



## TRANSIT-ORIENTED COMMUNITIES: A BLUEPRINT FOR WASHINGTON STATE

Futurewise | GGLO | Transportation Choices Coalition



## TRANSIT-ORIENTED COMMUNITIES: A BLUEPRINT FOR WASHINGTON STATE



**October 2009**

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*Funded in part through generous support from the Surdna Foundation and the Bullitt Foundation*

## CONTENTS

<i>Executive Summary</i> .....	2
<i>Welcome</i> .....	6
<i>Context</i> .....	14
<i>Evidence</i> .....	21
<i>Typology</i> .....	34
<i>Measures</i> .....	48
<i>Action</i> .....	57
<i>Appendices</i>	
<i>A: Data Assumptions</i> .....	66
<i>B: Glossary</i> .....	68
<i>C: List of Images</i> .....	72
<i>Notes &amp; References</i> .....	73

## EXECUTIVE SUMMARY

### CONTEXT AND EVIDENCE

The sustainability of our cities—as measured by both the quality of life they provide today, and the long-term environmental protection they promise to future generations—will determine the future of our planet. Considering the host of social and environmental challenges we currently face—including global warming, air quality concerns, water scarcity, food and energy security, poverty and declining social equity—the global trend toward urbanization demands that cities will need to be a part of the solution.

New transit investments offer more than a means of moving people from one point to another; they can also be an opportunity to support, and in some cases, create communities by opening up new opportunities for people to gain access to, from, and within the neighborhood. By integrating land use, transportation, and housing policies to foster vibrant and safe mixed-use communities where residents, employees, and visitors can walk, bicycle, or take transit to reach their destinations, cities can continue to grow in a manner that is healthy for both people and the planet. And perhaps most importantly, if done well, this growth is an opportunity not a sacrifice, because the end result will be great urban places for people. Such is the vision of transit-oriented communities (TOC).

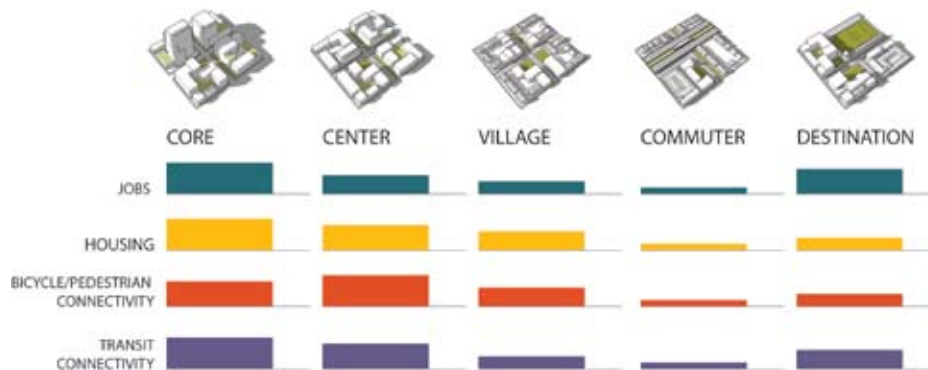
There is an extensive and growing body of published research providing evidence that well-designed TOC can lead to a range of substantial social and environmental benefits. In brief, TOC have the potential to:

- > ***Promote health by encouraging walking and bicycling, cutting air pollution, and reducing motor vehicle accidents;***
- > ***Lower household expenses for both transportation and housing;***
- > ***Reduce municipal infrastructure costs;***
- > ***Provide a high return on public investment in transit infrastructure;***
- > ***Help meet the growing demand for walkable neighborhoods;***

- > *Curb land consumption and thereby help conserve working farms and forests, and protect natural ecosystems and water quality; and*
- > *Cut energy consumption and greenhouse gas emissions associated with both transportation and the built environment.*

## TYOLOGY

In order to successfully promote high-performing TOC that provide such benefits, we must first understand the opportunities within our existing and planned transit infrastructure. Every station area is unique. A half-mile station area may encompass several distinct neighborhoods, topographies, and a range of zoning and development patterns. Nevertheless, for the purposes of measuring the performance of individual station areas relative to policy goals, it is helpful to develop a comparative framework—a matrix of station area types. Using the expanded light rail system in the central Puget Sound region as an example, the following typology uses the attributes of existing infrastructure, the most common zoned land uses, and zoning capacity to classify five station area types, presented roughly in order of land use intensity: Core, Center, Village, Commuter, and Destination.



**Creating vibrant places for people, especially safe sidewalks and open spaces, is critical to station area performance.**





The overarching goal of high-performing TOC is to provide housing and transportation choices that give residents access to homes, jobs, recreation opportunities, and stores and community services to meet their daily needs, without relying on a personal vehicle.

Ranking the station area types on zoning and connectivity measures (above) reveals roughly tandem performance from Commuter, to Village, to Center, to Core station area types. The Destination station area type is an outlier, for which place-specific conditions can vary greatly between station areas. Many factors that are influenced by zoning and infrastructure attributes impact social and environmental outcomes, including the residential density, mix of uses, and pedestrian connectivity. Accordingly, one can expect Core stations to produce a high level of social and environmental benefits, based on these attributes, followed by Center, Village and Commuter station types.

While these station area types may exist throughout the state, public policy should encourage the highest level of performance on social and environmental measures for all station area types.

## MEASURES

The overarching goal of *high-performing* TOC is to provide housing and transportation choices that give residents access to homes, jobs, recreation opportunities, stores, and community services to meet their daily needs, without having to rely on a motorized personal vehicle. This has the long-term result of increasing the quality of life and reducing the cost of living for residents, lessening the environmental impacts of development, and reducing transportation and energy-related greenhouse gas emissions. Plans, policies and regulations that meet the following seven performance goals would enable a high-capacity transit station area to become a high-performing TOC.

- **Bicycle and Pedestrian Connectivity:** *High-performing station areas will provide a complete pedestrian and bicycle network to facilitate safe non-motorized vehicle transportation and promote easy access to transit.*
- **Housing Affordability:** *High-performing TOC will provide housing affordable to a broad range of incomes to accommodate and encourage a diverse, mixed-income community.*

- > **Residential and Employment Density:** *High-performing TOC will provide ample opportunities to accommodate future population and employment growth in order to support transit use, encourage economic development and social equity, promote a healthful urban environment, support businesses and amenities within the station area, and reduce the potential adverse environmental impacts of growth.*
- > **Mix of Uses:** *High-performing TOC will include a range of uses to provide access and choices in housing, employment, stores and community services to meet daily needs, and recreational opportunities to create a complete and accessible community.*
- > **Green Infrastructure and Open Space:** *High-performing TOC will provide ample park and open space, public areas, and recreational opportunities to meet the needs of a community with a moderate to high residential and employment density, and will provide for green spaces and strengthen the functioning of natural systems.*
- > **Parking:** *High-performing TOC will include parking policies and requirements that encourage housing affordability, safe pedestrian streetscapes, and good urban design and form.*
- > **Urban Design:** *High-performing TOC will feature well-designed buildings, streetscapes and public spaces that support pedestrian safety and promote neighborhood character and values.*

## **ACTION**

Effective planning for TOC will require changes in the land use and transportation regulatory and financing framework from the local through the federal level. In brief, public policies, regulations, and incentives in station areas should:

- > **Encourage optimal performance on all measures in all station areas;**
- > **Provide support and incentives for high-performing TOC; and**
- > **Plan for high-performing TOC along future high-capacity transit investments.**

The following recommendations outline pivotal policy changes at the local, regional, state and federal level needed to foster more and higher-performing TOC throughout the state.

### **Local Actions**

- *Conduct sub-area planning for TOC.*
- *Encourage meaningful public engagement in TOC planning.*
- *Plan and fund for public facilities and services within TOC.*
- *Develop strong and innovative land use regulations in TOC.*
- *Reform parking requirements and programs.*
- *Encourage innovative housing types in TOC.*
- *Link affordable housing programs to TOC.*
- *Consider TOC as TDR receiving sites.*

### **Regional Actions**

- *Maximize the potential for high-performing TOC along future high-capacity transit alignments.*
- *Support local station area planning at the regional level.*



Learn more, get involved, take action.

- *Incorporate the measures from this report into the regional transportation planning organization guidelines and principles.*
- *Prioritize funding for high-capacity transit and high-performing TOC in regional transportation plans.*

### **State Actions**

- *Define high-performing TOC in statute to assist in planning for high functioning communities.*
- *Reflect regional transportation priorities in state transportation funding decisions.*
- *Authorize fiscal home rule.*
- *Provide more tools for long-term infrastructure funding and greater state funding.*
- *Provide expanded taxing authority for transit funding.*
- *Adopt legislation to implement the Federal American Clean Energy and Security Act.*

### **Federal Actions**

- *Pass comprehensive federal clean energy and climate change legislation.*
- *Reauthorize the Federal Transportation Funding Act including improved federal transportation policies.*
- *Provide federal technical assistance for TOC planning and implementation.*

### **NEXT STEPS**

*To realize the benefits of TOC, we must all work together. There is no single policy solution that will bring about more vibrant and high-performing TOC across Washington State; rather, it will take many actions at all levels to create the regulatory and funding framework to allow more high-performing TOC to emerge. It will take understanding and support of these issues by a broad array of interests, including neighbors, businesses, planning staff, elected officials, and the advocacy community.*

*Thank you for your interest in this important work, and we encourage you to learn more, get involved and take action in your own communities.*

## VISION

The urban areas of Washington State will grow in a manner that is good for both *people* and the *planet*.

Urban growth patterns will give *people* choices in housing and transportation by creating more mixed-use and mixed-income neighborhoods with excellent pedestrian, bicycle and transit connectivity. These patterns will allow more people access to homes, jobs, and community services without relying on personal vehicles, thereby reducing household transportation expenses and promoting better physical health. Neighborhoods will be well designed, preserve historic and cultural character, and offer ample open space, good schools and recreational opportunities—all together fostering a strong sense of place and community.

Urban growth patterns will also help protect the *planet*, promoting long-term environmental sustainability and the conservation of natural resources. Compact urban patterns in existing cities will direct development away from working farms and forestlands, thereby protecting food and fiber production, wildlife habitat, and water quality. These patterns will reduce impervious cover that leads to run-off pollution, and decrease shoreline development that leads to erosion and habitat destruction. Compact development will be energy efficient, reducing energy-related pollution and increasing energy independence. Finally, these compact patterns will allow more people the choice to walk, bike or take transit, leading to critical reductions in vehicle miles traveled and greenhouse gas emissions.

This is the vision of ***transit-oriented communities***.





In order to maximize the benefits of our transit investments, we must allow more people to live and work near transit.



## PREFACE: FUTUREWISE AND TRANSPORTATION CHOICES COALITION

In the 2009 Washington State legislative session, Futurewise and Transportation Choices Coalition advocated for House Bill 1490 and Senate Bill 5687—both termed *Creating Transit-Oriented Communities* (hereafter TOC). The two bills would have amended the Growth Management Act to require consideration of the climate impacts of land use and transportation policies. A portion of the legislation applied exclusively to high-capacity transit station areas. The section asserted that in order to leverage our transit investments to maximize their potential social and environmental benefits, we should give more people the opportunity to live and work near transit. However, we must also ensure that these communities are well planned to provide a high quality of life for both current and new residents. The legislation therefore mandated station area planning for all high-capacity transit station areas and established minimum thresholds for residential and employment density, and for affordable housing. It required better planning for pedestrian and bicycle facilities, recreation spaces, and design guidelines.

The legislation was supported by the Environmental Priorities Coalition, the Washington Low Income Housing Alliance, and many planning, neighborhood and social justice organizations. In the end, however, the legislation died in the House of Representatives, as a result of numerous amendments to undo the legislation's climate provisions.

During the legislative session, Futurewise and Transportation Choices Coalition board members and staff attended dozens of meetings with community members, planners and policymakers in the Seattle region to discuss the provisions of the bill. While most people supported the intent of the legislation, many expressed concerns over the impacts of the specific provisions. In general, these concerns fell into three broad categories:

- > *What is the need—in terms of population growth and environmental challenges—to promote TOC patterns over conventional land use patterns?*
- > *What social and environmental benefits can we expect to achieve through the minimum thresholds set out in HB 1490 and SB 5687?*

> *What do TOC look like? How will these provisions change my neighborhood?*

This report responds to these concerns by laying out a detailed case for TOC through: analysis of population and growth trends in Washington State, data linking TOC to environmental and social outcomes, performance-based measures for planning for TOC, images and case studies to help visualize TOC, local, state and federal policy actions needed to support more TOC, and appendices with additional resources for citizens, planners and policymakers.

It is our hope that this document will contribute meaningfully to the ongoing conversation about land use, housing and transportation policy decisions as our state population grows. We firmly believe that we must grow in a manner that protects our environment and promotes a greater quality of life for everyone in our cities. And we believe that TOC are a vital strategy to help that happen. We look forward to the continued dialogue.

***Futurewise** is a statewide nonprofit smart growth advocacy organization formed by citizens in 1990. Through education, technical assistance, and advocacy, we promote healthy communities and cities while protecting farmland, forests and shorelines today and for future generations. For more information, please visit [www.futurewise.org](http://www.futurewise.org).*

***Transportation Choices Coalition** was founded in 1993 as a statewide nonprofit organization that seeks to bring Washingtonians more and better transportation choices—real opportunities to take a bus, take a train, ride a bike, or walk. For more information, please visit [www.transportationchoices.org](http://www.transportationchoices.org).*



**We firmly believe that we must grow in a manner that protects our environment and promotes a greater quality of life for everyone in our cities.**



**Asa Flats and Lofts, a 16-story mixed-use project located in Portland's Pearl District.**



## PREFACE: GGLO

GGLO is an integrated design firm whose core mission is to create vibrant, economically, socially and environmentally sustainable communities. Since 1986, our architects, urban designers, landscape architects and interior designers have practiced an inter-disciplinary approach to planning and design. We have helped neighborhoods throughout the Puget Sound Region grow into thriving mixed-use centers by designing buildings and public spaces that fit their context, expand the local marketplace, and provide the basis for sustainable lifestyles. Transit has been an integral part of many of our projects, which serve as precedents for how our station areas can be transformed into dynamic places that add housing options, new services and amenities to their larger communities.

GGLO has always been an advocate for responsible urban growth policies. Working with Futurewise and Transportation Choices Coalition, we have analyzed case studies, and helped inform and clarify public discussion about key issues including appropriate housing types and density, pedestrian and bicycle-friendly streets, public space design, sustainability metrics, and innovative land-use regulations such as form-based codes.

As Washington's cities take bold steps toward a sustainable future, increasingly based on transit, GGLO will play a vital role by helping decision makers and fellow citizens:

- > *Clearly understand station area planning and development issues,*
- > *Envision outcomes tailored to the unique character of individual places, and*
- > *Implement these visions through high-performance, community-based design.*

We look forward to our continued role in this important work.

## ACKNOWLEDGEMENTS

Futurewise, GGLO and TCC would like to thank the many voices that led to this publication.

This report followed on the heels of a seven month speaker series that included time and energies of many panelists with expertise in issues related to transit-oriented development. Thank you to **Stephen Antupit, GB Arrington, Lyle Bicknell, Branden Born, Stella Chao, Dave Cutler, Paul Fischburg, Tom Giring, Barbara Gray, Howard Greenwich, David Hiller, Nancy Hirsh, Ric Ilgenfritz, Rob Johnson, Bill Kraeger, Sara Nikolic, Denny Onslow, Ed Rose, Dan Rosenfeld, Jared Smith, Hugh Spitzer, Peter Steinbrueck, Alison Van Gorp, Darby Watson, and David Yeaworth** for their participation in the series, and to the hundreds of attendees that contributed to the engaging discussions.

Thank you to the **legislators and organizations** who worked in support of House Bill 1490 and Senate Bill 5687, especially **Representative Sharon Nelson (D-34th), Representative Geoff Simpson (D-47th), Speaker of the House Frank Chopp (D-43rd), Senator Chris Marr (D-6th), Senate Majority Leader Lisa Brown (D-3rd), Climate Solutions, Washington Environmental Council, the entire Environmental Priorities Coalition, Washington Low Income Housing Alliance and the Housing Development Consortium of King County.** Thank you to the many local elected officials who provided vital perspective to shape the legislation, especially **Tacoma Mayor Bill Baarsma, Tacoma City Council Member Jake Fey, Seattle City Council Member Sally Clark, and Seattle Deputy Mayor Tim Ceis,** and to the planning staff, agency personnel, and individuals who provided input and assistance throughout the process, especially **Nick Federici, Joe Fitzgibbon, Tom Hauger, Maureen Kostyack, Randy Lewis, Anna Markee,**

**Ethan Moreno, Ian Munce, Rachael Myers, Carl Schroeder, Melanie Smith, Donna Stenger, Dan Stroh, Joe Tovar, and Greg Walker.**

Thank you to the countless **citizens and neighborhood activists** that took an interest in House Bill 1490 and Senate Bill 5687, supporting it in some cases, and challenging it in others. Such citizen perspectives continue to shape our policy positions.

Thank you to the **Surdna Foundation** and the **Bullitt Foundation** for their generous support to make this publication possible.

Thank you to the many **individuals and organizations** that contributed images to the report, especially **Oran Viriyincy** and the **Puget Sound Regional Council.** Thank you to **Lisa Peterson** at Girlfriday Graphics for the design and layout of the document.

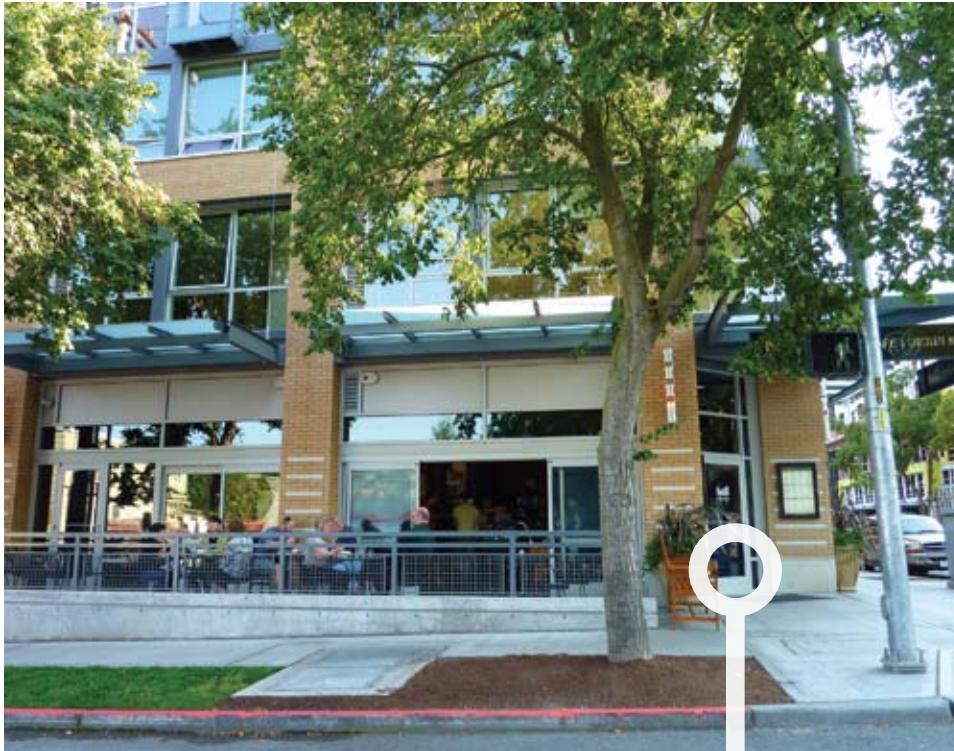
Finally, thank you to the **many individuals** who contributed directly to this report, from help with big picture perspectives to the nitty-gritty work of research, writing and editing. Thank you especially to **Jay Arnold, Andrew Austin, Ben Bakkenta, Denna Cline, Evan Franzel, Alan Grainger, Roberta Lewandowski, Bruce Lorig, Rob Matthews, Nicholas Matz, Mary McCumber, Kevin O'Neill, Jennifer PettyJohn, April Putney, Shefali Ranganathan, Dave Russell, Kerston Schwartz, Jennifer Shih, Greg Smith, Jared Smith, Joe Tovar, Tim Trohimovich, Angela Uhl, Roger Valdez, Chieu Van, Clark Williams-Derry, Barbara Wilson, and Chuck Wolfe.**

## USING THIS REPORT

This report is written for community members, planners, and policymakers working on station area planning efforts in Washington State. The report proceeds with the following sections:

- The **CONTEXT** section outlines the political and policy context for planning for TOC, analyzes current population growth trends, and discusses new opportunities for rethinking station area planning.
- The **EVIDENCE** section presents scientific evidence to support the linkages of social and environmental benefits to TOC, with a focus on cost of living and greenhouse gas emission reductions.
- The **TPOLOGY** section introduces a typology of station areas in the central Puget Sound region in order to analyze which stations are most likely to function as high-performing TOC, providing the greatest social and environmental benefits for their residents and the region.
- The **MEASURES** section articulates performance goals and measures to create high-performing TOC capable of maximizing the potential for social and environmental benefit.
- The **ACTION** section lays out specific policy actions that are needed at the local, regional, state and federal level to support the creation of more high-performing TOC.
- Finally, the **APPENDICES** provide a description of data assumptions used in this report and a glossary of key terms and acronyms.

There are **IMAGES** from around Washington State throughout the report to illustrate characteristics of TOC. The images are not an endorsement of specific developments or designs, nor a suggestion that any one jurisdiction has all the policies in place to create high-performing TOC. Rather, they help visualize the principles of the report, and demonstrate the many wonderful examples of good planning and urban form that exist across Washington State today.



**Mixed-use development with wide sidewalks and established tree canopy create a safe and vibrant streetscape in Seattle's South Lake Union neighborhood.**

**The new Burien Town Square development creates a revitalized, more walkable downtown area.**





High-capacity transit investments give new opportunities for people to access homes, jobs, shopping and recreation without relying on a personal vehicle. The funded expansion of Link light rail will connect 12 cities in central Puget Sound by 2023. Planned expansions could connect another six cities to the system in the following years.

## CONTEXT

### WHAT ARE TOC? WHY DO WE NEED THEM?

The sustainability of our cities—as measured by both the quality of life they provide today, and the long-term environmental protection they promise to future generations—will determine the future of our planet. Over half of the world’s population lives in urban areas today.<sup>1</sup> In Washington State the number is higher, with 62 percent of Washington residents living in incorporated areas in 2009, a steady increase from the 52 percent that did so in 1990 when the Growth Management Act was enacted.<sup>2</sup> The United Nations predicts that by 2050, over 75 percent of the world’s population will reside in cities.<sup>3</sup>

Considering the host of social and environmental challenges facing our world’s population today—ranging from global warming, air quality, water scarcity, and food

and energy security, to poverty and social equity—this rapidly urbanizing trend indicates that cities will need to be a part of the solution. Accordingly, the International Panel on Climate Change has recognized that urban planning for transportation modal shifts and land use pattern changes is necessary to mitigate the impacts of global warming.<sup>4</sup> However, to be effective, our urban growth patterns—the land use, housing and transportation patterns that make up our cities—must be both good for *people*, allowing access and choices for a quality of life that will make city living attractive to a wide range of changing demographics, and good for the *planet*, ensuring long-term environmental sustainability for future generations.

We believe this is possible. And we believe that the creation of vibrant and inclusive *TOC* is a central strategy to get us there.

But what are *TOC*?



**TRANSIT-ORIENTED COMMUNITY EXAMPLE:** *Burien Town Square, Burien*  
The Burien Town Square project includes 124 homes, retail, a new city hall, a library and a park on 1.5 acres (for a net residential density of 79 housing units per acre), near a major bus terminal, with shuttles to the airport and light rail, and a future bus rapid transit station. The project includes a range of housing types and sizes, from studio apartments to two-bedroom townhouses, to encourage diversity and housing choice. The development, which revitalizes the heart of downtown Burien, is the culmination of a decade of integrated planning that considered holistically the interplay between civic, residential and commercial uses with the local and regional connections provided by transit.

**TRANSIT-ORIENTED DEVELOPMENT EXAMPLE:** *Broadway Crossing, Seattle*  
An example of transit-oriented development, the Broadway Crossing project is a mixed-use building, offering studio to two-bedroom units at a residential density of 138 units per acre. The building is adjacent to seven bus lines and within a half-mile of future streetcar and light rail stations. The project used several subsidy and tax incentive programs so that all 44 homes have rents that are affordable to individuals and families making less than 60% of the area median income.

# “The days where we’re just building sprawl forever, those days are over.”

–President Barack Obama, February 10, 2009

The seminal *The New Transit Town* defines transit-oriented development as “a mix of uses, at various densities, within a half-mile of each transit stop,” (page 21), and offers more nuanced performance-based benchmarks that define effective transit-oriented development projects: location efficiency, a rich mix of choices, value capture, placemaking and resolution of the tension between node and place.<sup>5</sup>

While *transit-oriented development* focuses primarily on site-specific projects within a half-mile of a major transit station, the notion of *TOC* looks holistically at the built form and function of the entire half-mile radius station area. Station area planning for *TOC* must integrate land use, transportation, and housing policy to promote and support vibrant mixed-use neighborhoods where residents, employees, and visitors walk, bicycle, or take transit to reach their destinations.

## POLITICAL CONTEXT FOR TOC

Our nation now recognizes that urban development must follow more compact and walkable patterns. “The days where we’re just building sprawl forever, those days are over,” said President Barack Obama at a February 2009 press conference. “I think that Republicans, Democrats, everybody recognizes that that’s not a smart way to design communities.”<sup>6</sup> One month later, his administration introduced the *Sustainable Communities Initiative*, a joint venture of the U.S. Department of Transportation, U.S. Department of Housing and Urban Development and U.S. Environmental Protection Agency. This initiative is to promote transit-oriented development patterns in order to provide “more choices for affordable housing

near employment opportunities; [offer] more transportation options, lower transportation costs, shorten travel times, and improve the environment; and [create] safe, livable, healthy communities.”<sup>7</sup>

Future federal policy will likely support these transit-oriented development patterns. The current discussions on the reauthorization of the Federal Transportation Funding Act indicate a strong preference to leverage federal transportation dollars to support compact development. It is expected that the legislation will direct metropolitan planning organizations, such as the Puget Sound Regional Council, to analyze and reduce the climate impacts of transportation infrastructure investments, with the necessary result of supporting more transit-oriented development.<sup>8</sup>

This policy trend recognizes that the threats posed by global warming are mounting, and adequate responses are needed now. In April 2009, the U.S. Environmental Protection Agency proposed a new rule adopted under the federal Clean Air Act acknowledging that “greenhouse gases in the air endanger the public health and welfare of current and future generations.”<sup>9</sup> While the full gamut of institutional and personal behaviors necessary to mitigate these impacts span across many policy arenas, those pertaining to land use and transportation are well-defined and backed by solid research. The 2007 book *Growing Cooler*, published by the Urban Land Institute, found that compact land use patterns could lead to critical reductions in transportation-related greenhouse gas (GHG) emissions, and that without land use related actions, necessary GHG

emission reductions could not be achieved.<sup>10</sup> The 2009 follow-up *Moving Cooler* further found that compact land use patterns integrated with transit investments are vital components for long-term reductions in vehicle miles traveled (VMT) and subsequent GHG emissions.<sup>11</sup>

In Washington State, where just over half of GHG emissions stem from the transportation sector,<sup>12</sup> the potential impact of land use patterns that lead to reduced VMT is even greater. As a result, numerous recent studies at the state level have recommended that land use and transportation policies help address GHG emission reduction goals, including the 2008 Land Use and Climate Change state stakeholder committee<sup>13</sup> and the 2008 Governor’s Climate Action Team.<sup>14</sup> The state has adopted requirements to reduce GHG emissions to 50 percent of 1990 levels by 2050.<sup>15</sup> The state has also adopted benchmarks to reduce per capita VMT by 50 percent by 2050.<sup>16</sup> Engrossed Second Substitute Senate Bill 5560, signed into law in May 2009, further requires state agencies to consider climate impacts when appropriating state infrastructure and economic development funds.

In the Central Puget Sound Region, countless studies have called for more compact and walkable urban development near transit for a variety of reasons. An overarching goal of the Puget Sound Regional Council’s *Vision 2040* Plan, adopted in 2008, states that “the region will focus growth within

already urbanized areas to create walkable, compact, and TOC that maintain unique local character.<sup>17</sup>” The Urban Land Institute’s Reality Check exercise that brought together over 250 of the region’s leaders to envision future growth patterns in April 2008, identified transit-oriented development as a top priority for regional growth that minimizes climate impacts.<sup>18</sup> Reality Check’s implementation body, the diverse coalition of the *Quality Growth Alliance*, released a report by the University of Washington in August 2009 on transit-oriented development centers, focusing on both their necessary role in regional growth and the various barriers to their successful realization.<sup>19</sup>

Compact, transit-oriented development patterns have been promoted by broader environmental and conservation advocates as well. Recognizing the negative impacts of sprawling development on riparian habitat and water quality, the Puget Sound Partnership’s *2008 Action Agenda* recommends that policy “focus growth away from ecologically important and sensitive areas by encouraging dense, compact cities, vital rural communities, and protected areas that support the ecosystem Soundwide.”<sup>20</sup> And the comprehensive Cascade Agenda of the Cascade Land Conservancy advocates “complete, compact and connected” communities as a way to both preserve critical working farms and forestlands and to create vibrant and healthy cities.

“...the region will focus growth within already urbanized areas to create walkable, compact, and transit-oriented communities that maintain unique local character.”

–*Vision 2040*, Puget Sound Regional Council, April 2008



**Compact, transit-oriented development patterns are an integral strategy for restoring Puget Sound and diverting growth away from ecologically important rural and resource lands.**

Meanwhile, affordable housing advocates have also recognized that transportation costs are key to the broader picture of housing affordability, and accordingly, that promoting more housing choices in walkable communities near transit is an important goal. A 2006 Brookings Institution report piloted a housing and transportation affordability index in the Seattle region (among others). It demonstrated that although the housing costs in inner city neighborhoods were higher than suburban and rural areas of counties, they were more than offset by the lower transportation costs associated with greater walkability and transit access.<sup>21</sup> Following this finding, the Seattle Planning Commission Affordable Housing Action Agenda<sup>22</sup> and the Middle Income Housing Alliance of Seattle Workforce Housing Action Agenda<sup>23</sup> both identified transit-oriented development as a primary strategy to

encourage more housing affordable to low, moderate and middle income individuals and families in the Seattle region.

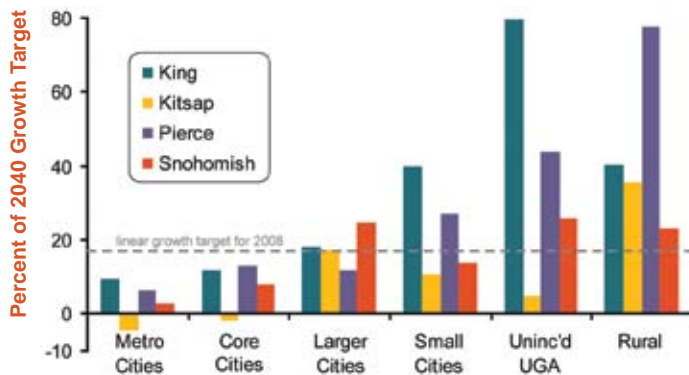
Clearly efforts spanning diverse interests have called for more transit-oriented development in Washington State, particularly in the major urban areas of the central Puget Sound region. How do our current population and growth trends stack up against these recommendations? What are the opportunities that exist in the near future to create and support more TOC?

### **GROWTH CHALLENGES AND OPPORTUNITIES**

The population of Washington State is expected to continue its rapid growth in the decades to come. The state Office of Financial Management forecasts over 2.6 million new residents between 2000–2030, a growth of 44 percent. The Growth Management Act instructs local planning efforts to direct the majority of this growth to areas within designated urban growth areas, in order to deliver public services and amenities more efficiently and to preserve working farms and forestlands and water quality.<sup>24</sup>

The central Puget Sound region, comprised of King, Pierce, Snohomish, and Kitsap Counties, will take half of the state’s growth—a total of 1.7 million new residents and 1.3 million new jobs from 2000–2040, according to the Puget Sound Regional Council’s land use plan, *Vision 2040*. The plan projects growth by regional geographies, in which the region directs the majority of growth to “Metro Cities,” “Core Cities,” and “Larger Cities,” with substantially less growth directed toward “Smaller Cities,” “Unincorporated Urban Growth Areas,” and “Rural” areas.

Unfortunately, the actual population growth trends from 2000–2008 indicate that, based on their *Vision 2040* planned trajectories (see Figure 1 below), the latter geographies have grown disproportionately quickly with some areas already achieving in eight years nearly 80 percent of their allocated growth for the 40 year period. Although the Metro Cities and Core Cities have taken the largest portion of growth in absolute terms, they have underperformed in terms of achieving allocated growth, absorbing in many cases less than half the growth expected during the same eight-year period.



**Figure 1: Percentage of allocated 2000–2040 growth achieved in 2000–2008, by county and regional geography**

A Center of Neighborhood Technology analysis of King County household expenses reveals another disturbing trend: transportation costs are rising disproportionately faster than income in King County. From 1999–2007, household income increased by 26%, while housing costs increased by 40% and transportation-related costs by 168%. This trend most greatly impacts the less centralized areas of the county, where trips tend to be longer, and insufficient transit service leaves more individuals and families dependent on personal vehicles. While housing costs in those areas are lower than in transit-supported urban areas, the increased cost of transportation creates an overall higher cost of living. In addition, the shrinking gap between income and household (housing plus transportation) expenses has a particularly adverse impact on families with incomes of half of the county median income or less.<sup>25</sup>

Both the growth and the household expense trends suggest that we must direct growth back toward Metro Cities, Core Cities, and Larger Cities—those areas with the infrastructure and amenities, notably transit, to support greater population. There are many potential strategies and urban forms for accommodating growth in these cities. However the expanding high-capacity transit system in the central Puget Sound, together with the above-mentioned political support for transit-oriented development patterns, invites a rethinking of high-capacity transit station areas. Such areas may provide vital opportunities to accommodate future growth while offering a host of social and environmental benefits.



The expansion of high-capacity transit, such as Community Transit's Swift bus rapid transit system, gives us the opportunity to provide more people access to housing, jobs, shopping, services and recreation, without relying on a personal vehicle. When it opens in November 2009, Swift will connect the cities of Everett, Lynnwood, Edmonds, Mountlake Terrace and Shoreline along 17 miles in Snohomish County.

## CONCLUSION

*New transit investments offer more than a means of moving people from one point to another; they can also be an opportunity to support, and in some cases, create communities by opening up new opportunities for people to gain access to, from and within the neighborhood. In the coming decades, an interconnected system of light rail, commuter rail, streetcar, bus rapid transit, and express bus service will connect dozens of cities in the central Puget Sound region, creating significant opportunities for TOC.*

*But what precise benefits can citizens, planners and public officials expect from these TOC? What evidence exists to link planning for growth near transit to specific social and environmental outcomes?*



The Station at Othello Park will be the first major TOD development along the new light rail line in Southeast Seattle. At a density of 175 units per acre, it provides both housing and retail between the light rail line and the Othello Park and Playground.



## EVIDENCE

There is an extensive and growing body of published research providing evidence that well-designed TOC can lead to a range of substantial social and environmental benefits. In brief, TOC have the potential to:

- *Promote health by encouraging walking and bicycling, cutting air pollution, and reducing motor vehicle accidents;*
- *Lower household expenses for both transportation and housing;*
- *Reduce municipal infrastructure costs;*
- *Provide a high return on public investment in transit infrastructure;*
- *Help meet the growing demand for walkable neighborhoods;*

**Urban design that facilitates walking, biking and transit use, such as this pedestrian and bike-friendly plaza at a streetcar stop in Seattle, can lead to substantial social and environmental benefits.**

- > *Curb land consumption and thereby help conserve working farms, forestlands, and natural ecosystems, and protect water quality; and*
- > *Cut energy consumption and GHG emissions associated with both transportation and the built environment.*

The following sections review this evidence.

## SOCIAL BENEFITS

TOC have the potential to deliver a range of social benefits, both to local residents and to the greater community. These benefits can be divided into two main categories: human health and economic health, each discussed below.

### Human Health

#### *Physical Activity*

It has been estimated that lack of physical activity is responsible for between 200,000 to 300,000 premature deaths annually in the U.S.,<sup>26</sup> and that obesity-related problems cost Americans \$76 billion annually.<sup>27</sup>

Walking and bicycling are both forms of physical activity that can help people meet the commonly recommended 30 minutes of moderate-intensity activity on five or more days per week.<sup>28</sup> However, data from the Nationwide Personal Transportation Survey show that between 1977 and 1995 the number of trips taken by foot in the U.S. dropped by 42 percent.<sup>29</sup> At the same time, VMT increased at about three times the rate of population growth.<sup>30</sup> Both of these trends are due in part to the increasing prevalence of a built environment in which nearly every trip requires a car.



**Walkable communities, such as the Phinney Ridge neighborhood in Seattle, lead to greater levels of physical activity and lower levels of obesity.**

As described below in the following section on Environmental Benefits, TOC have demonstrated reductions in the number of trips taken by car. Most of these trips are replaced by modes that involve physical activity, such as walking or biking (as even transit trips require some amount of walking or biking at either end of the trip). A 2006 review paper concluded that “community-scale and street-scale urban design and land use policies and practices” were effective in promoting physical activity.<sup>31</sup> One recent study compared high- and low-walkability neighborhoods and found that levels of physical activity are higher, and obesity rates are lower in neighborhoods with high walkability.<sup>32</sup>

A 2009 Centers for Disease Control and Prevention review included the following recommendations to prevent obesity in the United States:<sup>33</sup>

- > *improve access to public transportation*
- > *zone for mixed-use development*
- > *enhance infrastructure supporting walking*
- > *enhance infrastructure supporting bicycling*

### **Air Pollution**

Although motor vehicle pollution control measures have improved over recent decades, air pollution produced by motor vehicles remains a significant public health issue. For example, a 1996 study estimated that motor vehicle pollution causes 40,000 premature deaths and \$450 billion in additional health costs annually.<sup>34</sup> Air pollution and particulate matter produced by vehicles is roughly proportional to VMT. Thus the VMT reductions associated with households in TOC will reduce air pollution and its related health problems.

A 2005 study of land use patterns in King County, found that “Increased residential density, street connectivity, and land use mix near home and work are associated with significantly lower per capita vehicle emissions.”<sup>35</sup>

### **Auto Accidents**

In a typical year in the United States, more than 40,000 people are killed, and another three million are seriously injured in auto accidents. Estimates of the cost of these accidents—including medical care, emergency services, property damage, travel delays, lost productivity and quality of life—range from \$164 billion<sup>36</sup> to 231 billion<sup>37</sup> per year.

The rate of auto accidents is dependent on VMT, so it follows that TOC, by reducing VMT, will also reduce accidents and their associated costs. The per capita cost of accidents in “small” metropolitan areas was found to be 41 percent higher than the cost in the “very large” metropolitan areas.<sup>38</sup> This trend can be attributed in part to the higher average densities the larger metropolitan areas.

A 2003 study on the relationship between urban form and auto accidents found that for every one percent change in the “sprawl index,” traffic fatality rates and pedestrian fatality rates fall by 1.5 percent.<sup>39</sup> A similar study concluded that “traffic fatality rates were highest in exurban areas.”<sup>40</sup>

### **Social Capital**

The effects of urban form on community cohesion are difficult to assess. But there is evidence suggesting that social capital can be enhanced in compact, walkable communities, for example:

- > *In Bowling Alone, Robert Putnam reported that a ten minute increase in commute time was associated with a ten percent drop in community involvement.*<sup>41</sup>
- > *A 1995 study comparing single-use and mixed-used areas in Columbus, Ohio, found “significantly more sense of community in the mixed-use neighborhood.”*<sup>42</sup>
- > *A 2002 study in Portland, Oregon showed that social capital is positively linked to a safe and interesting walking environment.*<sup>43</sup>

**“Increased residential density, street connectivity, and land use mix near home and work are associated with significantly lower per capita vehicle emissions.”**

## Economic Health

TOC can yield significant economic benefits for both the public and private sectors. As summarized by the Pew Center on Global Climate Change, “Well-planned compact growth consumes 45 percent less land and costs 25 percent less for roads, 20 percent less for utilities, and 5 percent less for schools, than does sprawling growth.”<sup>44</sup> TOC also have a demonstrated record of providing significant return on public investment, raising property tax revenues, and stimulating the economy by responding to a growing market demand for walkable communities.<sup>45</sup>

### Household Transportation Expenses

It is well established that automobile ownership rates and VMT both decline as urban development density increases, which can lead to significant savings on household transportation costs.<sup>46</sup>

The American Public Transit Association estimates that the average annual cost of owning one car is \$9,147 per year in the U.S., and \$11,185 per year in Seattle.<sup>47</sup> Figure 2 illustrates the strong relationship between auto ownership and density, controlling for income and household size.

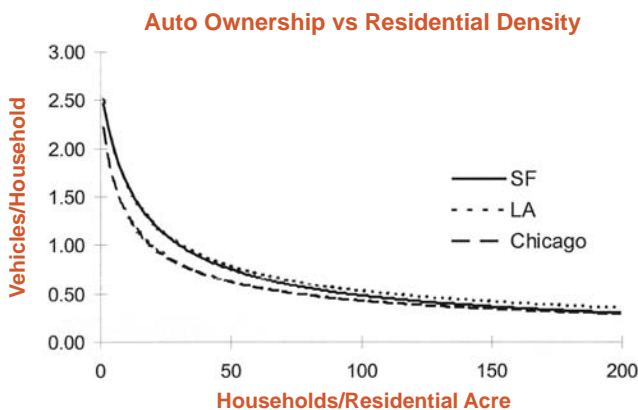


Figure 2: The relationship between density and auto ownership.<sup>48</sup>

The Center for Neighborhood Technology has developed a model for estimating household transportation expenses that captures the contributions from both car ownership and VMT. The model consistently shows a reduction in transportation expenses as density increases, for example:

- > In the Minneapolis metro region, estimated annual transportation costs are \$13,860 for a household in a neighborhood with a density of 0.6 households per residential acre, as compared to \$6,995 for a household in a neighborhood with a density of 9.7 households per residential acre.<sup>49</sup>
- > In the Chicago metro region, estimated annual transportation costs are \$12,444 for a household in a neighborhood with a density of 1.8 households per residential acre, compared to \$8,208 for household in a neighborhood with a density of 14 households per residential acre.<sup>50</sup>

### Housing Affordability

New construction of the compact mid-rise housing that is often appropriate for TOC is inherently less expensive than new single-family housing because it requires less land, materials, infrastructure, and parking per unit. However, evolving demographics and preferences have increased the demand for higher-density housing in compact, walkable neighborhoods in recent years,<sup>15</sup> driving up housing prices in these desirable communities. For example, a study of housing types in Kirkland, Washington, found car-dependent suburban housing valued at \$358 per square foot, while housing in walkable neighborhoods was \$540 per square foot—a 51 percent premium.<sup>16</sup> Other areas show similar premiums for walkable communities. Building more housing in TOC has the potential to reduce housing prices by providing a product that helps alleviate a currently unmet demand.

Even so, the market still cannot provide sufficient multi-family housing at levels affordable to low- and moderate-income individuals and families in most areas. Programs such as tax-abatements or location-efficient mortgages for homeowners can help offset higher housing costs associated with desirable walkable neighborhoods. Public sector intervention, however, is usually the only mechanism to achieve deeper levels of affordability. Such policies should be widely used, but carefully crafted so as not to discourage development altogether.

### **Infrastructure**

There is a wealth of research comparing the public-sector costs of compact development versus sprawl. In 2005 the Puget Sound Regional Council published a review of the literature and the evidence is unequivocal.<sup>53</sup> For example, a 2004 study by Todd Littman concludes that “smart growth” can lead to \$5,000 to \$70,000 savings per unit on infrastructure and utility installation, as well as \$500 to \$10,000 annual savings on maintenance. The City of Albuquerque determined that the cost of infrastructure is 22 times higher for new housing on the urban fringe than for infill, high-density housing in the existing city.<sup>54</sup> Infrastructure to serve low-density development has been estimated to be about \$90,000 per home.<sup>55</sup> Fewer multilane roads in higher density development lead to typical cost savings of 25 percent on roadways alone.<sup>56</sup>

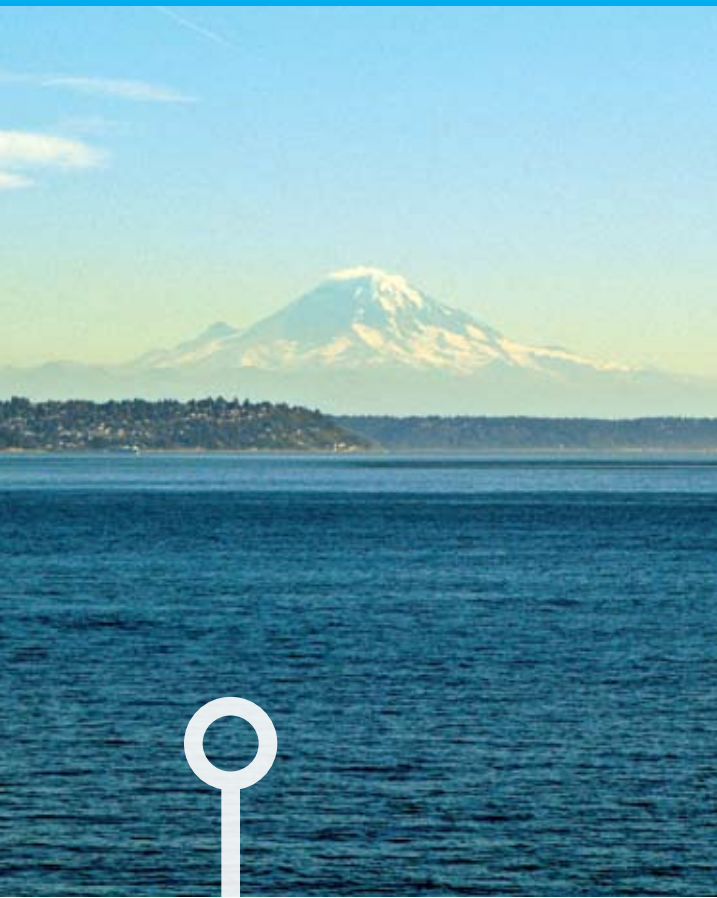
### **Return on Public Investment**

The American Public Transportation Association estimates that \$1 of public transportation investment yields \$6 in economic returns.<sup>57</sup> Reconnecting America estimates that transit investment increases surrounding property values by 5 to 20 percent,<sup>58</sup> and that every \$1 of public investment in transit leverages \$31 in private investment.<sup>59</sup> For example:

- > *Portland, Oregon spent \$73 million on a streetcar, which helped catalyze \$2.3 billion of private investment within two blocks of the line.*<sup>60</sup>
- > *In Arlington, Virginia, the county invested \$100 million to pay the incremental cost not to build Metrorail in the middle of Interstate 66, setting the stage for \$8.8 billion in private development.*<sup>61</sup>

**Every \$1 of public investment in transit leverages \$31 in private investment.**





**Compact development allows more land to be preserved for working farms and forestlands—a vital strategy for restoring Puget Sound.**

## ENVIRONMENTAL BENEFITS

By definition TOC are comprised of compact development, a land use pattern with significant and widely recognized environmental benefits.<sup>62</sup> The discussion here will be limited to a brief review of land and water conservation-related benefits, followed by a more detailed treatment of energy and GHG emissions.

First and foremost, compact development inherently consumes less land for buildings and roadways than does sprawling development, and thereby allows more land to be preserved for working farms and forestlands.<sup>63</sup> This land preservation is vital to protecting food and fiber production and wildlife habitat.

In addition, impervious surfaces associated with development increase storm water runoff, which upsets natural hydrological systems, a particularly serious problem for salmon-bearing streams in the Puget Sound region. Impervious surfaces also accelerate the delivery of toxic chemicals to local water bodies, which has been documented in Puget Sound.<sup>64</sup> As development becomes more compact, the per capita footprint of impervious surface is reduced because there are more housing units per unit area of land, and because there is less roadway and parking pavement. Assuming

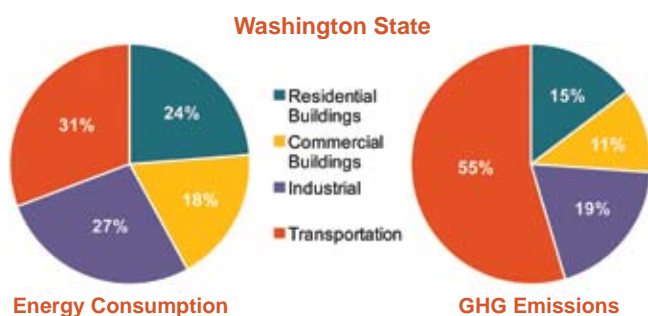
paved area is inversely proportional to density, increasing density from three units per residential acre (typical sprawl) to 30 units per residential acre (low and mid-rise multifamily) reduces paved area by 90 percent.<sup>65</sup>

Households in compact development also consume less potable water than those in sprawling development, primarily because less water is used for irrigating landscaping. A 2006 EPA report estimated a savings ranging from 20 to 50 percent.<sup>66</sup>

### Energy and Greenhouse Gas Emissions

The sources of energy consumption and GHG emissions in Washington State are shown in Figure 3. Typically, energy use and GHG emissions are closely linked, but the abundance of carbon-free hydropower in Washington State reduces the relative emissions of sectors that use a lot of electricity, such as buildings.

TOC have the potential to bring about significant energy use and GHG emissions reductions in both the transportation and residential building sectors.



**Figure 3: 2007 energy consumption<sup>67</sup> and 2004 GHG emissions<sup>68</sup> by sector in Washington State.**

### Transportation

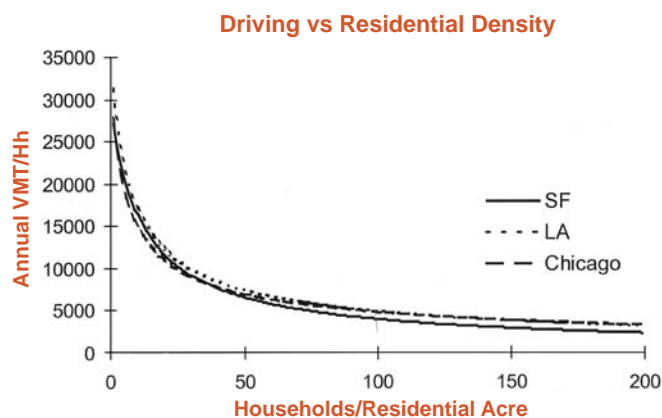
Automobiles and trucks account for about three quarters of the transportation carbon footprint, so any realistic plan to reduce fossil fuel consumption and GHG emissions must target a significant reduction in VMT. In recognition of this need to address GHG emissions from personal vehicles, Governor Chris Gregoire signed House Bill 2815, in March 2008, which mandates a 50 percent reduction in per capita VMT by 2050.<sup>69</sup>

Fuel use and GHG emissions from cars and trucks are tied to VMT, and a wealth of research has shown that VMT is strongly correlated with land use patterns. The extent of VMT reduction is determined by two main factors: (1) the number of car trips that are eliminated—either by a mode switch, or by elimination of the trip outright—and (2) trip length reduction. TOC land-use patterns combine compact development, a mix of uses, walkability, and transit use, all of which work synergistically to offer alternatives to travel by personal vehicles.

### Key Role of Density

It has been well established that as population density increases, people drive less. In 2007 the Urban Land Institute published *Growing Cooler*,<sup>70</sup> the authors provide an extensive literature review, and conclude that compact development has the potential to reduce how far we have to drive in our daily lives by 20 to 40 percent.<sup>71</sup>

A 2002 study of location efficiency provides a good graphical illustration of the density-VMT trend, as shown in Figure 4. The authors analyzed travel data from Los Angeles, San Francisco, and Chicago to derive equations for VMT.<sup>72</sup> The same relationship was observed in the Baltimore metropolitan region.<sup>73</sup>



**Figure 4: Plot of VMT versus density in LA, SF, and Chicago.<sup>74</sup>**

A University of California team analyzed data from the 2001 U.S. National Household Transportation Survey and concluded that given two identical households, if one is located in a residential area with 1,000 more dwelling units per square mile (1.6 units per acre) more than the other, the occupants will drive 1,171 miles per year less.<sup>75</sup>

### **Other land use factors**

Several other urban form factors have been found to impact VMT. In a 2005 review of data from the Central Puget Sound Region, the most influential variables were found to be street connectivity, land-use mix, retail floor area ratio, and distance to a transit stop.<sup>76</sup> The authors' analysis shows that households in the Seattle's Queen Anne neighborhood drive 22 percent fewer miles than those located in a suburban neighborhood in the City of Redmond.

Another study defined a "Sprawl Index" based on a combination of factors—density, mix, centers, and streets—that demonstrated a strong correlation to VMT.<sup>77</sup> For example, in Atlanta, with a Sprawl Index of 58, the average person drives 34 miles per day. In Portland, Oregon, with Sprawl Index of 126, the average person drives 24 miles per day—29 percent less than the average in Atlanta.

The Center for Neighborhood Technology developed a model for estimating VMT, with variables including average block size, distance to employment centers, job density, access to amenities, and "transit connectivity index."<sup>78</sup> Their analysis shows, for example, that the average household in central Minneapolis drives 80 percent fewer miles than does an equivalent household located in Farmington, an auto-oriented Minneapolis suburb.

A 2009 review article by the Transportation Research Board concluded:

*"The literature suggests that doubling residential density across a metropolitan area might lower household VMT by about 5 to 12 percent, and perhaps by as much as 25 percent, if coupled with higher employment concentrations, significant public transit improvements, mixed uses, and other supportive demand management measures."<sup>79</sup>*

### **VMT and transit**

Reducing VMT is largely dependent on shifting trips to transit. The key determinants of transit ridership at TOC-type developments have been categorized by the "4 Ds:"<sup>80</sup>

- > **Density** – population, housing units, and jobs
- > **Diversity** – jobs to population ratio
- > **Design** – pedestrian environment variables including street grid density, sidewalk completeness, and route directness
- > **Destinations** – accessibility to other activity centers

It has recently been proposed that a fifth D—distance to rail transit station—is also an important factor.<sup>81</sup> One Bay Area study found that people living within a half mile of a transit station are four times more likely to use transit than those living more than a half mile from a (non-rail) transit station.<sup>82</sup>

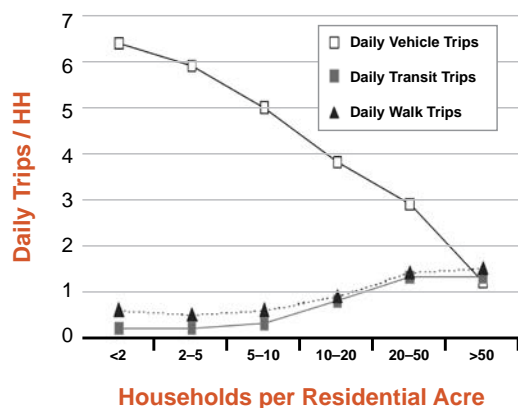


**Increasing residential density and improving pedestrian amenities near transit are critical ways to encourage ridership, as seen at this Renton station.**

In an exhaustive 2008 literature review sponsored by the Transit Cooperative Research Program (TRCP), the authors conclude that “the most effective strategy to increase [transit] ridership is to increase development densities in close proximity to transit.”<sup>83</sup> They also emphasize that the presence of employment near transit stations is a critical ingredient.

The TCRP report analyzes data from Portland, Oregon, San Francisco, Philadelphia, and Washington D.C. and reveals four key variables that determine ridership, listed here in order of decreasing importance: distance to central business district; higher residential densities; a reduced parking supply; and the walking distance to the station.<sup>84</sup> The authors of a 2007 review paper corroborate the importance of density, concluding that “when it comes to transit-based residences, the greatest ridership pay-off comes for intensifying station-area housing.”<sup>85</sup>

An analysis of Household Travel Survey data found that daily vehicle trips declined as residential density increased. At 50 units per residential acre, daily walking and transit trips surpassed the number of daily vehicle trips.<sup>86</sup> See Figure 5 below.



**Figure 5: Mode trips by residential density.**<sup>87</sup>

To summarize, two key conclusions can be drawn from the land use pattern evidence: (1) Density is necessary for land use patterns that promote transit ridership, and therefore should be the first factor to consider in efforts to reduce VMTs; and (2) To be most successful, transit station areas must integrate a range of reinforcing land-use characteristics—often expressed as complete, compact, and connected.

### *VMT and greenhouse gas emissions*

All else being equal, GHG emissions from motor vehicles are approximately proportional to VMT. Thus the relationships between land use patterns and VMT reduction discussed in the previous section apply in parallel to GHG emissions reduction.

Two recent studies of U.S. metropolitan regions demonstrate the universal trend of decreasing transport-related GHG emissions with increasing density. The first found that the biggest 100 metropolitan regions in the U.S. produce ten percent less transport-related emissions than the U.S. average.<sup>88</sup> In the second, the authors compared central cities with their surrounding metro areas and calculated that households in central cities emit from 3 to 34 percent less CO2 emissions from driving.<sup>89</sup>

The *Growing Cooler* authors estimate that by 2050, if 60 to 90 percent of new development is compact as opposed to status-quo sprawl, transportation-related GHG emissions would be reduced from current trends by seven to ten percent. In contrast, assuming business as usual, between 2005 and 2030 VMT will increase by 59 percent, with a corresponding increase in GHG emissions of 41 percent.<sup>90</sup>



Increased residential density, such as this new senior housing development at the Northgate Transit Center in Seattle, has a strong correlation with decreased transportation-related greenhouse gas emissions.

The 2009 Transportation Research Board report noted previously estimates that if 75 percent of new development is built at twice today's average density, total household GHG emissions would be 8 to 11 percent less by 2050.<sup>91</sup>

A 2000 Canadian study of the Toronto area modeled the effects of socioeconomic makeup, location, and neighborhood design on GHG emissions from vehicles.<sup>92</sup> The results are summarized in Figure 6, and show that both the urban form and distance to the central business district have a significant impact on household GHG emissions. For example, in the "inner area" case, GHG emissions from households in a neo-traditional neighborhood (residential density = 102 units per acre) are half that of households in the traditional suburban neighborhood (residential density = 9 units per acre).

The Center for Neighborhood Technology has recently developed a methodology for estimating household GHG emissions that is based on their previous work on VMT. In a 2008 study of TOD and GHG emissions funded by the Federal Transit Administration, they found "GHG reductions of 43 percent for households living in compact, mixed-use neighborhoods near stations, and 78 percent reductions for households living in central business districts."<sup>94</sup>

The Center for Neighborhood Technology provides an online tool that displays the results of their GHG emissions model for select metropolitan regions across the U.S.<sup>95</sup> Table 1 shows the land use pattern variable inputs and estimated transportation-related GHG emissions for three sites in Seattle. The results illustrate the expected trend of decreasing GHG emissions with increasing land use intensity and connectivity.

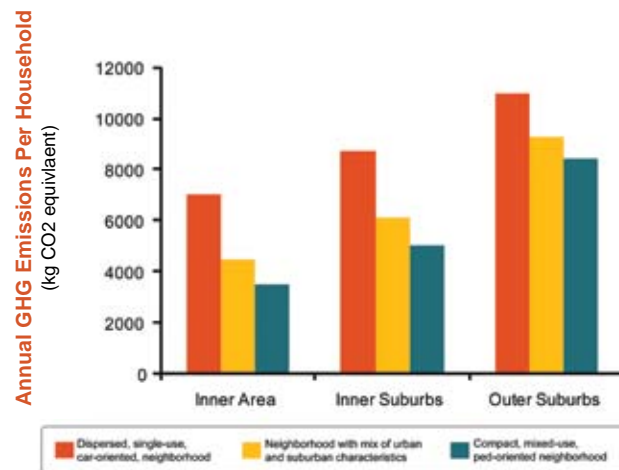


Figure 6: GHG emissions by neighborhood type<sup>93</sup>

The relatively large GHG emissions reduction projected for the International District Station is in part due to the presence of high-capacity transit, the effect of which is captured in a model variable called the “Transportation Connectivity Index” that is not accessible through the online tool.

Location	Density (households per residential acre)	Employment Access Index (jobs)	Block Size (acres)	Transit Ridership (% of workers)	Transportation GHG Emissions (metric tons CO2 per household)
International District Station	31.2	211,362	3.4	21.9	1.5
Capitol Hill Station	23.8	193,767	4.1	19.2	3.4
Roosevelt Station	7.8	63,442	4.2	11.3	5.4

**Table 1: GHG emissions modeling results for three station area sites in Seattle.**

### Transit and GHG emissions

In much of the U.S. where transit use is low, the GHG emissions caused by transit represent an almost negligible fraction of total transportation-related emissions. But as levels of density and transit use rise, the fraction of GHG emissions produced by transit can become significant. A recent study of 66 U.S. metropolitan regions estimated that the portion of transportation emissions from transit ranges from essentially zero in some cities, to as high in 26 percent in New York City.<sup>96</sup>

As of 2005, the U.S. average GHG emissions per passenger-mile for transit were 29 percent lower than that of the average car. The efficiency of transit in the U.S. is significantly below potential because such a large fraction of the vehicles operate under capacity. But as development becomes denser, transit tends to operate closer to full capacity, and efficiency is improved. For example, in New York City urban area, GHG emissions per passenger-mile for transit are 43 percent less than the national

**Average GHG emissions per passenger-mile for transit were 29 percent lower than that of the average car.**



average for transit.<sup>97</sup> In addition, because destinations are closer at hand in TOC compared to dispersed single-use development, trips are shorter on average. And when people can meet their daily travel needs with shorter trips, GHG emissions are reduced, regardless of the mode.

## Buildings

While transit does not directly impact building performance, the compact urban form typical of TOC can be expected to reduce energy use and associated GHG emissions of buildings. The following sections review the available research.

### Building Operations

As urban areas become more densely developed, it almost invariably means an increasing ratio of multifamily to single-family households. And because unit sizes are typically smaller and share walls, multifamily is inherently more energy efficient than detached single-family housing. Compact arrangements of housing also enable the implementation of efficient district heating systems.

A 2008 analysis of urban form and energy consumption in the United States concludes that:<sup>98</sup>

- > *Compared to multifamily households, single-family households consume 54 percent more energy for space heating and 26 percent more energy for space cooling.*
- > *A 2,000 square foot house consumes 16 percent more energy for space heating and 13 percent more energy for space cooling than does a 1,000 square foot house.*
- > *The average household would be expected to consume about 20 percent less energy living in a compact county than in a sprawling county.*



**The compact urban form typical of TOC can be expected to reduce energy use and related GHG emissions of buildings.**

A 2008 study commissioned by the City of Portland, Oregon estimated that the operational carbon footprint of a typical household in a “high-density” environment is 60 percent lower than that of a household in a “suburban” environment.<sup>99</sup> Since high-density households have fewer members, this translates to a 32 percent reduction on a per capita basis.

The 2009 Transportation Research Board study noted above estimates that compared to a 2,400 square foot single-family house, a 2,000 square foot apartment produces 30 percent less GHG emissions from energy use.<sup>100</sup>

A 2006 Toronto-based study compared households living in a 15-story high rise (61 households/acre net) with households living in a single-family subdivision (8 households/acre net), and estimated that per capita energy use is 45 percent lower in the high-density household than in the low-density household.<sup>101</sup>

Only one study<sup>102</sup> in Australia contradicts this trend, suggesting that per capita energy use rises for higher density types. However the study does not control for socio-economic factors, and part of the greater energy use in high-rise is likely a result of higher household incomes.

As for commercial buildings, the impact of land use patterns on operational energy consumption is small, because an office needs the same amount of space regardless of whether it's located in the downtown core or in the suburban fringe. In fact, the Energy Information Administration's Commercial Building Energy Consumption Survey shows that energy use intensity actually increases in taller commercial buildings.<sup>103</sup> The 2008 Portland study noted above concurs, estimating that the operational carbon footprint of commercial buildings was slightly higher in the "high density" case as compared to the "suburban" case.<sup>104</sup>

### **Embodied Energy**

Embodied energy is the energy consumed in creating a building. It consists of the energy used for extraction and processing of raw materials, transporting those materials to the site, and assembly. The GHG emissions that are generated through the consumption of embodied energy are commonly called embodied carbon, typically equivalent to between about 10 to 20 years of building operations GHG emissions.<sup>105</sup>

With compact development, because housing units are generally smaller, fewer materials are consumed and embodied carbon is reduced. The 2008 Portland study discussed above estimates that, assuming concrete construction and a 1,200 square foot housing unit for the urban case, and wood construction and a 2,400 square foot unit for the suburban case, urban development results in 18 percent less embodied carbon than does suburban development.<sup>106</sup>

The 2006 Toronto study noted above estimated that the embodied energy per resident was 35 percent lower in the high-rise case compared to the single-family case.<sup>107</sup>

### **Infrastructure**

It is well known that relative to dispersed suburban development, compact development requires significantly less physical infrastructure, such as pavement, pipe, utility poles, wire, etc. Presumably, embodied carbon would be reduced proportionally, but unfortunately there is a dearth of published research that quantifies the GHG emissions related to infrastructure.

Life-cycle analysis reveals that the embodied carbon associated with roadway construction and maintenance represents a significant fraction of the total carbon footprint of personal vehicles, adding another 26 percent to the GHG emissions associated with operating a conventional gasoline sedan.<sup>108</sup>

## **CONCLUSION**

***The evidence demonstrates that we can expect to see vital social and environmental benefits from TOC patterns in Washington State. In order to realize the full potential for such benefits—to create high-performing TOC—we must first understand the opportunities that exist within our existing and planned transit infrastructure to foster such communities.***



Transit-oriented communities exist at different scales throughout the urban region. Every station area is unique.

## TPOLOGY

What opportunities exist to create *high-performing TOC*—areas capable of providing substantial social and environmental benefits to both community residents and the broader region—in Washington State today? The past decade has seen growing interest and investment in transit throughout the State. The central Puget Sound region opened its first light rail line from Tukwila to Seattle in July 2009, and it will extend to the airport by late 2009, and to the University of Washington in 2016. In 2008, voters approved an additional 36 miles of light rail to connect another eight cities in the region. King and Snohomish Counties are in the process of building funded bus rapid transit lines, and the City of Seattle is considering funding options to expand its streetcar network to connect adjacent neighborhoods to the downtown core. In addition, the region is already serviced by a 10-city commuter rail system and an expansive and well-used express bus system.

Other cities across the state are also considering investments in high-capacity transit. A planned expansion of the MAX light rail would connect the City of Vancouver to Portland. While efforts to fund high-capacity transit in Spokane have failed at the ballot, the County already owns the right-of-way for a future dedicated rail corridor to connect the City of Liberty Lake to downtown, and North Spokane to downtown. There is interest in another ballot effort in the future. In the long-term, such new investments will not only provide greater access for existing residents to housing and jobs, but will also offer local jurisdictions greater options for accommodating future residential and job growth. Figure 7 illustrates the opportunities for TOC along the central Puget Sound region’s current and funded transit infrastructure through 2040.

### Typology of Station Areas in Central Puget Sound Region

In order to understand the potential to create high-performing TOC along these current and future transit investments, it is useful first to understand the context and attributes of station areas as they exist today. Every station area is unique. A half-mile walking distance around a transit station may encompass several distinct neighborhoods, topographies, and a range of zoning and development patterns. Because individual street characteristics, uses, amenities, and building types also vary, the grain of each half-mile station area is necessarily place-specific. All of this, of course, is augmented by the uniqueness of the people who live, work, and play there. The variety is rich and seemingly infinite.

Nevertheless, for the purposes of measuring the performance of individual station areas relative to policy goals, and of calibrating policies to the specifics of place, it is helpful to develop a singular comparative framework—a matrix of station area *types*. Using the expanded light rail system\* in the central Puget Sound region as an example, this section first classifies station areas into a typology



**Figure 7:**  
**Central Puget Sound Region**  
**2040 Transit Infrastructure**

\* Although the basis of the typology is the expanded light rail system in the central Puget Sound region, the types are applicable to areas serviced by other modes of transit. Indeed, the Capitol Hill example, which will not be serviced by light rail until 2016, is currently served by multiple bus routes and functions very well.



Individual street characteristics, uses, amenities, and building types will vary within TOC.

based on the attributes of the existing infrastructure, dominant zoned land uses, and zoning capacity. These attributes comprise the foundation upon which people, buildings, amenities, and design create a community, and can help predict the relative potential performance of station area types on social and environmental outcomes. Each station area type is further illustrated by case studies of specific station areas in the region. The section then closes with a matrix for comparing the attributes and expected social and environmental outcomes of different station area types.

The typology is informed by the station area typology presented in *The New Transit Town*, subsequent research by the Center for Transit-Oriented Development, and the regional geography typology created in the Puget Sound Regional Council's *Vision 2040*. The typology is based on the following measurable attributes:

- > *Location of the station area relative to the urban region;*
- > *Dominant land uses allowed by the city's or county's zoning regulations;*
- > *Level and quality of transit connectivity;*
- > *Potential residential and employment capacity and density allowed by current zoning;*
- > *Jobs-to-housing balance allowed by the existing zoning;*
- > *Physical block pattern as a measure of pedestrian and bicycle connectivity.*

For a full explanation of the case study measures and data assumptions, please see the Appendix A.

Based on these attributes, in the central Puget Sound region, the following five station area types exist, listed in order of development intensity:



## CORE

Station areas within the downtown **core**, or central business district, typically have zoning capacities that provide excellent access to a wide range of uses and accommodate substantial jobs and housing growth, an 18–24 hour, well-connected multi-modal transit service including two or more modes of high-capacity transit, a well-connected street grid to support mobility, and a metropolitan-scale user base. These stations can outperform less centrally located station areas on a per capita basis, especially on issues related to GHG reductions and energy consumption. Often, the quality of the public realm and enabling infrastructure is also high. Many Core station areas have significant overlap with other nearby stations, increasing performance potential through increased choice and connectivity. Examples of this type in the central Puget Sound Region are the Chinatown/International District, Pioneer Square, University Street, and Westlake Link stations in downtown Seattle, the future Link station in downtown Bellevue, the 10th & Commerce station in Tacoma, and the Everett Transit Center.

	Westlake	Downtown Bellevue
Dominant zoned land uses	mixed-use, commercial	mixed-use, commercial
Transit Connectivity	very high	high
Developable Acres	241	323
Existing Percent Open Space	2%	4%
Zoned Job Capacity ( <i>total jobs</i> )	87,200	40,000
Zoned Job Capacity Net Density ( <i>jobs/acre</i> )	362	124
Zoned Housing Capacity ( <i>total units</i> )	61,700	57,800
Zoned Housing Capacity Net Density ( <i>units/acre</i> )	256	179
Zoned Jobs to Housing Capacity Ratio	1.4 : 1	1 : 1.4
Street Center Line Miles per Square Mile	40	25

**Table 2: Core Station Area Case Studies**

Core station areas exist in the downtown central business district.





The Westlake station area encompasses much of downtown Seattle and adjacent neighborhoods South Lake Union and Capitol Hill.

### *Core Station Area Case Study 1:* **Westlake Transit Center, Seattle**

The Westlake station area in downtown Seattle marks the intersection of light rail, streetcar, regional express bus, monorail, and substantial local bus service. Although the current land use is predominantly commercial, the station area zoning allows for very high densities of both housing and jobs, with a balanced jobs-to-housing ratio. A tight street grid supports a strong pedestrian environment. See Table 2 for detailed information on the station area attributes.



Westlake offers very high transit connectivity as the intersection of light rail and express bus service in the Seattle transit tunnel, and the Seattle streetcar and Seattle monorail at and above grade.

### *Core Station Area Case Study 2:* **Downtown Bellevue Transit Center**

The Downtown Bellevue transit center station area is serviced by local feeder and regional express bus service, and is a future bus rapid transit and light rail station. The dominant mixed-use and commercial zoning permits very high housing and job densities, with a balanced jobs-to-housing capacity ratio. Although the large street grid reduces pedestrian connectivity, Bellevue has created pedestrian-only passages to break up existing “super-blocks” and support foot traffic. See Table 2 for detailed information on the station area attributes.



Currently the transit center is serviced by numerous local feeder and regional express bus routes. The station area is also a planned Metro RapidRide station, scheduled to open in 2011, and future Link light rail station, opening in 2021.



The Downtown Bellevue station area includes a substantial portion of the increasingly dense employment, residential and civic uses in downtown Bellevue.



## CENTER

**Centers** may provide a regional employment or destination draw, however, they also function as distinct residential and employment districts within a city. These station areas typically possess an adequate (or nearly adequate) zoning capacity for a vibrant use mix, a street network and streetscape quality that encourages pedestrian and bicycle mobility, at least two modes of 18–24 hour transit service, and an intra-city user base that enables higher intensity uses than nearby areas without as good access to transit. Examples of this typology are the following future Link stations: Capitol Hill, Brooklyn, and Northgate in Seattle, Bel-Red in Bellevue, and Overlake in Redmond, and possibly the Renton and Burien transit centers.

	Capitol Hill	Brooklyn
Dominant zoned land uses	mixed-use, residential	mixed-use, institutional, residential
Transit Connectivity	high	high
Developable Acres	280	199
Existing Percent Open Space	3%	1%
Zoned Job Capacity ( <i>total jobs</i> )	17,500	13,600
Zoned Job Capacity Net Density ( <i>jobs/acre</i> )	63	68
Zoned Housing Capacity ( <i>total units</i> )	27,800	15,100
Zoned Housing Capacity Net Density ( <i>units/acre</i> )	99	76
Zoned Jobs to Housing Capacity Ratio	1 : 1.6	1 : 1.1
Street Center Line Miles per Square Mile	35	33

**Table 3: Center Station Area Case Studies**

**Centers function as distinct residential and employment centers within a city.**



*Center Station Area Case Study 1:*  
**Capitol Hill future Link light rail station, Seattle**

The Capitol Hill station area is located within a larger designated regional growth center, and is adjacent to the major employment centers of First Hill and Downtown Seattle. The station area is served by substantial local and regional bus service, and is a future station on the funded First Hill streetcar line and Link light rail. The existing dominant uses are retail and housing. The well connected street grid supports high levels of walking which in turn is supported by extensive retail options. See Table 3 for detailed information on the station area attributes.



**The centrally located Cal Anderson park provides the open space amenity vital to maintain a high quality of life in the relatively dense area.**



**The moderately-dense Capitol Hill station area is flanked on the west and south by higher density development in South Lake Union and Downtown Seattle, and by lower density single family development to the east.**

*Center Station Area Case Study 2:*  
**Brooklyn future Link light rail station, Seattle**



**The Brooklyn station area includes a moderately dense mixed-use core, between the UW campus and residential neighborhoods.**

The Brooklyn station is located within the designed University District regional growth center. The UW Tower at the core of the station area is the visual center of the entire district, as well as the center for transit connections, including existing express and local bus service, and a future Link light rail station. The zoning allows for a mix of moderately-dense housing and commercial uses. The street network encourages walking and bicycling. See Table 3 for detailed information on the station area attributes.



**The future light rail station will reside in a tunnel beneath the 325-foot UW Tower.**



## VILLAGE

**Villages** are smaller centers within the larger urban area, and typically do not serve as regional draws. Some transit villages may have the connectivity and zoning capacity necessary to achieve high performance on regional social and environmental goals, but some do not. The urban pattern may or may not encourage highly connective mobility networks. Secondary modes of frequent, high quality transit service are sometimes not readily accessible. Often, residents within the half-mile area characterize the majority of the user base. Examples of this typology include Roosevelt, Mt. Baker, and Othello stations in Seattle. Some centers in smaller cities, such as those serviced by Sounder commuter rail stations, may also fit this type.

	Mt. Baker	Roosevelt
Dominant zoned land use	residential, mixed-use	residential, mixed-use
Transit Connectivity	moderate	moderate
Developable Acres	279	251
Existing Percent Open Space	7%	9%
Zoned Job Capacity ( <i>total jobs</i> )	12,300	5,300
Zoned Job Capacity Net Density ( <i>jobs/acre</i> )	44	21
Zoned Housing Capacity ( <i>total units</i> )	13,100	7,500
Zoned Housing Capacity Net Density ( <i>units/acre</i> )	47	30
Zoned Jobs to Housing Capacity Ratio	1 : 1.1	1 : 1.4
Street Center Line Miles per Square Mile	27	34

**Table 4: Village Station Area Case Studies**

Residents within the half-mile area characterize the majority of the user-base in Village station area types.





The Mount Baker station area includes a core of big-box and strip development that is zoned for higher density mixed-use development, surrounded by a substantial amount of single-family zoning.

### *Village Station Area Case Study 1:* **Mount Baker Link light rail station, Seattle**

The Mount Baker station area possesses moderate transit connectivity, with a light rail station across the street from a transit center for local bus routes. Although auto-oriented commercial development dominates the station area core, the zoning calls for a mix of commercial and housing uses, with single-family residences on the periphery. Pedestrian and bicycle connectivity in the area is constrained by topography, a lack of a tight street network and an incomplete sidewalk infrastructure. The long-term vision of the station area plan creates a vibrant neighborhood town center, while preserving the diverse cultural character and relative affordability of the neighborhood. See Table 4 for detailed information on the station area attributes.



The Mount Baker station (under construction in this 2008 photo) is immediately surrounded by auto-oriented commercial development.



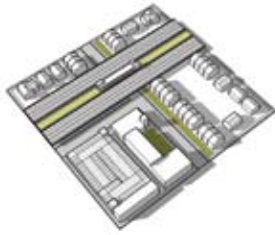
Development patterns include newer moderately-dense mixed-use development, older commercial properties, and historically significant single-family neighborhoods.

### *Village Station Area Case Study 2:* **Roosevelt future Link light rail station, Seattle**

By 2020, Roosevelt will be home to Link light rail service in addition to numerous existing local bus lines. Low to moderate intensity mixed-use zoning lines the station area, arterials, while the majority of the remaining land is zoned for single-family. Although the neighborhood has proposed modest upzones in the station area core to create a more vibrant center, the area is unlikely to provide the capacity for substantial housing or job growth such as found in the neighboring station areas of Northgate and Brooklyn. The street grid is compact, allowing people easy walking access to all parts of the neighborhood. See Table 4 for detailed information on the station area attributes.



The Roosevelt station area in north Seattle includes low and moderate density mixed-use zoning along the major arterials, surrounded by single-family.



## COMMUTER

Commuter station areas ring the periphery of the metropolitan core, often serving as the terminus for the transit line, or as a stop along the corridor. Stations are often sited along freeway corridors, greatly limiting the potential to create vibrant neighborhood centers around the station site. Station areas typically possess limited zoning capacity and civic amenities, have insufficient street connectivity for walking and biking, and few users in the immediate vicinity. Primary station access is usually via park and ride facilities and feeder bus service, as opposed to the multi-modal connectivity that would serve more diverse users. The Tukwila Link light rail station and the future South Bellevue Link light rail station are examples of this type.

	South Bellevue
Dominant zoned land uses	residential, park
Transit Connectivity	moderate
Developable Acres	181
Existing Percent Open Space	41%
Zoned Job Capacity ( <i>total jobs</i> )	0
Zoned Job Capacity Net Density ( <i>jobs/acre</i> )	0
Zoned Housing Capacity ( <i>total units</i> )	800
Zoned Housing Capacity Net Density ( <i>units/acre</i> )	4
Zoned Jobs: Housing Capacity Ratio	NA
Street Center Line Miles per Square Mile	15

**Table 5: Commuter Station Area Case Study**

### *Commuter Station Area Case Study:* **South Bellevue Park and Ride**

The South Bellevue Park and Ride exemplifies a commuter station area; the park and ride allows residents to access to regional bus service at a location to which they are highly unlikely to walk or bike. The environmentally-



**The half-mile South Bellevue station area is dominated by the Mercer Slough to the east, and low-density single-family housing to the west.**

sensitive Mercer Slough, which takes up nearly half of the station area, provides an important regional ecological function that must be maintained, but greatly limits the future growth of the station area. Low density

single-family zoning dominates the remainder of the station area, another limitation to redevelopment. There is no neighborhood center and no commercial or retail uses. Because of its nature, there can only be a few roadways in the large park, which reduces the otherwise moderate street connectivity. In addition, the low-density housing and lack of different land uses makes walking an unattractive mode option. See Table 5 for detailed information on the station area attributes.



## DESTINATION

**Destinations** are station areas encompassing a significant physical attraction that creates a large, singular user base. Universities, hospitals, institutions, major anchor employment campuses, stadiums, and large parks fall into this category. These station areas' physical and performance characteristics can vary widely, earning them their own typological category, but limiting meaningful generalizations based on type. Furthermore, many institutional uses may be subject to oversight and growth governance processes that are beyond the direct control of their 'home' jurisdictions, which can make deploying policies a considerable challenge. Examples include the Sodo, Stadium and University of Washington Link light rail stations in Seattle, the Overlake Hospital future Link light rail station in Bellevue, the Airport Link light rail station in SeaTac, and the Tacoma Dome Sounder commuter rail and Tacoma Link station.

	Stadium	Sodo
Dominant zoned land uses	industrial, mixed-use	industrial, commercial
Transit Connectivity	very high	moderate
Developable Acres	147	243
Existing Percent Open Space	2%	2%
Zoned Job Capacity ( <i>total jobs</i> )	30,900	57,800
Zoned Job Capacity Net Density ( <i>jobs/acre</i> )	210	238
Zoned Housing Capacity ( <i>total units</i> )	4,000	0
Zoned Housing Capacity Net Density ( <i>units/acre</i> )	27	0
Zoned Jobs to Housing Capacity Ratio	7.7 : 1	NA
Street Center Line Miles per Square Mile	31	23

**Table 6: Destination Station Area Case Studies**

**Destination station types have a regional draw, and may or may not have a local residential base.**

*Destination Station Area Case Study 1:*  
**Stadium Link light rail station, Seattle**

The Stadium station area is serviced by light rail; however, the northern portion of the station area includes King Street and Union Stations,



**The Stadium station area includes Qwest and Safeco fields and substantial amounts of industrial uses.**

the greatest transit access point in the central Puget Sound region with Link light rail, Sounder commuter rail, Amtrak service, numerous feeder and regional express buses, and a funded streetcar line. These connections provide service to the stadiums, the mixed-use areas of the International District and Pioneer Square, and the industrial area south of the stadiums. The street grid is more compact in the mixed-use areas, where pedestrians are more likely to be found. In the industrial areas, street connectivity is not as fine-grained, though this has recently been improved somewhat with a new multi-use trail next to the light rail tracks. See Table 6 for detailed information on the station area attributes.



**The Stadium station area is the center for major events throughout the year, such as the annual Rock and Roll Marathon pictured above.**



**The incompatibility of residential development with the current industrial uses ensures the Sodo station will remain a destination station type in the foreseeable future.**

*Destination Station Area Case Study 2:*  
**Sodo Link light rail station, Seattle**

The Sodo station provides access to light rail and local bus services. The area is the Duwamish manufacturing and industrial center, the industrial heartland of Seattle, with nearly the entire station area zoned for industrial uses. Residential use is prohibited through most of the industrial area because of its incompatibility with many industrial and manufacturing uses. The street grid focuses on serving the industrial uses through super blocks, making the area difficult for pedestrians, though this has improved somewhat with the multi-use trail adjacent to the light rail line noted in the Stadium case study. See Table 6 for detailed information on the station area attributes.

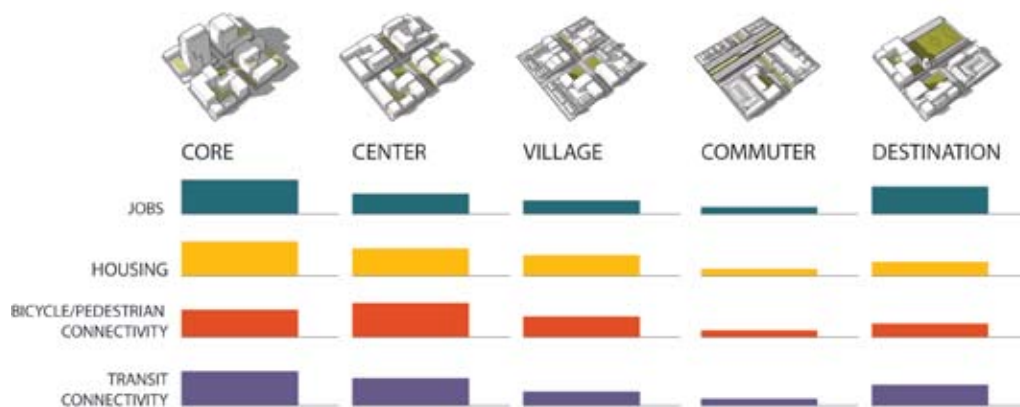


**The Sodo station area is comprised, nearly exclusively, of industrial land uses.**



### Comparison of Station Area Types

Evaluating and understanding the differences between station areas on specific attributes can help predict the degree to which station area types, and the specific station areas within that type, may perform highly on various social and environmental outcomes. The following Station Area Typology Matrix (see Figure 8) ranks and compares station area types on zoning attributes (jobs and housing capacity) and infrastructure conditions (bicycle and pedestrian, and transit connectivity)—the elements that create the foundation for eventual development patterns. The matrix ranks station area types for each measure on a scale of one (lowest-performing) to five (highest-performing).



*Figure 8: Station Area Typology Matrix*

The matrix reveals that performance diminishes across zoning and connectivity measures from Core, to Center, to Village, to Commuter. The Destination station area type is an outlier, for which place-specific conditions can vary greatly between station areas, making meaningful generalizations difficult.

As the Evidence section demonstrates, many factors that are influenced by zoning and infrastructure attributes impact social and environmental outcomes, including residential density, mix of uses, and pedestrian connectivity. Accordingly, one can expect Core stations to perform well, based on these attributes, followed by Center, Village and Commuter station types.

**Improving connectivity for people is a critical way to improve station area performance.**

However, while zoning and infrastructure provide the foundation for development patterns, public policy shapes the resulting communities in countless ways. Policies that ensure a range of affordable housing, a rich mix of uses, ample open space, protection of environmental, cultural and historically significant places and uses, and a vibrant and safe pedestrian experience will lead to a higher quality of life and long-term sustainability. It is the interplay between the zoning and infrastructure foundation and the additional programs and policies influencing land use and urban design that determines the station area's eventual level of performance as a TOC.

Furthermore, it is important to note that station areas are not static. Changing public policies, new infrastructure investments, and shifting employment and residential demographics will alter the performance of a station area. A Commuter station may evolve to a Village, a Village to a Center. Station area types may also grow toward each other along major boulevards or surface transit alignments to form high-performing transit corridors that connect key nodes in the city and region. These shifts may often lead to higher-performance on social and environmental outcomes, and should be encouraged.

## CONCLUSION

*Every station area is unique, and its eventual performance on social and environmental outcomes depends on a number of variables discussed in the Evidence section. Examining the zoning attributes (jobs and housing capacity) and infrastructure conditions (bicycle and pedestrian, and transit connectivity), however, is a useful method to categorize station areas into different types. Station area types with more intense land uses and better infrastructure are most likely to perform well. Public policy to provide for community needs and amenities, such as affordable housing and open space, are also a critical piece to ensure a high quality of life in station areas.*

*Existing research and best practices inform performance goals and measures, presented in the next section, to help identify station areas that are more likely to provide significant social and environmental benefits. And this enables the targeting of programs and funding to encourage more high-performing TOC in the future.*



Investments in pedestrian infrastructure can lead to a higher quality of life and long-term sustainability of a neighborhood.



The overarching goal of high-performing TOC is to provide housing and transportation choices that give residents access to homes, jobs, recreation opportunities, and stores and community services to meet their daily needs, without relying on a personal vehicle.

## MEASURES

If we are to achieve the many potential social and environmental benefits of TOC, we must integrate land use, transportation and housing policies and regulations to maximize the access and choices for people living, working and visiting high-capacity transit station areas. The following performance goals and measures seek to define *high-performing TOC*—those that have the greatest potential to provide the access and choices that lead to social and environmental benefits.

It is important to note that not all station areas can or necessarily should meet all these criteria. As the Typology section demonstrates, station areas have unique forms and functions, and actual performance on these measures will vary greatly. However, for the purposes of public policy—allocating limited resources for infrastructure or amenities, or enacting regulations to maximize the return on the public investment

in transit—it is useful to establish minimum performance standards to set apart high-performing TOC from other station areas.

For the purpose of these goals and measures, we define the station area by the roughly 500 acres within a half-mile walking distance radius around high-capacity transit stations. The seminal *New Transit Town* validates the use of the half-mile radius to define high-capacity TOD areas because data demonstrate that people are willing to walk a half-mile, or approximately ten minutes, to access high-capacity transit. The use of a half-mile radius planning area does not assume that uniformly dense land uses should necessarily be present throughout the half-mile area, in most cases, higher densities will be concentrated near the station site, with lower density uses at the periphery. However, it does assume that planning for the pedestrian and bicycle standards, design guidelines, affordable housing and open space should consider the entire half-mile station area. Several recent studies in Washington State also support the use of a half-mile walking radius to define high-capacity station areas, including the City of Bellevue’s 2008 *Light Rail Best Practices Report* and the University of Washington’s *From Barriers to Solutions and Best Practices: Urban Centers and TOD in Washington* released by the Quality Growth Alliance in 2009.

Furthermore, for the purposes of these goals and measures, high-capacity transit is defined as fixed-rail transit, bus rapid transit, or multiple high-frequency bus routes that operate on no less than ten-minute headways at peak service, or by commuter rail service that connects the station area to other regional centers. In addition, high-performing TOC should also be supported by feeder or circulator transit service to



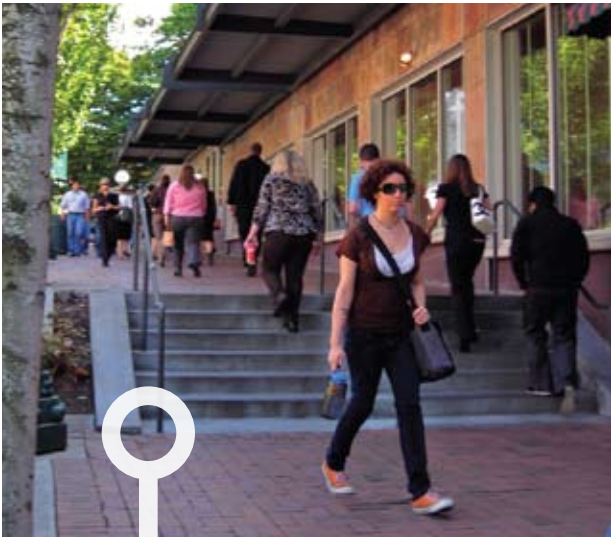
**The Burien Town Square project embodies many characteristics of a high-performing station area, including a high residential density with good transit connectivity, a mix of residential, retail and civic uses, and plenty of green space.**

connect adjacent areas to the station area. It should be noted that this definition is meant to differentiate areas served by frequent high-capacity transit from other areas less served by transit. Certainly there are other transit nodes and corridors with lower headways in vibrant neighborhoods that can accommodate growth, but they are unlikely to achieve the same level of social and environmental benefits as higher-capacity transit station areas.

The overarching goal of high-performing TOC is to provide housing and transportation choices that give residents access to homes, jobs, recreation opportunities, and stores and community services to meet their daily needs, without relying on a personal vehicle. This has the long-term result of increasing the quality of life and reducing the cost of living for residents, lessening environmental impacts of development, and reducing transportation and energy-related greenhouse gas emissions. Local jurisdictions should design and support high-performing TOC to allow at least



**Pedestrian and Bicycle Connectivity:** This Bellingham café spills onto the wide tree-lined sidewalk, making for a safe and vibrant pedestrian environment.



**Pedestrian and Bicycle Connectivity:** The City of Bellevue has created a successful pedestrian walkway that cuts through the “superblocks” of their downtown grid in order to connect pedestrians from the transit center to the downtown core.

half of all trips that originate or terminate in the station area to be made by walking, biking or transit.

Plans, policies and regulations that meet the following seven performance goals and measures would enable a high-capacity transit station area to become a high-performing TOC. These measures are derived from trends and practices discussed in the Evidence section, and further supported by accepted best practices in urban planning and design, such as LEED-ND standards and recommendations in the 2009 University of Washington and Quality Growth Alliance report, *From Barriers to Solutions and Best Practices: Urban Centers and TOD in Washington*. The measures were then “ground-truthed” against the case studies in the Typology section to ensure that the measures set high but achievable standards for high-performing TOC.

### 1: Pedestrian and Bicycle Connectivity

**GOAL:** High-performing station areas will provide a complete pedestrian and bicycle network to facilitate safe non-motorized vehicle transportation and promote easy access to transit.

**MEASURES:** High-performing TOC should provide “complete streets” that are designed and operated to allow safe access for users of all modes and ability levels. High-performing station areas should have a street center line mile average of no less than 30 center line miles per square mile, as a measure of street connectivity. In addition, street grids should strive to have blocks no larger than three hundred feet by three hundred feet square. In areas where this is not possible, well designed mid-block pedestrian and bicycle pathways could be used to accomplish a similar result.

However, street connectivity does not directly measure the quality of the infrastructure for walking and bicycling. Therefore in addition to good street connectivity, high-performing TOC should provide sidewalks and bicycle infrastructure commensurate with population and traffic patterns, including measures of street type, vehicle volume and speeds.

## 2: Housing Affordability

**GOAL:** High-performing TOC will provide housing affordable to a broad range of incomes to accommodate and encourage a diverse, mixed-income community.

**MEASURE:** High-performing TOC should provide housing affordable to low- and moderate-income households commensurate with the need demonstrated through a comprehensive needs assessment for both the local jurisdiction and the specific station area, based in part on the existing and expected job types. Typically this would require that no less than 25% of all housing units be affordable to households earning 80% or less of the area median income, 10% of all housing units be affordable to households earning 50% or less of the area median income, and guarantees of no net loss of affordable housing.

## 3: Residential and Employment Density

**GOAL:** High-performing TOC will provide ample opportunities to accommodate future population and employment growth in order to support transit use, encourage economic development and social equity, promote a healthful urban environment, support businesses and amenities within the station area, and reduce the potential adverse environmental impacts of growth.

**MEASURE:** High-performing TOC should be zoned to allow a residential and employment density of no less than 25,000 housing and employment units, of which at least 15,000 must be housing units, within the half-mile station area.<sup>‡</sup> This allows for an overall average gross density of approximately 50 housing and employment units per acre.<sup>§</sup> The average allowed net density, however, would be higher, depending on the amount of developable land within the station area. Most high-performing station areas will greatly exceed this threshold; in fact, four of the nine case studies in the Typology surpass this measure under current zoning. See pages 52–53 for a description of density ranges.

<sup>‡</sup> See Appendix A for a discussion of the data assumptions involved with housing and employment density calculations.

<sup>§</sup> Data suggests that at 50 units per acre residents take more daily trips by walking, biking, or transit than by personal vehicles. See the Evidence section for further discussion of the important relationship between density and key social and environmental benefits.



**Housing Affordability:** The moderately dense Rainier Vista Hope VI development in Seattle provides a range of low, moderate and market rate ownership and rental units adjacent to light rail.



**Housing Affordability:** The TOD at the King County Metro Transit Center in Downtown Redmond includes 322 residential units, with 20% affordable to households making less than 80% of the area median income.

## Scales of Residential Density

Land use regulations in TOC should allow a variety of housing types and forms to achieve moderate to high residential densities near transit. Local residents and stakeholders should decide, through station area planning, the appropriate mix and scale of housing types to ensure that the community may grow in a way that respects and augments the neighborhood's character and assets.

Density is a function of several building and site factors, including size of units and amount of surface parking. For example, the Stone Way Apartments contain a large percentage of two and three bedroom units, but achieve a high density because all of the parking is below-grade. This allows more of the parcel's surface to go toward housing.

The similar scale development at Rainier Vista (see upper photo on page 51) has smaller unit sizes, but achieves a much lower density, 66 units per acre compared to Stone Way Apartments' 98 units per acre, because a significant portion of the parcel is used for surface parking.



These townhouses at the Rainier Vista mixed-use development in Seattle provide eight low and moderate-income homes on 0.6 acres for a net density of 14 units per acre.



The Stone Way Apartments mixed-use development in Seattle's Wallingford neighborhood provides 70 low-income apartments on 0.71 acres for a net density of 98 units per acre.



The Salmon Creek mixed-use project at the Greenbridge development in White Center provides 34 low-income homes on 1.3 acres for a net density of 26 units per acre.



The Nia Apartments at the Greenbridge mixed-use development in White Center provides 82 low-income apartments on 1.39 acres for a net density of 59 units per acre.



The Alcyone mixed-use development in Seattle's South Lake Union neighborhood provides 161 mixed-income apartments on 0.83 acres for a net density of 194 units per acre.



The 18-story M Street mixed-use development in Seattle's First Hill neighborhood provides 220 market-rate apartments on 0.66 acres for a net density of 333 units per acre.



**Mix of Uses:** Successful TOC must provide for a mix of housing and jobs, in addition to retail and community services, such as this grocery beneath medical offices and residences in the dense First Hill neighborhood of Seattle, to meet the daily needs of residents.

#### 4: Mix of Uses

**GOAL:** High-performing TOC will include a range of uses to provide access and choices in housing, employment, stores and community services to meet daily needs, and recreational opportunities to create a complete and accessible community.

**MEASURE:** High-performing TOC should allow a balance\* of residential, commercial, retail and recreational uses. In addition, zoning in high-performing TOC should allow for at least one housing unit for each employment unit in the station area.

#### 5: Green Infrastructure and Open Space

**GOAL:** High-performing TOC will provide ample park and open space, public areas, and recreational opportunities to meet the needs of a community with a moderate to high residential and employment density, and will provide for green spaces and strengthen the functioning of natural systems.



**Green Infrastructure and Open Space:** It is important to site parks and public spaces to provide open space and recreational opportunities near high-density areas, such as the Riverfront Park in downtown Spokane.

*\* LEED-ND uses the Simpson Diversity Index to measure unit type diversity in the designated area.*

**MEASURE:** High-performing TOC should include planning and funding for adequate open space and public areas within or near the station area. In addition, high-performing TOC will include policies to increase the urban tree canopy within the station area and incorporate low impact development measures to minimize storm water runoff.

## 6: Parking

**GOAL:** High-performing TOC will include parking policies and requirements that encourage housing affordability, safe pedestrian streetscapes, and good urban design and form.

**MEASURE:** High-performing TOC should eliminate minimum parking requirements for all uses and set appropriate parking maximums. In addition, surface parking lots and at-grade parking, with the exception of on-street parking, should be prohibited.

## 7: Urban Design

**GOAL:** High-performing TOC will feature well-designed buildings, streetscapes and public spaces that support pedestrian safety and promote neighborhood character and values.

**MEASURE:** High-performing TOC should have in place community-created design guidelines and standards for buildings and streets that include criteria to make safe and activated streetscapes, discourage uses and designs that disrupt pedestrian and bicycle flow and access, incorporate locally important characteristics and historic structures, and promote good building design.



**Parking:** When well-planned, parking should not interfere with pedestrian or bicycle flow. In this example from North Seattle, the on-street parking serves to protect the pedestrian-friendly streetscape from the street traffic.



**Urban Design:** Design guidelines can be a way to ensure high quality new construction while preserving historically significant structures, such as this example of a new mixed-use project in Seattle's Pike-Pine Corridor beside a much older brick building.



Seattle's Thornton Place at Northgate provides a mix of uses, range of housing types, and new open space adjacent to a future light rail station. The project supports the revision of this auto-centric area into a higher-performing transit-oriented neighborhood.

## Evaluating Station Area Types

Evaluating the station area types developed in the Typology section against the seven goals and measures outlined above reveals several patterns. Based on the zoning attributes (jobs and housing capacity) and infrastructure conditions (bicycle and pedestrian, and transit connectivity) of station areas, Core and Center station area types are most likely to perform well on measures for connectivity, density, and mix-of uses. Some station areas within the Village and Destination types may also perform well on these measures,

while others will not. Commuter station area types are unlikely to perform well on measures for connectivity, density and mix-of-uses.

Performance on the remaining four measures—housing affordability, green infrastructure and open space, parking, and urban design—is dependent upon local programs and conditions that transcend station area type.

## CONCLUSION

*By enacting policies and regulations to meet these seven goals and measures to the greatest extent possible in station areas, local jurisdictions can provide better access to choices for residents while achieving critical regional social and environmental benefits. In order to do so, however, local jurisdictions must be able to engage in meaningful station area planning and provide funding for necessary improvements to implement plans. Wise policies and regulations can improve a station area's performance over time.*

*Effective planning for TOC will require shifts in the land use and transportation regulatory and financing framework from the local to the federal level. The following section provides an overview of policy action items to facilitate this process.*



## ACTION

Transit investments provide new access that can support and revitalize existing station area communities and create opportunities for growth and economic development. In general, public policies, regulations, and incentives in station areas should:

- > *Encourage optimal performance on all measures in all station areas;*
- > *Provide support and incentives for high-performing TOC; and*
- > *Plan for high-performing TOC along future high-capacity transit investments.*

All station areas should have sufficient uses and intensity to leverage the transit system to make progress toward the goals discussed in the Measures section. While the most intense land uses may be reserved for Center and Core station area types, there are

Residents in Seattle's Rainier Valley participate in an urban design workshop, or 'charrette', which charges local stakeholders, businesses, urban design experts, public agencies, and the local jurisdiction to work actively together in the design of their community. In highly integrated planning efforts, the values gleaned from community workshops help inform implementation strategies and development codes, which will regulate the physical design of buildings, streetscapes, and open space networks.



The City of Bellevue dedicated over four years to plan a new vision for the Bel-Red corridor, resulting in the most comprehensive station area planning to date in the State of Washington. The sub-area plan, which includes two future Link light rail station areas, and portions of two others, gives special attention to bicycle and pedestrian connectivity, and open space and green infrastructure, while also providing zoning capacities to absorb substantial residential and employment growth. Plan implementation includes incentive zoning mechanisms to provide affordable housing, participation in a regional transfer of development rights program, and hundreds of millions of dollars in planned infrastructure improvements.

other station area attributes, notably pedestrian and bicycle connectivity, affordable housing and open space, that should be encouraged at all stations regardless of intensity of use.

Over time, infrastructure investments, zoning changes, and the homes and jobs they foster may improve a station area's performance. As documented in the Typology section these improvements may shift the character of a station area from Commuter to Village, or from Village to Center. Public policy should encourage and reward these transitions.

Future transit funding—the critical first ingredient of TOC—will likely bring expansions to the existing system in central Puget Sound, as well as the creation of new high-capacity transit systems in other regions of the state. Public policy should also be crafted to anticipate and support the establishment of high-performing TOC at the station areas of the future.

Unfortunately, many barriers to the implementation of high-performing TOC exist. The recent Quality Growth Alliance/University of Washington report *From Barriers to Solutions and Best Practices: Urban Centers and TOD*<sup>109</sup> details barriers at the regulatory, social, financial, institutional and political levels. In particular, the “silo” approach typical of conventional planning is insufficient; rather, local jurisdictions should commit to more innovative processes that integrate land use, transportation, and housing policies in the context of community needs and market conditions. The following recommendations build on the findings of that report by outlining pivotal policy changes at the local, regional, state and federal level needed to foster more and higher-performing TOC throughout the state.

## LOCAL ACTIONS

➤ **Conduct sub-area planning for TOC.** Local jurisdictions, in collaboration with regional transit agencies and Metropolitan Planning Organizations, should conduct comprehensive sub-area planning for high-capacity transit station areas, typically

encompassing the area defined by a half-mile walking distance radius around the station site. For areas in which the station area is a part of a larger sub-area plan, the local jurisdiction should devote special attention to the station area. Station area plans should integrate land use, transportation and housing policies to optimize performance toward the goals and criteria in the Measures section.

The sub-area planning should also focus on the fine-grained issues and opportunities that help TOC function well. For example, planning for attractive and functional walking and bicycling networks requires review of existing street and sidewalk networks, identification of gaps and deficiencies, and thoughtful design standards for architecture, site design, street trees, street furniture, and open spaces. Sub-area plans are an opportunity to address these fine-grained, but important issues and opportunities that are usually not addressed at the necessary level of detail in city-wide plans.

If environmental studies are needed in association with the sub-area plan, the preparation of a Planned Action can be an effective strategy. A Planned Action approach addresses environmental issues well in advance of development, and thereby reduces time spent on subsequent permitting and entitlement. This can help make projects more feasible by lowering development costs—savings that can be passed on to the end user.

**> *Encourage meaningful public engagement in TOC planning.*** High quality plans combine the perspective and vision of local residents, businesses and property owners, along with the technical knowledge of planners. Meaningful collaboration between private and public interests through charrettes or other opportunities for neighborhood

involvement is essential to build on a neighborhood’s best qualities and unique character. Such opportunities for community input can also allow neighbors to feel ownership of the plan, thereby increasing chances for the plan’s successful implementation and long term relevance.

Most neighborhoods develop incrementally, one building or one block at a time, over many years, even when significant investment in transit catalyzes the process. Areas looking to encourage resilient, transit-supportive growth should bring together the many players that will enact this change—not only to build a cohesive vision for the community, but also to ensure that this vision is well-informed, politically sustainable, coordinated, practical, and contextually appropriate. Planning efforts should integrate lessons learned from the public engagement processes into the implementation strategies and development codes that will regulate the design of buildings, streetscapes, and open space networks and encourage new growth, programs, and amenities.

**> *Plan and fund for public facilities and service in TOC.***

As this report has documented, public facilities and amenities are needed to create TOC that provide a full range of social and environmental benefits. Local jurisdictions should plan for the needed public facilities and amenities and use available funding sources to help provide for them. Funding sources include local government capital improvement funding, enterprise funds for public utilities, local improvement districts, impact fees, systems development charges, Washington State Environmental Policy Act (SEPA) exactions and state and federal grants.<sup>110</sup> Public investments can have a catalytic effect, encouraging the development and revitalization of station area neighborhoods.



Form-based codes extensively use images and diagrams to illustrate how future development shapes a vibrant, pedestrian-friendly public realm. Each code element is calibrated to the unique physical qualities and economic potential of individual sites. Developing a form-based code involves substantial public engagement to ensure that the resulting design meets community character and values.

➤ **Develop strong and innovative land use regulations in TOC.** Successful TOC planning efforts must be analysis-based, community-oriented, forward-thinking, and above all, implementable. This means that public facilities investments should be coordinated to support overall planning goals, and development regulations should encourage a variety of building types that are financially feasible and consistent with a neighborhood’s character. Overall, station area land use regulations should promote development patterns that achieve measurable social and environmental benefits for the local community and for the region.

A variety of tools exist to regulate land use and urban form in a way that can support growth, preserve key assets, and also enhance the character of the public realm. Form-based codes and performance-based standards utilize area-specific analyses as well as community feedback to establish urban design standards that shape future development and improvements, carefully crafting the physical relationships that enable connective streetscapes and contextual development.

Development incentives can target preferred uses, key neighborhood programs, and amenities. Low impact development standards, measures to reduce GHG emissions, minimum density thresholds, and development rights transfers can improve environmental performance. Often, a suite of these tools is appropriate.

➤ **Reform parking requirements and programs.** In order to encourage walking, bicycling and transit use, minimum requirements for off-street parking spaces should be eliminated for all uses in TOC. In addition, there should be limits on the maximum number of allowed off-street parking spaces. Surface parking lots underutilize land and diminish the pedestrian environment, and should be prohibited in areas with good transit service, including TOC. Cities and counties should develop parking strategies that include parking taxes and parking impact fees that could fund pedestrian and bicycle improvements while reflecting the actual hidden costs of parking spaces and driving. If parking was priced at its true cost, it would send a price signal that would increase the number of trips made by walking, bicycling and transit.

➤ **Encourage innovative housing types in TOC.** Innovative housing forms, such as cottage housing, row housing, and accessory dwelling units, are an important way to add density in single-family zones with minimal impact on the character of these



**Well-designed townhouses can add density to single-family zones with minimal impact on the character of the neighborhood. The Ross Road Townhomes in Bothell provide a net density of 16 units per acre.**

neighborhoods. Such strategies are critical, as single-family zoning is the predominant land use in most Commuter and Village station area types, greatly limiting the opportunity for people to live within walking distance of the station. Promoting greater density in single-family zones can be politically challenging, and innovative housing forms can provide a crucial compromise to allow the station area to function better.

***Link affordable housing programs to TOC.*** Local jurisdictions must adopt programs to encourage and require affordable housing to meet the amount and affordability levels needed in the station area. Programs should include tools such as tax abatements and incentives, and workable density bonuses.

Residential development in station areas should not be required to provide on-site parking, which adds substantially

to the rental or ownership cost of units. Further, state and federal housing funding should be directed to these station areas so they can provide their regional fair share of affordable housing. Programs and regulations should also provide for no-net loss of affordable housing and preserve the existing affordable housing stock when consistent with the preferred and needed urban form.

**➤ *Consider TOC as TDR receiving sites.*** Transferable Development Rights (TDR) programs use an incentive mechanism to permanently preserve working farms and forestlands (“sending sites”) while directing development to appropriate infill areas (“receiving sites”). TDR programs depend on viable receiving sites at which

property owners may purchase development rights from sending site property owners in exchange for a market incentive. Station areas are often viable receiving sites—infill areas appropriate for development with market conditions that can support the incentive mechanisms of the program. Local jurisdictions should evaluate station areas and market conditions as potential TDR receiving sites. When upzones take place in station areas, local jurisdictions should link density and height increases to participation in a TDR program.

## **REGIONAL ACTIONS**

**➤ *Maximize the potential for high-performing TOC along future high-capacity transit alignments.*** Future high-capacity transit stations should be sited to maximize social and environmental benefits and to help achieve GMA goals.



The greatest opportunity to encourage transit-oriented development comes with the station siting decision. Locating stations in growth centers and neighborhoods centers, rather than along freeway corridors, will lead to higher-functioning station areas.

Local and regional transit agencies that plan and site high-capacity transit lines should give priority to alignments and station sites that can best achieve the goals and measures discussed in the Measures section within one half mile of the station site. This would mean siting most stations in growth centers and neighborhood centers rather than freeway corridors that would be accessed largely by auto trips. In addition, local jurisdictions should not receive a station site without an explicit willingness to plan and implement policies to ensure the station area will perform well on the goals and measures in the Measures section.

**> Support local station area planning at the regional level.**

Regional transit agencies and Metropolitan Planning Organizations should provide support, through both funding and technical assistance, to station area planning efforts at the local jurisdiction level.

**> Incorporate the measures from this report into the regional transportation planning organization guidelines and principles.** Regional transportation planning organizations, such as the Puget Sound Regional Council, prepare guidelines and principles in cooperation with cities and counties.<sup>111</sup> The cities and counties then use these guidelines and principles to prepare the transportation related elements of their comprehensive plans.<sup>112</sup> The regional transportation planning organizations use the guidelines and principles, the regional transportation plans, and the comprehensive plan requirements of the GMA to evaluate and, if they comply, certify the transportation related elements of county and city comprehensive plans.<sup>113</sup> The regional transportation planning organizations should incorporate the recommended measures from this report into the guidelines and principles and use them to prepare, evaluate, and certify comprehensive plans.

**> Prioritize funding for high-capacity transit and high-performing TOC in regional transportation plans.** As we have seen, high-performing TOC provide a wide array of social and environmental benefits, including increased mobility. These

benefits are consistent with state and federal transportation planning and construction priorities. Therefore regional transportation planning organizations should prioritize funding for high-capacity transit and high-performing TOC, thereby encouraging land use patterns that provide the largest transportation benefits.<sup>114</sup>

## STATE ACTIONS

➤ **Define high-performing TOC in statute.** A legislatively adopted definition of high-performing TOC would help local jurisdictions better plan for these communities and achieve their potential for social and environmental benefits. This definition should be based on the goals and measures in the Measures section of this report. Incentives should be provided to encourage and enable local governments to meet the legislative definition.

➤ **Reflect regional transportation priorities in state transportation funding decisions.** Regional transportation plans are required by both state and federal law.<sup>115</sup> These plans are required to identify the most efficient transportation investments taking into account a broad array of factors. Regional governments are required to involve local governments, state agencies, businesses, legislators, and the community as a whole on their policy boards and when making decisions on proposed transportation facilities and services. The transportation funding decisions of state agencies and the state legislature should be consistent with and help implement the regional transportation plans.

➤ **Authorize fiscal home rule.** Fiscal home rule refers to allowing local governments to enact the taxes and charges of their choice within the requirements of the Washington State and U.S. Constitutions. Currently in Washington State, local governments can only adopt taxes and charges authorized by state law, and this gives local governments little flexibility in

raising revenues. Fiscal home rule will allow a community to plan for the future it wants and design a revenue system to fit that community, rather than to design the community to fit Washington's current tax system. One of the options that should be included in fiscal home rule is street utilities to help local governments fund the maintenance and reconstruction of streets, sidewalks, and related facilities.

➤ **Provide more tools for long-term infrastructure funding and greater state funding.** Washington State and its local governments lack many important tools to fund public facilities and services that are available in other states. While Washington has adopted several forms of tax increment financing within the limitations of the current constitution, these programs are very restricted. The legislature and the voters should amend the constitution to authorize tax increment financing, which allows some or all of the increased property taxes generated by new development to pay for the public facilities in support of that development for a limited period of time. The legislature should also authorize other infrastructure funding tools including value capture taxation, which allows some of the increase in land values that result from public investments to be used to pay for those investments.

State funding for public facilities should be targeted to station areas, consistent with SB 5560. The bill passed in 2009 and requires new state investments to further the state's greenhouse gas and VMT reduction goals. Once the state funding situation improves, the state should provide additional funds for these purposes on a consistent basis.

➤ **Provide expanded taxing authority for transit funding.** Since passage of the state constitution's limitation on gas tax for "highway purposes" in 1943, the state has not treated transit as the critical component of our state's transportation



Transit agencies, such as King County Metro, rely on regressive sales tax for funding. This highly volatile funding source is currently leading agencies across the state to cut service despite record levels of ridership.

system that it truly is. Since the legislature repealed the Motor Vehicle Excise Tax (MVET), following passage of I-695 in 1999, the state has provided little funding for transit capital or operations. Transit agencies largely rely on sales tax, a volatile source of funding. The legislature must provide transit agencies with more local options such as MVET and local tolling revenue.

In addition to increased local taxing authorities for transit, the state should increase existing regional mobility, rural transit and disabled access grant programs by a factor of at least three so they can provide a more balanced transportation system that benefits all of the citizens of Washington State. Funding sources for these grants could include any of the following sources: toll revenue, VMT charges, upstream fuel taxes (barrel fee or refinery tax), a carbon tax, a sales tax on fuel, increased vehicle weight fees or a tax based on engine displacement. The state must not restrict new revenue sources to “highway purposes” as with the current gas tax.

**➤ Adopt legislation to implement the Federal American Clean Energy and Security Act.** The federal government will likely pass a bill to address climate change and energy

efficiency in the next year (further described under Federal Actions below). While Washington State is a national leader on building energy efficiency, it will need to adopt state legislation to help effectively implement the new federal law so state and local governments and Washington citizens can fully benefit from the new federal legislation. Compatible state legislation would require transportation and land use plans to include strategies for meeting the state’s VMT reduction goals while relying on reasonable assumptions for future vehicle technologies, market penetration of cleaner cars, low carbon fuels, land use changes and the ability to reduce GHG emissions in other sectors of the state’s economy.

## FEDERAL ACTIONS

**➤ Pass comprehensive federal clean energy and climate change legislation.** HR 2454, the American Clean Energy and Security Act, or Waxman-Markley bill, passed by the US House of Representatives requires the EPA to establish national transportation-related GHG reduction goals. The Senate’s version of the bill, recently introduced by Senators Barbara Boxer and John Kerry, also includes these provisions. So, any federal climate bill signed into law will likely

require states and Metropolitan Planning Organizations to develop transportation plans consistent with those reduction goals. These plans would provide the framework for future transportation investments funded with federal, state and regional dollars.

**> Reauthorize the Federal Transportation Funding Act including improved federal transportation policies.** The new federal transportation bill (SAFETEA-LU reauthorization) should award funding to transportation projects based on performance standards such as the ability to meet existing environmental standards, GHG reduction and VMT reduction standards, safety, household transportation costs, pedestrian and bicycle mobility and metropolitan mobility. Highway investments should be prioritized to “Fix-it First” projects (the preservation and reconstruction of the existing highway system) and safety projects. The highway/transit split, now 80% highways and 20% transit, should be changed to increase the funding invested in transit to effectuate our GHG reduction goals and increase metropolitan mobility.



**Increased federal funding for regional transit will help effectuate our GHG reduction goals and increase metropolitan mobility.**

**> Provide federal technical assistance for TOC planning and implementation.** The Partnership for Sustainable Communities, a joint project of the U.S. Department of Housing and Urban Development, the U.S. Department of Transportation, the U.S. Environmental Protection Agency, should be funded to assist metropolitan areas in efforts to plan for and implement TOC, complete streets policies, sustainable building practices, and amenities in centers and TOC.

## CONCLUSION

*High-performing transit-oriented communities have the potential to provide numerous essential benefits for both people and the planet. Our world faces tremendous social and environmental challenges that we all must solve together—from cost of living and quality of life, to the long-term environmental sustainability of our land, water, and air. Fostering transit-oriented land use patterns that give people access and choices, while protecting the planet, is critical to resolving these challenges.*

*To realize the benefits of TOC, we must all work together. There is no single policy solution that will bring about more vibrant and high-performing TOC across Washington State; rather, it will take many actions at all levels to create the regulatory and funding framework to allow more high-performing TOC to emerge. It will take understanding and support of these issues by a broad array of interests, including neighbors, businesses, planning staff, elected officials, and the advocacy community.*

*Thank you for your interest in this important work, and we encourage you to learn more, get involved and take action in your own communities.*

## APPENDIX A

### STATION AREA CASE STUDIES: DEFINITIONS, CALCULATIONS, AND SOURCES

The following describes the definitions, calculations, and sources that were used derive the data for the station area case studies detailed in the Typology section.

#### *Definitions for the Typology Tables*

**TRANSIT CONNECTIVITY** A simplistic, yet telling measure of the ability for a person in a station area to take transit, considering access to local transit and a variety of high-capacity transit. See the Transit Connectivity Calculation below for the calculations.

**DEVELOPABLE AREA** The Station Area minus public rights-of-way, property belonging to the city government (libraries, parks, schools, utilities, other), state government, federal government, hospitals, major stadiums (i.e. Qwest and Safeco Fields), private schools, and railroads.

**EXISTING PERCENT OPEN SPACE** The percentage of the Station Area which is public parks and public open space.

**ZONED JOB CAPACITY** The number of employees that could be accommodated in the Developable Area of a Station Area, assuming all parcels are developed to the full capacity allowed by existing zoning.

**ZONED JOB CAPACITY NET DENSITY (jobs/acre)** The Job Capacity divided by the Developable Area.

**ZONED HOUSING CAPACITY** The number of dwelling units that could be accommodated in the Developable Area of a Station Area, assuming all parcels are developed to the full capacity allowed by existing zoning.

**ZONED HOUSING CAPACITY NET DENSITY (units/acre)**  
The Housing Capacity divided by the Developable Area.

**ZONED JOBS TO HOUSING CAPACITY RATIO** The ratio of Job Capacity to Housing Capacity.

**STREET CENTERLINE MILES PER SQUARE MILE** The density of street centerline miles in an area is an established proxy for the level of connectivity provided for pedestrians and cyclists, and has been used in green building standards such as LEED-ND.

#### *Definitions for the Zoning Capacity Calculations*

**STATION AREA** The area within a half-mile radius circle centered on an existing or planned station. The center point is located at the approximate middle of the station.

**MIXED-USE ZONE** A zone permitting both commercial and residential uses. For estimating residential and commercial capacity, the allowed floor area in a mixed-use zone is assumed to be split into  $3/4$  residential and  $1/4$  commercial. This assumption is based on typical midrise, mixed-use projects that have been recently developed in the Puget Sound region.

**AVERAGE MULTIFAMILY DWELLING UNIT SIZE** The gross floor area of the average multifamily dwelling unit—including apartments and condos—is assumed to be 1,100 square feet. This assumption is based on typical multifamily product found in the Seattle area.

**EMPLOYEE UNIT AREA** The average commercial gross floor area occupied by one employee, as defined by the assumptions used in the King County Buildable Lands Report.

#### *Zoning Capacity Explanation and Calculations*

The housing and job capacity calculations represent the full-build out of the station area to the maximum density allowed under current zoning. Actual redevelopment of a station area, on the other hand, does not happen all at once. Rather, it is a never-ending process in which sites are redeveloped one parcel at a time over the course of decades and as the market dictates.

So, why calculate density capacity under existing zoning instead of the density of the actual use on the ground today? If TOC are a logical place to accommodate future residential and employment growth, then it is critical to ensure that zoning allows adequate capacity for additional housing and job units. Once redeveloped, a building may rest on a site for 50–100 years, making a strong case for long-term vision when making zoning decisions in station areas. By making sure that zoning is sufficient to help meet long-term growth needs, important and unique opportunities to redevelop station area sites will not be under-realized.

Zoned capacities were calculated using the following methods:

**DWELLING UNIT CAPACITY: SEATTLE** For purely residential zones, divide the Developable Area in the zone by the minimum allowable lot size for the given zone (e.g. 5,000 square feet for SF 5,000, or 600 square feet for L-4).

For mixed-use zones, multiply the Developable Area in the zone by the floor-area ratio allowed by code. Multiply by 0.75 to account for the assumed residential/commercial split. Divide by the assumed 1,100 square foot per unit average apartment/condo size.

**DWELLING UNIT CAPACITY: BELLEVUE** For purely residential zones, multiply the Developable Area in the zone by the dwelling units per acre allowed by code for the given zone.

For mixed-use zones, multiply the Developable Area in the zone by the floor-area ratio allowed by code. Multiply by 0.75 to account for the assumed residential/commercial split. Divide by the assumed 1,100 square foot per unit average apartment/condo size.

For mixed-use zones with unlimited floor-area ratio, assume sites will be developed to the maximum allowed building height and the maximum allowed floor-plate area, and will have an average a floor-to-floor height of 14 feet. For each parcel in the zone, assume the development of one building with a base that fills the parcel, and calculate the maximum total allowed floor area for each parcel. Sum the allowed floor areas for every parcel. Multiply by 0.75 to account for the assumed residential/commercial split. Divide by the assumed 1,100 square foot per unit average apartment/condo size.

**JOB CAPACITY:** For purely commercial zones, multiply the Developable Area by the floor-area ratio allowed by code for the given zone. Divide by the zone's Employee Unit Area (square feet per employee) as defined by the King County Buildable Lands Report.

For mixed-use zones, multiply the Developable Area in the zone by the floor-area ratio allowed by code. Multiply by 0.25 to account for the assumed residential/commercial split. Divide by the zone's Employee Unit Area (square feet per employee) as defined by the King County Buildable Lands Report.

In mixed-use zones with unlimited floor-area ratio, calculate the total allowed floor area for the zone following the method described above for dwelling units in Bellevue. Multiply by 0.25 to account for the assumed residential/commercial split. Divide by the zone's Employee Unit Area (square feet per employee) as defined by the King County Buildable Lands Report.

### ***Transit Connectivity Calculation***

Determine all types of transit within the Station Area  
Give one point per access to any of the following:

- *Five or more local bus routes which operate at least twelve hours per day*
- *One or more express bus routes which operates at least twelve hours per day*
- *One or more streetcar stations*
- *One or more Bus Rapid Transit stations*
- *One or more light rail stations*
- *One or more heavy/commuter rail stations*

Out of the six points available, the ranking system based on the point total is as follows:

*One = low*

*Two = moderate*

*Three = high*

*Four or more = very high*

### ***Sources***

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City of Bellevue, GIS Data (2007).

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City of Seattle Data Request, Development Capacity Assumptions, July 2, 2009.

City of Seattle, GIS Data (2006).

City of Seattle, *Seattle Municipal Code Title 23: Land Use Code* (2009). <http://clerk.ci.seattle.wa.us/~public/toc/t23.htm>

## GLOSSARY

**Affordable Housing:** Affordable housing is generally defined as housing where the occupants are paying no more than 30 percent of their gross incomes for housing costs, including utilities, and meets the needs of moderate- or low-income households. In 1974, Congress defined “low income” and “very low income” for U.S. Department of Housing and Urban Development (HUD) affordable housing rental programs as incomes not exceeding 80 and 50 percent, respectively, of the area median family income. These remain the most common definitions. Other categories, such as moderate income, between 80 and 100 percent of the area median family income, are also used for certain affordable housing programs.

**Bus Rapid Transit (BRT):** A public transportation system that uses buses to provide a transportation service that is of a higher speed than an ordinary bus line. Often this is achieved by having lanes that are dedicated to buses (sometimes referred as busways especially in Europe), or making improvements to existing facilities, vehicles, and scheduling. The goal of these systems is to approach the service quality of rail transit while still enjoying the cost savings of bus transit.

**Carbon Tax:** A charge on fossil fuels, such as coal, oil, and natural gas, based on their carbon content. When burned, the carbon in these fuels becomes carbon dioxide in the atmosphere, one of the chief greenhouse gases that are contributing to global warming. The charge is intended to provide an incentive to use alternative energy sources, reducing greenhouse gas emissions.

**Center Station Area Type:** One of five station area types developed in the Typology section of this report. Centers are moderate to high density regional nodes with their own local residential base.

**Circulator or Circulator Transit:** Routes served by buses, street cars, or other types of public transit that distributes people throughout an area. Circulators often connect with high-capacity transit stations and bring passengers within an area to and from the station.

**Climate Change or Global Warming:** Changes to the climate due to human caused emissions of greenhouse gases and their increased concentrations in the atmosphere. These changes have been linked to an increase in global and regional average temperatures, which is referred to as global warming. Major greenhouse gases (GHG) include water vapor, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and ozone (O<sub>3</sub>).

**Community Services:** As used in this report, community services refers to stores, retail commercial uses, personal and business service providers, public services, eating and drinking places, and similar establishments.

**Commuter Station Area Type:** One of five station area types developed in the Typology section of this report. Commuter station areas typically have a low residential density and station access is primarily through park and ride facilities or feeder transit.

**Compact Development/Compact Growth Patterns/Compact Land Use:** Planning and development techniques that allow the amount of land required to accommodate the needs of a population to be met using less land area. Compact development can take various forms, and communities can develop more compactly using a variety of techniques. The techniques include building on vacant or underdeveloped land within a built-up area, often referred to as infill development, or cleaning up and redeveloping areas that may have environmental contamination, referred to as brownfield redevelopment, and building more density on vacant land.

**Complete Streets:** Streets or roadways designed and operated to enable safe, attractive, and comfortable access and travel for all users. Pedestrians, bicyclists, motorists, and public transit users of all ages and abilities are able to safely and comfortably move along and across a Complete Street.

**Core Station Area Type:** One of five station area types developed in the Typology section of this report. Core station area types exist in downtown central business districts, and typically exhibit very high residential and employment density and excellent transit and pedestrian connectivity.

**Density:** The number of units (e.g., families, persons, housing units, jobs or buildings) per unit of land, usually expressed as “per acre.”

*Actual density* refers to the number of units in existence today; whereas *allowed or zoned density* refers to the number of units permissible under the current land use regulations, regardless of what is on the ground today.

*Gross density* refers to the number of units in an entire area, inclusive of land that is not in developed use, such as public right-of-way and parks; whereas *net density* looks is calculated using only the developable portion of an area, exclusive of parcels in the public right-of-way. As a result, the *net density* for a specific area is necessarily higher than the *gross density*.

**Destination Station Area Type:** One of five station area types developed in the Typology section of this report. Destination station area types contain a regional draw, such as a recreation site or institution, and may or may not have a local residential base.

**Embodied Energy:** The energy, other than human energy, used to extract, manufacture, and transport building materials to a building site and the energy used to construct the building and site improvements. Sometimes embodied energy in building materials and the energy used to construct the building and site improvements are accounted for separately.

**Employee Unit:** As used in this report, the amount of building space, usually expressed in square feet, needed to accommodate one employee. This tends to vary based on the industry and employee type.

**Express Bus:** A bus that connects major destinations with few or no stops between them. The number of stops are reduced to improve [or decrease] the travel time between the destinations.

**Feeder Transit:** Routes served by buses, street cars, or other types of public transit technology that connect with higher capacity transit types at stations or stops and that are timed to arrive and depart so that riders can easily and quickly connect with the higher capacity transit and feeder transit.

**Fiscal Home Rule:** A state law that authorizes a city, county, or special district to levy any tax or fee authorized by the state and federal constitutions consist with the constitutional limits. Some forms of fiscal home rule set broad limits on the allowed taxes or fees and the amounts that may be levied.

**Floor Area Ratio (FAR):** The gross floor area of all buildings or structures (less any area devoted to parking or vehicle circulation) on a lot divided by the gross land area.

**Greenhouse Gases (GHG):** The major greenhouse gases are water vapor, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and ozone (O<sub>3</sub>), although there are others. The term Greenhouse Gas refers to gases which help contain heat from the sun on the earth, functioning similar to a greenhouse. As humans produce more of these gases, scientists expect temperatures to continue to rise.

**Green Infrastructure:** Natural systems and processes that perform environmental services that benefit humans and their settlements. These environmental services include reducing flooding, recharging aquifers from which people obtain their drinking water, and cleaning storm water.

**Green Space:** An area of natural or human planted and maintained vegetation including parks, landscaping, and natural areas.

**Growth Management Act (GMA):** The 1990 State Growth Management Act (ESHB 2929 as amended) requiring all counties and cities to designate and protect critical areas and larger, faster growth counties and the cities within them to adopt comprehensive plans and development regulations to direct growth in Washington State over the next 20 years, to take advantage of the opportunities growth provides, and to address the challenges of growth. The GMA is codified at RCW 36.70A and other chapters.

**High-Capacity Transit** – For the purposes of this report, high-capacity transit is defined as fixed-rail transit, bus rapid transit, or multiple high-frequency bus routes that operate on no less than ten-minute headways at peak service, or by commuter rail service that connects the station area to other regional centers.

**High-Performing Transit Station Area or High-Performing Transit-Oriented Community** – For the purposes of this report, high-performing transit-oriented communities are defined station areas that succeed in meeting performance goals and measures on pedestrian and bicycle connectivity, affordable housing, residential and employment density, mix of uses, green infrastructure and open space, parking and urban designed, defined within the Measures section of this report.

**House Bill 1490 or Senate Bill 5687:** Two companion bills introduced in the 2009 legislature that would have adopted measures to reduce greenhouse gas emissions through improved land use and transportation planning. The bills did not pass. The bills included amending the Growth Management Act's environment goal to require that the planned land use patterns reduce greenhouse gas emissions, changing the housing and transportation elements of the act to reduce the impact of transportation on the environment and increase affordable housing opportunities, mandating planning for transit-oriented development at high-capacity transit stops, and revising regional transportation planning requirements to reduce driving and therefore greenhouse gas emissions.

**Housing Unit:** A house, an apartment, a mobile or manufactured home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live and eat separately from any other persons in the building and which have direct access from the outside of the building or through a common hall.

**Impervious surface:** For instance, rain does not readily penetrate most roofs, or standard asphalt and concrete pavements. This leads to **runoff pollution** as the water runs off impervious surfaces collecting fertilizer, petroleum products, and other pollutants flowing into storm water systems and surface waters. Increased impervious surfaces in a basin compounded by the corresponding loss of tree cover disrupts the hydrology of a basin, drastically increasing flow rates during storm events, which increases erosion, reduces ground water absorption, and destabilizes year-round flow rates.

**Location Efficiency:** Whether an area is located in a region so that residents, employees, and customers can travel to their preferred destinations using travel modes other than single-occupancy motor vehicles and whether single-occupancy vehicle trips can be short. Location efficiency takes into account several key variables that can affect travel demand, including a small area's net residential density, the frequency and type of transit service and its connectivity to the regional transit systems, and the distance to employment locations.

**Low Impact Development (LID):** A land planning and engineering design approach to managing storm water runoff whose goals are to replicate the pre-development hydrology of watersheds and to protect water quality. Low impact development uses many techniques including reducing impervious surfaces, retaining on-site natural features, and implementing engineered small-scale hydrologic controls such as infiltrating, filtering, storing, evaporating, transpiring, and using and detaining runoff close to its source.

**Metropolitan Planning Organization (MPO):** To be eligible for federal transportation funding, federal law requires that metropolitan areas have a Metropolitan Planning Organization (MPO). A MPO has a governing board of elected officials in urbanized areas with populations 50,000 or more. The MPO is also the Regional Transportation Planning Organization (RTPO) for a metropolitan area, please see the definition of Regional Transportation

Planning Organization below. Washington has the following Metropolitan Planning Organizations covering its most populous counties and the cities in those counties: Benton-Franklin Council of Governments, Cowlitz-Wahkiakum Council of Governments, Lewis Clark Valley Metropolitan Planning Organization, Puget Sound Regional Council, Skagit Metropolitan Planning Organization, Southwest Washington Regional Transportation Council, Thurston Regional Planning Council, Wenatchee Valley Transportation Council, Whatcom Council of Governments, Yakima Valley Conference of Governments.

**Mixed-Income Community:** A neighborhood, area, or development that has residents whose incomes reflect the range of incomes within a region including low and moderate income families as well as middle and high income families.

**Mixed-use:** a building or development that has more than one type of land use. The development would typically include two or more of the following land uses: residential uses, retail commercial uses, service uses, public services, employment sites, and recreational uses.

**Motor Vehicle Excise Tax:** A charge imposed by a regional or local government once a year on those who own motor vehicles, typically paid when a motor vehicle license is purchased and renewed. Several state laws currently authorize motor vehicle excise taxes. For more information the currently authorized motor vehicle excise taxes please see the Washington State Department of Revenue *Tax Reference Manual 2007*.

**Multi-Modal:** More than one transportation mode. In this report it refers to areas served by more than one transportation mode, usually motor vehicles in addition transit, walking, and bicycling.

**Parking Requirements:** A county, city, or town law that requires a certain number of parking spaces for a use or activity to meet the parking demands of those who use the building or area. The laws typically set a minimum number of required parking spaces, although some jurisdictions also set a maximum number of spaces to encourage alternative travel modes and a built environment that functions well for walkers, bicyclers, and transit users and reduces impervious surfaces and their adverse impacts.

**Performance Based Measures:** In the context of land development and its regulation, it refers to standards that are based on the characteristics and impacts of a use or activity, rather than the use or activity itself. Zoning regulations typically regulate uses to address their impacts, performance based measures focus on the impact rather than the use.

**Personal Vehicle:** A motor vehicle, such as a car, motor cycle, sport utility vehicle, or light truck, operated by the driver to transport the driver and perhaps some passengers and their personal goods.

**Placemaking:** The process of planning, designing, building, operating, and maintaining public spaces and a community's public realm that meet individual and community needs in an attractive, safe, functional, efficient, and memorable manner.

**Puget Sound Regional Council:** The Metropolitan Planning Organization and Regional Transportation Planning Organization for King, Kitsap, Pierce, and Snohomish Counties and the cities and towns within these counties. The Puget Sound Regional Council prepares, adopts, and monitors the long-range land use (Vision 2040), transportation (Transportation 2040), and economic development plans for the region, maintains shorter term transportation plans, awards and monitors federal transportation funds, adopts multicounty planning policies that guide comprehensive planning within the region, and certifies the plans as complying the policies and other requirements along with other duties.

**Regional Center:** One of a hierarchy of centers described in *Vision 2040*, the Puget Sound Regional Council's adopted land use plan for the central Puget Sound region, intended to accommodate residential and employment development of varying but high intensities. Manufacturing centers, one type of regional center, is intended to accommodate industrial and manufacturing development.

**Regional Transportation Planning Organizations (RTPOs):** Multi-county planning organizations created by the Growth Management Act to prepare regional transportation plans, prepare and update six-year Regional Transportation Improvement Programs and certify that the transportation related parts of city and county comprehensive plans comply with the Growth Management Act and regionally adopted guidelines and principles. RTPOs must include cities, counties, the Washington State Department of Transportation, transit providers, ports, and private employers in preparing their plans. All counties, except San Juan County, are included in RTPOs.

**Runoff Pollution:** Please see the definition of impervious surface above.

**Sprawl:** "[T]he process in which the spread of development across the landscape far outpaces population growth. The landscape sprawl creates has four dimensions: a population that is widely dispersed in low density development; rigidly separated homes, shops, and workplaces; a network of roads marked by huge blocks and poor access; and a lack of well-defined, thriving activity centers, such as downtowns and town centers. Most of the other features usually associated with sprawl—the lack of transportation choices, relative uniformity of housing options or the difficulty of walking—are a result of these conditions." *From Reid Ewing, Rolf Pendall, & Don Chen, Measuring Sprawl and Its Impact (Smart Growth America: 2002).*

**State Environmental Policy Act (SEPA):** A state law passed in 1971 that requires local and state government agencies to analyze the environmental impacts of the actions they are considering and authorizes local governments and state agencies to take actions to reduce or eliminate adverse environmental impacts.

**Station Area or High-Capacity Transit Station Area:** The area roughly defined, for the purposes of planning, by the half-mile walking radius around a high-capacity transit station.

**Station Area Planning:** A process that involves meaningful engagement between local and regional jurisdictions, community members and other stakeholders to create a vision and strategy to integrate the land use, transportation and housing policies within a specific station area.

**Street or Road Connectivity** (also referred to as **Street or Road Permeability**) The directness of links, that is the distance between two points along a street or road, and the density of connections in a street or road network. A well-connected street or road network has many short links, numerous intersections, and minimal dead ends (such as cul-de-sacs). As connectivity increases, travel distances decrease and route options increase, allowing more direct travel between destinations. *Modified from the Victoria Transport Policy Institute, TDM Encyclopedia.*

**Transit-Oriented Communities:** A district-level approach to transit-oriented development that looks holistically at the housing, transportation and land use decisions within a station area to create a community in which people have the choices to access homes, jobs, shopping to meet their daily needs, community services and recreation opportunities without relying on a personal vehicle.

**Transit-Oriented Development:** A site-specific development near transit whose design and features promote walking, bicycling or taking transit. Such features may include a high residential and/or employment density, safe pedestrian infrastructure providing access between the project and the transit station, and a mix of on-site uses to allow fewer trips.

**Urban Design:** The arrangement, appearance, and functionality of cities and towns and the relationship between buildings and sites with other buildings and sites and public spaces including streets.

**Urban Form:** The location, arrangement, density, appearance, and functionality of buildings and spaces within a city or town and the larger landscape.

**Urban Land Institute (ULI):** A 501(c)(3) nonprofit research and education organization supported by its members which conducts multidisciplinary real estate research, education, and communication. ULI operates worldwide.

**Value Capture or Value Capture Taxation:** The recovery of part or all of the increase in value of private real property due to public investments, such as the construction of transit lines and transit stations, to be used to pay for part of that investment or other public investments.

**Vehicle Miles Travelled:** The number of miles that residential vehicles are driven. Often this is the number of miles that residential vehicles are driven in a year.

**Village Station Area Type:** One of five station area types developed in the Typology section of this report. Villages are typically zoned for moderate density with residents within the half-mile area characterizing the majority of the userbase.

**Walkable communities:** Pedestrian-oriented neighborhoods with pedestrian infrastructure (including sidewalks, crosswalks, street furniture) and traffic and parking policies that facilitate walking and promote pedestrian safety.

**Washington State Environmental Policy Act:** Please see the above definition of the State Environmental Policy Act.

## LIST OF PHOTOGRAPHS (Location, Photo Credit)

Front cover	Downtown Seattle, <i>Dan Bertolet</i> ; Seattle tree, <i>Sara Nikolic</i> ; Alcyone and Cascade Park, South Lake Union, Seattle, <i>GGLO</i> ; Link light rail tracks (watermark), <i>Oran Viriyincy</i>	Page 41	Stone Way Apartments, Wallingford, Seattle, <i>GGLO</i>
Page 3	Burien Town Square, Burien, <i>GGLO</i>	Page 42	Mount Baker Station Aerial, Seattle, <i>Eagle Eye Aerial</i> ; Dwell at Roosevelt, Seattle, <i>Peter Dane</i>
Page 4	Link light rail Mount Baker Station, Seattle, <i>Oran Viriyincy</i>	Page 44	Seattle Center, <i>PSRC</i>
Page 6	North Rainier, Seattle, <i>GGLO</i>	Page 45	Qwest Stadium, Seattle, <i>PSRC</i> ; Link light rail in Sodo, Seattle, <i>Oran Viriyincy</i>
Page 7	Seattle tree, <i>Dan Bertolet</i>	Page 46	Downtown Tacoma, <i>PSRC</i>
Page 8	Link station, Tacoma, <i>PSRC</i>	Page 47	Downtown Everett, <i>PSRC</i>
Page 9	Olympic National Park, <i>Sara Nikolic</i>	Page 48	Mount Baker Link light rail station, Seattle, <i>Oran Viriyincy</i>
Page 10	Asa Flats and Lofts, Portland, <i>GGLO</i>	Page 49	Burien Town Square, Burien, <i>GGLO</i>
Page 12	Link light rail tracks, <i>Oran Viriyincy</i>	Page 50	Downtown Bellingham, <i>Andrew Austin</i> ; Downtown Bellevue, <i>Sara Nikolic</i>
Page 13	South Lake Union, Seattle, <i>Dan Bertolet</i> ; Downtown Burien, <i>GGLO</i>	Page 51	Rainier Vista, Seattle, <i>Dan Bertolet</i> ; Metro TOD, Downtown Redmond, <i>King County</i>
Page 14	Othello Link light rail station, <i>Oran Viriyincy</i>	Page 52	Rainier Vista townhomes, Seattle, <i>GGLO</i> ; Stone Way Apartments, Wallingford, Seattle, <i>GGLO</i>
Page 15	Burien Town Square, Burien, <i>GGLO</i> ; Capitol Hill, Seattle, <i>Dan Bertolet</i>	Page 53	(clockwise from top left) Greenbridge, White Center, <i>GGLO</i> ; Greenbridge, White Center, <i>GGLO</i> ; M Street, First Hill, Seattle, <i>GGLO</i> ; Alcyone, South Lake Union, Seattle, <i>GGLO</i>
Page 18	Puget Sound, <i>Dan Bertolet</i>	Page 54	M Street, First Hill, Seattle, <i>GGLO</i> ; Riverfront Park, Spokane, <i>Chieu Van</i>
Page 20	Swift Station, Mill Creek, <i>Community Transit</i> ; Station at Othello Park, Seattle, <i>Othello Partners</i>	Page 55	Greenwood, Seattle, <i>Sara Nikolic</i> ; Pike-Pine, Seattle, <i>Dan Bertolet</i>
Page 21	South Lake Union, Seattle, <i>Dan Bertolet</i>	Page 56	Thornton Place at Northgate, Seattle, <i>Studio 216</i>
Page 22	Phinney Ridge, Seattle, <i>Sara Nikolic</i>	Page 57	Design Charette, North Rainier, Seattle, <i>GGLO</i>
Page 25	Link light rail, Tukwila, <i>Oran Viriyincy</i>	Page 58	Bel-Red Corridor, Bellevue, <i>MAKERS and the City of Bellevue</i>
Page 26	Puget Sound and Mount Rainier, <i>PSRC</i>	Page 60	Form-based code image, <i>GGLO</i>
Page 28	Metro TOD and transit station, Renton, <i>King County</i>	Page 61	Ross Lake townhomes, Bothell, <i>CamWest</i>
Page 30	Aljoya at Northgate, Seattle, <i>Sara Nikolic</i>	Page 62	Link railyard, Seattle, <i>Oran Viriyincy</i>
Page 31	Renton, <i>PSRC</i>	Page 64	Ravenna, Seattle, <i>Oran Viriyincy</i>
Page 32	Madrona, Seattle, <i>Dan Bertolet</i>	Page 65	Souder Station, Tacoma Dome, <i>Oran Viriyincy</i>
Page 34	Mount Rainier from Downtown Seattle, <i>Oran Viriyincy</i>	Back Cover	Link light rail station, Seattle, <i>Oran Viriyincy</i> ; Greenbridge, White Center, <i>Dan Bertolet</i> ; Eastlake, Seattle, <i>Dan Bertolet</i>
Page 35	Central Puget Sound Region 2040 Transit Map, <i>PSRC</i>		
Page 36	Wallingford, Seattle, <i>GGLO</i>		
Page 37	Westlake, Seattle, <i>Oran Viriyincy</i>		
Page 38	Westlake, Seattle, <i>Oran Viriyincy</i> ; Downtown Bellevue Transit Center, <i>Dan Bertolet</i>		
Page 39	Ballard, Seattle, <i>GGLO</i>		
Page 40	Cal Anderson Park, Capitol Hill, Seattle, <i>Dan Bertolet</i> ; UW Tower from the UW Campus, Seattle, <i>Peter Dane</i>		

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114 Regional transportation planning organizations (RTPOs) were created by the Growth Management Act to prepare regional transportation plans and certify that the transportation related parts of city and county comprehensive plans comply with the Growth Management Act and regionally adopted guidelines and principles. RTPOs must include cities, counties, the Washington State Department of Transportation, transit providers, ports, and private employers in preparing their plans. All counties, except San Juan County, are included in RTPOs.

115 For the state requirements see chapter 47.80 RCW.

116 Federal law requires that to be eligible for federal transportation funding, metropolitan areas must have a Metropolitan Planning Organization (MPO) that prepares a regional land use and transportation plan. MPOs also maintain and adopt the regional 3-year Transportation Improvement Program (TIP), a list of current transportation projects within its jurisdiction. The TIP contains projects that are funded through federal or state grants or that are deemed regionally significant. MPOs must demonstrate that the regional long-range metropolitan transportation plan and TIP conform to the State Implementation Plan (SIP) for Air Quality, required under the federal Clean Air Act.<sup>7</sup> A MPO has a governing board of elected officials in urbanized areas with a population 50,000 or more and are the RTPO for a metropolitan area. Washington has the following Metropolitan Planning Organizations covering its most populous counties and the cities in those counties: Benton-Franklin Council of Governments, Cowlitz-Wahkiakum Council of Governments, Lewis Clark Valley Metropolitan Planning Organization, Puget Sound Regional Council, Skagit Metropolitan Planning Organization, Southwest Washington Regional Transportation Council, Thurston Regional Planning Council, Wenatchee Valley Transportation Council, Whatcom Council of Governments, Yakima Valley Conference of Governments.

