Bridging the Gap: Community-Oriented Transit Development

BRIDGING THE GAP:
COMMUNITY-ORIENTED TRANSIT DEVELOPMENT

A Thesis Presented
by
MATTHEW C. JONES

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

MASTER OF ARCHITECTURE

May 2014

Architecture + Design

BRIDGING THE GAP:
COMMUNITY-ORIENTED TRANSIT DEVELOPMENT

A Thesis Presented

by

MATTHEW C. JONES

Approved as to style and content by:

_____
Kathleen Lugosch, Chairperson

_____
Caryn Brause, Member

_____
William T. Oedel, Chair
Department of Art, Architecture, and Art History

DEDICATION

To my fiancée Jennifer for your love, support, and patience throughout this process. Your support has made this project possible.

To my family, your support from the very beginning is realized in these pages.

ACKNOWLEDGMENTS

I wish to express my gratitude for the support, critique, and dedication of the Architecture + Design faculty over the past two years.

I wish to give special thanks to Kathleen Lugosch for her continual faith in me throughout this thesis process. Your guidance and soft-spoken critique have helped me to develop my personal style over the past two years and has helped to drive this thesis design.

I would also like to acknowledge and thank Caryn Brause for her persistence and insight. You challenged me to question my assumptions and to dig deeper in order to truly understand this project.

Finally, I would like to thank my fellow classmates for their advice, support, commiseration, and criticism over the last two years. It has been a pleasure sharing countless hours in studio with you all and learning and growing with you.

ABSTRACT

BRIDGING THE GAP: COMMUNITY-ORIENTED TRANSIT DEVELOPMENT

MAY 2014

MATTHEW C. JONES, B.S. STATE UNIVERSITY OF NEW YORK AT ALFRED

M.ARCH, UNIVERSITY OF MASSACHUSETTS AMHERST

Directed by: Professor Kathleen Lugosch

The bedroom community has become a prevalent and oft-criticized part of the modern architectural landscape. These suburban towns have continually grown radially outward from major cities across the nation since the end of the Second World War. While these suburbs have served to fulfill housing needs and wants of society, pressure to develop has often forced this growth to occur at a much more rapid rate than a traditional community. This rapid development has led to poorly implemented infrastructure, especially with regard to walkability and public transportation, which has fallen short of meeting the needs of users. These solutions in turn have contributed to the automotive dependence of society, despite the numerous detrimental effects this engenders, such as waste of natural resources, greenhouse gas emissions, and increased congestion of roadways. This has led many within the architectural community to push for a shift away from the suburbs due to their lack of sustainability, especially when compared to urban environments. However, the reality of the situation which our society faces does not enable us to simply abandon the suburbs in a mass exodus to city centers. Even if it did, there is a large percentage of the population which simply likes suburbia and its associated lifestyle. If this is the case, then,

there needs to be a shift in the way transit is implemented within these communities. This thesis will examine how improving access to transit can revitalize bedroom communities and better serve their residents. Through examining the town of Beacon, NY, a bedroom community serving New York City and currently underutilizing its existing transit infrastructure, this thesis will explore how architecture can integrate mass transit into lives and daily activities of a community in order to better serve its residents and reduce automotive dependency.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

The mainstream proliferation of the automobile since the conclusion of the Second World War has been one of the main driving factors of suburban sprawl in the United States.[1] The independence and flexibility offered by automobiles has allowed residents to move outside the dense, urban communities traditionally developed and to flock to the open, airy "neighborhoods" that sprawl has created. These communities, due to their lack of density, often necessitate the use of an automobile to reach basic services. Even further, there is often a lack of proportionate work available within the suburbs, forcing residents to commute to urban centers in order to work.[2] This trend has led to the creation of "bedroom communities," suburbs in which a large proportion of residents commute to urban centers. This commuting often follows the suburban dependence on the automobile. If we then accept that bedroom communities in their current form are unsustainable and untenable, then the following problem arises: what becomes of these suburbs?

---

[1] Duany, A., Zyberk, E., & Speck, J. (2000). *Suburban nation: the rise of sprawl and the decline of the American dream*. New York: North Point Press, 31.

[2] Duany et al., 52.

CHAPTER 2

BEACON, NEW YORK

History and Background

The city of Beacon is in the process of being reborn. A small city of approximately 16,000, Beacon is fast becoming a center for art and culture in upstate New York. Benefitting from the availability of the Hudson to transport goods to New York City and beyond, Beacon had been an industrial center during the latter half of the 19th century. Beacon was also a popular weekend retreat for New Yorkers due to the casino and resort atop Mount Beacon.

Figure 1 - Mount Beacon Hotel and Casino
From
<http://www.inclinerailway.org/history_heyday.htm>

However, the destruction of the casino by fire, the lack of clay to continue making bricks (one of Beacon's prime exports), poorly implemented urban renewal, and economic downturn in the 1970s led to Beacon's decline. By the 1980s, almost eighty percent of Beacon's commercial buildings were vacant.

However, the announcement that the Dia Art Foundation would be creating a contemporary art museum sparked a resurgence. Opened in 2003, Dia:Beacon was housed in a former Nabisco box factory. Praised for its architecture and exhibition spaces, this new museum continues to introduce a new generation of New Yorkers to Beacon. Beacon began to draw artists who

were fed up with the New York lifestyle and who hoped to profit from the growth this new museum would generate. These new residents have helped revitalize the once run-down Main Street and have helped it become the vibrant home of galleries, shops, and restaurants that it is today.

Context and Community

Beacon is located roughly sixty miles north of New York City on the eastern shore of the Hudson River. In terms more relevant to the subject of this thesis, that sixty miles equates to approximately an hour and a half commute. That number, however, doesn't take into account the traffic that commuters face on a daily basis, which can sometimes add an hour or more to the total. A train leaving Beacon station takes approximately the same hour and a half, to which the time it takes to reach the station and final destination on the opposite end must be added. Given that there is little difference in the commute time for most travelers, it is clear that commuting time is not the prime motivator in commuting method choice.

Figure 2 - Beacon Location Map
Generated by Author with content from Open Street Map.

It's close proximity to the water has long had an influence on Beacon's development and on its residents. From the turn of the century, various attractions have made Beacon a weekend destination for New York residents. Originally, steamships made the trek up the Hudson, bringing guests to visit the casino atop Mt. Beacon. Today, the same railroad that allows commuters to reach New York allows New Yorkers to visit Beacon's art galleries and the world-famous Dia:Beacon museum. According to Metro North, there are nearly five hundred riders departing Grand Central Station in Manhattan every Saturday for Beacon.

Beacon's main street is home to numerous art galleries, antique stores, restaurants, and other unique businesses. This traditionally-oriented main street is united by a tight-knit group of business owners that come together with local artists on a monthly basis to offer "Second Saturday." A community-wide party, this event often includes live music, art demonstrations, or restaurant samplings, and is designed to further connect Beacon inhabitants. The accessibility of Main Street to residents is one of its most appealing aspects. Roughly half of Beacon's population is within a 5-minute walk from Main Street.

Figure 3 - Main Street, Beacon, NY
Image by Rob Penner, from Chronogram Magazine

This includes many lofts and apartments that are provided in the numerous mixed-use buildings lining Main Street. It is this density and interconnectedness that help make Beacon so successful.

Another key aspect to Beacon is its close ties to nature. Taking advantage of the river access, Riverfront Park, Dennings Point, and Long Dock all provide public access to the river. Hiking, volleyball, and summer concerts all help to unite the community of Beacon. Long Dock even provides canoe and kayak rentals and lessons and organizes water-based excursions. The Fishkill Creek trail begins near the river and winds through Beacon and farther into Dutchess County. Further inland, on the trails left by the abandoned inclined railway, Mount Beacon park hosts hiking and biking trails. In addition to its art, Dia:Beacon is home to magnificent gardens. While this access to nature is widely utilized, it comes with a catch. All of these destinations are not easily accessed by most residents without the use of an automobile (or bicycle). Walkability to these locations is very limited, which diminishes the benefits of these amenities. Compounding the problem, Riverfront Park and Long Dock are isolated by the train tracks and separated from each other by some of the parking for Beacon Station.

Beacon and Transit

Despite all of the elements which make it successful, Beacon has a transit problem. During the late 1990s and early 2000s, and especially following the

September 11th terrorist attacks, many chose to move out of New York City and the surrounding metropolitan area. This exodus greatly increased the number of so-called "super-commuters" hailing from the Mid-Hudson area. Census data puts this growth at approximately 19% over that period for Beacon, an increase of roughly 3,000 residents.[3] While census data doesn't provide a clear picture as to commuter destinations, based on data about commute length, we can presume that approximately 1,750 commuters (or approximately 27% of Beacon's work force) travel to the New York City area on a daily basis.[4] By using census data on method of travel to work, we can further surmise that of these 1,750 commuters, only 17.4 percent utilize some form of public transit, or 304 workers.[5] Since the Metro North Railroad provides the most logical and easiest route from Beacon to New York City, we will assume for the sake of argument that those 304 workers all use the train as their method for reaching NYC. This means that there are approximately 1,500 workers reaching the city via automobile every day. Since census data states that 77.4 percent of these workers travel alone, that put on average of 1,161 cars on the road each day.[6]

---

[3] U.S. Census Bureau. (2000, 2010*). Beacon city, New York QuickLinks*. Retrieved April 19, 2013, from http://quickfacts.census.gov.

[4] *Work and Jobs in Beacon, New York (NY) Detailed Stats: Occupations, Industries, Unemployment, Workers, Commute*. Retrieved April 19, 2014, from http://www.city-data.com/work/work-Beacon-New-York.html.

[5] *Work and Jobs in Beacon, New York*

[6] *Work and Jobs in Beacon, New York.*

Another aspect of this problem is found in the automotive usage to reach Beacon Station. While there is no statistical data available for the parking lots serving Beacon Station, LAZ Parking, the contractor managing the parking lot for the MTA, states that the parking is currently filled to an average of 89 percent.[7] Since there are 1,430 spots available for parking, this equates to 1,273 spots filled on average. While some of this is due to the necessity of reaching the station from outlying communities, some of this parking could be eliminated by making the station more accessible to walkers from Beacon. As the station exist currently, it is served by a narrow sidewalk that takes an indirect route from downtown Beacon. This path covers approximately a distance of half a mile and an elevation change of 125 feet. Even without taking into account the distance to this path from a rider's home, this distance makes for a 10 minute walk, the maximum recommended by Andres Duany.[8] The mean grade change is also at the suggested maximum of five percent, creating a route that will be uncomfortable and longer than most transit users will be willing to negotiate.[9] This is further emphasized by the walk score of 45 for the train station address, deemed automobile dependent, as opposed to the Beacon average of 80, which represents a highly walkable area.[10] Therefore, many of Beacon's commuters using the railroad travel to the station by automobile.

---

[7] LAZ parking, personal communication, November 26, 2013.

[8] Duany et al., 37.

[9] The Design of the Pedestrian Network. (n.d.). Retrieved April 20, 2014, from http://www.nzta.govt.nz/resources/pedestrian-planning-guide/docs/chapter-14.pdf

[10] Data generated from http://www.walkscore.com, April 22, 2014

Beacon Station is also accessible from the west side of the Hudson River via a passenger ferry service. This service runs from the city of Newburgh, a larger metropolitan center across the river, and provides free parking at its terminal there. However, the usage of this ferry is hindered by the lack of easy access to the station on the Beacon side. Analysis of ridership numbers[11] point to a large number of non-Beacon residents using the station as well, and since Beacon is the closest station for most residents in Newburgh and further north, many of these residents come from these locations. It is likely, based on ferry usage statistics[12], that most of these commuters are driving to Beacon Station.

This thesis will look at the factors that shape transit usage and strive to discover what factors have led to Beacon's underutilization of its transit resources. By examining successful transit development, transportation research, and Beacon itself, I hope to uncover the underlying causes and examine how architecture and the built environment can be implemented in order to reduce automotive dependency.

---

[11] T. Bowen, personal communication, November 19, 2013.

[12] Mid-Hudson News Network (2013, September 18). Newburgh-Beacon Ferry ridership down 21% this year. *Daily Freeman*. Retrieved from http://www.dailyfreeman.com/general-news/20130918/newburgh-beacon-ferry-ridership-down-21-this-year

CHAPTER 3

TRANSPORTATION AND SUBURBIA

While there are many characteristics that make suburbs attractive, the major shift away from urban dwelling has had serious unintended consequences. First, the average suburban dweller drives twice as many miles per year compared with the average urban resident. This results in a carbon footprint that is almost three times as large for the suburbanite.[13] This further leads to a dependence on foreign oil and results in a much greater depletion of our nonrenewable resources.

Secondly, CDC studies have shown that living in the suburbs lead to a generally more sedentary lifestyle.[14] This may seem somewhat obvious, but the walking, biking, and generally more active lifestyle of an urban dweller results in better health and reduced obesity. A large part of this difference again stems from the prevalence of the automobile in suburbia.

Finally, as fuel costs continue to rise, the suburbs will become financially untenable. While there was at one point a financial savings to live in the suburbs,

---

[13] Dunham-Jones, E. (2010, January). Retrofitting suburbia [Video file]. Retrieved from http://www.ted.com/talks/ellen_dunham_jones_retrofitting_suburbia#

[14] Frumkin, H. (2002). Urban sprawl and public health. *Public Health Reports*, *117*, 201-217. doi:10.1016/S0033-3549(04)50155-3

the increasing cost of auto ownership has removed this savings and even shifted the benefit to the urban neighborhood in certain cases.[15]

Given these facts, then, what are we to do with the suburbs? There is no immediate way to simply abandon the suburbs. Our existing urban centers are incapable of supporting such a major influx, and financially it would be near impossible to adapt them in any short period of time. Additionally, there is the problem of individual selection. The advantages of suburban home ownership are oft-touted in the so-called "American Dream," and there will remain a portion of the population who would simply choose this lifestyle regardless of the negatives. If the suburb is to remain, then must transform and retrofit it order alleviate these problems. As one of the major offenders in this situation is the automobile, I intend to look at ways to take urban transit strategies and apply them to the suburbs so as to reduce automobile usage.

The Role of Architecture

The major concept that is proposed to lessen the influence of the automobile is that of Transit Oriented Development (TOD). This concept, at its core, is about creating small mixed use developments within walking distance of a transit station. These developments generally create their own microcosm within the urban fabric, providing most or all needs for residents and integrating retail, offices, and open space into a dense residential collective.

---

[15] Dunham-Jones, 2010.

Transit-oriented development provides many benefits. By providing a variety of uses within a walkable context, there is no need to drive in order to reach common destinations such as grocers, restaurants, and stores. Similarly, the proximity to transit allows residents to walk to the transit source, whether train, bus, or other method, in order to reach their workplace.

However, often TOD has little or no connection to the existing character of the city. Streets may continue through, public space is touted as being available to all, and the commercial influx is certainly not limited in use to residents of the new development. But there is something about cities which is less superficial; there is a kind of inherent quality unique to every city. Paul Lukez asserts that such projects are "often predictable and less likely to incorporate local idiosyncrasies and individual expression."[16] In order to truly integrate transit and its associated development into an existing locale, the development needs to be in tune with this character.

Cities and towns which develop over time have a natural variety which has been refined over time. This process gives a city its unique identity and allows for socially, economically, and culturally diverse growth that has developed in response to the needs of the residents. The open, organic development of a space over a period of time allows for a process of natural selection and leads to

---

[16] Lukez, Paul. *Suburban transformations*. New York: Princeton Architectural, 2007. Print. 15.

a city composed of elements whose existence originates from those who live there.

Instead, many developments and suburban retrofits struggle with this concept. Many try to appear old when they are not, to create new spaces for interaction which supersede old ones, and to turn the traditional concept of the main street into a new design strategy for a strip mall. Because of the closed-loop nature of such designs, they tend to ignore the existing character and the way the city already functions and build upon it.[17] Some suburbs may need this level of creation, where no community exists and no architecture exists to foster it. Such is the case with King Farm, a development in Maryland located in a formerly rural site. While there is a completely separate conversation that could be had about the merits of locating such a development in a rural setting, the lack of context does necessitate the simulation of a history and a more natural development process. However, in most cases, the goal of transit architecture and development should be to make transit a part of the existing fabric. Instead of cookie-cutter development, each design needs to be tailored for its intended destination.

Smart Growth and New Urbanism

One of the preeminent movements associated with fixing the suburbs is the Congress of New Urbanism. New Urbanism builds its theories upon the

---

[17] Lukez, 24.

concepts of traditional developmental methods in order to develop "Smart Growth." The Smart Growth movement suggests ten keys to retrofitting a suburban neighborhood. They are:

- Create a Shared Vision for the Future . . . and Stick to It
- Identify and Sustain Green Infrastructure
- Remember that the Right Design in the
- Wrong Place Is Not Smart Growth
- Protect Environmental Systems and Conserve Resources
- Provide Diverse Housing Types and Opportunities
- Build Centers of Concentrated Mixed Uses
- Use Multiple Connections to Enhance Mobility and Circulation
- Deliver Sustainable Transportation Choices
- Preserve the Community's Character
- Make It Easy to Do the Right Thing[18]

Originally introduced by Andres Duany and Elizabeth Plater-Zyberk, Smart Growth focuses on applying these concepts within suburban contexts as a means of reforming them into more community-oriented places. These concepts hail from historic research of successful non-urban development and look at factors such as diversity, density, walkability, and the commercial main street as keys which led to their success.[19]

---

[18] Corrigan, Mary Beth (2004). *Ten principles for smart growth on the suburban fringe*. Retrieved from ULI--Urban Land Institute website: http://www.uli.org/wp-content/uploads/2012/07/TP_SuburbanFringe.ashx_.pdf

[19] Corrigan, v.

Complete Streets and Walkability

Related to these concepts is that of the complete street. A complete street is so-called because it is designed with equal attention for all users, not just those in automobiles.[20] Complete streets focus on creating spaces that are equally friendly and safe for cyclists and pedestrians. Through use of landscaping and scaling strategies, complete streets generally attempt to control and slow traffic and strive to increase the comfort of non-automotive users. Integration of islands, bike lanes, wide sidewalks, and lining trees all help to achieve this end. This strategy is often effectively used to create traditional "main street" development (or redevelopment).

The increased walkability provided by complete streets is key in reducing automotive usage. Often, suburban development creates uncomfortable, narrow sidewalks (if any at all) and forces long walks, sometimes across wide swaths of asphalt parking lots, in order to reach a destination. By consolidating the commercial strip into a walkable main street and creating comfortable, short, and accessible routes to it, residents no longer feel the need to drive to a given location.[21]

---

[20] Walkable and Livable Communities Institute (2012). *Walkable 101: the walkability workbook*. Retrieved from http://www.walklive.org/project/walkability-workbook/

[21] Speck, J. (2012). Walkable city: how downtown can save America, one step at a time. New York: Farrar, Straus and Giroux.

CHAPTER 4

PRECEDENTS

The next step in the process of solving Beacon's transit issue was to explore projects which had dealt with similar obstacles. Looking at projects which had dealt with transit connectivity, topography, multiple transit sources, and other factors allowed for the examination of multiple strategies prior to applying them to a design concept. By analyzing such projects, this thesis was able to see which elements were most successful and why and to distill which elements were critical to the success of a project.

Downtown Transit Center

Designed by Wallace, Roberts and Todd and completed in 2008, the Downtown Transit Center in Charlottesville, Virginia is one of the few multimodal transit centers that have been completed and not just proposed outside of a major city. Charlottesville is both a college town as the home of the University of Virginia and a tourist attraction as the home of Thomas Jefferson and Monticello. Additionally, Charlottesville has a highly successful and activated

Figure 4 - Charlottesville Downtown Transit Center
Photo by Jeffrey Totaro, from Greensource

downtown. However, the city is also surrounded by suburbs, which is another factor for my choosing this case study. The Transit Center was designed as a terminus and transfer point for public buses, an existing rubber-tire trolley serving the UVA campus, and bicyclists.[22] The resulting multimodal facility also needed to become a gateway to the city, with a drop-off point for coach tours, a visitor's center, cafe, newsstand, and exhibition areas. Additionally, the project needed to be sensitive to the historical context of downtown Charlottesville.

The Downtown Transit Center lies at the eastern end of Charlottesville's Main Street pedestrian mall. Transformed in the 1970s by the celebrated landscape architect Lawrence Halprin, this nine-block corridor is lined with historic buildings fronted by shops and restaurants and is considered one of the most successful pedestrian malls in the country. But for years, it has been cut off from City Hall, an outdoor amphitheater, and the 1905 Chesapeake & Ohio railway depot which is now a major office building by a tangle of roads to the east. The transit center was designed in order to reduce the loading that necessitated these roads, thus helping to complete Halprin's vision by extending the mall eastwards all the way to City Hall.[23]

---

[22] Chen, A. (2008, November). Jeffersonian ideal: in charlottesville, wallace roberts & todd architects designs a transit hub that links the past with the future. *Greensource*. Retrieved from http://greensource.construction.com/projects/0811_transitstation.asp

[23] Wallace Roberts & Todd (2008). *Downtown transit station*. Retrieved from http://www.charlottesville.org/Modules/ShowDocument.aspx?documentid=27631

One of the key factors in WRT's design was to minimize the amount of parking on site. In order to do this, WRT placed the bus stops south of the mall on Water Street, curving and widening that road to accommodate up to eight city buses in single file, alongside private coaches and an eventual light-rail system that has been proposed. However, by utilizing Water Street, WRT was forced to deal with a 17-foot grade difference between the mall level above and the buses below.[24] In response to this differential, WRT created a new stepped outdoor plaza. This plaza serves to connect Water Street and the old C&O depot to the south and the City Hall building to the north via a series of landings that encourage both pedestrian activity and socialization while waiting for transit services.

The building was certified LEED Gold and provided a "halo" building for the city's sustainability initiative, but it seems that more effort was put into making a building which provided "bragging rights" than actually served to bolster transit throughout the city. There is no reference to how the DTC would generate more commuter traffic and reduce automobile loads on the city, possibly because the project was rushed and not thought about in terms of a larger overall strategy of transit services.

Figure 5 - Relationship to Amtrak Line
Photo by Barry Halkin, from Greensource

[24] Chen, 2008.

Even the siting of the project, however, shows that the desire to shift transportation paradigms in the area was not a priority. Instead of locating the building at the Charlottesville Amtrak station, located approximately a mile down the road, or superseding this station and providing access at the new location (the tracks are located right across the street, but there is no train stop) the Downtown Transit Center ignores an opportunity to integrate a key transit component more powerfully (Fig. 6). There is a bus loop which stops at both locations, but such added complexity and time is something which Duany clearly states is detrimental to transit use.

Figure 6 - Relationship of Transit Center to Amtrak Station
Generated by Author with imagery from Bing Maps

The building itself is rather successful and is merely let down by an overall weak transit strategy. The building is successful in its goals of sustainability and, although this of course arguable, does a fairly successful job of aesthetic integration despite its modernistic design. The ancillary uses the facility provides, such as meeting rooms, an art gallery, a café and newsstand, and an outdoor social gathering space are great for making people feel comfortable in their waiting and even serve to minimize frustrations with waiting for transportation.

Additionally, the siting near the downtown mall and amphitheater allow the hub to serve most users adequately, especially if they are using only the bus/trolley services as opposed to commuter rail.

Intermodal Hub

Salt Lake City's Intermodal Hub, designed by AJC Architects and completed in 2005, was designed to be a catalyst for light rail and bus use within the city as well as a focal point for a transit-oriented development community. While set in a more urban context than Beacon provides, the multimodal strategies and mixed-use programming make it a precedent worth studying.

The Hub brings together many transit options in one central location: Greyhound bus service, Amtrak rail service, and UTA light rail and rapid bus transit services.[25] By combining these modes of transit, the hub serves to unify commuters entering the city via rail or express bus with the city's transit network as well as connecting city residents to services that can

Figure 7 - Intermodal Hub
From <http://www.flickr.com/photos/39017545@N02/7174902375/>

[25] Cracroft, C., Holbrook, J., Schindewolf, J., & Wright, H. (n.d.). Salt lake city intermodal hub. Retrieved from http://faculty.arch.utah.edu/miller/Intermodal%20Hub%20Case%20Study.pdf

allow users to travel nationally or even internationally. This combination of uses proves to be a truly universal transit solution and seeks to benefit all community members, not just those of commuters or urban dwellers.[26] However, there are a few issues with these options as well. The TRAX light rail currently stops at the facility, but the current station merely shares a site with the Hub and does not use the main building at all.[27] Furthermore, the TRAX service only currently serves one of the three major lines, requiring riders accessing other parts of the city to travel out of their way in order to use the light rail system. Additionally, the site is currently lacking in parking. The master plan includes a proposal for a parking garage, but this has yet to materialize.

The Intermodal Hub also integrates two other non-mass transit options: U Car Share, a car rental program similar to Zipshare, and Greenbike, a city-wide bike share system. U Car Share allows users to rent cars short-term, providing further flexibility and providing further incentive for urban residents to forgo car ownership. By allowing short-term car rental, these users are still able to have a car when necessary and depend on mass transit when they have no need for an automobile. The Greenbike program allows members to borrow any bike from the facility and return it to any Greenbike location.[28] One flaw of the Greenbike program is that it is only seasonal. Granted, many users would choose not to ride

---

[26] IBI Group (n.d.). *Salt lake city intermodal hub and master plan*. Retrieved from http://www.ibigroup.com/projects/salt-lake-city-intermodal-hub-and-master-plan

[27] Cracroft et al, 7.

[28] *Salt Lake Central Station*. (n.d.). Retrieved April 22, 2014, from http://www.transitunlimited.org/Salt_Lake_Central_Station

in the winter, but limited year-round service would likely better serve the community and those who rely upon the transit network. Further supporting cyclists, the hub is host to the Bicycle Transit Center. The center offers bicycle rentals, shower facilities, lockers, temperature-controlled bike storage, and full service repair.

While the facility itself is well-programmed and provides a wide variety of transit options, the siting of the facility seems to be a failure. Located 9 blocks (approx. 1.5 miles) from the downtown, the transit hub is isolated from most pedestrian accessibility.[29] While accessibility via light rail or bus is of course an option, the limited (at least currently) light rail accessibility and the lack of proximity to the downtown definitely let down an otherwise successful project. Further exacerbating the issue, the recent construction of the North Temple Station allows most commuters to bypass the hub altogether. This new station allows better light rail access, is closer to downtown, and is a station most Hub users will need to pass through anyway in order to reach many destinations. While this does take away from the sustainability factor of the Intermodal Hub and reduce

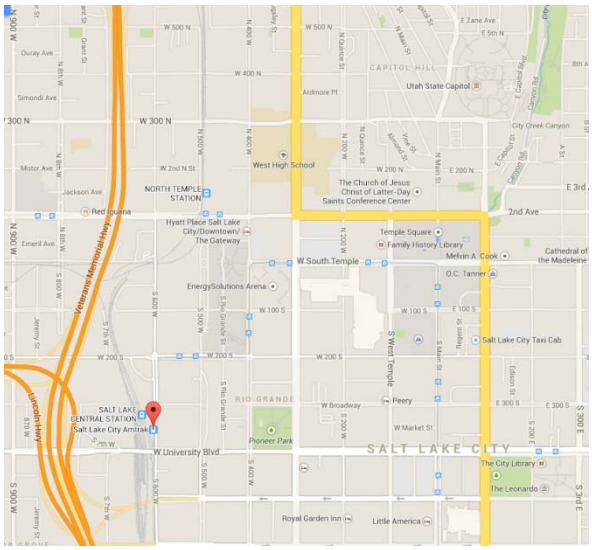


Figure 8 - Proximity of Intermodal Hub to Downtown Salt Lake City
From Google Maps

[29] Cracroft et al, 15.

its education potential, the combined stations do serve to promote alternative transit within Salt Lake City.

One of the final key parts to the Intermodal Hub is the planned Transit-Oriented Development. While not yet constructed, this new development will mitigate the proximity issue to a large extent and create a residential base that will have limited need of automobiles.

Union Station Bicycle Transit Center

Designed by KGP Design Studio, the Union Station Bicycle Transit Center is located adjacent to Washington D.C.'s Union Station. One of the most impressive parts of the Center is that it provides storage for 150 bicycles in 1,000 square feet, eliminating the need for an equivalent 45,000 square feet of automobile parking (Fig. 10).[30] Given the parking issues that Beacon faces, that is an important consideration, and if bike usage could be encouraged, would serve to alleviate most of them. In addition to the 150 "permanent" spaces, which are available for rental, there is short-term parking for

Figure 9 - Bicycle Storage
From <http://www.wejetset.com/magazine/2009/11/16/865/new_bike_transit_cent>

[30] *Bicycle Transit Center at Union Station*. (n.d.). Retrieved from http://architizer.com/projects/bicycle-transit-center-at-union-station/

an additional 50 bikes, which while not as secure, allows for occasional users to store their bikes as well. By using tilting, stacking racks, the station allows for 2 bikes to fit into the footprint of one bike, almost acting as a vertically-oriented, double-loaded corridor. Finally, the most important aspect of the storage is that it provides 24/7 access via card swipe to the facility.[31] This convenience allows freedom for users while maintaining security and peace of mind for them.

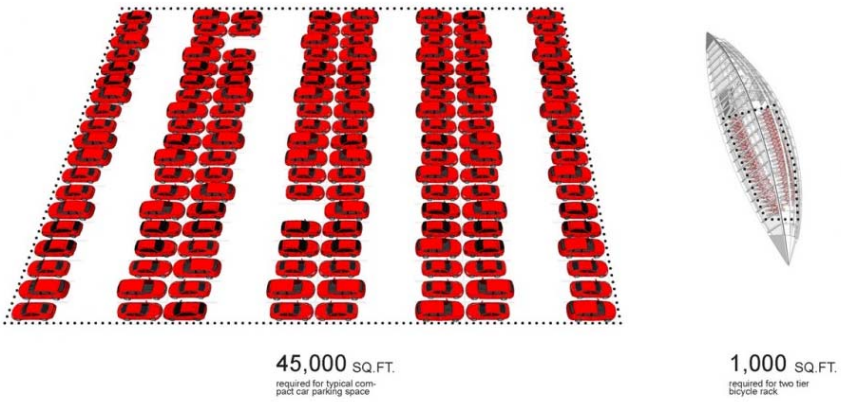


Figure 10 - Parking Space Comparison for 150 Cars and Bicycles
From KGP Design

In addition to the storage aspect, the facility provides other amenities designed to increase bike usage. One of the largest of these is the provision of changing facilities and lockers. These allow users the opportunity to change after a ride in to the station and to leave their bike gear at the facility in a safe, secure way. While these features are important, the implementation of them within this project is lacking. The largest issue with these provisions is that while there is potential storage of 200 bicycles at the Center, there are only 40 lockers

[31] *Bicycle Transit Center*

available.[32] Granted, in this situation not everyone will need or want a locker, but most users would likely want the ability to safely store their helmets and other gear instead of carrying them back and forth every day. It seems that the lockers were more of an afterthought, and should have been integrated into the storage solution at a one-to-one ratio.

Another essential feature which the Center incorporates is a bicycle repair shop. This allows commuters to service their bikes and purchase accessories without interfering with their normal commute. This lack of interruption is something which Duany considers essential in encouraging alternative transportation usage.[33] The one thing lacking in the service facility is that there is no provision for "loaner" bikes while service is being performed. While there is some opportunity provided for service to be completed post-commute, this may not work for all users and the simple inclusion of several "loaner" bikes seems an obvious solution.

Overall, the Union Station Bike Transit Center is a successful implementation. While there are several shortcomings, it seems to be a viable alternative for commuters. The location, amenities, and security all serve to make it easy to integrate into a daily routine. Additionally, the design and location allow the facility to act as an advertisement and showcase for alternative transit.

---

[32] *Bikestation Washington DC*. (n.d.). Retrieved April 22, 2014, from http://home.bikestation.com/bikestation-washington-dc

[33] Duany et al, 235.

Trollstigen Tourist Route

The Trollstigen Tourist Route is a national tourist site located in Norway. The site is located within a mountain pass in a deep fjord and winds along steep, craggy terrain. The purpose of the construction is to open up the beautiful vistas offered by the site to all and allow tourists to reach areas and explore views most would never have been able to see otherwise. While Trollstigen, Norwegian for Troll's Path, has been a popular destination simply for its mountain roads, Reiulf Ramstad Architects was asked to create an entire visitor experience, including a mountain lodge, restaurant, gallery, and gift shop as well as bridges and paths to outdoor pavilions and platforms meant for viewing the surrounding environment.[34]

Figure 11 - Paths Over Terrain
Photo by Reiulf Ramstad Architects

Most relevant to the topic of this thesis are the paths, bridges, and viewing platforms that negotiate the steep terrain to provide pedestrian access. The rocky, uneven terrain of the Trollstigen site is part of its character, and thus the architect's decision to raise the path over this on pedestals is a conscious choice

---

[34] *National tourist route trollstigen*. (2009, August 20). Retrieved April 22, 2014, from http://www.archdaily.com/32441/national-tourist-route-trollstigen-rra/

made to minimize the impact on the surrounding environment (Fig. 11). This choice also helps to lighten the structure and give it the feeling of cascading down the mountain, almost as if it is mimicking the stream and waterfall.

The paths follow a linear procession that is broken only for select platforms which highlight specific moments (Fig. 12). These platforms serve as stopping points, showing that these locations have an importance worth stopping for.[35] The architect clearly chose these locations to emphasize certain views and moments which characterized the site, such as the platform cantilevering over the waterfall.

The provision of these platforms also lets visitors rest along the long path. While the paths provide a much easier route to view the site than hiking and climbing would have, there is still a large distance and grade change covered along the way, and providing rest points along the way is essential in ensuring that all visitors can and will make the trip to reach the end.

---

[35] *National tourist route trollstigen*, 2009.

Figure 12 - Site Plan
From Reiulf Ramstad Architects

By allowing visitors to break en route, Reiulf Ramstad Architects also allow for moments of conversation, allowing for a more communal experience of the site. While the procession along the paths is generally introspective and isolated, these breakout spaces allow for visitors to share their experiences and insights, enhancing the trip for all.

Olympic Sculpture Park

The Olympic Sculpture Park by Weiss/Manfredi is an outdoor urban sculpture gallery in Seattle, Washington. The park uses landform construction and a series of paths to negotiate a four-lane road and a set of train tracks as

well as a forty foot grade change.[36] These paths connect the city grid to the waterfront, allowing for public interaction with art and the environment.

Built on a site formerly owned by Union Oil of California, the site was heavily contaminated. Weiss/Manfredi's design strategy was to use infrastructure as a means of remediation, with the landform constructions and clean fill from the Seattle Art Museum's expansion capping untreated soil. Additionally, the infrastructure was designed to combine contemporary art and the urban lifestyle.[37] Dealing with the existing infrastructure while implementing its own, the landform serves as a reminder of the original topography of the site which the road and trains have disrupted.

The site begins with a gallery building. Carved into the created landform, the building serves to hold the edge of the street while transitioning into the park experience behind. This building also hides the parking garage burrowed under it and the landform, allowing vehicular access without infringing on the experience of the park.

---

[36] *Seattle art museum: Olympic sculpture park*. (n.d.). Retrieved from http://www.weissmanfredi.com/project/seattle-art-museum-olympic-sculpture-park

[37] *Seattle art museum.*

The pathways of the landform follow a 'Z' shape, weaving back and forth across the site (Fig. 13). The purpose for this pattern is twofold. First, the 'Z' shape helps lengthen the paths, allowing both more space to experience art and more length in which to negotiate the grade change smoothly. Secondly, each bend is designed to highlight a specific view.[38] The first bend points toward the Olympic Mountains, the second views of downtown and the harbor, and the final leg descends to the newly created beach and waterfront access.[39] Additionally, each of these legs provides alternative access to the site via stairs which connect to other neighboring elements.

Figure 13 - Landform of Olympic Sculpture Park
Photo by Benjamin Benschneider, from Weiss/Manfredi

[38] *Olympic sculpture park*. (n.d.). Retrieved from http://www.archdaily.com/101836/olympic-sculpture-park-weissmanfredi/

[39] *Seattle art museum.*

CHAPTER 5

DESIGN SOLUTION

Overview

Solving the lack of transit usage in Beacon is a difficult problem. There are several issues that all play a role in the underutilization, and all must be addressed in order to develop a successful solution.

The lack of equal access to the site is one of the key issues to be dealt with. The existing train station heavily prioritizes the automobile and marginalizes

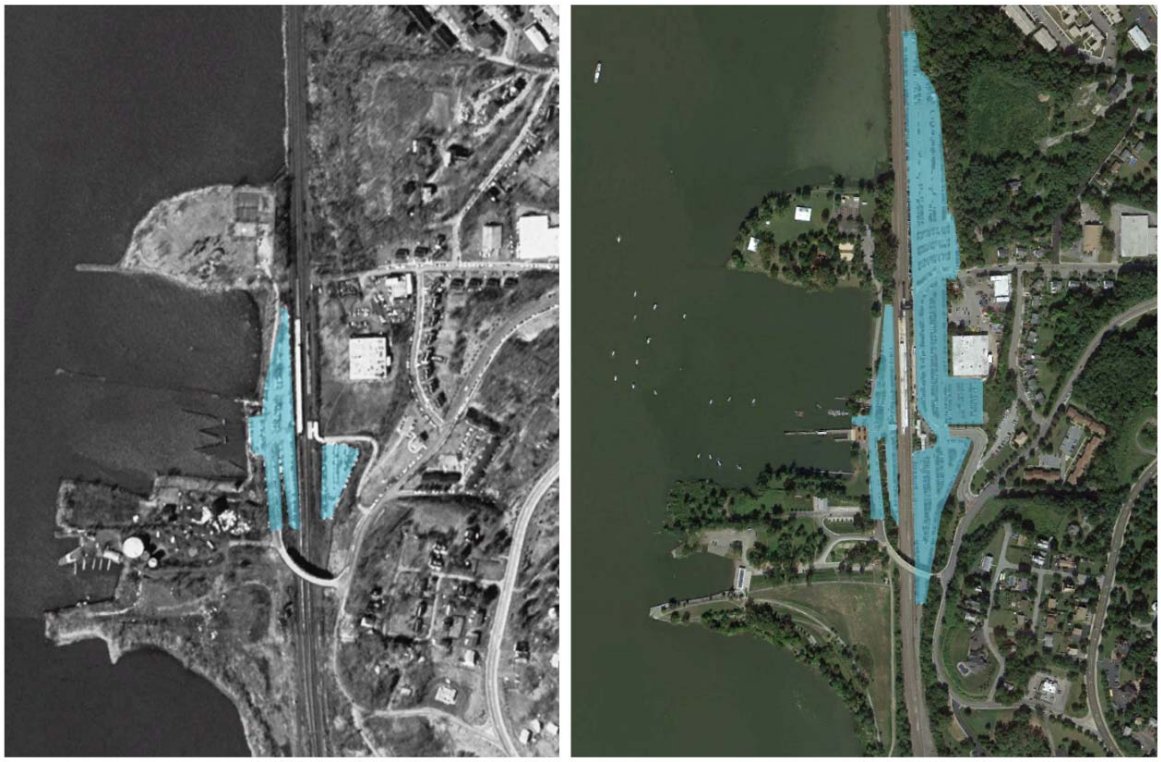


Figure 14 - Comparison of Parking, 1994 and 2013
From Google Earth with highlights by Author

other forms of access. This is evidenced by aerial imagery dating back to 1994 which shows that the parking for the station has more than tripled in size since that time period (Fig. 14). Based on the current usage of the station, it seems likely that that trend will continue unless another solution is provided. Since it would be nearly impossible to shift Beacon users away from parking currently, the solution needs to examine policy implementations which can disincentivize automobile usage.

Figure 15 - Site Issues and Features
Image by Author

The favoring of the automobile in the current scheme fails to provide cyclists with a secure place to leave their bikes, supplying a minimum even of outdoor unsecure bike racks at the station. Even if riders are willing to negotiate

the long, steep hill to reach the site, many would be unwilling to risk leaving their cycles at the station.

Similarly, ferry users are also marginalized. Site constrictions and the large amount of parking force ferry riders to cross one of the station's parking lots in order to reach the station. Further discouraging users is the lack of permanent shelter in which to await the ferry. The current ferry schedule runs every fifteen minutes at peak hours and every half hour at other times. While this schedule does provide a regular option, there is still the chance that users will be forced to wait for the ferry. The only shelter provided in case of inclement weather is a small tent structure. This tent houses no seating and does not serve a large number of people, sometimes leading ferry users to huddle in the tunnel passing underneath the train tracks to await the ferry's arrival. While there are some issues with the ferry on the Newburgh side as well, they are beyond the scope of this thesis and will be considered as a potential future phase of the project.

Another issue stems from the natural character of the site. The steep topography separating Beacon from the river is a major reason there is little pedestrian and bicycle access to the site (and the river itself). Even without considering financial ramifications, railroad requirements make moving the station closer to downtown physically impossible, at least in a scale large enough to change this problem. This forces any potential solution to negotiate the 125 foot grade change between the city and the station.

There also is another automotive-induced issue created by Route 9D. A major highway running north-south between downtown Beacon and the river. This three lane road has formed an edge to downtown Beacon and has become a barrier to pedestrian access from downtown. The width of the road (forty feet at most locations) and the lack of crosswalks, signals, and traffic-slowing measures has created a barrier that is uncomfortable to cross as a pedestrian or cyclist.

Finally, Beacon Station also serves as a gateway to many New York City day trippers. Most of these visitors are making the trip solely to visit Dia:Beacon and never venture to make the trek to downtown Beacon. Mostly, this is due to a lack of connection between the station and downtown as well as Dia and downtown. Any proposed solution should address this issue and allow for easier connections between these three locations.

Site Selection

One of the key decisions to be made in this project is the selection of the site. Because so much of this project will depend upon infrastructure in order to be successful, careful site selection is essential.

Existing Site Issues

This thesis initially intended to utilize the existing lands owned by the Metropolitan Transit Authority (MTA), the parent company for the Metro-North

Railroad. This site has the advantage of existing automobile infrastructure as well as already being owned by the MTA. However, this site posed several large issues which made it less than ideal for the new train station.

Figure 16 - Land Use Map of Beacon
Image by Author

The first of these issues is related to the topography. While negotiating the hill will be an issue at any location along the river, the current site is barred from a direct route from downtown by a group of townhomes located on the hill. Negotiating around these homes resulted in design concepts which were either long and twisted, discouraging users because of their length and lack of clear destination, or enormous bridges, spanning a distance of roughly 2,000 feet.

These solutions were both unrealistic and not in keeping with the design ideals set for the project.

Figure 17 - Existing Beacon Station
From <http://www.panoramio.com/photo/41603054>

Another major issue with the existing site is not directly related to access to transit, but with access to the waterfront itself. The massive parking lot serving the existing site as well as the tracks and station serve as a barrier from public river access. Additionally, the parking lot on the west side of the tracks separates two public parks from each other and interrupts some of Beacon's prime environmental access. By relocating the station, it is possible to remove or address these barriers and make the river more accessible to Beacon residents.

Choosing a New Location

Once it became obvious that the existing site was not going to be the optimal location for the new station, a new location had to be found. Through struggling with the existing site and its limitations, it became clear that a new site needed to meet several criteria. First, the new site needed to be as close to downtown as possible. Next, close proximity to the water was also essential in order to have easy ferry access. Finally, the site needed to be able to serve as a midpoint between Dia:Beacon and downtown.

By studying aerial imagery and tax maps of the area, the final site was chosen for the project. This site was chosen based on the criteria above, as well as the ownership of the land by Scenic Hudson. A nonprofit group that seeks to preserve land and access to nature, the site chosen was preserved as part of the hiking and biking trails originating from Long Dock Park. For the purposes of this thesis, it is proposed that the MTA would negotiate a trade of land to gain ownership of this site while turning over the majority of the existing station site to Scenic Hudson. It is also assumed that the access to these trails would need to be preserved or remediated as part of such an agreement.

Choosing this new site solves many problems, but it introduced a new problem of parking and vehicular access. While clearly there is a move in this project away from the automobile, it is designed to be equally accessed. In the long term, the site should allow for a shift away from the automobile, but human nature and habit as well as commuters from outside Beacon dictate that there must still be a significant amount of parking. In addressing this issue, it became clear that there

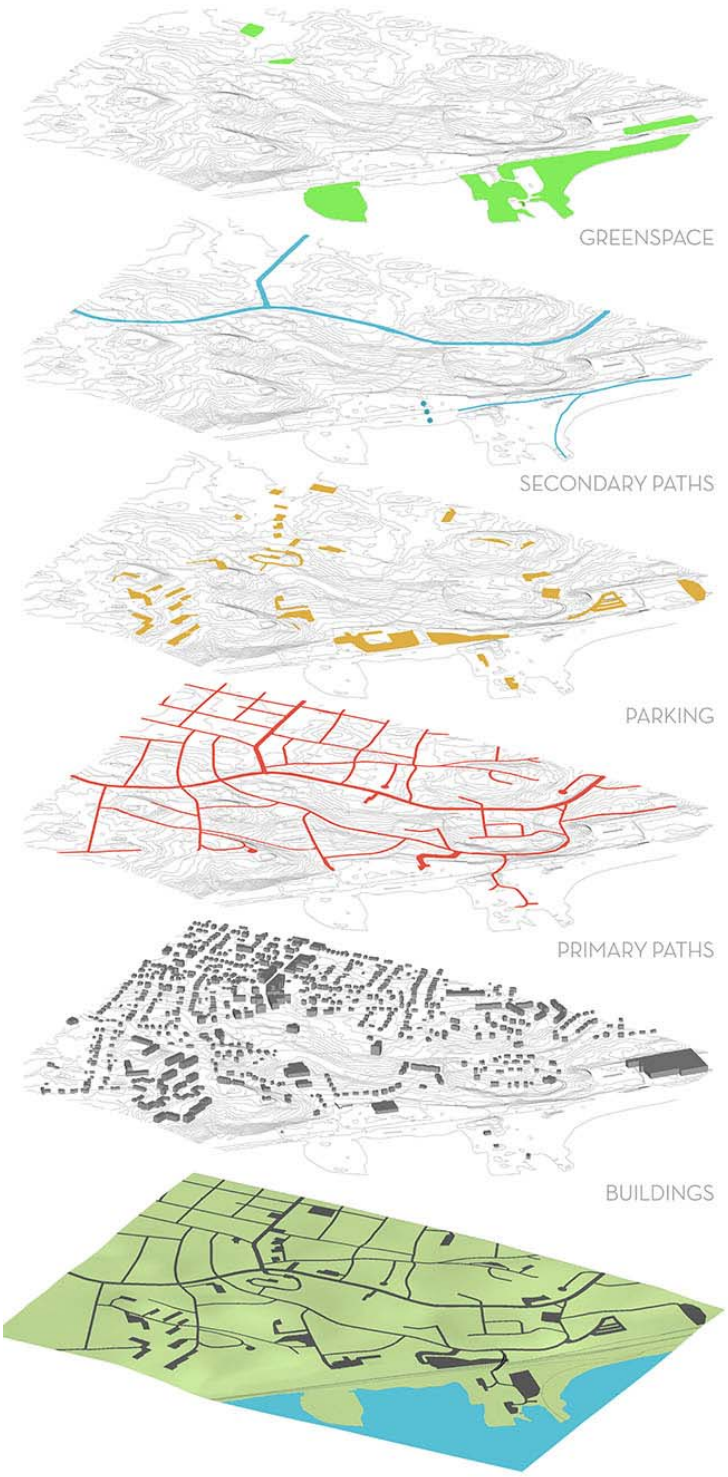


Figure 18 - Analysis of Site Influences
Image by Author

would not be enough parking on site, and thus an alternative parking site needed to be found. This led to the discovery of two adjacent

Figure 19 - Beacon Lot Map with Overlay Showing New Sites
Image from Dutchess Co. ParcelAccess with overlay information by the Author

abandoned parcels of land located on the hillside above which abut Route 9D. These parcels are both owned by Beacon Ridge Associates, Inc., a private land speculation corporation that would likely be willing to sell these parcels to the MTA.

Reimagining the Existing Site

With the site selected for the new station, there exists the question of what to do with the existing station. As mentioned previously, the proposal of thesis is that this land would be exchanged with Scenic Hudson in order to gain the land for the new station. However, since the southern end of the existing parking lot abuts the new site, it is proposed that this parking area remain for handicapped access, drop-offs, and limited parking. The rest of the lands turned over to Scenic Hudson are intended to allow the joining of Long Dock Park and Riverside Park as well as allow pedestrian crossing of the tracks to access these parklands, possibly by utilizing the existing station tunnel which passes under the tracks. While this project is regarded as a later phase of this project and outside the immediate scope of this thesis, this is still an important consideration in the future of the greater context of Beacon's waterfront that will have an impact on the way people interact with the new transit hub.

Project Program

This project will be designed on several scales. First, there is the overall planning aspect of the project. This includes the parking and infrastructure needed to make the site accessible via all methods of transportation. This portion of the project will also seek to link downtown Beacon, Dia:Beacon, and the transit hub to better allow visitors to travel to these destinations. As part of this larger design, there are also small moments of designed program which allow users to break away from the paths and infrastructure and appreciate the beauty of the

Hudson Valley. On a smaller scale, there is the design of the actual transit hub. This is the main focal point of the development and serves to enhance and feed the other aspects of the project.

Planning and Infrastructure

In order to get Beacon residents to the site, Route 9D needs to be addressed as a first step. Introducing complete street concepts such as bike lanes, wider sidewalks, and landscaping can help slow traffic and reduce the scale of the road to a more pedestrian-friendly size. Also, integrating several traffic slowing measures to allow for easy crossing will facilitate pedestrian use. Since 9D borders the entire south and west sides of the residential portion of Beacon, this newly redesigned street will act as a feeder for the transit site and will allow users to safely access the more designed pathways leading to the hub.

The Role of Policy

As mentioned previously, one of the key issues with this site is the lack of on-site parking. While architecture can and is a powerful tool for solving transit issues, such a complex issue cannot be addressed solely by architecture. There exists an equal need for policy changes to be implemented in order to incentivize or de-incentivize elements within a project in order to realize end goals. As such, this thesis proposes to implement a tiered parking scheme which implements pricing incentives. This scheme proposes charging different prices based on different locations for parking. The first location, which is the parking area kept

from the original site, will be the premium parking area. This site can hold up to 200 cars and would be the highest priced lot at $8.00 per day and would not offer access via a monthly discounted pass. The second location is located uphill from the site along 9D. This site will house a parking garage serving approximately 600 cars and would charge visitors a reduced price of $4.00 to park here. This site would also allow discounted monthly passes, ensuring access for regular commuters who really need daily parking. The distance of this garage from the hub is designed to dissuade Beacon residents who can walk from driving to the station as a matter of convenience. Finally, free parking would be provided at the ferry terminal on the Newburgh side. This existing lot can hold approximately 500

Figure 20 - Tiered Parking Policy Diagram
Image by Author

vehicles, and would be the cheapest option. The ferry only costs $1.75 round trip when combined with a Metro-North ticket and currently also provides monthly and bulk ticket packages.

The parking garage on 9D would be integrated into the topography, creating a rooftop park which helps preserve the viewshed. The garage will also be designed with future flexibility in mind, While a ramped garage could conceivably hold more vehicles (as would one with rooftop parking), the garage will be designed with flat floor plates and large floor-to-floor heights to allow for future conversion to another use as automobile dependency dwindles and the need no longer exists.

The parking garage park area will serve as one of the main entrances to the site. From this location, a series of pathways will follow the topography and bridge over it in order to reach the transit hub. Similar paths will connect to a new ferry dock and terminal along the river and to Dia:Beacon to the south. These paths will intersect with nodes along their length allowing other access to the pathways as well as points for rest, conversation, and enjoyment of the environment.

Transit Hub

For the transit hub, the building needs to provide both easy circulation and amenities which cater to the users of the station. One of the major issues with the

existing station is the lack of amenities. Apart from benches and the covered platform, there is nothing there to enrich the user experience. There aren't even any restrooms at the facility as users are expected to utilize those onboard the trains. Furthermore, the MTA Police's District 7 office is nominally located at Beacon Station. However, in actuality, their office is in a converted single family home on the edge of the parking lot, completely isolated from the station.

Through precedent research, it has become clear that there are certain functions which help make transit hubs more successful and improve the rider experience. This hub will integrate several of these amenities which will mesh with the Beacon community and culture.

Café

One of the essential amenities in creating a transit space which is inviting to users is providing a café or other spot which allows commuters to grab their morning coffee, breakfast, etc. and also allows them to await the train in comfort. As Beacon is host to multiple successful cafés, this could possibly become an extension of an existing business, helping to grow the local business base and preserving the sense of community. The café space will need to provide coffee, tea, and other beverages as well as lighter fare for breakfast and lunch. On weekends, this space can initiate visitors into Beacon's culture by displaying local works of art and information about local events and activities.

MTA Police Office

Integrating the existing offices for MTA Police District 7 into the station is an essential element of the program. While this will have no direct interaction with riders, the presence of police will help imbue a sense of safety lacking in the currently unmanned Beacon Station. Also, by placing these offices in a more public location, it introduces an element of transparency that will help engender respect and appreciation for the department. This will help the MTA Police to better accomplish their mission of serving the people.

Bicycle Shop and Storage

Providing secure bicycle storage is necessary if a transit center wants to encourage bicycle ridership. Additionally, providing basic repair services within this area can help to keep cyclists using this transportation method by making it more convenient. Providing access to shower and changing facilities also helps with this as it allows cyclists to change and freshen up before work after a long, hot ride to the station. Lockers also allow riders to store their helmets and other riding gear instead of forcing them to carry it around with them.

Restrooms

While this may seem an obvious inclusion, many Metro-North stations have omitted these facilities due to the associated maintenance requirements. This has forced riders to utilize the cramped facilities onboard the train instead.

However, if a transit hub is to become more inviting and less of a transitional space, restrooms are important in making users feel comfortable.

Circulation

Finally, a successful transit hub needs to have clear and easy circulation. Since there will be many paths coming from different locations, circulation paths will have to be laid out in such a way that paths are clear to all users. This circulation have to negotiate the barrier that is the train tracks in order to reach the platforms serving both northbound and southbound trains. This will require decisions to be made about how the station will interact with the tracks, such as whether to have a central platform or two separate ones as well as how to cross the tracks in order to reach these platforms.

Evolution of Concept

This project began by exploring the implementation of Transit-Oriented Development in Beacon. The initial premise was that by taking successful strategies implemented in more urban contexts and adapting them for use within the context of Beacon, the transit problem would be solved. These initial concepts for utilized the existing Beacon Station site. However, they still provided useful insights that helped shape the final design.

In implementing this Transit-Oriented Development typology, five key elements were identified for use in this project (Fig. 21) . First, the heavy traffic

on the 9D arterial needed to be rerouted to allow 9D to become a safer, more narrow street where it interacted with the residential neighborhoods of Beacon. Next, it was essential to take this rerouted traffic and to buffer it from the more residential areas, existing and proposed, with mixed use development. This would help to extend the traditional Main Street while also allowing for safe, walkable neighborhoods. Next, the existing grid of neighborhood streets needed to be extended across 9D. This would unify the new development and the existing city. Next, walkable streets would be added to the development area, breaking the land into smaller blocks and allowing for a more intimate neighborhood scale. These blocks were designed based on the scale typical in downtown Beacon. Finally, community spaces were to be developed, including a small corner park and the reconnection of the riverfront to Beacon.

Figure 21 - Beacon TOD Mapping
Image by Author

While Transit-Oriented Development can be successful in certain contexts, these measures did not fit with the character of Beacon. Developing

the area between downtown Beacon and the existing station would be possible, but this new growth would be too rapid and forced to be successfully integrated. In order for the transit solution to be successful, it must develop in a less forceful way. TOD in Beacon proved to be a more brute force method of design in a context which called for a more surgical and natural approach.

The next series of concepts examined the methods for ascending and descending the grade between downtown and the waterfront. Three methods were examined in this process. The first concept, based upon terraced rice paddies and Mediterranean villages, negotiated the hillside via a winding path. This path followed the contours of the site and was interspersed with mixed-use development in order to create a Main Street extension which responded to the topography of the site (Fig. 22). This concept, however, failed to integrate into the context of Beacon and also did not allow commuters to take a direct route to the transit station. While the slope was easily negotiated, the path was simply too long and windy to boost ridership.

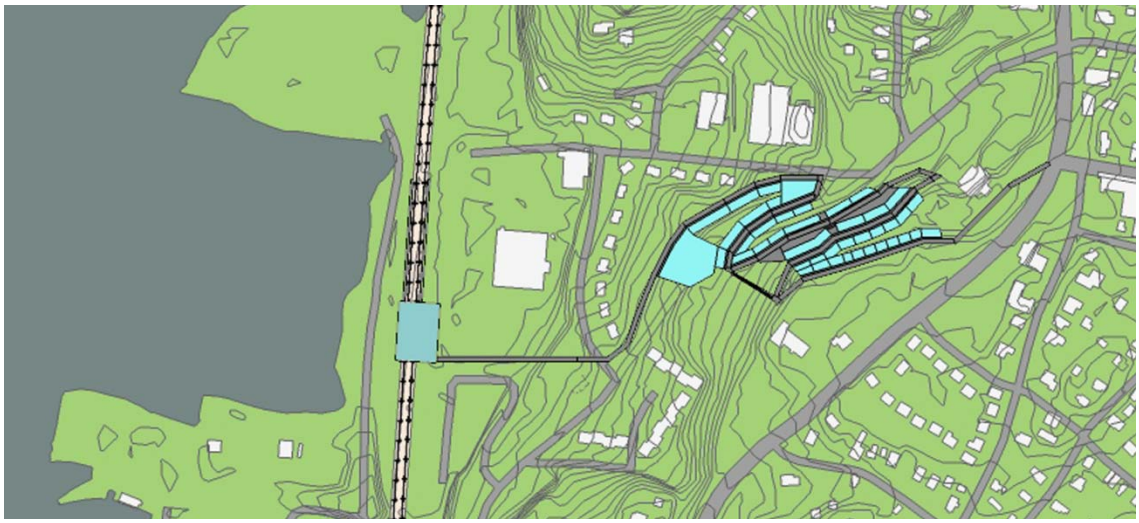


Figure 22 - Terraced Concept Site Plan
Image by Author

The next concept in this series explored the idea of a funicular. A funicular, or incline railway, is a way of quickly negotiating a steep gradient. The funicular railway has historical precedent in Beacon as an incline railway, at the time the steepest in the world, was once used to reach the casino and resort atop Mount Beacon. While this option does satisfy the requirement of quick, direct access to the transit hub, it serves little other purpose for the community. The incline railway would be a novelty, but would not serve as a community space and would not help in linking the various disconnected elements that this thesis seeks to unite.

The final concept of this series consisted of a long elevated bridge which extended from the end of Main Street to the transit station and conveyed users to the platform via a tall elevator at the end of it (Fig. 23). The idea behind this concept was to bridge over all the buildings and roads that were barriers to

reaching the site directly, thus realizing the simplest route to transit as advocated by Duany.[40] This design concept began the exploration of bridging and vertical circulation that shaped the final design. However, the scale of the bridge is such that the project is infeasible and unrealistic. Additionally, because of the bridging nature, there is limited interaction with the surrounding community, something which is key in growing transit usage.[41]

Figure 23 - Section Showing Bridge and Elevator Concept
Image by Author

Final Design

The final design for the transit hub complex draws inspiration from Beacon's industrial heritage. Much of the design language and raw, unprocessed materiality is based upon the factories and brickyards that once made Beacon a center of industry in the Hudson Valley. While there are many elements composing the final design, the cohesive design language and limited material palette helps create a cohesive, unique identity for the project.

---

[40] Duany et al, 234.

[41] Duany et al, 101.

Complete 9D

As an essential first step in reducing automobile usage is changing the pedestrian relationship to Route 9D. By adding bike lanes, removing the center "suicide" lane, adding a landscaped median, and providing trees lining the road, the wide highway will be brought into a more residential scale. These measures will also help to slow traffic to the 30 mile per hour limit that is posted but rarely obeyed. Additionally, providing crossings at key locations along the route will further slow traffic and provide safe opportunities for pedestrians to reach the opposite side of 9D.

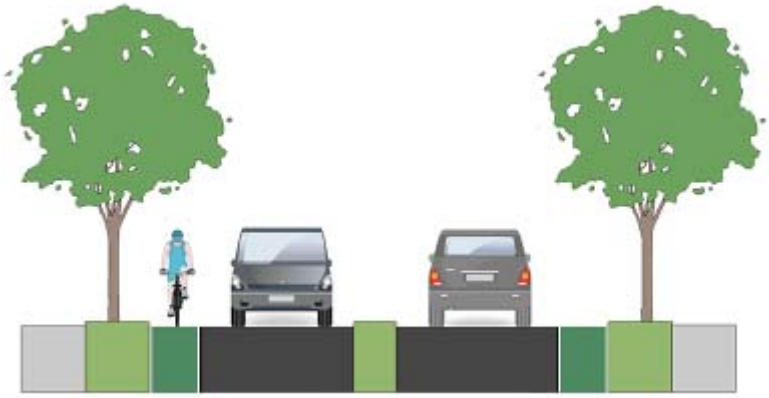


Figure 24 - Section Through Redesigned Route 9D
Image by Author

Paths

The final design of the project is centered around three paths which bridge over the site. These paths lead from the parking garage/downtown entrance, Dia:Beacon, and the ferry terminal and converge at the transit hub. These paths

are designed to negotiate the steep terrain while minimally impacting the environment below. One of the main reasons for this bridging is to preserve the shale cliff and talus communities that are present in some locations. These habitats are home to many rare species, and while this thesis has not sought to identify these elements, these potential habitats are worth preserving and minimizing the impact on.

The pathways themselves are sixteen feet in width and are sloped no more than one inch in sixteen so as to allow for handicap accessibility as well as

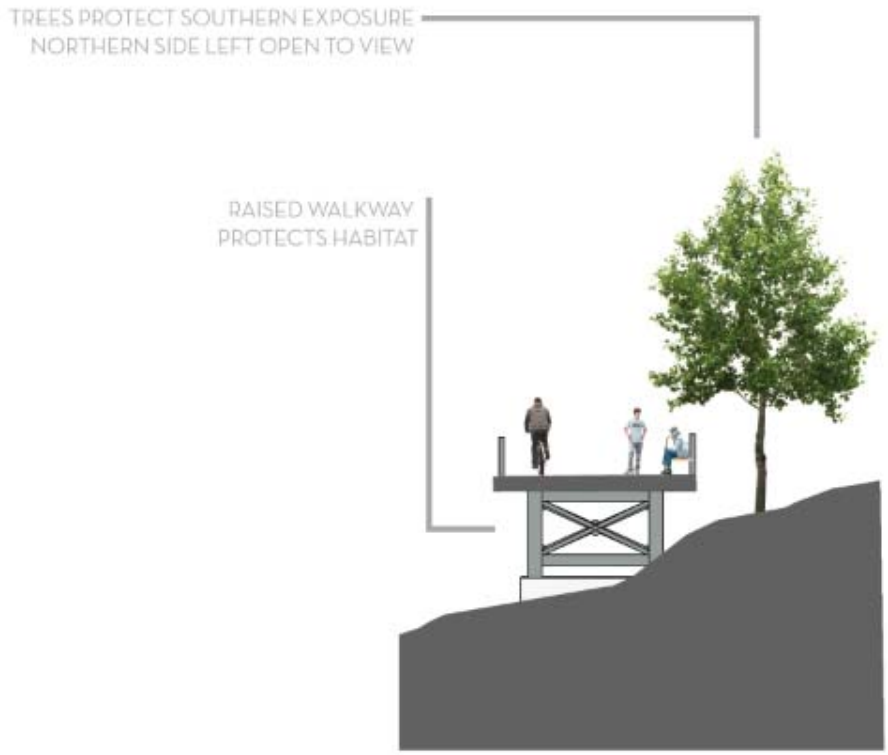


Figure 25 - Path Section Showing Trees and Structure
Image by Author

easy pedestrian and cyclist access. Trees are provided along the southern or western sides of the paths. This provides shade and protection from prevailing

winds while still allowing access to the views. While there are slight bends in the paths, the goal was to maintain a direct line of sight to the transit hub from start to finish. This allows viewers to have a relationship with the hub from any point on the paths and to understand their distance and location in relation to it. This strategy also minimizes the distance traveled, reducing travel time and increasing the number of residents that can reach the hub with a five minute walk or bike ride.

Figure 26 - Path Plan Showing Bench Configurations
Image by Author

While the primary goal of each path is to allow commuters and visitors to access the key elements of Beacon, the paths also integrate elements which allow them to act as a linear park. Benches are integrated into the handrails along the side opposite the view. Different configurations of benches allow for personal reflection or intimate conversation. These benches are located along the side opposite the view so as to be protected by the shade trees along that

side and so that when sitting on the benches, visitors can stop and admire the views.

Located at select nodes are small pavilions. These pavilions are directed so as to frame specific views such as that of the Newburgh-Beacon

Figure 27 - Pavilion at Dia:Beacon Entrance
Image by Author

Bridge or Mount Beacon (Fig. 27). Each location is also chosen as a transitional point between the path network and the community. These nodes are placed at points of access to the paths and also serve as larger protected rest areas along the route.

Parking Garage

The parking garage draws its design from the language of the transit hub. Wrapped in an eastern white cedar rainscreen, the concrete mass is set into the hillside (Fig. 29). This serves to hide the building's bulk from the much smaller scale residential area opposite 9D, but also allows the roof to act as a park space and minimizes the impact on the river views (Figs. 28, 30).

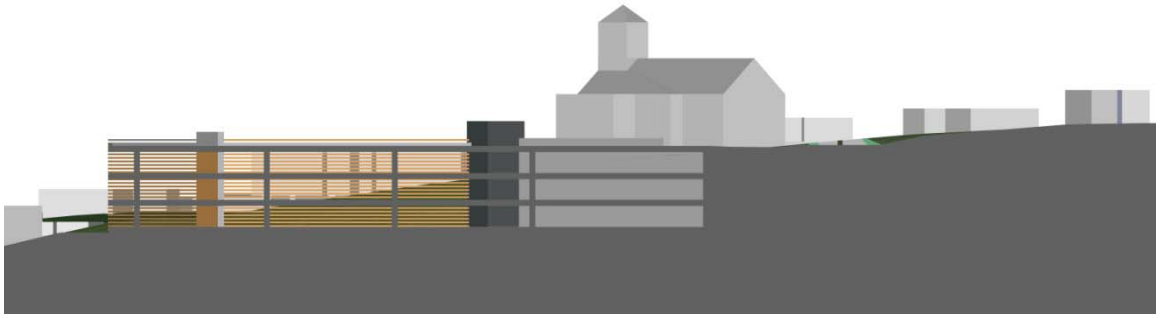


Figure 28 - Section Through Parking Garage
Image by Author

Also integrated into this site is an amphitheater. Carved into the hillside adjacent to the garage, this terraced theater will allow for public interaction and events in a location which takes advantage of the natural beauty of Beacon.

Figure 29 - Parking Garage Facade From Path
Image by Author

Figure 30 - Parking Garage From 9D Showing Rooftop Park
Image by Author

Ferry Landing

The relocated ferry landing is served by a floating dock. As the Hudson is a tidal river, this dock can rise and fall, making access to the ferry simpler for those with disabilities. This floating dock is connected to one of the nodal pavilions by a gangway. This gangway is hinged on one end from the pavilion and is suspended by a system of cables and counterweights which minimize the reaction forces at the other end, allowing the gangplank to adjust to the rising and falling dock.

The nodal pavilion at this location provides shelter from rain as well as the predominant north-south winds of the valley. There is seating provided for those awaiting the ferry, and the tube-like pavilion frames views of the hub and Mount

Figure 31 - View From Ferry Dock
Image by Author

Beacon to the one end and the City of Newburgh on the other. A path then leads out of this pavilion to the transit hub. This path is elevated so as to cross over the existing Scenic Hudson trails originating at Long Dock Park.

Beacon Transit Hub

The design of the transit hub itself is complex. The multiple paths which intersect the hub all enter at different heights due to the large grade changes in the surrounding context. This was the prime influence in the final design. These multiple levels allowed programmatic elements to be suspended within the main volume and to act as receiving nodes for the paths. These four programmatic

Figure 32 - Rendering of Path Leading to Fourth Level
Image by Author

boxes are clad in oxidized zinc paneling, establishing a design language which is then extended to the nodes along the paths and thus serves to differentiate space from circulation.

Coming from Beacon, a commuter would enter the building on the fourth floor (Fig. 33). This box serves to house the bike shop and storage elements of the project, allowing commuters to safely store their cycles and avoid the difficulty of negotiating the levels with their cycles. There are racks designed to

Figure 33 - Fourth Floor Plan

Image by Author

store 148 bicycles in this location, although there would likely be some rentals stored here for use by day trippers and visitors to Dia.

From this box, commuters have the option to access an elevator leading to the northbound platform as well as the third level box or to continue along the path inside the volume, across the "roof" of the third box, and thus have access to the southbound platform and the second box.

Figure 34 - Third Floor Plan
Image by Author

The third level box (Fig. 34) serves to provide access from the northbound platform to Dia:Beacon, catering to day trippers arriving from New York City. This space also provides space for the MTA Police offices.

The second level box (Fig. 35) hosts the café space. Overlooking the Hudson River, Newburgh, and the ferry terminal, this space allows commuters on their way to the southbound platform to grab breakfast and coffee. Chairs and couches also provide a lounge space for those waiting for an arriving train. This space also serves as the access point for those arriving on the ferry from Newburgh.

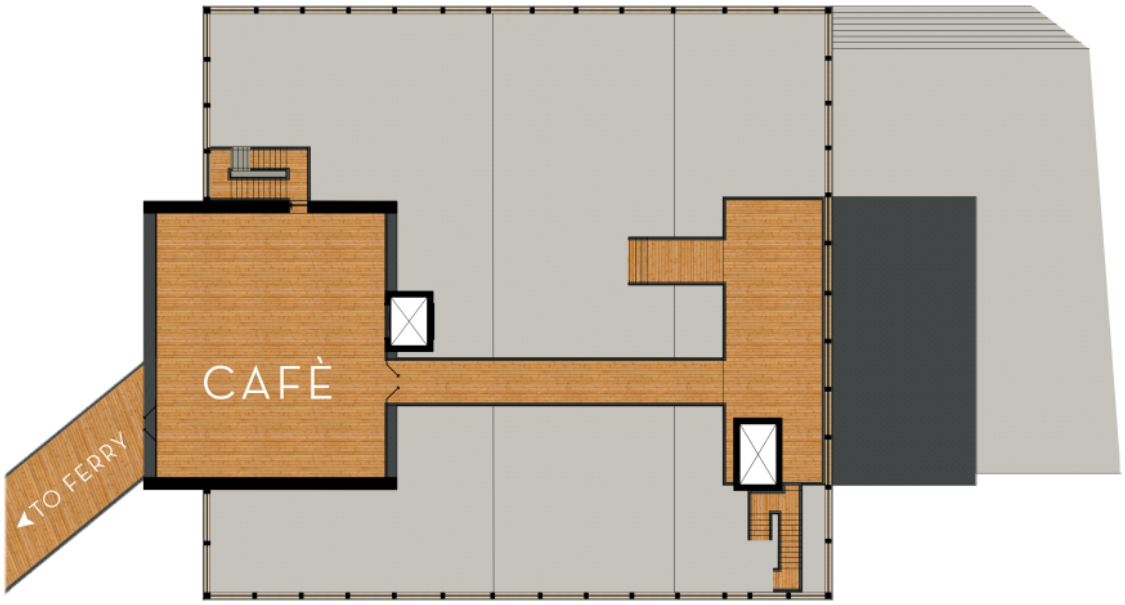


Figure 35 - Second Floor Plan
Image by Author

Finally, the first, or ground level, box (Fig. 36) serves as the entry to the building from premium parking and the drop-off loop. This box also holds

ticketing machines to allow those wishing to travel north on the Metro-North Railroad to purchase tickets without crossing over to the southbound side. This box then transitions onto the northbound platform and into the main volume.

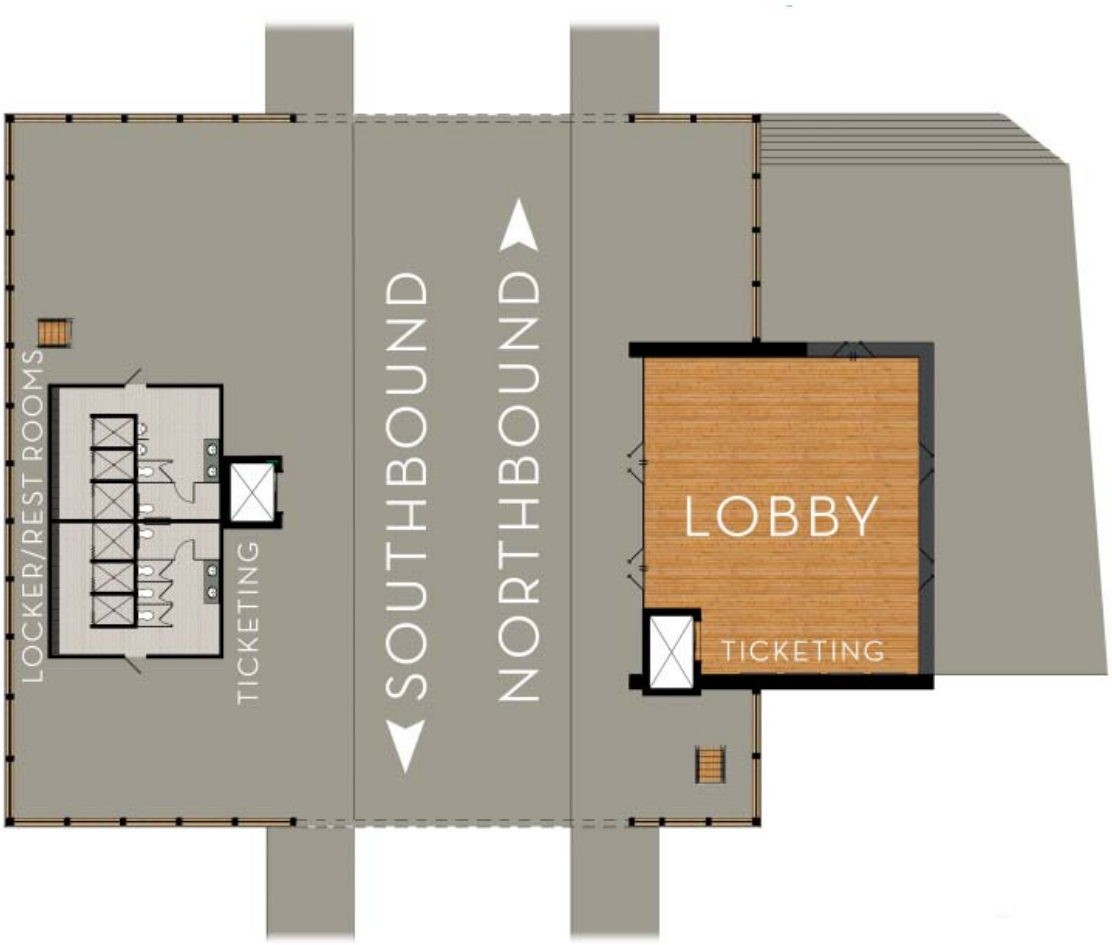


Figure 36 - First Floor Plan
Image by Author

The platforms themselves extend beyond the main volume in order to provide the necessary length for the typical seven car train. The southbound platform provides restrooms and locker rooms, allowing commuters to use the facilities without waiting for the train and allowing cyclists to store their gear as

well as shower and change if necessary. Ticketing machines are also located on the southbound side for those needing to purchase tickets.

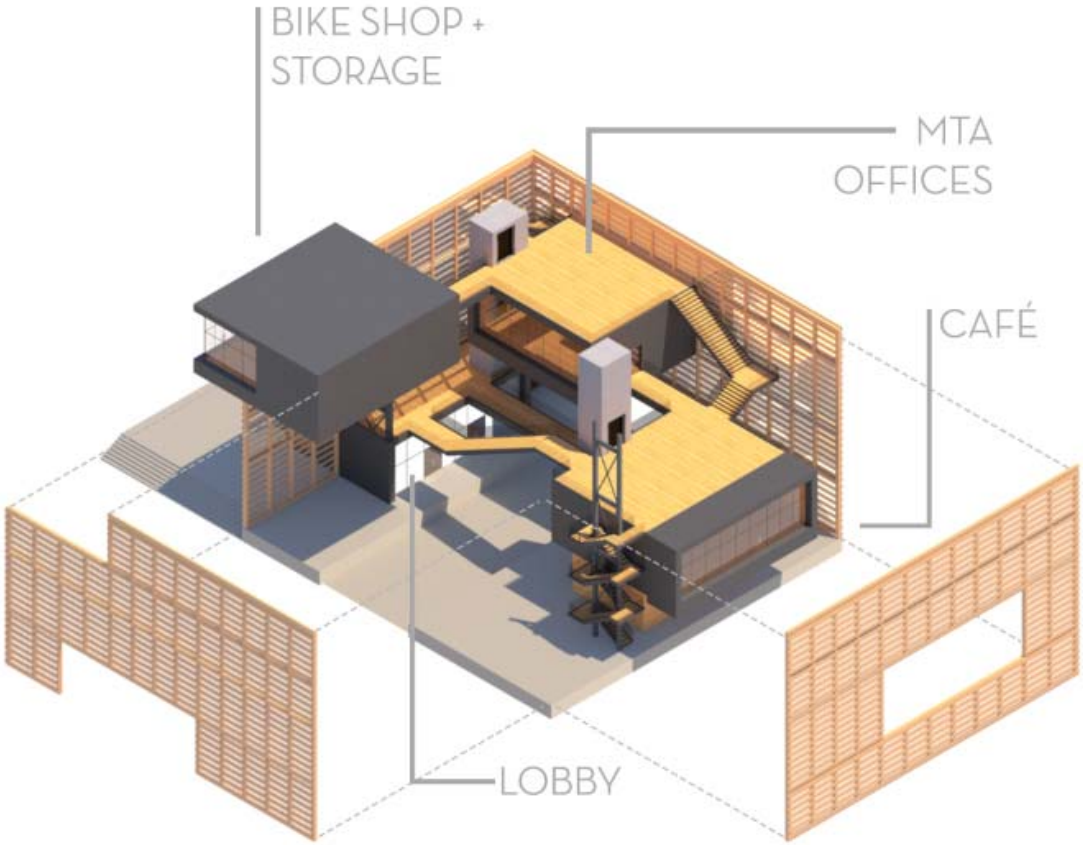


Figure 37 - Exploded Axonometric View Detailing the Relationship Between Volumes
Image by Author

Figure 38 - View From Premium Parking Showing Main Level Entry Box
Image by Author

While a large, tall building was necessitated by the site conditions, the main volume which houses the programmatic spaces is intended to be unconditioned. This allows only the programmatic spaces to be heated and cooled and greatly minimizes the operating expenses of the facility. Clad in eastern white cedar rainscreen, the cubic volume is designed to allow natural lighting into the space while minimizing solar heat gain. Operable windows on the north and south facades can be opened to take advantage of the prevailing winds in warmer months.

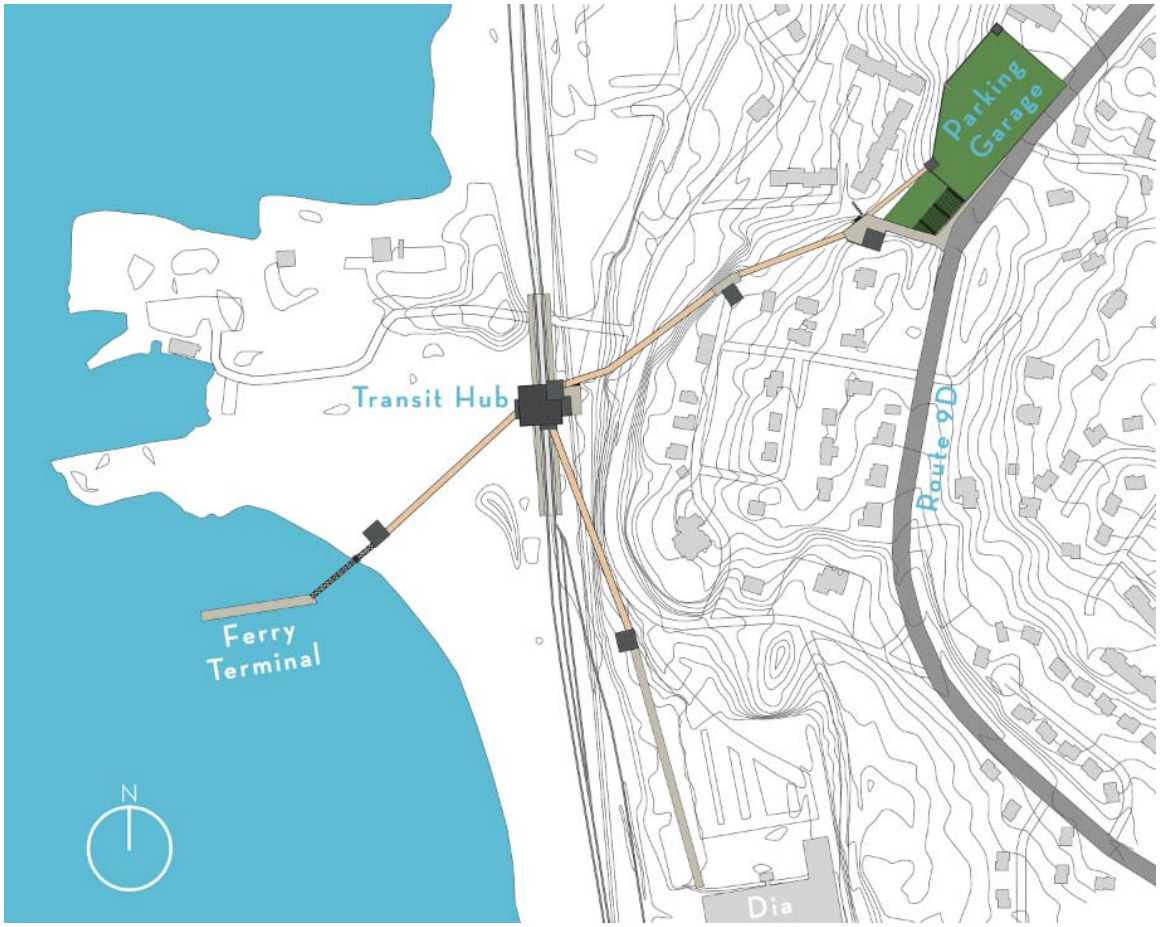


Figure 39 - Site Plan
Image by Author

CHAPTER 6

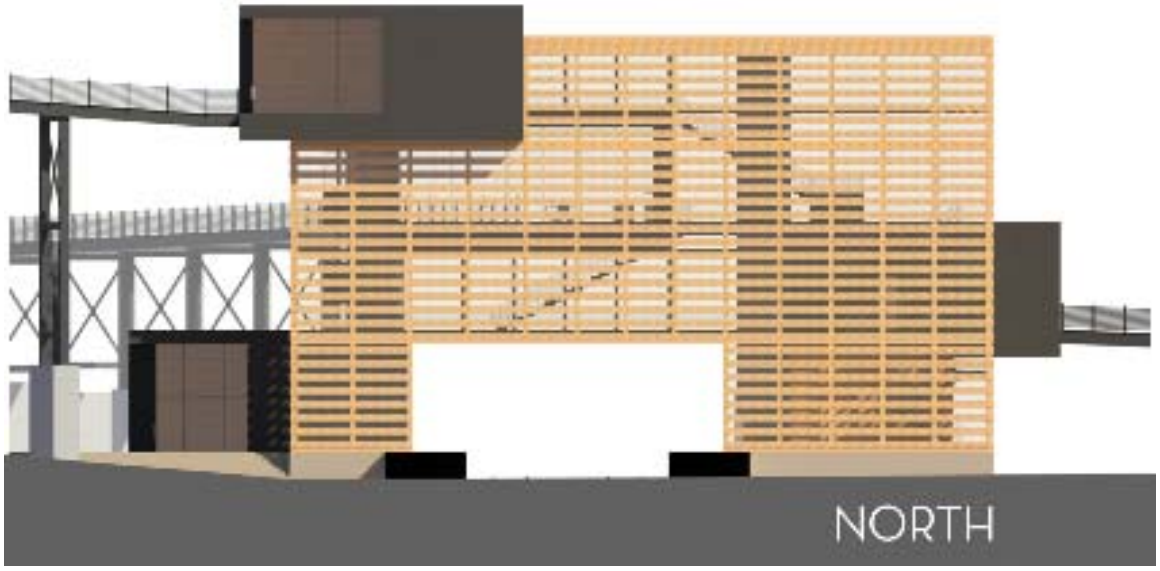
CONCLUSION

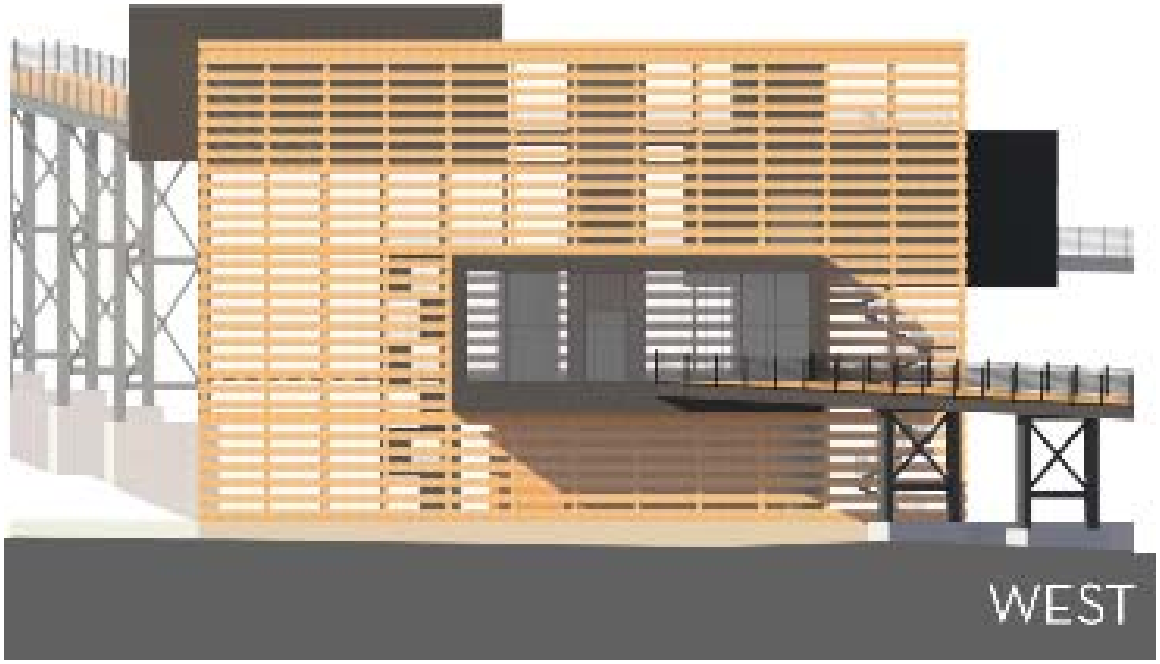
The original intent of this thesis was to create a series of strategies which suburbs and bedroom communities can implement in order to reduce their automobile dependency and to promote transit ridership. However, in the course of designing for Beacon, it became clear that such a generalized set of guidelines would fall short in most occurrences. While it may be possible to implement specific strategies in an urban context, every suburban community has a different character. Each community has certain traits which define it and which will, in a well designed project, directly affect the solution. In designing for Beacon, the result is so directly tied to Beacon that there is little to be pulled out for future implementation in other locales. The topography, culture, community, and context were all so integral to the design that the resulting project is itself integral to Beacon.

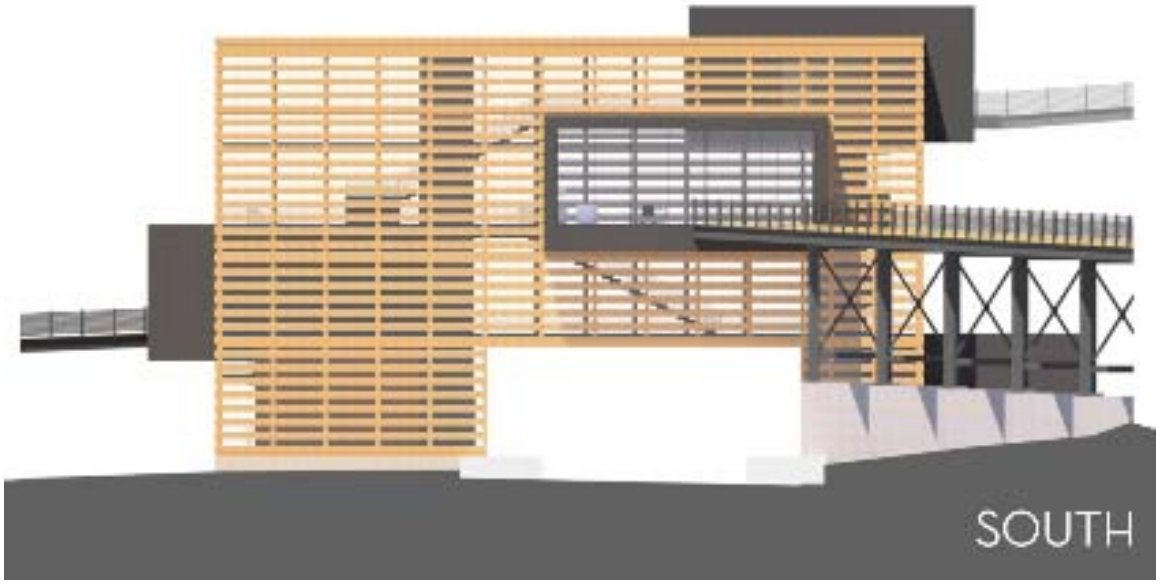
While this means that there are few architectural takeaways from this thesis, there remains a lesson to be learned in this. If suburbs are to successfully improve their transit access, then each suburb needs to have a solution that fits its own unique character. To have an overarching set of rules would be detrimental in the long run. Instead, it is up to the designer to explore the defining elements of a community and distill them into a specific solution.

APPENDIX A

ELEVATIONS





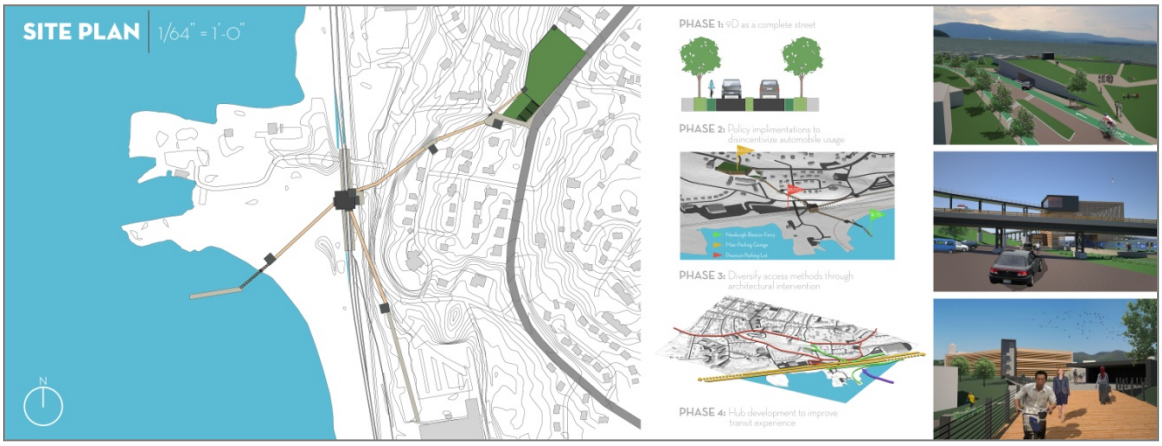

SOUTH

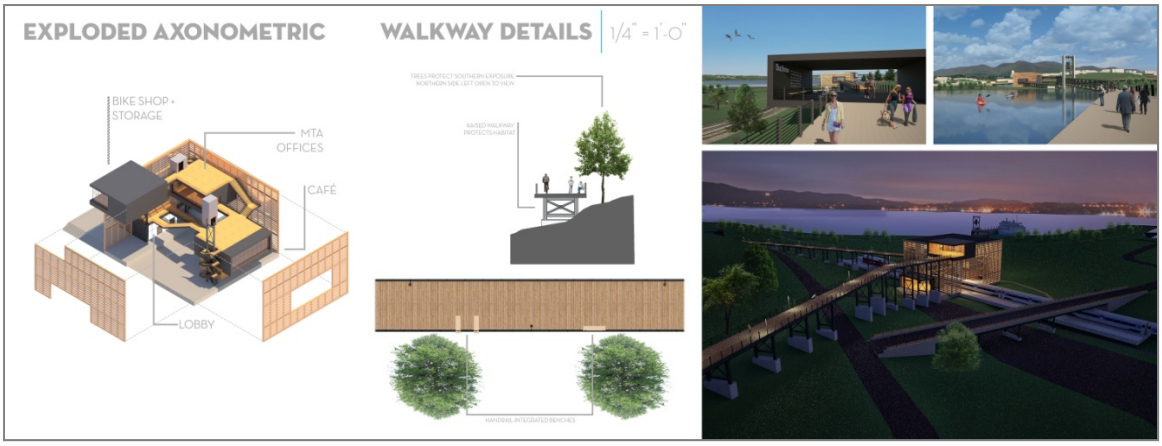

EAST

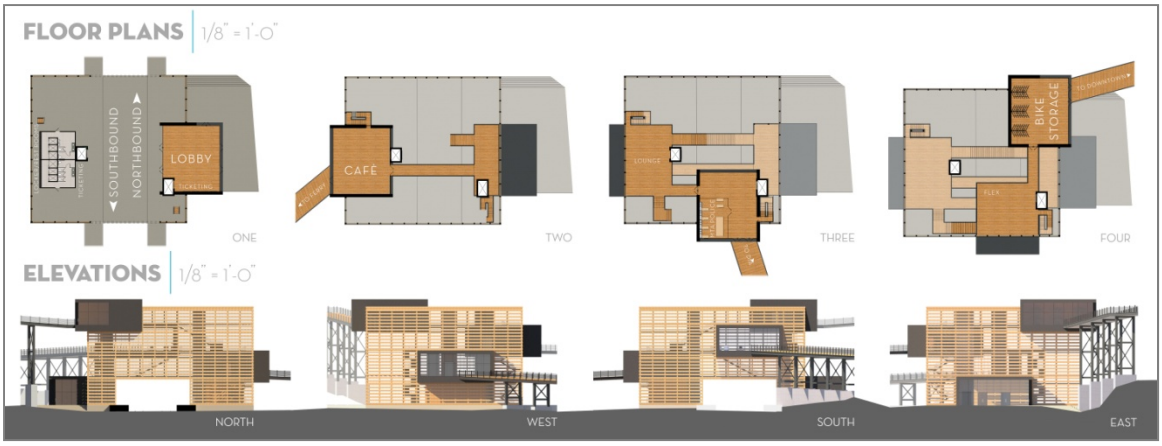
APPENDIX B

PRESENTATION BOARDS

The following images are the boards presented on April 3, 2014. The original size of each board was 96" x 36".




EXPLODED AXONOMETRIC
BIKE SHOP + STORAGE
MTA OFFICES
CAFÉ
LOBBY
WALKWAY DETAILS
1/4" = 1'-0"


FLOOR PLANS
1/8" = 1'-0"
SOUTHBOUND
NORTHBOUND
LOBBY
CAFÉ
BIKE STORAGE
ONE
TWO
THREE
FOUR
ELEVATIONS
1/8" = 1'-0"
NORTH
WEST
SOUTH
EAST

BIBLIOGRAPHY

Altoon, Ronald A., James C. Auld, and Nancy Egan. *Urban transformation: transit oriented development and the sustainable city*. Mulgrave, Vic.: Images Group, 2011. Print.

Beatley, T. (2000). Transportation and Mobility in Green-Urban Cities. *Green urbanism: learning from European cities* (pp. 109-193). Washington, DC: Island Press.

Bicycle Transit Center at Union Station. (n.d.). Retrieved from http://architizer.com/projects/bicycle-transit-center-at-union-station/

Bikestation Washington DC. (n.d.). Retrieved April 22, 2014, from http://home.bikestation.com/bikestation-washington-dc

Brand, S. (1994). *How buildings learn: what happens after they're built*. New York, NY: Viking.

Calthorpe, P., & Fulton, W. B. (2001). *The regional city: planning for the end of sprawl*. Washington, DC: Island Press.

Chen, A. (2008, November). Jeffersonian ideal: in charlottesville, wallace roberts & todd architects designs a transit hub that links the past with the future. *Greensource*. Retrieved from http://greensource.construction.com/projects/0811_transitstation.asp

Cracroft, C., Holbrook, J., Schindewolf, J., & Wright, H. (n.d.). Salt lake city intermodal hub. Retrieved from http://faculty.arch.utah.edu/miller/Intermodal%20Hub%20Case%20Study.pdf

Corrigan, Mary Beth (2004). *Ten principles for smart growth on the suburban fringe*. Retrieved from ULI--Urban Land Institute website: http://www.uli.org/wp-content/uploads/2012/07/TP_SuburbanFringe.ashx_.pdf

Dittmar, Hank, and Gloria Ohland. *The new transit town: best practices in transit-oriented development*. Washington, DC: Island, 2004. Print.

Dittmar, Hank. *Transport and neighbourhoods*. London: Black Dog, 2008. Print.

Duany, A., Zyberk, E., & Speck, J. (2000). *Suburban nation: the rise of sprawl and the decline of the American dream*. New York: North Point Press.

Dunham-Jones, E. (2010, January). Retrofitting suburbia [Video file]. Retrieved from http://www.ted.com/talks/ellen_dunham_jones_retrofitting_suburbia#

Dunham-Jones, E., & Williamson, J. (2009). *Retrofitting suburbia: urban design solutions for redesigning suburbs*. Hoboken, N.J.: John Wiley & Sons.

Frumkin, H. (2002). Urban sprawl and public health. *Public Health Reports*, *117*, 201-217. doi:10.1016/S0033-3549(04)50155-3

IBI Group (n.d.). *Salt lake city intermodal hub and master plan*. Retrieved from http://www.ibigroup.com/projects/salt-lake-city-intermodal-hub-and-master-plan

Jackson, J. B. (1994). *A sense of place, a sense of time*. New Haven: Yale University Press.

Kieran, S., & Hildebrand, G. (2008). Evolving an Environmental Aesthetic, Biophilic Architectural Space. *Biophilic design: the theory, science and practice of bringing buildings to life* (pp. 243-251, 263-275). Hoboken, NJ: John Wiley & Sons.

Kunstler, James Howard. *Home from nowhere*. New York: Simon & Schuster, 1997. Print.

Lukez, Paul. *Suburban transformations.* New York: Princeton Architectural, 2007. Print.

Mees, Paul. *Transport for suburbia: beyond the automobile age*. London: Earthscan, 2010. Print.

Mid-Hudson News Network (2013, September 18). Newburgh-Beacon Ferry ridership down 21% this year. *Daily Freeman*. Retrieved from http://www.dailyfreeman.com/general-news/20130918/newburgh-beacon-ferry-ridership-down-21-this-year

National tourist route trollstigen. (2009, August 20). Retrieved April 22, 2014, from http://www.archdaily.com/32441/national-tourist-route-trollstigen-rra/

Olympic sculpture park. (n.d.). Retrieved from http://www.archdaily.com/101836/olympic-sculpture-park-weissmanfredi/

Pollard, O. A. (2002). *Smart growth and sustainable transportation: can we get there from here?*. New York: Fordham University].

Salt Lake Central Station. (n.d.). Retrieved April 22, 2014, from http://www.transitunlimited.org/Salt_Lake_Central_Station

Seattle art museum: Olympic sculpture park. (n.d.). Retrieved from http://www.weissmanfredi.com/project/seattle-art-museum-olympic-sculpture-park

Speck, J. (2012). *Walkable city: how downtown can save America, one step at a time*. New York: Farrar, Straus and Giroux.

Tachieva, G. (2010). *Sprawl repair manual*. Washington: Island Press.

The Design of the Pedestrian Network. (n.d.). Retrieved April 20, 2014, from http://www.nzta.govt.nz/resources/pedestrian-planning-guide/docs/chapter-14.pdf

Tumlin, J. (2012). *Sustainable transportation planning: tools for creating vibrant, healthy, and resilient communities. Hoboken, N.J.: Wiley.*

U.S. Census Bureau. (2000, 2010*). Beacon city, New York QuickLinks*. Retrieved April 19, 2013, from http://quickfacts.census.gov.

Walkable and Livable Communities Institute (2012). *Walkable 101: the walkability workbook*. Retrieved from http://www.walklive.org/project/walkability-workbook/

Wallace Roberts & Todd (2008). Downtown transit station. Retrieved from http://www.charlottesville.org/Modules/ShowDocument.aspx?documentid=27631

Williamson, June. *Designing Suburban futures: new models from build a better burb. Washington: Island, 2013. Print.*

Work and Jobs in Beacon, New York (NY) Detailed Stats: Occupations, Industries, Unemployment, Workers, Commute. Retrieved April 19, 2014, from http://www.city-data.com/work/work-Beacon-New-York.html.