Reimagining I-94

A REPORT ON REPARATIVE HIGHWAY ALTERNATIVES & EVALUATION METRICS

our streets

Our Team

Contributors

Our Streets

Our Streets works to put people first by transforming transportation and infrastructure in the Twin Cities and at the state level. We do this by making our streets places where people can easily and comfortably walk, bike, roll, and use public transit.

Toole Design Group

Toole Design is committed to designing and building spaces where people can move freely and intuitively, enjoying the experience and becoming a part of the community instead of just moving through it. Our success is built on collaborative partnerships with our clients, and thinking that goes beyond conventional solutions. For 20 years, we've transformed the way people move, and helped communities thrive.

Visible City

Visible City is a geospatial data consulting and management organization, focused on leveraging the expanding universe of fast-moving data for public and private clients. The firm's team of professionals combine expertise and passion in urban economics, statistics, community development, and high-volume data processing and application development to improve life in the world's cities.

Smart Mobility

Smart Mobility, Inc. is a transportation planning and modeling firm founded in 2001 and based in Thetford, Vermont. Smart Mobility has completed transportation projects in over 30 states for a wide range of clients including state Departments of Transportation, Metropolitan Planning Organizations, Cities, transit agencies, and public interest groups.

Contents

Executive Summary

This report explores highway removal options to inform the Rethinking I-94 process.

Rethinking I-94 is the Minnesota Department of Transportation's (MnDOT) initiative to address the deteriorated condition of I-94 between Hiawatha Avenue in Minneapolis and Marion Street in Saint Paul. At this time, MnDOT is evaluating ten high-level alternatives for the future of the I-94 corridor. Two of the alternatives would remove the highway and replace it with a ground level (at-grade) multimodal boulevard that includes dedicated bus lanes and bike lanes.

The goal of this report is to fill in information gaps and provide more context about highway removal. This report informs the community about how removing I-94 would work, what it might look like and what the community benefits would be. It also provides recommendations to ensure that highway removal options are evaluated accurately and fairly by MnDOT.

Highway removal is a proven solution for addressing multiple related problems. A multitude of harms resulted from building highways through urban neighborhoods. Many urban highways, including this segment of I-94, were constructed in the 1960s and 1970s and are reaching the end of their useful lives.

Highway removal is an increasingly common way to address these aging roadways as people recognize that urban freeways are not essential to an efficient, healthy and equitable transportation system. Highway removals in the US have been highly successful, improving transportation access, reconnecting communities, reducing human health and environmental harms, and strengthening local economies. Some cities, like Rochester, NY and Oakland, CA, are planning to remove additional highway segments after firsthand experiences with successful removal projects.

Most trips on I-94 are short and local. There are more than 120,000 vehicles per day on this section of I-94, but a great majority of trips on I-94 are local, using the highway only for short distances. However, motorists are drawn to use the highway because it provides a convenient option and may save them a few minutes.

People make travel choices about where they are going and how they will get there based on the infrastructure available to them. I-94 is used because it exists, not because it is necessary. If the highway is removed, people will instead successfully rely on local streets for local trips, using the reconnected street network.

The models being used to study alternatives are not reliable and should not be used to predict congestion and travel times. MnDOT uses a travel demand model to assess how the different alternatives for I-94 might perform.

At its best, travel demand modeling provides insights on how changes in land-use and transportation will play out into the future. In reality, the model used to evaluate alternatives in the *Rethinking I-94* process uses techniques developed more than 40 years ago, and will not accurately reflect how people will adapt to life after the highway. The results provided by the model will be misleading, and should not be used for such an important decision unless the model is dramatically improved.

Urban highways were originally built to combat congestion, but the reality is that highways attract motorists and become congested. When highway expansion occurs, new highway users are attracted, and congestion quickly returns. Models like the one being used by MnDOT do not reflect this behavior, which is readily observed in cities across the US. Nor will the model accurately show how people adapt to a highway removal.

An I-94 boulevard conversion will look different in each neighborhood. We all know what freeways look like, sound like, and how they make us feel. However, it is not easy for most people to visualize what a multimodal boulevard or street that has replaced a highway would look like.

This report provides visualizations to demonstrate how an at-grade alternative would work, and what it would be like to live, walk or bike alongside or across it. There will also be economic benefits brought forth by repurposing the land formerly occupied by I-94, which are quantified and described.

Reimagining I-94 has enormous potential for providing space for new housing, businesses and parks. Replacing I-94 with an attractive multimodal street and restored local street network will create huge benefits for the cities of Minneapolis and Saint Paul, their neighborhoods and the region as a whole.

Less traffic, noise and air pollution will improve the health and well-being of corridor residents. People will more easily travel between neighborhoods north and south of I-94. Of great significance is the redevelopment potential of the land now occupied by I-94, which could be used for new housing, businesses and parks.

***Rethinking I-94* is a political decision, not an engineering decision.** The choice among *Rethinking I-94* alternatives is not an engineering decision, but rather one that must reflect the values of the people of the Twin Cities.

The highway is not necessary for the Twin Cities to thrive, and if it is rebuilt or expanded, the myriad harms from the highway will continue. If the highway is removed, significant benefits will accrue.

The Twin Cities have an opportunity to set a national example, but changes are needed to ensure *Rethinking I-94* is a truly reparative project. This report provides recommendations to advance a reparative, equitable process to consider the future of I-94. These recommendations include:

RECOMMENDATION 1

Ensure That Community Needs Come First in Project Evaluation

People in the neighborhoods surrounding the highway have suffered years of serious negative consequences from the highway, and addressing these harms must be a foremost goal in comparing the alternatives.

RECOMMENDATION 2

Create a cross jurisdictional working group to implement anti-displacement and community benefit benchmarks

MnDOT should create a cross jurisdictional working group specifically focused on evaluating and advancing such policies. This should be done in partnership with local community members, organizations and institutions.

RECOMMENDATION 3

Add a "restored network" option to the studied project alternatives

A restored option has a few key benefits. It maximizes the opportunity to repurpose land for new housing, businesses, parks and other neighborhood amenities.

RECOMMENDATION 4

Fix inaccurate travel demand models

Evaluate the alternatives with a travel demand model that accurately shows how people adapt to change in highway capacity - including expansions and removals.

RECOMMENDATION 5

Incorporate land-use changes into future transit ridership modeling

To make a fair and accurate comparison among the options being studied, consider the full range of benefits that a highway removal can bring, including the potential for new housing and jobs.

RECOMMENDATION 6

Extend the Project Area to connect into the downtowns and add a portion of Highway 280

The project limits should not end at the highway, because no trip begins or ends on a highway. Based on the analysis of trip origins and destinations, it is clear that access and connectivity into both downtown Minneapolis and Saint Paul, and changes to Highway 280 should be priorities.

RECOMMENDATION 7

Create a working group on highway conversion projects

Similar to MnDOT's working group to explore issues with land bridges, freeway caps, and other similar concepts, a working group on highway removal projects should be convened.

RECOMMENDATION 8

Improve transparency and community engagement

MnDOT, the Federal Highway Administration and local government partners should take into account input from the public, especially from those who are most affected by I-94.

SECTION 1

Project Overview

What is Rethinking I-94?

Rethinking I-94 is a yearslong process led by the Minnesota Department of Transportation (MnDOT) to plan the future of the I-94 corridor through and between downtown Minneapolis and downtown Saint Paul.

The freeway's pavement, bridges and retaining walls are nearing the end of their useful lives. The *Rethinking I-94* project reviews conditions along the I-94 corridor, develops and evaluates alternatives, and then plans a program of projects to address the needs. The process is guided by the National Environmental Policy Act (NEPA) and is being done in phases.

The process began in 2016 with a Phase 1 report that reviewed the corridor from West Broadway Avenue in Minneapolis to Highway 61 in Saint Paul. However, the project boundaries were later narrowed to the segment of I-94 between Hiawatha Avenue (Highway 55) in Minneapolis and Marion Street in Saint Paul.

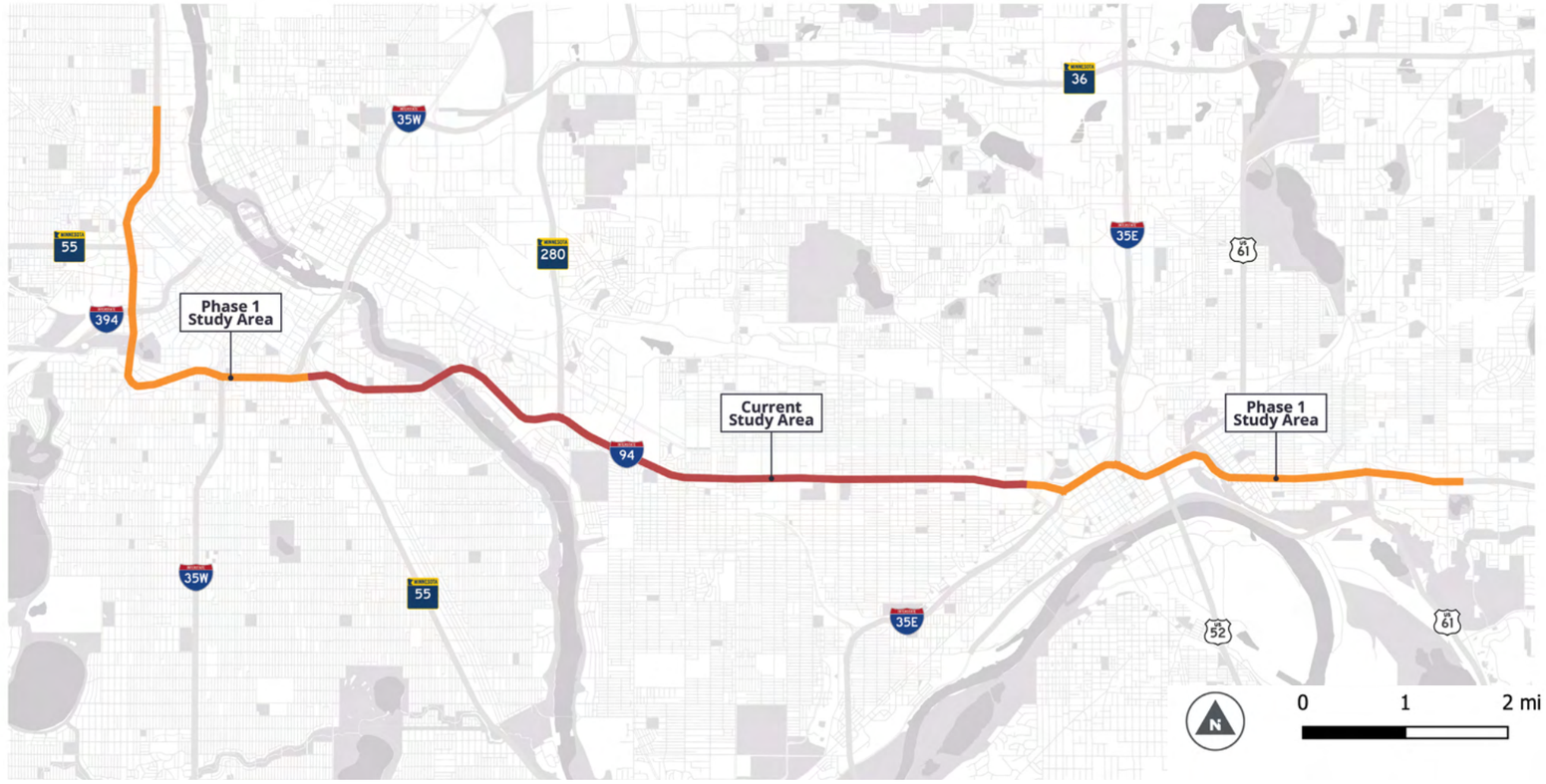


Figure 1. The current boundaries of MnDOT's Rethinking I-94 study (red) juxtaposed with the previous, larger boundary from the Phase 1 report (orange).

What Is The Purpose Of This Report?

The Rethinking I-94 project is one of the most consequential infrastructure projects in Twin Cities history, and will impact multiple generations.

It is critical that the options that remove and repurpose the highway are fairly considered. The evaluation process and public discourse must encompass the full scope of the highway's impact and community priorities, beyond traditional highway planning metrics that narrowly focus on vehicle capacity.

As of March 2024, MnDOT is considering ten project alternatives. Two of the alternatives are "at-grade" options, which would remove the highway and replace it with an at-grade, multimodal street with signalized intersections. The other eight would repair and rebuild the highway trench in various forms, including expansion.

While it is appreciated that highway removal options are included in MnDOT's alternatives analysis, the *Rethinking I-94* process to date has shown that MnDOT does not appear to be heading on a path to prepare more robust boulevard concept designs and evaluate multimodal boulevard alternatives.

This report aims to ensure that affected communities and elected decision makers have the necessary information to imagine what an I-94 boulevard conversion would look like, how it would work, and the full range of benefits and impacts it could bring to their lives.

Our Streets commissioned this report to address the following concerns about the execution of the *Rethinking I-94* project:

CONCERN 1

FATAL FLAW DEFINITION

At this time, MnDOT is evaluating ten project alternatives. If any are deemed to have a "fatal flaw," they will be eliminated. However, **no clear definition of a fatal flaw is provided, but one is needed.** A transparent and open evaluation process is required to ensure trust and transparency.

CONCERN 2

EVALUATION METRICS PRIORITIZE CAR AND TRUCK TRAFFIC

The evaluation criteria that will be used in **the Scoping Decision Document (SDD) are outdated and have an intrinsic bias toward alternatives that would increase roadway capacity.** Performance measures that focus on travel time and congestion are prioritized, while those that focus on community values such as improving air quality, providing gathering places, and reconnecting neighborhoods, are simply rated as "yes/no" and do not capture the wide-ranging social benefit of the at-grade alternatives.

This report will suggest evaluation methods that will be **comprehensive, fair and responsive to the desires of affected communities.**

CONCERN 3

DEFINITION OF PROJECT AREA LIMITS

While the title "*Rethinking I-94*" suggests the project is taking a comprehensive approach, the project limits are constrained by a narrow study area of only ¼ mile on each side of the highway. Downtown Minneapolis and downtown Saint Paul lie just outside the project limits, even though many trips using I-94 are heading to or near downtown. ***Rethinking I-94* should expand its focus to include the street network connecting the two downtowns and the neighborhoods along the corridor.**

CONCERN 4

FLAWED MODELING

MnDOT's alternatives analysis is based on the Metropolitan (Met) Council's regional travel demand model and uses measures that prioritize vehicle speeds and travel time. However, speeds are not modeled accurately in the model used to evaluate the alternatives, being too high in some locations and too low in others. The metrics related to congestion and delay use the modeled travel speeds, making the results misleading, inaccurate and unreliable.

Another major problem with the traffic-related measures is that **the model does not use dynamic traffic assignment.** This is required to realistically model how travel behavior would change following a highway-to-boulevard conversion. MnDOT's ridership projections for the at-grade transit alternatives fail to consider land-use changes, ignoring how repurposing the highway land with new homes, businesses and attractions would grow transit ridership.

CONCERN 5

EFFECT ON THE LOWRY TUNNEL IS IGNORED

MnDOT first studied a larger corridor that stretched west beyond downtown Minneapolis and east beyond downtown Saint Paul before selecting the current smaller study area. The region's worst highway bottlenecks and safety issues are west of the proposed study area, particularly in the Lowry Tunnel. In MnDOT's words from the Phase 1 study of *Rethinking I-94*, "The Lowry tunnel is one of the acknowledged bottlenecks along I-94 that will require substantial economic resources to address."

The safety and congestion problems of the tunnel are real, and practical solutions are elusive. **The problems of the tunnel are most cost-effectively mitigated by reducing the volume feeding into it.** The at-grade project alternatives would accomplish this and should be reflected in MnDOT's evaluation criteria used in the alternatives analysis.

CONCERN 6

EVALUATION CRITERIA IGNORE POTENTIAL BENEFITS OF A BOULEVARD CONVERSION

MnDOT's presentation on the at-grade alternatives emphasized the potential for traffic congestion and did not acknowledge the benefits of a boulevard solution. MnDOT's analysis predicts that parallel arterials will see an increase in traffic volumes. While this is to be expected, **the static traffic model does not reflect real world phenomena of dispersion, reduced demand and mode shift.** Also not mentioned is that in the majority of locations analyzed, there is sufficient capacity to absorb this additional volume without causing congestion.

Further, MnDOT should evaluate the key benefits of a boulevard conversion on safety, accessibility, pollution and community health, greenhouse gas emissions, racial equity, and reclaimed land for new housing, businesses and neighborhood amenities.

SECTION 2

The Impacts of Interstate 94 in Minneapolis and Saint Paul

Highway History

Interstate 94 through the Twin Cities was first envisioned in the late 1940s as a city amenity that would alleviate congestion and speed up commutes for the boom of vehicle owners and suburban inhabitants that followed World War II.

I-94 would be part of the federal highway vision which promised speed, improved national defense and beautification. The Minnesota Highway Department (MnDOT's predecessor) and State Planning Agency favored the Los Angeles model of inner-city highways, in part due to prevailing ideas about the potential of highway construction to clean up neighborhoods considered "blighted," re-invigorate economic activity, and improve the city's image as a modern metropolis.

After the passage of the National Interstate and Defense Highways Act of 1956, federal aid paid for 90% of Minnesota's highway costs, and plans moved forward rapidly. Only two public hearings were held for I-94 and I-35 before the state began buying up homes and demolishing properties along the corridor in 1957.

In some neighborhoods, including Saint Paul's Black business and residential hub of Rondo, concerned citizens raised their voices early, but they were met with firm resistance. The wealthier white neighborhoods of Prospect Park and Merriam Park achieved minor adjustments in highway routing and ramps only after years of political activism. Overall, fighting the future highway was a pursuit available only to those with time and means.

Once I-94 reached west across the Mississippi river in 1965, the diverse residents of Cedar-Riverside were already wrapped up in resistance to urban renewal. Thousands of homeowners had recently been displaced by University of Minnesota expansion from 1957 to 1965. The University and developers welcomed the highway to bring employees and students to campus from the suburbs. Few understood the ramifications of a high-speed interstate in their neighborhood until it was too late.

> "My heart broke thinking of all that we had lost. History was gone. The cattle yards were industrial complexes. The train stop and station disappeared. We accepted this as part of the development of a new freeway system to give access to greater populations needing transportation.
>
> We adapted as our neighborhood lost its center and core identity. It's all held in memory."
>
> - Charlotte Berres, Merriam Park native

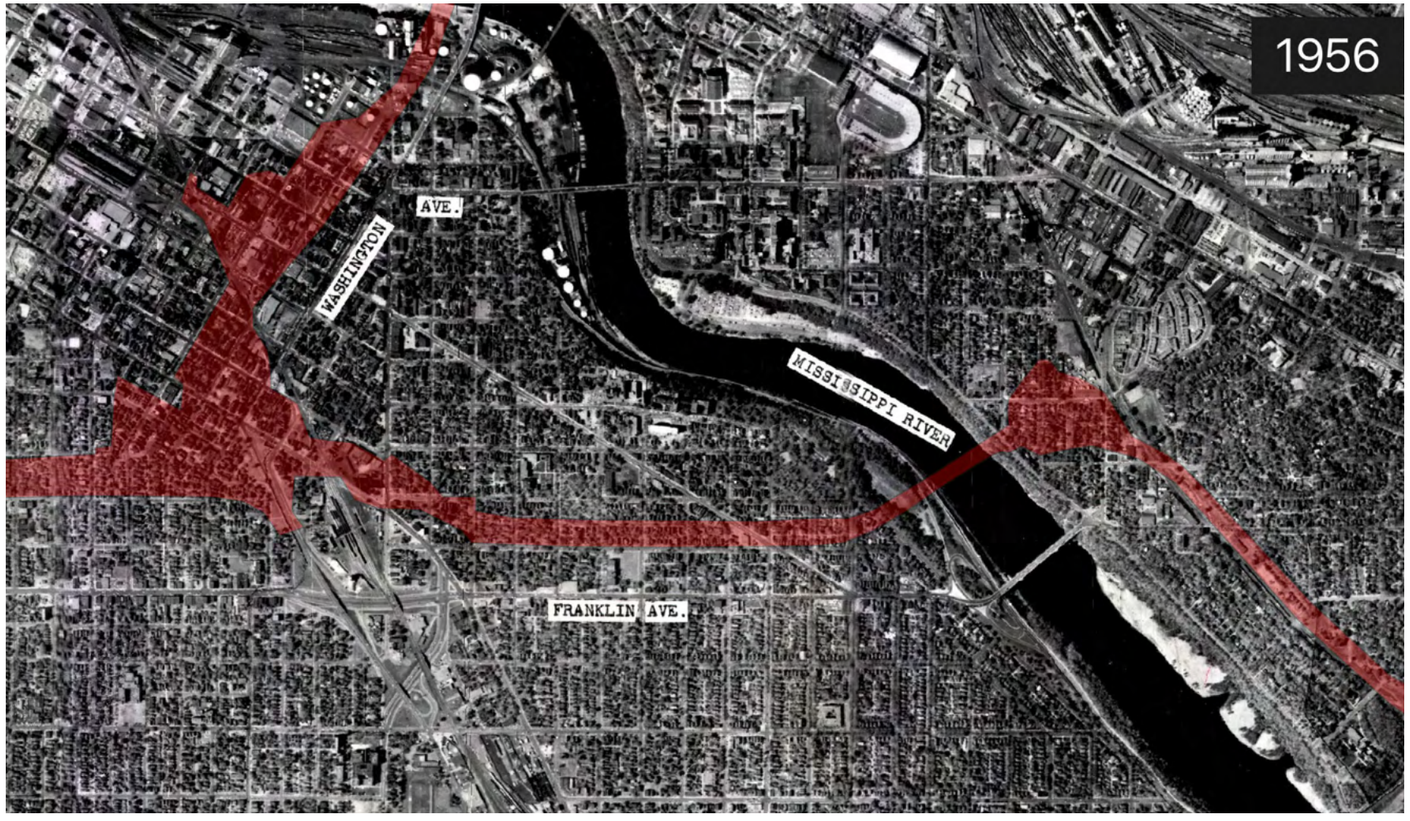


Figure 2. 1956 aerial of Cedar Riverside- future path of I-35 and I-94 in red. Source: University of Minnesota libraries and Michael Corey

Figure 3. 1966 aerial highway under construction through Cedar-Riverside. Source: Hennepin County Libraries.

> "We didn't know anything about the coming of I-94 until the Minneapolis Star and Tribune printed it in the paper...the I-94 plans they first had for the park would have destroyed what Glendale had."
>
> - Ann Munt, resident and social worker in Glendale Housing Development, from "Interstate I-94, A History and Its Impact" Twin Cities PBS, 2017

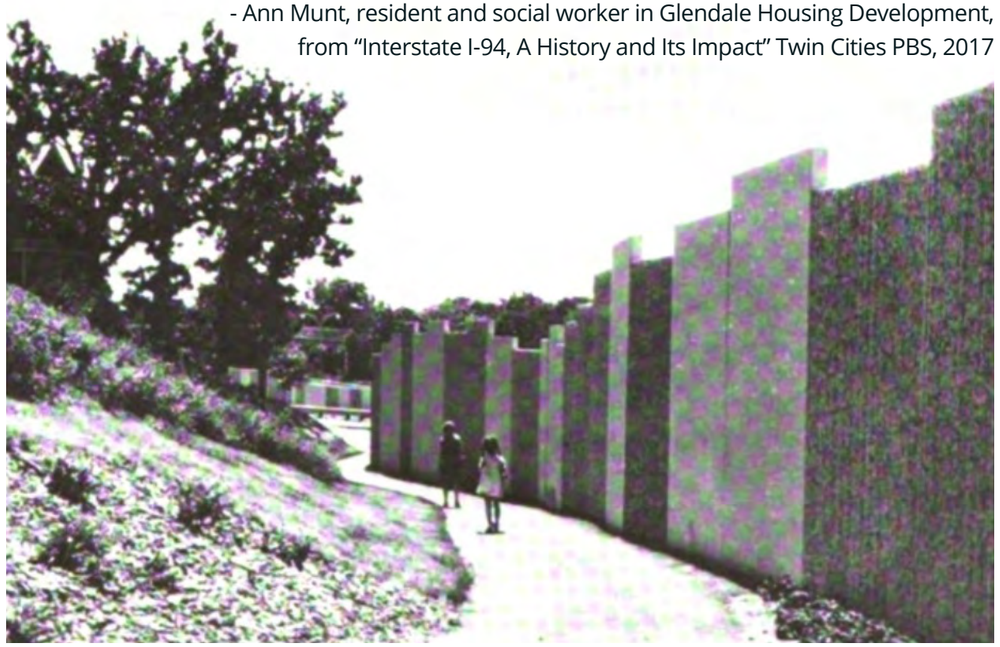


Figure 4. Concrete Noise Wall on I-94 in Prospect Park, Minneapolis Source: Minnesota Highways October 1974 - Haithi Trust.jpg

The path of the highway was supposed to follow "lines of desire" as indicated by highway studies and polls. However, the routing of I-94 through Rondo, Cedar-Riverside, Phillips, and North Minneapolis and the routing of I-35 through Minneapolis's Old Southside's Black neighborhood deviated from desire lines to intentionally displace communities of color.

As stated in the Home Owners Loan Corporation documents of 1936, a highway or ravine provided a perfect barrier between white (blue or yellow coded) and racially mixed neighborhoods (coded red for "at risk") and would preserve the property values of white areas.

The federal and state governments had entrenched legacies of red-lining and enacting racially restrictive housing covenants. The result was the displacement of thousands of residents, disproportionately low-income and people of color, who had limited options of where to move with the inadequate funds the state provided as compensation.

Communities were torn apart and made unsafe for pedestrian travel in order to ease the commutes of downtown workers and suburban families. New chain link fences and the noise and air pollution of new rivers of cars belied the scenic depictions shown on early highway propaganda.

The Highway Department's budget proposal for the interstate in 1952 included no money for sound walls. Only after the visual and sonic ramifications of the highways became evident were sound walls considered necessary. But sound walls served as inadequate protection and today are stark reminders of the loss of quiet city neighborhoods, residential vistas, pedestrian-friendly streets, parks, and playgrounds.

Figure 5. CUMN Pillsbury House undergoing demolition for I-35W in April 1968. Source: University of Minnesota Social Welfare History Archives

Highway destruction was shocking. Beginning in 1958, MDH hoped to condemn about 1,000 properties a year throughout the Twin Cities for freeway construction.[1] In total, the number of properties condemned or purchased for Twin Cities freeway construction ranges between 7,000 and 8,000, depending on the source.[2] [3]

Every school in Cedar-Riverside was displaced by the highway and related developments. Hundreds of homes and businesses in Rondo were bulldozed, a theft of generational wealth valued today in the tens of millions.

The human scale of each neighborhood bisected by I-94 was dramatically shifted to favor a tide of noisy vehicles flowing in a wide and dangerous concrete river.

> "I remember standing on the corner when they were tearing our house down, and tears were streaming down my family's faces.
>
> We didn't want to move."
>
> - Dee Dee Ray, Rondo native. "Interstate I-94, A History and Its Impact" Twin Cities PBS, 2017.

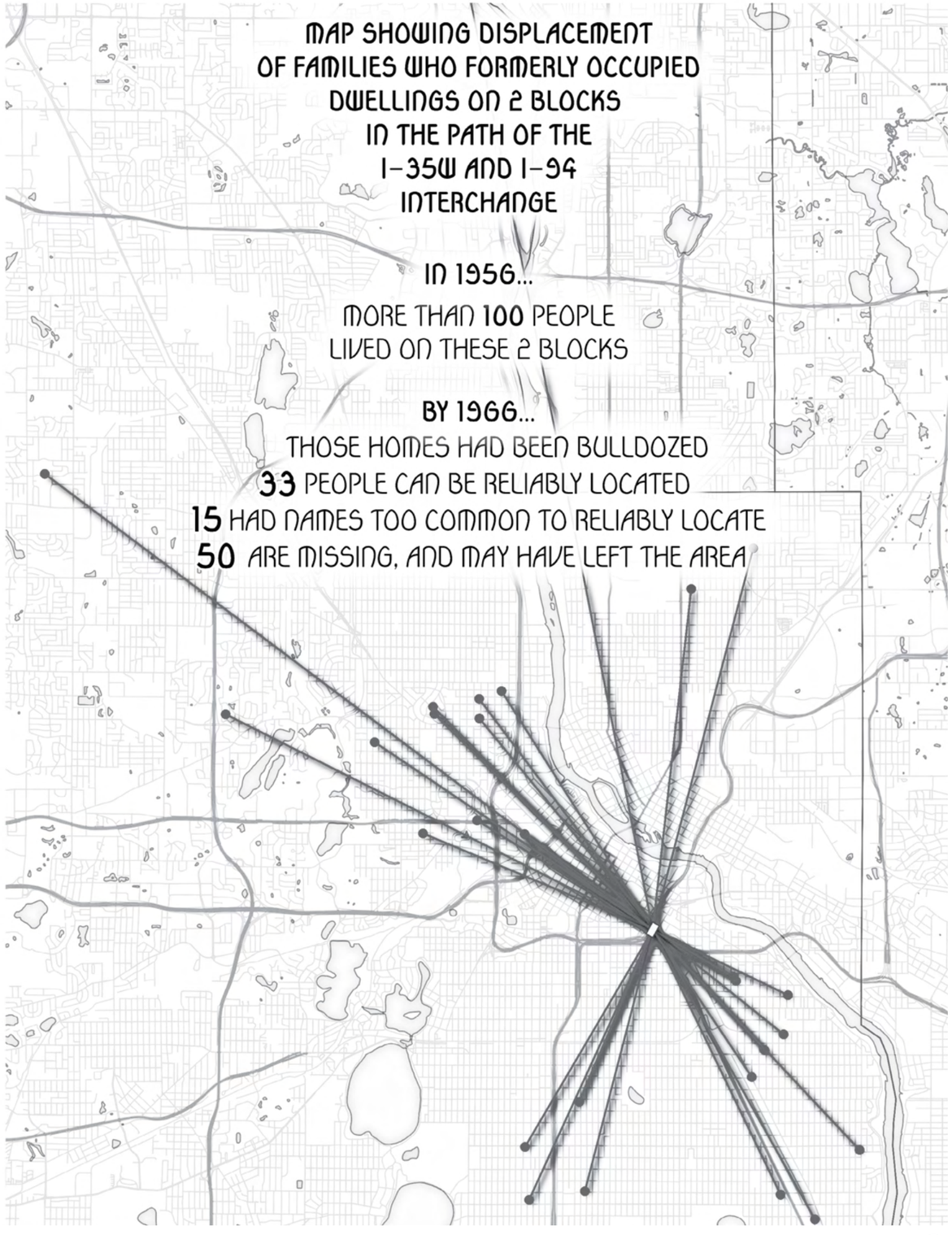


Figure 6. Cedar-Riverside displacement blocks. Source: Minneapolis City Directory, Sanborn Maps and Property Records, Michael Corey 2023

1 Humphrey Doermann, "Appeals Slow Freeway Cases," Minneapolis Star, Nov. 19 1958.
2 Humphrey Doermann, "Homeowner Can Act to Win Fair Sale to State," Minneapolis Star, Nov. 18, 1958.
3 "State OKs Direct Road Land Buying," Minneapolis Star, July 19, 1960, 18.

Ongoing Legacy

The impacts of I-94 have continued to this day. More than 60 years later, early promises of economic prosperity never came true.

Instead, these communities have endured decades of harmful impacts from the highway. Some of these impacts can be clearly seen, others are invisible. Added together, the result is that I-94 takes a daily toll on the well-being of the people who live, work and go to school nearby.

More than 50,000 people live within a half-mile of the *Rethinking I-94* project corridor. Air pollution in these communities is nearly three times worse than what is deemed unhealthy by the Minnesota Pollution Control Agency (MPCA). Highway traffic is listed as the biggest source of this pollution. Traffic pollution from tailpipes and tire wear is associated with higher rates of severe health impacts like asthma, cancer, heart disease, birth defects, dementia and premature death. Children who attend schools near freeways like I-94 have lower test scores. Noise pollution is linked with health impacts like stress, anxiety and hearing loss. These impacts are expected to be exacerbated by climate change, with extreme heat island effects and smoke from forest fires.

As was the case during I-94's initial construction, the highway disproportionately impacts the Black, Indigenous and people of color who live along the highway corridor. 94% of the project corridor has been identified by the MPCA as "an area of concern for environmental justice."

Access and Transportation

I-94 is a barrier that compromises the safety, accessibility, economy, and overall livability of the neighborhoods along its path by making smooth passage across the community impossible. 21.4% of residents along the corridor do not have access to a personal car and are reliant on other transportation options including biking, walking, and public transportation.

I-94's impact on low-emission transportation options has major implications for climate change. Transportation is the largest source of greenhouse gas emissions in Minnesota and a rapid reduction in driving is widely accepted as necessary to prevent the worst consequences of climate change.

Every year that the I-94 trench continues to exist is a tremendous missed opportunity to replace it with infrastructure that benefits, not harms, the surrounding communities. The highway occupies more than 284 acres or nearly half a square mile within the *Rethinking I-94* project area. This land generates no tax revenue that could be used to fund vital city services.

This is a significant opportunity cost. It costs hundreds of millions of public dollars to maintain the highway's pavement, retaining walls and bridges. It simply doesn't make sense to continue investing hundreds of millions of our tax dollars into an idea that doesn't work and provides limited benefits at a great cost to surrounding communities.

The *Rethinking I-94* project is our once-in-a-lifetime opportunity to reclaim the highway land and transform it into something that puts community needs first.

Who is impacted by I-94?

Of the 51,075 residents who live within a half mile of the highway corridor:

26% identify as Black/African American

39% identify as Black, Indigenous and/or people of color

13% have a disability

15% have a household income at or below the poverty line

28% do not use a car to commute to work

Introduction to the Twin Cities Boulevard Campaign

The Twin Cities Boulevard campaign is a grassroots community movement to reconnect neighborhoods and repair I-94's historic and ongoing harms.

The Twin Cities Boulevard movement aims to replace the highway with a multimodal street and reconnected grid. The campaign goals extend beyond transportation. The campaign proposes that former highway land be repurposed for new housing, businesses and parks, accompanied by policies to prioritize benefits for those who have been disproportionately impacted by highway harms, and protections against displacement and gentrification. This includes placing the former highway land into a community land trust.

This movement comes as cities across the country are considering the removal of their urban highways.

MnDOT has an extraordinary opportunity to replace I-94 with a multimodal boulevard that more effectively moves people and goods, creates new affordable housing and economic activity, and results in cleaner air and reduced climate emissions.

The *Rethinking I-94* project will have long-lasting impacts on Minneapolis and Saint Paul community members, particularly those who live, work and go to school near the highway. Every resident must be notified about and informed of the highway project's current and future impact on their lives, be given opportunities to be included in the project planning process, and be invited to consider and influence all possible project options.

Residents must be treated respectfully, be fully informed in plain language of the benefits, harms and consequences of each proposed alternative, and have their questions answered honestly and thoroughly.

To raise community awareness about the *Rethinking I-94* project and the possibility for non-highway project alternatives, Our Streets has knocked on more than 35,000 doors within the project corridor since November 2021. The Twin Cities Boulevard campaign aims to uplift the community priorities that emerge from these conversations and build a shared vision for *Rethinking I-94*.

SECTION 3

Concepts for Reimagining I-94

Types of Urban Streets

For as long as cities have been around, creative, elegant solutions to urban problems have been developed through street design.

For generations in the United States, cities employed a number of street types that responded to the surrounding land-use context, or to a preferred future that the city had determined.

Some of these street types, like boulevards, avenues, and parkways are found in the Twin Cities and still follow their original intention.

For example, East and West River Parkways carry people walking, biking and driving along the shaded banks of the Mississippi River, in a park-like setting that is characterized by its mature tree canopy, gentle curves, and slow speeds. Along the I-94 corridor through Minneapolis and Saint Paul, the land-use context changes as it passes through different neighborhoods. The street and street network that replaces it should change with these neighborhoods.

We have developed a number of highway removal concepts for each neighborhood to respond to changes to the available right-of-way, land-use context, and demands of the corridor.

It is important that each concept reconnects neighborhoods and creates more ways for people to reach their destinations. Moreover, the corridor should be a cohesive transportation system, facilitating east-west travel, as I-94 does today.

Therefore, the concepts that follow employ a number of street types, including multimodal boulevards, (which include a transit boulevard and multiway boulevard designs), parkways, and two-, three-, and five-lane multimodal urban streets.

We explored a number of urban street types for these concepts, including the following:

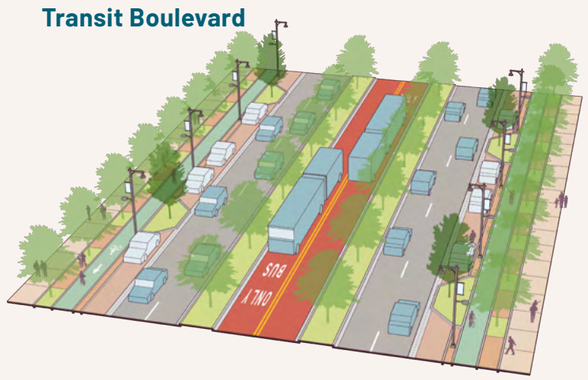
Multiway Boulevard

Multiway boulevards combine high-capacity traffic flow with pedestrian-friendly features.

With a main thoroughfare of four to six lanes and one-lane, one-way frontage roads on one or both sides, a multiway boulevard seamlessly integrates on-street parking, curb extensions, and landscaping. On larger street, dedicated transit lanes of often included in the design. Access to adjacent properties is facilitated through the frontage roads, optimizing the flow of both vehicular and pedestrian traffic.

Multiway boulevards are an elegant design solution for large commercial corridors that warrant walkable, human-scale places and have historically been used in both European and American cities for grand, civic streets. In some multiway boulevard designs, frontage roads access the thoroughfare before intersections, allowing only right turns and reducing intersection complexity.

Transit Boulevard



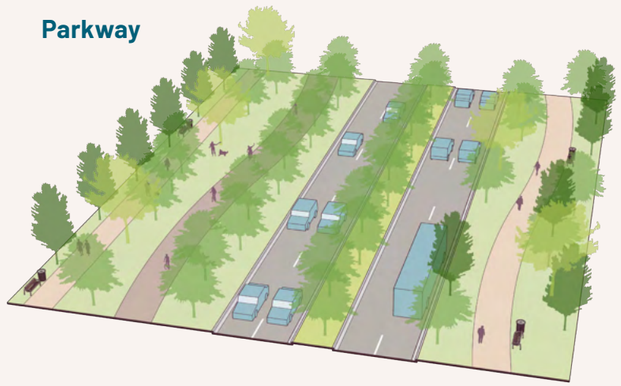
A transit boulevard is an urban thoroughfare that prioritizes public transportation movement, typically buses and/or bus rapid transit, integrated into a multimodal street.

A transit boulevard incorporates dedicated transit lanes seamlessly into its layout. These lanes can run along the right side of the main roadway or in dedicated center lanes. This configuration effectively shields transit operations from local vehicle access, bicycles, parking, and loading activities.

The incorporation of transit lanes not only enhances the efficiency of the boulevard, mirroring the streamlined nature of transitways, but also amplifies its capacity to accommodate a substantial volume of buses.

Moreover, the dedicated transit lanes can be used by multiple bus routes, both local buses and BRT. This design choice contributes to the overall goal of creating a transit-friendly environment within the urban landscape.

Parkway



A parkway street is a carefully designed thoroughfare that combines the functionality of a roadway with the aesthetic beauty of park-like surroundings.

Unlike conventional streets, parkways are characterized by their scenic landscapes and greenery, and often feature well-maintained, tree-lined medians or adjacent green belts. These streets are intentionally designed to provide a visually pleasing and serene experience for all users.

In addition to serving as transportation corridors, parkway streets are intended to be destinations in themselves.

Parkway streets often include elements such as landscaped medians, tree-lined sidewalks and recreational areas, creating an atmosphere that encourages leisurely strolls and outdoor activities. The vegetation along the parkway contributes to the visual appeal and serves as a buffer, enhancing the overall sense of tranquility.

Neighborhood-focused Concepts

Diverse neighborhoods exist along the I-94 study corridor. While these neighborhoods share a history of being disrupted by the implementation of the highway, they all have unique characteristics, challenges, and constraints.

It is important to understand these existing conditions and nuances in order to imagine the opportunities and potential of the boulevard project specific to each area. To best serve the primary users of the corridor and to prevent further harm to local communities, the design of the highway removal alternatives should be co-created with the affected residents. This report presents illustrative options to begin the discussion.

While there are variations, this report largely presents two concepts for the length of the study corridor to replace the existing highway.

These options include:

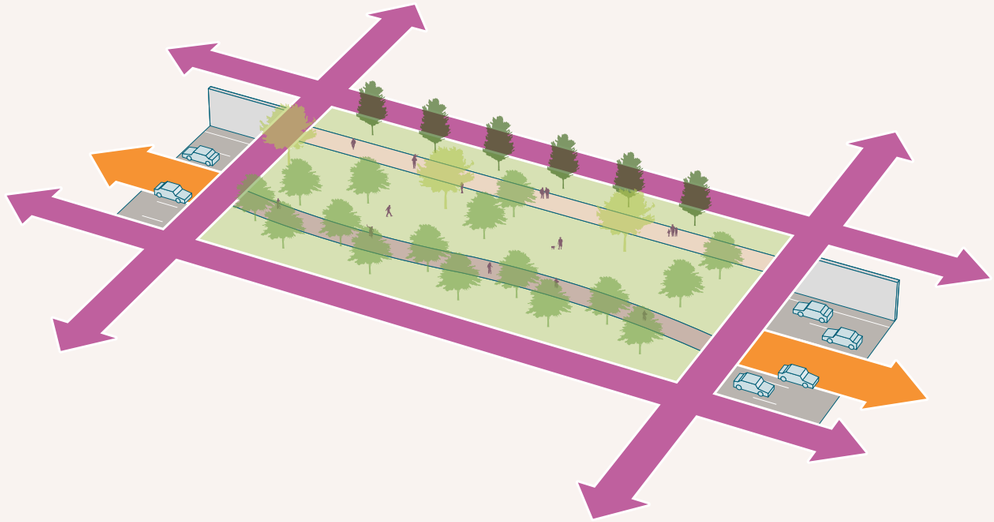
- The **Transit Boulevard** concept proposes a primary corridor that prioritizes multimodal travel options, with dedicated transit lanes, bike lanes, and multiple travel lanes in each direction. This concept includes a secondary roadway for vehicular and pedestrian travel.
- The **Restored Network** concept proposes two traditional roadways for multimodal travel and prioritizes the reconnection of the surrounding street grid. This concept highlights one street as the primary but does not include dedicated transit lanes, though the design could be amended to add them.

Both of these concepts identify space for potential redevelopment or greenspace in the remaining corridor right-of-way. Each of these concepts will look different through the neighborhoods that exist along the corridor. Understanding the existing conditions, addressing the needs of the community, and working collaboratively with residents will be important to avoid repeating similar disruption that the implementation of I-94 caused and ensure that this project enhances the affected neighborhoods and surrounding area.

This section illustrates the existing and proposed road network for each highway removal option, highlighting existing conditions and potential challenges and opportunities.

CONSIDERATION

A Note on Highway Caps



A highway cap, also referred to as a lid or cover, is used to mitigate part of a depressed highway to a higher degree than just a bridge.

A highway cap is actually a very wide bridge, except that in addition to a street going over the bridge, many other things can be placed on top of the cap such as parks, plazas, and small buildings. Caps typically range in length from a few hundred feet to a block or more. Caps hide much more of the highway from view than a bridge.

These structures require expensive maintenance and, occasionally, replacement. Highway caps are wider than bridges but shorter than tunnels. Typically, caps do not need special ventilation of exhaust pipe emissions, unlike tunnels.

While caps can be an attractive alternative to standard bridges over a depressed highway, they only address the micro problems that the highway causes, not the macro issues. Moreover, highway caps hardwire the highway - making any future removal highly unlikely.

Cedar-Riverside and Seward

The Cedar-Riverside and Seward neighborhoods were once seamlessly connected, but are now separated by the I-94 trench. Cedar-Riverside is located in the pocket of land between the Mississippi River and I-94 and I-35W highways.

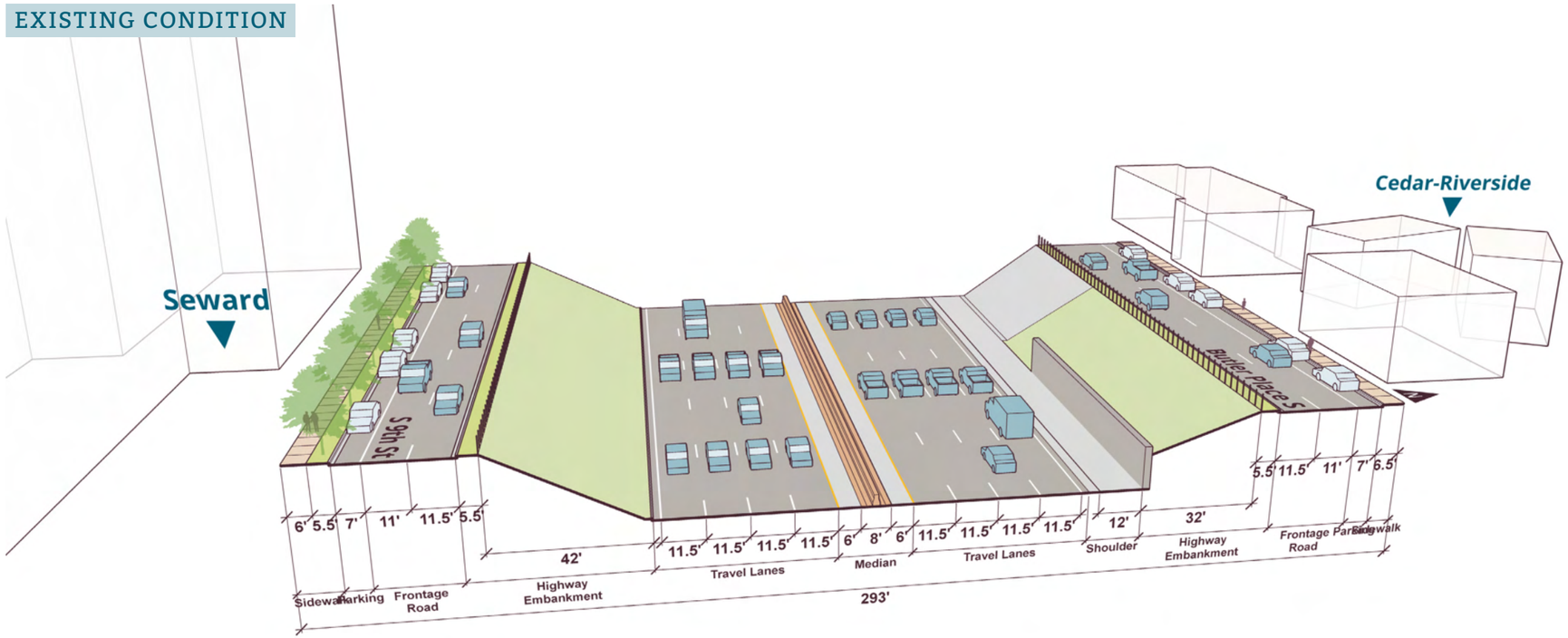
This diverse community has a rich history of art and culture. It is home to a wide variety of cultural destinations, centers, shops, restaurants, and theaters, as well as the Augsburg University campus and the University of Minnesota's West Bank Arts Quarter.

The neighborhood has long welcomed immigrants to the Twin Cities, and today is a hub for Minnesota's East African community. Though this neighborhood serves as an important part of the identity of Minneapolis, it is somewhat detached from the fabric of the surrounding area due to the barriers of the river and highway corridors to the street network.

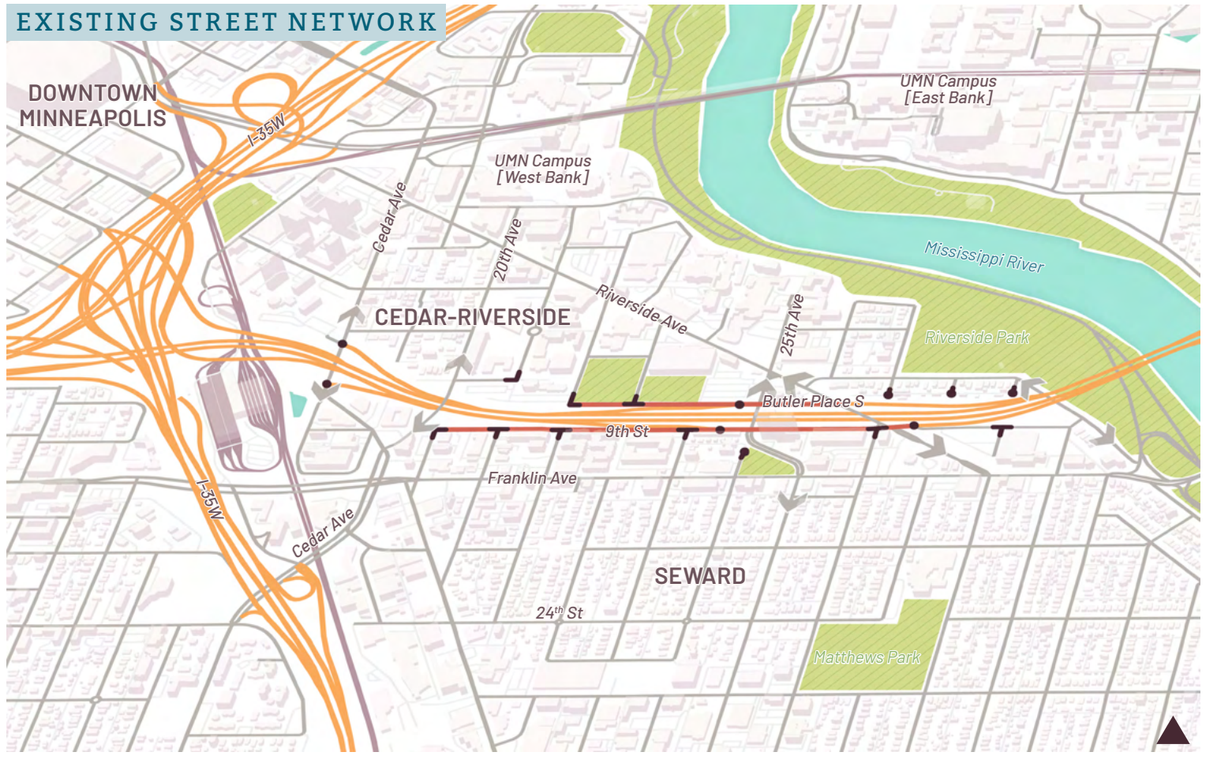
The Seward neighborhood is located south of Cedar-Riverside and is also bordered by I-94 (north) and the Mississippi River (east), as well as Hiawatha Avenue to the west. Similar to Cedar-Riverside, the physical boundaries of the neighborhood are well-defined. Seward has a strong sense of community among residents.

Another similarity to the adjacent Cedar-Riverside is the cultural significance of the neighborhood. The commercial corridor along Franklin Avenue, running east/west through the north side of Seward one block from I-94, provides various cultural and community centers and services, cafes, restaurants, the community co-op, and other shops and businesses.

EXISTING CONDITION



EXISTING STREET NETWORK



LEGEND

- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Existing Street Network

The existing street network indicates that most of the north/south roadways are disconnected between Cedar-Riverside and Seward by the I-94 corridor. Through connections are made via the 20th Avenue, 25th Avenue, and Riverside Avenue bridges, as well as Cedar Avenue, connecting below I-94.

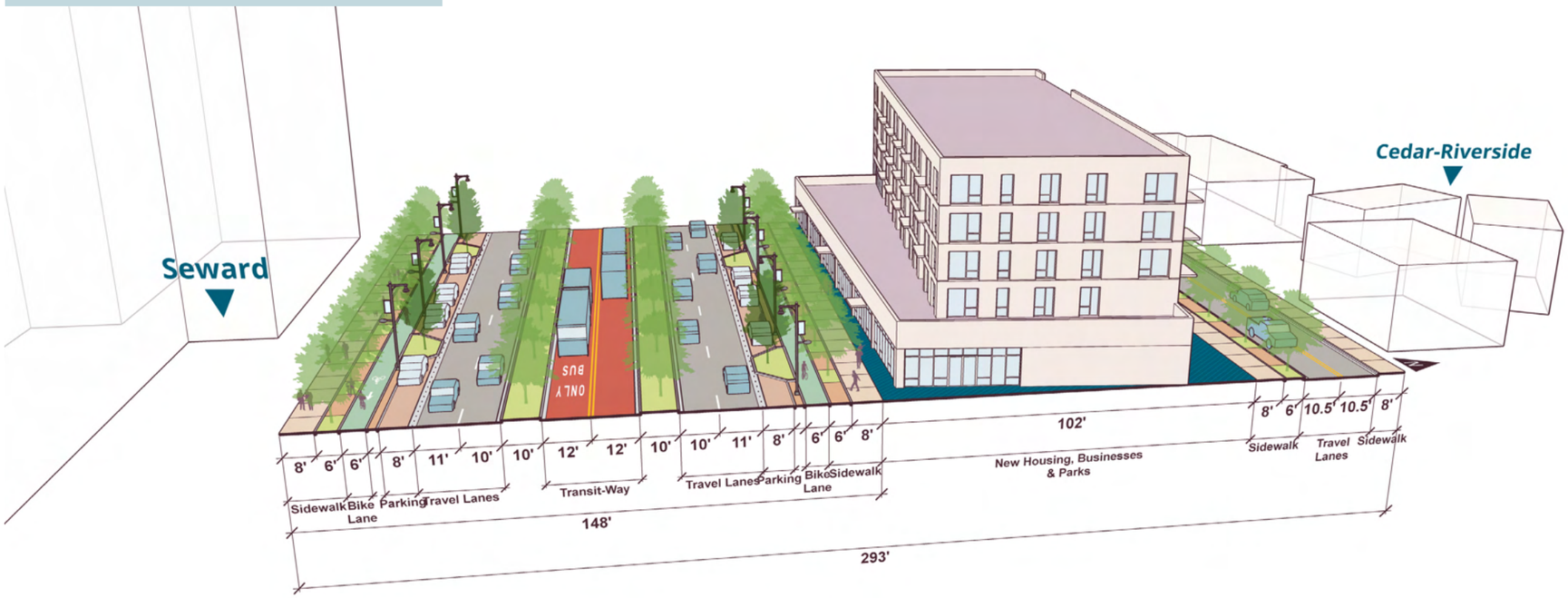
Butler Place and 9th Street serve as frontage roads to the highway, providing one entry and exit point to I-94 to each neighborhood, with an additional entry and exit point on Cedar Avenue.

Transit Boulevard Concept

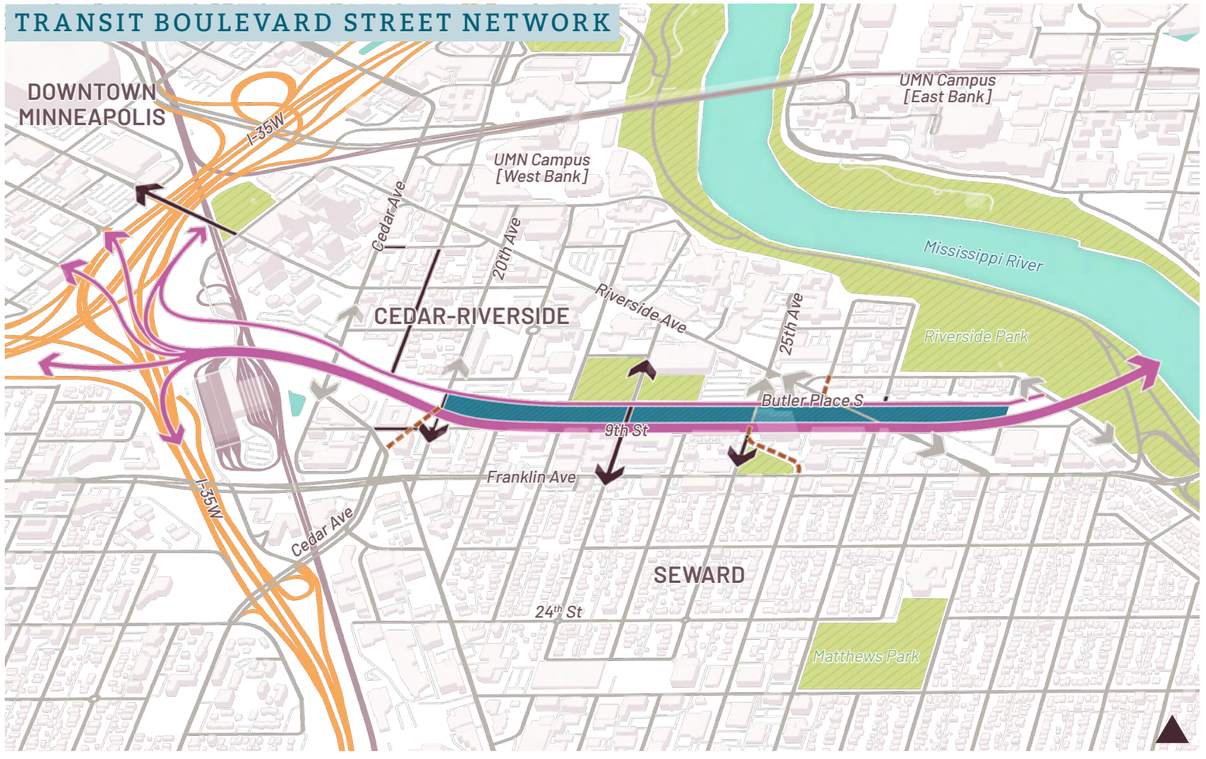
The boulevard concept proposes a multimodal corridor to replace 9th Street, with a secondary roadway along Butler Place.

Both proposed roadways should connect to downtown via 6th Street, with additional links between the boulevard and 7th and 8th Streets. The transit boulevard will also maintain vehicular access to I-35W and Hiawatha Avenue and will continue over the I-94 bridge to the east. This concept retains the existing north/south connections, with a new connection at 23rd Avenue.

TRANSIT BOULEVARD CONCEPT



TRANSIT BOULEVARD STREET NETWORK



LEGEND

- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

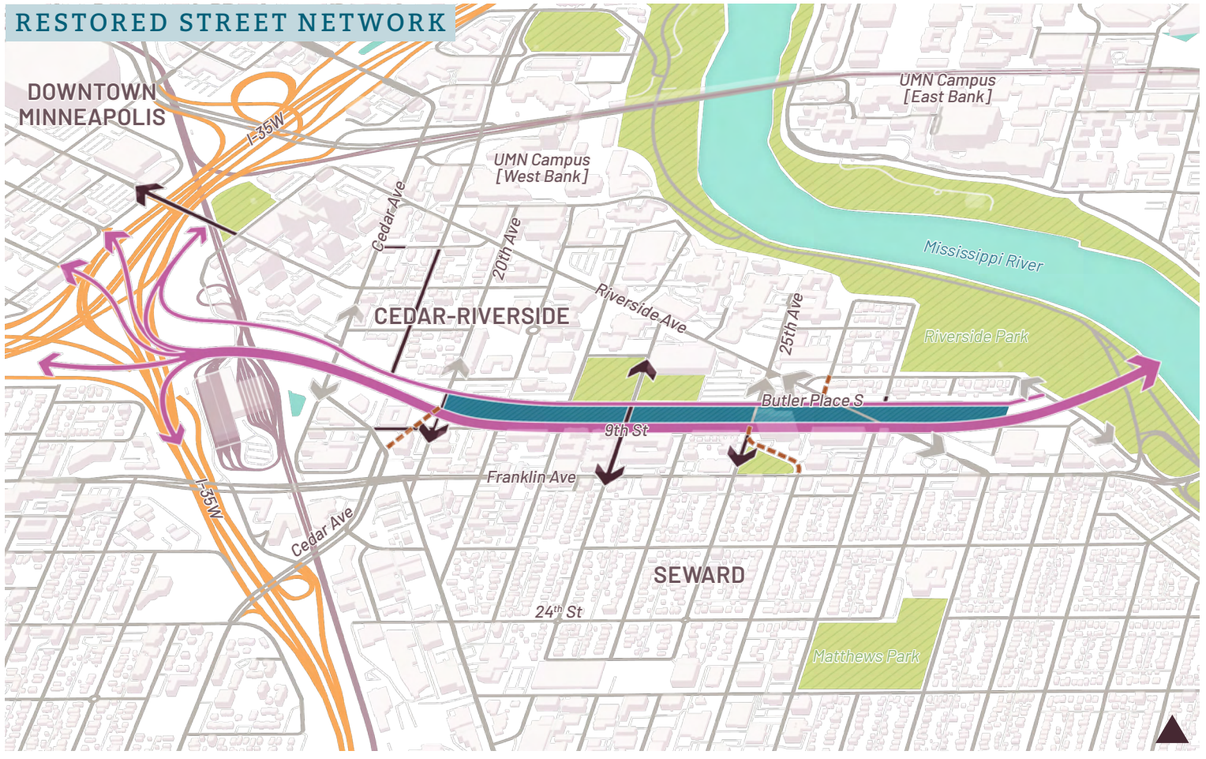
Restored Network Concept

The restored concept, reflected in the diagram above, proposes connections from the primary corridor to downtown via 6th, 7th, and 8th Streets and to I-35W and Hiawatha Avenue.

The primary corridor will also extend to the east via the I-94 bridge. This concept expands on the existing north/south network, with reconnected streets at 15th, 22nd, and 23rd Avenues and additional links between the two proposed roadways.

RESTORED NETWORK CONCEPT

RESTORED STREET NETWORK



LEGEND

- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Today, I-94 runs through the Cedar-Riverside and Seward neighborhoods to downtown Minneapolis.

Figure 7. A west-facing view of I-94 through Cedar-Riverside and Seward neighborhoods, with downtown Minneapolis in the distance.

This rendering visualizes what it might look light if a transit boulevard replaced I-94 in Cedar-Riverside and Seward.

Figure 8. A west-facing view of I-94 through Cedar-Riverside and Seward neighborhoods replaced with a multiway transit boulevard, with downtown Minneapolis in the distance.

This is a view of I-94 from the highway looking east towards the 25th Avenue S bridge in Cedar-Riverside.

Figure 9. View from I-94 trench today, looking east from Cedar-Riverside. Source: Google Maps

This rendering, located in Cedar-Riverside near Riverside Avenue, shows land use possibilities with a transit boulevard conversion.

Figure 10. Rendering showing the potential transformation of I-94 through Seward and Cedar-Riverside.

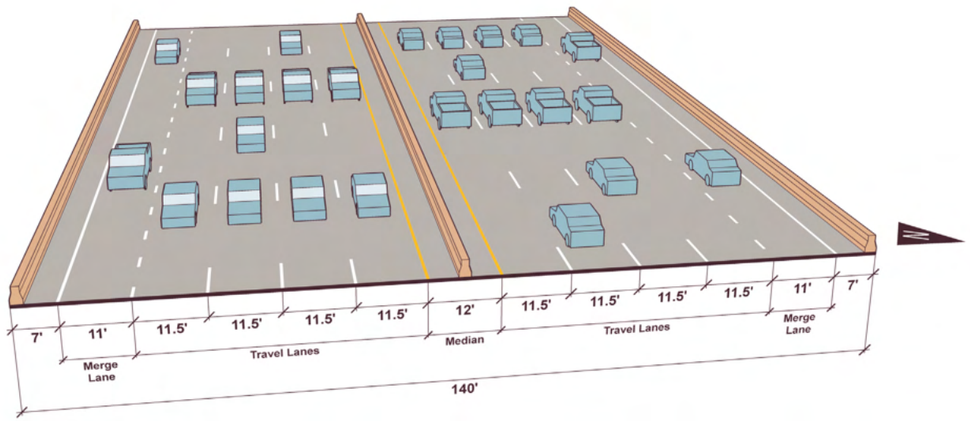
This is a view of the I-94 overpass over Cedar Avenue today, which creates a visual and physical barrier between two sides of the street.

Figure 11. This is a view of the I-94 overpass over Cedar Avenue today. Source: Google Maps

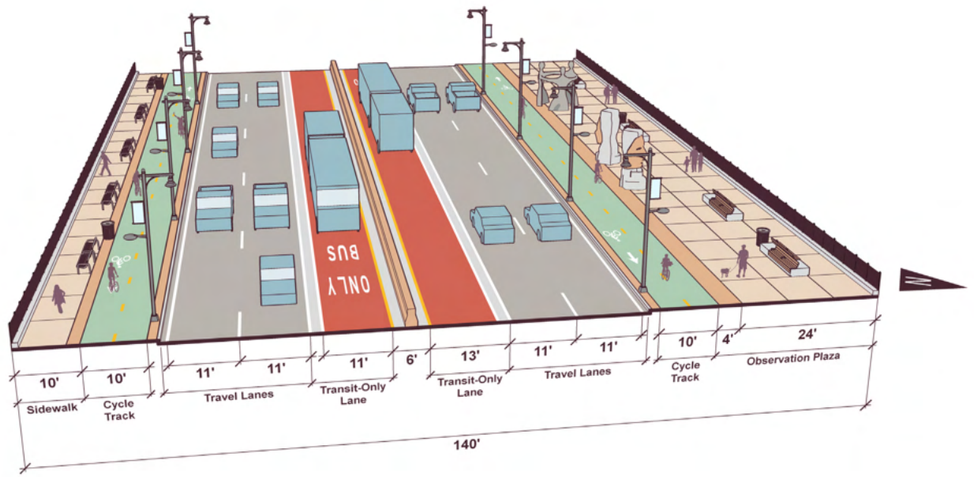
This rendering visualizes an option with no grade separation and connection to a transit boulevard option.

Figure 12. Rendering of Cedar Avenue and intersection of the project corridor, shown with a transit boulevard option.

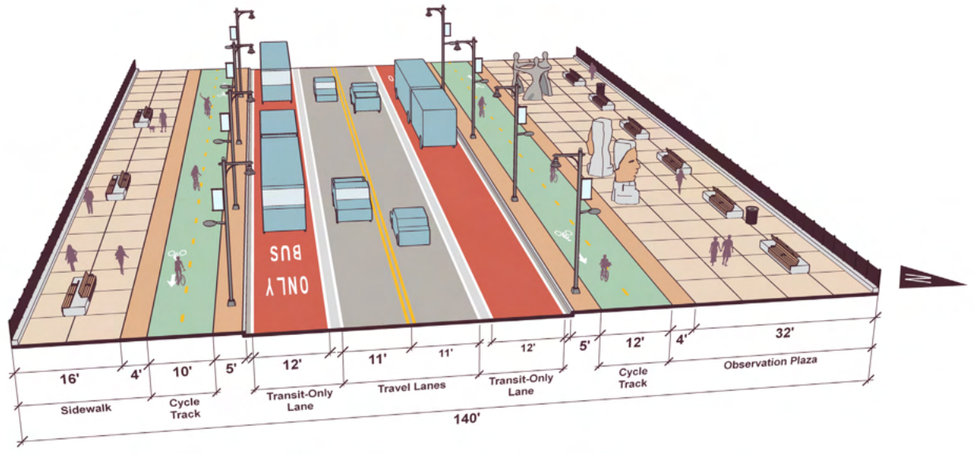
EXISTING CONDITION



TRANSIT BOULEVARD CONCEPT



RESTORED STREET NETWORK



I-94 Bridge

The I-94 bridge over the Mississippi River has the potential to be repurposed into a multimodal bridge that serves all modes of transportation.

A wide pedestrian walkway on the north side would create abundant community gathering space, with views of downtown Minneapolis and the river gorge.

Aerial view of I-94 bridge over the Mississippi River, looking northwest towards downtown Minneapolis.

Figure 13. View above the I-94 bridge looking northwest at downtown Minneapolis. Source: Google Maps.

Converting I-94 to a transit boulevard allows for more public space along the bridge across the Mississippi River.

Figure 14. Rendering showing I-94 bridge over the Mississippi River, looking west towards downtown Minneapolis, with a transit boulevard option

The I-94 bridge today does not accomodate pedestrians or cyclists despite it's ample right-of-way and importance to the street network.

Figure 15. The view from a car on I-94 today, looking northwest at downtown Minneapolis. towards downtown Minneapolis. Source: Google Maps

Repurposing the I-94 Mississippi River bridge would create a vibrant new gathering space in the river gorge.

Figure 16. Rendering from a pedestrian viewpoint of the bridge over the Mississippi River, looking west towards downtown Minneapolis.

Prospect Park and South Saint Anthony Park

Like the Cedar-Riverside and Seward neighborhoods to the west, Prospect Park has well-defined boundaries with the Mississippi River to the south, railroad yard to the north, the University of Minnesota campus to the west, and the city of Saint Paul border to the east. As a historic neighborhood, situated adjacent to the UMN campus and Saint Paul, Prospect Park has a variety of districts and character areas.

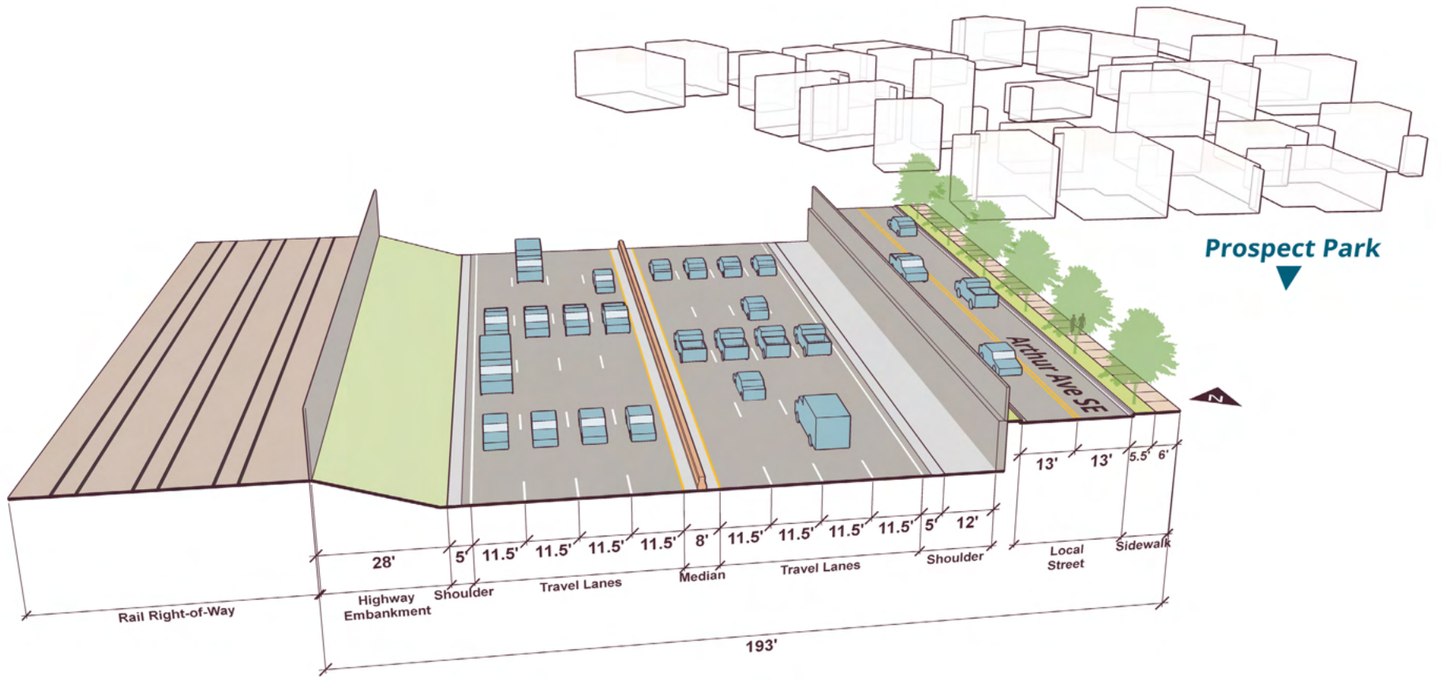
The campus, stadium, student housing, and other related and commercial uses in Prospect Park access the highway via the Huron Boulevard interchange, a wide entry/exit highway junction. The residential neighborhood within Prospect Park is divided by I-94 and the parallel railway. A large portion of the residential neighborhood, as well as University Avenue, an important Minneapolis and Saint Paul thoroughfare, are accessed via Huron Boulevard or TH 280.

The southeastern residential section is largely isolated with minimal connections to the surrounding neighborhoods and I-94 via East River Parkway, 27th Avenue, and Franklin Avenue/bridge as indicated in the Existing Street Network map to the right.

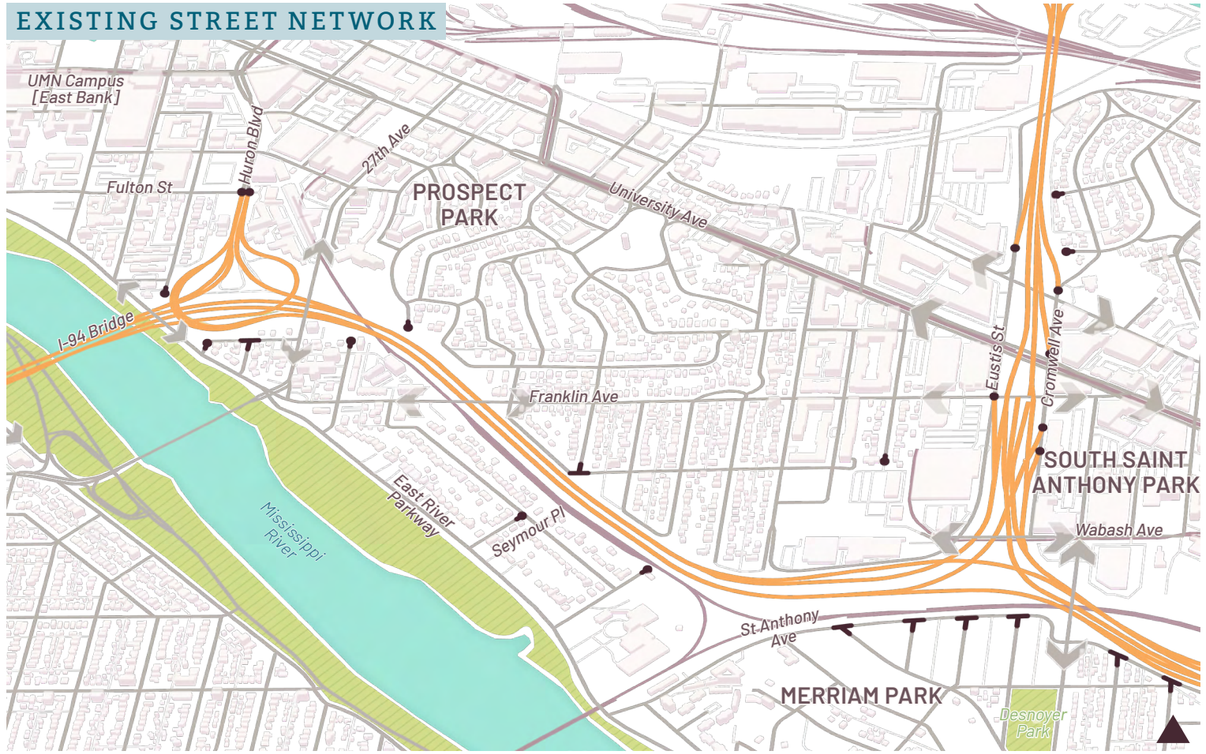
Existing Street Network

South Saint Anthony Park connects Saint Paul to downtown Minneapolis and the UMN campus via University Avenue and I-94 and is an important connector for commuters due to its access to the MN 280 and I-94 interchange.

EXISTING CONDITION



EXISTING STREET NETWORK



LEGEND

- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Transit Boulevard / Parkway Network

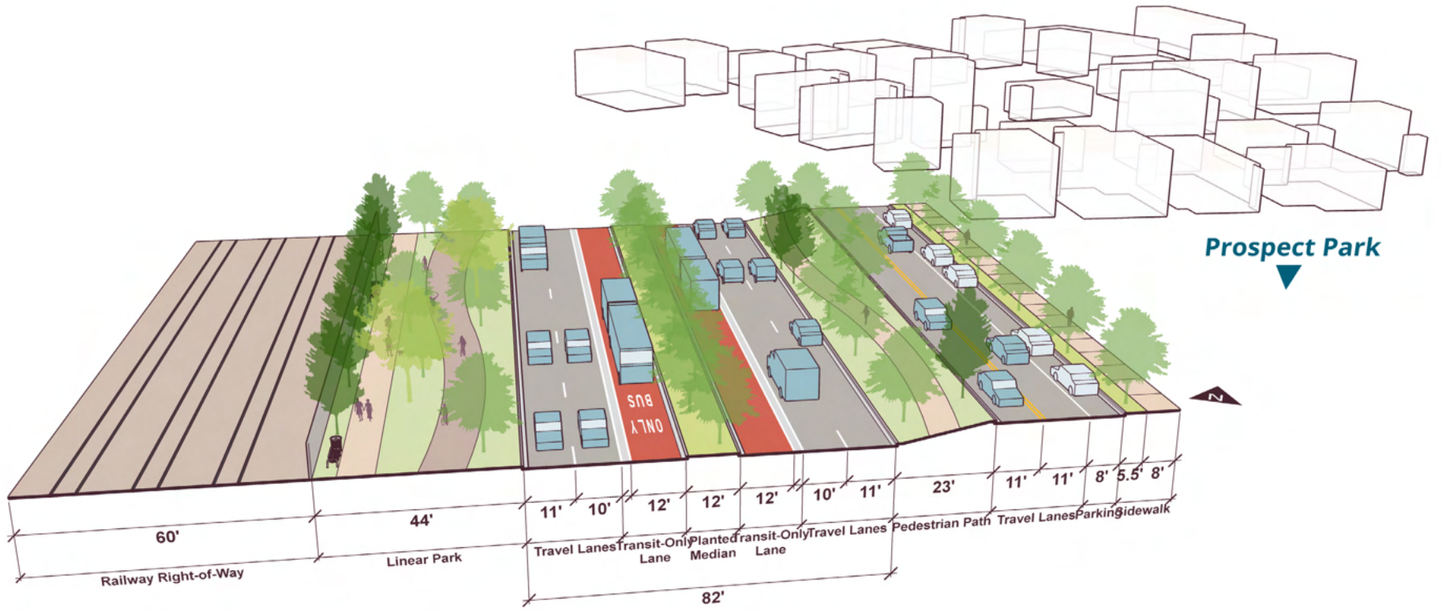
The roundabout/linear park concept proposes the multimodal corridor connecting the Cedar-Riverside and Seward neighborhoods over the I-94 bridge through the Huron Boulevard interchange, and dividing into two roadways through Prospect Park beyond the MN 280 interchange.

This option would replace the Huron Boulevard interchange with a large roundabout, which would provide an entry/exit point to Huron Boulevard but divert the corridor below the roundabout interchange. This would simplify the Huron Boulevard and I-94 corridor junction and establish additional space for development.

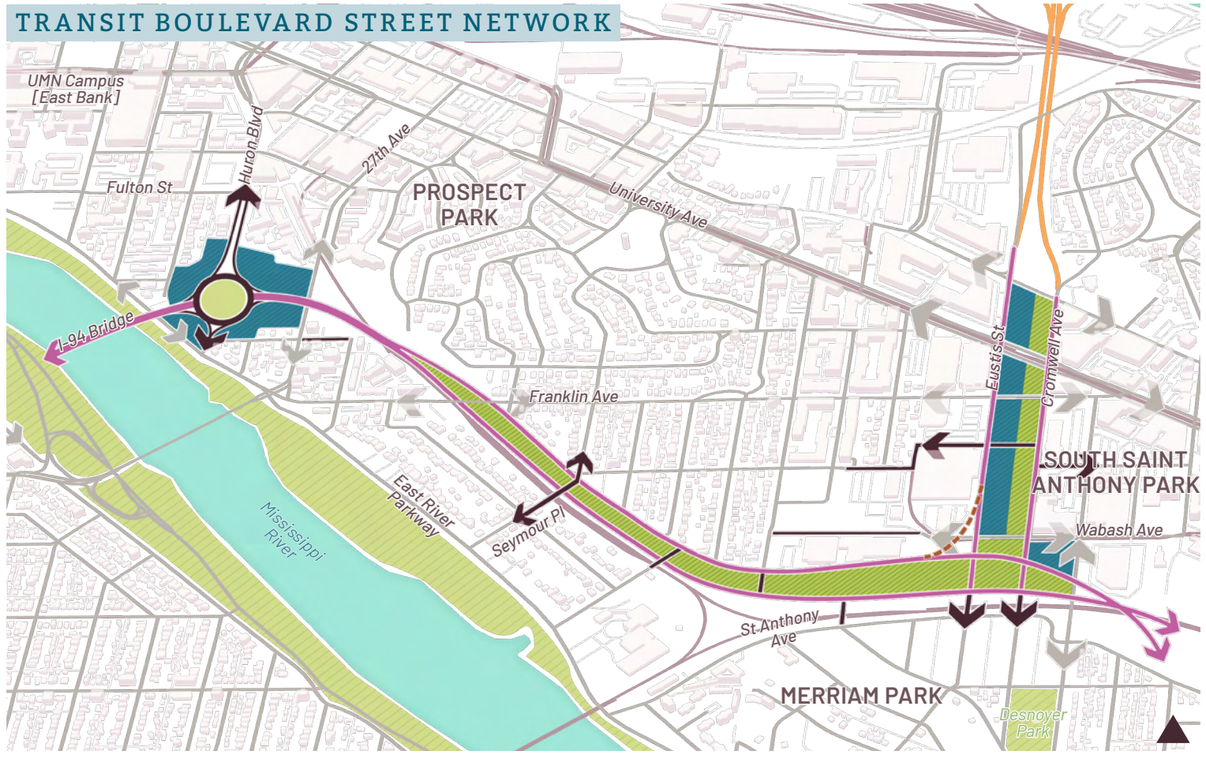
There is limited right-of-way due to the railroad and land configuration, therefore limited space for new uses between Huron Boulevard and MN 280. This project proposes a linear park between the two roadways in this area, providing diverse greenspace and recreational uses accessible to the surrounding neighborhoods. This would also allow for important connections from the disconnected southwest segment of Prospect Park and Merriam Park to the neighborhoods to the north via Huron Boulevard, Eustis Street, Cromwell Avenue, and Seymour Place.

This project also proposes a reconfiguration of MN 280 from Territorial Rd to the I-94 interchange as shown in the diagram to the right. This includes converting the Eustis Street and Cromwell Avenue frontage roads to similar multimodal roadways along the I-94 corridor, redeveloping the existing highway right-of-way to land development and linear park space, and restitching the road network across the existing MN 280.

TRANSIT BOULEVARD / PARKWAY CONCEPT



TRANSIT BOULEVARD STREET NETWORK



LEGEND

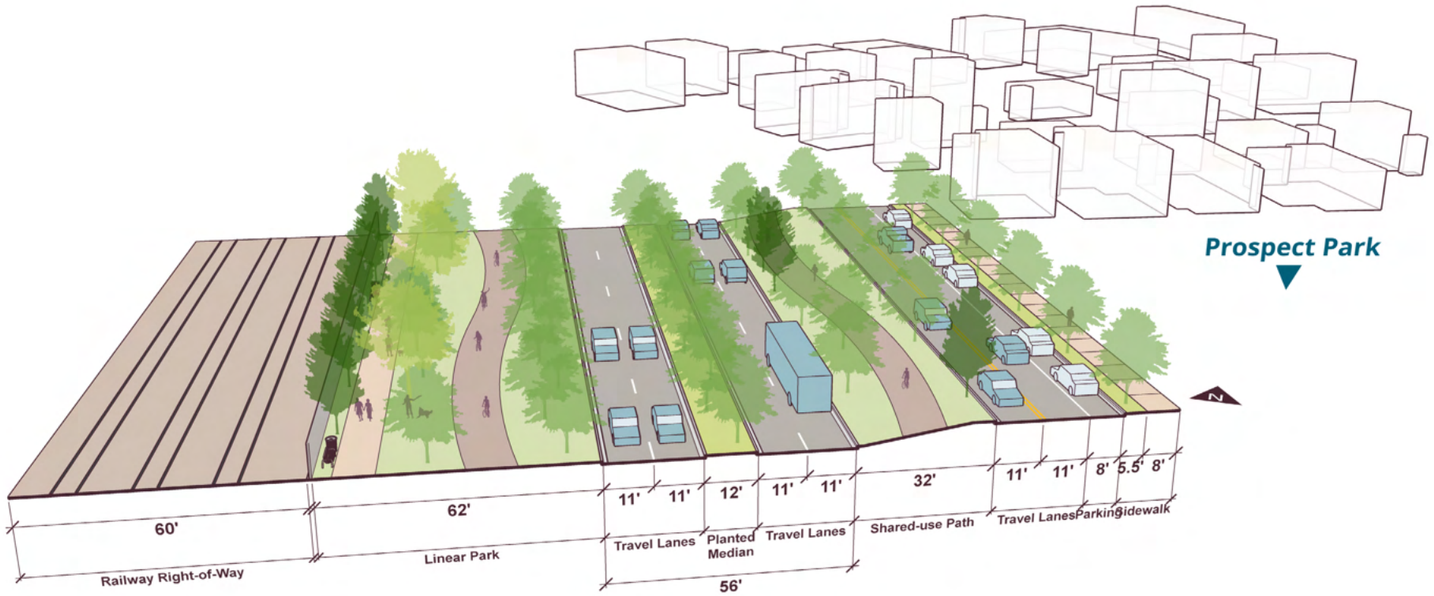
- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Restored Street Network / Parkway

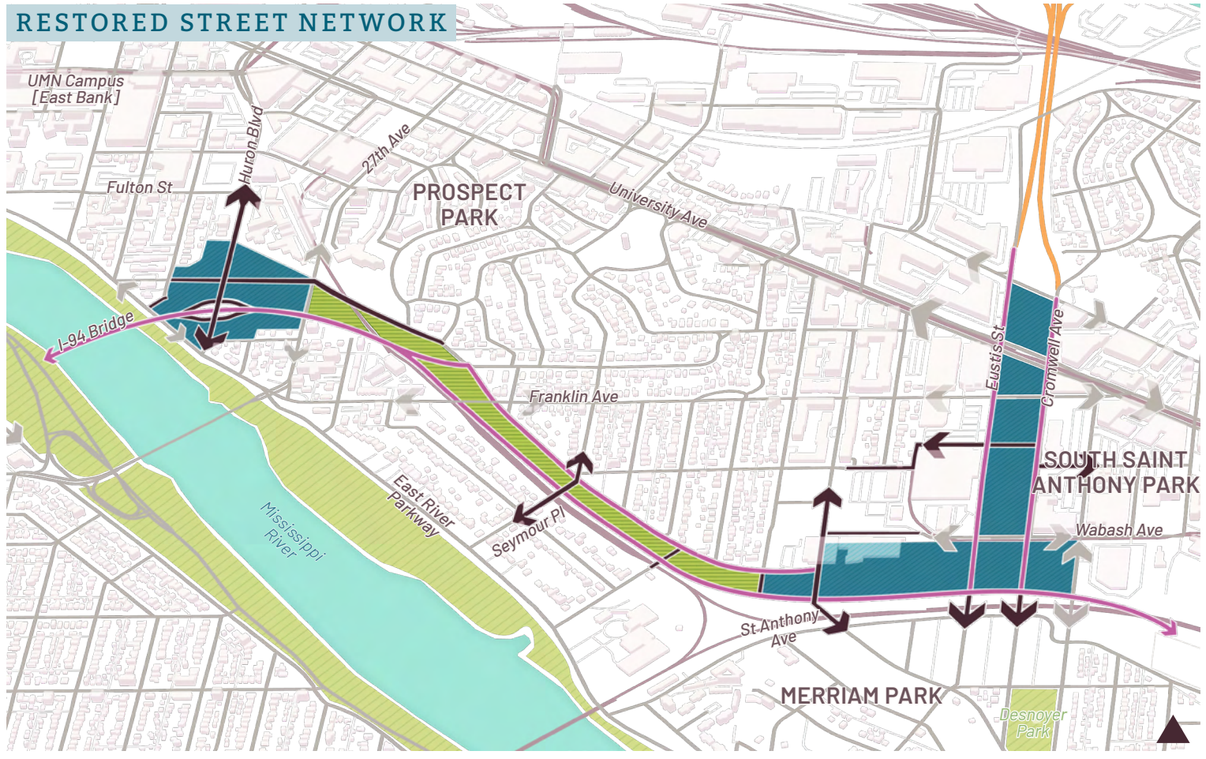
The restored concept, shown here, proposes a grid connection at the Huron Boulevard and I-94 corridor intersection. The street, now designed like a parkway, would continue at-grade and still divide into two roadways beyond the interchange.

This concept proposes a linear park between the roadways for a large section of this segment but includes the option for development between the boulevard and Wabash Avenue.

RESTORED NETWORK CONCEPT



RESTORED STREET NETWORK



LEGEND

- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

South Saint Anthony Park/ Merriam Park

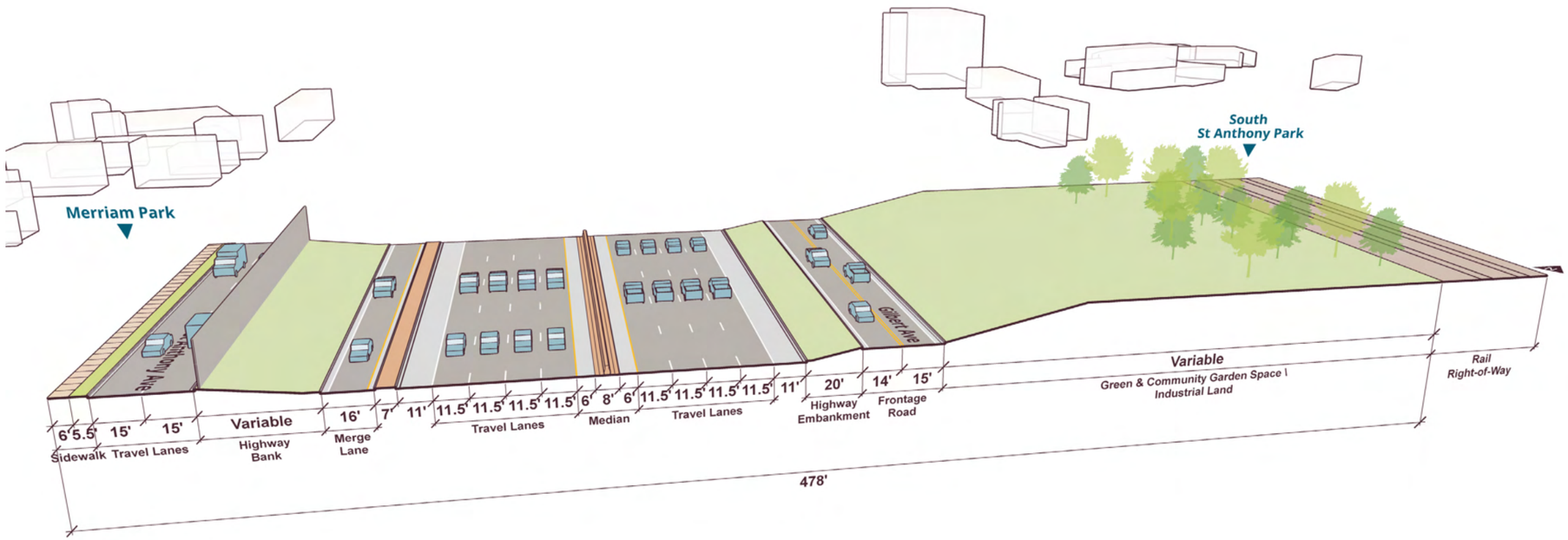
South Saint Anthony Park is an industrial railroad district to the east of Prospect Park. It is bound by the Saint Paul/ Minneapolis border (west), the railroad yard and North Saint Anthony Park (north), Midway (east), and the railway and I-94 (south). This neighborhood provides many services and industrial uses, as well as shops and restaurants, including the Hampden Park co-op.

Merriam Park is a largely residential neighborhood, originally a streetcar neighborhood built around a rail depot. The neighborhood contains important destinations for the greater Twin Cities area, such as the University of Saint Thomas campus and the Town and Country Club Golf Course. It also provides many amenities for the local community, such as a variety of parks, a recreation center, churches and schools, grocery, coffee shops, and other local businesses.

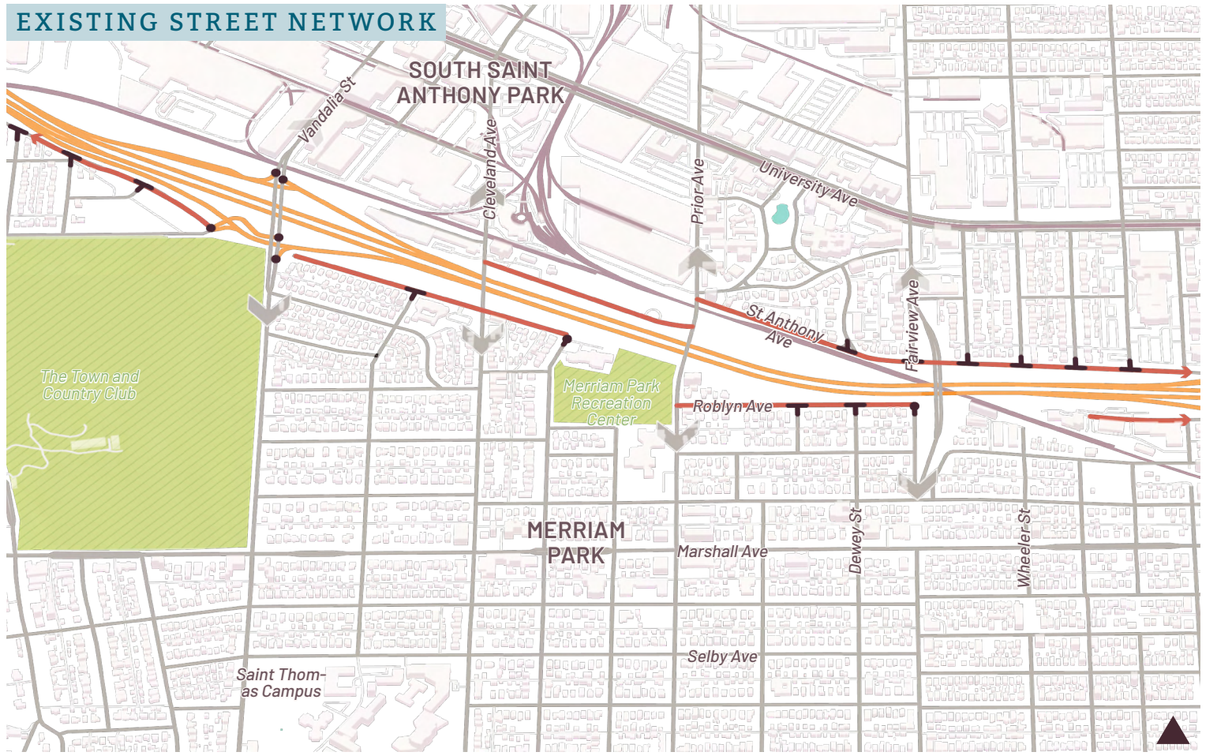
Existing Street Network

The northern section of Merriam Park is divided from the rest of the neighborhood by the I-94 corridor. North/south connections from Merriam Park to the northern section, South Saint Anthony Park, and University Avenue have limited access via Vandalia Street, Cleveland Avenue, Prior Avenue, and Fairview Avenue. Roblyn Avenue and Saint Anthony Avenue serve as frontage roads to I-94.

EXISTING CONDITION



EXISTING STREET NETWORK



LEGEND

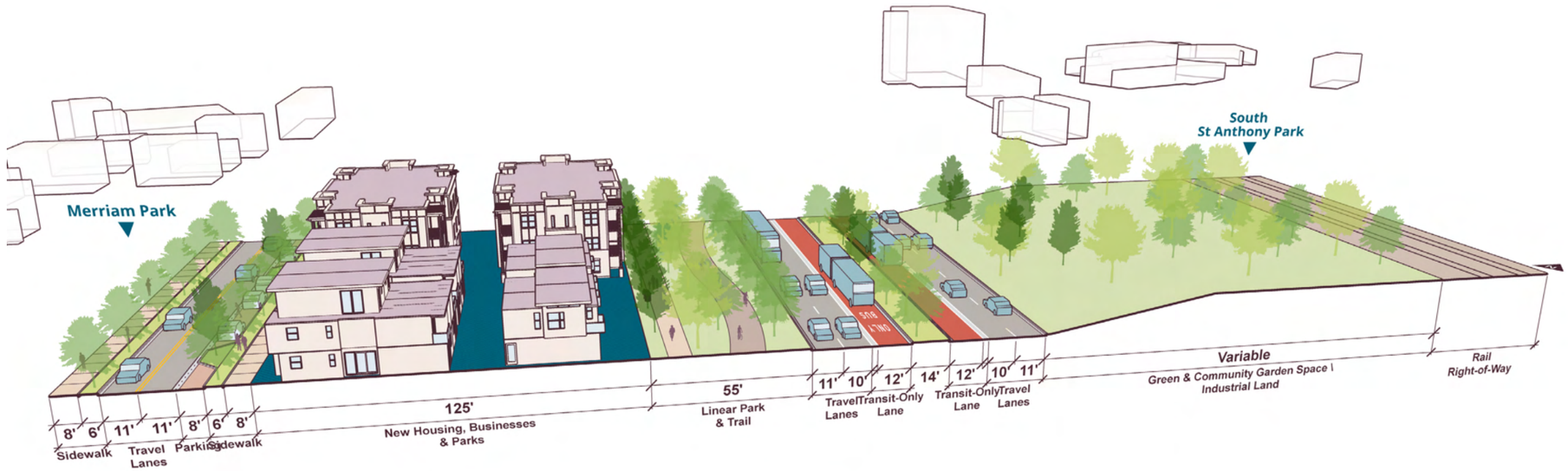
- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Transit Boulevard Network

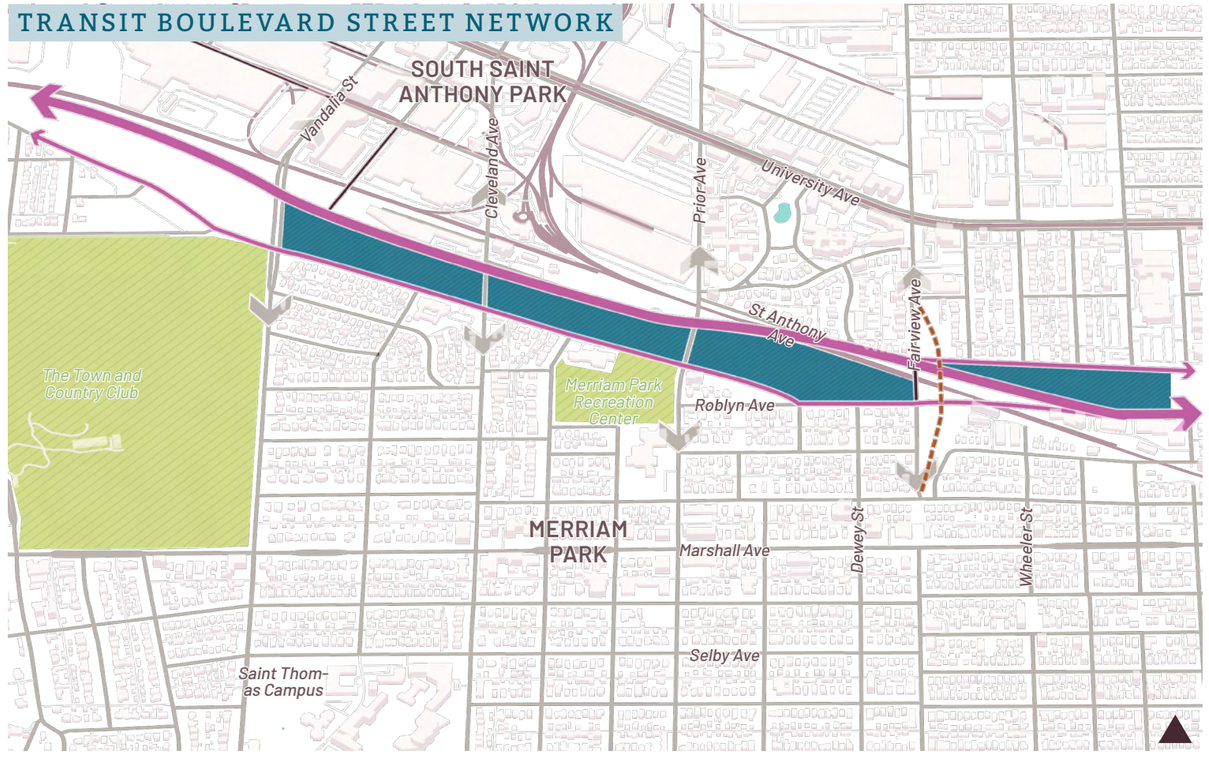
The transit boulevard concept proposes a multimodal corridor to replace Saint Anthony Avenue/Gilbert Avenue to the north of the I-94 right-of-way with a secondary roadway along Roblyn Avenue/ Saint Anthony Avenue to the south.

The boulevard will remain below grade under the railway bridge connecting the Prospect Park area to the west. This concept would improve the north/ south connections by creating at-grade intersections as shown in the Boulevard Street Network diagram.

TRANSIT BOULEVARD CONCEPT



TRANSIT BOULEVARD STREET NETWORK



LEGEND

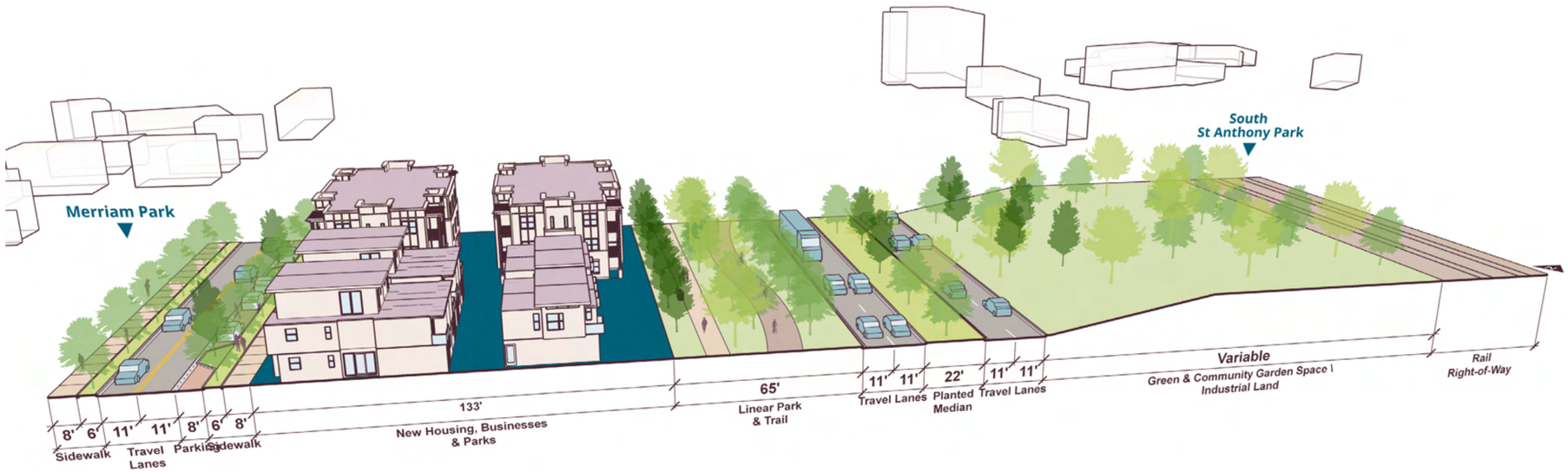
- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Restored Street Network

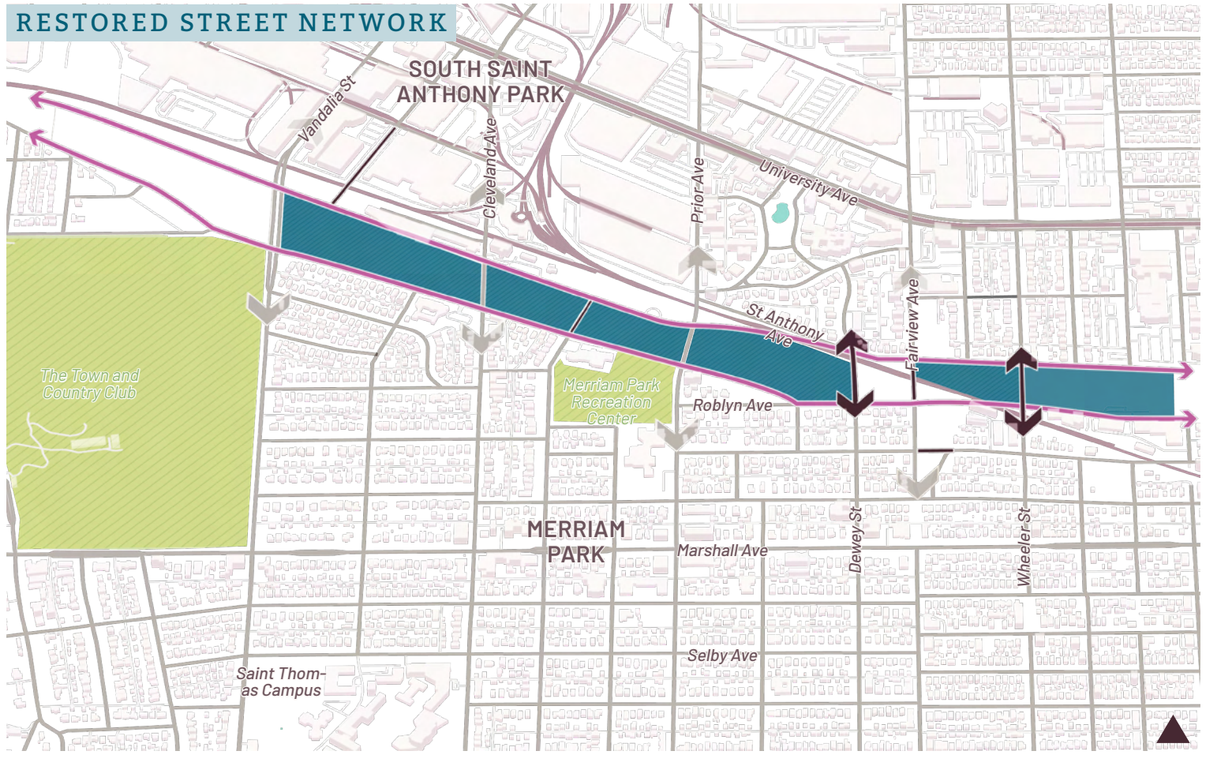
The restored concept similarly proposes a primary roadway to replace the frontage roads to the north and a secondary roadway to replace the frontage roads to the south.

This concept expands on existing north/south connections via Dewey Street and Wheeler Street, as well as additional connections from the adjacent neighborhood to the corridor.

RESTORED NETWORK CONCEPT



RESTORED STREET NETWORK



LEGEND

- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Midway and Union Park

Hamline-Midway, colloquially referred to as Midway, is positioned between the downtowns of Saint Paul and Minneapolis. It is bound by the railway to the north, Lexington Parkway to the east, Cleveland Avenue to the west, and University Avenue to the south. It has a history as an industrial area used for railroad activity, known as the Midway Industrial District, until becoming part of Saint Paul in the 1890s.

The economic development and geographic location of Midway and South Saint Anthony Park between the two cities elevated the adjacent roadways as prominent transportation routes in the regional area, such as University Avenue, Prior Avenue, and Snelling Avenue.

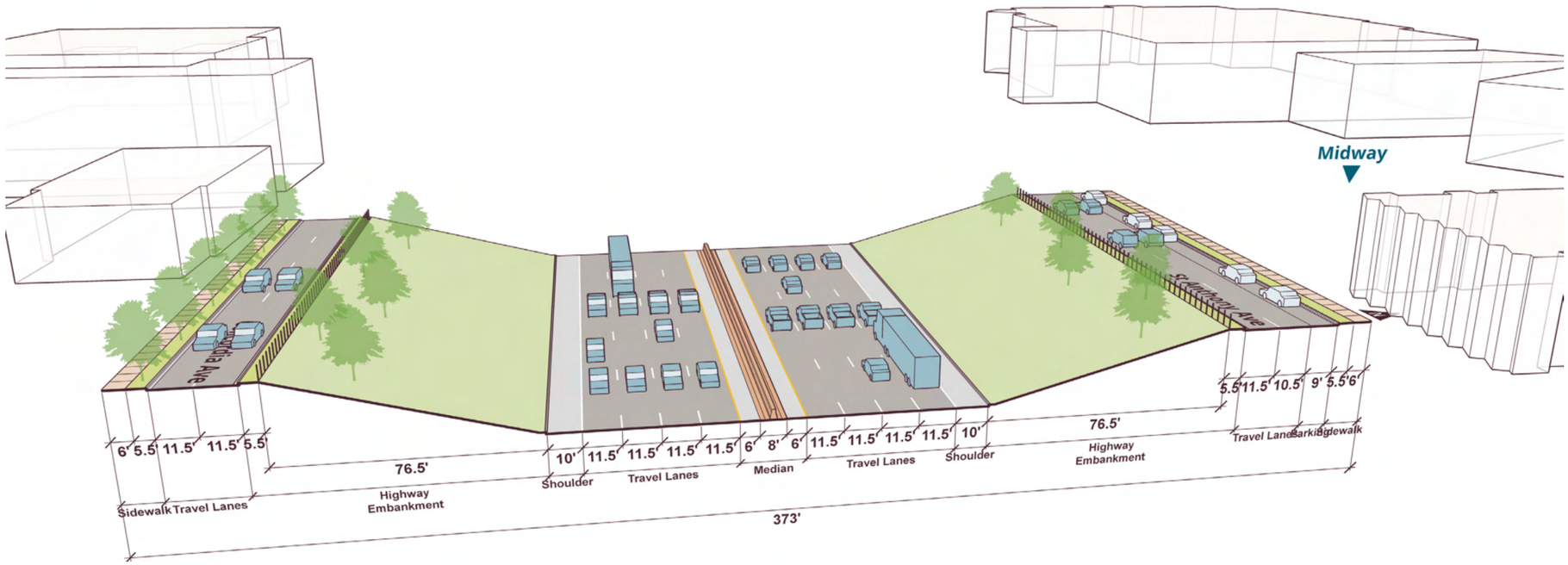
Midway is home to Hamline University and provides access to the nearby Como Park, Minnesota State Fairgrounds, and Allianz Field, all significant regional destinations. Similar to the other neighborhoods in the area, it is also home to many shops, cafes, breweries, services, and parks popular with local residents.

Because of projects and land development in recent years (i.e. the Green Line light rail and the construction of Allianz Field), the history of being an underserved neighborhood, and the impacts of the I-94 to the area, Midway presents a gentrification and displacement risk.

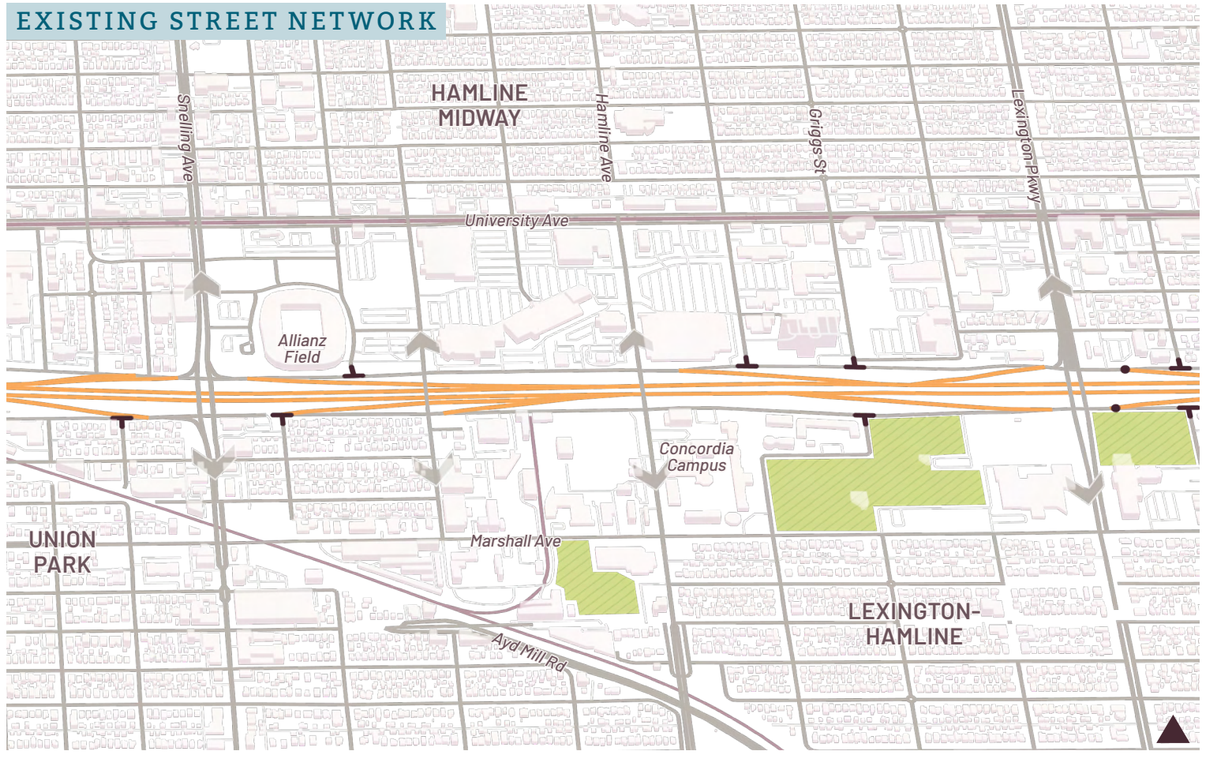
For this reason, elevating the voices of the local community is even more vital.

Union Park, originally home to a large amusement park and resort that was eventually built over, is a merger of a larger historic area. Encompassing Merriam Park, parts of Midway, and other neighborhoods, Union Park has a history of strong communities and significant neighborhood organization presence. These organizations and residents were active and vocal against the initial construction of I-94. Union Park is bordered by Lexington Avenue (east), the Mississippi River (west), University Avenue and I-94 (north), and Summit Avenue (south). Beyond the destinations in Merriam Park, Union Park is also home to Allianz Field, the Midway Marketplace, Central High School, and many other neighborhood shops and services.

EXISTING CONDITION



EXISTING STREET NETWORK



LEGEND

- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Existing Street Network

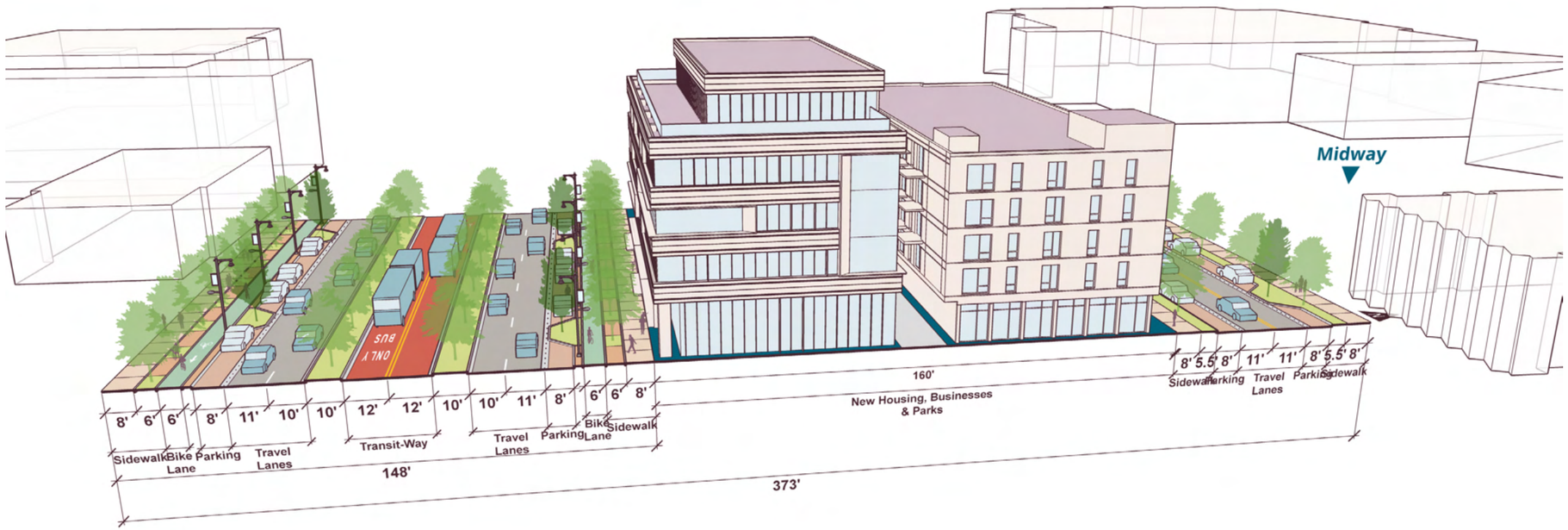
Similar to Merriam Park, the northern section of Union Park is also divided from the rest of the neighborhood by the I-94 corridor. North/south connections across the highway are limited to Snelling Avenue, Hamline Avenue, and Lexington Parkway. These connections across the corridor, as well as the highway entry/exit points serve both Union Park and Midway.

The street network is disconnected due to the highway and adjacent land-uses (Concordia University campus and the Midway Marketplace). The highway is flanked by adjacent frontage roads through this section of the corridor that provide the access points to the highway.

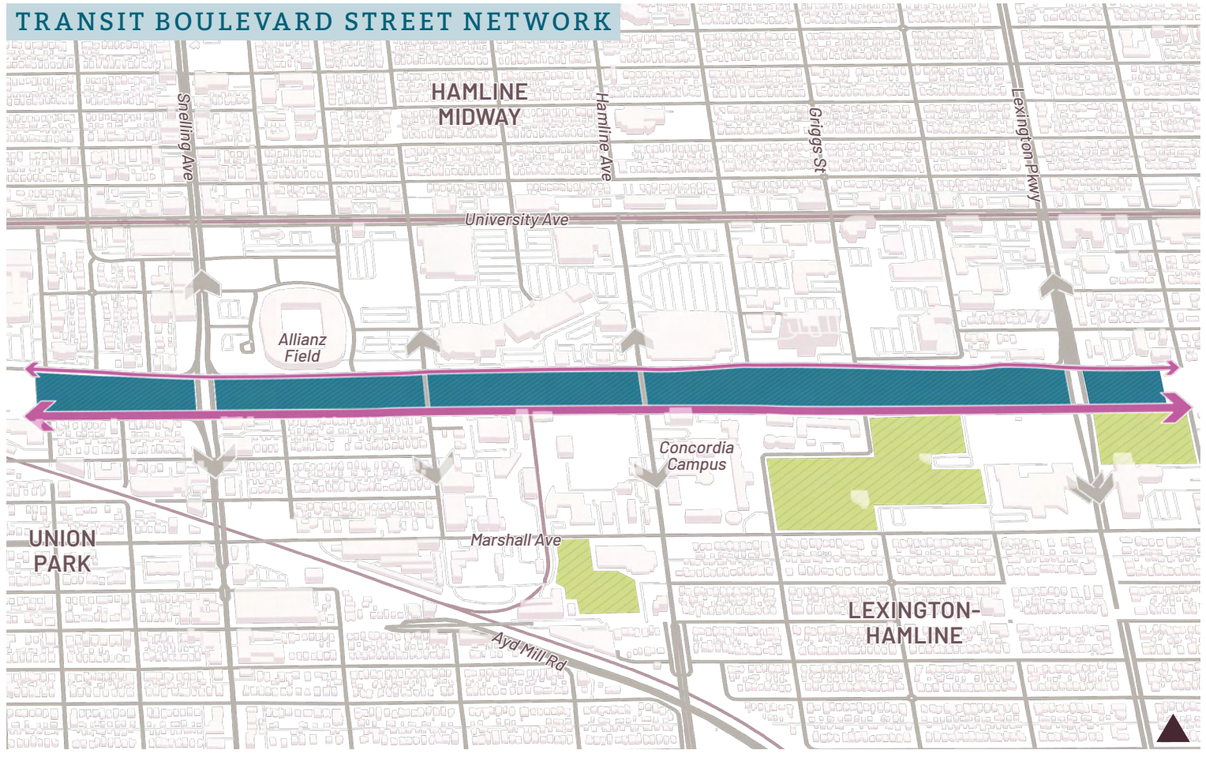
Transit Boulevard Concept

The boulevard concept proposes a multimodal corridor to replace Concordia Avenue south of the highway with a restored street along Saint Anthony Avenue to the north. While the north/south connections would remain largely the same as they are today, making the corridor at-grade would greatly improve access to new and existing development.

TRANSIT BOULEVARD CONCEPT



TRANSIT BOULEVARD STREET NETWORK



LEGEND

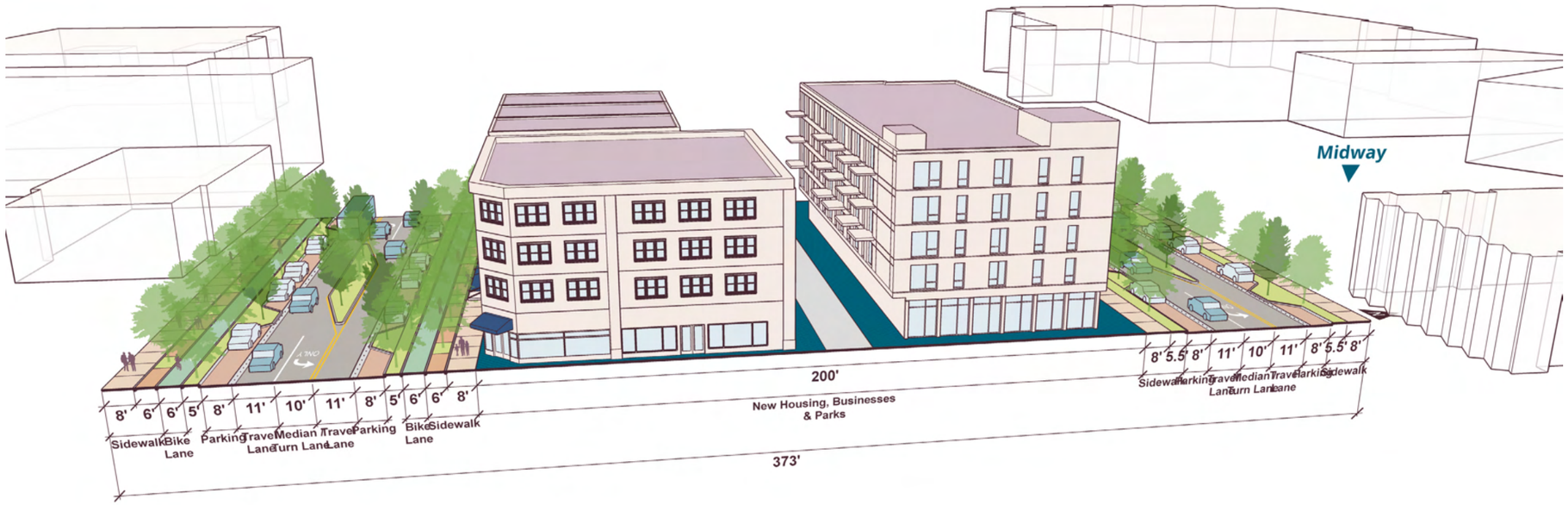
- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Restored Street Network

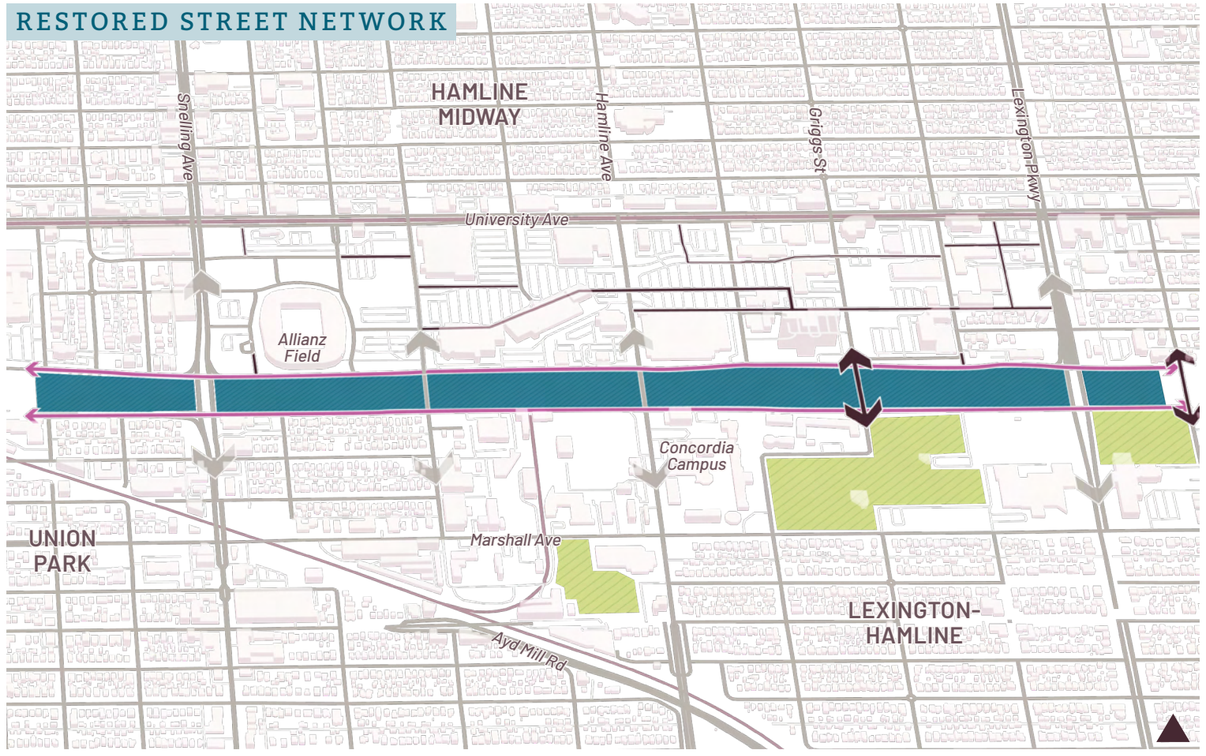
The restored concept proposes new north/south connection across the corridor at Griggs and Oxford Streets.

In addition to north/south connections, this concept also proposes expanding the local network to maximize connections to important destinations adjacent to the corridor, particularly through the Midway Marketplace development which is currently a barrier to the street grid.

RESTORED NETWORK CONCEPT



RESTORED STREET NETWORK



LEGEND

- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

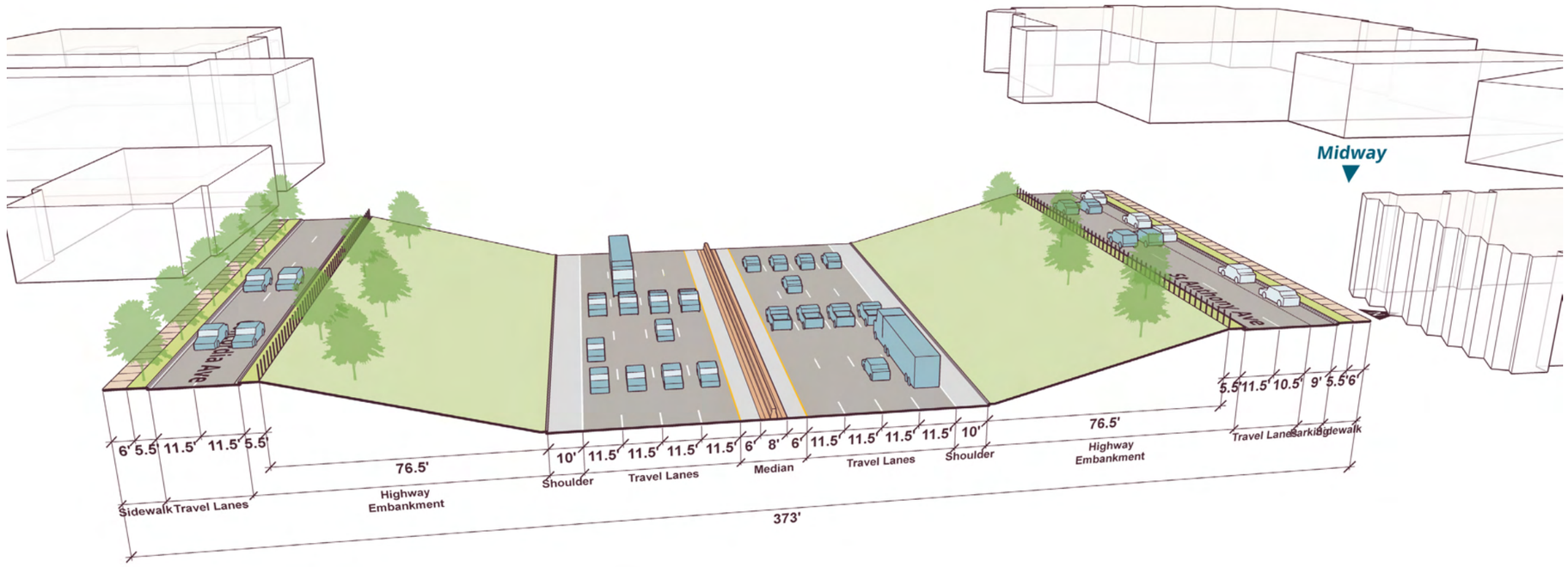
Rondo

The historic Rondo neighborhood, split in half by I-94, is bounded by Lexington Avenue to the west, Rice Street to the east, Marshall Avenue to the south, and University Avenue to the north. Rondo has long been a thriving, predominantly African American community (with nearly 85% of Saint Paul's Black residents living in the area). Rondo was a cultural and residential hub for Black Saint Paul residents, as racially restrictive housing covenants limited housing options for residents of color.

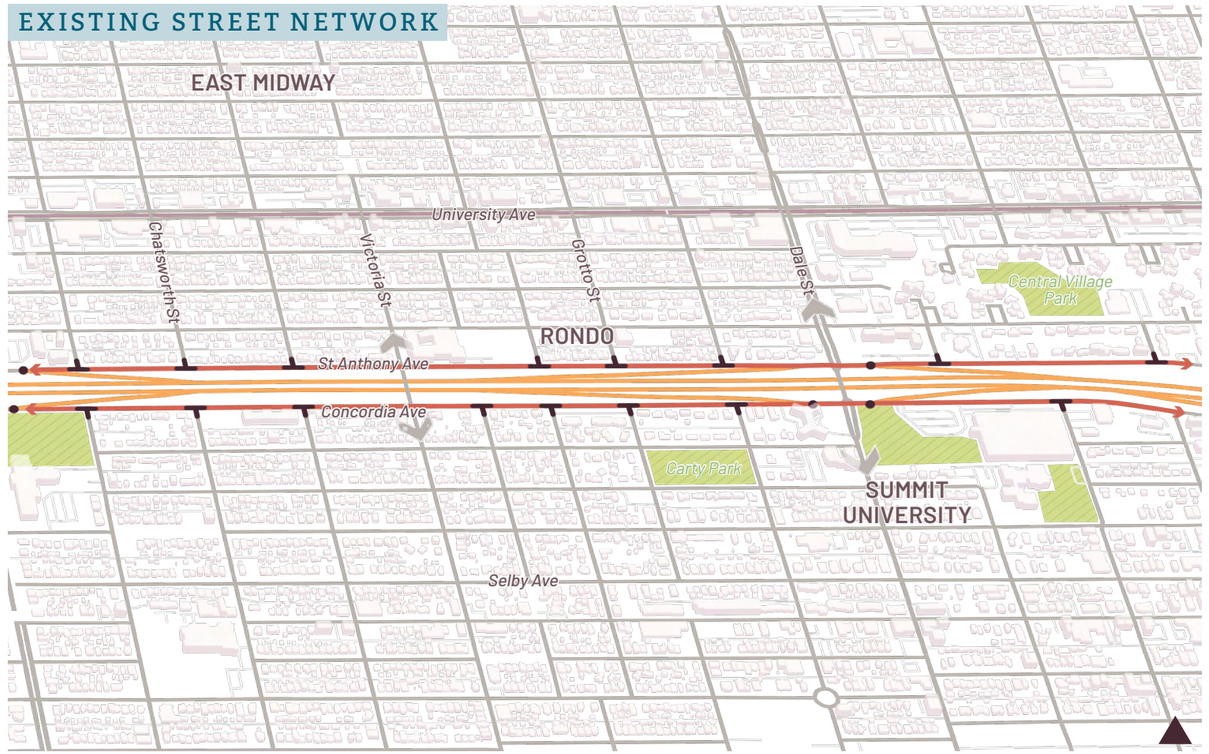
The neighborhood was severely and disproportionately impacted by the construction of I-94. The core of the neighborhood was demolished to make way for the freeway, destroying thousands of homes and hundreds of businesses, eliminating generational wealth and contributing to the Twin Cities' steep racial disparities.

Though these impacts are felt today, Rondo has retained a strong sense of community and cultural identity. Rondo is home to many community services (e.g., the Rondo Community Land Trust), cafes, restaurants, grocery/markets, churches, parks, and the Rondo Community Library. While there has been acknowledgement and effort by state and local governments to correct past harms, this project has the potential to propel the initiative to reconnect Rondo and advance reparations in close collaboration with local residents and community organizations.

EXISTING CONDITION



EXISTING STREET NETWORK



LEGEND

- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Existing Street Network

The I-94 highway today splits the Rondo neighborhood in half and divides an otherwise well established street grid. Although the network is connected throughout the Rondo and east Midway neighborhoods, there are only two north/south connections across the highway along Victoria Street and Dale Street.

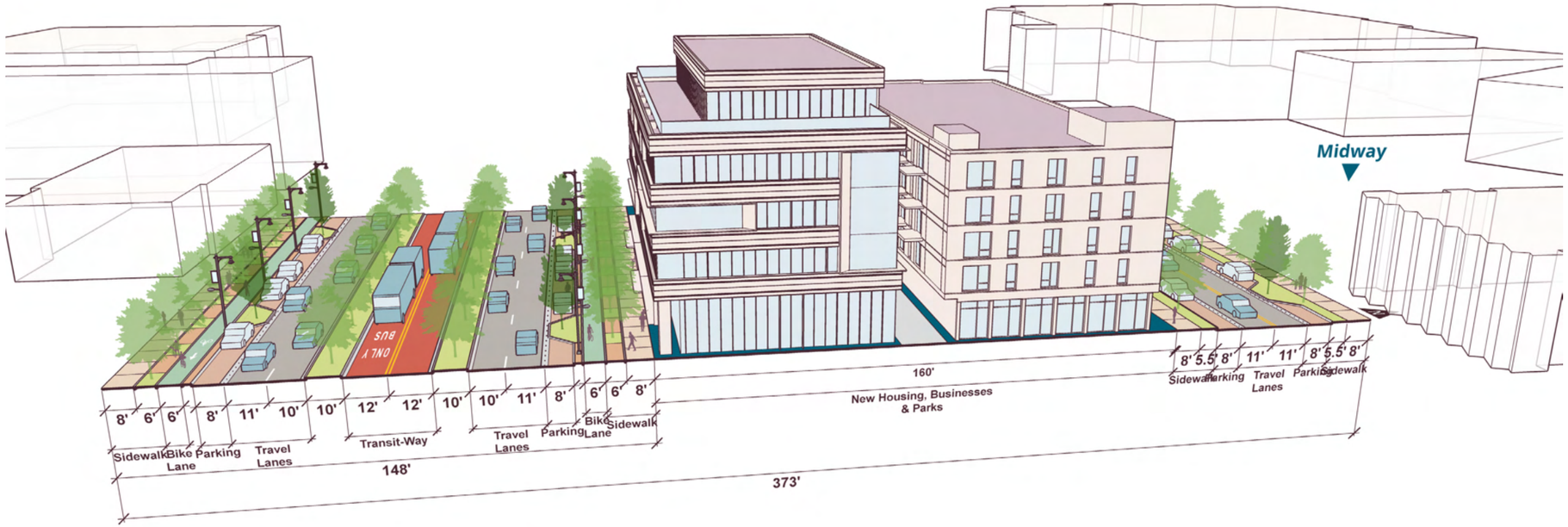
Similar to the Midway area, the highway frontage roads run parallel to the highway through Rondo with entry/exit points along these roads.

Transit Boulevard Concept

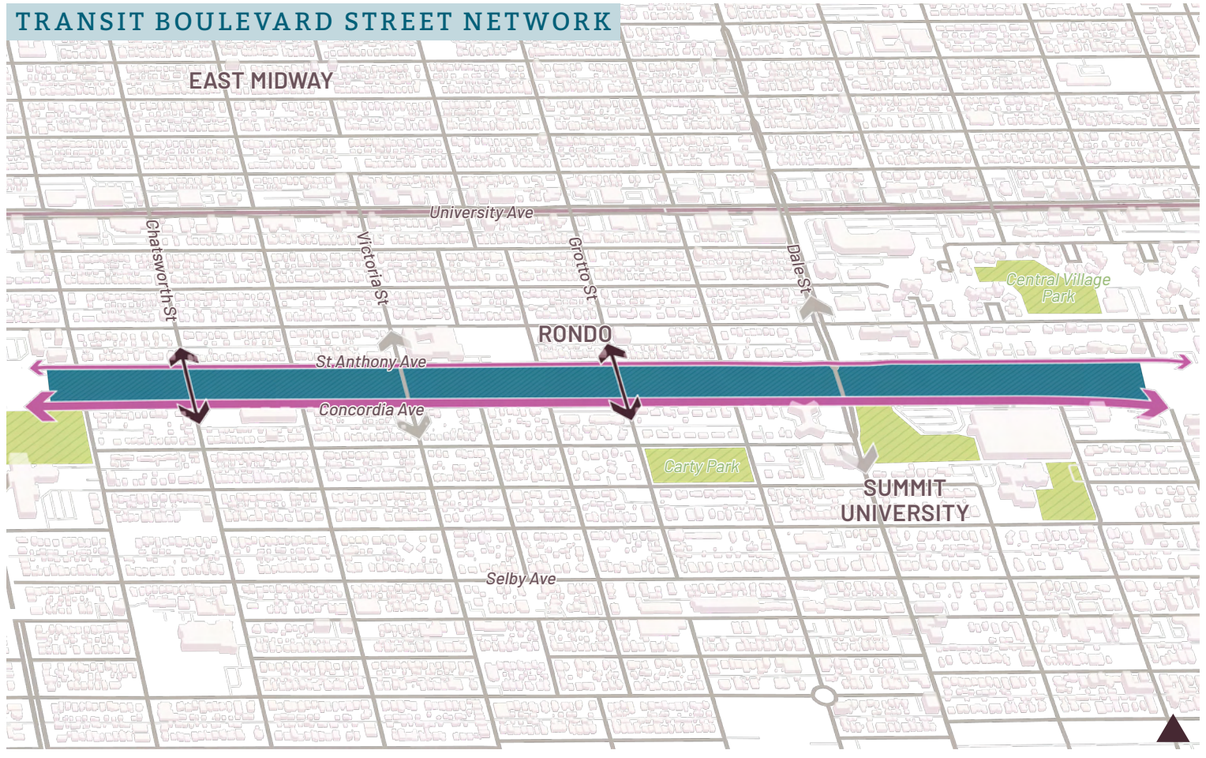
Similar to Midway, the north/south connections would remain largely the same as they are today, with the exception of three new through connections along Chatsworth Street, Grotto Street and Oxford Street.

This concept would further improve the existing network by connecting the grid to the at-grade corridor and proposed developments.

TRANSIT BOULEVARD CONCEPT



TRANSIT BOULEVARD STREET NETWORK



LEGEND

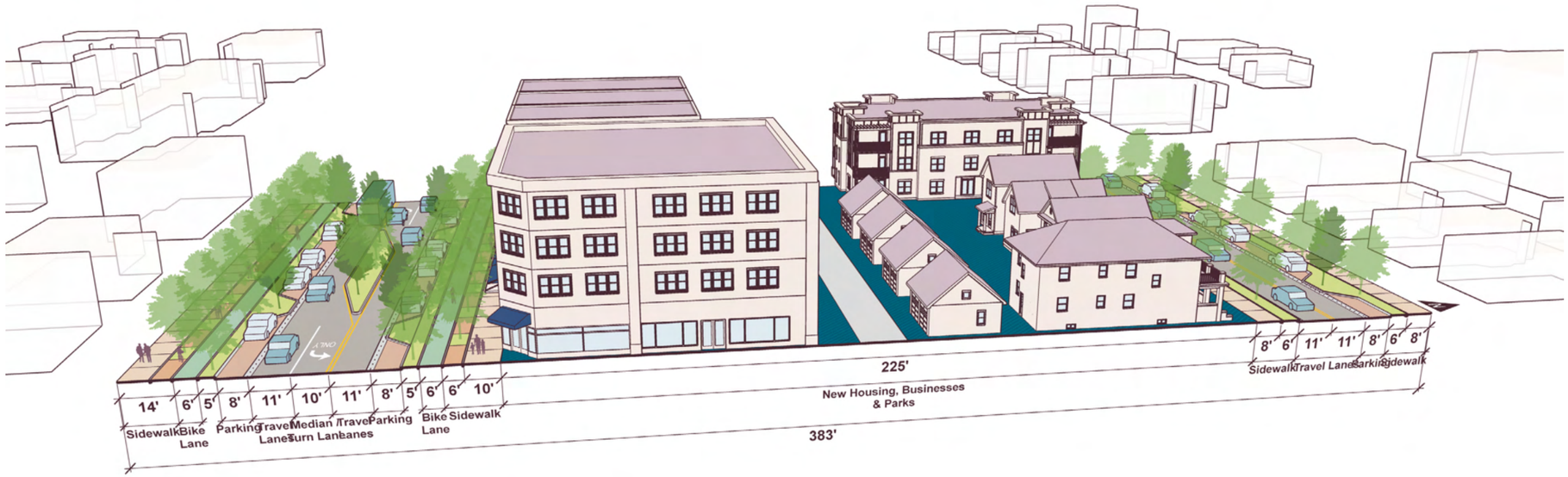
- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Restored Street Network Concept

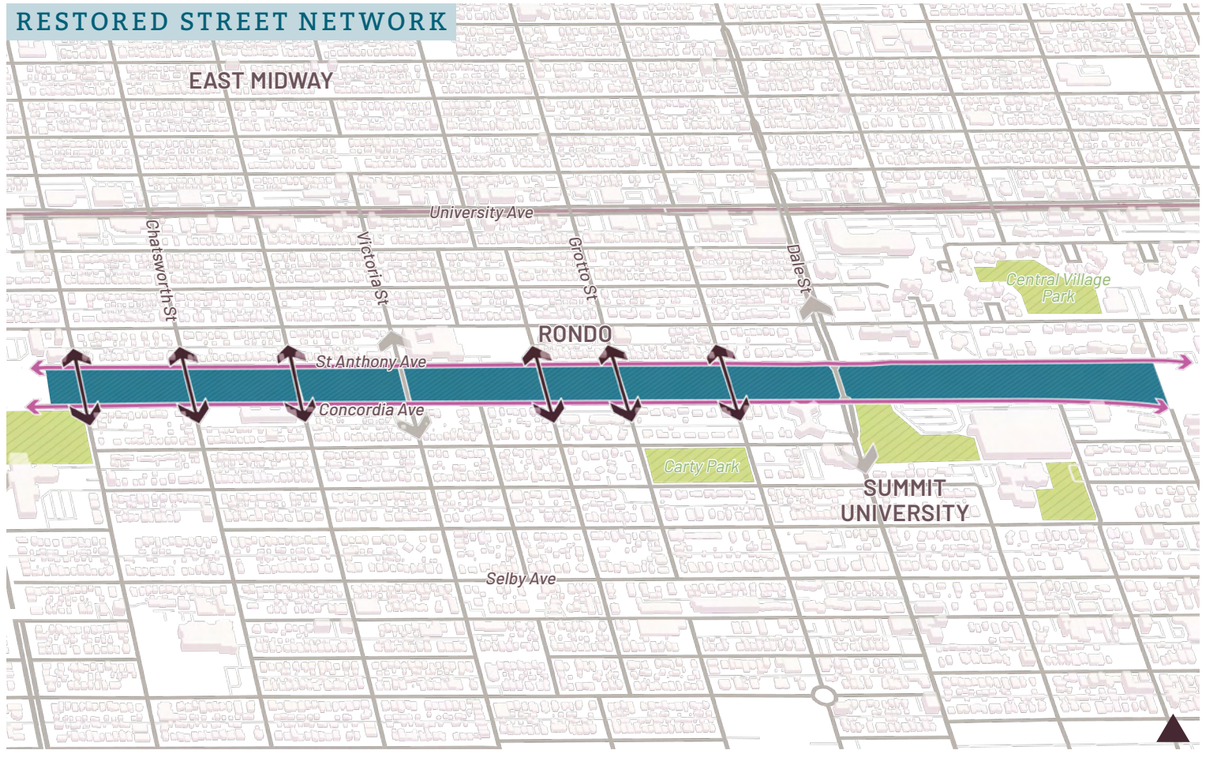
The restored street network concept proposes north/south connections along most streets obstructed by the corridor, except for where existing developments prevent reconnecting the grid along Fisk Street, Kent Street, and Mackubin Street.

This concept would facilitate a more complete street network through Rondo.

RESTORED NETWORK CONCEPT



RESTORED STREET NETWORK



LEGEND

- Major Highway
- Major Railway
- Existing Streets
- Proposed Street
- Waterbodies
- Parks & Recreation
- New Housing, Businesses, & Parks
- Removed Streets
- Existing Highway Frontage Street
- Proposed Boulevard (Primary)
- Proposed Boulevard (Secondary)
- Existing N/S Street Connections
- Proposed N/S Street Connections
- Interrupted Street Connection

Land Bridge Concept

The nonprofit organization Reconnect Rondo has developed a three-to-five block land bridge concept over highway I-94, within a broader African American Cultural Enterprise District plan in the Rondo neighborhood.

A reconnected Rondo and surrounding cultural enterprise district is a critically important vision. The highway removal option can be designed to be compatible with a land bridge. Should the Rondo community desire to reconnect the neighborhood at-grade, then the boulevard could run below grade through this portion of the corridor. This strategy would solve multiple serious problems created by the highway, from neighborhood disconnection to air pollution and community health disparities.

Compared to alternatives that maintain I-94, the below-grade boulevard would significantly increase the amount of affordable, buildable land available for new homes and enterprise-scale businesses by reducing the width of the roadway under the bridge.

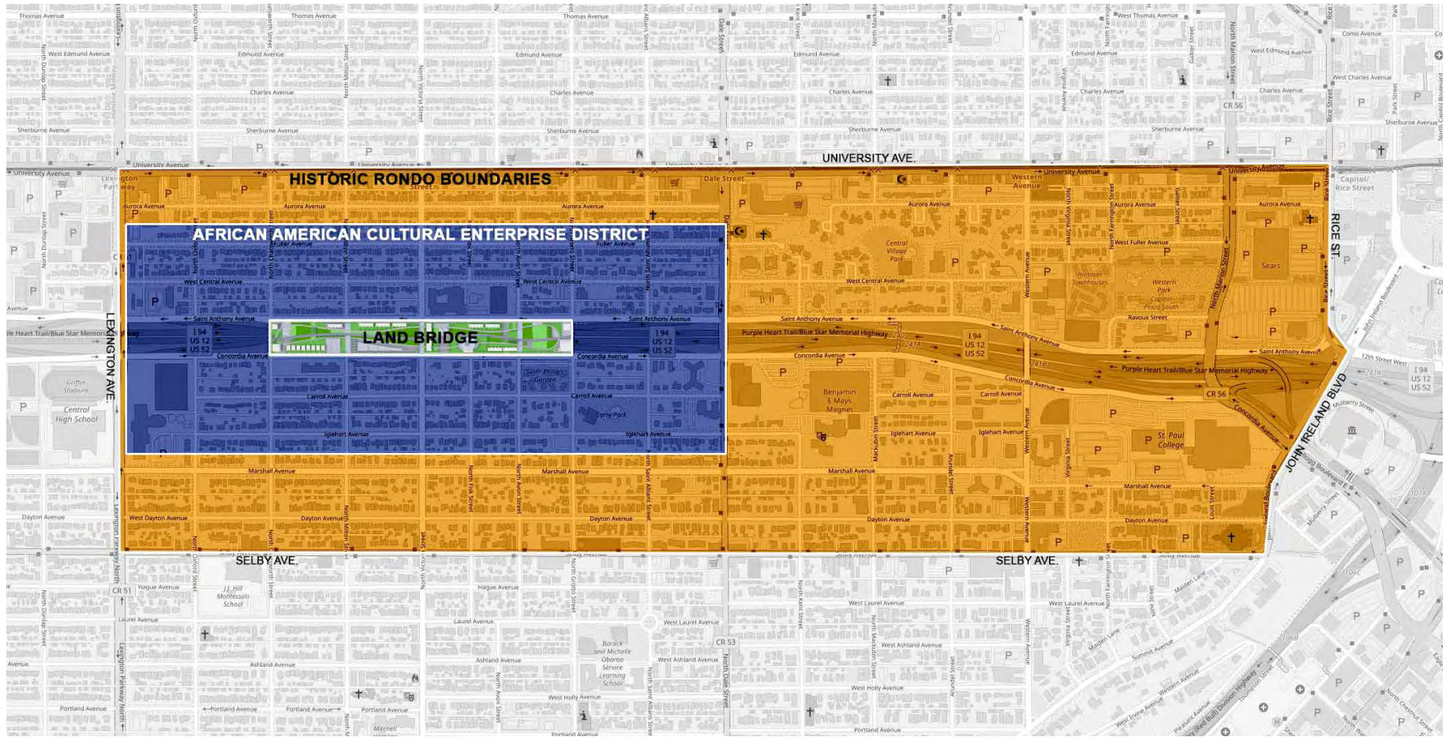


Figure 17. The boundaries of a proposed African American Cultural Enterprise District and Land Bridge across I-94 in the Rondo neighborhood. Source: Reconnect Rondo

Pedestrian connections over I-94 are few and far between in the Rondo neighborhood.

Figure 18. Aerial view of pedestrian bridge over I-94 today near Chatsworth Street North in the Rondo neighborhood.

Highway removal allows for true reconnection in Rondo, with abundant space for community gathering.

Figure 19. Rendering of the intersection of Chatsworth Street North with a transit boulevard option in the Rondo neighborhood.

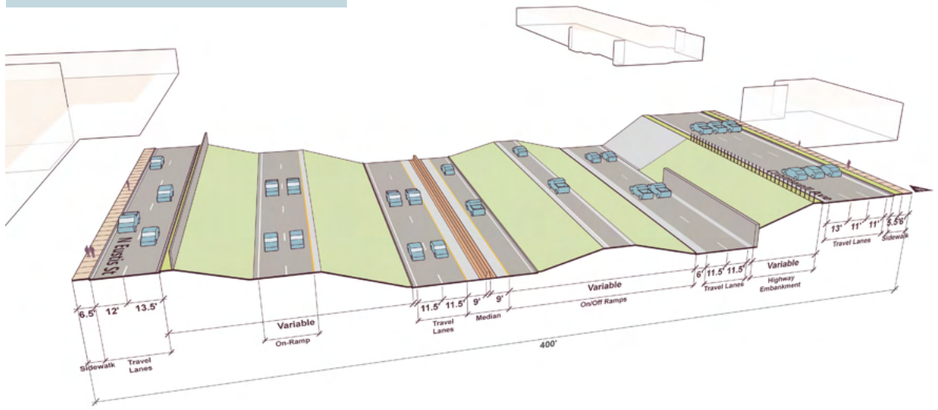
The corner of Dale Street and Old Rondo Avenue today, with I-94 behind.

Figure 20. Street view of Dale Street bridge over I-94 intersecting with Old Rondo Avenue, looking north. Source: Google Maps

With a transit boulevard, the freeway trench could be repurposed to restore a walkable main street in Rondo, creating space for new affordable housing, locally owned businesses and green space.

Figure 21. Rendering showing street view of Dale Street at the intersection of "Rondo Boulevard" and the transit boulevard.

EXISTING CONDITION



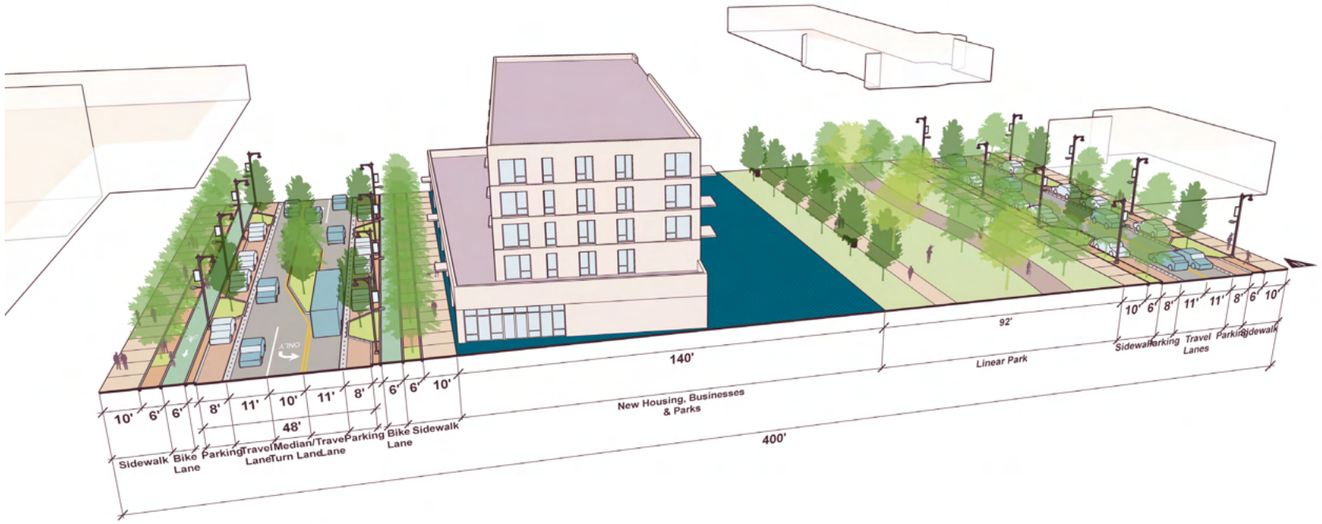
Highway 280

While the current project area only encompasses I-94, this report recommends expanding the scope to include the portion of Highway 280 south of Energy Park Drive in Saint Paul. There is a need to expand the project scope to realign the broader transportation network.

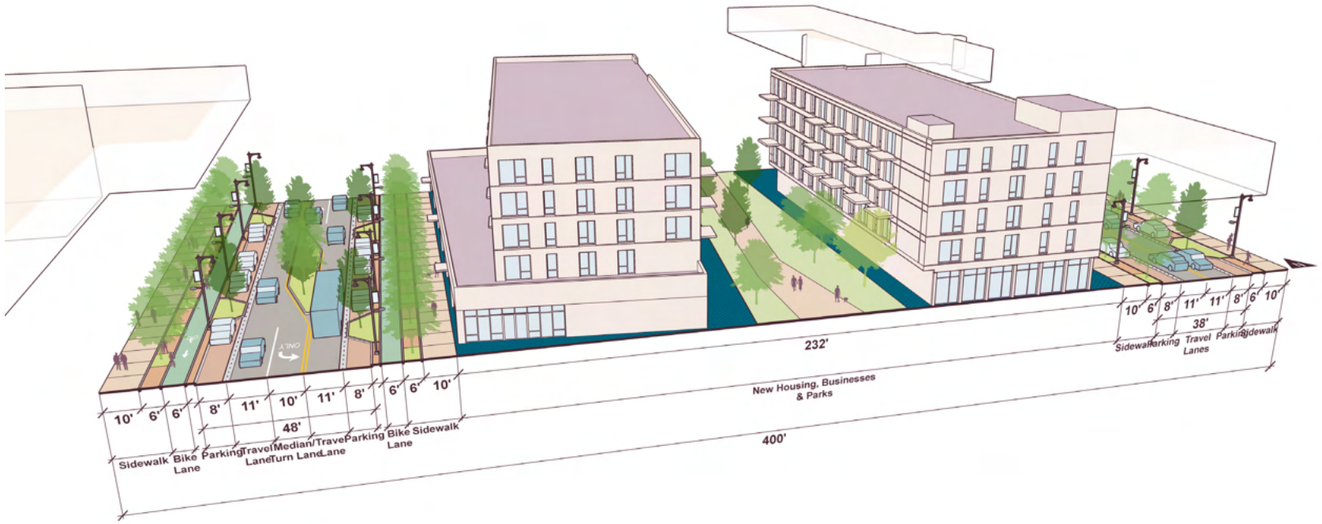
Should the *Rethinking I-94* project result in a boulevard conversion of I-94, this segment of Highway 280 would be significantly overbuilt. Filling in the Highway 280 trench and reimagining the I-94 interchange would reconnect South St. Anthony Park and create extensive opportunities to repurpose highway right-of-way for new housing, businesses and parks.

This report proposes two potential designs for this segment of Highway 280: a linear park option and a restored network option.

LINEAR PARK CONCEPT



RESTORED NETWORK CONCEPT



Highway 280 interchange with I-94, with an arrow of grade separated on- and off-ramps.

Figure 22. An street view images showing Highway 280 today, as it connects to I-94. Source: Google Maps.

Highway 280 interchange transformed in housing, businesses, a linear park and trail, stitching two sides of Highway 280 together.

Figure 23. An vision for what Highway 280 could be if reimagined alongside I-94.

SECTION 4

Reimagining A Highway

How I-94 Is Used Today

To understand how the Twin Cities Boulevard can meet Minneapolis and Saint Paul's needs for access and mobility, we need to understand current travel patterns.

Using data available from MnDOT, Replica,[1] a platform for built environment data, and data included in MnDOT's *Rethinking I-94* Phase 1 report, we can gain insights into current multimodal travel behavior and volumes.

What follows are the key findings, which are generally corroborated by the traffic data contained in the Phase 1 report.

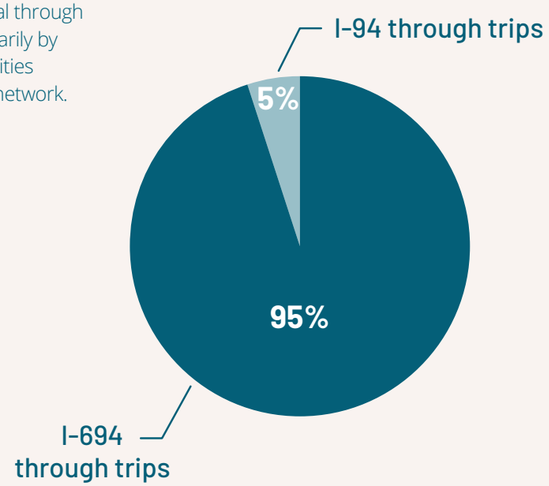
1 Trip data is supplied by Replica, (www.replicahq.com) which uses in-vehicle GPS data scaled to match estimated roadway capacity during peak hours and to match 2022 and 2023 average annual daily traffic (AADT) data from the Federal Highway Administration (FHWA).

CONSIDERATION 1

Through Trips Avoid Using This Section of I-94

"Through traffic" means motorists passing through the Twin Cities with no local destination or origin. In other words, people who are neither starting nor ending their trips in the project area, but are merely passing through it.

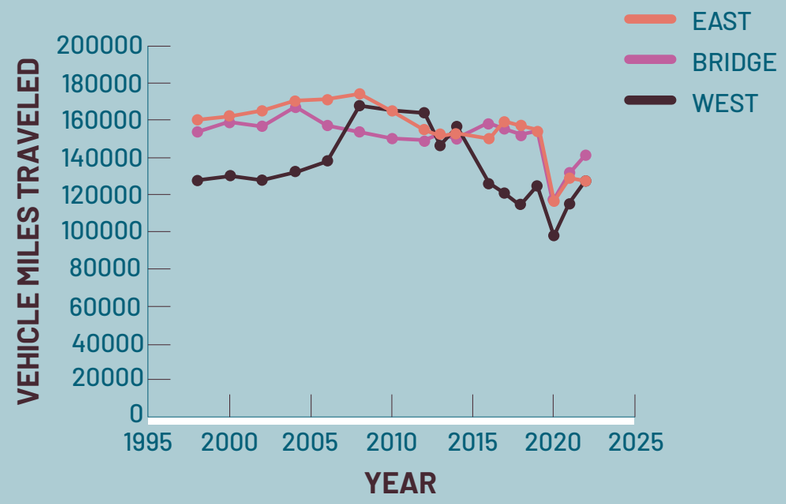
Today, only a small portion of through traffic uses I-94 in the project area. Regional through traffic is served primarily by I-694 and the Twin Cities outer loop highway network.



Since The Pandemic...

Looking at historic traffic trends on MnDOT's website, traffic volumes on I-94 in the study area peaked between 2004 and 2008.

Volumes declined significantly during the pandemic. Overall, VMT is back to 2019 levels, but travel patterns and behavior are different with more non-work trips made throughout the day.



Some key observations recently published at Replica include:

- Transit ridership has fallen off, in the Twin Cities and elsewhere, particularly for longer work trips.
- Downtowns have partially rebounded, as indicated by restaurant spending, but still below 2019 levels.
- Peak volumes are flatter as workers have more flexibility in their commute times.

CONSIDERATION 2

Most Trips On I-94 Are Local

I-94 serves significant daily traffic when compared to other highways in the region, but most of these trips use I-94 within the project limits for short distances. The maps to the right show the most frequently visited destinations and the most frequently completed trips using the study segment of the I-94 corridor.

The most common trips and most visited destinations accessed from the project corridor are almost exclusively within the Twin Cities. Most trips start and end within Minneapolis or Saint Paul. Figure 23 and Figure 24 show the most common trip origins or destinations for trips using this portion of I-94.

AVERAGE TRIP PURPOSE

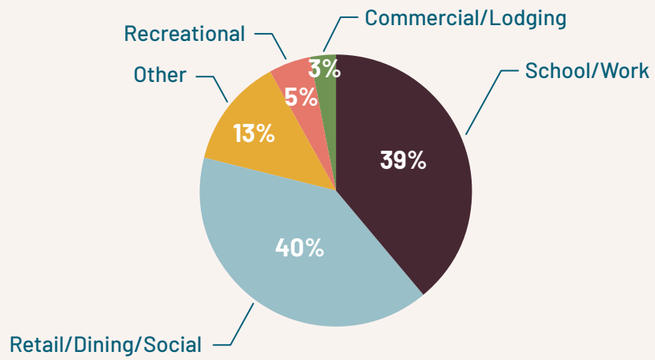
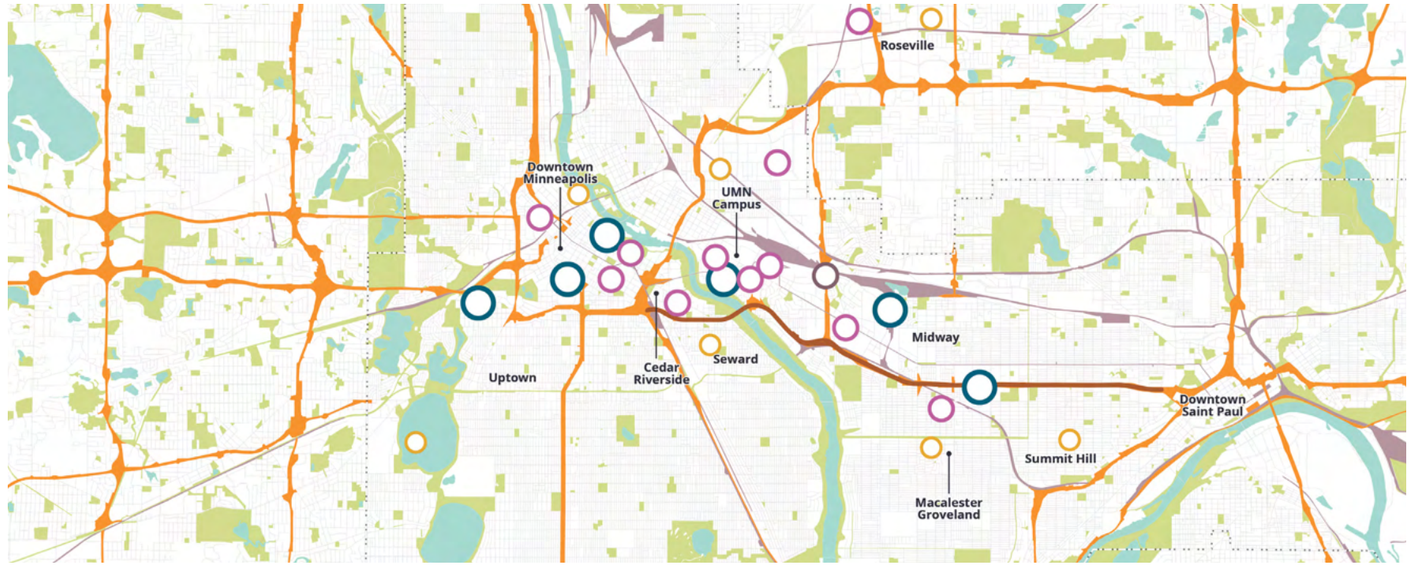
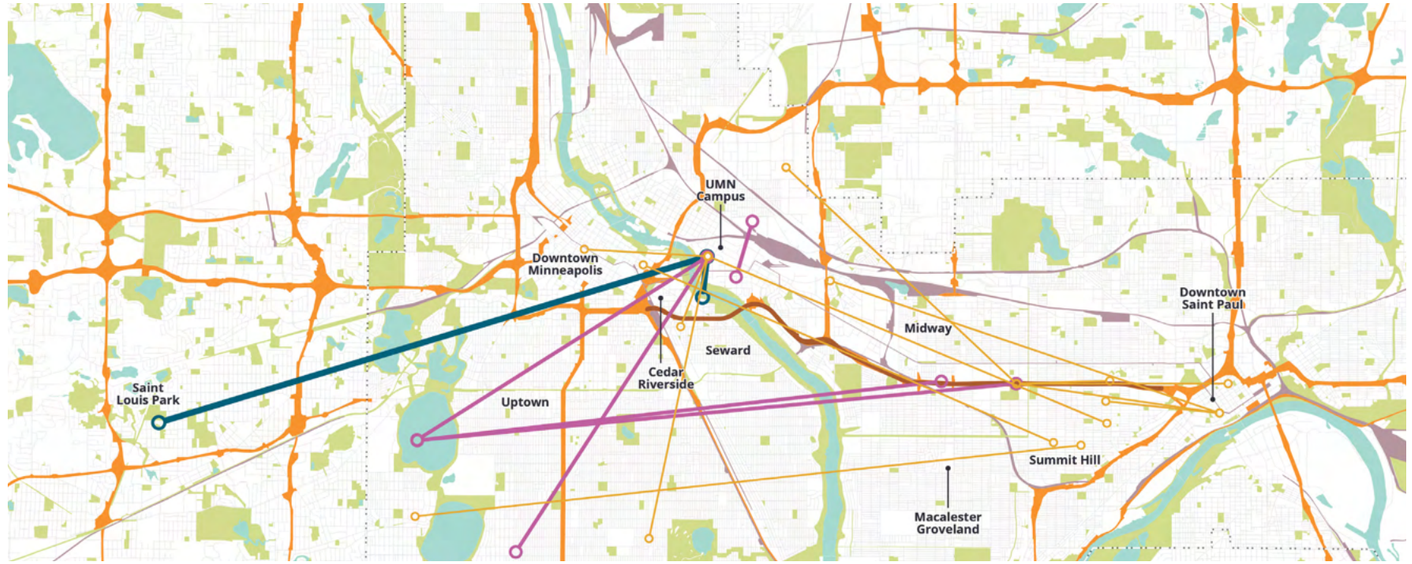


Figure 24. Frequent destinations along I-94 (top).

Figure 25. Frequent trips along I-94 (bottom).





LEGEND

- Major Highway
- Major Railway
- Roads
- Study Corridor
- Twin Cities Boundary
- Waterbodies
- Parks & Recreation

Frequent Destinations (Top 25)
- Over 2,000 Visits
- 1,000 - 2,000 Visits
- Under 2,000 Visits

Frequent Trips (Top 20)
- Over 500 Trips
- 300 - 500 Trips
- Under 300 Trips

0 1 2 mi

CONSIDERATION 3

A Majority of Trips Begin and End Within a Mile of the Study Area

The maps to the right shows the origins (purple) and destinations (orange) of trips passing through the center of the study area near Snelling Avenue. The great majority of I-94 users start and end their trip within a mile of the study area or near downtown Minneapolis or Saint Paul. These motorists rely on the highway for only a portion of their trip.

A well connected network of multimodal urban streets can serve these local trips far more efficiently, and with far less harm than an interstate highway.

The most common average trip duration along I-94 is 5 minutes, compared to 15 minutes and 20 minutes for I-494 and I-694 respectively. The high percentage of local trips using an interstate highway creates bottleneck, congestion, and network issues. Local trips to daily destinations and activities are ideally served by the local street network, which provides direct connections to different areas, disperses traffic, and facilitates efficient local travel.

REGIONAL TRIPS

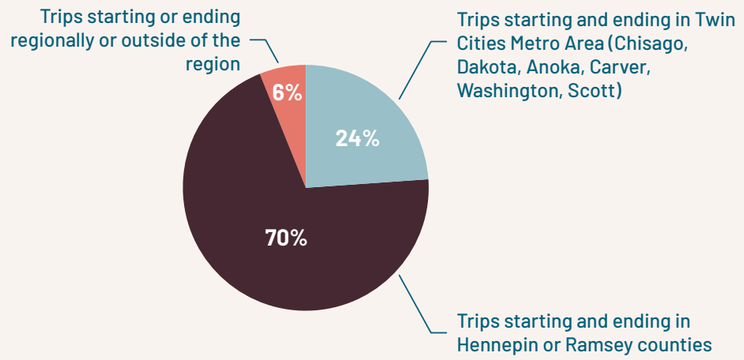
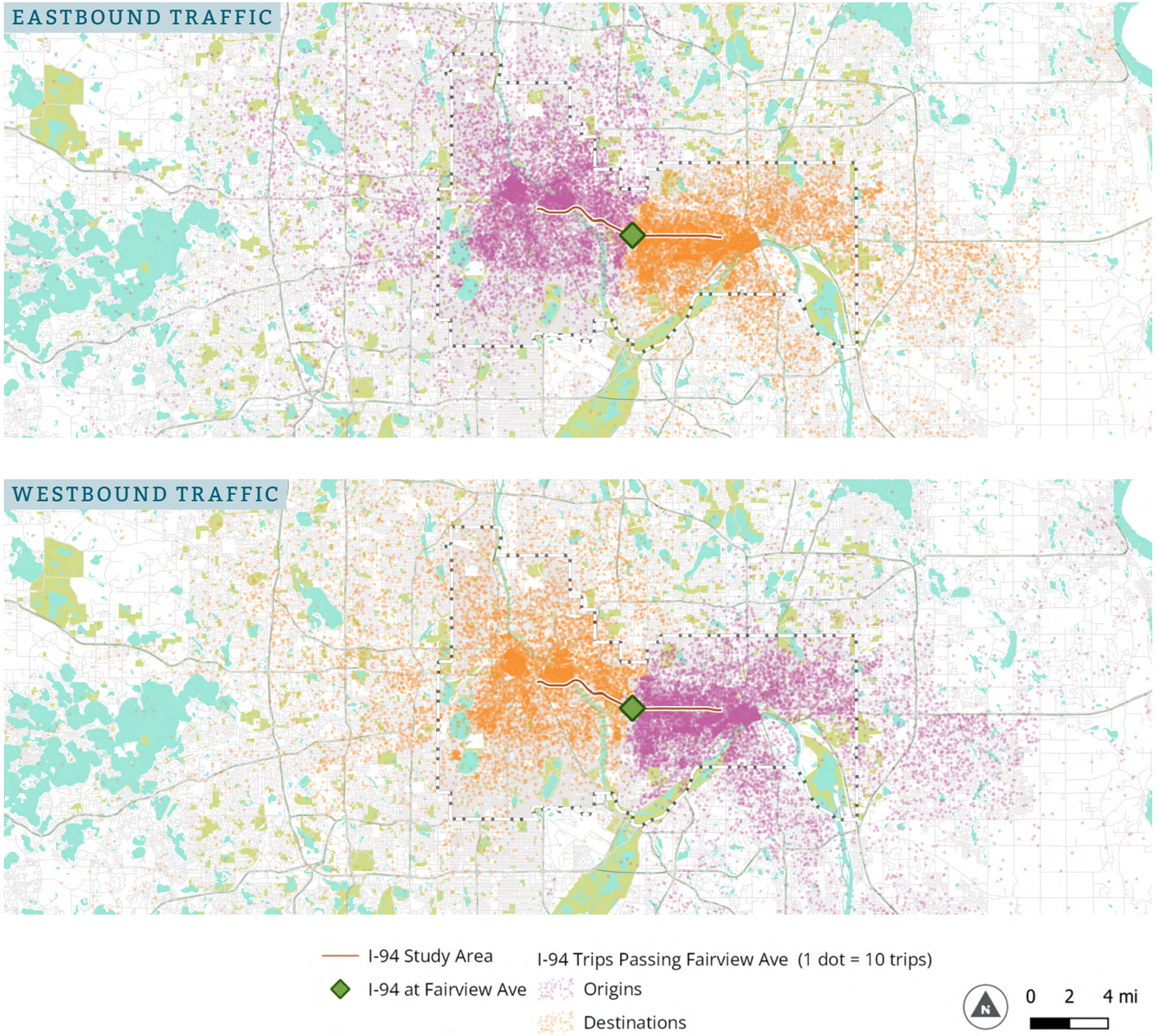


Figure 27. Caption here

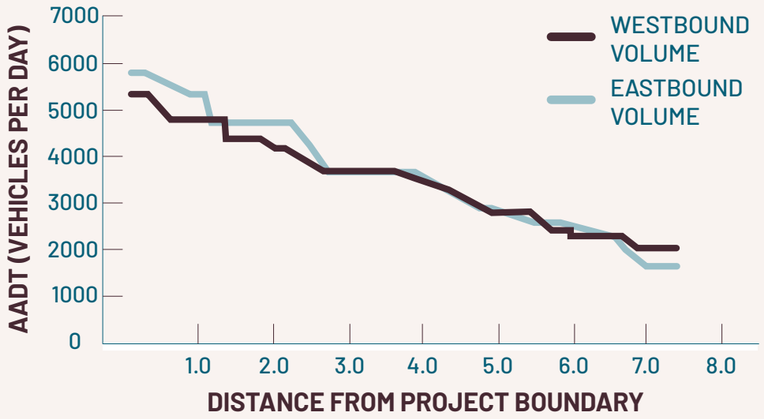
Figure 26. Caption here



CONSIDERATION 4

Most Trips Use the Highway for a Short Distance

Among all trips using I-94 in the project area from either direction, only 33% of vehicles travel through to the other end of the study area.



According to data from Replica, the average trip uses this portion of I-94 for about 4 miles.

AVERAGE TRIP LENGTHS ON I-94

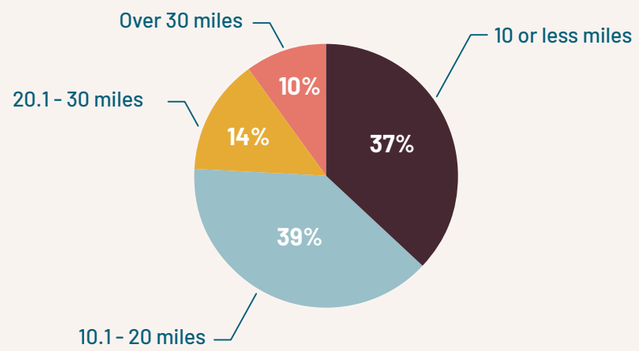


Figure 29. Non-through and through trips by the numbers.

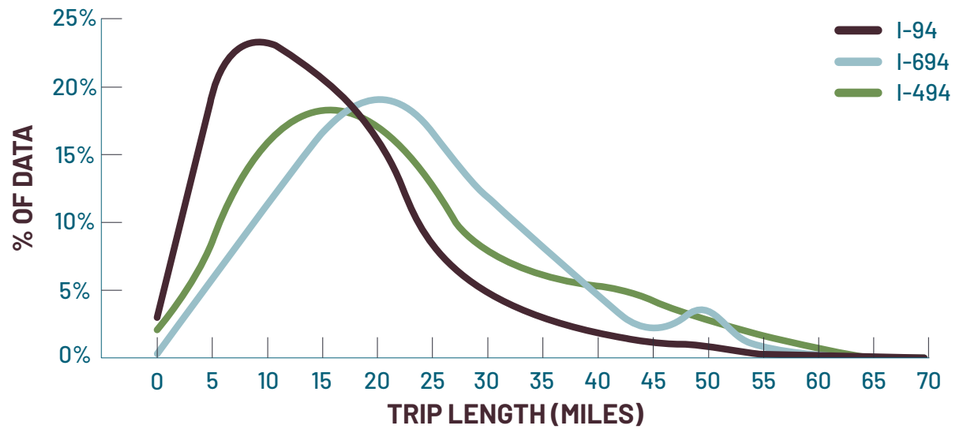


Figure 28. Average trips lengths comparison by highway. i-94 has the shortest trip lengths by far.

CONSIDERATION 5

I-94 is a Barrier

The I-94 trench interrupts the street grid and limits local access, dividing Minneapolis and Saint Paul into north and south. This causes congestion and safety issues where north-south travelers are restricted to specific roadways and bottlenecks at limited entry/exits to I-94 and at complicated highway interchanges.

The barrier is felt most acutely by people walking or biking, as there are relatively few crossing opportunities, many of which also have interchanges. Getting across I-94 is unsafe and uncomfortable for people walking, using wheelchairs or strollers and riding bicycles.

Figure 30. Barriers (in red) compared to through connections (in blue) along I-94.

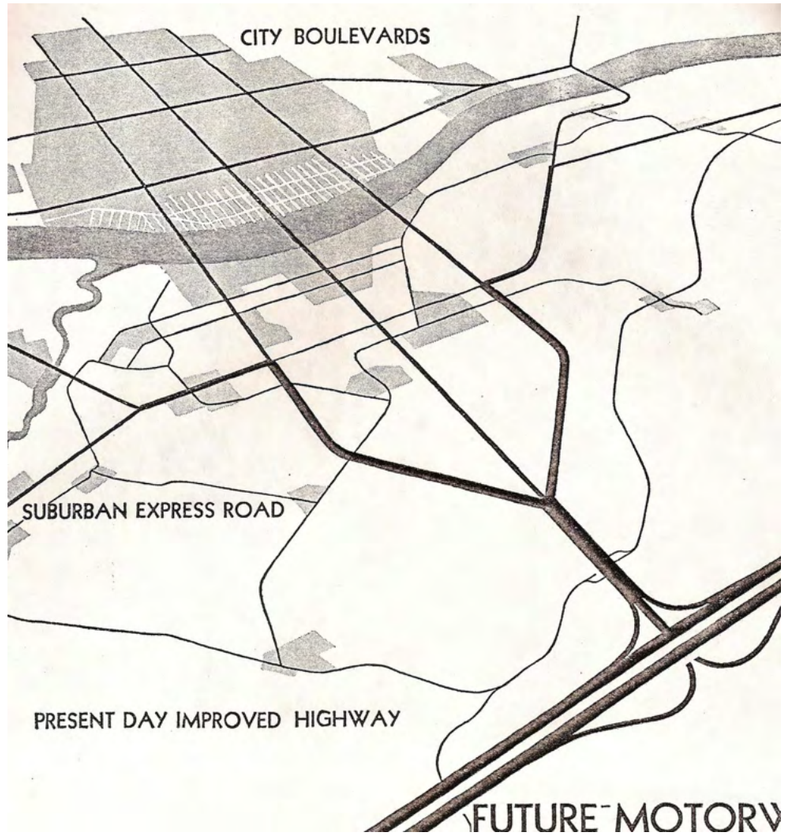


Figure 31. "The Future of Motorways" depicting a highway avoiding the adjacent city, instead connected to it via a connected network of "feeder" streets. Source: Norman Bel Geddes

The Purpose of Interstate Highways

When the interstate highways were built through cities in the mid-20th century, engineers and planners upended centuries of city-building knowledge.

Traditionally, city street networks evolved to promote connectedness and social and economic exchange. As interstate highways were built, these values were supplanted by a focus on moving automobiles quickly and eliminating traffic congestion. The form and function of streets quickly realigned as well, given over to a functional classification system (i.e., local, collector, arterial, and highway) that has proved to be very damaging to American cities.

The interstate highway system was originally envisioned as a European-style network of highways that connected rural areas to cities, and cities to each other, but would not go into cities. Rather, motorists would use the urban street network to navigate to their final destinations.

However, as the growth of automobile use brought traffic congestion on city streets, increasing pressure to build highways into and and across cities grew, and highway links such as the I-94 were constructed, causing devastation to many Twin Cities neighborhoods.

The development of US urban highwaysresulted in myriad external problems, and encouraged more motor vehicle use and more vehicle-miles traveled (VMT). The goal of reducing congestion has never been achieved, as increased highway capacity simply drew more users, resulting in perpetual peak hour congestion.

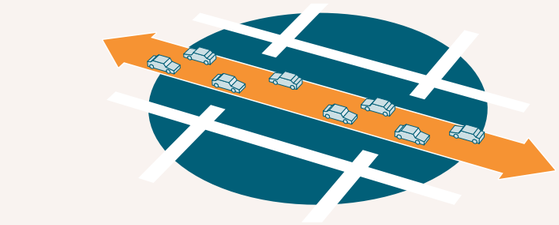
Adapting to the Removal of I-94

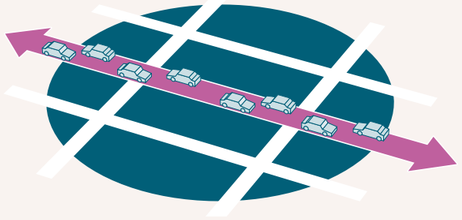
Successful highway removal requires a network solution.

Streets or boulevards that replace the highway will not provide the same vehicle throughput, but with improved street connectivity and multimodal infrastructure, people will adapt to the new network.

Changes in infrastructure will lead motorists to change their habits, such as taking a different route, traveling at different times or choosing a different destination.

The trips made on I-94 today will fall into one of the following categories in a highway removal scenario:





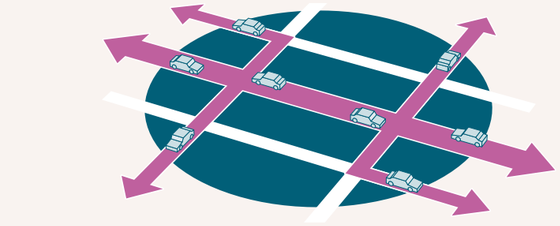
ACCOMMODATION

Traffic can be accommodated with a multimodal boulevard and well-connected street network that provides efficient, direct routing of trips.

A transitway operated on the I-94 corridor can serve many person-trips that are currently made on I-94. High-quality bike infrastructure will encourage mode shift for the many short trips within the study area. Rapid adoption of electric bicycles is changing mode choice for many who do not now consider traveling by bike.

New housing and businesses within the project corridor would encourage walking and biking. Working from home provides greater flexibility in when and where people travel.

The design of the boulevard matters - a four-lane roadway will carry more cars than the two-lane option. A multiway boulevard, with separate through lanes and access lanes, provides even more capacity. However, scaling up a roadway does not increase vehicle capacity proportionately, as larger roads are much less efficient. Moreover, scaling up the roadway impacts road safety and walkability.

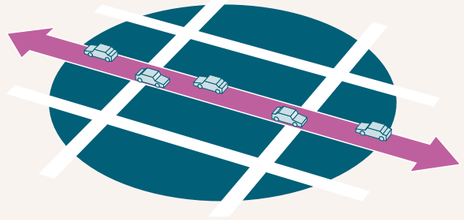


DIVERSION

It is not necessary to supply equal vehicle throughput capacity on the boulevard as traffic will disperse to other parallel routes, and there will be changes in trip making in response to changes in the transportation infrastructure.

Many motorists making local trips currently go out of their way to hop on and off I-94 as part of a short trip, even when more direct routes on local streets are available. Following a highway removal, these trips will use more direct routes on the reconnected local street network.

Many parallel corridors to I-94 are significantly underutilized during peak hours and can absorb additional traffic without widening, while maintaining slow safe speeds.



EVAPORATION

Traffic evaporation, sometimes called "reduced demand," describes the process in which traffic is reduced on roadways in which space is reallocated to non-automobile modes, such as walking, biking and transit.

When roadway capacity is reduced, drivers change their behavior so that traffic volumes actually go down. In some instances, traffic volumes are reduced by "efficiencies," such as traffic signal synchronization. Most often, however, it is individual travel decisions, made by hundreds or thousands of drivers, that changes.[1]

1 https://ideas.repec.org/p/uab/wprdea/wpdea2011.html

Trucks and Freight Traffic

Freight movements along I-94 include through traffic as well as truck traffic generated within the project area. About 6,000 commercial truck trips use I-94 on a typical day, which includes trucks of all sizes, compared to the total vehicle volumes of up to 140,000. An Urban Freight Study was conducted as part of Phase 1, which provides insights on freight movements to, from and through the study area.

Figure 14, from the Urban Freight Study, shows freight districts in the vicinity of I-94.

Key findings about freight movements and these districts include:

- The most common industry types for freight movement in the corridor are generally retail related, including motor vehicles, furniture, electronics and clothing.
- The project area was divided into freight districts. The districts with the greatest reliance on I-94 in this study area include Hiawatha, Midway, Snelling and Downtown Saint Paul. These freight districts are characterized by serving intra-regional routes, and smaller trucks.
- The freight districts with the largest trucks and longest trips are clustered to the north, including Como, Northeast, and Roseville and make relatively less use of I-94 in the study area.
- An environmental justice analysis found that lower income people experienced greater exposure to freight traffic, and recommends reducing the impact of air and noise pollution on these communities. (see "What About Air Quality?" sidebar)

The highway removal options will maintain access for commercial traffic to serve businesses along the corridor. The travel lanes and intersections will be designed to accommodate truck traffic.

Through freight traffic, or longer regional freight trips, is expected to divert to other trunk line highways (I-694). Because freight trips tend to avoid peak hour travel, this diversion is not expected to exacerbate peak hour traffic congestion.

An updated regional travel demand model would be useful in determining the locations of freight bottlenecks, and measures to address these can be included in the project.

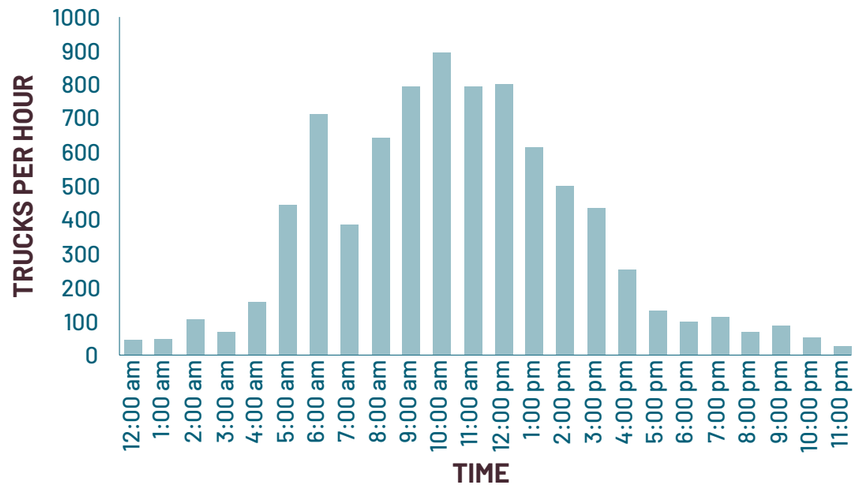


Figure 32. Freight traffic is typically relatively low during the morning and evening peak hours of traffic, so it is relatively less affected by peak hour congestion.

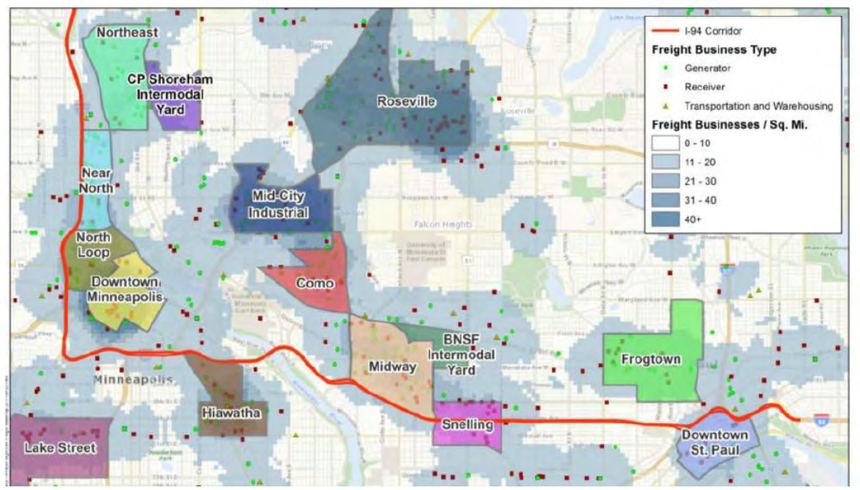


Figure 33. shows freight districts in the vicinity of I-94, from MnDOT's Phase 1 Urban Freight Study.

CONSIDERATION

Air Quality

Proponents of increasing highway capacity often justify it by suggesting that it will reduce air pollutants and greenhouse gas emissions by relieving congestion. In reality, this does not happen.

Instead, motorists shift onto the expanded highway until the same level of congestion occurs, and emissions increase due to more vehicles using the expanded highway.

Expanded highway capacity does not reduce emissions. Rather it increases them in the long term. The way to reduce emissions is to reduce driving, or VMT. This can best be done by reducing highway capacity, leading to reduced highway demand, and ensuring that lower-emitting alternatives are convenient and comfortable.

CONSIDERATION

Emergency Vehicles

Highways create barriers to emergency services just as they do for other mobility needs. Emergency responders typically take the most direct route, more often using urban street networks rather than freeways. Connected city street networks are designed to be redundant and resilient in the event of emergencies as they provide multiple route options if one street is closed.

Dedicated bus lanes can also be used by emergency vehicles, providing fast and reliable route options. Using a freeway for emergency response requires all traffic to weave and shift lanes, which itself in creases the risk to the traveling public.

Emergency response to crashes or other incidents on urban freeways are often problematic, particularly if occurring during a period of traffic congestion. Circuitous routing may be required for accessing the site, and require all highway traffic to clear the way, leading to more potential conflicts.

Evaluation of the I-94 Alternatives

The health and well-being of communities along I-94 has suffered from the highway's presence.

MnDOT officially endeavors to prevent this harm, stating in the project purpose and need that they are seeking to "improve relationships with communities" and have "made a commitment to working with stakeholders, coordinating agencies and other organizations to advance objectives beyond transportation that prioritize the wellbeing of those that live, work, and recreate near the corridor."

These statements show intention on the part of MnDOT to pursue a project that will be restorative and account for the past and present harms that resulted from the construction of I-94.

To make good on this commitment, *Rethinking I-94* alternatives must be evaluated with the health and well-being of corridor residents as its highest priority. MnDOT is currently evaluating ten project alternatives ranging from highway expansion to at-grade boulevards.

Concerns and suggestions regarding the evaluation criteria are summarized next.

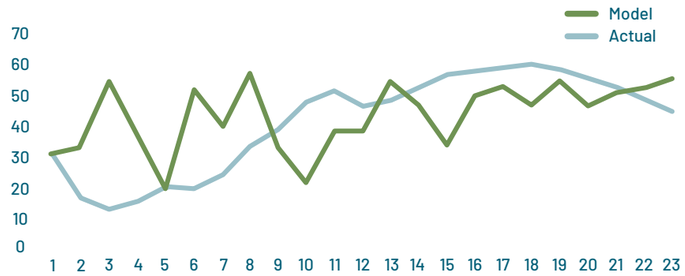


Figure 34. Chart showing speeds on I-94 during evening peak, model numbers vs actual numbers.

CONSIDERATION 1

VHT

MnDOT's evaluation includes quantitative measures of the time people spend in vehicles ("vehicle-hours traveled," or VHT), average speed that can be maintained on highway travel lanes ("mainline speed") vehicle congestion and travel delay.

Problem: The MnDOT base year analysis for corridor traffic speeds is demonstrably inaccurate (See Figure 33 and more discussion in the "Appendix"). Any predictions of the change in speed in response to roadway network changes in the alternatives will therefore be unreliable.

Problem: The significant potential for the highway removal options to reduce VHT is not reflected in the evaluation, as future redevelopment is not included in MnDOT's modeling. The redevelopment of the I-94 right-of-way would bring many new residents and businesses to a highly accessible location with excellent multimodal access, lowering VHT.

Solution: Highway removal scenarios should inlcude new development inthe highway right-of-way, shifting growth patterns to reduce regional VHT.

CONSIDERATION 2

VMT

Vehicle Miles Traveled (VMT) is an important measure of the efficiency of the transportation system, and is proportional to greenhouse gas emissions.

Rapidly reducing VMT is a goal of the State of Minnesota.

Problem: MnDOT is not using analytical tools that show the reduced demand and reduced driving/VMT that would result from a boulevard conversion. Reduced driving/VMT would partly be due to new land-use opportunities as noted previously, where housing and jobs would be provided in highly accessible locations.

In order to plan for reduced emissions and reduced VMT, a multipronged analytic approach is needed that tests the full range of options to reduce emissions, in particular reduced demand arising from reduced highway capacity.

Problem: VMT is also influenced by transit ridership. With the high potential for redevelopment of the right-of-way documented in this report, more people will have access to transit, and transit ridership and mode shares can increase. However, if MnDOT does not consider the future changes in land-use, this analysis will not be accurate.

Solution: Develop and use modeling techniques, such as dynamic trip assignment, that reflects travel behavior that reduces VMT.

CONSIDERATION 3

ENVIRONMENTAL JUSTICE AND LIVABILITY MEASURES

MnDOT is rightly seeking to evaluate each alternative through the lenses of environmental justice and livability.

However, the execution of these important evaluation criteria is problematic, limited only to a "Yes/No" measure for each characteristic.

Example: "Public health and the environment" is measured by an evaluator answering yes or no to the question, "does the alternative have the potential to impact green space or land-uses that benefit quality of life and the environment?" The highway removal alternatives would offer far superior green spaces and human-friendly land-uses than any of options that maintain or expand the highway.

However, if the MnDOT employees or contractors conclude that there is "potential" for even a small amount of additional green space in any given option, then it will receive the same score as highway removal options, despite highway removal producing a vastly different outcome.

Example: MnDOT's Economic Vitality measure considers "Employment opportunities (jobs) accessible within 30-minute travel time." I-94 bulldozed and destroyed much of the local economy, eliminating many nearby jobs. The highway removal options open vast tracts of land for local commercial development and new jobs, as documented in section 6.

As in the above example, these benefits will not be considered in the evaluation if MnDOT does not account for the potential of new land-uses in the repurposed right-of-way.

Rewarding Short Trips

It's crucial to recognize that the total number of trips is directly linked to the level of social and economic activity in an area: more trips indicate increased activity and vibrancy.

Although both long and short trips serve the same purpose and contribute equally to the economy and society, they differ significantly in costs.

For instance, consider two people who work in the same office: one person lives eight blocks away (1 mile), while the other lives fifteen miles away. While both trips benefit society equally, the latter incurs significantly more public infrastructure costs and is less efficient regarding land and energy consumption. Opting for shorter, non-automobile trips would enhance efficiency in land and energy consumption. For example, if the first person decides to walk instead of drive for her short trip, it would further reduce energy and land usage.

It is trip-making that helps the economy, not traffic. Highways create a lot of traffic but not a lot of trips.

Thus, initiatives like *Rethinking I-94* should fully include alternatives that reconnect a transportation network that prioritizes short trips to promote sustainability and efficiency in transportation. By accommodating numerous short trips with the same infrastructure investment required for a single long trip, we can achieve significantly greater societal value.

CONSIDERATION

State and Local Policies that Support Highway Removal

MnDOT's stated "purpose" within the draft *Rethinking I-94* purpose & need document includes "Support transportation objectives consistent with adopted state and regional (Met Council) plans."

As such, the project evaluation process must consider local, regional and state goals to rapidly reduce vehicle miles traveled (VMT), which was determined to be necessary to achieve climate goals. These goals include:

GOAL 1

MnDOT's goal in the 2022 Statewide Multimodal Transportation Plan to reduce statewide VMT 14% per capita by 2040

GOAL 2

The City of Minneapolis has set a goal to reduce vehicle miles traveled by 1.8% per year

GOAL 3

The City of Saint Paul's Climate Action and Resilience Plan set a goal to reduce VMT 40% by 2040, or approximately 2.5% per year.

The plan's sustainable transportation section includes a goal to "Identify strategies to mitigate the impacts of inner-city highways including capping, conversion to boulevards, or complete removal."

The Benefits of a Boulevard

An I-94 boulevard conversion has the potential to benefit not only highway-adjacent communities but also the larger Twin Cities region.

Highway removal projects across the world are proving their positive impacts to local communities, including enhanced mobility options, community investment, and improved health of residents along with environmental benefits.

The scale and type of benefits depends on local context and the type of removal project. Impacts will vary from city to city and neighborhood to neighborhood along a given corridor. This section outlines the benefits that boulevard concepts could bring to the Twin Cities region, while the following section will explore how these impacts may be applied to neighborhoods along the corridor.

Access and Circulation

Adding or expanding high-capacity corridors has been shown to create congestion issues and barriers to local networks.

Conversely, a connected network disperses traffic and provides better access and circulation. Converting the highway to a multimodal boulevard would significantly improve connections locally and in the greater Twin Cities area.

Local Connections

I-94 divides numerous neighborhoods throughout the corridor and restricts mobility. The highway is a major barrier to local circulation because there are limited north/south connections across the highway. These limited connections also often serve as the access points to the highway, putting additional burden on these routes and creating congestion that further restricts mobility. The boulevard conversion would allow neighborhoods to be reconnected, improve north/south mobility, and expand the multimodal transportation network.

This would also increase street network capacity. **Though counterintuitive, highway conversion projects enhance the capacity of the transportation network.**

Expanding connections to and across the corridor reduces congestion and bottlenecks and improves the flow of traffic. Converting the highway to a boulevard would encourage behavior changes that further impact network capacity. Drivers are more likely to choose alternate routes, or work remotely, reducing the burden of traffic along the corridor. With better multimodal options, people are also more likely to choose to walk, bike, or take transit to their destinations, further reducing transportation loads.

The Multimodal Network

Where the highway currently only serves vehicles, the proposed boulevard would serve all modes of transportation. This corridor is an important connection from downtown Minneapolis to downtown Saint Paul.

The boulevard would improve multimodal travel to the downtowns by providing bicycle and transit connections, greatly expanding the greater Twin Cities area bicycle and transit networks. **Enhancing local and regional network connections for all modes also helps economic vitality by improving visibility of and access to local businesses.**

Additionally, the proposed boulevard conversion would improve neighborhood walkability and bikeability by creating safe, comfortable, and appealing places to walk and bicycle along and across the corridor. Improving multimodal connections is vital to creating an equitable transit system, where not all users have access to vehicles and may rely on transit or active transportation to get to their destinations. Improving local connections for all modes of transit benefits the local economy.

This project aligns with state goals established in the Statewide Pedestrian and Bicycle System Plans to support local and regional pedestrian and bicycle routes and improve comfort and safety for active transportation users. This also supports both Minneapolis and Saint Paul city mode shift goals to encourage drivers to instead complete their trips walking, bicycling, or taking transit.

Environment

Replacing the highway with a multimodal corridor will lead to significant environmental benefits by reducing traffic congestion and vehicle miles traveled (VMT), expanding options for multiple modes of transportation, and providing opportunities for increased green space and vegetation.

The Twin Cities Boulevard's environmental and emissions benefits would also propel progress towards Minnesota's state, county, and city climate goals.

Air Quality

While all vehicular roads contribute to air pollution, major roadways have the most significant impact on air quality. Highways have the highest concentration of automobiles. Additionally, certain traffic activities contribute higher levels of pollutants, such as congestion, stop-and-go traffic, and high auto speeds. These activities are common on highways and exacerbated by the concentration of traffic on a designated route. This exponentially degrades air quality because of high levels of undiluted pollutants.

Pollutants from vehicles include carbon dioxide, particulate matter, carbon monoxide, nitrogen oxide, benzene, debris, and other compounds that combine to form additional pollutants in the atmosphere.[1] While electrification is an important solution for eliminating tailpipe emissions, it does not address other sources of pollution, including fine particulate pollution from tire and brake wear.

Converting the highway to a boulevard would significantly reduce emissions along the corridor and positively impact the region's air quality. By restoring the multimodal street network, the proposed project would reduce the concentrations of traffic, congestion and bottlenecks, and regular high-speed traffic that we see along the corridor today, leading to decreased emissions.

Expanding multimodal options, such as walking/rolling, bicycling, and transit, incentivizing telework, and allowing travelers to make more direct, efficient trips will reduce vehicle miles traveled and single occupancy vehicle trips. Further, a boulevard will increase capacity for green space and vegetation.

The concepts introduced in this report propose street trees and plantings along the length of the corridor, as well as linear parks and various green spaces. This would improve the regional air quality considerably, as vegetation mitigates air pollution by intercepting and filtering airborne particles.[2]

State and transportation partners, such as MnDOT and Metro Transit, share sustainability and climate goals for transportation-related impacts on air quality. To meet MnDOT's goals of reducing transportation emissions by 80% by 2040 and decreasing VMT by 20% per capita by 2050 (SMTP), the state has identified increasing multimodal options, particularly non-motorized, and increasing transit services as priority actions. This project would align with these transportation goals and actions.

Water Quality

Water quality is also severely impacted by major roadways. The pollutants from vehicle emissions land in waterways or are deposited by runoff, the flow of water over a ground surface, washing debris and pollution into the drainage system.

Highways, such as I-94, are massive areas of continuous impervious surfaces. Impervious surfaces increase runoff, thereby increasing pollutant, bacteria, and sediment loads into water systems.

Today, more than 2,798 Minnesota water bodies are considered impaired by one or more pollutants or stressors.[3] The corridor area of this study falls within the Mississippi River Twin Cities Watershed, where most of the runoff is deposited into the Mississippi River.

Water pollutants increase levels of turbidity, nutrients, and contaminants, degrading the water quality and impacting ecosystems. This can be detrimental to lakes, rivers, and wetlands. Large road surfaces also have higher maintenance requirements, such as salt application and roadway construction, leading to even more pollution of waterways.

The State of Minnesota has established goals to store carbon, increase carbon sequestration, and increase state-funded and sponsored species management plants as part of the land and water stewardship commitments. This is a project that could contribute to the initiatives laid out by MnDOT to meet these goals.

In the same way that the Twin Cities Boulevard will improve air quality by reducing emissions, the project would similarly lead to improved regional water quality. **Increased capacities for vegetation, street trees, and green space will greatly reduce the total amount of impervious surfaces and will break up the impervious surfaces, reducing runoff loads in waterways.**

Vegetation further mitigates pollution, not only by intercepting airborne pollutants but also by filtering pollutants out of soil and water bodies. Further, vegetated ground cover increases infiltration, reducing levels of runoff entering water systems during storm events.

Wildlife

Transportation-caused chemical, noise, and light pollution all negatively impact the health and well-being of local wildlife. Pollutants in the air, soil, and water not only lead to sickness and death but also degrade wildlife habitats. This is particularly true for aquatic species and pollinators. Pollution and habitat loss lead to imbalances in the ecosystem as the list of endangered species grows. Roadway infrastructure and declining biodiversity create conditions for invasive species to flourish.

346 of Minnesota's more than 2,000 known native wildlife species have been identified as Species in the Greatest Conservation Need. Habitat impacts are the top stress factors for this, followed by invasive animal species and contaminants.[4]

The Twin Cities Boulevard project would improve the health of local wildlife by reducing pollution but also by expanding wildlife habitats and improving biodiversity through increased tree plantings, vegetation, and green space. Combined impacts of decreasing air and water pollution, disincentivizing urban sprawl, and improving green mobility will have significant effect on the local wildlife, which aligns with the State of Minnesota's efforts to create wildlife habitats and enhance biodiversity.[5]

1 US Environmental Protection Agency. (2014). Near Roadway Air Pollution and Health: Frequently Asked Questions.

2 Nowak, David. ScienceDirect. (2006). Urban Forestry & Urban Greening: Air pollution removal by urban trees and shrubs in the United States.

3 Minnesota Department of Transportation. Minnesota GO. (2024). Water Quality.

4 Minnesota Department of Natural Resources. (2016). Minnesota's Wildlife Action Plan 2015-2025. Division of Ecological and Water Resources, Minnesota Department of Natural Resources.

5 Minnesota Department of Transportation. (2022). Climate Action Framework.

Community Well-being

The transportation sector has a major impact on human health and well-being, climate change and resilience, and the regional economy.

This project has the potential to boost the resilience of the community along the corridor and the greater region by reducing pollutants, encouraging healthy lifestyles, combating climate impacts, and providing economic opportunities. Resilient communities and Healthy lives and communities are two of the six Climate Framework Goals outlined by MnDOT.

Public Health & Stress

Air quality and water quality directly impact the health of residents. Pollutants in the air can cause a range of health complications, such as heart attacks, asthma, cardiovascular disease, emphysema, stroke, cancer, and other health issues. The asthma hospitalization rate among Twin Cities children is more than 50% higher than children in Greater Minnesota[1] and air pollution played a role in an estimated 10% of all deaths in the Twin Cities metro area in 2015.[2]

With 2,798 impaired Minnesota water bodies, water pollution presents a threat to public health as well. Groundwater is the source for approximately 75% of drinking water for Minnesotans and nearly all crop irrigation, making groundwater contamination an important issue.[3]

By reducing pollution contributors and concentrations along the corridor and increasing the capacity to remove pollutants from the air, water, and soil, this project has the potential to greatly improve the physical health of the local community, particularly for residents along the corridor.

Breaking up impervious surface area, replacing some of the highway corridor with vegetation and green space, and planting street trees along the corridor will also reduce heat island impacts. Heat islands lead to higher general temperatures and increased pollution levels, contributing to diseases and illnesses.

1 Minnesota Pollution Control Agency. (2023). Air Quality and Health.
2 Minnesota Department of Health. (2023). Health Impacts of Air Pollution. Life and Breath: Metro.
3 Minnesota Pollution Control Agency. (2023). Water quality trends and data.

In addition to chemical pollution, transportation, particularly major roadways, causes some of the most pervasive sounds in the built environment. The World Health Organization (WHO) defines noise above 65 decibels (dB) as noise pollution and over 75 dB as harmful. Highway noise typically generates 70 - 80 dB (A) within 50 feet of the roadway. Noise impacts people differently as it can affect sleep, focus/concentration, speech, or physical activities.

The concepts proposed in this project would combat noise pollution by reducing travel speeds and concentrations of traffic along the corridor.

This project would further improve public health by combating obesity. The adult obesity rate in Minnesota was 30.1% in 2018, which can lead to various other diseases, such as high blood pressure and diabetes. Active transportation is an important element in combating obesity through active lifestyles.

The proposed concepts in this report expand the active transportation network by adding multimodal connections, encouraging walking, rolling, and bicycling over driving. This is in line with the Statewide Health Improvement Partnership (SHIP) goal of expanding healthy living styles across sectors in partnership with more than 5,250 community partners.[4]

4 Minnesota Department of Health. (2022). Obesity Quick Facts.

Climate Action & Resilience

Climate change exacerbates health complications, as diseases are more readily spread due to increased windiness and stagnation events, raised temperatures, lengthened allergy seasons, increased rain and flooding events, and expanded survival conditions for parasitic species, such as ticks.[5]

The MnDOT 2016 Sustainability Report identified heavy precipitation/flooding, warmer winters, new species ranges, drought, heat, and wildfires as the top projected climate impacts for Minnesota. Improving resilience to these impacts will strengthen the health and safety of the community.

The Twin Cities Boulevard project would tie into the state's climate mitigation efforts to reduce greenhouse gas emissions and pollution by lowering VMT, encouraging alternative modes of transportation, reducing demand for salt and chlorine, increasing trees and vegetation, and improving biodiversity.

Increased tree canopy and reduced impervious surface also serve as factors in the state's climate adaptability efforts. This reduces the effects and impacts of extreme heat and instances of flooding. The project also provides opportunities to expand green infrastructure, climate-resilient buildings, and food resources, such as community gardens and markets.

5 Minnesota Department of Health. (2023). Climate and Health in Minnesota.

Economic Opportunity

The construction of I-94 divided neighborhoods along the corridor, destroying the economic stability of thousands of residents and businesses. The project provides opportunities for new housing and development along the corridor, including affordable housing, local businesses, parks, and community services.

Restoring the street network will improve access to existing businesses and has the potential to raise the value of homes in the surrounding areas. This in turn increases job opportunities, community resources, and access to daily destinations for residents. Expanding homes and businesses raises the tax base in the neighborhoods along the corridor, increasing total revenue and dispersing infrastructure and maintenance cost burdens for the community.

This project also creates opportunities for resilient infrastructure. This includes green infrastructure, resilient buildings, and reduced maintenance demands. Resilient infrastructure reduces the burdens of regular maintenance and infrastructure repair costs on communities, which can be made worse by climate change effects.

Additionally, the boulevard has the potential to reduce health-related cost burdens to the community. By adding to public health improvements for residents, this project could reduce healthcare costs of transportation and climate-related diseases, illnesses, and injuries.

Safety

The Rethinking I-94 concepts provide various opportunities to improve heath, safety, and comfort not only of people using the corridor, but also those in the areas affected by the project. Implementing an at-grade, multimodal transitway would result in improved traffic safety, reduced travel stress, and mitigate transportation-related health impacts.

The corridor concepts proposed in this report include dedicated routes for multimodal travel, safer intersections (shorter crossing distances, simplified movement, improved sight lines), reduced number of travel lanes, and reduced speeds. The proposed concepts would also allow better visibility, decrease congestion, and minimize travel stress. These factors together would reduce the probability and severity of crashes and conflicts between users across all modes of travel.

Providing a connected street network disperses traffic loads and allows for traffic capacity management. The concepts address bottleneck issues at areas such as Huron Boulevard, Snelling Avenue, and highway interchanges. The boulevard would impact the street network outside of the grid as well, improving traffic flow, circulation, and connections for the full road network in the Twin Cities.

For example, a boulevard would combat the safety issues at the Lowry Tunnel. Highways I-35W and I-94 interchange and diverge at this area, which is also an important entry/exit point to/from downtown Minneapolis. Traffic congestion is high at various points throughout the day for highway users, and requires unsafe driver movements to exit across multiple lanes to downtown.

Because of the complicated series of multidirectional interchange, high-speeds, and frequent congestion on the highways leading to the Lowry Tunnel, this is a dangerous and high-risk area for highway users. Better connections from the I-94 corridor to the downtown street grid (prior to the 35W interchange) and improved connections for local trips would reduce the traffic burden at the Lowry Tunnel.

DISTANCE	CANCER RISK (per million) FROM TRAFFIC	RESPIRATORY INDEX FROM TRAFFIC POLLUTION	ASTHMA RATE
Less than 1 mile	5.66	0.10	9.97%
1-5 miles	4.79	0.08	9.89%
5-10 miles	3.87	0.06	9.69%
More than 10 miles	1.95	0.03	10.0%
US average	3.94	0.07	7.70%

Figure 35. Health risks associated with loving close to a highway. Source: EPA National Air Taxics Assessment / Centers for Disease Control and Prevention

Equity

As discussed earlier in this report, the construction of I-94 intentionally and unintentionally displaced thousands of homes, businesses, and community centers in predominantly Black and immigrant neighborhoods, dividing communities and cementing racial and economic segregation.

Today, pollution and other ongoing impacts continue to disproportionately impact communities of color that neighbor the highway.

While this damage can never be undone, the *Rethinking I-94* project is an opportunity for MnDOT and government partners to take significant steps toward reparations for this terrible injustice. Highway removal would free up dozens of acres of land that is currently occupied by the highway for new uses. This land could be used to create new home and business ownership opportunities and community and public spaces/centers, accompanied by protections, like a land trust, to ensure that they are affordable for surrounding residents.

A local business incubator could help new and existing business owners of color expand into new commercial space along the boulevard. A right-to-return program could ensure that residents and descendants of those who were displaced by the highway's construction are prioritized in new housing and businesses.

New cultural districts could be created in Rondo and Cedar-Riverside. These districts would help to eliminate racial wealth disparities by creating new housing and business opportunities prioritized for existing community members, protect neighborhood identity from gentrification, and promote the unique cultural vibrancy of each neighborhood. New parks and gathering places could be co-created by each neighborhood along the project corridor, reconnecting neighborhoods that the highway has divided for more than a half-century.

Highway removal would also help to advance environmental justice and address I-94's impact on environmental racism. A 2023 ABC News report found that constant commuter traffic from the nation's interstate highways is contributing to toxic air pollution in the remnants of nearby neighborhoods. As is the case nationally, I-94's pollution disproportionately impacts Black, Indigenous and People of Color. As climate change and extreme heat continue to worsen, air pollution is expected to grow more potent and dangerous.

Highway removal would greatly reduce traffic pollution while also improving affordable and low-emission transportation options in impacted neighborhoods. Currently, the freeway is a daily hazard for car-free households. A boulevard conversion would add improved transit and biking options, while also adding new walkable businesses, parks and other community amenities.

The Highway Removal Movement

Aging US freeway infrastructure and a growing awareness of the harms these freeways represent has sparked a movement to remove them.

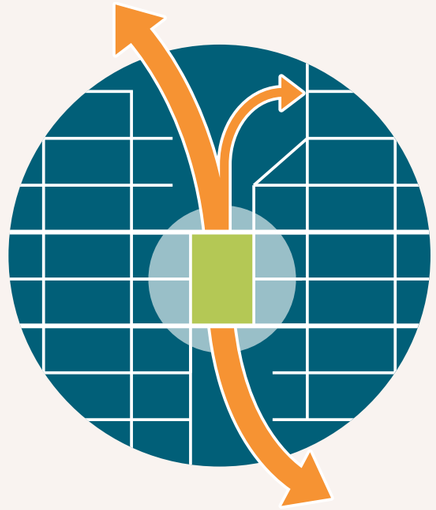
Some communities have relocated highways and replaced them with new houses, businesses, parks or other desired uses. Other communities have removed highways completely, replacing them with urban streets to more easily reach local destinations, plus hundreds of new houses and businesses.

Where highway removal has happened, the trend has caught on. Citizens and cities have looked for additional opportunities to remove highway infrastructure. What follows are considerations and examples of successful highway removal efforts in North America.

CONSIDERATION

Highways in cities have outsized local and regional impacts.

These impacts can be addressed via mitigation measures or by removing the highway.



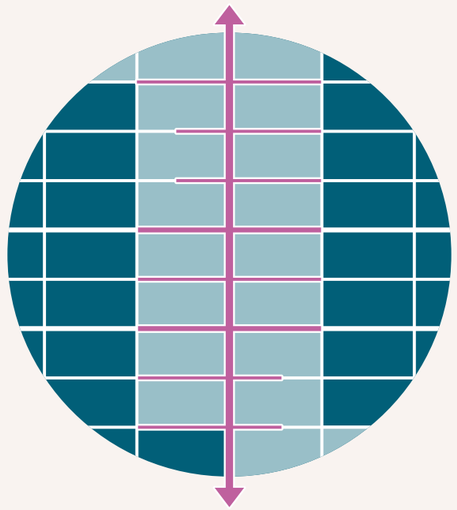
HIGHWAY MITIGATION

"Highway mitigation" means that the highway is not removed but is altered to reduce its negative effects locally.

Highway mitigations address the micro effects of highways, such as affecting trip length for people walking or bicycling, but generally do not address macro effects, such as air pollution or encouraging unsustainable suburban sprawl.

LOCAL (MICRO) IMPACTS OF HIGHWAYS IN CITIES

- Divided neighborhoods
- Noise pollution
- Light pollution
- Localized air pollution
- Unsightly structures/poor aesthetics
- Depressed land values
- Longer trip lengths for pedestrians and cyclists



HIGHWAY REMOVAL

"Highway removal" means that the highway is removed, and the land is used for new purposes.

Often, the highway is replaced with a network of streets, which may or may not correspond to the historic street pattern. The removal allows for historic uses to return and new uses such as housing and urban development, parks and other civic spaces, public art, or some combination.

Highway removals address both the micro and macro effects of highways on cities.

REGIONAL IMPACTS (MACRO) OF HIGHWAYS IN CITIES

- City form
- City image
- Automobile dependency
- Inner city disinvestment
- Regional air pollutant emissions
- Higher energy consumption
- Impacts on transit performance
- Increased automobile dependence
- Facilitates unsustainable sprawl development
- Negative health impacts
- Rural and habitat destruction

Completed Projects

Inner Loop East

Rochester, NY

Removal Type: Section Removal

The 2.68-mile Inner Loop in Rochester, constructed in the 1950s and 1900s for a larger city, became a physical barrier between downtown and nearby neighborhoods. However, at the end of the century and as the region suburbanized, the Inner Loop was in disrepair and underutilized.

The idea for the boulevard conversion was included in the *Rochester 2010: The Renaissance Plan* in 1999. A study soon followed, but it took another decade and a federal funding source for the project to make progress. In 2012, a $17.7 million USDOT TIGER grant supported the removal of the Inner Loop East, a 2/3 mile section of the six-lane sunken highway, replacing it with an at-grade boulevard between Monroe Avenue and Charlotte Street, as well as bike lanes and on-street parking.

The project was completed in three phases, with the first focused on filling in the highway and then building out the streets. Former and current mayors supported the plan as a tool to revitalize neighborhoods that had been damaged by the highway's construction.

The removal of Rochester's Inner Loop East was completed in 2017 and freed up nine acres for new development (estimated to support **430,000 to 800,000 square feet of mixed-use development**), generating **$229 million in economic development**, creating more than **170 permanent jobs and more than 2,000 construction jobs**. It also increased walking by 50% and biking by 60%. The removal allowed for mixed-use developments to break ground, including below-market-rate apartments.

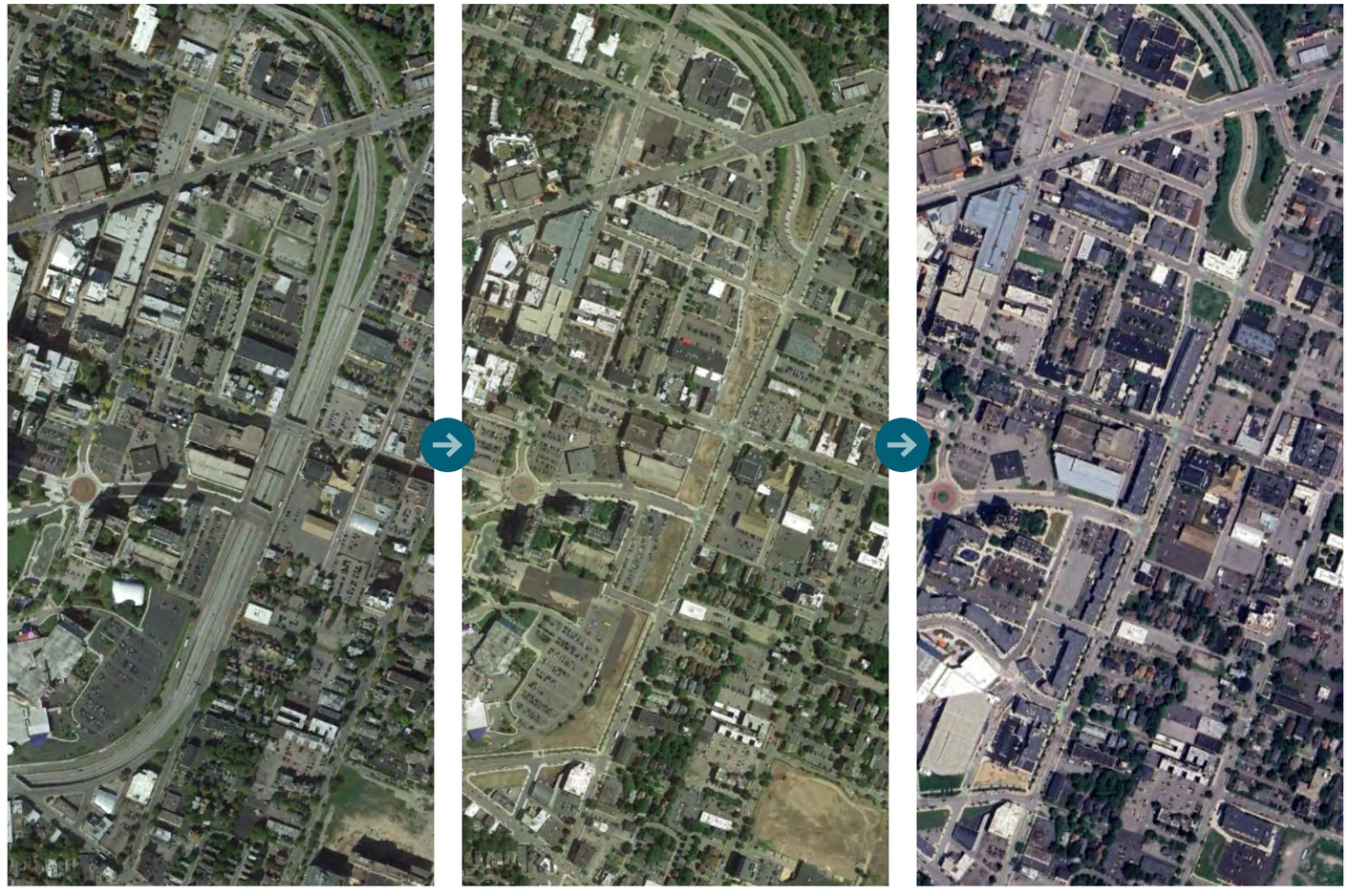
Key Takeaways

- Highway removal can support healthy lifestyles, boosting walking and biking trips.
- It is useful for cities to plan for the future of their highways, to inform their state DOT.
- Highway removal work can be undertaken in phases, and reconnecting streets is just as important as what happens to the street that replaces the highway.
- City-led change across administrations is critical, as highway removal efforts can take many years, often decades, to come to fruition.

Streets have been reconnected across the former highway. As of 2023, nearly 500 housing units have been added in the former highway right-of-way, the majority affordable.

Rochester is now planning for the remaining Inner Loop sections, including the Inner Loop North. In 2021, the US House of Representatives approved $4 million in funding to transform Rochester's Inner Loop North into a street-level boulevard. The project aims to reconnect northern neighborhoods to downtown and will cover study, design, and planning phases. The State of New York has committed $100 million to the project.

Figure 36. Progression of the Inner Loop East Removal. Source: Google Earth



Sources

https://www.cnu.org/highways-boulevards/model-cities/Rochester

https://www.cityofrochester.gov/InnerLoopEast/

https://rochesterbeacon.com/2023/10/19/whats-next-for-the-inner-loop-north/

https://www.fhwa.dot.gov/ipd/project_profiles/ny_freeway_to_boulvard_rochester.aspx

Park East Freeway

Milwaukee, WI

Removal Type: Spur Removal

The Park East Freeway in Milwaukee was originally part of a 1960s plan to encircle downtown with freeways. The plan aimed to extend the freeway spur to the lakefront, connecting to I-794, but was halted in the mid-1970s due to local opposition. Only a one-mile elevated segment was completed, leading to underutilization and blight in the neighborhood.

In the 1990s, Milwaukee saw renewed interest in its riverfront with the development of a Riverwalk system along the Milwaukee River. This sparked a downtown housing boom, but the area around the Park East Freeway remained underutilized with parking lots and aging industrial parcels.

Recognizing it as a barrier to redevelopment, then-Mayor John Norquist campaigned for the complete demolition of the freeway. In 1999, collective approval was granted for the removal of the spur, and in 2002, using Federal ISTEA money and local Tax Increment Financing, the removal process began with $45 million in funding from federal, state, and city sources.

The removal of the freeway and the introduction of at-grade six-lane McKinley Boulevard revitalized the area, restoring the previous urban grid. The City of Milwaukee, under the direction of City Planner Peter Park, drafted a form-based code to encourage development that aligns with the original form and character of the region.

Between 2001 and 2006, land values in the footprint of the Park East Freeway increased by more than 180%, and within the Park East Tax Increment District, they grew by 45%, surpassing the citywide increase of 25% during the same period.

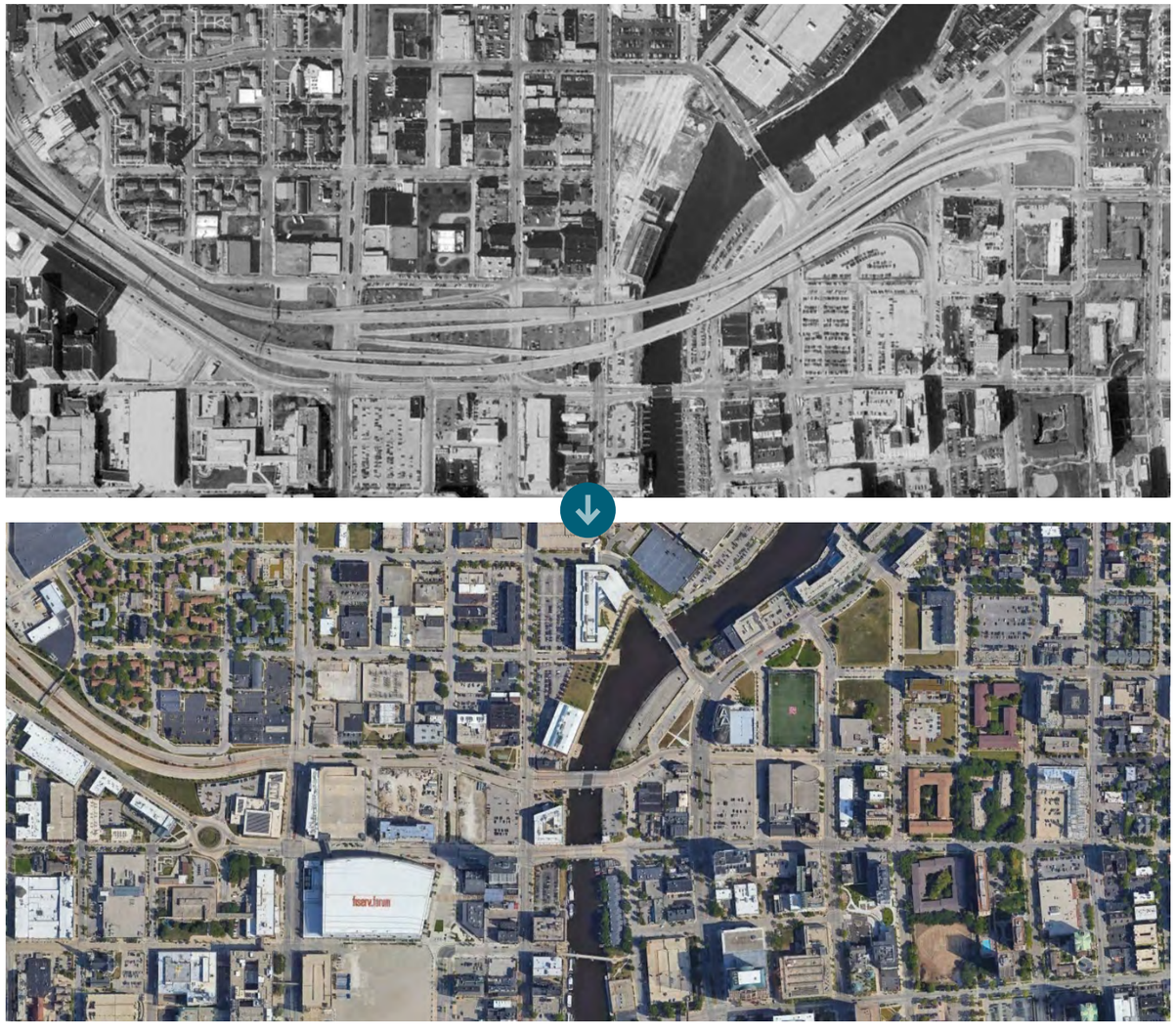
Key Takeaways

- Highway removal can save a significant amount of taxpayer money compared to rebuild alternatives while generating significant economic and community benefits.
- Form-based codes can be deployed as part of a strategy to address concerns of new development "not fitting into" neighborhood context.
- Projects require myriad funding sources, from the federal, state, and local level, to get off the ground.
- Highway removal decisions are political, not technical. Political will is needed to bring coalitions and decision-makers on board.

The Park East Corridor in Milwaukee underwent restoration, restoring the street grid that was interrupted by the Park East Freeway. The restored street network improved traffic flow and access to downtown. To date, the area has attracted more than $1 billion in investment funding. The decision to tear down the spur rather than reconstruct it resulted in savings of an estimated $25 to $55 million in taxpayer funds.

Today, a new local group named Rethink I-794 is building on decades of local advocacy work and wants to see more projects like the Park East Freeway removal. The Wisconsin Department of Transportation has proposed a $300 million rebuild of I-794 through Milwaukee and has plans to widen a 3.5-mile section of a nearby freeway to alleviate congestion. The Rethink I-794 initiative understands the futility of roadway expansion and is pushing for a different, proven idea: remove the highway altogether.

Figure 37. Progression of the Park East Freeway Removal. Source: Google Earth



Sources

https://www.cnu.org/highways-boulevards/model-cities/milwaukee

https://city.milwaukee.gov/DCD/Projects/ParkEastredevelopment/Park-East-History

https://www.fastcompany.com/90844043/theres-not-a-neighborhood-that-got-improved-when-a-freeway-went-through-it-inside-milwaukees-push-to-tear-down-a-highway

https://urbanmilwaukee.com/2023/08/14/murphys-law-park-east-removal-didnt-devastate-downtown/

https://www.planning.org/blog/9262111/removing-freeways-and-healing-communities/

https://www.fhwa.dot.gov/ipd/pdfs/value_capture/case_studies/milwaukee_wi_park_east_freeway_case_study.pdf

Cypress Street Viaduct / Mandela Parkway

Oakland, CA

Mitigation Type: Relocation

The Cypress Street Viaduct, California's first double-decker freeway inaugurated in 1957, aimed to alleviate local road traffic and provide a direct route to the Bay Bridge. However, its construction severed the West Oakland neighborhood, contributing to the isolation of the predominantly Latino and African American population. In 1989, the Loma Prieta Earthquake led to the viaduct's collapse, prompting a reevaluation of freeway investments in the Bay Area. San Francisco dismantled the Embarcadero and Central Freeways, while Oakland sought alternatives for the Cypress Street Viaduct.

Post-quake, the viaduct's destruction redirected more than 160,000 daily vehicles, causing congestion. Oakland engaged the community in reconstruction, selecting a new $1.1 billion route for Interstate 880 through an industrial area and railroad yard, avoiding residential and commercial zones. Simultaneously, the Mandela Parkway, a 1.3-mile boulevard, played a crucial role in reconnecting the divided West Oakland community.

Opened in 2005 with a $13 million investment, the parkway prioritized walkability, featuring 68 tree species, bike lanes, walking paths, grass lawns, and unique acorn-shaped light fixtures reflecting the city's character.

Mandela Parkway catalyzed economic development, fostering approximately three dozen new businesses.

Key Takeaways

- Focus on solutions that address both micro and macro impacts of urban highways.
- Listen and engage with desires of residents.
- Connect transportation and land-use policies for holistic planning efforts to ensure housing affordability and neighborhood stability for long-time residents.

Between 1990 and 2010, West Oakland witnessed a 14% decrease in residents in poverty and a $5,720 increase in median household income. The removal of the highway resulted in health benefits, reducing annual nitrogen oxide levels by 38% and annual black carbon levels by 25%.

The Mandela Gateway affordable housing project, established in 2005, provided 168 affordable-income residences, contributing to positive neighborhood transformation. Additionally, the parkway serves as a vital link in the Bay Trail, a planned 500-mile walking and bicycle trail around the San Francisco Bay. Beyond transportation, Mandela Parkway has become a community focal point, promoting connected and active urban living.

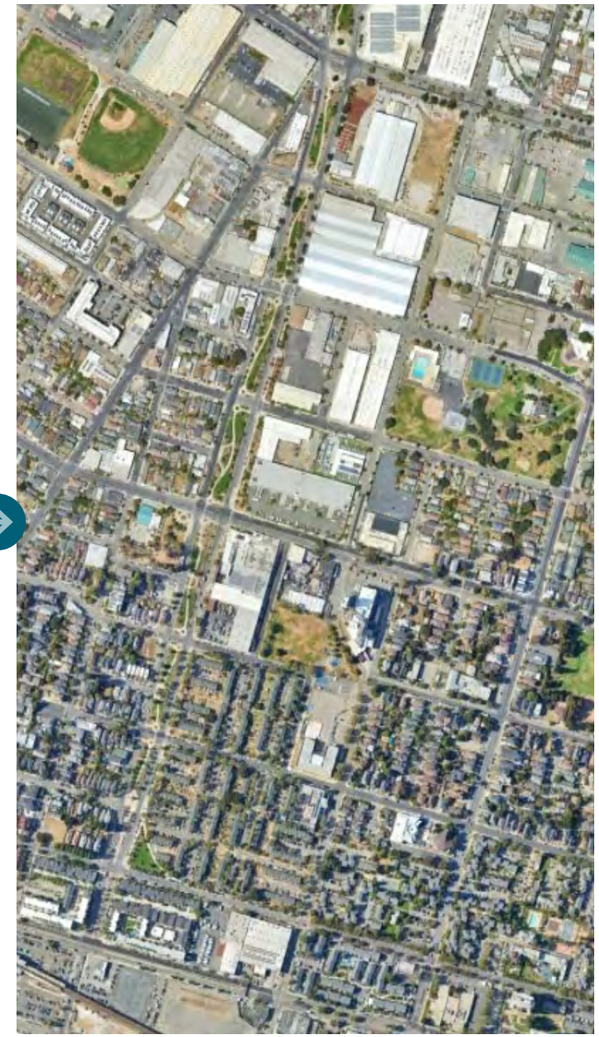
Unfortunately, rising housing costs in the Bay Area have pushed out long-time residents who would have otherwise benefitted from these changes. It has been reported that

"Black residents, who made up 73% of the population around the expressway in 1990, accounted for only 45% in 2010, according to Patterson's research. Median home values along the parkway jumped by $261,059 in that time frame" (Digiulio, 2021).

Moreover, the highway wasn't removed, per se, only moved to a less-residential, industrial area bordering the Port of Oakland. While air quality immediately around the footprint of the former highways has improved, the highway still runs through the City of Oakland, where trucks and passenger vehicles continue to spew noise and air pollution that impacts other residents around the city.

Figure 38. Aerial of the Cypress Street Viaduct before it fell down. Source: USSB Archive

Figure 39. Aerial of Mandela Parkway today. Source: Google Earth



Sources

https://www.cnu.org/oakland-mandela-parkway

https://nextcity.org/urbanist-news/can-bidens-plan-remove-urban-highways-improve-the-health-of-american-cities

Bonaventure Expressway

Montreal, QC

Removal Type: Section Removal

Built for the 1967 World's Fair, the Bonaventure Expressway initially aimed to ease traffic into downtown Montreal. Despite Expo's success, the 11-lane expressway became obsolete, hindering waterfront development, isolating neighboring Griffintown, and contributing to an auto-centric downtown.

The underutilized 11-lane expressway served 58,000 travelers daily. In 2002, Société du Havre de Montréal spearheaded harborfront redevelopment, exploring the transformation of Bonaventure into an at-grade boulevard. Of all the alternatives, the boulevard was chosen as the best option to reconnect the downtown area with the river, enhance waterfront development, and revitalize surrounding areas.

Projet Montréal began in 2011 and progressed through 2017, demolishing the expressway and introducing a light rail link. The $143 million project replaced it with two urban boulevards featuring green spaces, parks, and public art. An added $61 million was used to widen adjacent streets for additional traffic. The new street configuration allocated 65% of roadway space to active transportation and 10% to public transit, reducing motor vehicle allocation from 70% to 25%.

With this portion of the expressway replaced by more people-friendly streets and urban amenities, the City of Montreal is continuing its efforts to reconnect the city to its waterfront with recently announced plans to transform the non-elevated sections of the expressway as they reach the end of their design lifespan.

Key Takeaways

- Highway removal can happen in phases as funds and public support builds.
- it is important to seize opportunities when infrastructure reaches the end of its lifecycle.
- It is critical to consider a well-designed boulevard and street network options from the start of the planning and visioning process.
- Highway removal can play a critical role in neighborhood revitalization.
- Inclusion of rapid transit in the highway removal alternative aids in success of travel mode shift

According to reports on this new stretch: "The new lanes will overlap with Carrie-Derick St., which will be eliminated. The overall changes will reduce the road footprint and heat islands by 40 percent. Two active mobility paths will be built, including a river promenade for pedestrians and a multipurpose path that can be used by cyclists and skaters. Organizers said 650 trees will be planted, as well as 18,000 shrubs and 13,000 perennials. The new makeup will also provide better access from Pointe-St-Charles to the river." (Bruemmer, 2023).

> "Transforming a highway to bring it into the 21st century is a major project that doesn't come around often and we seized the opportunity to ensure safe travel for all users."
>
> - Valérie Plante, Mayor of Montreal

Figure 40. Progression of the Bonadventure removal. Source: City of Montreal

Sources

https://www.cnu.org/highways-boulevards/model-cities/montreal-bonaventure-expressway

https://montrealgazette.com/news/local-news/bonaventure-expressway-to-be-reconfigured-into-urban-boulevard

https://momentummag.com/montreal-expressway-bonaventure-transformation/

https://jacquescartierchamplain.ca/en/the-corporation/media-centre/news/the-bonaventure-expressway-to-be-reconfigured-into-a-boulevard-with-a-green-corridor/

Lessons from Ongoing Highway Removals

There are a number of cities across the US and beyond that are planning to remove highways. Of particular relevance is the planned removal of Interstate 81 through downtown Syracuse, NY, as the preferred alternative that arose from this project has many parallels to the Twin Cities Boulevard.

I-81 skirts along the edge of downtown Syracuse, and similarly to I-94, it is heavily used for short trips to and around downtown. The removal of I-81 will require de-designation of I-81 through downtown Syracuse and re-routing I-81 to I-481 around the city. This project has recently completed the NEPA process with a record of decision issues in May of 2022.

In the words of the NYSDOT, the boulevard option was selected "based on a balanced consideration of the need for safe and efficient transportation, the social, economic, and environmental effects of the proposed transportation improvement, and the national, state, and local environmental protection goals." The selected alternative, called the "Community Grid," was also found to reduce VMT and greenhouse gas emissions.

This is not the first highway removal that the NYSDOT has undertaken. The removal of the Inner Loop highway in downtown Rochester, NY was completed in 2018. Since completion, redevelopment projects for the lands formerly in the right-of-way are providing housing and businesses. The success of this project is leading to the next phase of removal, the Inner Loop North.

Additionally, the NYSDOT has worked in stages to remove the Robert Moses Parkway from the City of Niagara Falls, NY, removing the barrier from the city to the gorge and removing an overbuilt and unnecessary highway.

Figure 42. An elevated section of I-81 today through Syracuse, NY.Source: Dover, Kohl & Partners, "Syracuse Community Grid Vision Plan 2024"

Figure 41. Rendering of the community grid vision of removing I-81 through downtown Syracuse and replacing it with a surface boulevard, new housing, and public space. Source: Dover, Kohl & Partners, "Syracuse Community Grid Vision Plan 2024"

SECTION 5

Economic & Land-Use Potential

Opportunities for Growth and Development

Transforming the existing I-94 freeway to a boulevard and allowing restoration of urban land-use in this location has the potential to unlock dramatic opportunities for housing, economic opportunity, and neighborhood amenities including parks.

Decisions about major public infrastructure such as I-94 are by definition long-term in nature. As cited in the highway history described in Section 2, the decision to construct I-94 through established, fully developed urban areas set a precedent for the land-use of the area for two generations.

With the boulevard conversion option, decision-makers have a viable pathway to make the project area into a more productive, more accessible and healthier element in the Twin Cities landscape.

Economic and Land-Use Overview

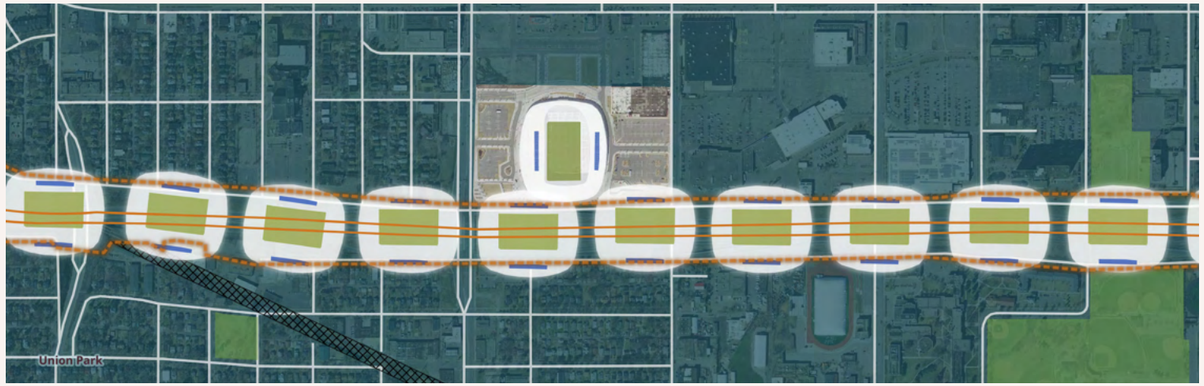
In its current form, I-94 commits 366 acres of centrally located urban land to exclusive freeway use between Minnesota State Capitol and the 35W interchange. Expressed differently, this represents the footprint of 50 Allianz Field stadiums, three Ford plant sites (now Highland Bridge), or 235 Minnesota State Capitol buildings.

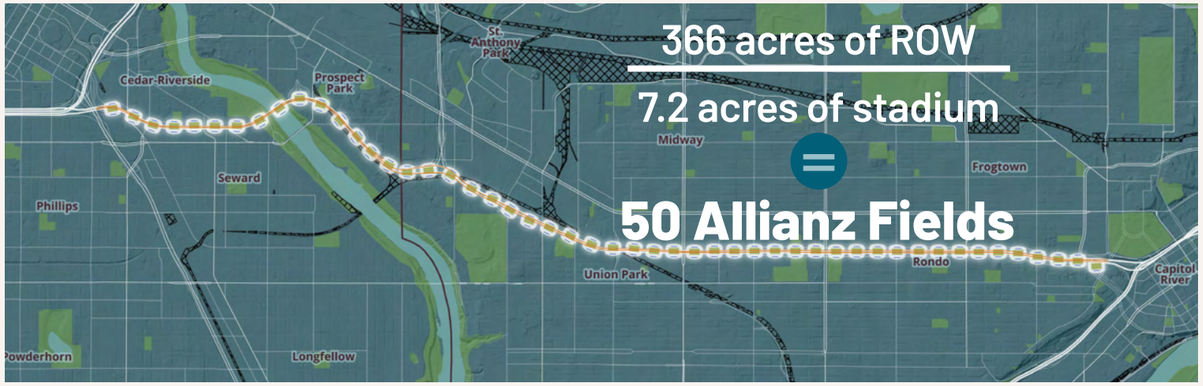
This report highlights the national precedent and technical feasibility of diversifying the uses of the I-94 corridor. Conversion to a boulevard will reduce the land area consumed by transportation infrastructure and allow for more landuses that generate community and economic benefits in previously underutilized, single-use freeway right-of-way.

A boulevard design provides for a continued transportation role for the corridor while adding housing, space for commercial activity, links to parks, fewer barriers to local trips, and reduced health costs associated with the toxic freeway use.

CONSIDERATION

How many Allianz Fields Could Fit in the Study Area's Right-of-Way (ROW)?





As outlined in this report, the neighborhoods through which I-94 currently runs were originally developed with continuous street grids serving the range of land-uses such as housing (single-family, multifamily and other) and commercial (primarily one, two or three-story structures). **Those areas were cleared of property and streets and replaced with the lanes and surrounding right of way of I-94 sixty years ago.**

Still, the scale of local neighborhood land-use and development found along streets in other Twin Cities neighborhoods provide insights into how the space could alternatively be used.

For comparison, the team measured and applied the land-use mixes currently in place in four local segments (lower density, moderate density, medium density, and higher density) pictured at right.

Analyzing the existing conditions within these corridors enabled us to create a set of metrics which, when applied to each neighborhood's capacity for new developable land, resulted in a series of projected economic and community impacts for the boulevard vision.

Using these four community development profiles, the consultant team calculated and applied how the 366 acres that comprise the I-94 corridor between 35W and the Minnesota State Capitol could be reprogrammed to provide multimodal transportation infrastructure and also meet community needs through housing units, employment, and additional tax base (the area is currently tax-exempt in its entirety.)

LOWER DENSITY

Cleveland Avenue from Randolph Avenue to St. Clair Avenue in Saint Paul's Highland Park

MODERATE DENSITY

Phalen Boulevard to Magnolia Avenue East in Saint Paul's Payne/Phalen

MEDIUM DENSITY

Franklin Avenue from Pleasant Avenue to 3rd Avenue South in Minneapolis' Stevens Square

HIGHER DENSITY

University Avenue Southeast from 25th Avenue Southeast to Malcolm Avenue Southeast in Minneapolis' Prospect Park

Description of Approach for New Land-Use Projections

The consultant team quantified the capacity for community development in the I-94 corridor initially at the neighborhood scale. To provide for the area needed to support multimodal transportation in the transit boulevard option and the restored network option, the team articulated prospective new boundaries for those areas that could be returned to nontransportation uses in a conversion.

For each neighborhood, we applied the four density scenarios to establish how right of way could be redeployed for greater community impact. Each density scenario was evaluated in the context of the boulevard option (comprising 86 acres in total) and the restored street grid option (96 acres total).

Cedar-Riverside / Seward Land-Use Scenarios

The maps at right illustrate this exercise for Cedar-Riverside/Seward, the first of five neighborhoods considered for this report. There is the least amount of existing right-of-way in the Cedar-Riverside/ Seward study area, resulting in the most modest estimates of total acreage for new land use of the report's neighborhoods.

The transit boulevard concept would allow for new land use to be added on 7.7 acres, with the restored network concept adding 10 acres. Under a higher density scenario, these land capacity estimates project up to 255 new jobs, 49 million dollars of new market value, and 235 new housing units. The projections under additional density scenarios are as follows:

CEDAR-RIVERSIDE / SEWARD POTENTIAL CAPACITY FOR NEW LAND-USE SCENARIOS

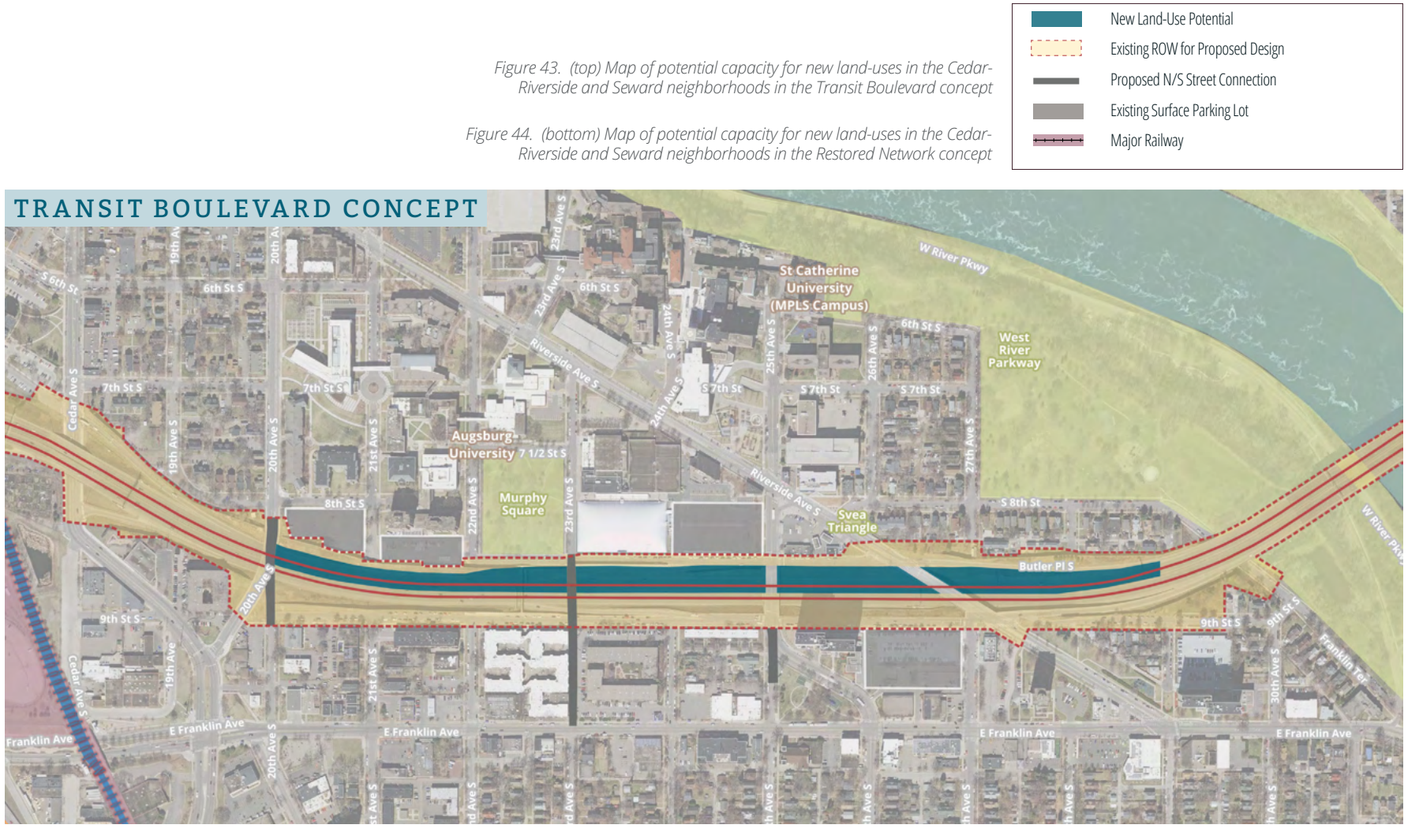
ELEMENT	LOWER DENSITY	MODERATE DENSITY	MEDIUM DENSITY	HIGHER DENSITY
Job Estimate	20 - 25	77 - 100	150 - 195	195 - 255
Market Value Estimate	$17.8 - 23.3M	$13.5 - 17.5M	$23.7 - 30.8M	$97.6 - 49M
Housing Units	45 - 60	80 - 105	150 - 190	180 - 235

Potential Capacity for New Land-Use

7.7 acres

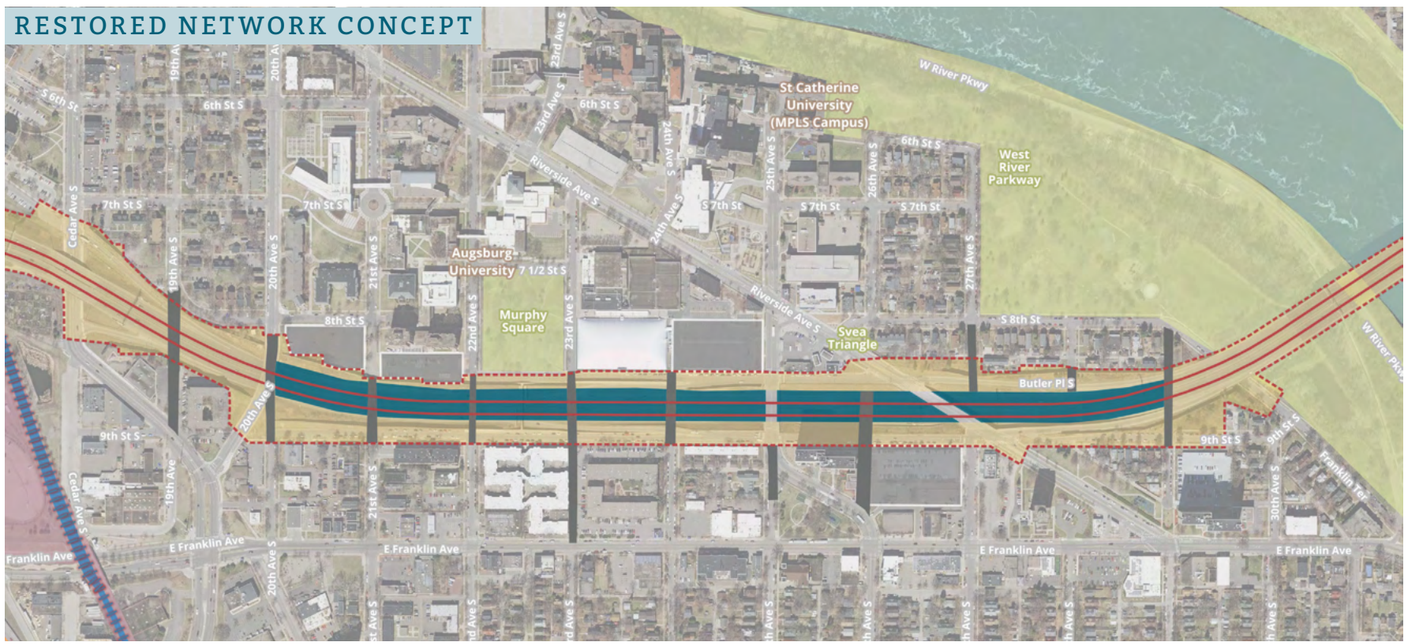
Figure 43. (top) Map of potential capacity for new land-uses in the Cedar-Riverside and Seward neighborhoods in the Transit Boulevard concept

Figure 44. (bottom) Map of potential capacity for new land-uses in the Cedar-Riverside and Seward neighborhoods in the Restored Network concept



Potential Capacity for New Land-Use

10 acres



South Saint Anthony Park / Merriam Park Land-Use Scenarios

Under boulevard conversion, land currently dedicated to highway in the South Saint Anthony Park/Merriam Park neighborhood would allow for new land use to be added on 25.5 acres under the transit boulevard concept, while the restored network concept would free up 26.1 acres.

These land capacity estimates project up to 665 new jobs, 128 million dollars of new market value, and 610 new housing units within the South Saint Anthony Park/Merriam Park study area. Analysis of additional density scenarios results in the following combinations of potential outcomes:

SOUTH SAINT ANTHONY / MERRIAM PARK POTENTIAL CAPACITY FOR NEW LAND-USE SCENARIOS

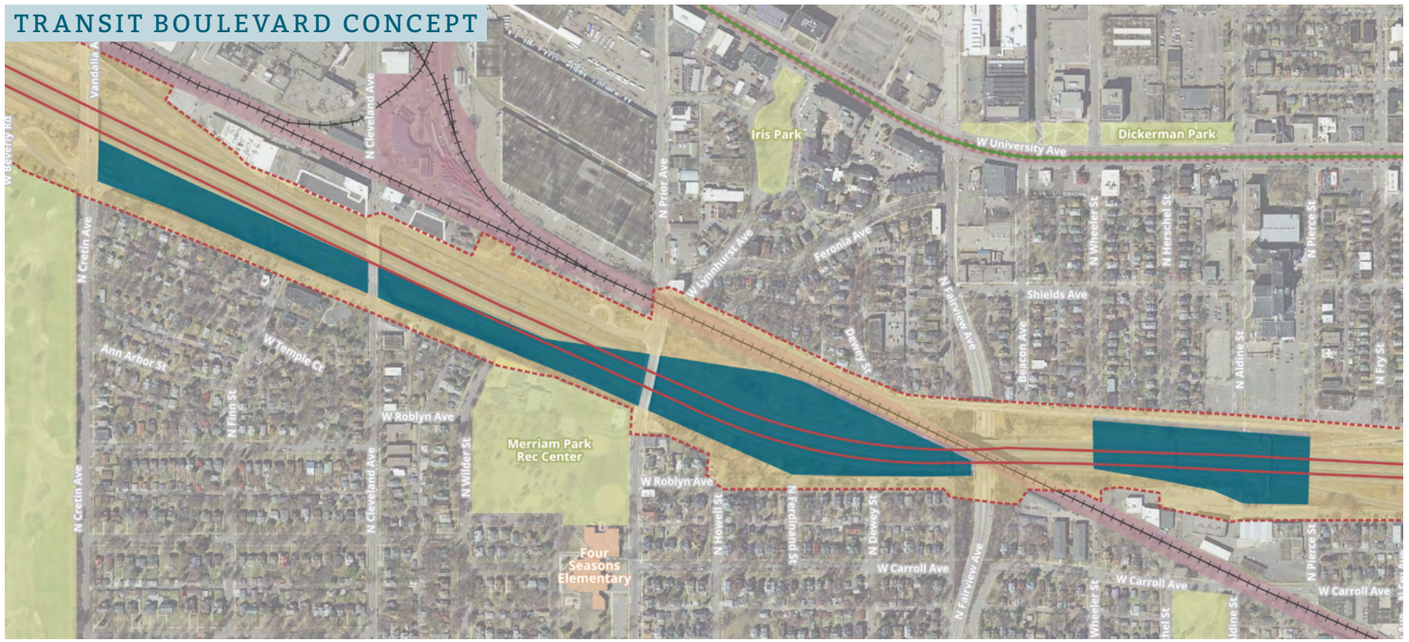
ELEMENT	LOWER DENSITY	MODERATE DENSITY	MEDIUM DENSITY	HIGHER DENSITY
Job Estimate	65 - 70	255 - 260	490 - 500	650 - 665
Market Value Estimate	$59.4M - 60.8M	$45.1 - 46.1M	$78.5M - 80.3M	$125M - 128M
Housing Units	150 - 155	260 - 270	490 - 500	595 - 610

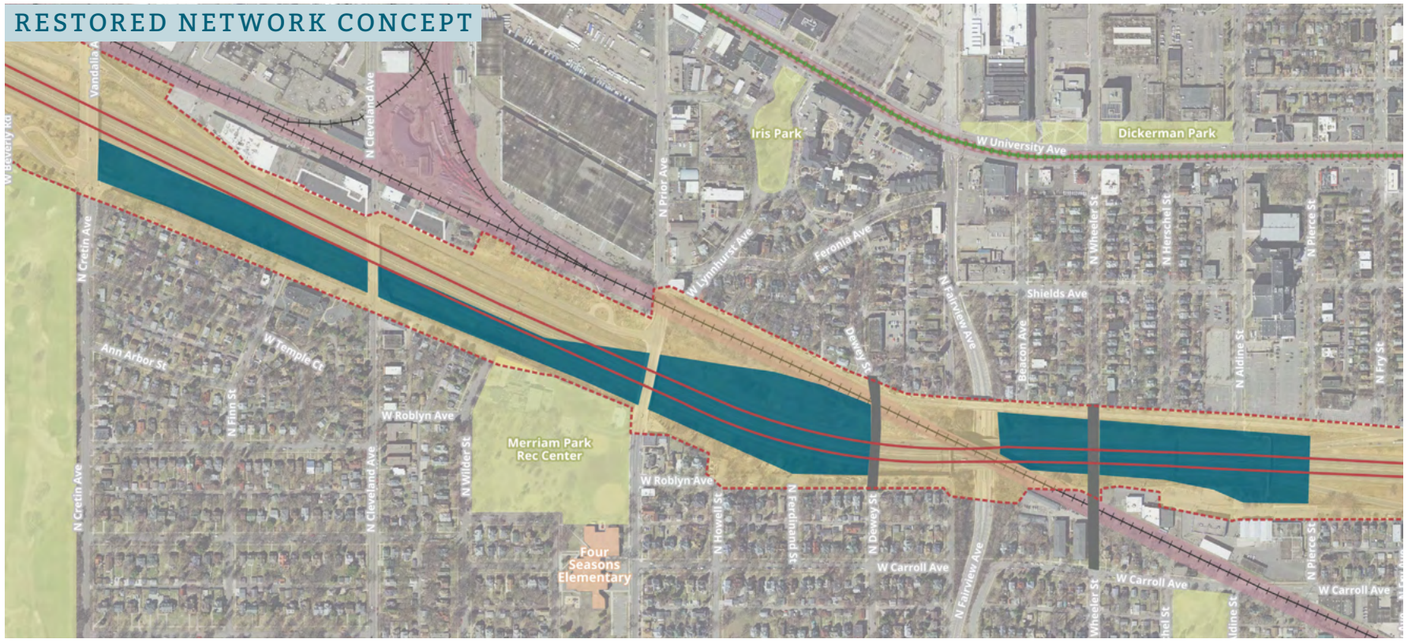
Potential Capacity for New Land-Use

25.5 acres

Figure 45. (top) Map of potential capacity for new land-uses in the South Saint Anthony Park and Merriam Park neighborhoods in the Transit Boulevard concept

Figure 46. (bottom) Map of potential capacity for new land-uses in the South Saint Anthony Park and Merriam Park neighborhoods in the Restored Network concept





Potential Capacity for New Land-Use

26.1 acres

Midway Land-Use Scenarios

Boulevard conversion creates the opportunity for the current right-of way in Midway for new land use to be added on 26.2 acres under the transit boulevard concept, or 27 acres under the restored network concept.

These land capacity estimates project up to 690 new jobs, 133 million dollars of new market value, and 630 new housing units. The projections under additional density scenarios for Midway are as follows:

MIDWAY POTENTIAL CAPACITY FOR NEW LAND-USE SCENARIOS

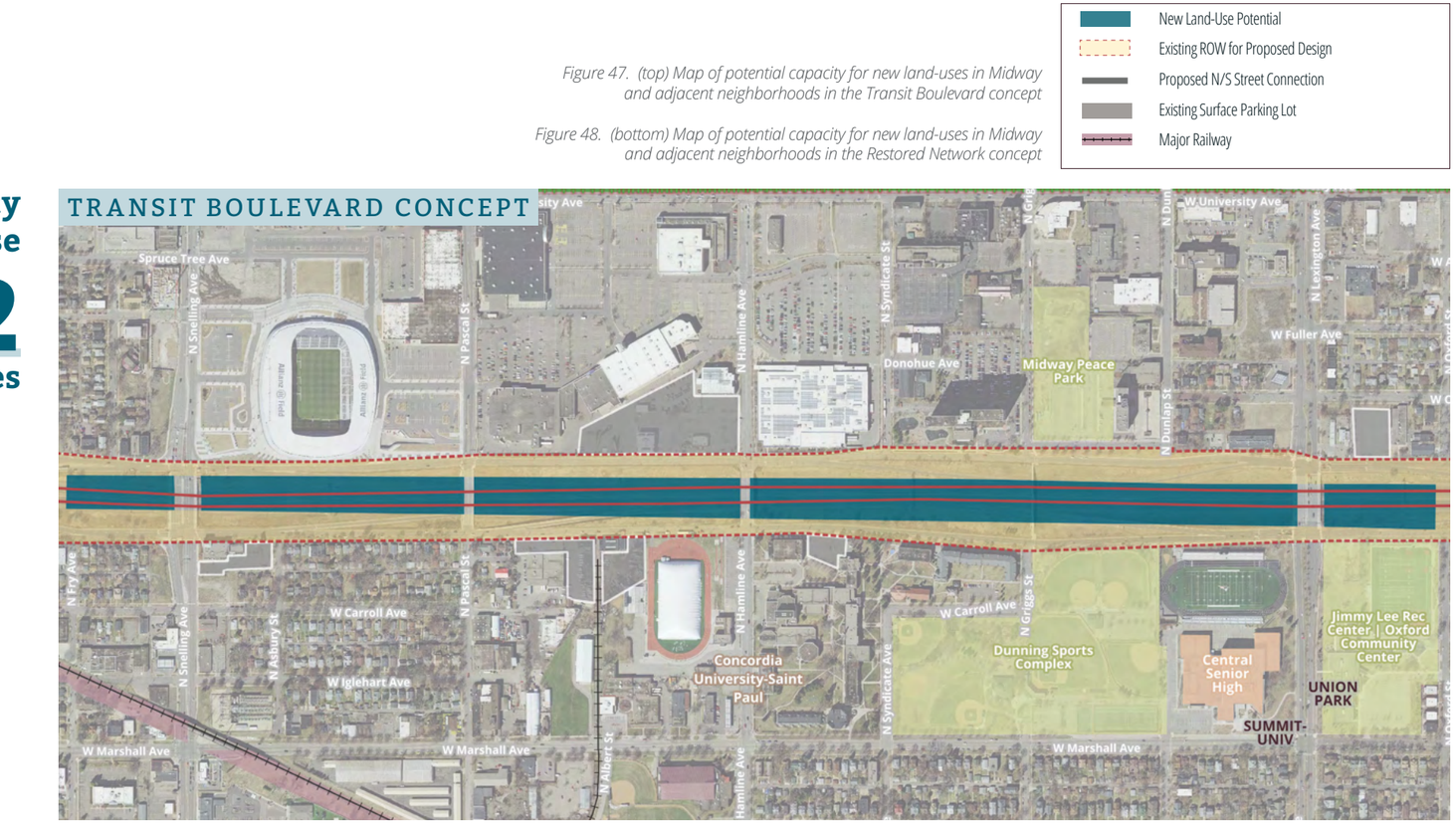
ELEMENT	LOWER DENSITY	MODERATE DENSITY	MEDIUM DENSITY	HIGHER DENSITY
Job Estimate	70 - 75	260 - 270	500 - 520	665 - 690
Market Value Estimate	$60.9M - 62.9M	$46.2M - 47.8M	$80.5M - 83.1M	$128M - 133M
Housing Units	155 - 160	270 - 280	500 - 520	610 - 630

Potential Capacity for New Land-Use

26.2 acres

Figure 47. (top) Map of potential capacity for new land-uses in Midway and adjacent neighborhoods in the Transit Boulevard concept

Figure 48. (bottom) Map of potential capacity for new land-uses in Midway and adjacent neighborhoods in the Restored Network concept



Potential Capacity for New Land-Use

27 acres

Rondo Land-Use Scenarios

The Rondo stretch of I-94 cuts a direct east-west line through the neighborhood; this consistent right-of-way pattern opens up the potential for new land use to be added on 27.4 acres under the transit boulevard concept, with the restored network concept adding 27 acres.

Under a higher density scenario, these land capacity estimates project up to 840 new jobs, 161 million dollars of new market value, and 765 new housing units. The projections under additional density scenarios for Rondo are as follows:

RONDO POTENTIAL CAPACITY FOR NEW LAND-USE SCENARIOS

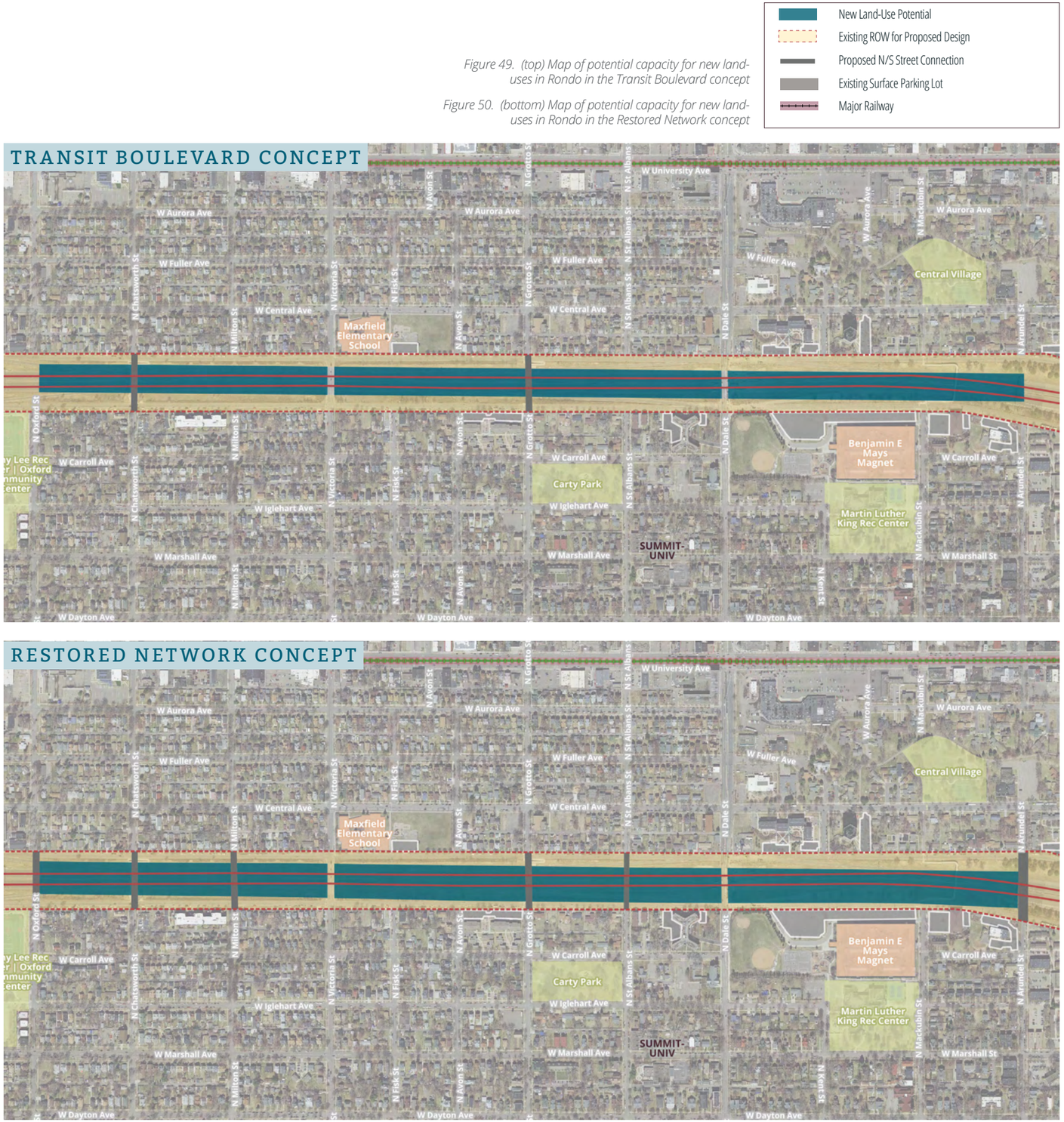
ELEMENT	LOWER DENSITY	MODERATE DENSITY	MEDIUM DENSITY	HIGHER DENSITY
Job Estimate	75 - 85	275 - 330	525 - 630	700 - 840
Market Value Estimate	$63.8M - 76.4M	$48.4M - 58.1M	$84.4M - 101M	$134M - 161M
Housing Units	160 - 190	280 - 340	525 - 630	640 - 765

Potential Capacity for New Land-Use

27.4 acres

Figure 49. (top) Map of potential capacity for new land-uses in Rondo in the Transit Boulevard concept

Figure 50. (bottom) Map of potential capacity for new land-uses in Rondo in the Restored Network concept



Potential Capacity for New Land-Use

27 acres

Economic and Land-Use Findings

For each neighborhood, we applied the four density scenarios to establish how right of way could be redeployed for greater community impact. Each density scenario was evaluated in the context of the boulevard option (comprising 86 acres in total) and the restored street grid option (96 acres total).

In aggregate, the 86-96 acres released from transportation use in the I-94 study area could support community development at the following scale:

TOTAL POTENTIAL CAPACITY FOR NEW LAND-USE SCENARIOS

ELEMENT	LOWER DENSITY	MODERATE DENSITY	MEDIUM DENSITY	HIGHER DENSITY
Job Estimate	230 - 255	870 - 965	1,660 - 1,880	2,200 - 2,450
Market Value Estimate	$202.1 - 223.3M	$153.3 - 169.8M	$267.1 - 295.8M	$425.5 - 470M
Housing Units	510 - 565	890 - 990	1,665 - 1,885	2,020 - 2,230

Each of these density levels reflect development patterns observed on and around commercial streets in Minneapolis and in Saint Paul. Given the central location of the I-94 corridor, the consultant team believes that land released from exclusively freeway use in a boulevard conversion, could develop at any of the evaluated density levels including higher density.

A process in each city will provide for rezoning and other regulatory controls to maximize community benefit, allow for location of spaces for commercial, civic and residential use, and support transition from exclusive use as freeway.

Community Land Trust

Figure 51. Example of housing (628 Franklin Condos) proposed within an existing community land trust. Source: Marnie Peichel

As part of this transition, where centrally located and valuable land would become available for uses to meet community needs, a community land trust model is recommended as part of the land ownership mix.

In a land trust model, a nonprofit or public agency maintains ownership of specified sites, granting land leases to residential, commercial or other users who proceed to build structures on the sites. Residents own homes and/or businesses built on land held in trust, creating affordability by limiting the required home purchase to the building and not the land.

The land trust model may also preserve affordability over the long term by capping appreciation, thereby protecting the ability of future homeowners to access the opportunity of ownership and wealth building.

The Rondo Community Land Trust and City of Lakes Community Land Trust are existing organizations that have demonstrated the success of this model. Rethinking I-94 project partners should collaborate with these organizations to plan for equitable land ownership on the I-94 corridor.

A residential or commercial land trust is one strategy to support participation by all residents in access to - and ownership of - the expansion of activities and investment in the areas released from freeway right of way through a boulevard conversion. In addition to the quantities of potential benefits identified by the consultant team, intentional strategies can ensure universal participation in these benefits as the local marketplace responds to the new opportunities created by available space.

Huron Boulevard to 280 Interchange Land-Use Scenarios

The capacity for new land use within the proposed designs for Huron Boulevard to 280 Interchange are not included in the projections summarized on the previous page for the entire I-94 corridor, but rather as an additional opportunity for new use adjacent to I-94. This proposed extension of the study area increases the amount of reimagined land use substantially.

With the inclusion of right-of-way between Huron Boulevard and Highway 280 in the study area, 19.5 additional acres of land would be redeployed for new use under the transit boulevard / parkway concept, and 40.4 acres under the restored network concept.

Including Huron Boulevard to 280 in the study area adds to projected totals of up to 1,030 new jobs, 198 million dollars in new market value, and 945 new housing units

HURON BOULEVARD TO 280 INTERCHANGE POTENTIAL CAPACITY FOR NEW LAND-USE SCENARIOS

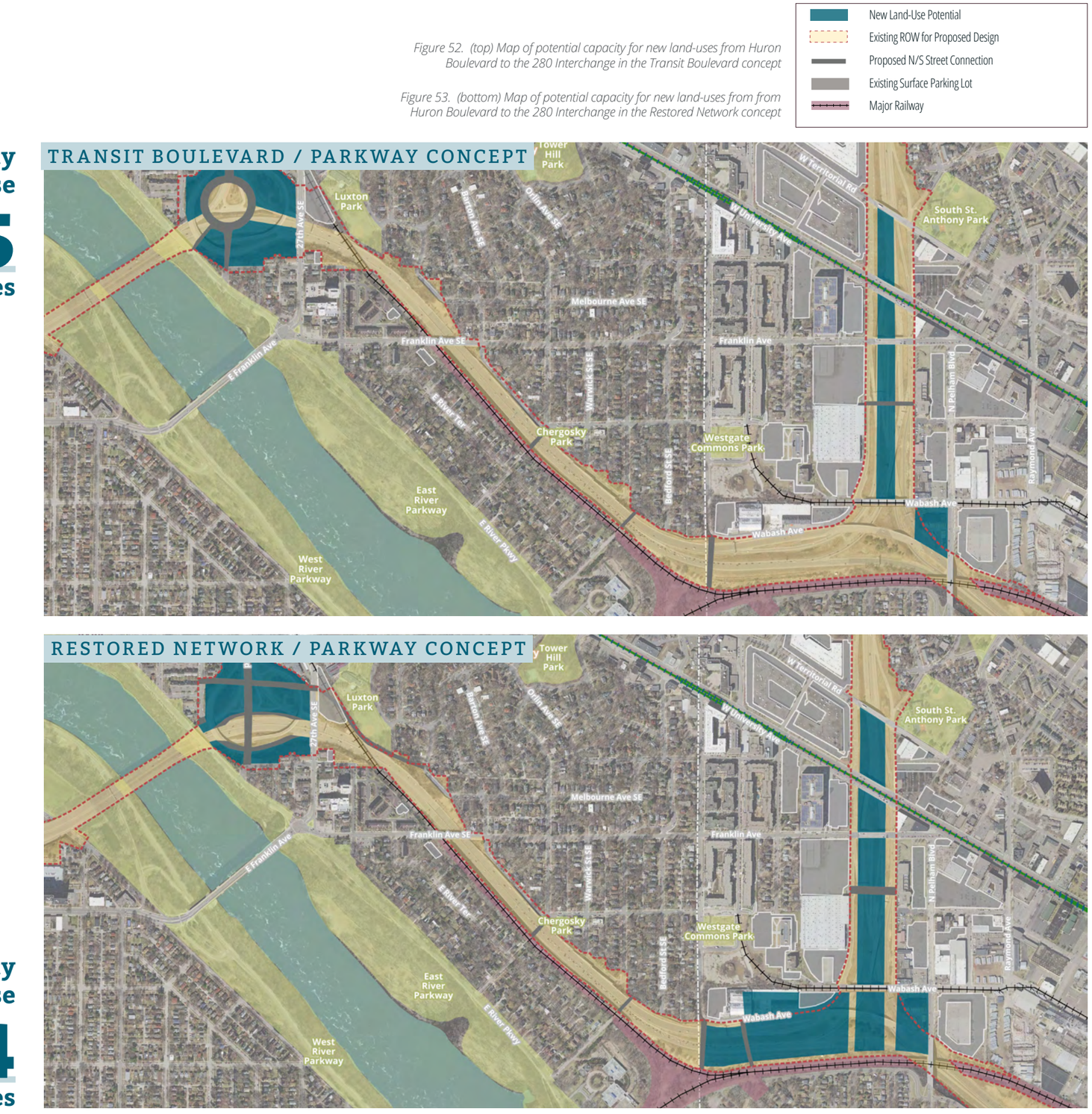
ELEMENT	LOWER DENSITY	MODERATE DENSITY	MEDIUM DENSITY	HIGHER DENSITY
Job Estimate	50 - 105	195 - 400	375 - 775	500 - 1,030
Market Value Estimate	$45.3M - 94.1M	$34.4M - 71.3M	$59.9M - 125M	$95.4M - 198M
Housing Units	115 - 235	200 - 415	375 - 775	455 - 945

Potential Capacity for New Land-Use

19.5
acres

Figure 52. (top) Map of potential capacity for new land-uses from Huron Boulevard to the 280 Interchange in the Transit Boulevard concept

Figure 53. (bottom) Map of potential capacity for new land-uses from from Huron Boulevard to the 280 Interchange in the Restored Network concept



Potential Capacity for New Land-Use

40.4
acres

SECTION 6

Recommendations to Achieve a Reparative Project

Study Recommendations

MnDOT is following an EIS process that has been used for highway planning and expansion projects for decades all across the USA.

While the NEPA process is required by federal law, it must be applied in a way that will provide a fair and equitable evaluation of the full range of solutions, including highway removal. With that aim, Our Streets makes the following recommendations.

It is not too late to make these course corrections, and there is nothing in state or federal law that prevents their implementation.

RECOMMENDATION 1

Ensure That Community Needs Come First in Project Evaluation

The health and well-being of communities along I-94 have suffered from the presence of I-94. MnDOT states in the project purpose and need that they are looking to "improving relationships with communities" and have "made a commitment to working with stakeholders, coordinating agencies and other organizations to advance objectives beyond transportation that prioritize the wellbeing of those that live, work, and recreate near the corridor."

To make good on this commitment, *Rethinking I-94* must prioritize a comprehensive approach to evaluating alternatives, one wholly different than the auto-centric approach that justified the freeway's construction in the first place.

The health and well-being of corridor residents must be the highest priority.

MnDOT has conducted community studies and neighborhood research, but the current alternatives do not adequately respond to the concerns brought to light in these studies. The project definition and project evaluation criteria should be revised to highlight these concerns.

Revise the draft evaluation criteria to reflect community health and well-being.

- The SDD health/quality of life metrics are qualitative yes/no scores, which loses the enormous differences in outcomes between the highway options and boulevard options.
- For a truly reparative project, social and environmental harms should take precedence over vehicle speed and travel times. Vehicle mobility will be accommodated with the street network, and while some trips may take a bit longer, access and multimodal options will be improved.
- Cost considerations must include maintenance and the economic potential of repurposing highway land.
- Benefit impacts from project alternatives are not proposed to be quantified until the Tier 1 EIS stage. The at-grade alternatives have enormous quality of life and economic benefits, but these will not be evaluated in the SDD. This could potentially lead to their elimination despite these extraordinary potential for positive outcomes.

RECOMMENDATION 2

Create a cross jurisdictional working group to implement anti-displacement and community benefit benchmarks

Intentional and proactive measures must be taken to ensure that the *Rethinking I-94* project primarily benefits those who have been forced to bear the highway's harms and does not facilitate gentrification and displacement. This will require policies that extend beyond transportation and the scope of MnDOT.

The *Rethinking I-94* project already involves a wide-variety of government stakeholders, including Hennepin and Ramsey Counties, the cities of Minneapolis and Saint Paul, the Metropolitan Council, the State of Minnesota and the federal government.

As the project convener, MnDOT should create a cross jurisdictional working group specifically focused on evaluating and advancing such policies. This should be done in partnership with local community members, organizations and institutions.

RECOMMENDATION 3

Add a "restored network" option to the studied project alternatives

The design options included in this report show the wide breadth of possibilities for the community to consider through the *Rethinking I-94* process. Design options range from parkways to multiway boulevards to restoring the historic street network. The opportunities and community benefits will vary and should be a topic of outreach and community discussion. MnDOT should add project options that restore the historic street grid.

A restored option has a few key benefits. It maximizes the opportunity to repurpose land for new housing, businesses, parks and other neighborhood amenities. It would also reduce the width of the new street, facilitating easier pedestrian crossing and north/south access. A restored option should be added for the community to consider before the scoping decision document is finalized.

RECOMMENDATION 4

Fix inaccurate travel demand models

It has been said that "all models are wrong, but some models are useful."[1] In the case of the regional travel demand model used for the I-94 evaluation, a review of the model structure and baseline conditions concludes that it is both primitive (using static rather than dynamic assignment), and produces results in travel speeds that are highly inaccurate.

MnDOT should instead use dynamic traffic assignment, which is essential to show how people will adapt to a significant change in vehicle capacity along the I-94 corridor. Providing results on the redistribution of traffic with a static model does not provide accurate or realistic information for decision makers.

Figure 1. Box, George E. P. (1976), "Science and statistics," Journal of the American Statistical Association, 71 (356): 791–799).

RECOMMENDATION 5

Incorporate land-use changes into future transit ridership modeling

As shown in Section 5, there is significant potential for new housing, jobs and other neighborhood amenities to be located in the I-94 right-of-way. The transit ridership potential of the boulevard options is significant, as they include dedicated transit lanes on much or all of their length and provide direct pedestrian connectivity to the surrounding neighborhoods in a way that is impossible with transit service on highway lanes.

Despite this, MnDOT's transit ridership projections failed to consider the impact of land-use changes, ignoring a major source of potential ridership. This renders the transit ridership projections meaningless, and should be remedied before any decisions about project alternatives are made.

RECOMMENDATION 6

Extend the Project Area to connect into the downtowns and add a portion of Highway 280

The Rethinking I–94 project boundaries are unnecessarily constrained and prevent a holistic reimagining of the corridor. The project limits should not end at the highway, because no trip begins or ends on a highway. Based on the analysis of trip origins and destinations, it is clear that access and connectivity into both downtown Minneapolis and downtown Saint Paul should be a priority. Additionally, changes to the Highway 280 corridor (this report evaluated the removal of the portion south of Energy Park Drive) must be considered simultaneously with changes on I-94 in order to be accurate and comprehensive.

RECOMMENDATION 7

Create a working group on highway conversion projects

In response to the initiation of exploring a land bridge in Rondo, MnDOT has convened a working group to explore issues with land bridges, freeway caps, and other similar concepts. In order to similarly inform and engage the agency on highway removal / boulevard conversion projects a working group on highway removal projects should be convened.

RECOMMENDATION 8

Improve transparency and community engagement

It is imperative that the decision on the future of I-94 is made transparently and with comprehensive and accurate information. MnDOT, the Federal Highway Administration (FHWA) and local government partners should take into account input from the public, especially from those who are most affected, and from their representatives in local and state governments

MnDOT and the Rethinking I-94 project team have the opportunity to set a new standard for engagement that centers the voices of impacted communities, creating the potential for a truly reparative project. This can begin with making the following changes:

This should begin with making the following changes:

- Create a wide variety of neighborhood specific concepts that show potential new connections, and opportunities for repurposing land, so that community members can fully understand the implications of each alternative
- Disclose the full range of social and environmental impacts of each project alternative
- Clearly define, in plain language, how MnDOT will be evaluating the various project alternatives, and provide clarity about how MnDOT is defining "fatal flaws"

Project Phasing and Construction Mitigation

Any of the *Rethinking I-94* alternatives currently under consideration could be huge projects with significant construction impacts. The corridor has a high number of aging, deficient bridges that will need to be removed, which will disrupt the use of the highway. Careful planning and ample outreach and coordination will be necessary to minimize the negative consequences of a construction project.

For any alternatives that maintain the highway, extensive lane closures will be required as bridges and retaining walls are reconstructed, and there are likely to be long periods wherein I-94 operates at reduced capacity. In the highway removal options, construction will similarly be disruptive, but may be reduced in its duration as it will avoid the need to reconstruct bridge and retaining walls.

To minimize the impact of construction, careful planning of construction phasing can help.

While there are a huge number of options for how the removal of I-94 could unfold, many may share the following elements:

- Using an enhanced travel demand model with dynamic assignment, the alternate routes that may get an increase in traffic can be more accurately determined. Capacity and efficiency enhancements can be put in place before construction begins to reduce impacts during construction.
- Once these network improvements are in place, I-94 can be reconfigured in stages to essentially become two "spur" highways, that distribute traffic to the neighborhoods, but not allow entry for short trips within the corridor. This will reduce the utilization of the highway, so that once a full closure becomes necessary to begin removal, the impacts will be reduced.
- Best practices for construction mitigation should be incorporated into the traffic management plan that include avoiding closures of multiple parallel streets at the same time, ensuring property access is always provided, and providing detour route and wayfinding signage.

Eligibility for Federal Funding

Highway removal projects are eligible for federal funding. The Federal Highway Administration and United States Department of Transportation encourage reparative projects like the Twin Cities Boulevard through their Reconnecting Communities and Neighborhoods program in addition to many other federal funding programs. Many other highway removal projects across the US have used federal highway funds.

After the highway removal, the jurisdiction of the boulevard or restored street network will need to be determined. I-94 also carries US Routes 12 and 52, which were historic state highway routes that connected Saint Paul and Minneapolis, and continuing on across the state.

The transit boulevard or restored street that replaces I-94 can continue to have the US highway designation, and continue to be maintained by MnDOT, similarly to numerous other State and US Highway Routes in the Twin Cities.

SECTION 7

Appendix

Review of Evaluation Criteria and Modeling

The Scoping Decision Document analysis that is currently underway will evaluate the ten alternatives based on a set of criteria documented in the report, *Rethinking I-94 Evaluation Criteria: Scoping Decision Document (SDD) and Tier 1 EIS*, dated January 11, 2023.

There are three major concerns about these proposed measures:

1. The SDD **quantitative evaluation criteria favor a highway solution** and may result in the highway removal options being dropped from the Tier I EIS despite the benefits.

2. The qualitative measures are **overly simplistic yes/no indicators that do not reflect the enormous benefits of highway removal** and may result in the highway removal options being dropped from the Tier I EIS despite how highway removal can advance community goals.

3. The travel demand model that is the basis for most of the quantitative measures is highly flawed in its ability to analyze highway expansion or removal impacts and **cannot provide reliable traffic impact results to inform the project decision makers.**

The evaluation criteria include both quantitative and qualitative metrics to evaluate the alternatives. The Scoping Decision Document will result in the elimination of some alternatives based on this evaluation, so it is critical that the evaluation provide a fair comparison of highway removal options. The evaluation criteria concerns are discussed separately in the following sections, along with suggestions.

Quantitative Measures

Quantitative evaluation measures are proposed for Mobility, Throughput and Travel Time Reliability. In evaluating mobility, the fact that I-94 serves primarily local trips, and that the majority of trips use I-94 for only a short distance, should inform the future mobility needs.

The measures proposed by MnDOT reinforce highway travel to provide mobility for short trips, which is not cost effective, inefficient, and harmful to the adjacent communities. Short neighborhood trips can be accommodated more efficiently and with less harm on the urban street network, as in the highway removal alternatives.

Local access and mobility is best served by an efficient, connected, well-designed urban street network that provides efficient routing and multiple options. The quantitative measures that are being used to evaluate mobility in the SDD all focus on travel times and corridor throughput, which presumes that only highway alternatives will be selected.

Specific changes to provide a fair evaluation of the highway removal alternatives are discussed in the next section.

Systemwide Mobility

The proposed evaluation uses vehicle-hours-traveled (VHT) or person-hours-traveled (PHT) rather than a more meaningful vehicle-miles-traveled (VMT). VMT measures transportation network efficiency and is proportional to greenhouse gas emissions. A goal of the *Rethinking I-94* project should be to minimize VMT, while accommodating the same number of trips.

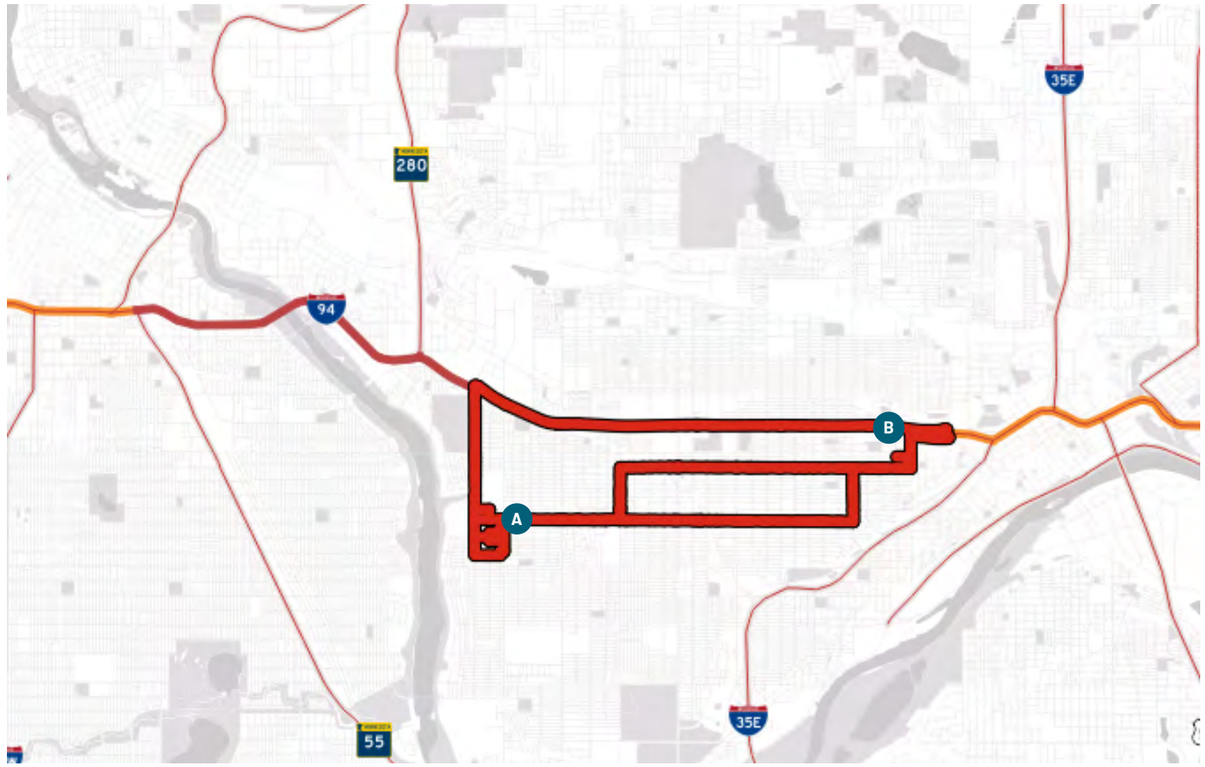
To accurately model the highway removal alternatives, the future land use scenarios must include the redistribution of future housing and jobs as shown in the Reimagining I-94 report . The land use changes enabled by highway removal will bring people and jobs to highly accessible, location-efficient places, which will increase mobility and access while minimizing VMT.

Corridor Mobility

The proposed measure for corridor mobility is "mainline speed (average over corridor)." This measure is highly problematic for several reasons. First, the model being used to evaluate the alternatives is highly inaccurate for determining speeds long I-94, which is detailed later in this report. Any metrics involving travel times or speeds are not accurate.

Second, the corridor mobility metric presumes that a high-speed highway corridor is a desirable outcome. Given the enormous past and present harms from I-94, performance measures should encompass a wider range of more desirable outcomes.

Figure 54. Trip Routes from A to B as shown in Replica, illustrative of how motorist go out of their way to use I-94 for a short distance of their trip.



It is also important to consider the fact that the majority trips on this part of I-94 use the highway for a short distance, and therefore do not require high speeds. A more meaningful measure of mobility should consider the capacity of the network to process peak hour trips. Measures such as average volume-to-capacity ratio (V/C) for the overall area are far more appropriate for measuring urban mobility and will not bias the decision towards maintaining or expanding the highway.

Qualitative Measures

Qualitative measures are proposed for categories including safety, environmental justice, noise, air quality, sense of place, equity and public health. Most of these are proposed as simple "yes/no" scores, which will fail to show the differences among the alternatives, nor will it show the tremendous benefits from the highway removal alternatives relative to the other options.

Some of the measures are so general that it is likely that all options, ranging from highway expansion to highway removal/boulevard alternatives will have the same score. A few examples are highlighted in the following section, but concerns are not limited to the following measures.

Corridor Throughput

The high automobile capacity of I-94 causes people to divert from a more direct route and use the highway for local trips. An example is shown in Figure 53 from Replica, where some people elect to go out of their way and use a short section of I-94 for a local trip, rather than using a more direct route on the street network. Motorists are drawn to I-94 to use it for short trips because it exists, not because it is necessary.

In a highway removal scenario, trips will be distributed through the urban street network, and there will be reduced throughput along the former highway corridor. The corridor throughput measure should be replaced by network capacity, or screenline capacity, which considers all the vehicle capacity in the area where the majority of the trip origins and destinations occur.

Economic Vitality

This is proposed to be measured by "Employment opportunities (jobs) accessible within 30-minute travel time." While this is a reasonable measure, it is important that the job numbers in the boulevard options include the estimate of future economic development (jobs) provided in the *Reimagining I-94* report. Otherwise, the measure will provide an inaccurate picture of future jobs accessible within-30 minute travel time.

Air Quality

Proposed air quality metric:

Qualitative Assessment - is the project considered regionally significant for air quality concerns or will the project have a meaningful impact on traffic volumes or vehicle mix (Yes/No)

The air quality measure is confusing at best but seems to imply that the status quo – where thousands of residents along the corridor are exposed to traffic emissions – is desirable, and any change from that is undesirable. The boulevard alternatives will have a positive impact on air quality as it will eliminate the concentration of traffic that currently exists on I-94 and reduce VMT. An alternative way to consider air quality in the SDD is to use regional VMT. Any options that reduce VMT will also reduce emissions.

Sense of Place

Proposed sense of place metric:

Qualitative Assessment - does the project have the potential to create features or amenities in partnership with communities to enhance sense of place (Yes/No)

It is likely that all alternatives could receive the same score as there is likely as least some opportunity for amenities in each of the alternatives. The fact that the boulevard alternatives will provide substantially greater placemaking opportunities will not be apparent in this performance measure.

A rubric where the degree of placemaking options are considered, such as ranking on a scale of 1 through 5 based on relative area that could be devoted to parks and gathering places, would provide a meaningful measure for the SDD evaluation.

Equity

Proposed equity metric:

Qualitative Assessment - does the alternative have the potential to enhance transportation choices for individuals (Yes/No)

First, the single measure to indicate equity is inadequate to address the goals for a reparative project. It does not address how alternatives will reverse air pollution, the barrier formed by I-94, nor numerous other harms that the neighborhoods have endured for the past fifty years. A broader evaluation of equity is required for this project to meet the goals set out by MnDOT, informed by the community.

Second, similar to the other metrics, it is likely that all of the SDD alternatives could receive the same score, as each alternative is likely to provide some potential for greater transportation choices. The fact that the boulevard alternatives will provide far superior transportation options, with transit and bike infrastructure that directly serve the affected neighborhoods, will not be reflected in a simple yes/no score.

The transportation choices measure should be a rubric where the degree of transportation choices are ranked on a scale of 1 through 5, to show the variations between the alternatives.

Connectivity

Proposed connectivity metric:

Qualitative Assessment - facilitates or does not eliminate opportunities to implement planned nonmotorized facilities (Yes/No)

Once again, it is highly likely that all of the alternatives in the SDD would receive the same score, which negates the fact that non-motorized infrastructure is a key element of the boulevard options. This is not a meaningful measure to compare the different alternatives in this important metric.

Alternatively, this measure should consider the relative degree of active transportation infrastructure proposed in the alternative. This type of measure could be quite simple to determine; for example, it could be bicycle lane miles, or relative cross section of the study area that dedicated to non-motorized transportation.

Travel Demand Modeling

It has been said that "All models are wrong but some are useful." [1] While it is not reasonable to expect that a complex regional model of the Twin Cities transportation networks will be 100% accurate, any model that is used to inform decisions that will potentially cost hundreds of millions of dollars should be reasonably accurate for the measures that will be used to evaluation alternatives. The model should reflect existing conditions and then apply logical assumptions to predict future conditions with some degree of confidence. The model used for *Rethinking I-94* does neither of these and should not be the basis of eliminating alternatives nor of making important decisions in its current form.

The travel demand model used for *Rethinking I-94* is built from the Met Council's regional travel demand model, with some additional changes made by MnDOT specifically for the Rethinking I-94 project (referred to as the MnDOT model). These models both rely on a 40-year-old Static Assignment Algorithm (STA), which was adopted when computers were less powerful than today's smart phones. Models similar to the MnDOT model have been used in highway expansion projects for a half century.

The MnDOT model still employs static traffic assignment (STA) algorithms developed in the 1970s, even though more accurate dynamic traffic assignment (DTA) methods could be incorporated into the model.

1 Box, George E. P. (1976), "Science and statistics," Journal of the American Statistical Association, 71 (356): 791–799).

What is especially important to consider is that STA models have repeatedly failed us: STA models overstate the potential for highway expansions to alleviate congestion. We know from experience that after highway capacity is increased, people readjust their travel behavior to use the highway more frequently, and congestion returns quickly. This scenario has happened again and again for decades in cities across the US, and highway expansions have been proven unsuccessful in reducing congestion, even though STA models suggest they would reduce congestion.

The underlying reason for the failure of STA models to accurately predict how people will respond to changes in capacity is that STA algorithms are not realistic. STA treats every road segment as independent of other road segments. In peak periods, traffic congestion on I-94 and other congested freeways in the region are characterized by queues behind bottlenecks.

In STA, there are no queues behind bottlenecks, and the model cannot accurately represent conditions during the peak of rush hour traffic. For these reasons, an STA model cannot realistically show how motorists will adapt to changes in roadway capacity in a freeway removal scenario.

A review of the MnDOT model shows significant shortcomings in the existing conditions that will inaccurately render any future predictions of speeds, travel times, or other metrics. Key factors that should be addressed with the MnDOT model before it is used to evaluate the *Rethinking I-94* alternatives are summarized in the following sections.

I-94 Speeds in the MnDOT Model are Wrong

The proposed SDD alternatives analyses relies on metrics from the regional travel demand model. Two of the most critical metrics are:

- average speed during peak hours, and
- daily vehicle hours of travel.

For example, MnDOT presented information in July 2023 that the future peak hour speed would be 42 mph in the Maintenance B (no build) alternative, but 48-49 mph in the two expanded freeway alternatives.[2]

It would be reasonable to assume that MnDOT would not present these future forecasted speeds as decision metrics unless the regional model could accurately forecast peak period speeds, or, at minimum, match current peak period speeds. **In fact, the model cannot even match current peak period speeds.**

Traffic speed data collected from cellphones and other electronic devices is available to compare to the current year modeled speeds.[3]

The following graphics show hourly peak period speeds by direction, averaged over all non-holiday weekdays in 2022. The project area has been extended at both ends because the most significant congestion in the corridor is outside the study area – particularly in the I-94/I-35W overlap area, but also in the I 94/I-35E overlap area. The speed graphics include 23 eastbound segments, and 23 westbound segments covering the extent shown in Figure 54.

2 TAC Meeting, Rethnking I-94 Phase 2, June 20, 2023, p. 25.
3 Regional Integrated Transportation Information System (RITIS)

Figure 55. Corridor Extent in Speed Graphics.

The most significant congestion in the expanded corridor is westbound in the afternoon peak period as shown in the Figure 55.

As shown in Figure 55, there is significant recurring congestion at the west end of the corridor, likely arising from the capacity constraints in the Lowry Tunnel. The worst segment is #3 within the I-I94/I-35W overlap area. Traffic from that bottleneck spills back into the study area which begins with segment #5.

The most congested hour is 4-5 p.m. Figure 56 compares these speed data to the model outputs for the same hour in the 2015 model base year.

The model speeds are wrong. The modeled speeds are generally too high in the congested western segments and too low in the uncongested eastern segments.

Similar problems are present in the eastbound afternoon peak period modeled speeds. Figure 57 below show speed data and a comparison with the modeled speeds.

Eastbound congestion is not as significant as westbound congestion. Again, the worst segment is segment 21 – outside the study area in the I-94/I-35E overlap area – and spills back into the study area that ends in segment 19.

As shown in Figure 58, the model generally underestimates eastbound speeds during the 4-5 p.m. hour in the study area (segments 5-19). In some cases, the error is very large. In segment #14 (at Snelling Avenue), the average measured speed is 50 mph, but the modeled speed is only 23 mph.

Figure 56. 2022 Average Afternoon Peak Period Westbound Hourly Speeds

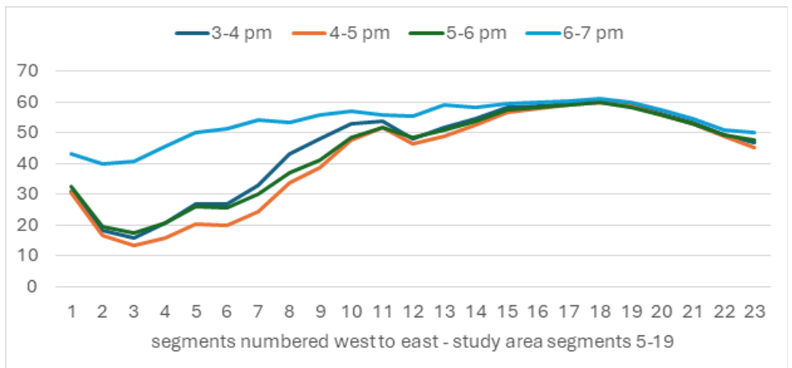


Figure 57. 2022 Average 4-5 pm Westbound Speed vs. Model Speed

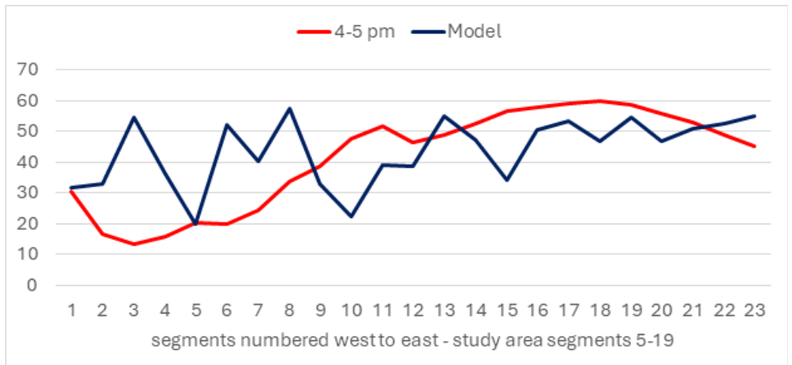


Figure 58. 2022 Average Afternoon Peak Period Eastbound Hourly Speeds

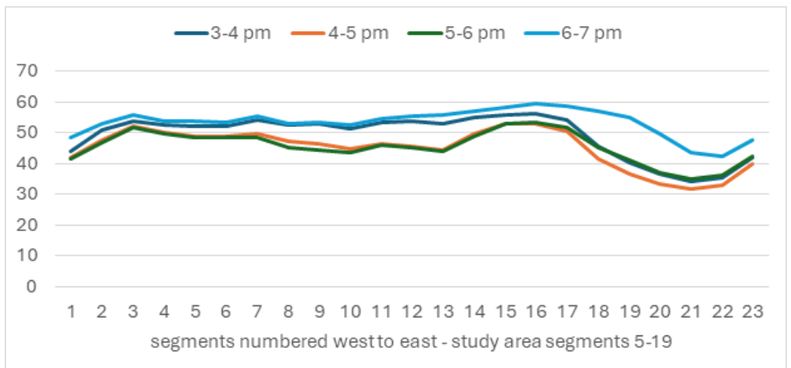


Figure 59. 2022 Average 4-5 p.m. Eastbound Speed vs. Model Speed

The adjacent figures show westbound speed data and a comparison with the modeled speeds for the morning hours.

As shown in Figure 59, there is only moderate congestion in the study area, with the largest problem again being spillback from the bottleneck in the I-94/I-35W overlap area.

Figure 60 compares these speed data to the model outputs for the 8-9 a.m. hour in the 2015 model base year.

The model shows extreme congestion that does not exist. The worst segment is #10, (at Southeast Franklin Avenue) where the actual speed is 53 mph, and the model speed is only 22 mph.

Figure 61 and Figure 62 show eastbound morning peak period speed data and a comparison with the modeled speeds.

There is little eastbound congestion in the study area (segments 5-19) during the morning peak period.

As shown in Figure 62, this is the best performance by the model – but only because it isn't overpredicting congestion as much as in the other cases.

In general, the model cannot accurately match existing peak period speeds, and certainly cannot be relied on to accurately forecast future speeds. The speed and delay metrics are wrong and should not be considered in the evaluation of alternatives unless the model problems are cor rected.

Figure 60. 2022 Average Morning Peak Period Westbound Hourly Speeds

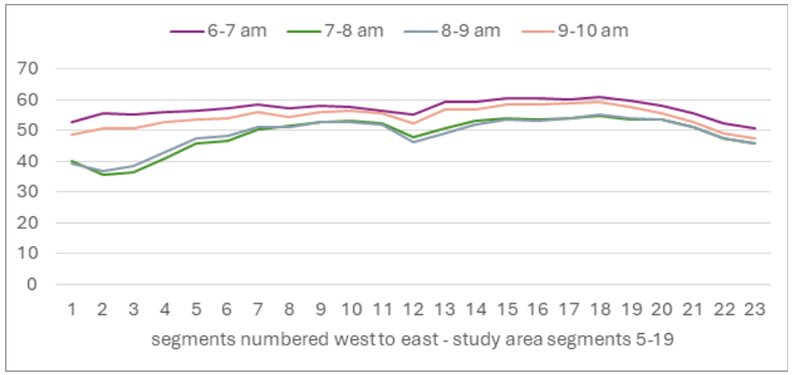


Figure 61. 2022 Average 8-9 a.m. Westbound Speed vs. Model Speed

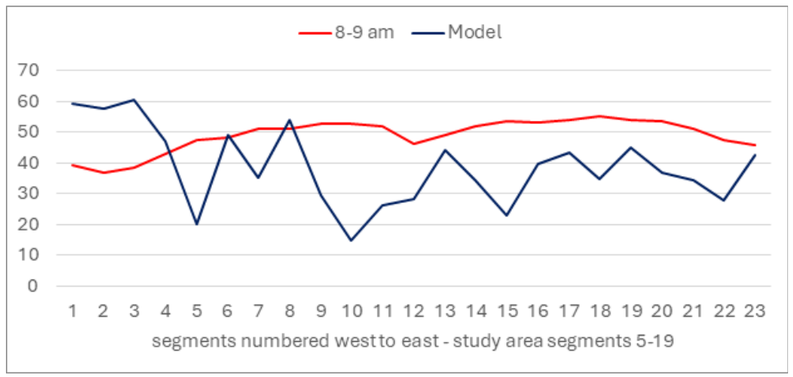


Figure 62. 2022 Average Morning Peak Period Eastbound Hourly Speeds

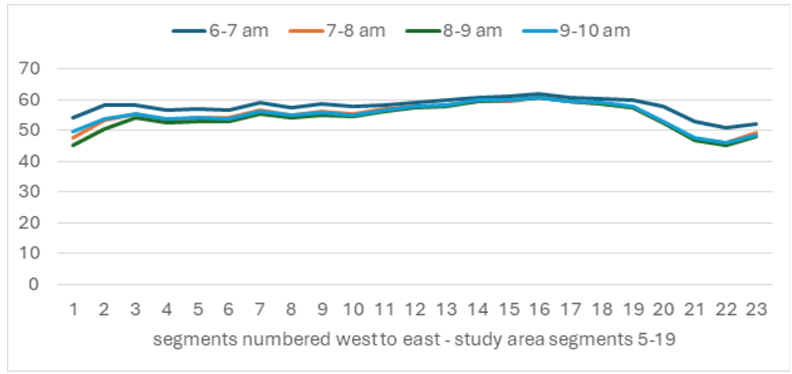
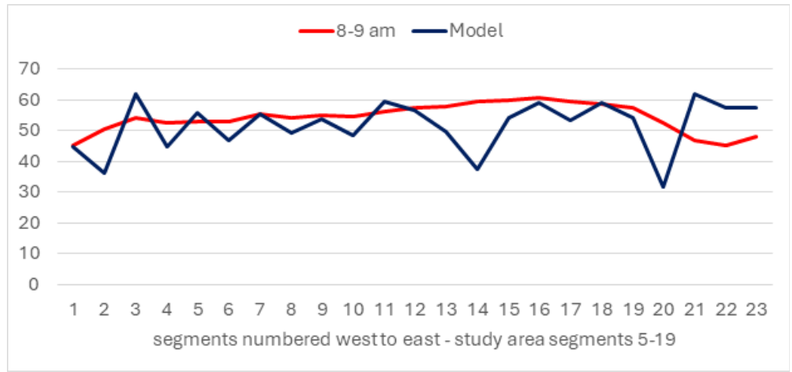


Figure 63. 2022 Average 8-9 a.m. Eastbound Speed vs. Model Speed



I-94 Traffic Volumes in the MnDOT Model are Wrong

People driving congested freeways during peak periods experience bottlenecks where there is significant delay. As documented in the previous section, the most significant bottleneck in the expanded corridor is outside the study area in the I-94/I-35W overlap area. Traffic from these bottlenecks can spill back onto upstream sections as is shown in the Phase 1 study. Also, there are some uncongested segments between bottlenecks as is also shown in the study area graphics .

Modeling traffic congestion accurately requires modeling both the bottleneck areas and less congested areas accurately. As demonstrated above, the model relied on by MnDOT in developing Rethinking I-94 metrics cannot do this, and the speed and delay metrics are wrong.

The traffic volume metrics are also wrong. The I-94/I-35W bottleneck limits westbound throughput. Without a reconfiguration of the I-94/I-35W interchanges, afternoon westbound peak hour traffic cannot grow. Daily traffic volumes could grow, and there could be more hours when the traffic volume is at capacity, but there is no way for the hourly volume to increase.

By failing to model the bottleneck correctly, the model will overestimate traffic increases throughout the corridor because it does not properly account for all the ways that some drivers will change their behavior to avoid the congested bottleneck including:

- changing trip route,
- changing trip destination (for discretionary trips like shopping), and
- changing departure time.

In general, the failure to model bottlenecks accurately causes the model to:

1. overestimate no build alternative traffic volumes and congestion,
2. overestimate boulevard alternative traffic volumes and congestion,
3. underestimate traffic growth (induced travel) from expansion alternatives.

The Rethinking I-94 Modeled Study Area is Too Small for Valid Analysis

Both the I-94/I-35W and I-94/I-35E overlap areas should be included in the study area – whether changes are considered in those areas or not because it is critical to model these bottlenecks accurately.

Modeling Recommendations

Stop reporting results from an inaccurate model. The current model is inaccurate for generating transportation performance metrics for Rethinking I-94. However, an improved model could be useful. As documented above, the regional model relied on by MnDOT cannot accurately forecast speed or traffic volume metrics. As this is the only model currently available, MnDOT should stop reporting them or using them in decision-making.

Enhance the model with dynamic traffic assignment. MnDOT or Met Council could enhance the model by including Dynamic Traffic Assignment (DTA). An example of another agency that conducted a model enhancement to plan a freeway removal is the I-375 Reconnecting Communities[4] project in Detroit. In this case, the Southeast Michigan Council of Governments (SEMCOG), evaluated the traffic impacts of the proposed highway removal by adding a DTA. They concluded that without DTA, the model results would be misleading.

Incorporate current research into the modeling practices. In Norman Marshall's peer-reviewed journal article: *Forecasting the impossible: The status quo of estimating traffic flows with static traffic assignment and the future of dynamic traffic assignment,*[5] he documents that STA always produces impossibly high freeway traffic volumes in congested networks and cannot be relied on for planning.

The best solution is to replace STA with a more modern Dynamic Traffic Assignment (DTA) algorithm. Another alternative is to rework the STA framework to represent the queue delays much more closely as is being researched by Arizona State University's Xuesong Zhou and his colleagues.[6]

4 I-375 Reconnecting Community Project

5 Marshall, Norman. Forecasting the impossible: The status quo of estimating traffic flows with static traffic assignment and the future of dynamic traffic assignment, Research in Transportation Business & Management, Volume 29, 2018, 85-92.

6 Zhou, Xuesong Simon, Qixiu Cheng, Xin Wu, Peineng Li, Baloka Belezom, Jiawei Lu, and Mohanmmad Abbasi. A meso-to-macro cross-resolution performance approach for connecting polynomial arrival queue model to volume-delay function with inflow demand-to-capacity ratio.