

**Improving Transportation Safety in the
Town of Arlington, MA**
Urban Politics and Policy Course
Prof. Katherine Levine Einstein

METROBRIDGE



About this Report

This report is a product of student work in Boston University's Urban Politics and Policy course taught by Prof. Katherine Levine Einstein in Fall 2019.

Acknowledgments

The MetroBridge program at Boston University's Initiative on Cities wishes to thank our partners in the Town of Arlington for their collaboration and support on this project: Adam Chapdelaine, Arlington Town Manager; James Feeney, Interim Director of Facilities; Jennifer Raitt, Director of Planning and Community Development; and Daniel Amstutz, Senior Transportation Planner.

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Executive Summary

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The MetroBridge project for the Town of Arlington was designed to provide new analysis and related research to help guide future transportation policy and programmatic decisions. Students in Prof. Katherine Levine Einstein's Urban Politics and Policy class addressed this challenge by examining current conditions, visiting Arlington to observe transit-related behaviors, interviewing public transit users and other stakeholders, and proposing evidence-based solutions.

The class divided into eight teams, each selecting a specific focus area such as pedestrian or bicyclist safety, bus rapid transit, physical infrastructure (e.g., crosswalks, street lights), and the state's Safe Routes to School program. Each team prepared a report of key findings and recommendations for the Town of Arlington to consider. These suggestions include:

- Addressing a mismatch between the time periods when traffic accidents are most likely to occur and levels of police/traffic enforcement
- Creating an instructional guide to assist more Arlington Public Schools in applying for the Safe Routes to School program
- Revisiting the Stratton Elementary School's Safe Routes to School proposal to verify it will maximize safety benefits for students
- Increasing the duration of all crosswalk signals by five seconds and numbering streetlights so residents can more effectively report outages
- Installing a new crosswalk on the north side of Grove Street
- Expanding bus rapid transit to Lake Street to help alleviate congestion
- Designating CharlieCard distribution locations in the town
- Creating express bus service to address the problem of "bus bunching"
- Installing bike share racks at Minuteman Bikeway entrances
- Considering tax incentives that reward residents who choose to commute to work via bike

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METROBRIDGE



Team 1

MetroBridge Policy Report

December 08, 2019



Adrian Wang & Ryan Bondfield

Executive Summary

Local Governments play a vital role in ensuring the safety of their constituents in their commutes to and from their workplace, school or activities. These functions include (and are not limited to):

- Infrastructure;
- Policy creation and enforcement and;
- Providing alternative transport methods.

This report builds on the current suite of policies undertaken by the Town of Arlington (Arlington) and suggests means by which Arlington can continue to promote a pedestrian-safe community. Primary and secondary research reveal a mismatch between police resources and peak periods of accidents which inform our proposed solutions to improve child pedestrian safety. Of note is Arlington's already extensive investment in infrastructure improvement of footpaths and roads to promote safer conditions for pedestrians. Supporting this, the high levels of public or alternate modes of transport demonstrate a need and desire for Arlington and their residents to ensure pedestrian safety is at the core of their transport infrastructure.

This report focuses on policies that the Town of Arlington can implement directly, such as enforcement prioritisation and new data collection methods. By focusing on a specific facet of transportation - School-aged pedestrian safety and The Safe Routes to School Project (SRTS) - it is clear that while Arlington is already adopting pedestrian-centric policies, more can be done both in the short and long term to better focus resources and identify potential problem areas earlier. Overall, this report finds that Arlington and their residents are already bucking American 'Car Culture' and as this is the preferred direction of the town, the ability of local government to overcome collective action problems can be leveraged to continue to improve safety.

Goals

1. **Background:** The town of Arlington's policy implementation process in the arena of public transit – specifically, Safe Routes to School and related youth pedestrian safety.
2. **Challenges and Obstacles:** Obstacles, both external and internal, that we observe for potential youth commuter safety. Additionally, we will examine the Town's planning process and see what limitations exist, examining regional externalities and primary data.
3. **Proposed Reforms:** Based on primary data as well as data from research, we propose policy solutions that provide feasible actions the Town of Arlington can take. We propose the following solutions that are tailored to the structure of Arlington's population and the policy process:
 - a. A look into reassignment of police hours to better focus resources at core periods of school-aged pedestrian activity;
 - b. A program that implements primary research used in the present study to inform long-term and proactive policy solutions of the future and;
 - c. Inclusion of safety-related goals in the Town Master Plan to energise conversation and normalise the trade-offs inherent in prioritising pedestrian safety.

I. Background

The town utilizes what is known as a “Master Plan”, which was adopted by the Arlington Redevelopment Board on February 4, 2015, and was endorsed by Town Meeting on May 11, 2015.¹ Review and implementation of the Arlington Master Plan is maintained by the Master Plan Implementation Committee (MPIC), which was established by the Arlington Redevelopment Board in September of 2015.² This committee meets quarterly to review an implementation table³, which is a spreadsheet detailing every action in the ledger of the Master plan; it provides details on which lead entity handles each project as well as any support, the approximate timeline, the resources needed, whether or not town meeting action is required, and the current status of the project.



¹ “Town of Arlington.” *Master Plan Documents* | Town of Arlington. Accessed December 8, 2019.

<https://www.arlingtonma.gov/departments/planning-community-development/master-plan/master-plan-maps>.

² “Town of Arlington.” *Master Plan Documents* | Town of Arlington. Accessed December 8, 2019.

<https://www.arlingtonma.gov/departments/planning-community-development/master-plan/master-plan-maps>.

³ “Arlington Implementation Program.” *Welcome to Arlington Massachusetts. Town of Arlington, n.d.* <https://www.arlingtonma.gov/home/showdocument?id=28435>.

The master plan itself is a useful aggregation of issue identification within a town, identifying key issues and proposing strategies to guide development and project decisions. It is meant to be a document that is open to modification to remain relevant. The plan draws from a variety of data sets, ranging from internal data from the Town of Arlington to research from the Metropolitan Area Planning Council (MAPC) to even census data from the U.S Census Bureau. However, the master plan does not detail how new projects are proposed, nor is it designed to analyze potential new projects.

Rather, the creation of new proposals is born from the Board of Selectmen⁴, which is comprised of five elected residents for three year terms. The selectmen of the Town of Arlington are thus responsible for the adoption of new policies, as well as reviewing and setting fiscal guidelines for operational budgets and capital improvement initiatives. In addition, the board will hold hearings open to the public on issues deemed important to the town. The Board of Selectmen then appoint a single individual as a Town Manager, who in conjunction with the Board, appoints the heads of various Arlington's boards and commissions. These boards and commissions in turn are responsible for the facets of specific policy areas, ranging from community preservation, finance, to education.

Specifically related to our topic of Transportation Planning, Arlington formed the Transportation Advisory Committee (TAC) on April 30th of 2001, which is an independent body that provides expertise and separate input on policy solutions on all things related to transportation. However, the TAC is not the only committee and group involved, rather, they have a more "oversight role" as they span a broad reach in terms of all specific transit projects. Instead, they serve as a liaison as well as oversight on more specific groups such as:

1. The Arlington Bicycle Committee
2. Walking in Arlington
3. Arlington Council on Aging and Senior Association

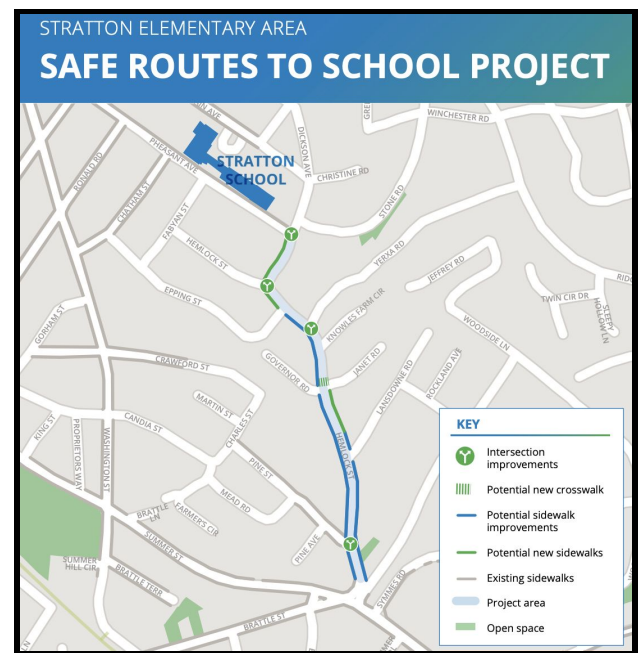
⁴***"Town of Arlington." Select Board | Town of Arlington. Accessed December 8, 2019. <https://www.arlingtonma.gov/town-governance/all-boards-and-committees/board-of-selectmen>.***

4. Arlington Commission on Disabilities

As it is not feasible to provide detailed analysis of all the Town's transportation priorities, we will focus on a specific facet of transportation: The Safe Routes to School Project (SRTS).

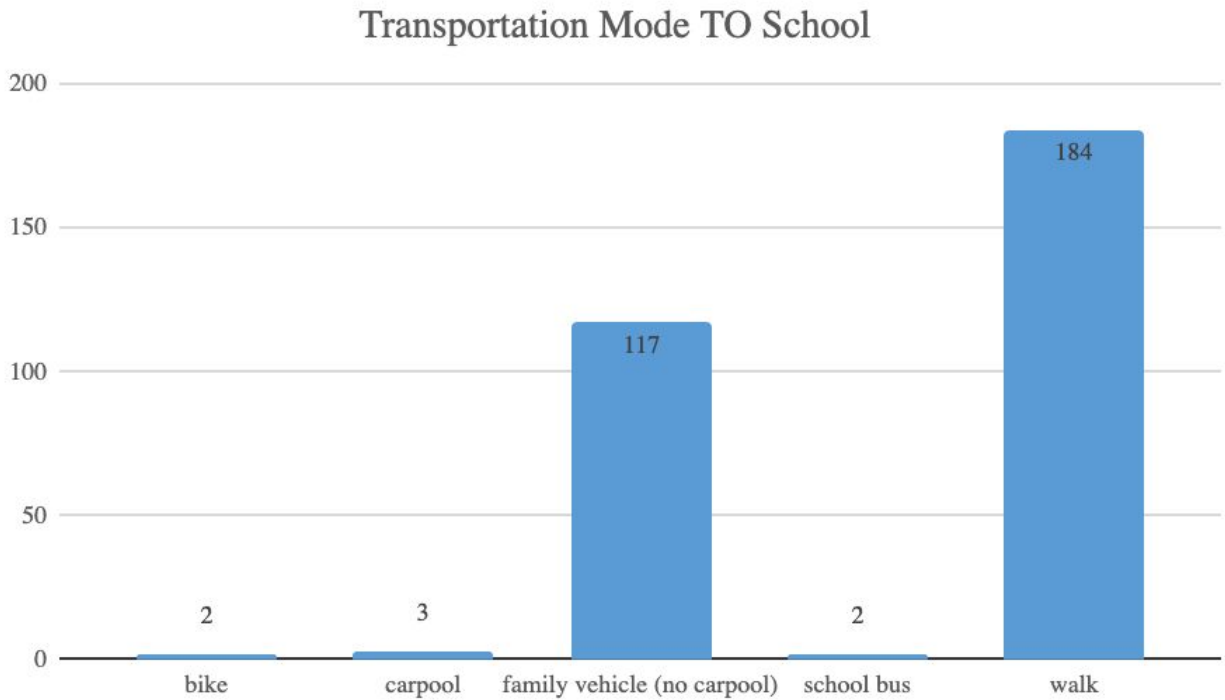
"Safe Routes to School (SRTS) is a national movement that aims to make it safer and easier for students to walk and bike to school. The Massachusetts Department of Transportation (MassDOT) runs a statewide SRTS program and uses Transportation Alternative Program (TAP) federal funds to construct projects selected through a competitive process open to local governments and school systems."⁵

While all the elementary schools have some form of SRTS based funding, Stratton Elementary was ultimately chosen for infrastructure project. Why Stratton? There was public input from parents whose children attended Stratton; a concerned parent met with the Arlington Police Department, Department of Public Works, as well as the Town Manager's office in August of last year. Furthermore, data was collected from parents revealing that a majority of students commute on foot, emphasizing the need to improve street design on highly trafficked intersections. In the above map, problematic areas were identified on two streets (Hemlock St & Dickson Ave). With a budget of just under \$900,000, the



⁵***"STRATTON ELEMENTARY AREA SAFE ROUTES TO SCHOOL PROJECT."*** *Welcome to the Town of Arlington. Town of Arlington, n.d.*
<https://www.arlingtonma.gov/home/showdocument?id=47075>.

town seeks to install ADA-compliant curb ramps, sidewalk repairs, create new walkways, repair narrowing roadway intersections to slow vehicles and reduce pedestrian crossing distances, improve crosswalks, and add new signs to the area.⁶



As seen, a majority of Stratton elementary students are walk-to-school commuters, with 65% of students walking from a quarter of a mile to a full mile.

The data collected from Stratton children was a key part of the process in making a determination in which schools to set as the focal point. Additionally, the Senior Transportation Planner met with three Stratton parents who aided in building a justification for the project. For Stratton, while there was no public opinion survey done,

⁶***“STRATTON ELEMENTARY AREA SAFE ROUTES TO SCHOOL PROJECT.” Welcome to the Town of Arlington. Town of Arlington, n.d. <https://www.arlingtonma.gov/home/showdocument?id=47075>.***

it was clear to the Transportation Advisory Committee that it was a known issue that the walking routes to school to Stratton had lacked adequate sidewalks. Thus, Stratton was set as the focal point for SRTS in Arlington because of an active parent group to collect data from which not only serves as an important justification for funding, but also community input from concerned parents, who are an important vector in making the determination on which projects get priority.

II. Challenges and Obstacles

Following our theme of fleshing out Arlington's planning and policy implementation, we will examine what externalities set limitations on our topic of interest: ensuring pedestrian safety for children commuting to and from school.

1. **What the Data Tells Us:** Police are vital to upholding the safety of all citizens and in the case of pedestrian safety this is no exception. Research from Australia highlights that police presence is vital to deter drivers from illegal maneuvers near school-aged pedestrians as well as being desired by the community.

An analysis of data from the Arlington Police Department shows that there is a mismatch of resources as they relate to road and pedestrian accidents occurring in the Arlington area. Figure 1 (below) compares the total number of enforcement occurrences between January 1st of 2009 and July 31st of 2019 against (from left to right) road accidents without injury, road accidents with injury and pedestrian crashes [2011-2019]. It is clear from the data that there is a mismatch between police resources and crash and injury hotspots. Most enforcement occurs between the hours of 6 and 7AM, and this is a significant outlier, constituting almost 40% of total occurrences. Meanwhile the corridor of interest for school-aged pedestrians (7-8:30AM, 2-4PM) experiences **more** accidents with significantly less enforcement.

There are two possible explanations that may contextualise this data. On one hand, the data demonstrates that the high enforcement period of 6-7:00AM shows minimal accidents - indicating that there is a potential deterrent effect of enforcement at these times. Another explanation could be that these periods are being 'over-enforced', meaning that those times had little issue to begin with, but that rather we are seeing police resources being misallocated.

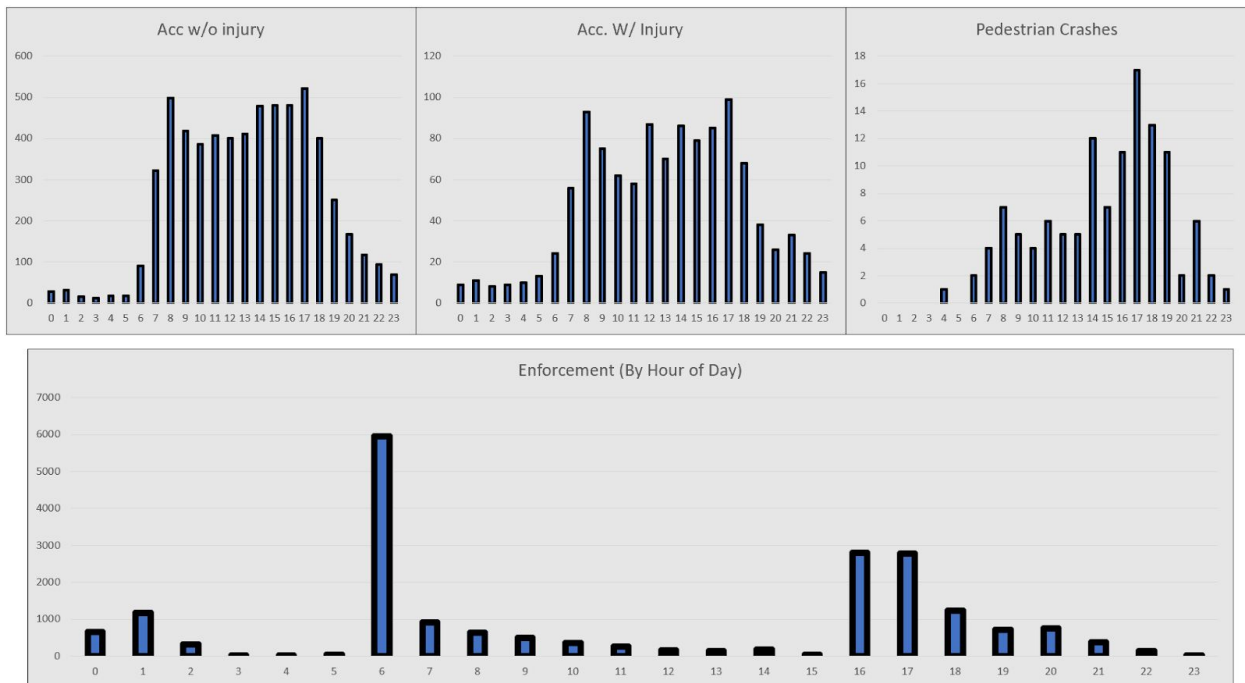
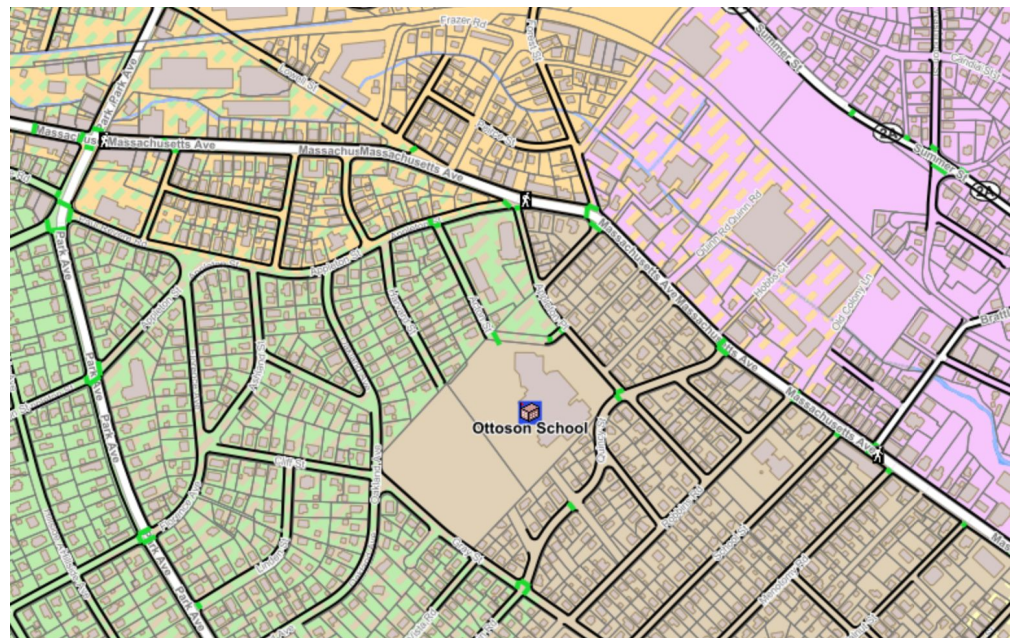


Figure 1: Crash and Accident Data Against Enforcement Times

Regardless of which explanation is correct, the prevailing insight the data provides is that the periods that experience high amounts of school-aged pedestrian traffic do tend to have less police resources put toward enforcement. Upon presenting these findings to Arlington officials, it was noted that this coincides with the change-over period of the Arlington Police Department.

2. **The Walking Culture:** Arlington does a fantastic job of emphasizing a walk to school community with their Safe Routes to School program, and has high rates of walking and bicycling as modes of transportation for students. While this is great for the environment and for the health of the population, other externalities pertaining to greater risks of traffic accidents and issues of traffic safety may arise, and legislators must consider the opportunity costs of combating the excesses of car culture.

In fact, we have primary data collected from our study of unexplored street regions that reveals other problem areas near schools not currently being worked on. In one such case, we stationed an observer at a sidewalk adjacent to two crosswalks near



Ottoson Middle School, and over the course of an hour observed traffic interactions involving speeding cars and children attempting to cross the street to get to school in the morning. The street juncture in question, between Park Avenue and Appleton Street, revealed issues in pedestrian safety. Here is a timeline highlighting a few of the more egregious incidences within a span of less than an hour:

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7:26 - Boy ran right through the crosswalk without slowing down or looking because he needed to get to his bus stop.

7:27 - A young boy was halfway down the crosswalk, a car speeds right past in front of him.

7:28 - Several children are walking and on their phones, a company land development truck actually speeds up while the kids were walking across the crosswalk.

7:29 - Car stopped but over the crosswalk.

7:32 - Man crosses, car speeds onto crosswalk, almost hit man.

7:34 - 40 cars did not stop for a young boy and girl.

7:39 - Young girl walked onto the crosswalk, blue car was forced to stop.

7:41 - Cars speed onto right hand turn from Park Ave to Appleton Street without looking, because they assume the coast looks clear, but there are people walking from time to time.

7:49 - Kid on a bike trying to cross. However, in an attempt to turn from Appleton, cars will overstep the crosswalk, making it impossible for drivers on the other side to see the biker trying to cross.

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Figure 2: A Pedestrian Deals With Traffic at the Junction Between Appleton and Park

III. Proposed Reforms

In this section, we will highlight feasible reforms the town can do to improve outcomes in the arena of child pedestrian safety.

1. **Restructuring Police Enforcement:** The Town of Arlington needs to collaborate with the Arlington Police Department to reschedule and implement new measures that highlight enforcement of traffic at hours in which child pedestrians are commuters. As Arlington is a municipality with a strong walk to school community, this is an important public goal that has clear benefits.

As observed before, there is a mismatch between police enforcement of traffic and the hours that kids walk to school. Times of day in which there is heavy enforcement such as 6-7:00am have no kids who walk to school, while times of day such as 7-8:00am have incredibly low levels of traffic enforcement. With start times of all schools being in the 8am zone, we recommend a shifting of police resources to heavily focus on this important migratory period for children.

We recognize that police resources are limited, and that it is easy to come up with policy solutions such as “put more money into the police so we can have higher monitoring of traffic”; we are aware that there exists limitations to budgets. Thus, our proposal involves restructuring the shift times of police to better balance it in favor of times which children commute, instead of putting more money into policing itself.

However, we also recognize that our proposal is not without difficulties. An Arlington official mentioned that enforcement was so high during the period of 6-7:00am because it coincided with shift changing, making it easy for police to enforce traffic at those hours. Understandably it would be an effort by Arlington PD to change their shift times, and of course rescheduling is no small task, but if Arlington wants to take traffic enforcement seriously as a cost-effective means to ensure child pedestrian safety, we believe this is the best path forward.

2. **A Proactive Approach:** Developing a proactive approach to identifying unsafe areas on the walk to and from school. Most local governments struggle to be proactive in the way they approach policy development. This is because there are key constraints on their ability to manage the multiple stakeholders and policy areas while having resource limitations.⁷ Consequently, towns often rely on citizens to voice concerns before they act on issues - hence policy in cities tends to be reactive. While listening to citizens is core to any government, there is a need for towns like Arlington to move beyond traditional policy development and

⁷ *Peterson, Paul E. City Limits. Chicago: University of Chicago Press, 1981.*

toward more forward-thinking, proactive policy in the arena of Safe Routes to School and related youth pedestrian safety.

The primary research methodology used for this report was a simple but effective example of how simple primary research can provide important insights into how effective the SRTS program has been and how safe student-pedestrians are in their commute to and from school. We recommend that parents be encouraged by Arlington to undertake a simple data-retrieval task similar to the primary research undertaken for this report. Simply put, we recommend the TAC, PTO, or even volunteer parents undertake the following actions:

1. Place themselves at an intersection they, or the Town of Arlington, suspect may be dangerous/frequently used by school children
2. Count the number of times and nature of incidents that place children in danger
3. Report these results back to Town of Arlington and associated bodies

The benefit of this approach is that if enough parents partake in the data collection, a large database that can locate hotspots for where school-aged pedestrians are placed in danger will be created. The Town of Arlington also saves on the costs of employing people to do this research.

It is likely that parents in Arlington will partake in this data collection strategy, given Arlington is had an organised and affluent parent body. Furthermore, we have already seen parents are willing to volunteer their time for students to assist with safety. The 'Walking School Bus' program is a clear example of parents' willingness to improve the safety of children which the town of Arlington can leverage.

Moving from a reactive to a proactive risk assessment strategy is also a strong long-term solution to solving pedestrian safety issues for school children. While

changes to enforcement may provide short-term improvements, particularly at hotspots such as the intersection of Appleton and Park St, it is not an efficient long-term solution. This is because police hours are expensive and are often better utilised outside of enforcing minor infringements. Therefore, enforcement improvements are intended to act more like a 'reminder' to drivers who do not respect the road rules designed to protect pedestrians.

Meanwhile, our second recommendation seeks to bring new insights into the experiences of school-aged pedestrians. By utilising available volunteer hours, the town of Arlington can begin to 'map' where issues are emerging before any accidents or large concerns arise. Thus Arlington can overcome the often slow policy process it currently follows which requires highly organised parent bodies to identify issues that pertain to them. Overall this shifts the ways in which safety is thought about in the town of Arlington away from reactive, lethargic policy-making and toward proactive, preventative policy solutions that should minimise the danger school-aged pedestrians are put in.

3. **Frame the Safety Discussion:** it is clear that the Town of Arlington takes safety seriously. A lot of resources, time and money are being leveraged by Arlington for projects such as SRTS which has funding for most schools in the area. Despite this, in the Arlington Master Plan the word safety is not mentioned in the key goals for the city. While safety is certainly addressed later in the document, signposting Arlington's commitment to safety could be included by adding this as a primary outcome of the master plan

Rhetoric is a vital component of political discourse. Our last suggestion is a minor one, though not unimportant. By setting safety on the primary agenda for Arlington’s Town goals, we can begin to combat the excesses of car culture and be a paragon of leadership in a nationwide investment in safety, sustainability, and environmentalism.

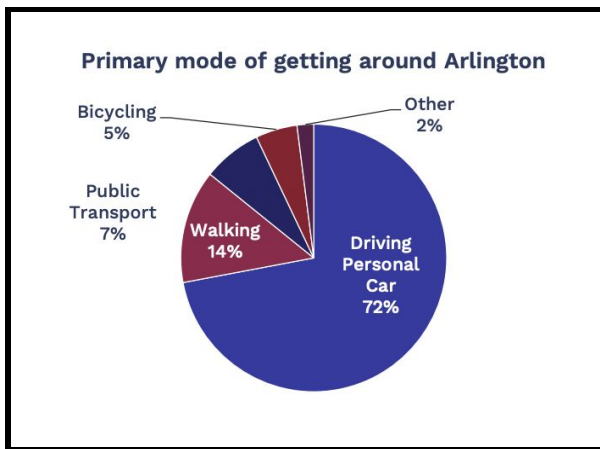


Figure 4: Mode of Transit in Arlington

arlington’s town goals

This plan was developed to be consistent with the Town Goals.¹ The Master Plan Advisory Committee (MPAC) considers the Master Plan and Master Plan Goals to be consistent with the Town Goals, which are:

ARTICLE 1. COMMUNITY AND CITIZEN SERVICE

We value Arlington’s geographic neighborhoods, common interest groups, and the sense of community in our Town. We value an active and compassionate citizenry delivering services in our community. We will be known for the vitality of our neighborhoods and as a community of people helping others.

ARTICLE 2. DIVERSITY

We value the diversity of our population. Our Town’s mix of ethnic, religious and cultural backgrounds, as well as economic and personal circumstances, enriches us all. We will be known for the warm welcome and respect we extend to all.

ARTICLE 3. EDUCATION

We value learning for all Arlington citizens. We are responsible as a community for educating our youth and providing all ages with opportunities for educational growth. We will be known for demonstrated excellence in public education and our commitment to life-long learning.

ARTICLE 4. THE ENVIRONMENT

We value the physical beauty and natural habitats of our Town – parks, ponds, and wetlands, dramatic vistas and tree-lined streets – as they contribute to the well-being of our community. Recognizing the fragility of our natural resources, we must ensure that Arlington’s residential areas, commercial centers, and infrastructure are developed in harmony with environmental concerns. We will be known for our commitment to the preservation of Arlington’s beauty, limited open space and resources, as well as our place in the regional and global community.

ARTICLE 5. CULTURE AND RECREATION

We value the many opportunities to meet, play and grow in Arlington while treasuring and preserving our unique historical resources. Our social, cultural, artistic, historic, athletic, recreational, and other community groups strengthen Town life. We will be known for the breadth and richness of our resources and activities available to Arlington citizens.

ARTICLE 6. COMMUNICATION

We value public dialogue. Communication and information-sharing build trust. Our goals are true openness and accountability. Arlington will be known as a community that thoughtfully searches beyond divisive issues for the opportunities that bind us together.

ARTICLE 7. FISCAL RESOURCES

We value Arlington’s efficient delivery of public services providing for the common good. The benefits from these services and the responsibility of taxation will be equitably distributed among us. We will be known for our sound fiscal planning and for the thoughtful, open process by which realistic choices are made in our Town.

ARTICLE 8. GOVERNANCE

We value our representative Town Meeting system and the community spirit it fosters. Participatory governance is both responsive and interactive. We will be known as a community where government provides effective and efficient services, insures open two-way communication, promotes the lively exchange of ideas, and encourages active citizen participation.

ARTICLE 9. BUSINESS

We value Arlington’s diverse and accessible mix of merchants and service providers. We will be known for our vibrant, attractive commercial centers supporting the primarily residential and historic character of the Town.

Figure 3: Safety Not Listed in Arlington Town Goals

IV. Conclusion

The Town of Arlington currently oversees an extensive suite of policies aimed at improving the efficacy and safety of public transportation and pedestrian travel. The Safe Routes To School program has seen a prioritisation of pedestrian safety for school-aged children in funding infrastructure projects to improve footpaths and optimise the routes children and their parents take to and from school. While this is a good and proven strategy to improving pedestrian safety, an investigation of police level data, town documents and primary research revealed further concerns relating to enforcement, data collection and rhetoric relating to safety by Arlington.

Enforcement: Utilising police data it was shown that there is a mismatch between when accidents occur and when laws are being enforced by Arlington Police. This does not suggest negligence on the part of Arlington Police, but rather suggests there is an opportunity to better prioritise pedestrian safety of school-aged children and morning and afternoon pedestrian commuters.

Data Collection: The Town of Arlington necessarily relies on organised groups of individuals to bring issues to the attention of government officials to begin tackling policy issues. This form of reactive policy making is not atypical, but rather a result of the resource limitations inherent in local government and politics. As a result, multiple areas that remain dangerous to school-aged pedestrians to and from school have gone unnoticed. The primary data collection methods of the present report provides a potential approach that Arlington could promote to the vast volunteer body of parents and the broader community to predetermine areas of concern for pedestrian safety.

Rhetoric: Framing issues is an essential element of policy development and promotion. Currently, the Town of Arlington does not clearly promote its prioritisation of safety to the Arlington community in its master plan document. Amending this will assist in engaging the community in the safety discussion and normalising the trade-offs

inherent in promoting pedestrian and public transport commuter safety over personal motor vehicles.

Thus, the three policy proposals we promote to the Town of Arlington should have both short- and long-term effects on developing and implementing safety solutions. These are:

1. Utilise data-driven approaches to police resource allocation and consider how enforcement in peak periods could be improved, including:
 - a. More police near crosswalks during the school commute in the morning and afternoon;
 - b. Hiring more crosswalk guards at crossings frequented by school children that are currently unserviced and;
 - c. Considering the impact that the shift-change period has on police availability in peak periods and considering staggered shift-changes if required
2. Implement new data-collection tools that utilise the volunteer body available to the Town of Arlington that follows a similar approach to that in the paper:
 - a. Place volunteers at an intersection they, or the Town of Arlington, suspect may be dangerous/frequently used by school children
 - b. Count the number of times and nature of incidents that place children in danger
 - c. Report these results back to Town of Arlington and associated bodies
3. Include safety jargon in the City Master Plan document as a core goal of the town of Arlington.

METROBRIDGE



Team 2

ARLINGTON'S SAFE ROUTES TO SCHOOL PROGRAM

Case Studies in Stratton and Hardy Elementary Schools



Executive Summary

by Madelyn Carr, Hannah Cuthbert, and Sarah Eagan

The Safe Routes to School program (SRTS), offered by the Massachusetts Department of Transportation and its federal counterparts, is a collaborative approach to education initiatives and resource allocation which promotes safe, sustainable, and accessible transportation options for students. This report reviews the proposed implementation of an SRTS infrastructure grant, awarded to Stratton Elementary School in the town of Arlington earlier this year, and evaluates the safety conditions of Stratton by contrast to another Arlington public school, Hardy Elementary.

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Executive Summary

Our investigation discovered problematic areas outside of the grant's proposed routes in the Stratton neighborhood, which led to questions concerning the capacity of the current grant application procedure to be efficient and inclusive in navigating and addressing the diverse interests of a densely populated, urban, and active community. While Stratton and Arlington as a whole could certainly benefit from increased state funding to improve the town's sidewalks, roads, intersections, and traffic infrastructure, our findings suggest that incoming funds and future resources may be appropriated more efficiently should Arlington reconsider its current practices in terms of organization, mobilization, and execution in the stages of the grant application process.

Stratton Elementary School and its surrounding residential area presents a pressing need for municipal and state support in creating sidewalks for its residents and the large student population traversing unsafe roads to walk to school each morning. Yet Stratton's section of Arlington experiences comparably low traffic by contrast to Hardy Elementary School's more central, congested, and populated position in the town's traffic network. With mind to the critical differences between the reported crash incident rates for these schools, we conducted field observations of both school zones during peak drop off periods. During these windows, we observed a stark difference between Stratton's and Hardy's needs and how school traffic issues were being addressed. We then surveyed a number of stakeholders on what they perceived to be the worst issues facing their communities. Our discussions with parents, crossing guards, school administrators, and Massachusetts Department of Transportation officials informed our fieldwork further and uncovered critical gaps in the grant application process that leaves out essential elements of community feedback. Ultimately, these gaps produce grant proposals that do not adequately incorporate the needs of these schools and will lead to less than satisfactory outcomes when the plans become reality.

Citizen, administrative, and official insight allowed our report to be led by community need and balanced with town and state priorities. Accessible, practical, and equitable modes of transport, particularly in terms of pedestrian safety, shaped our research priorities and perspectives. The students of Arlington public schools and the residents of their surrounding neighborhoods deserve safe sidewalks, roads, and intersections, not to mention increased education initiatives and supervised enforcement to ensure their safety. The findings presented here encourage early communication, inclusive mobilization, heightened organization, and a streamlining of the current processes in terms of town grant applications in order to ensure the best possible outcomes for all parties involved.

I. Background

Introduction to Stratton and Hardy Elementary Schools in Arlington, MA

This analysis will study two elementary schools in Arlington, Massachusetts, Stratton and Hardy Elementary Schools, in order to determine whether the schools are accessible, practical, and equitable in their approaches to school drop-off safety. While Stratton and Hardy Elementary Schools share similar racial demographics, test score results, and general characteristics, the topographical composition and traffic patterns of the two schools differ immensely (School Profiles). Stratton Elementary, which is bordered by Mountain Road and Pheasant Avenue, is surrounded by single-family homes in an overall low traffic, hilly residential area. Hardy Elementary, which is bordered by Lake Street and Brooks Avenue, is surrounded by duplexes in a highly trafficked, flat urban area.

Arlington is known to possess a large commuter population of 60% of commuters using their personal vehicles, in addition to its proximity to Alewife Red Line Massachusetts Bay Transit Authority (MBTA) station. This suggests for our analysis that we should expect a number of parents who use their cars to commute to work and to drop off their children (“Census Profile: Arlington, MA”). Both of these schools are located in easily walkable areas, yet Stratton’s surrounding residential neighborhood lacks adequate sidewalks. On the other hand, the highly trafficked Minuteman Commuter Bikeway intersects with Lake Street in the Hardy school zone. Each school presents challenges stemming from its respective environment that lead to unsafe conditions for children to walk, ride, or bike to school.

Priorities and Challenges that Arlington Faces

The town of Arlington is an affluent, tight-knit suburb populated by a majority of white-collar professionals who are invested in local government and improving the community. Therefore the town is in a unique and fortunate situation in its capacity to prioritize and execute policy initiatives. Yet, Arlington still faces challenges that often hinder or delay the process of implementing and completing projects. In a presentation by Arlington’s Senior Transportation Planner Daniel Amstutz, he informed us of certain obstacles that the town encounters, such as: constrained funding; limited staff; staff and volunteers having to coordinate among many different departments; limited rights-of-way; scattered data/siloing (lack of communication among departments); and automobile culture. With limitations on the town’s resources in view, our investigation focused particularly on the effects of constrained funding and automobile culture on pedestrian safety in the areas around Stratton and Hardy Elementary Schools. Constrained funding is a pervasive issue for city and town governments around the country. This leaves municipalities reliant on grant funding from the state level to support larger projects. Stratton Elementary was fortunate to receive the Safe Routes to School Infrastructure grant from the state of Massachusetts; however, schools like Hardy face more difficulty in fixing unsafe infrastructure without the same grant security.

Stratton’s case can act as a blueprint for Arlington when navigating the grant process at the state level; as we will demonstrate throughout the paper, it is clear that Stratton and its associated parent organizations were particularly effective advocates to make the school an attractive grant candidate.

Safe Routes to School

For the purposes of this project, the Massachusetts Department of Transportation’s (MassDOT)’s selection of Stratton Elementary as a recipient of the Safe Routes to School (SRTS) Infrastructure Program’s grant is particularly salient. The SRTS Program is a federally-funded initiative that is facilitated by MassDOT. According to the SRTS Statewide Lead, Emily Budzynkiewicz, the program originated in Denmark and has now spread to 45 countries across the world and operates in all 50 states. In an email exchange, Budzynkiewicz explained that the program “works to increase safe biking and walking among elementary and middle school students by using a collaborative, community-focused approach that bridges the gap between health and transportation.” This community-based focus is reinforced through the “Six E’s” which guide the implementation processes of the SRTS program: Education, Encouragement, Enforcement, Evaluation, Engineering, and Equity (Fig. 1).



Figure 1. Courtesy of Safe Routes to School Project

The national program applies the same principles to each school in order to prioritize safety, ease, and accessibility of using active modes of transport for school drop-off and pick-up. Budzynkiewicz critically noted that “Arlington served as one of the first SRTS programs in the country as it was designated as a SRTS pilot program through the National Highway Traffic Safety Administration.” A colleague of Budzynkiewicz and transportation planner with MassDOT’s SRTS program, Cassandra Gascon Bligh, provided further insight into Stratton’s selection and eligibility for the program. Arlington’s application was specifically selected based on its demonstrated need, the clarity of its proposal, and the school’s existing commitment to the SRTS program. Bligh particularly noted that Stratton’s proposal was strong in comparison to the other 55 communities in its applicant pool. Awarded a Bronze status based on the MassDOT’s rubric for ranking applicants, Stratton Elementary presented a demonstrated interest and potential for continued commitment to the SRTS program, evidenced through its previous participation in SRTS initiatives and its willingness to cooperate with outreach partners.

Arlington was one of fourteen communities selected, which suggests that its planning processes were in line with the goals of SRTS priorities and rooted in community need.

The primary concern that prompted the grant application is the lack of safe sidewalks surrounding Stratton Elementary School. In documents released by the town of Arlington, the MassDOT SRTS grant will cover the estimated costs of \$887,662 to improve two streets surrounding Stratton Elementary: Hemlock Street between Brattle Street and Dickson Avenue and Dickson Avenue between Hemlock Street and Pheasant Avenue (Fig. 2).

The map of the project, provided by the town's transportation planners, includes four intersection improvements, a new crosswalk, several new sidewalks, improvements for existing sidewalks, and adding new signage in the affected area. The town will work alongside a construction consulting company assigned by MassDOT, AECOM. Funding for the project will become available in 2022, leaving several years to refine the planning, design, and development of the project. MassDOT officials confirmed that proposals are taken on the whole, which is to say the plans provided in applications will be implemented as provided unless other direction is given. With the apparent strength of Stratton's application in view, our analysis aims to evaluate the accessibility, sustainability, and equity of the accepted project proposal in order to determine if the MassDOT grant will be used efficiently and appropriately in serving the Stratton and larger Arlington community.

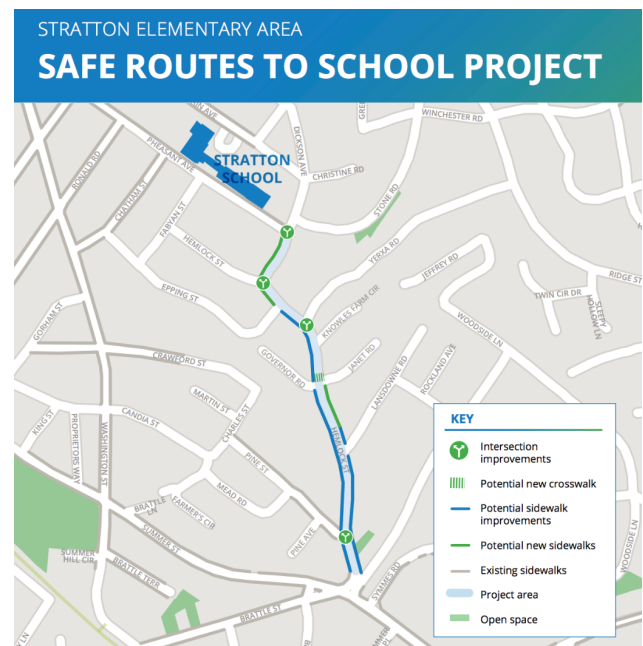
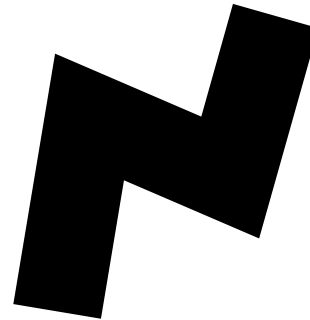


Figure 2. Courtesy of Safe Routes to School Project

Complete Streets Grant

While Stratton Elementary School received the SRTS Infrastructure Program’s grant for infrastructure improvements, the town of Arlington applied for MassDOT’s Complete Streets grant to improve safety at the dangerous intersection between the Minuteman Commuter Bikeway and Lake Street. The proposal to improve this intersection, which is located in Hardy’s school zone, was rejected. The Complete Streets grant is awarded to communities who are in need of providing “safe and accessible” modes of transportation for all residents, according to the MassDOT website (“Complete Streets Funding Program”). This grant includes improvements for cyclists, pedestrians, and vehicles, stressing the need to enhance the quality of life and promote fiscal growth of the eligible municipalities. In order to receive this grant, communities must participate in a Complete Streets training as well as create a thorough prioritization plan and construction development proposal. The town of Arlington applied for this grant in 2017 for Ottoson Middle School and successfully qualified for funds in the first round. However, in 2018, when Arlington applied for the grant to make safety improvements at the intersection between Lake Street and the Minuteman Commuter Bikeway, the proposal was rejected. According to Arlington local Adam Auster, the town received a preliminary unofficial but positive response from MassDOT staff on its project (Auster 2018).

Arlington’s proposal for this intersection improvement, named the “75 percent” design, included construction for a stoplight in the area where the current crosswalk is located (see Fig. 3). Only 75 feet away from the Brooks Avenue/Lake Street stoplight, this new proposed stoplight would align with the Brooks Avenue stoplight to ease traffic by changing the signal to include a pedestrian only phase.



Figure 3. Courtesy of the Town of Arlington

Hardy students will then be able to safely cross the street without the immediate need of a crossing guard (Matheson 2017). This proposal also included repaving the Brooks Avenue sidewalks. The Complete Streets grant is capped at \$400,000 per town, which is the amount Arlington requested for this single project.

While this design was originally estimated for \$150,000 in 2016, in early 2018 the town revealed an updated estimate of \$700,000 due to the need to refurbish the technology of the Brooks Avenue signal in order to coordinate the two (“State Declines to Fund \$400K for Lake St./Bikeway Project”). Therefore, the town would have had to use \$300,000 of their Chapter 90 funding to complete the project, around 40% of their annual budget for infrastructure improvements (Auster 2018). According to a feedback sheet composed by Complete Streets Engineer Michelle Danila and Complete Streets Program Administrator Eileen Gunn, the application was rejected because it left several portions blank and was overall “unclear,” instead suggesting a signal warrant analysis or a new project involving a HAWK signal (Matheson 2018).

II. Challenges and Obstacles

Visit to Stratton Elementary

To investigate the measures already in place for pedestrian and student safety at Stratton and to assess the conditions that warranted the Safe Routes to School Infrastructure grant, we visited the school during drop-off— 7:45 AM to 8:25 AM— on Monday, November 4th. The school is located on Mountain Avenue in a residential area that has very few sidewalks; the sidewalks that the neighborhood does have are in need of repair. As for the school drop-off process, we observed that the majority of students were walking to school with their parents or being dropped off in vehicles. This corroborates the data from a Stratton parent survey conducted in December 2018, in which it was reported that about 60% of all students walk to school while about 38% are driven. Those who are driven are dropped off in/around the parking lot or in front of the school, which causes significant traffic on Mountain Avenue where Stratton’s main entrance is located. There is a traffic circle in front of the main entrance, which typically would be used to streamline and expedite drop-off by giving parents another place to drop off their kids instead of the street in front of the school (Fig. 4).



Figure 4. Courtesy of Google Maps

However, in Stratton’s case, this circle is only used for school buses (Fig. 5). With the knowledge that 60% of all students are walking to school every morning, it is understandable that community members with ties to the school have advocated for the SRTS grant, given the lack of existing infrastructure in the neighborhood that makes walking safe. We talked with parents who were dropping off their children and asked them what they perceived to be the most pressing issues pertaining to pedestrian and student safety at Stratton.



Figure 5



Figure 6

Consistent with the trend already observed in this neighborhood, there are no sidewalks on either side of the bottleneck. As highlighted by the yellow arrow in (Fig. 7), there is a citizen-made pathway on one side of the bottleneck that a resident constructed on their own property to facilitate safer crossing through the area, as visibility is low for both pedestrians and motorists coming around the sharp corner (Fig. 8).

One parent, Mike Siegel, who currently has three children attending Stratton, drew our attention to what he and other community members have colloquially termed “the bottleneck.” This bottleneck area is located at the intersection between Morningside Drive and Ridge Street where the road narrows down to one lane, and is about 0.1 of a mile away from Stratton (Fig. 6). There is a small speed bump put in place to prevent motorists from speeding in this area, although this did not seem to act as much of a deterrent: most cars we observed in the bottleneck, including a number of large construction trucks, were still driving at fairly high speeds without regard for pedestrian presence.



Figure 7. Courtesy of the Town of Arlington



Figure 8

This problematic area on Morningside Drive and Ridge Street would greatly benefit from more legitimate sidewalks constructed with money from the SRTS grant. The SRTS project, however, omits this area altogether in its proposal for improvements (Fig. 2), which focuses mainly on streets south of Stratton and ignores areas north of Stratton. Siegel informed us that this is a personal issue for him, because he and his family, including his three kids who attend Stratton and walk to school every morning, live on the other side of the bottleneck and must walk through it on their way to and from school. Additionally, statistics from the aforementioned Stratton parent survey show that 145 of students who live within a ½ mile from Stratton walk to school every morning. This suggests that similar areas without sidewalks face high foot traffic in the morning, outside of the identified route in the SRTS. Only one conversation with a concerned parent revealed that the SRTS infrastructure project does not incorporate the bottleneck, which calls into question whether other conversations would uncover similar problematic areas.



In an email from Amstutz, the transportation planner detailed why Stratton specifically was chosen for the SRTS grant and why particular pathways were prioritized over other potentially dangerous streets and intersections:

My understanding is that Stratton has the greatest neighborhood sidewalk needs compared to the rest of the elementary schools. The topography is particularly challenging and the land development patterns around the school excluded sidewalks, in many cases. Although many students walk to Stratton, there have often been concerns about the lack of safe walking infrastructure. It also happened that a parent of a Stratton student had met with APD, DPW, and the Town Manager's office about this problem in August 2018. Since we had a very short turnaround time for the grant, and an active parent group to collect data and support letters, it made sense and all came together in a really good way.

While it is true that Stratton has pressing neighborhood sidewalk needs, this articulation confirmed the sense of our research that Stratton's selection and proposal was based on organized interests rather than ranked need. In a relatively affluent and functional community like Arlington, having an organized and passionate association of parents is evidently the key to pursuing and eventually receiving the funding necessary to improve infrastructure. Not every dangerous, un-sidewalked area like the bottleneck can be addressed in a system like this, though the systemic insufficiency of a grant-based process is especially compounded when the most outspoken parents' wishes are prioritized.

Visit to Hardy Elementary School

We similarly investigated Hardy Elementary School in order to compare the two schools' approaches to maximizing safety during school drop off. On Friday, November 15th, we observed drop off at Hardy during the same peak time frame (7:45 AM to 8:25 AM). Initial observations starkly registered that Hardy experiences far more traffic congestion by contrast to Stratton's surrounding neighborhood. Located on Lake Street, about four blocks away from the notoriously congested and dangerous Massachusetts Avenue, Hardy experiences a higher volume of vehicles during drop-off time because vehicles are not limited to parents of Hardy students but inevitably include local rush-hour traffic. Hardy's central location places its suggested routes to school in line with those commuting into Boston, who often pass through with little regard for elementary school students attempting to cross the street. Indeed, Arlington crash data from the past decade shows that there have been 278 total car crashes with and without injury on Hardy's Lake Street and Brooks Avenue from 2009-2019 compared to only 7 crashes on Mountain Ave and Pheasant Street in Stratton's surroundings in the same time period (7).

Crash Data from Areas Around Stratton and Hardy Elementary Schools, 2009-2019

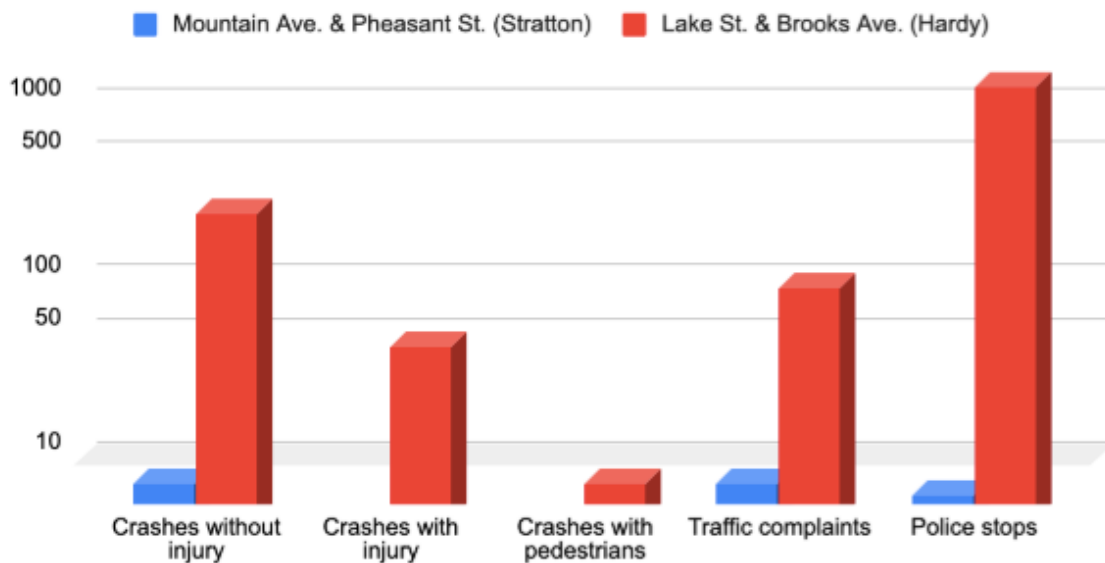


Figure 9. Data Courtesy of Town of Arlington

A discussion concerning the needs of Hardy Elementary commuter students with Hardy Principal Kate Peretz further reinforced our inclinations. Peretz appreciates that so many families choose to walk to school and shared that the school relies on their crossing guard heavily to ensure the safety of their students. She identified her primary concern to be Lake Street, where there is “terrible traffic” and “people are in a rush and are not always paying attention.” In an email, Peretz outlined the issues Hardy faces and the solutions that the school administration has considered to remedy the potential dangers traffic poses during drop off and pick up windows:

We ask for more of a police presence from time to time, but do understand that this can be difficult for our local department. We hope that the crossing at the bike path will someday have a light, as we think that would help a great deal. Another thing we have been thinking about is a re-painting of the lines in our parking lot so pedestrians have a clearer path and cars see the places where kids are walking a bit better. This would involve the area over by our dumpster on the way to the playground. We also struggle a bit with the drop-off/pick-up area, as parents tend to park there and get out (then I worry that others will drop a student off in the middle of the road on Chandler because there is no place to pull over). We don't have the staff to monitor that area as well as the street crossings.

Given Arlington Public Schools' commitment to safety and the traffic incident rates surrounding Hardy, Peretz's concerns about traffic are unsurprising. The request for supervision of the school's surroundings, either by the local police department or by school staff, is a significant one.

The allocation of town resources are rightfully contested and constrained, therefore our object is to mitigate drop off and pick up issues through improvements that would lessen the need to rely on police enforcement or staff supervision of a given school zone. Incorporating the feedback of school administrators is a method by which a municipality can strive to better address the needs of a community, as the day-to-day experience of school administrators is indispensable.

Furthermore, a significant source of traffic near Hardy is the point at which the Minuteman Commuter Bikeway intersects with Lake Street less than one block away from the front of the school. Cyclists and pedestrians alike utilize the Bikeway, which is directly perpendicular to Lake Street, in a relatively steady stream while the cars on Lake Street must yield without any formal regulation. We connected with the one crossing guard assigned to Hardy, Linda, who is charged with stopping traffic at a four way stop right in front of the school (Fig. 10).



Figure 10

She identified the intersection of the Bikeway and Lake Street as one of the most pressing safety concerns that Hardy faces, and shared with us that the school recently received a grant to place a stoplight at this intersection within the next five years. When we looked into this, however, it appears as though the state of Massachusetts declined issuing funds for said stoplight in Arlington's application for a Complete Streets grant (Matheson 2018). This is particularly important to note because a stoplight on Lake Street would not only make walking to school safer for Hardy students, but would make commuting, driving, and walking in Arlington safer in general.

While Hardy is quite close to the Lake Street and Minuteman Bikeway intersection, its proximity was hardly referenced in the Complete Streets grant proposal. Instead, the proposal primarily focused on the potential benefits reaped for vehicles, rather than cyclists and pedestrians who also frequent the area. In the proposal's feedback sheet, the two MassDOT employees outlined harsh criticisms of Arlington's grant application, citing a lack of clarity and professionalism. While this error may have resulted from the various challenges that municipalities typically face, such as staff capacity and lack of interdepartmental communication, the application inappropriately included five different project narratives yet only requested funding for one (Matheson 2018). In addition, as the officials describe, "the header was blank on the application," leading to a consensus from MassDOT that the proposal seemed unfinished and rushed (Matheson 2018). Complete Streets Engineer Michelle Danila and Complete Streets Program Administrator Eileen Gunn suggested to the town of Arlington to complete a full "signal warrant analysis, or consider a HAWK signal" instead (Matheson 2018). A HAWK signal would be a cheaper alternative to this expensive project and a warrant analysis that evaluates engineering needs in a cost-benefit analysis would cement this high-cost proposal as necessary and justified. While Arlington was successful in receiving this grant a year previous in 2017 for sidewalk improvements on Gray Street near Ottoson Middle School, the Complete Streets program was in its first year at that point and accepted each proposal it received. Rejections are more common as the Complete Streets program ages, with just under half of the applicant pool approved in the past two years ("Participation Report").

In addition, a common critique of Arlington's proposal was that it prioritized addressing the delays of vehicle traffic over the commutes of cyclists and pedestrians. Since the Complete Streets program aims to increase the safety of all modes of transportation, the "perceived slant" of the proposed project did not qualify for this grant in the first place (Matheson 2017). Arlington's proposal entailed coordinating two stoplights on the affected streets so that vehicles would not have to stop at both signals, but critics of the project declared that these signals would instead increase delays for pedestrians and cyclists due to the strict design (Matheson 2017). These public comments were not incorporated in the feedback sheet from MassDOT, yet our analysis points to the utility of incorporating public comment in planning processes in order to avoid inadequate and poorly conceived projects that do not fully engage with community needs.

MassDOT SRTS Grant

The MassDOT's grant for SRTS became available in late 2018 and relies heavily on partnership building to achieve its efforts, primarily through a combination of community-based initiatives and incentivized grants that structure SRTS priorities and their implementation.

The town's ability to organize and generate a successful grant application, alongside the use of school and community-based programs, must frame our analysis of SRTS grant initiatives. Recalling Amstutz's insights into Stratton's specific SRTS application process: "It also happened that a parent of a Stratton student had met with APD, DPW, and the Town Manager's office about this problem in August 2018. Since we had a very short turnaround time for the grant, and an active parent group to collect data and support letters, it made sense and all came together in a really good way." The activism of a single parent from Stratton seems to have driven the application process further, fostering communication between the Arlington Police Department (ADP), Department of Public Works (DPW), and the Town Manager's office. The rejection of Arlington's Complete Streets proposal illustrates that citizen insight is invaluable in planning processes. The Stratton case study, however, demonstrates that stakeholder insight is limited if shared only through particular channels and biased perspectives of those heavily invested in the project. Notably, the Stratton application appears to have placed the impetus to advocate for change on citizen activists, rather than incorporating larger town priorities through the Transportation Advisory Committee or other town planning bodies. The Complete Streets grant process presented a reversal of responsibilities compared to Stratton; whereas citizens drove Stratton's specificity and success, the lack of direct citizen involvement in the Complete Streets grant prevented the town from reaching its full potential.

The case is complicated further when we consider that the Safe Routes to School program also faces its own constraints on staffing, resources, and the heightened challenge of distance from the community. It is not within MassDOT's purview to determine if the problem areas a parent organization identifies are fully representative of the town's needs, instead, as SRTS Coordinator Cassandra Bligh explained, "What you can run into with these types of projects, is that the school knows that they have a lot of kids coming from a particular side of town, but the town on the other hand is planning to spend money there in a few years. You lose a lot of buy-in when you don't collaborate, so that's important from the beginning. You need that support." Bligh underscored that MassDOT does not want to enter communities where they may encounter opposition to their projects. When asked about the composition of the proposal itself, she replied that "We mostly stuck with what the application asked for. In most communities, they know what they need, and that they could use all the grants in the world. Communities can propose a project they need, want, and support."

Arlington presented a case where there is clear community buy-in through letters of the support from stakeholders in the school administration and town officials. Despite demonstrable commitment to SRTS, our inquiry uncovered gaps in the proposal's coverage of problem areas and discovered that there were several areas where a single parent organization's mobilization may have detracted from a more beneficial plan from being proposed and ignored the potential for improving pedestrian safety in an equally as eligible school like Hardy.

III. Proposed Reforms

Localized Solutions for Stratton and Hardy

If Arlington aims to maintain and strengthen its reputation of being a walkable community, we propose that the town reduce the speed limit on Lake Street in front of the school from 20 to 15 miles per hour. Reducing the speed limit in a school zone will not drastically impact the length of a single person's commute and will increase safety for cyclists, motorists, and pedestrians alike. That said, studies show that simply reducing speed limits is not necessarily the most effective in getting motorists to drive slower (Mayyasi 2014). For this reason, we also propose that Arlington implement a HAWK (High-Intensity Activated crossWalk) Beacon at the intersection between Lake Street and Brooks Avenue, where Linda the crossing guard currently single-handedly stops four-way traffic (Fig. 10).



Figure 11. Courtesy of Carpenter Mary Transportation

A HAWK signal will ensure not only that the new speed limit is obeyed, but also that the onus of responsibility for the safety of hundreds of children does not rest solely on one crossing guard's overworked shoulders (Fig. 11). Studies have shown that areas with HAWK Beacons experience significantly fewer accidents overall— particularly one study conducted in Tucson, Arizona which found that the introduction of a HAWK Beacon reduced total crashes by 29%, pedestrian crashes by 69%, and severe crashes by 15% (Do 2010). Additionally, HAWK Beacons are cheaper and quicker to implement than traditional stoplights (Bushell et al. 2013).

While Hardy receiving a grant like the SRTS infrastructure grant is a long-term solution for addressing safety concerns in this area, implementing a HAWK Beacon at the main intersection in front of Hardy will likely reduce potential harm in the short term.

Stratton would also benefit from reducing the speed limit by five miles per hour, yet its less central location means there are fewer cars speeding during drop-off and fewer vehicles in general. Stratton therefore would not benefit from a HAWK Beacon as much as it would benefit from repurposing its existing infrastructure, like the traffic circle in front of the school, to be used more efficiently. As the circle is currently only used by the one school bus from the METCO program that services Stratton, we propose that Stratton open up the traffic circle to cars in order to facilitate safer drop-off. Not only would this clear congestion on the street due to parents finally having a designated place to drop off their children, but it would also accelerate the drop-off process by creating a steady flow of movement through the circle. The Lincoln School in Providence, Rhode Island provides a helpful outline on its website (Fig.12) for using a circle like this during both drop-off and pick-up that Stratton can use as a model (“Traffic and Parking”).



Figure 12. Courtesy of the Lincoln School

Overall Guidance and Comments

In the short term, specific to the cases presented here, we suggest encouraging Arlington Public Schools to implement SRTS programs that are available free online, from lesson plans for biking to school to community outreach days, to increase their status in the MassDOT’s points-based rubric system. We do not want to encourage increased policing or enforcement of kindergarteners and their parents making their daily journeys to school and work, but rather we advocate for the creation of a space to learn safe practices that will equip students and community members with better commuting habits.

Such education based approaches aim to shift the commuting culture over time and require less resource allocation than rearranging police department schedules or extra funds for signage and infrastructure. Based on documentation from the SRTS Massachusetts program available through the agency’s website, the ‘Infrastructure Application Application Guidance Document,’ school partnership is required in order to complete the ‘non-infrastructure component’ of the application (“Infrastructure Application Guidance Document”). Eligibility to apply is dependent upon participation in these non-infrastructure components, including the education, encouragement, enforcement, and evaluation activities that a SRTS partnership promotes and facilitates. Cassandra Bligh was careful to mention that proposals that were biased towards the vehicular experience would not be considered, as student and pedestrian experience are the chief priorities of the program. This sentiment is reflected in the official guidance distributed by MassDOT—projects that incur or require recurring costs, maintenance requirements, improvements to travel lanes, or extraneous equipment like bicycles or reflective clothing will not be funded (“Infrastructure Application Guidance Document”). Alongside efforts to educate, encourage, enforce, and evaluate safety implementation, SRTS values the joint support of the school, municipality, and constituency in successful applications. We therefore strongly suggest Arlington does not allow unilateral action to remain the only action in these proposals; community contacts, advice from administrators, and inclusive approaches will serve Arlington best in becoming an attractive candidate in future applications.

Moreover, we are concerned with the “short-turnaround time” of the SRTS application that may have compromised the full potential of the funds in the Stratton community. The activism of the parent community in Arlington is certainly an asset, but should be balanced with a thorough grant application process that contends with diverse interests, community supports, and perspectives. Arlington is an affluent, well-connected, and well-organized community and still is challenged by time constraints and limitations on its ability to address all constituent needs, which does not bode well for less-organized and likely underserved towns and cities. Bligh at the Department of Transportation sympathized that countless communities across the state could use funds to improve their roads, sidewalks, and town infrastructure, but critically assured us that the grants provided through SRTS must specifically improve the active transportation experience of students in Massachusetts. Viewing Arlington’s needs in balance, the general grant application process must be more inclusive of diverse perspectives from multiple layers of the community, align its proposals with the reality of the data, and assess whether the community as a whole will benefit from the specifically proposed plans.

Thus, we argue that this grant process can be replicable and applied to other schools, problem areas, and sections of Arlington and surrounding towns, if the town develops application guides and effectively streamlines the way it approaches planning in terms of grant appeals. As we have demonstrated, Arlington knows what works for SRTS grants—streamlining the process will open the potential for more essential feedback, ensure the success of future proposals outside of SRTS, and enhance the next project to serve the community as effectively as possible before deadlines cut planning short.

We thank Arlington town officials, Stratton and Hardy School administrators and staff, Massachusetts Department of Transportation planners and coordinators, and the parents we spoke to in our search for answers surrounding the SRTS grant and Arlington's needs. Without their crucial insight, it would not be possible to generate real change in Arlington.

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METROBRIDGE



Team 3

A photograph of a paved path leading through a grassy area towards a road lined with trees. The path is made of concrete slabs and is flanked by tall grass. In the background, a road with yellow double lines curves to the left, and several trees are visible. The overall scene is bright and green, suggesting a park or school grounds.

Arlington Metrobridge Project
Stratton Elementary School
&
Safe Routes to School Programs

Anthony Aguirre
Sophia Parnell
Boston University
Professor Einstein
PO/AA 517
12/8/19

I. Background & Study Purpose

The Town of Arlington and Professor Einstein of Boston University commissioned several student studies to evaluate the successes and shortcomings of the Town of Arlington's current transportation planning process and subsequent policy implementation. The Town's Master Plan (MP) contains an exhaustive list of goals to improve upon existing aspects of the Town, such as Arlington's business districts, recreational resources, and its walking and biking infrastructure.¹ For our purposes, the MP serves as a guidebook for the implementation of transportation policy that will make the Town safer, more accessible, less congested, and more desirable for its more than 45,000 residents.²

The MP's traffic safety section makes explicit mention of the Safe Routes to School (SRTS) program. Arlington was among the first towns in the United States to adopt an SRTS program, for which Dallin Elementary was chosen as the Town's pilot.³ With the use of SRTS funding, Dallin received extensive infrastructure improvements in order to encourage students to walk and bike to school by making the trip safer and more accessible. New crosswalks were installed, existing sidewalks were improved, and adjustments were made in order to slow the flow the vehicle traffic.⁴

Following the successes observed at Dallin, as of 2014, all Arlington elementary and middle schools participate in the SRTS program. All schools are aware of the various walking and biking routes used to travel to and from their premises, and they have made various safety improvements along these routes.⁵ Further, a Safe Routes to Schools Task Force has been created in order to continue to improve upon the current SRTS implementation. As a result of their efforts, no elementary schools need school buses with the exception of Bishop School.⁶ However, as of the MP's adoption in 2015, town officials were unsure if any future SRTS funding could be secured in the future, since towns usually receive reconstruction funding for only a single project.⁷

¹ "Arlington Master Plan," Arlington Redevelopment Board, February 4, 2015, 11, <https://www.arlingtonma.gov/home/showdocument?id=24289>.

² "QuickFacts Arlington Town," *United States Census Bureau*, Last Updated 2018, <https://www.census.gov/quickfacts/fact/table/arlingtontownmiddlesexcountymassachusetts/VET605217>.

³ "Arlington Master Plan," 62.

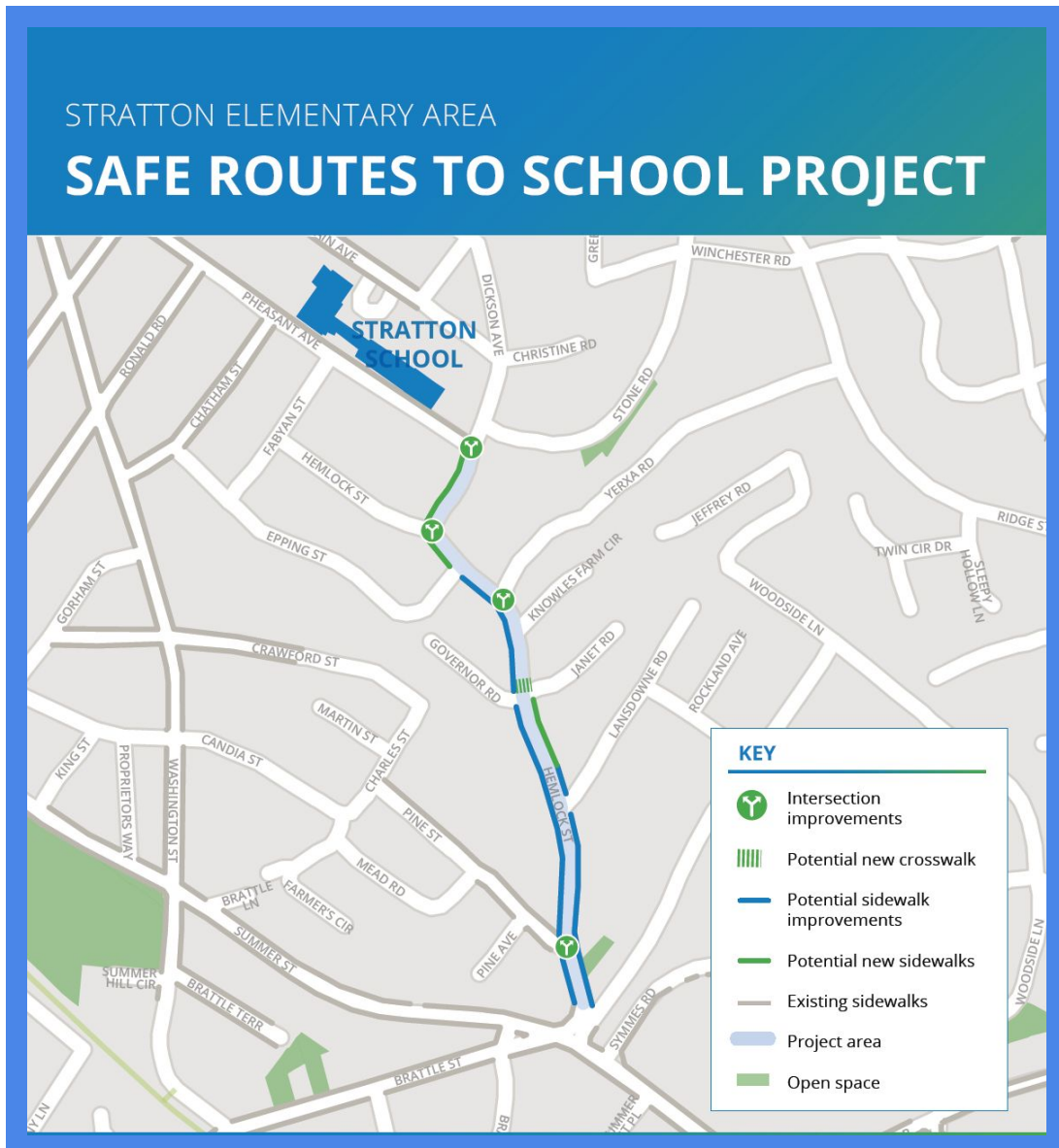
⁴ Ibid.

⁵ Ibid.

⁶ Ibid.

⁷ Ibid, 66.

This study analyzes the proposed Safe Routes to School (SRTS) program investment at Stratton Elementary School, pictured below.⁸ The implementation of a SRTS infrastructure improvement program at Stratton Elementary has been made possible due to Arlington’s successful procurement of roughly \$887,622 in funds from the MassDOT SRTS Project Award. These funds will become available beginning in 2022.⁹ The proposed improvements are currently located along Hemlock Street and Dickson Avenue, which would provide safer and easier access for students walking or biking to and from the school from the south.



⁸ “Stratton Elementary Area Safe Routes to School Project,” June 13, 2019, 2, <https://www.arlingtonma.gov/home/showdocument?id=47075>.

⁹ “Stratton Elementary Area Safe Routes to School Project,” 1.

THE QUESTIONS THAT THIS STUDY WILL ANSWER ARE:

1

Based on previous literature, is the implementation of a SRTS infrastructure improvement program an effective investment?

2

Is the SRTS infrastructure improvement project for Stratton Elementary an effective investment?

3

What are the expected complications in the implementation of the SRTS infrastructure improvement project proposal?



II. Literature Review

SRTS programs are a national phenomenon, offering both a source of physical activity for students as well as a potential means of curbing traffic congestion during critical rush hour periods. According to the U.S. Department of Transportation (USDOT), at least a tenth of morning car trips are strictly for family vehicle school transportation.¹⁰ The USDOT lists some of its most successful program implementation locations, one being Oregon’s Roosevelt Middle School. Roosevelt implemented a biking program that was supported by the school, city officials and staff, and an impressively engaged surrounding community. As a result of their efforts, **physically active modes of transportation to Roosevelt increased from 27% to 42%** over the course of three years.¹¹



Extensive academic literature exists regarding the physical benefits of SRTS programs, but such analyses, while valuable, are not this study’s priority. Above all else, we are interested in evaluating the **cost-effectiveness** of an SRTS infrastructure improvement program in Stratton. Data gathered regarding New York City’s SRTS program supports claims of monetary benefits due to program implementation. When SRTS funding was first given to the New York City Department of Transportation (NYCDOT), funds were allocated with priority to schools with the highest rates of injury.¹² SRTS safety improvements were found to “produce an **11% increase in active transport to school**...while simultaneously leading to a **33% to 44% reduction in school-age injury rates** in high-risk intersections within New York City.”¹³ Factoring in societal costs of injuries involving vehicles, the researchers found that the implementation of an SRTS program was “associated with an overall net societal benefit of \$230 million and 2,055 quality-adjusted life years gained in New York City.”¹⁴

¹⁰ “Safe Routes to School Programs,” *U.S. Department of Transportation*, <https://www.transportation.gov/mission/health/Safe-Routes-to-School-Programs>.

¹¹ Ibid.

¹² Peter A. Muennig et al, “The Cost-Effectiveness of New York City’s Safe Routes to School Program,” *American Journal of Public Health* vol. 104,7 (2014): 1294-9. doi:10.2105/AJPH.2014.301868.

¹³ Ibid.

¹⁴ Ibid.

A similar study was performed in California, which has had a state-level SRTS program instituted since 1999. Analyzing over ten years of data, researchers found clear evidence of long-term positive effects of SRTS program implementation in the state. Students whom lived in close proximity of safety improvements were more likely to shift their mode of transportation from a vehicle to an active mode. Accidents involving vehicles also notably declined along SRTS paths. Critically, **“the safety of pedestrians increased within 250 feet of an infrastructure improvement, such as a sidewalk.”**¹⁵ This is particularly relevant for our study of Stratton, since a SRTS framework already exists for the school. The project proposal will improve and add sidewalks to affected areas along Hemlock and Dickson, which, according to previous literature, will improve the safety of both students and residents in the area.

III. The Study

Stratton Elementary, as is the case with many other Arlington schools, has a massive number of students that both (1) live in close proximity to the school and (2) commonly walk to school. Survey data provided by The Town and its Senior Transportation Planner Daniel Amstutz provide more precise figures for these measurements, included below.¹⁶

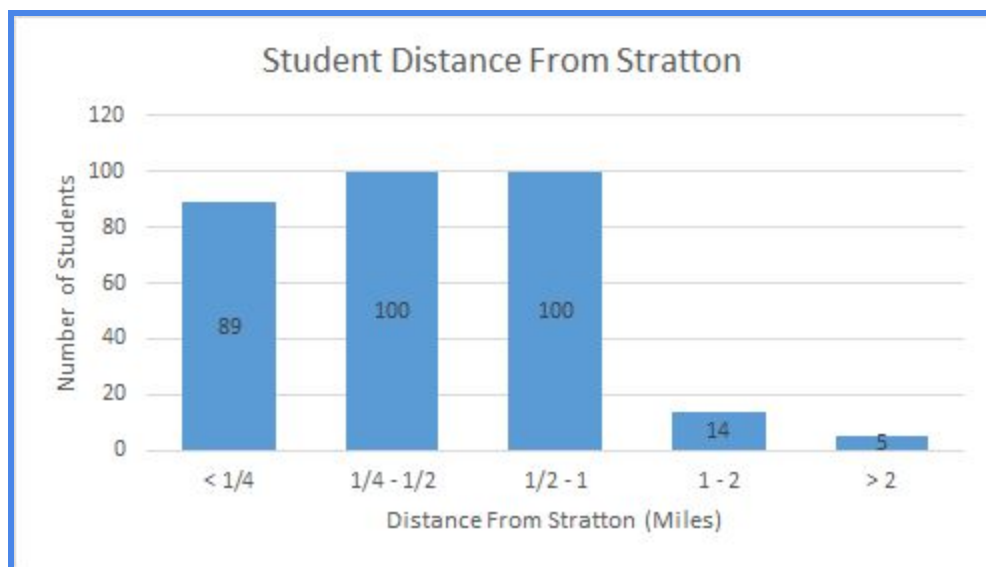
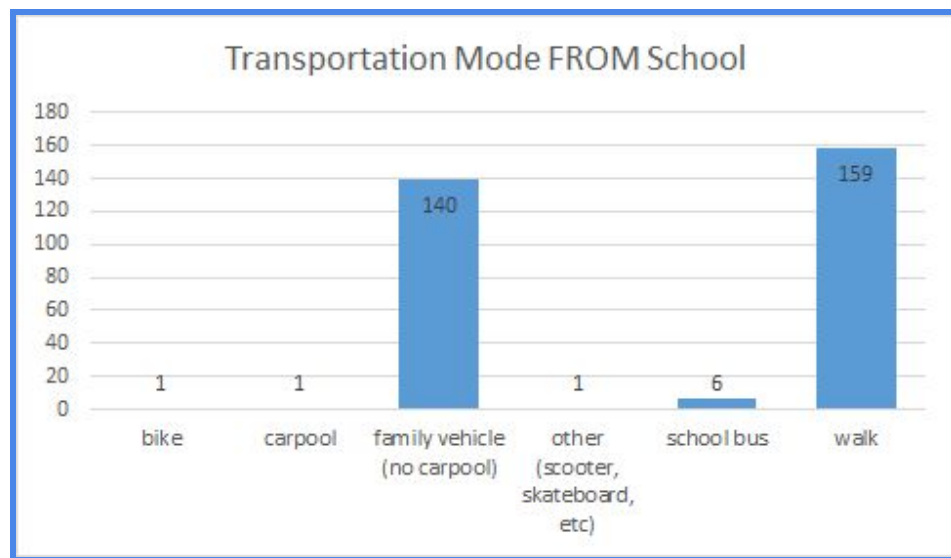
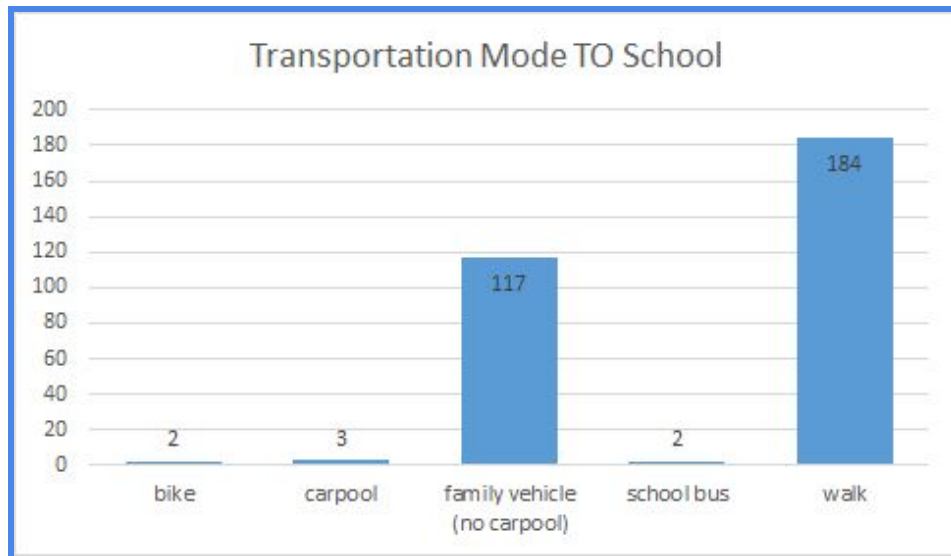


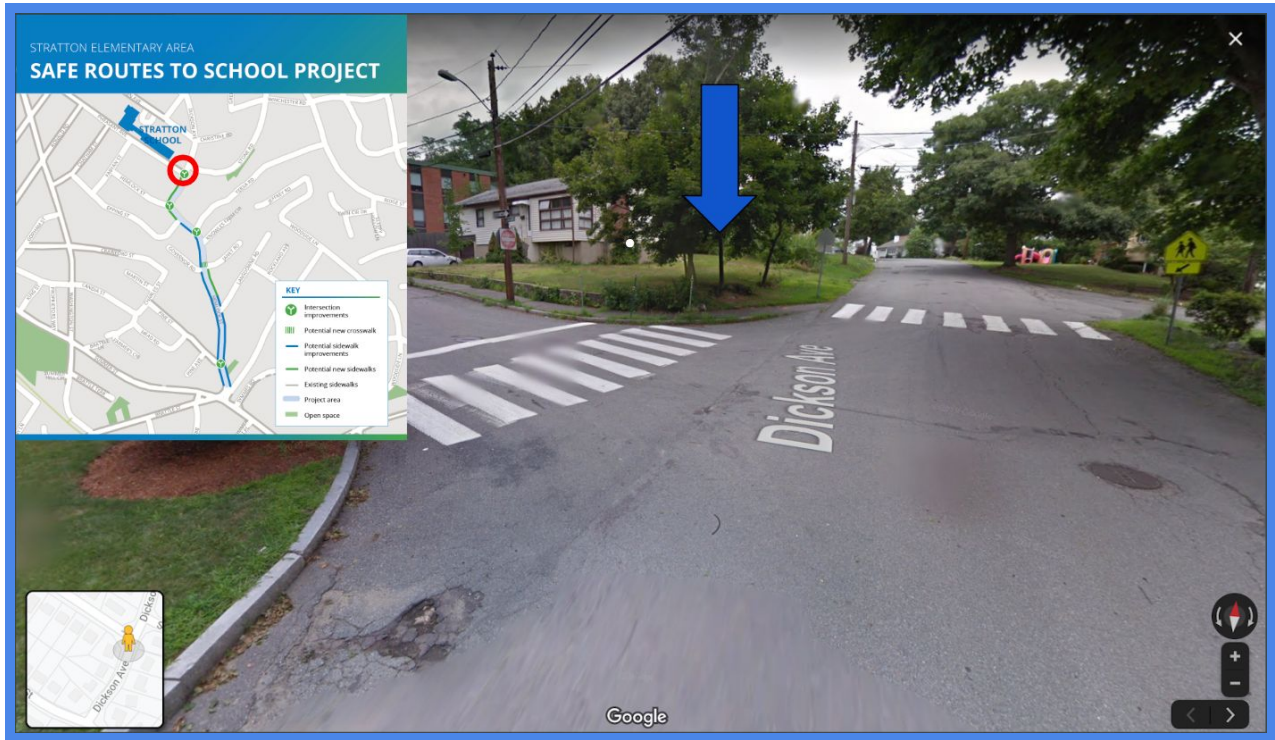
Figure 1: As seen in this graph, the vast majority of Stratton students (93.8%) live within a mile of the school. 61.4% live within half a mile of the school, & 28.9% live within a fourth of a mile.

¹⁵ David Ragland et al, “Ten Years Later: Examining the Long-Term Impact of the California Safe Routes to School Program,” *UC Berkeley: Safe Transportation Research & Education Center*, https://escholarship.org/uc/item/8m59g6vx#article_main.

¹⁶ “Stratton Walking Information,” https://www.dropbox.com/sh/u1yw147jda9we4z/AABoIsKMnZLBM20iFOH5_bDna?dl=0&preview=Stratton+Walking+Information.xlsx.



*Figures 2 & 3: As seen in these graphs, the majority of Stratton students reportedly walk to **and** from school as their main mode of transportation (59.7% to school, 51.6% from school). The second most common mode of transportation is family vehicle without carpool (38% to school, 45.5% from school).*



For our study, we positioned ourselves at the northern end of the Stratton SRTS path on the morning of Friday, November 8th, 2019. Our precise location is pictured above, represented both by the blue arrow and the red circle. We had assumed that rain or snow may push students who may typically walk to school to choose a non-active mode of transportation, so we picked more ideal weather conditions for the purposes of our study. The temperature was in the mid-30s and sunny, which is fairly representative of an average fall or winter day in Arlington with no precipitation. The goal of the study was to keep an accurate count of vehicle and foot traffic along the SRTS path from 7:20 AM to 8:10 AM (the latter time is when school begins at Stratton).

IV. Study Results

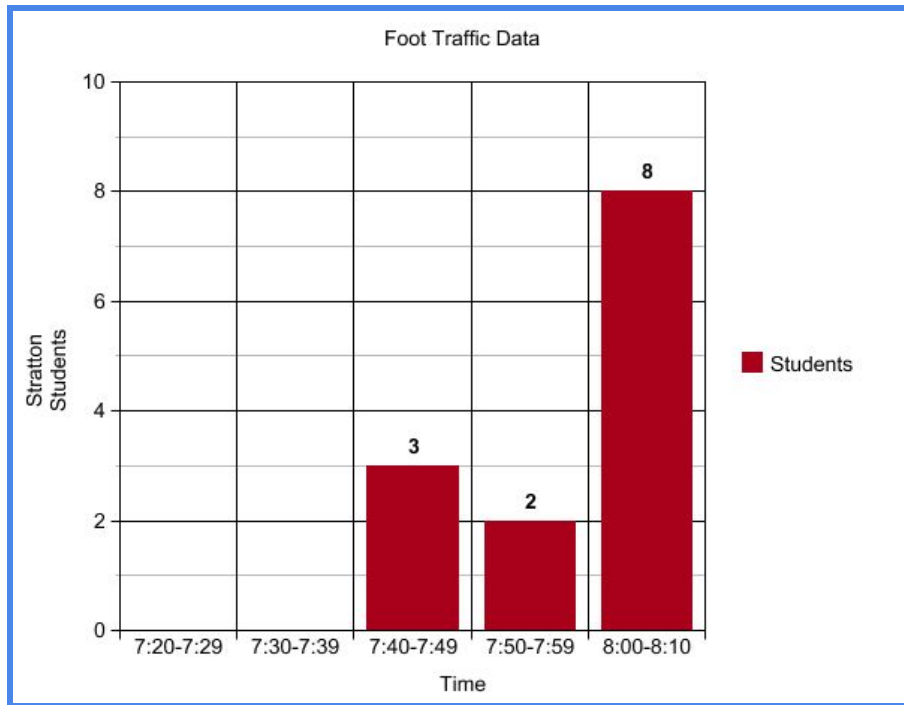


Figure 4: Observed foot traffic

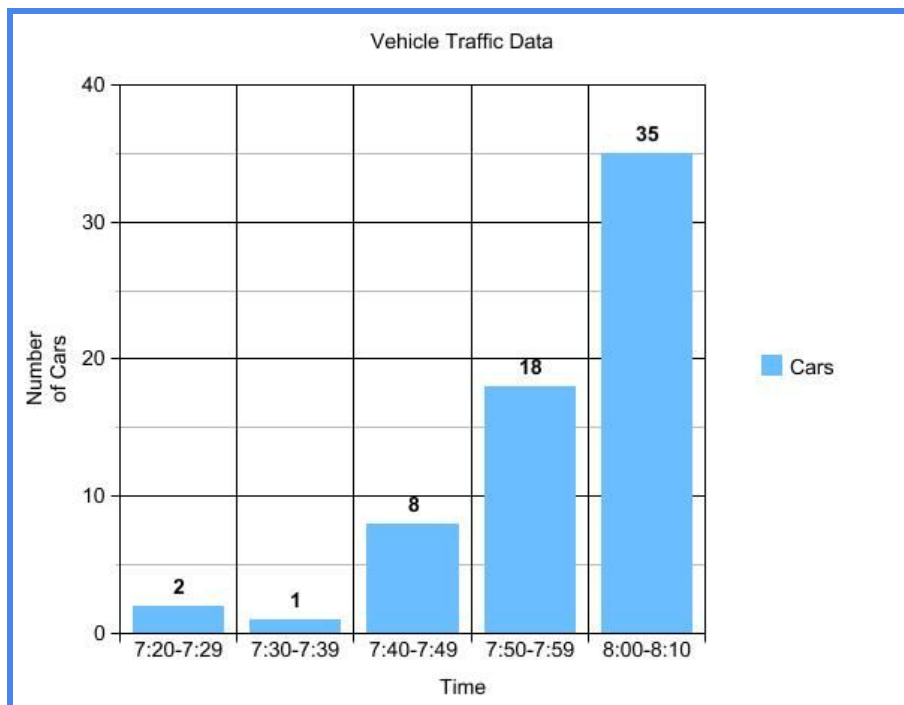
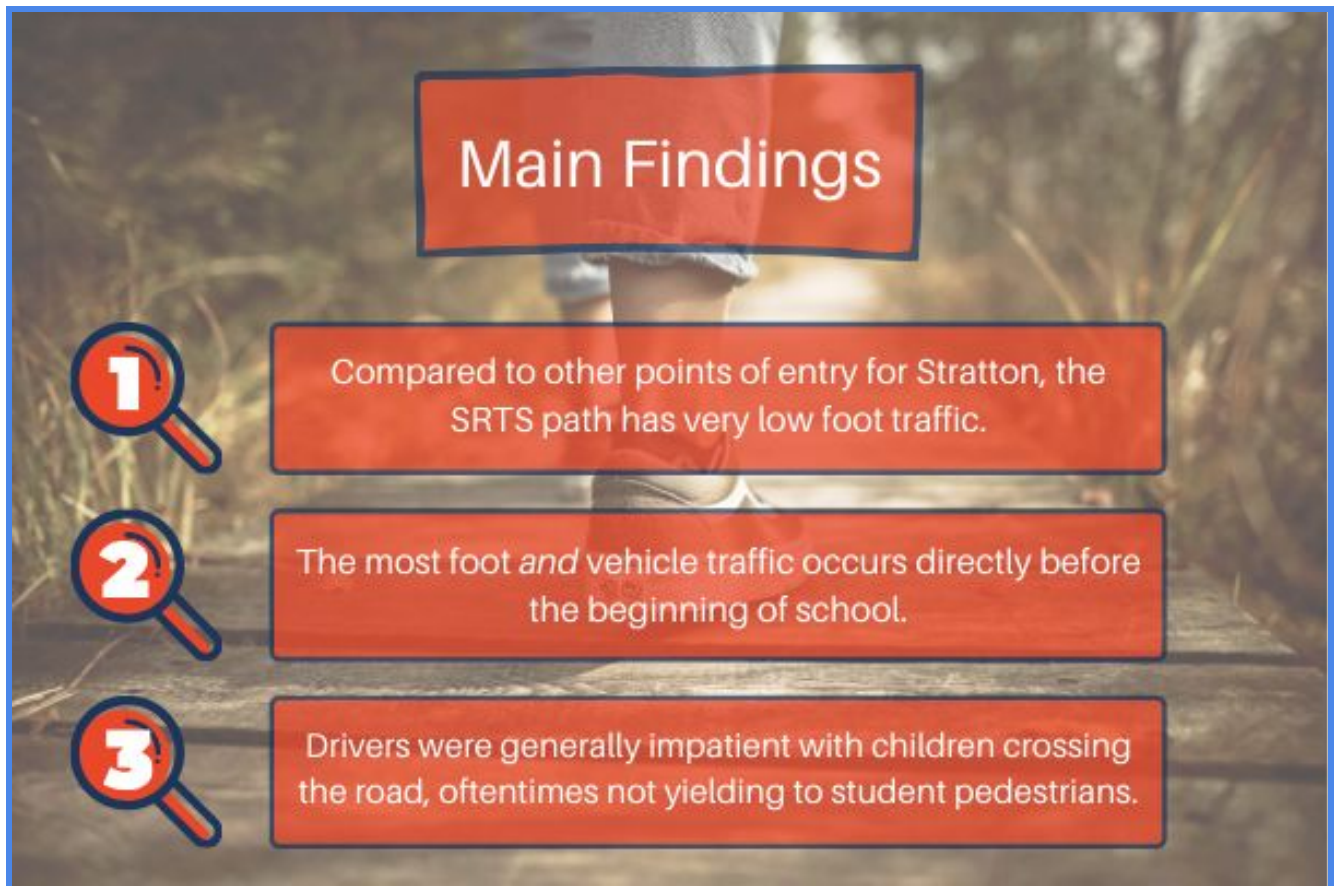


Figure 5: Observed vehicle traffic



Our findings generally do not support the conclusion that the proposed SRTS improvement project path is the most cost-efficient use of funding. Based on the survey data provided by Arlington, we had expected to see many students making use of the path outlined in the infrastructure improvement proposal. While dozens of students arrived at Stratton from the north, east, and south hardly any made use of the Hemlock/Dickson route approaching from the southeast. **In total, we observed only 13 Stratton students using the route outlined in the proposal, comprising a small minority of walking students.** Further, the majority of the students we observed making use of the route were not coming from further down Hemlock Street; most of the 13 students lived right on Dickson Avenue or on Stone Road, to the east of the school. **These students would walk on the final portion of the infrastructure improvement proposal regardless of the new sidewalk implementations, since they live directly next to Stratton. These students only walk on the SRTS path for a maximum of 1.5 minutes.**

However, the few students that we did observe making use of the SRTS path were walking in unsafe conditions. Drivers were often driving either at or over the residential speed limit, and many would not yield for student pedestrians, either driving or turning through intersections despite the children waiting to cross. Students approaching from Hemlock Street either crossed through front yards or walked on the far edge of the street in order to avoid vehicle traffic. This became especially dangerous as the time drew closer to the beginning of school, as both foot and vehicle traffic hit their peaks simultaneously.

III. Challenges & Obstacles

We have **two main concerns** regarding the successful implementation of the SRTS infrastructure improvement project: **NIMBYism** (‘Not In My Backyard’ attitudes), and **monetary constraints**.

NIMBYism refers to residents whom generally support new urban planning measures in the larger context of the cities they inhabit, but not in their individual communities.¹⁷ Due to high **concentrated costs** as a result of nearby construction (loss of parking, increased noise, dust, etc.), NIMBY residents are opposed to construction projects *even if such projects will benefit them in the long run*. Academic literature regarding NIMBYism focuses on new housing developments in cities and suburbs, as well as proposed subsidized housing that would change the landscape of cities. For the purposes of our study, however, we are much more interested in potential NIMBYism towards sidewalk construction and the perceived concentrated costs of the infrastructure improvement. Although very little scholarly research has been conducted surrounding the relationship between sidewalks and NIMBYism, two contemporary sidewalk improvement initiatives in the cities of Raleigh, NC and Roswell, GA provide important insight on community attitudes towards sidewalk installations.

¹⁷ Michael Hankinson, “When Do Renters Behave Like Homeowners? High Rent, Price Anxiety, and NIMBYism,” *The Harvard Joint Center for Housing Studies*, https://www.jchs.harvard.edu/sites/default/files/harvard_jchs_hankinson_2017_renters_behave_like_homeowners_0.pdf

In 2014, Raleigh residents of the Fallon Park neighborhood requested a new sidewalk alongside an existing park.¹⁸ Although the community was small, there were large amounts of car, bike and pedestrian traffic in the area, mainly along Oxford Road, due to the nearby Catholic school and several businesses. Oxford Road presented a unique problem for the community, as it was densely traveled and provided no sidewalks, forcing people out onto the street. One resident reflected, “There are constantly people on that road. It’s not always the safest.”¹⁹ At the time, many residents harbored similar feelings about safety concerns on Oxford Road and the overall walkability of their community.

The popular project was successfully passed, and development for the Oxford Road sidewalk began that same year. However, five years later, the complaints of a small group of NIMBY residents effectively ended the plan and side barred any future discussions around the Fallon Park neighborhood. NIMBY residents were worried that the proposed sidewalk would harm the roots of the trees that bordered Fallon Park and that the sidewalk would restrict parking for residents who park their cars on the street.²⁰ This tension within the small North Carolina community illuminates the ways in which a vocal minority of NIMBY residents can manage to derail sidewalk infrastructure improvement projects, even if the majority of residents are in support of the initiative.

In September 2018, the mayor and city council of Roswell, GA deliberated increasing the minimum sidewalk width by 2 ft.²¹ The legislators of a city dedicated to increasing walkability could not agree upon what width would be appropriate for sidewalk improvements. Those who were against the proposal were concerned about the aesthetic and structural changes that would have to be made in areas of the city in order to accommodate the new widths, namely trees and power boxes. Those who were in support wanted to protect and encourage walking pedestrians.²² Through collective bargaining, only areas of Roswell within commercial corridors were granted approval for the sidewalk extensions.

¹⁸ Leigh Tauss, “Raleigh Spent Five Years and Thousands of Dollars Working on a Sidewalk. Then a Few Complaints Killed It,” Jan 16, 2019,

<https://indyweek.com/news/wake/raleigh-spent-five-years-and-thousands-of-dollars-working-on/>

¹⁹ Ibid.

²⁰ Ibid.

²¹ Lindsay Moscarello, “Roswell Paves the Way for Future Sidewalk Improvements,” *North Fulton Neighbor*, September 25, 2018.

https://www.mdjonline.com/neighbor_newspapers/north_fulton/news/roswell-paves-the-way-for-future-sidewalk-improvements/article_f5b9ab20-c0c5-11e8-8b31-03b7134950ca.html

²² Ibid.

As the aforementioned case studies showcase, NIMBYism can override projects despite their popularity - even if only a minority of residents express opposition. The neighborhood of the SRTS route has numerous trees along its route, and, as seen in Roswell and Raleigh, some residents might be fond of them, which could cause potential resistance to the implementation of the sidewalks that would lead up to Stratton.

Importantly, Dickson Avenue and Hemlock Street are publicly-owned city streets.²³ Even if residents in the neighborhood along the SRTS path are against proposed changes, the Town ultimately can implement these infrastructure improvements despite pushback. As mentioned by Leigh Tauss when looking at the Raleigh sidewalk case, “as with the Fallon Park sidewalk, the council has listened to outspoken residents fearful of change, not those eager to adopt and accommodate innovations that have proliferated in cities across the country.”²⁴ In order to successfully implement the proposed SRTS infrastructure improvement project, the Arlington officials need to hold their ground against any neighborhood complaints - or risk becoming another Raleigh.

As for the monetary constraints of the SRTS project, the budget that was allocated to the Town of Arlington is approximately \$887,622. Although this money can help the SRTS initiative in its earliest stages for the installation of the sidewalks, it does not consider what it will cost to maintain the sidewalks in the future. Further, “sidewalk materials can vary substantially, including concrete, asphalt, brick, or other materials.”²⁵ This is an important factor to consider, especially due to the inclement weather that the Stratton neighborhood faces.

IV. Proposed Reforms

Considering our study findings, we are skeptical that the current SRTS proposal would have the **maximum utility for Stratton students**. The current plan would unequivocally benefit residents along the SRTS path, but the Stratton student foot traffic along the route is incredibly low compared to other routes used to travel to and from the school. Keeping this in mind, we have two alternative proposals for Arlington depending on the desired impact on the route. *If the goal is to maximize the utility for Stratton students, our proposal would be different than if the goal is to maximize utility for residents living to the southeast of Stratton.*

²³ “Town of Arlington Street List,” January 1, 1997, <https://www.arlingtonma.gov/home/showdocument?id=2468>.

²⁴ Tauss.

²⁵ Max A. Bushell, Bryan W. Poole, Charles V. Zegeer, Daniel A. Rodriguez, “Costs for Pedestrian and Bicyclist Infrastructure Improvements: A Resource for Researchers, Engineers, Planners, and the General Public,” October 2013, 24. http://www.pedbikeinfo.org/cms/downloads/Countermeasure%20Costs_Report_Nov2013.pdf.

If the goal is to maximize the utility for residents near Stratton, we believe that the current Safe Routes to School proposal is perfect as is. As can be seen in the image below, the topography along the SRTS route is particularly hilly, posing safety concerns for residents. For example, vehicles driving on Hemlock Street have natural challenges of visibility. If a driver is travelling uphill, they would be unable to see pedestrians that are at the top of the hill until they too are at or near the top of the hill. If a driver is about to begin travelling downhill, they would be unable to see pedestrians that are walking uphill until they have already begun to drive downhill. The implementation of sidewalks would help ensure the safety of all pedestrians, which would directly benefit the residents of the area.

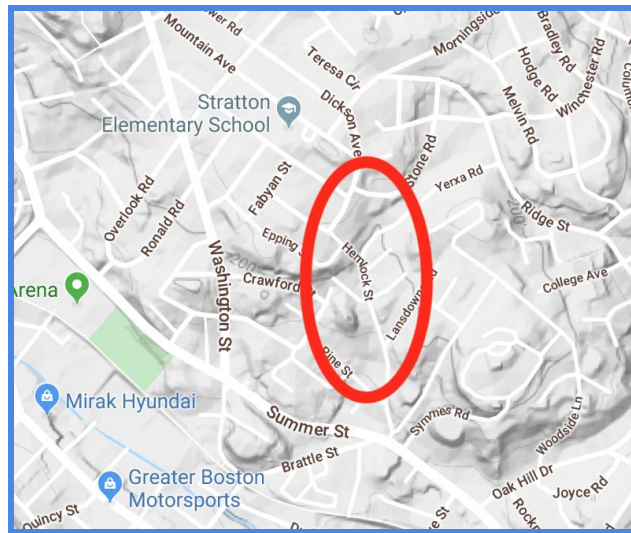


Image courtesy of Google Maps

On the morning of our site visit, we walked the entirety of the SRTS route, observing that the existing sidewalks along Hemlock Street were poorly maintained and warped, oftentimes due to nearby trees whose roots had surfaced under the asphalt. The few sidewalks that appeared to be in a better condition overall would often stop at a tree or telephone pole and not continue afterwards. As an example, this is the case of the sidewalk on the right side of Hemlock Street just slightly north and past Landsdowne Road, seen on the following page.



Image courtesy of Google Maps

At the southernmost end of the proposed SRTS route, there are sidewalks on both sides of Hemlock Street. However, once one passes Landsdown Road, sidewalk availability shifts primarily to being on the left side of the street, if at all. Residents in the upper half of the neighborhood on the SRTS route would especially benefit from sidewalk improvements and installations. We also noted that Hemlock Street is rather narrow, forcing motorists, Stratton school children, and other residents in the neighborhood to share the road. Therefore, we anticipate that the implementation of the SRTS infrastructure improvement project as it is currently planned would increase walkability within the neighborhood.

If the goal is to maximize the utility for Stratton students and their parents, we believe that the current proposal may not be the best possible solution. Based on our observations from our field work, we found that the majority of foot traffic to Stratton came from the west side of the school and filtered eastward up Pheasant Avenue. Our discussion with Marilyn, Stratton's assigned crossing guard at the Pheasant Avenue and Chatham Street intersection, pictured below, further suggested that the proposed SRTS project would not improve what is currently the most traveled route to Stratton. Marilyn informed us that many of Stratton's walking commuters funnel in eastward towards the school on Pheasant Avenue. This particular route ushers kids towards Marilyn at her assigned position on Pheasant and Chatham.

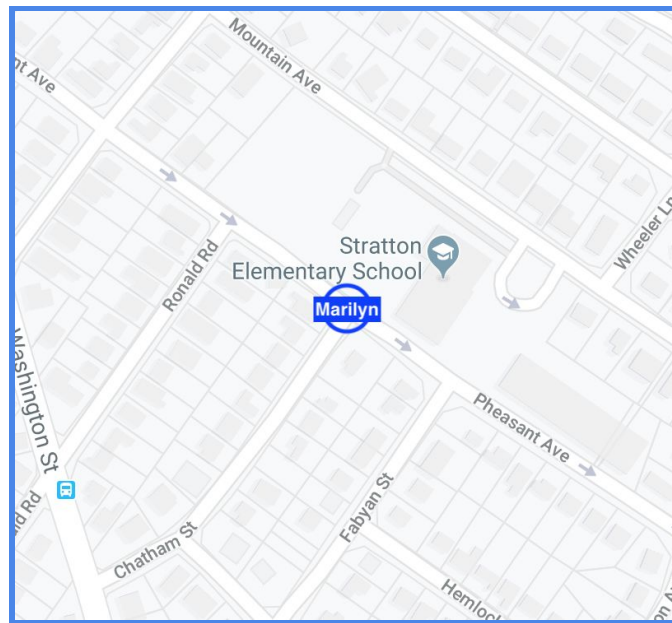


Image courtesy of Google Maps

Marilyn told us that the kindergarteners line up and enter at the front of the school near the traffic circle on Mountain Avenue, the 1st and 2nd graders enter the school from a playground-accessible side door closest to her post on Pheasant and Chatham, and the 3-5th graders use the side door further east at the Pheasant Avenue and Fabyan Street intersection. Excluding the kindergarteners who line up at the main doors of the school, roughly 2/3 of Stratton school children are entering the school somewhere along Pheasant Avenue every morning and afternoon. Some common problems that arise on Pheasant Avenue are congestion caused by an uptake in cars and pedestrians, as well as near-collisions between vehicles attempting to drop off children and those attempting to depart the premises.

Adding to the limited space along Pheasant Avenue, Marilyn said that parents park illegally in the loading zone during the winter in order to make sure that their children make it inside to school (see photo below for warning zone area and signage). The vehicle loitering that occurs in the area increases congestion even further. In light of this information, we suggest that the SRTS proposal be relocated to focus on improving the densely populated eastward commute that occurs along Pheasant Avenue, where many of the past safety improvements at Stratton have been implemented. This new SRTS route would help to alleviate the congestion that builds in the area. However, we acknowledge that the MassDOT funds may have only been allocated for the particular location and route, which may render any changes to the SRTS proposal either incredibly difficult or outright impossible.



Image courtesy of Google Maps

Given the potential monetary constraints surrounding an SRTS route shift for Stratton, **we believe that the best way to optimize the current plan is through parent involvement in developing Walking School Bus (WSB) program.** A Walking School Bus describes a group of children being led to school by a parent chaperone.²⁶ The adults who decide to volunteer as heads of a Walking School Bus are called “drivers” who follow a predesignated stop-based route to school.²⁷ The benefits of WSBs are that they guarantee that a child is accompanied all the way to school, they build a stronger sense of community, and they act as environmentally friendly alternatives to children taking school buses.

²⁶ Noreen C. McDonald and Annette E. Aalborg, “Why Parents Drive Children to School: Implications for Safe Routes to School Programs,” *Journal of the American Planning Association* vol. 75,3 (2009), 337. <https://www.tandfonline.com/doi/full/10.1080/01944360902988794>

²⁷ Ibid.

Positive reactions to Stratton WSBs are likely, considering that studies have found that Walking School Busses are the only form of supervision that address the safety concerns of parents whose children commute to school on foot.²⁸ We believe that Stratton can successfully incorporate WSBs within the SRTS route using parent volunteers from Stratton’s Parent Teacher Organization (PTO). Stratton officials believe that “student achievement increases, schools improve, and parent and community involvement thrives when parents get involved with their child’s education.”²⁹ The school is invested in parent participation, and parents who join the PTO can get involved in the Stratton community through “various community, social, enrichment, and fundraising events each year.”³⁰ Although Stratton parents have multiple ways that they can get involved in the school community, encouraging PTO parents to be WSB “drivers” could prove to be the most beneficial form of parent involvement for the community. Stratton officials could work with eager and highly involved PTO parents to establish WSBs, rather than having to recruit from a pool of other parents and adults in the community who do not want to get involved. **In terms of cost-efficiency, this may be the cheapest and most effective option that Stratton has at its disposal.**

In order to address concerns of liability that Stratton officials may have, we recommend working with the Arlington school district to ensure that its umbrella insurance policy covers its SRTS program. This is the most comprehensive solution as it would treat walking to school the same as taking the school bus. If school districts are unwilling to directly cover SRTS programs, insurance could be sought through other parties such as the Parent Teacher Association.³¹

The above solutions summarize our suggestions for Stratton’s future SRTS improvement project as it relates to community members, schoolchildren, and their families. We have full confidence that the Town of Arlington will choose the most cost-effective option in its pursuit of maximizing the safety and well-being of its neighborhoods, and ensuring that Arlington continues to be a walkable community.



²⁸ Ibid., 338

²⁹ Stratton Elementary School, “Stratton Elementary School Frequently Asked Questions for Kindergarten Families,” May 2018, 4. <https://strattonpto.org/wp-content/uploads/2018/05/FAQs-for-New-Families.pdf>

³⁰ Ibid.

³¹ McDonald and Aalborg, 339.

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METROBRIDGE



Team 4

Street Lights, Crosswalks and Intersections in Arlington: Recommendations and Challenges

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The Town of Arlington (hereinafter “Arlington” or “the Town”) has had multiple transportation related concerns in the past several years. Transportation issues include, but are not limited to, congestion, speeding, pedestrian and bicycle safety and maintenance and improvement of public transportation infrastructure. Multiple actors work together to achieve the Town’s transportation goals including: the Selectmen, Town Manager, Public Works, Transportation Advisory Committee, Bicycle Advisory Committee and the Senior Transportation Planner. In order to get a better idea of the Town’s current transportation related priorities, we attended the monthly Transportation Advisory Committee meeting held on November 13, 2019. Based upon this meeting and our own investigations, we found that some of the most important transportation issues concern intersections, street lights and crosswalks. For context, the first Section of this Report will provide some brief background information, Section II will describe three key transportation issues, reform proposals and challenges and Section III will provide a brief conclusion. Finally, Section IV will provide a brief memo regarding what we learned from working with the Town of Arlington on this project.

I. Background Information

The Town of Arlington, Massachusetts has 45,000 residents (approximately 8,000 people per square mile) and is located seven miles from downtown Boston. Residents of Arlington commute to a wide range of neighboring areas including Boston, Cambridge, Lexington and Burlington. Some residents also work in the Town. Unfortunately, commuting to work alone is the most common form of transportation. In fact, 66.5% of residents report that they drive to work alone. Congestion is a big concern for the Town, given Arlington’s population density, many businesses and close proximity to Boston. Arlington’s goal is to find transportation

solutions that reduce congestion, encourage walking and bicycling, and help ensure safety for pedestrians, bicyclists and motorists. This section of the paper will provide some background information regarding Arlington's transportation system, including: the current state of affairs for Arlington's transportation situation, transportation priorities and information regarding current transportation related projects.

The best source of information regarding the Town's current state of affairs and transportation priorities is Chapter 4 of the Town's 2015 Master Plan (hereinafter, "the Plan"), entitled "Traffic and Circulation." The Plan starts by stating that Arlington's network of roads is experiencing strain. Arlington's road network and capacity structure were developed many decades ago, and have barely changed, in spite of the additional traffic that has been added to the system. (Town of Arlington, 2015 Master Plan 55)

Arlington's transportation system includes streets, sidewalks, pathways and trails. (Town of Arlington, 2015 Master Plan 55) Arlington has a total of 120.80 miles of roadways. There are three different classifications of roads in Arlington including: arterial, collector and local. The most common road classification is local roads, spanning 89.99 miles of the Town. (Town of Arlington, 2015 Master Plan 56). According to the Plan, local roads "provide access to abutting land, with less emphasis on mobility." (Town of Arlington, 2015 Master Plan 57)

The Town has 34 traffic lights, which are used to improve safety for motorists and pedestrians. (Town of Arlington, 2015 Master Plan 57) However, given the large percentage of residents that commute alone, it is not surprising that many of Arlington's roadways are congested, especially during the morning and evening commutes. (Town of Arlington, 2015 Master Plan 58-59). Additionally, many traffic accidents have occurred in Arlington over the last

several years. Between 2008 and 2010, 1,664 accidents occurred in the Town. (Town of Arlington, 2015 Master Plan 61). In fact, the Plan indicates, “MassDOT [has listed] the intersection of Massachusetts Avenue/Mystic Street/Pleasant Street in Arlington Center in its most recent statewide 200 Top Crash Locations Report (September 2012). The intersection was ranked 95, with sixty-eight crashes from 2008-2010.” (Town of Arlington, 2015 Master Plan 62). Only a small portion of these traffic accidents involved pedestrians. (Town of Arlington, 2015 Master Plan 61) Specifically, the data shows that there have been 120 accidents involving pedestrians between 2011 and 2019. (Town of Arlington, Crash Data). Fortunately, the total number of accidents has actually declined by 2.7% between 2012 and 2014. (Town of Arlington, Crashes by Town and Year) However, it is imperative that the Town continue to prioritize the reduction of accidents given that just a single accident can result in serious injuries or even death.

For residents that prefer to avoid the hassles associated with traveling on congested roads and reduce their risk of accidents, Arlington offers an extensive network of sidewalks that connect nearly all of the Town’s roads, as well as a well-developed bike path. (Page 59). The main bike path in Town is the multi-Town/City eleven-mile Minuteman bike path. Three miles of this bike path are located in Arlington. Pedestrians and bicyclists can use this bike path to travel between Arlington, Bedford, Lexington and Cambridge. (Town of Arlington, 2015 Master Plan 59) Commuters can also choose to take public transportation. The MBTA bus is the most popular form of public transportation in Arlington, but commuters also have easy access to the Alewife train station (located in Cambridge), which takes commuters right into Boston. (Town of Arlington, 2015 Master Plan 64)

The Plan also describes the Town's current transportation priorities. It appears that the Town solicits feedback from residents at events and various community meetings to identify transportation related priorities. (Town of Arlington, 2015 Master Plan 65) Residents have named congestion and pedestrian safety as "significant transportation issues." (Town of Arlington, 2015 Master Plan 65) The Transportation Advisory Committee, Department of Planning and Community Development, Engineering Division, Police Department and Department of Public Works are working together to help address these issues. (Town of Arlington, 2015 Master Plan 65).

Congestion can be a significant issue for the efficient transportation of motorists as well as business development and pedestrian and bicyclist safety. (Town of Arlington, 2015 Master Plan 65) For these reasons, it is imperative that the Town effectively address congestion related issues. The Plan identifies the following factors contributing to Arlington's congestion, including, "local driving patterns and traffic patterns near schools during the beginning and end of the school day." (Town of Arlington, 2015 Master Plan 65). Furthermore, the Town has identified several roadways/intersections where congestion is particularly problematic. (Town of Arlington, 2015 Master Plan 65)

Next, we turn to resident's other main concern: pedestrian safety issues. As previously stated, Arlington has a fairly comprehensive sidewalk system. However, the Town's Public Works Department has placed priority on construction of new sidewalks in underserved areas and repairs/improvements to existing older sidewalks. (Town of Arlington, 2015 Master Plan 66). If there were more and better sidewalks, walking would likely be more attractive and safe. Additionally, the Town has identified areas of the Minuteman bike path that are failing and

prioritizes improving these areas and installing more lighting along the path to increase safety. (Town of Arlington, 2015 Master Plan 66) The Town has also identified roadways that need improvement to enhance safety for bicyclists, as well as public transportation and parking improvements that are needed to improve Arlington's overall system of transportation. (Town of Arlington, 2015 Master Plan 67). The Plan lays out several recommendations to help reduce congestion and improve pedestrian safety. (Town of Arlington, 2015 Master Plan 68).

Arlington's Department of Planning and Community Development also orchestrates and participates in transportation improvement projects. The Department's website states that current improvement projects include the following: Massachusetts Ave Bus Priority Pilot, Safe Routes to School at Stratton Elementary School, Arlington Center Parking Study, Parking Benefits District, Arlington Center Safe Travel Project, Complete Streets, Autonomous Vehicles and the Perfect Fit Parking Study. (Town of Arlington, Transportation Planning). The Town clearly prioritizes safe travel to school and has developed maps showing how students can safely walk to school. (Town of Arlington, Walking Safety for Schools).

In order to develop recommendations to help solve the Town's current transportation challenges, we attended a Transportation Advisory Committee meeting, spoke with Town officials and did our own independent investigation. In this Report, we will focus on three of Arlington's major transportation issues, including: intersections, streetlights and crosswalks.

II. Proposed Reforms: Issues, Recommendations and Challenges

Streetlights

Issues With Streetlights

One transportation challenge Arlington is currently facing is transportation safety for

bicyclists and pedestrians. The Town's ineffective streetlights are partially to blame for this ongoing problem. On November 13, 2019 we attended a Transportation Advisory Committee meeting in which members of the Arlington community came forward and expressed some concerns they had regarding transportation issues in the Town.

An Arlington citizen came forward and voiced some of her concerns regarding the streetlights with the Board members. She informed the members of the Board that just on Mass Ave, 18 streetlights currently do not work and that they have been out for a while. On the Park Avenue extension, she has seen four streetlights that are not in service. In addition, there are no pole numbers on these streetlights, making it nearly impossible to know who to contact about this issue. She continued by letting us know that the streetlight outages have led to five deaths in Arlington, one of whom was a dear friend of hers.

When we looked into the issue further, there appears to be no direct record of deaths due to streetlights but it can be inferred that some deaths were an indirect result of streetlights. For example, in June of 2015 a pedestrian was struck by a vehicle on Mass Ave at 9:20 pm. Since the streetlights would have undoubtedly been on at 9:20 p.m. one could assume that the lack of streetlights were to blame. However, the accident occurred while the pedestrian was attempting to cross the street where no crosswalk was located and it could be possible that since the driver was not expecting someone to cross the street where they did, they were simply not paying attention or could not see the pedestrian in the roadway. In addition to this accident, there do appear to be four additional pedestrian deaths that occurred on or near Mass Avenue. None of these deaths have been specifically attributed to the streetlights ("YourArlington," 2015).

The members of the TAC informed us that they will look further into the matter to

determine if the deaths are attributed to the streetlights and whether action should be taken to remedy this situation. They also let us know that they will be looking into the matter to double check the number of streetlights that are out and see whether or not the poles are clearly labeled with numbers.

It should be noted that the Town converted to led-emitting diode (hereinafter “LED”) streetlights six years ago. This switch was met with a bit of pushback with some members of the community claiming that the new lights did not provide as much light as the previous lights. This could potentially be the reason for some of the accidents that have occurred in this area since the LED lights were installed. The lower lights could have made it so that drivers were unable to see both cyclists and pedestrians crossing the street on Mass Ave (Waller, 2013).

Recommendations and Challenges

One challenge residents are facing in regards to streetlight outages is not knowing who to report the problem to. Pole replacements are different than light outages. To get a bulb changed requires that a pole number be called in to Siemens (on DCR poles in Arlington). If there is no pole number then the replacement is no longer the job of people working on the utilities (“SeeClickFix,” 2019). Our solution to this would be for the Town to make sure that every pole has a working number attached to it. This would ensure that if a light goes out, citizens would have someone to easily contact about the issue.

While the reason for the accidents was undetermined as of November 2019, it could be helpful for members of the TAC to drive through Mass Ave at night to determine if they can see pedestrians with the streetlights that are currently in place. It may be helpful to get people with different eye sights to see if this is an issue.

If eighteen street lights are out, the Town should replace them in order to ensure pedestrian safety. Another solution would be to trade out the LED lights in some of the poles and replace them with the High Pressure Sodium (hereinafter “HPS”) lights that were there before to see if there is any difference in citizen complaints and accidents. This may help since the white LED lights are much dimmer than the HPS lights. The challenge with this would be that it would cost Arlington a significant amount of money replacing only a few of the bulbs, knowing that regardless of the outcome, they will have to do two sets of installations. This would require manpower, money and equipment that the Town may not be prepared to provide at this time. In addition, having both LED and non-LED lights may confuse drivers even more and could potentially lead to more pedestrian involved accidents.

Since Park Avenue also has four street lights, the Town could potentially only replace the lights on this street as opposed to replacing all of the lights on the busier Mass Avenue. This would ensure that drivers are not confused due to the alternation between LED and non- LED lights on the same street. An additional benefit to this would be that traffic would not need to be rerouted or detoured as occurred the last time the Town went through streetlight conversion.

Some of the challenges the Town is facing include constrained funding, staff capacity, staff and volunteer coordination (multiple departments and committees). Another challenge that would result with the switch from LED lights to non-LED lights would be the cost in energy. According to Smart-Energy, “LED-based lamps consume twice less energy and last twice as long as the ordinary HPS or HID lamps” (Panchuk 2009). The extra energy may be more than the Town is willing to pay in order to fix this issue.

Crosswalks

Issues With Crosswalks

Attending November's Transportation Advisory Committee meeting gave us the opportunity to learn about citizen's transportation concerns and hear about the Committee's proposed improvement projects. One common concern among citizens and Committee members appears to be the Town's crosswalks.

At the meeting, an older female citizen expressed concern regarding the timing of the crosswalk walk signals. Specifically, the citizen indicated that crosswalk walk signals in Arlington simply do not provide pedestrians enough time to safely cross the road. In her opinion, pedestrians would literally have to run across the road in order to reach the other side by the time the walk light turns off. This citizen said that these short walk signals are especially problematic for individuals with disabilities or handicaps that may need extra time to safely cross the road. To remedy the problem, the citizen requested that the Town extend the crosswalk walk signals by at least five seconds to allow for safe crossing.

TAC members are also concerned about Arlington's crosswalks. Specifically, the TAC is investigating whether to install an additional crosswalk to ensure pedestrian safety. Specifically, the Committee is in the process of trying to determine whether a new crosswalk should be added to Grove Street near the Department of Public Works (hereinafter, "DPW" or the "Department"). The DPW is located at 51 Grove Street across from the Town's tennis courts. Committee members think that it may be advantageous to install a crosswalk on the northside of Grove Street to the right of the DPW's parking lot for the reasons that follow.

The DPW is near the high school and many students are choosing to cut through the

Department's parking lot on their way to school. The TAC has performed afternoon and morning pedestrian counts over a two-day period to determine how many pedestrians are walking in this area. The results show that pedestrian traffic picks up around 7:10am and reaches its highest point between 7:45am and 8:00am. Most traffic comes to a halt at approximately 8:00am. Additionally, students also ride their bikes in and around the DPW lot during this peak traffic period. This pedestrian and bicycle traffic is especially problematic because students are traveling near or through the Department's parking lot right around the same time the Department's employees are beginning work. During this time, employees are arriving at the DPW parking lot and large DPW trucks are pulling out of the lot and heading to worksites. The mix of vehicle, pedestrian and biker traffic in this area creates a potentially hazardous situation. The TAC found only sparse pedestrian traffic in the afternoon, so the problem appears to be morning traffic.

The TAC is discussing the potential installation of another crosswalk north of the DPW lot in an effort to remedy some of these hazards. The Committee believes that placing the crosswalk to the north of the DPW parking lot would be appropriate given that most of the Department's trucks are turning left out of the lot to go onto Massachusetts Avenue.

Our Investigation

In order to evaluate the merits of the citizen's complaint that crosswalk walk signals are too short, we performed our own independent investigation. During the afternoon of Saturday, November 16, 2019, we visited two crosswalks in Arlington to determine the length of the crosswalk walk signal and see if we could reasonably cross the road before the signal expired. The first crosswalk we visited is located at the corner of Highland Avenue and Massachusetts

Avenue. This crosswalk is particularly interesting because it runs across a main road in Arlington (Massachusetts Avenue) and is located in front of the local Stop and Shop grocery store. We found that the crosswalk walk signal stayed on for 20 seconds and we were able to cross the street safely before the signal turned off. The second crosswalk we visited is located between Lockland Avenue and Massachusetts Avenue. This crosswalk is of particular interest because it is located near the Arlington High School, and likely serves many students who walk to school. Similar to the first crosswalk, we found that the crosswalk walk signal stayed on for 20 seconds and we were safely able to cross the road before the signal turned off. Below please find pictures of these crosswalks for location orientation.



*Crosswalk at the corner of Highland Ave and MA Ave
This crosswalk is located in front of the Stop and Shop*



Crosswalk located between Lockland Ave and MA

We also went to the Department of Public Works to see the layout of the parking lot and examine the location of the new proposed crosswalk. Below, please find photographs of the Department as well as the proposed location for the new crosswalk.



*Department of Public Works
Located at 51 Grove St, Arlington, MA*



Proposed location of Grove Street crosswalk

Recommendations and Challenges

The best way to address the citizen's concern regarding the short duration of crosswalk walk signals is to increase the length of these signals. Our investigation demonstrates that it is not difficult for us to safely cross the road while the walk signal is illuminated. However, we are young adults. It may be much more difficult for people with disabilities or handicaps to safely cross the road before the signal expires. Therefore, we would recommend that the Town extend the crosswalk walk signal by 25% or 5 seconds. This additional time will help ensure that more pedestrians can safely cross the road, regardless of age.

There are a couple of challenges associated with extending the crosswalk signal that the Town should consider before implementing this recommendation. First of all, extending the signal may delay traffic and cause backups because it will require vehicles to remain stopped for a longer period of time. This will likely be especially problematic during high traffic times, such as the morning and evening commute. Second, some handicapped or disabled pedestrians still may not be able to reach the other side of the street in 25 seconds. Finally, there may be some monetary costs associated with getting workers to extend crosswalk signals. The Town must

balance these costs and benefits in order to determine if this change is in the Town's best interest. In our opinion, a 5 second extension is the best option because it will help a greater percentage of pedestrians cross the street while minimizing the traffic backup issues that may arise.

We also analyzed how to best address the Committee's concern that the mixture of vehicle, pedestrian and bicyclist traffic near the DPW parking lot in the morning is a safety hazard. We agree with the Committee that a new crosswalk on the north side of Grove Street to the right of the DPW's parking lot may be advantageous. The crash statistics show that numerous accidents occur on Grove Street. Specifically, between 2009 and 2019, there have been 70 accidents without injury, 6 accidents with injury and 1 crash with a pedestrian. (Town of Arlington, Crash Data). Although only one crash involved a pedestrian, we would still recommend this new crosswalk. When it comes to pedestrian crashes, the stakes are high. Just one additional pedestrian crash could result in serious injuries or death. Therefore, given the high traffic volume in the morning, as shown by the Committee's traffic study, we still think that a new crosswalk should be implemented at this location.

However, there are some challenges associated with the installation of the new crosswalk. Similar to extending the crosswalk walk signal, the new crosswalk will create traffic delays as it will require vehicles to come to a stop while pedestrians cross the road. Furthermore, some members of the Committee were doubtful that installing a crosswalk at this location would solve the safety issues. Some Committee members expressed concern that high school students would decide that it is easier to cut through the DPW lot than to use the crosswalk. Another Committee member reasoned that the Town should have an option for those pedestrians who want to safely

cross the road. We agree with this Committee member's rationale: even though some pedestrians may choose not to use the crosswalk, the Town should still encourage people to be safe and provide a safe way to cross the road. Furthermore, installing a crosswalk is probably the most viable option for increasing safety at this location. Even though there are some challenges associated with installing the additional crosswalk, we think the benefits outweigh the costs if even one pedestrian accident can be avoided.

We believe that implementing these changes to the Town's crosswalks will increase pedestrian safety and reduce accidents.

Intersection: Appleton Street at Park Ave

Dangerous intersections were a key issue discussed during Arlington's November Transportation Advisory Committee Meeting. Intersections have been a key concern for years, and since 2006, MassDOT has collected data and traffic counts on various roadways and intersections around Arlington to find where improvements can be made (Town of Arlington, 2015 Master Plan 55).

During peak travel times for Arlington's commuters, many of Arlington's intersections experience congestion (Town of Arlington, 2015 Master Plan 55). One intersection of specific concern as discussed in the TAC meeting in November is Appleton Street at Park Avenue. Currently, several Arlington residents have expressed concern about this intersection. There have been a number of crashes at this intersection as a result of the fact that the intersection is slightly skewed, which can make it difficult for drivers to determine which car has the right of way, or also to see pedestrians.

Members of the transportation committee agree that despite the fact that stop signs are in place at the intersection, the sheer level of traffic during commute times still lends to dangerous situations for commuters. These members agree that though signage should mitigate the risk of car crashes, this specific intersection is still problematic, especially during high traffic hours when drivers become rushed and less careful. There have been several car crashes, but beyond that, the intersection becomes very congested during peak commute times, and creates problems for not just drivers, but other commuters, as well. Pedestrian crossing specifically at this intersection is very dangerous. In fact, as discussed at the TAC meeting, many walkers and bikers completely avoid even attempting to cross the intersection.

A working group has already been established, and they are currently collecting more data about what may work to help this intersection. The group has collected traffic volumes for this intersection including the peak hours and average daily uses. These studies conclude that the intersection is in fact a good candidate for the installation of a traffic light. We believe that on top of any additional traffic-directing infrastructure the Town decides to add, more efforts should be made that will help congestion issues beyond just this specific intersection.

Recommendations and Challenges

In order to best address concerns about intersections in Arlington, it is advisable to add necessary traffic-directing infrastructure, especially in problematic intersections like Appleton and Park Ave.

Researchers have already determined that a traffic light will help fix commuting and safety issues occurring at the Appleton and Park Avenue intersection. We generally agree, however a traffic light would create certain challenges as well. Installing a traffic light puts this

intersection at risk of moving even slower. The Town of Arlington could benefit more by finding a solution that increases safety while also reducing the congestion level of daily commutes through the intersection.

Something especially notable about the Appleton and Park Avenue intersection is that it is so problematic that researchers actually found that pedestrians avoid using the crosswalks there entirely. This means that this intersection specifically is a key area for Arlington to focus on as they work to encourage alternative forms of transportation and reduce congestion. Making intersections more pedestrian-friendly will work to reduce the large amount of Arlington commuters who currently opt to drive alone to work. Making intersections more versatile in terms of the amount of modes of transport they can sustain, lends to creating a more sustainable model for the daily commute, while also promoting the addition of infrastructure to make the intersection more safe.

We recommend that the Town of Arlington change the signage near this intersection. An example of more effective signage would be adding a “stop sign ahead” sign on each side, or additionally adding pedestrian crossing signs in the middle of each crosswalk of the intersection. This will promote more pedestrian and biker utilization of this intersection. Appleton St. and Park Avenue is a place to start, but as Arlington continues to fix problematic and dangerous intersections, it will incentivize more residents to walk to other types of public transportation as available to them, or to bike, as opposed to driving themselves places. As Arlington continues to implement similar ideas around the Town, Arlington will start to see a decrease in the amount of people driving themselves to work, since the roads will become more pedestrian and biker-friendly. It is important for Arlington to begin working on making its roads more

pedestrian and biker-friendly as soon as possible. We believe that each of these recommendations, or all of them together will increase safety, reduce car accidents, and work to decrease congestion.

III. Conclusion

This Report discusses three important transportation challenges that the Town of Arlington is currently facing. In summary, based upon our research and investigation, we recommend the Town do the following to remedy these problems:

Intersection: Appleton Street at Park Ave:

- Install a traffic light to help fix commuting and safety issues

Streetlights:

- Make sure streetlights are clearly numbered so that residents can report outages
- Replace streetlights that are not working properly
- Potentially replace LED lights with HPS lights to shine more light on the roadway

Crosswalks:

- Increase length of walk signals by 25% or 5 seconds
- Install a new crosswalk on the north side of Grove Street

Although there are costs associated with each of these improvements, we believe that implementing these recommendations will increase pedestrian and bicyclist safety and potentially save lives in the future.

IV. Memo

We have learned a few things from working with the Town of Arlington on this project. What stood out to us the most was the Town's willingness to listen to citizen concerns regarding

transportation. The Transportation Advisory Committee meeting was a great way for us to get insight into the transportation issues that are most pressing to the residents as well as the members of the Board. From our project alone it appears that out of the three main transportation challenges we have discussed, the Town seems to put the most priority on crosswalks. This can be seen through the additional pedestrian signs that have been added to crosswalks in order to ensure pedestrian safety. The members of the Board all seemed very organized when it comes to handling transportation issues. Board members seem very willing to check out any concern of citizens or other Board members. This gives us hope that the Town will address the issues discussed in this Report. Hopefully the Town will see transportation improvements in the near future.

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METROBRIDGE



Team 5

Metrobridge Policy Analysis: Town of Arlington

Promoting Alternative Modes of Transportation:
Buses and Bikes

By: Naomi Lambert, Temma Pelletier and Julia Steinberg

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Background: Introduction to Arlington

Arlington's History

Streetcar Suburb

Arlington is described as a streetcar suburb (a residential area where growth corresponds with nearby streetcar lines) along with Brookline, Somerville, Newton, Dorchester, Roxbury, and several other neighboring Boston communities. The expansion of streetcars across America was rapid; electric trolleys started replacing horsecars in the late 1800s, and “by 1903 nearly thirty thousand miles of America’s street railways were electrified, more than enough to circle the globe.” Suburban development surged as more people could commute to cities at faster rates and lower costs. In fifty years, the introduction of streetcars extended Boston’s “urbanized area radius” from roughly two miles to ten miles ([The Limitless City: A Primer on the Urban Sprawl Debate](#)).

Massachusetts Avenue was once a streetcar corridor that encouraged “a mainly non automobile environment”. Now, it is a car-centric thoroughfare that runs through the heart of Arlington’s business district and into Boston and Cambridge. After 1955, traffic congestion emerged as the streetcars were replaced with the 77 Arlington Heights - Harvard Station transit bus service ([Master Plan - Traffic & Circulation](#)).

The legacy of streetcars is evident in East Arlington and Arlington Heights. Here, the dense streets are organized into grids and have completed, “walk friendly” sidewalks. This stands in contrast to the northern, newer neighborhoods in Arlington. These are located farther from Massachusetts Avenue, where the roads are hilly and curvy. In this area, sidewalks are not always designated- which creates trouble for children walking to local schools like Stratton Elementary ([Master Plan - Traffic & Circulation](#)).

Arlington Today

Arlington Intersections and Congestion

When analyzing Arlington’s transportation system, Massachusetts Avenue is not only important for its history in the Town’s development, but also for its current influences on traffic. Like many suburbs, Arlington is a busy place during peak commute times. During morning rush hour, the intersection of Massachusetts Avenue (which carries Route 2A) and Alewife Brook Parkway (Route 16) causes major delays that result in congestion into East Arlington. Traffic gets backed up all the way to Lake Street, which can be particularly problematic because of the nearby Minuteman Bikeway crossing and school traffic from Lesley Ellis and Hardy Elementary. In this way, although Route 16 does not cut into Arlington, the Parkway has a huge impact on Arlington’s traffic flow.

Another major point of congestion on Massachusetts Avenue occurs at its intersection with Mystic Street and Pleasant Street in the middle of Arlington’s Town Center ([Master Plan - Traffic & Circulation](#)). With a total of 68 crashes (13 of which resulted in injury), this intersection placed 95th in Massachusetts’ statewide Top 200 Intersection Crash List from 2008 - 2010, proving how dangerous this busy area can be ([MassDOT Crash Report, 2012](#)).

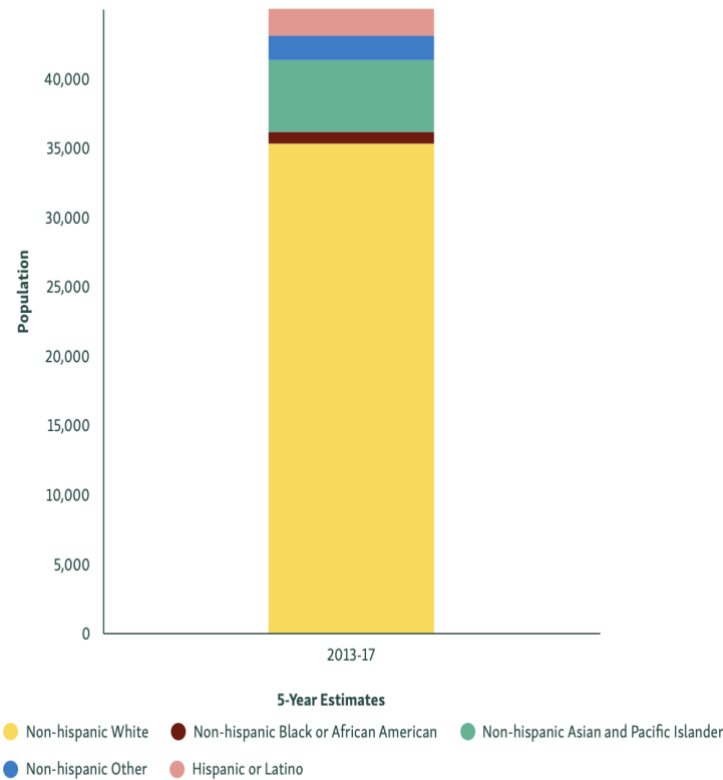
Minuteman Bikeway

The Minuteman Bikeway is an 11-mile path that was built on top of a former railroad in 1993 by the Commonwealth of Massachusetts. This rail-trail travels through Bedford, Lexington, Arlington and Cambridge ([Minuteman Bikeway](#)). Arlington’s segment of the Bikeway is three miles long, running alongside Massachusetts Avenue. This path brings cyclists and pedestrians to Arlington Heights, Arlington Center and East Arlington. Beyond this, the Bikeway connects Arlington residents to Cambridge’s Alewife Station, making it a “primary commuter cycling route” in Arlington’s subway desert ([Master Plan - Traffic & Circulation](#)).

No Red Line Extension

Missing from Arlington’s transportation system is an MBTA subway station. In the 1970s, there was a two-part plan to expand the Red Line: first, extend the subway from Harvard Square to temporarily end in Arlington Center, and then eventually from Arlington Center to Route 128 in Lexington. While Lexington was on board with this plan, Arlington was not. Town residents feared opening their close-knit community to urban outsiders. They did not want to be labelled a “terminal town” (even just provisionally). This marked the third and final time Arlington had a chance to join a subway line (a second failed attempt in 1931 resulted in the Minuteman Bikeway’s original railroad tracks) ([“Why Didn’t the Red Line Extend to Arlington?”](#)). Had the Town agreed, not only might its transportation planning process look different today, but Arlington’s overall demographics might have become more diverse.

Race and Ethnicity



Source: American Community Survey Years: 2012-2016 5-Year Estimates

Arlington’s Population

Today, Arlington is home to approximately 45,000 residents. According to [the Metropolitan Area Planning Council’s](#) community profiles, the Town is “characterized by village-oriented

Source: ([MAPC Data Common - Community Profiles](#))

residential neighborhoods dominated by multifamily homes and smaller apartment buildings.” The Town’s population is beginning to shift in terms of age: school enrollment rates have increased as more young families with kids are moving in. In fact, “over 62% of householders in Arlington today were not here in the year 2000,” ([Master Plan - Demographic Profile](#)).

In terms of race, ethnicity, and economic class, Arlington is not very diverse. According to the [US Census Bureau](#), Arlington is 81.7% White, versus 11.5% Asian, 4.3% Hispanic or Latino, and just 1.9% Black or African American. The median household income from 2013-2017 was \$103,594. In comparison, neighboring cities Somerville and Cambridge show a bit more diversity in population: 77.2% and 66.9% are White, 9.6% and 15.7% are Asian, 9.9% and 8.8% are Hispanic or Latino, and 6.6% and 10.8% are Black or African American (respectively). Both cities’ median household incomes from 2013-2017 fall below Arlington’s, with \$84,722 and \$89,145 (respectively). Considering a town’s demographic makeup is important when thinking of the concerns that are raised and the type of projects the local government prioritizes.

Arlington’s Government

The Town government is divided into an executive and legislative branch. The executive branch includes the Board of Selectmen. These five elected at-large members meet about twice a month. They hold public hearings, oversee licenses, issue warrants for Town Meeting, hire a Town Manager, and more. The Selectmen choose a professional Town Manager to be in charge of implementing policy, keeping Arlington residents informed, preparing budgets, and overall, administering day-to-day government operations ([Town Manager Department](#)). Adam Chapdelaine will serve as Arlington’s Town Manager through February 10, 2022. Any of his proposed annual budgets are submitted to the Select Board and Finance Committee for review. From this point, recommendations are brought to Arlington’s legislative branch: Town Meeting.

The Town Meeting is a group of 252 representatives elected from 21 precincts ([Master Plan - Public Facilities & Services](#)). While this government structure can be beneficial, as it provides residents the ability to have representation at the Annual Town Meeting, it can also create problems. In any sort of council, it is difficult to form a consensus when such a large body of individuals are involved. Also, it is important to recall that these 252 representatives serve as volunteers. This fact warrants a discussion of who would be most motivated to participate in Town Meeting, and what their levels of expertise are. It takes a very passionate citizen- with a lot of free time- to make this commitment. Furthermore, due to the nationalization of American politics, local and/or off-year elections lack high voter turnout. As a result, it is possible for a Town Meeting candidate to win with only a few votes. This can disadvantage vulnerable constituents if the elected candidate has a more personal political agenda.

In addition to the two branches, Arlington’s government is also organized by the School Committee, Board of Assessors, Town Moderator and Town Clerk. Outside of this, the Town has “what seems like hundreds of Committees and Commissions that are primarily volunteer staffed and are critical to helping Arlington function efficiently,” ([Arlington Government Primer \(2019\)](#)).

Town Planning and Policy Implementation

Current State of Affairs

Two groups that work directly on town planning are the Arlington Redevelopment Board (ARB) and the Department of Planning and Community Development (DPCD).

The Arlington Redevelopment Board: The ARB has five members: four are selected by the Town Manager and one is appointed by the Massachusetts Department of Housing and Community Development. This group manages properties, approves road designs, and grants special permits to projects that need an Environmental Design Review. Last year, the ARB approved nine applications. In recent years, the ARB has seen increasing demand for the renovation of mixed-use buildings in Arlington ([2018 Annual Town Report](#)).

The Department of Planning and Community Development: The DPCD has 14 full-time and two short term staff members, each “committed to improving the quality of life for Arlington’s residents by improving housing opportunities, transportation access, economic development to enhance the vitality of our business districts and generate commercial tax revenue, providing opportunities for households that make low to moderate income, improving energy efficiency, and preserving and promoting the Town’s natural, historic, and cultural resources,” ([DPCD](#)). For example, the Department works to support low income residents and increase homeowners/renters’ energy efficiency through participation in Community Development Block Grant funds and the Commonwealth’s Green Communities Act Program ([2018 Annual Town Report](#)).

The Department gets involved in many areas of commission work. It is important to note that the DCPD also represents Arlington at the Boston Region Metropolitan Planning Organization (MPO). Several other committees that include DCPD staff are the ARB, the Master Plan Implementation Committee, Envision Arlington, the Bicycle Advisory Committee (BAC), and the Transportation Advisory Committee (TAC). Through partnerships with transportation-specific committees (such as the latter two), the DCPD has helped implement projects like the Massachusetts Avenue Bus Lane, Stratton Elementary’s Safe Routes to School, and the Complete Streets Policy ([Transportation Planning](#)).

Transportation Planning Projects

In recent years, there has been a lot of focus on Arlington’s transportation system. Specifically, how to shift the Town away from a solo-personal car driving culture. For instance, the Town’s 2016 Complete Streets Policy was centered on making roadways that work for everyone: “drivers, pedestrians, bicycle riders, transit users, and freight carriers,” ([Transportation Planning](#)). To do so, the Director of Public Works coordinated with many moving parts of Arlington’s government, including the Town Manager, the Town Engineer, and TAC. It was decided that any Town project that is started in conjunction with another community or agency, or is federally-, state-, or privately-funded, should embrace the Complete Streets approach. As a result, Arlington saw increased use

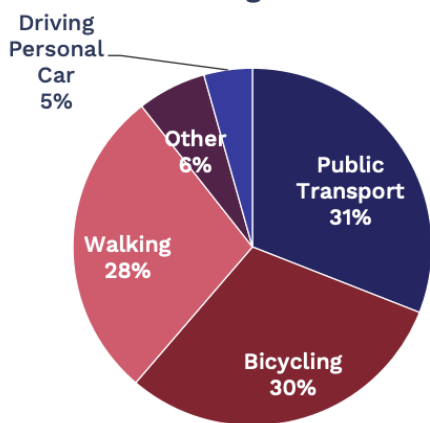
of bike lanes, more kids walking to school, and improvements in overall pedestrian accommodations ([Complete Streets Policy and Guidelines](#)). Much of this was made possible by the \$400,000 MassDOT gave the Town to install new sidewalks near Ottoson Middle School ([Transportation Planning](#)).

Envision Arlington

With so many different projects and commissions, Envision Arlington has helped to bring Town workers and residents together since 1992. Envision Arlington is a network of volunteers who want to amplify the community's opinion. This is achieved through public forums. The Annual Town Survey is one of Envision Arlington's top priorities ([Envision Arlington](#)).

Listening to constituents is the best way for Town governance to decide what projects to pursue. Through Envision Arlington's 2019 Town Survey, Town leaders gained valuable insight into evolving mobility preferences:

How would you prefer to get around Arlington?



Source: ([2019 Town Survey](#))

“Nearly a third of respondents say they aren’t getting around in the way they want to, and more than 38% of people whose primary mode of transportation is in a personal car would prefer to get around in **a different way.**”

“Nearly 95% of the respondents who are not getting around in their preferred way would **prefer a mode other than a personal car**, with preferences nearly equally split in favor of **public transportation, bicycling, and walking.**”

Understandably, Arlington residents listed time, availability of alternative transportation modes, safety, and weather as obstacles when it comes to getting around:

“When respondents were asked what prevents them from getting around in their preferred mode, **the highest ranked barrier was time**: approximately 31% reported it would take them too long to reach their destinations or **the preferred mode of transportation isn’t available when they need it**; this was especially true of respondents whose preferred mode was public transportation (56%) or walking (34%).”

“**Logistical, weather, and safety** also ranked high among concerns among all respondents, with between 10% and 15% of respondents selecting these as barriers. The chief concern among respondents who would prefer to bike was safety (35%), followed by weather (26%).”

If the 2019 Survey made one thing clear, it is that one of the Town's biggest deterrents is traffic congestion:

“The top priority or thing to change for getting around Arlington was less traffic congestion, with nearly 1/4 of all respondents selecting it as their top issue; **this was an even higher priority among those who said they would prefer to take public transportation (28%).**”

“Other high priorities included **safer crosswalks, safer sidewalks, better bicycle infrastructure, and more vehicular parking.**”

4,574 people participated in the survey, representing 24.7% of Arlington households (keep in mind the Town’s overall population of approximately 45,000). Of these respondents, 37% indicated that this year is the first time they have ever taken the Annual Survey ([2019 Town Survey](#)). This statistic points to an improvement in the Town government’s community outreach, more effective communication strategies, and/or strengthened civic engagement.

Town Priorities

Fortunately, many of the Town’s priorities align with residents’ concerns. As stated in Arlington’s Master Plan, Town leaders would also like to see congestion managed “safely and efficiently” through upgraded traffic operations, and “enhanced mobility” by improving access to alternative modes of transportation, such as biking, walking and bus transit. Another Town goal is to better “manage the supply of parking in commercial areas.” ([Master Plan - Traffic & Circulation](#)).

Addressing residents’ feelings toward parking could be a double-edged sword. As shown in the 2019 Survey, some people want more parking availability in the Town. But making it easier for people to park around Town would result in more people on the road- not the best way to fight car culture. In 2017, Town Meeting voted to create the first Parking Benefits District of Massachusetts in Arlington Center. In order to help its struggling stores, the Parking Benefits District would allow parking meter revenues in Arlington Center to *stay* in Arlington Center. This creates a fund for area improvements (i.e. maintaining meters, increased street sweeping, streetscaping projects, etc.) ([Warrant Article 26: Parking Benefits Districts](#)). While incentivizing support for small businesses is a great idea, at the same time, this parking meter strategy does not help further the cause for alternative transportation modes.

Implementation

Master Plan Implementation Committee: One way Arlington has been able to address concerns is through the Master Plan Implementation Committee (MPIC). This team was formed by the ARB and endorsed by Town Meeting in 2015. Its purpose is to ensure that the recommendations stated in the Master Plan come to fruition. In order to do so, MPIC meets quarterly to review what Town improvements are underway, on hold, or completed ([Master Plan Implementation Committee](#)). Some of MPIC’s accomplishments include incentivizing redevelopment in business districts to promote more mixed-use buildings, working with MassDOT to solidify a \$100,000 grant used to pilot a bus rapid transit trial run, enhancing public participation in bike sharing, updating the Town’s sustainability action plan to account for climate change and flooding concerns, and so much more ([MPIC Annual Town Meeting Report](#)).

Outside of this specific Committee, the Town has made other, more general efforts to steer away from solo-personal car driving culture. This includes improving pedestrian conditions with sidewalk repairs and extensions, and placing Zipcar stations along Massachusetts Avenue.

Challenges and Obstacles

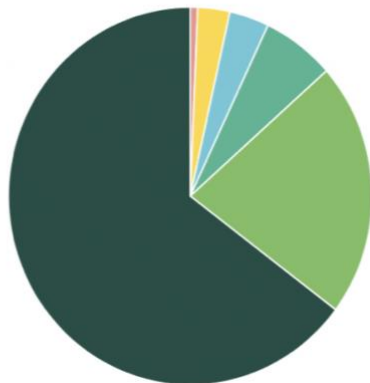
Within Arlington’s Control

Traffic congestion is a massive challenge in Arlington. As Senior Transportation Planner Daniel Amstuz says, too many cars on the road simply “becomes a problem of geometry.” But how does the Town turn, for example, 20 solo drivers into 20 loyal bus riders? It takes a lot of strategic planning, community feedback and action-something that isn’t expedited through long processes like Town Meeting (which only convene annually).

In order to minimize traffic congestion, Arlington needs to continue studying and encouraging walking, cycling, and bus transit. The 2019 Survey proves that there is an increasing community interest in alternative modes of transportation. It just needs to be practical.

When it comes to promoting alternative modes of transportation, commuters are a ripe target population.

Commute to Work



- Drive alone to work 64.7%
- Carpool 6.4%
- Public transportation 21.8%
- Taxi 0.0%
- Motorcycle 0.0%
- Bicycle 3.5%
- Walk 2.9%
- Other 0.7%

Source: American Community Survey Years: 2012-2016 5-Year Estimates

Source: ([MAPC Data Common - Community Profiles](#))

Arlington Commuters

As a predominantly residential suburb, most people in Arlington have to commute to jobs outside of Town. When rush hour is over and these commuters are off the roads, there is a “32% decrease in the town daytime population.” About 39% of Arlington’s commuters work in Cambridge or Boston. While 80% of these people live within one-quarter mile of a bus stop, 49% of them still choose to drive into work alone. How can we change this? Overall, approximately two-thirds of Arlington commuters are still solo drivers ([Master Plan - Traffic & Circulation](#)).

Arlington Schoolgoers

Commuters are not the only ones packing Arlington’s streets in the busy morning hours. Arlington High School’s close location to Massachusetts Avenue makes it a prime traffic congestion contributor. In a 2018 traffic study, the School collected important data regarding teacher and student transportation. Please note that in these surveys, respondents had the option of choosing multiple answers.

124 adults (high school, preschool, and school district staff, etc.) took the “teacher” survey. Out of this number, 83.1% reported that their typical mode of travel to school is driving (and potentially on-street parking along Massachusetts Avenue). In comparison, only 7.2% walk, 5.6% bike, 5.6% take the MBTA bus, and less than 2% carpool ([Arlington High School - Student and Staff Surveys](#)).

Fortunately, in the “student” survey, students and/or parents were more open to alternative modes of transportation: out of 233 respondents, 33.9% walk, 14.1% bike and 24% take the MBTA bus. However, it remains that 70% get dropped off, (of which almost 40% are dropped off specifically along/off of Massachusetts Avenue). Furthermore, 33.9% of students drive themselves to school ([Arlington High School - Student and Staff Surveys](#)).

In explaining why more teachers take cars to school than students, it is fair to assume that some staff might live outside of the district, therefore making driving the most convenient mode of transportation. Furthermore, students without licenses and parents away at work might have a built-in partiality to alternative modes, such as walking, biking, or taking the bus. Nevertheless, finding ways to decrease rush hour congestion in Arlington should not be limited to those who commute out of Town. Programs such as Safe Routes to School do a lot to improve pedestrian rates among students. Now, finding other strategies to get more teachers involved is the next step.

Outside of Arlington’s Control

Of course, the Town does not have total control of traffic conditions. While getting more Arlington residents to rely on buses or bikes is a good start, this does not resolve traffic congestion entirely. This is simply due to the fact that a lot of the traffic in Arlington does not stem *from* Arlington. As previously mentioned, Route 16 falls outside of Arlington. Even so, the Parkway still causes major backups in East Arlington.

Alewife Station Revitalization

Additionally, the Alewife Station in Cambridge is under construction (the new complex will have a bigger parking garage, a major bus station and more convenient entrances) ([Alewife Revitalization](#)). Renovations to this nearby station will be a great resource for Arlington locals. However, this attraction is not exclusive to Arlington; an improved Alewife Station means more customers- who will drive through Arlington to get there. Arlington’s TAC has warned that once construction is completed, it could result in increased congestion along not only Route 16, but also Route 2, Lake Street, and Massachusetts Avenue ([Master Plan - Traffic & Circulation](#)).

Green Line Extension

On the bright side, the MBTA Green Line Extension might help combat Arlington’s traffic congestion. This project will extend the Green Line to College Avenue/Tufts University in Medford- about a mile from East Arlington. If funding becomes available, a Green Line extension to Route 16 at Boston Avenue in Medford could happen too. This would bring the MBTA “within a quarter

mile of Arlington's northeast border" ([Master Plan - Traffic & Circulation](#)). While these possibilities are exciting, they are not being executed just yet. An initial schedule estimated the Green Line Extension to be completed in 2019- but now it's been postponed until late 2021 ([MBTA GLX](#)). This is an example of another challenge in local government planning: project pushbacks. Plans are great, but change is not achieved without implementation.

Proposed Reforms

Arlington Buses

About Bus Transit

Since Arlington does not have a subway line, bus transit makes up a huge part of public transportation. The Town has 11 MBTA bus routes, connecting locals to Alewife, Harvard, Lechmere, or Davis Square Station ([Master Plan - Traffic & Circulation](#)). On average, Arlington has more than 10,000 bus riders per day. By 2035, the Town will see a predicted 30% increase in transit. However, two major issues that stand in the way of making the Town's bus transit more efficient are delays and a lack of reliability (which lead to long wait times and overcrowding) ([Bus Priority Pilot](#)).

Bus Rapid Transit Pilot

After reviewing traffic conditions and meeting with stakeholders in East Arlington, the Town collaborated with the City of Cambridge and the MBTA to implement a bus rapid transit (BRT) pilot along Massachusetts Avenue. This pilot was made possible by a \$100,000 grant from the Barr Foundation. From October 9, 2018 to November 9, 2018, Arlington dedicated a morning commute bus lane from Varnum Street to Alewife Brook Parkway. In addition, there was "a bus stop relocation with transit signal priority and a queue jump at Lake Street... and modifications to the lane assignments and signal changes at Alewife Brook Parkway" ([MPIC Annual Town Meeting Report](#)).

The project was warmly received; through surveys, riders indicated that the BRT decreased their travel time by 6 to 10 minutes, and increase bus reliability. In fact, 95% of respondents said they would like to see a permanent installation of the bus lane- and Arlington listened ([Bus Priority Pilot](#)). Starting October 21, 2019, the eastbound lane (serving routes 77,79, and 350) operates as a bus priority lane weekdays from 6:00am to 9:00am ([Transportation Planning](#)).

Observation

On October 24, 2019, we traveled to Arlington to personally observe the new bus lane. While the lane offers many benefits to bus riders, it does take away street parking during its window of operation. For this reason, we thought it would be interesting to see how cars adjust to the BRT's new rules. As predicted, not all drivers were used to the new lane. In a span of 30 minutes, we noted over 10 car interferences with the BRT. Two examples of interferences are pictured below:



On the left is a blue car, trying to make a right turn. Since Massachusetts Avenue was really busy at the time, this driver ended up having to wait for about two minutes before being able to go (cutting into the bus lane the entire time!).

On the right is a silver Jeep, parking in the bus lane while it is still in operation! As a result, a cyclist had to insert herself into traffic just to get around.

Note: We recognize that the rainy weather may have impacted the number of active cyclists we recorded using the bus lane, and traffic conditions in general.

Recommendation

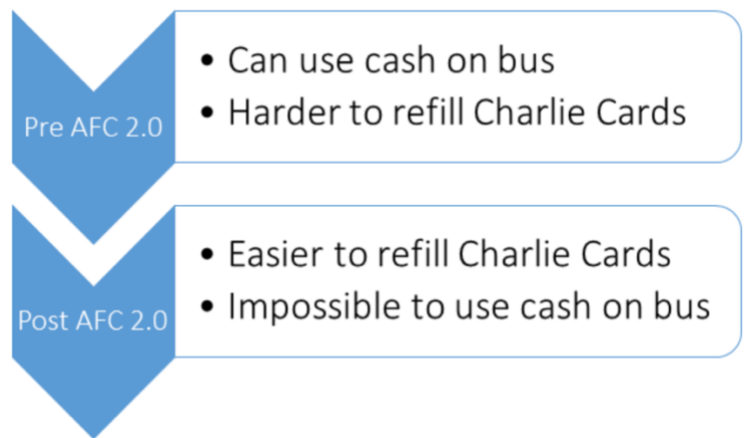
In order to maximize this new bus lane's potential, we recommend that the Town expands it. While it would be to 77, 79, and 350 bus riders' benefit to have this BRT cover the *entire* route, realistically speaking, it makes sense to at least extent it to Lake Street. As previously explained, there is regularly dense traffic in this area due to nearby schools. Having a segment of this bus lane start along Lake Street could potentially help alleviate some of this congestion.

CharlieCards

CharlieCards enable MBTA riders to pay a lower fare for the bus and subway than they would if they paid in cash or with a CharlieTicket. Riders can get CharlieCards at subway stations or at distribution locations such as designated retail sales locations and public buildings ([MBTA - CharlieCard](#)). Riders can refill CharlieCards at subway stations, online, or in cash on the bus or train ([MBTA - Fares Overview](#)). Because there are no subway stations or CharlieCard distribution locations in Arlington, there are no physical locations in Arlington to get (or add value to) a CharlieCard/Ticket. This means that Arlington residents have to leave Town in order to get CharlieCards. They can only refill CharlieCards online or on the bus, but both these methods are inconvenient. The online refill system takes until the next day to update ([MBTA - CharlieCard Web Program](#)), and paying on the bus distracts the driver and holds up the boarding line. This difficulty in accessing CharlieCards/Tickets likely contributes to Arlington's high rate of solo-personal car driving commuters.

Automated Fare Collection 2.0

As part of an \$8 billion dollar 5-year capital investment plan, the MBTA will change how riders pay fares system-wide with the Automated Fare Collection (AFC) 2.0. This system will make it easier to reload Cards/Tickets online and at any station. Riders will be able to use cashless methods like Apple Pay to board trains and buses and they will be able to refill CharlieCards from a smartphone app or at most bus stations ([MBTA - Fare Transformation](#)). It is unclear when the project will be completed as its original completion date in 2021 has been postponed ("[No Timeline For Delayed MBTA Fare Collection System](#)"). Once this plan is completed, bus riders will no longer be able to pay in cash- which will magnify the problem of limited access to CharlieCards. It will become impossible to board the bus without a CharlieCard/Ticket or smartphone. This will add a barrier to access for disadvantaged populations in the MBTA's coverage area. While many of Arlington's affluent residents will not be negatively impacted by AFC 2.0, it is still important to uphold a level of inclusiveness in transportation policy planning.



Distribution Locations:

Outside of subway stations, CharlieCards are distributed at public and private locations around the MBTA's coverage area. Distribution centers include supermarkets, gas stations, libraries, and town halls, among others. At some locations, CharlieCards are sold pre-loaded with a small amount of money, and at others they are given out without a balance ([MBTA - Fare Transformation](#)). Recently, the MBTA has shown increased interest in designating public distribution centers at town halls and libraries to be proactive in preparation for the AFC 2.0 ([MBTA Chelsea Partnership](#)).

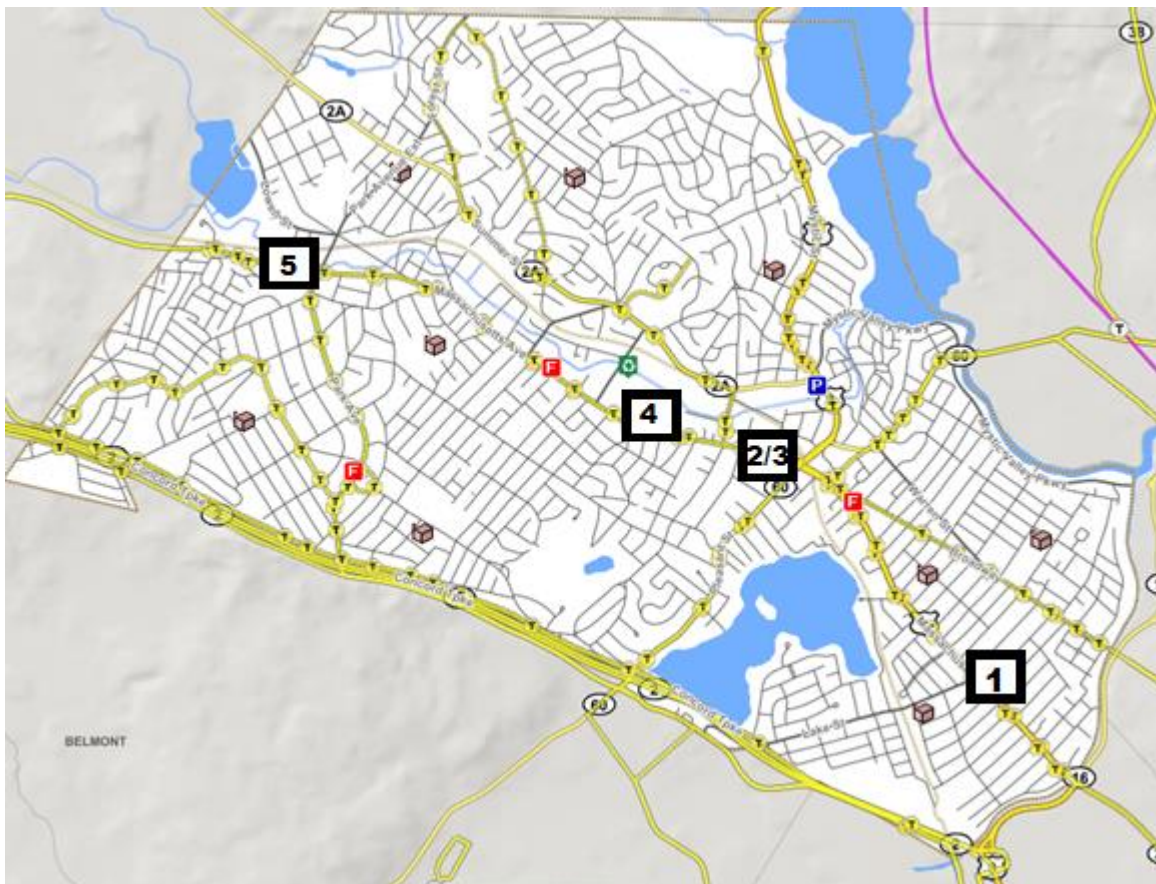
Public Distribution Centers:

This January, the Town of Chelsea partnered with the MBTA to sell CharlieCards pre-loaded with \$5 at Chelsea City Hall. Following this, the MBTA issued a statement that it "is looking to partner with nonprofit organizations or cities and towns to provide residents with CharlieCards, either blank or pre-loaded with a dollar amount for purchase. By providing easier access to CharlieCards, the T hopes to incentivize riders to use CharlieCards and fare vending machines throughout their travels, resulting in a savings of both time and money" ([MBTA - Chelsea Partnership](#)). Improving access to CharlieCards is especially important with AFC 2.0 in the pipeline. In July, the town of Watertown started a similar program to distribute blank CharlieCards at Watertown Town Hall and Watertown Free Public Library. Ten branches of the Boston Library System, mostly in towns served more by buses than trains, distribute CharlieCards as well ([MBTA - Watertown Partnership](#)).

Recommendation

We recommend that the Town of Arlington designate CharlieCard distribution locations. If the Town is willing to handle distribution of the Cards, the Arlington Town Hall, Fox Library, or Robbins Library would work as public CharlieCard distribution locations. Otherwise, if the Town would prefer to coordinate with a retail location, any centrally located gas station or supermarket, like Stop and Shop, Trader Joe’s, or Whole Foods, could distribute the Cards. All of these buildings are located on Massachusetts Avenue and within walking distance from popular bus routes like the 67, 77, 79, and 350. These buses take riders to Harvard and Alewife: key destinations for commuters.

The MBTA has asked towns interested in designating distribution locations to reach out to Chief Customer Officer Danny Levy. Having such locations in Arlington would not only promote equal access to CharlieCards, but would also further encourage bus ridership as an alternative mode of transportation.



Key: 1. Fox Library 2. Robbins Library 3. Whole Foods 4. Stop & Shop 5. Trader Joe’s

Source: ([Town of Arlington, MA GIS Viewer](#))

Arlington Biking

About Biking

As previously introduced, the Minuteman Bikeway is a cycling cornerstone not only to Arlington, but to all of Massachusetts. In fact, from July through October 2019, 322,241 trips were counted on this pathway. Daily, approximately 2,600 trips are made on the Bikeway by bikers, runners, walkers, etc. While Sundays tend to be the path's busiest day, 40% of weekday trips alone are made during peak commute hours (from 7:00am to 9:00am and 5:00pm to 7:00pm) ([Minuteman Bikeway Trips Counted Press Release](#)).

Outside of the Minuteman Bikeway, other bike facilities in Arlington include bike lanes/wide shoulders/or sharrows on roads like Park Avenue, Mystic Valley Parkway, and Massachusetts Avenue. The Town's next step is to create a broader network of bike thoroughfares between neighborhoods ([Master Plan - Traffic & Circulation](#)).

Lime Bikes

On June 28, 2018, Arlington partnered with Lime to introduce a dockless bike share system. The initial launch consisted of 150 manual bikes. Later on, a fleet of e-bikes were brought in (ultimately replacing all manual bikes by Spring 2019). From June to December 2018, over 19,500 Lime bike trips were recorded in Arlington ([MPIC Annual Town Meeting Report](#)).

Unfortunately, similar to other Lime communities, Arlington has run into a problem: Lime bike trips that start in Arlington, mostly *end* in Arlington. To be exact, 68% of 12,770 Lime trips started and finished within Town from October 2018 to September 2019 ([Demand for Bike Share Report](#)).

Unlike last season, Lime has decided to suspend bike sharing in Arlington throughout the winter. Lime bikes have been eliminated from Town since late November, and will not reappear until March 2020 ("[Lime Bikes Unavailable During Winter](#)"). While this is understandable when thinking about the dangers of winter weather conditions, at the same time, this decision may present a challenge to the locals who found appropriate ways to use Lime bikes last winter, and had planned on doing the same this year.

With that being said, Lime is not the only company in the bike share business. Another program Arlington should consider in helping to promote cycling as an alternative mode of transportation is Bluebikes.

Bluebikes

Bluebikes is a bike share program in the Boston Metro area. The program began in July 2011 with 600 bicycles and 61 stations, and has since expanded to over 2,500 bikes and 250 stations. The system has grown into neighboring municipalities such as Brookline, Cambridge, Somerville, and most recently, Everett ([Bluebikes - How it Works](#)). The program operates as a conventional

bike share: Bluebikes can be activated from one docking station and then returned to any other ([Micromobility in Boston](#)). This type of mobility would be ideal for Arlington residents.

Recommendation

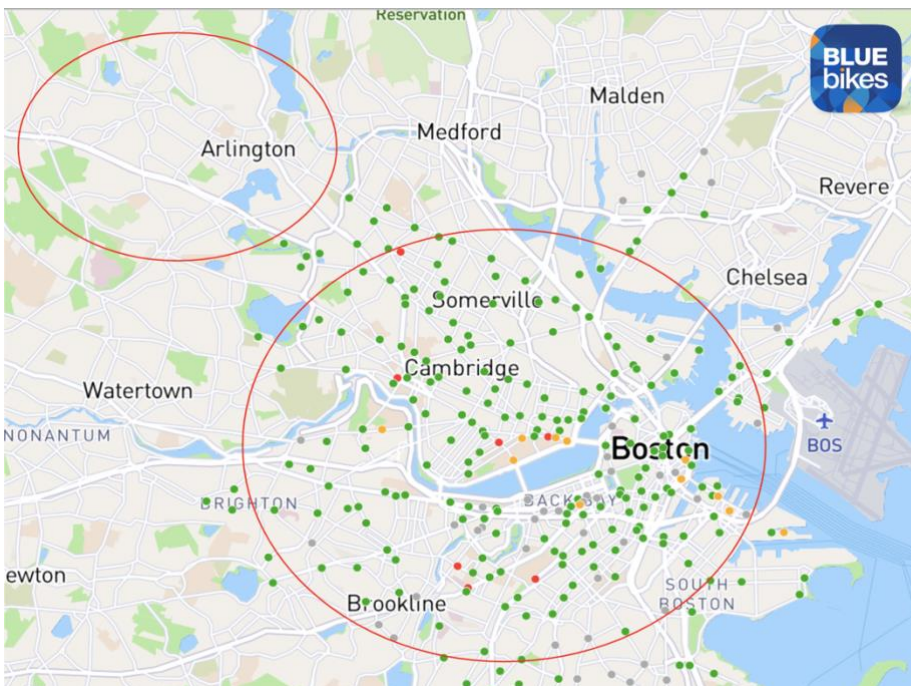
Upon further research, we found that the Town of Arlington is already in talks to potentially partner with Bluebikes once its Lime contract expires in May 2020 ("[Newton could shift bike-share system from Green to Blue](#)"). We strongly recommend that the Town pursues this. Locations for Bluebikes fare best in central areas and along traffic dense routes (to allow for convenient and accessible travel, either for leisure or commuting). Potential locations include Alewife Station, Arlington Town Hall, Arlington Center for the Arts, and the Arlington Reservoir on Lowell Street. Key intersections we recommend for docks are at Massachusetts Avenue and Lake St., Mass. Ave and Park Ave., N. Union St. and Broadway, and Mystic St. and Pleasant St..

The fact that most of Arlington's Lime bike trips start *and* end within the Town proves that locals are turning to other means of commuting. In order to make it possible for these commuters to use a bike share system, it must be compatible with the program used in Cambridge and Boston: Bluebikes. In comparison with Lime, this system is more accessible, reliable and affordable.

Accessibility & Reliability

Bluebikes' docking stations would be great for Arlington cyclists. Currently, under Lime's dockless system, users have no designated area to drop off bikes. As a result, Lime bikes become safety hazards; they are abandoned on curbs, fall into streets, and even block sidewalks.

Additionally, Bluebikes overcome one of Lime bikes' biggest challenges: reliability. As previously mentioned, Arlington residents have issues with preferred modes of transportation being unavailable when they need it most ([2019 Town Survey](#)). For commuters- or anyone looking to plan a trip ahead of time- a bike share program with a docking system is critical. This is the only



Key: Dots represent Bluebikes docks

Source: ([Bluebikes - System Map](#))

way to guarantee that individuals can consistently find a bike, and even more so, incentivize the community to trust bike shares as a viable mode of transportation.

Affordability

Payment Plans: Bluebikes is able to cater to a diverse community of riders through its unique payment structure. The company offers \$2.50 single ride trip passes that allow for 30 minutes of riding ([Bluebikes - Single Trip](#)). This contrasts with Lime, where costs are \$1.00 to unlock a bike and \$0.15 per minute. When considering a 30 minute trip, this prices Lime bikes at \$5.50 ([Lime - Pricing](#)). With more affordable pricing, Bluebikes can encourage cycling to a wider scope of Arlington residents.

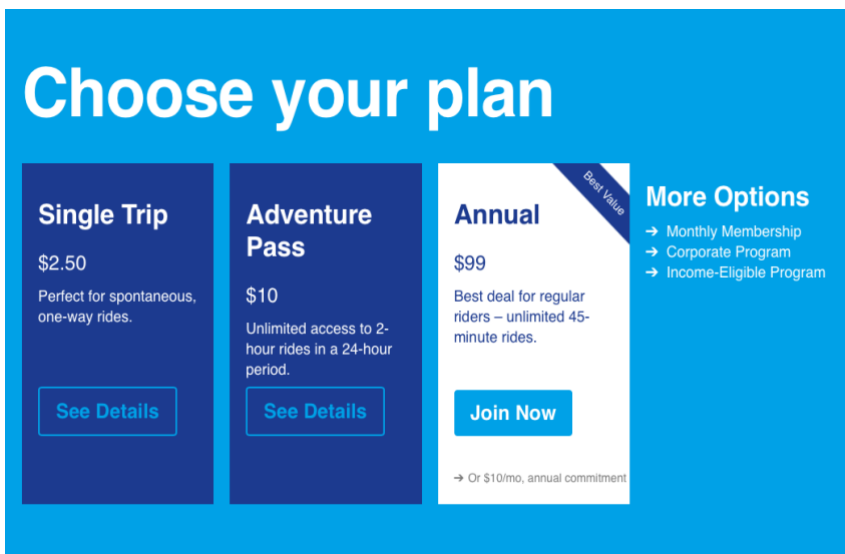


Source: ([Bluebikes Expansion Update](#))

Other Bluebikes payment plans include \$10.00 two hour “adventure” passes, in which individuals have 24-hour access to bikes for up to two hours at a time. These passes are ideal for encouraging cycling among visitors and tourists. Talk about the perfect opportunity to explore the Minuteman Bikeway!

Bluebikes also offer more long-term pricing options, such as monthly and annual memberships. These memberships would be valuable to Arlington commuters and other frequent riders. Monthly and annual plans provide unlimited rides during the allotted time frame.

A monthly membership with Bluebikes is \$20.00 per month ([Bluebikes - Monthly Membership](#)), which is less than Lime’s price of \$29.95 per month (Via Lime App).



Plan	Price	Description	Action
Single Trip	\$2.50	Perfect for spontaneous, one-way rides.	See Details
Adventure Pass	\$10	Unlimited access to 2-hour rides in a 24-hour period.	See Details
Annual	\$99	Best deal for regular riders – unlimited 45-minute rides.	Join Now

More Options

- Monthly Membership
- Corporate Program
- Income-Eligible Program

→ Or \$10/mo, annual commitment

Bluebikes even goes as far as to offer annual memberships, which provide unlimited rides at \$99.00 per year (or 12 monthly payments of \$10.00) ([Bluebike Pricing](#)).

Corporate Program: Bluebikes has a Corporate Membership Program that offers discounted memberships to partnered organizations’ employees and students. Companies enroll in a subsidy plan annually, ranging from about 20% off the typical annual fee to complete compensation.

Source: ([Bluebikes Pricing](#))

Currently, Bluebikes has partnered with over 100 Boston Metro area companies ([Bluebikes Corporate Membership](#)). Since Arlington commuters may already have this employee benefit, having Bluebikes in Town would allow them to finally use this perk.

Improving Bike Culture

The Town of Arlington has a strong bike culture compared to neighboring suburbs. For example, among all of the towns in Lime's program, Arlington ranks third for most annual bike trips ([MAPC - First Miles](#)). However, further community engagement can be fostered through bike initiatives on policy and social levels. Our recommendations are composed of four pillars: safety, awareness, education, and community engagement.

Safety: In our observations, we noticed that the Minuteman Bikeway does not have lighting. This likely deters users from biking in the evening, especially in the winter when it gets darker much earlier. By ensuring that there are ample lamps along the trail, visibility will improve and lead to increased ridership. Furthermore, repairing and maintaining pavement on the Bikeway should be another Town priority ([Master Plan - Traffic & Circulation](#)).

Recently, there have been discussions surrounding speed limit on the Minuteman Bikeway. After a fatal collision involving an elderly cyclist, towns along the Bikeway have had to reconsider its safety. We agree with proposals to implement "15 mph" speed limit signage along the pathway. Inserting these signs is not about penalizing fast bikers who break the rules- it is simply about reminding cyclists to think twice about their speed ([Proposal For Speed Limit signs on Bikeway Gains Traction in Lexington](#)).

Awareness: Increasing bike ridership in the Town of Arlington begins with raising awareness of the positive impact of cycling. Working in tandem with the BAC, a cycling ambassador program that utilizes experienced cyclists and sends them to residential neighborhoods to promote safe cycling could encourage bike culture, particularly among young children ([Cycling for Everyone: Lessons from Europe](#)). Ambassadors could promote bicycling culture through integrated marketing campaigns focused on the environmental, social, and health benefits of biking. Other programs that could be implemented to bring awareness to the positives of biking include hosting annual bike races, mass bike rides, and car-free days that promote alternative methods of transportation in Town.

Education: Building and sustaining bike ridership begins with the youth. Offering "Learn to Ride" programs in schools' physical education classes would expand the base of potential riders and build bike confidence at a young age. Also, health classes should teach the benefits biking has on cardiovascular and mental health.

Community Engagement: "Learn to Ride" classes can extend elsewhere into the community. The Town of Arlington could partner with local businesses, such as Quad Cycles and The Bike Stop, to provide residents of all skill levels and experiences instruction in a low stress forum. These

classes could help residents strengthen their confidence to bike in an urban area and generate excitement about biking as an alternative mode of travel.

Conclusion

Funding

Cost is a serious constraint that always influences how policy is prioritized at a local level, especially for transportation improvements (which can require heavy capital investments). Arlington has benefitted from several significant grants for transportation projects in recent years: some examples are 2016's \$400,000 Complete Streets grant ([Wicked Local - Complete Streets](#)) and 2018's \$100,000 Bus Priority Lane Pilot grant. Still, the Town has more work to do, and funding is not unlimited. To make the most of limited funding, Arlington should take a proactive approach to prioritizing projects. Typically, the Town focuses on an area once it has heard that there is an issue. Moving forward, coming up with a system that allows for consistent collection and active analysis of data-before complaints arise- would be beneficial. This might mean coordinating volunteer groups to regularly observe and record traffic conditions around Town.

Weather

In Massachusetts, weather poses a major threat to bike ridership. In the coldest months of the year, ridership drops off dramatically: in July 2018 there were over 44,000 Lime bike trips in the Boston area, but in February 2019 there were under 1,000 trips ([MAPC - First Miles](#)). Given that Arlington gets so cold and windy in the winter, during these months, the Town should encourage summer cyclists to become winter bus riders- not drivers. Therefore, improving bus accessibility through programs, such as providing CharlieCards, is critical.

Bus Stigma

One possible obstacle to promoting bus ridership in Arlington is the Town's affluent demographic makeup. Studies have shown that there is a level of stigma associated with bus travel among the upper middle class. Nationwide, over 50% of bus riders make less than \$50,000 a year ("[The Bus Gets a Lot of Hate. American Cities are Trying to Change That](#)"). With this in mind, the fact that Arlington has a bus ridership rate of 10,000 people per day is very impressive. However, if more progress is to be made, thinking of new strategies to destigmatize bus travel is a must. Improvements to Arlington's bus system will not only make riding the bus more enjoyable and attractive to new populations, but will also allow bussing to compete with car travel. For this reason, the Town's new permanent BRT lane is a great start.

Conclusion

Overall, while Arlington is on the right track in promoting alternatives to solo-personal car driving, there is always more work to be done. Because locals have actually expressed a desire to move away from driving as a primary mode of transportation, any meaningful improvements to the Town's transportation system will likely be effective. Currently, Arlington has a great foundation

in place with the presence of the Minuteman Bikeway and popular bus routes that lead to top commuter destinations in Cambridge and Boston. With improvements to this existing system, we believe Arlington has all the tools it needs to create an environment where alternative modes of transportation are the new norm.

SOURCES

<p>1) Background</p> <p>2018 Annual Town Report</p> <p>2019 Town Survey</p> <p>Arlington Government Primer (2019)</p> <p>Complete Streets Policy and Guidelines</p> <p>DCPD</p> <p>Envision Arlington</p> <p>MAPC Data Common - Community Profiles</p> <p>MassDOT Crash Report, 2012</p> <p>Master Plan - Demographic Profile</p> <p>Master Plan Implementation Committee</p> <p>Master Plan - Public Facilities & Services</p> <p>Master Plan - Traffic & Circulation</p> <p>Minuteman Bikeway</p> <p>MPIC Annual Town Meeting Report</p> <p>The Limitless City: A Primer on the Urban Sprawl Debate</p> <p>Town Manager Department</p> <p>Transportation Planning</p> <p>US Census Bureau</p> <p>Warrant Article 26: Parking Benefits Districts</p> <p>“Why Didn’t the Red Line Extend to Arlington?”</p> <p>2) Challenges and Obstacles</p> <p>Alewife Revitalization</p> <p>Arlington High School - Student and Staff Surveys</p> <p>MAPC Data Common - Community Profiles</p>	<p>Master Plan - Traffic & Circulation</p> <p>MBTA GLX</p> <p>3) Proposed Reforms</p> <p>Buses:</p> <p>Bus Priority Pilot</p> <p>Master Plan - Traffic & Circulation</p> <p>MBTA - CharlieCard</p> <p>MBTA - CharlieCard Web Program</p> <p>MBTA Chelsea Partnership</p> <p>MBTA - Fares Overview</p> <p>MBTA - Fare Transformation</p> <p>MBTA - Watertown Partnership</p> <p>MPIC Annual Town Meeting Report</p> <p>"No Timeline For Delayed MBTA Fare Collection System"</p> <p>Town of Arlington, MA GIS Viewer</p> <p>Transportation Planning</p> <p>Bikes:</p> <p>2019 Town Survey</p> <p>Bluebikes Pricing</p> <p>Bluebikes Corporate Membership</p> <p>Bluebikes Expansion Update</p> <p>Bluebikes - How it Works</p> <p>Bluebikes - Monthly Membership</p> <p>Bluebikes - Single Trip</p> <p>Bluebikes - System Map</p>
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[Cycling for Everyone: Lessons from Europe](#)

[Demand for Bike Share Report](#)

[“Lime Bikes Unavailable During Winter”](#)

[Lime - Pricing](#)

[MAPC - First Miles](#)

[Master Plan - Traffic & Circulation](#)

[Micromobility in Boston](#)

[Minuteman Bikeway Trips Counted Press Release](#)

[MPIC Annual Town Meeting Report](#)

["Newton could shift bike-share system from Green to Blue"](#)

[“Proposal For Speed Limit signs on Bikeway Gains Traction in Lexington”](#)

4) Conclusion

[MAPC - First Miles](#)

["The Bus Gets a Lot of Hate. American Cities are Trying to Change That"](#)

[Wicked Local - Complete Streets](#)

METROBRIDGE



Team 6



BUS RAPID TRANSIT UPDATE

DEC 2019 // PREPARED BY ELIZABETH
ANNERINO AND HELEN BEKELE

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The Town of Arlington recently piloted a Bus Rapid Transit Initiative which sought to increase reliability and decrease travel times for patrons. In order to achieve this goal, the Town replaced on-street parking with a priority bus lane, added transit signal priority for buses, and relocated the Lake Street bus stop. Prior to the pilot of this initiative, the town distributed a survey which found that a majority of bus riders were dissatisfied with their experience due to heavy traffic, decreased reliability, and long travel times. In response, the Town of Arlington piloted the Bus Rapid Transit Initiative in 2018. After the pilot ended in November of 2018, the Town distributed another survey which found that a large majority of residents wanted the improvements to be permanent.

While the Town of Arlington was met with positive feedback after the initial pilot, our research set out to evaluate whether or not the same sentiments prevailed a year later. In order to gauge popular opinion amongst bus riders, we distributed surveys throughout Arlington which asked participants about their experiences under the new bus system. In addition, we conducted several in depth interviews to add context to our survey data. While riders noted a decrease in their travel times due to the priority bus lane, we found that respondents still struggled with bus reliability issues. Participants noted

that their buses were more often than not delayed and that they were unable to track the bus due to a lack of accurate bus-tracking information.

As a result, we have proposed three improvements for the Town of Arlington to consider moving forward. First, adding real-time bus arrival information displays at popular stops throughout Arlington would give bus riders a better sense of when the next bus is coming. This information will decrease bus related anxiety for riders and seemingly increase reliability. Second, we believe creating an “express bus” distinction in which regular buses stick to a strict stop schedule and express buses are permitted to only stop when patrons are seen waiting at a stop. This distinction would enable riders to, overtime, benefit from decreased travel times on the “express bus” as well as increased reliability of the regularly scheduled bus. Lastly, we propose improving the accuracy of bus location on bus-tracking applications as well as adding a feature which enables riders to “reserve” a spot on the bus. This “reservation” would allow riders to signal which bus they intend to board and at what time and location they intend to do so. As a result, this feature would give bus drivers a better sense of which stops will have patrons coming as well as decrease anxiety amongst riders



DEMOGRAPHICS

Located to the northwest of Boston, Arlington is home to just under 45,000 residents. Among Arlington households, 45.1% house married couples and 27% house children under 18 (Census). While a significant portion of residents are children under 18 (21%), 45% of citizens are ages 30 to 59 (Census). The median household income in 2016 was nearly \$105,000, which is about \$30,000 higher than the state median household income (Census). While the median house or condo value in 2000 was only \$284,900, the median value for Arlington in 2016 rose to \$603,972 (Census). Overall, the cost of living in Arlington has increased over the past few years and is substantially higher than the U.S. average. In terms of racial demographics, Arlington has a large white population with 83.6% of residents identifying as white, 8.3% as Asian, and 2.3% as African American (Census).

MAJOR BUS ROUTES

The Town of Arlington features three major bus routes, Route 77, Route 79, and Route 350, that provide transportation for the 17% of Arlington residents that commute by bus (Town 2018). Route 77 is the most popular route of the three with a ridership over 7,600 people per day (State of the Bus System 2018). This route spans from Harvard Square to the Arlington Heights Busway with 32 stops along the way. Similarly, Route 79 stretches from the Arlington Heights Busway to the Alewife stop. However, Route 79 only has 21 stops and services an average of 1,200 people per day (State of the Bus System 2018). Lastly, Route 350 begins further out but travels through Arlington as part of its 70 stops. This route spans from Chestnut Avenue at Cambridge Street to the Alewife Stop and services around 1,600 people per day (State of the Bus System 2018)



PRIOR TO THE BUS RAPID TRANSIT INITIATIVE

Prior to the Bus Rapid Transit Initiative, the primary focus of public transit improvements in Arlington centered on ensuring the accessibility and safety of bus stops (Transportation Advocacy Committee 2017). As a result of feedback from Arlington residents, Arlington Transportation Advisory Committee members undertook projects pertaining to establishing safe pedestrian access to bus stops by means of constructing landing pads in the grass strips located at various bus stops. Residents displayed an interest in adding landing pads to bus stops to increase safety for individuals waiting as well as assisting residents in wheelchairs in loading the buses. As a result of the Arlington resident's expressed interest, the Transportation Advisory Committee advocated for the implementation of the landing pads to the Massachusetts Bay Transportation Authority (MBTA). The Committee focused on certain bus stops as priority locations for the inclusion of landing pads at bus stops. Overall, the effort to add landing pads to various bus stops was successful (Transportation Advocacy Committee 2017).

Following the establishment of landing pads in Arlington, the Transportation Advocacy Committee shifted their concerns to center on the reconstruction of different MBTA services in Arlington. Additionally, the town of Arlington's involvement in the MBTA Capital Investment Program aided Transportation Advocacy Committee members in their work towards improving other transportation services (MBTA 2018). The MBTA capital investment program is an investment program that allowed Committee members the opportunity to indicate which types of projects and transit investment would aid their community the most (MBTA 2018). The Transportation Advocacy Committee members identified the following projects as priorities to the city's transportation services; keeping the red line in a state of good repair, modernizing and improving bus stops and routes, and extending the Green Line. Over time, the focal point of public transit issues shifted away from safety and access concerns towards increasing efficiency and reliability of the bus system in Arlington.

BETTER BUS PROJECT

The Massachusetts Bay Transportation Authority (MBTA) is a division of the Massachusetts Department of Transportation (MassDOT) that is responsible for managing almost all the public transportation services in the Boston metropolitan area. In response to a change in both demographic and rider expectations, the MBTA has dedicated eight million dollars to improving the efficiency of the bus system in Boston through the "Better Bus Project" (State of the Bus System 2018). In order for the Better Bus Project to achieve its goal of increasing the reliability as well as decreasing travel and wait times of bus routes, new plans must address the crippling congestion that is at the center of these issues. The MBTA is implementing dedicated bus lanes, retimed traffic signals to allow buses to pass through intersections more quickly, and queue-jump lanes among other things to mitigate congestion issues (State of the Bus System 2018).

As a part of the Better Bus Project, the Town of Arlington and the City of Cambridge have partnered with each other as well as with the MBTA to utilize grant money from the Barr Foundation to fund a Bus Rapid Transit project on Massachusetts Avenue. The bus systems in both Arlington and Cambridge have struggled with long wait times, bus bunching, and overcrowding as a result of increased economic growth as well as an uptick in traffic. In order to overcome these issues, Arlington and Cambridge piloted a priority bus lane down Massachusetts Avenue which was intended to increase reliability and reduce travel time (Town 2018). The priority bus lane replaced the parking lane on the eastbound section of the road that stretches from Varnum Street to Alewife Brook Parkway. This lane is effective during the hours of 6:00 am to 9:00 am. During the pilot period that spanned from October 9 to November 9 of 2018, Arlington Police Officers enforced the new system to ensure that cars did not park in the newly dedicated bus only lane (Town 2018). In addition to the priority bus lane, Arlington relocated the Lake Street bus stop and implemented Transit Signal Priority systems which decrease travel times by shortening red lights or holding green lights for busses passing through the intersections.

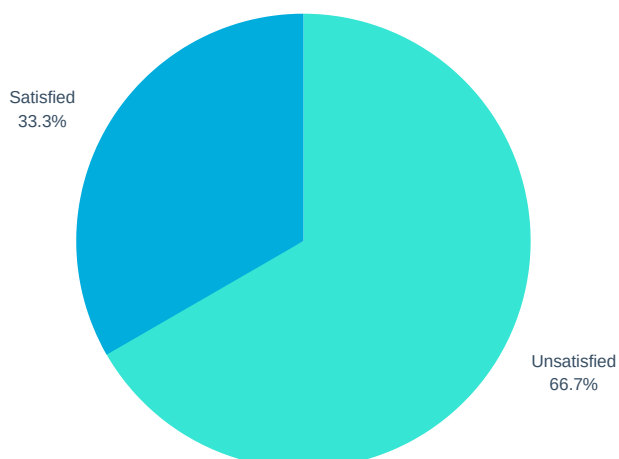
PRE-PILOT SURVEY DATA

Prior to piloting the priority bus lane and transit signal systems, Arlington distributed a survey to residents to assess the existing relationship between the buses, cars, cyclists, and pedestrians in the town. Their pre-pilot survey garnered 314 responses with 26.5% coming from bus riders. While the overall levels of satisfaction varied amongst all surveyors, a majority of bus riders were dissatisfied with their experience (Town 2018). In addition, bus riders frequently cited heavy traffic on Massachusetts Avenue as the main factor resulting in increased travel times as well as decreased reliability of the bus.

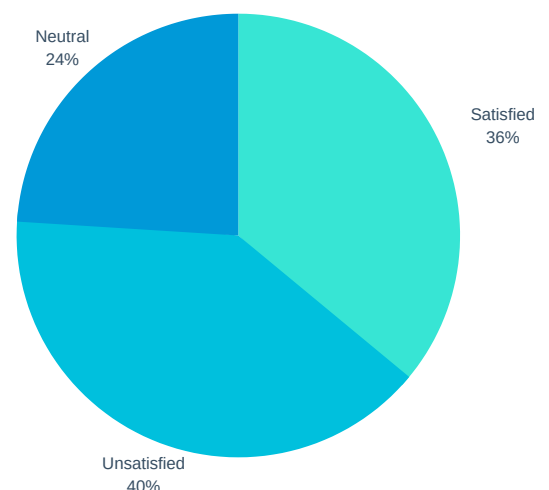
As a result of the pre-pilot survey results, Arlington aimed to design a plan that improved traffic flow, reduced travel times, and increased reliability of the bus (Town 2018). When constructing a new arrangement, officials set various base criteria for an effective pilot including: bus travel time, reliability, vehicular traffic, intersections queues, pedestrian and bike accommodations, on street parking displacement, and feasibility (Town 2018). Overall, officials sought to make the roadways in Arlington safer and more efficient for all its users regardless of their mode of transportation. It was town officials belief that possessing an efficient and reliable bus transit system would further enable economic development and promote public health (Town 2018).

MASS. AVE. SATISFACTION LEVELS

Bus Riders



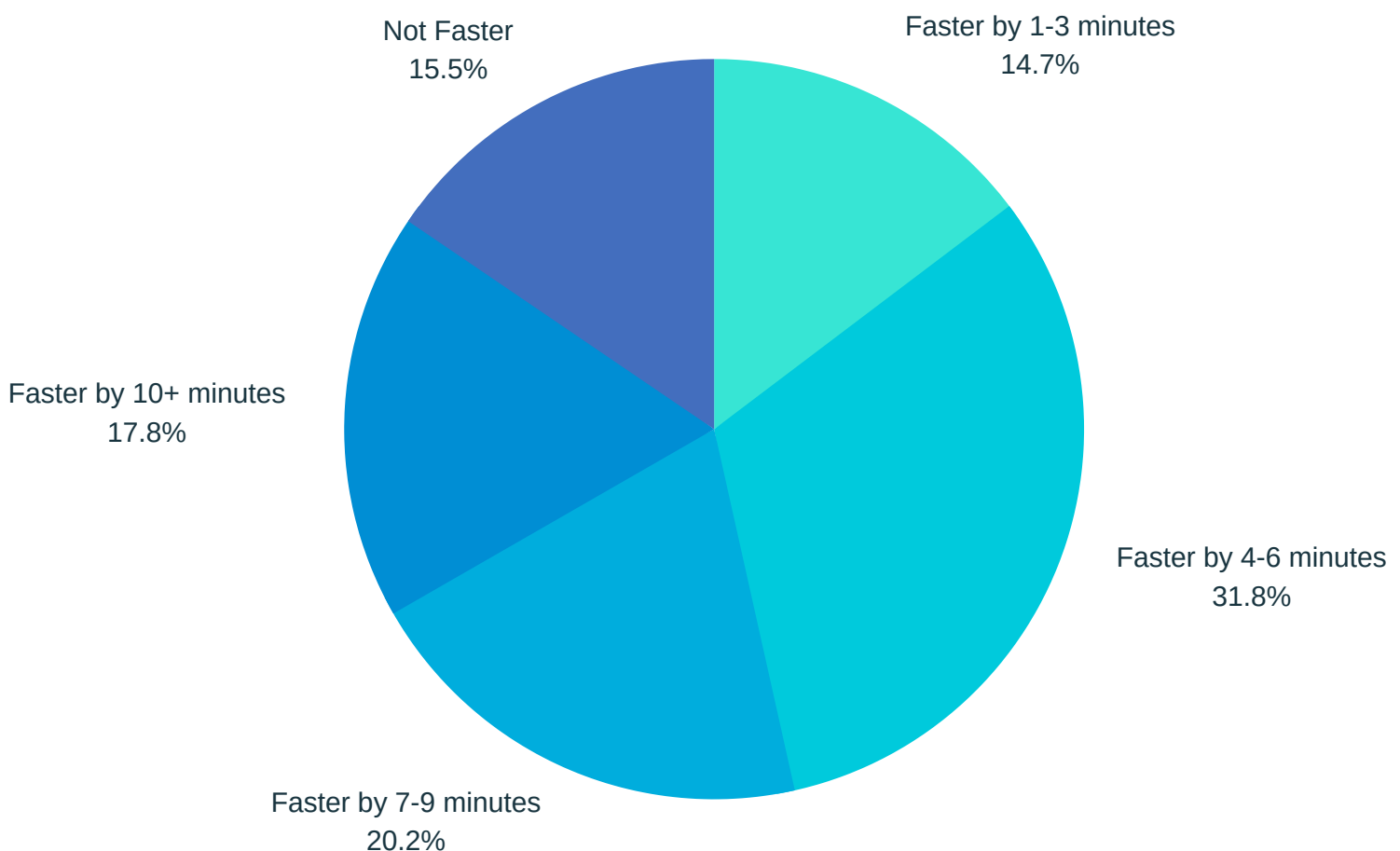
All Respondents



POST-PILOT SURVEY DATA

In order to assess the overall success of the Bus Rapid Transit pilot, officials distributed a follow-up survey to better understand the experiences of those immediately affected by the improvements. The survey found that most people, including bus riders as well as drivers, cyclists, and pedestrians were satisfied with the improvements due to the perceived decrease in travel times. As a result of the priority bus lane and transit priority signal systems, 24.8% of people said that they would take the bus more often. Additionally, 94.7% felt that the improvements ought to be permanent (Town 2018). Overall, officials found that both the 77 and 79 bus routes saw decreased levels of variability while also having a low impact on parking and vehicle traffic (Town 2018).

DECREASES IN TRAVEL TIME



RESEARCH METHODS

While the Town of Arlington's initial survey revealed an overall sentiment that was supportive of the new changes, we set out to follow-up with residents after the permanent installation and see if the approval was still widespread. In order to do this, we created a survey which was distributed in person throughout Arlington as well as posted at almost all the bus stops for bus route 77, 79, and 350. In addition, we conducted 8 in-depth interviews with Arlington residents to serve as a check on the survey data we received. The content of our survey focused on reliability and efficiency of the three major bus routes after the implementation of the Bus Rapid Transit program. Additionally, our survey contained 12 focused questions as well as one open-ended question where respondents were encouraged to mention any additional information regarding the bus system they felt necessary. During the time our survey was active, we received 30 number of responses.

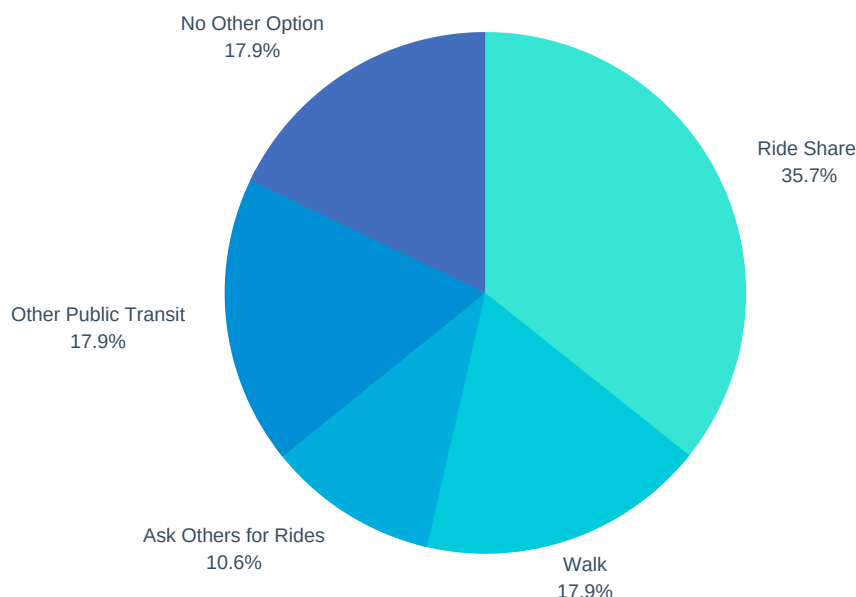
In addition to collecting survey data, we observed bus routes 77 and 79 in order to assess their reliability and frequency of use. In particular, we observed bus interactions at the Arlington Heights Busway Stop which is one of the stops for both routes 77 and 79, among others. Observations conducted at this stop took place between the hours of 6:30 am and 9:00 am in order to focus in on commuters on their way to work. Additionally, we observed the 77 bus from the Harvard stop to assess the bus's reliability on its way back to Arlington as well. Observations here took place between the hours of 4:00 pm and 6:00pm in order to catch commuters on their way home to Arlington after work.



FINDINGS

According to the responses gathered, a majority of respondents displayed a heavy reliance on the bus transit system in order to get to work. For example, 86.2% of respondents said the bus was their primary mode of transportation to work and 79.3% said they rode the bus five or more days a week. As a result of this heavy dependence on the bus system among respondents, frequent delays and unreliability of the bus in Arlington can negatively impact the careers and livelihoods of both a majority of respondents in this survey as well as other citizens that find themselves in a similar position. Bus delays in Arlington often result in dependent riders turning to more expensive means of transportation. When asked what mode of transportation they utilize when the bus is delayed, 35.7% used ride share apps, 17.9% walked, 10.6% asked friends for rides, 17.9% tried a different bus route or train, and 17.9% had no other option. Regardless of which alternative mode residents used in wake of delays, many cited the additional financial burden they were forced to bear as a result. While most shared that ride share apps were the main source of additional costs, some respondents also cited that paying for an additional train pass was an unexpected cost that was difficult to undertake.

ALTERNATIVE MODES OF TRANSPORTATION

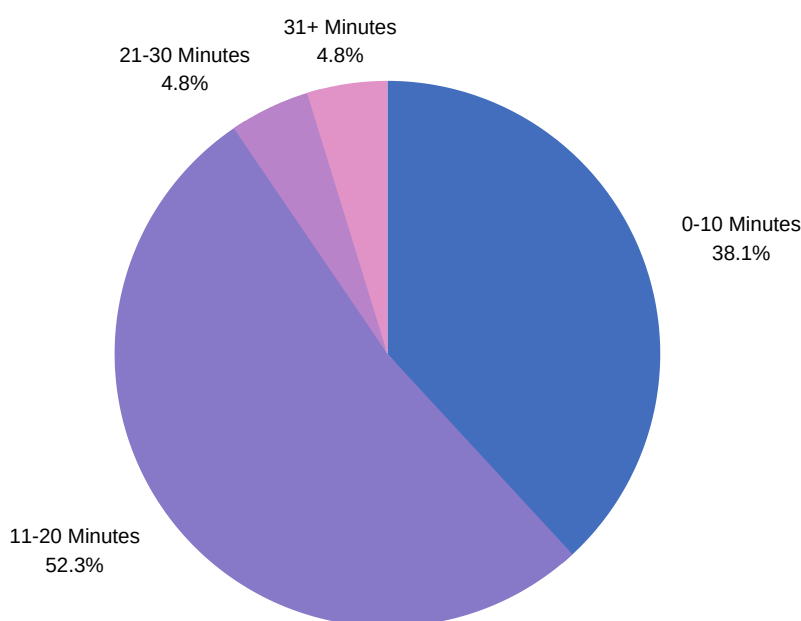


FINDINGS

In order to assess the frequency of delays, we asked participants if the bus they take is often delayed as well as how reliable the bus was at arriving on time. While a majority of respondents indicated that the bus was neither overly unreliable or reliable, 83.3% of participants indicated that their bus route is often delayed. A possible reason for the apparent variance in answer is that most bus delays are between 2 and 20 minutes. For example, 38.1% of respondents indicated that their bus was typically delayed between 1 and 10 minutes and 52.4% shared that they experienced delays between 11 and 20 minutes. The relatively shorter delay times may account for why respondents felt reluctant to deem the reliability of the bus system as wholly reliable nor wholly unreliable. One respondent indicated that her bus was delayed practically every day. However, the delay time was consistent, thus in her opinion, the bus was still reliable.

While one respondent has successfully been able to predict the bus delay times, many residents felt especially burdened by the uncertainty surrounding bus arrival times. In both the open-ended response

opportunity on the survey and in depth conversations with Arlington residents, as well as during our observations at both key bus stops, a recurring issue discussed and detected was the inability of patrons to know how long it will be until the next bus arrives. Participants cited a lack of “real-time bus arrival information displays” and misinformation on the bus tracker app as two major causes of their lack of knowledge regarding when the bus will arrive. As a result of the inconsistency of bus arrivals, it becomes more difficult for riders who are dependent on the bus system to commute to work in regards to knowing if they need to find an alternative mode of transportation due to a massive delay or cancellation.



FINDINGS

While a scarcity of means to check real-time bus information fosters a sense of unpredictability for riders, the overarching reason for bus arrival uncertainty is much larger. One underlying cause of variability in arrival times is buses not adhering to their scheduled routes and stop times. Survey respondents, as well as participants in the in depth interviews, shared that buses often race ahead of schedule and fail to stop at designated bus stops. One participant shared that buses often experience rush hour delays “during the early part of the morning and then try to catch up by racing ahead of schedule.” This course of action renders current bus predictor apps ineffective and inhibits potential riders from boarding their desired buses.

In addition to racing ahead of schedule causing uncertainty in when the bus will arrive, it also leads to “bus bunching” or the accumulation of multiple of the same bus routes following directly behind each other. Bus bunching is a phenomenon that was frequently mentioned by survey participants, as well as detected during observations at both the Alewife Busway and Harvard stops. Bus bunching results in trailing buses being rendered ineffective and appearing to be a waste of resources that could be best utilized elsewhere. Several participants cited a desire for an increased number of buses during the morning rush hour to meet the demand and stop the morning delays from negatively impacting the remainder of the bus routes that day. This desire stems from a belief that reallocating buses to run more frequently in the morning rush hour will prevent drivers from feeling the need to rush ahead of schedule later and find themselves in a bus bunching situation.



Face early morning traffic



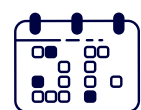
Race ahead to make up time



Fail to adhere to schedule



Creates "bus bunching"



Results in patrons being unable to predict bus arrival

FINDINGS

While the issues regarding delays and reliability still remain despite the implementation of the Bus Rapid Transit project, a majority of participants that were aware of the project felt that the project did have a substantial positive impact. When asked if the priority bus lane made travel by bus more efficient, 65% of respondents said that it did. A common sentiment amongst participants is that the priority bus lane has shaved off time from their travel through Arlington but that the priority bus lane ought to be extended through other neighborhoods. One respondent said that "the bus lane in Arlington has been a fantastic improvement. Cambridge needs to add one through Porter Square in both directions during rush hour." Our findings on this topic align with the findings of Arlington officials' post pilot survey. Overall, the Bus Rapid Transit project seems to have improved the bus transit system to a certain extent, but did not go far enough.

"The bus Lane in Arlington has been a fantastic improvement though. Cambridge needs to add one through Porter Square in both directions during rush hour."

"I would love to see a bus lane for the 77 on Mass Ave all the way through Arlington and into Cambridge."



ADD REAL-TIME BUS ARRIVAL INFORMATION

One of the most frequent issues regarding the bus system in Arlington mentioned by residents was an inability to predict when the bus would arrive. As a result, riders often don't know whether they should be turning to potential backup methods of transportation due to a bus delay. In order to overcome this and enable Arlington bus riders to better plan their commute, real-time bus arrival information displays and an up to date bus tracking app should be implemented.

Although the cost of real-time bus arrival information displays at every stop along key bus routes in Arlington would likely be too costly, merely adding displays at the most popular spots would greatly increase reliability. In order to assess which stops most need the real-time bus arrival information displays, another survey could be done of each of the stops as well as observation of which stops harbor the most riders throughout the day. Starting with a few of the most popular stops would enable the most amount of residents to be positively affected by the improvements. However, it is likely easier to install these displays at stops that already have landing pads present due to the already present infrastructure. Therefore, Arlington officials should consider their potential budget options for installing the real-time bus arrival displays and choose a course of action accordingly.

While residents expressed a desire for large real-time bus arrival information displays at every bus stop similar to those at the Harvard stop, matching that goal may be too far-fetched and unrealistic. Numerous stops along the major bus routes in Arlington are designated solely with a sign posted in the ground, thus, it is not feasible to add real-time displays at these stops. However, it is still possible to provide riders at these stops with up to date bus arrival information in the form of an app. While residents shared that such an app currently exists, a majority of riders claimed the app does not provide reliable information, meaning it does not fulfill its primary goal.

ADD REAL-TIME BUS ARRIVAL INFORMATION

While fixing reliability issues with the bus tracking app will increase riders awareness regarding bus arrival times, bus drivers not sticking to their routes and schedules is an underlying issue to why the app is unreliable as it stands. Riders routinely cited bus drivers racing ahead of schedule as one of the main reasons why the app was unpredictable. Therefore, in order to truly address the problem of bus unpredictability, Arlington town officials ought to work with the MBTA on a new system that requires drivers to stick to their prescribed schedule.



EXPRESS BUS

Another major issue contributing to the unreliability of the bus in Arlington is a failure of drivers to adhere to their scheduled stop times. During our observation, we noted that the buses often did not stop at bus stops without patrons waiting unless a resident already on the bus requested a stop. While this practice aids in decreasing travel times of those on the bus, it ultimately results in the prescribed bus schedule being ineffective and meaningless. Similarly, bus drivers racing ahead of schedule also results in “bus bunching,” meaning multiple buses following the same route are trailing each other. This phenomenon was observed during the data collection as well as frequently mentioned within the open ended question provided on our survey. Bus bunching creates a reliability issue for riders as well as appears to be a misuse of funds in that there are unnecessary buses running with very few riders present.

In order to solve the reliability issue created by bus drivers who fail to adhere to their scheduled routes and stops, we propose creating a distinction between “express buses” and regular buses. Express buses would maintain the status quo, meaning that drivers of these buses are permitted to breeze through stops where no patrons are waiting. On the other hand, regular, or non-express, buses would be required to stop at bus stops regardless of whether or not there are residents currently waiting at the stop. These buses would wait at the stop until the prescribed time, and then continue down their route.

While we believe this distinction will increase reliability, others may disagree. One possible counterpoint to our suggestion is that it would be incredibly irritating to sit on a bus that is stopped for three to four minutes waiting for individuals to arrive and ultimately have no riders show up. While we concede that this would be frustrating, we argue that riders will be on the receiving end of benefits from both the express bus’s quickness as well as the regular buses patience throughout their time as patrons. Ideally, the town of Arlington would provide a schedule that denotes which type of bus will be arriving approximately when. Therefore, giving residents the opportunity to try and catch

EXPRESS BUS

an express bus if they are especially troubled with having to ride the non-express bus.

Another possible issue with this proposal is the effectiveness of the priority bus lane if the express bus is caught waiting behind a regular bus. As a result of this relevant issue, we would suggest that the regular bus does not drive in the priority bus lane. While the non-express bus will need to be present in the priority bus lane during pickups, we believe that the traffic of the regular street lanes will keep the bus closer to its scheduled stop times. Therefore, resulting in the non-express bus not idling in the priority bus lane and hindering the express bus from continuing on its route.



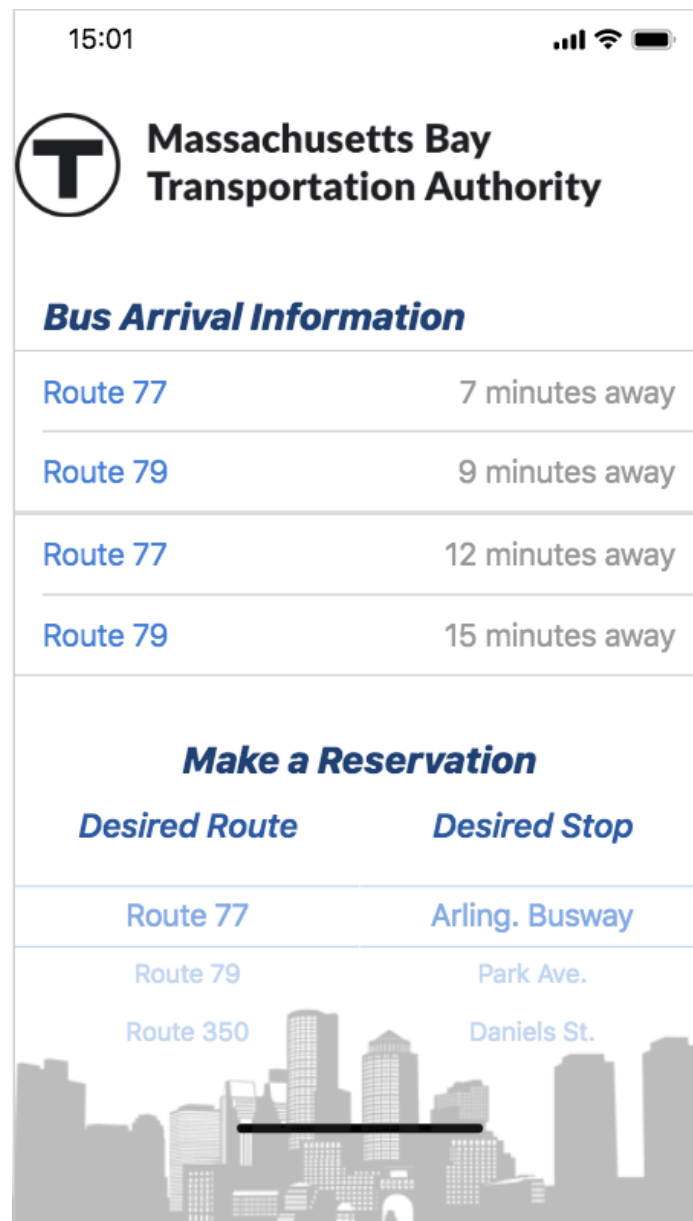
BUS-TRACKING APP IMPROVEMENT

Riders often indicated they used bus tracking apps such as Transit and ProximiT to access information regarding bus arrival times. Apps of this nature provide individuals with a list of transportation services in their area and the times they are expected to arrive to a certain destination. While these services are valuable to riders who are dependent on the bus for transportation, these bus-tracking apps are reported to be more often than not inaccurate. As a result of riders being unable to identify the times that buses are actually going to arrive, many are left waiting at a designated bus stop without certainty that a bus will be arriving. One way to solve the unreliability of bus-tracking apps is to improve the accuracy of the service at approximating the location of the bus as it travels down its route. However, this is not the sole answer.

While the inability of bus-tracking applications to provide accurate arrival times is an issue, this problem is the result of previously discussed unpredictable bus patterns. In order to properly address the failings of bus-tracking applications, one must address the ways in which buses fail to adhere to their scheduled within a reasonable margin of error. While we believe our proposal of creating a distinction between express and non-express buses will aid in this effort to increase the accuracy of bus-tracking apps, one other way to achieve this is through bus “reservation” features. Here, we propose adding a feature to an app that enables frequent riders to “reserve” a spot on a bus by indicating which stop and at what time they will be getting on the bus. This feature will allow bus drivers to gain a better sense of whether or not patrons are intending to load the bus at various stops along their route and adjust their driving pattern accordingly. Bus riders can be incentivized to use this feature through promotions like discounted fares or a membership reward system that rewards riders who consistently show up to their “reservations.”

BUS-TRACKING APP IMPROVEMENT

An ideal implementation of this program would result in the non-express buses mentioned above being able to know which stops riders intend to load the bus at and being able to eventually move past stops without any “reservations.” Therefore, providing the reliability of the bus arriving at its prescribed time while also allowing room for increased efficiency by means of reducing the number of stops made where no patrons board.



Potential Mock-up of Proposed App

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METROBRIDGE



Team 7

The Future of Sustainable Transportation:
Cycling & Pedestrian Safety Improvements
within the Town of Arlington

Sara Goldman & Ysabelle Regis

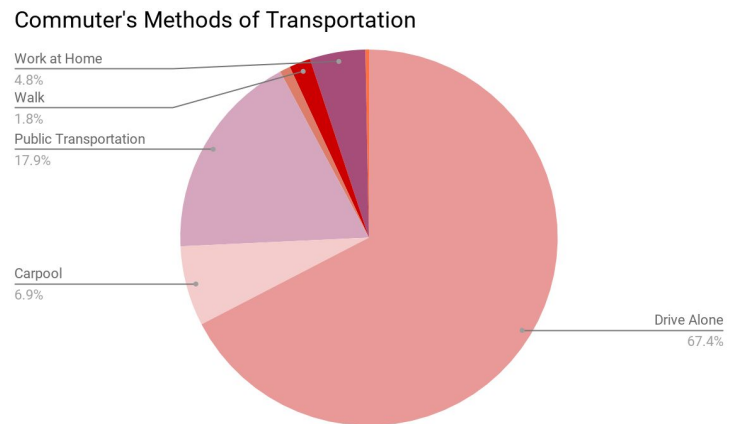
CAS PO 517 Urban Politics & Policy

Professor Katherine Levine Einstein

December 8th, 2019

Background Information

Arlington, Massachusetts is a residential town with a population of 45,000 people. With 71.5% of Arlington Residents being in civilian labor force, the average 32 minutes it takes for an Arlington resident to travel to work is likely due to its proximate location to Central Boston and the surrounding areas.



With its proximity to Boston, the issue for Arlington residents is not where to work, but how to get to work. While a majority of residents choose to drive on their own as their daily commute, many others are choosing the more economical and environmentally friendly option of using public transportation.

The increasing usage of sustainable forms of transportation call for greater accessibility to services such as bike lanes, buses, and trains.

After observing a presentation led by Arlington's Senior Transportation Planner Dan Amstutz, it is evident that the Town of Arlington already has innovative procedures in place that allowed them to create a 2015 Master Plan & Sustainable Transportation plan.

Sustainable Transportation Plan
20 year plan to redevelop transportation systems within Arlington MA. The \$80,000 budget will be used to cover all aspects of transportation including biking, driving, and public transit

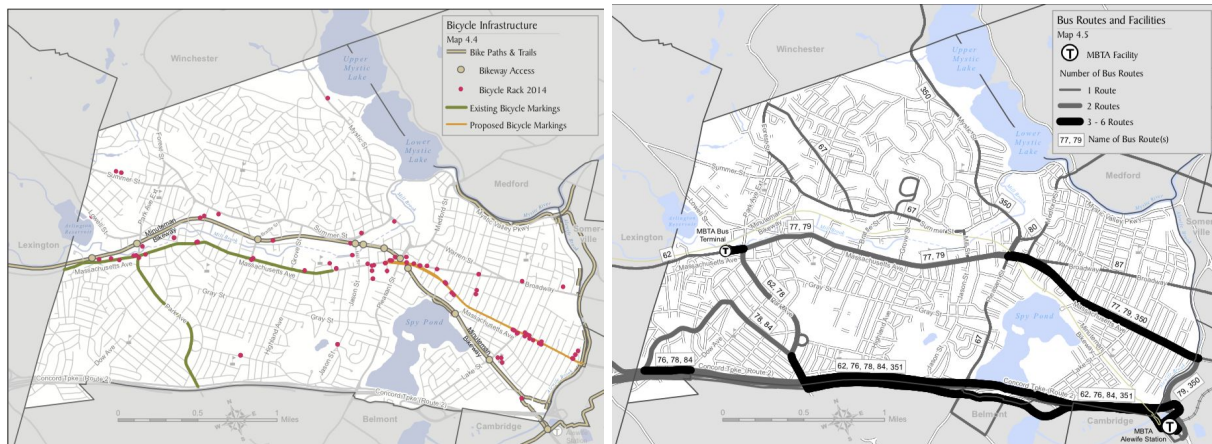
Master Plan

Devised by a committee of selected officials in 2015, to be used as a guide for development and land use decisions.

In communication with the residents of Arlington, the main issues within transportation are regarding congestion, speeding, safety, maintenance, and public transportation. Our report will outline some of our suggestions for improving bicycle and pedestrian safety and encourage the usage of public transportation in

Arlington.

Arlington's Master Plan allows for mutual accessibility between town officials and residents, ensuring that both parties concerns are adequately addressed. In regards to transportation, the main goals are to maximize accessibility and minimize congestion and parking issues.



Pictured above are satellite view images of the town of Arlington's bike paths (left) and bus routes (right). Note that both images have routes that are centralized to Massachusetts Avenue.

Report Objective:

To improve cycling and pedestrian safety in order to create an incentive for using more environmentally friendly transit.

Challenges and Obstacles:

Challenges and obstacles to implementing our proposed plans will stem from limited budget from the town to implement all of the recommendations; there might not be sufficient funding to actually purchase new bike racks, or install protected bike lanes. Further obstacles will stem from individuals preference on driving into the city instead of taking the MBTA, which is known for breaking down and being continuously late. Other obstacles will stem from citizens lack of compliance with safe driving and will continue to text while driving.

The Boston Metro Area is one of the most congested metropolitan areas in the country. The Boston Metropolitan Area currently has 300,000 more cars than it did 5 years ago. MBTA has had about 40 derailments in the past 5 years, making it a less desirable alternative to a car. In February 2015, $\frac{2}{3}$ commuter trains were late. Consequently, 1.7 million Bostonians drive to work. A study recently revealed that it has the nation's worst rush hour traffic, with most jobs concentrated in the city of Boston. The issues that Arlington faces regarding transportation are linked to the issues in the Boston Metro Area; citizens need to guarantee they can get to work on time and can't always rely on the public transportation that Boston provides to do so. The issues with the MBTA and commuter rail can also be an obstacle to Arlington's incentive to try and get more people utilizing public transportation (Ryan).

Funds are another clear obstacle in implementing all proposed policies. Arlington has a fund of \$80,000 to create a Safe Transportation Plan, and it is unclear if this amount of money will be sufficient to implement every desired policy recommendation. Specifically, protected bike lanes along Massachusetts Avenue. Finally, the town of Arlington can have reasonable belief that its homeowners will oppose proposed policies as NIMBYism is very high among homeowners in affluent communities, despite the fact that there is a town planning and policy implementation group that meets to try and implement policies, this has the potential to be an area that will impede progress.

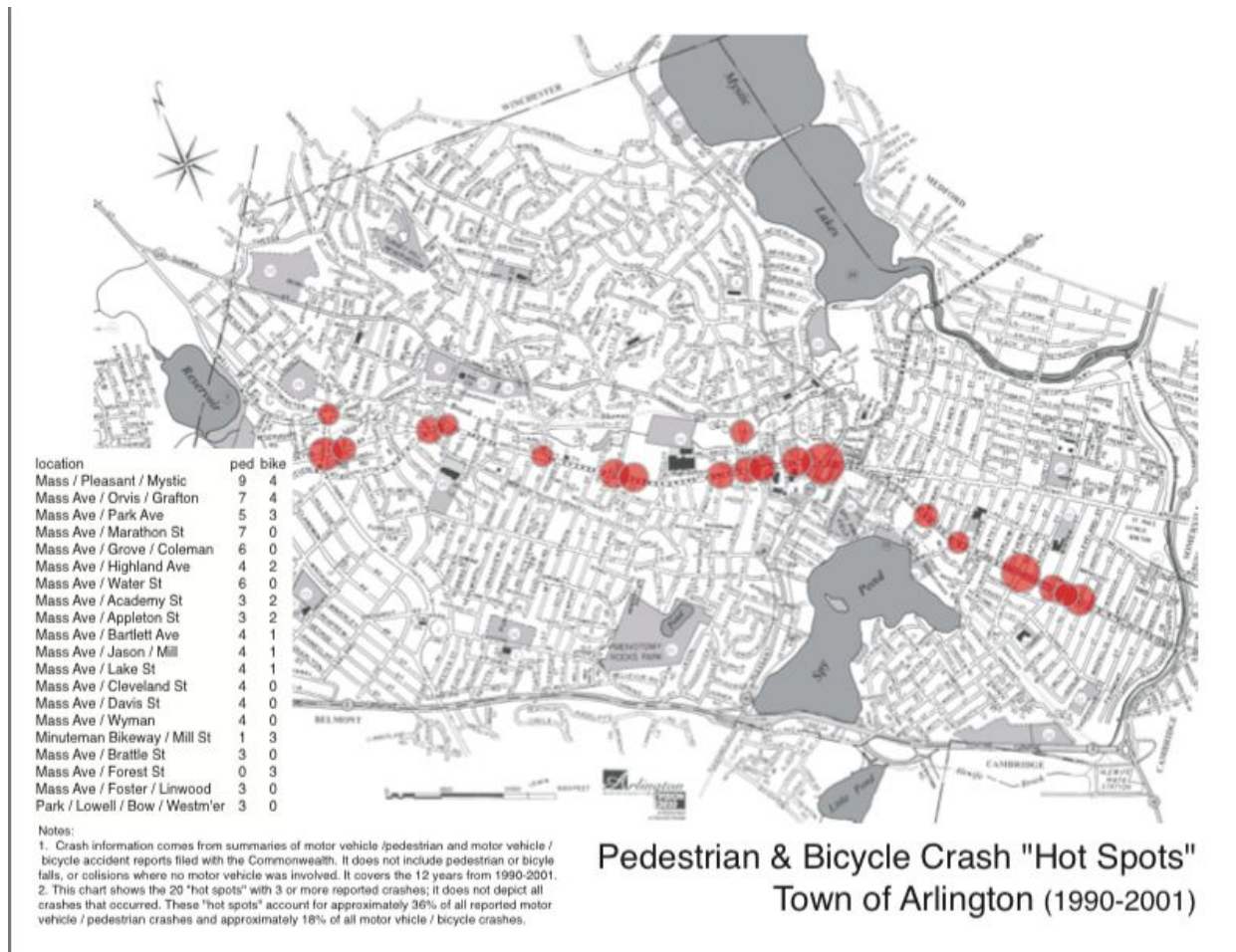
Policy Areas:

Massachusetts Avenue- Traffic & Circulation:

Mass Ave Bus Lane: There was a bus lane installed on Massachusetts Avenue on the eastbound section of the road between Varnum street and Alewife Brook Parkway serving MBTA bus routes 77, 79, and 350 and operates Monday through Friday between the hours of 6am-9am. It is designated by pavement markings (red lane) and signage. No stopping, standing or parking will be allowed on the bus lane while the bus lane is in operation. This bus lane is also shared with cyclists to travel without restriction during its hours of operation. Bus drivers have been instructed not to pass bicyclists in the bus priority lane to ensure the safety of its cyclists.

Data is focused primarily at the intersection of Massachusetts Avenue / Mystic Avenue / Pleasant Street, due to the high amount of pedestrian & cycling crashes in aforementioned area.

Pedestrian and Cycling Crash Hotspots



Data was collected by measuring traffic in 60 second intervals throughout multiple periods of time. Data shows that approximately 80% of traffic through the Massachusetts Ave/ Pleasant St intersection is from vehicles, 8% is from cyclists, & 12% is from pedestrian traffic. While pedestrians and vehicle drives had clear delineated signage and traffic lights to make their trips simple, cyclists were visibly having difficulty navigating the road. Drivers infringed upon their bike lane space, and did not acknowledge their presence when turning tight corners, creating a dangerous space for cyclists.

	<i>Vehicles</i>	<i>Cyclists</i>	<i>Pedestrians</i>
Period 1	42	2	3
Period 2	32	6	5
Period 3	29	5	9
Period 4	46	9	4
Period 5	57	1	10

Policy Recommendation

Install a separate protected bike lane on
Massachusetts Ave Eastbound Section

Bicycle Parking: Zoning amendments to the bicycle parking regulations of the Zoning Bylaw were adopted by the 2019 Annual Town Meeting.

- Found that cyclists need dedicated parking so that they don't leave their bicycles on unstable areas, (faulty poles) or that they don't leave their bikes in areas where they would obstruct a walkway.

Bicycle Rack Criteria

SHOULD

- Be securely attached to a permanent surface
- Adhere to ADA standards
- Be a hook & ring design, hitch & lollipop, inverted U rack, or any artistic rack that follows the pre determined guidelines

SHOULD NOT

- Obstruct pedestrian /vehicular traffic
- Require bikes to be lying down/need a kickstand to remain upright.
- Require the user to lift the bike off of the ground without assistance
- Be a wave, coat hanger, wheel bender, or schoolyard rack design

- Looking for functional and secure bike parking - want to reduce the amount of bikes being tied to light posts, sign posts or trees

Short Term Bicycle Parking: Usually used to serve visitors of a site for usually around 2 hours per visit. Specific requirements include: location - must be located within 50 feet of the main entrance or building and no further than the nearest off-street parking space. Signage - appropriate signage must be visible if bike parking is not visible from the main entrance.

Long Term Bicycle Parking: Long term parking is intended to serve residents, employees, and other who need to park their bicycle for a substantial portion of the day. Location - must be within 200 feet of the area that it is being intended to use. Residential - residents shall be permitted to bring their bicycles into their unit for use.

Policy Recommendation

Invest in bike racks that can be used for both short and long term parking.

In order to incentivize residents to use their bikes more often, bikes must be easy to store, in terms of accessibility and proximity. While the addition of more bike racks is sure to increase cycling traffic, our specific recommendation is to invest in *Cyclehoop's* Car Bike Port.



This company was created in 2006 with the intent to create products that are meant to be seen, and simplify the road for all. These racks are intended to be used in parking spots, due to their signage stating “1 Car = 10 Bikes”, in an effort to call attention to the simplicity and eco-conscious lifestyle that cycling can offer. However, since limited parking is already a concern for Arlington residents, these bike ports can be located anywhere, both for permanent and short term bike parking, as well as for special events due to their flat pack design and easy installation.

Cyclehoop Car Bike Ports come with the additional customization options of an integrated bike pump and a panel for the front of the car that can be used as a source of advertisement for local businesses or for branding purposes for the Town of



Arlington. With their eye catching design and the added accessibility they offer, Car Bike Ports are a great rack option that brings art and sustainability into the Town of Arlington.

Complete Streets: “complete streets” is a concept that promotes streets that work for all users of the roadway network - drivers, pedestrians, cyclists, transit users and freight carriers. In 2016, the Select Board adopted a policy and guidelines to incorporate Complete Streets planning into roadway design in Arlington. This enabled the Town to apply to MassDOT for funding under their Complete Streets Program. In July, 2017 the Town received \$400,000 from MassDOT to

install new sidewalks on Gray Street, which is heavily used by students to access the Ottoson Middle School. **Complete streets report**

Arlington Center Safe Travel Project, 2014 to present: In 2014, the Town received funding from the State Department of Transportation and the Federal Highway Department, through the Transportation Improvement Program (TIP), for approximately \$1.5 million to improve safety for Minuteman Bikeway users by providing a connection through Arlington Center. A second goal is to improve efficiency and reduce congestion for all users by adjusting signal timing and improving crosswalks. Improvements are now complete, with some final adjustments underway.

Boston City Planning Transportation:

Boston Transportation Plan:

The city of Boston is also committed to improving the safety of cyclists and pedestrians:

- Building 15 Neighborhood Slow Streets zones to traffic-calm residential streets
- Completing 15 miles of protected bike lanes
- Making improvements at 15 corridors with safety challenges in the next four years.

Current Projects: Summer Street Protected Bike Lane, Bike Share Network Expansion, Public Realm Plan, Walk and Bike Friendly Main Streets, Vision Zero: Priority Corridors and Safe Crossings, Neighborhood Slow Streets, Better Bike Corridors, Washington Avenue, Columbus Avenue Complete Street

Projects in Design: Greek Links Network, Commonwealth Avenue Beyond Packards Corner, Southwest Corridor extension to Back Bay and MGH, Morrissey Blvd Resilient Complete Street

Not yet started: Pedestrian First Traffic Signals, Dorchester Avenue Complete Street (Southie) Columbia Road Greenway

Improving Local and Regional Transit

- Updates occurring along MBTA, specifically Green line improvements
- Massachusetts Avenue Rapid Bus (the unreliability of the Massachusetts Ave bridge prevents people from taking the bus home during rush hour and might opt to drive or find less cost effective measures.)

Smarter, safer, more reliable streets

- Expand the Drive-Boston to provide over 150 new locations for car-share in Boston neighborhoods,
- Install electric vehicle charging stations in municipal parking lots.

Boston Biking Initiatives

<u>Women Bike Initiative-</u> Free Cycling Classes for Women	<u>Fix Your Bike-</u> Repairs bikes at no cost
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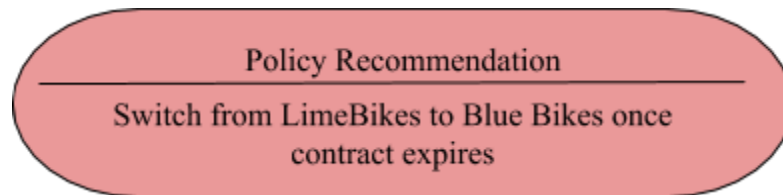
Youth Cycling Plan-
Boston Public Schools students are taught about bicycle safety, and how to safely maneuver a bike

Discounted Blue Bikes-
Rent a bike for \$5/mo. if income eligible

Boston Bike Safety:
Outlines bike routes & guidelines

The graphic is a light pink rounded rectangle containing text about various biking initiatives. It features a title at the top, two side-by-side boxes for 'Women Bike Initiative' and 'Fix Your Bike', a larger box for 'Youth Cycling Plan', and two more boxes at the bottom for 'Discounted Blue Bikes' and 'Boston Bike Safety'.

- monitor an ongoing pilot of pickup and drop-off zones for rideshare companies to minimize traffic disruptions, and develop a Shared Mile Playbook of principles to navigate the new technology-driven and on-demand landscape.



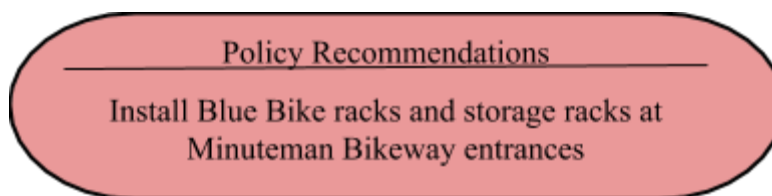
Arlington Cycling Transportation Report and Information:

Creates potential for people to bike into Boston if it would require because citizens are currently primarily cycling around Arlington.

New Demand for Bike Share in Arlington:

In 2018, Arlington joined 15 other communities to bring a bike share to the greater Boston area. Working with the Metropolitan Planning Organization, Arlington, Bedford, Belmont, Chelsea, Everett, Malden, Medford, Melrose, Milton, Needham, Newton, Quincy, Revere, Waltham, Watertown and Winthrop all selected Lime Bikes to establish a regional dockless network. Research by the MAPC showed that connections to transit were relatively small because only 15% of trips ended within 100 meters of a subway, trolley, Silver Line or Commuter Rail Station. Many of the trips took place between communities and points of interest. 68% of trips that started in Arlington ended in Arlington and 22% of trips took place in Arlington and ended in Cambridge. The report outlined areas with high bike share usage: Minuteman Bikeway (especially between Arlington Center and Alewife T Station) as well as Mass Ave, Lake Street,

Pleasant Street, Broadway and Mill Street, and neighborhood streets in East Arlington such as Herbert Road and Thorndike Street. Cycling is popular on streets that do not have popular cycling infrastructure (Wicked Local Arlington). Furthermore, Arlington is on a contract with Limebike until 2020, Limebike is looking to transition exclusively to scooters which doesn't fit the needs of Arlington. It will be up to Limebike if the contract is renewed, but the town has already discussed alternatives to Limebikes will discuss this at the next meeting (Collings).



The Minuteman Bikeway is a 10 mile paved multi use trail rail. Running from Bedford to Alewife Station. It passes through Lexington and Arlington, it is heavily used in Arlington for commuting and leisure activities. There have been a substantial amount of bicycle crashes on the minuteman bikeway. On October 2nd, Police responded to a report of a crash involving a cyclist at the intersection of Oakland and Park avenues. The cyclist told police he was stopped at the intersection when the car approached the intersection and did not stop, striking him and knocking him over. On October 4th, Police responded to a report of a crash involving a cyclist on Massachusetts Avenue. The cyclist told police he was in the bike lane when the driver opened his door, striking him. The driver told police he did not see the cyclist when he opened his door. Additionally, on October 7th, reported a bicycle crash from 9/17. A man hit a boy riding his bike and then offered to pay to fix it and gave him his cellphone number but they have been unable to get in contact with him. Finally, on May 4th, a cyclist was attempting to pass another cyclist on

the minuteman bikeway another crash on the Minuteman bikeway and fell and was left unconscious (The Arlington Advocate).

Policy Recommendation
Place heavier enforcement on distracted driving. Incentivize using alternative forms of transportation.

Vision Zero Program: a strategy implemented in Boston, Cambridge, and Somerville, goal is to eliminate all traffic fatalities and accidents, while promoting safety at the same time.



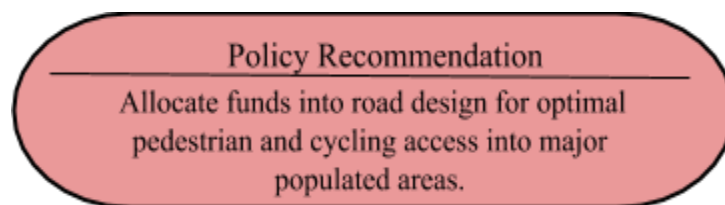
Through a proactive preventative approach, Vision Zero has a 9 step commitment to ensure the strategy is effective at its highest level. This involves but is not limited to; **Political Commitment & Leadership, Community Engagement, Transparency, and Communication.** In such a tight knit community like Arlington, creating a dialogue of transparency and trust between residents and town officials is projected to be a very successful

program and will ease the minds of residents and commuters when it comes to their safety on the road.

Incentives to increase the usage of public transit:

To encourage the use of public transportation, incentives may be offered to help reduce the cost to the user, including free or discounted bus, rail, or public transportation passes. Other incentives include employer-provided subsidies, reimbursements, partial payments, or pre-tax payroll deductions. Such incentives have been shown to increase public transportation use, and use of active travel options such as walking and bicycling, particularly among college students.

Incentives such as free or discounted bus, rail, or transit passes reimbursements, partial payments (Bueno 2017), or pre-tax payroll deductions (NCTR-Commuter benefits) decrease consumers' cost to use public transportation. Incentives are typically offered by employers as a commuter benefit and can be part of transportation subsidy programs, deep discounting, or transit pass incentive programs (Bueno 2017).



It is vital to have some continuity throughout the town so that bikers do not find themselves without a lane. Having a consistent bike lane route will not only incentivize residents to start cycling more often due to the safety and security of their own lane, but will also allow drivers to see a bike lane as a consistent part of their driving. Ensuring that biking becomes a

norm and is no longer seen as an inconvenience to a driver allows for more acceptance and awareness when it comes to sharing the road, making traveling safer for all parties involved.

Conclusion

Within our research, we have seen the dedication towards creating more effective transportation by the Town of Arlington officials. Through the Master Plan, land use and development planning is streamlined by the predetermined guidelines. Arlington's Sustainable Transportation Plan allows the work of the Safe Travel Project and Master Plan to continue while fully supporting and developing alternatives to driving.

With the extended time frame and small budget of the Sustainable Transportation Plan, there is a limit to what can be done within these next 20 years. Emphasizing safety and placing incentives on cycling and public transportation is a lower cost solution with immediate results.

Maximizing access and opportunity to public transportation will in turn minimize congestion, and open up parking spaces without the need to allocate funds to create more spaces, and create a greener and more eco-conscious community.

METROBRIDGE



Team 8

Bicycling Safety in Arlington MA

A policy overview and proposal on the impact of increasing
bicycling safety policies in Arlington MA



Your Town, Your Future

Arlington's "Master Plan"

The town of Arlington has a comprehensive plan set to take place during a 10-year implementation period. During this time Arlington's Department of Planning and Community Development, which leads many of the town's transportation planning projects. According to their plan, many of the policies to be implemented will focus on zoning, such as bicycle parking regulations. The most important component when it comes to the committees creation of transportation policy has been having the appropriate **capacity**. For example, the town has identified its need to increase the capacity of its Department of Public Works (DPW), so in doing so they have already increased signs and signals on the Minuteman Bikeway, which weren't previously there.



Current Policies/Initiatives



Minuteman Bikeway

- ❖ A 10-mile long bike path that stretches from Bedford to Alewife Station, running through Arlington.
- ❖ As reported by the Town of Arlington, there have been over 320,000 riders from July-October this year on the bikeway itself. (2019)



Bike-Share Usage

- ❖ In 2018, Arlington launched its first trial run with Lime Bike, a bike sharing company based out of San Francisco.
- ❖ Ever since its arrival, bike share usage in Arlington has quadrupled. From Aug. 2018 – Oct. 2018 more than 15,000 rides were taken by users in Arlington.



“Complete Streets”

- ❖ The Complete Streets Policy is one that requires streets to be operated, planned, and designed to be utilized by all modes of transportation.
- ❖ As a result of this policy plan being set in place, Arlington recently developed bicycle parking guidelines that will expand the amount of bicycle parking available.



Bicycle Advisory Committee (ABAC)

- ❖ All volunteer committee that meets monthly in order to advocate for the establishment and practice of bicycle safety in town policy.
- ❖ In 2014, the committee created a new map of the minuteman bikeway, to help plan for the future safety and preservation of the path.



As it can be seen, Arlington has already made great strides towards creating proper bicycle safety and management. Many policies currently being discussed or implemented are structured on improving bicycle parking issues. The town has instituted both short term and long term bike parking requirements to ensure bicycle security and encourage more people to ride. The new plan discusses proper bike rack design, requiring 2 points of contact, as well as enforcing bike rack placement locations, in order to avoid sacrificing mobility for pedestrians. Ultimately, this plan acts as a good start at taking steps towards proper safety measures, and in that way Arlington is succeeding. However, Arlington still has many problems it needs to address.

In order to plan, execute, and suggest proper bike safety protocol, its important to first acknowledge the benefits of biking, particularly in Arlington. Ever since the deal to bring Lime bikes to Arlington, more residents have been riding bikes than ever before. This coupled with the Minuteman Bikeway running through Arlington, gives a great opportunity for those who bike, to bike, and for those who don't to start. Biking's benefits go beyond the community, and it should be a priority to inform people, and make them conscious of the beneficial reasons to ride a bike instead.

Benefits of Biking

General

01

Health

Cardio vascular disease reduced by 16% in those who actively commute.

02

Economically

Around 80% of people can afford a bike. Only 10% can afford cars.

03

Energy Efficient

Biking to work for a year would save about 1.5 tons of greenhouse gas emissions.

04

Industry

US bike industry holds 1.1 million jobs. Generating \$1.8 billion in tax revenue.

05

Ideal

Most trips mad by Americans are short. 3 miles or less > 50%.

Arlington

Commuter

Arlington has many student's, and workers that commute every day.

01

Social

As a mall and close community, creating a larger biking community, strengthens that.

02

Cuts Down Traffic/Accidents

More bikes means less cars. Mass Ave. is one of the busies roads, and has many accidents.

03

Cuts down Pollution

Arlington is a school oriented community, and pollution is harmful to child development.

04

Active

Healthy exercise will help cut down on cardiovascular incidents in Arlington

05

Challenges & Obstacles

Safety Funding

There's a limited amount of Federal funding Arlington receives towards transportation policy. According to the Shenandoah Valley Bicycle Coalition, bicycling receives less than 2% of federal transportation funding. Also there are a lot of public safety concerns, so it is hard to decide where to allocate the proper amount of funding into.

Commute Times

According to DataUSA, the average travel time for an employee in Arlington, MA is 30.2 minutes. This is slightly above the average US worker at 25.1 minutes. Due to this, it is a lot harder for Arlington to encourage people to start cycling to work instead. Higher travel times means that people will not only less likely bike, but it also means they are less likely to use public transportation. Ultimately longer commutes, not only makes people less likely to bike, but also makes Arlington less likely to invest in biking infrastructure.

Weather

It is not an unknown fact that Boston, and its surrounding areas such as Arlington, hit extremely low temperatures come winter time. This make sit very likely to snow, which practically shuts down the opportunity to go cycling. This winter, Lime Bike removed all of its bikes until spring time. Uncontrollable climate and weather is another obstacle that prevents biking policies from becoming more invested in.





Safety Issues & Concerns

Sidewalk Riding

After reading the Bicycle Program Safety Report made by the Town of Arlington's Transportation advisory Committee, the town had this to say in regards to bicycle riding, "Sidewalk riding due to Bikeway crossing has had multiple complaints from Residents." Not only does sidewalk riding disrupt sidewalk traffic, it also puts everyone in danger including operators of motor vehicles. Many bike organizations are uniformly against sidewalk riding, and many of the, for example, The League of American Bicyclist, have gone on to say that riding on the sidewalk is a large cause of bicyclist-motorist accidents. When a bicycle is on the sidewalk, everyone's safety is compromised as each person's visibility as well as movement has to be adjusted. When a motor vehicle has to turn it is difficult to stop in case of a crossing bicycle, because the driver is used to anticipating pedestrians rather than bicyclist. If Arlington is recognizing its problems with sidewalk riding, then there needs to be something done in order to change it.

Lack of Education

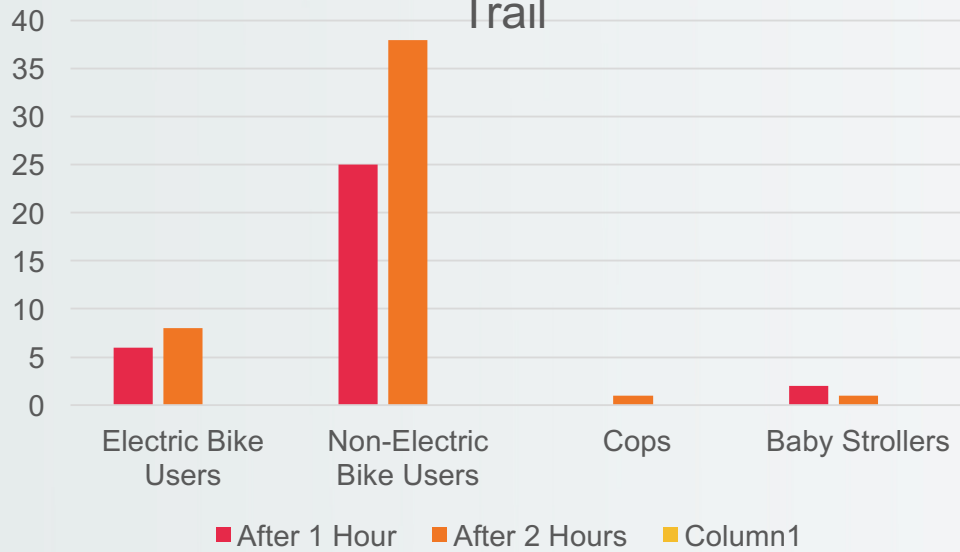
As it has been stated before, Arlington's bike usage has been growing over the past couple of years.. Now another aspect that has also been growing in Arlington, and one in which the most amount of funding is put into each year is education. According to Niche.com Arlington ranks 46th out of 218 districts in MA, on top of which it received an A rating overall and an A+ in academics. According to Deputy Town Manager Sandy Pooler in his interview on, *Your Arlington Dollar*, said that, "A lot of people are moving here because of the schools." It is clear that at the heart of Arlington's community is its education and school districts, however the education is lacking in regards to its bicycle safety. Currently there is no curriculum that teaches student's how to ride a bike safely. Due to the increase of bike usage, and the increase in students (an estimated 210 by the end of FY2020), there needs to be better safety education provisions moving forward.

High Traffic and Motor Vehicle Usage

According to Data USA, 60.5% of all residents in Arlington drive alone everyday. This leads to a lot of pollution in the air and produces harm to all residents. Also, high traffic areas are likely to have less bikers, and factor negatively in people's decisions to ride bikes, as it is viewed unsafe. These high rates of car usage limit the town from achieving cleaner transportation as well as safer transportation.



Number Of People Passing on the Trail



Lack of Enforcement

Law enforcement is a huge part of ensuring bicycle safety, however Arlington has struggled to enforce proper law enforcement with biking. On Nov. 15th, I collected data on certain users of the the minuteman bikeway, and under my observations in two hours, only saw 1 cop in my vicinity, and it was during a slower period in the late morning. The most interesting thing I found is that in the time I was there, you were 3X more likely to see a baby stroller than a cop during some of the busies times of the day.

Title XIV, Chapter 90 Section 1B

Under this provision in **Massachusetts General Laws**, it states that *“Motorized bicycles may be operated on bicycle lanes adjacent to the various ways, but shall be excluded from off-street recreational bicycle paths.”*

I found this interesting, because it means that the state requires motorized bikes to be on the road, not on paths. However, in Arlington, many people take their Electric bike s onto the bike path, and no enforcement takes place.

Overcrowded Trails

Despite Arlington’s access to the Minuteman Bikeway, Many residents have complained about people using it as a multipurpose trail rather than one strictly for biking. This creates a lot of traffic for everyone using the trail, especially bikers who are constantly needing to adjust their pace and momentum in order to avoid crashing. As of right now, Arlington doesn’t have any road or path that is bikes only., which means that bicyclist are constantly sharing lanes with people. After crunching some numbers from reviews on Trip Advisor, about 71% of all reviews mentioned in some way that the trail was either busy, they were using it for something not related to biking, or they mentioned having to obey “Rules of the Road.” Even many people who would give the trail a perfect 5 out of 5 stars still were part of that group of people, with one person even claiming that she was nervous at first.





tomaqua
Boston,
Massachusetts

126 36

Reviewed February 7, 2016

great for inline skating

Many folks ride their bikes on the minuteman trail but I find it too crowded with too many full stops at intersections. BUT, it is great for inline skating. I start in the parking lots just off Harwell Ave in Lexington and skate in to Alewife and back. I think it's about 15 miles. The return to lexington is just a bit uphill. Stop into Ride Studio cafe for a nice coffee!

Show less

Date of experience: September 2015

Ask tomaqua about Minuteman Trail Bikeway



dennisw574
Loda, Illinois

44 18

Reviewed September 5, 2017 via mobile

Dodgeball

The Minuteman is a nice paved trail. But it is heavily used. Riding it is like playing dodgeball due to all the different type of people on it...hi speed serious cycle JoJo's, walkers, parents with strollers, little kids on bikes.

We are normal cyclists...we like to run 12 to 15 mph. This is not the place for that.

In fact, I think it is one of the most dangerous trails I have ever ridden due to the high traffic and highly variable users. So if you ride it, be careful!

We did enjoy the Uncle Sam exhibit in Arlington and the Lexington battle green.

Show less

Date of experience: September 2017



Ask dennisw574 about Minuteman Trail Bikeway

1 Thank dennisw574

This review is the subjective opinion of a TripAdvisor member and not of TripAdvisor LLC.



8umble8ee
Braintree,
Massachusetts

62 51

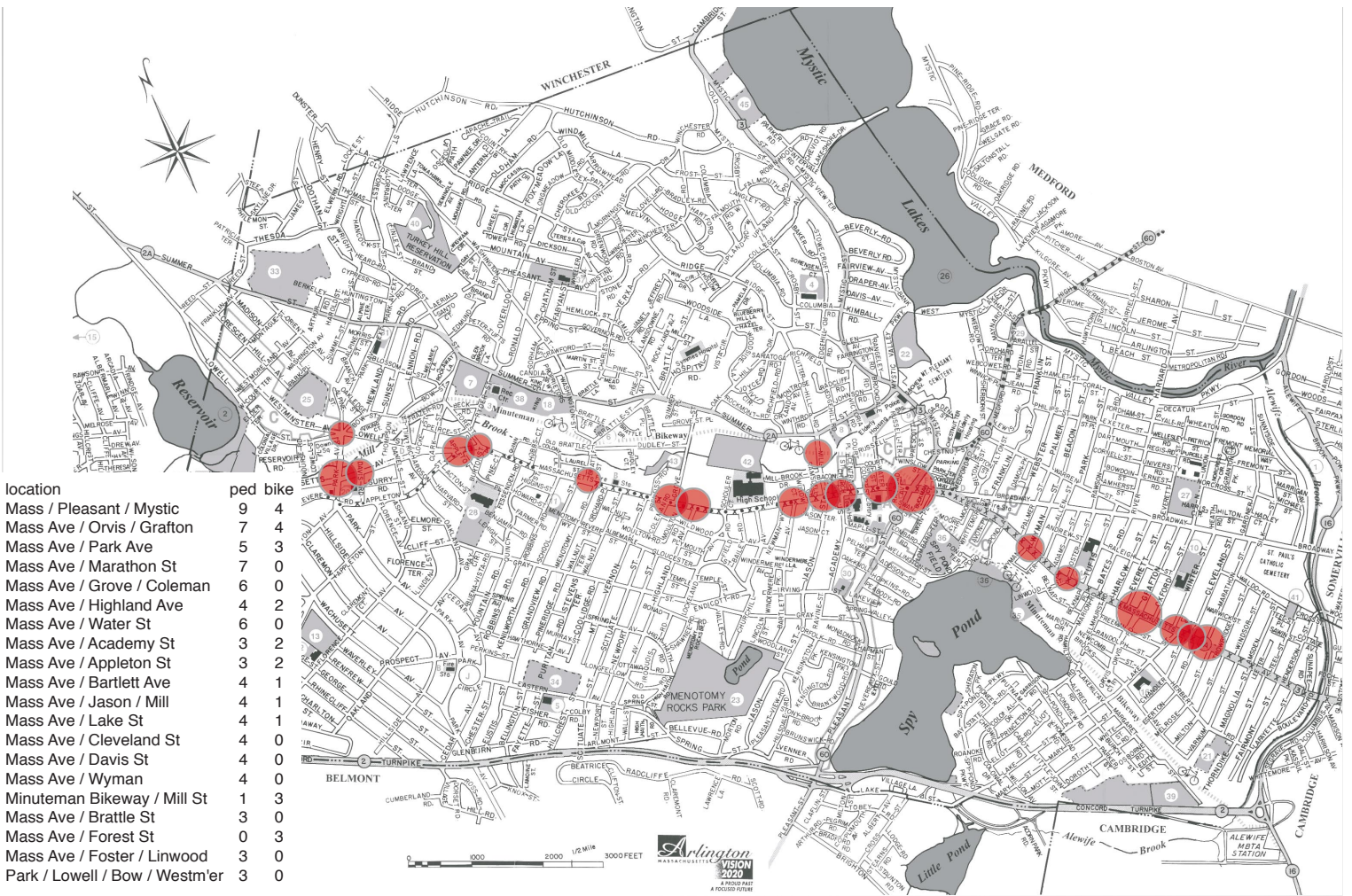
Reviewed October 22, 2013

Nice place to walk, too many people to really bike.

This is a great place to go for a walk rather than trying to bike. During peak hours, such as mid morning on a beautiful Saturday, there are lots of strollers, kids, dogs, elderly folks enjoying the day. So you really need to be careful riding your bike, especially if you enjoy riding fast! This is NOT the place to ride FAST! It's a great place to just relax and go for a leisurely ride.

Show less





Notes:
 1. Crash information comes from summaries of motor vehicle /pedestrian and motor vehicle / bicycle accident reports filed with the Commonwealth. It does not include pedestrian or bicycle falls, or collisions where no motor vehicle was involved. It covers the 12 years from 1990-2001.
 2. This chart shows the 20 "hot spots" with 3 or more reported crashes; it does not depict all crashes that occurred. These "hot spots" account for approximately 36% of all reported motor vehicle / pedestrian crashes and approximately 18% of all motor vehicle / bicycle crashes.

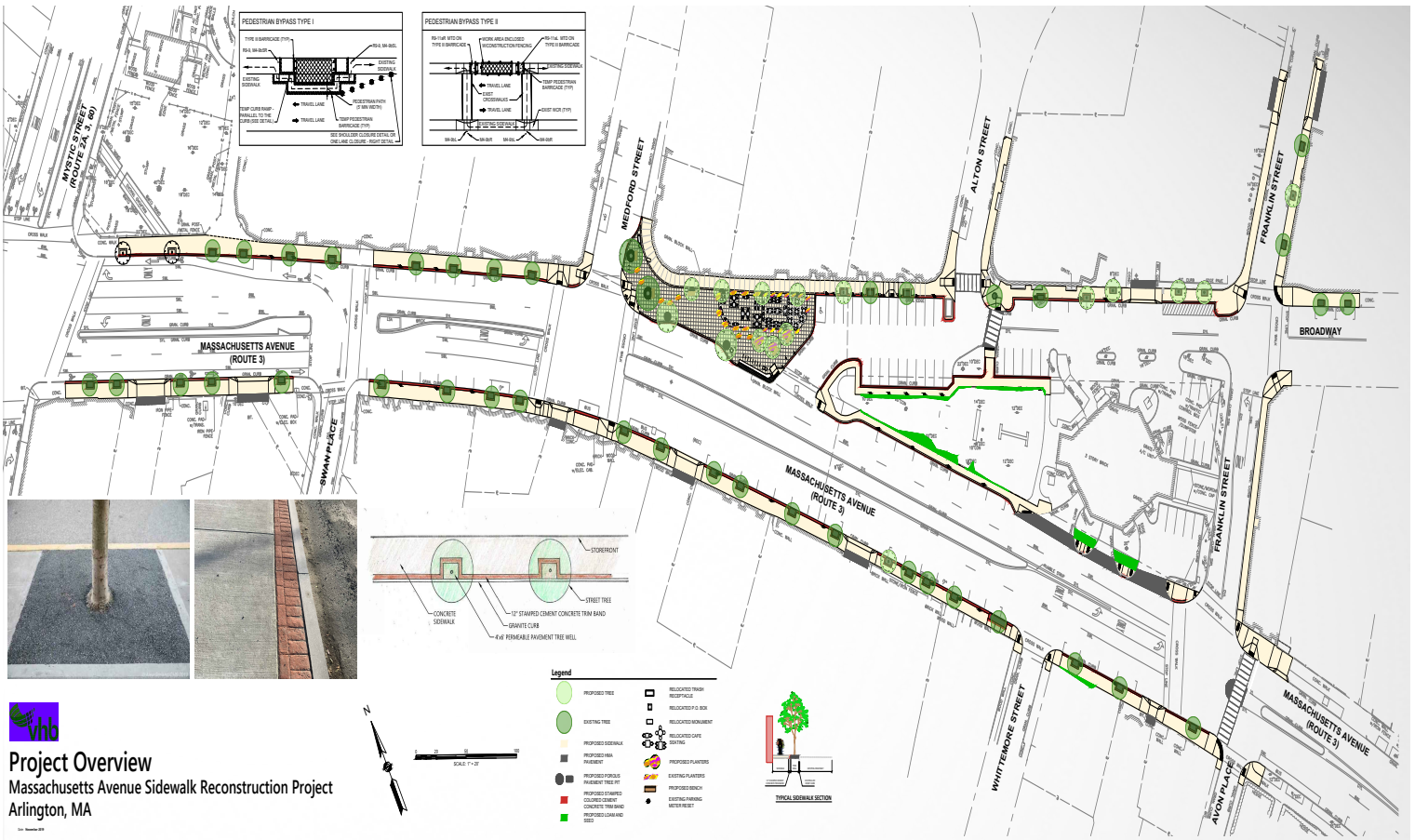
Pedestrian & Bicycle Crash "Hot Spots" Town of Arlington (1990-2001)



Accidents

The worst problem, and obviously the most dangerous as well is accidents. Arlington doesn't have many bicycle accidents, but with the rising number of people biking, the more secure and well maintenance bicycle infrastructure needs to be constructed. Looking at the figure above, you can see the "Hot Spot" data in Arlington, MA. Analyzing the crash data, one can see that almost all of the accidents from (1990-2001) take place on Mass Avenue, the town's busiest stretch of road. The largest cluster of accidents takes place right after the Mass Ave & Broadway connection. This area is where majority of the listed accidents occurred, with the highest concentration of accidents happening one block down at the Mystic and Mass Ave intersection.

So how can Arlington start to prevent all of these problems and accidents? Well, I don't think its any governments job to be able to fully prevent danger, nor do I think it is feasible. However, there are certainty safety measures and plans that can be initiated in order to achieve Arlington's goal at providing proper bicycling safety. One current initiative that the town has planned to start construction on in the Spring of 2020 is the Massachusetts Ave Sidewalk Reconstruction Project.



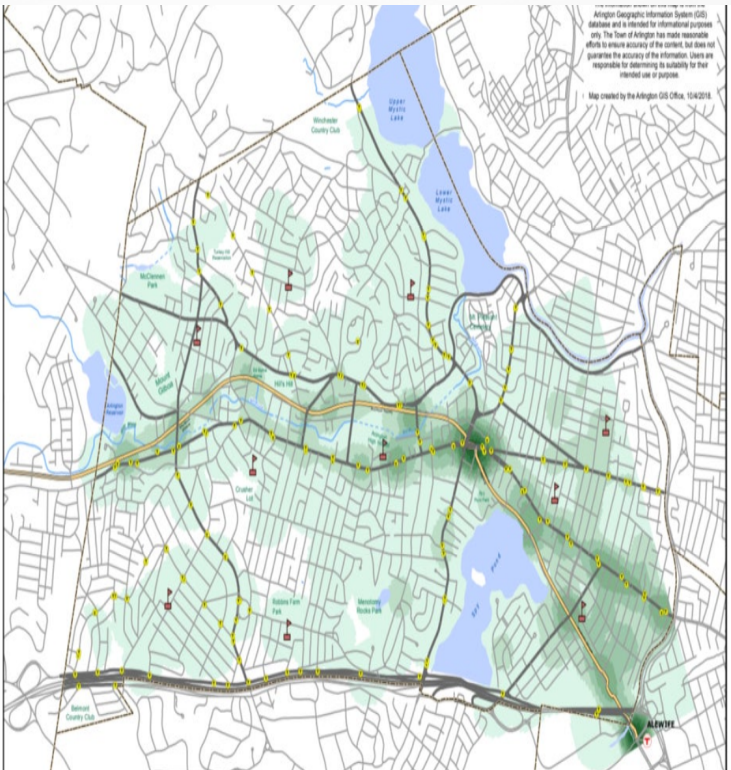
Massachusetts Avenue Sidewalk Reconstruction Project

This project is the current Department of Planning and Community Development's attempt to fix the deteriorating sidewalks in the center of the Town. The current plan calls for the installation of a whole new sidewalk, and a trip of trees lining both sides of the road along the intersection of Mass Avenue and Broadway. The budget for the plan has not been released, but enough funds have been allocated to do an entire restoration of Broadway Plaza as well.

Trip Start Locations
 July - September 2018
 Arlington, MA

LEGEND

- High Activity
- Low Activity
- Trip Start Location
- MBTA Bus Stop
- MBTA Alewife Station
- School
- Major Road
- Public / Private Road
- Minuteman Bikeway
- Brook / Stream (surface)
- Brook / Stream (subsurface)
- Water Body
- Town Boundary



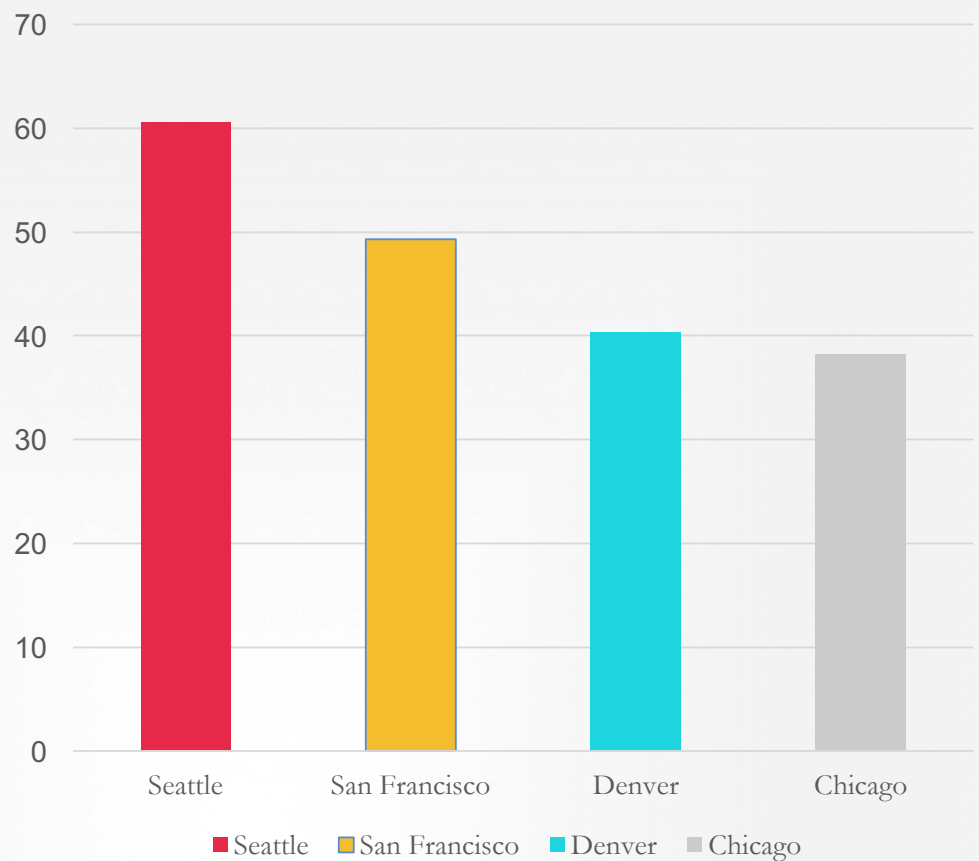
Lime Bike Usage Rates

The current Lime Bike usage map shows that the majority of people riding the pay-to-ride machines are starting their trips at the Mass A ve. and Broadway connection.

Now putting all of this data together, it is clear that the this intersection is the hottest spot for both accidents, as well as Lime Bike users. With the growing trend in Lime Bikes, that in intersection is going to end up getting to steadily get more congested. This is imperative information when it comes to addressing the issue of bicycle safety. Now that Arlington has already allocated funding for a sidewalk restoration in this high traffic area, it should also start considering the implementation of a separated bicycle lane.

Separated Bicycle Lanes

Percent Drop In Fatal Crash Rates Over 13 years



Proposal

In order to ensure the safety of all citizens, and achieve in Arlington's mission at providing beneficial transportation reform, I'm am proposing to institute a separated bike lane as part of Arlington's Sidewalk Reconstruction project. This would require the town of Arlington to put together enough funds to create a separation between the road, and the newly renovated sidewalk. In result this would eliminate the current parking spaces on the Mass Ave. and Broadway intersection.

I believe that this proposal is reasonable, and many of the funds would come from the unnecessary amount of trees that are a part of the current reconstruction document. Trees are excellent for creating a better atmosphere in downtown Arlington, but they should not be valued over necessary safety infrastructure. The Bicycle Program safety document, states that the Arlington Bicycle Advisory committees as well as the transportation advisory committee have already endorsed the idea of an all new road design, if it would provide a good alternative to sidewalk riding. Sidewalk riding is only one of many issues and concerns that would see a tremendous decrease if this proposal were to be installed. Bicyclist would have their own lane, and it would eliminate a lot of trail overcrowding, as bikers would have a space only for them.

According to a thirteen year long study, researchers at the University of Colorado Denver and the University of New Mexico discovered cities with protected and separated bike lanes had 44 percent fewer deaths and 50 percent fewer injuries on the road than the average city. Fatal crash rates dropped 60.6 percent in Seattle, 49.3 percent in San Francisco, 40.3 percent in Denver, and 38.2 percent in Chicago over the same period as cities added more protected and separated bike lanes. Many of these results are explained as previous systems of shared motor vehicle-bike lanes becoming safer through proper safety infrastructure policy. Interestingly enough, the same study reports that just painted bike lanes have no improvement on safety, and that shared lanes in cities actually have a negative impact towards safety. The painted marks are linked to giving both drivers and cyclist false senses of security, and in doing so, more injuries are a result.



Currently in Arlington

- ❖ Currently in Arlington bike lanes are majorly shared lanes with motor vehicles.
- ❖ Lanes with barriers are proven to be exponentially safer than those with just paint.

Proposed Plan

- ❖ The goal is to have an installation of a separated bicycle lane stretch down the entirety of Mass Avenue, starting with the at the Broadway Mass Ave, connection in the Sidewalk Reconstruction Plan.



More Opportunity

Not all safety can be solved with just one proposal or reform. With that being said, I want to address some other forms of reform that could aid in cyclist safety.

Increasing Ride-Share Usage

- ❖ Arlington has already seen first hand how publicly accessible bikes can increase the growth of cycling. The town would benefit from providing more options for pay-to-ride cycling especially Blue Bike, which has hubs in almost all surrounding areas, but not Arlington.

Tax Incentives

- ❖ One possible reform, that is rather new, would be to provide tax incentives for local residents that choose to commute to work through cycling. This is currently being tested in the Netherlands, where riders are given a \$.22 tax credit for each km traveled.

Education

- ❖ Informing all people on proper cycling protocols would establish a knowledge base and make everyone more aware of cyclist in the road.
- ❖ Establishing youth education programs to teach underprivileged kids how to ride a bike, would help the community as well as provide proper education.



All of these Reforms work at getting more people on the road cycling. The reason for this is that statistically areas where more people bike, there is less injuries/accidents on the road.

Conclusion

Bicycling is a rapidly growing means of transportation not only in Arlington, throughout the entire US. With that Arlington needs to ensure that the proper safety precautions are being taken to meet the needs of the people. Through the installation of Separated Bike lanes as well as other suggestions outlined in this paper, not only will safety be improved, but the separated lanes will lead to an increase in overall bike usage. Statistically it has been proven that the more people who ride bikes, the safer biking becomes, meaning, the safer biking becomes, the more people will ride bikes. Therefore, this proposal will not only make Arlington a safer area to bike, but it will also make it a more secure community of active and healthy people.

So what will Arlington do? Will it address the need and growing demand for bicycle safety, or will it be passive and wait for an accident to happen?

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