US Army Corps of Engineers®

Pittsburgh District
Great Lakes and Ohio River Division

Project Title: ***UPPER GUIDE WALL SLOPE STABILIATION AND LOWER POOL WORKBOAT MOORING AREA***

Authority: ***RIVER AND HARBOR ACT - 3 MARCH 1909***

P2/Project Number: [redacted]

Review Plan

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MSC APPROVAL DATE: 3/28/22

REVIEW PLAN
ENGINEERING AND DESIGN PRODUCTS
UPPER GUIDE WALL SLOPE STABILIZATION AND
LOWER POOL WORKBOAT MOORING AREA
PITTSBURGH DISTRICT

Current Version Date: 2/1/2022
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1. PURPOSE AND REFERENCES

a. Purpose. This review plan describes necessary quality reviews for engineering and design (E&D) products for the Upper Guide Wall (UGW) Slope Stabilization and Lower Pool Workboat Mooring Area projects at Dashields Locks and Dam on the Ohio River. The projects will be completed under two separate design and subsequently contract actions, but are inherently related. Slope stability at the upper guide wall necessitated relocation of the existing workboat mooring area from behind the upper guide wall to the lower pool behind the lower guide wall thus facilitating upper guide wall slope stabilization.

b. References.

(1) Engineering Regulation (ER) 415-1-11, Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Reviews
(2) Engineering Regulation (ER) 1165-2-217, Civil Works Review Policy
(3) Qualtrax 08504 LRD, Supplemental Quality Procedures for Civil Works (CW) Engineering and Design (E&D) Products
(4) Project Management Plan (PMP)

2. REVIEW MANAGEMENT ORGANIZATION (RMO). The RMO for this project is the MSC (Great Lakes and Ohio River Division).

3. PROJECT SCOPE AND PRODUCTS

a. **Upper Guide Wall Slope Stabilization** - Project Description and Scope of Work. The purpose of this project is to design a long term solution for the ultimate award of a construction contract. This project will consist of utilizing an existing Architect Engineering (A/E) IDIQ contract to provide engineering services to design stabilization measures for the development of construction ready plans, specifications, and supporting documents for Upper Guide Wall Slope. Based on LRP's conceptual design efforts to date, micropiles for slope stabilization appear to be the most efficient, cost effective, and scalable option. The A/E Contractor shall review the Government Furnished Information (GFI) including the conceptual micropile stabilization system design prepared by LRP and shall perform their own independent design of a micropile system for upper guide wall slope stabilization. The A/E Contractor shall develop the micropile design to the 30% design phase, which shall include estimated costs for construction of the micropile system. Since the time of LRP's conceptual design, project requirements and constraints have evolved; therefore, LRP is also requesting that the A/E Contractor perform a Value Engineering (VE) study. The micropile option will be considered the baseline slope stabilization method for which other stabilization measures or design alternatives will be compared to during the VE study. Following the VE study, the A/E Contractor will meet with LRP to discuss the

results of the VE study, and LRP will reach consensus on final conceptual design before the A/E Contractor proceeds with final design and preparation of contract documents for the selected alternative.

Project Number	[redacted]
Business Line	Navigation
Project Type	Navigation Lock – Upper Guide Wall Slope Stabilization
Geographic Location	Pittsburgh, PA - 40°32'56.40"N / 80°12'25.60"W
Main Project Features	Micropile slope stabilization system, instrumentation/monitoring, and Value Engineering Study.
Estimated Construction Cost	$12 million
E&D Product Delivery Method	A/E Firm
Construction Delivery Method	Fixed Price

b. **Lower Pool Mooring Area** - Project Description and Scope of Work. The existing work boat mooring area, currently located at the upstream end of the upper guide wall (UGW), was affected by the 2018 UGW slope failure and can no longer be used safely. The mooring area's rip rap is at a level that would cause damage to boats and the sheet pile wall adjacent to the UGW archways is above the water surface further restricting the area available. The purpose of this project is to relocate the existing boat slip downstream to the landward side of the lower guide wall (LGW). Relocation of the existing boat slip will facilitate permanent UGW slope stabilization. This location is considered favorable because it maintains an on-site mooring location for the Dashields work boat while removing design constraints from the UGW slope stabilization project, to be completed under separate contract. An anchored sheet pile wall will be constructed between the LGW and existing parking area to allow limited underwater excavation to create draft and a footprint for the work boat to be safely moored. Operations has already provided input on the location for the boat mooring area and has approved the new location for the workboat mooring area. The Pittsburgh District (LRP) will perform the design and prepare contract ready construction ready plans, specifications, and supporting documents (DDR and ECIFP) for the lower pool work boat mooring area.

Project Number	[redacted]
Business Line	Navigation
Project Type	Navigation Lock – Workboat Mooring Area
Geographic Location	Pittsburgh, PA - 40°32'56.40"N / 80°12'25.60"W
Main Project Features	Anchored Sheet Pile Wall, Excavation, Slope Protection
Estimated Construction Cost	$1.85 million
E&D Product Delivery Method	In-House Design
Construction Delivery Method	Fixed Price

c. Products. The E&D products to be reviewed for each design effort include the following.

(1) Design Documentation Report (DDR)
(2) Plans and Specifications (P&S)
(3) Engineering Considerations and Instructions for Field Personnel (ECIFP)
(4) E&D Products for Construction Contract Modifications

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.

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.

UGW Slope Stabilization

(1) The UGW Slope Stabilization project requires stabilization of a marginally stable slope that has exhibited movement in the recent past (September 2018) in proximity to both the Dashields Locks and Dam Upper Guide Wall (toe of slope) and a CSX mainline rail road (top of slope). The following problem triggers could result in further destabilization of the slope and consequently accelerated slope movements during construction. These factors include but are not limited to
    a. construction activities at the toe of the slope that reduce resisting forces for the current slope and sheet pile wall system;
    b. construction activities at the top of the slope that add temporary driving forces to the slope;
    c. significant rainfall events that further saturate the soils composing the slope;
    d. rapid rise and lowering of the river level;
    e. erosion to the riverbanks upstream of the sheet pile wall;
    f. freeze thaw cycles;
    g. high volume of railroad traffic; and
    h. repeated addition of ballast by the railroad to realign tracks for maintenance during smaller movements increasing the driving forces at the top of the slope.

    Further slope deformations present risks to the stability of the existing upper guide wall and impacts to navigation.

(2) Construction activities and the final stabilization measure could also have an impact on the existing railroad and risk potential litigation with the railroad owner if their operations are negatively impacted.

Lower Pool Mooring Area

(1) Sheet pile drivability risk due to presence of obstructions. Presence of large concrete rubble was observed near the toe of slope during a 6/30/2021 site visit and the presence of a rockfill embankment beneath the access road embankment shown on the 1986 as-built drawings.
    a. This risk has been addressed in a meeting between LRP's Geotech and Construction sections. To mitigate the constructability risk, the driving line will be cleared with limited pre-excavation and immediate backfill. Refer to the MFR dated 19 November 2021 for more information.

(2) Removal of backfill from the lower guide wall presents risk of a negative impact on lower guide wall stability.

a. Existing stability calculations have been reviewed by the LRP Geotech section and removal of backfill to the proposed grade for workboat mooring does not have a negative impact on lower guide wall stability. Refer to the MFR Dated 29 November 2021 for more information.

5. REVIEW EXECUTION

a. 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.

b. District Quality Control (DQC): DQC is required for all 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.

c. Biddability, Constructability, Operability, Environmental, Sustainability (BCOES): BCOES reviews are required for all 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.

d. 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) [Command Training Plan & CERCAP Tool (CTP) - PROD v2.5.2 - Home (army.mil)]. PDT and review team leaders will collaborate to oversee and ensure effective execution.

Table 1a. ATR Technical Discipline(s) and Required Expertise – **UGW Slope Stabilization**	
Technical Discipline	Expertise Required
ATR Team Leader	Expertise in geotechnical engineering [(1)]
Geotechnical Engineering	Geotechnical Engineering: stabilization of landslides using micropile or similar systems, instrumentation and monitoring.
Structural Engineering	Structural Engineering: micropile design as well as familiarity with guide wall stability.

[(1)] The Geotechnical Engineering Lead will perform geotechnical engineering ATR.

Table 1b. ATR Technical Discipline(s) and Required Expertise – **Lower Pool Mooring Area**	
Technical Discipline	Expertise Required
ATR Team Leader	Expertise in geotechnical engineering [(1)]
Geotechnical Engineering	Geotechnical Engineering: specifically sheet pile walls, tie-back anchors, and construction/drivability of sheet piling.
Structural Engineering	Structural Engineering: anchored sheet pile wall design and familiarity with guide wall stability.

[(1)] The Geotechnical Engineering Lead will perform geotechnical engineering ATR.

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

f. 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.

Table 2a. Review Schedule and Budgets – **UGW Slope Stabilization** [1]			
Review Activities [2]	Start Date	Finish Date	Budget ($)
BCOES – Concept Design	4/10/2022	4/17/2022	$5,000
DQA – Final Design	7/5/2022	7/18/2022	[3]
ATR – Final Design	7/18/2022	8/1/2022	$30,000
BCOES – Final Design	7/17/2022	7/31/2022	$7,000
BCOES - Backcheck	7/31/2022	8/7/2022	[3]
Notes: (1) Review schedule is subject to change based on schedule negotiated with the A/E; (2) Review activities may be scaled to project size and scope; (3) Is inherent to the design effort and cost is not tracked separately			

Table 2b. Review Schedule and Budgets – **Lower Pool Mooring Area**			
Review Activities (Note 1)	Start Date	Finish Date	Budget ($)
BCOES – Concept Design	12/20/2021	1/6/2022	$2,000
DQC – Intermediate Design	2/21/2022	2/28/2022	(Note 2)
ATR – Intermediate Design	2/28/2022	3/7/2022	$10,000
DQC – Final Design	4/11/2022	4/18/2022	(Note 2)
ATR – Final Design	4/11/2022	4/25/2022	$13,500
BCOES – Final Design	4/25/2022	5/9/2022	$7,000
BCOES - Backcheck	5/9/2022	5/16/2022	(Note 2)
Notes: (1) Review activities may be scaled to project size and scope; (2) Is inherent to the design effort and cost is not tracked separately.			

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) Project Manager:
      a. UGW Slope Stabilization: David J. Heidish, CELRP-PM-PM, david.j.heidish@usace.army.mil, (412) 395-7276
      b. Lower Pool Mooring Area: Mayss Saadoon, CELRP-PMP-M, mayss.saadoon@usace.army.mil, (816) 389-3439

(2) Engineering Technical Lead: Alex S. Kassick, CELRP-ECG-G, alex.s.kassick@usace.army.mil, (412) 395-7596

b. ATR Team Leader: Michael P. Navin, CEMVS-ECG, michael.p.navin@usace.army.mil, (314) 303-4691

c. Review Management Organization (RMO) Representative: Frank A. Appelfeller, CELRD-RBE, frank.a.appelfeller@usace.army.mil, (513) 684-6200

9. APPROVAL SIGNATURE:

JONES.MARK.C [redacted]

[redacted]

District Chief of Engineering

ATTACHMENT 1 – TEAM MEMBERS

PROJECT DELIVERY TEAM (Lower Pool Mooring Area)		
Function/Discipline	Name (Last, First)	Office
Customer	Schneller, Beth	CELRP-OPT
Project Manager	Heidish, David / Saadoon, Mayss	CELRP-PMP-M
Technical Lead	Kassick, Alex	CELRP-ECG-G
Cost Engineer (required)	Legaspi, Chelsea	CELRP-ECD-T
Value Engineer (required)	Sakmar, Benjamin	CELRP-ECD-T
Geospatial Lead (required)	Baker, Brian	CELRP-ECG-I
Geotechnical Lead	Kassick, Alex	CELRP-ECG-G
Structural Lead	Dubois, Jennifer	CELRP-ECD-S
Civil Design Lead	Slomers, Dan	CELRP-ECD-C
Survey Lead	Haas, John	CELRP-ECG-I
Hydrology and Hydraulics Lead	Bartholomew, Scott	CELRP-ECG-W
DQC REVIEWERS (Lower Pool Mooring Area)		
Function/Discipline	Name (Last, First)	Office
DQC Lead	Itani, Prem	CELRP-ECG-G
Geotechnical	Itani, Prem	CELRP-ECG-G
CADD/Geospatial	Tyszkiewicz, Robert	CELRP-EC-NS
Civil Design	Rusnak, John	CELCRP-ECD-C
Cost & Specs	Moore, Patrick	CELRP-ECD-T
Hydrology and Hydraulics	Georgetson, Gabrielle	CELRP-ECG-W
Survey	Price, Robert	CELRP-ECG-I
BCOES REVIEWERS		
Function/Discipline	Name (Last, First)	Office
Biddability	Conrad, David	CELRP-ECC-O
Constructability	Conrad, David	CELRP-ECC-O
Operability	Dubinsky, Joseph	CELRP-OPT-M
Environmental	McClain, Bobbi Jo	CELRP-PME-V
Sustainability	Anderson, Neil	CELRP-OPT-M
ATR REVIEWER(S)		
Function/Discipline	Name (Last, First)	Office
ATR Lead (Geotechnical)	Navin, Michael	CEMVS-ECG
Geotechnical Engineering	Schulenberg, Joseph	CELRC-TS-D-G
Structural Engineering	Young, Coty	CELRL-EDD-S
DQA OF A/E PRODUCTS (UGW Slope Stabilization)		
DQA Lead	Kassick, Alex	CELRP-ECG-G
Geotechnical	Itani, Prem	CELRP-ECG-G
Structural Lead	Dubois, Jennifer	CELRP-ECD-S
Civil Design Lead	Slomers, Dan	CELRP-ECD-C
Cost & Specs	Legaspi, Chelsea	CELRP-ECD-T