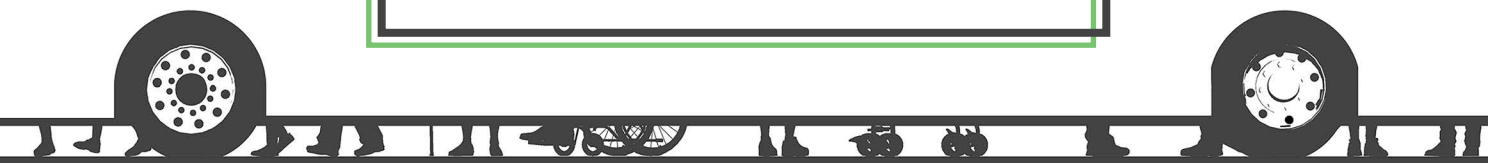
Sauk Trail (East)



equitable

autonomous

integration

in Detroit

Acknowledgements

This project, my undergraduate thesis, would not have been possible without the generous involvement of my advisors, the doctors Mariana Fragomeni (Landscape Architecture), Carol Atkinson-Palombo (Geography), Norman Garrick (Engineering), and Monica van Beusekom (Individualized + Interdisciplinary Studies).

Aaron Johnson

University of Connecticut, 2021
Individualized Major: Sustainable Urban Design

Concentrations:

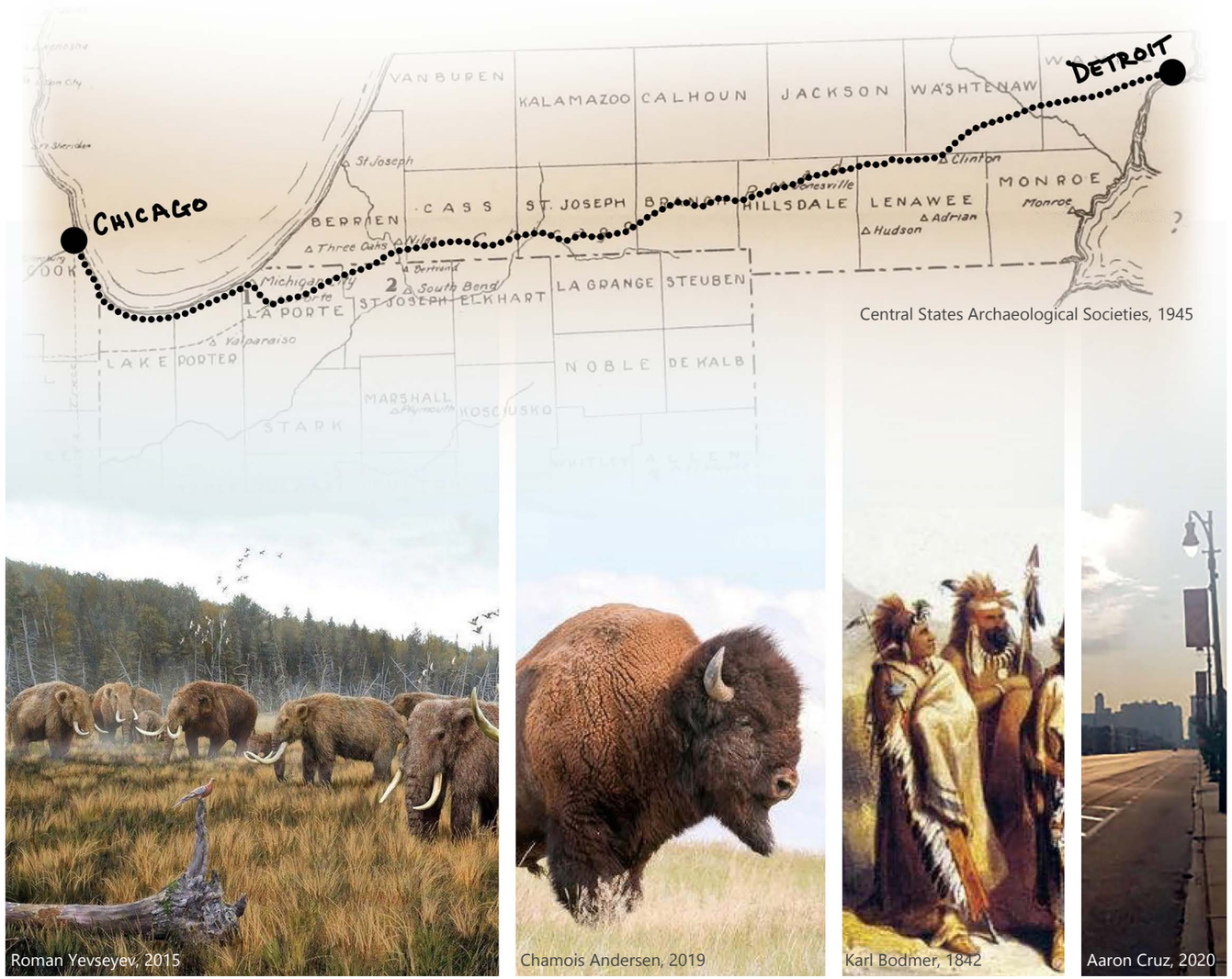
- Urban Design + Planning
- Transportation Design + Planning
- Participatory Engagement
- City of Detroit

Questions?
aaronjohnson057@gmail.com

Contents

* = Design Intervention

Project Introduction



Central States Archaeological Societies, 1945

Roman Yevseyev, 2015

Chamois Andersen, 2019

Karl Bodmer, 1842

Aaron Cruz, 2020

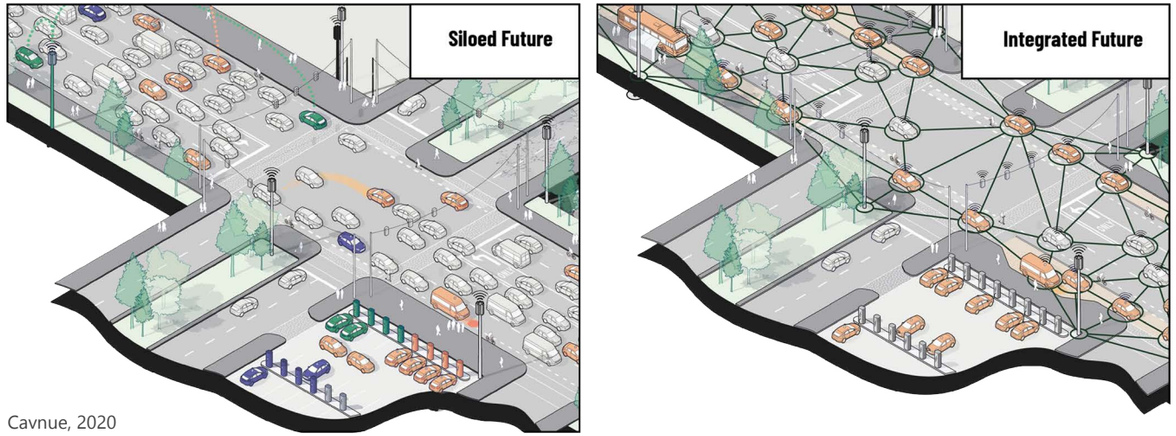
A vision for the next stage of the Great Sauk Trail, a transportation route that has operated continuously for tens of thousands of years.

The passage was originally formed by migrating mastodons following a woodland edge between present day Detroit and Chicago. After the Ice Age, the path was taken over by migratory bison following the same route. Stewardship passed to the Sauk, Chippewa, Potawatomi, and Fox peoples, who used the trail while hunting buffalo. By the arrival of Europeans, the Great Sauk Trail was about one foot wide, and depressed about a foot deep from millenia of single file use [1].

Today, most people just know it as US Route 12, but soon it will facilitate a potentially transformative experiment involving the future of transportation.

Cavnue, 2020

In January 2020, the State of Michigan, in an effort to cement its role as the home of the autonomous vehicle industry, sent out a request for proposals for a public-private infrastructure project [2] that would serve as a pilot for a public use autonomous vehicle corridor. In June 2020, Michigan selected the Alphabet Inc. subsidiary Cavnue to develop its proposal for a Connected Autonomous Vehicle Corridor (CAV-C) [3]. Since then, dozens of car companies, autonomous vehicle developers, research institutions, and governmental bodies have signed onto the project as partners.



Cavnue, 2020

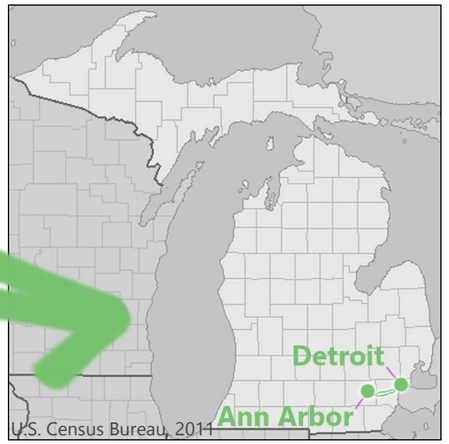
Cavnue states the largest problem hindering autonomous vehicle (AV) development is limiting self-driving cars to existing, traditional roadways. Stuck among regular traffic and prone to unpredictable interactions with human drivers, such a “siloed” scenario [3] would prevent CAVs from realizing any of their touted hypothetical safety, efficiency, or cost benefits. Cavnue’s “integrated” solution [3] reconfigures four domains of infrastructure:

- Physical - changes to roadways and the built environment
- Digital - communication connectivity between vehicles and infrastructure
- Coordination - digital system twin to evaluate scenarios and relay instructions
- Operational - network support + user experience amenities

Where will it go?

The corridor will link the cities of Detroit and Ann Arbor, which are about 36 miles apart. The project will follow two routes with different functional classes:

- The arterial freeway segment involves Interstate 94 and will provide a connection to Detroit's International Airport.
- The collector roadway segment tracks along Michigan Avenue and passes through the hearts of Detroit and Dearborn, as well as other smaller cities and towns.



Stated Project Goals

Michigan's January 2020 Request for Proposals (RFP) [2] invited submissions for CAV-C concepts that align with the state's long-term economic objectives, investing in the development of the autonomous vehicle industry early to secure its standing as the global center of the anticipated AV revolution.

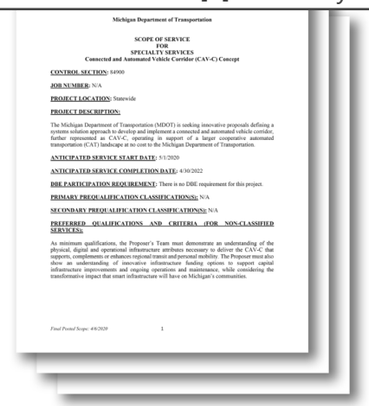
Cavnue's Statement of Work (SOW) [3] response conveys Alphabet's ambition to establish the best model for connected autonomous vehicle infrastructure in Michigan and replicate its successes in other cities around the world.

However, the Michigan Department of Transportation's RFP also asserts that the corridor must address real-world personal mobility needs [2], thus begging the question:

Will the project address the needs of Detroiters?

MDOT Michigan Department of Transportation

From MDOT 5100B [2] - January 2020



Michigan Department of Transportation

SCOPE OF SERVICE
FOR
SPECIALTY SERVICES
Connected and Automated Vehicle Corridor (CAV-C) Concept

CONTROL SECTION: 84900

JOB NUMBER: N/A

PROJECT LOCATION: Statewide

PROJECT DESCRIPTION:

The Michigan Department of Transportation (MDOT) is seeking innovative proposals defining a systems solution approach to develop and implement a connected and automated vehicle corridor, further represented as CAV-C, operating in support of a larger cooperative automated transportation (CAT) landscape at no cost to the Michigan Department of Transportation.

ANTICIPATED SERVICE START DATE: 5/1/2020

ANTICIPATED SERVICE COMPLETION DATE: 4/30/2022

DBE PARTICIPATION REQUIREMENT: There is no DBE requirement for this project.

PRIMARY PREQUALIFICATION CLASSIFICATION(S): N/A

SECONDARY PREQUALIFICATION CLASSIFICATION(S): N/A

PREFERRED QUALIFICATIONS AND CRITERIA (FOR NON-CLASSIFIED SERVICES):

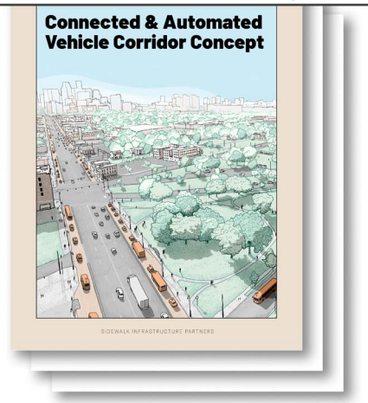
As minimum qualifications, the Proposer's Team must demonstrate an understanding of the physical, digital and operational infrastructure attributes necessary to deliver the CAV-C that supports, complements or enhances regional transit and personal mobility. The Proposer must also show an understanding of innovative infrastructure funding options to support capital infrastructure improvements and ongoing operations and maintenance, while considering the transformative impact that smart infrastructure will have on Michigan's communities.

Final Posted Scope: 4/6/2020 1

- Bolster Michigan's share of the autonomous vehicle industry's research and development.
- Apply CAV technologies to **real-world personal mobility needs** at scale.

cavnue

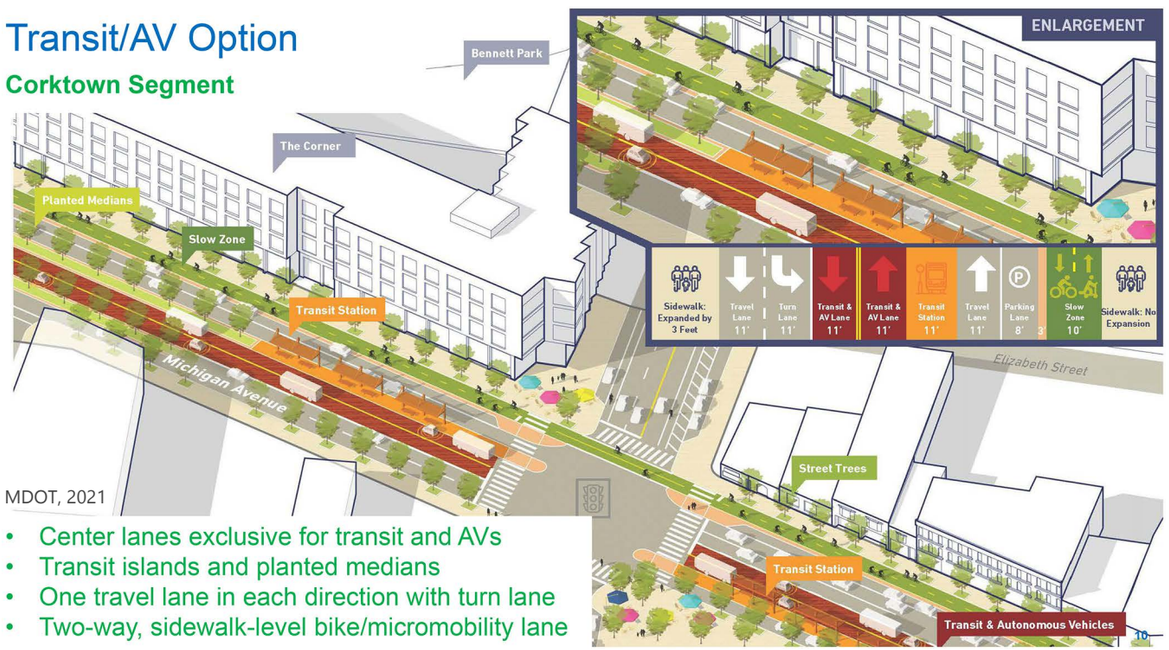
From Cavnue SOW [3] - April 2020



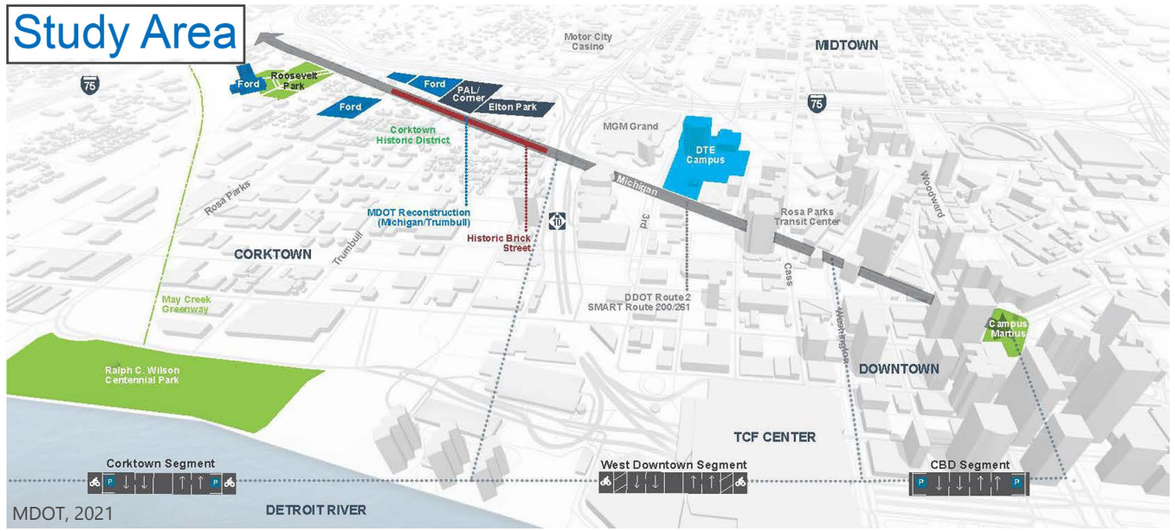
- Unlock the full potential of connected autonomous vehicles (safety, efficiency, cost).
- Establish a replicable CAV-C infrastructure model to use in other cities around the world.

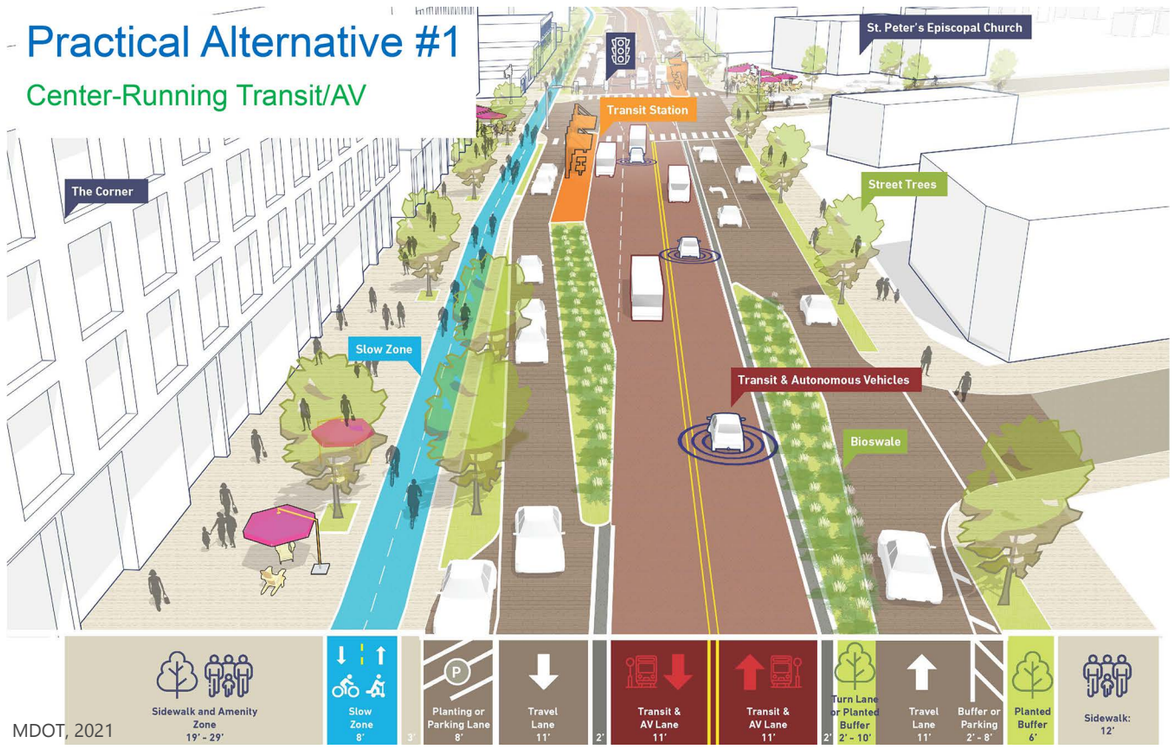
MDOT previews potential implementation strategies for CAV-C in Detroit

The Michigan Department of Transportation (MDOT) has started a Planning and Environment Linkages (PEL) Study [4] that considers the practical alternatives for integrating a connected autonomous vehicle corridor into Michigan Avenue in Detroit. The department held virtual public meetings in December 2020 and March 2021. The resulting working-proposal stretches 1.5 miles from Downtown to the adjacent neighborhood Corktown, ending at Michigan Central Station, where Ford Motor Company plans to open its AV-focused Mobility Campus in 2022. The Practical Alternatives integrate dedicated lanes shared by both mass transit and autonomous vehicle operations. The CAV-C improvements are complemented by amenities for pedestrians and cyclists, including widened sidewalks, new cycle tracks, and more frequent crosswalks [4].



- Center lanes exclusive for transit and AVs
- Transit islands and planted medians
- One travel lane in each direction with turn lane
- Two-way, sidewalk-level bike/micromobility lane





Contextualizing Detroit

Detroit Matters

All American cities have experienced some degree of the cycle involving automobilization, white flight, sprawl, and disinvestment. Detroit may have been more affected than anywhere else. In the early 20th century, Detroit was at the forefront of industrialization and the rise of the auto industry. The Motor City embraced cars as the progressive transportation mode of the future and reconfigured itself around them. Historically Black neighborhoods were split apart or torn down entirely to make way for urban freeways [5]. Dense residential districts underwent "renewal" to form superblock developments designed around car ownership [6]. Streets were widened and parking lots began to dominate a new, more spread out urban landscape.


The Henry Ford, 1913

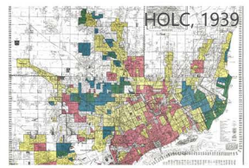

Detroit Historical Society, 1959

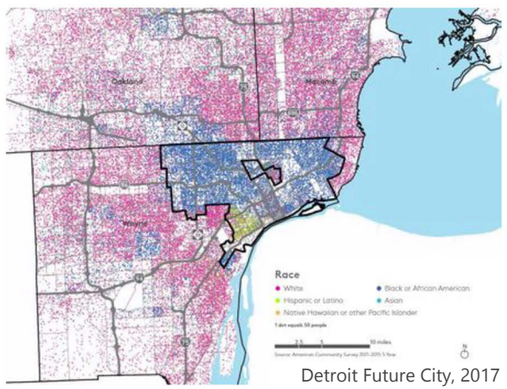

DTE Energy, 1949


Detroit Historical Society, 1961

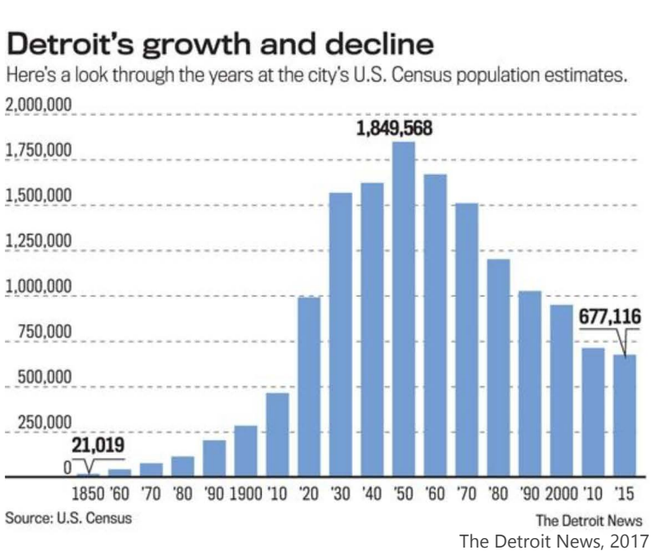

DTE Energy 2014

Library of Congress, 1942


HOLC, 1939



Detroit Future City, 2017



The Detroit News, 2017

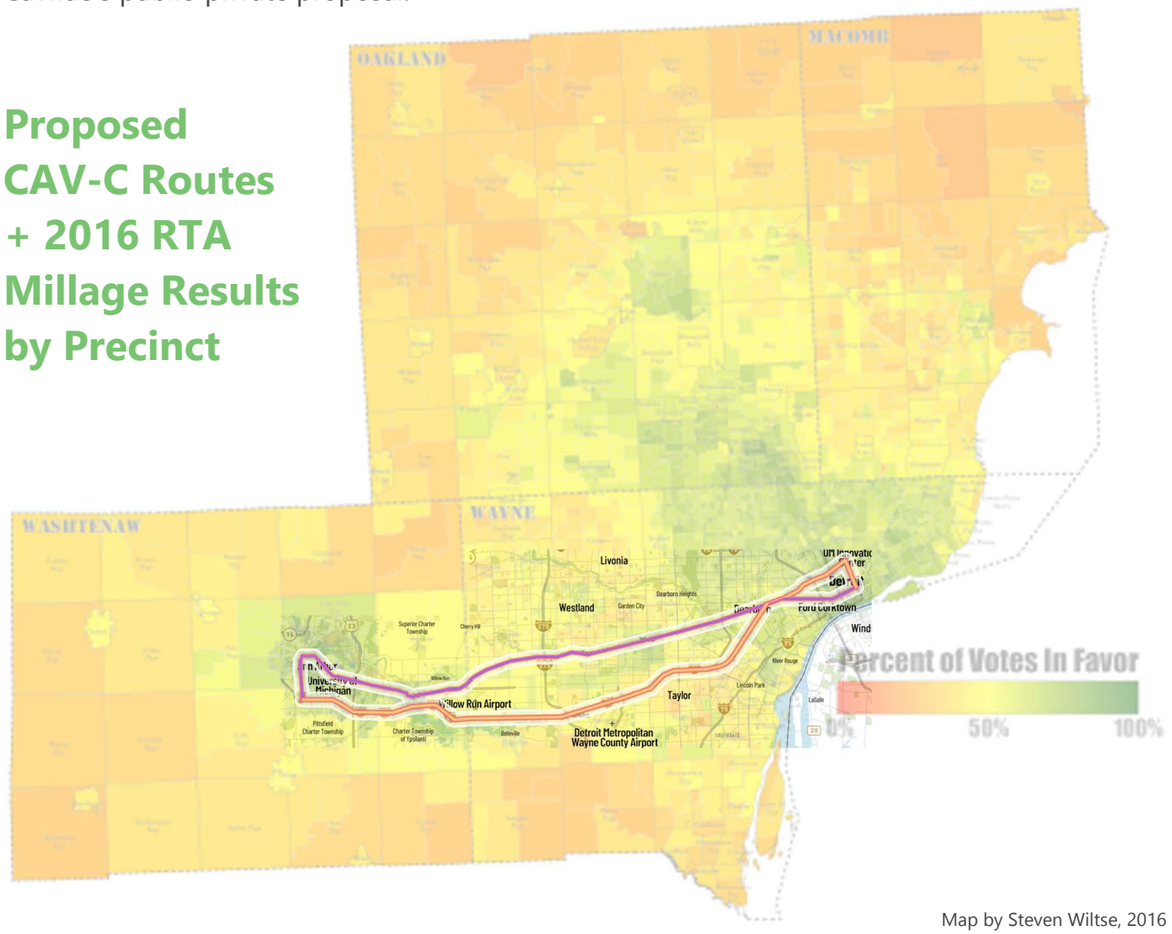
Concurrently, the Second Great Migration brought an influx of Black Americans fleeing the Jim Crow South. Detroit's white population reacted by moving outside the city to newly built suburbs [5], whose development was precipitated by public programs for urban freeways and mortgage subsidies for single family homes in white neighborhoods [6]. Since 1950, 95% of white residents have left the city [5]. While the region has steadily grown, the city's population has declined from nearly two million in 1950 to under 700,000 today [7]. Redlining practices prevented Black people from buying homes in suburban communities, and as a result, Detroit's metropolitan region is among the most segregated in the nation [7].

The Detroit News, 2019

Since the 1970s, suburban and state-level opposition have halted the development of regional transit. Former Detroit Mayor Coleman Young and then Michigan Governor William Milliken worked together to propose a 1975 regional transportation plan that included commuter rail, light rail, and a subway [8]. The proposal faced suburban opposition, and was ultimately deemed infeasible after the federal government cut funding for transit projects [9]. All that was built was the 3-mile Downtown People Mover loop. More recently, the non-profit M-1 RAIL built a three-mile long streetcar line on Woodward Avenue that opened in 2017. City bus service has improved in recent years after a long standing reputation for unreliability. However, most bus lines stop at the city's borders, and only a handful of suburban routes continue from there. Detroit is often reported as having the worst public transportation of any major American city [10]. The lack of service connecting the city and its suburbs hurts the 60% of Detroit residents who work outside the city and ensures the 75% of workers who commute in from the suburbs must drive [11]. Even though more than one third of Detroiters don't have regular access to a car [10], the region remains severely auto-dependent.

The Regional Transit Authority of Southeast Michigan was created in 2013 to establish comprehensive transit throughout Detroit's metropolitan region [12]. So far, the agency has failed in 2016, 2018, and 2020 to implement the necessary funding millage for its bus rapid transit (BRT) and rail focused master plan due to opposition in suburban counties to the city's north. The planned route for Cavnue's autonomous vehicle corridor aligns with voter support for the 2016 regional transit tax[13]. It also covers the same route that the RTA plan would have connected via commuter rail [14]. The correlation may indicate that after years of rejection, fulfilling any implementation of the regional transit strategy now hinges on MDOT and Cavnue's public-private proposal.

Proposed CAV-C Routes + 2016 RTA Millage Results by Precinct

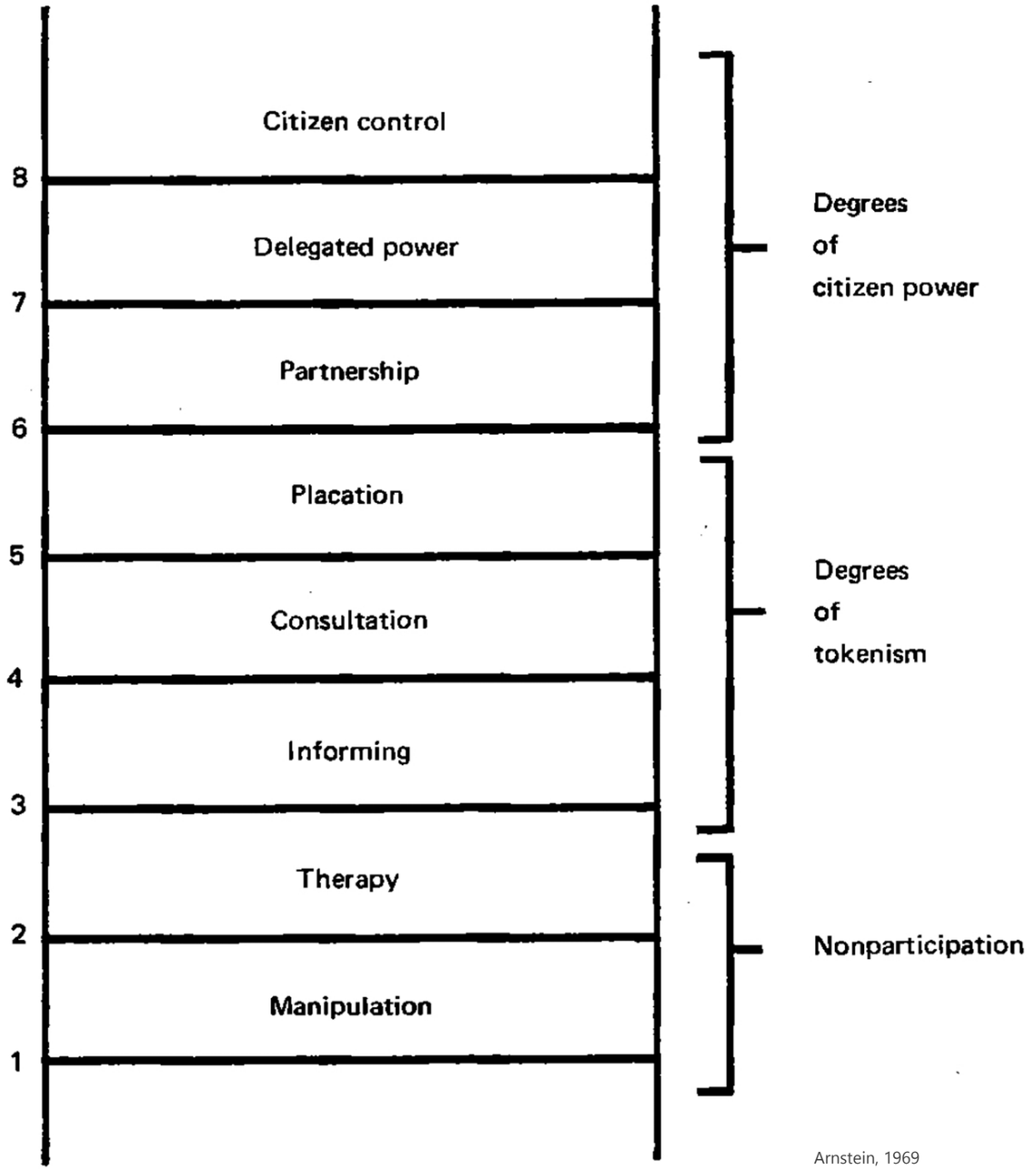


Map by Steven Wiltse, 2016

Automobile-centric planning has had a transformative impact on development patterns, fostering sprawl, segregation, and inequality [6]. Because the CAV-C concept is meant to be replicable on roadways in cities across the nation, it has the potential to change how and where Americans live and travel all over again. Whether or not the system is equitable and sustainable will result in very different futures. Thus, for this project, much more is at stake for Detroit and its residents than is for Cavnue, its industry partners, or possibly even Michigan's tech sector ambitions.

Self-Determination through Community Engagement

Those who fled the Jim Crow South for Detroit have been left profoundly behind since arriving in the city. Inevitably, the Black community has historically been excluded from many of the key planning processes that have shaped the modern region. Involvement in such matters is the only way stakeholders can effectuate decisions that align with their goals and values. To analyze the historical clout of Detroiters' input, this project compares the city's past engagement efforts with Sherry Arnstein's Ladder of Citizen Participation [15]. The typology defines citizen participation as "the redistribution of power that enables the have-not citizens, presently excluded from the political and economic processes, to be deliberately included in the future… it is the means by which they can induce significant social reform which enables them to share in the benefits of the affluent society" [15]. The Ladder categorizes involvement on a scale from nonparticipation, to tokenism, to the ideal outcome of citizen power.



Arnstein, 1969

Public Housing Era (1933-)

Detroit's public housing era began with a 1933 grant from the Federal Emergency Housing Corporation, and it became the first of five city-wide redevelopment movements over the past century. The first developments reflected progressive neighborhood arrangements, with clusters of apartments and townhomes conveniently located near playgrounds and commercial facilities. However, over time, public housing projects morphed into high-rise apartment tower complexes that concentrated poverty, fostered crime, and provided children minimal access to the outdoors [6]. Although the concept of citizen participation emerged later during the urban renewal era [15], some levels of citizen engagement are evident during the public housing era:

> The city government built Brewster Homes for blacks only because [Detroit's Housing Director Josephine Gomon] realized that opposition by the Wider Woodward Association, white business owners located on the city's main thoroughfare, would kill the project if it were not segregated. Gomon gave black leaders the choice of either racially segregated housing or none at all; they chose segregation. [6]

Certain citizens, especially those with power, exerted great influence over the planning process to the point of catalyzing the project in the first place. Nevertheless, forcing a marginalized community to decide between segregated public housing or none at all demonstrates a paternalistic illusion of choice, and is thus a definitive example of manipulation and non-participation.

U-M Library Digital Collections, added 2016

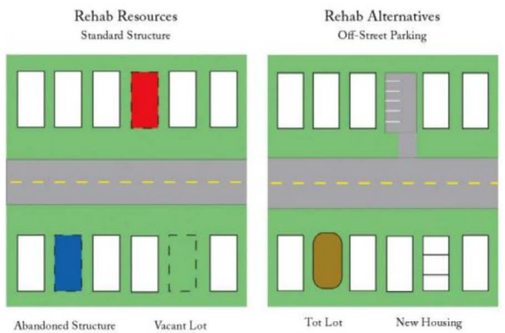
Detroit Housing Commision, 1952

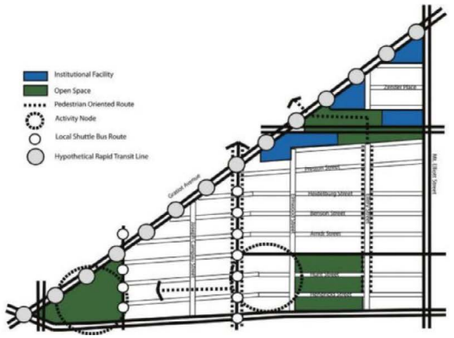
Urban Renewal Era (1949-1974)

Detroit's urban renewal era left the most visible imprint of any city-wide redevelopment effort to date. The first area chosen for redevelopment in 1949 was Black Bottom, a working-class, majority Black community and commercial hub adjacent to the central business district. Downtown business owners pressured city officials to take action to encourage middle class white residents to move into Black Bottom in order to increase their white customer base. City planners, seeing an opportunity to generate increased tax revenue, heeded the business contingent's proposition, commencing the redevelopment of 500 acres for superblocks and freeways and displacing more than 2000 black families [5]. Detroit's urban renewal agenda thus reflected a thoroughly non-participatory strategy.

The scale of these endeavors became unrealistic in the 1960s, as white flight to the suburbs shuttered growth. The Model Neighborhoods program scaled back initiatives to focus on a smaller area of the city, while introducing a much stronger role for citizen decision-making:

> Residents chose representatives for an overall governing board, which could select from an array of programs and guide implementation. Hiring many locals, the Detroit Model Neighborhood program provided temporary employment and opened up new career ladders, helped address educational needs in local elementary schools, and put in place a public health care delivery system... specific subsections of the Model Neighborhood area developed their own redevelopment initiatives. [16]





Parkins/Rogers and Associates, 1972

Detroit's Model Cities initiative was one of 15 out of the 75 nationally that achieved some degree of power-sharing, even though "it was angry citizen demands, rather than city initiative, that led to the negotiated sharing of power" [15]. Ultimately, "their expectations and needs far outweighed resources" [16]. The Nixon Administration inherited the Model Cities program in 1969 and cut off funding in 1974 [16]. Whether a citizen group involved in redevelopment receives adequate funding qualifies the nature of the participation as either legitimate or tokenistic (Arnstein), thus Detroit's Model Neighborhood program too failed to produce citizen power.

Community Development Block Grants (1974-)

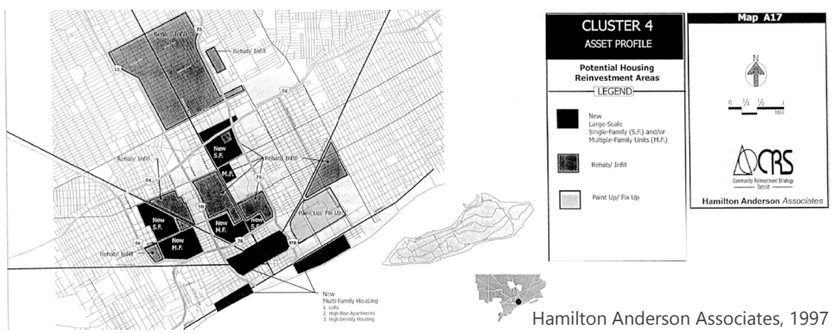
The U.S. Congress launched Community Development Block Grants (CDBG) in 1974. The program provides local and state governments federal funding for housing, infrastructure, and anti-poverty programs. Michigan state legislation mandated that city governments maintain funding for citizen district councils, which served as advisory groups for the disbursement of funds on proposals. However, the councils had little oversight during the beginning of the CDBG program since nearly all funds were allocated toward previously approved urban renewal projects [6]. A new avenue for citizen participation came out of the city council's establishment of the CDBG-funded Neighborhood Opportunity Fund (NOF), which made allocations based on applications from community-based organizations. While financial self-sufficiency is a critical element of citizen power, these organizations often lacked the technical expertise required to carry out major initiatives on their own [6]. In the best of cases, the program funded projects for race-centered (often church-based) organizations, contributing toward "racial/ethnic self-determination" [17]. However, former Mayor Coleman Young's ambition to develop large, expensive projects also put him at odds with community groups applying for funding for public services and community development. A disconnect emerged in the city's allocation of funds, with the city council approving up to 90% of NOF applications it received in one year, while the mayor's office supported only about one third [17]. The various barriers to implementation of community-initiated projects reflects a tokenistic commitment to citizen participation.

EZ, CRS, & Master Plan (1994-2009)

In 1994, Detroit successfully applied for designation as a federal Empowerment Zone. The ten-year program injected $100 million into census tracts suffering social and economic distress. The Empowerment Zone initiative sought to correct previous urban redevelopment programs' failures to involve communities in goal setting, project design, and implementation. Rather, "the EZ initiative emphasized planning and implementation from the 'bottom up' through community involvement and partnerships" [18]. Despite all stated intentions, the program failed to adequately involve citizen participation:

> Examination of programmatic emphases and funding allocation revealed that community partnerships received the least amount of funding and program attention… Detroit's funding emphasis was on economic opportunities… [the] overarching goals were not implemented equally and emphasis on community involvement was scant. [18]

Concurrently, former Mayor Dennis Archer convened a task force to carry out the Community Reinvestment Strategy. The planning endeavor established ten clusters throughout Detroit, and each assembled a committee to establish a volume of needed improvements in the area. All ten volumes were completed by 1997, at which point they sat unused until their eventual adoption in the city's 2009 Master Plan [6]. By then, the CRS committees had long since dissolved, and their recommendations were 12 years old. The members who spent years assessing their communities under the pretense that their recommendations would be executed walked away from the process feeling betrayed [19]. Detroit's continued inability to adequately fund and commit to citizen groups demonstrates the city's Empowerment Zone effort failed to generate more than tokenistic participation.



Hamilton Anderson Associates, 1997

Detroit Works Project, Long-Term Planning (2010-)

In 2010, former Mayor Dave Bing partnered with various foundations to launch the 24-month long Detroit Works Project, Long-Term Planning initiative (DWPLTP). The team was managed by the Steering Committee, made up of representatives of city government, philanthropy, nonprofits, business, and other local institutions (Griffin, et al.). After the failed 2009 Master Plan engagement process, the team soon encountered significant barriers to effective citizen participation during their initial town halls:

> Foremost… a profound sense of immobilization, planning fatigue, and a general perception of cynicism about planning and engagement efforts. These challenges were compounded by historic racial dynamics and tension… Detroiters were not new to civic participation, and they had certainly been let down by hollow public commitments of inclusion numerous times before. [19]

The team sought to rebuild trust by "inviting people into the planning conversation both earlier and more inclusively… investing time and resources in outreach and cultivating relationships… [and listening] to people's questions and perspectives on their own turf and in their own terms" [19]. They also convened a citizen group named the Process Leaders:

> The more than a dozen local community leaders who comprised this group were selected for their expertise in civic engagement and local community knowledge among different racial, cultural, and age groups, as well as geographic areas of the city… This role went beyond the typical 'community advisory group' to active participation in decisions about where, when, and how engagement would roll out. [19]

Although the Process Leaders worked voluntarily without compensation, they had access to substantial foundation funding, and thus did not suffer the pitfalls of the under-resourced community groups involved in prior efforts. The engagement team utilized in-person, online, and over the phone participation tactics. In all, the process engaged about 16% of Detroit's total population [19]. However, engagement was explicitly conceived to be "citizen-shaped, not citizen-driven… [to] clarify expectations and roles" [19].

Such a distinction disqualifies the participation effort from reaching the top two rungs, "citizen control" or "delegated power," of the Ladder. However, the emphasis on gathering community expertise reflects a lower degree of citizen power: "partnership" [15]. In order to bridge the gap between community inputs and technical interpretations, the engagement team created the "Civic Engagement Feedback Loop" model [19]. This strategy intended to communicate to participants how their feedback was being applied to the outputs of the technical team.

Griffen, et al., 2014

The most consequential outcome of the synthesis of community and technical expertise was DWPLTP's reaction to widespread planning fatigue among the city's residents: the stated imperative to "dedicate ourselves to implementing this framework for our future" [19]. That promise, backed by two years of intensive engagement efforts, illustrates Detroit's first realization of a "partnership" and thus, citizen power.

The aforementioned framework was ultimately published in 2013 as the Detroit Future City Strategic Framework [11]. Many of the document's stated "imperatives" have been adopted by agencies like the Regional Transit Authority of Southeast Michigan [12]. In 2015, DWPLTP became the non-profit think tank Detroit Future City (DFC), tasked with implementing the 2012 framework. Although the plans are now nine years old, they still represent the most relevant and comprehensive synthesis of Detroit residents' visions for the future of their city. As such, this project will integrate and, when necessary, contemporize DFC's strategies in scenarios that intersect with and/or complement the proposed CAV-C initiative.

Methodology

With Detroit's preferential planning legacy and the potential long-term impacts of reshaping standards for transportation infrastructure in mind, this project seeks to:

Examine CAV-C as a mechanism to improve regional access through an integrative transportation and land use framework that supports:

equitable social, environmental, and economic development

In keeping with this goal, all stated findings and recommendations are informed by a research methodology that synthesizes a diverse set of data.

Contemporary Public Opinion

Public opinions are derived from community surveys, comments, and interviews published within the past decade in:

- Detroit Metro Area Communities Study - University of Michigan, 2017
- 2045 Regional Transportation Study - Southeast Michigan Council of Governments, 2019
- Understanding Public Opinion Regarding Transit in Southeast Michigan - Mineta National Transit Research Consortium + University of Detroit Mercy, 2015
- Public comment records from Detroit's Planning and Development Department and MDOT
- "It's safe to come, we've got lattes": Development disparities in Detroit - Michigan State University and Wayne State University, 2016

Geographic Context Analysis

Qualitative and quantitative data are synthesized in maps using ArcGIS from spatial data provided by:

- City of Detroit
- Southeast Michigan Council of Governments (SEMCOG)
- Environmental Protection Agency
- U.S. Census Bureau
- Detroit Future City (DFC)

Overlap with Relevant Plans

Regional and local alignment is emphasized via comparisons with plans proposed by:

- Cavnue
- Michigan Department of Transportation (MDOT)
- Detroit Future City
- Detroit Greenways Coalition

Together, these sources constitute the basis for decisions that determine the scope of the project, areas of concentration, and proposed design interventions within a regional transportation context.

The resulting program + design development process visually explores potential interventions developed in AutoCAD, SketchUp, Lumion, and Photoshop.

Contemporary Public Opinion

What preferences and concerns have Detroit residents expressed since the DWPLTP civic engagement process?

The University of Michigan's 2017 Detroit Metro Area Communities Study [20] found that most Detroiters drive, while few rely on "new mobility" options such as ride sharing or car sharing. Carless Detroiters primarily rely on the bus and rides from others. Those without vehicles are less satisfied with transportation in the city. Of Detroiters without a vehicle, 43% have missed work, an appointment, or an outing due to lack of transportation [20].

Detroiters, both with and without their own vehicles, prioritize improving driving conditions above all other transportation improvements. Nevertheless, expanding public transportation was slightly more popular than repaving streets [20], despite a widespread perception of poor road quality in and around Detroit.

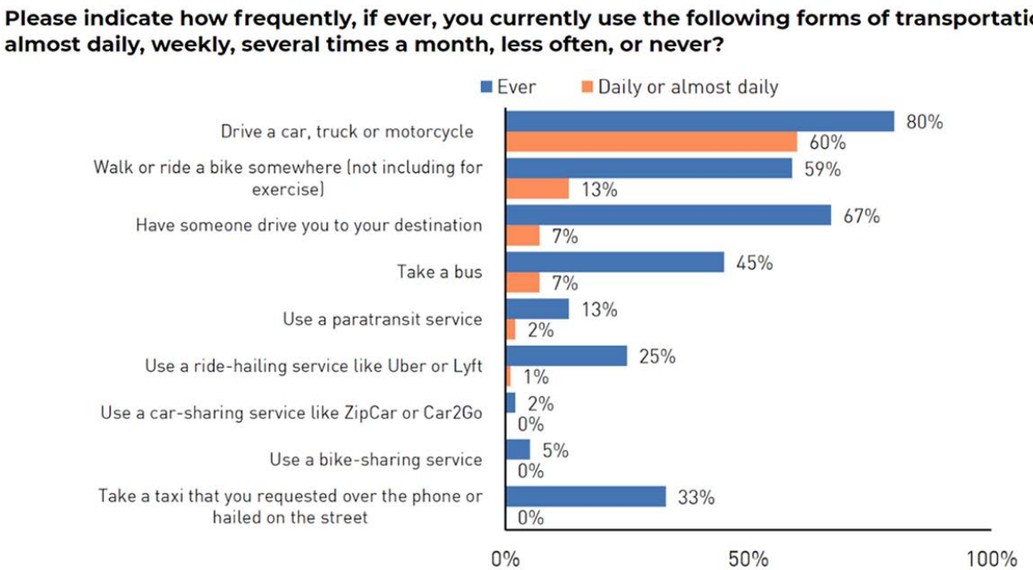


Figure by Gerber, et al., 2017

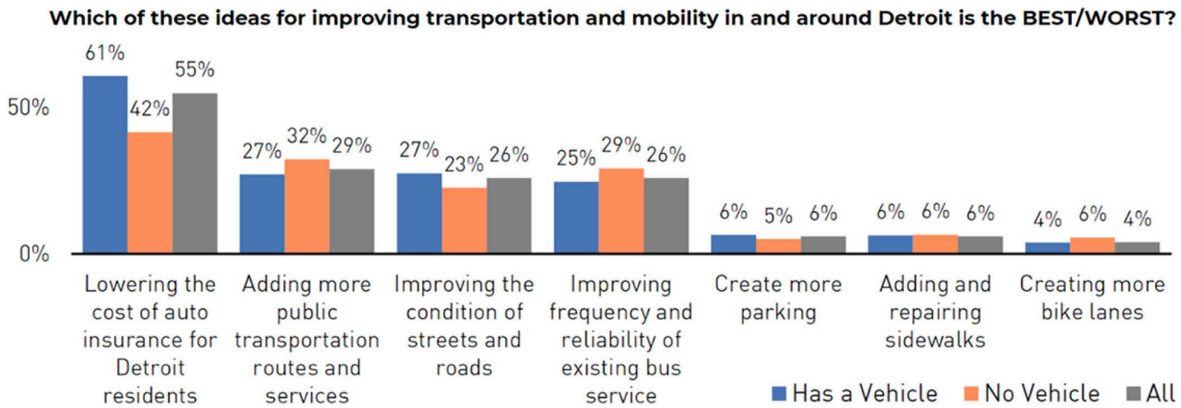


Figure by Gerber, et al., 2017

The Southeast Michigan Council of Governments 2045 Regional Transportation Study [21] found that 85% of transit users walk to their stop. 20% of transit-dependent households are beyond a 30-minute walk to fixed route transit service, and 65% are beyond a 10-minute walk [21].

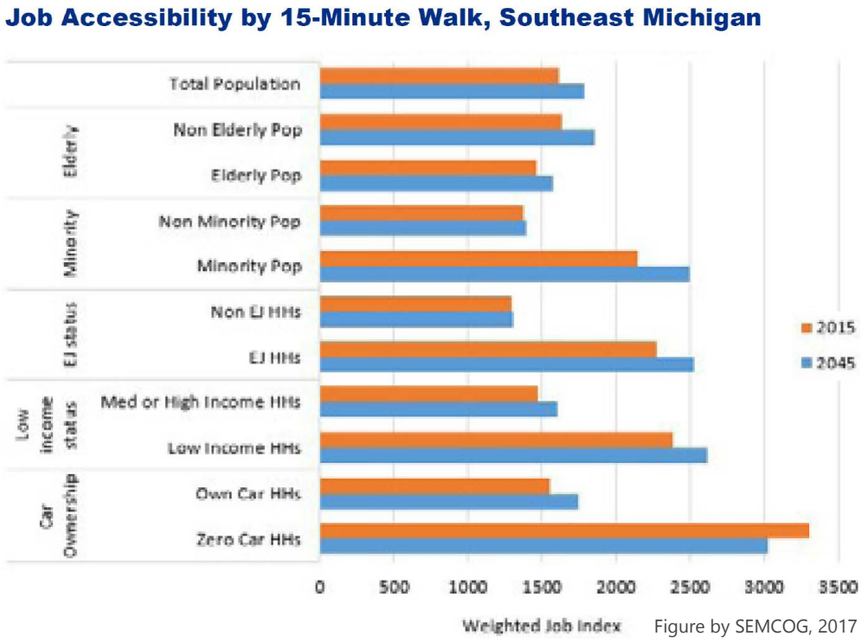


Figure by SEMCOG, 2017

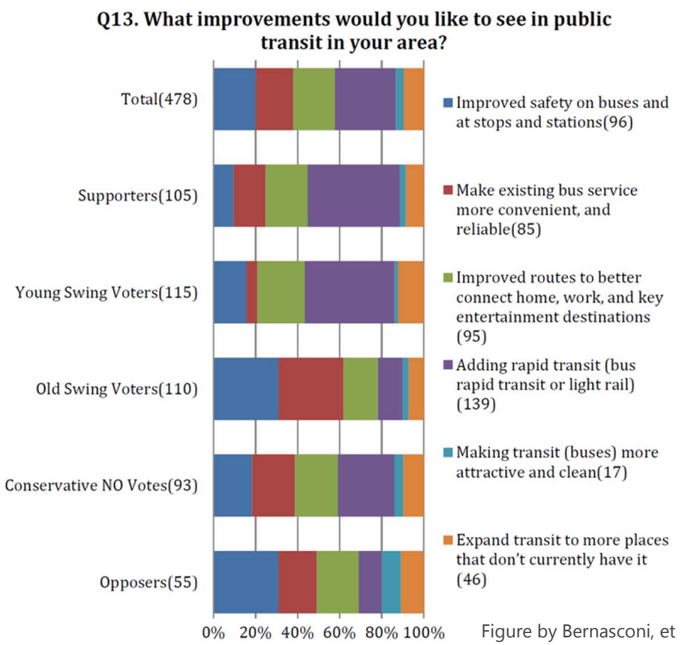
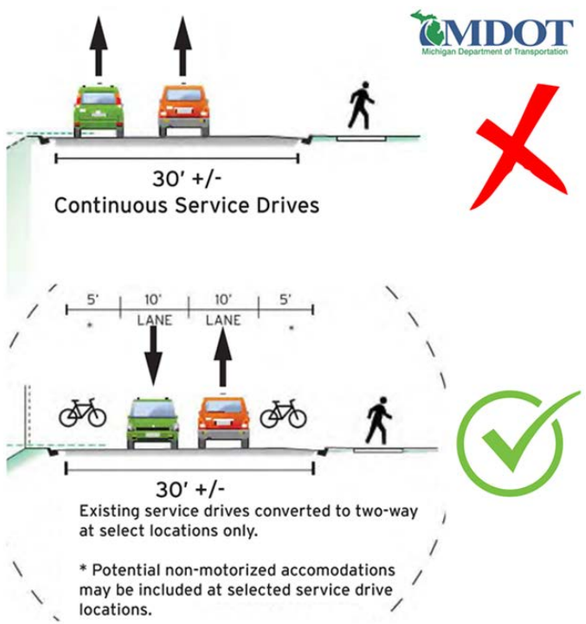


Figure by Bernasconi, et al., 2015

The 2015 Report "Understanding Public Opinion Regarding Transit in Southeast Michigan" by Mineta National Transit Research Consortium and University of Detroit Mercy [22] found that adding rapid transit (defined as bus rapid transit or light rail) is the most popular transit improvement option. The next highest rated objectives are improved buses, stops, and stations, as well as improved routes to better connect home, work, and entertainment destinations. [22]



Figures by MDOT, 2019

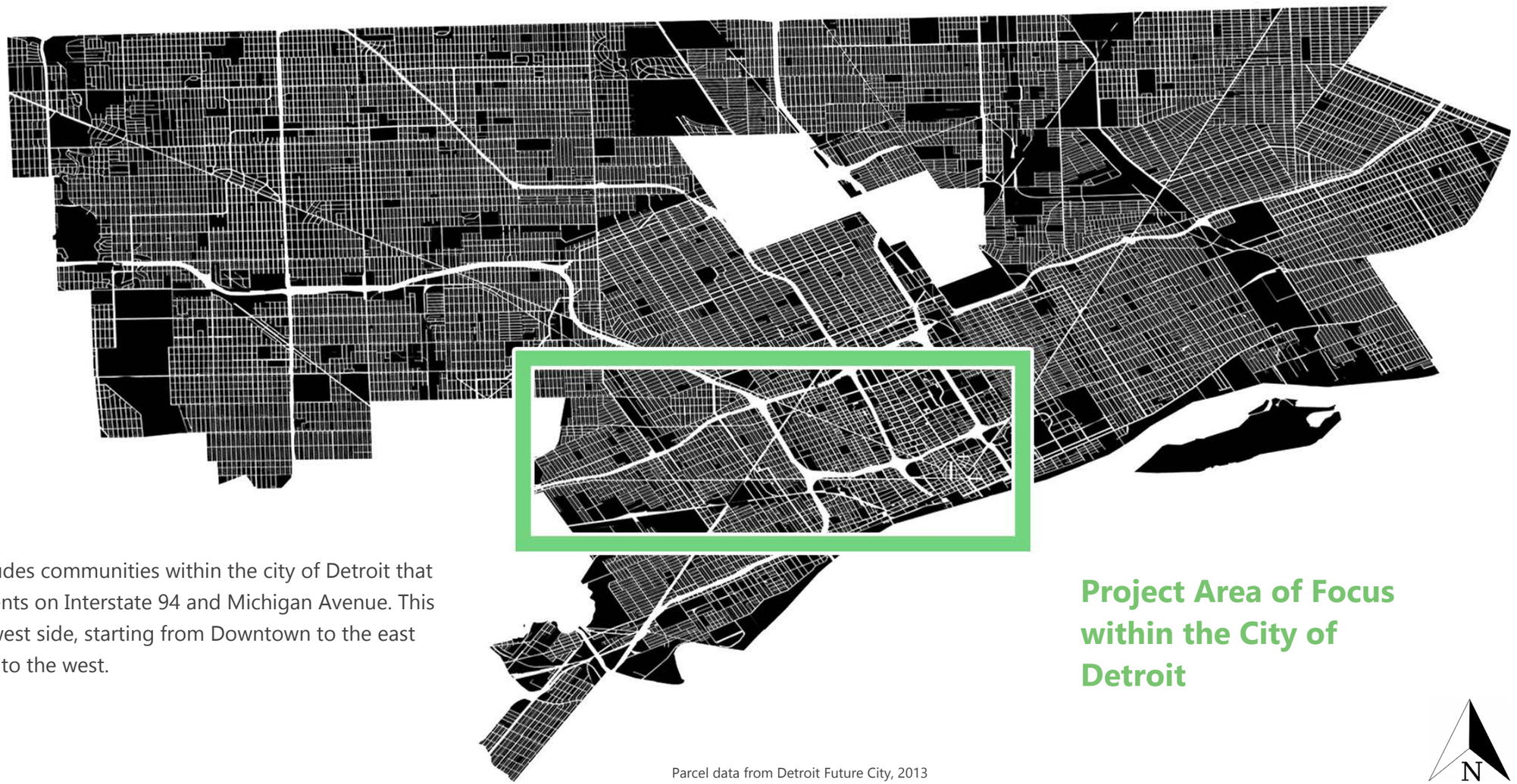
The most recurrent public comments on land use collected by the Detroit Planning and Development Department (PDD) describe the need for bike infrastructure, affordable housing, accessibility, historic preservation, and reuse of existing buildings [23].

A 2019 Michigan Department of Transporation (MDOT) public hearing process for an Interstate 94 overpass improvement project [24] yielded similar concerns, leading to a compromise for a service road design that would become two-way and integrate bike lanes. Public comments related to this project also widely criticized MDOT's plans to widen the freeway [24], but no alternatives were offered.

In various public hearings held by the Detroit PDD and MDOT, and in other vocal and editorial forums, many residents have expressed frustration owing to a perception that Detroit's widely publicized "comeback" has excluded the poorer neighborhoods that make up most of the city [25, 26, 27]. Such criticism often stems from public subsidies being granted to wealthy developers for large projects in neighborhoods like Downtown and Midtown, sometimes at the expense of city services. Indeed, a 2016 Michigan State University study [28] found that while Downtown and Midtown have recently reversed a decades-long trend of population loss and disinvestment, the resulting benefits disproportionately affect suburbanites and recent white millennial arrivals. Overall, Detroit continues to experience decreasing population, employment, and incomes, and increasing vacancies and poverty [28].

Geographic Context Analysis

Mapping spatial characteristics of the Detroit neighborhoods that would be impacted by the proposed CAV-C route



The area of focus for this project includes communities within the city of Detroit that surround the proposed CAV-C segments on Interstate 94 and Michigan Avenue. This zone encompasses the city's central west side, starting from Downtown to the east and reaching the border of Dearborn to the west.

Project Area of Focus within the City of Detroit

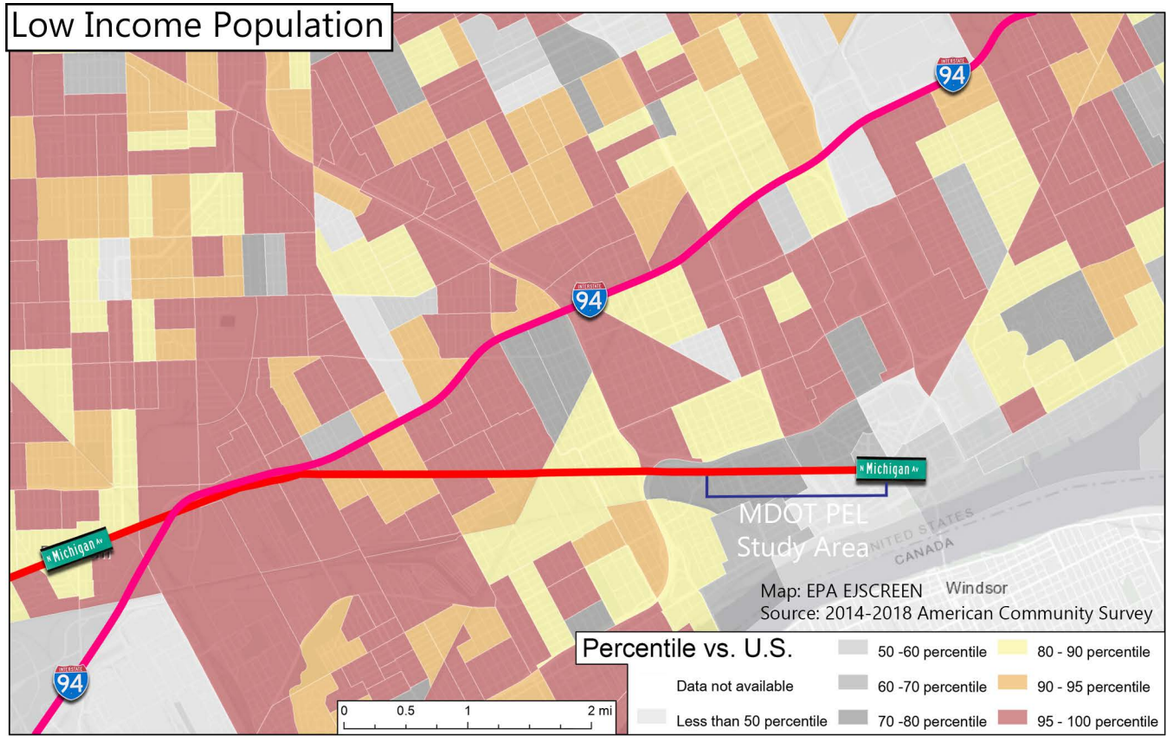
Parcel data from Detroit Future City, 2013

Demographics

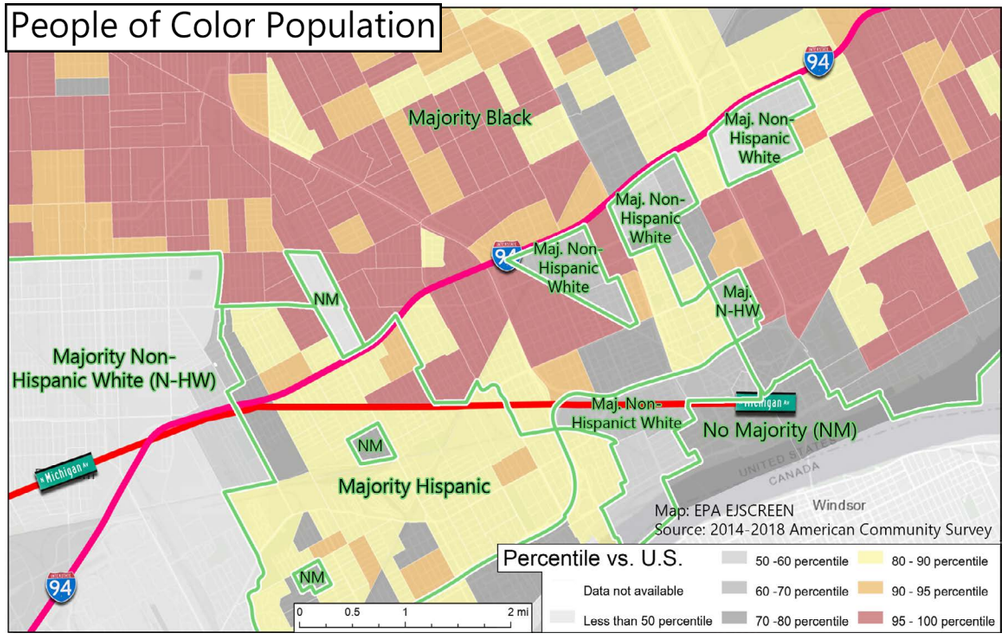
GIS analysis indicates that lower income populations are concentrated further west along both the Interstate 94 and Michigan Avenue CAV-C routes.

The eastern segment of Michigan Ave is surrounded by a higher proportion of non-hispanic white residents than most of the rest of the city. Further west, neighborhoods to the north of Michigan Ave are predominantly Black, and neighborhoods to the south are majority Hispanic. These latter neighborhoods have a very high percentile of linguistically-isolated residents, which may indicate a population unable to obtain driver's licenses due to disenfranchisement based on immigration status.

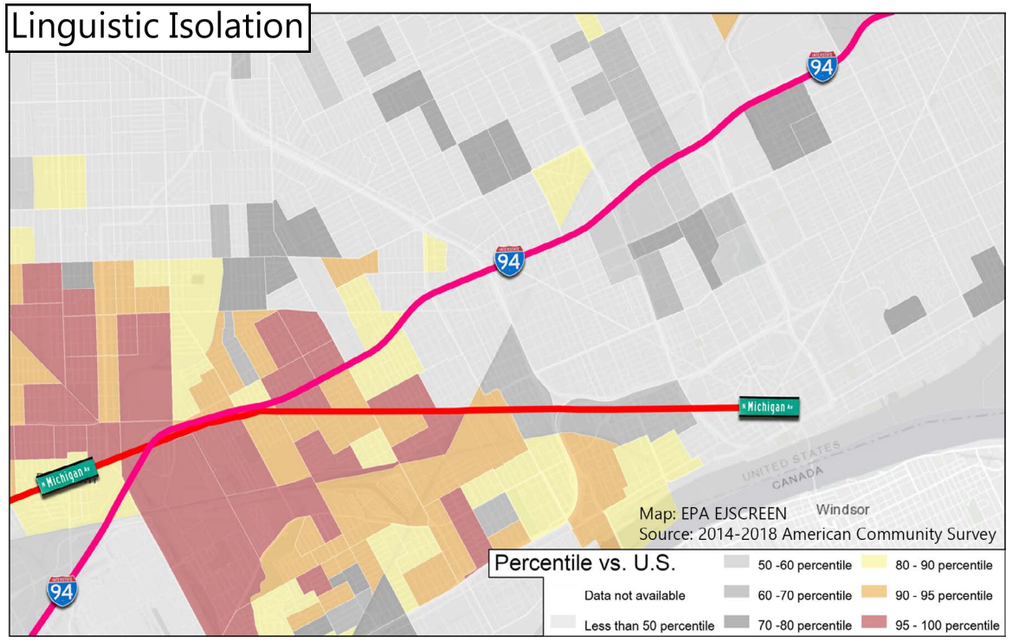
Low Income Population



People of Color Population



Linguistic Isolation



Transportation Factors

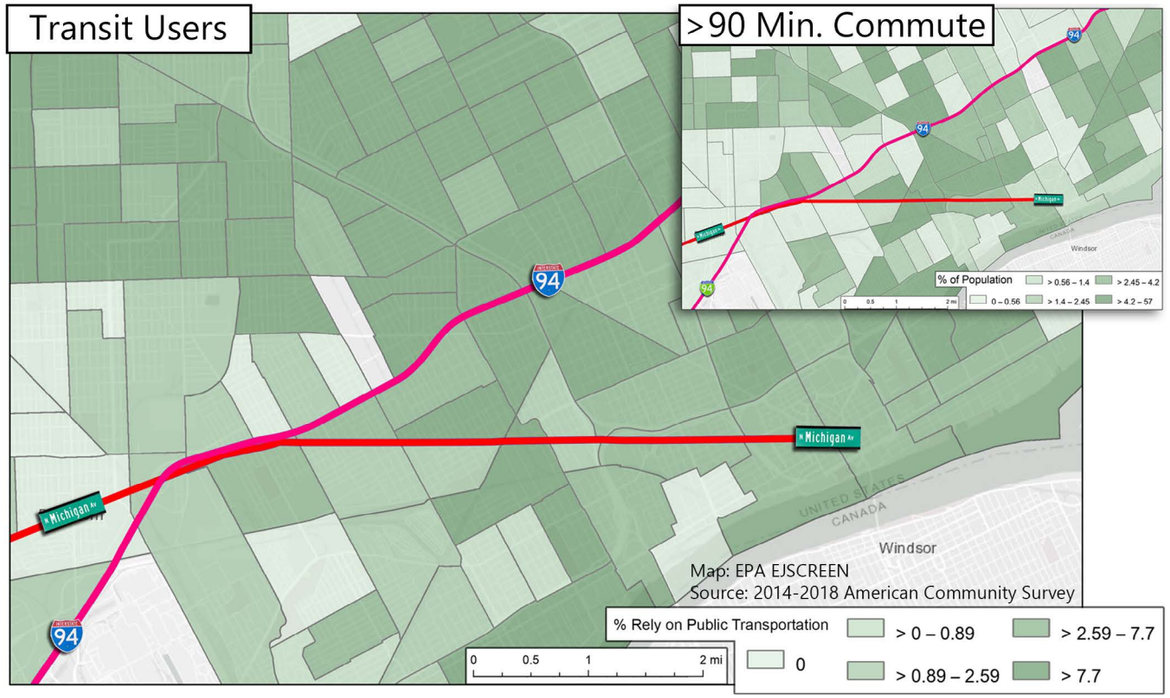
The highest concentration of transit users live in between the more and less affluent communities along the corridor, near where I-94 and Michigan Ave intersect with West Grand Boulevard. A larger transit-dependent population surrounds Livernois Avenue outside of the area of focus to the north.

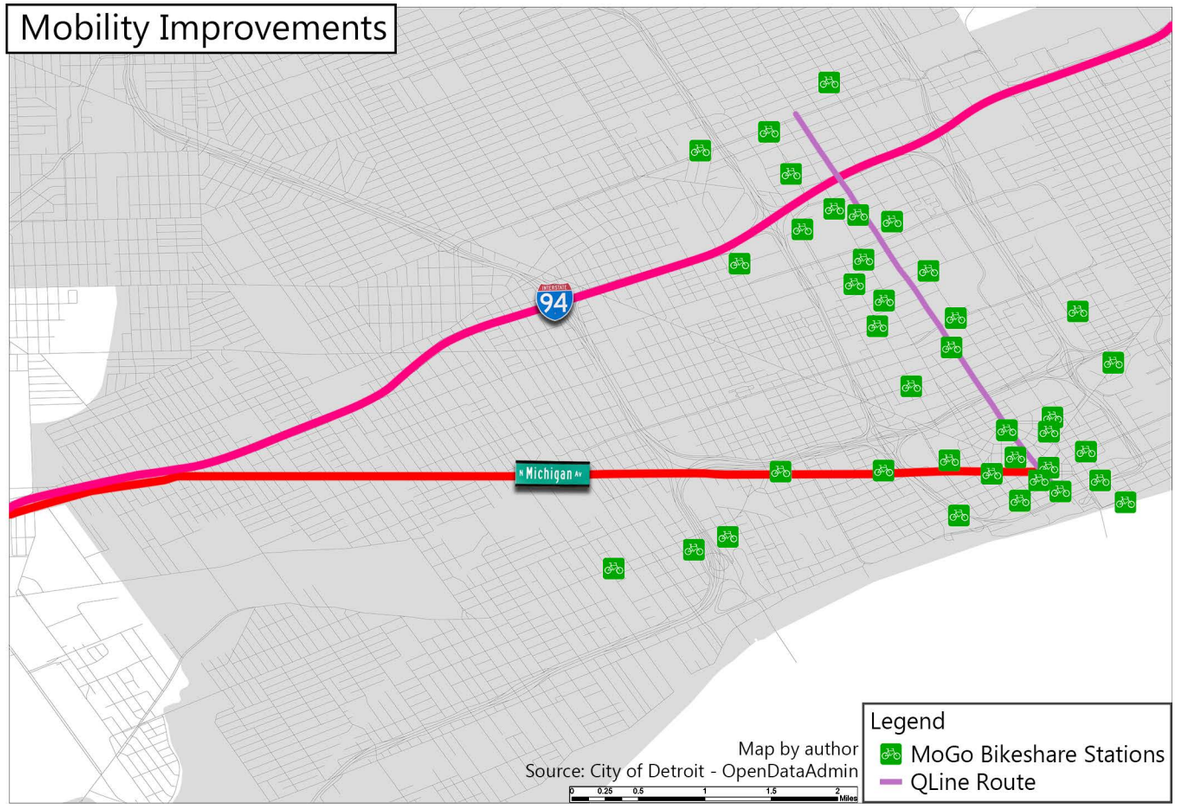
There is a significant overlap between the higher rates of transit users in Black-majority neighborhoods surrounding West Grand Blvd and the highest percentile of residents with commutes that take more than 90 minutes.

Recent mobility projects substantiate the public perception of disparate investment in socioeconomically different communities.

Nearly all of the stations operated by Detroit's non-profit bikeshare network MoGo are concentrated in three adjacent neighborhoods that account for most of the city's wealthy population: Downtown, Midtown, and Corktown.

Similarly, the QLine streetcar route exclusively serves Downtown and Midtown.





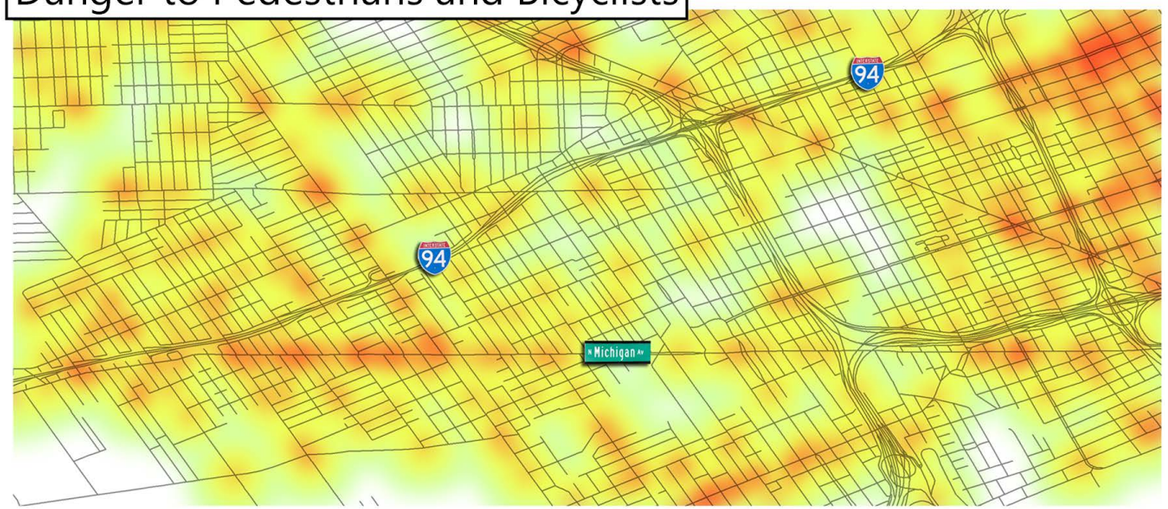
Traffic Safety

Based on Detroit's records of reported incidents from 2011-2019, a small cluster of crashes involving pedestrians or bicyclists is evident along Michigan Ave in Corktown.

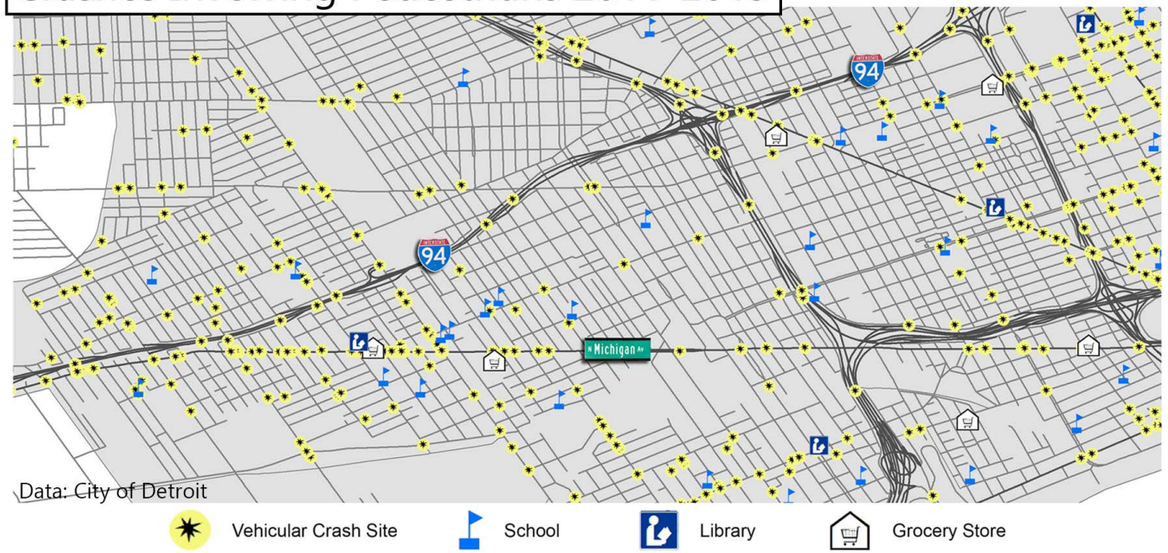
A larger agglomeration of such crashes is visible on Michigan Ave between Livernois and Central Avenue. This stretch includes the highest concentration of schools and grocery stores along Michigan Ave, as well as the only library along either proposed CAV-C segment.

An adjacent but less dense concentration of crashes also indicates an elevated risk to pedestrians and cyclists on Livernois to the north of Michigan Ave.

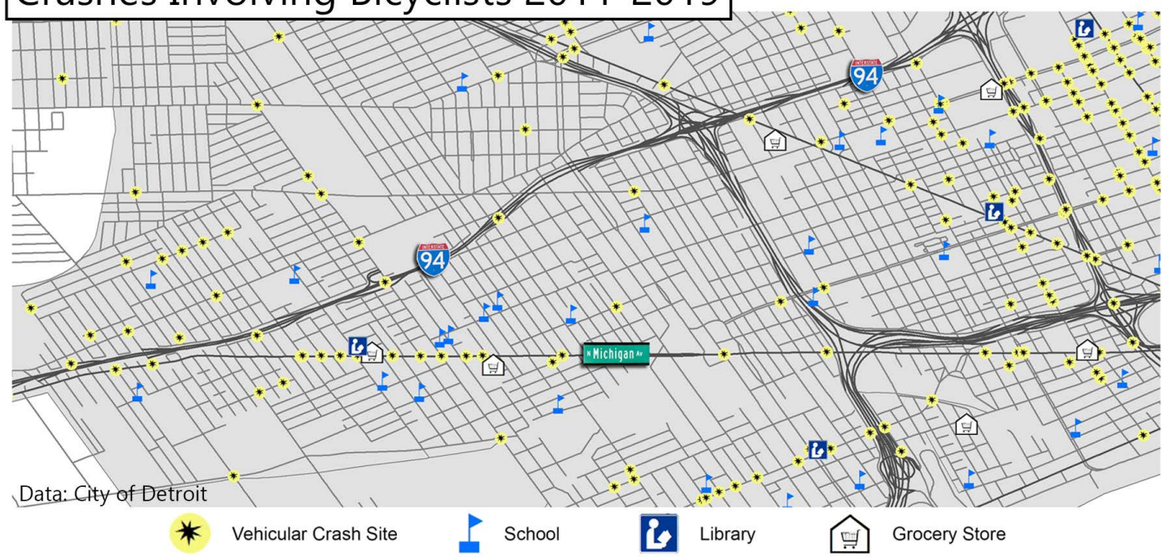
Danger to Pedestrians and Bicyclists



Crashes Involving Pedestrians 2011-2019



Crashes Involving Bicyclists 2011-2019

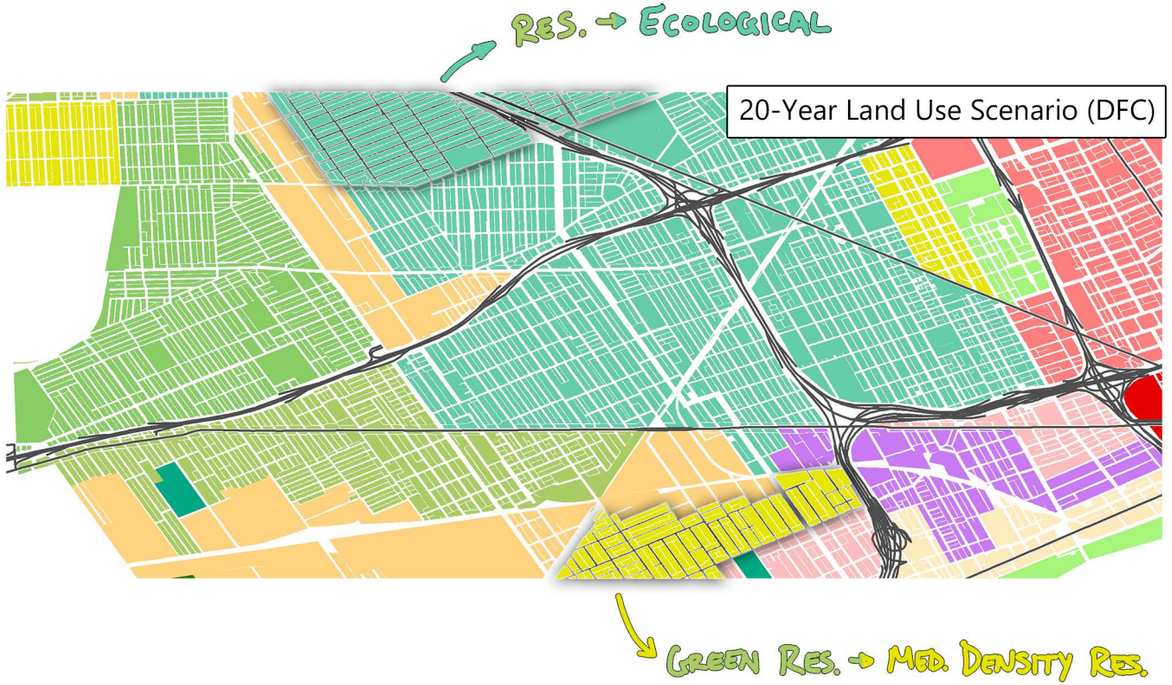


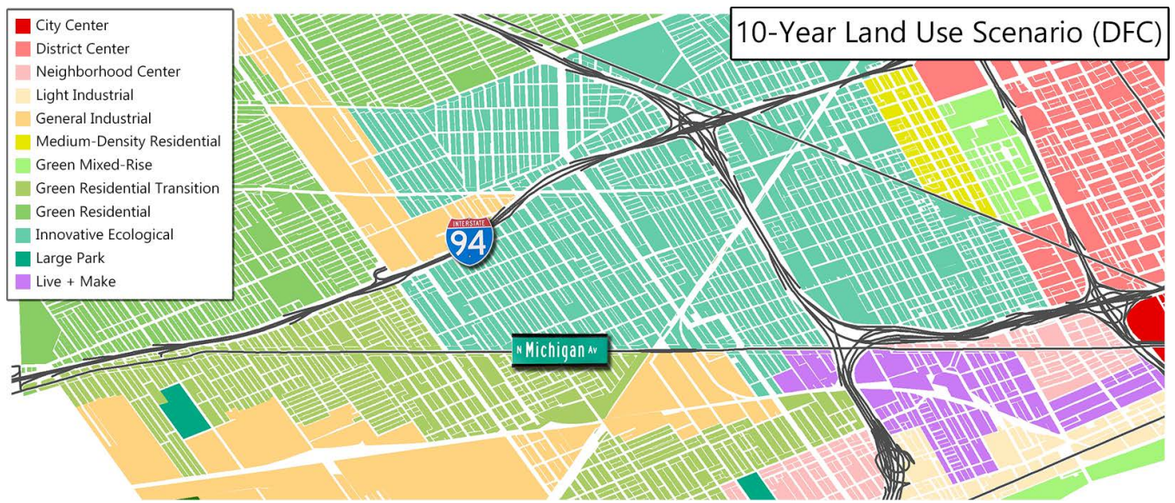
Future Land Use

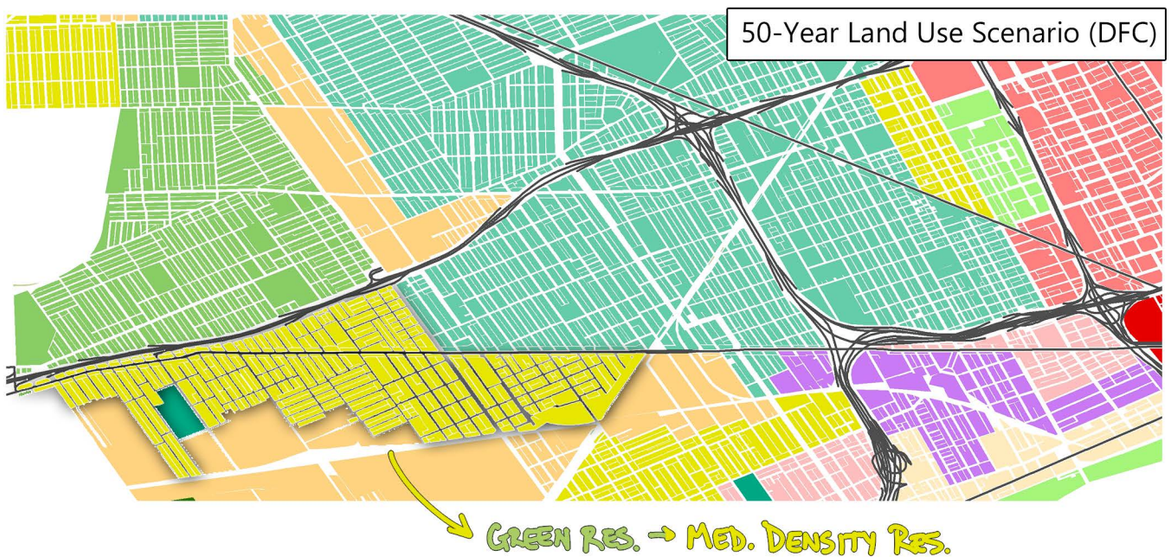
Detroit Future City projects [11] that over 50 years, the eastern segment of Michigan Ave will continue to support neighborhood centers in Downtown and Corktown. Western Corktown will become a “live + make” zone.

Further west, neighborhoods south of Michigan Ave, some areas between Michigan Ave and I-94, and Southwest Detroit will experience significant population growth, transitioning from “green residential” to medium-density residential. This level of projected growth exceeds all other neighborhoods within the city.

Many of the areas north of I-94 are projected to continue to lose residents and experience increasing vacancy, enhancing their ecological value but discouraging increasing services or development.







Overlap with Relevant Plans

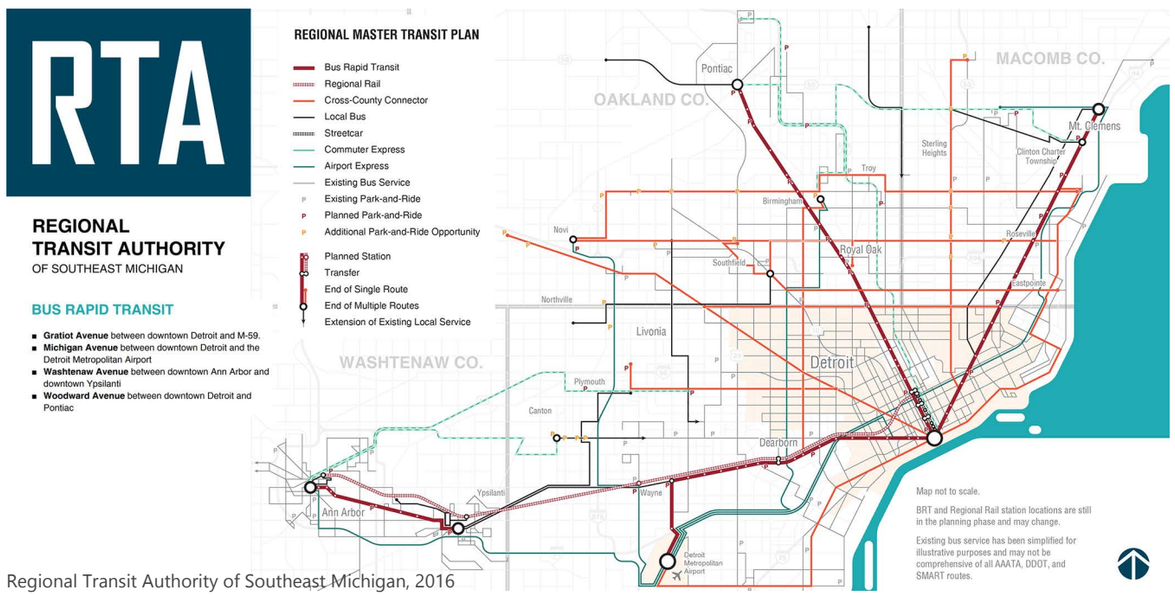
Detroit Future City Proposed Transit Corridors

DFC's Strategic Framework [11] proposes integrating bus rapid transit service into six of Detroit's major thoroughfares. Where these "Tier 1" routes intersect, the proposal calls for the integration of transit nodes. Within the area of focus, the proposed CAV-C segment on

Detroit Future City, 2013

DFC's Strategic Framework [11] proposes integrating bus rapid transit service into six of Detroit's major thoroughfares. Where these "Tier 1" routes intersect, the proposal calls for the integration of transit nodes. Within the area of focus, the proposed CAV-C segment on Michigan Avenue aligns directly with DFC's recommended BRT route along the same roadway. Both Michigan Ave and I-94 would intersect the proposed Livernois BRT line. DFC calls for the creation of a BRT transit node at the Michigan Ave-Livernois intersection, which also constitutes part of the Michigan Ave CAV-C segment.

Much of this proposal was adapted for the 2016 Master Plan for the Regional Transit Authority of Southeast Michigan [12]. Overall, the RTA's objectives are less ambitious, substituting several dedicated BRT corridors with more traditional express bus connections.



Regional Transit Authority of Southeast Michigan, 2016

Detroit Future City Proposed Carbon Forest Buffers

DFC's Strategic Framework [11] promotes carbon forest buffers along highway routes throughout the city as part of a proposed green space network. The strategy is intended to clean air, reduce sound, block glare, and provide a visually pleasing barrier for residential neighborhoods [11].

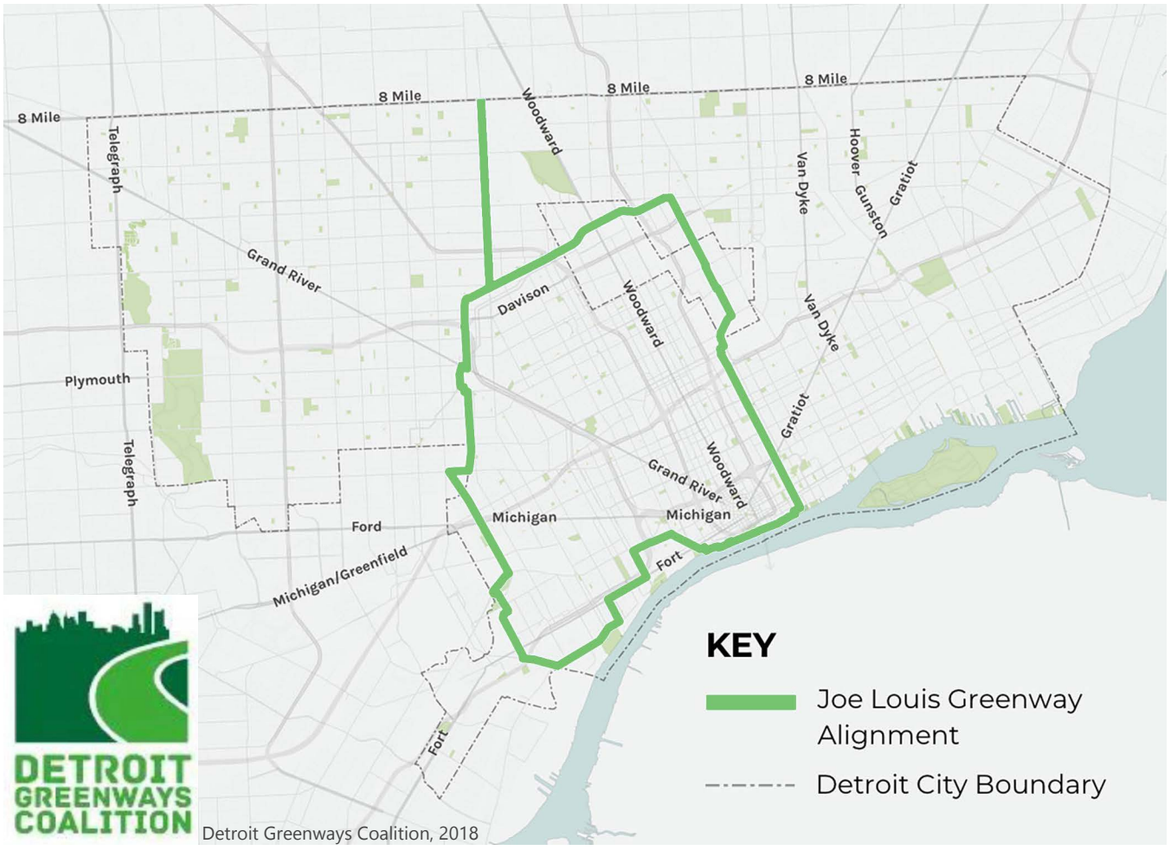
Within the project area of focus, DFC calls for carbon forest buffers along vacant land surrounding Interstate 94, including the segment slated for CAV-C adoption.

Detroit Future City, 2013

Joe Louis Greenway

In 2017, the non-profit Detroit Greenways Coalition received city approval for their proposed 27.5-mile walking and biking trail [29] that will establish a non-motorized route around the city. Now overseen by the Detroit Planning and Development and General Services Departments, the Joe Louis Greenway is expected to break ground in June 2021.

Within the project area of focus, the path's route along Lonyo Street crosses both proposed CAV-C segments on I-94 and Michigan Ave.



Detroit Greenways Coalition, 2018

Opportunities + Constraints Analysis

Overlaying geographic characteristics with contemporary planning goals, the opportunities and constraints analysis examines neighborhoods within the area of focus that warrant prioritization during the planning process.

In order to achieve Cavnue's goal of an "integrated" network [3], the entire route must ultimately be constructed. However, local considerations can establish a framework that sequences implementation according to mobility and access needs.

Numbered markers correspond with specific neighborhoods in the "Opportunities + Constraints Map" on pages 45-46.

Constraints

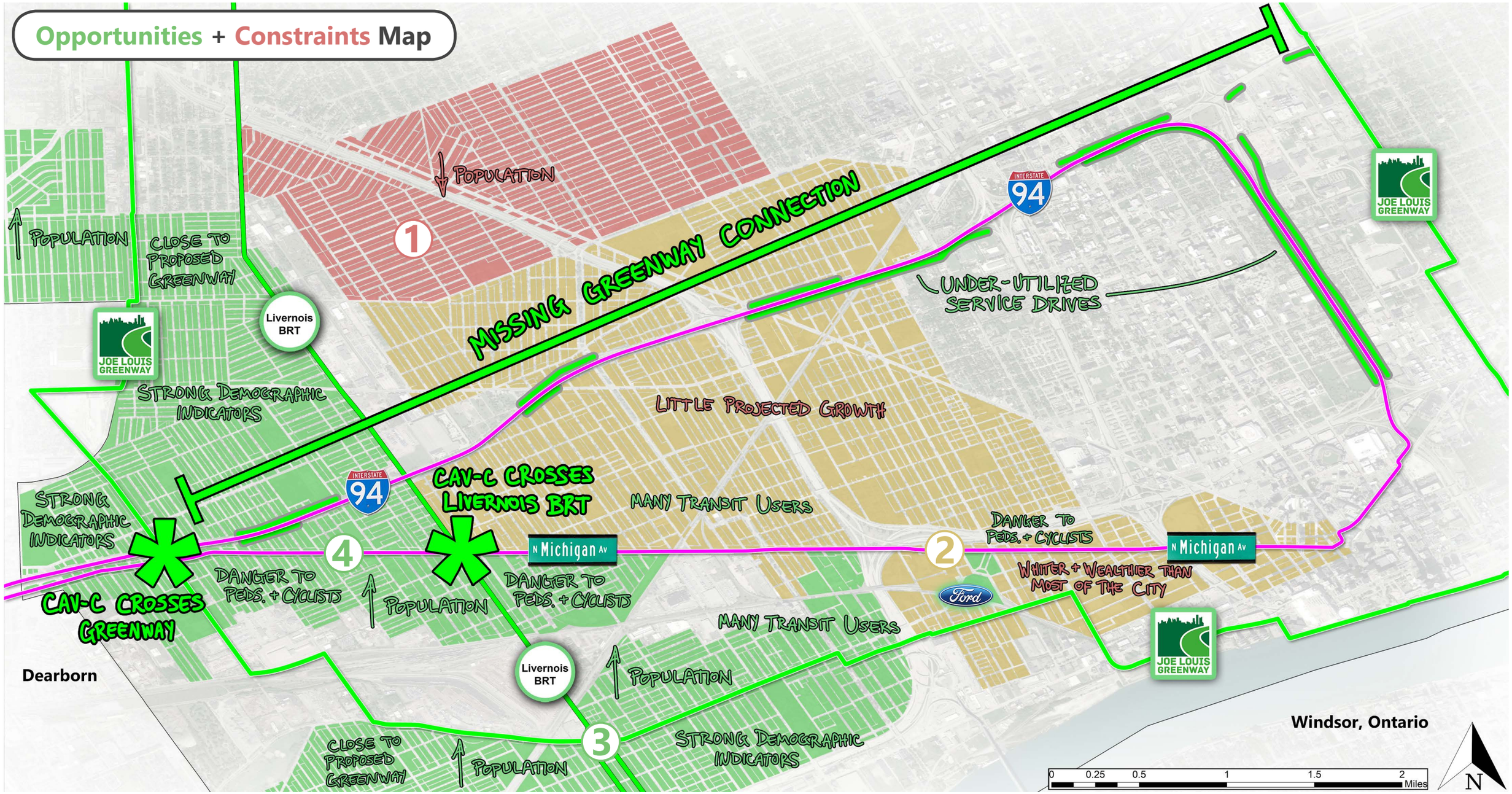
1. The red area to the north of Interstate 94 is expected to continue shrinking for the foreseeable future and would thus offer limited ridership to support mass transit infrastructure.

2. The yellow area encompassing Corktown could use pedestrian and cycling improvements, but its residents comprise one of the wealthiest neighborhoods in the city, undercutting its deservedness for public investment from a needs based perspective. This zone will house Ford's future mobility campus, and it encompasses the scope of MDOT's PEL Study, the only CAV-C implementation strategy yet to secure consideration. The rest of the yellow area northwest of Corktown is unlikely to experience significant population growth, but its high proportion of transit users could still justify regional transit integration.

Opportunities

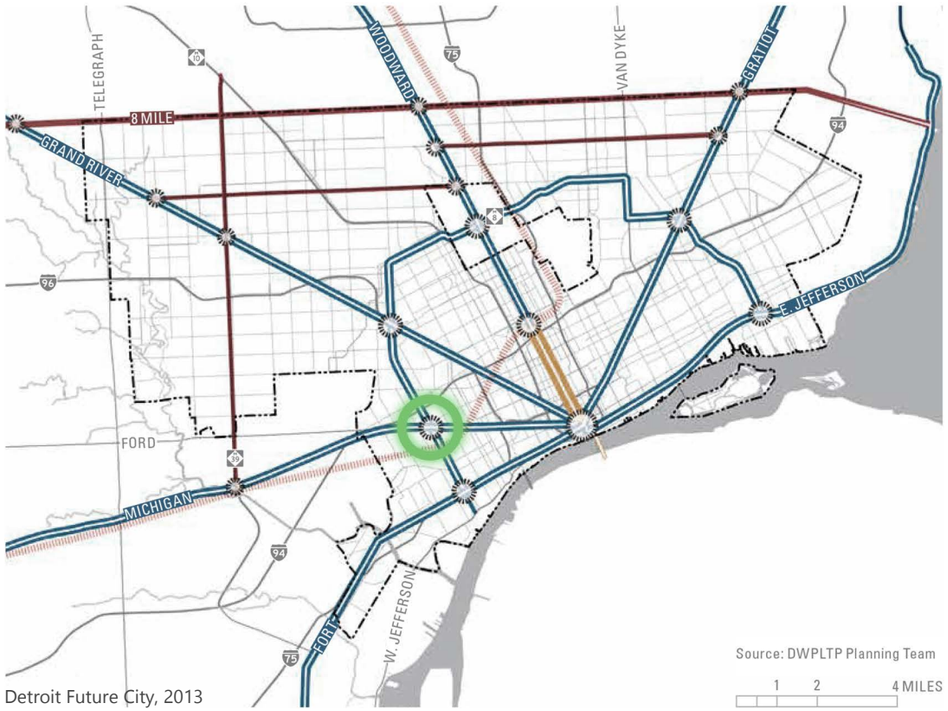
3. Highlighted in green, Southwest Detroit is the fastest growing neighborhood in the city and is slated to gain greenway and BRT connections to the CAV-C routes.

4. The green areas to the west represent the greatest opportunity for transportation investment. The area is projected to grow, it is the most dangerous for pedestrians and cyclists, and most of its Black and Hispanic neighborhoods are within the 95th-100th percentile of low-income population makeup within the U.S. Further, where the proposed I-94 and Michigan Ave CAV-C routes traverse this part of Detroit will incorporate the slated Joe Louis Greenway and proposed Livernois BRT intersections. Thus, the segment offers an opportunity to incorporate key multimodal nodes that take advantage of the diverse range of mobility infrastructures designated for implementation.


Opportunities + Constraints Map
Population
Close to Proposed Greenway
Livernois BRT
Joe Louis Greenway
Strong Demographic Indicators
Missing Greenway Connection
Interstate 94
Under-utilized Service Drives
Little Projected Growth
CAV-C Crosses Livernois BRT
Many Transit Users
Danger to Peds. + Cyclists
N Michigan Av
Whiter + Wealthier than Most of the City
Ford
CAV-C Crosses Greenway
Dearborn
Windsor, Ontario
1
2
3
4
0 0.25 0.5 1 1.5 2 Miles
N

Intervention I: Michigan + Livernois Hub

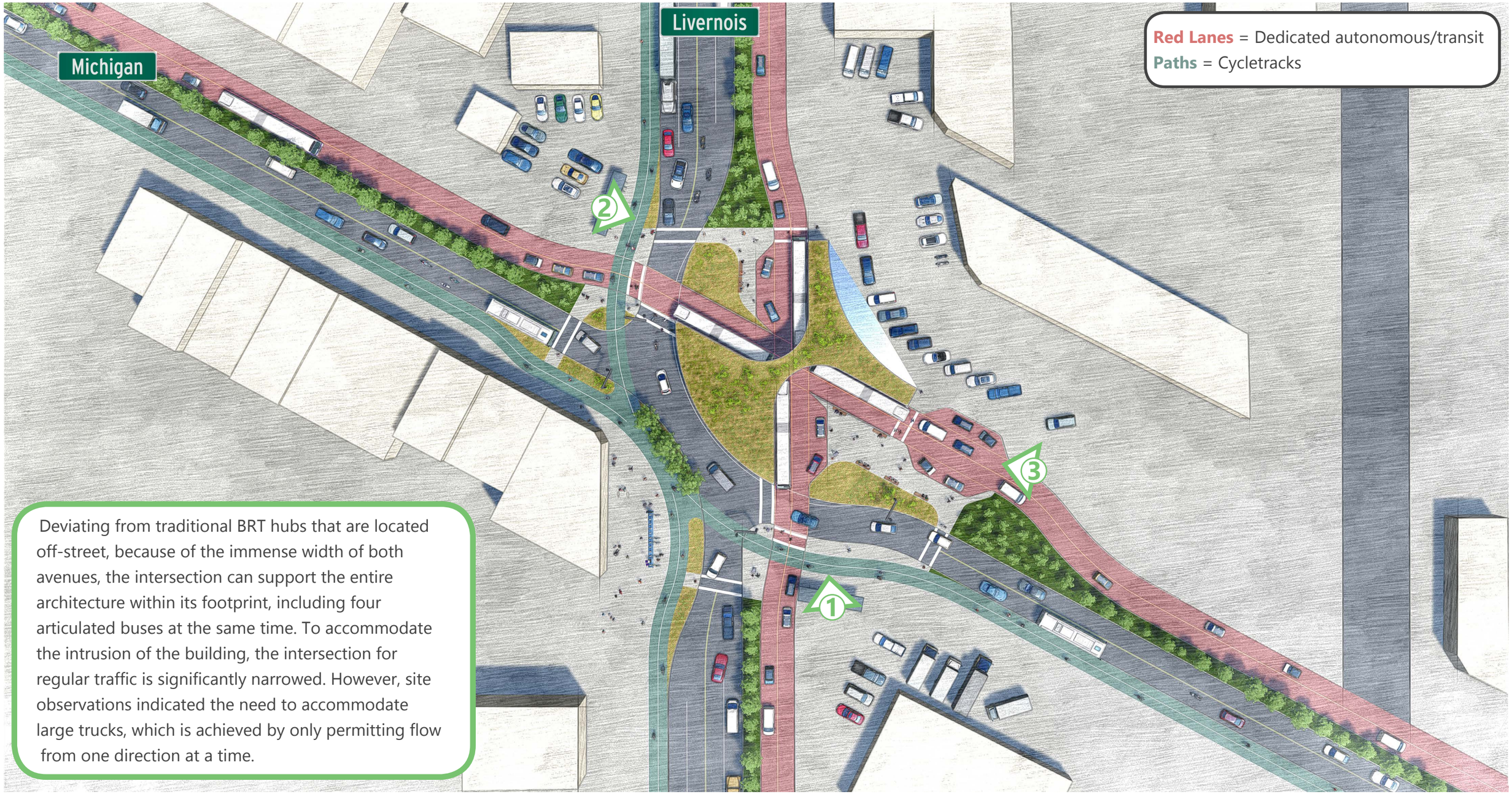
The first intervention for this project involves the design of a new bus rapid transit hub that capitalizes on the opportunities afforded by CAV roadways.



Detroit Future City, 2013

Located on the site of Detroit Future City's proposed Michigan and Livernois transit node [11], the intersection will facilitate transfers between two autonomous transit routes and other mobility options.

Existing Conditions



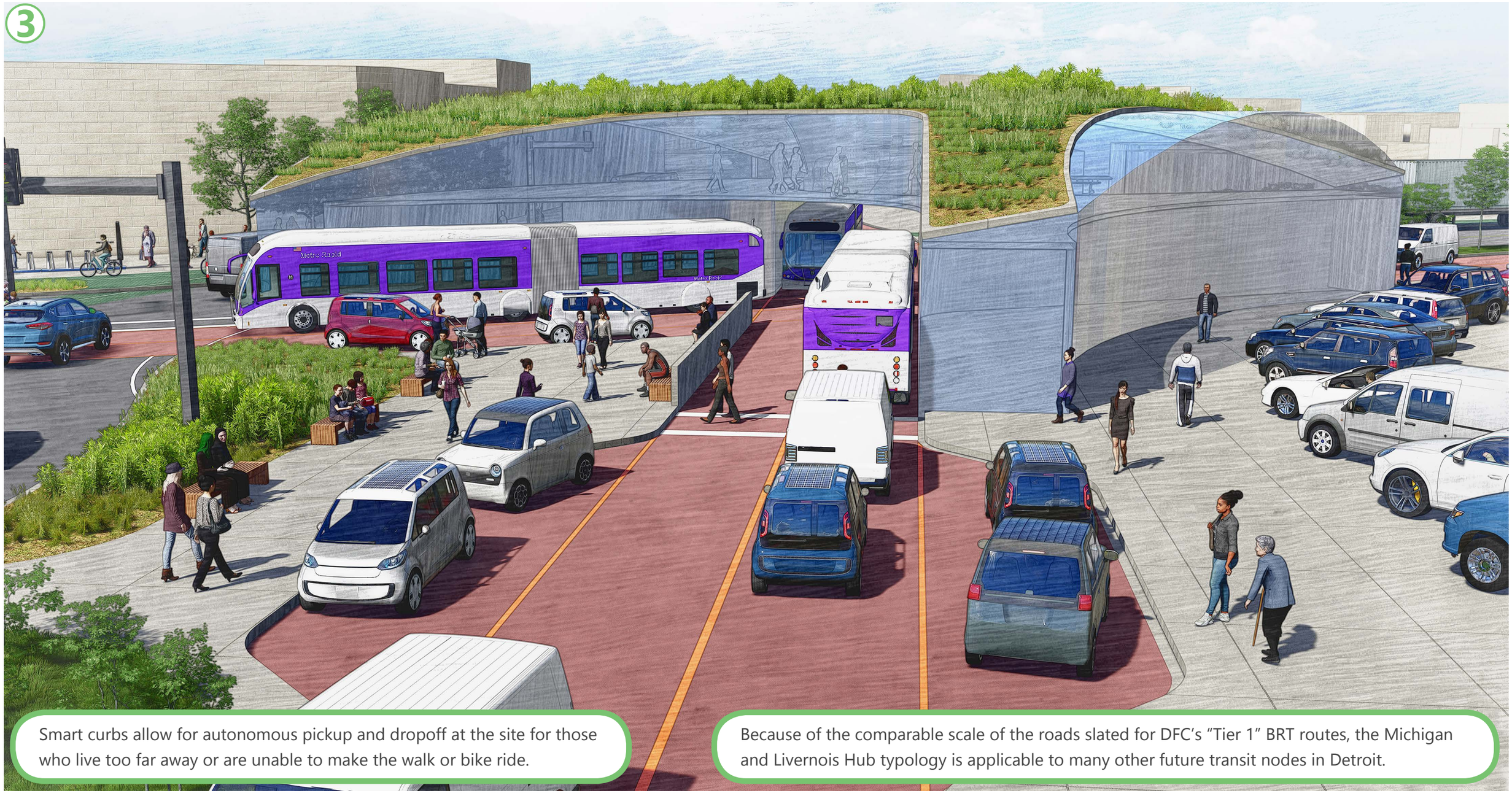
Deviating from traditional BRT hubs that are located off-street, because of the immense width of both avenues, the intersection can support the entire architecture within its footprint, including four articulated buses at the same time. To accommodate the intrusion of the building, the intersection for regular traffic is significantly narrowed. However, site observations indicated the need to accommodate large trucks, which is achieved by only permitting flow from one direction at a time.


①
Taking inspiration from the success of enclosed BRT stations first deployed in Curitiba, Brazil, the hub allows passengers to wait indoors, improving the system's appeal during cold Detroit winters. The "opposing boomerang" platform layout allows both BRT lines to share platforms and creates only one elevated crossing point for all four directions of travel.
Intelligent traffic signaling coordinates adaptive timing to facilitate a hierarchy of modal prioritization: from pedestrians, to cyclists, to autonomous/transit vehicles, and lastly, normal traffic.

2

Despite converting each avenue into two separate roadways, the layout provides space for widened sidewalks and planted medians by eliminating unnecessary lanes.

Cycle tracks along each avenue improve bicycle safety and access for the surrounding neighborhoods and encourage transit riders to use personal mobility options for their first and last mile journeys to and from the station.


3
Metro Rapid
Smart curbs allow for autonomous pickup and dropoff at the site for those who live too far away or are unable to make the walk or bike ride.
Because of the comparable scale of the roads slated for DFC's "Tier 1" BRT routes, the Michigan and Livernois Hub typology is applicable to many other future transit nodes in Detroit.

Intervention II: Lonyo Connection

The second intervention is located between the intersections of Lonyo Street with Michigan Avenue and Interstate 94.

The connection ties together the planned Joe Louis Greenway [29] with DFC's proposal for carbon forest buffers along the freeway [11].

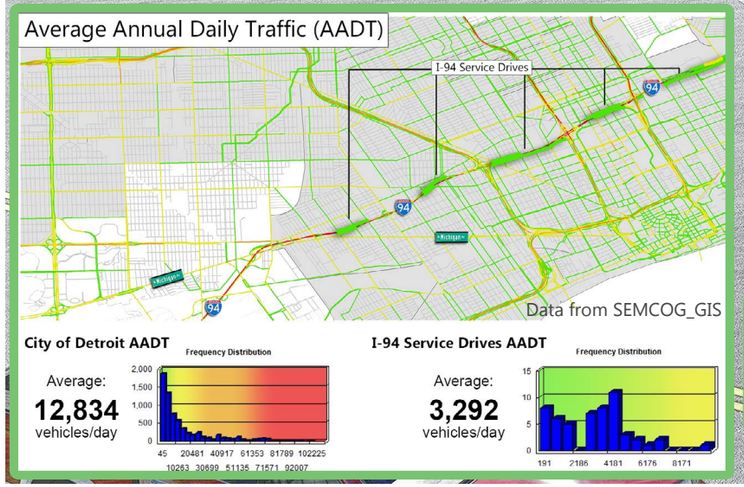
Detroit Future City, 2013

Existing Conditions

The I-94 BRT stations have their own lanes so that other autonomous traffic can bypass buses stopped for boarding. In accordance with Detroiters' stated opposition to freeway widening, these short additional autonomous lanes under overpasses make up the only required expansion of I-94's footprint.

①

Detroit is full of frontage roads typically named “service drives.” The I-94 Service Drives are consistently underutilized, with average annual daily traffic around a quarter of the city’s overall average.



Service drives can be reclaimed to provide a useful wooded greenway connection that bisects the Joe Louis Greenway loop. They will also provide non-motorized access to the CAV-C transit stops located along the I-94 freeway segment.


2
The I-94 BRT stop utilizes freeway running platform islands for both directions with elevator and stair access to the overpass and greenway above.

Thanks to its location near where Michigan Ave crosses I-94, the Lonyo Connection allows transit riders to transfer between the freeway and non-freeway segments of the CAV-C BRT routes. Within a regional transit framework, this equates to switching between express and local service on I-94 and Michigan Ave respectively.

Discussion + Conclusion

Reflection

The Sauk Trail East project set out to consider potential impacts on regional access surrounding the world's first public connected autonomous vehicle corridor (CAV-C) proposal in Detroit, where residents have faced severe historic and ongoing issues surrounding transportation inequality. With the goal of balancing social, environmental, and economic equity, this urban mobility research and design study promotes one conceptual typology's potential to relink Detroit communities via changes to land use, expansion of modal choice, and division of intermodal prioritization.

To determine the most pressing factors at stake in Detroit's regional transportation context, background research examined the metropolitan area's fraught development, transportation, and community engagement histories. The evident narratives together indicate a century-old pattern of top-down, exclusionary systematic processes that have, with few exceptions, disproportionately suppressed Black residents' physical and civic autonomies. Contemporary studies of Detroiters' stated mobility needs demonstrate that few residents have realized adequate access within the region, and many respondents and interviewees perceive they are not sharing in the limited scope of increasing redevelopment within the city. Indeed, geographic analyses of transportation and land use data illustrate a stark gap in the distribution of key mobility services across demographically segmented areas surrounding the proposed CAV-C routes. Existing, overlapping community-informed plans developed by Detroit Future City and the Detroit Greenways Coalition indicate an authoritative framework for Detroit's path forward towards establishing comprehensive regional access. These critical findings comprise the foundation for Sauk Trail East's proposed design interventions.

The Michigan + Lonyo transit hub reimagines local-scale modal hierarchy for the integration of CAV-C into a typical Detroit collector road (Michigan Avenue). Taking advantage of the inherent opportunities for autonomous operation afforded by the bus rapid transit (BRT) typology, the node aligns with Detroit Future City's proposed BRT framework [11] that establishes transfer points away from the current spoke-hub transit network with only one transfer node downtown. Automation further enhances BRT's utility, facilitating the design's small footprint and improved operational functionality via intelligent traffic signalling. The primary spatial objective was to redistribute the allocation of space away from vehicles to people in order to foster the more livable conditions Detroit residents have advocated for in public hearings. The community's priorities also informed the integration of cycle tracks, which increase alternative mobility capacity to boost network access to non-adjacent neighborhoods. The resulting proposal is an experimental BRT hub layout that could help catalyze a uniform mass transit system throughout the metropolitan region.

The Lonyo Connection shifts the intervention focus to regional-scale accessibility, establishing an interface between arterial BRT (Interstate 94), collector BRT (Michigan Avenue), and a statewide-connected greenway project (Joe Louis Greenway [29]). On the topic of transportation, Detroiters are vocal opponents of freeway expansion [24], an issue culturally grounded in the impacts of destructive freeway construction during the urban renewal era [5]. The project not only demonstrates a strategy for integrating CAV-C into I-94 without extensive widening, but also reclaims underutilized frontage roads along the interstate into a bisecting connection across the Joe Louis Greenway Loop [29]. The service greenways also enhance a Detroit Future City framework for highway forest buffers [11] that limit the spread of noise and emissions pollution from freeways into nearby neighborhoods. The resulting proposal illustrates CAV-C's potential for multimodal connectivity beyond the city and its surroundings.

Limitations

Implementing interventions as costly and consequential as those outlined in this project would first require much more research and several additional considerations. Due to time limitations and the COVID-19 pandemic, no project-specific community engagement was possible to inform the project's outcomes. Such a serious commitment would be irresponsible without direct participation by affected residents. Thankfully, the Michigan Department of Transportation has held virtual public hearings throughout its Michigan Avenue PEL Study process. Time constraints also limited the scope of the interventions to one small section of the corridor. While this project recommends prioritizing this area, it would be unwise to break ground without establishing comprehensive plans to improve equity and access along the entire corridor.

Other issues remain unsolved by this effort. The most important transportation issue for the majority of Detroiters remains lowering the city's auto insurance rates, which are the highest in the nation. Insurance companies have adopted redlining practices that raise the cost of coverage based on zip code rather than assessing an individual's risk. The practice has forced half of the city's residents to drive uninsured, which reinforces a feedback loop that further raises rates. No planning initiative should mandate what mode of transportation people use, so the barriers to car ownership for Detroiters unquestionably need to be removed. The improvements proposed in this project also carry the risk of displacing residents due to gentrification. The Atlanta Beltline project has demonstrated the potential for new public amenities to dramatically increase adjacent home values, yet the initiative is still cited as a case study for Detroit's proposed Joe Louis Greenway. At a minimum, measures to increase the city's affordable housing stock and help homeowners manage property tax obligations would need to be enacted alongside the improvements.

Lastly, Detroit is not currently in the best financial position to make such a bold investment in its infrastructure. The city is still managing its fully expanded 139 square miles with only about one third of its peak population, and thus inadequate property tax revenue. However, given the futuristic nature of the CAV-C proposal, other stakeholders may be willing to invest in its implementation. The state of Michigan has a major stake in the project's success. AV developers need autonomous roadways for large scale deployment. Additionally, the U.S. Department of Transportation is shifting its priorities away from traditional roadways to increase funding for transit and bicycle infrastructure.

Lessons Learned

Regardless of what designs ultimately reach construction, this project offers critical learnings that any involved planner should acknowledge:

- Approach CAV-C primarily as a driver for transit feasibility rather than as the imminent transportation technology of tomorrow.
- Focus project implementation where access and mobility needs are highest first.
- Integrate and advance contemporary plans that already represent Detroiters' hopes for the city's future.

References

1. “Heritage Trail Story.” U.S. 12 Heritage Trail, Southwest Michigan Planning Commission, 6 May 2015, www.us12heritagetrail.org/us12story.asp
2. Castle, Collin. “Scope of Service for Specialty Services: Connected and Automated Vehicle Corridor (CAV-C) Concept.” MDOT, Michigan Department of Transportation, Jan. 2020.
3. Cavnue. Cavnue Michigan RFP Response. Sidewalk Infrastructure Partners, 2020.
4. Michigan, MDOT Studies. Michigan Avenue Planning and Environmental Linkages Study, Michigan Department of Transportation, 2021.
5. Boyd, Herb, et al. Black Detroit: a People’s History of Self-Determination. Harper Collins Publishers, 2018.
6. Thomas, June Manning, and Henco Bekkering. Mapping Detroit: Land, Community, and Shaping a City. Wayne State University Press, 2015.
7. “139 Square Miles Report.” Detroit Future City, Inland Press, July 2017, detroitfuturecity.com/wp-content/uploads/2017/08/DFC-139-Square-Miles-Report-FINAL.pdf
8. United States, Congress, Urban Mass Transportation Administration, et al. Public Transportation Alternatives Analysis in Wayne/Oakland/Macomb Counties: Environmental Impact Statement, vol. 1, U.S. Department of Transportation, 1979, pp. 31–76.
9. Goetz, Mario. “A Dream Derailed: Public Transit Policy in Southeast Michigan Late 1960s-Early 1980s.” Edited by Matthew Lassiter, University of Michigan Library, University of Michigan, 1 Apr. 2015.
10. Grabar, Henry. “Detroit Has America’s Worst Transit System. And It Now Has a Chance to Fix It.” Slate Magazine, Slate, 7 June 2016.
11. Detroit Future City: 2012 Detroit Strategic Framework Plan. 2nd ed., Inland Press, 2013.
12. “2016 Regional Master Transit Plan.” Regional Transit Authority of Southeast Michigan, Aug. 2016, secureservercdn.net/198.71.233.44/tng.f93.myftpupload.com/wp-content/uploads/2021/02/2016-Regional-Master-Transit-Plan.pdf
13. Admin, and Steven Wiltse. “Mapping the RTA Vote.” Motor City Freedom Riders, 6 Dec. 2016, motorcityfreedomriders.org/2016/12/06/mapping-the-rta-vote/
14. “Mobility-Oriented Development Study Rail Corridor Mobility Gap Analysis.” Regional Transit Authority of Southeast Michigan, Sept. 2020.
15. Arnstein, Sherry R. (1969) ‘A Ladder Of Citizen Participation’, Journal of the American Planning Association, 35: 4, 216 — 224
16. Thomas, J.M. (1996). ‘Model Cities revisited: Issues of race and empowerment’, Urban planning and the African American community: In the shadows (pp. 143-65). Thousand Oaks, CA: Sage.
17. Shaw, T. C., & Spence, L. K. (2004). Race and Representation in Detroit’s Community Development Coalitions. The ANNALS of the American Academy of Political and Social Science, 594(1), 189–192.
18. Oakley, Deirdre & Tsao, Hui-Shien. (2006). A New Way Of Revitalizing Distressed Urban Communities? Assessing the Impact of The Federal Empowerment Zone Program. Journal of Urban Affairs. 28. 443 - 471.
19. Griffin, T.L.; Cramer, D.; Powers, M. Detroit Works Long-Term Planning Project: Engagement Strategies for Blending Community and Technical Expertise. Buildings 2014, 4, 711-736.
20. Gerber, Elisabeth, et al. “Detroiters’ Views on Transportation and Mobility.” Poverty Solutions, University of Michigan, 2017.
21. “Public Outreach Report 2045 Regional Transportation Plan.” SEMCOG, Southeast Michigan Council of Governments, Oct. 2017.
22. Bernasconi, Claudia, et al. “Understanding Public Opinion Regarding Transit in Southeast Michigan.” Mineta National Transit Research Consortium, United States. Dept. of Transportation. Office of the Assistant Secretary for Research and Technology, 1 Apr. 2015.
23. “Brush Park Planning and Form-Based Code Public Meeting No. 1 Summary.” Detroit Planning and Development Department, City of Detroit, May 2017.
24. “I-94 Public Hearing Exhibit Boards and Roll Plots.” I-94 Detroit, Michigan Department of Transportation, Oct. 2019.
25. Witsil, Frank. “Metro Detroit’s Poverty Gets Worse despite City’s Comeback.” Detroit Free Press, Detroit Media Partnership, 27 Apr. 2018, www.freep.com/story/news/local/michigan/detroit/2018/04/26/detroit-poverty-getting-worse/553439002/
26. Reese, Laura A., and Gary Sands. “That Detroit Recovery? In Some Ways, the City Is Worse off than in 2010.” MarketWatch, Dow Jones & Company, 11 Feb. 2017, www.marketwatch.com/story/that-detroit-recovery-in-some-ways-the-city-is-worse-off-than-in-2010-2017-02-08
27. Kirshner, Jodie Adams. Broke: Hardship and Resilience in a City of Broken Promises. St. Martin’s Press, 2019.
28. Reese, Laura & Eckert, Jeanette & Sands, Gary & Vojnovic, Igor. (2017). “It’s safe to come, we’ve got lattes”: Development disparities in Detroit. Cities. 60. 367-377.
29. “Request for Proposals Joe Louis Greenway Framework Plan Project.” Detroit Economic Growth Association, City of Detroit, 2 Oct. 2018.