



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION
FORT HAMILTON MILITARY COMMUNITY
302 GENERAL LEE AVENUE
BROOKLYN NY 11252-6700

CENAD-RB-T

APR 2 2018

MEMORANDUM FOR Commander, Philadelphia District, 100 Penn Square East,
Wannamaker Building, Philadelphia, PA 19107-3323

SUBJECT: Approval of the Review Plan for Green Brook Flood Risk Management
Project, Segment C-1, Contract 1 Plans, Specifications, and Design Documentation
Report

1. References:

a. Memorandum, CENAP-EC, undated, subject: Review Plan for Green Brook Flood
Risk Management Project, Segment C-1, Contract 1;

b. Memorandum, CEIWR-RMC, 26 February 2018, subject: Risk Management
Center Endorsement – Green Brook Flood Risk Reduction Project, Segment C-1,
Contract 1, Review Plan;

c. EC 1165-2-214, Water Resources Policies and Authorities – Civil Works Review,
15 December 2012;

d. EC 1165-2-216, Policy and Procedural Guidance for Processing Requests to
Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408, 30
September 2015.

2. The enclosed review plan for plans, specifications, and design documentation report
(DDR) for Segment C-1, Contract 1, Green Brook Flood Risk Management Project was
prepared in accordance with References 1c and 1d.

3. The Risk Management Center is the Review Management Organization for the
Agency Technical Review of the preparation of the plans, specifications, and DDR for
Segment C-1, Contract 1, Green Brook Flood Risk Management Project. The Review
Plan includes Type II Independent External Peer Review (IEPR) (Safety Assurance
Review). The Risk Management Center is the Review Management Office for the
IEPR.

4. The review plan for preparation of plans, specifications, and DDR for Segment C-1,
Contract 1, Green Brook Flood Risk Management Project is approved. The Review
Plan is subject to change as circumstances require, consistent with study development
under the Project Management Business Process. Subsequent revisions to this Review
Plan or its execution require new written approval from this office.

CENAD-RBT

SUBJECT: Approval of the Review Plan for Green Brook Flood Risk Management Project, Segment C-1, Contract 1 Plans, Specifications, and Design Documentation Report

5. In accordance with Reference 1b, Appendix B, Paragraph 6, post this approved Review Plan on your district website for public review and comment. NAD will post on the Division website.

6. The point of contact in the Engineering and Construction Division is Mr. Ralph LaMoglia, PE, 347-370-4599 or ralph.a.lamoglia@usace.army.mil.

Encl
Review Plan



WILLIAM H. GRAHAM
Brigadier General, USA
Commanding

CF: (w/o encl)
CENAB-OP (Mr. Zacheiss)



DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS, PHILADELPHIA DISTRICT
100 PENN SQUARE EAST
PHILADELPHIA, PA 19107-3390

CENAP-EC

MEMORANDUM THRU Chief, Engineering and Construction Division, North Atlantic Division, U.S. Army Corps of Engineers (CENAD-RB-T)

FOR Commander, North Atlantic Division, U.S. Army Corps of Engineers

SUBJECT: Review Plan for Green Brook Flood Risk Management Project,
Segment C-1, Contract 1

1. Respectfully request that the attached review plan for Green Brook Flood Risk Management Project, Segment C-1, Contract 1 be approved.
2. The enclosed review plan was developed in accordance with EC 1165-2-214 "Civil Works Review Policy", dated 15 December 2012.
3. The review plan was endorsed by the Risk Management Center. The RMC endorsement memorandum is also enclosed.
4. Point of contact is Mr. John W. Zacheiss, P.E. at (215) 656-0543.

A handwritten signature in blue ink, reading "Kristen N. Dahle", is positioned above the printed name.

KRISTEN N. DAHLE
LTC, EN
Commanding

Encl.

1. Review Plan
2. RMC Endorsement



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
RISK MANAGEMENT CENTER
12596 WEST BAYAUD AVE., SUITE 400
LAKEWOOD, CO 80228

CEIWR-RMC

26 February 2018

MEMORANDUM FOR: Commander, New York District, ATTN: CENAN-EN-MC

SUBJECT: Risk Management Center Endorsement –Green Brook Flood Risk Reduction Project, Segment C-1, Contract 1, Review Plan

1. The Risk Management Center (RMC) has reviewed the Review Plan (RP) for – Green Brook Flood Risk Reduction Project, Segment C-1, Contract 1, dated 16 February 2018, and concurs that this RP complies with the current peer review policy requirements outlined in EC 1165-2-214 “Civil Works Review Policy”, dated 15 December, 2012.
2. This review plan was prepared by Philadelphia and New York District, reviewed by the RMC, and all RMC review comments have been satisfactorily resolved. For this project a Type II IEPR will be performed.
3. The RMC endorses this document to be approved by the MSC Commander. Upon approval of the RP, please provide a copy of the approved RP, a copy of the MSC Commander’s approval memorandum to the RMC Senior Review Manager (rmc.review@usace.army.mil).
4. Thank you for the opportunity to assist in the preparation of this RP. Please coordinate all aspects of the Agency Technical Review and the Independent External Peer Review (as appropriate) efforts defined in the RP. For further information, please contact me at 601-631-5896

Sincerely,

HERR.DUSTIN.CHA
RLES.1384614082
Digitally signed by
HERR.DUSTIN.CHARLES.1384614082
DN: c=US, o=U.S. Government, ou=DoD, ou=PR,
ou=USA, cn=HERR.DUSTIN.CHARLES.1384614082
Date: 2018.02.26 14:32:56 -0500

Dustin C. Herr, P.E.
Review Manager
Risk Management Center

CF:
CEIWR-RMC (Mr. Snorteland)
CENAD-DQM (Division Quality Manager)

**Review Plan
U.S. Army Corps of Engineers
North Atlantic Division
New York District**

**Green Brook Flood Risk Management
Project, Segment C-1, Contract 1
Levee, Pump Station, and Drainage Piping Construction**

Plans, Specifications, and Design Documentation Report

MSC Approval Date: *2 April 2018*

Last Revision Date: *None*

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

1. Purpose and Requirements

a. Purpose

This Review plan for Green Brook Flood Risk Management Project, Segment C-1, Contract 1, Levee, Pump Station, and Drainage Piping Construction will ensure a quality-engineering project is developed by the Corps of Engineers in accordance with EC 1165-2-214, "Civil Works Review Policy". The Review Plan shall layout a value added process that assures the correctness of the information shown. This Review Plan describes the scope of review for the current phase of work, and is included in the Project Management Plan (P2 #125181). The New York District Chief of Engineering has assessed that risk of the project is significant; therefore a Safety Assurance Review (SAR) will be required.

b. Guidance and Policy References

- EC 1165-2-214, Civil Works Review Policy, 15 December 2012
- ER 1110-1-12, Quality Management, 31 Mar 2011
- ER 1110-2-1806, Earthquake Design and Evaluation for Civil Works Projects, 31 May 2016
- EM 1110-2-1913, Design and Construction of Levees, 30 Apr 2000
- EM 1110-1-1905, Bearing Capacity of Soils, 30 Oct 1992
- EM 1110-1-1904, Settlement Analysis, 30 Sep 1990
- EM 1110-1-1902, Slope Stability, 31 Oct 2003
- EM 1110-2-1901, Seepage Analysis and Control for Dams, 30 Sep 1986
- EM 1110-2-3102, General Principles of Pumping Station Design and Layout, 28 Feb 1995
- EM 1110-2-3104, Structural and Architectural Design of Pumping Stations, 30 Jun 1989
- EM 1110-2-3105, Mechanical and Electrical Design of Pumping Stations (Change 2), 30 Nov 1999
- EM 1110-2-2104, Strength Design for Reinforced Concrete Hydraulic Structures, 30 Nov 2016
- EM 1110-2-2502, Retaining and Floodwalls, 29 Sep 1989
- EM 1110-2-2100, Stability Analysis of Concrete Structures, 01 Dec 2005
- Green Brook PMP
- MSC and/or District Quality Management Plan(s)
- Feasibility Report for Flood Control, Green Brook Sub-Basin, August 1980
- Final General Reevaluation Report & Supplemental Environmental Impact Statement, Green Brook Sub-Basin of the Raritan River Basin, May 1997

c. Requirements

This review plan was developed in accordance with EC 1165-2-214, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The EC outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. The RP identifies the most important skill sets needed in the reviews and the objective of the review and the specific advice sought, thus setting the appropriate scale and scope of review for the individual project. This Review Plan should be provided to PDT, DQC, ATR and IEPR Teams.

d. Review Management Organization

The USACE Risk Management Center (RMC) is the Review Management Organization (RMO) for this project. Contents of this review plan have been coordinated with the RMC and the North Atlantic Division, the Major Subordinate Command (MSC). In-Progress Review (IPR) team meetings with the RMC, NAD, and HQ will be scheduled on an "as needed" basis to discuss programmatic, policy, and technical matters. The NAD Levee Safety Program Manager will be the POC for vertical team coordination. This review plan will be updated for each new project phase. Philadelphia and New York Districts will assist the RMC with management of the ATR and IEPR reviews and development of the draft ATR and IEPR "charges".

2. Project Description and Information

a. Project Description

The objective of the Green Brook Flood Risk Management Project, Segment C-1, Contract 1: Levee & Pump Station is to provide protection against floods up to a 150 year event for the Green Brook Sub-basin, which is part of the Raritan River Basin. Segment C-1 consists of a levee, pump station, two sections of floodwall, and culverts at the southeast corner of the Green Brook project. The scope of Contract 1 is the design and construction of the levee, pump station, eastern section of floodwall, and ancillary features related those structures such as a detention pond and access road for the pump station.

Contract 1 of Segment C-1 of the Green Brook Flood Risk Management Project consists of the levee, pump station, and eastern floodwall portions of the segment. The levee extends approximately 400 feet along Bound Brook from the end of the Segment C-1 floodwall to the New Jersey Transit railroad embankment where it crosses over Bound Brook in Middlesex, New Jersey. The pump station is located within the levee

b. Documentation of DQC

DrCheckssm review software will be used to document all DQC comments, responses and associated resolutions accomplished throughout the review process. Comments will be limited to those that are required to ensure adequacy of the product.

4. Agency Technical Review

a. Requirements

ATR is mandatory for all implementation documents (including supporting data, analyses, environmental compliance documents, etc.). ATR reviews will occur at the 30%, 60%, and 90% milestones. The ATR team will consist of reviewing the plans, specifications, and design documentation report (DDR). The IEPR review will occur simultaneously with the ATR review at the 90% milestone. The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct, went through robust DQC, and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. The PDT should obtain ATR agreement on key data such as hydraulic and geotechnical parameters early in design process. The goal is to have early involvement of ATR team, especially when key decisions are made. The ATR Lead should be invited virtually to all PDT meetings, in order to understand the design efforts and to know when to engage other ATR members for concurrence on key decisions. Value added Lessons Learned from the ATR team should be shared early on to have the best chance of being adopted by the PDT. Most of the ATR effort should be accomplished midway through the design effort; after completion of design the ATR effort will check that the effort agreed to at mid-point was accomplished. This is consistent with the requirement that the ATR members shall not be involved in the day-to-day production of the project/product. A site visit will be scheduled for the ATR Team.

b. Documentation of ATR

DrCheckssm review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments will be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

- (1) The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures;
- (2) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not been properly followed;
- (3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components,

- efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and
- (4) The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern.

c. Comment Resolution

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist. The ATR documentation in DrCheckssm includes the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrCheckssm with a notation that the concern has been elevated to the vertical team for resolution and noted in the ATR Certification Report.

d. Products to Undergo ATR

Documents to undergo the ATR include the project plans, specifications, and DDR. In addition, the DDR will include appendices for all calculations and documentation of the completed DQC reviews.

e. Required ATR Team Expertise and Requirements

ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead will be from outside the home MSC. The ATR team will be chosen based on each individual's qualifications and experience with similar projects. All EC reviewers will be certified in CERCAP: https://team.usace.army.mil/sites/ERDC-CRREL/PDT/atr_certification/default.aspx . See Attachment 2 for ATR members.

ATR Lead: The ATR team lead is a senior professional outside the home MSC with extensive experience in preparing Civil Works documents and conducting ATRs. The lead has the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline, in this case, Structural Engineering, Geotechnical Engineering, Civil Engineering, or Hydraulic Engineering

Geotechnical Engineer - shall have experience in the field of geotechnical engineering, analysis, design, and construction of levees and pump stations. The geotechnical engineer shall have experience in subsurface investigations, rock and soil mechanics, internal erosion (seepage and piping), slope stability evaluations, erosion

protection design, and earthwork construction. The geotechnical engineer shall have knowledge and experience in the forensic investigation of seepage, settlement, stability, and deformation problems associated with levees, pump stations, and appurtenances constructed on rock and soil foundations.

Hydraulic Engineer – shall have experience in the analysis and design of hydraulic structures related to levees including the design of hydraulic structures and pump stations.

Mechanical Engineer – shall have experience in machine design, machine rehabilitation and familiarity with design of mechanical gates and controls for flood control structures.

Structural Engineer – shall have experience and be proficient in performing stability analysis, finite element analysis, seismic time history studies, and external stability analysis.

Civil Engineer – shall have experience in site design of flood control projects, levees, and pump stations.

Electrical Engineer – shall have experience in electrical design of gates and control for flood control structures.

f. Completion and Certification of the ATR

At the conclusion of each ATR effort, the ATR team will prepare a Review Report summarizing the review. Review Reports will be considered an integral part of the ATR documentation and shall:

- (1) Identify the document(s) reviewed and the purpose of the review;
- (2) Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- (3) Include the charge to the reviewers;
- (4) Describe the nature of their review and their findings and conclusions;
- (5) Identify and summarize each unresolved issue (if any); and
- (6) Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. The ATR lead will prepare a completion of ATR and Certification of ATR. It will certify that the issues

raised by the ATR team have been resolved (or elevated to the vertical team). The completion and certification should be completed based on the work reviewed to date for the project. A Sample Completion of ATR and Certification of ATR are included in Attachment 1.

5. Independent External Peer Review (IEPR)/Safety Assurance Review (SAR)

a. Decision on Type II IEPR

A Type II IEPR Safety Assurance Review (SAR) will be performed during the Implementation Phase on the design and construction activities associated with the following features: plans and specifications, the Design Documentation Report (DDR), supporting data, and analyses. A risk-informed decision was made as to whether IEPR is appropriate based on the factors to consider for conducting a Type II IEPR review that are outlined in EC 1165-2-214, Appendix E, Section 2 (a) thru (c).

A risk informed decision was made that this project does pose a significant threat to human life (public safety) since it involves the levees, pump station and floodwall. For a Type II IEPR the selection of IEPR review panel members will be made up of independent recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of expertise suitable for the review being conducted. The selection of IEPR review panel members will be selected using the National Academy of Science (NAS) Policy which sets the standard for "independence" in the review process. A site visit will be scheduled for the IEPR Team.

Segment C-1 as documented in Memorandum for Record dated 9 November 2017 (Attachment 3) based on a risk informed assessment which considered life safety factors, New York District Chief, Engineering Division, determined that there is a significant threat to human life. Accordingly, a Type II IEPR, Safety Assurance Review is required for the levee, floodwall, pump station components of Segment C-1.

b. Products to Undergo Type II IEPR

Segment C-1 Contract 1 products that will undergo IEPR include the DDR, plans and specifications and construction activities for the levee, floodwall and pump station.

c. Required Type II IEPR Panel Expertise

The following provides an estimate of the Type II IEPR panel members and the types of expertise that should be represented on the review panel. All panel members shall be recognized experts in their field and have specialized experience pertaining to the work being performed in this project. In addition all panel members should have an advanced degree and be professionally registered.

The disciplines required for the IEPR are as follows:

Civil Engineer - The Panel Member shall have extensive experience in evaluation of levees and floodwalls.

Electrical Engineer - The Panel Member shall have extensive experience with electrical components of pump stations, closure gates and sluice gates.

Geotechnical Engineer - The Panel Member shall have extensive experience in geotechnical evaluation of levees such as slope stability evaluation, evaluation of the seepage through levees and under-seepage through the foundation of floodwalls, closure structures and other pertinent features and in settlement evaluation of the structures.

Hydraulic Engineer –The Panel Member should have extensive experience in the field of urban hydraulics, including levee systems and interior drainage and have a thorough understanding of the use of HEC computer modeling systems.

Mechanical Engineer – The Panel Member shall have extensive experience with mechanical components of pump stations, closure gates and sluice gates.

Structural Engineer – The Panel Member shall have extensive experience in structural evaluation of floodwalls and closure gates.

d. Documentation of Type II IEPR

The Type II IEPR will be managed by an AE firm or Government entity which meets the criteria set forth in EC 1165-2-214. DrChecks review software may be used to document the Type II IEPR comments and aid in the preparation of the Review Report but is not required.

Comments should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. Type II IEPR comments should generally include the same four key parts as described for ATR comments in Section 4. An A/E contractor or Government Entity will be responsible for compiling and entering comments into DrChecks.

No later than 60 days following each milestone, the Type II IEPR panel will prepare a Review Report that will accompany the publication of the final report for the project and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

This review report, including reviewer comments and a recommendation letter will be provided to the RMC as soon as they become available. Written responses to the IEPR Review Report will be prepared to explain the agreement or disagreement with the views expressed in the report, the actions undertaken or to be undertaken in response to the report, and the reasons those actions are believed to satisfy the key concerns stated in the report (if applicable). These comment responses will be provided to the RMC for concurrence. The revised submittal will be provided to the RMO with the USACE response and all other materials related to the review.

USACE shall consider all comments contained in the Review Report and prepare a written response for all comments and note concurrence and subsequent action on non-concurrence with an explanation. The Review Report and USACE responses will be made available to the public including through electronic means on the internet.

6. Policy and Legal Compliance Review

All implementation documents will be reviewed throughout the project for their compliance with law and policy. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies.

7. Review Schedule and Costs

a. Schedule of Reviews

To the extent practical, reviews should not extend the design schedule but should be embedded in the design process. Reviewers should be involved at key decision points and are encouraged to provide timely over the shoulder comments. The design schedule is provided as an attachment to this plan.

b. ATR Schedule and Cost

The cost for the ATR is approximately \$70,000.

c. IEPR Schedule and Costs

A Type II IEPR will be required for this project. Initial indications are that the estimated cost for the Type II IEPR is in the range of \$200,000 to \$300,000. This estimate will be refined when the Scope of Work for the IEPR Type II contract is completed. The IEPR Type II contractor will be involved with the project through the construction phase and into the OMRRR phase. More specific milestone dates will be added in the future during the construction phase, but it can be assumed to occur near the mid-point of construction and near the end of construction.

8. Public Participation of Review Plan

As required by EC 1165-2-214, the approved Review Plan will be posted on the District public website (<http://www.nan.usace.army.mil/>). The public will have 30 days to provide comments on the documents; after all comments have been submitted, the comments will be provided to the technical reviewers. This is not a formal comment period and there is no set timeframe for the opportunity for public comment. If and when comments are received, the PDT will consider them and decide if revisions to the review plan are necessary. This engagement will ensure that the peer review approach is responsive to the wide array of stakeholders and customers, both within and outside the federal government.

9. Review Plan Approval and Updates

The MSC for this is the North Atlantic Division. The MSC Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving the New York District, MSC, and RMC) as to the appropriate scope and level of review for the study and endorsement by the RMC. Like the PMP, the Review Plan is a living document and may change as the study progresses; the district is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC Commander approval will be documented in an Attachment to this plan.

Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-endorsed by the RMC and re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, will be posted on the District's webpage and linked to the HQUSACE webpage. The latest Review Plan should also be provided to the RMO and home MSC.

10. Engineering Model Certification and Approval

The use of certified or approved engineering models is required for all activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required). The following engineering models are anticipated to be used:

MODEL	STATUS
AutoCAD Civil 3D	Approved
HEC-HMS	Preferred
HEC-RAS	Preferred
GeoStudio	Approved
RISA 3D	Approved



US Army Corps
of Engineers®

New York District

11. Review Plan Points of Contact

NAME/TITLE	ORGANIZATION	EMAIL/PHONE
John Zacheiss, Design Manager	CENAP-EC-EM	<u>John.W.Zacheiss@usace.army.mil</u> 215-656-0543
Elena Manno, Technical Manager	CENAN-EN-MC	<u>Elena.Manno@usace.army.mil</u> (917) 790-8371

ATTACHMENT 1: COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the Green Brook Flood Risk Management Project, Segment C-1, Contract 1. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214. 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 DrCheckssm.

SIGNATURE

Michael Robinette
ATR Team Leader
CELRH-DSPC-GS

Date

SIGNATURE

Robert Greco
Project Manager
CENAP-PP-C

Date

SIGNATURE

David Carlson, P.E., PMP
CEIWR-RMC-E

Date

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

Michael Rovi
Chief, Engineering Division &
Levee Safety Officer
CENAN-EN

Date

For Official Use Only -To be Removed Prior to Posting on District Web Site

ATTACHMENT 2: TEAM ROSTERS

PDT Members

NAME/TITLE	ORGANIZATION	EMAIL/PHONE
John Zacheiss, Design Manager	CENAP-EC-EM	<u>John.W.Zacheiss@usace.army.mil</u> (215) 656-0543
Elena Manno, Technical Manager	CENAN-EN-MC	<u>Elena.Manno@usace.army.mil</u> (917) 790-8371
Derek Burleigh, Civil Engineer	CENAP-EC-EC	<u>Derek.T.Burleigh@usace.army.mil</u> (215) 656-6485
Nestor Delgado, Structural Engineer	CENAP-EC-EB	<u>Nestor.J.Delgado@usace.army.mil</u> (215) 656-5575
Feliks Plotnikov, Structural Engineer	CENAP-EC-EB	<u>Feliks.S.Plotnikov@usace.army.mil</u> (215) 656-6335
Earl Fisher, Geotechnical Engineer	CENAP-EC-EG	<u>Earl.M.Fisher@usace.army.mil</u> (215) 656-6700
Conor McCafferty, Geotechnical Engineer	CENAP-EC-EG	<u>Conor.M.McCafferty@usace.army.mil</u> (215) 656-6672
Robert Moore, Hydraulic Engineer	CENAP-EC-EH	<u>Robert.J.Moore@usace.army.mil</u> (215) 656-6684
Andre Chauncey, Hydrology, Interior Drainage	CENAN-EN-H	<u>Andre.T.Chauncey@usace.army.mil</u> (917) 790-8353
Juan Escajadillo, Hydraulic Engineer	CENAN-EN-H	<u>Juan.C.Escajadillo@usace.army.mil</u> (917) 790-8356
Claudio Sang, Mechanical Engineer	CENAN-EN-DB	<u>Claudio.Sang@usace.army.mil</u> (917) 790-8277
Tom Sessa, Electrical Engineer	CENAN-EN-DB	<u>Thomas.E.Sessa@usace.army.mil</u> (917) 790-8272
Jerson Nafarrete, Architect (Pump Station)	CENAN-EN-DB	<u>Jerson.R.Nafarrete@usace.army.mil</u> (917) 790-8740
Charles Ganley, Architect (Generator Building)	CENAN-EN-DB	<u>Charles.M.Ganley@usace.army.mil</u> (917) 790-8349
Chris Dols, Cost Estimator	CENAN-EN-C	<u>Christopher.A.Dols@usace.army.mil</u> (917) 790-8347
Luis Rosario-Llueras, Specification Engineer	CENAN-EN-DB	<u>Luis.G.Rosario-Llueras@usace.army.mil</u> (917) 790-8244

Glenn McKensie, Specification Engineer	CENAP-EC-ES	<u>Glenn.C.McKenzie@usace.army.mil</u> (215) 656-6642
Kim Rightler, Biologist	CENAN-PL-E	<u>Kimberly.A.Rightler@usace.army.mil</u> (917) 790-8722

DQC Reviewers

NAME/TITLE	ORGANIZATION	EMAIL/PHONE
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Agency Technical Review (ATR) Team

DISCIPLINE	NAME	REVIEW DISTRICT	MILESTONES INVOLVED
ATR Lead	Michael Robinette	LRH	30%, 60%, 90%
Civil Engineer	TBD	TBD	90%
Electrical Engineer	TBD	TBD	90%
Geotechnical Engineer	TBD	TBD	30%, 60%, 90%
Hydraulic Engineer	TBD	TBD	30%, 60%, 90%
Mechanical Engineer	TBD	TBD	90%
Structural Engineer	TBD	TBD	30%, 60%, 90%



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New York District

Type II Independent External Peer Review (IEPR) Panel

DISCIPLINE	NAME	REVIEW DISTRICT
IEPR Lead	TBD	TBD
Civil Engineer	TBD	TBD
Electrical Engineer	TBD	TBD
Geotechnical Engineer	TBD	TBD
Hydraulic Engineer	TBD	TBD
Mechanical Engineer	TBD	TBD
Structural Engineer	TBD	TBD



New York District

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ATTACHMENT 3: ADDITIONAL INFORMATION ON RISK DRIVERS

See attached memo.

Attachment 3: Risk Informed Assessment

CENAN-EN

9 November 2017

MEMORANDUM FOR RECORD

SUBJECT: Green Brook Flood Risk Reduction Project, Segment C-1, Contract 1
Levee, Pump Station and Drainage Piping Construction (Safety Assurance Review)

1. Reference is made to the following with regard to the Safety Assurance Review for Implementation Documents:

EC 1165-2-214, paragraph 15.a.

2. **PROJECT BACKGROUND AND DESCRIPTION**

The Green Brook Sub Basin is located within the Raritan River Basin in north-central New Jersey in the counties of Middlesex, Somerset and Union. It encompasses 13 municipalities and drains approximately 65 square miles of primarily urban and industrialized area. For the majority of the project area, the most damaging floods of record resulted from the August 2, 1973 storm, Tropical Storm Floyd on September 16, 1999 and April 15-17 2007 Nor'easter. Eight deaths were attributed to these floods. The Final General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS), dated May 1997 recommended flood protection for the Lower Basin and Stony Brook Basin, and is supported by the project sponsor, the New Jersey Department of Environmental Protection. This project is authorized for construction in Section 401a of the Water Resources Development Act of 1986.

The objective of the Green Brook Flood Control Project, Segment C-1, Contract 1 Levee and Pump Chamber is to provide protection against floods up to a 150 year event for the Green Brook Sub-basin, which is part of the Raritan River Basin. Segment C-1 consists of a floodwall, levee, pump chamber and culvert.

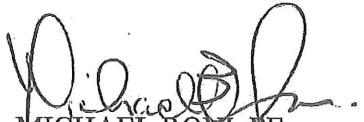
3. **SIGNIFICANT THREAT TO HUMAN LIFE ASSESSMENT**

In accordance with EC 1165-2-214 (15 December 2012), Civil Works Review Policy, a risk informed assessment was made as to whether there is a significant threat to human life (Table 1).

4. **CONCLUSION**

The Water Resources Development Act of 2007, under Section 2034, part (a), states that a project may require a Type II Safety Assurance Review (SAR) if there is a significant threat to human life. Based on a risk informed assessment of significant threat which

considered life safety factors, there is a significant threat to human life associated with the Green Brook Segment C-1 Flood Risk Management Project. Accordingly, a Type II IEPR, Safety Assurance Review, is warranted and it will be performed.



MICHAEL ROVL, PE
Chief, Engineering Division

Encls

Table 1

No.	Risk Factor (Possible Threat to Life Safety)	Risk Magnitude (H/M/L)	Basis of Concern	Risk Assessment
1	<i>Land Use adjacent to the project:</i>	Medium	The land use adjacent to the project is generally residential and comprised of single family homes with some commercial and municipal structures.	See 1a – 1c below.
1a	<ul style="list-style-type: none"> Population Density 	Medium	The density behind the levee may increase after the project is completed	Due to population density, many people could be affected by flooding or project failure.
1b	<ul style="list-style-type: none"> Critical Facilities Affected (e.g. schools, hospitals, assisted living/nursing homes, evacuation routes) 	Low	New or changes usage would introduce critical facilities to the protected area.	The Borough of Middlesex issues evacuation orders to those in flood prone areas prior to storm events to minimize, to the extent possible, the chances that individuals will be trapped during storm events.
1c	<ul style="list-style-type: none"> Numbers/ types of structures in flood plain 	Medium	There are generally two story, single family homes, with some commercial and municipal structures.	Project structures within the floodplain could be adversely affected by flooding or project failure.
2	Structural failure of project components	Medium	Weather event that creates discharge on Green Brook that could cause significant damage to levee/floodwall system thereby leading to loss of functional integrity.	For the completed project, structural failure of a project component up to the design event is unlikely due to the use of proven design and construction techniques. However, larger events which can lead to failure would result in significant flood damages and impact a large number of people. Risk would be inherent with all levee/floodwall projects.
3	Overtopping of Hydraulic Structure	High	Weather event that creates discharge on Green Brook that would exceed the design elevation or cause debris jam that restricts flow resulting in overtopping of levee/floodwalls.	Overtopping could lead to structural failure or a breach, which is high risk situation.

4.	<ul style="list-style-type: none"> Use of unique or non-traditional design methods 	Low	Unique or non-traditional design methods may be poorly understood or inadequately designed and may be more subject to failure than proven design methods	The design of this project will be performed by accepted methods in accordance with COE guidance. No innovative or precedent setting methods or models are anticipated.
5.	<ul style="list-style-type: none"> Use of unique or non-traditional design features 	Low	Unique or non-traditional design features may be poorly understood or inadequately designed and may be more subject to failure than proven design features.	The design of this project will fall within prevailing practice and include only time tested design features (levees, floodwalls and pump station).
6.	Use of unique non-traditional construction materials or methodologies	Low	Unique or non-traditional materials or methods may be poorly understood or executed inadequately resulting in a project feature that may be more subject to failure than those built with proven materials and methods.	All materials used will be within common practice.
7.	Does this project have unique construction sequencing or a reduced or overlapping design/ construction schedule?	Low	Accelerated construction may lead to poor quality work, leading to unexpected maintenance and repairs. Construction sequencing will result in only partial protection.	Due to the construction sequencing, the authorized level of protection will not be achieved until all portions of Segment C are constructed.
8.	<i>Does the project Require:</i>			
8a.	Redundancy	Low	Failure of one critical project element would result in sudden, catastrophic damage. Duplication of critical components of the protective system is required to increase the reliability of the system.	The levees, floodwalls and pump stations greatly reduce the risk to human life and property relative to the without project conditions. The outlet structures have sluice gate/flap valve as a redundant feature.
8b.	Resiliency	Medium	Level of protection maybe reduced over time.	Adherence to OMRR&R requirements will ensure that the project remains at full operating efficiency. However, over time the hydrology may change thereby reducing the level of protection.

8c.	Robustness	Medium	Natural events can occur that are greater than the design level and may lead to project failure.	This project is designed to provide protection against a 150 year event. Should more severe events occur, inundation damages to structures may exceed the without-project condition.
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ATTACHMENT 4: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number

