

# DENVER MOVES EVERYONE <sup>20</sup><sub>50</sub>

Our Vision to  
Move People,  
Goods & Services



**2050 STRATEGIC TRANSPORTATION PLAN**  
APRIL 2023



# ACKNOWLEDGMENTS



Special thanks the thousands of Denver residents and hundreds of community organizations and public agencies who participated in this process.

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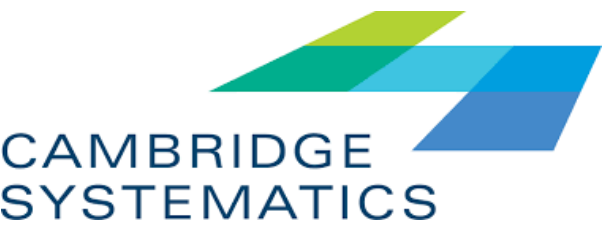
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## CHAPTER 1

# INTRODUCING *DENVER MOVES EVERYONE*

To move everyone and everything equitably, safely, and sustainably, Denver must transform how our city moves.

*Denver Moves Everyone 2050* is the Strategic transportation plan for the Department of Transportation & Infrastructure (DOTI). *Denver Moves Everyone*, or DME, aligns our investments with our collective values and provides our agency with new tools, data, and guidance to achieve the community's transportation vision.



# 1.1 |

## CREATING DENVER MOVES EVERYONE

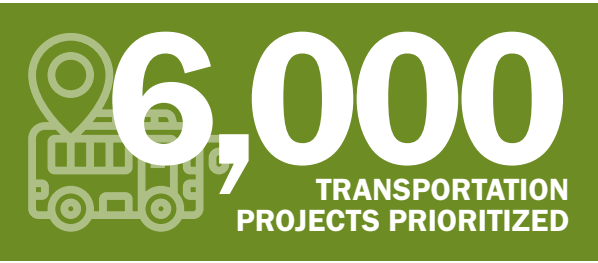
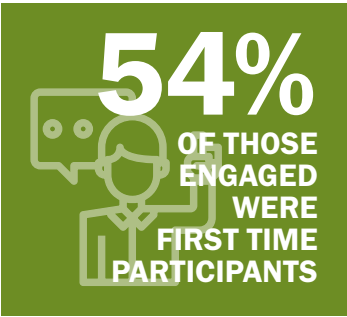
### TAKING ACTION

Denver Moves Everyone reflects the input and ideas of thousands of Denver residents. The feedback received directly shaped how Denver will move forward. The scale of the tools and resources produced, along with the magnitude of feedback received, reflects the importance of this plan to Denver. DOTI is committed to responding to feedback by taking action to make Denver’s transportation vision and goals a reality.

#### PROCESS



#### OUTCOMES



#### ENGAGEMENT





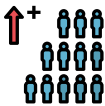
# DENVER’S CHALLENGES AND SOLUTIONS

## DENVER’S CHALLENGES

Denver last completed a strategic transportation plan in 2008. Since then, the need to rethink Denver’s transportation system became even more critical.

**Denver’s Population and Economy Expanded**

Denver was the fifth fastest growing city in the nation between 2010 and 2020.



**Traffic Crashes Resulting In Death or Serious Injury — or Traffic Violence — Increased**

84 traffic deaths occurred in 2021 compared to 37 in 2010.



**Neighborhoods Grew Hotter and Air Quality Worsened**

Denver’s greenhouse gas (GHG) emissions from transportation grew 10% between 2010 and 2019 and the number of days with bad air quality increased by 10 days on average between 2011 and 2020 when compared to the previous decade.



**Housing Prices Escalated Rapidly**

Displacement of our long-term residents accelerated, with housing and rental costs in Denver growing 90% between 2010 and 2020.



**The Vast Majority of Denver’s Largest Public Space — Our Streets — Remained Dedicated to Cars**

80% of the transportation system was dedicated to the movement of vehicles compared to 20% dedicated to moving pedestrians, bicyclists, buses, and trains.



**Inequities In Transportation Access Deepened and Denver Became Less Racially Diverse**

Of all households in Denver who do not own a vehicle, 80% were low income. Denverites who identified as Black, Indigenous, or other People of Color (BIPOC) took transit at higher rates than white residents, and on average for any given trip in Denver, transit took 2.6 times as long as driving.



**The Way Denverites Chose to Travel Didn’t Change Much**

Despite increasing traffic violence, more pollution, rising housing and travel costs, and growing inequities, the percentage of people driving alone to work ranged from 67% to 70% of all commuters between 2010 to 2019.



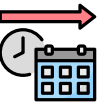
## DENVER MOVES EVERYONE SOLUTIONS

DME provides a strategic framework to address these challenges, programming limited resources to have the biggest impact on achieving our transportation vision and goals.



**CHAPTER 3  
Assessing the State of Mobility In Denver**

This synthesizes Denver’s existing transportation system and its impacts and which barriers and opportunities must be addressed.



**CHAPTER 4  
Envisioning Denver’s Future**

This illuminates how the future of transportation in Denver could change and what actions we must prioritize to shape the future residents want.



**CHAPTER 5  
Achieving Denver’s Transportation Vision and Goals**

This summarizes the strategy to prioritize the right transportation improvements in the places that need them the most, maximizing limited resources to achieve Denver’s vision and goals.



**CHAPTER 6  
Measuring Denver’s Progress**

This defines the key policies and strategies that Denver will act on to achieve the city’s transportation vision and goals.



**CHAPTER 7  
Imagining Denver’s Big Moves**

This envisions 17 transformational actions to .for Denver to become a city with a world-class transportation system.

# 1.3 | DENVER'S TRANSPORTATION VISIONS, GOALS, AND OUTCOMES

## DENVER'S 2050 TRANSPORTATION VISION



This is an aspirational statement describing what our city's transportation system will be in 2050:

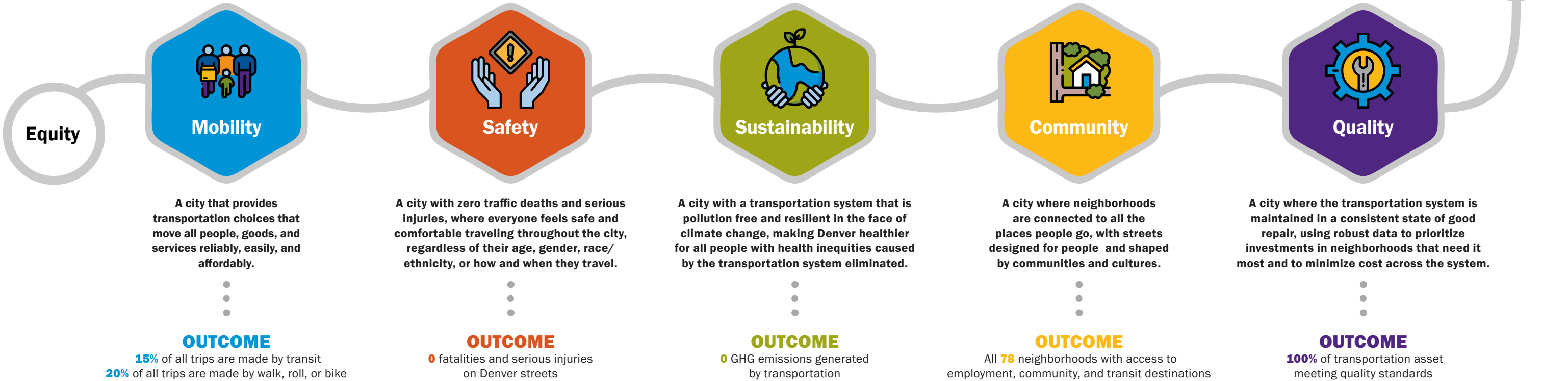
Denver moves everyone and everything with respect and care. Denver is a city of safe streets connected by sustainable mobility options, providing equitable access and opportunity for the people who need it most.



## DENVER'S TRANSPORTATION GOALS

These elements represent Denver's collective set of shared values when it comes to improving our transportation system:

Achieving transportation equity means living in a city where your identity no longer impacts your ability to thrive; where transportation is accessible and affordable to all; and where everyone has the opportunity to travel easily no matter their race, ethnicity, income, or physical ability.



Denver's Transportation Outcomes are the benchmarks Denver will aspire to and how progress will be measured.

# 1.4 | INVESTMENT RECOMMENDATIONS

## FUNDING TARGETS

By 2050, Denver will create a world-class transportation system where all neighborhoods have access to safe, equitable, and quality transportation options. *Denver Moves Everyone* provides a comprehensive investment strategy to get there.












Achieving Denver’s transportation vision and goals requires significant investment — as much as \$800 million annually to improve, expand, operate, and maintain Denver’s transportation system. This level of investment exceeds the funding available to DOTI today. Improvements in Denver’s transportation infrastructure must also be leveraged by investing in supporting community programs and initiatives that enable transformative change in how people use the transportation system.

## SHORT-TERM INVESTMENT STRATEGY

Denver’s short-term strategy of transportation improvements describes what can be achieved with current funding levels and advances priority projects through 2030. *Denver Moves Everyone* prioritized improvements and completed analysis to understand what projects and what investment levels can move Denver toward its transportation goals. Investments in community programs to motivate and communicate changes in traveler behavior are included in this strategy to make the most of the improvements Denver will make.

## MID-TERM INVESTMENT STRATEGY AND LONG-TERM INVESTMENT STRATEGY

Denver’s mid-term and long-term investment strategy identifies the major system expansions and upgrades necessary to achieve our goals, as well as the supporting investments in operating and maintaining this system. This long-term strategy is based on funding needs identified to meet Denver’s goals and future improvement targets that will result in a world-class system. This long-term horizon provides Denver an understanding of the magnitude of funding needed by 2050.

TRANSPORTATION ASSET		2050 IMPROVEMENT TARGETS	FUNDING DISTRIBUTION FOR SHORT-, MID-, AND LONG-TERM INVESTMENT STRATEGIES
	Pedestrian Infrastructure	Filling 300 miles of sidewalk gaps and widening 800 miles of narrow sidewalks.	<div><div></div><div></div><div></div></div>
	Bicycle and Micromobility	Building 400 miles of new bikeways and upgrading 175 miles of existing bikeways.	<div><div></div><div></div><div></div></div>
	Transit	Completing 100 miles of new Bus Rapid Transit corridors, installing 80 miles of bus priority improvements, and upgrading 2,500 bus stops.	<div><div></div><div></div><div></div></div>
	Signals	Replacing and updating more than 4,000 signals to modern standards.	<div><div></div><div></div><div></div></div>
	Signage and Striping	Maintaining 100% of existing assets in good condition and completing new signs and striping to support system expansion using modern curbside management systems.	<div><div></div><div></div><div></div></div>
	Bridge and Structures	Maintaining 95% of bridges and structures in good condition and completing 75 new crossing structures.	<div><div></div><div></div><div></div></div>
	Streetscape and Curbside	Providing green infrastructure on more than 1,300 miles of streets.	<div><div></div><div></div><div></div></div>
	Streets and Alleys	Constructing 20 miles of new streets.	<div><div></div><div></div><div></div></div>
	System Operations	Accommodating requirements for all new infrastructure completed.	<div><div></div><div></div><div></div></div>
	Paving and Maintenance	Maintaining pavement on 95% of streets and alleys in good or better condition.	<div><div></div><div></div><div></div></div>
	Multimodal Improvements	Constructing major new multimodal improvement projects.	<div><div></div><div></div><div></div></div>

# 1.5 | STRATEGY RECOMMENDATIONS

## HOW WE WILL TRACK RESULTS

To advance Denver’s transportation vision and goals and measure progress, *Denver Moves Everyone* identifies strategies that represent key actions Denver must advance. These strategies identify clear paths and significant opportunities for Denver to achieve change in how the transportation system works to move everyone and everything. Measurable indicators enable Denver to measure progress and track results over time.



Mobility



Expand affordable travel opportunities for all Denverites.



Prioritize people walking or rolling, biking, using micromobility, and taking transit in roadway design.



Facilitate the efficient movement of freight throughout the city.



Shift single-occupancy vehicle trips to more efficient modes.



Safety



Achieve Vision Zero by eliminating traffic deaths and serious injuries.



Make traveling in Denver comfortable and secure for all.



Design all streets for safe speeds.



Sustainability



Take action to reduce Urban Heat Island Effect.



Improve air quality through reducing transportation-related emissions.



Keep our steams and waterways clean.



Address Denver’s climate crisis.



Community



Use inclusive engagement strategies for public outreach.



Transform streets as places for people.



Repair harm and alleviate the burden created by past transportation infrastructure decisions in Denver’s low-income and BIPOC communities.



Quality



Maintain Denver’s transportation system in a state of good repair.



Build a world-class transportation system.



Bolster efficiencies and accountability in operating Denver’s existing and future transportation system.



# 1.6 | FUTURE TRANSFORMATIONS

## DENVER'S BIG MOVES

To achieve the vision of becoming a city with a world-class transportation system, Denver needs to look ahead and identify opportunities to be bold and rethink how our transportation system can be used to provide multiple benefits and meet future needs. *Denver Moves Everyone* identifies new programs and projects to move more people safely, comfortably, and sustainably by eliminating barriers, creating new public spaces, and adding more travel options.

THEMES AND CONCEPTS	
	<b>Greening Our Streets</b>
	<b>1 Green Street Network</b>
	<b>2 Green Alleys</b>
	<b>3 Grand Green Boulevards</b>
	<b>Connecting Our City</b>
	<b>4 Highway and Arterial Lids</b>
	<b>5 Highway Interchange Closures</b>
	<b>6 Railyard Redevelopment</b>
	<b>Reimagining Our Public Spaces</b>
	<b>7 Reimagine Cherry Creek</b>
	<b>8 Reimagine the Platte</b>
	<b>Transforming Our System</b>
	<b>9 Front Range Passenger Rail Hub</b>
	<b>10 Electric Mobility Transition</b>
	<b>Rethinking Our Streets</b>
	<b>11 Shared and Slow Streets</b>
	<b>12 Car-Free Zones</b>
	<b>13 Multimodal Traffic Signal Upgrades</b>
	<b>14 Pedestrian Crossing Density</b>
	<b>Expanding Our Transit Network</b>
	<b>15 Denver Connector Microtransit Services</b>
	<b>16 Mobility Hub and Transit Center Expansion</b>
	<b>17 Accelerated Bus Rapid Transit (BRT) Network Implementation</b>

CONCEPT DESCRIPTIONS	
<b>1</b>	Provide a park-like transportation experience across Denver with intensive green infrastructure by establishing a network of corridors that are either entirely closed to vehicle traffic or have significantly reduced traffic volumes and speeds. Green streets could include streets that have redundant origin and destination pairs in the arterial network, locations to daylight streams and channels, or streets that run along existing channelized streams.
<b>2</b>	Reconstruct alleys with streetscaping and green stormwater infrastructure — such as permeable pavement — to provide cool, safe, comfortable places to travel that also clean stormwater runoff.
<b>3</b>	Retrofit major multimodal arterials that are planned to become a BRT route to improve the pedestrian experience in accordance with Denver's Complete Street Design Guidelines by widening sidewalks, incorporating amenity zones, and installing green infrastructure. Include intersection safety treatments for bicycles and pedestrians where appropriate.
<b>4</b>	Construct caps over highways and major arterials in key locations to eliminate barriers, create new public spaces, safe multimodal connections, reconnect neighborhoods, and lessen the impacts of traffic — such as noise and air pollution — on neighboring residents.
<b>5</b>	Close select highway ramps to reclaim space and calm traffic while creating new multimodal connections. This would remove barriers for people walking and rolling while improving safety by eliminating potential conflict points. Ramps that serve local or collector streets with relatively low volumes could be considered as candidates for removal.
<b>6</b>	Consolidate and remove obsolete rail lines to create a connected street grid and reopen large areas of land in the core of the city for transit-oriented redevelopment.
<b>8</b>	Increase capacity of the South Platte River Trail to accommodate growth, support mobility, access, and wildlife preservation needs by repurposing South Platte River Drive into an expanded multipurpose trail.
<b>9</b>	Establish Denver Union Station as a main hub along the planned Front Range Passenger Rail (FRPR) route from Pueblo to Fort Collins.
<b>10</b>	Incentivize a complete transition to electric mobility through an approach that centers and prioritizes shared mobility and multimodal transportation options in order achieve goals of reducing emissions and improving air quality, as well as reducing congestion through mode shift.
<b>11</b>	Denver's Shared Streets Program will provide residents and visitors with a comfortable space to walk, roll, bicycle, interact, and play. Selected streets will incorporate aggressive traffic calming treatments to design for low vehicle speeds and volumes to accommodate higher bike and pedestrian activity. Shared streets will be classified as either "Community" or "Commercial" depending on the location and use unique design characteristics to mimic the neighborhood and intent.
<b>12</b>	Establish car-free public spaces by closing off streets to general traffic temporarily and permanently while still allowing bicycles, micromobility, transit, and deliveries where appropriate. Locations should be selected in areas of high pedestrian activity — such as around downtown or near major activity centers — where public space is in high demand.
<b>13</b>	Increase citywide signal density and upgrade equipment to allow for multimodal enhancements, particularly progression signal timing for speed management. Upgrades may include Transit Signal Priority (TSP), transit queue jumps, leading pedestrian and bicycle intervals, pedestrian countdowns, protected left turns, and other safety treatments for people walking, rolling, or bicycling.
<b>14</b>	Increase the density of controlled bicycle and pedestrian crossings along busy streets. On less busy streets, install new safe places to cross so that it is possible to cross the street nearly every block.
<b>15</b>	Expand Denver Connector Microtransit, a currently free on-demand transit service that supplements fixed-route service in defined areas where traditional transit operations are challenging. Focus service on connecting residents and visitors to important destinations — such as transit hubs, job centers, schools, or grocery stores.
<b>16</b>	Build out a network of mobility hubs at key transit connection points across the city, incorporating high-quality pedestrian infrastructure and transit passenger amenities, bike facilities, micromobility, and other modal connectivity. Expand capacity at existing transit centers — such as Civic Center Station — to accommodate the growing BRT network.
<b>17</b>	Accelerate the implementation of the BRT network identified in <i>Denver Moves: Transit</i> to provide faster, more reliable and frequent transit service throughout the city. Quick implementation of the transit network would provide more travel options and benefit BIPOC communities who face higher rates of transportation inequities.

## CHAPTER 2

# CRAFTING DENVER'S PLAN

*Denver Moves Everyone* represents the shared vision of Denverites for the future of transportation in our city and the guiding plan to achieve that vision. Over two years, thousands of voice came together to shape the plan. *Denver Moves Everyone* provides the data, tools, and strategies to transform how Denver moves.

### What this chapter introduces:

- + Description of *Denver Moves Everyone* and DOTI.
- + Summary of public and partner input in shaping the future of transportation in Denver.
- + Description of transportation equity as the foundational theme guiding Denver's transportation future.



# 2.1 | DENVER DEPARTMENT OF TRANSPORTATION AND INFRASTRUCTURE

## DOTI MISSION

DOTI is a modern agency focused on increasing mobility and safety while reducing congestion and fighting climate change.

## DOTI FUNCTIONS

DOTI is the public agency responsible for planning, designing, building, operating, regulating, and maintaining the City’s infrastructure. The agency is organized around two core functions — utilities and mobility. Utilities delivers the City’s water and waste functions and green infrastructure and services. Mobility delivers transportation infrastructure, services, and initiatives for all travelers, which includes pedestrians, bicyclists, transit riders, commercial vehicles, and drivers.

Together, DOTI is responsible for most things within the public right-of-way — or all the public space between private property lines. DOTI connects and leverages the City’s transportation, water, waste, and environmental systems to build a better Denver.

Denver Moves Everyone focuses on the mobility functions of the agency by providing the overall vision and framework for how transportation infrastructure is **planned** and **operated**.

### PLANNING AND DELIVERING THE TRANSPORTATION SYSTEM



#### PLAN

Engage residents and organizations to develop strategic plans for all the ways people move, including citywide, area, and corridor mobility plans. This team’s core responsibilities include transportation safety, innovation, micromobility, walking, bicycling, transit, and freight.



#### DESIGN

Coordinate with Denver’s neighborhoods to provide project development, engineering, safety, and environmental services to advance projects identified in planning efforts and through the City’s 311 resident service.



#### IMPLEMENT

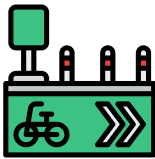
Manage the construction of capital projects including bridges, water systems, street reconstructions, sidewalks, bikeways, and transit projects.



#### RESOURCE

Provide resources to the Plan, Design and Build divisions to guide program development, facilitate project implementation, and evaluate success in reaching City goals.

### OPERATING AND MAINTAINING THE TRANSPORTATION SYSTEM



#### OPERATE

Manage the operation of transportation system assets that help manage travel flow, including street markings, signs, traffic signals, and fiber optic connections.



#### MAINTAIN

Conduct the upkeep and improvements to paved streets and alleys, clear snow, sweep and clean streets and bikeways, and maintain curbs and gutters.



#### REGULATE

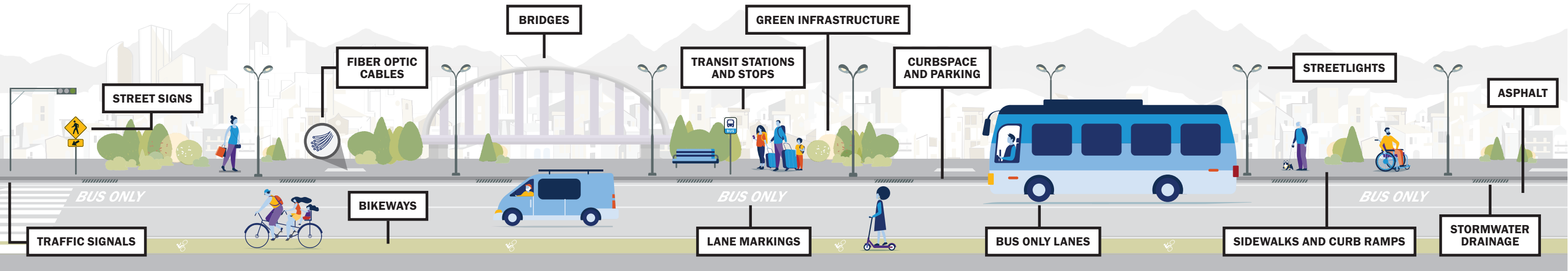
Review and permit capital projects and development to ensure transportation, water, waste, and environmental elements of the public right-of-way are coordinated and consistent with standards.



#### ENFORCE

Ensure compliance with standards and guidelines for parking, accessibility, sidewalks, privately built infrastructure, and other right-of-way codes.

FIGURE 2.1: Public Right-of-Way Infrastructure Elements of Denver’s Transportation System



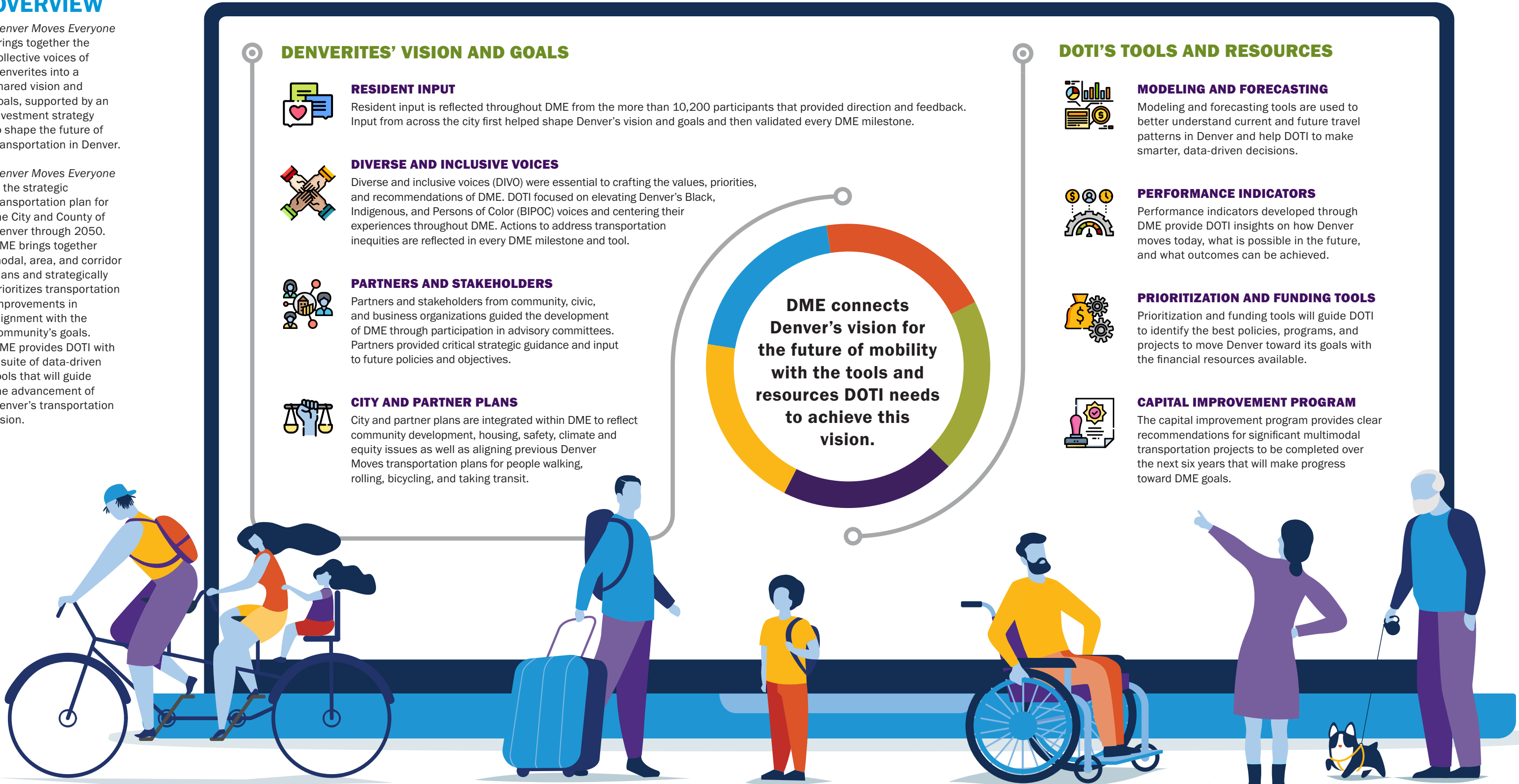
# 2.2 | DENVER MOVES EVERYONE

## DME OVERVIEW

Denver Moves Everyone brings together the collective voices of Denverites into a shared vision and goals, supported by an investment strategy to shape the future of transportation in Denver.

Denver Moves Everyone is the strategic transportation plan for the City and County of Denver through 2050. DME brings together modal, area, and corridor plans and strategically prioritizes transportation improvements in alignment with the community's goals. DME provides DOTI with a suite of data-driven tools that will guide the advancement of Denver's transportation vision.

FIGURE 2.2: DME Framework

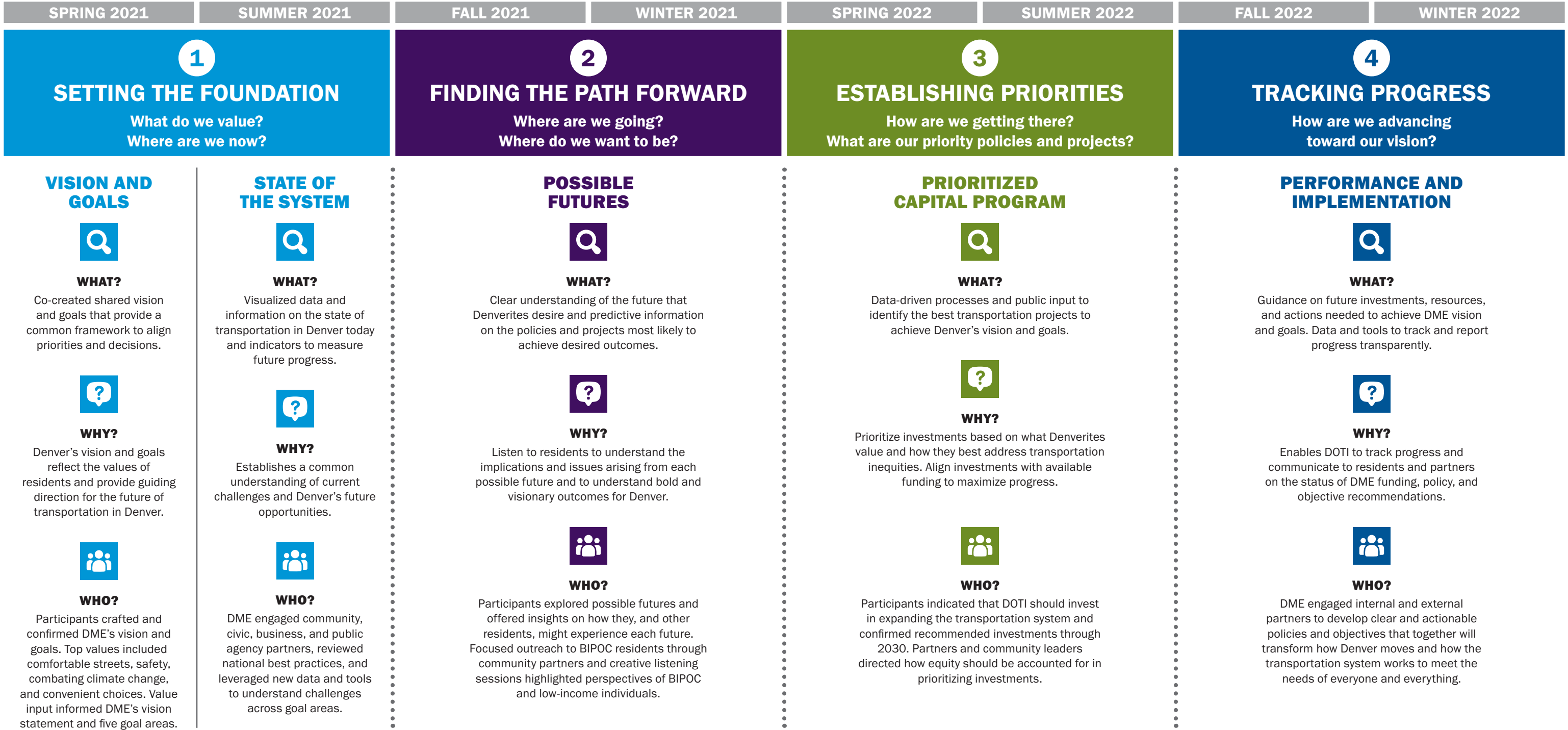




# 2.3 | SHAPING DENVER'S TRANSPORTATION FUTURE TOGETHER

Together, DOTI collaborated with thousands of Denverites to develop a strategic plan that reflects Denver's values, and elevates the voices of Denver's Black, Indigenous, and People of Color residents to shape Denver's transportation future.

FIGURE 2.3: DME Process and Timeline





# DME ONLINE AND IN-PERSON GRASSROOTS EVENTS

DOTI is grateful for the participation of the residents and community partners that made *Denver Moves Everyone* possible. Over two years, DME reached participants through online and in-person grassroots events. At more than 90 community events across the city, volunteers spent more than 1,880 hours — which adds up to over 78 days of face-to-face connection — reaching out to a wide range of residents. Community ambassadors helped reach residents not typically involved in planning processes and creative listening sessions produced poetry to translate the experiences and insights of diverse residents.

- 
**1** SHARED VISION
- 
**60** PARTNER ORGANIZATIONS INVOLVED
- 
**78** ALL DENVER NEIGHBORHOODS WERE ENGAGED
- 
**90** COMMUNITY EVENTS HELD
- 
**5,600+** SURVEYS COMPLETED
- 
**10,200+** PARTICIPANTS ONLINE AND IN-PERSON
- 
**151,000+** RESIDENTS ENGAGED ON SOCIAL MEDIA

FIGURE 2.4: Examples of DME Online and Media Outreach



SOURCE: City and County of Denver

Various social media outreach posted over two years promoting DME outreach.



SOURCE: Denver7 — The Denver Channel

Denver7 reported on the DME public outreach during its January 20, 2022, broadcast alerting the public that the City was seeking input on the project.



SOURCE: City and County of Denver

Various bilingual online outreach materials were also distributed to the public for DME.

FIGURE 2.5: Examples of DME In-Person Grassroots Events



SOURCE: City and County of Denver

Staff collected input at a grassroots event in 2022 to educate Denverites about the cost of transportation services and improvements and to gather feedback about where they as residents want to see future investments made.



SOURCE: City and County of Denver

Even the youth of Denver came to grassroots events to learn more about the future of transportation in the city and county.



Conversations at grassroots events were critical to the DME process. The feedback from in-person surveys submitted, as well as online public engagement tools, was incorporated into this final plan.

SOURCE: City and County of Denver



SOURCE: City and County of Denver

Materials were translated in Spanish and other languages, as requested, as part of DME's dedication to engagement inclusivity.



By meeting people where they are, DME was able to gather feedback from community members who may have not historically been engaged with on other DOTI projects or programs.

SOURCE: City and County of Denver



# 2.4 | TRANSPORTATION EQUITY IN DENVER

Equality means each one of us has the same access to the same opportunities. Equity recognizes that each of us have different circumstances and that access to appropriate opportunities is needed to reach an equal outcome. DME focused on addressing transportation equity through targeted outreach to Denver residents, through applying an equity lens to results of technical analyses and integration of equitable transportation actions throughout DME.

## EQUITY: PAST AND PRESENT

DOTI is working toward an equitable Denver where everyone has the opportunity to be successful and thrive, no matter their race, income, or zip code. Denver will achieve racial equity in transportation when one’s race can no longer be used to predict economic and health outcomes. Through DME, DOTI is committed to acknowledging inequities in transportation services and systems and is working to enable access to opportunity for every resident.

Currently, lower-income and BIPOC residents experience more barriers to mobility and more involuntary displacement pressures than white, affluent Denverites. Policy decisions and public investments of the past shaped the outcomes that residents of Denver’s neighborhoods experience today. Neighborhoods that are adjacent to major roadways have less frequent and lower-quality transit routes; have fewer community trees and parks; lack adequate sidewalks or safe routes; have streets in poor condition; and tend to have a higher proportion of persons of color or lower-income residents living within them.

Transportation policy decisions are only part of the story. Racially-based housing lending practices and zoning regulations of the 1930s and 1940s created barriers to homeownership and limited public investment in neighborhoods with residents of color. Urban renewal policies and highway construction programs of the 1960s and 1970s demolished historic buildings and bisected communities with busy roads. Together, these policies and public infrastructure projects contributed to racial segregation across Denver by excluding BIPOC communities from building wealth through homeownership and limiting access to opportunity.

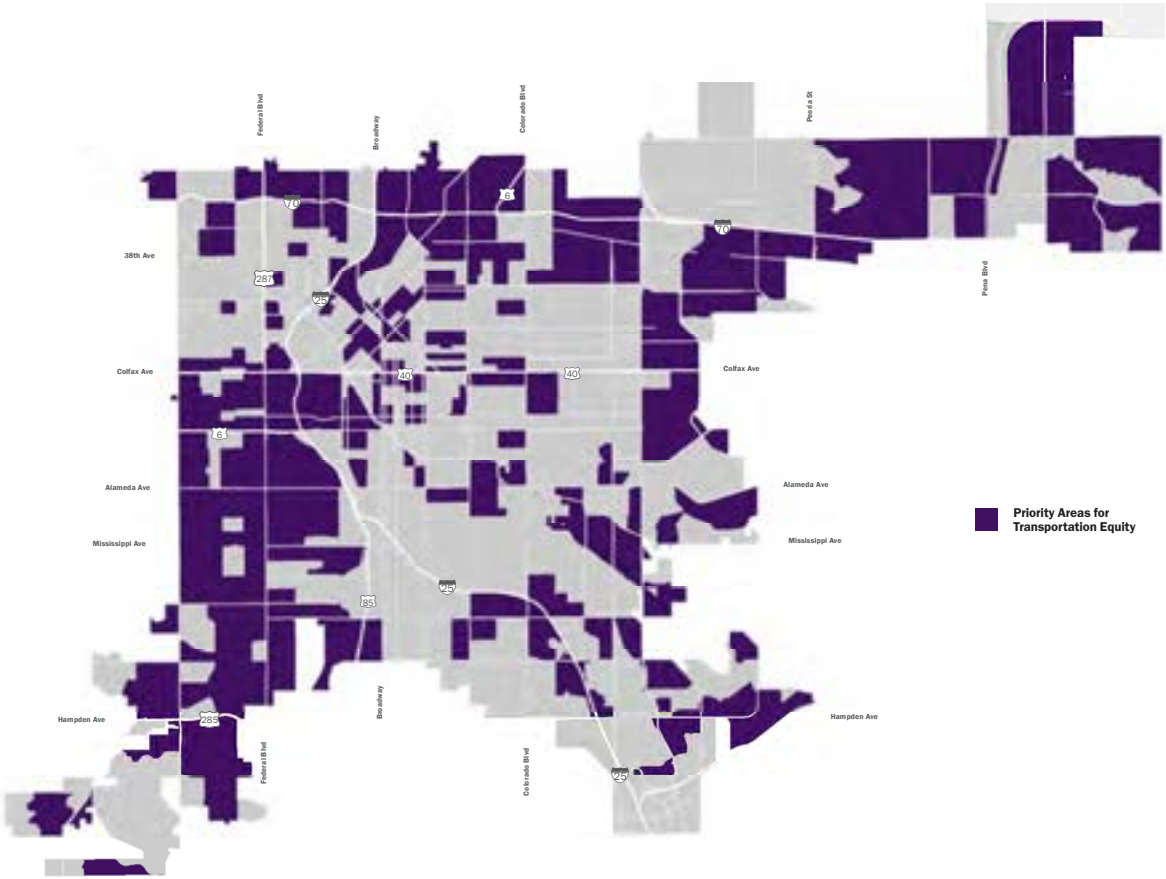
DME focuses on eliminating the barriers created over our city’s history that disproportionately impact BIPOC communities in many of Denver’s neighborhoods. Every resident in Denver has the right to clean air; a sense of safety in public spaces; connected, accessible, and convenient travel options; and affordable mobility choices to get where they need to go. DOTI is committed to social and racial equity by taking impacts of systemic racism into account when planning for the future of mobility in Denver. **To achieve justice and eliminate racial disparities, DOTI’s policies, programs, practices, and procedures will center on the voices, experiences, and desires of Denver’s BIPOC communities to identify solutions and reverse harms of the past.**

## DENVER’S PRIORITY AREAS FOR EQUITY

Transportation is essential to creating equitable access to opportunity. Denver’s transportation system has historically been vehicle-oriented, making travel easier for drivers and comparatively more difficult for people without access to a vehicle. Limited travel choices for those who do not drive for all trips perpetuates existing transportation inequities by making it harder for some residents to reach jobs, food, healthcare, or educational opportunities, and other essential services. Research demonstrates that low-income residents and residents identifying as BIPOC are most likely to not own a vehicle and rely more on walking, rolling, bicycling, transit, and informal carpools to get around.

DOTI developed a data-based **Equity Index** that identifies **Denver’s Priority Areas for Transportation Equity**. This approach helps DOTI understand where residents most burdened by transportation inequities in Denver’s current system reside. The Equity Index leverages data that correlate with an increased reliance on walking, rolling, bicycling, and transit to access opportunities. Denver’s Priority Areas for Transportation Equity indicate which areas of Denver have higher concentration of residents who face transportation inequities. Inequities in the transportation system include unsafe travel conditions, longer travel times, commute cost-burdens, and historical disinvestment in quality and comfortable infrastructure. By identifying these areas, DOTI will focus transportation investments that reduce inequities by providing better access to multimodal infrastructure and programs for the people who need it most.

FIGURE 2.6: Priority Areas for Transportation Equity



SOURCE: City and County of Denver, DOTI, 2022

## DOTI’S EQUITY INDEX FACTORS

### RACE AND ETHNICITY

BIPOC residents tend to travel more than other residents by walking, rolling, bicycling, and transit and are less likely to have access to a household vehicle (U.S. Census, 2020).

### EDUCATION LEVEL

Nationwide, residents without high school diplomas have the highest rates of walking and the second highest rates of bicycling to and from work (U.S. Census, 2020).

### POPULATIONS OF AGE 65+

Older adults experience more limited mobility as they age, with more than half of American adults ages 65 years or older having at least one activity-based limitation (U.S. Census, 2020). Ensuring walking, rolling, and transit access is critical for older adults to maintain their independence and health.

### HOUSEHOLDS WITH NO VEHICLE

In Denver, 10% of households do not own a car. Of these households, 80% are lower income households and nearly 90% are residents who rent their homes (U.S. Census, 2020). Without adequate alternatives to driving, these households face more numerous barriers to opportunity.

### FEMALE HEADS OF HOUSEHOLD

Female caregivers with responsibility for children must make more trips to access education, health, work, and human services and face greater safety, comfort, time, and cost barriers when traveling. Gender inequities in transportation access represent additional burdens to primary caregivers (University of Minnesota, 2019).

### PEOPLE WITH DISABILITIES

People aged 18 to 64 with disabilities are less likely to own or have access to vehicles than people without disabilities (U.S. Census, 2020). People with limited or no vehicle access rely more on walking, bicycling, and transit to get around, which can be made more difficult by a lack of adequate walking, bicycling, and transit facilities, especially for people with mobility challenges.

## CHAPTER 3

# ASSESSING THE STATE OF TRANSPORTATION IN DENVER

*Denver Moves Everyone* envisions a complete transportation system that moves everyone and everything. To achieve this vision first requires understanding the mobility opportunities and challenges Denver faces today. To do this, Denver leveraged new data and unique analyses to understand our mobility system and benchmark Denver against peer cities.

### What this chapter introduces:

- + Detailed information and visualizations of transportation opportunities and challenges within *Denver Moves Everyone* goal areas.
- + New data points to measure progress.
- + Critical social and racial inequities caused by today's transportation system design and function.





# 3.1 | HOW DENVER MOVES

Denver moves... a lot. Residents make trips to and from school, work, stores, and for daily errands and needs. Visitors to Denver travel to and from major destinations and transportation hubs. Businesses rely on workers to travel to offices and job sites across the metro region and to move the packages and products that support Denver's economy.

## WEEKDAY TRIPS

Every weekday, 3.7 million trips are made in Denver. Half of those trips represent travel in and out of the city made by residents of Denver and residents of surrounding communities (DOTI, Locus, 2019). Transportation is a regional issue and requires cooperation between Denver and neighboring jurisdictions.

More than three million trips a day may seem like a large number, but it represents about four trips per person each and every day. Each time Denverites leave their homes — whether for work, daycare, school, shopping, socializing, dining, exercise, or just for fun — residents should have access to safe, reliable, and affordable ways of getting around.

## HOW PEOPLE TRAVEL

Many Denverites rely on cars for most trips. One in four trips within Denver are made by walking, bicycling, scooter, bus, or train. Since most trips are made by driving, this has impacts on safety, our communities, air and water quality, and the quality of our infrastructure. Travel choices have remained consistent while congestion has increased (DOTI, 2021).

FIGURE 3.1: Average Daily Weekday Trips In, Out, and Around Denver

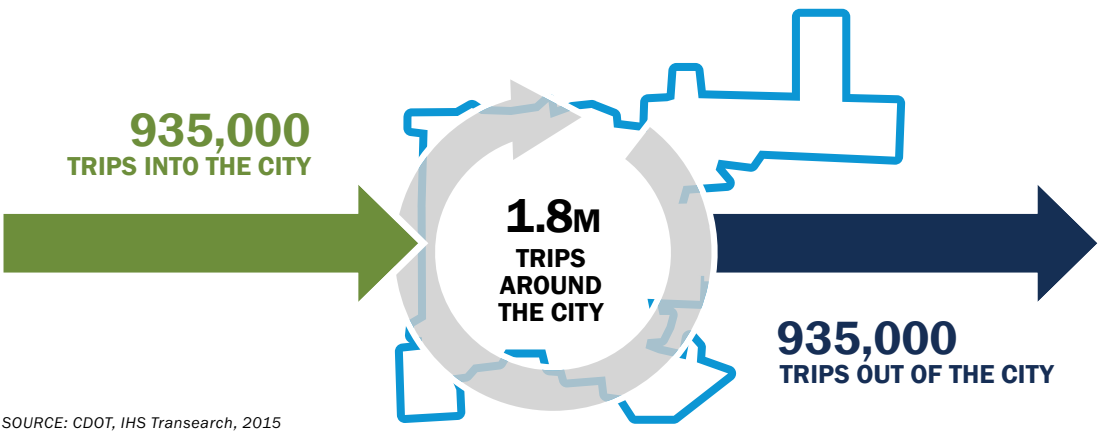
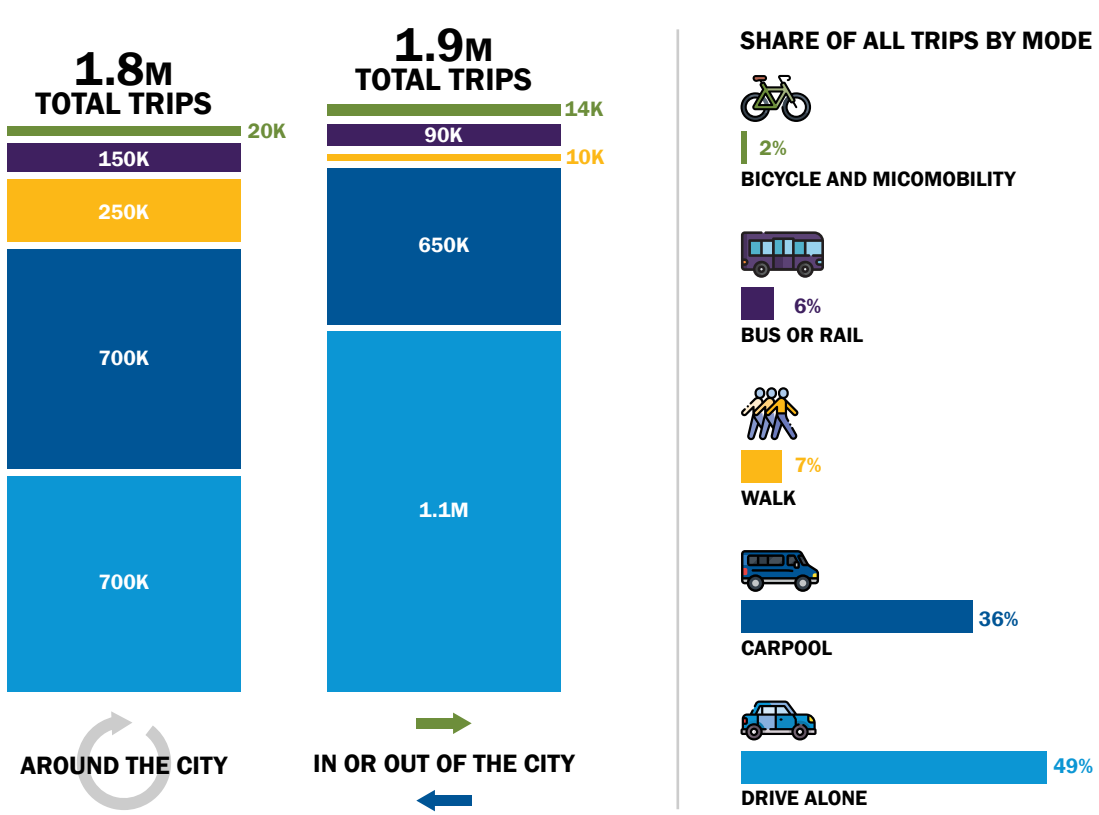


FIGURE 3.2: Average Daily Weekday Trips by Mode In, Out, and Around Denver



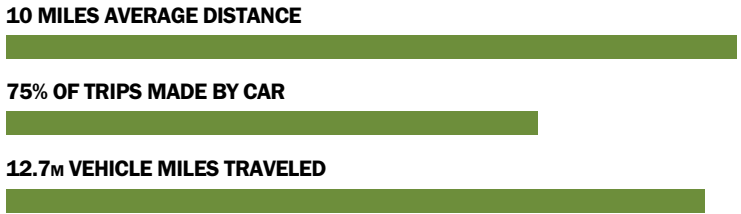
## TYPES OF TRIPS

Denverites travel for many reasons at all times of the day. Most trips residents make are not to or from work. These non-work trips are frequent but tend to be shorter in distance and account for a smaller proportion of all miles driven by vehicles. **Work-related trips to workplaces and job sites represent 30% of all trips and 60% of all miles traveled by single occupant vehicles in Denver.**

The choice to drive a vehicle is often an economic choice. **For many Denver residents, driving a vehicle to work, instead of taking transit, is faster. For an average trip in Denver, transit takes 2.6 times longer (DOTI, 2021).** For families, reliable travel times are critical when working jobs without flexible hours or to meet daily needs for childcare or healthcare appointments. Driving may be the most convenient option in some neighborhoods of Denver to reach daily destinations such as schools and stores. Driving also represents independence for many residents, including older residents. Older adults may have greater concerns about the safety and reliability of public transit (Colorado Department of Transportation (CDOT), Survey of Older Adults, 2014). Access to a vehicle is often necessary to travel around the greater metro region and around Colorado. Residents without access to a vehicle are faced with less competitive or available options to travel within and out of Denver.

FIGURE 3.3: Comparison of Work Trips in Denver vs. Trips for All Purposes Made in Denver, 2020

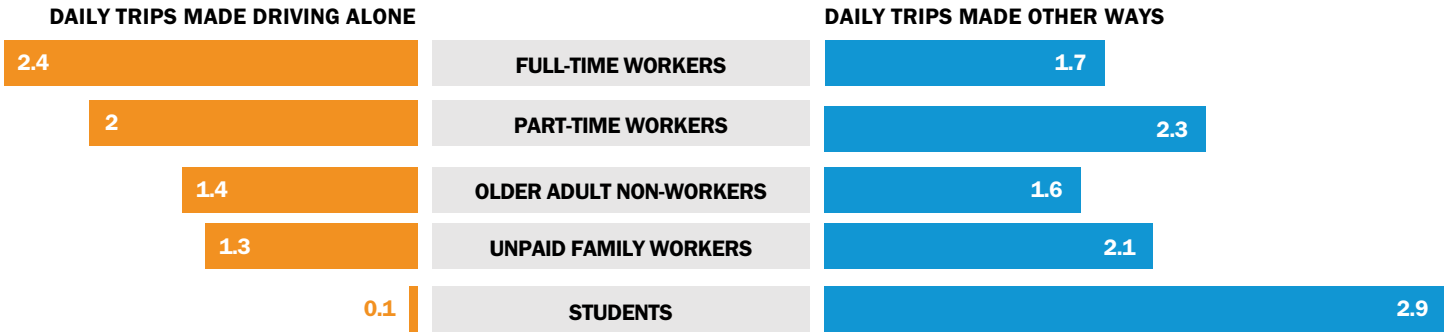
## TOTAL WORK TRIPS: 1.5M PER DAY



## ALL OTHER TRIPS: 2.5M PER DAY

FIGURE 3.4: Daily Trips Made by Denver Residents

Denverites working full and part time make the most trips each day and the most trips made by driving. Today's transportation system is designed for commuting and accommodating the significant number of vehicles on our streets during rush hour. Many trips are made by older adults, family workers, caregivers, and students throughout the day, in ways that do not include driving a vehicle.



# 3.2 | TRANSPORTATION COMMUTES AND COST

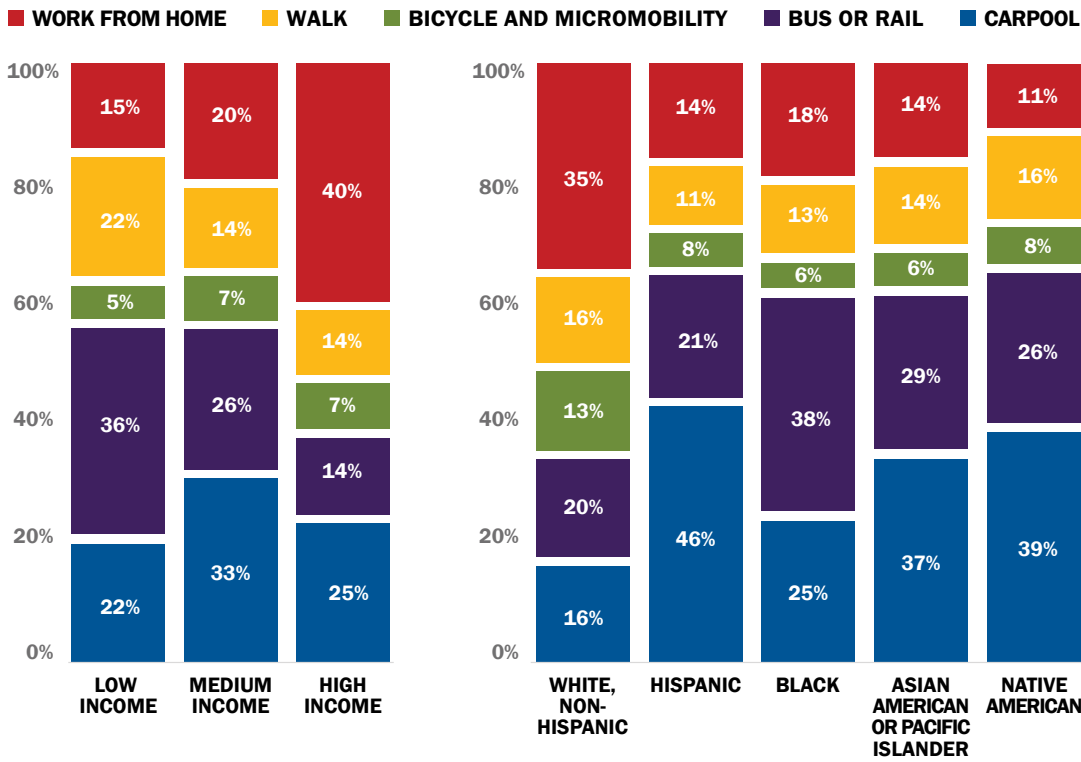
## DEMOGRAPHIC TRAVEL PATTERNS IN DENVER

Commuting patterns differ across household income levels and racial and ethnic identities. Getting to work reliably and within a reasonable time can be a challenge for many Denverites. Owning a vehicle is expensive and out of reach for many. **In Denver, 10% of households do not own a car. Of these households, 80% are lower-income households and nearly 90% are residents who rent their homes** (DOTI, Focus, 2020). Without a car, getting to work on time every day means depending on transit, carpools, or bicycling and walking routes.

Denver's bus and rail system doesn't work for every resident. **On average for any given trip in Denver, transit takes 2.6 times longer than driving.** For underserved populations in Denver's priority areas for equity, transit can take 2.7 times longer.

Denver local bus and rail service is primarily utilized by BIPOC and low-income populations (RTD, 2019). Time spent traveling to and from work or for any trip is time spent away from family and represents a significant personal cost for these households.

FIGURE 3.5: Non-Drive Alone Commute to Work Choices



SOURCE: U.S. Census, American Community Survey, 2019

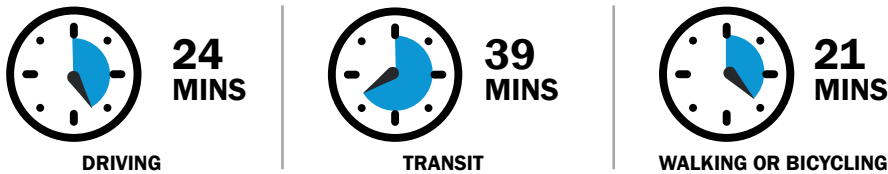
FIGURE 3.6: Average Commute Time in Denver

Residents who rely on transit to get to work face longer travel times than driving, even though those trips are likely covering less distance. Persons of color relying on public transit spend an average of 1.5 hours a day commuting.

### BIPOC Residents



### White Residents



SOURCE: U.S. Census, PUMS 2019 National Equity Atlas

FOR THE AVERAGE TRIP IN DENVER, TRANSIT TAKES 2.6 times longer than driving



SOURCE: DOTI, 2021

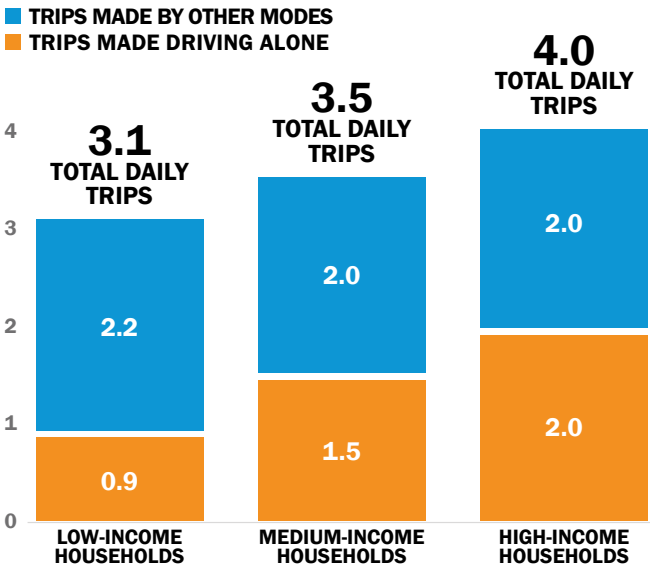
## THE BURDENS OF DRIVING

Denver's higher-income households make more trips per person each day than households with lower incomes and make greater share of total trips driving alone.

Low-income workers are more likely to hold jobs with less flexible working hours, tend to have more limited options to work from home, and have less convenient transit options to commute between their workplace and home. Recent national studies examining low-income commute patterns during the pandemic found that work travel for low-income residents did not decline as much as high-income households (Ohio State University, Center for Urban and Regional Analysis, 2021).

The result is that Denver's higher-income households benefit more from the policies and infrastructure that make driving cheap and easy for those with access to a vehicle but bear less of the social costs of the choice to drive.

FIGURE 3.7: Denver Daily Trips Per Person



SOURCE: DOTI, Focus Model, 2020

## TRANSIT AFFORDABILITY

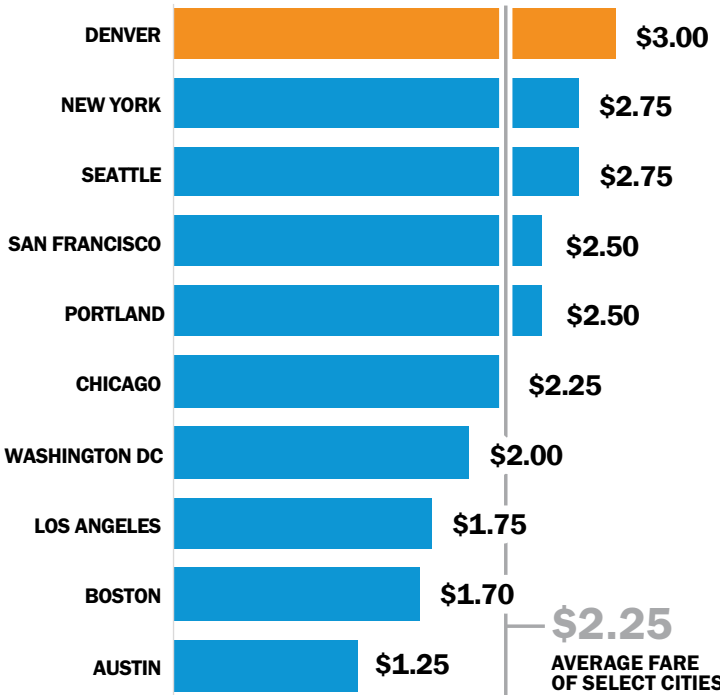
In 2019, RTD raised fares for the first time since 2016, to \$3.00 base fare for local service.

**Local base fares for RTD are currently some of the most expensive in the country.** In 2021, the Colorado Legislature eliminated a mandate on RTD that impacted fares. Going forward, RTD will have the flexibility to lower fares or offer free service. Discounted passes are available for Denver residents living below poverty levels and discounts for annual, commuter, and employer-sponsored passes are also available.

Even with RTD's discount programs, current fares for low-income riders, students, older adults, and persons with disabilities remain higher than other peer transit agencies around the country (APTA, Fare Database, 2020).

In Denver, the median income of commuters relying on public transportation to get to work is lower than those who drive. The average transit commuter spends 6% of their income to purchase monthly regional RTD passes for a year.

FIGURE 3.8: Adult Base Fares 2020



SOURCE: American Public Transit Association, 2020



# 3.3 | DENVER'S TRANSPORTATION SYSTEM

## DENVER'S SIDEWALK NETWORK

There are approximately 2,300 miles of sidewalk in Denver. Sidewalks are the most important elements of Denver's transportation system and sidewalk gaps are the weakest links. Missing sidewalks and sidewalks that are too narrow present barriers for everyone, especially for people with different abilities.

PERCENT OF SIDEWALKS MEETING CITY WIDTH AND BUFFER STANDARDS:

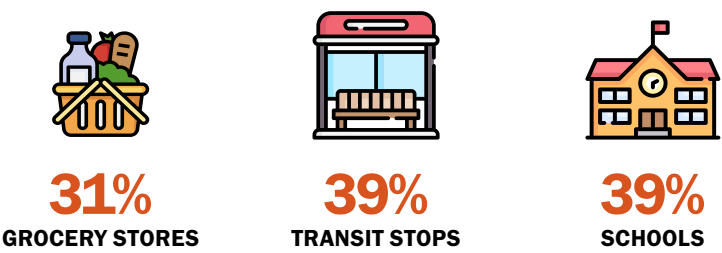
ARTERIAL STREETS: 2% COLLECTOR STREETS: 8% LOCAL STREETS: 5%

SOURCE: DOTI, 2021

## NOT ALL DESTINATIONS ARE ACCESSIBLE

Deficient sidewalks are less than four feet wide, which is the minimum width required to meet standards in the Americans with Disabilities Act (ADA). Narrow sidewalks may not be comfortable or provide an accessible route, particularly for people in a wheelchair or for someone with a stroller.

PERCENT OF SIDEWALKS THAT ARE TOO NARROW WITHIN WALKING DISTANCE OF COMMUNITY DESTINATIONS:



SOURCE: Denver Moves: Pedestrians & Trails, 2017

## NOT ALL STREETS ARE EASY TO CROSS

Crosswalks, signals, beacons, and signage make it easier and safer for pedestrians to cross streets. Crossing wide, multilane arterial roadways poses particular challenges for pedestrians, due to long crossing distances and high traffic volumes and speeds. Along Denver's arterial roadways, 58% of intersections — 2,783 out of 4,839 intersections — do not have traffic signals (FHWA, 2021; DOTI, 2021).

1/5 mile AVERAGE DISTANCE BETWEEN SIGNALIZED ARTERIAL STREET CROSSINGS

5-minute walk AVERAGE WALKING TIME TO REACH SIGNALIZED CROSSING ALONG ARTERIAL

SOURCE: DOTI, 2021

## DENVER'S BIKEWAY NETWORK

Expanding Denver's network of high-comfort bikeways is a priority for DOTI. In 2011, only 36% of residents had easy access to a high-comfort bikeway and today, 42% of households do. Easy access means that anyone is within a quarter mile, or about a two-minute bicycle ride, from a bikeway that is comfortable for all ages and abilities. High-comfort bikeways include trails and paths separated from vehicle traffic; protected bicycle lanes with physical barriers such as curbs or posts; and neighborhood bikeways with design elements to slow traffic and prioritize bicycle and pedestrian travel. Most metro region residents (70%) indicate they would ride a bicycle if high-comfort bikeways were available (DRCOG, 2018). The majority of Denver's 177 total miles of high-comfort bikeways are trails and paths (94%), with the small remainder being on-street facilities (6%). Rapidly expanding on-street, high-comfort bikeways will be necessary to link more households to safe and comfortable bicycle routes, given limited opportunities to build new trails and paths.



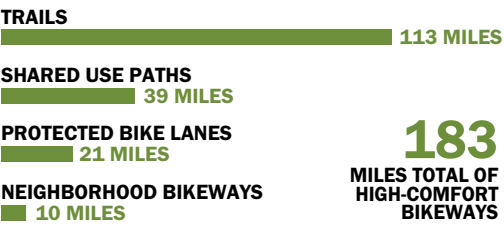
SOURCE: City and County of Denver



SOURCE: City and County of Denver

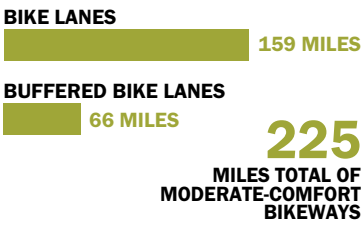
Trails, shared-use paths, protected bike lanes, and neighborhood bikeways are considered high-comfort bikeways. Bike lanes and buffered bike lanes are considered moderate comfort bikeways.

FIGURE 3.9: Existing High-Comfort Bikeways



SOURCE: DOTI, 2021

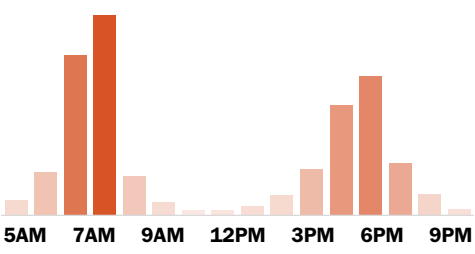
FIGURE 3.10: Moderate-Comfort Bikeways



## BICYCLING GETS DENVER TO WORK

Of the total bike trips made, two-thirds are made during weekdays (STRAVA Metro, 2020). Most bicycle trips made in Denver are to commute to work, school, and other regular destinations. Data from the activity tracking application STRAVA suggests bicycle ridership is highest during regular commute times when traffic volumes are also at their highest.

FIGURE 3.11: Bicycling Volumes by Hour in Denver



SOURCE: Strava Metro, 2021

## DENVER'S MICROMOBILITY NETWORK

Since the launch of Denver's micromobility pilot program in 2018, trips made by scooter and e-bike have continued to increase across Denver. Between 2019 and summer 2021, Denverites completed more than 5.9 million scooter trips and 215,800 e-bike trips.

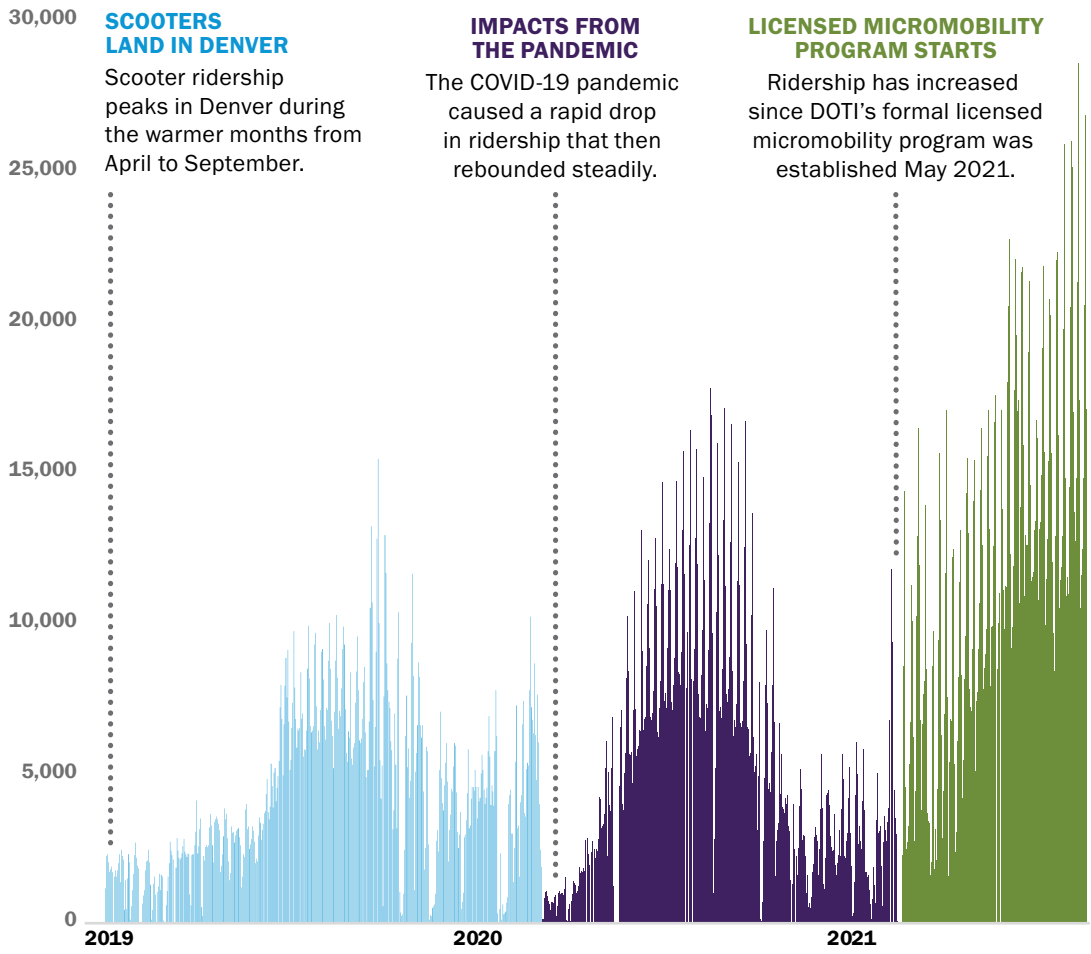
## MICROMOBILITY TRIPS

One in five micromobility trips are less than a mile in distance with the average trip in Denver being one mile long and taking 10 minutes (Ride Report Denver, 2021).

## IMPACTS TO VEHICLE TRIPS

The North American Bikeshare Association evaluates micromobility programs across the country and found that 37% of scooter trips replace a trip that would otherwise be made by vehicle. An evaluation of Denver's program by DOTI found a similar substitution effect. These data suggest that **since the licensed program began in 2021, over one million vehicle trips have been eliminated in Denver**, which could reduce GHG emissions by as much as 470 metric tons (NABSA; DOTI, 2021).

FIGURE 3.12: Daily Scooter Trips from January 2019 through September 2021

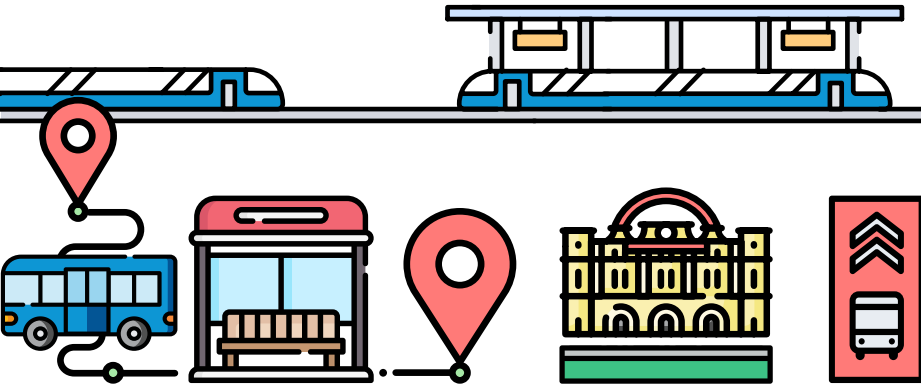


SOURCE: RideReport, 2021



## DENVER'S TRANSIT NETWORK

In Denver, the Regional Transportation District (RTD) is responsible for providing bus and light and commuter rail service within the Denver metro region. Denver's role providing space and operating transit is expanding. The transit network in Denver consists of the following elements:



SOURCE: RTD, 2021

### 15% OF DENVER BUS STOP SIDEWALK ACCESS IS IN POOR CONDITION

Many bus stops lack benches, shelter, lighting, trash removal, and ongoing maintenance that can make them inviting and comfortable for all residents in every neighborhood. Property owners, neighborhood associations, RTD, the City, and others manage and maintain the approximately 2,700 bus stops in Denver, including upkeep of signs, shelters, and benches, as well as snow and garbage removal. DOTI is expanding its role in stop maintenance and working with RTD to evaluate the condition of all bus stops and make needed improvements (DOTI, 2020).

### 25% OF DENVER RESIDENTS ARE WITHIN A SHORT WALK TO ALL-DAY FREQUENT TRANSIT

Residents are more likely to use transit when buses and trains arrive every 15 minutes or less, run at the time of day that is needed, and are easy to reach in a short walk. Most are willing to walk five minutes (a quarter mile) to bus stops and 10 minutes (a half mile) to rail stations. (DenverMoves Transit, 2019).

### 8% OF COMMUTES TO WORK ARE MADE USING TRANSIT

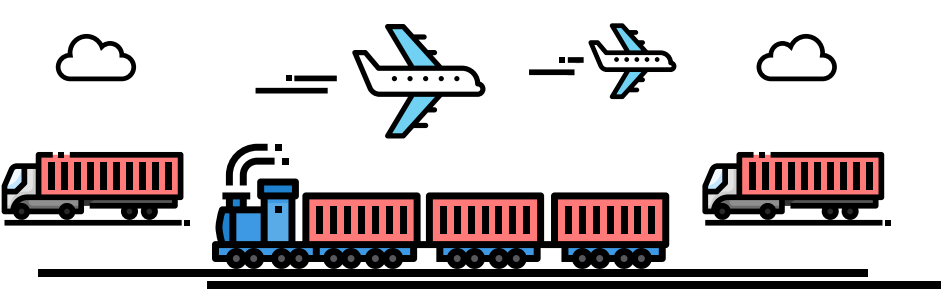
Since 2000, the share of commuters in Denver using transit to travel to and from work has not grown. Over the past 20 years, RTD has expanded light rail service to surrounding cities and major destinations such as the airport. However, the bus system that serves Denver has not expanded, and service frequency and some local routes have been scaled back. These cuts were accelerated by the COVID-19 pandemic (U.S. Census, 2019).

### 10% OF DENVER HOUSEHOLDS DO NOT OWN A VEHICLE

For many Denver residents, including people who do not own a vehicle, Denver's youth, older adults, and others who do not drive, transit is their primary travel option. Lower-income workers and residents of color rely more on transit options to get to work. For residents with different abilities, accessible buses and trains and para-transit service are critical for getting people to medical appointments and to run daily errands with a wheelchair (U.S. Census, 2019).

## DENVER'S FREIGHT NETWORK

Denver consumes more goods than are produced in the region. An imbalance in the flow of goods means that more trucks, railcars, and planes may be leaving the city empty after delivering goods. Growing the value of international exports and manufactured goods produced in Denver can offset this inefficiency.



## 380 pounds of goods per resident

MOVE THROUGH DENVER EACH DAY

SOURCE: Transearch, 2015

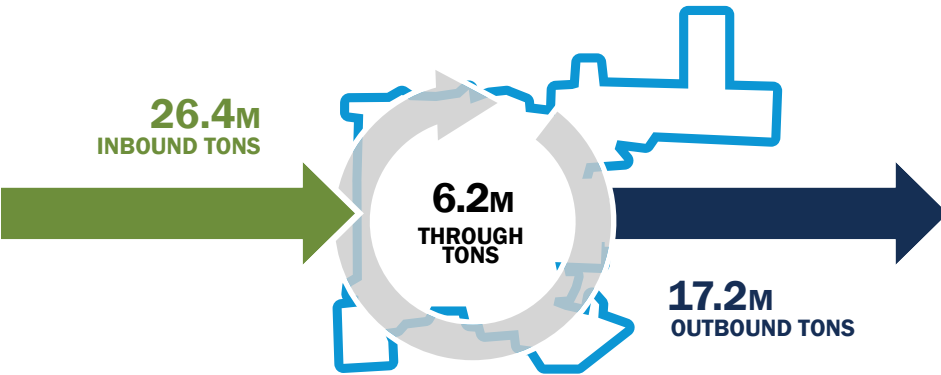
### FREIGHT CONGESTION AND DELAY

Congestion and resulting delay in truck travel times directly impacts businesses because it can result in missed deliveries, regulatory violations, extended parking needs, and other direct costs to both businesses and consumers. Truck traffic impacts are a visible issue for many residents. Illegal parking, noise, air pollution, and safety issues caused by trucks are growing as demand for deliveries expands.

### RAILROAD IMPACTS

There are over 170 public freight railroad crossings within Denver; more than two-thirds of those are not separated from traffic (Federal Railroad Administration, 2019). Many of Denver's historic industrial and railroad areas are being redeveloped to provide new housing and commercial centers. Growth in neighborhoods, such as River North, creates new conflicts including safely moving hazardous materials carried by rail, railroad crossing noise, and rail crossing safety issues.

FIGURE 3.13: Total Freight Tonnage In, Out, and Around Denver



SOURCE: CDOT, IHS Transearch, 2015

## DENVER'S STREET NETWORK

Denver is the 19th most populous urban area in the U.S. and the 17th most congested. Metro area residents spend an average of 2.5 days per year sitting in traffic. The cost of that delay to the average commuter is \$1,260 in time lost and excess fuel wasted (TTI, 2021). The cost to Denver's communities, economy, and climate are much greater.

### 21% OF ALL VEHICLE TRIPS MADE ARE LESS THAN A MILE

Driving trips are often made for multiple purposes and often include several stops or errands. In the U.S., nearly half (45%) of all vehicle trips are under three miles. This amounts to about a six-minute bike ride or 20-minute walk (National Household Travel Survey, 2017).

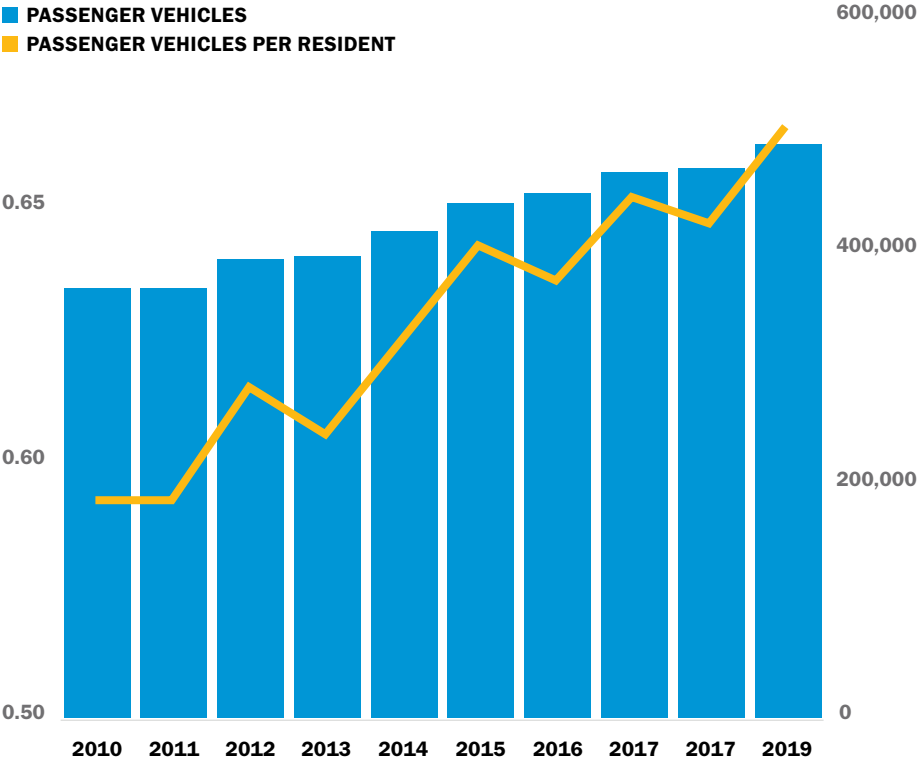
### 81% OF TRIPS BY DENVER RESIDENTS ARE MADE IN PERSONAL VEHICLES

Most trips made by residents are completed by people driving alone to a single destination, like to work, daycare, or the grocery store, and back. Driving is frequently the only readily available option for many residents. Denver is working to make travel easier for residents to get around without a vehicle (DOTI Focus Model, 2021).

FIGURE 3.14: Registered Passenger Vehicles in Denver

### 75% OF DENVER HOUSEHOLDS HAVE AS MANY, OR MORE, VEHICLES THAN WORKERS IN THE HOUSEHOLD.

Vehicles serve multiple purposes, including travelling out of the city and carrying family members and things. As Denver's population continues to grow so does the number of vehicles owned. More people and more vehicles moving around the city will amplify the safety, mobility, congestion, and sustainability challenges Denver faces today (U.S. Census, 2019).

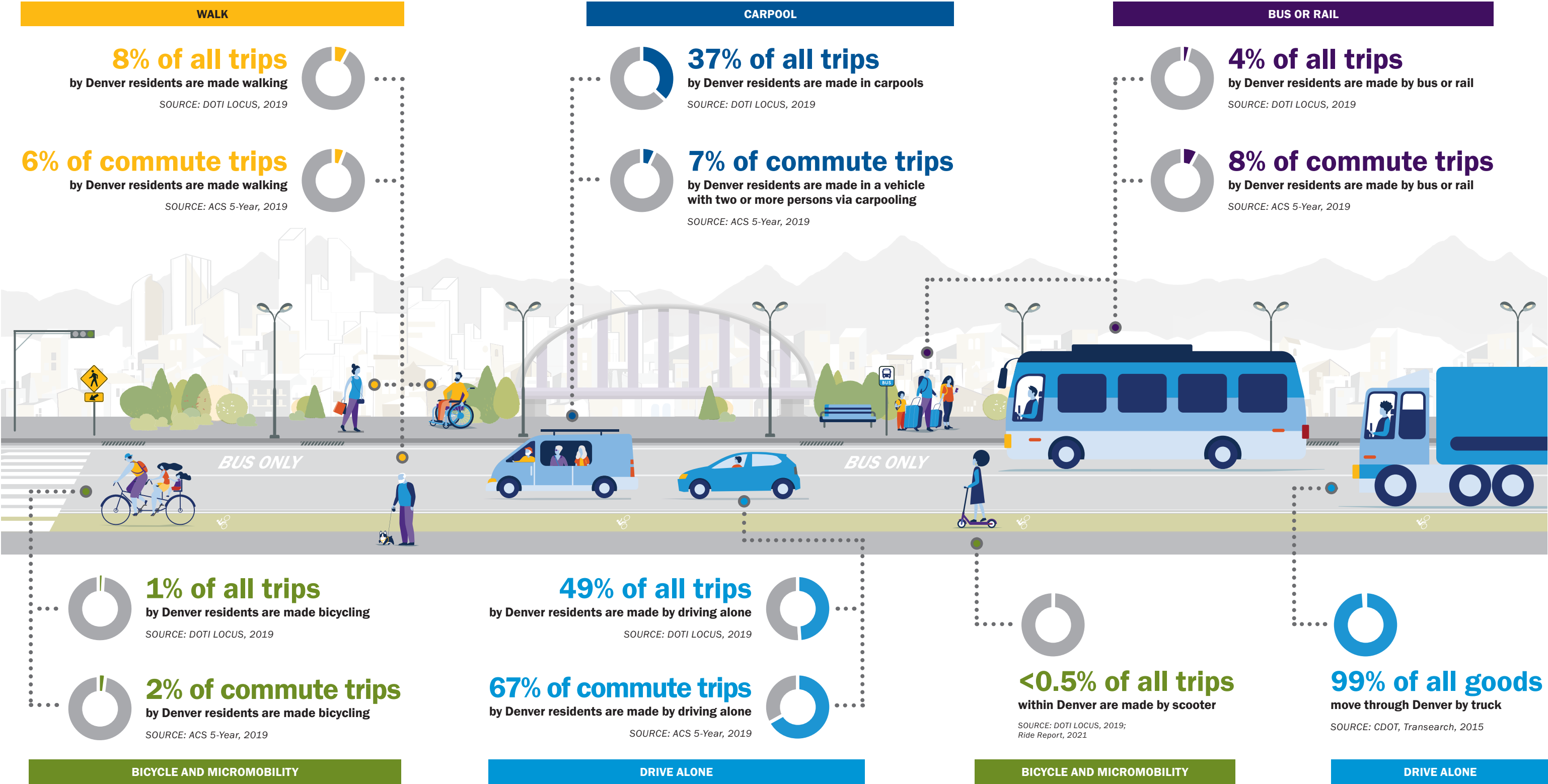


SOURCE: Colorado Department of Revenue, 2021



# 3.4 | TRAVEL IN DENVER

FIGURE 3.15: How People Travel on Denver’s Transportation System



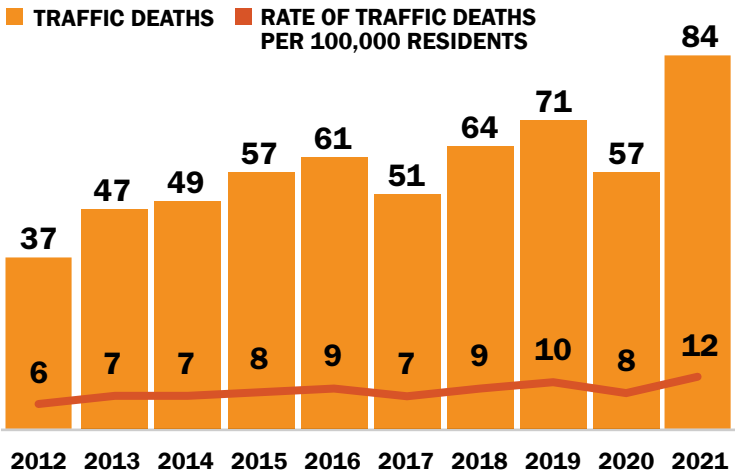
# 3.5 | STREET SAFETY

## SAFETY TRENDS IN DENVER

2021 marked the most traffic fatalities in Denver over the past 20 years. This increase is consistent with a nationwide increase in traffic fatalities during the COVID-19 pandemic. The U.S. experienced the largest ever annual increase in traffic deaths in the first half of 2021, since the nationwide dataset was established in 1975 (NHTSA, 2021).

Denver is committed to making streets safe for everyone — no matter where a person travels, no matter their means, and no matter their choice to walk, bike, roll, ride transit, or drive.

FIGURE 3.16: Denver Traffic Deaths and Rate Per 100,000 People



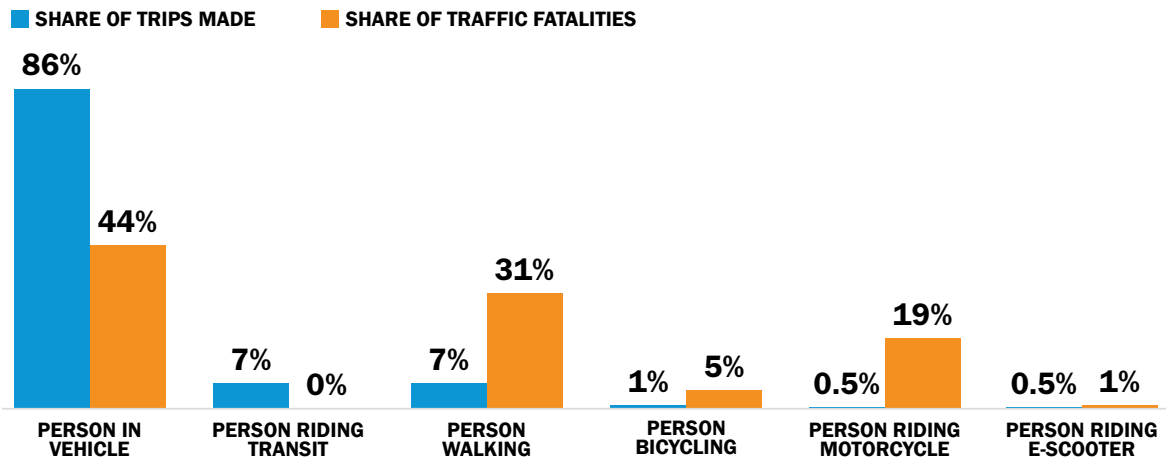
SOURCE: Denver Police Department, 2012-2021 | U.S. Census, 2020.  
Note: Denver population for 2021 estimated using 10-year annual growth rate.

## FATAL CRASH RISKS

Most trips in Denver are completed by people driving, but **the majority of people involved in fatal traffic crashes are not driving vehicles.** Figure 3.17 compares the proportion of trips to traffic fatalities per mode from 2017 to 2021 and demonstrates the modes of travel that are overrepresented in fatal traffic crashes.

There were no recorded deaths in the past five years for people riding transit. This is consistent with national research that found people riding transit are less frequently involved in fatal crashes and that cities with higher transit ridership tend to have lower overall rates of traffic fatalities (Victoria Transport Policy Institute, 2021).

FIGURE 3.17: Denver Travel Patterns Compared to Traffic Deaths



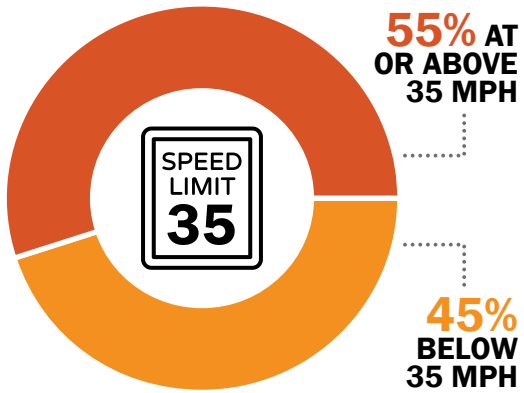
SOURCE: Denver Police Department crash data, 2017-2021. Driving, walking, bicycling and transit trip data sourced from DOTI LOCUS 2019. Trip data for scooters sourced from Ride Report, 2021. Trip data for motorcycling based on commute mode share sourced from U.S. Census, 2019.

## SPEED, STREET DESIGN, AND SERIOUS CRASHES

In Denver, more than half of all traffic deaths and serious injuries occur on roadways with speed limits at or above 35 mph (DOTI, 2021). High speed is a significant factor for vulnerable roadway users involved in crashes with vehicles. Research indicates that 50% of pedestrian traffic fatalities occur at speeds equal to or less than 30 miles per hour (Transport Research Laboratory, 2010).

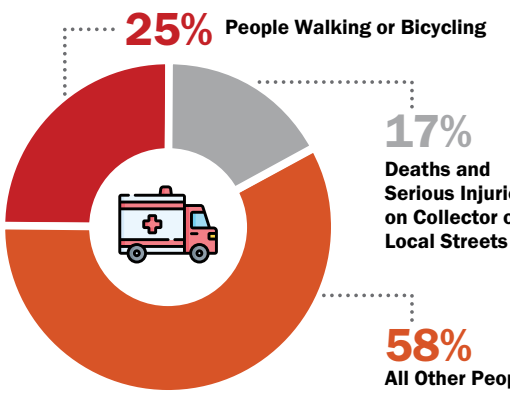
Serious traffic crashes are most likely to occur on high-speed, multilane arterial roadways. Serious bodily injury (SBI) crashes on these streets account for 83% of all SBIs. Arterial streets carry more traffic and the probability of a crash occurring is highest along these corridors. Arterial streets also tend to have higher speed limits, and higher speeds are associated with more severe crashes.

FIGURE 3.18: Average Speed of Traffic Related Deaths and Serious Injuries in Denver



SOURCE: Denver Police Department, Sept 2016 to Sept 2021.

FIGURE 3.19: Traffic Related Deaths and Serious Injuries in Denver on Arterial Streets

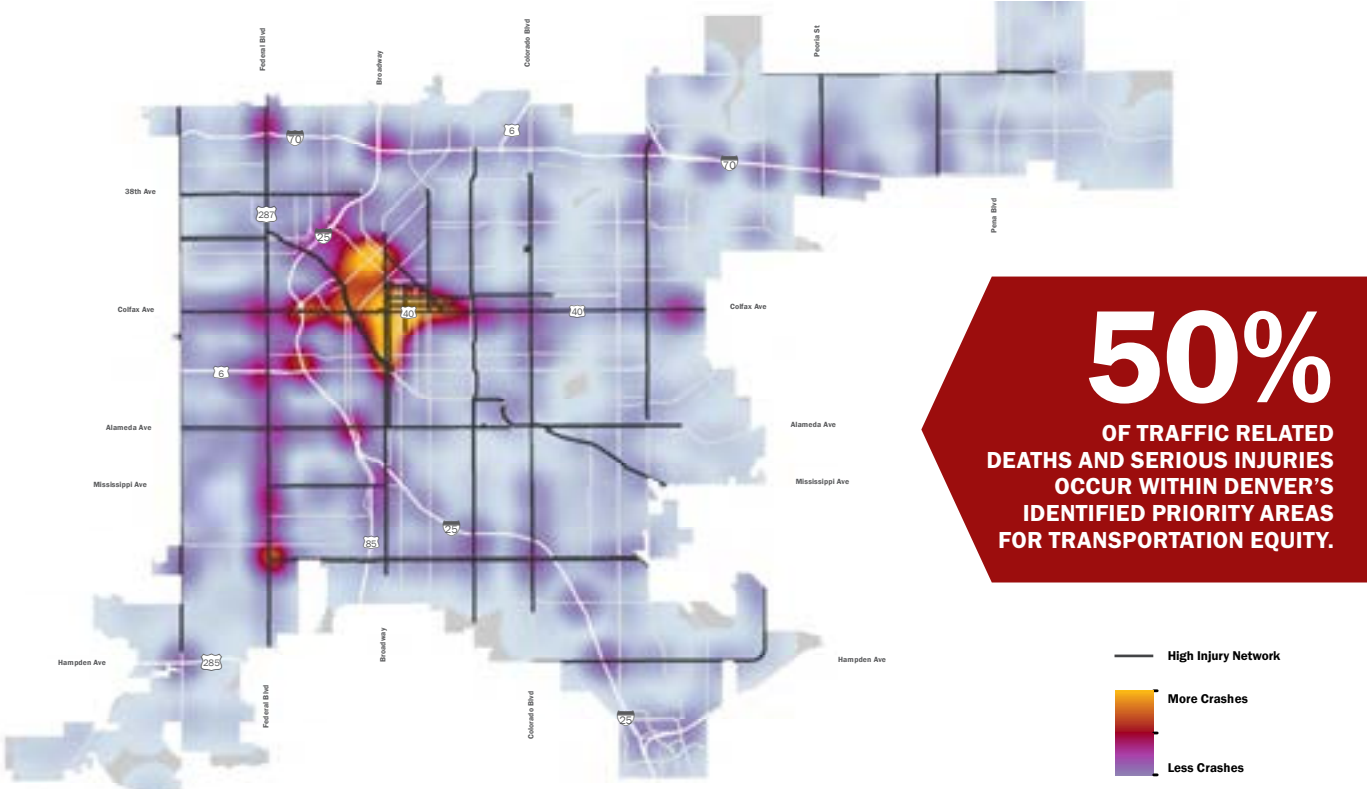


SOURCE: Denver Police Department, Sept 2016 to Sept 2021.

## THE HIGH INJURY NETWORK AND CRASH HOT SPOTS

**47% of deaths and serious injuries occur on just 5% of Denver's streets.** DOTI calls these streets where we see the highest rates of crashes the **High Injury Network**. These streets carry heavy vehicle traffic, include multiple travel lanes, and have high posted speed limits. They also travel through Denver's commercial areas and carry RTD's main bus lines. This combination of heavy, fast moving vehicle traffic and people walking and bicycling increases the risk of serious injury or death when a crash occurs. Other crash hot spots include Downtown Denver, where there is a high concentration of people and vehicles traveling, as well as interstate on-ramps, where fast moving vehicles transition to Denver's urban context.

FIGURE 3.20: The High Injury Network and Serious Crash Concentrations



SOURCE: Denver Police Department, Sept. 2016 to Sept. 2021



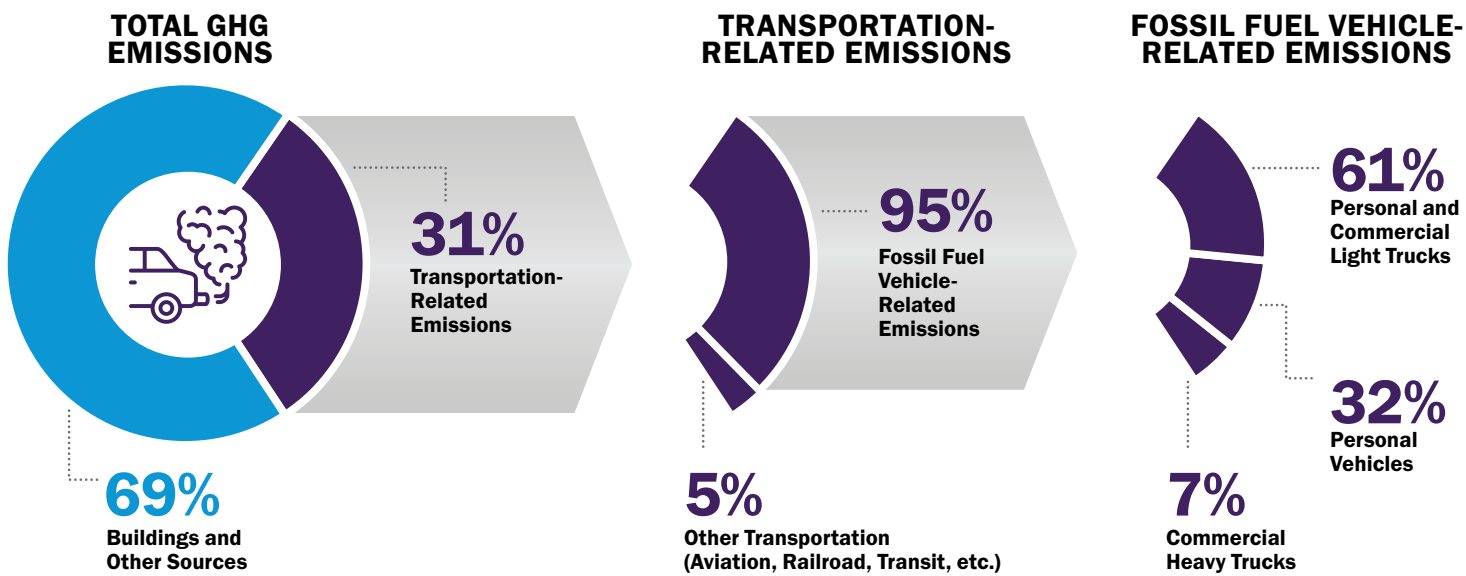


# 3.6 | PUBLIC HEALTH AND CLIMATE CHANGE

## TRANSPORTATION RELATED GREENHOUSE GAS EMISSIONS

Energy consumed by buildings is the largest source of GHG emissions in Denver. **Transportation — primarily gas- and diesel-powered vehicles, aviation, transit, and railroads — represents 31% of total GHG emissions making transportation the second largest source of GHG emissions in Denver.** Most people today travel using fossil fuel powered vehicles, representing a significant contributor to Denver’s changing climate and quality of life. Vehicles burning gasoline and diesel fuels are responsible for 95% of transportation-related emissions. More than half of those vehicle-related emissions are generated from light trucks, which include pickups, SUVs, minivans, and cargo vans used for both commercial and personal purposes (CCD, GHG Inventory, 2020).

FIGURE 3.21: Transportation Contributions to GHG in Denver



SOURCE: CCD, GHG Inventory, 2020



SOURCE: Adobe Stock



SOURCE: Adobe Stock



SOURCE: City and County of Denver



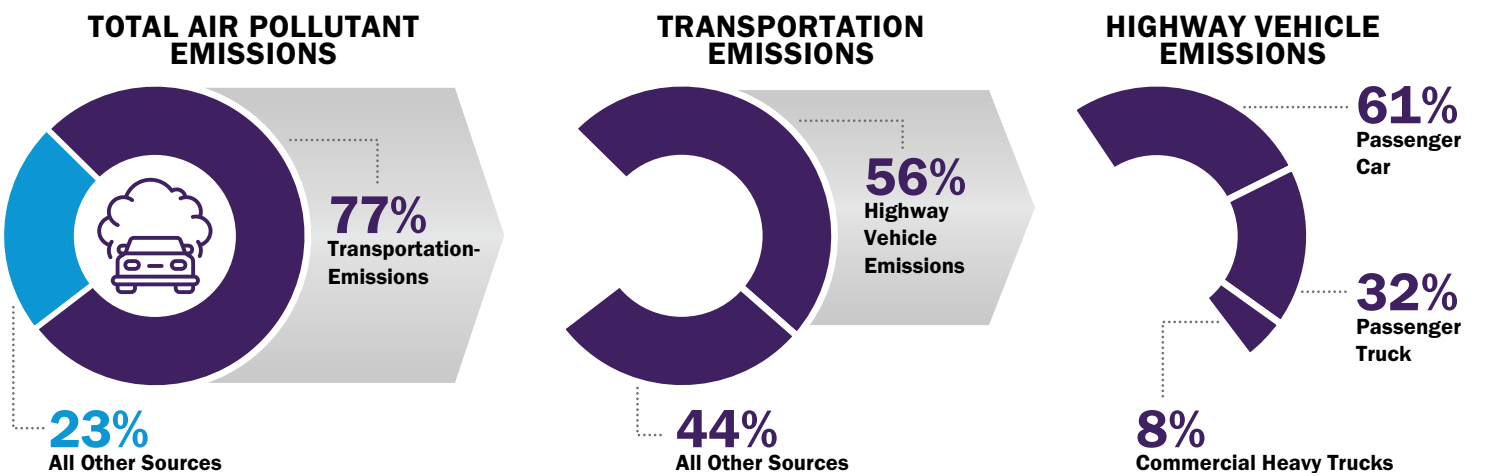
SOURCE: Adobe Stock

Denver’s current reliance on personal vehicles for daily travel contributes to climate change. Transportation — primarily gas- and diesel-powered vehicles, aviation, transit, and railroads — represents 31% of total GHG emissions making transportation the second largest source of GHG emissions in Denver.

## SOURCES OF AIR POLLUTION

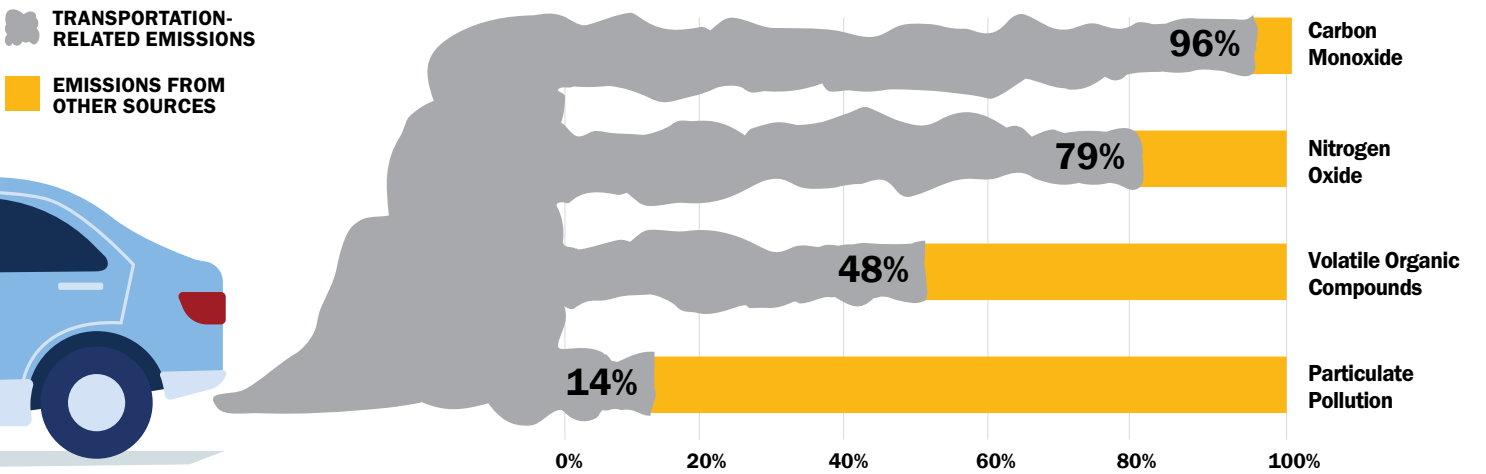
Transportation-related emissions account for 77% of all air pollutant emissions in Denver. More than half of transportation emissions are generated by personal and commercial vehicles. Other sources include airports, railroads, and fuel use in outdoor or construction equipment. Of vehicles, gasoline powered passenger vehicles are the primary source of all transportation emissions. The impact on air quality of driving a vehicle alone is significant compared to utilizing transit (low-emission per passenger) and walking or bicycling (zero-emission).

FIGURE 3.22: Transportation Contributions to Air Pollutants in Denver



SOURCE: EPA National Emissions Summary, 2017

FIGURE 3.23: Major Causes of Air Pollution in Denver



SOURCE: EPA National Emissions Summary, 2017

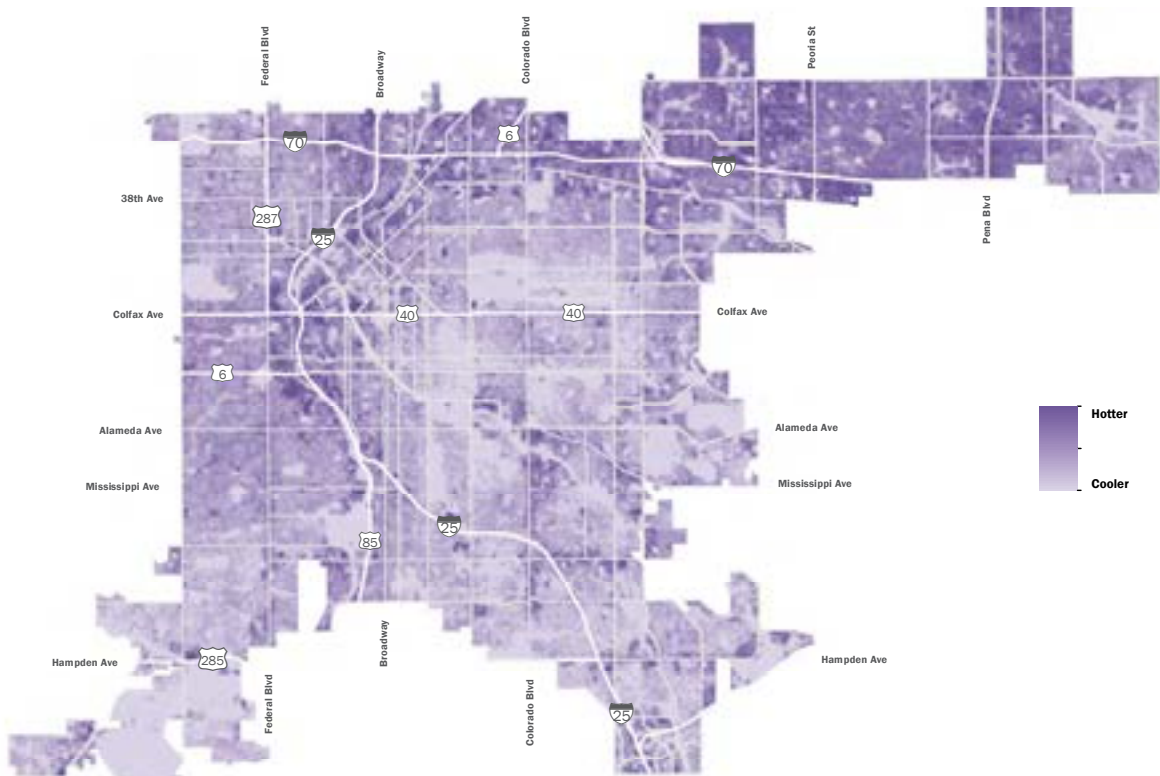


# 3.7 | CLIMATE VULNERABILITY, AIR POLLUTION, AND HEALTH RISKS

## VULNERABILITY TO EXTREME HEAT

Urban heat islands occur as a result of pavement, parking lots, buildings, and other impervious surfaces that retain heat. Tree canopy and green infrastructure can help cool urban spaces. In Denver, trees often are sparse in low-income neighborhoods and communities of color. The most critical risk factors for vulnerability to extreme heat are social and economic and reflect residents’ access to healthcare, caregiver responsibilities, independent living abilities, income, and housing quality. Of the hottest areas in Denver, 92% of high urban heat islands are within a priority area for equity (DOTI, 2021). Denver’s older adults, particularly those living alone or on fixed incomes, are vulnerable to higher temperatures and potential future heat waves.

FIGURE 3.24: Urban Heat Islands in Denver

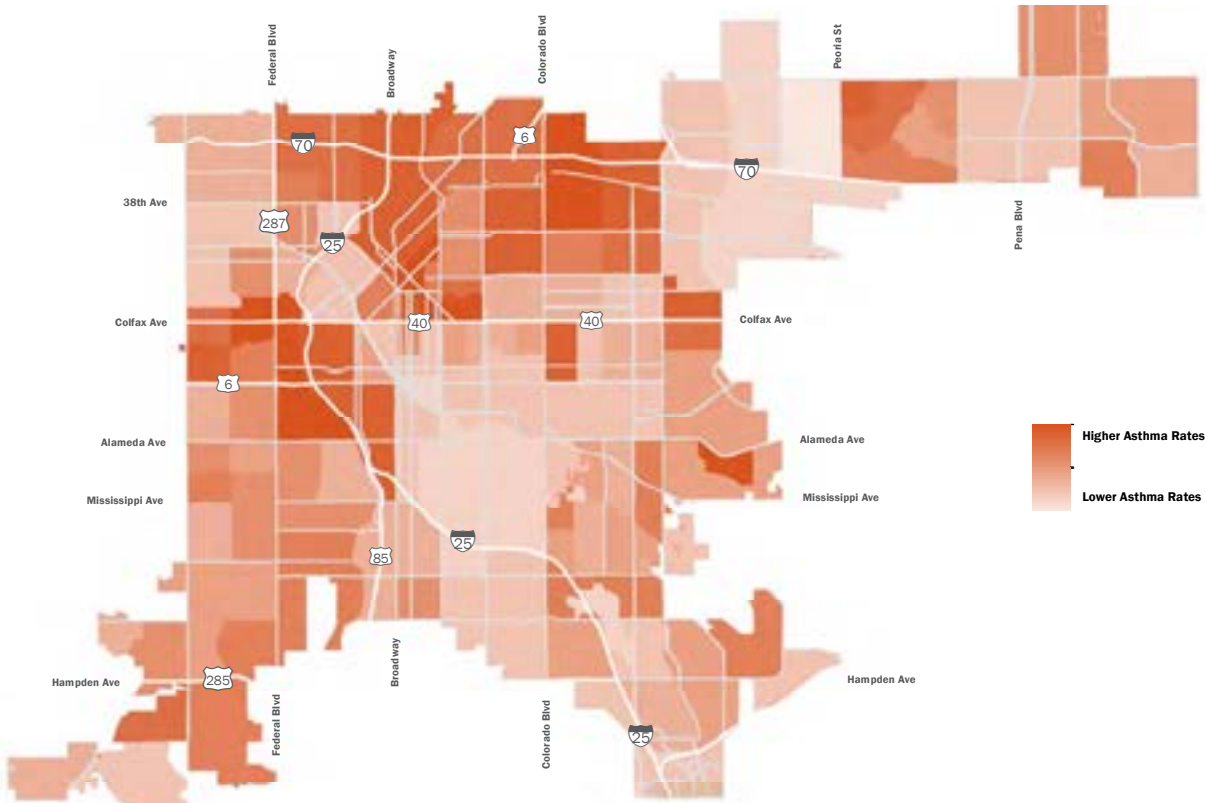


SOURCE: City and County of Denver, Office of Climate Action, Sustainability, and Resiliency, 2021

## HEALTH IMPACTS OF POOR AIR QUALITY

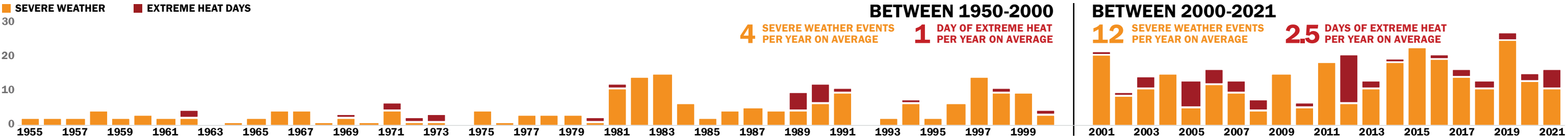
Denver has higher rates of asthma and chronic respiratory illnesses than the average across Colorado (CDPHE, 2020). Research from the American Lung Association and the Health Effects Institute concluded that traffic pollution causes onset of childhood asthma, impaired lung function, and death from cardiovascular diseases. Residents living within a third of a mile from highways are most at risk. Risk factors are compounded by social, economic, and demographic factors that contribute to inequality among Denver’s residents.

FIGURE 3.26: Age-Adjusted Asthma Hospitalization Rate Per 100,000 Persons



SOURCE: Colorado Department of Public Health and Environment, 2017

FIGURE 3.25: Denver Extreme Weather Trends, 1955-2021



SOURCE: Severe Weather Event Alerts Denver County (National Oceanic and Atmospheric Administration, 2021), Number of Days Over 100 Degrees Denver (National Weather Service, 2021)





# 3.8 | TRANSPORTATION AND COMMUNITY ACCESS

## MAKING THE MOST OF DENVER’S PUBLIC RIGHT-OF-WAY

Denver guides neighborhood development to coordinate how the city’s built environment and transportation systems complement each other. Denver dedicates a large amount of the public space in our neighborhoods to moving people and goods. The way that the space is designed, and how safe, accessible, comfortable, affordable, and equitable transportation is, can support communities or present barriers to mobility between communities. As our city evolves, growth and development are placing new pressures on communities and our transportation system. Coordinating how our neighborhoods and transportation system are designed and interact will help Denver achieve a complete multimodal system that connects all Denverites.

The public right-of-way, or the space between private property lines occupied by streets, alleys, sidewalks, benches, trees, and plantings, is the largest public space in Denver. The space Denver has available to move people, goods, and services cannot expand significantly, even though our population and economy continues to grow.

Over 25% of Denver’s land area is dedicated to transportation

A NUMBER WHICH INCREASES TO NEARLY 40% WHEN EXCLUDING THE AREA OF THE CITY OCCUPIED BY DENVER INTERNATIONAL AIRPORT.

SOURCE: DOTI, 2021

Denver has historically dedicated most of the public right-of-way to move vehicles. In terms of moving people, driving represents the least efficient use of the public right-of-way. The National Association of City Transportation Officials estimates that a dedicated lane for buses can move 10 times more people than a single lane dedicated to moving vehicles (NACTO, 2016).

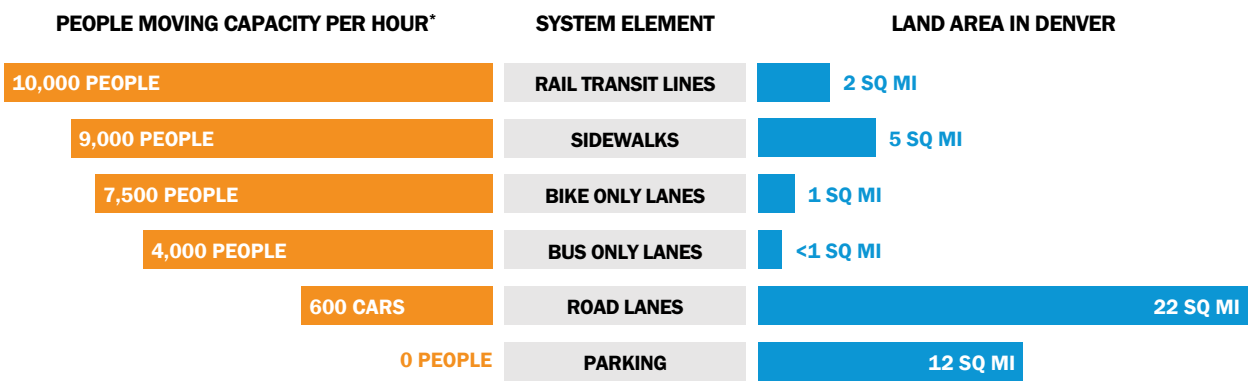
DOTI must make efficient use of the limited public street space as Denver continues to grow. Coordinated land use planning, efficient and high-density development, greener streets, and multimodal options can make Denver a city of shared spaces and great places that are comfortable, enjoyable, safe, and accessible for everyone.

80% of the Denver transportation system is dedicated to vehicles

COMPARED TO ONLY 20% OF THE TRANSPORTATION SYSTEM BEING DEDICATED TO MOVING PEDESTRIANS, BICYCLISTS, BUSES, AND TRAINS.

SOURCE: DOTI, 2021

FIGURE 3.27: People Moving Capacity per Hour vs. Land Area in Denver



\*How many people can be moved per lane per hour.  
SOURCE: National Association of City Transportation Officials, Transit Street Design Guide, 2016

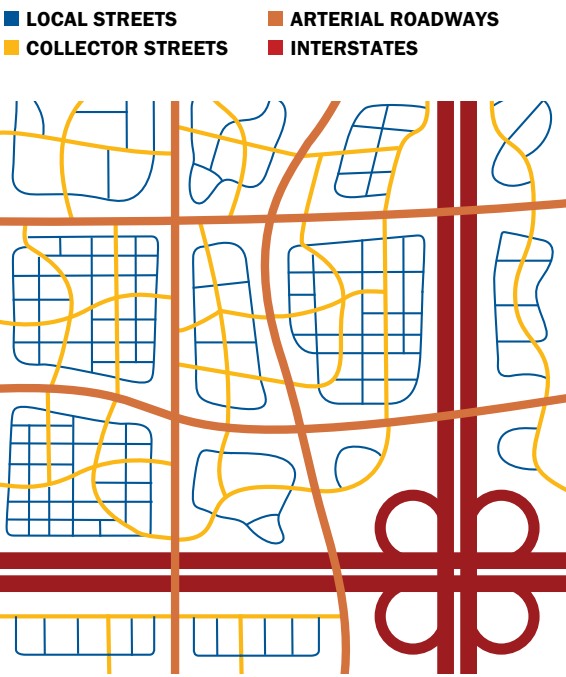
## TRANSPORTATION SHAPES OUR COMMUNITIES

Street systems across the United States, including Denver’s, are the product of decades of transportation policy decisions that primarily emphasized moving vehicles. Nationally, and in Denver, a hierarchical classification system of streets was implemented to move vehicles from neighborhoods to highways. While improving vehicle access, this street network design created barriers between neighborhoods across Denver that are evident today.

### COMPLETE STREETS DESIGN GUIDELINES

While enhancing vehicle access, Denver’s system of large and fast interstates and arterial and collector roadways create barriers between neighborhoods for people who are walking, rolling, bicycling, or taking transit. In 2020, Denver crafted new Complete Streets Design Guidelines to update how the public right-of-way is designed to better reflect land use and balance access for all people who use streets. DOTI is now using the Complete Streets Design Guidelines to better accommodate multimodal travel options and enhance neighborhood connectivity.

FIGURE 3.28: Denver Street System



### LOCAL STREETS

These are Denver’s streets with the lowest speed limits, commonly residential streets providing access to homes.

### COLLECTOR STREETS

The next classification of streets collects traffic from neighborhoods and convey it to larger, regional routes known as arterial roadways.

### ARTERIAL ROADWAYS

These roadways act as the main ‘arteries’ of Denver’s transportation system. They have multiple travel lanes, high posted speed limits, and include roads such as Colorado Blvd., Federal Blvd., Santa Fe Ave., Broadway, or Colfax Ave. These roadways have been designed to move people quickly across the city and move traffic to Interstates and surrounding communities outside Denver.

### FREEWAYS

The final classification in Denver’s street system are Freeways, such as I-70, I-25, and the 6th Ave. Freeway, which facilitate regional and Interstate travel, limiting access to just vehicles.



SOURCE: Google Earth

In Denver, the intersection of Colorado and Martin Luther King Boulevards divides four neighborhoods: Northeast Park Hill, North Park Hill, Skyland, and Clayton. Large high-speed, multilane arterial roads represent barriers to neighborhood connectivity and are challenging to cross for people who are not driving.



SOURCE: City and County of Denver

Through programs like Denver Vision Zero and DOTI’s implementation of complete streets approaches, improvements are being made to create slow and comfortable streets for everyone. This floating bus island at W 14th Ave. near Speer Blvd. provides a dedicated space for bicyclists to ride separated from traffic, shortens the crossing distance for pedestrians, and provides more efficient loading of bus passengers.



# 3.9 | COMMUNITY DEVELOPMENT IN DENVER

## DEVELOPMENT AND TRANSPORTATION CHOICES

Blueprint Denver is the citywide land use plan that calls for growing an inclusive Denver through complete neighborhoods and transportation networks; a measured, common-sense approach to new growth; and, for the first time, land-use decisions through the lens of social equity. Blueprint Denver is the mechanism for the city to coordinate land use with the transportation investments identified in Denver Moves Everyone. The way we design our communities impacts our travel choices. Mapping density and accessibility, as shown in **Figure 3.29** and **Figure 3.30**, demonstrates a correlation between compact communities and more multimodal trips.

More people walk, bike and ride transit in denser areas of Denver.

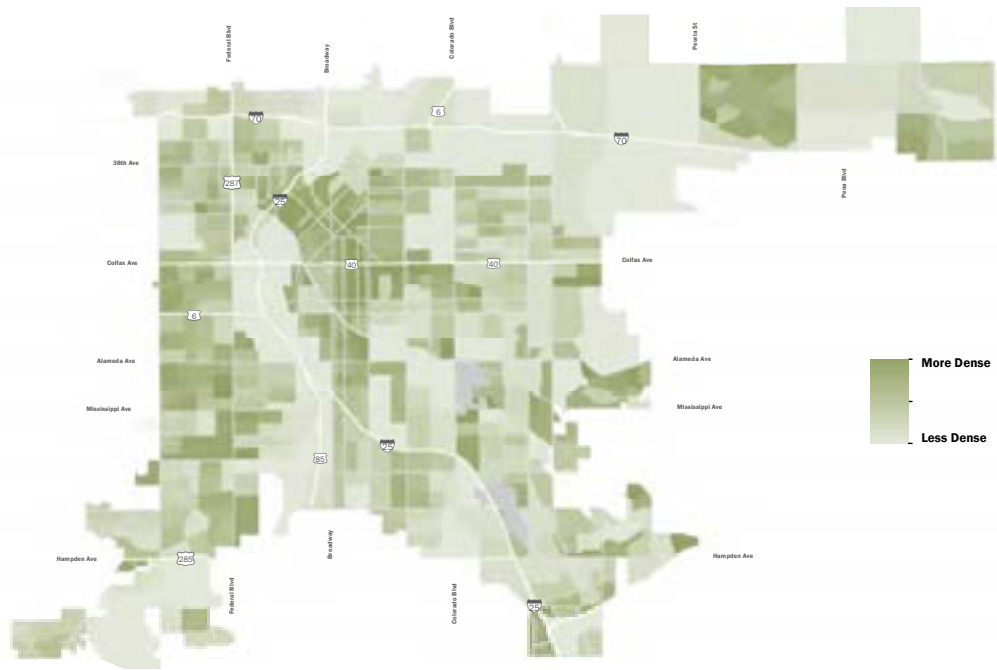


SOURCE: City and County of Denver



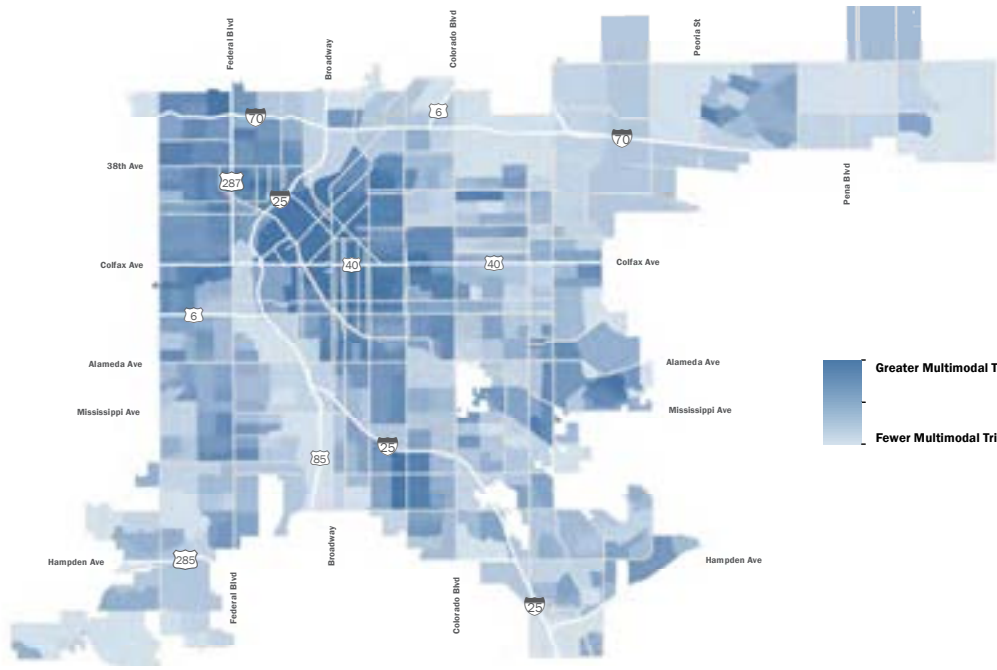
SOURCE: Adobe Stock

FIGURE 3.29: Population Density in Denver, 2019



SOURCE: U.S. Census, 2019. Population per square mile

FIGURE 3.30: Trips Made by Walking or Bicycling in Denver, 2019



SOURCE: DOTI, Locus, 2019 Share of trips made by walking and bicycling

## GENTRIFICATION IN DENVER

Denver has experienced significant growth over the past decade. While this has brought prosperity for some residents, it has made it harder for many to continue to call Denver home and remain in their communities of choice.

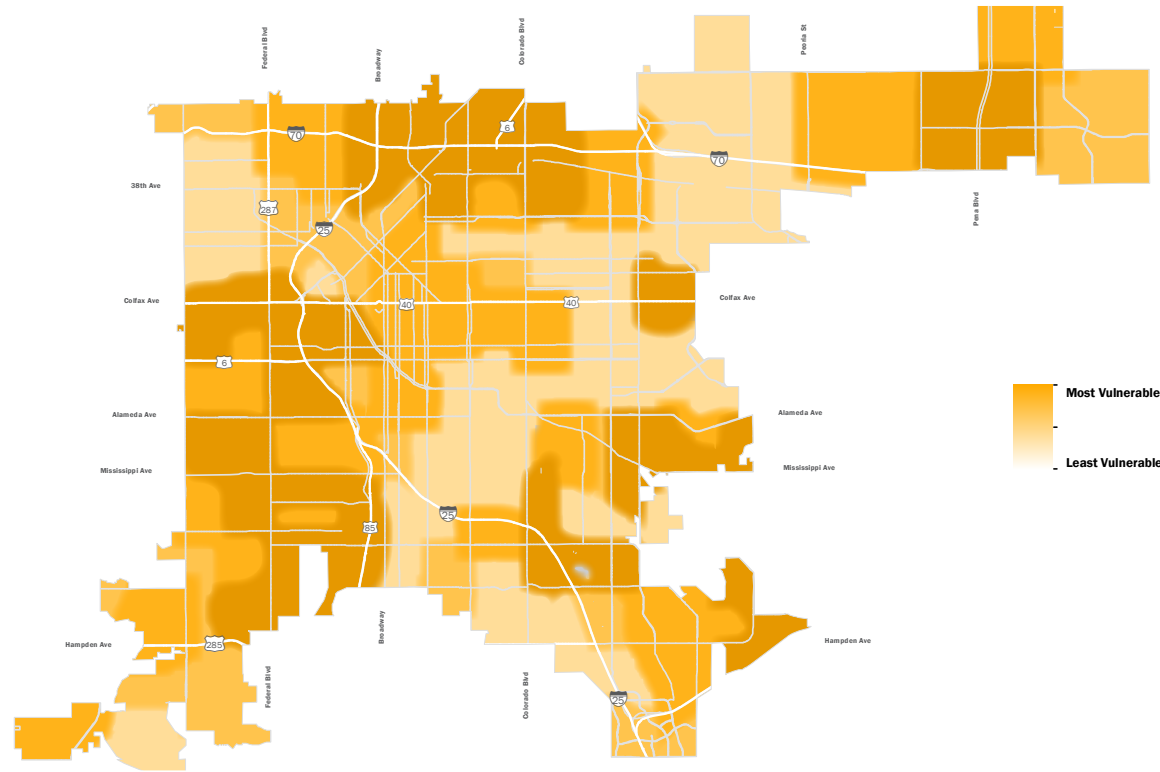
The term gentrification captures a complex group of neighborhood dynamics, some positive and some negative, that occur when an area experiences new investment and an influx of higher-income residents. Involuntary displacement occurs when residents or businesses can no longer afford to stay in an area due to increasing property values and rents and is a negative impact of gentrification that the City can take action to mitigate.

Historically lower-income neighborhoods near downtown have become wealthier when comparing income levels in Denver from 1980 to 2020. A 2020 national analysis found that Denver was the second most intensely gentrified city in the nation, following only San Francisco (National Community Reinvestment Coalition, 2020).

Neighborhoods vulnerable to gentrification and displacement tend to have certain characteristics, including a history of disinvestment, low-income residents, and a high proportion of renter households. Denver’s challenge is to continue investing and improving transportation accessibility and housing affordability within areas that have been historically underinvested in — without displacing long-time residents.

DOTI is partnering with city agencies, such as the Department of Housing Stability, Community Planning and Development, and Denver Economic Development & Opportunity, to better plan for transportation investments in evolving neighborhoods and mitigate negative impacts of growth.

FIGURE 3.31: Vulnerability to Displacement in Denver, 2018



SOURCE: U.S. Census, NHGIS. Adjusted for inflation.

This map provides a current snapshot of the areas in Denver where existing populations are most vulnerable to involuntary displacement, based on income and renter households. There are also residents vulnerable to involuntary displacement who live in neighborhoods that are shown as ‘less vulnerable.’





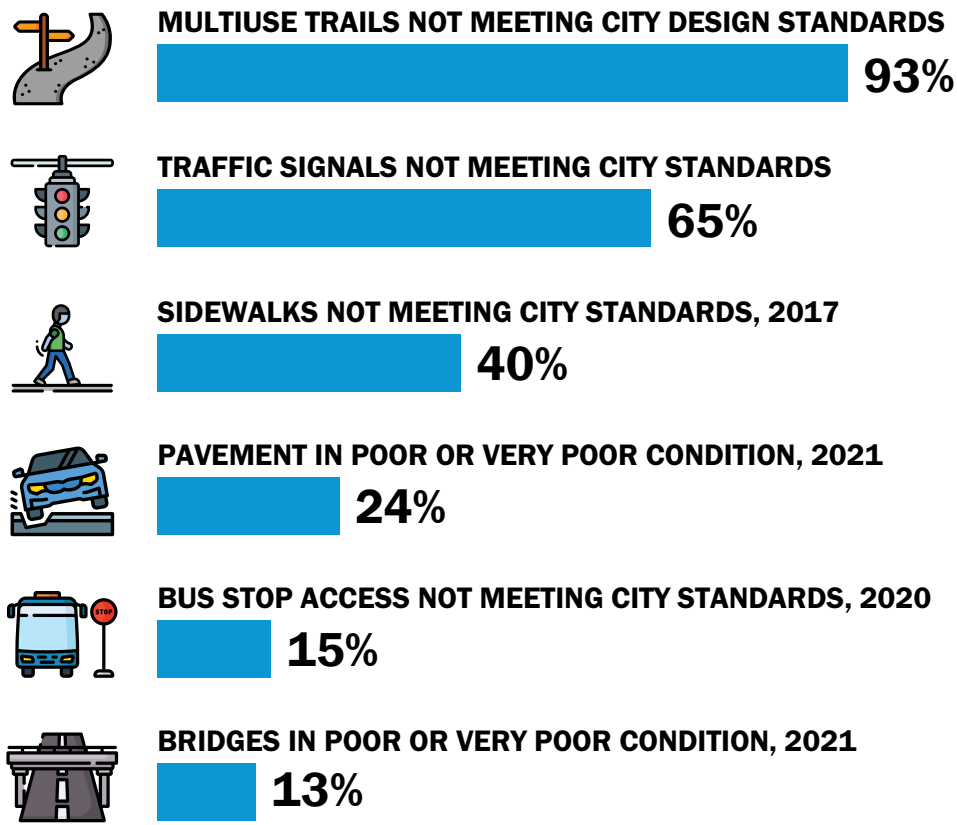
# 3.10 | HIGH-QUALITY TRANSPORTATION INFRASTRUCTURE IN DENVER

## THE STATE OF DENVER’S ASSETS

DOTI is responsible for maintaining and operating Denver’s transportation system in a state of good repair. This responsibility represents more than \$100 million in annual investment and requires careful planning to identify which assets need repair to maximize quality across the system. Every time new assets are added, such as bikeways, transit lanes, or new traffic signals, maintenance responsibilities increase. **DOTI does not presently have the funding necessary to keep up with the maintenance needs of the current transportation system, let alone the needs of new multimodal assets (DOTI, 2021). Despite this challenge, in 2020, about 55% of DOTI’s capital maintenance projects and 83% of capital infrastructure projects were in neighborhoods with the highest needs (DOTI, 2020).**

**Figure 3.32** illustrates the challenge associated with keeping up with an expanding transportation system given that some assets today do not meet the City’s quality standards. Many of the City’s signals, bus stops, sidewalks, and trails are in need of repair and improvement to meet City standards. Specifically, upgrades to pedestrian infrastructure are necessary to meet and exceed ADA standards, which became law in 1990, after many of these assets were first constructed. Street pavement and bridges are rigorously inspected and maintained to ensure they are safe, but adequate funding is needed to improve the condition of pavement and bridge assets citywide.

FIGURE 3.32: Condition of Select Assets in Denver



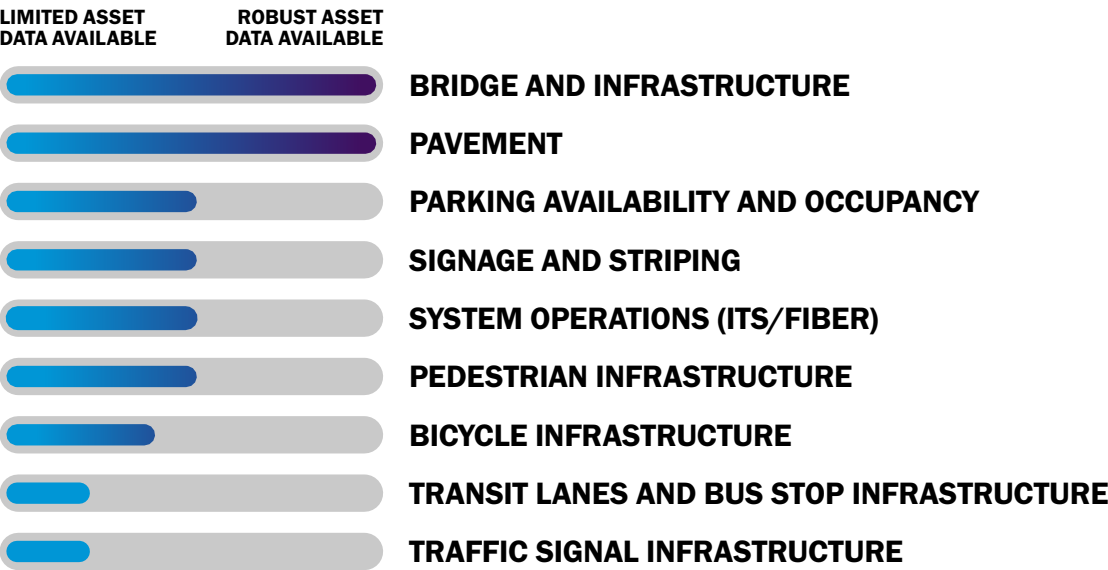
SOURCE: DOTI | DOTI. Data and years represented vary.

## MANAGING ASSETS

Maintaining Denver’s transportation system in a state of good repair is a strategic approach to making preventive improvements that minimize long-term replacement costs. By making regular and routine small investments in maintenance and needed repairs, the City can avoid replacing an entire asset at greater cost and sooner than expected. DOTI uses asset condition data collection, funding and condition projections, and technologies to identify maintenance strategies and rehabilitation schedules within asset management tools. These tools track factors such as age, condition, and risk to optimize the timing of maintenance strategies in order to cost-effectively preserve Denver’s transportation system in a state of good repair.

Consistent and reliable systemwide asset condition data is critical to guiding investments, maximizing the lifespan of existing infrastructure, and making data-driven asset maintenance decisions. **DOTI has made significant strides in the past decade to improve asset management systems for the City’s expanding catalog of assets, but a comprehensive inventory of all assets remains incomplete.** Data for foundational system elements, such as streets and bridges, is robust and well established. Within the last 10 years, DOTI went from having no data on sign condition to having all signs in dozens of neighborhoods inventoried. However, data for other key assets, such as bikeways, transit lanes and bus stops, and signal infrastructure, is more limited. **Figure 3.33** demonstrates data variability across select assets.

FIGURE 3.33: Asset Information Data Dashboard



SOURCE: DOTI

## OPERATING THE TRANSPORTATION SYSTEM

### PARKING AND CURBSIDE ACCESS

DOTI manages the curbside space between travel lanes and sidewalks by allocating space to different uses that maximize mobility, safety, and access. The most common curbside assets include parking meters and stations, curbside access, and bicycle and micromobility corrals and racks. Green infrastructure includes appropriate trees, plantings, and stormwater management to restore natural systems.

### SIGNS AND PAVEMENT MARKINGS

DOTI is responsible for 78,000 signs and 1,500 miles of street lane markings and other street striping within the city. DOTI monitors conditions and implements a cyclical strategy for maintaining signage and pavement striping in a state of good repair. The program aspires to replace all signage within the city every 10 years through the Neighborhood Sign Replacement program. Signs that are faded or covered by graffiti are prioritized for replacement. Signage and pavement marking maintenance responsibilities are increasing as new multimodal assets, such as bike and transit lanes, are implemented.

### TRAFFIC SIGNAL INFRASTRUCTURE

DOTI’s Signal Maintenance, Design and System Operations teams monitor the performance of approximately 1,350 signalized intersections to ensure the system operates reliably and safely. DOTI develops and maintains standards for all signals within the city, signal timings, signal coordination, interfacing with Traffic Management Centers, and rebuilds or replaces underperforming signals. The City responds to outages and malfunctioning signals within two hours and inspects and conducts maintenance on approximately a quarter of the City’s signals each year.

### INTELLIGENT TRANSPORTATION SYSTEMS

DOTI’s Systems Operations Program oversees capital improvements and maintenance of Intelligent Transportation Systems, including over 300 miles of City-owned fiber optic communication networks, and two Traffic Management Centers. Without a dedicated funding source, the Systems Operations program has relied on grants to expand the fiber optic system.

## DOTI’S MAINTENANCE RESPONSIBILITIES

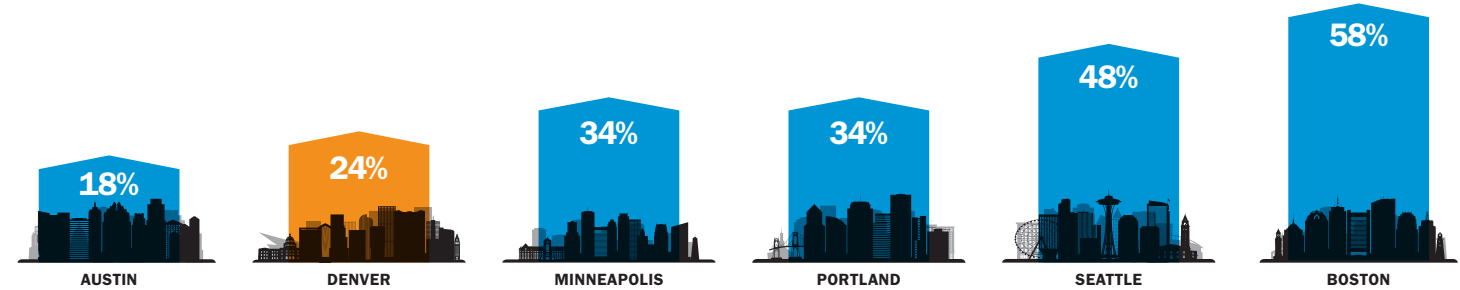




# 3.11 | HOW DENVER COMPARES

FIGURE 3.34: Share of Commuters Not Driving to Work

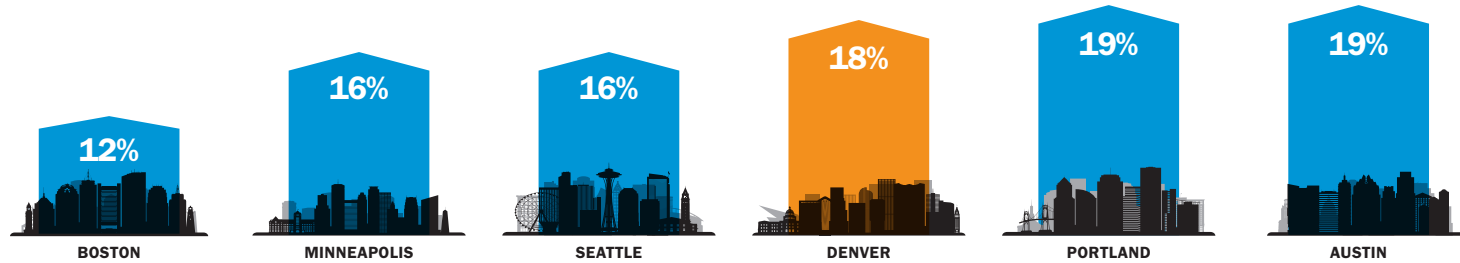
Cities such as Boston, Seattle, Portland, and Minneapolis demonstrate that when jobs and homes are close to one another and there is significant investment in transit systems, it can be easier for people to get around without a car.



SOURCE: US Census, American Community Survey 2019

FIGURE 3.35: Transportation Costs as a Share of Income

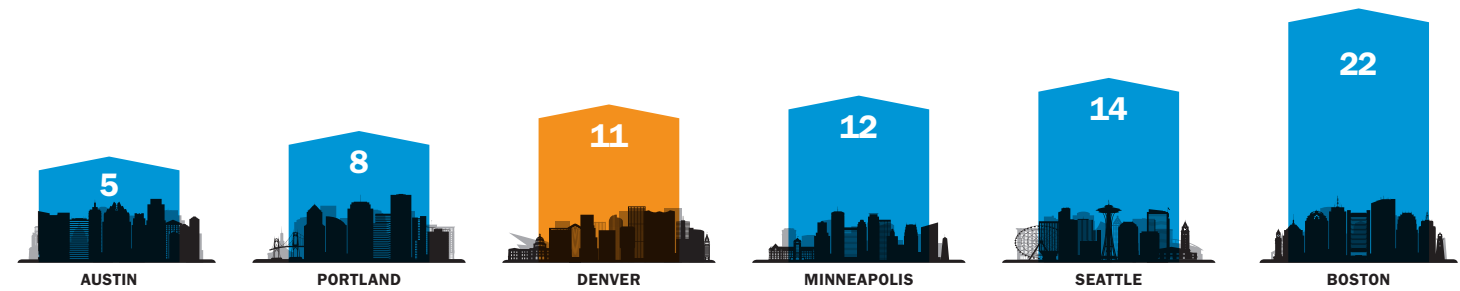
On average, transportation costs as a share of income are lower in the nation's largest cities, compared to smaller urban areas. It is relatively more expensive to own and operate a vehicle and to get around in Denver than larger cities with high-quality transit service such as Seattle, Minneapolis, and Boston.



SOURCE: Center for Neighborhood Technology, 2017

FIGURE 3.36: Population Density, Persons per Acre

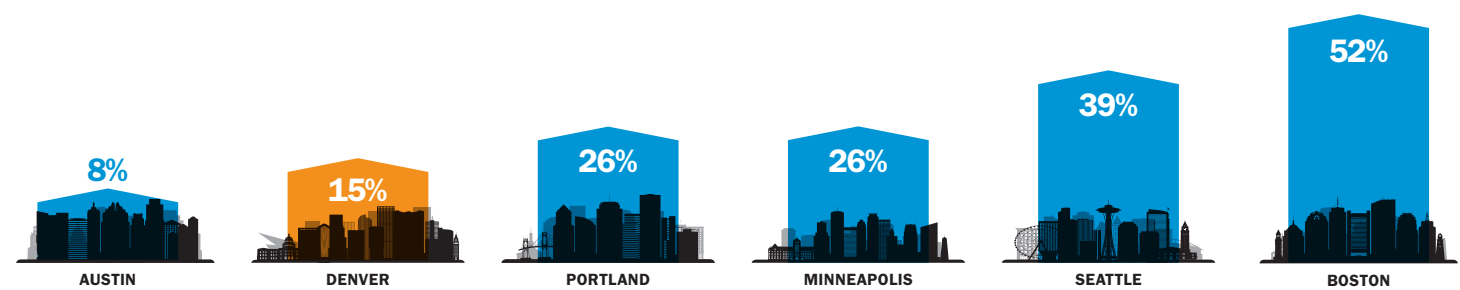
Across the country, cities with greater concentrations of people living and working in close proximity are able to move more people without relying on private vehicles.



SOURCE: U.S. Census Bureau, American Community Survey 2019. Total land area in Denver excludes Denver International Airport land area.

FIGURE 3.37: Percent of Commuters Traveling to Work by Transit, Walking, or Bicycling

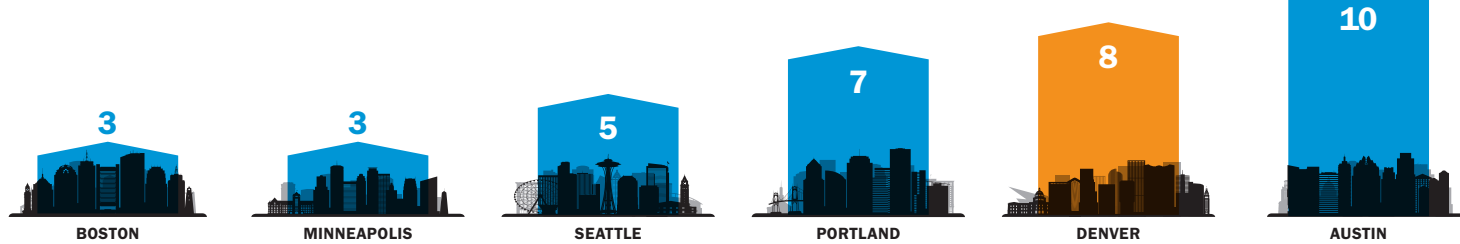
Across the country, cities with greater concentrations of people living and working in close proximity are able to move more people without relying on private vehicles.



SOURCE: U.S. Census Bureau, American Community Survey 2019.

FIGURE 3.38: Traffic Deaths per 100,000 People

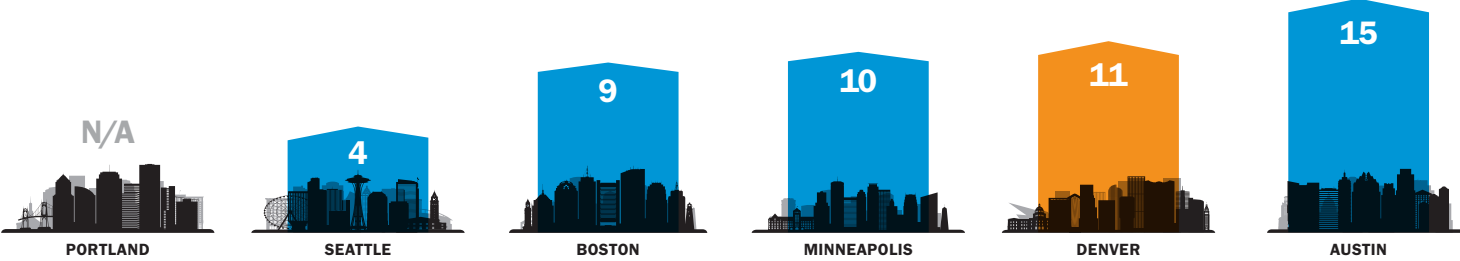
More than 40 cities in the U.S. have committed to Vision Zero and are working to eliminate traffic deaths and serious injuries. Denver's streets can be safer when compared to peer multimodal cities. The national average traffic fatality rate is 11 per 100,000 population.



SOURCE: National Highway Safety Administration, 2015-2019, FARS Database. U.S. Census Bureau, 2019. Fatality and population data are reported for county of primary city. Fatality data represents 5-year average using most recent comparable data.

FIGURE 3.39: GHG Emissions per Capita, Metric Tons of Carbon Dioxide Equivalent

Cities with lower driving rates tend to have more connected, frequent transit service, more robust bicycling and walking infrastructure, more walkable and transit-oriented neighborhood developments, and lower rates of GHG emissions per capita (FHWA, 2016; Denver GHG Inventory, 2019).



SOURCE: Denver GHG Inventory, 2019. Values are presented for illustration purposes and may not represent direct comparisons due to differences in inventory methodologies and time periods.

## CHAPTER 4

# ENVISIONING DENVER'S FUTURE

**Predicting the future is impossible. However, cities today can better anticipate future risks and develop forecasting tools to understand likely changes in transportation. *Denver Moves Everyone* developed robust strategies to manage coming changes and more effectively reach our goals in an increasingly uncertain and unpredictable world.**

### What this chapter introduces:

- + Chapter 4 introduces how *Denver Moves Everyone* used a cutting-edge process — exploratory scenario planning — to evaluate the future and identify the changes that we need to be planning for, starting today.
- + Future changes were analyzed with modeling tools and evaluated through extensive public outreach. The results of the modeling, combined with public feedback, produced the most significant opportunities and challenges for achieving Denver's transportation goals, representing the facets of the future that Denver needs to be planning for.



# 4.1 | PLANNING FOR AN UNCERTAIN FUTURE

## EVOLUTION OF TRANSPORTATION DESIGN AND IMPLEMENTATION

Denver last created a strategic transportation plan in 2008. That plan established goals for a better transportation system and identified strategies to achieve those goals. Fifteen years later, Denver is a different city – larger and denser – with new and emerging transportation technologies and rapidly growing demand for new ways to move around.

Transportation design and implementation has rapidly evolved over the past 15 years to become more multimodal, more comprehensive, and more performance oriented. In 2010, the National Association of City Transportation Officials (NACTO) published the first Urban Bikeway Design Guide sparking a revolution in street design. In 2015, the passage of the FAST Act marked the first time that Complete Streets concepts – or streets as public spaces – were embedded in federal transportation legislation. In 2016, Denver adopted a Vision Zero approach to achieving a roadway system with no fatalities or serious injuries. Denver has also embraced multimodal planning from a people first orientation, marked by the agency’s recent transformation from the Department of Public Works to DOTI.

These evolutions dramatically altered the way Denver is planning for the future of mobility, including thinking about what the future could hold to better prepare for an uncertain future. *Denver Moves Everyone* used a process called **Exploratory Scenario Planning** to plan for a range of possible futures. This approach allows Denver to prepare for the future by understanding what could happen and what impacts those changes could have on travel. Together, this information is leveraged to develop and test **dynamic strategies** to achieve Denver’s long-term transportation vision and goals.

### EMERGING TECHNOLOGIES



#### SMARTPHONES ARE COMMONPLACE

A decade ago, just one-third of Americans used a smartphone. Now, nearly 80% of adults rely on smartphones daily (Pew Research Center, 2021). Mobile apps transformed ride-sharing services and enabled “pay-as-you-go” on-demand bikes and scooters but have also given rise to distracted driving and new safety challenges.



#### E-COMMERCE IS BOOMING

As a percentage of all retail sales, online shopping tripled between 2008 and 2021 (U.S. Census, 2022). As Denver residents buy more products, food, and even services online, expectations for rapid delivery have transformed demand for goods movement and curb space.



#### VEHICLE TECHNOLOGY IS ADVANCING

Significant safety features are now standard on many new cars, including sensors to detect nearby vehicles and pedestrians and to keep cars in travel lanes. Nearly every major auto manufacturer now includes automatic emergency braking in 2021 model vehicles (Insurance Institute for Highway Safety, 2022).



#### AUTONOMOUS VEHICLES ARE TESTED

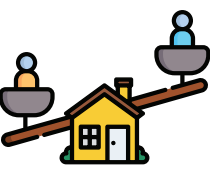
In 2017, Colorado passed legislation allowing autonomous vehicles on public roads as long as they can safely navigate. Testing of automated shuttles, semi-trucks, and construction vehicles is now well underway in Denver.

### EVOLVING PLACES



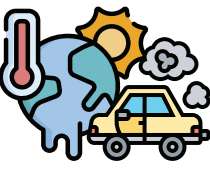
#### HOUSING COSTS ARE RISING

As Denver continues to grow, housing is becoming more and more expensive, placing an undue burden on Denver’s low-income population. Residents who cannot afford to live within the city may face longer travel times and have more limited commute options.



#### DIVERSITY IS SHIFTING

Denver is a city of neighborhoods with distinctive cultures and character. Since 2010, Denver has become less racially and ethnically diverse with 46% of residents identifying as a person of color (U.S. Census, 2020). Residents of color are more likely to face challenges accessing affordable, safe, and convenient housing and travel options.



#### CLIMATE CHANGE IS ACCELERATING

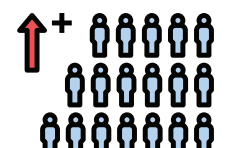
Over the past 10 years, total GHG emissions in Denver have decreased, yet transportation-related emissions have increased. Extreme weather events, urban heat, and air pollution will continue to challenge Denver unless significant shifts in vehicle fuels and driving patterns are achieved.

### SHIFTING DEMAND



#### PANDEMIC TRANSFORMS TRAVEL

The COVID-19 pandemic resulted in Denverites making massive shifts in commuting, workplaces, and local and regional travel patterns. The pandemic disrupted decades-long commute patterns and in 2021 temporarily reduced transit ridership in Denver by half.



#### POPULATION IS GROWING

Denver grew by 115,000 new residents since 2010 – that’s 31 people per day for the past 10 years. This growth has brought new challenges to the city and region. Denver became the fifth fastest growing city in the United States in 2020 (U.S. Census, 2020).



#### ECONOMY IS EXPANDING

Denver’s \$80 billion dollar economy has expanded over the past decade. Over 31.9 million tourists visit each year and businesses employ more than 540,000 workers in the city. Businesses depend on efficient movement of goods and services to meet customer demands and deliver the parcels and products that keep Denver’s economy competitive.

## DIVERSE AND INCLUSIVE VOICES

Throughout this chapter, the term **Diverse and Inclusive Voices (DIVO)** is used to demonstrate a specific aspect of the *Denver Moves Everyone* public and partner engagement process. Historically, transportation decisions have disproportionately negatively impacted people and communities who identify as BIPOC.

Transportation inequities persist today for these communities, as described in *Chapter 3: State of the System*. Denver is committed to eliminating these inequities.

To understand the opinions and priorities of the communities most impacted by these past decisions, *Denver Moves Everyone* conducted DIVO, including BIPOC Focus Group sessions, organizing a DIVO Stakeholder Committee comprised of neighborhood leaders and community-based organizations, and targeted in-person grassroots engagement in diverse neighborhoods. The feedback generated through this outreach is highlighted in this chapter to demonstrate the consistencies and differences in opinion provided by these groups versus the general public and to elevate their voices in shaping Denver’s transportation future.

# 4.2 | EXPLORATORY SCENARIO PLANNING

## 1. DEVELOPMENT STAGE

Our ability to think about and plan for the future is evolving. Past transportation plans often simply projected trends based on historic patterns or identified a single desired future but without the context to understand what might happen if the world changed. Exploratory scenario planning represents a best practice technique that recognizes the future is uncertain and is deeply rooted in public and partner feedback. The process assesses numerous possible futures, including futures Denver might want to avoid, to better understand and define a road map to reach our vision and goals, regardless of how the future ultimately unfolds. The *Denver Moves Everyone* exploratory scenario planning process identifies several possible futures through qualitative and quantitative analysis. **This process includes three primary stages: Development, Testing, and Recommendations.**

In the Development Stage, growth and development, technological innovation, transformations in transportation, and the voices and preferences of the community will continue to shape Denver’s future. Denver engaged residents to co-create four possible futures by generating ideas about what the future could look like and what could change. Common ideas were distilled into key **drivers of change** and used to develop **four possible futures: Status Quo Future, New Normal Future, Walkable and Green Future, and Technology Driven Future.**



Status Quo Future



New Normal Future



Walkable and Green Future



Technology Driven Future

### SCENARIO: PLANNING INPUT

#### GENERAL PUBLIC:

In one word, what is your vision for the future of transportation in Denver?



#### 8 FOCUS GROUPS:



#### DME THINK TANK AND COMMITTEES

Dozens of Key Trends and Uncertainties



### IDENTIFYING: DRIVERS OF CHANGE

#### THE SIX MAJOR DRIVERS OF TRANSPORTATION CHANGES:

Based on the thousands of ideas about future trends and uncertainties we need to plan for.



Travel Behavior



Unpredictable Growth



Mode Shift



Equity



Technology



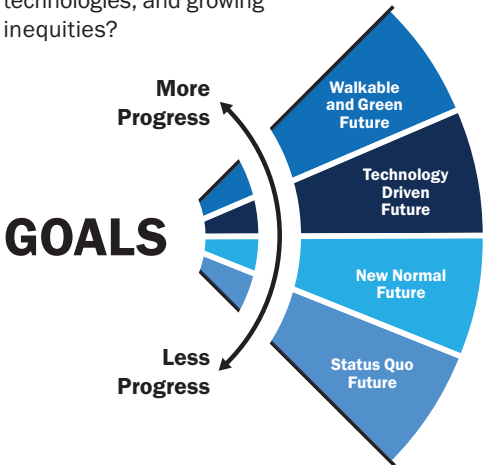
Climate Crisis

### CRAFTING: POSSIBLE FUTURES

#### COMBINED DRIVERS OF CHANGE INTO FOUR POSSIBLE FUTURES TO UNDERSTAND:

1. How might our city change?
2. How might our travel behavior change?

Also seeks to answer: how does Denver achieve ambitious transportation goals given rapid population growth, increasing safety challenges, evolving freight and transportation needs, advancing transportation technologies, and growing inequities?



## 2. TESTING STAGE

Qualitative information from residents and planning partners is combined with quantitative analysis to gauge potential impacts across possible futures and develop recommendations to support long-term goals. To understand what impacts would occur if the four possible futures came to pass, Denver developed a suite of analytical tools, including a Travel Demand Model and an Exploratory Modeling Analysis Tool. The planning process used these tools to assess outcomes under each possible future.

- + A **Travel Demand Model** is a tool designed to understand how people travel today and in the future. The model uses a sample of real data from Denver and the surrounding area to represent how people travel and why certain people make different travel choices. Inputs into the model include population, employment, transportation system and traffic data, and land and development characteristics, for both existing conditions – today and a forecast year, 2050.
- + The **Exploratory Modeling Analysis Tool (EMAT)** is designed to run analysis across thousands of ‘what if’ questions, prepare results about how travel patterns might change, and what the impacts of these changes could be in 2050. EMAT provides insights, such as what factors could create the highest or lowest levels of transit ridership or how large of an impact might higher or lower parking costs have on congestion and parking.

While tools can help predict what might happen, they lack the ability to demonstrate how people feel about the future. *Denver Moves Everyone* provided opportunities for residents and stakeholders to think about the future and to share what their hopes and worries might be under each of the possible futures.

## 3. RECOMMENDATIONS STAGE

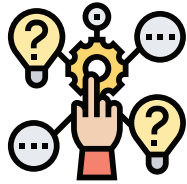
Feedback from residents on possible futures and results from analytical tools directly informed the development of the *Denver Moves Everyone* 2050 recommendations. The key recommendations for each DME goal – Equity, Mobility, Safety, Sustainability, Community, and Quality – that are necessary to support the desired outcomes for Denver by 2050, are highlighted in **Section 4.7: Achieving Denver’s Transportation Goals**. These findings form the basis for the DME strategies and actions presented in **Chapter 6: Measuring Denver’s Progress**, which will be implemented to achieve the desired 2050 recommendations.

### MODELING: POSSIBLE OUTCOMES

#### ANSWERS THE QUESTION OF WHAT MIGHT HAPPEN?

##### Modeling

- + One Travel Demand Model
- + 12 Cloud Super Computers
- + 100s Scenario Specific Measures
- + 5,000 Exploratory Scenario Permutations



### ENGAGING: PUBLIC AND PARTNERS

#### ANSWERS THE QUESTION HOW DO PEOPLE FEEL ABOUT CHANGE?

##### Testing

- + Six Neighborhood Community Events
- + 2,700+ Denverites Participated Online
- + 900 Survey Responses
- + 10+ Hours of Partner and Committee Input
- + DIVO Engagement



### DEVELOPING: RECOMMENDATIONS

#### RECOMMENDATIONS

- + DME Strategies
- + DME Actions





# 4.3 | STATUS QUO FUTURE

## OVERVIEW

### WHAT THE MODEL ANALYSIS TAUGHT US

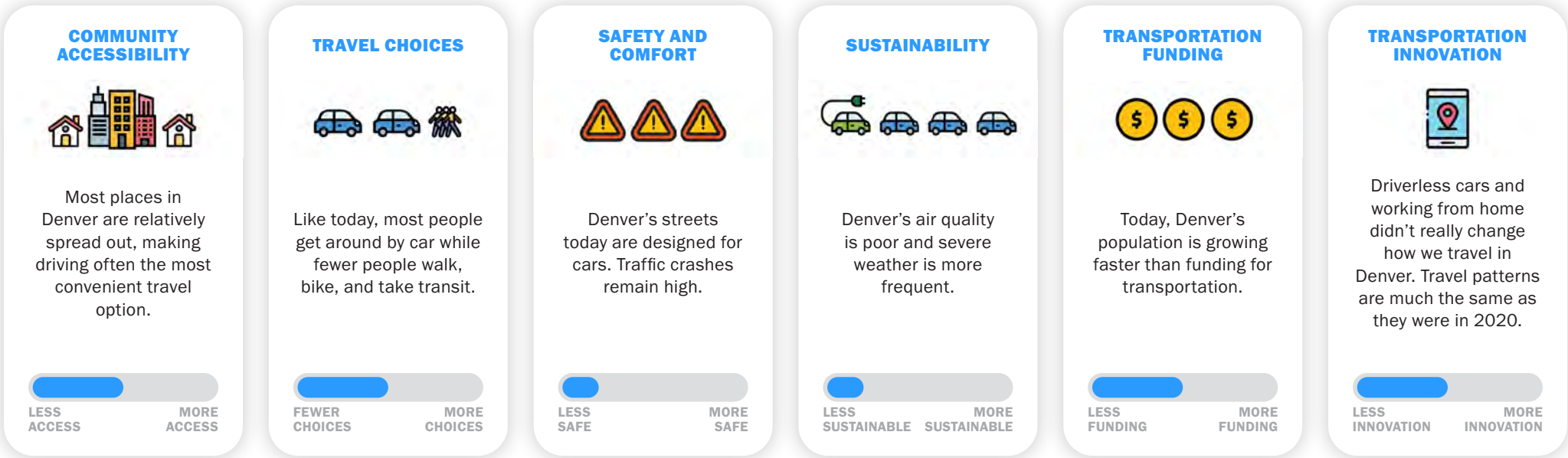
In the Status Quo Future, Denver’s population grew through 2050, and the City did not make many major changes to streets. People continued to travel much like they did in the period prior to the COVID-19 pandemic, choosing to drive for most trips. Compared to today, more people using the same system and making the same transportation choices as they did pre-pandemic results in more traffic delay, more serious crashes and fatalities on streets, and higher levels of pollution in this future.

### VALUE OF MODELING THIS FUTURE

This future reveals the impacts of not making major changes to Denver’s transportation system and the way people travel, combined with population growth through 2050. This future represents a “do nothing” benchmark against which the other possible futures can be compared.

FIGURE 4.2: Status Quo Future – Summary, Trends, and Public Feedback

In this future, Denver travels mostly by car and looks and feel the same as always.



## PUBLIC PERCEPTION

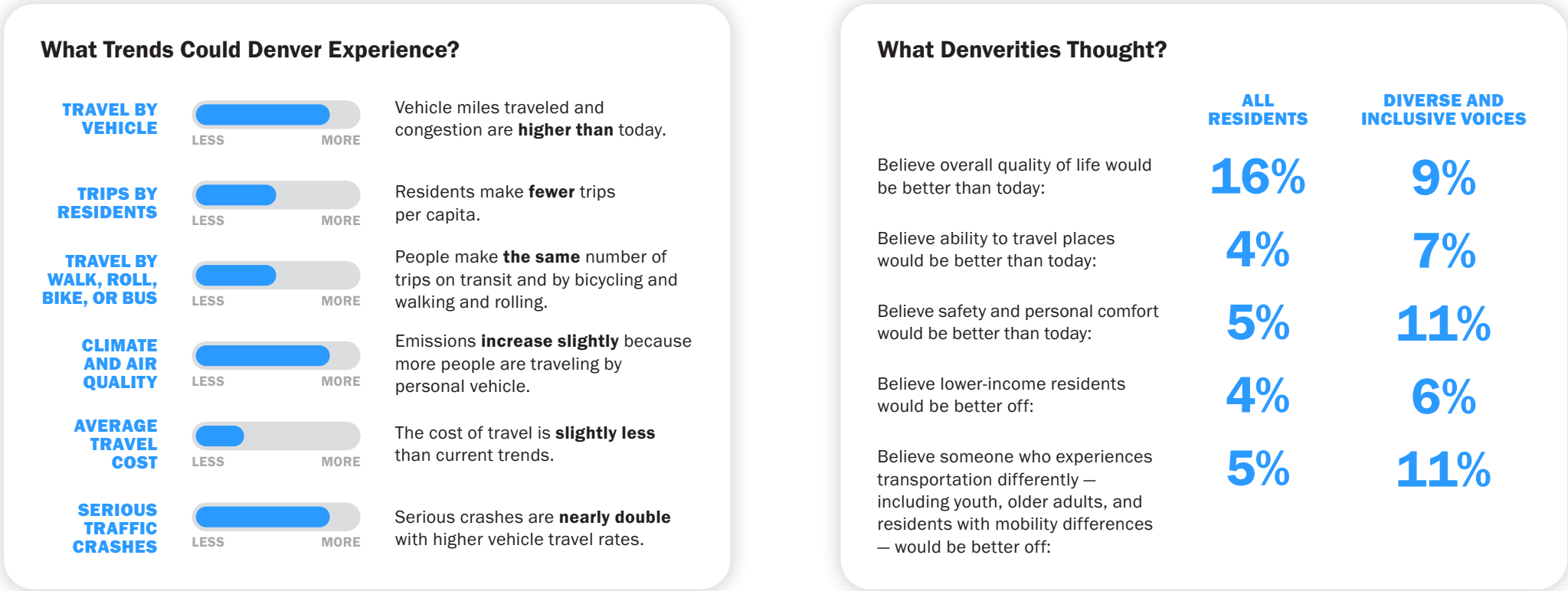
Of the four futures evaluated, the public supported the Status Quo Future the least. In reacting to this future, participants emphasized that the city needs to provide a better travel experience than this future depicts, as well as prioritize advancing safety and improving transit service.

## ELEVATING DIVERSE VOICES

Denver’s BIPOC participants communicated strongly that the Status Quo Future is an unacceptable future for Denver. In reacting to this possible future, these participants voiced concerns of increased **congestion and emissions**, stating a desire to live in a future where having a car is not necessary and **environmental disasters** are averted. **Health equity** was also a primary concern, given the expected increase in poor air quality in this future.

Participants cited numerous possible concerns about this future, including transportation would become **increasingly expensive**, the transit system would be **overly burdened**, **personal safety and crime patterns would increase**, and transportation would become further inaccessible. BIPOC participants viewed this future as providing less walkability, abandoning public transit, ignoring a degrading sidewalk system, and **general transportation frustration**.

BIPOC participants expressed that in this future they would like to see **transit expansion**, including routes that start earlier and end later, fewer transfers to get to destinations, and more direct routes and connections.





# 4.4 | NEW NORMAL FUTURE

## OVERVIEW

### WHAT THE MODEL ANALYSIS TAUGHT US

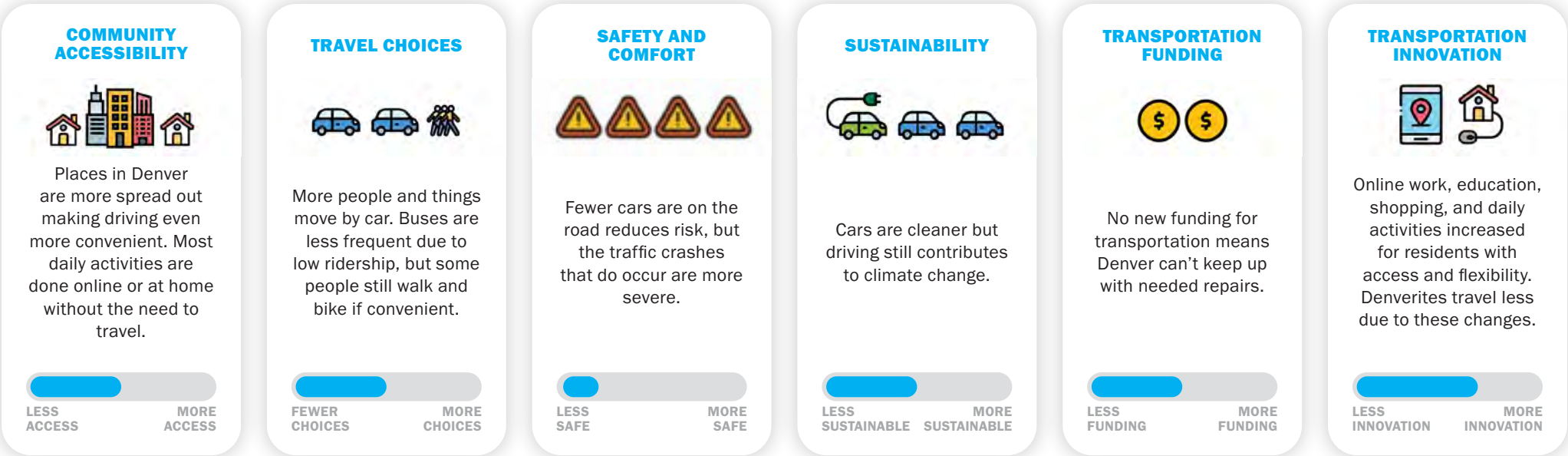
In the New Normal Future, Denver’s population grew through 2050, at the same rate as the Status Quo Future. The COVID-19 pandemic altered how people worked and traveled, so that by 2050, many more people worked from home and ordered goods online. Compared to today, more people working from home resulted in slightly lower overall rates of driving, a decrease in traffic delay, a slight increase to serious crashes and fatalities on streets, and similar levels of pollution in this 2050 future.

### VALUE OF MODELING THIS FUTURE

This future reveals the long-term impacts caused by more people working from home and effects of this change specifically on Downtown traffic and citywide transit ridership.

FIGURE 4.3: New Normal Future – Summary, Trends, and Public Feedback

In this future, Denver goes virtual as the travel changes experienced during the pandemic accelerate.



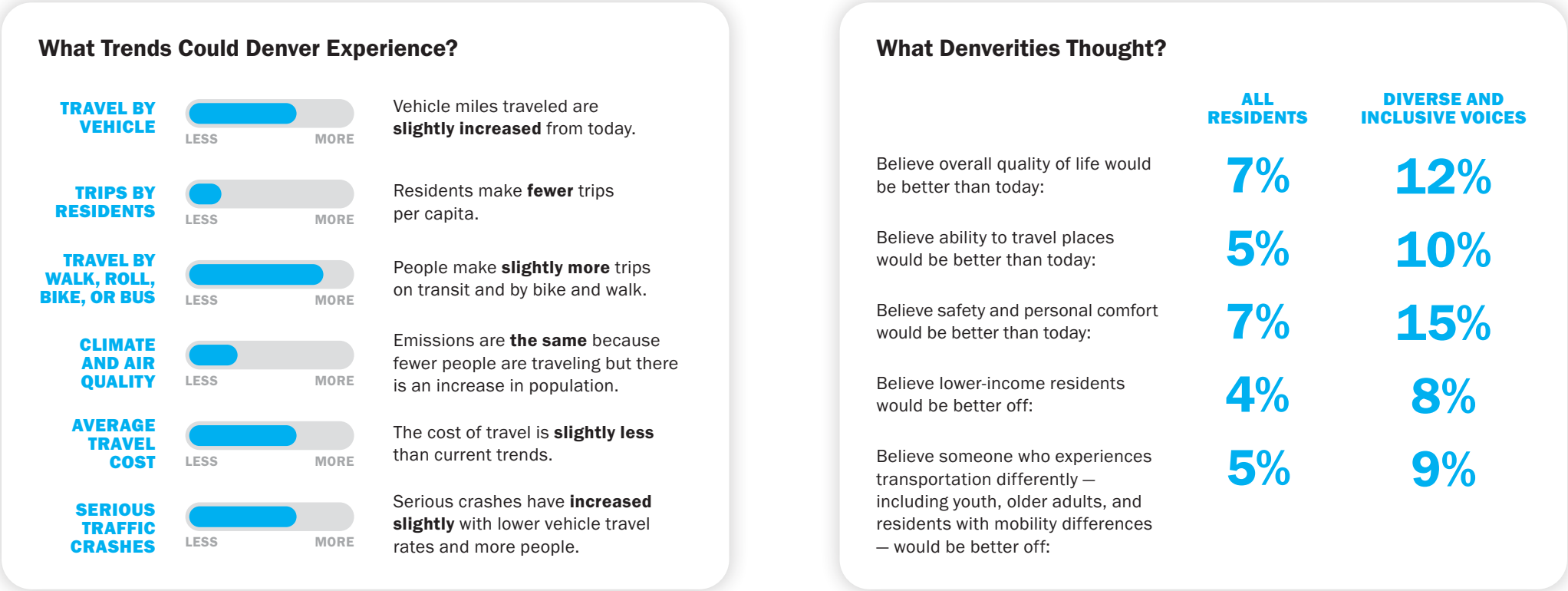
## PUBLIC PERCEPTION

Many participants expressed dissatisfaction overall with the New Normal Future. In reacting to this future, participants appreciated potential environmental benefits due to less traffic, emphasized the importance of access to broadband internet connectivity, and highlighted the need for increased walking, bicycling, and transit options for non-work-related trips.

## ELEVATING DIVERSE VOICES

DIVO participants appreciated some aspects of the New Normal Future, including potentially having fewer cars on the road and reduced emissions but highlighted numerous potential concerns with this future. Issues identified included **congested roads and highways**, **less community cohesion**, and **increased social division**. DIVO participants indicated that working from home is **not possible for essential workers** who do not have the opportunity to do so, compounding existing inequities in this future.

DIVO participants feared this future would ultimately result in **more expensive transportation** options, and potentially more unemployment and houselessness. Additionally, many DIVO participants experienced a **decrease in transit service** reliability and frequency during the pandemic and noted that this trend would likely continue in this future. Additional **transit-related concerns** with this future included a lack of bus routes and expansion, accessibility concerns, service disruptions and decreased Sunday service, canceled routes, and less transit funding.



# 4.5 | WALKABLE AND GREEN FUTURE

## OVERVIEW

### WHAT THE MODEL ANALYSIS TAUGHT US

In the Walkable and Green Future, Denver’s population grew at a rapid rate through 2050. Denver made massive investments in better transit, walking, and bicycling options, including greener streets — dramatically changing the way streets look and feel. Many vehicles, both personal as well as freight, transit, bicycles, and scooters are electric and powered by renewable energy sources. Transportation choices shifted due to higher driving costs and cultural shifts toward walking, bicycling, and transit. As a result of those shifts, this future resulted in a slower rate of increase in vehicle miles traveled (VMT), a decrease in serious crashes and fatalities, and lower levels of air pollution and GHG emissions.

### VALUE OF MODELING THIS FUTURE

This future reveals the benefits created by the combination of a rapidly growing Denver, dedicated investment in walking, bicycling, and transit options, and shifting preferences to use these options more.

FIGURE 4.4: Walkable and Green Future – Summary, Trends, and Public Feedback

In this future, Denver is easy to get around without a car, but less convenient to drive.



## PUBLIC PERCEPTION

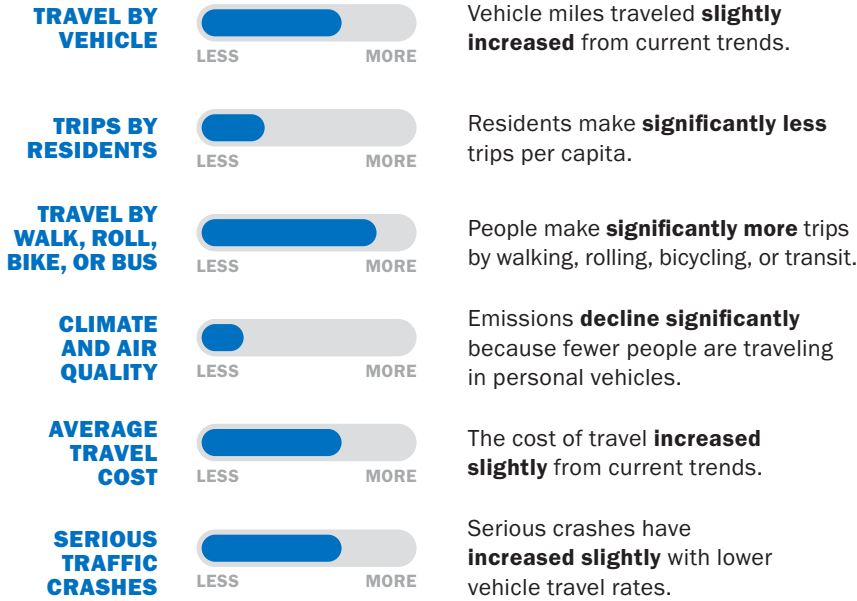
Participants appreciated that the Walkable and Green Future could result in a more sustainable Denver, but voiced transportation equity, safety, and access concerns. Suggestions for new tools to improve safety, such as technology to detect near-miss crashes as well as adopting other technologies were identified as important to support success in this future. Participants identified needed policy shifts to support this future, including changing the way DOTI prioritizes street space to provide more comfortable and easy options for pedestrians, bicyclists, and transit users. In providing more space for these street users, freight access would need to be considered and preserved.

## ELEVATING DIVERSE VOICES

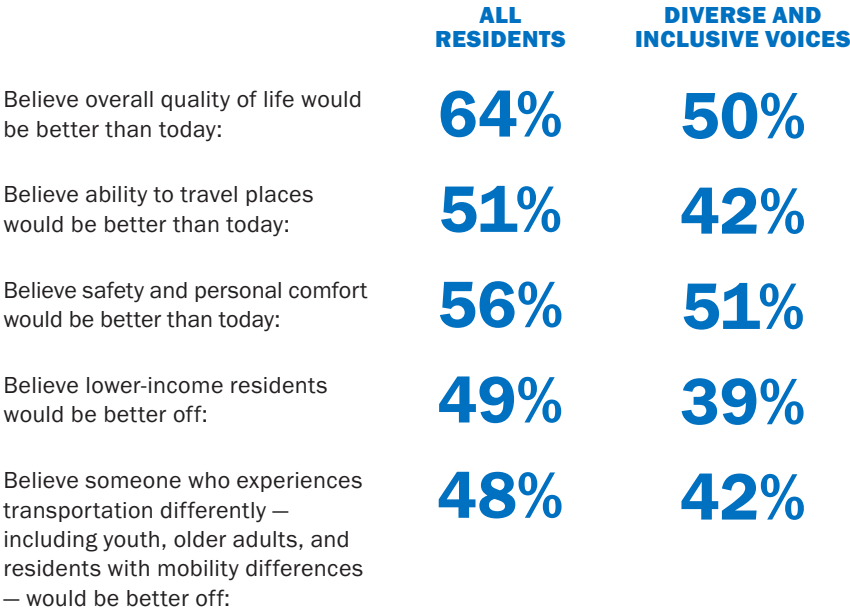
DIVO participants favored many aspects of the Walkable and Green Future, though voiced concerns related to **transit service, transit affordability, and equity**. Participants were excited about the opportunities for **healthier lifestyles and community connectedness** that could be realized. Concerns highlighted included the recognition that car ownership would still be necessary for many people and making driving more expensive would place undue burden on lower-income households.

DIVO participants voiced trepidation related to **equity implications** of this future. Specifically, participants emphasized that Denver could become a more expensive place to live, furthering affordability and displacement trends. Concerns were expressed that this future could **perpetuate existing inequities** by making some areas more comfortable and accessible while leaving other areas behind.

### What Trends Could Denver Experience?



### What Denverites Thought?



# 4.6 | TECHNOLOGY DRIVEN FUTURE

## OVERVIEW

### WHAT THE MODEL ANALYSIS TAUGHT US

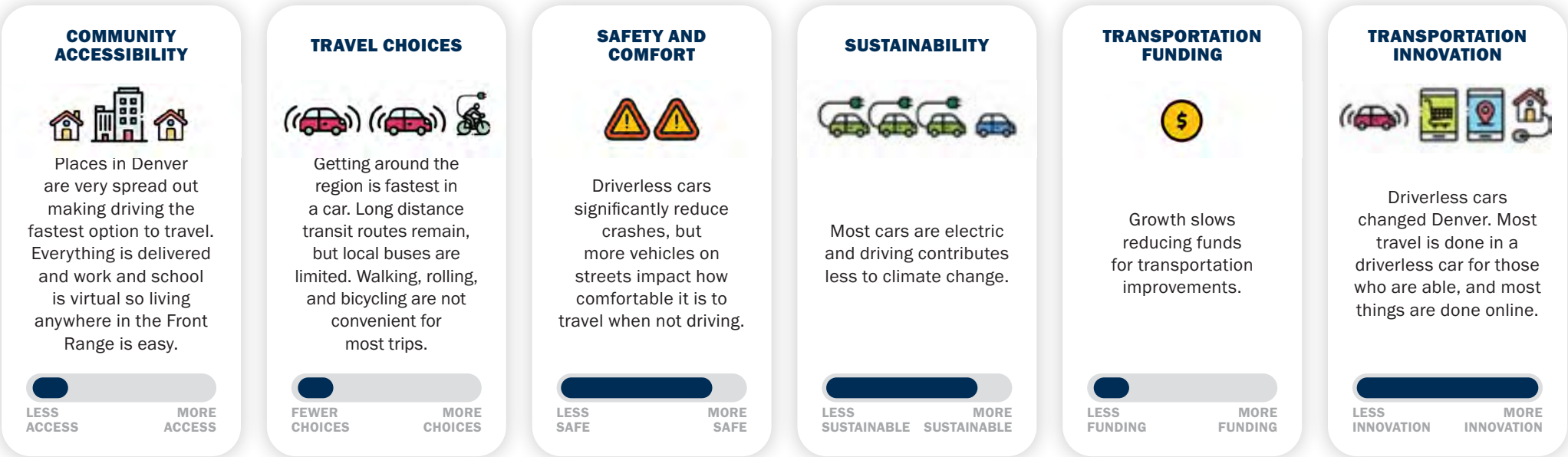
In the Technology Driven Future, Denver’s population grew through 2050 but at a slower rate than the Status Quo Future. The slowdown in Denver’s population growth was driven by widespread adoption of personal autonomous, or driverless, vehicles, which in this future, are cheap and everywhere. Other technology advances to make travel seamless and easy by vehicle are assumed in this scenario, including connected infrastructure, vehicle-to-vehicle communications, and safety prevention and detection. As a result, autonomous vehicles made long commutes less stressful and less costly, leading more would-be Denverites to relocate to areas well outside of Denver or even the Front Range. Compared to baseline trends, more people riding in autonomous vehicles resulted in higher rates of driving — with a decrease in serious crashes and fatalities on streets — and lower levels of pollution in this 2050 future.

### VALUE OF MODELING THIS FUTURE

This future reveals the impacts that widespread adoption of autonomous vehicles in Denver could have on traffic patterns and where people may choose to live.

FIGURE 4.5: Technology Driven Future – Summary, Trends, and Public Feedback

In this future, driverless cars become the norm for how Denverites travel.



## PUBLIC PERCEPTION

Many participants expressed apprehension regarding the Technology Driven Future. In reacting to this future, participants emphasized support for leveraging new technologies to improve transportation, but voiced trepidation that new technology would be delivered equitably, affordably, and in a comprehensive manner citywide. Concern was expressed with assuming technology would improve everything and cautioned Denver not to overlook non-technological solutions to mobility problems, such as completing sidewalk gaps and providing safe bikeways. Participants emphasized the need to maintain transit service, which could become slower and less reliable in this future.

## ELEVATING DIVERSE VOICES

DIVO participants favored some aspects of this future, noting automation can improve standards of living, offer more efficient travel, and a more seamless supply chain. Additionally, they voiced driverless cars could be a great resource for people with travel limitations, including younger and older residents and persons with mobility limitations. Shared forms of transportation could have the potential to help people save money, increase safety, and improve the environment. Concerns participants voiced related to this future, included high costs, danger of technological malfunctions, and mental health issues that could stem from a lack of community. They also expressed, that if this future meant that everyone had their own driverless car, streets could remain congested.

### What Trends Could Denver Experience?



### What Denverites Thought?

	ALL RESIDENTS	DIVERSE AND INCLUSIVE VOICES
Believe overall quality of life would be better than today:	16%	20%
Believe ability to travel places would be better than today:	17%	23%
Believe safety and personal comfort would be better than today:	20%	27%
Believe lower-income residents would be better off:	11%	15%
Believe someone who experiences transportation differently — including youth, older adults, and residents with mobility differences — would be better off:	20%	25%



# 4.7 | ACHIEVING DENVER'S TRANSPORTATION GOALS

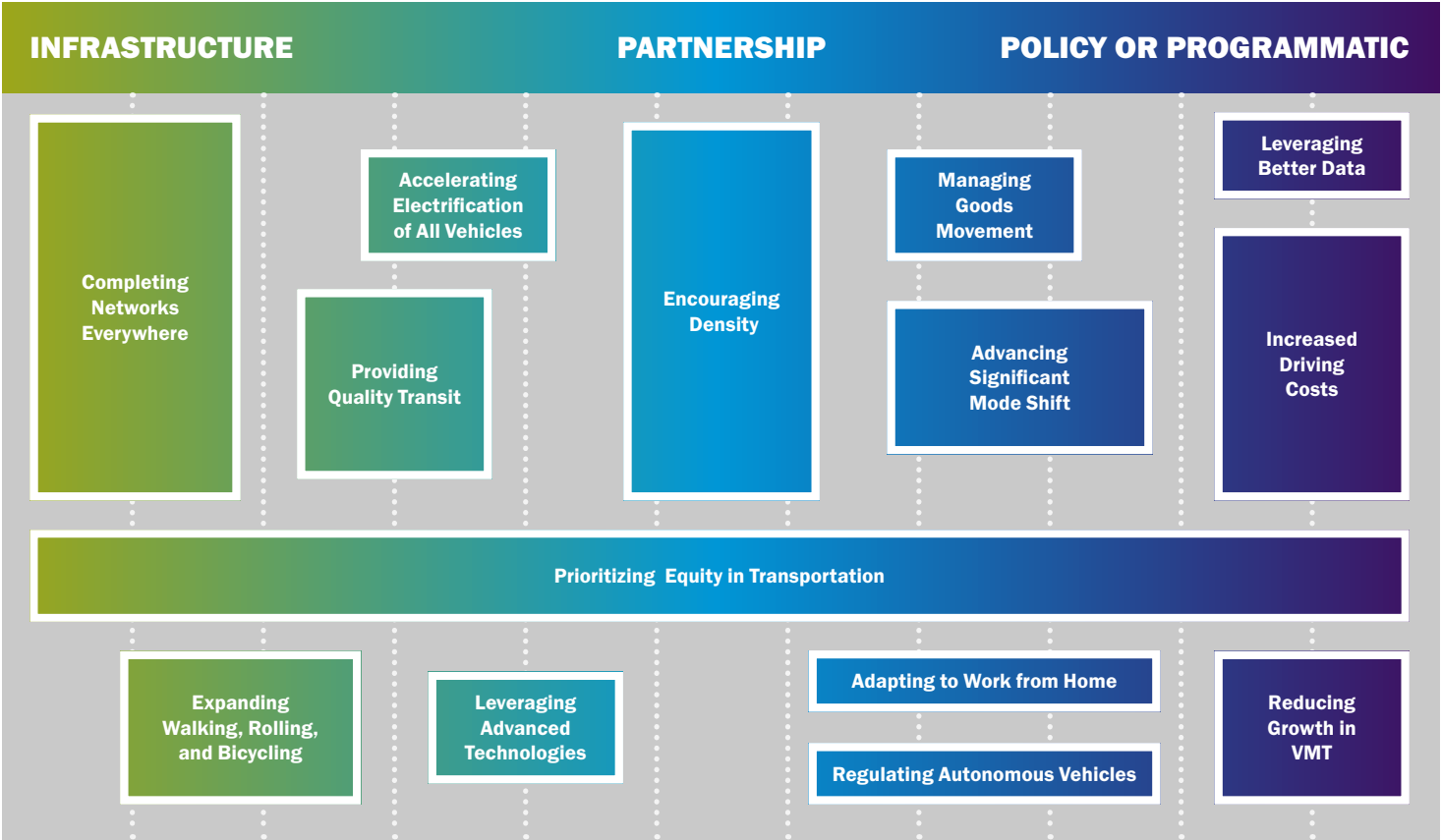
**Chapter 3: Assessing the State of Transportation in Denver** defined the process to develop Denver's five transportation goals: Mobility, Safety, Sustainability, Community, and Quality, with Equity as a cross-cutting theme integrated into each goal. Beyond understanding the impacts and preferences related to each of the four possible futures, *Denver Moves Everyone* leveraged the scenario planning process to understand, given an uncertain future, what potential changes represent the most significant opportunities and challenges to achieving Denver's vision and goals.

A significant finding from the scenario analysis is that infrastructure investment alone is not enough to achieve Denver's goals and dramatically shift the way we travel. Supporting policies and programs are critical to fund in parallel with infrastructure to provide the supportive environment necessary to change travel behavior. Programmatic investments may include initiatives on communication and education, travel safety, demand management, and cultural shifts.

Additionally, many influential travel behavior factors are outside the City and County of Denver and DOTI's direct control, demonstrating the importance of strategic partnerships across government agencies and with the private sector to achieve desired outcomes. The scenario analysis also demonstrated that increased levels of vehicle delay and congestion encourage shifts in travel choices. This finding encourages Denver to not make significant investments to reduce vehicle delay and instead focus on managing travel time reliability and decreasing person miles traveled, an overall measure of travel activity.

**Figure 4.6: Significant Influencing Factors to Achieving Denver's Vision and Goals**

This chart highlights the most frequent and impactful **infrastructure, partnership, and policy or programmatic** influencing factors. The size of each factor indicates the relative influence in achieving Denver's transportation goals. These factors were identified through modeling and technical analysis. Denver will continue to update analyses as more information and better data becomes available to guide decision making. The following section spotlights the primary factors found to influence progress toward recommendations for each goal. Together, these are the key strategies Denver will plan for and pursue, regardless of what the future holds.



## MOBILITY RECOMMENDATION

**A city that provides transportation choices that move all people, goods, and services reliably, easily, and affordably.**

### STRATEGIES THAT HAVE THE GREATEST IMPACT



**ENCOURAGING DENSITY:** A more dense city represents a city that can accommodate more people and places in a smaller area to live, learn, work, play, and shop. The analysis forecasted different density levels for Denver and found that futures with more people and places closer together supported higher levels of walking, bicycling, and transit by making these choices more practical for more trips. Areas with a greater concentration and variety of destinations must be supported by mixed-use zoning — which allows businesses, housing, and retail to be in the same buildings — to recognize the benefits of greater density.



**INCREASING DRIVING COSTS:** For many residents, the choice to drive is influenced by driving costs including fuel, vehicle purchase costs and maintenance, ownership fees, tolls, and parking. Higher driving costs reduce drive-alone trips, as residents shift preferences and use other forms of transportation, like transit, at higher rates or complete fewer trips total due to high costs. Lower-income households are more sensitive to price changes. A higher proportion of lower-income households may drive and travel less in possible futures with high driving costs, compared to higher-income households.



**PROVIDING QUALITY TRANSIT:** The key factors that influence residents' choice to take transit include the transit network (how many places transit routes connect), the frequency of transit (how often transit vehicles arrive), the reliability of transit (how on-time trains and buses arrive), and the cost of transit. A more comprehensive transit network, with improved frequency and reliability, is correlated with higher rates of transit ridership. Transit costs are secondary to network improvements — a cheap or free transit system that is unreliable and connects few places will remain an inconvenient travel choice for most residents.



**EXPANDING WALKING, ROLLING, AND BICYCLING:** Increasing residents' comfort and safety while walking and bicycling will shift more trips to these travel options, especially short trips. These preferences can be positively influenced by network expansion, greener and cooler streets, comfortable, secure, and safe routes, behavioral change campaigns, and greater mixed-use development density.

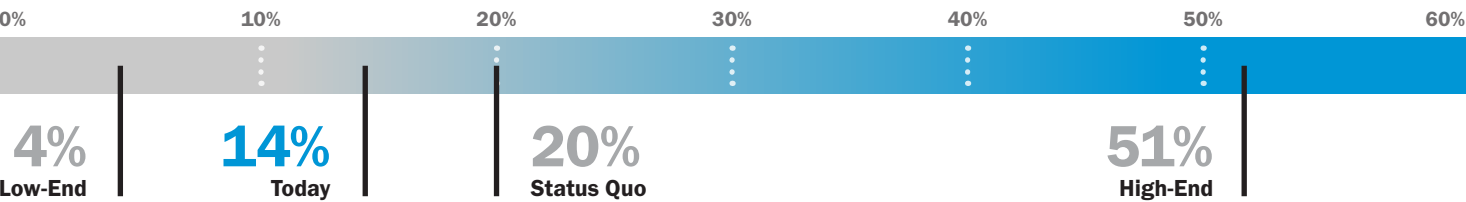


**GROWING MULTI-USE DESTINATIONS:** Downtown Denver and other key activity centers with a concentration of housing, jobs, and shopping, represent key nodes of transportation demand — more residents need to access these places to live, work, learn, and meet other daily needs. A concentration of trips to and within activity centers supports higher rates of walking, rolling, bicycling, and transit.

**Figure 4.7: Modeled range – Rate of Walking, Rolling, Bicycling, and Transit**

The possible range for combined walking, rolling, bicycling, and transit rate for Denver in 2050 was between 4% and 51%. If Denver did little to change transportation in Denver, the expected combined rate is projected to be 20%.

### PERCENT SHARE OF ALL TRIPS MADE BY WALKING, ROLLING, BICYCLING, AND TRANSIT







## SAFETY RECOMMENDATION

A city with zero traffic deaths and serious injuries, where everyone feels safe and comfortable traveling throughout the city, regardless of their age, gender, race/ethnicity, or how they travel.

### STRATEGIES THAT HAVE THE GREATEST IMPACT

Note: Not all factors influencing safety outcomes can be assessed directly through modeling and analysis but represent important considerations to achieve a safer transportation system.



**REDUCING GROWTH IN VMT:** VMT is a measure of how many miles all vehicles in Denver travel over a given year. In the past decade, as Denver's population grew and travel choices remained consistent, overall VMT grew too. With more miles being driven, traffic crashes resulting in serious injury or death are also likely to increase. Several key factors support lower rates of VMT in the futures and possible paths to achieving Vision Zero for Denver.

- + Higher Driving Costs:** In futures with lower total VMT, the most influential factor in reducing miles driven is higher costs for owning and operating personal vehicles. Higher driving costs result in more residents choosing to not take a trip they otherwise would have taken or choosing to use a different or less expensive option.
- + Walking and Bicycling Rates:** In futures where the rate of walking and bicycling are higher, miles driven are lower as more residents choose to walk or bike for a higher proportion of all trips. The impact of higher walking and bicycling rates is less influential on reducing VMT compared to higher driving costs.
- + Transit Rates:** In futures where transit ridership is higher, vehicles miles driven was lower. Of all travel options, transit represents the safest way to travel with the lowest serious crash risk. Shifting more trips to transit options is a key strategy to achieving the Safety goal in the long term. The impact of higher transit travel rates is also less influential on reducing VMT compared to higher driving costs.
- + Land Use Density:** The analysis found that higher density supports higher walking, rolling, bicycling, and transit rates. In possible futures with higher densities and higher non-auto travel rates, VMT is also lower.

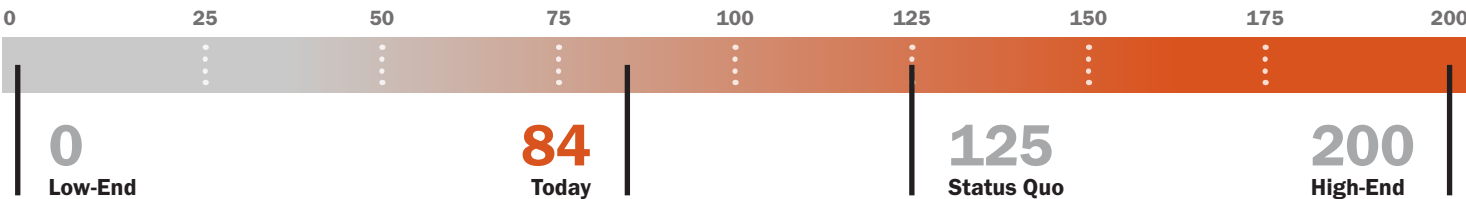
**LEVERAGING ADVANCED TECHNOLOGIES – AS DEMONSTRATED IN STATE OF THE SYSTEM:** Street safety today, speeding, substance abuse, distracted driving, and not wearing seatbelts are all behaviors linked to serious traffic crashes in Denver. The analysis assessed the impact of autonomous vehicles on reaching Denver's goals. Theoretically, autonomous vehicles could be equipped with devices that could control vehicles speed based upon posted speed limits. Similarly, key behavioral factors linked to serious traffic crashes could also be eliminated if people no longer manually drove their vehicles. While it is not possible to forecast the precise impact, new vehicle technologies can be leveraged to support Denver's Safety goal. Autonomous vehicle technology also has significant potential to increase transit availability and frequency, moving more people, more safely than personal vehicles. However, an increase in autonomous vehicles on Denver's roads also has the potential to increase VMT and to put more vehicles on the road.



Figure 4.8: Modeled Range – Number of Serious Crashes per Year

The analysis found the range for the total number of fatal crashes in Denver in 2050 was between 0 and 200. If Denver did little to change transportation, the expected annual number of fatal traffic crashes in 2050 would be 125.

#### TOTAL NUMBER OF FATAL CRASHES



## SUSTAINABILITY RECOMMENDATION

A city with a transportation system that is pollution free and resilient in the face of climate change, making Denver healthier for all people with health inequities caused by the transportation system eliminated.

### STRATEGIES THAT HAVE THE GREATEST IMPACT



**ADVANCING SIGNIFICANT MODE SHIFT:** In Denver, fossil fuel powered vehicles are the single largest contributor to transportation-related GHG and air pollutants. Mode shift describes the shift in travel preferences from driving to non-single occupant forms of travel, including walking, rolling, bicycling, and transit. Possible futures that shift the most trips to non-single occupant vehicle modes have lower overall GHG emissions and air pollutants. Mode shift is positively influenced by network expansion, greener and cooler streets, comfortable, secure, and safe routes, behavioral change campaigns, and greater mixed use development density.



**ACCELERATING ELECTRIFICATION OF ALL VEHICLES:** Long-term shifts away from relying on single occupant vehicles for most trips represent the most critical strategy to achieving Denver's sustainability goals. Electrification of personal, transit, and freight vehicles is also an important near-term strategy to reduce immediate air pollution emissions generated from fossil-fuel vehicles. Even with higher rates of walking, bicycling, and transit in Denver, vehicles will still be traveling millions of miles per day on city roads. These vehicles will need to convert to electric to reduce the impact of transportation on our climate and air. Electric vehicles require significant amounts of energy, which must be generated by renewable sources and distributed through the electric grid to homes and businesses. Electric personal and commercial vehicles still produce GHG emissions and generate particulate air quality emissions from braking, tire friction, and heat generation while on the road. Electrified transit vehicles, e-bikes, and other electrified personal mobility options have a significant role to play in achieving mode shift and sustainability outcomes. This emphasizes the importance of a multifaceted approach combined with mode-shift to reduce pollution and manage climate change.



**REGULATING AUTONOMOUS VEHICLES:** While autonomous vehicles do not exist in Denver today, the analysis forecasted the potential impacts of a high rate of adoption of privately owned vehicles. If a large portion of the population owned autonomous vehicles, driving may become cheaper and more attractive, therefore increasing VMT. This increase in driving would compete with the ability to shift more trips to walking, bicycling, and transit. Alternatively, people could use autonomous vehicles that are shared and accessed when needed. Denver's focus for future vehicle technology is on deploying autonomous transit vehicles and shuttles that have the potential to increase transit accessibility, frequency, and service. Automated package and goods delivery solutions are currently being tested throughout the world and offer the additional benefits of reducing delivery trips that might otherwise be made by a traditional freight truck or van.

The analysis did not assess power-generation necessary for all vehicles in Denver to become electric, nor life cycle impacts of electric vehicles on the environment, notably batteries. However, the impacts of fossil fuel extraction are many times greater than the production of electric vehicle components.

Figure 4.9: Modeled Range – Regional GHG Levels

The analysis found the range for regional GHG emissions levels in Denver in 2050 was between 15 metric million tons (mmt) and 0.2 mmt. If Denver did little to change transportation, the expected GHG emissions level in 2050 is 12.4 mmt.

#### MMT OF REGIONAL GHG EMISSIONS

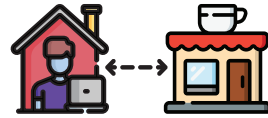




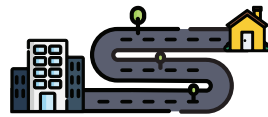
## COMMUNITY RECOMMENDATION

A city where neighborhoods are connected to all the places people go, with streets designed for people and shaped by communities and cultures.

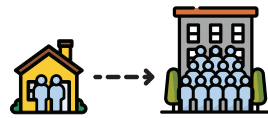
### STRATEGIES THAT HAVE THE GREATEST IMPACT



**MANAGING WORK FROM HOME AND GOODS MOVEMENT:** The analysis determined that possible futures with higher rates of working from home and e-commerce resulted in fewer trips overall. While this change could lower VMT, these changes would also result in fewer trips to local businesses, posing a potentially negative impact on Denver's Community goal. Higher rates of e-commerce and working from home pose the potential to diminish vibrant activity centers like Downtown by reducing trip chaining, which is when people stop at other destinations on their way to another final destination by grabbing coffee on their way to work, picking up a book during their lunch break, or stopping by other businesses on their way home.



**COMPLETING NETWORKS EVERYWHERE:** The analysis showed high levels of travel activity in Downtown Denver supports reaching the City's long-term transportation goals, since trips in this area tend to be short and can more easily be completed by walking, rolling, bicycling, and transit. However, the analysis forecasted possible futures where trips to-and-within Downtown shrink, caused by higher rates of working from home. To manage futures where this trend occurs, the analysis demonstrated the importance of developing complete transportation networks. Complete networks in communities throughout Denver allow Denverites to access key activity centers, beyond downtown, with a variety of transportation options.



**ENCOURAGING DENSITY:** Dense development patterns allow more people to live in a smaller area and support a mix of land uses. When places are closer together, trips tend to be shorter and can more easily be completed by walking, bicycling, and transit. This is evidenced by Downtown Denver — the densest area in Denver and the highest rate of non-single occupant vehicle driving trips. Dense and mixed-use areas enable unique cultures and creates vibrant public spaces. These factors culminate in a tighter, more close-knit community, emphasizing the link between Denver's Community goal and dense development.

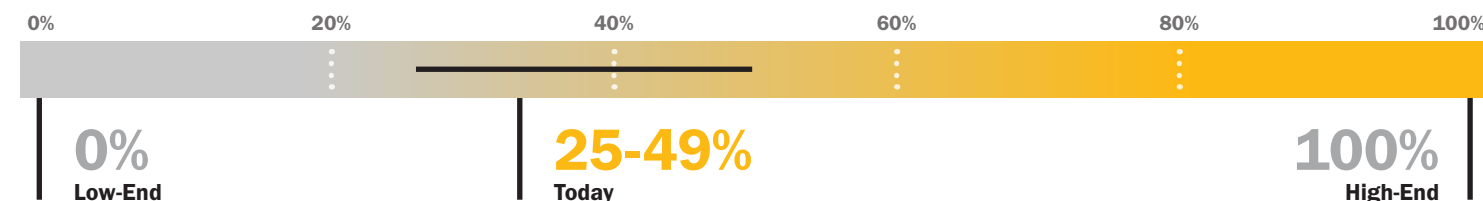


**PRIORITIZING EQUITY IN TRANSPORTATION:** Denver's BIPOC and low-income populations are more likely to use transit, share rides, and walk or bike to get around. In testing policies that help Denver achieve goals (such as disincentivizing driving), these populations shift modes at higher rates than the general public. Prioritizing alternative modes and services in BIPOC and low-income communities first will support mode shift and community connectedness.

Figure 4.10: Community Access – Neighborhood Access to Jobs, Transit, and Amenities

Access to job, community, and transit destinations and proximity to quality of bike and pedestrian networks is modeled using geospatial analyses of Denver's existing system. The benchmark created for this goal was completed through analysis outlined in **Chapter 5: Achieving Denver's Transportation Vision and Goals**. Today in Denver, 25-49% of households have access and the range of possibilities is 0% to 100%.

### PERCENT OF HOUSEHOLDS WITH ACCESS TO DESTINATIONS AND NETWORKS



## QUALITY RECOMMENDATION

A city where the transportation system is maintained in a consistent state of good repair, using robust data to prioritize investments in neighborhoods that need it most and to minimize cost across the system.

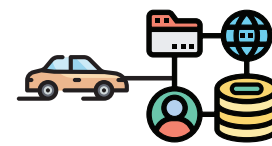
### STRATEGIES THAT HAVE THE GREATEST IMPACT



**MANAGING GOODS MOVEMENT:** In possible futures where e-commerce increased, so did the volume of truck trips. As more people order things online, more vans and trucks are needed to distribute those goods to homes. A greater number of heavy trucks on Denver's streets generates additional maintenance needs for streets, competition for limited curbside parking and delivery zones, and potential for more conflicts between all users of the public right-of-way. Strategies to consolidate freight into fewer delivery points, manage consumer demand for next-day delivery, and shift deliveries to alternative modes or electric vehicles can mitigate some of the impacts of goods movement.



**ADAPTING TO WORK FROM HOME:** As more Denverites work from home, fewer longer trips are made for commute purposes, but more frequent and shorter trips may be made throughout the day. Commute trips are responsible for the majority of VMT on Denver's roads and are typically made in single-occupant vehicles. Any reduction in VMT reduces maintenance needs for pavement, markings, bridges, and curbs.

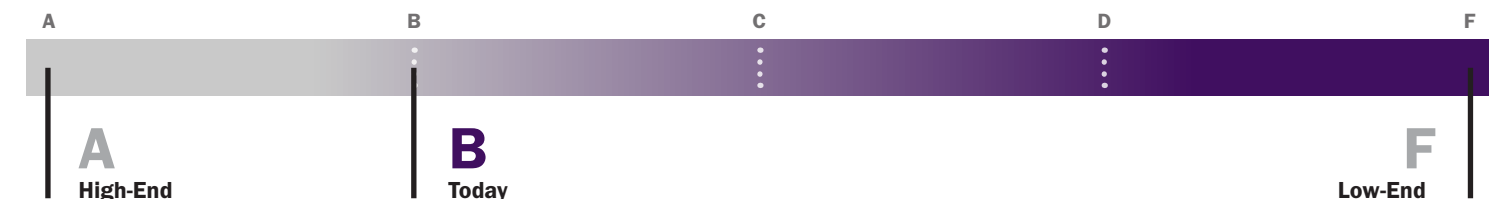


**LEVERAGING BETTER DATA:** The research and analyses completed to understand future impacts and system needs are only as robust as the data available to Denver. More frequent, comprehensive, accurate, and organized data on transportation infrastructure, utilization, and condition is critical to identifying and supporting strategies. Investing in data and plans to better manage assets will enable Denver to strategically invest in the maintenance and upgrade of infrastructure that will improve the quality of the system while meeting resident expectations and using financial resources efficiently.

Figure 4.11: System Asset Condition Grade

The Travel Demand Model is not able to model system asset condition. Shown in **Chapter 3: Assessing the State of Transportation in Denver**, an analysis of existing transportation assets managed by DOTI in Denver was conducted. Today's grade for transportation asset condition is measured as a B in Denver.

### GRADE OF SYSTEM ASSET CONDITION



## CHAPTER 5

# ACHIEVING DENVER'S TRANSPORTATION VISION AND GOALS

*Denver Moves Everyone* is more than a plan — it is a dynamic suite of tools for Denver to strategically reach its transportation vision. Moving forward, the investments DOTI delivers will be aligned to achieve Denver's transportation goals. *Denver Moves Everyone* provides the means to consistently expand and improve Denver's transportation system, while ensuring our growing system is maintained and operated efficiently.

### What this chapter introduces:

- + Denver's process and tools to link investments to goals.
- + Future funding needs to make Denver's transportation system world-class.
- + Decision-support tools to identify and prioritize transportation projects.
- + Near- and long-term investment recommendations.



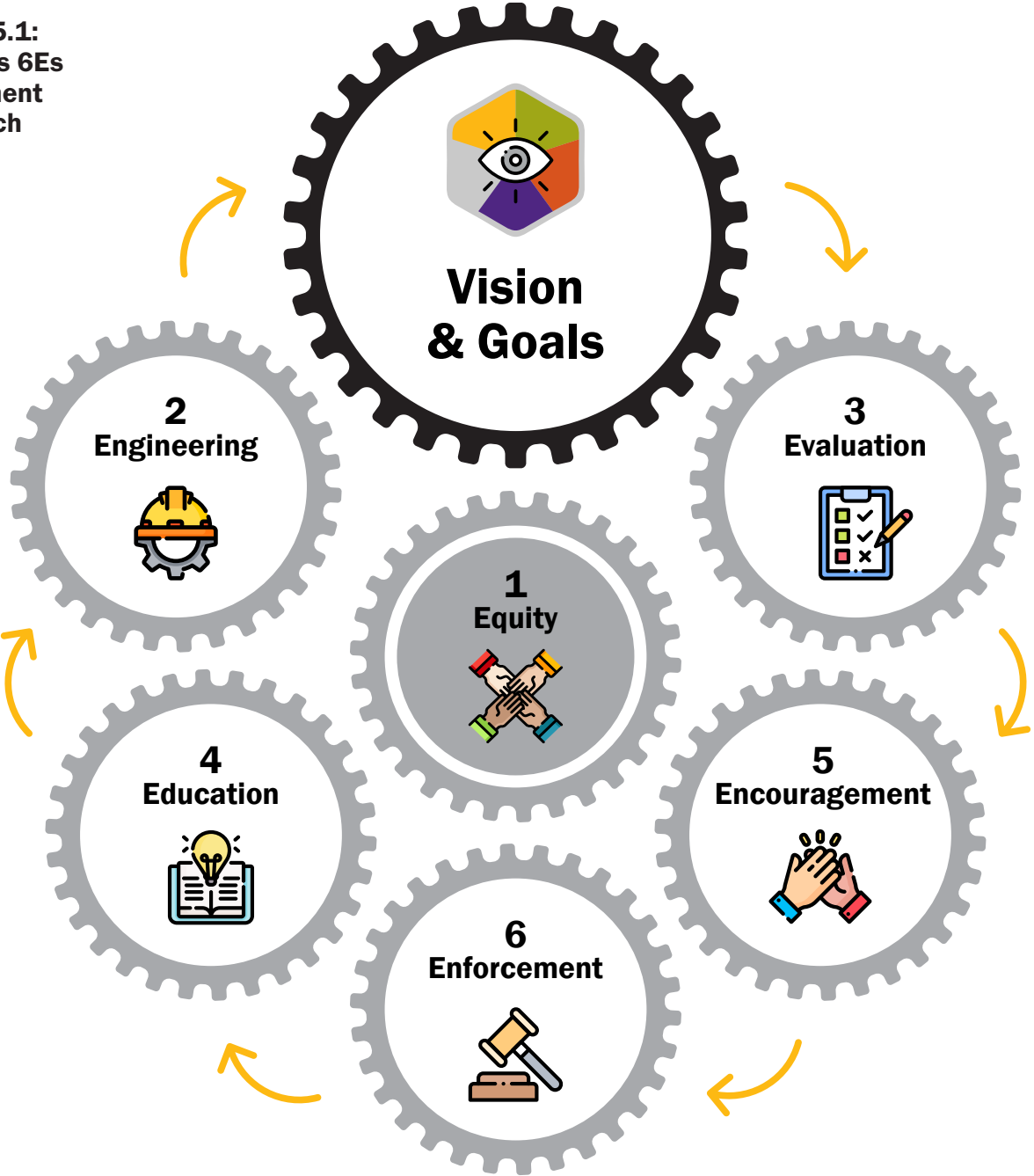


# 5.1 | INVESTING IN DENVER'S TRANSPORTATION SYSTEM

## MAXIMIZING INVESTMENTS TO ACHIEVE OUR GOALS

Denver Moves Everyone created a data-driven process — co-created with the community — to prioritize our dollars and most effectively achieve Denver's transportation vision and goals. Analysis conducted in **Chapter 4: Envisioning Denver's Future** found that while creating better transportation infrastructure, like safer sidewalks and bikeways and faster bus routes is critical, what is equally important is incentivizing the use of these new options. This conclusion shaped Denver's comprehensive 6E's Investment Approach represented in **Figure 5.1**.

Figure 5.1:  
Denver's 6Es  
Investment  
Approach



## INVESTING IN DENVER'S TRANSPORTATION SYSTEM

Delivering a world class transportation system requires scaling investment across the 6E's by organizing our work into Operations, Improvements and Expansion, and Maintenance. As our transportation system grows, investment in system maintenance and operations must increase as well. Denver will make strategic improvements in the following transportation system components:



**OPERATIONS**

Includes the people, data, and tools needed to keep the transportation system working and the incentives and programs needed to motivate more people to use travel options. As Denver moves more people and goods in the future, greater resources are required to efficiently use the transportation system.



**IMPROVEMENTS AND EXPANSION**

Includes upgrading the existing network of streets, sidewalks, bikeways, and bus and rail lines to work better and providing new travel options on more and greener streets to connect more places. As Denver grows, an improved and expanded system will move more people.



**MAINTENANCE**

Includes fixing things like cracks, potholes, and broken signs to keep the transportation system in good shape. Maintenance also means clearing snow and sweeping sidewalks, bikeways, and streets regularly and replacing major assets such as bridges and traffic signals. As Denver continues to expand the system, future maintenance responsibilities will grow.

Figure 5.2: Scaling Investments to Meet Needs

Denver must balance transportation investments in Maintenance to keep the system we have in good shape, in Operations so we have enough people and equipment to keep the system running smooth, and in Improvements and Expansions to make the system work better and provide more transportation options, and in. As we increase investment in improvements and expansion in the future, we must scale the level of investment in operations and maintenance proportionally.

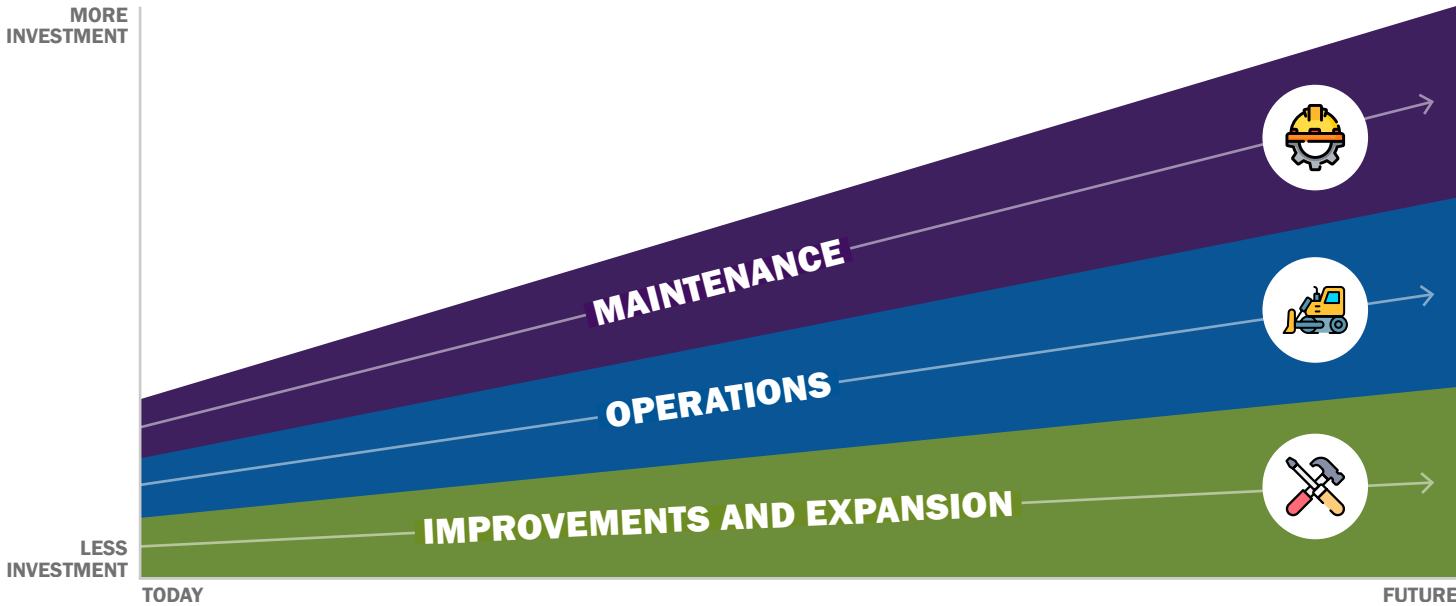
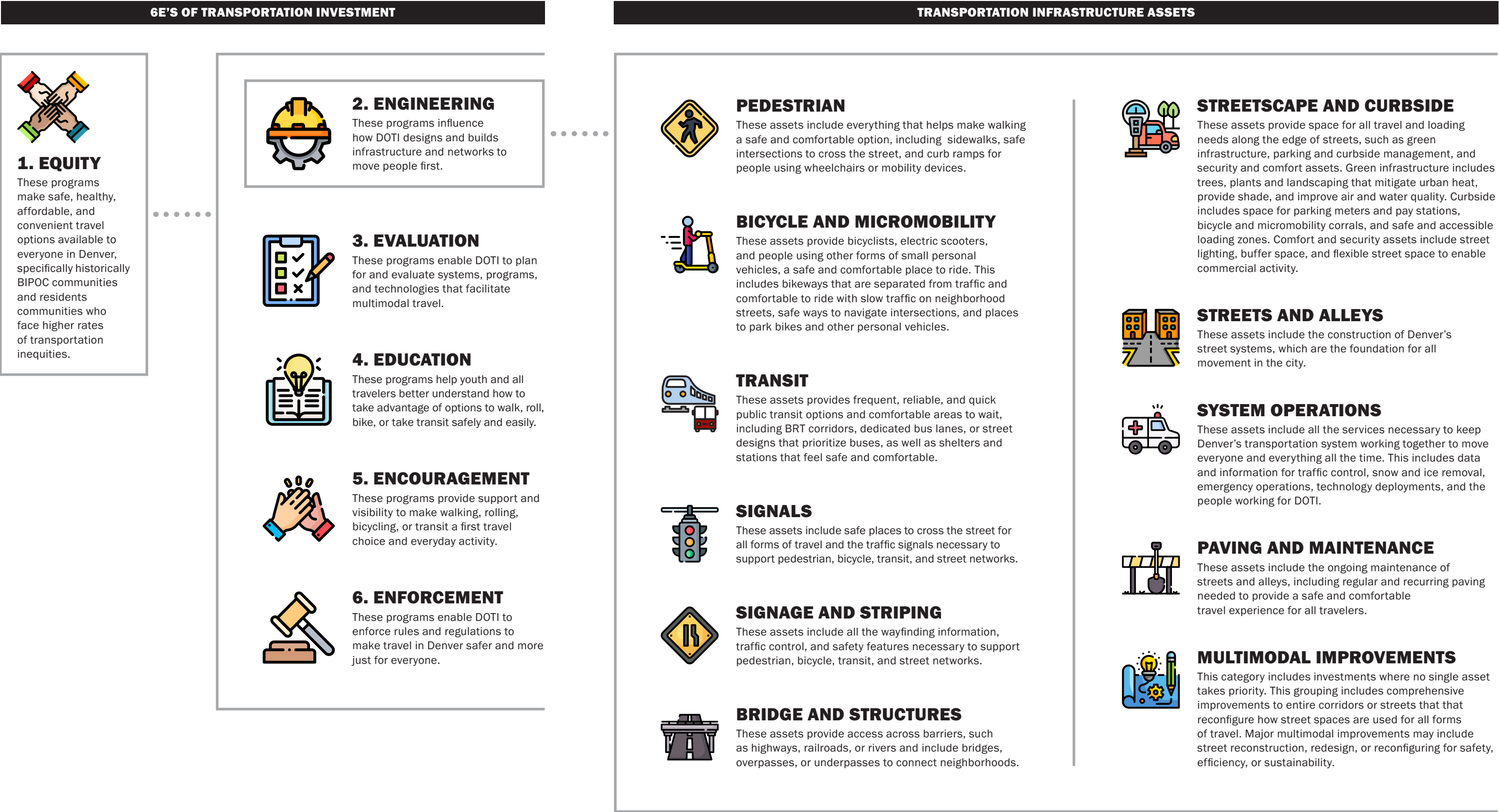


Figure 5.3: Denver’s 6E’s of Transportation Investment and Transportation Infrastructure Investment Classes/Categories



# 5.2 | FUTURE FUNDING NEEDS AND CURRENT GAPS

## TRANSPORTATION FUNDING IN DENVER

Transportation is an essential service provided by the city and supported by taxpayers. In Denver, transportation is primarily funded by property taxes, general fund transfers, grants from state and regional agencies, and bond programs approved by voters. Fuel taxes and vehicle registration fees primarily fund statewide improvements. The amount of funding available for DOTI to invest in Denver’s transportation system varies from year to year and is shared across all the infrastructure needs of the City, including funding for buildings, parks, venues, and other City-owned property and projects. Compared to growth in Denver’s population, funding for transportation has not kept pace with new demands for transportation infrastructure and services.

### FUTURE FUNDING NEEDS

Between 2017 and 2021, Denver invested an average of \$170 million annually in transportation infrastructure, or approximately 25% of the future funding needed. The difference between what DOTI expects to receive and the funding needed to meet 2050 goals is Denver’s funding gap. With limited resources, Denver must consider the tradeoffs of investing in expansion versus maintenance projects and in one asset class over another. The funding gap substantiates the need for a well-defined, data-driven process to allocate limited resources through Denver’s investment strategy.

### FUTURE FUNDING TARGETS












Significant new investment is needed to achieve Denver’s transportation vision and goals. Through *Denver Moves Everyone*, DOTI established what it would take to transform the transportation system of today into a world-class system tomorrow. To get there, Denver has established future targets and associated future funding levels for each transportation asset. Denver’s investment strategy is aimed at achieving these future unconstrained funding targets in the long-run. The estimated needs, in current dollars, to accomplish this vision will require \$700 million to \$800 million in transportation funding each year. This level of investment over the long-term will enable Denverites to travel equitably, safely, easily, and sustainably.

Figure 5.4: Funding Level Needed to Achieve Goals

Creating a world-class transportation system by 2050 requires significant investment, equating to \$700 million to \$800 million annually to improve, expand, operate, and maintain Denver’s transportation system. This level of investment exceeds the funding available to DOTI today. \$170 million represents the historical annual average transportation funding level between 2017 and 2021.



Figure 5.5: Denver’s Unconstrained Improvement Targets

TRANSPORTATION ASSET	2050 IMPROVEMENT TARGETS	2050 ANNUAL FUNDING NEED THROUGH 2050
 <b>Pedestrian Infrastructure</b>	Filling 300 miles of sidewalk gaps and widening 800 miles of narrow sidewalks	\$160M
 <b>Bicycle and Micromobility</b>	Building 400 miles of new bikeways and upgrading 175 miles of existing bikeways	\$30M
 <b>Transit</b>	Completing 100 miles of new BRT corridors, installing 80 miles of bus priority improvements, and upgrading 2,500 bus stops	\$170M
 <b>Signals</b>	Replacing and updating more than 4,000 signals to modern standards	\$190M
 <b>Signage and Striping</b>	Maintaining 100% of existing assets in good condition and completing new signs and striping to support system expansion using modern curbside management systems.	\$15M
 <b>Bridge and Structures</b>	Maintaining 95% of bridges and structures in good condition and completing 75 new crossing structures	\$50M
 <b>Streetscape and Curbside</b>	Providing green infrastructure on more than 1,300 miles of streets	\$45M
 <b>Streets and Alleys</b>	Constructing 20 miles of new streets	\$30M
 <b>System Operations</b>	Accommodating requirements for all new infrastructure completed	\$20M
 <b>Paving and Maintenance</b>	Maintaining pavement on 95% of streets and alleys in good or better condition	\$55M
 <b>Multimodal Improvements</b>	Constructing major new multimodal improvement projects	\$40M



# 5.3 | PRIORITIZING INVESTMENTS

## IDENTIFYING PROJECTS

Denver plans the transportation system in collaboration with the public through processes that consider needs, incorporate resident feedback, and identify improvements to infrastructure. Previous Denver Moves planning processes have identified future projects for transit, walking, rolling, and bicycling systems citywide, and for specific street corridors and local areas throughout the city. Denverites have contributed significant ideas and insights through these planning processes, resulting in the identification of thousands of projects needed to improve travel in Denver.

Through *Denver Moves Everyone*, DOTI gained the ability to inventory past and future project recommendations in a single tool. The result is a comprehensive list of nearly 10,000 improvements that Denverites have said are important to their neighborhoods and to the city. Grounded in resident feedback, this inventory forms the basis for DOTI's investment recommendations. As new plans are completed, this list will be updated so that Denver is always considering new recommendations informed by resident input.

## PRIORITIZING ALL PROJECTS

To understand which projects have the greatest ability to make progress toward Denver's vision and goals, DME developed a data-driven and stakeholder-informed process to make decisions. This process identified a common set of criteria based on what residents valued, how transportation inequities could be resolved, and what current travel demand and infrastructure needs exist.

For each DME goal, measurable criteria specifically address transportation equity concerns. An additional set of criteria address transportation issues that every traveler in Denver faces. Project scores are based on the level of measured needs and level of anticipated benefits. To determine needs, data-driven measures assess the current conditions in the immediate area of a project. To consider the outcome or impact of completing a project, anticipated benefits are factored in to understand how a project will address underlying needs. This approach values outcomes and prioritizes projects that have the greatest impact across all of Denver's transportation goals.

## SELECTING TOP PROJECTS

The result is a systematic and objective process to rank the many ideas gathered through past planning process and produce a prioritized list of projects that have the greatest impact on Denver's transportation vision and goals. DOTI will continue to improve on this prioritization process to incorporate new and better data and score new projects as they are identified through future plans. *Denver Moves Everyone* designed this process to develop priority recommendations for projects to be completed under Denver's short-term investment strategy.

Figure 5.6: Identifying the Best Investments To Address Our Needs

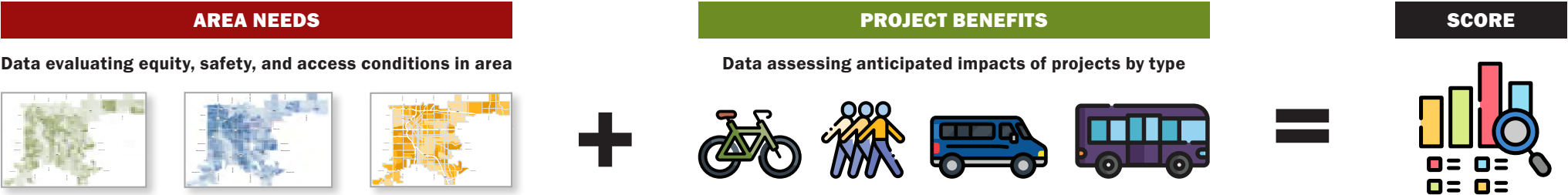








Figure 5.7: Denver's Transportation Prioritization Approach

EQUITY				EVERYONE			
	CRITERIA	AREA NEEDS	PROJECT BENEFITS		CRITERIA	AREA NEEDS	PROJECT BENEFITS
 MOBILITY	Access and Affordability	+ Current household transportation costs	+ Projects that reduce travel costs	+	Travel Time and Reliability	+ Current household trip lengths and travel modes + Current origin and destinations of trips	+ Projects that serve major destinations and improve travel times
 SAFETY	Comfort and Security	+ Existing street characteristics and comfortable assets	+ Projects that improve comfort and safety	+	Risk Reduction	+ Current fatality, serious injuries, and HIN crashes	+ Projects that reduce traffic crash risks and incidences
 SUSTAINABILITY	Environmental Justice	+ Exposure to transportation-related air quality emissions + Existing urban heat exposure	+ Projects that cool streets and improve public health outcomes	+	Climate Action	+ Current vehicle-dependent households contributing to transportation GHG emissions	+ Projects that shift travel to sustainable modes
 COMMUNITY	Access to Opportunity	+ Existing access to social, economic, and education destinations	+ Projects that increase multimodal access to destinations	+	Connectivity	+ Current origin and destinations of trips	+ Projects that provide multimodal travel choices to major destinations
 QUALITY	Equitable Investment	+ Existing infrastructure access	+ Projects that complete gaps	+	State of Good Repair	+ Current quality and condition of infrastructure	+ Projects that improve or upgrade quality of infrastructure

  
= **DENVER'S HIGHEST PRIORITY TRANSPORTATION PROJECTS**

# 5.4 | DEVELOPING DOTI'S INVESTMENT STRATEGY

## MAKING IMPACTFUL INVESTMENTS

To move the needle on Denver’s transportation vision and goals, Denver must align how and where investments are made. Developed in partnership with the community, *Denver Moves Everyone* defines an investment strategy to maximize the return on investment with limited dollars available across all of Denver’s transportation assets, including investments in improvements, expansion, operations, and maintenance. Consistently leveraging this strategy places Denver on the path to achieving our 2050 transportation vision and goals.

### SHORT-TERM INVESTMENT STRATEGY

The short-term investment strategy includes a short list of projects that DOTI intends to set in motion between now and 2030. While not all these projects will be built during this horizon, this prioritized pipeline of projects equips DOTI to phase projects and best match limited funding to strategically advance them toward construction. Funding levels in this short-term investment strategy are based on the level of funding DOTI currently anticipates.

#### INVESTMENT APPROACH

- + Constrained to current funding level
- + Includes prioritized transportation projects to be advanced by 2030
- + Estimated operations needs and community programs and initiatives
- + Identifies maintenance needs to support system improvements and expansions

### MID-TERM INVESTMENT STRATEGY

Transportation projects take a long-time to deliver and represent multi-million-dollar investments. Prioritizing investments beyond 2030 is critical to setting in motion priority projects to be delivered in the future. DOTI must also plan ahead to scale the level of investment across asset categories and continue to deliver on Denver’s vision. The mid-term investment strategy combines both these components, extending DOTI’s strategic investment horizon out to the year 2040.

#### INVESTMENT APPROACH

- + Estimated future funding needs
- + Includes identified capital projects not included in near-term strategy
- + Estimated operations and maintenance needs that reflect system improvements and expansions

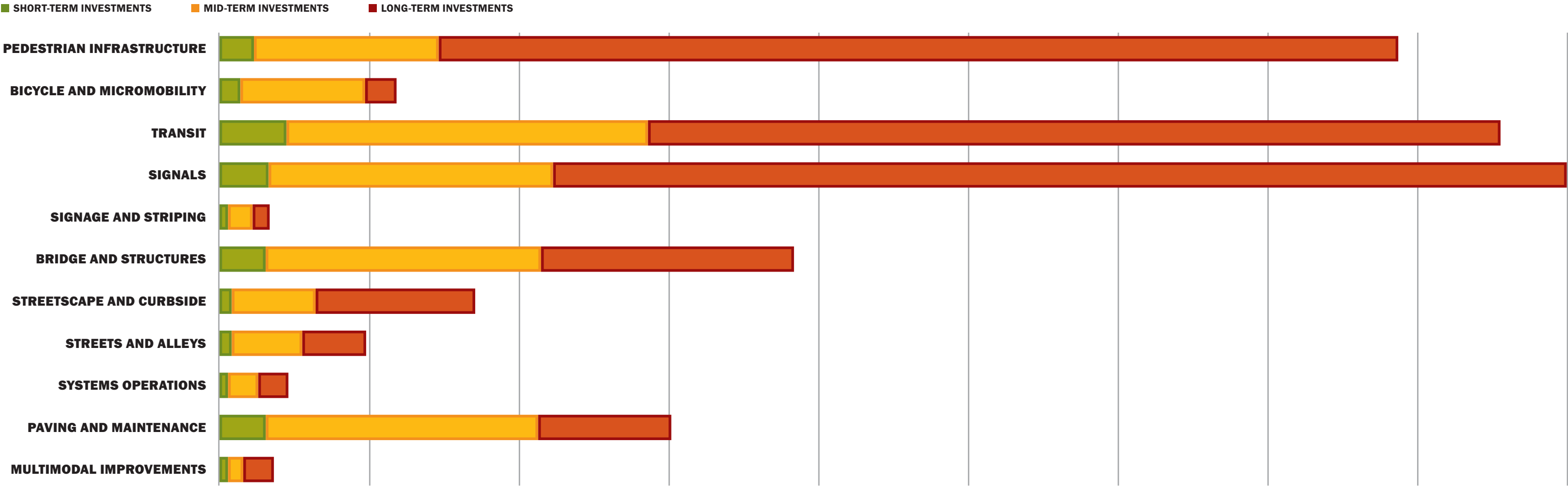
### LONG-TERM INVESTMENT STRATEGY

To reach Denver’s long-term transportation vision and goals, significant new funding is necessary. The long-term investment strategy summarizes the level of investment needed within each asset class by 2050 to achieve asset targets and build out a world-class transportation system in Denver. Denver’s investment strategy must also shift over the long-term as infrastructure gaps and networks are completed. More resources will be needed to maintain a quality system and continue to operate the expanded system to meet the needs of everyone and everything.

#### INVESTMENT APPROACH

- + Estimated future funding needs
- + Recommends total investment levels needed for transportation asset categories
- + Estimated operations and maintenance needs to support system

Figure 5.8: Estimated Investment Strategy Allocation for Denver’s Transportation Assets



NOTE: Investment strategy for Pedestrian Infrastructure based on historic dollars. At time of publication, Initiative 307 is still being finalized.

## CHAPTER 6

# MEASURING DENVER'S PROGRESS

*Denver Moves Everyone* requires strategies and actions to help get us achieve our goals. To assess the success of these strategies and actions toward meeting our broader goals, measurable indicators were developed to help track our progress.

### What this chapter introduces:

- + The strategies and actions we will take to implement *Denver Moves Everyone*.
- + How we will measure success toward achieving our goals.
- + The outcome that will be achieved if we meet our goals.





# 6.1 | OUR PLAN

## STRATEGIES AND ACTIONS

Denver Moves Everyone is a community, data, and performance driven plan. To advance the vision for Denver’s transportation system, we must take strategic actions to get there. Overtime, we must also measure if our actions are bringing closure to our goals, and finally define what will result if our goals are met.

Denver Moves Everyone includes five community developed transportation goals, including mobility, safety, sustainability, community, and quality, with equity being a component of each goal.

This chapter lists the strategies that will help guide us toward our goals as well as more detailed actions for achieving them.

Figure 6.1: Our Transportation Goals



## MEASURING OUR SUCCESS

An important component of implementing Denver Moves Everyone is tracking our progress to ensure that our policies and investments in transportation infrastructure our advancing our goals. To do this, we must define how we will measure progress toward each policy. If we are advancing toward our goals, we would expect to see measurable change toward a particular direction. Each policy listed in this chapter is supported by one or more measures that will be used to track success.

## OUTCOMES

An outcome helps us define what will result if we meet our goals. Outcomes, or measurable targets, were identified for each of these goals. The outcome selected is aspirational, a vision for where Denverites would like Denver to be in the future, representing a benchmark to track success.

FIGURE 6.2: How To Read Our Plan



# 6.2 | MOBILITY

## 1 SHIFT SINGLE-OCCUPANCY VEHICLE TRIPS TO MORE EFFICIENT MODES

**A** Create a seamless travel experience by establishing a network of mobility hubs with walking and bicycling connections; wayfinding and travel information; micromobility; and other shared mobility services near major transit centers.

**METRICS FOR SUCCESS**  
Reduction in trips made by single-occupancy vehicles.

**BENCHMARKS**  
+ Add 2,000 to 2,500 new bike parking spaces by 2030.

### MOBILITY OUTCOME

**15%**  
OF ALL TRIPS  
ARE MADE  
BY TRANSIT

**20%**  
OF ALL TRIPS ARE MADE  
BY WALKING, ROLLING,  
OR BICYCLING



## MOBILITY GOAL

A city that provides transportation choices that move all people, goods, and services reliably, easily, and affordably.

# 6.2 | MOBILITY

## 1 EXPAND AFFORDABLE TRAVEL OPPORTUNITIES FOR ALL DENVERITES

- A** Eliminate barriers to transit ridership by creating programs to reduce transit fares for youth, older adults, people with disabilities, and low-income riders to bolster transit as an affordable option.
- B** Implement a fast, frequent, and reliable transit network with all-day service, prioritizing corridors that serve equity populations while ensuring that transit serves off-peak, non-9-to-5 commutes for low-income workers.
- C** Encourage transit ridership by increasing service coverage, frequency, and reliability so that average transit travel times are no more than 1.5 times longer than driving.
- D** Expand availability of low-cost mobility options such as micromobility and e-bikes. Partner with community-based organizations to subsidize rental and purchase costs for youth, older adults, low-income, and zero-car households.

## METRICS FOR SUCCESS

- + 75% of households within high-frequent transit network.
- + 100% of households within a quarter mile of high-comfort bike facility.
- + 100% of sidewalks meeting standard.
- + Decrease in average transit travel times to no more than 1.5 times longer than driving.

## BENCHMARKS

- + Fund and implement five high or medium capacity transit corridors by 2040.
- + Add or upgrade 75 miles of high-comfort bikeways by 2030.
- + Widen 165 miles of sidewalks by 2030.



SOURCE: City and County of Denver

Transit riders catching the 16th Street MallRide in Denver.

## MOBILITY OUTCOME



**15%**  
OF ALL TRIPS  
ARE MADE  
BY TRANSIT



**20%**  
OF ALL TRIPS ARE MADE  
BY WALKING, ROLLING,  
OR BICYCLING



2

PRIORITIZE PEOPLE WALKING OR ROLLING, BIKING, USING MICROMOBILITY, AND TAKING TRANSIT IN ROADWAY DESIGN

A

Prioritize calculations for person delay, comfort, and safety in infrastructure and street design decisions over vehicle delay to make our streets people focused.

B

Revise development review requirements to ensure site design encourages multimodal trips. Revise mobility requirements for large developments so that along with infrastructure to accommodate vehicle trip generation, sites that generate bicycle, walking and rolling trips be required to build multimodal infrastructure both to and through the site.

C

Develop and enforce standards for new infrastructure that supports changing vehicle technology, such as autonomous and electric vehicles, to ensure multi-modal needs, equity, transportation emissions, and neighborhood character are prioritized.

D

Prioritize public transit and pedestrians on medium and high-capacity corridors through implementing bus signal priority, dedicated transit lanes, and pedestrian realm improvements.

E

Advocate to update state laws requiring vehicles to yield to pedestrians at intersections to include yielding to pedestrians waiting to cross at crosswalks.



METRICS FOR SUCCESS

+ Increase in the miles of dedicated travel space for people walking or rolling, biking, using micromobility, and taking transit.



BENCHMARKS

- + Construct 100 to 150 miles of new bikeway projects and upgrades to existing bikeways by 2030.
- + Complete sidewalk network by building out 300 miles of missing sidewalks.
- + Implement 10 bus priority corridors by 2040.

3

FACILITATE THE EFFICIENT MOVEMENT OF FREIGHT THROUGHOUT THE CITY

A

Develop a Denver Freight Network and Sustainable Freight Plan as well as establish an annual freight data collection program to understand where and when freight traffic is greatest and when communities are disproportionately impacted.

B

Identify solutions to mitigate overnight truck parking in residential areas by partnering with DRCOG and CDOT to identify regional over-night truck parking locations and coordinate enforcement in residential areas.

C

Integrate freight demand management to evaluate and plan for freight impacts on future land use development by requiring shared-use lockers, loading facilities, and a loading management plan as appropriate.

D

Improve communication between impacted communities, the freight industry and the City by developing a Freight Program Communications Plan to enable planning alongside communities disproportionately impacted by freight land-use and movement.

E

Use innovative strategies for managing delivery of freight and supporting local and last-mile deliveries in dense areas such as zero emissions zones, shared-use lockers, cargo bike deliveries, off-hour deliveries, e-bike deliveries, consolidation centers, flex zones, or neighborhood loading zone programs.

F

Identify opportunities to implement freight system reliability improvements.



METRICS FOR SUCCESS

+ Increase in travel time reliability for freight vehicles.



BENCHMARKS

+ Initiate a Denver freight plan by 2026.





4

SHIFT SINGLE-OCCUPANCY VEHICLE TRIPS TO MORE EFFICIENT MODES

A

Encourage bicycling as a viable travel option by connecting all households in Denver within a quarter mile or less of a high-comfort facility for bicycling and micromobility.

B

Complete FasTracks system in Denver by coordinating with RTD to study, identify, and advance a preferred alternative for Central Rail extension.

C

Create a safe and seamless travel experience by establishing a network of mobility hubs with walking and bicycling connections, safe bicycle storage, wayfinding and travel information, micromobility and other shared mobility services, as well as lighting, near major transit centers.

D

Bolster transit system by building out network of high- and medium- capacity corridors with frequent service while also increasing reliability of service on corridors.

E

Implement innovations in pricing and regulations to better optimize both the supply of and demand for public on-street and private off-street parking, while respecting each neighborhood’s equity needs, land use, mobility network, context and character.

F

Support land-use development and policies that reduce the need for personal-vehicle trips such as increasing density around centers and corridors and establishing parking maximums and removing parking minimums.

G

Operate and expand a robust Transportation Demand Management program that encourages and requires the implementation of strategies that maximize multi-modal choices and behaviors.

↓

METRICS FOR SUCCESS

+ 20% of trips made by walking & rolling or biking and 15% of trips made by transit by 2030.

✓

BENCHMARKS

- + Add 2,000 to 2,500 new bike parking spaces by 2030.
- + Construct 35 to 45 miles of Bus Rapid Transit corridors by 2030.



SOURCE: City and County of Denver



SOURCE: City and County of Denver



SOURCE: City and County of Denver

Walking, rolling, bicycling, and transit can accommodate more people using less space in Denver.





### SAFETY GOAL

A city with zero traffic deaths and serious injuries, where everyone feels safe and comfortable traveling throughout the city, regardless of their age, gender, race, ethnicity, or how and when they travel.

## 6.3 | SAFETY

### 1 ACHIEVE VISION ZERO BY ELIMINATING TRAFFIC DEATHS AND SERIOUS INJURIES

- A** Continue to fund and implement Vision Zero with targeted processes, policies, and tools to ensure systematic street design and cultural changes happen concurrently.
- B** Advocate for expanded laws and campaigns around safe driving, walking, and riding — including laws that eliminate distracted driving, driving under the influence of drugs and/or alcohol — increase motorcycle helmet use, increase occupant protection for both adults and youth, and increase compliance with posted speed limits.
- C** Advocate for regulations including advocating for increased seat belt wearing enforcement, red light and auto speed enforcement camera policies, and adding speed governors to vehicle fleets and personal vehicles.
- D** Facilitate a culture of safety by coordinating messaging across stakeholder groups, city staff, elected officials, and residents.
- E** Improve crash data collection, analysis, and management processes.

### ↓ METRICS FOR SUCCESS

- + Zero traffic fatalities and serious injuries by 2030.

### ✓ BENCHMARKS

- + Complete road safety audits on all HIN corridors and implement proposed improvements on three corridors per year.
- + Complete four Focus Area Safety studies and implement proposed improvements in four areas per year.
- + Set up multimodal safety curriculum and make available to every Denver student by 2030.
- + Develop a citywide transportation safety evaluation program by 2024.



SOURCE: City and County of Denver

Example of improved crossing for pedestrians in Denver at the intersection of W Florida Ave. and South Navajo Street.

### SAFETY OUTCOME




**0**  
FATALITIES AND  
SERIOUS INJURIES  
ON DENVER STREETS



## 2 MAKE TRAVELING IN DENVER COMFORTABLE AND SECURE FOR ALL

- A** Protect intersection movements on arterial streets for all modes where feasible to reduce crashes and investigate banning right turns on red in safety focus areas and on the high injury network. Proactively improve intersection locations with risk factors and right-of-way characteristics associated with serious and fatal crashes with a focus on youth, older adults, and people walking, bicycling, or rolling with a mobility device.
- B** Improve the sense of safety and comfort waiting for and riding transit at all times of day with lighting improvements, transit station activation, and a mobility ambassador program.
- C** Evaluate efficacy of controlled crossing criteria and increase the number of controlled bicycle and pedestrian crossings to decrease walking and rolling distance to signalized intersections.
- D** Leverage technology to reduce the reliance on deputized personnel to ensure compliance to traffic laws. Review current traffic laws and fines to improve transparency, compliance, and address unintended consequences.
- E** Improve pedestrian comfort by building or improving pedestrian-scale lighting and maintaining an accessible walkway network.


 **METRICS FOR SUCCESS**  
+ Increase in resident perception of mobility and safety ease.

 **BENCHMARKS**  
+ Add, upgrade, or replace 250 to 300 signals on busy streets by 2030.  
+ Upgrade 60 to 100 transit shelters with benches, lighting, or heating by 2030.  
+ Develop 10-12 travel plans annually at schools that increase safety during pickup and drop-off times.  
+ Design and implement 4 shared streets by 2030.

## 3 DESIGN ALL STREETS FOR SAFE SPEEDS

- A** Designate “slow zone areas” such as roadways with high pedestrian and bicycling activity or high crash rates with speed limits less than 20 mph and with appropriate roadway design to eliminate the number of crashes resulting from fast-traveling personal vehicles.
- B** Study school zones speed limits across the city and implement a toolbox of treatments to enable DOTI to consistently set speed limits in school zones at or below 20 mph.
- C** Use progression timing, intelligent transportation system (ITS), and other innovative strategies to achieve safe speeds on arterial and collector streets and eliminate fatalities and serious injuries.
- D** Review and reduce posted speed limits for arterials and streets along the HIN using the 50th percentile or other innovative methods to reduce speed while also ensuring speeds align with target speeds identified in the Complete Street Design Guidelines.
- E** Implement a neighborhood traffic calming program to proactively identify traffic calming improvements citywide and use slower design speeds as recommended by Complete Streets Design Guidelines to evaluate traffic calming improvements. Incorporate green infrastructure where feasible to further traffic calming benefits.

 **METRICS FOR SUCCESS**  
+ Reduction of speeds upon post evaluation of major multimodal street projects.

 **BENCHMARKS**  
+ Implement progression timing on three corridors a year.  
+ Evaluate efficacy of multimodal and speed reduction improvements on at least 10 corridors annually.







## SUSTAINABILITY GOAL

A city with a transportation system that is pollution-free and resilient in the face of climate change, making Denver healthier for all people, with health inequities caused by the transportation system eliminated.

# 6.4 | SUSTAINABILITY

## 1 TAKE ACTION TO REDUCE URBAN HEAT ISLAND EFFECT

- A** Incorporate green infrastructure into transportation projects and expand tree canopy throughout the city with streetscape improvements, plantings and tree canopy, transit shelters, and other public realm improvements.
- B** Test and use materials on transportation infrastructure projects that reduce urban heat island effect especially in Denver’s most heat vulnerable communities.
- C** Promote streets and alleys as key components of the City’s drainage and water systems by establishing a program to green alleys with vegetation and by installing permeable materials.
- D** Increase DOTI’s role to protect and champion urban tree canopy within public right-of-way by coordinating with Urban Forestry to ensure DOTI operates as an agency that improves public space.
- E** Leverage bicycle and pedestrian infrastructure improvements and other major multimodal projects as opportunities to place green infrastructure and integrate stormwater management into transportation projects to cool streets.

- METRICS FOR SUCCESS**
  - + Increase in tree canopy.
  - + Increase in projects integrating stormwater and green infrastructure.

- BENCHMARKS**
  - + Cool 30 miles of Denver’s streets by planting trees and installing landscaping improvements by 2030.



SOURCE: City and County of Denver

Green infrastructure in Denver is critical for cooling our streets.

## SUSTAINABILITY OUTCOME



**0**  
GHG EMISSIONS  
GENERATED BY  
TRANSPORTATION



## 2 IMPROVE AIR QUALITY THROUGH REDUCING TRANSPORTATION-RELATED EMISSIONS

- A** Partner with RTD to accelerate deployment of electric bus fleet to by building transit stops and hubs with appropriate charging facilities. Explore ways to financially support the electrification of RTDs transit fleet, helping Denver improve air quality through increased adoption of electric vehicles.
- B** Support electric vehicle use in the community, with a focus on low-income households and neighborhoods by providing publicly available EV charging stations in public spaces such as at recreation centers or curbside; partnering with, incentivizing and regulating the private sector to provide EV vehicle and charging station access to the public across the city; and providing direct incentives to purchase, rent or share EV vehicles.
- C** Create low- and no-emissions zones throughout the city.
- D** Forge partnerships with the private sector to scale electric vehicle share programs across city. Dedicate curb space to allow for electric car-sharing and ensure electric car share is available in neighborhoods with low incomes and low rates of vehicle ownership.

- METRICS FOR SUCCESS**
- + Decrease in number of days not meeting the EPA's air quality standards.
  - + Increase in the number of electric vehicles registered within Denver.

- BENCHMARKS**
- + Install 10 publicly accessible electric vehicle charging ports per 1,000 residents by 2030 through public and private sector partnerships, incentives, and regulations.

## 3 KEEP OUR STEAMS AND WATERWAYS CLEAN

- A** Use Green Continuum guide to scale green infrastructure and water quality features across transportation projects where possible.
- B** Leverage stormwater and other waterway projects to incorporate green and clean mobility such as bike or walking paths.
- C** Restore habitat and reduce impervious surfaces along the South Platte River.

- METRICS FOR SUCCESS**
- + Increase in green infrastructure incorporated into mobility projects.

- BENCHMARKS**
- + Install five or more mobility projects that incorporate green infrastructure features annually.





## 4 ADDRESS DENVER'S CLIMATE CRISIS

- A** Mitigate and protect vulnerable communities — including low-income, BIPOC, youth, older adults, and people with disabilities — from the disproportionate impacts of climate change like flash flooding, stronger and more frequent rain events, low air quality due to more frequent fires, and intense, prolonged heat events.
- B** Build out Denver's multimodal transportation networks to reduce carbon emissions from Denver's transportation system by shifting trips from single occupancy vehicles to low-emission mobility choices such as walking, rolling, bicycling, and taking transit.
- C** Conduct an assessment of climate emissions resulting from DOTI capital investments and programs in order to better track efficacy. Refine future emissions reductions targets based on that analysis in order to be aggressive, achievable, and in alignment with science based targets.
- D** Ensure that the six year capital investment plan is on track to meet the City's transportation share of climate mitigation goals; each year, evaluate the program of projects or incorporate GHG Mitigation Measures as needed to meet VMT and GHG reduction targets.
- E** Meet ENVISION Gold standards for large infrastructure projects, or develop an alternative set of required criteria for sustainable infrastructure that is applied to all projects within DOTIs portfolio.
- F** Identify climate hazards exposure and impacts on Denver's transportation system and incorporate resilience into new investments, including both maintenance efforts and new projects.

### METRICS FOR SUCCESS

- + Reduction in Green House Gas emissions.

### BENCHMARKS

- + Fully build out the network of high and medium capacity transit corridors by 2050.
- + Complete the sidewalk network by building out 300 miles of missing sidewalks and widening 830 miles of deficient sidewalks.
- + Complete bike network by building out 370 miles of high-comfort bikeways by 2050.



SOURCE: Denverite

Green infrastructure in Denver can help cool streets while filtering pollutants and reducing runoff during storm events.



SOURCE: City and County of Denver

Shifting trips to efficient travel modes — such as walking, rolling, bicycling, and transit — is critical for reducing GHG emissions.



SOURCE: City and County of Denver

Transitioning from gas-powered vehicles to electric is one strategy to reduce overall emissions.





## COMMUNITY GOAL

A city where neighborhoods are connected to all the places people go, with streets designed for people and shaped by communities and cultures.

# 6.5 | COMMUNITY

## 1 USE INCLUSIVE ENGAGEMENT STRATEGIES FOR PUBLIC OUTREACH

- A** Partner with impacted communities to establish racial equity objectives for every DOTI project, plan, and policy. Align DOTI resources and project development processes to ensure continuity both internally and with impacted communities by applying the Racial Equity Toolkit from planning through design, implementation, and evaluation.
- B** Build capacity and maintain ongoing relationships in priority communities for transportation equity to understand their mobility needs and community-identified solutions. Dedicate funding to be responsive and support ongoing implementation and refinement of community co-created mobility solutions and street improvements.
- C** Prioritize supportive education and low-cost programs in communities that are low-income and at risk of displacement to provide priority communities for transportation equity with multiple choices for their travel modes, including education related to transit, bicycling, and micromobility.
- D** Work with the Office of Economic Development to build capacity and support economic vibrancy in commercial areas with a greater proportion of BIPOC and immigrant or refugee-owned businesses. Co-create street and corridor improvements with BIPOC business owners and create supportive programs to stabilize BIPOC businesses to withstand construction impacts and benefit from long-term improvements.

## METRICS FOR SUCCESS

+ Increase in projects using Racial Equity Toolkit for public engagement.

## BENCHMARKS

+ Apply to racial equity toolkit to all DOTI led projects by 2025.



SOURCE: City and County of Denver

Transportation improvements in Denver provide opportunities for culturally significant public art.

## COMMUNITY OUTCOME



**78**  
NEIGHBORHOODS WITH ACCESS  
TO EMPLOYMENT, COMMUNITY  
AND TRANSIT DESTINATIONS





## 2 TRANSFORM STREETS AS PLACES FOR PEOPLE

- A** Implement the Curbside Action Plan to ensure that the many demands for the curb space can be met by prioritizing the highest and best use that benefits the greatest number of people — such as bicycle and transit lanes, loading and freight access, and traditional paid and unpaid parking time limits.
- B** Develop urban design guidelines for public realm improvements to result in high quality public spaces.
- C** Ensure Denver’s diverse communities see themselves and their cultures reflected in the street improvements and transportation projects in their neighborhoods by co-creating street improvements and mobility solutions informed by community partnership and engagement and neighborhood histories and identities.
- D** Increase community access to public space and recreation by implementing a Shared Streets program.
- E** Expand walkable density and retail along Centers and Corridors to permit more daily trips that can be accomplished by walking or rolling.

- METRICS FOR SUCCESS**
  - + Increase in density in Centers and along Corridors identified by Blueprint Denver.
  - + Increase in miles of shared streets.

- BENCHMARKS**
  - + Continue to coordinate with Community Planning & Development on Neighborhood Planning Initiatives.
  - + Design and construct 5 shared streets projects by 2030.

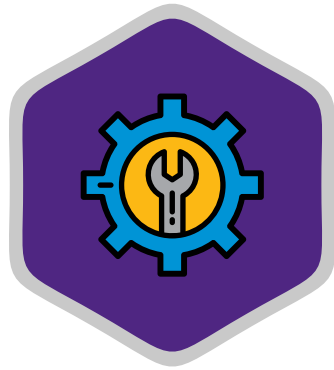
## 3 REPAIR HARM AND ALLEVIATE THE BURDEN CREATED BY PAST TRANSPORTATION INFRASTRUCTURE DECISIONS IN DENVER’S LOW-INCOME AND BIPOC COMMUNITIES

- A** Prioritize opportunities for active travel in places with the worst health outcomes and limited access to recreation and healthy foods through implementing multimodal transportation projects or projects that reduce barriers around highways and railroad tracks.
- B** Mitigate the pressures of displacement through ongoing partnership and collaboration between City staff and community leaders in Denver’s historically underserved communities. Co-create anti-displacement and equitable development strategies with communities experiencing displacement pressure and elevate community-identified transportation challenges and solutions.
- C** Research, share, and maintain documentation of the racial and cultural histories in Denver, including the historic decisions that led to current-day disparities to inform solutions that advance racial equity. Elevate and celebrate the unique racial and cultural histories of Denver’s priority communities in transportation planning processes and improvements.
- D** Grow and refine data sources for understanding disproportionate burden of transportation projects including access to opportunity and displacement pressure to advance racial equity and prioritize improvements where there are the greatest needs.

- METRICS FOR SUCCESS**
  - + Balance in commute times for BIPOC residents.

- BENCHMARKS**
  - + Design and construct bikeways in three new community transportation network areas by 2030.
  - + Continue to build-out sidewalk network in priority areas for transportation equity.
  - + Install at least five new multimodal bridges or roadway connections in priority areas for transportation equity.





### QUALITY GOAL

A city where the transportation system is maintained in a consistent state of good repair, using robust data to prioritize investments in neighborhoods that need it most and to minimize costs across the system.

## 6.6 | QUALITY

### 1 MAINTAIN DENVER'S TRANSPORTATION SYSTEM IN A STATE OF GOOD REPAIR

- A** Develop a robust asset data management program and integrate existing assets' data into the system while collecting data for assets where there is not currently data available.
- B** Consider lifecycle costs when developing transportation investments, including construction and maintenance costs so resources can be planned appropriately.
- C** Maintain and modernize existing assets ensuring infrastructure is maintained in priority areas for transportation equity to the level and extent as other areas of the city.
- D** Keep public right-of-way clear of obstructions by conducting property owner education and capacity building for maintaining frontages in areas where people rely on walking, rolling, bicycling, and access to transit.

### ↑ METRICS FOR SUCCESS

- + Increase to 100% of assets meeting or exceeding quality standards.

### ✓ BENCHMARKS

- + Resurface 2,500 to 3,000 miles of roadway to maintain pavement in fair condition or better by 2030.
- + Restripe 7,500 to 9,000 lane miles by 2030.
- + Replace all signs citywide every 13 years on a rolling basis.



SOURCE: City and County of Denver

Crews installing safety improvements using permanent materials in Denver.

### QUALITY OUTCOME



**100%**  
OF TRANSPORTATION ASSET  
MEETINGS OR EXCEEDING  
QUALITY STANDARDS



2

BUILD A WORLD-CLASS  
TRANSPORTATION SYSTEM

- A

Upgrade existing low-cost (paint and post) intersections and bikeway improvements with permanent materials upon evaluation to transfer successful pilot programs into permanent infrastructure.
- B

Create a park like transportation experience throughout the city by building a network of multimodal greenways and green streets.
- C

Establish a capital projects planning function within DOTI planning to prioritize, study, and conceptualize major capital projects to further align design outcomes with community needs.

- ↑

METRICS FOR SUCCESS

+ Increase in miles of bikeways upgraded with permanent materials.

+ Increase in miles of deficient sidewalks upgraded.

+ Increase percentage of households within a half mile of enhanced transit stops and stations.

- ✓

BENCHMARKS

+ Install or upgrade 10 miles of bikeways with permanent materials each year.

3

BOLSTER EFFICIENCIES AND ACCOUNTABILITY  
IN OPERATING DENVER’S EXISTING AND  
FUTURE TRANSPORTATION SYSTEM

- A

Continue to improve ability to be nimble in project delivery by increasing contractor staff, improving contracting abilities to allow more work to be done in-house, and using public resources strategically.
- B

Develop and implement robust data-sharing requirements for DOTI and all vendors to allow for integration of vendor data in transportation analysis, while ensuring data policies and practices are routinely updated.
- C

Leverage technology for DOTI’s chartered responsibilities to operate and carry out transportation system functions.
- D

Continue to recruit, retain, and advance DOTI staff in creative and intentional ways to have a workforce reflective of Denver’s diverse population.

- ↑

METRICS FOR SUCCESS

+ Data maintained for all of DOTIs assets.

- ✓

BENCHMARKS

+ Continue to increase the number of operations and maintenance staff.



## CHAPTER 7

# IMAGINING DENVER'S BIG MOVES

To achieve the vision of becoming a city with a world-class transportation system, Denver needs to look ahead and identify opportunities to be bold and rethink how our transportation system can be used to provide multiple benefits and meet future needs. These opportunities represent **Big Moves** — or major projects and programs — that could move more people comfortably and sustainably while also improving safety, creating new connections, and expanding public space.

### What this chapter introduces:

- + The Big Moves projects and programs will require additional visioning and planning and identify where there are major opportunities to reshape how we use our transportation system. This chapter presents the descriptions, objectives, and key considerations for each of the Big Moves and identifies both short- and long-term next steps.





# 7.1 | ASSESSING TRANSPORTATION SYSTEM GAPS

## GAP ANALYSES

To ensure that current and future transportation needs are met *Denver Moves Everyone* analyzed where gaps remain in Denver’s transportation system. Gaps highlight locations for improvements or transformative projects that have not been identified in previous planning efforts. This assessment identified additional capital project recommendations for prioritization and consideration within Denver’s investment strategy. Examples of new project recommendations include underpasses and bridges to improve access, additional multimodal connections, and improved transit station access.

GAP ANALYSIS RECOMMENDATIONS INCLUDE:

70

MILES OF  
SIDEWALK  
UPGRADES

125

HIGH-COMFORT  
BIKEWAYS

30

SEPARATED BIKE  
AND PEDESTRIAN  
CROSSINGS

70

SYSTEMIC  
INTERSECTION  
IMPROVEMENTS

### PEDESTRIAN NETWORK

Narrow sidewalks along busy arterial streets may feel unpleasant to walk and roll along and may not provide sufficient amenity space between the roadway. **Across the city, over 70 miles of additional sidewalk upgrades were identified along arterial streets to increase comfort and safety.**

### BICYCLE NETWORK

**In areas of the city with high rates of bicycle and scooter activity, a greater density of high comfort bikeways and connections is needed than what has been proposed** from previous updates to the *Denver Moves: Bicycles* plan. Analysis was completed to identify areas of the city where connections in the existing network could be strengthened and where bicycling activity indicates a need to intensify the network.

### CROSSINGS AND BARRIERS

Intermodal railyards, interstates, rail corridors, and rivers, can pose major challenges for people moving between destinations. More frequent safe crossings along busier streets also eliminate barriers to movement. The city’s network was assessed to determine where additional crossings could eliminate barriers or improve access to transit stations. **More than 30 new crossings are needed for people walking, rolling, or bicycling.**

### INTERSECTION NETWORK

Intersections with high levels of pedestrian activity can be made safer to prioritize needs for people crossing, particularly in and around busy destinations. Every intersection in Denver was evaluated to determine those with the highest levels of pedestrian activity and have the highest fatality and serious injury rates for vulnerable road users. **This analysis resulted in the identification of over 70 intersections where significant systematic safety improvements could be made.**

## BIG MOVES

To achieve the vision of becoming a city with a world-class transportation system, Denver needs to look ahead and identify opportunities to be bold and rethink how our transportation system can be used to provide multiple benefits and meet future needs. *Denver Moves Everyone* identifies new programs and projects to move more people safely, comfortably, and sustainably by eliminating barriers, creating new public spaces, and adding more travel options.

DENVER’S BIG MOVES REFLECT:

6

DISTINCT  
THEMES

17

UNIQUE  
CONCEPTS

Figure 7.1: Denver’s Big Move Themes and Concepts



# 7.2 | GREENING OUR STREETS

## GREENWAY NETWORK

Provide a park-like transportation experience across Denver with intensive green infrastructure by establishing a network of corridors that are either entirely closed to vehicle traffic or have significantly reduced traffic volumes and speeds. Greenways could include streets that have redundant origin and destination pairs in the arterial network, locations to daylight streams and channels, or streets that run along existing channelized streams.

### OBJECTIVES

A Greenway Network would achieve the following:

- + Create a connected park-like travel experience throughout the City and County of Denver.
- + Provide new spaces for safe multimodal travel, recreation, and placemaking features — such as culturally relevant public art.
- + Complement existing trail system.
- + Reduce the urban heat island effect and improve air quality with green infrastructure.
- + Incorporate stormwater drainage infrastructure.
- + Naturalize channelized streams and daylight buried streams.

### NEXT STEPS

#### SHORT-TERM ACTIONS

- + Develop Greenways Master Plan to study feasibility on locations and conceptualize improvements.
- + Prioritize projects for implementation based on multimodal need and equity.

#### LONG-TERM ACTIONS

- + Daylight piped drainage by opening channels to create a Greenway with enhanced pedestrian facilities.
- + Design and construct Greenways that provide a desirable and comfortable experience for slow-speed travelers as well as sustainable amenities and green infrastructure.

### KEY CONSIDERATIONS

#### COST

- + **Short-Term:** \$500,000 feasibility study
- + **Long-Term:** \$10 million per mile

#### POTENTIAL IMPLEMENTATION PARTNERS

- + Mile High Flood District
- + Denver Greenway Foundation
- + Denver Parks & Recreation

#### PLAN AND DESIGN GUIDANCE

- + Complete Streets Design Guidelines
- + Denver Parks & Recreation: Game Plan for a Healthy City (parkways guidance)
- + Stormwater Master Plan
- + Mile High Flood District Mater Plan
- + Green Streets Continuum
- + Denver Moves: Pedestrians & Trails

FIGURE 7.2: Greenway Typology



The Streets identified on this map have been organized into a typology representing varying levels and types of green infrastructure investment depending on context explained below.

#### GREENWAYS

Greenways are streets along streams, gulches, or channels where steams are daylighted and concrete channels are naturalized. Greenways include high amounts of green infrastructure to benefit water quality and stormwater runoff while also providing exclusive travel and recreation space for pedestrians and bicyclists.

#### CYCLEWAYS

Cycleways are streets with high levels of green infrastructure where streets are repurposed as exclusive mobility corridors for bicyclists and pedestrians.

#### GREEN BOULEVARDS

Green Boulevards still allow vehicle access but have high levels of green infrastructure and dedicated space for bicycles and pedestrians that is well separated from traffic.

SOURCE: DOTI

FIGURE 7.3: Greenway Example



Example of what a Greenway could look like, featuring open channel natural drainage infrastructure, comfortable bicycle and pedestrian facilities, and an enhanced tree canopy

SOURCE: City and County of Denver



# GREEN ALLEYS

Reconstruct alleys with streetscaping and green stormwater infrastructure — such as permeable pavement — to provide cool, safe, comfortable places to travel that also clean stormwater runoff.

## OBJECTIVES

Green Alleys would achieve the following:

- + Reduce urban heat island effect.
- + Improve stormwater management and flood mitigation.
- + Complete gaps in the multimodal network.
- + Create space for street amenities and recreation.

## NEXT STEPS

### SHORT-TERM ACTIONS

- + Develop criteria for determining Green Alley candidates — such as adjacent land use and gaps in the multimodal network.
- + Identify potential locations and study feasibility, including an understanding of competing alley uses — such as parking, freight delivery, and trash pick-up.
- + Engage communities in candidate Green Alley locations to inform designs.

### LONG-TERM ACTIONS

- + Develop a Green Alley Program to create and administer guidance for implementation and maintenance.
- + Expand Green Alleys into an inter-connected network throughout the city to complement the multimodal network.

## KEY CONSIDERATIONS

### COST

- + **Short-Term:** \$100,000
- + **Long-Term:** \$1 million per mile

### POTENTIAL IMPLEMENTATION PARTNERS

- + Business Improvement Districts

### PLAN AND DESIGN GUIDANCE

- + Denver Complete Streets Design Guidelines
- + Green Streets Continuum
- + Denver’s unimproved alley paving program

FIGURE 7.4: Examples of Green Alleys



SOURCE: <https://nacto.org/publication/urban-street-design-guide/streets/green-alley>

This green alley in Philadelphia, PA shows that good lighting is an essential prerequisite to a feeling of public safety in alleys.



SOURCE: City and County of Denver

The Old Firehouse Alley West in Fort Collins, CO was completed in 2010 and allows for full vehicular access.



Example of a green alley from the National Association of City Transportation Officials (NACTO) Global Street Design Guide. The alley depicts a 14-foot path within a 28-foot right-of-way. The majority of residential alleys have low traffic and infrequent repaving cycles, resulting in back roads with potholes and puddling that are uninviting or unattractive. Green alleys use sustainable materials, pervious pavements, and effective drainage to create an inviting public space for people to walk, play, and interact.

SOURCE: NACTO



# GRAND GREEN BOULEVARDS

Retrofit major multimodal arterials that are planned to become a Bus Rapid Transit (BRT) route to improve the pedestrian experience in accordance with Denver’s Complete Street Design Guidelines by widening sidewalks, incorporating amenity zones, and installing green infrastructure. Include intersection safety treatments for bicycles and pedestrians where appropriate.

## OBJECTIVES

Grand Green Boulevards would achieve the following:

- + Encourage mode shift by enhancing multimodal access to high-quality transit, both at the station-areas and along the first-mile-last-mile journey.
- + Calm traffic and promote safety on arterial streets, including high-injury network corridors.
- + Improve air quality in areas of high pedestrian activity.

## NEXT STEPS

### SHORT-TERM ACTIONS

- + Create a Grand Green Boulevard. Implementation Plan that analyzes the feasibility of selected corridors, incorporating multimodal needs into concept designs.

### LONG-TERM ACTIONS

- + Redesign major arterials throughout the city as Grand Green Boulevards, incorporating enhanced transit infrastructure and amenities, bike facilities, and ample pedestrian space.
- + Integrate green infrastructure into corridor designs, including landscaping, street trees, and stormwater runoff management.

## KEY CONSIDERATIONS

### COST

- + **Short-Term:** \$2 million study
- + **Long-Term:** \$40 million per mile

### POTENTIAL IMPLEMENTATION PARTNERS

- + Federal Highway Administration (FHWA)
- + Colorado Department of Transportation (CDOT)
- + Regional Transportation District (RTD)
- + Business Improvement Districts

### PLAN AND DESIGN GUIDANCE

- + Complete Streets Design Guidelines
- + Bikeway Design Manual
- + Green Streets Continuum
- + Denver Moves: Transit
- + Denver Moves: Bicycles
- + Denver Moves: Pedestrians & Trails

FIGURE 7.5: Examples of Grand Green Boulevards



SOURCE: Denverite

The Brighton Blvd. Redevelopment project worked within the existing right-of-way to accommodate a multimodal street with dedicated bike paths, controlled turn lanes, and better pedestrian thoroughfares.



SOURCE: Denver Complete Street Design Guidelines

The Denver Complete Street Design Guidelines includes guidance for designing streets around transit while also providing an enhanced pedestrian environment with an amenity zone.



# 7.3 | CONNECTING OUR CITY

## HIGHWAY AND ARTERIAL LIDS

Construct caps over highways and major arterials in key locations to eliminate barriers, create new public spaces, safe multimodal connections, reconnect neighborhoods, and lessen the impacts of traffic — such as noise and air pollution — on neighboring residents.

### OBJECTIVES

Highway and Arterials Lids would achieve the following:

- + Create new public space and safe multimodal connections across major barriers.
- + Reconnect and provide amenities to neighborhoods that have been previously dissected by highway expansion.
- + Reduce noise and air pollution impacts to surrounding communities.

### NEXT STEPS

#### SHORT-TERM ACTIONS

- + Prioritize proposed locations based on equity and multimodal needs.
- + Assess feasibility of priority locations including environmental and traffic impact analysis.

#### LONG-TERM ACTIONS

- + Design and construct highway and arterial lids with new parks, public spaces, and multimodal connections.
- + Incorporate programming to activate parks and public spaces.
- + Develop plan for ongoing maintenance.
- + Establish program to identify additional locations to evaluate for feasibility.

### KEY CONSIDERATIONS

#### COST

- + **Short-Term:** \$500,000 study
- + **Long-Term:** \$100 million to \$200 million per location

#### POTENTIAL IMPLEMENTATION PARTNERS

- + Denver Parks & Recreation
- + Colorado Department of Transportation (CDOT)
- + Federal Highway Administration (FHWA)
- + Denver Regional Council of Governments (DRCOG)

#### PLAN AND DESIGN GUIDANCE

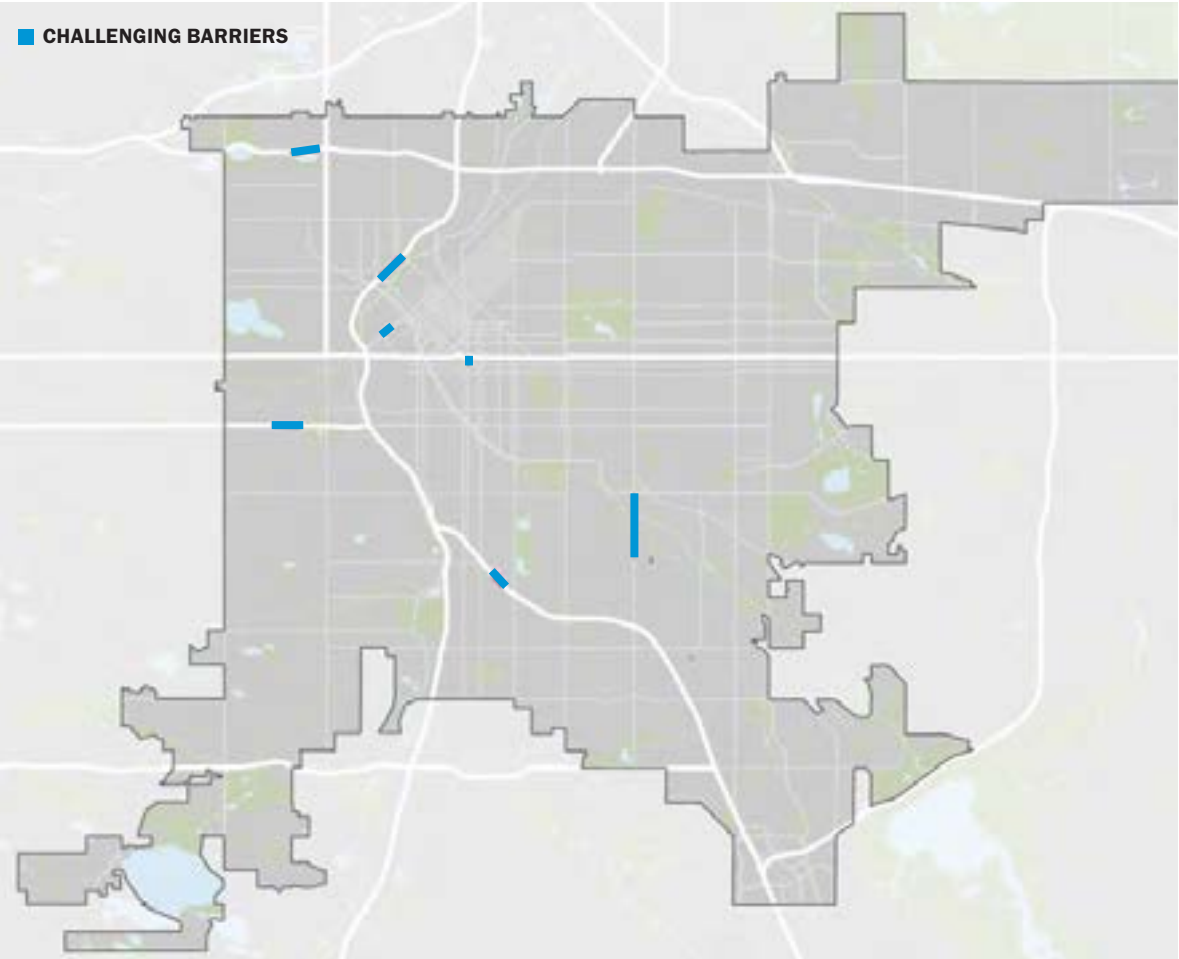
- + *Denver Parks & Recreation: Game Plan for a Healthy City*
- + *Denver Moves: Pedestrians & Trails*

### POTENTIAL LOCATIONS

- + I-25 south of West Washington Park
- + I-25 east of Lower Highlands
- + 6th Ave. at Barnum Park
- + Auraria Parkway between Auraria Campus and Ball Arena neighborhood
- + Lincoln Street at Civic Center Park
- + I-70 north of Rocky Mountain Lake Park

FIGURE 7.6: Denver’s Greatest Barriers

Arterial lids in challenging barrier locations would provide missing connections between neighborhoods, amenities, and provide easier alternative transportation options.



SOURCE: City and County of Denver

Figure 7.7: Example of an Arterial Lid



SOURCE: [https://upload.wikimedia.org/wikipedia/commons/c/c0/Uptown\\_Dallas\\_and\\_Klyde\\_Warren\\_Park.jpg](https://upload.wikimedia.org/wikipedia/commons/c/c0/Uptown_Dallas_and_Klyde_Warren_Park.jpg)

Klyde Warren Park in Downtown Dallas, Texas is a 5.2-acre public park over the Woodall Rodgers Freeway.



## HIGH INTERCHANGE CLOSURES OR MODIFICATIONS

Close select highway ramps or modify interchanges to calm traffic and create new multimodal connections. This would remove barriers for people walking and rolling while improving safety by eliminating potential conflict points. Ramps that serve local or collector streets with relatively low volumes could be considered as candidates for removal.

### OBJECTIVES

Highway Interchange Closures would achieve the following:

- + Remove pedestrian and bike conflicts from interchanges.
- + Reduce traffic volumes, noise, and air pollution on neighborhood streets.
- + Improve pedestrian and bicycle network connectivity.

### NEXT STEPS

#### SHORT-TERM ACTIONS

- + Identify priority locations that maximize multimodal benefit and minimize potential traffic impact as well as projects that may align with Colorado Department of Transportation’s (CDOT) Statewide Transportation Improvement Program (STIP).
- + Coordinate with CDOT and the Federal Highway Administration (FHWA) to conduct feasibility studies for candidate closures, including any necessary diversion analysis.
- + Engage impacted neighborhoods to determine support and discuss any concerns — such as strategies for minimizing traffic impacts on other streets where drivers will access the freeway through alternative routes.

#### LONG-TERM ACTIONS

- + Retrofit existing streets connecting to interchanges with multimodal safety improvements.
- + Repurpose reclaimed land into new multimodal street connections or public space.
- + Study ongoing traffic impacts and implement traffic calming where appropriate.

### KEY CONSIDERATIONS

#### COST

- + **Short-Term:** \$500,000 to study and identify locations to close
- + **Long-Term:** \$10 million to \$100 million per location for construction

#### POTENTIAL IMPLEMENTATION PARTNERS

- + Federal Highway Administration (FHWA)
- + Colorado Department of Transportation (CDOT)
- + Regional Transportation District (RTD)

#### PLAN AND DESIGN GUIDANCE

- + Complete Streets Design Guidelines
- + Bikeway Design Manual
- + CDOT Statewide Transportation Improvement Program (STIP)

### POTENTIAL LOCATIONS

- + 8th Ave. and I-25
- + Lowell Blvd. and I-70
- + Lowell Blvd. and US 6
- + Washington/Emerson/Downing and I-25

FIGURE 7.8: Highway Interchange Closure Example

A recent study identified options to close the cloverleaf interchange at Federal Blvd. and Colfax Ave. where a new developable space is created by redesigning an interchange.



SOURCE: Google Earth



# RAILYARD REDEVELOPMENT

Consolidate and remove obsolete rail lines to create a connected street grid and reopen large areas of land in the core of the city for transit-oriented redevelopment.

## OBJECTIVES

Railyard Development would achieve the following:

- + Reduce travel times by improving the connectivity of the street grid.
- + Create opportunities to increase the affordable housing supply in transit-oriented locations.
- + Establish new pedestrian and bicycle connections.
- + Reduce noise and air pollution.

## NEXT STEPS

### SHORT-TERM ACTIONS

- + Identify priority projects from the 2018 Colorado Freight and Passenger Rail Plan.
- + Partner with state and federal agencies administering freight and passenger rail.
- + Engage businesses that rely on current railroad alignments to discuss needs and mitigation strategies.
- + Conduct feasibility studies to understand environmental constraints.

### LONG-TERM ACTIONS

- + Consolidate and relocate outdated rail lines.
- + Establish Railyard Development Program to provide guidance and encourage redevelopment of railyards.

## KEY CONSIDERATIONS

### COST

- + **Short-Term:** \$1 million feasibility study
- + **Long-Term:** greater than \$1 billion

### POTENTIAL IMPLEMENTATION PARTNERS

- + Federal Transit Administration (FTA)
- + Federal Rail Administration (FRA)
- + Colorado Department of Transportation (CDOT) Division of Transit and Rail
- + Community Planning and Development
- + Denver Parks & Recreation
- + Denver Office of Economic Development
- + Denver Regional Council of Governments (DRCOG)
- + Burlington Northern Santa Fe (BNSF) Railway
- + Private investment firms
- + Developers

## FIGURE 7.9: Railyard Redevelopment Example

The Riverfront Park neighborhood behind Denver Union Station consisted entirely of railyards in the 1990’s. Over the course of the past two decades a new, vibrant neighborhood has taken the place of this industrial area.



SOURCE: United States Geological Survey



SOURCE: Google Earth



SOURCE: City and County of Denver



SOURCE: City and County of Denver



SOURCE: City and County of Denver



# 7.4 | REIMAGINING OUR PUBLIC SPACES

## REIMAGINE CHERRY CREEK

Increase capacity in the busiest sections of the Cherry Creek Trail to accommodate growth, support mobility, access, and wildlife preservation needs by utilizing or redesigning portions of the adjacent right-of-way.

### OBJECTIVES

- + Utilize Cherry Creek Trail as a major mobility corridor for the city as bike and micromobility trips increase.
- + Expand capacity of the Cherry Creek Trail.
- + Enhance the corridor with green infrastructure.
- + Preserve existing and create new “habitat units,” balancing mobility goals with wildlife preservation.

### NEXT STEPS

#### SHORT-TERM ACTIONS

- + Work with community stakeholders to determine a long-term vision for Speer Blvd. through Downtown between Colfax and I-25.
- + Coordinate with Denver Parks and Recreation through Denver Moves: Cherry Creek Plan to develop a concept for long-term vision for Cherry Creek Trail through East First Avenue.
- + Explore funding opportunities.
- + Identify locations where existing trail can be expanded to meet standards.

#### LONG-TERM ACTIONS

- + Reconstruct portions of Speer Blvd., Cherry Creek Drive North and South, and the Cherry Creek Trail along East First Ave.
- + Install green infrastructure and public amenities to create desirable public spaces.
- + Develop maintenance program.

### KEY CONSIDERATIONS

#### COST

- + **Short-Term:** \$2 million study; \$10 million design
- + **Long-Term:** \$30 million per mile

#### POTENTIAL IMPLEMENTATION PARTNERS

- + Denver Parks & Recreation
- + Mile High Flood District

#### PLAN AND DESIGN GUIDANCE

- + Complete Streets Design Guidelines
- + Bikeway Design Manual
- + Denver’s Design Guidelines and Manuals
- + *Denver Parks & Recreation: Game Plan for a Healthy City*
- + Green Streets Continuum

### POTENTIAL SEGMENTS

#### SPEER BLVD. (COLFAX TO I-25)

The portion of the Cherry Creek Trail that runs along Speer Blvd. through Downtown is congested with additional access points needed. Realigning or consolidating portions of Speer Blvd. would allow for opportunities to expand the trail, restore the natural habitat of Cherry Creek, and improve the pedestrian and transit access on Speer Blvd.

#### EAST FIRST AVE. (DOWNING STREET TO UNIVERSITY BLVD.)

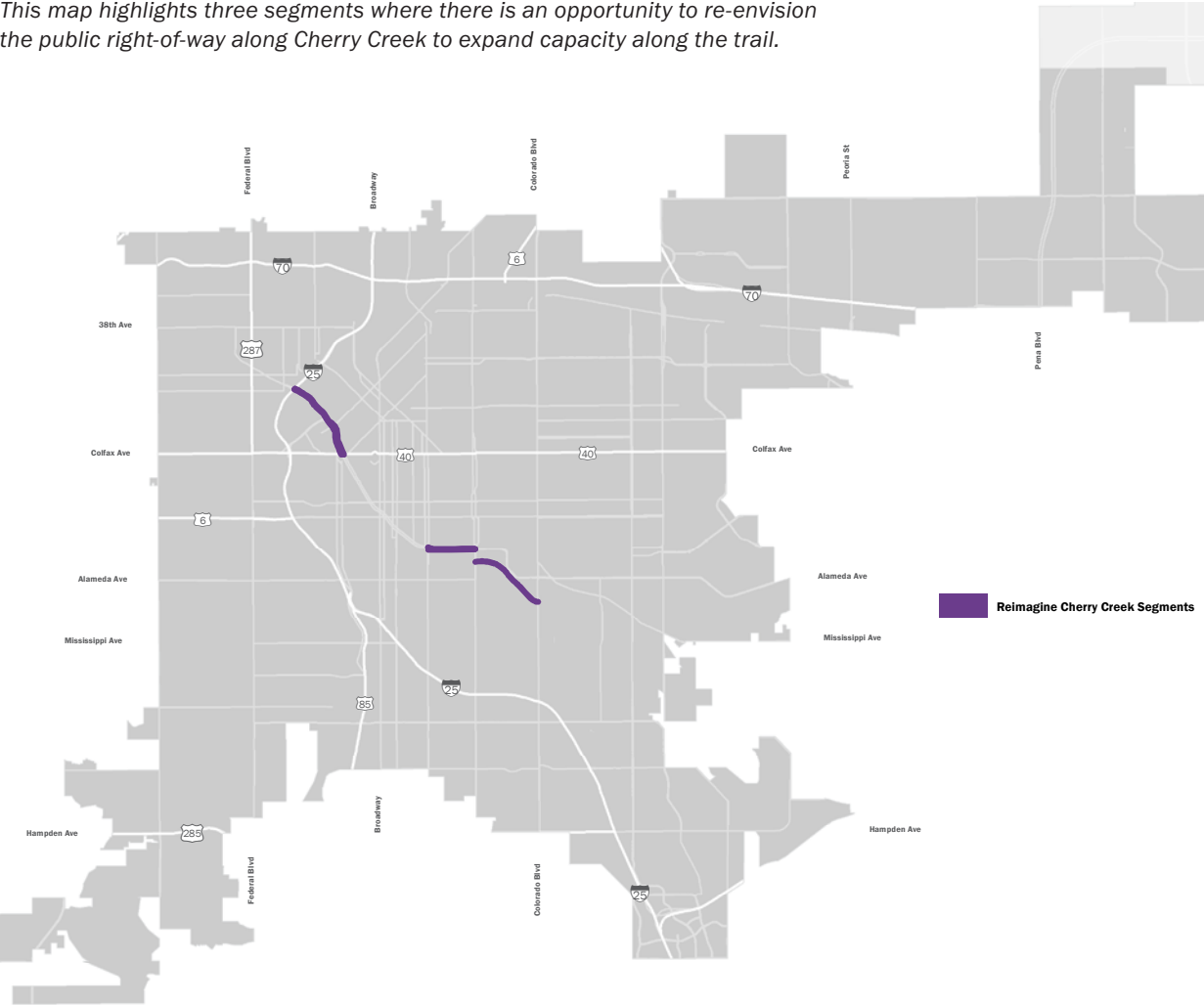
The section of the Cherry Creek Trail that runs along East First Ave. between Downing and University Blvd. runs adjacent to moving traffic without any barrier and is congested and narrow. An expanded cross-section of the trail in this segment is needed to increase safety and comfort as well as capacity.

#### EAST CHERRY CREEK DRIVE SOUTH

East Cherry Creek Drive South acts as a parallel corridor to East Cherry Creek Drive North, both running on either side of the creek and trail. This presents an opportunity to consolidating motorized travel to a single side of the creek and create a wider cross-section that is at or above standards for the Cherry Creek Trail and meet future demand.

FIGURE 7.10: Reimagine Cherry Creek Map

This map highlights three segments where there is an opportunity to re-envision the public right-of-way along Cherry Creek to expand capacity along the trail.



SOURCE: DOTI

FIGURE 7.11: Cherry Creek Trail Example



The existing Cherry Creek Trail near Speer Blvd. and West Colfax Ave. in Denver.

SOURCE: <https://commons.wikimedia.org/wiki/File:CherryCreekTrail2.jpg>

# REIMAGINE THE PLATTE

Increase capacity of the South Platte River Trail to accommodate growth, support mobility, access, and wildlife preservation needs by repurposing portions of the public right-of-way along the river into an expanded multipurpose trail.

## OBJECTIVES

Reimagine the Platte would achieve the following:

- + Repurpose South Platte River Drive to provide additional capacity for South Platte River Trail and create additional buffer space.
- + Provide adequate space for people to be able to comfortably use the trail at different speeds, whether walking, rolling, bicycling, or using other forms of micromobility — such as electric scooters.
- + Preserve existing and create new “habitat units” by restoring river habitat.
- + Reduce impervious surfaces near the river.
- + Develop strategies to protect water quality, preserve wildlife habitat, and effectively manage stormwater.

## NEXT STEPS

### SHORT-TERM ACTIONS

- + Study feasibility of closing and repurposing South Platte River Drive.
- + Coordinate with Denver Parks & Recreation to develop conceptual designs through public input process.
- + Identify funding opportunities.
- + Identify opportunities to repurpose right-of-way in other character areas along the trail.

### LONG-TERM ACTIONS

- + Reconstruct South Platte River Drive as a wide multiuse trail that restores habitat and reduce impervious surfaces near the river.
- + Install green infrastructure and public amenities to create desirable public spaces.
- + Develop maintenance program.

## KEY CONSIDERATIONS

### COST

- + **Short-Term:** \$1.5 million design for southern section; \$1 million to study remainder of corridor; \$2 million conceptual design and National Environmental Policy Act (NEPA)
- + **Long-Term:** \$5 million per mile

### POTENTIAL IMPLEMENTATION PARTNERS

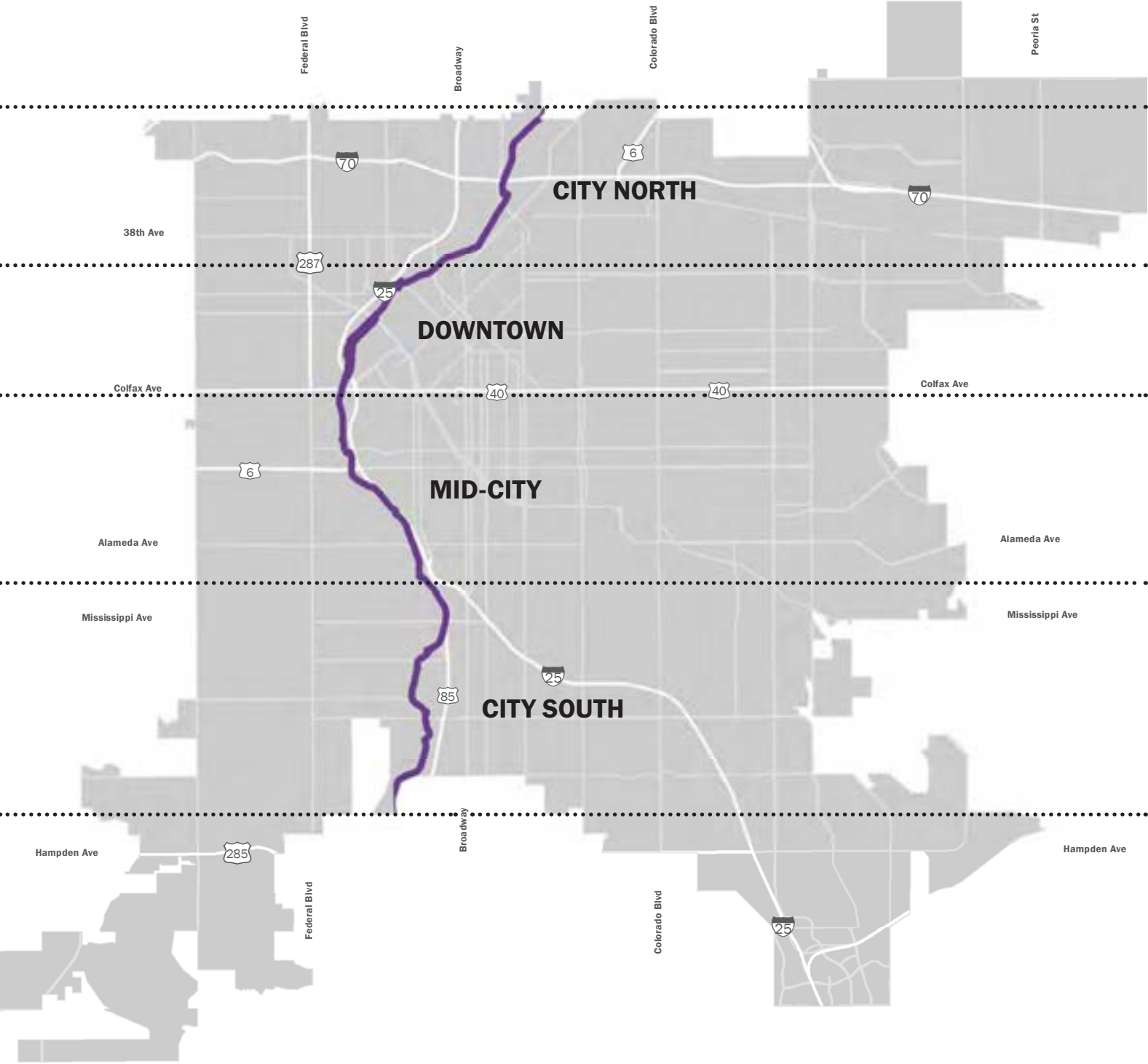
- + Colorado Department of Transportation (CDOT)
- + Denver Parks & Recreation
- + South Platte River Tributaries project
- + Mile High Flood District
- + The Greenway Foundation

### PLAN AND DESIGN GUIDANCE

- + Complete Streets Design Guidelines and Standards
- + South Platte River Needs Assessment
- + Bikeway Design Manual
- + *Denver Moves: Pedestrians & Trails*
- + *Denver Parks & Recreation: Game Plan for a Healthy City*

FIGURE 7.12: Reimagine the Platte Map

This map highlights character areas along the South Platte River as defined by the Denver South Platte River Needs Assessment. Opportunities to re-envision the adjacent public right of way should be considered in these character areas to expand capacity along the regional trail. South Platte River drive is one such opportunity.



SOURCE: City and County of Denver



# 7.5 | TRANSFORMING OUR SYSTEM

## FRONT RANGE PASSENGER RAIL HUB

Establish Denver Union Station as a main hub along the planned Front Range Passenger Rail (FRPR) route from Pueblo to Fort Collins.

### OBJECTIVES

A FRPR Hub at Denver Union Station would achieve the following:

- + Encourage regional mode shift for longer trips.
- + Provide optimal connectivity to FRPR for Denverites and others traveling within the Regional Transportation District (RTD) service area, which is centered around Denver Union Station.
- + Strengthen Downtown Denver as an economic engine for the region.

### NEXT STEPS

#### SHORT-TERM ACTIONS

- + Partner with Colorado Department of Transportation (CDOT) to study alignment feasibility and establish station locations to expedite the arrival of FRPR, ensuring that Denver Union Station is preferred the hub within Denver.
- + Explore funding opportunities for design of construction of required infrastructure and equipment — such as RAISE, BUILD, or TIGER.
- + Align local transit planning and programing with FRPR, focusing on enhanced connectivity at Denver Union Station.
- + Advance National Environmental Policy Act (NEPA) and concept design within Burnham Yard to accommodate FRPR.

#### LONG-TERM ACTIONS

- + Design and construct the necessary infrastructure to support FRPR at Denver Union Station.
- + Continue partnership with CDOT and other local agencies to operate a successful passenger rail service along the front range.

### KEY CONSIDERATIONS

#### COST

- + **Short-Term:** no cost
- + **Long-Term:** \$11 million to \$14 billion total (Denver share unknown)

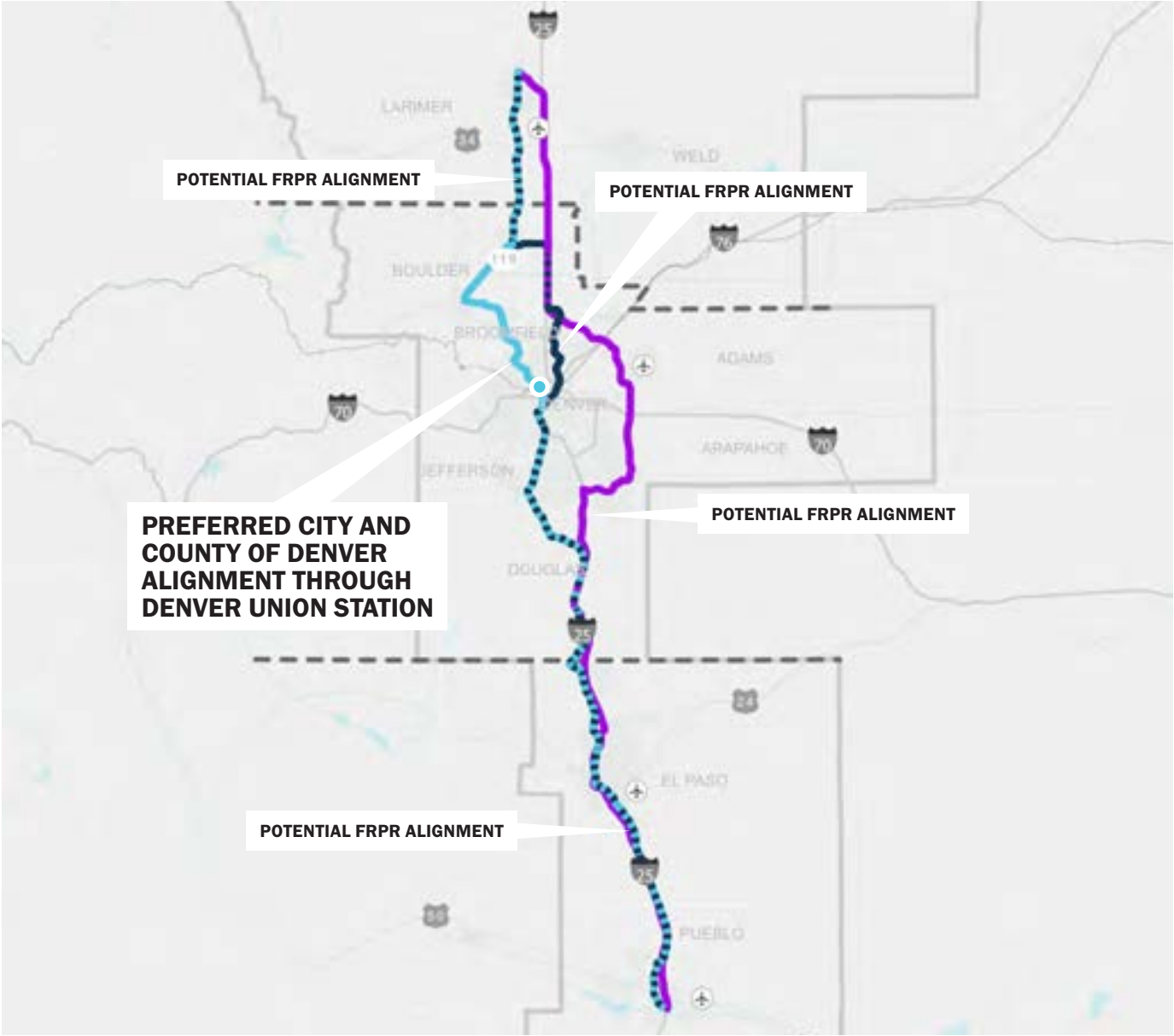
#### POTENTIAL IMPLEMENTATION PARTNERS

- + Federal Transit Administration (FTA)
- + Federal Railroad Administration (FRA)
- + Colorado Department of Transportation (CDOT)
- + Regional Transportation District (RTD)
- + Other local agencies along the Front Range

FIGURE 7.13: Potential FRPR Alignments



SOURCE: City and County of Denver



SOURCE: Front Range Passenger Rail Commission

## ELECTRIC MOBILITY TRANSITION

Incentivize a complete transition to electric mobility through an approach that centers and prioritizes shared mobility and multimodal transportation options in order achieve goals of reducing emissions and improving air quality, as well as reducing congestion through mode shift.

## OBJECTIVES

## CITY VEHICLE FLEET TRANSITION

- + Transition the full fleet of City vehicles to electric, including (but not limited to) Connector Microtransit, right-of-way enforcement, and solid waste management for trash, compost, and recycling.
- + Prioritize services that operate in areas with poor existing air quality.
- + Construct charging infrastructure on all public property including parking areas, schools, mobility hubs, transit stations, and other public right-of-way areas.
- + Explore opportunities for City services that currently use vehicles to instead utilize ebikes or other small electric mobility devices — such as e-scooters.
- + Develop strategy and partnerships with industry and educational institutions to develop pipeline of trained electric vehicle mechanics and technicians and locate modernized maintenance facilities.

## RTD FLEET TRANSITION SUPPORT

- + Encourage the full transition of the Regional Transportation District's (RTD) transit vehicle fleet to electric.
- + Determine priority routes to transition based on existing air quality conditions.
- + Support the construction of electric bus charging infrastructure at stations and layover locations.

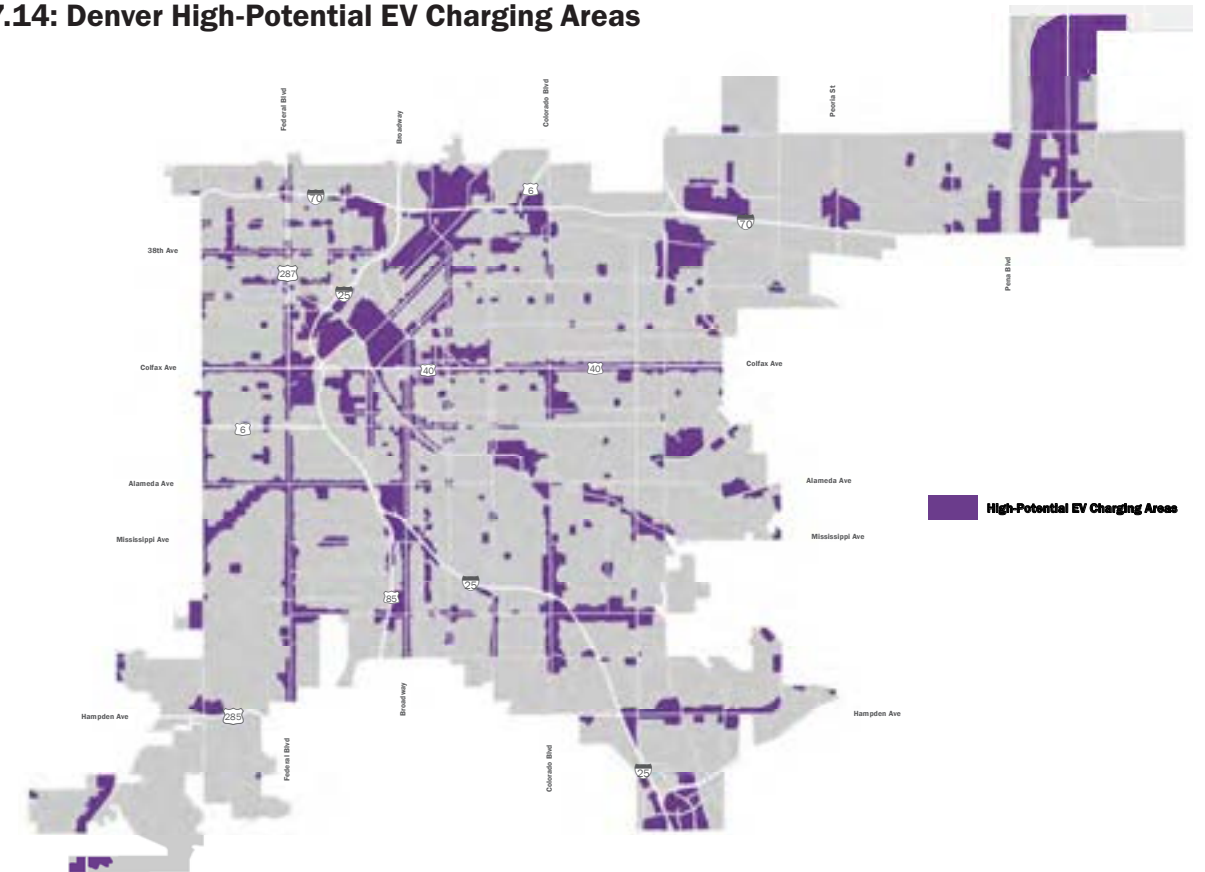
## ELECTRIC VEHICLE SHARE

- + Forge partnerships with private sector to provide citywide electric vehicle share programs. Support discounts or free rentals in priority areas for transportation equity.
- + Dedicate appropriate right-of-way space for shared electric vehicle charging and implement both on- and off-street stations.
- + Support electric vehicle (and truck) sharing for businesses to utilize for deliveries, prioritizing disadvantaged businesses.

## WIDESPREAD ELECTRIC MOBILITY CHARGING INFRASTRUCTURE

- + Incentivize implementation of electric mobility charging (for both vehicles and micromobility) at key locations — such as multifamily residences, mixed-use buildings, employment centers, schools, parks, grocery stores, and park-n-rides.
- + Revise development Transportation Demand Management (TDM) strategies to be more supportive of ebike and electric micromobility infrastructure, as well as incentivize electric carshare.
- + Establish program to provide electric vehicle charging locations along parking zone in public right-of-way.

**FIGURE 7.14: Denver High-Potential EV Charging Areas**



SOURCE: City and County of Denver

**FIGURE 7.15: Electric Mobility Example**



Charging electric vehicles will be a key component to an effective fleet transition. This example of a bus charging facility from the Metropolitan Transportation Authority in New York City is just one way to address the challenge.

SOURCE: Metropolitan Transportation Authority



# 7.6 | RETHINKING OUR STREETS

## SHARED AND SLOW STREETS

Denver’s Shared Streets Program will provide residents and visitors with a comfortable space to walk, roll, bicycle, interact, and play. Selected streets will incorporate aggressive traffic calming treatments to design for low vehicle speeds and volumes to accommodate higher bike and pedestrian activity. Shared streets will be classified as either “Community” or “Commercial” depending on the location and use unique design characteristics to mimic the neighborhood and intent.

### OBJECTIVES

Shared streets would achieve the following:

- + Encourage mode shift by providing safe and comfortable places for people to walk, roll, or bicycle.
- + Reduce risk of serious crashes by slowing vehicle speeds and decreasing vehicle volumes on streets designated for vulnerable users.
- + Foster a sense of community through placemaking, programming, and activation, as well as and encouraging in-person interactions at the neighborhood scale.
- + Act as greenspace or recreation spaces in communities that are in a park desert.

### NEXT STEPS

#### SHORT-TERM ACTIONS

- + Develop the Shared Streets Program.
- + Identify priority streets to begin work and adopt into the six year capital investment plan to finance design and construction.

#### LONG-TERM ACTIONS

- + Install shared streets across Denver to create right-of-way space that prioritizes vulnerable road users over vehicles.
- + Identify most cost-effective and beneficial combinations of materials and traffic calming measures that can be installed on a permanent basis with low maintenance requirements.

### KEY CONSIDERATIONS

#### POTENTIAL IMPLEMENTATION PARTNERS

- + Denver Parks & Recreation
- + Business Improvement Districts
- + Registered Neighborhood Organizations (RNOs)
- + Developers

#### PLAN AND DESIGN GUIDANCE

- + Complete Streets Design Guidelines
- + Bikeway Design Manual
- + DME opportunity and green streets

FIGURE 7.16: Shared Streets Program

In 2020 and 2021, DOTI established 11 temporary Shared Streets to create safe and comfortable space for residents to walk, roll, bicycle, and play. These streets used short-term traffic calming methods to reduce vehicle trips and speeds which resulted in a significant increase in people walking, rolling, and bicycling on these corridors. Based on this success, the City is creating a permanent Shared Streets Program that will include design guidelines, locational analysis, priority projects, and build out a five-year capital funding plan to start implementing right away.



SOURCE: Denverite

FIGURE 7.17: Examples of Shared and Slow Streets



SOURCE: City and County of Denver

The 39th Ave. Greenway in Denver was completed in 2020 and enhances green space and community connectivity while addressing flood issues.



SOURCE: [https://commons.wikimedia.org/wiki/File:Bell\\_Street\\_Park.jpg](https://commons.wikimedia.org/wiki/File:Bell_Street_Park.jpg)

Bell Street Park in Seattle, WA is four block park that has one lane of traffic, improved landscaping, better lighting, and more open space.



## CAR-FREE ZONES

Establish car-free public spaces by closing off streets to general traffic temporarily and permanently while still allowing bicycles, micromobility, transit, and deliveries where appropriate. Locations should be selected in areas of high pedestrian activity — such as around downtown or near major activity centers — where public space is in high demand.

### OBJECTIVES

**Car-Free Public Spaces** would achieve the following:

- + Encourage mode shift by providing safe and comfortable places to walk, roll, and bicycle.
- + Create high-quality public spaces that enhance the livability and economy of the City.
- + Improve air quality in areas of high pedestrian activity.

### NEXT STEPS

#### SHORT-TERM ACTIONS

- + Identify candidate locations based on findings from the Shared Streets Program Development.
- + Engage neighborhood organizations and Business Improvement Districts to understand where car-free streets and zones would bring the most benefit to communities.
- + Identify funding opportunities.
- + Conduct feasibility studies including any necessary traffic or parking analysis.

#### LONG-TERM ACTIONS

- + Pilot and study temporary “pop-up” car-free streets and zones on select days of the week or during special events.
- + Develop an annual program to implement permanent car-free streets and zones throughout the city.

### KEY CONSIDERATIONS

#### COST

- + **Short-Term:** \$500,000 city-wide study; \$100,000 per location for local outreach, concept development
- + **Long-Term:** \$4 million per mile

#### POTENTIAL IMPLEMENTATION PARTNERS

- + Business Improvements Districts
- + Denver Office of Climate Action, Sustainability & Resiliency (CASR)
- + Developers
- + Community Planning
- + Denver Office of Economic Development and Opportunity

#### PLAN AND DESIGN GUIDANCE

- + Shared Streets Program Development
- + *Denver Parks & Recreation: Game Plan for a Healthy City*
- + Complete Streets Design Guidelines

FIGURE 7.18: Examples of Car-Free Public Spaces



SOURCE: [https://en.wikipedia.org/wiki/File:Quincy\\_market\\_pano.jpg](https://en.wikipedia.org/wiki/File:Quincy_market_pano.jpg)

The Quincy Market and Faneuil Hall Marketplace area is a popular car-free space in Boston.



SOURCE: [https://commons.wikimedia.org/wiki/File:16th\\_Street\\_Mall\\_northwest\\_past\\_Tremont\\_Place.jpeg](https://commons.wikimedia.org/wiki/File:16th_Street_Mall_northwest_past_Tremont_Place.jpeg)

The 16th Street Mall in Denver is a car-free area and has a free shuttle running several buses both directions each day of the week.



# MULTIMODAL TRAFFIC SIGNAL UPGRADES

Increase citywide signal density and upgrade equipment to allow for multimodal enhancements, particularly progression signal timing for speed management. Upgrades may include Transportation Safety Planning (TSP), transit queue jumps, leading pedestrian and bicycle intervals, pedestrian countdowns, protected left turns, and other safety treatments for people walking, rolling, or bicycling.

## OBJECTIVES

Multimodal Traffic Signal Upgrades would achieve the following:

- + Achieve safer vehicle speeds with progression signal timing to reduce severe crash risk.
- + Increase the visibility of people walking, rolling, and bicycling with leading signal intervals to improve comfort and reduce vulnerable user crash risk.
- + Eliminate potential conflict points with protected movements to reduce vehicle crash risk.
- + Shorten transit travel times by reducing transit delay along corridors and at intersections.

## NEXT STEPS

### SHORT-TERM ACTIONS

- + Identify warranted intersections for near-term new or upgraded signals along the High Injury Network and Frequent Transit Network.
- + Develop a strategic plan for installing new signals and upgrading existing equipment on a citywide scale.
- + Identify and appropriate dedicated annual funding.

### LONG-TERM ACTIONS

- + Integrate multimodal goals into Denver’s Department of Transportation and Infrastructure (DOTI) existing signal program to track progress of mode shift, Vision Zero, and transit travel times against signal network expansion and upgrades.

## KEY CONSIDERATIONS

### COST

- + \$90,000 per location for minor upgrades; \$750,000 per location for full signal rebuild.
- + \$190 million annually

### POTENTIAL IMPLEMENTATION PARTNERS

- + Federal Highway Administration (FHWA)
- + Colorado Department of Transportation (CDOT)
- + Regional Transportation District (RTD)

### PLAN AND DESIGN GUIDANCE

- + National Association of City Transportation Officials (NACTO) Design Guides
- + Complete Streets Design Guidelines
- + Bikeway Design Manual
- + Federal Highway Administration (FHWA) Proven Safety Countermeasures
- + Safe Routes to School Action Plan
- + *Denver Moves: Transit*
- + Denver Department of Transportation and Infrastructure (DOTI) Bus Priority Treatments Toolkit

FIGURE 7.19: Examples of Multimodal Traffic Signal Upgrades



SOURCE: City and County of Denver

Denver still has many span-wire traffic lights that lack multimodal signals — such as pedestrian Walk Don’t Walk symbol traffic signals.



SOURCE: City and County of Denver

Transit signals communicate specifically to buses and trains. On transit corridors TSP can be used to reduce delay for buses.



SOURCE: City and County of Denver

Countdown signals let pedestrians know how much time remains of the pedestrian phase for a traffic light.



SOURCE: City and County of Denver

Bike signals help bicyclists navigate intersections by providing a phase when it is safe to cross.



# PEDESTRIAN CROSSING DENSITY

Increase the density of controlled bicycle and pedestrian crossings along busy streets. On less busy streets, install new safe places to cross so that it is possible to cross the street nearly every block.

## OBJECTIVES

**Pedestrian Crossing Density would achieve the following:**

- + Enhance the walking, rolling, and bicycling environment through provision of safe crossings.
- + Increase walk and bike mode share by making those modes more convenient.
- + Reduce crashes along the high-injury network.
- + Prioritize non-single-occupant vehicle travel on all city streets.

## NEXT STEPS

### SHORT-TERM ACTIONS

- + Identify warranted intersections for near-term new or upgraded signals along the High Injury Network and Frequent Transit Network.
- + Develop a strategic plan for installing new signals and upgrading existing equipment on a citywide scale.

### LONG-TERM ACTIONS

- + Construct full buildout of signal program.
- + Construct full buildout of crossing program.

## KEY CONSIDERATIONS

### COST

- + \$30,000 per location for minor improvements; \$150,000 for mid-level improvements; \$750,000 per location for full traffic signal.

### POTENTIAL IMPLEMENTATION PARTNERS

- + Colorado Department of Transportation (CDOT)
- + Denver Regional Council of Governments (DRCOG)
- + Business Improvements Districts

### PLAN AND DESIGN GUIDANCE

- + National Association of City Transportation Officials (NACTO) Design Guides
- + Complete Streets Design Guidelines
- + Bikeway Design Manual
- + *Denver Moves: Pedestrians & Trails*
- + Denver Department of Transportation and Infrastructure (DOTI) Uncontrolled Crossing Guidelines

FIGURE 7.20: Arterial Street Example



*On busy arterial streets, controlled crossings are needed to help people walking, rolling, or bicycling to safely get across busy intersections. Crossings should be installed frequently so that pedestrians are encouraged to cross at a signalized location and do not have to go out of their way to find a safe place to cross.*

SOURCE:  
City and County of Denver

FIGURE 7.21: Local and Collector Street Example



*On streets that have less traffic, it can still be difficult to cross the street as a pedestrian. Adding roadway treatments — such as bulb-outs — to slow down turning vehicles, daylighting intersections, and adding pavement markings can help increase visibility for pedestrians crossing the street.*

SOURCE:  
City and County of Denver



# 7.7 | EXPANDING OUR TRANSIT NETWORK

## DENVER CONNECTOR MICROTRANSIT SERVICES

Expand Denver Connector Microtransit, a currently free on-demand transit service that supplements fixed-route service in defined areas where traditional transit operations are challenging. Focus service on connecting residents and visitors to important destinations — such as transit hubs, job centers, schools, or grocery stores.

### OBJECTIVES

Denver Connector Microtransit Services will achieve the following:

- + Decrease travel times for transit-dependent populations.
- + Improve access to transit by filling in first-mile-last-mile gaps and improving food access.
- + Complement, not compete with, fixed-route transit service by providing connections to major transit stops and stations.
- + Provide a safe, reliable, fast, and convenient transportation option.

### NEXT STEPS

#### SHORT-TERM ACTIONS

- + Document lessons learned from the Globeville, Elyria-Swansea, and Montbello Connector pilot programs.
- + Identify and engage neighborhoods with transit-dependent populations and challenging transit connectivity to plan additional Connector service areas.

#### LONG-TERM ACTIONS

- + Establish a permanent Connector Microtransit Program that is fully staffed with administrators, service planners, operators, and other additional personnel needs.
- + Upgrade to larger vehicles with additional features — such as expanded bike racks — as demand increases.
- + Explore opportunities to upgrade app technology.
- + Expand service to equity areas to meet community needs.
- + Determine future funding strategy for ongoing operations and maintenance.

### KEY CONSIDERATIONS

#### COST

- + **Short-Term:** \$200,000 for outreach and study
- + **Long-Term:** \$500,000 to \$1.5 million per area per year

#### POTENTIAL IMPLEMENTATION PARTNERS

- + Regional Transportation District (RTD)
- + Business Improvement Districts
- + Denver Office of Climate Action, Sustainability and Resiliency (CASR)
- + Transportation Management Associations (TMAs)
- + Private businesses and employers

#### PLAN AND DESIGN GUIDANCE

- + *Denver Moves: Transit*

FIGURE 7.22: Example of Microtransit Services

In October 2021, the City and County of Denver began the Denver Connector Pilot, a free ride share for Montbello to use to commute to local neighborhood destinations and transit stations.



SOURCE: City and County of Denver



SOURCE: City and County of Denver



SOURCE: City and County of Denver



## MOBILITY HUB AND TRANSIT CENTER EXPANSION

Build out a network of mobility hubs at key transit connection points across the city, incorporating high-quality pedestrian infrastructure and transit passenger amenities, bike facilities, micromobility, and other modal connectivity. Expand capacity at existing transit centers — such as Civic Center Station — to accommodate the growing Bus Rapid Transit (BRT) network.

### OBJECTIVES

**Mobility Hub and Transit Center Expansion would achieve the following:**

- + Encourage mode shift by allowing for safe, comfortable, and convenient intermodal connections and improving first-mile-last-mile connectivity.
- + Enhance the pedestrian environment at key transit connection points.
- + Provide secure bike parking at BRT stations and rail stations
- + Prioritize implementation in priority areas for transportation equity with transit-dependent populations and major infrastructure gaps.

### NEXT STEPS

#### SHORT-TERM ACTIONS

- + Determine priority locations based on the Frequent Transit Network identified *Denver Moves: Transit*.
- + Evaluate potential funding opportunities and partnerships — such as local Transportation Management Associations (TMAs).
- + Conduct a citywide study to identify locations of greatest need.
- + Launch pilot projects at appropriate locations to verify effective mobility hub components.
- + Ensure that adequate space is allocated adjacent to major stations along BRT lines for station expansion.
- + Future proof stations with conduit for charging, transit information, and electronic wayfinding.
- + Encourage transit-oriented development near future BRT stations that minimizes off-street parking.

#### LONG-TERM ACTIONS

- + Develop a Mobility Hub Program that incorporates maintenance.
- + Update infrastructure as new technologies emerge.
- + Install mobility hubs at every major transit center.

### KEY CONSIDERATIONS

#### COST

- + **Short-Term:** \$200,000 for outreach and study
- + **Long-Term:** \$500,000 to \$1 million per area

#### POTENTIAL IMPLEMENTATION PARTNERS

- + Regional Transportation District (RTD)
- + Business Improvement Districts
- + Denver Office of Climate Action, Sustainability and Resiliency (CASR)
- + Transportation Management Associations (TMAs)

#### PLAN AND DESIGN GUIDANCE

- + *Denver Moves: Transit*

**FIGURE 7.23: Example of Mobility Hub and Transit Center**

As Denver’s BRT network grows, major hubs like Civic Center Station will need to expand to accommodate more buses and intermodal connectivity.



SOURCE: RTD



SOURCE: RTD



ACCELERATED BUS RAPID TRANSIT NETWORK IMPLEMENTATION

Accelerate the implementation of the Bus Rapid Transit (BRT) network identified in *Denver Moves: Transit* to provide faster, more reliable and frequent transit service throughout the city. Transit is the safest choice when traveling and full implementation of the BRT network can help eliminate traffic fatalities on Denver’s streets. Quick implementation of the transit network would provide more travel options and benefit BIPOC communities who face higher rates of transportation inequities.

OBJECTIVES

Accelerating BRT Network Implementation would achieve the following:

- + Achieve the vision for a Frequent Transit Network established in *Denver Moves: Transit*.
- + Provide high-quality transit services and stations, particularly for transit-dependent populations.
- + Reduce transit travel times to become more competitive with driving and make transit a convenient mode for most trips.
- + Encourage mode shift and effectively reduce emissions and improve air quality.

NEXT STEPS

SHORT-TERM ACTIONS

- + Advance the recommendations identified through the Bus Priority Program by verifying the feasibility of and implementing quick-build projects that set up corridors for future BRT.
- + Complete corridor studies to develop conceptual designs that analyze the impacts of full-corridor lane conversion for dedicated transit lanes and transit signal priority.
- + Explore funding opportunities, including local funding and potential to pursue Federal Transit Administration (FTA) Small Starts grants.
- + Conduct a service buy-up study to understand how to best transition the operation of select BRT services from the Regional Transportation District (RTD) to allow the City to operate transit in tandem with RTD to provide better frequencies where appropriate.

LONG-TERM ACTIONS

- + Design and construct the full BRT Vision network by 2050.
- + Expand the BRT network to include additional corridor recommendations and study implementation feasibility for those routes.

KEY CONSIDERATIONS

COST

- + **Short-Term:** \$1 million per mile for Bus Priority projects
- + **Long-Term:** \$20 million to \$40 million per mile for full BRT buildout

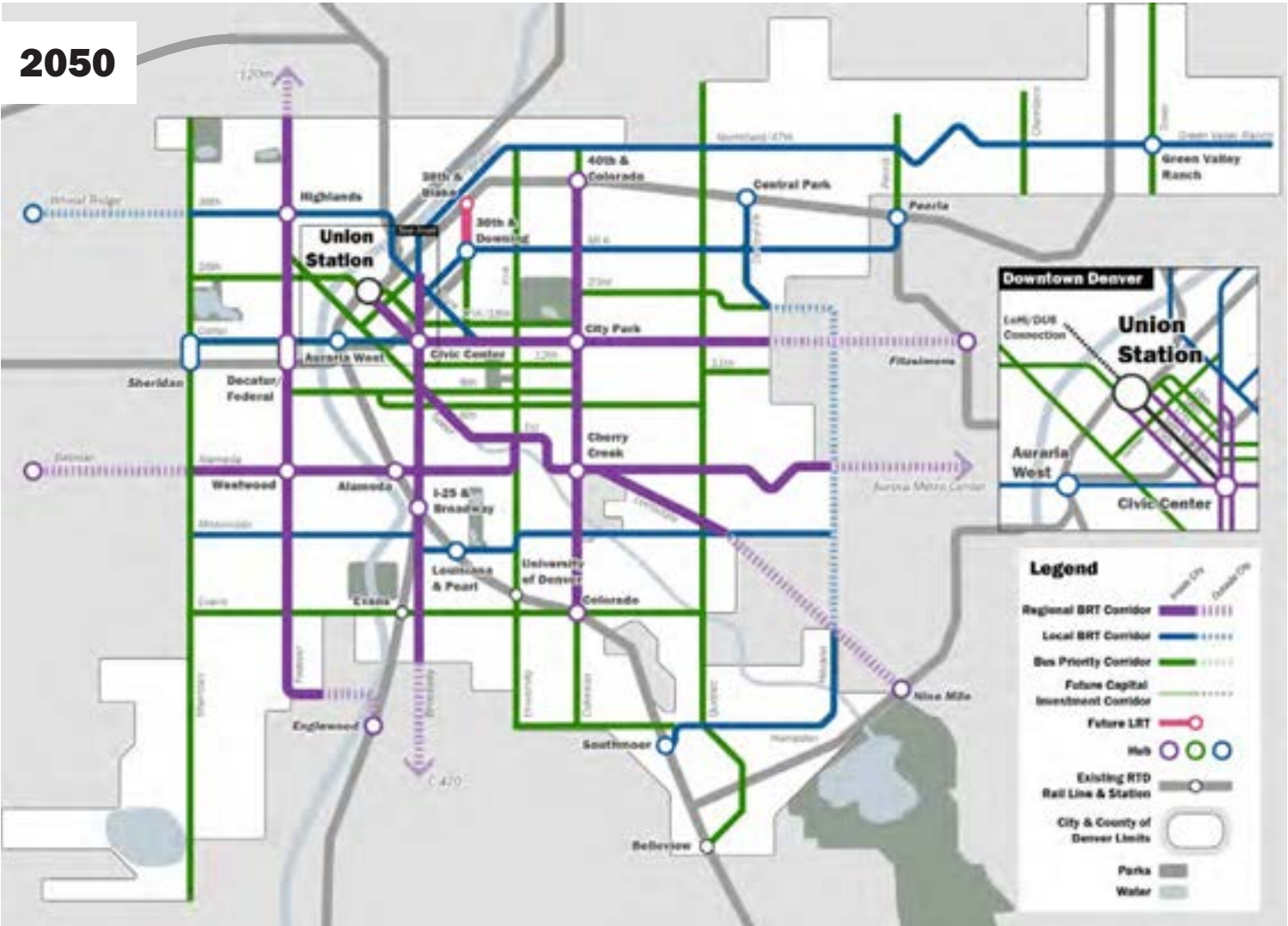
POTENTIAL IMPLEMENTATION PARTNERS

- + Federal Transit Administration (FTA)
- + Colorado Department of Transportation (CDOT)
- + Regional Transportation District (RTD)
- + Neighboring jurisdictions
- + Denver Regional Council of Governments (DRCOG)

PLAN AND DESIGN GUIDANCE

- + Complete Streets Design Guidelines
- + *Denver Moves: Transit*

FIGURE 7.24: Proposed 2050 Denver BRT Network



SOURCE: Denver Moves: Transit

FIGURE 7.25: BRT Network Example



San Francisco’s Van Ness BRT line is a 2 mile corridor with center running dedicated bus lanes and nine stations. Service began in 2022 and demonstrated a 35% savings in travel time compared to prior service.

SOURCE: [https://upload.wikimedia.org/wikipedia/commons/1/13/Van\\_Ness\\_Bus\\_Rapid\\_Transit\\_02.jpg](https://upload.wikimedia.org/wikipedia/commons/1/13/Van_Ness_Bus_Rapid_Transit_02.jpg)







# DENVER *MOVES* **EVERYONE** 20 50

**Our Vision to  
Move People,  
Goods & Services**

More information about this plan can be found online at [denvergov.org](https://denvergov.org)