

Effects of Complete Streets Infrastructure and Design on Street Life

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Abstract

Complete streets policies are spreading throughout the United States, and this thesis explores their provides greater understanding of how complete streets style designs impact street life. Research for the thesis includes observations of street life at four locations with complete streets designs as well as interviews with residents, community advocates, municipal planners, and other project stakeholders. Observational research provides examples of how people interact in a complete streets environment, compared with control sites within the same neighborhood. This thesis found that complete streets style infrastructure effects street life through improved street safety, creating a welcoming environment and sense of place, and through economic development. The study of four street redesigns and interviews with project designers reveal implementation patterns and which parts of the street redesign were most effective in achieving their goals. The thesis concludes with a critique of complete streets design and implementation, yet proposes that they should be created where possible due to their positive impacts on safety for the most vulnerable street users.

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Chapter 1: Introduction

Cities are many things; they are buildings, sidewalks, stores, restaurants, trucks, noises, smells, and manholes. Cities around the world have different parks, buses, schools, animals, and food. The most essential part of these cities are their people. Without people, who can inhabit the buildings, use the sidewalks, shop in the stores, eat at the restaurants, play in the parks, and smell the smells? Cities provide places for people to live, learn, work, socialize, participate in recreation, and relax. These city functions occur in many places; the place I will focus on is the street.

Complete streets are defined by the National Complete Streets Coalition as streets “to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities” (What are Complete Streets). Streets are microcosms of many of the general uses found in the city, and planning streets that invite those uses into the public realm of the street helps create street life. For the purposes of this thesis, I borrow the definition of street life from Jan Gehl, who states street life is “all of the activities that occur in the public realm” (Cities for People 19).

The purpose of this study is to explore how complete streets infrastructure affects urban street life, focusing on pedestrians, cyclists, and transit riders and how they move around the public space. My question is what are the effects of complete streets infrastructure and design on street life?

To answer this question, I designed a primarily qualitative study that relies on observations and interviews with different stakeholders associated with street redesign projects: neighborhood residents, municipal planners, and advocacy groups. This design is inspired by the street observation strategies outlined by Gehl and Gemzøe’s design in *Public Spaces - Public Life* and Gehl and Svarre’s *How to Study Public Life*, but relies less on

comprehensive observations of street life and more on interviews. The emphasis on interviews instead of observations is due to limitations in time, funding, and workforce.

Study Locations

In order to study the different effects of various complete streets treatments (i.e. bicycle lanes, raised crosswalks, road diets, transit only lanes, etc.), I studied streets in four different neighborhoods. I studied Amsterdam Avenue on the Upper West Side neighborhood of New York City, Vanderbilt Avenue in the Prospect Heights neighborhood of New York City, Western Avenue in the Riverside Neighborhood of Cambridge, Massachusetts, and Hillsborough Street in Raleigh, North Carolina. Having study locations in different neighborhoods within different cities allowed me to study distinct types of people and urban environments. I have more confidence in my findings because I studied streets in different types of urban environments across three different states.

I chose the sites in New York City and Raleigh, NC based off of my familiarity with the cities and personal experience with the streets. I chose Western Avenue in Cambridge by contacting bicycle advocates based in the region and asked their opinion on interesting complete streets designs. The four streets I chose are all different due to their surroundings even though they share similar designs and infrastructure types.

I focused on the effects of complete streets infrastructure on street life as it pertains to three areas: safety, placemaking, and economic development. I chose to focus on the impacts to street safety because protecting vulnerable street users should be of the utmost priority of planners and designers. People in urban areas use streets every day, so I focused on how complete streets style infrastructure effects the sense of place or identify of the street. Lastly, I focused on the effects on street life for economic development to see how designs helped or hindered economic activity by creating or discouraging street life.

Research Scale

I conducted research on the impact of street design on street life using two different types of information: street life observation and interviews. I interviewed people who self-identified that they lived within the neighborhood that had a street redesigned, were community advocates for that neighborhood, were municipal planners involved in the project, or were another related stakeholder in the planning process. Most of the residents that I interviewed were also community advocates, and were therefore partial to the stance of their advocacy group. I do not believe this discounts their opinion, because they were still residents of the neighborhood who were often involved in the planning process and have seen the results of the project.

At each project site, I first observed street life around the project, and compared it to other neighborhood streets with similar and different street designs. I observed street life at the redesigned street and compared it to observations at a street with a similar design and surrounding land uses. I then observed street life at a third and dissimilar street to make further comparisons. These observations illustrate how different actors interact with each other and the street.

Next, I interviewed residents and project stakeholders and asked what they thought of the redesigned street, and any other parts of the projects of which they were familiar. My advance observations let me ask specific questions about the design of the infrastructure and anecdotes that I could bring to the interviews. By interviewing residents and local stakeholders I could begin to understand how the redesigned street affects them on a day to day basis. Their perception of the street is vital: ultimately we plan for people.

I attempted to interview at least three people per project, with the idea of interviewing one resident, one neighborhood advocate, and one municipal planner. I found interview subjects through targeted contacting of advocates, contacting the municipality

responsible for the redesign, and asking interview subjects for their opinion on who else would be knowledgeable about the project.

By interviewing community advocates and representatives, I could get a history of how the neighborhood reacted to the planning process, and what the feeling about the finished project has been around the community. These community advocates perspective helped identify what designs and processes did and did not work for them, and any further concerns they had about the street and its surroundings moving forward. Interviews with municipal planners showed why certain street designs were chosen and whether existing or desired street life affected those choices. Municipal planners provided insight to how complete streets are being designed and implemented from their perspective, and what effects the infrastructure is having on overall street life.

Data Collection

Street Observations

At each of the four streets, I selected observation locations along that street that had been redesigned with complete streets infrastructure. I chose observation locations at places on each of the streets that had received complete streets infrastructure and had a mix of land uses and attractions that I thought would generate the most street life. Street life attractions were important to this research because each observation took place in winter, and good, warm weather was not guaranteed.

I observed the overall street layout by walking down the street and the around the neighborhood. I also did more targeted observations at Vanderbilt Avenue, Hillsborough Street, and Western Avenue by staying in one place and making notes of activities, the number of people doing each activity, and locations of any stationary people for fifteen minutes at each of the three streets. My observational comparison at Amsterdam Avenue was not two other city blocks, but rather general observations from my walks around the surrounding neighborhood. My observation area in each location was a standard city block:

approximately 200 to 300 feet long. This scale was small enough to observe how and where people were on the street, generally where they were coming from, and where they were going.

All observations took place on Wednesday, Thursday, or Friday between the hours of 1:00pm and 6:00 pm. Most observations took place in the middle of the afternoon, timed for when local schools would be releasing students. I chose this afternoon time presuming that parents and children would be walking home from school, people would be running errands, or beginning to come home from work. During these observations, I took pictures of street life, noted general observations, counted people by their street activity, and created activity maps when applicable.

Due to the limited sample size of observations that I had at each location, I do not present any of the activity counts I collected. I do, however, discuss the trends I observed at the redesigned streets and compare them to other neighborhood streets. Common activities that I observed and counted include people bicycling in the bicycle lane, walking with or without their dogs, carrying groceries, running, and sitting on a bench or at a cafe table. I observed people using the safety-focused complete streets infrastructure at every street that had them, but to get a better understanding of how street safety impacts street life, I focused on the actions of a few different users. In *How to Measure Street Life* Jan Gehl references an Australian study that found that parents holding or not holding their children's hands while the walk along or cross the street is an indicator of how safe the street feels (102). I noted this and expanded to paying particular attention to how families with children (including strollers and scooters) and female cyclists traveled on the street.

Interviews

I conducted open-ended interviews, and asked broad questions about the street redesign and its effects and then followed up with more specific questions tailored to each location. The broad questions were similar in each interview. I asked each person to describe

their history with the street and redesign project, what they thought about the street, and how they thought the street design impacted street life. My intent was to see how the different residents, community advocates, and planners think about streets, their design and, and their effects on their experiences with the street.

My interviews with residents and community advocates featured more specific questions focused on their daily experience around the street. I asked questions about what they like most and least about the current design, and how their experience with street life has changed before and after the street redesign. I also asked what they thought other neighborhood residents felt about the street, and what, if any, concerns their neighbors had.

I also asked if they think people feel safer, if they choose different transportation modes, or if they have changed the amount of leisure time they spend on the street. Interviews with planners were similar to interviews with residents and community advocates, but were more focused on what went into the planning process, and why the planners chose that particular design. I learned about planners' experiences during public outreach and implementation, and why they chose the strategies they did.

Data Analysis

My objective for this research was to identify overarching themes in how street design affects street life and at each scale. To do this, I took conversation notes and summarized the interviews emphasizing the overarching themes of each interview.

Chapter 2: Background

The term “complete streets” was first coined in 2003 by bicycle advocate Barbara McCann. A coalition of bicycle, transit, public health, elderly, and urban design advocates grew around this idea that streets should be for more than moving cars, and the term quickly grew to encompass planning for other transportation modes (Zavestoski and Agyeman 3). The combination of advocacy groups is especially important because complete streets policies seek to improve transportation accessibility, which is limited when streets are planned strictly for automobiles (Burden and Litman 36). By planning for all modes, including walking, cycling, transit, and automobiles, complete streets provide people with transportation choice. This allows people to choose the best mode according to their needs, abilities, and preferences.

A Brief History of Streets

City streets in the early 20th Century were unmarked and generally unsignalized places where many users interacted (Norton 21). Pedestrians favored sidewalks not because of danger imposed by the street, but rather due to mud and manure (21). In comparing these muddy streets to modern times, Appleyard states, “twentieth century streets are cleaner than they used to be...the paving has encourages the intrusion of a new menace – the motorized vehicle” (Livable Streets 3). Norton poses that cars were generally thought of as intrusive, and anything traveling over the speed of a streetcar was considered unsafe. Children commonly played on the less traveled streets, and pedestrians crossed higher traveled streets at will. Norton states that because streets were unsignalized and unmarked, simple decency prevailed; people were given at least the same right to the street as other users (21).

As the number of cars in cities grew, so did the number of people killed by cars, and consequently, cars were seen as murderous machine of the aristocracy in popular culture. Planners and engineers were tasked with easing the congestion on city streets (Norton 23). Automobile manufacturers and advocates saw the demand for automobiles more as a function

of street capacity, and not consumer desire. Automobile advocates therefore created a narrative that shifted street safety responsibility from the car to the pedestrian, which included coining the term “jaywalker”.

Car ownership and use continued to grow in cities in the 1950s and 1960s, and the study of street life and the public realm was a result of observations of how street life had changed with the invasion of cars. Modern urban planning also started separating focuses and functions in accordance with the specialization of industrialization; streets that had formerly held all users were being designed for cars only, paths were designed for bicycles, and pedestrians were relegated to the sidewalk or to parks. The 1960s and 1970s were times of social unrest where people challenged authority, and these decades helped foster the ideas of Jane Jacobs, William Whyte, Jan Gehl, and Donald Appleyard (*How to Study Public Life* 48-55). These urbanists challenged modernist planning by advocating for people centered design, and supported their ideas with extensive studies.

These urbanists advocated for the street as a place for people. In her seminal work *The Death and Life of Great American Cities*, Jane Jacobs states “streets in cities serve many purposes besides carrying vehicles, and the city sidewalks...serve many purposes besides carrying pedestrians (29). She continues by describing the sidewalk ballet; a street filled with children going to school, shopkeepers opening their store, home makers cleaning their stoops, and parents taking their babies out for a morning stroll (52-53). Donald Appleyard describes the role of city streets as “the place where most children grow up” and a place with “personal and social meaning for adults and old people”; he states “the social relations that take place on the streets, its potential for neighborliness and street life, are values of urban life to be treasured” (*Livable Streets* 9).

Barbara McCann’s idea and the complete streets movement are a new addition to this old struggle for the streets as a place for people, and as Jane Jacobs argues, the soul of the city (Jacobs 29). Since its origination in 2003, complete streets policies have spread

throughout the United States. In the Spring of 2008, New York City Department of Transportation (NYCDOT) began its Sustainable Streets program which includes complete streets redesigns (“Sustainable Streets”, NYCDOT), New York Governor Andrew Cuomo signed the Complete Streets Act in August 2011 (“Complete Streets”, NYSDOT), and as of December 2016, Smart Growth America states “over 950 Complete Streets policies have been passed in the United States” (“Complete Streets Policies Nationwide”). In many large cities, these complete streets policies have led to the creation of complete streets design manuals. These manuals often list street typologies and prescribe possible treatments for each street type and provide design standards for those treatments. For this thesis, I consulted complete streets design manuals from Philadelphia, New York, Boston, and Chicago.

Typical Street Design

In order to judge complete streets designs, I must first define a typical auto-centric street layout. Modern automobile-centric streets are generally designed with 11 to 13-foot travel lanes (NACTO 34). Sidewalks have a minimum conventional width of 5 feet, but reach 10 to 14 feet wide in dense urban environments (NACTO 36). Generic two-way urban streets have four 12-foot lanes; two of used for parking, and two for travel. This right-of-way would include two 10-foot sidewalks for pedestrians, and no space is allocated for other modes. Using this simple example, automobiles receive approximately 70 percent of the road space while pedestrians receive approximately 30 percent. A typical street is shown on the following page in Figure 1¹.

These designs led complete streets advocates to push for policies that reallocated space from automobiles to other modes. In a May 2014 article in Planning Magazine, Zehngbot and Peiser state that complete streets policy designs generally included

¹ Unless otherwise noted, each of the following street layout diagrams were created by the author using Streetmix.

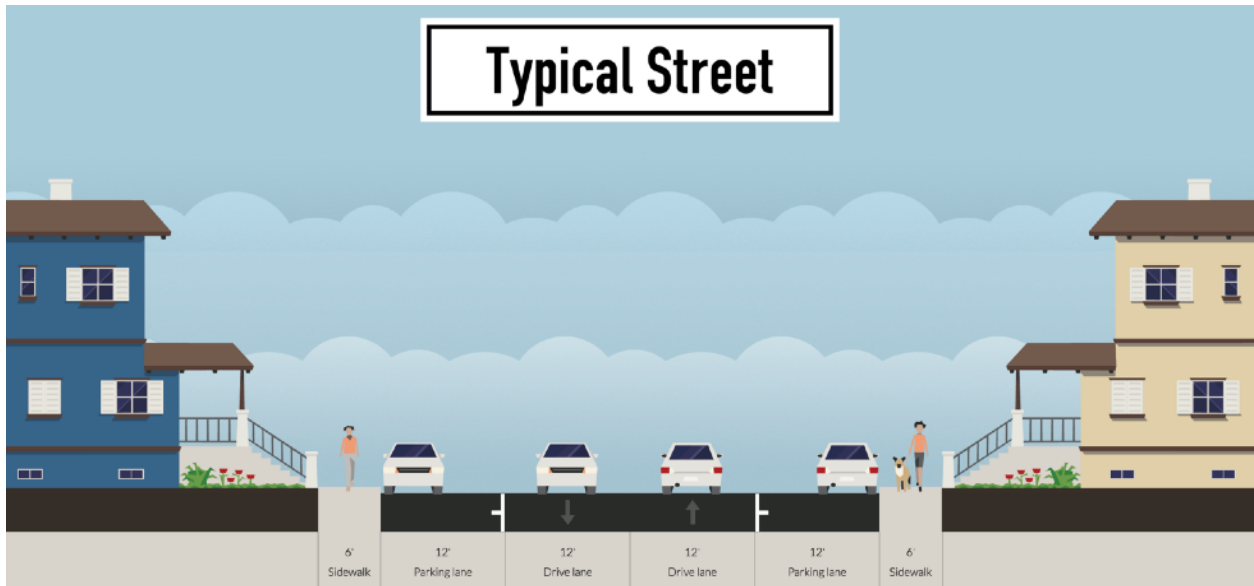


Figure 1: Typical Street Layout

“ample sidewalks, improved standards for street tree planting and other landscape elements, bike lanes, dedicated bus lanes, comfortable and accessible transit stops, frequent crossing opportunities, median island, and curb extensions”.

Figure 2 shows the same street, but with street space taken from cars and given back to people who travel on transit and bicycles. Reallocating this street space should create

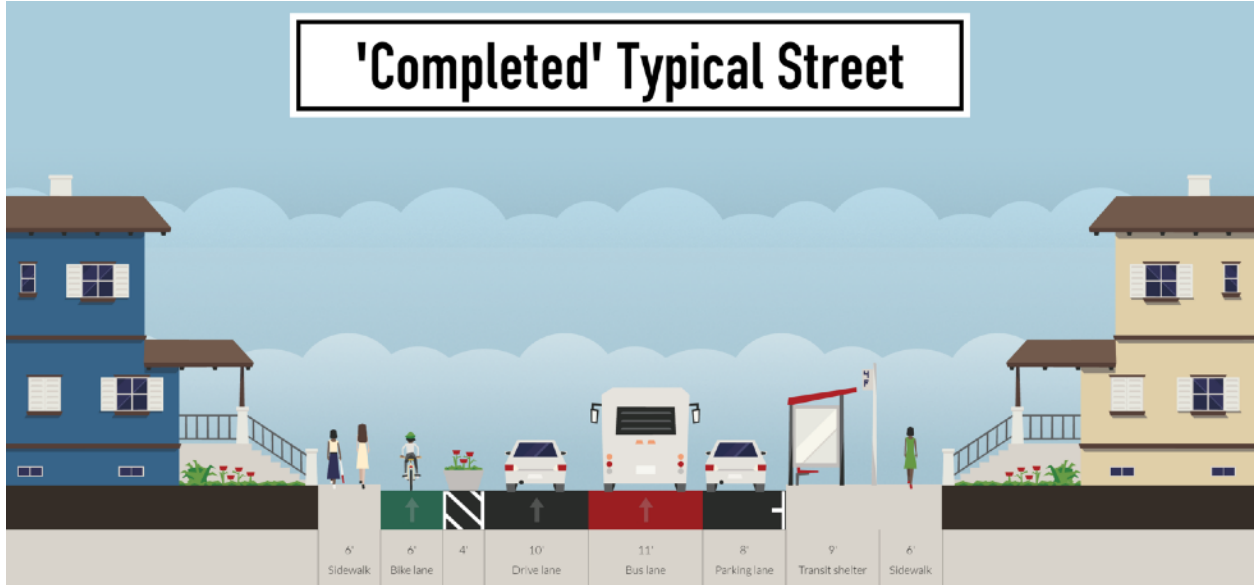


Figure 2: Completed Street Layout

more pleasant and efficient space for transit riders and bicycles. In this example, motorists lose one travel lane, but keep their on-street parking.

Complete Streets Infrastructure and Design

Many different types of infrastructure can be used to make streets more hospitable for non-car users, and for purposes other than rapid movement of automobiles. Using the Chicago Metropolitan Agency for Planning Select Treatments gallery as inspiration, I listed common complete streets infrastructure treatments and organize them by their primary intended outcome. Street safety and access improvements generally are constructed for one of three purposes: pedestrian and bicycle safety, bicycle mobility, and transit mobility. These street improvements descriptions are located in Appendix B.

Chapter 3: Literature Review

This literature review is for a thesis focused on how complete streets effect street life, and is not intended to be a comprehensive review of complete streets policies, their effects on safety, automobile Level of Service, implementation patterns, or any other parts of society. It briefly highlights the literature on complete streets policies, and their societal benefits and costs. I then discuss literature on street life and its measurement. Lastly, I discuss the existing literature on streets as a place, and the effect of complete streets on street life.

What are Complete Streets?

A complete street can take many forms, but at its core, a complete street is “a road that is designed to be safe for drivers, bicyclists, transit vehicles and users, and pedestrians of all ages and abilities” (LaPlante and McCann 2). The previous definition is almost identical to the one used in the introduction of this proposal by the National Complete Streets Coalition, a program of Smart Growth America. The National Association for City Transportation Officials (NACTO) Urban Street Design Guide does not mention complete streets by name, but guides street design in a functionally equivalent manner, and defines street design principles as “safe and inviting for people walking, shopping, parking, and driving in an urban context” (NACTO vii). Litman offers a similar definition as well, stating “*Complete streets* refers to roads designed to accommodate diverse modes, users and activities including walking, cycling, public transit, nearby businesses and residents” (Litman 1). For the purposes of this thesis, I use the definition issued by LaPlante and McCann , which is similar to the one given by the National Complete streets Coalition. I chose these definitions due to their inclusion of street safety.

Effects of Complete Streets

In academic literature, complete streets policies are analyzed comprehensively, or with a particular focus on one area of impact. For this thesis I review the impacts of complete streets on safety, economics, street life and findings from opposition to complete streets policies.

The existing literature supports the claim that complete streets policies create safer streets for all users. Chen et al. studied traffic safety measures in New York City and found that the complexity of New York City's streets did not make it more dangerous than other large American cities. In fact, the study references NYCDOT figures from 2008 that showed the city's rate of traffic fatalities per 100,000 persons was a quarter of the national average and less than half those of Chicago and Los Angeles. In Chen et al.'s study of safety countermeasures in New York City, speed humps (speed reduction measures) and road diets² were found to be statistically significant ways to reduce all vehicle and pedestrian crashes, as well as injurious and fatal crashes. In contrast, a study using Highway Safety Information System³ data to compare road diets before and after implementation to comparison sites found that road diets had a significantly lower number of crashes, but there was no significant difference in crash severity (Huang et al. 6). A study by Anderson et al. found that across 37 complete streets design projects that had accessible before and after data, approximately "70 percent of projects saw reduced crashes, and in many cases these reductions were significant" (Anderson et al. 30).

Logically, complete streets provide an for healthy commercial activity because they are pedestrian friendly, have on-street parking, and are aesthetically pleasing. A study from NYCDOT released in December 2013 used NYC Department of Finance data to study the before

² Road diets are defined by Chen et al. as "reducing the number of travel lanes and installing bike lanes". Road diets are part of complete streets policies, but are often discussed and studied separately.

³ The Highways Safety Information System is database that includes crash information from nine states distributed throughout the United States.

and after effects of complete streets redesigns on neighborhood level businesses and found mixed results (Economic Benefits 41). The study compared the redesigned streets to other streets in the neighborhood and found that some neighborhood businesses along redesigned streets saw an increase in sales compared to control sites within the same neighborhood, while others did not (Economic Benefits 41). Anderson et al. also studied the impact of complete streets designs on neighborhood economies, but found it difficult to attribute the observed improving economic climate strictly to the street designs; instead the study found cities used complete streets as a part of a larger economic development strategy (34). Both studies showed that although it is logical that a more inviting streetscape would provide a better neighborhood-level economic environment, it is tough to find a causal link between complete streets and economic growth.

In a report published in June 2016 by Smart Growth America titled *Amazing Place: Six Cities Using the New Recipe for Economic Development*, the authors state that urban economic development strategies are moving away from traditional methods of offering tax breaks and incentives towards building vibrant cities where employees and companies want to be. Tax breaks and financial incentives can be helpful, but that these traditional methods can lead to a race to the bottom that pits communities against each other which results in the jobs coming at high cost due to the subsidy or lost tax revenue. The report states that “companies are looking for walkable, live/work/play neighborhoods...with a vibrant mix of restaurants, cafes, shops, entertainment venues, and cultural attractions”. Companies also “place a premium on providing employees with multiple transportation options, including the ability to walk, bike, or take transit to work and meetings” (1). This place and livability-based economic development strategy is beneficial because even if the jobs don’t pan out, the residents end up with a better city.

Through my research of complete streets policies in academic literature, the overwhelming majority of articles stated the positive impacts of complete streets. However,

one case study from Topeka, KS showed that often opposition to complete streets comes from professional engineers and planners who design streets to maximize vehicle level of service (mobility instead of accessibility), and from community members who were concerned about project cost and did not see the preventative value of complete streets (Dodson et al. 3). Opposition to complete streets is better discussed anecdotally through magazine articles like the comprehensive tale of New York City's "bike wars" from former DOT Commissioner Janette Sadik-Khan. Sadik-Khan relays the story of New York City's complete streets projects where public outcry was centered on accusations that bike lanes made street more congested, dangerous for pedestrians, and that NYCDOT data regarding the matter was fabricated (*New York Magazine*, March 8, 2016). Sadik-Khan states that opposition to these bicycle lanes are not based in fact, and she believes New Yorkers are simply resistant to any change (*New York Magazine*, March 8, 2016).

Other critiques of complete streets revolve around its assignment of street space to some users and exclusion of others. By defining space on streets for cars, transit, and bicyclists, complete streets exclude many others. Vikas Mehta argues that complete streets reinforce a street hierarchy and compartmentalize users based on mode, and that complete streets are harmful because they reinforce that street are for transportation. With complete streets, streets are paths, not places (Mehta 96-97). Mehta finds inspiration from streets in India that have commercial activity and other uses including "walking, sitting, standing, lying down, sleeping, pan-handling, cooking, eating, washing and cleaning, grooming,...praying, playing music, playing games" and so on (Mehta 100). Regardless of its "completeness" a street that has assigned space for transportation uses only will not have the complex street ecology that occurs in some places.

One of the most tangible critiques of complete streets is their role in gentrification. Themis Chronopoulos discusses a bicycle lane in Williamsburg, Brooklyn that was installed around the same time that luxury condominium towers were being built along the waterfront.

The timing suggests that the NYCDOT became concerned with the conditions on the street because here would not be wealthy residents living next door to a “truck thoroughfare” (Chronopoulos 70). Sig Langegger describes how streets are spaces for public life, but that different cultures have different expectations of street life, and designing complete streets promotes one culture over another (Langegger 120). Langegger tells the story of the Latino culture of lowriding (driving a custom car at low speeds) in North Denver which is also called the Northside or Northside barrio. In the telling of this story, Langegger states that longtime residents of the neighborhood see streets as “congested with cultural activity”, but that today, gentrifiers invest in the predictable mobility...[and] ‘trendy livability’ of North Denver parks (122). Other critics have told similar stories, but the main point is that complete streets favor a street design that is preferred by one group of people who are often seen as newcomers trying to change the neighborhood to their liking.

Understanding Street Life

Danish architect and urban designer Jan Gehl is known worldwide for his work creating places and cities with people-centered design. In New York City, he is famous for helping NYCDOT design its Sustainable Streets program (Sadik-Khan, *Street Fight* 78). In his 2010 book *Cities for People* Gehl describes street life as “all of the activities that occur in the public realm” (19). In the 1996 book *Public Spaces, Public Life*, Gehl and Gemzøe importantly state that an overall number of pedestrians alone does not indicate quality urban life, but that a better gauge is the amount of people who “are spending time in the city, standing about, looking at something, or sitting just enjoying the city, the scenery and other people” (59). Gehl and Gemzøe state that people choose to walk for transportation or leisure, but they choose recreational and stationary activities for enjoyment (59). A report from Transportation Alternatives, an active transportation advocacy group, regarding livable street design in New York City similarly defines a healthy urban life (specifically “livability”) as “whether the place allows a diverse range of people to voluntarily engage in a wide variety of activities” (Lusher

et al. 18). As mentioned earlier, both Jane Jacobs and Donald Appleyard discuss the importance of streets as the location for all types of social interactions. Streets are where children are socialized, where neighbors greet each other, and where friends wander as they chat about life.

In the 1996 book *Public Spaces - Public Life*, Gehl and Gemzøe and their research team measured public life in Copenhagen through pedestrian observations, counts, and behavioral mapping (47). The team observed people primarily using public space for transportation (51-57) for stationary activities (59-65), and for events, and cultural activities (66-71). This study counted pedestrians in multiple locations throughout the city center; these locations varied by type of space (streets and plazas) and by dimension (47). The research team observed pedestrian activity during daytime and evenings on Tuesdays, Wednesdays and Saturdays on sunny days in both the summer and winter (47). The consistency of observation methodology allows for comparisons between sites.

In the 2013 book *How to Study Public Life*, Jan Gehl and Birgitte Svarre expand on the tools of public life study, which at their simplest are include walking around public space and “taking a good look” (xii). The tools in this book expand on the ones listed above by getting more specific into what observers should pay special attention to. The authors point out that different people occupy different space at different times, and that planners should pay special attention to the needs of women, children, and the elderly (14). The authors describe that street life can be categorized by necessary or optional activities, and that social activities can be either necessary or optional (17). The authors also recommend paying attention to how fast people move through or stay in a space, mapping where they are in the space, tracking their movements by the illustration of desire lines, and by photographing their activities (21-31). These tools help planners understand why certain people are in certain places at certain times, and those actions identify problems that should be fixed or working practices that should be expanded.

Impacts of Street Design on Street Life

The recent literature on creating urban livability and street life is focused on planning for people and not cars. In *A Changing Street Life in a Changing Society*, Gehl blames auto-centric urban design which has directed people away from traditional urban gathering spaces such as open-air markets, plazas, and streets towards shopping malls (Gehl 1). Gehl supports his claim by stating that once Copenhagen pedestrianized some of its downtown streets, people took to using the streets both actively and passively instead of simply passing through them (14). Through studies of this newfound urban street life, Gehl found that certain factors were correlated with pedestrian street usage: location, weather, dimensions, and most importantly, street furniture (15). Gehl concludes by stating that if public spaces are well designed and democratically accessible, urban street life can be supported and can eventually become as integral to cities as Olmstead's parks (17).

In *Cities for People*, Jan Gehl provides 12 quality criteria that dictate what makes a quality pedestrian landscape. He states that safety is the most important part of creating a place; good places always take care of protection first because if a location is unsafe people will not want to be there (238). Quality places are where people feel protected from "risk, physical injury, insecurity and unpleasant sensory influences" (*Cities for People* 238). He also states that quality public spaces can be comfortable and inviting to people when they provide space for people's activities, including "walking, standing, sitting, seeing, talking, hearing, and self-expression" (*Cities for People* 238). Complete streets help create quality places per Gehl's criteria by providing safety, and space for walking, standing, sitting and seeing.

In a 2006 exhibit at the Municipal Arts Society, the Project for Public Spaces and the New York City Streets Renaissance listed four criteria of what makes a great street: access and linkages, uses and activities, comfort and image, and sociability. Streets with good access and linkages connect people to where they want to go, and by whichever mode they choose; great streets also have places for many uses and activities which give people reasons to stay

on the street instead of passing through. The presentation also stated that great streets had comfort and image; they have comfortable seating, interesting streets, and celebrate the local community and do not look like “anywhere USA”. Lastly, great streets are sociable; they attract all types and ages of people. A great street is one that has all kinds of people yet everyone feels welcome.

As evidenced in the work described above, complete streets are often intertwined with the practice of creating “livable streets” and quality public space. The creation of quality public space is also referred to as “placemaking”. In Susan Silberberg’s 2013 report about how placemaking builds places and communities, she defines placemaking by stating

“At its most basic, the practice aims to improve the quality of a public place and the lives of its community in tandem. Put into practice, placemaking seeks to build or improve public space, spark public discourse, create beauty and delight, engender civic pride, connect neighborhoods, support community health and safety, grow social justice, catalyze economic development, promote environmental sustainability, and of course nurture an authentic ‘sense of place’” (2).

Placemaking often refers to parks and plazas, but the streets as place movement advocates for people to think of streets as public space, often stating that streets make up a large amount of a city’s publicly owned land (Streets as Places). Silberberg compares the practice of placemaking with the creation of livable streets; both have the same outcome of creating inviting places for people, but their processes can be different (27). She uses the example of NYCDOT implementing streets projects in a “lighter, quicker, cheaper” approach in comparison to an extensive public engagement process that accompanies placemaking projects (27). This design strategy may be true to the NYCDOT’s complete streets projects, but other municipalities could engage in a more extensive public involvement and design campaign.

The literature I have reviewed for this thesis proposal does not directly link complete streets to an improved street life by name, but it does by attribute. I look forward to furthering this literature review for the final thesis report. I hope to find more direct examples of researchers and governments who measure street life before and after complete streets redesigns, and gain greater overall insight into how governments use street life studies to build infrastructure that creates more inviting spaces.

Chapter 4: Locating Study Sites

The following sections provide background information on the street redesigns at each of the four locations where I conducted observations. First, I briefly discuss the physical layout of the street before and after redesign, and the project history. I then discuss the main takeaways from interviews with stakeholders and street observations.

Amsterdam Avenue, New York, New York

Amsterdam Avenue is a large northbound one-way street that is located on the west side of Manhattan, in the Upper West Side neighborhood (See Figure 3 for Study Area location between 88th Street and 89th Street). Amsterdam Avenue is a truck route located east of Broadway and west of Columbus Avenue and Central Park. Amsterdam Avenue is flanked by high-rise and mid-rise residential buildings, often with ground floor retail. The land uses along the street is diverse; there are many community facilities, cultural attractions, and commercial (retail and restaurant) uses. The portion of Amsterdam Avenue that I studied is located in the Upper West Side, which is an affluent community, although there is mixed and lower-income housing in the neighborhood, particularly further uptown.

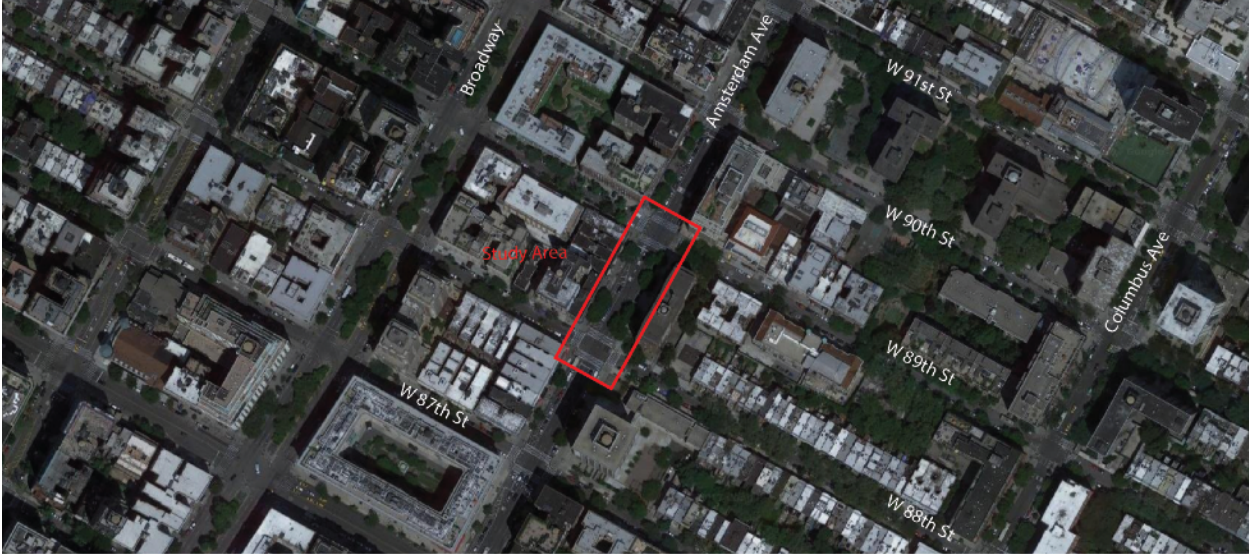


Figure 3: Amsterdam Avenue Study Area
Source: Google Maps

The roadbed of Amsterdam Avenue is 60 feet wide. Before the street redesign, the street featured two ten-foot parking lanes and four ten-foot travel lanes. The revised street design features a six-foot bicycle lane adjacent to the eastern curb with a five-foot buffer west of the lane; the bicycle lane and buffer are then protected by a nine-foot parking lane with concrete pedestrian refuge islands at some intersections. West of that parking lane is three ten-foot travel lanes and one ten-foot parking lane on the western curb. Figure 4 shows the street layout before and after the redesign (the figure is used from an NYCDOT presentation, so the “proposed” has been implemented).

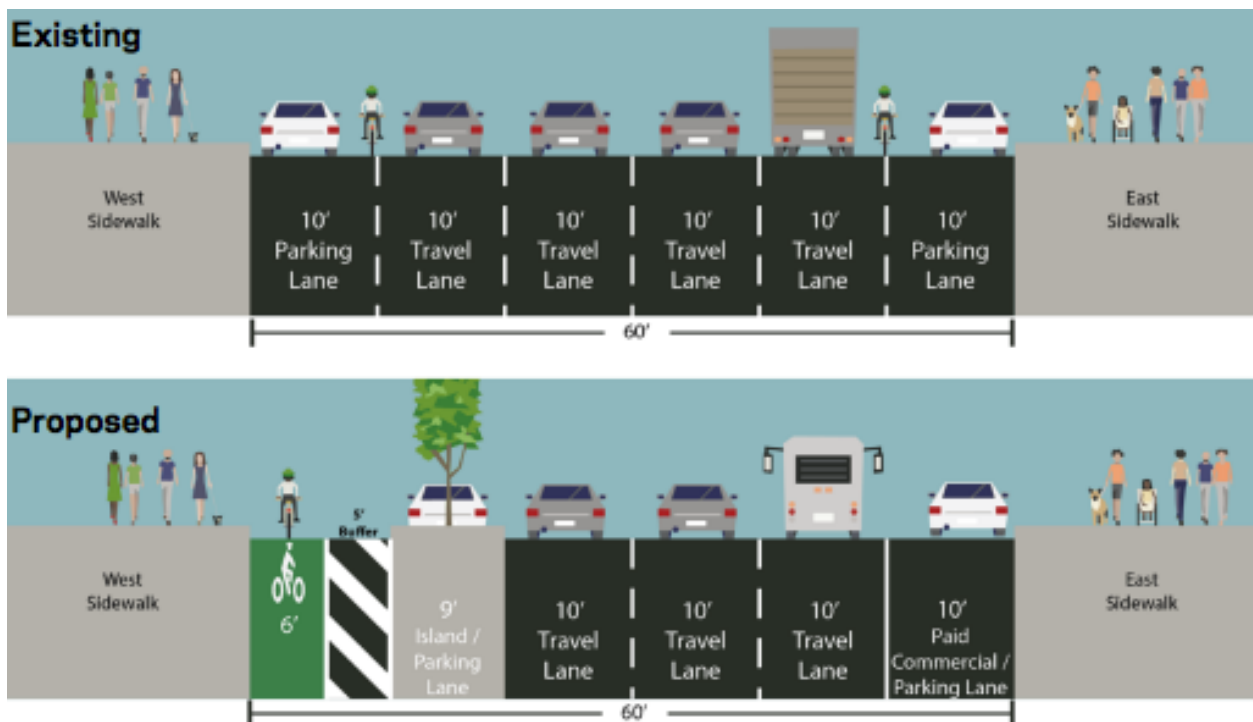


Figure 4: Amsterdam Avenue Design
Source: NYCDOT

Project History

The Upper West Side has had a history of advocacy and activism around livable and complete streets. *The Blueprint for the Upper West Side* study was published by the Upper West Side Streets Renaissance (a resident led campaign for livable streets) in November 2008. This report recommended safer and more pleasant streets and intersections through design, a network of protected bicycle lanes, and an equitable allocation of street space. Per an

interview with two Manhattan Community Board 7 members, the community asked NYCDOT to study complete streets designs on Columbus and Amsterdam in 2009. Columbus Avenue (Amsterdam Avenue's downtown pair) received the first phase of its parking protected bicycle lane in late 2010 (NYCDOT Amsterdam). Community Board 7 pressed DOT to redesign Amsterdam in 2013 and the construction was finally completed in 2016. The two community board members that I interviewed told me that their meetings were contentious due to some members not wanting streets to change out of fears that the changes would hurt drivers.

Overview of Interviews

For information about this redesign, I interviewed three people. All three are residents of the neighborhood, two are community board members, two are safe streets advocates, and one is a commercial property owner.

The interviewees stated that Amsterdam Avenue was always the logical uptown pair with Columbus Avenue which had been redesigned with a bicycle lane and a Manhattan Community Board 7 member stated that they have “seen more cyclists now that there is an uptown and downtown pair”. The interviewees stated that some community members were worried that the redesign would create lots of congestion and that it would take away their parking. One community board member stated that resistance to the redesign came from “three things: [fears of] traffic congestion, [loss of] parking, and resistance to change”. The three interviewees considered the redesign a success because of the safety benefits, space for street trees, and because street space has been reallocated for other users. One community board member stated Amsterdam feels like a

“multipurpose street now; the bicycle lane and pedestrian refuges send an implicit signal that the street is multipurpose, which is a subversive message that streets can be something different than narrow sidewalks and lanes of traffic for motor vehicles.”

Photo 1⁴ shows the protected bicycle lane, and pedestrian refuge island with the empty tree planter.



Photo 1: Amsterdam Avenue and 88th Street

Observations

I conducted observations at Amsterdam Avenue between 88th Street and 89th Street and around the Upper West Side on Wednesday January 4th through Friday January 7, 2017, I saw most people on the street passing through or running errands. Most people crossed the street only in a crosswalk and with a crossing signal. I observed people cycling, using the pedestrian refuges to shorten their crossing distance, and standing around talking on the sidewalk. I did not see anyone sitting on benches or stoops, and the most interaction I saw was between local shopkeepers and people who knew them. Weather was a factor in my

⁴ All of the photos shown in this thesis were taken by the author in 2017

observations. The street could be nice in the sun, but the weather was never comfortable enough to socialize on the street for an extended period. Outside of winter, weather in New York is generally temperate and conducive to street life. Direct interaction with the complete streets infrastructure was limited. Photo 2 shows people walking down the street and one cyclist traveling in the wrong direction.



Photo 2: Amsterdam Avenue between 88th and 89th Street

Vanderbilt Avenue, Brooklyn, New York

Vanderbilt Avenue is a neighborhood-scale commercial street with two-way traffic in the Prospect Heights neighborhood of Brooklyn. Vanderbilt Avenue connects the Brooklyn Navy Yard to Prospect Park, but the part located in Prospect Heights is located between Atlantic Avenue and Grand Army Plaza. Vanderbilt Avenue is located east of Flatbush Avenue and Carlton Avenue, and west of Underhill Avenue and Washington Avenue. My study area is the

block of Vanderbilt Avenue between St. Marks Avenue and Prospect Place. Mid-rise residential buildings with ground-floor commercial uses flank Vanderbilt Avenue, and brownstones and other mid-rise residential buildings are located on the perpendicular side streets. Prospect Heights is a mixed income neighborhood that, like much of New York City, is undergoing rapid change with more affluent people moving into the neighborhood. Figure 5 shows the location of the Study Area on Vanderbilt Avenue between Prospect Place and St. Marks Avenue, and the comparison sites of Washington Avenue between St. Marks Avenue and Prospect Place, and Prospect Place between Vanderbilt Avenue and Carlton Avenue.

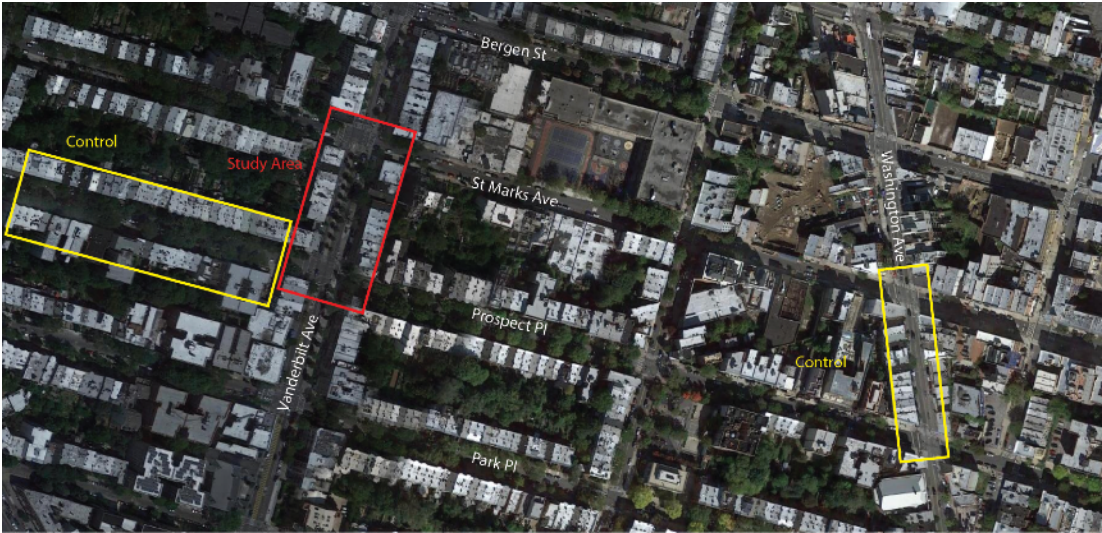


Figure 5: Vanderbilt Avenue Study Area
Source: Google Maps

The Vanderbilt Avenue roadbed is 58 feet wide, and originally featured one eight-foot parking lane, one ten-foot travel lane, and one eleven-foot travel lane in each direction. The street was redesigned twice (first in 2006 and then in 2008), and the current design is still a two-way street with one nine-foot parking lane, one five-foot painted bicycle lane, and one ten-foot travel lane in each direction. The two directions are separated by a ten-foot raised and planted median in some parts of the street, and a raised or striped median in other parts. The medians act as a pedestrian crossing refuges. Figure 6 and Figure 7 show the street layout before and after the redesign.

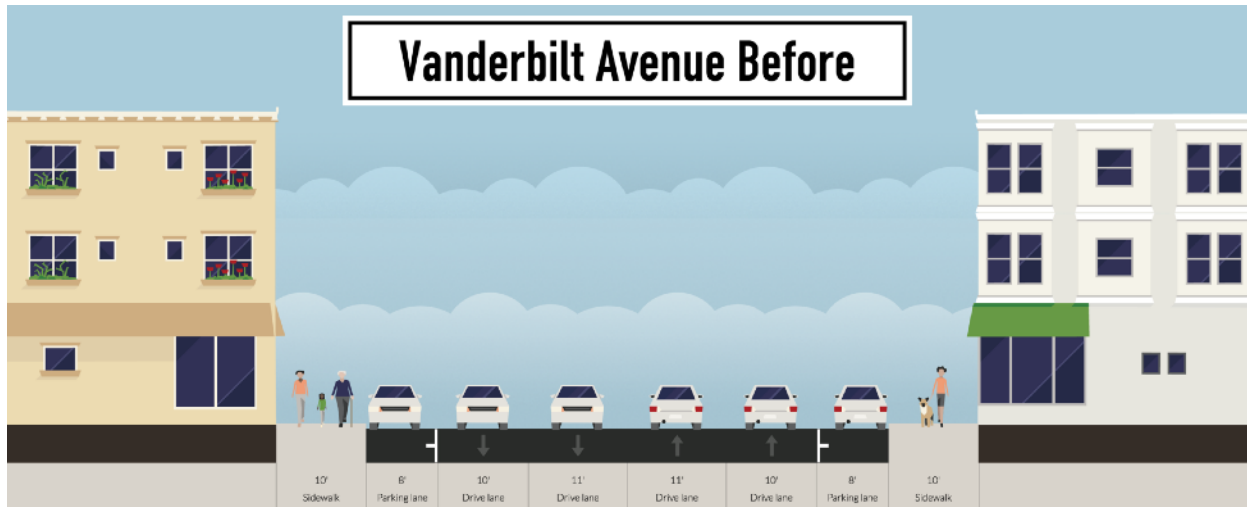


Figure 6: Vanderbilt Avenue Before its Initial Redesign

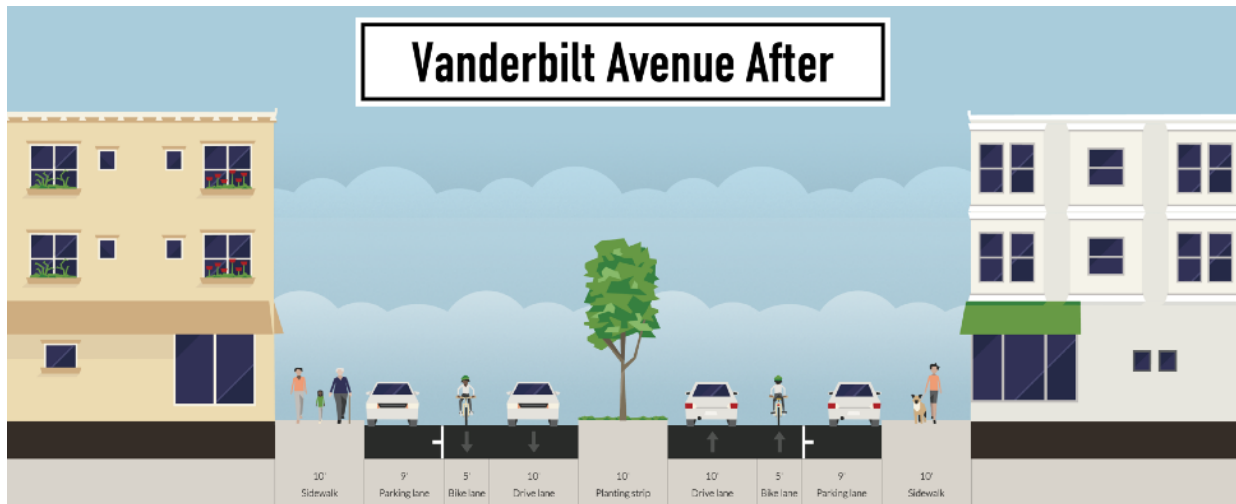


Figure 7: Vanderbilt Avenue After its 2008 Redesign

Project History

Vanderbilt Avenue was first redesigned in 2006 after the local community asked for traffic calming. The first redesign was a simple road diet that removed one of the two through lanes in each direction and replaced them with a striped 14-foot median with turning lane. The second redesign occurred in 2008 and featured the introduction of a striped bicycle lane and paved and planted median. The impetus for the first redesign was overall traffic calming along the growing commercial corridor, and the second redesign was focused on providing dedicated cycling space to link Prospect Park with the cross-Brooklyn routes of Dean Street and Bergen Street. According to interviewees, the paved traffic calming was important

to keep Vanderbilt a neighborhood street as the Barclays Center was being constructed; the concrete median was a physical structure that would keep traffic slow, regardless of any increase in automobile traffic that could come from events at the Barclays Center. Photo 3 shows the paved and planted median that was created to make this street safer by calming traffic.



Photo 3: Vanderbilt Avenue At Prospect Place

Overview of Interviews

For information about this design, I interviewed three people: one former resident and project planner for the NYCDOT, one current planner at the NYCDOT, and one current resident who is also community advocate and community board member.

The interviewees stated Vanderbilt Avenue has been a success due to its effective traffic calming and safety improvements. When describing the support for traffic calming in the neighborhood, one member of Brooklyn Community Board 8 stated “everyone loves it;

there is no opposition and incredible community support”. In describing why there is this much support, the interviewee stated “young families with children are supportive”. The interviewee continued, [these] “young families are a part of the Prospect Heights culture” and “many have been in a force in the neighborhood”. The interviewee also pointed out that because of this community activism, most of the neighborhood is a slow zone which caps the speed limit at 20 miles per hour.

As with all changes, there was criticism and resistance. The interviewee from Community Board 8 identified the population most likely to oppose the redesign as “older residents who have been [in Prospect Heights] a while, are less affluent, and who own cars”. A former NYCDOT planner and former resident came to a similar conclusion; they stated “opposition came from old line businesses who didn’t want the medians or removal of parking; these people were used to Vanderbilt Avenue the way it was”. The former resident also highlighted the divide saying “new [businesses] were supportive, old [businesses] were not”.

Observations

I conducted observations at the Vanderbilt Avenue project site between Prospect Place and St. Mark’s Avenue. I directly compared those observations to ones on control streets of Washington Avenue between Prospect Place and St. Mark’s Avenue and Prospect Place between Vanderbilt Avenue and Carlton Avenue. I observed street life on Wednesday February 1st, and Thursday March 9th, 2017. Weather was sunny and cool on both days, but March 9th was warm enough to sit outside and socialize.

Vanderbilt Avenue appeared to be more pedestrian friendly than Washington Avenue, but the difference was not drastic. The differences in the two complete streets blocks are the paved and planted median, which makes a noticeable difference in the pedestrian experience. Vanderbilt Avenue seemed to have more pedestrian use than the comparison sites, including more families and children. All of the streets were used by cyclists; Vanderbilt

Avenue had the most cyclists during my limited observations (~20 on Vanderbilt and ~10 on Washington during one period on the same day). Photo 4 shows a cyclist on Vanderbilt Avenue. Vanderbilt and Washington are both great streets with a diverse array of shopping stores, restaurants, and cafes, but neither had seating options that reflect the vibrant nature of the street. During the time of my observations, Vanderbilt seemed to have more and better seating options, but there is room for improvement. Traffic congestion seemed worse on Washington Avenue, but that could be a function of having the cars together in a constrained space, whereas Vanderbilt Avenue has the median which separates them.



Photo 4: Cyclist on Vanderbilt Avenue

The most surprising findings were on Prospect Place. In many ways Prospect Place is an ideal residential street; it is lined with brownstones and apartment buildings that offer semi-private space for front gardens or other activities. My observation days and times were not the most advantageous for observing street life on this street, but the finding of limited

street life was surprising. Prospect Place is currently too wide, and should receive a road diet redesign. During my observations, I observed five large and heavy weight trucks driving down street, in addition to the neighborhood delivery trucks and personal use cars and vans. Photo 5 shows a large construction vehicle passing by a double parked van on Prospect Place. The over allocation of street space to cars results in an uninviting streetscape.



Photo 5: Construction Vehicles on Park Place

Western Avenue, Cambridge, Massachusetts

Western Avenue is a two-lane one-way street located in the Riverside neighborhood of Cambridge, Massachusetts. Western Avenue connects the Cambridge's Central Square to portions of Harvard's campus across the Charles River in Boston. Western Avenue is located south of Massachusetts Avenue (until they meet in Central Square), and north of River Street, Western Avenue's one-way pair. Land uses around Western Avenue are mostly mid-rise

residential, duplexes, and detached single family homes. The area around Western Avenue is mixed-income, but has historically been a working-class African American neighborhood. Figure 8 shows the location of the Study Area of Western Avenue between Kinnaird Street and Jay Street, and the Control Areas River Street between Jay Street and Kinnaird Street, and Kinnaird Street between Western Avenue and River Street.



Figure 8: Western Avenue Study Area
Source: Google Maps

The Western Avenue Roadbed was 45 feet wide, and previously featured one eight-foot parking lane on the southern curb, two twelve-foot travel lanes, one five-foot bicycle lane, and another eight-foot parking lane on the northern curb. The entire street was completely reconstructed (compared to other projects where the street was simply repainted with a few additions), and now features one seven-and-a-half-foot parking lane on the south curb, two ten-and-a-half-foot travel lanes, and another seven-and-a-half-foot parking lane on the north curb. On the north side of the street there is a raised six-foot separated bicycle lane separated from the street by a three-foot curb. The separated lane is demarcated from the sidewalk by its permeable pavement which has a different color and texture than the sidewalk, different markings, signage, and intermittent street trees. The street also features

curb extensions at intersections, raised crosswalks for the sidewalk and bicycle lane, and bus bulb-outs at bus stops. The street redesign also has many urban design features including landscaped plantings granite blocks for seating, and granite curbs. Figures 9 and 10 show the street layout before and after the redesign.

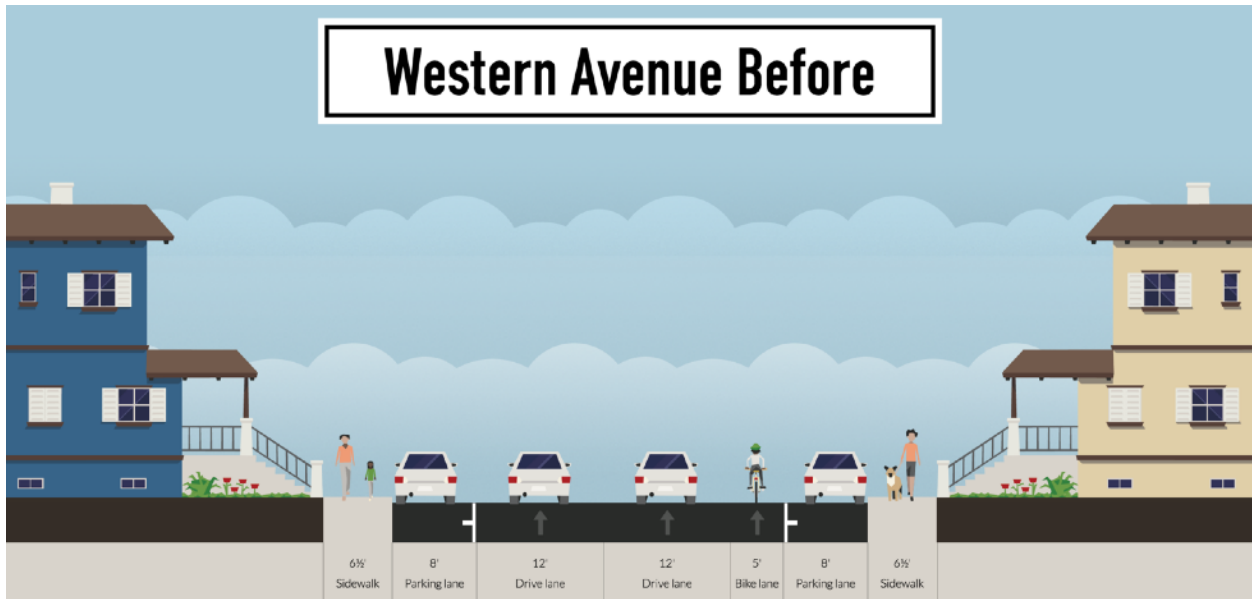


Figure 9: Western Avenue Before 2015 Redesign

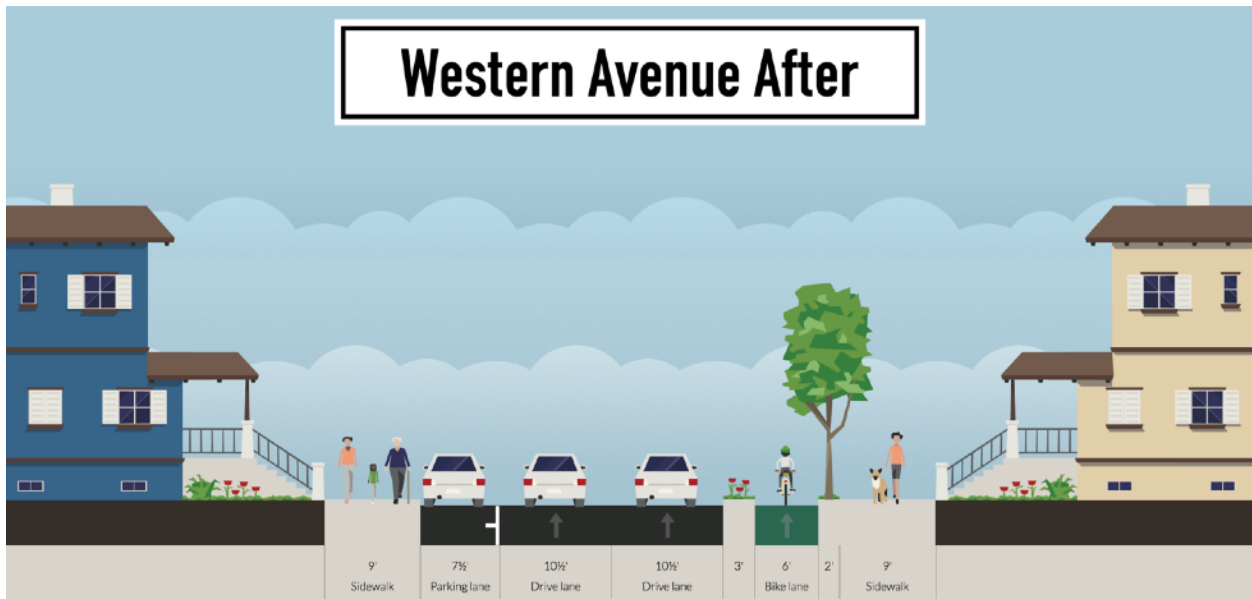


Figure 10: Western Avenue After 2015 Redesign

Project History

Western Avenue was reconstructed by the Cambridge Department of Public Works who received a grant from the Environmental Protection Agency (EPA) to reconstruct the sewer system under the road. The road was also in the rolling five-year plan to be upgraded by the city's Department of Transportation. The funding from the EPA pushed this project to the forefront, and since the entire road would have to be dug and rebuilt, the city took the opportunity use some of the money set aside for reconstruction to create a complete street. The project also included a redesign of a park along the route and the process featured extensive public involvement. The redesign was complete in 2015, and was awarded the best new bike lane of 2015 by the bicycle advocacy group People for Bikes.

Overview of Interviews

I interviewed six people for this project: one former City of Cambridge Planner, one current City of Cambridge Planner, a former City of Cambridge elected official, a community advocate, an employee at a local bicycle shop, and a city of Boston planner.

The interviewees stated this project was successful due to its innovative and pleasing design, but also because of the extensive, purposeful, and meaningful community outreach. Photo 6 shows the innovative design which includes landscape design with seating and planters with the sidewalk and protected bicycle lane. The former Cambridge planner explained that the community was hesitant at first because there were concerns “about why not put the street back the way they found it”. The planner continued, stating that people were apprehensive about the design out of “fear of cars and traffic patterns, reduced parking” but also “safety concerns for pedestrians”. familiar with the project said the community was hesitant at first due to a long and troubled history with the city government and the scope and length of the construction. The former and current Cambridge planners stated the public engagement process helped the community get behind the vision of the project, and emphasized that meaningful community outreach and involvement was



Photo 6: Western Avenue at Kinnaird Street

paramount. Community engagement was important to help ease the fears of the redesign, and government action in general. The former Cambridge planner stated that this “neighborhood was [previously] ignored by Cambridge because they were African American”, and that “old Cambridge feels that they have more authority [in the neighborhood] not just because of longevity but because of [this history]”.

Observations

I conducted observations at the project site and around the neighborhood on Thursday, January 19, 2017. The first thing I noticed is how beautiful the design is; it has the most innovative street layout of any sites I went to, uses the most aesthetically pleasing materials, and has the best landscape design. This design is particularly innovative through its use of protected bicycle lanes that are separated from traffic by a raised curb and raised crosswalks.



Photo 7: Granite Block in Landscaped Planter on Western Avenue

This pleasing design makes sense considering the project's cost and scope, but regardless, it is noticeable. Photo 7 shows a planter with seating and a community history plaque. The weather wasn't the most conducive to street life, and perhaps that is why it was lacking. However, when I walked down to Massachusetts Avenue where there are more attractions, I saw people doing more stationary and social activities of sitting on benches and talking. This dichotomy of street life reflects the challenges of creating livable cities and streets; changing one part of the built environment won't automatically change places for the better. Western Avenue was the most inviting street that I observed, and is certainly much better than its one-way complement River Street, but the land use is predominately residential, so the street doesn't attract many people for social activities.

The street life I did observe included bicyclists using the off-street lane, people walking along the street for recreation and transportation (Photo 8 shows one person walking on the sidewalk), and one person waiting for the bus at the bulbed-out bus stop. The bicycle lane was also used by a person in a wheelchair/scooter, and cyclists going in the opposite direction. Street life was much more apparent on Western Avenue than its two comparison streets, Kinnaird Street and River Street; Kinnaird is a short residential block that only had walkers passing through or going to a residence. River Street had similar types of street life; it seemed the only people there were on the street due to their route.



Photo 8: Pedestrian on Western Avenue

Hillsborough Street, Raleigh, North Carolina

Hillsborough Street is the main commercial street for North Carolina State University and the surrounding neighborhood. It acts as the northern boundary for the university; south of the street is the university campus with buildings generously set back from the street while north of the street is one to two-story commercial buildings (mostly restaurant and retail),

and some mid-rise residential, beyond which are small multifamily residential and single-family detached houses. The residential area directly north of the street is generally occupied by students, but housing beyond the first few streets is occupied by families. Figure 11 shows the location of the Study Area and Control Areas.



Figure 11: Hillsborough Street Study Area
Source: Google Maps

The roadbed of Hillsborough Street varies in width, but the section within my study area is 50 feet wide. The street was previously a five-lane road with two ten-foot travel lanes in each direction and one ten-foot parking lane on the north side of the street. The street redesign included a road diet where one travel lane was removed in each direction. The street currently has two seven-foot parking lanes, one eleven-foot travel lane in each direction, and one four-foot striped bicycle lane in each direction. The street also features curb extensions at intersections and a seven-foot wide raised median and pedestrian refuge island that allows for left turns at a few intersections. The newly constructed sidewalks are made of brick instead of the standard concrete. Figures 12 and 13 show the layout of the street before and after the redesign.



Figure 12: Hillsborough Street Before Redesign



Figure 13: Hillsborough Street After Redesign

Project History

Hillsborough Street is the commercial high street and cultural focus the university, and has been a gathering place for students with restaurants and shops for many years. Over time, the pedestrian and commercial environment on the street deteriorated which alarmed local

residents, the city, and the university who each had an interest in revitalizing the area. All of the stakeholders wanted to prevent the area from becoming dangerous and uninviting, which had happened at other universities around the country. A car crash in 1997 that killed a pedestrian spurred the University and the City of Raleigh to envision a redesigned street. The city produced a feasibility study in 2001 that proposed a road diet, roundabouts, and an improved pedestrian environment. The main focus of this project was pedestrian street safety, but the city and university wanted to use the opportunity of redesigning the street to make it a more pleasing place with the goal of improving its economic performance. Because the project would involve a complete redesign and repaving of the street and sidewalks, construction of the project was split into phases; Phase I (the area where I studied and observed street life) began construction in 2009, and was complete in 2010. Photo 9 shows the pedestrian refuge median and additional on-street parking.



Photo 9: Hillsborough Street

Overview of Interviews

I interviewed five people for this project; two who are involved with the local business improvement district, one who was involved with real estate from the university, a City of Raleigh planner and engineer, and one transit user and cyclist.

Interviews with project stakeholders emphasized that Hillsborough Street is an example of a project that blends safety and streetscape improvements with the goal of economic development along the corridor. The project was planned to be one that helped transform the area around the street from run-down to a destination for students, faculty/staff, and residents of the surrounding neighborhood. The former university real estate official stated

“[fear came from] peer institutions [where] the business district and residential neighborhood are sometimes in strong decline. If [the community] waits long enough and don't do anything it gets so bad that you have to put [the university's] money behind the corrections to make it a safe and viable neighborhood again.”

Per a City of Raleigh Project Engineer “[the project] impetus was pedestrian safety; [the street] was the most dangerous for pedestrians in North Carolina”. The interviewees who were involved with the planning and development of the street and surrounding commercial growth stated the street is a success due to its traffic calming and inviting design, but public outreach and community meetings also played an important role. The diverse stakeholders in the area were accommodated with the design, which led some to criticize it as not being as progressive as it could have been.

Observations

I conducted observations at the site on Wednesday, January 25 through Friday, January 27, 2017. Unlike other locations, the weather was generally nice, with portions of the day



Photo 10: Hillsborough Street Streetscape

that felt warm; the weather was very conducive to spending time outside. I observed people spending time along the street eating and drinking coffee at café tables (see Photo 10), and talking to friends on informal street seating (a brick wall). My observations showed the project was a complete success for pedestrian safety and for economic development. The street protects and invites pedestrians; and each additional pedestrian is another potential customer for the restaurants, cafes, and retail stores. The raised median and curb extensions seemed to make a huge difference in crossing the street for people coming and going between the university and the street attractions.

The comparison streets were Clark Avenue, which is a street similar street without the pedestrian-friendly designs; and Horne Street, which is a connecting street with standard sidewalks where it connects to Clark Avenue, and brick sidewalks near the connection to Hillsborough Street. The comparison streets did not have as good of street life, which is probably due to their surrounding detached residential homes and lack of attractions. Hillsborough Street also has the most interesting and inviting streetscape, where Clark Avenue and most of Horne Street are standard suburban-style sidewalks with houses set back from the street.

Chapter 5: Effects of Improved Street Safety on Street Life

Each fatal crash on our streets is a tragedy; for this reason, pedestrian safety should be the most important factor in creating complete streets. Luckily, the benefits of street safety do not stop at saving lives. Safe streets provide the baseline for active street life; it is intuitive that people will not want to spend their time in a space that is dangerous to their well-being. Safe street designs also include the creation or demarcation of space for marginalized road users, including cyclists and transit riders.

All four projects were reconstructed or redesigned first to improve street safety for pedestrians. The City of Raleigh Engineer stated “the most important thing [about the redesign] is safety; the most important impact is slowing traffic down. Period. That’s it.” The NYCDOT planner had a similar response. Their favorite part of street redesigns is “the organization piece of the project...taking things away [can] make them better. It actually works and is proven to work.” This planner is referring to the removal of some travel lanes or other pieces of the street to simplify the road and make traffic patterns more predictable.

Impetus for the Complete Streets Projects

At Amsterdam Avenue, portions of the community had advocated for safer streets for quite some time. The Blueprint for the Upper West Side document was a privately funded study that brought Jan Gehl to the Upper West Side to plan for a pedestrian-friendly neighborhood. Both interviews and observations pointed out the incompatibility of pedestrian safety with Amsterdam’s categorization as a truck route. I observed many large trucks attempting left turns and yielding to pedestrians in the crosswalk. Neighborhood residents told me that Amsterdam Avenue was planned to be a highway instead of the neighborhood street that it is. Photo 11 shows a large truck turning onto Amsterdam Avenue as people are crossing the street.



Photo 11: Truck turning onto Amsterdam Avenue

The Prospect Heights community approached the NYCDOT and the Brooklyn Borough President about the dangers around the street, and in May 2006 the city gave Vanderbilt Avenue a road diet which removed an on through lane of traffic in each direction and created a striped median. A resident who lived close to Vanderbilt Avenue told me that it was “not unusual to see cars wrapped around the lamp post” that is located at the corner of his street and Vanderbilt Avenue.

The redesign of Hillsborough Street was also a product of a desire for safer streets; two interviewees and a corridor redevelopment study revealed there had been a pedestrian fatality in 1997 that pushed the city to make the street safer. Raleigh is not an urban city with many walkable communities, but North Carolina State University, Hillsborough Street, and the surrounding neighborhood are one of the few places in the city where daily activities can occur without a car. In places like Raleigh where car ownership and vehicle trips are more

Table 1 - Safety Features

Treatment	Amsterdam Avenue	Vanderbilt Avenue	Western Avenue	Hillsborough Street
Bicycle Signs/Signals	✓	✓	✓	
Curb Extensions			✓	✓
Narrowed Lanes		✓	✓	
Painted Bicycle Lanes		✓		✓
Pedestrian Refuge	✓	✓		✓
Protected Bicycle Lanes	✓		✓	
Raised Crosswalks			✓	
Road Diet	✓	✓		✓
Separated Bicycle Lanes			✓	

common than other cities like Boston and New York, it is critical that the few places with walking friendly land uses and density are safe for pedestrian use.

Although Western Avenue was designed as a part of a sewer reconstruction project, former and current City of Cambridge Planners stated that Western Avenue needed a new design due to safety concerns, and that the redesign would have happened eventually.

Safety Features of the Project Designs

Most complete streets infrastructure is dedicated to safety. In the section below, I discuss the key safety improvements from these projects and show how they affected the street in each location.

I asked most interviewees which common complete streets-style infrastructure treatment was the most important. The NYCDOT bicycle and pedestrian planner responded that the “best tool is the four-lane to three-lane road diet; [because] it can add turn bays or parking or median islands.” He continued, “the road diet treatment is hands down has had the most safety impacts, and economic development with the trees and narrower lanes”. Vanderbilt Avenue and Hillsborough Street received traditional four-lane to three-lane road diets. Amsterdam Avenue did not receive a traditional four lane to three lane road diet, but it did remove one travel lane and replace it with one bicycle lane.

The first iteration of the Vanderbilt Avenue road diet involved a painted median and no bicycle lanes; that design was improved and eventually featured painted bicycle lanes and a pedestrian refuge median on some parts of the street. According to the NYCDOT’s Safe Streets Index 2009 Report, Vanderbilt Avenue had an 80% increase in bicyclists after the initial redesign, and average traffic declined from 34 mph to 28 mph. The total number of crashes with injuries in the three years after the initial redesign were equal to or below the number in the three years prior. This shows a lower crash rate since the number of cyclists on the street increased by 80%.

Hillsborough Street’s four lane to three lane road diet also features a pedestrian refuge median along the length of the street. The City of Raleigh showed in a 2014 presentation that pedestrian crashes drastically decreased after construction to two in the three years from ten in the three years prior. The same presentation stated there were two more bicycle crashes in the street after construction; there were seven crashes before and nine crashes after. This increase in crashes is troubling, but if the corridor is being used by more cyclists as is expected, then this would indicate a decrease in total crash rate.

Amsterdam Avenue’s redesign removed one lane of through traffic of automobiles and replaced it with a bicycle lane. A Community Board 7 member stated that its previous design

of four lanes in one way “is a recipe for disaster”. The same Community Board member stated “the most important thing [about the project] is to take out a lane of traffic to improve safety”.

I agree with the comments from the interviewees. Many streets are designed with more capacity than needed to move motorists effectively, and I think the NYCDOT bicycle planner’s statement of “right sizing” the street is the most appropriate description of a road diet. Road diets aren’t always intuitive; how could traffic flow better or be safer with less lanes? Road diets streamline streets by removing unnecessary hazards caused by too many general-purpose lanes. Road diets, like the one on Vanderbilt Avenue, remove a general-purpose lane but provide left-turn bays in its place. This design keeps the function of the four-lane road when necessary, but improves safety and experience in the other parts.

The redesigns of Amsterdam Avenue, Vanderbilt Avenue, and Hillsborough Street all feature pedestrian refuge islands. These islands create shorter crossing distances for pedestrians, which improves safety and creates a better walking environment because people do not have to wait for the signal to cross the street safely.

On Amsterdam Avenue, the addition of the pedestrian refuge island also shortens the effective crossing distance by two lanes; instead of crossing from curb to curb, pedestrians can now stand in the place of the parking lane which requires them to only cross three travel lanes and one parking lane (compared to the two parking lanes and four travel lanes before the street redesign). A resident of the neighborhood around Amsterdam Avenue discussed the benefits of the pedestrian refuge medians saying “there is an aging population in the Upper West Side...the pedestrian refuges are serious helps. They [make the street] easier to cross and the sight lines are better”. During my observations, I saw some people using the median to cross the street, but the vast majority did not. Photo 12 shows a person waiting in the median to cross the street.



Photo 12: Pedestrian Refuge on Amsterdam Avenue

The redesign of Hillsborough Street created a pedestrian refuge median along the length of the street, except at the intersections. The intersections feature curb extensions. The design also coupled the road diet with curb extensions at the intersections which shortened the crossing distance from 50 feet (curb to curb) to 18 feet (bulbed curb to median). A project stakeholder told me “[my] favorite aspect [of the design] is the mid block crosswalks that don't have a signal but just the refuge”. He continues, “I didn't use the light, I always just waited then went to the mid block crossing...the pedestrian experience is tremendous”. The planted median on Vanderbilt Avenue also acts as a pedestrian refuge. Taking the refuge into account, the redesign shortened the crossing distance from 58 feet (curb to curb) to 24 feet (curb to median).

My observations at Hillsborough Street and Vanderbilt Avenue were similar to those on Amsterdam Avenue. Compared to the overall number of people crossing the street, those who crossed halfway using the median were very few. Based on these observations, pedestrian medians seemed to improve the safety for the people that chose to use them; my assumption is that the people who use the median would have been more inclined to cross the street without the signal, and the median makes that crossing safer. Medians also act as physical barriers that visually narrow the roadway, and slow cars down.

Complete streets policies often involve the promotion of bicycle lanes. All four redesigns that I studied created an unprotected, painted bicycle lane in the street, or a protected bicycle lane on (Amsterdam Avenue) or off (Western Avenue) the street. Complete streets policies can promote these improvements as a way to expand access to bicyclists or as street safety improvements that will benefit all users. A member of Community Board 7 expressed both points to me, stating “Complete streets slow cars down and makes bikes safer in a dedicated bike lane”.

The parking protected bicycle lane on Amsterdam Avenue protects bicyclists and pedestrians by physically separating them from moving traffic and lengthening the distance between cars and vulnerable street users. The Amsterdam Avenue street redesign was completed in the summer of 2016, and the NYCDOT has not released any data regarding its impacts on safety. In its promotion of the redesign, the NYCDOT presented data from streets in Manhattan before and after they have received protected bicycle lanes. Per the NYCDOT, in the three years after protected bicycle lanes were implemented, “total injuries have dropped by 20 percent, crashes with injuries have been reduced by 17 percent”, and “pedestrian injuries are down 22 percent” (NYCDOT Amsterdam 14). The same report showed that total injuries to cyclists have only declined slightly, but the injury rate of cyclists has most likely dropped as use of the bicycle lanes has increased. Each project interviewee touted the benefits of this protected bicycle lane. The resident and commercial property owner thought



Photo 13: Western Avenue

the lanes were helping change travel patterns; he stated “bike lanes are increasingly used by commuters and tourists”. At the time of the interview, the redesign was not a year old, and the resident thought its use would only grow. He made a comparison to the Hudson River Greenway, saying “[it] was initially ver low usage...now it’s like the Long Island Expressway... the lesson is that the city is changing, and bike lanes will be used a lot more as time goes on.” Of all of the cyclists I observed, the vast majority cycled in the protected lane compared to bicycling in the automobile lanes.

Western Avenue’s redesign offers the most protection to cyclists by removing them complete from the roadway. In a presentation at the 2016 NACTO Designing Cities Conference, the city showed that the street redesign resulted in a 32 percent increase in the number of pedestrians and a 122 percent increase in the number of cyclists in the PM peak weekday



Photo 14: Cyclist with Child on Vanderbilt Avenue

hours. These increases in pedestrians and bicyclists could reflect improved street safety. In my interview with the City of Raleigh Engineer, he stated that if he had the resources, he would design a street with a separated lane due to the increase in safety it would provide. Most of the cyclists I observed at Western Avenue were riding in the separated bicycle lane, but a small number road in the travel lane; I saw many more cyclists on Western Avenue than on the control streets. Photo 13 shows the separated bicycle lane on Western Avenue.

According to the NYCDOT's Safe Streets Index 2009 Report, Vanderbilt Avenue had an 80% increase in bicyclists after the initial redesign. Photo 14 shows a female cyclist transporting a child on Vanderbilt Avenue. These two vulnerable populations on Vanderbilt Avenue show that the cyclist deems the street safe enough for their travel, even though they are not protected from cars. In my observations, I saw a diverse array of cyclists on Vanderbilt

Avenue; some were wearing spandex gear and cycling for exercise, some were commuting. Hillsborough Street has a non-protected bicycle lane that functions very similarly to Vanderbilt Avenue. Vanderbilt Avenue had many more bicyclists, and more hospitable to bicycle use but that could be due to Hillsborough Street's proximity to a university campus which would have larger sidewalks where bicyclists could travel away from traffic.

A measure of perceived street safety for cyclists is where they choose to travel on the street. Cyclists should ride in the street, and their choice of riding in the sidewalk is a revelation that they find the street unsafe. I did not see a single cyclist at Amsterdam Avenue or Vanderbilt Avenue riding on the sidewalk, but that could be a function of New York City's large amount of pedestrians.

At all four project sites, I paid particular attention to children holding their parents' hands as they walked down the street was not definitive when compared to control streets within the same neighborhood. The fact that my observations did not point out a large discrepancy between complete streets and streets only designed for routine accommodation (maximizing automobile level of service), suggests that either parents and children feel similarly safe on these neighborhood streets regardless of infrastructure, or that this method is less meaningful in this context.

I did notice in both New York City locations that there were many people on the street with children; many were pushing strollers, walking with children, or escorting children while they traveled the sidewalk with scooters. I don't think it is too far of a stretch to suggest that the presence of families with small children in a stroller or young children riding scooters on a sidewalk indicates a safe feeling around the street. Vanderbilt Avenue was a telling site because it had noticeably more parents and families than either control street, one of which had two painted bicycle lanes. This could reflect residential patterns within the neighborhood, or the locations of popular origins and destinations, but it does suggest that families feel safer on Vanderbilt Avenue than Washington Avenue. Western Avenue and Hillsborough Street did not have as many children with families as the sites in New York City.

Chapter 6: Effects of Placemaking on Street Life

For purposes of this thesis, I define placemaking as human-scale and people-focused design that creates a welcoming environment and a sense of meaning or community that gives people a connection to that place. As stated in the previous section, the impetus for most street redesigns is safety, and safety-focused infrastructure often is designed at a human scale, and therefore helps create a sense of identity at the street. A planner from the NYCDOT told me that after creating a safer street, the second best way to get a community behind a project was to show them that “this street will look like it belongs to the neighborhood instead of a cut through for people who are commuting”.

Complete streets infrastructure effects street life by providing many of the design elements that create a great street. The Project for Public Spaces show what makes a great place through four main points: sociability, uses and activities, access and linkages, and comfort and image (*What Makes a Successful Place*). Jan Gehl Similarly provides twelve quality criteria that are based on three main ideas, protection, comfort, and delight; these criteria are described further in the literature review (Gehl *Cities for People* 238). In the previous chapter I made the argument that people would not spend their time on a street that they thought was dangerous; here I argue that people will choose to spend their time on a street that welcomes them.

In the sections below, I describe the complete streets infrastructure and design elements that help create the great (people-oriented) streets as described by the Project for Public Spaces (PPS) and Gehl. Many of the elements described by PPS and Gehl overlap with the previous section on safety, so here I focus mainly on their impacts to creating a sense of place.

Impetus for the Complete Streets Projects

The impetus for Amsterdam Avenue was street safety, but interviews revealed that creating a more neighborhood focused street was also one of the important reasons for creating the redesign. Amsterdam Avenue is a truck route, and many stakeholders stated it felt like a highway running through their neighborhood. Vanderbilt Avenue was also designed first for street safety but its redesign coincided with neighborhood development of the neighborhood. Per interview with neighborhood advocates, the residents were concerned that the development that would become the Barclays Center would bring more cars through the neighborhood. The new street design was meant to physically control traffic and put a “line in the sand” that this street was for residents and not people who were passing through for entertainment at the new arena. According to interviews with former an NYCDOT planner, the street was also designed to help provide connectivity to Prospect Park and the local bicycle network.

Western Avenue was redesigned for safety, but lots of time and effort went into designing a street that would turn it into a neighborhood street that welcomed walkers, bicyclists, and bus riders while celebrating the history of the neighborhood. I think they achieved their goal by combining the complete streets style infrastructure with beautiful streetscapes with planters, street trees, and plaques that recognized local history. Hillsborough Street was redesigned for safety but also to make the street a destination that would attract students, university staff, and neighborhood residents. Photo 15 shows one of the plaques that celebrate local history on within the landscaped street planters.

Placemaking Features of the Project Designs

The streets that I studied feature a few different design details and pieces of infrastructure that help give the street an identity and make it a welcoming place. In the section below, I discuss a few of the key features from these projects and show how they affected the street in each location.



Photo 15: Celebratory Plaque

Table 2 - Placemaking Features

Treatment	Amsterdam Avenue	Vanderbilt Avenue	Western Avenue	Hillsborough Street
Landscaping		✓	✓	
Local Features			✓	✓
Quality/Inviting Design			✓	✓
Seating	✓	✓	✓	✓
Space for People	✓	✓	✓	✓
Street Trees	✓	✓	✓	✓

The design of Western Avenue includes many different types of complete streets infrastructure, including bus stop bulb-outs, sidewalk extensions, bicycle lanes, and raised crosswalks. These are important, but I believe the most interesting part of the street is how they all fit together in a beautiful design that includes landscaped planters and things that provide a local feel or sense of place and history (I refer to them as “local features”). Western Avenue’s design is especially striking compared to the control streets, and to a “typical” street that one might think of, which look like they were only created to move cars as efficiently as possible. Western Avenue’s design invites people onto the sidewalk, and into the public realm, and therefore can increase the sociability of the street. The new design was inviting to the neighborhood and the celebratory plaques help give the street local context. The quality of the design, landscaping, and materials helps elevate Western Avenue from a through street for commuters rushing to get to the highway to place for residents who deserve the beautiful infrastructure. This redesign is unique among all of the streets that I observed because of the experience it provides to cyclists and wheelchair users. The separated and raised bicycle lane creates horizontal and vertical separation of bicyclists from cars, and the raised crosswalks make traveling down the road much easier because the entire trip is at a single grade.

The planted median on Vanderbilt Avenue is also unique to New York City; most streets do not have this type of median, and street trees are usually located on the sidewalk. The other streets in the neighborhood are beautiful in the quintessential Brooklyn brownstone way, but Vanderbilt Avenue has a uniqueness encourages a sense of place and community around the street. Vanderbilt Avenue and Washington Avenue have very similar street designs, but the planted median on Vanderbilt gives it more of a sense of place than Washington Avenue. I observed Vanderbilt Avenue to be much more active than its control streets. Vanderbilt felt much more like the Main Street or commercial high street of Prospect Heights, and the street design supports that designation. During two periods of observation, Vanderbilt Avenue had more cyclists than Washington and more families with children walking down the

street. These observations could be due to the street being a direct route, but could also reveal a choice because the street is more pleasing due to its sense of place.

Hillsborough Street similarly invites people into the street through its brick detailing. This choice of material increases the comfort and image of the street because brick is a defining feature of the university. Regardless of the redesign, Hillsborough Street is the commercial high street of the neighborhood, but the new street makes the area more welcoming and pleasant compared to the control streets. In an interview, the Business Improvement District representative said the “pedestrian friendly design is attractive and useful.” He continued, saying that “the [upgraded] lights, furniture, and street amenities are all nice, but they do not move the needle to the extent that the [widened] sidewalk and [pedestrian refuge median] did.” In my experience and observation, Hillsborough Street was more welcoming than its control street due to those wide brick sidewalks, brick median, and upgraded street lights.

The redesigned Amsterdam Avenue features space for street trees in the pedestrian medians, although they were not planted at the time of my January 2017 observations. Street trees improve the comfort and image of the street by providing color and helping soften the street by providing an organic shape that contrasts with the hard rigid lines of the street, sidewalks, and buildings. The most noticeable part of the Vanderbilt Avenue redesign features a raised median with trees planted by the NYC Greenstreets program. These trees help make the street a more welcoming place, especially when they are in bloom; in fact, a community board member told me that the trees were “quite lovely”. The raised and planted median and bicycle lanes also provide a more interesting streetscape for people to look at while they are on the street. Western Avenue and Hillsborough Street also have street trees, but they are less striking by comparison because Cambridge and Raleigh are more green compared to New York. I didn’t observe any people interacting with the street landscaping and trees at either location, but Western Avenue’s landscaping was a major point in my interviews. A

neighborhood resident said that she liked everything about the new street design but was worried about the upkeep, which is especially important for landscaping. She stated “the issue is upkeep, make it stay the way it is now; the street was really beat up before”.

If planners want to bring people back to the street and encourage street life, they must first give them street space to occupy. On Amsterdam Avenue, the protected bicycle lanes move cars further from the pedestrians on the sidewalk, but the amount of sidewalk space has stayed the same. This distance from pedestrians should help lower noise on the sidewalk and make cars generally less intrusive on the pedestrian experience. The Amsterdam Avenue redesign most notably improves street uses and activities by providing a dedicated space for bicyclists who previously had to mix with vehicle traffic.

The Vanderbilt Avenue redesign improves the uses and activities of the street by creating space for pedestrians, bicyclists, and simplifying the roadway. A former NYCDOT planner who was also a Prospect Heights resident stated that their favorite part of the redesign was the road diet because it “makes the street less about cars and brings it back into balance”. These lanes also improve the access and linkages of the street; Vanderbilt Avenue now provides a bicycle connection from the Fort Greene to Prospect Park, and Vanderbilt Avenue provides an uptown route through the Upper West Side.

Western Avenue and Hillsborough Street reconstructed the entire street and widened the sidewalks. These sidewalk increases gives space for activities through these new sidewalks, separated bicycle lane, and bus stops. Hillsborough Street’s expanded sidewalk space notable provides space for more pedestrians and café seating.

Inviting people back into the street can lead to what seems to be incongruent uses. During my observations on Amsterdam Avenue I saw families pushing strollers and large trucks sharing the street at the same time. Photo 16 shows that although the redesigned street is more inviting, cars and trucks do not necessarily respect the design.



Photo 16: Amsterdam Avenue

I firmly believe that street safety is the upmost priority for planners and designers, but creating a welcoming and inviting environment through unique designs, providing space for people, and street trees is a close second. Our streets should be for everyone, not just those who can afford to travel via an automobile, and to truly create these multimodal and multi-use streets, we must design pleasing but safe streets.

Chapter 7: Effects of Economic Development on Street Life

As Janette Sadik-Khan states in her introduction of the NYCDOT's *Economic Benefits of Complete Streets* "better designed streets are not simply aesthetic or safety improvements. Better streets attract more people and more activity, thus strengthening both communities, the businesses that serve them and the city's economy as a whole". The basic thought is that redesigning streets at a pedestrian scale impacts local businesses by creating more inviting streets which change people's travel and spending patterns (NYCDOT Economic Impacts 8). Creating a more interesting and attractive public realm also encourages pedestrians to stay and socialize around the street, further makes them a potential customer (NYCDOT Economic Impact 8). A pleasant retail street one where people feel physically safe and safe from crime, where there are a mix of uses and attractions, places to eat, sit, places to park your bicycle, and in some cities, a car.

Impetus for the Complete Streets Projects

Hillsborough Street is the only project that was explicitly redesigned with the stated goal of economically revitalizing the street. The university, city, and local community wanted to see Hillsborough Street reverse its trajectory that was devolving into a gritty place with limited investment. Representatives from the local Business Improvement District and the university stated that they were worried the street and surrounding neighborhood would continue to decline, and would end up as rough neighborhoods. In particular, the university wanted to turn the street around before they were forced to use money from their own endowment to improve the area.

Vanderbilt Avenue's redesign was correlated with a revival, so its design includes pieces that helped carry that momentum. In a 2008 presentation Brooklyn Community Board 8, the NYCDOT stated that Vanderbilt Avenue was a street that was frequently used by bicyclists to run errands, and that the street had a mix of uses and attractions that support it as a pedestrian-oriented neighborhood commercial street. They pointed out that it had a

grocery store, cleaners, and other routine stores and services, but that it was a growing restaurant, nightclub, and shopping destination.

Economic Development Features of the Street Design

If streets are made safe for all users, and the designs are interesting, inviting, and give people a place to spend time, then economic development will most likely follow. In my thesis research I found a few design features beyond those desired in the section on placemaking features that help encourage economic development along the street.

Table 3 - Economic Development Features

Treatment	Amsterdam Avenue	Vanderbilt Avenue	Western Avenue	Hillsborough Street
Bright Street Lights	✓	✓	✓	✓
Cafe Seating Space	✓	✓		✓
Street Parking	✓	✓		✓

In general, I believe that planners and designers allocate too much space for cars, especially parking. The storage of personal vehicles on public streets, often at a low price or free of charge, is a issue that all urban communities face. Parking design and management are, however, essential in the cultivation of a successful retail environment.

The redesign of Hillsborough Street added metered parking to the north side of the street, where previously the street space was used as an automobile travel lane. The representative from the Business Improvement District stated “[the] additional parking is good, [it’s] important to add the parking spaces”. He was quick to add, however, that “its not like that changed everything”. They continued to discuss the need for parking, and hinted at a disconnect between business owners and the greater community. They stated business owners always want more parking, but that the parking issue was more complicated than that, and finding a quick fix would be impossible. Photo 17 shows on-street parking and unique bicycle racks on Hillsborough Street.



Photo 17: Parking on Hillsborough Street

The representative from Community Board 8 stated “the only concern [with the design] is from the grocery, they were concerned that if there was a raised median they would have trouble with deliveries”. Vanderbilt Avenue also features extra parking for bicycles; it has two to three (depending on construction) bicycle corrals in places where on-street parking would be. The same representative stated that these corrals “were very popular; [they are] a partnership between the NYCDOT and whichever business is hosting it”. The corral that was located on my observation block also had flex posts that demarcated the bicycle parking and two potted trees to make it more visually pleasing.

Well-managed street parking is very important for a healthy commercial street. Streets serve many functions, and one of them is the loading of goods for businesses. Whether a street must be used for the storage of personal vehicles is up for debate, but delivery areas

are necessary to keep stores running. In my observations at each location I observed cars parking on the street and leaving, and saw goods being hand-trucked from delivery vans on Amsterdam Avenue and Vanderbilt Avenue. Complete streets should take deliveries into account during the design process, and hopefully any conflicts can be planned around.

Cafe seating generally occurs on the sidewalk adjacent to a restaurant or business that sells food. Hillsborough Street was widened in part to encourage this use, and when there was nice weather on my observation days the majority of the cafe seating was occupied. Space for cafe seating is very similar to concept of providing space for people that was discussed in the previous chapter, but I chose to mention it in this chapter due to its importance for economic development. Amsterdam Avenue and Vanderbilt Avenue did not have redesigned sidewalks, but due to their location in New York City, they already had enough space for limited seating. Photo 18 shows limited cafe seating on Washington Avenue in Prospect Heights.



Photo 18: Limited Cafe Seating

Weather played a very important role on my observations that were aimed at studying economic development infrastructure at each street. Vanderbilt Avenue was an interesting case of a weather-related test; one of my observation days was cold and overcast, and the other was warm and sunny. The warmer day had many people sitting on benches outside of coffee shops and cafes, and the colder day did not. On the warmer day, I was at a coffee shop on Washington Avenue that propped their door and windows open to let in the breeze; this interested me because it signaled that they felt the street was pleasant enough to physically open their store to it.

Although I've discussed complete streets effects on safety, placemaking, and economic development as different chapters, they are very complementary, and often inextricably linked. A member of Community Board 8 stated "safety and placemaking have economic and social benefits which are hard to separate". Infrastructure related to economic development, in particular is hard to separate from safety and placemaking. Hillsborough Street was an interesting location to study, because interviewees described the effects that the infrastructure had on the street, but also its effect beyond street life. The former university real estate officer said the main catalyst for the revitalization of the corridor was the city's investment in the street design; he stated "[previously] no one wanted to invest or maintain their buildings, and the city investment changed that perspective".

Chapter 8: Discussion and Conclusion

In the previous chapters, I explained how complete streets infrastructure effects street life, based off of interviews and observations. In this chapter, I present a more critical view. I first discuss complete streets infrastructure, design, and implementation, then ask who we talk about when we say “street life”, and follow with discussions of the many factors that impact street life, and the fallacy of physical determinism.

According to the definition from the National Complete Streets Coalition, complete streets are “designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities”. This idea is admirable, as it prioritizes safety and access to the street, rather than vehicular level of service. Limited funds and space, however means planners must make trade-offs. In our interview, the designer from Raleigh stated

“Hillsborough Street is not perfect, but is a good example of not letting the perfect be the enemy of the good. We needed more space...everything could have been wider and better, but you make do with what you have”.

Each street I studied had a different design, which is due to need and constraints, but these constraints have consequences. All four of the projects have upgraded bicycle and pedestrian infrastructure with the addition of pedestrian refuges, medians, and protected or unprotected bicycle lanes. These designs make sense, since the impetus was to improve safety and to protect the most vulnerable street users, however, the trade off is that there is little space left for transit improvements. Mehta pointed out the issue with these tradeoffs in his writing; each tradeoff values and promotes one user over another. In the designers desire for safety, and allocation of space for on-street private vehicle parking, transit users have been left behind.

Western Avenue has the most progressive transit infrastructure, which is a simple bus bulb and bus stop. Other streets had the opportunity to create better transit infrastructure, but chose not to. Bus stops on Vanderbilt Avenue and Hillsborough Street could be moved into an existing parking space which would have a similar design to Western Avenue. Amsterdam Avenue has three automobile travel lanes, so there is certainly the physical space to create a bus-only lane in addition to bus stop bulb outs. Photo19 shows the bus stop on Hillsborough Street that has the space for a bus bulb out. Of course, there are other factors that play into these decisions. Moving curbs is more expensive than simply painting the street, and creating bus-only lanes in addition to a bicycle lane could negatively impact vehicular level of service (which might worth the possible increase in transit capacity).



Photo 19: Bus Stop on Hillsborough Street

If all street designs have trade-offs, how should we allocate resources? As I've stated in this thesis, I believe safety for the most vulnerable street users (pedestrians and cyclists) should be of the utmost priority. In the urban areas that I have studied, transit should receive the second priority, and automobiles and their storage should be last. Not everyone who drives a car is wealthy, but even if they aren't, planners shouldn't promote this mode over those who rely on less expensive transportation: buses, bicycles, and walking. In a discussion about complete streets the Cambridge Planner stated that "transit is the missing piece from the city's complete streets". They further stated "if you want to decrease single occupant vehicles [you can design streets to] get bikers and walkers, but you really have to improve transit".

Chronopoulos highlighted Kent Avenue in Williamsburg, Brooklyn as a street that seemed to receive bicycle and pedestrian improvements that coincided with gentrification, but he could have been chosen Western Avenue in Cambridge. A former Cambridge elected official who represented the Riverside neighborhood in Cambridge stated "Riverside is the least likely neighborhood for bike lanes in the world". The interviewee provided context, stating "[the neighborhood] is [the] historic [residence of] stevedores...many people have lived there forever". Continuing in this conversation, I asked the interviewee if they thought people liked the redesigned street, since I thought it was very aesthetically pleasing; they responded with a story about the local community center that needed improvements and could have been renovated with a mortgage. The community chose not to take a loan, and the interviewee pointed out "what you see and what the natives see is not the same".

I don't think these discussions are really about bicycle lanes or pedestrian improvements; they are about their timing. Regardless of if streets are redesigned for safety or to promote community identity in public space, the essential question that is raised is who are the improvements for? The Cambridge planning team attempted to assuage these fears by holding extensive and meaningful community outreach, and to include design aspects that

celebrated the history of the neighborhood. Unfortunately, If street redesigns improve safety but they occur while a neighborhood is being revitalized or gentrified then they will really only serve the residents that can afford to stay in the neighborhood. The former Cambridge elected official summed up the neighborhood change in Riverside by stating “gentrification is real...by the time I left office the neighborhood went from 100 percent black to 10 percent”. These are valid concerns that sadly follow any proposed streetscape improvement in historically low income or non-white neighborhoods. Hopefully in the future complete streets will be in every neighborhood, and transportation choice will be a right that every urban resident has, so there will not be a debate of who these improvements are for.

Other constraints around complete streets redesigns are funding and political will. Amsterdam Avenue, Vanderbilt Avenue, and Hillsborough Street are each fine redesigns in their own right, but they lack the creativity of Western Avenue. The Western Avenue planners had the luxury of capital and a complete redesign, where the NYCDOT did not. Hillsborough Street’s redesign is nice, but if the goal was to help revitalize the corridor, why not a more creative design that would have extended the sidewalk even further into the street (into the street parking area) for larger cafe seating, or other desired activities? In the previous chapter I discussed the importance of street parking, but as planners and designers we should be able to find a creative solution for these streets.

In conversations with advocates and residents, everyone seemed to be in agreement that communities want inviting streetscapes for their neighborhood. However, on my walks through the neighborhoods I would occasionally see things that were hostile to street life. Each street had a lack of benches on the sidewalk; Amsterdam Avenue had one bench in front of a large public housing complex, and Vanderbilt’s only benches were at a bus stop or created for use of the customers of a particular restaurant or store. Hillsborough Street had lots of informal and cafe seating, but no benches on the commercial side of the street. Western Avenue is unique in that it provided seating in the form of large blocks in the

landscaped planters, but even this design was somewhat of a slight of hand. Western Avenue is also an interesting because the same planner stated that people wanted street life in their neighborhood, but did not want the invite street life from the adjacent Central Square neighborhood, which is known for panhandlers: The former Cambridge elected official confirmed this sentiment when they discussed a proposed art installation at a park on Western Avenue that would have included benches; they stated “the neighborhood said the chairs did not characterize their neighborhood and it would attract vagrants”. Photo 20 shows part of the limited seating on Vanderbilt Avenue.



Photo 20: Vanderbilt Avenue Seating

Hillsborough Street’s revitalization was applauded by all stakeholders that I interviewed, but they also hinted at its downsides and opposition. The former university real estate official described the area around the eastern part of the street as run down; it was a block with a “plasma collection center, pawn shop, and head shop. Subway was the nicest

part of that block”. I agree that revitalizing the street into a place where landlords take care of their properties and where students and neighborhood residents feel safe is a positive, but its important to recognize the negatives associated with this change. In the years since the redesign, some long term local businesses have closed or moved, and chain stores have taken their place. The representative from the Hillsborough Street Business Improvement District suggested that some of these closings were due to bad business management, but regardless of that statements truth, progress does have its costs. Photo 21 shows the construction site of a former local bowling alley that is being turned into a Target.



Photo 21: Former Bowling Alley

Western Avenue had the most unique juxtaposition of infrastructure investment and design and its its resulting street life of all of the projects. Western Avenue is unequivocally the most beautifully designed street in the neighborhood with its raised crosswalks, granite curbs, and landscaped planters. However, the center of activity in the surrounding area is

Massachusetts Avenue, which crosses the eastern part of the neighborhood in Central Square. Massachusetts Avenue (locally referred to as Mass Ave), is the commercial high street in Cambridge, and had much more street life than Western Avenue on my observation days. Mass Ave does not have the same high quality landscaping and design as Western Avenue, but has wide sidewalks, an unprotected bicycle lane, street parking for cars and bicycles, street trees, and seating. The biggest difference is the surrounding land uses and attractions. Western Avenue is surrounded by multifamily and detached residential homes, where Massachusetts Avenue has restaurants, stores, coffee shops, and offices. Photo 22 shows the Massachusetts Avenue streetscape.



Photo 22: Massachusetts Avenue

When I walked onto Massachusetts Avenue the first time from Western Avenue, I immediately questioned why the Cambridge used money to make Western so beautiful, when they could have used that money on Mass Ave, which would have benefitted many more

pedestrians and cyclists. I posed the question to a current City of Cambridge planner who reminded me that Western Avenue was constructed due to a required sewer project, and that “the goal[now] is to provide protected facilities...[on Massachusetts Avenue] there is extremely high demand for transit and on-street parking”, so the project and Massachusetts Avenue would be more complicated.

Safety and inviting streetscapes are very important when designing to encourage street life, but surrounding land uses and attractions could be more important. I asked a cyclist who travels on Western Avenue daily for their commute to work if they’ve ever stopped to spend time on Western Avenue, and they responded “its a nice area, not a ton of benches...but there is no reason to stop”. A neighborhood advocate relayed the same sentiment, stating “I wish we had more restaurants...Carrot (a research and test kitchen on Western Avenue) is a test kitchen for rich people...I wish that was a neighborhood restaurant”. Humans are social creatures; if there is nothing to attract people, a complete street will not make a difference in street life.

The most important point of this criticism is that planners, designers, and local government cannot assume that street life will automatically appear once the street infrastructure has changed. The fallacy of physical determinism can be applied to street life the same way that it can to modernist planners who thought slum clearance would solve societal problems. When walking or cycling for pleasure, people have a variety of routes to choose from. When the same people run errands or commute to work, their functional choices shrink; their trips become more time sensitive or reliant on the location of their errand destination.

The most interesting lesson from my interviews with designers was that if they had a time and money constraint but still wanted a successful project, they would spend it on public outreach and community planning instead of a specific design or landscaping feature. The engineer I interviewed in Raleigh stated “the first thing is to develop community buy-in,

not infrastructure. Make sure everyone is on board”. These interviews further humbled my impetus for this thesis, which was very modernist in thought. I originally wanted to know which types of street designs were the most effective in encouraging street life so they could be easily applied to all neighborhood-level commercial corridors and downtown revitalization projects. I still believe it is a valid questions, but when I discussed this impetus with each designer I interviewed, they responded that if cultivation of street life were that easy, we would have done it by now.

Expanding on this point, the designers stated the most important design factor of all projects is safety, and pointed out that we know how to create safer streets. The true challenge is getting public and political support for street upgrades, which links back to questions of who belongs on the street and who the street improvements are for. The planners I interviewed viewed themselves not only as people who brought design expertise to an unsafe street, but also as people who helped the community create and implement their vision for their streets. The NYCDOT planner stated this was his favorite part of his job, saying

“I got into the planning field to help bridge gaps within communities and bring them together. There are lots of barriers within a community when it comes to transportation. Some streets are designed to create a barrier, or there are neighborhoods that are sprawling and you can’t get to other parts. The NYCDOT wants to right size those streets and let people connect to the neighborhood”.

The former NYCDOT planner and Hillsborough Street Business Improvement District representative reminded me that Vanderbilt Avenue’s and Hillsborough Street’s street life was encouraged not only through its updated design, but also through programming that included closing the street to cars for block parties. Vanderbilt Avenue has been closed to traffic through the NYCDOT’s Summer Streets program, and Hillsborough Street hosts a block party

every year during the beginning of each fall semester. Street life doesn't just happen with infrastructure, people need to be invited back into the street.

This insight from the planners who helped implement these complete streets redesigns supports the validity of my research question, but also addresses its limitations. Each street, community, and desired outcomes are different. Streets that need to be redesigned for safety should focus their time and money on slowing cars down, providing safer pedestrian crossings through shortened crossing distances, raised medians, and raised crosswalks. Communities that want to focus on creating a sense of place should slow down cars and invite pedestrians and cyclists into the street through people-centric design that celebrates natural beauty and community, including street trees, benches, cafe seating, bicycle parking, and public art. Lastly, areas that want to redesign their commercial street in order to build a stronger local economy should improve the pedestrian environment with wider sidewalks, create opportunities for on-street parking (where desired), and manage that parking so spaces are available for people who want to shop or dine at local restaurants.

In this thesis, I've explored the history of streets and street design in the United States, introduced the concept of complete streets and described the types of complete streets treatments that are commonly applied to urban streets. I then examined the literature related to complete streets and their effect on safety, health, economic development, and street life. To investigate the effects of complete streets on street life, I designed a study that involved interviews with people involved with complete streets projects and conducted observations around recently completed complete streets in three different cities.

I have found that complete streets are a complementary addition to the idea that we should design our cities for people. When we design our cities and streets for cars, we lose street life, which is what makes living in a city so enjoyable. Complete streets infrastructure

complement many designs that make great, people-scaled places, even if my observations were not a resounding endorsement.

Complete streets do two main things. First they physically improve the urban environment by creating safer spaces for pedestrians, cyclists, and transit riders. Well-designed complete streets help provide interesting streets that are welcoming and pleasing to all people; they provide space not only to travel, but to sit and stay, and celebrate the neighborhoods and cities in which they are located. This improved public realm can lead to a more pleasant street environment and more people on the street which can lead to a stronger local economy. Second, the physical changes of complete streets can help change our collective mindset from one that thinks streets are places for cars, and instead leads us to a vision that streets are places for all people.

Complete streets have been proven to increase pedestrian safety, and for that fact alone they should be implemented wherever possible. Beyond that, complete streets challenge the status quo that streets are for the efficient movement of automobiles by inviting pedestrians and cyclists back into the street and reallocating street space to them. In *Streetfight*, Janette Sadik-Khan tells a story that her mother told her the best way to impact people's daily lives was to work with sanitation on streets (13). I agree with her assertion; we use streets every day, they connect us to our sustenance, our family, and our community. We should be planning these streets for our own quality of life, not so a certain number of cars can be moved at a certain speed in a certain time.

Limitations

Methodology

The biggest limitations on my research were time and weather. I conducted observations on a maximum of three consecutive days, all of which were in winter. There was some nice weather in Raleigh, but every other observation occurred when the warmest part of the day would still be described as “cool”. As stated earlier in this thesis, I took some

quantitative measurements of street life, but due to the time limitations could not fully rely on this effort.

Opportunities for Further Research

In *Places in The Making*, Susan Silberberg states that the process of bringing the community together for act of creating public space can be just as important as the product (Silberberg 3). Further studies should investigate this claim in regards to designing complete streets. As was pointed out in this thesis, planners have the tools to create complete streets, but often what's lacking is political will and community support.

It would be interesting to interview planners and community members specifically about this point. One outcome could be that the planning complete streets is a very tough thing to do thanks to a charged atmosphere between people with entrenched interests in preserved the auto-centric status quo. Another outcome could be that communities bonded over planning streets with improved street safety and places for people to socialize.

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Interviews

Amsterdam Avenue, New York, New York

Community Board 7 Member, Neighborhood Resident

Community Board 7 Member, Complete Streets Advocate, Neighborhood Resident

Commercial Property Owner, Neighborhood Resident

Neighborhood Resident, Housing Advocate

New York City Department of Transportation Bicycle Planner

Vanderbilt Avenue, Brooklyn, New York

Community Board 8 Member, Neighborhood Advocate and Resident

Former New York City Department of Transportation Planner, Former Resident

New York City Department of Transportation Planner⁵

Western Avenue, Cambridge, Massachusetts

City of Cambridge Project Planner

Former City of Cambridge Project Planner

Former City of Cambridge Elected Official

Community Advocate, Resident

City of Boston Complete Streets Planner

Bicycle Commuter

⁵ This interview is the same as the one listed for Amsterdam Avenue

Hillsborough Street, Raleigh, North Carolina

City of Raleigh Department of Transportation Engineer and Planner

Hillsborough Street Community Service Corporation Staff Member

Hillsborough Street Community Service Corporation Board Member

Complete Streets Advocate

Former North Carolina State University Real Estate Officer

Appendix A: Example Interview Questions

Neighborhood Resident

- What do you think of when you walk down this street?
- How does this street make you feel?
- How have your thoughts and feelings changed from before and after this street was redesigned?
- Do you feel safe on this street?
- How do you move on this street on your way to work, running errands, or relaxing?
- What are your favorite parts of this street?
 - What are your least favorite?
- What would you change about this street?
- What comes to mind when you think of this street?
- Why do you feel different about this street after it was redesigned?
- What matters most to you on this street?

Community/Neighborhood Advocate

- How has this street redesign affected the neighborhood?
- Has this street become a more or less vibrant part of the neighborhood?
- How do local retailers feel about this street design?
- How has this street design affected local community groups?
 - Families? Schools?
- What was neighborhood morale like before the street redesign?
 - What is it like now?
 - How much do you attribute street changes to any change in feeling?
- What things would you like for your neighborhood?
 - Where does street redesign fall on that list?
- How does infrastructure affect your neighborhood?
- Does this neighborhood feel safer after the redesign?

- Have you noticed an increase in walkers, cyclists, or transit riders after the street redesign?

Municipal Planner

- How did this street redesign come to be?
- What were the objectives and reasons behind this street redesign?
- How does this redesign fit in with the city overall?
 - Is it a part of a larger complete streets initiative?
 - If so, how did you allocate assets to different streets - Why did you choose this one?
- What was the community response to this redesign?
- How would you improve on this design?
- What concerns about this redesign did community members voice?
- How did public outreach shape the street design?
- Describe the political and community support/opposition to this redesign.
 - How did it change during the planning and implementation process?
- What would you recommend to other cities who want to implement complete streets redesigns?
- Which parts of the redesign were most supported and which were most opposed?

Appendix B: Street Redesign Definitions

Safety

Safety improvements are made to protect the most vulnerable users of the street: pedestrians and cyclists. Most of the following improvements focus on pedestrians, although some have spillover affects to all users.

Intersection Improvements

Curb Extensions, also called bulb outs, are an enlargement of the sidewalk at the intersection, which narrows the street and shortens crossing distances for pedestrians. They also provide space for pedestrians while waiting, to cross the street, street seating, street trees, or planters (NACTO 45). Bulb outs also increase the turning radius of vehicles, which requires them to slow down, and increases visibility of pedestrians by placing them closer to the drivers' line of sight (NACTO 46).

Raised crosswalks are crosswalks that are raised above the level of the travel lanes on the street and are generally at the same height of the sidewalk or curb. Raised crosswalks help slow down vehicles and signal to drivers that they are in a pedestrian zone or neighborhood street (NACTO 97). The raised nature of the crosswalks also increases visibility (NACTO 97). Raised crosswalks also make travel easier for wheelchair users or others pushing wheeled objects like strollers because the person stays on the same level as the sidewalk instead of dipping down into the street and then back up to the sidewalk when they reach the other side.

Pedestrian Countdown Signals are lighted displays that give a numeric countdown of the remaining time that pedestrians have to cross the street. The timers increase safety by letting pedestrians judge whether they would have enough time to cross the street fully before making the attempt (NACTO 111).

Leading Pedestrian Intervals are a part of traffic light timing that gives pedestrians a three to seven second head start in crossing the intersection before cars traveling in the same direction are given the green light (NACTO 128). This allows pedestrians to enter the intersection before vehicles start moving, which increases their visibility to drivers and can shorten the amount of time that pedestrians and cars share the roadway.

[Street Improvements](#)

Sidewalks are paved walkways within the street right-of-way that are raised and separated from travel lanes by a curb. Sidewalks may seem ubiquitous to people living in urban areas, but they are not prevalent in many rural and suburban areas. At the very least, a complete street should have sidewalks so people can safely walk along a street to get to their destination.

Road diets are when at least one existing travel lane on the street is removed, and two-way left turn lane or striped or paved median is created. Road diets improve safety often without sacrificing capacity to move vehicles because they simplify the roadway and reduce possible point of conflict between multiple cars or cars and pedestrians or cyclists (NACTO 15). By simplifying the road, this new configuration removes the congestion caused by vehicles darting between lanes to avoid left turning vehicles, double parked, or slow moving vehicles (NACTO 15). By removing travel lanes, road diets free up street space for other uses, which can include street parking, bicycle lanes, an enlarged shoulder to name a few.

Lane narrowing is as simple as restriping existing road with narrower travel lanes. Wider lanes encourage higher speeds which can lead to higher crash rates (NACTO 16). Narrowed lanes also give the leftover street space back to other uses.

Pedestrian refuge medians are generally constructed on street with three or more travel lanes, or on streets that have received a road diet (NACTO 116). The refuges allow pedestrians to shorten their crossing distances between the sidewalks, which should also shorten the amount of time they are in a travel lane (NACTO 9). Pedestrian refuge medians

also allow the pedestrian to cross the street in segments, and makes crossing without the crossing signal easier. A pedestrian can cross each side of the street when they deem it safe instead of waiting for all lanes to be clear. This segmentation of crossing the street should allow pedestrians to continue their walk faster and lessens their wait time at intersections.

Improvements for Bicycling

The simplest bicycle improvements make drivers more aware of bicyclists' existence and right to use the road, but more effective improvements give cyclists their own designated space or separate them from vehicles.

Intersection Improvements

Protected intersections are an improvement on the existing bicycle intersection design in many cities, which involves bicycles and cars merging into the same lane whenever there is a possible turn; this is called a "mixing zone" which leads to an unsafe exchange where cyclists are less visible to cars (Anderson INSERT CITATION IN WORKS CITED). The protected bicycle lane makes cyclists more visible to cars because there is another raised curb in the intersection which forces cars into a sharper turn further into the intersection, which lets drivers and cyclists see each other while looking forward, compared to the mixing zone where the driver must look over their shoulder (Anderson). This design resembles bulb outs that extend into the intersection by are constructed to be bicycle friendly.

Leading cycle intervals are similar to leading pedestrian intervals; they are a technique of signal phasing that allows cyclists to get a head start into the intersection before cars receive the green light.

Synchronized bicycle signals are a set of signals along a corridor that are not timed to optimize vehicle travel but are instead timed for the speed of a bicycle (NACTO 134). These signals can keep cyclists traveling along the corridor in an uninterrupted flow (NACTO 134).

This makes cycling more pleasant because it takes less energy to keep a bicycle moving than it does to accelerate from a stopped position.

Bicycle specific signage and signals are street infrastructure dedicated to cyclists. They are placed at a height observable by bicyclists and are often placed adjacent to the bicycle lane. They make cycling easier by providing assistance with navigation and safety.

Bike Boxes are places where the street pavement is painted to put bicyclists in front of cars at intersections and moves the vehicle stop bar further away from the intersection (Types of Bike Infrastructure). By putting bicycles in front of cars at the intersection, the bike box improves visibility of cyclists and lets them to through the intersection unimpeded by cars.

[Street Improvements](#)

Sharrows are painted graphics on travel lanes that alert the driver that bicycles are common on the street. They do not provide any protection from conflict, nor do they demarcated specific space allocated for bicyclists.

Painted Bicycle Lanes are street space reserved for cyclists are marked with street paint. They are usually placed adjacent to travel lanes, and do not offer any physical protection for cyclists. These lanes can be blocked by double parked vehicles, which forces bicyclists back into travel lanes where they would have to mix with cars. Painted bicycle lanes can be buffered by a painted space that is neither for cyclists nor for cars; these are often referred to as **buffered bicycle lanes** (Vanderkooy).

Protected Bicycle Lanes take on a few different forms, but all have some sort of a physical barrier that protects cyclists from cars in a travel lane. These bicycle lanes can look very similar to painted lanes, but they have some sort of a curb or physical barrier between the bicycle lane and the travel lane. These lanes can also be protected by a row of parked cars; this design involves shifting the row of parked cars off the curb and into a former travel

lane. They are popular in New York City, and have the advantage of buffering bicyclists from travel lanes, and by creating space in the new parking lane for pedestrian refuge islands (NACTO 9). These protected lanes can be striped for one or two-way travel. Two-way bicycle lanes are generally referred to as cycle tracks.

Separated bicycle lanes offer the most protection for bicyclists. They are bicycle lanes that are adjacent to the roadway and are elevated above the travel lanes⁶ (FHWA 13). Separated facilities completely remove bicycles from the road, offering horizontal and vertical distance from vehicles. Separated lanes are more comfortable for recreational and less experienced cyclists (FHWA 30).

Improvements for Transit

Complete streets should also make the street more effective for transit vehicles and riders. Transit improvements are often similar to pedestrian improvements, because all transit riders (and most other street users) start out as a pedestrian. The only transit-related complete streets improvements I could find were located on the length of the street, and not at the intersection.

Street Improvements

Bus bulb outs are similar to curb extensions but they are designed to assist the boarding of transit vehicles instead of to shorten a crossing distance. Bus bulb outs allow transit riders to board the bus while the bus is still located in the travel lane which eliminates the time the bus would have previously spent to exit and enter the travel lane after dropping off or picking up riders. This time saved could lead to a quicker trip and improved transit service.

⁶ The FHWA document *Separated Bike Lane Planning and Design Guide* does not differentiate between protected and separated bicycle lanes like I have in this thesis. Their report defines separated bicycle lanes as “an exclusive facility for bicyclists that is located within or directly adjacent to the roadway and that is physically separated from motor vehicle traffic with a vertical element”.

Dedicated bus or transit lanes are travel lanes that are reserved only for buses or other transit vehicles. These dedicated lanes should provide faster travel times and better service by cutting down on the amount of vehicles in the lane that would cause congestion.