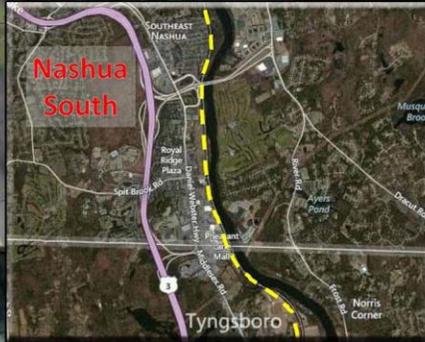


Appendix 5

TECHNICAL REPORT

Task 5: Preliminary Evaluation of Conceptual Alternatives and Recommended Alternatives for Detailed Evaluation

April 2014



New Hampshire

Capitol Corridor Rail & Transit Alternatives Analysis (Parts A & B)

State Project Numbers 16317 and 68067-A



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Table of Acronyms

AA	Alternatives Analysis
EA	Environmental Assessment
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
PAR	Pan Am Railways
TOD	Transit-Oriented Development

1 Project Purpose and Need Summary

Increasing transportation demand and growing concerns about mobility, economic development, and quality-of-life have led New Hampshire and Massachusetts citizens and officials to explore transit and/or intercity passenger rail service options in the 73-mile corridor (Capitol Corridor) between Boston, Massachusetts and Concord, New Hampshire.¹ The purpose of this Capitol Corridor Rail and Transit Alternatives Analysis (AA) Study is to evaluate a diverse set of rail and bus options to improve connectivity by leveraging existing transportation infrastructure, including Pan Am Railways (PAR), Route 3, and I-93. Investment in an improved transportation strategy is needed for several reasons:

- Projected population growth will result in increased roadway congestion
- New Hampshire’s existing transportation network does not effectively connect existing modes
- The regional economy is singularly dependent on roads for movement of goods and passengers
- Improved transportation options will attract employers to New Hampshire and improve employment options for New Hampshire residents
- Young New Hampshire professionals are leaving the area to be closer to employment and cultural/social opportunities associated with larger urban centers
- New Hampshire’s growing senior population needs more “car-light” mobility options
- Residential development patterns resulting from population growth may negatively impact the region’s existing quality-of-life
- The existing transportation network cannot accommodate increased levels of demand without negative environmental consequences

2 Task Objective

This report summarizes the detailed evaluation of the following 12 initial preliminary transit alternatives, plus the no build option:

- No Build (Base)
- Concord Regional Rail
- Concord Commuter Rail
- Manchester Regional Commuter Rail
- Manchester Commuter Rail
- Nashua Commuter Rail
- Nashua Minimum Commuter Rail
- Intercity 8
- Intercity 12

¹ The report “Task 2: Project Purpose and Need” (Appendix 2 to the AA Final Report) provides an in-depth evaluation of the Capitol Corridor’s historical, current, and future state, and how Massachusetts and New Hampshire citizens would benefit from a transit investment strategy responsive to transportation needs and the region’s economic, social, and environmental climate

- Intercity 18
- Expanded Base (increased bus service)
- Bus on Shoulder (existing service levels)
- Expanded Bus on Shoulder (increased service)

3 Evaluation Criteria

The Study team initially used the following evaluation criteria, listed in the original scope, to evaluate those alternatives:

- **Environmental impacts.** Are there any environmental fatal flaws that would, by themselves, be cause for eliminating an alternative?
- **Land use and economic development.** Relative to the other alternatives, how likely is it that an alternative would help promote desirable development patterns, in particular denser, walkable, mixed-use neighborhoods near transit stations, i.e., Transit-Oriented Development (TOD)?
- **Transportation impacts.** Compared with the other options, what is the average weekday ridership in terms of total boardings?
- **Financial cost.** What is the total capital cost (construction, equipment, stations, track right-of-way and signal upgrades, highway improvements) of each alternative?

While much of the assessment and ranking was qualitative and based on the Study team members’ extensive transit experience and knowledge of the Boston-Concord corridor, the team produced preliminary capital cost and ridership data to guide this early screening process. Numbers were later refined for Task 7 detailed analysis (Appendix 7 to the AA Final Report). Table 3.1 shows preliminary cost and ridership estimates used in this preliminary evaluation process.

Table 3.1: Preliminary Cost and Ridership Estimates

Alternative	Capital Cost (In Millions, 2014\$)	Ridership (Total Weekday Boardings)
Existing (Base) NH Transit Riders	\$0	2,400
No Build/Base	\$0	---
Concord Regional Rail	\$226	2,700
Concord Commuter Rail	\$206	3,020
Manchester Regional Commuter Rail	\$164	3,120
Manchester Commuter Rail	\$164	3,060
Nashua Commuter Rail	\$124	2,040
Nashua Minimum Commuter Rail	\$124	1,480
Intercity 8	\$162	1,460
Intercity 12	\$174	1,720
Intercity 18	\$174	2,040
Expanded Base	\$6	346
Bus on Shoulder	\$2	692
Expanded Bus on Shoulder	\$9	1,038

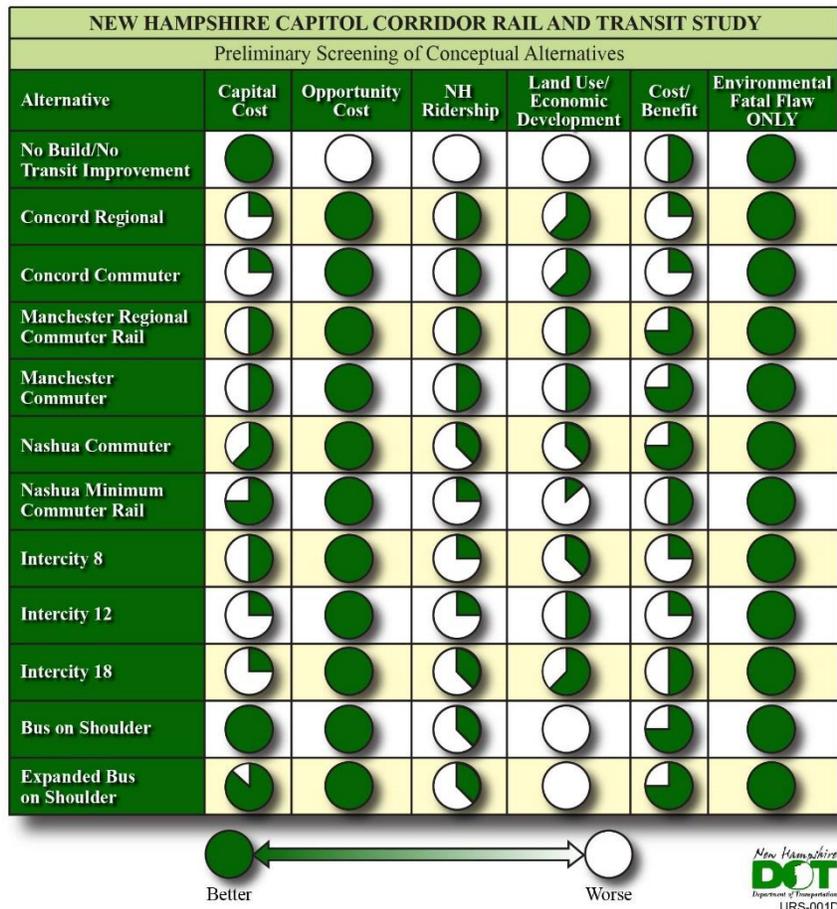
4 Alternative Evaluation

Based on the data above, professional judgment relating to environmental impacts, and land use and economic development potential, the Study team rated each alternative. In addition to those criteria, in consultation with the Federal Transit Administration’s (FTA’s) regional office staff in Cambridge, Massachusetts, the Study team added two additional evaluation criteria:

1. **Cost-benefit ratio:** how successfully does an alternative deliver greater benefits at a comparatively low cost?
2. **Opportunity cost:** weighed against the financial savings resulting from doing nothing (or doing relatively little), what are the resulting costs in terms of opportunities lost, for example, foregone development and additional transit options?

Figure 4.1 shows the ratings. Each alternative received a qualitative rating from best (full circle) to worst (empty circle), or, in most cases, somewhere in between. Ratings (and therefore rankings) are *relative to the other alternatives in the Capitol Corridor Study – rather than to any national standards or projects in other regions around the country.*

Figure 4.1: Alternative Ratings based on Preliminary Screening



5 Key Findings and Conclusions

5.1 Rail vs. Bus Tradeoffs: Cost and Development Impacts

Bus and rail alternatives can both perform well in terms of costs and benefits, but for very different reasons: bus options tend to rate low on cost (good) and benefit (not good) measures, while rail rates high on both.

In general, bus alternatives are far less expensive than rail projects. And for the Capitol Corridor, costs naturally rise as options move north from Lowell to Nashua, and then to Manchester and Concord.² However, in transit planning, benefits often rise with costs, and this is certainly true with the rail-bus tradeoffs in the Capitol Corridor. Thus, while rail costs are significantly higher than those for bus-based strategies, the benefits resulting from rail are also considerably greater, especially regarding beneficial land use and development impacts. As noted above, the type of development sought for this project is TOD, which is denser, mixed-use (commercial plus residential), walkable development near transit stations. Experience in the U.S. indicates that rail investments are more likely than bus investments to help spur that kind of desirable development. (That is not to say that bus facilities are not associated with development – Exit 5 on I-93 south of Manchester, for example – just not TOD, which is an objective of this Study.)

Naturally, as alternatives extend further to the north, total TOD potential increases with each city, with the greatest opportunities in Manchester, which already has major TOD elements, and Concord. Because of the station location at Crown Street, less opportunity exists in Nashua.

However, from a cost-benefit as opposed to benefit-only standpoint, alternatives providing service to Concord decline sharply north of Manchester, which effectively marks the peak of cost-benefit performance.

5.2 Opportunity Costs: The Cost of Doing Nothing

As noted above, after discussions with FTA, the Study team added an opportunity cost column to the evaluation matrix. Typically, in transit planning the focus is on the financial cost of implementing a project. However, for the Capitol Corridor Study, it is important to consider the costs of not making a transit investment. These include environmental costs and the costs to individuals and the broader population and economy from a lower quality-of-life that would result from not making a major transit investment.

Finally, while environmental impacts (positive and negative) are very important, for the purposes of screening alternatives in this early Study phase, the Study team considered only major negative impacts

² A potentially important caveat: the low cost for bus on shoulder alternatives assumes very limited highway improvements would be required in Massachusetts, where the feasibility of infrastructure requirements and strategy cost were being studied as of May 2014

that would be likely to disqualify alternatives. None were found. As the Study continued, Environmental Assessments (EAs) were completed (see Appendices 10a and 10b to the AA Final Report).

5.3 Intermediate Alternatives

The preliminary alternatives assessment helped guide selection of a set of alternatives to advance into more detailed analysis. Selection was also guided by input from two major public meetings in Manchester and Concord and by extensive discussions with public- and private-sector stakeholders (Task 1, Appendix 1 to the AA Final Report) in New Hampshire and Massachusetts.³ In addition, the decision on final alternatives followed extensive consultation with the FTA and the Federal Railroad Administration (FRA).

The seven alternatives that advanced to further analysis (intermediate alternatives) included four bus-only and three rail-plus-bus options as follows and depicted in Figure 5.1:

1. **No Build/Base.** Existing bus service from Concord and Manchester to Boston via I-93 and Route 3; no additional cost
2. **Bus on Shoulder.** Existing bus service using I-93 shoulders in Massachusetts
3. **Expanded Base.** Additional service on the existing system
4. **Expanded Bus on Shoulder.** Additional service, using the I-93 shoulders in Massachusetts
5. **Nashua Minimum Commuter Rail.** An extension of the MBTA Lowell line to North Station in Boston terminating in South Nashua; this is lowest-cost rail alternative of the initial 12 alternatives, retaining existing bus service on I-93 between Concord, Manchester, and South Station and Logan Airport in Boston and along Route 3
6. **Manchester Regional Commuter Rail.** An extension of the MBTA Lowell line terminating in downtown Manchester; when the decision on final options was made, this was judged to be the most cost-effective initial option; it would also retain existing bus service on I-93 and Route 3
7. **Intercity 8.** Intercity service from Concord to North Station overlaid on existing MBTA Lowell line service, operating similarly to the Amtrak Boston-Brunswick *Downeaster* service; this is the lowest cost of the original intercity alternatives and maintains all existing bus service on I-93 and Route 3

Each of the seven alternatives, except No Build, was defined in greater detail to help assure more accurate cost-benefit estimates. Detailed evaluation criteria were then developed in Task 6 (Appendix 6 to the AA Final Report) and were used to evaluate the alternatives in Task 7 (Appendix 7 to the AA Final Report), leading to a recommended strategy in Task 8 (Appendix 8 to the AA Final Report).

³ See Appendix 1 to the Capitol Corridor AA Final Report for a list of stakeholders

Figure 5.1: Diagrams Summarizing the Intermediate Alternatives

