US Army Corps of Engineers ®
Buffalo District

REVIEW PLAN

FOR

ENGINEERING & DESIGN PRODUCTS

Black Rock Lock Miter Gates
Black Rock Channel and Tonawanda Harbor, NY
P2 #478211

Buffalo District, Great Lakes & Ohio River Division

MSC Approval Date: *Pending*

1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan (RP) defines the overall scope and levels of review required for the engineering and design (E&D) products for the Black Rock Lock Miter Gates project (P2# 478211).

b. References. This RP is prepared in accordance with regional business process QMS 08504 LRD and latest versions of the guidance documents listed below.

(1) ER 415-1-11 Biddability, Constructability, Operability, Environmental and Sustainability Reviews, January 1, 2013
(2) Engineer Regulation (ER) 1110-1-12, Quality Management, 31 March 2011
(3) EC 1165-2-217, Civil Works Review, 20 February 2018 (expires 31 March 2020)
(4) Project Management Plan (PMP), Black Rock Lock Miter Gates, TBD

c. Requirements. The design and construction activities and documents for the Black Rock Lock Miter Gates project are required to be reviewed by independent technical experts in accordance with ER 1110-1-12 and EC 1165-2-217. Review requirements include district quality control/assurance (DQC) and agency technical review (ATR) as described below.

2. REVIEW MANAGEMENT ORGANIZATION (RMO)

The RMO for this project is the Inland Navigation Design Center (INDC). The RMO has provided the District with written concurrence for this review plan.

3. PROJECT SCOPE AND PRODUCTS

a. Project Description and Scope of Work. The project scope is to design and construct new miter gates for the Black Rock Lock. The scope includes removal of the existing gates; fabrication of new miter gates and appurtenances such as anchorages, pintles, and quoins; delivery and installation of new miter gates and appurtenances. The existing operating machinery will remain. The Black Rock Lock facilitates commercial navigation by deep draft vessels between Buffalo and Tonawanda around the rapids of the head of the Niagara River. Lock construction was completed in 1913. Recent inspections show the lock miter gates have deteriorated and need to be replaced. A design charrette by Inland Navigation Design Center (INDC) supported gate replacement.

Project Type:	Operations & Maintenance
Location:	Black Rock Channel and Tonawanda Harbor, Buffalo, NY
Purpose/Function:	Continued reliable lock operations.
Key Physical Components:	Upstream and Downstream Miter Gates and Appurtenances
Estimated Construction Cost:	[redacted]
E&D Product Method Delivery:	In-House
Construction Delivery Method:	Competitive Contract Solicitation

b. Engineering and Design Products. The engineering and design products to be reviewed include:
(1) Design Documentation Report (DDR)
(2) Plans and Specifications (P&S)
(3) Engineering Considerations and Instructions for Field Personnel (ECFIP)
(4) Major Construction Contract Modifications

c. Required Quality Reviews.

(1) District Quality Control (DQC): DQC procedures will be performed for all E&D products.

(2) Agency Technical Review (ATR): The District Chief of Engineering has determined based on Tables 2 and 3 of QMS 08504 LRD that ATR is required for the E&D products.

(3) Type II Independent External Peer Review (IEPR), Safety Assurance Review (SAR): The District Chief of Engineering has determined that the project does not pose significant life safety risks and a Type II IEPR (SAR) is not required.

d. Technical Risk Analysis and Review Charge. ATR is required and a review charge will be prepared and issued to the review team. According to paragraph 7.4.d and Table 4 of QMS 08504 LRD, the ATR will focus on the project complexities and technical risks described below.

(1) Structural: Miter gates are sizable structures with substantial static and dynamic loads and numerous critical and complex components. A miter gate structural failure can cause a long lock closure, lengthy disruption of navigation traffic, and substantial economic impact. The District requires additional senior expertise to confirm the structural design.

(2) Mechanical: For debris and ice flushing, the miter gates will have a bubbler system and butterfly valves. Failure of this system to clear floating objects from behind an open miter gate can result in obstruction to complete lock opening and create an obstacle to traffic. The District requires additional senior expertise to confirm the mechanical design.

(3) Geotechnical: The existing miter gate design is horizontally-framed type which transfer loads to the lock walls. The new gates will be vertically-framed type which instead transfer loads to the miter sill. The critical nature of changing the load path from the lock walls to the sill adds complexity and risk. The District requires additional senior expertise to verify the adequacy of the sill foundation.

(4) Fabrication and Welding: The load paths through miter gates are complex. Proper fabrication and welding of miter gate steel components is critical to reliable, long term performance. The District requires additional senior expertise to confirm the proper fabrication and weld design.

4. PROJECT DELIVERY TEAM (PDT)

The project delivery team members are listed in Attachment 1.

5. REVIEW EXECUTION

District quality control (DQC) will be performed per Chapter 3 of ER 1110-1-12 and Section 8 of EC 1165-2-217. ATR shall be performed in accordance with Section 9 of EC 1165-2-217. Based on the review charge in paragraph 3.d, the technical disciplines and names for ATR team members are shown in Table 1 below and Attachment 1.

Table 1. ATR Team Disciplines, Names and Expertise	
Technical Discipline or Name	Expertise
Structural Engineer/ATR Leader [redacted] CERCAP Certified	Senior level knowledge with USACE and industry design standards for navigation lock miter gates. Over 15 years of experience in the field of structural engineering including design, fabrication and maintenance of hydraulic steel structures. The reviewer shall have performed design and analysis of navigation locks and components including miter gates. Previous experience as an ATR team leader and with ATR report production for navigation projects.
Mechanical Engineer [redacted] CERCAP Certified	Senior level knowledge with USACE and industry design standards for navigation lock mechanical systems. Over 15 years of experience in the field of design and maintenance of mechanical systems for navigation locks. The reviewer shall have performed mechanical design and analysis of navigation locks and components including bubbler systems and butterfly valves. Previous experience as an ATR team member.
Geotechnical Engineer [redacted] CERCAP Certified	Senior level knowledge with USACE and industry design standards for navigation lock geotechnical and foundation systems. Over 15 years of experience in the field of design and maintenance of foundations for navigation locks. Previous experience as an ATR team member.
QA Specialist, Fabrication & Welding [redacted] CERCAP Certified	Senior level knowledge with fabrication and welding for navigation lock miter gates or similar large-scale hydraulic structures. Over 10 years of experience with USACE in quality assurance of fabrication and welding hydraulic structures. Certified Level 2 Welding and Coating Inspector and Level 2 Non-Destructive Evaluation experience in MT, PT, UT, and RT .

6. REVIEW SCHEDULE AND BUDGET

The schedule and budgets for reviews are shown in Table 2.

Table 2. Review Schedule and Budgets

Review	Start Date	Finish Date	Budget ($)
DQC 35% Review	13-May-2019	17-May-2019	5,000
BCOES 35% Review	13-May-2019	17-May-2019	2,500
ATR 35% Review	13-May-2019	17-May-2019	5,000
DQC 65% P&S Review	12-Jul-2019	25-Jul-2019	5,000
ATR 65% P&S Review	12-Jul-2019	25-Jul-2019	5,000
DQC 95% P&S Review	26-Aug-2019	30-Aug-2019	5,000
BCOES 95% P&S Review	02-Sep-2019	27-Sep-2019	7,500
ATR 95% P&S Review	02-Sep-2019	27-Sep-2019	7,500
BCOES Final P&S Review	Q1, FY20	Q1, FY20	2,500
ATR Final P&S Review	Q1, FY20	Q1, FY20	2,500

7. REVIEW PLAN POINTS OF CONTACT

Questions and comments relating to this review plan can be directed to the following points of contact:

a. District Project Leaders

(1) Project Manager: [redacted]

(2) Technical Lead: [redacted]

b. Design Center/RMO: Inland Navigation Design Center (INDC), [redacted]

c. ATR Leader: [redacted]

8. DISTRICT APPROVAL

[redacted]

ATTACHMENT 1: TEAM MEMBERS

PROJECT DELIVERY TEAM			
Function/Discipline	Name	Office	Phone
Project Manager	[redacted]	CELRB-PM-PM	[redacted]
Technical Lead/Structural Engineer	[redacted]	CELRB-TD-DS	[redacted]
Cost Engineer	[redacted]	CELRB-TD-DE	[redacted]
Specifications Engineer	[redacted]	CELRB-TD-DS	[redacted]
Value Engineer	[redacted]	CELRH-EC-TQ	[redacted]
CADD Technician	[redacted]	CEMVR-ERN-S	[redacted]
Mechanical Engineer	[redacted]	CEMVP-EC-D	[redacted]
Geotechnical Engineer	[redacted]	CELRB-TD-DC	[redacted]
Electrical Engineer	[redacted]	CEMVP-EC-D	[redacted]
H&H Engineer	[redacted]	CELRB-TD-HD	[redacted]
Contracting	[redacted]	CELRB-CECT	[redacted]
Construction/NY-PA Area Office	[redacted]	CELRB-TD-CN	[redacted]
NY-PA Operations & Maintenance	[redacted]	CELRB-TD-ON	[redacted]
Environmental/Geospatial Lead	[redacted]	CELRB-PM-EA	[redacted]

DQC REVIEWERS			
Function/Discipline	Name	Office	Phone
DQC Lead	[redacted]	CEMVR-EC-DS	[redacted]
Civil/Structural Engineer	[redacted]	CELRB-TD-DS	[redacted]
Structural Engineer	[redacted]	CELRB-TD-DS	[redacted]
Cost Engineer	[redacted]	CELRB-TD-DE	[redacted]
Specifications Engineer	[redacted]	CELRB-TD-DS	[redacted]
Mechanical Engineer	[redacted]	CEMVP-EC-D	[redacted]
Electrical Engineer	[redacted]	CEMVP-EC-D	[redacted]
Geotechnical Engineer	[redacted]	CELRB-TD-DC	[redacted]

BCOES TEAM MEMBERS
The Project Delivery Team members and DQC Reviewers listed above, comprising the range of disciplines required to complete this project, will be responsible for coordinating BCOES review activities, addressing BCOES comments, and making revisions to the technical products as applicable. BCOES comments, responses, and back-checks will be documented in DrChecks, and a BCOES certification will be completed upon conclusion of the review.

ATTACHMENT 1: TEAM MEMBERS (CONTINUED)

ATR TEAM MEMBERS			
Function/Discipline	Name	Office	Phone
Structural Engineer/ATR Leader	[redacted]	CEMVS-EC-DA	[redacted]
Mechanical Engineer	[redacted]	CELRP-EC-NT	[redacted]
Geotechnical Engineer	[redacted]	CELRP-ECG-G	[redacted]
QA Specialist, Fabrication/Welding	[redacted]	CENWP-ENC-CC	[redacted]