WRRDA 7001 Submissions Package

U.S. Army Corps of Engineers

Proposal Name: Hartford Region Flood Protection Project

Submission Date: 09/19/2016

Proposal ID Number: 61f1e48c-417e-4458-84b4-a37342ada061

Purpose of Proposal: Severe floods in 1936 and 1938 prompted the U.S. Army Corps of Engineers (USACE) to construct a comprehensive flood control system to protect the City of Hartford and Town of East Hartford from Connecticut River flooding. Despite the initial protection, the effects of time and the elements have taken a toll on the system's integrity, and significant capital investment is needed. Recent ratings by the USACE placed the City of Hartford's system in the "unacceptable" category, while the Town of East Hartford's system was rated "minimally acceptable, indicating that both systems are at a heightened risk of failing to meet the rated protection criteria of the original USACE flood control projects.
In addition to the risk to human life, there is significant public and private infrastructure at risk in the event of a levee failure. Over 20% of Hartford's land area is in the levee protected zone, most of which is comprised of important commercial, institutional, and residential properties; with a similar composition in East Hartford. Major public infrastructure in both municipalities is also at risk, the most vulnerable of which is the MDC's regional sewage treatment system which is in the process of a $3 Billion EPA mandated upgrade. The Interstate 84/91 interchange, regional airport, MDC water distribution system, military jet fuel supply pipeline, and numerous major employers are also at increased risk. To ensure that the flood protection systems can safely protect human life, public and private property, and regional utility infrastructure; federal assistance through WRRDA is greatly needed.

1. Administrative Details

Proposal Name: Hartford Region Flood Protection Project

by Agency: The Metropolitan District, Hartford, CT

Locations: CT

Date Submitted: 09/19/2016

Confirmation Number: 61f1e48c-417e-4458-84b4-a37342ada061

Supporting Documents

File Name	Date Uploaded
Hartford WRRDA Cost Benefit.pdf	09/19/2016
GHFC Letter to ACOE 020116.pdf	09/19/2016
2014 WRDA Request Attachment.pdf	09/19/2016
WRDA Perez-Dibella Ltr to Cong Larson FINAL 4.3.09.pdf	09/19/2016
EH cost benefit data.pdf	09/19/2016
Final USACE Hartford SWIF Approval Letter.pdf	09/19/2016
Meeting Minutes MDC USACOE COH 2014 05 23.pdf	09/19/2016
WRRDA Request Letter - Jellison to USACE 9.19.16.pdf	09/19/2016
Levee-system.pdf	09/19/2016
Flood Comm Handout.pdf	09/19/2016
EH System overview map.pdf	09/19/2016
EH letter of support MDC 091416.pdf	09/19/2016
Regional Project Details.pdf	09/19/2016
Meeting Minutes MDC USACOE COH 2015 02 19.pdf	09/19/2016
2014 Transmittal Letter WRDA Application.pdf	09/19/2016
2014 WRDA Project Request Form.pdf	09/19/2016
Report to Congress on Future Water Resources Collab.pdf	09/19/2016

2. Provide the name of the primary sponsor and all non-Federal interests that have contributed or are expected to contribute toward the non-Federal share of the proposed feasibility study or modification.

Sponsor	Letter of Support
The Metropolitan District, Hartford, Connecticut(Primary)	Local support has been demonstrated through letters provided by the mayors of the City of Hartford and Town of East Hartford (see attachments to this application). Both letters express their respective community's support of the MDC's regional flood control capital improvement application, which includes a series of projects on City of Hartford, Town of East Hartford, and MDC facilities that directly impact flood protection performance. Both Hartford and East Hartford have conducted significant public outreach programs as part of meeting the requirements of the Federal Emergency Management Agency (FEMA) and U.S. Army Corps of Engineers (USACE) with respect to levee safety. Both communities have also committed significant amounts of local funding which has been approved through public referenda, further demonstrating public support. The MDC has also been proactive in developing support for regional flood control improvements through efforts at the legislative level. One example of such legislative efforts is explained further in the MDC's letter which is attached to this application.
City of Hartford Connecticut	The City of Hartford has attached a detailed letter of support for the MDC's request for WRDA funding for regional flood control improvements. Through significant local expense, Hartford went through a mandated levee accreditation process with the Federal Emergency Management Agency (FEMA) which resulted in accreditation for the 100 year flood in 2009. Hartford conducted a significant outreach program, receiving much public support, as part of meeting the FEMA requirements. Although FEMA 100 year requirements were met, the Harford Flood Control system also falls under U.S. Army Corps of Engineers (USACE) regulations which require a much higher level of protection, exceeding the 500 year flood level. The City's system was recently determined by USACE to be deficient, and the City was forced to enter into the USACE System Wide Improvement Framework (SWIF) program. This is a remedial program which allows 2 year grace period for the City to evaluate all defects, develop a plan to correct the deficiencies, and commit to the funding that is required. Hartford has been struggling to fund the high cost of the flood control capital improvements needed to satisfy USACE. Although Hartford's levee system provides protection for many regional assets, Hartford has had to shoulder the financial burden alone. The City's USACE approved SWIF program includes a commitment for $78 M in capital improvements. Hartford's financial condition is such that local funding alone will not be sufficient, and therefore outside assistance from WRRDA is greatly needed.
Town of East Hartford Connecticut	The Town of East Hartford is the non-Federal sponsor and will be an active participant in the Rehabilitation of the flood reduction system. The rehabilitation of the flood reduction system is a high priority of the

3. State if this proposal is for a feasibility study, a modification to an authorized USACE feasibility study or a modification to an authorized USACE project. If it is a proposal for a modification, provide the authorized water resources development feasibility study or project name.

[x] Modification to an Authorized USACE Project : 1.) Connecticut River LB & Hockanum River RB Levee – East Hartford, CT; 2.) Connecticut River RB – Hartford, CT; 3.) North & South Branch Park River, Park River Conduit System – Hartford, CT

4. Clearly articulate the specific project purpose(s) of the proposed study or modification. Demonstrate that the proposal is related to USACE mission and authorities and specifically address why additional or new authorization is needed.

Severe floods in 1936 and 1938 prompted the U.S. Army Corps of Engineers (USACE) to construct a comprehensive flood control system to protect the City of Hartford and Town of East Hartford from Connecticut River flooding. Despite the initial protection, the effects of time and the elements have taken a toll on the system's integrity, and significant capital investment is needed. Recent ratings by the USACE placed the City of Hartford's system in the "unacceptable" category, while the Town of East Hartford's system was rated "minimally acceptable, indicating that both systems are at a heightened risk of failing to meet the rated protection criteria of the original USACE flood control projects.

In addition to the risk to human life, there is significant public and private infrastructure at risk in the event of a levee failure. Over 20% of Hartford's land area is in the levee protected zone, most of which is comprised of important commercial, institutional, and residential properties; with a similar composition in East Hartford. Major public infrastructure in both municipalities is also at risk, the most vulnerable of which is the MDC's regional sewage treatment system which is in the process of a $3 Billion EPA mandated upgrade. The Interstate 84/91 interchange, regional airport, MDC water distribution system, military jet fuel supply pipeline, and numerous major employers are also at increased risk. To ensure that the flood protection systems can safely protect human life, public and private property, and regional utility infrastructure; federal assistance through WRRDA is greatly needed.

5. To the extent practicable, provide an estimate of the total cost, and the Federal and non-Federal share of those costs, of the proposed study and, separately, an estimate of the cost of construction or modification.

	Federal	**Non-Federal**	**Total**
Study	$0	$0	$0
Construction	$50,446,500	$27,163,500	$77,610,000

Explanation (if necessary)

Listed costs include MDC Northeast Transmission Water Main Rerouting Project: $24,000,000, City of Hartford Concrete Floodwall Stability and Settlement Repairs: $1,800,000, City of Hartford Levee Underseepage Mitigation: $12,500,000, City of Harford Levee Toe Drain Repairs: $2,500,000, City of Hartford Folly Brook Flood Control Conduit Replacement: $8,000,000, City of Hartford North Meadows Pump Station Rehabilitation: $4,200,000, City of Hartford Keney Lane and Bushnell Pump Station Rehab: $5,600,000, Town of East Hartford Structural Improvements: $8,760,000, Town of East Hartford Dredging: $3,950,000, Town of East Hartford Pump Station Renovation: $4,500,000, Town of East Hartford Levee Operational Improvements: $1,800,000. Please see attached Regional Project Details.pdf for additional information

6. To the extent practicable, describe the anticipated monetary and nonmonetary benefits of the proposal including benefits to the protection of human life and property; improvement to transportation; the national economy; the environment; or the national security interests of the United States.

Potential loss of integrity of the flood control systems is a threat not only to the MDC's existing infrastructure, but also to the significant capital investment being made as part of the Clean Water Program. This request for projects will not only enable the City's flood management control systems to meet federal standards to control storm water runoff and eliminate pollutant discharge into critical watersheds and waterways, it will also protect $600M of Federal and State investments in the largest regional wastewater treatment plant in CT which is protected by the dike systems. Failure of the dike system, independent of multiple months without wastewater service, will cost MDC towns more than$10B to reestablish operation to the plants. This would have to be funded on a pay go basis, as the availability to issue new GO Bond debt within the MDC's current debt limitation would be significantly less than reinvestment required. The majority of this incremental pay go capital would be funded through Ad Valorem system, creating an undue burden on the budgets of the MDC's member towns. Long term effects are of concern for the communities involved, the property owners within the protected areas, and also for the MDC's regional facilities. Studies have indicated that properties in the affected flood zone account for approximately 25% of the current City of Hartford grand list. If a breach or failure of the dikes occurred, property values would diminish significantly or in their entirety, impacting the City of Hartford's grand list and leading to substantial disruption of tax revenue to the City of Hartford. This would shift the funding of the MDC Sewer Operations to the other seven member towns as a result of the Ad Valorem tax formula, and therefore result in additional serious financial impact on the member town's budgets.

7. Does local support exist? If 'Yes', describe the local support for the proposal.

[x] Yes

Local Support Description

The attached correspondences outline the local sponsors' support for the rehabilitation of the flood reduction system and their commitment to provide the local cost share necessary. We understand that the inclusion in the WRRDA 7001 Report is the first step in the process and that a USACE Chief's report, congressional authorizations and appropriations are required to enter into an agreement for the project. The Sponsors are committed to making the necessary improvements and modifications to the flood reduction study to protect lives, property and infrastructure located behind the flood reduction system.

8. Does the primary sponsor named in (2.) above have the financial ability to provide for the required cost share?

[x] Yes

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

Hartford WRRDA Cost Benefit.pdf

Hartford WRRDA Cost-Effectiveness Analysis

The financial ramifications of a failure of the flood control system would be severe for the City of Hartford, which is major employer in the region. As Connecticut's capital city, Hartford is also home to many government and institutional buildings and is culturally rich and endowed with a great wealth of nationally significant history. However, as history has proven, Hartford is extremely vulnerable to flood risk. The most severe example is the massive flood that hit Hartford in the 1930s. The Great Flood of 1936 submerged much of the city leaving 14,000 residents homeless and businesses boarded.

Unemployment and poverty are severe and pervasive in Hartford. The citywide unemployment rate is 16.4%, with some areas as high as 27% - higher than the rate during the Great Depression. While the statewide poverty rate is 10%, the city's is 33.9%, with some areas as high as 49.35%. Hartford households are disproportionately low-income with an average per capita income of only $16, 286 annually versus $37,726 statewide. These economic conditions have been acknowledged by the federal government via designation of a North Hartford Promise Zone.

The economic consequences of a levee failure include severe impacts to Hartford's regional employers which include the insurance and banking industry, as well government and institutional employers. Infrastructure failure would be an environmental and civic catastrophe for the entire central-Connecticut region. A levee breach today would flood over 20% of Hartford's land base. This would inundate approximately 3,000 acres of highly developed residential, commercial, and industrial areas and potentially impact 20% of the City's grand list. Affected areas would include the North Hartford Promise Zone, the MDC's regional Wastewater Treatment Facility (the largest such facility in the area and sole processing center for the regions sludge-based waste), and numerous historical and essential city and state government facilities.

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

GHFC Letter to ACOE 020116.pdf

GREATER HARTFORD FLOOD COMMISSION

525 Main Street
Hartford, Connecticut 06103

Telephone: (860) 757-9975 Fax: (860) 722-6215

February 1st, 2016

Colonel Christopher Barron
Commander and District Engineer
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742

RE: 2015 Annual Report
City of Hartford, Connecticut
Local Protection Project
Connecticut and Park River Systems

Dear Colonel Barron:

The purpose of this letter is to provide an annual report to the District Engineer of the inspection, maintenance, and operation of the Hartford Local Protection Project as prescribed by 33 CFR 208.10(a). This annual report includes a summary of the activities undertaken by the City in 2015 and planned for the 2016 calendar year. This letter also serves to advise you of the City of Hartford's plans for long-term capital improvements, as required by the *Operation & Maintenance Manual for Hartford Local Protection Project, Connecticut and Park Rivers,* dated June 2009 (O&M Manual).

Operation

Currently, the Hartford Department of Public Works (DPW) has a staff of three workers dedicated to the operation, inspection, and maintenance of the flood control system. The Metropolitan District Commission (MDC) also has a crew dedicated to sewer maintenance that inspect many of the combined storm and sanitary sewer structures that are related to the flood control system. During flood events, the DPW will use staff from its street division to augment flood control staff. These crew members are trained to assist in the operation of pump stations, patrolling the line of protection, operate closures, and other activities related to flood control. In addition to our own staff, the City regularly uses outside consultants to provide engineering expertise.

A major flood event for the system is defined when the Connecticut River rises to above 12 feet at the Bulkeley Bridge (i.e. action stage) and daily flood patrols are conducted above flood stage of 16 feet. In general, 2015 was a slightly drier year than average, and despite higher than average snow totals, the snow melt in the greater Connecticut River basin was gradual and did not produce any large flooding events. The flood system experienced one flooding event from April 13 to 28, 2015, with the high water mark at 17.08 feet. Daily flood patrols were performed between April 15 and 18, 2015. During this event, 4 of the 6 pumping stations were put on-line (North Meadows, South Meadows, Keney Lane and Bushnell Park stations). Though the season was dry, there were numerous times the river rose to between the 5 to 10 foot elevation marks, activating the North and South Meadows pumping stations.

Routine Inspections and Maintenance

Routine inspections and maintenance of the flood control system performed during 2015 included:

- **Levees:** In the spring of 2014, a contract for on-going maintenance and operations of the levees and floodwalls was awarded for a three-year maintenance period. In 2014, the contractor performed clearing along the entire levee system

to remove heavy vegetation. This included clearing vegetation too large to mow in grassed areas, clearing and applying herbicide in riprap areas, clearing vegetation from drainage ditches, and repairing approximately 400 animal burrows. The program has continued in 2015 with periodically mowing in designated areas, applying herbicide and removing woody vegetation from designated riprap protected slopes, periodically clearing vegetation from designated drainage ditches and disposing, performing nuisance wildlife surveys and implementing animal control measures, repairing animal burrows, removal of accumulated debris from the levee system after significant flood events and disposing of accumulated debris. Specifically, the contractor completed first mowing of all dikes, ditch cleaning, 150 animal burrows, started clearing vegetation between top of slope and water edge at South Meadow Pond and North Meadow Pond, and cleared vegetation at base of roadway at North Meadows Dike in 2015.

- **Pump Stations:** The interior and exterior maintenance of each station continues year round, with monthly test runs of the engines and pumps, as well as, all the mechanical or electrical equipment, the general custodial and cleanliness of the station and the trimming, trash clean-up, and snow removal of the exterior. North and South Meadows Stations, which have a combined total of 10 pump engines, were run approx. 60 hours this year, Keney Station, with 3 pump engines ran approx. 20 hours, Bushnell Station with 3 pump engines ran approx. 7 hours and Armory and Pope Stations with a combined 6 pump engines ran approx. 6 hours this year.

- **Conduits:** The Park River Conduit sluice gates maintained by DPW have been inspected and exercised, with all of them operational. There were minor repairs made to handles and covers to the access points. More intensive repairs are needed to the access point on #12 and # 21, although this does not affect operation of these gates. Gully Brook, Folly Brook, Cemetery Brook, and North and South Branch of the Park River are checked and cleared of debris at their access and exit points to maintain proper flow. No interior inspection of these conduits was conducted this year.

Maintenance Projects

Completed Projects

DPW completed a number of major projects to maintain the flood control system during 2015, including:

- **North and South Meadows Storage Pond Dredging and Restoration Project:** This project involved the dredging and disposal of approximately 50,000 CY of contaminated sediment to restore ponds upstream of the North and South Meadows Pumping Stations to their original dimensions and storage volume. Improvements also included the clearing of trees around the perimeter of the ponds, construction of sedimentation forebays, and installation of a water main for pump cooling at North Meadow.
- **South Meadows Pumping Station Repairs:** This project consists of rehabilitation of four pumps (Pump Numbers 1, 2, 5 and 6) such as pump shaft, bearings and seals at South Meadow Pumping Station and repair of the Pump # 6 gear box.

Projects in Progress

In addition to the projects completed during 2015, the following projects are currently in progress:

- **Construction/Repairs of Pump Station:** This project involves the mechanical improvements to two vertical mixed flow pumps (Pump #3 and #4) at South Meadows pumping station and all South Meadows Pumping Station suction and discharge valves, sump pump improvements and replacement of valve operators. Inspection of Pump #3 at North Meadow pump station and Pump #2 gear box at Armory pump station.
    - Activities in 2015 included dewatering and setting up the temporary sump pump at South Meadow pump station; removal of the Pump #3 shaft, bearings and seals at South Meadow pump station; demolition of 6"cast iron bypass piping; surveying DI piping and pipe supports; Applied Dynamics Company completed the

repair to the Pump Number 3, including shaft, impeller, seal, volute wear ring and rotating assembly; and installation of the sump pumps Control Panel and all electrical connection.

- **Levee Closure Structure Modernization:** This project involves the upgrade of Closure Structures to improve operational efficiency, reliability, and durability of the structures. Specifically, the project includes the replacement of timber stop logs with aluminum panels at Closure Structures #2, 4, 5 and 6 and the decommissioning of Closure Structure #3 and the metal bulkhead door at the Materials Innovation and Recycling Authority (MIRA) (formerly Connecticut Resources Recovery Authority (CRRA)) facility. Closure Structure #1 currently require the railroad tracks to be cut and the ballast removed before the stop log timbers can be installed, which is time consuming and potentially unreliable. Aluminum panels will be installation in place of the timbers, and precast railroad installation of "at-grade" type track crossings will eliminate the need to cut the tracks.
    - Activities in 2015 included the removal of the existing steel bulkhead door and associated hardware and filling the opening with reinforced concrete at the MIRA facility, and permanently filling Closure Structure #3 with reinforced concrete. Work at Connecticut Southern Railroad Closure Structure #2 and Providence and Worcester Railroad Closure Structure #6 including upgrades to the existing rails, ties and ballast and installation of precast concrete grade crossings was completed in 2015. Replacement of concrete sills at Closure Structures #4 and #5 was also completed in 2015. Remaining work consists of the replacement of wooden stop logs with new aluminum closure panels at Closure Structures #2, #4, #5, and #6, which is expected in the first quarter of 2016.
- **North and South Meadows Bar Screens Installation and Cleaning Mechanism Replacements:** This project involves replacement of existing bar screen at South and North Meadows pump stations. And also it involves the replacement of existing trash rack at south and north meadow pump station.
    - Activities in 2015 included putting the project out to bid and selecting a contractor to begin work in 2016.
- **Weston Street Drainage Phase 2:** This project includes construction of remaining improvements needed to correct interior drainage problem in the North Meadows area. Phase 2 is the portion of the project that could not be previously completed due to an electric utility conflict.
    - Activities in 2015 included coordination with Eversource for temporary power service and installation of a new underground electrical duct bank. Construction documents are complete and the project is anticipated to go out to bid in early 2016.

Projects Planned for 2016

The following are planned for design process to begin in 2016, and the construction of the chosen alternative to follow the design process:

- **Bulkeley Bridge Under Seepage Mitigation:** Underseepage gradients are at or above the USACE allowable criteria for floods exceeding the 100 year event.. In August and September 2011, piezometers at three locations between the Bulkeley and Founders Bridges captured landside groundwater data which confirmed the analytical results that predicted that when significant flooding occurred on the Connecticut River that seepage gradients would exceed allowable criteria. Piezometric elevations confirmed quite conclusively that excessive underseepage was in fact occurring, and that landside groundwater levels rapidly approached the Connecticut River flood levels.

  Activities planned for 2016 include the development of a preferred alternate for seepage control systems out of potential solutions such as steel sheet pile cutoff wall, a soil bentonite cut off wall, a jet grouting system, and a network of interior relief wells. Conceptual layout plans for the preferred alternate and coordinate with various departments like Riverfront Recapture Inc, MDC, Connecticut DOT, Connecticut Southern Railroad Company, Etc. Following the concept design, an RFP for the engineering design will be put to bid for the detailed engineering design of the preferred alternative.

- **South Meadows Dike Impervious Blanket Design:** available levee design and as-built drawings and identified the limits and thickness of the impervious shell. Due to the uncertainties of both the original Clark Dike construction details, and the various efforts to raise the levee and repair flood damage, the actual composition of the current levee impervious shell remains somewhat uncertain. In 2009, 15 hand auger borings in the riverside slope of South Meadows Dike were performed to confirm the results of our document review and to assess the likelihood that the impervious shell may be thin or missing at some locations. It was concluded that several portions of the impervious shell in this reach appear to be less than 1.5 feet thick, which is far below the minimum design criteria of 3.5 feet. Also the material observed in the "impervious" shell is suspected of lacking the required imperviousness in some locations. From a seepage and stability perspective, the analysis shows that reducing the impervious shell thickness to 1.5 feet causes increased seepage into the levee core, and a significant reduction in stability results. The main purpose of the South Meadows Dike Seepage Impervious Shell Repair Design Project will be to restore the impervious shell to meet the required anti-seepage criteria.

  Activities planned for 2016 include field sampling and testing program, provide levee surface repair plan and recommendations, impervious shell repair details, evaluate the regulatory permitting requirements, and produce the technical scope of services documents for the construction services to go out to bid.

- **North Meadows, Hartford, and South Meadows Dike Toe Drain Installation:** Based on the available toe drain information, many of the toe drain filter materials are likely to either be clogged or allow the loss of fine sand and silt particles from the adjacent embankment and foundation materials. Some of the existing toe drains are not equipped with piping, manholes, cleanouts, or other access points, and are not readily accessible for inspection and cleaning. Some of the toe drains were constructed with rockfill in place of piping, primarily in the North Meadows Dike. Based on previous condition assessments, the overall functionality of the toe drain system is uncertain. Also, in some instances toe drains have been destroyed or buried due adjacent construction projects, including I-91. The toe drains along the landside toe of the South Meadows Dike consist of gapped clay pipe segments rather than perforated pipe, as is required by current design standards.

  Activities planned for 2016 include engineering design for the replacement of the existing clay pipe with toe drains made of perforated pipe along the South Meadows Dike, installation of perforated pipe toe drains for portions of the North Meadows Dike, and improvements to toe drains on the Hartford Dike to bring the toe drain systems into compliance with USACE criteria.

- **Hartford Pumping Stations Evaluations and Capital Improvements Plan:** The City of Hartford owns and operates six stormwater pumping stations powered by diesel engines that protect the City and surrounding environment from flooding during times of elevated water levels on the Connecticut River. There are numerous operational, maintenance, and staff-reported equipment deficiencies related to the pumping stations and surrounding structures that were identified in a 2009 evaluation. Since that time, various upgrades were performed and a re-evaluation is necessary to determine the overall pumping station capital improvement needs.

  Activities planned for 2016 include third-party site reconnaissance, operation and maintenance administrative compliance evaluations, plant building structural evaluations, building electrical, safety, fire protection, control system evaluations, and evaluations of all mechanical, electrical and HVAC system. This system-wide evaluation will inform the upgrade plan for the pumping stations.

- **Utility Penetration Abandonment & Modification:** A large number of utilities pass through the levee and flood walls, introducing the potential for progressive seepage, backflow, or destabilization of the levee during a flood event. Planned improvements include properly abandoning utilities no longer in use, and repair or enhanced backflow prevention for those that remain in use. Utility owners include the City, the MDC, and others.

Activities planned for 2016 include inspecting (via third-party reporting or visual/CCTV for larger pipes) to develop a comprehensive list of the system penetrations, including their current operational status, location, size/dimensions, ownership, outlet/inlet elevation, and condition. This list will inform future planned penetration abandonments.

Long-Range Capital Improvements

In addition to the specific planned projects described above, the City continues to prioritize and plan for capital improvements that are deemed necessary to maintain the vitality of the flood control system:

Floodwalls

- **Concrete Flood Wall Upgrades:** Existing concrete flood wall sections were cast in place with regularly spaced construction/expansion joints, which were installed with water stops to prevent leakage through the joints. This project would seek to replace the flexible joint material, refurbish deteriorated concrete, and investigate and repair the situations where the walls have settled or moved laterally due to support problems.

Pumping Stations

The following projects may be refined based on the proposed "Hartford Pumping Stations Evaluations and Capital Improvements Plan" planned for 2016:

- **North Meadows Pumping Station:** Recommended repairs for the North Meadows Pumping Station include replacement of the existing original 36-inch valves and replacement of the smallest 16-inch pump discharge valve; replacement of pump bearings and seals; addition of electronic operators to expedite opening and closing of handwheel-driven valves; replacement of original electrical panels; provision of access to the pump suction chamber for maintenance of the pumps; and installation of an automated bar rack assembly. Additional safety improvements are under consideration including repair of the perimeter fence and equipment shrouds.

- **South Meadows Pumping Station:** In addition to the pump repairs currently underway at South Meadows, the City is also planning for sump pumping improvements; 36-inch valve replacements; replacement of original electrical panels, and replacement of one electronic valve operator which experienced an electrical short during a flooding event.

- **Keney Lane Pumping Station:** The Keney Lane Pumping Station was erected in 1943, and has recently been surrounded by the parking garage for the Convention Center. Recommended improvements for the Keney Lane Pumping Station include replacement of existing valves and pump bearings and seals; replacement of valve operators; addition of walkways to safely access equipment; replacement of existing electrical equipment; and various safety improvements.

- **Bushnell Park Pumping Station:** Recommended repairs for the Bushnell Park Pumping Station include repair of a leaking roof above the screening room; replacement of the 30-inch valves and pump bearings; repair of sluice gate operators at the inlet to the wet well; replacement of existing electrical panels; and various safety improvements.

- **Pumping Station Automation Improvements:** Pumping station automation improvements would include supervisory control and data acquisition (SCADA) to centralize monitoring and operation of all six pumping stations from a single location. Other improvements would include telemetry upgrades to remotely report pond levels, tank levels, intruders, valve positions, etc. and issue alarms to flood control staff and supervisors.

Conduits

- **North Branch of the Park River Channel Improvements:** The North Branch Park River upstream of the conduit entrance is an unimproved open channel. Trees and other large debris from these areas can clog the conduit entrance, or enter the conduit and obstruct flow at other locations to reduce overall flood capacity. Planned improvements to

address this problem include construction of a dual-use maintenance and recreation access road, right-of-way acquisition, vegetation control, and debris management system.

- **Park River Conduit Upgrades:** The sections of the Park River Conduit in the vicinity of I-91 were built circa 1940 and are founded on wooden pilings. Several joints in this area have shown signs of settlement and lateral movement. Causes of the movement need to investigated, and potentially the conduit may need to be shored up in places to prevent further movement. Also, construction/expansion joints need to be replaced due to failure to prevent infiltration and further deterioration.

- **Folly Brook Conduit Replacement:** The Folly Brook Conduit was constructed in various phases using different construction techniques and has suffered significant deterioration due to age, substandard initial construction techniques, and the corrosive effects of combined sewer overflows which discharge into this conduit. This project calls for the construction of a new conduit, which would likely have to be constructed parallel to the existing conduit for logistical reasons. This upgrade is needed to allow for reliable future flows of storm and floodwaters, and the increased flows which may result from sewer separation.

- **Cemetery Brook Conduit Upgrades:** The Cemetery Brook Conduit suffers from intermittent sections of open channel that cause multiple inlet restrictions, sections of poor inlet structures, and susceptibility to clogging and overflow due to debris accumulation. This project would seek to improve open channels, stabilize eroded areas, improve inlet structures, and extend sections of the conduit to replace certain open channel sections.

If you have any questions related to this report, please do not hesitate to contact me at 860-757-9975.

Respectfully Submitted,

Constantin Banciulescu, P.E.
City Engineer / Assistant Director of Public Works
Flood Control Director, Greater Hartford Flood Commission

c: Luke Bronin, Mayor
Gina M Varano, Assistant Corporation Counsel
Marilynn Cruz-Aponte, DPW Interim Director
Michael L. Bachand, Levee Safety Program Manager, USACE
Scott Michalak, Chief, Geotechnical/Water Resources Branch, USACE
Arthur Christian, Connecticut DEEP
Craig Lapinski, Fuss & O'Neill

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

2014 WRDA Request Attachment.pdf

WRDA Funding Request Overview & Project Description Attachment

Hartford and East Hartford CT Flood Control System
Feasibility Studies for Capital Improvements
December 1, 2014

Index to Attachment Sections:

SECTION A: WRDA FUNDING REQUEST SUMMARY FOR FEASIBILITY STUDIES FOR CAPITAL IMPROVEMENTS

• Project #1 Underseepage Control Task:	$550,000
• Project #2 Interior Drainage-Pump Station Rehab/Replacement Task:	$350,000
• Project #3 Interior Drainage-Conduit Rehab/Replacement Task:	$450,000
• Project #4 Levee Utility Penetration Abandonment/Modification Task:	$250,000
• Project #5 Levee Toe Drain Modifications Task:	$250,000
TOTAL WRDA FUNDING REQUEST	$1.85 Million

SECTION B: FUNDING REQUEST BACKGROUND & OVERVIEW

1. Flood Control System Background

Following devastating floods in 1936 and 1938, U.S. Army Corps of Engineers began construction of a comprehensive flood control project to protect the City of Hartford and Town of East Hartford from Connecticut River flooding. This system has become the largest of its kind in New England, and one of the largest on the East Coast.

This system has been effective at protecting both communities from flooding for greater than 70 years since its construction. Despite the protection afforded, the effects of time and the elements have taken a toll on the system's integrity. Significant capital investment is needed to continue the level of protection originally afforded. Significant development has occurred behind these levees in the ensuing years, much of which is at risk in the event of a levee failure. In Hartford, for example, approximately 20% of its land area is in the levee protected zone, most of which is comprised of prime commercial, institutional, and residential properties. Furthermore, major public safety related infrastructure is also vulnerable to flooding in the event of a levee failure. Some of the infrastructure that would be most adversely impacted include the Interstate 84/ 91 interchange, the MDC regional sewage treatment facility, the State of Connecticut's Brainerd Airport, and a critical aviation fuel supply line that serves Bradley Airport and Westover Air Force base.

Both Hartford and East Hartford have been struggling to fund the high cost of capital improvements needed to satisfy maintenance and improvement mandates from regulatory agencies including FEMA and the U.S. Army Corps of Engineers.

GEI Consultants, Inc.
455 Winding Brook Drive, Suite 201, Glastonbury, Connecticut 06033
860.368.5300 fax: 860.368.5307

The City of Hartford's flood protection system consists of 7 miles of levees, 6 storm water pump stations, and over five miles of major underground conveyance conduits. The Town of East Hartford's system, although smaller in size, is very important in protecting some of its key commercial districts and residential properties. The East Hartford system consists of 4 miles of levees, 3 storm water pump stations, and various levee penetrations.

2. Federal Accreditation of Flood Control Systems

Both Hartford and East Hartford went through an exhaustive accreditation process with FEMA which resulted in both Hartford and East Hartford receiving FEMA accreditation for the 100 year level of protection for their respective systems in 2009 and 2010. The significance of levee accreditation is that properties within the levee protected zone would otherwise be considered in a high risk flood zone which would necessitate flood insurance, and would require the application of flood plain development regulations. These requirements would deter growth and economic development in these areas. Furthermore, designation of the areas as high risk flood zones would severely inhibit the use of state and federal funding for many public infrastructure projects. Although accreditation was secured from FEMA, there were numerous caveats relating to future capital improvements that were included. The accreditations include commitments to continue with flood control system improvements and maintenance in order to maintain the 100 year protection level accreditation status.

3. Flood Control System Deficiencies Cited by USACE

In 2012, both communities received Periodic Inspection (PI) letters from the U.S Army Corps of Engineers (USACE) which outline immediate repair and maintenance needs, in addition to long range capital improvement needs. The USACE requirements include efforts to maintain the basic 100 year protection status as mandated by FEMA, but also the added burden of ensuring that the levee systems meet the original design basis, which in this case exceeds the 500 year level of protection.

In 2014 USACE evaluated the systems again under newly adopted criteria, and reported that the systems were not in compliance due to unfulfilled improvement needs to correct deficiencies previously cited, and that ongoing care and investment in the systems were severely lacking. USACE took the further and serious action of notifying the City of Hartford, by letter dated August 13, 2014, that its flood protection system was being placed in the USACE "Inactive Status" category. The Town of East Hartford fared better in this USACE evaluation and was assigned a "Minimally Acceptable" rating, however, there are uncompleted capital improvements that USACE expects to be completed in East Hartford as well. USACE placed the Hartford system in inactive status due to the number and magnitude of the deficiencies noted.

4. Consequences of USACE Inactive Rating

The consequences of the action by USACE to place the Harford system in inactive status is significant. The immediate consequence is that Hartford is currently exposed to the full cost of any potential damage to the levee system caused by flooding that would otherwise be covered by federal funding. A second and, as yet unknown consequence, relates to FEMA's reaction to the USACE "Inactive Status" designation of the Harford system. Potentially, FEMA may rezone the levee protected zones as high risk flood zones, which would cause severe consequences for property owners within this zone. This would result in requirements for expensive flood insurance for property owners, limit use of State and Federal funding within these high risk flood zones, and generally hinder economic development once these areas are considered high risk flood zones.

In addition to the above regulatory problems, the actual condition of the flood control systems, as reported by USACE, present that there is significant risk to human life, property, public infrastructure within the levee protected zone. In essence, USACE has indicated that the Hartford Flood Control System is not capable of providing the flood protection it was designed to provide. In addition to human life, there is significant public and private infrastructure including public and private buildings, street and highway infrastructure, and public utility facilities.

One of the most vulnerable and expensive public facilities that would be impacted by a failure of flood control components is the regional sewer collection and treatment system, owned and operated by the Metropolitan District Commission. This facility is at the lowest elevation within the levee protected zone, and would be inundated under various levee failure scenarios.

5. Financial Burden of Levee Compliance and Request for WRDA Funding Assistance

Although the combined systems are essentially a regional protection system, in that it protects both communities as well many regional facilities, Hartford and East Hartford have had to shoulder the ongoing financial burden alone. The capital investment needs for these flood control systems is extreme, and neither community has been able to meet the system's investment needs.

Both communities have relied primarily on local bonding and, to a lesser extent, state grants to perform the improvements needed. However, given the magnitude of the combined financial needs, this has proven inadequate. The investment needs for both communities has an order of magnitude estimate of $98 Million, and federal assistance appears to be the only viable source for such an extensive investment. The Hartford system alone has capital needs that have been estimated to exceed $81 Million.

In order to meet federal levee safety requirements, and to ensure that the systems are capable of protecting the human life, public and private property, and regional utility infrastructure that exists within the levee protected zone, federal assistance is severely needed.

6. WRDA Project Description Overview: Engineering Evaluation and Plan Development for Capital Improvement Alternatives

In order to begin the process of implementing the capital improvements needed for USACE to reinstate an "Active Status" for the Hartford Flood Control system, and avoid the East Hartford system from also becoming "Inactive", engineering and planning work must first occur on the identified projects. A comprehensive list of conceptual projects has previously been complied, which results in the investment needs summarized above, however, important project details have yet to be resolved.

Examples of major capital projects include general levee surface repairs, rehabilitation and upgrades to the nine pump stations, repair of levee toe drains and associated collector drainage systems, repair and upgrade of levee penetrations for public utilities (pressurized and non-pressurized), repair and upgrade of railroad closure structures, and structural repairs to major underground conduit systems. Perhaps the most urgent project is the control of flood wall under-seepage between the Bulkeley Bridge and Founders Bridge, which respectively carry Interstate I-84 and Route 2 over the Connecticut River.

The WRDA funding request is intended to be used to perform the following general tasks associated with the listing of conceptual projects needed to satisfy UACE requirements:

- Advance conceptual designs to a level that will allow for evaluation of feasibility and ability of each project to satisfy USACE criteria for noted deficiencies.
- Develop alternative designs to a level whereby risk assessment criteria can be evaluated, cost estimate can be prepared, and a value engineering process can be conducted.
- Identify and evaluate environmental impacts and permitting aspects of each alternative.
- Select a preferred alternative for each project along with a final cost estimate.
- Develop preferred alternatives to a level that will support rapid final plan and specification preparation to support expedited construction bidding.

Section C below entitled "Project Descriptions" contains details of five specific projects that are considered the highest priority, and therefore included in this request for WRDA funding for Engineering Evaluation and Plan Development.

SECTION C: PROJECT DESCRIPTIONS

Project #1 Hartford and East Hartford Levee "Under-Seepage" Control

The City of Hartford is protected by a concrete floodwall in the vicinity of the central business district between the Bulkely Bridge on Interstate I-84, and the Founders Bridge which connects Route 2 to downtown Hartford. Interstate I-91 is located behind and parallel with the floodwall. When the flood control system construction in the late 1930's, a raised boulevard on the Hartford side existed where the current I-91 is situated. The raised boulevard provided a considerable mass of earth to resist underseepage and uplift caused by high Connecticut River levels. For this reason, sheet pile underseepage control was not used in the original construction of this section of the levee. With the construction of the interstate highway system (now Interstates 84 & 91) in the late 1950's, and later improvements in the 1980's, the highways were grade-separated and I- 91was significantly depressed in elevation. Most of the fill upon which the raised boulevard was built has been removed, thereby creating a shorter seepage path and the potential for increased under-seepage.

Although the entire remainder of Hartford's levee system is protected from under-seepage by a sheet pile cut-off wall, this is the only section where no cut-off wall exists. Piezometers installed on the land side of the floodwall have shown that groundwater levels rise in direct relation to increases in Connecticut river elevation, which indicates that excessive under seepage is occurring. Depending on the severity and duration of the flooding, the consequences of underseepage problems could range from nuisance flooding of the highway and adjacent railroad to large scale failure of the levee system. The Levee Accreditation report performed by the City's consultant indicates that underseepage models, which have been confirmed by piezometer monitoring, indicate that the current configuration can control underseepage for up to approximately a 100 year flood event. At flood levels greater than this, the underseepage would significantly exceed allowable USACE standards for hydraulic gradient, thus indicating an unacceptable underseepage condition.

This is a potentially dangerous condition that could lead to flooding of the complete levee protected area in the City. The most vulnerable facilities at this location are the active rail lines and Interstate I-91, both of which are within less than 100 feet from the floodwall. In order to determine the specifics of the highway construction for I-91, a significant amount of CT DOT records research is required, supplemented by field exploration. The research and analysis is needed to determine the extent to which Interstate I-91 is currently resistant to uplift forces caused by levee underseepage.

Subsurface exploration to more specifically identity environmental contamination parameters and geotechnical conditions in this project location is also required. Conceptually, this project calls for installation of an underground cut-off wall system using either sheet piling, grout/slurry wall, installation of ground water relief wells and pumping

equipment, highway ballast improvements , or other methods. Each option has various pros and cons, however, alternatives for completing this project need to be explored in greater detail and developed into a preferred alternative. The Preliminary Opinion of Cost is $12.5 M based on conceptual information.

In another section of the levee, piezometer readings taken over the last several years indicate that interior groundwater levels are also reacting excessively to increased river levels at the South Meadows Dike. This project seeks to determine the specific causes of the under-seepage in this location as well. The effectiveness of the underseepage controls at this location is also a major concern for the MDC for its adjacent regional sewage treatment facility. Construction operations for upgrades to the MDC's facility need to be especially careful about excavation support systems to ensure that the levee's underseepage system is not further compromised. Also, permanent flood resistant design criteria for the MDC's upgrade projects may be needed if the risk of levee underseepage failure is not fully addressed. Preliminary Opinion of Cost is $5.0 M based on conceptual level information.

Project #1 WRDA Request: The requested amount of WRDA funding for the Feasibility Studies, Engineering Evaluation, and Plan Development related to the **Underseepage Control** task is $550,000. This would include development of design alternatives, feasibility evaluation of alternatives, preliminary engineering design, cost estimating, value engineering, and selection of a preferred alternate.

Projects #2 and #3-Flood Control System Interior Drainage

Introduction

In addition to the levee system, Hartford and East Hartford flood control systems contain an extensive interior drainage system consisting of multiple pump stations, storm water collection pipes, gravity and pressure conduits, and associated valves, gates and control structures. The interior drainage system also has multiple interconnections with the regional sanitary sewer and combined sewer systems, owned and operated by the Metropolitan District Commission(MDC).

Aside from levee failure, the interior drainage system poses the most significant risk of inundation within the levee protected area. One of the main goals of the interior drainage project(s) is to perform a comprehensive inundation analysis to determine the extent to which inundation would occur as a result of various interior drainage component failures. This information is important for Hartford and East Harford to understand, but is of also of great importance for the MDC since its collection and treatment facilities are greatly impacted by the performance of the flood control interior drainage system. The MDC may need to include additional costs for improvement to its existing or proposed facilities to

protect against potential failures of the interior drainage system.

The regional sewage treatment facility, owned and operated by the Metropolitan District Commission (MDC), is also greatly affected by the performance of these facilities. Poor performance or failure of any of these interior drainage components could result in flooding that would inundate the regional sewage treatment facility. The MDC's regional sewage treatment facility is perhaps the most vulnerable public infrastructure within the levee protected zone due it its low elevation. Such flooding could cause significant damage to the plant, or could result in the plant's failure to fulfill its mission of treating the region's sewage. Such a failure could create a significant release of untreated waste water, which would have severe environmental and public health impacts. Thus, the performance of the flood control system's interior drainage components is of great importance to the integrity of the regional sewer system.

The City of Hartford system includes 6 flood control pump stations, while the East Hartford system contains 3 pump stations. The primary purpose of the pump stations is to evacuate storm water that falls within the protected areas and pump it to the Connecticut River. The levee system provide protection from the Connecticut River flowing into the protected areas, however the pump stations are needed during flood conditions since gravity flow of stormwater is not possible when the Connecticut River is elevated.

Project #2 Flood Control Pump Stations

The South Meadows Pumping Station, constructed in 1929, is the oldest and most frequently used station within the Hartford Flood Control System. Although various repairs have been made to mechanical equipment, including replacement of pump bearings and seals, valve replacement, and pipe joint repairs, the station is outdated and deteriorated structurally. Failure of this pump station to perform at full capacity results in localized flooding outside of the station's holding pond. If the station fails to pump as per its design capacity, the resulting flooding could easily inundate the adjacent regional sewer facility which would could cause damage and have severe environmental impacts. Capital improvements currently being designed by the MDC may need to consider some degree of flood protection for their facilities to guard against the potential for inundation as noted above. Thus the MDC may incur increased construction costs to include such safeguards in their construction projects at the sewage treatment facility.

An evaluation needs to made as to whether major rehabilitation or complete replacement is needed. The major rehabilitation alternate would include replacement of the original 1929 pumps with newer more efficient models capable of maintaining the base pumping capacity. New electrical service and panels would be installed along with various electrical and mechanical improvements.

As an alternate to the above rehabilitation, consideration of an alternate to completely replace this pumping station with a new station needs to be evaluated. The new station could be built alongside the existing station, and the old station decommissioned and demolished following completion of the new station.

Rehabilitation work is also needed on the City's remaining 5 pump stations, The North Meadows Pumping Station was constructed in 1939 and is the second oldest of the six Hartford Flood Control pumping stations. This station should also be evaluated for major rehabilitation or complete replacement.

The Keney Lane Pumping Station which was erected in 1943, and the Bushnell Park Pumping Station which was constructed in 1944, need to be evaluated for rehabilitation needs. The remaining two stations, Armory Station and Pope Park Station, are the newest stations and receive little usage. Therefore, minor rehabilitation is recommended for evaluation of these stations. The Town of East Hartford's three Pump Stations (Meadow Hill, Cherry Street, and Pitkin Street Stations) also need consideration for upgrade or replacement.

Project #2 WRDA Request: The requested amount of WRDA funding for the Feasibility Studies, Engineering Evaluation, and Plan Development related to the **Interior Drainage-Pump Station Rehabilitation/Replacement** task is $350,000. This would include development of design alternatives, feasibility evaluation of alternatives, preliminary engineering design, cost estimating, value engineering, and selection of a preferred alternate.

Project #3 Flood Control System Interior Drainage – Flood Control Conduits

There are 4 pressure conduits within the system which become pressurized due primarily to backflow of the Connecticut River into these conduits during periods of high river level. These systems also become surcharged due to high inflows, generally coincident with the high river levels.

The Park River Conduit is a twin barrel concrete box culvert, of varying cross section ranging from approximately 22' to 36' in width, and 20' to 28' in height. It conveys flow from the South and North Branches of the Park River through the City and discharges to the Connecticut River. It is one of the most important components in the flood protection system. There are various storm drain, combined sewer, and pump station inlets along the way, all of which have regulation devices to prevent backflow during periods of high river levels. The sections of the conduit in the vicinity of I-91 were built circa 1940 and are founded on wooden pilings. Several joints in this area have shown signs of settlement and lateral movement. Causes of the movement need to investigated, and potentially the

conduit may need to be shored up in places to prevent further movement. Also, construction/expansion joints need to be replaced due to failure to prevent infiltration and further deterioration. The Park River Auxiliary Conduit is a 22' diameter concrete relief conduit which takes excess flow from the Park River Conduit (PRC) during times of high flow. It is an inverted siphon approximately 140' feet in depth, and is prone to collecting sediments that diminish capacity Due to its design as a siphon, it is full of water at all times. Preliminary Opinion of Cost for repairs to the Park River Conduit system is $10.0M based on conceptual information.

The Gully Brook Conduit is a twin concrete box culvert which was constructed as a pressure conduit for its lower-most segment. The cross sections of each barrel vary from 9'wide by 7' high to 11'wide by 9'-6" wide. The Corps of Engineers built the pressure conduit section which is approximately 3,119 feet long measured from its intersection with the Park River Conduit within Bushnell Park. The pressure conduit connects with and accepts flow from the existing Gully Brook Conduit. This conduit needs to be evaluated for rehabilitation or replacement due to signs of deterioration. Preliminary Opinion of Cost for repairs to the Gully Brook Conduit is $5M based on conceptual information

The Folly Brook Conduit is a concrete conduit of varying cross section and construction type, with an average cross section measuring approximately 12' wide by 8' high. Its purpose is to accept the flow of the Folly Brook which enters from Wethersfield, convey the flow through a portion of the south end of Hartford, and discharge to the Wethersfield Cove. The Conduit flows in a west to east direction, roughly parallel with the Wethersfield Town line. The Folly Brook Conduit is completely open to the Wethersfield Cove at its outlet, and therefore is directly exposed to any fluctuations in the Connecticut River level. The total length is approximately 3,000 feet.

The Folly Brook Conduit was constructed in various phases using different construction techniques and has suffered significant deterioration due to age, substandard initial construction techniques, and the corrosive effects of combined sewer overflows which discharge into this conduit. This project calls for the construction of a new conduit, which would likely have to constructed parallel to the existing conduit for logistical reasons. This upgrade is needed to allow for reliable future flows of storm and floodwaters, and the increased flows which may result from sewer separation. Preliminary Opinion of Cost is $8.0 M, based on conceptual information.

Project #3 WRDA Request: The requested amount of WRDA funding for the Feasibility Studies, Engineering Evaluation, and Plan Development related to the **Interior Drainage-Conduit Rehabilitation/Replacement** task is $450,000. This would include development of design alternatives, feasibility evaluation of alternatives, preliminary engineering design, cost estimating, value engineering, and selection of a preferred alternate.

Project #4 Levee Utility Penetration Abandonment & Modification

A large number of utilities pass through the levee and flood walls, introducing the potential for progressive seepage, backflow, or destabilization of the levee during a flood event. Planned improvements include properly abandoning utilities no longer in use, and repair or enhanced backflow prevention for those that remain in use. Utility owners include the City, the MDC, and others. Among them is a high pressure jet fuel line that transfers fuel through central Connecticut to points north including Bradley International Airport, and Westover Air Force Base.

Levee penetration investigation is needed, along with a program to permanently abandoning unused utility lines that penetrate through the dike, As Hartford transitioned from an industrial riverfront City to an insurance and financial center, many utility connections that passed through the earthen levees and concrete walls were no longer needed. Unfortunately, however, it is not clear in many cases how they were abandoned. Records for the abandoned utilities and inspection/confirmation of their integrity is difficult to locate or is non-existent. Given the presence of these penetrations and the risk posed, efforts are needed to perform exploratory work to uncover the known penetrations, visually inspect, and then permanently seal with grout fill or other means where needed.

Project #4 WRDA Request: The requested amount of WRDA funding for the Feasibility Studies, Engineering Evaluation, and Plan Development related to the **Levee Utility Penetration Abandonment & Modification** task is $250,000. This would include development of design alternatives, feasibility evaluation of alternatives, preliminary engineering design, cost estimating, value engineering, and selection of a preferred alternate.

Project #5 Levee Toe Drain Modifications

The toe drains along the landside toe of Hartford's North Meadows Dike consist of drainage rock rather than perforated pipe, as is required by current design standards. As such the U.S. Army Corps of Engineers (USACE) has identified these toe drains as an "unacceptable" feature. Installation of perforated pipe toe drains is required along the North Meadows Dike to bring it into compliance with USACE criteria.

The toe drains along the landside toe of Hartford's South Meadows Dike consist of gapped clay pipe segments rather than perforated pipe, as is required by current design standards.

As such the USACE has classified these toe drains as “unacceptable.” Replacement of the existing clay pipe with toe drains made of perforated pipe is required along the South Meadows Dike to bring it into compliance with USACE criteria.

The Town of East Hartford also has documented problems with its toe drain system and improvements needs have been identified by USACE.

Project #5 WRDA Request: The requested amount of WRDA funding for the Feasibility Studies, Engineering Evaluation, and Plan Development related to the **Levee Toe Drain Modifications** task is $250,000. This would include development of design alternatives, feasibility evaluation of alternatives, preliminary engineering design, cost estimating, value engineering, and selection of a preferred alternate.

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

WRDA Perez-Dibella Ltr to Cong Larson FINAL 4.3.09.pdf

EDDIE A. PEREZ
MAYOR

April 2, 2009

Honorable John B. Larson
U.S. Representative
106 Cannon House Office Building
Washington, DC 20515

Dear Congressman Larson:

As you are aware, the Metropolitan District Commission is currently undertaking a massive Clean Water Program in the City of Hartford focused on the upgrade of the City's 150 year-old combined sewer system. At present the existing systems surcharge with rainwater during storm events, and discharge untreated wastewater through overflows. More than 1 billion gallons of untreated wastewater overflow to area streams and waterways annually. These discharges impact the Connecticut River water quality over a 30 mile distance up to 50 times per year—every time it rains more than 0.25 inches. Other area waters that have their water quality affected include Wethersfield Cove, North Branch Park River, Trout Brook, Goff Brook, among others. In addition, area basements and streets experience flooding by raw sewage.

Unfortunately, the Clean Water Program and combined sewer-separation project has been complicated by the deficiencies of the City's 70 year-old flood control system. As it exists the system prevents the central business district and surrounding areas from flooding, including additional flooding from the Park River. The redirection of wastewater to accommodate the MDC abatement of these dangerous public health and safety concerns has strained the several miles of underground tunnels and piping systems, storm water pumping stations, check valves, and lock structures spread throughout the area.

In order to ensure the success of the MDC Clean Water Program as well as the safety of Harford's central business district, the City, along with the Metropolitan District Commission, are requesting $10,000,000 in federal funding as authorized by The Water Resource Development Act of 1999; the first $5,000,000 of those funds to go to the City of Hartford for the rehabilitation of 10 pumps and valving systems and the acquisition of new mechanical intake screens for the North Meadows and South Meadows Pump Stations; the remaining $5,000,000 to be drawn down by Metropolitan District Commission to contribute to their Clean Water Program.

550 Main Street
Hartford, Connecticut 06103
Phone (860) 543-8500
Fax (860) 722-6606

These projects will enable the City's flood management control system to meet federal standards to control storm water runoff and to eliminate pollutant discharge into critical watersheds and waterways.

Respectfully,

Eddie A. Perez
Mayor

William A. DiBella
Chairman, MDC

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

EH cost benefit data.pdf

GEI Consultants

Consulting
Engineers and
Scientists

East Hartford, CT Flood Control System
Benefit Cost Analysis for Flood and Erosion Control Board Program Request for Financial Assistance
October, 2015

1.0 Background

GEI Consultants has prepared this report to assist in the Town of East Hartford's efforts to conduct a benefit-cost analysis for the Flood and Erosion Control Board Program Request for Financial Assistance application. The Connecticut Department of Environmental Protection requests that applicants seeking state funds demonstrate the financial efficiency of a proposed project using a benefit-cost analysis. This portion of the application is worth a total of five (5) points if the benefit-cost ratio (B/C) is greater than one (1); and zero (0) points if the ratio is less than one (1). A benefit-cost ratio that is greater than one (1) has a project price that is lower than the value of the buildings and property it is designed to protect from a particular flooding event.

2.0 Data and Methods

An analysis of estimated flooding damage from a 500-year flood (0.2% chance of occurrence in any given year) conducted by the US Army Corps of Engineers in 2013 was used as the input for damages avoided (benefit) if the project was funded. These avoided damages were calculated to be $364,200,000.

The Town of East Hartford provided three (3) costs for various project phases that would protect to the 500-year flooding event and prevent the $364,200,000 in damages. Phase 1 alone was $8,760,000; Phase 1-3 was $14,010,000; and the Overall Project (Phase 1-4) was $19,010,000

Depending on the funding source, benefit-cost ratios sometimes need to incorporate a discount rate that calculates the net present day value of the damages being avoided in the future. For example, FEMA requires that a 7% discount rate be used for Hazard Mitigation grants; however they often only require designing to today's 100-year flood event. Some state and county governments request using a 3.3% discount rate; which is the general growth of the economy over recent decades.

There was no mention of using or requiring discount rates in any of the funding documents provided to GEI, so the first table of results does not include discounting future benefits. The second table of results does include discounting future benefits, at 7% and 3.3% for each project phase, and depending on when a 500-year flood would occur in the future. GEI was informed that the lifespan of the project would not last more than sixty (60) years so future benefits were not modeled beyond 2075.

GEI Consultants, Inc.
455 Winding Brook Drive, Suite 201, Glastonbury, Connecticut 06033
860.368.5300 fax: 860.368.5307

3.0 Results

Table 1 shows the benefit-cost ratios for the three (3) project phases. The Overall Project had a benefit-cost ratio of 19.16 and would be considered cost beneficial since the ratio is greater than one (1). There was no project phase that had a benefit-cost ratio less than one (1).

Avoided Damages	Project Phase 1	Project Phase 1-3	Overall Project	Benefit-Cost Ratio Phase 1	Benefit-Cost Ratio Phase 1-3	Benefit-Cost Ratio Overall Project
$364,200,000	$8,760,000	$14,010,000	$19,010,000	41.58	26.00	19.16

Table 1. Benefit-cost analysis for East Hartford flood defenses with future benefits not discounted. Ratios in green are considered fiscally efficient because they are greater than one (1).

Table 2 shows the benefit-cost ratios for the three (3) project phases broken down by a 7% and 3.3% discount rate. Future benefits are discounted depending on the number of years in the future that a 500-year flood could occur (first column). The probability of a 500-year flood occurring within those years was also calculated (second column). Using a 7% discount rate, the benefit-cost ratio for the Overall Project was no longer fiscally efficient (benefit-cost ratio less than 1) when the 500-year flood occurred after forty (40) years from today. The benefit-cost ratio for the Overall Project remained fiscally efficient sixty (60) years from today using a 3.3% discount rate.

Yrs. in the Future	Prob. of 500-yr Flood	Avoided Damages (7% Disc. Rate)	Avoided Damages (3.3% Disc. Rate)	Benefit-Cost Ratio Phase 1 (7% Disc. Rate)	Benefit-Cost Ratio Phase 1 (3.3% Disc. Rate)	Benefit-Cost Ratio Phase 1-3 (7% Disc. Rate)	Benefit-Cost Ratio Phase 1-3 (3.3% Disc. Rate)	Benefit-Cost Ratio Overall Project (7% Disc. Rate)	Benefit-Cost Ratio Overall Project (3.3% Disc. Rate)
1	0.20%	$340,373,832	$352,565,344	**38.86**	**40.25**	**24.30**	**25.17**	**17.90**	**18.55**
5	1.00%	$259,669,567	$309,626,650	**29.64**	**35.35**	**18.53**	**22.10**	**13.66**	**16.29**
10	2.00%	$185,140,812	$263,230,814	**21.13**	**30.05**	**13.21**	**18.79**	**9.74**	**13.85**
15	3.00%	$132,002,840	$223,787,136	**15.07**	**25.55**	**9.42**	**15.97**	**6.94**	**11.77**
20	3.90%	$94,116,201	$190,253,875	**10.74**	**21.72**	**6.72**	**13.58**	**4.95**	**10.01**
25	4.90%	$67,103,550	$161,745,387	**7.66**	**18.46**	**4.79**	**11.54**	**3.53**	**8.51**
30	5.80%	$47,843,904	$137,508,738	**5.46**	**15.70**	**3.41**	**9.82**	**2.52**	**7.23**
35	6.80%	$34,112,042	$116,903,816	**3.89**	**13.35**	**2.43**	**8.34**	**1.79**	**6.15**
40	7.70%	$24,321,415	$99,386,428	**2.78**	**11.35**	**1.74**	**7.09**	**1.28**	**5.23**
45	8.60%	$17,340,833	$84,493,923	**1.98**	**9.65**	**1.24**	**6.03**	0.91	**4.44**
50	9.50%	$12,363,774	$71,832,977	**1.41**	**8.20**	0.88	**5.13**	0.65	**3.78**
55	10.40%	$8,815,200	$61,069,204	**1.01**	**6.97**	0.63	**4.36**	0.46	**3.21**
60	11.30%	$6,285,116	$51,918,322	0.72	**5.93**	0.45	**3.71**	0.33	**2.73**

Table 2. Benefit-cost analysis for East Hartford flood defenses with future benefits discounted at 7% and 3.3%. Ratios in green are considered fiscally efficient because they are greater than one (1). Ratios in red are not considered fiscally efficient because they are less than one (1).

4.0 Conclusion

The Town of East Hartford qualifies for a five (5) point score on Cost Benefit Ratio question of its application for Financial Assistance to the FECB, as the proposed project has a benefit-cost ratio greater than one (1). The benefit-cost ratio is 19.16 when constant dollars are utilized in the ratio. The application does not require or ask for a discount rate to be applied when calculating the benefit-cost ratio. Even if future benefits are discounted at a high annual rate of 7% as required by FEMA in certain situations, the proposed project still has a benefit-cost ratio greater than one (1), as long as a 500-year flood can be expected to occur within the next forty (40) years.

Additionally, the National Climate Assessment report (2014) noted that extreme precipitation events are projected to increase in frequency and intensity as the climate continues to change. If the amount of precipitation from today's 500-year event is more likely to occur in the future, it would make many of the benefit-cost ratios in Table 2 even more fiscally efficient since the future benefits (avoided damages) would be occurring sooner.

5.0 GEI Preparers

Report Prepared by: Alex Gray, Adaptation Specialist/GIS Analyst

Reviewed by: J.T. Lockman, AICP, Senior Project Manager

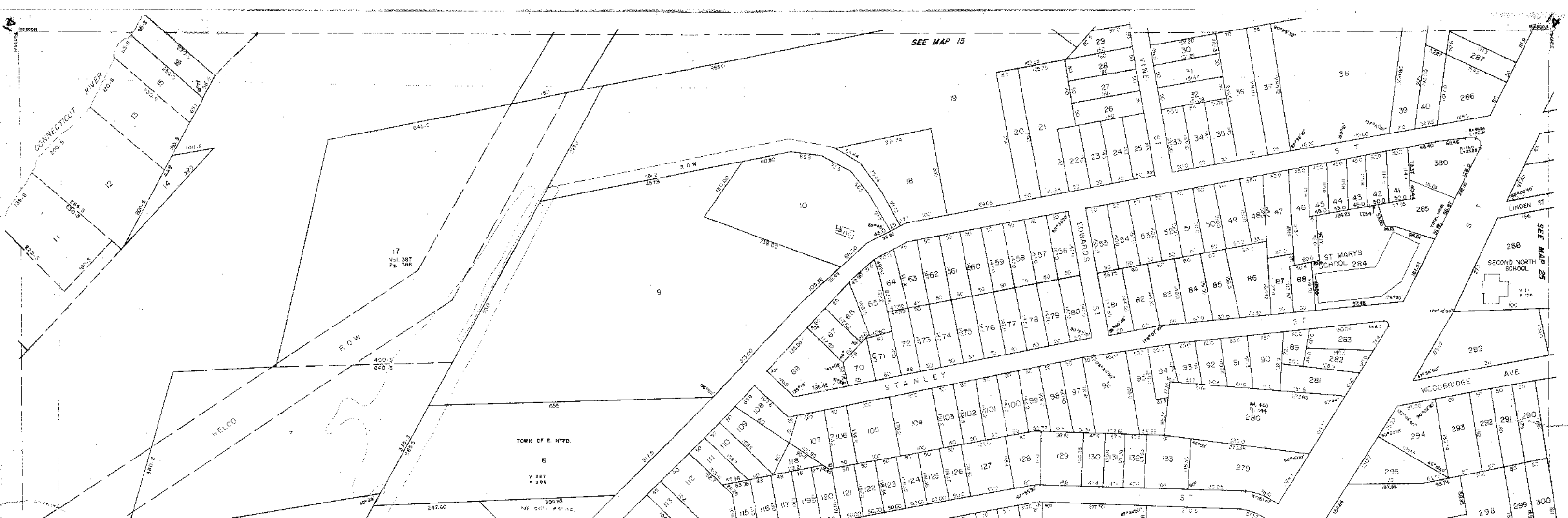
Approved and Submitted by: John McGrane, PE, Project Manager

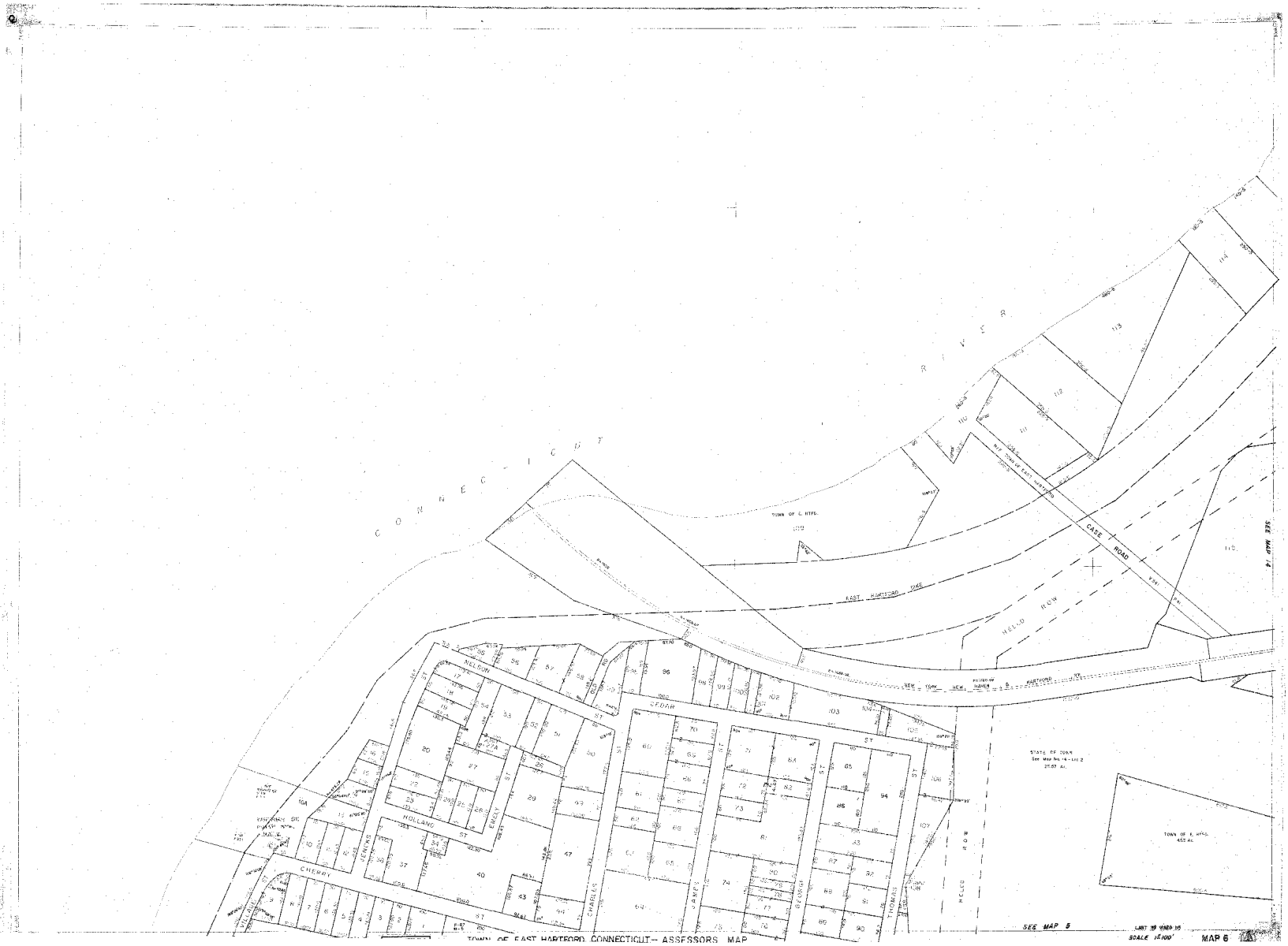
6.0 References

Horton, R., G. Yohe, W. Easterling, R. Kates, M. Ruth, E. Sussman, A. Whelchel, D. Wolfe, and F. Lipschultz, 2014: Ch. 16: Northeast. *Climate Change Impacts in the United States: The Third Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 16-1-nn.


SEE MAP 27
CORNELIUS MEAD/FFE PARK
ANNA E. NORRIS SCHOOL
SEE MAP 26
TOWN OF EAST HARTFORD, CONNECTICUT ASSESSORS MAP

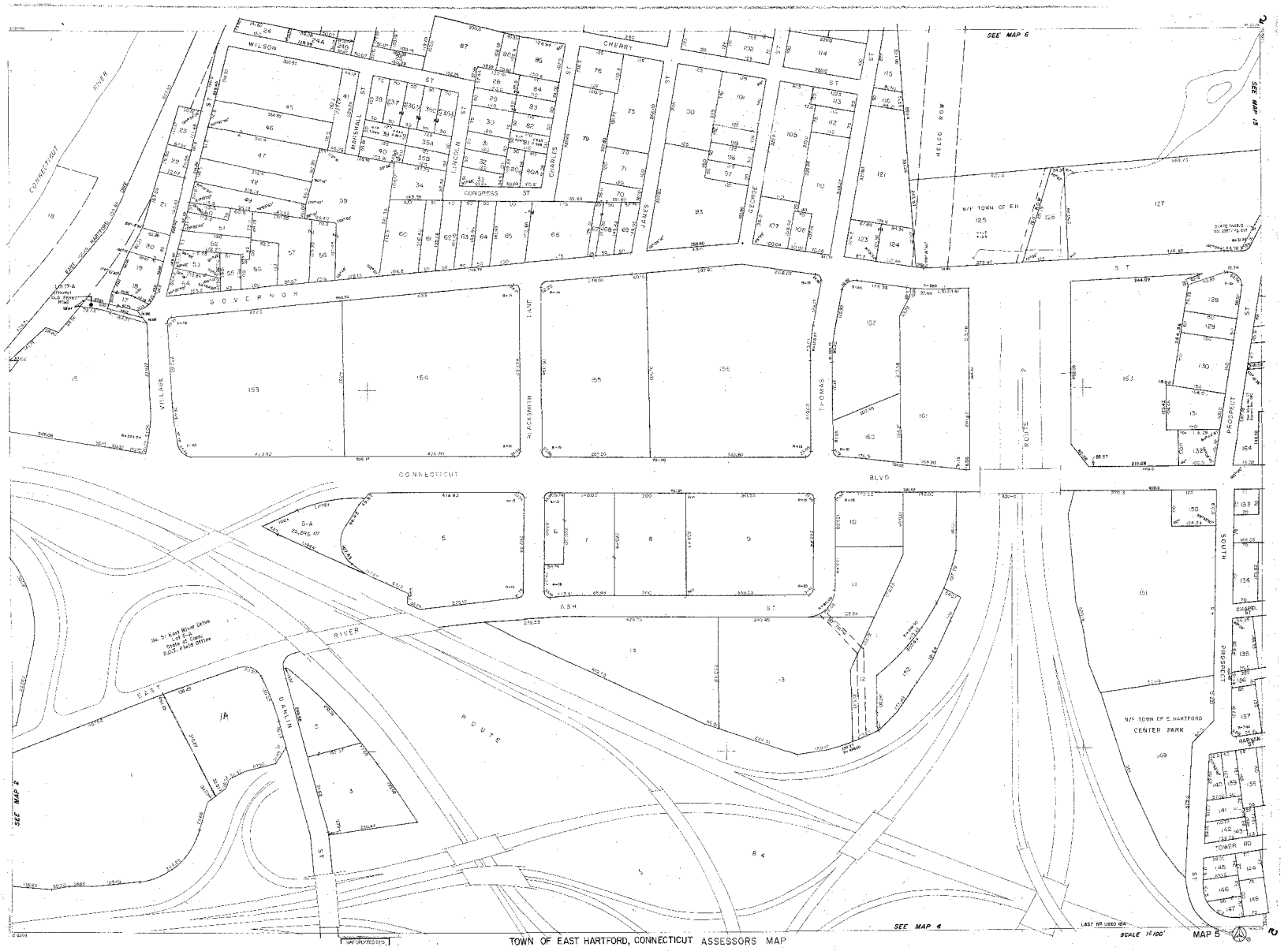

SEE MAP 16
SEE MAP 26
RIVER
CONNECTICUT
HELCO R/W
EDGE OF LAKE
MDC EASEMENT
DOWN RIVER CHANNEL ENCROACHMENT LINE
EDGE OF DAM
FLORENCE DR
GREENE TERR
RESERVED 40 ROW
SPRINGSIDE AVE
EASEMENT
MURRAY ST
ADAMS ST
LINE ST
SEE MAP 14
MAP 16


SEE MAP 15
CONNECTICUT RIVER
HELCO
R.O.W.
TOWN OF E. HTFD.
STATE OF CONN.
TOWN OF E. HTFD.
SEE MAP 6
SEE MAP 25
SEE MAP 13
STANLEY
STERLING
JOHN ST
ORCHARD
FULLER AVE
RICHARD RD
ROBERTS
RECTOR ST
BURNSIDE AVE
SPENCER CT
WOODBRIDGE AVE
LINDEN ST
OLMSTED ST
MAIN
PROSPECT
EDWARDS
VINE ST
ELM ST
HOWARD ST
SHERMAN AVE
CHAPMAN PL
ORCHARD TERR
ST MARYS SCHOOL 284
SECOND NORTH SCHOOL
CENTER SCHOOL
1.229 ACRES
MAP 13 LOT 266
LAST NO USED 381
TOWN OF EAST HARTFORD, CONNECTICUT - ASSESSORS MAP
SCALE 1" = 100'
MAP 14

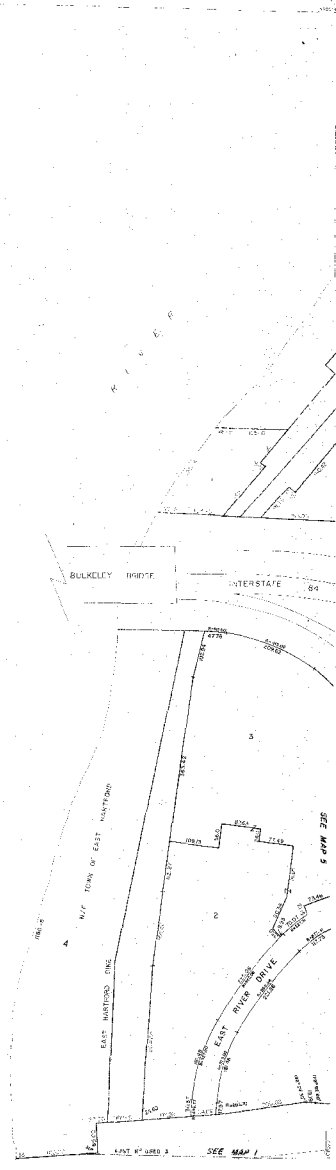


TOWN OF EAST HARTFORD CONNECTICUT-- ASSESSORS MAP

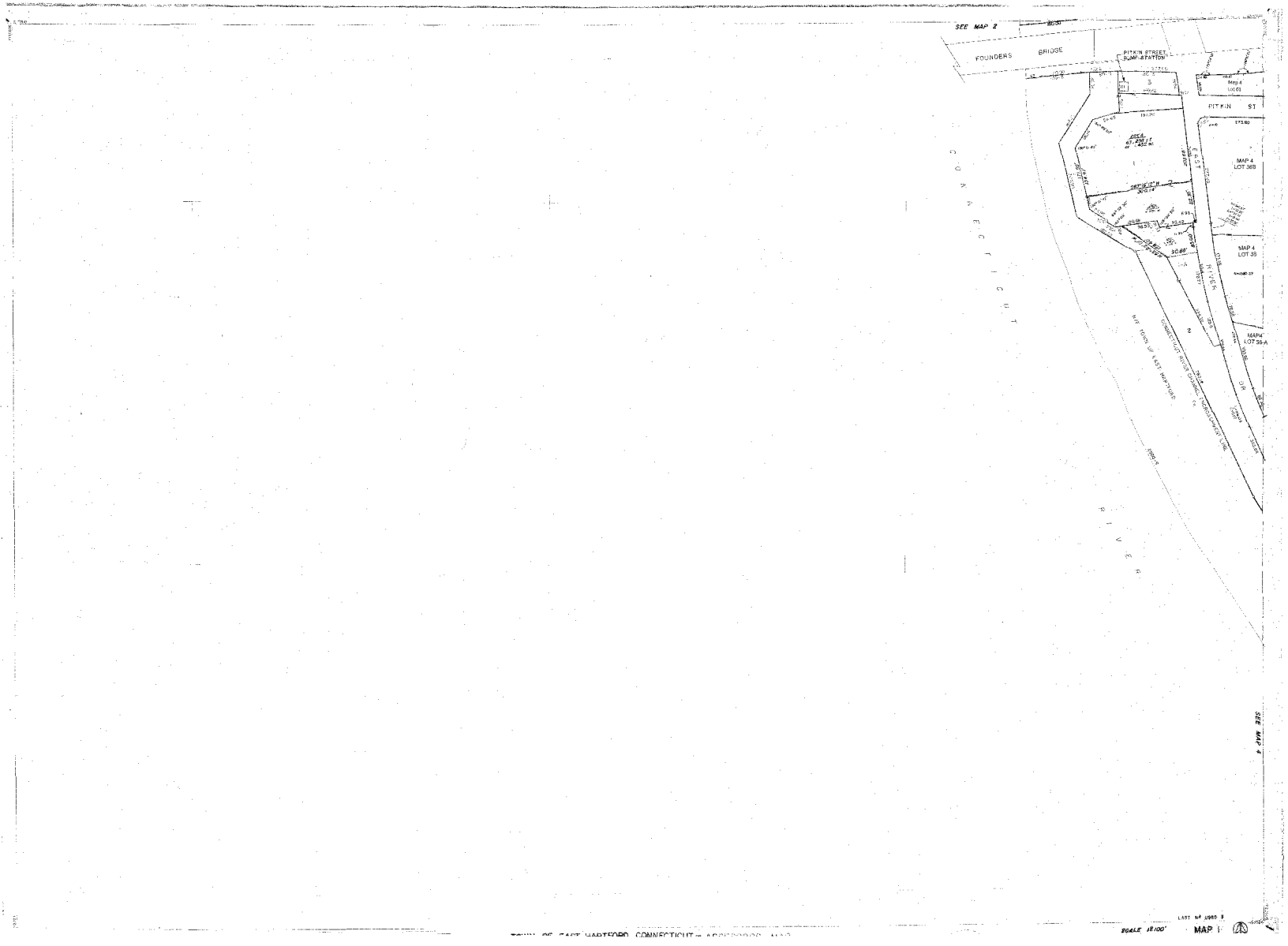
SCALE 1"=100' MAP 6

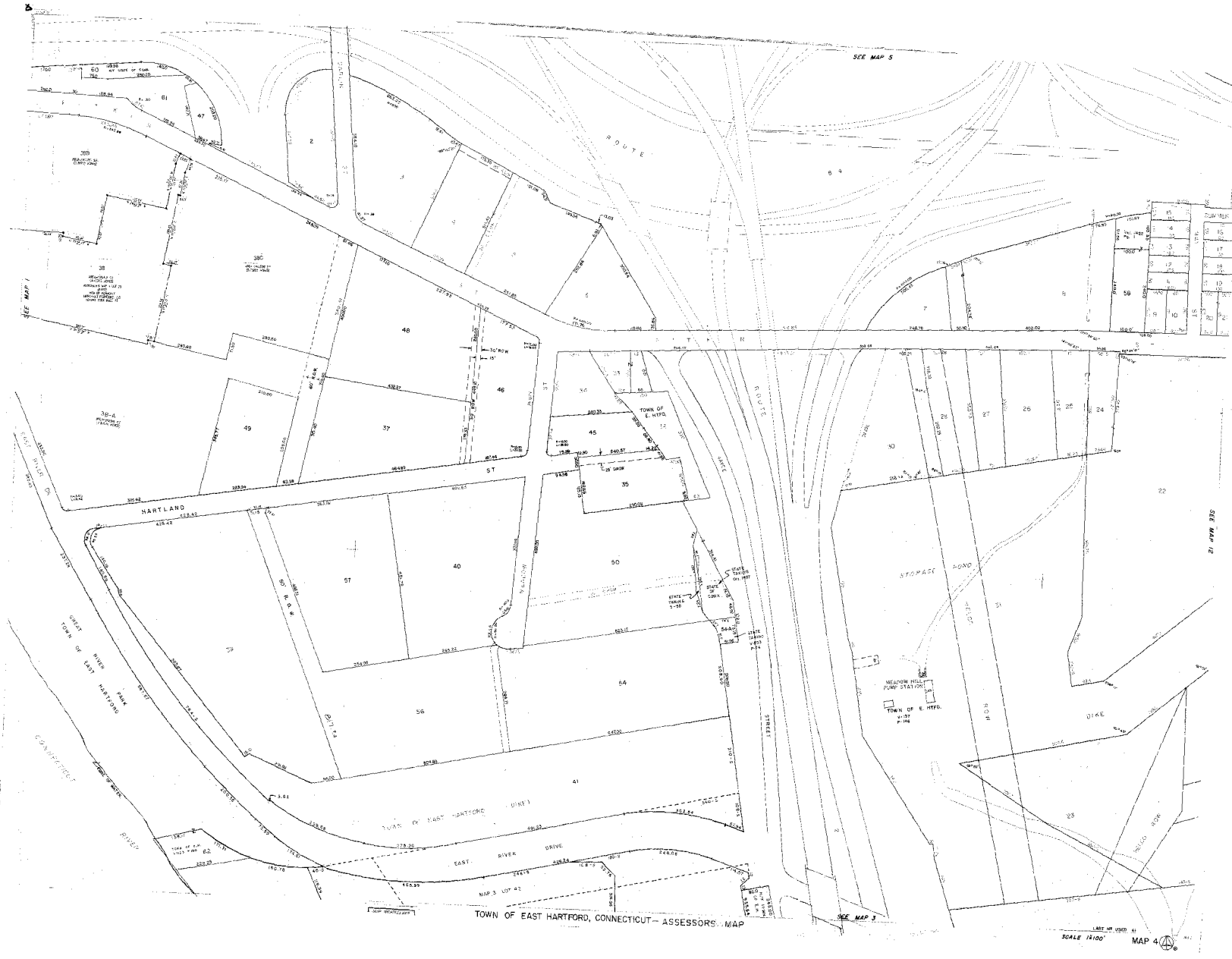


TOWN OF EAST HARTFORD, CONNECTICUT ASSESSORS MAP

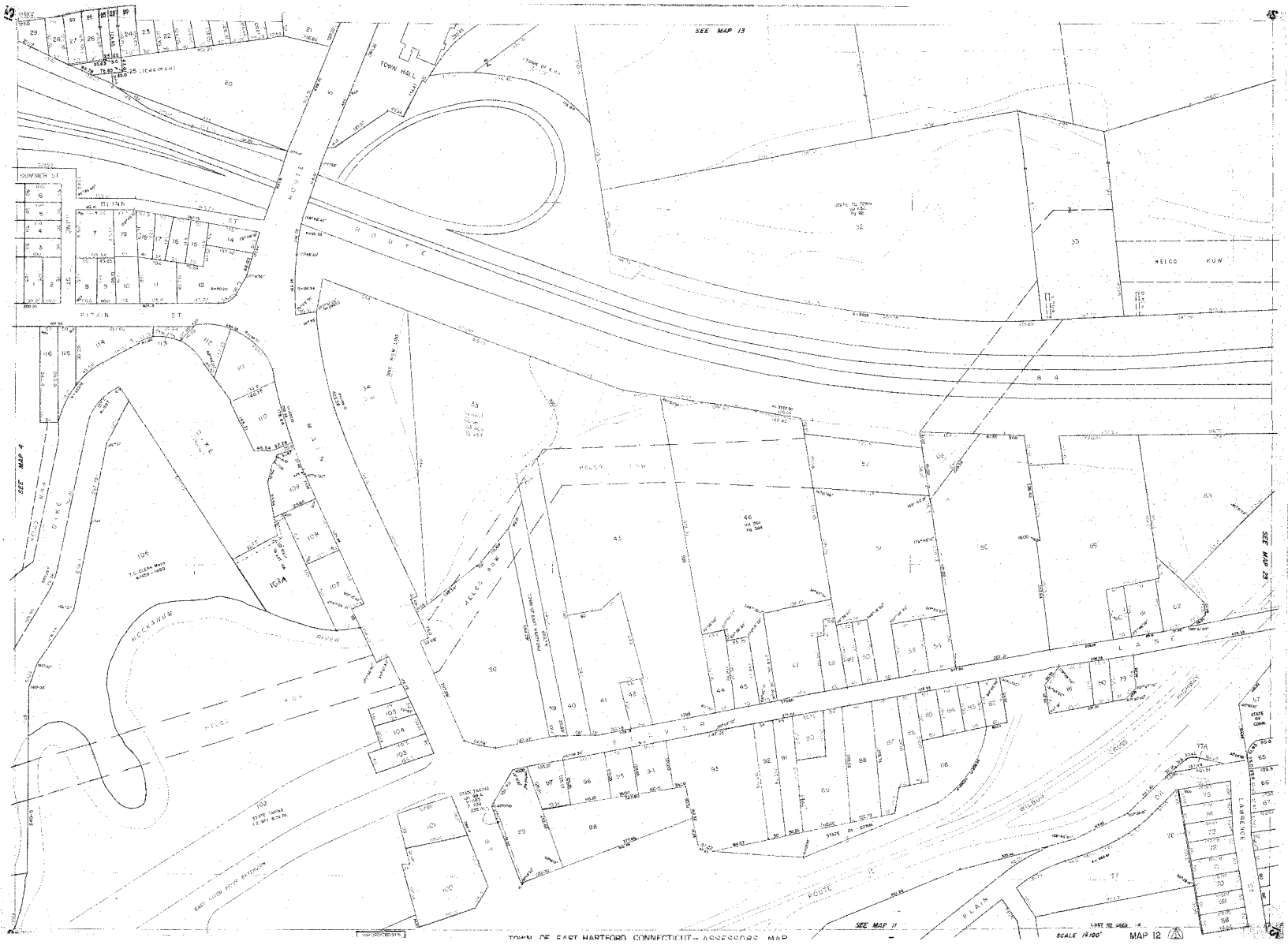


TOWN OF EAST HARTFORD, CONNECTICUT – ASSESSORS MAP


SEE MAP 2
FOUNDERS BRIDGE
PITKIN STREET PUMP STATION
PITKIN ST
MAP 4 LOT 38B
MAP 4 LOT 38
MAP4 LOT 38-A
CONNECTICUT RIVER
CONNECTICUT RIVER DRIVE
TOWN OF EAST HARTFORD
TOWN OF EAST WINDSOR
SEE MAP 4
SCALE 1"=100'
MAP 1



TOWN OF EAST HARTFORD, CONNECTICUT– ASSESSORS' MAP


SEE MAP 13
TOWN HALL
ROUTE
SUMNER ST
RITAIN ST
HELCO ROW
SEE MAP 4
SEE MAP 23
SEE MAP 11
ROCKAWAY
RIVER
DIKE
WILBUR
LAWRENCE ST
PLAIN
STATE OF CONN.


SEE MAP 14
SEE MAP 5
SEE MAP 12
SEE MAP 24
PROSPECT
ELLSWORTH
RICHARD
CHAPMAN
GOVERNOR
WALKER
JOHN
WELLS
BISSELL
PHELPS
CONNECTICUT
HARRISON
MAIN
CHAPEL
GARVAN
CENTRAL
LOCUST
SAUNDERS
GARFIELD
359
CENTER CEMETERY
EAST HARTFORD DYKE
TOWN HALL
N/F TOWN OF EAST HARTFORD
TOWN OF EAST HARTFORD, CONNECTICUT - ASSESSORS MAP
SCALE 1" = 100'
MAP 13

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

Final USACE Hartford SWIF Approval Letter.pdf

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

January 15, 2016

Honorable Luke Bronin
Mayor of Hartford
550 Main Street, Room 200
Hartford, CT 06103

Dear Mayor Bronin,

The US Army Corps of Engineers (USACE) has reviewed the City of Hartford's December 3, 2015 letter requesting approval of the Letter of Intent (LOI) for Hartford's two Flood Damage Reduction (FDR) Systems (System ID #4305000011 and #4305000032) located in Hartford, CT. The December 3, 2015 letter and attachment addressed USACE's comments as requested in our October 09, 2015 letter. Therefore, as of August 11, 2015 the LOI for the two Hartford FDR Systems (Connecticut River Right Bank and North and South Branch Park River Conduit) is approved and the systems are eligible in the Rehabilitation Program pursuant to Public Law (P.L.) 84-99.

The city of Hartford is granted a two-year period starting on August 11, 2015 to prepare a SWIF plan. During the development of the SWIF plan, the city is expected to (a) operate and maintain the system in accordance with the operation and maintenance manual, (b) implement interim risk reduction measures, and (c) perform risk communication activities with the population at risk. USACE will monitor the city's progress during the 2 year SWIF plan development period on an annual basis. During the review period, if progress is deemed unsatisfactory, the two Hartford FDR systems may be returned to an "ineligible" status within the Rehabilitation Program pursuant to P.L. 84-99.

If you have any questions concerning this project or this letter, please contact David Schafer, Chief, Emergency Management Office, at 978-318-8274 or email at david.w.schafer@usace.army.mil or Michael Bachand, Levee Safety Program Manager, at 978-318-8075 or email at michael.l.bachand@usace.army.mil.

Sincerely,

Christopher J. Barron
Colonel, Corps of Engineers
District Engineer

Copy Furnished:

Honorable Richard Blumenthal
702 Hart Senate Office Building
United States Senate
Washington, D.C. 20510

Honorable Chris Murphy
SD-B40A Dirksen Senate Office Building
United States Senate
Washington, D.C. 20510

Honorable John B. Larson
United States Representative
1501 Longworth House Office Building
Washington, DC 20515

Dean Savramis, P.E.
Director, Mitigation Division, FEMA Region 1
99 High Street, 6th Floor
Boston, MA 02110

Arthur P. Christian II P.E.
Inland Water Resources Division
Connecticut Department of Energy and Environmental Protection
79 Elm Street
Hartford, Connecticut 06106

Constantin Banciulescu, P.E.
Greater Hartford Flood Commission
City Engineer/Assistant Director of Public Works
50 Jennings Road
Hartford, CT 06210

Bob Umasnahker
Civil Engineer
Department of Public Works
50 Jennings Road
Hartford, Connecticut 06210

ROUTING SLIP For use of this form, see AR 25-50	NEVER USE FOR APPROVALS, DISAPPROVAL, CONCURRENCES, OR SIMILAR ACTIONS		
	TO	INITIALS	DATE (YYYYMMDD)
7	**District Engineer**		
6	Deputy District Engineer	DJA	1-19
5	Deputy District Engineer PM		
4	Executive Assistant	JA	1-19
	Library		
	Security		
	ACE-IT		
	Contracting Division		
	Contracts Branch		
	Purchase Branch		
	Construction Division		
	Counsel		
3	**Engineering/Planning Division**	for	1/15/16
	A/E – Value Engineer		
	Design Branch		
	Evaluation Branch		
	Geo-Environmental Branch		
2	Geotechnical/Water Resources	for	1/15/16
	Planning Branch		
	Emergency Mgmt. Office		
	Equal Employ. & Opp. Office		
	Human Resources		
	Internal Review Office		
	Logistics/ULA Office		
	Operations Division		
	Technical Support Branch		
	Programs/Project Management		
	Env/Military Proj. Mgmt. Branch		
	Programs/Civil Proj. Mgmt. Br.		
	Navigation Section		
	Public Affairs Office		
	Real Estate Division		1
	Appraisal Branch		
	Conveyancing Branch		
	Planning & Control Branch		
	Regulatory Division		
	Resource Management Office		
	Budget Manpower Branch		
	Finance & Accounting Branch		
	Management Analysis Branch		
	Safety & Occup. Health Office		
	Small Business Prog. Office		
	Julie		

CHECK ACTION DESIRED

	INFORMATION		NECESSARY ACTION
	SIGNATURE		SEE ME
	NOTE AND RETURN		
	CIRCULATE		

FROM	DATE
Mike Bachand	20160115
TELEPHONE	FAX
E-MAIL	
ORGANIZATION	

NAE FORM 917-R, MAR 2010 PREVIOUS EDITIONS ARE OBSOLETE

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

Meeting Minutes MDC USACOE COH 2014 05 23.pdf

DRAFT Minutes of Meeting

May 23, 2014, 1:00 PM, MDC Headquarters, Hartford, CT

The Metropolitan District of Hartford (MDC)
U.S. Army Corps of Engineers (USACE)
City of Hartford (COH)
Greater Hartford Flood Commission (GHFC)

I. Agenda - Attached
II. Presentation Materials - Attached

Attendees

Name	Organization	Name	Organization
Clarence Corbin	MDC	Constantin Banciulescu	City of Hartford
Brendan Fox	MDC	Jim DelVisco	City of Hartford
William Hogan	MDC	Mike McGarry	City of Hartford
Scott Jellison	MDC	Bob Umashamkar	City of Hartford
Susan Negrelli	MDC	Gina Varano	City of Hartford
Alan Pelletier	MDC		
Eric Pizzoferrato	MDC	Jim Sullivan	AECOM
Chuck Sheehan	MDC	Greg Bazydola	ARCADIS
Chris Stone	MDC	Brian McCarthy	CDM Smith
		Michael Schultz	CDM Smith
Mike Bachand	USACE	Fred Johnson	GEI
Lindsay Flieger	USACE	John McGrane	GEI
Scott Michalak	USACE	Bill Wright	Jacobs
		Julie Bjorkman	JKB Consulting

Transactions

1. **Introductions** – Attendees introduced themselves and their affiliations

2. **Project Reviews – The MDC Project Managers briefly reviewed the status of projects:**

   a. ***Collection System Gates – Repairs & Improvements***
      - Eric Pizzoferrato (MDC) reviewed the features and current status of the project.
      - There are a number of permits/approvals required from USACE, GHFC and COH.
      - A pre-application meeting was held on March 5th with the USACE, and COH/GHFC. Meeting minutes documenting the permit requirements were finalized and distributed to participants on March 28th.
      - MDC anticipates submitting applications to the Flood Control Commission by the end of June.

b. Wet Weather Expansion Projects

- Alan Pelletier (MDC) reviewed the features and current status of the projects.
- C. Sheehan stressed that the WWEP and the tunnel projects are subject to consent order and consent decree schedule requirements.
- Contract 2012-21, scheduled for advertisement Q3-Q4 2014, requires approval by the GHFC and USACE for excavation work to take place on MDC property adjacent to the property line/drainage swale/dike; however, no actual work will occur on City/Flood Control Property. USACE asked about excavation support techniques planned for the work, requesting an analysis of liquefaction potential associated with driving sheeting. S. Jellison requested Geotech. Engineer of record to provide recommendation of pulling sheeting or leaving in place.
- Status of Submittals/Permits/Approvals for Contract 2012-21
    - GHFC Application submitted April 7, 2014
    - GHFC presentation May 14, 2014
    - GHFC approval pending
    - USACE modified 408 permit to be submitted following approval of GHFC Application
- Action Items
    - Obtain GHFC approval
    - Prepare and submit modified 408 permit

c. South Hartford Conveyance and Storage Tunnel, Pump Station and Conduits

- Brian McCarthy (CDM Smith) reviewed the current status of the projects.
- USACE advised using New York City's guidelines for particle velocity when evaluating potential impacts from blasting activity.
- Design team has requested meeting with USACE to discuss analysis to date on tunnel, shafts, and pump station cavern.
- Design team has met with USACE and COH regarding wetlands, including a site visit. There are some areas exhibiting characteristics of wetlands at the site that may not be subject to USACE or COH jurisdiction. These are the result of re-grading or moving of soils and muck by the COH's Contractor during the PRAC or South Meadows Pond maintenance work. MDC will address the jurisdiction of these areas with the submittal of its mitigation plan.
- MDC requested de-coupling of the wetlands and flood control permits, as the wetlands permit will be needed to conduct utility relocation work much sooner than the work associated with the tunnel and shafts.
- S.Jellison identified GEI will act on behalf of MDC as the required peer reviewer for all USACE related activity.

d. Assessment of MDC Water Main Penetrations

- Clarence Corbin (MDC) reviewed the current status of the project.
- MDC is using a phased approach to evaluate the water mains.
- A special meeting with the GHFC is scheduled for June 2, 2014.
- USACE stated that they will be performing a 5 year site visit to Hartford during July 2014. COE HQ has recently stressed the importance of penetration assessments and any incomplete assessments will result in "U" ratings. MDC

will accelerate its portion of the project in an attempt to support the GHFC and the City from receiving any "U" ratings.

- The GHFC permit application was submitted on May 27, 2014 for the three MDC water main levee penetrations in Hartford. Based upon the review of the application by GHFC staff, the MDC was assured, by the COH, will be issued an administrative approval.
- MDC is to complete the Levee Penetration inspections in Hartford by the end of July.
- USACE recommended MDC review New York City's Guidance documents for pipe penetrations in levees.

e. North Tunnel

- Brian McCarthy (CDM Smith) reviewed the current status of the project, including the potential for crossing the Park River Auxiliary Conduit (PRAC).
- MDC asked USACE for guidance regarding the technical analysis for the crossing evaluation. Mike Bachand replied that the 408 approval process should be followed. Also referenced a recent approval granted in Nashua, NH. USACE stated there is not a standard minimum for separation distances, with each application handled on a case-by-case basis.
- USACE stressed that tunnel crossings of flood control structures are a very sensitive topic within the organization given a recent high-profile levee failure in Dallas. It will be important for the MDC to explain why crossing the PRAC might be a preferred alternative to other routes. A peer review using the criteria of the National Academy of Sciences would be very helpful. MDC needs to anticipate a 2 year review process for approval based on previous applications submitted such as Stamford's Barrier.
- MDC will analyze the alignment alternatives, including a peer review by GEI.
- USACE stressed that it can only issue permits and approvals based on final design documents. Any opinions offered during design development are not binding.

3. Risk Management for Tunnel Facilities

- Brian McCarthy reviewed the risk management process used by the MDC and the design engineers.
- The risk of inundation of the work area and shafts due to flood control system failure was discussed. Currently, the project team views this as an event with an improbable likelihood, but with high consequences. The current risk mitigation strategy is to prepare contingency plans.
- MDC will engage the COH/GHFC as design and contingency planning progresses so that the project can successfully mitigate the risks.
- FEMA certifies the levees, not the USACE
- Whereas COH built the South Meadows Pump Station (SMPS), MDC must coordinate any risk mitigation associated with the SMPS with the COH and not the USACE.

- CDM will bring design of north tunnel to 30%, in order to determine risks associated with fault zone as well as USACE requirements for tunnel crossing alignment.

4. Project Review Protocol

- The COH/GHFC shall be the primary point of contact for the MDC for all project issues that involve flood control structures and systems. The USACE (M. Bachand) should be copied on all correspondence or submittals. The USACE is willing to review issues with the MDC, but the COH/GHFC need to be included in the discussions and copied on all correspondence. Constantin Banciulescu is the primary point of contact for the COH and GHFC.
- GHFC is an independent body (all volunteers) from the COH and meets only once every two months.
- Gina Varano advised the MDC of the various elements of the City's government involved in approving permits and granting easements, noting that easements require council approval (a 60 to 90 day process) and have a longer lead time than permits that would be granted by Engineering, Public Works, or the GHFC. COH will advise MDC of which City office the MDC needs to deal with if MDC provides the COH (Corporation Counsel) with project information.
- USACE stated that the City is free to grant temporary and permanent easements across or under lands that are associated with its flood control system. However, if the City wishes to sell property that was originally acquired specifically for flood control purposes, then prior approval from the USACE is required. MDC will research the recent transaction between the City and the MDC to determine if USACE approval should have been granted.

Primary Sponsor Letter of Support

(As uploaded)

WRRDA Request Letter - Jellison to USACE 9.19.16.pdf

MDC
The Metropolitan District
water supply • environmental services • geographic information

September 19, 2016

John Kennelly
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

RE: Proposal from non-federal sponsor for inclusion in the Annual Section 7001 Report to Congress for WRRDA – Hartford Flood Control System and East Hartford Flood Reduction System

Dear Mr. Kennelly:

Attached are application materials being submitted for requested WRRDA funding for critical improvements to the Hartford and East Hartford flood control systems. The Metropolitan District (MDC) is very interested in the well-being of the areas protected by these flood control systems, and in seeing that these areas remain safe from flooding now and in the future. The MDC, a nonprofit municipal corporation chartered by the Connecticut General Assembly in 1929, provides regional water, sewer and household hazardous waste collection services to its 8 member municipalities: Bloomfield, East Hartford, Hartford, Newington, Rocky Hill, West Hartford, Wethersfield and Windsor. In addition, the District supplies treated water to portions of 5 additional towns: Glastonbury, South Windsor, Farmington, East Granby and Portland. As a result, the MDC feels compelled to take proactive steps to ensure that its central mission of safely operating the regional sewer collection and treatment system for the benefit of the public is fully achieved.

As you are aware, the Metropolitan District Commission is currently undertaking a $2.4B Clean Water Program (CWP) in the Hartford Region focused on the upgrade of the City's 150 year-old combined sewer system. At present the existing systems surcharge with rainwater during storm events, and discharge untreated wastewater through overflows. More than 1 billion gallons of untreated wastewater overflow to area streams and waterways annually. These discharges impact the Connecticut River water quality over a 30 mile distance up to 50 times per year - every time it rains more than 0.25 inches. Other area waters that have their water quality affected include Wethersfield Cove, North Branch Park River, Trout Brook and Goff Brook, among others. In addition to key water quality improvements, the CWP will mitigate or eliminate reported basement and street flooding by raw sewage that occurs during heavy rain events.

Unfortunately, the Clean Water Program and combined sewer separation projects have been complicated by the deficiencies and limitations of the City's 70 year-old flood control system. As it exists, the system prevents the central business district and surrounding areas from flooding, including additional flooding from the Park River during high river conditions. The redirection of wastewater to accommodate the MDC abatement of these dangerous public health and safety concerns has strained the several miles of underground tunnels and piping systems, storm water pumping stations, check valves, and lock structures spread throughout the area.

In order to ensure the success of the MDC Clean Water Program as well as the safety of Harford's central business district, the Cities of both Hartford and East Hartford, along with the Metropolitan District Commis-

sion, are jointly requesting $77,000,000 in federal funding as authorized by The Water Resources Reform and Development Act of 2014. The funds will go to the Cities for the rehabilitation of Flood Control pump stations and valving systems, Flood Control Dike improvements, as well as for the elimination of 2 aging pressure vessels penetrating both dike systems. The MDC has identified $24,000,000 of the request for the relocation of 2 pressurized water mains which penetrate the Dike systems in both communities. These water mains are of the same 1960's vintage from which MDC has recently experienced catastrophic failure in the Farmington River. These water mains penetrations impose critical risk to the Dike system.

Potential loss of integrity of the flood control systems is a threat not only to the MDC's existing infrastructure, but also to the significant capital investment being made as part of the Clean Water Program. This request for projects will not only enable the City's flood management control systems to meet federal standards to control storm water runoff and eliminate pollutant discharge into critical watersheds and waterways, it will also protect $600M of Federal and State investments in the largest regional wastewater treatment plant in CT which is protected by the dike systems. Failure of the dike system, independent of multiple months without wastewater service, will cost MDC towns more than $10B to reestablish operation to the plants. This would have to be funded on a pay go basis, as the availability to issue new GO Bond debt within the MDC's current debt limitation would be significantly less than reinvestment required. The majority of this incremental pay go capital would be funded through Ad Valorem system, creating an undue burden on the budgets of the MDC's member towns.

Long term effects are of concern for the communities involved, the property owners within the protected areas, and also for the MDC's regional facilities. Studies have indicated that properties in the affected flood zone account for approximately 25% of the current City of Hartford grand list. If a breach or failure of the dikes occurred, property values would diminish significantly or in their entirety, impacting the City of Hartford's grand list and leading to substantial disruption of tax revenue to the City of Hartford. This would shift the funding of the MDC Sewer Operations to the other seven member towns as a result of the Ad Valorem tax formula, and therefore result in additional serious financial impact on the member town's budgets.

In the attached documents, the MDC, Hartford and East Hartford have compiled a listing of the highest priority projects that have been recognized by each of the two communities and the Corps of Engineers as projects that need to be completed to satisfy federal regulatory criteria for levee systems. All of the projects listed are contained within the existing capital planning documents for Hartford and East Hartford, but are unable to proceed due to lack of funding.

Given that the MDC's system is affected in many ways by the performance of the Hartford and East Hartford flood control systems, we believe it is the region's best interest to pursue funding to invest in these flood control systems. Your assistance in helping to secure WRRDA funding is of high importance to the City of Hartford, Town of East Hartford, the MDC, and ultimately, the region. Thank you for your consideration of this request.

Respectfully Submitted

Scott W. Jellison, P.E.
Chief Executive Officer

CC: William DiBella, Chairman
Congressman Larson
Senator Murphy
Senator Blumenthal

Congresswoman Esty
Congressman Courtney
Congresswoman DeLauro
Congressman Himes

Enclosures as included with the current Hartford Region Flood Protection Project application:

1. East Hartford Mayor LeClerc Letter of Support 09.15.2016
2. Hartford Mayor Bronin Letter of Support 09.19.2016

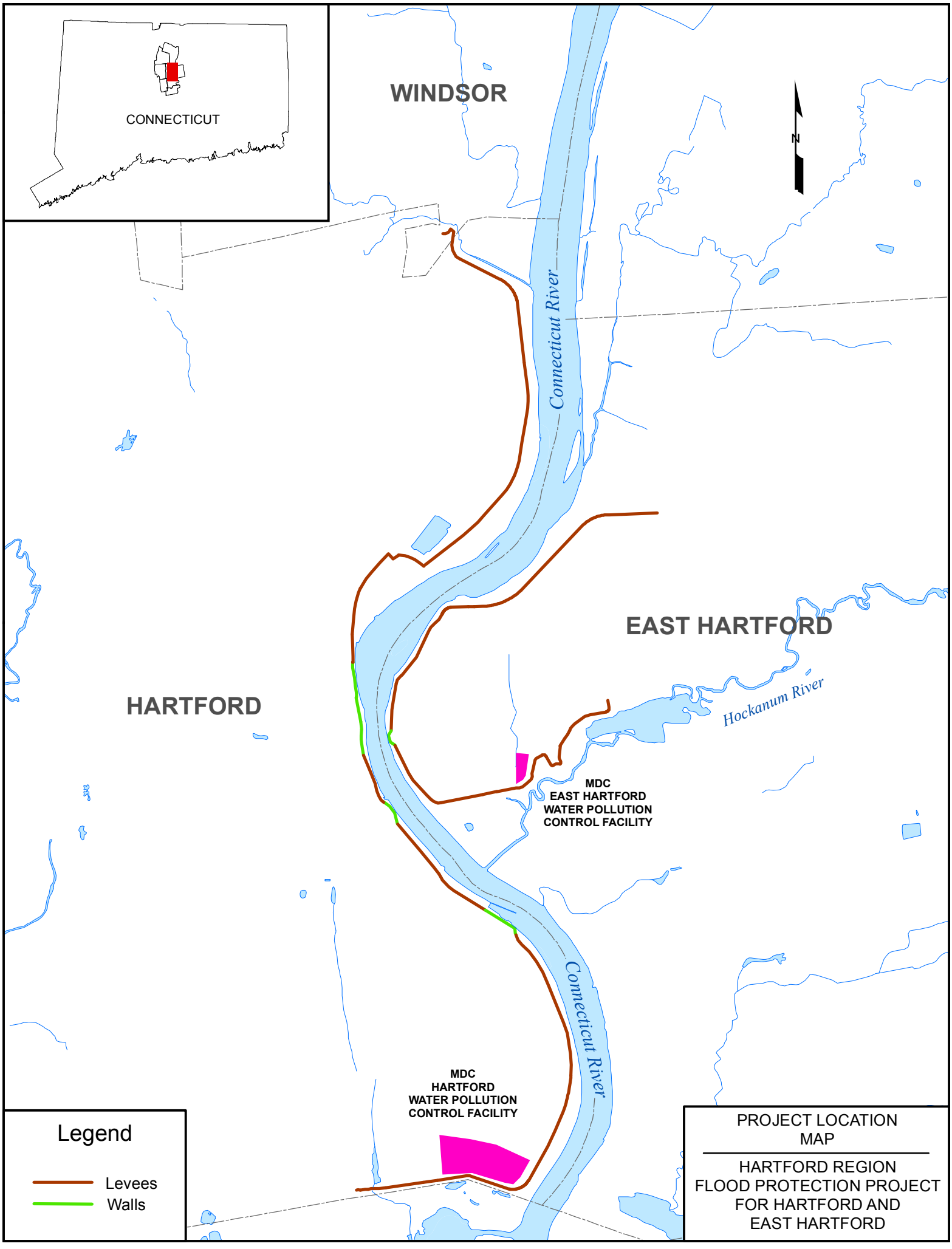
Historical Background Enclosures:

1. Regional Flood Protection Project Details
2. Hartford WRRDA Cost Benefit Analysis
3. East Hartford Cost Benefit Data, October 2015
4. Final USACE SWIF Approval Letter 01.15.2016
5. Greater Hartford Flood Commission Notice
6. East Hartford System overview map
7. Meeting Minutes MDC USACE 02.19.2015
8. Meeting Minutes MDC USACE 05.23.2015
9. Greater Hartford Flood Commission Letter to USACE 02.01.2016
10. WRDA Funding Request for Hartford and East Hartford 12.02.2014 w/ 2 atch
11. Hartford (Mayor Perez/Chairman DiBella) letter to Congressman Larson 04.02.2009

Map Document

(This is as uploaded, a blank page will show if nothing was submitted)

Levee__system.pdf


CONNECTICUT
WINDSOR
N
Connecticut River
EAST HARTFORD
HARTFORD
Hockanum River
MDC
EAST HARTFORD
WATER POLLUTION
CONTROL FACILITY
MDC
HARTFORD
WATER POLLUTION
CONTROL FACILITY
Connecticut River
Legend
Levees
Walls
PROJECT LOCATION
MAP
HARTFORD REGION
FLOOD PROTECTION PROJECT
FOR HARTFORD AND
EAST HARTFORD

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

Flood Comm Handout.pdf

GREATER HARTFORD FLOOD COMMISSION

DPW ENGINEERING DIVISION
50 Jennings Road, Hartford, Connecticut 06120
(860) 757-9900

Please Visit Us At:

www.hartford.gov/dpw/engineering-division/flood

The City of Hartford is protected by a Flood Control System that is regarded as the largest in New England. Unlike many flood prone communities just beginning to address resiliency, Hartford is already protected by a 7 mile long levee along the Connecticut River. Although Hartford's system is currently accredited with the Federal Emergency Management Agency (FEMA), the U.S. Army Corps of Engineers (USACE) has mandated that various corrective actions be taken to meet its more rigorous standards. In order to secure the time to evaluate and plan the corrective work, as well to arrange funding, the City entered into a System Wide Improvement Framework (SWIF) agreement with USACE. The SWIF temporarily allows the City to remain eligible for federal support of its Flood Control System while a formal plan and commitment schedule is developed. The City is required to develop the SWIF plan on or before August 2017. Because certain identified deficiencies will remain unresolved during this time, affected persons should be aware that an increased flood risk exists.

In the event of potential flooding, the City of Hartford will provide public notification corresponding to various warning levels of flooding danger, or ultimately the need to evacuate in event of a severe flood emergency. The property address above is one of over 700 properties within or adjacent to the Levee Protected Zone.

If You Live, Work, or Own Property within the Levee Protected Zone, please be aware that:

- Evacuation of the levee protected zones may be necessary if severe flooding is predicted
- The City of Hartford has a Flood Zone Evacuation Plan available on the City's website
- The U.S. Army Corps of Engineers notified the City of corrective action needs on its flood control system
- The City entered into a SWIF agreement with USACE that requires a schedule for corrective actions
- You should consider ways to protect your property from flood damage
- Businesses should: Develop a contingency operations plan in the event of a flood evacuation
- Residents should: Organize emergency items and important documents in the event of a flood evacuation
- Landlords Should: Notify your tenants of this Flood Zone Evacuation Plan
- The City's website above contains relevant information including important links to sources of flood information

COMISIÓN DE CONTROL DE INUNDACIONES DE HARTFORD Y SUS PUEBLOS VECINOS

La Ciudad de Hartford está protegida por un Sistema de Control de Inundaciones que se considera el más grande de Nueva Inglaterra. A diferencia de muchas comunidades propensas a las inundaciones que recién empiezan a encarar sus acciones de resistencia, Hartford ya está protegido por un dique de 7 millas de longitud a lo largo del río Connecticut. Aunque el sistema de Hartford está acreditado en la actualidad por la Agencia Federal de Manejo de Emergencias (FEMA), El Cuerpo de Ingenieros de EE.UU. (USACE) ha ordenado que se tomen diversas acciones correctivas para cumplir con sus estándares más rigurosos. Con el fin de asegurar el tiempo para evaluar y planificar el trabajo correctivo, así como para organizar la financiación, la Ciudad ingresó al Sistema Amplio de Mejoramiento (SWIF) con USACE. El SWIF permite temporalmente que la ciudad permanezca elegible para el apoyo federal de su Sistema de Control de Inundación, mientras se desarrolla un compromiso formal y un horario fijo. Se le requiere a la Ciudad desarrollar el plan SWIF en o antes de Agosto del 2017. Debido a que ciertas deficiencias ya identificadas permanecerán sin resolver durante este tiempo, las personas afectadas deben ser conscientes de que existe un aumento del riesgo de inundación.

En caso de una posible inundación, la Ciudad de Hartford proporcionará las notificaciones públicas correspondientes sobre los distintos niveles del peligro de la inundación, o por último, notificará la necesidad de evacuar en caso de una emergencia de inundación severa. La dirección arriba de este documento es una de las más de 700 propiedades dentro o adyacentes a la zona protegida del dique.

Si usted vive, trabaja o tiene propiedad dentro de la Zona Protegida del Dique, tenga en cuenta que:

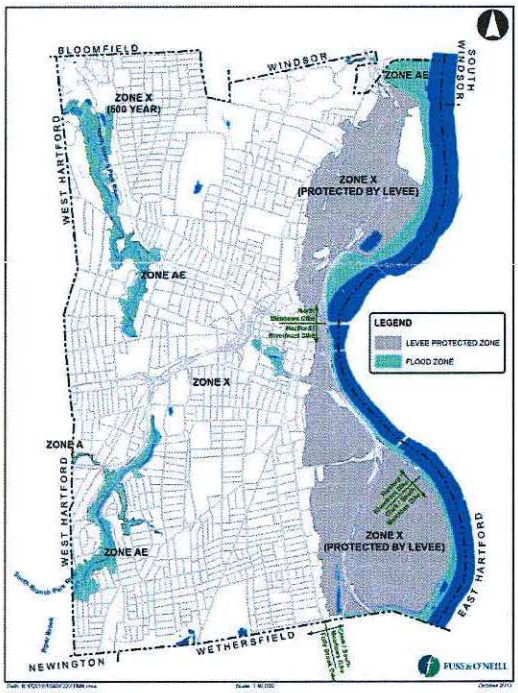
- Si se pronostica una inundación severa, puede ser necesaria la evacuación de las zonas protegidas por los diques
- La Ciudad de Hartford tiene un Plan de Evacuación para la Zona de Inundación disponible en la página web de la Ciudad
- El Cuerpo de Ingenieros de EE.UU. notificó a la Ciudad sobre las medidas correctivas necesaria para el sistema de control de inundaciones
- La ciudad entró en un acuerdo SWIF con el USACE que requiere un horario para terminar las acciones correctivas
- Debe tener en cuenta las formas de proteger su propiedad de posibles daños por inundaciones
- Los Negocios deben desarrollar un plan de operaciones en caso de una evacuación de inundaciones
- Los residentes deben: Organizar artículos de emergencia y documentos importantes en el caso de una evacuación de inundaciones
- Los propietarios deben: Notificar a sus inquilinos de este plan de evacuación de la zona de inundación
- El sitio web de la ciudad contiene información pertinente, incluidos vínculos importantes con fuentes de información sobre inundaciones

GREATER HARTFORD FLOOD COMMISSION
50 JENNINGS ROAD
HARTFORD, CONNECTICUT 06120

BUREAU OF PUBLIC WORKS METROPOLITAN DISTRICT
555 MAIN ST
HARTFORD, CT 06103-2915

IMPORTANT INFORMATION ON HARTFORD'S FLOOD CONTROL SYSTEM

INFORMACIÓN IMPORTANTE SOBRE EL SISTEMA DE CONTROL DE INUNDACIONES DE HARTFORD

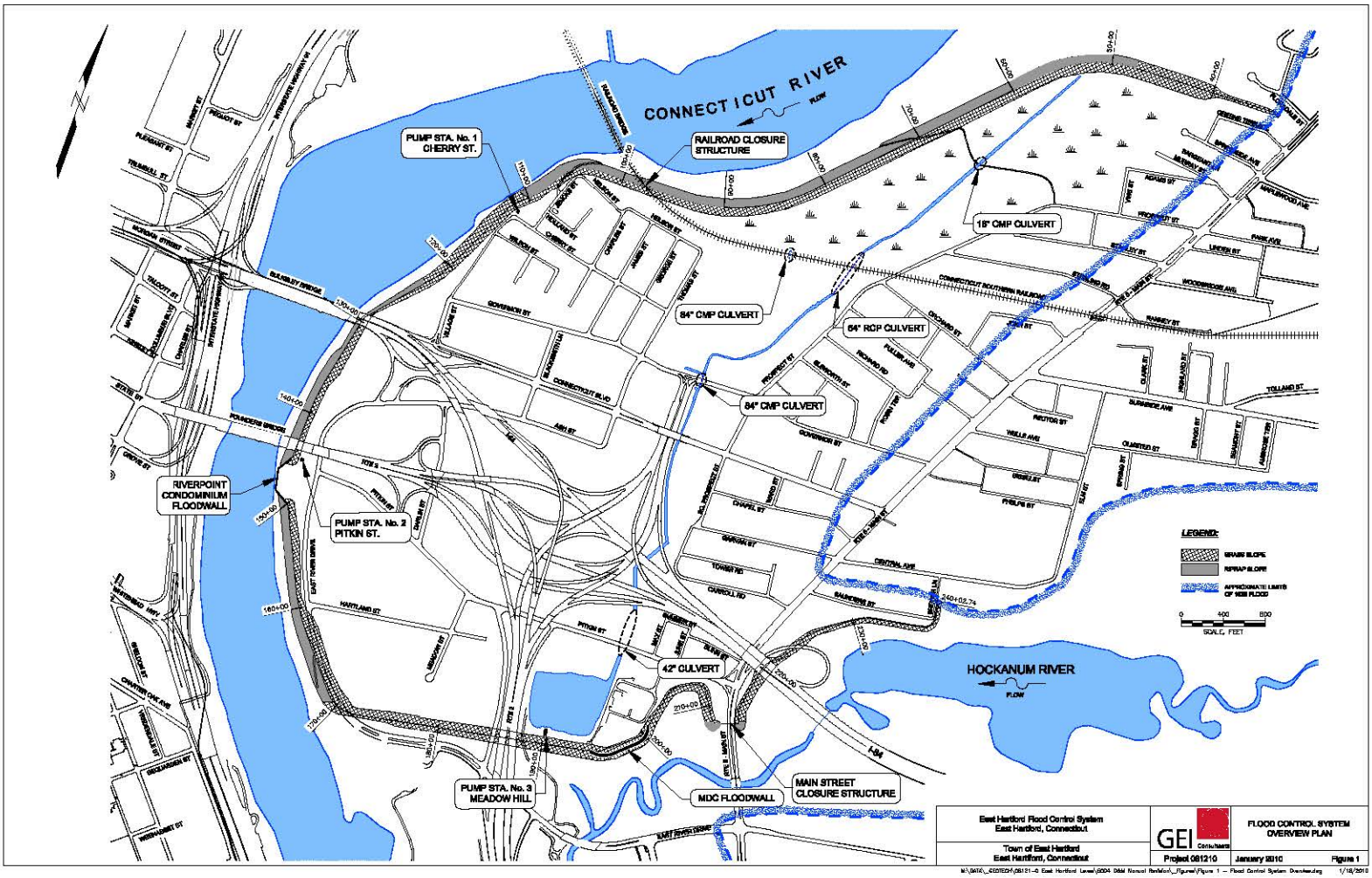
WHAT YOU NEED TO KNOW:	LEVEE PROTECTED ZONES *ZONAS PROTEGIDAS POR EL DIQUE*	*LO QUE NECESITAS SABER :*
• SHADED AREAS ON THIS MAP ARE PROTECTED BY A FLOOD CONTROL SYSTEM • CITIZENS MAY NEED TO EVACUATE IF SEVERE FLOODING IS PREDICTED • BUSINESSES SHOULD ALSO BE AWARE OF FLOOD RISK • THE U.S. GOVERNMENT HAS NOTED CORRECTIVE ACTIONS REQUIRED FOR THE FLOOD CONTROL SYSTEM • HARTFORD HAS ENTERED INTO A "SWIF" AGREEMENT TO ADDRESS REPAIR NEEDS **See reverse side for details*		• LAS ÁREAS SOMBREADAS EN ESTE MAPA ESTÁN PROTEGIDAS POR UN SISTEMA DE CONTROL DE INUNDACIONES • ES POSIBLE QUE LOS CIUDADANOS TENGAN QUE EVACUAR SI SE ESPERAN GRAVES INUNDACIONES • LOS NEGOCIOS TAMBIÉN DEBEN TENER EN CUENTA EL RIESGO DE INUNDACIONES • EL GOBIERNO ESTADOUNIDENSE TIENE ACCIONES CORRECTIVAS QUE SE REQUIEREN PARA EL SISTEMA DE CONTROL DE INUNDACIÓNES • HARTFORD HA ENTRADO EN UN ACUERDO "SWIF" PARA CORREGIR NECESIDADES DE REPARACION **Vea el reverso para más detalles*

For more information / Para más información:
Call 311- Llame al 311 | 860-757-9311 | www.hartford.gov/dpw/engineering-division/flood

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

EH System overview map.pdf



East Hartford Flood Control System
East Hartford, Connecticut

Town of East Hartford
East Hartford, Connecticut

GEI Consultants

FLOOD CONTROL SYSTEM
OVERVIEW PLAN

Project 061210 | January 2010 | Figure 1

M:\DATA_EDITED\061210 East Hartford Levee\2004 O&M Manual Revision_Figures\Figure 1 – Flood Control System Overview.dwg 1/18/2010

Other Non-Federal Sponsors Letter(s) of Support

(This is as uploaded, a blank page will show if nothing was submitted)

EH letter of support MDC 091416.pdf

MARCIA A. LECLERC
MAYOR

TOWN OF EAST HARTFORD
740 Main Street
East Hartford, Connecticut 06108

Phone: 860 291-7200
Fax: 860 289-0831

Office of the Mayor

September 15, 2016

John Kennelly
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

RE: Proposal from Non-Federal Sponsor for inclusion in the Annual Section 7001 Report to Congress for WRRDA - East Hartford Flood Reduction System

Dear Mr. Kennelly,

The Town of East Hartford takes our responsibility for the protection of the community as it relates to the Flood Protection System (System) very seriously. Since 2006 the Town has invested over $21 million for repairs, modifications and upgrades to the System in order to meet Federal Emergency Management Agency (FEMA) and the United States Army Corps of Engineers (USACE) standards, maintain levee accreditation, active status and to ensure the protection of lives and property for those who live and work adjacent to the System. The Town has been working closely with FEMA, USACE and the Connecticut Department of Energy and Environmental Protection (CT DEEP) through every stage of the multi-phase rehabilitation of the System.

The Town of East Hartford in partnership with the City of Hartford and the Metropolitan District Commission (MDC) requests assistance in the rehabilitation of the Town of East Hartford and the City of Hartford flood reduction systems. The project would involve improvements to both flood reduction systems in four major categories but is not limited to the following:

1. Structural improvements including closure structure upgrades, toe & collector drain replacement and repairs / replacement of levee penetrations, etc.
2. Improvements to the interior storm drainage system including the dredging of the storm water storage ponds.
3. Renovations and upgrades to the storm water pump stations
4. Operational improvements throughout the two systems to assist in the maintenance and operation of the levee systems.

The first step in a comprehensive rehabilitation of the two Systems would be an evaluation of the existing facilities and operations. Consideration should be given for various alternatives for rehabilitation, modification and /or upgrades to the Systems during the design process.

On behalf of the citizens and business community, The Town of East Hartford gives it full support for the rehabilitation of the Flood Reduction Systems and is committed to provide our local cost share for the project components associated with the East Hartford System. We appreciate the technical support of the USACE in assisting the partnership on the project.

Thank you for the opportunity to submit the MDC's request along with our support of the project.

Sincerely,

Marcia A. Leclerc
Mayor

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

Regional Project Details.pdf

Hartford Region Flood Protection Project Details

The Metropolitan District:

The Metropolitan District Commission (MDC) has identified approximately a high priority water transmission line project which represents a major levee safety concern for both the City of Hartford Levee system, and the Town of East Hartford Levee system. The water transmission main is known as the Northeast Transmission Main, which is a 36" diameter RCCP pipe. The project proposes to reroute the main to avoid penetrations through or adjacent to either levee system.

WRDA CAPITAL PROJECT FUNDING REQUEST SUMMARY

MDC Northeast Transmission Water Main Rerouting Project	$24 M
TOTAL MDC WRDA CAPITAL PROJECT FUNDING REQUEST	**$24 M**

A large number of utilities pass through the Hartford and East Hartford levee systems, introducing the potential for progressive seepage, backflow, or destabilization of the levee as a result of a utility break or flood event. USACE has identified levee penetrations as a serious levee safety issue. This is particularly important with pressurized water mains which have the potential to displace large volumes of soil and can thereby undermine or even breach an earthen levee.

Levee owners are required to identify and inspect penetrations, and require utility owners to do so on their own systems. The MDC is one such utility owner. In 2016 the MDC completed an extensive inspection program of its own penetrations which includes 13 in the Hartford Levee system, and 15 in the East Hartford Levee system.

In general, penetration improvements may include properly abandoning utilities no longer in use, installing enhanced backflow prevention and shut off valves for those that remain in use, or eliminating penetrations and rerouting the utility where possible. The ideal solution from a levee safety perspective is to completely remove the penetration and reroute so that the risk of failure is eliminated.

PROJECT SUMMARY DESCRIPTION

In order to address the safety concerns posed by the Northeast Transmission main, this project proposes to Install a new water transmission main with a revised routing that will eliminate the need to either cross or run parallel to either levee system. The project details are as follows:

- Install approximately 11,300 feet of new water transmission main starting from a point well behind the Hartford Levee on the landside, and extending the new main to a point beyond the levee system to the north, at which point the water main would turn east and cross under the Connecticut River.

- The new water transmission main would connect with the existing water main on the East Hartford side of the river, north of Floradale Street in East Hartford, and north of the East Hartford Levee. The existing water main parallels the toe of the East Hartford levee and has been identified as a significant levee safety issue. Relocation of this water main will eliminate this risk.

- A series of isolation and pressure reducing valves (PRV's) will be installed on the east and west ends of the new pipe. The pit on the east end of the pipe will connect to the transmission pipe and be set to a similar hydraulic grade to the Floradale PRVs. The pit on the west end of the pipe will be placed to the north of the river crossing and will serve as the surrogate to the existing Main @ Tower PRVs, which will be decommissioned (with full flow through). The new PRV settings will have a similar hydraulic grade to the former Main @ Tower PRV settings.

- The portions of the existing Northeast Transmission Main outside of the levee systems are planned to be permanently abandoned in place once the new main is operational. The portions of the old Northeast Transmission Main which pass through or run adjacent to the Hartford and East Hartford levees will be completely removed, and the impacted areas properly restored in accordance with USACE levee standards.

City of Hartford:

The City of Hartford has identified approximately $78 million in capital improvement projects needed to attain USACE compliance for its Flood Control System. This WRDA funding request is intended to be used to perform the following aspects of the overall project:

WRDA CAPITAL PROJECT FUNDING REQUEST SUMMARY

Project #1 Concrete Floodwall Stability and Settlement Repairs:	$1,800,000
Project #2 Levee Underseepage Mitigation:	$12,500,000
Project #3 Levee Toe Drain Repairs:	$2,500,000
Project #4 Folly Brook Flood Control Conduit Replacement:	$8,000,000

Project #5 North Meadows Pump Station Rehabilitation:	$4,200,000
Project #6 Keney Lane and Bushnell Pump Station Rehab:	$5,600,000
TOTAL WRDA CAPITAL PROJECT FUNDING REQUEST	**$34,600,000**

PROJECT SUMMARY DESCRIPTIONS

Project #1: Concrete Floodwall Stability and Settlement Repairs Design and Construction of Northernmost Railroad Levee Closure Structure

The City of Hartford's concrete floodwalls and closure structures form an integral part of the Connecticut River Levee system. Portions of these components were noted by the U.S. Corps of Engineers (USACE) as deficient in its recent inspections, and the City has agreed to address these problems in the recently approved System-wide Improvement Framework (SWIF) Letter of Intent.

USACE has identified various floodwall sections that have visual signs of distress. Three specific sections of the concrete floodwalls were included in the O&M inspection guidelines as requiring periodic movement measurement, however, USACE has also identified several other concrete floodwall sections or closure structure components that have demonstrated signs of distress. Obvious signs of distress, such as differential settlement and movement, cracking, and fracturing of concrete were apparent at these locations.

Through the SWIF documents and other USACE inspection records, deficient floodwall locations have been identified as follows:

Location #1 Closure Structure #1 and Closure #2 Cracking North Meadows Dike
Location #2 Settlement/Tilting at Concrete Closure Structure #6-South Meadows Dike
Location #3 Settlement/Movement Floodwall at Sta. 0+00 to 4+67 North Meadows Dike
Location #4 Settlement/Tilting at Floodwall within the MIRA site
Location #5 Floodwall East of Van Dyke Avenue at Sta. 36+00 to 45+00 (Hartford Dike)

Also, a concrete closure structure at the north end of the levee system allows for passage of Amtrak trains through an opening in the levee, with a standby closure system to attain the full levee height in the event of a flood. Required periodic exercising of the closure system, as well as installation in the event of a flood, causes disruption to rail service for several days due to a need to cut the rail and remove all ties and ballast to install the closure panels. USACE has also identified structural cracking in the concrete closure structure abutments, and remedial repairs

are needed. The City has planned to upgrade this closure structure for several years to allow for operation of the gate without disturbing the rail bed. The WRDA funding requested would be used for concrete repairs to structural components, purchases of new aluminum closure panels, coordination with Amtrak regarding the details of the closure, design of the selected alternate, and construction and placement of the new closure structure. The preliminary opinion of cost for design and construction is $1,800,000 M.

Project #2: Hartford Levee "Under-Seepage" Mitigation

The City of Hartford is protected by a concrete floodwall in the vicinity of the central business district between the Bulkeley Bridge on Interstate I-84, and the Founders Bridge which connects Route 2 to downtown Hartford. Analytical evaluation and piezometric readings on the land side of the floodwall have shown that groundwater levels rise in direct relation to increases in Connecticut River elevation, which indicates that excessive under seepage is occurring. The observed underseepage condition significantly exceeds allowable USACE standards for hydraulic gradient, thus indicating an unacceptable underseepage condition. The potential consequences of underseepage range from nuisance flooding of the adjacent highway and railroad to large-scale failure of the levee system and interior flooding. The requested WRDA funding is proposed to be used for final engineering design plans and specifications and installation of an underground cut-off wall system using either steel sheet piling, grout/slurry wall, installation of ground water relief wells, highway ballast improvements, or other methods. The preliminary opinion of cost for design and construction is $12.5 M.

Project #3: Levee Toe Drain Repairs

A critical component of the flood control system is the assembly of toe drains that run along the landside toe of the levee walls. These drains collect and channel water resulting from underseepage to retention ponds where it is pumped back into the river. Many of the levee toe drains are believed to be non-functional. Some of the existing toe drains are not equipped with piping, manholes, cleanouts, or other access points, and are not readily accessible for inspection and cleaning. Some of the toe drains were constructed with rockfill in place of piping, primarily in the North Meadows Dike. Also, in some instances toe drains have been destroyed or buried due to adjacent construction projects, including I-91. Installation of perforated pipe toe drains is required along much of the flood wall to bring it into compliance with USACE criteria. WRDA funding is requested to perform planning, engineering design, and construction of a functioning toe drain system. The preliminary opinion of cost for design and construction is $2,500,000 M.

Project #4: Folly Brook Flood Control Conduit Replacement

Another critical component of the flood control system is the conduit network which becomes pressurized, thereby increasing stress on these structures, primarily due to backflow of the Connecticut River during periods of high river levels. The Folly Brook Conduit is a concrete conduit of varying cross section and construction type which accepts the flow of the Folly Brook and discharges to the Wethersfield Cove. The Folly Brook Conduit was constructed in various phases using different construction techniques and has suffered significant deterioration due to age, substandard initial construction techniques, and the corrosive effects of combined sewer overflows which discharge into this conduit. This project calls for the construction of a new conduit, which would likely have to be constructed parallel to the existing conduit for logistical reasons. This upgrade is needed to allow for reliable future flows of storm and floodwaters, and the increased flows which may result from sewer separation. The preliminary opinion of cost for design and construction is $8.0 M.

Project #5 North Meadows Flood Control Pump Station Rehabilitation

Rehabilitation and/or reconstruction work is needed on each of the City's remaining pump stations. Key among these is the North Meadows Pumping Station which was constructed in 1939 and is the second oldest of these facilities. Various repairs are needed to mechanical equipment, including replacement of pump bearings and seals, suction and discharge valve replacement, and rehabilitation of valve operators. Electrical components, including the main distribution panel and valve actuators, are in need of modernization and replacement. Failure of this pump station to perform at full capacity would result in localized flooding outside of the station's holding pond. If the station fails to pump as per its design capacity, the resulting flooding could easily inundate the surrounding areas including city and state public works facilities thus terminating the city's ability to respond to flooding. WRDA funding is requested to perform feasibility studies, engineering evaluation, plan development, and reconstruction related to the North Meadows Pump Station. This would include development of design alternatives, feasibility evaluation of alternatives, engineering design, cost estimating, value engineering, and construction. The preliminary opinion of cost for design and construction is $4.2 M.

Project #6 Project #6 Keney Lane and Bushnell Pump Station Rehab

The Keney Lane Pumping Station was erected in 1943, and has recently been surrounded by the parking garage for the Convention Center. Recommended improvements for the Keney Lane Pumping Station include replacement of existing valves and pump bearings and seals; replacement of valve operators; addition of walkways to safely access equipment; replacement of existing electrical equipment and generator; and various safety improvements.

Recommended repairs for the Bushnell Park Pumping Station include repair of a leaking roof above the screening room; replacement of the 30-inch valves and pump bearings; repair of sluice gate operators at the inlet to the wet well; replacement of existing electrical panels and generator; corrosion mitigation and various safety improvements.

The preliminary opinion of cost for design and construction for the combined pump station improvements is $5.6 M.

Town of East Hartford:

The purpose of the rehabilitation project is to improve levee performance and further reduce the risk of failure of the levee system located along the Connect and Hockanum Rivers. The flood reduction project for East Hartford, Connecticut was authorized by the Flood Control Act approved June 28, 1938, House Document No. 455, 75th Congress, 2nd Session, as modified by Public No. 859, 76th Congress, approved October 15, 1940.

Structural Improvements include the replacement of impacted toe / collector drain system, elimination of seepage paths at the closure structures and the replacement of a damaged water stop on the Meadow Hill Pump Station box culvert.

Structural Improvement Costs = $ 8,760,000 (construction & inspection costs)

Dredging of the Meadow Hill Storage Pond located at the Meadow Hill Pump Station is required to remove the accumulation of sediment within the storage pond. The project will restore the storage pond to the original lines and grades.

Dredging Costs = $ 3,950,000

Stormwater Pump Station Renovation includes the updating / replacement of the three original storm water pump stations.

Pump Station Renovation Costs = $ 4,500,000

Operational Improvements: The Flood Protection System was constructed in the 1940's. Many of the features incorporated into the System are based on 1930's technology. The operations of various System elements are of obsolete technology and require a significant labor effort. Implementation of automation and the updating the outdated technology will improve the overall performance and operation of the System with limited staffing.

Operational Improvement Cost = $ 1,800,000

TOTAL COST OF OVERALL PROJECT: $19,010,000

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

Meeting Minutes MDC USACOE COH 2015 02 19.pdf

Minutes of Meeting

February 19, 2015, 1:00 PM, MDC Headquarters, Hartford, CT

The Metropolitan District of Hartford (MDC)
U.S. Army Corps of Engineers (USACE)
City of Hartford (COH)
Greater Hartford Flood Commission (GHFC)

I. Agenda - Attached
II. Presentation Materials - Attached

Attendees

Name	Organization	Name	Organization
Clarence Corbin	MDC	Jim Sullivan	AECOM
Chris Stone	MDC	Leo Martin	AECOM
Andrew Perham	MDC		
Scott Jellison	MDC	Michael Schultz	CDM Smith
Susan Negrelli	MDC		
Eric Pizzoferrato	MDC	Fred Johnson	GEI
		John McGrane	GEI
Mike Bachand	USACE		
Scott Michalak	USACE	Bill Wright	Jacobs
Constantin Banciulescu	City of Hartford		
Jim DelVisco	City of Hartford		
Gina Varano	City of Hartford		

Transactions

1. **Introductions** – Attendees introduced themselves and their affiliations (this happened at the end of the meeting).

2. **Project Reviews – The MDC Project Managers briefly reviewed the status of projects:**

   a. ***Collection System Gates – Repairs & Improvements***
      - Eric Pizzoferrato (MDC) reviewed the features and current status of the project.
      - There are a number of permits/approvals required from USACE, GHFC and COH.
      - An application for a USACE Section 408 permit was sent to the COH / GHFC on September 9, 2014. Upon approval, the application will be forwarded to the CT DEEP and the USACE. COH indicated that this approval would occur following the week of this meeting and would be sent to the USACE.

- Routine inspections won't be conducted by the USACE. MDC should be prepared to submit as-builts after construction.

b. Wet Weather Expansion Projects

- Construction Underway

c. South Hartford Conveyance and Storage Tunnel, Pump Station and Conduits

- Section 408 permit application submitted to COH on January 7, 2015 for four properties. Some additional information is required for COH review.
- GHFC meeting / hearing is scheduled for March 18, 2015. The GHFC should issue recommendations / conditions regarding the permit. When approved, the application can be sent to USACE.
- AECOM assured that monitoring of control points for settlement will be conducted during and after construction.
- COH indicated that an easement will be necessary for tunneling under the South Meadows Pump Station (SMPS). Subterranean easements will be necessary for tunneling under all COH-owned properties. AECOM to verify property ownership at subject properties.
- COH to grant line assignments for the South Tunnel.
- The COH indicated that they will need easement applications for COH properties not in USACE areas by early March.
- Review periods for properties that are both COH and GHFC may take up to eight weeks.
- Assistant District Counsel to send Public Notice information (2/24/15) to the COH (Gina).
- GEI completed peer review of Section 408 permit application. Their comments are included in the application.
- The original Section 408 application included the possibility of either a one-pass (segmental precast liner) or two-pass (cast-in-place liner) tunnel boring method. The USACE was informed that the project will be bid as a **one-pass system** only. The USACE didn't seem concerned and verbally accepted this change. The design team will have to submit an official letter to the USACE signifying this change.
- The USACE can provide comments on Section 408 application but can't officially approve until it is accepted by the GHFC.
- The USACE indicated that they will be able to provide official comments to the design team by the end of March 2015. The official approval letter is not required at time of bid, but is necessary to start construction.
- The USACE requested a "one-pager" from GEI indicating a record of their peer review.

d. Assessment of MDC Water Main Penetrations

- Clarence Corbin (MDC) reviewed the current status of the project.
- MDC is using a phased approach to evaluate the water mains.
- Various types of inspections of MDC levee penetrations were completed at 16 locations (12 sewer, 4 water). A report on the findings was completed in July 2014.

- An O&M plan for the penetrations is currently being prepared by MWH.

e. North Tunnel

- The design engineering services agreement with MWH is still under review. The CT DEEP will need to approve the agreement before it is fully executed.
- MWH will likely only proceed on an alignment study of the North Tunnel in the short term. Further work by MWH will be evaluated based on the CWP budget and schedule.
- USACE stressed that it can only issue permits and approvals based on final design documents. Any opinions offered during design development are not binding.

3. Risk Management for Tunnel Facilities

- The risk of inundation of the work area and shafts due to flood control system failure was discussed. Currently, the project team views this as an event with an improbable likelihood, but with high consequences. The current risk mitigation strategy is to prepare contingency plans.
- Fuss & O'Neill completed an inundation map for the SMPS. GEI has this and shall submit this document to AECOM for review. This information will be used by AECOM to help design the local levees and prevent flood water from entering the launch shaft.
- The USACE indicated that an Emergency Action Plan (EAP) is required to be submitted. The triggers for implementing the EAP can be submitted to the USACE now and should be given to the MDC Command Center and included in the MDC's internal EAP.
- The contractor shall prepare the EAP after the bid is awarded.
- The property transfer at Brainard Rd should be investigated. If the land was purchased by the COH for GHFC then the COH can't transfer property to MDC without USACE approval.
- MDC will engage the COH/GHFC as design and contingency planning progresses so that the project can successfully mitigate the risks.
- FEMA certifies the levees, not the USACE.
- Whereas COH built the SMPS, MDC must coordinate any risk mitigation associated with the SMPS with the COH and not the USACE.

4. Project Review Protocol

- No comments.
- Please refer to the previous meeting's minutes (5/23/14).

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

2014 Transmittal Letter WRDA Application.pdf

PEDRO E. SEGARRA
MAYOR

December 2, 2014

U.S. Army Corps of Engineers
Attn: CECW-CE (Lisa Kiefel)
441 G Street NW.
Washington, DC 20314-1000.

RE: WRDA Funding Request for Hartford and East Hartford Flood Control Systems

Dear Ms. Kiefel:

Attached are application materials being submitted for WRDA/WIFIA funding that is urgently needed in support of critical improvements to the Hartford and East Hartford flood control systems.

Both Hartford and East Hartford are very concerned about the well-being of the areas protected by our flood control systems and in seeing that the region will remain safe from flooding now and in the future. Furthermore, we feel compelled to take proactive steps to ensure the continued safe operation of the regional sewer collection and treatment system (operated by MDC) for the public benefit of the region. Given that the MDC's sewage system is affected in many ways by the performance of the Hartford and East Hartford flood control systems, we believe it is in the region's best interest to pursue funding to invest in the security of these flood control systems.

The recent action by the U.S. Army Corps of Engineers to place the City of Hartford system in the "inactive" status due to financially unfulfillable capital investment and maintenance needs is a cause for grave concern. This is a concern for the communities involved, the property owners within the protected areas, and also for the MDC's regional facilities. Potential loss of integrity of the flood control systems is a threat not only to the MDC's existing infrastructure, but also to the significant capital investment being made as part of the $2.1B Clean Water Program. Accordingly, the needs supporting this request are both urgent and compelling.

In the attached documents, we have compiled a listing of the highest priority projects that have been recognized by both our communities and the Corps of Engineers as projects that need to be completed to satisfy federal regulatory criteria for levee systems. All of the projects listed are contained within the existing capital planning documents for Hartford and East Hartford, but are unable to proceed due to lack of funding.

550 Main Street
Hartford, Connecticut 06103
Phone (860) 757-9500
Fax (860) 722-6606

Your assistance in helping to secure WRDA funding is of high importance to the City of Hartford, the Town of East Hartford, the MDC, and all constituents residing within this region. Thank you for your consideration of this request.

Respectfully Submitted,

Pedro E. Segarra
Mayor of Hartford

Marcia Leclerc
Mayor of East Hartford

Enclosures: WRDA Project Request Form
WRDA Funding Request Overview and Project Description Attachment

CF: The Honorable John B. Larson, United States Congressman
First District of Connecticut
221 Main Street, 2nd Floor
Hartford, CT 06106

Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

2014 WRDA Project Request Form.pdf

(Name of Senate/Congressional Office Submiting Request)
WRDA Project Request Form

Name of governmental entity or organization: *City of Hartford and Town of East Hartford*

Name of proposed project: *Hartford and East Hartford Connecticut Flood Control System – Feasibility Studies for Capital Improvements*

Location of proposed project (include city/county and state): *City of Hartford and Town of East Hartford, located in Hartford County, Connecticut*

Total dollar amount authorization requested: $1.85 million

Primary Contact Name(s):

Pedro E. Segarra, Mayor, Hartford
Phone Number: (860) 757 - 9500
Address: 550 Main St, Hartford, CT 06103
Email: segap001@hartford.gov

Marcia Leclerc, Mayor, East Hartford
860-291-7200
740 Main Street, East Hartford ,CT
Mleclerc@easthartfordct.gov

If the request is for a construction authorization, does the project have a completed Corps report? *The Hartford and East Hartford Flood Control Systems were federal projects constructed by the US Army Corps of Engineers (USACE), and are regularly inspected and evaluated by USACE. The projects listed in this request are familiar to USACE's New England District as they are intended to address recognized deficiencies with the systems. Hartford and East Hartford have worked with the Corps through the planning and levee certification and accreditation process, and have specifically included the projects outlined in the attached project description within their levee improvement plans that have been presented to USACE.*

Does this request modify an existing authorization? ***No***

If yes, please provide a reference for the existing authorization: *N/A*

If the project has received any federal funding over the past five years, please identify the amount, the year appropriated, and the federal program that provided the funding:

This project has not received any federal funding within the last 5 years

Is your request for a:

Specific Project: N/A **Study:** Yes, see below **Other:** N/ A

**Project involves feasibility studies, engineering evaluation, and plan development for capital improvement projects recognized by USACE as needed to address deficiencies in the flood control system, and also to address impacts on related public utility infrastructure. The flood control system is interconnected with, and has direct impacts on, the regional sewer collection and treatment systems in Hartford and East Hartford.*

In addition to filling out this form in its entirety, **please include a brief description of the project and submit any relevant studies or assessments.** For those projects requesting funding authorization, the summary must include a brief budget outline for the requested funds.

Upon competing this form and the project description, please email the form and summary to (*Name and address of Senate/Congressional Office Submitting Request*) by (*submittal date*). Electronic submissions only! Please note that this form provides preliminary information only and additional information may be requested that may be necessary to process the request.

Contact: (*provide contact information for political office forwarding this request)*

ATTACHMENT A

Water Resources Development Act
Environment and Public Works Committee
REQUEST FORM

(Please fill out one sheet for each request)

MEMBER: ___**(***PoliticalLiaison)*_____
Member Staff Contact Name: _____
Phone Number: _____
Email:_____

Priority: I of I

Project/Study/Activity Requests
(Complete this section if your request relates to a specific project)

Name of Project: *Hartford and East Hartford Connecticut Flood Control System – Feasibility Studies for Capital Improvements*

Improvements Location (include city/county and state): *City of Hartford and Town of East Hartford, CT, Hartford County, Connecticut*

Corps District(s): *USACE New England District*

Non-Federal Sponsor Contact Information (Name, Phone, and Email Address): Pedro E. Segarra, Mayor, Hartford, (860) 757- 9500, *segap001@hartford.gov*; Marcia Leclerc, Mayor, East Hartford, 860-291-7200, Mleclerc@easthartfordct.gov

Corps Report: If the request is for a construction authorization, does the project have a completed Corps report? Yes (Periodic Inspections and Levee System Rratings)

Project Modification: Does this request modify an existing authorization? ***No***
If yes, please provide a reference for the existing authorization

Project Cost: *$1.85 Million*

Policy/Programmatic/Other Language Requests
(Complete this section if your request is programmatic or policy-related)

Provision Title: *All work described in this grant application is being proposed to help achieve and maintain compliance with existing federal regulations relating to flood control levee safety. The Code of Federal Regulations, which governs FEMA regulatory requirements for levees including levee certification and accreditation, is contained in 44 CFR 65.10. The federal regulations that U.S. Army Corps of Engineers' requirements are based on is 33 CFR 208.10 and 33 USC 408.*

Geographic Areas Affected (if applicable): *Hartford and East Hartford, Hartford County, CT.*

Description of Purpose and Need for Request
Complete this section for ALL requests. See attached project description entitled:

"*Hartford and East Hartford CT Flood Control System*
Feasibility Studies Capital Improvements
December 1, 2014"

Other Non-Federal Sponsors Letter(s) of Support

(This is as uploaded, a blank page will show if nothing was submitted)

Report to Congress on Future Water Resources Collab.pdf

Luke A. Bronin
Mayor

United States Army Corps of Engineers
New England District
696 Virginia Road
Concord, Massachusetts 01742

September 19, 2016

RE: Report to Congress on Future Water Resources Development (WRDA)
Section 7001 Request for Funding Reginal Capital Improvement Request with MDC
City of Hartford Flood Control System Improvements

In collaboration with the Metropolitan District Commission (MDC), the City of Hartford hereby expresses its support for the MDC's regional application for WRDA funding for critical water resource projects for inclusion in pending federal legislation associated with Section 7001 of the Water Resources Development Act (the "WRDA"). The MDC's regional application addresses a number of high priority projects which have significant importance to the Hartford Flood Protection Systems. Hartford respectfully requests recognition of the current undertaking to remediate the aging flood control systems, and of the importance of the designation of these improvement projects as a federal priority.

Massive floods hit Hartford in the 1930s. The Great Flood of 1936 submerged much of the city leaving 14,000 residents homeless and businesses boarded. In response, the U.S. Army Corps of Engineers (USACE) constructed an intricate flood prevention system comprising 7 miles of earthen embankments and concrete flood-walls, 6 storm-water pump stations, 6 closure structures, and 5+ miles of tunnels. This collective flood protection assembly is regarded the largest and most complex in New England, and has capably provided protection from Connecticut River flooding since its construction. Although the flood control system was devised and built by the federal government, the responsibility for operation, maintenance, and repairs was transferred to the City of Hartford through a series of formal assurance agreements. USACE continues to maintain complete regulatory authority over the Hartford Flood Control System.

This system is now 75 years old and in urgent need of major repair. USACE Engineers notified Hartford in 2014 that the flood control system is no longer compliant with minimum standards and was being placed in "Inactive Status." This means that material deficiencies exist in the system which substantially reduce its capacity to provide flood protection as initially designed and constructed. The immediate impact of this determination was ineligibility for rehabilitation support; meaning, the city would be denied federal funds to rebuild flood prevention infrastructure if damaged by flooding. These deficiencies also put in jeopardy the City of Hartford's current FEMA Levee Accreditation under 44 CFR 65.10. Loss of accreditation will result in large sections of the City being designated as high-risk flood zones triggering extreme increases in flood insurance premiums and severe impediments to the deployment of state and federal funds therein.

Hartford applied for and obtained formal eligibility in January 2016 for participation in the USACE System Wide Improvement Framework ("SWIF") in order to avoid the deleterious impacts of being placed in Inactive Status. The SWIF requires a formal plan be developed within 2 years to bring the system back into compliance. The SWIF requires a schedule of corrective actions and demonstration of financial planning in support of all required repairs. The current cost projection for the improvements is in excess of 80 million dollars.

550 Main Street
Hartford, Connecticut 06103
Telephone (860) 757-9500
Facsimile (860) 722-6606

Luke A. Bronin
Mayor

The financial ramifications of an imminent project of this scale and expense will be severe for Hartford. This capital city is culturally rich and endowed with a great wealth of nationally significant history; however, it is facing a severe fiscal crisis, with limited ability to raise additional revenue. Unemployment and poverty are severe and pervasive in Hartford. The citywide unemployment rate is 16.4%, with some areas as high as 27%.While the statewide poverty rate is 10%, the city's is 33.9%, with some areas as high as 49.35%. Hartford households are disproportionately low-income with an average per capita income of only $16, 286 annually versus $37,726 statewide. These economic conditions have been acknowledged by the federal government via designation of a North Hartford Promise Zone.

While the costs of the flood control system are far beyond the fiscal capacity of the City of Hartford, deferral of these expenses is simply not an option. Infrastructure failure would be an environmental and civic catastrophe for the entire central-Connecticut region. A levee breach today would flood 25% of Hartford's land base. This would inundate approximately 3,000 acres of highly developed residential, commercial, and industrial areas and destroy 20% of the city's grand list. Affected areas would include Downtown Hartford's Commercial District, the North Hartford Promise Zone, the $2 billion South Meadows Wastewater Treatment Facility (the largest such facility in the area and sole processing center for the regions sludge-based waste), and numerous historical and essential city and state government facilities.

For the foregoing reasons I hereby submit this critical city water resources project for inclusion in the forthcoming WRDA legislation. The program that we propose to undertake with WRDA funding is specifically described in Attachment A and is entitled Description of SWIF Capital Project Feasibility & Planning Program. Also included as Attachment B is a letter from USACE dated January 15, 2016 which formally accepts the City of Hartford into the SWIF program. Approval of the SWIF by USACE as per the attached letter is a recognition that the improvement projects included are considered viable projects by USACE, and also serves as verification that they are within USACE New England District scope of responsibilities.

I trust that you will find our application, comprised of this letter and the aforementioned attachments, to be both complete and compelling. Please do not hesitate to contact either myself or my staff if you have any questions or require further information. You will find David Tanner, City of Hartford Department of Public Works Deputy Director, to be immediately responsive and knowledgeable of all matters related to this project. He can be reached preferably by email at david.tanner@hartford.gov or by phone at (860) 757-9962. Again, thank you for your support through your exceptional and tireless representation of our interests from within the highest levels of the United States Government.

Respectfully,

Luke A. Bronin
Mayor, City of Hartford

Attachments (uploaded separately):
Attachment #A Description of WRDA Capital Project Funding Request

Attachment #B SWIF Verification Letter from USACE dated January 15, 2016

550 Main Street
Hartford, Connecticut 06103
Telephone (860) 757-9500
Facsimile (860) 722-6606