Project Title: Black Rock Lock Comprehensive Lock Evaluation

Authority: Operations and Maintenance

P2/Project Number: 510340

Review Plan

PREPARED BY:

[redacted]
Structural Engineer
USACE, Buffalo District (LRB)

[redacted]
Project Manager
USACE, Buffalo District (LRB)

RECOMMENDED BY:

[redacted]
District Commander
USACE, Buffalo District (LRB)

ENDORSED BY:

[redacted]
Director, Inland Navigation Design Center (INDC)
Review Management Organization Representative
USACE, Rock Island District (MVR)

APPROVED BY:

[redacted]
Regional Business Director
USACE, Great Lakes and Ohio River Division (LRD)

MSC APPROVAL DATE: _____

REVIEW PLAN
ENGINEERING AND DESIGN PRODUCTS

COMPREHENSIVE EVALUATION LETTER REPORT AND REMEDIAL DESIGN MEASURES FOR BLACK ROCK LOCK BUFFALO DISTRICT (LRB)

Current Version Date: 15 June 2023
Mandatory Revision Date: 15 June 2024

1) PURPOSE AND REFERENCES

a) Purpose. This review plan describes necessary quality reviews for engineering and design (E&D) products for the Black Rock Lock Comprehensive Evaluation Letter Report and Remedial Design Measures project (P2# 510340).

b) References.

i) Engineering Regulation (ER) 415-1-11, Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Reviews
ii) Engineering Regulation (ER) 1165-2-217, Civil Works Review Policy
iii) Qualtrax 08504 LRD, Supplemental Quality Procedures for Civil Works (CW) Engineering and Design (E&D) Products
iv) Project Management Plan (PMP), Black Rock Lock Comprehensive Lock Evaluation

2) REVIEW MANAGEMENT ORGANIZATION (RMO). The RMO for this project is the U.S. Army Corps of Engineers (USACE) Inland Navigation Design Center (INDC).

3) PROJECT SCOPE AND PRODUCTS

a) Project Description:
i) The construction of the Black Rock Lock had begun in 1908 with the construction completing, and the lock being opened to navigation traffic in 1914. Due to solutioning out of gypsum seams under the lock walls and sills, a grouting program was performed in the early 1990's. The purpose of this grouting program was to inject grout under the lock walls to assist in the stability of the lock both during normal operations and during dewatering.
ii) In the summer of 2022, in support of the design effort to replace the existing guard gates with new lock bulkhead, a concrete coring contract was awarded for the lock. The goal of this contract was to check on the integrity of the concrete in the gate sills and in the lock walls, with the added benefit of allowing the geotechnical team to check on the quality of the previously mentioned grouting program. The results of this program were that several sections of concrete in the gate sills and in the lock walls showed signs of degradation along the concrete cold joints, and that the grouting performed in the 1990's had begun to solution out from under the lock.

b) Project Scope: Perform a comprehensive evaluation of the Black Rock Lock according to the following goals:

i) Perform additional test drilling along the lock to identify the extent of the grout loss and determine sections of lock concrete that will need to be repaired or replaced. Subsurface data for the bedrock in its current state, and after it has undergone a test grouting program. This will be completed by creating an A/E Contract that will involves geotechnical drilling, a test grouting program, and finally resulting in P&S for grouting of the lock.

ii) Determine the current deficiencies regarding lock wall stability, and operational capabilities for the lock, while in normal operation, during dewatering, and after the new miter gates have been installed. This will involve performing a stability analysis of the lock walls and sills in addition to coordinating with operations staff to identify other deficiencies. Compile a rough order of magnitude (ROM) estimates for recommended repairs to rectify the deficiencies. Establish a rough schedule for when recommended repairs are to be completed.

iii) Design of temporary and/or permanent remedial measures to rectify deficiencies that would prohibit normal operation or dewatering of the lock in the form of a detailed design reports followed by plans and specifications.

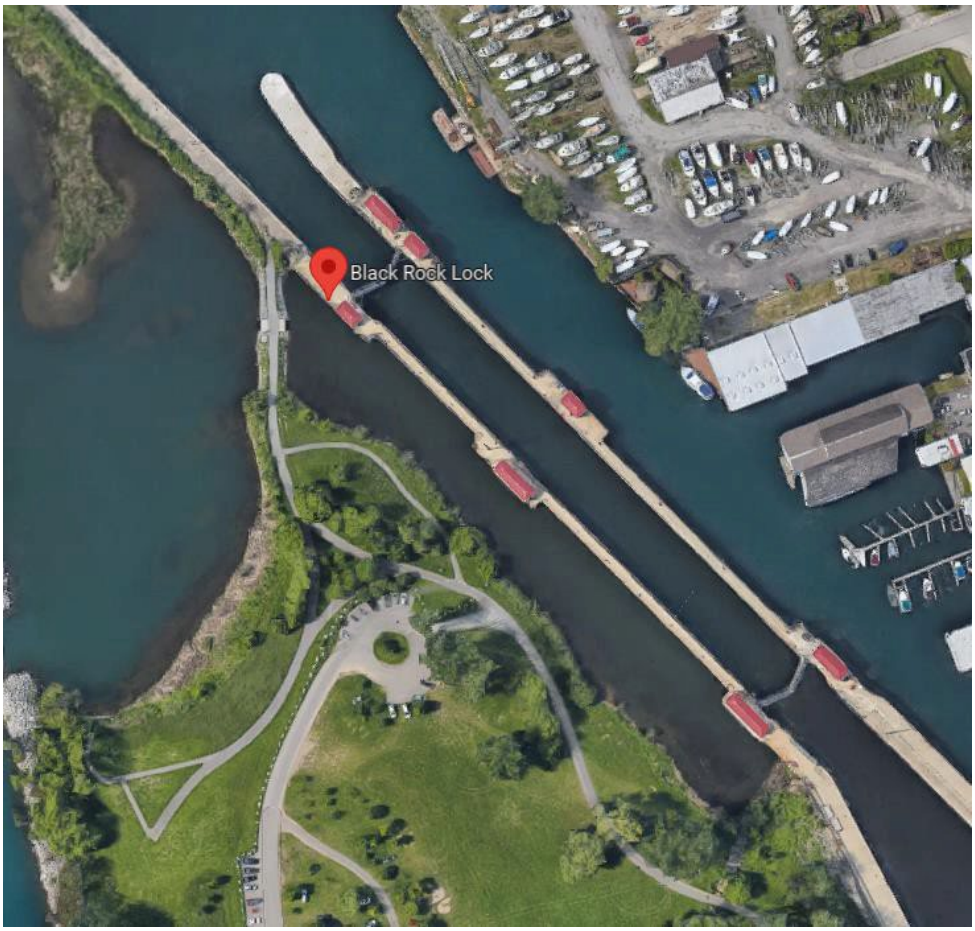

Figure 1: Satellite imagery for the Black Rock Lock

Business Line	Operations & Maintenance
Project Type	Operations & Maintenance
Geographic Location	Black Rock Channel and Tonawanda Harbor, Buffalo, NY
Main Project Features	Remedial measures to ensure the safe operations of the lock
Key Physical Components	-Letter Report Detail Existing Structural Deficiencies -Remedial measures to ensure the safe and operations of the lock
Estimated Construction Cost	[redacted]
Inland Navigation Category	3
E&D Product Method Delivery	In-House
Construction Delivery Method	Competitive Contract Solicitation

c) Products. The E&D products to be reviewed include the following:
(1) Geotechnical Investigation Plan and Report, Including Test Grouting
(2) Structural Analysis
(3) Comprehensive Evaluation Letter Report
(4) Design Documentation Report(s)
(5) Plans and Specifications (P&S)
(6) Engineering Considerations and Instructions for Field Personnel (ECIFP)
(7) E&D Products for Major Construction Contract Modifications

d) Commonality and Standardization (C&S). The IND Project Category for this project has been assessed with the INDC and determined to be Category 3 per ER 1110-1-8168 and INDC guidance. Project components to be designed will be determined after the Comprehensive Letter report has been completed. Design for these components will adopt existing standard designs from or result in new standard designs for the enterprise C&S portfolio. Components will be designed for Enterprise-wide, Division-wide, District-wide, or River System application.

4) DOCUMENTATION OF RISKS AND ISSUES

a) Life Safety Assessment: The District Chief of Engineering has reviewed the project requirements and determined there is not a significant threat to human life if the project were to fail. The focus of this project will involve a technical assessment of the lock rehabilitation from a wholistic perspective to ensure a comprehensive understanding of the lock structure and the underlying subsurface conditions to facilitate risk-informed decisions on a path forward, with the key deliverable being a letter report.

b) Technical Complexities and Risks. The project delivery team (PDT) performed a thorough risk analysis of the anticipated project construction and operations activities and identified the following key technical complexities and risks. Quality reviews will be focused to manage these risks.

(1) Lack of PDT Labor Resources
(2) Limited Funding for Remedial Measures
(3) Cost Increases
(4) Weather Delays during drilling
(5) Contractor unavailability
(6) Unavailability of Subsurface data for Stability Analysis
(7) Cost for required remedial measures
(8) Complexity of Required Design Measures

5) REVIEW EXECUTION

i) Project Delivery Team (PDT): PDT members are listed in Attachment 1. PDT members will work collaboratively with review team members to ensure effective execution of quality reviews.

ii) District Quality Control (DQC): DQC is required for all E&D products. Follow DQC procedures in Chapter 4 of ER 1165-2-217 and District local work instructions. The Engineering Technical Lead and DQC Lead will collaborate to oversee and ensure effective DQC execution.

iii) Biddability, Constructability, Operability, Environmental, Sustainability (BCOES): BCOES reviews are required for all E&D products. Follow BCOES review procedures in ER 415-1-11 and District local work instructions. The Engineering Technical Lead and DQC Lead will collaborate to oversee and ensure effective BCOES execution. It is noted that the BCOES reviews will be scaled based on conceptual design alternatives being developed as part of the letter report.

iv) Agency Technical Review (ATR): ATR is required for all products and will follow ATR procedures in Chapter 5 of ER 1165-2-217. ATR will address the technical risks described in sub-section 4.b. Required senior technical disciplines and expertise needed for ATR are shown in Table 1. Assigned ATR team members are listed in Attachment 1. ATR members in engineering disciplines are verified as certified in the Corps of Engineers Review and Certification Access Program (CERCAP). PDT and review team leaders will collaborate to oversee and ensure effective execution.

Table 1. ATR Technical Discipline(s) and Required Expertise

Technical Discipline	Expertise Required
ATR Team Leader	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 may also serve as a reviewer for a specific discipline.
Structural Engineer	Shall have extensive experience in the field of structural engineering including performing stability analysis of locks and other mass concrete structures for inland navigation projects.
Geotechnical Engineer	Shall have senior level experience in geotechnical design, stability analysis, drilling contracts and experience in application of same to navigation locks and dams.
Geologist	Shall have senior level experience in field investigations, drilling, testing and foundation grouting, preferably in a marine environment.
Operations	Shall have experience and knowledge in the operation and maintenance of navigation locks.
Construction	Shall have experience in and knowledge of construction in marine environments, preferably on work associated with navigation locks.

v) Safety Assurance Review (SAR): Per sub-section 4.a, an SAR not required. When required, SAR will be performed per Chapter 6 of ER 1165-2-217.

vi) Review Charge. Reviewers will refer to and perform ATR per Section 5.7 of ER 1165-2-217, Objectives, Scope and Review Criteria. Reviews shall check to confirm the design addresses the technical complexities and risks described in paragraph 4.b.

6) REVIEW SCHEDULE AND BUDGETS. The schedule and budgets for reviews are shown in Table 2. BCOES reviews will not be scheduled performed concurrently with DQC and ATR review periods.

Table 2. Review Schedule and Budgets

Review Activities (Note 1)	Start Date	Finish Date	Budget ($)
DQC – A/E contract for Geotechnical Investigations	Aug 22, 2023	Sept 5, 2023	[redacted]
ATR – A/E contract for Geotechnical Investigations	Sept 5, 2023	Sept 15, 2023	[redacted]
DQC – Letter Report	Aug 14, 2023	Aug 18, 2023	[redacted]
ATR – Letter Report	Sept 5, 2023	Sept 15, 2023	[redacted]
BCOES – Letter Report	Sept 18, 2023	Sept 30, 2023	[redacted]
LRD Approval – Letter Report	Sept 30, 2023	Sept 31, 2023 (Est)	[redacted]
DQC – 65% Design of Remedial Measures (DDR and P&S)	Q1 FY24	Q1 FY24	[redacted]
ATR – 65% Design of Remedial Measures (DDR and P&S)	Q2 FY24	Q2 FY24	[redacted]
BCOES – 65% Design of Remedial Measures (DDR and P&S)	Q2 FY24	Q2 FY24	[redacted]
DQC – 95% Design of Remedial Measures (DDR and P&S)	Q2 FY24	Q2 FY24	[redacted]
ATR – 95% Design of Remedial Measures (DDR and P&S)	Q3 FY24	Q3 FY24	[redacted]
BCOES – 95% Design of Remedial Measures (DDR and P&S)	Q3 FY24	Q3 FY24	[redacted]
BCOES - Backcheck	Q3 FY24	Q3 FY24	[redacted]
Notes: (1) Review activities may be scaled to project size and scope;			

7) REVIEW DOCUMENTATION. The ATR leader will prepare an ATR report per Section 5.10 of ER 1165-2-217. The ATR report with certification form will be provided to the approval signatories, including the RMO representative. Review documents will be stored with the official project records.

8) 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) [redacted]

(2) Engineering Technical Lead:
[redacted]

b) Review Management Organization (RMO) Representative: [redacted] Technical Manager, Inland Navigation Design Center, [redacted]

9) APPROVAL SIGNATURE: [redacted]

District Chief of Engineering

ATTACHMENT 1 – TEAM MEMBERS

PROJECT DELIVERY TEAM		
Function/Discipline	Name (Last, First)	Office
Customer	Buffalo District (LRB)	
Project Manager	[redacted]	[redacted]
Technical Lead/ Structural Engineer	[redacted]	[redacted]
Structural Engineer	[redacted]	[redacted]
Cost Engineer	[redacted]	[redacted]
Value Engineer	[redacted]	[redacted]
Senior Geotechnical Engineer	[redacted]	
Geotechnical Engineer	[redacted]	[redacted]
DQC REVIEWERS		
Function/Discipline	Name (Last, First)	Office
Project Management	[redacted]	[redacted]
Operations Branch	[redacted]	[redacted]
Cost Engineering	[redacted]	[redacted]
Civil/Structural Engineering	[redacted]	[redacted]
Geotechnical Engineering	[redacted]	[redacted]
BCOES REVIEWERS		
Function/Discipline	Name (Last, First)	Office
Biddability	[redacted]	[redacted]
Constructability	[redacted]	[redacted]
Operability	[redacted]	[redacted]
Environmental	[redacted]	[redacted]
Sustainability	[redacted]	[redacted]
BRL Operations	[redacted]	[redacted]
Geotechnical	[redacted]	[redacted]
Office of Counsel	[redacted]	[redacted]
Real Estate	[redacted]	[redacted]
Operations	[redacted]	[redacted]
Operations/Lock Master	[redacted]	[redacted]
ATR REVIEWER(S)		
Function/Discipline	Name (Last, First)	Office
ATR Leader (Structural)	[redacted]	[redacted]
Geotechnical	[redacted]	[redacted]
Construction	[redacted]	[redacted]
Operations	[redacted]	[redacted]
Geologist	[redacted]	[redacted]