



DEPARTMENT OF THE ARMY  
U.S. ARMY ENGINEER DIVISION, GREAT LAKES AND OHIO RIVER  
CORPS OF ENGINEERS  
550 MAIN STREET  
CINCINNATI, OH 45202-3222

CELRD-PD-S

15 December 2016

MEMORANDUM FOR Commander, U.S. Army Engineer District, Chicago, 231 South LaSalle Street, Suite 1500, Chicago, IL 60604-1437

SUBJECT: Little Calumet River Flood Risk Management Project Implementation Phase Review Plan (RP) - MSC Approval

1. References:

a. CELRC-DE memorandum, dated 6 May 2016, subject: Little Calumet River Flood Risk Management Project – Review Plan (Encl).

b. EC 1165-2-214, dated 15 December 2012, Water Resources Policies and Authorities, “Civil Works Review”.

2. The enclosed RP was presented to the Great Lakes and Ohio River Division for approval in accordance with reference 1.b.

3. The Little Calumet River Flood Control and Recreation project includes flood control and recreation benefits along the Little Calumet River in Northwest Indiana. The project was authorized in the 1986 Water Resources Development Act and consists of replacing and expanding existing levees and floodwalls, rehabilitation of existing pump stations, a flow control structure, nonstructural floodproofing, and a flood warning system for flood damage reduction and recreation features. The non-Federal sponsor for the study is the Little Calumet River Basin Development Commission.

4. The Implementation Phase RP defines the scope and level of peer review for the activities to be performed for the subject project phase. The USACE LRD Review Management Organization (RMO) has reviewed the attached RP and concurs that it describes the scope of review for work phases and addresses all appropriate levels of review consistent with the requirements described reference 1.b.

5. I concur with the recommendations of the RMO and approve the enclosed RP for the Little Calumet River Flood Control and Recreation project.

6. The District is requested to post the RP to its website. Prior to posting, the names of all individuals identified in the RP and the dollar values of all project costs should be redacted.

CELRD-PD-S

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7. If you have any questions please contact Mr. Frank Appelfeller, CELRD-RB-T, at (513) 684-6200, or Ms. Rita Boccieri, CELRD-PD-S, at (513) 684-6249.

**BUILDING STRONG and Taking Care of People!**

**R. MARK TOY**  
Brigadier General, USA  
Commanding

Encl

**IMPLEMENTATION PHASE  
REVIEW PLAN**

**LITTLE CALUMET RIVER, INDIANA  
FLOOD RISK MANAGEMENT PROJECT**

*Chicago District*

**MSC Approval Date:** 15 Dec 2016

**Last Revision Date:** 18 November 2016



**US Army Corps  
of Engineers** ®

**REVIEW PLAN**

***LITTLE CALUMET RIVER, INDIANA  
FLOOD RISK MANAGEMENT PROJECT***

**TABLE OF CONTENTS**

1. PURPOSE AND REQUIREMENTS..... 2

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION..... 3

3. PROJECT INFORMATION ..... 4

4. IN-KIND CONTRIBUTIONS..... 4

5. DISTRICT QUALITY CONTROL (DQC)..... 4

6. AGENCY TECHNICAL REVIEW (ATR)..... 5

7. INDEPENDENT EXTERNAL PEER REVIEW (IEPR) ..... 8

8. REVIEW SCHEDULES AND COSTS ..... 10

9. PUBLIC PARTICIPATION..... 11

10. MSC APPROVAL..... 11

11. REVIEW PLAN POINTS OF CONTACT ..... **Error! Bookmark not defined.**

Figure 1: Little Calumet River Levee System..... 13

Figure 2: Little Calumet River Profiles and Closures..... 14

Table 1: Little Calumet River Summary of Stage and Products ..... 15

Table 2: Project Delivery Team Roster..... 17

Table 3: Agency Technical Review Team Roster and Team Expertise ..... 18

**ATTACHMENT 1** ..... 21

**ATR CERTIFICATION TEMPLATE** ..... 21

Table 5: Little Calumet River, Indiana, Flood Risk Management Project Review Plan Revisions ..... 22

## 1. PURPOSE AND REQUIREMENTS

a. **Purpose.** This Review Plan for Little Calumet River Flood Risk Management Project will ensure a quality-engineering project is developed by the United States Army Corps of Engineers (USACE) in accordance with Engineer Circular (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 # 113567). The District Chief of Engineering has assessed that risk of the project is significant; therefore a Safety Assurance Review (SAR) will be required.

### b. References

- (1) Engineer Circular (EC) 1165-2-214, Civil Works Review, 15 December 2012.
- (2) Engineer Regulation (ER) 1110-1-12, Quality Management, 31 July 2006.
- (3) 14610 LRD - Preparation and Approval of Civil Works Review Plans – Qualtrax Document ID # 4833, 22 September 2011
- (4) Project Management Plan for the Little Calumet River, Indiana Local Flood Control and Recreation Project, revised 30 Mar 2007
- (5) Little Calumet River Project, Post Authorization Change Report (PACR), February 2011.
- (6) Little Calumet River Project, Limited Reevaluation Report (LRR), October 2011.
- (7) Little Calumet River Levee Systems Map Exhibit, 21 October 2011.

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.

- (1) **District Quality Control (DQC).** DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). Basic quality control tools include a Quality Management Plan providing for seamless review, quality checks and reviews, supervisory reviews, Project Delivery Team (PDT) reviews, etc. It is managed in the home district. Quality checks may be performed by staff responsible for the work, such as supervisors, work leaders, team leaders, designated individuals from the senior staff, or other qualified personnel. However, they should not be performed by the same people who performed the original work, including managing/reviewing the work in the case of contracted efforts. Additionally, the PDT is responsible for a complete reading of any reports and accompanying appendices prepared by or for the PDT to assure the overall coherence and integrity of the report, technical appendices, and the recommendations before approval by the District Commander. The Major Subordinate Command (MSC)/District Quality Management Plans address the conduct and documentation of this fundamental level of review.

- (2) **Agency Technical Review (ATR).** EC 1165-2-214 requires that USACE Risk Management Center (RMC) shall serve as the RMO for Dam Safety Modifications projects and Levee Safety Modification projects. For all other projects, the MSC shall serve as the RMO. ATR is an in-depth review, managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of the project/product. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. The ATR team reviews the various work products and assures that all the parts fit together in a coherent whole. ATR teams will be comprised of senior USACE personnel, preferably recognized subject matter experts with the appropriate technical expertise such as Regional Technical Specialists (RTS), and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team shall be from outside the home MSC.
- (3) **Independent External Peer Review (IEPR).** IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. For clarity, IEPR is divided into two types, Type I is generally for decision documents and Type II is generally for implementation documents.

A Type II IEPR Safety Assurance Review (SAR) shall be conducted on design and construction activities for hurricane and storm risk management and flood risk management projects, as well as other projects where potential hazards pose a significant threat to human life. This applies to new projects and to the major repair, rehabilitation, replacement, or modification of existing facilities. External panels will review the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed. The review shall be on a regular schedule sufficient to inform the Chief of Engineers on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring that good science, sound engineering, and public health, safety, and welfare are the most important factors that determine a project's fate.

- d. Review Progress.** The review plan will be updated as appropriate and approved by the MSC throughout the Preconstruction Engineering and Design (PED) and Construction Phases.

## **2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION**

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 Lakes and Rivers Division (LRD), the Major Subordinate Command (MSC). In-Progress Review (IPR) team meetings with the RMC, LRD, and Headquarters USACE (HQ) will be scheduled on an "as needed" basis to discuss programmatic, policy, and technical matters. The LRD Dam/Levee Safety Program Manager will be the POC for vertical team coordination. This review plan will be updated for each new project phase. The Chicago District will assist the RMC with management of the ATR and IEPR reviews and development of the draft ATR and IEPR "charges".

### 3. PROJECT INFORMATION

- a. **Purpose.** The authorized project consists of constructing levees and floodwalls along approximately 13 miles of the Little Calumet River from the Illinois-Indiana state line to the Norfolk Southern (formerly Conrail) Railroad embankment. The project site falls entirely in the state of Indiana, including the cities Gary, Munster, Hammond, Highland and Griffith. The project includes the rehabilitation of approximately 16 existing pump stations, the construction of a flow control structure in the vicinity of Hart Ditch, a flood warning system, and the construction of recreation trails and other features. The project extends from the communities of Hammond and Munster at the Illinois-Indiana state line to the Norfolk Southern (formerly Conrail) Railroad embankment in Gary, Indiana. The project also includes the Marshalltown levee located east of the N-S RR embankment. Reference Figure 1, Little Calumet River Systems, and Figure 2, Little Calumet River Profiles and Closures, for an overview of project extents, reaches, phases and hydraulic profiles as part of this document.
- b. **Factors Affecting the Scope and Level of Review.** Construction for the Little Calumet River Flood Control Project began in the mid-1990's and construction of the last final major construction contracts, Stage 7 and Stage 8, were completed in 2012. The Project Authorization Request (PAR) for the project is 617,000 people. The only remaining flood damage reduction features left to be built are the Southmoor floodwall segment and the levee tiebacks at the east and west ends of the project. Since the project formulation and authorization, nearly 30 years have spanned and over the course of those years, the Corps of Engineer's views and policies related to levee safety and levee system definitions have changed. The Little Calumet River Flood Control Project Engineering Documentation Report (EDR) will ensure that the authorized level of protection is provided upon completion of the project and bridge the gap between old and new policies for levee safety to act as a system. Approximately 90% of the project is completed and operating. The IEPR II review team will ensure that the levee/floodwall system is designed and functioning according to the authorized purpose and meets current levee safety standards.
- c. **Products.** Table 1 attached to this document is a list of the products along with the status of the design phase or construction phase and ATR/Internal Technical Reviews (ITR) completion dates. ITR was the predecessor to ATR and is why the date is shown. All elements were designed in accordance with USACE criteria in effect at the time of design. In addition, the products under design or construction are indicated.
- d. **Review Progress.** The review plan will be updated and approved by the MSC throughout the PED and Construction Phases.
- e. **Project Delivery Team.** The PDT is listed in Table 2.

### 4. IN-KIND CONTRIBUTIONS

The Non-Federal Cost Share Sponsor for this project is the Little Calumet River Basin Development Commission (LCRBDC). The costs for the Type II IEPR described in this Review Plan will be cost-shared 75 percent Federal and 25 percent Non-Federal and have been previously provided through approved cost share credits. There are no in-kind contributions that would need to be reviewed.

### 5. DISTRICT QUALITY CONTROL (DQC)

All implementation documents (including supporting data, analyses, environmental compliance documents, etc.) and design documents shall undergo DQC. DQC is an internal review process of basic

science and engineering work products focused on fulfilling the project quality requirements defined in the PMP. Basic quality control tools include a Quality Management Plan providing for seamless review, quality checks and peer reviews, supervisory reviews, and PDT reviews throughout the life of the project. Detailed Quality Control Procedures will be described in a separate Quality Control Plan (QCP) for each produce per business process 08504 LRC – QC/QA Procedures for Civil Works. DQC efforts will include the necessary expertise to address compliance with published Corps policy and will be performed on all work products of the project. DQC was performed on all of the completed projects and will be performed on all the remaining work products of the project.

- a. **Documentation of DQC.** All designs will be checked and initialed by the reviewer. Comments and responses from reviewers and Chiefs for the design products shall be documented and maintained in shared electronic folders. The design product PDT member checklist will be completed and signed by the Chiefs.
- b. **Products to Undergo DQC.** All remaining design products are listed in Table 1 attached to this document and will undergo DQC. The three remaining products are for the Southmoor Floodwall, the Levee Tiebacks and Wetland Mitigation.

## 6. AGENCY TECHNICAL REVIEW (ATR)

- a. **General.** ATR shall be performed for all implementation documents (including supporting data, analyses, environmental compliance documents, etc.) and design products and will be in accordance with EC 1165-2-214. 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 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. ATR will be conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate to assure the project acts as a system. The ATR team lead will be from outside the home MSC. The ATR is intended to be on going throughout product development, using a team concept, not a cumulative process performed at the end. The Little Calumet project has spanned nearly 30 years and technical review requirements and policies have changed over the years. The required technical reviews were completed for the products during the design phase. Prior to the ATR policy released in January 2010, Internal Technical Review (ITR) was performed on some of the products and the certification dates are documented in Table 1. Feature Design Memoranda were reviewed by MSC technical staff and site visits were conducted.
- b. **Products for Review.**

All products under the Little Calumet project are listed below in Table 1. The completed products have undergone technical reviews as required at the time of the design including ATRs and ITRs. The remaining design products to undergo ATR review are the following:

- (1) Engineering Documentation Report (EDR).

The project formulation and authorization as well as design and construction of Little Calumet River Flood Control project have spanned nearly 30 years and over the course of those years, the Corps of Engineers views and policies related to levee safety and levee system definitions have changed. The EDR, which covers the entire system, is prepared to ensure that the authorized



level of protection is provided upon completion of the project and addresses level of protection in the project area that is below the authorized level.

- (2) Plans & Specifications for the remaining levee tiebacks and Southmoor Floodwall. One set for each project will be provided.

The remaining levee tiebacks are located in the City of Hammond, Town of Munster, and City of Gary, Indiana. An ATR was completed for the City of Hammond levee tiebacks that is currently in construction phase.

The Southmoor portion of Stage VIII project is located on the north side of the Little Calumet River, east of Hohman Avenue in the Town of Hammond, Indiana. The project includes design of approximately 650 lineal feet of floodwall and drain outlet. This portion of Stage VIII is pending Local Sponsor approval.

Since these are separate but related products, an ATR review will be conducted separately for each product.

- c. **Required ATR Team Expertise.** 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. See Table 3 for ATR members. The composition of the ATR team shall be assembled on a design case-by-case basis. For example, a geotechnical engineer and structural engineer were used for the Hammond-Forest Avenue Tieback levee design. 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](https://team.usace.army.mil/sites/ERDC-CRREL/PDT/atr_certification/default.aspx).

**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:

**Geotechnical Engineer** – The Geotechnical Engineer shall be a senior engineer, an expert in the field of engineering, and have knowledge of advance engineering concepts, principles and practices of geotechnical engineering including design of levees and floodwalls. The reviewer shall have thorough understanding of soil mechanics, subsurface investigation, groundwater hydrology and seepage, slope stability analyses, earthwork construction and other geotechnical applications. The geotechnical engineer shall be a licensed Professional Engineer.

**Hydraulics and Hydrology Engineer** – Hydraulics and Hydrology Engineering reviewer shall be a senior engineer, an expert in the field of hydraulics, and have a thorough understanding of the application of levees and floodwalls, non-structural solutions involving flood warning systems and flood proofing, etc., and computer modeling techniques that will be used such as HEC-RAS, FLO-2D, UNET, TABS, etc. The hydraulic engineer shall be a licensed Professional Engineer.

**Structural Engineer** – The structural engineer shall be a senior engineer, an expert in the field of structural engineering, and have thorough knowledge of stability analyses and structural design of floodwalls and retaining walls. The structural engineer shall be familiar with current design software. The structural engineer shall be a licensed Professional Engineer and/or Structural Engineer.

**d. Documentation of ATR.** DrChecks review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should 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, ASA (CW)/USACE 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 must take to resolve the concern.

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 DrChecks will include 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 DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

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:

- Identify the document(s) reviewed and the purpose of the review;
- 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;
- Identify and summarize each unresolved issue (if any); 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.

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 Statement of Technical Review certifying that the issues raised by the ATR team have been resolved (or elevated to the vertical team). A Certification of ATR should be completed, based on work reviewed to date, draft report, and final report. A Certification of ATR is included in Attachment 1.

## 7. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision, as described in EC 1165-2-214, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. Additional questions will be developed but the Type II IEPR will help assure the entire project acts as a system. A Type II IEPR is described below:

- Type II IEPR, or Safety Assurance Review (SAR), is managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.
- a. **Decision on Type II IEPR.** In accordance with EC 1165-2-214, a Type II IEPR (SAR) will be conducted on design and construction activities for flood risk management projects. The Little Calumet project provides flood protection for highly urbanized communities in the State of Indiana and failure of the system poses a significant threat to human life. The IEPR II review is critical to ensure that safety risks and concerns are addressed and levee safety standards are emphasized.
- b. **Products for Review.** An orientation briefing will be coordinated by the District and will include a presentation of the project history and reaches, studies, reports, design documents, etcetera. The orientation briefing will also include a site visit of the entire project. The Type II IEPR review of the design and construction products will include the City of Hammond, Town of Munster, and Town of Highland completed sections, and three upcoming levee segments – Munster Stateline Tieback, Hammond-Forest Avenue Tieback, and Stage VIII Southmoor Levee. The Munster Stateline Tieback levee and Southmoor levee features were in the design phase when the policy for Type II IEPRs was implemented; and the tiebacks are still to be designed and constructed, pending Local Sponsor approval. Note that the Southmoor residents objected to having a flood control structure constructed in their backyards that would obstruct their view of the river and that would result in the loss of trees. Completion of the design and initiation of the construction phase for Southmoor is pending resolution of issues addressing the residents' concerns. The Southmoor portion of Stage VIII design is being reviewed again by LRC and the local sponsor during the design phase. Therefore, the IEPR will be performed on the Southmoor portion if it is to be designed and/or awarded for construction within the timeframe of the IEPR study. The review will also include Feature Design Memoranda, an Engineering Documentation Report, one set of plans and specifications for each project, each project's Detailed Design Report and all relevant design and construction information, and the O&M manuals, and other support documentation as specified in the RMC's template SOW.
- c. **IEPR Review Team.** SAR Type II IEPR Review Team will be established, in consultation with the RMC, and will be comprised of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. The Review Team will be selected based on their technical qualifications and experience. The Review Team must be independent of USACE and free of conflicts of interests. The Review Team will have experience in design and construction of projects similar in scope to

the Little Calumet River Project. The Review Team shall be distinguished experts in their field. The Review Team members must also have engineering degrees. A minimum Master's degree or higher degree in engineering is required as well as hands-on relevant engineering experience in the listed disciplines being of significant importance. The Review Team members shall be comprised of Level 3 Engineers as described in the Type II IEPR SOW and as listed in Table 4. The required minimum experience in required disciplines will be described in the Type II IEPR SOW.

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 distinguished 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.

**Geotechnical Engineer** - The Geotechnical Engineer shall be a senior engineer, an expert in the field of engineering, and have knowledge of advance engineering concepts, principles and practices of geotechnical engineering including design of levees and floodwalls. The reviewer shall have thorough understanding of soil mechanics, subsurface investigation, groundwater hydrology and seepage, slope stability analyses, earthwork construction and other geotechnical applications. The geotechnical engineer shall be a licensed Professional Engineer.

**Hydraulic Engineer** – Hydraulic engineering reviewer shall be a senior engineer, an expert in the field of hydraulics, and have a thorough understanding of the application of levees and floodwalls, non-structural solutions involving flood warning systems and flood proofing, etc., and computer modeling techniques that will be used such as HEC-RAS, FLO-2D, UNET, TABS, etc. The hydraulic engineer shall be a licensed Professional Engineer.

**Structural Engineer** – The structural engineer shall be a senior engineer, an expert in the field of structural engineering, and have thorough knowledge of stability analyses and structural design of floodwalls and retaining walls. The structural engineer shall be familiar with current design software. The structural engineer shall be a licensed Professional Engineer and/or Structural Engineer.

**Project Manager** – The Project Manager (PM) shall be a registered professional engineer or geologist with a minimum of five years project management experience related to the above discipline descriptions. The PM will be the liaison/Point of Contact for the panel. The PM shall have extensive knowledge of risk-based levee safety analysis, levee safety procedures and remedial construction (including risk reduction measures and cutoff wall construction) for levees/floodwalls similar in size and geologic setting to the Little Calumet River, Indiana, Flood Risk Management Project.

- d. **Documentation of IEPR.** DrChecks review software will be used to document IEPR comments and aid in the preparation of the Review Report. Comments should address the adequacy and acceptability of engineering and environmental methods, models, data and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Paragraph 7.d., Documentation of ATR. The IEPR team will be responsible for compiling and entering comments into DrChecks. The IEPR team will prepare a Review Report for each review 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 prepared by the RMC;
- Describe the nature of their review and their findings and conclusions;
- 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; and
- Other documentation as prescribed in the Type II IEPR SOW.

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.

## 8. REVIEW SCHEDULES AND COSTS

- a. DQC Schedule and Cost.** The cost for DQC is included in the costs for PDT activities and is not broken out separately. DQC will occur seamlessly during throughout the EDR and the P&S. Quality checks and reviews occur during the development process and are carried out as a routine management practice. DQC was completed for the EDR and Southmoor Floodwall products. Tie Backs plans and specification 100% DQC review was completed in June 2016.
- b. ATR Schedule and Cost.** The estimated cost for ATR is \$40,000. ATR will occur during the 100% review of P&S. The ATR team is invited to take part in weekly team meetings and monthly vertical team meetings. An approximate schedule for the products ATR reviews is shown below and will be further defined during the development of the product's Quality Control Plans. Comment resolution meetings will be scheduled with the ATR team, if necessary.

ATR Milestones	
Gary Levee Tiebacks P&S Review	TBD
Munster Levee Tiebacks P&S Review	TBD
Southmoor Floodwall System	TBD
Levee System Evaluation Reports	TBD*

\*The ATR of the Levee System Evaluation Reports (LSERs) will be performed upon completion of each report. Four to five separate reports are anticipated. One has been completed.

- c. IEPR Schedule and Cost.** The estimated cost for Type II IEPR (SAR), including the cost for the RMC to administer and manage the review, is in the range of \$ - to \$ -. IEPR schedule of the products listed will be coordinated with the RMC upon approval of this Review Plan. Comment resolution meetings will be scheduled with the IEPR team, if necessary.

IEPR (SAR) Milestones	
Completed Project Review Phase	May 2017
Hammond-Forest Avenue Tieback Design Phase Review*	June 2017

Hammond-Forest Avenue Tieback Construction Phase Review*	July 2017
Munster Tieback Design Phase Review*	TBD
Munster Tieback Construction Phase Review*	TBD
Southmoor Floodwall Design Phase Review*	TBD
Operation, Maintenance, Repair, Replacement and Rehabilitation Review Phase	September 2017
Periodic Inspection Report Review Phase	October 2017
Final IEPR SAR Report Submittal	October 2017

\*The review portion of the Type II IEPR will occur at 100% design phase, 25% construction complete milestones for the Hammond-Forest Avenue Tieback, Munster Tieback, and Southmoor Floodwall contracts.

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.

## 9. PUBLIC PARTICIPATION

Since initiation of the Little Calumet River Project, numerous public meetings have been conducted. Close coordination with the Little Calumet River Basin Development Commission and local municipalities regarding each phase of the project has occurred over the last 30 years. As a result, some municipalities have taken a more active role in the operation and maintenance of the portion of the project within their boundaries. Additional public meetings will be conducted, as necessary, through the design and construction phases for the Southmoor Floodwall and Levee Tiebacks and Hobart Marsh Mitigation products. Information will also be conveyed to the public through the use of press releases and media interviews as necessary and through the Chicago District's web site. There is no formal public review for the design documents of the Southmoor Floodwall and Levee Tiebacks products. However, the Little Calumet River Basin Development Commission and local municipalities will have opportunities to review the plans and specifications of the design products during the design phases. Upon MSC approval of this Review Plan, the Review Plan will be posted on the Chicago District Internet for Public Review. As required by EC 1165-2-214, the approved Review Plan will be posted on the District public website (<http://www.lrc.usace.army.mil/pm/pmPeerReview.html>). 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.

## 10. MSC APPROVAL

The Great Lakes and Ohio River Division is responsible for approving the review plan. Approval is provided by the MSC Commander. The commander's approval should reflect vertical team input (involving district, MSC, RMC, and HQUSACE members) as to the appropriate scope and level of review for the project and endorsement by the RMC. Like the PMP, the Review Plan is a living document and may change as the study progresses. Changes to the review plan should be approved by

following the process used for initially approving the plan. In all cases the MSCs will review the decision on the level of review and any changes made in updates to the project. The latest version of the Review Plan, along with the Commanders' approval memorandum, will be posted on the District's webpage (<http://www.lrc.usace.army.mil/pm/pmPeerReview.html>) and linked to the HQUSACE webpage. The latest Review Plan should also be provided to the RMO and home MSC.

# Little Calumet River Levee Systems

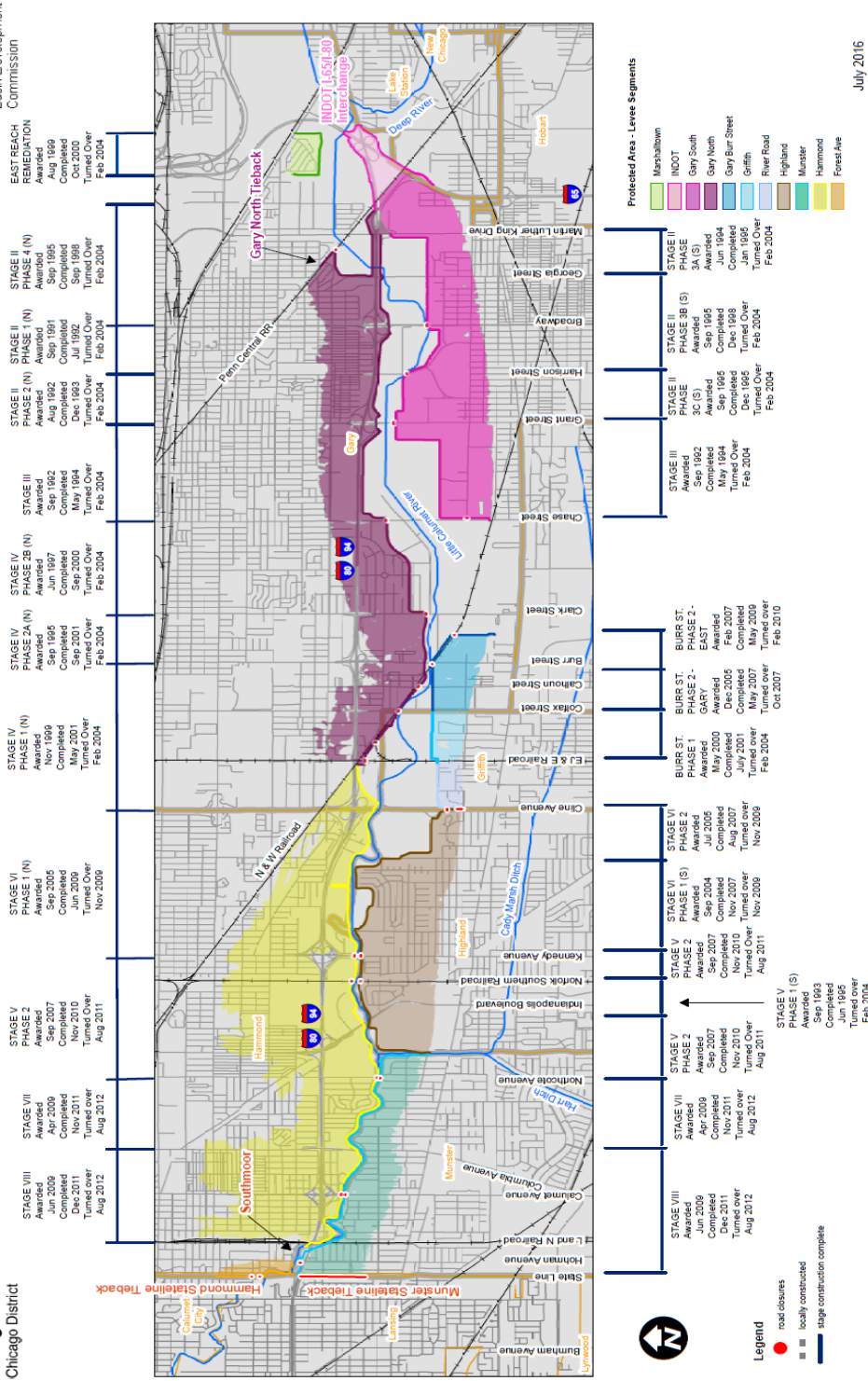


Figure 1: Little Calumet River Levee System



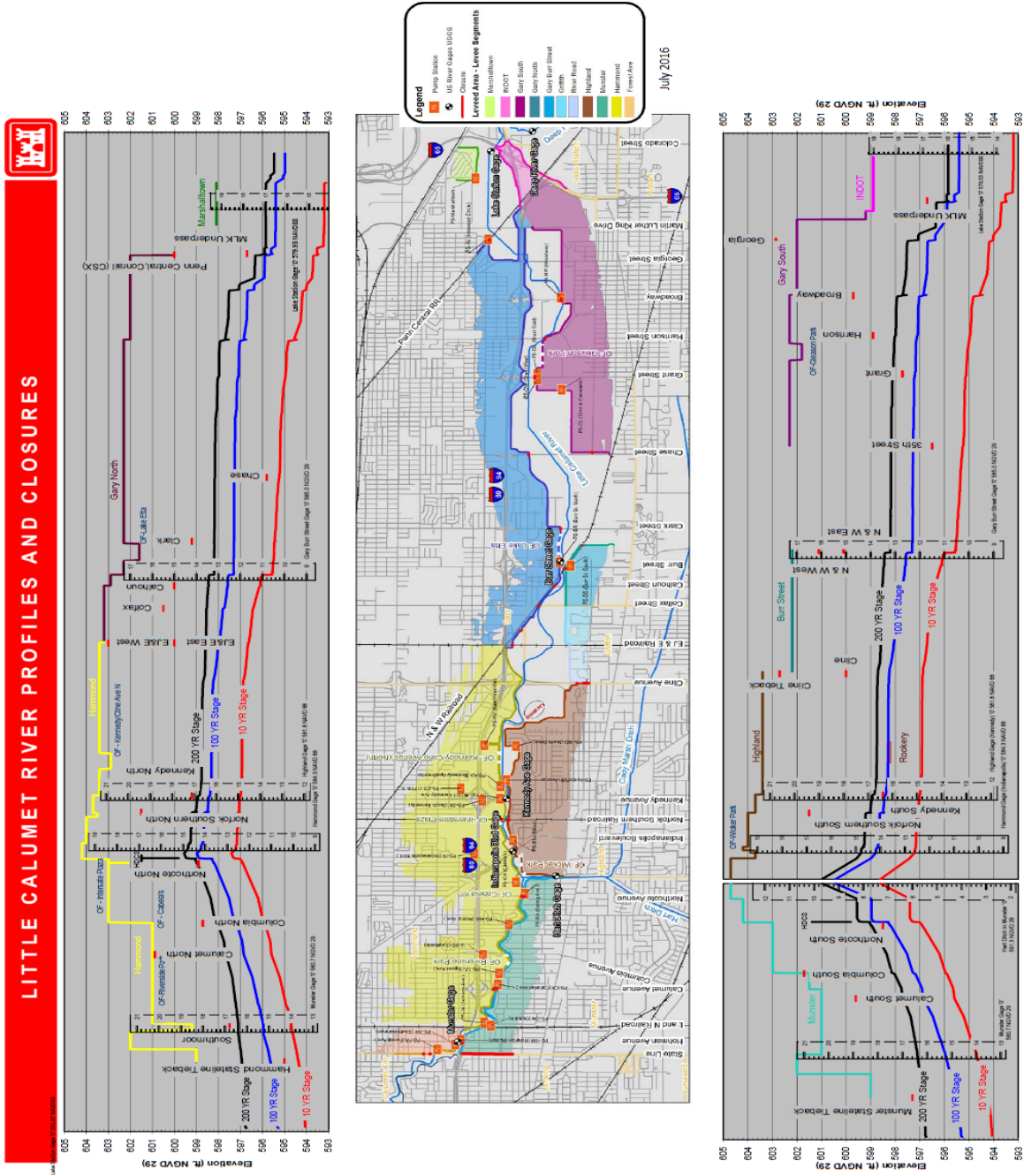


Figure 2: Little Calumet River Profiles and Closures

**Table 1: Little Calumet River Summary of Stage and Products**

<b>Stage</b>	<b>Product</b>	<b>Design or Construction Completion Phase/Date</b>	<b>ATR/ITR</b>
Stage I	Evacuation and Demolition	Construction complete	
	Utility Protection	Construction complete	
	Burr Street Betterment Levee System – Phase 1	Const. complete 6/2001	
	Burr Street Betterment Levee System – Phase 2, Gary	Const. complete 5/2007	ITR - 6/18/2004
	Burr Street – Phase 2, East	Const. complete 5/2009	ITR - 3/2/2006
	Flood Warning System	Construction complete	
Stage II - North and South Levees: Grant to Martin Luther King (MLK)	Phase 1 –N Levee Harrison to Broadway	Const. complete 7/10/1992	
	Phase 2 –N Levee Grant to Broadway	Const. complete 7/10/1992	
	Phase 3 –S Levee Grant to MLK	Const. complete 9/25/1998	
	Phase 4 –N Levee Broadway to MLK	Const. complete 9/22/1998	
Stage III	Stage III – North and South Levees Chase to Grant	Const. complete 5/6/1994	
Stage IV – North Levees Cline to Chase	Phase 1 –Cline to Burr	Const. complete 11/16/2001	
	Phase 2 –Burr to Chase	Const. complete 9/30/2000	
Stage V	Phase 1 – Abandoned Erie Railroad to Conrail Railroad	Const. complete 7/1/1995	
	Phase 2 – North and South Levees Northcote to Kennedy, Including Hart Ditch Control Structure	Const. complete 11/2010	ITR - 07/25/2007
Stage VI –North and South Levees Kennedy to Cline	Phase 1N - N Levees Kennedy to Liable	Const. complete 6/2009	ITR - 03/31/2005
	Phase 1S - S Levees Kennedy to Liable	Const. complete 11/2007	ITR - 06/30/2004
	Phase 2 - S Levee Liable to Cline	Const. complete 8/2007	ITR - 04/30/2004
Stage VII	North and South Levees Columbia to Northcote	Const. complete 11/2011	ITR - 07/31/2008
Stage VIII	North and South Levees Indiana - Illinois state line to Columbia	Const. complete 12/2011	ITR - 03/31/2008

Southmoor	*Southmoor Floodwall - Hohman Ave to Lyman (Design at 100% Level)	100% Design (On Hold)	ATR – 03/2012
Tiebacks	Tieback Levee - Indiana - Illinois state line (Hammond-Forest Avenue)	Construction in progress	
Tiebacks	*Tieback Levee - Munster	50% Design (On Hold)	
Tiebacks	*Tieback Levee - Ironwood Park - Gary	50% Design (On Hold)	
Rehabilitation of Existing Pump Stations	Pump Station 1 A	Const. complete 11/21/2004	
	Pump Station 1 B	Const. complete 9/18/2001	
	North 5th Pump Station	Const. complete 11/30/2007	
	Pump Station 2A	Const. complete 9/18/2001	
	Pump Station 2B	Const. complete 4/28/2011	
Recreation Facilities	Recreation Contract 1 (East Reach)	Const. complete - 4/28/1997	
	Recreation Contract 2 (West Reach)	Const. complete	
Landscaping	Landscaping Contract 1 (East Reach)	Construction complete	
	Landscaping Contract 2 (East Reach)	Construction complete	ITR - 03/23/2004
Wetland Mitigation	*Mitigation Contract 1 (In-Project Lands)	Design kickoff TBD	
	Mitigation Contract 2 (Hobart Marsh)	Construction in progress	ATR - 6/17/2016

\*Remaining Work

**Table 2: Project Delivery Team Roster**

<b>TABLE 2: Project Delivery Team</b>		
<b>Functional Area</b>	<b>Name</b>	<b>Office</b>
Project Management Branch		PM-PM
Civil Design Section - Lead Engineer		TS-DC
Economic Formulation and Analysis Section		PM-PL-F
Environmental Formulation and Analysis Section		PM-PL-E
Mech/Elec Design Section		TS-DT
Mech/Elec Design Section		TS-DT
Hydraulic Engineering Section		TS-HH
Environmental Engineering Section		TS-HE
Geotechnical Section		TS-DG
Structural Engineering Section		TS-DS
Cost Engineering Section		TS-DC
Specifications Section		TS-DT
Real Estate Division		LRE-RE
Contracting Office		CT
Construction Section		TS-C-C
Construction Section		TS-C-C
Office of Counsel		OC
Public Affairs		PAO
Calumet Area Office		TS-C-S

**Table 3: Agency Technical Review Team Roster and Team Expertise**

Name	ATR Team Disciplines		Expertise
	ATR Lead – Hydraulics and Hydrology		The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead will also serve as a reviewer for the Hydraulics and Hydrology discipline. Hydraulic engineering reviewer shall be a senior engineer, an expert in the field of hydraulics, and have a thorough understanding of the application of levees and floodwalls, non-structural solutions involving flood warning systems and flood proofing, etc., and computer modeling techniques that will be used such as HEC-RAS, FLO-2D, UNET, TABS, etc. The hydraulic engineer shall be a licensed Professional Engineer.
	Geotechnical Engineering		The Geotechnical Engineer shall be a senior engineer, an expert in the field of engineering, and have knowledge of advance engineering concepts, principles and practices of geotechnical engineering including design of levees and floodwalls. The reviewer shall have thorough understanding of soil mechanics, subsurface investigation, groundwater hydrology and seepage, slope stability analyses, earthwork construction and

			other geotechnical applications. The geotechnical engineer shall be a licensed Professional Engineer.
	Structural Engineering		The structural engineer shall be a senior engineer, an expert in the field of structural engineering, and have thorough knowledge of stability analyses and structural design of floodwalls and retaining walls. The structural engineer shall be familiar with current design software. The structural engineer shall be a licensed Professional Engineer and/or Structural Engineer.

**Table 4: Independent External Peer Review Team Roster and Experience Criteria**

<b>NAME</b>	<b>DISCIPLINE</b>	<b>EXPERIENCE</b>
TBD	Project Manager	Registered professional engineer or geologist with a minimum of five years project management experience related to the above discipline descriptions. The Project Manager shall have extensive knowledge of risk-based levee safety analysis, levee safety procedures and remedial construction (including risk reduction measures and cutoff wall construction) for levees/floodwalls similar in size and geologic setting to the Little Calumet River, Indiana, Flood Risk Management Project.
TBD	Geotechnical Engineer	Recognized expert in the field of geotechnical engineering analysis, design and construction of floodwalls and levees, with extensive experience in subsurface investigations, soil mechanics, retaining wall design, seepage and slope stability evaluations, erosion protection design and construction, and earthwork construction. The Geotechnical Engineer shall be a licensed Professional Engineer, familiar with USACE regulations.
TBD	Structural Engineer	Extensive experience in the design, layout, and construction of flood control structures including floodwalls and gatewells. Demonstrated knowledge regarding hydraulic structures, floodwall design, sheet pile, rebar, concrete placement, formwork, and relocation of underground utilities. The Structural

		Engineer shall be a licensed Professional Engineer, familiar with USACE regulations.
TBD	Hydraulic & Hydrology Engineer	Extensive experience in the analysis and design of hydraulic structures related to flood control levee projects. The Hydraulic and Hydrology (H&H) Engineer must have performed work with HEC-RAS unsteady flow modeling, H&H related risk analysis, and be familiar with interior drainage analysis and design of erosion control for culvert outlets and levee bank protection. The H&H Engineer shall be a licensed Professional Engineer, familiar with USACE regulations.

NOTE: Further requirements are contained in the IEPR Scope of Work.

### **Vertical Team**

The Vertical Team consists of members of the HQUSACE, Risk Management Center, and Great Lakes & Ohio River Division Offices. The Vertical Team plays a key role in facilitating execution of the project in accordance with the Project Management Plan. The Vertical Team is responsible for providing the PDT with Issue Resolution support and guidance as required. The Vertical Team will remain engaged seamlessly throughout the project via monthly teleconferences as required and will attend In Progress Reviews and other key decision briefings as required. The District Liaison Rita Bocchieri, CELRD-PDM-M, is the District PM's primary Point of Contact on the Vertical Team.

**ATTACHMENT 1**

**ATR CERTIFICATION TEMPLATE**

**COMPLETION OF AGENCY TECHNICAL REVIEW**

The Agency Technical Review (ATR) has been completed for the <type of product> for <project name and location>. The ATR was conducted as defined in the project’s Review Plan to comply with the requirements of EC 1165-2-214. 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 DrChecks<sup>sm</sup>.

SIGNATURE

Name  
ATR Team Leader  
Office Symbol/Company

\_\_\_\_\_  
Date

SIGNATURE

Name  
Project Lead/Quality Manager  
Office Symbol

\_\_\_\_\_  
Date

SIGNATURE

Review Management Office Representative  
Office Symbol

\_\_\_\_\_  
Date

**CERTIFICATION OF AGENCY TECHNICAL REVIEW**

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

*The Southmoor floodwall segment presents a unique challenge. The proximity of the river to property lines and homes will reduce the size of equipment capable of being brought on to the site. Also, with the proximity of homes to the proposed location of sheet pile placement the structural integrity of the foundations of the local residences. The resolution for these two issues are being discussed.*

As noted above, all concerns resulting from the agency technical review of the Little Calumet River Project have been fully resolved.

SIGNATURE

Chief, Design Branch  
TS-D

\_\_\_\_\_  
Date



**Table 5: Little Calumet River, Indiana, Flood Risk Management Project Review Plan Revisions**

<b>Revision Number</b>	<b>Approval Date</b>	<b>Description</b>
<b>1</b>		
<b>2</b>		
<b>3</b>		