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Wasted Space: Using Parking Lots & Vacant Land to Improve Neighborhood Completeness

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Introduction

The complete neighborhood provides residents with access to all their daily needs within a convenient active transportation trip. Generally, if you can access things like groceries, employment, education, transportation, healthcare, parks, and social spaces within 20 minutes of non-car travel then, you live in a complete neighborhood (Capasso Da Silva et al., 2019; Center for Disease Control and Prevention, 2017; City of Kirkland, n.d.; City of Portland, n.d.; McNeil, 2011; Peters, 2020; Steuteville, 2021). For planners, creating a complete neighborhood requires the right balance of density, land uses and infrastructure (Center for Disease Control and Prevention, 2017; Dovey & Pafka, 2020; Ferrer et al., 2015; Gunn et al., 2017; Lindelöw et al., 2014). In cities and districts that have removed parking requirements, parking lots and vacant land become resources for infill development that can help create the right balance of density, land uses and infrastructure necessary to improve neighborhood completeness throughout the city.

The Complete, Walkable, __ Minute Neighborhood

The complete neighborhood goes by multiple names including the 20 minute neighborhood or the 15 minute city. The concept aligns with other planning concepts like smart growth and new urbanism. The idea originated in Portland with the 20 minute neighborhood in 2010 (Capasso Da Silva et al., 2019; McNeil, 2011; Steuteville, 2021) and was introduced by the planning firm, Gerding Elden. The firm states that the goal is to create a walkable environment that allows residents to reach necessary destinations by foot in 20 minutes or less. They add that 20 minutes by biking or public transit is also reasonable (McNeil, 2011). The complete neighborhood calls for access to specific uses such as grocery stores, retail, restaurants, schools, employment, transportation, healthcare, and parks (Capasso Da Silva et al., 2019; Center for Disease Control and Prevention, 2017; City of Kirkland, n.d.; City of Portland, n.d.; McNeil, 2011; Peters, 2020; Steuteville, 2021). The complete neighborhood can be defined as a neighborhood "that allows residents to access most activities required for a good living within [__] minutes of walking, biking, or taking transit from their home" (Capasso Da Silva et al., 2019). This means having active transportation connections between home, work, and play (Dovey & Pafka, 2020). Complete neighborhoods intend to reduce urban sprawl and dependency on automobiles by encouraging walking, biking, or taking public transit (Capasso Da Silva et al., 2019; CBC News, 2019; City of Kirkland, n.d.; Peters, 2020; Steuteville, 2021).

Public Health Benefits

Institutions such as the Center for Disease Control and Prevention (2017) recommend making changes to the built environment that support active modes of transportation to improve public health. Countries where active transportation is the primary mode of getting around the city have the lowest rates of obesity (Ferrer et al., 2015). Encouraging walking and rolling by providing the appropriate infrastructure can also address other prevalent conditions such as cardio vascular disease (Lo, 2009). Feelings and perception of safety can also be improved by creating active, walkable places (Speck, 2012).

Economic Benefits

There are significant economic benefits for residents and businesses near active transportation infrastructure. In Denver, walkable neighborhoods are valued at 150% of what sprawling

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neighborhoods are. New York City invested $10 million in bike infrastructure and saw a $130 million return in social benefit (Speck, 2012). Closer proximity results in higher economic production and businesses can benefit from an increased ability to innovate, create, and share knowledge (Dovey & Pafka, 2020).

Community Development

Communities can be developed through the creation of pedestrian spaces. Creating active and vital spaces provides more opportunities for neighbors to connect and communities to form. The City of Kirkland, Washington claims that "pedestrian activity and local gathering places build social cohesion." Research has found that residents living on light traffic streets have three times as many friends as those who live on busy streets (Speck, 2012).

Sustainability

Walkable cities are also sustainable cities. Local governments across the world are adopting climate action plans to combat and reverse climate change. These plans generally call for the reduction of greenhouse gas emissions, addressing urban heat and creating infrastructure to adapt to an increasingly extreme climate. In the United States, transportation is the largest emitter of greenhouse gasses (EPA, 2023). Providing people with more efficient and carbon free transportation options, like walking, biking, and electrified public transit, are needed for cities to reach their emissions goals.

Equity

Most importantly, walkable cities are equitable cities. Those who rely on active modes of transportation most are low income people of color. Cities that have more transit options have less income inequality (Speck, 2012).

The Complete Neighborhood Can Be Better

Get Specific about Essentials. The current version of the complete neighborhood specifies some broad categories of amenities and services as necessary or essential. These categories include grocery stores, places of employment, education, green space, civic and community centers, healthcare, and transit options (Capasso Da Silva et al., 2019; Center for Disease Control and Prevention, 2017; City of Kirkland, n.d.; City of Portland, n.d.; McNeil, 2011; Peters, 2020; Steuteville, 2021). Table 1 unpacks these broad categories to better understand the specific businesses and services that must be present to consider an area "complete." This is not an exhaustive list but provides a more detailed description of essentials, and considers social, cultural, and financial context of existing residents.

Table 1. Categories of Daily Essentials.

Daily Essentials	
Groceries	Culturally & budget appropriate grocery stores, farmers markets, CSA pick up locations
Employment	Retail, hospitality, office, education, healthcare, manufacturing that residents are qualified for
Education	Preschool, elementary, middle school, high school, libraries, community learning

Green space	Community gardens, natural areas, public plazas, spaces for gathering, playing, exercising, relaxing, forming community, and political organizing
Civic	Post offices, libraries, government agencies, ballot drop offs, credit unions, banks
Community	Places of worship, cultural venues, recreation centers, daycare/preschool, spaces for gathering, playing, exercising, relaxing, forming community, political organizing, mutual aid
Healthcare	Hospitals, culturally appropriate clinics, emergency rooms, dental care, eye care, veterinarians
Transportation	Sidewalks, marked cross walks, micro mobility, protected bike lanes, dignified, reliable & frequent public transportation, ride share, car share

Pick One Mode of Transportation to Measure Access: Walking

The complete neighborhood is currently defined by the amount of time it would take an able bodied person to walk, bike or take transit to broad categories of essential destinations. It may take a disabled person or someone who uses a mobility device longer to travel that same distance. For the remainder of this paper the terms walkable or pedestrian are intended to describe people of all abilities including those using mobility devices.

The distances covered between walking, biking and transit varies greatly. For an able-bodied person, 20 minutes of walking might be about one mile, 20 minutes of biking might be three miles, while 20 minutes on public transit could be four or more miles, yet all these modes are grouped together in the same measurement of access. Because of the significant variation of distances between modes, critics claim that the complete neighborhood is not a planning standard as much as "an open to interpretation goal" (Steuteville, 2021).

How Far are People Willing to Walk to Essentials? 10 Minutes

A convenient walk can be subjective and varies depending on factors like age, ability, weather, and the type of destination but is often considered to be a five to ten minute walk (Ferrer et al., 2015). For older residents or those with mobility challenges a convenient walk may be closer to three to five minutes.

Currently, the complete neighborhood claims that if a person can access their essentials within a 15 or 20 minute one way trip via active transportation, then their neighborhood is complete (CBC News, 2019; City of Kirkland, n.d.; City of Portland, n.d.; McNeil, 2011; Peters, 2020; Steuteville, 2021). Measuring these as round trips, the neighborhood then becomes a 30 or 40 minute neighborhood. Following this standard, planners aim to create trips that are at a minimum twice as long as people are willing to walk. If the complete neighborhood is to effectively reduce car dependency, then the proximity of home and essentials must align with people's needs, especially driver's willingness to walk.

Sustainability & Equity aren't just Active Transportation

The complete neighborhood claims to improve sustainability and equity by promoting use of active transportation. Uneven development and unequal distribution of environmental benefits have created social and environmental issues that need to be addressed with urgency. Addressing these issues means providing environmental improvements like more housing, greener space, and more amenities. Doing this within an exclusively market based political economy will no doubt exclude or displace those who cannot afford to be there. If the complete neighborhood aims to integrate equity into its framework, marginalized neighborhoods and communities will need to be systematically protected from being displaced from areas that receive environmental improvements through city, regional, and state policies. This also means providing non market, 'de-commodified,' guaranteed housing to those residents who cannot afford market rates.

Additionally, the redevelopment of land is always an opportunity to re-indigenize it. Equity in the complete neighborhood also includes decolonization. Decolonization addresses and repairs the ways that indigenous communities and communities of color have been excluded from the social and economic benefits of settler colonialism and racial capitalism. Decolonization recognizes the ways in which these structures have created racial and economic inequality, and how that inequality has shaped the built environment. Decolonization involves restoring power, control, and land back to indigenous people, which will bring a shift in social, economic, and ecological paradigms.

Using Wasted Space to Improve Completeness

This research aims to better understand the ways that "wasted space," such as parking lots and vacant land can be used to improve completeness, within cities. So, what makes parking lots and vacant land wasted space? Even-Cowley (2016) found that retail parking lots in Columbus, Ohio were on average 72% unoccupied during the day. Other research has found that parking garages in Des Moines, Iowa go 92% unused throughout the day (Peters, 2018). This suggests a significant over supply of parking. This over supply of parking combined with the under supply of housing in Portland, and throughout the United States, (and world) invites criticism of how land is being used, or not used, within cities. Parking lots and asphalt surfaces produce negative externalities that affect entire communities. Providing abundant free storage for private vehicles incentivizes people to drive, which generates greenhouse gas (GHG) emissions as vehicles travel from parking space to parking space. Asphalt surfaces also contribute to urban heat, which kills over 1,300 people every year in the United States (EPA, 2021). These negative externalities affect public health and conflict with climate action plans. Concentrations of parking represent concentrations of destinations. But parking lots disincentivize walking by creating a low density urban form with distances between destinations that throw off the necessary balance of density, land uses and infrastructure needed to encourage walking.

Additionally, the United States, and especially Portland, is experiencing a housing shortage that has produced levels of houselessness never seen before. The intent of labeling parking lots and vacant land as wasted is to say that this land is not being used to the fullest potential of its current use (by staying 70%+ vacant during the day), its highest and best economic use (parking lots are generally free), nor its highest social use (abundant free parking enables emissions of greenhouse gasses). The valuable urban land in question can and should be converted to more socially

necessary uses such as housing and spaces for essential services and amenities or green space. Bringing housing to these areas is critical to support active transportation infrastructure and the nearby amenities. Using parking lots to create complete neighborhoods will help to create the necessary balance of density, land uses, and infrastructure that enable walking, reduce vehicle miles traveled, reduce greenhouse gas emissions, and reduce urban heat while increasing access to housing and daily essentials. In summary, the current use, or lack of use, of these wasted spaces stand in the way of creating complete neighborhoods.

Why Does Wasted Space Stay Wasted?

The urban environment is shaped by complex layers of political and economic structures that result in uneven development across regions. The City of Portland eliminated parking requirements for all developments in 2023, allowing parking lots to be developed into other uses. Although, land developers and their lenders and investors are only interested in projects that produce a certain level of profit, also known as rent gap. The rent gap describes the difference between the potential ground rent and the actual ground rent of a real estate development project (Smith, 1996). This means the cost of purchasing and developing land must be significantly less than the value of the new development. The rent gap is best explained by looking at gentrifying areas that have experienced decades of systemic disinvestment and is now seeing public and private reinvestment resulting in displacement of longtime residents. Because the area lacked investment for decades, buildings are in disrepair and can be purchased at relatively low cost and because the area is now desirable to consumers and businesses, developers can exploit the rent gap and make profits. This is because deprecation makes for a profitable reinvestment (Ghertner, 2014). If wasted space goes unchanged it is because the rent gap is not enough to trigger development by for profit real estate firms.

Methodology

In 2023 the city of Portland removed all parking requirements from the city code as part of Oregon's climate friendly and equitable cities policy. The decision to remove all parking requirements for all developments frees up of vast sums of land within cities for new uses. This research first measures the amount of surface parking lot throughout the city of Portland, then analyzes the land use zoning to understand the capacity to provide housing and mixed use development. Vacant land is also included as a resource to increase housing capacity and space for essential services and amenities and improve neighborhood completeness.

By using geographic information software, I conducted a spatial analysis of Portland, Oregon. I created original data that measures the area within the city's administrative boundaries occupied by surface parking lots. Satellite images from June of 2022, provided by Google, were manually scanned and surface parking lots were drawn as polygons. Data for vacant land within the city was provided by Oregon Metro (2022).

To determine if wasted space is feasible to develop, this research uses the architectural software, Revit, to create digital at scale models of the case study neighborhoods. Wasted space is divided into 50 foot by 100 foot lots, a standard size lot in the City of Portland. Wasted space that cannot fit this size lot within its boundary is deemed not feasible for development. Buildings that are proposed on feasible lots conform to existing zoning and land use laws that regulate floor area ratio, setbacks, height, and uses. Properties in zones that do not allow residential uses are deemed

not feasible. This research proposes ground floor commercial space in all scenarios where this is allowed with housing on the floors above. The number of residential units is calculated by dividing the gross new residential area by 1000 square feet per unit. The potential population is calculated by multiplying the number of housing units by 2.26, the average number of people per household throughout Portland (U.S. Census, 2021).

City Wide Analysis

The citywide analysis finds that 24% of Portland, or 34.2 square miles of the city, is wasted space. Surface parking lots take up 27.6 square miles (19%) of land within the city's boundary. The remaining 6.7 square miles (5%) is vacant land. The typical parking lot in Portland occupies three to 11 standard (50' x 100') lots and provides 30 to 120 parking spaces. Citywide there is space for 1.69 million cars to park off street, which amounts to 6 off street parking spaces per household. This estimate does not include the number of parking spaces provided on streets, in garages, in residential driveways or in parking structures within the city.

Looking at the land use of these parking lots, we see that the heavy industrial zones, IH and IG2, account for 50.4% of all parking lot and asphalt area. In total, industrial land uses (EG1, EG2, EX, IG1, IG2, IH) make up 60.2% of all parking and asphalt surface. 15.8% of total parking lots are zoned for residential uses (RMP, R20, R10, R7, R5, R2.5, RM1, RM2, RM3, RM4), 13.8% are zoned for mixed use (CM1, CM2, CM3, CR, CX), 8.9% are zoned as open space and 1.4% are zoned for commercial use (CL, CL1, CL2). 53.8% of vacant land is zoned for industrial use, followed by residential at 27.1%, mixed use at 7.1% and commercial at 1.8%. 30% of parking lots and 34% of vacant land are currently zoned to allow housing or mixed use development. In total, the city of Portland has 10.5 square miles of wasted space that can be used as a resource to improve neighborhood completeness through the infill development of housing and other essentials.

Neighborhood, Town & Regional Centers in Portland

As part of the 2035 Comprehensive Plan, the city of Portland has designated 33 areas as Regional, Town and Neighborhood centers. These are district anchors where city planners intend to focus growth and move forward with climate action strategies. These centers are defined as "compact urban places that anchor complete neighborhoods, featuring retail stores and businesses, civic amenities, housing options, health clinics, employment centers and parks or other public gathering places" (City of Portland, 2021).

The proportion of wasted space within the centers ranges from 7% (Killingsworth/Interstate Town Center) to 66% (Hayden Island Neighborhood Center). Centers are generally between 10% and 36% wasted spaces. Parking lots are the main contributors and account for 86% of wasted space within the centers.

Amenities within the centers were also measured. The amenities measured in this analysis include frequent transit (City of Portland, 2019f), groceries stores, defined as stores that provide fresh produce (City of Portland, 2019c), farmers markets (City of Portland, 2019b), public schools (Oregon Metro, 2022c), libraries (Oregon Metro, 2022b), community centers (Oregon Metro, 2022a), Bike Town docks (City of Portland, 2019a), parks (City of Portland, 2019d) and public restrooms (City of Portland, 2022). Other data used includes boundaries for

neighborhood, town, and regional centers (City of Portland, 2021), streets (City of Portland, 2019e) and building footprints (Oregon Metro, 2010). These amenities, services and infrastructure are unevenly distributed throughout the city. Density of these amenities within centers ranges from 9 per square mile (Macadam Neighborhood Center) to 306 (Belmont/Hawthorne/Division Town Center) but the typical center has about 80 amenities per square mile. Across all the centers, frequent transit stops account for 60% of all amenities within their boundaries.

Case Studies

To gain a clear understanding of the potential that wasted space offers to improve completeness within Portland's neighborhood, town and regional centers, this research looks at five case studies.

Division/162nd Neighborhood Center

The Division/162nd Neighborhood Center is in east Portland, near the border of Gresham. The boundary covers an area of 114 acres and is 31% wasted space (27% parking, 4% vacant). There is one grocery store, six frequent transit stops, land zoned to allow commercial uses and two roads with unprotected bike lanes. This center has the highest rate of wasted space of the case studies and the second lowest density of amenities (57/square mile).

This research found that 67% of the existing 36 acres of wasted space within the center could be converted to housing and mixed use development. This conversion would reduce the total on and off street parking supply by 44% (1,738 spaces). In addition, this conversion could provide up to 440,000 square feet of ground floor commercial space and 1,650 residential units. That's enough space for 150 businesses and 3,700 people. This conversion reduces the rate of wasted space in the center from 31% down to 10%. Adding new streets to complete the network and rearranging how space is used in the existing right of way can add 500 on street parking spaces, protected bike lanes on Division Street and 162nd Ave, dedicated bus/light rail lanes on Division Street, and 800 street trees to the center. Converting the large parking lots within the area to mixed use development with small, walkable blocks will create a vibrant downtown area for residents on the edge of the city's boundary.

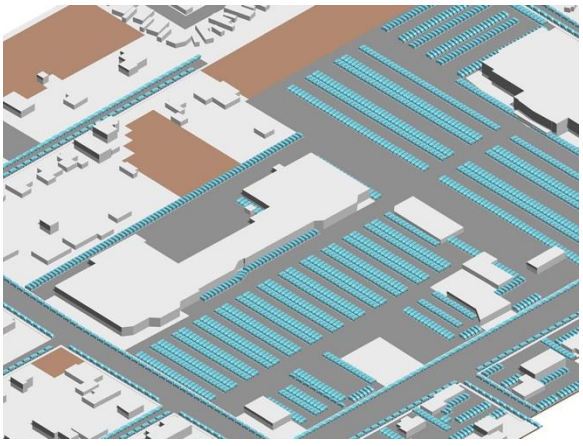

Figure 1. Diagram representing the existing conditions of the Division/162nd Neighborhood Center

Figure 2. Diagram representing the potential to the complete the Division/162nd Neighborhood Center

Hollywood Town Center

The Hollywood Town center is in inner northeast Portland, at the intersection of Sandy Boulevard and Interstate 84. Oregon Metro and has also labeled the area as a "station community" which describes "areas of development centered around a light-rail or high-capacity-transit station that feature a variety of shops and services that will remain accessible to bicyclists, pedestrians and transit users as well as cars" (Oregon Metro, 2022d). The boundary covers an area of 127 acres and is 18% wasted space (18% parking, 0% vacant). The center has three grocery stores, one farmers' market, three CSA pick up locations, one library, 16 frequent transit stops, three community centers, commercially zoned properties, one park, two streets with unprotected bike lanes and one greenway. The Hollywood Town Center has the second lowest rate of wasted space and the second highest density of amenities (143/square mile) of the case studies.

This research found that 62% of the existing 22 acres of wasted space within the center could be converted to housing and mixed use development. This conversion would reduce the total on and off street parking supply by 34% (1,450 spaces) and in exchange can provide up to 440,000 square feet of ground floor commercial space and 2,200 residential units. That's enough space for 150 businesses and 5,000 people. This conversion reduces the rate of wasted space in the center from 18% to 7%. Rearranging how space is used in the existing right of way can add dedicated bus/light rail lanes on Sandy Boulevard, and 1,100 street trees to the center. Additionally, an existing transit center can be developed into dense housing and commercial space. The abundant frequent transit options, multiple sources for groceries and multiple community centers make the Hollywood Town Center a place that could handle the increase in population while becoming even more of a destination neighborhood within Portland.

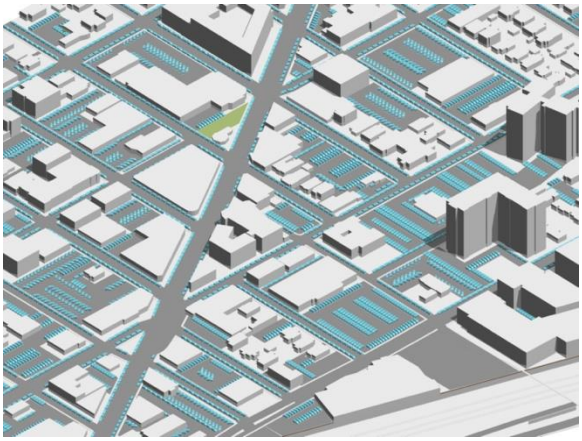

Figure 3. Diagram representing the existing conditions of the Hollywood Town Center

Figure 4. Diagram representing the potential to complete the Hollywood Town Center

Kerns Neighborhood Center

The Kerns Neighborhood center is in inner southeast Portland and is the closest to downtown of the case studies. The boundary covers an area of 308 acres and is 13% wasted space (13% parking, 0.3% vacant). Within the center there is one grocery store, four CSA pick up locations, one high school, 14 frequent transit stops, two parks, one public restroom, three streets with unprotected bike lanes, three bike town docks, and two greenways. This center has the lowest rate of wasted space of the case studies and the median density of amenities (69/square mile).

This research found that 71% of the existing 42 acres of wasted space within the center could be converted to housing and mixed use development. This conversion would reduce the total on and off street parking supply by 31% (3,200 spaces) and can instead provide up to 750,000 square feet of commercial space and 4,400 residential units, enough space for 250 businesses and 10,000 people. This conversion reduces the rate of wasted space in the center from 13% down to 4%. Adding new streets to complete the network and rearranging how space is used in the existing right of way can add 250 on street parking spaces, protected bike lanes on Glisan Street and 16th Ave, dedicated bus/light rail lanes on Sandy Boulevard and Burnside Street, and 3,500 street trees to the center.

Figure 5. Diagram representing the existing conditions of the Kerns Neighborhood Center

Figure 6. Diagram representing the potential to complete the Kerns Neighborhood Center

Parkrose Neighborhood Center

The Parkrose Neighborhood center is in east Portland and is located along Interstate 205 and Sandy Boulevard. The boundary covers an area of 181 acres and is 23% wasted space (21% parking, 2% vacant). The center has two grocery stores, five frequent transit stops, one street with an unprotected bike lane and is within the bike town service area. This center has the median rate of wasted space and the lowest density of amenities (32/square mile) of the case studies.

This research found that 60% of the existing 42 acres of wasted space within the center could be converted to housing and mixed use development. This conversion would reduce the total on and off street parking supply by 36% (1,980 spaces) and provide up to 500,000 square feet of commercial space and 2,400 residential units. That's enough space for 170 businesses and 5,500 people. This conversion reduces the rate of wasted space in the center from 23% to 9%. Adding new streets to complete the network and rearranging how space is used in the existing right of way can add 100 on street parking spaces, protected bike lanes on Sandy Boulevard and 102nd Ave, dedicated bus/light rail lanes on Sandy Boulevard, and 1,400 street trees to the center.

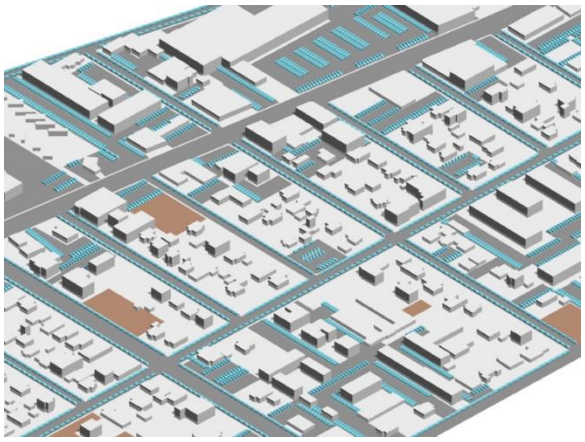

Figure 7. Diagram representing the existing conditions of the Parkrose Neighborhood Center

Figure 8. Diagram representing the potential to complete the Parkrose Neighborhood Center

Woodstock Neighborhood Center

The Woodstock Neighborhood center is in southeast Portland and is the geographically smallest of the case studies. The boundary covers an area of 55 acres and is 26% wasted space (22% parking, 4% vacant). The center is an active area with two grocery stores, one library, six frequent transit stops, one public restroom and six streets with unprotected bike lanes. This center has the second highest rate of wasted space of the case studies combined with the highest density of amenities (197/square mile).

This research found that 83% of the existing 14 acres of wasted space within the center could be converted to housing and mixed use development. This conversion would reduce the total on and off street parking supply by 33% (800 spaces) and provide up to 260,000 square feet of ground floor commercial space and 1,150 residential units. That's enough space for 87 businesses and 2,600 people. This conversion reduces the rate of wasted space in the center from 26% down to 4%, the greatest reduction of the case studies. Adding new streets to complete the network and rearranging how space is used in the existing right of way can add 160 on street parking spaces, protected bike lanes on Woodstock Boulevard and 52nd Ave, and 800 street trees to the center.

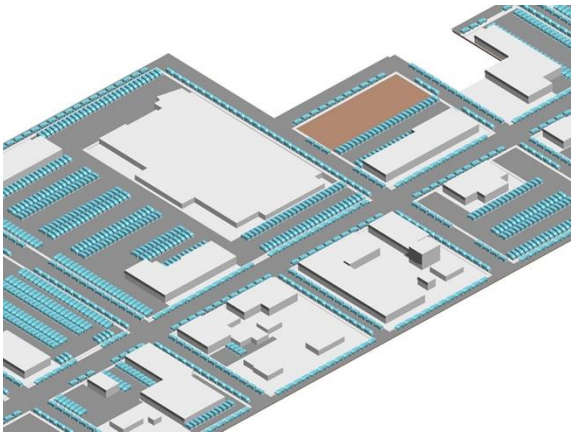

Figure 9. Diagram representing the existing conditions of the Woodstock Neighborhood Center

Figure 10. Diagram representing the potential to complete the Woodstock Neighborhood Center

Conclusion

Across the case studies an average of 69% of wasted space was found feasible to convert to housing and mixed use development. If we project the numbers generated from the case studies across the city, wasted space that allows residential and mixed uses could provide 7.2 million square feet of ground floor commercial space and 394,000 residential units. Without destroying or modifying any existing buildings, wasted space can provide room for 24,000 businesses and services and homes for 890,000 people. Additionally, wasted space that does not allow residential uses can provide 18.5 million square feet of commercial or industrial space. Adding close to one million new residents would give Portland a population density like that of Chicago, about 12,000 people per square mile. This increase in capacity for business and consumers can boost Portland's economy to that of a global city.

As more and more cities throughout the United States repeal costly parking mandates this opens up vast amounts of land for infill development of housing and essential services. Rather than expanding urban growth boundaries, jurisdictions should remove off street parking requirements to unlock significant capacity for infill development within the existing boundary. This will help to create a more sustainable urban form that supports active transportation infrastructure and connects home and destinations within a convenient walk. Removing asphalt surfaces throughout cities will also help to reduce urban heat and flooding. In addition to physical changes in the built environment systemic changes will be necessary. Providing this scale of environmental

improvements will likely increase property values and demand to live and work in the areas that receive improvements. In order to prevent low income and marginalized populations from being displaced they must be systemically protected. On top of that, housing and commercial space must be provided outside of the free market at below market rates. The complete neighborhood as outlined in this paper will improve sustainability and equity throughout and cities and communities by designing neighborhoods that are human centered rather than car and profit centered.

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