

Transit-Oriented Denver: The impact of transit-oriented development on socioeconomics in
Denver County, Colorado

by

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A REPORT

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Abstract

The aim of my research is to explore if the reconstruction of Denver Union Station had an impact on the socioeconomics in Denver County, Colorado. Additionally, this research seeks to identify what characteristics of gentrification and sustainability are implemented when a new transit infrastructure is introduced to a community. This study specifically adds to the literature in socioeconomics, how to use statistical tools to determine if households have been impacted, and how the community changes. In this report, I examine how the redevelopment of Denver Union Station impacted socioeconomical factors in Denver County, Colorado. To provide a holistic perspective to this exploration, I used a case study and semi-structured interviews with representatives from Denver, Colorado. This site was specifically chosen for its explicit adaptation of Transit-Oriented Development.

Table of Contents

Table of Figures	vi
Acknowledgements	viii
Chapter 1 – Introduction	1
Research Questions	6
Method Process	7
Importance of Socioeconomics	8
Socioeconomics in an Urban Planning Realm	9
Chapter 2 – Literature Review	11
Transit-Oriented Development	11
Sustainability	14
Socioeconomics	16
Gentrification	18
Chapter 3 – Methodology	20
Case Study Process	21
Interview Process	23
Study Area Representatives	24
Data Collection	25
Chapter 4 – Denver Union Station	28
Background	28
Regional Transportation District	32

System Profile	33
2014 Denver TOD Strategic Plan	35
TOD Principles	38
Context for TOD	41
Readiness For TOD	43
Denver County Community Profile	48
Housing	53
Chapter 5 – Conclusions	56
Data Analysis	56
Interview Analysis	58
Chapter 6 – Recommendations	60
Implication for Planning	62
Limitations	64
References	65
References – Figures	74
Appendix A: Interview Questions	78

Table of Figures

Figure 1.1: Denver, Colorado Skyline	3
Figure 1.2: Transit-Themed Denver Skyline	5
Figure 2.1: Denver Union Station Light Rail/Commuter Rail Hub	13
Figure 2.2: Denver Union Station	14
Figure 2.3: Gentrification in Neighborhoods	19
Figure 3.1: Denver County Study Area	22
Figure 3.2: Example of Data in Microsoft Excel Used to Populate Maps	27
Figure 4.1.1: Downtown Denver, Colorado	29
Figure 4.1.2: RTD Light Rail Car	32
Figure 4.1.3: RTD Rail Map	33
Figure 4.1.4: RTD Runboard	34
Figure 4.2.1: TOD Principles – pt. 1	39
Figure 4.2.2: TOD Principles – pt. 2	40
Figure 4.2.3: History of Transit in Denver	41
Figure 4.2.4: (Continued) History of Denver	42
Figure 4.3.1: Denver Households by Type	44
Figure 4.3.2: Gainers of Population Aged 24-34	45
Figure 4.3.3: Population Growth, Age, and Densification	45
Figure 4.3.4: Expansion of Rail Transit in Denver	46
Figure 4.3.5: Denver Region Per Capita VMT	46

Figure 4.3.6: Denver Bike Infrastructure	47
Figure 4.3.7: Denver Mode Share	47
Figure 4.4.1: Change in Population in Denver County	48
Figure 4.4.2: Percent of Residents Who Do Not Identify as Only White From 2010 to 2020	49
Figure 4.4.3: Percent of Residents Who Identify as Hispanic or Latino From 2010 to 2020.....	50
Figure 4.4.4: Percent of Residents Who Identify as Only Black From 2010 to 2020	51
Figure 4.4.5: Change in Available Housing From 2010 to 2020.....	53
Figure 4.4.6: Vacant Units in 2020	54

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Chapter 1 – Introduction

Transit-Oriented Development (TOD) represents a progressive urban planning paradigm that integrates land use and transportation planning to create sustainable, livable communities centered around high-quality transit systems. This approach aims to reduce reliance on private vehicles, decrease urban sprawl, and enhance the quality of life by creating densely populated, walkable neighborhoods with mixed-use development. This paper delves into the principles of TOD, examining its historical evolution and its relevance in the modern urban landscape. It assesses the impact of TOD on urban mobility, environmental sustainability, and socio-economic dynamics within urban settings. By exploring a specific case study, this report aims to provide a comprehensive understanding of how TOD is being implemented and the diverse outcomes of these implementations. The analysis will also address the challenges and opportunities presented by TOD, offering insights for policymakers, urban planners, and stakeholders involved in urban development. Ultimately, this paper seeks to underscore the significance of Transit-Oriented Development as a key strategy for building more sustainable, efficient, and livable cities in the 21st century.

In recent decades, the nexus between urban planning and socioeconomics has become increasingly apparent, driven by the recognition that the built environment significantly influences the social and economic fabric of communities (LeGates & Stout, 2018). This intersection has given rise to a compelling area of study and practice, with Transit-Oriented Developments emerging as a focal point for investigation. This report aims to delve into the impact of TODs on socioeconomics, exploring how these development strategies can shape and

transform urban landscapes. Specifically, for this study, socioeconomics is studied in Transit-Oriented Developments neighborhoods near Denver Union Station, located in downtown Denver, Colorado. Transit-Oriented Developments are developments in a half-mile radius or high density and mixed-use buildings around transit rail stations that are pedestrian and bicycle-friendly (Chatman, 2013). They have strong potential to improve urban development, improve air quality, preserve open spaces, provide affordable houses, and improve the living conditions of low-income households (Cervero, 2004; Debrezion et al., 2006; Haas et al., 2016; The Center for Transit-Oriented Development, 2009; Transportation Research Board & National Academies of Sciences, Engineering, and Medicine, 2004). However, numerous studies have found TODs causing increased rents and home prices and other going to the extent of causing gentrification and displacement (Baker & Lee, 2009; Bates, 2013; Cao & Lou, 2018; Chapple et al., 2017; Chapple & Loukaitou-Sideris, 2019; Chapple & Thomas, 2020; Diaz, n.d.; Duncan, 2011b; Grube-Cavers & Patterson, 2015; D. B. Hess & Almeida, 2007). Some gentrification researchers have gone further to classify displacement into direct or indirect (exclusionary). Direct displacement is when an influx of new residents causes rent prices to increase and force the incumbent residents to leave (Atkinson, 2000). Indirect or exclusionary displacement has also been defined as when current neighborhood conditions prevent some residents from moving in or the incumbent resident feels excluded (Burns et al., 2012; Chapple et al., 2017).

Transit-Oriented Development (TOD) projects have proven successful by fostering sustainable, connected communities where people can live, work, and play with easy access to public transport. The Hudson Yards redevelopment in New York City is a prime example, turning a rail storage yard into a bustling neighborhood with residential, commercial, and public

spaces anchored by a major transit station. In the San Francisco Bay Area, the Fruitvale Transit Village transformed a parking lot into a lively community hub, integrating housing, retail, and community services with the Fruitvale BART station, significantly boosting local business, and reducing car dependency. In Washington D.C., the NoMa district has seen a resurgence, with the Union Market area becoming a dynamic mixed-use space, further enhancing the neighborhood's connectivity and economic vitality. These examples highlight how TOD projects can rejuvenate urban areas, improve transportation efficiency, and contribute to economic growth.

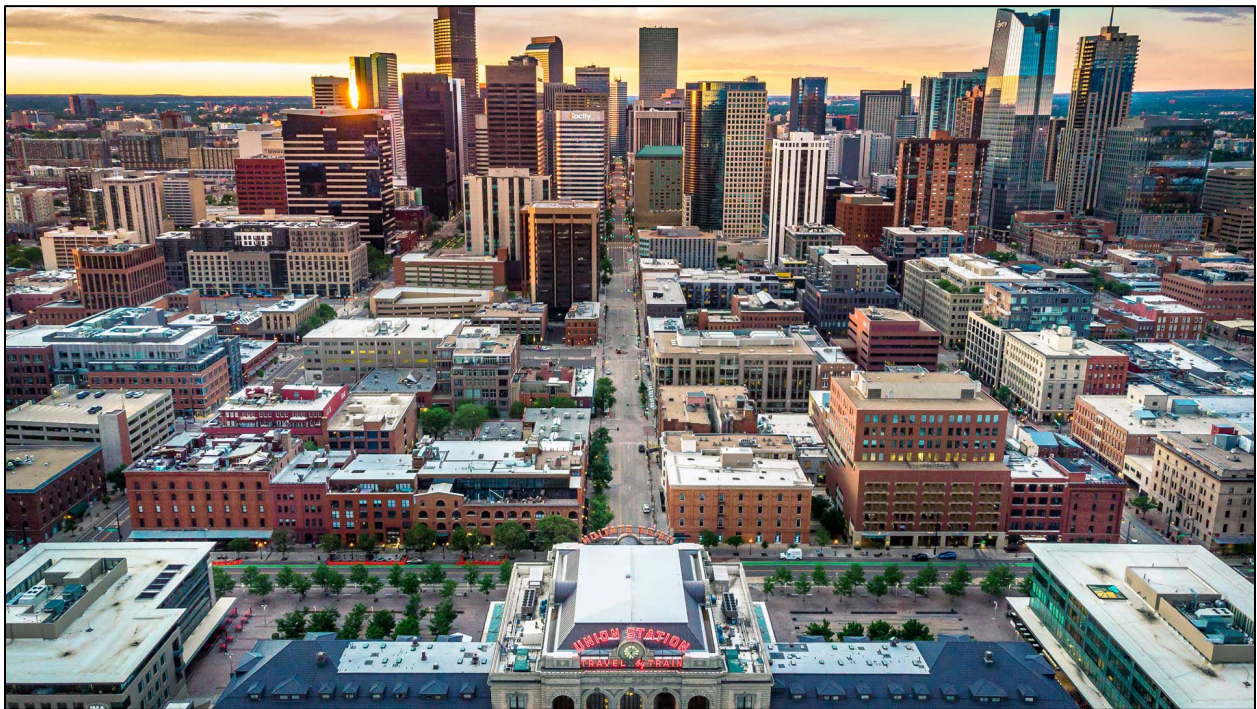


Figure 1.1: Denver, Colorado Skyline

The intersection of sustainability and urban planning has become a central theme in contemporary discourse as cities worldwide grapple with the challenges posed by rapid urbanization, climate change, and resource depletion. Sustainability, broadly defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987), is intricately linked to the

field of urban planning. This introduction sets the stage for a comprehensive exploration of how Transit-Oriented Development impact socioeconomics within the broader framework of sustainable urban development. Urban planning, as a discipline, is charged with shaping the physical, social, and economic aspects of cities to create environments that enhance quality of life for residents (Cullingworth & Nadin, 2006). The integration of sustainability principles into urban planning is a response to the recognition that cities, as significant contributors to environmental degradation, must evolve towards more sustainable and resilient forms.

Sustainable urban planning seeks to balance the ecological, social, and economic dimensions of urban development to create cities that are not only livable but also environmentally responsible and economically viable. TODs emerge as a key strategy within the realm of sustainable urban planning. These developments, characterized by high-density, mixed-use structures clustered around transit nodes, epitomize a departure from conventional car-centric urban planning (Cervero & Kockelman, 1997). The emphasis on public transportation, walkability, and reduced reliance on private vehicles aligns with sustainability goals, aiming to curtail carbon emissions, alleviate traffic congestion, and promote resource efficiency. As urban areas grapple with the imperative to transition towards sustainability, understanding the intricate relationship between TODs and socioeconomics is essential. This study also seeks to unravel the impact of TODs within the broader sustainability context, examining how these developments influence the social and economic fabric of communities.

This research employs a pretest-posttest study focusing on neighborhoods in Denver County surrounding Denver Union Station in Denver, Colorado. As the Regional Transportation District (RTD) of Denver contemplates continuing the existing transit lines by adding many

miles of tracks by 2040, it becomes imperative to investigate the potential gentrification and displacement resulting from the existing state of the RTD. This study aims to offer insights into whether a substantial change in socioeconomics has occurred in the neighborhoods surrounding Denver Union Station and, if so, how these phenomena have manifested. By examining qualitative and quantitative methods, including simple percentage change, location quotient, and local share, this research seeks to determine changes in the neighborhoods and assess the risk of displacement before and after the reconstruction of Denver Union Station. Through this analysis, the study aims to shed light on how the presence and expansion of transportation infrastructure have influenced the vulnerability of neighborhoods to socioeconomical change and gentrification of residents. In addition, this research contributes to the broader discourse on the socioeconomic impact of Transit-Oriented Developments, providing valuable insights that can guide urban planning policies and decisions, especially in the context of a major transportation hub like Denver Union Station.

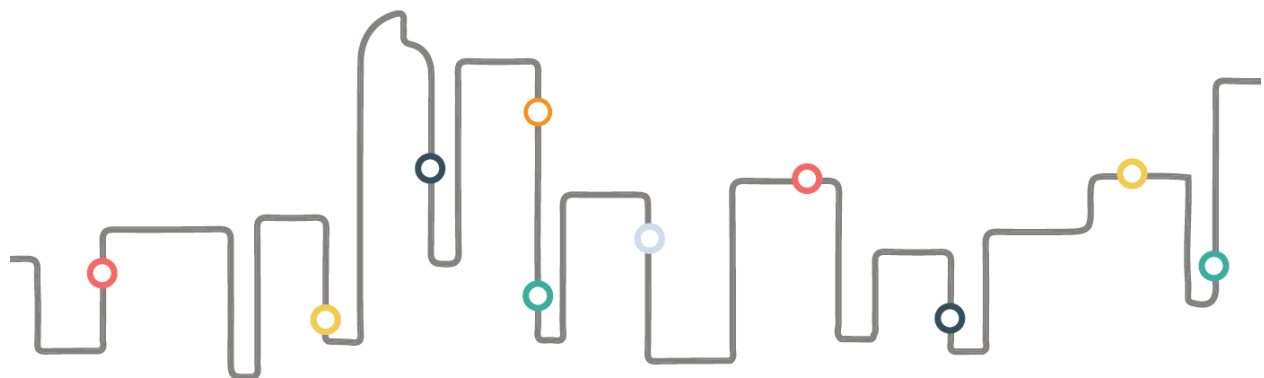


Figure 1.2: Transit-Themed Denver Skyline

Research Questions

The aim of this research is to identify if the redevelopment of Denver Union Station in Denver, Colorado impacted Denver County to encounter a noticeable change in socioeconomics.

The questions that this research aims to answer are:

- i. Did the reconstruction of Denver Union Station impact socioeconomics in Denver County?
- ii. Can Transit-Oriented Development contribute to sustainable urban development?
- iii. Does Transit-Oriented Development have an impact on gentrification?

The answers to the questions above will then help us:

- i. To understand if the construction of Transit-Oriented Development has substantial socioeconomic impacts in Denver County.
- ii. To identify if low-income and historically marginalized races are displaced.
- iii. To determine which variables can be used to predict demographic change in a neighborhood.
- iv. To understand if sustainability can play a pivotal role in the construction of Transit-Oriented Development.

Method Process

To answer these questions and fully understand Transit-Oriented Developments' impact on socioeconomics and gentrification, I use two primary modes of data collection and analysis: case studies and semi-structured interviews. These modes result in in-depth and rich qualitative data on the impacts of the community. Case study research as a method provides the opportunity for an in-depth study of a single, contemporary phenomenon or "case." Cases are selected because of their characteristics that enable conclusions and generalizations to be drawn based upon their type (Swaffield, 2017). In the field of planning, this method allows for an action-oriented approach, "seeking cause-effect understanding to guide contemporary interventions" (Campbell, 2003).

Interviews- the second mode of data collection used in this work- provide information on the topic of interest through structured and unstructured conversations. Structured interviews are formatted beforehand, with questions asked in a predefined order and provide consistency in responses. Unstructured interviews explore alternatives to pick up on information, do not necessarily have defined areas of importance, and allow for the respondent to take the lead in the conversation. This method is advantageous for its ability to grant respondents the opportunity to express their viewpoint and allow the conversation to be adaptable to emerging topics (Bolderston, 2012). For this work, I conducted semi-structured interviews i.e., interviews included both structured and unstructured portions to allow for some consistency in responses, while also allowing for follow on questions and a more organic conversation.

Recap of the methodology process that took place throughout the report:

1. *Research: Transit-Oriented Development + Socioeconomical Change*
2. *Study Area: Denver Union Station/Denver County*
3. *Methodology: Preliminary Research and Analysis; Case Study; Interviews*
4. *Analysis: Analyze Data Collected in Case Study; Analyze Data Collected in Interviews*
5. *Formulate Recommendations and Limitations for Future Study of Future TOD Projects Based Upon Results from Analysis Phase*

Importance of Socioeconomics

Socioeconomics is a multifaceted discipline that explores the interplay between social and economic factors within societies. This field examines how economic activities and policies influence social structures, such as family, education, health, and vice versa. As noted by Branch (2017), socioeconomics involves studying how economic activities affect different groups within a society, particularly focusing on issues of inequality and social justice. It also considers factors such as income distribution, access to resources, and the impact of economic changes on various social groups. According to Sen (1999), the evaluation of economic prosperity should also include the capabilities and freedoms people enjoy, moving beyond traditional income metrics. This perspective is crucial for understanding the broader impacts of economic policies and activities on human well-being and social development. Socioeconomics, therefore, provides an essential framework for analyzing the complex and reciprocal relationship between economic and social dynamics.

Socioeconomics encompasses various types, each focusing on different aspects of the relationship between social behavior and economic factors. In labor economics, for instance, the focus is on the dynamics of the labor market, employment, and wages. As Acemoglu and Autor (2011) explain, this branch examines how economic forces and policies affect employment rates, labor productivity, and wage distribution. Another significant area is health economics, where the emphasis is on how economic conditions impact health outcomes. Fuchs (2012) discusses how socioeconomic status, healthcare policies, and economic barriers can influence an individual's health and access to healthcare services. Environmental economics, another type, as described by Kahn (2010), explores the economic aspects of environmental issues. It studies how economic activities affect the environment and how economic tools can address environmental problems. Educational economics is another important area, focusing on the economics of education, analyzing how economic factors influence educational attainment and the quality of education. As Hanushek and Woessmann (2011) note, this field evaluates the economic implications of educational policies and the role of education in economic development. Each of these types demonstrates the diverse applications of socioeconomics in understanding complex societal issues.

Socioeconomics in an Urban Planning Realm

Urban planning is a resource allocation tool. As a resource allocation tool, planning plays ecological, economic, and social roles in society. Keeble (1951), one of the renowned experts on the subject, notes that the outcome of planning should promote health and safety; convenience; economy; aesthetics; and, above all, livability. It is therefore within the context of the foregoing

that the role of planning is discussed. Historically, urban planning emerged in response to rapid urbanization and the accompanying challenges, such as pollution and poor living conditions, particularly in Western Europe during the industrial revolution. Initially reluctant to intervene, governments eventually enacted legislation to address these issues, as seen in the UK and the US (Simpson et al. 1989). This intervention aimed to improve living conditions, public health, and ultimately the quality of life in urban areas.

Urban planning's role extends beyond creating physical spaces; it involves addressing socioeconomic disparities and promoting public health. This is achieved by ensuring equitable access to housing, amenities, and transportation, fostering physical activity through well-designed mixed-use communities, reducing environmental pollution, and enhancing social interactions in urban spaces. These efforts align with the broader goals of sustainable development, as outlined in the United Nations' Sustainable Development Goals and New Urban Agenda, emphasizing urban planning's crucial contribution to environmental and socio-economic sustainability (Salas-Zapata and Ortiz-Munoz, 2019). The complexity of urban planning lies in its multifaceted approach, combining regulatory frameworks, infrastructure development, and incentives for environmentally friendly practices, all aimed at mitigating urban pollution and enhancing public health. This holistic approach underscores the integral role of urban planning in shaping not only our physical surroundings but also the socioeconomic fabric of urban life. Cities are growing faster than ever before. In 1950, only 30% of the total world population was living in cities. Today, this datum stands around 54%. By 2050, the estimates project that 66% of the total world population will be urban, with cities in developing countries attracting the greatest number of new city dwellers (Department of Economic and Social Affairs, 2014).

Chapter 2 – Literature Review

Transit-Oriented Development

The success of transit systems in rural, urban, and suburban neighborhoods is critical to the economic health and sustainable growth of America’s communities. Transit systems should address the needs of everyone and help people get to jobs, school, healthcare and visit friends and family. Transit-Oriented Development (TOD) is where those two areas intersect to create real change (U.S. Department of Transportation, FTA, 2023). Dense, walkable, mixed-use development near transit attracts people and adds to vibrant, connected communities. Public transportation can help foster partnerships in communities that support the development of affordable housing around transit. When done right, TOD leads to more equitable communities. As defined by the Institute for Transportation and Development Policy:

“TOD, or Transit-Oriented Development means integrated urban places designed to bring people, activities, buildings, and public space together, with easy walking and cycling connection between them and near-excellent transit service to the rest of the city. It means inclusive access for all to local and citywide opportunities and resources by the most efficient and healthful combination of mobility modes, at the lowest financial and environmental cost, and with the highest resilience to disruptive events. Inclusive TOD is a necessary foundation for long-term sustainability, equity, shared prosperity, and civil peace in cities.” (Institute for Transportation and Development Policy, 2017, p. 8)

While Transit-Oriented Development is a vast and broad subject, this statement identifies the direct intents of TOD into just a few sentences. TOD projects are generally judged successful

based on a range of factors. From the private development industry's perspective, financial outcomes are paramount, while public sector actors consider a broader spectrum of outcomes. In North America, TOD has been linked to reduced car use, increased public transport use, and higher levels of walking compared to conventional suburban neighborhoods. However, there is mixed evidence regarding TOD's impact on gentrification. It is also noted that land values tend to increase around TOD areas due to enhanced accessibility and amenities, and that there is a willingness among consumers to pay more for living in areas with greater walkability.

One of the primary challenges in TOD implementation is achieving a mix of uses, delivering TOD at a regional scale, reconciling density with a livable environment, and ensuring sufficient public transport services to attract investment. Coordinating a large, diverse number of factors is also a significant challenge in the planning process. The review identifies several research gaps in the field of TOD. These include the need for a clear understanding of how TOD is defined by different actors in various spatial, country, and institutional contexts, and whether the development industry has a unified definition of TOD. There is also a need for more research on TOD planning and implementation in European contexts and geographical areas characterized by medium or low population densities. In addition to these findings, research has shown that larger, denser municipalities tend to integrate public transport and land-use planning more than smaller, less densely populated ones. Policies aiming to combine increased regional mobility with sustainable transport goals are central to broadening the scope of TOD approaches, including less densely populated areas outside immediate urban, regional cores. The literature also suggests that the concept and implementation of TOD vary significantly across different regions and countries. For example, studies in the Chinese context have highlighted unique

challenges and opportunities in applying TOD principles in rapidly urbanizing cities with distinct institutional frameworks.

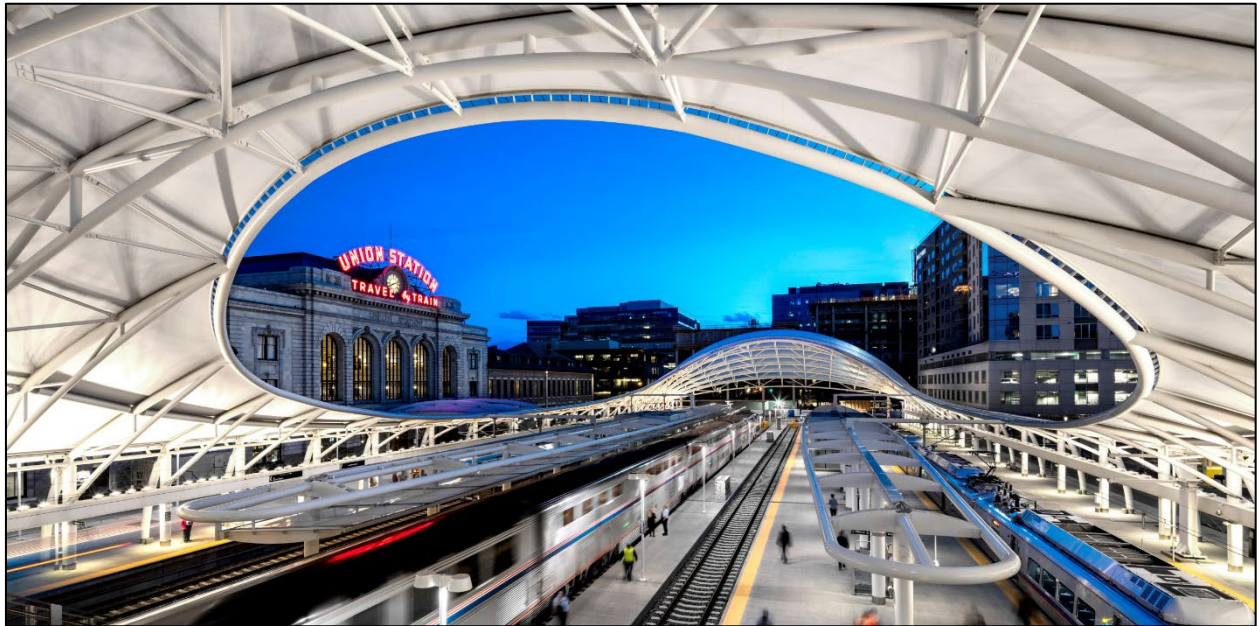


Figure 2.1: Denver Union Station Light Rail/Commuter Rail Hub

Transit-Oriented Development (TOD) principles focus on creating vibrant, sustainable communities centered around high-quality public transportation. TOD aims to increase access to transit, encourage mixed-use development, and promote walkability and cycling. By integrating residential, office, and retail spaces with transit options, TOD seeks to reduce reliance on automobiles, enhance urban livability, and support economic growth. This approach is key to building more inclusive, connected, and environmentally sustainable cities. TOD principles regarding Denver Union Station will be outlined in more detail in Chapter 4. In summary, while TOD is seen as a promising approach to urban planning, its application is complex and context dependent. The challenges include defining and measuring the success of TOD, adapting its principles to different urban contexts, and navigating the intricate process of coordination among various stakeholders.

Sustainability

Sustainability in urban planning, particularly in relation to Transit-Oriented Development, highlights the trend towards integrating land use and transportation systems for sustainable development. The concept of TOD, emerging in the late 1970s and gaining prominence in the 1990s in the United States, is a key component of smart growth and new urbanism. It focuses on densifying neighborhoods, reducing congestion, increasing accessibility, and transportation options through the land-use clustering and mixing. This approach aims to reduce car trips, promote non-motorized transport, and thereby create more livable communities. Research in this area often evaluates the effectiveness of TOD projects post-implementation, with less focus on quantitative measures of TOD ‘level’ or ‘TOD-ness’. However, measuring the overall TOD level of urban areas is crucial for effective TOD planning. The implementation of TOD varies globally, with different regions like Europe, Asia, and Australia embracing the concept in varying ways (H. Ayad, S. Ibrahim, D. Saaldallah, 2022).

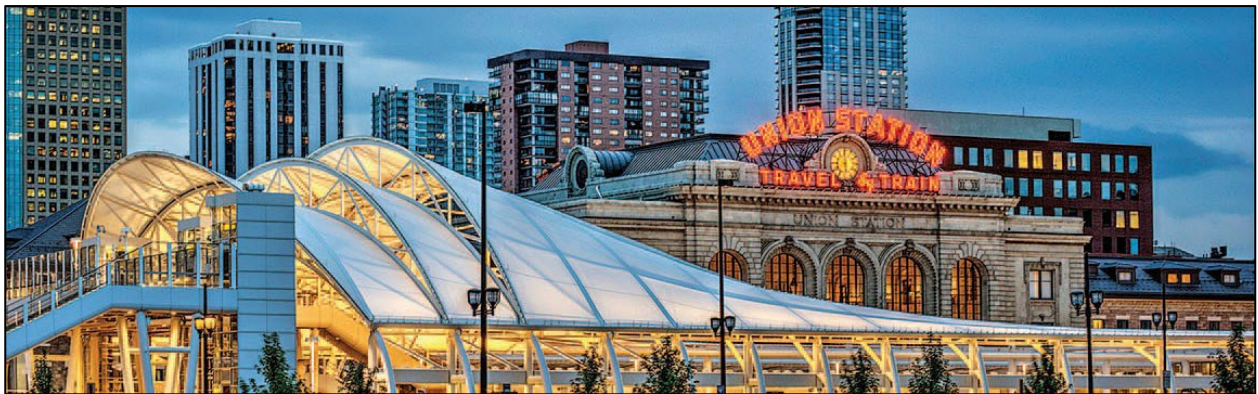


Figure 2.2: Denver Union Station

Sustainability is crucial for Transit-Oriented Development (TOD) for several reasons:

1. **Environmental Benefits:** TOD reduces dependence on automobiles, thereby lowering greenhouse gas emissions and air pollution. It promotes more environmentally friendly modes of transportation, such as walking, cycling, and public transit.
2. **Economic Efficiency:** TOD can lead to more efficient land use and transportation systems, reducing the overall cost of urban infrastructure and maintenance. It also often increases property values and can stimulate local economies.
3. **Social Equity:** By providing accessible public transit and mixed-use developments, TOD supports more inclusive communities, offering improved access to jobs, services, and amenities for people of all income levels.
4. **Health and Well-Being:** TOD encourages active transportation modes like walking and biking, which have health benefits. It also contributes to better urban air quality and reduced noise pollution.
5. **Sustainable Urban Growth:** TOD helps manage urban growth more sustainably, controlling urban sprawl and promoting denser, more efficient urban forms that make better use of resources.

In summary, TOD aligns with the principles of sustainable development, addressing economic, social, and environmental aspects of urban living (Denver 2014 TOD Strategic Plan).

Socioeconomics

The literature on socioeconomics in urban planning, particularly in sustainable urban developments, emphasizes the importance of social inclusion. This concept involves enhancing participation and access to resources and services for disadvantaged social groups. It's recognized as crucial for creating productive, cohesive, and safer societies. Sustainable urban developments are understood to improve the quality of life through various aspects such as environmental, economic, socio-cultural, institutional, and political dimensions. These developments aim to provide access to basic resources and services, build resilience, ensure spatial heterogeneity, and avoid burdening future generations. Social inclusion in this context is about participation in, and access to, services like healthcare and resources like food, especially for marginalized groups. The role of social inclusion within urban sustainability is an evolving area of interest, crucial for academics and policymakers focusing on sustainable urban development (Moreno, 2021).

Socioeconomics is a multifaceted discipline that explores the intricate interplay between social behavior and economic phenomena (Ramirez, 2023). It investigates how economic processes and policies influence social structures, including family dynamics, community interactions, and broader societal norms. A significant focus lies on understanding income distribution, poverty, and wealth disparities, delving into how these economic factors shape and are shaped by social hierarchies and class systems (Lee, 2022).

Central to socioeconomics is the study of labor markets. This encompasses employment patterns, job market trends, the impact of technological advancements on employment, and the

role of education and skills development in economic mobility. Researchers in this field scrutinize how economic opportunities or lack thereof affect individual life choices and societal outcomes, such as health, education, and crime rates. Another critical aspect of socioeconomics is social mobility. This involves examining the ability of individuals or groups to move within or between social strata in a society. The literature explores factors that facilitate or hinder such mobility, including access to education, economic policies, and the influence of social networks.

Additionally, socioeconomics addresses the impact of globalization on local and international communities. This includes analyzing the movement of goods, services, people, and capital across borders and how these phenomena affect local economies, cultures, and social structures (Thompson, 2023). It also involves studying the economic implications of demographic shifts, such as aging populations or migration patterns, on social welfare systems and economic productivity. Urban socioeconomics, a subset of the field, examines the relationship between economic activity and urban development. It studies how urban planning and policies influence socio-economic outcomes in cities, including housing affordability, urban poverty, and the spatial distribution of resources and opportunities.

The literature in socioeconomics often adopts an interdisciplinary approach, drawing on insights from economics, sociology, psychology, political science, and geography. This comprehensive perspective is essential for understanding the complex ways in which economic and social factors are interwoven in the fabric of societies. Overall, socioeconomics provides a lens to critically analyze and address the challenges and opportunities presented by the ever-evolving economic and social landscapes.

Gentrification

In containing socioeconomics, gentrification has its own positive benefits but becomes an issue when neighborhoods attract more affluent residents and increases rents, and make property values unbearable (Bates, 2013). As rents and property values go up, low-income residents often become incapable of paying their rents in that neighborhood and must leave to place they can afford to live there. In some cases, they are pushed out by people who can afford the higher rents (Burns et al., 2012; Chapple & Loukaitou-Sideris, 2019; Shin et al., 2016). Chapple & Loukaitou-Sideris (2019) and Burns et al. (2012) identify displacement of eviction and an indirect result of exclusionary action. Someone immersed so much in a neighborhood where they have grown up would feel different when the area suddenly changes. Studies have shown that residents who remain in a gentrifying community who have strong connections with where they live are affected psychologically (Burns et al., 2012).

Hamnett (2003) argues that a reduction in the working-class population over time is not necessarily displacement but rather a replacement. He, therefore, justifies his argument by saying:

"If it is assumed that the average working life of an individual is 40 years (from age 20 to age 60), the entire labor force will turn over and be replaced during a 40-year period, and a quarter will be replaced every 10 years. Consequently, a high proportion of the manufacturing labor force in 1961 will have disappeared by 1991 or 2001. They will have either retired, moved out or died. This change will have taken place as a result of

long-term industrial and occupational change, not necessarily as a result of gentrification per se." (Hamnett, 2003, p. 2421)

This statement is evident in most studies where no or little correlation is found between gentrification and displaced residents (Chapple et al., 2017; Chapple & Loukaitou-Sideris, 2019), which most authors have blamed on a lack of data regarding displaced people. However, when the shift is coupled with increasing rents and change in taste of the neighborhood, it does not only remain replacement but gentrification.



Figure 2.3: Gentrification in Neighborhoods

Other studies have also found that gentrification has a more significant impact on closer commercial properties than residential homes (Debrezion et al., 2006). In some cases, only commercial properties gentrify even amid poor residents (Burnett, 2014). For reasons like these, (Bates, 2013) suggests that today's

approaches to gentrification should not be so limited and must include racial /ethnic equity, effects of public investment, and the public sector's interference in the change process. These fundamental questions, amongst others, are what triggers scholars to investigate gentrification and displacement. There have also been many concerns about how transit lines, stations, and systems increase land premiums in surrounding neighborhoods, further discussed in the following sections.

Chapter 3 – Methodology

This chapter introduces the research methods used in this research which is a pretest-posttest analysis of the community surrounding Denver Union Station. When studying the effects of Transit-Oriented Development, you must look at what happened before the development, and what happened after. For this study, I am looking at Census Tract data from 2010; 5 years before the reconstruction of Denver Union Station, and 2020; 5 years after the reconstruction of Denver Union Station. By looking at these time frames, I can see what changes have taken place in a reasonable amount of time. Since the reconstruction, there have been many changes in the economic and social communities surrounding Denver Union Station. This time frame will also give us an ideal perspective of which socioeconomics were impacted the most.

Denver Union Station serves as an exemplary case study for Transit-Oriented Development (TOD) and its socioeconomic impacts due to its transformation from an underused train station and vacant land into a vibrant, mixed-use development. This project, completed in 2014, encompassed office, residential, retail, hotel, and transit use, thereby revitalizing downtown Denver and establishing a new urban core. It involved a comprehensive public/private partnership, integrating various public agencies and private developers, which contributed to its success as a sustainable and pedestrian-friendly urban redevelopment. This case demonstrates innovative financing, sustainable development, and the creation of a pedestrian-friendly environment, making it a model for cities and transit systems worldwide (Urban Land Institute, 2016). Denver Union Station is a key case study because it illustrates the potential of TOD to transform urban areas. This project is typically renowned for successfully integrating mixed-use

development with transportation, creating a vibrant community hub that boosted the local economy and revitalized the downtown area. Its innovative public-private partnership model, sustainable and pedestrian-friendly design, and positive socioeconomic impacts make it an instructive example for urban development and planning professionals looking to replicate similar successes in other cities.

Case Study Process

To select a specific case study for this research, it was vital to make a list of multiple prospects before selecting a single case study to investigate. During the selection process, a list of multiple prospects was narrowed down to two sites: Denver Union Station, and Los Angeles Union Station. Denver Union Station was then decided as the selected case study, as the Los Angeles Union Station rehabilitation project was not expected to be completed until Fall of 2024. By selecting Denver Union Station, this allows us to look at not only the community factors before the reconstruction in 2014, but also the community factors following the reconstruction. This creates a fair timeline to analyze data 5 years before, and 5 years after the reconstruction. This being said, Los Angeles Union Station could be used soon in similar research.

The list of the case study identification process is detailed below:

- Identified American cities that were implementing Transit-Oriented Development infrastructure.

- Researched housing and additional socioeconomics factors to better understand the scope of each city.
- Analyzed existing zoning ordinances for gentrification guidelines and requirements.
- Compiled all data into chapter into subchapters for the Denver Union Station case study.
 - o Analyzed housing affordability, employment, living wages, education, demographics, etc.
- Conducted preliminary analyses from the data identified in previous steps of data collection.
- Expanded on preliminary analyses with improved understandings after interviews were conducted.

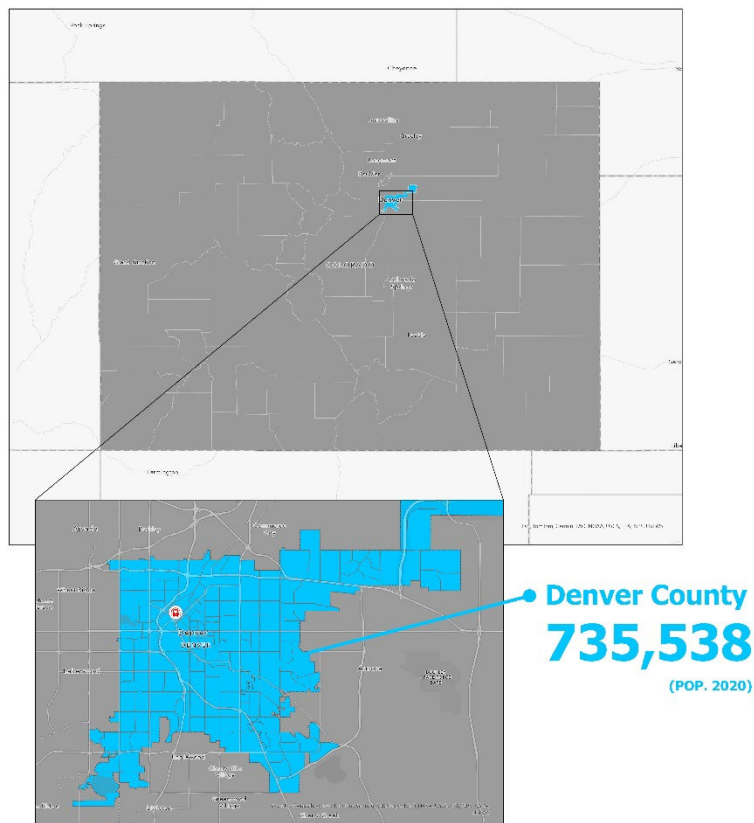


Figure 3.1: Denver County Study Area

Interview Process

When selecting the interviewee pool, it was important to look at several factors. The factors listed below are the specific criteria for possible interviewees:

- Identify traffic planning and engineering professionals in the Denver, Colorado region.
- Coordinate with interviewees to guarantee they are comfortable and willing to participate in the interview.
 - o Send interview disclosure and agreement forms to the interviewees to be signed and reviewed.
- Schedule hour-long interviews and save them to the computer's hard drive in a protected folder to review later.
- Record the interviews and review the recordings afterwards to make note of key points.
- Insert key takeaways into the report to support the case study research as qualitative methods.
- Use the software Dedoose to code and analyze interview responses.

Keeping these criteria in mind, I was able to identify two subjects for the interview. Before conducting the interview, it was important to follow IRB protocol. To start, it was vital to disclose all necessary information about the subjects and provide detail about what the research was aimed at. The subjects were both notified by e-mail that their professional criteria met the guidelines and were picked to participate in the interview. After a signed agreement and disclosure document was sent and returned, a date and time was coordinated to conduct the interview. It is critical that the subjects are notified of all possible conflicts and all questions are

answered concerning the interview/interview questionnaire. It is also important to note that both subjects declined to stay anonymous and agreed to their name and likeness to be used in the research. By signing the anonymity agreement, both subjects will be called by their legal names, and their interview answers will not be modified in any way to secure anonymity.

Study Area Representatives



Stephen Bartels, P.E.

Mobility Engineer – Olsson

Bachelor of Civil Engineering – Colorado School of Mines

Denver Metropolitan Area

The first interviewee, Stephen Bartels, is a life-long transit advocate who works as a Mobility Engineer in the Denver metropolitan area. Stephen is quoted as using transit ever since he could remember, and still uses it in his day-to-day life. Graduating from the Colorado School of Mines in Golden, Colorado in 2012, Stephen earned his Bachelor of Science (B.S.) in Engineering, with a focus in Civil Specialty. Stephens' interview plays an important role in this research, as he is an active member of the community and transit plays an important role in his everyday life.



Hannah Sievers

Associate Planner / Transportation – Olsson

Bachelor of Arts – University of Nebraska-Lincoln

Denver Metropolitan Area

The second interviewee, Hannah Sievers, is a Transportation Planner from Denver, Colorado. Hannah Graduated from the University of Nebraska-Lincoln in 2020 with a bachelor's in arts. Moving back to her hometown of Denver after graduation, Hannah studied urban development and started her career as an Assistant Planner at Olsson in their Denver, Colorado office. Unlike Stephen, Hannah uses private transportation in her everyday life. Hannah relies on her personal vehicle to get to and from work, the store, and other daily amenities. Although she uses private transportation daily, her insights as a Transportation Planner provide valuable detail to this study.

Data Collection

Demographic data, housing data, and shapefiles were collected from the US Census Bureau, and the US Census Bureau TIGER/Line shapefile database. Denver County, Colorado ACS 5-Year Estimates Data Profiles from 2010 and 2020 were used to calculate demographic, housing, and commutative data to represent change in the socioeconomics around Denver County; analysis was done at a Census Tract level to get an accurate representation of the surrounding County. Block Group data was collected but was not available for demographic

analysis, so Census Tract data was used to keep the analysis consistent. The US Census Bureau TIGER/Line shapefile provided all shapefiles for the data for 2010 and 2020 analysis and mapping. The following variables are what was extracted from the census data for the study:

- i. Demographic-based
 - a. Total population
 - b. White Alone
 - c. Non-White (Hispanic; Black; Asian/Pacific Islander; American Indian/Eskimo/Aleut)
 - d. Income
- ii. Housing
 - a. Median Gross Rent
 - b. Median Value

ESRI ArcGIS Pro was used to generate maps for Denver County. The US Census Bureau TIGER/Line Shapefile database provided census tract shapefiles for 2010 and 2020, which were used to create data analysis via mapping visuals. The study area was mapped by inserting the state-wide census tract shapefile and using a mapping tool called “clip” to cut off the tract is not contained within Denver County. This allowed for precise mapping visualization to ensure consistency during the data analysis. A total of 178 Census Tracts were selected, with the mapping area shown in the figure below. In the figure below, Census Tract 9800.01 is mostly left out of frame, as this tract covers Denver International Airport in the northeast region of Denver

County. This tract was purposely left out as it has a total population of 0, as well as creates a better map visualization by leaving it out of frame.

All data collected was first configured in Microsoft Excel and refined to populate the Census Tracts in Denver County. By refining the data in Microsoft Excel, this ensured the data would join the map shapefiles correctly as well as display the data efficiently and accurately.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	OBJECTID	STATEFP2	COUNTYF	TRACTCE2	GEOID20	NAME20	Total pop	One race	Two or m	One race	White	Black or	American
2	149	8	31	102	8031000102	1.02	3667	3443	224	3443	2918	72	23
3	2	8	31	201	8031000201	2.01	3381	3256	125	3256	2745	77	72
4	150	8	31	202	8031000202	2.02	4380	3819	561	3819	2930	297	175
5	151	8	31	301	8031000301	3.01	5403	5339	64	5339	4726	7	0
6	152	8	31	302	8031000302	3.02	4863	4618	245	4618	4022	270	19
7	7	8	31	303	8031000303	3.03	5071	4784	287	4784	4390	45	0
8	90	8	31	401	8031000401	4.01	3754	3390	364	3390	3243	60	24
9	18	8	31	403	8031000403	4.03	3399	3238	161	3238	3089	0	0
10	17	8	31	404	8031000404	4.04	2142	2046	96	2046	1670	50	176
11	91	8	31	501	8031000501	5.01	2154	2095	59	2095	1879	160	26
12	89	8	31	503	8031000503	5.03	2534	2481	53	2481	1901	135	53
13	16	8	31	504	8031000504	5.04	3556	3371	185	3371	3265	9	20
14	92	8	31	600	8031000600	6	3435	2952	483	2952	2583	84	0
15	9	8	31	703	8031000703	7.03	1898	1867	31	1867	1237	159	63
16	68	8	31	704	8031000704	7.04	3093	3026	67	3026	2532	99	76
17	15	8	31	705	8031000705	7.05	2775	2625	150	2625	2104	96	0
18	20	8	31	706	8031000706	7.06	2252	2103	149	2103	1741	47	39
19	170	8	31	800	8031000800	8	1414	1364	50	1364	482	710	42
20	171	8	31	902	8031000902	9.02	6034	5362	672	5362	4314	166	278
21	172	8	31	903	8031000903	9.03	6547	5380	1167	5380	4795	35	150
22	93	8	31	904	8031000904	9.04	5418	4462	956	4462	2789	174	45
23	173	8	31	905	8031000905	9.05	4225	4067	158	4067	3095	40	47
24	174	8	31	1000	8031001000	10	4931	4897	34	4897	3859	45	19
25	175	8	31	1101	8031001101	11.01	2481	2308	173	2308	1729	110	148
26	176	8	31	1102	8031001102	11.02	4818	4487	331	4487	3912	40	39
27	98	8	31	1301	8031001301	13.01	5570	5106	464	5106	4431	63	111
28	99	8	31	1302	8031001302	13.02	4015	3909	106	3909	2955	12	147
29	100	8	31	1401	8031001401	14.01	5498	5306	192	5306	3981	142	0
30	101	8	31	1402	8031001402	14.02	4802	4630	172	4630	3389	119	15
31	102	8	31	1403	8031001403	14.03	3409	3169	240	3169	2939	26	0
32	42	8	31	1500	8031001500	15	4458	4319	139	4319	3591	221	27
33	64	8	31	1601	8031001601	16.01	2862	2787	75	2787	2339	412	0
34	53	8	31	1602	8031001602	16.02	3559	3446	113	3446	3037	243	0

Figure 3.2: Example of Data in Microsoft Excel Used to Populate Maps

Chapter 4 – Denver Union Station

Background

Denver Union Station, a historic and central transportation hub in Denver, Colorado, has a rich history that dates to the late 19th century. Its story began as an ambitious venture to meet the demands of the growing city and its connection to the expanding railway network in the American West. The original Denver Union Depot opened on June 1, 1881, boasting a prominent clock tower and standing as the tallest building in the West at that time. However, this structure was short-lived; it succumbed to an electrical fire in 1894, leading to a rapid rebuilding effort. The replacement station, too, soon became inadequate for the city's needs, prompting the construction of a new, more grandiose structure. The current Denver Union Station, completed in 1914, was designed in the Beaux-Arts style with carved granite. It has welcomed many notable dignitaries over the years, including Queen Marie of Romania and several U.S. Presidents. The station reached its peak usage in the mid-20th century, particularly during World War II, serving over 50,000 visitors daily. However, the latter half of the 20th century saw a decline in rail travel, and the station gradually fell into disuse. In response, a significant renovation and redevelopment effort began in the early 21st century. This transformation, completed in late 2014, reinvented Denver Union Station as a mixed-use development featuring shopping, dining, and a hotel, while still serving as a major transportation hub. Today, Denver Union Station

stands not just as a functional transit center but also as a cultural and historical landmark, reflecting Denver's evolution and its pivotal role in the development of the American West.



Figure 4.1.1: Downtown Denver, Colorado

Denver's Transit-Oriented Development Program began in 2006. The main goal of the Denver TOD Strategic Plan (2014) for Denver, Colorado, including Denver Union Station, is to guide city-led actions essential for successful TOD implementation. This plan builds on previous efforts since the 2006 TOD Strategic Plan, focusing on integrating various city department policies, goals, and strategies towards TOD. It aims to enhance Denver's urban fabric by fostering mixed-use, walkable, and livable transit communities, thereby improving connectivity, sustainability, and socio-economic inclusivity across the city. As outlined in the 2014 plan, Strategic Planning is an important step to successful TOD implementation for several reasons:

- Station areas have identified needed, but unfunded, investments.
- Barriers to TOD implementation exist at multiple stations.
- Stations are at varying levels of market and development readiness for TOD.

- The city has limited resources to implement TOD.
- Alignment of City departments' approaches to TOD improves implementation efficiency.
- Some station areas best suited for near-term TOD may require focused financing strategies for needed investments.

To promote the TOD program, Denver amended their zoning code and worked with the Regional Transportation Department (RTD), the Colorado Department of Transportation (CDOT), and the Denver Regional Council of Governments (DRCOG) to implement the new regulations (Mazza et. al, 2023). The revised zoning code limited car use in heavily trafficked areas by limiting car-centered services such as mini-storage, drive-thrus, and car washes. Additionally, Denver created dedicated transit lanes, higher capacity vehicles to increase the number of people transported, and enhanced stops and stations along transit corridors. By 2016, there were 81 miles of rail lines and over 120 miles of bike paths implemented around the city.

The Denver Union Station redevelopment, a \$500 million project, has transformed a 19.5-acre former rail yard into a vibrant urban nexus, linking metro Denver with the global community through nine transportation modes and spurring regional growth. As Co-Master Developer, Continuum Partners spearheaded this initiative, earning the ULI Global Award of Excellence. The project encompassed new transit facilities, public spaces, and over 1.5 million square feet (about half the size of a large shopping mall) of private development, revitalizing the area while slashing public infrastructure costs by half. "The \$500 million Denver Union Station redevelopment is that rare project that not only elevates its immediate surroundings, but an entire city and region. By connecting metro Denver with Colorado and the rest of the world through

nine modes of transportation, union station has transformed 19.5 acres of abandoned rail yard into a cohesive, inviting urban center featuring new office, retail and residential developments surrounding the freshly renovated union station” (Continuum). Through a pioneering public-private partnership, the project was financed by a mix of local, state, federal, and private funds, including innovative use of federal loan programs. Continuum's involvement extended beyond construction, fostering community benefits like mentorship programs and sustainable development, exemplifying their commitment to the project's long-term success. The company CEO, Mark Falcone, is quoted,

“People are blown away by Union Station's infrastructure, not the 30,000-square-foot building; that’s just its charismatic vertebra. But the way people interact with their core city is going to change because of this infrastructure” (Continuum)

In Denver, TOD is closely linked to the presence of walkable urban areas that offer easy access to everyday needs without a car, representing some of the city's most sought-after neighborhoods. These areas exemplify TOD principles through pedestrian-friendly designs, diverse use mix, varied housing and transport options, healthy living choices, and numerous destinations, contributing to a lively, desirable environment. However, many of Denver's rail stations are situated outside these walkable communities, posing challenges to creating a cohesive, walkable urban network. TOD in Denver extends beyond mere station-area development; it's about crafting transit communities that enhance the city's urban fabric and connectivity.

Regional Transportation District

The Regional Transportation District (RTD) is the primary public transportation agency serving the Denver metropolitan area in Colorado. Established in 1969, RTD has grown to become an integral part of the region's transportation infrastructure, providing comprehensive transit services to millions of residents and visitors across eight counties including Denver, Boulder, and parts of surrounding areas. RTD operates a wide range of transportation options, including buses, light rail, and commuter rail lines, catering to the diverse needs of its service area. With a mission to deliver safe, clean, reliable, efficient, and cost-effective transit services, RTD aims to enhance the quality of life in the Denver metro area by promoting sustainable transportation alternatives. In recent years, RTD has embarked on significant expansion projects, such as the FasTracks program, which aimed to extend and improve the light rail and commuter rail network. This initiative reflects the agency's commitment to addressing the growing demands of the region's transportation needs and its dedication to environmental sustainability and urban development.



Figure 4.1.2: RTD Light Rail Car

emphasizing environmentally friendly transportation methods. The district’s services are designed to reduce traffic congestion, lower emissions, and promote efficient urban mobility. RTD also supports economic development by providing accessible transportation options, which helps to connect people with jobs, education, and essential services, contributing to the overall growth and vitality of the region. Seen in the table below, RTD boasts 134 fixed routes. Four of these fixed routes are contributed by commuter rails, six by light rail, and 97 by local and regional bus routes. The remaining fixed routes are operated by partnership services and special services (FlexRide, Senior Ride, etc.).

RTD Service Overview	
Service Area Pop.	3.09 Million
Service Area Sq. Mi.	2,342 sq. mi
Fixed-Route Service Mi. (weekday)	135,495
Fixed-Route Service Mi. (annual)	60,532,485
Passenger Bus Stops	9,720
Number of Fixed-Routes	134
<i>Commuter Rail</i>	4
<i>Light Rail</i>	6
<i>Local</i>	86
<i>Regional</i>	11

Figure 4.1.4: RTD Runboard

In terms of governance and funding, RTD is overseen by a board of directors elected by the public, ensuring that its operations align with community needs and priorities. The district’s budget, sourced from various channels including federal grants, local taxes, and fare revenues, supports its extensive transportation network and strategic initiatives. RTD’s infrastructure includes key facilities like Denver Union Station, a major transportation hub that integrates different transit modes, including bus, light rail, and commuter rail services. The station is a

central part of Denver’s transportation ecosystem, facilitating seamless connectivity and transit-oriented development in the area.

2014 Denver TOD Strategic Plan

The Transit-Oriented Development (TOD) Strategic Plan for Denver, established in 2014, outlines a comprehensive approach to urban development centered around transit hubs, specifically focusing on the transformative impact of the Denver Union Station reconstruction. This plan serves as a pivotal element in reshaping Denver's urban landscape, aiming to integrate transportation and land use to create sustainable, vibrant, and inclusive communities. The reconstruction of Denver Union Station, a historic and central transit hub, catalyzed significant socioeconomic changes across Denver County, influencing economic growth, real estate development, and community connectivity.

The reconstruction of Denver Union Station impacted the rest of Denver County in several significant ways:

1. **Economic Growth and Investment:** The redevelopment spurred economic growth and attracted substantial private investment into the area. This led to increased business opportunities, retail development, and residential projects, contributing to the overall economic vitality of the county.

2. **Real Estate Development:** The area around Denver Union Station saw a surge in real estate development, including residential, commercial, and mixed-use projects. This development helped increase property values and added to the county's tax base.
3. **Transportation and Connectivity:** As a major transit hub, Denver Union Station improved connectivity within the county and beyond, facilitating easier and more efficient travel for residents and visitors. This enhancement in transit options likely contributed to decreased traffic congestion and promoted the use of public transportation.
4. **Urban Renewal and Gentrification:** The redevelopment of the Union Station area led to urban renewal, transforming previously underutilized or neglected spaces into vibrant, active areas. However, this revitalization also brought concerns about gentrification, potentially leading to displacement of lower-income residents and changes in neighborhood demographics.
5. **Tourism and Commerce:** By becoming a destination, Denver Union Station attracted tourists and locals alike, boosting local commerce and contributing to the county's economic diversity and resilience.
6. **Sustainable Urban Development:** The reconstruction emphasized sustainable and transit-oriented development, aligning with broader goals for environmental sustainability and efficient land use within the county.

Overall, the reconstruction of Denver Union Station acted as a keystone for broader socioeconomic changes across Denver County, driving growth, improving infrastructure, and reshaping urban landscapes.

Funding and taxing played critical roles in the TOD plan, particularly regarding the redevelopment of Denver Union Station. Key mechanisms included:

1. Metro Districts: These independent special districts can impose taxes, assessments, fees, and other charges to raise revenue for public improvements. Metro Districts operate within the parameters established in their service plan, which is authorized by the City Council, and are typically considered for areas with few large land holdings or developer-driven projects.
2. Tax Increment Financing (TIF): TIF captures the incremental taxes generated when a property is developed to a higher and better use. This increase in property value produces additional revenue that can fund TOD projects. However, to use TIF in Denver, a project site must meet the definitions of blight as outlined by the Denver Urban Renewal Authority (DURA).
3. Urban Renewal TIF: Managed by DURA, this financing tool has been effective in redeveloping infill locations, including several TODs. While some station areas might qualify as urban renewal areas, not all meet the necessary blight requirements, thus limiting the applicability of this funding source.

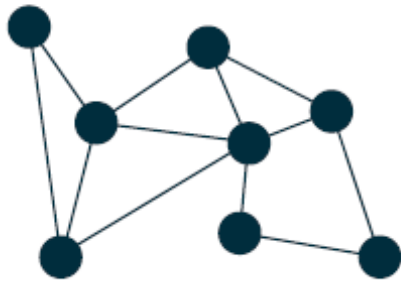
These funding and taxing strategies were integral to implementing the TOD Strategic Plan, enabling the City of Denver to finance infrastructure improvements and other developments essential for the plan's success.

TOD Principles

Transit-Oriented Development (TOD) principles focus on creating vibrant, sustainable communities centered around high-quality public transportation. TOD aims to increase access to transit, encourage mixed-use development, and promote walkability and cycling. By integrating residential, office, and retail spaces with transit options, TOD seeks to reduce reliance on automobiles, enhance urban livability, and support economic growth. This approach is key to building more inclusive, connected, and environmentally sustainable cities. As presented in the 2014 Denver TOD Strategic Plan, the following TOD principles establish a base line for Denver neighborhoods to envision and plan for great transit communities:

TOD PRINCIPLES

connect



Achieve a high level of connectivity at station areas. The more walkable and bikeable a station area is, the greater amount of access is granted to the most people. This is true in both stations that are located in areas with a strong market development potential, as well as stations that simply need to serve existing neighborhoods. As each station increases its reach into the larger community, access to the region's economy is improved.

- Entry Point** – access to the regional economy
- First/Last Mile** – walk, bike, bus to the station
- Access to All** – connect to new and existing neighborhoods

innovate



Innovation drives Denver to take its place in the global economy, leading the Rocky Mountain region in building healthy, sustainable, and equitable communities. Transit communities have proven to be more environmentally, socially, and economically sustainable than areas dependent on one mode of transportation. Seeking innovative thinking around TOD in Denver can foster sustained, responsible, economic growth.

- Sustainable** – economic, social, environmental
- Equitable** – opportunities for all
- Global Economy** – compete on the world stage

efficient



Be an intrinsically efficient place to live, play, and do business. By consciously placing homes, jobs, civic uses, shopping, entertainment, parks and other daily necessities close to transit stations, cities make possible short, walkable trips and reduce long, inefficient travel. A greater percentage of jobs and housing placed close together at rail stations throughout the region can lead to better use of infrastructure dollars.

- Location** – one place to live, work, and play decreases need for regional trips
- Shared Resources** – reduce cost of infrastructure per household
- Balance** – jobs and homes nearby reduce travel times and long commutes



Figure 4.2.1: TOD Principles – pt. 1

place



Make places not just to travel through, but rather to stop, linger, converse, and generally live life. These activities happen in the public realm – the streets and open space – between buildings. Great public spaces with easy access encourage people to come outdoors, promoting a feeling of safety and visual interest for pedestrians. An activated public place becomes a destination, strengthening the livability of the community.

- Active** – promote safety and visual interest
- Vibrant** – bring together people and activities
- Destination** – public life happens in the streets and open space

mix



Provide a balanced mix of complementary uses and activities within close proximity, increasing the chances that people can reach a majority of their daily needs by foot, bicycle, or transit. A strong mix of uses keeps streets active and safe while making many daily trips walkable. Transit communities' balanced mix of uses and activities provides residents a true choice of lifestyles, leading to a more resilient place to live, work, and play.

- Choice** – housing, jobs, shopping, transit options
- Diversity** – mix of incomes and age groups
- Resilient** – stands up through changing economic conditions

shift



Lead the region's effort to shift into a new way of thinking about personal mobility. The shift from being a car-dependent city to a multi-modal city is taking place all over the world. A true multi-modal city goes beyond needed transit improvements. A complete network needs high-ease-of-use bike and pedestrian facilities, car sharing, bike sharing, and other new ways to make getting around without the use of a car a reality.

- Car Free/Car Lite** – becoming non-/less car dependent for most trips
- Public Space** – more room for pedestrians and bikes, less for cars
- Reduce and Energize** – carbon emissions go down, healthy living goes up

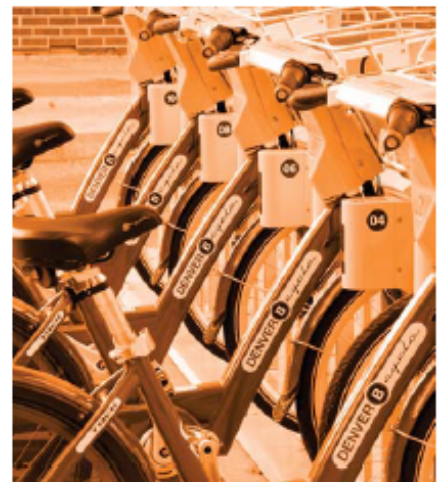


Figure 4.2.2: TOD Principles – pt. 2

Context for TOD

Over the years, Denver has experienced cycles of economic booms and stagnation, with significant growth spurts linked to events like the gold rush and the oil and telecom booms. These phases of economic prosperity were crucial in shaping the city's infrastructure and urban landscape. In recent times, Denver has diversified its economy, hosting a mix of startup tech companies, industrial manufacturing, and innovative business cultures. This diversification has contributed to a robust urban center, rich in jobs, housing, cultural sites, and entertainment, making Denver a magnet for a highly educated workforce and a leader in urban development.

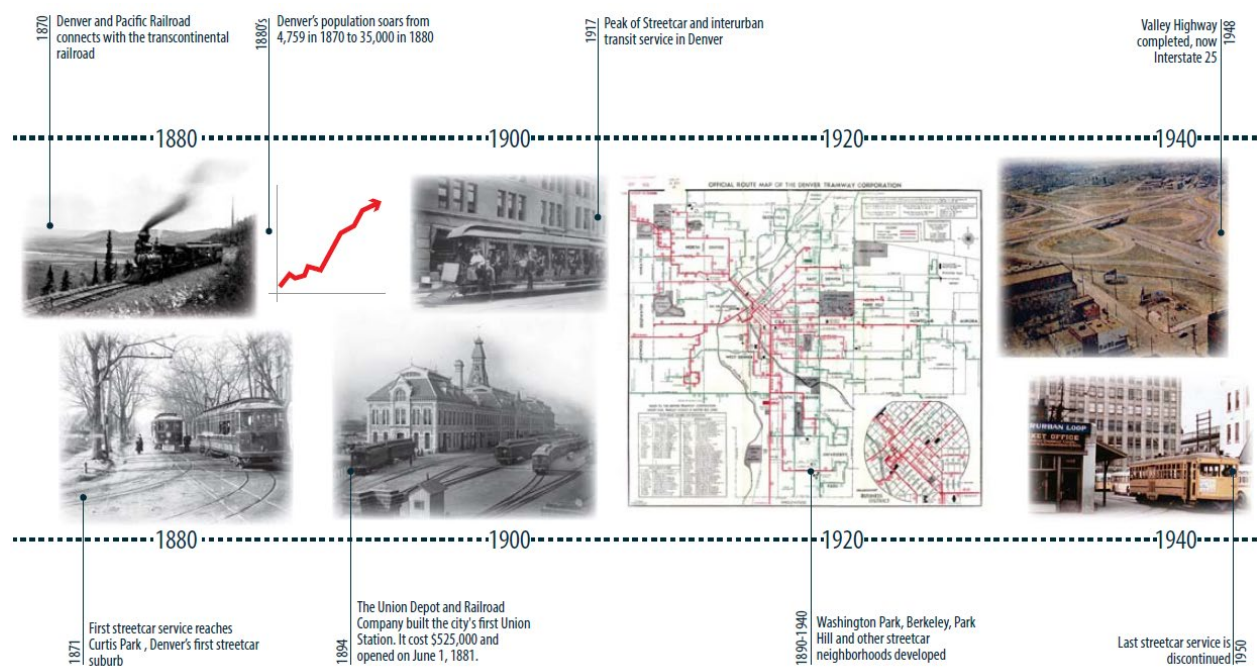


Figure 4.2.3: History of Transit in Denver

Denver's development pattern closely follows its transportation history, from railroads to streetcar suburbs and freeway communities. Key transportation investments like the Denver

Pacific Railroad and the expansion of the Denver Tramway Company played pivotal roles in shaping the city's growth. Recent projects like the T-REX and RTD FasTracks have further transformed the urban landscape, enhancing connectivity and supporting the city's vision of a walkable, livable community.

Transit-Oriented Development in Denver aims to create transit communities that integrate suburban and urban areas with the city's core, enhancing overall connectivity. The strategic placement of passenger rail stations and the focus on eliminating barriers to TOD are steps toward weaving a more cohesive urban tapestry. This approach aligns with Denver's objective of becoming a world-class city, where seamless connections between transportation hubs and walkable neighborhoods are fundamental.

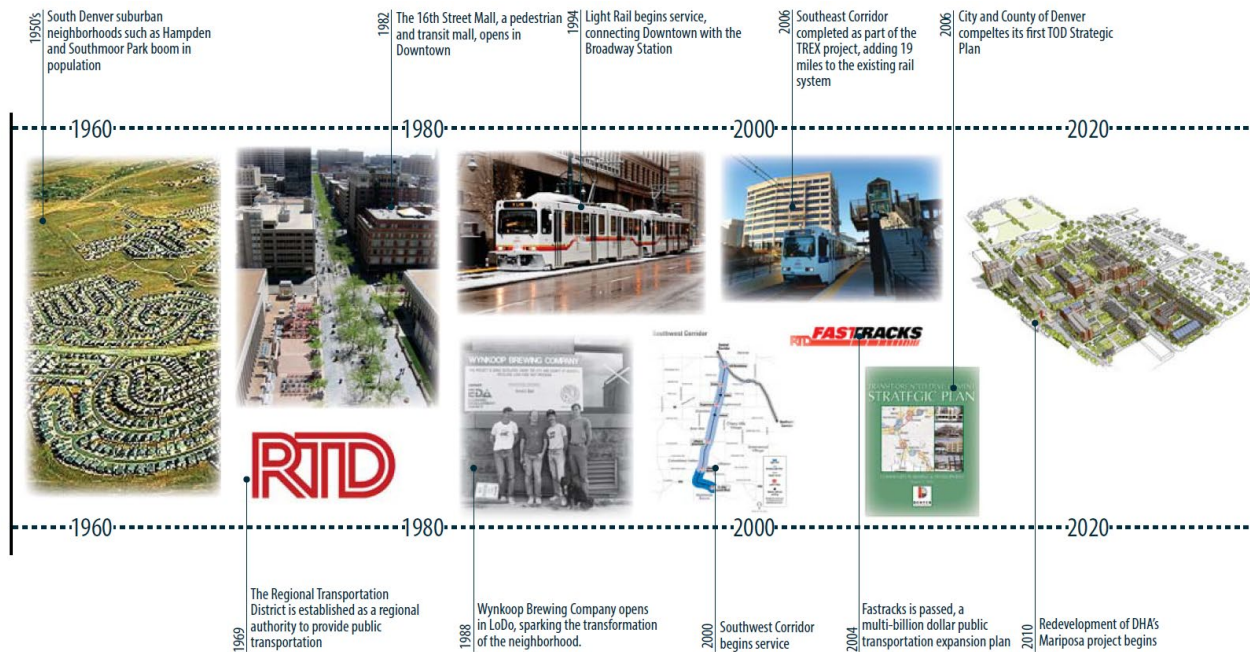


Figure 4.2.4: (Continued) History of Denver

In summary, the context for Transit-Oriented Development in Denver is deeply rooted in the city's unique geographic and historical landscape, its economic resilience, and strategic

transportation initiatives. These elements collectively form the foundation for Denver's TOD strategy, aiming to foster a more integrated, sustainable, and dynamic urban environment.

Readiness For TOD

Over the last several years, Denver has collectively begun to re-imagine the city's perception of itself, contemplating its identity and future direction. Questions abound: Is Denver a car-centric city, or is it on the verge of becoming a transit-oriented urban hub? Should the ideal living space be a single-family home with a two-car garage, or a more compact townhouse in a lively neighborhood? And what draws people to Denver—is it the allure of the mountains, or the appeal of urban living?

Though automobiles remain common, Denver is witnessing a cultural and practical shift in transportation and living preferences. Biking to work has transitioned from a novelty to a norm, and there's a burgeoning demand for efficient, infill housing locations. As one of the nation's fastest-growing major cities, Denver is a magnet for talented individuals and innovative businesses. The city is experiencing a surge in housing development, particularly in Downtown and adjacent neighborhoods, with millennials and baby boomers alike valuing the ambiance of their neighborhoods over the square footage of their homes. This mirrors a national trend toward mixed-use communities that prize walkability and transit accessibility—a significant pivot from the dominant land use and transportation patterns of the past seven decades. Denver is poised to meet the escalating demand for walkable, livable communities.

Denver's readiness to evolve into a transit-oriented city is underscored by the willingness to expand walkable areas and enhance neighborhood connectivity. Neighborhoods experiencing

rapid growth, like Union Station and the Lower Highlands, are burgeoning with activity and are a focal point for investors seeking the next prime location. Many rail stations in close proximity to Downtown Denver present a ripe opportunity for urban infill development. These areas, characterized by promising redevelopment potential, improving market conditions, and robust connectivity to the vibrancy of Downtown, are ideal for fostering the next wave of growth. These transit hubs are catalysts for extending the walkable fabric of Denver's neighborhoods, creating new employment opportunities, and diversifying housing options for those wishing to call Denver home.

Denver County was not just ready but eager for Transit-Oriented Development. The graphics below provide several key indicators that support this readiness:

70% OF HOUSEHOLDS = MARKET FOR TOD
DENVER HOUSEHOLDS BY TYPE

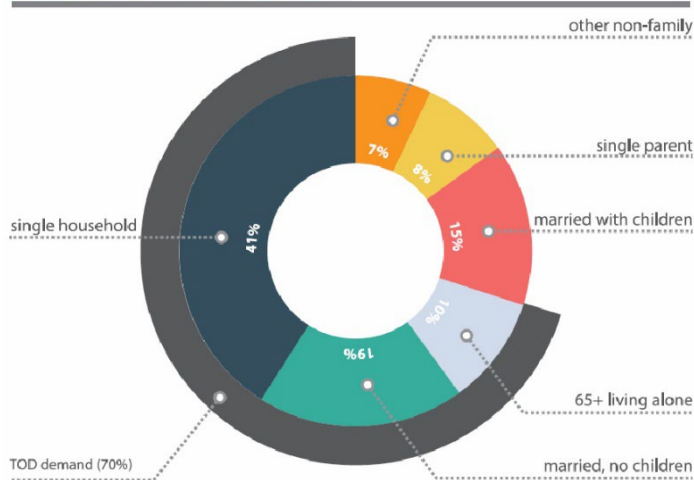


Figure 4.3.1: Denver Households by Type

Household Dynamics: With 70% of households forming the market for TOD, Denver's diverse household types—including a significant proportion of single households and married couples without children—reflect an ideal demographic for TOD communities.

DENVER IS THE #1 CITY FOR MILLENNIALS
TOP 7 GAINERS OF POPULATION AGED 25-34 FROM 2000-2010

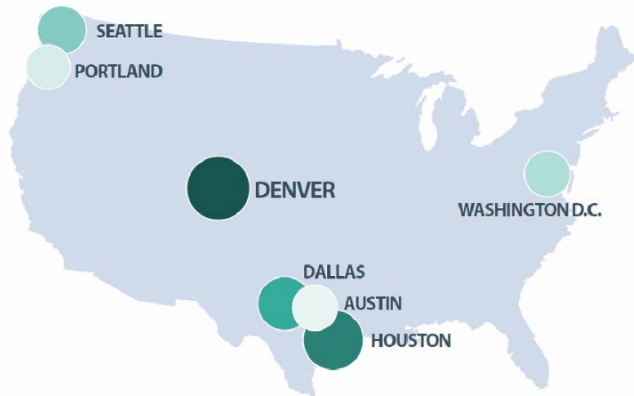
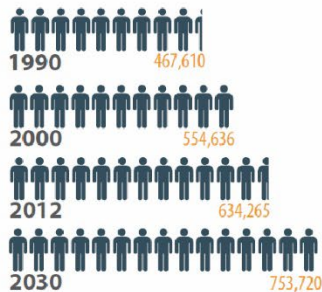


Figure 4.3.2: Gainers of Population Aged 24-34

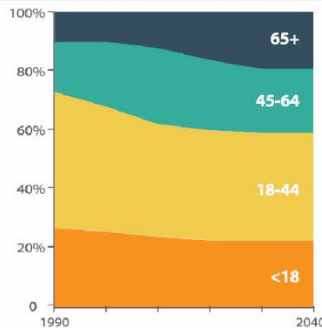
Population Growth and Preferences: As the number one city for millennials, Denver's population trends suggest an inclination towards urban living and modern housing preferences. The population growth, estimated to reach 753,720 by 2030, shows a dynamic urban expansion that TOD can effectively support.

Ageing Population and Urban Densification: The shifting age demographics, with an increase in older adults, point to the need for more accessible, transit-rich neighborhoods that can cater to all ages, reinforcing the need for TOD. The significant densification of Colorado's urban population, from 62.7% in 1950 to 86.2% in 2010, signifies a move towards denser, more transit-friendly environments.

DENVER IS GROWING
TOTAL POPULATION



THE POPULATION IS AGING
COLORADO HOUSEHOLDS BY TYPE



COLORADO IS DENSIFYING
COLORADO URBAN POPULATION

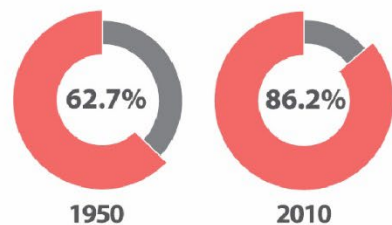


Figure 4.3.3: Population Growth, Age, and Densification

Expanding Regional Rail Transit: The marked growth of the regional rail transit system from 5.3 miles in 1994 to a projected 81 miles in 2016 underscores a commitment to improving public transit infrastructure.

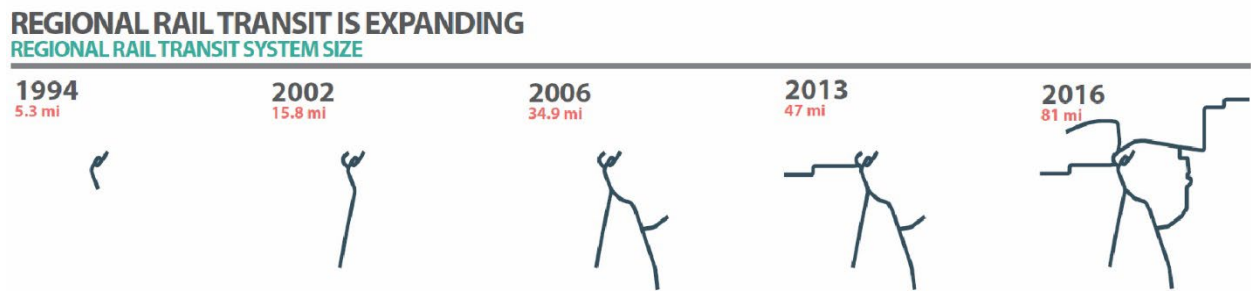


Figure 4.3.4: Expansion of Rail Transit in Denver

Decreasing Dependence on Cars: The trend of declining per capita vehicle miles traveled in the Denver region signals a shift away from car dependency towards alternative modes of transport.

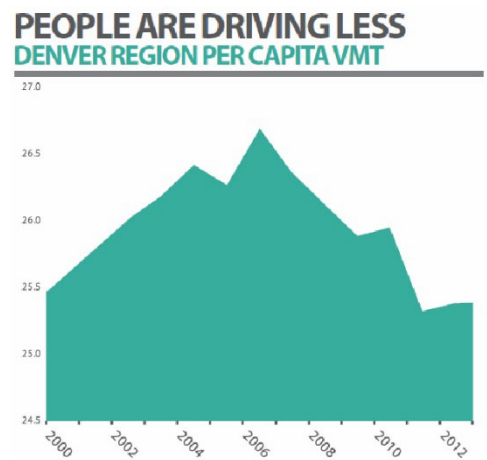


Figure 4.3.5: Denver Region Per Capita VMT

Growth in Bike Infrastructure: The increasing miles of bike lanes in Denver reflect the city's efforts to promote cycling as a viable and popular mode of transportation.

**BIKE INFRASTRUCTURE IS GROWING
MILES OF BIKE LANES IN DENVER**

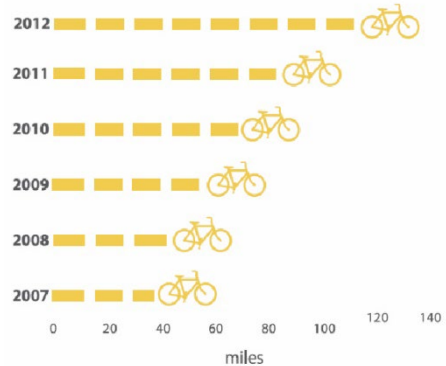


Figure 4.3.6: Denver Bike Infrastructure

Rise in Non-Automotive Travel: The increase in biking and walking's share of Denver's mode of transportation indicates a shift towards a more active, sustainable, and transit-oriented lifestyle.

**BIKING & WALKING IS INCREASING
DENVER MODE SHARE**

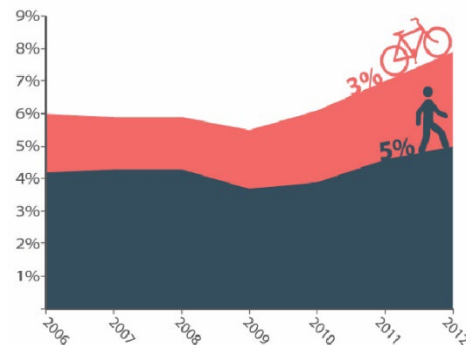


Figure 4.3.7: Denver Mode Share

Taken together, these trends point to a city that is not only ready but actively transitioning towards a more transit-oriented future. Denver's evolution reflects a city aware of its potential for TOD to create a more connected, sustainable, and livable urban environment for all its residents. With the groundwork laid and a clear vision for the future, Denver stands at the forefront of

shaping a modern urban landscape where transit-oriented living isn't just possible—it's the preferred way of life.

Denver County Community Profile

Denver's population saw a significant increase of more than 115,000 residents between 2010 and 2020, amounting to a growth rate of 19.2%. This surge brought the city's population up to 715,522. The growth was evident not only in Denver but across metro counties, with Broomfield County experiencing the highest growth rate in the state. The map below depicts the changes in Denver County's population from 2010 to 2020. Areas in blue experienced growth, with darker shades indicating higher increases—up to and exceeding 120%. Red regions saw population declines of up to 30%. The map shows a considerable variation in population dynamics across Denver County, with some areas burgeoning and others shrinking, reflecting the shifting demographics within the county over the decade.

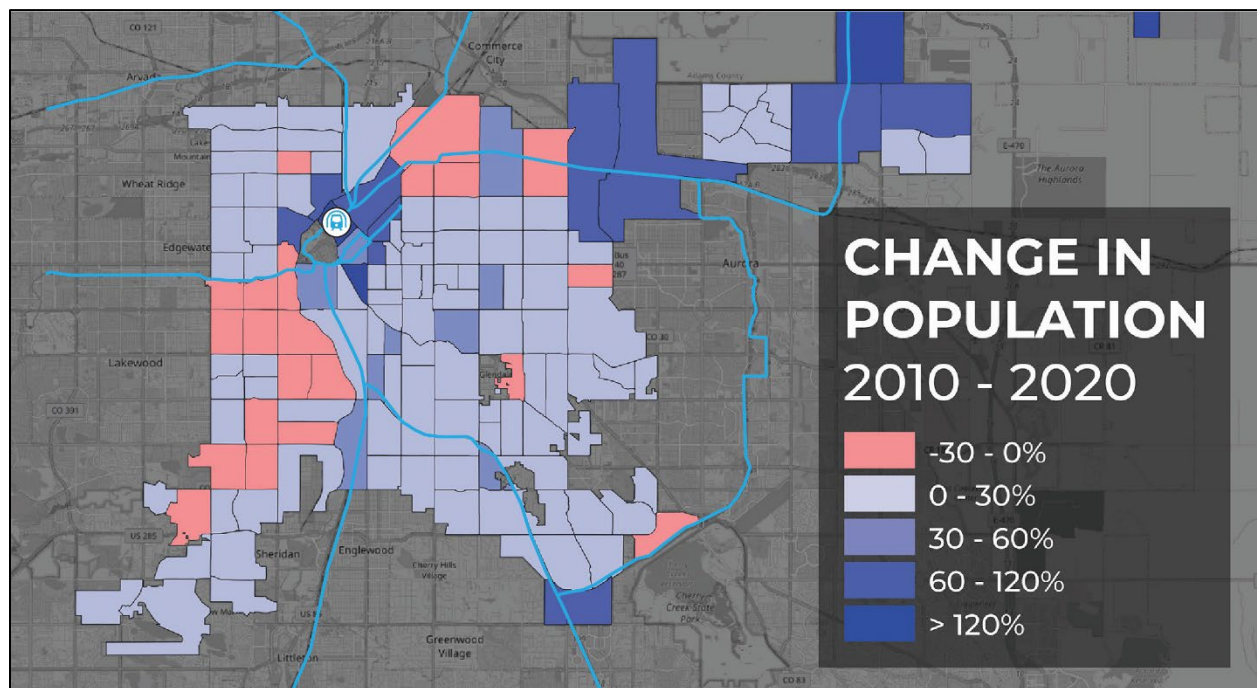


Figure 4.4.1: Change in Population in Denver County

In an article over the demographic change in Denver, Kevin Beaty states, “Denver, like the rest of the country, has gotten less white.” (Beaty, K. 2021). Between 2010 and 2020 in Denver, the percent of residents who said they identified with multiple races rose drastically, from just four percent to 13.5. The number of people in Denver who identified as "white only" dropped from 70 percent to 60. Just two Census tracts in the city came back as overwhelmingly "white" in 2020: Denver's Country Club neighborhood and the top piece of Washington Park. On the map, there's a noticeable shift from 2010. Another trend noted at the national level is an increase in people who identify as two or more races. That also happened in Denver. Between 2010 and 2020, the percent of residents who said they identified with multiple races rose from just four percent to 13.5.

PERCENT OF RESIDENTS WHO DO NOT IDENTIFY AS ONLY WHITE

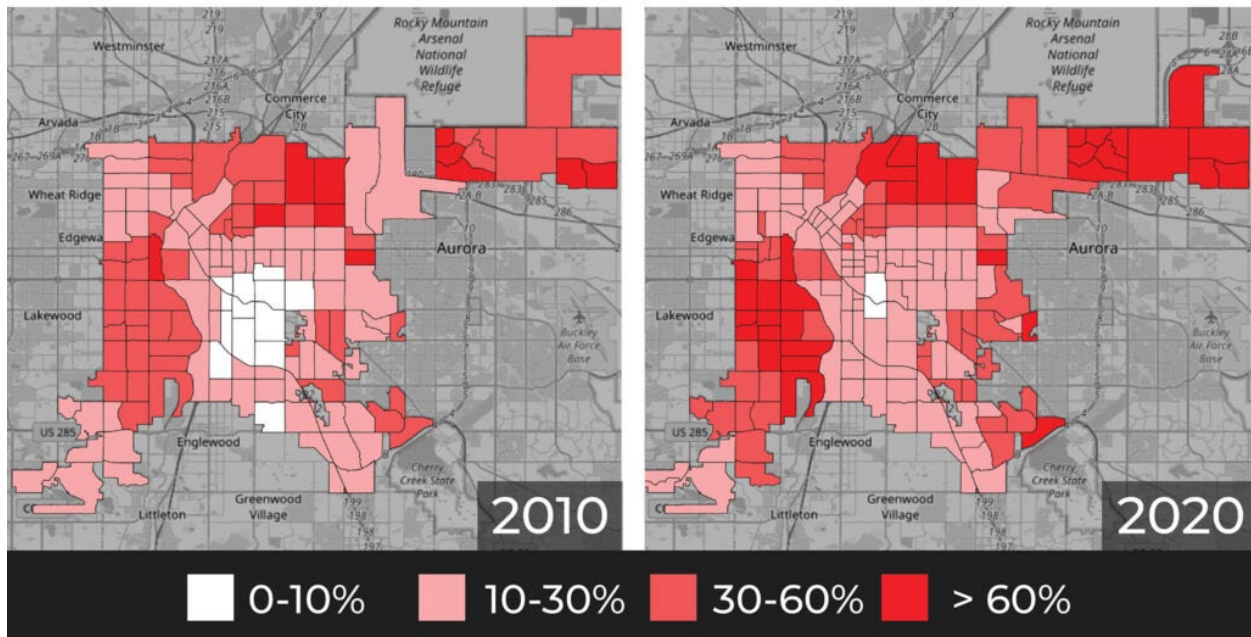


Figure 4.4.2: Percent of Residents Who Do Not Identify as Only White From 2010 to 2020

Above, **Figure 4.4.2** illustrates the demographic changes in Denver County over a decade, comparing the percentage of residents who do not identify as not white only in 2010 and 2020. The map indicates a decrease in areas where residents predominantly who do not identify as only white. In 2010, larger portions of Denver County were represented by higher percentages of not white-only identifying residents, while by 2020, these areas appear to have increased, suggesting a diversification in the racial and ethnic composition of the county's population.

PERCENT OF RESIDENTS WHO IDENTIFY AS HISPANIC OR LATINO

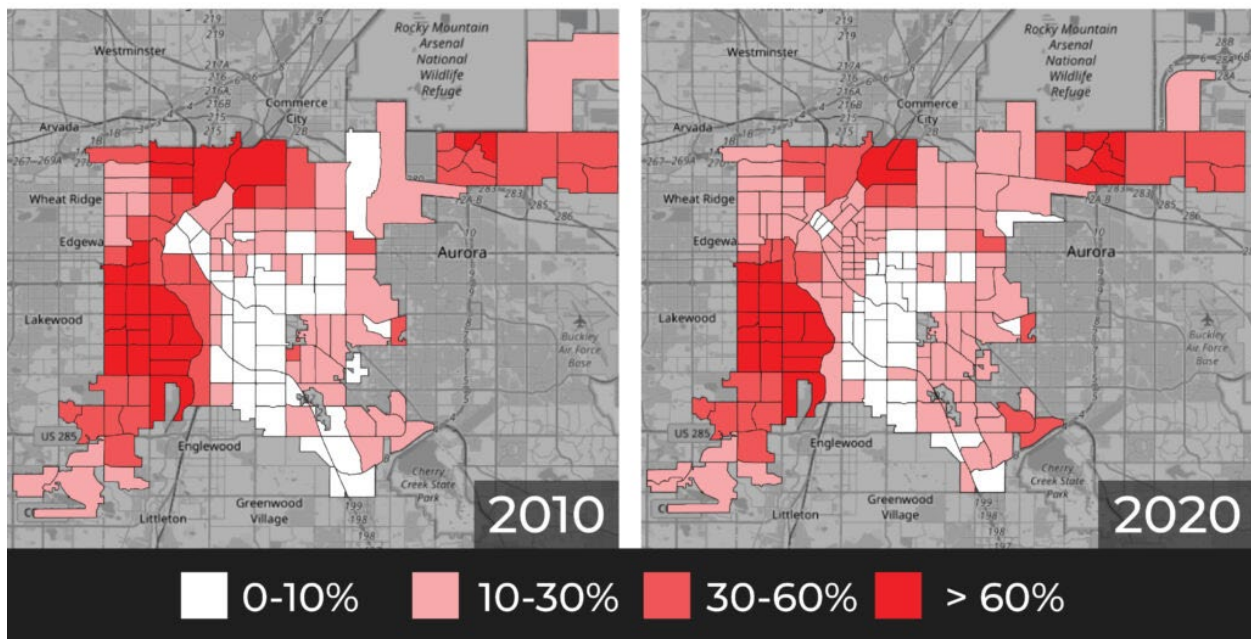


Figure 4.4.3: Percent of Residents Who Identify as Hispanic or Latino From 2010 to 2020

The numbers also show how gentrification has played out across town. Across the city, the proportion of people who identified as Hispanic/Latino or only Black declined since 2010. Ten years ago, Black residents made up 10 percent of the population. Now they account for nine. People who identified as Hispanic or Latino (which on the Census is an ethnicity that can encompass any race) fell from 31 percent to 28. The real news here is changes in where people

live. There have long been complaints in Hispanic and Latino communities that the "Northside," Denver's northwest area commonly known now as "the Highlands," has been ground zero for displacement as wealthy people move in, scrape houses and raise property values. It's been such a hot-button issue that a play about gentrification in the neighborhoods sold out for weeks. In the last decade, people who identify as Hispanic or Latino did become smaller proportion of the Census tracts in the Northside. In the Highland statistical neighborhood, in particular, this slice of the community went from 37 percent of the population to just 16. Baker saw a similar trend for Hispanic/Latino residents, who dropped from 34 percent to 18 in the last ten years.

PERCENT OF RESIDENTS WHO IDENTIFY AS ONLY BLACK

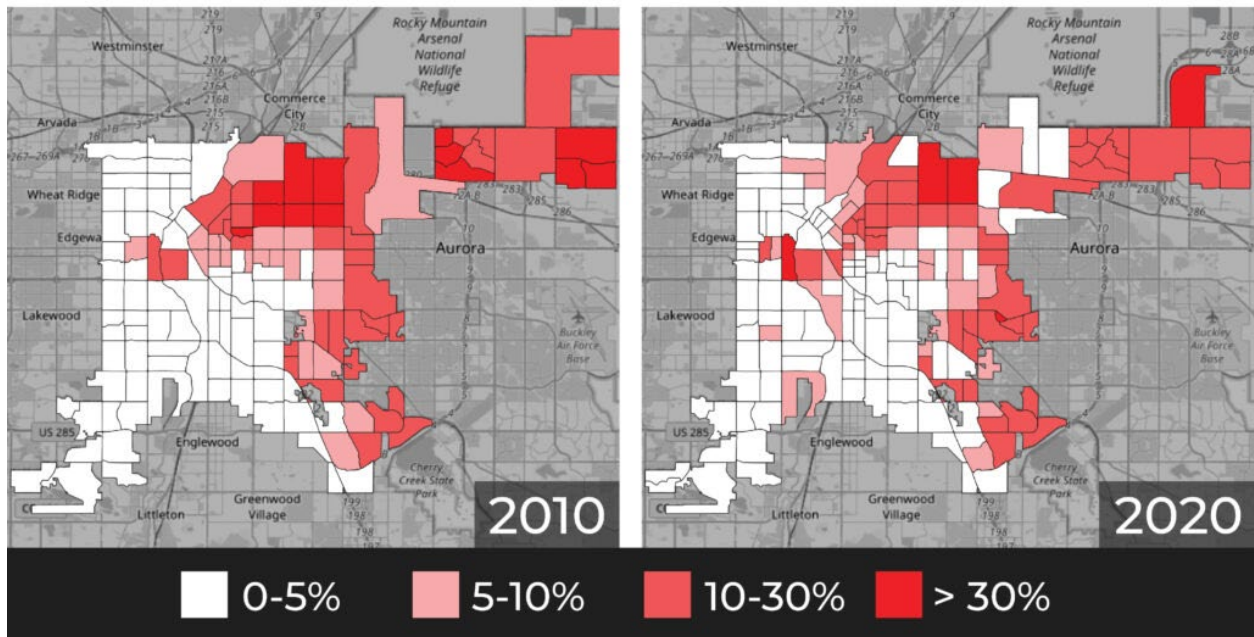


Figure 4.4.4: Percent of Residents Who Identify as Only Black From 2010 to 2020

The Census also quantifies how many Black residents moved out of historic neighborhoods as the city grew. In Five Points, once known as the "Harlem of the West," Black

residents represented 16 percent of the population in 2010. A decade later, that number had fallen to 10 percent. The stats paint a starker picture for Park Hill, the three neighborhoods just east of Colorado Boulevard where many Black families moved after redlining rules, which restricted them to Five Points in the early 20th century, were eased and unwritten. In 2010, Black residents comprised 32 percent of all three neighborhoods - South Park Hill, North Park Hill and Northeast Park Hill. Today, that number has fallen to 21 percent. While people who identify as only Black and Hispanic/Latino have become smaller proportions of the total population, people who consider their racial identities only Asian, Indigenous, or "other" have stayed fairly constant in the last decade.

Housing

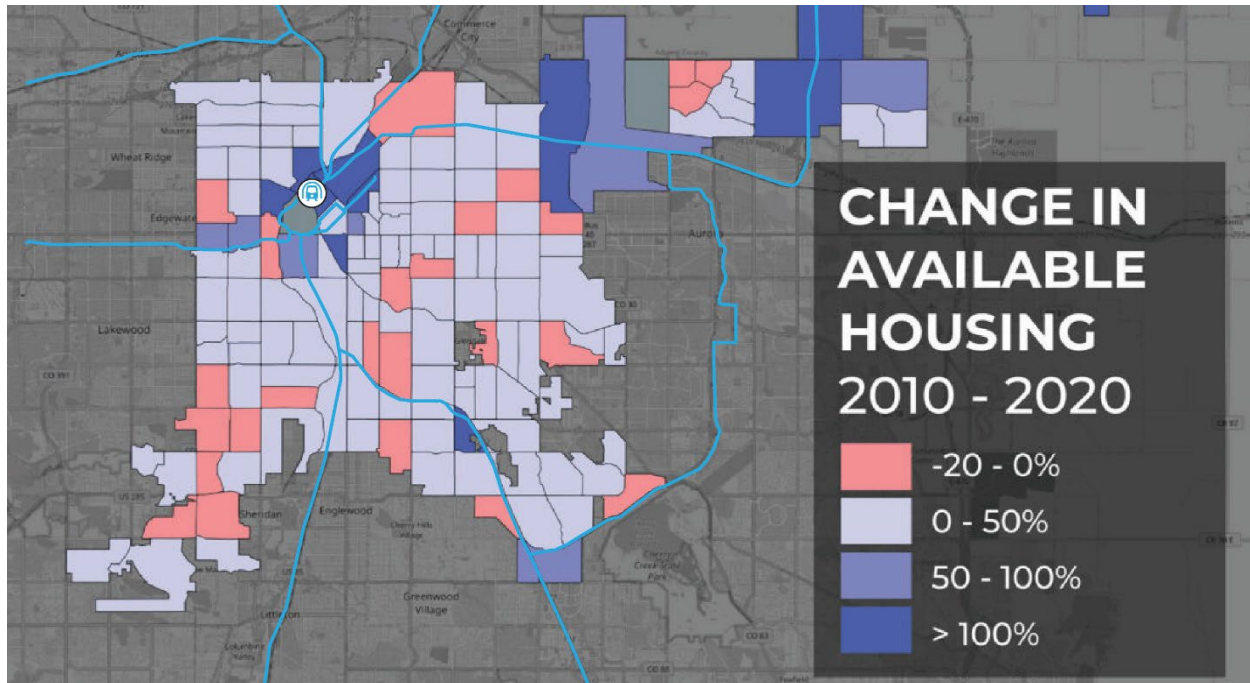


Figure 4.4.5: Change in Available Housing From 2010 to 2020

Here's something else that deserves a deeper look: vacant units, of which there were over 27,000 recorded in the Census. In the meantime, here's a map of where they were concentrated. Golden triangle, where luxury units have been built, had the second-most empty units on the list. The tract with the most was a southern bit of Five Points, where high-rises also continue to grow along Welton Street.

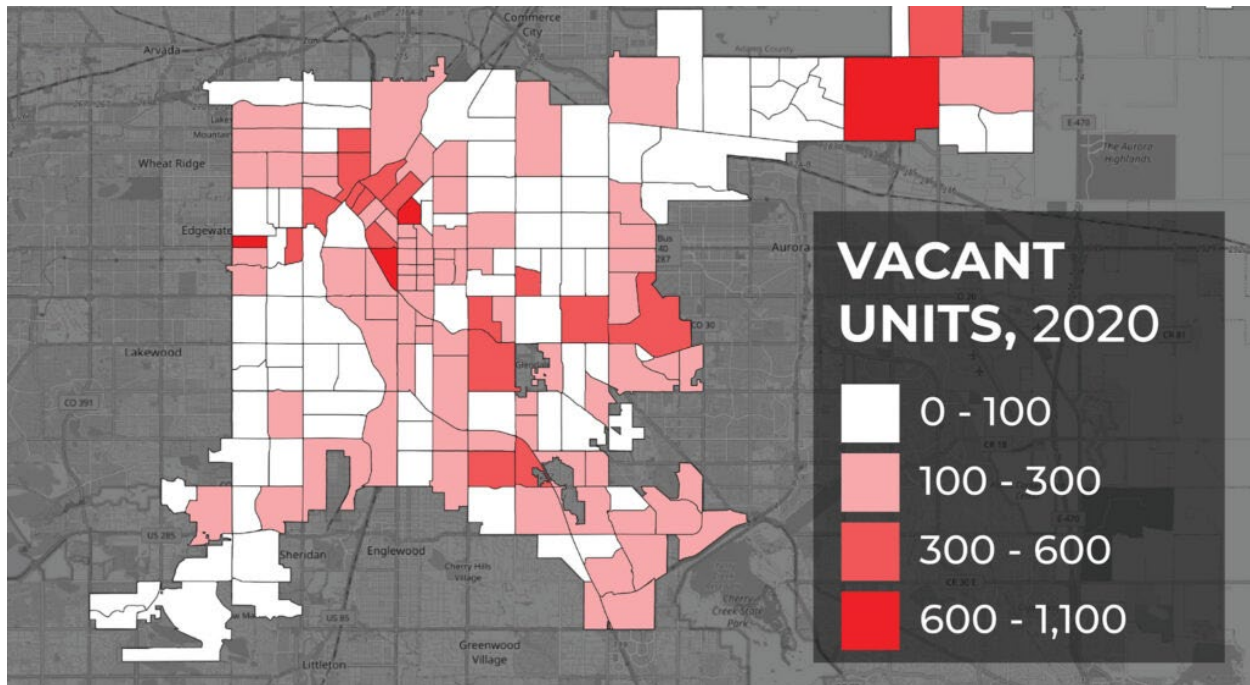


Figure 4.4.6: Vacant Units in 2020

The booming construction sector in Denver responded to a rising demand in the multifamily market, with apartment occupancy rates reaching 94%, surpassing the national average and continuously driving up rent prices. Between 2010 and 2020, home prices in Denver saw a substantial increase, impacting the demographics of renters and homeowners alike. According to the Colorado Real Estate Journal, "Denver's average rent soared by 85%, from \$898 in 2010 to \$1,660 in 2019, and home prices experienced a 104% increase, reaching \$431,000 in 2019" (Lupa, I. 2020). This growth outpaced national trends, with U.S. average rent rising by 36% and median home prices by 31% during the same period, highlighting Denver's unique market dynamics where home prices escalated more rapidly than apartment rents.

From 2010 to 2020, Denver added 61,700 units to its multifamily housing market, ranking it among the top 10 U.S. metros for apartment construction in the decade. The consistent high demand and swift occupancy of these units encouraged developers to increase the supply, especially of luxury apartments, with 51% of the new units being high-end, in Class A and A+ buildings. The average apartment size in Denver County decreased by 43 square feet, a 5% reduction over the decade, reflecting a growing demand for smaller, more affordable living spaces like studios and micro-apartments in the city.

Chapter 5 – Conclusions

To gather the results of this research, we use a mixed-method analysis to enable a comprehensive understanding by quantitatively measuring changes in socioeconomic indicators while qualitatively exploring community experiences and perceptions. Using a mixed-methods analysis is important because it combines the strengths of both quantitative and qualitative research. Quantitative data provides numerical evidence of trends and patterns, allowing for a broad overview of the research question, while qualitative data offers depth and context, possibly revealing the underlying reasons and motivations behind those trends. This comprehensive approach leads to a more nuanced and complete understanding of the research topic, enhancing the validity and reliability of the findings.

Data Analysis

While statistics only provide a glimpse of what is going on in the community, it does provide us with quantitative data that we can use to understand our research. Throughout our quantitative analysis, we've looked at the County examining the population and demographic patterns. There is no denying that Denver is growing at an accelerated rate, and that economic growth comes with population growth. The important note of this is to look at how Denver is adjusting to the rapid growth and how they are growing economically. To stay in line with this, the goal of the research is to find what impact the redevelopment of Denver Union Station had on Denver County, not the effect.

Looking at demographic data is crucial in analyzing the impact of Denver Union Station's redevelopment because it provides insights into how different population groups are affected. Changes in demographics, such as shifts in age distribution, income levels, racial composition, and household types, can indicate the station's influence on local communities. This data helps to identify trends like gentrification, economic displacement, or improved access to services, offering a clearer picture of the socioeconomic changes resulting from the Transit-Oriented Development.

When looking at the demographic data (White, Black, and Hispanic), we can see an increase of each group throughout Denver County. This leads us to believe gentrification has not taken place throughout Denver County. While the population of Denver County grew and densified, so did the demographic populations. By examining the demographic maps, we can infer that displacement did not take place as most neighborhoods only grew in their respective demographic population. While some populations increased in percentage, it is important to note that the Black percentage fell from 10% down to 9%, and the Hispanic percentage fell from 31% to 28%. As populations grow, the percentage of populations fluctuate. This does not raise concerns of gentrification for the reason of a small change in percentage.

Interview Analysis

Conducting interviews with residents in the study area is important because it provides qualitative insights into the community's experience and perceptions of the changes brought by the redevelopment of Denver Union Station. Through interviews, we can gather personal narratives and detailed accounts that reveal the impact on residents' daily lives, uncovering aspects that statistical data alone cannot show. This approach helps to understand the nuanced impact of Denver Union Station, contributing to a more comprehensive analysis of the socioeconomic impact.

With the help of these interviewees, we are able to conduct an analysis of the impact of Denver Union Station through a qualitative analysis. By engaging with resident in the Denver region, we gain a better understanding that statistical data alone can not show. Their backgrounds in engineering and transportation also provide a great understanding of the subject.

When asked about the availability of public transportation and the ease of access around Denver, both Stephen and Hannah agreed that mobility has drastically increased. Stephen is quoted, “You know, most areas around Denver have always been bad for driving and it's gone from bad to still bad... it's so much easier to get downtown by rail, especially access by bike, and into the Union Station area.” Stephen then went on to talk about how his daily commute has gotten easier due to the increase of bike infrastructure and how easy it is for him to bike to a rail station and hop on the line to downtown and bike from Denver Union Station to his place of work. Hannah responded to the question of mobility, “The availability of public transportation is widespread in the Denver-metro area. My awareness of different options of travel modes has

increased significantly as the transit has grown over the years”. While Hannah stated that she does not use public transportation as much as she thinks she should, she states that she has seen a drastic increase in mobility and ease of access.

One of the main aspects of the interview was focused on the socioeconomic change they’ve seen in their community. When asked how the TOD redevelopment has impacted social interaction, Hannah stated, “I think this project has increased social interaction among a high percentage of Denver-metro residents by providing access across Denver, and Denver Union Station as a dual social space”. Stephen replied similarly to this question. Both interviewees agreed that the development of space around transportation infrastructure has increased social interaction. With the implementation of new mixed-use developments near existing transportation infrastructure, social interaction has increased with the availability of many amenity options.

Chapter 6 – Recommendations

This analysis leads us to our main research question: did the reconstruction of Denver Union Station impact socioeconomics in Denver County? Yes. By serving as a keystone for broader regional development, the redevelopment of Denver Union Station created connectivity for all, throughout the Denver region. The redevelopment of Denver Union Station promotes socioeconomic benefits for the entire county by significantly enhancing connectivity and mobility. By serving as a central transit hub that integrates various modes of transportation, it facilitates easier and more efficient travel across the region, linking outlying areas with downtown Denver and boosting access to employment, education, and services. This improved connectivity attracts businesses and stimulates economic activity throughout the county, leading to broader regional development and prosperity. Moreover, the project catalyzed a wave of development in the surrounding areas, leading to the construction of new residential complexes, office buildings, retail spaces, and cultural amenities. These developments have stimulated the local economy, increased the county's tax base, and provided a range of employment opportunities. The influx of new residents and businesses into the area has revitalized once underutilized spaces, turning them into bustling hubs of activity and commerce. Additionally, the Union Station project has had a broader impact by enhancing the overall attractiveness of Denver County as a place to live, work, and visit. The area's transformation into a vibrant urban district has improved the quality of life for its inhabitants and made the county a more desirable destination for tourists and new residents alike. The combination of these factors has contributed to a dynamic, economically robust community, underscoring the transformative power of strategic urban redevelopment projects like Denver Union Station.

Now, we ask can Transit-Oriented Development contribute to sustainable urban development? Yes, Transit-Oriented Development can contribute to sustainable urban development. The redevelopment of Denver Union Station promotes sustainability by integrating multi-modal transportation options, reducing the reliance on individual car travel and lowering carbon emissions. The project's design includes green spaces and energy-efficient buildings, contributing to environmental conservation and promoting healthier urban living. Additionally, the mixed-use nature of the development encourages local economic growth and reduces urban sprawl by concentrating resources and amenities in a central location. These features ensure that Denver Union Station is poised for future sustainability, both environmentally and economically.

Looking at the final question of our research, did the reconstruction of Denver Union Station have an impact on gentrification? It does not appear that the reconstruction had a negative impact on gentrification in the county. The data shows that there were more residents that identified as Black and non-Hispanic who were growing in population in Denver County. If gentrification were to take place, we would see less of these populations and more White populations throughout the county. Although, the rapid increase in housing costs and the focus on luxury apartment construction in Denver may have exacerbated gentrification, displacing lower-income residents and altering neighborhood demographics. As property values and rents rise, affordable housing options diminish, potentially pushing long-standing communities out of their neighborhoods and contributing to socio-economic segregation. While rising housing costs is an often indicator of gentrification, it is important to keep in mind the population numbers that sustained the economic change.

Implication for Planning

When evaluating the impact of Transit-Oriented Development on socioeconomics, and acknowledging its positive impact on communities, several planning policy recommendations can be made to sustain and enhance these benefits:

Promote County-Wide Mixed-Use Development: Encourage the development of mixed-use zones across the county, combining residential, commercial, and recreational spaces within and around TOD areas to stimulate local economies and reduce the necessity for residents to travel long distances.

Implement County-Specific Affordable Housing Strategies: Develop county-level policies that mandate a certain percentage of housing in TOD areas to be affordable. This could involve establishing county-wide rent control measures, offering housing subsidies, or providing incentives for developers to include affordable units in their projects.

Enhance County Transit Connectivity: Improve public transportation links throughout the county, ensuring easy and affordable access to and from TOD areas. This could involve expanding county-wide bus, rail, and tram networks and optimizing transit schedules to cater to the diverse needs of county residents.

Facilitate Community Engagement at the County Level: Create platforms for residents and businesses across the county to participate in TOD planning processes. This can help tailor developments to meet county-wide needs and foster community support and satisfaction.

Adopt Sustainable Planning Practices County-Wide: Integrate green spaces, pedestrian pathways, and bike lanes into TOD designs across the county to promote health, environmental sustainability, and enhance the overall quality of life in TOD neighborhoods.

Initiate County-Supported Economic Development Programs: Launch economic development initiatives at the county level to support and stimulate local businesses within TOD areas. Programs might include grants, tax incentives, or business support services designed to foster economic growth and entrepreneurship county-wide.

Establish County-Level TOD Impact Assessment Mechanisms: Set up systems to continuously monitor and evaluate the socioeconomic impacts of TOD across the county, assessing factors like property values, local business performance, and resident satisfaction to ensure community-wide benefits.

Revise Zoning Laws on a County Scale: Update zoning regulations across the county to allow for flexible land use within TOD areas, accommodating a range of development types and evolving community needs, thereby facilitating innovative and inclusive urban planning.

Limitations

This research is faced with some limitations. It would be important to acknowledge several constraints in assessing the socio-economic impacts of Transit-Oriented Development (TOD) in Denver County. Firstly, the time frame of the study may not capture long-term socio-economic changes, as the full effects of TOD can unfold over decades. Secondly, the research might be limited by the availability and granularity of data, particularly in distinguishing between the impact of TOD and other urban development processes. Additionally, the study's focus on Denver County may not account for wider regional dynamics that influence socio-economic trends. Lastly, the analysis might not fully account for external factors such as economic cycles, policy changes, or global events that could affect the outcomes of TOD initiatives. These limitations should be considered when interpreting the findings and formulating policy recommendations.

Future research should examine specific neighborhoods that have been impacted by large transportation developments. For example, the Greenville neighborhood in Tulsa, Oklahoma, where a once thriving Black community was displaced by highway infrastructure. By looking at specific neighborhoods, we can gain a deeper understanding of the direct impacts TOD has on the community.

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References – Figures

Figure 1.1: Denver, Colorado Skyline

Source: Planetizen Courses

Figure 1.2: Transit-Themed Denver Skyline

Source: Denver 2014 TOD Strategic Plan

Figure 2.1: Denver Union Station Light Rail/Commuter Rail Hub

Source: SOM

Figure 2.2: Denver Union Station

Source: Cowboys and Indians Magazine

Figure 2.3: Gentrification in Neighborhoods

Source: American Planning Association

Figure 3.1: Denver County Study Area

Source: Benjamin Rehm; ACS Census TIGER

Figure 3.2: Example of Data Used in Microsoft Excel to Populate Maps

Source: Benjamin Rehm; ACS Census

Figure 4.1.1: Downtown Denver, Colorado

Source: Oakwell Beer Spa

Figure 4.1.2: RTD Light Rail Car

Source: RTD-Denver

Figure 4.1.3: RTD Rail Map

Source: Transit Wiki

Figure 4.1.4: RTD Runboard

Source: Benjamin Rehm; RTD-Denver

Figure 4.2.1: TOD Principles – pt. 1

Source: Denver 2014 TOD Strategic Plan

Figure 4.2.2: TOD Principles – pt. 2

Source: Denver 2014 TOD Strategic Plan

Figure 4.2.3: History of Transit in Denver

Source: Denver 2014 TOD Strategic Plan

Figure 4.2.4: History of Transit in Denver (Continued)

Source: Denver 2014 TOD Strategic Plan

Figure 4.3.1: Denver Households by Type

Source: Denver 2014 TOD Strategic Plan

Figure 4.3.2: Gainers of Population Aged 24-34

Source: Denver 2014 TOD Strategic Plan

Figure 4.3.3: Population Growth, Age, and Densification

Source: Denver 2014 TOD Strategic Plan

Figure 4.3.4: Expansion of Rail Transit in Denver

Source: Denver 2014 TOD Strategic Plan

Figure 4.3.5: Denver Region Per Capita VMT

Source: Denver 2014 TOD Strategic Plan

Figure 4.3.6: Denver Bike Infrastructure

Source: Denver 2014 TOD Strategic Plan

Figure 4.3.7: Denver Mode Share

Source: Denver 2014 TOD Strategic Plan

Figure 4.4.1: Change in Population in Denver County

Source: Kevin Beaty; Benjamin Rehm; ACS Census

Figure 4.4.2: Percent of Residents Who Do Not Identify as Only White From 2010 to 2020

Source: Kevin Beaty; Benjamin Rehm; ACS Census

Figure 4.4.3: Percent of Residents Who Identify as Hispanic or Latino From 2010 to 2020

Source: Kevin Beaty; Benjamin Rehm; ACS Census

Figure 4.4.4: Percent of Residents Who Identify as Only Black From 2010 to 2020

Source: Kevin Beaty; Benjamin Rehm; ACS Census

Figure 4.4.5: Change in Available Housing From 2010 to 2020

Source: Kevin Beaty; Benjamin Rehm; ACS Census

Figure 4.4.6: Vacant Units in 2020

Source: Kevin Beaty; Benjamin Rehm; ACS Census

Appendix A: Interview Questions

1. Can you describe your experience with Denver Union Station and its surrounding area?
 - a. Can you speak in terms of transportation and accessibility? (auto, walking, biking, transit)
2. What are some of the most noticeable changes in the community since the implementation of the Transit-Oriented Development at Denver Union Station?
3. How has the availability of public transportation, such as light rail and buses, affected your daily life and commuting patterns?
4. Have you observed any changes in property values or housing affordability in the vicinity of Denver Union Station since the TOD project began?
5. What impact has Denver Union Station's redevelopment had on local businesses and job opportunities in the area?
6. Have you noticed any changes in the demographics of the community as a result of the TOD project? Has there been an influx of new residents or businesses?
7. Can you share your thoughts on the accessibility of amenities, such as grocery stores, healthcare facilities, and schools, in the Denver Union Station area before and after the TOD project?
8. How do you think the TOD project has influenced social interaction and community engagement in the Denver Union Station neighborhood?

9. Are there any concerns or challenges that the community has faced due to the TOD project, such as displacement of long-term residents or rising living costs?
10. What do you see as the potential long-term impacts of the Denver Union Station TOD on the socioeconomic well-being of the community?
11. Have there been any community initiatives or programs aimed at addressing the effects of the TOD project on socioeconomics and community cohesion?
12. Can you discuss any sustainability or environmental benefits you've observed as a result of the TOD project in terms of reduced car usage and improved air quality?
13. How would you rate the effectiveness of community engagement and consultation throughout the development process of Denver Union Station and its associated TOD?
14. In your opinion, what lessons can other communities and cities learn from Denver Union Station's experience with Transit-Oriented Development?
15. Do you have any recommendations or suggestions for future TOD projects to better address the needs and concerns of the community and ensure equitable outcomes?
16. My project is focused on TOD's and socioeconomics, is there anything else you would like to share that could be helpful in my report?