DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET NW
WASHINGTON, D.C. 20314-1000

DEC 17 2008

CECW-CE

MEMORANDUM FOR COMMANDERS, MAJOR SUBORDINATE COMMANDS

SUBJECT: Policy Guidance Letter – Periodic Inspection Procedures for the Levee Safety Program

1. Purpose. This guidance letter establishes the procedures for performing and documenting Periodic Inspections (PIs) for the US Army Corps of Engineers (USACE) Levee Safety Program. The purpose of PIs is to verify proper operation and maintenance; evaluate operational adequacy and structural stability; identify features to monitor over time; and improve the ability to communicate the overall condition. These procedures shall be applied to all PIs USACE conducts on any levee system.

2. Applicability. This guidance letter applies to all Headquarters US Army Corps of Engineers (HQUSACE) elements, Major Subordinate Commands (MSCs), districts, and field operating activities having responsibility for Civil Works projects.

3. References.

   a. Engineer Regulation (ER) 1110-2-100, 15 February 1995, Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures.
   b. Engineer Regulation (ER) 1110-2-8157, 31 January 1997, Responsibility for Hydraulic Steel Structures.
   c. Engineer Regulation (ER) 1110-1-12, 21 July 2006, Quality Management.
   d. Engineer Circular (EC) 1110-2-6065, 1 July 2007, Comprehensive Evaluation of Project Datums - Guidance for a Comprehensive Evaluation of Vertical Datums on Flood Control, Shore Protection, Hurricane Protection, and Navigation Projects.
   e. Memorandum, HQ USACE (CECW-HS), 16 November 2007, Subject: Levee Safety Program Implementation.
   f. Draft Engineer Technical Letter (ETL) 1110-2-571, 2 April 2008, Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures.

4. Background. The mission of the Levee Safety Program is to assess the integrity and viability of levee systems and recommend actions to reduce the associated flood risks to the public, property, and the environment. This guidance is part of the effort to implement a more rigorous inspection program for levee systems to improve the ability to communicate

the overall condition and associated risks of levee systems and to help ensure more consistent national application of inspection standards. This policy letter for PIs supersedes the PI policy in references 3.a. and 3.e above.

5. Definition of a Levee System. A levee system comprises of one or more levee segments and associated features which collectively provide flood, storm, or hurricane damage reduction to a defined area. Failure of one feature or segment within a levee system constitutes failure of the entire system. The levee system is inclusive of all features that are interconnected and necessary to ensure protection of the associated separable floodplain. These levee features may consist of embankment sections, floodwall sections, closure structures, pumping stations, interior drainage works, and flood damage reduction channels. Levee systems include all flood, storm, and hurricane damage reduction systems with any of the major levee features listed above. This definition does not apply to shore line protection or river bank protection systems such as revetments and barrier islands.

6. Funding for Periodic Inspections. Funding to conduct PIs, including preparation of the report for each levee system, shall come from the district's appropriate fiscal year allocation as specified below. Costs incurred by Headquarters and MSCs will be funded from the General Expense appropriation.

   a. Funding for the PI for federally operated and maintained projects shall be under the project's Operation and Maintenance account.

   b. Funding for the PI during the "period of construction" shall be under Cost Code 51, Appropriation 96X3122, Construction. The term "period of construction" is defined as the period from the issuance of the solicitation of the first construction contract to the date the District Engineer notifies the sponsor in writing of the government's determination that construction is complete which formally transfers operation and maintenance responsibility to the sponsor.

   c. Funding for the PI after the project has been transferred to the project sponsor and completed features are placed in operation shall be under Appropriation 96X3123, Operation and Maintenance, Inspection of Completed Works.

   d. Funding for the PI for any non-federal project shall be under Appropriation 96X3125, Flood Control and Coastal Emergencies, Class 360, Continuing Eligibility Inspections.

7. Inspection Frequency and Project Type. Periodic Inspections shall be performed on federally operated and maintained levee systems and federally authorized, non-federally

operated and maintained levee systems on a 5-year interval. PIs on non-federal levee systems shall only be conducted as directed by HQUSACE. Priority shall be given to urban and high consequence areas. In addition, a Periodic Inspection shall be completed on newly constructed levee systems prior to transfer to the non-federal sponsor.

8. Composition and Qualifications of the Inspection Team. The PI team is to be led by a licensed professional engineer with experience in the design, construction, or operation and maintenance of levee systems. Depending on levee system features and past levee system issues, the team shall include, when appropriate, the following disciplines: civil, geotechnical, structural, hydraulic, mechanical, and electrical engineering, environmental restoration, biologist/landscape architecture, and the inspector for the routine/annual inspections. The composition of the team shall be commensurate with the features of the levee system. The project sponsor and maintaining entity shall be part of the inspection team.

9. System Documentation and Records Management. All available and relevant data relating to the levee system features shall be collected and permanently retained in appropriate files maintained by the district office for availability to the inspection team. The sponsor shall maintain a copy of the data and documentation and have it readily accessible for use during the inspection and for emergency response. Such data and documentation shall be considered permanent, subject to retirement or disposal only upon termination of operation of the system. The documentation listed below can be used as a guide for data that will be useful to complete the Periodic Inspection.

   a. Engineering and design documents to include design assumptions, hydraulics and hydrology analysis, geotechnical data, structural features, and interior drainage features, including ponding areas and pump stations.
   b. Base maps showing alignment and system features.
   c. Construction records and as-built drawings.
   d. Survey data.
   e. Details of instrumentation location and recorded observations.
   f. Previous inspection reports, which include records of district routine and periodic inspections and sponsor inspections.
   g. Utility crossings and encroachment documentation.
   h. Documentation of any variances related to the system.
   i. Documentation of project easements.
   j. Prior flood insurance studies and levee certification documentation.

k. Copy of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the levee system area.
l. Reports of levee system performance during previous flood events, including hydraulics and hydrology information during those flood events.
m. Post flood reports, if applicable.
n. Maintenance, repair, modification, and rehabilitation records.
o. Hydrologic and hydraulic modeling.
p. Operation and Maintenance (O&M) manual(s).
q. Flood warning system and emergency action plan.
r. Copy of the Project Cooperation Agreement (PCA), Local Cooperation Agreement (LCA), or Project Partnership Agreement (PPA).

10. Design Criteria Review. District engineering staffs are to evaluate the system's original design criteria versus current design criteria to determine potential performance impacts. Documentation and results of this evaluation shall be completed prior to the physical levee inspection.

11. PI Inspection Checklist. The inspection team shall develop a Periodic Inspection checklist which shall include specific system features such as instrumentation, weirs and other appurtenant structures which warrant special consideration in addition to the routine (annual) inspection checklist. The inspection team shall also determine whether or not the project sponsor is in compliance with the existing project agreement, such as, Project Cooperation Agreements (PCAs), Local Cooperation Agreements (LCAs), Project Partnership Agreements (PPAs) and the Operation and Maintenance manual.

12. Pre-inspection Packet. A technical packet shall be prepared in advance of the Periodic Inspection to familiarize inspection team members with general system features. The packet should be formatted to be incorporated into the final Periodic Inspection report. This packet shall include, but not be limited to, the following,

a. General description of the project location and description of pertinent system features such as pumping stations, closures, rip-rapped areas, etc.
b. Vicinity and detailed map of the project.
c. Typical section drawings.
d. Drawings of outlet and closure structures. If available, include drawings of all gate wells, pipes, inlet structures, outlet structures, and gates. Tabulated dimensions with

representative drawings are acceptable. Individual drawing of closure structures are usually required because of the diverse types and sizes of closures.

e. If available, the most recent instrumentation data and/or plots, evaluation, and plan showing the instrumentation location. Where appropriate, cross-sections showing piezometric data shall show design uplift assumptions along with the current pressure line. Plots of piezometric elevation versus river elevation and plots of relief well or drain flow versus pool elevation shall be included.

f. Technical summary of foundation conditions, including any significant seismic sources

g. Most recent culvert inspection results.

h. Most recent hydraulic and hydrologic information.

i. Summary of any significant issues that arose during construction that might have an impact on the performance of the system.

j. History of system deficiencies.

k. Most current inspection report. If conducted by USACE, include routine inspection rating and a highlighted list of current Unacceptable rated items, if any. If the rating is Minimally Acceptable, and Unacceptable items are listed in the routine inspection, provide associated engineering evaluation of reasons Unacceptable items do not impact the system integrity. Provide narrative of any special or unusual situations, as needed. Describe deficiencies corrected since the last inspection and past deficiencies not yet corrected.

l. Identification of fracture critical members.

m. Description of major flood events and levee performance during those events.

n. Evaluation of design criteria as described in paragraph 2-3, Design Criteria Review.

o. Federal and/or non-federal responsibilities for Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) including annual O&M cost.

p. Emergency Action Plan.

q. Periodic Inspection checklist, as described in paragraph 11.

r. Any approved variances or waivers that have been approved.

The pre-inspection packet shall be completed and distributed to inspection team members at least 30 days prior to the inspection date.

13. Inspection Procedures. The inspection team lead will coordinate with the sponsor and establish a mutually agreeable inspection date. Inspections shall be scheduled to allow for sponsor and maintainer participation. Because the PI checklist includes the routine inspection checklist, the PI shall be scheduled to replace the routine inspection for that system for that year. A plan will be established for each inspection to ensure that

inspection results will provide the information needed to evaluate the operational adequacy of the system. Operational adequacy means an evaluation of system features to determine whether its failure or failure to operate properly could impair the operational capability and/or usability of the system. The inspections shall be conducted by physically walking the alignment and associated inspection areas.

14. Photographs. In order to more accurately portray conditions and changes in conditions, color photography and/or video recording during inspections are encouraged.

15. Special Considerations. Features which are vital to the operation of the system shall receive special consideration. These shall include, but are not limited to,

    a. Culverts and all penetrations shall be visually inspected for structural and operational adequacy. The inspection shall be sufficient to identify major defects such as visible cracks.
    b. Inspections should verify all gates are exercised in accordance with the prescribed schedule. Inspections should verify that flapgates (passive closures) are not blocked or propped open and the hinges are properly maintained and will function with river head to assure an adequate seal. For sluice gates (active closures), inspections should verify that required mechanical, and possibly electrical, equipment are functioning.
    c. For concrete structures, identify the need for any type of in-depth evaluation to determine the cause of deterioration in order to make recommendations for remediation.
    d. Fracture critical members shall be inspected in accordance with ER 1110-2-8157, Responsibility for Hydraulic Steel Structures, dated 31 January 1997.
    e. For riprap, the inspection team shall look for signs of deterioration that impact performance. This would be deterioration such as weathering and breakdown on bedding planes; benching along the water line; or depressions in the riprap from inadequate bedding or vandalism. An estimate of bedding thickness and stone size shall be completed to determine if it continues to meet design specifications.
    f. Emergency generating systems shall be inspected and tested during the scheduled inspection to ensure that all critical system features can be operated under emergency conditions or in the absence of the normal source of power. The testing of emergency power shall include the maximum power demand that could be expected in emergency situations.
    g. Reading schedules and testing results of instrumentation shall be reviewed to ensure that data is being properly collected and analyzed to determine proper operating condition. Where possible, threshold values for key instruments shall be established. Threshold values shall also be entered into the system emergency operations plans.

h. In areas where settlement or subsidence is occurring, a survey shall be performed to determine current top of levee elevation by the local sponsor or maintaining entity. Survey results shall be compared to the as-built drawings and design elevation and the comparison results, with consistent datum, shall be included in the final report. At present, all surveys should be conducted following the specifications in EC 1110-2-6065, "Engineering and Design - Comprehensive Evaluation of Project Datums: Guidance for a Comprehensive Evaluation of Vertical Datums on Flood Control, Shore Protection, Hurricane Protection, and Navigation Projects". In the future, any superseding guidance on vertical datums will be in effect. In absence of this survey, this shall be noted in the final report as a deficiency.

i. Features external-to-the-design which are critical to the functionality of the system, such as railroad embankments in which a levee ties in to, shall also be included as part of the Periodic Inspection and shall be considered as a factor in determining the operational adequacy of the system. If these features cannot be inspected or evaluated during the inspection, the need for further evaluation shall be identified in the final inspection report.

j. The operation logs of equipment shall be reviewed to verify annual tests. Equipment testing shall be conducted during the scheduled inspection if feasible.

k. I-walls over six feet in height from the protected side ground surface shall be documented and inspected for any signs of distress from loading. If an opening or gap exists or has the potential to form between the I-wall and the ground on the water side of the I-wall, the district shall review and evaluate the design, construction, and flood performance data associated with the I-wall.

l. Closure structures shall be inspected to determine if they are in good repair and if the closure placing equipment, stoplogs, and other materials are readily available at all times. The components should be clearly marked and installation instructions/procedures readily available. The sponsor shall verify if trial installation of the closure structures have been accomplished in accordance with the O&M manual.

m. Impacts from modifications to the system as a result of emergency response activities should be addressed.

n. Inspection team should verify relief wells and seepage collection systems functioned properly during the last flood event and that no sediment is observed in the horizontal system (if applicable). Determine if there are observations that would indicate that the drainage systems may not function properly during the next flood event and that maintenance records indicate regular cleaning. Verify the relief wells have been pump tested within the past five years and that this documentation is available.

o. Determine if variances, encroachments, and/or easements exist and are being complied with.

p. Verify if an Emergency Action Plan (EAP) exists, it has been exercised, and is up-to-date.

q. Verify the levee system has little or no unwanted vegetation (trees, brush, or undesirable weeds), except for vegetation that is properly contained and/or situated on overbuilt sections. Reference draft Engineer Technical Letter (ETL) 1110-2-571, Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures (or final ETL when released).

r. Determine if O&M manuals exist, are current, and are being utilized.

s. Identification of overtopping resiliency issues. Examples include,
   - Lack of adequate overflow sections and other hydraulic features;
   - Lack of adequate scour protection and armoring at transition areas;
   - Potential damage of the I-walls due to barge/vessel impact on navigable waterways;
   - Presence of cold formed piling and the impacts to seepage criteria, or
   - Situations where the concrete cap is bonded to the sheet piling with no mechanical (i.e. shear stud or concrete reinforcement) connections.

16. Inspection Out-Brief. At the conclusion of the Periodic Inspection, the inspection team shall conduct an out-brief with the project sponsor and maintainer. The out-brief should succinctly describe how the inspection was conducted, which features were inspected, any major problems identified during the inspection, and an estimated timeline for completion of the final inspection report, which shall not exceed 60 days from the date of inspection. The inspection team leader shall ensure the sponsor and maintainer are aware of any major deficiencies that shall be corrected immediately to restore structural stability.

17. Inspection Reports. The Periodic Inspection report shall present the results of each system inspection. The requirements for the final report outline and content are included in the attached enclosure. The initial report shall provide a general system description and present the results of the inspection. Reports of subsequent inspections shall be supplementary to the initial report and only include the results of the inspection. The reports will be numbered sequentially, i.e., Report No. 2 would describe PI number 2. Specific details related to the publication of the report are as follows,

a. Text: All sections and paragraphs shall be numbered and shall be on 8 1/2 by 11-inch paper with sufficient margin on the left side for binding. Reproduction shall be accomplished by any available process with printing done head-to-head, if possible.

b. Drawings: Drawings or plates shall normally be 8 1/2 by 11-inch with sufficient margin on the left for binding. Foldouts normally shall not exceed 11 inches by 17 inches. Drawings and photos shall be included in the text or placed entirely in the

appendices. However, any figure or drawing in the text shall support the written material. Sufficient plates shall be included to adequately represent the features of the levee system.

c. Binding and Cover: Reports shall have flexible paper or card stock, hidden-hinge covers with fasteners that facilitate removal and insertion of pages and drawings. Also, the name of the preparing agency and the date of inspection shall be shown on the cover.

18. Independent Technical Review (ITR). An ITR shall be performed on each Periodic Inspection report in accordance with ER 1110-1-12, Quality Management, Chapter 4, dated 21 July 2006. An ITR is a review by a qualified team not involved in the day-to-day production of the report for the purpose of confirming the proper application of established criteria, policies, and professional practices, in addition to ensuring that appropriate methods of analyses were performed and documentation is sufficient. The ITR team will be led by a licensed professional engineer with experience in the design, construction, or operation of the type of levee system inspected. This ITR will not replace other Quality Control (QC) processes. All other applicable quality management processes in ER 1110-1-12 apply. The ITR team will provide a signed report of the review completed.

19. Report Approval. The district Levee Safety Officer is the approving official for levee system Periodic Inspection reports.

20. Reporting. Reporting shall be in accordance with the General Instructions on the Inspection of Flood Damage Reduction Systems checklist. If the results of the PI may have an impact on levee certification, the district shall coordinate PI inspection results with the corresponding regional FEMA office.

21. Distribution of Approved Inspection Reports. Upon approval of the inspection report, an electronic copy of the report with a copy of all correspondence will be posted to the National Levee Database. The following shall receive an electronic Adobe Acrobat file and hard copy of the approved Periodic Inspection report.

a. Project Sponsor
b. Major Subordinate Command
c. USACE Library:

U.S. Army Engineer Research & Development Center Library
ATTN: CEERD-IS-L
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

21. The point of contact for this guidance is Ms. Tammy Conforti, (202) 761-4649.

Encl

STEVEN L. STOCKTON, P.E.
Director of Civil Works

Enclosure – Periodic Inspection Report Outline

PERIODIC INSPECTION REPORT
[LEVEE SYSTEM NAME]
[WATERCOURSE(S)]
[CITY, COUNTY, STATE]
[REPORT NO. #]
[DATE]

Levee safety officer approval memorandum and ITR certification

Table of Contents

Part I. Executive Summary. *(An executive summary of the major items found in the inspection, including a statement regarding the system's ability to continue safe operation.)*

Part II. Inspection team and date of inspection

1. Inspection team lead and team members. *(Include everyone that participated in the inspection, including sponsor representatives)*
2. Date of inspection

Part III. System Background Information

1. Project Identification
   a) System name. *(Include both the formal name and any popularly used or former names.)*
   b) Project type. *(Federally operated and maintained, federally authorized and non-federally operated and maintained, non-federally operated and maintained. Identify if the project is urban, rural or agricultural. Indicate if the project is a multipurpose project.)*
2. Project Authority. *(If a federal project, provide the authority under which it was originally constructed. If a non-federal project, provide known information.)*
   a) Estimated original cost of project.
   b) Construction completion date of original project.
   c) Public Sponsor(s) *(Include names and contact information)*
   d) Location. *(Identify city, county, state, basin, watercourse on which system is located, if a river, include river mile and river bank (left/right).)*
   e) Potential consequences. *(Brief description of the populations at risk and the estimated value of the property in the protected area. This data shall be obtained from the National Levee Database. List any changes since the last inspection.)*
   f) Investigations prior to construction. *(List the reports that contain site and material investigations. Present a very brief summary if pertinent to evaluation of the performance of the system)*
   g) History of remedial measures and major modifications. *(Provide additional information regarding major modifications, improvements and betterments, to include those done by the Corps and/or the local sponsor. List all repairs and major rehabilitation to the system to include date of the action, short summary of the actions taken, and the cost of the repairs or rehabilitation.)*

Enclosure – Periodic Inspection Report Outline, continued

Part IV. Pre-inspection packet information.

Part V. Inspection Findings and Evaluations

1. Results of examination for each feature. *(Present the results of the inspection for each feature. Present a discussion and evaluation for each item that received a minimally acceptable or unacceptable rating. The following features (and associated items) will be addressed if applicable to the system inspected. Include a statement as to the ability of each feature and the overall system to function as authorized.) Features may include,*
    a) Levee Embankments
    b) Floodwalls
    c) Interior Drainage System
    d) Pump Station & Drainage Structures
    e) Flood Damage Reduction Channels
    f) Emergency Action Plans
    g) Compliance with project agreement.
    h) Other special considerations
2. Design Criteria Review. *(Present results of the design criteria review and system evaluation against the criteria used and the current design criteria. Discuss the need for updating the system design based on the design criteria review. Discuss and present the evaluation of the ability of each feature and the overall system to function as authorized using the findings of the design criteria review.)*
3. Levee Safety Issues. *(Present discussion of the levee safety issues identified including the identification of data gaps and the need for further engineering evaluations. A summary table, in addition to text, is required for documenting levee safety issues and repair/evaluation recommendations. Preliminary engineering assessment of the causes of distress and abnormal conditions will be performed during the levee PI. If such assessment cannot be accomplished within the time allotted to complete the inspection report, the results of a preliminary assessment shall be presented with a plan and schedule to complete the assessment.)*

Part VI. Conclusions and Recommendations *(Include a statement as to the ability of each feature and the overall system to function as authorized. Recommended actions for each levee safety issue shall be identified. Recommendations shall be presented for all features that receive a minimally acceptable or unacceptable rating. Include recommendations on the need for updating the system design based on the design criteria review. One of the final products shall be the rating for the routine inspection portion of the PI. If the system was previously certified by USACE, a discussion of any impacts to the certification, including a recommendation for decertification if necessary. Date of next periodic inspection. Periodic inspections shall be conducted every five years.)*

Enclosure – Periodic Inspection Report Outline, continued

Appendices

a) Figures.

b) Photographs. *(Color photographs taken during the inspection with an appropriate caption, including the date taken.)*

c) Completed Periodic Inspection checklist.

d) Inspection notes and/or trip reports.

e) Summary of Crack Surveys.

f) References. *(A listing of the location and status of engineering and operation design data, manuals, reports and correspondence as required by this document and others as deemed necessary to provide comprehensive system documentation.)*

g) Independent Technical Review (*Include the review comments and their resolution.*)