

6 Conclusions

The purpose of this Transportation Planning Study is to evaluate potential broad, transportation system changes and establish a range of practicable alternatives aimed at addressing capacity and safety related deficiencies along I-293 and the Exit 6 and 7 interchanges. The study also considers relocating and reconfiguring Exit 7 into a full directional interchange.

The study (Part A) is the first part of a three part process. The study will be followed by Preliminary Engineering and Environmental Documentation (Part B) and Final Design Plans (Part C) and ultimate construction. This study establishes a range of practicable alternatives for further development and more detailed evaluation under Part B. The following key findings and issues emerged during the study.

No Build

The No Build alternative will not meet the study purpose. Capacity analyses performed for the existing I-293 freeway segments and ramps under the 2035 No Build alternative show substantial degradation in traffic operations. Many of the freeway segments and ramp junctions are expected to degrade to LOS E or F. All but two of the nine signalized intersections are expected to operate at a LOS D or worse.

Transportation Demand Management

Transportation Demand Management (TDM), encompassing a wide range of strategies designed to change personal travel behavior, can result in a reduction in demand for automobile use and in the need to construct additional roadway capacity. TDM actions alone will not meet the study purpose. However, TDM actions need not be an either/or alternative but could be implemented in conjunction with a Build alternative. There is a wide-range of TDM strategies and actions that have the potential to reduce vehicular travel demand. These actions will be further developed and evaluated in more detail under Part B.

Transportation System Management

Transportation System Management (TSM) strategies are generally low cost, easy to implement actions aimed at optimizing the performance of the existing transportation system. Some examples of TSM actions include traffic signal coordination, access management, and incident management. Based on feedback from the public NHDOT forces cut back growth along the east side of I-293, south of the Exit 6 northbound off-ramp. This low cost and easy to implement action had an immediate effect of improving driver sight lines as motorists approach the interchange. In addition, the NHDOT is evaluating opportunities to install dynamic message boards along I-293 aimed at alerting southbound motorists of peak period congestion at the Exit 6 ramps. Other actions being considered include increasing the storage capacity of the Exit 6 northbound off-ramp by widening the ramp to provide two-lanes, with possible traffic signal enhancements at Amoskeag Street. These actions will be further developed under Part B.

I-293 Mainline

Meeting the study purpose will necessitate the widening and reconstructing of the I-293 mainline from its current four-lane divided highway configuration to a modern six-lane divided highway for most of the study corridor. However, the projected travel demand for the segment through and north of Exit 7 suggests that an upgraded four-lane divided highway section could be retained through this area. Regardless of the number of lanes that may be initially constructed, consideration should be given to constructing the Exit 7 interchange to accommodate a future six-lane divided highway.

Potential Impacts to the Merrimack River

The Merrimack River, which flows along the easterly edge of the study area directly adjacent to I-293 and Front Street, is the most prominent environmental resource occurring within the study area and is a regionally important water resource. Additionally, two perennial tributaries, Black Brook and Milestone Brook, drain from the west with their watersheds primarily located in the communities of Manchester, Dunbarton and Goffstown. However, the Merrimack River is known to have water quality impairments and its existing water quality is not sufficient to fully support all designated uses. The primary water quality concern relates to elevated levels of *E. coli* bacteria. The Merrimack River is also considered to be marginally impaired relative to supporting aquatic life due to previously detected elevated levels of aluminum, low pH and low dissolved oxygen saturation levels.

A primary factor influencing water quality is the amount of impervious surface in a watershed; larger percentages are associated with decreased water quality. Increased runoff, if not properly managed, could have a variety of impacts on the Merrimack. These potential impacts include increased chances of flooding, erosion of streambanks and drainage ways, warming of stream waters, and decreased groundwater base flow due to less infiltration.

Thus, because all of the study alternatives that propose to expand the pavement surface will result in increased imperviousness, careful study and management of the potential impact on the Merrimack River and its tributaries will be a critical issue during subsequent project phases. A formal top-of-bank delineation for the Merrimack River, Black Brook, or Milestone Brook, may also lead to additional impacts. A top-of-bank delineation will be necessary in next phase of the project.

Mainline Segment - Alternatives 2&3 – A Tradeoff of Impacts to the Merrimack River or the Historic Millyard District

The 0.8-mile mainline segment, which begins just north of Exit 5, is constrained with the Amoskeag Millyard Historic District on the west and the Merrimack River on the east. Developing a workable alternative in this section will involve a tradeoff between impacts to the Merrimack River and the Millyard; minimizing impacts to one resource will involve increased impacts to the other. Both alternatives will impact the floodplain of the river, with Alternative 2 resulting in the greater impact compared to Alternative 3. However, Alternative 3 will require greater impacts to the Millyard than Alternative 2. Balancing these impacts and choosing a preferred alternative will be a key issue during the NEPA phase. Substantial regulatory protection is in place for both floodplain and river bank impacts (e.g., NH RSA 482-A relative to dredge and fill in wetlands, the Clean Water Act Section 404 and Executive Order 10988), as well as impacts to historic resources (e.g., Section 106 of the National Historic Preservation Act and Section 4(f) of the USDOT Act, which requires demonstration that no prudent or feasible alternative exists to the “use” of historic property).

Exit 6 Alternatives

Of the five alternative configurations evaluated at Exit 6, the SPUI will meet the study purpose, provide acceptable operating conditions, and will distribute traffic flow well. The Front Street/Eddy Road connection to Amoskeag Street will be provided by a bridge separated from the ramp movements that will be accommodated at the SPUI. Each of the diamond interchange configurations, with the exception of the Diamond Interchange with Roundabouts, will also meet the study purpose and provide acceptable operating conditions. However, these configurations will not distribute traffic flow as well as the SPUI. The proximity of the traffic signal controlled northbound ramps and the traffic signal controlled Amoskeag Street intersection show potential queuing problems under the Standard Diamond Interchange Alternative and the Diverging Diamond Interchange Alternative. The Diamond Interchange with Roundabouts Alternative does not operate well (Level of Service F) and will not meet the study purpose and should be eliminated from further consideration.

Exit 7 Alternatives

Reconfiguring Exit 7 to provide fully directional connectivity to I-293 at its current Front Street location will moderately meet the capacity and safety study purpose. However, the

limited spacing between the interchange and Exit 6 is not ideal and would necessitate an additional weaving lane (a fourth lane) in each direction on I-293 between the interchanges. Reconstructing the interchange at its existing location will fail to meet the City of Manchester’s desire to support connectivity to the Hackett Hill area and the Town of Goffstown’s desire to support connectivity between I-293 and the town’s industrial zoned land.

Each of the alternatives that involve relocating the Exit 7 interchange to the north will operate well and meet both the capacity and safety study purposes. The relocated interchange alternatives that provide a westerly connection to Dunbarton Road will meet the City of Manchester’s desire to support connectivity to the Hackett Hill area. The alternatives that extend westerly to Goffstown Road crossing Black Brook will meet the Town of Goffstown’s desire to support connectivity between I-293 and the town’s industrial zoned land.

Crossing of Black Brook

During the course of the study, members of the public and Goffstown town officials expressed a strong desire to create a new direct connection between I-293 and Goffstown. In response to these public comments, Alternatives 10A and 10B were developed, both of which would construct a Goffstown Connector Road. This extension will require construction of a new bridge over Black Brook. While impacts have been minimized as a result of the careful alignment of this possible new roadway, the creation of a new crossing of this perennial tributary to the Merrimack River stands out as an important potential impact which will need further study during the next project phase.

Construction Costs

For the purpose of preparing a programing construction cost estimate (2013 Dollars), the I-293 corridor was divided into three separate roadway segments that include a Mainline Segment, an Exit 6 Segment, and an Exit 7 Segment. The Mainline segment includes the southernmost 0.8-mile section of the I-293 study area. The Exit 6 Segment includes the Exit 6 interchange and adjacent 0.8-mile section of I-293. The Exit 7 Segment includes the current Exit 7 interchange and a 1.9-mile section of I-293 north of Exit 6.

Note that the programming construction cost estimate does not include costs related to utility construction or relocation, right-of-way acquisition or relocation, mitigation, or preliminary and final engineering fees. The programing construction cost estimates for each alternative is summarized in Table 6.1-1.

Table 6.1-1 Construction Cost Estimate

Segment	Construction Cost
<u>I-293 Mainline Segment</u>	
Alternative 2	\$18 to \$20 million
Alternative 3	\$8 to \$9 million
<u>Exit 6 Segment</u>	
Alternative 4	\$54 to \$60 million
Alternative 5	\$38 to \$42 million
Alternative 5A	\$37 to \$41 million
Alternative 6	\$41 to \$45 million
Alternative 7	\$34 to \$37 million
<u>Exit 7 Segment</u>	
Alternative 8	\$33 to \$36 million
Alternative 9A	\$36 to \$40 million
Alternative 9B	\$37 to \$41 million
Alternative 10A	\$42 to \$47 million
Alternative 10B	\$43 to \$48 million

a million square feet of office and R&D space. The various Exit 7 alternatives may accelerate the development of new facilities and create jobs. In addition, Alternatives 10A and 10B include improved access to Goffstown Road linking undeveloped industrial zoned land in the Town of Goffstown with I-293. This improved access may accelerate development of this property and increase the tax base for both communities.

Next Steps

The evaluation presented in this planning study phase identifies key issues on a conceptual basis, and should not be interpreted as a conclusive study of impacts. More formal analysis of impacts will need to occur during the next preliminary design and environmental analysis phase with the more detailed evaluation of the alternatives under the National Environmental Policy Act (NEPA). NEPA is a comprehensive federal law that applies to all projects that may receive federal funds for any portion of the financing or licensing for the project. The main provision of NEPA requires an Environmental Impact Statement (EIS) be written for all “major federal actions” which may have a “significant impact” on the environment. However, NEPA permits an Environmental Assessment (EA) to be prepared for an action where the significance of the social, economic, and environmental impacts are not clearly established. The NEPA study under an EA will examine the project alternatives and impacts in greater detail with additional in-depth public involvement.

In addition to the federal requirements under NEPA, the NHDOT will need to prepare and submit an Interchange Modification Report (IMR) to the Federal Highway Administration (FHWA) under the next phase of the project study. The IMR is required because the project considers the reconfiguration and potential relocation of interstate system interchanges along the interstate system. This action serves as a formal request through FHWA to modify Exit 6 and Exit 7, regardless of the funding source of project. At a minimum, the interchange modification request will evaluate and document eight FHWA policy requirements. The IMR for the improvements along I-293 with Exit 6 and 7 must demonstrate that:

- *The existing system cannot accommodate the design-year traffic demands.*
- *All reasonable alternatives have been considered.*
- *The proposed change does not have a significant adverse impact on the safety and operation of the Interstate facility or on the local street network based on both the current and the planned future traffic projections.*
- *The proposed access connects to a public road only and will provide for all traffic movements.*
- *The proposal is consistent with local and regional land use and transportation plans.*
- *The proposal is consistent with any long-range system or network plan.*
- *When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements.*
- *The proposal will be included as an alternative in the required environmental evaluation, review and processing.*

Benefits of Enhanced Regional Highway Access

In addition to the immediate and direct benefits associated with highway improvements (safety, increased capacity, improved level of service), there is the potential for indirect and induced economic benefits within a broader regional context.

Regardless of the selected alternative, improvements to Exit 6 will allow for improved connectivity between downtown Manchester to points north and south. Downtown Manchester serves as a regional employment and financial services hub within the State of New Hampshire. Due to the availability of existing office and light industrial/research & development (R&D) space, it has the capacity to increase the workforce. Easier access to and from the downtown area may accelerate existing economic development trends, leading to higher employment within the region.

Similarly, the relocation of Exit 7 will enhance accessibility to existing and potential job generation areas. For example, the Hackett Hill Master Plan calls for a total build-out of over

The FHWA approval of the interchange modifications and/or relocation constitutes a federal action, and as such, requires the NEPA process be followed. For this project, the preparation of the IMR and the NEPA documentation can be conducted concurrently through the next project development phase.

During the next project phase a review of funding sources will be necessary. Funding through FHWA, New Hampshire Turnpike Capital Program and local funds are potential sources to finance this project. I-293 is eligible for FHWA funding given that it is a “free section of the Turnpike” where motorists can access/egress the highway without paying a toll. Federal funds, if available, may also be used to support the infrastructure improvements along the access roads to the interchanges. Funding for right-of-way and/or construction within the Turnpike Capital Program would require specific legislative authority to the NHDOT and would likely be contingent on review of toll revenues to pay the expanded bonding authority. Other funding sources through local municipal contributions and/or public/private partnerships may be necessary for any desired system upgrades to the local roadway system.