

[Sherburne Brook Bridge Project](#)

TIGER VIII Application

April 2016



TIGER GRANTS



Sherburne Brook Bridge TIGER VIII Application

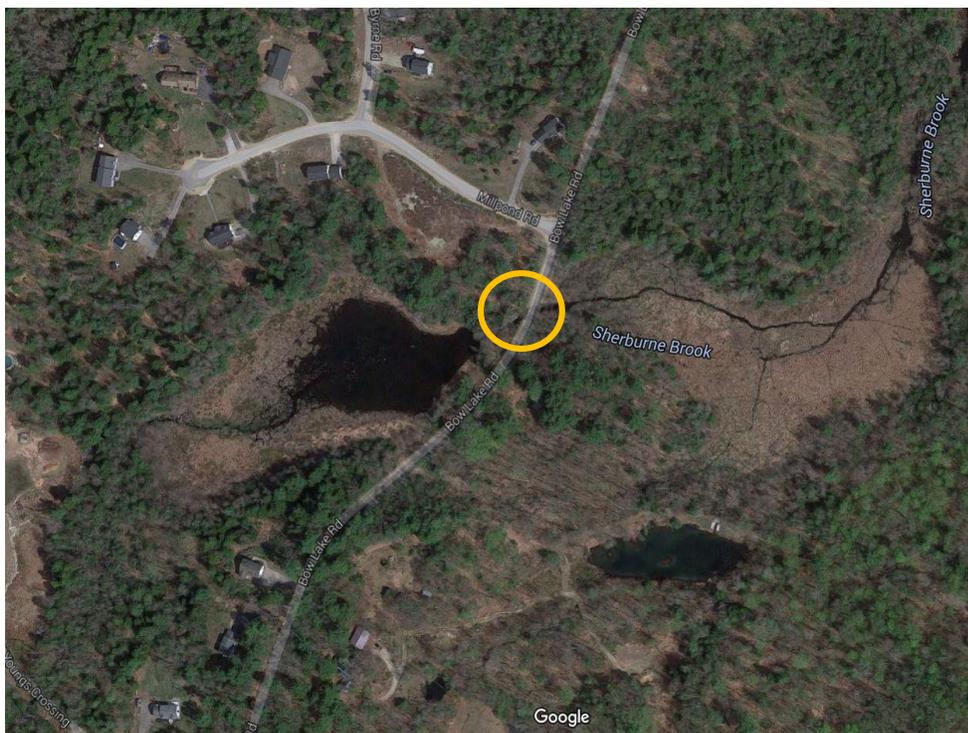
Table of Contents

Project Description.....	3
Key Project Benefits.....	4
Project Scope.....	4
Adverse Impacts of Bridge and Road Closure	5
Users and Beneficiaries.....	6
Ladders of Opportunity.....	7
Why Northwood can't do this alone.....	8
Project Location.....	8
Project Partners.....	9
Project Budget.....	11
State of Good Repair.....	12
Economic competitiveness.....	13
Quality of Life.....	14
Environmental Sustainability.....	17
Safety.....	18
Partnership and innovation.....	19
Benefit Cost Analysis.....	20
Project Readiness	23
Supporting Documentation.....	27

Project Description:

The Sherburne Brook Bridge Project consists of the bridge replacement and upgrade of the Sherburne Brook Bridge; reclaiming of East and West Bow Lake Road, which approaches the bridge; and upgrading the shoulders and drainage on the road to prevent erosion near the bridge and on Mary Waldron Beach, which abuts Bow Lake Road.

Located between Dover and Portsmouth, Northwood, New Hampshire is the center of the Route 4 Commerce Corridor (RFCC). Northwood's access to the state highway system provides access to lakes for tourism, space for restaurants and antique shops and easy access to educational opportunity at Coe-Brown Academy; the Town's highway infrastructure is its chief economic asset. The Town relies on two arterial roads to connect itself and the surrounding towns to the RFCC. Of the two roads one of them, Bow Lake Road, has a 78-year-old bridge that reached the end of its useful life 28 years ago and has been placed on the New Hampshire Red Listed Bridge list. The Bridge and adjacent road is extremely deteriorated necessitating weight restrictions and closures that adversely impact commerce, economic development, traffic congestion, tourism, and transportation efficiency in the Town and surrounding areas to a significant degree. If the bridge is closed permanently, school busses, fire trucks, ambulances and commercial vehicles will need to use a longer and cumbersome alternate route. The Town is requesting funding to help with the replacement of the bridge over Sherburne Brook and the reconstruction of 2.1 miles of road from the Town Line to the RFCC.



Key Project Benefits

Sherburne Brook Bridge Project

TIGER VIII Application

April 2016

- Coe-Brown academy is ranked the third best high school in the state of New Hampshire and relies on Bow Lake Rd. for bus routes. Access to education will improve after eliminating the restrictions on the bridge and eliminating bridge closures which force lengthy detours for busses transporting school children and parents dropping children off at school.
- The same detours around the bridge stifle economic opportunity by delaying deliveries of fuel to homes and other commercial trucking that rely on Bow Lake Rd. This grant will enhance public safety because fire apparatus, ambulances, and police will not need to take the long alternate route around the bridge, improving response times for emergency services to the remote areas of the Town.
- The environment and threatened species will be protected if the bridge is replaced. Any detour around the bridge places heavy traffic at the door step of threatened species like the American Loon and near pristine water bodies.
- Public health will be positively affected when detour routes that are on rural roads running past many lakes and streams end, thus reducing emissions along the 15-mile detour and preventing run off of petroleum products that come from cars and trucks running into water bodies.
- Bow Lake Rd. is part of Northwood's principle North-South arterial road system and has an entrance to Coe-Brown Academy. Replacing the bridge and rehabilitating the road will prevent catastrophic traffic congestion on Route 4, and the economic, safety, health, and environmental impacts of a full bridge and road closure.
- Environmental sustainability will be improved by replacing the bridge. There is an old mill pond just south of the bridge that floods in heavy storms and has flooded the road in the past. Replacing the bridge will prevent road flooding, and road debris, road salt, and portions of the road will not be washed into the nearby lake.

Project Scope

The project will include the complete replacement of the Sherburne Brook Bridge spanning Sherburne Brook with an upgraded 22' bridge that will withstand potential flooding in anticipation of the effects of climate change and the repaving of Bow Lake Road. The road improvement and bridge replacement accommodate increased bike and pedestrian traffic as well as the expected increase in through traffic in the coming years. Weight restrictions on the bridge will be removed to allow commercial traffic and emergency vehicles to utilize the crossing. New Hampshire DOT and the Town's engineers have been working together to assess and provide design options for a new bridge.

Adverse impacts of the Bow Lake Road bridge restrictions and closure

The Bridge is currently on New Hampshire's Red List meaning it has weight restrictions and has significant structural deficiencies and needs to be replaced. Because of the rapid deterioration the bridge is likely to see further restrictions and closure in the next year or two. The worsening of the bridge generates significant risk for the Town, the region, and for travel along Route 4, which is the main state highway between the capital of Concord and Portsmouth on the seacoast.

Public safety – Weight restrictions or a complete closure of the bridge limits the ability of police, fire apparatus, ambulances, and municipal equipment like plow trucks to use the crossing effectively cutting off access to a large swath of the town from emergency services. Failing to replace the bridge poses significant risk to public safety and emergency responses.

There are no natural gas pipes in Northwood; as such, all homes in Town rely on the delivery of heating *Public Transportation* – The weight restrictions or a complete closure of the bridge would limit school busses from using the crossing. It would impair the ability of the Town ride share group from picking up elderly residents on the west side of the crossing. Not replacing the bridge and repairing the road would result in a circuitous detour complicating the Town's already under-funded public transit options, create unnecessary delays for school children and create excessive congestion along Route 4.

Economic Development – oil, propane or wood to heat the homes. The bridge restrictions prevent many commercial vehicles from crossing the bridge. As a result fuel delivery services cannot efficiently reach their destinations in a large swath of the town without taking the 15 mile detour.

Pedestrian and Bike Safety - The population of Northwood has grown since Bow Lake Rd. was built, increasing the amount of traffic the road sees each day. The Town's last traffic count shows a 50% traffic increase over the last 10 years; consequently pedestrians and bicyclists are now sharing the road more often. During the summer season, when the Town's population nearly doubles because of its seasonal residents, the bridge is a dangerous focal point where pedestrian, motor vehicle, and bike traffic are forced together. The bridge is just large enough to accommodate 2 cars; with the added bike and pedestrian this section of road becomes a dangerous bottle neck, leading to accidents between cars, pedestrians and bicyclists.

Environmental Sustainability – The detour around the bridge if it is closed is 12 miles along unpaved roads that pass through the Upper Lamprey watershed and along the shore of Jenness Pond which is home to endangered bird species like the North American Loon. The introduction of significant, additional delivery truck and car traffic would add would add a disproportional amount of emissions and congestion to an already fragile ecosystem.

Impacts on the Regional Transportation System – The poor condition of Bow Lake Rd. and the bridge greatly impacts not only Northwood but the surrounding towns. If this bridge is closed traffic is detoured out of Northwood and into Pittsfield to the West or Strafford to the North. Many of the roads are unpaved in the towns surrounding Northwood and are not built to accommodate the level of traffic or the weight that would be detoured onto them. Any detour into these towns would devastate their infrastructure putting a disproportionate burden on these towns.

Coe Brown Academy serves Northwood and both Pittsfield and Strafford. If Bow Lake Rd. was closed the detour would also impact how towns bus their children to the academy adding, in some cases, 15 additional miles to the bus route and creating significant congestion on 1st NH Turnpike and adding an additional hour of travel time to 300 school children each day.

Users and Beneficiaries

Bow Lake Rd. was paved for the first time in the early 1950s when the population of Northwood was less than 1,000. The Table below illustrates the number of daily vehicle trips on Bow Lake Road. The Town of Northwood in conjunction with the Regional Economic Development Center (EDC) in Rockingham County developed an all-encompassing Comprehensive Economic Development Strategy (CEDS). The CEDS looked at population growth rates in the region, in Northwood, and traffic patterns. The CEDS anticipates Northwood being only one of 7 communities to see substantial growth in the next 5 years with a 1.2% growth rate in town and a 4% overall increase in the Route 4 Commerce Corridor. Unfortunately, the capacity of the local road network, if not improved, will artificially constrict growth in the area.

(<http://www.redc.com/pdfs/CEDS%20Final%202015.pdf> P.94)

Year	Average Daily Annual Traffic
AADT_2004	1770
AADT_2014	1987
AADT_2015	2066
AADT_2016*	2149
AADT_2017*	2213
AADT_2018*	2280
AADT_2019*	2348
AADT_2020*	2419
AADT_2021*	2491

Table 1 Count based on population growth and expected usage*

Ladders of Opportunity

As the Table shows below Northwood is among the least affluent communities in the state of New Hampshire with a high concentration of low income, unemployed and underemployed residents, a higher concentration than than the state average.

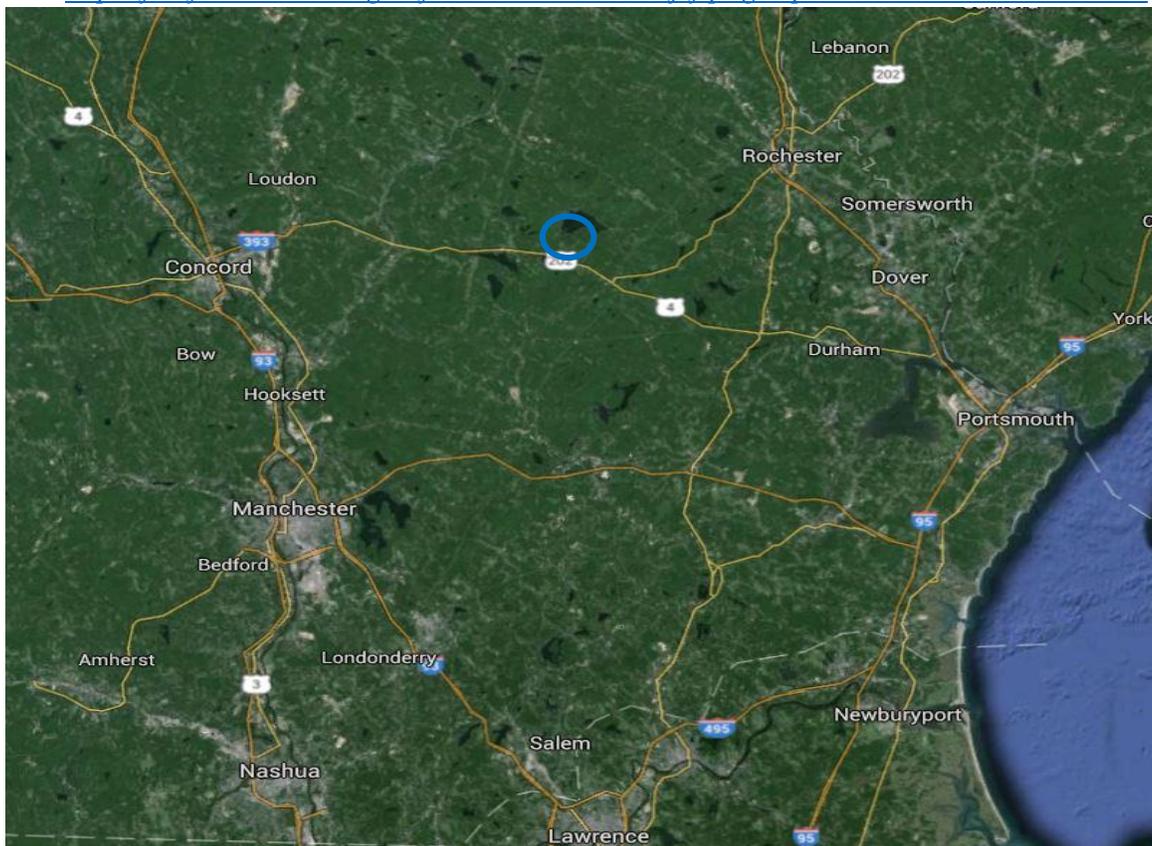
	Town of Northwood	State of New Hampshire
Median Earnings (2014)*	\$35,500	\$65,986
Unemployment rate (2014)**	5%	4.4%

* *Census.gov*

<http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

** *Census.gov*

<http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>



Consistent and easy access to education and employment are two of the most important factors for climbing the ladder of opportunity for Northwood residents. Improving Bow Lake Rd. and ensuring the bridge infrastructure supports current and future populations allows families access to the jobs along the Route 4 Commerce Corridor and the educational opportunities at Coe-

Brown Academy. If weight restrictions are increased or the bridge and road is closed completely the impacts will disproportionately fall on the low-income families of Northwood.

Why Northwood can't address this issue alone

Northwood is a small New Hampshire town with 4,200 residents. Because of the low level of affluence in the area the Town has an annual budget of only \$3.5 million. This is for all town functions including police, fire and highway maintenance. **The Town's highway paving and reconstruction budget is \$220,347 for 2016.** In 2015 New Hampshire Department of Transportation, along with Town Engineers, completed a cost assessment of replacing the bridge along with repaving the road. According to NHDOT engineers the **bridge replacement alone was \$654,850** and the road repaving would be \$457,066. This sum of \$1,122,706 is 32% of the entire [town budget](#) (see last page of the budget) and 5 times the Town's annual budget for road construction. The Town has created a trust fund to save the funds over the next five years to fund the project. However, the bridge has become dangerous and was added to the NH Red Listed Bridge in 2013. The Town has requested aid from the state but was told that because of the number of red listed bridges in the state Northwood would not see funds for a decade. During the last inspection of the bridge on 12/14/2015, the bridge received a poor rating on all structural components, the deck, the super structure, and the substructure. In reality the Town does not have another 10 years to wait to replace this bridge.

Project Location

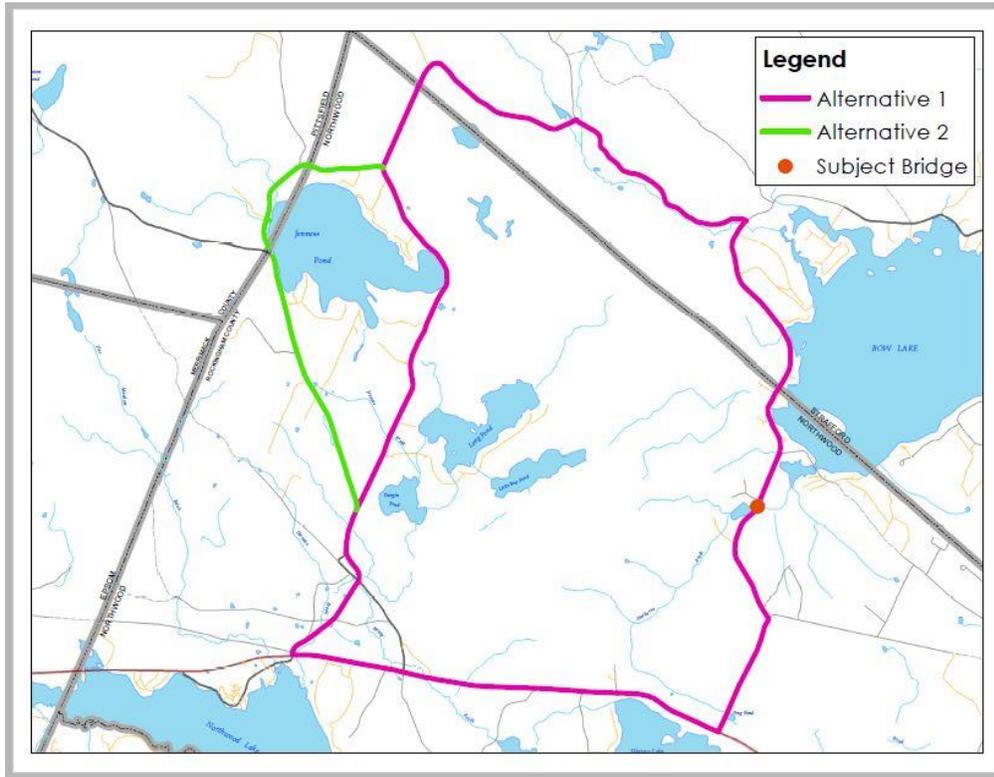
The Bridge and 2.1 miles of road are located in the Town of Northwood, New Hampshire. The town is located 22 miles east of Concord and has a growing population of 4,200 year round residents that swells to nearly 8,000 during the summer tourist season. In addition to the bridge and road's critical function of providing transportation access as the main North-South arterial road for the towns of Strafford and Northwood, they are a key link to the regional economy.

[Sherburne Brook Bridge Project](#)

TIGER VIII Application

April 2016

Sherburne Brook Location and Detours



Project Partners

The Sherburne Brook Bridge project is a dynamic public-private partnership and reflects the importance of New England's volunteerism in small communities.

The rural Town of Northwood with a population of 4,200 is the lead applicant. To ensure project success, NHDOT has agreed to manage the award for Northwood. At the same time Northwood's Highway Department will serve as the primary contact with NHDOT and will help oversee the entire project, from preconstruction permitting and design to final construction. NHDOT, and Northwood's finance, Highway, and land-use staff are dedicated to the success of this project, and to further support the project, Northwood will utilize its strong position as the Hub of the Route 4 Commerce Corridor to quickly and successfully complete the project.

The Town has staff that has managed \$135 million in United States Agency for International Development funds, \$7 million in federal grant funds for AmeriCorps programs, and \$1 million in National Institutes of Health grant funds. Town staff have the experience managing large federal grant programs and are well positioned to oversee and manage a TIGER grant.

The Town is over 200 years old and has a strong history of managing federal grants that funded bridge replacement and road repair in the past.

Sherburne Brook Bridge Project

TIGER VIII Application

April 2016

- In 2009, the Town secured \$150,000 in FEMA funding to replace Bennet's Bridge that was washed out during a storm and subsequent flooding.
- In 2010, the Town utilized \$100,000 from FEMA to build a road through town forest after a storm cut off dozens of residents from emergency services the year before.
- The Town manages \$100,000 in Highway Block grants from the State of New Hampshire every year.

Coe-Brown Academy

Coe-Brown is the third highest ranked high school in New Hampshire for academic achievement and is a major economic driver in the Town of Northwood. The Academy will support the Town's project financially by contributing to construction costs for road paint. The Academy has a 150-acre open campus with 5 academic buildings, a tunnel passing under Route 4, a dozen sports fields, along with 3 other campus facility buildings. The school employs about 100 professionals, paraprofessionals, and general laborers from the surrounding towns and draws about 1,000 students to its doors on a daily basis.

New Hampshire DOT

The NHDOT has a robust infrastructure of professional staff and consultants and has agreed to support the town with professional staff and engineering consultants. NHDOT will have oversight and compliance responsibilities for this project. NHDOT has successfully managed grants in the past for New Hampshire towns like Northwood. The state organization has experience managing federal dollars for large bridge replacements like the Sherburne Hill Project.

Town of Strafford

The Town of Strafford will support the Town through in-kind support of fire, police, road crew, and ambulance coverage on Northwood's west side of town during the construction phase of the project. Strafford had a similar problem 8 years ago when one of its bridges failed and forced traffic to reroute through Northwood. This bridge failure cut off that town's access to emergency services. At that time Northwood provided emergency coverage for Strafford's southeast corner. Learning from Strafford's experience Northwood is being proactive by requesting funds and creating a capital reserve fund for this major repair work.

In addition to the partners listed above the Ready Rides regional transportation non-profit, the Northwood School district, all town emergency services, and various commercial entities in the region will benefit from replacing the bridge and road and avoiding long detours and weight restrictions on the bridge.

Finally, numerous other partners representing the educational community, businesses, and non-profits in Northwood and the surrounding region have expressed their support for this project and the benefits to the local economy and local education.

Project Budget:

The following table summarizes the sources of funding for design and construction for the bridge and road reconstruction and associated matching funding commitments, which reflect the cross-sector collaboration behind this project, including private and public partners. Matching funds have been committed by Coe-Brown Academy and the Town of Northwood. None of the matching funds listed are from federal sources; nor have any federal funds been previously applied to this project. All matching funds are committed as evidenced by the attached support documentation. In addition, the Town of Strafford is providing emergency service coverage to Northwood’s western neighborhoods during the construction phase of the project, and NHDOT is providing consulting and professional services for all phases of the project, resulting in a comprehensive solution to the Sherburne Brook Bridge challenge.

The Uses of Funding table outlines the estimated project costs for each component of the project. The construction cost estimates summarized here are supported by cost estimates for each portion of the project including the bridge replacement. Estimated design costs include permitting and engineering studies. Construction costs include general conditions, contractor mobilization, traffic management, and a construction contingency. All costs assume compliance with federal and state public procurement requirements and payment of prevailing wages.

Funding Sources	Amount	Percentage of the project
TIGER VII Request	\$1,021,706	91%
Town of Northwood	\$100,000	8%
Coe-Brown academy	\$1,000	1%
TOTAL	\$1,122,706	100%

Pre-Construction Costs

The project budget anticipates \$98,140 in pre-construction costs of design and other related soft costs. The Town will use its matching funds to pay for the pre-construction costs, as a result, no TIGER funding is required to be allocated to pre-construction costs and can go straight to the construction portion of the project.

Sherburne Brook Bridge Project

TIGER VIII Application

April 2016

Location	Estimated Total Cost	Construction	Allowance for Environmental, Historic, and Utility Mitigation	Escalation to Mid-point of Construction	Design	Soft Costs	Project Contingency (10%)
1. Sherburne Brook Bridge replacement	\$658,445	\$555,000	\$7,000	\$329,223	\$36,595	\$4,350	\$55,500
2. Bow Lake Road replacement West of Bridge	\$292,531	\$244,485	\$0	\$146,265	\$23,597	\$0	\$24,449
3. Bow Lake Road replacement east of Bridge	\$171,731	\$125,575	\$0	\$85,865	\$33,598	\$0	\$12,558
maintenance	\$13,000	\$0	\$0	\$0	\$0	\$0	\$0
Total TIGER Project	\$1,122,706	\$925,060	\$7,000	\$561,353	\$93,790	\$4,350	\$92,506

State of Good Repair

New Hampshire in general and Northwood in particular relies heavily on their roads being in a State of Good Repair; it is essential for sustaining existing transportation services, providing mobility for our aging population, supporting a livable community and is crucial for Northwood’s tourist economy.

The RFCC, Coe-Brown Academy, the economic revitalization zones along Route 4, and jobs in the region are serviced by two arterials from Northwood. Bow Lake Road, located in the center of the Town is the principal arterial road. The road accommodates the majority of traffic entering and leaving Coe-Brown and commuters from central Northwood and eastern Strafford as well as beach traffic in the summer and tourist traffic year-round.

Bow Lake Rd. is the principal North-South arterial for Northwood bisecting the Town and is a major arterial road for Strafford. This road is the only northern access point for Coe-Brown and the RFCC and is vital for the local economy. On average 2,100 people use Bow Lake Rd. on a daily basis to access Coe-Brown or pass through to get to Route 4 with all of them crossing the bridge over Sherburne Brook. Currently the bridge’s substructure, superstructure, and deck are rated in poor condition with portions of the concrete footing missing, section loss in the substructure and exposed rebar in the deck. The bridge has an E2 rating, limiting shipments to western and northern Northwood and creating a hazard for fire trucks in the area. Past administrations have ignored the warnings of NHDOT. Continued neglect of the Sherburne Brook Bridge will result in continued deterioration and increased weight restrictions. There are no convenient detour routes to circumvent the bridge or an easy way into Coe-Brown or access

to Route 4 if the bridge is closed. Any detour would put an additional 2,100 vehicles a day onto rural unpaved roads or onto narrow back roads running past threatened aquatic habitats which already have capacity and safety issues.

If the bridge over Sherburne Brook is closed or suffers greater weight restrictions, the impact to education will be catastrophic for children and their families in the three towns of Northwood, Pittsfield, and Strafford. A closure would also limit access to the RFCC for many low income families adding more than 24 miles to their daily commute. In addition there are no quality alternatives to Bow Lake Rd. that could safely accommodate an additional 2,100 cars on a daily basis. The Town and surrounding towns do not have adequate north-south connectivity so the bulk of the 2,100 vehicles would need to pass through rural countryside which borders threatened aquatic habitat. Detour routes around Bow Lake Rd. are narrow, with many hidden residential driveways, a high probability of wildlife/vehicle collisions, and almost no traffic control signage or signalization at narrow intersections. These conditions pose great danger for additional traffic on the detour routes.

Following FHWA best practices, and working in partnership with New Hampshire DOT, the Town will employ a systematic and cost effective process for bridge and road replacement and long-term maintenance. Northwood is a truly rural community with 4,200 residents, a total annual highway budget of \$220,347, and very few resources at its disposal primarily because of its ruralness. If funded through the TIGER program, Northwood would be the first truly rural program TIGER grants funded in New Hampshire and would be extremely transformative for the region.

Economic Competitiveness

The streets of rural communities like those in Northwood are the core of its connectivity to the region and the world. They stimulate economic growth, add economic value, and stimulate innovation through the interconnectedness and aggregation of people from surrounding communities. Being the primary North-South corridor for Northwood and Strafford, Bow Lake Rd. represents connection to the region's employment and educational opportunities for those seeking "ladders of opportunity" for themselves and their children.

The primary purpose of surface transportation is to move goods and people to support the economy and community development efforts. The ability for rural communities to develop and maintain vibrant economies, create educational opportunities, and provide safety and emergency services is tied directly to its surface transportation infrastructure. In particular Northwood relies heavily on its roads and bridges for transportation to those economic and educational opportunities because our population of 4,200 precludes public mass transit like trains or light rail services. To maximize its potential Northwood relies on Bow Lake Road; if this road becomes unusable because of poor road repair conditions or the bridge is closed it would be catastrophic for the Town and regional economy.

One of Northwood's core strengths is being the center of the RFCC, making it the most accessible economy in the region. In the last 3 months the Town has seen substantial economic growth in the RFCC with 3 new restaurants opening, a grocery store, a music studio, a new auto repair garage and a large self-storage location. Northwood has a low median income compared to the rest of the state and these new businesses provide ladders of opportunity for many of the residents. If the bridge is closed over Sherburne Brook this will have an adverse impact on some the poorest residents in Northwood. Another core strength is the town's tourism industry. The Town has 10 lakes, 3 beaches, a state park, and hundreds of miles of hiking and snowmobiling trails which draws 1,700 additional people to the town annually putting an additional strain on town infrastructure. In addition the Town has an anticipated 3% annual growth rate over the next 5 years. The town relies on Bow Lake Rd. to move people north to 2 town beaches and south to the state park. Again, losing this route would be disastrous for the local economy and tourism. Northwood is a small rural town and it is difficult to accurately quantify tourism dollars entering the Town it is estimated that tourism accounts for **\$1,868,652** to local businesses during the summer months. If the bridge and road conditions are not addressed or are allowed to deteriorate, the increased travel delays and the cost of detours will stifle and potentially reverse the growing economic expansion. However, if the bridge replacement is completed and road repaired by this project, it will serve as a key component to a long-term more sustainable approach to regional transportation that will allow the economy and educational opportunities to thrive and expand while minimizing their impacts on traffic in the area and reduce school transportation travel times and operating costs associated with cumbersome detours.

Replacing the bridge will also complement the comprehensive conservation efforts between Northwood and its partners to conserve the Jenness Pond watershed conservation district. These efforts help to preserve the natural habitat of rare bird species and vast uninterrupted expanses of hardwood forest. The efforts of the Town and its partners are a thoughtful planning and innovative preservation-centered strategy to protect the quickly disappearing natural habitat in New Hampshire. If the road and bridge become unpassable, added traffic, traffic accidents, congestion, and the inevitable road runoff will threaten the unspoiled natural landscapes of Northwood endangering residents, the environment, and wildlife.

Quality of Life

The principles of [Northwood's Masterplan](#) (Page 13) and its economic development strategy are both consistent with the Livability Principles of the Partnership for Sustainable Communities. Northwood has seen substantial growth in new home starts and new business starting up in Northwood along the RFCC. The successful development of the Town relies on the ability of these new homes, and those who live in them, to be connected to the employment opportunities of the RFCC. The Town's successful growth and expanding economy over the last 2 years is threatened by the deteriorating conditions of the bridge and severely undermines the transportation network of the region.

Providing more transportation choices

Incorporated in 1773, Northwood is a truly rural New Hampshire town. With its 10 lakes, 3 beaches and miles of trails Northwood is a highly walkable town. Beyond being a main route for commuters on a year-round basis, Bow Lake Road abuts the Jenness Pond watershed conservation district and is the only access road to Mary Waldron Beach, which supports the only boat ramp into Bow Lake from Northwood. While the replacement of the bridge is the most pressing of problems, the road on either side of the bridge is also in a state of disrepair causing on average three accidents every year. This project proposes to correct the existing structural, functional, and safety deficiencies of the roadway and the bridge, while enhancing their bicycle and pedestrian accommodations, which will in turn support more transportation choices as more children choose to ride their bikes to school or adults choose to walk to recreation sites with their families during tourist season. In addition Northwood has an aging population that increasingly relies on public transit and ride share. By correcting the structural and functional deficiencies of Bow Lake Road the cost of ride sharing for our oldest residents will decrease as the route between towns and to the RFCC becomes more efficient.

Promote equitable, affordable housing

Average income in Northwood is only 53% of that of the rest of New Hampshire. Many of the residents that are affected by the poor condition of Bow Lake Road live in low cost/ affordable housing. As in the rest of Town, there have been new housing starts in the vicinity of Bow Lake Rd. Much of these new home starts create a mixed-income development with all housing units being market rated to avoid an over-concentration of poverty in the area. This area of Northwood is highly dependent on stable transportation infrastructure to ensure the low income households in the area have safe, efficient access to regional educational and employment opportunities.

Enhance economic competitiveness

At its core this project is about improving and sustaining direct access to educational and [economic opportunities](#) to multiple towns in the region by eliminating economically burdensome and ecologically damaging detours on rural, unpaved roads. This project would also reduce transportation burdens on the less affluent and elderly residents and create a ladder of opportunity for those populations by eliminating barriers to good paying jobs in the RFCC.

Supporting existing communities

Northwood has been recognized by the Future Farmers of America (FFA), the Northwood Economic Development Committee (NEDC) and the Northwood Area Land Management Collaborative ([NALMC](#)) as a model for balancing economic development along the RFCC while protecting and conserving natural landscapes. The Town has remitted and redeveloped contaminated land into a town park with 8 miles of hiking trails and preserved and repurposed its historic buildings for the economic benefit of the region. As a guide the Town has used the Environmental Protection Agencies "[Framework for Smart Growth](#)" (Page 11) to help develop its economy and protect its environment. In terms of protecting the natural resources and environment of Northwood and helping support smart economic growth, the Sherburne Brook Bridge is a critical component to continuing, rather than reversing, the positive development Northwood has experienced in Sustainable Economic Growth over the last few years.

Regional Collaboration

The Town of Northwood is a small rural community and has partnered with the surrounding towns, Coe-Brown Academy, and NHDOT to ensure this public-private partnership is a success. 6 years ago the Town of Strafford was in the same predicament Northwood is in today. One of their bridges on Northwood Road was closed because of its poor condition. The Town of Northwood stepped up and provided emergency services and assistance with their highway department functions while the bridge was being rebuilt. Now, the Town of Strafford has promised to repay the favor and provide emergency services to Northwood when our bridge is being replaced. In addition to this support Coe-Brown academy, a private school, is providing matching funds to help with the completion of the project. And perhaps most importantly, the New Hampshire DOT has offered to provide the Town construction consultation and to administer the grant on the town's behalf.

Valuing communities and neighborhoods

By improving Bow Lake Road and replacing the bridge, this project will increase the walkability and biking opportunities of the area. The road and bridge see thousands of vehicles a day while at the same time facilitate transportation to Mary Waldron Beach, the most-used beach in the Town; they also abut the Jenness Pond watershed conservation district which has miles of walkable trails that stretch from the center to the west side of Town through pristine untouched forests. By providing access to beaches and hiking trails through investing in the rebuilding of Bow Lake Road and upgrading the bridge spanning Sherburne Brook, the Town and DOT are ensuring that the community has a safe way to lead a healthy life style. Conversely, by rejecting the project, DOT and the Town threaten the same forests and waterways by pushing an additional 2,100 vehicles down unpaved roads that border at-risk ecosystems.

Environmental Sustainability

The Town of Northwood supports Michelle Obama's "[Let's Move](#)" initiative and is committed to creating and sustaining a healthy life style for visitors and residents through less carbon-intensive methods of transportation. This project will promote methods of commuting like biking and walking that have zero-carbon emissions; it will also make the road less dangerous for pedestrian traffic and make it easier for residents to bike and walk to nearby schools and places of work. All of Northwood's partners see the value of their natural resources and are committed to reducing the dependence on oil, reducing greenhouse gas emissions, improving energy efficiency and overall, are looking for ways to protect and benefit the environment. This attitude of being good stewards of the Town's natural resources will inform and guide the project's design.

Because it is proud of its rural character Northwood encourages land owners to put their large 10-acre lots into conservation, meaning that nothing can ever be built on that particular 10-acre plot. In addition the Town allows private owners to keep land in a current use status. This gives a tax break to land owners that keep their land in a natural state and allow others to use the land for passive recreation like biking, hiking and walking. Promoting more sustainable traffic patterns protects Northwood's most at-risk environmental resources like the conserved 10-acre lots and yields environmental and public health benefits. These benefits include reduced traffic crashes, reduced emissions from long detours, improved physical and mental health, and a higher standard of living for those commuting to and from Coe-Brown, Northwood Town Hall, and the other jobs on the RFCC.

If left unaddressed the current conditions of Bow Lake Road and the bridge over Sherburne Brook will be major road blocks to sustainably meeting the transportation needs of the growing community and damage the water bodies, forests and at-risk wildlife that thrives in this unique region of New Hampshire. If left unattended the disrepair of the bridge and road will reduce the quality of life for the 2,100 people that use it on a daily basis for commuting; the residents that live on the detour routes will see an increase in heavy truck traffic; and the economy of the region will be negatively impacted as tourism and retail services decline due to road closures.

The Benefit-Cost Analysis (BCA) highlights the savings from repairing the bridge and Bow Lake Road. The benefits are results of a reduction in miles travelled due to the weight restrictions on the bridge and a possible closure if traffic needs to access the 12-mile detour. The cost benefit from the ride share program that relies on the Sherburne Brook Bridge was not taken into account in the BCA to avoid specious inflation. However, if the bridge remains in its current condition and is allowed to deteriorate the Town will be unable to implement sustainable transportation solutions.

Safety

The Sherburne Brook Bridge Project has a significant impact on the safety of residents in two ways. First, the condition of the bridge, including the current weight restrictions as well as the likelihood of a complete closure in the absence of this project, force emergency vehicles on a

[Sherburne Brook Bridge Project](#)

TIGER VIII Application

April 2016

circuitous detour that delays response times; in some cases residents will see up to a 15-minute delay for service leading to significant life safety issues. Second, the project proposes to greatly enhance safety for pedestrians and cyclists using the bridges by creating a wider span providing vehicle, bike and pedestrian traffic with adequate space to safely pass while on the bridge.

The Town of Northwood understands the importance of being prepared in advance for natural disasters. As such the Town has and maintains an emergency/[hazard mitigation plan](#) that is consistent with the policies of the Federal Emergency Management Agency's (FEMA). FEMA defines hazard mitigation as *“any action taken to eliminate or reduce the long-term risk to human life and property from natural and technological hazards.”*

While developing the application for TIGER funding, the emergency service providers and primary providers of public safety were consulted to get a complete understanding of the importance of the Sherburne Brook Bridge. *In an emergency seconds count, and a delay could be the difference between life and death. “If the bridge over Sherburne Brook continues to deteriorate the result will be further weight restrictions and ultimately the closure of the bridge. This will have a catastrophic effect on public safety to not only the people of Northwood but also the residents of Strafford who rely on Northwood for mutual aid with Fire, ambulance, and police coverage.* Current weight restrictions on the bridge and the poor conditions of the road itself force heavy fire apparatus and other emergency vehicles on a 12-mile detour route over unpaved narrow country roads that were never meant to consistently support vehicles of the weight and size of heavy fire equipment.

Given the seriously deteriorated condition of the existing bridge structure and the road around it, this vital link to western Northwood and the Town of Strafford will certainly be closed in the very near future unless funding for replacement work is secured.

Assuming the bridge is not replaced to [NHDOT specifications](#), the circuitous detour that would need to be used to get to western Northwood would almost double emergency response time. In addition to fire related calls, Northwood Fire-Rescue also responds to emergency medical calls, Hazardous Material calls in case of vehicle accidents, and vehicular extractions. Even more critical is the need to access the Mary Waldron Beach which is only .7 miles west of the bridge. Northwood Fire-Rescue handles ice and water rescues at Mary Waldron Beach; if the bridge is closed there is almost no access to the beach except for a 15-minute detour that loops through the towns of Pittsfield and Strafford then back to Northwood. During a cold water rescue during ice fishing season, these additional 15 minutes could certainly lead to a life or death situation.

The bridge over Sherburne Brook serves a vital role in the ability of Northwood Fire-Rescue to provide adequate first alarm response to a large portion of the Town and to the Town of Strafford. Further weight restrictions or a complete bridge closure will not only remove Bow Lake Road and the bridge themselves from the transportation network, but will also increase traffic congestion on detour routes, including many unpaved narrow local roads that already exceed their design capacity, further hindering response times.

The proposed bridge replacements and rehabilitations will improve safety conditions along Bow Lake Road by incorporating modern transportation engineering for the cross-section, alignment, design speed, and transition segment designs. The bridge was built 78 years ago. The current poor lane design, lack of proper crash barriers, decaying guard rails, and configuration of the existing features on the bridge do not conform to current standards and create a potential safety hazard to all bridge users.

The proposed project, if funded through TIGER, will increase vehicular, pedestrian and bicycle safety and reduce the potential for accidents. Replacing and rehabilitating the existing outdated bridge with the NHDOT recommendations will reduce injury and accidents, improve emergency vehicle access, and promote healthy, attractive alternatives to driving across the bridge through the addition of new bicycle and pedestrian amenities.

For example, despite the Sherburne Brook Bridge being just wide enough to accommodate 2 regular sized cars during the summer, pedestrians, bikers, and trucks hauling boats share the bridge with greater frequency. Pedestrians are forced to walk in the travel way with no guard rails or barriers of any kind between them and passing vehicles. Exacerbating the problem is the limited site distance on the bridge. Because of the grade of the road, oncoming traffic has little time to react to pedestrians. The replacement proposed by NHDOT would alleviate the dangers of pedestrians and bikes crossing the bridge during the busy summer months.

Accident data was reviewed by the Northwood Police Department as part of the analysis for this TIGER application. As is typical of short-span bridges of this nature, few accidents took place on the bridge spans themselves. However, existing and future weight restrictions and closures on the Bridge will divert traffic, particularly heavy vehicle traffic to already congested and dangerous rural intersections. On Bow Lake Road itself the Town sees 3 reported accidents per year with a third of these occurring near the bridge. This is a high accident zone because of the width of the existing bridge structure, causing drivers to veer to close to and hit the decaying guard rails over the brook.

Partnership and Innovation

The bridge dilemma Northwood faces is an inheritance from its former days as a mill town. Northwood was established in 1773 and was known for its shoe factories and saw mills. The Sherburne Brook Bridge spans the Sherburne Brook that is fed from an old mill pond only 30 feet to the south of the bridge. The proximity of the bridge to the mill pond and the high water flow from Sherburne Brook during the spring thaw has taken a severe toll on the structural integrity of the bridge, leading to the deck, sub, and super structures to degrade to NHDOT's lowest rating of Poor. In addition to causing the degradation of the bridge, the brook and pond pose a serious threat to the safety of the bridge. If the old mill pond dam fails it would cause a life-threatening flood that would wipe out the bridge and easily wash it into Bow Lake. By upgrading this bridge the Town is preparing for the worst-case scenario and avoiding crisis situations into the future.

Fortunately, over the past decade Northwood, the surrounding towns, its educational partners, and local businesses have developed a culture of partnership that is the model for rural, small town collaboration across the country. The group shares responsibilities for housing, infrastructure development and maintenance, sustainable growth, and affordable housing. In addition, the economic growth in the RFCC has reinforced the collective recognition in the value of having a collaborative effort to gain shared benefits rather than competing for scarce resources.

The collaborative culture bred the strong partnership between Coe-Brown and the Town of Northwood. This is manifested in the collaboration of road maintenance and the sharing of maintenance costs between the Academy and the Town, in the implementation of this project, and in the development and submission of this application to TIGER grants. Northwood's inclusiveness has led to a high level civic participation in the planning process for the maintenance and construction of Town infrastructure, including:

- The 2013 road surface assessment and maintenance plan
- The 2009 NALMAC Ecological Assessment
- 2015 creation of the Jenness Pond watershed conservation district
- 2016 RSA 162K economic development and revitalization plan (in the mapping phase)
- 2016 reevaluation of Northwood's Masterplan

Benefit Cost Analysis

The Benefit Cost Analysis (BCA) takes an extremely conservative approach to estimating the benefits of the project. Where the known benefits were not readily quantifiable, a qualitative description is offered. With specific reference to the BCA Resource Guide the valuation of benefits uses a number of assumptions that are required to produce [monetized](#) values for non-pecuniary benefits. The different components of travel time, for instance, are monetized by using a value of time that is assumed to be equivalent to the user's willingness to pay for time savings in transit. The BCA expresses benefits and costs monetarily in present value (PV) capturing the flows of benefits and costs over the project horizon. Project costs and benefits are forecast over 25 years, discounted at both 3% and 7% in line with federal guide lines in the OMB circulars.

The Benefit Cost Analysis calculates a Benefit Cost Ratio (BCR) for the project. The BCR is expressed as the ratio of benefits of a project relative to its costs, expressed in present-value terms and over a period of 25 years. A BCR above 1.0 suggests that benefits exceed costs, in which case the project creates a positive return on investment.

[Sherburne Brook Bridge Project](#)

TIGER VIII Application

April 2016

	Total Project Benefits & Costs	3% Discount Rate	7% Discount Rate
Benefits	\$51,455,448.00	\$29,360,246.43	\$21,107,573.67
Costs	\$1,122,706.00	\$1,067,512.31	\$986,959.57
BCR	45.8	27.5	21.4

The Benefit Cost Ratio for the Sherburne project has an initial benefit of more than a 46 to 1 ratio, signifying that the value of the project significantly outweighs the costs of the project. Over a 25 year period those benefits accumulate from year to year. At a 3% discount rate the BCR over 25 years shows more than a 27 to 1 ratio for benefiting the region.

Current Infrastructure Baseline

Alternative solutions to address the condition of the bridge were considered as part of this project assessment. Because of Northwood's rural nature the Sherburne Brook Bridge is the only viable, economic and ecologically feasible overpass across the brook. Creating alternate routes around the bridge would mean deforesting portions of the Jenness Pond watershed conservation district or converting steep mountainside non-maintained dirt walking paths into paved roads. Replacing the bridge and paving the road is the only cost effective and environmentally sustainable option. Options for doing a phased closure or a temporary closure to repair the bridge was considered by NHDOT when inspecting the bridge in the Fall of 2015. Both [options](#) were rejected and force a detour route to be used.

Project costs are outlined below including permitting and construction. The Town of Northwood owns and maintains the road and bridge thus no right-of-way acquisition costs are involved in this project. The baseline project assumption is that once the project is approved, a phased construction effort would occur from July 2016 through November 2017. At the time of writing this grant application this project is only 4 months shy of being "shovel ready" with only the permits for replacing the bridge needed to begin. Northwood and NHDOT have been working together on the bridge issue and the Town is confident it will receive approval for replacement since NHDOT has recommended replacement of the 77-year-old bridge.

Project Costs

The total estimated project cost is \$1,122,706 including \$93,790 for final design, permitting. Northwood will use its match to pay for permitting and design and \$13,000 for 25 years of preventive maintenance are quantified in the BCA and are recommended best practice from [NHDOT](#), however, these dollars are not requested as part of this application.

Project Benefits

The requested TIGER VIII funding will enable the Town and its local and regional partners to complete this much needed and regionally transformative project. It will facilitate a safer transportation system and will provide economic, educational and social opportunities and connections within the Town and into the adjoining towns. In conjunction with ongoing transportation and economic development initiatives in Northwood, this project will facilitate the continued expansion of Northwood's economy and the growth of the RFCC. The quantitative benefits have been valued at more than \$29.3 million (at a 3% discount rate). This amount of return on investment is remarkable considering the rural nature of Northwood. Additional comments regarding these benefits as well as the qualitative impacts of the project are outlined below.

If left unimproved, the poor condition of the bridge will continue to threaten current and future transportation efficiency, mobility of goods or accessibility and mobility of people, and economic growth. The bridge over Sherburne Brook had a 50-year life span. It is now 77 years old proving the Town of Northwood understands the importance of bridge maintenance and takes the maintenance of its infrastructure very seriously. Following best practice from [FHWA](#), and continuing its partnership with NHDOT, the Town will continue to employ cost effective strategies and actions to maximize the life of this vital bridge.

Detailed analyses have quantified benefits in terms of travel time savings, savings in operating cost and savings in terms of avoided motor vehicle accidents. Attention was paid to ensure that no transfer benefits were included (e.g., fuel savings and vehicle maintenance costs, etc.) and that the BCA was not inflated in any possible way. As a result of this project, more towns will be and remain connected to the education center of the area, Coe-Brown Academy, and the economic center of the region, The Route Four Commerce Corridor. The net present value (2015) of the project's travel time savings over a 25-year period is **\$51,455,448.00**.

Operational and maintenance costs for the Northwood Highway will also be modestly impacted by this project. The Town will see an annual maintenance savings of **\$2,571** with a total savings of **\$13,000** combined net present value for savings 25 years. The BCA workbook also highlights accidents on or near the bridge that would be potentially eliminated by this project, providing a savings of **\$9,521,640** over a 25 year period.

So as not to inflate the BCA, no attempt was made to quantify the additional benefits associated with the social costs of carbon or emissions savings, travel time savings for emergency response vehicles (which has a dramatic effect on the Town), or reductions in the possibility of accidents involving cyclists or pedestrians because these impacts are extremely difficult to value precisely for a small Rural town like Northwood.

Project Readiness

Technical Feasibility

The Town has been working in close partnership with officials from NHDOT and the Town engineering firm CMA to study the existing conditions of the bridge. These studies have been ongoing since 2013 with the most recent study conducted by NHDOT in Fall of 2015. The NHDOT study has identified specific concerns with the bridge, proposed replacement solutions, and estimated costs, inclusive of design, soft costs, and appropriate contingencies. The NHDOT study and the CMA study form the basis of the proposed scopes of work defined in this application.

Sherburne Brook Bridge (NHDOT Br. No. 095/113) - The bridge will be completely replaced with a new precast 3-side frame bridge with a reinforced deck. Span will be 22 feet with a width of 27 feet. All work will be completed within the existing right-of-way, the new bridge will include new guardrails. The new bridge will not have any weight restrictions.

West Bow Lake Road – The Road will be ditched, shoulders refurbished, additional drainage swales added near the beach and then top coated. The inadequate drainage that is present has led to the erosion of the beach and the boat ramp creating an environmental problem. This project will correct the runoff issues. Extensive road side ditching and shoulder work will also be completed during this project to ensure the durability of the road. Guard rails will be added to another stream crossing west of Sherburne Brook. This portion of Bow Lake Rd is .7 miles long and all work will be completed within the existing right-of-way.

The Town of Northwood will replace the road in 2016 with a base coat in anticipation of receiving TIGER funds. Additional 18” culverts will be added west of the bridge to prevent flood waters from crossing and closing the road in the spring and winter seasons. Additional drainage and culverts will be added across from Mary Waldron Beach to prevent storm water from flowing to the beach and boat ramp. This is pre construction that will not be funded as part of the TIGER grant.

East Bow Lake Road – This portion of Bow Lake is in poor condition. Only a base coat was installed in 2013 and the road is showing signs of extreme stress due to the harsh winters of 2013 - 2015. The road will be replaced and additional drainage will be placed under the road to prevent spring water from pushing up through the road during the Fall and Spring seasons. Additional shoulder work will be completed and culverts added under driveways to allow flood waters to pass by the road without damage. Additional road painting and turn lanes are provided by Coe-Brown at busy intersections to ensure safety. Again, all work will be completed within the existing right-of-way.

Financial Feasibility

As discussed in the Project Budget section of this application, the total project is estimated to cost approximately \$1.1 million. The Town of Northwood is seeking \$1 million from the TIGER VIII program. The project is rural and is not required to provide match. However, this project is extremely important to Northwood and the surrounding towns so it will **match the TIGER funds with \$100,000. This is 45% of Northwood’s highway construction budget.** The Town understands that DOT wants partners to have “skin in the game.” Northwood is giving everything it can to ensure the success of this project. In addition Coe-Brown Academy will contribute \$1,000 for road paint and intersection safety projects. Northwood will also take responsibility for the maintenance of the bridge following completion of the project. None of the matching funds listed are from federal sources. All [matching funds](#) (Page 16) are committed as evidenced by the attached support documentation.

All of the funders are financially stable entities, whose capacity to honor their commitments is not in question. Coe-Brown is one of the most highly rated schools in New Hampshire and has been around for a century. The Town of Northwood is a credit-worthy municipality with healthy reserves, committed funds and conservative fiscal policies. The Town also has extensive experience managing federal grant programs, ranging from block grants to numerous competitive grants financed under HUD and FEMA.

The cost estimates included in this application incorporate a 10% contingency to allow for potential cost increases as designs are developed and construction begins. The two organizations that studied the bridge project, NHDOT and CMA engineers, have extensive experience with bridges in Northeastern mill towns like Northwood, heightening the Town’s confidence in their recommendations and estimates. The allowances are also being carried for historic and environmental coordination and mitigation as part of the full replacement of the bridge which could involve unanticipated costs.

Project Schedule

The following table outlines the proposed project schedule, which will enable the project to easily complete all pre-construction activity prior to November 1, 2017 and all construction completed by prior to December 1, 2018.

Project Schedule	Start	Complete
Grant Agreement Negotiation (anticipated)	Jul-2016	Oct-2016
Permitting & Approvals	Nov-2016	May-2017
Design	June-2017	Oct-2017
Construction Procurement	Nov-2017	April-2018
Construction	April-2018	Nov-2018

Required Approvals

This project involves three distinct elements, each of which is the replacement of an existing piece of infrastructure within the constraints of Northwood's existing right-of-way. Although the project elements are expected to provide safer motor vehicle transit, with pedestrian and bicycle safety as a key concern, and remove current weight restrictions on the bridge, there will be no increase in the number or width of vehicle travel lanes across the spans or on the road. Two thirds of the elements are estimated to have a construction cost of less than \$500,000 and after Northwood's match is added to the project each will involve less than \$500,000 in federal funds. As a result, environmental permitting is expected to be less complex than other TIGER funded projects.

National Environmental Policy Act (NEPA) – Based on consultations to date, the project elements are likely to qualify as categorically [excluded under CFR 771.117\(c\)\(22\)](#), [771.117\(c\)\(23\)](#), and possibly [771.117\(c\)\(28\)](#) provided no historic impacts are present.

[Fish And Game](#) Services – The project proponent will consult with the U.S. Fish and Game Warden, who lives in Northwood, to confirm that the project will not adversely impact protected species under their jurisdiction and ensure proper mitigation measures are incorporated into the designs in the event that any are required.

[New Hampshire Department of Environmental Services](#) (DES) – The Process for [replacing the Bridge](#) falls under the DES Minimum impact project. This process is streamlined and has reduced waiting time for permits. The project elements are not expected to meet any of the review thresholds for filing with the MEPA office.

Assessment and Mitigation of Risks

The Town of Northwood has already begun consultation with regulatory and permit authorities who may have jurisdiction over this project. The information derived from these consultations as well as similar recent precedent projects has informed an aggressive but realistic schedule for permitting and approvals. The schedule allows for up to two months of additional time for permitting in the event that one or more approval processes is delayed without impacting the proposed construction start. The project schedule has incorporated sufficient time to comply with both federal and local public construction procurement and contracting requirements. Further delays can be absorbed by delaying the construction start up to three additional months without significant impact on being able to mobilize contractors for a spring 2018 construction start.

The construction schedule anticipates project completion a year before the September 2019 deadline for the completion of TIGER VIII projects, allowing ample time to absorb potential delays during construction. While this is a large and important project for the Town of Northwood it is a relatively small project for NHDOT and will be easily permitted and completed well before 2019.

Supporting Documentation

The following materials can be found on the Project Website: [Sherburne Brook Bridge](#)

Application:

Cover Page

Executive Summary

Project Narrative

Letters of Support:

Coe-Brown Academy

Town of Strafford

Senator Kelly Ayotte

Northwood Economic Development Committee

Northwood Board of Selectman- Commitment of Funds

New Hampshire Department of Transportation

Benefit Cost Analysis:

BCA Sherburne Brook Project

BCA Summary

Bridge and Road Summary:

2015 NHDOT Bridge Inspection Report

NHDOT recommendation and cost estimate

Bow Lake Road Reconstruction Estimate

Wage Rate Certification