

## Memorandum

**To:** Programs, Projects and Operations Subcommittee

**Re:** Waterloo Levee Certification

**Date:** February 27, 2008

**From:** Paul Woodward, Water Resources Engineer

As a part of the floodplain re-mapping effort, for the West Papillion Creek and its tributaries, the Federal Emergency Management Agency (FEMA) has determined that the Village of Waterloo must provide the data and documentation required in regulation 44 CFR Section 65.10 in order to certify that the Waterloo levee can provide protection from the base flood (100 yr flood). Please see the attached flood map and fact sheet.

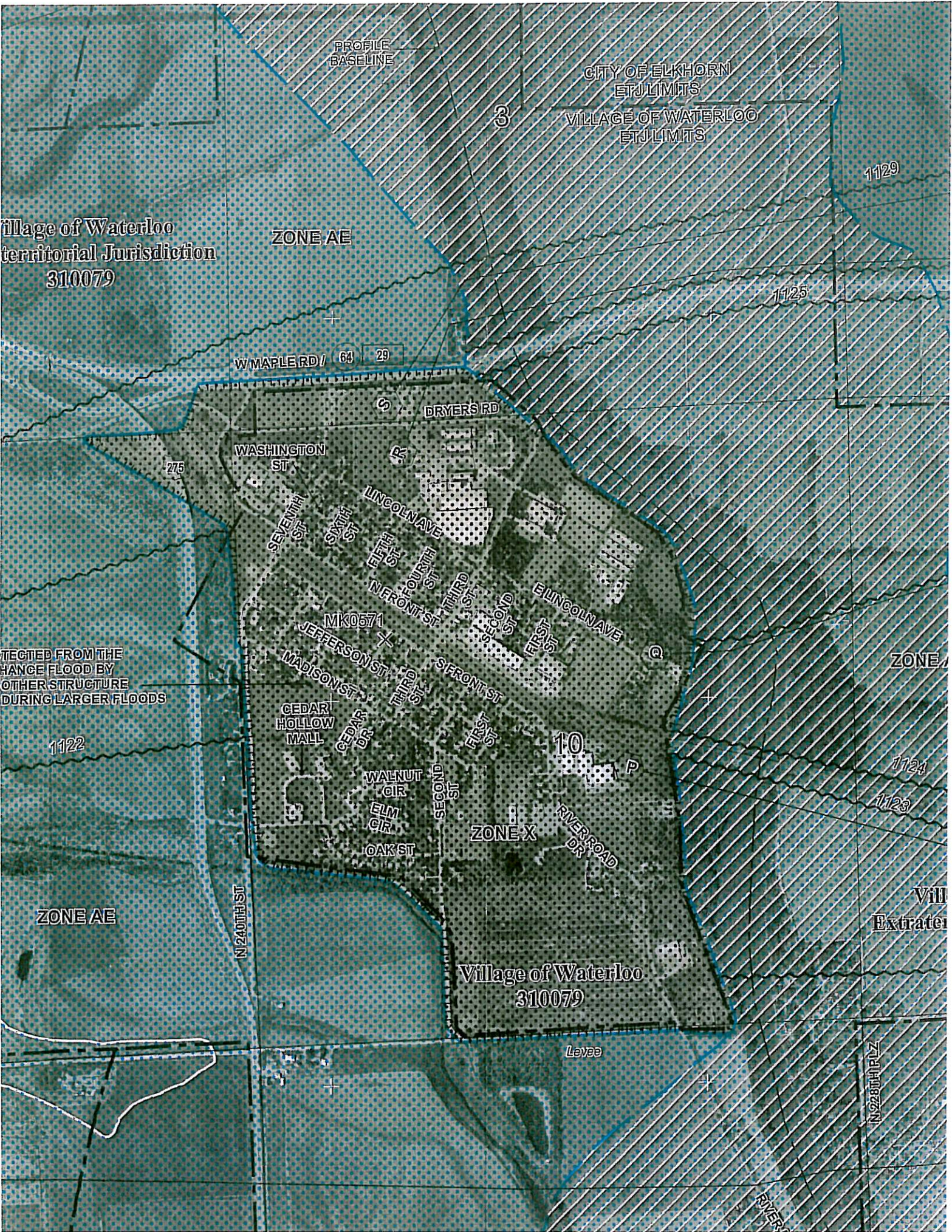
The Village signed an agreement with FEMA to designate the Waterloo levee as a Provisionally Accredited Levee (PAL) beginning on January 15, 2008. The PAL designation indicates that, to the best knowledge of the Village, the levee meets the requirements of 44 CFR Section 65.10 and all necessary documentation to support the levee accreditation will be submitted by January 15, 2010. This allows 24 months for the Village to study the existing levee and if necessary, bring the levee into compliance. During the 24 month period, the levee will be designated on the DFIRM map as providing protection, but will have a note to map users that the levee certification is in process. If the data and documentation is not provided by January 15, 2010, FEMA will issue a map revision which will likely redesignate the Village as a floodprone area without levee protection.

The first step in the recertification process is to evaluate the existing levee. Preliminary survey has shown that the existing levee may not have the required amount of free board. Therefore, the Village has contracted with JEO Consulting Group and Terracon to provide further analysis. The scope of services includes gathering background data on the existing levee, evaluating the certification requirements, and preparing a summary of findings which would include recommendations and/or alternatives that would enable the levee to be certified. Terracon will provide an initial geotechnical analysis of the existing levee.

The Village is requesting that the Papio- Missouri River NRD consider a 50-50 cost share for this initial evaluation of the levee. The cost to the District of this \$29,911 study would be \$14,956. See attached letter and cost breakdown of consulting fees. In addition to financial assistance, District staff is providing technical assistance throughout this certification process. Additional study and cost-share with the Village may be requested in the future depending on the outcome of this evaluation.

**It is management's recommendation that the subcommittee recommend to the Board of Directors that the General Manager be authorized to execute a cost share agreement, up to a maximum District contribution of \$14,956, with the Village of Waterloo for a preliminary investigation of their flood control levee.**





Village of Waterloo  
territorial Jurisdiction  
310079

ZONE AE

PROFILE  
BASELINE

CITY OF ELKHORN  
ETJ LIMITS  
VILLAGE OF WATERLOO  
ETJ LIMITS

TECTED FROM THE  
HANCE FLOOD BY  
OTHER STRUCTURE  
DURING LARGER FLOODS

Village of Waterloo  
310079

Levee

Village of Waterloo  
Extrajurisdictional



# Meeting the Criteria for Accrediting Levees on Flood Maps

## How-to-Guide for Floodplain Managers and Engineers

A levee is a manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding. Levees include floodwalls and other flood-control structures (not including dams).

As part of the countywide flood mapping process, the Department of Homeland Security, Federal Emergency Management Agency (FEMA) and its State and local mapping partners need to review data associated with levees.

It is the levee owner's or community's responsibility to provide data and documentation to demonstrate that a levee meets the requirements of the National Flood Insurance Program (NFIP) as described in Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44 CFR Section 65.10) which you may view on FEMA's Web site at [www.fema.gov/plan/prevent/fhm/lv\\_fpm.shtm](http://www.fema.gov/plan/prevent/fhm/lv_fpm.shtm).

To be recognized as providing protection from the 1-percent-annual-chance flood on Flood Insurance Rate Maps (FIRMs), levee systems must meet *and continue to meet* the minimum design, operation, and maintenance standards of 44 CFR Section 65.10 of the NFIP regulations.

To help clarify the responsibilities of community officials, levee owners, or other parties seeking recognition of a levee for providing information on levees identified during a mapping project, FEMA issued Procedure Memorandum No. 34 (PM 34), *Interim Guidance for Studies Including Levees*, on August 22, 2005. PM 34 provided clarification of the existing procedures, which were provided in Appendix H of FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners*.

FEMA issued Revised Procedure Memorandum No. 43, *Guidelines for Identifying Provisionally Accredited Levees*, on March 16, 2007, which will allow mapping contractors and partners to issue preliminary and, in some cases, effective flood maps while communities and levee owners are compiling and submitting the full documentation necessary to show compliance with 44 CFR Section 65.10 requirements.

This document provides information regarding what types of information you'll need to submit during the mapping process for your levee to be recognized as providing protection on FIRMs, including a checklist and an index of further resources you may wish to consult.

### COMMUNITIES WITH LEVEES SHOULD KNOW:

- The participating community and/or other party seeking recognition or continued recognition must provide sufficient data showing that the levee provides protection from the 1-percent-annual-chance flood (also known as the base flood) for FEMA to recognize the levee on a FIRM.
- Communities *must* actively participate in the levee documentation process.
- Levees structures without sufficient documentation will not be credited as providing flood protection.
- Some levees may qualify to be shown as Provisionally Accredited Levees on the FIRM. Guidance regarding Provisionally Accredited Levees is available at [www.fema.gov/plan/prevent/fhm/lv\\_fpm.shtm](http://www.fema.gov/plan/prevent/fhm/lv_fpm.shtm).

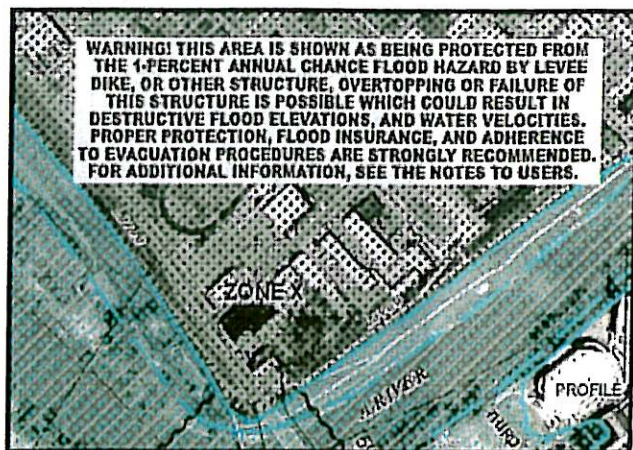


## HOW WILL FEMA MAP LEVEES?

FEMA's mapping requirements are designed to provide the people living and working behind the levee with appropriate risk information so that they may minimize damage and loss of life. It is important to note that FEMA does not evaluate the performance of a levee—this is the responsibility of the levee owner. FEMA is responsible for establishing mapping standards and risk determination zones and reflecting these determinations on flood maps.

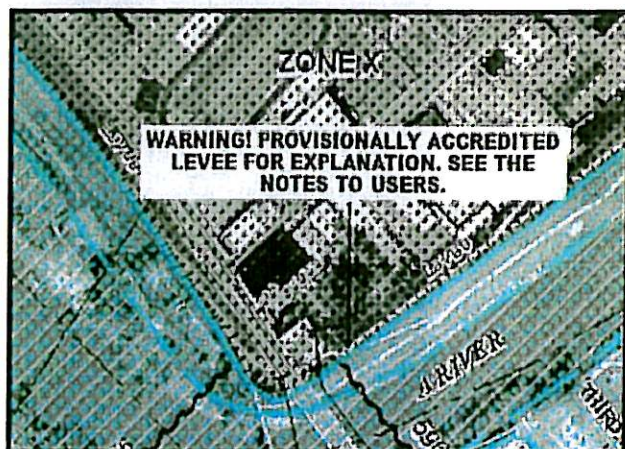
### Levee Accredited on FIRM

An accredited levee is a levee that FEMA shows on a FIRM as providing protection from the 1-percent-annual-chance or greater flood. This determination is based on the submittal of data and documentation as required by the NFIP regulations. The area landward of an accredited levee is shown as Zone X (shaded) on the FIRM except for areas of residual flooding, such as ponding areas, which will be shown as Special Flood Hazard Area. Flood insurance is not mandatory in Zone X (shaded); however, it is strongly encouraged for all structures in areas behind levees.



### Provisionally Accredited Levee (PAL)

A PAL is a designation for a levee that FEMA has previously accredited with providing 1-percent-annual-chance flood protection on an effective FIRM, and for which FEMA is awaiting data and/or documentation that will show the levee's compliance with NFIP regulations. Before FEMA will designate a levee as a PAL, the community or levee owner will need to sign and return an agreement that indicates that documentation required for compliance with 44 CFR Section 65.10 of the NFIP regulations will be provided within a specified timeframe, depending upon the levee's status. Flood insurance is not mandatory for structures behind a levee with provisional status however, it is strongly encouraged.









### Levee Not Accredited or De-accredited on FIRM

If the levee is not shown as providing protection from the 1-percent-annual-chance flood on an effective FIRM, the levee is considered "not accredited" and is mapped as Zone AE or Zone A, depending upon the type of study performed for the area. If the levee was previously shown providing protection from the 1-percent-annual-chance flood on an effective FIRM but does not meet the Provisionally Accredited Levee (PAL) requirements or is no longer eligible for the PAL, FEMA will "de-accredit" the levee and the area landward of the levee will be remapped as Zone AE or Zone A (high-risk flood zones) depending on the type of study performed for the area. Flood insurance will be required for structures with a federally backed mortgage.





Design Criteria*	Section of the NFIP Regulations: 65.10(b)
<b>Description:</b> For levees to be recognized by FEMA, evidence that adequate design and operation and maintenance systems are in place to provide reasonable assurance that protection from the base flood exists must be provided. The following requirements must be met:	
<b>Checklist for Design Criteria:</b>	
	<b>Freeboard.</b> Minimum freeboard required 3 feet above the Base Flood Elevation (BFE) all along length, and an additional 1 foot within 100 feet of structures (such as bridges) or wherever the flow is restricted. Additional 0.5 foot at the upstream end of levee. Coastal levees have special freeboard requirements (see 65.10(b)(1)(iii) and (iv)).
	<b>Closures.</b> All openings must be provided with closure devices that are structural parts of the system during operation and designed according to sound engineering practice.
	<b>Embankment Protection.</b> Engineering analyses must be submitted that demonstrate that no appreciable erosion of the levee embankment can be expected during the base flood, as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability.
	<b>Embankment and Foundation Stability Analyses.</b> Engineering analyses that evaluate levee embankment stability must be submitted. The analyses provided shall evaluate expected seepage during loading conditions associated with the base flood and shall demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment or foundation stability. An alternative analysis demonstrating that the levee is designed and constructed for stability against loading conditions for Case IV as defined in the U.S. Army Corps of Engineers (USACE) manual, <i>Design and Construction of Levees</i> , (EM 1110-2-1913, Chapter 6, Section II), may be used.
	<b>Settlement Analyses.</b> Engineering analyses must be submitted that assess the potential and magnitude of future losses of freeboard as a result of levee settlement and demonstrate that freeboard will be maintained. This analysis must address embankment loads, compressibility of embankment soils, compressibility of foundation soils, age of the levee system, and construction compaction methods. In addition, detailed settlement analysis using procedures such as those described in the USACE manual, <i>Soil Mechanics Design—Settlement Analysis</i> (EM 1100-2-1904), must be submitted.
	<b>Interior Drainage.</b> An analysis must be submitted that identifies the source(s) of such flooding, the extent of the flooded area, and, if the average depth is greater than one foot, the water-surface elevation(s) of the base flood. This analysis must be based on the joint probability of interior and exterior flooding and the capacity of facilities (such as drainage lines and pumps) for evacuating interior floodwaters.



<b>Operation Plan*</b>	<b>Section of the NFIP Regulations: 65.10(c)(1)</b>
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**Description:** For a levee system to be recognized, the operational criteria must be as described below. All closure devices or mechanical systems for internal drainage, whether manual or automatic, must be operated in accordance with an officially adopted operation manual, a copy of which must be provided to FEMA by the operator when levee or drainage system recognition is being sought or when the manual for a previously recognized system is revised in any manner. All operations must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP.

<b>Checklist for Operation Plan:</b>	
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<input type="checkbox"/>	<b>Flood Warning System.</b> Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials that will be used to trigger emergency operation activities; and demonstration that sufficient flood warning time exists for the completed operation of all closure structures, including necessary sealing, before floodwaters reach the base of the closure.
<input type="checkbox"/>	<b>Plan of Operation.</b> A formal plan of operation including specific actions and assignments of responsibility by individual name or title.
<input type="checkbox"/>	<b>Periodic Operation of Closures.</b> Provisions for periodic operation, at not less than one-year intervals, of the closure structure for testing and training purposes.
<input type="checkbox"/>	<b>Interior Drainage Plan.</b> See below.

<b>Interior Drainage Plan</b>	<b>Section of the NFIP Regulations: 65.10(c)(2)</b>
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**Description:** Interior drainage systems associated with levee systems usually include storage areas, gravity outlets, pumping stations, or a combination thereof. These drainage systems will be recognized by FEMA on NFIP maps for flood protection purposes only if the following minimum criteria are included in the operation plan.

<b>Checklist for Interior Drainage Plan:</b>	
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<input type="checkbox"/>	<b>Flood Warning System.</b> Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials that will be used to trigger emergency operation activities; and demonstration that sufficient flood warning time exists to permit activation of mechanized portions of the drainage system.
<input type="checkbox"/>	<b>Plan of Operation.</b> A formal plan of operation including specific actions and assignments of responsibility by individual name or title.



<input type="checkbox"/>	<b>Manual Backup.</b> Provision for manual backup for the activation of automatic systems.
<input type="checkbox"/>	<b>Periodic Inspection.</b> Provisions for periodic inspection of interior drainage systems and periodic operation of any mechanized portions for testing and training purposes. No more than 1 year shall elapse between either the inspections or the operations.
<b>Maintenance Plan</b>	<b>Section of the NFIP Regulations: 65.10(d)</b>
<b>Description:</b> For levee systems to be recognized as providing protection from the base flood, the maintenance criteria must be as described herein:	
<b>Checklist for Maintenance Plan:</b>	
<input type="checkbox"/>	Levee systems must be maintained in accordance with an officially adopted maintenance plan, and a copy of this plan must be provided to FEMA by the owner of the levee system when recognition is being sought or when the plan for a previously recognized system is revised in any manner.
<input type="checkbox"/>	All maintenance activities must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP that must assume ultimate responsibility for maintenance.
<input type="checkbox"/>	This plan must document the formal procedure that ensures that the stability, height, and overall integrity of the levee and its associated structures and systems are maintained. At a minimum, the plan shall specify the maintenance activities to be performed, the frequency of their performance, and the person by name or title responsible for their performance.
<b>Certification</b>	<b>Section of the NFIP Regulations: 65.10(e)</b>
<b>Description:</b> Data submitted to support that a given levee system complies with the structural requirements set forth in "Design Criteria" (paragraphs (b)(1) through (7) of the regulations) must be certified by a registered PE. Also, certified "as-built" plans of the levee must be submitted. Certifications are subject to the definition given in Section 65.2 of the NFIP regulations. In lieu of these structural requirements, a Federal agency with responsibility for levee design may certify that the levee has been adequately designed and constructed to provide protection against the base flood.	
<b>Checklist for Certification Requirement:</b>	
<input type="checkbox"/>	All data submitted is certified by Professional Engineer or certified by a Federal agency.
<input type="checkbox"/>	Certified as-built levee plans are included in the submittal.



## A NOTE ABOUT RISK AND FLOOD INSURANCE

It is important to note that levees are designed to provide a *specific level of protection*. They can be overtopped or fail in a larger flood events.

Levees also decay over time. They require regular maintenance and periodic upgrades to retain their level of protection. When levees do fail, they fail catastrophically. The damage may be more significant than if the levee was not there at all.

For all these reasons, FEMA strongly urges people to understand their flood risk, know their evacuation procedures, and protect their property by purchasing flood insurance.

## CHECKLIST INFORMATION

The checklist provided in this publication is meant to assist local officials and levee owners in gathering the documentation that will be required for FEMA to show a levee as providing base flood protection on the community's FIRM. Where possible, text from the actual NFIP regulations (44 CFR Section 65.10) was used.

The checklist is set up according to the appropriate paragraph of 65.10. For example, Design Criteria can be found in Paragraph 65.10(b):

Design Criteria*	Section of the FEMA Regulations: 65.10(b)
<b>Description:</b> For levees to be recognized by FEMA, evidence that adequate design and operation and maintenance systems are in place to provide reasonable assurance that protection from the base flood exists must be provided. The following requirements must be met:	

For a comprehensive description of each item in this checklist, please see Appendix H of the *Guidelines and Specifications for Flood Hazard Mapping Partners*. Locations of this resource, and other useful resources, are provided below.

## INDEX OF RESOURCES

This resource, and other levee-related information and materials, can be found at [www.fema.gov/plan/prevent/fhm/lv\\_intro.shtm](http://www.fema.gov/plan/prevent/fhm/lv_intro.shtm).

Procedure Memorandum No. 34, *Interim Guidance for Studies Including Levees*, can be found at [www.fema.gov/plan/prevent/fhm/lv\\_fpm.shtm](http://www.fema.gov/plan/prevent/fhm/lv_fpm.shtm).

Revised Procedure Memorandum No. 43, *Guidelines for Identifying Provisionally Accredited Levees*, can be found at [www.fema.gov/plan/prevent/fhm/lv\\_fpm.shtm](http://www.fema.gov/plan/prevent/fhm/lv_fpm.shtm).

Appendix H of the *Guidelines and Specifications for Flood Hazard Mapping Partners* can be downloaded at [www.fema.gov/plan/prevent/fhm/dl\\_cgs.shtm](http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm).

44 CFR Section 65.10 of the NFIP regulations can be downloaded at [www.fema.gov/plan/prevent/fhm/lv\\_fpm.shtm](http://www.fema.gov/plan/prevent/fhm/lv_fpm.shtm).

Flood insurance information can be found at [www.fema.gov/business/nfip](http://www.fema.gov/business/nfip) or on the NFIP's consumer site, [www.FloodSmart.gov](http://www.FloodSmart.gov).



occurred in the flood plain since the existing floodway was developed. If the original hydraulic computer model is not available, an alternate hydraulic computer model may be used provided the alternate model has been calibrated so as to reproduce the original water surface profile of the original hydraulic computer model. The alternate model must be then modified to include all encroachments that have occurred since the existing floodway was developed.

(ii) The floodway analysis must be performed with the modified computer model using the desired floodway limits.

(iii) The floodway limits must be set so that combined effects of the past encroachments and the new floodway limits do not increase the effective base flood elevations by more than the amount specified in § 60.3(d)(2). Copies of the input and output data from the original and modified computer models must be submitted.

(3) Delineation of the revised floodway on a copy of the effective NFIP map and a suitable topographic map.

(d) *Certification requirements.* All analyses submitted shall be certified by a registered professional engineer. All topographic data shall be certified by a registered professional engineer or licensed land surveyor. Certifications are subject to the definition given at § 65.2 of this subchapter.

(e) *Submission procedures.* All requests that involve changes to floodways shall be submitted to the appropriate FEMA Regional Office servicing the community's geographic area.

[51 FR 30315, Aug. 25, 1986]

#### § 65.8 Review of proposed projects.

A community, or an individual through the community, may request FEMA's comments on whether a proposed project, if built as proposed, would justify a map revision. FEMA's comments will be issued in the form of a letter, termed a Conditional Letter of Map Revision, in accordance with 44 CFR part 72. The data required to support such requests are the same as those required for final revisions under §§ 65.5, 65.6, and 65.7, except as-built certification is not required. All such re-

quests shall be submitted to the FEMA Headquarters Office in Washington, DC, and shall be accompanied by the appropriate payment, in accordance with 44 CFR part 72.

[62 FR 5736, Feb. 6, 1997]

#### § 65.9 Review and response by the Administrator.

If any questions or problems arise during review, FEMA will consult the Chief Executive Officer of the community (CEO), the community official designated by the CEO, and/or the requester for resolution. Upon receipt of a revision request, the Administrator shall mail an acknowledgment of receipt of such request to the CEO. Within 90 days of receiving the request with all necessary information, the Administrator shall notify the CEO of one or more of the following:

(a) The effective map(s) shall not be modified;

(b) The base flood elevations on the effective FIRM shall be modified and new base flood elevations shall be established under the provisions of part 67 of this subchapter;

(c) The changes requested are approved and the map(s) amended by Letter of Map Revision (LOMR);

(d) The changes requested are approved and a revised map(s) will be printed and distributed;

(e) The changes requested are not of such a significant nature as to warrant a reissuance or revision of the flood insurance study or maps and will be deferred until such time as a significant change occurs;

(f) An additional 90 days is required to evaluate the scientific or technical data submitted; or

(g) Additional data are required to support the revision request.

(h) The required payment has not been submitted in accordance with 44 CFR part 72, no review will be conducted and no determination will be issued until payment is received.

[51 FR 30315, Aug. 25, 1986; 61 FR 46331, Aug. 30, 1996, as amended at 62 FR 5736, Feb. 6, 1997]

#### § 65.10 Mapping of areas protected by levee systems.

(a) *General.* For purposes of the NFIP, FEMA will only recognize in its flood



hazard and risk mapping effort those levee systems that meet, and continue to meet, minimum design, operation, and maintenance standards that are consistent with the level of protection sought through the comprehensive flood plain management criteria established by § 60.3 of this subchapter. Accordingly, this section describes the types of information FEMA needs to recognize, on NFIP maps, that a levee system provides protection from the base flood. This information must be supplied to FEMA by the community or other party seeking recognition of such a levee system at the time a flood risk study or restudy is conducted, when a map revision under the provisions of part 65 of this subchapter is sought based on a levee system, and upon request by the Administrator during the review of previously recognized structures. The FEMA review will be for the sole purpose of establishing appropriate risk zone determinations for NFIP maps and shall not constitute a determination by FEMA as to how a structure or system will perform in a flood event.

(b) *Design criteria.* For levees to be recognized by FEMA, evidence that adequate design and operation and maintenance systems are in place to provide reasonable assurance that protection from the base flood exists must be provided. The following requirements must be met:

(1) *Freeboard.* (i) Riverine levees must provide a minimum freeboard of three feet above the water-surface level of the base flood. An additional one foot above the minimum is required within 100 feet in either side of structures (such as bridges) riverward of the levee or wherever the flow is constricted. An additional one-half foot above the minimum at the upstream end of the levee, tapering to not less than the minimum at the downstream end of the levee, is also required.

(ii) Occasionally, exceptions to the minimum riverine freeboard requirement described in paragraph (b)(1)(i) of this section, may be approved. Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted to support a request for such an exception. The material presented must

evaluate the uncertainty in the estimated base flood elevation profile and include, but not necessarily be limited to an assessment of statistical confidence limits of the 100-year discharge; changes in stage-discharge relationships; and the sources, potential, and magnitude of debris, sediment, and ice accumulation. It must be also shown that the levee will remain structurally stable during the base flood when such additional loading considerations are imposed. Under no circumstances will freeboard of less than two feet be accepted.

(iii) For coastal levees, the freeboard must be established at one foot above the height of the one percent wave or the maximum wave runup (whichever is greater) associated with the 100-year stillwater surge elevation at the site.

(iv) Occasionally, exceptions to the minimum coastal levee freeboard requirement described in paragraph (b)(1)(iii) of this section, may be approved. Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted to support a request for such an exception. The material presented must evaluate the uncertainty in the estimated base flood loading conditions. Particular emphasis must be placed on the effects of wave attack and overtopping on the stability of the levee. Under no circumstances, however, will a freeboard of less than two feet above the 100-year stillwater surge elevation be accepted.

(2) *Closures.* All openings must be provided with closure devices that are structural parts of the system during operation and design according to sound engineering practice.

(3) *Embankment protection.* Engineering analyses must be submitted that demonstrate that no appreciable erosion of the levee embankment can be expected during the base flood, as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability. The factors to be addressed in such analyses include, but are not limited to: Expected flow velocities (especially in constricted areas); expected wind and wave



action; ice loading; impact of debris; slope protection techniques; duration of flooding at various stages and velocities; embankment and foundation materials; levee alignment, bends, and transitions; and levee side slopes.

(4) *Embankment and foundation stability.* Engineering analyses that evaluate levee embankment stability must be submitted. The analyses provided shall evaluate expected seepage during loading conditions associated with the base flood and shall demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment or foundation stability. An alternative analysis demonstrating that the levee is designed and constructed for stability against loading conditions for Case IV as defined in the U.S. Army Corps of Engineers (COE) manual, "Design and Construction of Levees" (EM 1110-2-1913, Chapter 6, Section II), may be used. The factors that shall be addressed in the analyses include: Depth of flooding, duration of flooding, embankment geometry and length of seepage path at critical locations, embankment and foundation materials, embankment compaction, penetrations, other design factors affecting seepage (such as drainage layers), and other design factors affecting embankment and foundation stability (such as berms).

(5) *Settlement.* Engineering analyses must be submitted that assess the potential and magnitude of future losses of freeboard as a result of levee settlement and demonstrate that freeboard will be maintained within the minimum standards set forth in paragraph (b)(1) of this section. This analysis must address embankment loads, compressibility of embankment soils, compressibility of foundation soils, age of the levee system, and construction compaction methods. In addition, detailed settlement analysis using procedures such as those described in the COE manual, "Soil Mechanics Design—Settlement Analysis" (EM 1100-2-1904) must be submitted.

(6) *Interior drainage.* An analysis must be submitted that identifies the source(s) of such flooding, the extent of the flooded area, and, if the average depth is greater than one foot, the water-surface elevation(s) of the base

flood. This analysis must be based on the joint probability of interior and exterior flooding and the capacity of facilities (such as drainage lines and pumps) for evacuating interior floodwaters.

(7) *Other design criteria.* In unique situations, such as those where the levee system has relatively high vulnerability, FEMA may require that other design criteria and analyses be submitted to show that the levees provide adequate protection. In such situations, sound engineering practice will be the standard on which FEMA will base its determinations. FEMA will also provide the rationale for requiring this additional information.

(c) *Operation plans and criteria.* For a levee system to be recognized, the operational criteria must be as described below. All closure devices or mechanical systems for internal drainage, whether manual or automatic, must be operated in accordance with an officially adopted operation manual, a copy of which must be provided to FEMA by the operator when levee or drainage system recognition is being sought or when the manual for a previously recognized system is revised in any manner. All operations must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP.

(1) *Closures.* Operation plans for closures must include the following:

(i) Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials, that will be used to trigger emergency operation activities and demonstration that sufficient flood warning time exists for the completed operation of all closure structures, including necessary sealing, before floodwaters reach the base of the closure.

(ii) A formal plan of operation including specific actions and assignments of responsibility by individual name or title.

(iii) Provisions for periodic operation, at not less than one-year intervals, of the closure structure for testing and training purposes.

(2) *Interior drainage systems.* Interior drainage systems associated with levee systems usually include storage areas,



gravity outlets, pumping stations, or a combination thereof. These drainage systems will be recognized by FEMA on NFIP maps for flood protection purposes only if the following minimum criteria are included in the operation plan:

(i) Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials, that will be used to trigger emergency operation activities and demonstration that sufficient flood warning time exists to permit activation of mechanized portions of the drainage system.

(ii) A formal plan of operation including specific actions and assignments of responsibility by individual name or title.

(iii) Provision for manual backup for the activation of automatic systems.

(iv) Provisions for periodic inspection of interior drainage systems and periodic operation of any mechanized portions for testing and training purposes. No more than one year shall elapse between either the inspections or the operations.

(3) *Other operation plans and criteria.* Other operating plans and criteria may be required by FEMA to ensure that adequate protection is provided in specific situations. In such cases, sound emergency management practice will be the standard upon which FEMA determinations will be based.

(d) *Maintenance plans and criteria.* For levee systems to be recognized as providing protection from the base flood, the maintenance criteria must be as described herein. Levee systems must be maintained in accordance with an officially adopted maintenance plan, and a copy of this plan must be provided to FEMA by the owner of the levee system when recognition is being sought or when the plan for a previously recognized system is revised in any manner. All maintenance activities must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP that must assume ultimate responsibility for maintenance. This plan must document the formal procedure that ensures that the stability, height, and overall integrity of the levee and its associated structures

and systems are maintained. At a minimum, maintenance plans shall specify the maintenance activities to be performed, the frequency of their performance, and the person by name or title responsible for their performance.

(e) *Certification requirements.* Data submitted to support that a given levee system complies with the structural requirements set forth in paragraphs (b)(1) through (7) of this section must be certified by a registered professional engineer. Also, certified as-built plans of the levee must be submitted. Certifications are subject to the definition given at §65.2 of this subchapter. In lieu of these structural requirements, a Federal agency with responsibility for levee design may certify that the levee has been adequately designed and constructed to provide protection against the base flood.

[51 FR 30316, Aug. 25, 1986]

#### §65.11 Evaluation of sand dunes in mapping coastal flood hazard areas.

(a) *General conditions.* For purposes of the NFIP, FEMA will consider storm-induced dune erosion potential in its determination of coastal flood hazards and risk mapping efforts. The criterion to be used in the evaluation of dune erosion will apply to primary frontal dunes as defined in §59.1, but does not apply to artificially designed and constructed dunes that are not well-established with long-standing vegetative cover, such as the placement of sand materials in a dune-like formation.

(b) *Evaluation criterion.* Primary frontal dunes will not be considered as effective barriers to base flood storm surges and associated wave action where the cross-sectional area of the primary frontal dune, as measured perpendicular to the shoreline and above the 100-year stillwater flood elevation and seaward of the dune crest, is equal to, or less than, 540 square feet.

(c) *Exceptions.* Exceptions to the evaluation criterion may be granted where it can be demonstrated through authoritative historical documentation that the primary frontal dunes at a specific site withstood previous base flood storm surges and associated wave action.

[53 FR 16279, May 6, 1988]

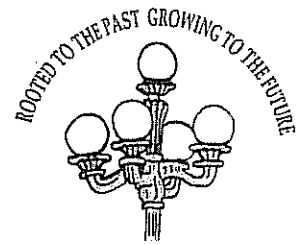




# Village of Waterloo

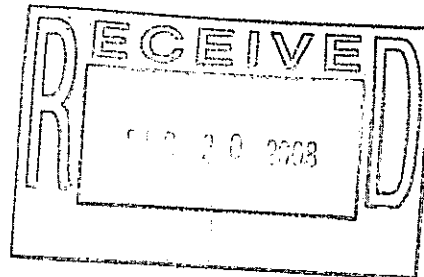
P.O. BOX 127 • WATERLOO, NEBRASKA 68069  
(402) 779-2292 • FAX (402) 779-2292

Board of Trustees



February 19, 2008

Mr. John Winkler, General Manager  
Papio-Missouri River Natural Resource District  
8901 South 154<sup>th</sup> Street  
Omaha, Nebraska 68138-3621



Dear Mr. Winkler:

As part of a flood plain re-mapping effort, FEMA has identified a number of levees across the state that may not meet the new requirements of the Code of Federal Regulations, Title 44, Section 65.10. The Village of Waterloo, as the sponsor of the levee that surrounds our community has been notified that this levee must be re-certified in order to continue to be listed on the Flood Insurance Rate Map, as providing 100-year flood protection.

On behalf of the Village of Waterloo, Trustee Vice-Chairman – Troy Petersen and myself, Trustee Chairman – Stanley E. Benke, Jr. entered into an agreement and a request for a Provisionally Accredited Levee Designation from the Federal Emergency Management Administration (FEMA) to allow time for us to comply with CFR Title 44, Section 65.10 on October 17, 2007. The 24 month compliance period actually began January 15, 2008.

It was at this meeting and subsequent meetings that the Waterloo Village Board of Trustees was seeking professional assistance for this levee accreditation task. We consider the Papio-Missouri River NRD, the Army Corps. of Engineers and Johnson, Erickson & O'Brien Engineering Firm as our partners, as we begin the levee accreditation process.

Initial surveys by JEO indicate that some of the current freeboard of the Waterloo levee system may not be sufficient to meet the new regulations. As a result, a review and evaluation of the existing levee must be done to determine what improvements maybe required for certification.

At this time we are asking that the Papio-Missouri River NRD consider cost sharing for the initial phase of the levee accreditation process by contributing 50% of the listed costs. This would only include the JEO Consulting Group expenses for surveying and outlining the Levee Accreditation scope of services and the geo-technical services to be provided by Terracon Consultants, Inc.





We will not fully understand the full extent of this project or the potential costs, until we have the preliminary engineering reports. Depending on the outcome of these reports, we may need to start looking for other funding sources, as well. We may find that it is not fiscally feasible for the Village of Waterloo to make the required improvements, but we have to at the very least, determine the full scope and the feasibility to comply.

Attached for consideration is a listing of our expenses to date, along with a copy of the invoices, service agreements and correspondence from FEMA. The Papio-Missouri River Natural Resource District has always been a valued partner. We do appreciate your support and consideration for this financial request to help us offset some of the costs associated with the initial phase of our levee accreditation.

Respectfully,

A handwritten signature in black ink, reading "Stanley E. Benke, Jr." in a cursive script.

Stanley E. Benke, Jr.

Village Board Chairman

Enclosures:

Cc: Paul Woodward, Papio-Missouri River Natural Resource District  
Marlin Peterman, Papio-Missouri River Natural Resource District  
Troy Petersen, Waterloo Village Board Vice-Chairman  
Garry Lee, Waterloo Village Board Trustee  
Bill Rotert, Waterloo Village Board Trustee  
Jeff Barnes, Waterloo Village Board Trustee  
Nancy Hert, Waterloo Village Board Trustee  
Don Overholt, Waterloo Village Attorney



**VILLAGE OF WATERLOO  
RECERTIFICATION EXPENSES  
FEBRUARY 15, 2008**

**JEO CONSULTING GROUP EXPENSES:**

Invoice #50593 - November 16, 2007-Study & Report/Site Visit/Inspection	\$880.00
Invoice #50858 - December 14, 2007-Study & Report/NRD Contact Site visit/Inspection	\$2482.00
Invoice #51351 -January 18, 2008 Study & Report/Survey Information NRD Contact/Site Visit/Inspection	\$4349.00
Preliminary Service Scope Agreement- February 8, 2008	\$17,000.00

**TERRACON CONSULTANTS, INC.**

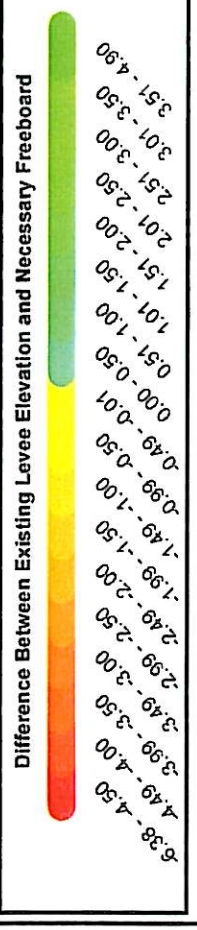
Terracon Service Agreement – February 8, 2008	\$5200.00
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<b>TOTAL EXPENSES TO-DATE</b>	<b>\$29,911.00</b>
<b>REQUESTED 50% FROM NRD</b>	<b>\$14,956.00</b>





Preliminary



**LEGEND**

- PROPOSED BORING LOCATION
- PROPOSED CONE SOUNDING LOCATION

IMAGE SOURCE: JEO CONSULTING GROUP

Project Manager:	RDM	Proposed by:	0508067
Drawn by:	PAI	Scale:	AS SHOWN
Checked by:		File No.:	0508067P01
Approved by:		Date:	FEBRUARY 2008
2211 SOUTH 156th CIRCLE PH: (402) 330-2202			
Terracon Consulting Engineers and Scientists			
OMAHA, NE 68130-2905 FAX: (402) 330-7605			
SUBSURFACE EXPLORATION DIAGRAM PRELIMINARY GEOTECHNICAL REPORT			Fig. No.
WATERLOO, DOUGLAS COUNTY			1
			NEBRASKA