An aerial, black and white photograph of a city street grid. A prominent, wide, tree-lined corridor runs vertically through the center of the image, creating a visual axis. The surrounding streets are visible as a grid pattern, with varying widths and orientations. The overall scene is captured from a high angle, looking down on the urban landscape.

Implementing a Pedestrian and Bike-oriented Street Network in Manhattan CB2

2021-2022 Fund for City of New York
Community Planning Fellow
Sori Han & Victor Gorchach

Abstract

The fast-changing dynamics in New York City's pedestrian scene and bicycle culture that have been strengthened by the creation of Open Streets and other pandemic-related cityscape developments have highlighted the necessity for a truly cohesive network of streets for pedestrians and bicycles, providing a continuous and safe connection throughout the city and Manhattan Community Board 2 (CB2).

Working with the CB2 Traffic and Transportation Committee, this report examines the current conditions of bike lanes and streets. Emphasis was given to Spring Street and 6th Avenue due to their importance within CB2's street network. Extensive observation, data analysis, and interviews were main methods used to develop an argument for recommendations to be submitted to the New York City Department of Transportation (NYC DOT). By focusing on these areas and their key aspects, we hope our analysis presents methods by which other parts of the city may be analyzed in the future.

Acknowledgments

Special thanks to Shirley Secunda, Daniel R. Miller, and Jeannine Kiely from CB2 and The Fund for the City of New York for making this research project possible. Huge thanks to the members of Manhattan Community Board 2 for their comments and questions related to this research.

Executive Summary

BACKGROUND

New York City has seen a rapid growth in bike ridership and its bike infrastructure throughout the last two decades, along with experiments in closing off street segments previously dedicated to cars, resulting in a significant change in the city's streetscape. But as global priorities shift, specifically relating to global warming, a new vision of the street is emerging which requires far greater boldness and coordination to realize than NYC has been able to commit to. The understanding of the street as a valuable public good demands that a strong commitment be made to give back the streets to pedestrians and alternative modes of transportation other than traffic-causing, noise-and-atmosphere-polluting cars. The Covid-19 outbreak has seen the success of the Open Streets program in providing much-needed open space to communities in the city and a large part of city residents see this precedent as an opportunity to keep pushing for further progress.

OBJECTIVE

Community Board 2 in Manhattan is in strong support of the ideas described above, and saw, through this report, an opportunity to produce a comprehensive analysis of street conditions from the pedestrian and cyclists' point of view. This is done to support the larger goal of successfully implementing a cohesive network of bike and pedestrian-friendly streets in CB2.

METHOD

This is done in three stages: first, walkthroughs of the neighborhood and insights from community board members help define the two focus areas, namely Spring Street and 6th Avenue (Avenue of the Americas). Following the identification of the focus areas, existing conditions along Spring street are observed, documented, and analyzed with the aid of data sourced from the NYC Open Data portal. Along Spring, an emphasis is given to Open Streets, how current implementation of the program fails to deliver optimal results, and what could be done to see the program realize its full potential. Next, existing conditions along 6th Ave are observed and documented, with an emphasis on understanding current cyclist behavior and riding patterns. The goal is to propose a safe and viable way of connecting the north-bound bike lane on Church Street (interrupted in CB1) to the 6th Ave bike lane on 6th Ave and 8th Street.

Upon gathering and documenting existing conditions, we proceed to suggest a set of recommendations and design proposals that would be appropriate for the incremental establishment of a street network in CB2 that could become increasingly lively, safe, and pleasant for all users.

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1

Introduction

- 1.1 Neighborhood Context
- 1.2 Statement of District Needs
 - 1.3 Cycling in CB2
- 1.4 Project Goals & Scope

Neighborhood Context



Manhattan Community Board 2



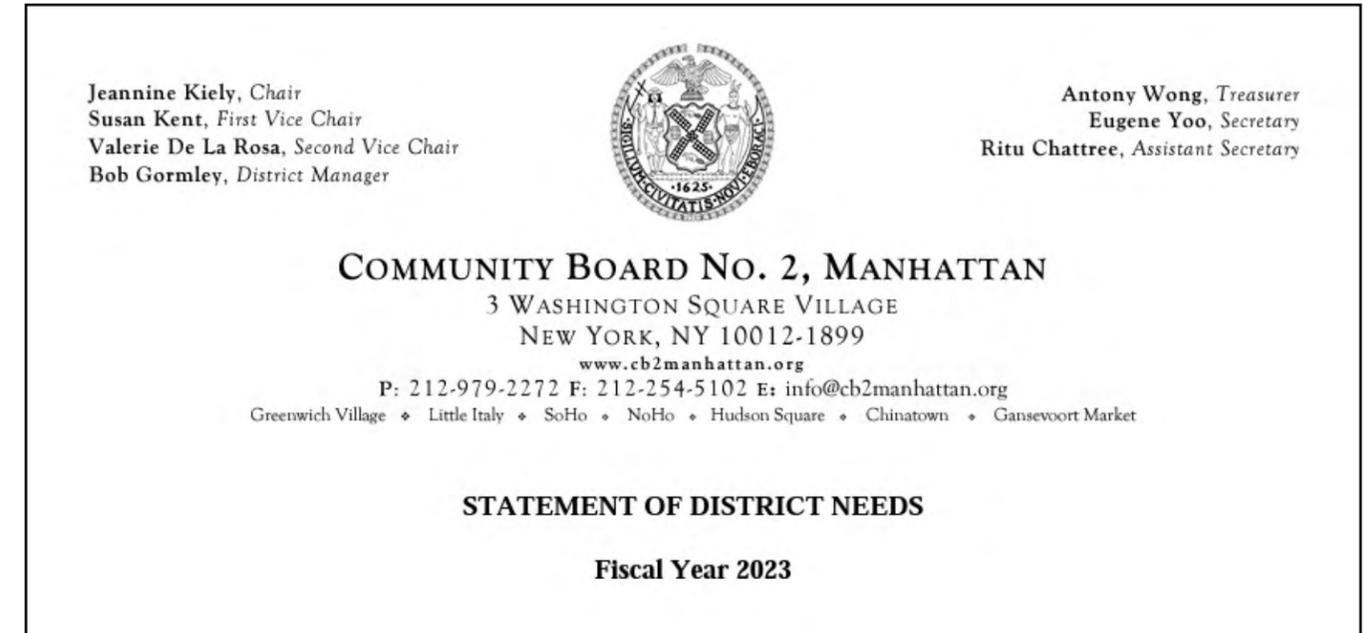
CB2 encompasses one of the largest landmark districts in New York City. The district includes the neighborhoods of Greenwich Village, SoHo, NoHo, Little Italy, Chinatown, Hudson Square, and the Gansevoort Market.

Its physical boundaries are the south side of 14th Street, the north side of Canal Street, the Hudson River, and the west side of Bowery/4th Avenue. The district is defined by its history of political activism, unique architectural landscapes, active artistic community, and the cultural and ethnic diversity of its population. It is also heavily commercial, having a high volume of food and beverage establishments on street level encouraging heavy nighttime and weekend

usage of the district's streets, by both cars and pedestrians. Relatively narrow streets are often overwhelmed with the different usage and transportation modes, leaving limited space to pedestrians and cyclists.

In the Statement of District Needs for the fiscal year 2023, the CB2 Traffic and Transportation Committee points out the need for an accessible street network that can safely and comfortably accommodate pedestrians and bicyclists throughout the community.

Statement of District Needs - Fiscal Year 2023



Statement of District Needs for Manhattan Community Board 2.

Community District 2 is an extremely popular area for tourists and New Yorkers. The relatively narrow width of many of the sidewalks has been historically serving a high volume of many different types of users – tourists, residents, business owners, cyclists, and drivers. In recent years, COVID-19 has dramatically increased the pressure on sidewalk access and usage. With the advent of the Open Streets and Open Restaurant programs as well as the increased number of delivery trucks, the burden on the narrow streets has been overwhelming more than ever.

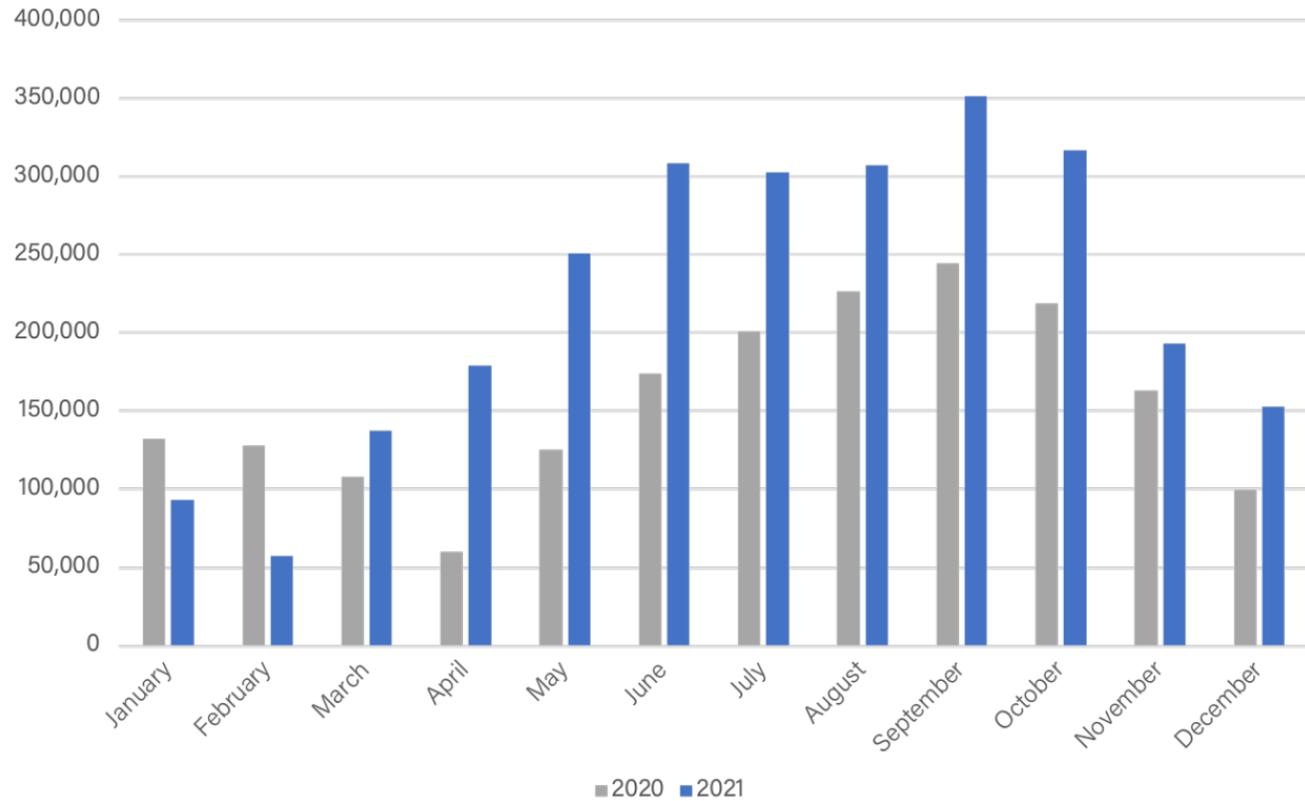
Poor connection of bike lanes and unmaintained road conditions have been leading to intense congestion and confusion that often forces

pedestrians to walk in the streets and cyclists to bike on sidewalks, which is undesirable and unsafe. The district's fragile network of streets is also vulnerable to the heavy impact on the infrastructure, and the population is suffering from the constant vehicular conflicts and emissions that affect the air quality.

In this regard, the committee recognizes the importance of establishing a safe and cohesive street network that prioritizes pedestrians and cyclists. CB2 sees opportunities to build upon the new concepts to establish the comfortable and safe street connections so needed in the community.

Cycling in CB2

Number of Citibike Rides Started from Community District 2



In the past two years, there has been an expressive expansion of Citi Bike stations in Community District 2. In 2020, there were 42 Citi Bike stations within the district, and in one year, the number of stations increased to 51.

By looking into the Citi Bike System data, rides starting from the district account for approximately 10% of the rides in all of New York City.

Additionally, the number of Citi Bike rides starting in Community District 2 increased significantly. In 2020 the number was 1,879,901 and by 2021 it had increased to 2,651,431, which means there was an approximately 70% increase in the number of rides within the district. Considering that Citi Bike is one of the many options that cyclists use to ride a bike, **it is likely that the number of total bike rides and cyclists within the district has grown massively in the past few years.**

TOP 10 CITI BIKE STATIONS IN NYC (2020)

- 1 Ave & E 68 St
- West St & Chambers St
- W 21 St & 6 Ave
- 12 Ave & W 40 St
- Broadway & W 60 St
- E 17 St & Broadway
- E 13 St & Avenue A
- Christopher St & Greenwich St**
- Pier 40 - Hudson River Park
- Broadway & E 22 St

TOP 10 CITI BIKE STATIONS IN NYC (2021)

- W 21 St & 6 Ave
- E 17 St & Broadway
- West St & Chambers St
- 1 Ave & E 68 St
- Broadway & W 25 St
- Cleveland Pl & Spring St**
- Broadway & E 14 St**
- 6 Ave & W 33 St
- West St & Liberty St
- E 13 St & Avenue A

Furthermore, it was found that Citi Bike stations within Community District 2 are some of the most popular Citi Bike stations citywide. Among 1,144 stations in New York City, Christopher St & Greenwich St station served 84,565 rides in 2020, ranked among the 10 stations that served the most rides in New York City. In 2021, Cleveland Pl & Spring St station and Broadway & E 14 St station were also ranked among the top 10 stations, out of 1,496 stations citywide.

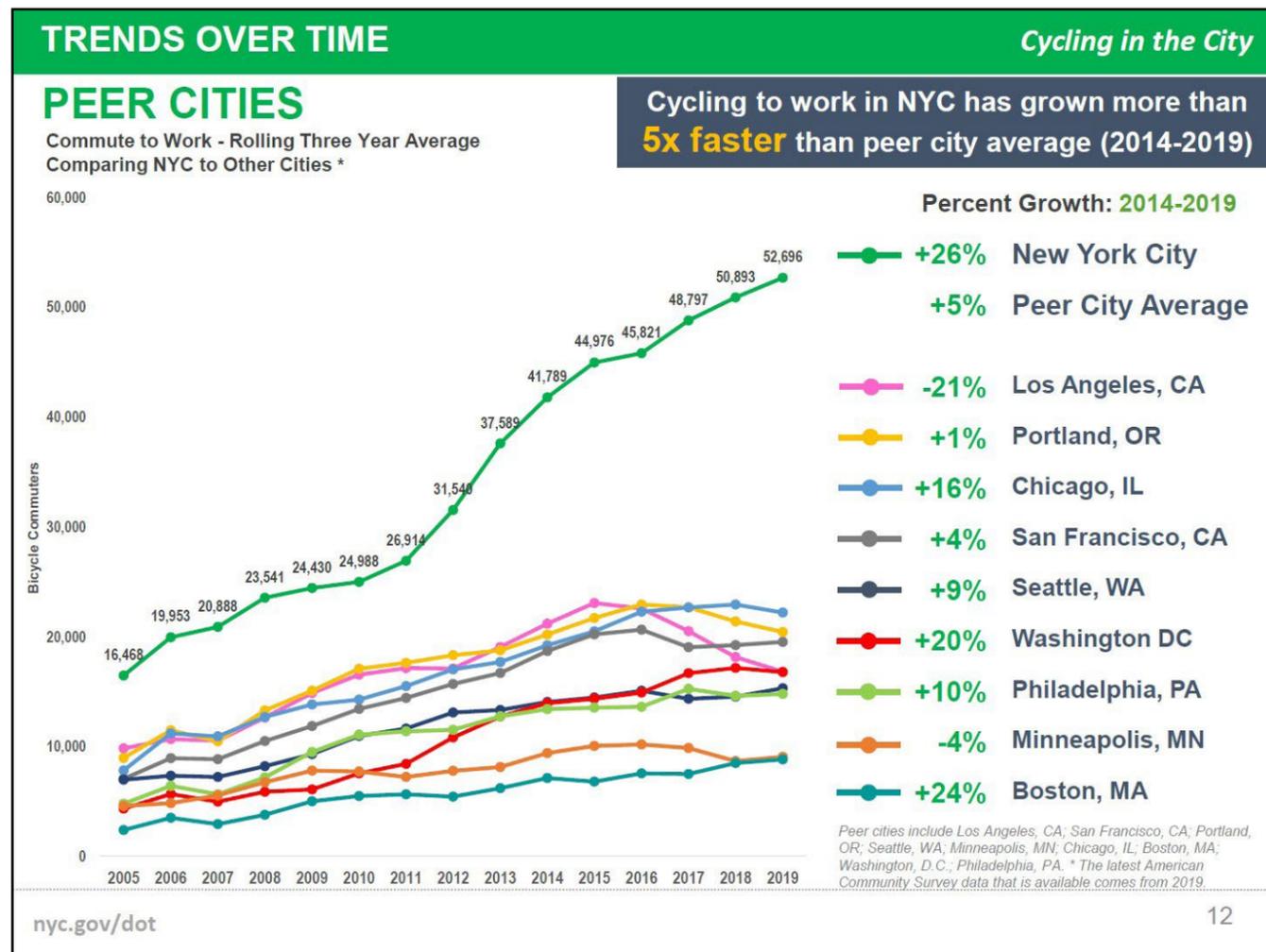
The observed expansion of bicycle use as a means of transportation follows **citywide trends that emphasize the need for a safer and more cohesive network of bike lanes within NYC and, as seen, CB2.**

As a response to global warming, in 2014, New York City, under mayor Bill de Blasio, committed to reduce the city's greenhouse gas emissions in 80% by the year 2050. The plan would focus on the transformation of four major categories: energy supply, buildings, solid waste management, and **transportation**.

There has been extensive literature worldwide over the recent years attesting to the inefficiency of car-centric transportation systems and advocating for emphatic investments in public

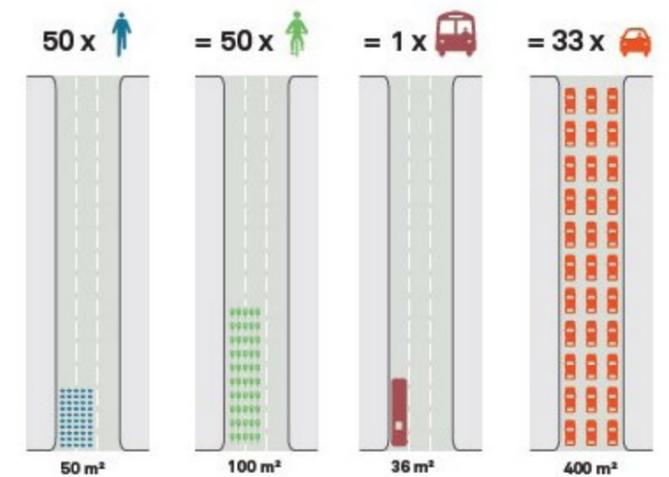
and other alternative modes of transportation, such as cycling, in urban centers.

Streets make up the vast majority of public space in NYC. As it stands now, according to Transportation Alternatives' 25x25 report, 96% of residents make regular use of public transportation, yet **75% of the city's streets are devoted to cars.** Only 24% are allocated to sidewalks, 0.02% for car-free bus lanes, and 0.93% for bike lanes.



Cycling in the City; DOT, 2021.

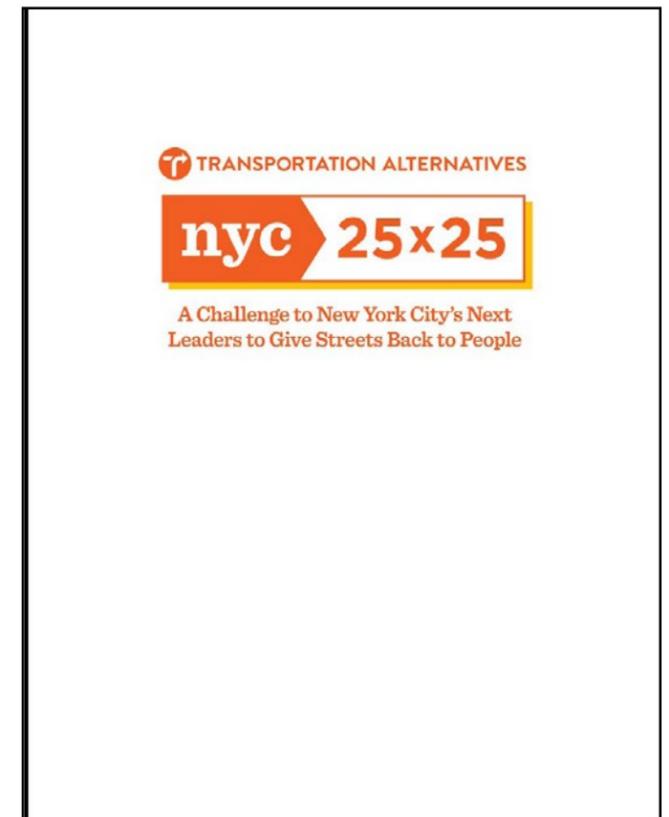
As we see bike ridership grow at a faster rate than other US cities, this allocation of public space seems increasingly disproportionate. **As our goals for decarbonization align with our desires for better streets and more efficient modes of transportation, investing in expanding and improving the city's bike lane network becomes essential.**



Space occupied by 50 people; Global Street Design Guide, 2016.



NYC's Roadmap to 80x50; 2014.

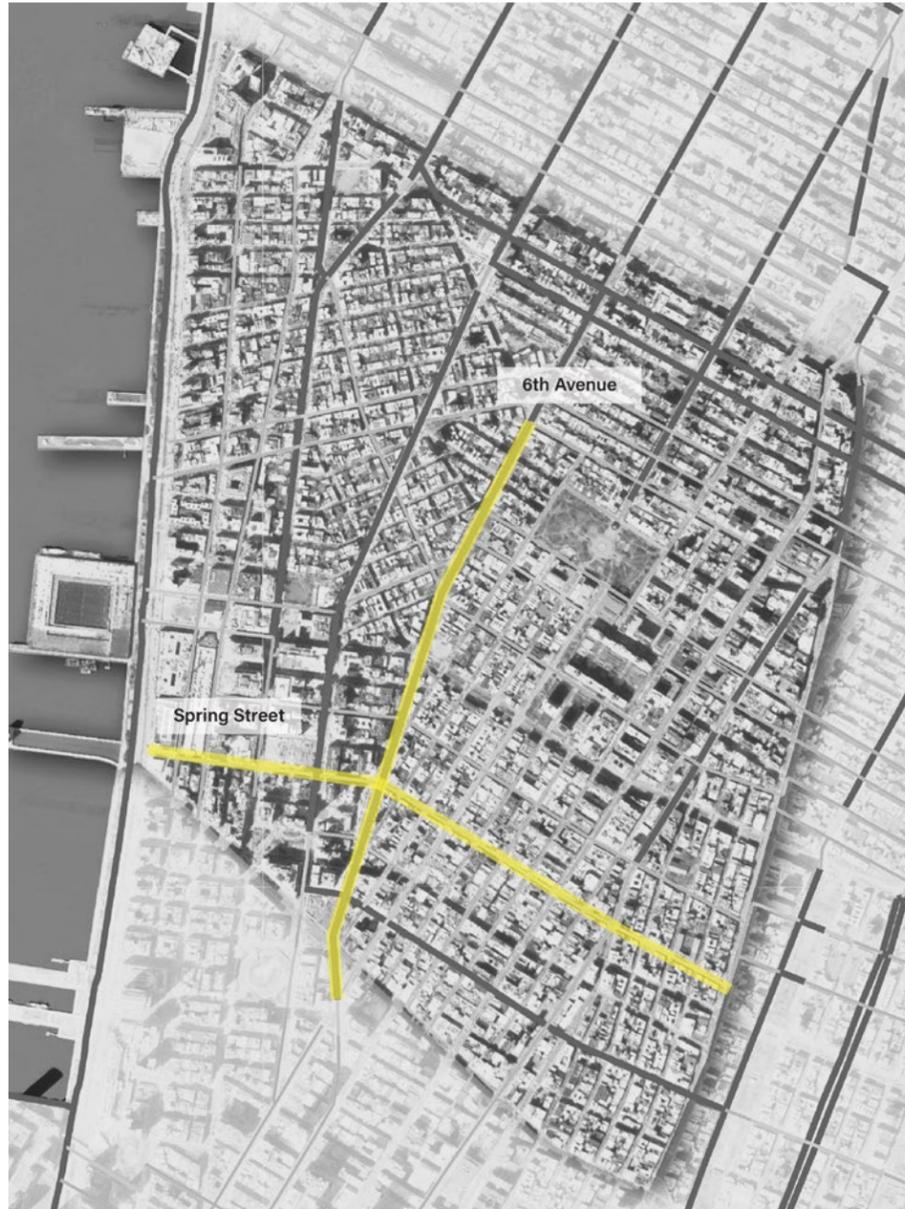


25x25; Transportation Alternatives, 2021

Project Goals

- Analyze current conditions of the bike lanes and streetscape of Community District 2.
- Explore alternative options and recommendations for a safer and more cohesive pedestrian and bike-focused network in Community District 2.

Project Scope



- **Spring Street** from West Street to Bowery.
- **6th Avenue** from Canal Street to West 14th Street.

2

Spring Street

- 2.1 About Spring Street
- 2.2 Current Conditions - Existing Assets
- 2.3 Current Conditions - Cycling
- 2.4 Current Conditions - Expected Changes
- 2.5 Issues- Complaints
- 2.6 Issues - Safety Problems
- 2.7 Issues - Bike Lanes
- 2.8 Issues - Open Streets
- 2.9 Residents' Voices
- 2.10 Recommendations



About Spring Street



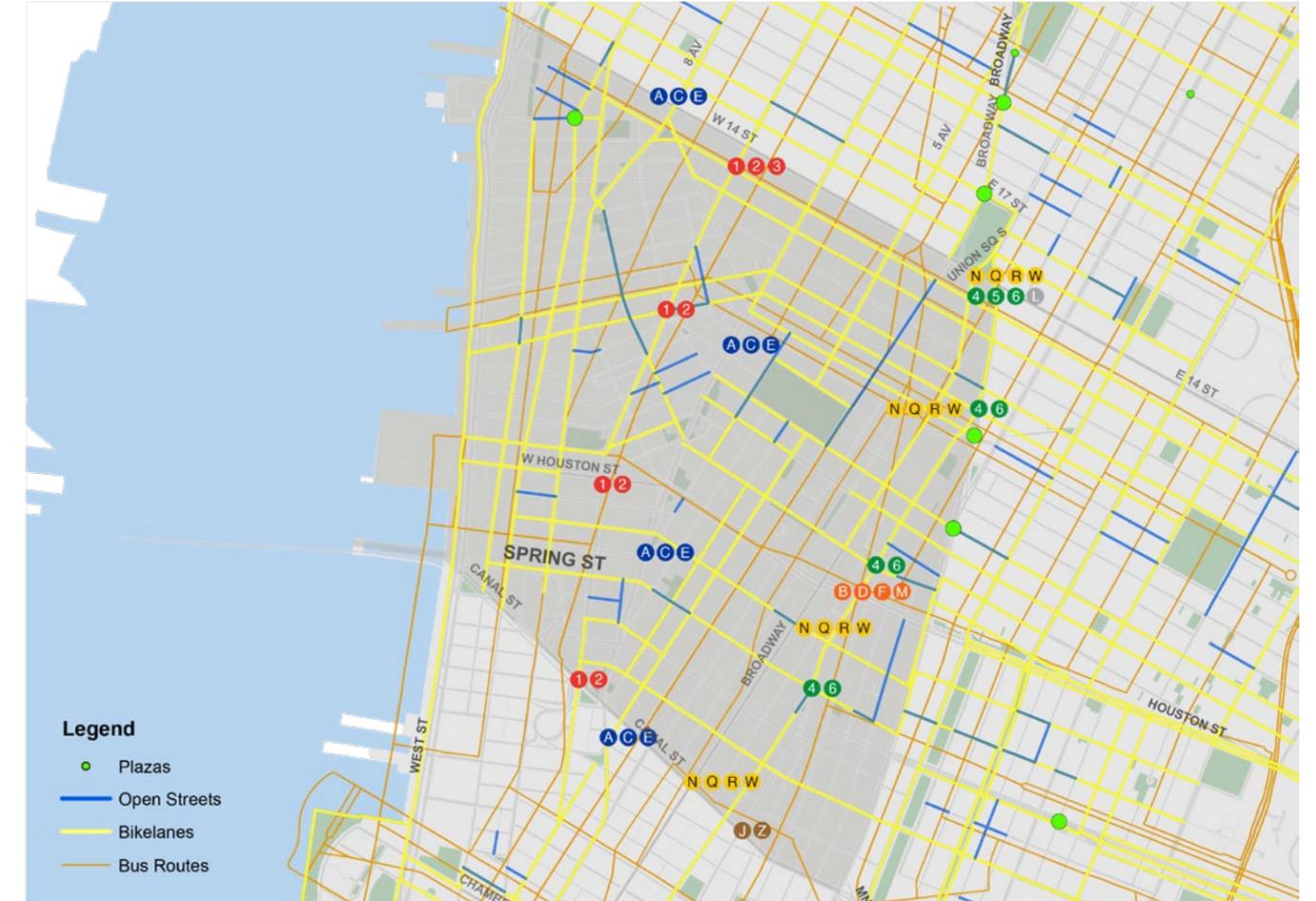
Spring Street runs west-east through the neighborhoods of Hudson Square, SoHo, and Nolita. As it passes through the center of SoHo, Spring Street is known for its artists' lofts, restaurants, and trendy and high-end boutiques, as well as its collection of cast-iron buildings. Spring Street station, located at the intersection of Spring and Lafayette streets is served by the A, C, and E trains.



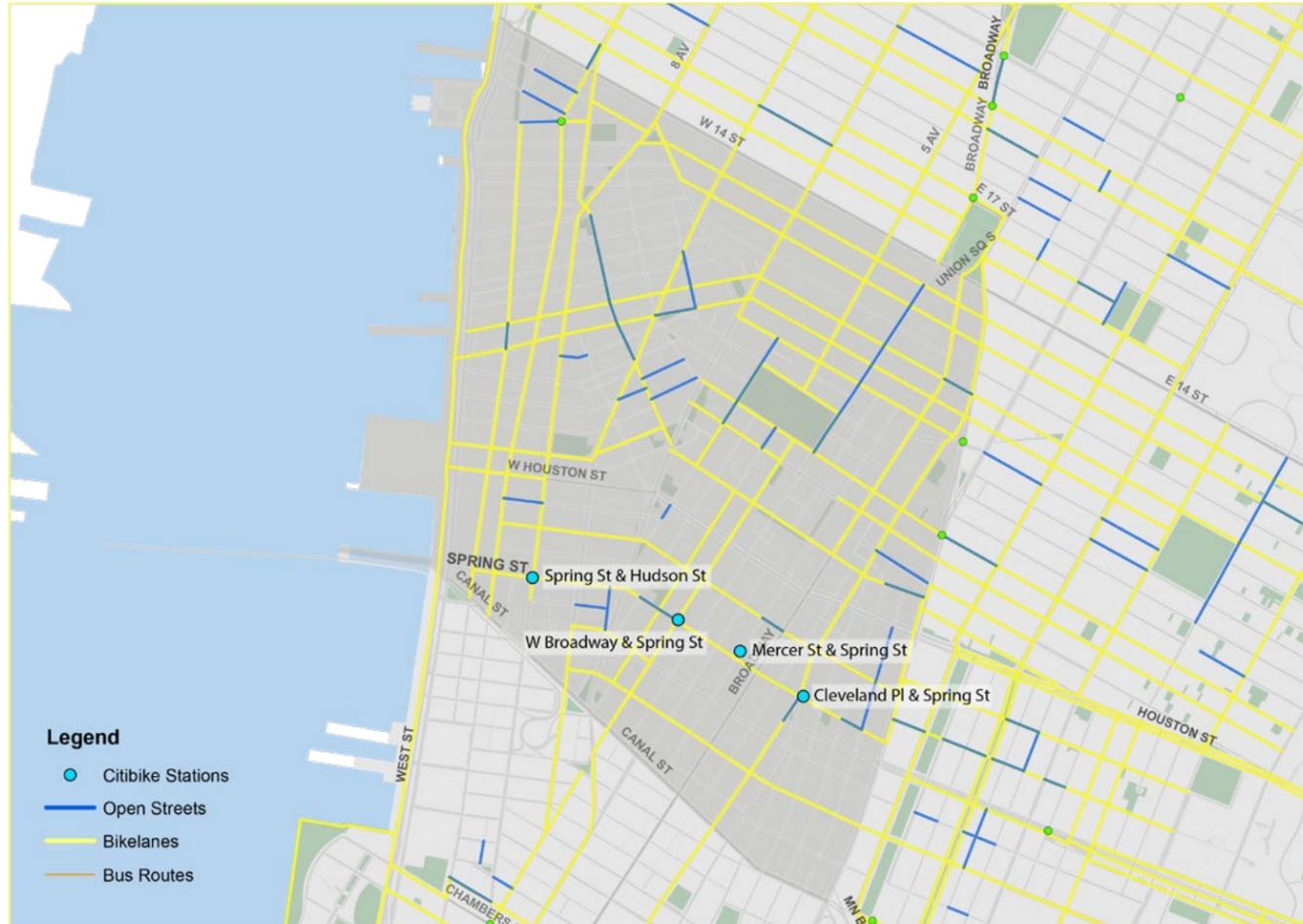
Spring Street; Google Street View

In Richard Lourie's New York Times article, Spring Street, a Stroll for All Seasons, Spring Street is described as "eminently strollable -- long enough to be invigorating but not so long as to be wearying" and that "the pace is naturally leisurely because there is so much variety at ground level with nary a dull block en route." As Lourie describes, Spring Street is packed with street-level food and beverage establishments, locally-owned small retail, and homes for residents that have been living in the neighborhood for decades.

Current Conditions - Existing Assets



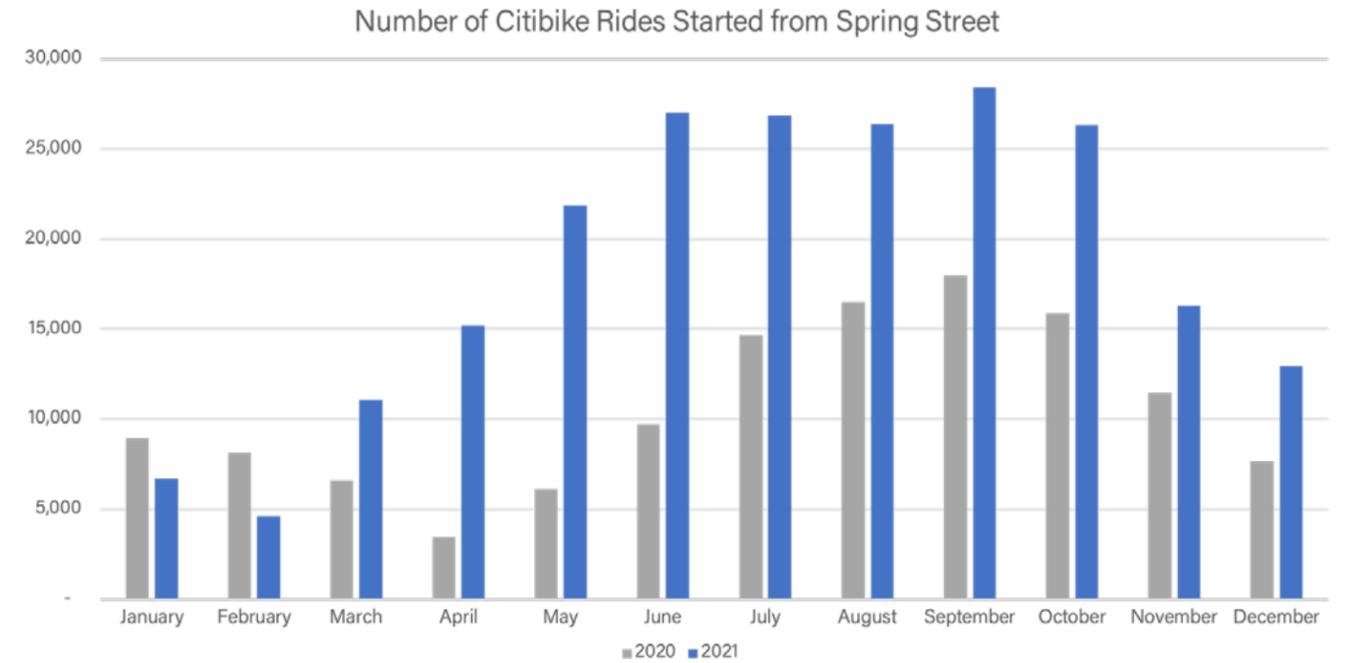
Current Conditions - Cycling



Citi Bike Stations on Spring Street

- Cleveland Pl & Spring St
- W Broadway & Spring St
- Mercer St & Spring St
- Spring St & Hudson St (new)

Currently, there are 4 Citi Bike stations on Spring Street. These stations serve a large number of rides year-round, especially Cleveland Pl & Spring St station was ranked among the top 10 most popular Citi Bike stations in 2021, out of 1496 stations citywide. As shown in the chart below, **the number of Citi Bike rides that started from the station on Spring Street has increased by 56% in just one year, serving 127,086 rides in 2020 and 223,695 rides in 2021.**



This uptrend proves that Community District 2 is serving more and more cyclists, and emphasized how timely and significant it is for the district and the City to analyze the current condition of the street and bike lanes and bring in a safe and cohesive bike network.

Current Conditions - Expected Changes

With increased and increasing development on the Far West Side along Spring Street, attention needs to be given to providing more transportation opportunities, accessibility, and connections in that area for residents, businesses, and those who visit Community District 2.

As the district aims to prioritize pedestrians and cyclists, opportunities must be sought and identified to reclaim streets for public spaces that both support pedestrian and cyclist activities as well as build community life.

Disney HQ at Four Hudson Square



Rendering of 4 Hudson Square; Designed by Skidmore, Owings & Merrill

According to an article by Curbed, Disney HQ at Four Hudson Square is expected to bring in approximately 5,000 employees.

Since the 2013 rezoning that created Hudson Square, the neighborhood has seen new developments. And now, the district is expecting one of the biggest new buildings on Spring Street – the Walt Disney Company's new headquarters.

The 1.2 million-square-foot building will occupy the entire block bordered by Varick, Hudson, Vandam, and Spring streets, with ground-floor retail and new sidewalk pavings included as part of the package. The development is likely to be finished around the end of 2023 or early 2024 at the latest.

Google Office at 550 Washington Street



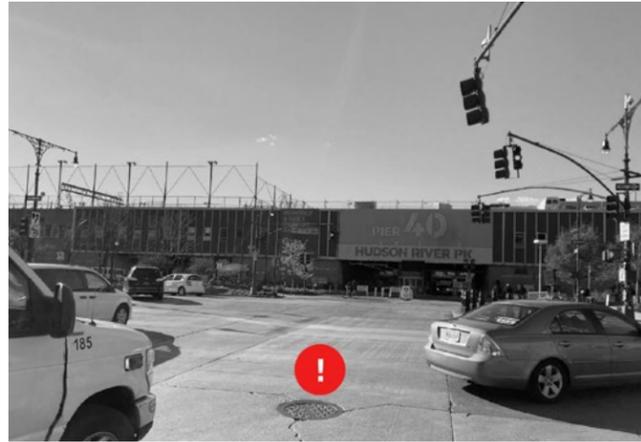
Rendering of 550 Washington Street; Designed by COOKFOX architects

According to Google's official announcement, Google Office at 550 Washington Street is expected to bring in approximately 7,000 employees.

At the end of 2018, Alphabet Inc. announced that Google would build a new campus at 550 Washington Street. Completion is anticipated for mid-2022, and occupancy is estimated for 2023.

With massive new developments coming into the community, the growing tech workforce is highlighting Hudson Square's shortcomings as a neighborhood, especially its current street condition and transportation infrastructure.

One of the District's major traffic and transportation problems is vehicular congestion around the entrance and exit to the Holland Tunnel. The tunnel brings in great volumes of private vehicles visiting the city from out of state. Additionally, as Curbed pointed out in its article, *With Google Moving In, Hudson Square Is Trying to Spruce Up the Place*, Hudson Square is largely cut off from its surroundings by Holland Tunnel ramps and a four-block-long UPS building on Greenwich Street. It hardly functions at street level, mostly because it's barely walkable.



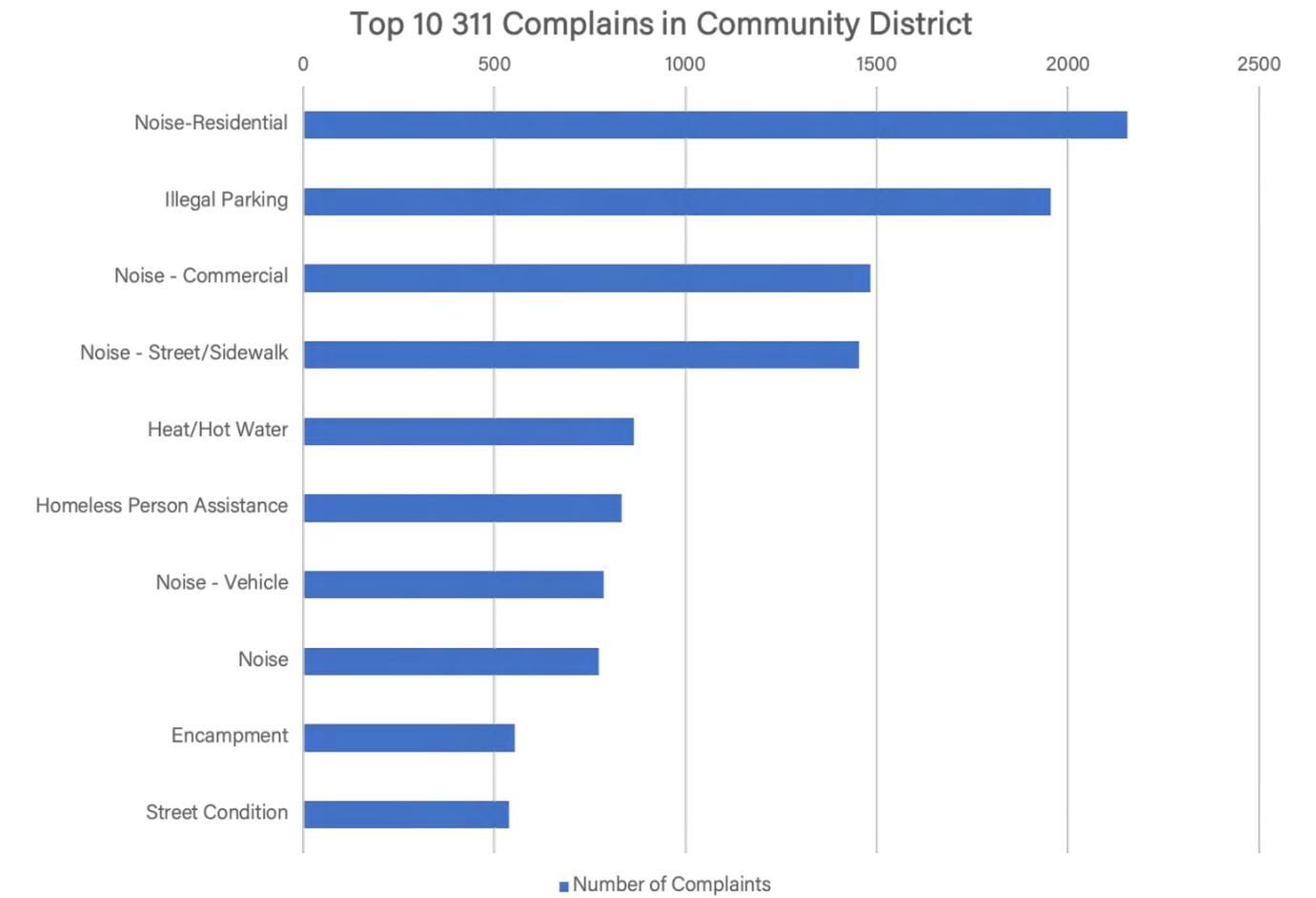
Currently, there is no crosswalk that leads to the Hudson River Park from the Spring Street, and Spring Street station, located at the intersection of Spring and Lafayette Streets will be the only station that serves over 10,000 new workers on Spring Street.

Cookfox, the architect firm for the new Google office at 550 Washington Street mentions on their website that “with the building located directly off the Hudson River Greenway, we designed the space to encourage bicycle commuting, tying the workplace to a healthier and more sustainable commuter infrastructure through a large bicycle parking facility,” which shows Google’s strong commitment to encourage its workers to commute by bike and use bike network. Thus, it is timely and important for the City to discuss with Disney and Google the expected problems and concerns that the district has and cooperate on implementing a cohesive bike network that can serve more than 10,000 new workers as well as existing residents.

In an attempt to address these issues before it’s flooded with additional workforce and visitors, the Hudson Square BID released a \$22 million plan in September 2021 that aims to make the area better for walking and biking. The BID’s proposal calls for a new sidewalk-level bike lane along Houston Street and a pedestrian bridge that runs from Spring Street over the West Side Highway.

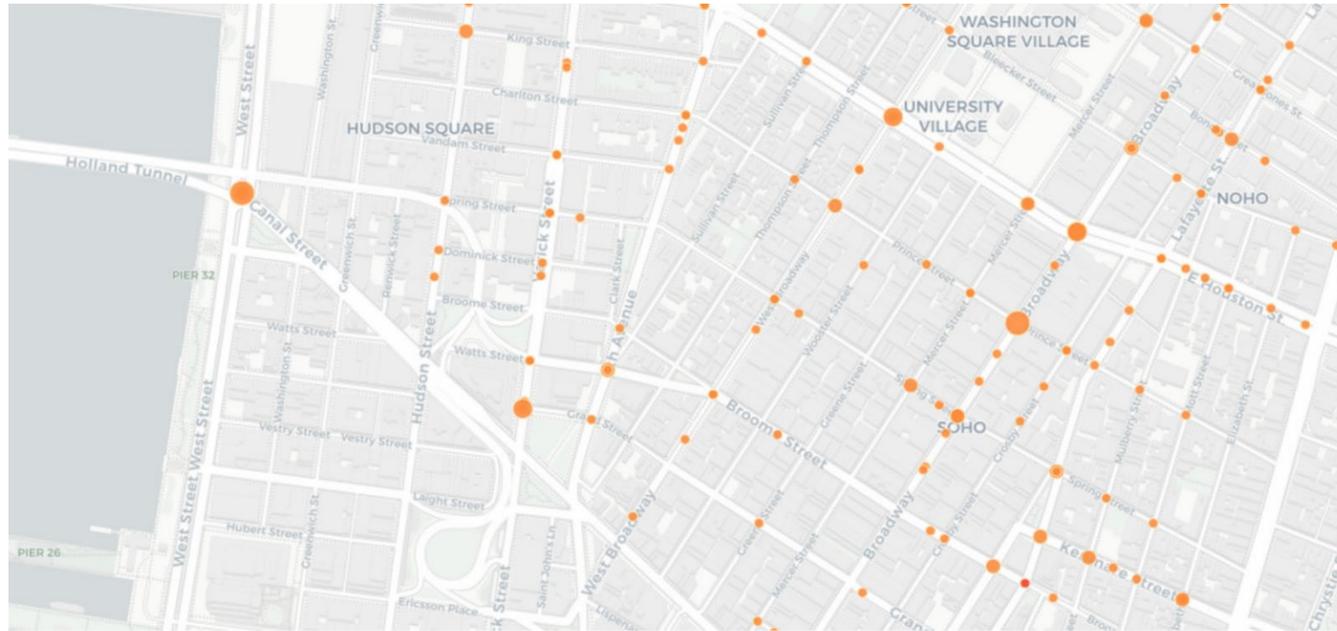
However, there needs to be broader support from the City and collaboration from the new developments to create a better street network that serves the workforce as well as protects current residents from quality of life issues such as traffic safety and congestion problems.

Issues - Complaints

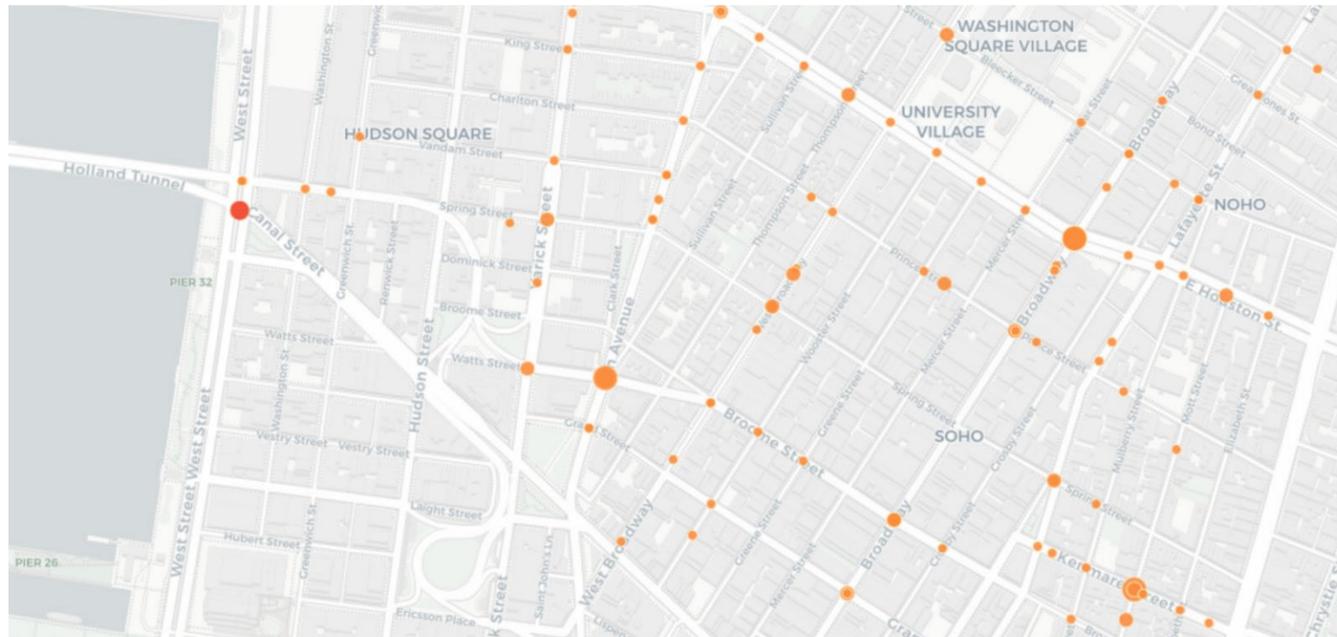


Complaints that were submitted to NYC 311 show that the residents are already suffering from poor street conditions and traffic congestion on Spring Street. When analyzing the number of complaints submitted from Community District 2 in 2021, complaints regarding **Illegal Parking, Vehicle Noise, and Street Conditions** were included among the top 10 complaints.

Issues - Safety Problems

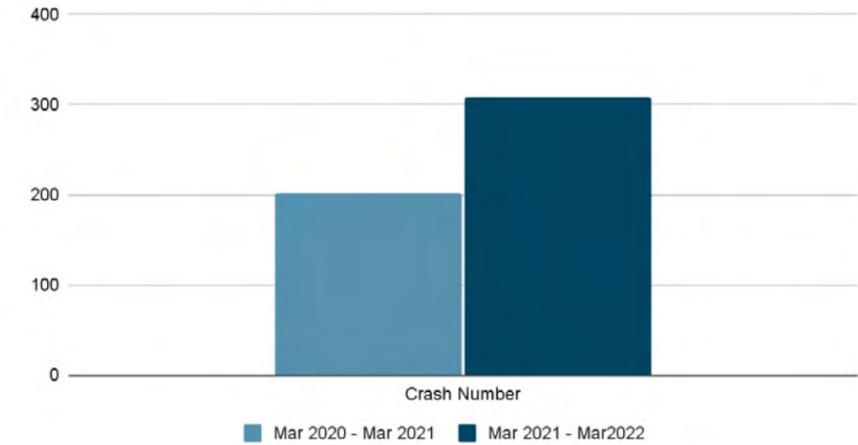


Crash Hot Spots (March 2020- March 2021)



Crash Hot Spots (March 2021- March 2022)

Number of Crashes in CB2

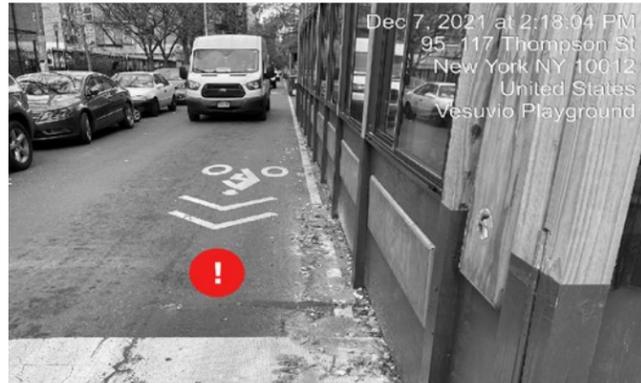


Data also shows that the number of crashes that happened in the district increased in the past few years. According to the NYC Crash Mapper, which uses NYPD Motor Vehicle Collisions and John Krauss's NYPD Crash Data Banaid data, the number of collisions and crashes caused by motor vehicles increased by 65% from 201 to 308 in Community District 2.

Both the high volume of 311 complaints regarding street conditions and the increased number of crashes happening in the district once again emphasize how timely and important it is to implement a more safe and cohesive street network in Community District 2.

Issues - Bike Lanes

From observations, this study was also able to capture some of the real conditions of the bike lanes and pedestrian and cyclist safety on Spring Street.

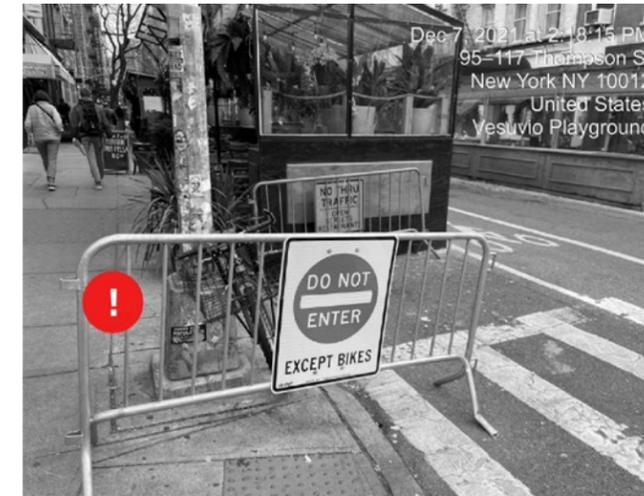


This photo was taken on one of the Open Streets on Spring Street, between Mott Street and Elizabeth Street. The observation was held during the Open Street operation hour, though there were no barricades on the street and the corridor was packed with parked cars. Additionally, because of the restaurant sheds, there weren't enough spaces for cyclists to use the shared street or open streets safely. Indeed, cyclists were riding bikes on the sidewalk to avoid the traffic, which was threatening pedestrians' safety.

This photo was taken from the bike lane in the intersection where Hudson Street and Spring Street meet, right in front of where the new Disney Headquarters is coming in. Because of the cars parked along with the street, construction materials, barricades randomly sitting on the road, vehicles were invading the bike lanes, threatening cyclists. It was also hard to notice the existence of the bike lane as they lack visual cues and the paint was often faded out.

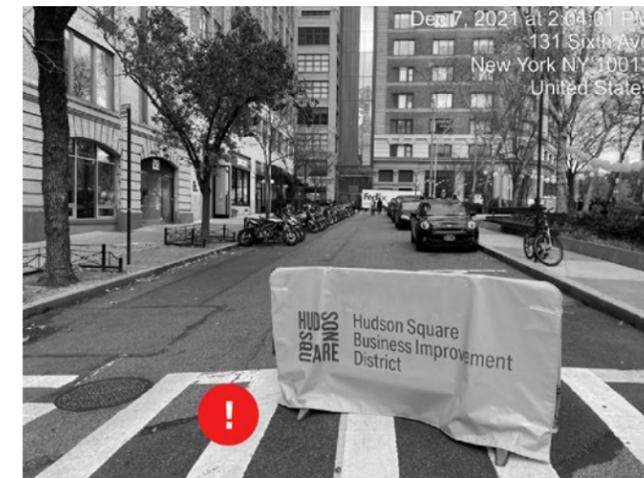


Issues - Open Streets



There are four Open Streets that are in operation along Spring Street, but it was hard to find one without having maintenance and operation issues.

First, the Open Street barricades were often not in place during the operation hour and were blocking the pedestrian flow on the sidewalk. There seemed to be no particular instructions or regulations about storing and placing the barricades.



Furthermore, the material of the Open Street signages was flimsy, making it easily removable and vulnerable to the weather. As such, the information on the Open Streets was often removed and destroyed. Signages were fixed on a road sign poles or trees on the sidewalk, making it difficult for pedestrians, cyclists, and drivers to recognize the Open Street in operation.



Residents' Voices

I often see Open Street barricades that are not in place on Spring Street although they should be maintained by the local businesses(Open Street partners). There needs to be a better operation and maintenance strategy for Open Street in order to serve pedestrians and cyclists right.

Adam Zeldin, Resident & Member of Manhattan CB2

I think residents will be far more welcoming of street closures(Open Streets) if they feel that it is also in an effort to help protect the neighborhood better.

Coral Dawson, Resident & Member of Manhattan CB2

I commute by Citi Bike almost every day and I feel much more threatened than before since the pandemic. There seem to be more bikes and delivery e-bikes on the road, but the increased number of unorganized outdoor sheds and delivery trucks often block the bike lanes, making cyclists hard to navigate. To be honest, I sometimes use the sidewalk to bike. I know it is dangerous both for me and other pedestrians, but the bike lanes in this area are not in good condition at all.

Anonymous, Cyclist on Spring Street

Recommendations

In a walking community like Community District 2, with a populace that spends much of its time on the streets, the City must continue to encourage improvements for pedestrian and cyclist-friendly street networks with emphasis on

the design of streets. This includes traffic calming approaches as well as a more pedestrian-oriented redesign of directional information and visual cues for both pedestrian and vehicular traffic.

Street Design Improvements

1. Open Street Signage Improvement



Open Street Signage Example of Willoughby Avenue Open Street.

Open Street signage on Spring Street should be replaced with more firm material resistant to the weather condition and should contain specific operation information about the Open Street. It should also be fixed on a steady and firm infrastructure such as planters making it easily visible to the pedestrians, cyclists, and drivers.

2. Open Street Barricade Improvement



Design ideas for Open Street barricades and signage by Sam Schwartz.



The temporary cones and barricades that have been used by NYC DOT over the past 18 months to alert road users to new conditions have a number of flaws. These makeshift methods, while somewhat effective, lack the permanence and consistency needed to prioritize pedestrians and cyclists. Relying on volunteers to administer barricades on a daily basis—although beneficial in community-building respect—is unsustainable in the long run. Similarly, depending exclusively

on traffic enforcement to ensure driver adherence to regulations is a costly and problematic proposition. Street design changes are needed to formalize the Open Streets program and better integrate them with local concerns. Above barricade designs suggested by Sam Schwartz aim to manage vehicle traffic in predictable ways, primarily through passive configurations that require less day-to-day volunteer input and attention.

Traffic Calming Techniques

In order to increase visual cues to prioritize cyclists and pedestrians on the road, the implementation of a few traffic calming techniques can be considered on Spring Street.

Curb Extension



Curb Extension Example of Willoughby Avenue Open Street.

- Narrow crossing distances
- Improves visibility for pedestrians
- Encourages slower turning speeds by vehicle

- Design and signage for 5 MPH advisory speed limit
- Slows vehicles and cyclists at the mid-block

Mid-block traffic calming



Mid-block traffic calming Example of Willoughby Avenue Open Street.

Bike Infrastructure Improvement

With increasing development on the Far West Side along Spring Street and the number of cycling in CB2, more attention and investment are needed in CB2's bike infrastructure. This includes painting bike lanes and Open Streets to enhance visual cues for users and increasing the number of bike parking spaces. Furthermore, as new developments in Hudson Square are expected to bring in over 12,000 employees in CB2, partnerships with these new neighbors are strongly encouraged to lessen the burden on NYC DOT to solely fund the improvements.

Enhance the connectivity between existing assets and infrastructures

The bike network shouldn't exist in isolation or be disconnected from the city around it and more permanent solutions are needed in a unified version. It is important for NYC DOT to recognize that not only increasing the number of bike lanes is important but also acknowledging Open Streets as part of the bike network and connecting existing public spaces such as Privately Owned Public Spaces, parks, and existing bike infrastructures to form a network is crucial. This will allow cyclists to have a choice to turn from one bicycle route to another and take a rest at a connected public space, without leaving the overall network. All of this should be supported by the infrastructure.

Education & Outreach Work for Community District 2

NYC DOT can increase general education to the district residents about the protocols of the new bicycle lanes and Open Streets through community outreach work. NYC DOT could also facilitate the conversation about the maintenance and operation strategies of Open Streets so that residents and local business owners who are interested could participate in volunteer work.



3

6th Avenue

- 3.1 Introduction to Sixth
- 3.2 Strategic Intersections
 - 3.3 Lispenard Street
 - 3.4 Canal Street
 - 3.5 Watts Street
(Special Condition - Bus Bulbs)
 - 3.7 Houston Street

Introduction to Sixth Avenue

Sixth Avenue, also known as Avenue of the Americas, is of major importance for moving people in cars, buses, baby carts, scooters, bicycles, roller blades, and motorcycles efficiently in the south-north direction of NYC. **When thinking of a comprehensive biking network within CB2, it is hard to imagine 6th Ave not being a major part of it.**

The vast majority of bike lanes running east to west (and vice-versa) within CB2 intersect 6th Ave, which suggests that it could play an important **role in distributing bike traffic into CB2. In fact, It already does so, just not safely.**

Like most avenues in Manhattan today, **6th Ave boasts a lengthy protected bike lane that stretches from 8th Street all the way to 59th Street.** While Church Street has recently been equipped with a protected bike lane that brings bikers north-bound from FiDi all the way up to Lispenard Street, the lane comes to an abrupt halt. Instead of continuing north on 6th Ave, bikers are encouraged to take West Broadway, which is only useful for those whose destination lies within CB2.

For those mid and uptown-bound, remaining on 6th is a necessary risk. **The bike lane gap can be seen on the map to the right, stretching from Lispenard St to 8th Street.**

This situation had already been previously noted by CB2's Traffic and Transportation Committee in a May 2020 Resolution, which requested the temporary extension of the bike lane on 6th Ave in response to the coronavirus pandemic and the immediate surge in deliveries in the city.

On February 16th 2022, a meeting with Kimberly Rancourt and Jennifer Leung, from the DOT, made it clear that the Department of Transportation is well aware of the need for a continuous lane on 6th Ave, but **complex intersections combined with heavy Holland Tunnel-bound traffic pose challenges that require careful consideration when developing a safe bike lane design.**

This part of the report aims to provide detailed observation and documentation of existing conditions and challenges along 6th Ave, which can subsequently inform sound design proposals and, hopefully, aid the DOT in their eventual implementation.

Throughout the report, the colors from the map to your right will remain consistent, with **dark green representing protected bike lanes, light green on-street bike lanes, and light yellow representing sharrows.**



Strategic Intersections



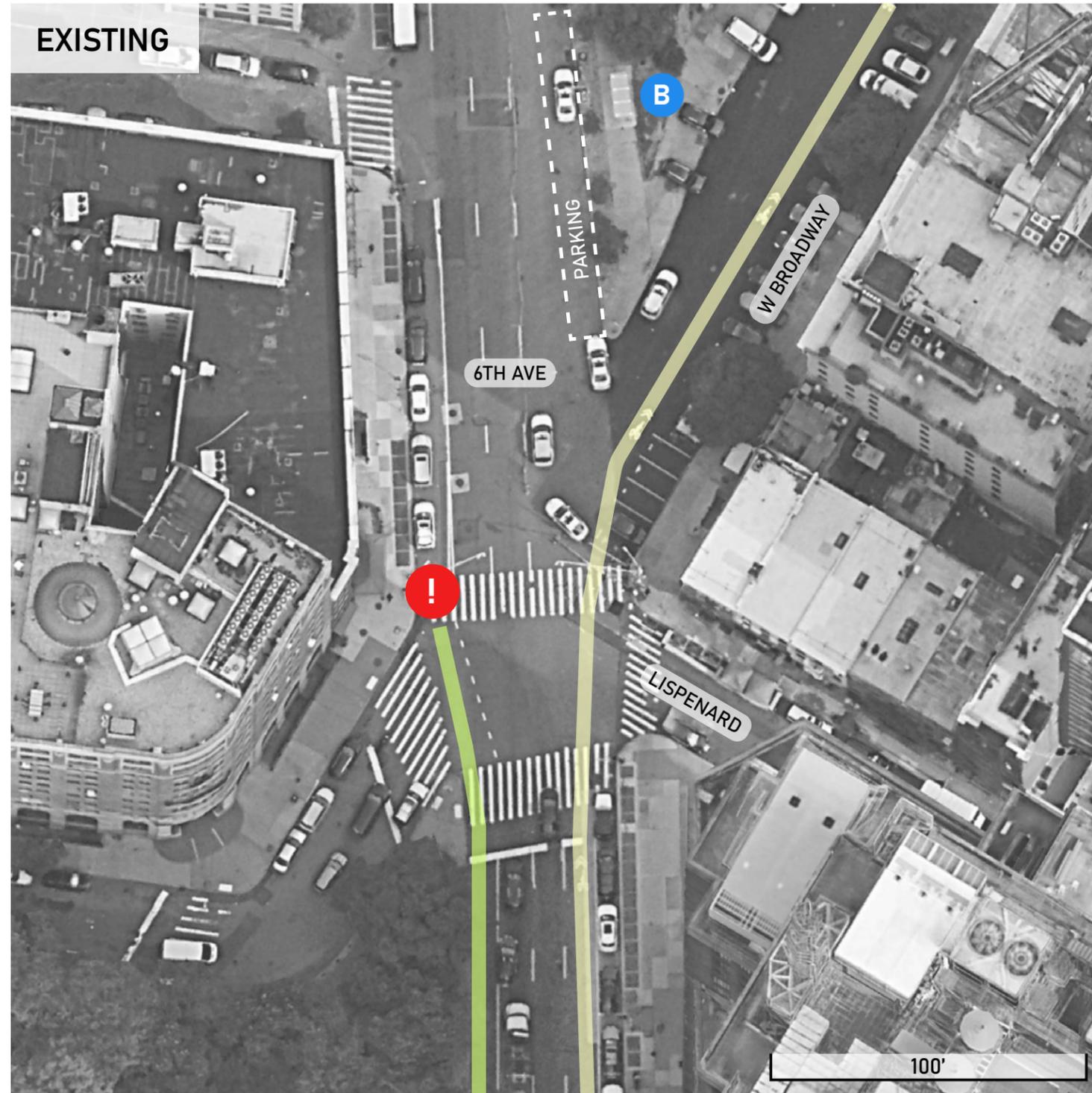
Initial walkthroughs of the neighborhood with community board members suggested that there were some intersections that presented certain peculiarities, bigger challenges, but also many opportunities. In order to successfully connect Lispenard to 8th St along 6th Ave, the design proposal should pay close attention to the intersections of 6th Ave with **Lispenard Street, Canal Street, Watts Street, and Houston Street.**

The observation of traffic issues on some of those intersections allowed us to entertain the question: **What if bike lanes could be used as educational devices to calm traffic?**

The street use in these four intersections was documented through timelapse photography, the frames of which were compiled to showcase how bikers ride on 6th Ave. **The observation of use patterns was fundamental in understanding why people make the choices they do, often underpinned by their perception of safety or convenience.**

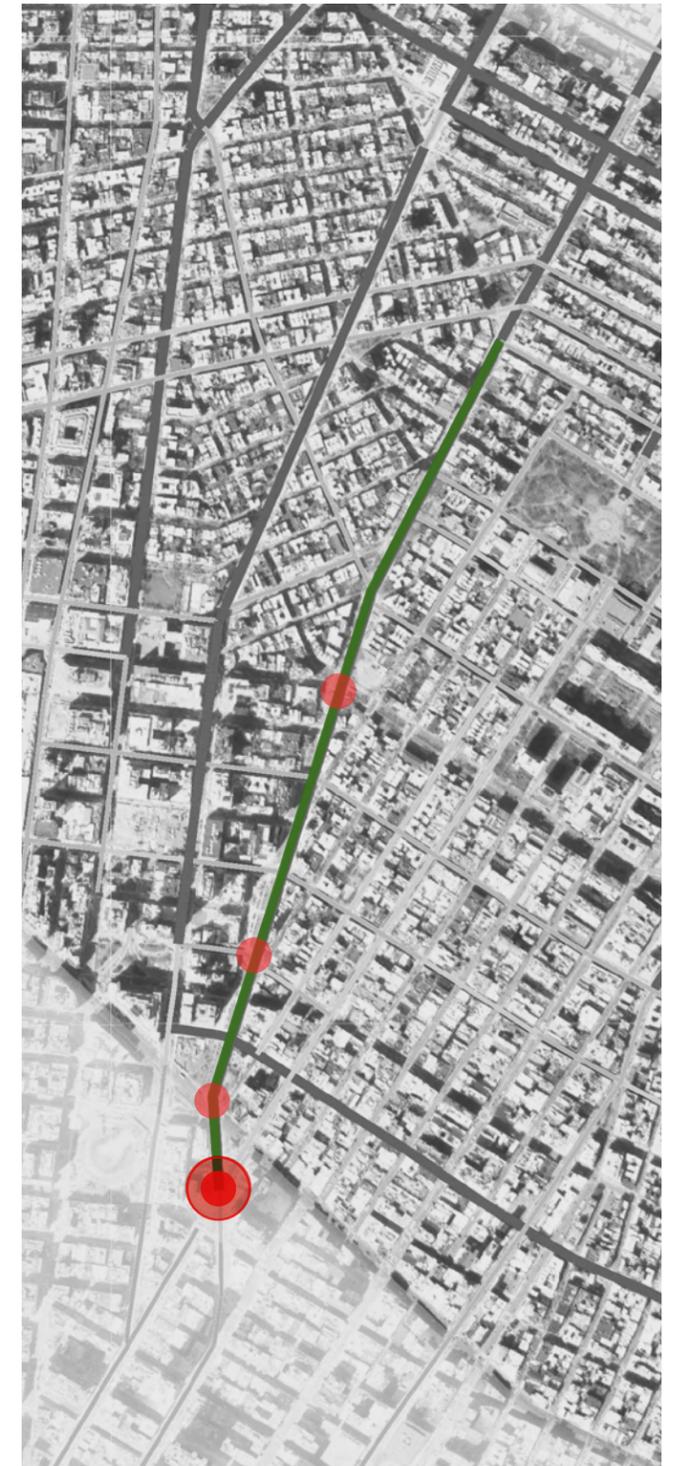
What follows is an analysis and proposal for each of the four highlighted intersections, resulting in a comprehensive proposal for a protected bike lane along 6th Ave.

Lispenard Street



The **designated bike lane** coming from Church Street comes to an **end at this point**, while **sharrows** on the opposite side of the street lead bicyclists northeast on W Broadway. Bikers heading north on the designated bike lane are left wondering how to proceed, which can lead to risky cycling among car traffic.

The diversity of use patterns observed attest to the confusing nature of the present markings for cyclists. In other words, **the incompleteness of cycling infrastructure here leads to unpredictable, and therefore dangerous, behavior on the part of cyclists.**





Bike lane ends here, leaving cyclists to continue at own risk.



This cyclist decides to cross diagonally. Risky.



Keeping to the left allows for uninterrupted cycling up 6th Ave.



Crossing 6th Ave onto W Broadway requires waiting at the light.



Parked car waits to merge onto moving lane, blocking cyclists.



Car still can't merge, making more cyclists go around and into moving traffic.



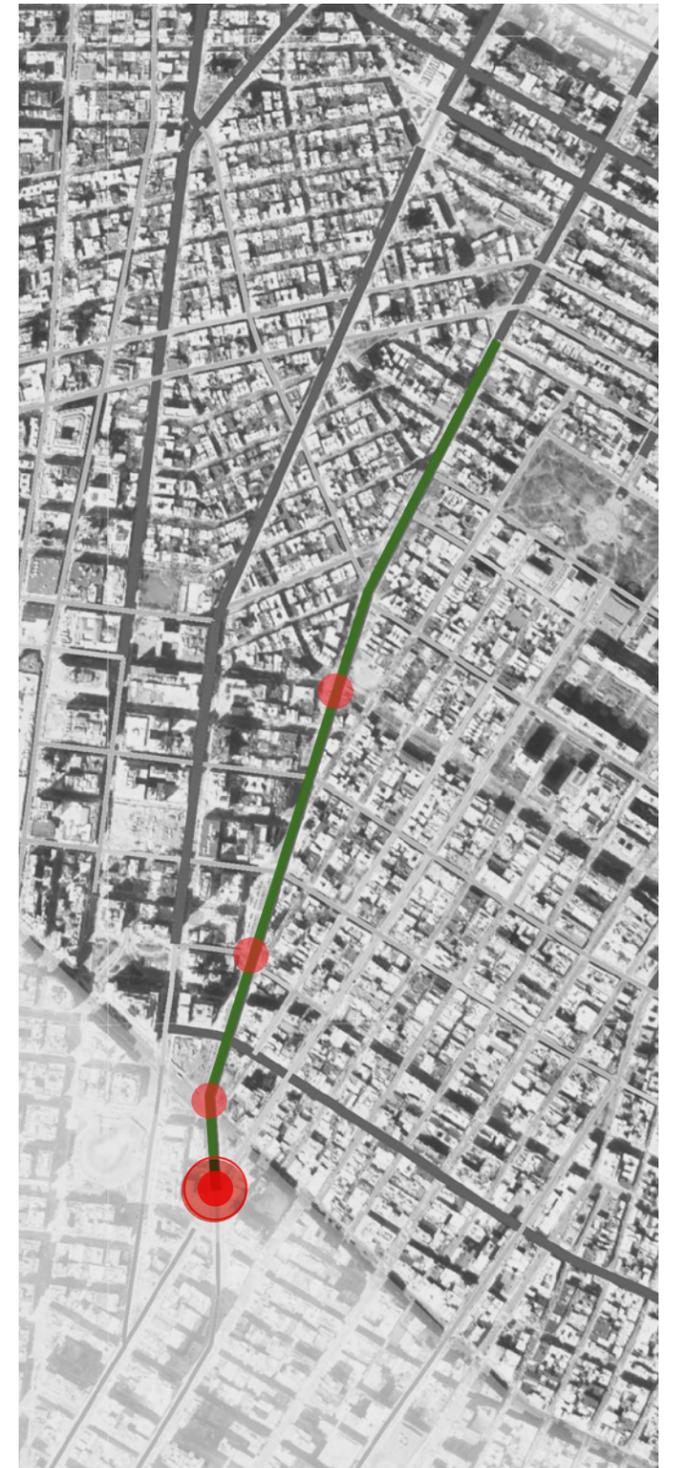
The proposed design would have the **bike lane continue** on the west side of 6th Ave, requiring the **removal of parking** from that side to allow for the new lane. This would benefit bike and car traffic alike, which would have an extra moving lane to turn left onto Canal St.

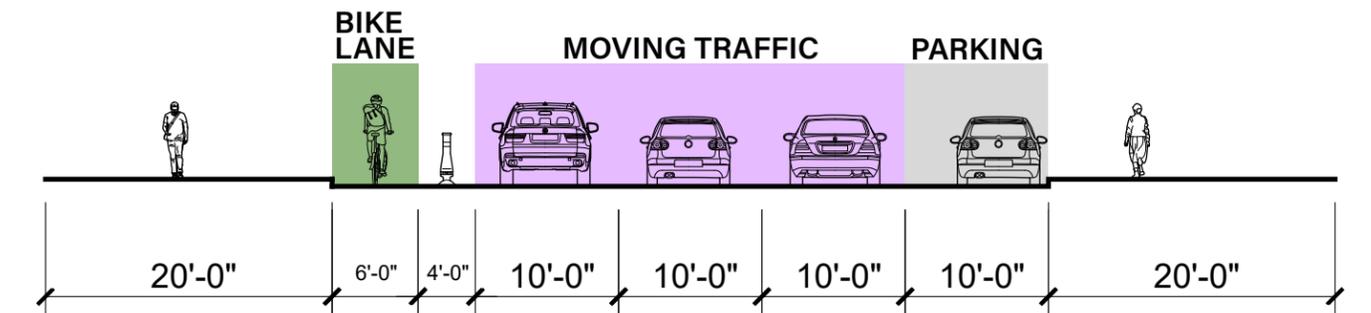
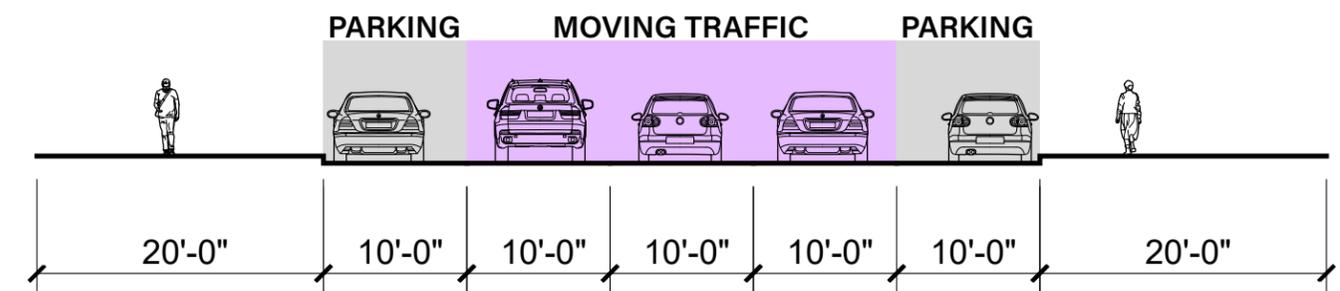
This stretch would be a protected bike lane with a 4' buffer employing plastic bollards, a configuration with many precedents in NYC. The difference here is that the **proposed bike lane would be 6' wide**.

In her March 29th of 2021 article in the "Reorientations" blog titled **NYC is ready for wider bike lanes. Here are some guidelines**, Annie Weinstock argues for the widening of NYC bike lanes, which have been designed according to guidelines that assume very low bike volumes. According to Weinstock, we should aim to adopt guidelines suggested by the Dutch **CROW standards in the organization's Design Manual for Bicycle Traffic**. By their guidelines and NYC cycling volumes, Annie Weinstock calculates that one-way **protected bike lanes should range from 8 to 10 feet in width**. They are 6 feet wide today.

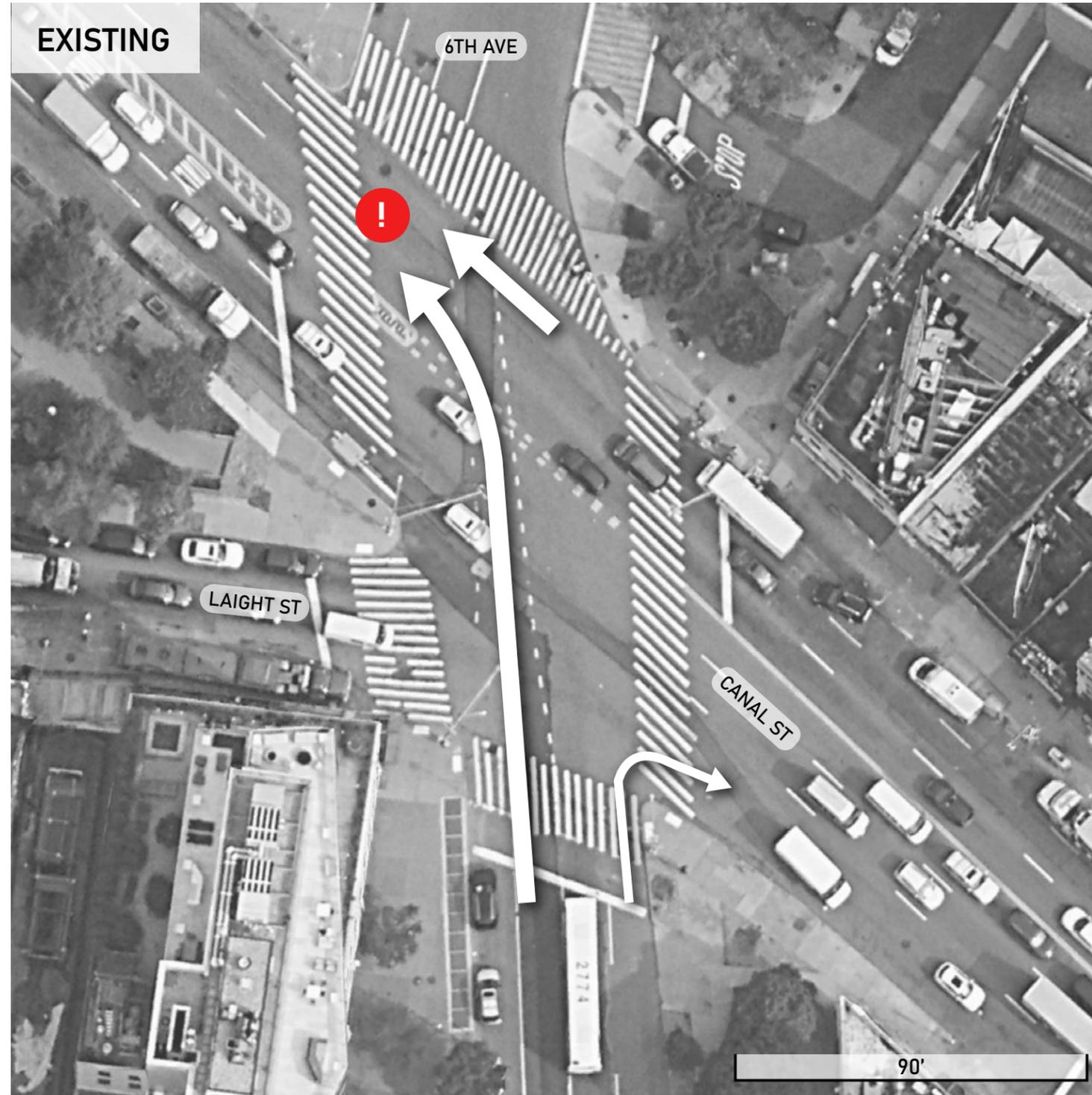
If we are to future-proof our biking infrastructure, it makes sense to economize on the eventual future retrofitting and build new lanes according to current and even future biking volume projections. 6th Ave and its 60' width gives us a great opportunity to experiment with wider bike lanes.

Where possible, proposed on-street bike lanes in this report will be 6-8 feet wide with a 4 foot buffer.



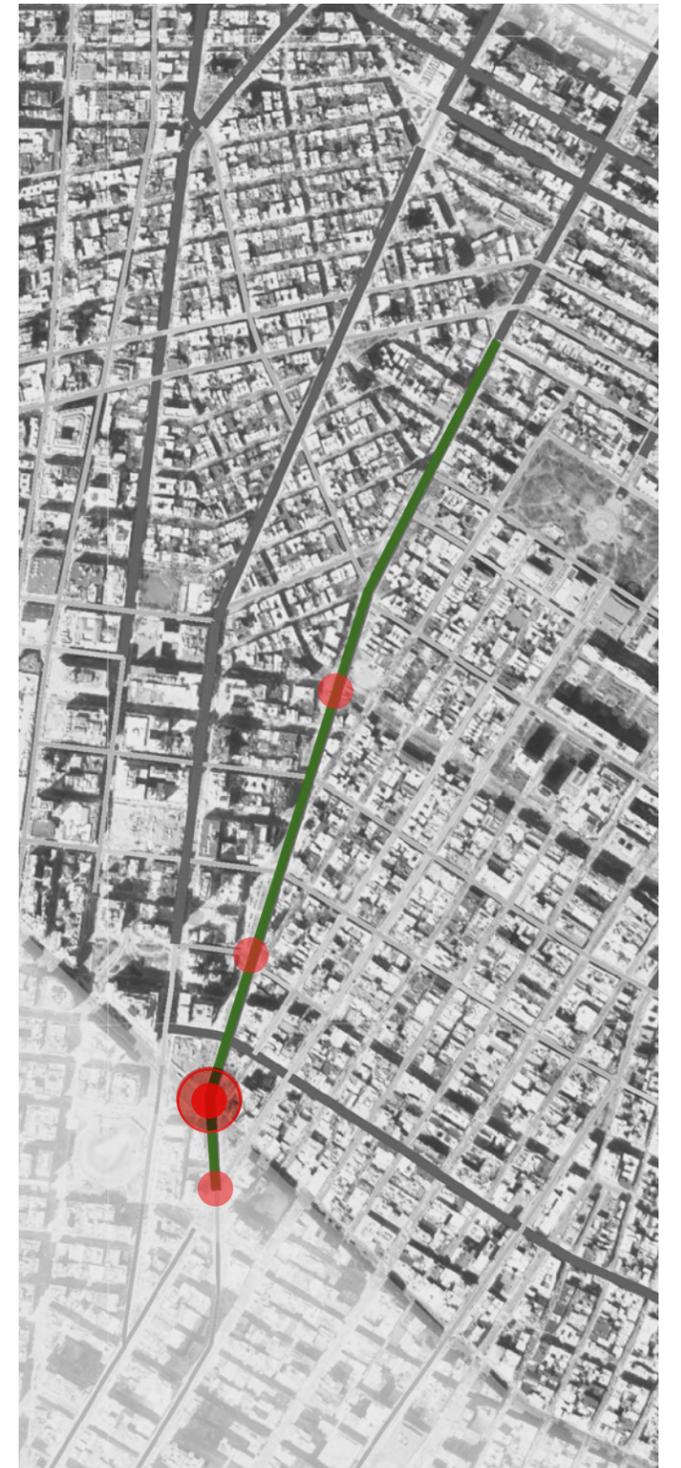


Canal Street



The amount of Holland Tunnel-bound traffic either turning left onto Canal from 6th Ave or coming from the east on Canal tends to **block the intersection** during heavy traffic hours. This makes it harder to have a north-bound bike lane on the west side of 6th Ave. The volume of cars turning right onto Canal St is much lower, which presents less opportunity for conflict between cyclists and drivers.

Observation suggests that the vast majority of cyclists tends to reach this intersection on the west side of 6th Ave and cross over to the east side in order to proceed straight across Canal St and up 6th Ave. This is precisely what one of the following proposals presents.





Natural tendency to cross Canal St along the safest crosswalk (east side of 6th Ave).



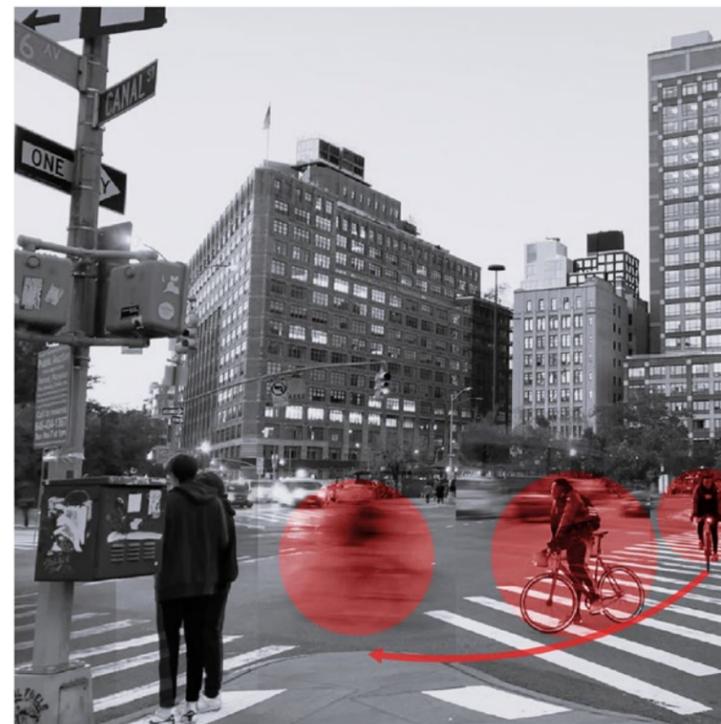
It's common for cyclists to use this crosswalk heading both north and south.



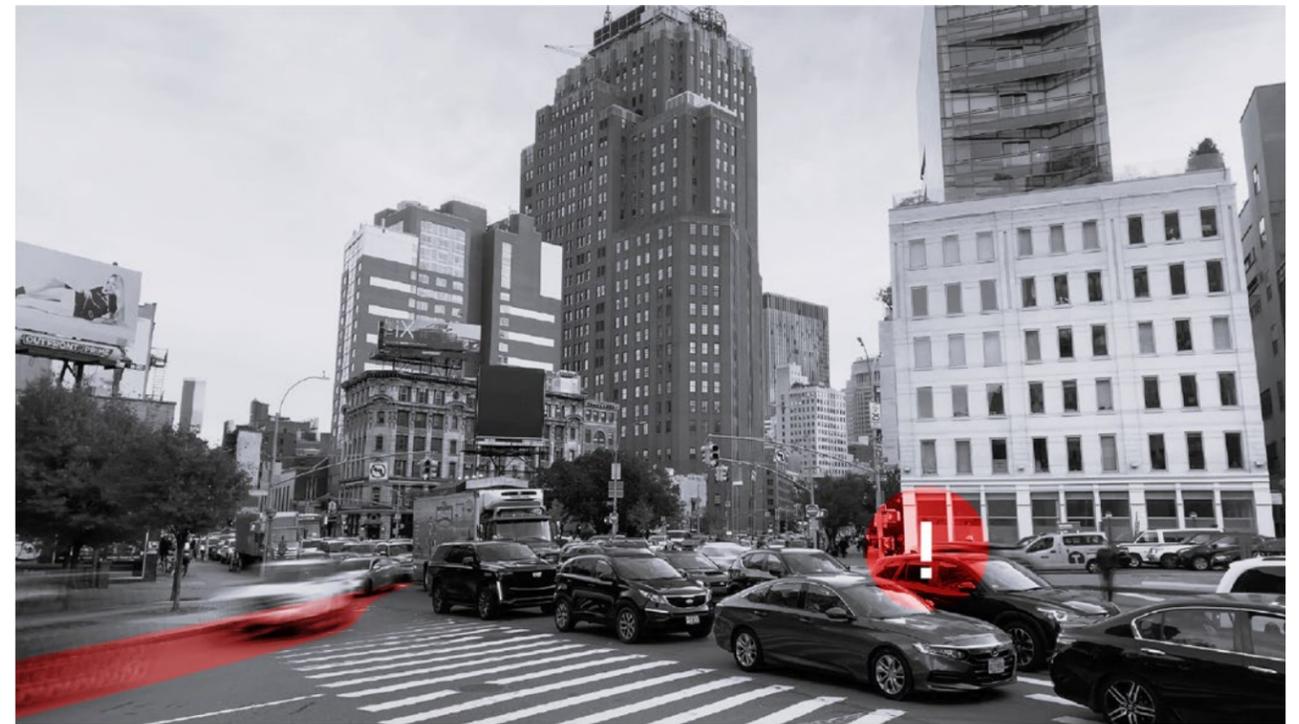
Cyclist forced to squeeze through the cars blocking the intersection.



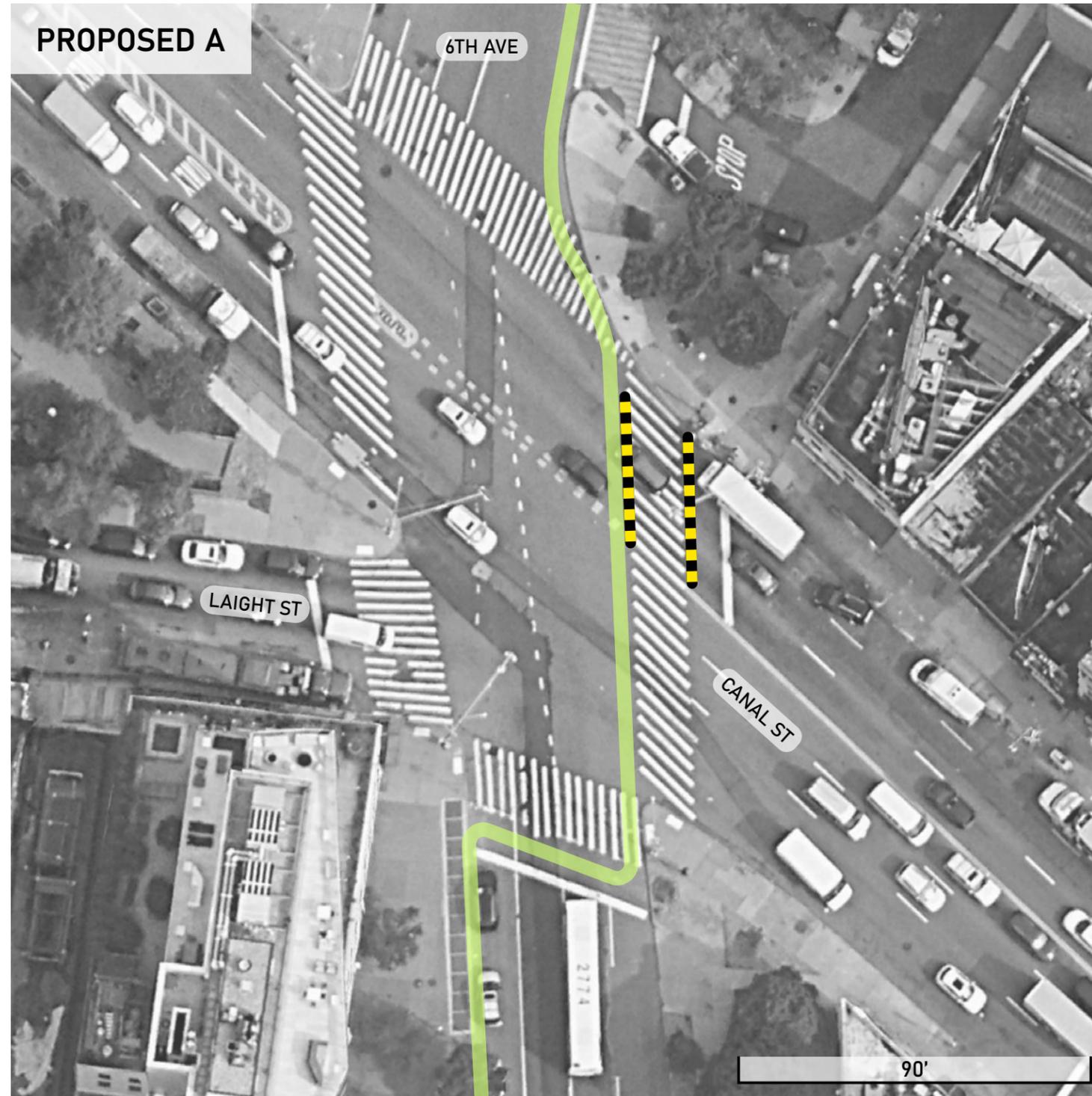
Electric unicycles also prefer the east side of 6th Ave.



The preferred route north on 6th Ave in this instance is done in the opposite direction.



For long lengths of time during rush hour, the only way through is the sliver left on the east side of 6th Ave.



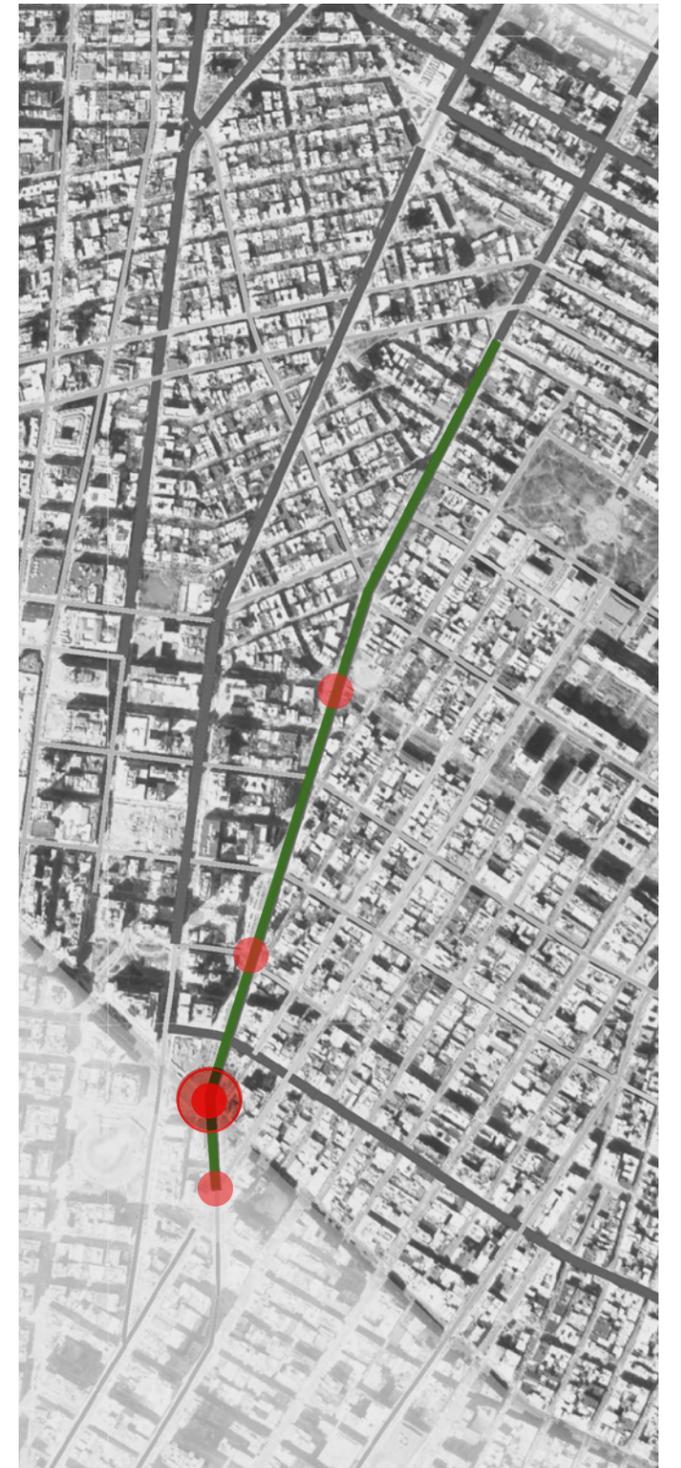
Notice that there are **two proposals** that originate here, the first being **Proposal A** on the image to the right.

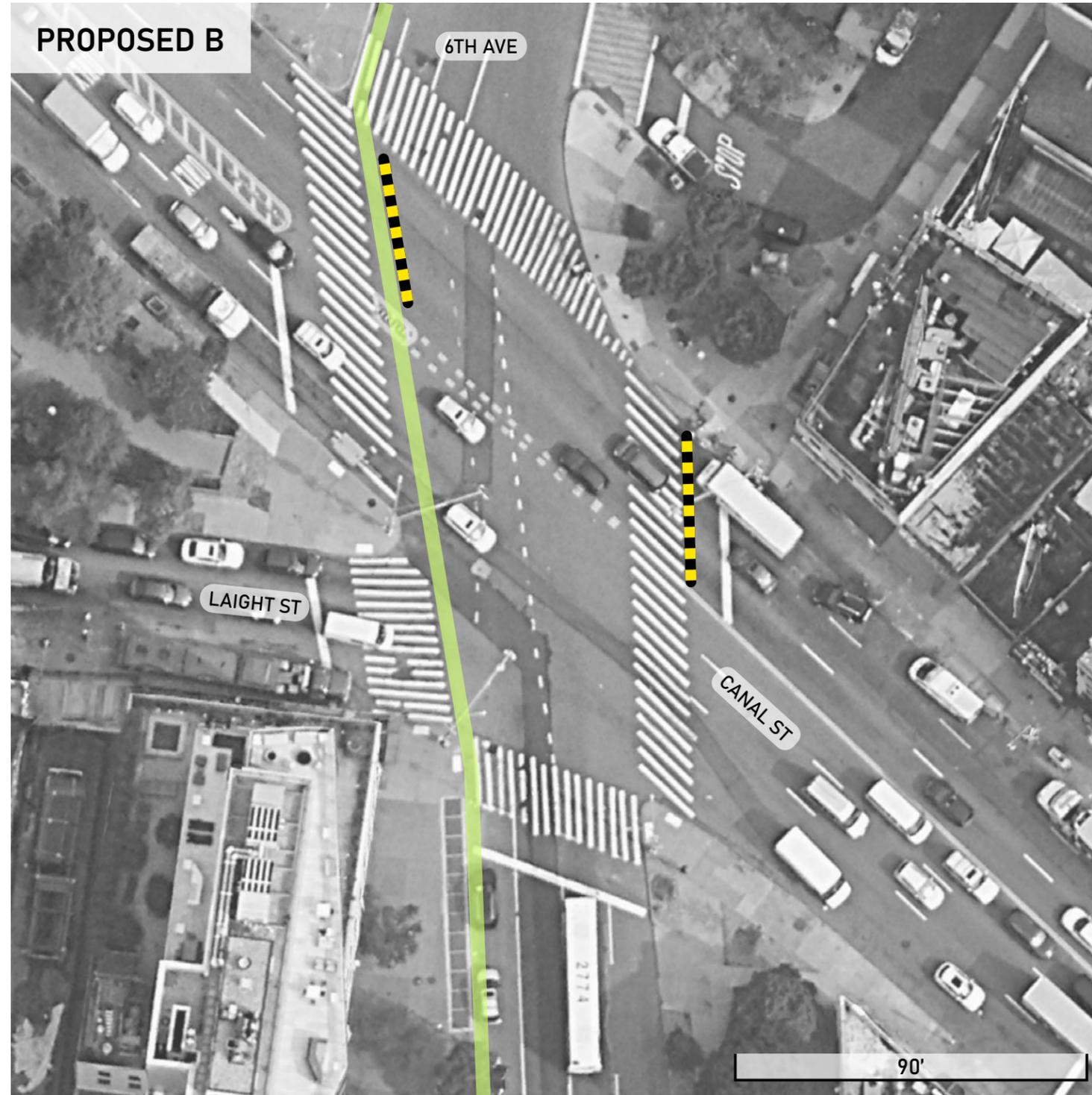
Proposal A is the most unusual of the two, suggesting the **employment of bike lanes as a means of disciplining traffic**. This would be done by **switching the bike lane to the east side of 6th Ave** and having it cross Canal St adjacent to the crosswalk. This option would be less dangerous for cyclists and would attempt to keep cars on Canal St from blocking the intersection. This would be achieved in tandem with **speed humps on both sides of the crosswalk**, followed by the adjacent bike lane. All these elements combined, when well signaled, **alert the driver to a special condition on the road**.

The presence of cyclists on a strip of street designated for them may spark the reprimanding of cars blocking the bike lane, and as a consequence, avoid the blocking of the whole intersection.

PROS: only low-volume right-turning traffic from 6th Ave crosses bike path on Canal, which makes for a safer cross.

CONS: having bike paths switch street sides is not optimal for the cyclists' experience of path continuity. Having the bike lane on the east side of 6th Ave will mean buses and bikes on the same side of street, something that is avoided when possible.





For **Proposal B** the bike path crosses Canal on the west side of 6th Ave, which puts bikers on the path of heavy left-turning traffic onto Canal. Speed humps would raise awareness to the presence of bikers and pedestrians alike, reducing turning speeds. The angle of the proposed speed hump illustrated on the west side of 6th Ave is not ideal for cars turning left onto Canal. As an alternative, one might consider experimenting with street painting that can cause the illusion of a 3-dimensional object and raise awareness to the new condition on the road.

PROS: the bike lane doesn't switch sides, which means that cyclists don't have to wait to cross 6th Ave when they have a green light. The presence of a bike lane and speed humps adjacent to the crosswalk reinforces pedestrian safety.

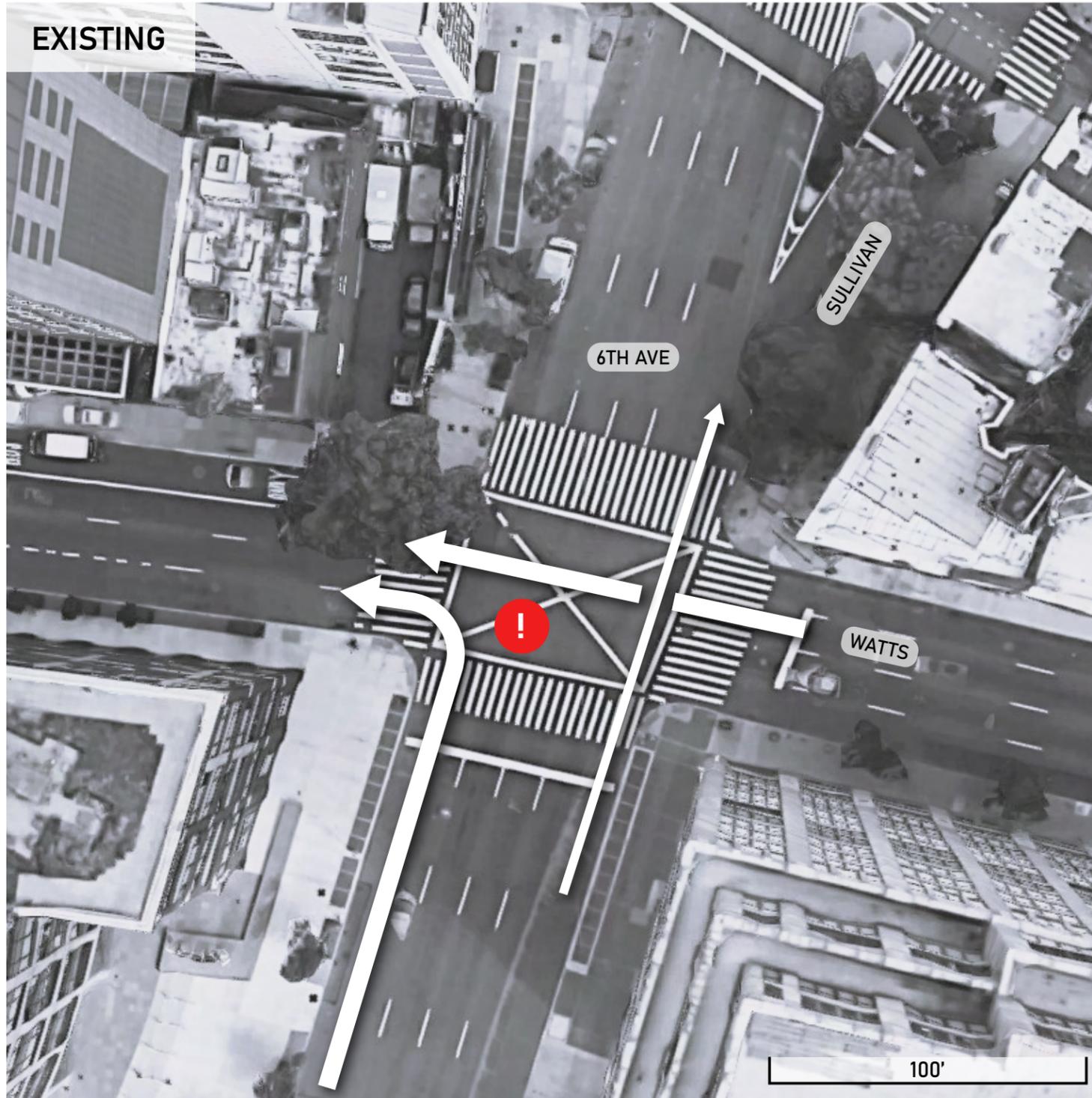
CONS: the volume of left-turning cars in this case is a concern when considering cyclists, as they approach the crossing at higher speeds than pedestrians do. The experimental traffic-calming facet of the bike lane design is discarded.



Watts Street



EXISTING



During peak hours, heavy traffic on 6th Ave turning left onto Watts St frequently **blocks the crosswalk**, inconveniencing north and south-bound pedestrians and cyclists. Simultaneously, heavy traffic on Watts St heading towards Holland Tunnel frequently **blocks the intersection**, leaving north-bound traffic on 6th Ave left to squeeze through the east side of 6th Ave.

Here another opportunity presents itself to **tackle traffic problems through design**, by using the bike lane in tandem with other design strategies to educate drivers.

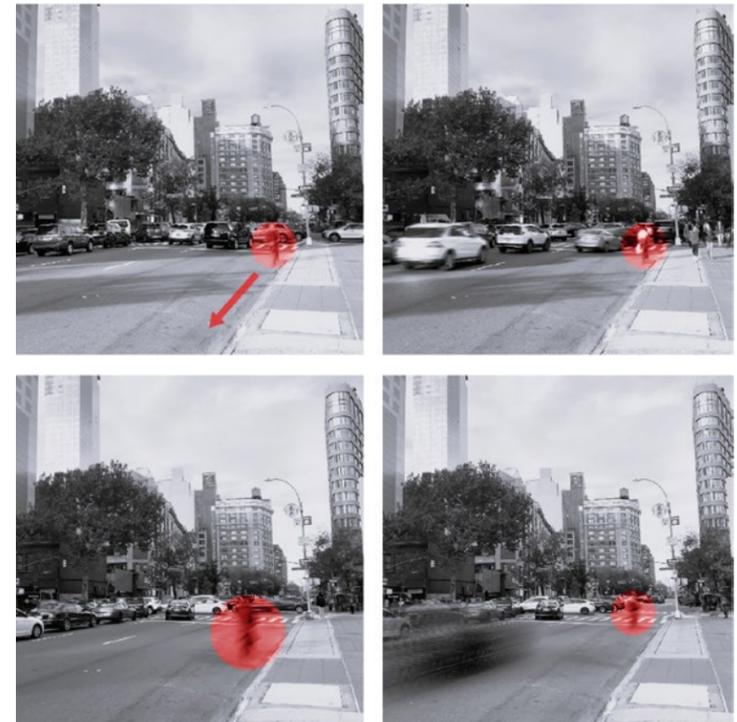




Lane left for north-bound traffic on 6th Ave to squeeze through.



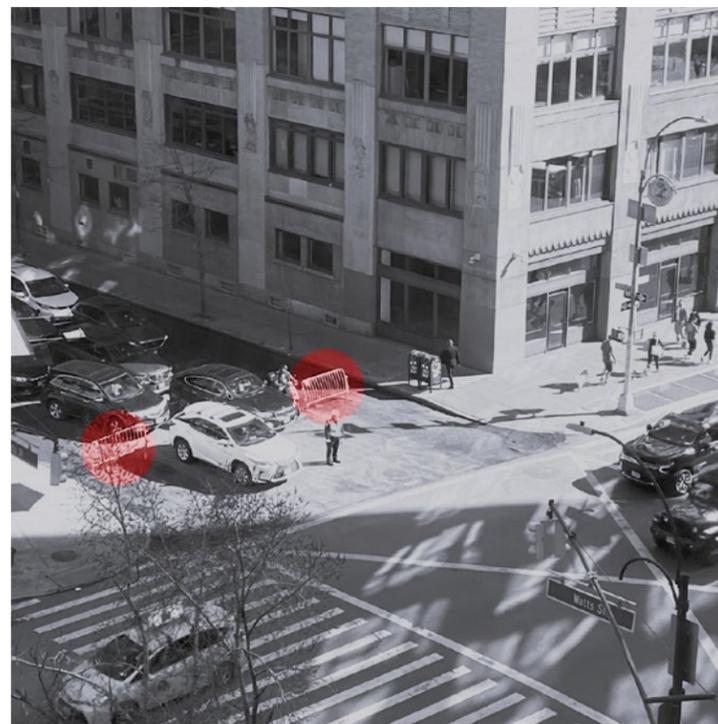
During busy hours, cars often block both crosswalks.



Not uncommon to see cyclists going down the wrong way on 6th Ave.



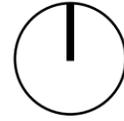
Cyclists stick predominantly to the east side of 6th Ave, where they can more easily get through.



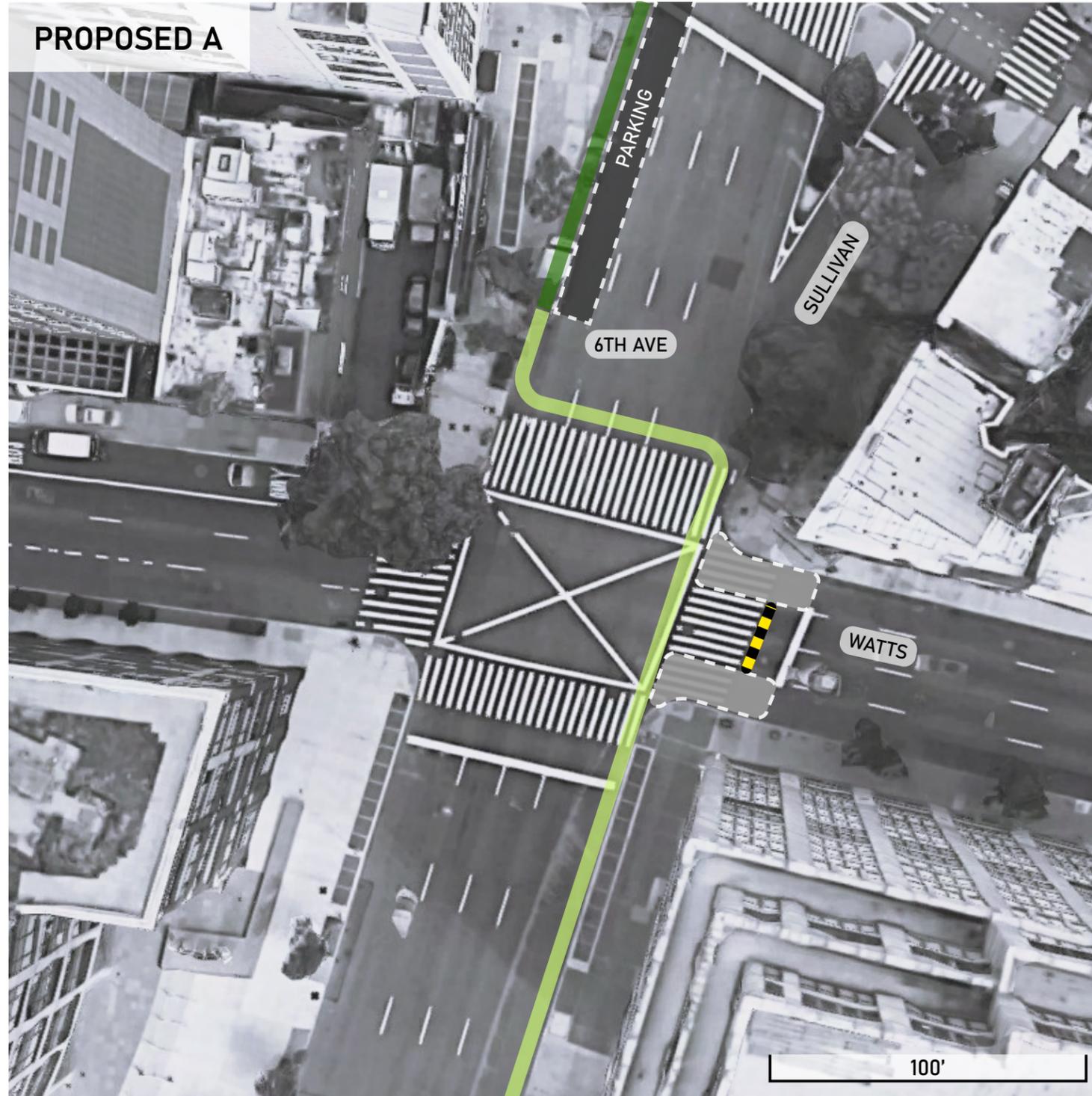
Lately, transit guards have began blocking the two outer lanes on Watts to control traffic more easily.



Makeshift blocking make for a less than ideal solution, and one that requires constant surveillance to work.



PROPOSED A



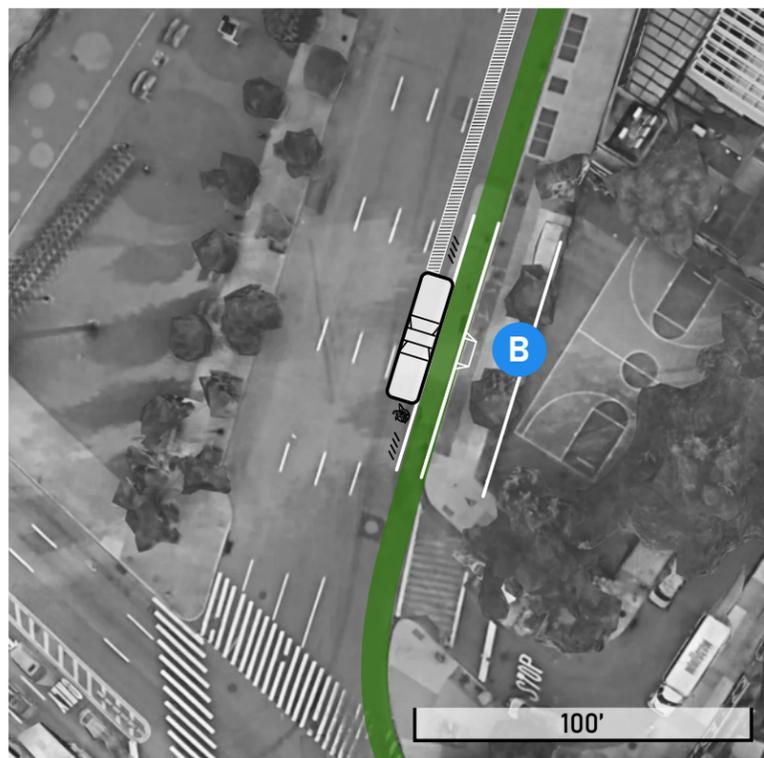
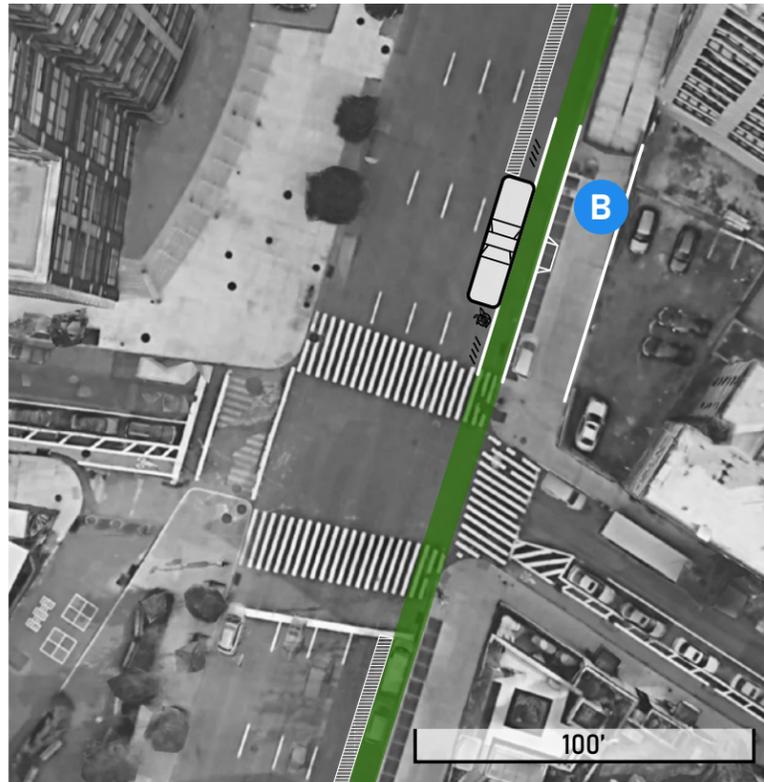
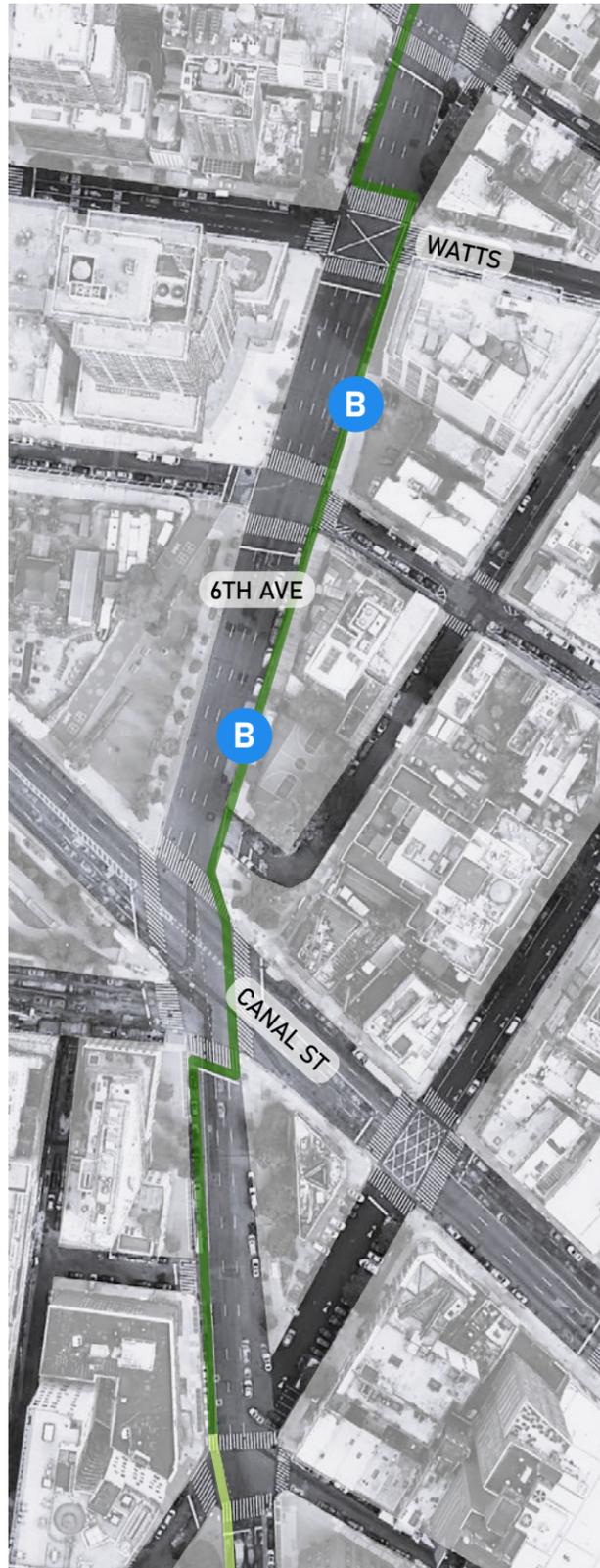
Proposal A is the result of the continuation of proposal A for Canal St. The combination of a curb extension, speed hump, and adjacent clearly signaled bike lane can deter drivers that insist on blocking the intersection, much like the way this strategy would seek to work on Canal St. The bike lane would proceed to cross to the west side of 6th Ave after Watts, when it becomes protected by floating parking up until W Houston St, when it is momentarily interrupted.

PROS: bike lane avoids heavy left-turning traffic from 6th Ave onto Watts. Performs traffic-calming function as part of a system of discrete parts that work together.

CONS: switches street sides a second time, which interrupts the cyclist's continuous rhythm.



Special Condition - Bus Bulbs



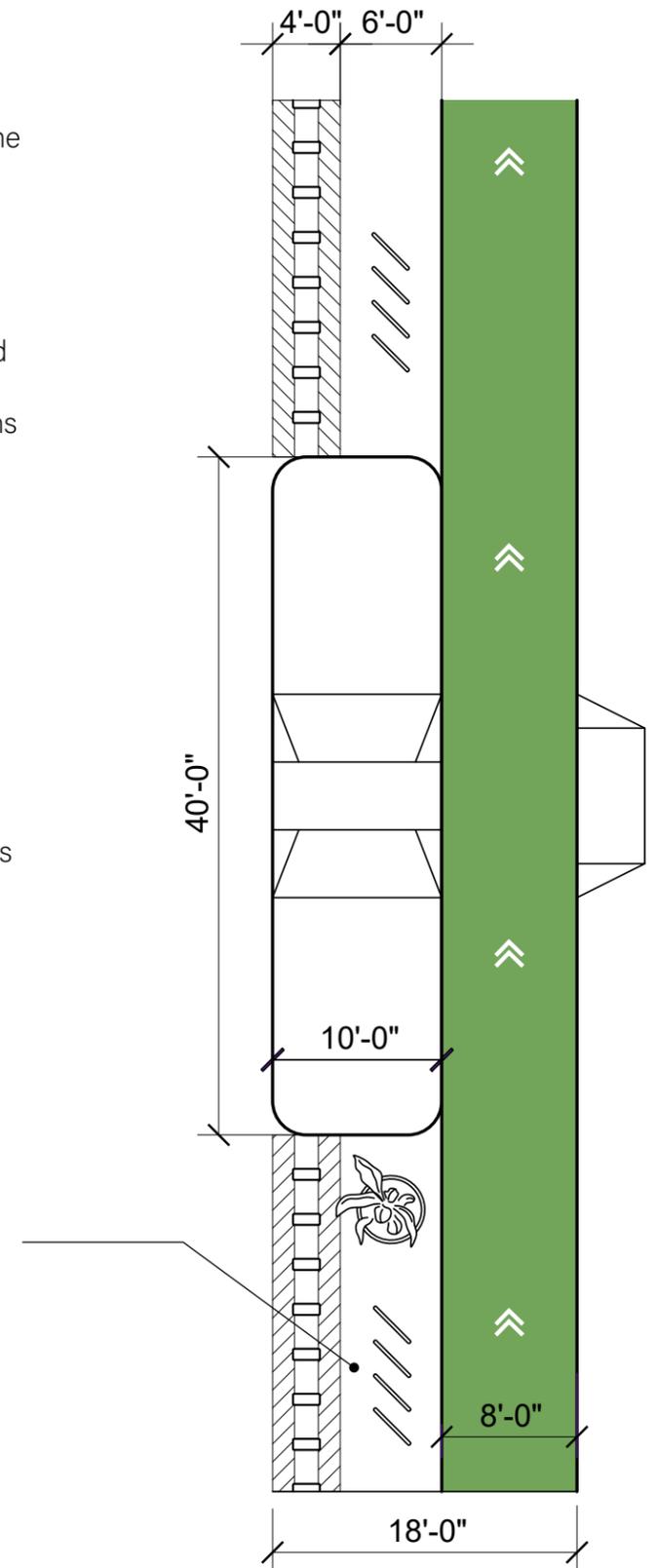
An important aspect of **Proposal A** is the fact that the bike lane crosses paths with two **bus stops** while on the east side of 6th Ave. When bike paths and bus stops are located on the same side of a right-of-way, **bus bulbs** are a feature commonly employed to safely accommodate both uses.

As part of proposal A, two bus bulbs would be installed, where the on-street bike lane protected by plastic bollards would separate the curb from the ten-foot-wide bus bulb. The bike lane remains on the same grade as the street. Here, signaling on the bike lane would be paramount to avoid conflict with pedestrian crossing the bike lane.

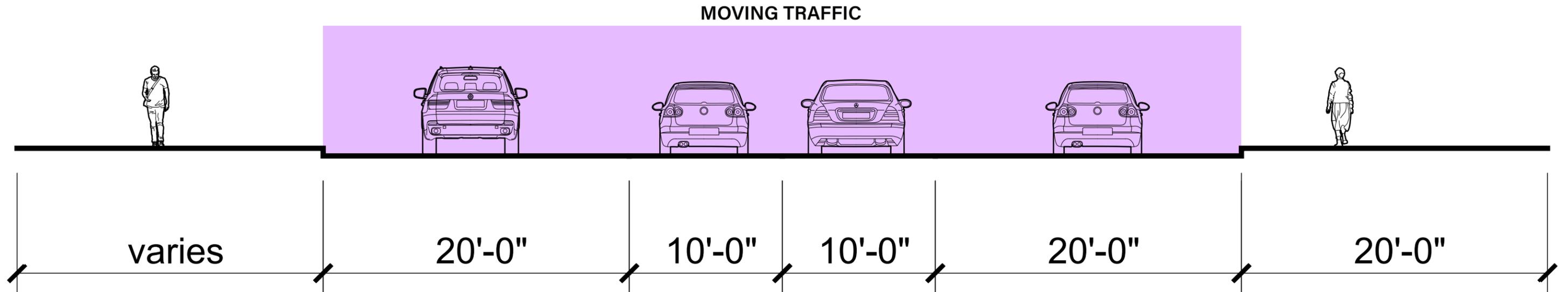
Due to the lack of parking on both sides of 6th Ave over the course of these two blocks, we can accommodate 4 lanes of moving traffic and still have enough space for the additional 6 feet of space for amenities proposed.

We can take advantage of the low traffic volumes on the east side of 6th Ave at this point to implement beneficial features without negatively affecting traffic flow.

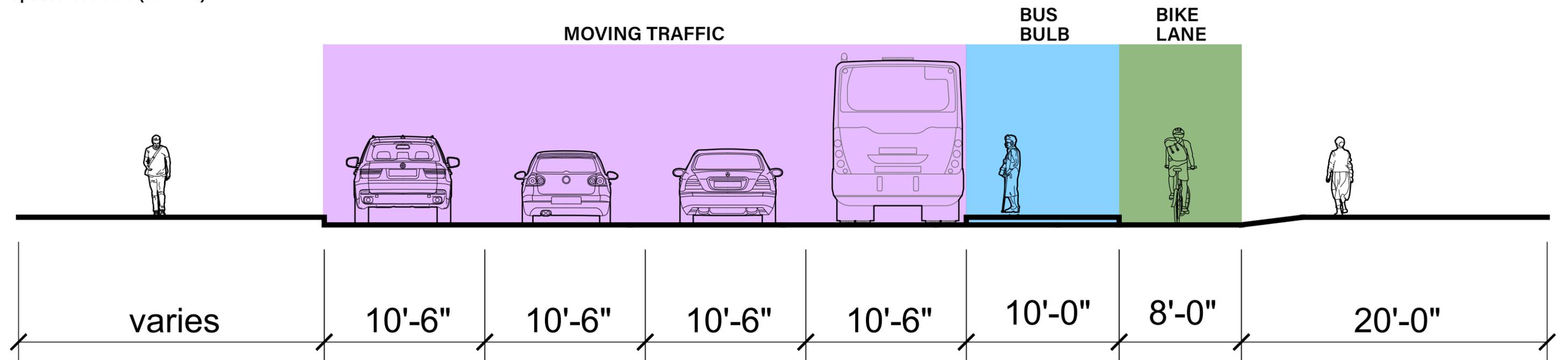
6-foot zone allows for installation of bike racks, planters, seating, signage, and other uses, while providing extra safety for cyclists.



Existing (6th Ave)

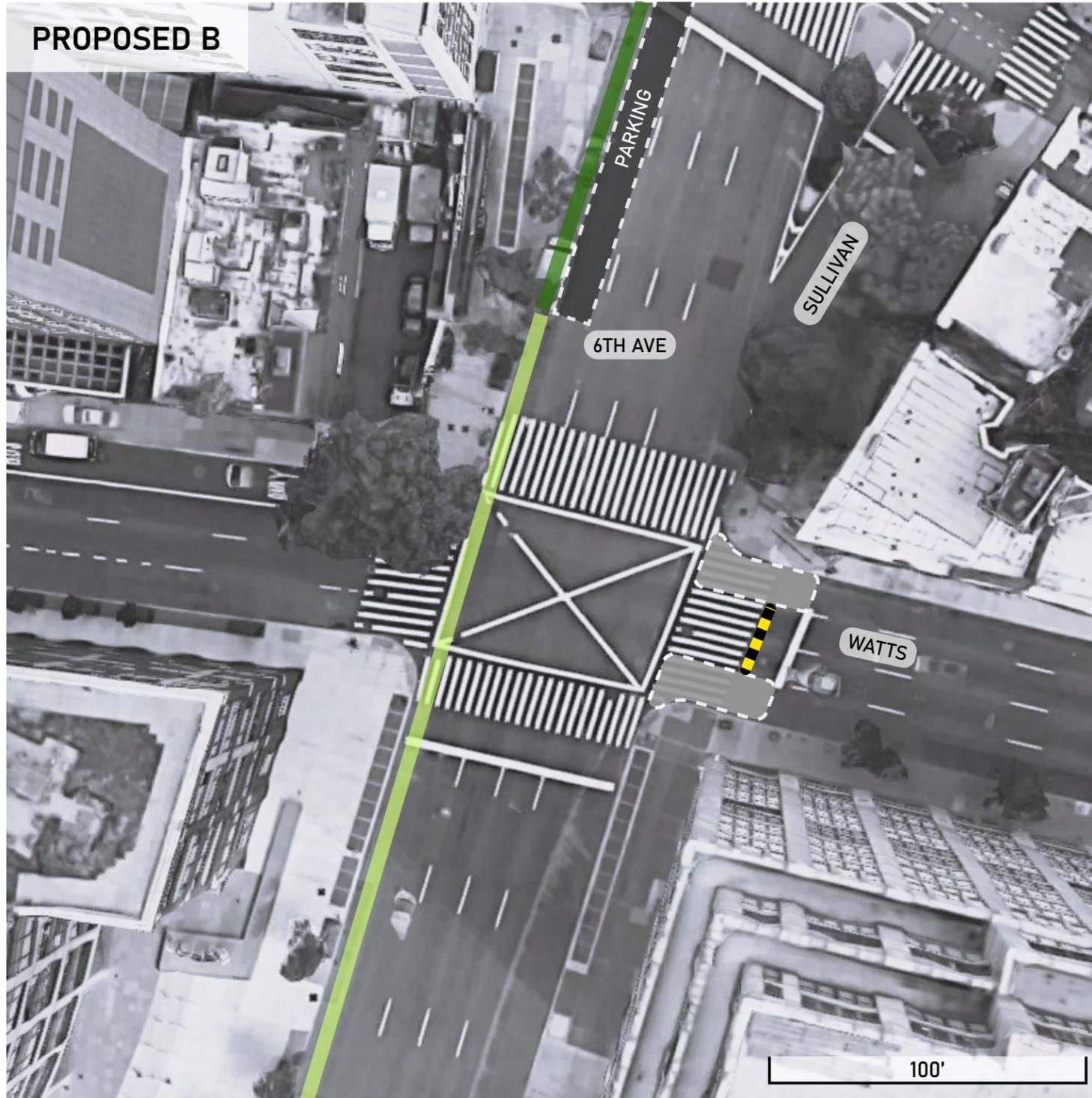


Proposed bus bulb (6th Ave)





PROPOSED B



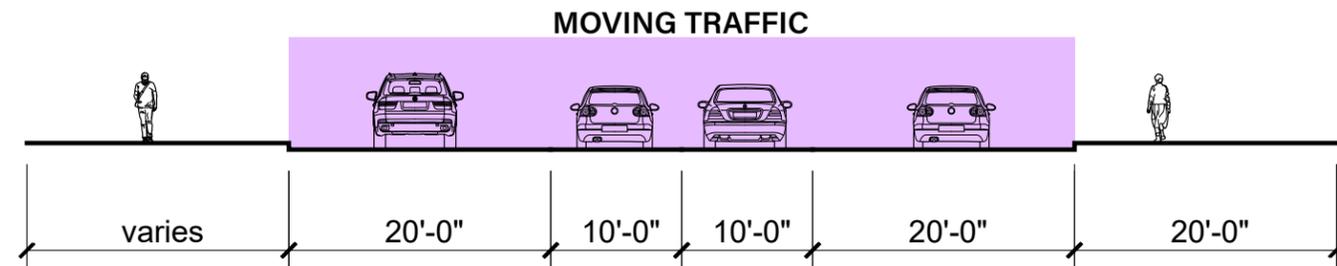
Proposal B is the result of the continuation of proposal B for Canal St. Here, the curb extension and speed hump are kept on the east corner of Watts, while the bike lane continues from 6th Ave and Lispenard always on the west side of the avenue. A clearly signaled bike lane would be paramount to educate left-turning traffic to yield to both pedestrians and cyclists instead of blocking the crosswalk. After Watts, the bike lane becomes protected by floating parking up until 8th St.

PROS: provides continuous experience to cyclists.

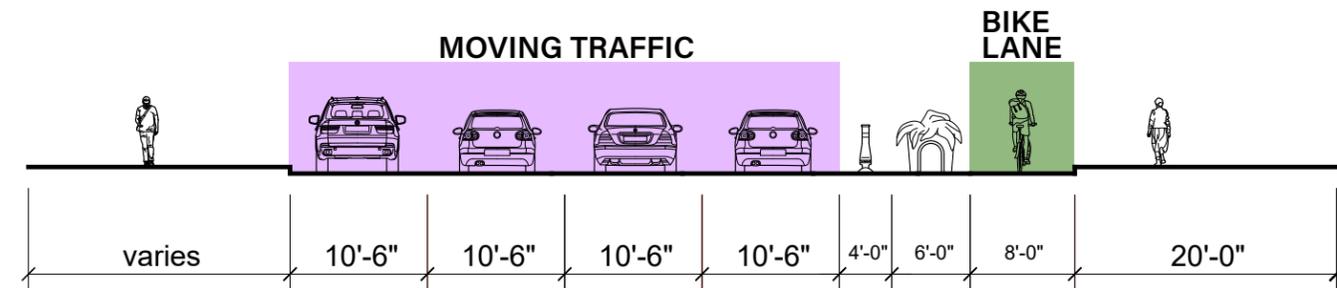
CONS: cuts through heavy left-turning traffic that many cyclists presently avoid.



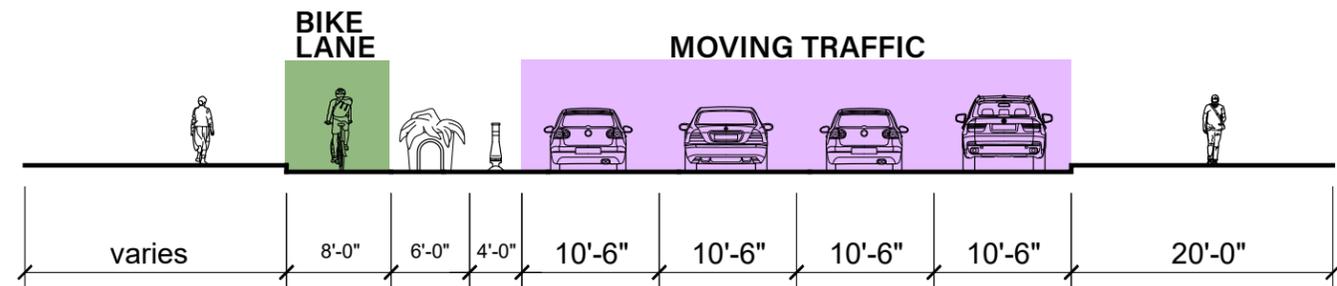
Existing (6th Ave)



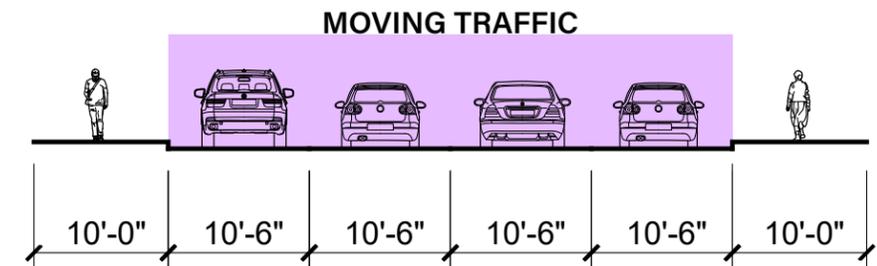
Proposal A (6th Ave)



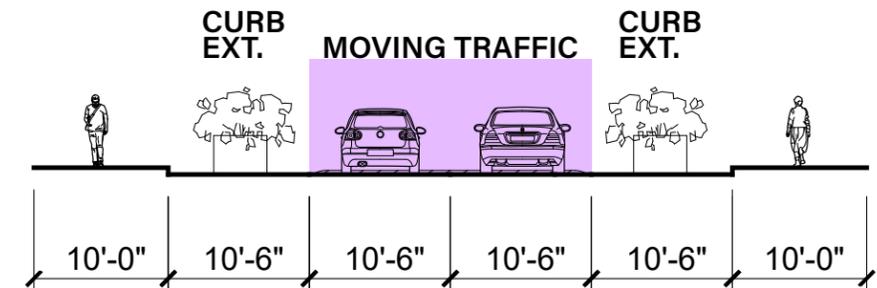
Proposal B (6th Ave)



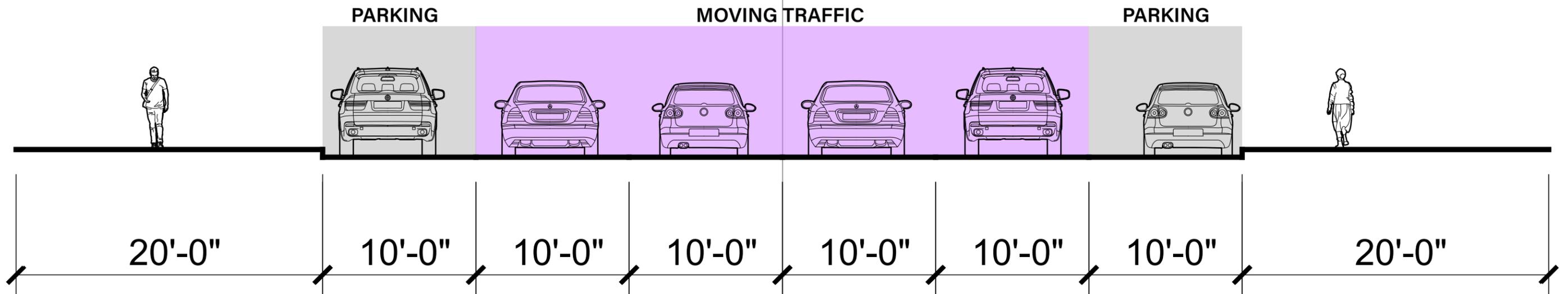
Existing (Watts)



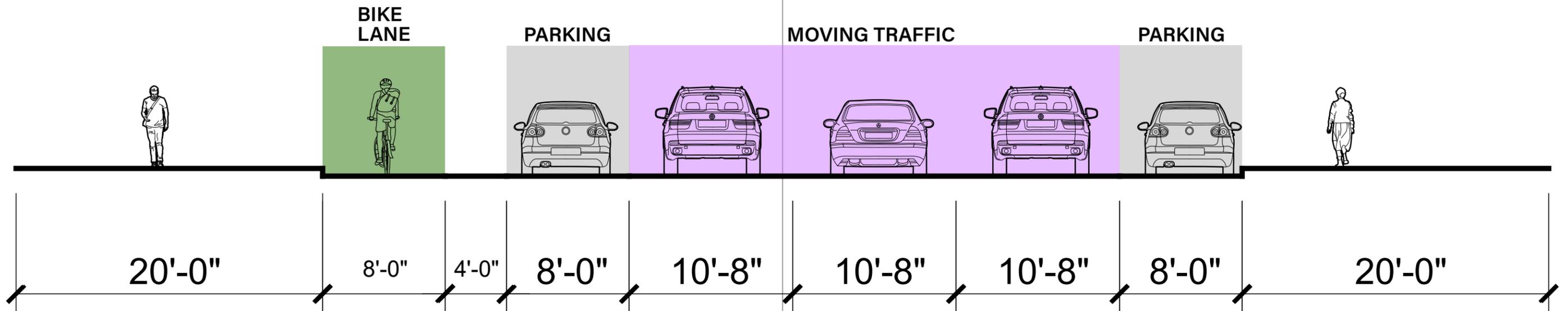
Proposal A & B (Watts)



Existing (6th Ave from Watts to 8th St)



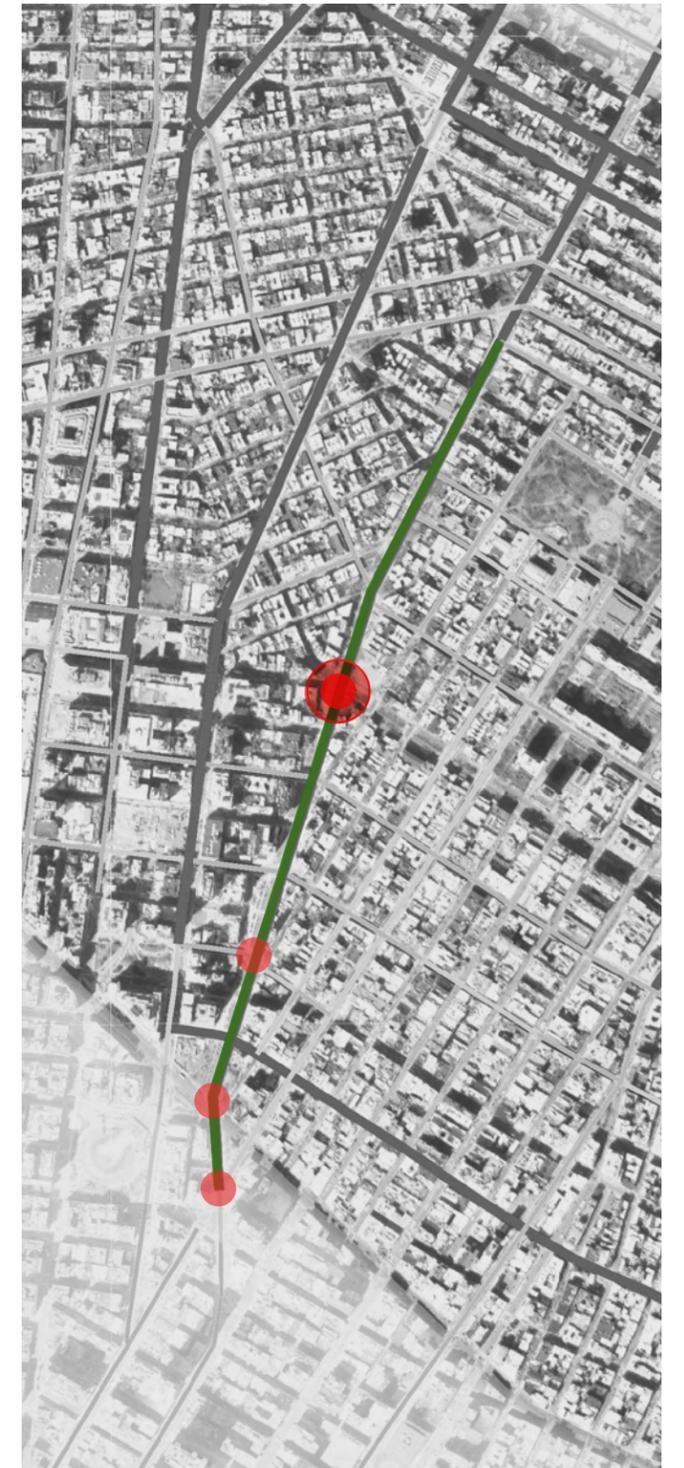
Proposed (6th Ave from Watts to 8th St)



Houston Street



Due to the large volume of traffic turning right onto W Houston St, cyclists tend to stick to the west side of 6th Ave when north-bound. The lack of a bike lane here poses a risk to cyclists, who end up squeezed by traffic to their right and parked cars and restaurant sheds to their left.





Cyclists tend to keep to the west of 6th Ave, where they encounter lower traffic volumes.



Biker cruises along 6th Ave.



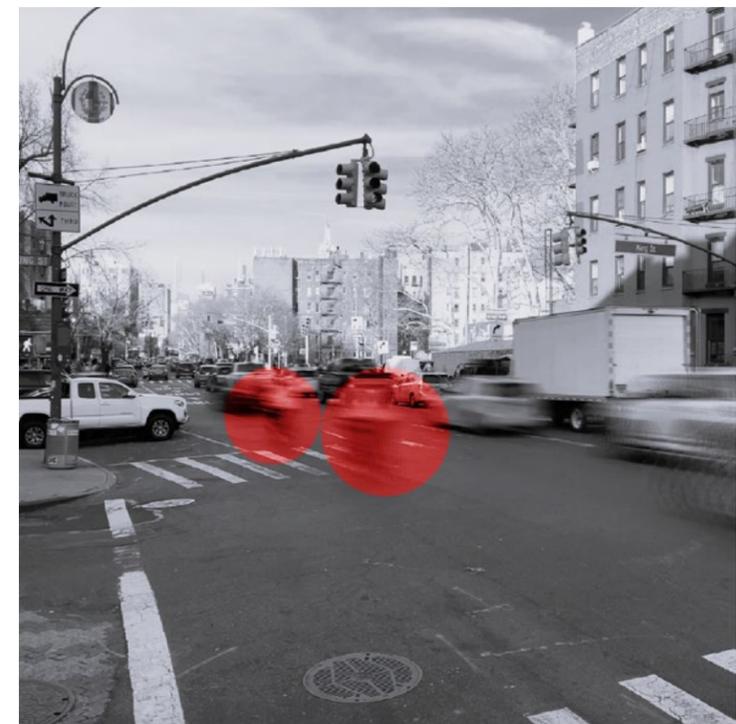
Cyclist left to share a lane with cars and restaurant sheds.



Usage pattern on 6th Ave reveals safest bike route..



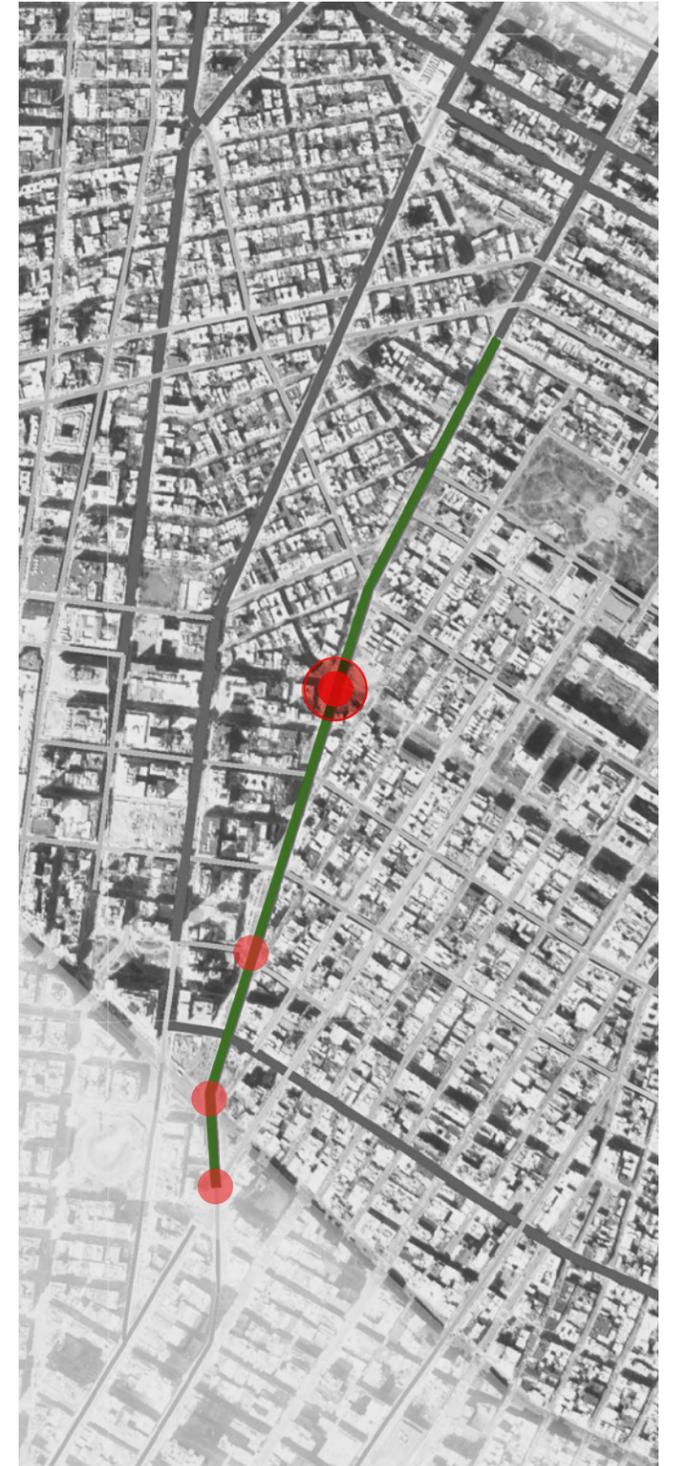
Delivery workers make up a large portion of cyclists heading further north on 6th Ave.



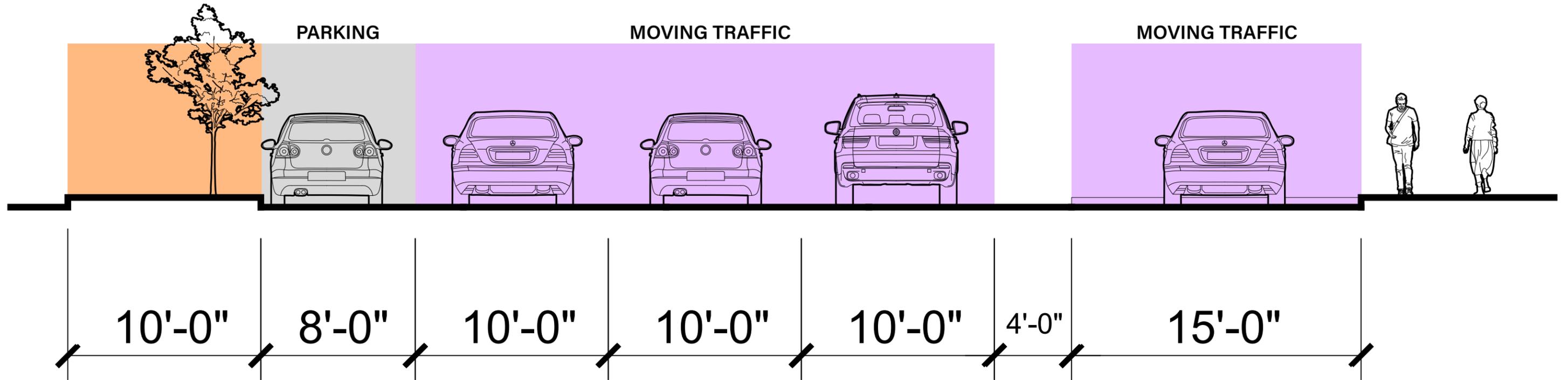
Large volume of cars turning right onto W Houston St.



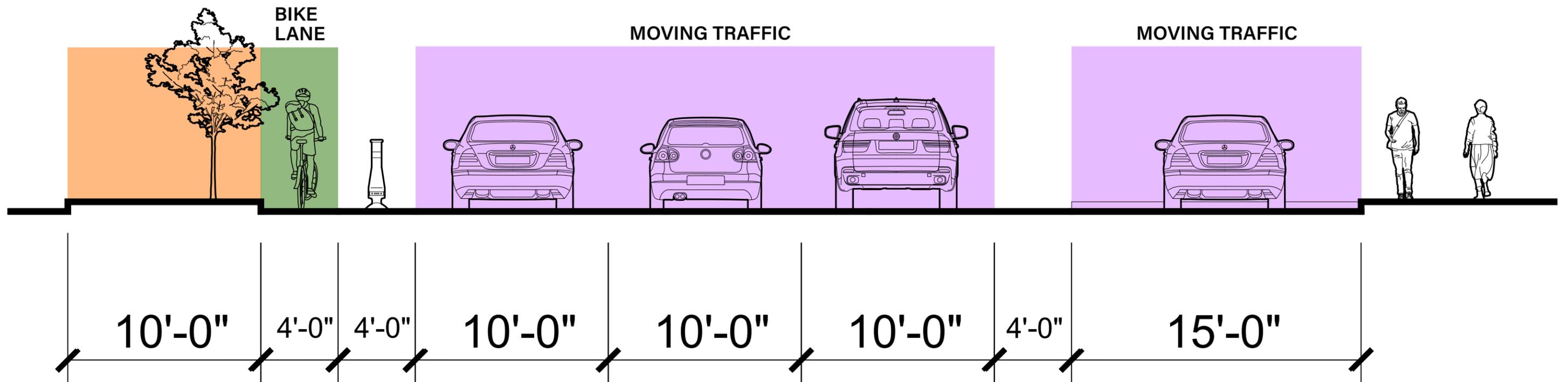
At this point, the **protected bike lane** is shortly interrupted due to the left turning lane onto W Houston St. The new **on-street bike lane** adjacent to the **triangular island** will replace parked cars. After having crossed W Houston, the **bike lane protected by floating parking resumes and continues until it meets the already existing lane on 6th Ave and 8th St.**



Existing (6th Ave & Houston)



Proposed (6th Ave & Houston)



Conclusion

Although NYC has shown significant progress in its pedestrian and cycling infrastructure over the past decade, there is still a big room for improvement. It is especially timely and important for CB2 as we have seen a significant increase in cycling in our neighborhood in the past few years, and at the same time, residents have been facing more traffic safety and quality of life issues due to the deterioration of streetscape.

Additionally, the creation of Open Streets as a response to the COVID-19 pandemic presented us with an opportunity to shift our perception of public space and question the car-centric paradigm that has shaped the streetscape over the last century. However, the program has also dramatically increased the burden on CB2's narrow streets by adding elements on the streets, such as open restaurant sheds, barricades, and signage.

Throughout the research, we were able to explore the recent cycling uptrend in CB2 and capture different types of safety issues that pedestrians and cyclists are facing. We were also able to come up with multiple recommendations for NYC DOT to improve the current pedestrian and bike network.

In 2022, our goals and aspirations no longer align with the old transportation model. During the pandemic, the City has come up with many creative ideas for prioritizing pedestrians and cyclists on our streets, and we have witnessed many successes. As these ideas are here to stay as a permanent part of our streetscapes, NYC DOT will have to pay more attention to what is really happening on the ground and the issues the residents are facing in their day-to-day lives.

References

Manhattan Community Board 2, Statement of District Needs - Fiscal Year 2023.
<https://cbmanhattan.cityofnewyork.us/cb2/about/district-profile/>

DotTT, 311 Service Requests from 2010 to Present, 2022.
<https://data.cityofnewyork.us/Social-Services/311-Service-Requests-from-2010-to-Present/erm2-nwe9>

Citibike, Citibike System Data, 2022.
<https://ride.citibikenyc.com/system-data>

Curbed, First look at Disney's SOM-designed Hudson Square HQ, 2019.
<https://ny.curbed.com/2019/11/13/20962397/disney-hudson-square-skidmore-owings-merrill>

Google, Google Hudson Square: our expanded New York campus, 2018.
https://www.blog.google/inside-google/company-announcements/google-hudson-square-our-expanded-new-york-campus/?mod=article_inline

Annie Weinstock, NYC Is Ready for Wider Bike Lanes. Here Are Some Guidelines. Reorientations, 2021.
<https://reorientations.medium.com/nyc-is-ready-for-wider-bike-lanes-here-are-some-guidelines-fcf224524f26#:~:text=Each%20of%20the%20above%20avenues,8%E2%80%9310%20feet%20in%20general.>

NYC DOT, Street Design Manual. Third Edition, 2020.

NYC DOT, Cycling in the City: Cycling Trends in NYC. September, 2021.

Global Designing Cities Initiative, Global Street Design Guide. 2016.

Marc Schlossberg et al, Rethinking Streets During COVID-19. Sustainable Cities Institute at the University of Oregon, 2021.

RPA, Re-Envisioning the Right-of-Way. October, 2021.

RPA, The Five Borough Bikeway. June, 2020.

Gale Brewer, The Future of Open Streets. March, 2021.

Transportation Alternatives, NYC 25x25. 2021.

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New York City, May 2022.