

University of Massachusetts Amherst

**ScholarWorks@UMass Amherst**

---

Masters Theses

Dissertations and Theses

---

July 2015

## Short Line Railroads and Municipal Land Use Planning, Policy, and Regulation

Alexander R. Train

*University of Massachusetts Amherst*

Follow this and additional works at: [https://scholarworks.umass.edu/masters\\_theses\\_2](https://scholarworks.umass.edu/masters_theses_2)



Part of the [Environmental Design Commons](#), and the [Urban, Community and Regional Planning Commons](#)

---

### Recommended Citation

Train, Alexander R., "Short Line Railroads and Municipal Land Use Planning, Policy, and Regulation" (2015). *Masters Theses*. 211.

<https://doi.org/10.7275/6956473> [https://scholarworks.umass.edu/masters\\_theses\\_2/211](https://scholarworks.umass.edu/masters_theses_2/211)

This Open Access Thesis is brought to you for free and open access by the Dissertations and Theses at ScholarWorks@UMass Amherst. It has been accepted for inclusion in Masters Theses by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact [scholarworks@library.umass.edu](mailto:scholarworks@library.umass.edu).

Short Line Railroads and Municipal Land Use Planning, Policy, and Regulation

A Thesis Presented

By

ALEXANDER R. TRAIN

Submitted to the Graduate School of the  
University of Massachusetts Amherst in partial fulfillment  
of the requirements for the degree of

MASTER OF REGIONAL PLANNING

May 2015

Department of Landscape Architecture and Regional Planning

© Copyright by Alexander R. Train 2015

This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0  
International License

Short Line Railroads and Municipal Land Use Planning, Policy, and Regulation

A Thesis Presented

By

ALEXANDER R. TRAIN

Approved as to style and content by:

---

John Mullin, Chair

---

Henry Renski, Member

---

Mark Hamin, Member

---

Elisabeth Hamin, Department Head

Department of Landscape Architecture and Regional Planning

## ACKNOWLEDGEMENTS

First and foremost, I am indebted to my family and close group of friends for the unwavering support and structure they endlessly provided.

I wish to extend my sincere gratitude to my committee: Professor Mullin, Professor Hamin, and Professor Renski. Each offered invaluable guidance, advice, and intellectual challenge they provided to me during this process. I wish to thank those who assisted with the research and development of this thesis. Furthermore, I must thank Antonio Musto for proofreading and criticizing my work, always at a moment's notice. Finally, I am extremely grateful to my partner Kaitie for her endless support.

## ABSTRACT

### SHORT LINE RAILROADS AND MUNICIPAL LAND USE PLANNING, POLICY, and REGULATION

MAY 2015

ALEXANDER R. TRAIN, B.S. HISTORY, SUFFOLK UNIVERSITY

M.R.P., UNIVERSITY OF MASSACHUSETTS AMHERST

DIRECTED BY: PROFESSOR JOHN MULLIN

This research puts forth an examination of the relationship between municipal planning and short line freight railroads. Methodologically, it employs a content analysis framework that explores local master plans and zoning bylaws for the presence of concepts relevant to short line railroads. A historically omitted topic, the railroads are found to be frequently omitted from plans, often conflicting with civic and recreational interests despite their increasingly efficient ability, economic and environmental, to service numerous industries. Zoning bylaws show a disfavor to these entities, and at times may exceed their authority. Moreover, they may create physical and legal limitations to new, rail-sustained industry, as well as the rehabilitation of former industrial clusters. Findings related to regulatory preemption, transportation and land use policy, corridor conversion, and shifting land use patterns are presented. Consequentially, daunting implications may resonate for both the railroad and municipalities. Recommendations encompass municipal, regional, and state policy, as well as opportunities for multi-agency collaboration, economic development initiatives, and revised regulatory structures.

## TABLE OF CONTENTS

	PAGE
ACKNOWLEDGEMENTS.....	iv
ABSTRACT.....	v
LIST OF TABLES.....	ix
LIST OF FIGURES.....	x
CHAPTER	
1. INTRODUCTION.....	1
2. LITERATURE REVIEW .....	5
Regional Development Theory .....	5
Freight Rail and Planning Theory .....	7
Freight Rail and Contemporary Planning.....	11
Physical Planning.....	11
Planning Practice & Policy.....	12
Smart Growth & Development .....	13
Environmental Externalities.....	14
Social and Community Factors.....	16
The Economic Impact of Short Line Rail .....	18
Corridor Preservation .....	20
Short Line Railroad Regulatory Structure .....	21
Conclusion.....	23
3. RESEARCH QUESTIONS.....	24
4. DATA COLLECTION AND METHODOLOGY.....	25

Methods: Content Analysis.....	28
Research Area and Inventory.....	31
Freight Rail and Land Use in Massachusetts.....	32
Bay Colony Railroad .....	34
Graton and Upon Railroad .....	38
Mass Central Railroad .....	43
Pioneer Valley Railroad .....	47
Housatonic Railroad.....	51
Mass Coastal Railroad .....	53
5. FINDINGS.....	55
Master Plan Findings.....	55
Zoning Bylaw Findings.....	59
Conclusion.....	65
6. BEST PRACTICES .....	69
Baltimore Maritime Industrial District: Preferential Zoning.....	69
Layton City, Utah Industrial/ Manufacturing District: Performance Zoning.....	70
Atlanta Regional Commission Regional Freight Mobility Plan (2008) .....	71
Fredrick County, Metropolitan Washington Council of Governments (2009).....	72
Chicago Industrial Corridor Tax Increment Financing Districts: Multiple Locations (1999) .....	73
Vancouver, Washington (2006-2011) BNSF Rail Yard Expansion .....	73
City of Holyoke and Pioneer Valley Railroad: Public-Private Partnership for Economic Development .....	75
State of Florida: Integrated Freight Planning.....	77



Mid-America Freight Coalition: Interstate, Multi-Agency Collaboration.....	78
Maine Department of Transportation: Regional Freight Planning and Public-Private Sector Outreach .....	79
7. RECOMMENDATIONS & NEXT STEPS .....	81
8. CONCLUSION .....	85
BIBLIOGRAPHY .....	86

## LIST OF TABLES

	PAGE
Table 1: Bay Colony Railroad Inventory.....	34
Table 2: Grafton and Upton Railroad Inventory.....	38
Table 3: Mass Central Railroad Inventory.....	43
Table 4: Pioneer Valley Railroad Inventory.....	47
Table 5: Housatonic Railroad Inventory.....	51
Table 6: Mass Coastal Railroad Inventory.....	53

## LIST OF FIGURES

	PAGE
Figure 1: National Freight Network Map.....	3
Figure 2: Bay Colony Railroad Map.....	34
Figure 3: Bay Colony Railroad Millis Yard, Millis, MA.....	36
Figure 4: Bay Colony Railroad Main Line.....	37
Figure 5: Grafton & Upton Railroad Map.....	38
Figure 6: Grafton & Upton Railroad's Repaired Line, Hopedale, MA.....	40
Figure 7: Grafton & Upton Railroad Yard, Propane Transload Facility, Hopedale, MA.....	41
Figure 8: Grafton & Upton Railroad's Main Yard, Propane Storage, Grafton, MA.....	42
Figure 9: Mass Central Railroad Map.....	43
Figure 10: Mass Central Railroad Right of Way.....	45

Figure 11: Mass Central Railroad Transload Facility, Ware, MA.....	46
Figure 12: Pioneer Valley Railroad Map.....	47
Figure 13: Pioneer Valley Railroad Propane Transload Facility, Westfield, MA.....	49
Figure 14: Pioneer Valley Railroad End of Line Storage, Southampton, MA.....	50
Figure 15: Housatonic Railroad Map.....	51
Figure 16: Mass Coastal Railroad Map.....	53
Figure 17: Grafton Zoning Map.....	63

# CHAPTER 1

## INTRODUCTION

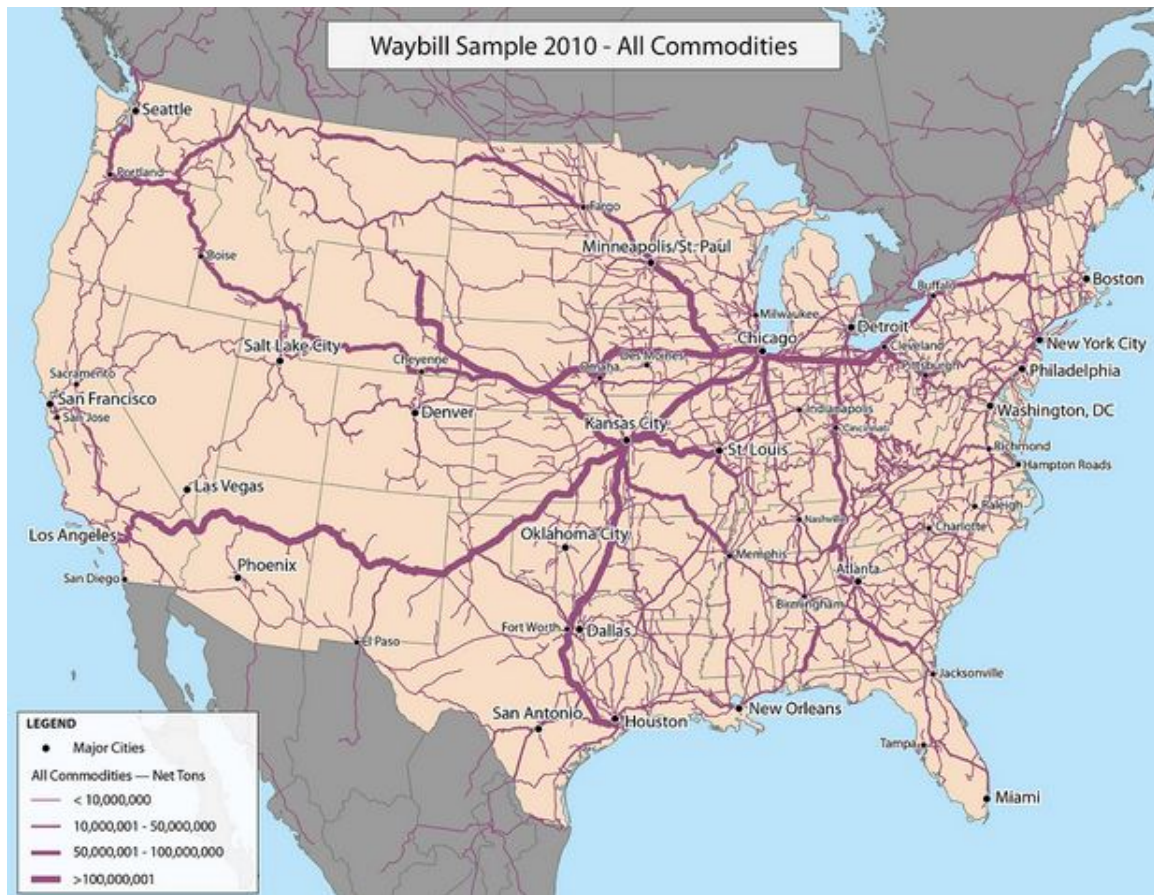
The purpose of this research is to investigate how municipal planning approaches short line railroads in Massachusetts. Prior to arriving in Massachusetts, foreign and domestic freight is transported through a web of lines and routes that compose our domestic logistics network. Commodities and products are moved, often in the mental shadows of citizens, with little fanfare over a system where the last stretch of the trip, beginning and end, is handled by small local railroads. Short line railroads, operating on small lines that directly service customers and freight terminals, are many industries' competitive connection to the logistic network (Sternberg, 2006). Short lines are generally either small businesses or the subsidiary of a corporate holding company that reveal direct economic development impacts that reverberate throughout the regional economy through which they operate (Zink, 1984). Moreover, transport by the rail network yields significant positive environmental benefits related to emissions, traffic congestion, and general fuel efficiency (Bickford et al., 2013; EPA, 2010; Fachanah & Horvanth, 2002). A vital transport mode, it is often overlooked in planning and policy, evident by the scarcity of literature on the topic. However, there are contemporary scenes involving the railroad unfolding regularly in our communities that deserve critical attention.

Freight rail, however, is often overlooked in urban planning, public policy, and government administration literature, an absence personified throughout this research. In most cases, the railroad's operations and infrastructure are omitted from town plans, with the exception of opportunities for recreational trail conversion. The findings discuss the

discrepancies in local land planning activity and regulation. Broadly, the need for collaborative transportation and land use planning, crafted regionally, is highlighted.

### **Current Short Line Industry**

The U.S. freight rail network is comprised of a myriad of carriers that serve specialized industry, ports, and terminals throughout the country. Comprised of over 140,000 miles of track, the network is a \$60 billion industry that handles bulk materials, such as grain and coal, as well as consumer goods en route to the marketplace. Operations of varying sizes are categorized as Class I, Class II, and Class III railroads. There are seven Class I railroads, which are defined as railroads with minimum annual revenues of \$433 million. Class II companies are defined as regional railroads that operate at least 350 miles of track while maintaining annual revenues between \$40 million and \$433 million. Class III railroads, with revenues less than \$40 million, are referred to as 'short line' railroads and operate on small branch lines and rail terminals (Federal Railroad Administration, 2013).



**Figure 1: National Freight Rail Network by Net Commodity Tons of Cargo Transmitted in 2010**

(source: FRA, 2014. <http://fra.dot.gov>)

Currently, there are 550 short line railroads operating over 50,000 miles of track in the United States. These companies, often classified as small businesses, operate on lines that were discarded by larger Class I and Class II companies following industry deregulation in the 1980s. As linkages to the international logistics network, short lines directly serve customers by providing interchanges with their larger counterparts. Combined, the short line industry employs 20,000 workers while hauling over 14 million carloads annually, often in competition with freight trucking industries. Primarily, these short lines haul coal, chemicals, wood, food and agricultural products, and other commodities along with intermodal shipments of consumer

goods (American Short Line and Regional Railroad Association, 2007). It is important to note that short line railroads have existed for only a short time, their inception the result of larger carriers shedding underperforming local lines during the era of deregulation, precipitated by the Staggers Rail Act of 1980. The Staggers Rail Act, a piece of federal legislation, substantially deregulated the railroad market, allowing companies to easily discard unprofitable lines that were depreciative to their business model. It also allowed companies autonomy in setting shipping rates (up until this point, railroads were regulated similar to how contemporary public utilities are regulated). As a result, small companies formed to purchase and operate these segments (Babcock, 1983).



## CHAPTER 2

### LITERATURE REVIEW

#### **Regional Development Theory**

Transportation infrastructure acts as a vital component for regional vitality and economic development. Multi-modal routes are arteries, constantly optimized and reimagined, that facilitate the exportation necessary to support a strong economy. This is depicted through numerous bodies of theory that are continuously refined, anchoring large-scale development projects to neighborhood plans.

Fundamentally, infrastructure is a subtle component to economic base theory- a key facet that allows local firms access to exogenous marketplaces, necessary for economic survival and prosperity. Locally produced goods relayed to neighboring regions and countries return with capital, traveling over a dynamic infrastructure network (Leigh & Blakely, 2012; Schaffer, 1999).

Isard (1956) augments the foundation of economic base theory, arguing that there is a spatial variable often ignored in contemporary economics related to transportation capabilities and costs— an evergreen theory that, despite its age, still invokes thought. Neglecting this variable leads economies away from their optimized state. This materializes as distance-inputs, or transport costs, another determinant of location. Firms that are input-oriented require manageable distance inputs when shipping from the source of production (and extraction in the case of some commodities) to the marketplace. These can be low cost modes, efficient multi-modal solutions for time sensitive cargo, or subsidized infrastructure networks. Conversely, firms that are output oriented and received shipped goods and ship their finished goods to the

marketplace, are also heavily contingent upon these distance-costs. For underdeveloped or growing areas, a change in a linkage, an introduction of a new transportation option or a reduction of costs in a preexisting mode, would have circulative effects, radiating throughout the local economy as more and more transit dependent businesses saw cost reductions. For example, the introduction of improved highway infrastructure, which would allow heavier trucks to travel over the roadway, would allow towns and businesses along that highway an improved shipping method. Now, trucks can carry more cargo in one trip, eliminating the fuel and labor costs that additional trips would result in. Before this, multiple light-weight trips were required due to the poor infrastructure conditions. These cost savings, hypothetically, would cycle throughout the local economy and make the location a more attractive destination for firms that produce tangible goods.

Contrarily, deficiencies in a linkage can arguably emanate inefficiencies (in the form of higher costs for multi-modal shipments or increased shipping time) clear enough to dissuade firms from moving to a specific area (Myrdal, 1957). A multitude of spatial factors influence this decision-making process, including suitable infrastructure and other nominal variables, such as quality of life (Myrdal, 1957, 140-155). Smaller communities can compete with larger urban markets through the establishment of efficient and cost-effective linkages (Leigh & Blakley, 2013, pp. 84-85). Myrdal extrapolated that an economy will struggle, unless competent infrastructure was established to persuade firms to migrate to a developing region (Myrdal, 1957). When a viable transportation connection that can handle imports and exports exist, efficiencies can be furthered through the creation of industrial clusters. This allows for the formation of a critical mass that allows businesses to afford resources and import/export in larger volumes, subsequently reducing costs, which would be unattainable individually (Porter,

1997). Logistics centers, which pool and ship goods from a number of manufacturers in close proximity, often complement these clusters and can be found within them, if physical goods are being produced. By enabling participants to achieve an ideal import-export volume through collaboration, cost savings can be realized (Rodrigue & Notteboom, 2008).

Financing infrastructure that allows the economic engine to run continues as a contemporary political debate. However, the seminal work of Aschauer (1989) provides empirical evidence that public investment in infrastructure catalyzes economic development. Ashauer concludes that for every one dollar of public capital investment in infrastructure, sixty cents of additional economic output would occur. Based off of the analysis of time-series data, these findings illuminates the financial power infrastructure investment plays in a region's ability to sustain industry and provide a complimentary quality of life (Ashauer, 1989). A handful of studies have since been published that encompass a variety of parametric estimates of the monetary return extracted from infrastructure investment, such as Munell (1990) Lynde (1992), that support the hypothesis initially posited by Aschauer (1989).

### **Freight Rail and Planning Theory**

Perhaps most notably, urban theorist Lewis Mumford perceived railroads, vehicles of industrialization, as damaging to the city. Indeed, railroads transformed the rate and type of development, building typologies, circulation patterns, and socioeconomic state of cities throughout the country.

This broad critique was echoed throughout his work, notably commencing with *Technics and Civilization* (1934). In this text, Mumford envisaged cities reaching a "terminal

point,” caused by the ecological and social damage spawned by the conversion of urban areas to railroad yards and industrial facilities (Mumford, 1934). Railroads, along with mines and factories, would rupture the veins of the city. One need not look any further than the misguided public works projects undertaken throughout the U.S. in the 1960s to see a contemporary example of what Mumford presaged. In *The City in History* (1961), Mumford decried the development of modern transportation systems, interstates and railroads, approaching them as part of the rapid capitalist industrialization that will corrode the human agency and social fabric organically present in cities (Mumford, 1961). Railroads, along with interstate highways, were the topic of Mumford’s sable reflection; planners who audaciously converted large parcels of urban land to railroad yards, harming the urban fabric of the city, were repeating these failures when developing the interstate (Mumford, 1968, 361-363).

The development of the railroad did alter the spatial, economic, and social structures of cities throughout the United States. Railroads possessed low marginal costs and high fixed costs; the inverse true for vehicular travel. This boded positively for urban areas and their economies (Clark, 1957). This transformation is vividly illustrated in William Cronan’s *Natures Metropolis* (1991). Chicago, Cronan explains, was initially heralded as an industrial mecca due to the presence of water transport. Soon, though, the advent of railroads dwarfed river transport. Chicago developed an extensive railroad network that altered its landscape and economy.

Rail networks in Chicago were topographically direct— as direct of a line between two points as possible— that were not inhibited by climactic factors or geography; transport liberation (Cronan, 1991, pp. 62-74). Railroads offered reduced travel time, bringing city and rural areas together in a way that reduced the barriers of market entry for merchants (due to

their competitive rates) while allowing new industrial opportunities to materialize (Cronan, 1991, pp. 325).

The lumber market's exponential growth in Chicago exemplifies this. The supply of raw lumber could be quickly and cheaply imported into Chicago for processing. This transformed land formerly unsuitable for use into productive and fiscally beneficial development (Cronan, 1991, pp. 169-183).

Such marked and preeminent changes to the American landscape, fueled by the railroad, were not limited to Chicago. The eras of Progressivism (1890-1920) saw industry, and the subsequent (and contentious) revisions to the urban form, captivate cities and their politicians. Cities of all scales and sizes were not spared. For example, Jonnes (2008) touches on how the technological advances of the railroad provided people and industry unimpeded access to the city of Manhattan, resulting in enormous growth (Jonnes, 2008). Smaller American cities were also transformed indelibly. Railroad planners cleared slums, under the auspices and direction of business leaders, in Cincinnati. The Reformist language of business interests during the Progressive Era often cloaked the private interest in redesigning cities for the railroad (Hahn, 2004).

As planners and business leaders became inseparable, private railroad companies redefined the economic function of the city and the use of urban space. Between 1828 and 1840, track was laid throughout the main thoroughfares of Baltimore, one of smaller cities where this was prevalent. A stark juxtaposition to Manhattan, the railroad undoubtedly changed the patterns of circulation and connectivity of the city as it redesigned enormous swaths of land with little regard for surrounding homes, parks, and public buildings, areas often immersed in

poverty and home to immigrant communities. This created a debate, between traditionalists and progressives, relating to how the city should be used and designed (Schley, 2013).

How were these drastic alterations possible? Politics, more specifically, the acumen of the political machines that operated throughout the U.S. but are perhaps most simply exemplified through the case of Milwaukee at the turn of the century. In Milwaukee, railroad companies were prosperous, channeling a sizeable amount of their gains into refining their local diplomatic skills, political capital, and involvement with civic operations. This was vividly present when they lobbied government for the favorable inclusion of their networks and real estate into master plans. Ostentatious and shrewd, the companies amassed and then used their power throughout the highest levels of government, much to the dismay to the municipalities and people on the ground who were indisputably affected by these decisions. This led to the adoption of Home Rule by municipalities. While this presented an opportunity for planners to exercise diligence in planning rail activity in the city, it was too little, too late, as the railroads were already giants during the turn of the 19<sup>th</sup> century (Moore, 2013).

As transportation technology evolved, railroads maintained an advantage over road transport in densely populated urban areas. Spatial and economic patterns were entwined to this technology, as cities were dependant on their transportation systems. Clark (1957) argued that this dependence, if left unchecked, could be harmful. As transportation technology evolved and the road vehicle rose to prominence, density would decrease, thus revealing sprawl. This scattered spatial pattern and population exodus, triggered by the adopting of cars and trucks, would lead to the decline of principle industrial centers (Clark, 1957).

*“Transport has done its work all too well”*

Known as the Clarkian Paradox, how should planners respond when transportation technology and adoption begins negatively affecting cities? Weber (1963) proposed that planners pragmatically work with spatial patterns by establishing “green belts.” These rural growth boundaries, augmented with attention to intra-city transport options such as rail, would hypothetically restore the healthy density gradient of past epochs. The unique commodity, Weber (1963) argued, possessed by cities is their ability to maintain and develop transportation systems that lowered costs by concentrating demand. This concept remains paramount to attracting business to urban centers (Weber, 1963).

Hall (1994) furthers the work of Weber (1963). The fundamental resolve, he argues, rests in the fact that transportation and land use policy are often divorced endeavors. By combining them, transportation options, such as rail, could be maximized in an environmentally and economically sustainable way (Hall, 1994).

### **Freight Rail and Contemporary Planning**

#### **Physical Planning**

Railroad operations, whether Class I or Class III, create spatial patterns of development and economic activity that respond to topography and land use regulations. A perennial and ironic dichotomy exists – how can the planner respond to the challenge of integrating, instead of ostracizing, the railroad into the fabric of urban areas where congestion is familiar and the land scarcity has yielded high densities. Ironically, it was the freight railroad that was responsible for the boom of cities, such as Chicago, during their fledgling eras by offering industries related to

manufacturing and natural resources a tremendously quick and affordable shipping method (Mayer, 1946). Following the introduction, the author illuminates a seemingly perennial hardship; how the planner can respond to the challenge of integrating, instead of ostracizing, the railroad in an urban area where congestion is familiar and the familiarity often douses the planner with pressure. The irony in this dichotomy, Mayer states, is that freight railroads were directly responsible for the development of cities, such as Chicago and Boston, back during their fledgling eras (Mayer, 1946).

### **Planning Practice & Policy**

Topography and land use patterns, often radial and extending from an urban core, that are present in economic centers with railroads dictate how their networks are formed and where their facilities are placed (Mayer, 1946). Yet, there is a scarcity of planning and development literature relating to how the public sector can plan and influence the design of these networks. According to a British study that surveyed 448 planning organizations, 57.2% had freight rail referred to in their strategic plans. Furthermore, only 30% had general policies in place to ensure the preservation of industrial sites with freight rail connections. This was in response to the conversion of an increasing amount of industrial land adjacent to freight corridors that had once received service. Amongst these findings, 50% of the planners surveyed believed current policy pertaining to freight rail to be poor and insufficient. Derelict land, once composed of productive industry, was victim to conversion to other uses, despite the spatial proximity to a value-added asset. Additionally, the study illuminated the lack of liaison between planners and the freight rail industry (Haywood, 2000).



Throughout the field of planning, there is arguably no methodology to analyze, assess, and plan with regards to freight rail. Sustainability and industrial development are contingent upon planners establishing a framework for analysis. However, awareness of the need for a strategy is growing, especially in urban areas, as partnerships are formed between logistics companies, railroads, and transportation authorities. This is a result of increased volumes drastically stressing transport systems as a result of untethered demand (Lindholm & Behrends, 2012). As a city grows, its population consumes more and more— at some point, rationally, the capacity of the existing network that these goods travel over will reach capacity, break down, or become technologically obsolete without adequate investment and attentive policy. Planners and policy makers make transportation funding decisions for public transportation and roadways which, in contrast to rail corridors, are financed with public funds (Due, Sibhu 1974). Utilizing rail for freight transport reduces the damage local arterials face when inhabited by heavy trucks (Gibby et al., 1990), highlighting the need for a cost-benefit analytical approach to fund both modes as the benefit brought forth by freight rail to local infrastructure may be significant enough to warrant public investment.

### **Smart Growth & Development**

With smart growth principles proposing the development of land with a plethora of non-industrial uses, there is a need for balance and the preservation of industrial land and assets. This, however, is not unfolding in the field of planning. (Leigh & Hoelzel, 2012). However, with the objective of sustainability signaling the dissolution of an era marked by an unequivocal amount of resources dedicated to the interstate highway system, freight rail has reemerged as a focal point. Rail is a competitive alternative to trucking, especially for long-haul transport. For the consumer, rail rates have decreased 44% between 1981-2012 (AAR, 2013). Moreover, with

the regionalization of the United States, as argued by Margaret Dewar in *Planning for Mega-Regions*, there is a need for the planning of logistic routes in a strategic manner. Linkages between and within regions delineate potential corridors to catalyze growth. Much of the freight data necessary to plan corridors, though, is proprietary and unavailable to the public (Dewar, Epstein, 2007).

### **Environmental Externalities**

Although freight rail as a broad system is thoroughly assessed in the environmental sciences, there has been but few studies conducted where short line rail is segregated and analyzed solely. Rail, though, is often the most environmentally beneficial mode of transit for freight. Trucks, a preferred freight shipping method, contribute to highway congestion at a rate of twice that of cars with air quality and local circulation patterns suffering as a result (Ostria, 2010). Bypassing trucking by shipping by freight rail, or utilizing an intermodal approach, is an opportunity to reduce these detrimental externalities (AASHTO, 2003). Intermodal shipping, increasingly popular, is perceived as an option that benefits both the environment and traffic congestion, as well as satisfies the “last-mile” of shipping, where trucks are used in the absence of a direct rail connection, to shippers (Handman, 2002). Seen from this vantage point, rail becomes a logic choice for transporting freight. The detriment to shippers, though, remains the inferiority of rail for shipping time-sensitive cargo; trucks are simply much quicker (Winebrake et al., 2008).

A strong body of research envelops the rail and trucking industries on the topic of emissions. The onset of the possibility of peak oil, coupled with heightened environmental cognizance of the need for sustainability, has led to the need for innovative policy, anchored by

fuel consumption and alternative fuels, which will pragmatically alter our current transportation models (Frankel & Menzies, 2012). In an analysis of modal air pollutants, rail scored better in all pollutant categories than road (Fachana & Horvanth, 2007). In the Midwestern United States, a study was conducted on modal shifts from truck to rail. Shifting to just intermodal transport, with trucking remaining a transport pillar, led to a 31% reduction of [the monthly mean of] CO<sub>2</sub> emissions and 28% reduction of NO<sub>2</sub> emissions (Bickford et al., 2013).

According to the EPA, freight rail can move one ton of freight 480 miles on one gallon of diesel fuel. This fuel efficiency has increased 94% since 1980 with trains becoming two to four times more fuel efficient than trucks on a ton-mile basis. Furthermore, freight rail emits one-third of the greenhouse gasses responsible for environmental depletion when compared to trucking on a ton-mile basis (EPA, 2010). Utilizing an alternative shipping configuration, with trucking in place of short line rail, would by-pass the rail network and its energy-efficiency (Gordon, 1991). The literature pertaining to short lines, though, is rare, beyond Gordon's statement. The majority of literature regarding air emissions envelops all freight-rail, long-haul and short line. Additionally, over 20 years has lapsed since Gordon's publication. Those years have revealed drastic improvements in emission technology (EPA, 2010).

As the number of Class I carriers has diminished due to consolidation efforts, the population of short line carriers has grown. In 1985, 480 short line carriers were operating in the shadow of the Staggers Rail Act, which deregulated the industry and allowed for larger carriers to shed underperforming lines, many which were purchased by newly-formed short line companies. As of 2004, 549 short line carriers were operating in the United States (Sternberg, 2006). Short line routes that supplement the larger Class I & II carriers collectively operate vital

linkages for shippers to the national logistic network. In regional hubs, this modal composition consists of short lines overseeing periphery lines and yards which form “outer gateways.” Large Class I carriers bring cars into a region, placing them in a main freight yard. From there, the cars are taken by short line carriers down local lines and out to smaller yards, sometimes in isolated areas, eventually arriving at their destination. These “outer gateways” are essential and often sustain industry that requires the high-volume and low-cost movement of goods and commodities that wouldn’t otherwise have access to rail given their geographic distance from larger Class I service (Mayer, 1954).

### **Social and Community Factors**

Community opposition to freight rail often materializes due to the negative perception that embodies freight yards, terminals, and other industrial developments. Known in the planning field as locally unwanted land uses (LULUs), these uses are often viewed as disruptive to the community’s quality of life (Shively, 2007). LULUs are generally larger operations that lead to the spatial concentration of negative impacts (Bryson, 1991).

Opponents to freight rail, often referred to as NIMBYs (not in my back yard), find freight operations to be degrading to their community character. This “NIMBY Syndrome” translates into local action, often in the form of political opposition in public forums such as town meetings. While embodied in controversy and with a negative connotation, the concept of NIMBYism places property values, hazardous materials, civic character, environmental and public health, and safety at the forefront, as these are all seen as risks. Driven by the possibilities of exposure to these risks, local opponents of projects have varying success at disrupting them (McClymont & O’Hare, 2008).

Rail, often stigmatized as disruptive and polluting due to past industrial practices, when a lack of regulation, flawed technology, and general negligence often led to improper waste disposal and air pollution, also encounters resistance from the public. From a practitioner's perspective, one must carefully chart a path towards equilibrium between mitigating the concerns of resident stakeholders and partnering with the private corporations which operate the railroads (Sternberg, 2006). Stakeholders are frequently apprehensive of the railroad, as it is "foreign" in nature and not from their community (Cidell, 2011). Moreover, there is belief that rail companies conduct business in a quiet, under-the-radar manner that sidelines civic concern (Marcum, 2011).

Security concerns also permeate from the railroad. The events of 9/11 unfolded precipitously for railroads, who responded by developing attentive security measures to prevent attacks on their infrastructure, aided by the U.S. government who saw the fortification of these networks as imperative for strategic national defense (Johnston & Plant, 2008). Approximately 140 million tons of hazardous cargo is transported on the U.S. rail network annually. This is an unfamiliar and murky reality that has not been extensively researched by academia (Verma, 2009). Potentially harmful materials, such as oil and chemicals, are transported in relative secrecy as the railroad is not obligated to declare the movement of such cargo to the municipalities through which it operates, although many railroads voluntarily do (Johnson, 2005). As rail-related accidents involving hazardous cargo are statistically more detrimental to the victimized population when compared to other modal accidents (Erkut, 2007), dense urban centers, such as Washington D.C., have pursued legislation to prohibit these movements within their boundaries, although this action has arguably preempted federal regulation (Johnson, 2005). Within the past decade, rail related accidents have occurred and subsequently captivated

the media. In 2014, an oil train derailed outside of Quebec . Cloaked in the night, the bucolic town center was ravaged and the explosion claimed 47 casualties, thus exacerbating the national anxiety involving shipments of cargo by rail (Cosh, 2014).

### **The Economic Impact of Short Line Rail**

More often than not, short line operations are small businesses that are family owned by those familiar with the local economy, although there is no percentage cited (Allen et al., 2002). These operations develop relationships with local industry which allow for tailored pricing and other personal advantages. Sustenance for short lines reveals itself in the diverse commodity structure of their haulage. Serving a multitude of customers with a variety of freight types (auto, packaged goods, perishables, etc.) in their hauls leads to a positive economic impact through employment, business and industrial activity(Zink, 1984).

Few short line railroads possess the capital necessary for the creation of optimal infrastructure and business operations. This is countered with the notion that these companies provide a vital linkage to a national logistic network that shippers would face increased hardship accessing (or forfeit all-together) without a rail connection (Sternberg, 2006). Independent of subsidies and public assistance, the success of these facilities depends on traffic density of shippers, low overhead costs, and the volume of traffic shipped by railroads top-ranking commodity customers. When disruptions occur, short lines often fall under financial duress. Often, small railroads are forced to dangle onto one large customer who becomes a determinant of their existence (Prater & Babcock, 1988). Moreover, a short line's ability to connect with a Class I railroad to interchange traffic is vital to their success. These strategic connections rank as the top concerns for short line owners (Landry & Ozment, 2002).

The economic impact of the railroad can be measured qualitatively and quantitatively. Short lines can foster the personalized business relationship, allowing for tailored services. Business relationships are formed between entrepreneurial community members and the railroad that transcend the normative contracts and service offered by larger corporations. As a result, the professional services offered by short line rail companies can be personally tailored to the needs of local businesses. These relationships simultaneously act as a marketing vehicle for the railroad, as the relationships can be referred to and noticed throughout the community. Moreover, these short line companies may be more proactive in community-based business matters. (Zink, 1984).

Maintaining an active short line railroad operation directly sustains employment through railroad workers and related technical service industries, such as engineering and construction (Zink, 1984). The economic effects of abandonment, a counterfactual that exposes the employment impacts of existing lines, unveil a fluctuating argument over the true impact short lines have on employment (Fesser, Cassidy 1993). Fesser & Cassidy (1996), Fruin (1992), and Allen & Due (1977) present arguments that a halt in short line operations would have few negative economic impacts beyond direct employment. Indirect employment on industries that utilize or serve rail would be negligible, as transportation needs would be compensated with truck transport, although this research preceded domestic attention to future environmental and economic climates (Fruin, 1992), (Allen, Due, 1997). Fesser & Cassidy (1996) offer a critique of this claim. Within it, they state that practitioners and scholars encounter difficulty in extrapolating how private businesses along the line (shippers) will be affected and subsequently act in the case of a loss of operations. For shippers, the price for rail is competitive with that of

truck, despite the encumbrance of additional infrastructure expenditures rail companies commit that trucking companies elide, as trucking uses public roads (Gibby, Kitamura, Zhao, 1990).

### **Corridor Preservation**

Dwindling short line business and political forces can lead to a cease of railroad operations and line abandonment. Abandonment can result in damaging economic impacts that take form in property devaluation, lack of rail access for current and future industry, and an increased dependency on freight trucking; all which erode the state and municipal tax base (Honeyman et al., 1996). The Surface Transportation Board's (STB) abandonment process legally requires the current owner to present data that accurately depicts a lack of economic viability on the line. As this occurs, the STB assesses the line in order to determine if a subsidy is necessary to operate the line with a "reasonable return of value" or if the line should be abandoned (STB, 1997). This process unfolds to encourage right-of-way preservation with numerous legal opportunities to do so. There are multiple opportunities for input from stakeholders, including community groups. (Southern & Cosenza, 2011).

These stakeholders often take the form of advocacy groups lobbying for corridor preservation for recreational trails. This process, often referred to as "rail banking," often transfers ownership from the railroad to another party, an advocacy group or state agency. While this does indeed preserve the corridors, the infrastructure is obviously disposed of in order to allow for recreational uses. More times than not, these corridors do not see future rail service as the resistance, the rails to trails advocacy groups, staunchly oppose a resumption of service. Due to this, there is support for sustaining underperforming lines through state subsidies (Miller & Stich, 2011). More recently, in *Marvin M. Brandt Revocable Trust v. United*



*States 2014* the Supreme Court ruled 8-1 that the legal right-of-way easement possessed by the railroad is terminated once railroad operations cease. Some railroad right-of-way is over property not owned by the railroad, but an easement exists for passage over that property. For the rails-to-trails advocates, this reveals a seemingly insurmountable objection. There is no legal easement without railroad operations, meaning recreational trails over rights-of-way constructed on a foundation of private property easements are actually illegal.

Retaining railroad operations along these corridors, though, continues to be the objective of many states, such as Massachusetts, which highlights this objective in their 2009 State Rail Plan and State Freight Rail Plan (MassDOT, 2010c; MassDOT 2010d). In the instances when a state agency purchases, or subsidizes a line, a short line railroad often operates over it. This ensures rail access and an intermodal freight option, amongst the other economic and environmental benefits, for a region (Fesser & Cassidy 1996).

### **Short Line Railroad Regulatory Structure**

While the federal government regulates all railroad activity, much of this activity is of interest to state and municipal regulatory bodies. State laws, although valid, cannot take precedence over those already established by the federal government. Simply, they are secondary, as stated in the U.S. Constitution's Supremacy Clause (U.S. const. art. VI, cl. 2). Legally, federal law states that rail carriers maintain exemption from state and local laws that preempt federal statutes (49 U.S.C. 10501(b)). The STB clarifies this law:

#### ***1. Section 10501(b)***

- *Gives Board exclusive jurisdiction over "transportation by rail carriers" and expressly preempts any state law remedies with respect to rail transportation; ICA defines "transportation" broadly to include all of the related facilities and activities that are part of rail transportation (section*

10102(9))

## **2. Reach of the Section 10501(b) Preemption**

- Statute not limited to “economic” regulation (*City of Auburn v. United States*, 154 F.3d 1025 (9th Cir. 1998))

- While most state and local laws are preempted, overlapping federal statutes (including environmental statutes) are to be harmonized, with each statute given effect to the extent possible (*Tyrrell v. Norfolk Southern Ry.*, 248 F.3d 517 (6th Cir. 2001))

- Two types of state and local actions are categorically preempted:

(1) any form of state and local preclearance or permitting that, by its nature, could be used to deny or defeat the railroad’s ability to conduct its operations (*City of Auburn v. United States*, 154 F.3d 1025 (9th Cir. 1998) (environmental and land use permitting categorically preempted); *Green Mountain R.R. v. State of Vermont*, 404 F.3d 638 (2d Cir. 2005) (preconstruction permitting of transload facility necessarily preempted by section 10501(b)) and

(2) state or local regulation of matters directly regulated by the Board (*CSXT Transportation, Inc.-Pet. For Decl. Order*, STB Finance Docket No. 34662 (STB served March 14, 2005))

- Preemption applies to proposals to build or acquire ancillary facilities that assist a railroad in providing its existing service, even though the Board lacks licensing authority over the projects

i. *Nicholson v. ICC*, 711 F.2d 364 (D.C. Cir. 1983)

ii. *Borough of Riverdale* □ Pet. for Decl. Order □ *The New York Susquehanna & Western Ry.*, STB Finance Docket No. 33466 (STB served Sept. 10, 1999, and Feb. 27, 2001)

iii. *Flynn v. Burlington N. Santa Fe. Corp.*, 98 F. Supp.2d 1186 (E.D. Wash. 2000)

iv. *Friends of the Aquifer et al.*, STB Finance Docket No. 33396 (STB served Aug. 15, 2001)

- No preemption where the operation does not constitute transportation by a rail carrier

*Grafton and Upton R.R. v. Town of Milford*, Civ. No. 03-40291 (D. Mass. Feb. 14, 2006); *Town of Milford, MA-Pet. For Decl. Order*, STB Finance Docket No. 34444 (STB served Aug. 12, 2004) (no preemption for planned steel

*fabrication facilities that are not part of “transportation”)*

(STB, 2005)

Historically, court cases such as (*English v. General Elec. Co.*, 496 U.S. 72 1990), (*Rice v. Santa Fe Elevator Corp.*, 331 U.S. 218), and (*Pacific Gas & Elec. Co. v. State Energy Resources Conservation and Development Comm’n*, 461 U.S. 190, 1983) have established that state law can coexist with federal law, but cannot surmount it. Furthermore, under U.S.C. 10501(b),

*“The Board has exclusive jurisdiction over rail transportation including ‘the construction, acquisition, operation, abandonment, or discontinuance of spur, industrial, team, switching, or side tracks or facilities, even if the tracks are located, or intended to be located entirely in one state (Surface Transportation Board, 2001a, pp. 883).”*

According to the the STB, any facility integral to the interstate transport of goods on rail (such as logistics terminals, rail yards, and maintenance facilities) are regulated by the federal government, leaving states with little power (Slaughter, 2005). For example, a railroad expanding their auto terminal would not be subject to municipal zoning and land use bylaws that would traditionally govern property owners (*Boston and Maine Corporation v. Town of Ayer*)(Surface Transportation Board, 2001b)

## **Conclusion**

From the literature, one can make numerous deductions regarding freight rail, specifically short lines, and planning. First, the popularity of rail has been overshadowed by our nation’s dependence on the interstate highway system for moving goods throughout the logistic system. With the onset of environmental cognizance, matched with increasingly unstable fuel prices, rail has become a viable alternative for industry. Second, local short line operations are

cemented as connections to the national rail logistics network. These linkages are assets often discarded in favor of preservation via-recreational trails. Third, there is a glaring lack of research that addresses methods of planning for freight rail. This is especially true for current studies on how to capitalize on freight rail as a tool for economic development.

## CHAPTER 3

### RESEARCH QUESTIONS

While there is state policy that advocates on behalf of short line railroads, the literature is surprisingly absent of methods that practitioners can follow in regards to land use planning and community engagement relevant to freight railroads. This is evident in the bibliography of this research— there are only four pieces of current literature. Given that there is little attention paid to this topic in the planning field, this research seeks to evaluate how freight railroads and municipalities interact. Moreover, this research catalogues and analyzes municipal policies in order to understand if short line freight railroads are integrated, leveraged, and used in the planning and economic development process. This research answers the following questions:

- 1.) Do municipalities integrate, refer to, or incorporate the short line railroads into their master plans?
- 2.) How does the implementation of land use policy, through the vehicle of zoning, relate to short line railroads?
- 3.) Are the state policy concerns of industrial land use preservation reflected “on the ground?”

## CHAPTER 4

### DATA COLLECTION AND METHODOLOGY

To investigate these research questions, documents are collected and categorized for analysis. These include municipal master plans, which guide local land use, infrastructure, and community planning activity, as well as zoning bylaws, the mechanisms used to administer land use policy. Broadly, master plans and zoning bylaws are indistinguishable from municipality to municipality. Only when carefully examined do the minor details, requirements, and objectives appear.

This research organizes documents according to which town they originated from. These towns are grouped by short line railroad. All documents referenced in this research were acquired from websites and/or databases kept by municipalities. Confidently, this can be done quite exhaustively and capture the necessary data with only minor omissions and gaps.

Municipalities' steady adoption of interactive websites embody the function of a visit to Town Hall and support public involvement. Conversely, some municipal websites maintain a user interface that entangles the visitor, eliciting frustration from the lack of basic upkeep (Scott, 2006). Municipal websites have benefited planning, though, by archiving and presenting crucial public documents on an accessible forum. Still, though, some municipalities do not update these documents, such as public meeting minutes, arguably a disservice to the public and the field of planning (Evans-Cowley & Conroy, 2010). For the purpose of this research, all documents are aggregated from municipal web sources. It is worth noting that some

municipalities maintain all of these documents; some maintain only one or two. If a municipality does not possess a master plan, or if it is unavailable to the researcher, it is noted when the inventory is conducted.

### **Master Plans**

Planning theorists unwaveringly argue that the course which a municipality charts should be devoid of ignorant and haphazard decision-making, while moving in a deliberative and pensive direction according to a master plan, not just the whims of individual property owners or business interests. In other words, these master plans are intended to pragmatically envision the future (Burby & Dalton, 1994). Furthermore, comprehensive plans that apply to the entire municipality (Kelly & Becker, 2000) allow municipalities to progress diligently (Dalton & Berke, 1994). However, flawed master plans are a commonality addressed by a cluster of academics who rigorously evaluate them such as Berke & Manta-Conroy (2000) and Stevens (2013).

Evaluating these documents has been undertaken by numerous researchers, notably Berke (1994), who argued that this analysis is needed to determine where municipalities currently are and where they wish to go (Berke, 1994). Baer (1997) and Kaiser & Davies (1999) execute this evaluation by first laying out a framework for analysis. There are seven dimensions:

- 1.) Inventory of Existing Conditions (What the municipality currently has)
- 2.) Planning and Development Goals and Objectives of the Municipality (using the assets on hand)
- 3.) Planning Policies (that guide the municipality to their preferred outcome)
- 4.) Methods of Implementing Plans
- 5.) Monitoring and Evaluation (hypothetically, what the planning practitioner is responsible for)
- 6.) Interorganizational Coordination
- 7.) Public Participation

Informed by this framework, this research seeks to analyze municipal master plans, as they refer to the short line railroads that operate in their boundaries. Essentially, it will evaluate the first four parts of this framework, capturing a foundational snapshot of “where municipalities are” on this issue which has been little explored. Certain municipalities, as stated in the inventory, do not maintain master plans. Furthermore, two municipalities, Westfield and Holyoke, are known to have master plans yet they cannot be accessed. Westfield’s plan, which is linked online, comes up as unavailable and officials were unresponsive. Holyoke, which often references the document, does not maintain a digital copy. In total, 16 master plans from municipalities are collected

### **Zoning Bylaws**

Under Massachusetts General Laws Chapter 40A, also known as the Zoning Enabling Act, municipalities possess police power in the form of zoning which can be exercised in both innocuous and detrimental ways when engaging certain realities. In Massachusetts, these bylaws are the vehicle in which municipalities regulate the development and use of land, as outlined in their master plans. Given this high degree of power, municipalities retain relatively complete control over how land is used. Zoning bylaws are collected from each municipality. If they are unavailable, it is noted in the inventory. Analysis of this collection of bylaws will look for references to freight rail, informed by the issues outlined in the literature review, as well as the land use Best Practices explored in the previous section

For the purpose of this research, the evaluation criteria will be tailored to test for the presence of short line freight rail. Towns without publicly accessible Master Plans are omitted from the sub-sample. Master plans will be contextually analyzed for the presence of freight rail,

infrastructure, and related industrial development. This will be guided by a coded schema found in (APPENDIX). This endeavor is necessary to discern if, how, or why these municipalities envisage the railroad benefiting, or inconveniencing, their future. In total, zoning bylaws from 28 municipalities are collected.

### **Methods: Content Analysis**

This research seeks to assess current municipal policy and planning regarding short line railroad operations through a process of content analysis. The year 2009 will be used as the historic data point from which data will be collected. This year coincides with the authoring and release of MassDOT's State Rail Plan. To answer the previously posed research questions, a two-part methodology, looking at zoning bylaws and masterplans, has been constructed utilizing Content Analysis according to Klaus Krippendorff (1980). This is necessary to evaluate the current land use realities and futures of municipalities with railroads.

Krippendorff's research and writings delve into the underlying theoretical and conceptual framework that is necessary for unbiasedly examining text. Underlying the method of Content Analysis is the fundamental argument for antipositivism— a belief many contemporary social scientists continue to maintain. With that in mind, this research does not proposed a formal hypothesis that is to be tested. Instead, it is conducted as textual survey, or the blanket gathering and analysis of texts and other documents, of the current municipal and industrial landscape present throughout our localities (Krippendorff, 1980).

Content Analysis is used to discern specific terms and concepts within texts, works of art, conversational transcripts, and other document types. This is done with the objective of uncovering relationships between concepts—key characters, entities, notions— and their



semiotic foundation. Furthermore, this method considers the context that is a backdrop to concepts and their relationships. Historically, a derivative of this method of contextual analysis was first used in 18<sup>th</sup> century Sweden. While seemingly remedial, the church and government analyzed works of religious hymns, fearful that dissenting themes were embedded within the text. Loebel (1903) published the first classification schema used to explore the structure and meaning of content. Max Weber was also an early adopter of the method. While its growth was undeniable within the social science, it was first functionally used to analyze propaganda material during World War II (Krippendorff, 1980, pp. 12-15).

Conducting research with content analysis seeks to understand:

- what are the subjects?
- what is being communicated?
- what are the reasons?
- what are the effects?

(Krippendorff, 1980, pp. 27)

The basic intellectual tasks of the analysis are to make inferences and deductions between concepts (Krippendorff, 1980, pp. 26). A schema of codes is drafted by the researcher. These codes represent concepts as they appear in the text. Through this method, the frequency with which these concepts appear, their relationships between other concepts and the manner in which they are stratified are aggregated. For example, the code “rail” may show up in different contextually forms— freight rail, railroad, freight service— multiple concepts may be assigned different codes. Validity of the results is measured through duplication; if the text can be analyzed utilizing the same schema, and the results duplicated, it is considered successful.

The results, interpreted by the researcher, should possess minimal bias, although completely unbiased analysis is not feasible (Krippendorff, 1980, pp. 129).

To accomplish this with a high degree of accuracy, the researcher first employs the technique manually. The researcher reads sample text, line by line, to highlight ideas, concepts, and terms. These concepts are noted by the researcher, who then constructs a schema of codes through which the full collection of text will be filtered through. While the first step of content analysis is to count term frequency, the process goes beyond this to examine textual meaning that can be broken into a small number of categories. The researcher is to avoid preconceived categories, instead allowing the textual meaning to dictate the groupings.

Comprehensively, the formation of categories is dependent on the relationships between the concepts (Weber, 1990, pp. 12). For example, if “LEGAL” and “ACCIDENT” codes are prevalent, they may be conceptually grouped into a category entitled “LIABILITY.” Coding for specific terms as concepts represents one level of analysis. The second level of analysis consists of strings of terms, such as sentence fragments, as representative of one concept (Krippendorff, 1980, pp. 49-56).

Furthermore, ‘variables’ are also the subject of analysis. In what Krippendorff (1980) argues was the intellectual endeavor that advanced the method, analyzing variation is fundamental to understanding context. Variables may be open-ended or bounded. ‘UNFAVORABLE’ and ‘FAVORABLE’ represent the polarity of interactions and decisions present in texts. The presence of specific terms, such as “denied” or “approved” may be coded according to their respective variable. Nominal scales may also be categorized in this fashion. For example, if “RACE” is coded in a schema, there are a set number of feasible variations which determine

the groupings (Krippendorff, 1980, pp. 90). Eventually, the different categories can be merged conceptually into larger groupings, thus forming what Krippendorff (1980) refers to as a “hierarchy tree (Krippendorff, 1980, pp. 94).”

For this research, a schema is drafted to analyze the content of zoning bylaws and master-plans. This schema, with one level of analysis, is coded for the presence of concepts related to freight rail and, more specifically, short line freight rail. It is informed by both the literature, best practice, and the municipal documents themselves. As the documents are coded for relevant terms, such as “zoning limitations,” codes that relate are merged together, altering the schema and resulting in the concepts exhibited in the findings. For example, “zoning limitations” and “special permit required” may be merged and become sub-groups of a concept entitled “legal preemption.” This schema has two levels. It is coded for the presence single concepts, such as “freight rail,” in order to find relevant information. This information, once located in the documents and catalogued, is then coded for analysis.

### **Research Area and Inventory**

The collection of data and subsequent analysis of it is performed in two, epistemologically related steps. In order to do this manageably, the research areas are delineated as the municipalities through which each short line railroad operates.

According to the Federal Railroad Administration (FRA), freight rail in the United States is currently a \$60 billion industry annually. Within the country, the FRA presides over seven Class I (railroads with annual revenues in excess of \$433.2 million), 21 regional Class II (railroads with annual revenues between \$20 million and \$433.2 million), and 510 “local,” short line, railroads

(with annual revenues below \$20 million). Massachusetts is home to 13 freight railroads that operate on 1,153 miles of trackage (MassDOT CIP, 2014).

### **Freight Rail and Land Use in Massachusetts**

Land use and development is referenced in MassDOT's State Rail Plan (2010). The plan states:

*"Many parcels of the size, location, amenities and access characteristics suitable for rail freight operations are currently threatened by development that would preclude their use for that purpose (MassDOT, 2010c, pp. XIX)."*

This foreshadowing statement emphasizes the preservation necessary to maintain a competitive logistics system in Massachusetts. To do so, supply-side incentives are recommended. M.G.L. 40L, the Agricultural Incentive Area, is alluded to within MassDOT's plan as a model for an "industrial incentive program" that prevents the conversion of parcels to uses incompatible with freight rail. Further remedy is recommended through the creation of a statewide inventory of strategic industrial parcels that can sustain freight service. Additionally, MassDOT recommends that freight-intensive uses be explicitly incorporated into M.G.L Ch. 43D's Priority Development Sites (MassDOT, 2010c, pp. XIX-XX).

Massachusetts is home to the following short line railroads:

#### **Short Line Class III**

- Bay Colony Railroad
- Mass Coastal Railroad
- East Brookfield and Spencer Railroad
- Fore River Transportation Systems
- Mass Central Railroad

- Pioneer Valley Railroad
- Housatonic Railroad
- Grafton & Upton Railroad

The areas of analysis, the municipalities, are therefore categorized by short line railroad.

Two railroads are eliminated from the analysis. The Fore River RR is chartered by the Massachusetts Water Resources Authority, providing service solely to its facilities (MWRA, 2014). As it operates to serve one entity only, they are eliminated. Further, the East Brookfield and Spencer Railroad, a new railroad tasked with switching cars at a CSX operated auto-terminal in Spencer, MA, is eliminated. It is assumed that this railroad is unable to take on new customers, due to their small size, track ownership structure, and the geographic layout of the auto terminal.

Six short line railroads, or five sample areas, remain for analysis. Each of these six sample areas contain sub-sample areas of a variety of scales—the municipalities. These are towns through which short line railroads operates through. Abandoned rail routes are not looked at. The geographic route of each short line railroad is taken from the Massachusetts State Rail Map. If the line is owned by a party other than the railroad, it is referenced<sup>1</sup>. Additionally, each railroad's key infrastructure is noted. Partially, this is sourced from the MassDOT State Rail Map for cases of interchanges and large-scale intermodal facilities. Documentation is also the product of extensive site visits and field observations conducted by the researcher.

## Bay Colony Railroad



**Figure 2: Bay Colony Railroad Map**  
Source: MassDOT State Rail Map

Municipality	Key Infrastructure	Master Plan Available	Zoning By-laws Available
Millis	GAF Industrial Complex	yes	yes
Medfield	CSX Interchange	yes	yes
Dover	none	yes	yes
Needham	none	partially-Trails Master Plan	yes

**Table 1: Bay Colony Railroad Inventory**

Bay Colony is a short line railroad which operates two branch lines in Massachusetts. It is owned by a group who also owns the Seminole Gulf Railway, a short line based in Florida. According to their website, they have “provided personalized transportation solutions to Massachusetts and Southern New England for over three decades (Bay Colony, 2014).”

The main customer in Millis was the former GAF Industries complex in Millis. This, up until its closure in the late 2000s, provided Bay Colony with the majority of its traffic. It is currently vacant and, although it is available to lease, is the subject of planning and redevelopment with the town (Koff, 2014, pp. 24). While this area of the ROW is partially overgrown, the researcher observed markings on the rail which provide evidence of recent activity on the line.

Currently, there has been increased local activity in support of a rail trail through Needham and Dover along the MassDOT owned track that Bay Colony retains operating rights on. Funding for the initial 2-mile portion of the project is private and being raised by the Bay Colony Rail Trail Association (Chen, 2013). A web search yields a Kickstarter page, a method of crowdfunding a project, which successfully raised \$20,000 as of June 30<sup>th</sup>, 2014 (Bay Colony Rail Trail, 2014).





**Figure 3: Bay Colony Railroad's Millis Yard, Former GAF Shingle Factory. Millis, MA (2014)**





Figure 4: Bay Colony Railroad's Millis Branch, looking West. Millis, MA (2014)

## Graton and Upon Railroad



**Figure 5: Grafton and Upton Railroad Map**  
Source: MassDOT State Rail Map, 2009

Municipality	Key Infrastructure	Master Plan Available	Zoning Bylaws Available
Grafton	CSX Interchange, Propane Transload	yes	yes
Upton	Transload Terminal	yes	yes
Hopedale	Future CSX Interchange	yes	yes

**Table 2: Grafton and Upton Railroad Inventory**

The Grafton and Upton Railroad is Massachusetts' longest running short line railroad. Originally, the railroad was created to haul unprocessed cotton over (what was then) a 15.5 mile industrial spur between Hopedale, Upton, and Grafton. In Grafton, the line intersects with the Boston and Albany's east-west corridor. In 1928, it undertook the responsibility of transporting regionally destined mail for the U.S. Postal Service. After many fluctuations in business operations, including labor strikes, the railroad allowed its business to recede, seemingly vanquished by the market. At the end of the 1990s, a new ownership group emerged and acquired the line, an action that preceded the line being incessantly invested in. Consequentially, infrastructure upgrades, and subsequent new customers, have appeared on the line (Hopper, 1999).



Following the purchase, \$1 million in state funding and an undisclosed amount private capital, were used to rehabilitate the long-dormant line. This heightened activity has been met with intermittent opposition from residents and officials of the municipalities it runs through. In 2012, Mr. Priscoli filed a \$20 million defamation suit against a former Upton selectwoman. This was followed by a petition to the U.S. Department of Transportation, filed by neighbors who own parcels which abut the line and believe a processing and intermodal facility should be locally regulated. Residents argue that the facility in question, which processes wood pellets, is not part of the Grafton and Upton's transportation infrastructure and therefore should fall under local bylaws (Price, 2012).

Another dispute, between the railroad and town, has recently come to light. This case, *Town of Grafton v. Grafton and Upton Railroad*, involved the railroad's plans to construct a propane transload facility. At this facility, propane would be offloaded from rail cars into tanks, which would subsequently be o-located where service trucks fill their tanks for local deliveries. According to the *Milford Daily News*, the case, which occurred in Worcester Superior Court, was remanded to the Surface Transportation Board. From here, the STB will issue a declaratory order which has not yet arrived at the time of this work's publication (Gleason, 2013).



**Figure 6: Grafton & Upton Railroad's Repaired Line, Draper Mills. Hopedale, MA (2014)**





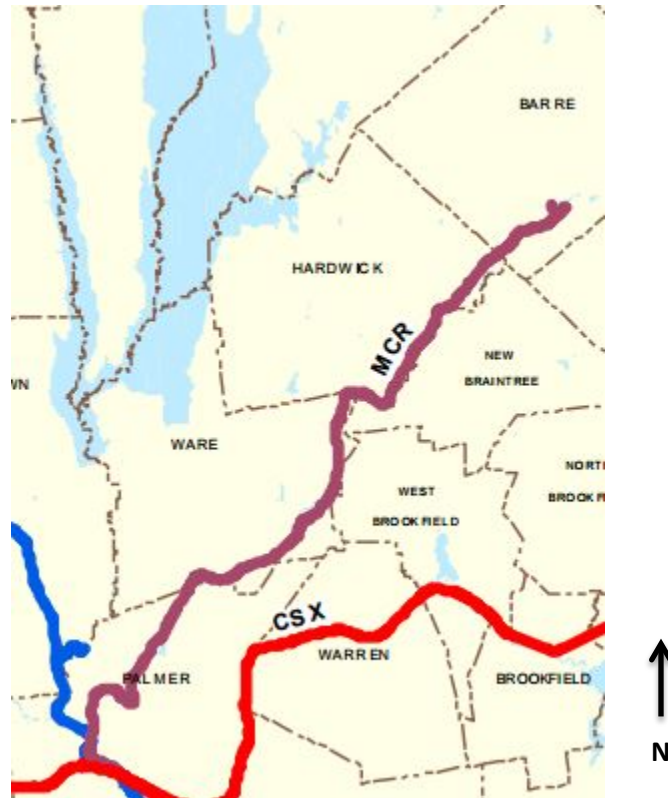
**Figure 4: Grafton & Upton Yard, Construction of Propane Transload Facility. Grafton, MA (2014)**





**Figure 8: Grafton & Upton Main Yard, Propane Storage. Grafton, MA (2014)**

## Mass Central Railroad



**Figure 9: Mass Central Railroad Map**  
Source: MassDOT State Rail Map, 2009

Municipality	Key Infrastructure	Master Plan Available	Zoning Bylaws Available
Palmer	CSX Interchange, Vacant Mill	Community Development Strategy Only	yes
Ware	Plastics Transload	No, Rail Trail Plan only	yes
Hardwick	none	no	yes
Barre	none	no	yes

**Table 3: Mass Central Railroad Inventory**

The Massachusetts Central Railroad owns and operates a corridor from Palmer, through Ware and Hardwick, to Barre. It connects to CSX's Boston to Albany line, as well as New England Central's north-south line which culminates in Canada, in Palmer. The railroad provides a vital link westward,

given the relative isolation of Barre and Ware, towns that border the rural Quabbin Reservoir area. Its strategic connection in Palmer allows it to intercept and send goods in all geographic directions.

The railroad, founded in 1975, operates over state-owned track once part of the Conrail system, although a small portion of the ROW leading into Palmer is privately owned by the railroad and is the location of its yard. Owned by three residents of western Massachusetts, Mass Central services less than a dozen customers. These include a large site in Ware, where the railroad maintains a Trans-load facility where it offloads plastic pellets destined for processing, as well as other plastics and concrete processors (Karr, 1995). A site visit, conducted by the researcher, confirms these facilities are still in operation.

The Mass Central Railroad does not have a web site or web presence. The address, listed as the company headquarters, is a trailer behind an ATV showroom in Palmer.





**Figure 10: Mass Central Railroad Right-of-Way. Barre, MA (2014)**





**Figure 11:** Mass Central Railroad Transload Facility. Ware, MA (2014)

## Pioneer Valley Railroad



**Figure 12: Pioneer Valley Railroad Map**  
Source: MassDOT State Rail Map, 2009

Municipality	Key Infrastructure	Master Plan Available	Zoning Bylaws Available
Holyoke	Pan Am interchange	no	yes
Westfield	Transload Terminal, Main Yard	Urban Renewal Plan inaccessible, town unresponsive	yes
Southampton	Propane Transload	yes	yes

**Table 4: Pioneer Valley Railroad Inventory**

The Pioneer Valley Railroad is a short line, owned by Pinsly Railroad Company, which operates in Holyoke, Westfield, and Southampton. In Westfield, it is served by CSX at an interchange point adjacent to the PVRR's main yard and headquarters. Northward, it maintains a propane transload facility on the town line of Southampton and Westfield. Customers on the line include Yankee Candle, receiving shipments of wax that are then trucked to East Deerfield, and various plastics, paper, and warehousing companies. In Holyoke, it has an interchange with Pan Am Southern (Pan Am & Norfolk Southern partnership) which was recently reestablished after years of stagnation. It also provides vital service to the remaining paper mills in Holyoke, which import wood pulp by train. A sister company, Railroad Distribution Services in Westfield, owns and manages a multitude of logistics facilities with rail access. A

variety of transload facilities, for plastics and propane, augment the PVRR's operations (Pioneer Valley Railroad, 2014).



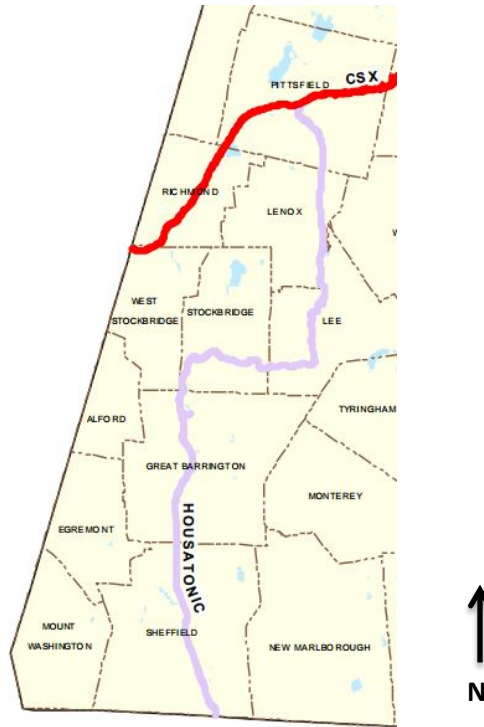
**Figure 13: Pioneer Valley Railroad Propane Transload Facility. Westfield, MA (2014)**





**Figure 14: Pioneer Valley Railroad End of Line Storage. Southamptton, MA (2014)**

## Housatonic Railroad



**Figure 15: Housatonic Railroad Map**  
Source: MassDOT State Rail Map, 2009

Municipality	Key Infrastructure	Master Plan Available	Zoning Bylaws Available
Sheffield	none	yes	yes
Great Barrington	none	none	yes
Stockbridge	none	none	yes
Lee	none	yes	yes
Lenox	none	none	yes
Pittsfield	CSX Interchange, Transload	yes, plus ULI West Street Corridor Plan	yes

**Table 5: Housatonic Railroad Inventory**

The Housatonic Railroad is headquartered in Pittsfield and maintains a 161 mile rail system. It is comprised of three lines: 1. The Berkshire Line (38 miles) from Pittsfield to the Connecticut border; 2. Berkshire Line in CT, which runs from the Massachusetts border to

Danbury, CT and; 3. The Maybrook Line, which runs from Derby, CT to Beacon, NY. In Massachusetts, they interchange with CSX's Boston to Albany Line in Pittsfield. In this region, the railroad serves two paper companies, warehouses, plastic processing, limestone, fertilizer, concrete, and lumber industries. In CT, the railroad serves similar industries, in addition to a pharmaceutical/biomedical company and various food-processing facilities (Housatonic Railroad, 2014).

MassDOT recently purchased the Berkshire Line up to the CT border for \$12.13 million. Additionally, the 2014 Transportation Bond Bill allocated a further \$35 million for rehabilitation of the line, which is plagued by old and frail infrastructure. Ideally, this portion of the line would retain freight service while allowing MassDOT to accommodate planned commuter rail trains originating from New York City (MassDOT, 2014).



## Mass Coastal Railroad



**Figure 16: Mass Coastal Railroad Map**  
Source: MassDOT State Rail Map, 2009

Municipality	Key Infrastructure	Master Plan Available	Zoning Bylaws Available
Middleboro	CSX interchange, Yard	yes	yes
Rochester	SEMASS Waste Processing Facility	yes	yes
Wareham	none	none	yes
Bourne	none	none	yes
Sandwich	none	none	yes
Barnstable	none	yes	yes
Yarmouth	none	none	yes
Falmouth	none	yes	yes

**Table 6: Mass Coastal Railroad Inventory**

A subsidiary of Cape Rail Inc., the Mass Coastal Railroad operates private freight service to customers along the Cape Cod Mainline. This route is owned by MassDOT and leased to Mass Coastal, who is the successor to Bay Colony. Class I connections via an interchange point with CSX in Middleboro provide access to the national rail network. Primarily, the traffic on the

line consists of municipal waste from Cape Cod with the end destination of the SEMASS Energy Facility in Rochester, MA. This vital activity is supplemented by a variety of other traffic, many of which serves the numerous logistics facilities and industrial properties marketed, managed, and/or owned by the railroad's parent company (MassCoastal, 2014). The railroad is also slated to begin service to New Bedford, serving the revitalized port (a free trade zone) where rehabilitation will result in a train-to-truck and train-to-ship intermodal facility (Port of New Bedford, 2011).

## CHAPTER 5

### FINDINGS

The 18 master plans and 27 zoning bylaws are quite homogenous, differing only in minor ways. Over the course of the coding process, codes were merged to form new concepts. The results are divided into two sections; master plans and zoning bylaws. The resulting (7) master plan findings and (5) zoning bylaw findings illustrate how municipalities perceive, deal with, and plan around the short line railroads within their boundaries. It is important to note that the corresponding numbers below tally references to a particular concept. One document may contain more than one concept, and therefore the number of documents each concept is referenced in is counted and one document can be counted twice.

#### **Master Plan Findings**

##### **Rail Trail Conversion Support (5)**

The most frequent concept to arise during the document analysis was the topic of rail trails and planning for the conversion of the short line rights of way. The prevalence was especially ominous in the towns through which the Bay Colony Railroad operates in; Medfield and Millis.

*“Should the existing rail line cease to be used, the town would then have the chance to extend its greenway to the Charles River at the Medfield border. If the rail line is reactivated at some time in the future for commuter service, its use as a trail could be terminated (Millis Master Plan 2000 pp. 79).”*

Currently, a private consortium entitled the Bay Colony Rail Trail Advisory Committee has lobbied MassDOT, the owner of the right of way, for the right to construct a recreational trail in Needham and

Dover. This effort has also been the subject of fundraising. The Town of Millis identifies continuing this recreational trail through the town, if feasible.

The concept additionally appears in the master plans for the towns of Lee, Hopedale, and Falmouth:

*“Another unique feature is the Grafton and Upton Railroad that once serviced the Draper Mill. The 1990 Open Space and Recreation Plan recommended the preparation of an acquisition and improvement plan for the abandoned railroad right of way. The creation of a rail trail could connect the town center, Draper Field, the Parklands and Upton State Forest, as well as offer scenic views of Hopedale Pond and the Mill River (Hopedale Community Development Plan 2004 pp. 64).”*

In Lee, the references to the rail trail involve a linear stretch of unused track which, up until 2014, was owned by the Housatonic Railroad but taken out of service. In Hopedale and Falmouth, two towns with nascent railroads operating within their confines, the master plans outline ambitions the town should take if these railroads cease to operate or serve stretches of track with shippers. The lack of support for these new operations is glaring. Additionally, struggling railroads such as the Bay Colony Railroad are especially vulnerable as they have recently lost profitable customers and are awaiting new tenants in facilities along their right of way. These municipalities, failing to understand the positive economic impact of the short lines, are seemingly waiting for their demise with patient aspirations of continuing a recreational trail.

### **Railroad Inventory Conducted (4)**

The towns of Dover, Millis, Falmouth, and Middleboro conducted an inventory of existing rail service in their communities, including short line service. Towns such as Dover, briefly acknowledge that

the railroad exists and traverses the town. Towns such as Falmouth and Middleboro, which envelop economies that are dependent on the short lines, address their presence with more detail:

*“Existing operational rail is limited to the railroad spur to Otis Air Force Base, which is used regularly for the transfer of solid waste. Otherwise, there is rail that occupies the State right-of-way that runs from North Falmouth through West Falmouth, down to Skating Lane in Falmouth Village where the Shining Sea Bikeway currently begins. The town has recently signed a long-term lease with the State in order to use this rail R.O.W. and continue the bikeway all the way to North Falmouth (Falmouth Comprehensive Plan 2004, pp. 4).”*

Falmouth, like other Cape Cod communities along the (formerly Bay Colony) Mass Coastal line utilize the short line to haul solid waste to an energy processing facility in Rochester, MA. Arguably, trucking this high-volume, low-cost cargo would be costly and less efficient. Although rail trail conversion is also referenced in Falmouth’s plan, the municipality and Middleboro offer the most comprehensive inventory of existing short lines and major customers in this category.

### **No Reference to Short Line Railroads (3)**

The master plans of Rochester, Pittsfield, and Great Barrington do not contain any references to short line rail or railroads. The rights of way, railroad operations, and industrial shipping customers served by short lines are not referenced.

### **Few Municipalities Identify Railroad Favorably (3)**

Three towns, Dover, Middleboro and Pittsfield identified the railroad in relatively favorable

terms. These towns referred to the railroad as a key facet of local infrastructure. With the exception of Ware, the towns reference the railroad as infrastructure that anchors commercial and industrial facilities that are important to town employment; there are no descriptive phrases used to allude to a positive perception of the railroad. However, unlike municipalities throughout Massachusetts, there is no context that mentions a desire to remove railroad operations. Instead, they arise during a landscape analysis of development patterns. Pittsfield cites the railroad as an important infrastructure linkage that its industry is dependent on. Dover's and Middleboro's references are more subtle:

*"Commercial and industrial properties are located along the major highways and arterial corridors and along the rail alignments (Middleboro Master Plan, 2001, pp. 26)"*

*Presently Dover has very limited alternate transportation: (i) private bus on Route 109 providing service between Milford and Boston; (ii) a taxi for hire; (iii) a single track railroad currently provides freight service between West Medway and Needham Junction with connections at the latter to Boston and Newton Highlands and at Medfield Junction to Walpole and Framingham (Dover Master Plan, 2004, pp. VIII)."*

## **Railroad & Town History (2)**

Middleboro and Palmer, in the introductory sections of their master plans, discuss the history of the town. Emerging as two industrial centers, the master plans highlight the crucial role the railroad played in the economic growth of the communities. Palmer, which is often called the 'town of seven railroads,' depicts a traditional New England setting, with an abundance of mills, which is consistently entwined with the railroad. This economic linkage is also spoken of as a vital connection that Middleboro factories were dependent on, prior to the advent of the Eisenhower Interstate System, specifically I-495.

## **Railroad Identified as a Constraint (2)**

Two master plans, Grafton and Millis, identify the railroad as a piece of infrastructure that correlates with incongruous development and limits the towns' future options for new development. These references encompass the physical limitations that the railroad's presence creates; they do not identify quality of life, socioeconomic, or environmental health topics.

*"Service constraints include crossing limitations of Massachusetts Turnpike and the railroad at locations that otherwise might be suitable for development (Grafton Master Plan, 2001, pp. 21)."*

## **Class I Railroad Referenced Only (1)**

Rochester's master plan identifies a rail line that runs through the town. It is operated by CSX, a Class I railroad headquartered in Florida. Despite the presence of the MassCoastal short line that serves the SEMASS biomass and waste processing facility, the Class I rail line is the only operational infrastructure of this kind mentioned in the plan.

## **Zoning Bylaw Findings**

The results of the zoning bylaw analysis are categorized into five groups. It should be noted that the various instances of bylaws that may plausibly preempt federal laws have no reference to legal precedents which may make them invalid. Bylaws are assigned to this category based on the analysis of case law and legal challenges to zoning regulations that are outlined in the previously discussed literature. Furthermore, there are no references to railroad classes, such as short lines, in the bylaws. Simply, the bylaws approach districts, uses, and rail as a singularly.

### **Buffer/Setback Requirements for Industrial Land (13)**

Numerous municipal bylaws require buffer areas and setbacks for industrially-zoned properties. The 13 instances of this concept appearing in the zoning documents can be conceptually divided into two groups: 1.) General buffers around industrial land that insulates adjacent residential development, with no reference to rail; 2.) Setbacks from public and private rights of way, in addition to a general insulated buffer. While these buffers provide a barrier from the aesthetically and audibly displeasing impacts of industrial facilities that many argue demean civic character, they create a paradox. The further the setback, or an explicitly required setback from the railroad, the less likely the facilities can receive rail service as a siding must be placed as close to the property as possible. The presence of this siding would, logically, require a setback, or could not be installed as a setback would not satiate the site design requirements.

Requirements for physical barriers that screen waste processing, recycling, and other manufacturing activities seem somewhat innocuous. However, there is no research highlighting a correlation between these requirements and firm deterrence, or the choice of firms to locate elsewhere where the regulatory landscape is less imposing. Without this proven correlation, one cannot argue if an bylaw of this kind is either favorable or unfavorable to fostering railroad operations.

*“In a Commercial & Industrial District, all open storage of junk, scrap metal, rags, waste paper, and similar used materials shall be completely screened from view at normal eye level (6) feet in height from any public or private way or from any premises (Upton Zoning Bylaws, amended 2012, pp. 19).”*



“A buffer area of one hundred (100) feet shall be provided around the perimeter of the property where it abuts residentially zoned or residentially occupied properties (Lee Zoning Bylaws, amended 2012, pp. 88).”

### **Industrial Zoning Facilitates Railroad Intensive Uses (5)**

On the other edge of the spectrum, five municipalities maintain zoning bylaws that seemingly facilitate uses that prosper with rail service. Or, the design requirements put forth by the zoning allows a parcel to be designed with a railroad siding, or against a right of way. Eliminating setback or buffer requirements for a portion of a parcel that borders the right of way means that structures can be placed against the corridor, allowing for delivery of rail cars.

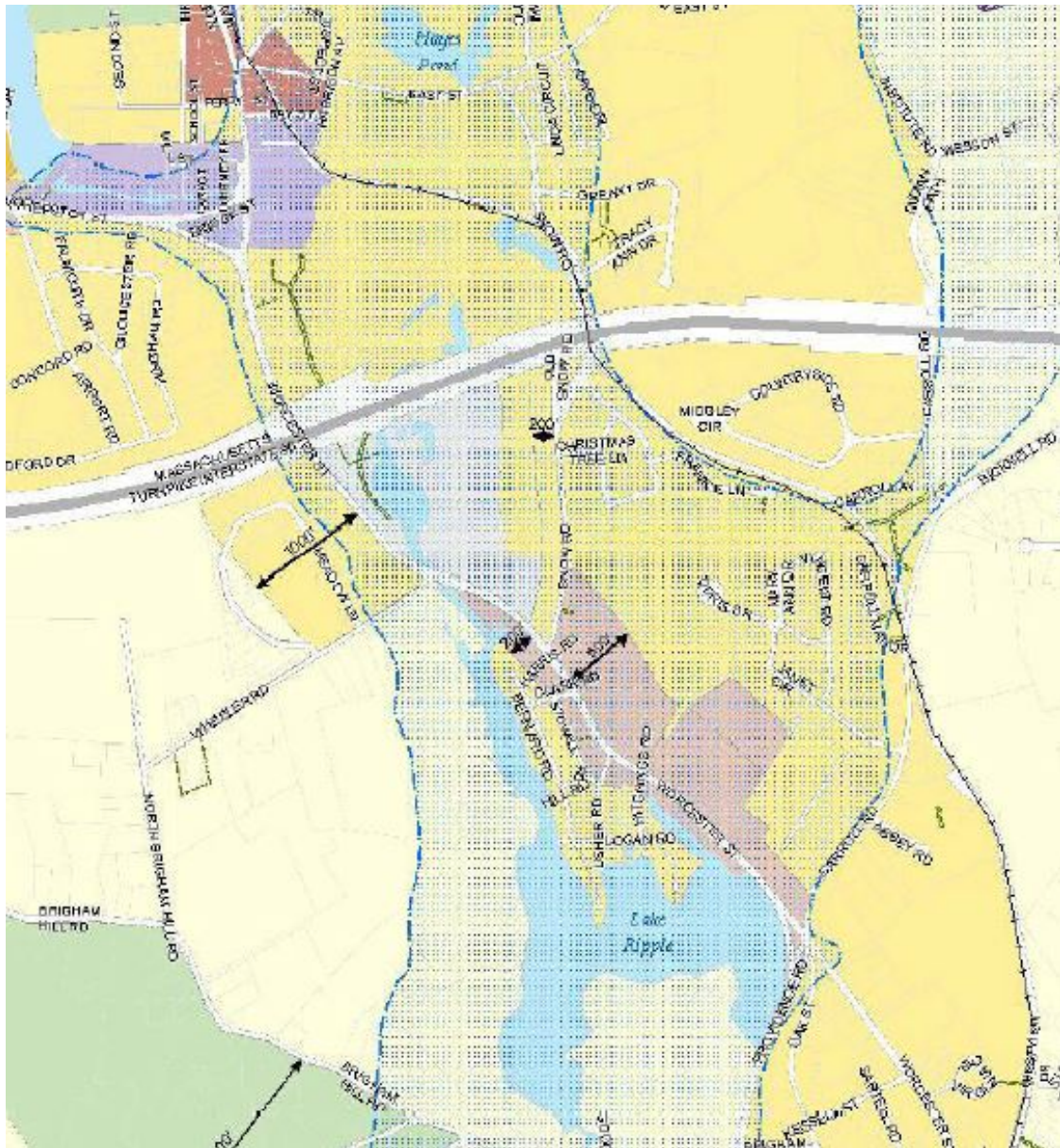
*“In an industrial District, there shall be no yard setback when abutting railroad tracks (Palmer Zoning Bylaws, amended 2007, pp. I-149).”*

### **Railroad Right of Way Treated as a Boundary (10)**

Nine municipalities, Grafton, Sandwich, Barre, Barnstable, Lee, Great Barrington, Hopedale, Upton, Millis, and Medfield treated railroad rights of way as physical boundaries, terminating zoning districts at the perimeter the right of way forms with other roads, highways, and water bodies. Drafting zoning districts with these boundaries limit the development of railroad intensive uses. Instead of permitting freight-sustaining uses on both sides of the right of way, increasing the parcels that are zoned to access rail service, industrial districts are often confined to only one side of the right of way.

*“Except when labeled to the contrary, district boundary lines shown approximately following or terminating at street, railroad, or utility easement center (Sandwich Zoning Bylaws, amended 2014, pp. 13).”*

The prevalence of this concept reveals an underlying regulatory structure that may be leading to the encroachment of the right of way by non-industrial uses. If one adjacent district is zoned residential, than industry that may take advantage of the rail service is not permitted from developing a facility. Furthermore, as detailed in the Best Practices section, the Port of Baltimore operated under a similar zoning scheme. The Town of Grafton, which maintains one of the bylaws with this concept, is composed of scattered industrially-zoned areas. As illustrated in Figure 11 below, the industrial district borders a right of way, yet the corridor is encased by residentially-zoned land outside of this area.



**Figure 17: Grafton Zoning Map**

The northern Industrial District is the location of a newly-sited propane transload facility; the Southern zoning district is an industrial facility that is one of the few remnants of the old Draper Mills.

## **Local Preemption Issues (12)**

Approximately half of the municipalities possess zoning bylaws that may preempt federal regulations. These are grouped into three categories:

- 1.) Special Permit required for railroad yard/terminal: Holyoke, Great Barrington, Hardwick, Palmer, Bourne, Sandwich, Grafton, Sandwich, Pittsfield'
- 2.) Railroad yard/terminal not permitted: Upton, Yarmouth;
- 3.) Cargo declaration to authorities required by anyone transporting hazardous waste through town: Stpckbridge

For the communities which require a special permit for freight yard development, the placement of the yard is confined solely to industrial districts and is at the discretion of local Planning Boards or Zoning Boards of Appeal. Further research is necessary to discern the process of gaining this permit, including the frequency, flaws, and political undercurrents that surround the application process and the end results. The remaining two communities do not permit yard or terminal development in any district under any circumstances, according to their bylaws. This is despite numerous examples of case law, as highlighted in the literature review, of unsuccessful bids by municipalities preventing freight yard development or expansion. The railroad, which is federally regulated, may not be locally regulated by bylaws that prevent activity that is legally permissible under federal law. This is also applicable to the Town of Stockbridge, which requires the registration of cargo by truck and rail shipping companies if it is deemed hazardous waste. Despite existing health regulations, there is undoubtedly local concern in the light of recent industrial accidents involving railroads. Irrespective of these incidences, it is arguable that a registration requirement preempts existing federal requirements that the railroads must comply with.

## **Conclusion**

. Summarily, the following conclusions are extracted from this analysis, illustrating the need for additional research to measure the depth and implications of these results.

First, railroads are unrealized pieces of key infrastructure that can may be able to support sustainable economic development strategies, targeted towards specific industries that import and export large volumes, at the local level. The presence, reduced transportation costs, and positive environmental externalities associated with the railroad could be used to attract industry, yet this is not apparent in any of the master plans. Overall, the majority of municipal plans offer only cursory references to the railroad, if any at all. Although state policy outlines the need for localities to attune land uses near freight rail lines, there is no land use model for service preservation that can be applied. Consequentially, the benefits that resonate from these companies is undocumented and seemingly ignored from a municipal planning vantage point.

It is evident from the literature that the overarching forces, advocacy groups and informal coalitions that champion recreation and civic character, have had their influence resonate into the local planning process. Occupying strategically valuable land, the short lines arise in the process, most commonly, in the context of land acquisition and recreational trails. Disconcertingly, communities often maintain a “wait it out” approach towards the railroads; awaiting the day in which operations waver and disappear, thus leaving land for recreational uses. Conflicting recreational and economic development goals, both which possess tremendous merit, require thoughtful, unbiased planning that weights both options.

Additionally, land planning is an impetus, if done assiduously and comprehensively, that can progressively inch a community and a region forward. There is no reference to broader objectives or discussion of the dawn of the regional consequences created by each individual community’s goals. This

may emerge precariously when sustainable logistics systems and the reality of shifting population concentrations become topical issues. However, it is evident that industrial uses, and the railroad, may be undesirable in certain communities that wish to retain a newfound rural and residential character. Despite the positive economic impact short lines can offer communities, especially geographically isolated areas, the plans are devoid of a dialogue that fairly weighs these many elements. While a formidable paradox can be appreciated in planning, one with such a glaring imbalance warrants further research efforts. Ideally, these would be constructed to uncover reasonable answers and pragmatic solutions that could be used on the ground, with or without the railroad, and would be sustained by a wide scope of data, as opposed to elementary politics.

Second, industrial site plan and design requirements are often entangled in archaic regulation that may be limiting transportation options. Current setback and buffer requirements, while steeped in a historic disdain for and fear of industrial facilities, are relatively outdated and, at the very least, should be more malleable and adaptive. It is perplexing as to why municipalities would require facilities to act, essentially, as islands. Apart from their distance from roadways and adjacent properties, they are away from the rights of way. While, hypothetically, rail sidings could be built out from the right of way, into the parcel, and against the facility, distance determines their viability. The longer the siding must be, the higher the cost of design, engineering, and installation; strongly dissuading factors for companies looking to expand in their existing facility or move to a new facility near a right of way. Moreover, it is not clear how, exactly, these buffer requirements apply to the rail siding. Would they be in violation of the minimum setback requirements?

Third, preemption issues are undeniably present in almost half of the existing zoning bylaws for towns that are home to short lines. Though outside of the scope of this analysis, examination of the

interactions between the short line operators, planning board, and zoning board of appeals in these towns would provide an illustration of the implications current bylaws produce. Under existing federal law, short lines are required to submit expansion or development plans to the STB, who subsequently assesses these in a method similar to the special permitting process. This submission's contents include how environmental regulations and historic properties, as well as adjacent structures that may be impacted, will be accommodated. Facility expansion and development challenged locally and leading to Boston and Maine Corporation and Town of Ayer, MA (2001), has been addressed through STB declaratory order. However, these findings demonstrate that existing zoning does not accurately reflect or react to this.

The current regulatory structure offers an uncomfortable premonition of the potential legal altercations that may arise between short lines and municipalities. For short lines without a corporate parent, this could be expensive and fatal. For towns, this could be an incident of spending resources in futility. Could this possibly be avoided altogether? With the proper training/education of staff on key preemption cases, revisions to current zoning could be made, eliminating unnecessary legal challenges in the future. While this is cumbersome and politically contentious, especially due to local Massachusetts political processes, it is an attainable long-term goal. True legal clarification on the issue by the STB, lucid and straightforward, could also provide further remedy, yet it appears only sporadically on the horizon. Fundamentally, municipalities have an obligation of remaining cognizant of the bylaws they create, implement, and enforce. The railroads, however, possess the resources and political will to possibly influence this, a concerning element of a topic that may never witness a resolution.

In conclusion, the master planning undertaken by municipalities appears to omit short line railroads that contribute to the economic vitality of the town. Growth of the short line network will be

presumably limited, given the opposition, both legally and socially, that will arise. Vanquishing these forces, while not insurmountable, will be arduous but arguably necessary if populations and industries continue to increase while adversity to trucking gains momentum. Resistance and concern due to risks of public health and corrosion of the quality of life may also limit the geographic scale of railroad operations and, subsequently, the location of future industries. Economic development strategies, which were not explored, may approach this topic differently, rationally embracing the utility provided by the railroads while cognizant of the drawbacks operations may pose. The zoning bylaws, which execute the master plan strategies at the ground level, go beyond simple omission. It is clear that certain zoning bylaws and the railroad are incompatible with each other in some instances. This could prevent increased rail service or the development of rail-served industrial facilities, due to infringement of other uses or constrictive bylaws. Applied land use planning has only begun to address this. Transportation and land use objectives remain divorced, except in the area of recreation. Corridor preservation is pushed aside, as disclosed by certain master plans, since the land they use serve community, recreational, and political purposes that have taken precedence.



## CHAPTER 6

### BEST PRACTICES

Unveiled in the findings of this research, there are many revisions needed to current planning practice involving short line railroads and, more broadly, rail systems that are inseparable from industrial facilities. Exhibiting the lack of integrated land use and transportation planning, compounded by tepid community perceptions regarding short lines, the findings show that there is a need for new practices and programs that can engage this dilemma. As illustrated in the following Best Practices, regional and local governments, planning agencies, and the private sector have realized progress is possible in completing the seemingly arduous. These examples, which cover notable programs and projects, address zoning and land use policy, transportation planning integration, regional initiatives, and development incentives.

#### **Baltimore Maritime Industrial District: Preferential Zoning**

The Maryland Port Administration, which operates the Port of Baltimore, in conjunction with the City of Baltimore, drafted and installed an industrial overlay district in 2008. Beset by the encroachment of non-industrial uses, exacerbated by current smart-growth mentalities, the Port of Baltimore's operations faced hindrances. This was in addition to high vacancy rates at the port. As industry diminished, former manufacturing and shipping facilities were converted to other mixed-uses.

The Port of Baltimore contains a large freight rail yard with scattered terminals that serve the deep-water port. The Port cites an anecdote of the Domino Sugar Factory to illustrate the glaring need for zoning revisions it faced during the onset of industrial decline. The factory, an employment anchor, depended on rail service for the raw materials it processed. On the outskirts of the Port, residential uses

began to materialize. This development, coupled with the residents, physically and politically impeded access to the factory. After numerous supply-chain interruptions, Domino Sugar decided to sever ties with the Port and relocate.

This, along with similar experiences for smaller shippers and manufacturers, led to the enactment of the Baltimore Maritime Industrial Overlay District. The overlay district regulates the uses of Within this district, industrial uses with Port and rail access were preserved, thus slowing the encroachment they faced. According to the Maryland Port Administration, the new zoning district now supports 16,500 direct jobs. Out of this, 9,718 workers are employed at private manufacturers and shipping terminals (Maryland Port Administration, 2008).

### **Layton City, Utah Industrial/ Manufacturing District: Performance Zoning**

Layton City, Utah is a suburban community within the Salt Lake City metropolitan area. Two freight rail lines, a Class I and a short line, traverse the town. This supports numerous warehousing, manufacturing, and intermodal facilities that manage the offloading of automobiles.

The municipality maintains a performance-based zoning code. Multiple uses may co-locate in a zone as long as that zone is achieving its intended 'performance goals.' For the industrial districts that border the rail line, this entails allowing not more than 40% of a property's floor area ratio to non-industrial uses. This limitation prevents industrial land from being encroached upon. Physical requirements such as setbacks, found in traditional zoning, are all conditional and contingent upon a property meeting the district's goals, as well as a property integrating with the district. Industry that can sustain rail service is not out-zoned as it frequently is in other communities. Moreover, the zoning code regulates trucking terminals, as conditional uses, but does not attempt to regulate the rail terminals.

This ensures that preemption issues do not arise. Given the city's prevalence of rail-dependent business, the zoning code arguably nurtures these industrial areas instead of opposing them.

### **Atlanta Regional Commission Regional Freight Mobility Plan (2008)**

Growth of the Atlanta metropolitan area is overseen by the Atlanta Regional Planning Commission. This entity simultaneously provides technical assistance to member communities while undertaking a variety of normal planning activity. Unlike most regional planning authorities, it has developed a regional freight planning process that attempts to combine transportation and land use planning as one. As detailed earlier in this research, the separation of these two actions yields disjointed development that often presents a competing goal.

The creation of the Regional Freight Mobility Plan, in conjunction with Atlanta's Plan 2040, established a Freight Advisory Task Force who was tasked with routinely coordinating outreach and meetings with shippers, industrial facilities, municipal planners, and resident stakeholders. Planning in this manner established a precedent; land use decisions were made by geographically and economically analyzing an area's connection to freight rail. Furthermore, the plan highlighted areas in the Atlanta region which needed funding to increase freight capacity, establish environmental and physical buffers, and mitigate social concerns by establishing safe passageways through industrial areas.

The resulting plan outlines the economic, social, and environmental impact of freight in an attempt to educate member communities. A series of freight-friendly land use guidelines for member communities were also created to encourage them to preserve land that is viable for freight-intensive uses. Additionally, the plan identifies land use conflicts present in the region that risk harming the freight network, including residential encroachment and an over-dependence on trucking. Finally, the plan looks inward, to Atlanta's urban center, by depicting derelict industrial areas as prime locations for

environmentally-friendly, cost-effective redevelopment. Here, new tenants could access existing short line rail lines while keeping the employment center in close proximity to where employees reside (Atlanta Regional Commission, 2009).

### **Fredrick County, Metropolitan Washington Council of Governments (2009)**

Lacking guidance on the topic of freight rail, the regional planning authority for Fredrick County commissioned Cambridge Logistics Systems to examine the region's land use and transportation policies. The resulting report recommends regional land use and transportation planning as an integrated process that sets forth tactful plans that are realized through the regional planning authority's advisory role. The issue of encroachment is raised, with light industrial uses recommended as a buffer area between heavy manufacturing and commercial/residential uses.

This report, echoed throughout the current land use policies of the agency, recommended the correct zoning of industrial parcels along the duration of rail corridors. Industrial zoning, encompassing parcels on both sides of the rights of way, ensures that both industry and the short line railroad (and Class I) that serve the region are kept prospering. Additionally, the report recommends the agency undertake new public participation efforts by involving community stakeholders, railroad executives, industrial customers, shippers, and local officials regularly. It also highlights the need for Tax Increment Financing as a method of last resort, citing the state's vehicular excise tax as a possible funding stream.

When examined, many of the report's recommendations are reflected in the current strategic plans created by the agency. The outreach to member communities regarding freight compatible land use is undertaken as a direct way of preserving industry. For example, many of the smaller member communities, which often cannot afford to solely finance TIFs or tax abatements for industrial projects, now undertake the effort collectively. A group of small communities that would benefit from an

industrial development opportunity may now collectively issue bonds, allowing them to pool their resources to accomplish the task (Metropolitan Washington Council of Governments, 2009).

### **Chicago Industrial Corridor Tax Increment Financing Districts: Multiple Locations (1999)**

The City of Chicago, realizing the deterioration of the local industrial base, installed a TIF program with the intention fostering growth in the plethora of industrial districts. The developer of the Northwest Industrial Corridor project, one of many, was granted a 23 year TIF scheme that offered an incentive to rehabilitate derelict industrial properties. This district is anchored by one Class I railroad, Canadian Pacific, and two short line railroads, the Chicago & Northwestern Railroad and the Belt Line Railroad. Referencing decreasing rail traffic as a convincing reason to pursue the program, the City of Chicago authorized a 1,200 acre TIF zone. Property values grown by this rehabilitation are captured through the increased tax revenues paid by properties surrounding the site.

When implemented, the program offered to help developers assemble parcels of suitable size that could sustain freight rail, alluding to the enormous incentive freight rail access provides tenants. The TIF area is almost symmetrically transected by the rail lines, allowing large swaths of buildings on each side access. This assemblage of land is now comprised of modern industrial facilities that receive regular shipments by rail. Commercial and retail projects were encouraged along the perimeter of the TIF site. These simultaneously act as a buffer between industry and homes, while catering to the commercial needs of surrounding residents.

### **Vancouver, Washington (2006-2011) BNSF Rail Yard Expansion**

The meticulously planned expansion of the BNSF (Class I) rail yard in Vancouver, Washington is an ideal example of intensive public participation, land use planning, and private sector outreach.

Financed through funds from the Federal Highway Administration, the seven track yard required two new additional tracks to handle rapidly increasing capacity. One of these tracks would act as a bypass track, veering away and around the rail yard to accommodate trains passing through, but not stopping. While the land was owned by the railroad, undeniable impacts on the surrounding community were possibilities during the construction.

The City of Vancouver, along with BNSF, orchestrated a six year planning process (1999-2005), with construction getting underway in 2006 and lasting until 2011. The city established a panel of stakeholders, deemed their 'community resource team,' who were each chosen in an attempt to compose a demographically and economically diverse advisory team that reflected the realities of the community. This team of 18 local residents assisted urban planners and designers, along with various consultants, in assembling the plan and design of the new rail yard. Noise, access, and safety were top concerns of the residents who critiqued the progress based on how it would affect their daily lives. Additionally, planning and engineering professionals were also brought in to critique the results in what was deemed 'value engineering,' an exercise to examine where funding could be saved or used more effectively.

The final rail yard, unveiled in 2011, accommodates up to 100 trains per day that serve the local industries scattered along the corridor. Physical buffers to reduce disruptive sounds were installed around parts of the rail yard. Most notably, a bridge for pedestrians and bicyclists was constructed over the 9 track yard in an attempt to bridge the divide between the neighborhoods on each side and, simply, to offer residents safe and direct passage (Washington State Department of Transportation, 2006).

## **City of Holyoke and Pioneer Valley Railroad: Public-Private Partnership for Economic Development**

As detailed in this report, the Pioneer Valley Railroad is a small short line that operates between the Southamptton/Westfield border and downtown Holyoke. It maintains a connection with Pan Am Railways through an interchange on Waters Street, situated in the canal district. It also connects to CSX's east-west line in Westfield. With interchanges that allow traffic to flow in each direction, the Pioneer Valley Railroad provides a strategic advantage to local manufacturers. Due to the industrial makeup of the city, traffic from trucks and related greenhouse emissions were of concern to Holyoke officials.

The City of Holyoke maintains a strategic marketing and development partnership with Pioneer Valley Railroad. Historically, the right of way that runs through downtown Holyoke was underutilized, dotted with abandoned industrial parcels. Seeing the potential in these sites, the City's economic development staff, in conjunction with the railroad, actively seeks businesses to relocate to these sites through an integrated marketing and development approach. While the City receives an increased tax base, diminished truck traffic, and reduced greenhouse gas emissions, the Railroad receives new customers. For both entities, this also results in a positive economic impact on employment.

To foster interest in these sites, the Railroad offers an annual rail tour of its Holyoke corridor, open to any interested businesses. However, there are numerous constraints and challenges in achieving the objectives of increased rail service. As many of the sites sit on contaminated land, the City established a working relationship with Massachusetts Department of Environmental Protection's Brownfields program to streamline the process of assessing the parcels for contaminants and planning remediation. Despite this, the City did not request additional public funding for clean-up.

Another challenge faced by both the City and the Railroad was striking an industrial equilibrium. Part of the right of way intersected residential and rural areas. Underutilized for so long, residents grew use to the lack of activity and were skeptical of a resurrected line. Moreover, residents were concerned of potential public health risks associated with the industries the City and Railroad were attempting to attract. To appease these concerns, the City and Railroad pursued only industries with low-impact output, assuring residents that hazardous materials and potential contaminants were not to be transported or processed downtown.

Often, measuring the success of such programs is ambiguous and difficult to quantify. However, the International Council of Local Environmental Initiatives (ICLEI), a collective of municipal governments, released a 2005 report illustrating the successes of this endeavor. According to ICLEI, this strategic partnership resulted in the relocation of Yankee Candle's wax processing facility to downtown Holyoke. Served by the railroad, the facility imports raw wax components for the manufacturing of candles when, once processed, are trucked to Deerfield for final production. This was the fifth rail-served facility to locate in Holyoke. Sunoco Paper utilized the railroad to import raw pulp for processing and to export finished paper goods. Lowes' Regional Distribution Center is also served by inbound traffic from the railroad. Although it falls outside of the City's boundaries, rail service has resulted in a direct reduction of truck traffic, some of which undoubtedly affects the air quality and transportation network in Holyoke. Annually, Lowes receives 1,500 railcars, displacing 12,000 truck trips from local roads. Other Holyoke businesses that receive rail service include Sealed Air, Sullivan Scrap Metal, and, as of 2014, the former Mt. Tom Power Plant. Overall, approximately 30-35 empty rail cars are delivered to Holyoke monthly to export finished commodities (ICLEI, 2005).



## **State of Florida: Integrated Freight Planning**

The State of Florida sets a precedent for integrated, multi-modal freight planning that is spearheaded by a stakeholder collective. Entitled the Strategic Intermodal System (SIS), the group is comprised of freight facilities, services, public agencies, and related stakeholders. They are responsible for crafting state policy, setting forth a framework for which planners approach the state's multi-modal needs, and selecting projects for annual funding. This strategy is constructed on a foundational plan, the Florida Freight & Goods Mobility Plan (FDOT, 2008). Outlined in the plan are the state's freight rail objectives, challenges, and physical and operational system conditions. A robust landscape analysis that chronicles each railroad, the existing conditions, level of service delivery, commodity makeup, and customer base sustains the plan (Florida Department of Transportation, 2007). While this document deviates little from typical state rail plans, such as MassDOT's Freight Rail Plan, the manner in which it is executed is creative, rigorous, and comprehensive.

Led by the SIS, planning activity involving data collection, capital planning, feasibility studies, and development plans are embarked on at the state, then regional level. State policy, molded by SIS, is executed by the regional Metropolitan Planning Organizations, a policy that diverges from other states, which plan with an air of uncertainty and incompleteness. Freight planning is integrated into all facets of planning at the regional level. Given the expansive scope of freight systems, these groups routinely collaborate with their partners in other states, as well.

Furthermore, these activities are supported by a rich database that is maintained with current information from multiple sources, including Global Insight's Transsearch (the premier proprietary database for freight traffic). With a repository accessible by all departments in Florida's regional planning agencies, knowledge of freight rail can be used regularly. Additionally, these agencies depend

heavily on stakeholder support from local groups, as well as SAS. These include rail companies, nonprofit organizations and trade groups, citizen advocacy groups, and local chambers of commerce. Overall, this data-driven model has widened the scope of planning activity through stakeholder-based and data-driven strategy (Cambridge Systematics, 2008, pp. 17-19).

### **Mid-America Freight Coalition: Interstate, Multi-Agency Collaboration**

Given the undeniably regional nature that defines freight of all types, there is a need for policymaking and planning with a wide scope. Each state presents a different portrait of economic, environmental, and transportation objectives. The freight systems that transgress these state lines often create the industrial identity of these areas; such is the case throughout the Mississippi Valley. The Mid-America Freight Coalition is a partnership between multiple state agencies and universities. According to the organization's website, they collaboratively plan and fund projects while setting overarching economic and transportation policy. The group includes academics, practitioners, and policymakers from Mississippi, Wisconsin, Illinois, Minnesota, Ohio, Kansas, Iowa, and surrounding states.

Creating metrics, drafting policy, and focusing on inter-state planning, this collaborative model is anchored by an academic research teams. The need for comprehensive data collection, precise measurements of freight traffic, and policy that eschews state lines and instead follows the logistics systems it attempts to aid, brought this group to fruition. With agencies from adjacent states collaborating, the planning process is widened and streamlined. Moreover, the organizational structure, which includes multiple working groups and committees composed of local shippers/industry, guides the creation of policy. This phenomenological approach, coupled with applied academic research, has yielded many successful projects. These include regional databases and policy metrics, in-depth

transportation profiles for multiple communities, ‘freight only’ lanes on interstate highways, and private-public partnerships that have rehabilitated freight rail lines across state boundaries.

While the majority of this research focuses solely on transportation policy and engineering, especially how to approach the elasticity of the logistics system, the overall structure of the coalition is notable. Despite a lack of land use and development related planning, this coalition has been successful in funding numerous large-scale infrastructure projects that were crafted through research and “on the ground” insight (Mid-America Freight Coalition, 2014).

### **Maine Department of Transportation: Regional Freight Planning and Public-Private Sector Outreach**

In 2006, the Maine Department of Transportation consolidated its road, rail, water, and air divisions. Tasked with planning and creating policies for a refined intermodal network, MDOT has undertaken many traditional capital-intensive infrastructure projects. The consolidation yielded the Bureau of Freight and Business Services, along with a planning division and program management division. This section is tasked with integrating industrial planning into the daily operations of the agency (Maine Department of Transportation, 2014). Focusing on marketing, public relations, and economic development, the Bureau of Freight and Business Services addresses a planning void that is apparent in other states.

Regional freight projects include a comprehensive State Freight Plan (updated in 2008), an in-depth landscape assessment entitled the Mid-Atlantic Operations Study (2001), and various data oriented projects that model geospatial panel data to understand the intricacies of regulatory compliance, border security, and capacity limitations. These reports are handed down to Maine’s four

MPOs. According to a 2008 study by Cambridge Systematics, only two of Maine’s MPOs conduct freight planning. Constrained by limited resources and staff, planning at the regional level remains disjointed (Cambridge Systematics, 2008, pp. 30-32).

Despite this shortcoming, Maine Department of Transportation participates in collaborations with other state agencies, freight and logistic companies, and regional industrial stakeholders. Examples include the Eastern States Border Coalition, a transportation policy partnership with agencies from surrounding states— Vermont and New Hampshire. This group, beyond addressing typical transportation planning and operational issues, also focuses on the implications of Canadian economic and transportation policy. Maine Department of Transportation further engages the Maine Department of Economic and Community Development, Maine State Energy Office, and the Maine Emergency Management Agency. Outside of government, the agency maintains regular outreach to the private sector and regional stakeholders. These include freight railways, trucking companies, and local industries such as timber and paper manufacturing firms. Routine working groups are augmented by surveys that are distributed to a sample of freight customers, in order to assess the success and drawbacks these shippers face when using the state’s logistic system (Cambridge Systematics, 2008).

Overall, this “on the ground” data collection, coupled with independent freight planning that pursues regional development strategies, is a successful example of a multi-jurisdictional partnership between the private and public sector. If implemented in Massachusetts, this model would provide an invaluable collection of data that could further refine efficiency and strategy.

## CHAPTER 7

### RECOMMENDATIONS & NEXT STEPS

Based on the findings and evaluation of the best practices showcased in this research, the following recommendations have been identified:

**Land Use and Population Concentration** – As previously discussed, population growth and a more densely concentrated population will require more consumer goods and commodities. Environmentally, with trucking's inferiority to rail in all classes of emissions and general fuel consumption, rail could responsibly serve these growing regions. An extensive logistics network requires infrastructure, which many towns are seeking to remove through the creation of rail trails. Given that these lines are rail-banked, it is possible for them to return to service, although the author has not come across a documented case of this occurring. States and localities should collaboratively approach corridor preservation as a necessity given the changing environmental climate and evolving logistics system.

**Local Economic Development** – The existing literature provides a theoretical foundation for embracing rail infrastructure as a catalyst for growth. Coupled with the environmentally-positive spatial development patterns that can emanate from urban and regional cores with access, developing municipalities should embrace short lines. This can be done simultaneously, through economic development policies and local land use planning. A landscape analysis and survey of modal preferences for existing industry can be supplemented with increased dialogue with short line operators, a formidable first step. Following this data-gathering, structuring local land makeup diligently and adeptly may result in heightened economic/industrial growth that is designed with cognizance of the regional

logistics system. Success, long-term, could bode a reduction auto and trucking reliance. For relatively isolated municipalities and regional planning agencies alike, this is a possibility that has not been fully explored.

**Local Programs and Incentives** – Initiatives, such as the Industrial Rail Access Program, are need to be continuously funded and then marketed for municipalities, shippers, and industrial land owners to ensure parcels with access to short line service can receive assistance in supporting rail infrastructure improvements. While other states have also premiered incentives, these programs must be analyzed for effectiveness as they evolve from infancy. A valuable incentive for rail service, such as grant and low-interest loan programs for small industrial businesses, may be at times necessary to catalyze shipper's location and modal choice. However, a parallel campaign to guide land use must supplement it. Given widely varying municipal positions regarding short lines, incentive programs at the state level may be able to accomplish these objectives more efficiently. Detrimentially, the entities that craft state and regional policy are faced with an unsettling land use problem. Without the powers granted under the Zoning Enabling Act, state policy and state money can persuade municipalities, but cannot artfully realize the land use reality that is needed. Preservation of industrial land that can sustain freight rail service is scarce. According to MassDOT, suitable sites of at least 50-100+ acres, are being rapidly developed into incompatible uses (MassDOT, 2010b). The rezoning of industrial land and market forces are the root of this issue but, since MassDOT cannot interfere with local zoning, will continue without incentives that can fuel change. As recommended by MassDOT, an integrated programmatic approach to incentivize the responsible development of vacant or under-utilized parcels is needed.

**Zoning Clarification** – The issue of preemption may reveal resource-consuming outcomes. Clarity is needed to outline the true regulatory powers possessed by home rule communities, non-home rule

communities, and the federal government. Furthermore, the effect these zoning bylaws may have on the location decisions of rail-dependent firms, as well as the further development of existing short lines, should be further explored.

**Data-Driven Corridor and Industrial Preservation** – Land use phenomenon along short line corridors, and all rail corridors, must be further explored. Mapping the shifts in land use offers an opportunity to explore the correlation between zoning bylaws and the impact they are having. Data documenting current service trends, including commodity shipments, as well information on the preferences of industry is needed. Furthermore, criteria for assessing land parcels based on their rail-suitability needs to be developed, refined, and then packaged for planning and development practitioners.

**Outreach and Education** – Knowledge of short line railroads, their customers, and their position in the regional logistics system needs to be passed along to active planners. This role may be fulfilled at the regional level, through an instrumental role for regional planning agencies. From here, this understanding can be transferred through the frequent advisory role regional planning agencies maintain with member communities. Given the general absence of short line operations in municipal plans, it can be argued that an effort is necessary to resolve this gap. Municipalities may not be prone to do this, hence the regional planning agency's role. State agencies, while effective at mitigating certain financial barriers faced by short lines, are not versatile enough or maintain the adequate resources and networks to fulfill this role. Regional planning agencies possess a unique opportunity to lead in this area.

**Policy Structure and Collaboration**– At the state and the regional level, land use and transportation planning should be integrated in the long-term. The lack of parallel policy and action has resulted in disjointed outcomes. These include the conversion of industrial land that is adjacent to rights of way to residential and/or mixed uses. While transportation planners monitor demand and volume, they rarely

interact with the structuring of development or the physical design of land that is in proximity to infrastructure. Collaborative policy that draws from both disciplines is needed to vanquish environmental, physical, and transportation challenges. Balance will not be achieved if they remain independent endeavors. Examples to follow include the model used by the State of Florida, as well as the Baltimore Maritime Industrial Overlay District. Both have yielded land use decisions, grounded by calculated synergy, which may not have materialized if not for cross-disciplinary planning. In Massachusetts, engaging short line operators, industrial and logistic firms, advocacy groups, and local officials regularly would expand the diligence and scope of planning.

**Urban and Physical Design Mitigation** – Planning is seldom successful unless refined design accompanies it. Solutions that mold the built environment in a manner that reduces many of the negative aspects associated with railroad operations should be pursued. Undeniably, an era of revised transportation and shipping methods is upon us, given the changing climate and evolution of our energy generation. Rail presents a key opportunity here, given its environmentally-friendly nature. However, progress may be restricted by local stakeholders and citizens who believe the railroad incessantly burdens a community with disruptions. Adaptation and public acceptance of rail, an essential political force, could be aided by design solutions that reduce the visual, audible, and physical disruptions.



## CHAPTER 8

### CONCLUSION

This research explores the land use policy structure as it relates to short line railroads. A critical facet of our logistics systems, these railroads wade through precariousness, with certain zoning bylaws and planning visions conflicting with their operations. Conclusively, it is apparent that the majority of communities does not identify or approach short lines in their planning processes. This is despite the indelible mark rail systems have made on development patterns and local economic bases. Negligence of short lines is evidently disrupted from time to time, with plans that envisage the removal of operations from a community, replaced with recreational or mixed-use development. Compounding this is the muddled air that many zoning bylaws are cast in; a reality that may have tenacious legal consequences for both the railroad and the municipality. While recommendations that may yield local progress are put forth, regional and state policy must indisputably be revised. Fundamentally, the divorced processes of land and transportation planning have allowed municipalities to proceed with their individual ambitions unrestrained, regardless of the wider implications that may radiate from a lack of consensus and collaboration. Further research that measures the impact these policies have on the railroad and regional land use makeup are also recommended.

## BIBLIOGRAPHY

- Allen, B. J. and J. F. Due. 1977. "Railway Abandonments: Effects on the Areas Served, *Growth and Change*." *Growth and Change* 8 (2): 8-14.
- Allen, W. Bruce, Michael Sussman, and Drew Miller. 2002. "Regional and Short Line Railroads in the United States." *Transportation Quarterly* 56 (4): 77-113.
- Aschauer, David Alan. 1989. "Is Public Expenditure Productive?" *Journal of Monetary Economics* 23 (2): 177-200.
- ASLRRA. "Connecting America's Communities." ASLRRA, accessed 3/15, 2014, [http://www.aslrra.org/images/ASLRRA\\_FS\\_PZ\\_Connecting.pdf](http://www.aslrra.org/images/ASLRRA_FS_PZ_Connecting.pdf).
- Atlanta Regional Planning Council. 2008. "Freight Mobility Plan." ARPC. Accessed 8/25/14 [http://documents.atlantaregional.com/transportation/freight/Freight\\_Mobility\\_Plan\\_Final\\_Report\\_Feb%206\\_%202008.pdf](http://documents.atlantaregional.com/transportation/freight/Freight_Mobility_Plan_Final_Report_Feb%206_%202008.pdf)
- Babcock, Michael. "Efficiency and Adjustment: The Impact of Railroad Deregulation." *Cato Policy Analysis* 33.
- Baer, William C. 1997. "General Plan Evaluation Criteria: An Approach to Making Better Plans." *Journal of the American Planning Association* 63 (3): 329-344.
- Bay Colony Rail Trail. "Bay Colony Rail Trail: A Great Walking Path for Everyone." Kickstarter, accessed 8/1/2014, , <https://www.kickstarter.com/projects/352360370/bay-colony-rail-trail-a-great-walking-path-for-eve>.
- Berke, Philip and David Godschalk. 2009. "Searching for the Good Plan: A Meta-Analysis of Plan Quality Studies." *Journal of Planning Literature* 23 (3): 227-240.
- Berke, Philip R. and Maria Manta Conroy. 2000. "Are we Planning for Sustainable Development?" *Journal of the American Planning Association* 66 (1): 21-33.
- Bickford, E., T. Holloway, A. Karambelas, M. Johnston, T. Adams, M. Janssen, and C. Moberg. 2014. "Emissions and Air Quality Impacts of Truck-to-Rail Freight Modal Shifts in the Midwestern United States." *Environmental Science and Technology* 48 (1): 446-454.
- Bryson, J., A. Carroll, and B. Crosby. 1991. "Fighting the Not-in-My-Backyard Syndrome in Minneapolis." *Journal of Planning Education and Research* 11 (1): 66-74.
- Bucldley, Patricia and Daniel M. Westbrook. 1991. "Market Definition and Assessing the Competitive Relationship between Rail and Truck Transportation  
." *Journal of Regional Science* 31 (3): 329-346.
- Cambridge Systematics. 2002. *Freight Rail Bottom Line Report*  
*American Association of State Highway and Transportation Officials*  
*Cambridge Systematics, 2002: American Association of State Highway and Transportation Officials.*

- Cambridge Systematics. 2011. "Frederick County Freight and Freight Dependent Land Use Plan." National Capital Region Transportation Planning Board.
- Cape Cod Commission. 2011. *Regional Transportation Plan*: Cape Cod Commission.
- Cassidy, G. and E. Feser. 1993. *The Benefits of Public Assistance for Short Line Rail Rehabilitation in North Carolina*. Raleigh, NC.
- Cassidy, G. and E. J. Feser. 1996. "Rethinking State Rail Policy: The Benefits of Rail Preservation Include More than Job ." *Policy Studies Journal* 24 (1): 57.
- Cassidy, Patrick. "Rail Manager Switches After 25 Years." *Cape Cod Times*, September 29th, 2007.
- Caves, Douglas, Laurits R. Christensen, and Joseph A. Swanson. 2010. "The Staggers Act, 30 Years Later." *Regulation* 33 (4).
- Cidell, Julie. 2012. "Fear of a Foreign Railroad: Transnationalism, Trainspace, and (Im)Mobility in the Chicago Suburbs." *Transactions of the Institute of British Geographers* 37 (4): 593-608.
- Clark, Colin. 1957. "Transport: Maker and Breaker of Cities." *Town Planning Review* 28: 237-50.
- Interstate Commerce Act of 1887*  
, (1887): Ch. 104 Stat. 379.
- City of Chicago. ND. "Northwest Industrial Corridor TIF." Accessed on 9/12/14.  
[http://www.cityofchicago.org/city/en/depts/dcd/supp\\_info/tif/northwest\\_industrialcorridortif.html](http://www.cityofchicago.org/city/en/depts/dcd/supp_info/tif/northwest_industrialcorridortif.html)
- Congressional Budget Office. 2006. *Freight Rail Transportation: Long-Term Issues*  
. Washington D.C.: Congressional Budget Office.
- Cosenza, Robert and Neil R. Southern. 2011. "Regulation of Rail Line Abandonments: A Perspective of the Policies of the Interstate Commerce Commission and the Surface Transportation Board  
." *Journal of Transportation Law, Logistics, and Policy* 78 (4): 255-270.
- Cosh, George. 2014. "After Lethal Crash, Quebec's Lac-Mégantic Fears Return of Oil Trains." *Wall Street Journal*, published July 4, 2014. Accessed February 20, 2015.  
<http://www.wsj.com/articles/after-lethal-crash-quebec-town-fears-return-of-oil-trains-1404502664>
- Cronan, William. 1991. *Nature's Metropolis: Chicago and the Great West* W. W. Norton & Company.
- Dalton, Linda C., Burby, Raymond J.,. 1994. "Mandates, Plans, and Planners." *Journal of the American Planning Association* 60 (4).
- Dewar, Margaret and David Epstein. 2007. "Planning for "Megaregions" in the United States." *Journal of Planning Literature* 22: 108.
- Due, J. F. and N. D. Sidhu. 1974. "Private Versus Social Decision-Making for Railway Abandonment.  
." *Quarterly Review of Economics and Business* 14: 23-42.
- Evans-Cowley, Jennifer and Maria Manta Conroy. 2006. "The Growth of e-Government in Municipal Planning." *Journal of Urban Technology* 13 (1): 81-107.

Feser, E. J. and G. Cassidy. 1996. "Rethinking State Rail Policy: The Benefits of Rail Rehabilitation Include More than Jobs." *Policy Studies Journal* 24 (1): 57-73.

Florida DOT. 2006. "2006 Florida Freight and Passenger Rail Plan." Accessed on 9/12/14.  
<http://www.dot.state.fl.us/rail/Publications/Plans/2006/flrail06.pdf>.

Forkenbrock, David. 2001. "Comparison of External Costs of Rail and Truck Freight Transportation." *Journal of Planning Literature* 16 (1): 80-163.

FRA. "Freight Rail Today." US Department of Transportation, accessed 3/15, 2014,  
<https://www.fra.dot.gov/Page/P0362>.

Frankel, Emil and Thomas Menzies. 2012. "Reducing Oil use in Transportation." *Issues in Science & Technology* 28 (2): 51-58.

Fruin, J. E. "A Summary of Research Studies on the Community Impacts of Rail Abandonment in the Midwest." Staff Paper, St. Paul, Department of Agricultural and Applied Economics, University of Minnesota.

Gibby, R., R. Kitamura, and H. Zhao. 1990. "Evaluation of Truck Impacts on Pavement Maintenance ." *Transportation Research Board* (890658).

Gleason, Mike. "  
**Grafton & Upton Railroad Seeks Federal Decision on Propane** " *Milford Daily News*, August 1, 2013.

Glickman, T.S., Erkut, E., Zschocke, M.S.,. 2007. "The Cost and Risk Impacts of Rerouting Railroad Shipments of Hazardous Materials." *Accident Analysis and Prevention* 39 (5): 1015-1025.

Gordon, Deborah. 1991. "Steering a New Course ." In , 21-47. Washington DC: Island Press.

Grafton and Upton Railroad. "Grafton & Upton Railroad.", accessed 4/12, 2014,  
<http://www.graftonuptonrr.com/>.

Hahn, Barbara. 2004. "Union Terminal: Business Clubs, Railroads, and City Planning in Cincinnati, 1880-1933." *Journal of Urban History* 30: 707-728.

Hall, Peter. 1994. "Squaring the Circle: Can we Resolve the Clarkian Paradox?" *Environment and Planning B: Planning and Design* 21: s79-s94.

Haywood, Russ. "Rail Freight Growth and the Land-use Planning System."  
."Sheffield Hallam University, .

Hopper, Gordon. 1999. "The History of the Grafton and Upton Railroad." *National Railway Bulletin* 64 (4).

Housatonic Railroad Company. "The Housatonic Railroad Company.", accessed 4/12, 2014,  
<http://www.hrrc.com/>.

- ICLEI. ND. "Environment and Economy Working Together: Holyoke's Partnership with Freight Rail." Accessed 9/15/14.  
[http://www.icleiusa.org/action-center/learn-from-others/Freight\\_Case\\_Study.pdf](http://www.icleiusa.org/action-center/learn-from-others/Freight_Case_Study.pdf)
- Isard, Walter. 1956. *Location and Space Economy: A General Theory Relating to Industrial Location, Land use, Trade, and Urban Structure*. Cambridge, Massachusetts: Massachusetts Institute of Technology.
- Johnson, Jeff,. 2005. "Railroad Safety, Security, Secrecy." *Chemical & Engineering News* 83 (12): 35-37.
- Johnston, Van R. and Jeremy F. Plant. 2008. "Rail Security After 9/11: Toward Effective Collaborative Regulation." *Public Works Management & Policy* 13 (1): 12-21.
- Jonnes, Jill. 2007. *Conquering Gotham: Building Penn Station and its Tunnelts*. New York, NY: Penguin Books.
- Jonston, Van R. and Jeremy F. Plant. "Rail Security After 9/11 Toward Effective Collaborative Regulation." *Public Works Management and Policy* 13 (1): 12-21.
- Kaiser, Edward, David Godschalk, and Stuart Chapin. 1995. *Urban Land Use Planning*. Chicago: University of Illinois Press.
- Karr, Ronald D. 1995. "the Rail Lines of Southern New England - A Handbook of Railroad History." In : Branch Line Press.
- Koff, Larry and MAPC. *Millis Town Center Properties Market Analysis*. Millis, MA: Town of Millis.
- Landry, Michael and John Ozment. 2000. "Short Line and Regional Railroad Executives Look at their Industry." *Transportation Quarterly* 55 (2): 19-27.
- Leigh, Nancey Green and Nathanael Z. Hoelzel. 2012. "Smart Growth's Blind Side." *Journal of the American Planning Association* 78 (1): 87-103.
- Lindholm, Maria and Sonke Behrends. 2012. "Challenges in Urban Freight Transport Planning – a Review in the Baltic Sea Region." *Journal of Transport Geography* 22: 129-136.
- Lynde, C. and J. Richmond. 1992. "The Role of Public Capital in Production." *Review of Economics and Statistics* 74 (1): 37-45.
- Maine DOT. 2012. "Bureau of Transportation Systems Planning." Accessed 9/12/14.  
<http://www.maine.gov/mdot/transplanning.htm>.
- Maryland Port Administration.2008. "The Economic Impacts of the Port of Baltimore." Baltimore, MD.
- Mass Coastal Railroad. "Mass Coastal Railroad.", accessed 4/12, 2014, <http://masscoastal.com/>.
- MassDOT. 2010. *Massachusetts Department of Transportation Capital Investment Plan FY 2011-2015*. Boston, MA: MassDOT.

- . . *Massachusetts Department of Transportation Capital Investment Plan FY 2014-FY 2018*. Boston, MA: MassDOT.
- . . 2010. *Massachusetts Department of Transportation Freight Plan*. Boston, MA: MassDOT.
- . . 2010. *Massachusetts Department of Transportation State Rail Plan*. Boston, MA: MassDOT.
- . "Massdot Board of Directors Approves Purchase of Berkshire Rail Line from Housatonic Railroad Company.", last modified 7/16/2014, accessed 8/1, 2014, <http://www.massdot.state.ma.us/main/tabid/1075/ctl/detail/mid/2937/itemid/460/MassDOT-Board-of-Directors-Approves-Purchase-of-Berkshire-Rail-Line-from-Housatonic-Railroad-Company.aspx>.
- Mayer, Harold M. 1946. "Railroads and City Planning." *Journal of the American Institute of Planners* 12 (4): 5-20.
- . 1954. "Urban Nodality and the Economic Base ." *Journal of the American Institute of Planners* 20 (3): 117-121.
- Mcclymont, K. and P. O'Hare. 2008. "'We're Not NIMBYs!'" Contrasting Local Protest Groups with Idealized Conceptions of Sustainable Communities." *Local Environment* 13 (4): 321-335.
- Miller, Chad R. and Bethany Stich. 2011. "Economic Development Perspectives and the Policy Process: Case of Railroad Revitalization Versus Rails-to-Trails." *Administration & Society* 44: 1.
- Moore, Karen W. 2014. "State Impediments to Transit-Centered Planning in Milwaukee, Wisconsin, 1916-1928." *Journal of Urban History* 40: 318.
- Mumford, Lewis. 1961. *The City in History*. United States: Harcourt, Brace, & World.
- . 2009. "The Highway and the City." In *Technology and Values: Essential Readings*, edited by Craig Hanks, 361: Wiley-Blackwell.
- . 1934. *Technics and Civilization* Harcourt Brace, and World.
- Munnell, A. 1990. "Why has Productivity Growth Declined? Productivity and Public Investment." *New England Economic Review, Federal Reserve Bank of Boston*: 3-22.
- Myrdal, G. 1957. In *Economic Theory of Underdeveloped Regions*, 12-15. London: University Paperbacks, Methuen.
- New Bedford, Port of and Inc HDR. 2011. *Port of New Bedford Massachusetts: Freight Rail Connections*: Port of New Bedford.
- Orr, Maureen F. MS, Wendy E. PhD Kaye, Perri MPH Zeitz, Marilyn E. BA Powers, and Lisa BA Rosenthal. 2001. "Public Health Risk of Railroad Hazardous Substance Emergency Events ." *Journal of Occupational & Environmental Medicine* 43 (2): 94-100.
- Ostria, S. J. 2004. *2010 and Beyond: A Vision of America's Transportation Future*; . Fairfax, VA: American Association of State Highway and Transportation Officials.

- Parker, Francis and Gorman Gilbert. 1977. "Rail Planning—Crisis and Opportunity." *Journal of the American Institute of Planners* 43 (1): 13-23.
- Pinsly Railroad Company. "Pioneer Valley Railroad.", accessed 4/12, 2014, <http://www.pinsly.com/companies/pvrr/>.
- Porter, Michael. 1997. "New Strategies for Inner-City Economic Development. ." *Economic Development Quarterly* 11 (1): 11-27.
- Prater, Marvin and Michael Babcock. 1998. "Prater, Marvin and Michael Babcock. "Determinants of Profitability of Grain Dependent Short Line Railroads." *Transportation Research E* 34(3), (1998): 187-200." *Transportation Research E* 34 (3): 187-200.
- Price, Richard. "Grafton & Upton Railroad Faces Suit from Upton Residents." *Grafton Daily Voice*, August 3, 2012.
- Public Services, Office of. 1997. *Overview: Abandonments & Alternatives to Abandonments*. Washington D.C.: Surface Transportation Board.
- Rodrigue, J. and T. Notteboom. 2009. "The Geography of Containerization: Half a Century of Revolution, Adaptation and Diffusion." *GeoJournal* 74 (1): 1-5.
- Rowangould, G. 2013. "Public Financing of Private Freight Rail Infrastructure to Reduce Highway Congestion: A Case Study of Public Policy and Decision Making in the United States." *Transportation Research Part A* 57: 25-36.
- Schaffer, William A. "Regional Models of Income Determination: Simple Economic-Base Theory." *Regional Impact Models*. Georgia Institute of Technology, accessed April 18, 2014, <http://www.rri.wvu.edu/WebBook/Schaffer/index.html>.
- Schley, David. 2013. "Tracks in the Streets: Railroads, Infrastructure, and Urban Space in Baltimore, 1828-1840." *Journal of Urban History* 39: 1062.
- Scott, James K. 2006. "We the People: Do U.S. Municipal Government Web Sites Support Public Involvement?" *Public Administration Review* 66 (3): 341-353.
- Slaughter, Kara. 2005. *Runaway Train? Federal Preemption of State and Local Laws Regulating Railroads*: Shoreham Area Advisory Committee.
- Southern, R. Neil, PhD and Robert Cosenza DBA. 2011. "Regulation of Rail Line Abandonments: A Perspective of the Policies of the Interstate Commerce Commission and the Surface Transportation Board." *Journal of Transportation Law, Logistics, and Policy* 78 (4): 255-270.
- Sternberg, Matthew and Charles H. Banks. 2006. "Shortline Railroads in Economic Development." *Economic Development Journal*: 16-23.
- Stevens, Mark R. 2013. "Evaluating the Quality of Official Community Plans in Southern British Columbia." *Journal of Planning Education and Research* 33: 471.
- 49 CFR Part 1151 - FEEDER RAILROAD DEVELOPMENT PROGRAM  
49 U.S.C. 10907, (1983): .

- . . N.D. *SECTION 10501(b) PREEMPTION Attachment* . Washington, D.C.: Surface Transportation Board.
- . . 2001. *Surface Transportation Board Reports Volume 5-27: STB Finance Docket 33971, Joint Petition for Declaratory Order- Boston and Maine Corporation and the Town of Ayer*. Washington, D.C.: Surface Transportation Board.
- . . August 2001. *Surface Transportation Board Reports Volume 5-36: STB Finance Docket no. 33966, Friends of the Aquifer, City of Hauser, ID, Hauser Lake Water District, Cheryl L. Rodgers, Clay Larkin, Kootenai Environmental Alliance, Railroad and Clearcuts Campaign*. Washington, D.C.: Surface Transportation Board.
- Tennessee Department of Transportation; Cambridge Systematics. 2008. "Best Practices for Statewide Freight Planning." Accessed 9/12/14.  
<http://www.tdot.state.tn.us/longrange/freightplan/Task2-TDOT-StatewideFreightPlanningBestPracticesv7.pdf>
- Utt, R. 2002. *Review of HUD's 1991 Report: Not in My Backyard: Removing Barriers to Affordable Housing*. Washington D.C.: United States Department of Housing and Development, Aspen Systems Inc.
- Verma, M.,. 2009. "A Cost and Expected Consequence Approach to Planning and Managing Railroad Transportation of Hazardous Materials." *Transportation Research Part D* 14 (5): 300-308.
- Washington State DOT. 2006." Vancouver Rail Project Update." Accessed 9/12/14.  
<http://www.wsdot.wa.gov/NR/rdonlyres/75C0F40C-8C27-4388-AF38-CA3D282D956E/0/VancouverRailupdate.pdf>
- Weber, Melvin. 1963. "Order in Diversity: Community without Propinquity." In *Cities and Spaces: The Futue use of Urban Land*, edited by Wingo Jr Lowden. Baltimore, MD: Johns Hopkins University Press.
- Weber, Robert Phillip. 1990. *Basic Content Analysis*. 2nd ed. Sage Publications.
- Williams, Ernest W. Jr. "A Critique of the Staggers Rail Act of 1980." *Transportation Journal* 21 (3): 5-15.
- Winebrake, James J., James J. Corbett, Aaron Falzarano, J. S. Hawker, Karl Korfmacher, Sai Ketha, and Steve Zilora. 2008. "Assessing Energy, Environmental, and Economic Tradeoffs in Intermodal Freight Transportation." *Journal of the Air & Waste Management Association (Air & Waste Management Association)* 58 (8): 1004-1013.
- Winebrake, James J., James J. Corbett, J. S. Hawker, Sai Ketha, and Steve Zilora. 2008. "Assessing Energy, Environmental, and Economic Tradeoffs in Intermodal Freight Transportation
- Steve Zilora." *J Air Waste Manag Assoc*. 58 (8): 1004-10013.



Zink, Daniel. 1984. *Analysis of Short Line Railroad Development in North Dakota, Report no. 181*.  
Fargo, ND: Department of Agribusiness and Applied Economics, North Dakota State University.

