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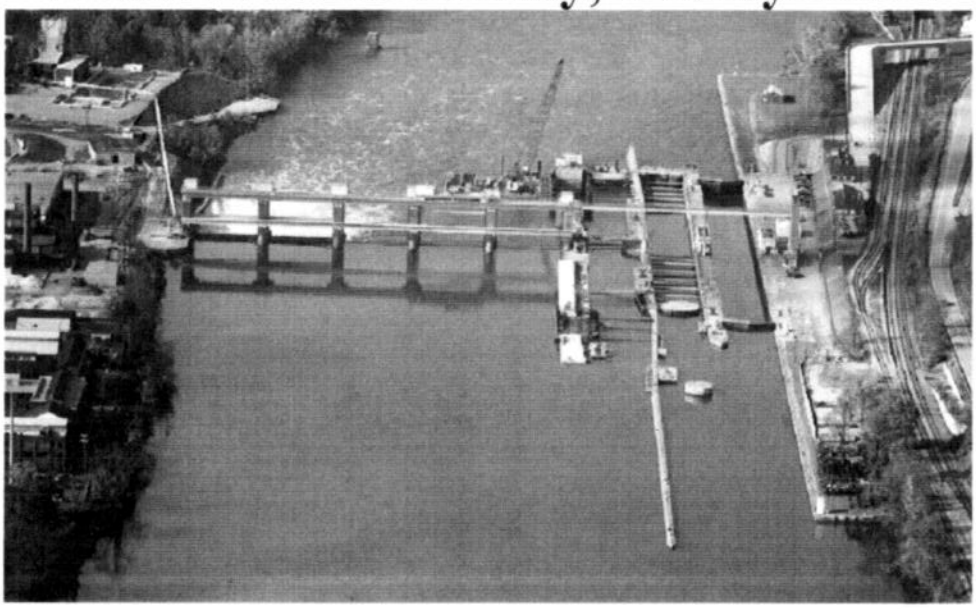
US Army Corps of Engineers®
Pittsburgh District

Charleroi Locks and Dam
Monongahela River
Westmoreland County, Pennsylvania



River Chamber Completion – Design, Plans and Specifications
Project No. 113106
QUALITY CONTROL PLAN

		Signature / Date
Written by:	[redacted]	4/19/12
Written by:		4/19/12
Reviewed by:		4/19/12
Reviewed by:		4/19/12
Approved by:		4/19/12

Quality Control Plan for Charleroi Locks River Chamber Completion Design, Plans and Specifications

1. Purpose.

The goal of the Pittsburgh District is to produce error free decision and implementation documents that result in completed projects that conform to customer's expectations and exhibit sound engineering practice. Included in the goal are adherence to technical, legal and policy criteria, functionality, budgetary and scope limitations, schedule, and the environment. This "Quality Control Plan" (QCP) represents the plan of action that will be implemented on this project to insure that the aforementioned goal is met. Because some features of the plan may be modified as the project develops, it is intended to be a continuously developing record document. This quality control plan has been developed in accordance with requirements set forth in USACE ER 1110-1-12 Engineering and Design Quality Management and the LRD Regional Business Processes (RBP) Manual.

2. Applicability.

This quality control plan applies to the completion of the engineering Design Document Report (DDR), Plans & Specifications (P&S), and Engineering Considerations and Information for Field Personnel (ECIFP) for the Charleroi River Chamber Completion Project.

3. References.

a. ER 1110-1-12, Quality Management

b. EC 1165-2-209, Civil Works Review Policy

c. ER 415-1-11, Biddability, Constructability, Operability, and Environmental Review

d. ER 1110-2-1150, Engineering and Design for CW Projects

e. Regional Business Processes (RBP) Doc. # 4921, QC/QA Processes for Civil Works

f. RBP Doc. # 3443, Biddability, Constructability, Operability, and Environmental (BCOE) Review

g. RBP Doc. # 2641, Design Process for Civil Works Projects

h. RBP Doc. # 187, Corrective Action

i. Locks and Dams 2, 3, and 4 Monongahela River, PA – Review Plan (March 2012)

4. General.

a. Type: Civil Works type construction project.

b. Location: Charleroi Locks and Dam; Westmoreland County; Pennsylvania

c. Authorization: Construction General (CG). The Lower Mon project's feasibility study report was the decision document for the project. The feasibility report was approved in 1991 and the project received authorization in WRDA 1992.

d. Project Description: This project consists of providing engineering services to perform investigations, calculations, and other analyses needed to develop the design; prepare plans, technical specifications, quantities and supporting documents pertaining to construction of the new river chamber for Charleroi Locks and Dam.

e. Design Criteria: This project will be designed in accordance with current Corps of Engineers criteria contained in engineering regulations, manuals, and other guidance. Unified Facilities Guide Specifications (UFGS) shall be used for contract specifications, and Corps and Pittsburgh District CADD standards shall be used as the basis for production of drawing files and layout. Design will be based upon available Corps of Engineers Standardization Program Documents for this facility type.

f. Project Background: The features of the Charleroi River Chamber were originally under design in 2003 with the anticipation of award of a Charleroi River Chamber contract in 2004. However, because of funding purposes, the decision was made to award a Charleroi River Wall contract in 2004 and to not finalize the design on many of the remaining project features. Additional small contracts were awarded in the 2007 to 2009 timeframe for the fabrication of new River Chamber components such as: miter gates, chamber bulkheads, floating mooring bitts, and the filling valves and liner system. In 2009, a contract for construction of the upper and lower guard walls was awarded and work is ongoing.

In addition, several of the project features were revised from their 2003 designs. Following are some of the items that were changed: the construction method for the new middle wall M8 to M21is being changed from a combined wall foundation to a cofferbox construction method which will include design of the cofferbox and changes to the wall design; a design feature for stabilizing the lower guide wall has been added; project features for closure and decommissioning of the existing land chamber are being added to the contract.

The River Chamber Completion Project consists of finalizing the design on all of the project features, and a contract for completing the remaining portions of the lock to make a fully functional new River Chamber at the end of the contract. See Section 5 for additional detail about the project features.

g. Project Complexity: The project is relatively complex as the project consists of many project features which are at varying stages of completion; some of the lock features were previously constructed or fabricated while design of other project features is ongoing. In addition, the fact that the features are being designed by multiple design teams within the Corps and A-E firms adds to the complexity of coordinating all of the features. The complexity was considered in the development of the Quality Control Plan and in the establishment of the ATR team.

5. Design Teams.

The design is being performed by various design teams, to include Pittsburgh District design teams, Regional Design Teams, and A-E design teams. Following is a breakdown of the project features being designed by the various design teams.

a. Overall Project Coordination

Following is a listing of overall project coordination items:

Team Assignments by Responsibility	Team Member
Lead Engineer - Coordination of all design features	[redacted]
River Chamber Contract Specifications	
River Chamber Cost Estimate	
Lead CADD	
Geotechnical and Geological Support	
Concrete Materials, Mix Designs, and General Concrete Support	
Environmental	
Survey	

b. Pittsburgh District Project Features

The following project features are being designed by team members within the Pittsburgh District:

Pittsburgh District Design Team - By Major Project Features	Project Engineer
Middle Wall	[redacted]
Middle Wall Cofferbox: M8-M21	
Middle Wall Design Changes: M8-M21	
River Wall	
River Wall Non-Cofferbox Sheet Pile Support System	
River Wall Completion - Top Lifts and Wall Facing	

Installation of Final Guard Wall Sections	[redacted]
River Chamber Completion	
Cofferdam Closures (floodway and dewatering) and DS Protection Cell	
Seepage Analysis and Floor Demolition	
Filling Valve/Upper Miter Sill, Fill System, Bulkhead Sills, DS Miter Sill	
Culverts and Floor Features	
Miter Gate Installation, Quoin and Sill Embedded Metals	
Lock Wall Accessories & Top of Wall	
Excavation for Lock Approaches	
Electrical Systems	
Mechanical Systems	
Temporary Power and Controls to Dam	
Instrumentation (Construction & Permanent)	
Construction of Bulkhead Storage Area	
Demo of Existing River Chamber	
Government Furnished Materials	
Revision to Stub Wall Modification Drawings	
Bulkhead Storage Area	
Filling and Emptying Systems	
Closure of land chamber (cells, and decommissioning of land chamber)	
Construction Schedule	
Revised Downstream Chamber Closure and Floodway System	

c. Corps Regional Project Features

The following project features are being designed by the Corps of Engineers Regional design teams as indicated below:

Regional Design Team - Project Feature	District
Middle Wall Control Tower and Middle Wall Shelter Buildings	LRL
Service Bridge	LRE
Design of Support Frame for Air Compressor and Generator	LRE
Existing Lower Guide Wall Stabilization	LRB
Waterway Safety Signs Support Structures	LRC

d. A-E Designed Features

The following project features are being designed by A-E firms:

Architect/Engineer Design - Project Feature	A-E Firm
Middle Wall Completion M1-M7 & M-22-M27	INCA
M25 Stabilization, DS Closure Cell Modification for Cofferbox Construction, and Instrumentation	DLZ

e. Use of Centers of Expertise and Standardization do not apply to this project.

6. Quality Control Review Teams.

a. Pittsburgh District Project Features

Throughout the design process the PDT is assigned the responsibility for the production of a quality product. The goal of the PDT is to provide quality engineering and design services and carry out the right actions the first time. PDT members must take pride in their work, ownership of the design, and an interest in the overall quality of the product. A thorough understanding of the work is required, and the work must be assigned to the appropriate design professionals. Each member of the PDT will ensure a quality product in their functional area through design checks, seamless reviews, and interaction with the ATR. To ensure accurate and complete inclusion of all quality control checks in documents, a QC certification form found in Appendix 1 will be signed. The QC review and certification should occur before the 95% Reviews, pre-final construction P&S complete, and certified final documents (advertisement).

b. Regional Design Team Project Features

The QC team, QC process, and certification forms for the regional design team project features are contained in the Attachments listed below. The lead District is responsible for the Quality Control of their products. The QC procedures and process for these project features are addressed in the subject Attachments to include team members, roles and responsibilities, and certification forms.

Regional Design Team - Project Feature	QC Plan - Attachment #
Middle Wall Control Tower and Middle Wall Shelter Buildings	A
Service Bridge	B
Existing Lower Guide Wall Stabilization	C
Waterway Signs - Sign Structures	D

c. Architect Engineer (A-E) Designed Project Features - QC & QA Teams

A-E's are responsible for the Quality Control of their work, as such; the A-E designed features will have stand-alone QC plans. Once the QC plans for the subject designs are complete, they will be attached to this the overall Project QC plan. The QC team, QC process, and certification forms for A-E designed features will be contained in the following attachments:

A-E Firm - Project Feature	QC Plan - Attachment #
INCA - Middle Wall Completion M1-M7 & M-22-M27	E
DLZ Inc. - M25 Stabilization, DS Closure Cell Modification for Cofferbox Construction, and Instrumentation	F

The Pittsburgh District will perform a QA review on the A-E designs. In addition, the A-E designs will be included in the overall project ATR and B&C reviews. It is anticipated that the QA team for the A-E designed features will consist of the following members.

INCA Engineers - Middle Wall Completion M1-M7 & M-22-M27	
QA Member	**Discipline**
[redacted]	Structural
	Specs & Cost
	Electrical
	Mechanical
	Geotech

DLZ, Inc. - M25 Stabilization, DS Closure Cell Modification for Cofferbox Construction, and Instrumentation Modification for Cofferbox Construction, and Instrumentation	
QA Member	**Discipline**
[redacted]	Structural
	Geotech
	Specs & Cost

7. Agency Technical Review/BCOE Teams.

a. Agency Technical Review (ATR):

An ATR is mandatory for all decision and implementation documents. The ATR Team Leader Jeff Stamper is from outside of LRD (St. Louis District) and the other review team members are from outside of the home district (LRP) as required by EC 1165-2-209. The ATR includes all engineering and specialty review of the DDR and Plans and Specifications. Because of the overall complexity of the project and the number of project features involved, there are two levels of ATR review teams for the project – ATR oversight team and the ATR technical team. The ATR oversight team is responsible for the review of the project as a whole to verify that that the contract package is fully coordinated and consistent across the entire project. The Great Lakes and Ohio River Division (LRD) shall be the review management organization (RMO) for these implementation documents defined as "other work products".

The following is a listing of the ATR team to include the oversight and the technical teams. See Appendix 3 for the ATR certification forms for the project.

ATR Technical Team	Discipline	District
[redacted]	Structural	MVS
	Hydraulics	LRH
	Cost	LRH
	Geology	LRH
	Civil	LRH
	Structural	LRE
	Structural	LRN
	Structural	LRC
	Geotechnical	LRC
	Mechanical	LRL
	Environmental	LRN
	Concrete Materials	SPK
	Electrical	LRH
ATR Oversight Team	**Discipline**	**District**
[redacted]	Structural	MVS
	Structural	LRH
	Structural	LRL
	Construction	LRL

b. BCOE:

As requested by the Project Manager, the design of the various project features are being completed and compiled into a comprehensive contract package, the Charleroi River Chamber Completion Contract. However, the estimated date for advertisement of the contract is in Fiscal Year 2016 (See Section 11 for schedule). In accordance with ER 415-1-11, BCOE review is to be performed and certified a maximum of 6 months prior to the contract advertisement. In order to incorporate Biddability and Constructability (B&C) into the design, a B&C review will be performed on the 95% Plans and Specifications package during the design phase. See Section 8 for further clarification on the B&C review and the official BCOE review to be performed on the contract documents.

The following is the anticipated participants in the 95% B&C Review.

B&C Review Team	Discipline
[redacted]	Construction
	Construction
	Construction
	Construction

The official BCOE will be performed by the Construction Branch of Engineering & Construction Division; the Facility Support Section and operations personnel in Operations Division; the Environmental and Cultural Resource Sections of Business Resource Division; and the Real Estate Division.

8. Review Process.

a. Pittsburgh District Design Products:

(1) Internal Reviews (IR). Throughout the design process, a seamless internal review will be performed by senior level Pittsburgh District staff and will focus on fulfilling the project quality requirements for the work products produced. Seamless QC review involves the review of sub-products and products as they are prepared. The QC is performed in a proactive manner throughout the entire planning and design process to take advantage of collective experience. This review is in the form of formal and informal meetings, telephone conversations, and other forms of informal communication that may involve one or more review team members. Also, detailed reviews and design checks, which must be carried out as routine management practice. A design check is a detailed evaluation of the engineering analysis and contract documents prepared by each engineering discipline as an extension of the design process. All checked drawings, computations, quantity estimates, and analyses will be annotated to show the initials of the designer and the checker and the date of action. The checker will be qualified to

originate the design that they check. Design checklists may be developed by each engineering discipline to strengthen the design process. These checks are performed by staff responsible for the work, such as supervisors, work leaders, team leaders, or designated individuals from the engineering staff and shall be performed prior to ATR of the deliverable. A design check should include a comprehensive evaluation of:

- the correct application of methods
- adequacy of basic data and assumptions
- correctness of calculations (error free)
- quantity estimates
- completeness of documentation
- testing, modeling, assumptions, calculations, text, and graphic presentations in all documents are complete, satisfy appropriate design criteria, and utilize sound engineering practice
- compliance with guidance, standards, regulations, laws, and BCOE issues

A memorandum of record prepared by the Project Engineer/Architect (PE/A) will be prepared after each such meeting or conversation documenting significant decisions reached. Copies are located in the project file and sent to the ATR Leader for distribution.

(2) Milestone Progress Review (MPR). This review process is conducted in the traditional approach using complete milestone deliverables. The ATR, QA and BCOE reviews will be conducted using this approach. It occurs during a specified period after the design progress has reached a target milestone. Deliverables are reviewed, and written comments are prepared by reviewers and input into DrChecks. Design progress ceases during the review period. This review method reaches completion at a convened review conference where prepared comments are discussed in a formalized open meeting attended by all or most reviewers.

ATR will be performed at 60% and 95% design complete milestones. Following is a list of new or substantially revised project features to be the emphasis of the 60% review. For the 60% review, the ATR team will be asked to focus their efforts on these features; however, they will be provided a comprehensive package of the entire river chamber to a 60% level of completion for their review and comment. The ATR team will be provided Design Documentation Reports, contract drawings, and contract specifications of all project features (as detailed in Section 5) for review.

Project Feature	Project Engineer
Middle Wall Cofferbox: M8-M21	[redacted]
Middle Wall Design Changes: M8-M21	
River Wall Non-Cofferbox Sheet Pile Support System	
Bulkhead Storage Area	
Seepage Analysis and Floor Demolition	

Temporary Power and Controls to Dam	[redacted]
Closure of land chamber (cells, and decommissioning of land chamber)	
Construction Schedule	
Revised Downstream Chamber Closure and Floodway System	
Middle Wall Control Tower and Middle Wall Shelter Buildings	LRL
Existing Lower Guide Wall Stabilization	LRB
Waterway Safety Signs Support Structures	LRC

b. QC of Regionally Designed Features:

QC of the regionally project features will be performed in accordance with the Quality Control plan developed for each feature. The Quality control plans for the features are attached to this quality control plan as detailed in Section 6.

c. QC & QA of A-E Designed Features:

As the initial step on each A-E contract, the contractor will prepare a Quality Control Plan to document the QC process and team to be used; the QC Plan will be approved by the Pittsburgh District prior to the start of the design phase. In general, the A-E is responsible for QC of their design, including the submission of QC certification forms for reviews performed. In addition, the Pittsburgh District will perform a Quality Assurance review on each A-E submittal. Also, the A-E designs will be included in the Agency Technical Review and B&C reviews. The A-E will be responsible for addressing all review comments and updating their design as may be required. The QA comments will be fully documented in Dr.Checks. As indicted previously, the Quality control plans for the A-E designed features will be attached to this quality control plan once they are completed.

d. B&C Review and BCOE Review:

The B&C review will be performed on the 95% plans and specifications of all the project features as detailed in Section 5. The BCOE review will be performed on the contract documents no earlier than 6 months prior to the advertisement of the contract.

e. Documentation of Reviews:

Dr. Checks will be used to manage QA, ATR, B&C, and BCOE comments.

f. Review During Construction:

During the construction period, an approved representative of the design agent shall make such visits to the project site as required by ER 1110-1-12. The construction site visitors

shall comply with all rules and regulations of the facility. Upon completion of the site visit, the visitor shall prepare a written report documenting their observations/recommendations relative to the purpose of the visit or site safety. This shall then be included in the project file along with all photos taken on such site visit.

9. Risks Inherent in the Project.

There are no special considerations, crucial design features or potential catastrophic failures associated with the work being performed in this contract.

10. QC Budget.

The budget for the ATR is $285,000 and the budget for the B&C is $20,000. The cost of performing QC reviews by those noted as "Checkers" in attachment 1 is not tracked separately since this function is performed through internal design checks and seamless reviews throughout the design process on various products. Because the BCOE is anticipated to occur in FY 2016, the budget for this review has not been established.

11. Schedule – Design and Contract Advertisement.

The critical milestone for this contract is the Pre-Final package completion by 31 October 2012. The following dates are important to position the district for achievement of this critical milestone:

Project Design Start	05 December 2011
60% P&S package to start ATR	23 April 2012
End 60% ATR	14 May 2012
95% P&S package to start ATR/B&C	27 August 2012
End 95% ATR/B&C	21 September 2012
Pre-Final Construction P&S Complete	31 October 2012
Begin maintenance of Pre-Final package	01 November 2012
Contract Advertisement	Fiscal Year 2016 (Estimated)

12. Review Schedule.

All review milestones shall be scheduled in accordance with the Project Management Plan, and shall be conducted by the methods identified above. The review milestone and schedule is as detailed below. QC review will be seamless with the design development.

60% P&S package to start ATR	23 April 2012
End 60% ATR	14 May 2012
95% P&S package to start ATR/B&C	27 August 2012
End 95% ATR/B&C	21 September 2012
Official BCOE Review	**

** The BCOE review will be completed and certified no sooner than 6 months prior to the advertisement of the Charleroi River Chamber Completion Contract.

13. Construction Contract Document Quality Certifications.

Upon completion of corrected final design and normally prior to advertising, the 100 percent contract construction documents shall be adequately reviewed to assure quality control measures have been met and incorporated. Demonstrated commitment to fully and properly incorporate comments prior to and during B&C Certification is considered part of the final design quality evaluation. The following certification documents shall be completed by the various review teams.

a. QC Certifications:

QC certification for each project design feature will be signed and filed to document that the quality control was performed as required. See Appendix 1 for a draft of the DQC certification for the features designed by the Pittsburgh District.

b. QA Certifications:

To ensure accurate and complete inclusion of all QA comments in construction contract documents, Appendix 2 will be signed by all QA team members and shall be placed in the permanent project file.

c. ATR Certification:

To ensure accurate and complete inclusion of all ATR comments in construction contract documents, an ATR certification form will be signed by each member of the ATR team. See Appendix 3 for the draft ATR certification form to be completed for the project. In addition, a separate certificate will be signed by chiefs of each LRP organizational elements having a stake of the final product.

d. B&C and BCOE Certifications:

There will not be any certification required for the B&C review performed during the design phase.

To ensure accurate and complete inclusion of all BCOE comments in construction contract documents, a BCOE Certification form will be completed and signed to document the BCOE review. The signed BCOE Certification form shall be placed in the permanent project file, and a copy furnished to Contracting Division prior to bid opening. See Appendix 4 for the BCOE certification forms that will be completed to document the BCOE review.

14. Designer Quality Evaluations.

Various designer evaluations will be accomplished over the lifetime of the project QCP. These will indicate to the design team the level of performance in executing the project design responsibility, which includes the final and total responsibility for assuring the correctness and specifically the constructed product adequacy and safety.

15. Design Quality Improvement.

Design review comments recurrent on several projects and recurrent construction change documentation/communications will be analyzed in accordance with the procedures defined by the Regional Business Processes (RBP). Where possible, recurring problem areas will be evaluated for corrective action in accordance with the RBP Corrective Action procedure (Document ID # 187). Frequently this will result in changes of design criteria, guide specifications, technical manuals, regulations, etc. In other cases where a change of criteria is not the necessary corrective action, a lesson learned may be identified and added to the USACE Enterprise Lessons Learned System.

16. Records.

Complete versions, if applicable, of the QCP, review meeting minutes, review dates, certification sheets and copies of all annotated review comments shall be placed with project permanent files upon completion of the deliverables. Items indicated above shall be included.

All project files are kept in the appropriate official project directory located on ProjectWise Explorer. Current project directories are:
pw:\\LRP-AP-PWINT.lrp.ds.usace.army.mil:lrp-ap-pwint.lrp.ds.usace.army.mil\Documents\Civil Works\Monongahela River Basin\Charleroi Locks and Dam\River Chamber

Appendix 1

DISTRICT QUALITY CONTROL CERTIFICATION (LRD)
(Draft)

PHASE: _____

I certify that a Quality Control review of the following portion of the Pittsburgh District designed River Chamber Completion project was performed in accordance with the Quality Control Plan

Pittsburgh District Design Team – By Major Project Features	Principal	DQC Reviewer Signature / Date
Overall Project Coordination		
Lead Engineer	[redacted]	
Specifications and Cost		
Lead CADD		
Geotechnical and Geological Support		
Concrete Materials, Mix Designs, and General Concrete Support		
Environmental		
Survey		
Middle Wall		
Middle Wall Cofferbox: M8-M21		
Middle Wall Design Changes: M8-M21		
River Wall		
River Wall Non-Cofferbox Sheet Pile Support System		
River Wall Completion - Top Lifts and Wall Facing		
Installation of Final Guard Wall Sections		
River Chamber Completion		
Cofferdam Closures (floodway and dewatering) and DS Protection Cell		
Seepage Analysis and Floor Demolition		
Filling Valve/Upper Miter Sill, Fill System, Bulkhead Sills, DS Miter Sill		
Culverts and Floor Features		
Miter Gate Installation, Quoin and Sill Embedded Metals		
Lock Wall Accessories & Top of Wall		

Excavation for Lock Approaches	[redacted]	
Electrical Systems		
Mechanical Systems		
Temporary Power and Controls to Dam		
Instrumentation (Construction & Permanent)		
Construction of Bulkhead Storage Area		
Demo of Existing River Chamber		
Government Furnished Materials		
Revision to Stub Wall Modification Drawings		
Bulkhead Storage Area		
Filling and Emptying Systems		
Closure of land chamber (cells, and decommissioning of land chamber)		
Construction Schedule		
Revised Downstream Chamber Closure and Floodway System		

Appendix 2

COMPLETION OF QUALITY ASSURANCE REVIEW OF A-E DESIGN

I certify that a Quality Assurance review of the following portion of the Architect/Engineer designed River Chamber Completion project was performed in accordance with the Quality Control Plan

1 - INCA Engineers - Middle Wall Completion M1-M7 & M-22-M27			
QA Team	**Discipline**	**Signature**	**Date**
[redacted]	Structural		
	Specs & Cost		
	Electrical		
	Mechanical		
	Geotech		

2 - DLZ, Inc. - M25 Stabilization, DS Closure Cell Modification for Cofferbox Construction, and Instrumentation			
QA Team	**Discipline**	**Signature**	**Date**
[redacted]	Structural		
	Geotech		
	Specs & Cost		

Appendix 3

ATR TEAM CERTIFICATION FORM
(Draft)

I performed an Agency Technical Review of the Charleroi River Chamber Completion project in accordance with the project Quality Control Plan

ATR Technical Team	Discipline	District	Signature	Date
[redacted]	Structural	MVS		
	Hydraulics	LRH		
	Cost	LRH		
	Geology	LRH		
	Civil	LRH		
	Structural	LRE		
	Structural	LRN		
	Structural	LRC		
	Geotechnical	LRC		
	Mechanical	LRL		
	Environmental	LRN		
	Concrete Materials	SPK		
	Electrical	LRH		
ATR Oversight Team	**Discipline**	**District**		
[redacted]	Structural	MVS		
	Structural	LRH		
	Structural	LRL		
	Construction	LRL		

Appendix 3 (Continued)

STATEMENT OF TECHNICAL REVIEW

[Project Name and Location]
[Product Type]
[Date]

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the *[product type & short description of item]* for *[project name and location]*. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks[sm].

Signature

_____ _____
[Name, Office Symbol] *[Date]*
ATR Team Leader

Signature

_____ _____
[Name, Office Symbol] *[Date]*
[Home District] Project Manager

Signature

_____ _____
[Name] *[Date]*
Architect Engineer Project Manager [1]
[Company, Location]

Signature

_____ _____
[Name, Office Symbol] *[Date]*
Review Management Organization Representative

Appendix 3 (Continued)

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:
[Describe the major technical concerns and their resolution]

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

Signature

_____ _____

[Name, Office Symbol] *[Date]*
Chief, Engineering Division

Signature

_____ _____

[Name, Office Symbol] *[Date]*
Chief, Planning Division [2]

Instructions to complete Statement of Technical Review form.

Information in Blue brackets and text is required. Once the input is provided, text should be formatted in black and the brackets should be deleted.

Add appropriate additional signatures (Operations, Construction, A-E principal for ATR solely conducted by A-E, etc).

[1] *Only needed if some portion of the design/study was contracted*
[2] *Decision Documents Only*

Delete these instructions in the completed form.

Appendix 4

STATEMENT OF BCOE REVIEW

[Project Name and Location]

[Date]

COMPLETION OF BIDDABILITY, CONSTRUCTIBILITY, OPERABILITY, AND ENVIRONMENTAL (BCOE) REVIEW

The Biddability, Constructibility, Operability, and Environmental (BCOE) Review has been completed for the *[project name and location]*. The BCOE was conducted to comply with the requirements of ER 415-1-11. During the BCOE, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs and is consistent with law and existing US Army Corps of Engineers policy. All comments resulting from the BCOE have been resolved and the comments have been closed in DrChecks[sm].

_____ _____

[Name, Office Symbol]
[Title] Date

_____ _____

Example: Tom Andre, P.E., CELRP-EC-NT
Specification/Cost Engineer Date

_____ _____

[Name, Office Symbol]
[Title] Date

_____ _____

[Name, Office Symbol]
[Title] Date

_____ _____

[Name, Office Symbol]
[Title] Date

Instructions to complete Statement of BCOE Review template:

Information in Blue brackets and text is required. Once the input is provided, text should be formatted in black and the brackets should be deleted (see example). Also delete "Attachment A."

Add appropriate team member signatures

Delete these instructions once the template is complete.

Appendix 4 (Continued)

CERTIFICATION OF BIDDABILITY, CONSTRUCTIBILITY, OPERABILITY AND ENVIRONMENTAL (BCOE) REVIEW

Project Name: _____

Phase or Type of Project:

Certification Date: _____

Significant concerns and the explanation of the resolution are as follows:
[Describe the major technical concerns and their resolution]

The Bid Package has been reviewed for Biddability, Constructibility, Operability, and Environmental (BCOE) in accordance with ER 414-1-11. All appropriate BCOE comments have either been incorporated into the bid package or otherwise satisfactorily resolved.

Chief, Engineering & Construction Division	Date
Chief, Construction Branch	Date
Chief, Planning & Environmental Branch, BRD	Date
Chief, Operations Division [1]	Date
Chief, Real Estate Division [1]	Date

Instructions to complete Certification of Biddability, Constructibility, Operability and Environmental Review:

Information in Blue brackets and text is required. Once the input is provided, text should be formatted in black and the brackets should be deleted. Also delete "Attachment B."

[1] *The following functional areas may be added to the BCOE Certification template at the discretion of the PDT:*

- *Operations*
- *Real Estate*
- *Contracting*
- *Office of Council*
- *Project Management*

Delete these instructions once the template is complete.

ATTACHMENTS

Regional Quality Control Plans

Design Feature	Attachment
Middle Wall Control Tower and Middle Wall Shelter Buildings	A
Service Bridge – New Lock Footbridges	B
Existing Lower Guide Wall Stabilization	C
Waterway Safety Signs Support Structures	D

A-E Quality Control Plans

Design Feature	Attachment
INCA - Middle Wall Completion M1-M7 & M22-M27	E
DLZ Inc. - M25 Stabilization, DS Closure Cell Modification for Cofferbox Construction, and Instrumentation	F

ATTACHMENT A

Quality Control Plan (QCP)
Middle Wall Control Tower and Shelter Buildings
Louisville District (LRL)

Quality Control Plan (QCP) Charleroi Locks Replacement Middle Wall Control Tower and Shelter Buildings Plans and Specifications

U.S. Army Corps of Engineers, Louisville District

1. Purpose.

This plan identifies all the quality control features to be used in completing the technical products and services described in paragraph 4.

2. Applicability.

This plan applies to completion of all deliverables of technical products and services including interim design, and construction contract drawings and specifications associated with this civil works project. Project internal design review and coordination by senior staff design "checkers" shall be performed prior to and independent of the quality control measures outlined herein.

3. References.

a. ER 1110-1-12, Quality Management

b. EC 1165-2-209, Civil Works Review Policy

c. ER 1110-2-1150, Engineering and Design for Civil Works Projects

d. Regional Business Processes (RBP) Document No. 187, Corrective Action

		Signature / Date
Prepared by:	[redacted]	3-29-12
Approved by:		3/29/2012

e. RBP Document No. 348 - QC/QA Processes for Study/Design Phase

f. RBP Document No. 3443, Biddability, Constructability, Operability, and Environmental (BCOE) Review

g. RBP Document No. 4921, QC/QA Procedures for Civil Works

h. RBP Document No. 5041, Design Process for Civil Works Projects

4. General.

a. Type: Civil Works type construction project.

b. Location: Charleroi Locks and Dam; Monongahela River; Westmoreland County, Pennsylvania

c. Authorization: Inland Waterways Trust Fund

d. Project Description: The Charleroi Locks are part of the Lower Monongahela River Project. The existing lock chambers are 56 feet by 720 feet (land chamber) and 56 feet by 360 feet (river chamber). The Lower Mon Project authorized new dual 84-foot by 720-foot lock replacements. Pittsburgh District is currently designing the new river chamber.

The control tower will be located at monolith M-12 on the new middle wall. Louisville District completed a 95% design of the control tower design, plans, specifications, and Design Document Report (DDR) in 2003. Louisville District shall be responsible for updating and providing the final design, plans, specifications, and DDR for all aspects of the control tower. The required design tasks include the following:

1. Provide architectural services and structural, mechanical, and electrical engineering services to revise and/or update the design for current codes and standards.
2. Provide design loads and reactions to Pittsburgh District for the design of the supporting monolith.
3. Provide information for the construction sequencing being developed by Pittsburgh District.
4. Revise and/or update the project specifications.

Two control shelter buildings originally designed by Pittsburgh District will be located on the new middle wall at monoliths M-3 and M-22/M-23. Based upon detailed evaluation of the control shelters performed by Pittsburgh District, the previous building design was determined to be inadequate. A two-story building layout is now required. Louisville District developed five conceptual layouts for consideration, of which one was selected as the basis for the final design. Louisville District shall provide design services for a single shelter building to be utilized at the two locations. The design team shall determine the structural

system to be used, i.e. cast-in-place or precast concrete. The required design tasks include the following:

1. Provide architectural and structural engineering services for the design of this feature.
2. Coordinate with Pittsburgh District electrical and mechanical engineers regarding the overall building layout and use.
3. Prepare project specifications.

The following are the required design tasks common to both features:

1. Provide all necessary CADD services to complete the drawing package.
2. Prepare the DDR detailing all aspects of the design.
3. Provide a quantity takeoff that will be used by Pittsburgh District to develop the project cost estimate.
4. Provide the Engineering Considerations and Instructions for Field Personnel (ECIFP) that will be incorporated into the overall project's ECIFP being developed by Pittsburgh District.
5. Louisville District shall be responsible for QC of all products and deliverables associated with the middle wall control tower and shelter buildings. QC certificates shall be developed and completed for each submission.
6. Respond to Pittsburgh District's Quality Assurance, Agency Technical Review (ATR), and In-Progress Review comments in DrChecks and perform the necessary revisions to the design documents.
7. Use the Pittsburgh District ProjectWise Dataset to organize and manage all electronic documents for the project.

e. Design Criteria: This project will be designed in accordance with current Corps of Engineers criteria contained in engineering regulations, manuals, and other guidance. Unified Facilities Guide Specifications shall be used for contract specifications, and Corps and Pittsburgh District CADD standards shall be used as the basis for production of drawing files and layout.

f. Quality Requirements: The project will be designed and constructed in accordance with standard procedures with the following Quality Expectations:

- Achieve an ED Services Evaluation of 3.0 or higher with no negative comments.
- No design deficiencies discovered during advertisement.
- No customer complaints concerning project design.

5. **Design Team.**

a. Project Designer and Checker list is enclosed as Attachment 1.

b. Use of Centers of Expertise and Standardization does not apply to this project.

c. All necessary design expertise is located within the Louisville District.

6. Independent Technical Review Team.

a. Independent Technical Review (ITR) includes all engineering and specialty review except BCOE which requires a separate and independent review process ending in an independent signed BCOE Certification. ITR review team member list is enclosed as Attachment 2. Also indicated on this list is the primary area of review assignment of each member of the ITR and a list of any special or unusual review requirements that are pertinent to the specific project.

b. All necessary design expertise is located within the Louisville District.

7. Review Process.

a. Products will be prepared using in-house forces. QC shall be completed using Louisville District authorized personnel and in accordance with this QCP.

b. Engineering and design QC shall be accomplished using the following review methods:

(1) Concurrent Review. This review process is conducted seamlessly in accordance with the QCP. Concurrent QC involves the review of sub-products and products as they are prepared. The QC is performed in a proactive manner by the ITR and BCOE teams interacting throughout the entire planning and design process to take advantage of their collective experience. This review is in the form of formal and informal meetings, telephone conversations, and other forms of informal communication that may involve one or more review team members. A memorandum of record prepared by the PE/A will be prepared after each such meeting or conversation documenting significant decisions reached. Copies are located in the project file and sent to the ITR Leader for distribution.

(2) Milestone Progress Review. This review process is conducted in the traditional approach using complete milestone deliverables. It occurs during a specified period after design progress has reached a target milestone. Deliverables are reviewed, and written comments prepared by reviewers are provided to the PE/A. Design progress ceases during the review period. This review method reaches completion at a convened review conference where prepared comments are discussed in a formalized open meeting attended by all or many reviewers.

c. DrChecks will be used to manage project review comments.

8. Contract and QC Budgets.

Middle Wall Control Tower:

Discipline	Cost
Architectural/Interior Design	$16,000
Cost	$4,000
Electrical	$15,000
Mechanical	$12,000
Structural	$52,000

Shelter Buildings:

Discipline	Cost
Architectural/Interior Design	$31,000
Cost	$2,000
Structural	$30,000

The budget for the ITR is $10,600.

9. Schedule.

Project design start	05 December 2011
60% package to start ATR/ITR	23 April 2012
End 60% ATR/ITR	14 May 2012
Respond to comments	15-25 May 2012
95% package to start ATR/BCOE/ITR	27 August 2012
End 95% ATR/BCOE/ITR	21 September 2012
Respond to comments	24 September - 24 October 2012
Pre-Final package complete	31 October 2012
Begin maintenance of Pre-Final package	01 November 2012

Note: The middle wall control tower will not be part of the 60% review.

10. Construction Contract Document Quality Certifications.

Upon completion of corrected final design and normally prior to advertising, the 100 percent contract construction documents shall be adequately reviewed to assure quality control measures have been met and incorporated. Demonstrated commitment to fully and properly incorporate comments prior to and during BCOE Certification is considered part of the final design quality evaluation. The following documents shall be completed by the ITR team:

To ensure accurate and complete inclusion of all ITR comments in construction contract documents, an ITR certification form will be signed by each member of the design team and the ITR team. In addition a separate certificate will be signed by chiefs of each LRL organizational element having a stake in the final product. These two certification forms are included as Attachments 3 and 4.

11. Designer Quality Evaluations.

Various designer evaluations will be accomplished over the lifetime of the project QCP. These will indicate to the design team the level of performance in executing the project design responsibility, which includes the final and total responsibility for assuring the correctness and specifically the constructed product adequacy and safety.

12. Design Quality Improvement.

Design review comments recurrent on several projects and recurrent construction change documentation/communications will be analyzed in accordance with the RBP Manual procedures. Where possible, recurring problem areas will be evaluated for corrective action in accordance with the Corrective Action procedure. Frequently this will result in changes of design criteria, guide specifications, technical manuals, regulations, etc. In other cases where a change of criteria is not the necessary corrective action, a lesson learned may be identified and added to the USACE Enterprise Lessons Learned System.

13. Records.

Complete versions of the QCP, review meeting minutes, review dates, and copies of all annotated review comments shall be placed with project permanent files upon completion of the deliverables. Items indicated above shall be included.

ATTACHMENT 1

DESIGN TEAM

CHARLEROI LOCKS REPLACEMENT
MIDDLE WALL CONTROL TOWER AND SHELTER BUILDINGS
PLANS AND SPECIFICIATIONS

Area of Responsibility	Principal	Office Symbol
Technical Team Leader	[redacted]	CELRL-ED-DS
Architect		CELRL-ED-DA
Checker		CELRL-ED-DA
Interior Designer		CELRL-ED-DA
Checker		CELRL-ED-DA
Cost Engineer		CELRL-ED-MC
Checker		CELRL-ED-MC
Electrical Engineer		CELRL-ED-DM
Checker		CELRL-ED-DM
Mechanical Engineer		CELRL-ED-DM
Checker		CELRL-ED-DM
Structural Engineer		CELRL-ED-DS
Checker		CELRL-ED-DS

ATTACHMENT 2

INDEPENDENT TECHNICAL REVIEW TEAM

CHARLEROI LOCKS REPLACEMENT
MIDDLE WALL CONTROL TOWER AND SHELTER BUILDINGS
PLANS AND SPECIFICATIONS

Primary Area of Review Responsibility	Name/Office Symbol	Unusual/Special Requirements Y/N *
Team Leader	[redacted]CELRL-ED-DA	N
Architect	[redacted]CELRL-ED-DA	N
Interior Design	[redacted]CELRL-ED-DA	N
Cost Engineer	[redacted]/CELRL-ED-MC	N
Electrical	[redacted]CELRL-ED-DM	N
Mechanical	[redacted]/CELRL-ED-DM	N
Structural	[redacted]/CELRL-ED-DS	N

- List any unique review requirements here.

ATTACHMENT 3

COMPLETION OF INDEPENDENT TECHNICAL REVIEW

The District has completed the (type of design) of (project name and location). Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project, as defined in the Quality Control Plan. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy. The design was accomplished by a district team/personnel from Louisville District, and the independent technical review was accomplished by an independent district team/personnel from Louisville District.

Design Team Leader	Date	ITR Team Leader	Date
Design Team Member	Date	ITR Team Member	Date
Design Team Member	Date	ITR Team Member	Date
Design Team Member	Date	ITR Team Member	Date
Design Team Member	Date	ITR Team Member	Date
Design Team Member	Date	ITR Team Member	Date

ATTACHMENT 4

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:

(Describe the major technical concerns, possible impact, and resolution)

As noted above, all concerns resulting from independent technical review of the project have been fully resolved.

(Signature) _____ (Date) _____

Chief, Engineering Division

ATTACHMENT B

Quality Control Plan (QCP)
New Lock Footbridges
Detroit District (LRE)

QUALITY CONTROL PLAN

PRECONSTRUCTION ENGINEERING AND DESIGN PHASE

FOR

CHARLEROI LOCKS AND DAM
NEW LOCK FOOTBRIDGES
MONONGAHELA RIVER
CHARLEROI, PA

CONSTRUCTION GENERAL

U.S. ARMY CORPS OF ENGINEERS
DETROIT DISTRICT

JANUARY 2012

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QUALITY CONTROL PLAN

PRECONSTRUCTION ENGINEERING AND DESIGN PHASE

CHARLEROI LOCKS AND DAM
NEW LOCK FOOTBRIDGES
MONONGAHELA RIVER
CHARLEROI, PA

Attachments

A QA/QC Checklist (Checklist for Review of Plans & Specifications)

QUALITY CONTROL PLAN

PRECONSTRUCTION ENGINEERING AND DESIGN PHASE

CHARLEROI LOCKS AND DAM
NEW LOCK FOOTBRIDGES
MONONGAHELA RIVER
CHARLEROI, PA

09-JANUARY-2012

1. Purpose: The goal of the Detroit District is to produce error free decision and implementation documents that result in completed projects that conform to customer's expectations and exhibit sound engineering practice. Included in the goal are adherence to technical, legal and policy criteria, functionality, budgetary and scope limitations, schedule, and the environment. This "Quality Control Plan" (QCP) represents the plan of action that will be implemented on this project to insure that the aforementioned goal is met. Because some features of the plan may be modified as the project develops, it is intended to be a continuously developing record document. This quality control plan has been developed in accordance with requirements set forth in USACE ER 1110-1-12 Engineering and Design Quality Management (21 July 2006) and the LRD Regional Business Processes (RBP) Manual.

2. Applicability: This quality control plan applies to the completion of the engineering Design Document Report (DDR), Plans & Specifications (P&S), and Engineering Considerations and Information for Field Personnel (ECIFP) for the subject project.

3. Project Description: Charleroi Locks and Dam are located along the Monongahela River at river mile 41.5 in Charleroi, Pennsylvania. The existing twin chamber lock is being replaced by two new larger lock chambers. The project is divided into three design packages: Emptying Basin, Stilling Basin and River Chamber. The River Chamber design package includes several features of work including new footbridges over the new lock chambers. Detroit District has been tasked with design of the new footbridges and this quality control plan covers the DDR and P&S for that feature only. USACE Pittsburgh District (LRP) is the home district for this project and is handling the overall project.

4. Document Control: All document control for this project will be in accordance with RBP 08503 LRD – Control of Project Plans, Specifications and Design Analysis and Environmental Records. The project will be developed and maintained in ProjectWise. The Pittsburgh District's (LRP) ProjectWise dataset shall be used to organize and manage all electronic documents that support this project. In the event that technical issues arise that require long lead times for ACE-IT to solve, Detroit District (LRE) will

maintain electronic documents on its ProjectWise server until such time as these files can be transferred. All hardcopy documents shall be scanned into Adobe (.pdf) documents and uploaded in the appropriate ProjectWise folder. The Detroit District shall strive to continuously maintain electronic filing of the documents throughout the project duration within the Pittsburgh District ProjectWise directory.

5. Project Risks: The footbridge provides access from land to the control tower and dam. Failure of these structures would have a negative impact and possibly prevent operation and/or maintenance of the new locks and the existing dam.

6. Design Risks: The various footbridge spans, which will support utility lines, will be supported by an existing tower, a new tower and an existing service bridge. Coordination with LRP's electrical and structural engineers will be required to ensure the new footbridges will have adequate support as well as provide adequate support for the utility lines. USACE Louisville District (LRL) is designing the new control tower. Therefore, support at the new control tower will be coordinated with LRL design engineers.

7. Design Team. The in-house design team assigned to this project includes the following:

NAME	FUNCTIONAL DISCIPLINE	PHONE
[redacted]	LRE Project Engineer	[redacted]
	Structural Engineer	
	CADD Technician	
	CADD Technician	

8. Review Plan.
Throughout the Preconstruction Engineering and Design Phase, the design team's goal is to provide quality work according to the Quality Control Plan. Each member of the design team will ensure a quality product in their functional area through internal detailed checks, reviews, and supervisory review by the appropriate Branch Chiefs. The team will perform sufficient independent technical review, management oversight, and verification to ensure that quality objectives are met consistent with the Project Management Plan and Review Plan prepared by LRP. A detailed evaluation of the engineering analysis, Design Document Report, and any contract documents will be made. As mentioned above this footbridge design is part of the larger River Chamber design package. An agency technical review (ATR) will be performed on the entire design package after it is assembled. LRP will be coordinating the ATR.

- **District Quality Control (DQC) Reviews:** Reviews to determine if concepts are valid; plans are feasible, safe, and functional; analysis is correct; project complies with engineering policy; and project complies with accepted engineering practices. Four types of DQC reviews will be performed on this project: Independent Technical Review (ITR), Plan-In-Hand Review, BCOE

review and Supervisory Review. All review comments will be submitted into DrChecks. The comment evaluator (LRE Project Engineer) shall evaluate the comment and reply to the comment in DrChecks. The reviewer will read the evaluator's comment and shall either backcheck the comments or get with the comment evaluator and LRP Project Engineer to find a mutually acceptable solution to the comment submitter's comment and then the comment submitter shall backcheck their comment. Formal certificates shall be signed by the reviewers, appropriate supervisors, and LRP Project Engineer. These signed certificates shall be combined with the DrChecks comments. All DrChecks comments and signed certificates will be saved in PDF form on the LRP ProjectWise server.

- **ITR Review:** An independent technical review of the DDR and P&S will be done within the Detroit District to ensure that the design conforms to proper criteria, that appropriate design methods have been followed, that an internal check of the design has been completed and is indicated on the drawings and computation sheets and that the completed project design is adequately documented in the DDR.

The ITR reviewers are as follows:

NAME	FUNCTIONAL DISCIPLINE	PHONE
[redacted]	Structural SME	313-226-6076

- **Plan-In-Hand Review:** On-site review to ensure design engineers and CADD technician have proper understanding of existing site conditions, new design will coordinate with existing conditions, and design meets customer's requirements. The plan-in-hand review will be performed on the 50% plans and specifications.

The Plan-In-Hand reviewers are as follows:

NAME	FUNCTIONAL DISCIPLINE	PHONE
[redacted]	Project Engineer/Structural	313-226-2424
	Structural Engineer	313-226-3189
	CADD Technician	313-226-7008
	LRP Project Engineer	412-395-7391

- **BCOE Review:** Review to assure solicitation documents are readily understood; the product can be bid, built, operated and maintained efficiently; and environmental concerns are protected. A formal BCOE will be done on the overall River Chamber Design package and will be conducted by LRP. An informal BCOE review will be done within the Detroit District on the 100% plans and specifications prior to submitting the design package to LRP. This review will be done in accordance with ER 415-1-11.

The BCOE reviewers are as follows:

NAME	FUNCTIONAL DISCIPLINE	PHONE
[redacted]	Structural SME	[redacted]

- **Supervisory Review:** Review to ensure ITR, BOCE and other reviews have been adequately done and P&S are ready for formal routing to LRP.

The Supervisory reviewers are as follows:

NAME	FUNCTIONAL DISCIPLINE	PHONE
[redacted]	Chief, Geotech and Structures Branch	[redacted]
	Chief, Engineering and Construction Office	

9. Communications: Coordination between districts will be essential to the success of this project. Detroit District will coordinate their efforts with LRP and LRL. Key decisions made from fact finding efforts during the design process will be documented in email and sent to the Project Engineer from LRP. The email will also be saved in ProjectWise for documentation as appropriate. Key decisions and discussions during formal meetings and teleconferences shall be documented and meeting minutes developed and submitted to the LRP Project Engineer and attendees. Meeting minutes shall be submitted within 3 business days after the meeting and will be open for comments for 3 business days after submission. After the 3 day comment period, the final meeting minutes will be locked down in ProjectWise for record.

10. Quality Assurance: CELRD performs quality assurance on work accomplished by the Detroit District, by means of quality audits, as required.

11. Review Schedule:

MILESTONE	DATE
ITR Review	18-June-2012
Plan-In-Hand Review	16-July-2012
100% BCOE	6-August-2012

12. Review Budget:
LRP will manage and distribute funding. The current budget is as follows:

Fiscal Year	Total
FY 12	$80,000

12. **QCP Approval:** This Quality Control Plan is:

Prepared by:

[redacted] Date: 10-JAN-12

Project Engineer
Geotech and Structures Branch

Submitted by:

[redacted] Date: 18 Jan-12

Quality Manager
Engineering & Construction Office

Reviewed by:

[redacted] Date: 11-Jan-12

Chief, Geotech and Structures Branch

APPROVED BY:

[redacted] Date: 18 JAN 12

Chief, Engineering & Construction Office

ATTACHMENT A – QA/QC CHECKLIST

I. CHECKLIST FOR REVIEW OF PLANS & SPECIFICATIONS

A. GENERAL

1. Use a consistent system for indicating sections & details.

2. Ensure that all sheets have consistent title blocks & are properly filled out.

3. Confirm that consistent legends, abbreviations & nomenclature is displayed & indicated on the all plans & specs.

4. Ensure that all drawings & details are drawn to a commonly accepted scale.

5. Clearly indicate required vs. existing on all sheets & in the legends.

6. Coordination regarding the location of existing utilities and their relocation, if required during construction, is complete. The utilities are correctly shown on the drawings.

7. Project and public safety measures are adequately addressed.

8. Scope of construction work is clear.

9. Is all required work clearly shown & described?

10. Do the Plans and Specifications incorporate the customer's needs for immediate and long term objectives? O&M?

B. CIVIL/SITE DWGS

1. Confirm that the number of BM's & HCP's are adequate.

2. Confirm that the control points are shown accurately on the drawings & adequately described in the specs.

3. Insure that the datum is correct and easily identifiable on the drawings.

4. Confirm that all major items can be located from the data supplied on the drawings either by coordinate or dimension from a known permanent feature.

5. Confirm that the quantity of all items can be estimated from the data on the drawings for confirmation.

6. Confirm that all demolition items are clearly indicated & completely described in the drawings or in the specs.

7. Confirm that stationing is consistent and clear.

8. Check all areas of interface & transition to insure that this condition is adequately presented.

9. Confirm that the plans and profiles show the same existing & required conditions.

10. Confirm utilities are shown consistently on the drawings & that spec includes POC for each.

11. Limits of site restoration are properly shown.

C. **SPECIFICATIONS**

1. The special and technical provisions of specifications reflect the intent of work shown on the plans.

2. The directions to the contractor are not duplicated in the plan notes and in the specifications.

3. The specifications do not conflict with the drawings.

4. Specifications do not conflict within themselves.

5. Specifications are not ambiguous.

6. Specifications are not unreasonably restrictive regarding contractor's operations or materials.

7. The bid items are consistent with the drawings.

8. The measurement and payment section is complete, and clear.

9. The construction phasing is clear.

10. The cross reference of specifications versus drawings and vice versa is appropriate.

11. The construction materials are appropriately selected and size and gradation of aggregate shown on the drawings agree with the specifications.

12. The benchmark and horizontal control data (station recovery data) are included in the General Provisions.

13. The requirements for cofferdam and control of water during construction are clearly identified.

14. The requirements for submittal and review of items are adequate.

15. Are provisions for property & public safety during construction adequate?

D. **COST ENGINEERING**

1. Are dimensions in the plans sufficient to enable reasonable estimates?

2. Is the estimated cost within anticipated funds and appropriate?

E. **ENVIRONMENTAL ANALYSIS**

1. Are there any environmental constraints?

2. Have they been appropriately addressed in the Plans & Specifications?

F. **POLICY**

1. Is the scope of the project consistent with authorizing legislation?

2. Are assumptions that were made during project development consistent with legislation, and were they reviewed with local interests?

3. Are there any outstanding issues?

ATTACHMENT C

Quality Control Plan (QCP)
Lower Guide Wall Stabilization
Buffalo District (LRB)

Engineering & Design Quality Control Plan for In-House Development of Design Documentation Report and Plans and Specifications Charleroi River Chamber – Lower Guide Wall Stabilization

1.0 Project Location: Charleroi Locks and Dam, Charleroi, PA (Pittsburgh District).

2.0 Product Description: Preliminary Design Report, Design Documentation Report (DDR) and Plans and Specifications (P&S) for stabilization of the lower guide wall.

3.0 Project Coordination: Dustin Tellinghuisen is the Buffalo District technical lead and will provide functional interface with the customer (Pittsburgh District), and will also be responsible for technical accuracy and acceptability of the DDR and P&S.

4.0 Contracting Mechanism: N/A. Project scope involves technical work by the Buffalo District. Construction contract acquisition will be accomplished by the Pittsburgh District.

5.0 Communications: The primary lines of communication will be through the Buffalo District technical lead, who will be responsible for coordinating the design review process. Review comments and responses will be processed through DrChecks. Documentation of key decisions and discussions during meetings/telephone conferences will be documented in concise (i.e., bullet format) notes emailed to the Pittsburgh District and meeting participants in a timely fashion, within 5 business days after each meeting.

5.1 Client: Pittsburgh District (LRP) is the client. LRP points of contact are as follows:

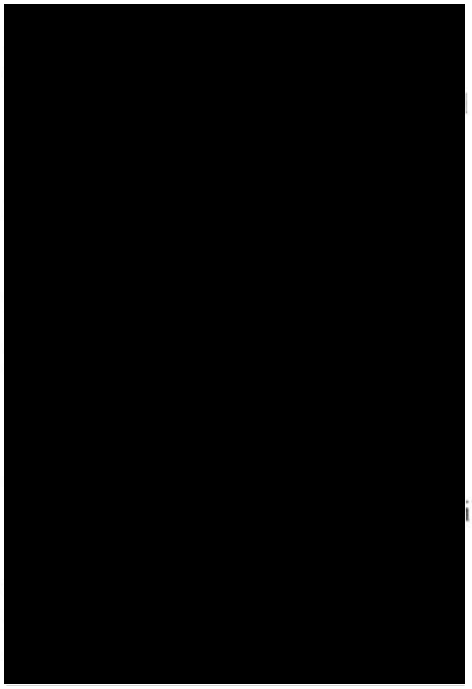
River Chamber Lead Engineer
(Primary POC)

DDR & ECIFP Coordination Lead

Specification Coordination Lead

CADD Coordination Lead

ProjectWise Coordination Lead



5.2 Stakeholders: N/A.

5.3 Documentation Management. The Pittsburgh District ProjectWise Dataset will be used to organize and manage all electronic documents for the Project. All hardcopy documents will be scanned into Adobe (.pdf) documents and uploaded in the appropriate folder. The Buffalo District will continuously maintain electronic filing of the documents under their preparation throughout the project duration in the Pittsburgh District ProjectWise directory.

6.0 Project Delivery Team (PDT):

6.1 In-House PDT: The following individuals are the primary technical PDT members who will be responsible for product development and reviewing the DDR and P&S to ensure that it meets all the design criteria/requirements:

Name	Title
[redacted]	Structural Engineer
	Geotechnical Engineer
	Cost Estimator
	CAD Operator

6.2 District Quality Control (DQC) Team: Team Leaders and Branch Chiefs assign team members to projects and are ultimately responsible for work performed by members of their team and for DQC reviews. Review of this work, whether through informal discussions or formal reviews, shall serve as a quality assurance check to ensure the work is technically complete and accurate before a product leaves a section team. These individuals, will be responsible for QC checks and overall product QA (unless otherwise indicated below), and along with the rest of the PDT, will be provided copies of the approved Quality Control Plan and any updates. A Completion of District Quality Control Review certification (Attachment 1) along with a summary of comments generated (Attachment 2) will be submitted with each major project deliverable.

Name	Title	DQC Role
[redacted]	Chief, Design Branch	QA
	Chief, Civil/Structural Design Team	QC, QA
	Chief, Cost & Project Engineering Team	QC, QA
	Chief, Coastal/Geotech Team	QA
	Geotechnical Engineer	QC

7.0 Agency Technical Review (ATR) Team: Pittsburgh District will be responsible for coordinating ATR activities. The Buffalo District PDT will be responsible for addressing ATR comments and making revisions to the technical products as applicable.

8.0 Biddability, Constructability, Operability, and Environmental (BCOE) Review: Pittsburgh District will be responsible for coordinating BCOE review activities. The Buffalo

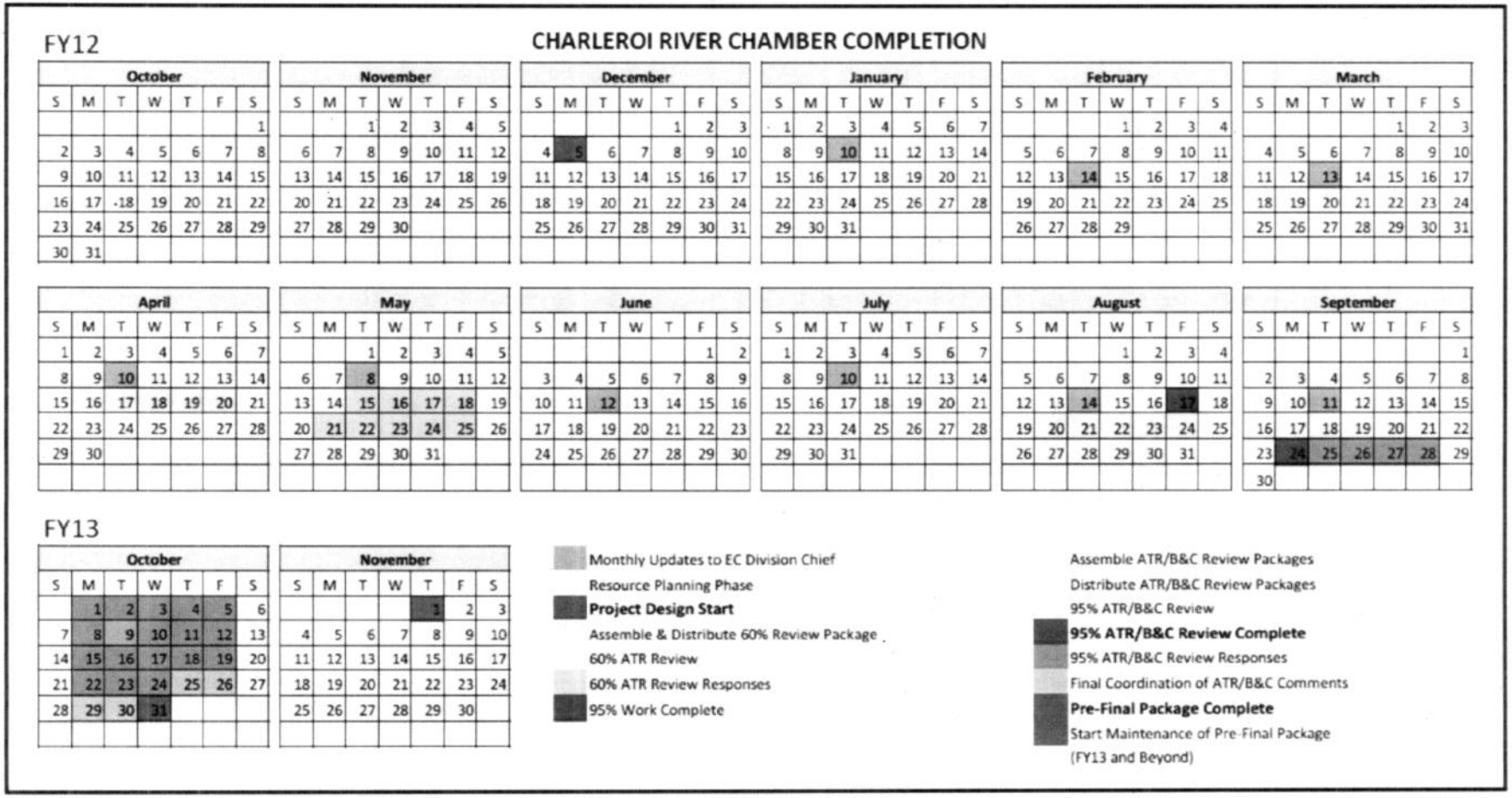
District PDT will be responsible for addressing BCOE comments and making revisions to the technical products as applicable.

9.0 Quality Assurance: Approval level of this QCP is with the Buffalo District.

10.0 Risks: The primary risk inherent to this project involves schedule. Close coordination with the Pittsburgh District is intended to facilitate seamless reviews, and adherence to the project schedule.

11.0 Special Considerations: Crucial design features associated with the guide wall stabilization focus on Structural Engineering and Geotechnical Engineering expertise.

10.0 Product Development Schedule:



11.0 Labor & Cost Estimates:

TASK	DESCRIPTION/SUBTASK	Qty (hrs)	Cost
1 (19DEC11-16FEB12)	**Preliminary Stabilization Design Concepts**		
	Task 1 Cost Estimating Total Cost (H5L1B07)	58	$6,258
	Task 1 Geotechnical Total Cost (H5L1B02)	160	$15,428
	Task 1 Civil/Structural Design Total Cost(H5L1B04)	238	$26,220
	Task 1 Total Cost	**456**	**$47,906**
2 (19DEC11-16FEB12)	**Develop Letter Report of Preliminary Design Concepts**		
	Task 2 Cost Estimating Total Cost	196	$20,296
	Task 2 Geotechnical Total Cost	36	$3,490
	Task 2 Civil/Structural Design Total Cost	40	$4,364
	Task 2 Total Cost	**272**	**$28,150**
3 (1MAR12-16AUG12)	**Perform detailed and final design of selected concept**		
	Task 3 Cost Estimating Total Cost	238	$24,922
	Task 3 Geotechnical Total Cost	156	$15,078
	Task 3 Civil/Structural Design Total Cost	1,194	$118,695
	Task 3 Total Cost	**1,588**	**$158,695**
Other Costs	LRB Design Branch Chief (H5L1B00)		$3,000
	ZCAD Facility Account (partial cost for software licensing) (H500000 - SHOP FACILITY)		$11,500
	Per Diem (H500000 - TRAVEL) three people @$125/day for two days		$750
	Govt Vehicle (H500000 - GSAVEH)		$200
	Other Costs Total		**$15,450**
Total Cost	**Resource Estimates and Other Costs**		**$250,201**

Signatures:

This Quality Control Plan has been coordinated with the Branch Chiefs and Team Leaders of the listed team members to verify they are available and committed to participate as specified in this QCP.

Prepared by:

[redacted] _____ 1/23/12
Date

_____ 2/2/12
Date

_____ 2/2/12
LRB-TD Date

CELRB-TD-D 05 January 2012

Attachment 1

COMPLETION OF DISTRICT QUALITY CONTROL REVIEW

The Buffalo District has completed the *[Preliminary Design Report] [60% Design Submittal] [95% Design Submittal]* for the Stabilization of the Lower Guide Wall, Charleroi Locks Replacement, River Chamber Completion Package, USACE, Pittsburgh District. Notice is hereby given that a District Quality Control Review has been conducted that is appropriate considering the level of risk and complexity inherent in the project, as defined in the Engineering & Design Quality Control Plan.

[redacted]

_____ _____
Date

m

_____ _____
Date

_____ _____
Date

Team

CERTIFICATION OF DISTRICT QUALITY CONTROL REVIEW

Significant concerns and the explanation of the resolution are as follows:
[Describe the major technical concerns and their resolution]

As noted above, all concerns resulting from the DQC review of the project have been fully resolved.

SIGNATURE _____ _____
Date

[redacted]

Attachment 2

STABILIZATION OF THE LOWER GUIDE WALL, CHARLEROI LOCKS REPLACEMENT, PITTSBURGH DISTRICT
DISTRICT QUALITY CONTROL (DQC) REVIEW COMMENT SHEET

Complete and Return to: _____ **Date Transmitted:** _____

Document Title: _____ **Reviewed by:** _____

COMMENT NUMBER	PAGE OR SHEET	REVIEWER'S COMMENTS	PREPARER'S RESPONSE	REVIEWER ACCEPT/ REJECT

ATTACHMENT D

Quality Control Plan (QCP)
Waterway Safety Signs Support Structures
Chicago District (LRC)

CHARLEROI LOCKS RIVER CHAMBER
WATERWAY SAFETY SIGNS SUPPORT STRUCTURES
PLANS AND SPECIFICATIONS
QUALITY CONTROL PLAN

CELRC-TS-DT **14 February 2012**

PROJECT: Charleroi Lock Replacement

PRODUCT: Structural Design for Charleroi Locks River Chamber, Waterway Safety Signs Support Structures

1. Project Description: The Charleroi Locks and Dam was constructed in the 1930's and consists of a gated dam with a 56'x720' land chamber and a 56'x360' river chamber that is no longer in service. The Charleroi Locks are part of the Lower Monongahela River Project, which includes Braddock L/D, Elizabeth L/D and Charleroi L/D. When the Lower Mon Project is completed, the Elizabeth L/D will be removed from operation, as a result the lower pool level at Charleroi L/D will be lowered approximately 3.2 feet. The Lower Mon Project authorized new dual 84'x720' lock replacements. The Pittsburgh is currently designing the new river chamber with some features of the new river chamber currently under construction or completed.

The Chicago District will perform the final structural design for the project Waterway Safety Sign Supports. A structural engineer will review the current framing and support structures to determine if they meet current design criteria. If the support structures are not adequate, the structural engineer will design new framings, top of wall connections or in river or land based foundations. Twelve structures will be installed on lock walls, two on existing mooring cells, and three on the right and left river shores of Monongahela.

2. Reference Documents:

   a. EP 310-1-6a Sign Standard Manual (dated 01 June 2006)

   b. ER 1110-1-12, Quality Management (dated 21 July 2006, updated 30 September 2006).

   c. ER 1110-2-1150, Engineering and Design for Civil Works Projects (dated 31 August 1999).

   d. LRP CADD Manual

   e. Regional Business Process Manual "08516 LRD Computer Aided Design and Drafting (CADD)".

   f. ER 1110-1-8152 "Engineering and Design – Professional Registration".

g. ECB 2006-9 "Deployment of Bentley ProjectWise".

3. Product Description: This Quality Control Plan (QCP) is for the in-house development of Waterway Safety Sign Support Plans and Specification. The design documents will be furnished to the Pittsburgh District (LRP) and LRP will prepare the solicitation documents for award of a contract.

Chicago District will provide all necessary CADD services to update the existing drawing package. The project will be executed using Project Wise V8i for drawing collaboration. Drawing scales will conform to those specified in the A/E/C CADD Standards. Chicago District will prepare the Design Document Report (DDR) detailing all aspects of the design. The DDR will include:

a. Structural DDR write up will provide project description, design criteria, loads, references, assumptions, etc.
b. Checked computations, including input and output reports from any software that was used in the design.
c. Documentation of project correspondences
d. All applicable sketches, drawings and reference material.
e. Quantity takeoff

The quantity takeoff will be provided to LRP to develop the project cost estimate. Chicago District will perform the Quality Control (QC) for all deliverables and will respond to all Pittsburgh District QA, ATR, and IEPR comments in DrChecks and will also perform all necessary revisions to the submitted design documents. The Chicago District will also prepare the ECIFP for the support structures.

4. Product Team:

Project Manager: [redacted] P-EC-NC [redacted]

Product Lead: Ga [redacted] C-TS-DC [redacted]

Structural Engine [redacted] C-TS-DT

Structural CADD: [redacted] C-TS-DC

ProjectWise Coor [redacted] C-TS-DC

Specifications: Ma [redacted] C-TS-DC

ProjectWise Coor [redacted] LRC-TS-DC [redacted]

5. Budget: The total estimate budget for this project is $80,000. A detail budget is included in Appendix A.

6. Schedule:

PRODUCT SCHEDULE

Schedule for Safety Sign Support Structures Design	
WORK ITEM	**DATE**
Project Design Start	5 Dec 2011
Site Inspection	17 Jan 2012
Draft QCP Packet	21 Feb 2012
60% Submittal	17 April 2012
60% ATR Review	23 April – 14 May 2012
60% ATR Review Responses	15 – 25 May 2012
95% Work Complete	17 Aug 2012
95% ATR/B&C Review	27 Aug – 21 Sept 2012
95% ATR/B&C Review Responses	25 Sept – 24 Oct 2012
Pre-Final Submittal	31 Oct 2012

SUBMITTED BY:

[redacted]

2/21/2012
Date
[redacted]ger

[redacted]

[redacted]ate

QUALITY CONTROL PLAN/ITR TEAM
APPROVAL FORM

PROJECT: Charleroi Lock Replacement

PRODUCT: Structural Design for Safety Critical Waterway Signs

The QCP for the subject Structural Design for Safety Critical Waterway Signs is supplemental to the overall project QCP and has been developed in cooperation with the appropriate functional elements and LRP. The product scope, schedule, and budget have been reviewed by the first-line supervisors and are determined to be appropriate for the development of this product. All comments to this QCP have been incorporated. This QCP is hereby submitted for approval by:

[redacted] 2/24/2012
Date
Product Lead / Quality Manager

S[redacted]
H[redacted]
B[redacted]te
Project Manager

II. This QCP has been fully coordinated and is considered appropriate for this work and is recommended for approved by:

[redacted] 2/21/12
Date
Chief, Design Branch
Levee Safety Officer

ATTACHMENT E

Quality Control Plan (QCP)
Middle Wall Completion M1-M7 & M22-M27
INCA Tetra Tech

Forthcoming

ATTACHMENT F

Quality Control Plan (QCP)
M25 Stabilization, DS Closure Cell Modifications, and Instrumentation
DLZ Inc.

Forthcoming