LIGHT RAIL TRANSIT IN BURLINGTON, VERMONT

AN ANALYSIS OF VIABLE ROUTES AND CONSTRUCTION COSTS

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State of Vermont
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BURLINGTON, VERMONT LIGHT RAIL TRANSIT SYSTEM

Summary and Introduction

The State of Vermont and the Burlington metropolitan region can together develop an "investment and growth" economic strategy that fosters Burlington's unique geography as the meeting point of the New England-New York-Quebec triangle. Included in this overall plan should be continued investment in downtown Burlington as the region's commercial and retail center, the state's continued stewardship of the University of Vermont as a first class center for higher education and cutting edge research, and the construction of public works and facilities to allow this growth to continue.

Key to these public investments is transportation, since it can mold and shape the urban center to either environmentally and economically attractive models, or environmentally destructive and economically inefficient land use patterns.

Rail systems, particularly light rail lines, can shape and mold key city areas to encourage private sector investment and growth. Combined with other transportation improvements, including the southern connector, a downtown fringe park and ride lot, a remodelled Union Station, and a new, enlarged and more centrally located ferry terminal, a LRT line can be the catalyst for desired and necessary economic development.

A light rail transit system starter line can be constructed in Burlington, Vermont for a cost of between $8 - 14 million per mile, including contingency and project management and administration.

While many various lines were considered, the best starter line would operate from downtown Burlington to the Airport via University Mall. Specific benefits include reinforcement of downtown's status as a regional commercial center, and the LRT system's ability to shape and guide the continued development, public and private, recreational and commercial, of the Lake Champlain waterfront.

The cost for the downtown-Airport starter line would be about $50 million.

LIGHT RAIL TRANSIT FOR BURLINGTON, VERMONT

Background

Residents of cities throughout North American have recently rediscovered the sheer joy of riding streetcars while at the same time enjoying the substantial economic and environmental benefits that the modern streetcar (also known as light rail transit) brings to their municipalities. In cities that have invested in light rail systems, transit patronage is climbing, per seat costs are dropping, and economic growth is increasing.

These cities have recently inaugurated light rail transit systems:

Sacramento, California
Portland, Oregon
San Jose, California
Calgary, Alberta
Edmonton, Alberta
Buffalo, New York
San Diego, California

In addition, St Louis, Missouri is currently building a light rail system, while Salt Lake City, Dallas and Minneapolis-St. Paul are all actively studying such investments.

LRT System Goals

Why should public monies be spent to build streetcar lines?

Tese systems can not only increase transit patronage (because people are much more willing to ride rail vehicles than buses), but can also direct growth to downtown areas, cluster higher density development around stations (thereby reducing urban/suburban sprawl and allowing people to live without automobiles) and create a character and urban pattern that defines and coherently shapes the urban compact. LRT can and does improve the quality of life within a community.

In Burlington, LRT should achieve the following goals: enhance tourism, recreation and regional economic development; improve mobility; alleviate traffic congestion; provide a cost-effective, dependable, comfortable, attractive and safe mode of transportation that helps the area to meet air quality, energy consumption, and accessibility goals.

These goals and policies are suggested to help LRT development in Burlington:

Goal 1 .Enhance regional economic growth and provide a private investment catalyst.

- Policy 1. LRT must encourage retail, commercial and residential development within its corridors.
- Policy 2. LRT should promote and encourage tourism and cross-border (New York and Quebec) trade and commerce.

Goal 2. Enhance regional mobility and support regional planning policies.

- Policy 1 LRT must enhance mobility in congested corridors.
- Policy 2. LRT should reduce the number of vehicles entering downtown Burlington.
- Policy 3. LRT projects must help achieve regional air quality and environmental goals.

Goal 3. Create a transit option that is an attractive alternative to the automibile.

- Policy 1. LRT service must be competitive with the automobile in travel time, cost, reliability and comfort.
- Policy 2. Schedules, intermodal facilities, fare policy, and marketing must be oriented to provide a single intgegrated system.

Goal 4. Offer a transit option that can be initiated in a timely, environmentally benign, and cost effective manner.

- Policy 1. LRT vehicles must be cost-effective and represent proven technonogy.
- Policy 2. Stations must be functional, attractive and cost-effective, while providing shelter, amenities, efficient access and egress, and adequate intermodal connections.
- Policy 3. Improvements and extensions should be developed incrementally as required to meet ridership.
- Policy 4. LRT should be implemented to reduce or delay the need for high capital cost highway projects.
- Policy 5. Local financial and in-kind support should be required for LRT capital and operating costs.

Because Burlington already has a high number of households without automobiles, and since the city is clustered among several universities and colleges, all with environmentally oriented student bodies and faculties, these factors suggest that community willingness to invest in an LRT system and public willingness to ride the system would be great.

Possible Burlington LRT Routes

Using these suggested goals as a guide, this report studied several possible "starter" LRT segments. All of the segments use downtown Burlington as a terminal, representing a desire to continue the region's emphasis on downtown as the center of commercial, educational and governmental activities.

From this hub, the alternative segments fan out as follows:

- From Burlington to the Airport, via UVM, University Mall and Route 2.
- A sub alternative of the downtown-Airport alignment operating via College Street in downtown.
- An extension of the downtown-Airport line to Tafts Comers, via Route 2.
- From Burlington to Shelburne, via Route 7.
- From Burlington to Essex Junction, via the Central Vermont Railway right-of-way (through Winooski).

Construction Costs and Operating Practices

Construction Costs

Construction costs for each of these alternatives varies from a low of about $8 million per mile for construction occurring on open railway rights-of-way, to about $14 million per mile for construction within a street right-of-way.

After analysis of these alternative alignments, the most appealing alignment appears to be from downtown to the Burlington International Airport via the Route 2 corridor and University Mall. This starter line would cost about $50 million.

Double versus Single Track

The consultant team analyzed the opportunity to use single track alignments in most of the system, versus double track throughout the system. The main advantage to double track is its ability to allow growth in the LRT system without hampering flexibility. As long as trains are safely spaced, practically any schedule can be accommodated, and increasing levels of service can also be implemented.

The main disadvantage of double track is cost. Every set of tracks and ties are duplicated, even if traffic is quite light.

Conversely, a single track system, which requires trains to travel is both directions on the same set of tracks, costs less to build. It has, however, inherent inflexibility. Meets must be scheduled

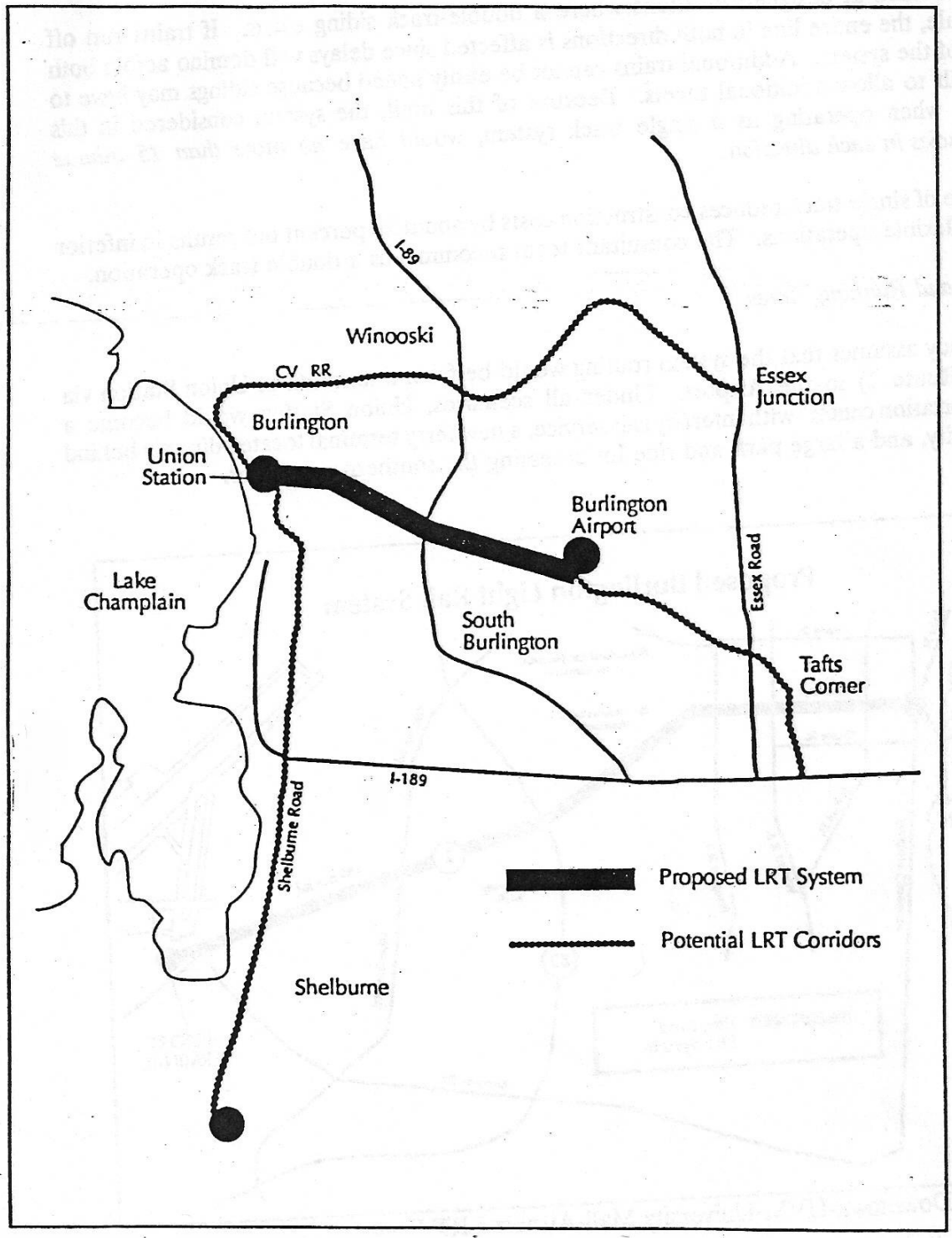

Figure 1 Potential Burlington Area Light Rail Transit Corridors

at designed locations where a double-track siding exists. If trains run off schedule, the entire line in both directions is affected since delays will domino across both sides of the system. Additional trains cannot be easily added because sidings may have to be built to allow additional meets. Because of this limit, the system considered in this paper, when operating as a single track system, would have no more than 15 minute frequencies in each direction.

The use of single track reduces construction costs by about 20 percent but results in inferior and inflexible operations. The consultant team recommends a double track operation.

Routes and Running Times

This study assumes that the system routing would be from a terminal at Union Station via Main (Route 2) to the Airport. Under all scenarios, Union Station would become a "transportation center" with intercity rail service, a new ferry terminal located directly behind the facility, and a large park and ride lot accessing the southern connector.

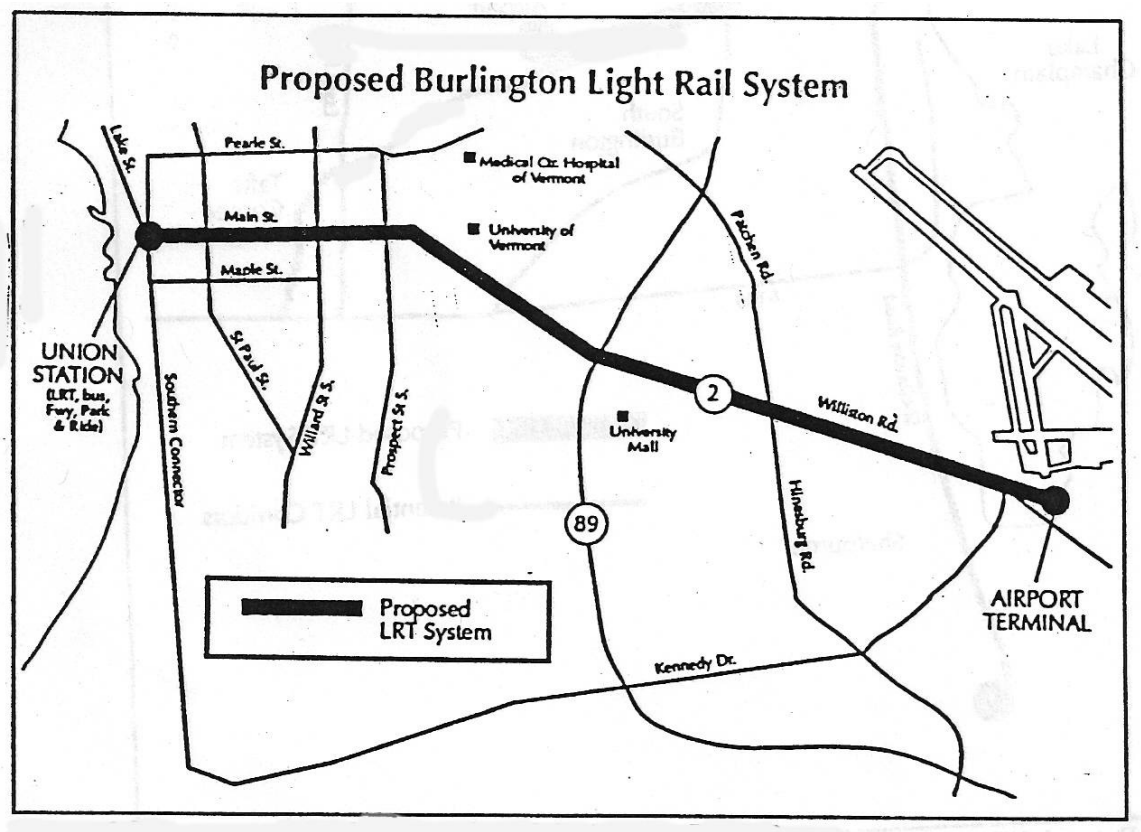

Figure 2 Downtown-UVM-University Mall-Airport LRT Route

At the Airport, a new terminal would be built at the corner of Route 2 and Airport Road. The LRT system would deliver passengers into the terminal at the basement level, where escalators and elevators would convey passengers into the ticketing and boarding areas. In the airport area, a small maintenance facility would be built to house the LRT system and perform routine servicing.

This overall transportation strategy would allow Vermont residents and visitors to access downtown Burlington easily and successfully without an automobile.

Alternative routings do exist and should be investigated in subsequent design studies. The most promising route would continue to use the Union Station and Airport anchors, but would operate downtown via College Streee to UVM, through UVM via the Quad, and then onto Route 2.

Generally, LRT operates about twice as fast as bus service. The proposed starter line would operate at an average speed of about 17 mph, with slower speeds downtown (about 13 mph), with faster speeds nearing the Airport (about 22 mph). A trip from the Airport to downtown would take about 17 or 18 minutes; round trip running time, including scheduled layovers, would be about 45 minutes, requiring five vehicles to operate the system at 10 minute headways.

Project Justification

This study has not estimated patronage of any of the light rail lines. Instead, it takes a "macro" view of Chittenden County development opportunities and attempts to overlay a public works project that could structure development in an environmentally and economic beneficial way.

Clearly, of all the proposed lines, the route from downtown Burlington to the Airport provides the greatest opportunities to shape development, serve existing traffic generators, and increase economic development within the Burlington central business district.

This line would connect the University of Vermont in a fixed guideway link with downtown; it would also link downtown with the airport and could allow, if South Burlington were amenable, for the incremental redevelopment of the Route 2 commercial strip development into a mixed use boulevard, with shopping and higher density residential uses, similar to Beacon Street in Boston and Brookline.

While the other lines have promise, the downtown-UMall-Airport line should be the first pursued in Burlington's discussions of light rail transit systems.

Funding

This report assumes that Vermont would pursue the project within existing funding sources, including the state's transportation funds, and the approximately $2 billion Federal Transit Administration funding program. In addition, a separate federal program allocates $100 million in highway funds for water transit (ferries) improvements, providing a source of funds for the relocation of the Lake Champlain Ferry terminal.

Finally, operating cost would need to be funded. While several approaches are possible, one option would impose a passenger service fee at the Burlington International Airport and use a part of the proceeds to fund the LRT system operating costs.

Institutional

The LRT project, while a major undertaking for Vermont and the Burlington area, is actually one piece of a larger multi-modal and development approach to investment and growth strategies designed to build upon the area's unique economic characteristics. Institutional arrangements should be altered to seize upon these opportunities.

A good example is the Port Authority of New York and New Jersey which provides overall economic initiatives for the bi-state region. The Port Authority owns and operates airports and ports, has real estate interests, and operates transit systems. Its profit making ventures subsidize the infrastructure projects (transit, ports, etc.) which contribute to overall economic growth.

A Champlain Port Authority would be a good institutional model to devise, incorporating airport and port facilities, bus and rail transit operation, multi-modal terminals (bus and rail), trucking facilities (intermodaI exchange yards and terminals) and various real estate projects necessary to ensure the economic development of the Burlington area.

Recommendations - Next Steps

This report concludes that Light Rail is feasible and desirable for the Burlington, Vermont area. Next steps should include a study to bring the system up to 10 to 15 percent design; such a study would cost about $200,000 to $250,000. In this study issues such as final alignment (Main Street or via UVM), operational location (side running versus median operation), location of stations (nine or ten), terminal issues (Airport and Union Station) would all be considered. Also studied would be operating costs and operational policies, probable patronage, and urban design plans.

The end result of such a study would be engineer's estimates for system construction and closure on the policy issues related to LRT construction.

CAPITAL COST ESTIMATE -- LRT SYSTEM UNION STATION TO AIRPORT

COSTS BY UNIT	UNIT COST	UNIT	ROUTE
1 Trackwork			
Double Track			
Embedded	525	RF	$13,035,225
Tie and Ballast	400	RF	0
Single Track			
Embedded	316	RF	0
Tie and Ballast	200	RF	0
Turnouts, Insul. & Com. Jnts	$111,000	$/mi	$521,973
Trackwork SUBTOTAL			$13,557,198
2 Catenary System	$1,400,000	$/mi	$6,583,447
3 Stations***			
Center Platform Stations	$335,000	$/ea	$1,005,000
Side Platform Stations	$419,000	$/ea	$1,676,000
Single Plaltorm only	$210,000	$/ea	$630,000
Stations SUBTOTAL			$3,311,000
4 Utilities	$346,000	$/mi	$1,627,052
5 Street Restoration	n/a	n/a	
6 LRT grade reduction	3.5	$/sf	
7 Retaining Walls, 2' to 12+'	30	$/sf	
8 LRT Signals, Control, Commun.	$100,000	$/mi	$470,246
9 Traffic Signalization	n/a	n/a	
10 Fare Collection	$31,250	$/sta	$312,500
11 Vehicles	$1,500,000	$/mi	$9,000,000
12 Right of Way	$200 to $450k	$/mi	
13 Maintenance Facility	$3,000,000	$/ea	$3,000,000
SUBTOTAL			$37,861,443
Contingency - 10%			$3,786,144
Insurance (Included elsewhere)		n/a	
Construction/Project Management, Design - 20%			$7,572,269
TOTAL			$49,219,876
Cost per mile			$10,466,631

LRT RESOURCES REQUIRED		ROUTE
Route Length one-way	ft	24829
Route Length one-way	mi	4.7
Route Length round-trip	ft	49658
Route Length round-trip	mi	8.4
Double Track (TOTAL)	ft	24829
Embedded	ft	24829
Tie and Ballast	ft	
Single Track (TOTAL)	ft	
Embedded	ft	
Tie and Ballast	ft	
Total Double Track	mi	4.7
Total Single Track	mi	0
Directional Track Miles	mi	8.4
Round Trip Travel Time	min	34
Average Route Operating Speed	mi/hr	16.6
Peak Travel Time (round trip) + rec	min	45
Peak Headway	min	10
Peak Vehicles	veh	4.5
Vehicles + Spares	veh	6
Stations		
Center Platform	sta	3
Side Platform	sta	4
Single Platform only	sta	3
Length of retaining walls	ft	
New or Modified Intr. Signals	ea	

NOTE: Contingency and Construction/Project Admin per State Policy
Street Restoration assumed to be part of Route 2 project