Bikeshart Report

Report

An **Action Plan** for the
University of Delaware
and City of Newark

By Thomas S. Benson

When August 2022

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Note: The associations beside each name reflect the associations held at the time of contribution, not the time of publication.

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Executive Summary

This Report and Action Plan concludes that a bikeshare program is feasible for the City of Newark and University of Delaware, but that such a program will likely not be successful without appropriate bicycle infrastructure. The infrastructure plays a critical role in ensuring the safety of cyclists—most notably with segregated bike lanes—which, in turn, encourages people to choose to cycle. With a bike network completed in phases, starting with the inner-most roads in Newark and then gradually expanding outward and into neighborhoods, a bikeshare program with docking stations can be deployed to further promote cycling and all its associated benefits. Ultimately, changes in infrastructure and culture to promote cycling are essential in supporting the broader transition in the U.S. to a low-carbon economy and to aid the City of Newark and University of Delaware in becoming more sustainable.

The Action Plan segment of this Report is split into two chapters. The first chapter (Chapter 5) is centered on goals and recommendations. There are five goals, and each goal has several recommendations that should be adopted and considered in the City of Newark's forthcoming Bicycle Plan. The first goal focuses on creating a citywide bike network, the second goal focuses on creating safer conditions for all cyclists, the third goal is about making biking accessible by making it more affordable and convenient, the fourth goal is centred on greening the city to further promote cycling and improve quality of life, and the fifth goal is about monitoring and measuring progress. The second chapter (Chapter 6) of the Action Plan is related to funding, which briefly identifies opportunities for grant funding, private funding, public funding, and bikeshare-specific funding.

The introduction of this Report begins with What's the Plan? (Chapter 1), which outlines the timeline for this Report and how it was created, including the consensus established by the Bikeshare Committee, the methodology for this Report, Newark's bicycle-related planning history, and recent and current bicycle-related developments in Newark. In the next chapter, City Conditions (Chapter 2), demographic data, transportation data, and aerial data for the City of Newark are drawn upon to generate a profile. The third chapter, Existing Research (Chapter 3), assesses existing academic literature and studies across several themes, including the legitimacy of cycling, mixed-use development and innovation, equity and health benefits, financial benefits and opportunities, sustainable development opportunities, and the COVID-19 pandemic. Comparative Cases (Chapter 4) is the second half of the examination of existing literature and studies, and it analyzes both the successes and failures of bikeshare programs and bike infrastructure. It does this by first examining cities and then universities, and includes student, faculty, and staff population for the sake of comparison, where the data exists.

Moving forward, this Report also stresses the need for collaboration between appropriate stakeholders and to capitalize on the strengths of these stakeholders, be it research, outreach, communication, public surveying, grant and report writing, hosting meetings, city and county planning, and infrastructure development. Additionally, this Report calls for consistent transparency in decision-making. By collaborating with appropriate stakeholders, opportunities for engagement can be disseminated through various networks that help to achieve buy-in from stakeholders across the spectrum, from students, faculty, and staff to residents, city, state, and county planners, non-profit organizations, community groups, and local businesses.

At the end of the Report, there are Resources, FAQs, and Endnotes.

Prologue

Thomas S. Benson, University of Delaware

There are many motivations for creating a Bikeshare Report and my reasons are varied. As a PhD Candidate, my job is to identify gaps in academic literature and fill them – to explain why phenomenon occurred the way that they did and account for the vast number of variables that may or may not have led to some processes to produce the outputs that they did. This snapshot of academia not only speaks to the value of social science as a whole, but also what is missing. While social science scholars are brilliant in unearthing why people vote the way they do, how climate change affects food and water insecurity, and the relationship between democracies and peace, they rarely have the option to inform policy and decision-making that affect voting practices, climate change prevention, mitigation, and adaptation, and the tinkering of political systems.

Through my own academic research—which focuses on urban sustainability, cities, climate security, and community engagement—city officials have called for greater levels of collaboration with academics. An ever-so-slight turn in social science research toward civically-engaged studies and increased levels of community engagement—especially with communities affected by our research—has led to some improvements in applied social science being rewarded. Nevertheless, tenure-track positions are often granted on the basis of the number of academic publications in highly-ranked journals, and less so excellence in teaching, community engagement, problem-solving-oriented research, or relationship-building with local stakeholders. In turn, this Bikeshare Report recognizes the diligence and dedication of those who contributed to this Report and made it a reality, including Leann Moore (Executive Director of The Newark Partnership) for their partnership with me and the University of Delaware's Community Engagement Initiative (CEI). Without Leann, the CEI, and those who spared their time to participate in Bikeshare Committee meetings, this Report would not have been possible. Additionally, I would not be where I am today without the critical support of those who have given me opportunities to participate in professional development programs, especially as a first-generation student.

From 2017 to 2019, I acquired a Masters in Political Science and International Relations and by the end of Spring 2023, I will have achieved a PhD in the same field. Since 2020, I have conducted 75 research interviews with city officials—city councillors, Chiefs of department, and policymakers—and, to a lesser extent, with academics, non-profit leaders and experts, planners, journalists, and activists and community organizations. Each of these interviews provided me with insights into how local governments operate, interact with diverse entities and stakeholders, and can govern themselves to be more sustainable, smarter cities. I have also published and presented research regarding climate insecurity, local citizen participation and community engagement, community solar, and diversity, equity, and inclusiveness in higher education. Furthermore, my work has been recognized by Princeton University (Princeton Dissertation Scholar), the Aspen Institute (Future Climate Leader), the Environmental Defense Fund (Climate Corps Fellow), the National Civic League (Carl H. Pforzheimer Jr. Fellow), the University of Delaware (Dissertation Fellow), and the Association for the Advancement of

Sustainability in Higher Education (AASHE Sustainability Change Leadership Development Program).

In 2017, when I started the PhD program at the University of Delaware, I never envisaged that I would be where I am today. It has been through hard work, perseverance, and support that have led me here. Most notably, my academic advisor, Dr. Benjamin E. Bagozzi, has been superb in supporting my endeavors and celebrating my achievements. In this vein, I implore city officials, non-profit and business leaders to continue to call upon universities for collaboration to advance progress toward shared goals. Similarly, I encourage academics, staff, and students to proactively seek out these opportunities and answer these calls for engagement. It is a two-way street and, as a collective, we can draw on one another's strengths and leverage our expertise to achieve desired outcomes.

Ultimately, we—as a community—need to be bold and make choices that improve quality of life for everyone and our natural environment. **The power predominantly lies in our hands to bring forth a new positive impact** on Newark and the University for the present and foreseeable future. We need to harness this power and collaborate with diverse stakeholders to enact decisions that turn these creative ideas into an enduring reality.

Thomas S. Benson.
August 2022.

Leann Moore, The Newark Partnership

As the Executive Director of The Newark Partnership (TNP), I am thrilled to have the opportunity to partner with Thomas to think through the feasibility of a bikeshare program, but, perhaps more importantly, to evaluate our current bike infrastructure in the City of Newark. **TNP works to showcase Newark, DE as the best place to work, live, and play.**

Newark is known as a university town with an incredible park and trail system, as well as a community of avid bicyclists. While Newark is already relatively walk-and-bikeable, there is always room for improvement. The City has historically been thoughtful in how we develop and redevelop our City streets, and this Report compliments that work with sustainable recommendations for the future. In addition to thorough, exceptional research on best practices, this Report also outlines funding mechanisms to kickstart the process.

TNP is excited about the future of cycling in Newark and looks forward to working with all stakeholders to implement these recommendations in a way that is beneficial to all.

Leann Moore.
August 2022.

1: What's the Plan?

This chapter outlines the chronological timeline in which this Bikeshare Report was created, in addition to the consensus achieved by the Bikeshare Committee, the methodology for this Report, Newark Planning History related to cycling, and recent and current developments regarding bicycle-related changes.

Timeline of the Plan

The University of Delaware has a Graduate Student Government in which representatives ('Senators') from each graduate degree program meet monthly to discuss the latest developments and propose changes that the University should embark on.[1] In March 2021, as Senator of the Political Science and International Relations department, I—with the support of Graduate Sustainability Committee, which I chaired since September 2020—presented 'legislation' that called for the establishment of an accessible bikeshare program that would promote the City and the University as bicycle-friendly. This legislation passed unanimously. In June 2021, the University's Faculty Senate charged me with forming a Bikeshare Committee to begin assessing the degree of interest in a Bikeshare Program in Newark. In August 2021, I formed this Committee after inquiring about initial interested parties, and it ran through to December 2021, with representatives from the University (Parking and Transportation, Student Life, undergraduate and graduate students), TNP, Newark Planning Commission, Newark City Planners, the Wilmington Metropolitan Planning Organization (WILMAPCO), Bike Newark, and the Newark Bike Project.

In Fall 2021, I authored—with the support of many others—the University of Delaware Graduate Environmental Sustainability Report that called for further inquiry into the feasibility of a Bikeshare Program in Newark, as well as the establishment of cycling-friendly awareness campaigns and an increase in cycling secure racks and lockers.[2] Later in Fall 2021, I contributed to the University of Delaware's Executive Sustainability Plan (published in Spring 2022), which called for the promotion of a bike friendly community, including more bike lanes, a bikeshare program, and a League of American Bicyclists' assessment of Newark.[3]

In June 2022, the effort to complete the Bikeshare Report was resurrected by myself, with the support of the University of Delaware's Community Engagement Initiative and TNP's Leann Moore.[4] This Report went through iterative drafts, in which community input was provided through the Bikeshare Committee and through existing public survey data from previous reports, plans, and strategies in Newark and New Castle County. Additionally, on August 10, 2022, this Report was presented at the Community Engagement Initiative Summer Scholars Symposium and comments, where appropriate, were incorporated into this Report.

This Report was published on August 19, 2022.

Consensus

Over the course of several Bikeshare Committee meetings—from August to December 2021—a foundational consensus was achieved on essential elements of a bikeshare program in Newark. These included:

- A bikeshare program needs to be accessible, safe, secure, convenient, and sustainable.
- The local community should be presented and perceived as bicycle-friendly.
- Bicycles are a legitimate form of mobility that can co-exist with pedestrians, cars, and public transport.
- The benefits for bicycle-friendly infrastructure and cycling are well-established.
- A docked bikeshare program is preferable to a dockless one given that the latter can suffer from increased maintenance costs and be a source of public nuisance.
- Infrastructure developments, including the creation of a bikeshare program, need to coincide with strong and clear public messaging that these changes are beneficial to everyone.
- Hotspots and nodes need to be identified where it would be helpful to place docking stations, storage, and maintenance facilities (e.g. air pumps, repair stations).
- A combination of pedal bicycles and e-bikes would be ideal to meet the diverse needs of users and potentially negate the need for showers for commuters using pedal bicycles, but e-bikes cost more.
- Bicycles – perhaps pedal bicycles alone – should be free for a certain period of time (e.g. 15 minutes, 30 minutes, 1 hour) to promote accessible cycling.
- Students and residents who are recipients of aid or assistance (from the university or government) should have fees waived. Students with families could receive discounted access to bicycles (e.g. cargo bicycles, two-seat bicycles).
- A work-study program or financial aid program could be established to promote student internships with the Newark Bike Project.
- Bike infrastructure must be appropriate and safe for a bikeshare program to be successful.

It is worth emphasizing that this is not an exhaustive list, but it demonstrates a starting point from which a bikeshare program and changes to Newark can sprout and evolve from. However, the benefits that are associated with bicycle-friendly infrastructure—such as a healthier natural environment, reduced emissions, increased physical health, reduced car accidents, equitable mobility options, enhanced safety, increased opportunities for socialization, convenience in travel, business benefits through heightened traffic, and improved city and university image—are outlined in *Chapter 4: Literature and Studies*.

Methodology

This Bikeshare Report is informed by a diverse array of stakeholders and sources. Many of these stakeholders are listed on the first page of this Report, and each of them kindly volunteered their time to share their expertise and insights into exploring the feasibility of a bikeshare program in Newark. In addition, they supported the assessment of existing conditions and infrastructure and potential changes that would need to occur *before* a bikeshare program would be established. Moreover, this Report draws on existing academic literature, journalistic accounts, non-academic research, and city reports that speak to the topic of bicycling (infrastructure, culture, benefits, drawbacks, bikeshare programs). Finally, it also draws on comparative cases with other cities and universities that have implemented bikeshare programs and made infrastructure changes to accommodate cyclists which, in turn, help to further inform the goals and recommendations proposed by this Report.

Newark Planning History

In May 2014, the Newark Bicycle Committee and WILMAPCO published the Newark Bike Plan. It drew attention to a wealth of important detailed which are summarized here. Notably, the 1973 Urban

Route Bicycle System Master Plan by the City of Newark recognized the need for a bicycling network to "accommodate students, recreational riders, adults, and children." A 1996 Newark Area Bicycle Interim Report provided information on existing conditions and a preliminary inventory of bicycle facilities and recommendations for improving bicycle infrastructure. Next, a 2002 Newark Bicycle Plan provided further recommendations and an updated network of facilities were featured in the 2011 Newark Transportation Plan. Since the 2002 plan, the 2014 plan highlighted numerous accomplishments, including:

- The completion of the Hall and Pomeroy Trails.
- Installation of bike racks on Main Street.
- Implementation of a bicycle safety-checkpoint program.
- Birth of the Newark Bike Project.
- Addition of bike racks to most DART and University buses.
- Improved bike lanes on Elkton and Paper Mill Roads.

Additionally, the 2014 plan highlighted goals and objectives that align with the goals outlined under **Consensus**—such as providing safe, affordable, environmentally-friendly, and convenient bicycle routes—and stated the same **benefits, such as greater options for transport, reduced congestion, improved air quality, increased access to nature and historic resources, support for local businesses and tourism, and support of healthy and active lifestyles**. These benefits remain unchanged, and the list has only grown – the motivations for establishing bicycle-friendly infrastructure are clear. Now, the collective should be on *how* Newark achieves these changes in a community-oriented, environmentally-sustainable, economically feasible, and efficient way.

The 2014 plan also, importantly, identified obstacles to residents wanting to cycle in Newark, these include:

- Gaps in bikeways.
- Safety concerns (e.g., crashing, driving alongside cars).
- Difficult intersections.
- Congestion.
- Limited end-of-trip facilities and bicycle parking, especially in downtown Newark.
- Better maintenance of existing routes is needed.
- More enforcement of and education about bicycling laws are needed.

Related to these obstacles, the 2009 Delaware Complete Streets Policy was created to ensure that modifications to infrastructure would enable "safe and efficient access for all users" and results in **a system that is "comprehensive, integrated, connected, safe, and efficient, allowing users to choose among various transportation modes, both motorized and non-motorized**."[5] Unfortunately, like many smaller American cities, Newark's infrastructure remains car-centric and has yet to comprehensively address the concerns that were identified in the 2014 plan. However, despite financial constraints, some improvements have been made and these developments are outlined later in this chapter.

Recommendations suggested by the 2014 plan include:

- Reconfigure Delaware Avenue to include a two-way, separated bike lane.
- A bike lane from Newark High School to Orchard Road.
- Bicycle-oriented intersections with a major crossing featuring signals that include bicycle signal detection and actuation and supplemental signs with markings, and median refuge islands.
- Amenities like trailheads, public art, maps, interpretive kiosks, water fountains, bike parking, benches, restrooms, and other features to make the facility unique to Newark.

- Bike boxes to increase the visibility of bicyclists, reduce signal delay, facilitate left turns, help prevent "right-hook" conflicts with turning vehicles at the start of the green cycle, and reduce turning-vehicle encroachment into the bike lane.
- Wayfinding signs, especially at gateways where bicyclists may arrive, including the train station and bus hubs.
- Increased bicycle parking, especially at multi-family residential developments and all commercial, industrial, and institutional developments and park-and-ride lots.
- Require all schools to provide bicycle parking.
- Set a maximum duration a bicycle may be parked in the same location, where a bicycle can and cannot be parked, define what constitutes an abandoned bicycle, and specify procedures for removing and storing abandoned bikes.
- Bicycle parking should be located as close as possible to building entrances or provide signs to direct cyclists to the nearest bicycle parking location. Parking should ideally be in a covered area.
- Promote events such as Bike to Work Week and Earth Week.

In 2016, WILMAPCO, DART First State, City of Newark, University of Delaware, and Cecil Transit formed the Newark Transit Improvement Partnership (Newark TrIP) and published and adopted the Newark-Area Transit Study in July 2019.[6] This study assessed existing fixed-route bus services in the Newark area, thus featured zero mention of bicycles. In September 2019, WILMAPCO published a Transportation Justice Plan and in this plan, they found that "Bus, walking, and bicycle connectivity is generally weak across the region," and that high poverty neighborhoods and black neighborhoods were more likely to experience high rates of bicycle crashes.[7]

In November 2019, the City of Newark published the Sustainable Newark Plan, which featured several goals and themes. The second theme of the plan was that the "City of Newark is committed to sustainable land development and clean transportation" and this included "**Land-use planning that promotes compact, mixed-use, walkable, and bikeable environments—creating opportunities to walk and bicycle and spend more time outside and out of cars**." One notable bicycle-related goal (Goal 2.2.E) noted the need for coordination with Bike Newark and the University of Delaware, as well as the City Council aspiring to implement a "K-12 bicycle education program and other programs to incentivize active transportation for daily living and coordinating bicycle/pedestrian programs, including a bicycle network design and bicycle-sharing plan with the University because pedestrians and cyclists cross these boundaries between the City and the University."[8]

In May 2020, the New Castle County Bicycle Plan was produced by WILMAPCO in coordination with New Castle County, the Delaware Department of Transportation (DelDOT), municipalities, cyclists and other stakeholders. The plan recommended strategies to improve safety, access and comfort of bicycling, prioritizes infrastructure improvements, and identifies programs and policies for education, enforcement, and encouragement in New Castle County. The central goals of the plan included: identify a bicycle transportation network; improve safety through design, maintenance, and enforcement; incorporate bicycle elements into land use planning and zoning; expand equitable access; provide bicycle access to transit; encourage parking and other end-of-trip facilities; and develop implementation and evaluation plan.[9]

In 2022, the City of Newark began the process of producing an updated Bicycle Plan, which is not expected to be completed until 2023.

Recent and Current Developments

According to the DelDOT, there are a few recent and ongoing bicycle-related developments in Newark. Visualizations and additional information accompanying these projects are hyperlinked in the electronic version of this Report.

Newark Regional Transportation Center
This project commenced in June 2017 and is expected to be completed in Spring 2023.

The center is designed to provide an improved passenger rail station in Newark where the existing SEPTA rail station is in Newark. It will provide Americans with Disabilities Act-compliant high-level platforms, expand parking, and provide significantly improved passenger amenities, including a station building with bathrooms.

More Information | Visualization

Delaware Avenue Separate Bikeway – Orchard Road to Library Avenue
This project started in Winter 2021/22 and was expected to be completed in Fall 2022, but the completion date was pushed back to Winter 2022/23. It features a two-way separated bicycle facility along Delaware Avenue between Orchard Road and Library Ave that will accommodate both eastbound and westbound bicycle travel. This project includes bicycle signals on traffic lights and painted bicycle boxes to promote cycling and add safety measures.

More Information | Visualization Part 1 and Part 2

Safe Routes to Downes Elementary School
This project started in Winter 2021/2022 and was mostly completed in Spring 2022. This includes increased signage for cyclists, pedestrians, and motorized vehicles. Parking has been restricted along a stretch of Casho Mill Road near Downes Elementary School for improved bicycle access and traffic flow since Fall 2021. New road paint and pedestrian safety islands were designed to slow motorized vehicle traffic on Casho Mill Road near Downes Elementary School.

More Information | Visualization

Elkton Road, MD Line to Casho Mill Road
This project started in Spring 2020 and aims to be completed in Fall 2022, after its original scheduled completion date in Spring 2022. This project includes a reconstructed concrete pavement and provides a third eastbound lane between Otts Chapel Road and State Route 4 (SR 4). It also provides upgraded bicycle and pedestrian facilities, including a 10 foot-wide shared-use path, meaning bikes and pedestrians will share the pavement but, for the most part, bicycles will share the roads with cars.

More Information | Visualization

Marrows Road Pathway
A technical memorandum that was revised in May 2022 showed that the installation of a shared-use path along the southbound side of Marrows Road between State Road 273 (SR 273) and Old Newark Road was considered and recommended, alongside the possible extension of the northbound right turn lane at the intersection of Marrows Road and SR 273.

South College Avenue Bicycle and Intersection Improvements
Another technical memorandum, revised in May 2022, drew attention to potential bike lanes and bicycles facilities along both side of South College Avenue, as well as the addition of a dedicated northbound right turn lane at the intersection of South College Avenue and Park Place. The bike lanes and bicycle facilities would start at East Main Street, travel southward, and end at Inspiration Boulevard/Mopar Drive. The bike lane would run most of the length of the segment, but sharrows would be used—given limited space—at the northern end of the segment to assist cyclists in sharing the lane with automobiles.

This bicycle lane would connect the University of Delaware's central Newark campus, which houses mostly academic buildings and dormitories, to East Main Street, East Park Place, and South College

Avenue, with South College Avenue housing the University of Delaware's STAR Campus, and the Newark Regional Transportation Center.

East Chestnut Hill Road and South Chapel Street Improvements

A technical memorandum from June 2022 highlighted many proposed changes, including bike lanes on East Chestnut Hill Road and South Chapel Street, and bicycle lane striping at intersections.

Paper Mill Road/Possum Park Intersection

A technical memorandum from May 2022 suggested that bike lanes be added to Paper Mill Road, but not for Possum Park Road or Thompson Station Road.

Pomeroy Trail and Library Avenue

In a technical memorandum from January 2022, the creation of a two-way separated bikeway between Pomeroy Trail and Library Avenue was evaluated and proposed as one of two possible options. Within this recommendation, it was suggested that the south side of Main Street be used to install a two-way bike lane at the south side as there are fewer conflicts with large commercial development entrances. The eastern end of the separated bike lane would be at Washington Street, with an off-street, shared-use path from Washington Street to Library Avenue.

Transportation Improvement District

According to the DelDOT, a Transportation Improvement District (TID) is defined as "A geographic area defined for the purpose of securing required improvements to transportation facilities in the area."[10] Following the City of Newark's adoption of the Comprehensive Development Plan V in September 2016, a TID Committee was formed in September 2018 to fulfil one of the recommendations outlined in the Plan—for the City of Newark to work with DelDOT to establish an area in Newark's downtown core to create a TID. The TID Committee's kick-off meeting was held in May 2019 with a range of stakeholders, including City staff, DelDOT, WILMAPCO, New Castle County, University of Delaware, citizen-appointees, and AECOM.

In March 2022, the City of Newark commissioned a charrette—a multi-day meeting where stakeholders and citizens collaborate to draft planning and design solutions—to acquire local opinions on infrastructure and transportation in the city, and this is a part of the broader TID scheme.[11] With regard to zoning, the charrette FAQ highlighted that the City of Newark is reviewing its zoning code for potential revisions to the Central Business District and Multifamily Dwellings-High Rise Apartment Districts.[12] These districts are identified by orange and yellow, respectively, in the below charrette study area.

More Information
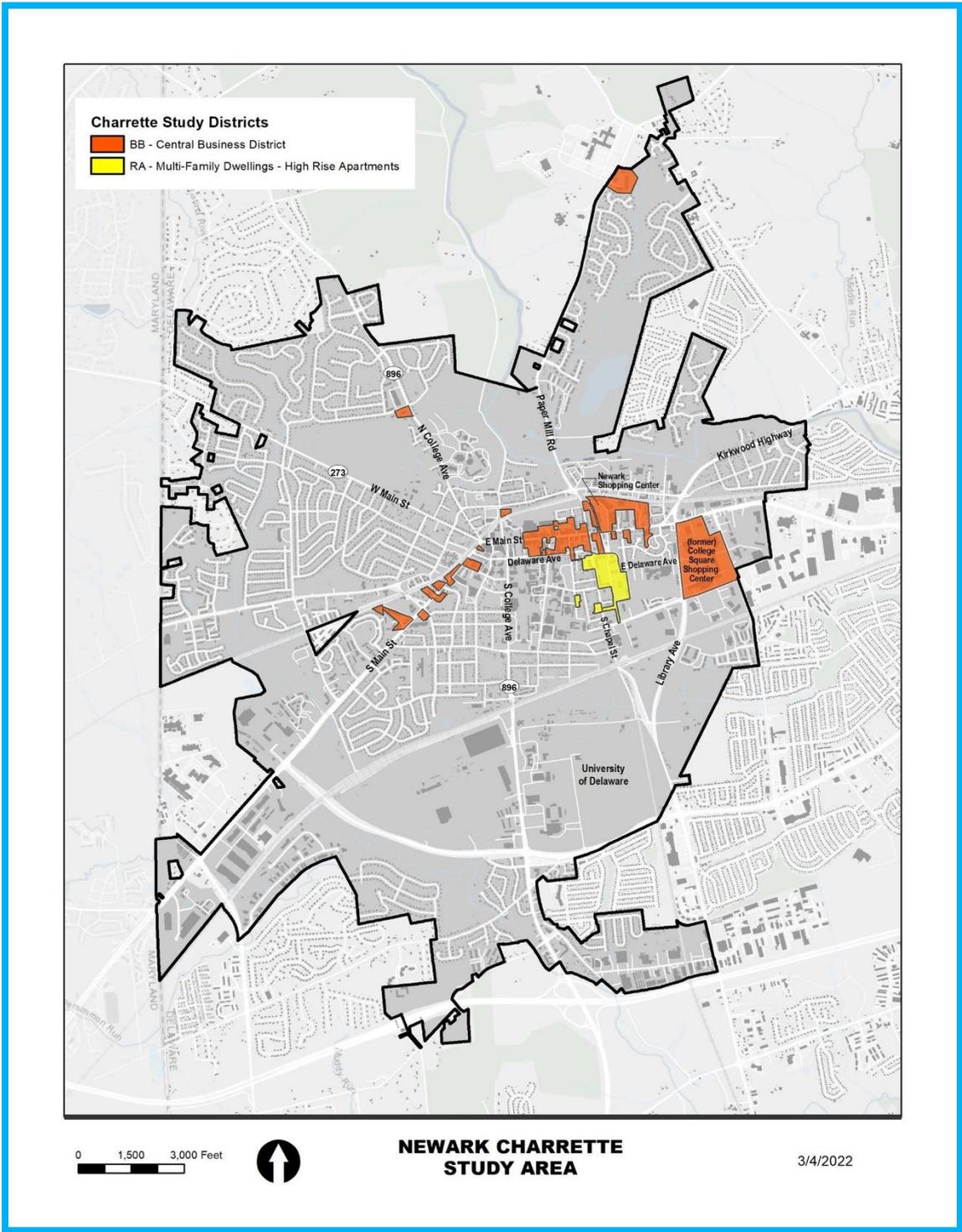
IMAGE 1: Newark Charrette Study Area.

One bicycle-related goal that derived from the TID is a commitment by the City of Newark, Bike Newark, and the University of Delaware to apply to the League of American Bicyclists (LAB) Bicycle Friendly Communities for a review of cycling in Newark. This review will, hopefully, demonstrate that Newark is a Silver Community—an increase from the City's Bronze Community status earned in 2014.[13] There are also intentions to develop an updated Newark Bicycle Plan.

More Information

2: City Conditions

This chapter presents some of the key demographic and transportation data related to the Newark to demonstrate its conditions and how they have changed over time. Given limited data availability, data pertaining to climate and topography are not provided.

Importantly, there are concerns about the capacity of Newark to replicate the observed success of many bikeshare programs in larger cities—given the comparatively smaller population and lower density in Newark. However, Newark is actively transforming low density spaces into high density spaces with new developments, especially in central Newark. In turn, **integrating bicycle lanes into high density public transport corridors aligns with a transformation that is *already* underway**. Enhanced bicycle infrastructure also aligns with planned mixed-use developments in Newark, whereby cyclists can more easily navigate between these mixed-use spaces and support local businesses.[14] Additionally, much in the same way that the expansion of freeways and highways generates induced demand, the creation of segregated bicycle lanes will likely induce demand and encourage people to cycle.

Demographic Data

Below, demographic data for 2010 and 2020 are provided by the U.S. Census Bureau and demonstrate that the population—which does not include students—has not changed significantly.[15] When incorporating the University population—using 2022 data from the University of Delaware and operating on the assumption that few reside in Newark year-round—the population increases to approximately 58,960 (18,618 undergraduates, 4,285 graduates, 710 professional and continuing studies students, 4,746 faculty and staff).[16]

TABLE 1. *City of Newark (DE) Census Bureau Data for 2010 and 2020*

	2010	2020
Population		
Population	31,454	30,601
White alone	25,906	20,494
Black or African American alone	2,094	4,609
American Indian and Alaska Native alone	53	39
Asian alone	2,245	2,774
Income and Poverty		

Public Assistance Income or Food Stamps/SNAP in the Past 12 Months for Households	318	607
Median Household Income (USD)	$53,118	$60,767
Mean Household Income (USD)	$72,653	$80,482
Transportation (workers 16 years and over)		
Means of transportation to work by car, truck, or van (drove alone)	8,579	9,335
Means of transportation to work by public transportation (excluding taxicab)	428	520
Worked outside county of residence (commute by car, truck, or van and drove alone)	1.3%	1.9%

Note: The data for transportation are based on a sample of the Newark population.

A quick assessment of the above data demonstrates that there is a marginal increase in population diversity from 2010 to 2020, a near-doubling of households receiving public assistance income or food stamps/SNAP, and slight increases in median and mean household income. Regarding transportation, the number of people who drive a car, truck, or van alone as a means to commute to work increased slightly, as did those who opt for public transportation.

Transportation Data

Drawing on data presented in the New Castle County Bicycle Plan (2020), which was pulled from the U.S. Census Bureau, the means of commuting over time can be broken down further.[17] The data presented in **TABLE 2** illustrates the mode of transportation for commuting to work between 2000 and 2018 for New Castle County.

TABLE 2. *New Castle County Commuting Patterns (2000-2018)*

	2000	2007-9	2008-10	2007-11	2008-12	2009-13	2010-14	2011-15	2012-16	2013-17	2014-18
Drove alone	79%	78.8%	78.8%	79.1%	79.2%	79.6%	79.7%	80%	80.2%	80.5%	79.9%
Carpool	10.9%	9.9%	9.7%	9.3%	9%	8.8%	8.6%	8.3%	8.1%	7.7%	8.1%
Transit	3.9%	4.4%	4.5%	4.7%	4.6%	4.5%	4.4%	4.3%	4.1%	4%	3.9%
Walk	0.7%	2.9%	2.8%	2.5%	2.4%	2.4%	2.3%	2.3%	2.4%	2.4%	2.5%
Bike	0.2%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.3%
Other	2.8%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%	0.7%	0.7%	0.8%
Work at Home	2.6%	3.1%	3.3%	3.5%	3.8%	3.8%	4.1%	4.1%	4.2%	4.2%	4.5%

The data presented in **TABLE 2** is also shown as a line graph (**FIGURE 1**) to demonstrate more clearly the change—or, more rather, lack thereof—in commuting over time.

FIGURE 1. *New Castle County Bicycle Plan (2020): Commuting Patterns (2000-2018)*
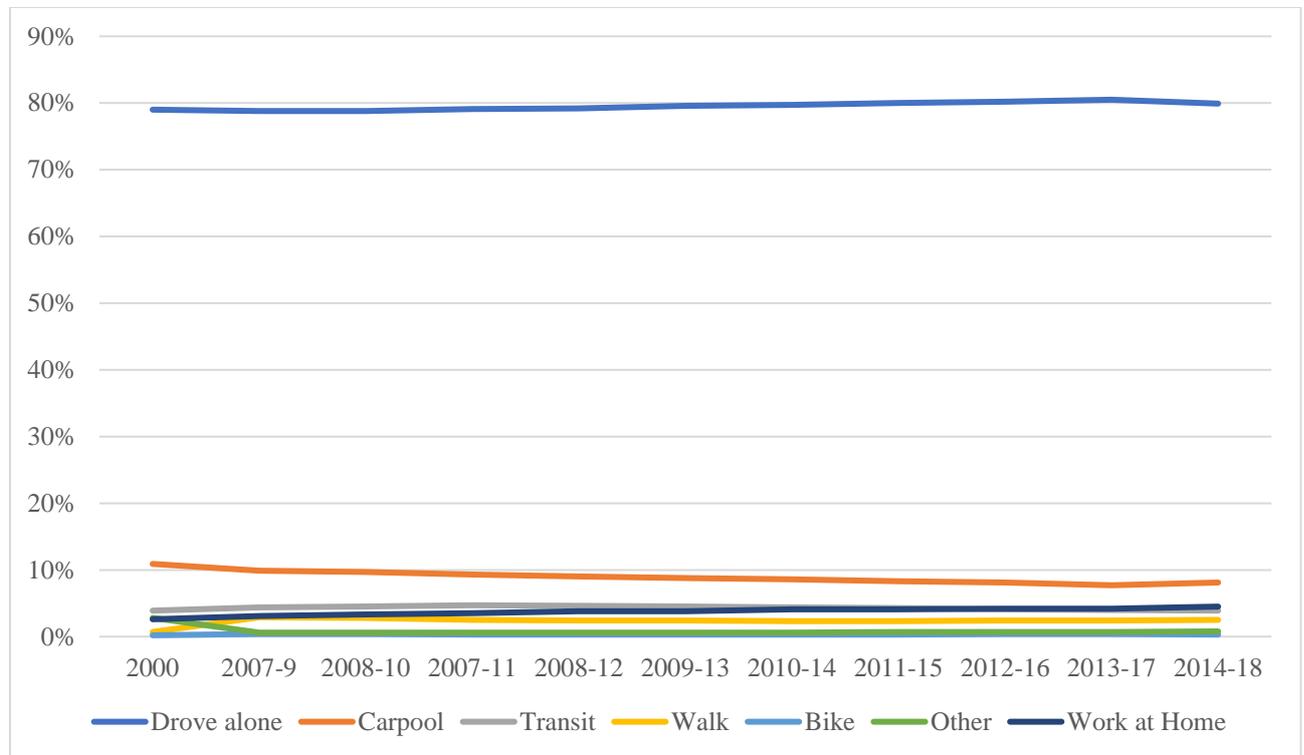
Based on the data shown in **TABLE 2** and **FIGURE 1**, the New Castle County average share of commute trips by bicycle was 0.3 percent between the years 2000 and 2018, but the data in the New Castle County Bicycle Plan (2020) also demonstrated that in many parts of Newark, there are more bicycle commuters.[18] Additionally, a 2018 Delaware Statewide Comprehensive Outdoor Recreation Plan found that recreation involving walking and bicycling are among the most popular outdoor activities. In New Castle County, household participation in walking or jogging was 84 percent, hiking was 60 percent, dog walking was 59 percent, and bicycling was 59 percent.[19] In 2014, the LAB assessment of Newark suggested that the percentage of daily bicyclists was 2.4 percent, and scored Newark the following:

- **Engineering** (bicycle network and connectivity): 3 out of 10.
- **Education** (motorist awareness and bicycling skills): 2 out of 10.
- **Encouragement** (mainstreaming bicycle culture): 3 out of 10.
- **Enforcement** (promoting safety and protecting bicyclists' rights): 5 out of 10.
- **Evaluation & Planning** (setting targets and having a plan): 3 out of 10.[20]

A 2017 Transportation Survey by the University of Delaware inquired about modes of transport among faculty, staff, and students. For graduate students, faculty, and staff, the breakdown in **TABLE 3** demonstrates how often they cycled to campus.

TABLE 3. *Graduate Students, Faculty, and Staff Bicycling Patterns to Campus (2017)*

Never	Rarely (1-3 days/month)	Sometimes (4-8 days/month)	Often (9-14 days/month)	Majority of the time (15+ days/month)
82.7%	7%	2.9%	2.1%	5.3%

In aggregating the number of those who *do* cycle at least once per month, the figure is 17.3 percent. When undergraduate students were provided with the same statement, it produced the following result in **TABLE 4.**

TABLE 4. *Undergraduate Students' Bicycling Pattern to Campus (2017)*

Never	Rarely (1-3 days/month)	Sometimes (4-8 days/month)	Often (9-14 days/month)	Majority of the time (15+ days/month)
84.5%	5.1%	2.8%	2.5%	5.1%

Undergraduate students who *do* cycle at least once per month total 15.5 percent.

For additional context, a map of the University of Delaware's presence in Newark is shown in IMAGE 2 on the next page.
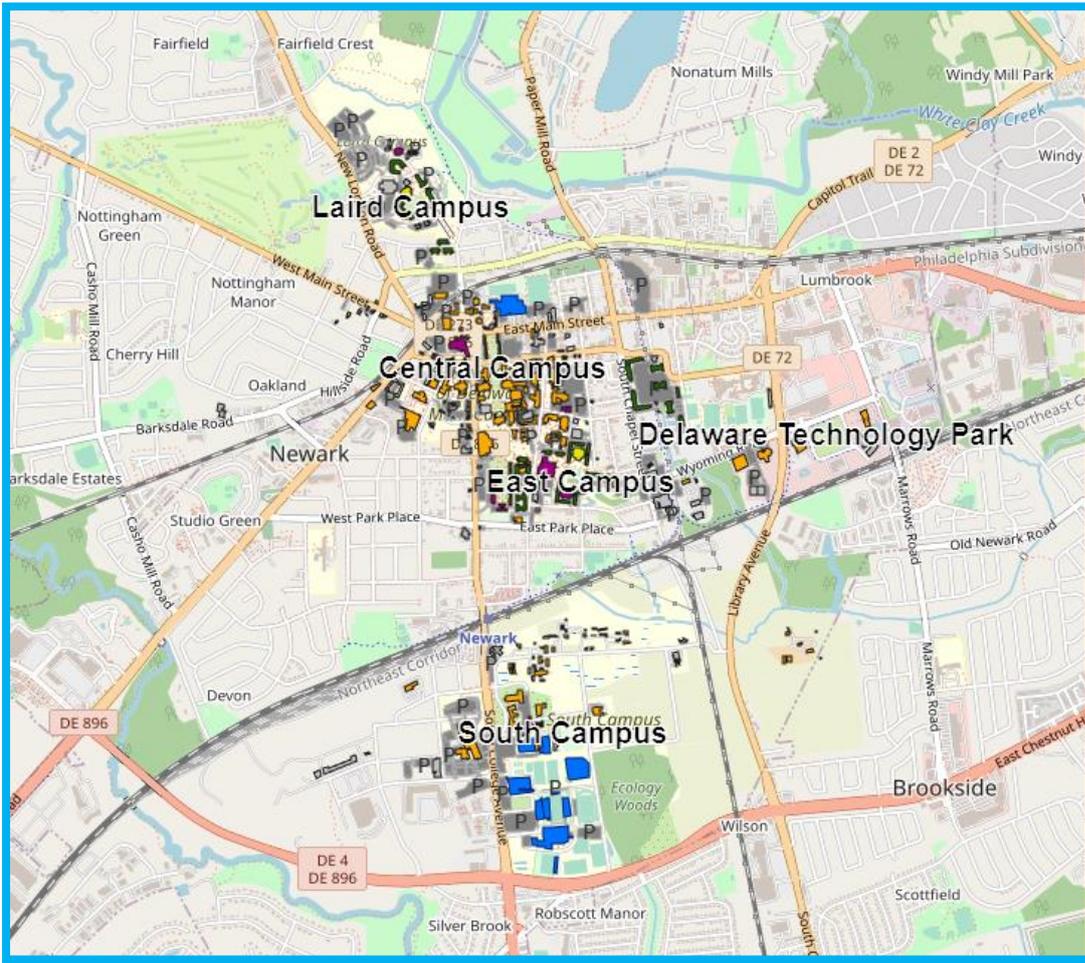
IMAGE 2: *Map of the University of Delaware's presence in Newark.*[21]

Aerial Data
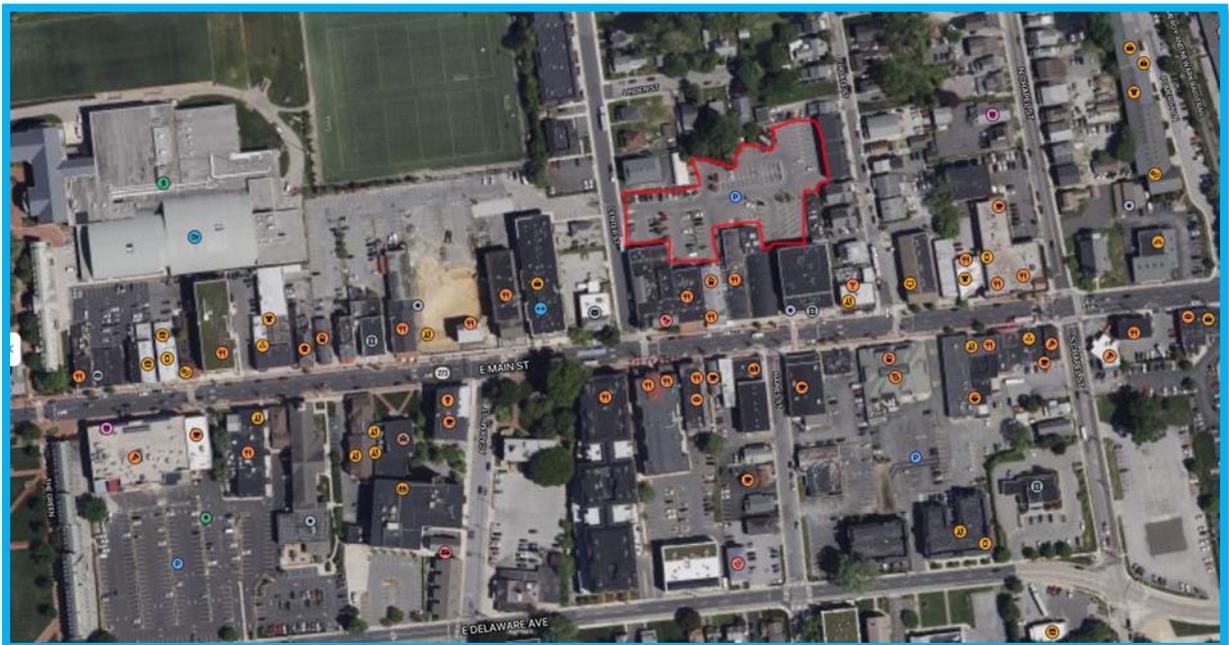
IMAGE 3: *Aerial view of Main Street, Newark, DE, taken from Google Maps.*

An aerial view of Main Street in Newark illustrates that there is ample on-street and, especially, off-street parking behind Main Street-facing properties. In one prime location on Main Street—outlined in red—Newark's City Parking Department owns and operates the parking lot. Additionally, the amount of concrete and asphalt contributes to the effects of climate change as they draw in heat, and this subsequently increases ground-level temperatures that can be uncomfortable for pedestrians, cyclists, and shoppers.

If a bicycle lane is implemented on Main Street—as one of the critical arteries of Newark—some on-street parking for cars will be removed. In turn, an opportunity to transform the parking lot highlighted in red into a multi-storey parking unit would be available, to house—at a fee—the displaced parking spaces from Main Street. On top of this, the additional spaces provided by the multi-storey parking unit could open up additional opportunities to develop other parking lots for mixed-use developments or green spaces.

3: Existing Research

This chapter is designed thematically, but it is important to understand that many of these themes are intersectional. For example, a people-first approach that promotes the diversification of urban transportation does not only encourage cycling (health benefits), but it can accompany tree planting for shade (sustainable development), legitimize non-automobile transportation (legitimacy and safety), and potentially induce investment, among many other things. Therefore, it is crucial to keep this in mind as reading the latest literature on transportation, infrastructure, cycling, and bikeshare programs.

Legitimacy of Cycling

Academic, non-profit, and journalistic accounts, overall, support changes in infrastructure that recognize the legitimacy of modes of transport outside of cars and this support extends to changes that promote cycling. David Zipper, a journalist who has written extensively for *Bloomberg CityLab*, has drawn attention to how poor transportation links act as a "tax on business productivity" as it "limits the availability to employers to match with workers, and vice versa" and reduces the leisure time gained from those with shorter commutes.[22] He has expressed criticism toward technological solutions to congestion and mobility—such as the Los Angeles Mayor Eric Garcetti's 2021 announcement supporting flying cars ("low-noise electric aircraft")—when low-tech solutions already exist, such as bicycle lanes, bus lanes, and improved sidewalks.[23]

In terms of cycling, Zipper has highlighted the integral role played by city leaders who drive innovative and cultural change, especially those who recognize that "walking and biking" are "legitimate forms of transportation." Integrating different forms of mobility also allows for public transit and commuters to overcome the "first-mile problem" of reaching a transit hub. For example, in Austin (TX), the bikeshare program was integrated with the bus network by incorporating bikeshare docking stations into new bus routes.[24]

Similarly, Pittsburgh unveiled a program, *Move PGH*, that allows users to open a single app with access to public transit and bikeshare, e-scooters, rental cars, e-mopeds, and carpooling all in one place. Pittsburgh also planned a second program, Universal Basic Mobility, that provides a free subscription package of mobility services to a few dozen low-income residents. Experts from Carnegie Mellon University and the Urban Institute were brought on board to help evaluate the progress made by these two programs, demonstrating collaboration among stakeholders and efforts to ensure inclusive and evidence-based decision-making.[25]

In Copenhagen, Denmark, bicycles were "always first to be built" and were considered an "equal form of urban transportation." This cultural value and practice continue today, as exemplified by the fact that cars must give priority to bicycles and pedestrians in

Copenhagen, timed intersections to create a green wave for cyclists throughout the city, bicycle lanes are cleared first during the winter, and bicycles can be taken on trains, waterbuses, or the metro for free to allow for complete and convenient inter-travel mobility. Even taxis, by law, are required to have capacity for two bicycles.[26]

IMAGE 4: Bicycle Bridge in Copenhagen, Denmark, with a painted bicycle lane beside pedestrian access.[27]

Generally, Stephen Yarwood—former Lord Mayor of the City of Adelaide, Australia, and urban futurists—concisely stated the legitimacy and purported benefits associated with cycling:

> *I've discovered this wonderful technology that can help you lose weight, save money and get through a city more quickly. It makes you happier, makes you live longer, and makes the city a much more attractive, cosmopolitan place. Evidence also suggests that people will even spend more money in local shops. It's called cycling.*[28]

Mixed-use Development and Innovation

The Centre for Liveable Cities (CLC) has drawn attention to the need for downtowns to "put people first," by establishing spaces that support mixed-use development and allows for residents to live rich and seamless lifestyles that connect them to "amenities for culture, recreation, and nature."[29] Diverse forms of urban mobility and associated clear signage can help to foster these changes in lifestyle and these changes ultimately mean shifting away from the dominance of cars. One way to tackle this is the requirement for drivers to purchase passes for high-traffic areas or, similarly, congestion charges that charge drivers who enter a congestion charge zone.[30]

IMAGE 5: *An example of mixed-use development from Complete Communities Delaware.*[31]

In Seoul, South Korea, one study demonstrated that the establishment of transit malls—streets in which automobile traffic is prohibited or greatly restricted with only public transit vehicles, bicycles and pedestrians permitted—were an effective solution to congestion and to increasing foot traffic.[32] Taxis were permitted only between midnight and 4am when there were no other modes of public transport, and business vehicles had to obtain approval in advance to enter the 1,804-feet stretch and were only allowed to enter between two fixed slots (10-11am and 3-4pm). On weekends, the area was fully closed to all traffic, making the mall completely car-free, and the four vehicle lanes were permanently reduced to two as a prescribed "road diet."[33] After all, congestion, pollution, and noise do not make for a great retail strip.

IMAGE 6: *Yonsei-ro Transit Mall, Seoul, South Korea.[34]*

Although congestion increased slightly on two nearby roads, the changes did not contribute to congestion in surrounding areas.[35] There were several other notable findings from this study, six months after the opening of the transit mall: (1) traffic congestion eased substantially; (2) a reduction in traffic accidents by 34 percent from the previous year; (3) an increase in bus commuters by 11.1 percent from the previous year; (4) a majority of people said they felt much safer than when both people and vehicles shared the roads; (5) visitor satisfaction rose from 14 percent in the previous year to 70 percent; and (6) businesses boomed with shoppers rising by 28.9 percent and revenues went up by 10.6 percent.[36] In the U.S., there is similar demand to close off streets to cars—sometimes conditionally, such as on weekends—to support the reclamation of streets for "communities, businesses, and families."[37] And it is safety that is paramount in many of these developments—the U.S. Department of Transportation (DoT) has suggested that a bicycle lane that is "physically separated from vehicles" can "help increase bicycle use, especially by less confident riders."[38]
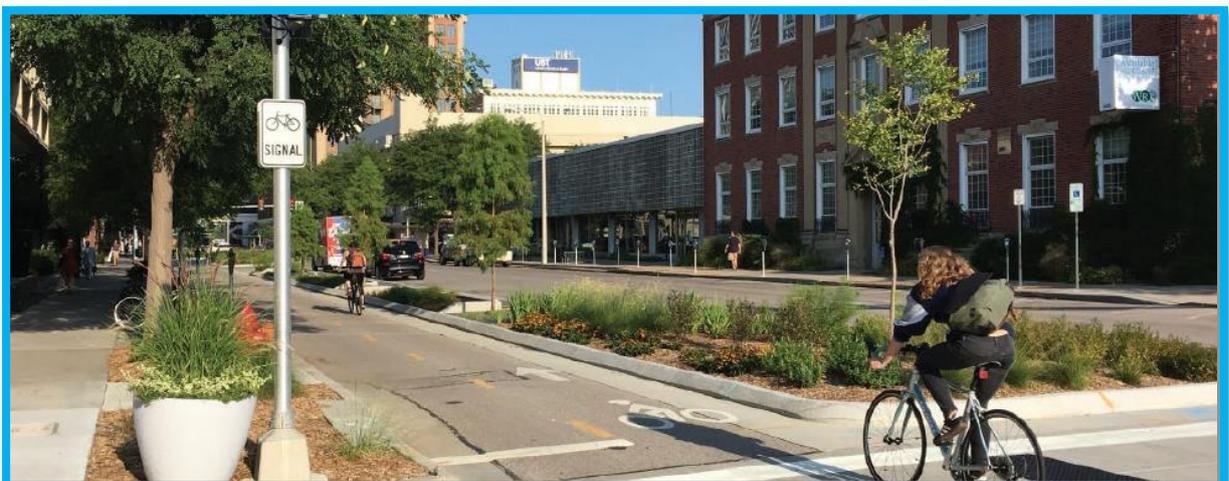
IMAGE 7: *Example of a physically separate bike lane in Lincoln, Nebraska.[39]*

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Another city, Bandung, Indonesia, introduced smaller "urban acupuncture" initiatives to nudge behavioral changes when major projects—such as light rail and cable systems—were underway, like the creation of car-free Sunday mornings on the main street.[40] In Melbourne, Australia, some streets have seen restricted private car and taxi usage to promote cycling and walking.[41] In London, UK, cycle super-highways were established to increase the accessibility of cycling.[42] In New York City, faster bus routes, protected bike lanes, bike share, and expanded and improved pedestrian space increased the city's "stature around the globe," made streets "safer and more pleasant for people," and led to more "compact and liveable" neighborhoods.[43] The Congress for the New Urbanism has also provided a Sprawl Retrofit Presentation that demonstrates, visually, the opportunities to retrofit urban sprawl and transform these spaces into more desirable places that will likely result in increased diversification of the tax base, increase housing and green space, improve public health, and better establish the city as a node in the region.[44]

IMAGE 8: Cycle Superhighway in London, UK.[45]

Evidently, there are many tried-and-tested ways to successfully boost cycling, as well as new and innovative ideas, albeit in cities much larger than the City of Newark. Nonetheless, Newark can draw inspiration from these examples and offer a test-bed for comparatively smaller cities, and there are general guiding principles that can be adopted:

1. Make cycling more convenient and efficient through a well-connected network and minimize fenced developments to reduce unnecessary detours.
2. Provide dedicated spaces for all with cycling infrastructure to increase walking and cycling.
3. Ensure visibility at junctions by designing these areas with painted cycle lanes and ample space and to allow drivers to stop to avoid collisions.
4. Maintain continuity of movement by reducing sharp bends or turns for cyclists, and by increasing travel efficiency at junctions.
5. Keep it slow by reducing motorized traffic speeds and to promote comfort and safety for pedestrians and cyclists.
6. Prioritize at-grade crossings that are simple and direct to promote continuity of movement and generate paths of least resistance for cyclists.

7. Ensure consistency in design standards and user-friendly signage to help road users anticipate traffic conditions.
8. Make it comfortable and appealing by developing bike lanes free of snow and leaves and by planting trees to provide shade.
9. Provide mixed-use developments to reduce the distance of daily commutes and provide convenient access to essential goods and services, and nature.
10. Close the loop with end-of-trip amenities through the provision of secure bicycle racks and lockers, parking, bicycle maintenance equipment and, if necessary, showers.[46]

Equity and Health Benefits

Academics have touted the health benefits of cycling and bikeshare programs. One analysis of 12 cities with bikeshare programs in Europe found that the "health benefits of physical activity outweighed the health risk of traffic fatalities and inhalation of air pollution."[47] Another study in Shanghai found that the proportion of participants "cycling for transport increased from 33.3% prior to the launch of the bicycle-sharing programmes to 48.3% 1 year after the launch," and that it was important for there to be "cycling-friendly built environments and cultural norms" in facilitating the use of bicycles.[48]

IMAGE 9: An example of bicycle culture, where cycling is a norm for many, in Portland, Oregon.[49]

Additionally, the U.S. DoT has reported that improved bicycle and pedestrian infrastructure can help address chronic disease (e.g., asthma, diabetes, heart disease), improve access to health-supportive resources, increase physical activity, improve safety, reduce exposure to transportation-related emissions, reduce motor vehicle-related injuries and fatalities, and reduce transportation's contribution to air pollution.[50] These health-related benefits, in turn, generate savings. Measured in 10 different studies, the savings range up to $1,175 per person, per year, with the median annual per capita value being $128.[51]

Equity is also an important consideration for urban development. The Chief of Harvard University Planning and Design, Purnima Kapur, has argued that most public-realm improvements and investments typically occur outside of a city's "hard-hit neigborhoods" that have "historically been left out." By boosting connectivity through "access to mass transit and personal mobility options" in these neighborhoods, a city can attract investment and deter crime (this is not to suggest crime exclusively occurs in hard-hit neighborhoods).[52] The President of Brooklyn Botanic Garden and former Commissioner of NYC Parks Department has argued that open space should be expanded in underserved communities, including transforming asphalt schoolyards into green community playgrounds, creating protected greenways for cyclists, adding new trees and benches, and expanding botanical gardens, zoos, and museums. Investment in these projects creates good jobs, improves physical and mental health, cleans the local environment and mitigates the impacts of climate change, attracts residents and businesses, and rebuilds neighborhoods.[53]

Economic Benefits and Opportunities

Research from the CLC highlights several interesting results. In one case study, the shores of the once abandoned and polluted Mapocho River in Santiago, Chile, were reclaimed by bicycle advocates, non-profit organizations, and community members and transformed into a cycling hotspot. Since 2011, annual cycling events in Santiago have been organized by the community and attracted over 30,000 people in 2015.[54] These efforts also attracted government funding for new cycling infrastructure along the river, illustrating how infrastructure does not only require funding but, once kickstarted, it can induce further investment upon demonstration of its success.

Building strong partnerships with the private and non-profit sectors through projects can generate additional financial support for local projects and initiatives. Popular examples include data-sharing agreements and platforms, and building an inventory of the city's assets. Harnessing data helps to quantify policy and partnership impacts that spur further development and investment, as well as to help raise the profile of a city through increased engagement with internal and external stakeholders.[55] By sharing data through open data platforms, new tools, resources, and research can be created that can further help cities improve their decision-making capacity.[56] In the context of cycling, data collected could be the number of bicycles owned and rented by residents, different types of bicycles (e.g., pedal, e-bike), most popular routes, and hotspots for the start and end of cycling trips, among other things. Over time, a bikeshare program and infrastructure can be refined to cater to the needs of diverse stakeholders.

Cities can also turn to federal and private sources of funding to assist in mobilizing change. At the federal level, there are often grants available through a wide variety of programs that include opportunities to invest in cycling infrastructure. Previous federal sources of funding included: Congestion Mitigation and Air Quality (CMAQ) Improvement Program; Highway Safety Improvement Program (HSIP); Surface Transportation Program (STP); Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant; and the Transportation Alternatives Program (formerly Transportation Enhancements). Private sources of funding can include developers, hospitals, banks, and philanthropy. Citizens groups, businesses, and local non-profit organizations can further assist in obtaining investment for sustainable urban development.[57]

Sustainable Development Opportunities

Many studies do not exclusively examine transportation and/or infrastructure. Instead, transportation systems and infrastructure changes are recognized as being situated within often varied geographies and interwoven with complex social, economic, and political fabrics. A common thread is understanding that transportation and infrastructure can act as societal glue that helps to bind together these different fabrics, and this includes sustainable development. Thus, the question needs to be asked: "do we want to live in a space dominated by grey concrete and steel structures, or one that includes green and blue elements?"[58] An atmosphere of imagination and of hope is critical to avoid

cities—including Newark—becoming machines that only function for their infrastructure. This means that mistakes *can* be made but that cities can learn from them—they can experiment and improve.[59]

The drive for a clear vision can support the generation of symbolic capital—the image a city has—that makes cities like Newark a desirable place for investment, for jobseekers, for businesses, to raise a family, and a good place to grow old. In turn, another question needs to be asked: "do we have good water, air, and mobility systems where we do not have to spend much time each week sitting in a traffic jam?" Positive responses to this question convey the enormous value of symbolic capital and underscore the need for investment in Newark's transportation infrastructure to be *more* than a bikeshare program, to be ambitious with a powerful and inspiring vision.[60]

Related to the concept of sustainable development is biophilia. Biophilia is the idea that humans have an affiliation to nature and is a design principle for creating sustainable and liveable cities. This is not simply planting a tree or positioning some natural material within the cityscape, but to ==create change that is experiential and emotional by deepening the level of connection that residents have with nature.== And such a transformative change in thinking requires recognition that biodiversity can be messy—"if you enjoy the butterfly, you must accept the caterpillar"—and this underlines the need to bridge the gap between human civilization and nature.[61] Too often, nature is perceived as 'out there' with urban nature often isolated in parkland, separate from the spaces people inhabit, but the more nature that cities invite in, the more they stand to benefit ecologically and economically.[62]

IMAGE 10: *An example of biophilic design with a living wall at the Longwood Gardens Conservatory in Kennett Square, Pennsylvania.*[63]

Trees, for example, can provide shade to help minimize the impact of the urban heat island effect—where buildings, roads, and other infrastructure absorb and re-emit the sun's heat more than natural

landscapes—and subsequently cool the city and encourage people to cycle and walk during warmer months of the year in Newark.[64] Additionally, retrofitting all air-conditioned buildings with painted white rooftops can reduce annual energy costs. One study estimated that painting 80 percent of all air-conditioned buildings in the U.S. with white rooftops would reduce annual energy costs for cooling by $735 million.[65]
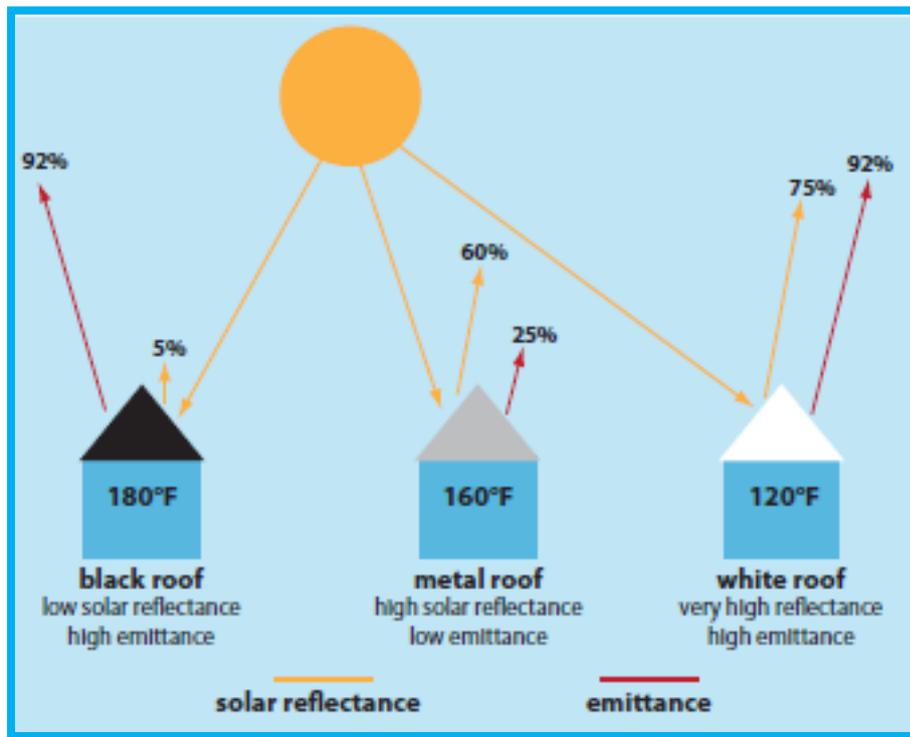
IMAGE 11: An example from the U.S. Environmental Protection Agency of the effectiveness of white rooftops in reducing energy consumption and supporting ground- and building-level cooling.[66]

Moreover, C40 is a network of mayors of nearly 100 global cities that collaborate to deliver urgent action on the climate crisis, alongside other challenges at the urban scale. Content produced by C40 has called for evidence-based decision-making that specifically draws on scientific expertise to develop climate projections specific to a city, such as Newark.[67] In the case of Newark, the city could draw on its relationship with the University of Delaware to develop consistent climate modelling to inform local decision-making about sustainability and transportation, like identifying the best places to plant trees to provide shade and reduce the urban heat island effect, the most efficient rooftops for solar gain, and to generate an inventory of the city's assets.

COVID-19 Pandemic

The DoT's Bureau of Transportation Statistics (BTS) has data on bikeshare and e-scooter systems in the U.S. (last updated February 2022). These data include docked and dockless systems and are limited to systems that were in existence from 2015 to 2020. The BTS stated that the total number of cities served by these systems declined from 2019 to 2020 due to many cities suspending their operations or closing permanently in response to the COVID-19 pandemic. However, this was part of a broader trend across all forms of transportation slowing down in response to COVID-19—these systems were not the only to suffer.[68]

IMAGE 12: *Seattle has three dockless e-scooter share permits for its 2022-2023 permit cycle. These permits are for Bird, Lime, and LINK.[69]*

In 2020, 66 docked bikeshare programs were open to the public and, on average, there were 100 docking stations operated by a system, with the largest being Citi Bike serving New York City and Jersey City, with over 1,000 stations. In 2021, the total number of docked bikeshare programs grew slightly to 69, with the total number of docking stations reaching its highest yet at 7,469.[70] The slight rebound in 2021 from the onset of the COVID-19 pandemic in 2020 was used by some cities as an opportunity to re-orient infrastructure, pedestrianize downtowns, redirect motorized vehicles, and green cities. In Newark, this was demonstrated by the closing down of access to the road on Main Street on Wednesday evenings to allow businesses to expand seating onto the road. Given the resounding success of this initiative, the change was made permanent and draws attention to the success of pedestrianizing spaces in supporting local businesses and improving quality of life.

IMAGE 13: *Example of a Citi Bike Bikeshare Docking Station in New York City.[71]*

IMAGE 14: *Example of a Nice Ride Bikeshare Docking Station in St. Paul, Minnesota.[72]*

4: Comparative Cases

This chapter explores comparative cases. However, given the lack of existing, standardized data across different bikeshare programs in cities of a similar size to Newark, a broader scope is adopted to provide insights into the successes and, to a lesser extent, the failures of bikeshare programs and changes to bike infrastructure.

Copenhagen, Denmark

Copenhagen is, alongside Amsterdam, a renowned example of excellence in cycling infrastructure. Over time, there has been much collaboration to develop this excellence in Copenhagen, with the primary stakeholders including the City of Copenhagen, Copenhagen Transport, Danish State Railways, Roads and Parks Department, the Cycling Embassy of Denmark, and the Danish Cyclists' Federation. Leadership has been especially key as cycling has been consistently perceived and portrayed as essential to the city; the city has "long been committed to encouraging cycling," according to the Center for Public Impact.[73]

Every two years, Copenhagen collects measurable data on the percentage and number of citizens who cycle to their places of work or study, the total length of bicycle lanes, the number of bicycle parking spaces, which residents cycle (demographics to help identify barriers to cycling), feelings of safety (when cycling) and security (parking), and the distance cycled by each cyclist.

However, Copenhagen has not always been bicycle-friendly. The main barrier to manifesting and maintaining a bicycle culture was the rise of car culture from 1945 to 1975. To make the transition, the city integrated cycling into urban and transport planning and policy, and committed "substantial resources in order to make cycling safe, time-efficient and enjoyable."[74] Additionally, by bringing together multiple stakeholders with a "collaborative, open and transparent work culture, supported by departmental heads, and a long-standing commitment to achieving consensus at all stages of project implementation," the transition was a success.

Alongside the successful transition was the intertwinement of bicycling and the push for achieving carbon neutrality by 2025. According to the city's Bicycle Strategy, the city—through cycling—has already accomplished "more space, less noise, cleaner air, healthier citizens and a better economy," and hopes to further increase cycling levels, reduce congestion, achieve fewer sick days, increase life expectancy, reduce pollution, and reduce wear and tear of roads.[75] The strategy also emphasized that cycling initiatives are inexpensive compared with other transport investments, and they planned to widen existing bike lanes, re-route cars from congested routes, improve bicycle travel times, provide shortcuts for bicycles, make certain streets one-way for cars to improve bicycling conditions, and provide better parking facilities for cargo bikes (cargo bikes are especially used for transporting children and shopping).

Amsterdam, Netherlands

Although Amsterdam is a well-known successful case study for cycling, it continues to set goals for improvement. These goals include the following:

1. Keep bicycle traffic flowing smoothly.
    a. Cycle paths are being overhauled to make them wider, smoother, faster, and more easily recognizable.
    b. Connect cycle paths to eliminate bottlenecks and problem areas.
    c. Create attractive new cycle routes, e.g., the 'Green Network'.
    d. Provide cyclists with more room on popular routes.
    e. Conduct a cycling survey to determine whether residents are satisfied with the new cycle network.
2. Improve bicycling parking.
    a. Introduce bicycle parking regulations in highly congested parts of the city to prevent improper bicycle parking and crack down on illegal bicycle parking.
    b. Encourage new bicycle parking habits, such as taking the trouble to park further away if it is not possible to park at a desired location.
    c. Create more bicycle storage facilities and street parking for bicycles.
    d. Improve signage and information to make it easier to find a parking spot.
3. Encourage considerate cycling.
    a. Ask stronger cyclists to store their bicycles on the upper levels of double-decker parking racks, leaving the lower levels free for those with less physical strength.
    b. Set new standards together through better enforcement and by confronting those who disregard cycling etiquette.
4. Major bicycling projects.
    a. Bicycle parking at stations.
    b. More cycle bridges.
    c. Connect new residential areas.
    d. Reduce the inner-city speed limit for cars.[76]

Amsterdam also has a *I Am Amsterdam* website for people visiting the city and the website features plenty of information about cycle routes, hiring bicycles, cycling guides, cycling history, cycling tours, cycling safety, and cycling information for locals.[77]

***IMAGE 15:** The popularity of cycling in Amsterdam requires plenty of bicycle parking.[78]*

Seville, Spain

A less famous case of successful change in bike infrastructure is Seville in Spain, which sought to establish a bicycle culture and promote cycling that. These changes subsequently led it to being dubbed the "cycling capital of southern Europe." One of the key architects reflected on the initial design process and wished, retrospectively, that the city had opted for wider bicycle lanes. Ultimately, the number of bike trips multiplied 11-fold in a few years and this was, in part, a reflection of the physical barriers erected between cyclists and motorized vehicles to make cyclists feel safe and to make cycling accessible to people of all ages.[79]

Much of the space for the lanes were taken from bus or parking lanes but the kerbs were raised to pavement level to offer more protection. The overall result, by 2015, was an increase from an average of 6,000 daily bicycle commutes to more than 70,000. The city's bicycling system has also been interlinked with public transport, with the main station allowing bus users to use their ticket to borrow a bicycle for free for a day, and the university's bikeshare program for students.[80]

Los Angeles, California

Los Angeles provides an example of a mixed result case study. In 2018, it was considered "heaven and hell" for cyclists with some "bike lanes to nowhere," and Bicycling Magazine gave LA the title of the "worst bike city in America." The criticisms stemmed from "hazards posed to cyclists by distracted drivers, the terrible shape of most streets," and the unwillingness of local officials to make LA a safer city to cycle in. However, the city's 2035 Mobility Plan hopes to add a bike infrastructure plan and "link up a network of fully separated and protected bicycle lanes and paths."[81]

The Bicycling Magazine argued that LA *should* be a heaven for cyclists given the lack of rainfall and the fact that the city is mostly flat, with plenty of boulevards with room for bike infrastructure. Thrown into this mix is some of the world's worst traffic, and creating bike infrastructure improvements could help to reduce this congestion as well as traffic-related incidents. Improved bike infrastructure can also help to alleviate pollution.[82]

Wilmington, Delaware

In 2019, Wilmington produced a Bike Plan. The Plan highlighted that, since 2010—with the establishment of the Wilmington Bicycle Advisory Committee—the city has added bicycle route signs, installed new bike racks and sharrows, and installed a 15-block bike lane on Union Street. In 2019, there were also approximately 80 bike racks of various style to hold about 240 bikes across the city. To make progress, the Plan provided the following recommendations:

1. Develop a coordinated and safe citywide bike route network.
   a. Among other objectives in this recommendation were the development of a Wilmington-specific Complete Streets policy and the promotion of the economic benefits of bike infrastructure.
2. Educate and advocate to provide safer biking conditions for all.
   a. Objectives included a maintenance plan for public bike infrastructure, the creation of publications and programs to educate about bike safety, assist Wilmington schools in participating in DelDOT's Safe Routes to School program, the adoption of a Vision Zero policy, and support for non-profit organizations and programs that provide education and advocacy for safe biking.
3. Facilitate access to bicycling.
   a. Objectives included coordination with and support for the Urban Bike Project, the implementation of an affordable city-wide bikeshare program or programs, increase the amount of quality bike parking throughout the city with appropriate signage, advocate for better accommodations for, and promotion of, using bikes in conjunction with transit, install wayfinding signs for easy visibility, install public bike repair

stations at key locations, and create a printable and mobile-friendly bike network map.[83]

The University of British Columbia (UBC) Vancouver
In July 2019, HOPR—the bikeshare operator at UBC Vancouver—launched 200 bikes that members could take anywhere on campus, including academic and neighborhood areas. HOPR's parent company is Cyclehop LLC, and HOPR operates at UBC under a License Agreement with the university that includes financial and operational requirements, and where and how HOPR bikes are used on campus. Over 80 designated bikeshare hubs have been installed across campus to conserve bike rack space for other cyclists.

UBC staff, students, faculty, and neighborhood residents are eligible for discounted annual memberships with Vancouver's public bikeshare program—a different bikeshare program—called Mobi by Shaw Go. Members receive unlimited use of the bikes for up to 30 minutes ($99 CAD) or 1 hour ($129 CAD) at a time, depending on the option selected. Other information provided by UBC include cycling tips and resources, bicycle parking, anti-bike theft registration, community bike clinics, e-bike trial program, and *Go by Bike Week* (formerly known as *Bike to Work Week*).[84]

A 2018 survey of 5,000 bikeshare members showed that 39 percent of trips replaced a walking trip, 35 percent replaced a transit trip, 17 percent replaced a car trip, and 7 percent replaced a personal bike trip. Most trips were combined with another mode of travel (e.g., transit, walking). Among the largest motivators for using the bikeshare program were riding for a one-way trip (80 percent), not being concerned about bicycle theft (74 percent), nearby stations at origin (68 percent) and destination (68 percent), comparative ease and speed to other forms of transport (68 percent), and free usage post-membership fees (58 percent). Among the top barriers were riding in rain and bad weather (47 percent), lack of stations at origins (20 percent) and destinations (29 percent), steep hills (29 percent), riding in traffic (22 percent), and bicycles being too heavy (22 percent).[85]

Overall, UBC has about 70,757 students, of which 58,768 are Vancouver undergraduate and graduate students. UBC Vancouver has 17,265 faculty and staff.[86]

Stony Brook University (SBU)
SBU's Wolf Ride Bikeshare is the university's bikeshare program for faculty, students, staff, and visitors and is operated by the university's Office of Sustainability and was launched in Spring 2013. The "per ride" bikeshare program provides users with an environmentally-friendly means of travel across campus. All users must wear a helmet when riding, and students use their SBU ID card at the bikeshare kiosk with a personal PIN (student's date of birth, e.g., MMDDYYYY), whereas faculty, staff, and visitors insert their credit/debit card and follow kiosk instructions.

Overall, SBU Wolf Ride Bikeshare has 13 solar-powered bike stations and 88 bicycles, and bicycles must be returned to a docking station. These figures demonstrate growth from the original bikeshare program offered to students in 2011, which started with 25 bicycles that were purchased by the university and were provided to students with unique locks and keys. Students selected for the initial program paid $15 for a semester and a $15 deposit for the bike, key, and helmet. Once students made the payments, a short introductory and safety video would be required to watch, alongside a waiver form, and then the selected students would pick up their bike, key, and helmet.[87]

Currently, SBU Wolf Ride Bikeshare is free for SBU students up to 1 hour per trip and is covered by the transportation fee. Students who use a bike for more than 1 hour per trip are responsible for additional charges billed to their student account. Faculty, staff, and visitors can utilize the bikeshare program by purchasing a subscription offered in annual, monthly, weekly, and daily terms and these can be purchased at the bikeshare stations with a credit or debit card. Those who use the bikes for more than 1 hour have additional charges billed to their card.[88]

The bicycles are not intended for off-campus use. Where bicycles are damaged and need repair, they should be returned to a docking station and users should select the red "REPAIR / WRENCH" symbol on the dock and this notifies the university that the bike is inoperable and prevents other users accessing the bike until it is repaired. Ridership data is provided by SBU and is shown in **TABLE 5**.[89] For April 2022, additional data demonstrates that the average ride time was 11 minutes and 32 seconds, and the average number of daily rides was 211.2, with a total of 6,336 rides.

TABLE 5. *SBU Wolf Ride Bikeshare Ridership Reports (2017-2022)*

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2017	S	S	S	4,603	5,436	2,929	3,241	6,685	14,873	10,651	5,151	1,75	55,354
2018	S	S	S	5,238	6,657	2,802	4,149	8,854	16,891	10,362	5,377	2,143	62,473
2019	S	S	89	6,854	6,775	1,541	1,257	5,707	14,896	10,236	6,854	1,894	56,103
2020	S	S	S	C	C	C	C	C	487	3,443	2,195	26	6,148
2021	93	115	971	3,800	3,235	898	1,507	8,527	15,356	10,115	5,423	2,129	52,169
2022	362	652	1,555	6,336	.	.	.	.	.	.	.	.	.
Total	455	767	2,615	26,831	22,103	8,170	10,154	29,773	62,503	44,807	24,997	7,977	241,151

Notes: 'S' denotes 'service' and 'C' denotes 'closed'; period denotes no data.

Overall, SBU has approximately 26,782 undergraduate and graduate students with no disclosed numbers for full-time, part-time, or visiting employees (including faculty and staff).[90]

University of California, Davis (UC Davis)

There are bike paths on the UC DAVIS campus and in the city, which had a 20 percent share of transportation users in 2015, and was headed for 25 percent—a match with the average modal share for cycling in the Netherlands. Cycle use was found to be at its highest on the campus, with a 50 percent modal share, largely due to the distance between lecture rooms and the short time to travel between classes. Alongside the bike paths, the university provided free air and use of tools to support their use.[91]

In 2018, the university launched JUMP Bikes—bright red and basket-equipped bicycles with electric-assist motors that could be rented via a mobile app. The Uber-owned company expanded to the City of Davis and the University, initially with 60 bikes. The speed limit on campus was limited to 15mph, and an additional hope was that students would opt to rent these bicycles rather than purchasing old bikes which would later become inoperable and be abandoned. For students, faculty, and staff, the first year of membership for the service was provided at a rate of $30, with fees for the general public at $1 for a 15-minute trip (7 cents per minute after that) or $30 for a monthly pass (one hour of riding each day).[92]

UC Davis has approximately 38,347 students and 1,826 faculty.[93]

University at Buffalo (UB), the State University of New York

UB launched a bikeshare program in 2013 on its north and south campuses with 25 bikes. After the initial pilot program, the program steadily expanded to more bikes docking stations across Buffalo. In Fall 2018, 50 of the bikes were decorated in UB blue and Hayes Hall White. Students can buy an annual bikeshare membership for $10 (down from $30 in 2014) or pay by ride at $2 per hour.[94] Each bike is equipped with GPS capabilities, and the university provides bicycle repair kits and stands throughout campus, as well as bicycle mechanics from the university's Parking and Transportation Services. Additionally, members can access lockers and showers on north and south campuses.

Interactive maps are offered to help users navigate the areas.[95] Overall, UB has 32,332 undergraduate and graduate students with approximately 5,787 full-time employees (including staff and faculty).[96]

Towson University

Towson University is considering a bikeshare program and is evaluating plans to implement one.[97] In 2021, their faculty and staff totalled 3,397 and their undergraduate and graduate students totalled 20,856.[98]

University of Tennessee (UT)

In Spring 2021, UT Martin College established a free bikeshare program on campus for students, faculty, and staff, which was created through a grant from the university's Center for Sustainability. Initially, the program began with five bikes and docking stations, with the intent to increase the number of bikes and stations as ridership increased.[99] The bicycles are white and feature the UT Martin logo, and they can be rented for two to three hours through the app MOVATIC that monitors the use and location of the bike. The app can also be used to report maintenance needs and any issues when renting. During the COVID-19 pandemic, the bikeshare program continued to operate, simply with the addition of sanitary wipes.[100] Overall, UT Martin has approximately 6,700 students, with no disclosed figure regarding faculty and staff.[101]

Stockton University (SU)

SU has a bikeshare program that was designed to improve the university's sustainable practices in accordance with goals in its strategic plan. For students, there is no cost to use the program. The program launched in 2009 and has 25 short-term rental bikes in five locations across campus and 30 additional bikes for students who use them for the entire semester. Given the huge demand, a lottery system was implemented to determine who can borrow a bicycle for the semester. More developments are planned but have yet to be shared.[102] According to Fall 2021 data, the university had approximately 9,352 full- and part-time undergraduate and graduate students, with no data on the number of faculty and staff.[103]

University of Maryland, Baltimore (UMB)

Baltimore Bikeshare— Baltimore's bikeshare program—is available at UMB and features numerous 16-port docking stations near the campus and throughout the city. A single trip (45 minutes) is priced at $2, and trips over 45 minutes cost an additional $2 per half-hour. Monthly passes are available for $15 and have unlimited 45-minute rides. The bicycles are pedal-assist electric motor bicycles and are available 24/7.[104] In October 2020, the electric bikeshare program by JUMP was introduced to Baltimore too, and 75 dockless bicycles were placed throughout Baltimore. These dockless bikes cost $1 to unlock and 39 cents a minute after that.[105] Overall, UMB has 7,244 undergraduate and graduate students and a total of 7,062 faculty and staff.[106]

Princeton University

In Spring 2016, Princeton University introduced 70 white, 8-speed Breezer city bikes at nine locations across Princeton University, each fitted with a lock and basket. The bicycles were available through Zagster, a bikeshare service, and bicycles could be rented through the Zagster website or app. Users paid a one-time fee of $20 that allowed bike rentals for up to two hours for free, with additional hours costing $2 per hour. Based on the popularity and expansion of the university's bikeshare program, the municipality of Princeton committed to work with the university to begin installing its own bikeshare stations in summer 2016, with support of a $192,000 federal Congestion Mitigation an Air Quality improvement grant allocated by the New Jersey Department of Transportation.[107]

Until recently, the university had a fleet of 119 Breezer bikes available to students, faculty, and staff, complete with front/rear lights and fenders, as well as a basket. Rental fees were also applicable, contingent on when a user wished to access the service, such as $15 for the summer, $25 for a semester, or $40 for the year. For unclear reasons, Zagster is no longer in operation in Princeton. The

latest mobility plan for the university is currently being analyzed.[108] Overall, Princeton has 1,289 full-time, part-time, and visiting faculty, 5,267 undergraduate students, and 2,946 graduate students.[109]

Overall Comparison by Population

The data presented in **TABLE 6** compares the latest available data on faculty, staff, and student populations of the above universities, including the University of Delaware, to provide insights into the feasibility of changes to bike infrastructure and the implementation of a bikeshare program in Newark and at the University of Delaware. The table is presented in descending order, with the highest total population university at the top and the lowest total population at the bottom. It is important to bear in mind that not every university listed publicly discloses population data in its entirety (e.g., some missing faculty and staff figures).

TABLE 6. *University Faculty, Staff, and Student Population Comparison*

	Undergraduates	Graduates	Faculty	Staff	Total
UBC Vancouver	58,768		17,254		**76,022**
UC Davis	38,247		1,826	No data	**40,073**
University at Buffalo	32,332		5,787		**38,119**
University of Delaware	18,618	4,285	4,746		**27,649**
Stony Brook University	26,782		No data	No data	**26,782**
Towson University	20,856		3,397		**24,253**
University of Maryland Baltimore	7,244		7,062		**14,306**
Princeton University	5,267	2,946	1,289	No data	**9,502**
Stockton University	9,352		No data	No data	**9,352**
University of Tennessee Martin	6,700		No data	No data	**6,700**

Note: The University of Delaware's student population listed in the table excludes the 710 professional and continuing studies students.[110]

5: Goals and Recommendations

This chapter lays out the Action Plan's five goals and mimics the structure of the City of Wilmington's Bike Plan (2019) recommendations. The goals and recommendations in this Report are informed by various existing recommendations in other reports, including the Newark Bicycle Plan (2014), City of Wilmington's Bike Plan (2019), and New Castle County Bicycle Plan (2020), among others. The first goal focuses on creating a citywide bike network, the second goal focuses on creating safer conditions for all cyclists, the third goal is about making biking accessible by making it more affordable and convenient, the fourth goal is centred on greening the city to further promote cycling and improve quality of life, and the fifth goal is about monitoring and measuring progress through a city-university partnership.

Each goal has a set of recommendations that support the achievement of the goal with which they are associated. Most of the recommendations are intended to be carried out in large part by the City of Newark and University of Delaware, and DelDOT. Undoubtedly, many of the recommendations will require additional support from and coordination with other stakeholders, including residents, students, faculty, staff, non-profit organizations, community groups, and businesses.

Importantly, these goals and recommendations should be considered in the City of Newark's Bicycle Plan that is expected to be completed in 2023. Additionally, these recommendations are intended to be flexible, given this Report's limited technical analysis and the financial and time constraints imposed on changes to infrastructure.

Prior to elaborating on the goals and recommendations therein, it is the conclusion of this Report that a bikeshare program is feasible for the University of Delaware and the City of Newark, especially as the city continues to build density. In addition to density, goals to make the city and university more sustainable and to offer greener, more accessible forms of transport will only be realized with these goals. The bottom line is that people will only cycle when they feel safe and this is, according to the research, only achieved when cyclists are physically separated from motorized vehicles.

Goal 1: Citywide Bike Network

As stated in Chapter 3, cycling is a legitimate form of transport and must be recognized and valued as such, and this is essential in establishing a bicycle-friendly city and university. Although this Report falls short of offering a map of a citywide bike network, this Report does suggest that—because of density—construction of segregated bicycle lanes and associated infrastructure should begin in downtown Newark. Through a phased approach, the City of Newark can prioritize developments along Main Street, including East, West, and South Main Street, and South College Avenue (to the University of Delaware's Bob Carpenter Center), as well as existing works for Delaware Avenue.

Once the initial interconnected infrastructure has been established, the lanes should be connected to locations further afield, as well as in local neighborhoods in Newark. This would include Elkton Road, Library

Avenue, Academy Street, North Chapel Street, Haines Street, Ogletown Road, Amstel Avenue, Orchard Road, Wyoming Road, Marrows Road, North College Avenue, East Cleveland Avenue, Casho Mill Road, Hillside Road, Nottingham Road, and Paper Mill Road. The University of Delaware, in its forthcoming Transportation Masterplan (2022/23), will need to share more thoughts on these roads in its plans.

Preliminary discussions suggest that the roads listed above will be critical for a successful cycling network and, in turn, for a bikeshare program to be successful. However, these lists are not intended to be exhaustive. Instead, they are a starting point.

To emphasize, these bicycle lanes would be physically separated from motorized vehicles. Ideally, they would be two-way lanes. Where there are relatively unused sidewalks (low foot traffic), space could be claimed to accommodate shared-use paths. In both instances, the bicycle lanes/routes should be painted—ideally in a color that reflects the City, University, and State—to clearly indicate space for cyclists and promote safety.

IMAGE 16: Example of shared-use path in Perth, Australia.[111]

IMAGE 17: *Example of raised bike lane beside pedestrians and separate from motorized vehicles.[112]*

The Bikeshare Committee identified hotspots and nodes that would be crucial for being interlinked in the citywide bike network. This is not intended to be an exhaustive list. These include the following:

- **Apartment complexes:** (1) Colonial Garden apartments; (2) Pine Brook apartments; (3) all student halls of residence; (4) One Easton apartments; (5) Studio Green apartments; (6) Thorn Flats; (7) Lehigh Flats; (8) Rittenhouse Station; (9) Fairfield Apartments; (10) School Lane Garden Apartments.

- **Recreation Centers and Parks:** (1) Mason Dixon Trail crossing; (2) Preston's Playground (Newark Reservoir); (3) William M. Redd, Junior Park; (4) Patriot Ice Center; (5) Fred Rust Arena.

- **Business/Shopping:** (1) Newark Shopping Center; (2) College Square Shopping Center; (3) Suburban Plaza Shopping Center; (4) Food Lion (401 New London Rd and 907 S. Chapel St.).

- **Campus:** (1) all student halls of residence; (2) multiple spots on The Green, beside central buildings (e.g. Memorial Hall); (3) University parking garage; (4) Perkins; (5) Lil Bob Gym; (6) Pencader Dining; (7) Morris Library; (8) Russell Dining Hall; (9) STAR Campus; (10) UD Creamery; (11) Delaware Stadium; (12) Bob Carpenter Center.

- **Schools/Other:** (1) Downes Elementary; (2) Newark High School; (3) Newark Free Library; (4) West Park Place Elementary School; (5) Newark Municipal Building.

By interlinking these entities, the prospects of increased ridership are heightened as they provide residents and visitors with opportunities to cycle from a point of origin to numerous destinations in a safe, convenient, and accessible bike network.

Again, it is important to stress that these hotspots and the previously identified roads are a starting point for thought. As infrastructure and developments change, so too will any corresponding bicycle plans, but it is vital that bicycle plans evolve and improve in line with the latest research and local change to ensure fluidity, sustainability, and higher quality of life for all. Overall, these recommendations align with those noted in the LAB review of Newark in 2014, including the need for ambitious projects, like protected bike lanes, the creation of a bike network and bicycle facilities, and integrating bicycle-safety awareness into education and ensuring infractions and violations are dealt with appropriately.[113]

Recommendation 1.1
Build a coordinated and safe citywide bike network in phases and use the identified hotspots and listed roads as a guide.

As noted in Chapter 1, there are many bike-related developments already underway, and others have been recommended. It is critical that a roadmap is established in the Bicycle Plan and that is it shared transparently with the wider Newark community. Additionally, it will be essential for the community to understand that the benefits of bicycle lanes and a bikeshare program will only be realized once the first phase of the bike network is complete.

As part of the roadmap, it is recommended that the city, university, and DelDOT agree on the roads where bike lanes will be implemented. In neighborhoods, where adding bike lanes may be less cost-effective, alternative means should be implemented, such as sharrows. This should only be the case in low-traffic areas, and the sharrows should be painted the same color as the bike lanes for consistency.

Recommendation 1.2
Establish a bikeshare program in partnership with the University of Delaware and City of Newark.

Once the first phase of bike lanes have been implemented, a bikeshare program should be established to further promote cycling among students, faculty, staff, residents, visitors, and local employees. The bikeshare program should acquire buy-in from local entities identified in the hotspots list, such as apartment complexes, as this would serve to encourage residents to cycle instead of drive for short distance travel and commutes. Each hotspot could, for example, feature a bikeshare docking station or hub in addition to bicycle racks for those who own their own bicycles. Each hotspot would ideally feature maintenance kits (e.g., tire pumps).

Recommendation 1.3
Create a bike network map as an app for cyclists.

Ideally, this app would earmark bikeshare docking stations or bicycle racks to help cyclists navigate where best to park their bicycle or use tire pumps. It would also highlight, using the same color as the painted bike lanes for the app, the bike lanes that can be used by cyclists to help them identify the best routes. Better yet, this app would integrate multiple forms of transport, including local bus systems, to allow users to input their origin and destination and the app would identify the best route and form(s) of transport to take advantage of.

This app could be developed and maintained by University of Delaware students as part of a group project and in collaboration with the City of Newark and DelDOT.

Printed maps of bike lanes and hubs should be provided at key buildings across Newark, including the Newark Municipal Building, several university buildings (e.g., halls of residence, Memorial Hall, the library, gyms), Newark Free Library, local schools, and on any public bulletin boards. These printed maps should be standardized and regularly updated.

Recommendation 1.4
Pedestrianize some or all of Academy Street.

Academy Street, at least the connection between Main Street and Delaware Avenue, could be pedestrianized. In other words, this road could be turned into a wider sidewalk and bicycle lane, while still permitting access for fire trucks. The road surface could also be turned into a pilot project for pedestrianizing a road, as well as an opportunity to integrate community art. According to one study of 17 different sites, community art can serve to reduce the rate of crashes and the rate at which

pedestrians improperly crossing roads. Creating and maintaining murals can become a community event too.[114]

IMAGE 18: *Example of public art (see endnote 114).*

IMAGE 19: *Example of public art (see endnote 114).*

Recommendation 1.5
Consider the legalization of e-scooters on public highways.

With local stakeholders, WILMAPCO, and DelDOT, the forthcoming Bicycle Plan should consider the legalization of e-scooters on public highways. Electronic-assist scooters with docking stations can sometimes be more accessible than bicycles given that they are not as heavy, do not take up as much space, and are more affordable. It is recommended that the Bicycle Plan considers how e-scooters could be integrated within a broader transition to promote micromobility in Newark.

Recommendation 1.6
Repurpose parking lots for cars to maximize capacity and develop a bike lane on Main Street.

Part of affording space to bicycles on roads and sidewalks inevitably means replacing some of the space that has long-been dominated by motorized vehicles. Notably, in removing one side (or both) of on-street parking on Main Street to provide space for a bike lane means that parking space will need to be reallocated elsewhere. Given that the City of Newark owns and operates the space behind Chipotle (see IMAGE 3), it would be wise to construct a pay-per-use, sustainable, colorful parking garage with a solar canopy.

Goal 2: Safety

For a successful transformation in bicycle culture in Newark, a completely protected and safe bike network must be established. It also requires that there is transparency in rules and that those who violate the rules are held accountable. However, *everyone* must feel safe—motorists, cyclists, public transport users, and pedestrians.

Recommendation 2.1
Develop and implement a maintenance plan for public bike infrastructure.

To ensure bike infrastructure and facilities remain safe and comfortable to use, they need to be maintained. It is recommended that the City of Newark, University of Delaware, and DelDOT collaborate and develop a plan to maintain and improve the quality, operation, and integrity of the city's bike infrastructure. This includes updates to the bike infrastructure roadmap.

Maintenance work will likely include ensuring bike lanes continue to hold their structure, paint is reapplied, and debris, slippery leaves, and snow are removed in a timely manner. Bike racks and signs will require periodic repair and replacement.

Recommendation 2.2
Develop and implement a maintenance plan for a bikeshare program.

For a bikeshare program to be safe and comfortable to use, the program must be maintained. Whether the bikeshare program is operated privately and is service that is purchased by the City of Newark and University of Delaware, or whether it is the City's and University's own joint product, an agreement must be reached on a maintenance plan. This will include repair of damaged bicycles, storage of bicycles during periods of reduced usage (e.g., bicycles entering a service period during winter), and maintenance of bikeshare docking stations.

A policy will need to be established for those who flout the rules, such as vandalizing bicycles, leaving bicycles in a state of disrepair and failing to report damage, and abandoning bicycles (e.g., not returned to a docking station).

Recommendation 2.3
Create publications and programs to educate about bike safety.

Education on how to properly use bike lanes is critical given the lack of bicycle commuting and travel in Newark. Existing educational tools from entities like Bike Newark and Newark Bike Project, as well as WILMAPCO, DelDOT, the University of Delaware, Delaware Greenways, Bike Delaware,

and City of Newark should be leveraged to create educational and outreach materials for cyclists, drivers, and pedestrians to raise awareness about cycling and to promote safe sharing of public facilities and roads.

To further promote cycling and safety, the bikeshare program should likely accompany safety workshops or videos that must be viewed prior to the first use of a bike from the bikeshare program. Offering cycling lessons would be another avenue that local businesses and non-profit organizations could provide.

Educational materials should be written in easily understandable terms, use graphics to convey messages, be available in English and Spanish (and possibly other languages, reflecting the diverse student population), and be available in print and digital versions.

Local city and university police will need to ensure their trainings are updated with safe bicycle practices, bike-related traffic laws, and issues faced by on-street cyclists.

Recommendation 2.4
Create a Safe Routes to School for Newark High School and West Park Place Elementary School.

DelDOT administers a Safe Routes to School (SRTS) program to support projects that help make cycling and walking a safer option for elementary and middle school children in kindergarten through eighth grade to get to school.[115] The program seeks to encourage students who live within one mile of their school to walk and those who live within two miles to bicycle both to and from school. It is recommended that local stakeholders provide support to Newark High School and West Park Place Elementary School, and continue to support Downes Elementary, and implement projects related to SRTS. Generally, all educational facilities and institutions should be safeguarded and have access to the citywide bike network in Newark insofar as is reasonable.

The two-way bike lane being constructed on Delaware Avenue will include a route that runs from Orchard Road to Newark High School at Library Avenue, meaning a direct connection between Orchard Road (at Delaware Avenue) and Newark High School will be created. Completion is expected by Winter 2022/23. This recommendation calls for greater connectivity between Newark High School, West Park Place Elementary School, and Downes Elementary School and surrounding areas to maximize safety and promote cycling.

Recommendation 2.5
Support non-profit organizations and programs that provide education and advocacy for safe biking.

Through the provision of educational materials, workshops, and cycling lessons, among other helpful practices, it is recommended that the City of Newark and University of Delaware, where possible, increase their budget and resources available to non-profit organizations and programs that provide education and advocacy for safe biking in Newark.

Recommendation 2.6
### Construct appropriate bicycle infrastructure in addition to bike lanes.

Painted boxes (using the same color as bicycle lanes) at traffic lights should be used throughout the city to promote cycling and to ensure safety by allowing cyclists to turn into other bike lanes (where the lanes are not enjoined) or switch lanes at an intersection or enter a neighborhood (e.g., leaving a bike lane and into a sharrow). Similarly, traffic lights should be modified to include a green bicycle to allow cyclists to leave first, further promoting safety. Speed limits should be considered where sharrows are concerned but are less important where bike lanes exist, given the safety of cyclists being separated from motorized vehicles. However, for electric-assist bicycles, a speed limit policy should be implemented on campus at the University of Delaware and for the City of Newark to minimize the prospect of collisions between cyclists.

IMAGE 20: *Example of painted boxes as an additional measure of safety and priority for cyclists.*[116]

IMAGE 21: *Example of bicycle signal to prioritize cyclists.*[117]
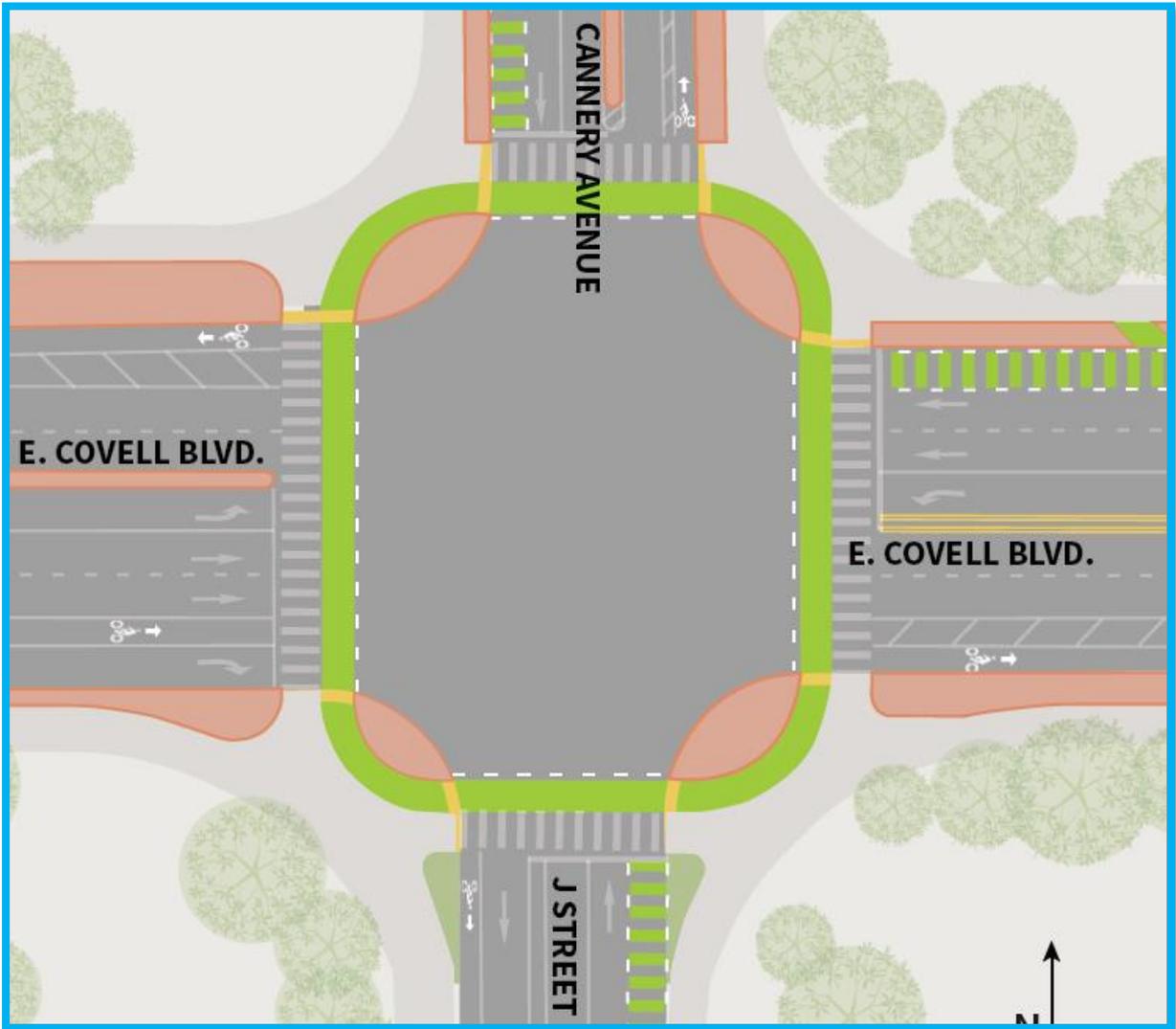
IMAGE 22: Example of a protected intersection in Davis, California that does not require any special knowledge to navigate.[118]

IMAGE 23: Another example of a protected intersection in Salt Lake City, Utah, for bicycle corridors.[119]

As noted elsewhere in these recommendations, secure and sufficient bicycle parking must be provided across Newark to encourage cycling, including at the identified list of hotspots. It is also

recommended that wayfinding signs are installed to help cyclists navigate the bike network throughout Newark. These signs should include directions to nearby bike lanes, hubs, bikeshare docking stations, and ample secure and sheltered parking. The signs should be easily readable.

It is further recommended that public bike repair and maintenance stations provide commonly used bike repair and maintenance tools, such as a pump and bike stand, and these should be available all the time and free at the point of use. In turn, these public facilities make bike ownership more affordable and convenient.

Recommendation 2.7
Consider, as part of the Bicycle Plan and Roadmap, a congestion charge.

A congestion charge can, according to the previously referenced research, help reduce the amount of congestion in high-traffic areas by requiring all drivers or the most-polluting vehicles to purchase passes. It is recommended that the Bicycle Plan considers the implementation of a charge as this would encourage residents to use more sustainable means of transport and reduce the number of motorized vehicles on the roads which, in turn, increases safety for cyclists and pedestrians. Additionally, the revenue earned from the congestion charge could be used to offset the costs of the congestion charge system and support bike infrastructure developments.

Goal 3: Accessible and Affordable

A citywide bike network alone is unlikely to be sufficient in generating a cultural transition and encouraging residents to shift from personal cars to bicycles. Providing affordable access to a bike—be it through a discounted or free personal bicycle or discounted or free access to a bikeshare program—and facilitating convenient origin to destination trips through a citywide bike network can help to promote cycling as a viable option for people who are less able to access cycling as a means of travel (recreational or for commuting).

Recommendation 3.1
Promote the incorporation of bicycle infrastructure into all developments, where appropriate.

For a successful bike network, private real estate developers—especially for residential properties, even in mixed-use developments—*must* install adequate bike facilities, such as bike racks and even financially contribute to public bike lanes around their site. Further, by operating as a laboratory and testbed for smaller cities—smaller when compared to the likes of New York City, Boston, and Los Angeles—Newark can portray itself as a hub for innovation and capitalize on this symbolic capital by drawing further investments. Therefore, it is recommended that the City of Newark and University of Delaware create incentives or requirements for development projects to include bike facilities and contributions to bicycle infrastructure where appropriate.

Recommendation 3.2
Promote the benefits of bicycle infrastructure and cycling.

As illustrated in Chapter 3, bicycle infrastructure can have a wide array of benefits, especially for health, but also for the local economy. It is recommended that these benefits are promoted to local community stakeholders. Local businesses and organizations could choose to offer bikeshare program or bicycle use privileges or discounts as part of employee perks and wellbeing packages. To showcase the benefits of bicycle infrastructure and cycling, infographic posters should be designed and placed in high-foot traffic areas around the city, much like with bike lane maps. Additionally, free public lectures and workshops could be held in collaboration between the University, City, DelDOT, non-profit organizations, and community groups.

Once bicycle infrastructure has become better established, a Bike to Work Week and Earth Week should be created to further encourage a cultural shift away from motorized vehicles and toward bicycles. For many years, annual Bike to Work events have been organized each May by Bike Newark or one or more of their partner organizations.

Recommendation 3.3
Facilitate access to bicycling.

For equitable access and affordability, measures should be taken by non-profit organizations to advocate on behalf of those aspiring to gain access to cycling and to bikeshare but cannot because of financial or other barriers. The University of Delaware should consider providing a discount for students who are recipients of any kind of financial aid, for both bicycles and for access to a bikeshare program (in the instance in which a bikeshare program is not free at the point of use for everyone). For the City of Newark, considerations should be made for households that are recipients of any kind of aid, such as STAMP or renters assistance, or by household income. Generally, discounts for families should also be considered for certain types of bicycles, like cargo bicycles.

Examples of access to affordable transportation can be seen across many universal basic mobility programs (UBM), such as Seattle's Commute Trip Reduction Program. Seattle's program requires "large employers to use a mix of information and amenities, subsidies, and parking management strategies to encourage alternatives to driving alone to and from work." Additionally, Pittsburgh and Oakland have engaged in UBM too, with Oakland's pilot program using 500 prepaid cards that could be used for public transit, bikeshare, and e-scooters. The cards were distributed to residents in neighborhoods that were predominantly inhabited by people of color and low-income residents.[120]

Recommendation 3.4
Integrate public transport.

Cycling can make using public transport more convenient because it can make it easier and faster to get to a transit stop, such as a bus stop or train station, or get from a transit stop to a destination. However, for this to be successful, public transport services need to make it convenient for people to bring bikes with them and provide secure and sufficient bicycle parking at, or as close as possible to, public transport stops. By building bicycle hubs—meaning plenty of bicycle parking, maintenance stations, information, and bikeshare docking stations—these public transport services will also benefit as residents and visitors will be incentivized to use public transport when they choose to cycle if their destinations are further afield.

It is recommended that the Bicycle Plan considers how more convenient bike accommodations can be made to buses, trains, vehicle hires, and ride-hailing services. Partnerships should be created with local and regional operators to ensure the provision of secure and sufficient bike parking at public transport stops.

Recommendation 3.5
Increase the amount of quality bike parking throughout Newark, and help people find it.

Providing conveniently located and secure bike parking across Newark is important in making cycling a convenient transportation option. It is recommended that the following measures are adopted:

- Increase existing bicycle parking at the identified hotspots, as well as others. Encourage buy-in from apartment complexes, residential halls, and shopping malls to cover these expenses or financially contribute to them (amend zoning laws and codes, if needed).

- Provide shelter for bicycle parking to ensure bicycles are well-protected from weather that can degrade the quality of bicycles and possibly dissuade people from using bicycles. The same applies to bicycle docking stations in a bikeshare program. Oonee bicycle pods (lockers) could be considered for this purpose (see IMAGE 24).[121] Additionally, shelters should use green or white rooftops and/or solar canopies to maximize the value of the space used.

- The inverted U rack style is a preferable design, beside pods/lockers, as they take up relatively little space and help to prevent bicycles from toppling over easily.

IMAGE 24: Oonee Bike Pod (parking for 20-80 bikes) (see endnote 121).

- Like the phased approach for bike infrastructure, installation of bike parking should be focused where the bike lanes exist, as well as schools and community centers, before gradually expanding outward.

- Collaborate with local bus operators to install bike parking adjacent to major bus stops and ensure buses can accommodate bicycles. The same approach should be applied to train operators at Newark train station.

- Amend local zoning regarding parking lots, especially for parking lots immediately behind many properties facing Main Street, to improve landscaping and greater accommodation of bicycle parking and nature.

- Develop a "Racks/Pods/Lockers with Plaques" program that allows people to donate a bicycle parking space for a public location with a plaque honoring an individual or organization (similar to memorial bench programs).

- Compile and post information on relevant webpages (e.g., Bike Newark, Newark Bike Project, University of Delaware, City of Newark) about locations of and access to bike parking throughout Newark.

Recommendation 3.6
Apply for Bicycle-Friendly Community Status.

The University of Delaware and City of Newark should jointly apply to the LAB for an assessment of the city's bike infrastructure, once the first phase has been completed. The feedback provided by the LAB provides insights on the strengths and weaknesses of the city's first phase and, in turn, can help inform decisions moving into subsequent phases and retrofit decisions for the first phase.

Goal 4: Sustainability

By greening the City of Newark and University of Delaware, the ground temperature, on average, can be cooled during the hotter months of the year. Additionally, a greater level of greenery in the city can support biodiversity, resilience to excess rainfall and flooding, increase property value, add greater aesthetic value, and increase happiness.

Recommendation 4.1
Plant more trees, shrubs, and flowers.

By planting trees, shrubs, and flowers, the University of Delaware and City of Newark can establish green corridors that offer shade and provide a cooling effect at the ground level. This recommendation not only benefits the city's carbon footprint but also supports ground-level temperatures for cyclists and pedestrians. Additionally, for added aesthetic value, hanging flower baskets should be added to streetlights and adjoin buildings. By improving the general aesthetic of the city, the quality of life can be increased, and pedestrians and cyclists are likely to wander and shop, as opposed to potentially viewing the city as a place to simply drive or cycle through as quickly as possible.

Other suggestions to take into consideration include dimming streetlights from midnight to 5AM to reduce light pollution and increase energy savings, and to provide public seating (e.g., memorial benches) for residents and visitors to stop and bask in the beauty of Newark.

IMAGE 25: Example of bioswales integrated with bicycle lanes.[122]

Recommendation 4.2
Add solar canopies to parking lots not earmarked for future development.

Solar canopies are an excellent way to enhance the value of parking lots. The added value comes in the form of shelter for those using cars and bicycles or pedestrians passing through parking lots, as well as in the form of generated clean energy that can subsequently be used to power the city. Another contribution from solar canopies in parking lots is the prevention of asphalt and concrete absorbing as much heat as they would otherwise without a canopy. One successful example of vacant lot change is in Philadelphia, where vacant lots were transformed into climate-resilient pollinator gardens in partnership with the Pennsylvania Horticultural Society and the National Wildlife Federation.[123] As with other sustainability-related recommendations, this recommendation helps to better stabilize ground-level temperatures during warm periods of the year, reduce the heat stress on pedestrians and cyclists, and reduce greenhouse gas emissions.

In a similar need to repurpose parking lots, brownfields should be converted to green spaces and revitalized for added public and environmental benefits. One notable example of brownfield redevelopment and clean-up is the establishment of a 2,200-foot riverfront public space with recreation opportunities, playgrounds, and natural areas along the Wisconsin River in Wausau, Wisconsin. With federal and state funding, the area has been significantly improved.[124] In these redevelopments, the City of Newark and University of Delaware need to be mindful that they

integrate the natural environment and balance amenities and local services with walkability and access to a safe and convenient bike network.

Ultimately, **nature-based solutions are critical in helping to "mitigate urban heat islands, provide cleaner air, capture and purify water, and create more quality public spaces."**[125]

Recommendation 4.3
Paint rooftops white and add solar.

As noted in Chapter 3, painting rooftops with white paint can reduce the urban heat island effect and help to keep the urban landscape cooler, as opposed to absorbing lots of heat and making ground-level conditions less tolerable for cyclists and pedestrians. This can help to reduce energy costs associated with air conditioning, as comparatively cooler temperatures will reduce the need for air conditioning. It is also an opportunity to capitalize on the installation of solar panels and reduce greenhouse gas emissions, thereby reducing the city's carbon footprint.

Recommendation 4.4
Endorse and fund the University of Delaware's Botanic Garden Masterplan.

The University of Delaware's Botanic Garden Masterplan features several proposals for projects to be implemented to help green Newark. It is recommended that both the University of Delaware and City of Newark endorse and, where possible, fund the Masterplan to support the projects therein. I Heart UD Day and community events could be ways to generate funding.

Goal 5: Monitoring and Measuring Progress
By monitoring and measuring progress, the City of Newark, University of Delaware, and other stakeholders can evaluate decisions and use data to inform decision-making regarding continued infrastructure changes. There are many evaluative frameworks and proposed metrics to assess performance over time.[126]

Recommendation 5.1
Monitor and measure progress using a consistent framework as a partnership between the City of Newark and University of Delaware.

To monitor and measure progress of the transportation system, it is recommended that the City of Newark provides as much data as possible to the University of Delaware (anonymized where human subjects are concerned) for faculty, staff, and students at the University of Delaware to subsequently assess performance.

Common indicators include:

- **Affordability:** Households should spend no more than 20 percent of their household income on transportation costs. How many people own a bicycle? How many people hold bikeshare membership (if relevant) and/or use the bikeshare program?

- **Accessibility:** Is there a financial discount for the purchase of bicycles and access to the bikeshare program, or is the program free at the point of use? Are cargo bicycles available usable by the bike infrastructure? Are maps and associated bike media and information provided in various languages? How many people cycle?

- **Efficiency:** What are the travel times from origin to destination? How much time is spent stuck in traffic? How much parking is readily available?

- **Reliability:** How consistent are travel times from origin to destination?

- **Safety:** How many collisions have taken place? How severe were those collisions (e.g., fatal)? How many vehicles (bicycles, cars, skateboards, scooters, etc.) were stolen?

- **Clean Air:** Quantities of air pollutants (e.g., particulate matter, ozone, methane, carbon dioxide, sulfer dioxide, etc.).

- **Reduction in Greenhouse Gases:** Quantities of greenhouse gases, reduced over time (if at all).

- **Reduction in Vehicle Miles Travelled:** Are fewer people choosing to drive? Do people opt for bicycles or walking for shorter distances?

- **Connectivity:** Number of households by income within walking distance to schools and services. Number of bikeshare docking stations. Number of bicycle parking racks, pods, lockers.

- **Fair Labor:** Were fair wages and basic employment benefits and protection given those working in construction, operation, and maintenance of the bike infrastructure and bikeshare program? Were employment opportunities made available?

- **Inclusive Local Business and Economic Activity:** Has foot and bicycle traffic changed over time to local businesses? Were new local businesses created? Did property values increase? Did the perceived quality of life increase?

This proposed set of indicators is a starting point for a framework that could be expanded upon and refined by researchers at the University of Delaware and with input from the City of Newark, DelDOT, WILMAPCO, New Castle County, and local community.

6: Funding

Overall, the recommendations—especially the bike lanes—will cost undoubtedly millions of dollars. Therefore, the City of Newark and University of Delaware must work with internal and local stakeholders to identify and secure appropriate funding for bike and sustainability projects. This includes leveraging contacts with New Castle County, DelDOT, banks and hospitals, local businesses, Newark Bike Project, Bike Newark, WILMAPCO, Bike Delaware, TNP, Delaware Greenways, the public, and more.

Grant Funding

There are several resources that highlight federal funding opportunities for bike-related projects and environmental improvements (e.g., reducing greenhouse gas emissions). These include:

- The Federal Transit Administration (FTA) Program and Bicycle Related Funding Opportunities: https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/livable-sustainable-communities/fta-program-bicycle

- The Federal Highway Administration (FHA) Bicycle and Pedestrian Program: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/

- Rails to Trails Conservancy, Obtaining Funding for Active Transportation: https://www.railstotrails.org/policy/building-active-transportation-systems/obtaining-funding/

- An organization, Better Bike Share, also offers Partnership Grants: https://betterbikeshare.org/grants-and-grantees/

Private Funding

Given the added benefit of bike infrastructure to local businesses, the City and University should reach out to major employers—as well as assess their own resources—to invest in the projects outlined by the recommendations, in addition to identifying opportunities for collaboration. Banks and hospitals may be particularly helpful in this area. The case could be made that with the initial setup costs shared across different entities across the city, the City of Newark, University of Delaware, and DelDOT could utilize their funds for the sake of maintenance.

Public Funding

Generally, public donations could be sought for smaller items outlined in the recommendations of this Report, such as trees, shrubs, plants, and bicycle racks, pods, and lockers. Additionally, to speed-up progress, local neighborhood community groups could finance the painting of sharrows and erection of signage in their neighborhoods where a bike lane is not perceived as essential for safety purposes (e.g., the road is low-traffic). A similar approach could be applied to local businesses, including for hanging flower baskets on streetlights, public benches, and bicycle parking. Alternatively, the City of

Newark, in partnership with the University of Delaware, could create community fundraising events to generate funding that can contribute to the implementation of these projects.

As noted in the recommendations, a congestion charge could be considered to incrementally accrue funds that would support ongoing development and maintenance of bike lanes and associated elements.

Bikeshare Funding

The above descriptions relate to bikeshare program funding, but this specific category is informed by the discussions from the Bikeshare Committee. The following ideas were considered and warrant further consideration by the University of Delaware and City of Newark:

- Bicycles could be free for a certain period of time (e.g., 15 minutes, 30 minutes, 1 hour, etc.) before a user is charged a free (e.g., $2 per 30 minutes or 1 hour).
- Pedal bicycles could be provided for free but electric-assist bikes could charge more. Bikeshare docking stations with solar canopies could help alleviate the burden on existing infrastructure and promote the image of Newark and the University of Delaware as green and sustainable.
- Advertising could be used on the bicycles from large companies (e.g., banks, insurance companies, Pepsi, etc.) to help defray or cover the costs of the bicycles.
- The University of Delaware could subsidize the cost of the bikeshare program for students, either with existing funds or with a possible increase in student fees (e.g., transportation fee or student life).
- Membership or subscription fees could be used to provide discounts to those who regularly use the system.

Resources

- Better Bike Share Partnership: https://betterbikeshare.org/
- City of Newark Transportation Improvement District Committee: https://www.newarkde.gov/1127/Transportation-Improvement-District-Comm
- City of Wilmington Bike Plan: https://www.wilmingtonde.gov/home/showpublisheddocument/8552/637898632616430000
- National Association of City Transportation Officials (NACTO) Bike Share Station Siting Guide: https://nacto.org/wp-content/uploads/2016/04/NACTO-Bike-Share-Siting-Guide_FINAL.pdf
- NACTO Guidelines for Regulating Shared Micromobility: https://nacto.org/sharedmicromobilityguidelines/
- NACTO Urban Bikeway Design Guide (Working Paper): https://nacto.org/wp-content/uploads/2022/03/Making_Bikes_Count_FINAL_March31-2022.pdf
- New Castle County Bicycle Plan: http://www.wilmapco.org/BikeNCC/bikenccendorsed.pdf
- National Highway Traffic Safety Administration (NHTSA) Bicycles: https://www.nhtsa.gov/road-safety/bicycle-safety
- NHTSA Pedestrians: https://www.nhtsa.gov/road-safety/pedestrian-safety
- Pedestrian and Bicycle Information Center: https://www.pedbikeinfo.org/index.cfm
- Smart Growth America: Complete Streets: https://smartgrowthamerica.org/what-are-complete-streets/
- Sustainable Newark: The City of Newark's Plan for Sustainability: https://newarkde.gov/DocumentCenter/View/12803/SustainableNewark_FINAL_30OCT19?bidId=
- The University of Delaware Sustainability Plan: https://sites.udel.edu/sustainability/files/2022/01/The-UD-Sustainability-Plan-2022.pdf
- Wilmington Bike Share Feasibility Study: https://www.wilmingtonde.gov/government/city-departments/planning-and-development/bike-wilmington/bike-share-feasibility-study

FAQs

What is a bikeshare system or program?

Bikeshare programs typically offer affordable, short-term rentable bicycles in a specific area. These programs can be publicly operated (e.g., city-owned and maintained), privately operated (e.g., private organization provides services and products procured by a city), or a hybrid (e.g., products procured by a city, but the city provides the service). Cities can have more than one bikeshare program.

Bikeshare programs with docking stations mean that users will typically pay a membership fee or pay-per-ride fee to access the bike from a docking station and be able to use it for a specified amount of time, with penalties or additional chargers incurred for using a bicycle over the specified amount of time. A dockless program will allow users to pick up bicycles left by others and leave them wherever they want when they are done, and users are usually charged through their smartphone.

Does the bikeshare system include e-scooters?

Delaware state law (4198N) prohibits the use of e-scooters and e-skateboards on public highways, streets, and sidewalks. Given this, e-scooters were not considered.[127] The City of Newark does not have the power to authorize e-scooter usage on bicycle lanes, sidewalks, or state highways as it cannot supersede state law.

Who would the bikeshare system be accessible to?

Everyone able to use a bicycle.

What are the rules for helmet use in Newark, Delaware?

The law mandates that bicycle helmets must be worn by anyone 16 and under.

What is the difference between a bike lane, protected bike lane, segregated bike lane, and physically separated bike lane?

In this Report, these terms are used synonymously. Generally, a 'bike lane' can be interpreted as a sharrow with painted lines or a bike lane with a concrete barrier or poles that separate it from motorized vehicles. Here, the addition of 'protected', 'segregated', and 'physically separated' add emphasis to the bike lanes being distanced from motorized vehicles and to stress the importance of this distance and the barrier for safety of all who share roads.

What is a 'sharrow'?

Sharrows are painted markings on a road that depict where cyclists and drivers must co-exist in the same lane. They are not created to reserve space for cyclists but, instead, to denote where the space is shared. They typically coincide with speed limits.

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