Portland to Lewiston / Auburn & Montreal Intercity Passenger Rail Feasibility Study

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1.0 Introduction

The Maine Department of Transportation (MaineDOT) in cooperation with the Androscoggin Valley Council of Governments (AVCOG) and Northern New England Passenger Rail Authority (NNEPRA) have embarked on this study to identify potential intercity rail service extensions that could be implemented in the area northwest of Portland, Maine and beyond to Montreal, Canada. This study is being conducted in response to public input received in 2009 during the meetings associated with the Maine State Rail Plan. In these meetings, the public requested that the MaineDOT explore the possibility of re-establishing intercity rail corridors in areas of the state that had not yet been the focus of prior planning efforts.

As background, it is important to note the existence of the current and highly successful Amtrak *Downeaster* intercity service that operates between Boston, MA and Portland, ME. Further, recently, NNEPRA has received funding to implement an extension of the *Downeaster* service northeast beyond Portland to Freeport and Brunswick, ME. As discussed further below, the alternatives discussed in this study will build upon the existing and proposed enhanced service.

The analysis includes information necessary to identify the general feasibility of the proposed services. This includes documentation of each route's existing conditions, potential service plans, required infrastructure improvements, estimated costs for improvements, vehicles and operations, and the estimated ridership of each service.

After providing a summary of the major findings, this report begins in Chapter 2 with a description of the differences between various public transportation services that operate in Maine and throughout the United States in order to provide a common understanding of the services being considered in this study. In Chapter 3, a summary of the existing conditions for each route is provided. Chapter 4 provides a detailed description of each scenario being considered. Chapters 5 though 8 identify for each scenario the design of the service, required infrastructure upgrades, capital costs and operating costs. Chapter 9 provides a summary of the study and findings.

2.0 Purpose and Need

The purpose of the project is to accomplish the following:

- Identify and evaluate the possibility of extending intercity rail service
- Utilize substantial existing and proposed rail infrastructure investment to:
    - Improve multi-modal connections
    - Increase employment
    - Enhance economic development
    - Position the region for potential passenger rail funding opportunities

In this study, the MaineDOT, AVCOG, and NNEPRA are investigating the feasibility of expanding intercity passenger rail services in the state by building upon the successful existing and proposed Amtrak *Downeaster* service that currently operates between Boston, MA and Portland, ME, and in the future will extend to Brunswick, ME. The potential rail services being assessed in this study include:

- Boston to Auburn (Amtrak)
- Boston to Bethel (Amtrak)
- Portland to Montreal (independent)

In addition to the intercity passenger rail services, this study examines an interim solution of improving intercity connectivity to the Lewiston/Auburn area and Bethel area by operating Amtrak Throughway Motorcoach Service connecting to the Amtrak *Downeaster* service in Portland. The bus services would be scheduled so that passengers could conveniently transfer to existing *Downeaster* train service, thereby improving access to this service and to Boston.

3.0 Description of Amtrak *Downeaster* Extension Alternatives

As noted above, both domestic (US) and international (Canadian) connections were explored in this study. It is assumed for the purposes of this study that the base condition includes and builds upon an expanded Amtrak *Downeaster* service than what is operating in the state today. This scenario is being called the 'Improved Baseline' and would include:

- Increased frequencies (to seven round trips/day)
- Extension of intercity rail service to Brunswick
- Reduced travel times to around 2 hours and 10 minutes between Boston and Portland
- Operations are streamlined in Portland to allow for quick and efficient train movements (i.e. the delay that would otherwise result because of operational deficiencies has been addressed)

3.1 Overview of Options

The domestic service options build upon the assumed baseline service as described above and maximize the use of the proposed *Downeaster* trips and equipment already in use. By using existing equipment, passengers have the ability to take a one-seat ride from Boston through Portland and beyond without transferring to another train. Two scenarios that would extend the existing *Downeaster* service are being examined. One scenario would extend the existing Amtrak rail service through Portland to Auburn. The other scenario under consideration includes extending service as far north as Bethel, including stops in Auburn and South Paris.

For each alternative, some general operating assumptions were carried through the analysis for the US-only options. These included:

- All options are contingent on and build upon implementation of the *Downeaster* improved baseline
- None of the options would disrupt existing or planned Pan Am Railways (PAR), St. Lawrence and Atlantic Railroad (SLR) or Amtrak service
- Amtrak would operate all service terminating in the US
- Amtrak's intercity fare structure would be assumed to calculate revenue to be generated
- Rail infrastructure would be upgraded to allow 60 MPH (Federal Railroad Administration (FRA) Class 3) maximum operating speed
- All stations would be Americans with Disabilities Act (ADA) accessible

3.2 Portland to Auburn

This service would operate from the Portland Transportation Center to the proposed Auburn Intermodal Passenger Center and would consist of three one-seat rides. Five shuttle trips could also occur where a rider would transfer between trains in Portland. The one-seat ride trips would take approximately 40 minutes and would operate between about 1:00 PM and 2:00 AM.

- **Route.** The trains would operate on the PAR between Portland and Royal Junction. From that point to Danville Junction, they could either use the PAR from Royal Junction or SLR from Yarmouth Junction. Beyond Danville Junction the SLR would be used to access the Auburn Intermodal Passenger Center.

- **Operations**. In order to operate the service, another train set would be required to be purchased, a layover facility would be required in Auburn, the Portland Transportation Center would need the ability to accommodate two train berthing, and a bus shuttle would need to be operated between the Auburn Intermodal Passenger Center and downtown Lewiston.

- **Ridership.** A ridership model was utilized to calculate the number of passengers that would potentially use the service on a yearly basis. Based on the specifics of the service, it is predicted that between 30,000 and 46,000 riders could use the service per year. The range would depend on whether only the one-seat ride service was operated or a combination of one-seat and transferred trips occurred.

- **Costs.** Potential construction and operating costs were calculated for this option. Construction costs ranged from $107 million to $234 million. The range would depend on the potential environmental impacts and the level of double track that would be required, which would be determined as the project is further developed. Costs to operate the service and maintain the rail infrastructure are estimated to range from about $3.5 million to $9.4 million annually. This would depend on how much service is put into place and the amount and type of infrastructure (e.g. track, signals) associated with the proposed alternative.

- **Revenue.** Revenue generated is expected to be approximately $1 million to $1.4 million per year, based on the number of people riding and the expected fare to be charged to use the service.

- **Fare Box Recovery.** Farebox recovery is a measure of how well revenue generated by an alternative offsets the costs to operate and maintain that alternative. The Portland to Auburn alternative is expected to generate at farebox recovery rate of between 15 to 27 percent, based on the level of service (number of overall daily trips) provided.

3.3 Portland to Bethel

This service would operate from Portland to the existing Bethel train station, including stops in Auburn and South Paris. Service would consist of three one-seat rides and could include one additional trip where a rider would transfer between trains in Portland. The one-seat ride trips would take approximately one hour and forty minutes and would operate between about 1:00 PM and 1:00 AM.

- **Route.** The trains would operate on the PAR between Portland and Royal Junction. From that point to Danville Junction, they could either use the PAR from Royal Junction or the SLR from Yarmouth Junction. Beyond Danville Junction the SLR would be used to access the Auburn Intermodal Passenger Center, South Paris and Bethel.

- **Operations.** In order to operate the service, another train set would be required to be purchased, a layover facility would be required in Bethel, the Portland Transportation Center would need the ability to accommodate two train berthing, and a bus shuttle would need to be operated between the Auburn Intermodal Passenger Center and downtown Lewiston.

- **Ridership.** A ridership model was utilized to calculate the number of passengers that would potentially use the service on a yearly basis. Based on the specifics of the service, it is predicted that between 66,700 and 71,100 riders could use the service per year. The range would depend on whether only the one-seat ride service was operated or a combination of one-seat and transferred trips occurred.

- **Costs.** Potential construction and operating costs were calculated for this option. Construction costs ranged from $139 million to $361 million. The range would depend on the potential environmental impacts and the level of double track that would be required, which would be determined as the project is further developed. Costs to operate the service and maintain the rail infrastructure are estimated to range from about $7.9 million to $10.5 million annually. This would depend on how much service is put into place and the amount and type of infrastructure (e.g. track, signals) associated with the proposed alternative.

- **Revenue.** Revenue generated is expected to be approximately $2 million to $2.2 million per year, based on the number of people riding and the expected fare to be charged to use the service.

- **Fare Box Recovery.** The Portland to Bethel alternative is expected to generate a farebox recovery rate of between 21 to 26 percent, based on the level of service (number of overall daily trips) provided.

3.4 Montreal Intercity Rail

Another passenger service analyzed was a new intercity rail service that would operate between Portland, ME and Montréal's Gare Centrale Station. Passengers traveling between Montreal and Maine would be able to transfer to the Boston-bound *Downeaster* service in Portland. Consequently the opposite would be true allowing passengers traveling from Boston to transfer in Portland to intercity service connecting with Canada. The service would consist of two daily round trips between Portland and Montreal. Trip time would be approximately seven hours and twenty minutes, and assumes a total of 90 minutes per trip for customs in both countries.

- **Route.** The trains would operate on the PAR between Portland and Royal Junction. From that point to Danville Junction, they could either use the PAR from Royal Junction or the SLR from Yarmouth Junction. Beyond Danville Junction the SLR would be used to the Auburn Intermodal Passenger Center, South Paris and Bethel. Beyond Bethel trains would use the SLR to the Canadian border where the line changes to the St. Lawrence and Quebec Railroad (SLQ). The SLQ is used until St. Rosalie Junction, Quebec, where the line changes to the Canadian National Railway (CN) and connects to the stop in Montreal.

- **Operations.** This service would be distinct from the Amtrak *Downeaster* service. And, while connections to the service in Portland would be possible, no one-seat rides could be provided, as is possible in the Portland to Auburn and Bethel alternatives. To operate the service, two train sets would need to be purchased, layover facilities would be required in Bethel and Montreal, and the Portland Transportation Center would need to be able to accommodate two train berthing. Stations would be provided in:
    - Auburn, ME
    - South Paris, ME
    - Bethel, ME
    - Berlin, NH
    - North Stratford, NH
    - Sherbrooke, Quebec
    - St. Hyacinthe, Quebec
    - St. Lambert, Quebec
    - Montreal, Quebec

- **Ridership.** A ridership model was utilized to calculate the number of passengers that would potentially use the service on a yearly basis. Based on the specifics of the service, it is predicted that between 203,100 and 204,400 riders could use the service per year. The range would depend upon which type of service to Montreal is operated.

- **Costs.** Potential construction and operating costs were calculated for this option. Construction costs ranged from $676 million to $899 million. The range would depend on the potential environmental impacts and the level of double track that would be required, which would be determined as the project is further developed. Costs to operate the service and maintain the rail infrastructure are estimated to range from about $23.4 million to $26 million. This would depend on how much service is put into place and the amount and type of infrastructure (e.g. track, signals) associated with the proposed alternative.

- **Revenue.** Revenue generated is expected to be approximately $7.5 million to $7.6 million per year, based on the number of people riding and the expected fare charged to use the service.

- **Farebox Recovery.** The Portland to Montreal alternative is expected to generate a farebox recovery rate of between 29 to 32 percent, based on the level of service (number of overall daily trips) provided.

3.5 Summary of Intercity Rail Alternatives

Table ES-1 provides a summary of the key indicators evaluated for each of the three alternatives developed as part of this study.

Table ES-1: Summary of Intercity Rail Alternatives

	Improved Baseline	Auburn			Bethel			Montreal (inc. Bethel Costs)		
Ridership	863,900	30,200	to	45,800	66,700	to	71,100	201,300	to	204,400
Revenue	$15,587,000	$961,000	to	$1,372,000	$2,036,000	to	$2,150,000	$7,498,000	to	$7,579,000
Operating Cost	$24,739,530	$3,521,000	to	$9,396,000	$7,851,000	to	$10,467,000	$23,421,000	to	$26,041,000
Net Revenue	($9,152,530)	($2,560,000)	to	($8,024,000)	($5,815,000)	to	($8,317,000)	($15,923,000)	to	($18,462,000)
Capital Cost	$150,000,000	$107,000,000	to	$234,000,000	$139,000,000	to	$361,000,000	$676,000,000	to	$899,000,000
Farebox Recovery	63%	27%	to	15%	26%	to	21%	32%	to	29%

4.0 Interim Amtrak Throughway Motorcoach Service

As an interim measure to provide immediate connections from the study area to Portland and the *Downeaster* service, an interim motorcoach service could be provided. This study developed options that mirrored, but would not replace the train service. It is assumed that the motorcoach service would not start until the *Downeaster* improved baseline is in place.

4.1 Lewiston/Auburn to Portland Throughway Motorcoach

The motorcoach service between Lewiston/Auburn and Portland could consist of two, three, or five round trip options. This service has been designed to meet north- and southbound *Downeaster* trains. Southbound buses would start at the Lewiston Oak Street Bus Station, connect in Auburn at either I-95 Exit 75 or the Auburn Intermodal Passenger Center and then head south to the Portland Transportation Center (PTC). The total trip time would be approximately one hour from Lewiston to the PTC.

4.2 Bethel to Portland Throughway Motorcoach

The motorcoach service to Bethel would be an extension of the Lewiston/Auburn to Portland service and would consist of one round trip with a trip time of approximately two hours and twenty minutes. This service would include stops at Auburn Intermodal Passenger Center (or I-95 Exit 75) and the Bethel train station.

4.3 Summary of Amtrak Throughway Motorcoach Alternatives

Table ES-2 provides a summary of the key indicators evaluated for each of the interim motorcoach alternatives developed as part of this study. As shown in the table, interim motorcoach service could be implemented with minimal capital and operating costs (as compared to rail alternatives). The bus alternatives, however, would carry substantially fewer riders, and should not be considered as an alternative to implementing intercity rail service.

5.0 Next Steps

The key next step towards implementation of any of the rail alternatives is to await the results of the recently awarded NNEPRA *Downeaster* study. The NNEPRA study will identify the specifics of the improved baseline service that is the foundation of the intercity extension alternatives discussed in this document. Once the specific improvements are identified, a decision can be made as to which alternatives presented in this study should be refined and/or implemented. Any strategy to implement intercity rail should include a timeline for implementation as well as funding sources for the construction and operation of the service. As noted previously, the purpose of this study was to provide the potential technical specifics and feasibility of providing improved intercity service between Portland and beyond to Montreal and points between. This study is an initial step in the decision-making process necessary to implement potential expanded rail service.

If a rail alternative is selected for implementation, as noted previously, the project proponents could implement as an interim step, a bus connection, or Amtrak throughway motorcoach service, as it's known. While this connection would require funding and an operator would need to be procured, little or no construction would be necessary, and it could serve as an expeditious way to provide some service to the region while a rail alternative is being developed/constructed. It is appropriate to note, however, that the Amtrak throughway motorcoach service developed as part of this study also assumed the *Downeaster* improved baseline conditions/improvements would to be in place prior to start-up. The list below details the possible next key milestones toward implementation of this project:

- Implement the *Downeaster* improvements recommended as a result of the NNEPRA study underway.
- Determine preferred rail alternative and timeline for implementation.
- Integrate the rail service proposal into NNEPRA's transportation service development plans.
- Solicit funds for capital and operating needs for selected alternative.
- As appropriate, procure rail service operator.

Table ES-2: Summary of Throughway Motorcoach Alternatives

	Lewiston/Auburn to Port. (2 RT)	Lewiston/Auburn to Port. (3 RT)	Lewiston/Auburn Port. (5 RT)	Bethel to Portland
Ridership	6,600	7,500	7,900	7,500
Revenue	$174,000	$197,000	$209,000	$218,000
Operating Cost	$207,000	$294,000	$621,000	$318,000
Net Revenue	($33,000)	($97,000)	($412,000)	($100,000)
Capital Cost	$1,104,000	$1,104,000	$1,104,000	$3,000
Farebox Recovery	84%	67%	34%	69%

Chapter 1 Introduction

The State of Maine is investigating the feasibility of extending intercity passenger rail services in the state to expand upon the successful *Downeaster* service that operates between Boston, MA and Portland and Brunswick (under construction), ME. The potential rail services being assessed in this study include:

- Boston to Auburn
- Boston to Bethel
- Portland to Montreal

In addition to the intercity passenger rail services, this study examines an interim solution of improving intercity connectivity to the Lewiston/Auburn area and the Bethel area by operating Amtrak Throughway Motorcoach Service connecting to the *Downeaster* service in Portland. The motorcoach services would be scheduled so that passengers could conveniently transfer to existing *Downeaster* train service.

Two scenarios that would extend the existing *Downeaster* service are being examined. One scenario would extend the existing Amtrak rail service to Auburn. The other scenario under consideration includes extending the existing intercity rail service as far north as Bethel, including stops in Auburn and South Paris.

Another passenger service being analyzed is a new intercity rail service that would operate between Portland, ME and Montréal's Gare Centrale. Passengers would be able to transfer to the Boston-bound *Downeaster* service in Portland.

The analysis includes information necessary to identify the general feasibility of the proposed services. This includes documentation of each route's existing conditions, potential service plans, required infrastructure improvements, estimated costs for improvements, vehicles and operations, and the estimated ridership of each service.

This report begins in Chapter 2 with a description of the differences between various public transportation services that operate in Maine and throughout the United States in order to provide a common understanding of the services being considered in this study. In Chapter 3 a summary of the existing conditions for each route is provided. Chapter 4 provides a detailed description of each scenario being considered. Chapters 5 though 8 identify for each scenario the design of the service, required infrastructure upgrades, capital costs and operating costs. Chapter 9 provides a summary of the study and findings.

Chapter 2 North American Public Transportation Operations

There are many different types of public transportation services that operate in Maine and throughout the US, all of which have different purposes, operating characteristics and benefits. In an effort to clarify the differences between the service types, this chapter provides a description of each type of public transportation that is discussed in this study.

Outside of an urban subway system, there are two dominant types of passenger rail service in operation in North America, namely intercity rail and commuter rail. While there is no standard definition for each type of service, the operating characteristics of each type makes them unique.

Additionally, Amtrak, the national passenger rail operator in the US augments portions of its service with Throughway Motorcoach Service. Therefore, a review of the operating characteristics of both commuter rail and intercity rail, as well as the various types of common bus transit is provided in this chapter.

2.1 Intercity Rail Service

Intercity rail (IC) service is generally characterized by long-haul passenger rail service operating between two large urban centers. Intercity rail passes through intermediate urban centers while en-route between the two terminals. Typically, intercity service operates along routes that are greater than 100 miles in length, with variable station spacing. The overall end-to-end trip time is typically greater than 2 hours with an operating speed between 50 mph and 80 mph. Intercity trains typically call on stations between two and 10 times per day, and have approximately 1,200 boardings across the entire line per day. A few examples of typical intercity service operating in New England include Amtrak's *Vermonter*, *Ethan Allen Express*, and *Downeaster* (see Figure 2-1). Table 2-1 provides a summary of the pertinent operating characteristics for these New England intercity services.

Table 2-1: New England Examples of Amtrak Intercity Service

Service Name	Ethan Allen	Vermonter[1]	Downeaster
Origin	NY Penn Sta.	NY Penn Sta.	Boston North Sta.
Destination	Rutland, VT	St. Albans, VT	Portland, ME
Route Miles	241	385	131
Max. Speed (mph)	59	59	79
Days Operated	Daily	Daily	Daily
Trains per Day	2	2	10
Trip Length (hrs)	6:00	10:11	3:15
Stations	12	21	12

Sources:
Amtrak Vermonter and Ethan Allen Schedules (*effective June 21, 2010)*
Vermont Agency of Transportation
Northern New England Passenger Rail Authority (NNEPRA)

[1] Does not include Washington, D.C. to New York Penn Station portion of route.

Figure 2-1: Examples of Intercity Service

Amtrak's Vermonter (Top Left) Ethan Allen (Top Right) and Downeaster Service (Bottom)

2.2 Commuter Rail Service

Commuter Rail (CR) service is a passenger rail service operating between a city center and its outer suburbs. Commuter rail service generally draws between 3,000 and 20,000 passenger boardings per line on a daily basis. The distance covered by commuter rail operations is typically no greater than 50 miles from the outer terminal to city center, with a typical station spacing of 2 to 10 miles. The operating speed of commuter rail service generally does not exceed 60 mph. Service is frequent during commuting hours, with most commuter rail lines operating at least 10 or more roundtrips each day. A robust commuter rail service operates 22 roundtrips per day, which translates into at least four peak periods, peak direction trains, and 14 off-peak roundtrips. Examples of commuter rail service include New York City's Long Island Railroad, Connecticut's Metro North Railroad, and Boston's Massachusetts Bay Transportation Authority (see Figure 2-2). See Table 2-2 for information regarding typical commuter railroad operations.

Table 2-2: Examples of Commuter Rail Service[2]

Agency Name	Metro North	Long Island Railroad	MBTA
City Served	New York	New York	Boston
No. Lines in System	9	11	13
Total Route Miles	273	319	351
Average Line Length	30	29	27
Days Operated	Daily	Daily	Daily
Avg. Trains per Day per Line	24	20	22
Longest Trip Length (hrs)[3]	~<2:08	~<2:10	~<1:45
Avg. Boardings per Train	223	264	199
Typical Daily Boardings per Line	5,352	5,280	4,378

[2] Data pertaining to Total Route Miles, Average Line Length, Average Boardings per train, and Typical Daily Boardings per Line were found in, and derived from 2008 NTD Data.
[3] Does not include time for transfers.

Figure 2-2: Examples of Commuter Rail Service

Metro North (Top Left), Long Island Railroad, (Top Right) and the Massachusetts Bay Transportation Authority (Bottom)

2.3 Local Bus Service

Local bus service is the most common form of passenger transport in the US. It usually operates over a short distance (typically less than 15 route miles) utilizing the existing road and highway network within its defined service area and takes between 30 and 90 minutes to complete a one-way trip. In an urban setting, bus stops are usually placed 0.1 to 0.3 miles apart and have identifying signs. A bus stop does not necessarily have to have a shelter or other types of amenities associated with it. The roles and specifications of transit buses are not always clear cut and vary with operator and region. Several examples of local bus service in operation around the State of Maine include *citylink* currently operating in Lewiston / Auburn, BAT in Bangor, and METRO in Portland (see Figure 2-3). On average, a 50' bus can transport up to 60 passengers between stops.

Figure 2-3: Examples of Local Bus Service

citylink in Lewiston / Auburn (Top Left), BAT in Bangor (Top Right) and METRO in Portland (Bottom)

2.4 Commuter Bus Service

Commuter (or Express) bus service is a fixed-route bus operation characterized by service predominantly in peak period and direction, limited stops, use of multi-ride tickets, and service operated between the central business district, academic centers, or other similar high demand regional destinations and outlying suburbs (often at a Park and Ride or Kiss and Ride location). Commuter bus service also may include other service, characterized by a limited route structure, limited stops and a coordinated relationship with another mode of transportation. Route lengths are typically no greater than 60 miles, and provide at least 3 peak direction trips per service day. Trip durations range from 20 minutes up to 2 hours in length. This type of service is provided by public agencies, a publicly funded private operator, or exclusively operated by a private operator. Several examples of commuter bus service include Portland's Zoom Turnpike Express, the New Hampshire Department of Transportation Boston Express (between Manchester, NH and Boston, MA), and Virginia's Loudon County commuter bus service (see Figure 2-4).

Figure 2-4: Examples of Commuter Bus Service

ZOOM Turnpike Express (Top Left), Boston Express, (Top Right) and Loudon County (Bottom)

2.5 Intercity Bus Service[4]

Intercity bus service utilizes the existing road and highway network to operate between two cities. It sometimes makes intermediate stops between the origin and destination at more densely populated municipalities, other posted locations, and at popular destinations along the route. The buses used in this type of operation are larger and have more powerful engines than their local bus counterparts. They have a high floor which allows luggage and other parcels to be stored beneath the main deck of the cabin. Intercity coaches typically have reclining seats and a restroom. Route lengths vary from 40 miles up to 1,200 miles in length. On long haul trips, layovers are often built into the schedule to allow for changes in drivers, bus refueling, and passenger comfort. The service frequencies for intercity service are highly variable, and can range from one trip every other day up to 10 trips per day. Several examples of intercity bus service include Concord Coach Lines, Greyhound, and Dartmouth Coach (see Figure 2-5). A 50' coach can typically transport between 40 and 50 passengers with no accommodation for standees.

Figure 2-5: Examples of Intercity Bus Service

Concord Coach Lines (Top Left), Greyhound Bus Lines, (Top Right) and Dartmouth Coach (Bottom)

[4] Intercity bus service is also commonly referred to as Over-The-Road (OTR) coach service.

2.6 Amtrak Throughway Motorcoach Service

Amtrak motorcoach services are locally contracted transit buses, through-ticketed bus routes, and taxi services that provide connections between Amtrak served train stations and areas not served by rail. Train and Throughway Motorcoach tickets are purchased together from Amtrak for the length of a passenger's journey and the connections are timed for convenient dedicated and guaranteed-reliable transfers between the two services. See Figure 2.6 for several examples of Amtrak Throughway Motorcoach bus services. Throughway Motorcoach service usually operates between two and four trips per day. Amtrak (contracted by C&J) provides Throughway Motorcoach service to the following Northern New England communities:

Maine	**New Hampshire**
- Bangor	- Berlin
- Orono	- Conway
- Searsport	- Littleton
- Rockland	- Lincoln
- Wiscasset	- Plymouth
- Bath	- Manchester
- Brunswick	- Portsmouth
- Portland	- Durham

Figure 2-6: Examples of Amtrak Throughway Motorcoach Service

Examples from Amtrak California

Chapter 3 Existing Conditions

This chapter provides a general overview of the locations and existing conditions of the transportation routes that are being considered for services in this study. This includes a review of the primary roadway and railroad routes and an overview of the existing conditions of railroad infrastructure along those routes. Figure 3-1 is a map of the regional roadway and rail networks.

3.1 Local Road & Highway Network

The roadway network is described below for each of the potential operating regions.

3.1.1 Lewiston/Auburn

The Maine Turnpike (I-95) is the major north-south roadway in the study area. From I-95 travelers can head north towards Augusta, Waterville and Bangor, or head south to Portland, Boston, and New York City. In the vicinity of Lewiston and Auburn, it is a four-lane limited access toll highway. Exit 75 serves South Auburn including the proposed Auburn Intermodal Passenger Center at the Auburn-Lewiston Municipal Airport. Exit 80 serves Lewiston. The speed limit on this toll road is 65 mph and is seldom congested.

Maine Route 196 links Lewiston and Brunswick via Lisbon and Lisbon Falls. The twenty mile trip on this two-lane roadway takes 30 to 40 minutes to complete depending on weather and traffic conditions.

3.1.2 Bethel

Maine Route 26 is the principal route linking Bethel with I-95 (via Gray at Exit 63) via Paris, Norway, Oxford and Poland. It is primarily a two-lane highway. Near population centers, the speed limit ranges from 25 to 35 mph. Outside of thickly settled areas the speed limit is generally 50 MPH. When tourist volumes peak in the summer and winter, it is reported that traffic volumes prohibit vehicular operation at the posted speed limit on much of this route.

Maine Routes 35 and 5 also provide north-south access to Bethel but have no direct access to I-95. Route 35 is the most direct route between Bethel and Portland with the 64 mile trip taking 90 or more minutes depending on weather and traffic conditions.

US Route 2 is the only east-west roadway through Bethel. It provides access to the communities of Gorham (near Berlin, NH) in the west, and to Skowhegan, Bangor and Houlton in the east. The posted speed limit on this road is generally 55 mph with restrictions to 25 mph through thickly settled areas.

3.2 Relevant Rail Network

There are two rail routing options for service between Portland and the Auburn Intermodal Passenger Center. Both routes would use track owned by Pan Am Railways (PAR) and the St. Lawrence and Atlantic Railroad (SLR). The principal difference between the two options is the route between Royal Junction, located in Yarmouth, and Danville Junction. One route uses the SLR between Yarmouth Junction and Danville Junction and the other remains on the Pan Am mainline between Royal Junction and Danville Junction. See Figure 3-1 for a map of the two route options to Auburn. North of Danville Junction a single route has been identified that will provide access to each of the station areas being considered for this study. The route to Montreal includes the use of the SLR, St. Lawrence & Quebec (SLQ), and Canadian National (CN) railroads. See Table 3-1 for further description of the railroad segments.

Figure 3-1: Rail and Roadway Network

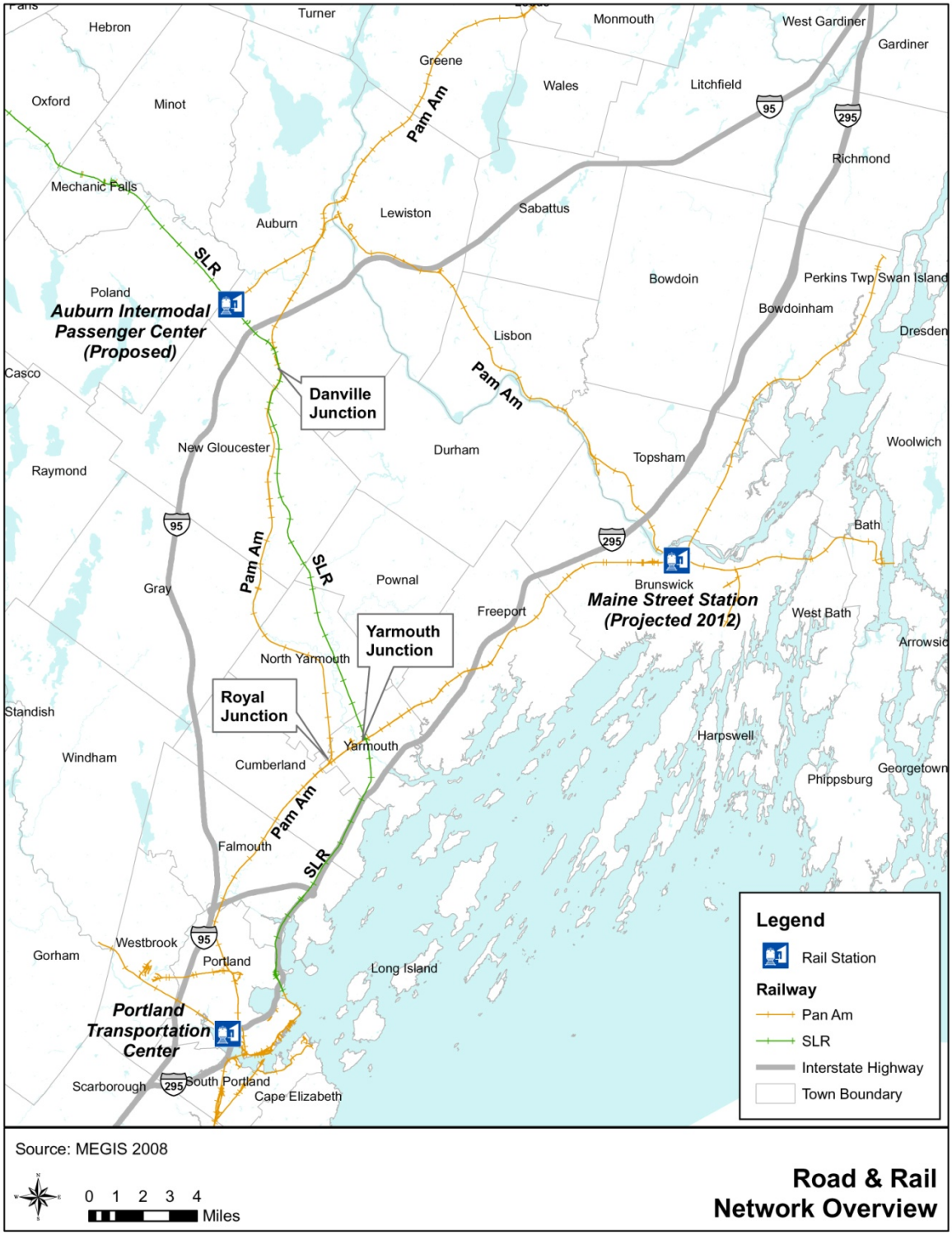


Table 3-1: Rail Routes by Segment

Segment	Pan Am Route	SLR Route
Pan Am Railways		
Portland to Royal Junction	X	X
Royal Junction to Danville Junction	X	
Royal Junction to Yarmouth Junction		X
St. Lawrence & Atlantic Railroad		
Yarmouth Junction to Danville Junction		X
Danville Junction to Auburn Intermodal Passenger Center		X
Auburn Intermodal Passenger Center to Bethel		X
Bethel to Montreal		X

The following sections describe the existing conditions for each of the rail segments

3.2.1 Portland to Royal Junction (PAR)

This 12 mile segment of the route is owned and maintained by Pan Am Railways. The segment includes a 2 mile segment in Portland where there are 12 at-grade highway crossings which effectively limits train speed and improvement options in the area. In addition, this segment has a high number of freight rail customers and sidings, especially in the Deering Junction area. The following identifies the existing conditions of the major components of the railroad in this segment.

- **Existing Rail Services**
    - With the initiation of the Brunswick extension of the *Downeaster* service, it is anticipated that Amtrak will operate six trains each day (3 round trips) over this section of track between Portland and Royal Junction.
    - Pan Am operates six daily freight trains between Royal Junction and Portland.[5]

- **Track & Right-of-Way.** The track in this segment is in a condition capable of accommodating the operation of intercity passenger rail trains. With the exception of 3.3 miles of track in downtown Portland, passenger rail trains can operate at speeds of up to 60 MPH, or Class 3. See Table 3-2 for more information on Federal Railroad Administration (FRA) speed classifications.

Table 3-2: FRA Railroad Speed Classifications

Speed Rating	Freight	Passenger
Excepted	10	-
Class 1	10	15
Class 2	25	30
Class 3	40	60
Class 4	60	80
Class 5	80	90
Class 6	-	110
Class 7	-	125
Class 8	-	160
Class 9	-	200

[5] Existing operations, per Pan Am, March 2009

FRA regulations affect train speeds through the provisions of its track standards and rules governing the installation of signal systems. Both sets of regulations are contained in Title 49 of the Code of Federal Regulations[6]. FRA's signal rules provide that in the absence of a signal system, passenger trains are restricted to 59 MPH and freight trains to 49 MPH[7]. However the speed of the line is ultimately defined by the characteristics of the signal system that is used to govern the line, such as an Automatic Block Signal (ABS) system or Cab Signal System (CSS). Since the *Downeaster* currently uses an ABS signal system, it is assumed that an ABS system will be utilized in key locations for any service extension north enabling trains to travel at the maximum Class 3 speed of 60 MPH, or 59 MPH in unsignalled territory.

The width of the railroad right-of-way between Portland and Royal Junction is sufficient to accommodate a second track in the segments where only one track currently exists. However, the existing embankment or other railroad infrastructure may require modifications in order to accommodate a second track. In the past, this segment operated two tracks the entire distance between Portland and Royal Junction. Currently, the second track only occurs in limited areas. The ROW borders upon commercial, residential and industrial uses.

- **Signal.** A Centralized Traffic Control (CTC) system is a fundamental element of modern passenger railroad operations. A CTC system is to the railroads what a traffic light system and signs are to a road. The system displays trains operating within a specified area and allows the dispatcher to track trains and manage their operations on the rail network. The *Downeaster* service to Brunswick includes a CTC signal system for the entire route.

- **Bridges.** According to the *Downeaster* Brunswick extension project map summary, no bridge upgrades are planned between Portland and Royal Junction.[8] The bridge over the Presumpscot River has abutments capable of supporting a deck for a second track, although currently there is only a deck for a single track.

- **Positive Train Control.** A Positive Train Control (PTC) system monitors and controls train movements to prevent a train from making an unsafe move. All train movement is enforced by onboard electronic equipment. Use of PTC significantly lowers the risk of an accident, and increases safety for all trains operating on the line. A PTC system can work in either unsignalled ("dark") or signaled territory.

  In 2015, the federal law that mandates that most major freight railroads and most passenger rail services have a PTC system installed on their railroads comes into effect. As of September 27, 2010, the FRA is willing to consider granting exemptions to railroads that meet one of the following criteria:

  - Passenger service is operated on a segment of track of a freight railroad that is not a Class I railroad on which less than 15 million gross tons of freight traffic is transported annually and on which one of the following conditions applies[9]:

    (i) If the segment is unsignalled and no more than four regularly scheduled passenger trains are operated during a calendar day, or

    (ii) If the segment is signaled (e.g. equipped with a traffic control system, automatic block signal system, or cab signal system) and no more than 12 regularly scheduled passenger trains are operated during a calendar day.

[6] 49 Code of Federal Regulations (CFR) 213.9 and 213.307
[7] 49 CFR 236.0
[8] Downeaster *Expansion* Project Element Map. Accessed: March 23, 2011. Available: http://www.amtrakdowneaster.com/sites/default/files/DE-BrusnwickPoster.pdf
[9] 75 FR 2598 (Federal Register) January 15, 2010 and 75 FR 59108, September 27, 2010.

- Not more than four passenger trains per day are operated on a segment of track of a Class I freight railroad on which less than 15 million gross tons of freight traffic is transported annually. Should a freight railroad and/or an operator fall into one of these categories, they must apply to the FRA for an exemption from this requirement.

Currently, there is no PTC system installed on any of the segments under consideration and it is not anticipated that one will be required. For all segments in the US, it is assumed that the volume of goods transported will not exceed the 15 million annual tons limitation set forth by the regulation, and that the either a signal system would be installed to enable up to 12 passenger trains to operate without a PTC system or passenger service volumes will be below four regularly scheduled trains. Since the Northern New England Passenger Rail Authority (NNEPRA) and Pan Am Railways both anticipate being exempt from this new regulation, it is therefore assumed that NNEPRA and PAR have, or will apply to the FRA for a PTC exemption in the segments that the *Downeaster* Brunswick extension will operate over.

- **Grade Crossings.** The following grade crossings are programmed to be upgraded for *Downeaster* service to Brunswick and would be assumed to be in place in the baseline condition.[10] See Table 3-3.

Table 3-3: Existing PAR Grade Crossings

Segment	No.	Name	Route Milepost	Protection	Type
Portland Transportation Center to Royal Junction (via the PAR Mainline)	1	Congress Street	0.8	PMS	Active
	2	Brighton Avenue	1.6	PMS	Active
	3	Prospect Street	1.8	PMS	Active
	4	Ashmont Street	1.9	PMS	Active
	5	Coyle Street	1.9	PMS	Active
	6	Lincoln Street	2.0	PMS	Active
	7	Revere Street	2.0	PMS	Active
	8	Woodford's Street	2.1	PMS	Active
	9	Saunders Street	2.2	PMS	Active
	10	Forest Avenue	2.2	PMS	Active
	11	Walton Street	2.7	PMS	Active
	12	Read Street	3.0	PMS	Active
	13	Allen Avenue	3.5	PMS	Active
	14	Riverside Street	5.4	PMS	Active
	15	Lambert Road	5.9	PMS	Active
	16	Falmouth Road	7.2	PMS	Active
	17	Field's Road	8.3	PMS	Active
	18	Woodville Road	9.2	PMS	Active
	19	Muirfeld Road	9.2	PMS	Active
	20	Route 9	10.3	PMS	Active
	21	Tuttle Road	11.3	PMS	Active
	22	Greely Road	12.3	PMS	Active

Key: PV = Pavement Marking, CB = Crossbuck, PMS = Predictor Motion Sensing (including flashers), ACO = Automatic Cut Outs

[10] Downeaster *Expansion* Project Element Map. Retrieved: March 23, 2011. Available: http://www.amtrakdowneaster.com/sites/default/files/DE-BrusnwickPoster.pdf

3.2.2 Royal Junction to Danville Junction (PAR)

This 16 mile single track segment of the route is owned and maintained by Pan Am Railways. This segment, like the one previously described, is part of the Pan Am Freight Mainline on which freight is transported between Mattawamkeag, ME and Rotterdam Junction, NY. The following identifies the existing conditions of the major components of the railroad in this segment.

- **Service.** Like the segment between Portland and Royal Junction, PAR operates six daily freight trains in this segment of track. There are no passenger trains that operate along this segment of railroad.

- **Track & Right-of-Way.** Between Royal Junction and Danville Junction the width of the railroad ROW is sufficient to accommodate a second track. However, the existing embankment or other railroad infrastructure may require modifications in order to accommodate a second track. In the past, this segment operated two tracks the entire distance between Portland and Royal Junction. Currently the second track only occurs in limited areas. Private residences and various commercial enterprises share a border with the PAR ROW. All track is maintained at FRA Class III standards and therefore can facilitate passenger train speeds of up to 60 miles per hour.

- **Signal.** As a result of the state's Freight Rail Interchange Program (FRIP) at Danville Junction, the PAR intends to install a signal system along this segment of track in the near future.

- **Bridges.** Pan Am reports that the bridges between the Royal Junction and Danville Junction are in a good state of repair for the existing six trains per day that travel on the mainline.

- **Grade Crossings.** On the PAR mainline, there are four grade crossings between Royal Junction and Danville Junction. The location of the crossings and the existing crossing protection is listed in Table 3-4.

Table 3-4: Existing Grade Crossings – Royal Junction to Danville Junction

Segment	No.	Name	Route Milepost	Protection	Type
Royal Jct to Danville Jct (via PAR main)	1	Mill Road	18.4	CB	Passive
	2	Depot Road	20.4	ACO	Active
	3	Morse Road	21.7	CB	Passive
	4	Route 231	25.1	PMS	Active

Key: PV = Pavement Marking, CB = Crossbuck, PMS = Predictor Motion Sensing (including flashers), ACO = Automatic Cut Outs

3.2.3 Royal Junction to Yarmouth Junction (PAR)

This 1.75 mile single track segment is part of the Brunswick Branch, owned and maintained by Pan Am Railways. The existing condition of the Brunswick Branch was recently improved in order to facilitate the initiation of Amtrak service to Brunswick.

- **Service.** With initiation of the Brunswick extension, Amtrak's Downeaster will operate six daily trains to and from Brunswick along this segment of track. Pan Am operates two trains per week between Royal Junction and Yarmouth Junction.[11]

[11] Federal Railroad Administration. (2009). *Downeaster Portland North Expansion Project, Portland to Brunswick – Finding of No Significant Impact*, pp. 1. Avalable: http://www.fra.dot.gov/downloads/rrdev/downeaster_portland_north_expansion_project_fonsi.pdf

- **Track & Right-of-Way.** Like the other segments of PAR track, the Brunswick Branch ROW between Royal Junction and Yarmouth Junction is sufficient to accommodate a second track. Presently there is only one track on this segment. Private residences and various commercial enterprises share a border with the PAR ROW. With the implementation of *Downeaster* service, all track will be maintained to FRA Class III standards to accommodate passenger train speeds up to 60 miles per hour.

- **Signal.** This segment of track would have a signal system installed to support *Downeaster* service.

- **Bridges.** The Royal River Bridge is being rehabilitated for *Downeaster* service to Brunswick.

- **Grade Crossings.** There is only one grade crossing between Royal Junction and Yarmouth Junction, which was recently upgraded for *Downeaster* service. See Table 3-5.

Table 3-5: Existing SLR Grade Crossings – Royal Junction to Yarmouth[12]

Segment	No.	Name	Route Milepost	Protection	Type	Remarks
Royal Jct to Yarmouth Jct	1	Sligo Road	13.5	CB	Passive	Recently Upgraded

Key: PV = Pavement Marking, CB = Crossbuck, PMS, Predictor Motion Sensing (includes flashing lights), ACO = Automatic Cut Outs

3.2.4 Yarmouth Junction to Danville Junction (SLR)

This 14 mile single track segment was originally a part of the St. Lawrence and Atlantic Railroad, but has recently been acquired by the state of Maine.

- **Service.** Between Yarmouth Junction and Danville Junction, the SLR operates up to two freight trains per week. These trains operate during the night.[13]

- **Track & Right-of-Way.** The railroad ROW width of the segment between the Yarmouth Junction and Danville Junction is sufficient to accommodate a second track where it may be necessary. However, the existing embankment or other railroad infrastructure may require modifications in order to accommodate the second track or siding. Private residences and various commercial enterprises share a border with the SLR ROW. The track in this segment is in a poor state of repair and is maintained only to FRA Class I standards thereby restricting trains to speeds of up to 10-15 miles per hour.

- **Signal.** This segment of track does not have a signal system installed.

- **Bridges.** According to a recent study investigating the feasibility of offering commuter rail service to the Auburn Intermodal Passenger Center, the bridges on this segment would require improvements to allow for regular passenger service.[14] A list of the bridges in this area is shown in Table 3-6.

[12] Pan Am Employee's Timetable (effective April 2007). SLR Employee's Timetable (effective June 2008).
[13] Existing operations, per St. Lawrence and Atlantic Railroad, October 2010.
[14] HNTB. *DRAFT Cost Feasibility Study for Portland Commuter Rail Study*. Prepared for the Maine Department of Transportation. November 25, 2005, pp. 3-16.

Table 3-6: SLR Bridges – Yarmouth Junction to Danville Junction

Bridges**No.**	**Bridge Name (South to North)**	**Type**
1	Royal River (1)	Open Deck
2	Royal River (2)	Open Deck
3	Farm Road	Open Deck
4	Allen Road	Open Deck
5	Farm Road	Open Deck
6	Meadow Brook	Open Deck
7	Royal River (3)	Open Deck
8	Royal River (4)	Open Deck
9	Royal River (5)	Open Deck
10	Royal River (6)	Open Deck

- **Grade Crossings.** On the SLR mainline between Yarmouth Junction and Danville Junction, there are a total of 15 grade crossings. Table 3-7 includes a list of the crossings, their location, and the form of crossing protection.

Table 3-7: Existing SLR Grade Crossings – Yarmouth Jct to Danville Jct

Segment	No.	Name	Route Milepost	Protection	Type	Remarks
Yarmouth Junction to Danville Junction (via the SLR Mainline)	1	Old Field Road	14.8	PV	Passive	
	2	Deer Run Road	15.7	CB	Passive	
	3	Unnamed Road	15.9	-	-	May not be legal crossing
	4	Farms Edge Road	16.1	CB	Passive	
	5	N Road	16.3	PMS	Active	
	6	Unnamed Road	16.6	-	-	May not be legal crossing
	7	N Road	17.0	PMS	Active	
	8	Unnamed Road	17.3	-	-	May not be legal crossing
	9	Memorial Highway	18.7	PMS	Active	Has Gates
	10	N Road	18.9	PMS	Active	
	11	Cluff Road	20.3	CB	Passive	
	12	Milliken Road	20.3	CB	Passive	
	13	Intervale Road	22.8	PMS	Active	Has Gates
	14	Cobbs Bridge Road	24.2	PMS	Active	
	15	Unnamed Road	27.1	-	-	May not be legal crossing

Key: PV = Pavement Marking, CB = Crossbuck, PMS, Predictor Motion Sensing (includes flashing lights),

3.2.5 Danville Junction to Auburn Intermodal Passenger Center (SLR)

These two miles of railroad are heavily used as SLR has many customers in the area who use it to facilitate operations into and out of the busy nearby Intermodal Freight Transfer Facility. This segment is projected to see an increased volume with the recent improvements that were made at Danville Junction.

- **Service.** Between Danville Junction and Auburn Intermodal Passenger Center, the SLR has numerous train movements throughout the day. The SLR uses the multi-track portions of railroad between Danville Junction and Auburn Intermodal Passenger Center to make up their road trains and also for local switching operations and interchange with PAR.

- **Track & Right-of-Way.** From Danville Junction to Auburn Intermodal Passenger Center, the railroad ROW width is sufficient to accommodate a second track where it may be necessary. The track is in a good state of repair and allows for train operation at Class II speeds.

- **Signal.** There is a CTC signal system installed between Danville Junction and Auburn Intermodal Passenger Center.

- **Bridges.** According to a previous study, one bridge is located in this segment, which will need to be upgraded.[15]

- **Grade Crossings.** There are three grade crossings in this segment. Their protection and location is shown below in Table 3-8.

Table 3-8: Existing Grade Crossings between Danville Jct & Auburn Intermodal Passenger Center

Segment	No.	Name	PAR // SLR Milepost	Protection	Type
Danville Jct to Auburn Int.	1	Brown's Crossing Road	28.7 // 29.4	CB	Passive
	2	Old Danville Road	29.8 // 30.5	PMS	Active
	3	Hotel Road	31.1 // 31.8	PMS	Active

Key: PV = Pavement Marking, CB = Crossbuck, PMS = Predictor Motion Sensing (including flashers), ACO = Automatic Cut Outs

3.2.6 Auburn Intermodal Passenger Center to Bethel (SLR)

This 42 mile segment includes the most heavily used segment of the St. Lawrence and Atlantic Railroad as it serves both the trains traveling to and from the Intermodal Freight Transfer Facility and is home to the SLR engine house at Lewiston Junction and the many freight customers located between the Auburn Intermodal Passenger Center and South Paris. The railroad in this segment is maintained to allow for FRA Class II freight speeds.

- **Service.** Between the Auburn Intermodal Passenger Center area and Bethel, SLR operates four trains per day – two locals servicing customers between South Paris and Auburn, and two road trains operating between Danville Junction and St. Rosalie Junction, QC. These trains have no scheduled time to operate, but primarily run at night. There are no passenger trains that operate on this segment.

- **Track & Right-of-Way.** Between Auburn Intermodal Passenger Center and South Paris most of the ROW is approximately 45' wide. In this segment of track, the track is in a good state of repair and allows for train operation at FRA Class II speeds. Private residences, various commercial enterprises, and recreational locations share a border with the SLR right-of-way.

  From South Paris to Bethel, the existing railroad embankment is narrow and bordered in many locations by wetlands. However, there are some locations where the existing embankment widens to accommodate the two tracks that already exist. Like the previous segment, the track is in a good state of repair and allows for train operation at Class II speeds. Private residences and various commercial enterprises share a border with the SLR ROW.

- **Signal.** This entire segment of track is all "dark" territory, meaning that there is no signal system.

- **Bridges.** Starting in the early 1990's, the SLR began replacing obsolete non-controlled cooled rail on its main line running from Portland, Maine through western Maine, the North Country of New

[15] Ibid.

Hampshire, and the Northeast Kingdom of Vermont to the Vermont - Quebec border through a combination of private investment and state and federal grants. The main line rail in the State of Maine has already been replaced and all but three miles of the rail have been replaced in Vermont.

The state of New Hampshire was recently awarded a Transportation Investment Generating Economic Recovery (TIGER) II Grant for rail upgrades in the state. The upgrades proposed for this project will replace 20.6 miles of rail with continuous welded, control-cooled rail that allows for larger-size 286,000 pound rail cars thus completing a rail corridor project that began a decade ago.[16] As a result of this upgrade, it is assumed that all bridges between Auburn and Bethel will be able to accommodate passenger trains operating at higher than freight speeds (FRA Class III minimum).

- **Grade Crossings.** There are 52 grade crossings between Auburn Intermodal Passenger Center and Bethel. Their protection and location is shown below in Table 3-9.

Table 3-9: Existing SLR Grade Crossings between Auburn Intermodal Passenger Center and Bethel

No.	Name	Route Milepost	Protection	Type	Remarks
1	Logistics Drive	29.5	PMS	Active	
2	Poland Springs Road	29.9	PMS	Active	
3	Empire Road	32.1	PMS	Active	
4	Worthley Brook Road	32.9	PMS	Active	
5	Mousams Road	33.0	PMS	Active	
6	Walker Road	35.0	PMS	Active	
7	Park Street	35.8	PMS	Active	
8	Myrtle Street	35.9	PMS	Active	
9	Elm Street	36.2	PMS	Active	
10	L. Androscoggin River	36.3	PMS	Active	
11	Route 11	36.4	PMS	Active	
12	Summer Street	36.6	PMS	Active	
13	Pearl Street	36.7	PMS	Active	
14	Williams Road	38.4	PMS	Active	
15	Old Quarry Road	39.1	PMS	Active	
16	French Road	40.1	CB	Passive	
17	Station Road	40.8	PMS	Active	
18	Number 6 Road	41.6	PMS	Active	
19	Industrial Drive	42.5	CB	Passive	
20	Fore Street	43.1	PMS	Active	
21	Monument Drive	43.8	PMS	Active	
22	Fore Street	44.5	PMS	Active	
23	Oxford Street	45.1	PMS	Active	
24	Kilgore Street	46.1	CB	Passive	
25	Pine street	47.1	PMS	Active	
26	Main Street	47.2	PMS	Active	
27	Gothic Street	47.5	PMS	Active	
28	Nicols Street	47.8	PMS	Active	

[16] St. Lawrence and Atlantic Rail Upgrade Benefit-Cost Analysis. Accessed: March 28, 2011. Available, http://www.nh.gov/dot/org/aerorailtransit/railandtransit/documents/BCA_000.pdf, pp. 2

No.	Name	Route Milepost	Protection	Type	Remarks
29	Prospect Avenue	48.3	CB	Passive	
30	High Street	48.8	PMS	Active	
31	Ballfield Road	55.5	CB	Passive	
32	Main Street	55.6	PMS	Active	
33	Old County Road	57.4	PMS	Active	
34	Old County Road	60.8	PMS	Active	
35	Church Street	61.5	CB	Passive	
36	Grove Street	61.7	CB	Passive	
37	Lake Road	61.8	PMS	Active	
38	Pine Pt Road	62.0	PMS	Active	
39	Lakeside Drive	62.6	PMS	Active	
40	Trails End Road	62.8	CB	Passive	
41	Littlefield Lane	64.2	CB	Passive	Has Manual Gates
42	Marshall Lane	62.4	PMS	Active	
43	Davis Lane	64.9	PMS	Active	
44	Howe Hill Road	65.2	PMS	Active	
45	Hart Road	66.7	CB	Passive	
46	Rabbit Road	67.8	CB	Passive	
47	Platinum Road	67.2	CB	Passive	
48	Platinum Road	68.5	CB	Passive	
49	Main Street	70.1	PMS	Active	
50	Carver Road	70.8	PMS	Active	Has Automatic Gates
51	Farm Road	71.0	CB	Passive	
52	Carver Road	71.1	CB	Passive	

Key: CB = Crossbuck, PMS, Predictor Motion Sensing (includes flashing lights)

3.2.7 Bethel to Montreal (SLR/SLQ and CN Railroads)

As previously mentioned, the SLR is presently upgrading its existing track in Coos County, New Hampshire and Essex and Orleans Counties in Vermont. The upgrades will complete the series of infrastructure investments initially started in the early 1990s to increase the safety, capacity and reliability of the SLR mainline. These upgrades will increase the weight of cars that can operate over the track from typical the 265,000 pound railcars up to 286,000 pound railcars.

- **Service.** Like existing freight services between Auburn and Bethel, only two road trains operate in this segment on a daily basis.

  A mix of 20 intercity VIA (the Canadian Rail operator) and AMT (Agence Métropolitaine de Transport) commuter trains use the segment of track between St. Rosalie Junction and St. Lambert. Up to 22 trains per day operate between St. Lambert and Gare Centrale.

- **Track & Right-of-Way.** Between Bethel and St. Rosalie Junction the railroad embankment appears wide enough to accommodate only the existing tracks. Like the other previous segments, the track is in a good state of repair and allows for train operation at FRA Class II speeds. Private residences, various commercial enterprises and recreational locations (e.g. golf courses) share a border with the SLR ROW.

Between St. Rosalie Junction and Montreal, the Canadian National (CN) mainline has at least two tracks with a ROW embankment of at least 40' in width. Track is maintained for Class V speeds (89 mph).

- **Signal.** With the exception of Danville Junction and St. Rosalie Junction, the SLR and SLQ do not have a CTC signal system installed. Between St. Rosalie Junction and Montreal, the railroad has a CTC signal system.

- **Bridge Upgrades.** Like with service from Auburn to Bethel, it is assumed that the recent track and bridge upgrades allowing for freight operation of 286,000 pound railcars will be sufficient to allow passenger rail service between Bethel, ME and St. Rosalie Junction, Quebec to operate at increased speeds. It is also assumed that since the railroad between St. Rosalie and Montreal is used by existing passenger and commuter rail services, that no upgrades are required in this segment.

- **Grade Crossings.** From Bethel to the US/Canada border, there are 44 grade crossings. See Table 3-10 for more information.

Table 3-10: Existing SLR Grade Crossings between Bethel and the US/Canada Border

No.	Name	Route Milepost	Protection	Type
1	Barker Road	72.9	CB	Passive
2	Ferry Road	74.1	CB	Passive
3	Randy Lane	74.2	CB	Passive
4	Bridge Street	80.1	PMS	Active
5	Mill Street	80.2	PMS	Active
6	Meadow Road	85.6	PMS	Active
7	Farm Road	87.8	PMS	Active
8	Kidders	89.9	PMS	Active
9	US Route 2	90.9	PMS	Active
10	Glen Road	91.5	PMS	Active
11	Church Street	91.9	PMS	Active
12	Dublin Street	92.1	PMS	Active
13	Union Street	92.1	CB	Passive
14	Belville	92.8	PMS	Active
15	US Route 2	92.9	PMS	Active
16	Abandoned Road	93.0	CB	Passive
17	Fortier	94.7	PMS	Active
18	Gill Street	95.5	PMS	Active
19	Mt. Forist	97.9	PMS	Active
20	Green Street	98.0	PMS	Active
21	Hillside Avenue	98.3	PMS	Active
22	City Park	100.7	PMS	Active
23	Emery	108.6	PMS	Active
24	Route 109	109.0	PMS	Active
25	Emery	109.4	PMS	Active

No.	Name	Route Milepost	Protection	Type
26	Dummer Road	110.2	PMS	Active
27	Crystals Road	111.6	PMS	Active
28	Bell Hill Road	112.8	PMS	Active
29	Percy Road	114.3	CB	Passive
30	Northside Road	116.4	CB	Passive
31	County Road	116.4	CB	Passive
32	Northside Road	116.9	CB	Passive
33	Route 110	117.6	PMS	Active
34	Cummings	118.8	PMS	Active
35	Main Street	122.2	PMS	Active
36	Farm Road	125.6	PMS	Active
37	Mapleton Road	126.7	PMS	Active
38	McManns	128.2	PMS	Active
39	Washburn	133.6	PMS	Active
40	Baldwins Road	134.3	PMS	Active
41	Main Street	134.6	PMS	Active
42	Route 102	134.8	PMS	Active
43	Dupee	145.3	CB	Active
44	Ethan Allen	147.7	PMS	Active

Key: CB = Crossbuck, PMS, Predictor Motion Sensing (includes flashing lights)

From the US/Canada border to Montreal, there are 46 grade crossings. See Table 3-11 for more information. Information pertaining to the type of grade crossing and its protection was not readily available. Additionally, information pertaining to route miles for the CN grade crossings is not provided at this time.

Table 3-11: Existing Grade Crossings in Canada – US/Canada Border to Montreal Gare Centrale

No.	Name	Route Milepost	No.	Name	Route Milepost
1	Rue Coward	172.4	29	Rue Lisgar	231.8
2	Rue Lessard	173.3	30	Chemin de l'Avenir	234.9
3	Chemin Falconer	174.6	31	Chemin Beaudoin	236.4
4	Rue Lavoie	176.8	32	Chemin 12 Rang	238.9
5	Rue Union	177.9	33	Chemin 4ieme Rang	244.7
6	Rue Principal	178.5	34	Rue St-Andre	246.5
7	Rue Court	178.6	35	Rue du Marche	246.6
8	Rue St-Paul Quest	178.9	36	Rue Dalpe	246.8
9	Rue Bourgeois	179.3	37	Rang #3	248.1
10	Rue Thornton	180.1	38	Chemin 2 Rand	252.7
11	Chemin Perras	181.5	39	Rue Ste-Helene	252.9
12	Chemin Lancourt	182.4	40	Rang St-Liboire	256.4
13	Rue Gilbert Est	183.6	41	Rue St. Georges	257.4

No.	Name	Route Milepost	No.	Name	Route Milepost
14	Chemin Compton	186.8	42	Chemin 7 Rang	258.4
15	Rue Drouin	188.3	43	Chemin 5 Rang	260.6
16	Rue Depot	189.9	44	Chemin 5 Rang	261.7
17	Boule Gosselin	190.2	45	Rue Guy	262.5
18	Chemin de Courval	192.2	46	Route #224	262.9
19	Chemin Winder	195.3	**Begin CN Mainline Grade Crossings**		
20	Rue College	196.8	47	Grand Rang	
21	Rue Depot	197.0	48	Chemin Rang Grand Rang	
22	Rue Aberdeen	199.5	49	Rang St. Simone	
23	Rue King	199.9	50	Rang Petit	
24	Rue Grand Forks	200.2	51	Chemin Benoit	
25	Magog River	200.2	52	Chemin Rouillard	
26	D-205E	206.0	53	Montee des Trente	
27	Route 143	206.6	54	Rang des Trente	
28	Rue Gee	229.2	55	Rue St. Georges	

Chapter 4 Scenario Development

The chapter describes both the interim bus and the intercity rail service scenarios that have been developed as a part of this study. In addition a description of alternative stations and routes that have been considered and evaluated is included and a description of interim bus services that were developed are summarized.

4.1 Rail Scenario Definition

The three service scenarios that have been explored for the feasibility of expanding passenger rail services are summarized in the following sections. These service scenarios include:

- Extension of the Amtrak *Downeaster* service to Auburn
- Extension of the Amtrak *Downeaster* service to Bethel
- Intercity rail service between Portland and Montreal

4.1.1 Portland to Auburn – Rail (*Downeaster* Extension)

The Auburn rail scenario would extend *Downeaster* service from Portland. For planning purposes it is assumed that the service to the Lewiston / Auburn region would operate via the SLR route, which would be accessed at Yarmouth Junction. The station for the Lewiston / Auburn area would be located at the Auburn Intermodal Passenger Center. See the following sections for alternatives that were considered for both the route and the Lewiston / Auburn station location.

4.1.2 Portland to Bethel – Rail (*Downeaster* Extension)

Like the Auburn rail alternative, the Bethel rail scenario would be an extension of the existing *Downeaster* service from Portland. Service would be provided to the Lewiston / Auburn region, South Paris, and Bethel.

4.1.3 Portland to Montreal – Rail (Separate Service)

The Montreal rail service would operate between Portland and Montreal. It would follow the same route to Bethel as the Bethel Rail scenario. Beyond Bethel trains would use the SLR to the Canadian border where the line changes to the St. Lawrence and Quebec Railroad (SLQ). The SLQ is used until St. Rosalie Junction, Quebec, where the line changes to the Canadian National Railway (CN) and connects from here to the stop in Montreal. Service would be provided to the Auburn Intermodal Passenger Center, South Paris, Bethel, Berlin, NH, North Stratford, NH (for Vermont access), Sherbrooke, St. Hyacinthe, St. Lambert, and Montreal Gare Centrale. For planning and cost estimating purposes it is assumed that the Bethel rail service and the associated infrastructure improvements would be in place prior to initiation of the Portland-Montreal service.

4.2 Interim Motorcoach Alternatives

In the interim, while intercity rail service is being evaluated for feasibility and funding options are identified, Amtrak Throughway Motorcoach service could be operated from the Lewiston/Auburn area to meet existing intercity rail service in Portland. The motorcoach service could be implemented more rapidly than rail service at a fraction of the cost. Thus, the motorcoach service option is a valuable interim opportunity to implement service in the region in order to evaluate demand for intercity service and to introduce people in the region to an alternative mode of transportation.

The motorcoach service is being designed as a precursor to rail service. Therefore, it is the goal of this study to minimize travel time and to maximize convenience and reliability. To this end, passengers will

only be able to board at limited locations and the motorcoach will operate as an 'express' bus. Time spent on the highway and off of local roads also reduces travel time and increases reliability.

4.2.1 Amtrak Throughway Motorcoach Connection from Lewiston/Auburn

Motorcoach service from Lewiston/Auburn to Portland would be the fastest connection for area residents to access Amtrak intercity rail service to points south in Maine and New Hampshire and onto Boston. Connections to just about anywhere can be made in Boston. Buses used for the service would be large Coach-style buses with comfort and amenities for the long ride. Large, comfortable seats, modern streamlined styling, and free Wi-Fi would be some of the characteristics and amenities on the service. Use of alternative fuels and innovative mechanics are also recommended for the shuttle service. It is further assumed that the service, regardless of the alternative, would utilize only one bus.

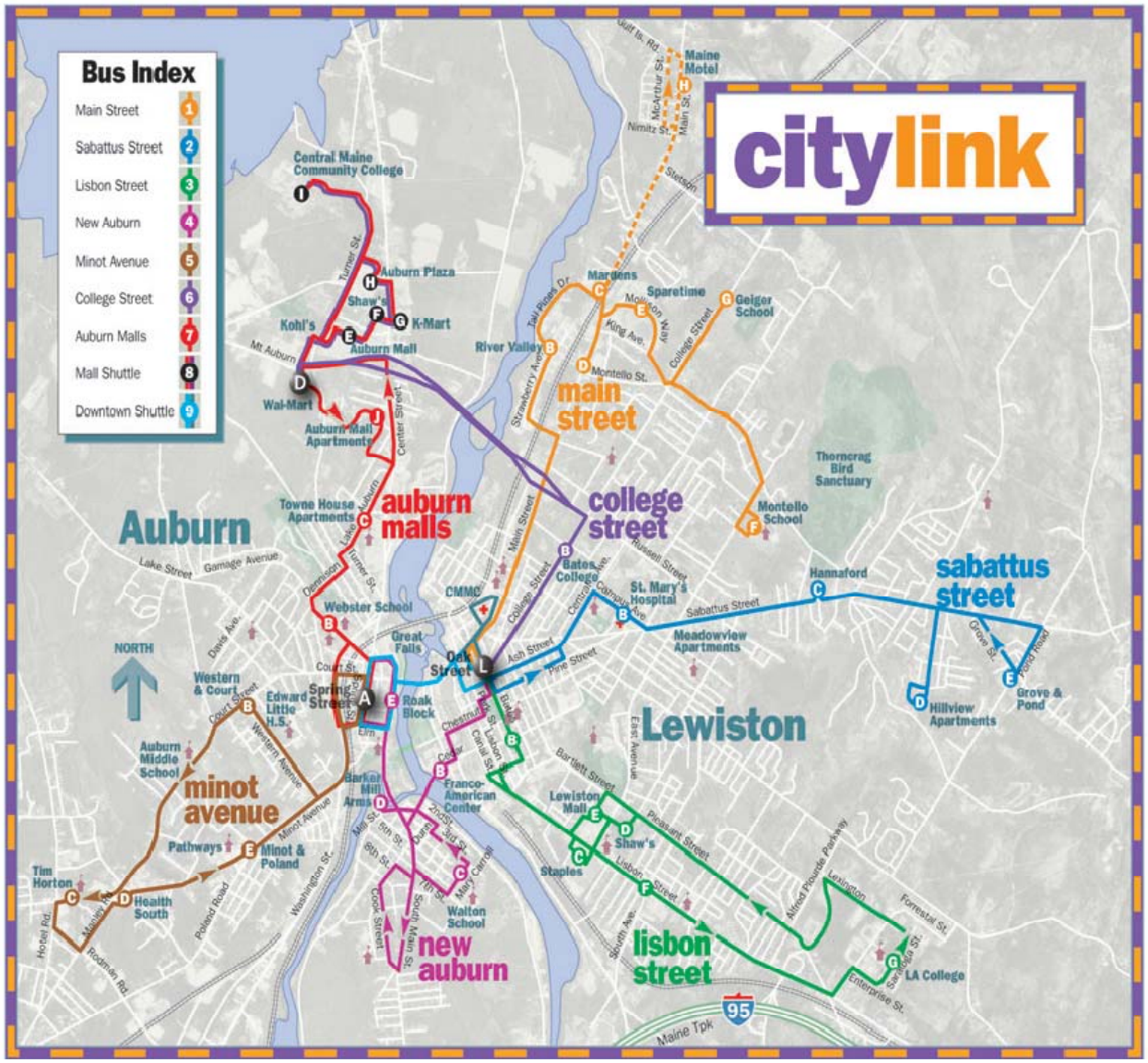
For all motorcoach options, Lewiston/Auburn would be the hub of the service. Parking in downtown Lewiston is provided in parking garages and there is a small parking lot adjacent to the existing Greyhound Transit Center. The location also provides easy walking access for downtown residents and employees. Local *citylink* bus service is also available at the site, as shown in Figure 4-1.

Motorcoach stops for the Lewiston-Portland service include the Lewiston Oak Street Bus Station, either the Exit 75 park and ride lot off the Maine Turnpike or the Auburn Intermodal Passenger Center at the Auburn-Lewiston Municipal Airport, and the Portland Transportation Center (PTC).

Upon arrival in Portland using any motorcoach option, the PTC is served by Route 5 on Greater Portland METRO local bus service. Route 5 connects to downtown Portland (Elm Street), the Portland Jetport, and the Maine Mall in South Portland. A schedule and map of METRO Route 5 service are provided as Figures 4-2 and 4-3. Route 5 operates a modified route and schedule with Route 1 on Sundays.

On METRO Route 5, PTC is served on both the inbound and outbound trips from the METRO. Therefore, passengers could easily get directly to the Maine Mall in South Portland or directly downtown to the METRO Pulse on Elm Street without having to ride the entire route. Route 5 is operated on approximately 35 minute headways in each direction at the PTC. Wait time for shuttle buses arriving in Portland to board METRO local service would be around 10-15 minutes, depending on the trip and time of day.

Figure 4-1: Map of Lewiston/Auburn *citylink* Bus Service[17]



[17] *2010 Lewiston-Auburn Weekday Bus Service*. www.purplebus.org, accessed July 25, 2011.

Figure 4-2: Map of Greater Portland METRO Route 5

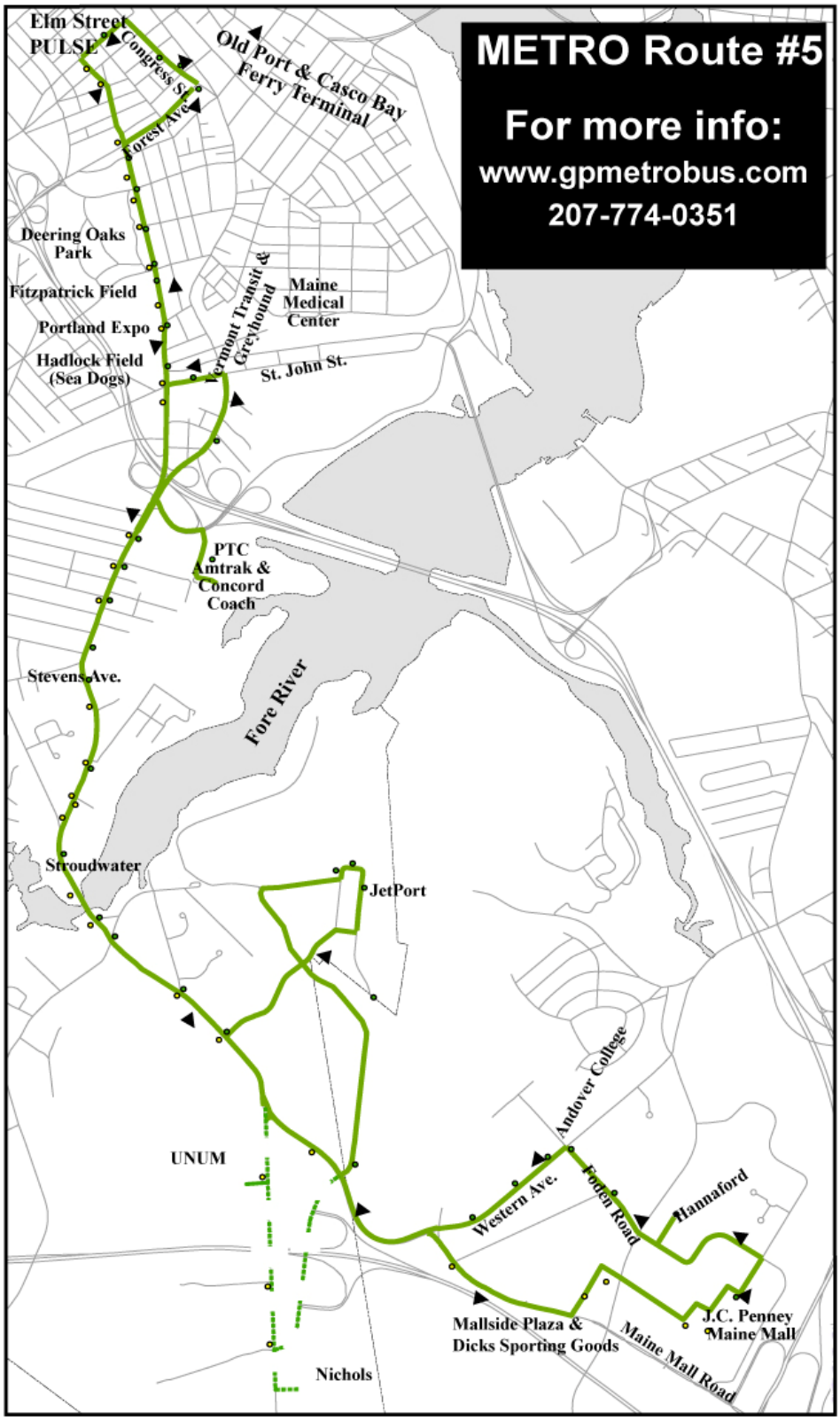
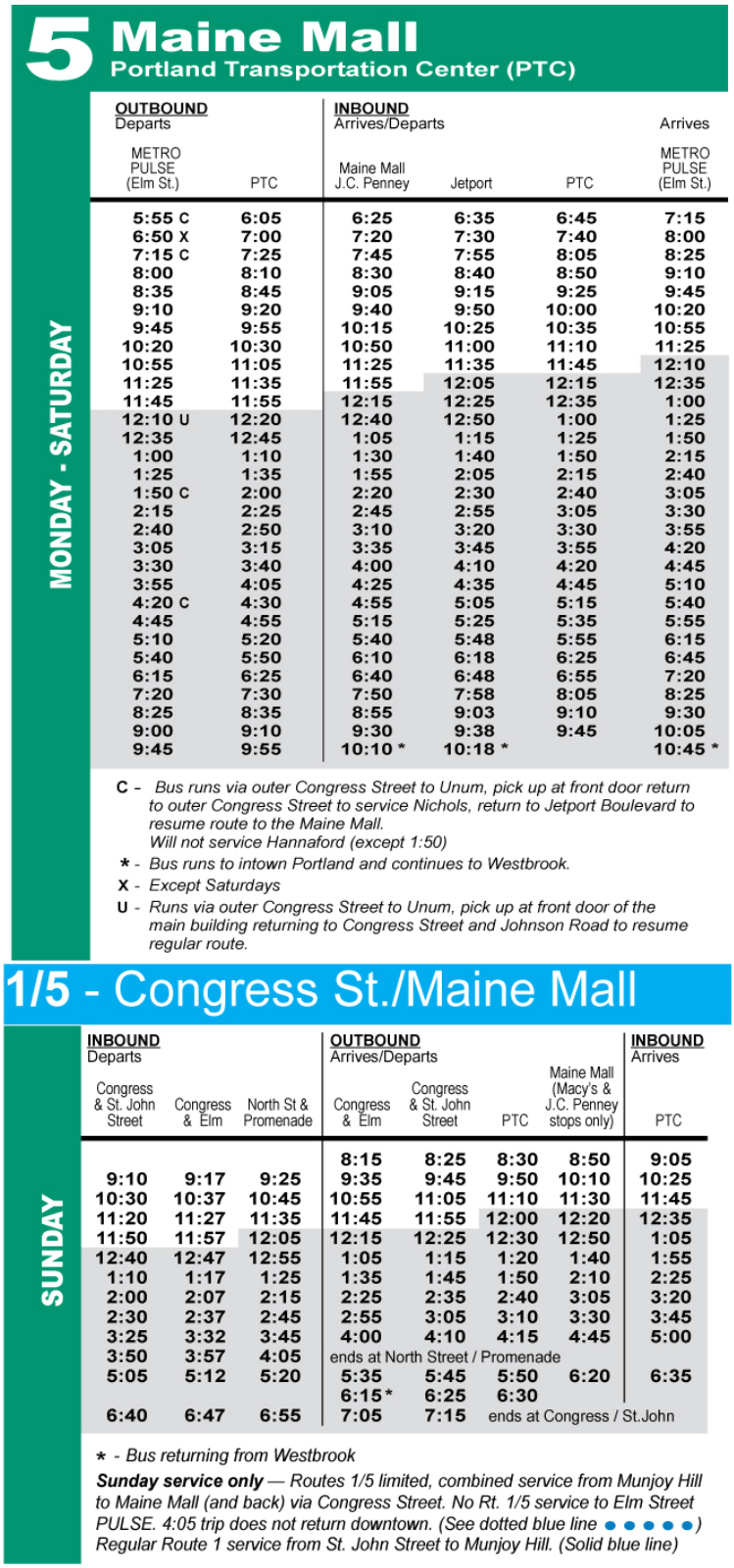


Figure 4-3: Greater Portland METRO Route 5 Schedule



5 Maine Mall

Portland Transportation Center (PTC)

MONDAY - SATURDAY

OUTBOUND Departs		INBOUND Arrives/Departs			Arrives
METRO PULSE (Elm St.)	PTC	Maine Mall J.C. Penney	Jetport	PTC	METRO PULSE (Elm St.)
5:55 C	6:05	6:25	6:35	6:45	7:15
6:50 X	7:00	7:20	7:30	7:40	8:00
7:15 C	7:25	7:45	7:55	8:05	8:25
8:00	8:10	8:30	8:40	8:50	9:10
8:35	8:45	9:05	9:15	9:25	9:45
9:10	9:20	9:40	9:50	10:00	10:20
9:45	9:55	10:15	10:25	10:35	10:55
10:20	10:30	10:50	11:00	11:10	11:25
10:55	11:05	11:25	11:35	11:45	12:10
11:25	11:35	11:55	12:05	12:15	12:35
11:45	11:55	12:15	12:25	12:35	1:00
12:10 U	12:20	12:40	12:50	1:00	1:25
12:35	12:45	1:05	1:15	1:25	1:50
1:00	1:10	1:30	1:40	1:50	2:15
1:25	1:35	1:55	2:05	2:15	2:40
1:50 C	2:00	2:20	2:30	2:40	3:05
2:15	2:25	2:45	2:55	3:05	3:30
2:40	2:50	3:10	3:20	3:30	3:55
3:05	3:15	3:35	3:45	3:55	4:20
3:30	3:40	4:00	4:10	4:20	4:45
3:55	4:05	4:25	4:35	4:45	5:10
4:20 C	4:30	4:55	5:05	5:15	5:40
4:45	4:55	5:15	5:25	5:35	5:55
5:10	5:20	5:40	5:48	5:55	6:15
5:40	5:50	6:10	6:18	6:25	6:45
6:15	6:25	6:40	6:48	6:55	7:20
7:20	7:30	7:50	7:58	8:05	8:25
8:25	8:35	8:55	9:03	9:10	9:30
9:00	9:10	9:30	9:38	9:45	10:05
9:45	9:55	10:10 *	10:18 *		10:45 *

C - *Bus runs via outer Congress Street to Unum, pick up at front door return to outer Congress Street to service Nichols, return to Jetport Boulevard to resume route to the Maine Mall. Will not service Hannaford (except 1:50)*

***** - *Bus runs to intown Portland and continues to Westbrook.*

X - *Except Saturdays*

U - *Runs via outer Congress Street to Unum, pick up at front door of the main building returning to Congress Street and Johnson Road to resume regular route.*

1/5 - Congress St./Maine Mall

SUNDAY

INBOUND Departs			OUTBOUND Arrives/Departs				INBOUND Arrives
Congress & St. John Street	Congress & Elm	North St & Promenade	Congress & Elm	Congress & St. John Street	PTC	Maine Mall (Macy's & J.C. Penney stops only)	PTC
			8:15	8:25	8:30	8:50	9:05
9:10	9:17	9:25	9:35	9:45	9:50	10:10	10:25
10:30	10:37	10:45	10:55	11:05	11:10	11:30	11:45
11:20	11:27	11:35	11:45	11:55	12:00	12:20	12:35
11:50	11:57	12:05	12:15	12:25	12:30	12:50	1:05
12:40	12:47	12:55	1:05	1:15	1:20	1:40	1:55
1:10	1:17	1:25	1:35	1:45	1:50	2:10	2:25
2:00	2:07	2:15	2:25	2:35	2:40	3:05	3:20
2:30	2:37	2:45	2:55	3:05	3:10	3:30	3:45
3:25	3:32	3:45	4:00	4:10	4:15	4:45	5:00
3:50	3:57	4:05	ends at North Street / Promenade				
5:05	5:12	5:20	5:35	5:45	5:50	6:20	6:35
			6:15*	6:25	6:30		
6:40	6:47	6:55	7:05	7:15	ends at Congress / St.John		

***** - *Bus returning from Westbrook*

Sunday service only *— Routes 1/5 limited, combined service from Munjoy Hill to Maine Mall (and back) via Congress Street. No Rt. 1/5 service to Elm Street PULSE. 4:05 trip does not return downtown. (See dotted blue line ● ● ● ● ●) Regular Route 1 service from St. John Street to Munjoy Hill. (Solid blue line)*

The Auburn Intermodal Passenger Center on Kittyhawk Avenue at the Auburn-Lewiston Municipal Airport could also be a stop for some options. The park and ride lot at Exit 75 off of the Maine Turnpike could also be used as a stop. Capacity is 137 vehicles at the park and ride lot[18].

Motorcoach service from Lewiston to Portland would start at the existing Oak Street Bus Station in Lewiston, travel to the proposed Auburn Intermodal Passenger Center on Kittyhawk Avenue in Auburn, get on the Maine Turnpike south to Portland and get off the highway and travel to the Portland Transportation Center.

The motorcoach would leave the Bus Station on the corner of Oak Street and Bates Street in Lewiston, turn left on US Route 202 (Main St) and continue south into Auburn, turn left to stay on US Route 202/Routes 4, 11, 100/Minot Avenue, then merge left to stay on US Route 202/Routes 4, 100/Washington Street. The bus would follow US 202 until turning right onto Kittyhawk Avenue just south of Maine Turnpike Exit 75. The bus would then travel on Kittyhawk Avenue and serve the Auburn Intermodal Passenger Center, then return to Exit 75 along Kittyhawk Avenue and a left onto US Route 202, and enter the Maine Turnpike. It should be noted that the Maine Turnpike is a toll road. Tolls will be paid at the New Gloucester toll on the highway. The route would follow the Maine Turnpike until Exit 46, where it would exit and turn right onto Congress Street/Route 22. The bus would follow Congress Street until turning right on Fore River Parkway, then turning right on Thompson's Point Road and arriving at the Portland Transportation Center.

Scheduling options exist for the Lewiston-Auburn-Portland motorcoach. Depending on the assumptions used, various options could be operated together and trips could be added or removed depending on demand and budget. Travel times assume a 20 minute trip from Lewiston to the Auburn Intermodal Passenger Center (including a 5 minute layover), and a 40 minute trip from the Auburn Intermodal Passenger Center to PTC. Layovers are generally considered to be 5 minutes unless otherwise noted.

4.2.2 Amtrak Throughway Motorcoach connection to Bethel

Amtrak Throughway Motorcoach service to connect both locals and tourists to Bethel and Sunday River Ski Resort is also being evaluated. Additionally, if the casino in Oxford, Maine is approved and constructed, this tourist destination could also be served on the Bethel route. In Bethel, the motorcoach would stop on Railroad Street downtown.

From Auburn, the shuttle bus would leave the Auburn Intermodal Passenger Center on Kittyhawk Avenue and turn left onto Hotel Road, left on Merrow Road, left onto Route 11/Route 121/Minot Avenue, right onto Route 119/Woodman Hill Road, and left to continue on Route 119/Route 124/W Minot Road. Then, the shuttle would continue on East Main Street and turn right onto Route 26/Park Street. The route would continue on Route 26 into Bethel, turn right to stay on Route 26/Railroad Street and stop.

Travel time would be 70 minutes from Auburn to Bethel. The shuttle bus would stop on Railroad Street to get within walking distance of the downtown Bethel area and to prepare for future rail service. The bus could also serve the potential train station at South Paris, with proposed connecting shuttle service to the proposed casino property. Both station locations are located on the route to Bethel (Route 26), so the layover time at either station would only be a couple of minutes in both directions (5 minutes total for a roundtrip).

In Bethel and Newry, the Mountain Explorer bus service is available for seasonal connections in the area, including to Sunday River Ski Resort. There is a Mountain Explorer flag stop at the railroad station in Bethel. A map and a schedule for Mountain Explorer bus service are shown in Figures 4-4 and 4-5.

[18] Maine Turnpike Authority. *Transportation Alternatives/Park and Ride Lots*. http://www.maineturnpike.com/traveler_services/transportation_alternatives.php. Accessed 11/16/2010.

Figure 4-4: Map of Mountain Explorer Bus Service

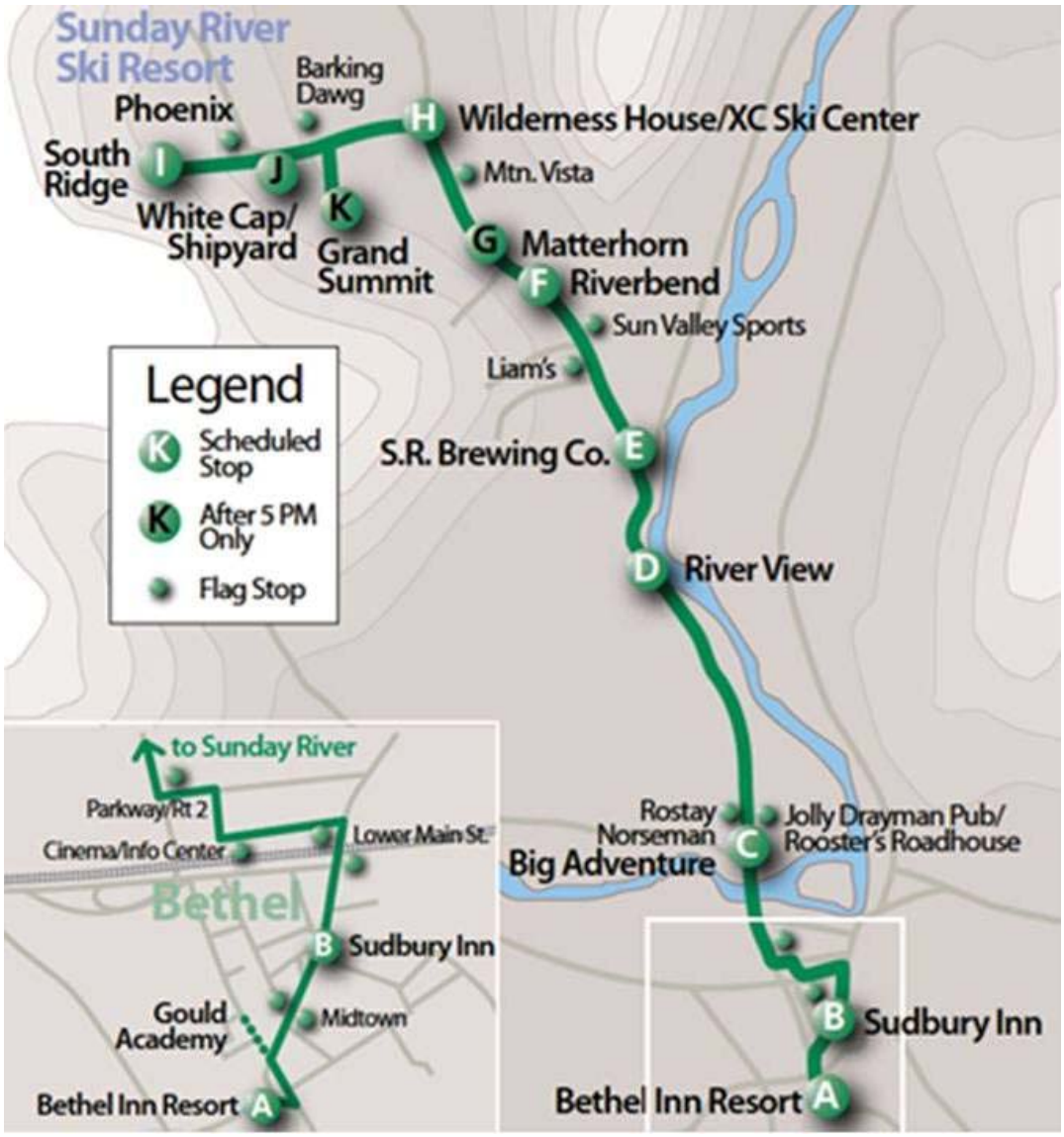


Figure 4-5: Mountain Explorer Bus Service Schedule

MOUNTAIN EXPLORER

Bethel to Sunday River

A BETHEL INN	B SUDBURY INN	C BIG A	D RIVER VIEW	E CANTINA DEL RIO	F RIVER BEND	G MATTER-HORN	H SR OUT-DOOR	I SOUTH RIDGE	J WHITE CAP	K GRAND SUMMIT
6:30	6:32	6:38	6:42	—	6:45	—	6:48	6:55	—	—
6:55	6:57	7:03	7:07	—	7:10	—	7:13	7:20	—	—
7:25	7:27	7:33	7:37	—	7:40	—	7:43	7:50	—	—
7:50	7:52	7:58	8:02	—	8:05	—	8:08	8:15	—	—
8:20	8:22	8:28	8:32	—	8:35	—	8:38	8:45	—	—
8:50	8:52	8:58	9:02	—	9:05	—	9:08	9:15	—	—
9:20	9:22	9:28	9:32	—	9:35	—	9:38	9:45	—	—
9:50	9:52	9:58	10:02	—	10:05	—	10:08	10:15	—	—
10:20	10:22	10:28	10:32	—	10:35	—	10:38	10:45	—	—
11:20	11:22	11:28	11:32	11:33	11:35	—	11:38	11:45	—	—
12:20	**12:22**	**12:28**	**12:32**	**12:33**	**12:35**	**—**	**12:38**	**12:45**	**—**	**—**
1:20	**1:22**	**1:28**	**1:32**	**1:33**	**1:35**	**—**	**1:38**	**1:45**	**—**	**—**
2:20	**2:22**	**2:28**	**2:32**	**2:33**	**2:35**	**—**	**2:38**	**2:45**	**—**	**—**
2:50	**2:52**	**2:58**	**3:02**	**3:03**	**3:05**	**—**	**3:08**	**3:15**	**—**	**—**
3:20	**3:22**	**3:58**	**3:32**	**3:33**	**3:35**	**—**	**3:38**	**3:45**	**—**	**—**
3:50	**3:52**	**4:58**	**4:02**	**4:03**	**4:05**	**—**	**4:08**	**4:15**	**—**	**—**
4:30	**4:32**	**4:38**	**4:42**	**4:43**	**4:45**	**—**	**4:48**	**4:55**	**5:05**	**5:10**
5:00	**5:02**	**5:08**	**5:12**	**5:13**	**5:16**	**5:18**	**5:20**	**5:25**	**5:35**	**5:40**
5:45	**5:47**	**5:53**	**5:57**	**5:58**	**6:01**	**6:03**	**6:05**	**6:10**	**6:20**	**6:25**
6:15	**6:17**	**6:23**	**6:27**	**6:28**	**6:31**	**6:33**	**6:35**	**6:40**	**6:50**	**6:55**
7:00	**7:02**	**7:08**	**7:12**	**7:13**	**7:16**	**7:18**	**7:20**	**7:25**	**7:35**	**7:40**
8:00	**8:02**	**8:08**	**8:12**	**8:13**	**8:16**	**8:18**	**8:20**	**8:25**	**8:35**	**8:40**
8:45	**8:47**	**8:53**	**8:57**	**8:58**	**9:01**	**9:03**	**9:05**	**9:10**	**9:20**	**9:25**
9:15	**9:17**	**9:23**	**9:27**	**9:28**	**9:31**	**9:33**	**9:35**	**9:40**	**9:50**	**9:55**
10:00	**10:02**	**D**	**10:12**	**10:13**	**D**	**10:18**	**10:20**	**10:25**	**10:35**	**10:40**
10:30	**10:32**	**D**	**10:42**	**10:43**	**D**	**10:48**	**10:50**	**10:55**	**11:00**	**11:05**
11:15	**11:17**	**D**	**11:27**	—	**D**	**11:33**	**11:35**	**11:40**	**11:50**	**11:55**
12:30	12:32	D	12:42	—	D	12:48	12:50	12:55	1:00	1:05

Sunday River to Bethel

I SOUTH RIDGE	J WHITE CAP	K GRAND SUMMIT	H SR OUT-DOOR	G MATTER-HORN	F RIVER BEND	E CANTINA DEL RIO	D RIVER VIEW	C BIG A	B MECH. ST	A BETHEL INN
6:55	—	—	6:58	—	7:01	—	—	—	—	7:15
7:20	—	—	7:23	—	7:26	—	—	—	—	7:40
7:50	—	—	7:53	—	7:53	—	—	—	—	8:10
8:15	—	—	8:18	—	8:21	—	8:27	8:29	—	8:37
8:45	—	—	8:48	—	8:51	—	8:57	8:59	—	9:07
9:15	—	—	9:18	—	9:21	—	9:27	9:29	—	9:37
9:45	—	—	9:48	—	9:51	—	9:57	9:59	—	10:07
10:15	—	—	10:18	—	10:21	—	10:27	10:29	—	10:37
10:45	—	—	10:48	—	10:51	—	10:57	10:59	—	11:07
11:45	—	—	11:48	—	11:51	11:53	11:57	11:59	—	**12:07**
12:45	**—**	**—**	**12:48**	**—**	**12:51**	**12:53**	**12:57**	**12:59**	**—**	**1:07**
1:45	**—**	**—**	**1:48**	**—**	**1:51**	**1:53**	**1:57**	**1:59**	**—**	**2:07**
2:45	**—**	**—**	**2:48**	**—**	**2:51**	**2:53**	**2:57**	**2:59**	**—**	**3:07**
3:15	**—**	**—**	**3:18**	**D**	**3:21**	**3:23**	**3:27**	**3:29**	**—**	**3:37**
3:45	**—**	**—**	**3:48**	**D**	**3:51**	**3:53**	**4:00**	**4:02**	**4:10**	**4:12**
4:15	**—**	**—**	**4:18**	**D**	**4:21**	**4:23**	**4:30**	**4:32**	**4:40**	**4:42**
4:55	**5:05**	**5:10**	**5:13**	**5:15**	**5:16**	**5:18**	**5:20**	**5:22**	**5:28**	**5:30**
5:25	**5:35**	**5:40**	**5:43**	**5:45**	**5:46**	**5:48**	**5:50**	**5:52**	**5:58**	**6:00**
6:10	**6:20**	**6:25**	**6:28**	**6:30**	**6:31**	**6:33**	**6:35**	**6:37**	**6:43**	**6:45**
6:40	**6:50**	**6:55**	**6:58**	**7:00**	**7:01**	**7:03**	**7:05**	**7:07**	**7:13**	**7:15**
7:25	**7:35**	**7:40**	**7:43**	**7:45**	**7:46**	**7:48**	**7:50**	**7:52**	**7:58**	**8:00**
8:25	**8:35**	**8:40**	**8:43**	**8:45**	**8:46**	**8:48**	**8:50**	**8:52**	**8:58**	**9:00**
9:10	**9:20**	**9:25**	**9:28**	**9:30**	**9:31**	**9:33**	**9:35**	**9:37**	**9:43**	**9:45**
9:40	**9:50**	**9:55**	**9:58**	**10:00**	**D**	**10:03**	**10:05**	**D**	**10:13**	**10:15**
10:25	**10:35**	**10:40**	**10:43**	**10:45**	**D**	**10:48**	**10:50**	**D**	**10:58**	**11:00**
10:55	**11:00**	**11:05**	**11:08**	**11:10**	**D**	**11:13**	**11:15**	**D**	**11:23**	**11:25**
11:40	**11:50**	**11:55**	**11:58**	**12:00**	**D**	—	12:05	D	12:13	12:15
12:55	1:00	1:05	1:08	1:10	D	—	1:15	D	1:23	1:25

SERVICE NOTES

D Indicates stops to drop off passengers. Shaded times operate Fridays, Saturdays, and vacation weeks only.

At flag stops, make sure you signal the driver.

Mountain Explorer is operated by Western Maine Transportation Services. Buses operate daily between December 26 and April 3.

Mountain Explorer bus service is supported by the towns of Bethel and Newry, local businesses and sponsors, USDOT and Maine DOT.

FUTURE TRANSIT SERVICE TO MT. ABRAM SKI RESORT

Western Maine Transportation Services in conjunction with the Maine Department of Transportation and Mt. Abram Ski Resort will be conducting a study this winter to determine future transit needs for the Mt. Abram area.

WWW.MOUNTAINEXPLORER.ORG

WE THANK OUR 2010-11 SEASON SPONSORS

◆◆

Sunday River Ski Resort Skiway Rd, Newry 824-3000
Bethel Inn Resort Broad St, Bethel 824-2175

◆

River View Resort 357 Mayville Rd, Bethel 824-2808
Gould Academy 39 Church St, Bethel 824-7700
Sunday River Outdoor Center 23 Skiway Rd, Newry 824-5700
Cantina del Rio 96 Sunday River Rd, Bethel 824-8345
Dream Realty Post Office Plaza, Newry 824-4300
Matterhorn Ski Bar 292 Sunday River Rd, Newry 824-6836
Phoenix House & Well 9 Timberline Dr, Newry 824-2222
Sudbury Inn 151 Main St, Bethel 824-2174
Shipyard Brew Haus White Cap Lodge, Newry 824-5269

■

BIG Adventure Center Mayville & North Rd, Bethel 824-0929
Sunday River Brewing Co 1 Sunday River Rd, Bethel 824-4253
Riverbend Condominiums/Rentals Cherry Ln, Bethel 249-1980
Four Seasons Realty/Workout 24-7 32 Parkway Plaza, Bethel 824-3776/824-4766
Inn at the Rostay 186 Mayville Rd, Bethel 824-3111
Good Food Store/Smokin' Good BBQ 212 Mayville Rd, Bethel 824-3754/824-4744

●

Mt. Vista Condo Assoc Vista Rd Newry
Norseman Inn 134 Mayville Rd, Bethel 824-2002
Pok Sun Emporium/Books N Things 130 Main St, Bethel 824-2997/824-0275
Barking Dawg Mkt 119 Skiway Rd, Newry 824-6969
BESTunes Ski & Snowboard Tuning 284B Mayville Rd, Bethel 824-2266
Bethel Shop N Save 72 Main St, Bethel 824-2121
Casablanca Cinema Cross St, Bethel 824-8248
Cho Sun Sushi Bar 141 Main St, Bethel 824-7370
Crossroads Diner Mayville Rd, Bethel 824-3673
Funky Red Barn 19 Summer St, Bethel 824-3003
Home Slice Pizza 177 Main St, Bethel 824-470
Hot Taco 7 Mechanic St, Bethel 381-6001
Kelley's Auto Parts 10 Mechanic St, Bethel 824-2102
Kowloon Village Mt View Mall, Bethel 824-3707
Mahoosuc Realty 16 Parkway, Bethel 824-2771
Maine Made Furniture 23 Skiway Rd, Newry 824-3181
Mallard Mart 33 Mayville Rd, Bethel 824-6111
Mountain View EyeCare 140 Main St, Bethel 824-2227
Mountains of Pasta Whitecap Lodge, Newry 824-5094

Northeast Bank 11 Main St, Bethel 824-2117
Norway Savings Bank 1 Parkway, Bethel 824-4989
Pat's Pizza 37 Mayville Rd, Bethel 824-3637
Pinnacle Snowboard Shop Post Office Plaza, Newry 824-6636
Rooster's Roadhouse 159 Mayville Rd, Bethel 824-0309
Sage Restaurant 32 Main St, Bethel 381-7002
Ski Esta Powder Ridge Rd, Newry 877-754-3782
Summit Financial Solutions Post Office Plaza, Newry 978-807-0027
The Foothills Grille & Catering 186 Main St, Bethel 514-7427
The Jolly Drayman 150 Mayville Rd, Bethel 824-4717
Viewer's Choice Video 99 Main St, Bethel 824-4290

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Carriage House Condo Assn
Chapman Inn
Wild River Realty
Bethel Outdoor Adventure
Business Equipment Unlimited
Key Bank
Maine Handicapped Skiing
Maine Street Realty
Sun Valley Sports
United Insurance
Rivendell House
Bethel Bicycle
Maine Line Products

4.3 Auburn Intermodal Passenger Center

Previous planning efforts have been performed regarding a railroad station for the Lewiston / Auburn area. Alternatives providing a connection between the Airport and the railroad were designed with the intent of providing convenient access for air and rail passengers to transfer from one mode to another. Ultimately, the airport alternatives were advanced to the point where an environmental assessment was required.

Consistent with the requirements of the National Environmental Policy Act (NEPA) an Environmental Assessment (EA) for the station site at the Auburn- Lewiston Municipal Airport (Auburn Intermodal Passenger Center) was completed and accepted in 2007. Several public meetings were held to solicit input from the public regarding the location and design of the proposed station and any possible consequences and/or impacts. The preparation of the EA resulted in a Finding of No Significant Impact (FONSI) for the proposed station.

The planning for the station selected a site that is located on a spur track off of the SLR mainline. In order to allow for operational ease of service to continue to points in the north, it may be necessary to include a station configuration that accommodates two trains. The spur could be modified into a complete wye so that trains can head north. The station would be located near the mainline, and would add at most 10 minutes time for service to points north.[19]

The station would be located approximately 1 mile from I-95 and Route 122 at the Auburn-Lewiston Municipal Airport. Local planners have indicated that a citylink bus will be operated to the Auburn Intermodal Passenger Center in order to provide convenient access from both downtown Auburn and downtown Lewiston. Additionally, the design for Auburn Intermodal Passenger Center includes 550 short- and long-term parking spaces (including a park and ride lot) and provides a direct and convenient connection to the airport. Given the intercity nature of Downeaster service, being able to provide ample space for overnight parking, as well as not interfering with the host railroad operations are both critical elements of the station plan. Modest capital investments are required to build the station.

4.4 Route Alternatives Analysis

As previously mentioned, there are two routing options for service between Portland and the Auburn Intermodal Passenger Center (see Figure 4-6). Both routes would use track owned by Pan Am Railways (PAR) and the St. Lawrence and Atlantic (SLR). The principle difference between the two options is the route between Yarmouth and Danville Junction. The route alternatives include the following:

- Auburn Intermodal Passenger Center via PAR – This route uses the Pan Am mainline between Royal Junction and Danville Junction

- Auburn Intermodal Passenger Center via SLR - This route uses the SLR between Yarmouth Junction and Danville Junction

Both route options use 11 miles of Pan Am's mainline between Portland and Royal Junction, which is approximately ⅓ of the route. This common segment is an active railway and will be used by Amtrak's Downeaster service to Brunswick, and PAR's existing freight services. These routes vary between Royal Junction and Danville Junction. Additionally, for the two miles between Danville Junction and Auburn Intermodal Passenger Center, both routes would use the SLR mainline.

[19] The 10 minutes comes from the train having to perform a Federal Railroad Administration mandated brake test every time the train changes directions.

Figure 4-6: Routing Options to Auburn Intermodal Passenger Center

For all alternatives that extend rail service north of Auburn, the SLR route between Auburn Intermodal Passenger Center and the US/Canada border would be used. At the border, the route would then use the St. Lawrence and Quebec (SLQ) railroad. The route would use the SLQ until it joins a Canadian National (CN) mainline between Montreal and Quebec City.

A series of stakeholder and public outreach meetings were held with the study team, MaineDOT, Oxford County Chamber of Commerce, NNEPRA, several municipal government officials, Androscoggin County Chamber of Commerce, Bethel Area Chamber of Commerce, Oxford Resort & Casino, Western Maine Economic Development Council, the SLR, PAR, the State of New Hampshire, the State of Vermont, VIA, ski resorts and other major destinations, and the general public in the Fall of 2010. Three important outcomes resulted from these meetings.

- The State of Maine acquired the SLR right-of-way between Yarmouth Junction and Danville Junction for $2.0 million. An additional element of the sale included an agreement between the State and the SLR to allow passenger service into the Auburn Intermodal Passenger Center.

- The SLR indicated that they would be amenable to allowing passenger operations on their tracks beyond Auburn Intermodal Passenger Center to the north, provided that the service does not in any way impact their existing operations. The SLR stated that at this level of planning it is reasonable to assume that a series of three (3) mile long passing sidings, built at key locations along the line, would be an effective measure to ensure its existing freight obligations are met.

- PAR is open to the idea of new passenger rail service(s) operating on their tracks, provided that the new services do not in any way impact their existing operations. To ensure that the new services would not interfere with their existing operations, the study team has conservatively assumed that a second track would need to be built along all PAR segments where the new service would operate.

The study team recommends that a detailed operational analysis be undertaken to determine the full extent of track upgrades required along the PAR mainline. This would enable the state and Pan Am Railways to determine the exact extent of the upgrades required to offer service, and to ensure that all current and future freight and passenger obligations are met.

While it is highly desirable to utilize the state of Maine's recent acquisition of the SLR for future passenger rail service to the north, the state has officially made no indication of the preferred route to Auburn (SLR vs. PAR). Consequently, when combined with the double track assumption along the PAR mainline, the study team has assumed *for the planning purposes of this study* that any new service to Auburn, Bethel and/or Montreal would use the SLR between Yarmouth Junction and Danville Junctions.

Chapter 5 Service Design

Both motorcoach and rail service alternatives are discussed in detail in this chapter.

5.1 Amtrak Throughway Motorcoach Service from Lewiston/Auburn

Three scheduling options exist to create connections between Lewiston/Auburn and Portland. The options are described below.

5.1.1 Lewiston-Auburn-Portland Motorcoach Service - Option 1: Two Roundtrips per Day

As shown in Table 5-1, a motorcoach could leave Lewiston at 6:55 AM to meet the 8:10 Amtrak train in Portland. This would allow commuters to Portland for employment to arrive by 9 AM. The train would arrive in Boston at 10:20 AM. The arrival in Boston at 10:20 AM would allow for intercity travelers to make connections early in the day. There is an earlier train that would allow workers to be in Boston by 9 AM, but the far more likely commute is to Portland from Lewiston or Auburn. The bus could leave PTC at 8 AM and arrive in Lewiston at 9 AM. This also leaves the potential for the reverse commute open.

In the afternoon, northbound trains from Boston arrive at 3:35, 7:10 and 8:35 PM. The 7:10 PM and 8:35 PM trains cannot both be met with only one motorcoach in operation. Meeting both trains would require two buses to be in service. For the two roundtrips per day option, the most logical train to serve is the 7:10 train from Boston. Thus, the motorcoach would leave Lewiston at 6:10 PM and arrive in Portland at 7:10 to meet the train. The southbound motorcoach also provides a connection to the 8:10 PM southbound train to Boston. From PTC, the motorcoach would leave Portland at 7:15 PM and arrive back in Lewiston at 8:15 PM.

Table 5-1: Lewiston-Auburn-Portland Motorcoach Option 1 Schedule – Two Roundtrips per Day

AM Schedule					
	Lewiston	Auburn	PTC	*Amtrak*	*Boston*
Southbound	6:55 AM	7:15 AM	7:55 AM	*8:10 AM*	*10:20 AM*
	Boston	*Amtrak*	PTC	Auburn	Lewiston
Northbound	*N/A*	*N/A*	8:00 AM	8:40 AM	9:00 AM
PM Schedule					
	Lewiston	Auburn	PTC	*Amtrak*	*Boston*
Southbound	6:10 PM	6:50 PM	7:10 PM	*8:10 PM*	*10:20 PM*
	Boston	*Amtrak*	PTC	Auburn	Lewiston
Northbound	*5:00 PM*	*7:10 PM*	7:15 PM	7:55 PM	8:15 PM

With this option, the motorcoach service would be operated for 4 hours and 10 minutes, with layover built in for the stops in Auburn and Portland. The southbound trip leaves 15 minutes between the motorcoach arrival and the train departure in order to allow the bus to get back to Lewiston at 9 AM for commuters. The amount of time needed to get back and forth from the bus garage (deadhead) would also need to be factored into the cost to operate the service depending on the service operator and location of the garage.

As an add-on to Option 1, one additional trip could be added in the afternoon to create additional connections to an Amtrak train in each direction (albeit with a longer wait time for the train) and to provide more convenient commuter hours. The schedule for Option 1a is shown in Table 5-2.

Table 5-2: Lewiston-Auburn-Portland Motorcoach Option 1a Schedule – Three Roundtrips per Day

AM Schedule					
	Lewiston	Auburn	PTC	*Amtrak*	*Boston*
Southbound	6:55 AM	7:15 AM	7:55 AM	*8:10 AM*	*10:20 AM*
	Boston	*Amtrak*	PTC	Auburn	Lewiston
Northbound	*N/A*	*N/A*	8:00 AM	8:40 AM	9:00 AM
PM Schedule					
	Lewiston	Auburn	PTC	*Amtrak*	*Boston*
Southbound	4:00 PM	4:20 PM	5:00 PM	*6:05 PM*	*8:20 PM*
	Boston	*Amtrak*	PTC	Auburn	Lewiston
Northbound	*1:25 PM*	*3:35 PM*	5:05 PM	5:25 PM	6:05 PM
	Lewiston	Auburn	PTC	*Amtrak*	*Boston*
Southbound	6:10 PM	6:50 PM	7:10 PM	*8:10 PM*	*10:20 PM*
	Boston	*Amtrak*	PTC	Auburn	Lewiston
Northbound	*5:00 PM*	*7:10 PM*	7:15 PM	7:35 PM	8:15 PM

Option 1a would be operated for 2 hours, 5 minutes in the morning and 4 hours, 15 minutes in the afternoon for a total of 6 hours, 20 minutes daily.

For additional service hours and associated cost, more connection trips to Amtrak could be operated. Or, service could be operated to Bethel during the mid-day period. Adding connection trips is discussed next and potential Bethel service is discussed in a later section.

5.1.2 Lewiston-Auburn-Portland Motorcoach - Option 2: Peak Period Coverage

With this option, at least two Amtrak trains would be met in Portland in both the morning and the afternoon. During the mid-day trains are not met. Some of the trains could be met with additional service hours and associated cost. Alternatively, the motorcoach could be operated to Bethel during the mid-day period between Amtrak connections. See Table 5-3.

Table 5-3: Lewiston-Auburn-Portland Motorcoach Option 2 Schedule – 5 Roundtrips per Day

AM Schedule					
	Lewiston	Auburn	PTC	*Amtrak*	*Boston*
Southbound	4:45 AM	5:05 AM	5:45 AM	*5:55 AM*	*8:10 AM*
	Boston	*Amtrak*	PTC	Auburn	Lewiston
Northbound	*N/A*	*N/A*	5:50 AM	6:30 AM	6:50 AM
	Lewiston	Auburn	PTC	*Amtrak*	*Boston*
Southbound	6:55 AM	7:15 AM	7:55 AM	*8:10 AM*	*10:20 AM*
	Boston	*Amtrak*	PTC	Auburn	Lewiston
Northbound	*N/A*	*N/A*	8:00 AM	8:40 AM	9:00 AM
	Lewiston	Auburn	PTC	*Amtrak*	*Boston*
Southbound	9:05 AM	9:25 AM	10:05 AM	*10:30 AM*	*12:40 PM*
	Boston	*Amtrak*	PTC	Auburn	Lewiston
Northbound	*N/A*	*N/A*	10:10 AM	10:50 AM	11:10 AM
PM Schedule					
	Lewiston	Auburn	PTC	*Amtrak*	*Boston*
Southbound	4:35 PM	4:55 PM	5:35 PM	*6:05 PM*	*8:20 PM*
	Boston	*Amtrak*	PTC	Auburn	Lewiston
Northbound	*1:25 PM*	*3:35 PM*	5:40 PM	6:20 PM	N/A
	Lewiston	Auburn	PTC	*Amtrak*	*Boston*
Southbound	N/A	6:25 PM	7:10 PM	*8:10 PM*	*10:20 PM*
	Boston	*Amtrak*	PTC	Auburn	Lewiston
Northbound	*5:00 PM*	*7:10 PM*	7:15 PM	7:35 PM	8:15 PM

Option 2 would be operated for 6.5 hours in the morning. There would be a 5.5 hour break in the late morning/afternoon. Then, the service would be operated for another 3.5 hours in the afternoon. The total operating hours for this option would be 10 hours. As noted, other Amtrak trains could be met in the mid-day period or service to Bethel could be operated. Each additional trip from Lewiston to Portland and back creates approximately two hours of service.

5.2 Amtrak Throughway Motorcoach Service to Bethel

In order to increase the attractiveness of the service and meet demands in the region, Amtrak Throughway Motorcoach service could also be operated to popular tourist destinations. Popular destinations accessible from the Lewiston/Auburn region include Bethel, Sunday River, and the Oxford casino (when it is constructed). Tourist destinations do not need peak-hour service like commuter destinations. Tourist destinations may, however, necessitate weekend service hours. Currently Amtrak operates 5 roundtrips per day on the weekends to Portland. This study, however, only includes weekday service. Service would be operated from the Auburn Intermodal Passenger Center.

The proposed schedule for the Bethel motorcoach service is provided in Table 5-4. To serve Bethel from PTC, a trip would need to be made from Lewiston at 12:15 PM to meet the 1:15 PM northbound train from Boston in Portland. The motorcoach would leave PTC at 1:20 PM, stop in Auburn at 2 PM, then arrive in Bethel at 3:10 PM. The motorcoach would then arrive at 4:55 PM to operate the schedule to Portland as was described in Option 2 of the previous section describing the schedule to meet the Amtrak train at PTC.

Table 5-4: Portland-Auburn-Bethel Motorcoach Schedule – 1 Roundtrip per Day

PM Schedule						
Southbound			Lewiston	Auburn	PTC	
			12:15 PM	12:35 PM	1:15 PM	
Northbound	*Boston*	*Amtrak*	PTC	Auburn	Bethel	
	11:05 AM	*1:15 PM*	1:20 PM	2:00 PM	3:10 PM	
Southbound		Bethel	Auburn	PTC	*Amtrak*	*Boston*
		3:15 PM	4:20 PM	5:00 PM	*6:05 PM*	*8:20 PM*

Travel time for the Bethel service to Portland would be 4 hours, 45 minutes per day. For this type of tourist-based destination, it may be most cost-effective to operate the service Friday-Saturday-Sunday-Monday on a weekly basis and daily during common vacation weeks. In any scenario, schedules could be more flexible during weekends if the core service is only operated on weekdays.

5.3 2015 Proposed *Downeaster* Schedule (Interim Baseline)

Passenger rail service north of Portland to either Auburn or Bethel is being planned as an extension of the *Downeaster* service. It is important to note that there are changes to the existing *Downeaster* service that are currently in the planning stages. These changes will significantly impact the viability of the service to either Auburn or Bethel. This study has assumed that any intercity rail extension north of Portland to Auburn/Bethel or Montreal would build upon these assumed *Downeaster* service improvements. Without these improvements, service to Auburn and other points north would be less feasible. The planned changes include:

- One additional train set. (increasing active fleet from 2 to 3)
- Operation of two additional daily roundtrips between Boston and Portland (increasing from five (5) daily roundtrips to seven (7) daily roundtrips)
- Increasing service to Brunswick by one daily revenue round trip (service will be initiated with two (2) daily revenue roundtrips between Brunswick and Boston)
- Reduction in one-way trip times between Portland and Boston by 20 to 30 minutes (current trip time is ~2:30)
- Improvements to the Portland Transportation Center facilities to enable two trains to berth simultaneously.

All improvements to the *Downeaster* currently being planned would both improve the service between Boston and Portland, and as previously mentioned, facilitate the extension of the service to the north and west of Portland. We have included a possible 2015 *Downeaster* schedule for service to Brunswick is shown in Table 5-5[20]. For the purpose of the study, we are designating this scenario as the improved baseline.

[20] The MaineDOT team conferred with NNEPRA to develop this draft schedule. However, it will likely change in the future as the project further develops.

Table 5-5: Proposed 2015 Baseline *Downeaster* Schedule

North (East) Bound Service

Equipment ID	a	b	c	a	b	c	a
Makes From	680	682	672	684	686	674	688
Station	681	683	671	685	687	673	689
Boston North Station	8:55 AM	11:05 AM	1:25 PM	5:00 PM	6:20 PM	9:15 PM	11:20 PM
Woburn, MA	9:12 AM	11:22 AM	1:42 PM	5:17 PM	6:37 PM	9:32 PM	11:37 PM
Haverhill, MA	9:39 AM	11:49 AM	2:09 PM	5:44 PM	7:09 PM	9:59 PM	12:04 AM
Exeter, NH	9:55 AM	12:05 PM	2:25 PM	6:00 PM	7:25 PM	10:15 PM	12:20 AM
Durham, NH	10:07 AM	12:17 PM	2:37 PM	6:12 PM	7:37 PM	10:27 PM	12:32 AM
Dover, NH	10:15 AM	12:25 PM	2:45 PM	6:20 PM	7:45 PM	10:35 PM	12:40 AM
Wells, ME	10:30 AM	12:40 PM	3:00 PM	6:35 PM	8:00 PM	10:50 PM	12:55 AM
Saco, ME	10:45 AM	12:55 PM	3:15 PM	6:50 PM	8:15 PM	11:05 PM	1:10 AM
Old Orchard Beach, ME	10:49 AM	12:59 PM	3:19 PM	6:54 PM	8:19 PM	11:09 PM	1:14 AM
Arr. Portland, ME	11:05 AM	1:15 PM	3:35 PM	7:10 PM	8:35 PM	11:25 PM	1:30 AM
Dep. Portland, ME	11:15 AM	-	3:45 PM	-	8:45 PM	-	-
Freeport, ME	11:46 AM	-	4:16 PM	-	9:16 PM	-	-
Brunswick, ME	12:00 PM	-	4:30 PM	-	9:30 PM	-	-
Turns To	684	686	674	688	Brunswick Layover	Thompson Pt Layover	Thompson Pt Layover

South (West) Bound Service

Equipment ID	a	b	c	a	b	c	a
Makes From	Thompson Pt Layover	Brunswick Layover	Thompson Pt Layover	681	683	671	685
Station	680	682	672	684	686	674	688
Brunswick, ME	-	7:15 AM	-	12:40 PM	-	5:10 PM	-
Freeport, ME	-	7:29 AM	-	12:54 PM	-	5:24 PM	-
Arr. Portland, ME	-	8:00 AM	-	1:25 PM	-	5:55 PM	-
Dep. Portland, ME	6:00 AM	8:10 AM	10:30 AM	1:35 PM	3:20 PM	6:05 PM	8:10 PM
Old Orchard Beach, ME	6:12 AM	8:22 AM	10:42 AM	1:47 PM	3:32 PM	6:17 PM	8:22 PM
Saco, ME	6:18 AM	8:28 AM	10:48 AM	1:53 PM	3:38 PM	6:23 PM	8:28 PM
Wells, ME	6:36 AM	8:46 AM	11:07 AM	2:11 PM	3:56 PM	6:41 PM	8:46 PM
Dover, NH	6:53 AM	9:03 AM	11:24 AM	2:28 PM	4:13 PM	6:58 PM	9:03 PM
Durham, NH	6:59 AM	9:09 AM	11:30 AM	2:34 PM	4:19 PM	7:04 PM	9:09 PM
Exeter, NH	7:14 AM	9:24 AM	11:45 AM	2:49 PM	4:34 PM	7:19 PM	9:24 PM
Haverhill, MA	7:30 AM	9:38 AM	11:59 AM	3:03 PM	4:48 PM	7:33 PM	9:38 PM
Woburn, MA	7:53 AM	10:01 AM	12:22 PM	3:26 PM	5:11 PM	7:56 PM	10:01 PM
Boston North Station	8:15 AM	10:20 AM	12:40 PM	3:45 PM	5:35 PM	8:20 PM	10:20 PM
Turns To	681	683	671	685	687	675	689

This schedule reflects the following:

- Seven daily roundtrips between Portland and Boston[21],
- Three (3) train consists in service,
- Three (3) roundtrips to Brunswick and four (4) roundtrips to Portland,
- Faster one-way Boston – Portland trip time of approximately 2:10 (currently ~2:30)
- Ten (10) minute turns in Portland for through service,
- Forty (40) minute turn/recovery at terminal, and
- A layover facility in Brunswick.

Additionally, until such time that improvements are made at MBTA's Boston North Station to improve capacity, there is no the ability to increase the number of departures and arrivals.

[21] Per NNEPRA, no new arrival or departure slots are possible into and out of Boston North Station.

5.4 Rail Service from Boston to Auburn Intermodal Passenger Center

The service developed in this scenario provides the most service given the constraints previously described for the *Downeaster's* 2015 baseline, (i.e. no new arrival or departure slots at Boston North Station). Given these constraints, rail service from Auburn Intermodal Passenger Center to Portland and Boston ranges from one-seat rides to Portland and Boston, up to a mixture of one-seat rides and timed transfers in Portland, and has been maximized to provide connections to all *Downeaster* services.

All trips originating in or terminating at Portland in the 2015 schedule identified above will be shifted to originate or terminate in Auburn. Up to 16 trips between Portland and Auburn would be offered, with six trips offered as one-seat rides to and from Boston and six trips providing transfers in Portland to another train[22]. Three trips would meet northbound *Downeaster* trains and three trains would be timed to meet southbound *Downeaster* service. The remaining four trips to and from Auburn Intermodal Passenger Center do not meet any *Downeaster* trains and are moving either to setup for a transfer or returning from a meet in Portland. See Table 5-6 for a summary of the maximum number of trips to and from Auburn.

Table 5-6: Proposed Trip Summary for Service to the Auburn Intermodal Passenger Center

	One Seat Rides		Timed Transfers in Portland		Total Trips	
	To Boston	From Boston	To Boston	From Boston	To Portland	From Portland
Brunswick	3	3	0	0	3	3
Freeport	3	3	0	0	3	3
Auburn Intermodal Passenger Center	3	3	3	3	8	8
Portland	7	7	N/A	N/A	N/A	N/A

Additionally, one new set of equipment (train set) that is identical to the other three *Downeaster* train consists (i.e. one P42DC locomotive, one PCU "cabbage" car, four coaches and one café car) would be required for the service. By purchasing a set of equipment that is identical to the other trains, additional flexibility in developing system schedules is provided and would thereby increase the number of one-seat rides possible between Auburn Intermodal Passenger Center, Portland, and Boston.

The following assumptions have been used to create the schedule shown in Table 5-7. Additional information regarding proposed and assumed infrastructure improvements are discussed in Chapter 6, including station and layover site details.

- **Crew & Equipment**
  - One (1) new set of equipment (D) is available in addition to the three existing *Downeaster* train sets.
    - Set D is equivalent in all ways to Sets A, B, & C
    - Train sets B & C are cycled through the service schedules on a two day rotation (two day cycle).
    - Train crew B and C are on a one day cycle.

- **Layover Facilities**
  - The existing overnight train storage facility (train layover) at Thompson's Point is closed;
  - A layover facility with capacity for at least one (1) train consist has been built in Brunswick; and
  - A layover facility with capacity for at least three (3) train consists has been built in Auburn.

[22] Passengers traveling from Boston through Portland to Auburn would not need to change trains.

- **Stations**
  - Station improvements have been made to the station in Portland to enable berthing two trains at once
  - Lewiston/Auburn station is located at the Auburn Intermodal Passenger Center

- **Operations**
  - Forty minute minimum turn/recovery time at terminal for all one-seat rides
  - Twenty minute minimum turn/recovery time at terminal for all shuttle trips
  - Ten minute timed transfers in Portland
  - All crews sign up and sign off in same location
  - Set B & C crews perform a "hot swap"[23] in Portland
  - Fifteen (15) minutes is allowed for the "hot swap"

Table 5-7: Proposed Schedule for Service to the Auburn Intermodal Passenger Center

North (East) Bound Service

Equipment ID	A	B	C	A	D	C	A
Makes From	680	682	672	684	686	674	688
Station	681	683	671	685	687	673	689
Boston North Station	8:55 AM	11:05 AM	1:25 PM	5:00 PM	6:20 PM	9:15 PM	11:20 PM
Woburn, MA	9:12 AM	11:22 AM	1:42 PM	5:17 PM	6:37 PM	9:32 PM	11:37 PM
Haverhill, MA	9:39 AM	11:49 AM	2:09 PM	5:44 PM	7:09 PM	9:59 PM	12:04 AM
Exeter, NH	9:55 AM	12:05 PM	2:25 PM	6:00 PM	7:25 PM	10:15 PM	12:20 AM
Durham, NH	10:07 AM	12:17 PM	2:37 PM	6:12 PM	7:37 PM	10:27 PM	12:32 AM
Dover, NH	10:15 AM	12:25 PM	2:45 PM	6:20 PM	7:45 PM	10:35 PM	12:40 AM
Wells, ME	10:30 AM	12:40 PM	3:00 PM	6:35 PM	8:00 PM	10:50 PM	12:55 AM
Saco, ME	10:45 AM	12:55 PM	3:15 PM	6:50 PM	8:15 PM	11:05 PM	1:10 AM
Old Orchard Beach, ME	10:49 AM	12:59 PM	3:19 PM	6:54 PM	8:19 PM	11:09 PM	1:14 AM
Arr. Portland, ME	11:05 AM	1:15 PM	3:35 PM	7:10 PM	8:35 PM	11:25 PM	1:30 AM
Dep. Portland, ME	11:15 AM	1:25 PM	3:45 PM		8:45 PM	11:35 PM	1:40 AM
Auburn Intermodal, ME	-	2:05 PM	-	-	-	12:15 AM	2:20 AM
Freeport, ME	11:46 AM	-	4:16 PM	-	9:16 PM	-	-
Brunswick, ME	12:00 PM	-	4:30 PM	-	9:30 PM	-	-
Turns To	684	Auburn Layover, Set D	674	688	Brunswick Layover, Set B	Auburn Layover	Auburn Layover

South (West) Bound Service

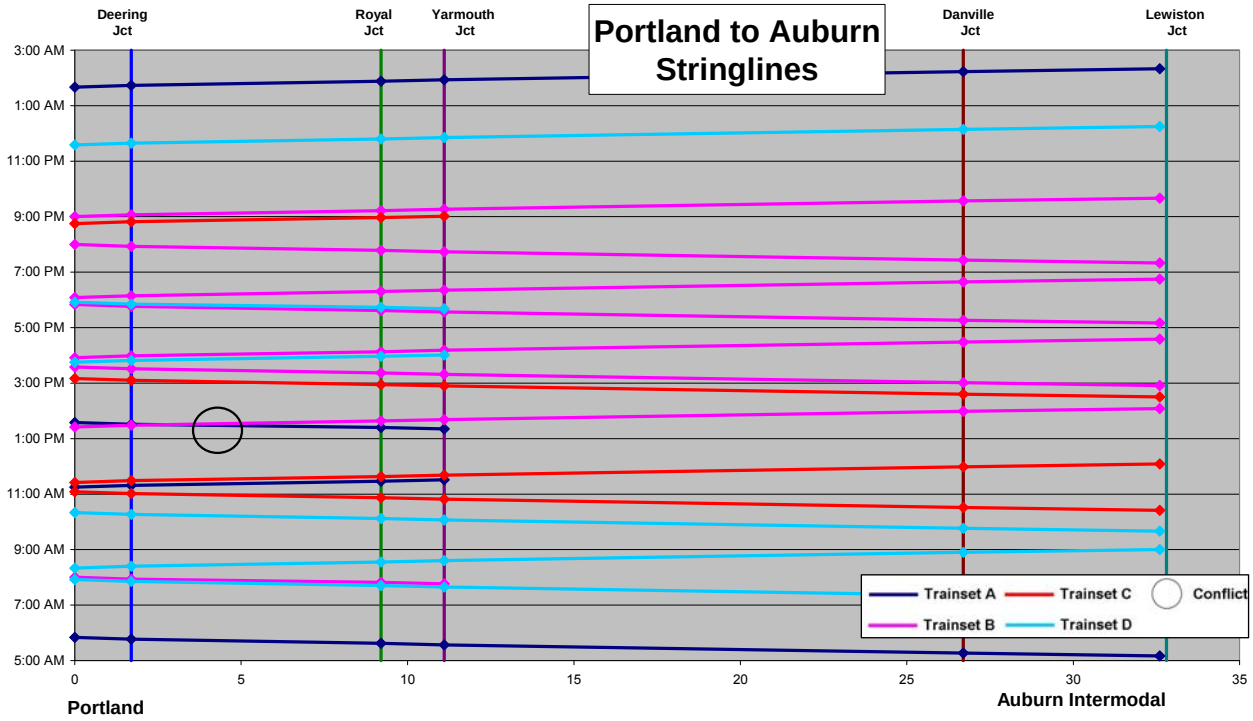
Equipment ID	A	B	C	A	D	C	A
Makes From	Auburn Layover	Brunswick Layover	Auburn Layover	681	683	671	685
Station	680	682	672	684	686	674	688
Brunswick, ME	-	7:15 AM	-	12:40 PM	-	5:10 PM	-
Freeport, ME	-	7:29 AM	-	12:54 PM	-	5:24 PM	-
Auburn Intermodal, ME	5:10 AM	-	9:40 AM	-	2:30 PM	-	-
Arr. Portland, ME	5:50 AM	8:00 AM	10:20 AM	-	3:10 PM	5:55 PM	-
Dep. Portland, ME	6:00 AM	8:10 AM	10:30 AM	1:35 PM	3:20 PM	6:05 PM	8:10 PM
Old Orchard Beach, ME	6:12 AM	8:22 AM	10:42 AM	1:47 PM	3:32 PM	6:17 PM	8:22 PM
Saco, ME	6:18 AM	8:28 AM	10:48 AM	1:53 PM	3:38 PM	6:23 PM	8:28 PM
Wells, ME	6:36 AM	8:46 AM	11:07 AM	2:11 PM	3:56 PM	6:41 PM	8:46 PM
Dover, NH	6:53 AM	9:03 AM	11:24 AM	2:28 PM	4:13 PM	6:58 PM	9:03 PM
Durham, NH	6:59 AM	9:09 AM	11:30 AM	2:34 PM	4:19 PM	7:04 PM	9:09 PM
Exeter, NH	7:14 AM	9:24 AM	11:45 AM	2:49 PM	4:34 PM	7:19 PM	9:24 PM
Haverhill, MA	7:30 AM	9:38 AM	11:59 AM	3:03 PM	4:48 PM	7:33 PM	9:38 PM
Woburn, MA	7:53 AM	10:01 AM	12:22 PM	3:26 PM	5:11 PM	7:56 PM	10:01 PM
Boston North Station	8:15 AM	10:20 AM	12:40 PM	3:45 PM	5:35 PM	8:20 PM	10:20 PM
Turns To	681	683	671	685	687	673	689

[23] A "hot swap" refers to a crew change at a set point (e.g., a layover facility or a train station) on a train that is currently en-route to its destination.

Stringline graphs are the traditional tool used for railroad operations planning. They are graphs of distance versus time, and show the location of all trains over a route at any given time. They incorporate conditions on the line such as the track geometry and track speed. Stringlines can also outline important locations such as interlocking limits, yards locations, and passenger stations. Areas of conflict arise when two or more strings (trains) intersect (or conflict) on the same track, and the existing infrastructure will not allow for one of the trains to be routed onto another track. Different colors indicate different sets of equipment.

In this instance, station locations and key railroad locations are shown on the X – axis, and the time of day is shown on the Y-axis in Figure 5-1.

Figure 5-1: Stringlines for the Proposed Schedule for Maximum Service to the Auburn Intermodal Passenger Center



The result of this analysis indicates that there is one operational conflict between Portland and Auburn (see the circle in Figure 5-1):

- Conflict 1
  Train #683 heading eastbound conflicts with Train #684 heading to westbound at Deering Junction at 1:29PM. This conflict is resolved by building a passing siding at Deering Junction to allow for the two trains to meet and pass each other.

As previously mentioned, equipment sets B & C are on a two day cycle, whereas the crews are on a one day cycle.[24] Since the sets are all interlined, it does not matter where they end up at the end of their service day. However, it does matter where the crew finishes their shift.

In order to reduce operating costs, the crew must return to the location where they signed up at the beginning of their shift. Additional costs would be incurred to transport the crew back to their sign-up location (either by train or non-rail transportation), or lodging must be provided for crew. To eliminate this

[24] This is common practice for railroads to operate equipment on multi-day cycles. The MBTA in Boston operates equipment on three day cycles.

cost, Set B & C crews perform a "hot swap" in Portland. As previously mentioned, a "hot swap" refers to a crew change at a set point (e.g., a layover facility or a train station) on a train that is currently en-route to its destination.

Fifteen (15) minutes has been allowed for the "hot swap." This crew swap will allow both crews to end up back in their sign-up location at the end of their shift.[25]

Please see Table 5-8 for a summary of the estimated weekday service statistics.

Table 5-8: Incremental Maximum Service Trip Characteristics to Auburn

Service Type	Miles	No. Trips	Hours	Miles
One-Seat Rides	32.9	6	04:40	197
Shuttle Trips	32.9	10	15:15	329
Total			19:55	526

A summary of the one-way trip information for service to the Auburn Intermodal Passenger Center is shown in Table 5-9.

Table 5-9: Summary of One-Way Auburn Trip

Information	Miles	Segment Trip Time	Total Elapsed Time
Boston	0	00:00	
Portland	110	02:10	02:10
Auburn	142	00:40	02:50

An example of a service schedule from Boston to Auburn is shown in Table 5-10.

Table 5-10: Example of One-Seat Trip and Timed Transfers for Service to Auburn

		Timed Transfer		One-Seat Ride
	Trip	681	6682	683
Station	Boston	8:55 AM	-	11:05 AM
	A: Portland	11:05 AM	-	1:15 PM
	D: Portland	-	11:25	1:25 PM
	Brunswick	12:00 PM	-	-
	Auburn		12:05 PM	2:05 PM

5.5 Rail Service from Boston to Bethel

Rail service from Bethel to Portland and Boston would be predominantly offered with one-seat rides and one, timed transfer in Portland. Most trips originating in or terminating at Portland in the 2015 Baseline *Downeaster* schedule would be shifted to Bethel. A total of eight trips between Portland and Bethel are offered, with six trips offered as one-seat rides to and from Boston and one trip providing timed transfer in Portland to *Downeaster* service to Boston. The remaining trip to Bethel is the timed transfers' return trip. See Table 5-11 for a summary of the trips to and from Bethel. In addition to serving Bethel, rail service would also stop at Auburn Intermodal Passenger Center and South Paris.

[25] The MBTA currently performs two crew hot swaps on their Providence line at the Pawtucket layover facility during the midday.

Table 5-11: Proposed Trip Summary for Service to Bethel

	One Seat Rides		Timed Transfers in Portland		Total Trips	
	To Boston	**From** Boston	**To** Boston	**From** Boston	**To** Portland	**From** Portland
Brunswick	4	4	0	0	4	4
Freeport	4	4	0	0	4	4
Bethel	3	3	1	0	4	4
South Paris	3	3	1	0	4	4
Auburn Intermodal Passenger Center	3	3	1	0	4	4
Portland	7	7	N/A	N/A	N/A	N/A

The following assumptions have been used to create the schedule shown in Table 5-12. Additional information regarding proposed and assumed infrastructure improvements are discussed in Chapter 6, including station and layover site details.

- **Equipment**
  - One (1) new set of equipment (D) is available in addition to the three existing *Downeaster* train sets.
    - Set D is equivalent in all ways to Sets A, B, & C, this allows for interlining of equipment sets
    - Sets A, B, & D equipment sets are on a 3 day cycle

- **Layover Facilities**
  - Thompson's Point layover is closed
  - The layover facility in Auburn has been closed and relocated to Bethel
  - A two (2) consist layover has been built in Brunswick
  - A two (2) consist layover has been built in Bethel

- **Stations**
  - Station improvements have been made to the station in Portland to enable berthing two trains at once
  - Lewiston/Auburn station is at Auburn Intermodal Passenger Center
  - Oxford County station in South Paris (at historical location)
  - Bethel Station at existing location

- **Operations**
  - Forty minute minimum turn/recovery time at terminal for all one-seat rides
  - Twenty minute minimum turn/recovery time at terminal all timed transfers
  - Ten (10) minute timed transfers in Portland
  - One additional roundtrip to Brunswick
  - Sets A, B, & D crews are on a three (3) day cycle

Table 5-12: Proposed Schedule for Rail Service to Bethel

North (East) Bound Service

Equipment ID	A	B	C	A	D	C	B
Makes From	680	682	672	684	686	674	688
Station	681	683	671	685	687	673	689
Boston North Station	8:55 AM	11:05 AM	1:25 PM	5:00 PM	6:20 PM	9:15 PM	11:20 PM
Woburn, MA	9:12 AM	11:22 AM	1:42 PM	5:17 PM	6:37 PM	9:32 PM	11:37 PM
Haverhill, MA	9:39 AM	11:49 AM	2:09 PM	5:44 PM	7:09 PM	9:59 PM	12:04 AM
Exeter, NH	9:55 AM	12:05 PM	2:25 PM	6:00 PM	7:25 PM	10:15 PM	12:20 AM
Durham, NH	10:07 AM	12:17 PM	2:37 PM	6:12 PM	7:37 PM	10:27 PM	12:32 AM
Dover, NH	10:15 AM	12:25 PM	2:45 PM	6:20 PM	7:45 PM	10:35 PM	12:40 AM
Wells, ME	10:30 AM	12:40 PM	3:00 PM	6:35 PM	8:00 PM	10:50 PM	12:55 AM
Saco, ME	10:45 AM	12:55 PM	3:15 PM	6:50 PM	8:15 PM	11:05 PM	1:10 AM
Old Orchard Beach, ME	10:49 AM	12:59 PM	3:19 PM	6:54 PM	8:19 PM	11:09 PM	1:14 AM
Arr. Portland, ME Dep. Portland, ME	11:05 AM	1:15 PM	3:35 PM	7:10 PM	8:35 PM	11:25 PM	1:30 AM
Auburn Intermodal, ME	-	1:55 PM	-	7:50 PM	-	12:05 AM	-
S. Paris, ME	-	2:23 PM	-	8:18 PM	-	12:33 AM	-
Bethel, ME	-	2:52 PM	-	8:47 PM	-	1:02 AM	-
Freeport, ME	11:46 AM	-	4:16 PM	-	9:16 PM	-	2:01 AM
Brunswick, ME	12:00 PM	-	4:30 PM	-	9:30 PM	-	2:15 AM
Turns To	684	688	674	Bethel Layover, Set D	Brunswick Layover, Set B	Bethel Layover	Brunswick Layover, Set A

South (West) Bound Service

Equipment ID	A	B	C	A	D	C	B
Makes From	Brunswick Layover	Brunswick Layover	Bethel Layover	681	Bethel Layover	671	683
Station	680	682	672	684	686	674	688
Brunswick, ME	5:15 AM	7:15 AM	-	12:40 PM	-	5:10 PM	-
Freeport, ME	5:29 AM	7:29 AM	-	12:54 PM	-	5:24 PM	-
Bethel, ME	-	-	8:43 AM	-	1:33 PM	-	6:23 PM
S. Paris, ME	-	-	9:12 AM	-	2:02 PM	-	6:52 PM
Auburn Intermodal, ME	-	-	9:40 AM	-	2:30 PM	-	7:20 PM
Arr. Portland, ME	5:50 AM	8:00 AM	10:20 AM	1:25 PM	3:10 PM	5:55 PM	8:00 PM
Dep. Portland, ME	6:00 AM	8:10 AM	10:30 AM	1:35 PM	3:20 PM	6:05 PM	8:10 PM
Old Orchard Beach, ME	6:12 AM	8:22 AM	10:42 AM	1:47 PM	3:32 PM	6:17 PM	8:22 PM
Saco, ME	6:18 AM	8:28 AM	10:48 AM	1:53 PM	3:38 PM	6:23 PM	8:28 PM
Wells, ME	6:36 AM	8:46 AM	11:07 AM	2:11 PM	3:56 PM	6:41 PM	8:46 PM
Dover, NH	6:53 AM	9:03 AM	11:24 AM	2:28 PM	4:13 PM	6:58 PM	9:03 PM
Durham, NH	6:59 AM	9:09 AM	11:30 AM	2:34 PM	4:19 PM	7:04 PM	9:09 PM
Exeter, NH	7:14 AM	9:24 AM	11:45 AM	2:49 PM	4:34 PM	7:19 PM	9:24 PM
Haverhill, MA	7:30 AM	9:38 AM	11:59 AM	3:03 PM	4:48 PM	7:33 PM	9:38 PM
Woburn, MA	7:53 AM	10:01 AM	12:22 PM	3:26 PM	5:11 PM	7:56 PM	10:01 PM
Boston North Station	8:15 AM	10:20 AM	12:40 PM	3:45 PM	5:35 PM	8:20 PM	10:20 PM
Turns To	681	683	671	685	687	673	689

As previously stated, stringline graphs are the traditional tool used for railroad operations planning and can be used to indicate where conflicts occur. A stringline analysis of the service to Bethel indicates that there are four operational conflicts with this service option. These conflicts are shown in circles in Figure 5-2.

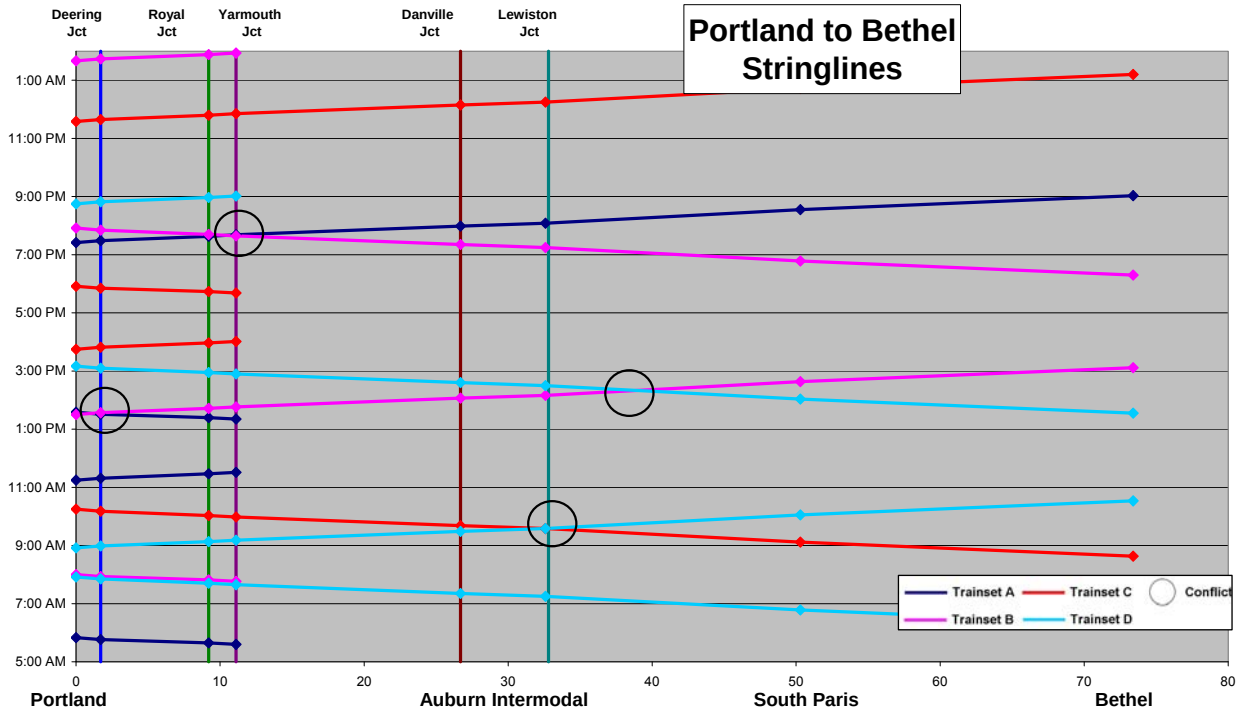
- Conflict 1
  Train #6681 heading westbound and Train #672 heading eastbound conflict at Auburn Intermodal Passenger Center at approximately 9:35AM. This conflict is resolved by constructing a two-track terminal at Auburn Intermodal Passenger Center.

- Conflict 2
  Train #684 heading westbound conflicts with Train #683 heading eastbound at Deering Junction at 1:34PM. This conflict is resolved by building a passing siding at Deering Junction.

- Conflict 3
  Train #683 heading westbound and Train #686 heading eastbound conflict at Mechanic Falls at 2:20PM. This conflict is resolved by building a three mile long passing siding in the vicinity of the conflict.

- Conflict 4
  Train #688 heading westbound conflicts with Train #685 heading eastbound at Yarmouth Junction at 7:39PM. This conflict is resolved by building a three mile passing in the vicinity of Yarmouth Junction.

Figure 5-2: Stringlines for the Proposed Schedule for Maximum Service to Bethel



One additional roundtrip between Brunswick and Portland has been added to the schedule. This trip has been added because it's assumed that Thompson's Point layover facility is closed. This creates four one-seat ride roundtrips from Boston to Brunswick, and three one-seat ride roundtrips between Boston and Bethel.

Equipment sets A, B & D and crews are on three day cycles. Since the sets are all interlined, it does not matter where they end up at the end of their service day. In order to reduce operating costs, it is ideal to have the train crew return to the location where they signed up at the beginning of their shift. Since this is not possible with the proposed schedule, the way to minimize crew costs is to provide a crew dormitory or some other crew accommodations at Bethel and Brunswick.

Please see Table 5-13 for a summary of the estimated weekday service statistics.

Table 5-13: Incremental Maximum Service Trip Characteristics to Bethel

Service Type	Miles	No. Trips	Hours	Miles
One-Seat Rides	73.4	6	15:47	440
Shuttle Trips	73.4	2	3:54	147
		Total	19:41	587

A summary of the one-way trip information for service to Bethel is shown in Table 5-14.

Table 5-14: Summary of One-Way Bethel Trip Information

	Miles	Trip Time	Elapsed Time
Boston	0	00:00	
Portland	110	02:10	02:10
Auburn	142	00:40	02:50
S. Paris	160	00:28	03:18
Bethel	183	00:29	03:47

An example of the service schedule from Boston to Auburn is shown in Table 5-15.

Table 5-15: Example of One-Seat Trip and Timed Transfer for Service to Bethel

		Timed Transfer		One-Seat Ride
	Trip	**6682**	**682**	**672**
Station	Bethel	6:23 AM	-	8:43 AM
	S. Paris	6:52 AM	-	9:12 AM
	Auburn	7:20 AM	-	9:40 AM
	Brunswick	-	7:15 AM	-
	A: Portland	8:00	-	10:20 AM
	D: Portland		8:10 AM	10:30 AM
	Boston		10:20 AM	12:40 AM

5.6 Rail Service from Portland to Montreal

Rail service from Montreal to Portland would be a one-seat ride between the two cities, scheduled to accommodate transfers to the Amtrak *Downeaster* Service. The operation of the rail service between Montreal and Portland does not build upon the rail service (i.e. the service would be independent) from Bethel or Auburn to Portland. However, the analysis does assume that the Boston to Bethel rail service is in place and operational so that the rail line capacity could be examined.

Two roundtrips per day would be operated. All trips are scheduled to arrive in Portland so that they can provide 10 minute timed transfers to *Downeaster* services headed to Boston, and 10 minute timed transfers from Boston. See Table 5-16 for a summary of the trips to and from Montreal.

Table 5-16: Trains per Day by Station Portland-Montreal

	Trains per Day	Proposed Trains per Day
Portland, ME	16	20
Auburn Intermodal Passenger Center, ME	8	12
South Paris, ME	8	12
Bethel, ME	8	12
Berlin, NH	0	4
North Stratford, NH	0	4
Sherbrooke, Que	0	4
St. Hyacinthe, Que	20	24
St. Lambert, Que	22	26

In addition to providing service to Montreal, the stations at the Auburn Intermodal Passenger Center, South Paris, and Bethel would receive increased service. Service would be restored to Berlin, NH and North Stratford, NH. In Canada, service will be restored to Sherbrooke, and provide for increased frequencies to St. Hyacinthe and St. Lambert.

Unlike the other two service options, this service would be a stand-alone service operating between Portland and Montreal. The following assumptions have been used to create the schedule shown in Table 5-17.

- **Equipment.**
  - Two (2) new sets of equipment are available.

- **Layover Facilities.**
  - Thompson's Point layover is closed
  - Layover facilities in Montreal are assumed to have enough capacity to handle the increased frequency of trains. Trains can be restocked, have tanks pumped, and if necessary, be fueled in Portland.
- **Stations.**
  - Berlin Station is at its historical location
  - N. Stratford Station is near its downtown
  - Sherbrooke Station is at its historical location

- **Operations.**
  - Three hour minimum turn/recovery time at the terminals
  - Ten (10) minute timed transfers in Portland
  - Ninety (90) minutes for customs at the US-Canadian border

As previously stated, stringline graphs are the traditional tool used for railroad operations planning, and can be used to indicate where conflicts occur. A stringline analysis of the service to Montreal indicates that there are two operational conflicts with this service option. These conflicts are shown in circles in Figure 5-3.

- Conflict 1
  Train #068 heading westbound and Train #067 heading eastbound conflict at ~ 2:35PM in the vicinity of Island Pond, VT. This conflict is resolved by constructing a second track in the vicinity of Island Pond.

- Conflict 2
  Train #066 heading westbound and Train #069 heading eastbound conflict at approximately ~2:50 AM in the vicinity of North Stratford. This conflict is resolved by constructing a second track in the vicinity North Stratford.

Table 5-17: Proposed Schedule for Service to Montreal

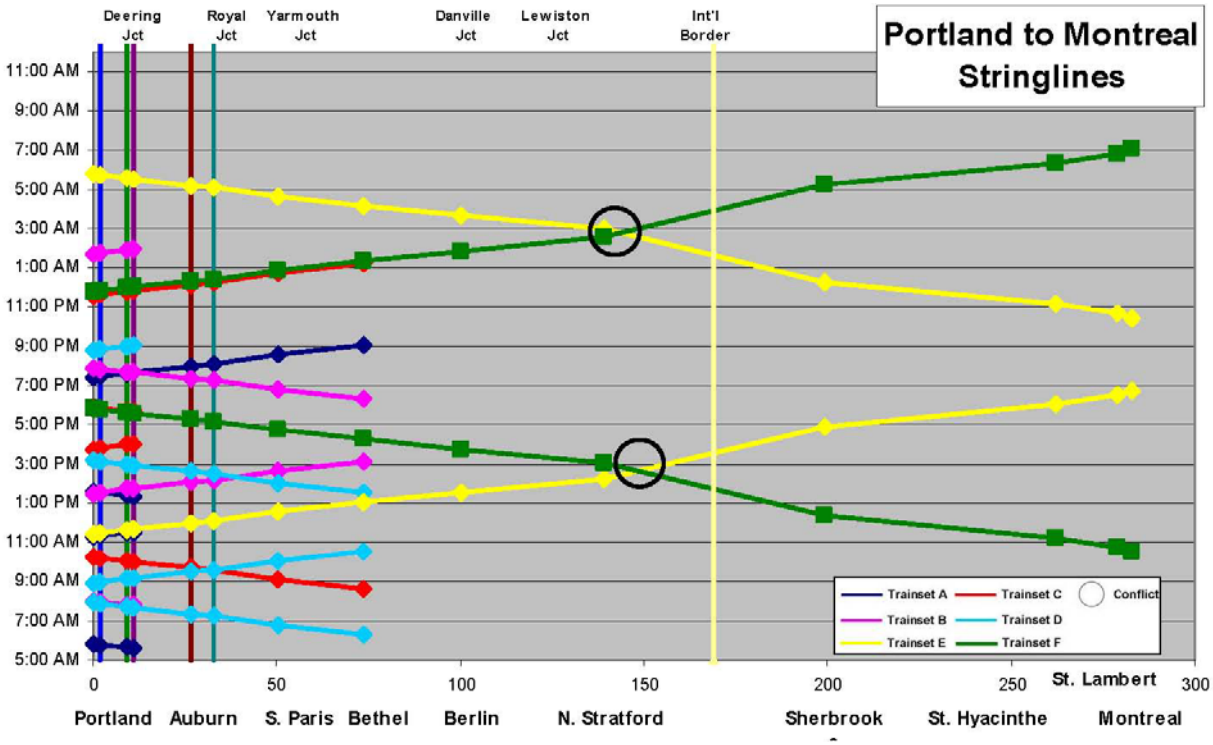
North (East) Bound Service

Equipment ID	A	MTRL A	B	C	A	D	C	MTRL B	B
Makes From	680	066	682	672	684	686	674	068	688
Station	681	067	683	671	685	687	673	069	689
Boston North Station	8:55 AM	-	11:05 AM	1:25 PM	5:00 PM	6:20 PM	9:15 PM	-	11:20 PM
Woburn, MA	9:12 AM	-	11:22 AM	1:42 PM	5:17 PM	6:37 PM	9:32 PM	-	11:37 PM
Haverhill, MA	9:39 AM	-	11:49 AM	2:09 PM	5:44 PM	7:09 PM	9:59 PM	-	12:04 AM
Exeter, NH	9:55 AM	-	12:05 PM	2:25 PM	6:00 PM	7:25 PM	10:15 PM	-	12:20 AM
Durham, NH	10:07 AM	-	12:17 PM	2:37 PM	6:12 PM	7:37 PM	10:27 PM	-	12:32 AM
Dover, NH	10:15 AM	-	12:25 PM	2:45 PM	6:20 PM	7:45 PM	10:35 PM	-	12:40 AM
Wells, ME	10:30 AM	-	12:40 PM	3:00 PM	6:35 PM	8:00 PM	10:50 PM	-	12:55 AM
Saco, ME	10:45 AM	-	12:55 PM	3:15 PM	6:50 PM	8:15 PM	11:05 PM	-	1:10 AM
Old Orchard Beach, ME	10:49 AM	-	12:59 PM	3:19 PM	6:54 PM	8:19 PM	11:09 PM	-	1:14 AM
Arr. Portland, ME	11:05 AM	-	1:15 PM	3:35 PM	7:10 PM	8:35 PM	11:25 PM	-	1:30 AM
Portland, ME	11:15 AM	11:25 AM	1:30 PM	3:45 PM	7:25 PM	8:45 PM	11:35 PM	11:45 PM	1:40 AM
Auburn Intermodal, ME	-	12:05 PM	1:30 PM	-	8:05 PM	-	12:15 AM	12:25 AM	-
S. Paris, ME	-	12:33 PM	1:30 PM	-	8:33 PM	-	12:43 AM	12:53 AM	-
Bethel, ME	-	1:02 PM	1:30 PM	-	9:02 PM	-	1:12 AM	1:22 AM	-
Freeport, ME	11:46 AM	-	-	4:16 PM	-	9:16 PM	-	-	2:01 AM
Brunswick, ME	12:00 PM	-	-	4:30 PM	-	9:30 PM	-	-	2:15 AM
Berlin, NH	-	1:31 PM	-	-	-	-	-	1:51 AM	-
N. Stratford, NH	-	2:13 PM	-	-	-	-	-	2:33 AM	-
Sherebrooke, Que	-	4:54 PM	-	-	-	-	-	5:14 AM	-
St. Hyacinthe, Que	-	6:02 PM	-	-	-	-	-	6:22 AM	-
St. Lambert, Que	-	6:30 PM	-	-	-	-	-	6:50 AM	-
Montreal Gare Centrale, Que	-	6:45 PM	-	-	-	-	-	7:05 AM	-
Turns To	684	Montreal Layover	688	674	Bethel Layover, Set D	Brunswick Layover, Set B	Bethel Layover	Montreal Layover	Brunswick Layover, Set A

South (West) Bound Service

Equipment ID	MTRL A	A	B	C	A	D	MTRL B	C	B
Makes From	Montreal Layover	Brunswick Layover	Brunswick Layover	Bethel Layover	681	Bethel Layover	Montreal Layover	671	683
Station	066	680	682	672	684	686	068	674	688
Montreal Gare Centrale, Que	10:30 PM	-	-	-	-	-	10:35 AM	-	-
St. Lambert, Que	10:45 PM	-	-	-	-	-	10:50 AM	-	-
St. Hyacinthe, Que	11:13 PM	-	-	-	-	-	11:18 AM	-	-
Sherbrooke, Que	12:21 AM	-	-	-	-	-	12:26 PM	-	-
N. Stratford, NH	3:02 AM	-	-	-	-	-	3:07 PM	-	-
Berlin, NH	3:44 AM	-	-	-	-	-	3:49 PM	-	-
Brunswick, ME	-	5:05 AM	7:15 AM	-	12:40 PM	-	-	5:10 PM	-
Freeport, ME	-	5:19 AM	7:29 AM	-	12:54 PM	-	-	5:24 PM	-
Bethel, ME	4:13 AM	-	-	8:38 AM	-	1:33 PM	4:18 PM	-	6:18 PM
S. Paris, ME	4:42 AM	-	-	9:07 AM	-	2:02 PM	4:47 PM	-	6:47 PM
Auburn Intermodal, ME	5:10 AM	-	-	9:35 AM	-	2:30 PM	5:15 PM	-	7:15 PM
Portland, ME	5:50 AM	6:00 AM	8:10 AM	10:30 AM	1:35 PM	3:20 PM	5:55 PM	6:05 PM	8:10 PM
Old Orchard Beach, ME	-	6:12 AM	8:22 AM	10:42 AM	1:47 PM	3:32 PM	-	6:17 PM	8:22 PM
Saco, ME	-	6:18 AM	8:28 AM	10:48 AM	1:53 PM	3:38 PM	-	6:23 PM	8:28 PM
Wells, ME	-	6:36 AM	8:46 AM	11:07 AM	2:11 PM	3:56 PM	-	6:41 PM	8:46 PM
Dover, NH	-	6:53 AM	9:03 AM	11:24 AM	2:28 PM	4:13 PM	-	6:58 PM	9:03 PM
Durham, NH	-	6:59 AM	9:09 AM	11:30 AM	2:34 PM	4:19 PM	-	7:04 PM	9:09 PM
Exeter, NH	-	7:14 AM	9:24 AM	11:45 AM	2:49 PM	4:34 PM	-	7:19 PM	9:24 PM
Haverhill, MA	-	7:30 AM	9:38 AM	11:59 AM	3:03 PM	4:48 PM	-	7:33 PM	9:38 PM
Woburn, MA	-	7:53 AM	10:01 AM	12:22 PM	3:26 PM	5:11 PM	-	7:56 PM	10:01 PM
Boston North Station	-	8:15 AM	10:20 AM	12:40 PM	3:45 PM	5:35 PM	-	8:20 PM	10:20 PM
Turns To	067	681	683	671	685	687	069	673	689

Figure 5-3: Stringlines for the Proposed Schedule for Service to Montreal (Assumes Maximum Efficiency Bethel Service in Place)



Please see Table 5-18 for a summary of the estimated weekday service statistics.

Table 5-18: Service Statistics for Service to Montreal

Service Type	Miles	No. Trips	Hours	Miles
One-Seat Rides	283	4	29:28	1,132

A summary of the one-way trip information for service to Montreal is shown in Table 5-19.

Table 5-19: Summary of One-Way Montreal Trip Information

	Miles	Trip Time	Total Elapsed Time
Portland, ME	0	00:00	00:00
Auburn, ME	32	00:40	00:40
S. Paris, ME	50	00:28	01:08
Bethel, ME	73	00:29	01:37
Berlin, NH	100	00:29	02:06
N. Stratford, NH	139	00:42	02:48
Sherbrooke, Que	199	02:41	05:29
St. Hyacinthe, Que	262	01:08	06:37
St. Lambert, Que	279	00:28	07:05
Montreal, Que	283	00:15	07:20

5.6.1 Border Crossing

There are several possibilities currently being explored by the US State Department and the Canadian Ministry of Foreign Affairs that would eliminate the impact customs has on the overall trip time. Presently, all trains heading between the two countries stop at or near the border so that passengers can clear customs. For Amtrak's *Adirondack* service operating between New York City and Montreal, passengers currently traveling to Canada alight just over the border in Lacolle, QC for a customs stop (~1:36), and passengers traveling to the US detrain at Rouses Point, NY for their customs stop (~1:00).[26]

One possibility being explored by both countries is to build a customs facility in Montreal, modeled after the existing Air-Security Treaty between the US and Canada. For southbound trips, passengers would clear US customs while still in Montreal. The train would then be closed between Montreal and the US. Once across the border, the train would make all local stops. For northbound service, the train would be closed from the border to Montreal. Once in Montreal, passengers would clear customs. However, this approach eliminates all local stops in Canada.

At present it is unknown which approach the US State Department and the Canadian Foreign Ministry will decide upon. Consequently, it is conservatively assumed that two facilities – one in the US (possibly near Island Pond, VT) and one in Sherbrooke, Canada would be built for passengers to clear customs. Based on the *Adirondack* model, 90 minutes was assumed sufficient for a customs stop in each direction.

5.7 Ridership and Revenue Forecasts

Ridership and ticket revenue forecasts were prepared for rail and motorcoach options using an existing model developed for Amtrak to assist in evaluating proposed *Downeaster* service options, including additional train frequencies, travel time improvements, and service extensions. Beyond the Portland-Boston corridor currently served by the *Downeaster*, the model also addresses markets that would be served by proposed extensions to Brunswick, Auburn, Bethel, and Montreal.

The model uses a two-stage approach addressing first total travel market size and then market share among the available modes of travel (e.g. passenger rail, automobile, etc.). The first stage of the model addresses total intercity person travel volumes and addresses changes due to population and employment growth. The second stage and central component is the mode share model, which addresses market shares by mode. The key independent variables driving the mode share model, which are specified for each mode and market, include travel time (including access to/from stations/terminals), travel cost, and departure frequency. The rail service characteristics that define these inputs include:

- Passenger Rail Timetable(s), providing departure/arrival times by train and station and thus defining:
    - travel time
    - frequency
    - departure/arrival time-of-day slots
- Average Fares, based on observed average yields in existing markets
- On-Time Performance (OTP)

The model utilizes observed Amtrak ridership and ticket revenue data as well as socio-economic data and forecasts, Amtrak timetables and pricing, and competitive mode data. The model application is regularly updated to reflect Amtrak's latest actual ridership and ticket revenues for the *Downeaster* service.

Tables 5-20 and 5-21 provide a summary of the projected ridership and overall revenue to be collected on a yearly basis by alternative. From a ridership standpoint, as is often the case, the greater service area and population, the higher the potential ridership. Since revenue is a factor of the number of riders, the greater the ridership, the more revenue is generated. Accordingly, the Montreal service would result in the

[26] Amtrak *Adirondack* schedule effective November 8, 2010.

greatest ridership and revenue. See Chapter 8 for a comparison of alternatives and summary of fare recovery ratios.

Table 5-20: Estimated Rail Ridership and Revenue

Alternatives	Ridership	Revenue
Improved Baseline	863,900	$15,587,000
Auburn	30,200 to 45,800	$961,000 to $1,373,000
Bethel	66,700 to 71,100	$2,036,000 to $2,150,000
Montreal	201,300 to 204,400	$7,498,000 to $7,579000

Table 5-21: Estimated Motorcoach Ridership and Revenue

	Lewiston/Auburn to Port. (2 RT)	Lewiston/Auburn to Port. (3 RT)	Lewiston/Auburn to Port. (5 RT)	Bethel-Portland
Ridership	6,600	7,500	7,900	7,500
Revenue	$174,000	$197,000	$209,000	$218,000

Chapter 6 Required Infrastructure Upgrades

6.1 Amtrak Throughway Motorcoach Service from Lewiston/Auburn to Portland

The Lewiston/Auburn to Portland motorcoach connection service would use a single bus. The bus would probably be a 40-foot over the road coach with the style, comfort, and capacity for the longer travel times needed to connect Lewiston and Auburn to Portland. The coach bus would seat approximately 50 passengers.

The other capital expense needed to get the service up and running is signage. Signs with the service name and schedules would be required at each stop.

The motorcoach service would be stopping at existing or proposed rail stations or existing or proposed park and ride facilities. All of the stops already have buses from other services using the stops. Thus, no bus stops or shelters need construction.

6.2 Amtrak Throughway Motorcoach Service to Bethel from Lewiston/Auburn

The Bethel motorcoach connection to Lewiston/Auburn service would use a single bus. The bus would probably be a 40-foot over the road coach with the style, comfort, and capacity for the longer travel times needed to connect Bethel and Portland. The coach bus would seat approximately 50 passengers.

The other capital expense needed to get the service up and running is signage. Signs with the service name and schedules would be required at each stop.

The motorcoach service would be stopping at existing or proposed rail stations or existing or proposed park and ride facilities. All of the stops already have buses using the stops. Thus, no bus stops or shelters need construction.

6.3 Rail Service from Boston to Auburn Intermodal Passenger Center

Service to the Auburn Intermodal Passenger Center would require upgrades to the existing rail infrastructure. A summary of the upgrades necessary to offer service is provided in this section. Additionally, known environmentally sensitive areas are identified that may impact the design and viability of planned infrastructure improvements.

- **Track Upgrades.** Track improvements would be required for the segments between Portland and Yarmouth. This could range between making track improvements limited to the Yarmouth Junction area to providing a second track for the entire segment. Additional capacity analyses are required to determine the specific level of capacity improvements required. For planning purposes an assumption has been made that the full second track would be required to mitigate impact on the railroad capacity being utilized by the proposed passenger service.

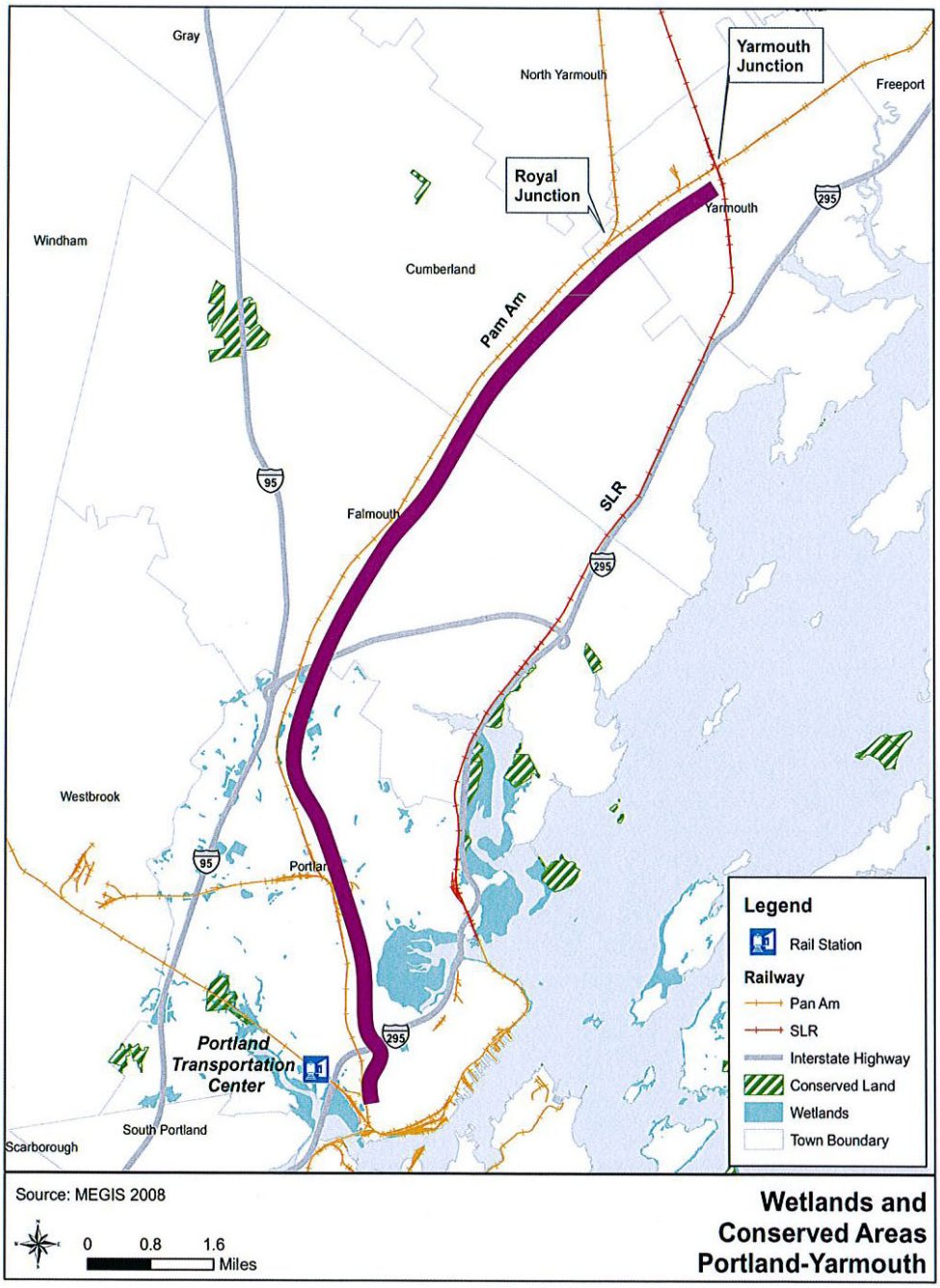
  To construct the second track existing passing sidings will be used to the greatest extent possible. In total, 9.3 miles of new track would need to be built between Portland and Yarmouth Junction. One universal crossover would be required for the double track segment. The ROW between Portland and Yarmouth Junction is wide enough to accommodate a two-track railroad including where the Brunswick Branch crosses the Presumpscot River, although only one track is currently in place. Due to the existing width of the bridge abutments and ROW, environmental impacts resulting from the second track and bridge replacement are anticipated to be minimal in this section. A map of the double track area is shown in Figure 6-1 with the purple line indicating the location of the double track.

  Up to 2.3 miles of existing track will need to be resurfaced to allow for FRA Class III speeds in and around Portland.

Approximately 14.8 miles of new track would replace the existing single track between Yarmouth Junction and Danville Junction. Since the SLR operates one to two trains per week between Danville Junction and Yarmouth Junction, no additional track work is anticipated in this segment.

A two track terminal at the Auburn Intermodal Passenger Center would be required. The station would be located on a 0.5 mile railroad spur located on airport property.[27]

Figure 6-1: Wetlands and other Environmental Areas between Portland and Yarmouth Junction



[27] Access to the station would require a diverging move from the SLR mainline. For service to points further north (e.g., Bethel, Montreal), a converging move to the mainline would be required. Operationally 10 minutes would be required for the engineer to "change ends" on the train, perform the mandated FRA brake test consist and then begin to travel to points further north.

- **Bridges.** Between Portland and Yarmouth Junction the only bridge work anticipated is the construction of a second bridge deck over the Presumpscot River. This bridge would need to be reconstructed to allow for the second track. This deck is estimated to be approximately 180 feet in length.

  Results of a recent review of this corridor segment indicated that 11 bridges between Yarmouth Junction and the Auburn Intermodal Passenger Center (10 bridges between Yarmouth and Danville Junctions and one bridge between Danville Junction and the Auburn Intermodal Passenger Center) will need to be replaced in order to bring them into the state of repair necessary to allow for regular passenger service[28].

- **Signals and Interlockings.** Up to 12.0 miles of new track between Portland and Yarmouth Junction would need to be tied into the existing CTC signal system. This would be the only signal upgrade required between Portland and Yarmouth Junction.

  Additionally, it is important that the new track between Yarmouth Junction and Danville Junction have all of the proper track circuitry installed at the exit and entry points of the interlockings at each Junction, so that this entire stretch of track would be considered one block of signaled territory (this has important PTC implications, as described in the next section).

- **Positive Train Control.** Due to the rules and regulations previously described regarding Positive Train Control, PTC requirements can be waived in a segment of dark territory if there are no more than 15 million gross tons transported annually, and if passenger service is limited to four regularly scheduled moves per day. If the segment is signalized, the number of daily train movements possible while still meeting the requirements for a waiver increases by eight to 12 regularly scheduled trips per day.

  There would be 12 regular train movements per day between Portland and Yarmouth Junction: six *Downeaster* trips (three roundtrips) to Brunswick and six *Downeaster* trips to Auburn (three roundtrips) starting out. This creates a total of 12 trips per day, which is the maximum number of movements allowed under an FRA exemption. As the service matures, and demand increases, additional trips could be added to either service, but PTC would need to be installed between Yarmouth and Portland.

  Since the segment of track between Yarmouth and Danville is considered signaled territory from the track circuitry at the exit point of both interlockings, up to 12 moves, or six roundtrips can be operated on the SLR main. As the service matures, and demand increases, additional trips could be added. However, if the number of trips exceeds 12, then PTC must be installed between Danville and Yarmouth junctions.

  Both of the circumstances described here are eligible for a PTC exemption. An exemption waiver must be submitted to the FRA for their review and approval.

- **Grade Crossings.** There are 41 existing grade crossings that may require safety improvements due to an increased level of rail traffic. Twenty-three grade crossings would need to be upgraded to accommodate a second track between Portland and Yarmouth Junction. It is further assumed that the remaining eighteen crossings would be fully upgraded to have gates and bells and be connected with the existing flashers. Additionally, a new crossing located on Kittyhawk Avenue in Auburn, for the Auburn Intermodal Passenger Center access track, will be required.

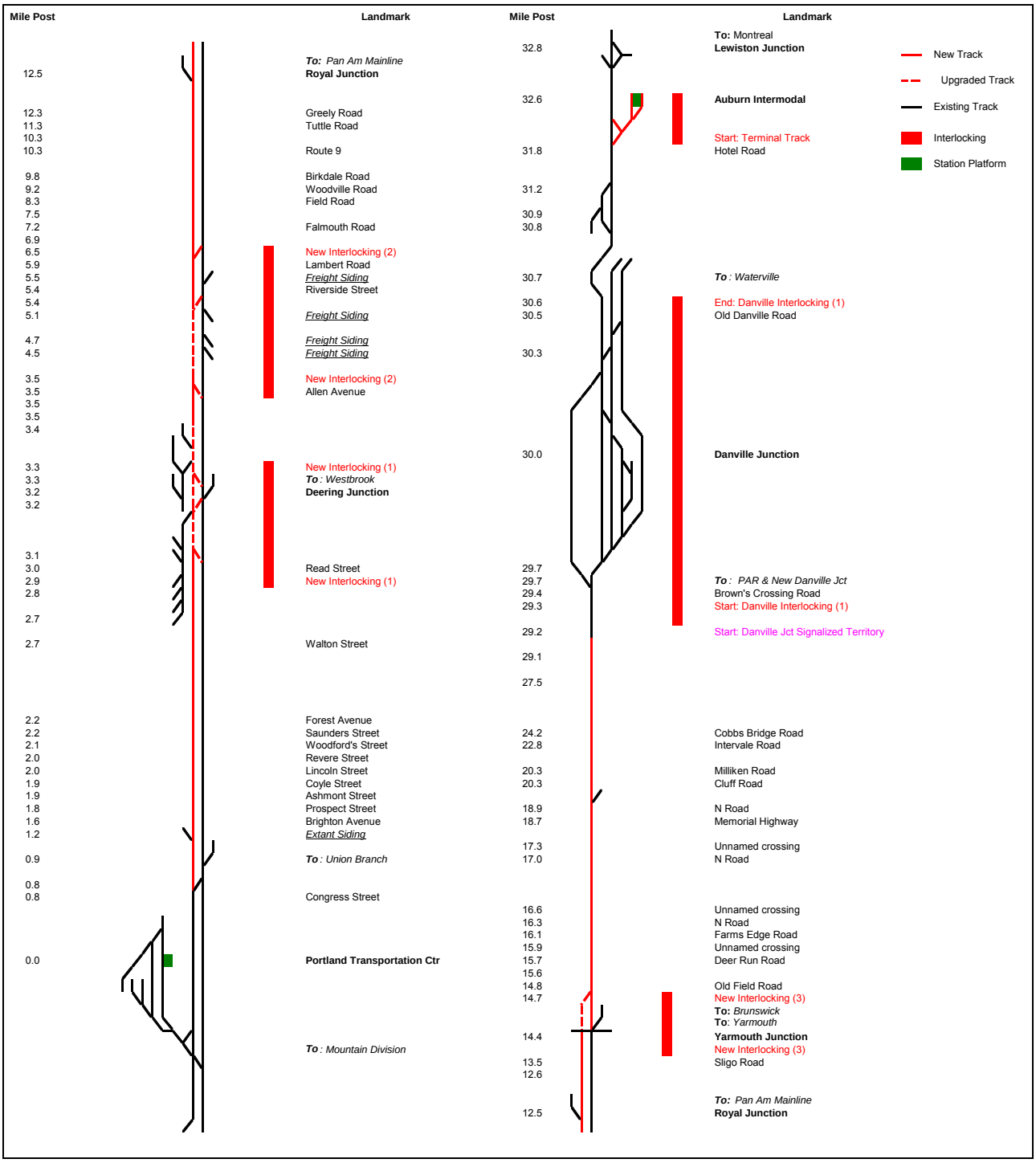
- **Stations.** There would be one new train station located at the Auburn Intermodal Passenger Center. No other stations are anticipated.

- **Layover Facility.** A new three consist layover facility will be required in the vicinity of the Auburn Intermodal Passenger Center.

[28] HNTB. *DRAFT Cost Feasibility Study for Portland Commuter Rail Study*. Prepared for the Maine Department of Transportation. November 25, 2005, pp. 3-16.

See Figure 6-2 for an illustration of the required infrastructure upgrades.

Figure 6-2: Required Infrastructure Upgrades for Service to the Auburn Intermodal Passenger Center



- **Rolling Stock.** As previously stated in Chapter 5, one (1) new set of equipment is required for Auburn service. This set is assumed to be identical to the existing train sets used by the *Downeaster*, and includes:

  - One (1) 1 P42DC locomotive
  - One (1) Powered Control Unit (aka “Cabbage” car)

- Five (5) coaches (including the café car)

By acquiring a trainset that is identical to those used for the existing *Downeaster* service, NNEPRA is provided with the highest degree of operational flexibility, by allowing all sets to be interlined, or substituted with one another, and ensuring that all trains will be sufficient to carry their anticipated passenger loads.

6.4 Rail Service from Boston to Bethel

Service to Bethel would require upgrades to the existing rail infrastructure. A summary of the upgrades necessary to offer service is provided in this section. Additionally, any possible impacts to wetlands and other environmentally sensitive areas are identified.

- **Track Upgrades.** Track upgrades between Portland and Auburn Intermodal Passenger Center are the same as previously described for service to Auburn Intermodal Passenger Center. Additionally, all 42.7 miles of track between Auburn Intermodal Passenger Center and Bethel will be resurfaced to allow passenger trains to operate at speeds of up to 60 mph.

- Since the PAR mainline will be double tracked to Yarmouth Junction, Conflict #4 described in the Bethel Rail Service section has been mitigated.

- Two scenarios have been developed regarding the segment of track between South Paris and Auburn. The two scenarios reflect unknowns regarding the trade-offs between the rail network capacity and potential environmental impacts. Additional analysis will be necessary to determine the extent of any environmental impacts and the extent of the rail system capacity improvements that will be necessary.

  - ***South Paris – Auburn: Scenario A***

    The SLR indicated that the stretch of railroad between South Paris and Auburn Intermodal Passenger Center is the route segment with the most daily traffic. Ideally, to avoid any service disruptions to the SLR, the 17.7 miles between these two stations would be double tracked. In this segment, the SLR abuts and passes through multiple freshwater wetlands. Double tracking the entire segment may result in wetland impacts that may be possible to avoid (see Scenario B). The existing embankment width in this segment ranges from approximately 30 to 55 feet at toe-of-slope, which depending on localized conditions may or may not be wide enough for a second track. Additional analysis will be necessary to identify the wetland limits and the extent of new rail sidings or double tracking necessary to avoid SLR service disruptions.

  - ***South Paris – Auburn: Scenario B***

    At a minimum, a three mile long passing siding located just west of Mechanic Falls will be required to allow for meets and passes of passenger trains. The right-of-way width for this passing siding ranges from approximately 30 to 40 feet at toe-of-slope.

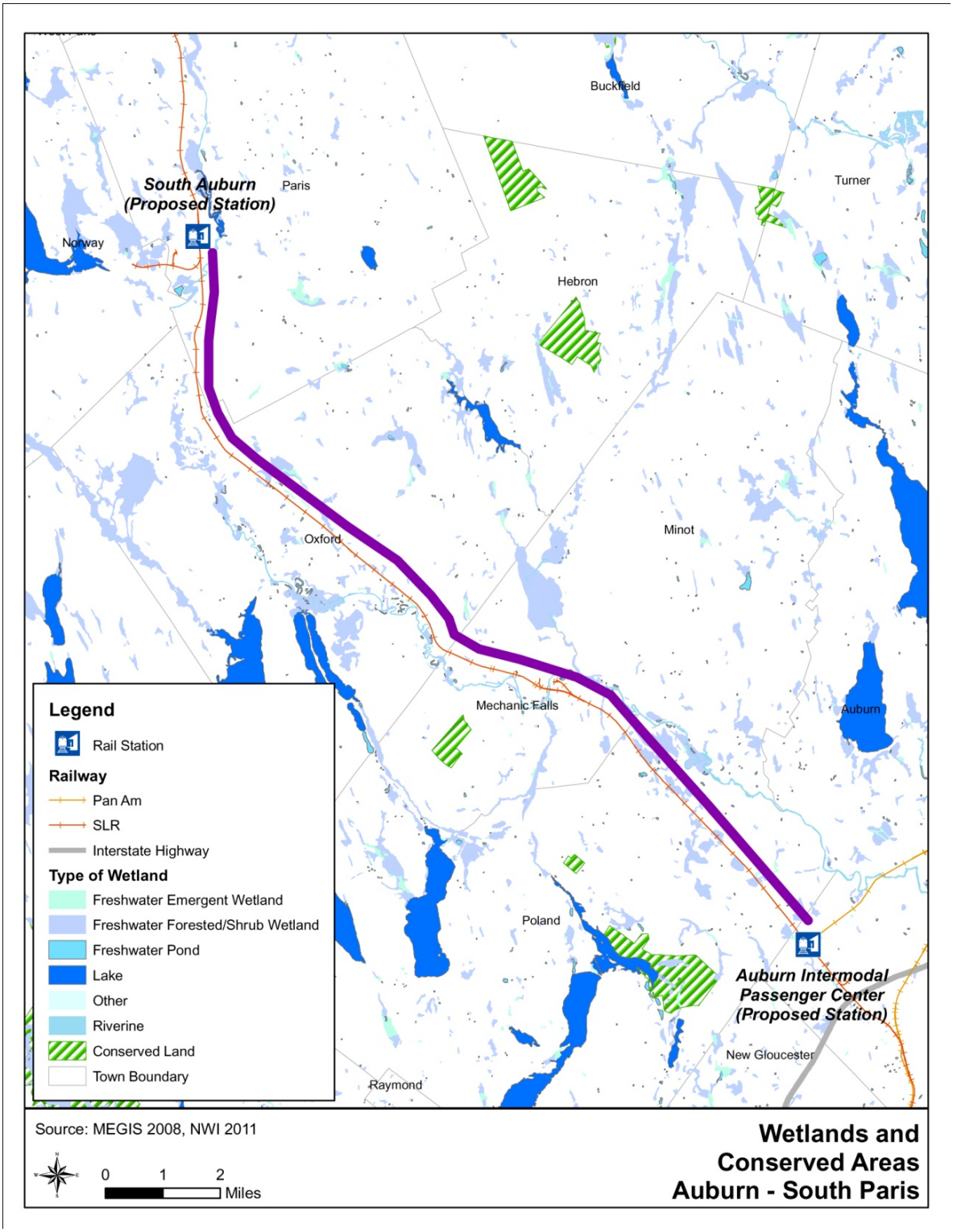
    SLR also states that a three mile passing siding in the vicinity of Bethel would be required to enable them to continue to meet their existing freight service obligations. This siding will be created by extending the existing 0.1 mile long station siding 0.7 miles north of the station and 2.2 miles south of the station.

- **Environmental Impacts.** Similar to the scenario providing service to Auburn Intermodal Passenger Center, there are no anticipated environmental impacts between Portland and Auburn. However, there are potential impacts to environmentally sensitive areas in the segment between Auburn and Bethel.

- ***South Paris – Auburn: Scenario A***

Currently, the SLR main line passes through nine documented wetlands, and crosses three rivers. It abuts another nine wetlands. A more detailed analysis is required to determine the extent of any impact in this segment. See Figure 6-3.

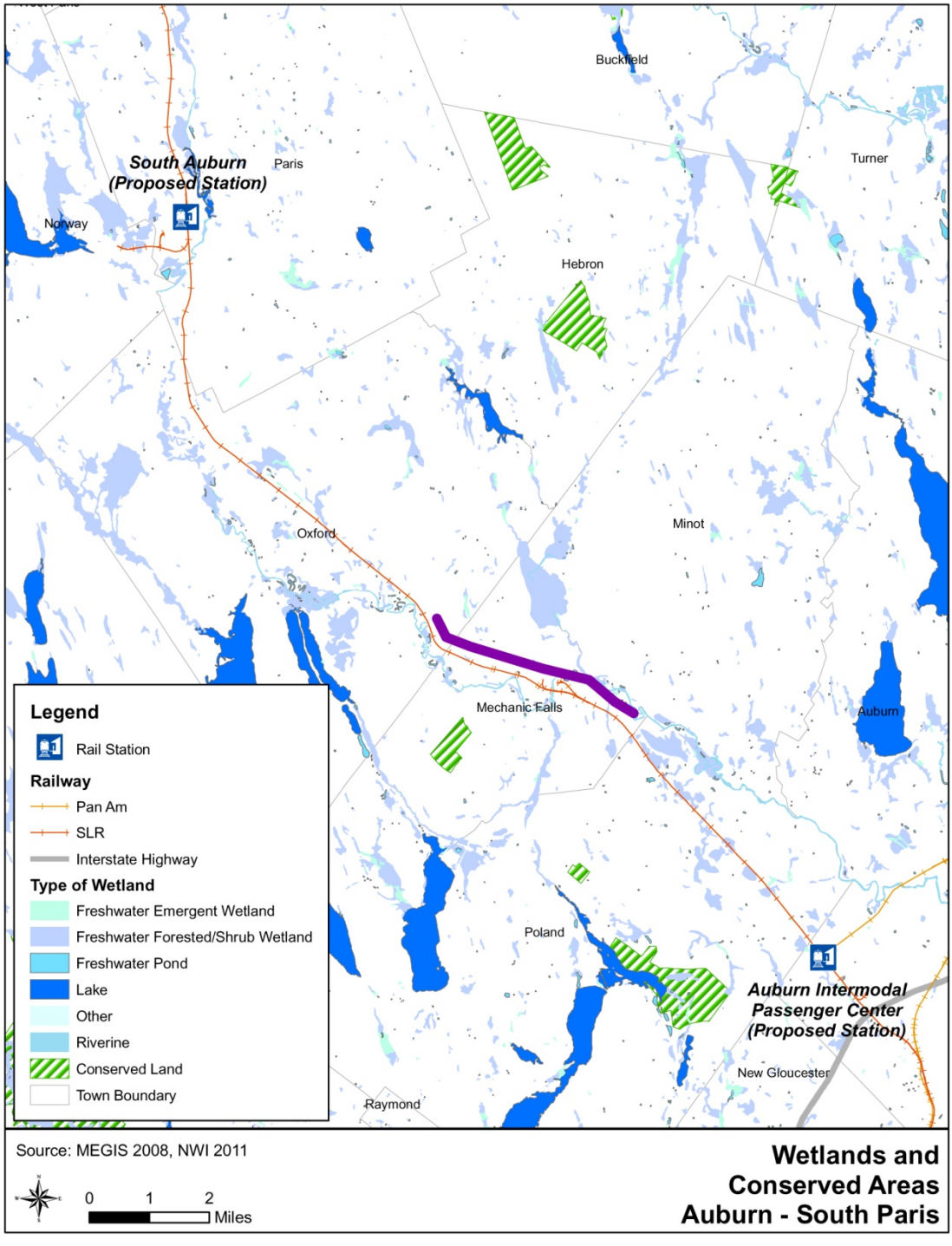
Figure 6-3: Wetlands and Environmental Areas Auburn Intermodal Passenger Center to South Paris



South Paris – Auburn: Scenario B

Under Scenario B a three mile long passing siding would be located just west of Mechanic Falls. Construction of the passing siding is not anticipated to directly impact any existing wetlands or conservation lands although it would come within close proximity to four wetlands. The siding would not cross any rivers, but it does come close to abutting one river. The embankment width at this passing siding location is approximately 35 feet at toe-of-slope. See Figure 6-4 for more information.

Figure 6-4: Proximity of Wetlands to the Passing Siding at Mechanic Falls



- **Bridges.** Like service to the Auburn Intermodal Passenger Center, bridge upgrades are limited to the segment of track between Yarmouth Junction and Danville Junction, and to construction of a second deck on the Presumpscot River Bridge.

- **Signals and Interlockings.** Similar to the service to the Auburn Intermodal Passenger Center, passenger rail service would operate in unsignalled or "dark" territory at speeds up to 59mph between Yarmouth Junction and Bethel.

- **Positive Train Control.** The number of train moves described in the *Service Design* section indicates that a maximum of eight trips per day could be operated, and the segment is eligible for an FRA exemption from the PTC requirements. An exemption waiver must be submitted to the FRA for review and approval.

- **Grade Crossings.** There are up to 52 grade crossings that would need to be assessed for safety improvements related to the increased speeds and volume of rail traffic. Between 5 and 25 grade crossings would need to be upgraded to accommodate double tracking through the crossings, depending upon the extent of double track improvements. The remainder, between 27 and 47, are assumed to require installation of gate and bells, and connection with the existing flashers.

- **Stations.** There would be three stations along this route: the Auburn Intermodal Passenger Center, South Paris, and Bethel. No other stations are anticipated. The stations are described in more detail in Section 6.6.

- **Layover Facility**. A new two consist layover facility would be required in the vicinity of Bethel. Since the train crews will be on multi-day cycles, overnight accommodations will be necessary for the train crews at or near the Bethel train layover facility.

See Figures 6-5 to 6-8 for the illustrations of the required infrastructure upgrades to double track to South Paris and also for a non-double track alternative.

Figure 6-5: Required Infrastructure Upgrades for Service to Bethel (Option A – 1 of 2)

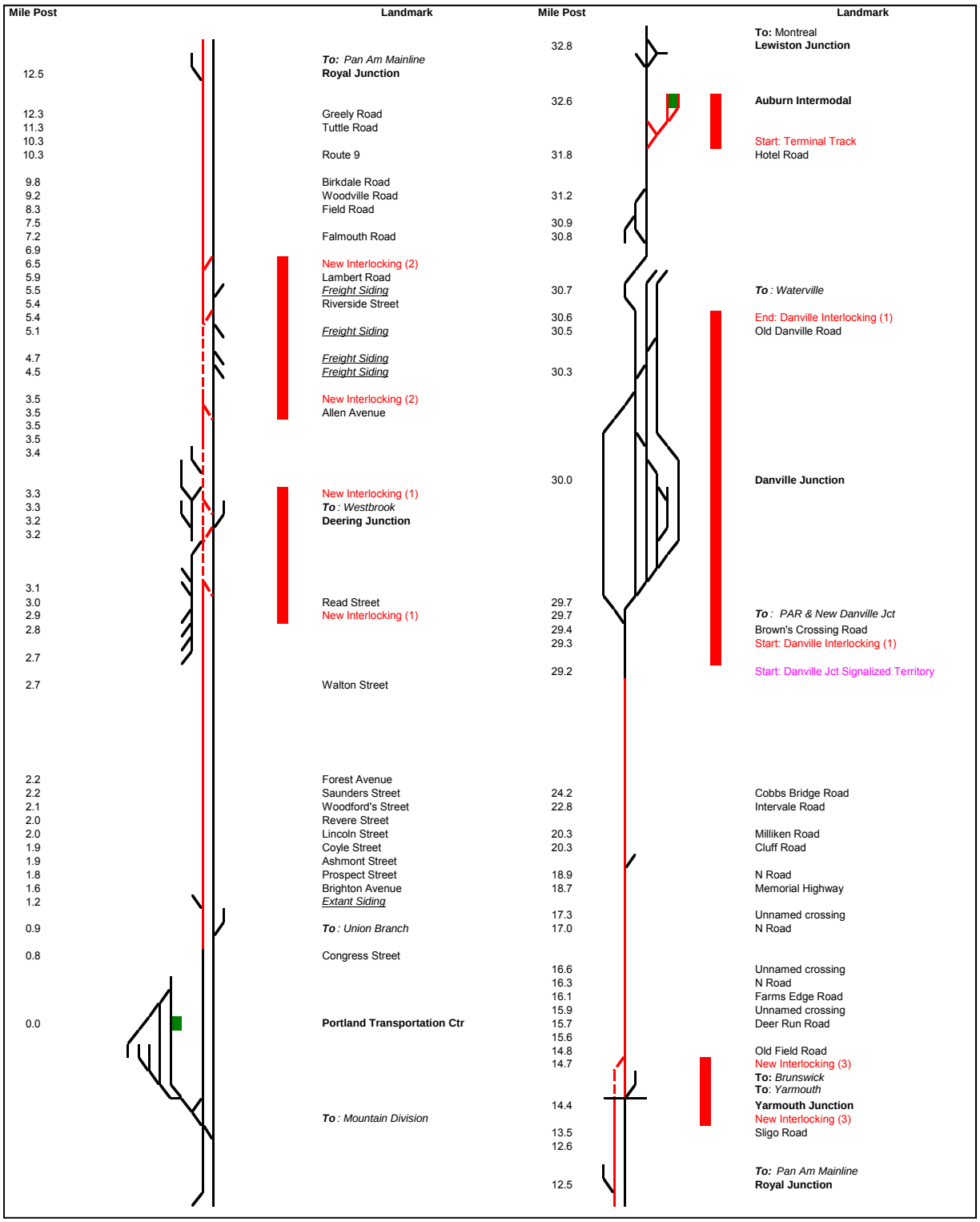


Figure 6-6: Required Infrastructure Upgrades for Service to Bethel (Option A – 2 of 2)

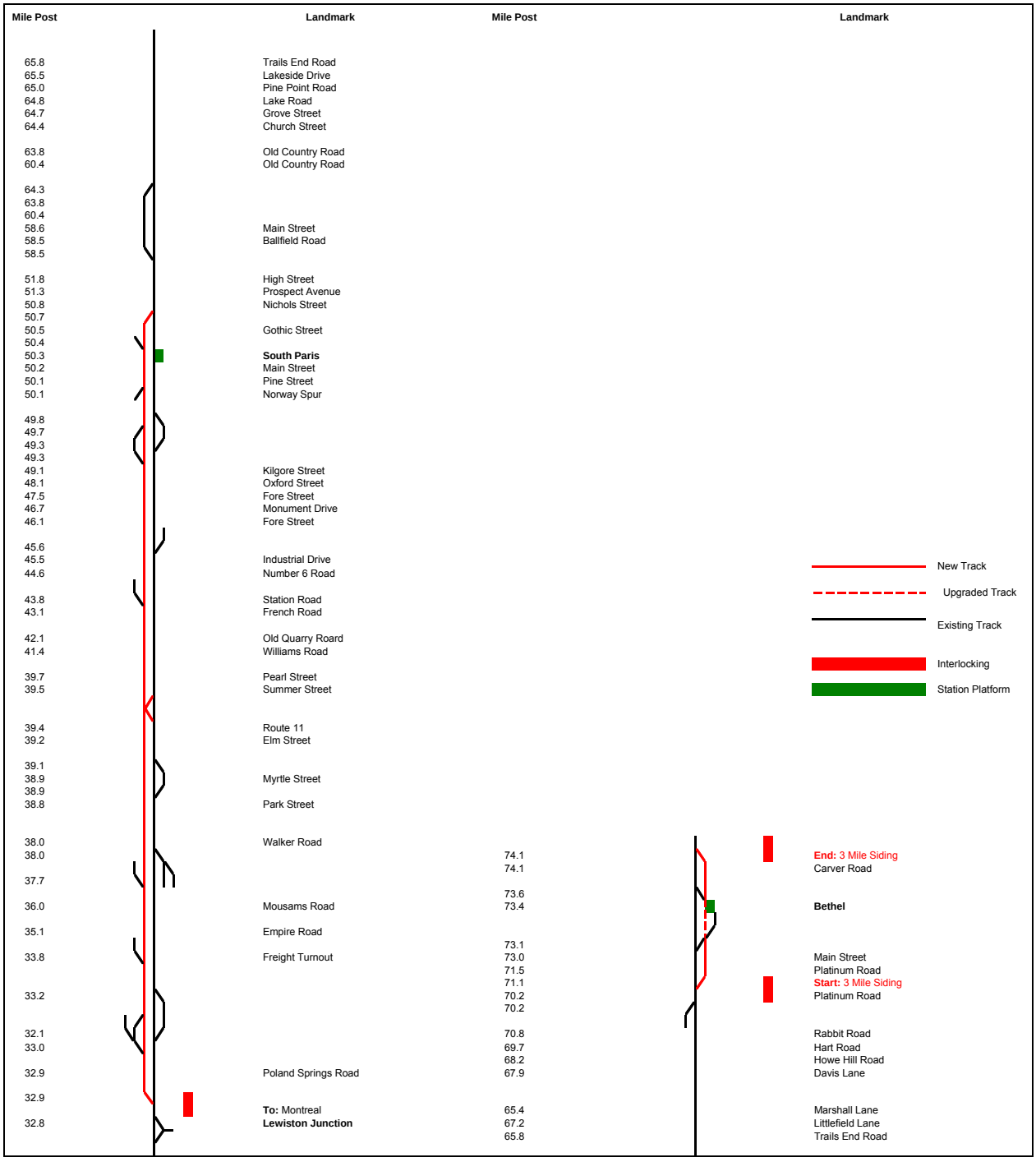


Figure 6-7: Required Infrastructure Upgrades for Service to Bethel (Option B – 1 of 2)

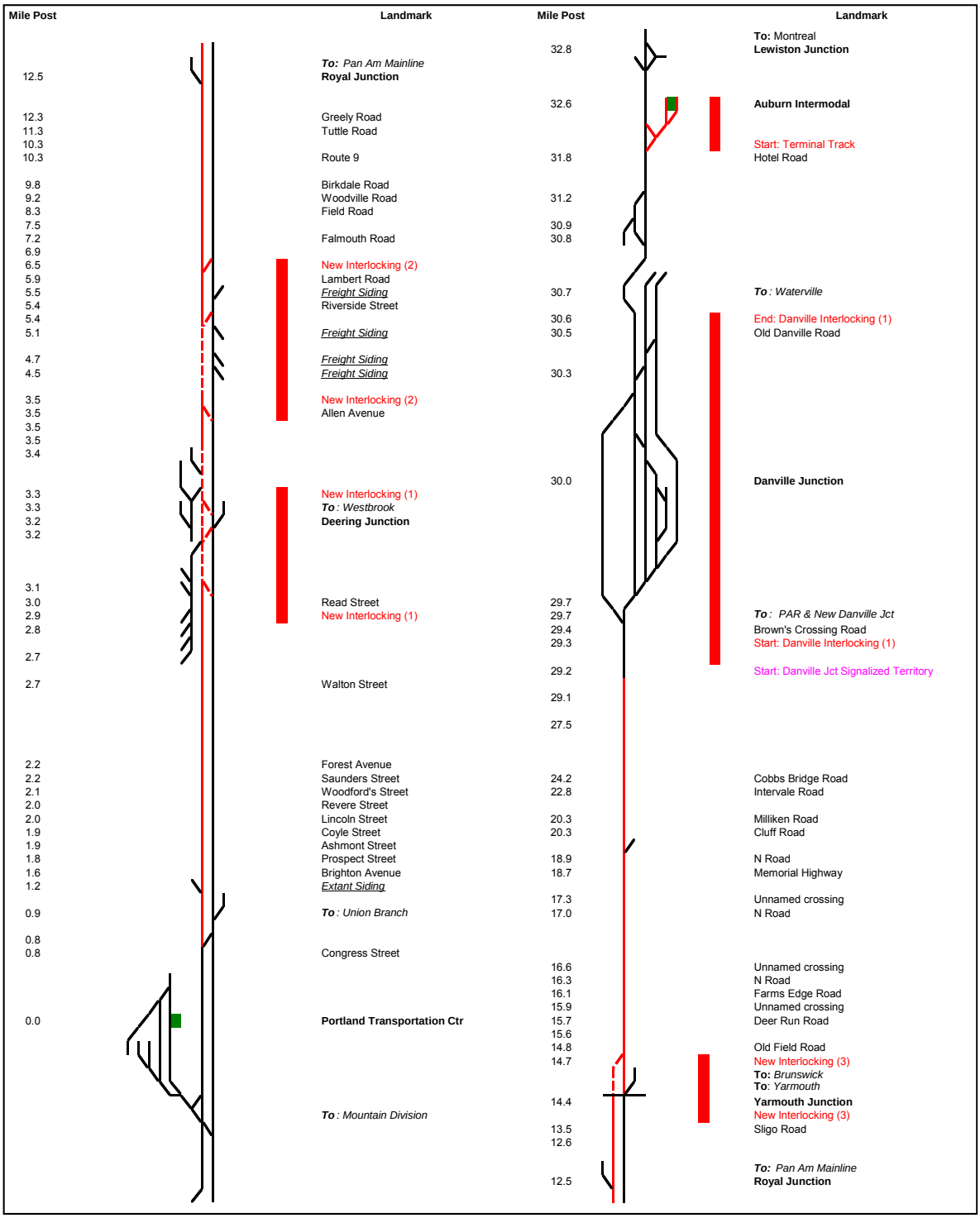
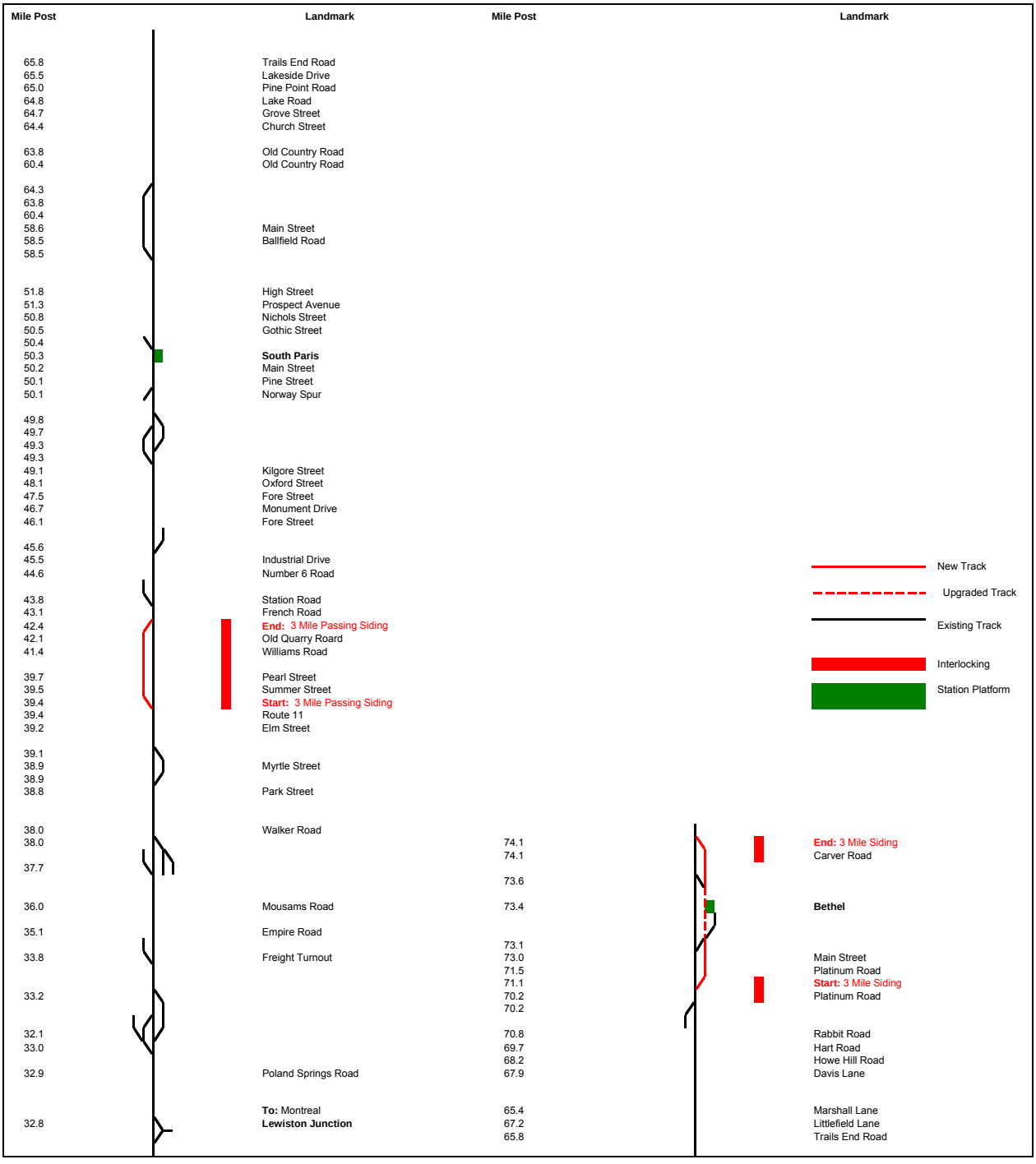


Figure 6-8: Required Infrastructure Upgrades for Service to Bethel (Option B – 2 of 2)



- Rolling Stock. As previously stated in Chapter 6, one (1) new set of equipment is required for the Bethel service. This set is assumed to be identical to the existing train sets used by the Downeaster, and includes:

    - One (1) 1 P42DC locomotive
    - One (1) Powered Control Unit (aka “Cabbage” car)
    - Five (5) coaches (including café car)

6.5 Rail Service from Portland to Montreal

Service from Portland to Montreal would require upgrades to the existing rail infrastructure. Since it is assumed that the Boston – Bethel service is in place, only the incremental upgrades required between Bethel and Montreal are listed and described here. It is estimated that all of the improvements identified as required for the Bethel service would also be required in order to operate the Portland-Montreal service, regardless of whether the Bethel service was in operation. Therefore the scope and magnitude of the overall upgrades from Portland to Montreal, are additive to the Boston – Bethel service.

- **Track Upgrades.** Between Bethel and the US border, approximately 95 miles of track will be resurfaced to allow passenger trains to operate at speeds of up to 59 MPH. Between the border and St. Rosalie Junction approximately another 92 miles of track will need to be resurfaced for travel at 59 MPH (95 KPH).

    - For planning purposes, SLR agreed that two (2) three-mile long passing sidings would likely be required and sufficient to minimize any interference with their existing freight operations. One would be located in Berlin, NH, and the other at Island Pond, VT. In Canada, three (3) three-mile passing sidings would be necessary at Sherbrooke, Richmond, and St. Rosalie Junction. One additional passing siding is assumed in the vicinity of North Stratford, NH to allow for passenger meets.

- **Environmental Impacts.** There are no anticipated environmental impacts for the locations of the passing sidings at Berlin, NH, North Stratford, NH, and Island Pond, VT. These sidings, while passing close to environmentally sensitive areas, do not appear to pose an impact, although additional analysis would be necessary during the design phase. See Figure 6-9.

- **Bridges.** No bridge upgrades are anticipated for service to Montreal.

- **Signals and Interlockings.** Similar to service to Bethel, passenger rail service would operate in unsignalled or “dark” territory at speeds up to 59 MPH (95 KPH) between Danville Junction in Maine and St. Rosalie Junction in Quebec.

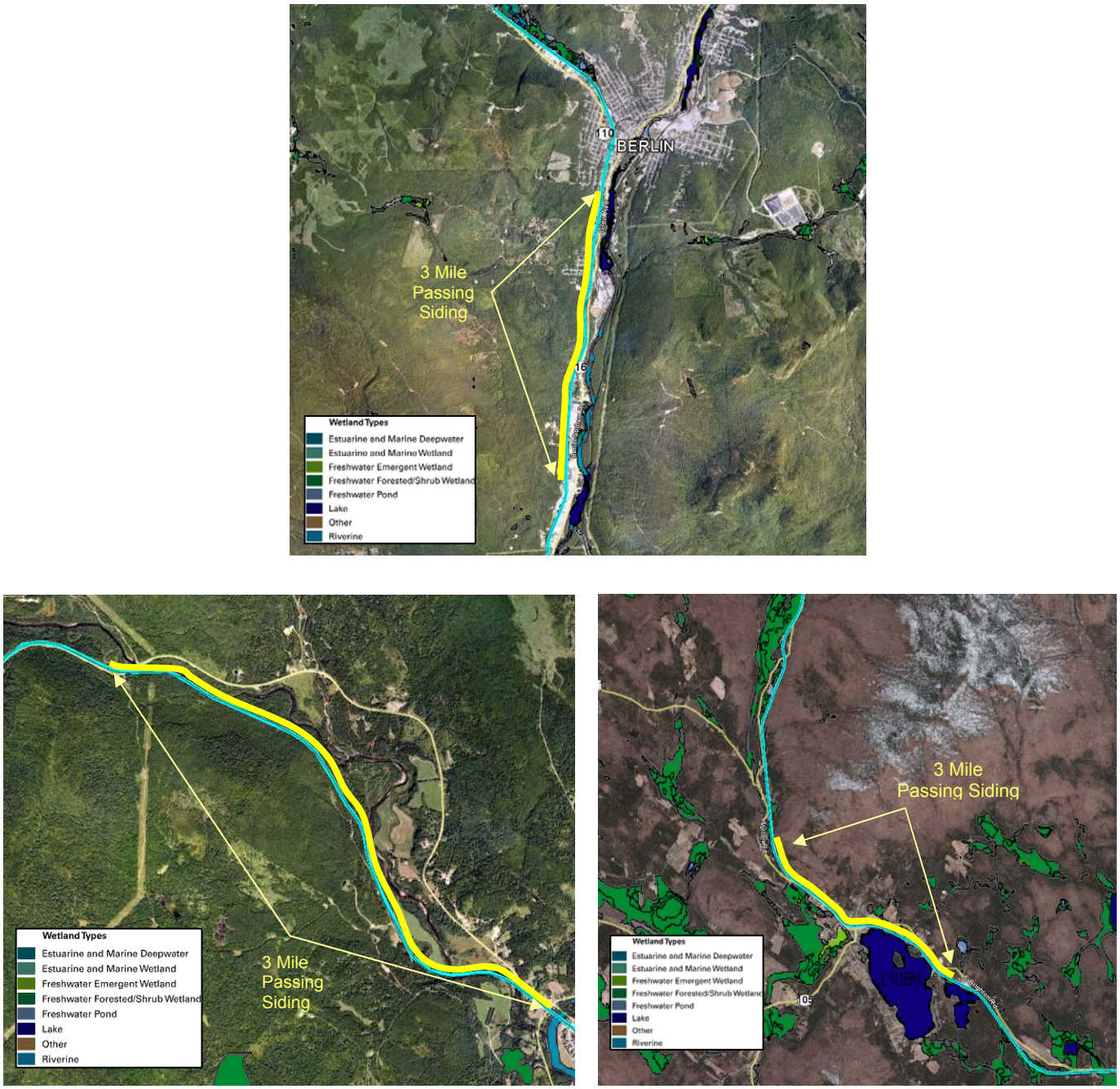
- **Positive Train Control.** The number of train moves described in the *Service Design* section indicates that a maximum of 12 trips per day could be operated between Portland and Bethel, and therefore this segment is eligible for an FRA exemption from the PTC requirements. An exemption waiver must be submitted to the FRA for review and approval.

- **Grade Crossings.** It is assumed that all 44 of grade crossings in the US would be upgraded to have a gate, bells and flashers. Likewise in Canada, up to 46 grade crossings would need to be assessed for necessary improvements due to increased speed and volume of rail traffic. Like in the US, all of these crossings are assumed to be single track crossing improvements.

- **Stations.** Service to Montreal would require three additional stations to be built, rehabilitated, or converted back to railroad use: Berlin, NH, North Stratford, NH, and Sherbrooke, Quebec.

- **Layover Facility.** It is assumed that the layover facilities in Montreal are sufficient for Portland to Montreal service. No additional layover facilities are required for this service option.

Figure 6-9: Potential Wetlands Impacts to Required Infrastructure Upgrades



Berlin, NH (Top), North Stratford, NH (Left) and Island Pond, VT (Right)

- Rolling Stock. As previously stated in Chapter 5, two (2) new sets of equipment are required for the standalone Portland to Montreal service. Other types of equipment such as Diesel Multiple Units (DMUs) could be used to operate the Portland to Montreal service. However, for the purposes of this analysis, the two sets of equipment are assumed to be identical to the existing train sets used by the Downeaster. Each trainset and include:

    - One (1) 1 P42DC locomotive
    - One (1) Powered Control Unit (aka “Cabbage” car)
    - Five (5) coaches (including café car)

- Customs Facilities. As previously mentioned, each country would need to build a Customs facility to allow for service to operate between Montreal and Portland. Since the only cross-border rail service operating in the northeast region is Amtrak's Adirondack service operating between New York City and Montreal, the study team is using its border crossing as a model for the proposed Portland to Montreal service. Consequently, it is assumed that passengers currently traveling to Canada will alight just north of the border, possibly Sherbrooke, Quebec, and that passengers traveling to the US would alight at someplace in Vermont to pass through border control and customs. For the purposes of this study, and after discussions with VTrans, it is assumed a facility would be built in Island Pond, VT. According to VTrans, the cost of a modern Immigration and Customs Facility is approximately $56 million.

- Each facility would be a Class A Port of Entry[29], and be responsible for enforcing the import and export laws and regulations of the US federal government and administering all appropriate immigration policies and programs. Ports also perform agriculture inspections to protect the US from potential carriers of animal and plant pests or diseases that could cause serious damage to America's crops, livestock, pets, and the environment.[30] Amenities that are included in a Class A facility are those required to process all aliens and residents entering the United States.

6.6 Stations

All of the station locations discussed here are preliminary concepts, based on siting stations at or near their historical locations on the former Grand Trunk Railroad. By siting stations at their historical location, the cost of site development and building construction is reduced. Additional coordination and outreach with the host communities will be necessary to determine the most advantageous locations for a train station.

[29] **Class A** - The Port is designated as a Port-of-Entry for all aliens.

Class B - The Port is designated a Port-of-Entry for aliens who at the time of applying for admission are lawfully in possession of valid Permanent Resident Cards or valid non-resident aliens' border-crossing or are admissible without documents under the documentary waivers contained in part 212 of 8 CFR, Chapter 1.

Class C - The Port is a designated Port-of-Entry only for aliens who are arriving in the United States as crewmen as that term is defined in section 101(a) of the Immigration and Nationality Act, as amended, with respect to vessels.

Accessed: March 28, 2011. Available:
http://www.cbp.gov/linkhandler/cgov/travel/pleasure_boats/8cfr_port_list.ctt/8cfr_port_list.doc

[30] United States Department of Homeland Security. Department of Customs and Border Protection - Accessed: March 28, 2011. Available: http://www.cbp.gov/xp/cgov/toolbox/ports/

6.6.1 Auburn Intermodal Passenger Center, ME

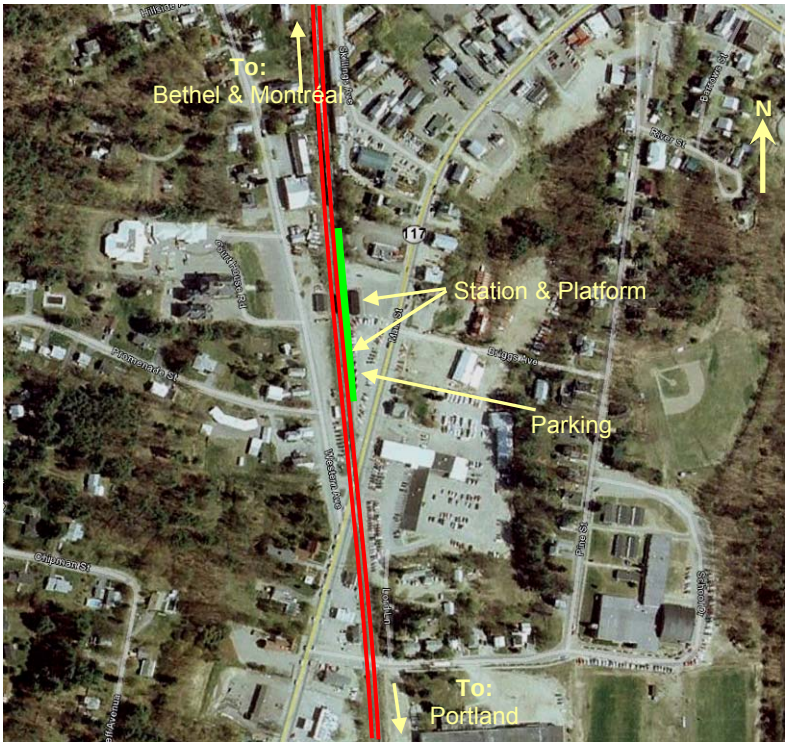
Figure 6-10: Auburn Intermodal Passenger Center Station

The Auburn Intermodal Passenger Center would be located along a rail spur located at the Auburn-Lewiston Municipal Airport. The station would be constructed as identified in the Environmental Assessment completed in 2007. However, to allow for operational ease of service for continuing on to points in the north, it may be necessary to include a station configuration that accommodates two trains. See Figure 6-10 for an overview of the proposed site.

At the station itself, a high level platform with a canopy, along with a station building will be built at the station. The platform will be capable of berthing a full *Downeaster* consist of 5 coaches (approximately 400' in length).[31] It is possible that with a new platform configuration, additional environmental impacts beyond those identified in the Auburn Intermodal Passenger Center Environmental Assessment. This would need to be revisited.

6.6.2 South Paris, ME

Figure 6-11: South Paris Station



It is anticipated that the South Paris Station would be located at its historical location in downtown Paris, near the intersection of Route 26 and Western Avenue. See Figure 6-11. Its location provides good access to Oxford County, and could also be used to provide access to the recently approved resort casino. The station building is currently used as an ice cream stand, and a paved lot to the south of the station is being used by a nearby car dealership for displaying automobiles. The Oxford County Chamber of Commerce reports that the car dealership does not own this property.

At the station itself, it is assumed that arrangements could be made with the existing tenants to provide a waiting area and parking lot for train passengers. A high level island platform with a canopy would be adjacent to the station building.

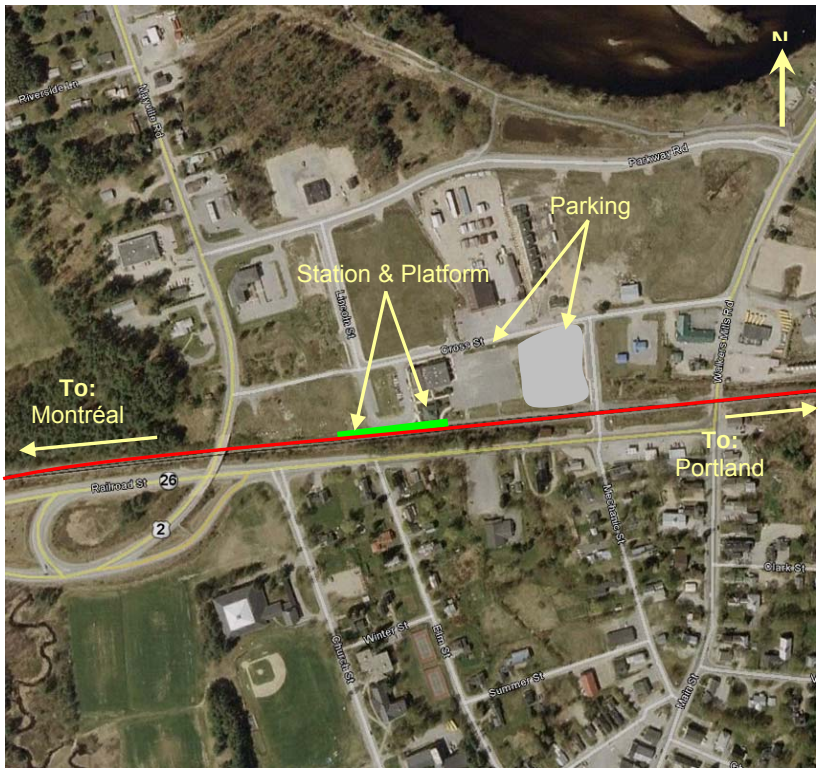
[31] The platform in Portland is 400' long.

The high-level platform will be capable of berthing a full *Downeaster* consist of 5 coaches (approximately 400' in length). A heated waiting room inside the station would be provided to enable passengers to comfortably wait for their train. The existing paved lot next to the south of the station would be striped to provide up to 100 parking spaces. There are no anticipated environmental impacts at this station.

It is anticipated that buses providing access to the proposed Oxford County casino would pickup and discharge passengers at the station, with little to no additional infrastructure improvements needed.

6.6.3 Bethel, ME

Figure 6-12: Bethel, ME Station

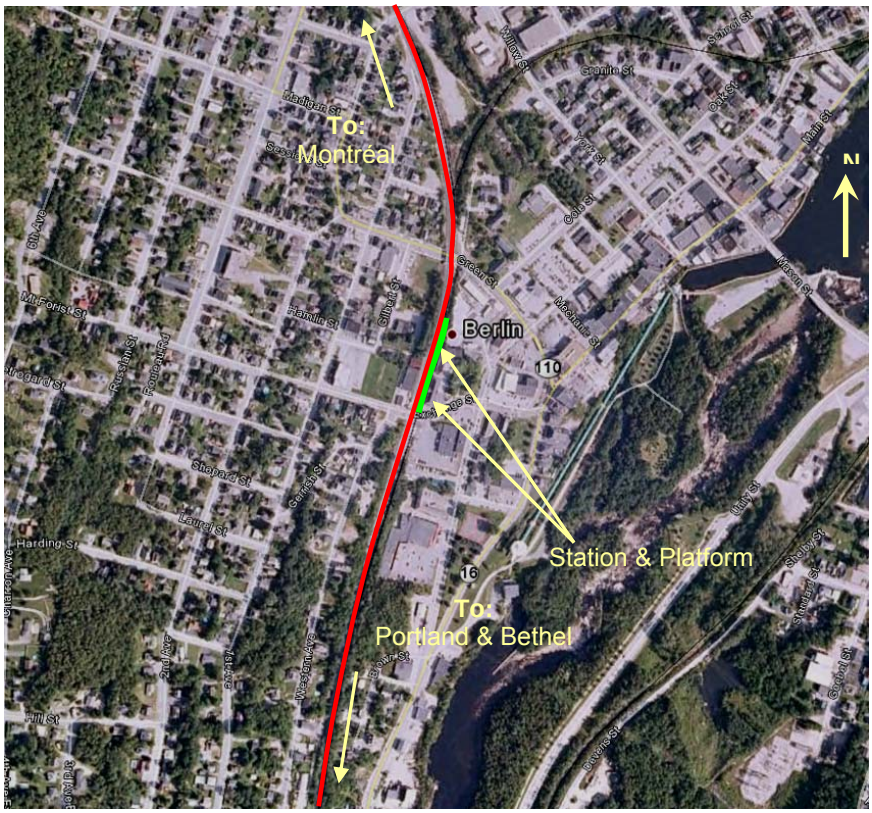


Bethel Station would be located at its historical location just outside of downtown. See Figure 6-12. When the ski train was operating back in the 1990s, the station served as the terminal for the service. Its location on the outskirts of town provides good access to the surrounding ski resorts, and is only ½ mile from downtown. The station building is currently used by the Bethel Area Chamber of Commerce. There is a parking lot immediately to the east of the station that is partially used by surrounding businesses.

At the station itself, the Chamber of Commerce has indicated that they would be willing to relocate to another location so that the station could once again be used for rail service. Due to concerns with the platform structural footings it is assumed that major rehabilitation of the existing high level platform would be necessary. The platform will be capable of berthing a full *Downeaster* consist of 5 coaches (approximately 400' in length). A heated waiting room inside the station would be provided to enable passengers to comfortably wait for their train. The nearby parking lot would be restriped to allow for 100 parking spaces for the train station. There are no anticipated environmental impacts at this station.

6.6.4 Berlin, NH

Figure 6-13: Berlin, NH Station



It is anticipated that the Berlin Station would be located at its historical location in downtown Berlin, near the intersection of Exchange Street and Western Avenue, which is right off of Route 110. See Figure 6-13. Its location downtown provides good access for residents of the city and other municipalities. The Tri-County Community Action Program currently uses the former station. There is a parking lot immediately to the east of the station that is partially used by surrounding businesses.

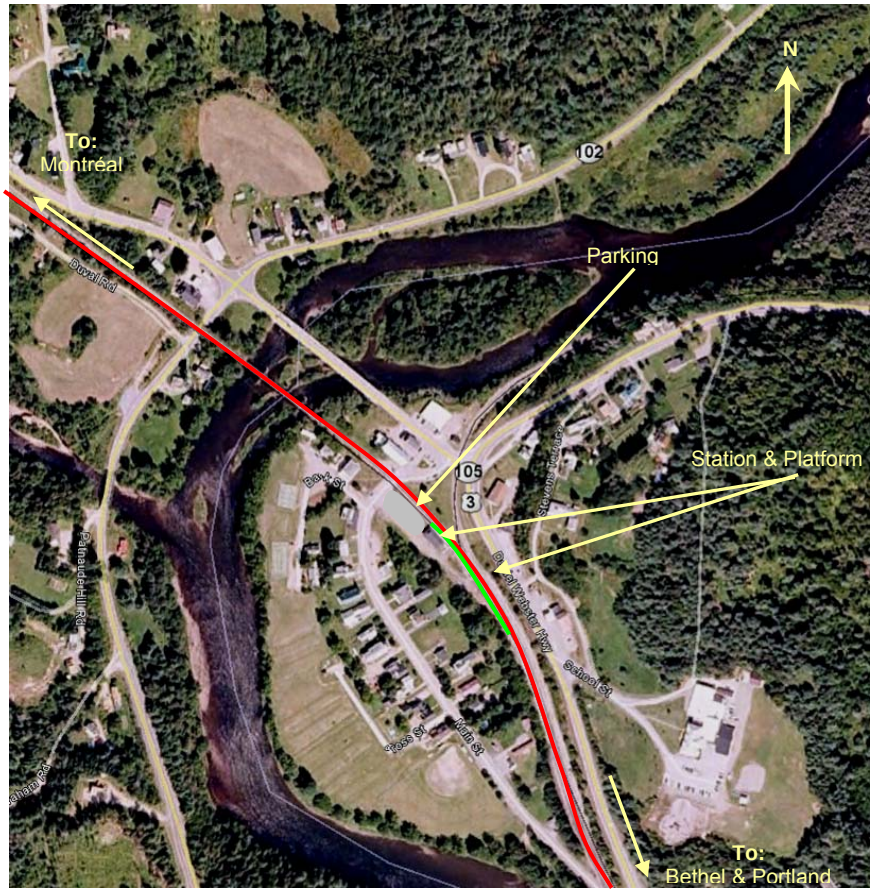
At the station itself, it is assumed that the Tri-County Community Action Program would allow for accommodations to be made to provide a waiting area for train passengers. The high-level platform will be capable of berthing a full *Downeaster* consist of 5 coaches (approximately 400' in length). A heated waiting room inside the station would be provided to enable passengers to comfortably wait for their train. Since there is no location in the immediate station vicinity that appears to be readily available for additional parking, further planning would be necessary to identify a location for station parking. Since the site has been previously developed it is anticipated that there will not be any significant environmental impacts at this location.

6.6.5 North Stratford, NH

North Stratford Station would be located at the location of the historical Grand Trunk Station, near the intersection of Main Street and River Street, just off US Route 3. See Figure 6-14. A station in this location provides good access for both sides of the Connecticut River in both New Hampshire and Vermont. There is space available to the north of the station that could be used for parking.

At the station building itself, it is assumed that the current use of the building could be modified to allow for the reuse of the structure as a train station. A high-level platform, capable of berthing a full *Downeaster* consist of 5 coaches (approximately 400' in length) would be built. The station building would be used as a heated waiting room to enable passengers to comfortably wait for their train. There are no anticipated environmental impacts at this station.

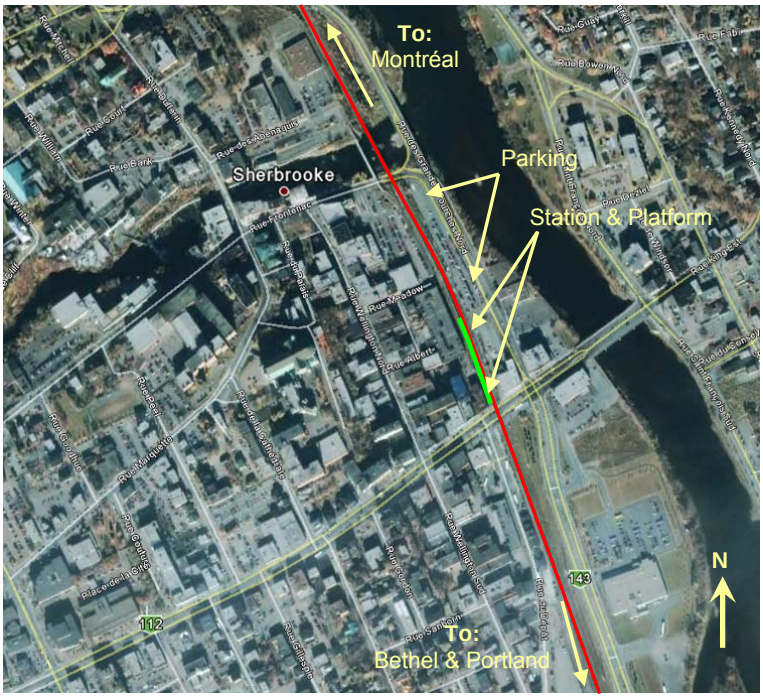
Figure 6-14: North Stratford, NH Station



6.6.6 Sherbrooke, Que

Sherbrooke Station would be located the historical station in downtown Sherbrooke, near the intersection of Rue King Est and Rue des Grandes Fouches Nord. See Figure 6-15. A station in this location provides good access for both sides of the St. François River in Canada. There is a nearby parking lot available to the north and west of station building that could be used for parking.

Figure 6-15: Sherbrooke, Que Station



At the station itself, it is assumed that any business located in the station would be willing to relocate to another location so that the station could once again be used for rail service. A high-level platform, capable of berthing a full *Downeaster* consist of 5 coaches (approximately 400' in length) would be built. The station building would be used as a heated waiting room to enable passengers to comfortably wait for their train.

It is also assumed that any other accessibility issues would be addressed to ensure a fully compliant station in Canada.

6.7 Rolling Stock

Two equipment alternatives could be used to operate the proposed service to Montreal: Diesel Multiple Units (DMUs) trains, comprised of a mix of powered cars and unpowered trailers or push-pull trains that would be the same as the existing *Downeaster* equipment sets. Since there are not presently any DMUs being manufactured and operated in the United States that are compliant with all Federal Railroad Administration crashworthiness standards, the study team has assumed the use of push-pull trains. However, as technology evolves use of other vehicle types may be possible.

6.7.1 Push-Pull Locomotives and Coaches

Locomotive-hauled diesel push-pull operations characterize most of the commuter railroads and intercity rail travel in North America. In this configuration, a diesel electric locomotive is employed to provide propulsion, lighting and HVAC power for the train. The diesel engine drives an electric generator that supplies power to electric motors on the locomotive's drive-wheels. A separate diesel engine and generator typically provide electric power to heat, cool and light the passenger coaches. The typical minimum length for a push-pull train is a locomotive and three coaches. Due to potential safety issues regarding signal shunting, trains with two cars are occasionally deployed, but are not favored. The typical diesel locomotive is 60 to 70 feet long and weighs 125 tons. The maximum practical train length for a single passenger locomotive is typically 8 or 9 cars. See Figure 6-16.

Figure 6-16: Amtrak *Downeaster* Push-Pull Train

The locomotive hauls the train in pull configuration. When the train reaches the end of its trip and turns to head back toward its origin, the engineman shifts the locomotive into push mode and changes his seating position from the locomotive to a work station at the far end of the last car in the consist. This work station provides a throttle, brakes, and other controls that allow him to operate the locomotive and the train in the push configuration.

The passenger coaches are unpowered trailers. Coaches can be either single-level or bi-level. Regardless of height, the typical coach is 85 feet long. A single-level car generally weighs about 50 tons. A bi-level weighs approximately 60 tons. All of the *Downeaster* coaches are single level and each consist has a Power Control Unit (PCU) for when the locomotive is operating in the push mode. This PCU is often referred to as a "cabagge" car, since it is used as the control car in the push mode and also as a baggage car.

Amtrak *Downeaster* trains that are similar to the existing fleet minimize the amount of upfront capital and annual operating costs required to maintain the equipment. The trains can continue to be serviced in Boston at the Boston Engine Terminal (BET) and can be interchanged for any other train.

6.7.2 Diesel Multiple Units

A Diesel Multiple Unit (DMU) is an option as a possible type of vehicle configuration that could be used for this service. A DMU is a passenger rail car with a self-contained, on-board source of motive power, making reliance on a locomotive or electric power distribution system unnecessary. Historically, nearly all DMUs have used on-board diesel engines for propulsion power and have been capable of operation as a single train with multiple cars. While motive power may be a diesel internal combustion engine or an alternative self-contained, on-board source, all DMUs in common use rely on diesel propulsion.

Although there are some DMUs in operation in the United States that are not compliant with FRA crashworthiness standards, those DMUs could not be used for the Portland-Montreal service due to the volume and frequency of freight service along the lines. However, a fully FRA compliant DMU (in the event one is available) could be used as a dedicated train set for the service between Portland and Montreal.

In 2010, Nippon Sharyo was awarded a contract to construct the first fully FRA complaint DMUs for the Sonoma Marin Area Rail Transit (SMART) project in California. The proposed vehicle will have a fully compliant carshell and will enhance passenger and crew safety by including Crash Energy Management components in the front and rear noses of the train into the design.[32] This significant development means that once these new fully compliant DMU vehicles are constructed and put into operation they will be able to operate on any segment of the national railroad network without requiring waivers from federal crashworthiness standards.

In addition to the purchase of new DMU vehicles, establishing a DMU fleet would require a dedicated maintenance facility and additional support staff to perform repairs on the equipment since there are few DMU maintenance activities that could be could be performed at an existing Push-Pull maintenance facility. Since there is no DMU maintenance facility in Maine, a new facility would need to be built. Construction costs of recent DMU maintenance facilities around the United States have varied significantly, ranging from as little as $10 million up to nearly $90 million, and do not include the cost of land acquisition for the facility.[33]

[32] Nippon Sharyo briefing to the *Transportation Research Board's DMU Subcommittee*, Washington, D.C. January 26, 2011.
[33] Internal Jacobs Memorandum on DMU Maintenance Facilities. Prepared April 9, 2009.

Chapter 7 Capital Cost Estimates

7.1 Motorcoach Service Capital Cost

All of the options presented for the Amtrak Throughway Motorcoach connection to *Downeaster* rail service would use a single bus. The bus would probably be a 40-foot over the road coach with the style, comfort, and capacity for the longer travel times needed to connect Lewiston and Auburn to Portland and Bethel. The coach bus would seat approximately 50 passengers. The approximate cost of obtaining an over-the-road coach style bus is $725,000.

In all options, a plan would also need to be set in place in the event that the single bus operated for the service needs to be out of service. If an independent operator is operating the service, perhaps an agreement could be made to use another vehicle from their fleet in that case. The same agreement would need to be made with a state operator or neighboring operator depending upon who operates the service.

The other capital expense needed to get the service up and running is signage. Signs with the service name and schedules would be required at each stop. The cost of signage is approximately $1,000 per stop.

The motorcoach service would be stopping at existing or proposed rail stations or existing or proposed park and ride facilities. All of the stops already have buses using the stops. Thus, no bus stops or shelters need construction.

7.2 Rail Service Capital Cost

To understand the feasibility of the route options identified, the cost of infrastructure upgrades required to operate the service alternatives were estimated. A simple three-step process was used to estimate capital infrastructure costs.

All unit costs are presented in 2010 dollar values. Once the preliminary cost totals were determined, they were then escalated to 2020 dollar values at a rate of 4.26% per year for 10 years. The year 2020 is assumed to be the build year for this project.

The escalation factor of 4.26% was chosen due to the historical percentage increase in railroad construction materials as a ratio when compared to the annual inflation rate. It is assumed that this trend will continue to play out over the next 10 years. The steps used in the estimation process were:

- **Step 1) Estimated Quantities:** The *Service Options* part of this report details the service requirements for offering intercity service to Auburn, Bethel, and Montreal. The service design provides a basis to determine the amount of infrastructure required to offer intercity rail service at the desired levels into Portland. These requirements vary according to the route chosen.

- **Step 2) Unit Costs:** The unit costs used to estimate the construction costs for each alternative were gathered from a variety of sources and are shown in 2010 dollar values. The majority of cost estimates were achieved through consultation with the MaineDOT team rail engineers and from cost estimates from previous commuter rail planning studies.[34,35,36] The unit cost estimates and their sources are listed in Table 7-1.

[34] HTNB. (2005). Draft Cost Feasibility Study for Portland Commuter Rail Study. Prepared for the Northern New England Passenger Rail Authority (NNEPRA) and the Maine Department of Transportation, Office of Passenger Transportation, Links 7, 10, 11.
[35] AECOM. (2010) Portland North Commuter Rail Alternative Modes Project. Prepared for the Maine Department of Transportation.
[36] KKO and Associates. (2006). *Portland North Alternatives Review*. Prepared for the Northern New England Passenger Rail Authority and the Maine Department of Transportation Office of Passenger Transportation, pp.106.

Table 7-1: Railroad Unit Costs ($2010)

Infrastructure Category	Units	Unit Cost ($ 2010)	Source
Track & Signal			
New Track	Track Mile	$ 920,453	HNTB
Track Resurfacing	Track Mile	$ 40,266	HNTB
Universal X-Over & Interlocking	Each	$ 1,324,715	HNTB
3 Mile Passing Siding	Each	$ 5,144,170	HNTB
1 Mile Station Siding	Each	$ 2,770,024	HNTB
CTC Signaling	Track Mile	$ 1,025,460	JEG
Convert Existing Siding to Passing Siding	Each	$ 1,324,715	HNTB
Start & End Double Track Interlockings	Ea. 2x Segment	$ 2,382,811	HNTB
Dispatch System	Each	$ 282,002	HNTB
Electric Locks	Each	$ 56,679	HNTB
Bumper	Each	$ 15,382	JEG
Grade Crossings			
Upgrade Single Track X-ing	Each	$ 86,754	GO Transit[37]
Upgrade to Double Track X-ing	Each	$ 216,886	GO Transit
New Single Track X-ing	Each	$ 179,456	GO Transit
New Double Track X-ing	Each	$ 403,775	JEG
Positive Train Control			
Dual Cab Devices	Vehicle	$ 95,000	JEG[38]
Single Cab Devices	Vehicle	$ 80,000	JEG
Wayside Devices	Track Mile	$ 121,000	JEG
Central Office Equipment	Each	$ 15,000,000	JEG
Bridges			
Back Cove Bridge	Each	$ 9,086,552	HNTB
Refurbished Bridge	Each	$ 9,106,087	HNTB
Upgrades to Yarmouth (Exit 15)	Lump Sum	$ 1,640,736	HNTB
Upgrades to Yarmouth Jct	Lump Sum	$ 3,096,890	HNTB
SLR Upgrades (Yarmouth Jct to Danville Jct)	Lump Sum	$ 6,098,812	HNTB
2nd Presumpscot River Bridge Deck	Linear Foot	$4,500	JEG
New Bridge Over Androscoggin River	Track Foot	$ 15,382	JEG
Stations			
High Level-Platform w/Canopy	Each	$ 964,709	GO Transit
Station Building	Sta	$ 2,000,000	JEG
Ticket Vending Machines (thru Sta)	Sta	$ 178,430	JEG
Ticket Vending Machines (Terminal Sta)	Sta	$ 356,860	JEG
CCTV	System	$ 246,110	JEG
Parking Spaces	Each	$ 3,589	AECOM[39]
Site Development	Sta	$ 500,000	JEG
Pedestrian Railroad Crossing	Each	$ 102,546	JEG

[37] Jacobs Engineering Group (2009). *Consulting Services for a Light Rail Feasibility Study on the Stouffville Corridor*. Prepared for: GO Transit, pp. 99.
[38] Jacobs Engineering Group analysis of Roskind, Frank D, Senior Industry Economist, Federal Railroad Administration, Office of Safety Analysis POSITIVE TRAIN CONTROL SYSTEMS: ECONOMIC ANALYSIS. DEPARTMENT OF TRANSPORTATION, FEDERAL RAILROAD ADMINISTRATION, 49 CFR PARTS 229, 234, 235, AND 236 [DOCKET NO. FRA-2006-0132, NOTICE NO. 1] RIN 2130-AC03 July 10, 2009 202 302 9704 pp 112-119 (Retrieved from http://www.fra.dot.gov/downloads/PTC_%20RIA_%20Final.pdf on July 21, 2009)
[39] AECOM Independent Estimate. Received via Email from AECOM, June 10, 2009.

Infrastructure Category	Units	Unit Cost ($ 2010)	Source
Two Track Stub-End Terminal	Each	$ 3,301,392	HNTB
Three Track Stub-End Terminal	Each	$ 3,767,238	HNTB
Vehicle Upkeep			
Layover Facility	Vehicle	$ 217,975	MBTA[40]
Maintenance of Equipment Facility	Vehicle	$ 500,701	KKO & Associates
Crew Dorms at Layover Facility	Layover Fac.	$ 2,000,000	JEG
Rolling Stock			
Locomotive (Model P42DC)	Vehicle	$ 4,360,656	Industry Average
Cabbage Car (PCU)	Vehicle	$ 875,000	VTrans[41]
Coach / Café Car	Vehicle	$ 1,428,000	Amtrak[42]
Customs Facility	Each	$58,000,000	VTrans[43]
Infrastructure Materials Contingency		10.0%	TCRP Report 138[44]
Vehicle Contingency		15.0%	TCRP Report 138
Unallocated Contingency		5.0%	TCRP Report 138

- **Step 3) Contingency & Soft Costs:** All infrastructure unit costs have a 10% materials contingency and all vehicle acquisition costs have a 15% contingency. A standard 5% unallocated project contingency is also assumed in addition to the material and vehicle contingencies. Due to the level of uncertainty regarding the extent of infrastructure upgrades required for service to Montreal, a 20% unallocated contingency is assumed.

  In addition to the infrastructure contingencies, an allowance has been included in the estimate for "soft costs" or professional services. These are project management and engineering costs, which are added to the total cost of each alternative. These soft costs include typical project management and engineering costs and are determined based on a percentage of the projected capital cost. The estimated soft costs are based on the guidebook in *TCRP Report 138: Estimating Soft Costs for Major Public Transportation Fixed Guideway Projects.* The average actual historical soft costs for each component that have been used are included Table 7-2.

Table 7-2: Project Soft Costs

Cost Item	Budgeted Amount
Preliminary Engineering & Final Design	14.0%
Project Management	7.5%
Construction Administration & Management	5.0%
Insurance	2.0%
Legal (permits, review fees, etc)	0.3%
Surveys, Testing, Investigation, Inspection	0.3%
Startup	0.3%

[40] Jacobs Engineering Group (2010). *Foxborough Commuter Rail Feasibility Study*. Prepared for: Massachusetts Bay Transportation Authority, pp. 107.
[41] Vermont Agency of Transportation. (2010). Passenger Rail Equipment Options for the Amtrak Vermonter & Ethan Allen Express, pp. 6. Available: http://www.leg.state.vt.us/reports/2010ExternalReports/253921.pdf
[42] National Passenger Railroad Corporation. (June 2010) American Recovery & Reinvestment Act Project Status Report, pp. 21. Available: http://www.amtrak.com
[43] Phone call with VTrans. February 4, 2010.
[44] Transportation Research Board. (2010). *TCRP Report 138: Estimating Soft Costs for Major Public Transportation Fixed Guideway Projects.*

Using the operational and infrastructure needs previously described in this report and the cost estimation process previously described, the study team was able to calculate the expected capital costs for infrastructure construction, then escalated them to 2020 dollar values. The findings of the three step estimation method are presented in Tables 7-3 for 2010 dollar values and 7-4 for escalated 2020 dollar values.

Details pertaining to all capital costs computed for this analysis are shown in the Appendix at the end of this report.

Table 7-3: Total Capital Cost Elements ($2010, in millions) [45]

Cost Category	Auburn (Low)		Auburn (High)	Bethel (Low)		Bethel (High)	Montreal (Low)		Montreal (High)
Track & Signal	$ 21.6	to	$ 68.4	$ 29.1	to	$ 119.4	$ 77.0	to	$ 167.3
Grade Crossings	$ 1.3	to	$ 6.5	$ 6.6	to	$ 14.9	$ 16.3	to	$ 24.6
Bridge Upgrades	$ 0.0	to	$ 0.9	$ 0.0	to	$ 0.9	$ 0.0	to	$ 0.9
Positive Train Control	$ 0.2	to	$ 8.7	$ 0.2	to	$ 8.7	$ 0.5	to	$ 9.0
Stations	$ 10.1			$ 19.2			$ 31.7		
Facilities	$ 5.0			$ 7.8			$ 138.7		
Rolling Stock	$ 14.2			$ 14.2			$ 28.5		
Unallocated Contingency	$ 1.9	to	$ 5.0	$ 3.4	to	$ 8.8	$ 45.2	to	$ 50.6
Soft Costs	$ 16.0	to	$ 35.0	$ 25.1	to	$ 58.5	$ 107.3	to	$ 140.6
Total Cost ($2010)	***$ 70.4***	***to***	***$ 153.9***	***$ 105.5***	***to***	***$ 252.3***	***$ 445.2***	***to***	***$ 592.0***

Table 7-4: Estimated Capital Costs for Rail Alternatives ($2020, in millions)[46]

Cost Category	Auburn (Low)		Auburn (High)	Bethel (Low)		Bethel (High)	Montreal (Low)		Montreal (High)
Track & Signal	$ 32.8	to	$ 103.9	$ 44.1	to	$ 181.2	$ 116.8	to	$ 253.9
Grade Crossings	$ 2.0	to	$ 9.9	$ 9.9	to	$ 22.6	$ 24.7	to	$ 37.4
Bridge Upgrades	$ 0.0	to	$ 1.4	$ 0.0	to	$ 1.4	$ 0.0	to	$ 1.4
Positive Train Control	$ 0.3	to	$ 13.2	$ 0.3	to	$ 13.2	$ 0.8	to	$ 13.7
Stations	$ 15.4			$ 29.2			$ 48.1		
Facilities	$ 7.6			$ 11.8			$ 210.5		
Rolling Stock	$ 21.6			$ 21.6			$ 43.2		
Unallocated Contingency	$ 2.9	to	$ 7.6	$ 5.1	to	$ 13.3	$ 68.6	to	$ 76.8
Soft Costs	$ 24.3	to	$ 53.1	$ 38.1	to	$ 88.7	$ 162.8	to	$ 213.4
Total Cost ($2020)	***$ 106.8***	***to***	***$ 233.5***	***$ 160.2***	***to***	***$ 382.9***	***$ 675.6***	***to***	***$ 898.4***

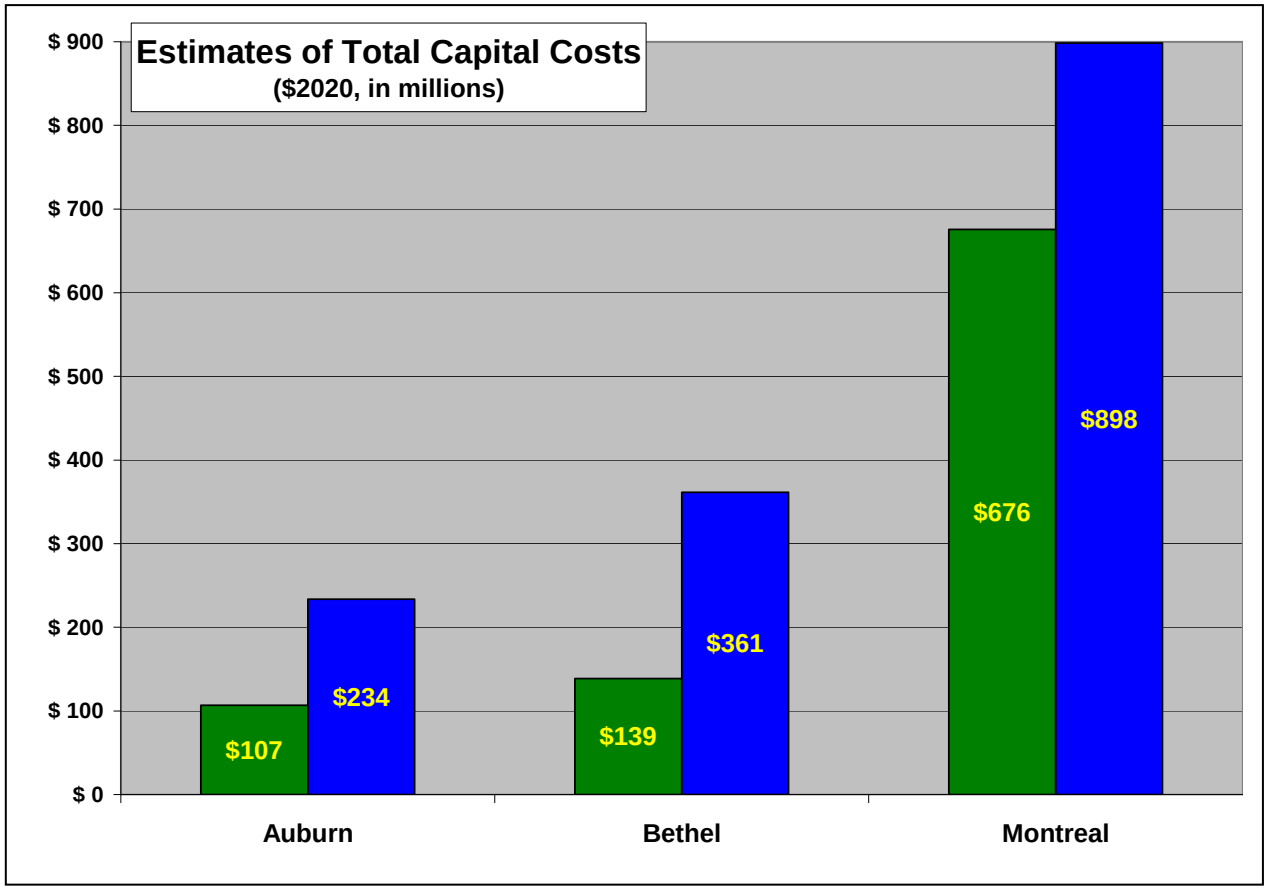
All costs estimates are arranged from low to high to reflect the level of uncertainty that is associated with each cost category. However, for all service options, there some categories such as rolling stock, stations, and other facilities do not vary and are required for any service.

The biggest cost driver associated with offering service to Auburn and points north is the cost of upgrading and enhancing the railroad between Portland and Auburn. However, once an investment has been made to upgrade the tracks for service to Auburn, the incremental costs for upgrading the SLR mainline for

[45] Due to rounding, some values may not add properly.
[46] Due to rounding, some values may not add properly.

service to Bethel and Montreal are not as extensive. The incremental costs for service from Auburn to Bethel range from approximately $50 to $150 million. See Figure 7-1.

Figure 7-1: Estimates of Capital Costs for Rail Alternatives



Due to the increased distance to go from Bethel to Montreal than to go from Portland to Bethel (it is almost four times the distance to go from Portland to Montreal than to go from Portland to Bethel), the incremental cost of service to Montreal from Bethel is significantly higher, and is approximately $516 million, which includes rolling stock acquisition.

Chapter 8 Annual Operating Cost

8.1 Motorcoach Service Operating Cost

In order to estimate operating costs for the Amtrak Throughway Motorcoach option, the ZOOM Turnpike Express Bus 2009 budget was obtained. Using the itemized ZOOM budget and total annual revenue hours, an operating cost per revenue hour was calculated at $95. Using a 5% multiplier for inflation, an operating cost of $100 per revenue hour was used for budget estimation in 2010 dollar values. Overtime hours would be required for some of the options at a rate of $150 per revenue hour. Additionally, the tolls were calculated for each trip using the Maine Turnpike Authority EZ Pass toll calculator. Every trip between Lewiston/Auburn and Portland (and the reverse) requires a toll of $3.65. There are no tolls on the route between Auburn and Bethel. Table 8-1 details the annual operating costs by option.

Table 8-1: Lewiston/Auburn Bus to Amtrak Connection Annual Operating Costs

	Lewiston-Portland (Weekdays Only)			Auburn-Bethel (Weekdays Only) One Roundtrip per Day
	1: Two Roundtrips per Day	1b: Three Roundtrips per day	2: Five Roundtrips per day	
Annual Operating Cost	$134,942	$191,829	$405,088	$207,433

8.2 Rail Service Operating Cost

All rail alternatives were generally addressed in the same manner from an operations and maintenance (O&M) cost standpoint. To start, Amtrak's historic O&M data for the current *Downeaster* service was utilized. Current (2010) cost baseline was estimated to be $30 per train mile, which was provided by NNEPRA in concurrence with Amtrak and MaineDOT. From this point, an inflation rate of 4.26% per year was used to calculate projected costs. The inflation rate was based on the difference in the annualized rate of growth from 2009 back to 1999 between the following two cost indices:

- American Association of Railroads (AAR) Cost Recovery Index (an industry standard source of railroad cost data)
- US Consumer Price Index (CPI)

The inflated unit costs were applied to projected annual level of service based on the operating plan (distance and frequency of service) for each service alternative.

Table 8-2 summarizes the projected annual O&M costs for each alternative.

Table 8-2: Annual Operating and Maintenance Costs by Alternative

Alternatives	Operating Cost
Improved Baseline	$24,739,530
Auburn	$3,521,000 to $9,396,000
Bethel	$7,851,000 to $10,467,000
Montreal	$23,421,000 to $26,041,000

Chapter 9 Summary

9.1 Summary of Alternatives

The purpose of this study was to develop options for providing both interim and permanent connections to the Amtrak *Downeaster* intercity rail service in Portland from the Lewiston/Auburn area and beyond to Montreal. As a result of the analysis, two Maine rail options and one Montreal rail option were developed to accomplish the study goals. The rail options are summarized in the Table 9-1.

Additionally, interim bus connections or Amtrak Throughway Motorcoach service options were developed as a means to provide more immediate in-state connections while a more permanent rail service could be developed and implemented. Table 9-2 provides a summary of these options.

9.2 Next Steps

The key next step towards implementation of any of the rail alternatives is to await the results of the recently awarded NNEPRA *Downeaster* study. The NNEPRA study will identify the specifics of the improved baseline service that is the foundation of the intercity extension alternatives discussed in this document. Once the specific improvements are identified, a decision can be made as to which alternatives presented in this study should be refined and/or implemented. Any strategy to implement intercity rail should include a timeline for implementation as well as funding sources for the construction and operation of the service. As noted previously, the purpose of this study was to provide the potential technical specifics and feasibility of providing improved intercity service between Portland and beyond to Montreal and points between. This study is an initial step in the decision-making process necessary to implement potential expanded rail service.

If a rail alternative is selected for implementation, as noted previously, the project proponents could implement as an interim step, a bus connection, or Amtrak throughway motorcoach service, as it's known. While this connection would require funding and an operator would need to be procured, little or no construction would be necessary, and it could serve as an expeditious way to provide some service to the region while a rail alternative is being developed/constructed. It is appropriate to note, however, that the Amtrak throughway motorcoach service developed as part of this study also assumed the *Downeaster* improved baseline conditions/improvements would be in place prior to start-up. The list below details the possible next key milestones toward implementation of this project:

- Implement the *Downeaster* improvements recommended as a result of the NNEPRA study underway.
- Determine preferred rail alternative and timeline for implementation.
- Integrate the rail service proposal into NNEPRA's transportation service development plans.
- Solicit funds for capital and operating needs for selected alternative.
- As appropriate, procure rail service operator.

Table 9-1: Summary of Intercity Rail Options

	Improved Baseline	Auburn			Bethel			Montreal (inc. Bethel Costs)		
Ridership	863,900	30,200	to	45,800	66,700	to	71,100	201,300	to	204,400
Revenue	$15,587,000	$961,000	to	$1,372,000	$2,036,000	to	$2,150,000	$7,498,000	to	$7,579,000
Operating Cost	$24,739,530	$3,521,000	to	$9,396,000	$7,851,000	to	$10,467,000	$23,421,000	to	$26,041,000
Net Revenue	($9,152,530)	($2,560,000)	to	($8,024,000)	($5,815,000)	to	($8,317,000)	($15,923,000)	to	($18,462,000
Capital Cost	$150M	$107M	to	$234M	$139M	to	$361M	$676M	to	$899M
Farebox Recovery	27%	27%	to	15%	26%	to	21%	32%	to	29%

Note: numbers in parentheses indicate a deficit or subsidy that would be required to operate the service.

Table 9-2: Summary of Amtrak Throughway Motorcoach Options

	Lewiston/Auburn to Port. (2 RT)	Lewiston/Auburn to Port. (3 RT)	Lewiston/Auburn to Port. (5 RT)	Bethel-Portland
Ridership	6,600	7,500	7,900	7,500
Revenue	$174,000	$197,000	$209,000	$218,000
Operating Cost	$207,000	$294,000	$621,000	$318,000
Net Revenue	($33,000)	($97,000)	($412,000)	($100,000)
Capital Cost	$1,104,000	$1,104,000	$1,104,000	$3,000
Farebox Recovery	84%	67%	34%	69%

Note: numbers in parentheses indicate a deficit or subsidy that would be required to operate the service.

Appendix

Portland to Auburn Intermodal Passenger Center Costs Range ($2010)

Key:

"(DARK)" → Royal / Yarmouth Jct to Danville Jct
"(SIGNALIZED)" → Royal / Yarmouth Jct to Auburn with CTC Signals
"(DOUBLE TRACK)" → Double track from Portland to Royal / Yarmouth Jct
"(PASSING SIDING)" → Passing Sidings from Portland to Royal / Yarmouth Jct

Cost Categories			$2010											
			AI via PAR (Dark) Passing Sidings		AI via PAR (SIGNALIZED) Double Track		AI via PAR (SIGNALIZED) Passing Sidings		AI via SLR (DARK) ($2010) Passing Sidings		AI via SLR (DARK) Double Track		AI via SLR (SIGNALIZED) Passing Sidings	
	Units	Unit Cost	Qnty	Cost	Qnty	Cost	Qnty	Cost	Qnty	Cost	Qnty	Cost	Qnty	Cost
Track & Signal														
New Track	Track Mile	$ 920,453	2.7	$ 2,485,223	27.3	$ 25,128,369	2.7	$ 2,485,223	13.0	$ 11,965,890	27.4	$ 25,220,415	13.0	$ 11,965,890
Track Resurfacing	Track Mile	$ 40,266	3.3	$ 132,877	4.6	$ 185,222	3.3	$ 132,877	1.9	$ 76,505	5.2	$ 209,382	1.9	$ 76,505
Universal X-Over & Interlocking	Each	$ 1,324,715	0	$ 0	3	$ 3,974,145	0	$ 0	0	$ 0	1	$ 1,324,715	0	$ 0
3 Mile Passing Siding	Each	$ 5,144,170	1	$ 5,144,170	0	$ 0	1	$ 5,144,170	1	$ 5,144,170	0	$ 0	1	$ 5,144,170
1 Mile Station Siding	Each	$ 2,770,024	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
CTC Signalling	Track Mile	$ 1,025,460	9.0	$ 9,229,142	31.9	$ 32,712,181	25.7	$ 26,354,328	4.9	$ 5,024,755	19.6	$ 20,099,020	17.9	$ 18,355,738
Convert Existing Siding to Passing Siding	Each	$ 1,324,715	2	$ 2,649,430	0	$ 0	2	$ 2,649,430	2	$ 2,649,430	0	$ 0	2	$ 2,649,430
Start & End Double Track Interlockings	Ea. 2x Segment	$ 2,382,811	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Dispatch System	Each	$ 282,002	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Electric Locks	Each	$ 56,679	0	$ 0	4	$ 226,717	0	$ 0	2	$ 113,358	4	$ 226,717	2	$ 113,358
Bumper	Each	$ 15,382	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Contingency (10%)				*$ 1,964,084*		*$ 6,222,663*		*$ 3,676,603*		*$ 2,497,411*		*$ 4,708,025*		*$ 3,830,509*
Track & Signal Subtotal				***$ 21,604,927***		***$ 68,449,298***		***$ 40,442,631***		***$ 27,471,520***		***$ 51,788,274***		***$ 42,135,601***
Grade Crossings														
Upgrade Single Track X-ing	Each	$ 86,754	4	$ 347,018	1	$ 86,754	4	$ 347,018	15	$ 1,301,316	15	$ 1,301,316	15	$ 1,301,316
Upgrade to Double Track X-ing	Each	$ 216,886	3	$ 650,658	26	$ 5,639,037	3	$ 650,658	3	$ 650,658	19	$ 4,120,835	3	$ 650,658
New Single Track X-ing	Each	$ 179,456	1	$ 179,456	1	$ 179,456	1	$ 179,456	1	$ 179,456	1	$ 179,456	1	$ 179,456
New Double Track X-ing	Each	$ 403,775		$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Contingency (10%)				*$ 117,713*		*$ 590,525*		*$ 117,713*		*$ 213,143*		*$ 560,161*		*$ 213,143*
Grade Crossing Subtotal				***$ 1,294,844***		***$ 6,495,771***		***$ 1,294,844***		***$ 2,344,573***		***$ 6,161,767***		***$ 2,344,573***
Bridges														
Back Cove Bridge	Each	$ 9,086,552	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Refurbished Bridge	Each	$ 9,106,087	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Upgrades to Yarmouth (Exit 15)	Lump Sum	$ 1,640,736	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Upgrades to Yarmouth Jct	Lump Sum	$ 3,096,890	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
SLR Upgrades (Yarmouth Jct to Danville Jct)	Lump Sum	$ 6,098,812	0	$ 0	0	$ 0	0	$ 0	1	$ 6,098,812	1	$ 6,098,812	1	$ 6,098,812
2nd Presumpscot River Bridge Deck	Linear Ft	$ 4,500	0	$ 0	180	$ 810,000	0	$ 0	0	$ 0	180	$ 810,000	0	$ 0
New Bridge Over Androscoggin River	Track Foot	$ 15,382	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Contingency (10%)				*$ 0*		*$ 81,000*		*$ 0*		*$ 609,881*		*$ 690,881*		*$ 609,881*
Bridges Subtotal				***$ 0***		***$ 891,000***		***$ 0***		***$ 6,708,693***		***$ 7,599,693***		***$ 6,708,693***
Positive Train Control														
Dual Cab Devices	Vehicle	$ 95,000	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Single Cab Devices	Vehicle	$ 80,000	2	$ 160,000	2	$ 160,000	2	$ 160,000	2	$ 160,000	2	$ 160,000	2	$ 160,000
Wayside Devices	Track Mile	$ 121,000	0.0	$ 0	63.8	$ 7,719,800	38.2	$ 4,622,200	0	$ 0	39.2	$ 4,743,200	37.5	$ 4,537,500
Central Office Equipment	Each	$ 15,000,000	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Contingency (10%)				*$ 16,000*		*$ 787,980*		*$ 478,220*		*$ 16,000*		*$ 490,320*		*$ 469,750*
PTC Subtotal				***$ 176,000***		***$ 8,667,780***		***$ 5,260,420***		***$ 176,000***		***$ 5,393,520***		***$ 5,167,250***
Stations														
High Level-Platform w/Canopy	Each	$ 964,709	1	$ 964,709	1	$ 964,709	1	$ 964,709	1	$ 964,709	1	$ 964,709	1	$ 964,709
Station Building	Sta	$ 2,000,000	1	$ 2,000,000	1	$ 2,000,000	1	$ 2,000,000	1	$ 2,000,000	1	$ 2,000,000	1	$ 2,000,000
Ticket Vending Machines (thru Sta)	Sta	$ 178,430	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Ticket Vending Machines (Terminal Sta)	Sta	$ 356,860	1	$ 356,860	1	$ 356,860	1	$ 356,860	1	$ 356,860	1	$ 356,860	1	$ 356,860
CCTV	System	$ 246,110	1	$ 246,110	1	$ 246,110	1	$ 246,110	1	$ 246,110	1	$ 246,110	1	$ 246,110
Parking Spaces	Each	$ 3,589	517	$ 1,855,570	517	$ 1,855,570	517	$ 1,855,570	517	$ 1,855,570	517	$ 1,855,570	517	$ 1,855,570
Site Development	Sta	$ 500,000	1	$ 500,000	1	$ 500,000	1	$ 500,000	1	$ 500,000	1	$ 500,000	1	$ 500,000
Pedestrian Railroad Crossing	Each	$ 102,546	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Two Track Stub-End Terminal	Each	$ 3,301,392	1	$ 3,301,392	1	$ 3,301,392	1	$ 3,301,392	1	$ 3,301,392	1	$ 3,301,392	1	$ 3,301,392
Three Track Stub-End Terminal	Each	$ 3,767,238	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Contingency (10%)				*$ 922,464*		*$ 922,464*		*$ 922,464*		*$ 922,464*		*$ 922,464*		*$ 922,464*
Station Subtotal				***$ 10,147,106***		***$ 10,147,106***		***$ 10,147,106***		***$ 10,147,106***		***$ 10,147,106***		***$ 10,147,106***
Facilities														
Layover Facility	Vehicle	$ 217,975	21	$ 4,577,470	21	$ 4,577,470	21	$ 4,577,470	21	$ 4,577,470	21	$ 4,577,470	21	$ 4,577,470
Maintenance of Equipment Facility	Vehicle	$ 500,701	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Crew Dorms at Layover Facility	Layover Fac.	$ 2,000,000	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Customs Facility	Each	$ 58,000,000	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0
Contingency (10%)				*$ 457,747*		*$ 457,747*		*$ 457,747*		*$ 457,747*		*$ 457,747*		*$ 457,747*
Vehicle Upkeep Subtotal				***$ 5,035,217***		***$ 5,035,217***		***$ 5,035,217***		***$ 5,035,217***		***$ 5,035,217***		***$ 5,035,217***
Rolling Stock														
Locomotive (Model P42DC)	Vehicle	$ 4,360,656	1	$ 4,360,656	1	$ 4,360,656	1	$ 4,360,656	1	$ 4,360,656	1	$ 4,360,656	1	$ 4,360,656
Cabbage Car (PCU)	Vehicle	$ 875,000	1	$ 875,000	1	$ 875,000	1	$ 875,000	1	$ 875,000	1	$ 875,000	1	$ 875,000
Coach / Café Car	Vehicle	$ 1,428,000	5	$ 7,140,000	5	$ 7,140,000	5	$ 7,140,000	5	$ 7,140,000	5	$ 7,140,000	5	$ 7,140,000
Contingency (15%)				*$ 1,856,348*		*$ 1,856,348*		*$ 1,856,348*		*$ 1,856,348*		*$ 1,856,348*		*$ 1,856,348*
Rolling Stock Subtotal				***$ 14,232,004***		***$ 14,232,004***		***$ 14,232,004***		***$ 14,232,004***		***$ 14,232,004***		***$ 14,232,004***
Infrastructure Subtotal I				$ 38,258,094		$ 99,686,173		$ 62,180,218		$ 51,883,108		$ 86,125,576		$ 71,538,439
Rolling Stock Subtotal I				$ 14,232,004		$ 14,232,004		$ 14,232,004		$ 14,232,004		$ 14,232,004		$ 14,232,004
Unallocated Contingency		5%		$ 1,912,905		$ 4,984,309		$ 3,109,011		$ 2,594,155		$ 4,306,279		$ 3,576,922
Infrastructure Total				$ 40,170,999		$ 104,670,481		$ 65,289,229		$ 54,477,264		$ 90,431,855		$ 75,115,361
Rolling Stock Total				$ 14,232,004		$ 14,232,004		$ 14,232,004		$ 14,232,004		$ 14,232,004		$ 14,232,004
Capital Cost Subtotal I				***$ 54,403,003***		***$ 118,902,485***		***$ 79,521,233***		***$ 68,709,268***		***$ 104,663,859***		***$ 89,347,366***
Soft Costs														
Preliminary Eng'g & Final Design		14.0%		$ 7,616,420		$ 16,646,348		$ 11,132,973		$ 9,619,298		$ 14,652,940		$ 12,508,631
Project Mgmt for D&C		7.5%		$ 4,080,225		$ 8,917,686		$ 5,964,092		$ 5,153,195		$ 7,849,789		$ 6,701,052
Construction Admin & Mgmt		5.0%		$ 2,720,150		$ 5,945,124		$ 3,976,062		$ 3,435,463		$ 5,233,193		$ 4,467,368
Insurance		2.0%		$ 1,088,060		$ 2,378,050		$ 1,590,425		$ 1,374,185		$ 2,093,277		$ 1,786,947
Legal (permits, review fees, etc)		0.3%		$ 163,209		$ 356,707		$ 238,564		$ 206,128		$ 313,992		$ 268,042
Surverys, Testing, Investigation, Inspection		0.3%		$ 163,209		$ 356,707		$ 238,564		$ 206,128		$ 313,992		$ 268,042
Startup		0.3%		$ 163,209		$ 356,707		$ 238,564		$ 206,128		$ 313,992		$ 268,042
Soft Costs Subtotal				***$ 15,994,483***		***$ 34,957,331***		***$ 23,379,243***		***$ 20,200,525***		***$ 30,771,175***		***$ 26,268,125***
Total Capital Costs				***$ 70,397,486***		***$ 153,859,816***		***$ 102,900,476***		***$ 88,909,793***		***$ 135,435,034***		***$ 115,615,491***

Portland to Auburn Intermodal Passenger Center Costs Range ($2020) (escalation rate of 4.26% used)

Key:

"(DARK)" → Royal / Yarmouth Jct to Danville Jct
"(SIGNALIZED)" → Royal / Yarmouth Jct to Auburn with CTC Signals
"(DOUBLE TRACK)" → Double track from Portland to Royal / Yarmouth Jct
"(PASSING SIDING)" → Passing Sidings from Portland to Royal / Yarmouth Jct

Cost Categories			$2020					
	Units	Unit Cost	AI via PAR (Dark) Passing Sidings	AI via PAR (SIGNALIZED) Double Track	AI via PAR (SIGNALIZED) Passing Sidings	AI via SLR (DARK) Passing Sidings	AI via SLR (SIGNALIZED) Double Track	AI via SLR (SIGNALIZED) Passing Sidings
Track & Signal								
New Track	Track Mile	$ 920,453	$ 3,771,748	$ 38,136,560	$ 3,771,748	$ 18,160,267	$ 38,276,254	$ 18,160,267
Track Resurfacing	Track Mile	$ 40,266	$ 201,663	$ 281,106	$ 201,663	$ 116,109	$ 317,772	$ 116,109
Universal X-Over & Interlocking	Each	$ 1,324,715	$ 0	$ 6,031,439	$ 0	$ 0	$ 2,010,480	$ 0
3 Mile Passing Siding	Each	$ 5,144,170	$ 7,807,150	$ 0	$ 7,807,150	$ 7,807,150	$ 0	$ 7,807,150
1 Mile Station Siding	Each	$ 2,770,024	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
CTC Signalling	Track Mile	$ 1,025,460	$ 14,006,787	$ 49,646,279	$ 39,997,159	$ 7,625,917	$ 30,503,670	$ 27,857,943
Convert Existing Siding to Passing Siding	Each	$ 1,324,715	$ 4,020,960	$ 0	$ 4,020,960	$ 4,020,960	$ 0	$ 4,020,960
Start & End Double Track Interlockings	Ea. 2x Segment	$ 2,382,811	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Dispatch System	Each	$ 282,002	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Electric Locks	Each	$ 56,679	$ 0	$ 344,081	$ 0	$ 172,041	$ 344,081	$ 172,041
Bumper	Each	$ 15,382	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Contingency (10%)			*$ 2,980,831*	*$ 9,443,947*	*$ 5,579,868*	*$ 3,790,244*	*$ 7,145,226*	*$ 5,813,447*
Track & Signal Subtotal			***$ 32,789,138***	***$ 103,883,412***	***$ 61,378,547***	***$ 41,692,687***	***$ 78,597,483***	***$ 63,947,916***
Grade Crossings								
Upgrade Single Track X-ing	Each	$ 86,754	$ 526,658	$ 131,665	$ 526,658	$ 1,974,968	$ 1,974,968	$ 1,974,968
Upgrade to Double Track X-ing	Each	$ 216,886	$ 987,484	$ 8,558,194	$ 987,484	$ 987,484	$ 6,254,065	$ 987,484
New Single Track X-ing	Each	$ 179,456	$ 272,354	$ 272,354	$ 272,354	$ 272,354	$ 272,354	$ 272,354
New Double Track X-ing	Each	$ 403,775	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Contingency (10%)			*$ 178,650*	*$ 896,221*	*$ 178,650*	*$ 323,481*	*$ 850,139*	*$ 323,481*
Grade Crossing Subtotal			***$ 1,965,146***	***$ 9,858,434***	***$ 1,965,146***	***$ 3,558,287***	***$ 9,351,526***	***$ 3,558,287***
Bridges								
Back Cove Bridge	Each	$ 9,086,552	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Refurbished Bridge	Each	$ 9,106,087	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Upgrades to Yarmouth (Exit 15)	Lump Sum	$ 1,640,736	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Upgrades to Yarmouth Jct	Lump Sum	$ 3,096,890	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
SLR Upgrades (Yarmouth Jct to Danville Jct)	Lump Sum	$ 6,098,812	$ 0	$ 0	$ 0	$ 9,255,981	$ 9,255,981	$ 9,255,981
2nd Presumpscot River Bridge Deck	Linear Ft	$ 4,500	$ 0	$ 1,229,312	$ 0	$ 0	$ 1,229,312	$ 0
New Bridge Over Androscoggin River	Track Foot	$ 15,382	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Contingency (10%)			*$ 0*	*$ 122,931*	*$ 0*	*$ 925,598*	*$ 1,048,529*	*$ 925,598*
Bridges Subtotal			***$ 0***	***$ 1,352,244***	***$ 0***	***$ 10,181,579***	***$ 11,533,822***	***$ 10,181,579***
Positive Train Control								
Dual Cab Devices	Vehicle	$ 95,000	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Single Cab Devices	Vehicle	$ 80,000	$ 242,827	$ 242,827	$ 242,827	$ 242,827	$ 242,827	$ 242,827
Wayside Devices	Track Mile	$ 121,000	$ 0	$ 11,716,105	$ 7,014,972	$ 0	$ 7,198,610	$ 6,886,425
Central Office Equipment	Each	$ 15,000,000	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Contingency (10%)			*$ 24,283*	*$ 1,195,893*	*$ 725,780*	*$ 24,283*	*$ 744,144*	*$ 712,925*
PTC Subtotal			***$ 267,110***	***$ 13,154,825***	***$ 7,983,579***	***$ 267,110***	***$ 8,185,581***	***$ 7,842,178***
Stations								
High Level-Platform w/Canopy	Each	$ 964,709	$ 1,464,110	$ 1,464,110	$ 1,464,110	$ 1,464,110	$ 1,464,110	$ 1,464,110
Station Building	Sta	$ 2,000,000	$ 3,035,339	$ 3,035,339	$ 3,035,339	$ 3,035,339	$ 3,035,339	$ 3,035,339
Ticket Vending Machines (thru Sta)	Sta	$ 178,430	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Ticket Vending Machines (Terminal Sta)	Sta	$ 356,860	$ 541,596	$ 541,596	$ 541,596	$ 541,596	$ 541,596	$ 541,596
CCTV	System	$ 246,110	$ 373,514	$ 373,514	$ 373,514	$ 373,514	$ 373,514	$ 373,514
Parking Spaces	Each	$ 3,589	$ 2,816,142	$ 2,816,142	$ 2,816,142	$ 2,816,142	$ 2,816,142	$ 2,816,142
Site Development	Sta	$ 500,000	$ 758,835	$ 758,835	$ 758,835	$ 758,835	$ 758,835	$ 758,835
Pedestrian Railroad Crossing	Each	$ 102,546	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Two Track Stub-End Terminal	Each	$ 3,301,392	$ 5,010,422	$ 5,010,422	$ 5,010,422	$ 5,010,422	$ 5,010,422	$ 5,010,422
Three Track Stub-End Terminal	Each	$ 3,767,238	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Contingency (10%)			*$ 1,399,996*	*$ 1,399,996*	*$ 1,399,996*	*$ 1,399,996*	*$ 1,399,996*	*$ 1,399,996*
Station Subtotal			***$ 15,399,954***	***$ 15,399,954***	***$ 15,399,954***	***$ 15,399,954***	***$ 15,399,954***	***$ 15,399,954***
Facilities								
Layover Facility	Vehicle	$ 217,975	$ 6,947,086	$ 6,947,086	$ 6,947,086	$ 6,947,086	$ 6,947,086	$ 6,947,086
Maintenance of Equipment Facility	Vehicle	$ 500,701	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Crew Dorms at Layover Facility	Layover Fac.	$ 2,000,000	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Customs Facility	Each	$ 58,000,000	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Contingency (10%)			*$ 694,709*	*$ 694,709*	*$ 694,709*	*$ 694,709*	*$ 694,709*	*$ 694,709*
Vehicle Upkeep Subtotal			***$ 7,641,795***	***$ 7,641,795***	***$ 7,641,795***	***$ 7,641,795***	***$ 7,641,795***	***$ 7,641,795***
Rolling Stock								
Locomotive (Model P42DC)	Vehicle	$ 4,360,656	$ 6,618,034	$ 6,618,034	$ 6,618,034	$ 6,618,034	$ 6,618,034	$ 6,618,034
Cabbage Car (PCU)	Vehicle	$ 875,000	$ 1,327,961	$ 1,327,961	$ 1,327,961	$ 1,327,961	$ 1,327,961	$ 1,327,961
Coach / Café Car	Vehicle	$ 1,428,000	$ 10,836,160	$ 10,836,160	$ 10,836,160	$ 10,836,160	$ 10,836,160	$ 10,836,160
Contingency (15%)			*$ 2,817,323*	*$ 2,817,323*	*$ 2,817,323*	*$ 2,817,323*	*$ 2,817,323*	*$ 2,817,323*
Rolling Stock Subtotal			***$ 21,599,479***	***$ 21,599,479***	***$ 21,599,479***	***$ 21,599,479***	***$ 21,599,479***	***$ 21,599,479***
Infrastructure Subtotal I			$ 58,063,142	$ 151,290,664	$ 94,369,020	$ 78,741,411	$ 130,710,160	$ 108,571,708
Rolling Stock Subtotal I			$ 21,599,479	$ 21,599,479	$ 21,599,479	$ 21,599,479	$ 21,599,479	$ 21,599,479
Unallocated Contingency		5%	$ 2,903,157	$ 7,564,533	$ 4,718,451	$ 3,937,071	$ 6,535,508	$ 5,428,585
Infrastructure Total			$ 60,966,299	$ 158,855,197	$ 99,087,471	$ 82,678,482	$ 137,245,668	$ 114,000,293
Rolling Stock Total			$ 21,599,479	$ 21,599,479	$ 21,599,479	$ 21,599,479	$ 21,599,479	$ 21,599,479
Capital Cost Subtotal I			***$ 82,565,778***	***$ 180,454,675***	***$ 120,686,950***	***$ 104,277,960***	***$ 158,845,147***	***$ 135,599,771***
Soft Costs								
Preliminary Eng'g & Final Design		14.0%	$ 11,559,209	$ 25,263,655	$ 16,896,173	$ 14,598,914	$ 22,238,321	$ 18,983,968
Project Mgmt for D&C		7.5%	$ 6,192,433	$ 13,534,101	$ 9,051,521	$ 7,820,847	$ 11,913,386	$ 10,169,983
Construction Admin & Mgmt		5.0%	$ 4,128,289	$ 9,022,734	$ 6,034,347	$ 5,213,898	$ 7,942,257	$ 6,779,989
Insurance		2.0%	$ 1,651,316	$ 3,609,094	$ 2,413,739	$ 2,085,559	$ 3,176,903	$ 2,711,995
Legal (permits, review fees, etc)		0.3%	$ 247,697	$ 541,364	$ 362,061	$ 312,834	$ 476,535	$ 406,799
Surverys, Testing, Investigation, Inspection		0.3%	$ 247,697	$ 541,364	$ 362,061	$ 312,834	$ 476,535	$ 406,799
Startup		0.3%	$ 247,697	$ 541,364	$ 362,061	$ 312,834	$ 476,535	$ 406,799
Soft Costs Subtotal			***$ 24,274,339***	***$ 53,053,675***	***$ 35,481,963***	***$ 30,657,720***	***$ 46,700,473***	***$ 39,866,333***
Total Capital Costs			***$ 106,840,117***	***$ 233,508,350***	***$ 156,168,913***	***$ 134,935,680***	***$ 205,545,620***	***$ 175,466,104***

Portland to Bethel Incremental Costs Range (escalation rate of 4.26% used)

Cost Categories			$2010				$2020	
			Bethel via SLR (Low, Opt. B)		Bethel via SLR (High, Opt. A)		Bethel via SLR (Low, Opt. B)	Bethel via SLR (High, Opt. A)
	Units	Unit Cost	Qnty	Cost	Qnty	Cost		
Track & Signal								
New Track	Track Mile	$ 920,453	0	$ 0	17.9	$ 16,476,110	$ 0	$ 25,005,290
Track Resurfacing	Track Mile	$ 40,266	40.8	$ 1,642,841	40.8	$ 1,642,841	$ 2,493,290	$ 2,493,290
Universal X-Over & Interlocking	Each	$ 1,324,715	0	$ 0	1	$ 1,324,715	$ 0	$ 2,010,480
3 Mile Passing Siding	Each	$ 5,144,170	1	$ 5,144,170	1	$ 5,144,170	$ 7,807,150	$ 7,807,150
1 Mile Station Siding	Each	$ 2,770,024	0	$ 0	0	$ 0	$ 0	$ 0
CTC Signalling	Track Mile	$ 1,025,460	0.0	$ 0	17.9	$ 18,355,738	$ 0	$ 27,857,943
Convert Existing Siding to Passing Siding	Each	$ 1,324,715	0	$ 0	0	$ 0	$ 0	$ 0
Start & End Double Track Interlockings	Ea. 2x Segment	$ 2,382,811	0	$ 0	1	$ 2,382,811	$ 0	$ 3,616,319
Dispatch System	Each	$ 282,002	0	$ 0	0	$ 0	$ 0	$ 0
Electric Locks	Each	$ 56,679	0	$ 0	17	$ 963,547	$ 0	$ 1,462,346
Bumper	Each	$ 15,382	0	$ 0	0	$ 0	$ 0	$ 0
Contingency (10%)				*$ 678,701*		*$ 4,628,993*	*$ 1,030,044*	*$ 7,025,282*
Track & Signal Subtotal				***$ 7,465,712***		***$ 50,918,926***	***$ 11,330,484***	***$ 77,278,100***
Grade Crossings								
Upgrade Single Track X-ing	Each	$ 86,754	43	$ 3,730,440	21	$ 1,821,843	$ 5,661,575	$ 2,764,955
Upgrade to Double Track X-ing	Each	$ 216,886	4	$ 867,544	26	$ 5,639,037	$ 1,316,645	$ 8,558,194
New Single Track X-ing	Each	$ 179,456	1	$ 179,456	1	$ 179,456	$ 272,354	$ 272,354
New Double Track X-ing	Each	$ 403,775	0	$ 0	0	$ 0	$ 0	$ 0
Contingency (10%)				*$ 477,744*		*$ 764,033*	*$ 725,057*	*$ 1,159,550*
Grade Crossing Subtotal				***$ 5,255,183***		***$ 8,404,368***	***$ 7,975,631***	***$ 12,755,054***
Bridges								
Back Cove Bridge	Each	$ 9,086,552	0	$ 0	0	$ 0	$ 0	$ 0
Refurbished Bridge	Each	$ 9,106,087	0	$ 0	0	$ 0	$ 0	$ 0
Upgrades to Yarmouth (Exit 15)	Lump Sum	$ 1,640,736	0	$ 0	0	$ 0	$ 0	$ 0
Upgrades to Yarmouth Jct	Lump Sum	$ 3,096,890	0	$ 0	0	$ 0	$ 0	$ 0
SLR Upgrades (Yarmouth Jct to Danville Jct)	Lump Sum	$ 6,098,812	0	$ 0	0	$ 0	$ 0	$ 0
2nd Presumpscot River Bridge Deck	Linear Ft	$ 4,500	0	$ 0	0	$ 0	$ 0	$ 0
New Bridge Over Androscoggin River	Track Foot	$ 15,382	0	$ 0	0	$ 0	$ 0	$ 0
Contingency (10%)				*$ 0*		*$ 0*	*$ 0*	*$ 0*
Bridges Subtotal				***$ 0***		***$ 0***	***$ 0***	***$ 0***
Positive Train Control								
Dual Cab Devices	Vehicle	$ 95,000	0	$ 0	0	$ 0	$ 0	$ 0
Single Cab Devices	Vehicle	$ 80,000	0	$ 0	0	$ 0	$ 0	$ 0
Wayside Devices	Track Mile	$ 121,000	0	$ 0	0	$ 0	$ 0	$ 0
Central Office Equipment	Each	$ 15,000,000	0	$ 0	0	$ 0	$ 0	$ 0
Contingency (10%)				*$ 0*		*$ 0*	*$ 0*	*$ 0*
PTC Subtotal				***$ 0***		***$ 0***	***$ 0***	***$ 0***
Stations								
High Level-Platform w/Canopy	Each	$ 964,709	1	$ 964,709	1	$ 964,709	$ 1,464,110	$ 1,464,110
Station Building	Sta	$ 2,000,000	1	$ 2,000,000	1	$ 2,000,000	$ 3,035,339	$ 3,035,339
Ticket Vending Machines (thru Sta)	Sta	$ 178,430	1	$ 178,430	1	$ 178,430	$ 270,798	$ 270,798
Ticket Vending Machines (Terminal Sta)	Sta	$ 356,860	1	$ 356,860	1	$ 356,860	$ 541,596	$ 541,596
CCTV	System	$ 246,110	1	$ 246,110	1	$ 246,110	$ 373,514	$ 373,514
Parking Spaces	Each	$ 3,589	200	$ 717,822	200	$ 717,822	$ 1,089,417	$ 1,089,417
Site Development	Sta	$ 500,000	1	$ 500,000	1	$ 500,000	$ 758,835	$ 758,835
Pedestrian Railroad Crossing	Each	$ 102,546	0	$ 0	0	$ 0	$ 0	$ 0
Two Track Stub-End Terminal	Each	$ 3,301,392	1	$ 3,301,392	1	$ 3,301,392	$ 5,010,422	$ 5,010,422
Three Track Stub-End Terminal	Each	$ 3,767,238	0	$ 0	0	$ 0	$ 0	$ 0
Contingency (10%)				*$ 826,532*		*$ 826,532*	*$ 1,254,403*	*$ 1,254,403*
Station Subtotal				***$ 9,091,857***		***$ 9,091,857***	***$ 13,798,433***	***$ 13,798,433***
Facilities								
Layover Facility	Vehicle	$ 217,975	14	$ 3,051,646	14	$ 3,051,646	$ 4,631,391	$ 4,631,391
Maintenance of Equipment Facility	Vehicle	$ 500,701	0	$ 0	0	$ 0	$ 0	$ 0
Crew Dorms at Layover Facility	Layover Fac.	$ 2,000,000	2	$ 4,000,000	2	$ 4,000,000	$ 6,070,678	$ 6,070,678
Customs Facility	Each	$ 58,000,000	0	$ 0	0	$ 0	$ 0	$ 0
Contingency (10%)				*$ 705,165*		*$ 705,165*	*$ 1,070,207*	*$ 1,070,207*
Vehicle Upkeep Subtotal				***$ 7,756,811***		***$ 7,756,811***	***$ 11,772,275***	***$ 11,772,275***
Rolling Stock								
Locomotive (Model P42DC)	Vehicle	$ 4,360,656	0	$ 0	0	$ 0	$ 0	$ 0
Cabbage Car (PCU)	Vehicle	$ 875,000	0	$ 0	0	$ 0	$ 0	$ 0
Coach / Café Car	Vehicle	$ 1,428,000	0	$ 0	0	$ 0	$ 0	$ 0
Contingency (15%)				*$ 0*		*$ 0*	*$ 0*	*$ 0*
Rolling Stock Subtotal				***$ 0***		***$ 0***	***$ 0***	***$ 0***
Infrastructure Subtotal I				$ 29,569,563		$ 76,171,962	$ 44,876,824	$ 115,603,863
Rolling Stock Subtotal I				$ 0		$ 0	$ 0	$ 0
Unallocated Contingency		5%		$ 1,478,478		$ 3,808,598	$ 2,243,841	$ 5,780,193
Infrastructure Total				$ 31,048,041		$ 79,980,560	$ 47,120,665	$ 121,384,056
Rolling Stock Total				$ 0		$ 0	$ 0	$ 0
Capital Cost Subtotal I				***$ 31,048,041***		***$ 79,980,560***	***$ 47,120,665***	***$ 121,384,056***
Soft Costs								
Preliminary Eng'g & Final Design		14.0%		$ 4,346,726		$ 11,197,278	$ 6,596,893	$ 16,993,768
Project Mgmt for D&C		7.5%		$ 2,328,603		$ 5,998,542	$ 3,534,050	$ 9,103,804
Construction Admin & Mgmt		5.0%		$ 1,552,402		$ 3,999,028	$ 2,356,033	$ 6,069,203
Insurance		2.0%		$ 620,961		$ 1,599,611	$ 942,413	$ 2,427,681
Legal (permits, review fees, etc)		0.3%		$ 93,144		$ 239,942	$ 141,362	$ 364,152
Surverys, Testing, Investigation, Inspection		0.3%		$ 93,144		$ 239,942	$ 141,362	$ 364,152
Startup		0.3%		$ 93,144		$ 239,942	$ 141,362	$ 364,152
Soft Costs Subtotal				***$ 9,128,124***		***$ 23,514,285***	***$ 13,853,476***	***$ 35,686,912***
Total Capital Costs				***$ 40,176,166***		***$ 103,494,844***	***$ 60,974,141***	***$ 157,070,968***

Bethel to Montreal Costs (escalation rate of 4.26% used)

Cost Categories			$2010						$2020		
			USA		Canada		Total (USA + Canada)		USA	Canada	Total (USA + Canada)
	Units	Unit Cost	Qnty	Cost	Qnty	Cost	Qnty	Cost			
Track & Signal											
New Track	Track Mile	$ 920,453	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Track Resurfacing	Track Mile	$ 40,266	95	$ 3,825,243	92	$ 3,704,446	187	$ 7,529,690	$ 5,805,455	$ 5,622,125	$ 11,427,581
Universal X-Over & Interlocking	Each	$ 1,324,715	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
3 Mile Passing Siding	Each	$ 5,144,170	3	$ 15,432,510	3	$ 15,432,510	6	$ 30,865,019	$ 23,421,449	$ 23,421,449	$ 46,842,899
1 Mile Station Siding	Each	$ 2,770,024	0	$ 0	1	$ 2,770,024	1	$ 2,770,024	$ 0	$ 4,203,982	$ 4,203,982
CTC Signalling	Track Mile	$ 1,025,460	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Convert Existing Siding to Passing Siding	Each	$ 1,324,715	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Start & End Double Track Interlockings	Ea. 2x Segment	$ 2,382,811	1	$ 2,382,811	0	$ 0	1	$ 2,382,811	$ 3,616,319	$ 0	$ 3,616,319
Dispatch System	Each	$ 282,002	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Electric Locks	Each	$ 56,679	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Bumper	Each	$ 15,382	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Contingency (10%)				*$ 2,164,056*		*$ 2,190,698*		*$ 4,354,754*	*$ 3,284,322*	*$ 3,324,756*	*$ 6,609,078*
Track & Signal Subtotal				***$ 23,804,620***		***$ 24,097,678***		***$ 47,902,299***	***$ 36,127,546***	***$ 36,572,312***	***$ 72,699,858***
Grade Crossings											
Upgrade Single Track X-ing	Each	$ 86,754	47	$ 4,077,457	55	$ 4,771,493	102	$ 8,848,950	$ 6,188,233	$ 7,241,549	$ 13,429,781
Upgrade to Double Track X-ing	Each	$ 216,886	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
New Single Track X-ing	Each	$ 179,456	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
New Double Track X-ing	Each	$ 403,775	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Contingency (10%)				*$ 407,746*		*$ 477,149*		*$ 884,895*	*$ 618,823*	*$ 724,155*	*$ 1,342,978*
Grade Crossing Subtotal				***$ 4,485,203***		***$ 5,248,642***		***$ 9,733,845***	***$ 6,807,056***	***$ 7,965,704***	***$ 14,772,760***
Bridges											
Back Cove Bridge	Each	$ 9,086,552	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Refurbished Bridge	Each	$ 9,106,087	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Upgrades to Yarmouth (Exit 15)	Lump Sum	$ 1,640,736	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Upgrades to Yarmouth Jct	Lump Sum	$ 3,096,890	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
SLR Upgrades (Yarmouth Jct to Danville Jct)	Lump Sum	$ 6,098,812	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
2nd Presumpscot River Bridge Deck	Linear Ft	$ 4,500	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
New Bridge Over Androscoggin River	Track Foot	$ 15,382	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Contingency (10%)				*$ 0*		*$ 0*		*$ 0*	*$ 0*	*$ 0*	*$ 0*
Bridges Subtotal				***$ 0***		***$ 0***		***$ 0***	***$ 0***	***$ 0***	***$ 0***
Positive Train Control											
Dual Cab Devices	Vehicle	$ 95,000	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Single Cab Devices	Vehicle	$ 80,000	4	$ 320,000	0	$ 0	4	$ 320,000	$ 485,654	$ 0	$ 485,654
Wayside Devices	Track Mile	$ 121,000	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Central Office Equipment	Each	$ 15,000,000	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Contingency (10%)				*$ 32,000*		*$ 0*		*$ 32,000*	*$ 48,565*	*$ 0*	*$ 48,565*
PTC Subtotal				***$ 352,000***		***$ 0***		***$ 352,000***	***$ 534,220***	***$ 0***	***$ 534,220***
Stations											
High Level-Platform w/Canopy	Each	$ 964,709	2	$ 1,929,418	1	$ 964,709	3	$ 2,894,127	$ 2,928,219	$ 1,464,110	$ 4,392,329
Station Building	Sta	$ 2,000,000	1	$ 2,000,000	0	$ 0	1	$ 2,000,000	$ 3,035,339	$ 0	$ 3,035,339
Ticket Vending Machines (thru Sta)	Sta	$ 178,430	2	$ 356,860	2	$ 356,860	4	$ 713,720	$ 541,596	$ 541,596	$ 1,083,192
Ticket Vending Machines (Terminal Sta)	Sta	$ 356,860	1	$ 356,860	0	$ 0	1	$ 356,860	$ 541,596	$ 0	$ 541,596
CCTV	System	$ 246,110	1	$ 246,110	1	$ 246,110	2	$ 492,221	$ 373,514	$ 373,514	$ 747,029
Parking Spaces	Each	$ 3,589	200	$ 717,822	100	$ 358,911	300	$ 1,076,733	$ 1,089,417	$ 544,708	$ 1,634,125
Site Development	Sta	$ 500,000	1	$ 500,000	0	$ 0	1	$ 500,000	$ 758,835	$ 0	$ 758,835
Pedestrian Railroad Crossing	Each	$ 102,546	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Two Track Stub-End Terminal	Each	$ 3,301,392	1	$ 3,301,392	0	$ 0	1	$ 3,301,392	$ 5,010,422	$ 0	$ 5,010,422
Three Track Stub-End Terminal	Each	$ 3,767,238	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Contingency (10%)				*$ 940,846*		*$ 192,659*		*$ 1,133,505*	*$ 1,427,894*	*$ 292,393*	*$ 1,720,287*
Station Subtotal				***$ 10,349,310***		***$ 2,119,250***		***$ 12,468,559***	***$ 15,706,832***	***$ 3,216,321***	***$ 18,923,152***
Facilities											
Layover Facility	Vehicle	$ 217,975	14	$ 3,051,646	14	$ 3,051,646	28	$ 6,103,293	$ 4,631,391	$ 4,631,391	$ 9,262,781
Maintenance of Equipment Facility	Vehicle	$ 500,701	0	$ 0	0	$ 0	0	$ 0	$ 0	$ 0	$ 0
Crew Dorms at Layover Facility	Layover Fac.	$ 2,000,000	1	$ 2,000,000	1	$ 2,000,000	2	$ 4,000,000	$ 3,035,339	$ 3,035,339	$ 6,070,678
Customs Facility	Each	$ 58,000,000	1	$ 58,000,000	1	$ 58,000,000	2	$ 116,000,000	$ 88,024,831	$ 88,024,831	$ 176,049,662
Contingency (10%)				*$ 6,305,165*		*$ 6,305,165*		*$ 12,610,329*	*$ 9,569,156*	*$ 9,569,156*	*$ 19,138,312*
Vehicle Upkeep Subtotal				***$ 69,356,811***		***$ 69,356,811***		***$ 138,713,622***	***$ 105,260,717***	***$ 105,260,717***	***$ 210,521,433***
Rolling Stock											
Locomotive (Model P42DC)	Vehicle	$ 4,360,656	1	$ 4,360,656	1	$ 4,360,656	2	$ 8,721,311	$ 6,618,034	$ 6,618,034	$ 13,236,068
Cabbage Car (PCU)	Vehicle	$ 875,000	1	$ 875,000	1	$ 875,000	2	$ 1,750,000	$ 1,327,961	$ 1,327,961	$ 2,655,922
Coach / Café Car	Vehicle	$ 1,428,000	5	$ 7,140,000	5	$ 7,140,000	10	$ 14,280,000	$ 10,836,160	$ 10,836,160	$ 21,672,320
Contingency (15%)				*$ 1,856,348*		*$ 1,856,348*		*$ 3,712,697*	*$ 2,817,323*	*$ 2,817,323*	*$ 5,634,647*
Rolling Stock Subtotal				***$ 14,232,004***		***$ 14,232,004***		***$ 28,464,008***	***$ 21,599,479***	***$ 21,599,479***	***$ 43,198,957***
Infrastructure Subtotal I				$ 108,347,944		$ 100,822,381		$ 209,170,325	$ 164,436,370	$ 153,015,053	$ 317,451,422
Rolling Stock Subtotal I				$ 14,232,004		$ 14,232,004		$ 28,464,008	$ 21,599,479	$ 21,599,479	$ 43,198,957
Unallocated Contingency		20%		$ 21,669,589		$ 20,164,476		$ 41,834,065	$ 32,887,274	$ 30,603,011	$ 63,490,284
Infrastructure Total				$ 130,017,533		$ 120,986,857		$ 251,004,390	$ 197,323,644	$ 183,618,063	$ 380,941,707
Rolling Stock Total				$ 14,232,004		$ 14,232,004		$ 28,464,008	$ 21,599,479	$ 21,599,479	$ 43,198,957
Capital Cost Subtotal I				***$ 144,249,537***		***$ 135,218,862***		***$ 279,468,398***	***$ 218,923,122***	***$ 205,217,542***	***$ 424,140,664***
Soft Costs											
Preliminary Eng'g & Final Design		14.0%		$ 20,194,935		$ 18,930,641		$ 39,125,576	$ 30,649,237	$ 28,730,456	$ 59,379,693
Project Mgmt for D&C		7.5%		$ 10,818,715		$ 10,141,415		$ 20,960,130	$ 16,419,234	$ 15,391,316	$ 31,810,550
Construction Admin & Mgmt		5.0%		$ 7,212,477		$ 6,760,943		$ 13,973,420	$ 10,946,156	$ 10,260,877	$ 21,207,033
Insurance		2.0%		$ 2,884,991		$ 2,704,377		$ 5,589,368	$ 4,378,462	$ 4,104,351	$ 8,482,813
Legal (permits, review fees, etc)		0.3%		$ 432,749		$ 405,657		$ 838,405	$ 656,769	$ 615,653	$ 1,272,422
Surverys, Testing, Investigation, Inspection		0.3%		$ 432,749		$ 405,657		$ 838,405	$ 656,769	$ 615,653	$ 1,272,422
Startup		0.3%		$ 432,749		$ 405,657		$ 838,405	$ 656,769	$ 615,653	$ 1,272,422
Soft Costs Subtotal				***$ 42,409,364***		***$ 39,754,345***		***$ 82,163,709***	***$ 64,363,398***	***$ 60,333,957***	***$ 124,697,355***
Total Capital Costs				***$ 186,658,901***		***$ 174,973,207***		***$ 361,632,107***	***$ 283,286,520***	***$ 265,551,499***	***$ 548,838,019***