Case Study Template

Municipality/Nonprofit Organization: Town of Rehoboth, MA
Project Title: Culvert and Green Infrastructure Concept Design and Dam Resiliency Assessment County Street and Perryville Pond Dam
Grant Award: $119,622
Match: $41,650

Community Overview:
Rehoboth is a right to farm community with long history of farming. Residences and farming make up the vast majority of the town. Route 44 and Route 118 are home to most of the commercial business and run north to south and east to west respectively. The town does not have public water or sewer so each lot needs to have its own septic and well. There are many historic sites in Rehoboth, including parcels of land and bridges.

Description of Climate Impact:
Extreme weather and natural and climate-related hazards are an increasing concern for the Town of Rehoboth, MA. The threat from flooding has been growing with the increasing frequency of major storm events that deliver large amounts of precipitation over a short time period, and this threat is expected to continue to grow due to climate change. The Northeast Climate Science Center at the University of Massachusetts Amherst projects that, given a medium to high future emissions pathway, Rehoboth will see as much as nine inches of additional rainfall per year by the end of the century. More critically in terms of flood potential, Rehoboth could see up to 4.5 additional days with precipitation over one inch, with the greatest increases occurring during the winter season, when partially frozen ground reduces infiltration and further exacerbates flooding risk. The stream crossings evaluated in this project were identified as being specifically vulnerable increased flooding resulting from the effects of climate change.

Project Goals:
The goals of the project were as follows:

- Assess two stream crossings on Danforth Street, downstream of the Perryville Dam, and a stream crossing on County Street;
- Prepare concept designs to replace the culverts considering present day flow rates and projected flow rates;
- Prepare concept designs for green infrastructure at each stream crossing site; and
- Prepare order of magnitude costs for design and construction for the stream crossing and green infrastructure.

Approach and Result:

The project included the following work and results:

- Topographic Survey. A field survey of the project area was conducted by a professional land surveyor. The survey included the locations of the existing surface features including the physical geometry of the existing watercourses and wetlands flagging. An existing conditions survey plan was prepared to depict this work
- Wetland Resource Area Assessment. Wetland resources were identified and located within 200 feet of the project area. This work was conducted by a wetlands scientist using the technical criteria required by the MassDEP and the Wetland Protection Act. A summary report was developed to outline findings of the assessment.
- Geotechnical Investigation. A geotechnical subsurface exploration program was conducted to assess subsurface soil conditions at the river crossing sites. The investigation included drilling borings at each site and collecting soil samples that were graded by a laboratory to confirm field soil classifications. A geotechnical report summarizing this work, including the boring logs from the subsurface exploration, was developed.
- Green Infrastructure and Floodplain Restoration Assessment & Concept Design. An assessment to identify green infrastructure (GI) retrofit opportunities to improve stormwater management both in the immediate vicinity of the Danforth Street and County Street culverts was conducted. The proposed approached was summarized in a memorandum and depicted on the concept plans.
- Hydraulic Analysis. An existing and proposed conditions hydraulic model was developed to evaluate the effectiveness of potential flood mitigation measures. In addition, future projected flow rates were utilized in the model to evaluate conditions with increased precipitation. The analysis served as the basis for selecting the proposed improvements. A memorandum was developed to outline the hydraulic analysis and its findings and results.
- Culvert Design. Concept plans of the culvert replacements were developed. The concepts considered data collected from the survey, wetland, geotechnical, GI and hydraulic analyses. Order of magnitude construction costs were also prepared to supplement the concept plans.

Lessons Learned:

The town learned how some of its older or more rural water management systems may not be able to deal with the increased number and intensity of storm events. This process showed us how we are able to prepare for the future by upgrading the capacity of the water management systems while keeping those upgrades in rural, farm character of the town. The ideas and

lessons learned here can be applied not just to other dams in town but to other infrastructure projects as well.

Partners and Other Support:
The project team included the following:

- Town of Rehoboth Town Planner & Conservation Agent
- Project Steering Committee consisting of Municipal Staff from the Town of Rehoboth
- Residents of the Town of Rehoboth
- Engineering Consultant

Project Photos:
Refer to Concept Plans