



March 4, 2014

**Attention: Mr. Steve Roth, City Administrator**  
City Hall  
101 Front Street  
New Haven, MO 63068

Dear Mr. Roth,

**Reference: Levee Accreditation Request for Proposal-Stantec Letter of Interest**

Stantec Consulting Services Inc. (Stantec) appreciates the opportunity to offer our professional consulting services to the City of New Haven in support of levee accreditation services. Stantec possess extensive experience with the requirements of not only 44 CFR 65.10, but also the levee system permitting requirements of United States Code (USC) Title 33, Chapter 9, Subchapter I, Section 408 (Section 408). As the City's levee is was designed and built by the United States Corps of Engineers (USACE), Section 408 approval will be required for all levee improvements. Stantec is ideally suited to assist the City with this effort.

Stantec would like to express our interest in furthering conversations with the City of New Haven to determine how we may best serve the needs of the City. We have performed similar accreditation services for municipalities around the country, most recently for the City of Des Moines, Iowa. While Des Moines' levee system is very complex and requires extensive engineering analysis, the needs of Des Moines and New Haven are very similar; provide the necessary engineering to adequately access the risk associated with the levee system, and determine design modifications to help alleviate the risk. Access these risks leads to the requirements of CFR 65.10 and Section 408. Stantec is prepared to dedicate personnel and resources to this project in the same manner we have dedicated resources to clients managing levees around the country.

Many of the requirements for a Section 408 permit overlap those of CFR 65.10. A particular exception, however, is that the USACE requires a risk-based analysis of the levee system to determine the annual-exceedance probability of overtopping, establish the required top of levee elevation, and verify that the levee raises do not have an adverse impact on upstream and downstream areas.

The City has asked quailed engineering firms to support its efforts to obtain FEMA accreditation. As the levee system is a federal levee, and Section 408 permitting will be required, we believe the Scope of work to include:

1. Review of available documentation to determine gaps in the City's current levee system data relative to CFR 65.10 accreditation requirements. Documents provided by the City for this review shall include record drawings, engineering reports, and operations and maintenance manuals. Prepare a report of the findings of this data review.
2. Performing additional engineering studies, analyses and reviews to address gaps identified in the data review of available information and preparing supporting documentation for submittal of an



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accreditation application to FEMA. Criteria used as the basis of this work will be limited to that prescribed by CFR 65.10.

3. Performing engineering studies, analyses, and reviews to prepare a Section 408 permit application.

Item 2 above will require geotechnical field exploration and laboratory testing in order to perform sufficient seepage and stability analysis to meet the requirements of CFR 65.10. A review of current FEMA/USACE hydraulic models will be required. An interior drainage model will be developed. Current embankment protection will be reviewed to determine if additional protection is necessary. We anticipate this effort will require a budget of approximately \$200,000. A more detailed cost estimate will be developed when necessary.

Stantec has the experience and personnel necessary to assist the City. Attached you will find a sampling of our experience in this field of expertise. We would very much like the opportunity to further discuss with you how we may assist in addressing the requirements of both FEMA and the USACE. If you have any questions for us, or would like to meet to discuss more extensively, please feel free to contact us.

Regards,

**Stantec Consulting Services, Inc.**

A handwritten signature in black ink, appearing to read "Bob Welsch".

**Bob Welsch, PE**  
Senior Associate

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A handwritten signature in blue ink, appearing to read "Matt Hoy".

**Matt Hoy, PE**  
Project Manager

[matthew.hoy@stantec.com](mailto:matthew.hoy@stantec.com)

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**Attachment: Project Descriptions**

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Stantec is contracted by numerous Urban Levee Districts in the St. Louis area to serve as Levee District Engineer. In this role, Stantec is responsible for all engineering related services for the flood protection systems, coordination with Federal Agencies and local sponsors, design of improvements and oversight of all construction related activities.

## Monarch-Chesterfield Levee District, St. Louis County, MO

The Monarch-Chesterfield Levee, a non-federal flood control project, protects approximately 4,700 acres of commercial/industrial development within the Missouri River floodplain in the Chesterfield Valley. Portions of the existing levee were constructed in the 1940s, and subsequent improvements have been made to provide flood protection against the 100-year flood event under FEMA requirements. The levee was breached on July 30, 1993 during the Great Midwest Flood causing extensive losses. Preliminary engineering studies began in 1994 for levee improvements to provide protection against the 500-year flood event (0.2% annual chance), and improvements are being made to interior drainage components as well as implementation of wetland mitigation measures. Stantec assumed the role of District Engineer in 2002 and is providing services in the areas of: site reconnaissance/observations; geotechnical explorations and borrow area evaluations; hydrologic and hydraulic analyses; drainage design; permitting; construction monitoring and inspection; and operations and maintenance review of flood protection and interior drainage system components. Stantec assists the Levee District Board in the allocation of project funds and maintenance costs to better determine the bonding capacity necessary for future improvements. Stantec reviews and approves all pay applications from applicable contractors working on levee improvements.

Most recently, Stantec has completed the design and construction monitoring and inspection of an approximate 17,000 LF levee raise and widening, along with seepage berm improvements, to the upstream end of the Levee District in order to increase the level of protection to greater than the 500-year flood event, along with meeting USACE flood control requirements. Earthwork excavation in excess of 650,000 CY was required. In addition, in the role of District Engineer, Stantec has provided design review of multiple stormwater pump stations, floodwall/floodgate design, levee realignment, and railroad closure structure design in correlation with USACE work to improve the levee to the 500-year level of protection.

## Riverport Levee District, St. Louis County, MO

Constructed in the mid 1980s to allow development of lands reclaimed from the Missouri River Floodplain, the Riverport Levee is an earthen levee, approximately two miles in length, which provided protection against the 500-year flood event for approximately 500 acres of commercial/industrial development and portions of Interstate Highway I-70. Stantec assumed the role of District Engineer in 2002 to provide services in the areas of levee evaluation and assessment; site reconnaissance/observations; geotechnical explorations; hydrologic and hydraulic analyses; analyses and design of remedial measures; performance of an interior drainage study; and operations and maintenance review of flood protection and interior drainage system components. Stantec also assisted in the formation of the Riverport Levee District along with budget development, improvement costs, and pay application review.

# St. Louis Urban Levee Districts

St. Louis, Missouri

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## Lakeside 370 Levee District, St. Charles County, MO

Construction began in October 2005 and was completed in November 2006 to allow development of lands reclaimed from the Mississippi River Floodplain. The Lakeside 370 Levee is an earthen levee, approximately 5.2 miles in length, which provided protection against the 500-year flood event for approximately 2200 acres of commercial/industrial development and portions of Interstate Highway I-370. Stantec assumed the role of District Engineer in 2006 to provide services in the areas of levee evaluation and assessment; site reconnaissance /observations; geotechnical explorations; hydrologic and hydraulic analyses; analyses and design of remedial measures; performance of an interior drainage study; and operations and maintenance review of flood protection and interior drainage system components. Stantec also assisted in the formation of the Lakeside 370 Levee District along with budget development, improvement costs, and pay application review. Stantec conducted a review of design seepage analyses and interior drainage modeling during initial stages of site development in 2007. A sensitivity analysis of seepage berm design parameters and further seepage/underseepage modeling of the levee and seepage berm during Mississippi River flood events resulted in interior drainage channel recommendations. The recommendations addressed issues associated with seepage flow during flood events including piping, flow gradient, and flow quantity. Stantec assists the Levee District Board in the allocation of project funds and maintenance costs to better determine the bonding capacity necessary for future improvements.

## Missouri Bottoms Levee District, St. Louis County, MO

An existing agricultural levee protects approximately 3,000 acres of “bottom land” located in the northwest St. Louis County metropolitan area. The earthen levee currently provides flood protection up to the level of approximately the 10-year flood event on the Missouri River, and the District is pursuing upgrades of the levee to protect the enclosed area from the 500-year flood event. The design and construction of a 500-year levee presents issues including underseepage beneath the levee and interior drainage of the protected area that have not previously been major concerns for the Missouri Bottoms area. Stantec has conducted preliminary geotechnical explorations and analyses, LOMR applications, and completed conceptual designs, alignment studies and layout for improvements to the levee to provide flood protection from the 500-year design flood event, plus three feet of freeboard.

## Howard Bend Levee District, St. Louis County, MO

The Howard Bend Levee protects approximately 6,000 acres of primarily agricultural development within the Missouri River floodplain. The earthen levee is approximately 8 miles in length with reinforced concrete floodwalls. The flood protection system includes an interior drainage system with pump stations to collect and evacuate stormwater runoff. Following the Great Midwest Flood of 1993, the levee was breached resulting in extensive losses and flooding to the area, and prompting the US Army Corps of Engineers to upgrade the levee to a 500-year level of protection. In 2002, Stantec was contracted by the District to provide levee benefit assessments, hydrologic and hydraulic analyses, and infrastructure and utility design.

Client: Various Levee Districts  
Completed: Ongoing  
Cost: \$10 million +  
Size: Appr. 35 river miles

Design with community in mind

# Downtown Levee System Master Plan

Des Moines, Iowa



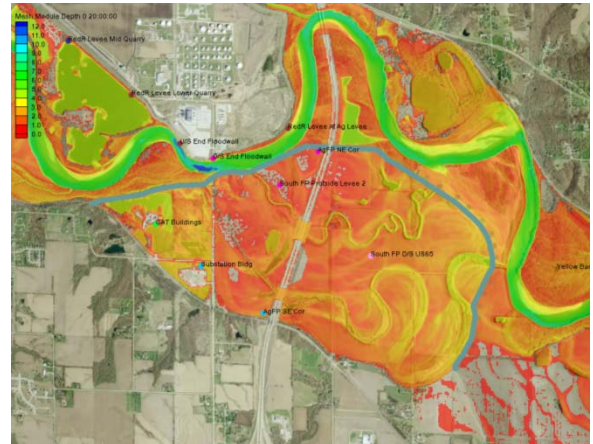
The City of Des Moines, Iowa is located at the confluence of the Des Moines and Raccoon Rivers in Polk County, IA. Portions of the City are protected by the Des Moines Downtown Levee Local Flood Protection Project (LFPP), which consists of a series of earthen levees and concrete floodwalls. Following an increase in the estimated 100-year discharge resulting from the 1993 and 2008 flood events, the LFPP no longer meets the freeboard requirements of CFR 65.10. Stantec is assisting the City in evaluation of their levee system and identifying the modifications necessary to meet the requirements of CFR 65.10.

Stantec first performed a gap analysis to identify sections of the levee and floodwall system that do not meet the requirements of CFR 65.10. The results of the evaluation were presented to the City and identified the additional analyses and documentation required to evaluate whether the levee systems satisfy CFR 65.10 criteria.

Stantec then evaluated the LFPP relative to CFR 65.10 criteria. This first involved a detailed field reconnaissance to review the levee system and identify operations and maintenance issues. This was followed by geotechnical exploration and laboratory analysis to support evaluation of the embankment and foundation stability. Stantec is currently performing seepage and stability analyses at select locations as required by CFR 65.10.

During the gap analysis, freeboard deficiencies along the levee system were quantified. Stantec identified potential alternatives for providing the required freeboard along the LFPP. These alternatives included increasing the height of the existing levee systems, through levee and floodwall raises, and/or construction of flood mitigation projects to lower water surface elevations during flood events.

Evaluating the flood mitigation potential of several structural alternatives in and around the City involved the use of one- and two-dimensional hydraulic models to evaluate the hydraulic impacts of the proposed measures. Downstream of the LFPP, the Des Moines River has several bends that result in two-dimensional flow behavior. Using a TUFLOW two-dimensional hydraulic model, Stantec incorporated potential options such



Client: City of Des Moines, Iowa  
Completed: Ongoing  
Cost: \$2 million  
Size: 12 river miles

Design with community in mind

# Downtown Levee System Master Plan

Des Moines, Iowa

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as agricultural levee removal, overflow conveyance channels, and bank modifications for reducing water surface elevations along the LFPP.

Along the LFPP, flow in the Des Moines and Raccoon Rivers is primarily one-dimensional. Therefore, a HEC-RAS hydraulic model was calibrated and used to evaluate freeboard provided by the existing flood protection system. Several potential structural measures were incorporated into the HEC-RAS model to estimate potential decreases in flood elevation, and in turn increases in freeboard, along the subject levee systems. The modeled structural measures included removal of abandoned bridges and low-head dams, removal or raising of select active bridges, channel widening, levee setbacks, and combinations of these alternatives.

Planning-level cost estimates were concurrently prepared for the alternatives of levee raises and water surface mitigation projects. The City and Stantec are currently working to determine the preferred method for providing the required freeboard.

Since the LFPP was designed and constructed by the USACE, modifications to the levee system require permitting under U.S.C. Section 408. Stantec has supported the City in coordination with the USACE-Rock Island District to determine the submittals required to obtain approval under Section 408. Stantec and USACE have established a plan using a risk-based approach to characterize the existing risk along the system and determine how this risk would be redistributed as a result of the City's proposed levee modifications. This analysis will involve use of the hydraulic models along with HEC-FDA software.

Stantec is also preparing the required engineering analyses relative to closure structures, embankment protection, and interior drainage.



# USACE Levee Periodic Inspections

USACE Various Districts

The American Recovery and Reinvestment Act of 2009 provided \$90 million for the USACE to conduct levee safety Periodic Inspections (PIs) on their inventory of federally authorized levee systems. The purpose of the PIs is to verify proper operation and maintenance, evaluate operational adequacy and structural stability, review design criteria to identify changes in current design standards, identify features to monitor over time, and improve the ability to communicate the overall condition to levee sponsors and the public. The levee system is inclusive of all components that are interconnected and necessary to ensure protection of the associated floodplain – levee and floodwall sections, closure structures, pumping stations, culverts, and interior drainage works.



Stantec was selected to conduct multi-disciplinary (civil, geotechnical, hydraulic, structural, mechanical, and electrical) inspections of 203 miles of levees in the Tulsa District, 330 miles of levees for the Little Rock District throughout Arkansas, Indiana, Kansas, Missouri, Oklahoma; 23 miles of levees for the Huntington District in West Virginia; 84 miles of levees for the Jacksonville District in Florida; and 200 miles of levees for the Louisville District throughout Kentucky. In combination, Stantec performed tasks on 900 miles of levees, 7 USACE Districts and 11 States, utilizing 150 staff members in 20 Stantec offices. Tasks associated with PI's include preparation of a Project Plan, system documentation collection, design criteria review, preparation of a pre-inspection packet for the USACE, field inspection, draft PI report, Independent Technical Review, out-brief for the USACE Levee Safety Officer, and closeout periodic inspection. Design criteria review, including hydraulic, geotechnical, structural, mechanical, electrical, and survey datum, is conducted to assess the ability of each feature and overall system to function as authorized and identify potential need to update system design.



Stantec managed multiple task orders, meeting delivery schedules for USACE. Stantec conducted additional coordination of stakeholder meetings with USACE and others. Presented presentations and comparison of results between levee districts. Stantec overview of portfolio wide issues and sponsor education and outreach. Stantec coordinated between the USACE Districts on the levee projects.

## CLIENT

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Geotechnical Engineering and Dam Safety  
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