

3.0 ALTERNATIVES ANALYSIS

This chapter provides an analysis of the various alternatives identified that could satisfy the Project's purpose and need. The screening process used to select a reasonable range of alternatives is described along with a detailed explanation of each alternative, including the No Build Alternative. A summary of the environmental consequences of each alternative is also provided, and the preferred alternative is identified. Many of the details regarding the screening process are described in the Rationale Report (CLD, 2000) and Scoping and Rationale Report (CLD, 2001) previously prepared for this Project.

3.1 Project Scoping

Scoping involves the identification of the issues and range of alternatives to be considered in the DEIS. As outlined in the 2007 DEIS, scoping was achieved through meetings, telephone calls, and correspondence with federal, state, and local agencies and officials, with additional input from a CATF and the general public. In addition, two formal scoping meetings were held during the daytime and evening on July 30, 1998, which included representatives from the Office of the Governor of NH, U.S. Congressmen, State Senators and Representatives, Derry Town Council, Londonderry Town Council, Towns of Derry and Londonderry, Derry Development and Preservation Corporation, CATF, Derry Conservation Commission, Derry Citizens Commission, citizens of Derry, Derry MS Corporation, SNHPC, NHDOT, EPA, the U.S. Fish and Wildlife Service (USFWS), and local newspapers.

At the scoping meetings, the Project's purpose and need were discussed, as well as the limits of the Project study area, issues associated with access routes extending to the west of I-93, the public involvement process, anticipated additional future meetings, and an explanation of the steps required as part of the NEPA process. Also discussed were the potential areas of impacts and the reasonable range of alternatives to be studied in the DEIS. The scoping meeting also provided opportunities for federal and state agency representatives, local groups, and public officials to provide guidance on issues salient to the DEIS study. Following are some of the issues identified during this early stage of the process:

- Westerly access
- Need for the Project, including the separate traffic and economic development components
- Coordination with I-93 widening project
- Construction costs
- Prime wetlands
- Transportation demand management studies
- Statewide traffic model
- Secondary impacts
- Parks, recreation areas, and historic properties
- Section 6(f) properties

- Secondary road improvements
- Project funding
- Traffic growth

Additional issues were identified and considered throughout the screening of Project alternatives.

3.2 Development of Conceptual Corridors

Early in Project planning, a number of conceptual corridors for a new interchange location and connecting roadways were identified. Each corridor was evaluated based on engineering, environmental, cultural, topographic, and socioeconomic constraints. The following resources or issues were considered: water resources, including prime wetlands and 100-year floodplains; wildlife resources; existing land use and zoning; prime farmlands and orchards; hazardous materials sites; steep slopes; tax map data; historic and archaeological resources; and Section 4(f) resources.

As noted in the 2007 DEIS, a 300-foot corridor width was used to represent the potential physical characteristics associated with a new location alternative and for the initial screening of alternatives from an environmental impact standpoint. This width was based on the likely required cross-section of the proposed roadway needed to serve projected traffic volumes, as well as the design criteria outlined in the 2007 DEIS. These preliminary design criteria used to develop potential highway alternatives, as well as upgrade options for existing highways, are based on American Association of State Highway and Transportation Officials (AASHTO) policy and the NHDOT Highway Design Manual (NHDOT, 2007).

3.3 Alternative Corridors Considered

Conceptual corridor alternatives considered during the screening process for the 2007 DEIS include (1) upgrade existing roadways, (2) new I-93 interchange/connector road options, and (3) combinations of 1 and 2.

3.3.1 Upgrade Existing Roadway Facilities

This alternative consists of improving existing roadway facilities rather than constructing new facilities on new locations. Consideration was given to satisfying the purpose and need for the Project by upgrading NH 102 and certain other existing roads where traffic analysis indicated a need for improvements. Improvements would include substantial highway and traffic control measures to eliminate or reduce existing deficiencies.

3.3.2 New Location Alternatives

These alternatives consist of the construction of a new interchange on I-93 with connecting roads to major arterials to the east. The intent of the environmental review of the study area west of I-93 was to consider the implications of a future westerly extension with a proposed new interchange, and to consider an adjustment of the interchange location if it would better suit a future westerly extension. Therefore, by mapping environmental constraints between I-93 and NH 128, potential new interchange locations were located in positions that did not preclude construction of a future westerly connection. However, any westerly connection to a proposed new interchange would not meet the stated purpose and need of this study and would require an

approval action from FHWA and NHDOT, and an independent environmental document pursuant to NEPA. The major arterials potentially affected by a new location alternative would include portions of NH 28 and/or NH 28 Bypass. The connecting roads could use portions of existing ROW, when feasible, or be on new locations. Combinations of alternatives were also considered.

3.3.3 Combinations of Alternatives

Combinations of alternatives were evaluated for their ability to meet the Project purpose and need. For example, combinations of new corridors, links, and a new I-93 interchange location, as well as upgrade alternatives with other improvements to existing roadways, were also evaluated.

3.4 Alternative Corridor Screening

The 2007 DEIS provides a detailed description of the identification of conceptual alternative corridors, their initial screening, and the resulting alternative corridors. The corridors were then screened in two phases to develop the five Build Alternatives considered in this SDEIS.

Initially, 24 corridors, including four possible interchange locations, were proposed for possible study. After discussion with CATF, TAC, and resource agencies, the number of possible combinations of links expanded to an investigation of 47 corridors. These 47 initial alternative corridors were screened for predetermined environmental and cultural resource impacts through a geographic information systems (GIS) analysis and the evaluation of projected traffic usage and benefit. The October 7, 1999, CATF meeting condensed the number of alternatives from 47 corridors to 11. Six of the 11 alternatives included access to I-93 from the west, while the other alternatives included only alternatives that provided access to the points east of I-93. The 2007 DEIS provides the rationale for screening out 36 of the original 47 conceptual corridors.

The 11 remaining alternative corridors were presented and discussed at a TAC meeting held on October 26, 1999, marking the start of the final screening process. As noted in the 2007 DEIS, the initial 47 corridors were rescreened, and an alternative was eliminated if it exceeded several of the following, newly established impact thresholds:

- Wetlands–10 acres
- Prime wetlands–1 acre
- Wildlife habitat–20 acres
- Hazardous waste sites–10 sites
- Land use/economy–moderately or seriously incompatible
- Potential displacements–50 buildings
- Historic resources–10 buildings and/or serious impacts on the Derry Village Historic District

Based on these thresholds, seven of the 11 alternative corridors were eliminated; however, three alternatives that had previously been eliminated were brought back into the analysis because the thresholds were not exceeded. The TAC determined that the following seven alternatives as

outlined in the 2007 DEIS would remain for further consideration and screening in stage two of the final screening process.⁴

- Alternative Corridor 9 (Segments A, C, C', D, K' [Upgrade]–From NH 128 to NH 28 to Ross' Corner to Tsienneto Road to NH 102)
- Alternative Corridor 10 (Segments C, C', D, K' [Upgrade]–From I-93 to Exit 5 to NH 28 to Ross' Corner to Tsienneto Road to NH 102)
- Alternative Corridor 16 (Segments H', D', D, K'–From I-93 to the powerline corridor to NH 28 to Ross' Corner to Tsienneto Road to NH 102)
- Alternative Corridor 22 (Segments L', L, B' [New Location]–From I-93 to the powerline corridor to NH 102 to north of Beaver Lake)
- Alternative Corridor 24 (Segments L', K, K'–From I-93 to Madden Road to Ross' Corner to Tsienneto Road to NH 102)
- Alternative Corridor 32 (Segments I', D', D, K'–From I-93 to the powerline corridor to NH 28 to Ross' Corner to Tsienneto Road to NH 102)
- Alternative Corridor 37 (Segments N, O, O' [Upgrade]–NH 102 Upgrade from I-93 to north of Beaver Lake)

Stage two of the final screening process involved re-running the SNHPC traffic model and considering the impacts of each segment within the seven alternatives. After re-running the SNHPC traffic model, the seven remaining alternatives were discussed with the TAC at a meeting on November 15, 1999. Based on these modeling results, it was determined that an upgrade of NH 28 would not effectively reduce the amount of traffic along NH 102. Therefore, Alternatives 9 and 10 were eliminated.

At this meeting, it was also determined that a segment of Alternative 22 (Segment B') would substantially alter the character of two historic agricultural areas (English Range and Chester Road). As a result, Segment B' was modified, and the resulting modified Alternative 22 was retained for analysis, while the original Alternative 22 was eliminated.

In addition, the TAC agreed to eliminate Alternative 16 because it lacked a feasible future western alternative. It was also agreed that Alternative 32 should remain due to the lack of substantial impacts represented in the matrix and that a modified Alternative 32, in addition to the original Alternative 32, would be studied. Alternative 32 Modified consists of Segment I', continuing to Segment D', and then to Segment D, Segment L, Segment B', and finally to Segment B.

Five alternatives remained after the screening process was completed:⁵

- Alternative Corridor 22 Modified (Segments L', L, B', B [New Location]–From I-93 to the powerline corridor to Tsienneto Road to the intersection with NH 102). This alternative was renamed Alternative A.

⁴ These corridors are shown on Figure 2.4-1 of the 2007 DEIS.

⁵ These corridors are shown on Figure 2.4-2 of the 2007 DEIS.

- Alternative Corridor 24 (Segments L', K, K'–From I-93 to Madden Road to Ross' Corner to Tsienneto Road to NH 102). This alternative was renamed Alternative B.
- Alternative Corridor 32 (Segments I', D', D, K'–From I-93 to the powerline corridor to NH 28 to Ross' Corner to Tsienneto Road to NH 102). This alternative was renamed Alternative C.
- Alternative Corridor 32 Modified (Segments I', D', D, L, B', B–From I-93 to the powerline corridor to NH 28 to Ashleigh Drive to the powerline corridor to Tsienneto Road to the intersection with NH 102). This alternative was renamed Alternative D.
- Alternative Corridor 37 (Segments N, O, O'–Minor upgrade of NH 102 from I-93 to north of Beaver Lake). This alternative was renamed Alternative F.

Regarding Alternative F, although initial planning efforts included Segments N, O, and O' in Alternative Corridor 37, the subsequent analysis of traffic volumes for NH 102 east of NH 28 Bypass noted that the existing road design was adequate to accommodate the Project traffic volumes. As a result, Segments O and O' were no longer included as part of this alternative, leaving only Segment N.

3.5 Identification of the Reasonable Range of Alternatives

The next step in the screening process involved the determination of a reasonable range of alternatives that could satisfy the purpose and need of the Project. At a regulatory/resource agency meeting held on November 17, 1999, USACE stated that its basic Project purpose that would satisfy its Highway Methodology process was *“To improve the safety and efficiency of traffic flow along NH 102 in the vicinity of Derry and Londonderry and to provide improved interstate access for commercial and industrially zoned lands in both Derry and Londonderry”* (Appendix A).

In 2006, a letter from USACE affirmed the basic purpose of the Project as follows: *“to reduce congestion and improve safety along NH 102 from I-93 easterly through downtown Derry, and to promote economic vitality in the Derry-Londonderry area.”* As noted in the 2007 DEIS, the reasonable range of alternatives includes Build Alternatives A, B, C, D, and F.

By letter dated December 12, 2005, USACE formally acknowledged, for purposes of its Section 404 permitting, these alignments as constituting the reasonable range of alternatives, along with the No Build Alternative. Under NEPA requirements, the No Build Alternative must be reviewed and considered as an alternative to provide a means of comparison against other alternatives analyzed as part of this Project.

3.6 Description of the Alternatives Evaluated in This SDEIS

Section 3.6.1 describes the No Build Alternative, and Section 3.6.2 describes the Build Alternatives A, B, C, D, and F. In addition, Section 3.6.3 evaluates the Transportation Systems Management (TSM) and Transportation Demand Management (TDM) Alternatives. Appendix D provides the Interchange Justification Report prepared in compliance with Title 23, USC, Highways Section 111 (23 USC §111) and FHWA's May 2017 Policy on Access to the Interstate System (FHWA, 2017a). The intent of this policy is to “preserve and enhance the Interstate

System to meet the needs of the 21st Century by assuring that it provides the highest level of service in terms of safety and mobility” (FHWA, 2017a).

3.6.1 No Build Alternative

The No Build Alternative assumes that no major new construction would occur except for projects that are already planned and programmed. Table 3.6-1 lists the planned and programmed transportation projects included in the traffic model for the No Build Alternative. In addition, as noted in the *Land Use Scenarios Technical Report* (Appendix B), known developments and background population and employment growth projected through 2040 are included in the No Build Alternative.

Table 3.6-1. Projects Included in the No Build Alternative

Community	Project	Project No.	Part of Regional Transportation Plan
Bedford	NH 101—Widen NH 101 to 5 Lanes from NH 114 up to Wallace Road	13953	
Bedford	NH 101—Widen NH 101 to 5 Lanes from Wallace Road up to Amherst TL		Yes
Bedford	US 3—Widen US 3 to 5 Lanes from Hawthorne Drive North to Manchester Airport Access Road	40664	
Bedford-Manchester	F.E.E. Turnpike—Improvement to Bedford Mainline Toll Plaza to Institute Open Road Tolling	16100	
Nashua-Manchester-Bedford	F.E.E. Turnpike—Widen existing 2-Lane Sections of the Turnpike to a 3-Lane Typical From Exit 8 in Nashua to I-293 in Bedford	13761	
Chester	NH 102—NH 102/North Pond Road Intersection Improvements		Yes
Hooksett	US 3/NH 28—Widen US 3/NH 28 to 5 Lanes from Martins Ferry Road to West Alice Avenue	29611	
Hooksett	US 3/NH 28—Construct Southern Segment of US 3/NH 28 Alternate Bypass		Yes
Hooksett	US 3/NH 28—Construct Northern Segment of US 3/NH 28 Alternate Bypass		Yes
Hooksett	Widen US 3/NH 28 to five Lanes from Legends Drive to Hunt Street		Yes
Hooksett	Hackett Hill Road—Reconstruct intersection of NH 3A/Hackett Hill Road	14950	
Hooksett	NH 3A—Reconstruct and Widen from Commerce Road North to Goonan Road	24862	
Londonderry	NH 28—Widening NH 28 from NH 128 to Page Road		Yes
Londonderry	NH 102—Widen NH 102 to 4 Lanes from Hudson Town Line to NH 128 ^a —Lower Corridor		Yes

Community	Project	Project No.	Part of Regional Transportation Plan
Londonderry	NH 102—Widen NH 102 to 5 Lanes from I-93 East to Londonderry Road—Upper Corridor		Yes
Londonderry	NH 102—Widen NH 102 to 6 Lanes from I-93 to NH 128 ^a —Central Corridor		Yes
Londonderry	Intersection Improvements at NH 28/NH 128 for Safety and Traffic Flow		Yes
Manchester	I-293—Reconstruction of Exit 4 on I-293		Yes
Manchester	I-293—Reconstruction and Widening of Exit 6 (Amoskeag)	16099A	
Manchester	I-293—Reconstruct Exit 7	16099B	
Salem-Manchester	I-93—Reconstruct and Widen Mainline, Environmental Impact Study and Final Design From Mass S/L in Salem to I-293 in Manchester. Capacity Improvements, Reconstruction, and Widening from North of Exit 3 to I-293	10418C	
Salem-Manchester	I-93—Northbound and Southbound Mainline Weigh Station to Kendall	14633B	
Salem-Manchester	I-93—Exit 4 Ramps, Northbound and Southbound Mainline, NH 102 Approach Work	14633D	
Salem-Manchester	I-93—Northbound and Southbound Mainline, Exit 5 to I-293 Split (Londonderry & Manchester)	14633H	
Salem-Manchester	I-93—Northbound and Southbound Mainline, Exit 4 and 5 (Londonderry)	14633I	
Salem-Manchester	I-93—Exit 1 to Exit 5—Construct 4th Lane Northbound and Southbound	14633J	
Salem-Manchester	I-93—Final Design and ROW for I-93 Salem to Manchester	10418X	
Windham	NH 111—Corridor Improvements Within Town Center (Construction not in 10-year plan)	40663	
Windham	NH 28—Intersection NH 28/Roulston Road Improvements	40665	

Source: FY 2017–2020 Transportation Improvement Program, FY 2017–2026 Ten-Year Transportation Improvement Plan, and 2017–2040 SNHPC Regional Transportation Plan.

3.6.2 Build Alternatives

Alternative A

Alternative A includes a corridor that is approximately 3.2 miles in length between the new, proposed I-93 Exit 4A interchange and eastern Derry. There would be approximately 1 mile of roadway construction on a new alignment and 2.2 miles of existing roadway reconstruction. It would originate from the southern I-93 Exit 4A interchange location and travel southeast along

new alignment through a wooded area to Folsom Road, near its intersection with North High Street and Madden Road. This alternative would continue to follow Folsom Road to Ross' Corner (Manchester Road/NH 28) and continue on Tsienneto Road across NH 28 Bypass to its intersection with NH 102, adjacent to Beaver Lake. Alternative A is shown on Figures 3.6-1 and 3.6-2. Specific improvements are outlined as follows:

I-93 Exit 4A to Ross' Corner

The section would contain a minimum of five lanes with additional lanes at intersections as required, mostly new construction.

Ross' Corner Reconstruction

Ross' Corner would require an additional eastbound through, left-turn lane and right-turn lane and an additional westbound through-lane to handle the traffic added by Alternative A. The intersection of Tsienneto Road and Pinkerton Street would also require additional through-lanes and would be signalized. The close proximity of NH 102 and Pinkerton Street will require that the signals are coordinated.

Tsienneto Road from Ross' Corner to NH 28 Bypass

The portion is an existing three-lane roadway (one lane in each direction with a middle turn lane) that would not be altered by the Project.

NH 28 Bypass/Tsienneto Road Intersection Reconstruction

This intersection would also require an additional through-lane in each direction on Tsienneto Road.

Tsienneto Road from NH 28 Bypass to NH 102

No work is proposed along a 1,600-foot long gap section from the NH 28 Bypass approach widening to Barkland Drive. Beginning at Barkland Drive, improvements extend easterly for 3,200 feet to NH 102. Improvements will involve construction of 11-foot lanes with 4-foot wide shoulders (5 feet adjacent to sidewalks), modification of horizontal and vertical curves to bring the alignments into conformance with design standards, and collection of stormwater with the provision of treatment at outfalls wherever feasible.

Tsienneto Road/NH 102/North Shore Road Intersection Reconstruction

This intersection would need to be signalized, with added through lanes in both directions on NH 102, and an added left turn lanes at the Tsienneto and North Shore Road intersections. The close proximity of North Shore Road and Tsienneto Road will require that the signals are coordinated. The left turn lane on NH 102 would be extended to the north to also provide for left turns into English Range Road.

Alternative B

The Alternative B corridor is approximately 3.4 miles in length between the new, proposed I-93 Exit 4A interchange and eastern Derry. With the exception of an 800-foot long section of Ashleigh Drive that will be reconstructed, the remaining 3.2-mile corridor would consist of

roadway construction on new alignment. It would originate from a new southern I-93 Exit 4A interchange and travel northeast along a new alignment through a wooded area to the intersection of Ashleigh Drive and NH 28. From this intersection, this alternative would extend northeast towards the intersection of London Road and NH 28 Bypass and then continue on new alignment to the intersection of Tsienneto Road and NH 102. Alternative B is shown on Figures 3.6-3 and 3.6-4. Specific improvements would be as follows:

I-93 Exit 4A to Ashleigh Drive/NH 28 Intersection

The section leading from the new, southern I-93 Exit 4A interchange to the intersection of Ashleigh Drive and NH 28 would contain five lanes of mostly new construction.

Ashleigh Drive/NH 28 Intersection Reconstruction

The new through roadway connecting from the west traveling east would consist of two through lanes, two exclusive right-turn lanes and a left-turn lane. Ashleigh Drive from the east traveling west would change from a through-left and exclusive right turn to an exclusive left turn, two through lanes and an exclusive right-turn lane. NH 28 north would require an additional left-turn lane.

Corridor from NH 28 to NH 28 Bypass

The portion would follow a new alignment along Ashleigh Drive to the powerline ROW, then along the powerline ROW to the NH 28 Bypass. This section would consist of one through lane in each direction and a median lane to accommodate left turns into existing commercial driveways and the remaining section of Ashleigh Drive. This median area would be available to accommodate left turns into future Corridor access points allowed between the aforementioned Ashleigh Drive intersection and NH 28 Bypass.

NH 28 Bypass Intersection Construction

A new signalized intersection would be constructed with all four approaches containing a left-turn lane. The southbound approach would contain a right-turn lane, and the remaining approaches would contain shared through/right-turn lanes.

Corridor from NH 28 Bypass to NH 102

This section would follow the powerline ROW, then head southeast through a wooded section to intersect with Tsienneto Road and NH 102. It would contain two lanes.

Corridor/Tsienneto Road Reconfiguration

Tsienneto Road would be reconfigured to connect to the Corridor Road as a “T” shaped intersection. Exclusive left- and right-turn lanes would be provided on Tsienneto Road.

Corridor/NH 102/North Shore Road Intersection

This intersection would need to be signalized, with added through lanes in both directions on NH 102, and added left-turn lanes at the Corridor and North Shore Road intersections. The proximity of North Shore Road and Tsienneto Road requires coordinating the signals. The left-turn lane on NH 102 would be extended to the north to also provide for left turns into English Range Road.

Alternative C

The Alternative C corridor is approximately 3.7 miles in length between the new, proposed I-93 Exit 4A interchange and eastern Derry. Approximately 2.9 miles of corridor would be on new alignment, while approximately 0.8 mile would reconstruct existing roadways. The alternative would start from a new northern I-93 Exit 4A interchange and travel east approximately 0.7 mile along a powerline ROW to NH 28. Following NH 28 south to the intersection of Ashleigh Drive, it would follow the same alignment as Alternative B to the intersection of Tsienneto Road and NH 102. Alternative C is shown on Figures 3.6-5 through 3.6-7. Specific improvements would be as follows:

I-93 Exit 4A to NH 28 Intersection

The section leading from the northern I-93 Exit 4A interchange option to the intersection with NH 28 of Ashleigh Drive and NH 28 would contain five lanes. Between Exit 4A and Scobie Pond Road, there would be new roadway construction that would tie into NH 28, an existing five-lane roadway.

Corridor/NH 28 Intersection Reconfiguration

NH 28 would be reconfigured to connect into the Corridor Road in a “T” shape signalized intersection. Single left- and right-turn lanes would be provided on southbound NH 28. On the Corridor Road, two through lanes and an exclusive left-turn lane into NH 28 would be provided traveling south. Two through lanes and an exclusive right-turn lane would be provided traveling northbound on NH 28 at the intersection.

NH 28 to Ashleigh Drive Intersection

The section would contain five lanes. Just south of the new NH 28 intersection, the new roadway construction would tie into existing NH 28. NH 28 currently consists of a two-lane roadway south to its intersection with Scobie Pond Road. From Scobie Pond Road to Ashleigh Drive, it consists of a five-lane section (two through lanes in each direction and a center-turn lane).

Ashleigh Drive/NH 28 Intersection

No changes to this intersection would be required.

Corridor from NH 28 to NH 28 Bypass

This portion would be the same as Alternative B.

NH 28 Bypass Intersection Construction

This intersection would be the same as Alternative B.

Corridor from NH 28 Bypass to Tsienneto Road

This portion would be the same as Alternative B.

Corridor/NH 102/North Shore Road Intersection Reconstruction

This portion would be the same as Alternative B.

Alternative D

The Alternative D corridor is about 3.9 miles in length between the new, proposed I-93 Exit 4A interchange and eastern Derry. Within this corridor, about 0.8 mile would be on new alignment, and 3.1 miles of existing roadways would be reconstructed. The alternative would begin from a new northern I-93 Exit 4A interchange and travel east approximately 0.7 mile along a powerline ROW to NH 28. Following NH 28 south to Ross' Corner, the corridor would then follow the same path as Alternative A to the intersection of Tsienneto Road and NH 102. Alternative D is shown on Figures 3.6-8 through 3.6-10. Specific improvements would be as follows:

I-93 Exit 4A to Ashleigh Drive Intersection Reconstruction

This portion would be the same as Alternative C.

NH 28/Ashleigh Drive Intersection

On the NH 28 northbound approach, an exclusive right-turn lane would be provided.

NH 28 to Folsom Road/Tsienneto Road Intersection

No changes to the existing five-lane section would be required.

NH 28/Folsom Road/Tsienneto Road Intersection Reconstruction

On NH 28 southbound, a second through and left-turn lane would be provided. Eastbound on Folsom Road, a second through-lane would be provided and westbound on Tsienneto Road a second right-turn lane would be provided. The intersection of Tsienneto Road and Pinkerton Street would also require additional through-lanes on Tsienneto Road and require signalization. The proximity of NH 28 and Pinkerton Street requires coordinating the signals.

Tsienneto Road from Ross' Corner to NH 28 Bypass

This portion would be the same as Alternative A.

NH 28 Bypass/Tsienneto Road Intersection Reconstruction

This intersection would be the same as Alternative A.

Tsienneto Road from NH 28 Bypass to NH 102

This portion would be the same as Alternative A.

Tsienneto Road/NH 102/North Shore Road Intersection Reconstruction

This intersection would be the same as Alternative A.

Alternative F

Alternative F focuses all improvements along the existing NH 102 corridor between Exit 4 at I-93 and downtown Derry. A two-way center left-turn lane would be constructed from Londonderry Road to Crystal Avenue/Birch Street (NH 28). The majority of existing on-street parking spaces would be lost to accommodate the center-turn lane. Alternative F is shown on Figures 3.6-11 and 3.6-12. Additional improvements in the study area would be as follows:

NH 102/Londonderry Road/St. Charles Street

Three approaches would be improved. The eastbound and westbound NH 102 approaches would include a new, left-turn lane and an additional through-lane. The southbound approach would include an extension to the existing right-turn lane. The signal would be upgraded to operate with the new lane geometry.

NH 102/Fordway/Madden Hill Road

Two approaches would be improved. The NH 102 eastbound approach would include a new right-turn lane, and the Fordway northbound approach would include a new left-turn lane. The signal would be upgraded to operate the new lane geometry. Also, there would be a three-lane cross-section along NH 102 from Valley Street, west of Fordway, and between Fordway and Crystal Avenue/Birch Street (NH 28).

NH 102/NH 28 (Crystal Avenue/Birch Street) Intersection Reconstruction

On NH 102 eastbound a new right-turn lane and westbound a new through lane would be provided. On Birch Street northbound, a second left-turn lane would be provided. The NH 102 approach widening from the east ends 500 feet east of the Birch Street/Crystal Avenue intersection. From the beginning of this approach widening, the work extends 4,200 feet to an ending point 100 feet before the Derry Rotary. No work on the rotary is included. Work includes one lane in each direction, shoulders on both sides and a sidewalk on the north side. On the south side, sidewalk would extend east for 1,700 feet, to a point 200 feet west of Hood Road that intersects on the north side of NH 102.

3.6.3 Other Alternatives

This section discusses other alternatives considered previously during alternatives screening and reconsidered during this SDEIS process. These alternatives would not meet the purpose and need and therefore are not analyzed in detail in the remainder of this SDEIS.

Transportation Systems Management

Potential TSM projects in the study area include signaling intersections that have poor LOS, adding turning lanes to intersections, and coordinating adjacent signalized intersections. These and other similar improvements could ease the flow of traffic and improve the LOS at specific locations in the area but would not have a substantial effect on overall traffic volumes.

Therefore, downtown Derry traffic issues, the diversion of traffic to local routes to avoid NH 102, and related safety issues would not be addressed by a TSM alternative. In addition, such an alternative would not have the potential to encourage economic vitality in Derry and Londonderry. However, TSM measures are incorporated into all five Build Alternatives through intersection improvements and signal timing changes to make the system work more efficiently.

Transportation Demand Management

The TDM alternative concept includes measures to improve efficiency of the existing transportation system by changing traveler behavior. This concept does not typically involve major capital improvements. TDM efforts include methods to traffic demand during peak periods by developing park-and-ride lots and ride-share programs (e.g., carpools or vanpools),

encouraging flex-time work programs with employers and compressed work week schedules, and encouraging alternative modes of transportation such as bicycling and bussing.

Park-and-ride facilities situated at I-93 Exit 4 and Exit 5 serve express service to Boston. These facilities most likely attract residents from the east side of Derry because that is the closest access to a transit option serving Boston. Creating a new park-and-ride facility on the east side of Derry may reduce a small portion of peak hour traffic by capturing the trips; however, the bus companies intentionally operate along the I-93 corridor and serve facilities at the interchanges to minimize lost travel time. It would be difficult for the bus companies to agree to travel 2 miles off the I-93 corridor (4 miles round trip) to service a new park-and-ride facility near the NH 28 Bypass and NH 102 intersection. This extra travel time would most likely impact bus ridership north of Derry and add new bus traffic to downtown Derry.

Local bus service currently is offered through a specialty shuttle operation that operates as an on-call service. If the shuttle trips were to operate on a fixed schedule to serve the existing park-and-ride facilities in Londonderry, that might help reduce the pass-through vehicle trips in downtown Derry and replace them with frequent transit trips. However, it is unlikely that fixed shuttle service could operate through Derry because the land use density is not conducive to fixed route bus service. If the traffic analysis zones (TAZs) representing the corridor through downtown Derry were combined, the forecasted 2040 housing and population would equate to an average of 2.1 dwelling units per acre and 3.1 jobs per acre. The minimum recommended density requirements to operate a bus through a corridor is between 5–10 dwelling units per acre and between 2–5 jobs per acre (FTA, 2014). The forecasted dwelling unit densities are below and the forecasted job densities are equal to the minimum recommended density. In addition, due to the rural nature of the area, the users of this operation would likely be limited to commuters destined to Boston or Woodmont Commons, the largest employment areas accessible by the service. Therefore, the potential to offer much downtown Derry through-traffic relief would be minimal.

Other transit options include Uber and Lyft services, which operate as a taxi or carpool service if more than one passenger shares a trip. Any reduction in vehicle trips through downtown Derry would be minimal because the land use density is not conducive to a high volume of carpools. TDM will not be evaluated further in this SDEIS.

3.7 Comparison of Alternatives

The following sections provide a summary of environmental considerations, Project costs, and traffic for each Build Alternative as well as the identification of and rationale for the preferred alternative.

3.7.1 Summary of Impacts

Table 3.7-1 presents environmental considerations used to evaluate the alternatives. Chapter 4 (*Affected Environment and Environmental Consequences*) of this SDEIS presents a detailed discussion of the impacts associated with the Build Alternatives and the No Build Alternative. In addition, as noted in Table 3.7-1, the effect on 2040 traffic volumes in downtown Derry and the potential for economic development were used to consider how well the alternatives meet the purpose and need for the Project. Finally, Project costs were also considered in the identification of a preferred alternative.

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Table 3.7-1. Comparison of Build and No Build Alternatives

Resource	Impact Calculation	Alternative					
		No Build	A	B	C	D	F
Purpose and Need	Change in 2040 traffic through downtown Derry (NH 102) compared to 2040 No Build Conditions: NH 102 East of Griffin Street	2040 AAWDT: 18,958	-19%	-24%	-22%	-8%	+18%
	Incremental increase in employment in Derry and Londonderry ^a	Derry: 10,479 Londonderry: 20,875	Derry: 346 Londonderry: 4,335	Derry: 346 Londonderry: 4,335	Derry: 0 Londonderry: 0	Derry: 0 Londonderry: 0	Derry: 0 Londonderry: 0
General	Length of roadway (miles)		5.96	5.59	6.25	6.21	2.44
	Additional lane miles ^b		9.1	12.6	12.0	8.1	1.8
	Construction costs ^c		\$38,800,000	\$37,800,000	\$34,700,000	\$35,400,000	\$4,300,000
	Transmission line relocation costs		\$850,000	\$3,530,000	\$7,560,000	\$4,930,000	\$0
Socioeconomic Conditions ^d	Potential residential total acquisitions (number)		13	19	13	0	0
	Potential business displacements (number)		25	11	2	2	16
	Potential commercial total acquisitions (number)		4	2	4	4	2
	Total area of ROW taking (acres)		41.45	52.81	53.35	43.20	1.17
Noise ^e	Single-family (number of impacted receptors)	66	83	60	56	67	66
	Multi-family/apartment (number of impacted receptors)	41	44	33	34	38	42
	Community facility/park (number of impacted receptors)	10	11	8	9	10	11
	Commercial w/outdoor use (number of impacted receptors)	0	0	0	0	0	1
	Total noise impacts	133	138	101	99	115	120
Soils	Total area of disturbance (acres)		75.16	78.69	89.91	93.18	21.51
Contaminated Properties and Hazardous Materials	Known hazardous sites (number) within ASTM search radii		23	18	17	27	41
	Potential hazardous sites (number) within ASTM search radii		28	24	32	56	78
Surface Waters and Water Quality	New stream crossings (number)		4	6	0	0	1
	Existing stream crossings (number)		5	2	4	6	3
	Stream impacts (linear feet)		2,281	1,341	562	557	153
	Stream impacts (square feet)		26,823	20,524	16,202	16,171	2,060
	Lane-miles for chloride loading		7.6	11.1	10.6	8.3	1.3
Wetlands and Vernal Pools	Non-prime non-vernal pool wetlands (acres)		3.12	8.85	8.40	3.60	0.00
	Prime wetlands (acres)		0.07	0.06	0.06	0.03	0.00
	Vernal pools (acres)		1.15	1.09	0.27	0.29	0.00
	Wetlands total (acres)		4.34	10.00	8.73	3.92	0.00
	Vernal pools (number)		8	8	3	4	0

Resource	Impact Calculation	Alternative					
		No Build	A	B	C	D	F
Groundwater	Aquifers, surface area of impacts, 0-1,000 sq ft/day (acres)		23.17	13.56	32.67	37.66	19.15
	Aquifers, surface area of impacts, 1,000-2,000 sq ft/day (acres)		0.00	0.00	0.00	0.00	0.16
	Public wellhead protection areas (number)		6	5	5	7	0
	Wellhead protection areas (new impervious, acres)		0.16	1.16	1.16	0.16	0
	Private wells (number)		0	2	2	0	0
	Private wells (number within 150 ft)		21	16	14	18	4
Floodplains	Floodway (acres)		0.15	0.20	0.45	0.45	0.06
	100-year floodplain (acres)		0.45	0.90	1.87	1.84	0.31
	500-year floodplain (acres)		0.57	0.89	0.20	0.43	3.01
Plant Communities and Wildlife	Wildlife Action Plan (WAP) supporting landscapes (acres)		15.37	22.49	8.69	1.85	0.00
	WAP highest ranked wildlife habitat in biological region (acres)		0.00	0.00	0.17	0.17	0.00
Threatened and Endangered Species	State-listed rare plant and animal occurrences (number)		1	2	2	1	0
Cultural Resources	Archaeological Resources		No impacts to known sites. Low probability of unknown resources.	No impacts to known sites. Low probability of unknown resources.	No impacts to known sites. Low probability of unknown resources.	No impacts to known sites. Low probability of unknown resources.	No impacts to known sites. Low probability of unknown resources.
	Historic Resources ^f		Adverse effect on Manchester & Lawrence Railroad Historic District	Adverse effect on Manchester & Lawrence Railroad Historic District	Adverse effect on the Reed Paige Clark Homestead properties (LON0114)	Adverse effect on the Reed Paige Clark Homestead properties (LON0114)	Adverse effect upon historic resources within the Broadway Historic District (Area B)
Parks, Recreation, and Conservation Lands	Parks and Conservation Lands (name, area)		Rider Fields (0.02 acre)	Rider Fields (1.31 acres)	Rockingham Road Conservation Site (0.035 acre) Dumont Conservation Site (0.048 acre) Rider Fields (1.31 acres)	Rockingham Road Conservation Site (0.035 acre) Dumont Conservation Site (0.048 acre) Rider Fields (0.02 acre)	Hoodcroft Golf Course (0.180 acre)
	Trails and Bicycle Paths (name)		Derry Rail Trail (Planned)	Derry Rail Trail (Planned)	Londonderry Rail Trail (Paved) Londonderry Rail Trail (Unpaved)	Londonderry Rail Trail (Paved) Londonderry Rail Trail (Unpaved)	Rail Trail/Path (On-Road Bicycle Route)

^a The employment numbers for the No Build Alternative represent the 2040 employment projection for the five-town study area. The employment numbers for Build Alternatives are incremental and would be added to the 2040 employment projections under the No Build Scenario.

^b Additional lane miles have not been used for chloride application purposes.

^c The values for Alternative A are based on an alternative comparison level design to determine the preferred alternative. Once Alternative A was identified as the preferred alternative, the design was advanced further and refined in response to a more detailed design approach.

^d The value of the residential relocations and business displacements will be evaluated.

^e Noise results shown account for I-93 widening barriers, except sections of barriers in conflict with the alternatives. Results do not include barrier modifications proposed for the Exit 4A Project.

^f Historic resources impacts based on NHDOT recommendations. State Historic Preservation Office concurrence is pending.

3.7.2 Description of and Rationale for the Preferred Alternative

To best address the traffic, economic, and safety issues, the Towns, NHDOT, and FHWA identified a preferred alternative. This preferred alternative, identified as Alternative A in this SDEIS, would include the following features:

- Construction of a new diamond interchange, located approximately 1 mile north of existing Exit 4, that would receive and direct traffic to the east side of I-93.
- Construction of approximately 1 mile of new roadway. This roadway would travel across currently undeveloped land to Folsom Road near its intersection with North High Street. This new roadway would be 72 feet wide from side to side, and would include four travel lanes that would be 11 feet-wide, with an 18-foot median to accommodate turn lanes with raised islands, and 5-foot shoulders.
- Reconstruction and improvements to approximately 1.6 miles of existing roadway, including sections of North High Street, Folsom Road, and Tsienneto Road, as well as sections of Franklin Street Extension, NH 28, Pinkerton Street, NH 28 Bypass, and NH 102. The specific improvements for each roadway segment are described in Section 3.6.2, but will generally include the addition of turning lanes, through-traffic lanes, traffic signals, and minor changes in roadway geometry.

Alternative A was selected as the preferred alternative based on the results of engineering, environmental, and socioeconomic studies (see Table 3.7-1 and Chapter 4). Advantages of Alternative A compared to the other Build Alternatives include lowest cost, including utilities; least acreage for ROW acquisitions; lowest wetland impacts of the alternatives that meet the purpose and need; and no impact on Wildlife Action Plan (WAP) highest ranked habitat.

The No Build Alternative and Alternative F do not meet the purpose and need of the Project. Although Alternative D would result in a modest decrease in traffic in downtown Derry (8 percent), it would not contribute to economic development. Alternative C would decrease the downtown Derry traffic the most (22 percent reduction); however, it would not contribute to economic development, and it is the most costly of the Build Alternatives (\$42,260,000).

Although Alternatives A and B both satisfy the traffic and economic development needs of the Project, Alternative A more closely follows existing roads than Alternative B, and Alternative A has considerably less impact on wetlands, wildlife habitat, and parks and recreational lands than Alternative B. For example, Alternative A would impact 4.34 acres of wetlands, and Alternative B would impact 10.0 acres of wetlands. Alternative A would impact 0.02 acre of Rider Fields, and Alternative B would impact 1.31 acres of Rider Fields.