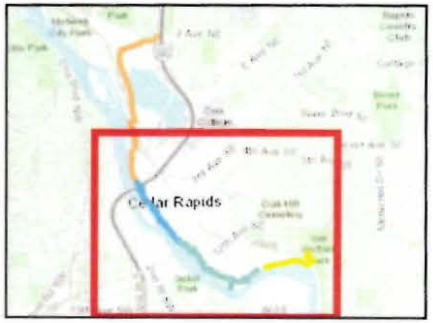
Contracts

- Existing Pump Stations
- A Avenue Gatewell
- New Pump Stations
- New Gatewells
- Completed Work - Pump Stations
- Reach 1
- Reach 2
- Reach 3
- Reach 4
- Road Closures
- Railroad Closures
- 16th Avenue Closure
- Other Contracts/Completed Work

N

0 750 1,500 Feet

Last Updated: 2018.12.20
Coordinate System:
State Plane Iowa North FIPS 1401 Feet
Imagery:
2015 National Agricultural Imagery Program (NAIP)



ATTACHMENT 4

Review Schedules

Cedar Rapids Flood Risk Management Project Review Schedules for DQC, LSTR, ATR, and BCOES

Contract or Deliverable	35% Start Dates (Expected Date For Reviewers To Receive Documents	35% Comments Due	35% Comment Backchecks Complete	65% Start Dates (Expected Date For Reviewers To Receive Documents	65% Comments Due	65% Comment Backchecks Complete	95% Start Dates (Expected Date For Reviewers To Receive Documents	95% Comments Due	95% Comment Backchecks Complete	Anticipated Disciplines Needed	Project Description
Existing Pump Station Outfitting and New Gatewells	Completed 2012	Completed 2012	Completed 2012	N/A	N/A	N/A	3/21/2019	3/27/2019	4/10/2019	Structural, Mechanical, Electrical	This contract includes the procurement and installation of 4 total pumps - 2 will be installed in the Sinclair pump station and 2 will be installed in the 10th Avenue Pump Station. The gatewell will be constructed at A Avenue and gates will be added to the existing CRST gatewell.
16th Avenue Closure Structure	Completed 2012	Completed 2012	Completed 2012	1/7/2019	1/11/2019	1/25/2019	4/5/2019	4/18/2019	5/2/2019	Structural, Geotech, Mechanical	This contract includes one roller-type gate. The gate is approximately 70' in length. The gate structure will tie into future/existing projects on the upstream and downstream ends
Reach 3	Completed 2012	Completed 2012	Completed 2012	2/7/2019	2/20/2019	3/13/2019	4/18/2019	5/1/2019	5/29/2019	Geotech, Civil	This contract includes the construction of approximately 1100' of earthen levee. The levee is being constructed in the middle of a municipal parking lot owned by the local sponsor (city of Cedar Rapids) and is 12-14' tall.
Reach 4	Completed 2012	Completed 2012	Completed 2012	3/7/2019	3/15/2019	4/5/2019	6/6/2019	6/19/2019	6/28/2019	Geotech, Civil, Structural, Mechanical, Electrical	This contract includes the construction of a new pump station and concrete floodwall. The floodwall height varies between 12' and 24' tall and is a T-type floodwall.
New Pump Stations and Gatewells	Completed 2012	Completed 2012	Completed 2012	5/3/2019	5/23/2019	6/13/2019	9/6/2019	9/26/2019	10/24/2019	Geotech, Civil, Structural, Mechanical, Electrical	This contract includes the construction of a new pump station at 5th avenue. Additionally, new gatewells will be constructed as a part of this contract.
Road Closures	Completed 2012	Completed 2012	Completed 2012	6/13/2019	6/26/2019	7/17/2019	10/10/2019	10/23/2019	11/20/2019	Geotech, Civil, Structural, Mechanical, Electrical	This contract includes the construction of 5 road closure structures that will be constructed across both 4-lane and 2-lane roadways. Each road closure abutment will tie into floodwall. Additionally, there is a significant amount of utilities that need to be relocated.
Railroad Closures	Completed 2012	Completed 2012	Completed 2012	6/13/2019	7/24/2019	9/11/2019	12/5/2019	1/15/2020	3/4/2020	Geotech, Civil, Structural, Mechanical, Electrical	This contract includes the construction of 4-5 railroad closure structures of varying widths. The gate type may vary depending on the width of the closure and how many tracks need to be crossed. These closure structures will be constructed on property owned by 2 different railroads.
Reach 1	6/14/2019	6/27/2019	7/18/2019	10/11/2019	10/31/2019	11/21/2019	2/14/2020	3/5/2020	4/2/2020	Geotech, Civil, Structural, Mechanical, Electrical, Hydraulics	This contract includes the construction of floodwall, levee, a pump station, channel widening, and concrete culvert widening. The length of levee is approximately 3600' and the length of floodwall is approximately 3000'. The levee will be constructed in an existing lake.
Reach 2	Completed 2012	Completed 2012	Completed 2012	12/19/2019	1/1/2020	1/22/2020	5/18/2020	5/29/2020	7/10/2020	Geotech, Civil, Structural, Mechanical, Electrical	This contract includes the construction of both removable and non-removable floodwalls 12-14' tall. The construction of this project is in an urban setting and has very tight working area with some areas around 50' wide. Additionally, there is a significant amount of utilities that need to be relocated.
8th Avenue Bridge	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Geotech, Civil, Structural, Hydraulics	This contract includes a new bridge at 8th Avenue and construction of tie-in walls to the FRM Project.
H&H Appendix	N/A	N/A	N/A	4/2/2019	4/10/2019	4/19/2019	TBD	TBD	TBD	H&H	This is the overall H&H appendix for the project.
Operations and Deployment Risk Assessment Report	N/A	N/A	N/A	N/A	N/A	N/A	3/1/2019	TBD	TBD	Civil, Structural, Mechanical, Electrical	This is the report that ERDC developed for the city of Cedar Rapids that studied Alternative and Sequencing Optimization for Removable Flood Barriers
Project Risk Assessment	N/A	N/A	N/A	N/A	N/A	N/A	5/15/2019	5/22/2019	5/29/2019	Geotech, Civil, Structural, Mechanical, Electrical, Hydraulics	This is a report that will outline the results of a risk Assessment performed on the project and assist in risk informed design.

Note: An ATR site visit is tentatively scheduled for 3rd Quarter 2019.

ATTACHMENT 6
Review Plan Revisions

Revision Date	Description of Change	Page/Paragraph Number