Equity in the Built Environment: An Urban Design Analysis of Transit-Oriented Development in Downtown Redmond, WA.

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Abstract

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Metropolitan areas in North America are growing as a result of favorable economic conditions, but this unexpected boom has exacerbated issues like traffic congestion, air pollution, land consumption, and housing affordability. To better accommodate growth and promote sustainability, some cities have implemented novel theories concerned with urban form and mobility, like Transit-Oriented Development, Complete Streets, and Walkability. However, in the quickness of development, pursuing social equity is overlooked. This research explores how urban design can support transit-oriented development by integrating equity considerations into the built environment. First a literature review explores the definition and manifestations of social equity in the built environment, and best urban design practices for transit-oriented development. An analysis framework is then developed and applied to precedent cases in Hillsboro, OR, Arlington,

VA and Oakland, CA and a case study in Redmond, WA. Additionally, a walkability survey of urban design qualities at the micro-scale level was performed in selected streetscapes in Downtown Redmond. The analysis revealed that cases with better urban design attributes exhibited more social equity qualities: accessibility, community, safety, enjoyment, environment, wellbeing, opportunity, and prosperity. Urban design supports transit-oriented development by incorporating the human experience into the built environment. The methodology and the case study application serve as an example of how urban designers and transportation planners can integrate urban design considerations into the built environment to promote social equity.

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Chapter 1. INTRODUCTION

Urban transportation plays a crucial role in the economic activities and wellbeing of cities. In countries like the U.S., sprawl is the dominant urban form, and automobility occupies a significant share of land (Gössling, 2016). Relying on motorized transportation has exacerbated some issues: extra time spent traveling at congested speed grew from 20 to 54 hours a year between 1982 and 2017 (Texas A&M Transportation Institute, 2019); ozone and short-term particle pollution worsened in many cities between 2015-2017 (Environmental Protection Agency, 2019). The number of pedestrian fatalities in the U.S. increased by 35 percent from 2008 to 2017 (Governors Highway Safety Association, 2019); sedentary lifestyles lead to obesity rates that almost tripled over the last 50 years, from 14 percent of the population in the 1960s to nearly 40 percent in 2016 (Fryar, Carroll, & Ogden, 2019).

In finding solutions for these transportation-related problems, cities have turned to emergent theories on how to adapt and redevelop the built environment to accommodate more people, be more sustainable, safe, and healthy. One strategy, Transit-Oriented Development (TOD), promotes urban growth around transit facilities to improve mobility, enhance the quality of life, and achieve environmental sustainability (Cervero, Ferrell, & Murphy, 2002). Cities and suburbs like Arlington County, VA, Hillsboro, OR, and Oakland, CA, have developed TOD projects with increased economic growth and neighborhood vitality. The Complete Streets policy model encourages roads designed to accommodate different modes of transportation, users, and activities to create more livable communities (Litman & Victoria Transport Policy Institute, 2015). San Diego CA, Boulder CO, New York NY, and Seattle, WA are among the cities that report an

improved environment, public health, and increased capacity of the transportation network after implementing complete streets policies.

The apparent success of these new theories has only increased their popularity; however, in their implementation, new problems have emerged. Multiple studies relate TOD with gentrification (Padeiro, Louro, & da Costa, 2019). As new transit stations increase property values and long-time residents are displaced by less ethnically diverse, more affluent, and higher-educated residents (Baker & Lee, 2019). Studies have found evidence in Boston, Washington, DC (Kahn, 2007), San Francisco, and Denver (Baker & Lee, 2019). Similarly, Moos (2016) argues that increased amenities, public transit, and housing options at inner cities create a process of "Youthification" as the share of young adults increase in these specific neighborhoods.

Improvements to the built environment alienate specific populations and represent a missed opportunity to address previous injustices and to create more inclusive spaces. The study of built environment elements that support equitable outcomes is relevant for several reasons. First, current decisions will impact future generations; planning and designing for future realities like fuel scarcity, climate change, and the aging population will accelerate adverse outcomes. Second, suburbs undergoing a re-urbanization process can create more sustainable communities. To guarantee a better life quality for all, the environmental and economic elements that contribute to sustainability should not minimize the social component. Third, urban planners have a professional responsibility to be conscious of the rights of others and seek social justice to open opportunities for all (American Institute of Certified Planners, 2016). Urban planners can no longer neglect the outcomes that planning decisions have historically provoked on disadvantaged populations.

This thesis attempts to contribute to the planning field by exploring how urban design can contribute to equitable forms of development, in specific:

- How does equity manifest in the built environment?
- How can urban design support transit-oriented development to create inclusive, safe, comfortable, and convenient spaces?

Addressing these questions involves an analysis of literature to identify the relationship between urban design and equity and its manifestation in built form. It also entails a study of how previous cases of transit-oriented development has influenced communities. This research suggests that urban design has the potential to support transit-oriented development and that certain built environment elements enhance social equity. This work involves a literature review to identify the relationship between equity, urban design, and transit-oriented development as well as equity indicators. It also compares precedent projects and a case study to determine how these qualities manifest in American suburban cities experiencing re-urbanization. The proposed assessment reveals urban design challenges and opportunities for future development.

This thesis takes place at a moment of increased awareness of the impact of the built environment on health outcomes, social justice, and economic opportunities. North American cities are at a crossroads; they are defining how to better prepare for the future, given these paradigm shifts.

This thesis is divided into six chapters: Chapter 1 introduces the study topic and its importance. Chapter 2 discusses relevant literature in equity, urban design, and transit-oriented development. Chapter 3 outlines the methods for this study and an explanation of the research approach. Best urban design practices, opportunities, and challenges in precedent cases of transit-oriented development are discussed in Chapter 4. In Chapter 5, Redmond, WA is examined as a case study using findings from the previous chapters, and Chapter 6 suggests recommendations, explores the limitations of this work, provides ideas for future research and lessons for practice.

1.1 LITERATURE REVIEW

This thesis reviews literature from three main areas: definitions of social equity, the significance of urban design, and the goals of transit-oriented development bye exploring academic articles, books, public documents, and previous studies. Exploring theories of social equity will help identify gaps in current approaches and potential opportunities for improvement. An analysis of the principles behind urban design and the goals of transit-oriented development reveals how the theory translates into practice.

In understanding the concept of equity, the research explores definitions from urban planning, public governance, and philosophy. In understanding cities and social justice, this chapter reviews John Rawls's theory of justice (1971) and David Harvey's social justice and the city (1973). Advocacy planning and urban social justice are discussed through the work of Norman Krumholz, Ruth Fincher, and Kurt Iveson. Finally, this section explores the work of Julian Agyeman and his theory of environmental justice (2004).

Within urban design, this research focuses on the main principles and their relationship with the built environment. The Urban Design Manifesto by Jacobs and Appleyard (1987) and its corresponding update by Loukaitou-Sideris (2012) are used as a starting point to understand contemporary concerns and the importance of the field.

In analyzing theories of Transit-Oriented Development, the leading authors are Peter Calthorpe, who developed the concept in his work The Next American Metropolis (1993), and Robert Cervero, whose prolific research addresses the relationship between transportation and urban form. Peter Newman and Jeffrey Kenworthy have also supported transit-oriented development as a strategy to promote mixed land uses and reduce car dependence (1999; 2015). Finally, the chapter discusses approaches that integrate equity and its manifestations in the built

environment by Rosenberg and Todd (2013), Lampman (2013), and Litman (2020). This exploration of literature provides a rich understanding of how equity manifests in urban design elements and transit-oriented development.

1.2 METHODS

Findings from the literature review, the examination of precedent cases, and evaluation of the case study constitute the main research methods of this work. The theory obtained from the literature review will reveal the principles that help identify equity in the built environment to analyze the precedents and the case study. The purpose is to identify the goals behind each project, the design principles, strengths, and weaknesses that relate to social equity. Identifying equity gaps in the existing conditions of transit-oriented development will inform lessons for practice and recommendations for urban designers and transportation planners.

This thesis applies a qualitative approach to facilitate the study of the phenomenon, in this case, manifestations of equity in the built environment. The effect that urban design elements have over its users is subjective and difficult to quantify; qualitative tools allow us to study this effect. Another attribute of qualitative research is capturing the real setting of the object of study and analysis of settings that are not controlled or manipulated (Hatch, 2002). Finally, a qualitative study facilitates the analysis of recent or unexplored theories, to start defining them and add to existing knowledge. Although equity is not a recent concept, no standard procedure exists to measure it, leaving room to explore and propose novel approaches.

1.3 PRECEDENTS

In order to characterize transit-oriented development, this research examines the urban design qualities of precedent cases to provide a detailed account of the challenges and opportunities of

integrating equity considerations into transit-oriented development. Precedents that fit specific criteria were selected: 1) projects located in the U.S., 2) cases with demographic characteristics related to the case study, 3) projects located in suburban locations, 4) precedents that exemplify the different interpretations of the transit-oriented development concept, 5) cases previously studied, 6) projects planned with rail as primary transit mode, 7) projects purposefully designed as transit-oriented development. Based on these criteria, three precedents were selected in the following locations: Orenco Station in Hillsboro, OR, Clarendon station in Arlington County, VA, and Fruitvale Village in Oakland, CA.

1.4 Case Study

This thesis examines a case study to determine how equity manifests in the built environment. The study site is downtown, Redmond, WA, a suburban city, notable for large high-tech companies like Microsoft or Nintendo of America, its affluent population, and the ethnic diversity of its residents. By 2024, the downtown neighborhood will be served by light rail, which will shorten travel distances to nearby cities like Bellevue and Seattle. This proposal has caused rapid densification of the downtown core and interest in the potential of making the city more inclusive. An assessment of current and planned conditions will reveal potential challenges and opportunities to make the city more equitable. The author chose this case study for its familiarity, equity potential, and relevance.

This research aims to inform urban designers and transportation planners on the importance of integrating urban design on transit-oriented development and its relationship with social equity. The proposed approach and methodology could inform the evaluation of existing projects and the development of future proposals.

Chapter 2. LITERATURE REVIEW

This chapter reviews literature related to equity, urban design, and transit-oriented development to better understand how urban design can support equity in the built environment. These three bodies of literature are vast and highly studied, so the focus of this work rests on how they approach equity and the way they influence the built environment. The first section of this chapter details the meaning of equity, its importance, and its relationship with the built environment. The second section explores the principles and goals of urban design and discusses how theory and practice integrate equity. Definitions, goals, and benefits of transit-oriented development are discussed in the third section and concludes with approaches that include equity indicators in the built environment.

2.1 Defining Equity

Equity is a concept that has gained popularity, but sometimes its meaning is not clear. How the term is defined determines its implementation. The American Planning Association defines equity as "just and fair inclusion into a society in which all can participate, prosper, and reach their full potential" (2019, p. 3). The emphasis of this meaning is on social inclusion, which asks planners to be advocates for participation. The National Academy of Public Administration emphasizes management and fair distribution of services by defining social equity as:

> "the fair, just, and equitable management of all institutions serving the public directly or by contract, and the fair and equitable distribution of public services, and implementation of public policy, and the commitment to promote fairness, justice, and equity in the formation of public policy" (NAPA, n.d., as cited in Wooldridge & Bilharz, 2016).

While the planning approach focuses on people, the public administration definition emphasizes processes. In describing equity, the subjects of interest and their expectations vary among professions, which highlights the importance of clearly conveying a definition of equity to aspire to desirable outcomes.

Equity is a long-standing concept, and its implementation has changed over time. From a "philosophical to a structural to an administrative concern," equity evolved from an element in the social contract to a constitutional norm to a social movement (Guy & Mccandless, 2012, p.56). Equity discourse goes as far as Aristotle and Plato, Rousseau, and the early colonists (Wooldridge & Bilharz, 2016). They recognized equity as a type of justice that has permanent effects. During the 1960s, equity acquired a racial justice and civil rights lens; it was paired with the term "social" and differentiated from similar terms like fairness and equality.

The work of American philosopher John Rawls marks the beginning of modern social equity theory. He argues that social justice depends on how fundamental rights and duties are assigned, and on the opportunities and conditions within different sectors of society (Rawls, 1971). He proposes two principles 1) each person to be guaranteed the most basic liberties that are similar for all and 2) the management of inequalities so that the least advantaged had the greatest benefit and for opportunities to be open to everybody (Rawls, 1971). He claims that in a well-ordered society, everyone accepts and knows the same principles and that institutions satisfy these principles.

David Harvey introduced the geographic aspect into the concept of equity in his work Social Justice and the City, defining social justice as the division of benefits and the allocation of burdens (1973). He then elaborates that three criteria constitute the essence of social justice: need, contribution to common good, and merit. Needs are fairly measured, allocating resources provide

extra benefits, and investments aim for the common good. The framing of these theories emphasizes the unjust nature of economic and institutional systems and possible means of action to address fairness.

In the following decades, theories that focused on the equity of processes and outcomes emerged. George Frederickson proposed the term "social equity" in the context of public administration. He claimed that social equity possesses the same importance as economy and efficiency in the creation, implementation, and distribution of public services and policies. He called for public managers to take responsibility for their decisions and to prioritize the needs of citizens rather than the needs of organizations (Frederickson, 1990).

Norman Krumholz influenced urban planners to make a shift from traditional land-use planning to advocacy planning through his work in the Cleveland Policy Plan Report of 1975, popularizing the equity planning movement. This framework urges urban planners to use their research and skills to influence the redistribution of public and private resources to the poor and working-class (Metzger, 1996). In other words, equity in planning is achieved by increasing housing, employment, and transportation options to those who have limited choices. The principles of advocacy planning - influencing opinion, mobilizing underrepresented communities, advancing and implementing alternative policies - were applied in some "progressive" cities like Chicago, Boston, San Francisco, Berkeley, Burlington, and Santa Monica. This new perspective to equity, with a focus on processes and procedures, proved challenging in terms of politics. Scholars started debating whether social justice was a better approach (Zapata & Bates, 2015).

Based on Rawlsian theory, Martha Nussbaum developed a list of fundamental human capabilities that she considers are essential to a "good life" (1999). She claims these capabilities should be the goal of public policy, and all citizens should have them regardless of their belongings

and personal aspirations. This alternative to welfare economics has been considered a practical approach to evaluate public policies from a justice perspective. It inquires whether the development of these policies followed democratic norms, whether the outcome improved the capabilities of disadvantaged populations, and whether defined groups achieved recognition from each other (Fainstein, 2010). These capabilities are opportunities that should be available for people, and people should be aware of their value in deciding if taking them or leaving them (Fainstein, 2009).

Ruth Fincher and Kurt Iveson (2008) focus on urban social justice and define three goals for just cities: the redistribution (of space, services) to address inequalities, the recognition of identities, and the provision of opportunities to encounter. This conceptual framework for planning defines diversity as differences in wealth, status, and hybridity (identities). They support the idea that identifying and working with the different "publics" in the city could address injustices. However, they argue that emphasis should not only be on procedure and process but also on ends and outcomes (Iveson & Fincher, 2011).

Another approach to social justice and equity has been through environmental justice, where the meaning of "environment" includes not only the wilderness or natural resources but also the places where people live, work, and play (Agyeman, 2005). This movement mainly focuses on issues that often impact poor communities and people of color: living in proximity to toxic facilities, poor transit services, and air pollution. Julian Agyeman developed the "just sustainability" approach, which combines concerns on justice, equity, and the environment (Agyeman, 2004). He argues that sustainability should be proactive in the distribution of environmental "goods," such as green and play spaces. Likewise, a genuinely sustainable society integrates concerns of social needs, welfare, and economic opportunities (Agyeman, Bullard, &

Evans, 2002). This call to integrate social issues to the sustainability framework remains relevant as professional fields like urban design, transportation, and architecture recognize sustainability as a fundamental element to address. Without social and economic equity, "the long-term objective of a more sustainable world is unlikely to be secured" (Agyeman et al., 2002).

2.2 The Importance of Equity

The quest to define equity and maintain its relevance is not new. Why is it important to pursue a more equitable society? What is the goal of pursuing a fair and inclusive community? First, not attending social equity issues contributes to civil unrest and political instability (Guy & Mccandless, 2012). Perceived inequalities between different income groups, classes, or castes originate feelings of insecurity, fear, and eventually conflict. For instance, limiting the liberties of the black population during racial segregation eventually motivated opposition, protests, and demonstrations. In fear of losing their privileged position, some white groups organized rallies, riots, and violent revolts against African Americans; this was particularly prominent when black families moved to predominantly white suburbs (Rothstein, 2017). In recent years, this oppression manifests as high-end and exclusive communities. As Rawls said, suspicion and hostility "tempt men to act in ways they would otherwise avoid" (1971). In an equitable society where there is no status competition, social divisions, or mistrust, there is a chance for real democracy. Everyone is sure their voice is heard and counted, advocates have the will to defend common interests, and there are avenues for social bonds and friendships to emerge. A society that allows its citizens to participate and prosper makes it easier to trust in their institutions and governments.

Second, inequity has negative impacts on efficiency and economic growth. Disparities in income and resources reduce opportunities within specific social sectors to make market contributions. One study in Latin American countries found that income inequality correlated with

birthplace, gender, ethnicity, and parental background makes up to even 50% of consumption inequality (Ferreira & Gignoux, 2008). In the U.S., white Americans with a college degree are, on average, three times as wealthy as black Americans with the same preparation (Meschede, Taylor, Mann, & Shapiro, 2017). Also, power disparities might lead to the establishment of inefficient processes without the chance to look for alternatives. For instance, workgroups that are composed of people from different backgrounds and perspectives could be more efficient than groups with a little variation in perspective. One study found that multicultural teams obtain higher scores, are more innovative, and produce more new perspectives than monocultural teams (MISOC, 2017). In short, including underrepresented groups strengthens markets, domestic demand, and makes sure no human potential is wasted (Jones, 2009).

Third, inequity erodes human health and environmental quality. People enduring injustice tend to experience anxiety and fear, which in turn has adverse health effects. For instance, U.S. states with more significant inequalities, like Mississippi and Indianapolis (measured as vote participation, tax fairness, Medicaid access, education levels), have higher rates of infant mortality and premature deaths (Boyce, Klemer, Templet, & Willis, 1999). Residents living in deprived neighborhoods (measured as educational level, occupation, employment status, car ownership) have higher obesity and cardiovascular risk (Cubbin, Hadden, & Winkleby, 2001; Ellaway, Anderson, & Macintyre, 1997; Van Lenthe & Mackenbach, 2002). In contrast, social equity has a positive correlation with environmental outcomes. Countries with more equitable distribution of power tend to have lower concentrations of air and water pollution and greater access to clean water and sanitation (Torras & Boyce, 1998). In American metropolitan areas, non-Hispanic Blacks are more likely to be living in areas with high concentrations of air pollutants (Lopez,

2002). In societies with no barriers to participation, it is easier for citizens to monitor and advocate for policies and changes that reduce pollution and contribute to a healthy environment.

Finally, seeking social equity is an ethical responsibility and an intrinsic value. The quest for equity is not only a means toward other goals (like progress, efficiency) but also a goal in itself. Efforts and talent, instead of circumstances, determine outcomes, and all members of society do not fall below an absolute threshold of need (Anderson & O'Neill, 2006). The principle of moral equality is a core belief in many religions, philosophical theories, legal traditions, and societies (Jones, 2009), since it helps us set the rules on how to assign rights and duties within our institutions and how to allocate benefits and burdens within society (Rawls, 1970). In other words, from an ethical and moral ground, building equitable societies is worth doing in and of itself.

As has been noted, seeking social equity contributes to building a thriving society. What approach can a community implement to aspire for stability, efficiency, and health? What tools are available to assist in this pursuit? This research explores the role that urban design can adopt in building equitable environments. It is not the intention of this work, however, to claim that all problems are resolved through urban design, but rather, to contribute to the understanding of the potential of urban design in addressing current equity issues in the built environment.

2.3 WHY URBAN DESIGN?

Urban Design is the discipline that translates planning for space into physical strategies (Krieger, 2008), that explores the relationship between the human experience and the urban realm, and that has the potential to resist the commodification of the environment (Sternberg, 2000). Urban Design involves a cultural process at a particular scale - urban (Kasprisin, 2011). Although a precise definition has not been broadly accepted (Krieger, 2008), Urban Design is regarded as the most traditional field of planning, and the discipline that links planning and architecture. It is even

considered an umbrella term containing design, culture, creativity, and form (Kasprisin, 2011) or a 'way of thinking' more than a discipline (Marshall, 2009). The significance of Urban Design rests on its potential to perpetuate or shorten inequalities. Designing the built environment affects choice, access, opportunity, interaction, movement, identity, connection, mix, security, and stability (Talen & Lee, 2018). From its origin, Urban Design functioned as a tool to divide the wealthy-poor, the private-public, the formal-informal, to segregate neighborhoods, to create inequitable access to open space, and inadequate transit services (Loukaitou-Sideris, 2020). The Chicago Plan of 1909 aimed to create improved spaces for the wealthy to promote local spending while keeping the least advantaged workers, immigrants, and poor residents segregated. Ultimately, designing is a political act (Berney, 2017; Loukaitou-Sideris, 2020) as it involves decision-making and prioritization of goals; it requires a process of visualization, recognition and community inclusion.

The rising importance of cities has also increased the influence of Urban Design. Madanipour (2006) describes how "producers, regulators, and users" reshape cities to accommodate new urban conditions through urban design. For professionals, developers, and investors, this discipline is the answer to designing at a medium scale beyond a single site, and within urban and regional plans, to shape the built environment, coordinate the development process and advertise the output. Regulators (planners and city staff) benefit from good governance, as urban design brings different parties together to participate in developing and implementing a vision for the city. Likewise, residents, workers, and visitors to the city (the users) benefit from improved functionality of urban spaces and its added symbolic value. This renewed interest in urban design as a profession presents an immediate opportunity to rebuild our cities and avoid further segregation, to develop in a more equitable, welcoming, and inclusive way.

Urban design faces challenges today that are no less difficult than the challenges of the past. From its origin, urban design aimed to create healthy, safe, and beautiful environments. The emphasis was on the physical design of cities and in providing light, air, spaciousness, and efficiency. In the process, cities adapted to the automobile. In the 1960s, figures like Kevin Lynch (1960) and Jane Jacobs (1961) called for the humanization of the discipline, and in the 1980s, Appleyard and Jacobs (1987) published the famous Urban Design manifesto. They delineated the issues of contemporary cities: poor living environments, large-scale development and loss of control, privatization and loss of public life, "centrifugal fragmentation," destruction of valued places, placelessness, injustice, and "rootless professionalism." They called to design for liveability, identity and control, access to opportunity, imagination and joy, authenticity and meaning, community and public life, urban self-reliance (sustainability), and an environment for all. Loukaitou-Sideris updated this list to include: ethnoscapes and informality, place marketing and consumption landscapes, privatization and fortification of public space, shrinking cities, virtual public spaces, climate change, and unhealthy neighborhoods. She called to expand Urban Design's scope and perspective: to contextualize and embed, to stitch and repurpose, to weave and interface, and for greening and sustaining (Loukaitou-Sideris, 2012), to further ecological, resilience, and justice goals, to have a more participatory and inclusive design process, and to interconnect geographic scales (Loukaitou-Sideris, 2020).

Despite these claims, there is still a gap between theory and practice; Urban Design still adheres to its functional and aesthetic tradition, and it is often unclear how the discipline contributes to equity. Increased scholarship in the fields of public health and sustainability have been the most fruitful attempts at linking Urban Design with contemporary challenges. In the last two decades, multiple studies have attempted to measure the effects of the built environment over

physical activity, accessibility and disability, and neighborhood disparities (Boarnet & Takahashi, 2011). Studies have found an association between elements of the built environment and physical activity (Ewing, Meakins, Hamidi, & Nelson, 2014; Forsyth, Michael Oakes, Lee, & Schmitz, 2009; Smith et al., 2017), barriers for people with disabilities (Church & Marston, 2003; Clarke, Ailshire, Bader, Morenoff, & House, 2008; Kirchner, Gerber, & Smith, 2008) and with equity outcomes (Hirsch, Green, Peterson, Rodriguez, & Gordon-Larsen, 2017; Keippel et al., 2017; Pearce & Maddison, 2011). Within sustainability, the discourse emphasizes sustainable development and, most recently, urban resilience. New ideologies and types of urbanism have appeared to respond to the threats of resource scarcity, environmental disruptions, climate change, and diversity loss: new urbanism and smart growth, green urbanism, ecological urbanism, landscape urbanism, tactical urbanism, and everyday urbanism. While health scholarship is limited to measuring the built environment, sustainability has influenced professional practice through increased urban infill and mixed-use development. Transit-Oriented Development (TOD) emerged within this framework and has gained popularity in the last three decades (Ibraeva, Correia, Silva, & Antunes, 2020; Jacobson & Forsyth, 2008; Loukaitou-Sideris, 2010). Sustainable projects have successfully addressed environmental and economic concerns but have failed short in approaching equity and justice. The prospect of Urban Design to produce change, bring stakeholders together, and its renewed position as a city machine has the potential to bring social issues into TOD projects.

2.4 Transit-Oriented Development

In 1993 Peter Calthorpe introduced the term "Transit-Oriented Developments" (TOD) in The New American Metropolis, to describe "a mixed-use community within an average 2,000-foot walking distance of a transit stop and core commercial area" (1993, p. 56). Inspired by the

environmentalism of the City Beautiful movement, the medieval urbanism of the Garden cities, and the urban life theories of Jane Jacobs and Leon Krier (1993, p. 15). Calthorpe called for a new way of development to redefine the American Dream by mixing "residential, retail, office, open space, and public use in a walkable environment making it convenient for residents and employees to travel by transit, bicycle, foot, or car" (1993, p.56) (Figure 2.1). During the 1980s, Calthorpe helped develop this concept, initially called the Pedestrian Pocket; this work would be the next step in defining a strategy for growth that could "preserve open space, support transit, reduce auto traffic, and create affordable neighborhoods" (1993, p.16). Later on, the term would be studied and refined by various scholars, most notably Robert Cervero (Cervero et al., 2002, 2004). Although the scope of the concept varies, there is consensus on the main goal: to create environments that make people drive less and use public transit more (Cervero et al., 2004).

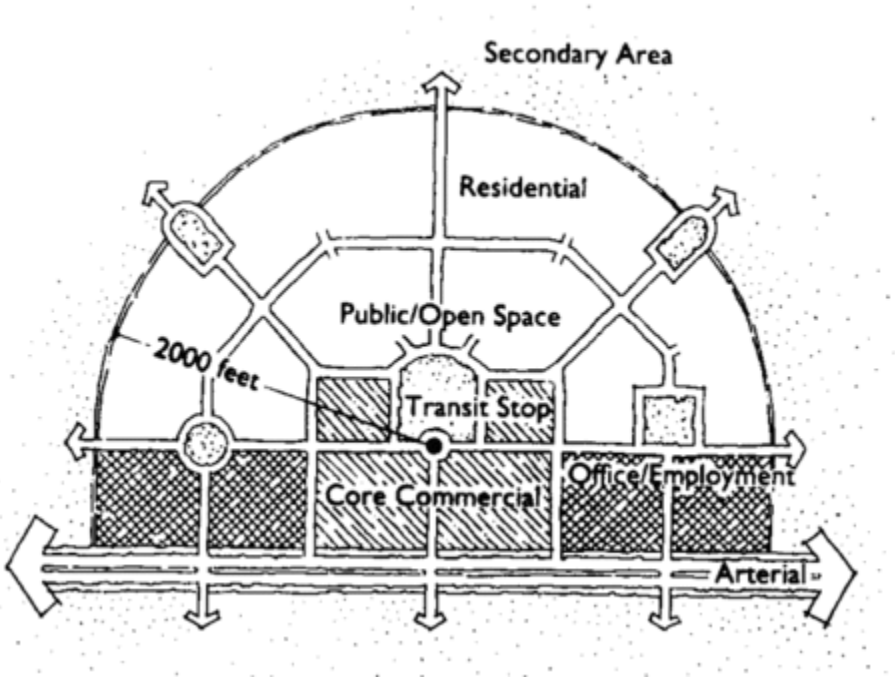


Figure 2.1. Transit-Oriented Development Model (Peter Calthorpe)

Initially, Calthorpe (1993) identified three key characteristics of successful TOD: Density, Diversity, and Design; other scholars then identified Distance, Destination Accessibility, Demand

Management, and High Frequency as additional key elements (Knowles, Ferbrache, & Nikitas, 2020). Today, the literature on TOD is fairly extensive, the term is no longer "academic" (Loukaitou-Sideris, 2010), and multiple transit agencies throughout the country have implemented TOD projects. In the process, there was a deviation to the original theory, and now there is no universally accepted definition of TOD. Each transit agency has adopted its definition, with slight variation from city to city (Cervero et al., 2004). After a systematic review of the literature of the past decades, Jamme, Rodriguez, Bahl, & Banerjee (2019) identified three different interpretations of the TOD concept: 1) a type of urbanism, 2) a planned station, 3) a self-contained housing development. Dependent on the interpretation used, projects could have different outcomes. Only the integration of the three interpretations corresponds to the original concept of TOD.

Transit-Oriented Development is not a new concept (Carlton, 2009; Cervero et al., 2004; Jacobson & Forsyth, 2008). We can identify four historical periods of TOD: historic TOD, planned TOD, contemporary TOD, and future TOD (Knowles et al., 2020). Historical TOD relates to residential suburbs created by rail and tram routes in the mid-19th century. Privately owned transit companies acted as real estate developers to produce clusters of housing that sometimes included schools, local shops, and factories (Knowles et al., 2020). By the mid-20th century, cities transformed to accommodate private cars, and bus systems replaced tram systems, sometimes less efficiently. In this period, planned TOD appeared in Europe and Asia, in cities like Copenhagen, Oslo, Stockholm, Paris, and Singapore. The period of contemporary TOD starts in the 1980s in cities where new light rail systems developed, and TODs were adopted to support urban regeneration (Knowles et al., 2020). Around this time, Calthorpe refined the TOD strategy. Nowadays, TOD is a popular planning strategy directed at cities looking to attract young adults through a sustainable discourse. The concept will probably evolve to account for the changes of

the new century: technology innovation, like Connected and Autonomous Vehicles (CAVs), Mobility-as-a-Service (MaaS) and Information and Communications Technology (ICT), non-motorized transportation, like walking and cycling, and new forms of rail transport and Bus Rapid Transit - BRT (Knowles et al., 2020).

The normative framework of TOD has evolved from sustainable development to community development to a market-driven approach. Calthorpe called to create sustainable communities using TOD (1993). One decade and dozens of projects later, Cervero et al. (2004) identified that the primary aim of transit agencies in implementing TOD is to increase ridership and revenues, promote economic development, and enhance livability. Now TOD projects are used to boost real estate opportunities in urban environments.

Thanks to increased literature and the boom of TOD projects throughout the country, it is possible to understand the real effects of TOD. Two decades ago, a study by the California Department of Transportation identified ten possible benefits of TOD (Parker & Arrington, 2002):

- Provide mobility choices
- Increase public safety
- Increase transit ridership
- Reduce rates of vehicle miles traveled (VMT)
- Increase household's disposable income
- Reduce air pollution and energy consumption rates
- Conserve resource lands and open space
- Play a role in economic development
- Contribute to more affordable housing
- Decrease local infrastructure costs

A significant number of studies have attempted to measure the effects of TOD in the last twenty years. Through a systematic literature review, Ibraeva et al. (2020) identified five types of effects studied by the literature: travel behavior, residential location, urban form, community life, and real estate prices. Studies reveal that: 1) proximity to TOD projects increases the use of transit, 2) TOD features are more significant for specific population groups, 3) TODs tend to attract new development and change the urban form, 4) park-and-ride stations tend to attract more lower-income residents than walk-and-ride, 5) and that proximity to TOD increases property prices, creating a market shift towards pedestrian-friendly developments accessible by transit.

2.5 Measuring Equity in the Built Environment

Translating equity into built elements is not an easy task; however, some studies have proposed frameworks and defined indicators that could be used as guidelines when promoting social equity. Rosenberg and Todd (2013) identified the key components of social equity in the built environment based on the sustainability principles used by the U.S. Green Building Council, the organization responsible for managing the LEED certifications of sustainable buildings. The authors propose eight characteristics divided into three main categories: 1) enhance community and quality of life, 2) human health, wellbeing, and vitality, 3) build a greener economy. These categories mirror the three pillars of sustainability: social, economic, and environment. Erik Lampman (2013) proposes a meta-index based on the ten central capabilities developed by Nussbaum. He proposes four groups: 1) healthy communities, 2) education and social cohesion, 3) housing, transportation and material wealth, and 4) democratic and civic virtue. A significant contribution from this approach is incorporating the concept of belonging, expressed through violence indicators. He argues that a healthy community does not have to rely on violent protests

to achieve equitable goals. He identifies police violence, mass incarceration, and the proportion of police employees as data points to analyze this category.

In terms of transportation, Litman (2020) defines equity as justice of fairness in the distribution of benefits and costs. He proposes an evaluation framework that identifies three types of equity: 1) horizontal, 2) vertical concerning income and social class, and 3) vertical concerning need and ability. This definition proves useful to identify the most vulnerable populations within the built environment and transportation, where horizontal equity demands the equal allocation of space across modes—in other words, providing the same amount of space to motorists, non-motorists, and pedestrians. Vertical equity concerning income and social class prioritizes the needs of low-income populations and relates to affordability, service quality, and fare structures. Vertical equity concerning need and ability highlights the importance of universal design, special mobility services, and options for non-drivers.

Based on the findings of this review, equity in the built environment translates as designing for the least advantaged. In our current suburban landscapes, the most oppressed populations are pedestrians, in terms of human scale and safety; cyclists, in terms of infrastructure and safety; people with disabilities, in terms of accessibility and safety, low-income populations, in terms of limited opportunities for development and wellbeing; ethnically diverse populations, in terms of identity and inclusion; women, children and older people, in terms of safety, accessibility and enjoyment.

Chapter 3. METHODS

This thesis endeavors to respond to how urban design can support equity in transit-oriented development by employing two qualitative approaches: an examination of precedents and a case study analysis. Theoretical frameworks, document reviews, mapping analysis, and a field survey constitute the tools of this research. This work aims to create a precedent that identifies urban design elements with the potential to enhance transit-oriented development through a framework of equity indicators.

The primary methodological approach of this research is qualitative. It is designed to explore the human experiences of a given topic and examine the reasons, the why, of specific questions (Given, 2008). It focuses not only on the process but also on the product or outcome (Crabtree & Miller, 1992), and the researcher is particularly interested in understanding how things occur. This work aims to provide useful recommendations for the profession by recognizing where the limitations in urban design and transit-oriented developments arise. Another characteristic of qualitative research is that data generated are descriptive; this is through words or pictures instead of numbers (Crabtree & Miller, 1992). This approach supports the nature of the topic as equity is often challenging to measure with numbers, and other means to define it are necessary. A qualitative approach also allows the study of this concept to be studied as a whole, to try to understand its complexity without breaking it into isolated, incomplete, and disconnected variables (Hatch, 2002). This complex quality helps us understand multiple realities or meanings, an environment that feels welcoming for some people might feel exclusive towards others. A qualitative design describes these different realities in their natural setting, in the context where these naturally occur.

In qualitative research, the primary instrument in data collection is the researcher (Crabtree & Miller, 1992; Hatch, 2002). This attribute introduces a range of strategic, ethical, and personal issues into the research process (Creswell & Creswell, 2018); thus, it is necessary to explicitly identify biases, values, and personal backgrounds that could shape the interpretations of the study. Using personal experiences in the inquiry process can provide a significant source of insights and validity checks (Bickman & Rog, 2008). My professional experiences have shaped my perceptions of the built environment and equitable development. I did my undergraduate studies in architecture, and my first experience with urban planning was through urbanism theory, more specifically in principles of New Urbanism. This background provided me sufficient knowledge of the formal elements and design principles present in the built environment; this allows me to discern whether some patterns are intentional or an oversight. I bring knowledge of design concepts, programming, and building code regulations. I also assume an urban planner role and recognize that there is more to the public realm than solely design. Particular attention is paid to how the urban design elements that compose the area of study integrate with their surroundings.

I have worked at Sound Transit, a regional transit agency in the Puget Sound. Due to this previous experience, I might bring biases to this study. I start from the perspective that public transit offers a viable solution to the congestion and pollution issues present in contemporary cities. I question how much right-of-way could be devoted to single-occupancy vehicles and what kinds of development would result most beneficial to everyday users. I view transit infrastructure as facilities that greatly benefit from multidisciplinary approaches, where engineering, design, and planning are all integrated into a common goal. I am also aware that this proves challenges when proposing projects with regional boundaries, depending on public resources and limited human hours. My personal experience has also benefited this research, as an immigrant to the US and a

commuter that relies entirely on public transit and walking. I do not own a car in my household; I care deeply about that the public realm ought to be designed in a way to include, protect and comfort all kinds of populations. I am also a resident of the study site and possess knowledge from the constant use of this environment.

The literature review on the previous chapter developed through an extensive database search on the University Libraries and Google Scholar. General search terms included "social equity," "social justice," "equity in urban design," "transportation equity," "transit-oriented development," "transportation justice," "just city," "equity planning," "environmental justice," "environmental equity," "just sustainability," "walkability," and other similar terms related to the research topic. Journal articles, books, and professional reports were the primary sources of literature.

The literature review covered the meaning of equity, the role of urban design, the approach of transit-oriented development, and ways in which equity could be measured. The first section described different approaches used to define equity, its historical background, and its importance. The second section looked at the goals of urban design, the origins of equity principles, and how the field integrates equity considerations. The third section explored the foundations of transit-oriented development, the objectives, and its most common outcomes. This research revealed the extensive literature available for TOD and equity issues in comparison with Urban Design. It also showed how far the concept of TOD has gone from a theoretical proposal to numerous implemented projects and their impact.

Reviewing previous literature helped to inform the selection of three precedents considered successful TOD projects. The choosing criteria (Table 3.1) considers factors that relate to the case study: 1) projects are in the U.S., 2) include neighborhoods with some degree of economic and

racial diversity, 3) correspond to suburban locations, 4) represent different interpretations of the TOD concept, 5) were built at different periods of time, 6) have previously been researched, 7) are based on rail for transit, and 8) were intentionally designed with TOD principles. Various projects fulfilled these criteria, and the three that represented a diverse range of types were chosen.

Table 3.1. Precedent TOD Case Review Selection Criteria.

Criteria	Description	Applicability to Selected Cases
Geographic location	Projects across the U.S.	Two cases on the west coast and one on the east coast.
Neighborhood context	Cases were selected from neighborhoods with varied demographic characteristics	Cases include neighborhoods with some degree of economic and racial diversity.
Community type	Cases represent suburban locations	Projects are located on the outskirts of primary cities.
Project type	Cases represent the three different interpretations of the TOD concept	One case pertains to TOD as New Urbanism, another case presents TOD as a planned station area and the third case represents TOD as a self-contained housing development.
Timeline	Projects exemplify different time periods	Cases include projects planned and built at different stages in the last three decades.
Previous studies	Cases were researched in other studies before	Projects were examined in case studies related to transportation, urban design, policy-making, and environmental justice, etc.
Transportation mode	Cases pertain to projects oriented to accommodate rail as main transit mode	The selected cases were planned to support light rail and commuter rail for public transit.
Design intention	Projects were designed and publicized as TOD	Each of the cases incorporated principles of TOD through their implementation and public processes.

Journal articles, government web pages, professional reports, books, and newspapers provided information for the precedents study. Each case contains background information that briefly presents the circumstances of its development, and then is analyzed using the urban design matrix developed by Jacobson and Forsyth (2008, p.55). Based on urban design issues present in TOD literature, they developed a matrix with twelve attributes clustered in three categories: processes, places, and facilities (See Table 3.2). This framework focuses on design elements of TOD and helps shift the attention from land-use policy to the design dimensions of TOD projects.

Table 3.2. Analysis criteria for precedent TOD cases.

Processes	Places	Facilities	Walkability
• Time • Engagement with public • Programming • Maintenance	• Scale • Public spaces for human use • Safety • Variety and complexity • Connections	• Pedestrian facilities • Transit within the urban pattern • Car movement and parking	• Imageability • Enclosure • Human Scale • Transparency • Complexity • Safety & Sensations • Tidiness

Adapted from "Seven American TODs: Good Practices for Urban Design in Transit-Oriented Development Projects" (Jacobson and Forsyth, 2008) and "Equity in Microscale Urban Design and Walkability: A Photographic Survey of Six Pittsburgh Streetscapes" (Bereitschaft, 2017).

These categories reflect acceptable urban design practices to evaluate each precedent and emphasize the relationship between design and transit-oriented development. To make a more in-depth analysis of the built environment, an additional layer of analysis is conducted for each project, based on the framework to measure urban design qualities related to walkability developed by Ewing and Handy (2009) and later adapted by Bereitschaft (2017). This framework (Table 3.3) originated from ratings in a panel of experts and measures urban design qualities in the built environment that influence walkability. Bereitschaft added two more categories to account for elements that might impact the urban experience: safety & sensations and tidiness. These seven attributes analyze elements at a smaller scale and account for built environment outcomes that might be overlooked by a more general analysis. As an example, Bereitschaft describes how macro-scale, quantitative metrics like WalkScore might overlook micro-scale attributes that influence the walkability of streetscapes, like the absence of sidewalks or the presence of conditions like noise, and smells.

Each attribute is assessed based on a relative scale of "good," "moderate," or "poor" condition. For the easiness of comparison, each rank assumes a numerical value, good=3, moderate=2, poor=1.

Table 3.3. Relative condition of specific attributes of the built environment. (Source: Bereitschaft, 2017)

Urban Design Quality	Built Environment Features
Imageability	historic buildings
	courtyards, plazas, parks
	major landscape features
	place signs/identifiers
Enclosure	contiguous street wall
	limited sight lines
	overhangs & vegetation
	road width to building height
Human Scale	street furniture
	building height & setback
	street vendors
Transparency	first-floor windows
	active uses/occupied storefronts
Complexity	pedestrian activity
	businesses density
	business type variety
	building identifier variety
	building color & design variety
	outdoor dining
	public art
	street performers/entertainers
Safety & Sensations	crosswalks & ped. infrastructure
	traffic density & speed
	noise
	smells
Tidiness	sidewalk condition
	storefront/building condition
	litter
	graffiti
	healthy/maintained vegetation

Condition | Good | Moderate | Poor

The analysis framework was applied to one street from each precedent, based on their location concerning the central transit station and their role as a primary pedestrian connection (Figure 3.1). This analysis has certain limitations as it was based on secondary sources. A visit in person was not possible at this time, so the author relied on descriptions found in journal articles, government reports, and virtual tours using the street view function in Google maps and Bing maps. When information was missing for specific elements, assumptions were made. For instance, the pedestrian levels of activity are rarely mentioned, but if the Google street view showed multiple people gathered at an intersection, it was assumed that pedestrian activity was moderate or good.

Orenco Station Parkway Clarendon Boulevard Avenida de la Fuente

Figure 3.1. Selected streetscapes for urban design analysis. (Adapted from Bing Maps)

Social equity is added to the previous framework to complement the analysis. The eight dimensions presented were synthesized from previous attempts at conceptualizing equity in transportation and the built environment. All attributes from nine distinct sources (Agyeman, 2013; Alfonzo, 2005; Ewing & Handy, 2009; Gehl, 2010; Gössling, 2016; Lampmann, 2013; Litman, 2020; Loukaitou-Sideris, 2012; Rosenberg & Todd, 2013) were listed on a single document and grouped if related. For instance, accessibility is explicitly considered an essential attribute of social equity in six sources (Rosenberg & Todd, 2013; Litman 2020; Lampmann, 2013; Gössling, 2016; Alfonzo, 2005; Gehl, 2010) and is implicit in others:

> "Additional elements that may enhance building recall are natural features around them, ease of pedestrian access, and uniqueness of architectural style." (Ewing & Handy, 2009, p 71)

> "explicit recognition of just sustainabilities concerns involving the ability of people of color, immigrant communities, and low-income populations to produce, access, and consume healthy and culturally appropriate foods." (Agyeman, 2013, p. 162)

> In enclosing the commons, "separation, fragmentation and enclosure are spatial strategies often encouraged by urban design instead of linkage, continuity, and access." (Loukaitou-Sideris, 2012, p. 473)

From this coding exercise, eight attributes to analyze social equity in the urban design of TOD were defined: accessibility, community, safety, enjoyment, environment, wellbeing, opportunity, prosperity. Table 3.3 shows more specific indicators that might be helpful to analyze each category and correspond to the elements found in the literature.

To finalize the analysis of each precedent case, these eight qualities are briefly discussed. The chapter closes with a summary of lessons learned for the three cases, including their equitable approach and their outcomes. Individually these precedents reveal the challenges of adopting TOD principles in specific settings and diverse circumstances. Collectively they show the evolution of the TOD concept and the perception changes in what constitutes equity and in the role of urban design.

These precedents help inform the chosen case study because they share similar characteristics. All projects correspond to suburban locations, have rail as their catalyst transportation mode, and exemplify relative long-term efforts to create TOD. Individually, the cases share specific characteristics with the case study. Both Orenco and Redmond are high-tech suburban locations while Clarendon incorporates a New Urbanist commercial town center. Fruitvale shows the built environment outcomes of an elevated rail station.

Table 3.3. Proposed Equity Framework based on literature review (Asela Chavez Basurto).

Quality	Indicator	Example
accessibility	access to necessities, amenities, facilities, services, universal design	transportation options, food, services, barriers, distances, paths, wayfinding, connections, special services, proximity to parks
community	opportunities for interaction, engagement, encounter, participation, expression, democracy, identity	spaces for gathering, artistic expression, public participation, religious facilities, historic buildings
safety	protection against risk, harm, discrimination, violence, unpleasant sensory experience	crosswalks & ped. infrastructure, traffic density & speed, noise, smell, litter, building conditions, enforcement, crime
enjoyment	presence of diversity, complexity, human scale, aesthetic appeal, urban furniture	street furniture, setbacks, building height, sidewalk size, bike lane size, pedestrian activity, building color & design variety
environment	protection against harmful substances, climate change effects, planning for ecosystem limits and resilience	protected areas, stormwater management, energy conservation, hazard mitigation, and management, air pollution, proximity to major traffic arterials
wellbeing	options for exercise, move, activities, play, access to green spaces	major landscape features, vegetation, non-motorized transportation
opportunity	options for employment, local businesses, economic activities	business type, variety, density, street vendors
prosperity	affordability, stability, education access, wealth accumulation, innovation, intragenerational and intergenerational equity	taxes, fees, and fares structures, affordable options, housing diversity, schools, banks, land, service quality, infrastructure maintenance

Like with the precedent cases, the analysis of this case study utilizes the urban design framework from Jacobson and Forsyth (2008). The analysis of the three categories and twelve attributes is based on government documents and previous academic research. Maps illustrating existing conditions around the future station were developed based on information from public documents, real estate webpages, and Google Earth information. Six streetscapes near the future station were analyzed using Bereitschaft's approach, to measure urban design qualities at a micro-scale. The photographic surveys were conducted in August 2020. This walking survey included portions of streets where new buildings are constructed and that connect the station. The study was

conducted by walking on one side of the street and then crossing. The surveys were performed at least twice, once at mid-day and once in the early evening in one week. Photographs and field notes were taken for further analysis. Afterward, each attribute was assessed by rating their condition as good, moderate, or poor based on the framework's definitions, where:

- Imageability refers to a unique identity or sense of place.
- Enclosure refers to fixed borders or definite shapes.
- Human scale relates to human size and speed of movement.
- Transparency is concerned with the connection between indoor and outdoor spaces.
- Complexity includes streetscape elements to which the observer is exposed.
- Tidiness describes the physical maintenance and appearance of street elements.
- Safety considers infrastructure that protects from traffic and perceptions.

Redmond works a TOD case study as it exemplifies the efforts of implementing mass transit into a suburban city, one of the core principles behind the ambitious concept of TOD: alleviating the effects of sprawl and developing walkable environments. Development around the light rail station is not the first attempt at implementing TOD. In 2008, a bus-based TOD, the Redmond Transit Center, opened. It includes six bus bays and a multi-family mixed-use building with 332-units (Shen, Xu, & Lin, 2018). In the decade since, the local government has made conscious decisions to increase walkability in the downtown area, and the future expectation of mass transit has resulted in an abundance of mixed-use construction in the area. The city has also started efforts to create a more inclusive city. These circumstances lead to an analysis of how new development close to the future light rail station implements urban design and whether these elements contribute to enhancing social equity in the neighborhood.

Chapter 4. PRECEDENTS

The concept of Transit-Oriented Development is not new, and cases from previous decades offer lessons on the challenges and opportunities of its implementation. This chapter analyzes three projects that exemplify the different interpretations of the TOD concept: Orenco Station in Hillsboro, OR represents TOD as urbanism, Clarendon Station in Arlington, VA presents a case of TOD as a planned station area, and Fruitvale Station in Oakland, CA showcases TOD as a self-contained housing development.

The cases represent projects across the US, in suburban communities, with specific demographic characteristics, planned for rail transit, developed at different periods, previously studied, and explicitly planned as TOD. This research implements an analysis framework adapted from the work of Jacobson and Forsyth (2008) on the urban design dimensions of TOD and the urban design qualities related to walkability proposed by Ewing and Handy (2009) and adapted by Bereitschaft (2017). These guidelines describe 1) the urban design qualities commonly found in TOD projects (processes, places, and facilities) and 2) the built environment elements that influence walkability. Equity is analyzed based on the criteria described in the previous chapter.

Table 4.1. Analysis criteria for evaluating precedent TOD cases.

Processes	Places	Facilities	Walkability	Equity
• Time • Engagement with public • Programming • Maintenance	• Scale • Public spaces for human use • Safety • Variety and complexity • Connections	• Pedestrian facilities • Transit within the urban pattern • Car movement and parking	• Imageability • Enclosure • Human Scale • Transparency • Complexity • Safety & Sensations • Tidiness	• Accessibility • Community • Safety • Enjoyment • Environment • Wellbeing • Opportunity • Prosperity

Adapted from "Seven American TODs: Good Practices for Urban Design in Transit-Oriented Development Projects" (Jacobson and Forsyth, 2008) and "Equity in Microscale Urban Design and Walkability: A Photographic Survey of Six Pittsburgh Streetscapes" (Bereitschaft, 2017).

4.1 ORENCO STATION

4.1.1 *Background*

Orenco Station is a neighborhood in the City of Hillsboro, Oregon, a suburb of Portland. It is usually recognized as a successful example of New Urbanism and Transit-Oriented Development. The neighborhood originated in the late 19th century when the Oregon Nursery Company was established in the area (hence the Orenco acronym). The town included residences, utilities, businesses, a school, and a church. The town was dissolved in 1938, a decade after the nursery went bankrupt. Eventually, the land was platted and sold to multiple buyers but remained undeveloped in the next decades. During the 1980s, the City of Hillsboro made a conscious effort to attract new development and initiated a series of planning decisions to consolidate the land and promote commercial development. At the same time, TriMet, the Metropolitan Transportation Agency, was considering a new rail line to be extended to downtown Hillsboro (the Westside MAX). In the next two decades, a series of short- and long-term ordinances, plans, and guidelines were proposed by local authorities to promote high density and justify TOD development. Land ownership was consolidated and sold to a technology company (Intel) and a development firm (PacTrust). This facilitated road modifications and commercial and residential development. In the following years, high-density projects developed, including apartments, single-family dwellings, condominiums, and townhomes.

Today, Orenco station is considered a successful example of New Urbanism; however, there are still mixed results regarding its success as a TOD (Bae, 2002). There is evidence of higher shares of commuting by foot and transit when compared with nearby communities (Dill & Mcneil, 2020). However, transportation by car remains the dominant mode, as constant issues with parking space reveal.

Figure 4.1. Orenco Plaza at Orenco Station (City of Hillsboro).

4.1.2 *Processes*

In three decades, local authorities established a series of short- and long-term strategies to ensure that high density and compact development took place in Orenco. In 1989, the City of Hillsboro established an urban renewal district (URD) formed by 300 acres of land and began purchasing lots from interested sellers (Community Design + Architecture Inc, 2001). This consolidated land ownership and allowed for road extensions and improvements in Evergreen Road, Butler Road, Cornell Road, and 229th Avenue. In 1994 Intel purchased 268 acres, and Pac Trust, a limited partnership, acquired the remaining 32 acres for commercial and residential development. This section is what is now known as Orenco Station.

In 1993, Tri-Met, the metropolitan transportation agency, defined its Mission Statement, which established the role of the agency in linking land use and transportation investments, which

eventually facilitated supporting Transit Oriented Development. A year later, the agency contracted Peter Calthorpe to propose designs for the future Orenco stop. Meanwhile, the City of Hillsboro adopted a Light Rail Station Area Interim Protection Ordinance (SAIPO). This short term strategy allowed mixed-use and compact development and discouraged low-density development in the neighborhood. The Station Community Planning Areas Zoning Ordinance (SCPA), adopted in 1996, replaced the SAIPO with permanent zoning for station areas in Hillsboro. Its scope was more extensive and included land use, parking regulations, design standards, and guidelines (Community Design + Architecture Inc, 2001). That same year the Metro 2040 Plan defined the Orenco Station development as a Station Community Planning Area, which describes a vision for these communities to offer a variety of shops and services and remain accessible by bike, pedestrians, transit users as well as cars (Oregon Metro, 2000). Finally, in 1998 the City of Hillsboro Comprehensive Plan designated Orenco as a Station Community Planning Area (SCPA) and established density targets of 45 persons per acre, varied housing types, design standards, multi-modal transportation systems, and the concentration of jobs and housing near transit stations (Community Design + Architecture Inc, 2001).

Many of these processes included public engagement, often in the form of public meetings. The proposal of the SAIPO caused an adverse public reaction, and multiple public meetings here held for the community to provide commentary. Some of the concerns included the strict density targets and the removal of big shade trees (Charles & Barton, 2003). The ordinance was adopted after allowing for more flexibility in specific areas. TriMet and Metro organized community visioning sessions to promote New Urbanism and the idea of TOD. To increase public acceptance, planners presented TOD as a similar concept to historic neighborhoods: walkable areas with short blocks and small lots (Charles & Barton, 2003).

Another response to new development was the creation of the Orenco Neighborhood Organization, a group of residents concerned with the perceived impacts of densification: increased traffic, crowding, and loss of property value. After negotiations, city planners established the Orenco Townsite Conservation ordinance. This conservation district designated an area of the neighborhood as historic and precluded it from some of the density and design changes (Charles & Barton, 2003). The neighborhood organization also influenced the development of the SCPA ordinance in 1996. Other events also attracted a significant number of residents, like the public open house on the Orenco Station development organized by Pac Trust and public reviews on the concept development plan for Orenco Station.

There is little evidence in the literature about the intended programming of Orenco Station. There is plenty of information regarding the establishment of a small grocery store in the neighborhood, small businesses, retail, restaurants, and other uses but little regarding planned events and activities. After construction finished in 2003, a farmers market was established in the neighborhood. This seasonal market takes place in Cornell Road every Sunday from May to November. It features produce from local farms and nurseries. The market also organizes cooking events, contests, children activities, and music performances. Public parks in the neighborhood mostly feature ample lawns, paved paths, and benches. Central Park features a pavilion, Rosebay Park has picnic tables, barbecues, a fire pit area, and a basketball court. The most recent addition (2015), the Orenco Station Plaza includes a water feature, decorative lighting, and public art (City of Hillsboro, n.d.). This public space sits right in front of the light rail stop and is the public space with most programming in the area. Every year there is a Harvest Festival in October, a "Winter Village" skate rink in December. Throughout the year, there are activities like outdoor yoga, wine festivals, and small scale concerts (City of Hillsboro, n.d.).

Amenities found in the neighborhood are carefully constructed and maintained. Public parks are owned and operated by the city of Hillsboro. A particular case is Orenco Plaza, the area right beside the light rail platform. TriMet previously owned it and then transferred to the city. The developer of the adjacent property paid for its construction and transferred it to the city after its inauguration. The city repairs, maintains, and programs the plaza with support from the developer.

4.1.3 *Places*

Orenco Station is a New Urbanist community and displays elements of neo-traditional design: walking distances, high densities, mixed uses, small setbacks, and front yards. Densities are higher than the Portland average of 4.8 dwelling units per acre, with 6.6 for single-family homes and 22.6 for multifamily (Bae, 2002). The entire neighborhood was designed under the concept of walking distances (a quarter-mile or a five-minute walk), although some housing is almost one mile away from the light rail station.

The community displays neo-traditional design elements that emphasize compact living and walkability. Housing units have small setbacks, 8 feet for townhomes, and 19 feet for detached units and small private side yards. The units are raised above the sidewalk for privacy and include garages located on back alleys. Facades are inspired in craftsmanship from the Portland area and many display front porches. The design of townhouses is consistent with single-family homes, and they are integrated, often at the end of the block. There is considerable open space in the community, with green areas like parks and plazas and wide sidewalks of 8 feet or more. Local businesses make use of wide sidewalks to offer outdoor seating. Some parks lack programming although they include benches and paved paths. The Orenco Station plaza adjacent to the light rail stop displays multiple elements intended for human use, like the water feature, movable furniture, lighting, art, and elevated boardwalks useful for seating.

Figure 4.2. Orenco Station Street (Michael Mehaffy, 2011).

Narrow roads and wide sidewalks contribute to pedestrian safety in the neighborhood. The right of way accommodates pedestrians, planting beds, trees, and street parking, which supports a sense of safety from moving cars. Retail areas offer canopies for rain and sun protection for pedestrians. Public lighting is ubiquitous in the neighborhood, even in most residential areas. At intersections, accessibility ramps mark pedestrian crossings, and in retail streets, different textures demarcate pedestrian crossings. Most sidewalks showcase public furniture and other design elements like boardwalks, bike parking, and bollards that could offer an extra element of pedestrian safety. Paved paths mark the walking route to the station. There is also evidence of a high level of bonding between the residents of the community (Podobnik, 2002) which contributes to building social capital and interpersonal trust.

In general, the neighborhood shows an upscale character with some degree of variety and complexity in its design, mainly in its housing mix. Buildings in the main street share a similar design vocabulary with brick facades and terracotta colors. The oldest part of the neighborhood shows green colors, french doors, pergolas, and bricks of a darker color. The character of each area varies slightly depending on its construction period. Buildings from the first phase of development tend to be shorter, more compact, and have darker colors. Newer buildings tend to be higher, have larger elements (windows, entrances), and brighter colors.

Figure 4.3. Three phases of Orenco Station development (City of Hillsboro)

Orenco station has well-connected street patterns. Sidewalks are continuous and wide, and street blocks are generally no larger than 400 feet on one side. They provide multiple options for pedestrians to move from place to place, and sometimes even pedestrian cut-throughs are provided (although in private property). Buildings tend to connect to the outdoors. Typical pedestrian barriers like wide roads or large parking lots provide pedestrian paths and accessibility ramps. Cyclists have a dedicated path from the bike & park at the light rail station and through the Intel campus. The bike lanes are delineated but are not protected. The most significant barrier in the community is Cornel Road, which cuts the neighborhood in half. The road acts as a boundary between buildings built in the first and second phase of the project; its six lanes contrast with the typical 2-lane thoroughfares in the area.

4.1.4 *Facilities*

A significant factor in the success of Orenco station is its pedestrian-friendly facilities. The neighborhood is well connected through wide pedestrian networks and relatively short distances. Pedestrian routes are mostly prioritized, with wide paths and buffers that separate the sidewalk from moving traffic. Intersections provide curb bulb-outs to decrease crossing distances, and crosswalks are delineated with different materials. An exception is Cornell Road, in which the crossing distance is significant (90 feet), and no pedestrian islands are provided. Wide sidewalks in the neighborhood allow for landscaping like trees and strips of grass, sidewalk dining, and sometimes bike racks.

Transit facilities in the area are conveniently located, but many lack sheltering or street furniture. Two bus routes cross Orenco station, one on the east-west axis and the other in the north-south axis. The stops are accessible by a walking distance, and stops are no more than a quarter-mile away. Service is not frequent; every 30-45 minutes and one route does not run on weekends.

Bus stops feature blue signs, a lighting post, and sometimes a bench for seating. The MAX Blue Line directly connects to downtown Portland and runs every 15 minutes. The light rail station provides shelter, benches, garbage cans, schedule displays, and telephone. In 2015, a commuter shuttle called North Hillsboro Link started serving the area. It connects the neighborhood with nearby employers, and the main stop in the area is the light rail station.

The design of the Orenco Station anticipates car movement to prioritize pedestrian activity. Parking lots and garages have entrances on back alleys, so most buildings face the street. Roads are relatively narrow, contributing to low vehicle speeds. On-street parking creates a safety barrier between the sidewalk and moving cars. An early design decision that contributed to prioritizing the pedestrian experience was relocating the station's park and ride, for pedestrians to walk directly north from the station to the town center. This decision was possible thanks to the residential developments and the station undergoing construction at the same time. Despite being planned as a TOD, the preferred method of transportation in the community is the car, and parking spaces have been a constant issue. The SCPA zoning code only required 1.5 off-street spaces for condos/townhouses and 1 for single-family homes, the developer Pac Trust negotiated and was able to offer 1.5 and 2 respectively. A different developer for a project near the light rail station only offered 1.39 parking spaces per unit, and residents struggled to acquire additional permits.

4.1.5 *Walkability*

Orenco station displays numerous qualities that enhance the pedestrian experience (Table 4.2). The original thoroughfare, NE Orenco Station Parkway, connects the light rail station with the retail block and the central park and creates a tidy, safe, and enclosed environment. Similar uses, little color diversity, the unifying design, and the limited art expressions reduce visual complexity, which is related to a positive sense of place (Jacobson & Forsyth, 2008, p.79). There

are no historic buildings in the area analyzed, but traditional materials and natural colors attempt to provide an old-fashioned feeling.

Table 4.2. Relative condition of urban design qualities related to walkability in Orenco Station.

		NE Orenco Station Parkway Orenco Station
	Score	78
Imageability	historic buildings	
	courtyards, plazas, parks	
	major landscape features	
	place signs/identifiers	
Enclosure	contiguous street wall	
	limited sight lines	
	overhangs & vegetation	
	road width to building height	
Human Scale	street furniture	
	building height & setback	
	street vendors	
Transparency	first floor windows	
	active uses/occupied storefronts	
Complexity	pedestrian activity	
	businesses density	
	business type variety	
	building identifier variety	
	building color & design variety	
	outdoor dining	
	public art	
	street performers/entertainers	
Safety & Sensations	crosswalks & ped. infrastructure	
	traffic density & speed	
	noise	
	smells	
Tidiness	sidewalk condition	
	storefront/building condition	
	litter	
	graffiti	
	healthy/maintained vegetation	

Condition: Good | Moderate | Poor

4.1.6 *Equity*

Based on the previous analysis, the leading equity issue of Orenco Station is its lack of affordable options. Despite the varied housing mix - condos, townhomes, live/work, small single-family units - housing in the community sells at about 20 to 30% higher than the county average (Bae, 2002; Charles & Barton, 2003). This limits who can access to live in the neighborhood, a criticized tendency often attributed to New Urbanism: to target affluent and ethnically homogeneous populations (Podobnik, 2002). This condition might soon change. Surveys conducted on three residential complexes in the community between 2005 and 2010 revealed that the vast majority of residents where white (74%, 91%, 96%), highly educated (4-year college and graduate degree), and affluent, the majority earning between $50-$75k, $75-100k annually (Dill & Mcneil, 2020). An update on the survey conducted in 2018 revealed a slight decrease in the ratio of white residents and a slight increase in Asian and Hispanic residents. There was also an increase in the ratio of residents with graduate degrees and high earnings ($100-$150k and >150k annually).

This ethnicity and affluence homogeneity has contributed to social bonding and internal cohesion within the neighborhood. A 2002 survey (Podobnik, 2002) showed that residents felt a sense of community in the neighborhood, considered their neighbors to be more friendly than elsewhere, and were often engaged in socializing activities: get-togethers, homeowners associations, and book clubs. However, this internal cohesion has also generated an exclusionary attitude to outsiders, where most residents reject the idea of affordable housing and are resistant to residents from nearby neighborhoods using the local parks.

When compared with traditional suburban development Orenco Station allocates more space and resources to pedestrians and active modes of transportation. As a result, levels of walking are higher than similar TODs in the region, and it is common to walk for small errands

and leisure trips (Dill & Mcneil, 2020). This quality benefits older people, as they do not need to rely on others to make their daily living. Ultimately this added benefit has contributed to an increase in the number of retired residents in the community.

Table 4.3. Equity assessment for Orenco Station.

accessibility	community	safety	enjoyment	environment	wellbeing	opportunity	prosperity

Condition	Good	Moderate	Poor

4.1.7 *Lessons Learned*

Orenco Station offers lessons on the opportunities and challenges of bringing TOD to suburban areas. First, it is essential to make a case for better transit options and housing opportunities while considering the opinions of existing residents. Participation and engagement in the process help address potential conflict and ensure timely projects. In Orenco, long-term residents received with resistance the preliminary proposal for the new neighborhood, and negotiations for approval proved difficult.

Figure 4.4. The unbuilt phase between the light rail station and the town center (Michael Mehaffy, 2003)

Second, connectivity supported by active uses at a human scale is essential to create a pleasant walking environment. The first phase of the project created a main thoroughfare that connected residences and retail with mass transit, but it was built at the farthest area from the light rail station, at a distance higher than ¼ mile, the comfortable walk. Vacant land surrounding this connection failed to create an inviting environment. One advantage of simultaneous construction with transit connection was the opportunity to reallocate the parking garage to prioritize pedestrian access to the station.

Lastly, developing in suburban areas should be supported with essential services and create space for new opportunities. Providing a varied mix of housing was aimed to attract residents from diverse backgrounds. However, the limited employment opportunities in the area and the real estate premium over "quality design" have hampered this goal. The built environment, both the public and the private, should provide spaces for opportunity and prosperity to support small businesses, community services, education, innovation, and artistic expression.

4.2 CLARENDON

4.2.1 *Background*

Clarendon station in Arlington County, VA, is one of the five "urban villages" that form the Rosslyn-Ballston Corridor, a densely populated area planned around public transit in Metropolitan Washington, DC. It is recognized as the "US most successful example of TOD outside a central business district" (Cervero et al., 2004, p.61). The area's planning started in the 1980s after the commercial decline and residential flight product of the Interstate Highway construction and multiple suburban shopping malls. The initial strategy was the creation of Sector Plans for each urban village. The 1984 plan for Clarendon called for small-scale development and the rising of

density maximums along the transit corridor where the Metrorail Orange Line connects the city of Rosslynn at the east to the Falls Church to the West.

The emergence of New Urbanism helped shape projects in the area to integrate high-rise housing, mixed-use, retail with pedestrian-friendly, and transit-oriented design. Decades later, Clarendon Station functions as an urban village with street-level shops, restaurants, offices, and residences where half of the residents commute by foot, bike, or transit ("Clarendon-Wilson Corridor: Arlington, Virginia," n.d.). In the upcoming years, the county expects to update the Clarendon Plan in preparation for the second headquarters of Amazon (ARLnow.com, 2020).

Figure 4.5. Market Commons in Clarendon (Regency Centers)

4.2.2 *Processes*

In the late 1960s, Arlington County started a long term planning effort that continues today. It started by accommodating the new Metrorail Orange Line along Wilson Boulevard, the former commercial route, instead of Interstate 66. Later, in 1972 the county presented a report that described alternative scenarios for the future development of the corridor (Arlington County

Virginia, 2006). In 1975 the General Land Use Plan presented a vision for the five stations along the Metro corridor. Each neighborhood would adopt a concept and enhance its unique characteristics: Rosslyn would be a first-class office and business center; Courthouse, Arlington's government center; Clarendon, an "urban village"; Virginia Square, a mix of residential, cultural, and educational facilities; and Ballston, a new downtown. The plan also adopted the "Bull's Eye" concept, a Scandinavian development model that supports transit by concentrating high density uses within walking distance of each Metro station (Cervero et al., 2004; "Rosslyn-Ballston Corridor," n.d.).

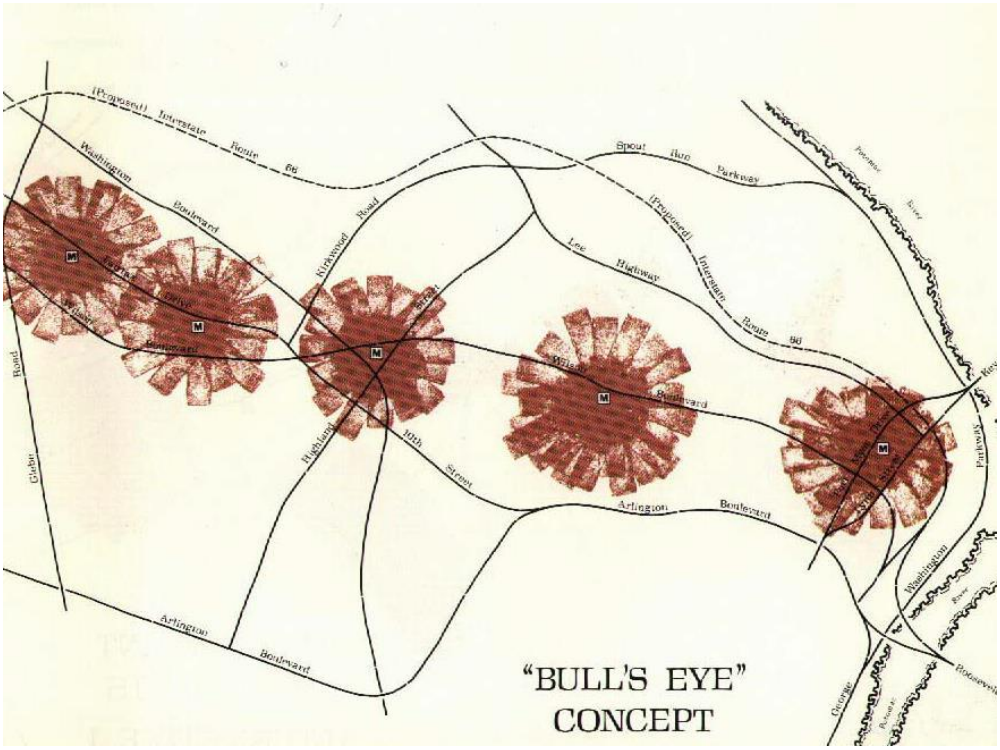


Figure 4.6. The "Bull's Eye" Concept. (Arlington County)

This model led to creating the first Clarendon Sector Plan in 1984, which provided detailed guidelines on the station area's vision. Together with community members, the Sector Plan was amended in 1990 to include an addendum of desired urban design characteristics for future development, emphasizing the search for "quality of place" (Beske & Dixon, 2018). The plan was

again updated in 2006 to support the General Land Use Plan, Transportation Plan, and Public Spaces Master Plan and guide development for the next 20 years (Arlington County Virginia, 2006). These Sector Plans have emphasized the built characteristics to achieve the "urban village" concept": a rich mix of uses, a high-quality public environment, active ground-floor uses, balanced upper-story uses, and lower levels of density closer to nearby neighborhoods (Arlington County Virginia, 2006). Ultimately, the Sector Plan is still a guiding document but influences future development to align with the neighborhood's vision. The Zoning Ordinance remains the regulatory plan, but it allows for a special exception within specific zoning districts: the site plan option. Private development seeking flexibility in form, use, and density, beyond what is allowed, engage in this public review process ("Site Plan Review Process," n.d.).

Urban planners and economic development experts, together with community members, were responsible for developing the Clarendon area. Business partnerships and alliances, neighborhood conservation groups, and individual residents were often involved in the planning process through forums, meetings, workshops, and interactive web pages (Cervero et al., 2004). For the development of the 2006 Clarendon Sector Plan, the Arlington County Board, the governing body, delegated authority to create the Sector Plan Task Force, a planning committee representing the community interests to lead the process (Slotterback, 2010). Thanks to previous documents and planning efforts, the community was already familiar with the idea of "urban village," which allowed the efforts to be placed on refining the concept. Consultants organized participatory charrette processes that allowed for a more in-depth analysis than typical public meetings. The outcome was creating a framework and content for the plan, and complementing ideas for the design of TOD, public, and private spaces. For the development of the Public Spaces

master plan focus groups, pop-up events at public spaces in addition to public meetings and charrettes contributed to the creation and approval of the final document.

Weekly activities near the Clarendon station help bring new people to the area (Jacobson & Forsyth, 2008). Central Park, right above the Metrorail station, accommodates a seasonal farmers market, serves as a concert venue, and has a bicycle repair station ("Clarendon Central Park," n.d.). James Hunter park includes a water feature, a dog area, and demonstration gardens, which allow visitors to know more about native plants, local species, and the on-site water management system that reutilizes rainwater. Other nearby public parks feature playgrounds for children and seating areas. The county closes roads for special events like Clarendon Day, the Columbia Pike Blues Festival, and Marine Corps Marathon.

Figure 4.7. James Hunter Dog Park (Myles Marlow)

The county owns most of the public space in Arlington and is managed by the Department of Parks and Recreation (Arlington County Virginia, 2019). The Clarendon sector plan defines

public spaces such as parks, squares, and streetscapes to be part of a more extensive network of spaces maintained by the county, and plazas to be privately owned and maintained but "fully accessible to the public" (Arlington County Virginia, 2006, p.65). In the county, the typical size of parks is under 5 acres. To manage, operate, and maintain public spaces, the county supplements investments with outside funding and public and private partnerships.

4.2.3 *Places*

A challenge for the Clarendon area has been how to reconcile the feeling of "urban village" with high-density development. A key element is the area's pedestrian scale; many essential services are available within walking distance: grocery stores, pharmacies, restaurants, daycare facilities, repair shops, and animal care. Bikeshare stations, car-sharing, parking garages, and bus transit are also nearby. The human scale has been implemented through design elements, mainly by façade details, decorative paving, small public spaces (Jacobson & Forsyth, 2008). Cornice lines break up and define buildings, multiple entries, and windows at ground level provide transparency, and diverse forms and materials define building tops to create visual interest.

Urban design elements prioritize human use throughout the area. Commercial signs are scaled and oriented towards sidewalks; storefronts have transparent windows; car parking is located underground and out of sight. Simple awnings and mature trees provide shade, while furnishings and outdoor cafes define sidewalks, and wayfinding signage provides information to visitors. In residential locations, small English front-yards create semi-private spaces, English basements connect directly into the street, and some first-floor entrances are above grade. Streetscape elements like vegetation, trees, bike furnishing, planters, and on-street parking form a barrier protecting pedestrians from moving cars. Upper stories generally have high transparency levels, through windows and balconies, to encourage "eyes on the street" (Jacobs,

1961, p. 35). Ground floor retail provides external lighting. Mixed-use buildings, a combination of residential and retail and office spaces and ensures round-the-clock activity.

Compared to other TOD communities, Clarendon has a low design complexity but a high historical character (Forsyth, Jacobson, & Thering, 2010). The development style of the area is mainly Art Deco, introduced by old buildings and restored facades. The color palette is muted, with tan, brown, and soft brick colors from older and new buildings. The numerous uses from the large commercial area contribute to intense use and high vitality in the streets, especially along the transit corridors. Ground-level retail also creates variety through recessed entrances and colorful signage. Some sidewalks feature a combination of textures from different materials: block paving, concrete, and street print.

Small size blocks, a grid pattern, and pedestrian cut-throughs contribute to high connectivity in the area. Some single-family housing units are ¼ mile away from the Metrorail station, and some are even closer, just 700 feet away. The station is a popular pedestrian destination, but nearby blocks' geometry made reaching the station a “multi-stage maneuver” (Toole Design Group & Kittelson & Associates, 2010). Recent improvements in both boulevards surrounding the station reduced intersections' size and fixed the skewed alignment of roads. The bike network around the county mainly relies on bike lanes on main thoroughfares and residential streets that function as bicycle-friendly roads. The Arlington loop surrounds the county and provides off-street facilities dedicated to cycling. Throughout the five urban centers, bike share is also available.

4.2.4 *Facilities*

The built environment around Clarendon station is generally pedestrian-friendly. Sidewalks are adequately sized, between 8’-12’, building frontage is inviting and diverse, and small pedestrian

plazas disperse throughout the neighborhood. The main challenges surrounding the area has been the quality of intersections and accommodating cyclists in the right of way. Clarendon Circle is a notable example where six roads encounter each other. Clarendon circle and surrounding intersections were recently improved to address these issues: long crossing distances, fast turns through crosswalks, narrow lanes for bike use, and non-ADA compliance ("Clarendon Circle," n.d.). The project included extending curbs to reduce crossing distances, creating underground utilities, upgrading traffic signals, and providing new street trees and lighting.

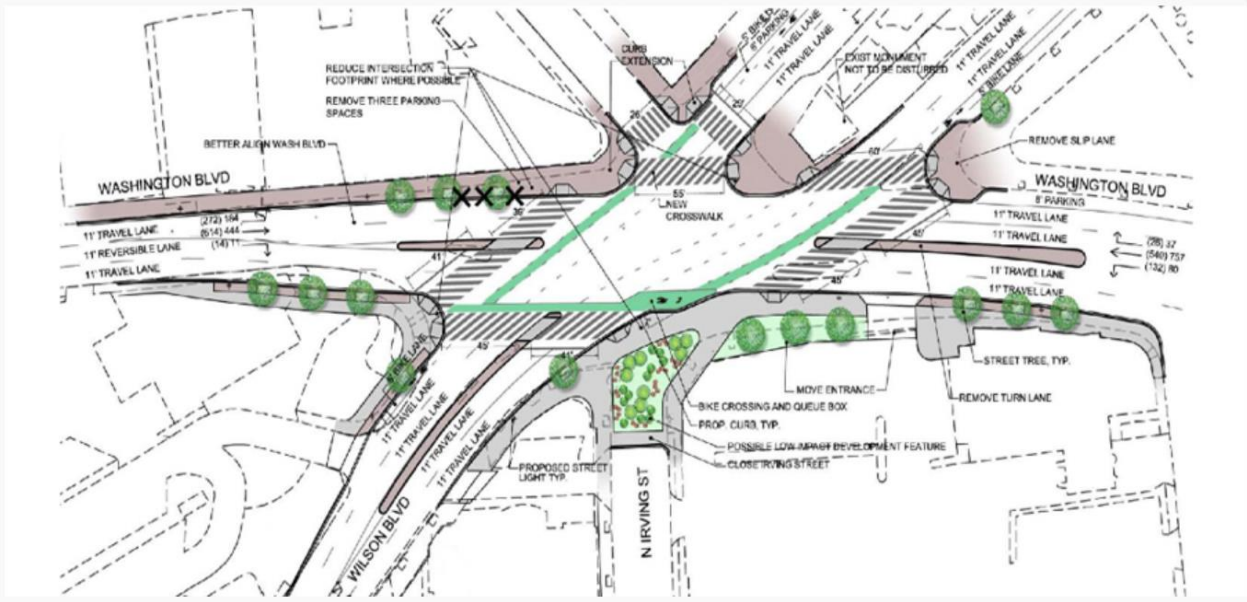


Figure 4.8. Clarendon Circle design concept (Arlington County).

The challenge remains for pedestrian refuge islands at main roadways, as they are small and provide an unsafe feeling (Toole Design Group & Kittelson & Associates, 2010), mainly in streets like Washington Boulevard. Although the neighborhood encourages alternative transportation, accommodating bikes in the right of way remains a challenge. Bike lanes are generally not separated or protected from car traffic and are unmarked in specific sections. Narrow roads push cyclists to immerse in unsafe behavior: taking a lane, using the sidewalk, riding very

close to the curb, or traveling in contraflow against oncoming car traffic (Toole Design Group & Kittelson & Associates, 2010).

Surface transit and metro make Clarendon a well-connected neighborhood. There are four bus routes, a metro bus route, and the Metro Orange Line, which provide service throughout the day and late-night hours. One route is classified as frequent service and runs every 20 minutes, two routes provide service every 30 minutes, and another route only runs on weekdays ("Routes & Schedules," n.d.). The metro bus runs every 20 minutes and the Metrorail every 5 to 8 minutes. Other resources for transit in the county include paratransit and shuttle services for employees. The bus stops near the metro station are complete (Toole Design Group & Kittelson & Associates, 2010); they provide benches, shelters, schedule information, and street furniture.

One early issue for Clarendon was balancing the parking requirements of local businesses with residents' desire for a quiet neighborhood (Jacobson & Forsyth, 2008). On-street parking, garages, and surface lots cover the parking demand in the neighborhood. Garage entrances are located on adjacent streets and concealed within the building; they are properly advertised and, when well designed, do not modify the sidewalk or create barriers for pedestrians. Curbside parking contributes to increased car movement from motorists looking for empty spaces. In the Clarendon district, the minimum parking required is one space per dwelling unit, while in the county, it is 1.125 spaces per unit (Arlington County Virginia, 2017). Developers have the option to ask for an exception through the site plan process and get more or less required parking if they prove that surface and curbside parking will meet the demand. A study in 2013 found that parking garages throughout the county are not being filled, which may indicate a tendency to overestimate the number of needed parking spaces (Simple Solutions Planning & Design & LDA Consulting,

2013). Furthermore, households that owned cars would not necessarily use them, as accessing public transportation is very convenient.

4.2.5 *Walkability*

Over the years, Clarendon has created a neighborhood that provides multiple services and facilitates access to economic activities. The pedestrian experience in Clarendon Boulevard is enhanced by continuous activities and amenities in the sidewalk: outdoor dining, dense retail, and street furniture. Parks and open spaces produce opportunities for gathering and enjoyment. Despite its size, buildings have been adapted to maximize space and create a sense of enclosure while keeping a human scale. Microscale elements like overhangs, first-floor windows, and signs oriented towards pedestrians support the sense of place. The challenge of creating a safe environment remains. Intersections of multiple roads at unusual angles, long crossing distances, and a limited right of way disorient pedestrians and create barriers for less abled people. Noise from outdoor activities and constant movement increases the perception of safety, but loud noise and constant vibrations from passing vehicles and night parties impact this perception.

4.2.6 *Equity*

In Clarendon, cyclists are on the losing side in terms of equal distribution of the right of way. People on motor vehicles might enjoy uncongested roads - traffic decreased between 6% and 25% from 1996 to 2012 (Merchant, 2014); pedestrians will soon experience updated facilities, whereas cyclists still struggle to have their own dedicated space throughout the neighborhood. Bike lanes in the right of way are narrow and unprotected, and sometimes nonexistent as bikes need to merge with traffic. People with disabilities also encounter challenges when navigating the neighborhood; many sidewalks are narrow (5’), crossing distances are significant, and refuge islands are small

and unsafe. Improvements are underway to bring sections of the Clarendon sector to ADA compliance.

Table 4.4. Relative condition of urban design qualities related to walkability in Clarendon.

		Clarendon Boulevard Clarendon
	Score	81
Imageability	historic buildings	
	courtyards, plazas, parks	
	major landscape features	
	place signs/identifiers	
Enclosure	contiguous street wall	
	limited sight lines	
	overhangs & vegetation	
	road width to building height	
Human Scale	street furniture	
	building height & setback	
	street vendors	
Transparency	first floor windows	
	active uses/occupied storefronts	
Complexity	pedestrian activity	
	businesses density	
	business type variety	
	building identifier variety	
	building color & design variety	
	outdoor dining	
	public art	
	street performers/entertainers	
Safety & Sensations	crosswalks & ped. infrastructure	
	traffic density & speed	
	noise	
	smells	
Tidiness	sidewalk condition	
	storefront/building condition	
	litter	
	graffiti	
	healthy/maintained vegetation	

Condition Good Moderate Poor

Despite these challenges, the transit corridor within Clarendon is successful in supporting multiple modes of transportation. More than half of residents primarily commute by train and bus (Southeastern Institute for Research, LDA Consulting, & CIC Research, 2017), alleviating the burden for many households of owning and maintaining a car. The neighborhood has also attracted a new population, one in five residents is foreign-born, and one in four speaks a language other than English at home (Duffy, 2018). Like many other densifying places in the US, increased interest in the area has threatened affordability, adding to historical tendencies of affluent populations living north of the county and disadvantaged populations in the South (Thurston, 2015). A recent effort evaluating "missing middle" housing options (Arlington Virginia, 2020) will explore these issues.

Table 4.5. Equity assessment for Clarendon.

accessibility	community	safety	enjoyment	environment	wellbeing	opportunity	prosperity

Condition	Good	Moderate	Poor

4.2.7 *Lessons Learned*

The Clarendon station area displays the benefits of long-term planning and design. Prioritizing accessibility to transit while keeping a balance between mixed uses and single-family residences has been beneficial in decreasing vehicle trips, increasing public transit use, and creating an active pedestrian environment. The human scale has been vital at the macro and the micro-scale and achieved by locating mass transit at a walking distance from traditional development (single-family housing) and alleviating the effects of increased density through small urban elements

(amenities). The Sector Plan Task Force is an excellent example of how it is possible for "experts" (planners and economists) and the community (residents and retailers) to work together and establish a shared vision for the neighborhood.

4.3 FRUITVALE VILLAGE

4.3.1 *Background*

Fruitvale Village is a Transit Oriented Development located in the Fruitvale neighborhood, south of downtown Oakland, California. The village comprises mixed-income housing, commercial retail, a market, and community facilities: a clinic, a public library, a charter college-prep high school, a child- care, a senior community center, and a thoroughfare that connects Bay Area Rapid Transit (BART) to International Boulevard. The project is famous for its community involvement in the planning, funding, and design process originated from opposition to a planned parking garage between the rail station and the neighborhood's commercial center. The community feared a further decline of one of Oakland's most impoverished neighborhoods (Jacobson & Forsyth, 2008). The Unity Council, a local non-profit organization, led an alternative proposal, and construction began in 1999 with support from several agencies (Sandoval & Herrera, 2015).

Today Fruitvale is a multimodal corridor with a well-established shopping district and a strong Latino identity. The village is one of the most diverse neighborhoods in the city with a high concentration of young families (The Unity Council, 2016, p.19). Recently, the city implemented a Bus Rapid Transit (BRT) station in Fruitvale, and the Unity Council is involved in the planning and construction of the second phase of the transit village, which includes two housing developments of affordable housing and commercial space (The Unity Council, n.d.-b).

Figure 4.9. Fruitvale Village (PGA design)

4.3.2 *Processes*

The Unity Council created the Fruitvale Development Corporation (FDC) to manage the Fruitvale Village project. It necessitated the involvement of many public agencies, like the City of Oakland, BART, Alameda County Transit, and the Metropolitan Transportation Commission, among others (Urban Land Institute, 2005). The FDC worked with BART to support its long-term goal of increasing ridership, and this consisted of lending money and exchanging land to free space for the mixed-use complex while accommodating parking. The City of Oakland also provided support through zoning ordinances and street improvements. The original zoning designation for the area made the new mixed-use development illegal, so the city created a new overlay zone (S15) that allowed high-density, mixed-use development. The City also supported the narrowing of East 12th Street and its realignment to redirect traffic.

The relationship between the Unity Council and the community was crucial in the development of the Fruitvale Village. The FDC engaged key service organizations, met with residents and businesses, distributed flyers, used personal contacts, and even involved local gangs in the process (Slotterback, 2010). The non-profit also secured federal and state grants for workshops that addressed the community's concern about BART's proposal (Bruner Foundation, 2005). Supported by the University of California at Berkeley, the community created a plan for the village through a series of meetings and design charrettes. Images that showed the possible transformation of International Boulevard were useful in conveying design concepts and engaging the community. The village's plan prioritized pedestrian access to BART, ensured space for retail development, and proposed transit-oriented housing (Agyeman & Evans, 2003). These collaborative efforts advocated for lower-income groups served as catalysts to reactivate the economy of the neighborhood while enhancing the ethnic identity of the area.

The public space created within the transit village facilitates events taking place throughout the year. The Paseo is a pedestrian plaza formed by the two mixed-use buildings of the village, and it connects International Boulevard with the BART station. The Fruitvale Farmers Market takes place in the plaza every Tuesday, Thursday, and Sunday ("Fruitvale Farmer's Market," n.d.). Prominent festivals celebrate specific holidays, like Cinco de Mayo, which brings together visitors and residents with folk art and food. During the Christmas season, residents gather for Posadas, a nine-day religious celebration that reenacts the pilgrimage before Christ was born; residents sing villancicos (Christmas carols) and eat tamales and champurrado, a traditional beverage (Rasilla, 2019). The most famous festival is Dia de Muertos, which brings over 80,000 people and showcases live music, traditional dances, family games, and altar installations ("Dia de los Muertos Festival," n.d.).

Ultimately, the FDC was successful in owning and operating Fruitvale Village and two other properties currently under development. For planning, design, and construction, Fruitvale Village received funding from more than 30 separate sources, like the Federal Emergency Management Agency (FEMA), Ford Foundation, R&R Goldman Fund, and Levi-Strauss, among others (Bruner Foundation, 2005). Each source had unique requirements and restrictions, and the process of securing resources took four years. Fruitvale was also included in a Tax Increment Financing (TIF) district to get additional funding (Urban Land Institute, 2005).

4.3.3 *Places*

Fruitvale Village is thriving in terms of human scale. The village's central concept was development right beside transit; thus, homes, commerce, and services are reachable at a comfortable walking distance from the rail station. Furthermore, the pedestrian plaza offers a pedestrian connection from transit to the heart of the commercial district. Childcare, schools, health services, churches, and food markets are located within a quarter-mile from the village. The height and size of nearby buildings facilitate a high density of commercial uses. At the Village, the three-story buildings accommodate retail and services at ground level and housing at the upper levels. At the commercial district, one and two-story buildings with thin facades accommodate small and diverse businesses.

The primary public space at Fruitvale village, the pedestrian plaza, seems to be modeled after the traditional square from Mexican towns (Davison, 2013). The Paseo (pedestrian way) provides spaces for resting, interacting, eating, and shopping. Benches, planters, and elevated boardwalks create sitting areas and delineate spaces for outdoor activities, like standing, seeing, and eating. Palm trees, canopy hangers, and umbrellas offer climate protection. Entrances and

windows oriented towards the plaza facilitate activity and create a public realm that is friendly to pedestrians.

Figure 4.10. Avenida de la Fuente in Fruitvale Village (PGA design).

An ongoing concern in Fruitvale is the real and perceived threat of crime that prevents businesses from establishing in the neighborhood and customers from visiting (The Unity Council, 2016). In the 1980s, a period of disinvestment and commercial decline contributed to Fruitvale's negative image. The idea of commercial revitalization was another motivator for the creation of the transit village. Before the project, Fruitvale station had the second-highest crime rate in the transit system, and years after completion, the station had one of the lowest (Bruner Foundation, 2005). Increased activity, building orientation, lightning, and mixed uses might have contributed to decreased crime within the station. Occupied storefronts, round the clock activity, and pedestrian movement contribute to a sense of safety and eyes on the street (Jacobs, 1961). Some

believe that the lack of graffiti and vandalism in the village is a sign of community ownership and pride of the project (Urban Land Institute, 2005).

Fruitvale's design is attractive, colorful, and engaging. It integrates street elements with architecture that display the heritage of the community. The style is said to be inspired by Mediterranean and Mexican influences (Davison, 2013) and represented in the tiles, arches, and water fountain in the middle of the pedestrian corridor. The California Mission Revival style inspired the massing, colors, and roofing of the village (Davison, 2013), adding another dimension of Latino culture as it relates to the Spanish Missions. Traditional design elements were modernized to prevent other ethnic groups from feeling excluded, while references to historical forms were minimized (Bruner Foundation, 2005). In the plaza, a ramp and a pair of stairs surround the fountain, tiles decorate planters and information kiosks, and the multicolored paving follows a swirl pattern. Yellow, orange, and red colors dominate the structure and contrast with the green of the vegetation and the urban furniture.

In terms of connectivity, Fruitvale Village has been mostly successful in creating a pedestrian-friendly connection and an intimate thoroughfare in an area surrounded by highways, parking lots, and railways. However, one design flaw has been failing to attract BART users that rely on the parking lot and the bus bays on the opposite side of the village (Jacobson & Forsyth, 2008). For these users, there is no need to cross the retail area, so small businesses in the corridor sometimes struggle to attract customers.

4.3.4 *Facilities*

The pedestrian connections to the north and south of the project show design elements intended to increase pedestrian safety. Crosswalks at the north side, at East 12th street and International Boulevard, create a separation between the pedestrian path and the road by the use of different

materials and curb bulb-outs. A pedestrian refuge creates extra protection from the four-car lanes at International Boulevard. On the western side of the project, a median strip was placed in the middle of East 12th street to help lower vehicle speeds. Furthermore, car lanes were narrowed, and buses and cars rerouted to the southern side of the station by opening 33rd and 34th avenues (Urban Land Institute, 2005). The streets surrounding the station lack bike infrastructure, but the village's northern building features a free bicycle garage with 200 spaces (Cervero, Guerra, & Al, 2018). The BART station also provides free bike racks and 28 on-demand electronic lockers ("Fruitvale Station," n.d.).

Fruitvale station features excellent connectivity to public transit; three rail lines and 14 bus routes serve the station (Eureka Cartography Berkeley, 2013). The elevated platform offers limited seating spaces and multiple trash cans. At the same time, the bus station provides bus shelters covered by ample and well-lighted roofs, and the seating consists of concrete blocks. Simple signs display the stop number and the available bus routes. Bus shelters are conveniently located near the parking garage and right at the entrance to the rail station. Currently, International Boulevard is changing to accommodate a Bus Rapid Transit (BRT) lane, which will further increase connectivity and transit service to and from Fruitvale.

Reducing parking requirements was vital in developing the project; it reduced the cost of housing and commercial spaces (Reconnecting America, 2015). The first issue was BART requiring that all surface parking taken away had to be replaced, resulting in the three-level parking garage at the west side of the station and surface parking at the north. The city created new zoning to allow for TOD and included reduced parking requirements for residential and commercial uses in the district. Instead of requiring the city's minimum standard of one parking space per unit, the overlay zone requires a minimum of one space per every two units (Cervero et al., 2004).

Currently, two developments are under construction in what used to be a large parking lot at the east of the station (The Unity Council, n.d.-a). These projects, considered phase II of development of the village, would mainly provide affordable housing units in an attempt to cover the urgent housing needs of the Oakland area.

4.3.5 *Walkability*

Avenida de la Fuente, the pedestrian thoroughfare produced by the buildings in Fruitvale Village, not only creates a safe connection between mass transit and the community, but it creates a public space that accommodates active uses in a comfortable environment. Complexity is Fruitvale's most recognizable design quality. The mix of colors, forms, and textures draw attention to the structure and express ethnic identity, which contributes to a sense of place. Constant activity and indoor connections support safety and ownership of the space. Noise, air quality, and limited green areas decrease the sense of comfort in the area.

4.3.6 *Equity*

Fruitvale Village exemplifies the potential that empowered communities could have in shaping their environment and proposing beneficial strategies for the least advantaged. The project created spaces for employment, participation, and advancement while addressing the major concerns of the area: transportation accessibility, community identity, and overall safety. In an area dominated by vehicle traffic and parking lots, the community successfully advocated and produced a space that prioritizes pedestrians and facilitates non-motorized transportation. In 2008, 1 in 10 trips to access the light rail station was made by bicycle, representing one of the highest mode shares outside a university campus (Cervero, Guerra & Al, 2018), pointing to the success of accessible and convenient facilities.

Table 4.6. Relative condition of urban design qualities related to walkability in Fruitvale Village.

		Avenida de la Fuente Fruitvale Village
	Score	84
Imageability	historic buildings	
	courtyards, plazas, parks	
	major landscape features	
	place signs/identifiers	
Enclosure	contiguous street wall	
	limited sight lines	
	overhangs & vegetation	
	road width to building height	
Human Scale	street furniture	
	building height & setback	
	street vendors	
Transparency	first floor windows	
	active uses/occupied storefronts	
Complexity	pedestrian activity	
	businesses density	
	business type variety	
	building identifier variety	
	building color & design variety	
	outdoor dining	
	public art	
	street performers/entertainers	
Safety & Sensations	crosswalks & ped. infrastructure	
	traffic density & speed	
	noise	
	smells	
Tidiness	sidewalk condition	
	storefront/building condition	
	litter	
	graffiti	
	healthy/maintained vegetation	

Condition Good Moderate Poor

Public policy and urban design supported affordability through reduced parking requirements and small retail. Dedicating less space for cars helped save construction money, which translated into lower rents for residents, commerce, and services. Small shops also support

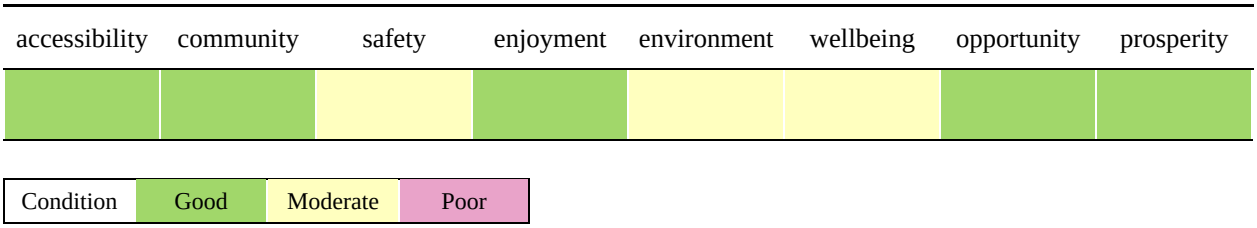
diverse businesses as less footage translates into lower rent. The community succeeded in organizing and advocating for uses that addressed the most pressing needs while opposing the plans of public agencies.

Community engagement strategies that are outside the typical approach (public meetings, review boards) were critical to the design of this TOD project. Envisioning strategies, door to door outreach, and meeting with local gangs supported the creation of a comprehensive project. Despite being led by a Latin organization, the design of the village tried to express this identity subtly. However, some critics have described Fruitvale as an example of "place-claiming" instead of place-making, in an urban planning practice that could be socially divisive (Davison, 2015). The case of Fruitvale Village showcases the potential of local character in shaping the built environment and the importance of engaging diverse populations into the process from the beginning.

Figure 4.11. The BART station at Fruitvale Village (PGA design).

Allowing for alternative modes of transportation, providing pervasive vegetation, and preventing debt were actions intended to support short and long term sustainability. Significant challenges remain for the Fruitvale area. Air quality decreases with highly congested traffic arterials surrounding the development. Green spaces are limited, and multiple social and economic conditions threaten small businesses and housing affordability. The upcoming years and ongoing improvements will determine the success of this transit district.

Table 4.7. Equity assessment for Fruitvale Village.



4.3.7 *Lessons Learned*

Fruitvale revealed the challenges of financing TODs. The FDC utilized funds from multiple sources to make the project a reality and took several years. It was also necessary to coordinate with the local government and regional public agencies to achieve the desired revitalization goals: affordability, safety, and economy. Partnerships with local governments are essential to guarantee the success of new developments. The Unity Council is an excellent example of a proactive and engaged community applying a bottom-up planning approach, where the initiative comes from the community and then reaches local authorities. Residents and workers have the potential to organize and address their needs to bring benefits to the entire area.

4.4 LESSONS FOR PRACTICE

Accessibility within TODs translates into many forms and could be addressed through urban design: providing continuous, safe, and enjoyable connections within essential uses, like transportation, food, healthcare, community services; adding elements that enable use by people with disabilities, like texture, sound, and visual cues; creating spaces for community building that enable gathering, participation, and expression, like parks, plazas, and green spaces, that are inviting, diverse and inclusive; providing wayfinding elements and identifiers that could be understood by people not familiar with the area, non-English speakers and people with disabilities.

Engage the community in the early stages of the project, empower them by delegating authority, and utilize non-traditional outreach strategies. Each community has its ways of connecting, taking advantage of already existing systems of communication and participation.

Spaces that facilitate encounters and gatherings contribute to building community. Do not privatize space to prevent a negative mentality ("us" vs. "them," "insiders" vs. "outsiders").

Green design is necessary for long term resilience and sustainability. Changes in the right of way could be vital in managing stormwater, protect critical areas, promote clean energy, improve air quality, and decrease urban temperatures.

Providing safe and convenient spaces for active transportation brings benefits for population wellbeing: increased physical activity, stress reduction, and disease prevention.

Changes in the built environment, travel behavior, and natural environment take time. These are long-term processes that handle numerous conditions: policies, finances, stakeholders, infrastructure, and more. It is essential to have a vision and define goals to guide the entire process.

Table 4.8. Relative condition of urban design qualities related to walkability for selected streetscapes in precedent cases.

		NE Orenco Station Pkwy Orenco Station	**Clarendon Blvd Clarendon**	**Avenida de la Fuente Fruitvale**
	Score	78	81	84
Imageability	historic buildings	Poor	Good	Poor
	courtyards, plazas, parks	Good	Good	Good
	major landscape features	Good	Moderate	Moderate
	place signs/identifiers	Moderate	Good	Good
Enclosure	contiguous street wall	Good	Good	Good
	limited sight lines	Good	Good	Good
	overhangs & vegetation	Good	Good	Good
	road width to building height	Good	Good	Good
Human Scale	street furniture	Good	Good	Good
	building height & setback	Good	Good	Good
	street vendors	Poor	Moderate	Good
Transparency	first floor windows	Good	Good	Good
	active uses/occupied storefronts	Moderate	Good	Good
Complexity	pedestrian activity	Good	Good	Good
	businesses density	Moderate	Good	Good
	business type variety	Moderate	Good	Good
	building identifier variety	Moderate	Good	Good
	building color & design variety	Moderate	Moderate	Good
	outdoor dining	Good	Good	Good
	public art	Moderate	Moderate	Good
	street performers/entertainers	Moderate	Moderate	Good
Safety & Sensations	crosswalks & ped. infrastructure	Good	Moderate	Good
	traffic density & speed	Good	Moderate	Good
	noise	Good	Moderate	Moderate
	smells	Good	Good	Moderate
Tidiness	sidewalk condition	Good	Moderate	Good
	storefront/building condition	Good	Good	Good
	litter	Good	Good	Moderate
	graffiti	Good	Good	Good
	healthy/maintained vegetation	Good	Good	Good

Condition: Good | Moderate | Poor

Table 4.9. Equity assessment of precedent cases.

Quality	Indicator	Orenco Station	Clarendon	Fruitvale Village
accessibility	access to necessities, amenities, facilities, services, universal design			
community	opportunities for interaction, engagement, encounter, participation, expression, democracy, identity			
safety	protection against risk, harm, discrimination, violence, unpleasant sensory experience			
enjoyment	presence of diversity, complexity, human scale, aesthetic appeal, urban furniture			
environment	protection against harmful substances, climate change effects, planning for ecosystem limits and resilience			
wellbeing	options for exercise, move, activities, play, access to green spaces			
opportunity	options for employment, local businesses, economic activities			
prosperity	affordability, stability, education access, wealth accumulation, innovation, intragenerational and intergenerational equity			
		19	20	21

Condition Good Moderate Poor

Chapter 5. CASE STUDY

5.1 BACKGROUND

The city of Redmond, Washington, is an example of the efforts some suburban cities are making to accommodate growth in the face of rapid expansion. Redmond is located 15 miles east of Seattle and is best known as the home city of Microsoft and Nintendo of America. These global corporations influence the median income and population diversity of the area by creating high-paying jobs and bringing employees from all over the world. According to the 2014-2018 American Community Survey 5-year Estimates, the city of Redmond has a median household income of $123,449 (U.S. Census Bureau, 2019), this represents double the median household income in the U.S., $61,937. Also, 46% of Redmond residents speak a language other than English at home, which reflects the composition of the population where 35% are Asian, and 7% Hispanic, and 4% are Mixed race (U.S. Census Bureau, 2019).

Figure 5.1. Regional Map, Redmond, WA (City of Redmond).

Like many other cities in the Seattle area, this economic growth has brought urban challenges like sprawl, traffic congestion, and lack of affordable housing, impacting the quality of life of its residents. In terms of transportation, the city developed a long term transportation plan for the city, which included the adoption of ordinances, designation of select neighborhoods, and the approval of light rail. This East Link Extension will connect the Redmond Technology Station, where Microsoft and similar corporations locate, Marymoor Village, a new neighborhood, and Downtown Redmond, with other centers of employment like Bellevue and Seattle. From downtown Redmond, travel time to Bellevue will be 18 minutes, 42 minutes to downtown Seattle and 72 minutes to SeaTac airport ("Downtown Redmond Link Extension," n.d.).

Figure 5.2. Downtown Redmond Link Extension (Sound Transit)

The occasion of mass transit creates the opportunity to rethink the built environment and bring it closer to Redmond's long term vision: "a vibrant, complete city, two Urban Centers and connected neighborhoods with high-quality services for an engaged citizenry" (City of Redmond, 2017, p.2). Although the light rail station is still years away (2024), the built environment in the city has started to change. Several multi-use developments are under construction, street improvements make space for non-motorized transportation, and a new central park opened. This rapid development poses the question of whether these changes are including equity among its design and planning principles.

5.2 HISTORY

Generations of people have been moving between the interior lakes of the Seattle area for thousands of years. The abundance of freshwater, fish, wild animals, rich soils, and woods have attracted people to settle in the Redmond area as far as 12,000 years ago, as evidenced by an archeological site found along Bear Creek in 2008 (Kopperl, Taylor, Miss, Ames, & Hodges, 2015). Indian tribes like the Duwamish primarily relied on marine resources and lived on inland lakes and river corridors like Lake Sammamish. Small towns connected to larger villages and tribes through trade, marriage, and social gatherings known as potlatches (City of Redmond, 2019b).

In the early 1870s, Euro-Americans began arriving in Sammamish Valley, and in 1871 the first pioneers established in the area that is now Downtown Redmond. Salmon and tall trees brimmed in the zone, initially called Salmonberg. Residents took advantage of these resources and primarily worked in the logging industry. In 1912 Redmond was incorporated as a town after reaching a population of 300 (Redmond Historical Society, 2019).

Figure 5.3. Stage Office in Leary Way (Redmond Historical Society)

During the 1920s, the town shifted to a farming economy after the depletion of nearby forests. Many young adults left the town in search of better opportunities during the Great Depression. The 1930s also saw the enactment of racial covenants restricting black people from residing in multiple properties around the region ("Restrictive Covenants Database," n.d.). In 1939 the community organized the first Redmond Bike Derby, a fundraiser that eventually became the nation's "oldest, continuous bike race" (Hardy, Llanos, & Ives, 2013), now an annual civic festival called Derby Days.

In 1940 the first Lake Washington floating bridge opened in I-90, and new residents started to move in. The 1940s also saw declining numbers of fish in the region leading to fishing restrictions during the 1950s and 1960s, which affected populations that used to fish in Bear Creek and Lake Sammamish. Further residential growth took place after the completion of the Evergreen Point floating bridge in 1963. At the same time, the first tech companies started to locate in the city: United Control in 1961, Rocket Research Company in 1968, Nintendo of America in 1982,

and Microsoft in 1986 (Hardy et al., 2013). This economic growth brought a significant number of workers and their families from across the country and the world, to form a more diverse city with an estimated population of 63,197 (U.S. Census Bureau, 2019).

Figure 5.4. The Lacey V. Murrow Memorial Bridge (I-90) on Aug. 28, 1943 (Seattle Municipal Archives).

5.3 PROCESSES

Making Redmond a transit-oriented city has been a long-term strategy involving regional and local stakeholders. In 1995, Vision 2020, Puget Sound's long-range planning framework, designated Downtown Redmond as a Regional Growth Center (Puget Sound Regional Council, 2013). These centers "focus future growth into dense, walkable, mixed-use areas" to protect natural resource lands from urbanization and create locations for public investment (Puget Sound Regional Council, 2013, p.1). Similarly, Sound Transit 2, the 2008 regional transit system plan for Puget Sound, designated Downtown Redmond as a future light rail destination and provided funding for the

preliminary environmental and engineering analysis (Sound Transit, 2008). Sound Transit 3 provided planning and funding to extend the transit system into downtown Redmond (Sound Transit, 2016).

At the local level, Redmond's Comprehensive Plan established a vision for downtown as an "economically healthy, people-friendly place, enhanced by the movement of pedestrians, bikes, cars, and a diversity of businesses" (City of Redmond, 2002). Efforts started in 1997 to revitalize downtown and acquire the old railroad property to create open space and opportunities for transit (Hope, 2015). In 2005 the City of Redmond completed its first Transportation Master Plan, which recognized the need to plan for a multimodal transportation system, to balance the needs of competing modes of transportation and to keep Redmond's "green, small-town community character" (City of Redmond, 2005). Subsequent documents and policies supported this vision, like the Downtown Wayfinding Design Manual (City of Redmond, 2006), the Complete Streets Policy (City of Redmond, 2007), the Comprehensive Plan (City of Redmond, 2011a) and the Capital Investment Strategy (City of Redmond, 2011c). The railroad property was acquired in 2010, and the project for the Redmond Central Connector, a one-mile trail across downtown, was completed in 2013 (Hope, 2015). Other projects intended to increase connectivity in downtown was converting Redmond Way and Cleveland street into parallel two-way streets, enhance Cleveland Street character as a "Main Street," and build Downtown Central Park (City of Redmond, 2011a). The 2030 vision for Downtown Redmond is a thriving urban center that attracts pedestrians and provides stores, restaurants, boutiques, theaters, and varied housing opportunities (City of Redmond, 2011a).

The community engagement process to develop the first transportation master plan was vital in establishing downtown's current urban form. This top-down process included interviews

with key stakeholders, City Council study sessions, and two community workshops. Among the nearly 200 participants were property and business owners, residents, high school students, city staff, elected officials, and consultants (City of Redmond, 2002). The concept for downtown originated from an open house, small group discussions, working sessions, and a voting activity. It proposed acquiring the railroad right-of-way, creating a transit spine, increase on-street parking, creating a central park, planning for higher density mixed-use and pedestrian-oriented downtown, and shifting downtown streets to 2-lane/2-way streets. In addition to the public workshops, the City maintained communication with local boards and commissions (trails, parks, design review, and bike/pedestrian) and the Redmond Chamber of Commerce.

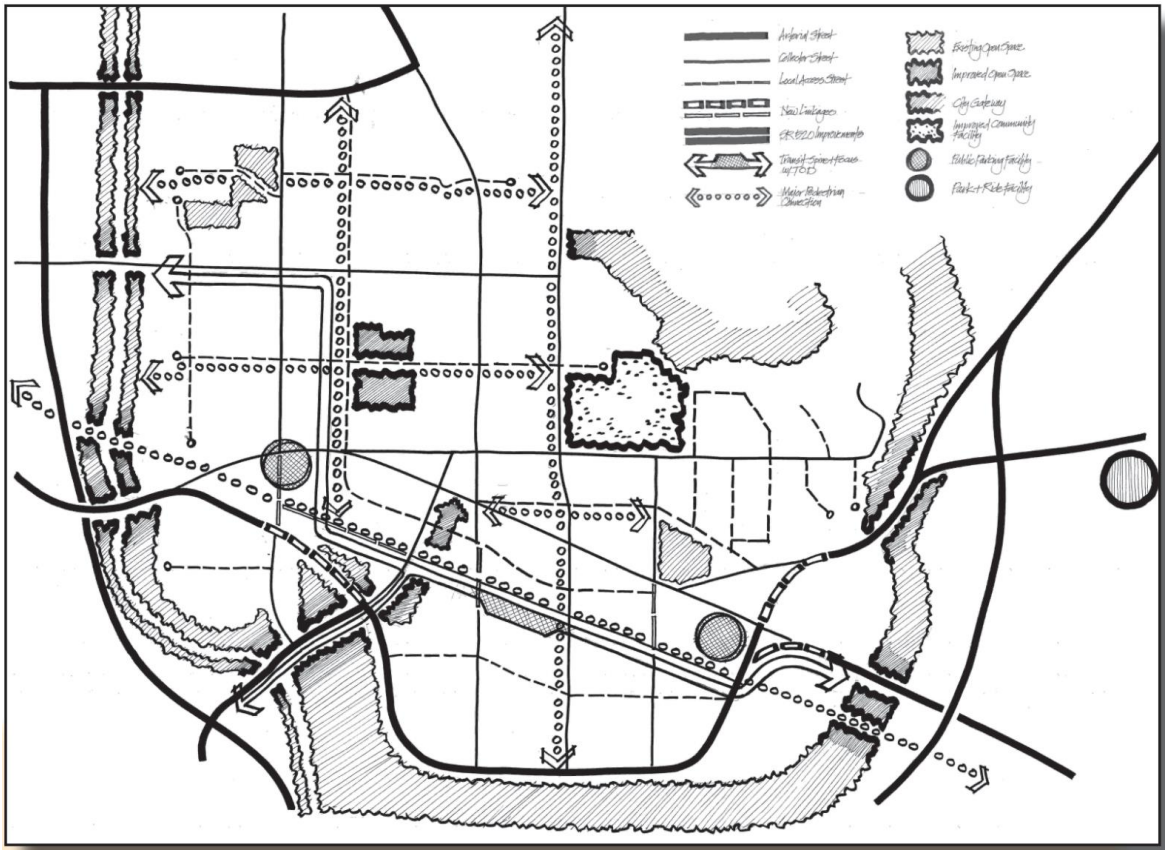


Figure 5.5. Refined concept for downtown Redmond after the Transportation Choices process (City of Redmond)

Another key event was the Downtown Link Extension Open House organized by Sound Transit in 2017. Participants provided public comment on two design proposals for the light rail station: an at-grade option with the station located west of Leary Way NE and an elevated option with the station located at 166th Ave NE. Attendants expressed a preference for the elevated option and displayed an interest in keeping pedestrian and bicycle connections, providing more TOD amenities, integrating rail with buses, and creating opportunities for public art, among others (Sound Transit, 2017). Currently, the process continues through meetings at the Design Review Board with the building consultant to refine the details and initiate construction in 2020.

The Parks and Recreation Department manages events and programming that take place along Redmond's Central Connector year-round. The events take advantage of the large open space and the pedestrian trail that connects City Hall to Town Center. These events include free and paid activities for families and young adults, like a luminary walk in December, a "Fun Run" for children in easter, the "Bike Bash" in May, and the "So Bazaar" night market in August. Additional programming varies year to year based on special occasions or unique opportunities and are proposed by the Arts and Culture Commission (City of Redmond, 2017a).

Budgeting the maintenance requirements of the public space adjacent to the future station has been part of its design process. Landscaping, stormwater, and recreational programming alongside the Central Connector was included in the City's budget. Redmond uses the budgeting by priorities approach to allocate its biennial budget. This method relies on public involvement to prioritize objectives and ensure resources align with community interests (City of Redmond, 2019a). "Infrastructure," "Clean & Green," and "Vibrant Economy" are the most related to improvements that make possible transit-oriented development and maintaining the quality of the built environment. The operational budget funds park maintenance and recreational programming,

and grant applications often support new projects (City of Redmond, 2017a). Also, in preparation for the light rail, the Capital Investment Strategy 2013-2030 planned for stormwater improvements near the site of the future station, sidewalk improvements to 164th Ave NE, and transportation impact studies (traffic and parking) in downtown (City of Redmond, 2011c).

5.4 PLACES

In general, Downtown Redmond could be described as "human scale" in terms of size and speed of locomotion. Buildings on the old town zone are one or two stories tall while new buildings located in main arterials and open spaces are six stories tall and provide street furniture, sufficient sidewalk, and diverse uses. Housing units locate within walking distance from other uses like food, services, and entertainment. Built blocks provide intermediate paths for pedestrians.

New development and historic properties within the neighborhood are highly oriented towards human use. They have small setbacks, provide active fronts, supply pedestrian amenities, and create small public spaces. Three parks - the Central Connector, Downtown Park and Anderson Park - create options for sitting, seeing, exercising, and recreation. The City redesigned Cleveland Street to give a "Main Street feel" and features pedestrian crossings, historic buildings, street furniture, vegetation, and public art. The Town Center, a new urbanist development, includes a pedestrian street with courtyards, outdoor dining, and games.

Lightning, first-floor windows, landscape features, and sidewalk size provide a safety feeling for pedestrians. Many blocks in downtown have commercial or pedestrian activity during the day and remain illuminated during the night. Narrow streets, especially in the old town zone, also provide pedestrian crossings and on-street parking, which creates a protective barrier against moving cars. Elements that impact safety are main arterials with heavy traffic, noise, and high speeds, with long crossing distances and no mid-block crossings, like Redmond Way.

In terms of building age, Downtown Redmond features variety and complexity. New mixed-use buildings integrate with historic low-rise brick buildings and mid-century car-oriented buildings. Multiple colors characterize each building: yellow, red, white, grey, and blue decorate new buildings. Orange, green, and yellow adorn old buildings. Building materials also vary, with brick, concrete, wood, and metal panel facades scattered across the neighborhood. Bike racks throughout the neighborhood have different shapes and colors, while businesses showcase signs of different shapes, colors, and sizes.

Increasing connectivity through downtown was a significant concept in reshaping the neighborhood two decades ago (City of Redmond, 2002). Transforming the abandoned railroad corridor into the Central Connector integrated the Town Center zone with the rest of downtown. The park, one mile long, also facilitated the creation of two new road crossings (161 Ave NE and 164th Ave NE) and three new mid-block connections to facilitate all types of transportation connectivity (Hope, 2015). Built blocks around the neighborhood fall within a comfortable pedestrian length and do not exceed the 360 feet of length (Institute for Transportation and Development Policy, 2018).

5.5 FACILITIES

Public infrastructure in downtown, like the Redmond Central Connector, support non-motorized transportation. Multi-use trails are paved and separated from vehicular traffic, have major landscape features, and provide multiple pedestrian amenities: bollards, benches, bike racks, drinking fountains, lighting, public art, trash receptacles, pet stations, and wayfinding signage. In traditional streets, marked crosswalks indicate preferred crossing locations and include curb ramps, texture patterns, pushbuttons, and audible walk indicators. Despite these amenities, there are some challenges for pedestrians as some older sidewalks are in disrepair, crossing distances are large,

and timing is limited, with no curb extensions or pedestrian refuge islands. Mid-block crossings are missing in large sections of the neighborhood, and it is common seeing pedestrians cutting across. Bike infrastructure is common in new developments in the form of bike racks, bike parking, and bike repair shops. Bike lanes are wide and well-marked, but they are rarely separated or protected from moving vehicular traffic.

Overall, transit stops in downtown are visible, convenient, and provide accommodations for pedestrians. Prominent bus stops have shelters with seating, lighting, and trash receptacles. Colorful stop signs indicate bus routes and contain timetables at a height accessible by wheelchair users. Some bus shelters even provide space for public art. Bus stops are close to parks and services, like the library, city hall, retail centers, and grocery stores.

Parking regulations for downtown Redmond aim to create a pleasing pedestrian experience. Parking lots and ground floor garages should be separated from streets and made available for pedestrian-oriented businesses (City of Redmond, 2011b). Stand-alone surface parking lots are prohibited, and other types of parking have frontage maximums (City of Redmond, 2011b). The City also established off-street parking maximums for residential and commercial uses, from 1 to 2.5 spaces per unit for different residential uses and two spaces per 1,000 square foot of gross floor area for commercial uses. Most of downtown off-street parking is privately owned and managed, 90% is free and associated with a business (City of Redmond, 2020a). On-street parking is in high demand and used for loading, unloading, and for quick trips to businesses. Demand is highest during meal hours when visitors come to downtown for dining (City of Redmond, 2020).

5.6 ANALYSIS

Redmond works a TOD case study as it exemplifies the efforts of implementing mass transit into a suburban city. This work studies the area surrounding the future light rail station to evaluate the urban design qualities that relate to equity (Figure 5.7). A general analysis examines assets at the neighborhood level, and a micro-scale analysis evaluates the relative condition of urban design attributes in six streetscapes: NE 76th St, 164th Ave NE, 166th Ave NE, and Cleveland St. The author conducted a walking survey of each street between August 6 -15, 2020. For each location, the survey measured the urban design qualities of the built environment at a distance of ¼ mile from the point of the future light rail station, at the intersection of the Redmond Central Connector and 166th Ave NE. Each street was surveyed at least twice in the afternoon and evening. The exception being NE 76th St, that has sidewalk at only one side (south).

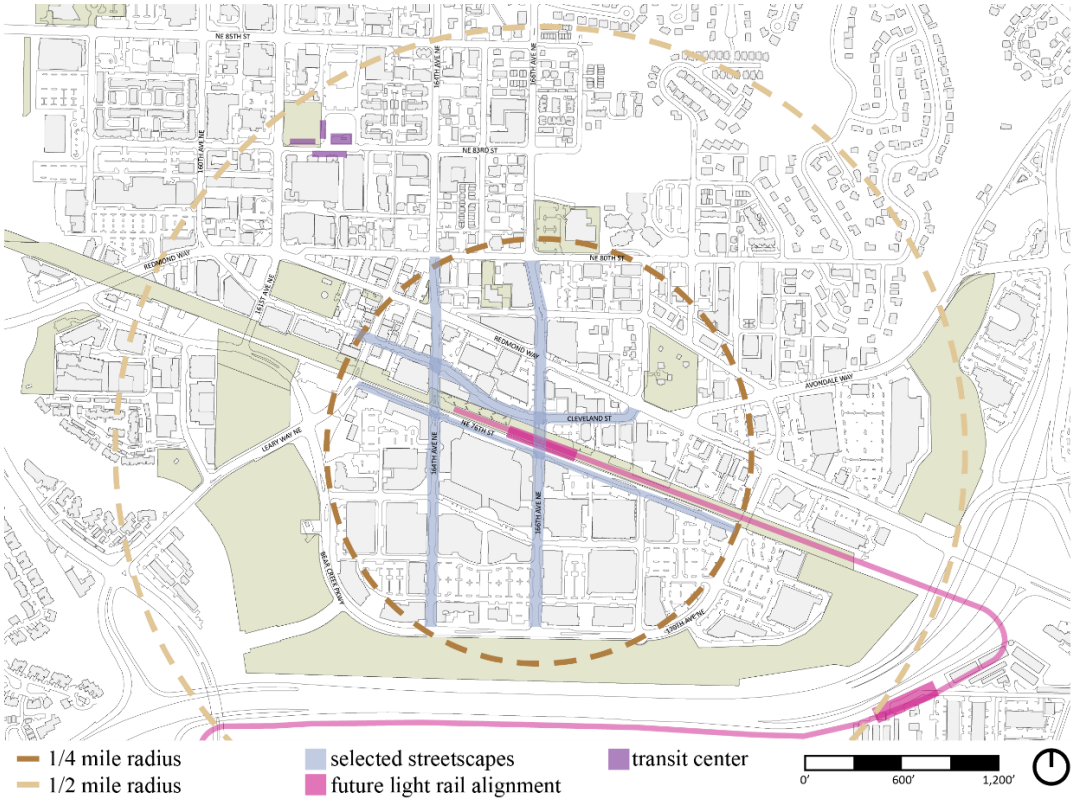


Figure 5.6. Study Area (Asela Chavez Basurto)

A smartphone was used to take photographs at each streetscape and to record decibel levels at each block. Written notes were taken on pedestrian activity and the condition of diverse elements in the environment. A sketch map was also used to record the position of relevant elements. Preliminary work in the map included identifying historical buildings, as classified by the City of Redmond and the Redmond Historical society as city landmarks. The material produced was categorized in digital folders for each streetscape and then evaluated based on their relative condition as described in the survey parameters.

5.6.1 *Accessibility*

Downtown Redmond can be described as accessible. There are ample pedestrian connectivity and amenities, and the design incorporates principles of universal design. The urban infrastructure appears well maintained, and everyday services are within walking distance or a short trip by bike or public transit. The Redmond Central Connector functions as a safe and convenient path that crosses the neighborhood while providing green and open spaces; this function was by design. What used to be an abandoned railroad that created a barrier in the urban form is now a convenient connection to move within downtown. The process of transforming the old railroad into a shared trail also served to complete the street grid and increase connectivity by extending 161st Ave, 164th Ave, and 168th Ave to the south and by creating two pedestrian mid-block connections, Gilman street, and Brown street.

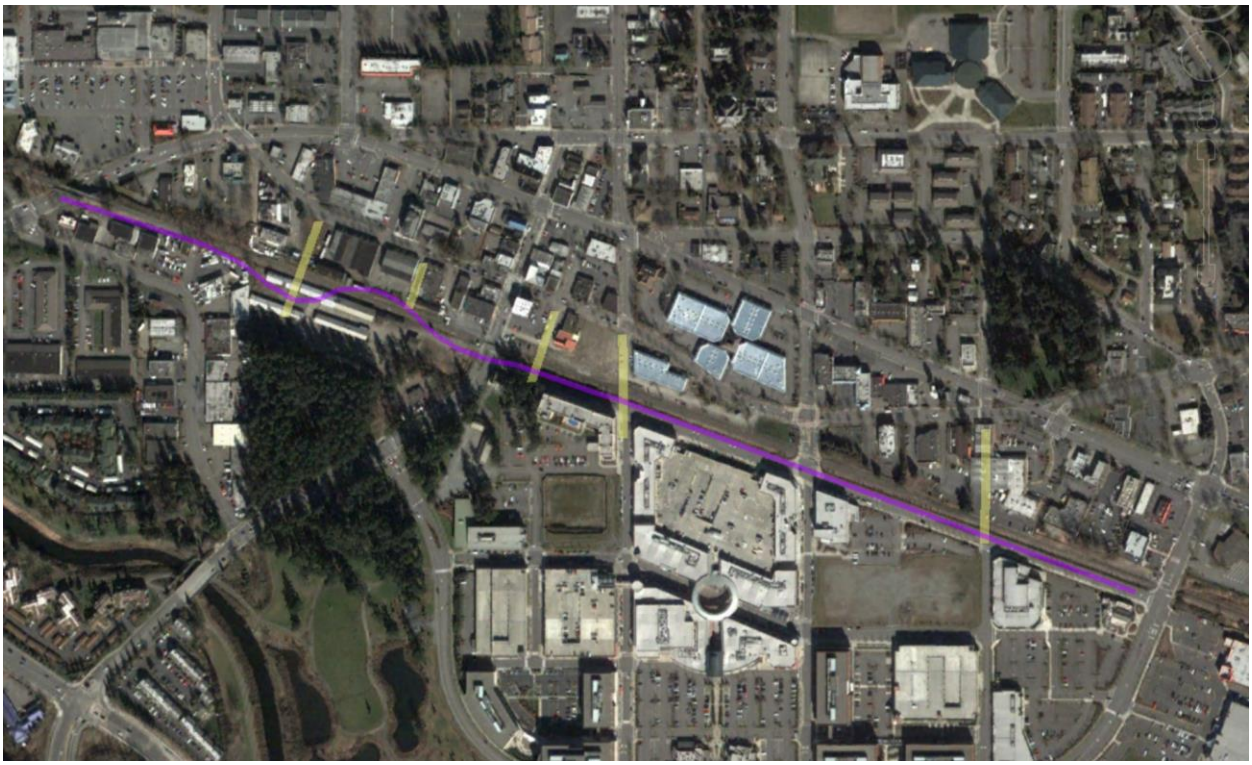


Figure 5.7. Downtown Redmond in 2002 before the Redmond Central Connector and new connections. (Google Earth)

During the mid-20th century Redmond was mainly a farming town and the population grew little, especially after the Great Depression. As a result, the city core maintained its size and human scale. New residents started to move in after the construction of the first floating bridge connecting to Seattle in the 1940s. By 1970 Redmond was a small and quiet town of about 11,000 residents (City of Redmond, 2020b). Redmond Way functioned as the main street, connecting the town to Seattle and Kirkland, and where many businesses where located, also City Hall (Prasanna, 2011). A big building with a tower located in Cleveland St was a poultry feed mixing factory. In this decade, commercial and industrial growth began with the establishment of high-tech corporations in the area.

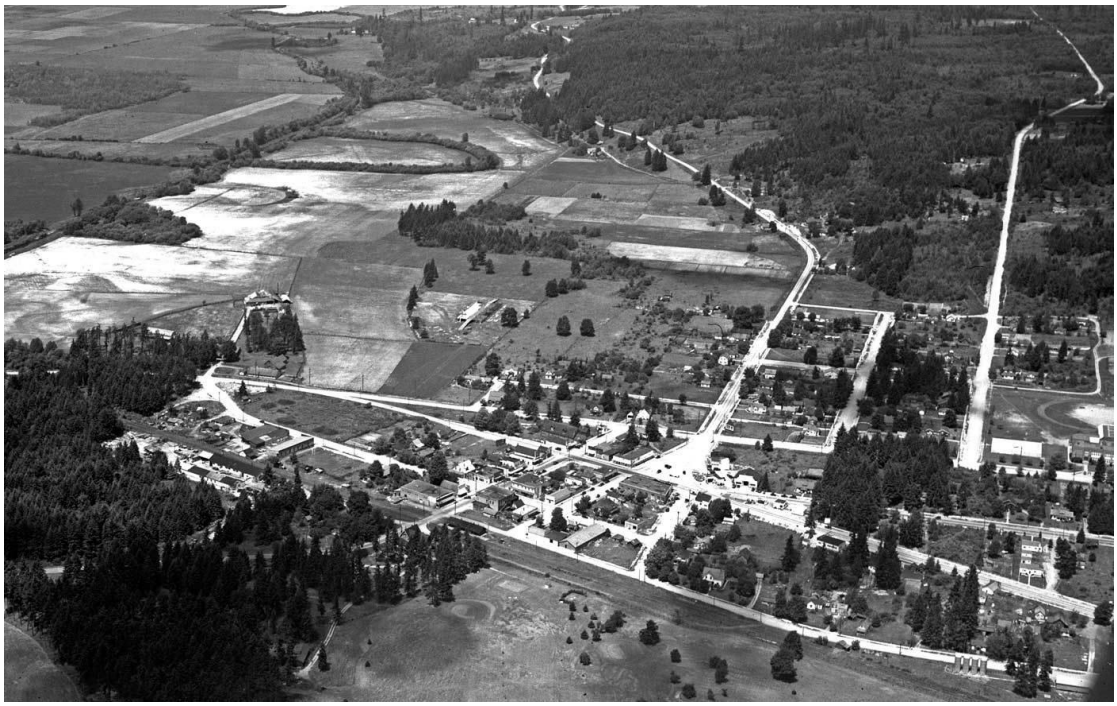


Figure 5.8. Aerial view Redmond, looking north, 1939 (Sherrard, Museum of History and Industry)

Figure 5.9. Aerial view Redmond, looking north, 2016 (Google Earth)

Figure 5.10. Aerial view Redmond looking east, 1950 (Sherrard, Museum of History and Industry)

Figure 5.11. Aerial view Redmond looking east, 2016 (Google Earth)

Figure 5.12. Brown's Garage, at164th Ave NE looking north, crossing with Redmond Way, 1970-2016 (Subbarayan Prasanna, Google Earth).

Figure 5.13. Cleveland St looking west, 1970-2016 (Subbarayan Prasanna, Google Earth)

Figure 5.14. Burlington Northern Santa Fe Railroad 1970, Redmond Central Connector 2016 (Subbarayan Prasanna, Google Earth)

Warehouses, parking lots, and storage buildings surrounded the downtown core and the railroad area. New suburban housing was developed in elevated land far from the neighborhood and near the Sammamish lake. There is little information on whether the town could cover daily necessities at a walking distance. In some areas, there was little distinction between the road and the space for pedestrians, as there are no sidewalks, in specific near the old railroad. Nowadays, downtown Redmond provides amenities and services that help support daily necessities and within a short walk or by public transportation: grocery stores, healthcare, public services, education, and childcare (Figure 5.24). Many food businesses are located in the Old Town zone, and shopping and entertainment options are concentrated in Town Center.

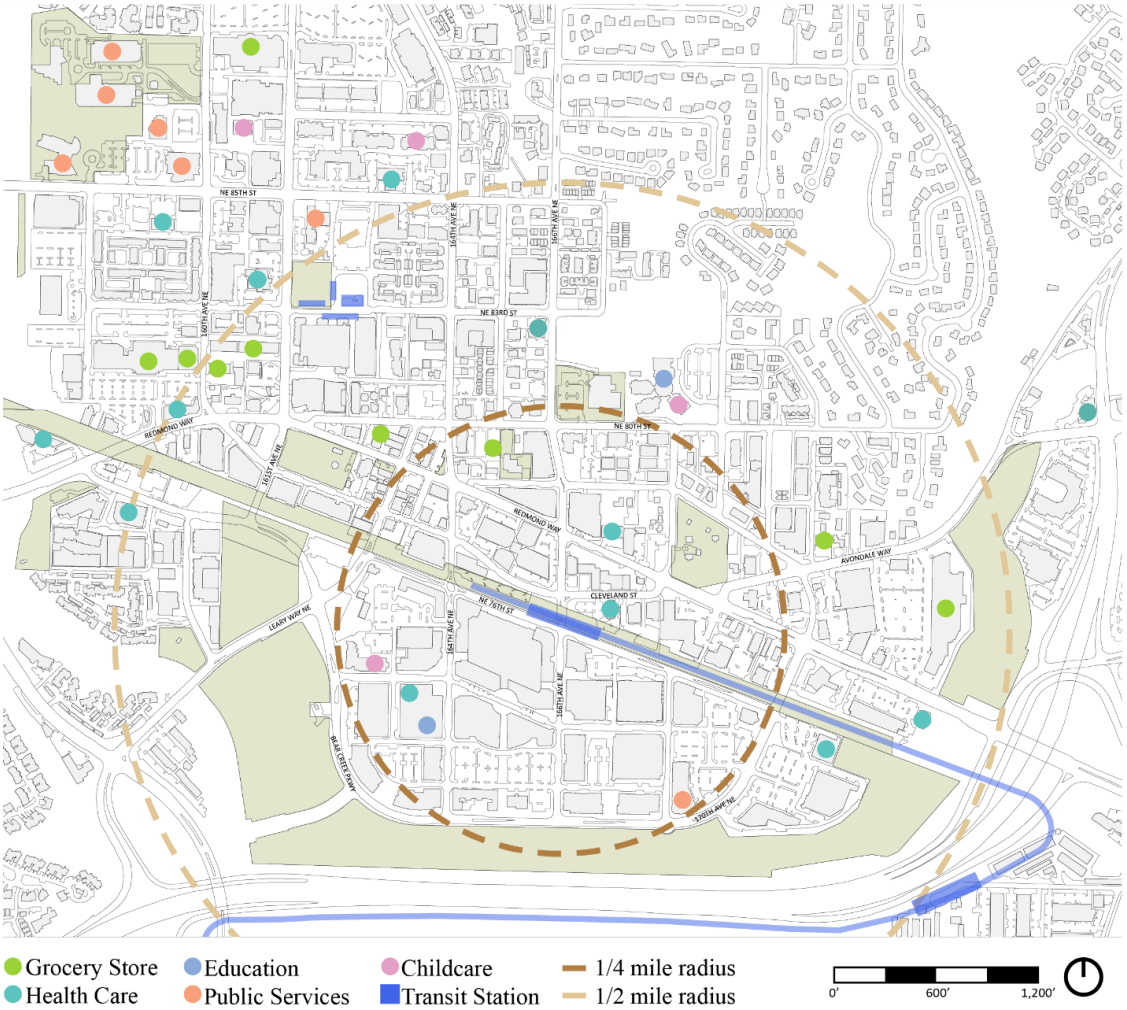
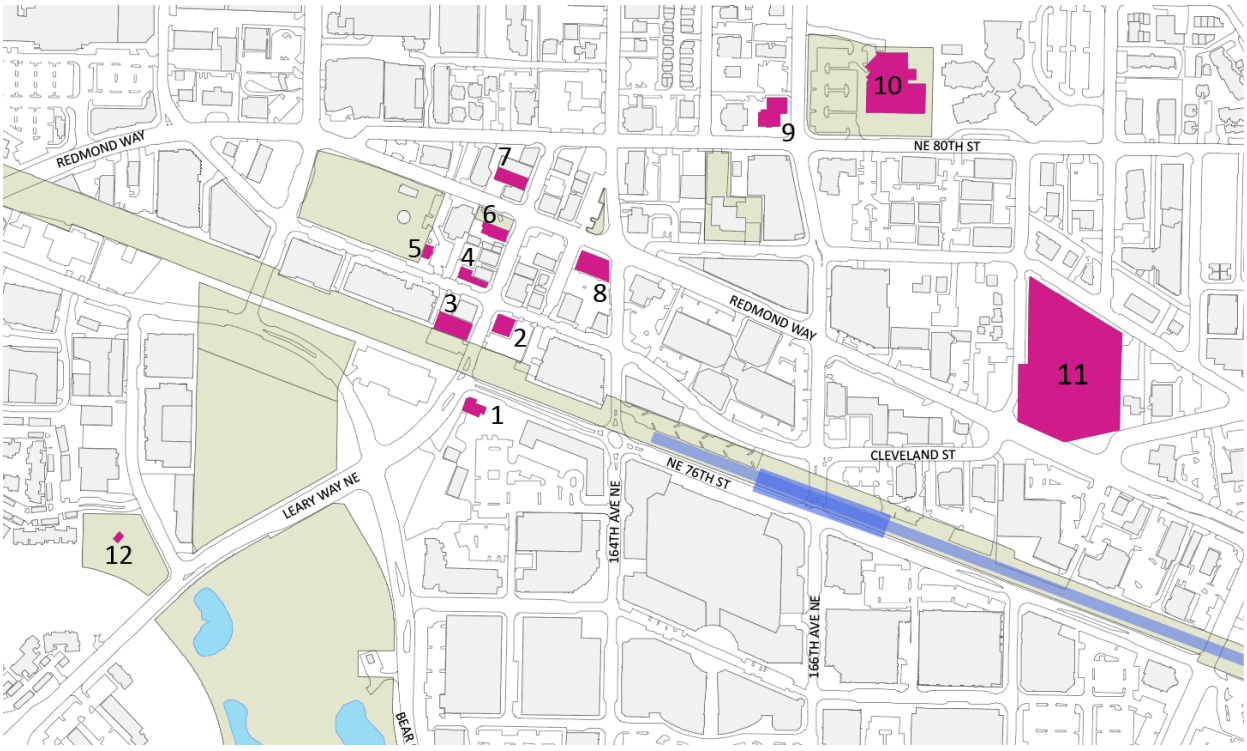


Figure 5.15. Downtown Neighborhood assets, including the future light rail station. (Asela Chavez Basurto)

5.6.2 *Community*

In the last few years, public improvements have created spaces for interaction and engagement in the neighborhood, which are complemented by the character of historical landmarks located in the downtown core. The City of Redmond recognizes twelve properties of historical significance within downtown, and all have adapted to modern use: an architecture firm, restaurants, an ice-cream shop, a bike shop, a church, a community center, and parks. These buildings are one or two-stories high, are points of reference within the urban fabric, and tend to have pedestrian activity.



1. Justice White House
2. Bill Brown Saloon
3. Redmond Trading Company
4. Redmond State Bank
5. O.A. Wiley Home
6. Lodge Hall
7. Odd Fellows Hall
8. Brown's Garage
9. Redmond Methodist Church
10. Redmond School
11. Redmond City Park
12. Haida House Studio

Figure 5.16. Location of City of Redmond Historical Landmarks (Asela Chavez Basurto).

Figure 5.17. City of Redmond Historical Landmarks (Asela Chavez Basurto, ot, Peter Thornton, Asela Chavez Basurto, David Elkins, David Roberts, Michael Cramer, Asela Chavez Basurto, Betty Bouley, Gowri Kumar Chandramouli, CatiaMagalhaes, Jeff King)

New development added to the neighborhood in the last decade contrast with historic properties located in the Old Town zone. Several properties have redeveloped in anticipation of the potential of mass transit. These mixed-use developments share common characteristics: they are five or six stories high, feature retail space on the ground floor, have minimum or no setbacks, have active uses facing the street, contain underground parking garages, and mainly offer rental apartments. In 2019, 132 Single Family Homes, 233 multi-family units, and 24,400 s.f. commercial space were built in the city (Yoder, 2020).

In maximizing profit and following the zoning code, the new multifamily buildings have a somewhat uniform design; at first glance, they feature similar materials and design principles, similar configurations, and the same scale. These new developments replaced short buildings often

surrounded by ample parking space, like drive-through banks or small retail. The following map and table were produced by gathering information from design review board documents, google map research, and information on apartment rental sites. Since 2009, approximately 40 mixed-use developments were built in downtown. It is expected that the population in the neighborhood grows from 3,807 in 2020 to 11,350 by 2030 (City of Redmond, 2020b).

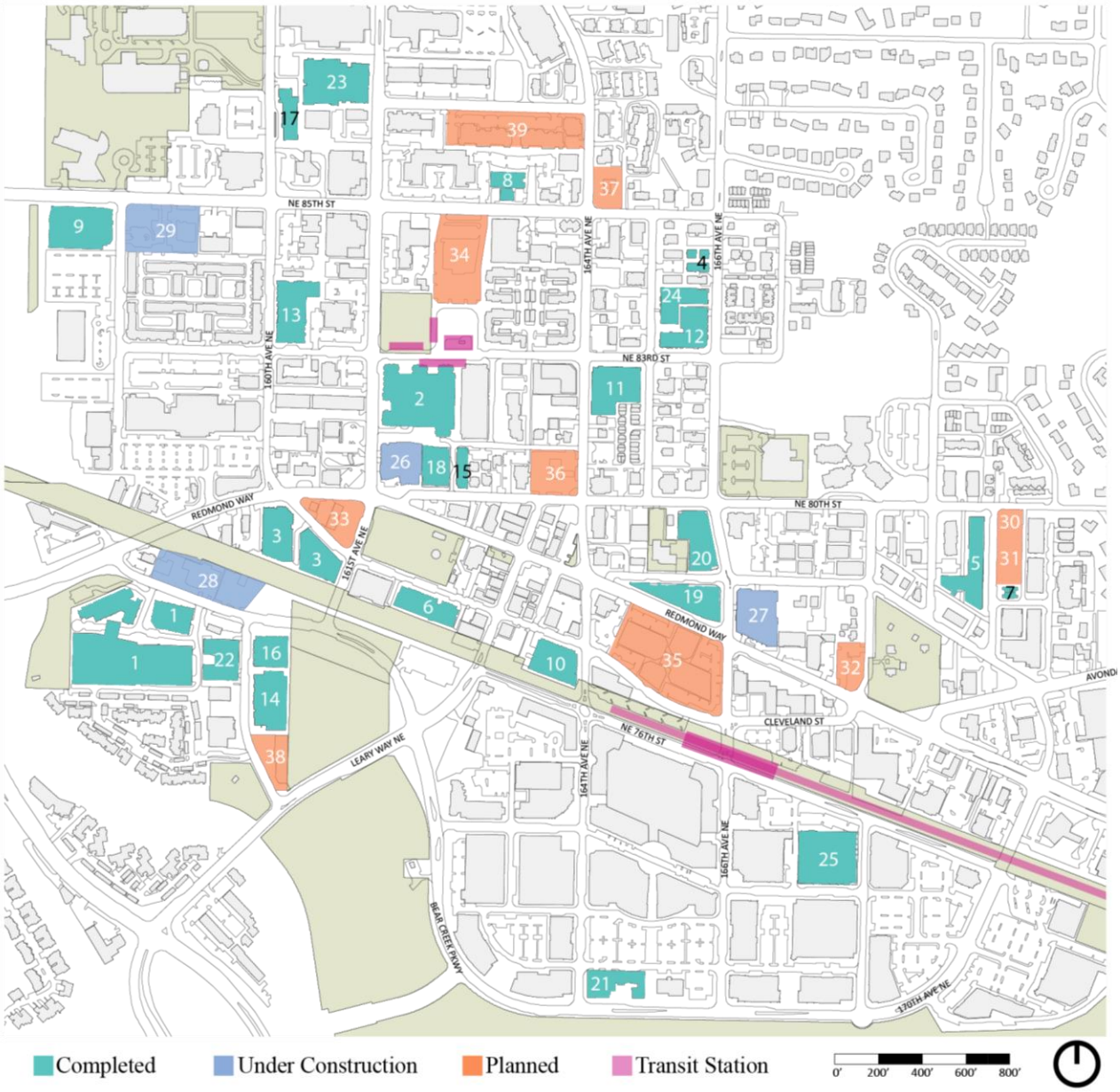


Figure 5.18. Redmond Downtown New Development since 2009 (Asela Chavez Basurto)

Table 5.1. Downtown Redmond Multi-use Developments 2009-2020

#	Name	Year Built	Stories	Units	Monthly Rent
1	Riverpark	2009	5	321	$1,530 - $2,690
2	Veloce	2009	6	322	$1,511 - $2,482
3	Red 160	2011	6	250	$1,558 - $3,056
4	Tudor Manor	2011	3	61	$1,540 - $2,600
5	Redmond Square Apartments	2012	6	156	$1,468 - $10,000
6	Elan Apartments	2013	6	134	$1,392 - $4,372
7	Penny Lane Townhomes	2013	2	4	-
8	Vision Five	2013	5	96	$835 - $1,200
9	Allez Apartments	2014	6	147	$1,775 - $2,975
10	Old Town Lofts	2014	6	149	$1,480 - $2,754
11	The Luke	2015	6	208	$1,555 - $2,770
12	Core 83	2016	5	120	$1,695 - $2,395
13	Milehouse	2016	6	177	$1,685 - $10,353
14	The Carter	2016	6	180	$1,620 - $3,695
15	162Ten	2017	5	96	$905 - $1,105
16	Heron Flats and Lofts	2017	7	95	$1,675 - $2,685
17	Providence Senior Housing	2017	5	74	50% - 60% AMI
18	Ravello Apartments	2018	6	102	$1,465 - $2,530
19	Redmond Triangle	2018	6	195	$1,693 - $3,897
20	Station House Lofts	2018	6	196	$1,668 - $2,897
21	Archer Hotel	2019	7	160 rooms	$134 - $230 per night
22	Blackbird	2019	6	159	$2,147 - $2,981
23	Modera	2019	5	300	$1,550 - $3,860
24	The Village (The Edge)	2019	5	96	$1,695 - $2,025
25	Talisman	2020	7	286	$1,799 - $4,015
26	Alexan Central Park	2020	7	190	-
27	Anderson Park Hotel	2020	6	177 rooms	-
28	Bear Creek Mixed Use	2020	6	360	-
29	Modera River Trail	2021	6	247	-
30	Penny Lane II	2021	3	14	-
31	Penny Lane III	2021	3	4	-
32	Redmond Way Flats	2021	6	102	-
33	Porch and Park	2022	6	86	-
34	Redmond City Center	2023	9	416	-
35	Redmond Square	2024	6	613	-
36	8009 164th Ave	~2022	8	214	-
37	Harmony	~2022	7	98	-
38	The Osprey	~2023	6	85	-
39	Together Center	~2023	6	280	-

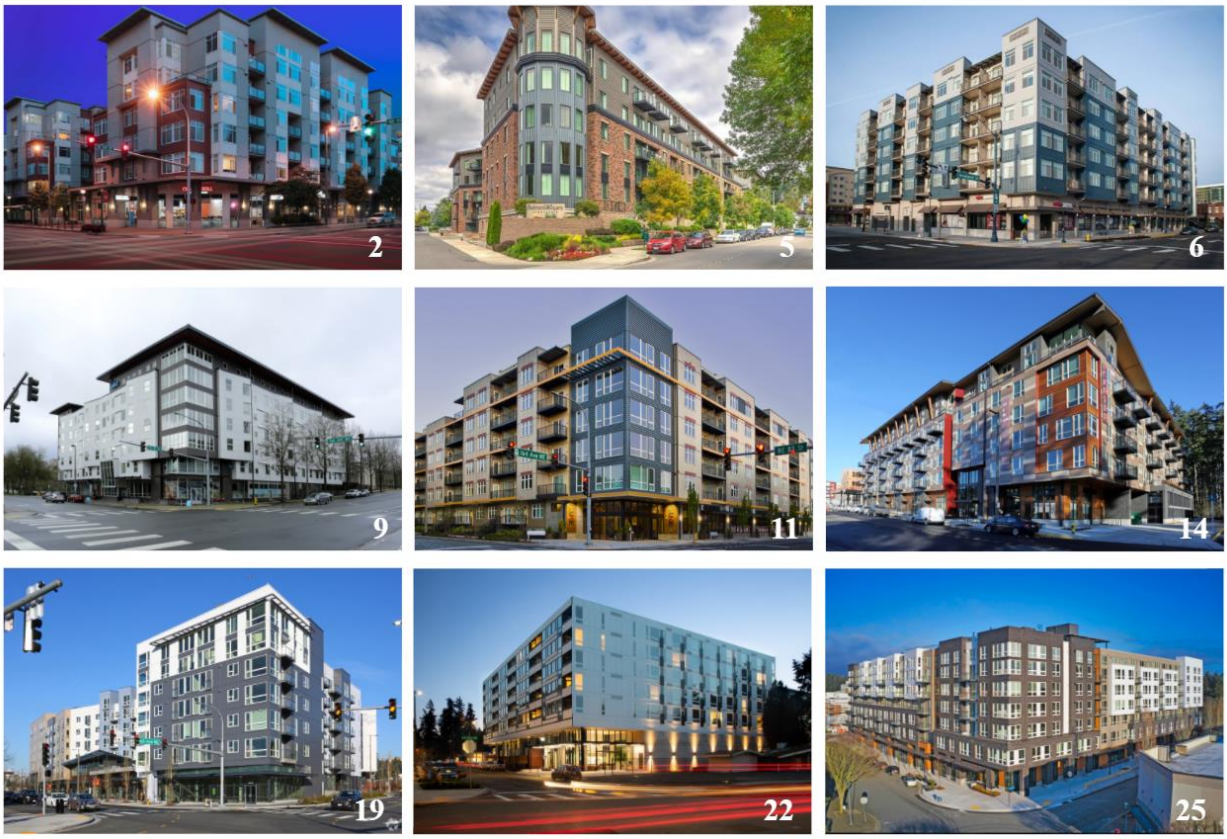


Figure 5.19. Mixed-use developments in downtown Redmond (Apartments.com)

The City of Redmond Design Review Board examines the design and planning of multi-use buildings and provides a space for the community to submit public comments on proposed developments. Public input guides future improvements and creates an opportunity for people to contribute and feel included by expressing their interests, concerns, and opinions on upcoming proposals. The downtown Redmond light rail extension has also incorporated public input in the past few years.

In 2017 Sound Transit hosted a preliminary engineering open house to gather input on "the look and feel" of future light rail station areas in Redmond (Sound Transit, 2018). The event took place in the Old Redmond Schoolhouse Community Center in November. Project staff from Sound Transit, City of Redmond, and King County Metro provided updates on the project to

approximately 130 participants, and public commentary was accepted in person, by email, and through an online survey. Sound Transit later published a summary of public feedback and the survey results through a report called "Preliminary Engineering" (Sound Transit, 2018) highlighting key findings and the next steps for the project. When exploring the results, some elements deserve further analysis:

Public outreach strategies to publicize the open house and survey: Sound Transit utilized postcards, newspaper advertisements, email notifications, web announcements, social media posts, and press releases to reach out to people interested in providing feedback for the light rail extension (Sound Transit, 2018). Postcards reached residents and businesses with a half-mile of the project alignment, and advertisements in local publications included organizations aimed at ethnically diverse readers: La Raza, Seattle Chinese News, SeattleIndian.com. Based on pictures included in the report, the event was successful with an attendance of 130 participants, as most seats were occupied, and many attendees were standing. There is also evidence of participants engaging with the materials (maps, boards, diagrams) exhibited at the open house. However, there is no information on the ethnicity of attendees and survey respondents, a relevant concern in a city where population estimates of that year indicated that 47% of residents identified as non-white ("Redmond city, Washington," n.d.). Including a related question in future surveys and outreach strategies could highlight any discrepancy between participants and the ethnic composition of the city and neighborhood. It is also worth considering whether different ethnic populations favor different outreach strategies. For instance, there is evidence that Hispanic communities prefer personal methods of engagement, like face-to-face meetings and phone calls (Keidan, 2008). Public projects of significant scale would benefit from public input that represents a wide range of the population.

Place of residence of survey respondents: Sound Transit was seeking public feedback on the east light rail extension, which includes transit stations at two Redmond neighborhoods, South East Redmond and Downtown. However, the results show that the largest proportion of survey respondents that lived in Redmond resided in Sammamish Valley (28%) or southeast Redmond (21%). Shockingly, only 5% of survey respondents resided in downtown. Because this neighborhood is located more than half a mile from the proposed light rail alignment, we can assume those survey participants from Sammamish Valley heard about the survey by means other than postcards. This circumstance becomes relevant by the fact that most respondents were interested in providing input to the Downtown Redmond Station.

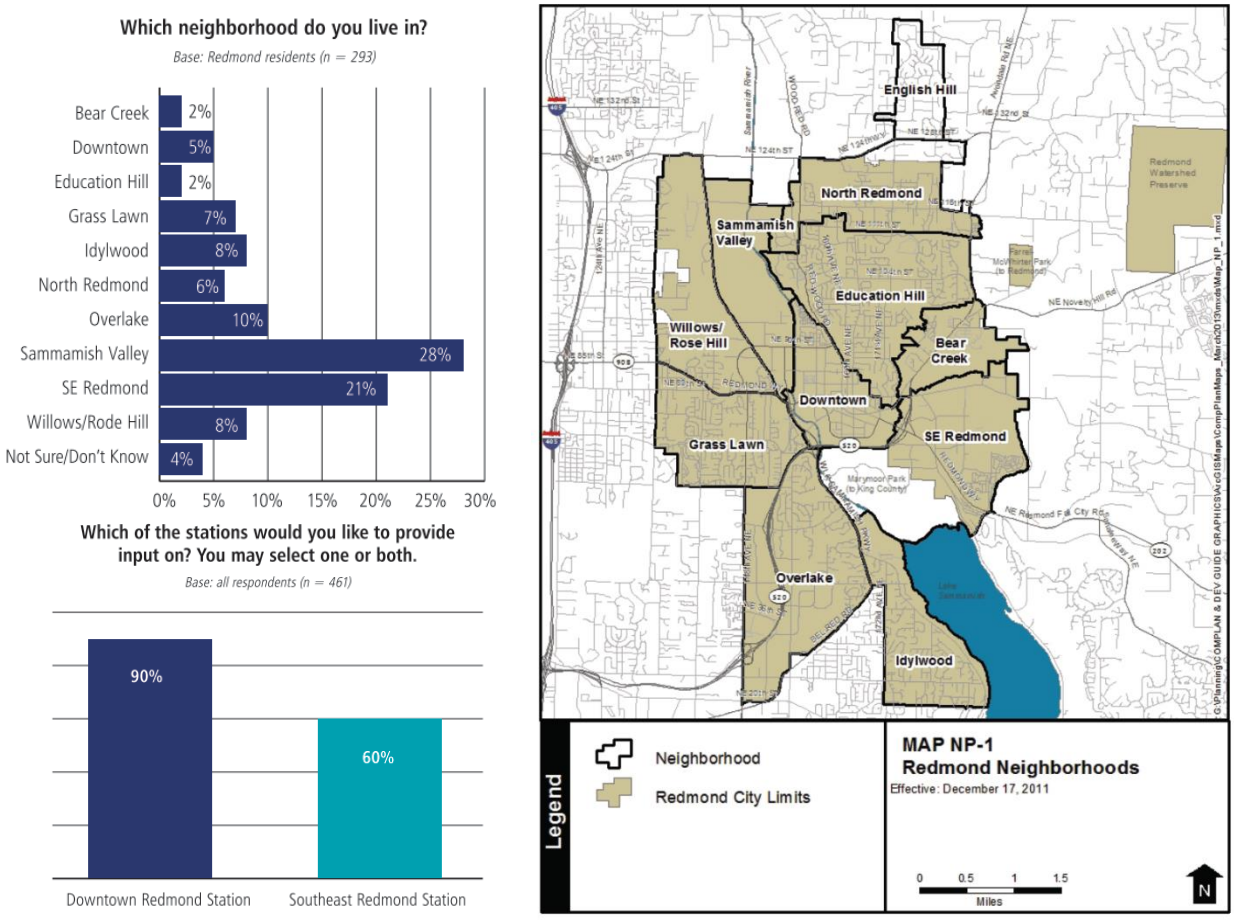


Figure 5.20. Survey participants neighborhood of residence. (Sound Transit, City of Redmond)

Many factors could explain the limited participation of downtown residents in the survey. The neighborhood has experienced significant changes in the last decade (multiple new housing units) suggesting that new residents might not be familiar with the local circumstances and significance of future projects. They could also lack confidence or interest in providing input to a proposal to which they have little information or familiarity. Future outreach efforts could include an educational component that clearly conveys the importance of transit improvements to current residents.

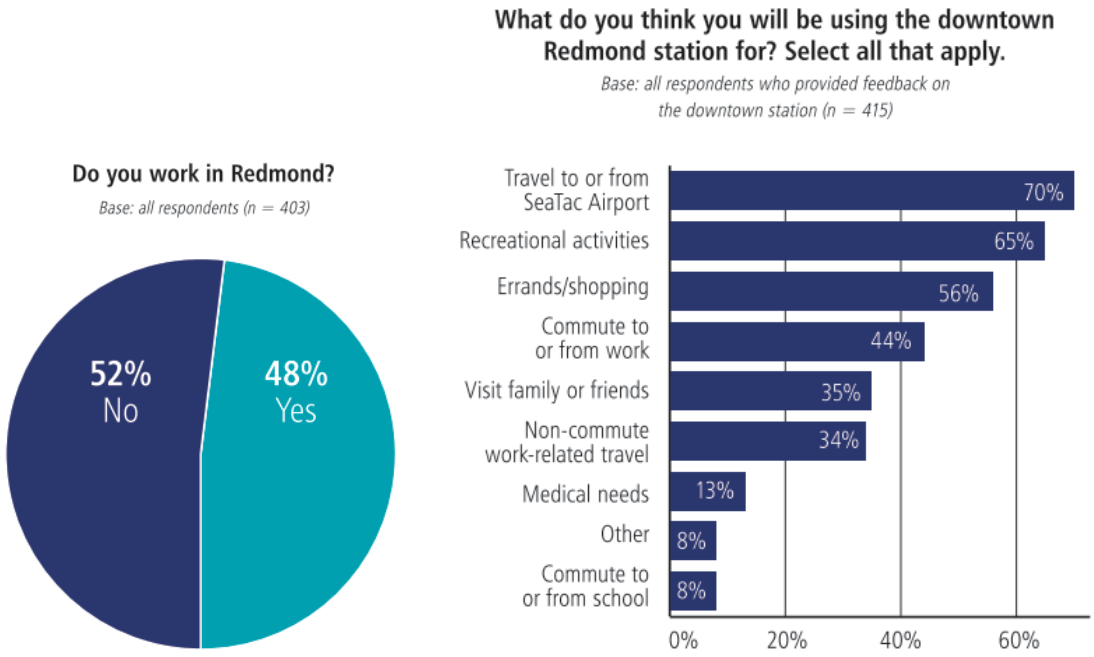


Figure 5.21. Anticipated travel for downtown station. (Sound Transit)

Intended trip use for the downtown station: survey results show that participants expect to use the light rail station mainly to travel to SeaTac Airport (70%), to reach recreational activities (65%), and do errands or shopping (56%). Commuting to and from work ranks as a fourth option and had less than half of respondents (44%). One of the goals of transit-oriented development is to provide transportation options and reduce car trips for daily activities. However, the results show

that survey respondents anticipate using the station mainly for occasional trips. This point becomes relevant when considering that more than half of respondents also indicated that they do not work in Redmond, which suggests they anticipate to keep commuting to or from work by their usual mode. It might be that Redmond residents work in areas that will not be reached by light rail or that there are other modes considered more efficient (in time and cost) to reach their workplace. Another explanation is that at the time of the survey and before the transit stations become a reality, it is difficult to grasp the extent and benefits of mass transportation, especially if the participants are not used to taking public transit.

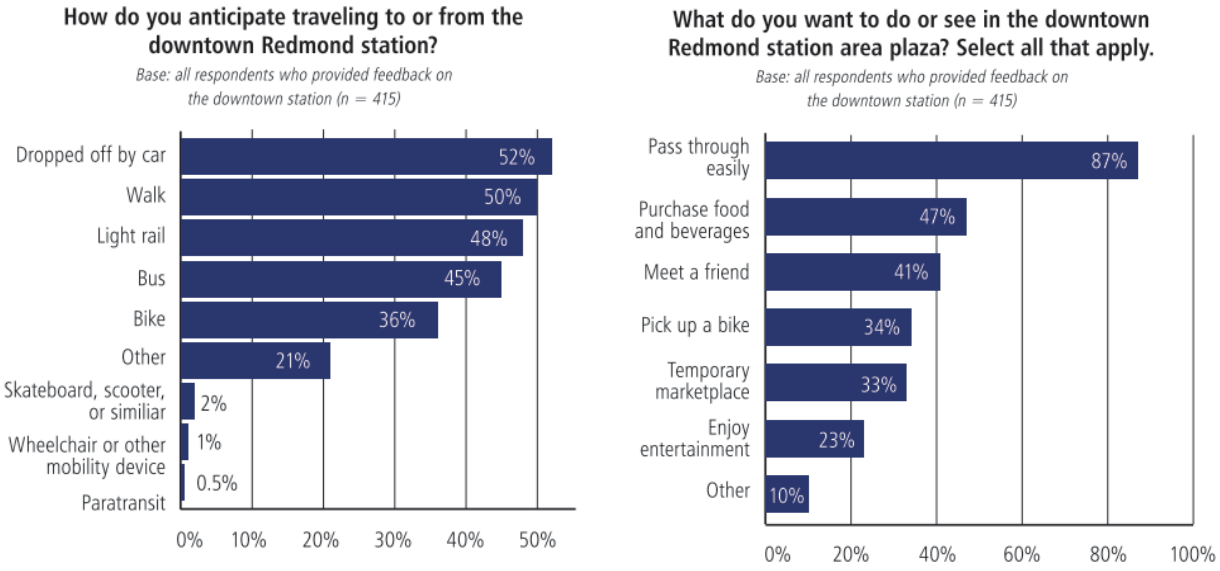


Figure 5.22. Anticipated mode of travel and interests for downtown station (Sound Transit)

Anticipated travel to and from the downtown station: most respondents plan to travel by car (52%) and walking (50%) to reach the light rail station. This point highlights the importance of available parking, the design of drop off areas, and the completeness of the pedestrian network. A minimal proportion of respondents anticipate reaching the station by paratransit (0.5%) or supportive mobility devices (1%). Space allocation would be essential to ensure access by diverse modes of transportation and to make it convenient and safe for all users to reach the station.

Future activities in the downtown station plaza: survey participants were mostly interested in passing through the station area easily (87%). This point suggests that future transit users expect an accessible station that could be easily navigated. There was slightly less interest in other activities that invite people to stay and enjoy the station, like purchasing food (47%) or meeting a friend (41%). This preference could be explained by the perception of mass transit stations as noisy and congested, as spaces where people would like to spend little time. Other suggestions included parking options, restrooms, Wi-Fi, and public art (Sound Transit, 2018).

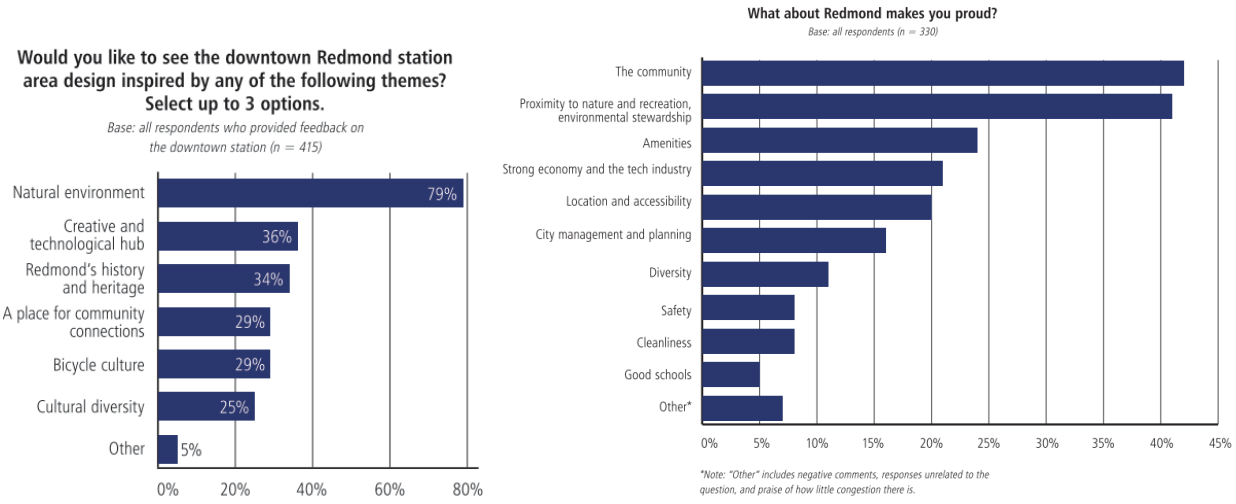


Figure 5.23. Design themes and Redmond identity. (Sound Transit)

Design theme preference: survey respondents favored a "natural environment" theme for the design of the downtown light rail station (79%). This interest aligns with one of the city goals of preserving a clean and green environment. Interestingly only 29% of respondents expressed interest in a bicycle culture theme, which seems unfortunate to a city that adopted the recognition of "Bicycle Capital of the Northwest." An open-ended question asked what makes respondents proud of Redmond, and they indicated it was the strong sense of community (42%) and its proximity to nature and recreation (41%), which aligns with the desired theme for the light rail station. Comments also envisioned a walkable city with proximity to nature and outdoor recreation

(Sound Transit, 2018). Respondents also expressed interest in equitable values: affordability, inclusivity, environmental stewardship, and diversity (Sound Transit, 2018).

The results of this public engagement effort informed the initial planning and design concepts for the planned transit stations. In 2020, another open house was organized to present project updates and gather input from the public. Circumstances at the time forced the event to move online; updates were shared through a video and input gathered through a survey. The refined designs were also shown at the Design Review Board and the Pedestrian and Bicycle Advisory Committee. No information on public commentary from the open house is available at the time of writing.

Figure 5.24. Station east entrance looking northeast (Stacy and Witbeck/Kuney, Sound Transit)

Figure 5.25 Landscape plan (Stacy and Witbeck/Kuney, Sound Transit)

Figure 5.26. Station west entrance looking northeast (Stacy and Witbeck/Kuney, Sound Transit)

5.6.3 *Wellbeing and Environment*

Increasing the percentage of tree canopy across Redmond is one of the goals that could significantly contribute to a healthy environment. The city is targeting that all neighborhoods reach a tree canopy coverage of 40% by 2050. It takes a tree around ten years to grow enough to count in the canopy analysis (City of Redmond, 2019c). Enhancing tree canopy will contribute to better water and air quality, increased aesthetics and property values, improving natural habitats, and combating climate change. Downtown is the neighborhood with the second-lowest percentage of coverage, which highlights the efforts needed in upcoming years. The widespread vegetation and open public spaces create wellbeing opportunities for exercising, moving, playing, and relaxing. Allocating resources for stormwater management, establishing protected areas, and increasing tree canopy are long-term strategies that will address sustainability and resilience.

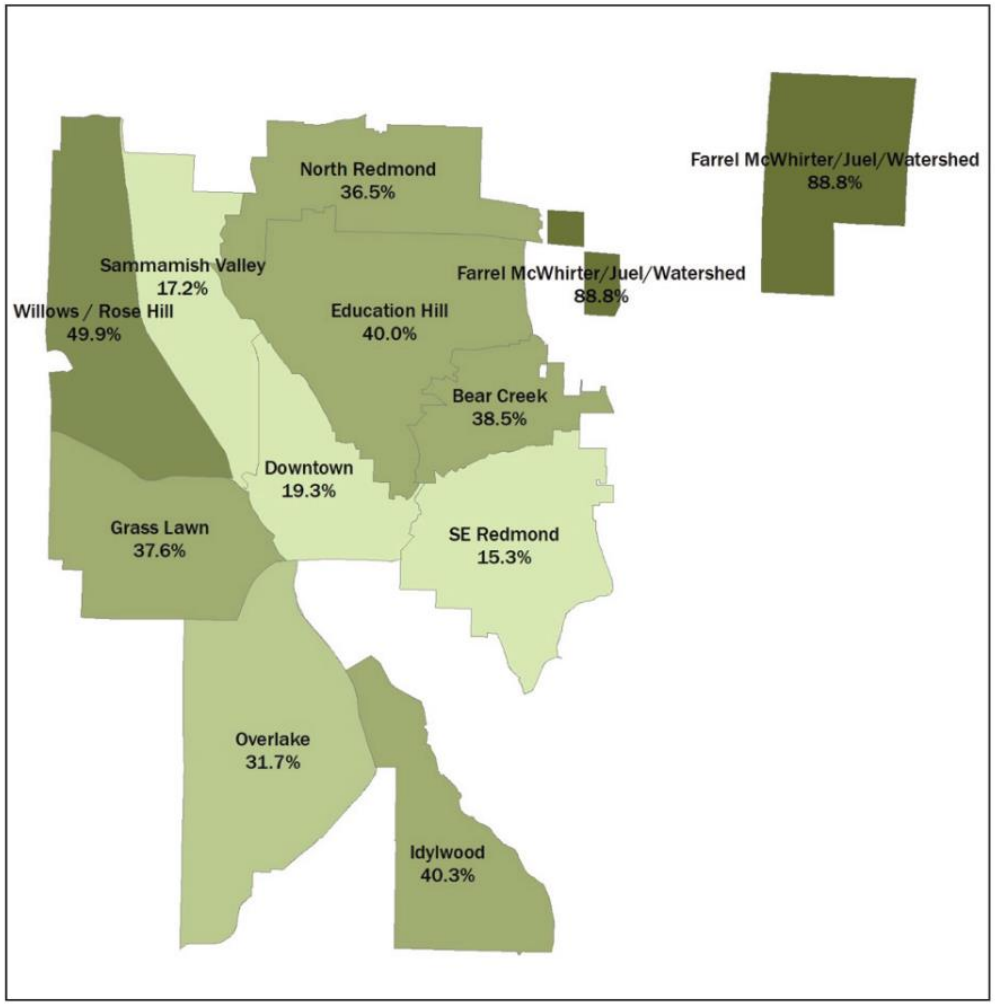


Figure 5.27. Current Tree Canopy Cover by Neighborhood (City of Redmond)

5.6.4 *Opportunity and Prosperity*

Downtown Redmond is home to 3,916 people and provides 10,212 jobs. The City estimates that by 2030 population increases to 11,350 and the number of jobs to around 10,800 (City of Redmond, 2020b). As a designated urban center, downtown is expected to accommodate a high share of future growth through 2030. The median household income in Redmond is $123,449, double the national median of $61,937. The median home value for downtown in August 2020 is $708,687, which represents a significant barrier for homeownership. Future population growth

will likely be accommodated in the rental apartments offered by recent development. As of August 2020, the average apartment rent in Downtown Redmond is $1,419 for a studio, $1,930 for one-bedroom, $2,574 for two bedrooms ("Downtown Redmond Apartments for Rent - Redmond, WA ," n.d.).

In Redmond, 14 low-income housing apartment communities offer 1,362 affordable apartments for rent ("Affordable Housing in Redmond", n.d.). Six communities are located in downtown, close to public transportation or at a walkable distance of a transit station. Redmond also offers 1,200 rent-subsidized apartments and 162 income-based apartments where tenants pay no more than 30% of their income towards rent and utilities.

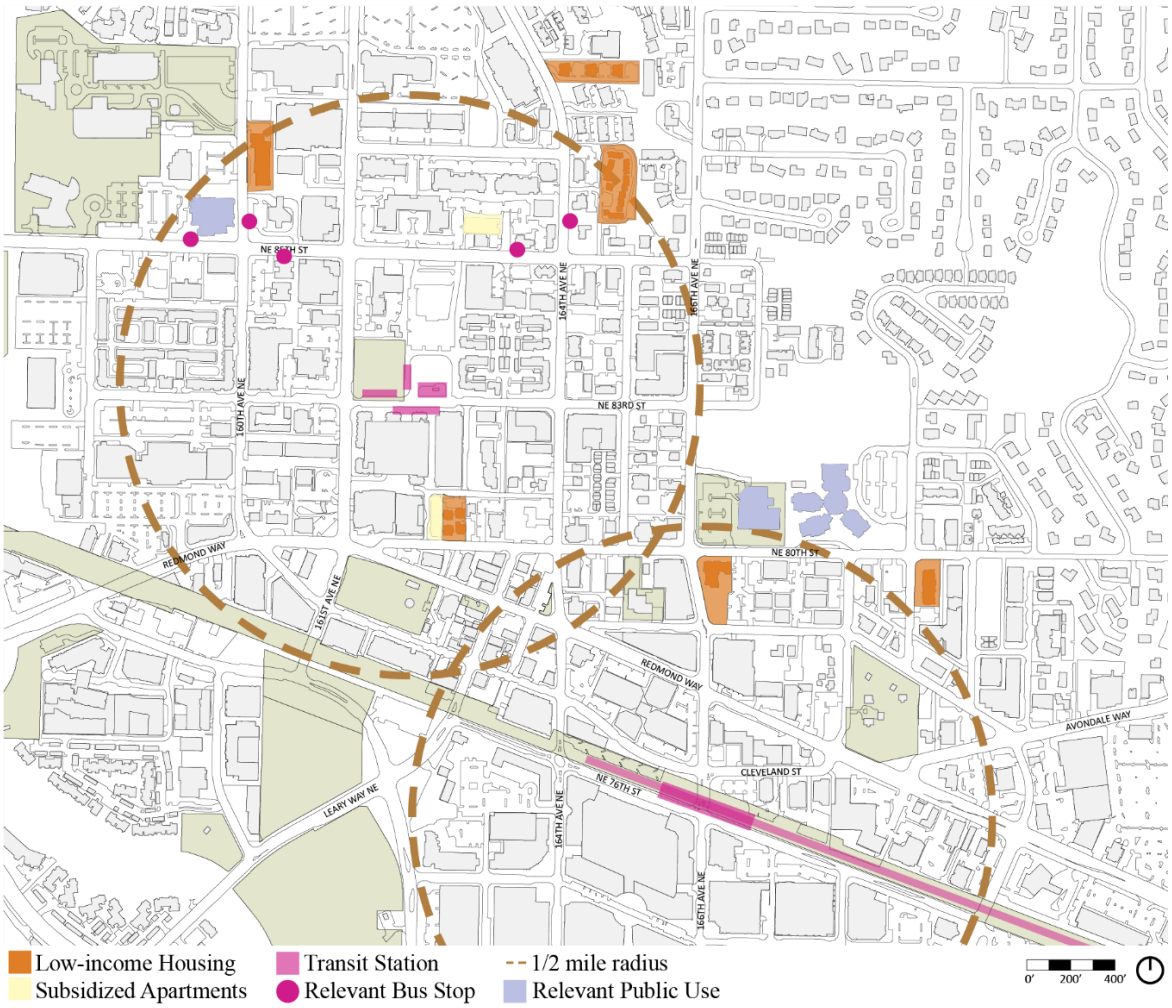


Figure 5.28. Low-income Housing in Downtown Redmond (Asela Chavez Basurto).

Despite enjoying a prime location, affordable communities within downtown suffer some peculiarities. Two of them appear to be hidden within the urban fabric and have little relationship with the street. One is located along a busy arterial that, in the urban design assessment, showcased the highest levels of noise. Lastly, another community adjoins an electric substation.

Figure 5.29. Terrace Hills Apartments and Florence Glen along 164th St (Google Earth)

Figure 5.30. Emma Mc Redmond Manor at 169th Ave NE (Google Earth)

Downtown Redmond has room for improvement in terms of opportunity and prosperity. The prosperous economic conditions supported by upscale buildings create a high barrier of entrance for low-income populations and people in need. Old and small retail is being replaced with large premises located in new mixed-use buildings with higher rents causing displacement of long-established businesses. While the future of Redmond looks prosperous in terms of finances, innovation, and stability, the barrier of entry to enjoy those benefits is high.

5.7 FIELDWORK

This section provides a summary of the observations made during the walking surveys organized by design element. Each element was assessed based on its relative condition as "good," "moderate," or "poor" and assigned a score good=3, moderate=2, poor=1. Streetscapes locate in distinct downtown zones: NE 76th St (W), NE 76th St (E), 164th Ave NE (S), and 166th Ave NE (S) are in Town Center, 164th Ave NE (N), and 166th Ave NE (N) and Cleveland St (E) in Anderson Park and Cleveland St (W) in Old Town.

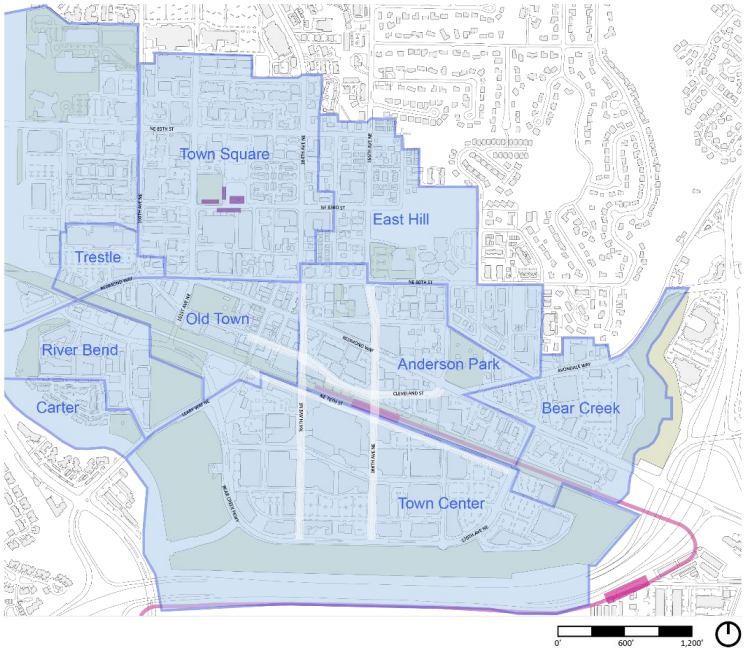


Figure 5.31. Downtown Zones (adapted from City of Redmond).

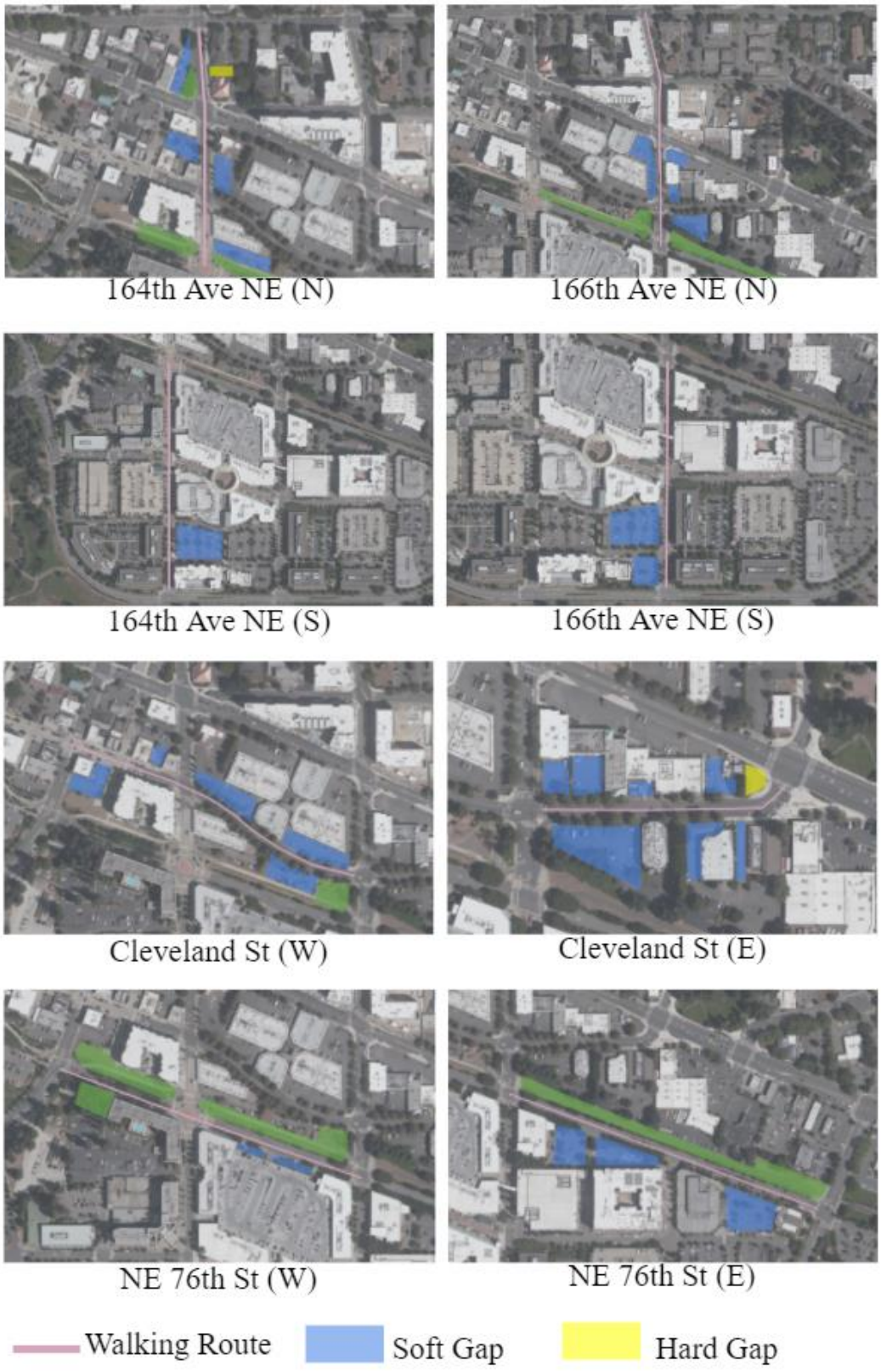


Figure 5.32. Walking route for each of the eight streetscapes. (Asela Chavez Basurto)

5.7.1 *Imageability*

Table 5.2. Relative condition of imageability attributes of the built environment across eight streetscapes in Downtown Redmond.

	NE 76th St (W)	**NE 76th St (E)**	**166th Ave NE (N)**	**166th Ave NE (S)**	**164th Ave NE (N)**	**164th Ave NE (S)**	**Cleveland St (W)**	**Cleveland St (E)**
Score	12	7	6	10	9	10	12	10
historic buildings								
courtyards, plazas, parks								
major landscape features								
place signs/identifiers								

Historic buildings

1 (Poor) - No historic buildings located in the street.
2 (Moderate) - Historic buildings located in the street but in disuse or in disrepair.
3 (Good) - Historic buildings located in the street, renovated and in use.

Courtyards, plazas and parks

1 (Poor) - No courtyards, pedestrian plazas or parks with public access.
2 (Moderate) - Some elements of courtyards, pedestrian plazas or parks with public access.
3 (Good) - Courtyards, pedestrian plazas and parks with public access

Major landscape features

1 (Poor) - No trees, lawns, shrubs, or flora, poorly designed pathways, furniture, planting beds or water features in the streetscape.
2 (Moderate) - Designed elements such as lawns, shrubs, flora, pathways, furniture, planting beds, water features.
3 (Good) - Carefully designed hardscapes with botanical elements.

Place signs/identifiers

1 (Poor) - No place identifiers.
2 (Moderate) - Some place identifiers, no memorable shape or form, oriented towards moving vehicles.
3 (Good) - Ubiquitous place identifiers, memorable shape or form, oriented towards pedestrians.

Streetscapes along Old Town and Town Center contained more elements that contribute to imageability than those along Anderson Park. The most common landmarks were green and open spaces and well-maintained old buildings. New buildings, mainly mixed-use multifamily, varied

little in shape, size and color. Courtyards and small plazas were found at Town Center and in Cleveland St, while street benches and trash receptacles were found in all streets except at NE 76th St (E). Place identifiers were less prominent in the north corridors and on 76th St (E). Lamp post banners in Town Center adorned the streets, creating site identity. Bike racks in the shape of a bicycle were found through the study area and helped reinforce the city identity as a bike friendly city. Major landscape features were observed throughout the area, in the form of green spaces with pedestrian amenities, like open spaces in the Central Connector and enclosed areas with dense vegetation. These spaces create enjoyable opportunities to access natural elements, for seeing and for gathering.

Figure 5.33. Photo collage illustrating "imageability" in 76th St (W) [**A**], 76th St (E) [**B**], 166th Ave NE (N) [**C**], 166th Ave NE (S) [**D**], 164th Ave NE (N) [**E**], 164th Ave NE (S) [**F**], Cleveland St (W) [**G**], and Cleveland St (E) [**H**]. (Source: Asela Chavez Basurto).

5.7.2 *Enclosure*

Table 5.3. Relative condition of enclosure attributes of the built environment across eight streetscapes in Downtown Redmond.

	NE 76th St (W)	NE 76th St (E)	166th Ave NE (N)	166th Ave NE (S)	164th Ave NE (N)	164th Ave NE (S)	Cleveland St (W)	Cleveland St (E)
Score	9	8	8	12	5	12	10	7
contiguous street wall								
limited sight lines								
overhangs & vegetation								
road width to building height								

Condition	Good	Moderate	Poor

Contiguous street wall

1 (Poor) - unused or vacant lots predominate the streetscape (hard gaps), significant building setbacks and gaps.
2 (Moderate) - occupied open spaces between buildings (soft gaps), some significant building setbacks and gaps.
3 (Good) - No unused or vacant lots, limited or no soft gaps, little or no building setbacks.

Limited sight lines

1 (Poor) - extensive sight lines, few or no vertical elements blocking lines of sight.
2 (Moderate) - sight lines are often disrupted by vertical elements.
3 (Good) - outdoor spaces are defined and shaped by vertical elements, lines of sight are blocked, sensation of fixed borders.

Overhangs & vegetation

1 (Poor) - No trees, plants or bushes in the streetscape.
2 (Moderate) - Some trees, plants or green elements in the streetscape.
3 (Good) - Carefully designed elements with trees, plants or bushes in the streetscape.

Road width to building height

1 (Poor) - ratio of building height to road corridor width is lower than 1:6, few or no humanizing elements like trees or street furniture.
2 (Moderate) - ratio of building height to road corridor is between 1:6 and 1:3, some successful humanizing elements like trees or street furniture.
3 (Good) - proportion of building heights to street width is closer to 1:2 or higher (Ewing and Handy, 2009, p.74). Some successful humanizing elements like trees or street furniture.

Streetscapes located in Town Center showed a higher level of enclosure than streets located in other downtown zones. The main difference was the presence of a continued street wall and minimal soft gaps (occupied open spaces between buildings). In the border between the Old Town and Anderson Park zones, 164th Ave NE showed fewer enclosure attributes, with long sightlines, a wide road with short buildings, and a lack of continuity in the street wall. In general, Cleveland St displayed limited sightlines thanks to its curved form and the presence of trees despite constant gaps in the urban fabric. Streetscapes that crossed primary vehicular arterials showcased ample sightlines and provoked a sense of nervousness. Incoming cars miles away can be seen in the straight streets, in particular, Redmond Way at their intersections with 164th Ave NE (N) and 166th Ave NE (N).

All streetscapes provided some form of vegetation, and only streets in Town Center provided constant overhangs for pedestrian use. There was significant variation in the ratio of building height to road width within the same streetscapes. Newer buildings are higher than existing ones and compensate for wider street roads; this is noticeable in 166th Ave NE, where new developments are replacing buildings surrounded by ample parking. An interesting case was NE 76th St, where somewhat mature trees and vegetation from a wall along the Redmond Central Connector, creating a sense of enclosure and minimizing for the lack of buildings. Overall, streetscapes with predominant automobile uses had lower levels of enclosure and led to a sense of vulnerability.

Figure 5.34. Photo collage illustrating "enclosure" in 76th St (W) [**A**], 76th St (E) [**B**], 166th Ave NE (N) [**C**], 166th Ave NE (S) [**D**], 164th Ave NE (N) [**E**], 164th Ave NE (S) [**F**], Cleveland St (W) [**G**], and Cleveland St (E) [**H**]. (Source: Asela Chavez Basurto).

5.7.3 *Human Scale*

Table 5.4. Relative condition of human scale attributes of the built environment across eight streetscapes in Downtown Redmond.

	NE 76th St (W)	NE 76th St (E)	166th Ave NE (N)	166th Ave NE (S)	164th Ave NE (N)	164th Ave NE (S)	Cleveland St (W)	Cleveland St (E)
Score	6	4	5	7	6	7	5	4
street furniture								
building height & setback								
street vendors								

Condition	Good	Moderate	Poor

Street furniture

1 (Poor) - No furniture to sit, stay or use.
2 (Moderate) - Some furniture for sitting, staying and using. Inconvenient location or lack of design.
3 (Good) - Carefully designed furniture for sitting, staying and using.

Building height & setback

1 (Poor) - Buildings in streetscape produce a sense of massiveness and overwhelm, ample setbacks.
2 (Moderate) - Buildings close in proportion to road width, ample setbacks.
3 (Good) - Buildings in proportion with road width, limited or no setbacks.

Street vendors

1 (Poor) - No street vendors or outdoor retail.
2 (Moderate) - Some street vendors or outdoor retail, inconvenient locations far from pedestrian environments.
3 (Good) - Street vendors or outdoor retail conveniently located in the streetscape close to pedestrian environments.

There are slight variations in the sense of human scale across the eight streetscapes. Limited or no setbacks from historic and newer buildings contrast with ample setbacks from mid-century buildings. Two streetscapes provided no street furniture for pedestrian use, the east portions of Cleveland St and NE 76th St. Both streets lacked formal or informal spaces to sit, bike racks, trash receptacles or similar elements. This is not surprising for 76th St, mainly consisting of rear facades and no active uses. Cleveland St (E), despite its business density, did not provide any kind of street

furniture, with setbacks and uses oriented towards moving vehicles and significant open space in disuse at the end of the street. In general, buildings in Town Center had no setbacks, and street furniture was ubiquitous throughout the shopping streets. There was no sight of street vendors in any of the streetscapes.

Figure 5.35. Photo collage illustrating "human scale" in 76th St (W) [**A**], 76th St (E) [**B**], 166th Ave NE (N) [**C**], 166th Ave NE (S) [**D**], 164th Ave NE (N) [**E**], 164th Ave NE (S) [**F**], Cleveland St (W) [**G**], and Cleveland St (E) [**H**]. (Source: Asela Chavez Basurto).

5.7.4 *Transparency*

Table 5.5. Relative condition of transparency attributes of the built environment across eight streetscapes in Downtown Redmond.

	NE 76th St (W)	**NE 76th St (E)**	**166th Ave NE (N)**	**166th Ave NE (S)**	**164th Ave NE (N)**	**164th Ave NE (S)**	**Cleveland St (W)**	**Cleveland St (E)**
Score	5	2	3	5	4	5	5	4
first floor windows								
active uses/occupied storefronts								

Condition	Good	Moderate	Poor

First floor windows

1 (Poor) - few or no windows at street levels, significant gaps or setbacks in the street wall.
2 (Moderate) - some windows at street level, some gaps or setbacks in the street wall.
3 (Good) - multiple windows at street level or buildings dominated by glass, no significant gaps or setbacks in the street wall.

Active uses/occupied storefronts

1 (Poor) - mainly closed or vacant storefronts, no externalized retail activities.
2 (Moderate) - open and occupied storefronts, few or no unused storefronts, no externalized retail activities.
3 (Good) - open and occupied storefronts, externalized retail activities.

There were relevant differences among streetscapes in terms of transparency. Buildings across the eight streetscapes displayed first-floor windows, but the main difference was occupied storefronts with active uses, which contributed to pedestrian activity. Gaps in the street wall translated into low transparency, as it is hard to externalize activities to the street; this was especially noticeable in the form of front parking. Two streetscapes NE 76th (N) and 166th Ave (N) showcased the lowest transparency, due to vacant storefronts from buildings about to be redeveloped and buildings that just finished construction. In Town Center, 166th Ave NE (S) displayed a lot of active uses and pedestrian activity in its west sidewalk while vacant buildings and offices dominated the east sidewalk.

Figure 5.36. Photo collage illustrating "transparency" in 76th St (W) [**A**], 76th St (E) [**B**], 166th Ave NE (N) [**C**], 166th Ave NE (S) [**D**], 164th Ave NE (N) [**E**], 164th Ave NE (S) [**F**], Cleveland St (W) [**G**], and Cleveland St (E) [**H**]. (Source: Asela Chavez Basurto).

5.7.5 *Complexity*

Table 5.6. Relative condition of complexity attributes of the built environment across eight streetscapes in Downtown Redmond.

	NE 76th St (W)	**NE 76th St (E)**	**166th Ave NE (N)**	**166th Ave NE (S)**	**164th Ave NE (N)**	**164th Ave NE (S)**	**Cleveland St (W)**	**Cleveland St (E)**
Score	19	11	14	19	16	18	19	17
pedestrian activity								
businesses density								
business type variety								
building identifier variety								
building color & design variety								
outdoor dining								
public art								
street performers/entertainers								

Pedestrian activity

1 (Poor) - no pedestrians on the street.

2 (Moderate) - some pedestrian activity, engaged in unvarying actions.

3 (Good) - heightened pedestrian activity, engaged in diverse actions.

Businesses density

1 (Poor) - no businesses or retail on streetscape.

2 (Moderate) - some businesses or retail on streetscape.

3 (Good) - multiple businesses and retail on streetscape.

Business type variety

1 (Poor) - no variety in store types, similar retail or dominant type.

2 (Moderate) - some variety in retail type.

3 (Good) - great variety in store types.

Building identifier variety

1 (Poor) - no signs identifying buildings or locations.

2 (Moderate) - few signs identifying buildings or locations, standard signs and symbols, no pedestrian orientation.

3 (Good) - multiple signs identifying buildings or locations, unique signs and symbols, pedestrian oriented.

Building color & design variety
1 (Poor) - uniform building facades and colors, similar architectural styles, unvarying textures and patterns.
2 (Moderate) - some variation in facades, colors, architectural styles, textures and patterns. Few or no unique designs.
3 (Good) - variety and creativity in building facades and colors, contrasting architecture styles, varied textures and patterns.

Outdoor dining
1 (Poor) - no outdoor dining activities or spaces.
2 (Moderate) - some outdoor dining activities, formal and informal spaces.
3 (Good) - multiple outdoor dining activities, carefully designed.

Public art
1 (Poor) - no presence of formal or informal street art.
2 (Moderate) - some street art, formal or informal, might be private or exclusive.
3 (Good) - pervasive street art, formal or informal, open to the public.

Street performers/entertainers
1 (Poor) - no formal or informal street entertainment or performances.
2 (Moderate) - occasional formal or informal street entertainment or performances.
3 (Good) - constant formal or informal street entertainment or performance.

All streetscapes contain some type of businesses that contributed to complexity. In downtown Redmond, the main elements that contributed to variety were building identifiers and distinct business types. Regardless of its target audience (pedestrians or moving vehicles), building identifiers and signs stand out across the urban fabric. They showcase distinct colors and memorable forms. Businesses were more varied in Town Center and Old Town, providing food, services, and entertainment. The North-South corridors streets, 164th Ave NE (N) and 166th Ave NE (N), and NE 76th St displayed little business variety due to vacant buildings or having the same variety. For instance, of the eight businesses located at 164th Ave NE (N), five are banks. Interestingly this same street showcased the widest variety in building color and design, corresponding to buildings from different architectural styles and eras, and its size and shape, ranging from short renovated historical buildings to taller newer buildings.

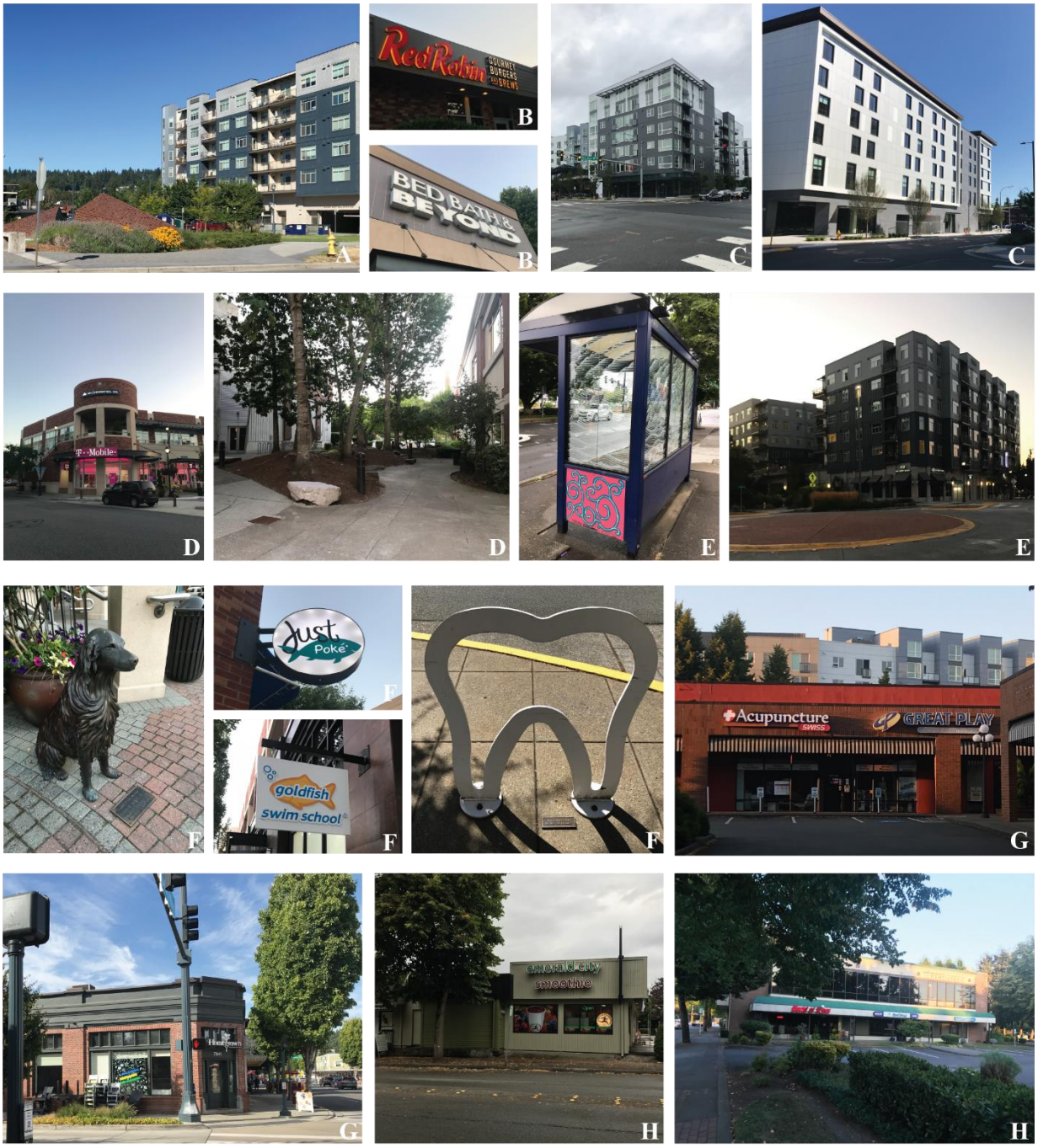


Figure 5.37. Photo collage illustrating "complexity" in 76th St (W) [**A**], 76th St (E) [**B**], 166th Ave NE (N) [**C**], 166th Ave NE (S) [**D**], 164th Ave NE (N) [**E**], 164th Ave NE (S) [**F**], Cleveland St (W) [**G**], and Cleveland St (E) [**H**]. (Source: Asela Chavez Basurto).

Among the newest buildings, the form and textures are uniform: six-story buildings with boxy shapes, metal facades, and monochromatic colors, often the building name is the most significant signifier. Buildings within Town Center showcase a similar language of colored brick with metal overhangs and concrete strips. Wood is most common among older buildings and is found in both its natural color or painted. Outdoor dining spaces were found in Town Center and Cleveland St and consisted of outdoor patios connected to inside restaurants. Streets intersecting to the Central Connector provided sitting areas for chatting and seeing, but no picnic tables were found. Throughout the eight streetscapes, public art and street performers were a rare sight; throughout the survey, no street performers were found, and public art was limited to bus shelters, small sculptures, bike racks, and public installations.

5.7.6 *Safety and Sensations*

Table 5.7. Relative condition of safety attributes of the built environment across eight streetscapes in Downtown Redmond.

	NE 76th St (W)	**NE 76th St (E)**	**166th Ave NE (N)**	**166th Ave NE (S)**	**164th Ave NE (N)**	**164th Ave NE (S)**	**Cleveland St (W)**	**Cleveland St (E)**
Score	11	10	6	10	9	12	10	9
crosswalks & ped. infrastructure								
traffic density & speed								
noise								
smells								

Condition	Good	Moderate	Poor

Crosswalks & pedestrian infrastructure

1 (Poor) - no crosswalk markings or barely noticeable, no accessible curb ramps.
2 (Moderate) - marked crosswalks, mostly barrier free, crossing distance higher than two traffic lanes without pedestrian refuge.
3 (Good) - well demarcated barrier-free crosswalks, universal infrastructure design, all-accessible refuge islands if crossing more than two traffic lanes (ITDP, 2018) or shortening distances through curb extensions.

Traffic density & speed
1 (Poor) - narrow sidewalk (5-6 feet), no planting strip or on-street parking.
2 (Moderate) - narrow sidewalk with pedestrian barrier or wide sidewalk without pedestrian barrier.
3 (Good) - sidewalk is minimum 8 feet wide if directly adjacent to moving traffic, a 2-feet planting strip or a lane of parked cars form a barrier from moving vehicles.

Noise
1 (Poor) - high noise levels (over 85 decibels), cannot hear conversation.
2 (Moderate) - medium noise levels (70-85 decibels), having to raise voice for conversation.
3 (Good) - low noise levels (below 70 decibels), able to use normal conversational voice and understand each other.

Smells
1 (Poor) - strong unpleasant scents dominate the streetscape.
2 (Moderate) - few unpleasant scents throughout the streetscape.
3 (Good) - no strong unpleasant scents throughout the streetscape.

Ample sidewalks and the presence of barriers between pedestrians and moving vehicles contribute to a feeling of safety; however, this sensation is affected by long crosswalks at critical intersections. The streets that converge near Town Center are treated with roundabouts and pedestrian refuges; this increases the attention of drivers and pedestrians about to cross, clear markings, and distinct materials differentiate the spaces for each user. Crosswalks often feature beg buttons and sound cues that indicate the times for crossing; however, the noise from moving traffic at peak hours in primary arterials impacts this functionality. Empty roads located within tall buildings amplify the noise from speeding cars, like at 166th Ave NE (N) and (S). Across the study, only two locations exhibited noticeable smells: garbage containers at 166th Ave NE (N) and an Indian restaurant at Cleveland St (E). Other, more subtle smells could have escaped the researcher as a face mask was being used at the time of the observations. The sensory experiences here observed have high variability and depend on multiple environmental factors; thus, what is reported here might differ at other days or times.

Figure 5.38. Photo collage illustrating "safety & sensations" in 76th St (W) [**A**], 76th St (E) [**B**], 166th Ave NE (N) [**C**], 166th Ave NE (S) [**D**], 164th Ave NE (N) [**E**], 164th Ave NE (S) [**F**], Cleveland St (W) [**G**], and Cleveland St (E) [**H**]. (Source: Asela Chavez Basurto).

5.7.7 *Tidiness*

Table 5.8. Relative condition of tidiness attributes of the built environment across eight streetscapes in Downtown Redmond.

	NE 76th St (W)	NE 76th St (E)	166th Ave NE (N)	166th Ave NE (S)	164th Ave NE (N)	164th Ave NE (S)	Cleveland St (W)	Cleveland St (E)
Score	12	11	11	12	12	12	10	11
sidewalk condition								
storefront/building condition								
litter								
graffiti								
healthy/maintained vegetation								

Condition	Good	Moderate	Poor

Sidewalk condition

1 (Poor) - no sidewalk provided.

2 (Moderate) - minimum sidewalk size (5-6 feet), not well maintained or not accessible..

3 (Good) - wide sidewalk (more than 6 feet), well maintained and accessible.

Storefront/building condition

1 (Poor) - buildings in disrepair found in the streetscape.

2 (Moderate) - buildings with good structure but unkept facades found in the streetscape.

3 (Good) - building structure in good condition, well maintained facades.

Litter

1 (Poor) - prominent litter throughout the streetscape.

2 (Moderate) - some litter found in the streetscape.

3 (Good) - no litter found in the streetscape.

Graffiti

1 (Poor) - graffiti is large and noticeable throughout the streetscape.

2 (Moderate) - small graffiti in subtle locations.

3 (Good) - no graffiti found throughout the streetscape.

Healthy/maintained vegetation
1 (Poor) - predominant unmaintained vegetation.
2 (Moderate) - some unmaintained vegetation, few or no ornamental varieties.
3 (Good) - prominent maintained vegetation, well-manicured or with ornamental varieties.

Figure 5.39. Photo collage illustrating "safety & sensations" in 76th St (W) [**A**], 76th St (E) [**B**], 166th Ave NE (N) [**C**], 166th Ave NE (S) [**D**], 164th Ave NE (N) [**E**], 164th Ave NE (S) [**F**], Cleveland St (W) [**G**], and Cleveland St (E) [**H**]. (Source: Asela Chavez Basurto).

Overall, the eight streetscapes analyzed in Downtown Redmond displayed high levels of tidiness. The physical infrastructure was well maintained, and even vacant buildings were in good

condition. Sidewalks in older sections of certain streetscapes were slightly cracked or deformed, which could cause accessibility challenges. Sights of litter were extremely rare; the most prominent was found on the back of the Central Connector, at the intersection of Cleveland St and 166th Ave. This section also had small graffiti, painted over electrical power boxes. The vegetation was varied and healthy and mainly consisted of trees, young and mature, grass, and low shrubs. Ornamental varieties were noticeable in the Town Center streetscapes. In general, these displays of maintenance and tidiness contribute to the perception of safety in the neighborhood.

5.7.8 *Equity*

The findings of this research suggest that downtown Redmond possesses built environment elements that create welcoming, safe, comfortable, and convenient spaces. However, there is room for improvement in terms of community, opportunity, and prosperity.

The downtown neighborhood has many assets that cover daily life necessities, from grocery stores to public services and medical care. Supported by a walkable environment and the great asset of the Redmond Central Connector, accessibility within the town core is good. Maintaining this accessibility when crossing busy arterials will be crucial to the future of the neighborhood. Although historical properties deter density and further development, they provide character and create opportunities for social interaction. The global pandemic of 2020 further revealed their potential through the establishment of “streateries,” outdoor dining spaces that increase restaurant capacity and allowed for better social distancing measures.

The image of tidiness, the limited spaces for artistic expression, and constant police patrolling could inhibit certain demographics, particularly, people of color. Constant encounters facilitated by programming and civic participation could contribute to an increased sense of community. A clean and healthy environment is part of the appeal of the city, and current targets

seem to support this long-term goal. In terms of opportunity and prosperity, the city needs to find and create opportunities to include residents and workers from all income levels and backgrounds.

Table 5.9. Equity assessment for Downtown Redmond.

accessibility	community	safety	enjoyment	environment	wellbeing	opportunity	prosperity

Condition	Good	Moderate	Poor

5.8 LESSONS LEARNED

Redmond benefited from a long-term vision to revitalize the downtown area. The community proposed a vision to reconnect the neighborhood to create pedestrian infrastructure and address vehicular traffic. Public participation, expert consultations, updated policies, and resource allocation aimed to support an improved built environment. Scheduling activities that take advantage of public space creates identity and brings visitors (Jacobson & Forsyth, 2008). The city has made a reasonable effort to promote the use of public amenities demonstrated by the constant pedestrian activity in certain areas.

Currently, the closest properties to the future light rail station provide limited opportunities for enjoyment. Adjacent lots prioritize vehicular access, tangent streets lack street furniture, and existing malls showcase vacant shops; these properties are guaranteed to change in the upcoming years. Ensuring that new development creates new opportunities and provides pedestrian spaces will be significant to enhance the access to mass transit with the rest of the neighborhood. Uniform, tidy, and extremely defined environments could discourage spontaneous uses like street vendors, art performances, and public expression by evoking a feeling of extreme formality and limited inclusion to outsiders. This fact is significant in a city that has more workers than residents.

Table 5.10. Urban design qualities of selected streetscapes in Downtown Redmond.

		NE 76th St (W)	NE 76th St (E)	166th Ave NE (N)	166th Ave NE (S)	164th Ave NE (N)	164th Ave NE (S)	Cleveland St (W)	Cleveland St (E)
	Score	77	56	56	78	64	79	62	65
Imageability	historic buildings								
	courtyards, plazas, parks								
	major landscape features								
	place signs/identifiers								
Enclosure	contiguous street wall								
	limited sight lines								
	overhangs & vegetation								
	road width to building height								
Human Scale	street furniture								
	building height & setback								
	street vendors								
Transparency	first floor windows								
	active uses/occupied storefronts								
Complexity	pedestrian activity								
	businesses density								
	business type variety								
	building identifier variety								
	building color & design variety								
	outdoor dining								
	public art								
	street performers/entertainers								
Safety & Sensations	crosswalks & ped. infrastructure								
	traffic density & speed								
	noise								
	smells								
Tidiness	sidewalk condition								
	storefront/building condition								
	litter								
	graffiti								
	healthy/maintained vegetation								

Chapter 6. CONCLUSION

6.1 RECOMMENDATIONS

Redmond offers the example of a growing suburban town and the densification efforts made possible by economic growth. A long-term vision and setting priorities have contributed to a walkable environment, an active downtown core, and a promising future. Some recommendations are offered below to ensure that new and existing development aligns with the city's vision.

Take advantage of the Redmond Central Connector and its unique function: linking the neighborhood to nearby cities. Complete the pedestrian and bicycle networks to ensure a wide range of transportation choices across the city.

Increase opportunities for social cohesion by taking advantage of existing public spaces: Given the working environment of the city, many new residents are immigrants or come from other states. Continue organizing outdoor activities that promote local artists, organizations, and businesses and create opportunities for interaction.

Ensure that new developments provide public spaces that are accessible to all: Prevent new spaces for enjoyment to be wholly private and subject to specific rules and patrolling.

Extend the character of "main street" to the entire Cleveland Street until Redmond Way. Integrate the street with the transit station plaza to ensure accessibility, enjoyment, social interaction, and create new prosperity opportunities.

Increase safety at intersections: Improving crosswalks at primary arterials could make them less intimidating for pedestrians. Within the study area, streets that intersect Cleveland St and Redmond Way could receive safety improvements. One initial strategy that is cheap and quick is programming signals that allow pedestrians to cross before cars. This slight advantage increases the visibility of pedestrians crossing and could prevent future accidents.

Consider adding active uses and pedestrian amenities along 76th St: the current conditions of the Central Connector and the former railroad produce a monotonous and uninteresting streetscape. While the future rail corridor aims to increase accessibility, the potential connectivity to nearby uses could be impacted by these perceived barriers.

Distribute the right of way to accommodate bicycles: To be recognized as the bike capital of the Northwest, Redmond should create a safe and convenient environment for cyclists within the right of way. The Central Connector remains the primary biking trail, but to fully take advantage of future mass transit opportunities, biking should convenient to access from nearby areas. Continuous paths, protected lanes, and pervasive amenities could bring more cyclists to the streets.

Build neighborhood identity: The future light rail station will become the entrance to the city and the neighborhood for transit users, consider strengthening the identity and sense of place of the downtown core. Temporal and permanent artistic elements programmed events and spaces for everyday encounters could help develop social cohesion.

Address affordability and opportunity through public spaces: allow for temporal and informal uses of public spaces that are accessible to many people to create economic opportunities. Events like the summer so bazaar functions as an advertising event for local businesses. Bring these opportunities to more centric areas like downtown parks on a common basis to increase outreach to potential customers.

6.2 LESSONS FOR PRACTICE

The purpose of this thesis was to explore ways in which urban design can support equity in transit-oriented development projects. First, the literature review provided information on the importance of equity and how it manifests in other fields, like health and public governance; it provided

knowledge on the driving principles behind urban design and how it influences the built environment. Lastly, it helped identify the main goals of TOD and its potential, based on extensive research that exists on the topic. With these findings, a tool to measure urban design qualities was selected, and a framework that addresses equity indicators was developed.

Three different precedent cases were studied to identify common challenges and opportunities for developing transit-oriented projects. Orenco Station, Clarendon, and Fruitvale revealed the importance of community engagement, long-term planning, and human scale. A relative assessment of urban design qualities for walkability showcased micro-scale elements that support or detract the enjoyment of the built environment within TOD zones. The equity framework highlighted the strengths and weaknesses of each precedent case and revealed that there is still room for improvement within the cases for prosperity and enjoyment opportunities.

A case study was analyzed to identify critical challenges of densifying American suburbs and its potential to transform into more human-friendly environments. Downtown Redmond displays a rapid transformation in response to future mass transit and reveals the importance of a shared vision for local authority and the users (residents, workers).

One takeaway from this research is the importance of responding to the question "equity for whom?" in the case of the current suburban environments across the US, the least advantaged are pedestrians, low-income populations, people with disabilities, the elderly, people of color, non-native speakers, women, and children. TOD recognizes the importance of planning for people and not for motorized vehicles through its design principles but would benefit from incorporating these additional perspectives.

The vast literature on the topic of this work is complex and originates from different fields. How to define, measure, and incorporate equity could be daunting and requires knowledge of

grand principles outside this work. Likewise, TOD literature is extensive and tends to address similar topics: gentrification, trip reduction, and integration with land use. There is limited research on the relationship between urban design and TOD. Maybe more research is developed in upcoming years.

Accessibility is a driving force behind TOD but could be adversely impacted by barriers created by the built environment, like long distances, intimidating zones, and forgettable places. Urban design has the potential to reconcile these barriers and create spaces that are beneficial to all users.

6.3 LIMITATIONS

This study builds on previous work by applying urban design analysis frameworks into a case study and supplementing the assessment with social equity considerations. It is essential to recognize that this work did not attempt to assess all dimensions of equity but focus on the most related to the built environment. One limitation of this study is the boundary of the study area. The field survey was limited to a radius within walking distance from the site of the future light rail station (0.25 miles), which limited the micro-scale urban design assessment on the characteristics and current conditions of streetscapes inside the boundaries of the study area.

Another limitation of this study is that it had time constraints that prevented a more thorough qualitative approach. Additional weeks spent on this research would have accommodated interviews with residents, workers, city officials, and transit agencies staff (Sound Transit and King County Metro). This information would have informed the qualitative assessments and complimented the author's personals views and experiences. With additional time spent on the study, other relevant streetscapes in the area could have been studied, like Redmond Way and 161st Ave NE, two important vehicular arterials.

Finally, this research was conducted over an eight-month period, during which the global pandemic of 2020 impacted normal observable conditions. Pedestrian activity, vehicular traffic, and daily patterns will not reflect typical circumstances. A significant portion of Redmond's employees is working from home. Trips for food delivery and pick up at restaurants, grocery stores, and food businesses have increased while businesses are operating at a reduced capacity, and sometimes with limited staff, park facilities remain closed. Social gatherings are limited to five people on the outdoors ("Chart: Washington's Phased Approach | Governor Jay Inslee," n.d.). Public health guidelines and weather conditions also influenced the fieldwork. The assessment was conducted using a face mask and under rainy or hot weather conditions.

6.4 FUTURE RESEARCH

The findings of this research reflect the urban design characteristics and social equity potential of Redmond's transit-oriented development at a particular time and scale in the downtown area. Time constraints and extraordinary social circumstances create several opportunities for further research, outlined below.

1. Conduct field observations after the completion of the transit stations and while the light rail is in operation:
    - Evaluate the completeness of the pedestrian and bicycle networks and its connection with the light rail station.
    - Consider the integration between mixed-use buildings and public spaces.
    - Examine human scale characteristics of new development like distance, setbacks, building height, and street furniture.
    - Evaluate the imageability of the new transit hub and its integration with Redmond's character.

- Assess the role of vehicle parking in accessing the station.
- Examine the role of the North-South corridors, 164th Ave NE, and 166th Ave NE, as primary vehicular connections to northern neighborhoods.

2. Conduct interviews with residents and transit users to complement the information obtained from field observations, in specific those related to personal preferences, decisions, and needs:
    - Do you have transportation options? Do you have access to all your daily needs?
    - Do you feel in community? Do you have opportunities to socialize?
    - Do you see yourself represented in the city?
    - Do you feel safe? Do you feel included?
    - Do you enjoy living/working in this city/neighborhood?
    - Do you have opportunities for active living?
    - Do you find opportunities to grow and prosper?
3. Investigate cases from similar cities where new development responds to public transit and active transportation. Compare results to the findings from Redmond and investigate whether social equity considerations are included and how they are being measured or targeted.
4. Explore the impacts of mass transit in public activity, social cohesion, safety perceptions, environmental impact, active living, car ownership, and access to opportunities.
5. Inquire about participation processes and public outreach strategies employed to inform citywide improvements and neighborhood projects.

The findings from the examination of the relationship between urban design, equity, and transit-oriented development support the idea that integrating human use considerations into the built environment creates welcoming, safe, comfortable and convenient urban spaces. Ideally, urban design elements support the accessibility, community, safety, enjoyment, environment, wellbeing,

opportunity, and prosperity needs of its users. The recommendations in this chapter aim to improve the integration of equity considerations into transit-oriented development in Downtown Redmond. Designing for social equity will: enhance freedom of choice for commuting and traveling, create a sense of community where all feel included, improve safety for non-motorized modes of transportation, increase the enjoyment and comfort for transit users and thus increase ridership, promote the wellbeing of people and the environment, enhance the character and identity of Redmond and the downtown neighborhood, and increase prosperity opportunities for residents, workers and users of the built environment in Redmond.

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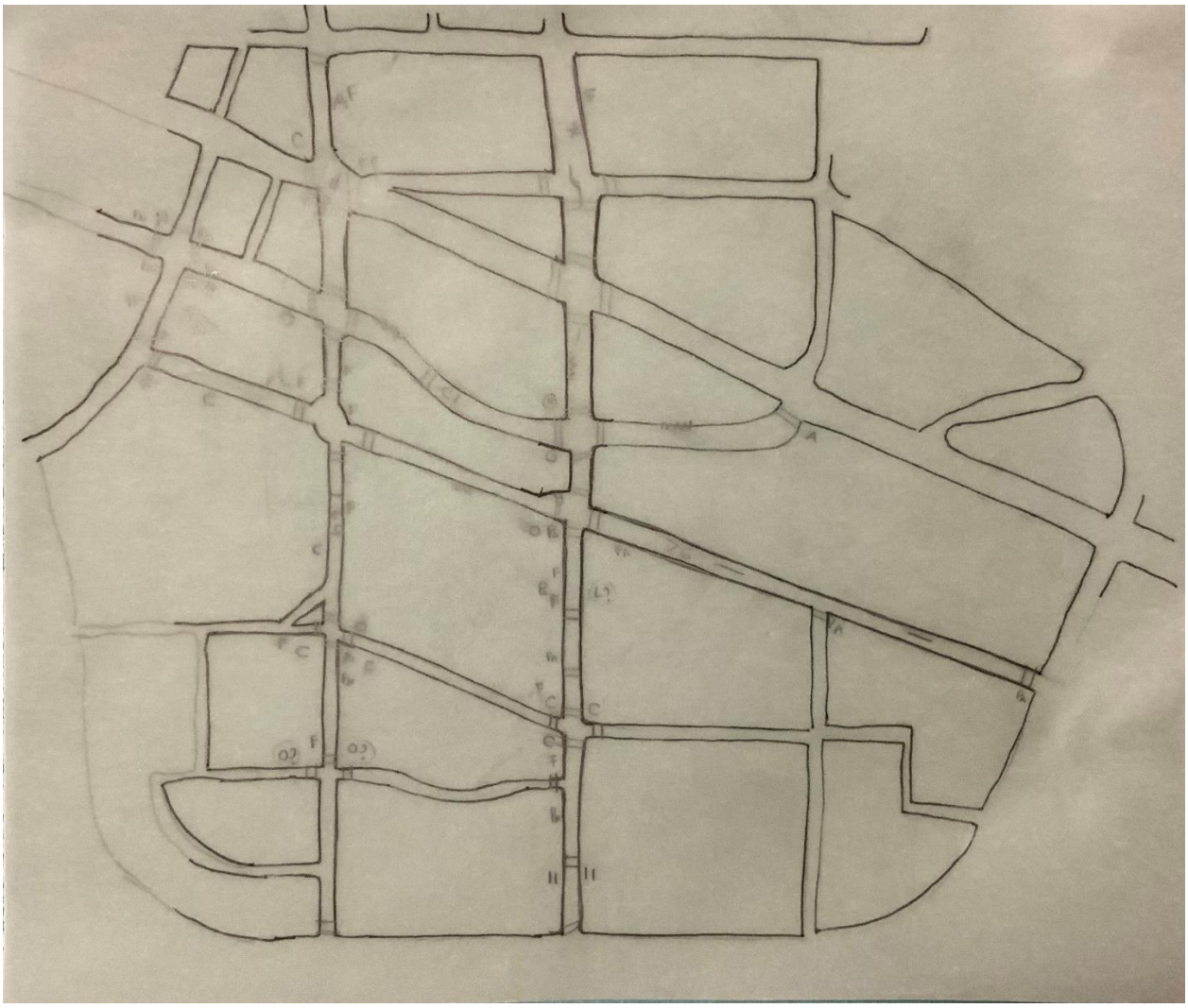
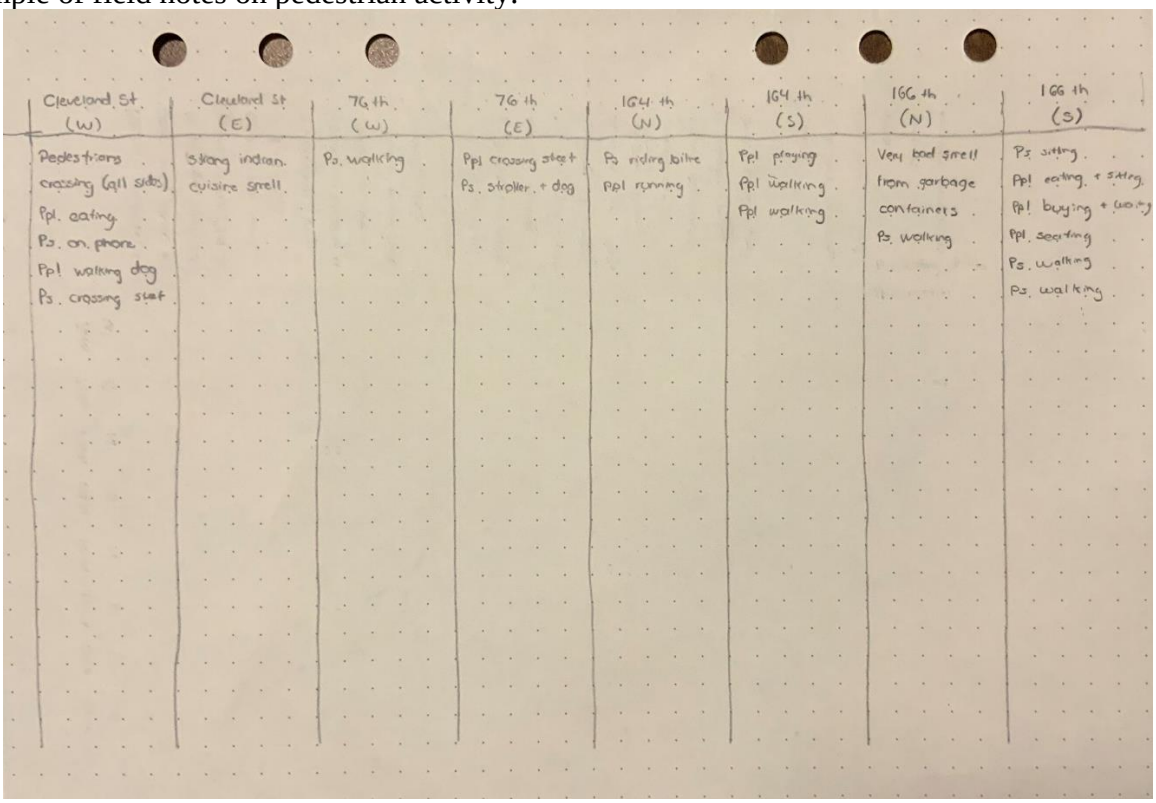
APPENDIX

Sample map for field survey.

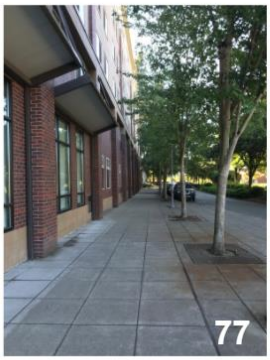


Sample of field notes on pedestrian activity.



Cleveland St (W)	Cleveland St (E)	76 th (W)	76 th (E)	164 th (N)	164 th (S)	166 th (N)	166 th (S)
Pedestrians crossing (all sides)	Strong indian cuisine smell	Ps. walking	Ppl crossing street	Ps riding bike	Ppl playing	Very bad smell from garbage containers	Ps sitting
Ppl. eating			Ps. stroller + dog	Ppl running	Ppl walking		Ppl eating + sitting
Ps. on phone					Ppl walking	Ps walking	Ppl buying + waiting
Ppl walking dog							Ppl. seating
Ps. crossing stat							Ps. walking
							Ps. walking

Scores from selected streetscapes in Downtown Redmond.

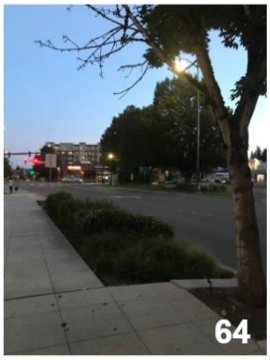


NE 76th St (W)

NE 76th St (E)

166th Ave NE (N)

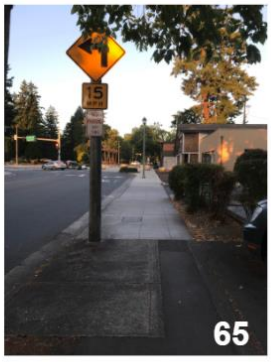
166th Ave NE (S)



164th Ave NE (N)

164th Ave NE (S)

Cleveland St (W)



Cleveland St (E)