



# Bow-Concord Interstate 93 Improvements Project INFRA Grant Application

February 2020





<b>Basic Project Information:</b>	
What is the Project Name?	Bow-Concord Interstate 93 Improvements Project
Who is the Project Sponsor?	New Hampshire Department of Transportation
Was an INFRA application for this project submitted previously?	No
<b>Project Costs:</b>	
INFRA Request Amount.	\$61,300,000
Estimated Federal Funding (excl. INFRA), anticipated to be used in INFRA funded future project.	\$0
Estimated non-Federal funding anticipated to be used in INFRA funded future project.	\$68,160,000
Future Eligible Project Cost ( <i>Sum of previous three rows</i> ).	\$129,460,000
Previously incurred Project Costs ( <i>if applicable</i> ).	\$25,182,000
Total Project Cost ( <i>Sum of 'previous incurred' and 'future eligible'</i> ).	\$154,642,000
Are matching funds restricted to a specific project component? If so, which one?	Yes. Turnpike funds can only be used on Turnpike Infrastructure
<b>Project Eligibility:</b> To be eligible, all future eligible costs must fall into at least one of the following four categories.	
Approximately how much of the estimated future eligible project costs will be spent on components of the project currently located on National Highway Freight Network (NHFN)?	\$129,460,000
Approximately how much of the estimated future eligible project costs will be spent on components of the project currently located on the National Highway System (NHS)?	\$129,460,000
Approximately how much of the estimated future eligible project costs will be spent on components constituting railway-highway grade crossing or grade separation projects?	\$0
Approximately how much of the estimated future eligible project costs will be spent on components constituting intermodal or freight rail projects, or freight projects within the boundaries of a public or private freight rail, water (including ports), or intermodal facility?	\$0
<b>Project Location</b>	
State(s) in which project is located.	New Hampshire
Small or large project.	Large
Urbanized Area in which project is located, if applicable.	N/A Rural
Population Urbanized Area (According to 2010 Census)	N/A Rural
Is the project located (entirely or partially) in an Opportunity Zone?	No
Is the project Currently programmed in the: <ul style="list-style-type: none"> <li>• TIP</li> <li>• STIP</li> <li>• MPO Long Range Transportation Plan</li> <li>• State Long Range Transportation Plan</li> <li>• State Freight Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• Yes</li> <li>• N/A</li> <li>• Yes</li> <li>• Yes</li> </ul>

U.S. Department of Transportation  
Infrastructure for Rebuilding America

"INFRA"  
GRANT APPLICATION PROJECT NARRATIVE REPORT

Project Name: Bow-Concord Interstate 93 Improvements Project  
Project Type: Roadway Construction  
Project Location: Rural, Bow and Concord, NH  
Funds Requested: \$61,300,000 (40% of Total)  
Non Federal Funds (NH Turnpike): \$68,160,000 (44% of Total)  
Non-Federal Funds Previously  
Incurred: \$25,182,000 (16% of Total)  
Total Construction Costs: \$154,642,000  
Contact: Mr. Donald Lyford, P.E.  
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DUNS #: 808591697



Interstate 93 at the  
Bow/Concord  
Town/City Boundary

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## PROJECT DESCRIPTION

### *Introduction*

The New Hampshire Department of Transportation (NHDOT) is seeking \$61,300,000 (40%) of U.S. Department of Transportation (USDOT) Infrastructure for Rebuilding America (INFRA) funds for improvements to 2.0-miles of Interstate 93 (I-93) in Bow and Concord, NH. The total cost of the project is \$154,642,000, which includes \$25,182,000 (16%) of NH Turnpike funds already spent on the project. The remaining \$68,160,000 (44%) will also be covered by NH Turnpike funds.

Due to population growth, development, and recreational opportunities in New Hampshire, the travel demands for I-93 between Bow and Concord have exceeded the capacity of this existing four-lane facility since about 2000. This grant application supports the critical need to address daily and seasonal congestion as well as safety issues along this portion of I-93. Funding constraints have delayed the project several times but the NHDOT has been able to fund necessary bridge improvements. Further delay in implementing the project has the potential to adversely impact the daily commute into the State Capital of Concord and impact the critical tourism industry that is essential to the New Hampshire economy.

The *Bow-Concord Interstate 93 Improvements Project* has been studied by the NHDOT for several decades. All involved stakeholders agree that improvements to the corridor are necessary and long overdue. The project improvements in this grant request include the following:

- Widen 2.0 miles of Interstate 93 from Interstate 89 to U.S. Route 3.
- Upgrade  $\frac{3}{4}$ -miles of Interstate 89 (I-89) beginning at I-93.
- Upgrade the I-93/I-89 Interchange.
- Upgrade Exit 12 that connects I-93 to NH Route 3A.
- Upgrade Exit 13 that connects I-93 to U.S. Route 3.
- Upgrade I-89 Exit 1 that connects Bow to I-93 and I-89.

The formal purpose of the *Bow-Concord Interstate 93 Improvements Project* is as follows:

“The purpose of the Interstate Route 93 Bow-Concord project is to address the existing and future transportation needs for all users of this 4.5-mile segment of I-93, while balancing the needs of the surrounding communities, by providing a safe and efficient transportation corridor for people, goods, and services.”

This project sits at the crossroads of two of New Hampshire’s most important regional corridors, I-93 and I-89 (See Figure 1). These two corridors are critical to the economic vitality of the state for the movement of both people and goods. With regards to freight, the New Hampshire Statewide Freight Plan<sup>1</sup> concludes:

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<sup>1</sup> NH Statewide Freight Plan, Final Report, January 2019

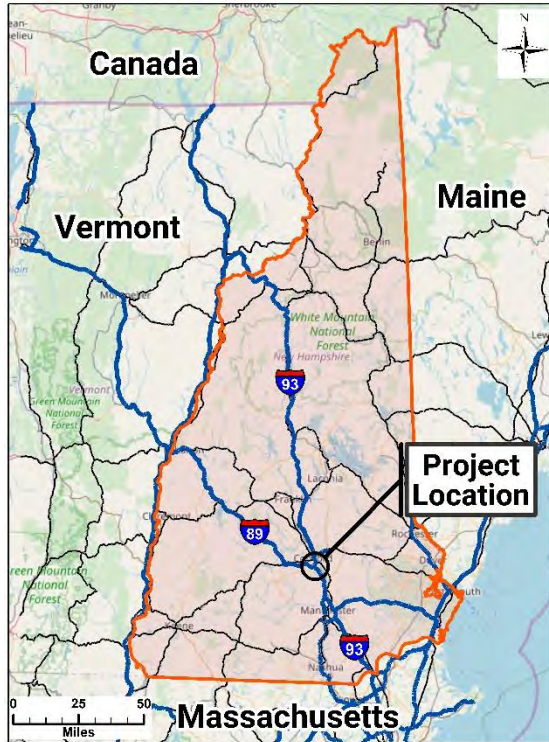


Figure 1: Project Vicinity

- “As the main transportation system in the state, more than 95% of goods are transported on New Hampshire’s highway system. Neighboring states account for 69% of total inbound truck traffic and 82% of outbound truck traffic. The majority of goods are carried on I-95, I-93 and US 3.” The project will benefit freight movement on both I-93 and US 3.
- The plan also identifies the I-93/I-89 junction as a priority freight bottleneck. The proposed upgrades at this interchange address the geometric issues that contribute to this bottleneck.
- I-93 and I-89 are New Hampshire National Highway Freight Network Routes. Trucks carrying freight from Canada, Vermont, and northern NH use I-89 and I-93 to access southern NH, Massachusetts and the rest of New England.

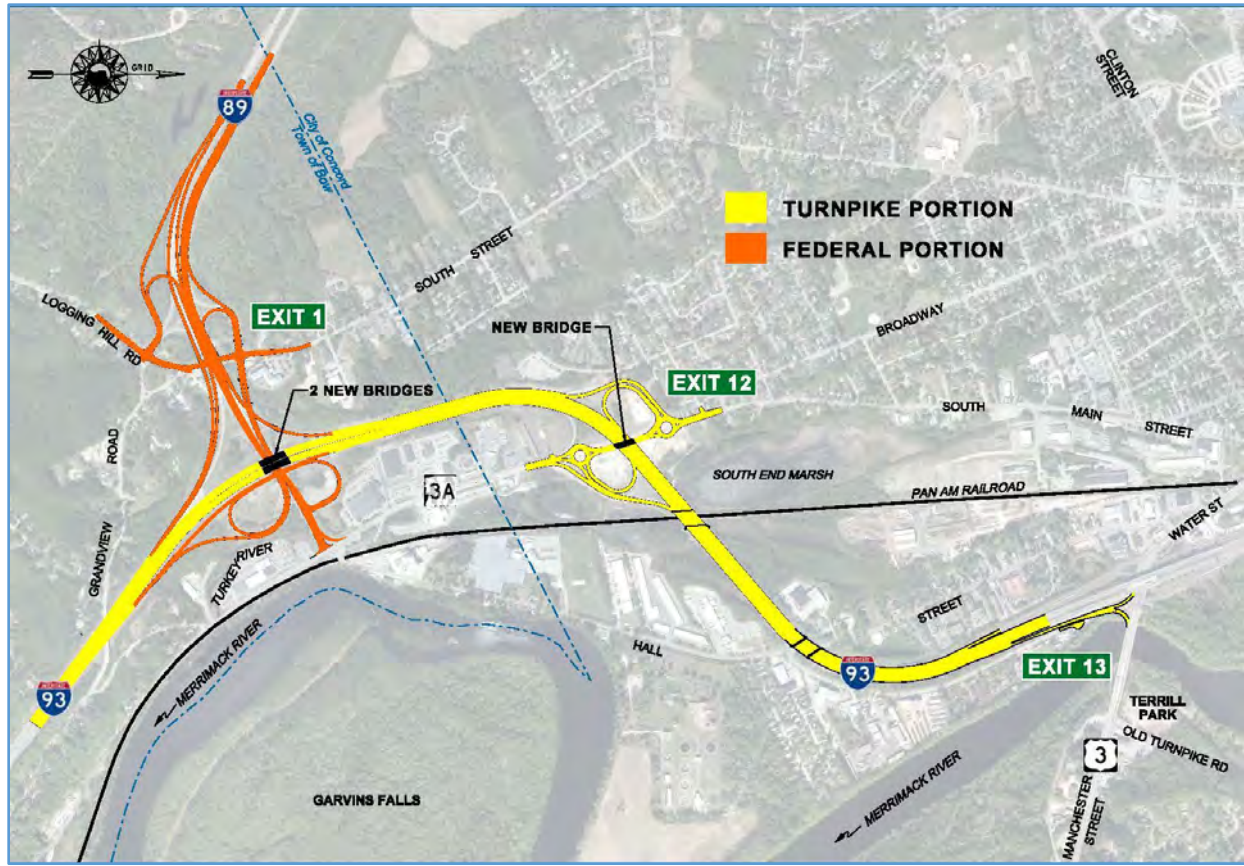
With regards to the movement of people, the two corridors are important for two reasons:

- As the state capital, Concord is a hub for employment in central New Hampshire. The widening of I-93 will help alleviate the daily congestion that exists along I-93 in Bow and Concord.
- Throughout the year, I-93 through Bow and Concord also serves as the dominant north-south corridor in New Hampshire for access to the White Mountains and the Lakes Region, both of which are major tourist and recreational destinations and are therefore critical to the economies of these areas and of the State.

There are many challenges to safely address the capacity and operational issues that exist along the I-93 corridor. Within the project limits covered in this grant application, there are 2 ¾ miles of interstate highway, a system interchange (I-93/I-89), and three local interchanges (Exit 12, Exit 13, and I-89 Exit 1). The close proximity of the four interchanges on I-93 and I-89 has created weaving sections and related safety issues. The desire of both Bow and Concord to retain the access that is presently provided by the four interchanges is also a challenge.

Figure 2 depicts the improvements that are included in this grant application. Also depicted is the separation between the Turnpike and Federal funded portions of the project. The INFRA funds are to be used for the federal portion of the project. However, this section of the Turnpike System is considered a "free Turnpike Section" and is eligible for federal funding.





**Figure 2: Southern Portion of Bow-Concord I-93**

The proposed solution depicted on Figure 2 contains the following improvements:

- Add one lane northbound and one lane southbound on I-93 from just south of the I-89 junction to just south of Exit 13. This proposed widening provides the needed capacity to the junction with US 3. The volumes on I-93 decrease north of Exit 13.
- Add auxiliary lanes northbound and southbound on I-93 between I-89 and Exit 12 and between Exit 12 and Exit 13. These auxiliary lanes address the weaving issues.
- The distance between I-93 and Exit 1 on I-89 is only about ¼ mile. The weaving at this location has raised concerns for many years in Bow. The proposed project eliminates the weave in both directions by “braiding” the ramps.
- Upgrade the I-93/I-89 interchange by replacing one of the loop ramps with a directional ramp. This new configuration not only adds capacity to the system ramp, it eliminates a significant amount of weaving traffic within the interchange.
- Upgrade Exit 12 by eliminating 2 exit ramps with deficient deceleration lengths and providing hybrid roundabouts at the ramp junctions with NH Route 3A.
- Exit 13 will remain mostly intact. However, the northbound exit ramp and ramp junction will be widened to allow for two right turn lanes onto US 3 southbound. The high volume

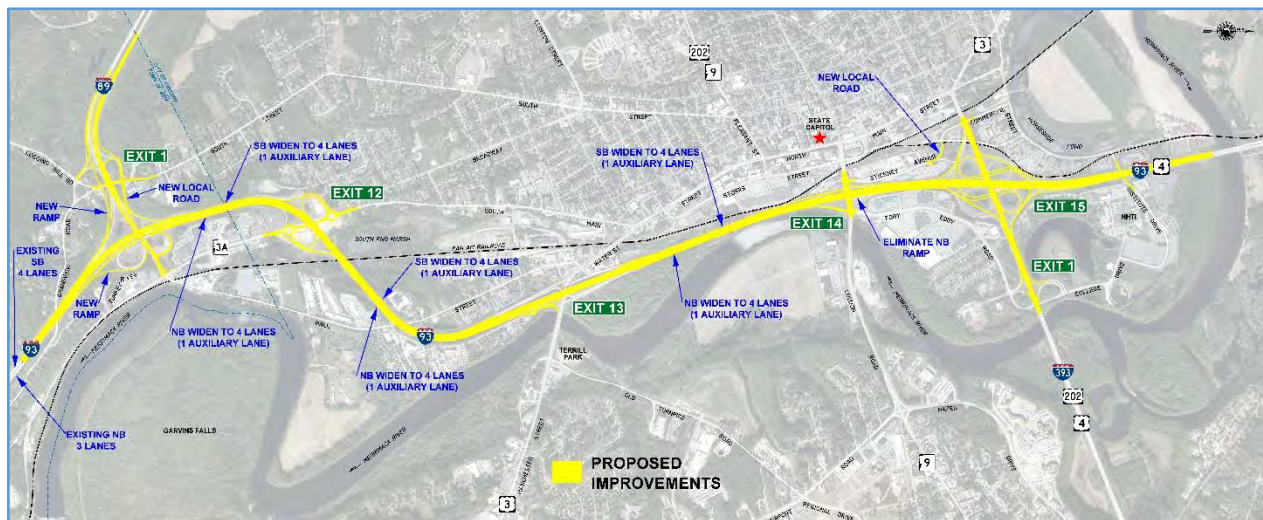
of right turns at this intersection with US 3 has caused daily queues that extend onto I-93. The ramp widening and traffic signal will eliminate this issue.

- The proposed configuration of I-89 Exit 1 provides for future access to 80 acres of undeveloped land near the interchange. This land has recently been re-zoned by the Town of Bow for mixed use. Access to the land has been difficult due to the steep topography of the area.

**Background**

Interstate 93 (I-93) is the principal north-south arterial highway within New Hampshire and is part of the National System of Interstate and Defense Highways. I-93 extends a total distance of 132 miles within New Hampshire, from the Massachusetts border to the northern Vermont border. The overall proposed project covers the 4.5-mile segment of I-93 from just south of its junction with Interstate 89 (I-89) in Bow to just north of its junction with Interstate 393 (I-393) at Exit 15 in Concord (See Figure 3). The segment of I-93 that begins in Manchester and continues north to Exit 14 in Concord is also part of New Hampshire’s Turnpike System.

With this grant application, the NHDOT seeks \$61,300,000 of U.S. Department of Transportation (USDOT) Infrastructure for Rebuilding America (INFRA) funds for the construction of the southern portion of the project. The southern portion begins south of I-89 and extends approximately 2.0 miles north to U.S. Route 3 at Exit 13 (See Figure 2). The southern portion meets all of the requirements specified for a project component as will be demonstrated in more detail in the following sections.



**Figure 3: Bow-Concord I-93**

The New Hampshire Department of Transportation (NHDOT) has undertaken a three-part project development process to develop a project purpose and need, develop a preferred alternative, prepare an appropriate environmental document, acquire rights-of-way, prepare construction documents, and construct the overall improvements. Part A of the project began in 2002 and was completed in 2008 with development of a project purpose and need, a range of reasonable



alternatives, and identification of the level of environmental documentation required to implement the project as prescribed by the National Environmental Policy Act (NEPA) of 1969.

However, at the conclusion of Part A, it was determined the funding for the project would be delayed. As there were several project bridges that were on the State's "Red List" (those bridges whose condition is determined to be structurally deficient or weight restriction requires more frequent inspections) it was determined the delay required action on these Red List bridges. Consequently, three of the Red List bridges within the southern portion of the project were replaced, as it was determined rehabilitation was not practical. The bridges were designed to accommodate all of the reasonable alternatives identified during Part A. The NHDOT utilized \$25,105,000 of Turnpike funds for the design, permitting, and construction of the three new bridges.

Part B of the project began in 2013 and is anticipated to conclude by the end of 2020. The focus of Part B is the selection of a Preferred Alternative and preparation of an environmental document. Through a robust public involvement process a Preferred Alternative for the project was determined in February 2018 and an Environmental Assessment (EA) was prepared. The EA was distributed in October 2018 with a Public Hearing held on November 14, 2018. Comments were received from the public, Town of Bow, and City of Concord. The public comments and those from the Town of Bow have been addressed. However, NHDOT and the City of Concord continue to meet to resolve concerns about the proposed design of Exit 14. It is anticipated these issues will be resolved by Summer 2020 and will allow for the Finding of No Significant Impact (FONSI) to be issued by the end of 2020.

### ***History***

This section of I-93, in central New Hampshire was constructed in the late 1950s and early 1960s as part of the Central Turnpike, more commonly known as the F.E. Everett Turnpike, and as part of the Interstate Highway System. There were no substantial improvements made to I-93 through Bow and Concord until 2003 when reconstruction of Exit 13 in Concord was completed. This reconstruction included a new interchange and the ability to widen I-93 to six lanes at that location. However, only four lanes were constructed. Exit 13 was reconstructed with a single-point urban interchange (SPUI). The proposed project's widening carries additional lanes to Exit 13 (US 3).

From 2010 to 2016, Red List bridges along I-93 were taken off the list due to either rehabilitation or replacement. Red List bridges require more frequent inspections due to known deficiencies, poor condition, or load restrictions, usually the result of structural deterioration. Replacement of the two bridges carrying I-93 over I-89 in Bow was completed in 2015. These bridges were constructed to accommodate six lanes at that location. However, only five lanes were provided. The bridge carrying NH Route 3A over I-93 at Exit 12 was replaced in 2016. This bridge was constructed to accommodate up to eight lanes (four in each direction) for I-93 and three lanes on NH Route 3A.

The need to address issues along I-93 in Bow and Concord was identified in 1990 when the Bow-Concord Widening Project was first placed on the State's Ten-Year Plan. New Hampshire RSA 228:99 and RSA 240 require that the NHDOT propose a plan for improvements to the State's transportation system every two years. The purpose of the Ten-Year Plan is to develop and implement a plan allowing New Hampshire to fully participate in federally supported transportation improvement projects as well as to outline projects and programs funded with State transportation dollars. The first study of the corridor was conducted in 1991/1992 and was documented in the I-93 Bow-Concord Feasibility Study (published in 1992). The purpose of that study was to determine the feasibility of widening I-93 while maintaining all the existing access points.

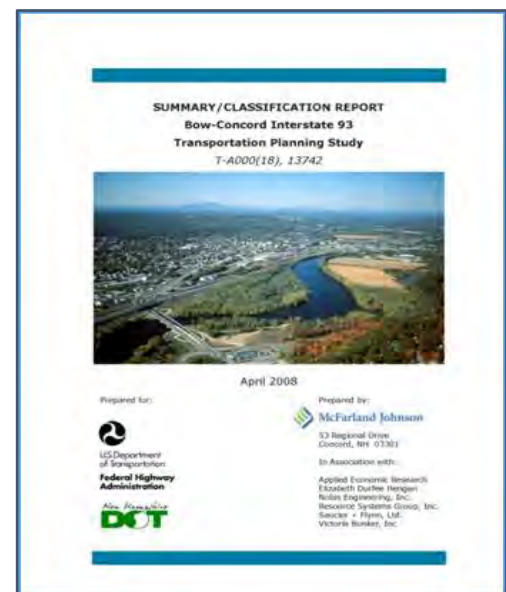
The scale of these recommended improvements was not well received by the surrounding communities and none of these 1992 recommendations were implemented.

In 1998, the City of Concord embarked on a visioning effort, 20/20 Vision for Concord, NH, which was completed in September 2001. This visioning effort included a comprehensive evaluation of the transportation system in Concord. The effort identified the importance of I-93 as a local road in addition to its role as a key commuter route and a route for recreational users. The 20/20 Vision also developed options and recommendations for I-93 that resulted in a recommendation that a six-lane I-93 would be sufficient to handle traffic until 2020. None of the improvements identified in the 20/20 Vision for I-93 have been implemented.

The current design of the Bow-Concord project addresses the need for improvements that have been under study since the NHDOT formally recognized the need for improvements to this section of I-93 in 1990, at which time the project was included in the first Ten Year Highway Plan that was enacted into legislation.

The various Ten-Year Transportation Improvement Plans (TIP) signed into law through June 1, 2006, covering projects through to 2016, included significant funding for the improvement of I-93 in Bow and Concord. The Part A planning study was initiated to study the proposed improvements to I-93 under this funding level.

However, the TIP signed into law on June 25, 2008, covering 2009 to 2018, only included funding to fix four of the Red List bridges along I-93 in Bow and Concord. The long-term improvements to the I-93 corridor were deferred until after 2018. The TIP signed into law on June 28, 2010, covering 2011 to 2020, continued funding for the Red List bridges only. The TIP signed into law on June 11, 2012, covering



**Part A Final Report**



2013 to 2022, began the restoration of corridor funding by including funds to begin Part B. Part B is to conclude by the end of 2020.

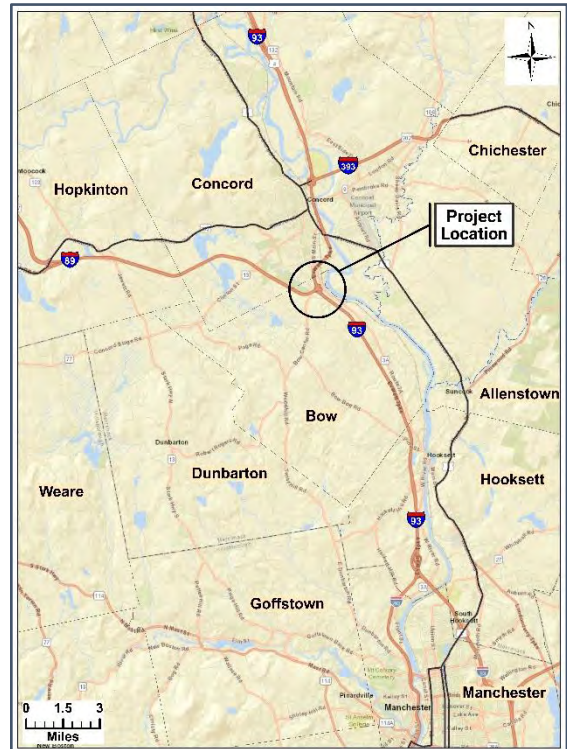
The current TIP, covering 2019 to 2028, includes both Turnpike and Federal funding for final design, right-of-way, and construction for a portion of the project. It indicates a funding deficit of over \$200,000,000. The current Draft of the Ten Year Plan, yet to be approved, that covers the years 2021 to 2030 reduces the deficit by about \$70,000,000 by including future bonding, and lists construction beginning in 2026.

## PROJECT LOCATION

The project is located in the Town of Bow and the City of Concord in Merrimack County, New Hampshire. Concord is the Capital of the State of New Hampshire. It is located in central New Hampshire about ten miles north of Manchester, the largest city in the state. See Figure 4.

It is a Rural Project as neither community is an Urbanized Area and the overall population is under 200,000.

The project is located at the junction of two interstates, I-93 and I-89. The GPS coordinates of the junction are: 43° 10' 13.6" N, 71° 31' 49.0" W.



**Figure 4: Project Location**

## PROJECT PARTIES

The grant recipient for this project is NHDOT. NHDOT is the lead agency for the project and is ultimately responsible for the planning, design, permitting, construction and funding for the project. FHWA is the lead federal agency and their NH office has been actively involved in all aspects of the project. NHDOT has contracted with a consultant team led by McFarland Johnson, Inc. to conduct the planning, preliminary engineering, bridge design, and environmental planning for the project. A complete list of FHWA, NHDOT and consultant personnel can be found in Appendix A of the EA. The complete EA can be found on the project website, the link is included at the end of this application.

The Town of Bow, City of Concord and the Central NH Regional Planning Commission (CNHRPC) have all been active participants. The project team has met multiple times with representatives of Bow and Concord as well as holding public meetings to review project progress and present potential solutions. A complete list of public activities can be found in Chapter 7 of the EA.

CNHRPC was an active participant in the development of the two project traffic models. Their knowledge of the local traffic patterns and development plans were instrumental in developing the future projections for the models.

**GRANT FUNDS, SOURCES AND USES OF PROJECT FUNDS**

Table 1 below provides a summary of the project costs including those incurred to date and the funding sources. As mentioned earlier, the I-93 portion of the project is to be funded utilizing NH Turnpike funds only. No other federal funds are allocated for this project. Further explanations can be found in the following sections.

	Prior Expenditures		INFRA Request		Sub-Total		Total
	Turnpike	Federal	Turnpike	Federal	Turnpike	Federal	
Preliminary Design	\$2,640,000	\$0	N/A	N/A	\$2,640,000	\$0	\$2,640,000
Final Design	\$2,030,000	\$0	\$6,010,000	\$5,410,000	\$8,040,000	\$5,410,000	\$13,450,000
Right-of-Way Acquisition	\$12,000	\$0	\$450,000	\$1,250,000	\$462,000	\$1,250,000	\$1,712,000
Construction	\$20,500,000	\$0	\$60,100,000	\$54,100,000	\$80,600,000	\$54,100,000	\$134,700,000
Mitigation	N/A	N/A	\$600,000	\$540,000	\$600,000	\$540,000	\$1,140,000
Utility Relocation	\$0	\$0	\$1,000,000	\$0	\$1,000,000	\$0	\$1,000,000
Sub-Totals	\$25,182,000	\$0	\$68,160,000	\$61,300,000	\$93,342,000	\$61,300,000	\$154,642,000
	16.28%	0.00%	44.08%	39.64%	60.36%	39.64%	100.00%

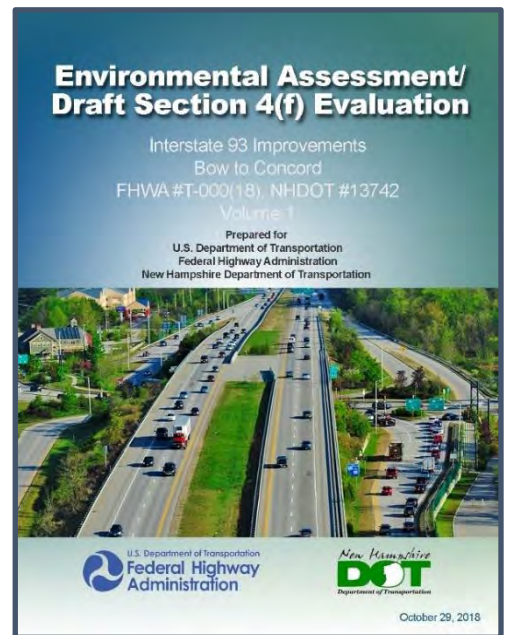
**Table 1: Project Cost Summary**

**Previously Incurred Expenses**

The prior expenditures for the project are for two main elements of work; 1) the planning, environmental, and preliminary engineering studies conducted for the project, and 2) the replacement of three (3) Red List bridges. The Preliminary Design costs noted above cover Part A and Part B of the project development process. The remaining prior expenditures noted above cover the design and construction of the three bridges. The adjoining photo shows the cover of the EA that was completed in October 2018.

**Future Eligible Costs**

The future eligible costs identified above are for final design, right-of-way acquisition, utility relocations and construction of the part of the project that is not on the NH Turnpike System. The construction includes highway widening, four interchange upgrades, five new bridges, six rehabilitated bridges, retaining walls, three traffic signals, and two roundabouts.



**Project Environmental Document**



### ***Source and Amount of Funds***

The summary above (Table 1) identifies the two proposed funding sources and the amounts expected for each. NHDOT is seeking an INFRA grant of \$61,300,000 to help advance the project work and cover the work on I-89. NHDOT is committing an additional \$68,160,000 of NH Turnpike funds to cover the turnpike portion of the project. No other federal funds are anticipated for this part of the project.

### ***Funding Commitments***

The NHDOT has spent \$25,182,000 of NH Turnpike funds on the project to date and is committing an additional \$68,160,000 as part of this application. The NH Turnpike System has been a steady and stable funding source for 70 years. See Appendix D for Ten Year Plan funding information.

### ***Contingencies***

The preliminary cost estimates prepared for construction of the project include contingencies to account for unanticipated costs.

## **MERIT CRITERIA**

### ***Criterion #1: Support for National and Regional Economic Vitality***

Manufacturing and tourism are the two largest industries in New Hampshire and the stretch of I-93 through Bow and Concord is vital to the economic vitality of both of these market sectors. With highways from the north, south, east, and west all converging here, most the State's movement of goods and tourism must pass through the project area to reach their destination. These market sectors depend on safe and reliable transportation to support their businesses. With travel delay increasing every year, it is becoming imperative that the capacity of the I-93 corridor should be increased within the project area so that negative impacts to the State's largest industries are avoided.

The movement of goods in New Hampshire from Vermont and Canada to eastern and central Massachusetts, including the Boston-metro area, pass through the project area. In addition, the Concord area is home to several distribution centers such as the Associated Grocers of New England, New Hampshire Distributors, New England Motor Freight, and Ross Express. The freight industry relies on a predictable transportation network and current congestion is impacting delivery schedules for not only the regional movement of goods, but also local distribution as well.

According to the State's 2017 Travel Barometer compiled by Plymouth State University, travel and tourism accounted for 67,000 jobs in the State, which provides employment for nearly 10% of the State's employed residents. The State attracted an estimated 39 million visitor trips which generated over \$5.3 billion in visitor spending, of which \$2 billion was for rooms and meals, a major source of income for the State through its rooms and meals tax. These numbers don't include the benefits the State of Vermont sees from visitors from Massachusetts that would also

travel through the project corridor. These economic indicators clearly demonstrate how vital the I-93 corridor is to the state’s tourism industry.

The Benefit-Cost Analysis (BCA) captures the current level of delay by computing the user costs of people sitting in traffic both during workday peak hour traffic and busy tourism weekends. In total, drivers are experiencing over \$6 million in user costs each year and that value is predicted to increase to nearly \$10 million per year in 20 years if no improvements are undertaken. While the current delays are a nuisance to visitors, it is reasonable to presume that current congestion, which results in several miles of backed-up traffic during busy tourist weekends, is probably deterring some visitation to the region. And while not captured in the BCA, an assumption of even a 1% loss to the current \$5.3 billion in visitor spending due to deterrence from congestion is resulting in \$53 million less visitor spending per year.

The proposed project will eliminate the congestion in the area and reduce the annoyance that current delays generate for the tourist vacationing in the state. This improvement has the potential to increase visitation to the state which will then increase visitor spending leading to improved economic conditions for the tourism industry in New Hampshire and Vermont.

The Benefit Cost Analysis Report can be found in Appendix B. Table 2 below contains the BCA Summary that identifies the savings (benefits) that would be gained by constructing the project.

Criteria	Real Dollars (2018)	3% Discount Rate	7% Discount Rate
Travel Time Savings (Weekday)	\$95,507,808	\$46,377,346	\$20,229,928
Travel Time Savings (Peak Weekends)	\$182,402,171	\$88,572,114	\$38,635,404
Fuel Savings	\$7,918,791	\$3,963,123	\$1,793,388
Crash Reductions	\$76,243,628	\$38,129,216	\$17,248,005
Avoided Bridge Projects	\$27,175,000	\$18,317,899	\$11,187,872
Residual Value of Bridges	\$19,700,000	\$6,220,345	\$1,407,664
Bridge Operation and Maintenance Costs	-\$310,000	-\$157,885	-\$72,936
Highway Operation and Maintenance Costs	\$2,000,000	\$2,521,698	\$2,231,143
Total Value of Benefits	\$410,637,397	\$203,943,856	\$92,660,466
Total Value of Costs	\$129,460,000	\$107,665,751	\$85,062,450
New Present Value (NPV)	\$281,177,397	\$96,288,105	\$7,598,016
Benefit to Cost Ratio (BCR)	3.17	1.89	1.09

**Table 2 – BCA Summary**



The importance of I-93 and I-89 to the economy of New Hampshire cannot be underestimated. I-93 is considered the “Spine” of New Hampshire. It provides continuous mobility from the Massachusetts border to the south to the Lakes Region, White Mountains and ultimately Canada to the north. I-89 connects to I-93 in Bow and provides access to the Sunapee Region, Vermont and ultimately Canada. To travel north and south in New Hampshire one must use I-93.

Both I-93 and I-89 are major truck routes for New Hampshire and New England. The adjoining table lists the percentages of trucks that were counted on the two interstates during the development of the traffic models. The high percentage of northbound trucks during the morning peak period indicates a high volume of freight activity during the day.

Roadway	Direction	Percent Trucks	
		AM	PM
I-93	Northbound	12%	4%
I-93	Southbound	4%	5%
I-89	Northbound	12%	6%
I-89	Southbound	5%	6%

**Table 3: Truck Percentages**

There are unique challenges associated with a rural corridor with the state’s largest city to its south, Manchester with a population of 111,000, and a small city to its north, Concord with a population of 43,000, that also happens to be the state capital. NHDOT has been able to maintain the condition of the I-93 corridor because it is part of the NH Turnpike System with its own funding source. However, even the turnpike system has not been able to keep pace with the capacity needs of I-93. Since I-89 is not part of the turnpike system, any maintenance or expansions of I-89 and the I-93/I-89 interchange must come from other funding sources. NHDOT has limited federal and local funding sources that make funding major interstate projects difficult.

**Criterion #2: Leveraging of Federal Funding**

The project proposes utilizing \$61,300,000 (40%) of Federal INFRA funds to support \$93,342,000 (60%) of NH Turnpike funds. The 60% of Turnpike Funds includes \$25,182,000 the NHDOT has already spent on the project. No toll increase is assumed to provide this funding. However, turnpike revenue bonds may be utilized up to the legislatively authorized limit to begin construction sooner than currently planned should the INFRA grant become available.

**Criterion #3: Potential for Innovation**

In addition to technology based innovation planned for the project, the NHDOT intends to utilize either a Design-Build or Construction Manager/General Contractor (CMGC) project delivery process. NHDOT has experience using both project delivery systems on large projects and understands the efficiencies that each can bring to this project. The schedule presented later in the application assumes using one of these practices to ensure construction begins within 18 months of the obligation of funds.

Since 2006 NHDOT has greatly expanded the use of Intelligent Transportation Systems (ITS) on its roadways, especially its key corridors like I-93. ITS components along I-93 from the Massachusetts border through Concord have been connected with fiber optic cable that feeds information from cameras and traffic monitors to the State's Traffic Management Center (TMC). Information is then distributed via variable message signs along the corridor. The signs that exist within this project's limits have been in place temporarily for several years and will be upgraded by the project. Additional traffic monitors, cameras and variable message signs will also be installed by the project to provide the TMC with the information needed to better manage congestion.



**Existing ITS Camera at I-93/I-89**

A significant issue that arises for the project at certain times of the year is sun glare. The north-south orientation of the project and the grade changes that occur south of I-89 cause significant sun glare for drivers along I-93. The ITS program for the project will include a warning system for glare to alert drivers when it is an issue.

Along South Street in Bow the project proposes installing traffic signals at the two ramp junction intersections associated with Exit 1. The peak hour volumes meet the warrants for signals; however, the off peak traffic volumes are significantly lower and the signals may create unnecessary delays. Adaptive signal control will be implemented to minimize the delay at these signals. Adaptive control uses cameras and other sensors to provide real-time traffic information to the controller. The controller uses algorithms to continually adjust the signal phasing to minimize delay.

NHDOT utilizes Smart Work Zones (SWZ) on large roadway projects as a means to provide the best information for motorists while they travel through a work zone. A SWZ will be used on this project to improve safety for motorists and workers as well as reduce delay.

Innovative financing is not envisioned for the project as the Turnpike System provides a proven and steady funding source for the project.

#### ***Criterion #4: Performance and Accountability***

The NHDOT has a long history of maintaining their key corridors to a high standard. All state bridges are inspected every 2 years with a detailed report prepared identifying all deficiencies and needed repairs. Bridge pavement is replaced every 20 years and decks are anticipated to be replaced between 40 and 60 years. Bridges that receive a low rating for any structural element are placed on the state's Red List where they are inspected every 6 months and specific plans for rehabilitation or replacement are made. Interstate pavement is closely monitored with overlays



planned every 10 years. In addition, the portion of this project on the Turnpike System has its own maintenance program that is funded through the tolls.

The need to progress this project has been well documented. Should the project receive the INFRA grant, the NHDOT is committed to moving expeditiously to design and construct the project. The NHDOT therefore accepts the accountability measure to start and complete the project by the specific dates as follows:

Start Construction by: September 1, 2023  
Complete Construction by: September 30, 2027

NHDOT intends to use an accelerated project delivery process to meet this schedule.

The project is expected to require four (4) years of construction. During Preliminary Design a project phasing evaluation was conducted to determine the critical construction activities that would control the duration of construction. The bridge replacements along I-93 require 3-phases that each take a construction season to complete. The additional year allows for final paving, lane striping, landscaping, etc. While the work on I-93 is underway, the reconstruction of the interchanges can also be completed. The photo below shows the prior 3-phase bridge construction for the I-93 bridges over I-89



**I-93 Bridges Under Construction  
in 2011**

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## PROJECT READINESS

As stated earlier in this application, the NHDOT has been progressing this project for many years. The preliminary engineering has been completed with a design that has community support. The environmental document has been distributed with approval expected by the end of 2020. The Right-of-Way research was started in 2018 with an understanding of the expected impacts and property needs. The sections below provide more of the detail requested.

### *Technical Feasibility*

The development of alternatives for this project followed a proven process whereby project needs were determined, concepts were developed to address these needs, criteria were used to evaluate the concepts, and a preferred solution was determined. A regional traffic model was developed that includes the 20 communities that comprise the Central NH Region. The regional model was calibrated using actual traffic and land use data to emulate actual traffic conditions in the region.

To appropriately evaluate the complex roadway network that comprises the I-93 corridor, a Microsimulation Model was also developed for the project area. The Microsimulation Model is a detailed model of the corridor that provides more detailed information on the interaction of traffic between and within the interchanges. This model was used to evaluate the various lane and interchange configurations considered for the project.

Property impacts were determined and costs assigned to acquire necessary properties and provide the required relocations. The project was presented to all the resource agencies that have oversight responsibility. The details of this coordination can be found in the project's EA document that can be found on the project website, see the link at the end of this application.

The project has five (5) main components as listed below. The details of each component are contained in the following sections.

1. Widen I-93.
  2. Upgrade the I-93/I-89 Interchange
  3. Upgrade I-89 Exit 1
  4. Upgrade I-93 Exit 12
  5. Upgrade I-93 Exit 13
- 
1. The need to widen I-93 has been known for many years but confirmed in 2015 when the project traffic model was first completed. The recent growth in the area has made the need to expand I-93 even more compelling. Below in Figure 5 is a graph of the traffic between Exits 12 and 13 beginning in 1981 through 2019. The traffic on I-93 has tripled in this time frame with no improvements or additional capacity.

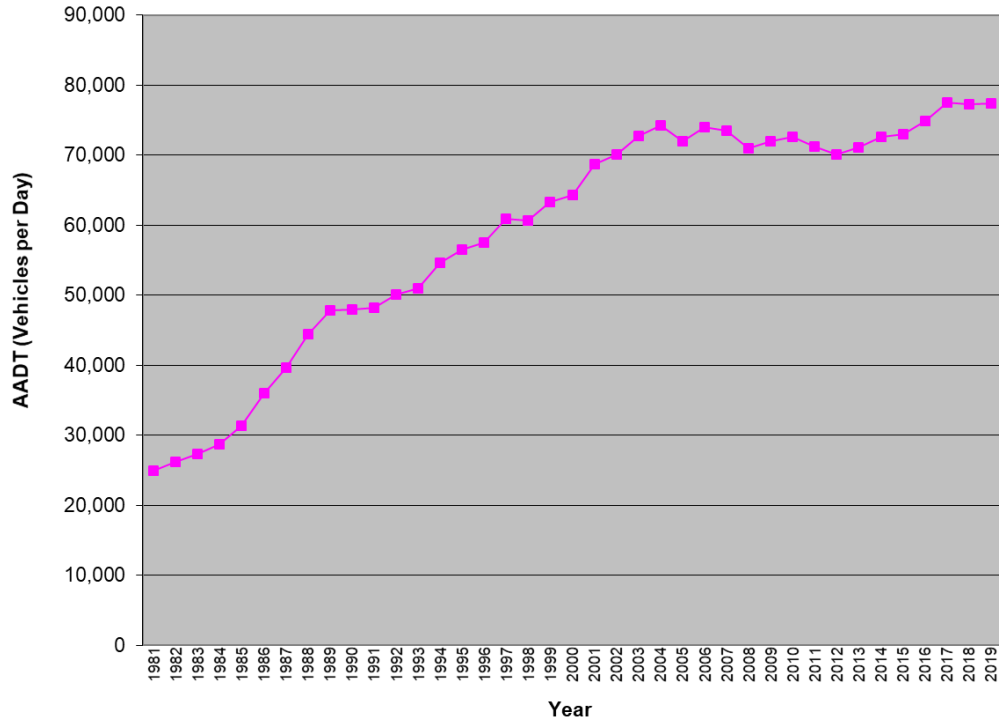


Figure 5: Adjusted Average Daily Traffic (AADT) on I-93 between Exits 12 and 13

The proposed project will begin the widening south of I-89 where I-93 is currently seven (7) lanes (3 northbound lanes, 3 southbound lanes, and 1 southbound climbing lane). This widening creates a 6-lane interstate within the project limits. Furthermore, due to the presence of three (3) interchanges in the proposed 2-mile segment of I-93, auxiliary lanes between the interchanges are also proposed. See the typical section below in Figure 6.

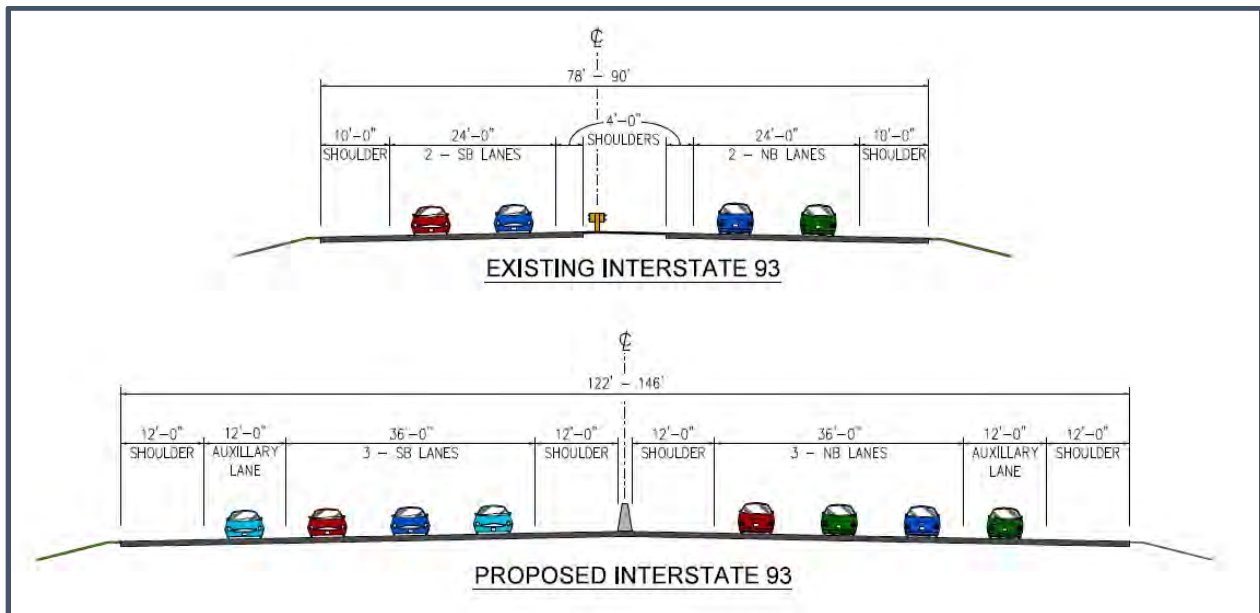
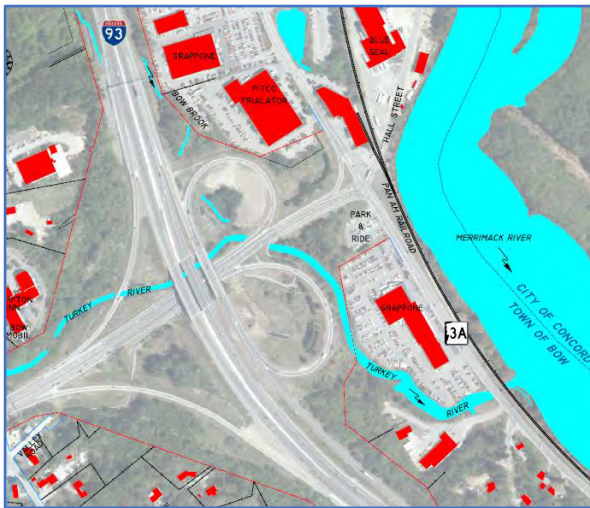


Figure 6: I-93 Typical Sections



- The existing I-93/I-89 interchange is a modified trumpet where I-89 terminates at I-93 but a local connection is provided to NH Route 3A. The southbound I-93 ramps connecting to I-89 are both directional ramps and this configuration will be retained. The northbound I-93 ramps to I-89 utilizes a separate collector-distributor (C-D) road and two loop ramps. The weave section between the loop ramps currently operates at a failed level of service. This poor level of operations will continue to get worse as volumes increase. The proposed project provides a directional ramp for northbound I-93 to northbound I-89 traffic. Removing this volume of traffic from the CD road allows the weave to operate at acceptable levels. See Figure 7 and Figures 2.4 and 2.6 in the EA.



I-93/I-89 Existing



I-93/I-89 Proposed

**Figure 7: I-93/I-89 Before and After**

- I-89 Exit 1 is a partial cloverleaf interchange that provides access to Logging Hill Road and South Street in Bow. The interchange will be reconstructed by the project but continue as a partial cloverleaf. The main concern for Exit 1 is its close proximity to I-93, being only ¼ mile away. The weaving of traffic between Exit 1 and I-93 is one of the most heard complaints about the project area. The proposed project eliminates both weaves by “braiding” the ramps. This means having one ramp bridge over the other where the traffic never has to interact.



**Short Weave on I-89 between I-93 and Exit 1**

- I-93 Exit 12 is a partial cloverleaf interchange that provides access to NH Route 3A in Concord. The existing interchange has two exit ramps in each direction, where ramps to northbound and southbound Route 3A are provided. The two successive exit ramps have

created deficient deceleration distances for the exit ramps. The proposed project retains the partial cloverleaf configuration but eliminates the dual exit ramps. The interchange ramps will now terminate at two intersections that will be controlled by hybrid roundabouts.

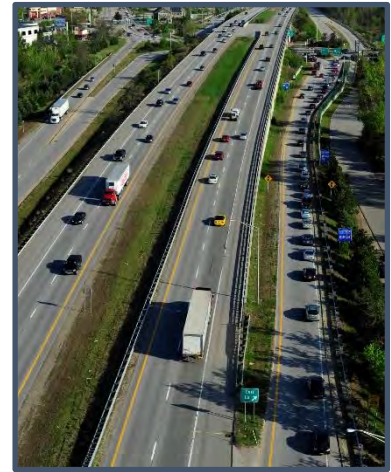


Exit 12 Existing

Exit 12 Proposed

**Figure 8: I-93 Exit 12 Before and After**

- I-93 Exit 13 is a single point urban interchange (SPUI) that provides access to US Route 3 (US 3) and was completed in 2002. The proposed project will widen the northbound exit ramp to provide 2 right turn lanes onto southbound US Route 3. The right turn will also be signalized to increase its capacity. These improvements will eliminate the daily queues that extend onto I-93.



**Daily Back-ups at Exit 13**

The cost estimates developed for the project quantified the major items of construction including excavation, embankment, base course materials, pavement, barriers, curbing, guardrail, traffic signals, sign structures, retaining walls, and bridges. Remaining items including traffic control, drainage and other minor items were determined by percentages. These percentages were determined by evaluating several recent large highway projects and calculating their percentages. The percentage for Minor Items and Contingencies was 50% of the Highway Major Items totals. This provided a conservative cost estimate for a preliminary design.

**Project Schedule**

Below is a simplified project schedule showing key project activities and milestones. Refer to Appendix C for a detailed project schedule. This schedule assumes notification of award by August 1, 2020 and construction beginning in July 2023.



Public Informational Meeting	2/2018
Distribute EA	10/2018
Public Hearing	11/2018
Public Workshops to discuss EA Comments	6/2019
INFRA Grant Application	2/2020
Advisory Committee Meetings	3/2020 to 06/2020
INFRA Grant Award	8/2020
Revised EA	10/2020
Approved EA	12/2020
Begin Design	6/2021
Complete Permits	6/2022
Complete Plans for Advertisement	10/2022
Complete Property Acquisitions	10/2022
CMGC Advertisement	4/2023
Award CMGC Contract	7/2023
Begin Construction	7/2023
End Construction	9/2027

**Required Approvals**

Completion of the NEPA process for the project is anticipated by December 2020. The entire *Environmental Assessment/Section 4(f) Evaluation (EA)* completed for the project can be found on the project website, the link is at the end of this application. The environmental studies prepared for the project are appendices to the EA and can all be found on the same link.

The permitting for the project will begin immediately with the expectation that all necessary permits will be secured by June 2022. There is much to be done in one year but much of the groundwork has been established with the resource agencies, which is expected to expedite the process. For example, the MOA for the historic impacts has been signed, the mitigation for impacts to a state forest have been agreed to, and the Section 4(f) legal review has been completed.

A robust public outreach process has been followed throughout the project development process. A complete list of public activities can be found in Chapter 7 of the EA. The meetings listed include those with Town of Bow and City of Concord officials, two rounds of Public Informational Meetings, Natural Resource Agency meetings, Cultural Resource Agency meetings, and a Public Hearing. The progression of the project followed the public activities. For example, potential alternatives were presented to the municipal officials first, then presented to the public, refined based on comments, and then a preferred solution selected based on public comments.



Both the Town of Bow and City of Concord along with the Central NH Regional Planning Commission have been active participants in the project’s development. Appendix A contains letters of support from these entities along with letters from the NH congressional delegation.

**Assessment of Project Risks and Mitigation Strategies**

There are inherent risks associated with a large project that requires environmental permits, land acquisition, multiple funding sources and exists within multiple jurisdictions. Below is a list of project risks and mitigation strategies that have been and will be used to deal with these risks.

Project Risks	Mitigation Strategies
<i>Cost Control/Funding</i>	
Delays in advertising the project have the potential to increase the project costs.	The NHDOT has elected to use an accelerated project delivery process (DB/CMGC) to fast-track construction to mitigate potential escalation of construction cost.
Constraints of project funding.	The use of NH Turnpike Funds minimizes this risk as this is a completely reliable funding source. In order to advance the project from where it is currently funded in the state’s Ten Year Plan will require utilization of turnpike revenue bonds up to the legislatively authorized limit. Without the INFRA grant, project cannot not be advanced from that shown in the Ten Year Plan.
<i>Environmental Permits</i>	
Section 106 of the National Historic Preservation Act of 1966.	The project impacts several properties that are eligible for the National Register of Historic Places. Coordination with the State Historic Preservation Office (SHPO) resulted in a Memorandum of Agreement (MOA) that stipulates the mitigation measures that have been agreed to. These will be incorporated into the project and no delays are anticipated.
Wetland Permit	Impacts to wetlands are minimal for the project and the mitigation measures have been discussed with the regulatory agencies.
<i>Right-of-Way Acquisition</i>	
The project requires full and partial acquisition of various privately owned parcels. Several of the parcels have active businesses and residents.	NHDOT began the right-of-way process in 2018 to ensure all impacted owners were aware of the project. Staff from the NHDOT Right-of-Way Bureau attended the Public Informational Meetings and Public Hearing to answer questions and concerns from affected owners. All owners are aware of the impacts to their properties. Once NEPA is completed, ROW plans will be fully developed, appraisals ordered, and the acquisition process started.

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## LARGE/SMALL PROJECT REQUIREMENTS

The project presented in this application satisfies the requirements for a large project. Below are the specifics:

### **1. Does the project generate national or regional economic, mobility, or safety benefits?**

The project generates national economic and mobility benefits and regional economic, mobility, and safety benefits. The national benefits are attributed to two interstate corridors that provide connectivity for the movement of people and goods between New England and Canada. The connection to Canada provided by I-93 and I-89 is imperative for moving freight to and from Canada and the movement of tourists between the two countries.

The regional benefits provided by the project are wide ranging. The economy of New Hampshire is dependent on the ability of tourists from southern New England to reach destinations in northern New Hampshire. The economies of the Lakes Region, Sunapee Region and White Mountains Region are largely dependent on tourism dollars. The increased capacity on I-93 and the upgrades to the I-93/I-89 interchange will make accessing these destinations much easier.

The regional safety benefits provided by the project are numerous. The weaving issues that persist along I-93 and between I-93 and I-89 Exit 1 will be addressed. The deficient deceleration for the Exit 12 exit ramps will be addressed. Finally, the safety issues present with the daily queues that back onto I-93 at Exit 13 will be eliminated. All of these safety improvements are expected to reduce the number and severity of the crashes that occur within the project area.

### **2. Is the project cost effective?**

The project is cost effective as shown in the BCA with over \$90,000,000 (7% discount Rate) of benefits and a Benefits-Cost Ratio (BCR) of 1.12. It should also be noted that the BCA does not allow for the inclusion of impacts to the State's tourism economy in the calculation of benefits. The weekly delays that occur on I-93 during the summer and winter seasons have not been monetized but are a significant issue for the State of New Hampshire's economy.

### **3. Does the project contribute to one or more of the Goals listed under 23 U.S.C. 150?**

The project contributes to all of the stipulated goals as follows:

1. It satisfies the National Goals as it proposes improvements to two interstate highways.
2. It satisfies Safety Goals by addressing safety issues related to weaving traffic, congestion and deceleration.
3. It satisfies the Infrastructure Condition Goal by reconstructing existing facilities and replacing bridges that are reaching their useful lifespan.
4. It satisfies Congestion Reduction Goals by providing capacity on roadways that experience daily congestion and delay.

5. It satisfies the System Reliability Goal by addressing the operational issues that exist due to the close spacing of interchanges.
6. It satisfies the Freight Movement and Economic Vitality Goals by improving mobility along I-93 and I-89, two NH National Highway Freight Network Routes.
7. It satisfies the Environmental Sustainability Goal by providing storm water treatment for water discharged into the adjoining Merrimack River. Little treatment is currently performed on discharged water.
8. It satisfies the Project Delivery Goal by utilizing accelerated delivery processes like Design Build or CMGC.

***4. Is the project based on the results of Preliminary Engineering?***

A formal Preliminary Engineering process was followed for the development and selection of alternatives for the project during Part B. The activities completed for the project include:

- Environmental Assessments
- Metes and Bound Surveys
- Traffic Studies
- Hazardous Materials Assessments
- General Estimates of the types and quantities of materials

***5a. Does the project have stable and dependable funding for the non-Federal components?***

The non-Federal elements of the project are to be funded through the NH Turnpike System. The NH Turnpike System collects tolls at various locations in the state with gross revenues of about \$132,000,000 per year. For the upcoming Ten Year Plan period, \$525,000,000 is planned to be expended on Turnpike Capital Improvement projects with an additional \$150,000,000 planned for Turnpike Renewal and Replacement work.

***5b. Are contingency amounts available to cover unanticipated cost increases?***

The project cost estimate includes a healthy contingency to account for unanticipated costs. Also, the NHDOT assumes inflation in all of its funding models to account for increased costs over time.

***6. Project cannot be easily and efficiently completed without other Federal funding.***

The *Bow-Concord Interstate 93 Improvements* project has been included in the State of New Hampshire Ten-Year Transportation Improvement Plan since 1990. At no time during these 30 years has the project been completely funded. Other large highway projects in the state have monopolized the state's share of federal funds. The current Draft of the Ten Year Plan that covers the years 2021 to 2030 contains at least a \$100,000,000 deficit for constructing the entire project. Without a grant such as INFRA, the improvements to I-93 will be delayed beyond 2030.



**7. Project reasonably expected to begin 18 months after obligation of funds.**

The project is well situated to move quickly to construction once funding is secured. The project has community support, the environmental document will be finalized by the end of 2020, right-of-way efforts are ready to begin in earnest once NEPA approval is secured, and the NHDOT is committed to using an accelerated project delivery method. The NHDOT feels strongly about meeting the schedule requirements and has therefore accepted the accountability measure for schedule.

**APPENDICES**

APPENDIX A: Letters of Support

APPENDIX B: Benefit Cost Analysis

APPENDIX C: Project Schedule

APPENDIX D: Funding Information

**Links**

All pertinent project information can be found on the Study Documents page of the project website, below is the link.

<http://i93bowconcord.com/Study-Documents.html>.

The NH Statewide Freight Plan, Final Report, January 2019 can be found at the following link:

<https://www.nh.gov/dot/org/projectdevelopment/planning/freight-plan/documents/NH-Freight-Plan-FINAL-REPORT-Jan-2019.pdf>