Municipal Vulnerability Preparedness Program
Action Grant Case Study

Municipality: Town of Leverett
Project Title: Shutesbury Road Culvert Enhancement
Award Year (FY): 2022
Grant Award: $258,750, Grant funds spent $200,684
Match: $ 66,890
Match Source: Town of Leverett general funds and in-kind contributions

- Total Project Match: $66,890
- $58,242 cash (special article funds)
- $ 8,648 in-kind match

One or Two Year Project: Two year project
Municipal Department Leading Project: Administrator and Highway Department
Project Website URL: none

Community Overview: Provide a general description of your community as a brief introduction to the project.

Leverett has a total population of 1,852 residents (Mass. DPH) and is located in Southern Franklin County, just north of Amherst in Hampshire County. The Town is heavily forested and spread out over 43 miles of road and 23 square miles. Many of Leverett's roads are long and winding, creating the challenge of keeping them passable during storm events or any evacuations that might be needed.

Leverett does not have an Environmental Justice (EJ) community in its borders. Leverett sits between the Towns of Montague, Orange and Amherst, all of which do have EJ communities, and Leverett provides well-used connecting routes for these communities. Residents from Orange and towns on the other side of Route 202 travel through New Salem and Shutesbury, then utilize Shutesbury Road in Leverett to get to the employment, medical, retail and education centers located in Amherst and the Connecticut River Valley.

Another environmentally vulnerable population that Leverett does have in large numbers is elders. Elders have a limited ability to drive and negotiate the roads during storms and are more dependent on electricity for medical devices and air cooling. As the number of projected days over 90 degrees F increases with time, as predicted by the Mass Dept of Public Health Bureau of Environmental Health predicts, the elder residents of town will experience a much higher risk exposure. According to the US Census report for Leverett's zip code, 24% of Leverett residents currently are over age 65.

History/Attractions/Business:

Leverett dates back to 1774, when it successfully petitioned the state for separation from the Town of Sunderland. It was named for John Leverett, an early governor of Massachusetts, who stood strongly against religious persecution and British rule. Much of Leverett's land is under conservation restrictions and Chapter 61 protection for forestry use. Leverett's primary attractions include the New England Peace Pagoda and its outdoor recreation activities. Unique conservation areas include Brushy Mountain, Rattlesnake Gutter (a rock strewn chasm), and Leverett Pond.

Leverett's single retail establishment is the Leverett Coop, which is a store and café located in North Leverett that draws business from local residents and nearby towns.

Project Description

Where was the project located?

The project was located on Shutesbury Road between the Old Mountain and Number Six Roads intersections.
Latitude 42d26m54.5s and Longitude 72d28m5.2s

What climate change impacts did the project address?

The culvert is located in a 288,370-acre BioMap2 Critical Natural Landscape, and its associated stream originates in BioMap2 Core Habitat (Forest Core & Species of Conservation Concern). Of particular note is the presence of wood turtle habitat. BioMap2 describes wood turtle habitat as "streams and rivers, preferably with long corridors of undeveloped, connected uplands." The MA Wildlife Climate Action Tool shows the presence of Wood Turtle habitat both upstream and downstream of the culvert. With those two areas designated, the stream between them should serve as a corridor for wood turtle movement. The previous culvert was blocking that connection. The new culvert has a natural substrate, is wider, and does not have a perched outlet so it will provide a better habitat and connectivity for the wood turtle, as well as for other species that rely on this stream.

In addition, the scour pool at the culvert outlet likely caused bank erosion and sedimentation in the downstream Roaring Brook, which is a Coldwater Fish Resource. The brook is a potential habitat for cold-water fish such as brook trout, which rely on the availability of shaded, clean water sources. The new culvert is a structure that is compliant with the MA Stream Crossing Standards and allows this tributary to have a natural flow into Roaring Brook, thus minimizing the risk of erosion and sedimentation. High velocity water that can scour and crush aquatic organisms such as freshwater mussels is also mitigated and mobile bottom-dwelling organisms are now encouraged and supported.

Project Goals:

What were the specific goals of the project?

The project's primary goal was to enhance the resiliency of the whole ecosystem of the area surrounding the culvert by replacing the 60 year old, 5' diameter and 50' long asphalt coated corrugated steel culvert, that was corroding along the bottom with visible rusted holes, had a pipe that had been compromised and flattened to a D-shape, with a new embedded concrete culvert. The previous pipe was not embedded, so that no natural substrate lined the bottom of the culvert, and the significant perching (about 18") at the downstream end had created a drop-off and a scour pool.

In addition, this project was chosen because failure of this culvert and subsequent closure of the two-lane road would cause significant economic impact to Leverett and surrounding towns. Shutesbury Rd is a vital corridor that connects larger employment centers (such as Amherst, Hadley, Springfield, and Northampton) with smaller towns such as Leverett, Wendell, Shutesbury, Orange, and New Salem. Many students, staff, and professors commute using this road to and from the University of Massachusetts-Amherst (a major employer in Leverett and in surrounding towns) as well as to other schools within the Five College system. Shutesbury Rd also provides an important connection between the above-mentioned townships and Routes 202 and 2, which connect to the northern half of the state and to Boston. As a result, Shutesbury Rd is among the most heavily trafficked roads in otherwise quiet Leverett.

Approach and Result: How did the project team implement the project and describe the methodology or your approach to achieve the project goals

The Town started the project by engaging Tighe and Bond, Inc. as engineers for the project. Tighe and Bond had previously been engaged to design and permit the project. They helped the town go out to bid for the construction work, then agree on a contract and ultimately hire Kenefick, Inc. as a contractor. Next, we had a project kick off meeting, discussed dates and issues specific to this project, and Kenefick started the submittals necessary for the construction. Once school started up in September, the town consulted with the police and fire chiefs about the best time to do the work and agreed to complete the Project over the three day October holiday weekend in an effort to not disrupt school busses.

Activities of the Community Engagement Plan were begun in July with flyers on the Leverett town website and available at the town hall announcing that construction would probably be in late August and soliciting comments and input. In September, a new flyer was disbursed announcing the correct construction dates of the October 7 through 10th holiday weekend. A press release was sent and "All calls" were made through the town system with the same information. The Police and Fire Departments' social media accounts posted the same update. The day before construction began, the town's electronic message signs were used in strategic locations to notify travelers that the road would be closed over the three-day weekend. Public comments were solicited at the September 27th and October 11th Selectboard meetings and during all onsite meetings.

Having the local Highway Superintendent onsite during the three-day construction period was very helpful as he was able to address resident concerns and questions in person. Due to the construction being completed over a three-day holiday weekend,

nearby residents were available to come, watch and ask questions as construction was happening. No written comments or complaints were received.

Beginning the week before the three-day weekend, the wetlands control activities and materials were put in place and prep work was completed. On Friday afternoon October 7th, the road was closed and over October 8, 9, and 10 the old culvert removed, the streambed opened up and the new culvert pieced together. The road was able to be opened to one way traffic for the school buses on Tuesday morning October 11th. The Town of Leverett Highway Superintendent and an engineer from Tighe and Bond were present during the construction period, monitoring progress, giving input and assisting with equipment when needed.

Work continued into the next couple weeks and the substantial completion meeting was held on October 26th, 2022. At this meeting, Tighe and Bond found several areas that needed to be redone and improved upon in order to meet the structural and environmental goals of the project. Tighe and Bond issued a punch list of activities needed for the project to be complete. Kenefick returned to the site over the next couple weeks and addressed the incorrect and outstanding items. A second meeting was held on December 9, 2022, during which Tighe and Bond found that most items had been corrected and that the stream now flowed through the new culvert uninterrupted and with a natural materials streambed. Kenefick then came and seeded the stream banks with natural seed mix, repaved and lined the road. Since the bank reseeding occurred later in the construction season, Kenefick may have to return in the spring of 2023 to reseed the banks again. Otherwise, the project is complete.

Describe, and quantify (where possible) project results (e.g. square footage of habitat restored or created

Shutesbury Road in this location now an open bottom culvert designed to accommodate increased flows and fish and wildlife passage. The new culvert will allow turtle passage along the new stream bottom in hopes that the two turtle habitat areas at both ends of the culvert will be able to connect. The increased flow capacity of the culvert also will mitigate future flood waters and keep this commuter route open for travel.

According to the Conservation Commission Order of Conditions, the project replaced a 41 foot long, 6 foot wide corrugated metal culvert with a 41 foot long precast concrete culvert that is 9.5 feet wide and 8 feet high with a recreated natural stream bottom. 240 linear feet of bank was altered and replaced with 700 square feet of land under waterbodies and waterways affected. The stream and banks were restored.

The project was completed in compliance with wetland permits and the Army Corps of Engineers permit allowing for the project to occur only at low water levels. The new culvert is much larger and will allow for a higher flow of water in spring. The new culvert also will last and keep the road safe and open for many years to come, allowing the connection of communities and transport along Shutesbury Road to the destination towns on the other side of the route.

The Community Engagement plan was successful as very few questions and fewer complaints were received during the construction period. Residents knew what to expect and when to expect it.

There are no web links to the project deliverables.

Lessons Learned: What lessons were learned as a result of the project? Focus on both the technical matter of the project and process-oriented lessons learned.

Lesson learned include the knowledge that projects of these types take a long time and that timeframes will probably be stretched and pushed back. Another lesson learned is that the project engineers serve a valuable role in monitoring contractors, documenting incorrectly done work, and getting corrections addressed.

Leverett also learned that having local town employees onsite is very valuable by addressing resident and neighbor concerns in person and on site by a familiar face. The activities of the Community Engagement Plan were very helpful in keeping residents and drivers of the road informed about the project and in heading off resident issues. "All call" resident phone calls with updates on the project seemed to be the most useful component of the Plan.

Leverett's project might have gone smoother if the procurement laws allowed some variation from the rule that construction projects must be awarded to the lowest reliable and responsive bidder. The contractor on this project was able to complete the project, but they had to return to the site a few times to do so, they used equipment for activities the equipment was not designed for, was slow on submittals and didn't have an internal engineer to help them understand the submittals and head and footwalls installation. The Town also felt that many pieces of culvert and equipment were stored by the Contractor at the site, which includes the ends of two gravel roads, in a way that could have been better planned and more safely executed.

Working over a holiday weekend was an interesting way to do a construction project, requiring long days of everyone. Despite a delay in placing the head and footwalls correctly, the Contractor was able to able to have the road open when needed Tuesday morning.

Partners and Other Support: Include a list of all project partners and describe their role in supporting/assisting in the project

1. Tighe and Bond, Inc. Engineers – took final design plans and put project out to bid, helped with contracting, oversight of construction and enforcement of construction.
2. Kenefick, Inc – Contractor that was the low bidder and installed the culvert.

3. Town of Leverett, Highway Superintendent and Administrator – managed the project, attended meetings. Highway Superintendent was onsite during construction to address resident questions and help with labor and equipment. Administrator completed steps of the Community Engagement Plan.
4. Town of Leverett Police Chief and Fire Chief – helped coordinate the timing of construction. Police Chief organized police details needed.

Project Photos:

Culvert with pool before replacement

Taking out the old culvert

First piece of new culvert on footings

Third piece of new culvert going in

All pieces of the culvert body in place

New streambed in new culvert

Finished downstream view

Guardrails in and stream banks seeded