Project Understanding and Approach

Introduction

Tighe & Bond will provide the City of Kingston with a detailed evaluation of the Twaalfskill watershed that will accomplish the City’s Goals:

- Understand which culverts are undersized, and what size is appropriate.
- Identify improvements to eliminate stream bank erosion
- Document construction costs for these improvements

We will do this by:

- Leveraging our status as NYSDEC certified North Atlantic Aquatic Connectivity Collaborative (NAACC) protocol Lead Coordinator, and inventorying and performing field assessments of all culverts in the study area that will qualify these crossings for future funding through the Hudson River Estuary Program’s Restoration of Watershed Connectivity Grants.

- Utilizing our extensive hydrologic and hydraulic modeling experience with very similar project scopes to provide accurate and efficient results.

Project Understanding

The Twaalfskill watershed carries stormwater from over 1,800 acres that are divided into approximately ten sub-watersheds. At minimum four areas of concern have been identified by City staff, including:

1. Restriction at the Chapel Street culvert for storms greater than a 10-year frequency (as observed)
2. Surcharging at the twin culverts located at Brook Street
3. Deterioration of a stone box culvert at South Wall Street
4. Stream bank erosion at 225 Wilber Street
**Project Requirements & Approach**

Hydrologic and hydraulic analysis of the Twaalfskill between the City of Kingston Public Works Yard (at the CSX railroad headwall) and the Chapel Street culvert is necessary to identify where improvements are needed, properly size creek crossings, and prepare accurate construction costs. Tasks include:

**Task 1: Delineation of Watershed** – Utilizing mapping and documentation available through the City, GIS mapping, and field investigation, delineation of the watershed tributary to the Twaalfskill will be completed.

**Task 2: Existing Condition Documentation** – Field Investigation will be completed at all crossings in the study area, including completion of NAACC inventory and evaluation. Areas of significant bank erosion, or structural deterioration (in walled sections) will also be identified and documented.

The Hudson River Estuary Watershed Connectivity Grant program has three grant levels. For a project to be qualified for planning, design or construction funding, the crossings must have been previously inventoried and evaluated. As certified lead coordinators, we can complete this initial part of the process for the project area crossings. When future funding phases for crossing improvements become available, the City will be qualified to pursue these opportunities and not have to start at the beginning.

**Task 3: Hydraulic & Hydrologic Analysis** – Modeling and analysis will be completed for the study area including:

- Calculation of the estimated stormwater runoff from each contributing watershed for storm return periods of 2, 5, 10, 25, 50, and 100 years
- Flood routing along the flow length of the Twaalfskill Creek for the return periods identified
- A capacity analysis for the Twaalfskill Creek stream channel between Chapel Street and its headwaters
- A capacity analysis for each culvert along the length of the Twaalfskill Creek between Chapel Street and its headwaters

We will utilize flow modeling previously completed for the Washington Avenue Tunnel Analysis of the Tannery Brook and Greenkill Avenue subwatersheds.

**Task 4: Recommended Improvements** – The modeling and analysis will be used to identify structures or channel sections with inadequate capacity for the identified return periods. Each of these items will be identified and recommendations made for improvements including culvert resizing and bank restoration. Opinion of probable construction costs for each of the recommended improvements will be prepared.

**Task 5: Reporting** – We will prepare a draft report that will include summation of each of the four above tasks. We will incorporate comments from the City into a final report. We anticipate three meetings with the City as part of the reporting process including a kick-off meeting to verify concerns and scope, a draft report review meeting, and a final report review meeting.

**Project Area Familiarity & Logistics**

Tighe & Bond will be serving the City of Kingston from its Rhinebeck office, just 20 minutes from the Twaalfskill watershed. Tighe & Bond has worked very successfully with the City of Kingston staff previously.
on our recent study of the Hasbrouck CSO sewershed and looks forward to working with the City again with another successful result.

Project Team & Experience

Contract Organization

We have assembled the following team of experts based on their knowledge of stormwater projects.

Resumes of Key Personnel

Principal-in-Charge - Dana C. Huff, P.E. (NY PE#96898) Dana is a vice president with over 38 years of experience on assignments covering a variety of disciplines. Utilizing technical, analytical, and engineering expertise, he has developed innovative and resourceful solutions to complex engineering challenges for municipal clients. His experience includes serving as principal-in-charge on multiple stormwater improvement projects including hydraulic and structural assessments of culverts and small span bridges, evaluation of repair/replacement alternatives, and rendering cost effective solutions for numerous communities. A recent example includes evaluating the stormwater collection and conveyance system in a low lying coastal area of Fairfield, Connecticut and developing and recommending a solution that will evacuate both routine storm flow and periodic storm surge to relieve prolonged flooding from within the low lying area. As Principal-in-Charge, Dana will ensure that the appropriate resources are allocated for successful completion of this project and ensuring the project is on time and within budget.

Project Manager - Erin K. Moore, P.E. (NY PE#84665) will manage the project, oversee the day to day execution, manage the project budget, and interface with the City. Erin has 17 years of experience focusing on rehabilitation of aging municipal infrastructure, ongoing operation and maintenance needs and in meeting existing and new regulatory requirements. Erin has helped communities with evaluating and prioritizing needed improvements, cost effective design and obtaining project financing. Erin presented her analysis, design and construction of complex stormwater improvements at the Mt. Lebanon Shaker Village involving a 100-year old stone aqueduct at the Capital District Engineer’s Week in Albany NY. As the director of the Tighe & Bond Rhinebeck office, she is familiar with managing all disciplines of municipal projects.
Technical Leader - Joseph A. Canas, P.E., LEED AP, CFM (NY PE #86159), will serve as the technical lead for the hydrologic and hydraulic modeling of the Twaalfskill Creek Stormwater Analysis project. Joe has 23 years of experience in hydraulics and hydrology and has participated in numerous flood studies including the Manchester by the Sea flood resiliency project and Marshfield South River Study. Joe has expertise in many civil engineering disciplines, including stormwater collection systems, floodplain modeling, and construction administration. He has been involved in all phases of project execution from planning through design and construction. Joe is a Certified Floodplain Manager by the Association of State Floodplain Managers, and has actively participated in many of the firm’s Connecticut floodplain management projects, both as project manager and primary hydrologic and hydraulic engineer, including the ASML Floodplain Mitigation project, the Norwalk Washington Village Floodplain Management Certification, and numerous Letter of Map Revision applications to FEMA for multiple clients. Joe is a founding member and officer of the newly created Connecticut Association of Flood Managers. Joe’s floodplain management and modeling experience will be invaluable to the project.

Field Investigation– Ryan Morrison, E.I.T, and David Seche, E.I.T. will serve as the field observation team for the Twaalfskill project. Within the past year, Ryan Morrison has completed inspection of 290 culverts throughout Ulster, Green, and Dutchess County and is a NAACC certified Lead Coordinator, which allows him to inventory and assess stream crossings for inclusion in the Hudson River Estuary Database. David Seche, a City of Kingston resident, was the lead field investigator for the recent Hasbrouck CSO sewershed evaluation which included field documentation of sewer and stormwater features.

Availability & Verification of Anticipated Schedule

Each of our team members are full-time employees and are fully committed to expedite this project. We have the resources to perform this project on a fast track basis. We acknowledge a project initiation date of December 2017 and a draft report delivery date of June 2018.

Similar Project Experience

Tighe & Bond staff has extensive experience working on all types and sizes of watershed analysis and stormwater management projects including hydrological macro-analysis and hydraulic analysis of streams and rivers. We also are adept at assessing, planning, modeling, and designing both conventional and innovative improvements, including culvert replacements, stormwater drainage improvements, streambank and shoreline restoration, and outfall restorations. We utilize the latest stormwater software programs and have expertise in the planning, modeling, design and construction of all types of stormwater systems.

The understanding of the impact of stormwater and non-point source pollution on the natural environment has come into sharp focus over the last decade driving a shift in focus to a more proactive approach to stormwater management. Unlike the drainage designs of the past, which were based primarily on hydraulics and design standards, today’s stormwater environment is complicated and nuanced. While the hydraulics have not gone away, today’s stormwater engineering needs to consider a broad range of considerations including public perception, maintenance and funding.

Tighe & Bond staff has been providing wetlands consulting services to our clients for several decades. We take pride in having these capabilities in addition to our already renowned civil and environmental engineering services. Our staff includes nationally recognized Professional Wetland Scientists, Registered Professional Soil Scientists, and Certified Professionals in Sediment & Erosion Control. Services include wetland delineations, environmental permitting, invasive species surveys, rare species surveys, compliance...
monitoring, and designing mitigation measures such as erosion control, wetlands replication areas, compensatory flood storage areas and endangered species protection.

Tighe & Bond has a long history of providing floodplain management services throughout the northeast.

**Sawmill Brook Culvert Analysis, Manchester-by-the-Sea, MA:**
The Town received a CZM Resiliency Grant to analyze the performance of existing culverts within the Saw Mill Brook watershed under various sea level rise and projections for increased inland precipitation. Data for the culverts was collected by Tighe & Bond field reconnaissance, with conditions at each culvert documented. Additional data gaps were filled in by survey and GIS topography. A HEC-RAS model of the watershed was created to model existing culverts in the watershed for a variety of storm frequency and sea level rise scenarios, with 41 evaluated in total. Based upon the results of the analysis, Tighe & Bond identified nine culvert improvements that were required in order to pass the selected design storm.

**Unity and Twin Brooks Parks, Trumbull, CT:**
Tighe & Bond was retained by the Town of Trumbull to evaluate a series of culverts through two Town parks. As part of this work, Tighe & Bond is identifying existing culverts that cannot pass the Town’s current design standards using modeling analysis and field measurement as supported by observed conditions, and will make recommendations for upgrading the culverts where necessary. Probable cost estimates were prepared for the recommended improvements. Also included as part of the overall analysis is the identification of appropriate channel linings to address portions of the watercourses through both parts that have been undercut and eroded.

**South River Study, Marshfield, MA:** The South River is a low-gradient river that travels 15 miles from its source at Round Pond in Duxbury downstream to its tidal estuary at Massachusetts Bay in Marshfield. The evaluation project focused upon the hydrology and hydraulics of the river reach between Main Street (Route 3A) upstream to Chandler’s Pond Dam. The river’s watershed area at Main Street is 11.4 square miles.

MassDER identified releases and riverine structures that impact the hydrology and hydraulics of the South River, including dams, undersized culverts, and releases from cranberry bogs. The goal of this project was to attain a more comprehensive understanding of the resultant hydrology and hydraulics on the South River if proposed restoration actions are completed. The project evaluated existing hydrology and hydraulics along the study reach under high and low flow conditions, completed an inventory of riverine structures, including dams and culverts, and evaluated future conditions assuming removal of restrictive structures. HEC-RAS and HEC-HMS were utilized for this project.
Horse Tavern Brook Flood Study, Trumbull, CT:
The Town of Trumbull commissioned Tighe & Bond to prepare a study of Tributary A to Horse Tavern Brook. The objective was to restudy an area of the watercourse that was incorrectly mapped by the Federal Emergency Management Agency (FEMA) as being inside a floodplain. As part of the study, Tighe & Bond worked with the Town to obtain new river cross sections along the watercourse, and at each of the eight culverts, and ran a new hydraulic model in HEC-RAS format. The goal of the study was to support a valid request to FEMA for a map revision to the existing flood insurance study. FEMA accepted the results and issued a Letter of Map Revision.

ASML Floodplain Improvements, Wilton, CT:
ASML, a world-wide manufacturer of microchip lithography equipment based in the Netherlands, hired Tighe & Bond to perform an assessment of floodplain risks and potential mitigation measures at its Wilton, CT facility. The facility is located adjacent to the floodplain of the Norwalk River. Tighe & Bond supplemented the CTDEEP’s existing stream channel encroachment line model of the Norwalk River with additional survey cross sections through the site to establish a more accurate and detailed HEC-RAS model of the site. This model was used as the basis to evaluate 11 different floodplain mitigation strategies involving various changes to bridges and channel modifications. The alternative ultimately selected reduced the floodplain elevation of the river by 2.25 feet, and was successfully permitted with the Town, CTDEEP, and USACE.

Organizational & Financial Responsibility

Tighe & Bond provides professional engineering services in New York State as T&B Engineering, P.C (Tighe & Bond). The firm, headquartered in Westfield, MA, is staffed by 325+ professionals in 8 offices, including our local office in Rhinebeck. Our engineers, scientists and planners work together in teams, sharing diverse expertise to benefit our clients.

Continuously operating since 1911, Tighe & Bond is a stable, financially sound firm. As a firm generating over $54 million in annual revenues, we have the capacity and resources to successfully complete this project.