



Accessibility of King County Parks
with a focus on Dick Thurnau Memorial Park

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Prepared by
2025 Population Health Initiative Applied Research Fellows

Sarah Desai
Nupur Gorkar
Xinyuan Hao
Mark Nepf
Annie Xu

Advised by
Jessica Godwin, Ph.D.

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0. Executive Summary

King County Parks' mission is to steward "parks, trails, and natural lands for all." This report, prepared by the University of Washington's Population Health Initiative Applied Research Fellowship Program 2025 Cohort, assesses the accessibility of parks both at a broad county-wide scale and a deeper focus on Dick Thurnau Memorial Park (DTMP) in White Center. Through comprehensive spatial analysis and field assessment, this study identifies accessibility patterns and provides evidence-based recommendations for improving park access, with a focus on youth and individuals with disabilities. The findings support targeted investments in underserved areas while providing a systematic framework for ongoing accessibility evaluation. The analytical methodology can guide future park development decisions to ensure alignment between community demographics and accessibility infrastructure, supporting equitable access to park resources across King County's diverse communities.

Demographic Pressures and Accessibility Needs

King County faces significant demographic changes affecting accessibility planning. In addition to more than a decade of rapid population growth, disability rates among young working-age adults (18-34 years) have doubled since 2020, representing an increase of over 27,000 individuals in this age group with accessibility needs. This growth spans multiple disability types, with cognitive difficulties showing particularly steep increases. The expanding population of young adults with disabilities requires immediate attention to accessible infrastructure and inclusive programming.

The demographic analysis reveals geographic concentration patterns, with many high-youth areas lacking adequate walkability infrastructure. This results in mismatches between where young people live and where accessible park infrastructure is located.

County-wide Spatial Accessibility Measurement

We investigated whether there were regions of relatively low park access across King County, measuring accessibility as the number of parks one could reach when walking 10-, 20-, or 30-minutes at 5 km/h (≈ 3 mi/h) in any direction from the centroid of a block group.

Our spatial analysis reveals distinct patterns in park accessibility across King County. Park access generally declines moving east and south across King County, conforming with the logic that urban areas tend to enjoy greater park access than their rural counterparts. Downtown and Central Seattle demonstrate relatively high accessibility to urban parks.

Southwest King County consistently shows low access clusters, despite urban development in these areas. Federal Way, Kent, Auburn, and growing communities like Covington, Maple Valley, and Black Diamond fall within these low-access zones. This pattern contradicts assumptions that urbanization correlates with adequate park access and highlights systematic disparities requiring targeted intervention.

Assessment of Dick Thurnau Memorial Park

We assessed physical infrastructure and park user perceptions at DTMP over two site visits, considering park access points, rest and hydration, signage, and recreation and safety. We make recommendations for immediate park needs and long-term planning.

Our systematic evaluation of DTMP reveals specific accessibility barriers that affect daily park use. The park's multi-use design creates documented safety concerns. Community members reported that individuals with mobility issues have been struck multiple times by flying discs from the disc golf course, with one family member no longer visiting the park due to repeated incidents. The terrain presents additional barriers, with steep hills limiting access for visitors with mobility concerns. The lack of wayfinding support particularly affects visitors with vision difficulties, as no accessible maps or tactile signage exist on-site.

The park is located around a substantial population of individuals who speak English as a second language, with Spanish and Vietnamese being the most prevalent first languages, yet safety signage is only written in English.

Some infrastructure conditions present immediate safety concerns, including playground equipment haphazardly repaired with duct tape and metal surfaces that are hot to the touch during peak daytime hours.

Basic amenities require attention. Only one of three drinking fountains was observed on site, and bathroom facilities present inconsistent access, with some locked during visiting hours and unclear operational signage.

Evidence-Based Recommendations

These findings indicate several priority areas for intervention. Infrastructure maintenance requires immediate attention, including playground equipment safety, water fountain restoration, and bathroom access standardization.

The disc golf course safety situation necessitates clear boundaries and multilingual warning signage to prevent further incidents involving vulnerable park users. Wayfinding improvements could significantly enhance park accessibility, particularly tactile mapping and multilingual directional signage, and reinforce boundaries between the disc golf course and general use areas.

Addressing terrain barriers through improved accessible pathways could expand usable park areas for individuals with mobility limitations. To provide an example of how these improvements could be implemented in Dick Thurnau Memorial Park, we have attached a [link to various signage mockups](#).

Long-term planning should consider the geographic accessibility gaps identified in Southwest King County. Furthermore, enhanced programming for youth populations could include the expansion of water activity facilities for hotter days to DTMP or other parks. This would address feedback from community members who currently travel to other parks for these amenities despite Dick Thurnau's proximity to their homes.

1. Objectives

King County Parks envisions “parks, trails, and natural lands for all” and strives to provide public open spaces that maximize accessibility through equitable distribution. This project addresses critical gaps in understanding how well this vision translates to reality for King County’s most vulnerable populations—youth and individuals with disabilities.

Our county-wide research examined two fundamental questions:

- 1) Where are accessibility gaps in King County’s park system?
- 2) What barriers might exist for youth and disabled residents in accessing and using these spaces?

Additionally, we performed a detailed field assessment of Dick Thurnau Memorial Park (DTMP), focusing on accessibility and community perceptions of safety. The park is located in the urban, unincorporated neighborhood of White Center and falls within King County Parks’ jurisdiction.

Through comprehensive spatial analysis and detailed field assessment, we aimed to provide King County Parks with actionable information to advance accessibility and equity goals.

2. Background

2.1 Health Benefits of Green Space

Public parks and green spaces play a crucial role in improving the general health and well-being of people of all age groups. Potential mechanisms underlying the positive association between green spaces and health include stress reduction, increased physical activities, and promotion of social cohesion (Groenewegen et al., 2012). Public parks serve as a free venue for physical activity. The availability of urban parks encourages physical activity, subsequently reducing incidences of chronic disease in its neighboring communities (Cohen et al., 2014). By offering a space for encountering and discussing community events, public parks can also bolster collective efficacy – a sense of trust and cohesion combined with elevated mutual intervention at times of distress (Cohen et al., 2014). As such, parks can serve as a pathway to build social cohesion, encourage social interaction, and foster trust among neighbors (Enssle & Kabisch, 2020). In addition, parks provide a controlled, well-maintained setting for exposure to nature. Research has shown that contact with nature can be a powerful tool to combat stress and mental fatigue and improve mental health (Bratman et al., 2019; Frumkin et al., 2017).

For children, especially, the effects of park access can be quite pronounced. Several systematic reviews revealed a positive relationship between access to green space and mental well-being: green spaces restore attention, improve memories, and moderate stress (McCormick, 2017; Tillmann et al., 2018). For children, living in neighborhoods without a park in the U.S. is associated with 30% higher odds of being physically inactive compared with living in a neighborhood with a park, accounting for income, age, sex, and race/ethnicity. Subsequently, U.S. children without parks are at a 22% higher risk of being overweight. Furthermore, the absence of a park is associated with 15% higher odds of excessive screen time and 17% higher odds of an ADHD diagnosis for children (Reuben et al., 2020).

At the other end of the life course, older adults are more susceptible to certain health issues and aging can lead to general frailty. A study of older adults (65+) in Berlin, Germany found that self-estimated good health strongly correlated with frequent park visits, while those with bad/declining health visited less frequently (Enssle & Kabisch, 2020). Parks can also be seen as places of encounter and social engagement that can be especially useful for elders who are at higher risk of social isolation (Cudjoe et al., 2020; Teo et al., 2023).

2.2 Environmental Benefits of Green Space

Beyond health and social benefits, green spaces also provide critical environmental advantages for cities. Urban parks help cool down hot areas by reducing what's called the urban heat island effect. Cities typically become much hotter than surrounding rural areas since concrete, asphalt, and buildings absorb and retain heat throughout daytime. Trees and plants naturally cool the air through shade and water evaporation, which can lower local temperatures by 2 to 9°C compared to areas with lots of concrete and buildings (Santamouris, 2014). This cooling doesn't just make parks more comfortable – it also helps reduce air conditioning costs in nearby buildings. In some

cities, strategically placed green spaces can save residents and businesses hundreds of dollars annually on energy bills.

Parks and green areas also clean the air we breathe and help fight climate change. Trees act like natural filters, removing harmful pollutants such as particulate matter, nitrogen dioxide, sulfur dioxide, and ozone from the atmosphere (Nowak et al., 2006). The environmental non-profit organization *One Tree Planted* estimates that trees absorb an average of 10 kg of CO₂ per year during their first 20 years of growth, meanwhile a mature oak tree can produce approximately 100,000 liters of oxygen annually (Bernet, n.d.). At the city level, these effects add up significantly as neighborhoods near green spaces typically have 10-25% less air pollution than areas dominated by roads and buildings (Abhijith et al., 2017). Large urban forests can remove thousands of tons of pollutants annually, providing air quality benefits worth millions of dollars in health cost savings (Nowak et al., 2018).

Green spaces also help manage stormwater and reduce flood risks. Traditional urban development creates impermeable surfaces that force rainwater to rush into storm drains, often overwhelming city infrastructure during heavy storms (“Impervious Surfaces and Flooding,” 2018). When it rains heavily, parks allow water to soak into the ground naturally rather than rushing into storm drains. This reduces flooding and helps filter pollutants before water reaches rivers and lakes (Fletcher et al., 2015). A single deciduous tree can intercept 500 to 760 gallons per year, and a mature evergreen can capture and filter more than 4,000 gallons per year (Cotrone, n.d.). Green infrastructure like parks, rain gardens, and tree-lined streets can significantly reduce stormwater runoff compared to conventional urban development. For example, Philadelphia’s citywide green infrastructure program aims to capture an inch of rainfall during storms and reduce combined sewage overflows by 7.9 billion gallons per year (Kasprzyk et al., 2022).

Urban parks also support biodiversity and create important wildlife corridors within cities. As urban development fragments natural habitats, parks become crucial refuges for native plants and animals (Zellmer & Goto, 2022). They provide homes and food sources for birds, insects, pollinators, and other wildlife that might otherwise struggle to survive in cities (Z. Liu et al., 2016). A well-designed network of parks can connect isolated green patches, allowing species to move between habitats for feeding and breeding. This biodiversity isn’t just important for conservation – urban ecosystems with diverse plant and animal communities tend to be more resilient and better at providing environmental services like air purification and pest control (Schwarz et al., 2017).

2.3 Park Access Inequity

Despite the benefit of public green space, not all groups can equally reap the benefit of public parks. Historical patterns of discrimination continue to shape contemporary green space distribution. A retrospective cohort study combining historical Homeowner’s Loan Corporation

(HOLC)'s redlining maps with contemporary satellite images showed that neighborhoods with worse historical HOLC grades (i.e., deemed declining or more hazardous) consistently have lower present-day greenspaces (Nardone et al., 2021). HOLC grades were largely determined by racial status: predominately white neighborhoods were assigned higher grades and neighborhoods with more residents of color were assigned with lower grades (Winling & Michney, 2021). Although redlining was outlawed more than 50 years ago, the legacy of segregation and economic inequality continue to shape green space access (Hoffman et al., 2020; Namin et al., 2020).

Existing research confirms these persistent disparities. Duncan et al., (2013) found that census tracts with higher percentage of non-Hispanic Black residents had less access to recreational open spaces. Access disparities extend beyond mere availability to encompass quality differences in open spaces. A survey of twenty-one parks in Greensboro, NC showed that lower income and minority areas had less wooded area and less clean sitting and resting features than non-minority areas (Bruton & Floyd, 2014). Similarly, affluent cities tend to have more parks with higher quality play spaces, which directly shape the experience of youth utilizing these facilities (Jenkins et al., 2015). The COVID-19 pandemic has further highlighted these inequalities. While access to public spaces has been shown to support well-being in face of social isolation, residents with lower park access – who were also more likely to be members of marginalized communities – tend to further reduce their park use as a result of pandemic related pressures (e.g., feeling unsafe; Larson et al., 2021).

Individuals with minoritized linguistic status can have unique challenges in accessing public spaces and infrastructure. Liu & Schachter, (2007) found that immigrants with limited English proficiency were in higher need of both informal and formal information that can encourage transit use, potentially increasing their overall mobility in host communities. Notably, low park accessibility for linguistic minorities can be exacerbated through intersecting vulnerabilities. While language barriers can sometimes be partially overcome through alternative modes of transportation such as walking or driving, those with physical constraints due to disability or old age cannot easily employ these alternatives.

In addition to race, language, and socioeconomic status (SES), disability status also plays a critical role in shaping access to all public spaces including parks. For instance, Wong et al., (2023) found that, contrary to expectations, residential areas across the U.S. with a higher proportion of green space tend also to have a higher proportion of residents with disability. Further cluster analysis, however, revealed that residential clusters with higher disability and low green space were in predominately non-white, urban, and low SES areas. Given that rural areas tend to have more green spaces and a higher prevalence of disability, the positive link between disability and green space may be attributable to the commonality of rurality. In addition, the presence of green spaces does not mean access (Corazon et al., 2019). Residents with disabilities cannot benefit from green spaces if they have no means to arrive at or utilize these park spaces.

Disability status poses challenges for commuting to parks. A systematic review found that, compared to individuals with little to no mobility concerns, individuals with disability drive less, walk less, make fewer trips in general, and are frequently frustrated by a host of structural issues, such as unreliable and inaccessible public transit (Park et al., n.d.). These frustrations gradually decrease all forms of daily travel.

The Americans with Disabilities Act (ADA) was a landmark legislation passed in 1990, enshrining legal protections to individuals with ambulatory, sensory, and cognitive disabilities. The ADA prohibits discrimination against people with disabilities in everyday activities, ensuring that those with disabilities have the same opportunities as those without when it comes to everyday activities like access to education, public spaces, employment opportunities, and participating in government (Administration for Community Living). The influence of the ADA is most prominently observed in the architectural restructuring of public spaces to maximize accessibility for all. This has led to the implementation of universal design, which involves designing products and environments to be usable by all people to the greatest extent possible, without the need for adaptation or specialized design for those with different access needs (National Association of Home Builders). The result has been design features like ramps, tactile curb-cuts, elevators, and other tactile elements, becoming commonplace within the built environment for all public spaces. Another important aspect of universal design within the built environment is the incorporation of wayfinding. Davis & Weisbeck (2015, as cited in Wu & Wang, 2017) pointed out that wayfinding is “essential for maintaining independence in the world”, emphasizing its importance in ensuring accessibility and autonomy for people with different disabilities. Carefully and universally designed signage is therefore crucial in maintaining accessibility, as it can accommodate for various access needs (Wu & Wang, 2017).

2.4 Local Context

2.4.1 Disability

King County experienced steady population growth from 2011 to the present. Over the decade, the population aged 65 and above experienced the fastest growth rate, reflecting broader national trends of an aging baby boomer generation reaching retirement age (see Figure 1). The 35 to 64 age group consistently maintained its position as the largest demographic group throughout the ten-year period. This sustained dominance can be partially attributed to the relocation of individuals in prime working years to King County in hopes of career advancement. The same individuals are incentivized to maintain residence in established communities through homeownership and the parenting of school-aged children.

King County Population by Age Group

American Community Survey Data, 2011-2023 (excluding 2020)
Error bars show 90% confidence intervals

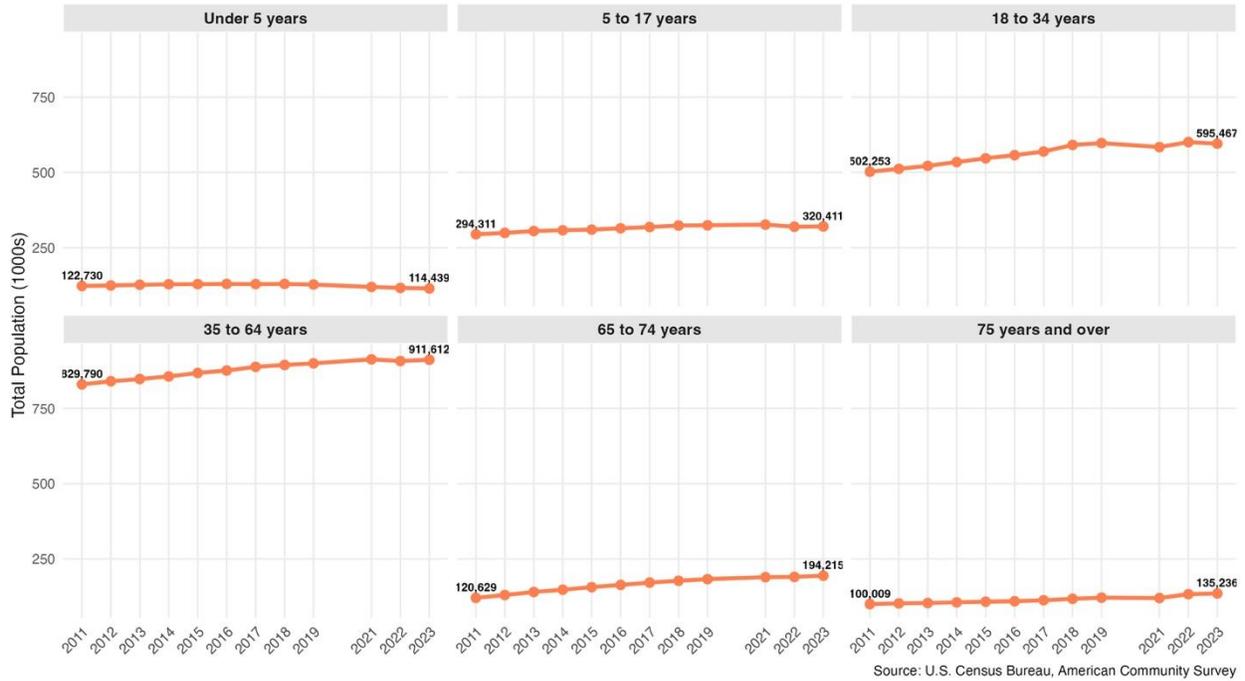


Figure 1: King County population by age (2011-2023).

Counts of King County individuals by age over the years 2011-2023. Error bars show 90% confidence intervals. (Source: American Community Survey, accessed via [tidycensus](#).)

Figure 2 shows that this population growth has been accompanied by significant shifts in disability prevalence. Each panel shows the annual estimated percentage (90% CIs) of the King County population in a specific age group living with at least one disability from 2011 to 2023. Predictably, the prevalence of disability increases substantially with age, with over 40% of adults aged 75 and above reporting at least one disability. This elevated prevalence in old age reflects the natural progression of aged-related conditions including functional decline and the progression of chronic health conditions.

Interestingly, despite middle-aged adults (35 to 64 years) comprising the largest population segment, this group experienced a modest 1% decrease in disability prevalence from 2011 to 2023. This modest decline may be explained by advances in preventative medicine, increased health awareness, and better access to wellness resources. In stark contrast to the middle-aged population, disability rates among young working adults (18 to 34 years) nearly doubled from 4.36% to 8.28% between 2011 and 2023. This substantial increase translates to an addition of approximately 27,000 young adults living in King County with at least one disability – a trend that demands serious attention from public health officials and policymakers.

Percentage of King County Population with Disability by Age Group

American Community Survey Data, 2011-2023 (excluding 2020)
 Error bars show 90% confidence intervals

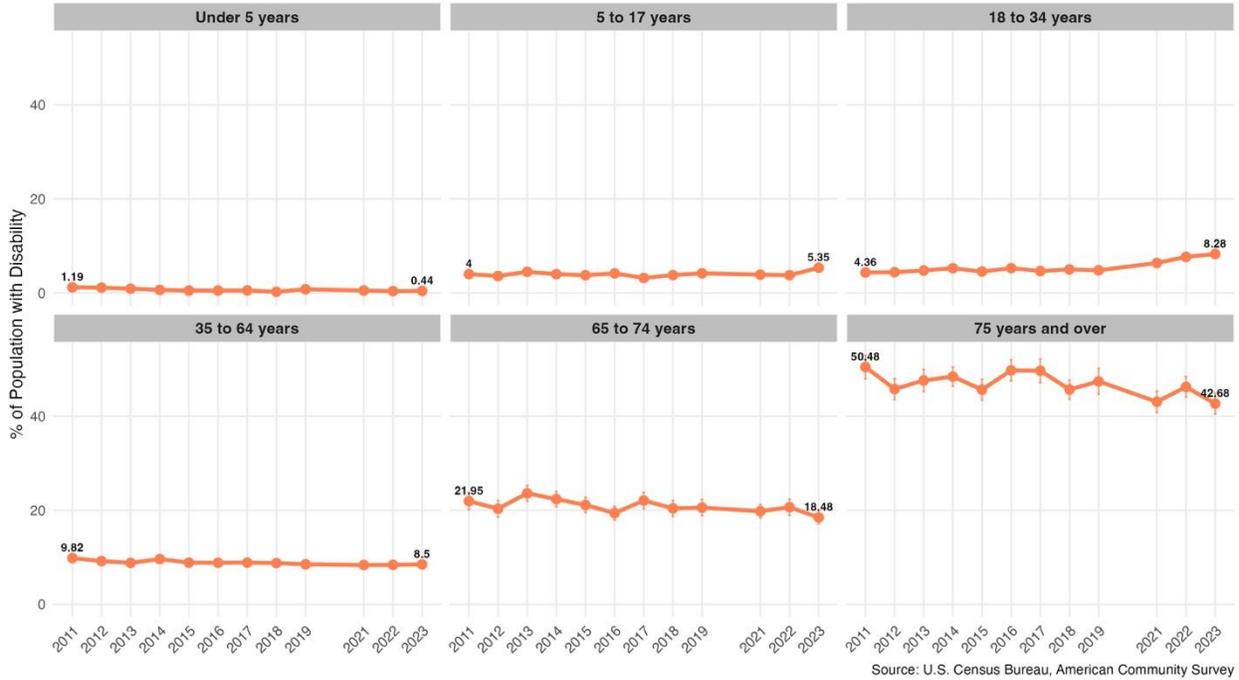


Figure 2: Percentage of King County population with disability by age (2011-2023).

Proportions of King County individuals with any disability broken down by age over the years 2011-2023. Error bars show 90% confidence intervals. (Source: American Community Survey, accessed via [tidycensus](#).)

Besides the age characteristics, King County demonstrates significant spatial variation in the distribution of individuals with at least one disability categories (see Figure 3), with important implications for targeted service delivery and resource allocation strategies. The clustering of disability populations in more central and southern areas of King County creates both opportunities and challenges for accessibility planning. The concentration pattern suggests that investments in universal design and accessibility improvements may achieve greater population impact when focused in these areas. However, it also highlights the risk of neglecting accessibility needs in lower-disability areas, where individuals with disabilities may face even greater isolation due to limited accessible facilities.

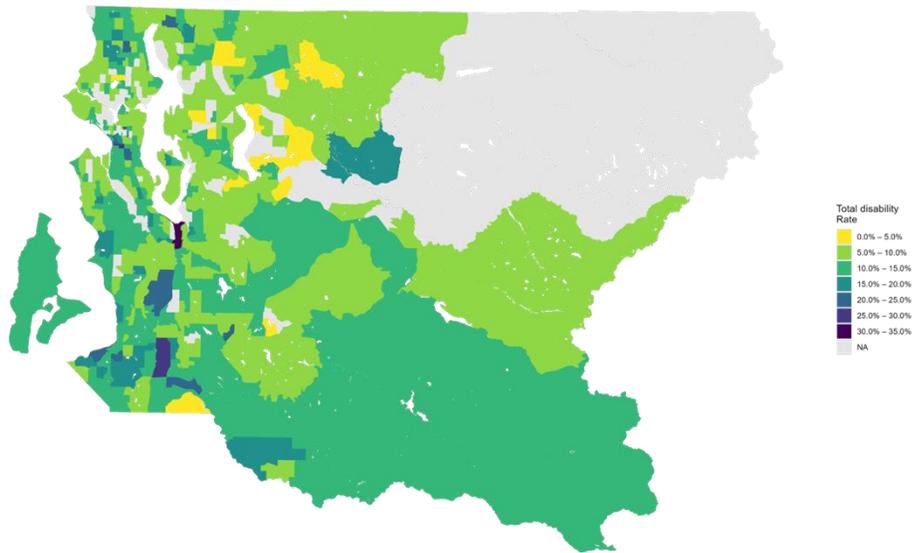


Figure 3. Disability Rate of King County by Census Tract (2019-2023)

Proportion of individuals in each Census tract report at least one of the following disability categories asked about by the ACS: ambulatory difficulty, cognitive difficulty, difficulty with independent living, hearing difficulty, vision difficulty. Unreliable tracts masked if the coefficient of variation, or ratio of the standard error to the point estimate exceeds 30%. (Source: ACS 2019-2023, accessed via [tidycensus](#).)

In particular, detailed analysis of specific disability categories reveals particularly alarming increases in cognitive difficulties, independent living difficulties, and vision difficulties among 18-to-34-year-olds (Figure 4). Cognitive difficulties, as defined by the [U.S. Census Bureau](#), encompass any physical, mental, or emotional condition that creates challenges in remembering, concentrating, or making decisions. The nearly 50% increase in young adults reporting cognitive difficulties coincides with the timeline of the COVID-19 pandemic, suggesting a potential causal relationship. Emerging research has provided supportive evidence linking COVID-19 infection to subsequent cognitive impairment. Studies have shown a positive correlation between the severity of COVID-19 symptoms and cognitive deficit. Larger deficits were seen in individuals with persistent unresolved issues and those who had been hospitalized (Hampshire et al., 2024). Notably, younger adults with post COVID-19 syndromes appeared to experience more marked impairment in attention and executive functioning than their older counterparts (Herrera et al., 2023). ICU COVID-19 survivors, especially those who had required mechanical ventilation, experienced subsequent post-intensive care syndrome, which can impact their ability to complete activities for independent living such as bathing or walking (Falvey & Ferrante, 2020). In King County specifically, 4.5% of the population has been hospitalized for COVID-19-related issues, with a higher concentration in South Seattle communities, and among older adults .

Percentage of King County Population (Age 18-34) with Different Disabilities

American Community Survey Data, 2011-2023 (excluding 2020)
Error bars show 90% confidence intervals

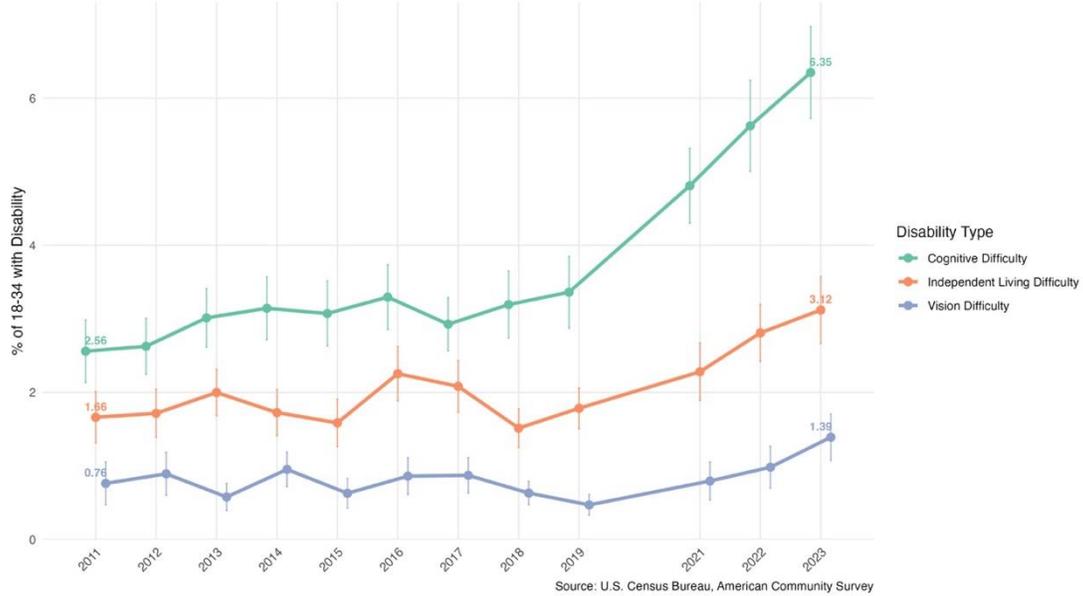


Figure 4. Percentage of Population Aged 18 to 34 with Specific Disabilities

Proportions of King County individuals with cognitive difficulties (green), independent living difficulty (orange), and vision difficulty (blue) over the years 2011-2023. Error bars show 90% confidence intervals. (Source: American Community Survey, accessed via [tidycensus](#).)

3. Data & Methods

3.1 Data Sources

Table 1 details the secondary data sources used throughout this report, and below we provide additional details as necessary.

We make use of two kinds of federally produced data: spatial information for Census Bureau geographies (both tracts and block groups) and American Community Survey (ACS) estimates of the size of demographic groups including population by age and disability prevalence. Estimates for King County as a whole make use of ACS 1-year data, allowing for annual estimates. Small area estimates at the Census tract level are for 5-year periods, combining all ACS responses within an area in the relevant period.

Spatial layer data for King County (KC) public parks and schools are publicly available through KC’s Geographic Information System (GIS) Center.

Table 1. Sources, descriptions and use of data. The first column indicates the source of the data (federal, county, or public and open source). The second column indicates the specific agency or organization that produced the data. The third and fourth columns describe data attributes and spatial information for each data source. Finally, the last column describes how the data are used in this specific report.

| Level | Source | Description | Spatial Features | Use |
|-------------|--|--|--|---|
| Federal | Census Bureau; American Community Survey | Population size and demographics | Small-area boundaries | Vulnerability groups and population characteristics |
| | Environmental Protection Agency | Nationally standardized walkability index | Composite raster-level index combining land-use mix, density, and transit availability | Assess built environment and pedestrian accessibility |
| County | King County GIS Center | King County schools and districts | Point-level school locations; polygon boundaries of school districts | Linking accessibility to educational institutions |
| | King County Parks | Public park boundaries and facilities | Polygon boundaries of parks and recreational sites | Accessibility analyses for open space |
| Open Source | OpenStreetMap | Open access global street and path network | Spatial lines for street and walking networks | Basis for isochrone and travel-time analyses; Site visit plans and maps |

Public parks data are maintained by King County Parks and provide two sources of information: area polygons and facility points. The former reflects the geographic boundaries of public parks as of December 2018, and the latter provides point locations for facilities within public parks, such as benches, playgrounds, and restrooms, as of March 2025. For the present analysis, public parks were filtered to those managed at or below the county level and those classified as *Park Site*, removing public pools (*Pool Site*), shopping centers (*Shop Site*), and trails (*Trail Site Regional*). The final sample included 1,398 parks. Park boundaries were then merged with

facilities data based on park name.

King County school location data includes the point locations for 681 public and private schools, updated March 2025, as well as 20 school district boundaries as of May 2025. Spatial data for public transit are publicly available through Sound Transit Open Transit Data and include stations for the *Link Light Rail* (n = 51), *Sounder Commuter Rail* (n = 12), and *Sound Transit Express Bus* (n = 377). In addition, *Seattle Streetcar* (n = 26) stations were obtained from Seattle GeoData and *King County Metro Bus* (n = 7,276) stops were provided by Rebecca Maskin, the KC Demographer. All were last updated in October 2024, with the exception of *Seattle Streetcar*, which was updated July 2025.

All spatial analyses were carried out in the default coordinate reference system used by the KC GIS Center, EPSG: 2926. Census and ACS data were accessed using the R package **tidycensus** (v1.7.3; Walker et al., 2025). OpenStreetMap data were accessed via the R package **osrm** to calculate walking routes and times and **via** the R package **maptiles** (Giraud et al., 2025) for making maps.

3.2 Spatial Analysis Methods

Given King County's diverse geographic characteristics – ranging from dense urban neighborhoods to sprawling suburban communities and rural areas – traditional Euclidean distance measurements prove inadequate for accurately assessing park accessibility. The county's complex topography, including significant elevation changes, water bodies, and varied street network connectivity, necessitates more sophisticated spatial analysis approaches that reflect real-world pedestrian movement patterns and accessibility barriers.

This study employs two complementary spatial analysis methodologies to comprehensively evaluate park access across King County. First, isochrone analysis provides precise measurements of actual walking accessibility by accounting for street network configuration, topographic constraints, and pedestrian infrastructure. This approach is particularly critical in King County, where steep terrain in areas like Capitol Hill and West Seattle, combined with discontinuous street grids and water barriers, can create substantial disparities between straight-line distances and actual walkable routes.

Second, spatial cluster analysis enables the identification of statistically significant concentrations of low- and high-access areas, moving beyond individual census tract assessments to reveal broader geographic patterns of accessibility inequality. This methodology is essential for understanding how park access disparities cluster across the county's diverse communities and for informing targeted policy interventions.

Together, these spatial analysis methods provide the analytical foundation necessary to address the complex accessibility challenges facing King County's increasingly diverse population, particularly as disability prevalence continues to rise among younger adults and geographic clustering of vulnerable populations creates concentrated areas of need.

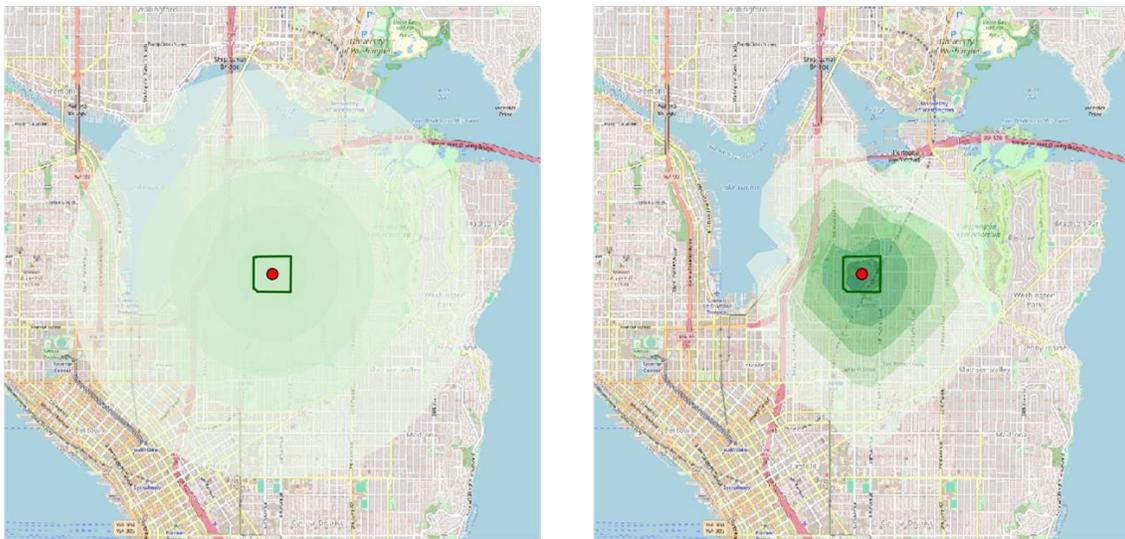
3.2.1 Measuring Walking Distance with Isochrones

Isochrones are a fundamental tool in spatial analysis for representing areas that can be reached within equal travel times. The term originates from the Greek words “iso” meaning equal and “chronos” meaning time. In this context, it denotes geographic zones accessible from a given point within a specified duration of time. In practice, one can visualize isochrones as polygons on a map, allowing analysts to delineate areas that are reachable within discrete time intervals, for example, 5, 10, 20, 30 minutes or more, by a specific mode of transport (O’Sullivan et al., 2000). Each isochrone polygon represents the cumulative area accessible within that specific time threshold, with outer boundaries encompassing all areas reachable in longer time periods.

Unlike Euclidean buffers, which are based on straight-line or “bird’s eye” distances, isochrones can incorporate travel networks and modes of transport. This distinction is critical, because real-world accessibility depends on the street network, traffic rules, terrain, and mobility options, rather than purely geometric or Euclidean distance (O’Sullivan et al., 2000). Figure 5 uses Volunteer Park in Seattle to illustrate the difference between using Euclidean distance and using network-based isochrones for walking distance. Such comparisons highlight the importance of methodological choice in accessibility research, as they can influence both academic conclusions and policy recommendations (Geurs & Van Wee, 2004). By embedding network-based distances, isochrones offer a more accurate depiction of how people move through urban space. Isochrone estimates are more accurate when using precise spatial reference points and detailed network data, though the choice of reference point – whether park centroids, entrances, or other features – can significantly affect results.

Euclidean buffers
(foot-units matched to walk time)

OSRM isochrones
(5 km/h foot profile)



Walk-time & distance 30 min (8,200 ft) 20 min (5,500 ft) 15 min (4,100 ft) 10 min (2,700 ft) 5 min (1,400 ft)

Figure 5. Travel distances from Volunteer Park.

Green shapes show distance from the centroid of Volunteer Park with darker shades indicating the area is closer to the park. Distances are calculated as Euclidean distance in two dimensions (left) and as walking time as determined by isochrones calculated with the **osrm** package (right). (Source: King County Parks)

Isochrones are widely used in transportation studies, health equity research, and urban planning, particularly for assessing equity in the distribution of services and amenities. For instance, a

walking isochrone can be generated using an assumed average speed, typically around 5 km/h (≈ 3 mph). However, these parameters can be adjusted to reflect the needs of different populations, such as elderly individuals or people with disabilities, for whom average walking speeds may be lower (Tribby & Zandbergen, 2012).

The spatial analysis of isochrone-based accessibility employs two complementary methodological frameworks to comprehensively evaluate service provision: population-based and place-based approaches. These methodologies represent fundamental paradigms in environmental health geography and public health research, addressing distinctly different research questions while providing complementary insights into the relationship between urban green spaces and community access patterns (Nicholls, 2001; Talen & Anselin, 1998).

The population-based approach, rooted in demand-side accessibility analysis, employs isochrone analysis to answer questions like, “What parks can residents [in a specific residential location] access?” (Hewko et al., 2002). The population-based approach is particularly valuable for transportation planning and equity assessments, as it directly addresses the resident experience and can incorporate various transportation modes and mobility limitations. Research by Sister et al., (2010) demonstrates how this approach enables policymakers to identify areas with limited park access and inform decisions about transit improvements or new facility placement.

The place-based approach, representing supply-side accessibility analysis, shifts the analytical perspective to examine questions like, “Who does this park serve?” by creating service areas around park facilities and analyzing the demographic characteristics of the populations within those catchments (Apparicio et al., 2008; Talen, 2001). The place-based approach draws from the tradition of service area analysis established in health services research (Joseph & Bantock, 1982) and has been refined through applications in recreational facility planning (Smoyer-Tomic et al., 2004; Talen & Anselin, 1998). This methodology is essential for facility-specific planning and resource allocation decisions. It enables park managers and policymakers to understand the demographic composition of their service populations, assess facility capacity relative to demand, and identify opportunities for programming that reflects community needs.

In this study, we generate population-based isochrones around Census block groups to assess park access across King County and place-based isochrones from park centroids to determine service coverage areas. As demonstrated in the University of Washington block group analysis (Figure 6), the population-based approach reveals that residents can access varying numbers of parks depending on their location and mobility constraints. The data show a progressive increase in park accessibility with extended travel times, with the most significant gain occurring in the 30-minute band, at which point 15 additional parks become accessible (bringing the total to 16 unique parks).

What parks can residents access? (UW block origin)

Accessible parks outlined (thin grey dashed) and labeled with black boxes

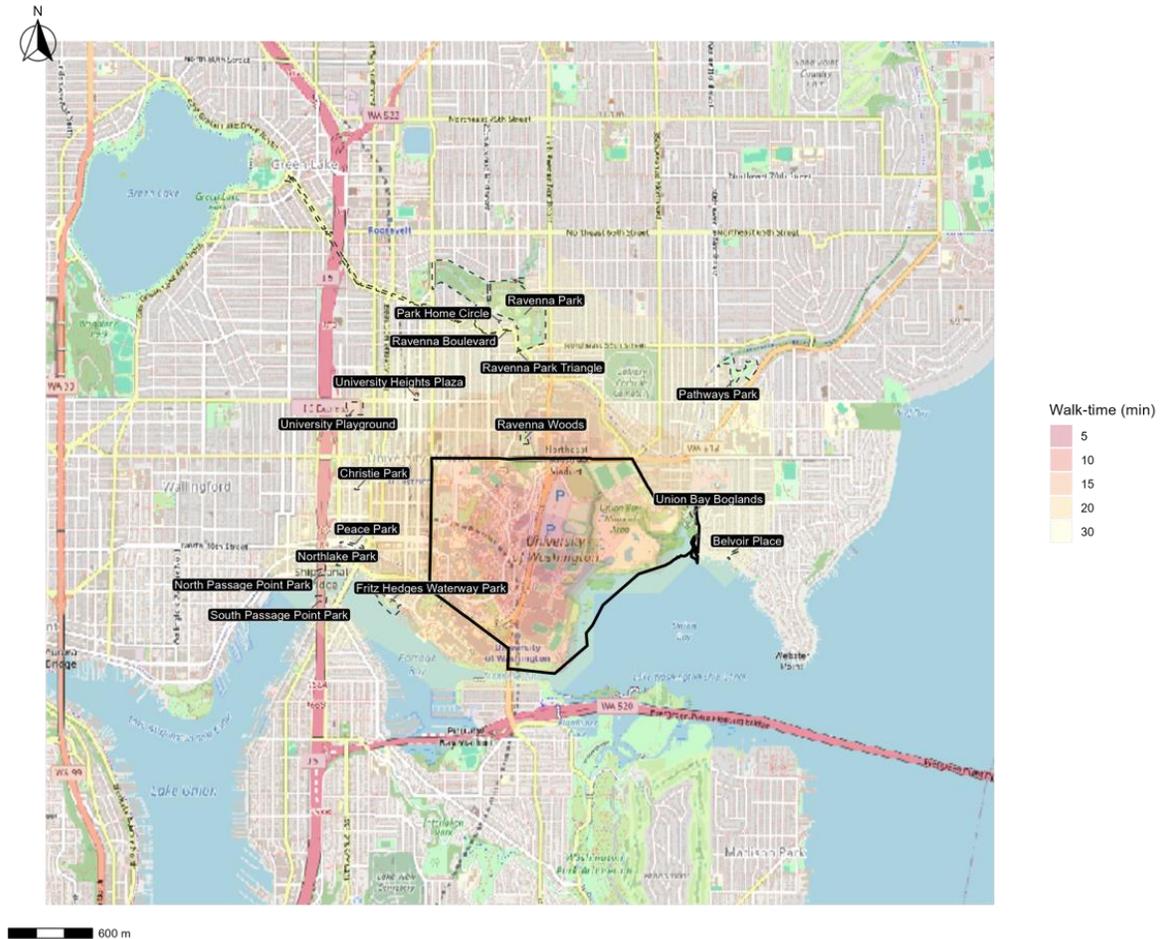


Figure 6. Parks Accessible from University of Washington Campus.

Walking distance isochrones from the centroid (red point) of University of Washington campus (green shape) with King County parks shown by name in black squares. Isochrones calculated via the **osrm** package are overlaid as translucent shades of red, orange, and yellow with Census block group in black dashed lines. The colors represent 10-, 15-, 20-, 30-, 45-, and 60- minute walking times with the darkest color representing the shortest walking time. (Source: Census Bureau, King County Parks).

We generate place-based isochrones centered on King County’s park locations, identifying all census block groups accessible within specified walking time thresholds. Figure 7 provides an example of White Center’s Dick Thurnau Memorial Park and its service coverage from 5 Census block groups within 10 minutes to 68 unique block groups within 60 minutes. The data reveal significant increases in coverage at the 45-minute threshold, where an additional 36 block groups are captured, suggesting that this park serves a substantial urban population.

Dick Thurnau Memorial Park: Isochrones & Covered BG Outlines (Cumulative)

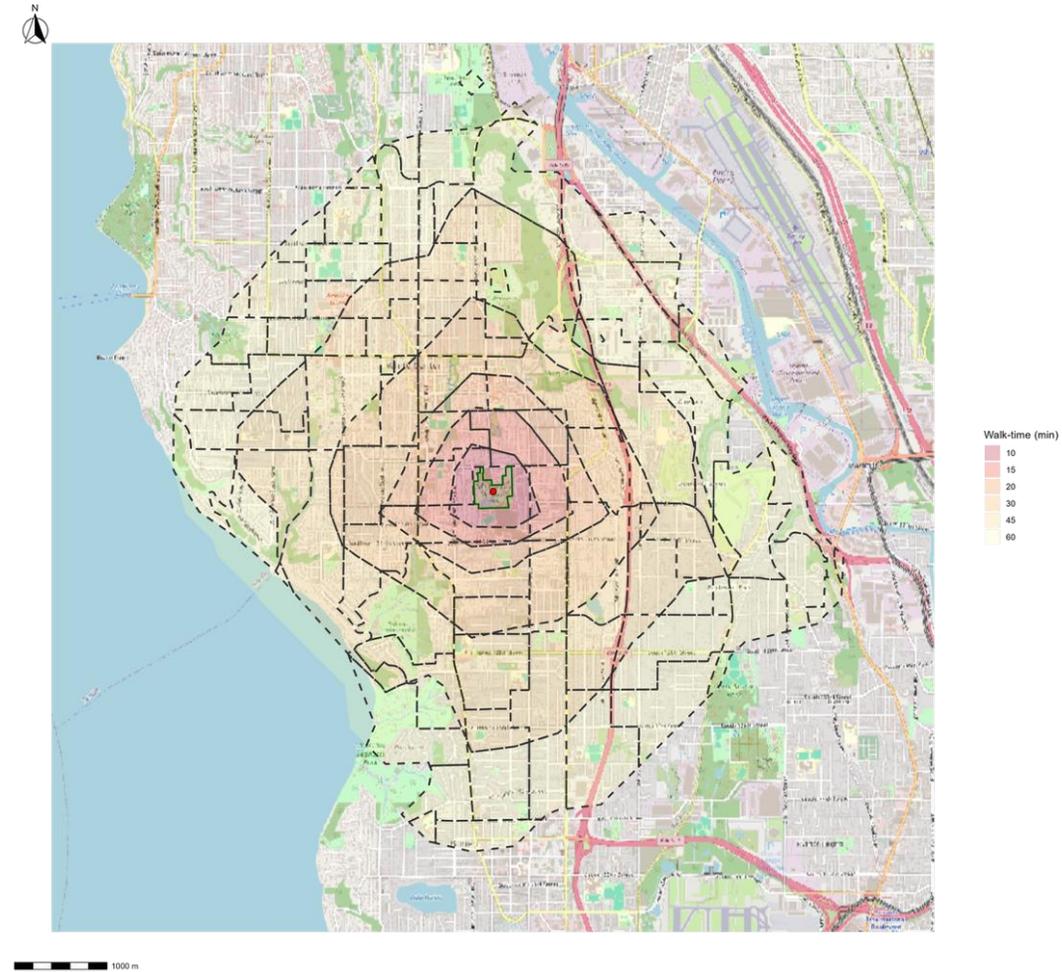


Figure 7. King County block groups accessible from the center of Dick Thurnau Memorial Park.

Walking distance isochrones from the centroid (red point) of Dick Thurnau Memorial Park (green shape) calculated via the **osrm** package are overlaid as translucent shades of red, orange, and yellow with Census block group in black dashed lines. The colors represent 10-, 15-, 20-, 30-, 45-, and 60- minute walking times with the darkest color representing the shortest walking time. (Source: Census Bureau, King County Parks)

All isochrone analyses were performed with the R package **osrm** (4.2.0; Giraud et al., 2024) . We used a standard walking speed of 5 km/h (approximately 3 mph) for all calculations, which represents typical pedestrian movement in urban environments.

For park-based analyses, we calculate isochrones from park centroids, rather than specific entrance points. This approach was chosen for consistency across King County’s diverse park types and sizes, and because detailed entrance location data were not uniformly available for all parks in our dataset. We generated isochrones at 5-, 10-, 15-, 20-, 30-, 45-, and 60-minute walking intervals, with each polygon representing the maximum area reachable within that time threshold.

3.2.2 Identifying Low- and High- Park Access Areas with Cluster Analysis

The aim of the quantitative component of this project was to identify areas in King County with relatively low access to public parks. To do so, we performed and visualized spatial cluster analyses to locate the regions where statistically significant clusters of high and low park accessibility were found.

Statistically speaking, identifying high or low access park clusters requires comparing each Census block group's park accessibility to that of neighboring block groups. Thus, the first step of the analysis was to define block group neighbors as those block groups that share a border. As an example, looking at Figure 8, we see the northernmost block group of Vashon Island shares a border with two other block groups. As such, these two block groups serve as neighbors for the northern block group. Neighbors for all block groups in King County ($n = 1,544$) were defined in this way.

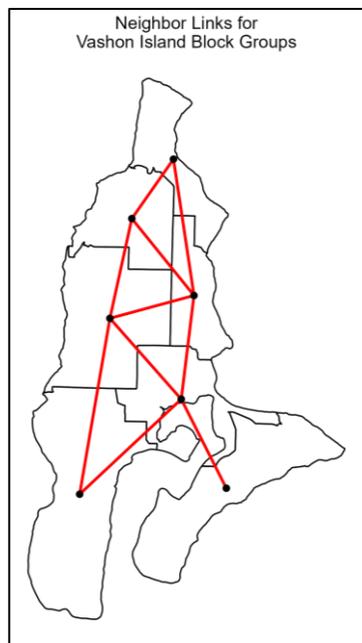


Figure 8. Neighborhood structure for Vashon Island Census block groups.

Census block group centroids connected by red lines indicate the two respective block groups are neighbors.

The second step was to define spatial weights for these neighbors. For a given block group, these weights encode the influence of the park accessibility of a neighboring block group. Because we had no reason to suspect that certain block groups would impart greater influence than others, we defined spatial weights evenly. For example, a block group with two neighboring block groups meant that each neighbor was given a weight of 0.50, a block group with four neighbors meant that each neighbor was given a weight of 0.25, and so on.

We measure park accessibility by block group as the number of parks intersecting an isochrone. We calculated 10-, 20-, and 30-minute walking time isochrones around block group centroids. Finally, we overlay King County parks data and count the number of parks whose boundaries intersect with each walking distance isochrone (Figure 9). This count serves as our value for park accessibility. In brief, we measure park accessibility as the number of parks one could reach when walking 10-, 20-, or 30-minutes in any direction from the centroid of a block group.

Clusters were identified by comparing the number of parks in a block group's isochrones with that of its neighbors. To this end, the **spdep** package in R, developed by (Bivand, 2022) was used. Specifically, Local Moran's I values were computed for each block group and represent the degree to which a block group's park accessibility value correlates with that of its neighbors. Importantly, Local Moran's I assumes spatial independence (i.e., that a block group's park accessibility is unrelated to neighboring block groups) and uses the data to verify or reject this assumption (Anselin, 1995).

As an additional measure, we also include Global Moran's I values. Global Moran's I performs the same statistical test as Local Moran's I, but on the entire sample (rather than at the observation level). This summary statistic tells us whether the data as a whole are found to be spatially dependent (Anselin, 1995). Global Moran's I values are bound between -1 and 1. As values approach -1, it indicates a near perfect negative correlation, while approaching 1 implies a near perfect positive correlation. Values close to 0 mean very little or no spatial dependence is found.

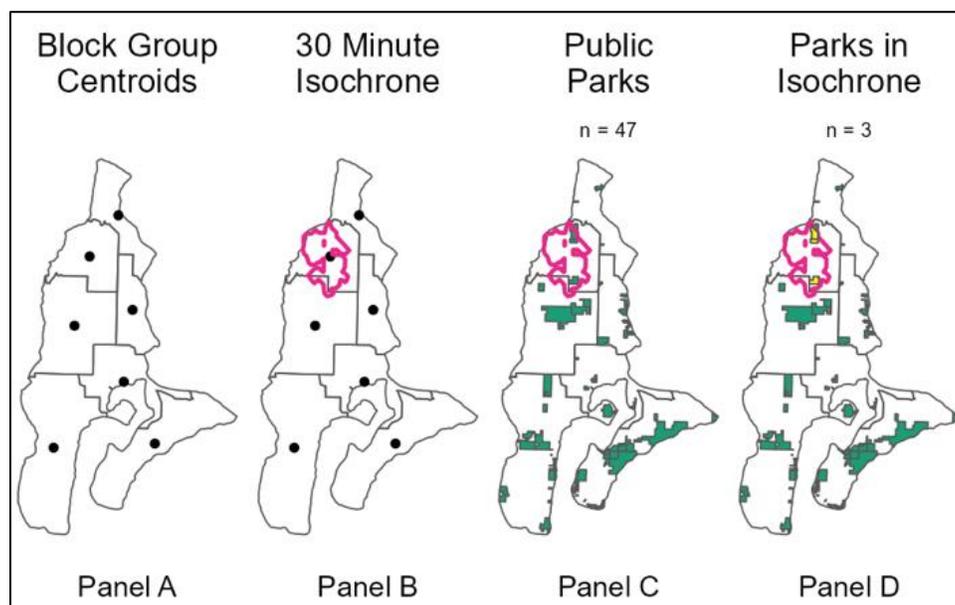


Figure 9. Construction of park accessibility measure for Census block groups.

In Panel A, Census block group centroids are identified by black dots. Moving right, Panel B shows a 30-minute walking distance isochrone calculated with the **osrm** package drawn around a single block group centroid in pink. Panel C shows the overlay of King County parks footprints in green. Finally, in Panel C, parks highlighted in yellow are those that overlap with the isochrone. The final count of parks within walking distance of the block group centroid serves as our block group-level park accessibility measure. (Source: Census Bureau, King County Parks.)

3.3 Site Visit Methods

3.3.1 Observation Site Background

The primary observation site is Dick Thurnau Memorial Park (DTMP), formerly known as Lakewood Park. Located in White Center, DTMP encompasses green spaces and recreational

facilities, including a disc golf course and the [White Center Bike Playground](#). The park services youth of a wide age range; nearby schools include Cascade Middle School, Evergreen Senior High School, and Mount View Elementary School. DTMP is also one of the meal sites for the Summer Food Service Program that provide free meals to youth aged 18 and below. The demographic composition of the surrounding census tract is 33% white residents, 24% Hispanic, and 23% Asian. The five-year ACS data from 2019 to 2023 show a sizable Spanish- and Vietnamese- speaking population near DTMP (See Figure 10 and Figure 11).

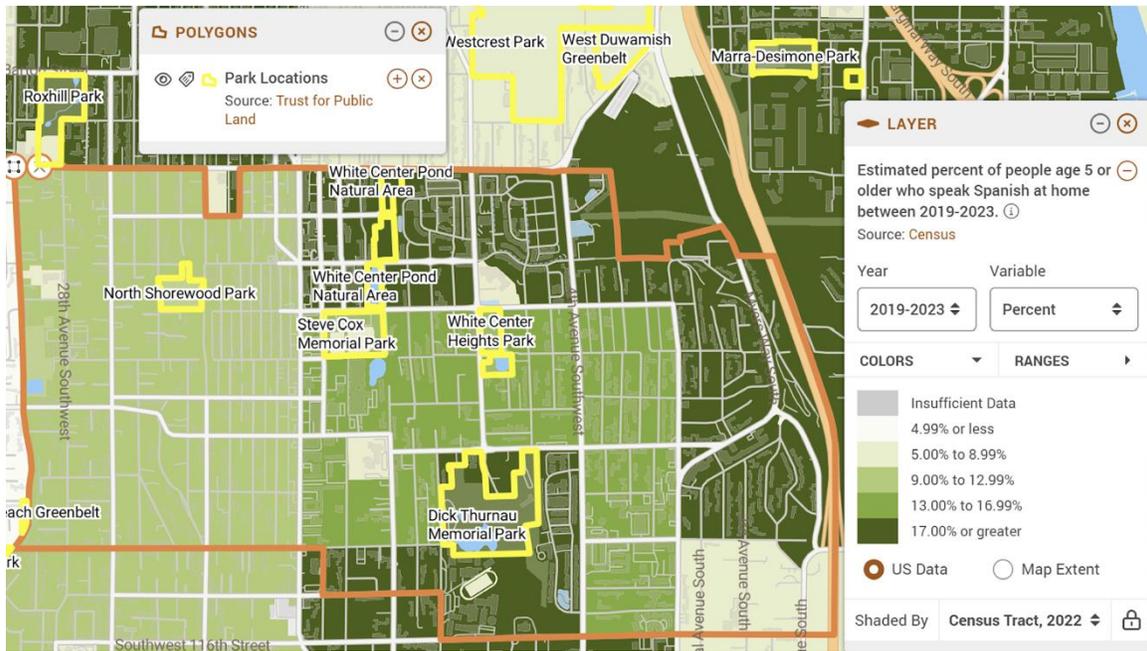


Figure 10: Percentage of Spanish-speaking people in Census tracts near Dick Thurnau Memorial Park
 Estimated percent of people age 5 or older in each Census tract who speak Spanish at home for the period 2019-2023. (Source: American Community Survey, [PolicyMap](#) Accessed August 6, 2025.)

Site visits incorporated both *naturalistic observation* and *informal interviews* with park users. Naturalistic observation was conducted on July 24, 2025, with three primary objectives:

- 1) **Inventory Verification**: the research team cross-referenced documented park facilities in King County GIS OpenData with actual installation onsite (e.g., comparing listed vs observed benches).
- 2) **Maintenance & Condition Assessment**: the research team evaluated the condition of park facilities not captured in existing documentation (e.g., potholes in sidewalks, damaged play equipment).
- 3) **Signage Evaluation**: Given the prevalence of residents with limited English proficiency and mobility or vision challenges in surrounding neighborhoods, the team conducted an exploratory assessment of signage type and accessibility throughout DTMP.

Informal interviews were conducted on August 5, 2025, to complement naturalistic observation

and gain more insight into how different park users experience accessibility in DTMP.

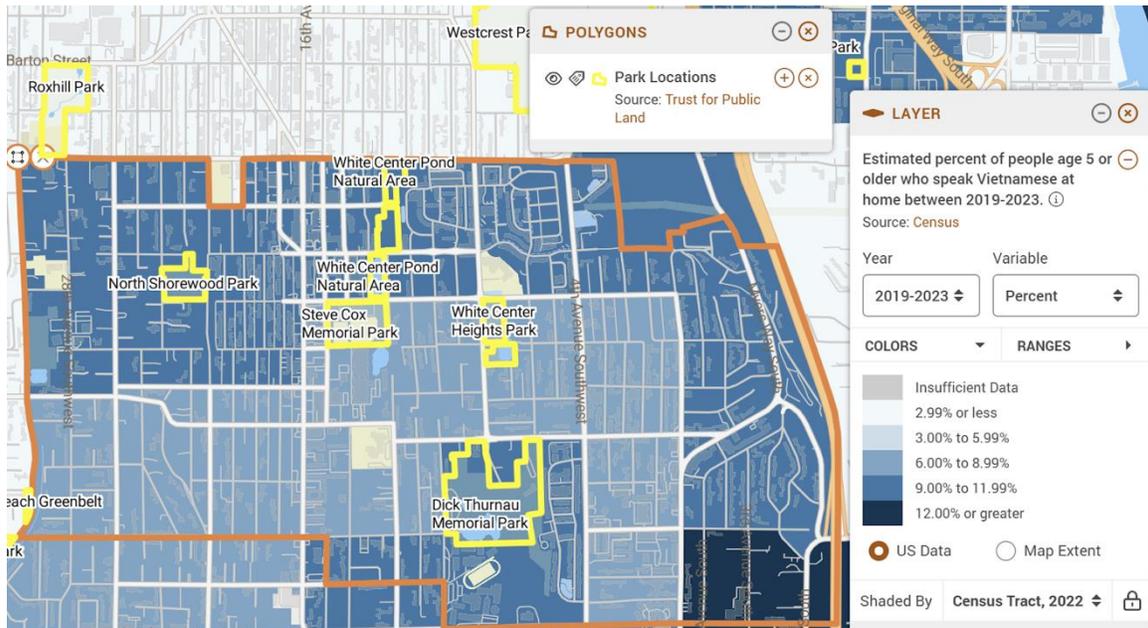


Figure 11: Percentage of Vietnamese-speaking people in Census tracts near Dick Thurnau Memorial Park

Estimated percent of people age 5 or older in each Census tract who speak Vietnamese at home for the period 2019-2023. (Source: American Community Survey, Accessed August 6, 2025.)

3.3.2 Naturalistic Observation

Drawing inspiration from the five dimensions of public spaces (Mehta, 2014), the observation recording sheet assesses the safety, comfort, and accessibility of spaces and facilities within the park and its quarter-mile radius (see Appendix A). Listed facilities were cross-referenced with existing park documents and reviewed collaboratively by research team members and stakeholders from King County Parks. The team evaluated the accessibility of each access point, including elevation and the presence of paved walkways. In-park facilities of interest included parking lots (and accessible parking spaces), drinking fountains, picnic shelters and nearby seating areas, as well as play equipment areas.

The assessment also incorporated findings from previous King County Parks public surveys to address on-going community concerns. [A public survey](#) regarding the safety of the Disc Golf course, for instance, identified community concerns about inadequate signage warning pedestrians of flying discs. Consequently, disc golf safety signage was included as a targeted observation criterion during the site assessment.

3.3.3 Informal Interviews

Interview questions address five major themes: general park experience, transit access, perceived park inclusivity, comfort and safety, and recommendations and complaints. See Appendix B for the list of interview questions.

Procedures

In-park data collection began at the lower parking lot and proceeded counterclockwise along the border of the park (see Figure 12 for the observation route). Time stamped photographs were taken of benches, signages, and other facilities that were in poor condition. We counted and documented the location of each facility type on a park map for inventory verification (see Figure 13 for an annotated park map with observed facilities). Condition ratings, maintenance needs, and security concerns were noted in the separate observation recording sheet. Signage documentation included recording of signage type (e.g., education, warning, etc.), languages, legibility by font size and font type, and readability from typical user distance. The quarter-mile radius map was constructed from the centroid of the park and included five access points as documented in previous King County public surveys (e.g., Dick Thurnau Park Disc Golf Survey). We observed and recorded crosswalk safety, public transit accessibility, and available bus stops near all access points by walking along the main path neighboring each access point. All observations were completed in real-time when possible and discussed amongst team members when discrepancies arose.



Figure 12: Observation Routes within and Around DTMP

Red arrows represent the route within the park and blue arrows represent the route around the park (1/4 mile from the park's centroid). Verified access points are marked with purple circles. (Source: base map from OpenStreetMap via **maptiles** package.)

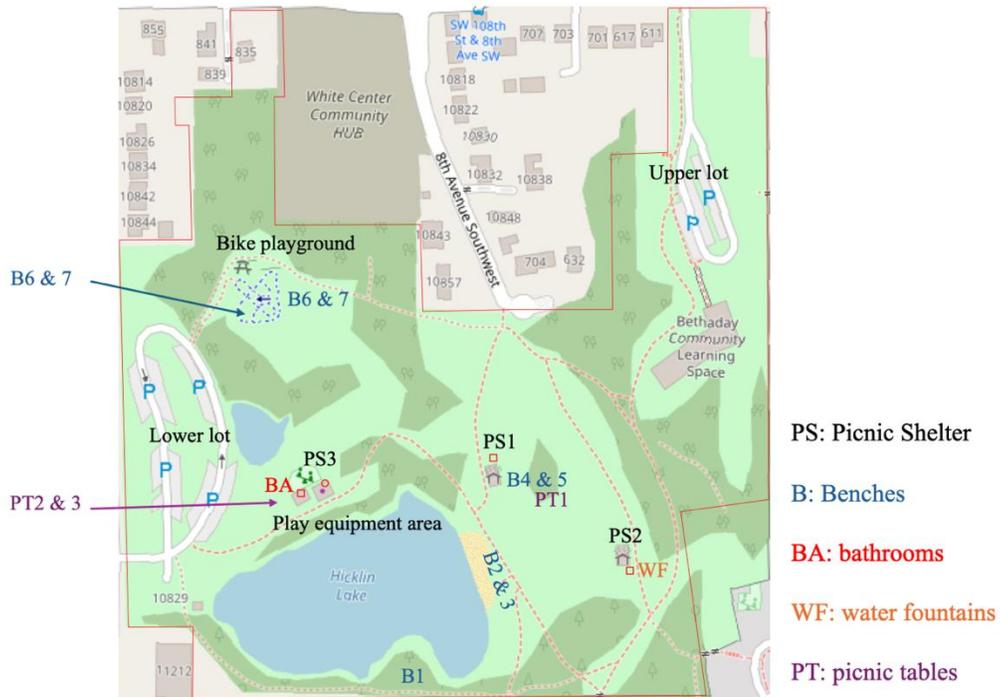


Figure 13: Annotated Park Map with Facilities

An annotated park map with locations of observed benches, water fountains, bathroom, picnic tables, and picnic shelters. (Source: King County GIS Center, base map from OpenStreetMap via **maptiles** package.)

For informal interviews, after confirming a park user was over 18 years old and therefore eligible, the interviewer acquired their consent and proceeded with the list of questions. No identifiable information (e.g., age, race, gender) or audio recording was obtained for the purpose of the interview. Quotes were recorded verbatim, and the content of the conversation was otherwise paraphrased and summarized.

4. Results

4.1 Low- and High- Access Park Clusters

In the first analysis, we include all King County block groups and test for spatial clustering at 10-, 20-, and 30-minute isochrone intervals (Figure 14). Across all three intervals, we see that Global Moran's I is highly statistically significant and positive. Thus, we find that block groups with high accessibility tend to be found clustered together, while block groups with low accessibility are also found near to one another.

This conclusion is corroborated by the Local Moran's I values, which are displayed in the maps themselves. Specifically, "high access" areas (colored in green), represent regions where the park accessibility of a block group is relatively high *and* the park accessibility of neighboring block groups is relatively high. High access clustering appears primarily within Seattle block groups, in western King County. Conversely, orange areas reflect the opposite – "low access" regions where a block group has relatively low park accessibility *and* is surrounded by block groups with similarly low park accessibility. Low access clustering is found in the eastern and southern regions of King County.

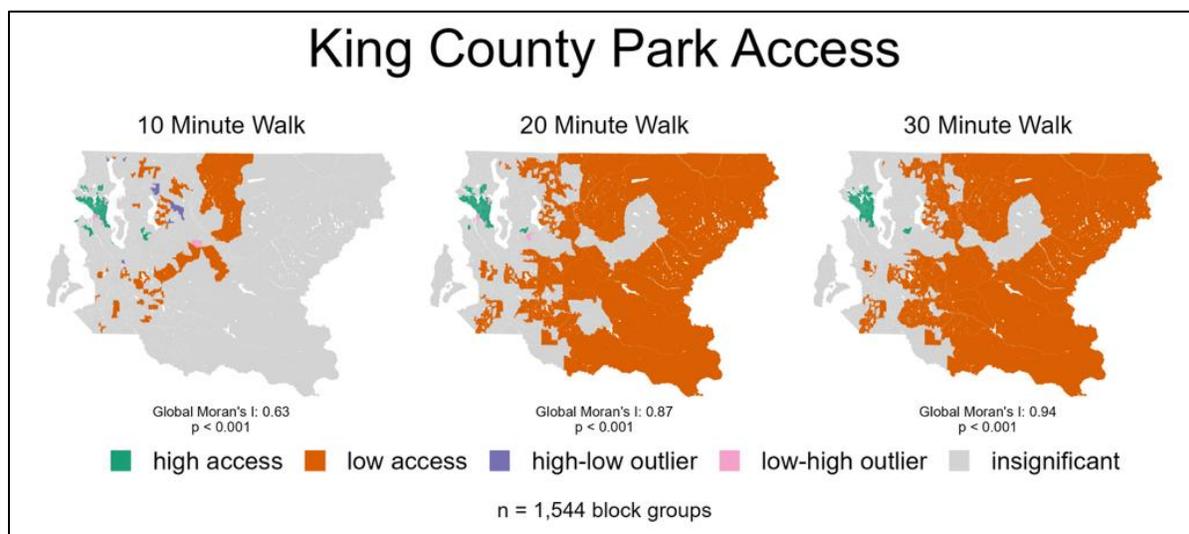


Figure 14. King County block groups with relatively high and low park access.

Each panel shows results of a spatial cluster analysis on the number of parks accessible within a certain walking time from the centroid of each King County block group. From left to right the analyses count parks in 10-, 20-, and 30-minute walk at 5 km/h (~3 mph.). High and low access clusters can be seen in green and orange, respectively. Some Census block groups experience either low park access with high-access neighbors (purple) or high park access with low-access neighbors (pink).

As walking time increases, we see both the high and low access clusters expand. Greater walking times correspond with greater distances traveled, so each block group's isochrone has a greater chance of encountering more parks. In the high access clusters, the results tell us that as residents walk further, they continue to encounter a relatively high number of parks. Hence, the green clustering spreads. Within the low access clusters, the maps reveal that, despite walking further, residents are unable to access relatively more parks. That is, increasing travel time does not improve their chances of accessing a park by foot. While not central to the present analysis, there are some high-low and low-high outliers present, as well. These reveal areas where a block

group's park accessibility is high (or low) but its neighboring block groups are areas of low (or high) park accessibility.

Additionally, we run cluster analyses on two subsets of these data, to consider urbanicity. In the present analysis, urban block groups are defined based on area. The first subset includes block groups at the 99th percentile in area (i.e., those whose area is less than or equal to 99% of the sample), while the second subset takes block groups at the 95th percentile. Because eastern King County block groups are mostly rural and relatively large, these subset analyses allow us to consider how park accessibility clustering changes when rural block groups are removed.

In the 99th percentile subset (Figure 15), we first note that only 16 block groups are removed, bringing the sample from 1,544 to 1,528. Consequently, the statistical findings are not altogether that different, because the sample size has only decreased by about 1%. Importantly, however, we see a clear difference in the visual appearance of the sample. Despite only constituting 1% of the sample, these 16 block groups make up a large portion of the county as a whole. In regard to clustering, we find the results are similar to those of the full sample: regions of high and low access clustering remain largely unchanged and positive spatial dependence indicators (i.e., Global Moran's I values) are nearly identical. These patterns hold even when the sample is reduced further, to the 1,466 block groups within the 95th percentile of area (Figure 16). Despite this more substantial drop in sample size, the regions of high and low access clustering are the same, boosting our confidence in the results.

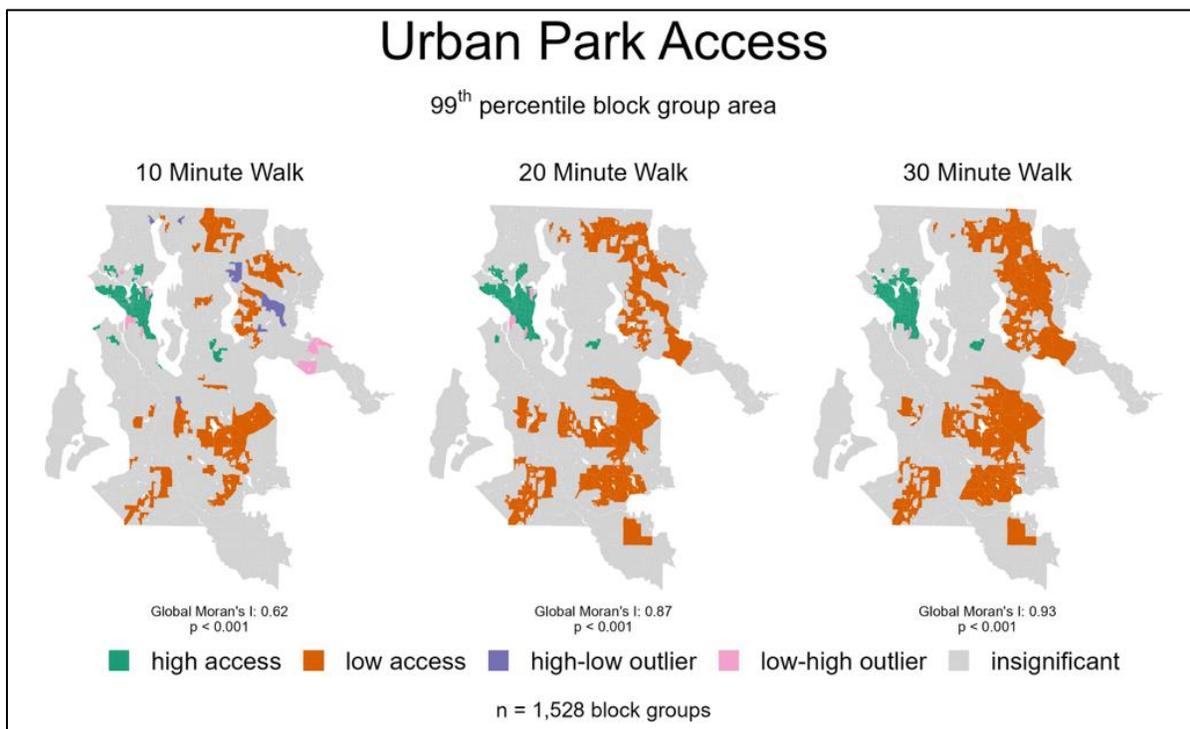


Figure 15. King County block groups within the 99th-percentile of land area with relatively high and low park access. Each panel shows results of a spatial cluster analysis on the number of parks accessible within a certain walking time from the centroid of each King County block group. From left to right the analyses count parks in 10-, 20-, and 30-minute walk at 5 km/h (~3 mph.). High and low access clusters can be seen in green and orange, respectively. Some Census block groups experience either low park access with high-access neighbors (purple) or high park access with low-access neighbors (pink).

Comparing the high- and low-access clusters to the concentration of King County’s youth population (Figure 17), we see a geographic mismatch between demographic need and recreational infrastructure availability. Eastern suburban areas – where park access clusters show lower accessibility – are experiencing significant youth population growth, but these areas often lack the dense park networks found in central Seattle. In contrast, central Seattle is one of the least youth-dense areas of King County, but the site of the high-access cluster.

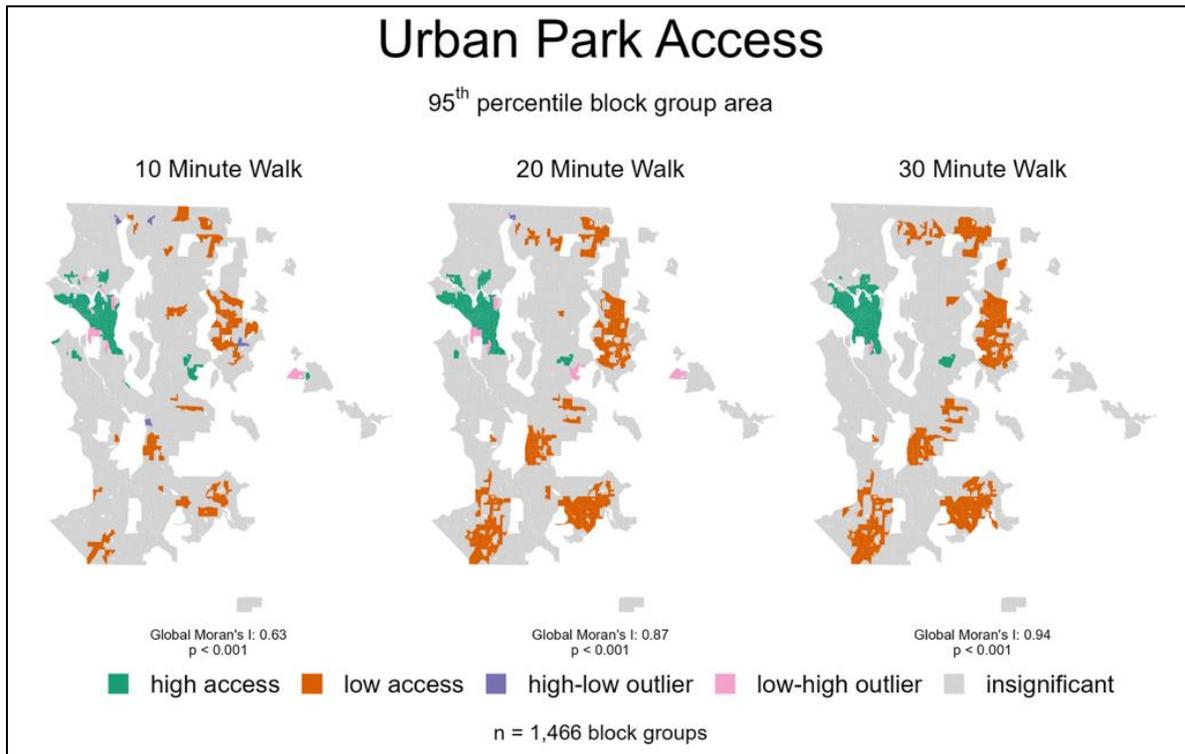


Figure 16. King County block groups within the 99th-percentile of land area with relatively high and low park access. Each panel shows results of a spatial cluster analysis on the number of parks accessible within a certain walking time from the centroid of each King County block group. From left to right the analyses count parks in 10-, 20-, and 30-minute walk at 5 km/h (~3 mph.) High and low access clusters can be seen in green and orange, respectively. Some Census block groups experience either low park access with high-access neighbors (purple) or high park access with low-access neighbors (pink).

4.2 School-Park Connectivity

Schools are essential daily public spaces for King County’s youth and represent critical access points for recreational opportunities that support physical health, social development, and overall well-being. Understanding park access from educational facilities is paramount for ensuring equitable recreation opportunities during formative years. Though schools have their own recreational facilities, we can use isochrones to assess the distribution of King County parks within walking distance of King County’s schools.

This analysis examines walking and transit-based park accessibility from all 681 schools within King County (Figure 18), encompassing elementary, middle, and high school facilities across urban, suburban, and rural contexts. The comprehensive school-centered approach enables the

identification of geographic disparities in youth recreation access and provides critical data for coordinated planning between educational and park systems.

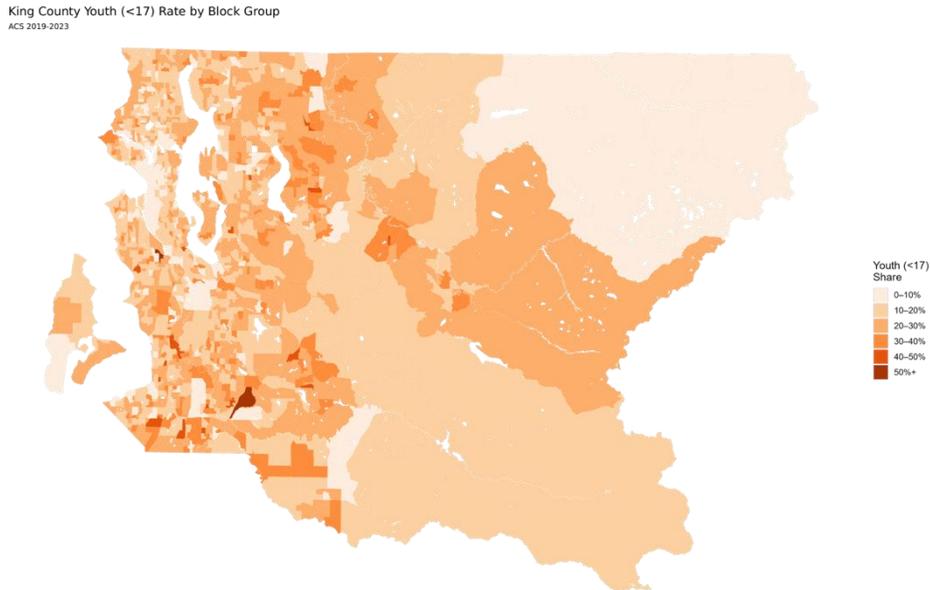


Figure 17. Youth (0-17) rate across King County block groups (2019-2023).

Shades of orange show the percentage of each Census block group that is aged 17 years or younger. Darker shades indicate a higher percentage. Unreliable tracts masked if the coefficient of variation, or ratio of the standard error to the point estimate exceeds 30%. (Source: ACS 2019-2023, accessed via [tidycensus](#).)

The spatial distributions of schools in King County urban areas demonstrate clustering patterns that align with residential density, with the highest concentrations in urban Seattle and suburban communities (Figure 18). Focusing on the more urban school districts in King County, Figure 19 shows:

- a concentrated distribution of high schools in central urban areas (e.g., Seattle, Bellevue) with additional facilities distributed across suburban communities like Shoreline, Northshore, Lake Washington, Renton, Tukwila, Highline, Kent, Federal Way, and Auburn districts.
- a broader geographic distribution of middle schools than high schools, with notable presence across all major urban and suburban districts, reflecting the need for more localized access for younger adolescent populations.

Distribution of Schools by Education Level — King County, WA
 All types shown together, color indicates education level

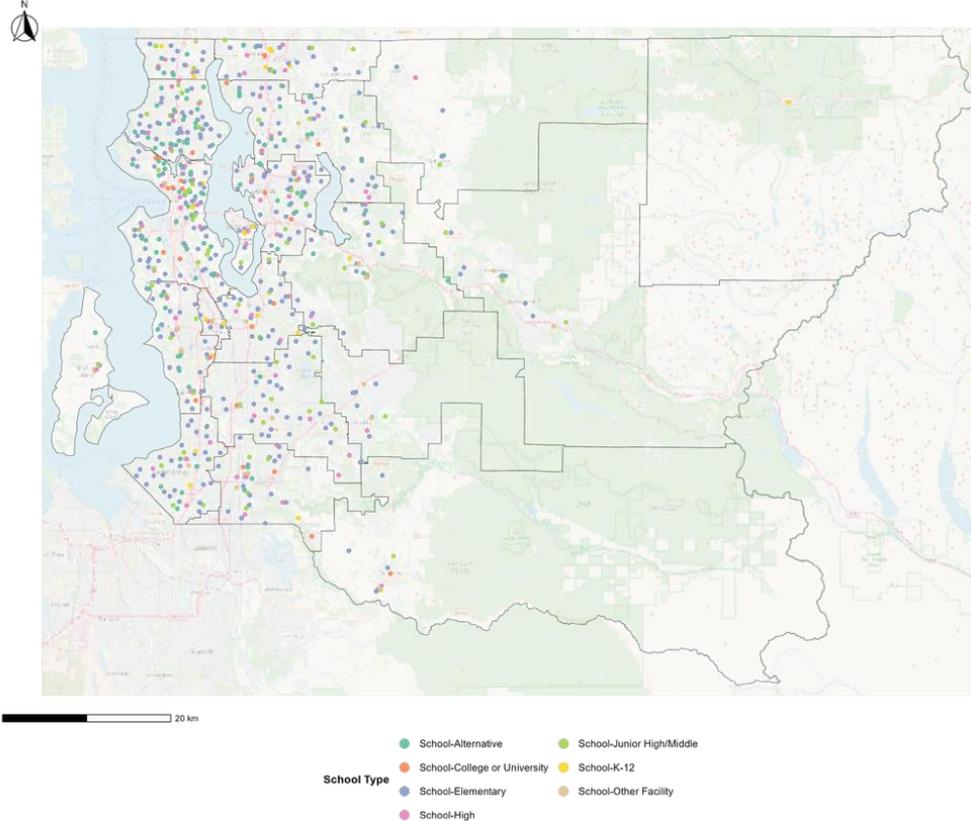
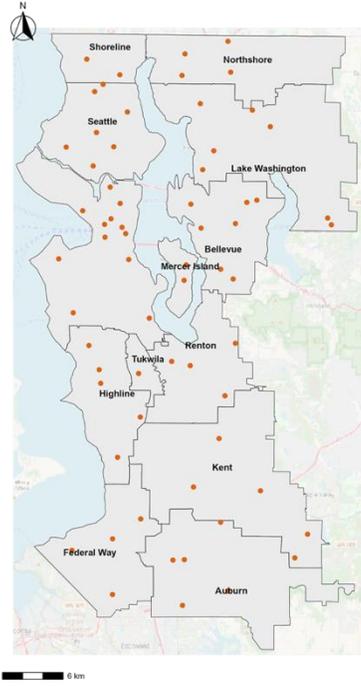


Figure 18. Distribution of schools by education level across King County

Spatial distribution of all 681 schools across King County, categorized by educational level. School density is highest in urbanized western areas, with elementary schools (blue) representing the most numerous category, followed by alternative schools (teal) and junior high/middle schools (green). High schools (purple), K-12 facilities (yellow), college/university institutions (orange), and other educational facilities (tan) show more dispersed patterns.

To assess the relationship between middle and high school locations and King County parks, we generated walking accessibility zones at 5-, 10-, 15-, 20-, 25-, and 30-minute intervals as Figure 20 shows. This analysis reveals significant variation in park access across educational facilities, with implications for after-school programming, physical education activities, and student recreational opportunities. Schools in central urban areas generally have access to multiple park facilities within reasonable walking distances, while schools in developing suburban areas and rural locations show more limited park connectivity. This pattern is particularly pronounced for middle and high schools, where students have greater independence and potential for autonomous park use compared to elementary-age populations.

Urban Distribution of School-High — King County, WA
 Only selected urban districts that contain this school type are shown



Urban Distribution of School-Junior High/Middle — King Co
 Only selected urban districts that contain this school type are shown

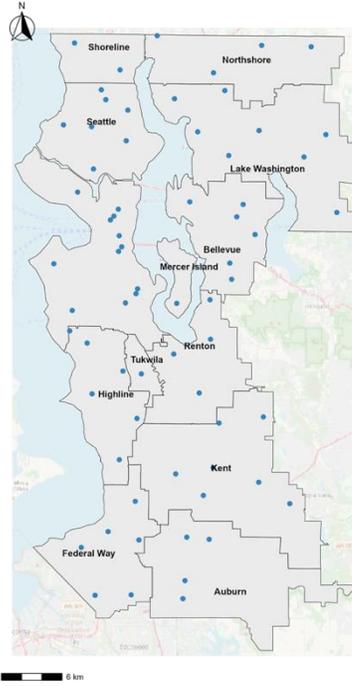


Figure 19. Distributions of High Schools and Middle Schools in Urban Area of King County

King County’s urban high schools (left) and middle/junior high schools (right). (Source: King County GIS Center, OpenStreetMap)

To identify schools facing the greatest accessibility challenges, we analyzed the facilities with the lowest park connectivity within 30-minute walking distances. Tables 2 and 3 present the 10 middle and high schools, respectively, with the most limited park access, highlighting priority locations for targeted interventions. The data reveal stark disparities, with Rainier Christian Middle and High School (Kent) accessing zero parks within a 30-minute walk, while Twin Falls Middle School (Snoqualmie Valley) reaches only one facility within the same timeframe. Geographic patterns show challenges in the Kent District and newer developments in the Lake Washington District, where educational facilities may precede adequate recreational infrastructure. Several schools rely primarily on natural areas rather than developed recreational facilities, potentially limiting access to structured youth programming and sports amenities. These findings provide the foundation for the comprehensive school-park connectivity dataset and accessibility metrics detailed in subsequent sections.

All Middle & High Schools — Isochrones (5–30 min)
 Basemap: OpenStreetMap | simplify = 10 ft | α(M/H) = 0.18/0.18

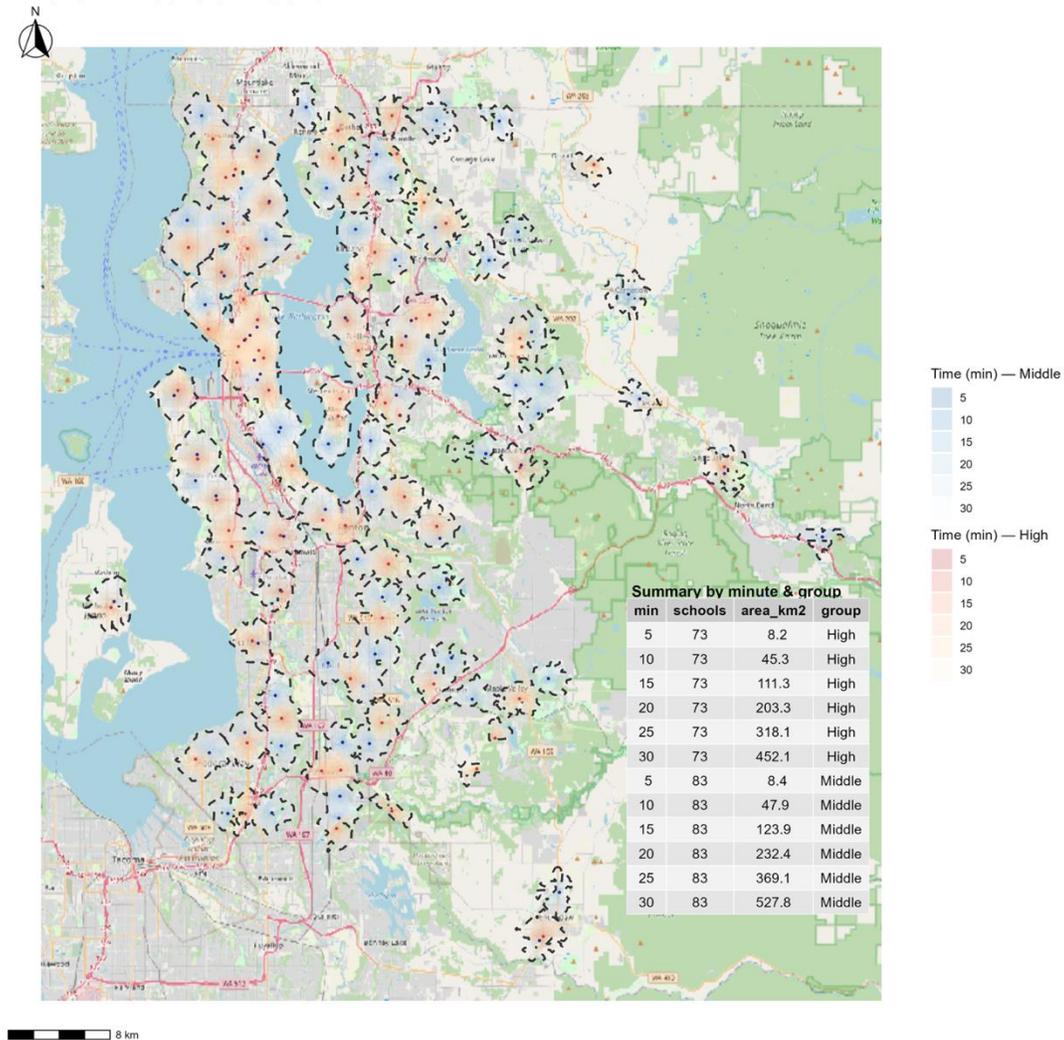


Figure 20. Walking distance buffers for King County’s middle & high schools,

Walking distance buffers for 5-30 minutes in 5 minute increments for King County’s eastern most middle (blue) and high (red) schools. Walking distance isochrones calculated with the **osrm** package.

Our comprehensive analysis of the 681 schools across King County reveals significant variation in accessibility to public parks, with critical implications for equitable youth access and public health outcomes. While the area covered by a 30-minute walking range around school centroids is, on average, 13.7 km² there is only a total area of 7.33 km² (median: 7.43 km²) that is itself a public park. In other words, approximately 53% of the areas surrounding King County's schools consist of public recreational facilities. These estimates may be limited by available data, which do not fully capture school-managed playgrounds and other types of recreational fields. The distribution nonetheless spans a wide range, with a 10:1 ratio of nearby parks between the most and least accessible schools, underscoring persistent inequities in recreational opportunities across the county’s educational landscape.

Table 22. Top 10 King County middle schools with lowest park accessibility within 30 minutes walking distance. The first column specifies the rank, with 1 having the lowest park access. The second and third columns identify the specific school and its district. The next 10 columns are a repeating series of park counts and names for 10-, 15-, 20-, 25-, and 30-minute walking distances. When a count increases, we list only the additional parks accessible to that school. Note, we also performed this analysis for 5-minute walking distances but no schools had parks that proximate. Walking distance isochrones are calculated via the **osrm** package. (Source: King County GIS Center.)

| Rank | School | School District | Parks (5m) | | Parks (10m) | | Parks (15m) | | Parks (20m) | | Parks (25m) | | Parks (30m) | | | |
|------|------------------------|-------------------|------------|--------------------------|-------------------|--------------------------|-------------------|--------------------------|-------------------|------------------------------|-------------------|------------------------------|-------------------|------------------------------|----------------|---------------------------------------|
| | | | N | Names | N | Names | N | Names | N | Names | N | Names | N | Names | | |
| 1 | Twin Falls Middle | Snoqualmie Valley | – | – | – | – | – | – | – | – | – | – | 1 | Tannerwood | | |
| 2 | Pacific Cascade Middle | Issaquah | – | 1 | Paradise Lake | 1 | Paradise Lake | 1 | Paradise Lake | 1 | Paradise Lake | 1 | Paradise Lake | 1 | Paradise Lake | |
| 3 | Leota Middle | Northshore | – | – | – | – | – | – | – | 1 | Cold Creek | 1 | Cold Creek | 1 | Cold Creek | |
| 4 | Evergreen Middle | Lake Washington | – | – | – | – | – | – | – | – | – | – | 1 | Grand Ridge | | |
| 5 | Timbercrest Middle | Northshore | – | 1 | Lakeland North | 1 | Lakeland North | 1 | Lakeland North | 2 | Camelot | 2 | Camelot | 2 | Camelot | |
| 6 | Cedar Heights Middle | Kent | – | 1 | Maplewood Heights | 1 | Maplewood Heights | 1 | Maplewood Heights | 1 | Maplewood Heights | 1 | Maplewood Heights | 2 | Cavanaugh Pond | |
| 7 | Inglewood Middle | Lake Washington | 1 | Covington Community | 1 | Covington Community | 1 | Covington Community | 1 | Covington Community | 1 | Covington Community | 1 | Covington Community | 2 | Jenkins Creek |
| 8 | Kenmore Middle | Northshore | 2 | Boulevard Ln, Soos Creek | 2 | Boulevard Ln, Soos Creek | 2 | Boulevard Ln, Soos Creek | 2 | Boulevard Ln, Soos Creek | 2 | Boulevard Ln, Soos Creek | 2 | Boulevard Ln, Soos Creek | 3 | Molasses Creek |
| 9 | Maywood Middle | Issaquah | – | – | – | – | 1 | Wallace Swamp Creek | 1 | Wallace Swamp Creek | 1 | Wallace Swamp Creek | 1 | Wallace Swamp Creek | 3 | Crawford Skate Ct., Northshore Summit |
| 10 | Nelson Middle | Renton | – | – | – | – | – | – | 2 | Talbot Hill, Thomas Teasdale | 2 | Talbot Hill, Thomas Teasdale | 2 | Talbot Hill, Thomas Teasdale | 3 | Cascade |

Table 33. Top 10 King County high schools with lowest park accessibility within 30 minutes walking distance. The first column specifies the rank, with 1 having the lowest park access. The second and third columns identify the specific school and its district. The next 10 columns are a repeating series of park counts and names for 10-, 15-, 20-, 25-, and 30-minute walking distances. When a count increases, we list only the additional parks accessible to that school. Note, we also performed this analysis for 5-minute walking distances but no schools had parks that proximate. Walking distance isochrones are calculated via the **osrm** package. (Source: King County GIS Center.)

| Rank | School | School District | Parks (10m) | | Parks (15m) | | Parks (20m) | | Parks (25m) | | Parks (30m) | |
|------|-----------------------------------|-----------------|-------------|-----------|-------------|-------------------|-------------|-------------------|-------------|--|-------------|--|
| | | | N | Names | N | Names | N | Names | N | Names | N | Names |
| 1 | Rainier Christian Middle and High | Kent | – | | – | | – | | – | | – | |
| 2 | Kentlake High | Kent | – | | – | | – | | 1 | Lake Sawyer | 1 | Lake Sawyer |
| 3 | Eastlake High | Lake Washington | – | | – | | – | | 1 | Sammamish Commons | 1 | Sammamish Commons |
| 4 | Eastside Catholic High | Lake Washington | – | | – | | 1 | Sammamish Commons | 1 | Sammamish Commons | 1 | Sammamish Commons |
| 5 | Auburn Adventist Academy | Auburn | – | | 1 | Cameron | 1 | Cameron | 1 | Cameron | 1 | Cameron |
| 6 | Skyline High | Issaquah | – | | 1 | Sammamish Commons | 1 | Sammamish Commons | 1 | Sammamish Commons | 2 | Pine Lake |
| 7 | Willows Preparatory | Lake Washington | – | | 1 | Sixty Acres | 1 | Sixty Acres | 1 | Sixty Acres | 2 | Meadow Neighborhood |
| 8 | Inglemoor High | Northshore | 1 | Moorlands | 1 | Moorlands | 1 | Moorlands | 2 | Tl' awh-ah-dees | 2 | Tl' awh-ah-dees |
| 9 | Cedarcrest High | Riverview | – | | – | | 1 | Duvall Open Space | 3 | Judd, Hix | 3 | Judd, Hix |
| 10 | Chrysalis Middle and High | Northshore | – | | – | | 1 | Woodin Creek | 3 | Wilmot Gateway, Northshore Athletic Fields | 3 | Wilmot Gateway, Northshore Athletic Fields |

For school districts, these findings inform site selection criteria for future educational facilities and highlight opportunities for enhanced after-school programming partnerships with park systems. For park planning agencies, the data provides precise targeting for new facility development and identifies communities where recreational infrastructure investment would yield maximum youth impact.

The concentration of low-accessibility schools in suburban growth areas suggests that current development patterns may systematically disadvantage youth recreation access. This pattern requires proactive planning interventions to ensure that educational and recreational infrastructure develop in coordination rather than in isolation, preventing the entrenchment of accessibility inequities as communities mature.

4.2.1 Data Deliverables

As part of our work, we compiled two data products for King County Parks, both contained as Excel CSV files. The first is all school-park pairs and the estimated isochrone walking time between them. The file includes 5-, 10-, 15-, 20-, 25-, and 30-minute isochrones. Thus, for every school (public and private), the parks reachable within those walking times are noted. For example, Mount View Elementary School is within walking distance of seven parks: *Dick Thurnau Memorial Park* (30 minutes), *Evergreen Athletic Field* (30 minutes), *North Shorewood Park* (30 minutes), *Salmon Creek Park* (30 minutes), *Salmon Creek Ravine* (20 minutes), *Seola Park* (15 minutes), and *Shorewood Park* (10 minutes).

The second data product provides the transit stations available to each school, also broken down by 5-, 10-, 15-, 20-, 25-, and 30-minute isochrones. Here, each row represents a unique school ($n = 681$). Subsequent columns provide the number and name (or ID, in the case of *King County Metro Bus*) of stations for the *Sounder Commuter Rail*, *Sound Transit Express Bus*, *Link Light Rail*, *King County Metro Bus*, and *Seattle Streetcar* that are reachable within the provided walking time. For example, given a 10-minute walk from Mount View Elementary School, one can reach four *King County Metro Bus* stations: 51615, 52081, 49576, and 49577. These comprehensive datasets enable detailed analysis of accessibility patterns across different school types and geographic contexts.

4.3 Site Visit: Dick Thurnau Memorial Park

4.3.1 Park User Profile

Informal interviews with ten park users revealed two distinct groups of visitors: *general park users* and *disc golfers*. The former ($n = 5$) frequent the park regularly, with the majority visiting more than five times per week or daily. This group primarily utilizes the park space for daily activities such as jogging or walking their pets. The paved walkway stood out as a motivator for park use. They live closer to the park and typically commute on foot. In comparison, the disc golfers ($n = 5$) are attracted mainly by the disc golf course, and some mentioned utilizing other nearby parks for the same purpose (e.g., North SeaTac Park and Ball Fields). The disc golfers tend to live further away from the park and drive to access it. Some disc golfers ($n = 2$) are mixed users – they simultaneously enjoy the disc golf feature and other park amenities, often

during park visits with family members who are not disc golfers. The picnic shelters, the play equipment area, and the paved walkways provide support for these various recreational needs.

4.3.2 Physical Infrastructure Assessment

Complementing results from informal interviews, naturalistic observation provides further insight into how physical infrastructure aligns with these diverse user needs. We highlight three major aspects – park access points, rest and hydration, and recreation and safety – for immediate park needs and long-term planning. See Table 4 for an inventory summary of facilities and installments at DTMP.

Table 44. Inventory summary at Dick Thurnau Memorial Park. The first column contains the type of park facility assessed. Recorded N (Column 2) notes the documented number of park facilities. Observed N (Column 3) notes the actual number of installments in DTMP. The final column contains our recorded observation notes.

| Facility | Recorded N | Observed N | Results |
|------------------------------|------------|------------|---|
| Access point | 5+ | 4 | <ul style="list-style-type: none"> • Three official access points (lower lot; upper lot; 8th Ave), one unofficial fenced gate near Cascade Middle School (CMS). • Lower lot most accessible in terms of elevation and accessible parking spots. • 8th Ave is difficult for wheelchairs and assistive devices to pass through. • Upper lot access point sits on high elevation. • CMS hidden and difficult to locate or access. |
| Parking lots | 2 | 2 | <ul style="list-style-type: none"> • Both lots have accessible parking spaces, but more capacity at lower lot. |
| Picnic shelters | 3 | 3 | <ul style="list-style-type: none"> • PS 2 (see Figure 16) is close to a water fountain, but not benches or picnic tables. |
| Benches | 12 | 7 | <ul style="list-style-type: none"> • Additional seating area is present in the form of smooth-surfaced rock structure near disc golf tees. • View from benches is otherwise limited. |
| Open playfield | 3 | unclear* | <ul style="list-style-type: none"> • Boundary between the open playfields and the disc golf course is ambiguous. |
| Bathrooms | 1 | 1 | <ul style="list-style-type: none"> • Bathroom (located near the playground) is locked, but still in use. • Two Honey Buckets are available at each end of the lower lot. |
| Drinking fountains | 3 | 1 | <ul style="list-style-type: none"> • Two drinking fountains are missing. • Fountain locations are near playground and PS, but not bike playground. |
| Signage | 4 | 10 | <ul style="list-style-type: none"> • Safety warnings (5), welcome signs (3), park rules (1), and vegetation info (1). • No wayfinding signs or signs that include textile or scanning features. |
| Playground | 1 | 1 | <ul style="list-style-type: none"> • The playground is located near PS3, with available seating. |
| Play equipment area | 2 | 2 | <ul style="list-style-type: none"> • One broken rope in the jungle gym structure. • Swing and slide surfaces are exposed to direct sunlight. |
| Tennis court | 2 | 2* | <ul style="list-style-type: none"> • No tennis courts were observed. |
| Disc golf course | 1 | 1 | <ul style="list-style-type: none"> • No disc golf course map or clear boundary between the course and general use. |
| Additional Facilities | | | |
| Dog waste station | 0 | 1 | <ul style="list-style-type: none"> • Dog waste bags are available by the lower parking lot. |
| Charcoal grill | 0 | 1 | <ul style="list-style-type: none"> • One charcoal grill is available at PS1. |
| Waste disposal | 0 | 8 | <ul style="list-style-type: none"> • Six garbage cans and two dumpsters across the park, easy access from PS. |

+The five access points were identified in a previous King County public survey (i.e., [Dick Thurnau Park Disc Golf Survey](#)).

*We were unable to clarify the boundaries between different open playfields and the disc golf course. The tennis courts were renovated and replaced by the White Center Bike Playground.

Park access points

The research team located four different park access points across two visits.

The 10th Avenue entrance (lower lot; see Figure 21) offers the most accessible entry point, with minimal elevation changes and no structural barriers that would impede assistive mobility devices. This entrance provides four accessible parking spaces – twice as many as the upper lot. However, this access point coincides with the disc golf course starting area, making it a relatively higher traffic area in the park. Visitors using this entrance may encounter safety hazards from both vehicle traffic and flying discs. Interviews with one park user whose parent has mobility issues echoes the observed safety concern near the parking lot (“My mom mostly sticks to the parking lot [because it is flatter] when she comes here. But that has its own issue too.”)



Figure 21: Access Point on 10th Ave (Lower Lot)

Park access point on 10th Ave showing two of the four accessible parking spaces (Source: Screenshot from Google Street View)

The 8th Avenue entrance, located in a residential area, presents significant accessibility challenges. It is not clear whether the 8th avenue gate is regularly opened during park hours. We presume that nearby residents who walk to the park will be the most likely users of this entrance. The gated entry features a narrow path that cannot accommodate wheelchairs (Figure 22.) While the paved pathways near this entrance are well-maintained and without visible potholes, visitors must navigate a relatively steep incline to reach the main park areas including Picnic Shelter 1 and 2.



Figure 22: Access Point on 8th Ave

Narrow pedestrian entrance to DTMP on 8th Avenue (Source: photographed onsite.).

The upper lot entrance (near the Technology Access Foundation building) sits at a higher elevation and offers two accessible parking spaces. Visitors rolling or using other assistive devices can easily navigate around the access point. However, to reach any major park facilities, they must travel down a steep decline.

The Cascade Middle School access point is fenced, hidden, and appears unofficial. As first-time park visitors, the team was unable to locate this entrance. Figure 23 shows a screenshot taken of the google satellite map. The orange line represents the fence that separates the middle school from the park site. The entry point (yellow circle) is located under a heavily wooded area. We suspect that this entry point is less frequently used and perhaps only by students at the Cascade Middle School. We were later informed by an interviewee that this entry point is a byproduct of construction (i.e., prior to the construction, the park extended further into what is now part of the school grounds). The interviewee urged the completion of construction and the removal of the fence. Inspection of this entry and the possible removal of fences that are no longer in active use can provide clarity on park access points and improve park accessibility.



Figure 23: Cascade Middle School Access Point

Yellow circle represents the hidden access point. (Source: screenshot from Google Satellite Map.)

Recommendations for park access: Given the varying accessibility challenges at each access point, users may benefit from knowing in advance the most suitable access points for different mobility needs, modes of transportation, and intended park use (e.g., disc golf vs. jogging). King County Parks may consider leveraging signage or providing information through websites or social media pages to help users plan their visit in advance when needed. For long term planning, interactive web features that allow visitors to filter access points by terrain, intended activities, and other features can also improve park accessibility.

Rest and Hydration

Drinking fountains and public bathrooms address fundamental physiological needs and enhance visitor comfort during park use.

Park records indicate that water fountains are strategically placed near picnic shelters to provide convenient access to drinking water for visitors using these social gathering spaces. However, field observation revealed that only one fountain, located at Picnic Shelter 2, remains operational. This functional unit delivers clear, odorless water with adequate pressure, though the limited availability of working fountains may inconvenience visitors using other areas of the park. There is currently no drinking fountain near major activity areas, including the White Center Bike Playground and the play equipment area, both of which serve families with children. The portion of the disc golf course adjacent to the TAF building also has no publicly available

water access.

The main restroom facility is positioned near both playground areas and Picnic Shelter 3. Given its proximity to spaces heavily used by families with children, we anticipated observing how well the facility supports childcare needs like diaper changing and handwashing. Unfortunately, the restroom was locked during our initial visit, with one gender label painted over (see Figure 24, right panel), leading us to conclude that the facility may be permanently out of service. During the second site visit, the bathroom stall with the gender label painted over was open and appeared clean and well-kempt inside. Interviews with park users showed that most, including frequent park users, were not aware of the public bathroom being in use. Many park visitors lamented the lack of access to a public bathroom, and one described the closure of the public bathroom as “very disappointing.” Two portable toilets have been placed near the lower parking area, requiring users to walk back to the park entrance when needed. This arrangement may create accessibility challenges for families with young children or caregivers with disabilities who are supervising small children. One disc golfer who visits the park semi-frequently with family commented that the portable toilets are not amenable to a young child because they are dirty and there is no changing station. There is currently no public bathroom on the 4th Ave side of the disc golf course.



Figure 24: Public Bathroom Signage

Left panel shows a bathroom with gender signage that has been painted over. Right panel shows a worn men's restroom sign with accessibility symbol. (Source: photographed onsite.)

Recommendations for rest and hydration: For drinking fountains, we recommend prioritizing the inspection of discrepant drinking fountain access (i.e., three recorded drinking fountains vs. one observed drinking fountain) and reinstalling the missing water fountains if possible. We did not inquire park users of their drinking fountain usage during our site visit and no comment regarding the drinking fountain organically emerged. Whether users take advantage of publicly accessible water sources remains unclear. Users might be reluctant to access drinking fountains because of sanitation concerns. Addressing such concerns can help ensure that park users not only have access to drinking fountains but will also use them. Additionally, given the substantial

number of dog walkers observed in the park, incorporating pet-friendly water stations into future planning would better serve this user demographic.

For the public bathroom, we recommend immediate clarification of bathroom signage and updated information regarding the operation/access hours and gender access of the public bathroom. Importantly, portable toilets are not permanent solutions for restroom access. We recommend developing a timeline for restoring existing facilities (i.e., the bathroom with the Male/Disability signs; See Figure 24, left panel) and installing additional restroom facilities if funding allows to improve the lack of access on the 4th Ave side.

Recreation and Safety The play equipment area and the disc golf course provide recreational opportunities for park visitors across age groups.

Play equipment area: Two sets of age-appropriate play equipment are positioned near Picnic Shelter 3, with swing sets designed for toddlers and small children separated from a jungle gym featuring climbing ropes and slides for older children. During our observation, we noted a broken climbing rope that had been repaired with duct tape, creating a potential safety hazard that requires professional inspection despite its proximity to the ground (see Figure 25). All playground equipment is situated in unshaded areas. During our first midday visit in 70-degree weather, metal surfaces on swings and slides were noticeably warm to the touch. Temperature measurement from our second visit revealed approximately 2°F ambient temperature differences between the unshaded playground (79.7°F) and temperature under the tree shade close to the playground (77.4°F) as Figure 26 shows. Importantly, neither visit took place during hot weather. During warmer weather or peak sun hours, compounded with the park's limited water fountain access, the lack of shade creates concerning conditions for children's comfort and safety during active play.

In addition, one parent highlighted the lack of water-based activities at DTMP and recommended the installation of "wading pool or splash pads." The parent mentioned travelling to other parks, such as the North SeaTac Park and Angle Lake, for additional recreational facilities, despite DTMP being a six-minute walk away.



Figure 25: Broken Play Equipment

A broken climbing rope fixed with duct tape (Source: photographed onsite.)



Figure 1. Ambient temperature readings at playground

Left panel shows the observed ambient temperature at unshaded playground (79.7°F). Right panel shows observed temperature under the tree shade close to the playground (77.4°F). (Source: photographed onsite.)

Disc golf course: Home to the largest disc golf course in the Puget Sound region, DTMP is a popular destination for both nearby residents and disc golf enthusiasts. However, the course spans the entire park area without clear boundaries separating disc golf playing fields from general recreational spaces. The only disc-free zone in the park is by Hicklin Lake, which contains only two benches for seating and a relatively underdeveloped dock area that is not equipped to support picnicking or open play. A [2023 safety survey](#) at DTMP revealed user concerns about this overlap. One respondent reported “feeling like I’m intruding at DTMP,” while several others requested clear zoning and etiquette signage. Results from our interview echoes findings from previous interviews. One interviewee reported that their parent, who used assistive walking devices had been struck by flying discs multiple times and no longer visited the park.

Currently, the park has two disc golf-related signs: a warning about flying discs at the lower parking lot entrance (Figure 27 right) and an etiquette reminder at Tee 7 that reads “know before you throw” (Figure 27 left). Both signs are in English only. While these warning signs represent helpful first steps toward improving safety through spatial awareness and mindful park use, they have limitations. Not all park users can efficiently detect or avoid flying discs, including those with mobility constraints (see interview results above) and small children. Some disc golfers are novice and may struggle to control the direction of flying discs. In the long term, establishing designated disc-free zones would allow visitors to recreate without constantly staying alert for passing discs, diversifying park use options, and making the space more accessible to a broader range of users.



Figure 27: Disc Golf Warning Signs

Left panel shows a warning sign (“Know Before You Throw”) near the 7th tee. Right panel shows a danger sign (“Disc Golf Zone. Watch for Flying Discs”) by the 10th Ave access point. (Source: photographed onsite.)

Recommendations for recreation and safety: For the play equipment area, we recommend immediate replacement of the duct-taped climbing rope to ensure the safety of users and minimize any liability concerns. King County Parks authorities can also consider periodic safety inspection of all playground equipment and solicit information from the community directly, by providing the contact information of responsible departments. If budget allows, installing water activity facilities can attract park visitors during the hotter months and effectively provide relief and comfort from the heat.

For disc golf and pedestrian safety, we recommend installing more signage regarding disc golf and pedestrian safety. A conversation with park staff Andrea Godinez indicated that specific signage has already been designed for disc golf purposes, and prioritizing its installation near the boundaries of the disc golf course will help increase pedestrian and disc golfer spatial awareness. We recommend installing the existing warning signs targeted towards disc golfers to complement the existing warning signs. Additionally, clearly designating disc-free zones, such as the existing Hicklin Lake area, and sharing this information through physical signs and park maps can further enhance safety and accessibility. In the long term, we suggest maximizing the utility of the disc-free lake area by installing more seating options, renovating the dock to improve safety and accessibility, and regularly inspecting lake water.

4.3.3 Signage Assessment

There was a total of ten observed signs distributed throughout the park, despite only four being initially recorded. It is not clear which of the observed signs have been recorded previously. We categorized these signs into four categories: safety, rules, informational, and welcoming after the site visit.

Based on Table 5, the park signage was primarily dedicated to park rule regulation, as half of all signs were safety related. During the observation, we noticed that there was a significant lack of wayfinding signage, creating potential for difficult navigation throughout the park, especially in terms of accessibility. For example, Picnic Shelter 2 is located on top of a hill which is accessible by paved walkways but challenging to roll to. A lack of signage indicating accessible pathways and park topography therefore creates a problem for park visitors with mobility disabilities. Lastly, the signage was predominantly in English. Only one warning sign, installed by the King County Department of Public Health, contained any languages other than English.

The primary recommendations for park signage would be to include more wayfinding signage, especially at entry points and in locations where accessible pathways need to be highlighted. At the main entry point, it would also be beneficial to include a tactile map of the park, demonstrating park topography, facilities, amenities, and accessible areas within the park. This would be beneficial to park visitors who have low vision or mobility, because it would allow them to understand the park terrain before entering and navigating their way through the park. Additionally, it is recommended that all park signage be printed in multiple languages, rather than exclusively English. Incorporating Spanish would be a top priority, but it would be

beneficial to conduct a community survey to determine the linguistic demographics of the area 0.25 miles outside of the park. Based on these recommendations, we have created three different design mockups which could be distributed throughout the park as Figure 28 shows.

Table 55. Observations of signage in Dick Thurnau Memorial Park

The first two columns indicate each sign’s usage category and type. The third column identifies the language the sign was printed in. Links in the fourth column jump to figures in Appendix C containing images of each sign.

| Usage | Sign | Language | Figure |
|------------------------|-------------------------------------|--|----------------------------|
| Information | Waterweeds Sign | English | Figure C4 |
| Rules | Entry Point Sign | English | Figure C7 |
| Safety and Information | Disc Golf Information Sign | English | Figure C1 |
| Safety and Rules | Safety and Rules Sign near entrance | English | Figure C6 |
| Safety | Disc Golf Warning Sign | English | Figure C2 |
| Safety | Dog Leash Sign | English | Figure C9 |
| Safety | Toxic Algae Warning Sign | English, Spanish, Vietnamese, Korean, Russian, Mandarin, Amharic | Figure C5 |
| Welcoming and Rules | Welcome Sign | English | Figure C3 |
| Welcoming | Main Entrance Sign | English | Figure C8 |
| Welcoming | Bike Playground Sign | English | Figure C10 |



Figure 28: Tactile map mockup for Dick Thurnau Memorial Park entrance

This mockup of a tactile welcome sign and map uses different fill gradients to represent different areas like the disc golf course (purple) and Hicklin Lake (blue) that would have distinct textures in the realized tactile map. A smooth, solid surface (orange) indicates an accessible walking zone without many hills. The fourth panel shows the rendered design would be four-sided with different languages on each side. [Link to design mockup](#). (Designed by 2025 Applied Research Fellow Nupur Gorkar.)

The purpose of this map is to depict a tactile representation of the map as Figure 28 shows. The orange area indicates a flat, accessible area with primary facilities that are the easiest to access

within the park. To indicate the hilly terrain of the park, we incorporated a bumpy texture in the green area of the map to indicate hills as topographic elements that may serve as an accessibility barrier. Similarly, we designated different colors and textures for the lakes and disc golf course in the park. To address the previously established language concerns, we created a four-faced sign, intended to feature one language on each side of the map.

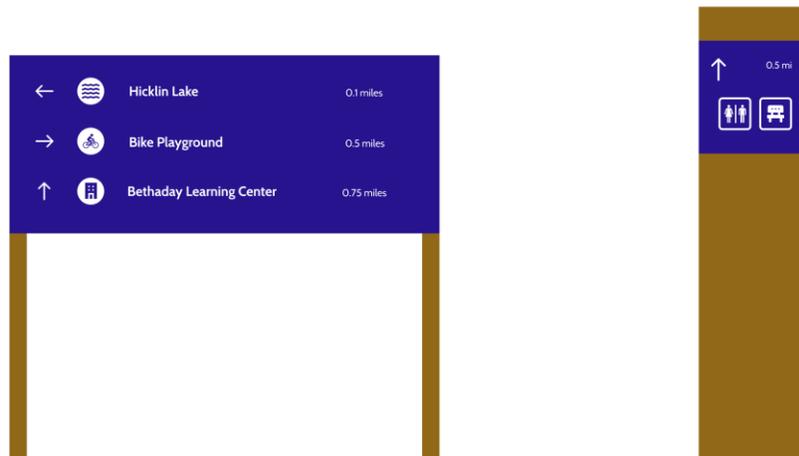


Figure 29: Additional wayfinding signage mockups

Left panel shows a signage mockup intended to be installed towards an entry point of the park with distances to important park locations, while the right panel shows a smaller signage mockup intended to be installed throughout the park. (Designed by 2025 Applied Research Fellow Nupur Gorkar.)

Secondly, we drafted more signage mockups in Figure 31 to be dispersed throughout the park. Incorporating design elements like universal icons and imagery, these indicate key facilities and amenities within the park.

4.3.4 School-Park Connectivity

DTMP is adjacent to three schools: Mount View Elementary School, Cascade Middle School, and Evergreen High School, providing easy access for students and their families after school. To understand the other youth populations DTMP might serve, we researched park access for six high schools within 25-minute walking distance or a 40-minute bus ride as Table 6 shows. These schools span three public school districts (Seattle, Highline, and Tukwila) and include one private school. Every school has access to at least four parks, with the furthest minimum walk to a park for the five public schools being 10 minutes. Kennedy Catholic High School is within 18 minutes walking of its closest park.

Highschoolers have the autonomy to commute to parks as they choose and are likely to do so if the parks are located in proximity to their schools. Many schools are within walking distance of parks, but the number of proximate parks nearly doubles when bus routes are considered. While

Seattle Public Schools' high school release time is 3:40pm on most days, both Highline and Tukwila districts end their days at 2:30pm. Perhaps there is an opportunity for King County Parks, King County Metro, and area public schools to work on advertising parks accessible by walking and transit to local high schoolers to increase awareness and use of local public green spaces. Overall, of the high schools analyzed, it appears that the Seattle public schools (Chief Sealth and Grover Cleveland) generally have the best walkable park access, with multiple green spaces accessible under 25 minutes through bus or walking. Highline and Tukwila school district high schools also have assessable parks, they just require longer walks and bus rides. Most schools observed do have at least one park within walking distance (10–20 minutes). This suggests students in this area do have some access to green space via walking and bus rides.

Table 66. Park accessibility for high schools within 25-minutes walking distance or 40-minutes by transit. The first column indicates the school district, the second column the school name and its start and release times for high schoolers. The third and fourth columns represent walking or transit routes and durations for Dick Thurnau Memorial Park and other parks respectively.

| School District | School | Walking & Transportation Access | |
|--------------------------|--|---------------------------------|--|
| | | Dick Thurnau Memorial Park | Other Parks |
| Highline School District | Evergreen Senior High School 8am-2:30pm, M-Th 8am-1:00pm, F | Walk – 10m | Salmon Creek Ravine Park: Walk – 23m Hazel Valley Park: Walk – 24m Puget Sound Park: Walk – 26m Shorewood Park: Walk – 28m |
| | Highline High School 8am-2:30pm, M-Th 8am-1:00pm, F | Bus 131 or H Line – 35m | Moshier Park: Walk – 8m Town Square Park: Walk – 13m Mathison Park: Bus 132 – 15m, Walk – 21m Dottie Harper Park: F Line – 19m, Walk – 20m Lakeview Park: Walk – 21m Hazel Valley Park: Bus 131 – 27m |
| Seattle Public Schools | Chief Sealth International High School 8:50am-3:40pm, M-Tu, Th-F 8:50am-2:25pm, W | H Line – 30m | Thistle Street Greenspace: Walk – 2m EC Hughes Park: Walk – 9m Roxhill Park: Walk – 13m, H Line – 12m Fauntleroy Park: Bus 22 – 17m, C Line – 20m, Walk – 28m Highland Park: Bus 125 – 25m, Walk – 27m Westcrest Park: Bus 60 – 26m |
| | Grover Cleveland STEM High School 8:50am-3:40pm, M-Tu, Th-F 8:50am-2:25pm, W | Bus 60 + Bus 128 – 40m | Ruby Chow Park: Walk – 10m Jefferson Park: Bus 60 or 107 – 10m Maplewood Playfield: Bus 60 or 107 – 12m, Walk – 16m Georgetown Playfield: Walk – 14m Dearborn Park: Bus 60 + 1 Line – 36m |
| Tukwila School District | Foster High School 8:00am-2:30pm, M-F | Bus 128 – 35m | Cascade View Community Park: Walk – 9m, Bus 128 – 12m Foster Memorial Park: Bus 128 – 11m, Walk – 19m Riverton Park: Bus 124 – 17m, Walk – 22m |
| Private | Kennedy Catholic High School 8:00am-2:30pm, M-F | Bus 131 – 25m | Mathison Park: Bus 131 or 132 – 13m Dottie Harper Park: Bus 131 – 12m, Walk – 18m Sunset Park: Bus 132 – 21m Chelsea Park: Walk – 25m Moshier Park: Bus 132 + F Line – 26m, Walk – 28m |

5. Conclusion

5.1 Main Takeaways

County-wide Park Access

Across all three analyses, we see two major trends emerge: 1) when we define park accessibility as the ability to reach park by foot, there is a decline as one moves east and south across King County; and 2) southwest King County is filled with low access clusters.

In general, the first finding was anticipated. The eastern and southern block groups of King County are larger than their western counterparts (e.g., Seattle), as well as more sparsely populated. As a result, the ability to walk to a public park is expected to be lower in these regions. Put another way, the assumption that urbanicity is a proxy for park accessibility holds. We see Seattle block groups consistently revealing high access clustering, while eastern and southern block groups contain the majority of low access clusters.

Southwest King County block groups, however, are urban, not rural. Thus, the low access clusters found here are contradictory to the conclusion that urbanicity is a proxy for park accessibility. Were it the case across all King County block groups, we would expect to see high access clusters in the southwest region. Or, at least, regions of insignificant results. Conversely, there are statistically significant low access clusters present. Residents of Federal Way, Kent, and Auburn, for example, do not appear to benefit from greater park access, despite being classified as urban. This low access trend is found across the growing areas of Covington, Maple Valley, and Black Diamond, as well, indicating that city growth and population density is outpacing park accessibility.

Dick Thurnau Memorial Park Site Visits

Differences in park activities between general park users and disc golfers create accessibility concerns for all visitors. Flying discs require both pedestrians and players to remain vigilant during what should be time for relaxation. Additionally, access points at DTMP vary in levels of accessibility: the lower lot offers the most accessible elevation, the upper lot provides the most accessible terrain, and the 8th Ave access has the most accessible traffic condition. Rest and hydration facilities require urgent maintenance and restoration. Broken play equipment poses concerns for safety and liability. Finally, the lack of wayfinding signage necessitates immediate attention.

Short term Recommendations at DTMP

We recommend addressing the following five immediate needs to improve park visit safety and comfort:

1. Inspect the fenced access point at Cascade Middle School;
2. Fix the broken climbing rope at the play equipment area;
3. Verify discrepant water fountain access and replace any missing water fountains;
4. Update signage for the public bathroom;
5. Install disc golf safety signs.

Long term Recommendations at DTMP

We recommend the following five items for long-term consideration to improve digital access of

park information and support meaningful activities at the park:

1. Increase accessible wayfinding by incorporating multilingual signage and tactile elements;
2. Improve digital access to park information such as listings of Disc Golf tournaments that might interfere with general park use and activity-specific recommended entry points;
3. Mark disc-free zones for designated park use;
4. Inspect Hicklin Lake Water and encourage regular cleaning and water circulation to reduce lake smell;
5. Diversify activities for youth (e.g., water activities);
6. Increase seating near the dock area to maximize the use of the existing disc-free zone.

5.2 Limitations

Despite the usefulness of proxying accessibility with isochrones, there were some notable limitations. To begin, isochrones could only be built off point locations, which is why we calculate walking distances from block group centroids, rather than borders. Thus, the resultant distances one could walk in 10-, 20-, or 30-minutes assumes one starts at the centroid, even though most – if not all – block group residents do not properly reside at the centroid. Similarly, the overlap of isochrones and park boundaries, which formed the basis of our park accessibility measure, assumes one can enter a park at any location. That is, the ability to reach a park within a given isochrone time is the walking time between block group's centroid and *any* spot along a park's boundary. This constraint neglects the presence of fencing and access points. For larger parks, the time to reach an access point may be substantially longer, given that the walker may need to navigate the perimeter until they reach an entrance.

Importantly, these limitations are surmountable. Given more time and computational power, we could build isochrones off the point locations of individual residences. This would not only avoid the issue of using arbitrary centroids but would also allow us to measure park accessibility at a finer scale (i.e., residential parcels rather than block groups). However, this would require significantly stronger computing power. Generating isochrones for the 1,544 block groups in King County took anywhere from four to six hours, depending on the walking time set. Because there are roughly 500,000 residential parcels in King County, building isochrones for each with our current computing ability would take several months to complete. Likewise, given more time, we could identify the access points for each park and set these as the necessary location for overlap between isochrones and parks. The result would be a more precise park accessibility measure that considers not simply the time to walk to a park boundary but the time to walk to a park entrance.

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Appendix A: Park Condition and Maintenance Assessment Criteria

Table A1. Park facility assessment criteria.

The first column indicates the type of park facility, the second column indicates the evaluation criteria used.

| Park Facility | Evaluation Criteria |
|----------------------|--|
| Access Points | Elevation; Terrain; sidewalks |
| Drinking fountains | Water pressure; Water quality; Presentation; Dog access |
| Bathroom | Presence of changing station; Gendered vs gender neutral bathroom; Access & access hour |
| Benches | Evenness of seat surface; Seating surface temperature; Back support; Located in a shaded area; Cleanliness; Presence of hostile structures |
| Open playfields | Presence of obstructive structures |
| Signage | Legibility (font type and size); Purpose; Language accessibility; Presence of tactile element |
| Playground | Presence of obstructive structure; Equipment type and condition; Surface temperature |
| Disc Golf Course | Safety; Presence of nearby seating; Distance between golf course and rest stops; Presence of safety signage |

Appendix B: Park User Interview Questions

General Park Experience

1. Thinking about DTMP, what are some words that come to mind?
2. How often do you visit DTMP in a week?
3. What do you usually do at this park?

Transit

1. How do you typically get to this park?
2. How long does it take you to get to this park?

Inclusivity

1. What would make this park more inclusive for you and your community?

Comfort & Safety

1. How safe do you feel in this park during the day? At night? Why?
2. How do you feel about the maintenance and upkeep of facilities?

Recommendations and Complaints

1. How does this park compare to other nearby parks?
2. What changes or improvement would you like to see in this park?

Appendix C: Dick Thurnau Memorial Park Signage

Figure C1: Disc Golf Information Sign

Disc Golf Course Warning Sign that reads "Know Before You Throw" near the 7th tee



Figure C2: Disc Golf Warning Sign

Disc Golf Course Warning Sign by the 10th Ave access point.



Figure C3: Welcome Sign

Welcome sign with King County Parks Rules attached.



Figure C4: Waterweeds Sign

Informative Signage about waterweeds in the lakes near the entrance



Figure C5: Toxic Algae Warning Sign

Signage near Hicklin Lake detailing a warning for toxic algae in the lake. It is written in English, Spanish, Vietnamese, Russian, Korean, and Amharic.



Figure C6: Safety and Rules Signs near Entrance

3 signs detailing different park safety warnings and rules. There is one for the Disc Golf Course, one for park hours, and another one warning owners to keep pets on a leash.



Figure C7: Entry Point Sign

Sign at potential entry point that emphasizes park rules, including no parking.



Figure C8: Main Entrance Sign
Sign at the upper parking lot of the park.



Figure C9: Dog Leash Sign
Sign at the entrance of the park warning park users to leash their dogs.



Figure C10: Bike Playground Sign
Sign indicating the bike playground at DTMP

