



Municipality: City of Lawrence, Massachusetts

Project Title: Flood Study and DPW Yard Adaptation Plan

Award Year (FY): 2021

Grant Award: \$213,418

Match: \$71,169

Match Source: City of Lawrence, Massachusetts

One- or Two-Year Project: One-Year Project

Municipal Department Leading Project: Department of Public Works

Project Website URL: <https://groundworklawrence.org/DPWadaptationplan>

Community Overview:

The City of Lawrence, Massachusetts (City) is located in Essex County and is approximately 30 miles north of Boston. The City has an area of 7.4 square miles and an estimated population of 80,000 as of 2019. The Flood Study and DPW Yard Adaptation Plan Project specifically focuses on the communities located within the floodplain of the Spicket River, however, the consideration of flood mitigation improvements at the City's only DPW Yard facility directly benefits all members of the Lawrence community.

The entire City of Lawrence is considered an Environmental Justice (EJ) population. In Massachusetts, a neighborhood is defined as an EJ population if any of the following are true:

- **Minority:** 25% or more of the residents identify as a race other than white;
- **Income:** The annual median household income is equal to or less than 65% of the statewide median; or
- **English Isolation:** 25% or more of the household have no one over the age of 14 who speaks English only or very well.

The entire City of Lawrence is considered an EJ population for Minorities, and the majority of the City meets one or both of the criteria for also being an EJ population for Income and English Isolation. The City's DPW Yard and most of the communities located along the Spicket River in Lawrence are mapped as meeting all three EJ criteria.

Project Description and Goals:

The purpose of this study was to evaluate the existing and projected future flooding conditions of the Spicket River in Lawrence, Massachusetts, how these conditions impact the City's DPW Yard, and the feasibility of several flood mitigation alternatives that could be implemented at the facility. The DPW Yard is located at 1 Auburn Street in Lawrence along the banks of the Spicket River, a river that has experienced several historic large-scale flooding events. The DPW Yard is critical for Public Works operations and emergency management throughout the City and is also an active waste disposal site.

The most recent flood event that impacted the DPW Yard occurred on Mother's Day in 2006 and inundated most of the facility, causing damage to buildings, equipment, and materials. To prevent recurring damages during future flood events, the City and Woodard & Curran have evaluated several flood mitigation alternatives for the facility. The goals of implementing flood mitigation efforts at the Auburn Street DPW Yard are to improve the resiliency of the facility, to minimize the impacts of flooding on the facility, to increase operational accessibility to the facility during a flood event, to help the City of Lawrence quickly



recover from flood events, and to ultimately allow the City to better serve its communities. As storm events increase in frequency and intensity due to climate change, flooding events within the Spicket River's floodplain are expected to occur more frequently, leaving the DPW Yard vulnerable to damages and inaccessibility without the implementation of flood mitigation measures.

Results and Deliverables:

There were several deliverables completed throughout the course of this project that contributed to the overall results of the project, including:

- Public Education and Outreach: Two public meetings, door-to-door outreach, educational flyers, a public art mural painted along the eastern side of the DPW Yard facility (visible from Bennington Street), and vertical flood elevation markers installed along the Spicket River Greenway
- Survey: Existing conditions survey for the DPW Yard facility and for cross sections and road crossings of the Spicket River
- Flood Maps: Flood inundation maps for the DPW Yard and the Spicket River in both the existing condition and future condition (2070)
- DPW Yard Operational Assessment: Impacts of the 2006 Mother's Day Flood on the DPW Yard, the City's current emergency response procedures at the facility, critical materials, equipment, and infrastructure located at the facility, and possible improvements that could be made to the facility
- Flood Mitigation Alternatives Analysis: Site overview of the DPW Yard, descriptions of commonly used flood mitigation strategies, four potential flood mitigation alternatives, and initial cost estimates for each alternative
- Final Report (Flood Study and DPW Yard Adaptation Plan): Summary of the existing and future flood risks for the DPW Yard and the communities surrounding the Spicket River and the final results of the flood mitigation alternatives analysis

In the Flood Study and DPW Yard Adaptation Plan, Woodard & Curran documented the following findings:

- The flood model of the Spicket River showed that public and private properties located within the River's floodplain are at risk of inundation and resulting damages during flood events;
- Flood Mitigation Alternative #1 (permanent berm or floodwall along river, extending from Hampshire Street to Bennington Street) would not significantly improve the flood resiliency of the DPW Yard; and
- Flood Mitigation Alternative #2 (permanent berm or floodwall along property line), Alternative #3 (wet and dry floodproofing combination), and Alternative #4 (relocation) would not result in significant flood impacts to surrounding properties and are each feasible alternatives for protecting critical materials, equipment, and infrastructure.

Lessons Learned:

There were two major lessons learned during the development of the Flood Study and DPW Yard Adaptation Plan. First, it became clear that public participation plans may not always yield the results expected. During the course of the project, door-to-door outreach was completed and educational flyers were distributed in an attempt to convince the public to attend the two public meetings conducted as part of this project. We learned that even with this involved approach, getting the public to participate in active



project events and discussion is not always a guarantee. Luckily, this project also included passive public education and participation, with the public art mural painted along the eastern side of the DPW Yard facility and the vertical flood elevation markers installed along the Spicket River Greenway. In the future, it will be important to consider both active and passive methods of public education and participation in projects.

Second, the selection of flood mitigation alternatives should always be greatly dependent on project location. Proximity to nearby properties, the topography of surrounding areas, and the available footprint for permanent or temporary infrastructure are just a few of the location-based factors that could impact the feasibility of different flood mitigation alternatives. In this project specifically, the DPW Yard implementation of a permanent berm or floodwall along the river was deemed an infeasible solution because of the DPW Yard's location. The facility is located between two roadways, Hampshire Street and Bennington Street, which controlled the start and end points of the proposed berm or floodwall. Since the berm or floodwall could not be extended through these two roadways, the structures would have to decrease in elevation on either end to tie into existing grades at the roadways. This would allow flood waters to bypass the structure and enter the DPW Yard facility, proving that location of the DPW Yard's location made this flood mitigation alternative infeasible.

Partners and Other Support:

Partners for this project included:

- Michelle Rowden, MVP Northeast Regional Coordinator: Provided guidance through the course of the project including suggestions on how to manage community outreach requirements given the impacts of COVID-19 on the project.
- City of Lawrence: Provided constant feedback and guidance to the project team via public meetings, conference calls, site visits and emails. The City was involved throughout the entire project.
- Groundwork Lawrence: Led the project's public outreach effort by facilitating two public meetings, participating in door-to-door outreach, distributing informational flyers to residents, supporting the creation of the flood awareness mural along the eastern side of the DPW Yard, and installing flood markers along the Spicket River Greenway.
- Woodard & Curran: Led the technical aspects of the project, including survey, flood modeling, creating flood maps, developing and analyzing flood mitigation alternatives, and producing the final Flood Study and DPW Yard Adaptation Plan.