



The Boston Regional Challenge

Examining the Costs and Impacts of Housing and Transportation on Area Residents, their Neighborhoods, and the Environment.



**Urban Land
Institute**

Terwilliger Center for Workforce Housing





The Boston Regional Challenge

Examining the Costs and Impacts of Housing and Transportation on Area Residents, their Neighborhoods, and the Environment.



Urban Land Institute

Terwilliger Center for Workforce Housing



CENTER FOR
HOUSING POLICY

CNT

Sustainable Communities
Attainable Results



National Advisory Board

J. Ronald Terwilliger, Chairman

Chairman Emeritus, Trammell Crow Residential

Carin Barth

President, LB Capital, Inc.

Tom Bozzuto

CEO, The Bozzuto Group

Henry Cisneros

Executive Chairman, CityView;

Former Secretary, U.S. Department of Housing and Urban Development

Bart Harvey

Former Chairman, Enterprise Community Partners

Bruce Katz

Vice President and Director,

Brookings Institute, Metropolitan Policy Program

Rick Lazio

Managing Director of Global Real Estate and Infrastructure,

JP Morgan Asset Management

Mel Martinez

Partner, DLA Piper;

Former U.S. Senator;

Former Secretary, U.S. Department of Housing and Urban Development

Steve Preston

President, OAKLEAF Waste Management;

Former Secretary, U.S. Department of Housing and Urban Development

Jonathan Reckford

CEO, Habitat for Humanity International

Nic Retsinas

Director, Joint Center for Housing Studies of Harvard University

Rick Rosan

President, ULI Foundation

Ronnie Rosenfeld

Former Chairman, Federal Housing Finance Board

Alan Wiener

Managing Director, Wells Fargo Multifamily Capital

Patrick Phillips, Ex-Officio

CEO, Urban Land Institute

Pam Patenaude

Executive Vice President and Executive Director,

ULI Terwilliger Center for Workforce Housing

Copyright 2010 by Urban Land Institute
1025 Thomas Jefferson Street, NW
Suite 500 West, Washington, DC 20007-5201



Terwilliger Center for Workforce Housing

About the Urban Land Institute

The Urban Land Institute is a 501(c)(3) nonprofit research and education organization supported by its members. Founded in 1936, the Institute now has more than 30,000 members worldwide representing the entire spectrum of land use and real estate development disciplines, working in private enterprise and public service. As the preeminent, multidisciplinary real estate forum, ULI facilitates the open exchange of ideas, information, and experience among local, national, and international industry leaders and policy makers dedicated to creating better places.

The mission of the Urban Land Institute is to provide leadership in the responsible use of land and in creating and sustaining thriving communities worldwide. Members regard ULI as a trusted idea place where leaders come to grow professionally and personally through sharing, mentoring, and problem solving. With pride, ULI members commit to the best in land use policy and practice.

About the ULI Terwilliger Center for Workforce Housing

The ULI Terwilliger Center for Workforce Housing was established by J. Ronald Terwilliger, chairman emeritus of Trammell Crow Residential, to expand housing opportunities for working families. The mission of the center is to serve as a catalyst in increasing the availability of workforce housing in high-cost communities by harnessing the power of the private sector.

The center supports the development of mixed-income communities close to employment centers and transportation hubs. Through a multifaceted approach, the center facilitates research, advocates for public policy change, publishes best practices, convenes housing experts, and works to eliminate regulatory barriers to the production of workforce housing.

Acknowledgments

This report was prepared by the Center for Housing Policy and the ULI Terwilliger Center for Workforce Housing, based on research conducted by the Center for Neighborhood Technology. Through the generous support of ULI Trustee James J. Curtis III, the ULI Terwilliger Center for Workforce Housing is working with the ULI Curtis Regional Infrastructure Initiative to examine how the intersection of land use, housing, and transportation can foster the creation of sustainable communities.

“When it comes to development—housing, transportation, energy efficiency—these things aren’t mutually exclusive; they go hand in hand. And that means making sure that affordable housing exists in close proximity to jobs and transportation. That means encouraging shorter travel times and lower travel costs. It means safer, greener, more livable communities.”

—President Barack Obama, July 13, 2009



THIS REPORT ANALYZES the combined costs of housing and transportation for neighborhoods, cities, and towns throughout a Boston regional study area that extends south to Providence, Rhode Island; west to Worcester, Massachusetts; and northeast to Dover, New Hampshire. Our analysis finds that the typical household in the study area spends upwards of \$22,000 annually on housing, which represents roughly 35 percent of the median household income (\$68,036). With transportation costs for the typical household reaching nearly \$12,000 annually, the combined costs of housing and transportation account for roughly **54 percent** of the typical household's income. Similar studies conducted for the San Francisco Bay Area and the Washington, D.C., region have found average housing and transportation cost burdens of 59 percent and 47 percent, respectively.ⁱ

Housing costs in the Boston area are much higher than national averages and exceed costs in many of the largest metropolitan areas in the country. Average housing costs for owners and renters are highest in many of the cities and towns inside Route 128, including the city of Boston, and between Route 128 and Interstate 495 (I-495) in communities typically referred to as MetroWest.

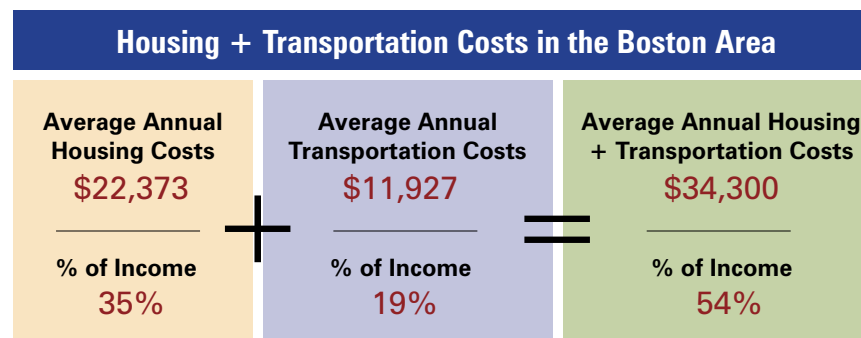
Housing prices outside of these high-cost communities are indeed lower, but transportation costs are often higher, reducing and sometimes even eliminating the savings made possible by lower housing prices. This appears to be particularly true for individual households that choose to move farther from work in

order to reduce their housing costs. Long and frequent trips in an automobile—whether back and forth to work or school, for everyday errands, or for entertainment—can stress a working family's budget, can cause countless hours to be wasted behind the wheel, *and* can take a serious environmental toll on the region. As this report shows, areas that are characterized by good access to public transit, jobs, and nearby amenities not only have the potential to keep combined housing and transportation costs in check, but they also can lower greenhouse gas emissions and provide for a more

environmentally sustainable future.

Leaders in the Boston area have long recognized that to maintain and grow the regional economy, households on all rungs of the income ladder must be able to find affordable housing options.ⁱⁱ Without such opportunities, the labor

pool needed to power the economy may have no choice but to look for work in other metropolitan areas where housing is less expensive. But affordable housing by itself is not sufficient if its location requires families to experience long, frequent, and expensive car trips. A focus on the combined burdens of housing and transportation costs highlights the importance of strategies such as building mixed-income housing near public transit and job centers and zoning for a mix of uses to reduce the need to drive long distances to meet basic needs. Such strategies help keep costs low for working families, strengthen the economy, and lower the carbon emissions of current and future generations.



Report Roadmap

THIS REPORT EMPHASIZES the importance of including transportation costs in any discussion of housing affordability. Why? Because when a family is looking for a home or neighborhood that it can afford, housing costs are stated clearly on the rental agreement or loan documents, but no such accounting exists for transportation costs—even though transportation is the typical household’s second-largest expenditure. This information is also important to policy makers and elected officials as they assess where future investments in workforce housing and public transportation improvements should be directed. By making the combined costs of housing and transportation more transparent, this report and the accompanying online cost calculatorⁱⁱⁱ provide useful information to policy makers and households alike.

This report is organized as follows:

- Pages 4 through 7 show the **costs for housing and transportation in different parts of the study area**. This section shows where housing and transportation costs are highest and lowest and explains why transportation costs vary from place to place.
- Pages 9 through 11 show the **combined costs of housing and transportation in each of 18 subregions**, documenting the substantial variation within the larger study area.
- Pages 10 and 11 also show the **combined costs of housing and transportation for each subregion as a percentage of income**, a theme extended in the maps on pages 12 and 13. Absolute costs are important, but

whether or not they are affordable is also a function of the incomes of the households paying them.

- Page 14 illustrates **how housing and transportation costs factor into the budget of a working family** and page 15 discusses **the environmental impacts of the study findings**.
- Pages 16 and 17 focus on neighborhoods and specific cities and towns where combined costs represent an **extreme housing and transportation cost burden**. Where housing and transportation combine to consume a disproportionate share of income, little is left over for other essentials.
- The report concludes with a brief discussion of the **policy implications of the study findings**.

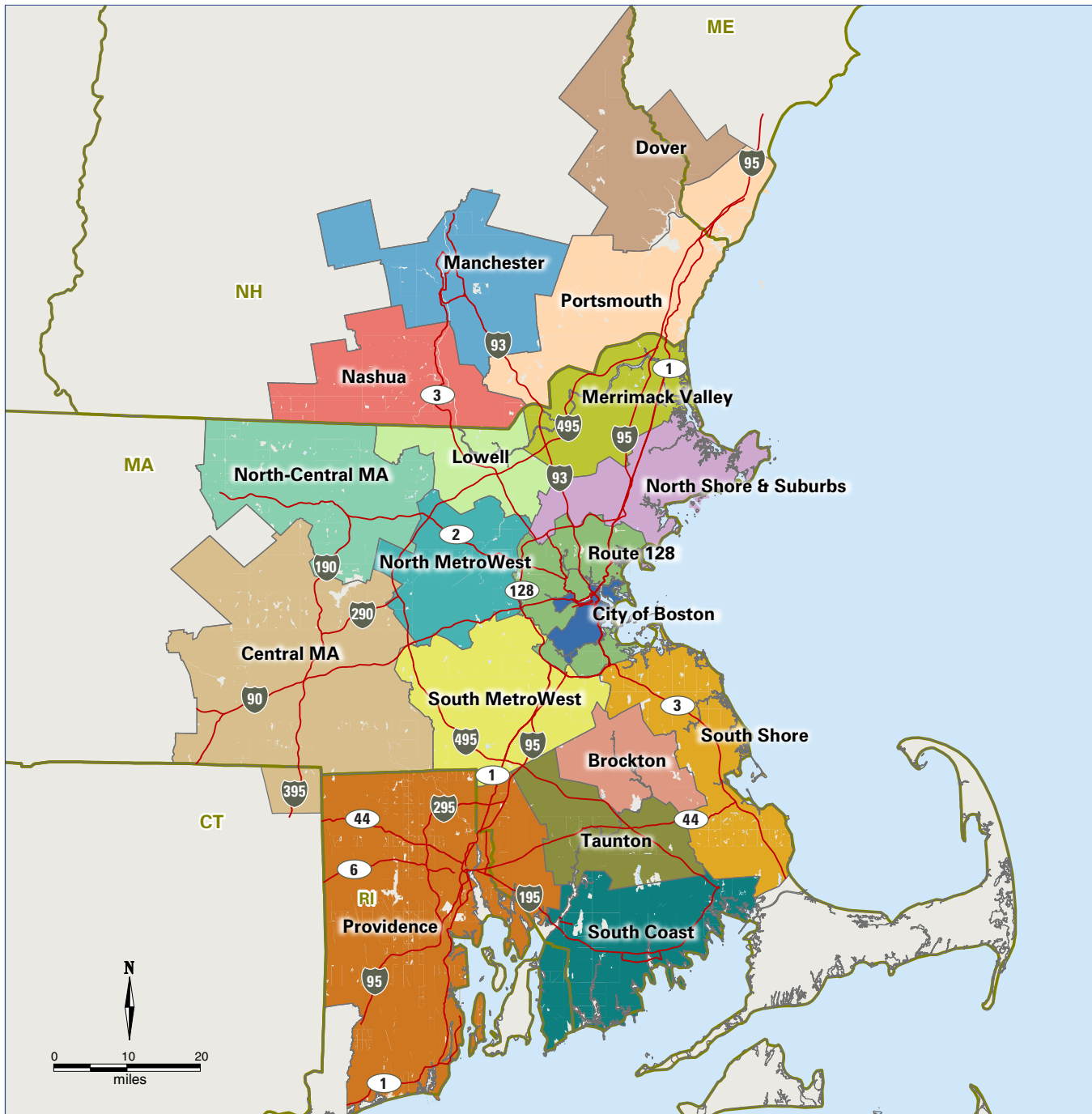
Boston-Area Subregions

THIS REPORT ANALYZES the combined costs of housing and transportation for the 2.7 million households that live in cities and towns throughout the Boston study area.^{iv} Because the Boston regional economy extends well beyond the Massachusetts state line, the study area includes most of Rhode Island, southeasternmost New Hampshire, and parts of Connecticut and southern Maine. In total, the study area for this report comprises

TABLE 1] The Study Area, Organized into 18 Subregions

Subregion	Total Households	Largest Cities and Towns
Route 128	456,596	Cambridge, Quincy
Providence (RI-MA)	398,713	Providence, Warwick
City of Boston	231,988	Boston
Central MA (MA-CT)	201,617	Worcester, Shrewsbury
South MetroWest	167,670	Natick, Norwood
North Shore & Suburbs	143,965	Peabody, Salem
South Coast (MA-RI)	134,654	New Bedford, Fall River
South Shore	123,391	Weymouth, Plymouth
Merrimack Valley	118,282	Lawrence, Haverhill
North MetroWest	102,594	Framingham, Marlborough
Lowell	100,465	Lowell, Billerica
Manchester (NH)	96,255	Manchester, Derry
Portsmouth (NH-ME)	88,311	Salem, Portsmouth
North-Central MA	79,888	Leominster, Fitchburg
Nashua (NH)	78,383	Nashua, Merrimack
Brockton	76,101	Brockton, Bridgewater
Taunton	56,183	Taunton, Mansfield
Dover (NH-ME)	51,371	Dover, Rochester

Note: Unless otherwise indicated, subregions are located entirely within Massachusetts.
Source: Center for Neighborhood Technology.



© 2010 Center for Neighborhood Technology

323 cities and towns.

In order to present the housing and cost data in a meaningful way, this report divides the cities and towns in the study area into 18 sub-regions developed with the input of housing and transportation experts in the Boston area (see the map and Table 1 for descriptions). The remainder of the report uses this framework to describe and discuss the combined costs of housing and transportation in the study area. Although these subregions represent the most efficient way to present the data, the reader should bear in mind that costs and incomes do vary from town to town, and data for the largest cities and towns are presented in the appendix.

Unless otherwise stated, the housing and transportation cost data provided in this report can be interpreted as a three-year average, covering the most recent years for which data are available (2006–2008).



Housing Costs

HOUSING COSTS in the Boston Combined Statistical Area (CSA)^v are among the highest in the nation. On measures typically used to quantify housing costs—home value, monthly costs for owners, and gross rent—the Boston CSA ranks in the top ten among the 100 largest metropolitan areas in the country (see Table 2). The Boston area has retained this ranking even though home prices, which peaked in 2005, had fallen an estimated 12 percent by 2008, and rents, which rose through mid-2008, also had begun declining marginally.^{vi}

This study finds that the typical household in the study area spends

an average of \$1,864 per month on housing costs including utilities, which represents 35 percent of household income. Monthly costs for owners (\$2,416) are more than twice as high as typical costs for renters (\$1,044).

As the map demonstrates, housing costs exhibit a substantial amount of variation across the study area. Average housing costs are highest in the city of Boston, inside Route 128, and in the North and South MetroWest subregions. Averages in these subregions range from \$2,700 to \$3,000 for owners and from \$1,150 to \$1,250 for renters.

TABLE 2] Housing Costs in the Boston CSA Rank Near the Top

	% Above U.S. Average	Rank Among the 100 Largest Metro Areas
Median Home Value	+75%	9th
Selected Monthly Owner Costs (total)	+57%	7th
for Owners with a Mortgage	+41%	9th
for Owners without a Mortgage	+64%	3rd
Gross Rent	+20%	10th

Note: Rankings apply to the Boston-Worcester-Manchester Combined Statistical Area.

Source: 2008 American Community Survey.



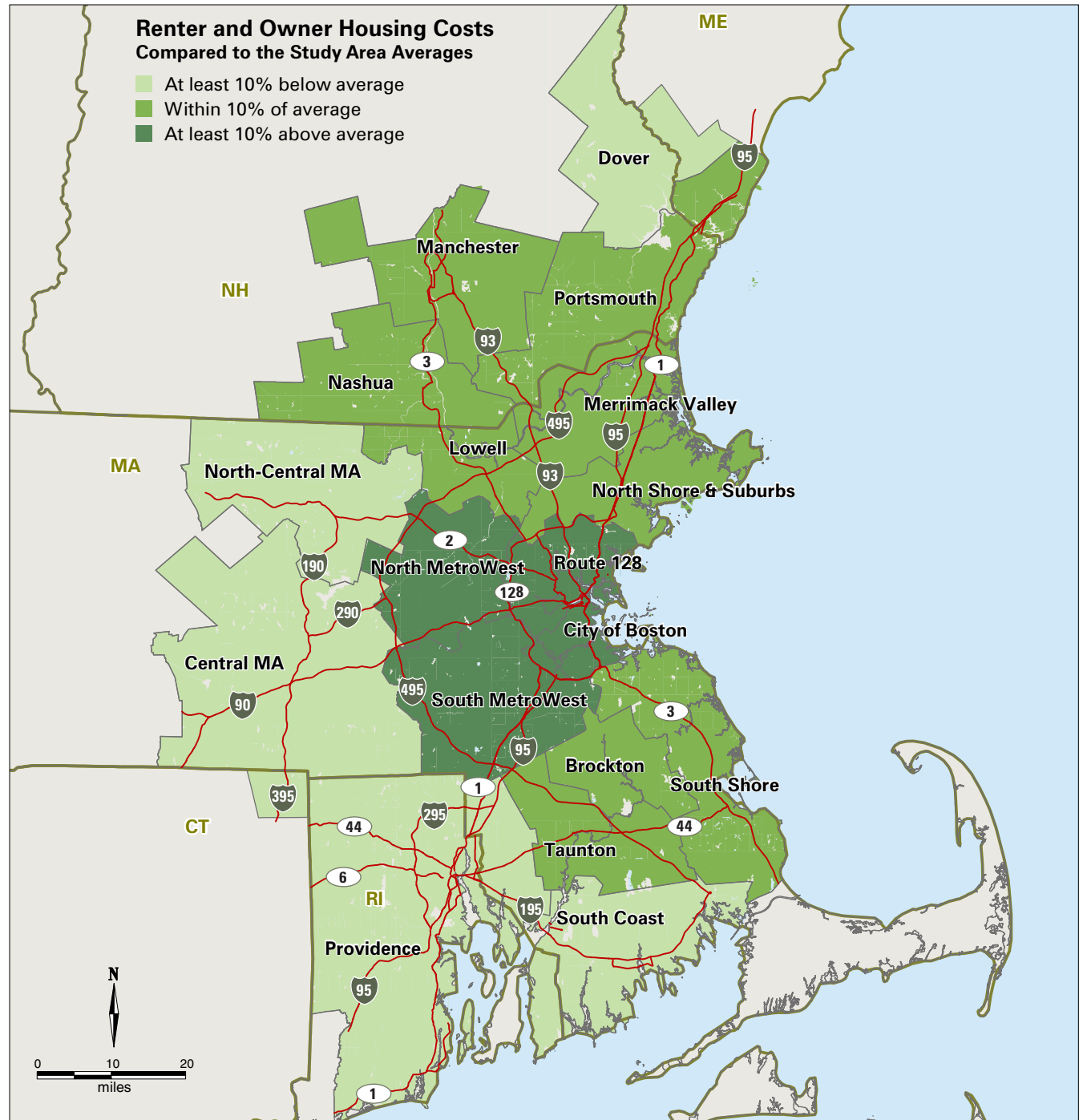
Even within these subregions, however, some cities and towns (e.g., Lynn) are much more affordable than others (e.g., Belmont).

North and south of these high-cost areas, housing expenditures more closely approximate the study area average. Typical costs for owners range from \$2,200 in the Manchester subregion to just over \$2,600 in the North Shore & Suburbs subregion; average gross rents run from just under



\$950 in the Merrimack Valley to nearly \$1,150 in the South Shore subregion.

On average, housing is least expensive outside of I-495 to the west and south, as well as in the northern tip of the study area in the Dover subregion. In these subregions, owners incur average monthly costs ranging from just under \$1,950 (Dover) to just over \$2,100 (Central Massachusetts). Gross rents average less than \$750 in the South Coast subregion and do not exceed \$900, on average, in any of these comparatively lower-cost areas.

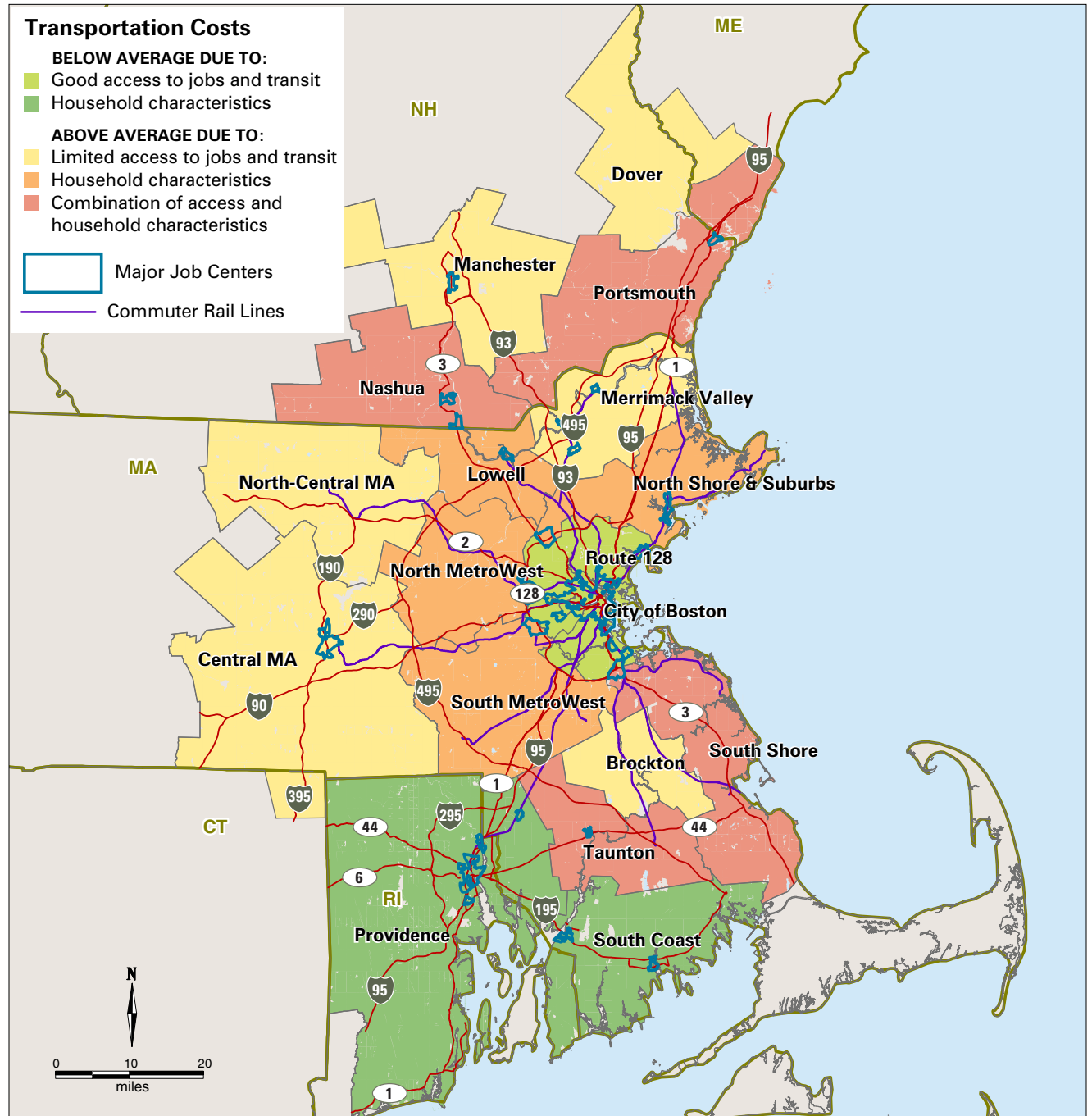


© 2010 Center for Neighborhood Technology

Transportation Costs

NATIONALLY, TRANSPORTATION COSTS are a household's second-largest expenditure—after housing—and the Boston area is no exception.^{vii} Between 2006 and 2008, transportation costs^{viii} consumed 19 percent of income for the typical household in the study area, amounting to \$994 per month, or \$11,927 annually.

A household's total transportation costs primarily depend on how many cars it owns, how frequently and how far members must drive, and whether or not public transit is an option. Some factors that affect auto and transit usage are tied to *household characteristics* like income, household size, and the number of workers per household. Larger households with



GOOD ACCESS KEEPS COSTS LOW: At under \$10,000 annually, the city of Boston and communities inside Route 128 (shaded light green) have the lowest transportation costs, largely attributable to their good access to public transit and job centers and their dense residential development patterns.

HOUSEHOLD CHARACTERISTICS KEEP COSTS LOW: The Providence and South Coast subregions (shaded dark green) also have below-average transportation costs, but this has less to do with proximity to major job centers and transit options and more to do with lower incomes and fewer commuters per household.

LIMITED ACCESS DRIVES COSTS HIGHER: These six subregions (shaded yellow) have below-average incomes and thus would be expected to spend less on transportation, but costs for the typical household are above average because of limited access to transit and major job centers. Even though commuter rail lines extend to many of these subregions, overall access to public transit throughout remains subpar, and lower-density residential development contributes to more frequent driving.

HOUSEHOLD CHARACTERISTICS DRIVE COSTS HIGHER: Above-average incomes allow households in these four subregions (shaded orange) to spend relatively more on transportation costs. Transportation costs are thus above average even though the subregions have comparatively good access to employment opportunities. Sub par transit accessibility also contributes to higher transportation costs in these subregions.

ALL FACTORS LEAD TO HIGHER COSTS: Four of the five subregions with the highest transportation costs (shaded pink) fit into this category. Incomes are above average, residential density is low, and transit and job access is far below average.

more workers and more disposable income may need—and be able to afford—multiple automobiles and longer, more frequent trips.

At the same time, easy access to public transit, major job centers,^{ix} and amenities typically leads to lower transportation costs because households can meet their daily transportation needs with shorter car trips or replace car trips with more affordable or convenient alternatives. (See

methodology at the end of the report for a more detailed discussion.)

A close look at the data shows that the 18 subregions can be loosely grouped into five categories based on (a) their overall transportation costs and (b) whether household characteristics or access to jobs, public transit, and other amenities are the primary determinants of these costs (see map and color-coded descriptions).



Transit Options and Travel Patterns

COMPARED TO NATIONAL spending patterns, households in the Boston CSA dedicate a relatively low share of their household expenditures to transportation.^x One reason is the Massachusetts Bay Transportation Authority (MBTA), which alone provides an average of 1.32 million trips every weekday.^{xi} When the Rhode Island Public Transit Authority (RIPTA) and smaller regional transit providers are considered, it is no wonder that the Boston CSA ranks sixth in the country in the proportion of commuters routinely using public transit to get to work each day (7.9 percent).^{xii}

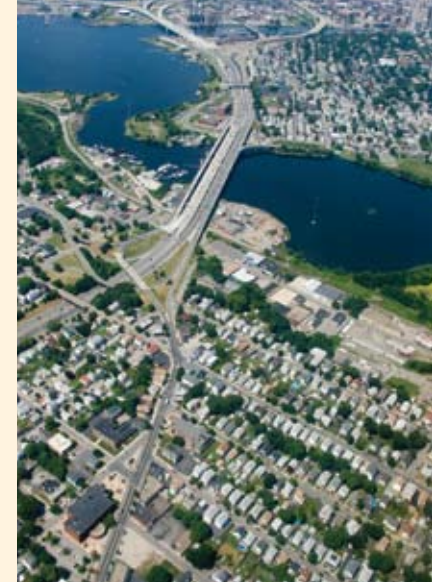
Although public transit is available in many communities throughout the study area, the subway system and bus routes are most convenient for those living in the city of Boston and in other communities inside Route 128. Roughly 24 percent of commuters in these two subregions rely on public transit to get to and from work daily, and an additional 11 percent bike or walk to work. Usage is much lower in the balance of the study area—only 3 percent of commuters outside of these two subregions routinely use public transit^{xiii}—but transporta-



Living and Working in Rhode Island and New Hampshire

The Providence area and parts of southeastern New Hampshire are undeniably important parts of the Boston regional economy, but commuting patterns between these areas and Boston are not as widespread as some may think. An analysis of commuting data suggests that 87 percent of Providence workers and 78 percent of South Coast workers are employed in either the Providence or South Coast subregions. Likewise, three-quarters of those living in the New Hampshire portion of the study area also work there. For those who do undertake long commutes to work, however, associated costs can be significant.

Source: Center for Housing Policy tabulations of the 2006-2008 American Community Survey Public Use Microdata Sample files.

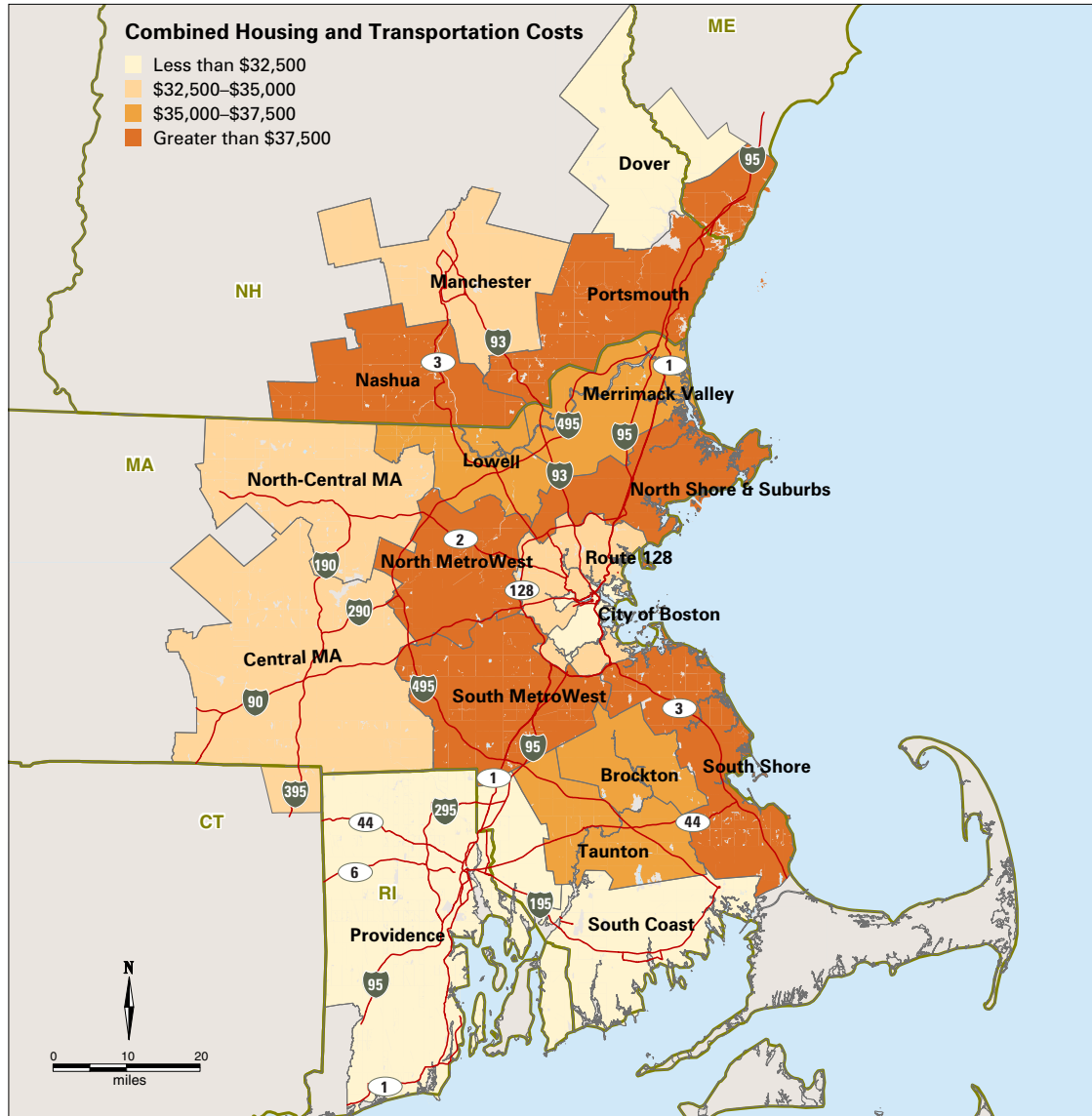


tion costs in outlying communities served by commuter rail are notably lower than in peripheral towns lacking such access. Compared to the cost of owning two cars, a family with good access to transit and jobs can save as much as \$5,000 each year by owning only one car.

Forty-one percent of workers in the Boston CSA have commutes of 30 minutes or longer, and one in ten commutes at least 60 minutes, ranking the Boston CSA 13th and 14th, respectively, among large

metropolitan areas in terms of longest commutes.^{xiv} The vast majority (72 percent) of those commuting more than one hour travel by automobile, but whether by private car or public transit, living far from job centers can impose a negative “time tax” on workers by consuming part of their day that could be spent on other pursuits with family and friends. Long commutes by car not only impose a time tax on the driver but also contribute to traffic congestion and carbon emissions (see page 15).

Housing + Transportation Costs



Why Combined Costs Appear Low in the City of Boston and Route 128 Subregions

Combined costs in the City of Boston and Route 128 subregions appear to be among the lowest in the study area, but this is partly due to the unusually high share of renters in these areas. Average housing costs for both renters and owners in these communities are very high, but since a relatively high share of households in the City of Boston (62 percent) and Route 128 (45 percent) subregions rent their homes, and since renting is typically less expensive than owning, average housing costs appear to be lower than expected. Given their below-average transportation costs, combined costs are slightly below average in the Route 128 subregion and substantially below average in the city of Boston.

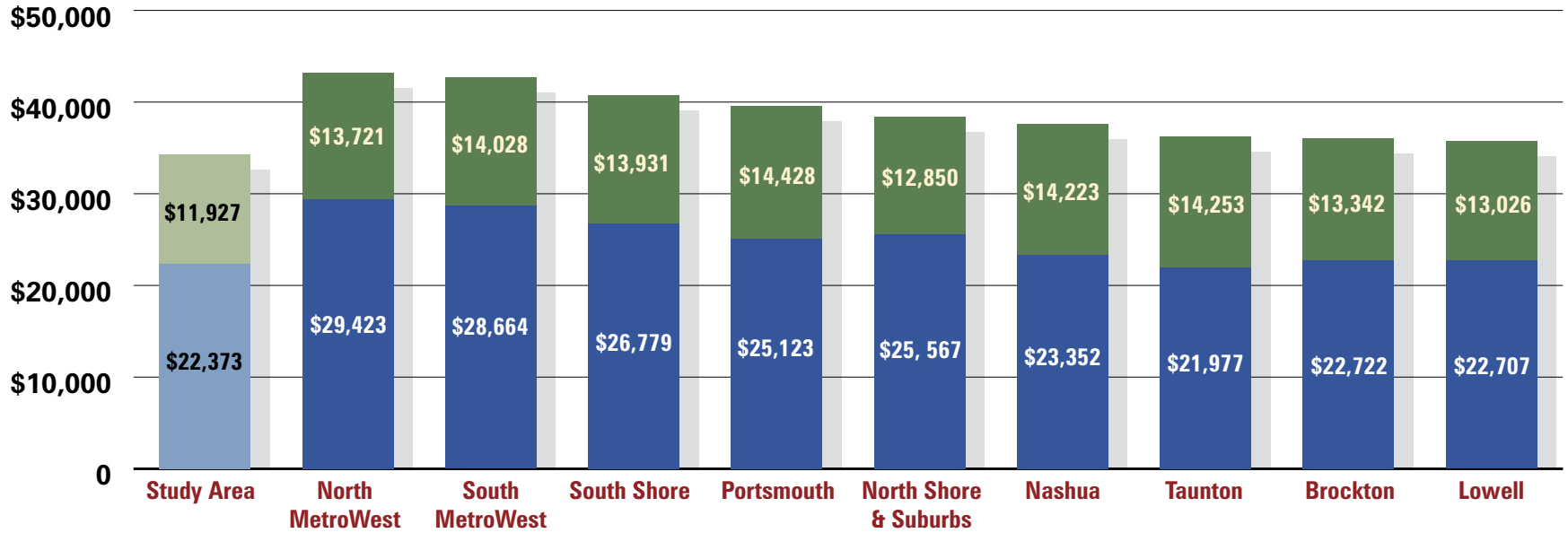
IN THE STUDY AREA, the typical household spends roughly \$34,300 per year on the combined costs of housing and transportation. In four subregions between Route 128 and I-495, as well as in

southern New Hampshire, annual costs exceed \$37,500 (see map). Combined costs are slightly lower—but still above average—in areas bordering the north and south sides of I-495: the Brockton,

Taunton, Lowell, and Merrimack Valley subregions. Below-average combined costs can be found in some of the peripheral subregions to the north (Dover), south (Providence and

South Coast), and west (Central and North-Central Massachusetts). Housing costs are relatively low in each, and in the south, transportation costs are below average as well.

Regional Variation in Housing + Transportation Costs



Annual H+T Costs	\$34,300	\$43,144	\$42,692	\$40,711	\$39,551	\$38,417	\$37,575	\$36,230	\$36,065	\$35,733
Average Median Income	\$68,036	\$95,744	\$92,371	\$77,812	\$76,585	\$76,452	\$77,704	\$69,032	\$67,017	\$73,969
Average H+T as % of Median Income	54%	48%	48%	54%	53%	52%	50%	54%	57%	51%

© 2010 Center for Neighborhood Technology

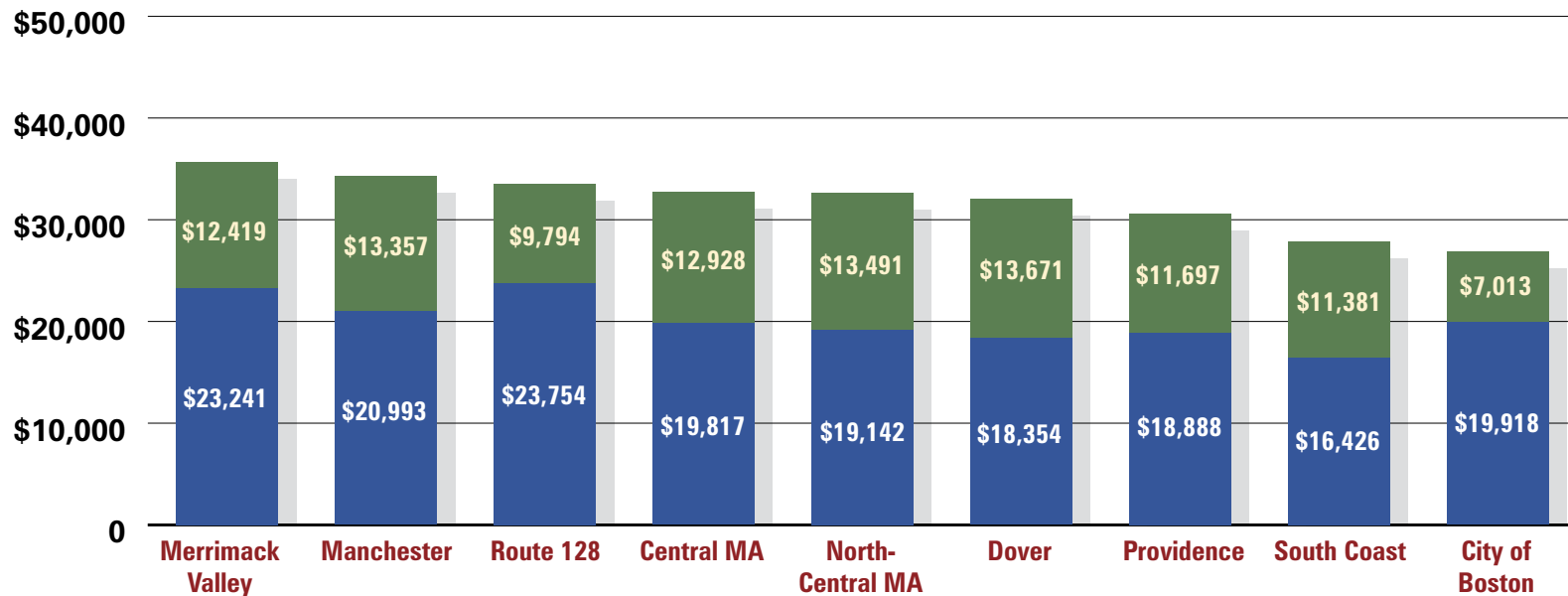
THE AVERAGE HOUSEHOLD in the Boston study area spends approximately \$34,300 annually on housing and transportation, which represents about 54 percent of the typical household's income. Combined costs are highest in the North and South MetroWest subregions, where both housing and

transportation costs exceed study area averages by wide margins. Because incomes are significantly higher in these subregions than in the area as a whole, however, the typical household's combined cost burden—i.e., the share of income spent on housing and transportation costs—is only 48 percent. For

higher-income households in these subregions, therefore, these high costs are not as burdensome as they initially appear, but for those earning less, there may be few affordable opportunities.

Combined costs are lowest in absolute dollar terms in the Providence, South Coast, and City

of Boston subregions. Both housing and transportation costs are below average in Providence and the South Coast, and in the city of Boston, very low transportation costs offset more expensive housing. Because typical incomes in these subregions are substantially lower than for the study area as a



Annual H+T Costs	\$35,660	\$34,350	\$33,549	\$32,745	\$32,633	\$32,024	\$30,586	\$27,808	\$26,930
Average Median Income	\$65,795	\$67,820	\$69,444	\$65,489	\$63,693	\$59,122	\$57,336	\$48,067	\$52,923
Average H+T as % of Median Income	59%	52%	51%	53%	53%	55%	57%	62%	56%

whole, however, these subregions' cost burdens are comparatively high, ranging from 56 percent of income in the city of Boston to 62 percent in the South Coast.

Combined cost burdens are roughly at or below the study area average of 54 percent in the remaining mid-cost subregions

with the exceptions of Brockton and Merrimack Valley, where they rise to 57 percent and 59 percent, respectively. In both, combined costs for housing and transportation are slightly above the study area average, and incomes are slightly below. Neither is particularly well situated in relation to jobs

or public transit, and housing is more costly than in more peripheral subregions such as Central and North-Central Massachusetts and parts of New Hampshire. Neither housing nor transportation is particularly affordable for the typical working family in the Brockton and Merrimack Valley subregions,

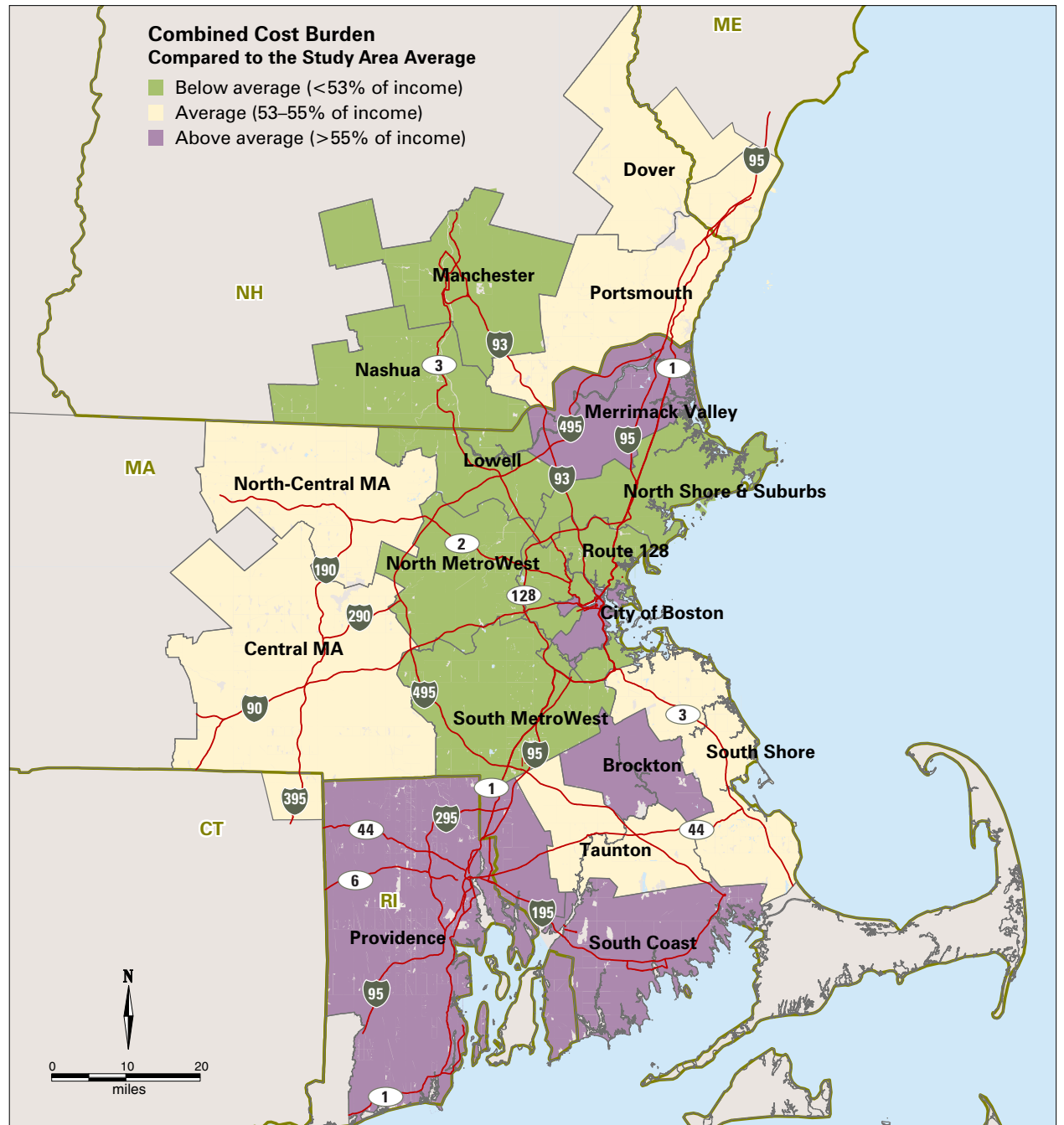
leading to high cost burdens.

See the appendix for data on housing and transportation costs and burdens for the largest cities and towns in the study area.

Regional Classification of Housing + Transportation Cost Burdens



IN THE MAP on this page, each of the 18 subregions is assigned to one of three categories based on its combined cost burden (i.e., the share of income spent on the combined costs of housing and transportation): (1) 53 to 55 percent, which includes the study area average (yellow in the map and text); (2) below average (less than 53 percent, in green); and (3) above average (more than 55 percent, in purple). The text accompanying the map explores some of the underlying factors that lead to these varying levels of cost burden.



© 2010 Center for Neighborhood Technology

Below-Average Cost Burdens

In the North and South MetroWest, Lowell, and North Shore & Suburbs subregions, below-average cost burdens are a reflection of above-average incomes that make even higher costs affordable to the typical resident. Households with lower incomes likely would find few affordable opportunities in these areas.

In the New Hampshire subregions of Nashua and Manchester, higher transportation costs are partially offset by lower housing costs, and incomes are sufficient to make combined costs affordable.

In the Route 128 subregion, the reverse is true—higher housing costs are offset by very low transportation costs.

Average Cost Burdens

Four of the six subregions with cost burdens ranging from 53 to 55 percent have moderate incomes and are located outside of I-495 on the periphery of the study area. Housing costs in these areas are low enough that, even when higher transportation costs are considered, combined costs are affordable.

With higher combined costs and higher incomes that make them affordable, the Portsmouth and South Shore subregions are two exceptions to this rule.

Above-Average Cost Burdens

In the Merrimack Valley and Brockton subregions, both housing and transportation costs are slightly above average and incomes are somewhat below average, resulting in combined cost burdens of 59 and 57 percent, respectively.

Housing costs are relatively high and transportation costs are low in the city of Boston, but incomes are significantly below average, leading to high overall levels of cost burden.

Very low incomes in the Providence and South Coast subregions also result in above-average cost burdens, despite the very low combined costs typically incurred by households in these communities.

Local Variation in Housing + Transportation Costs

This report focuses primarily on average costs, incomes, and resulting cost burdens estimated for the 18 subregions in the study area. While this is the most effective way to present the data, it can mask variation within each subregion. For example, within the Merrimack Valley subregion, the combined cost burden in Haverhill is 53 percent. But in nearby Lawrence, where costs are lower but incomes are roughly half, the combined costs of housing and transportation represent 74 percent of income—far above the study area average. Because there are 323 cities and towns in the study area, the report cannot focus on each individually. However, pages 16 and 17 discuss the neighborhoods, cities, and towns within each subregion that are particularly burdened by their housing and transportation costs, and the appendix includes data on all cities and towns with at least 10,000 households.



A Working Family's Budget— Location, Location, Location

A NEWS REPORTER, a bank teller, and their teenage son own a home in **Stoughton, Massachusetts**. The family earns an annual income of roughly \$70,000,¹ and after taxes, their monthly take-home pay is approximately \$4,667.² As with most families, housing is their largest expenditure, and transportation is their second largest. Their monthly budget is as follows:

Take-Home Pay	\$4,667
Housing	-\$2,430
Transportation	-\$1,095
Food	-\$636
Health Care	-\$381
Miscellaneous	-\$295
At Month's End	-\$170

¹ Average salaries for these professions in the Boston Metropolitan Statistical Area according to Salary.com, as reported in the Center for Housing Policy's Paycheck to Paycheck 2006 database.

² Tax estimates and monthly expenditures with the exception of housing and transportation are based on the Self-Sufficiency Calculator, produced by the Crittenton Women's Union in 2006. The calculator is available at www.liveworkthrive.org/calculator.php.

At the end of each month, this family is nearly \$200 short of covering its basic living expenses. Rather than cutting costs elsewhere, they may be able to bring expenses in line with their income by lowering transportation costs—even if it means paying more for housing by moving to another part of the Boston area.

THE SAME FAMILY could cover costs—with a little left over each month—if it moved to **Watertown, Massachusetts**.³ The cost of owning a home is slightly higher, but because the city is better situated in terms of jobs and public transit and is more “walkable” than their old neighborhood, transportation costs would likely be lower. In Watertown, this family's monthly budget would be as follows:

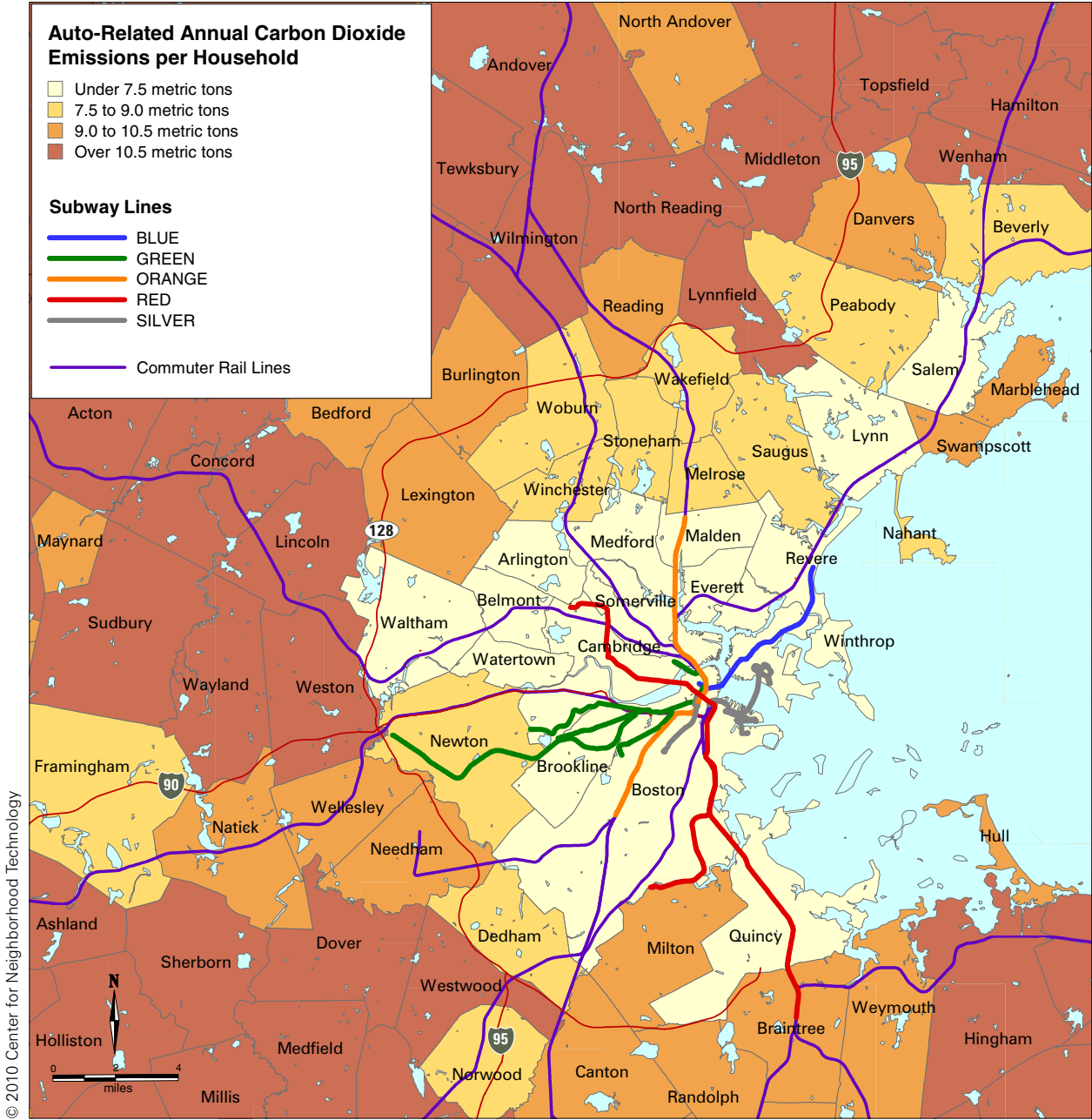


Take-Home Pay	\$4,667
Housing	-\$2,557
Transportation	-\$778
Food	-\$636
Health Care	-\$380
Miscellaneous	-\$254
At Month's End	+\$62

By moving to Watertown, this family would not only save over \$200 per month but would also reduce its carbon emissions by walking more frequently and taking public transit.

³ Compare housing and transportation costs throughout the study area by using the fully customizable, online Housing + Transportation Calculator, available at www.bostonregionalchallenge.org.

Environmental Impact



IN 2008, the Commonwealth of Massachusetts passed the Global Warming Solutions Act, legislation requiring that state greenhouse gas emissions be reduced to 80 percent of 1990 levels by 2050. Transportation is a major contributor of greenhouse gas emissions and thus a major target of emissions reduction efforts. Interestingly, the transportation sector accounts for 41 percent of all carbon dioxide (CO₂) emissions in Massachusetts,^{xv} compared to 33 percent nationally.^{xvi}

One strategy for reducing transportation-related CO₂ emissions is to reduce the number and length of car trips, often measured in vehicle miles traveled (VMT). High-density residential areas that can support—and are zoned to allow—nearby services, amenities, and employment have been shown to reduce VMT by 25 to 30 percent, on average.^{xvii}

CO₂ emissions related to automobile use are lowest, on a per-household basis,^{xviii} in the subregions with the highest residential density. The average household in the city of Boston produces only five metric tons of CO₂ annually, compared to a study area average of nine metric tons and at least 11 metric tons in six subregions with very low residential density. Low levels of per-household CO₂ emissions in the City of Boston and Route 128 subregions can further be attributed to access to the subway system, where coverage is most extensive (see map). As the map shows, emissions are lowest in cities and towns that have direct access to public transit, which can be a significant factor in reducing a household’s car usage.

Extreme Housing + Transportation Cost Burden



TO BETTER UNDERSTAND where housing and transportation costs are particularly high relative to incomes, we examine the share of households in each subregion living in neighborhoods^{xix} with an “extreme housing and transportation cost burden”—a level equaling or exceeding 58 percent of income. We chose 58 percent because only one-quarter of all households in the study area live in neighborhoods with a combined cost burden that meets or exceeds this level.

EXTREME HOUSING AND TRANSPORTATION COST BURDENS ARE COMMON AMONG VERY LOW-INCOME NEIGHBORHOODS IN THE SOUTH COAST, PROVIDENCE, AND CITY OF BOSTON SUBREGIONS. As Table 3 shows, more than half of all households in the South

Coast subregion and roughly one-third of those in the Providence and City of Boston subregions live in neighborhoods with extreme cost burdens. This is due, at least in part, to the very low incomes of residents in these neighborhoods—ranging from 47 to 54 percent of the median for the full study area—or roughly \$31,000 to \$37,000. Household incomes at this level are not sufficient to cover even the modest housing and transportation costs that characterize these neighborhoods.

EXTREME COMBINED BURDENS ARE ALSO PREVALENT IN MODERATE-INCOME NEIGHBORHOODS IN THE MERRIMACK VALLEY AND BROCKTON SUBREGIONS. Too close to the city to benefit from low-cost housing but not close enough to access jobs and transit

TABLE 3] Extreme H+T Cost Burdens Are Most Common Where Incomes Are Below Average

Subregion	Households in Neighborhoods Where H+T Cost Burden $\geq 58\%$	Percent of Regions' Households	Average Median Household Income Relative to Full Study Area
South Coast	69,045	51%	54%
Merrimack Valley	51,128	43%	64%
Providence	131,995	33%	54%
City of Boston	74,287	32%	47%
Brockton	19,471	26%	62%
Dover	13,140	26%	73%
Central MA	49,979	25%	56%
South Shore	27,111	22%	89%
Taunton	10,723	19%	71%
Route 128	86,685	19%	64%
Manchester	16,275	17%	62%
Portsmouth	14,572	17%	83%
North-Central MA	12,769	16%	58%
North Shore & Suburbs	22,649	16%	82%
Lowell	15,682	16%	57%
North MetroWest	9,571	9%	62%
Nashua	7,251	9%	60%
South MetroWest	8,582	5%	84%

Source: Center for Neighborhood Technology

nearby, many low- to moderate-income households in these neighborhoods cannot afford the combined costs of housing and transportation.

HIGHER-INCOME SUBREGIONS ALSO HAVE NEIGHBORHOODS WITH EXTREME COMBINED BURDENS, although such neighborhoods make up a smaller share of each subregion’s total households. In four—South Shore, Portsmouth, North Shore & Suburbs, and South MetroWest—the neighborhoods with extreme combined burdens have median incomes ranging

from 82 to 89 percent of the study area median, showing that extreme cost burdens are not a problem experienced solely by low-income families.

Finally, Table 4 demonstrates that some cities and towns throughout the study area have extreme combined cost burdens—even where the cost burdens of the subregions in which they are located are not markedly high. Not surprisingly, cities and towns in the Providence, South Coast, Merrimack Valley, and Brockton subregions make the list. But three cities inside Route 128, as well as cities such as Worcester and Fitchburg in Central and North-Central Massachusetts, also have combined cost burdens that qualify as extreme, even though their subregions do not stand out as being particularly burdened.

By and large, incomes for the cities and towns in Table 4 range from the mid-\$30,000s to the mid-\$50,000s, or roughly 50 to 80 percent of the median income for the study area. Not shown in the table because of their small size, a number of towns in New Hampshire and the South Shore subregions have extreme combined cost burdens and median household incomes on the order of \$60,000 to \$70,000.



TABLE 4] Many Cities and Towns in the Study Area Have Extreme H+T Cost Burdens

Subregion	City/Town	Average Median Income	Average H+T Cost Burden
Brockton	Brockton	\$53,065	62%
Central MA	Worcester	\$44,933	59%
Merrimack Valley	Andover	\$94,863	58%
	Lawrence	\$31,988	74%
	Methuen	\$55,080	63%
North-Central MA	Fitchburg	\$47,453	58%
Providence	Johnston	\$54,087	60%
	Pawtucket	\$41,390	58%
	Providence	\$36,342	72%
	Woonsocket	\$38,398	61%
Route 128	Chelsea	\$39,255	61%
	Lynn	\$42,928	63%
	Revere	\$48,377	63%
South Coast	Dartmouth	\$64,611	59%
	Fall River	\$35,051	62%
	New Bedford	\$37,850	66%

Note: Only cities and towns with at least 10,000 households and an H+T cost burden of at least 58 percent are shown here.

Source: Center for Neighborhood Technology.



The Way Forward

THERE ARE MANY REASONS to live in and move to the Boston area, including a wide array of highly regarded colleges and universities, two of the top ten hospitals in the nation,^{xx} a vibrant cultural scene, and a diverse economy. At the same time, many are concerned that a shortage of affordable housing may make it difficult to retain and attract necessary workers. As this report makes clear, an effective solution to the region's housing challenges will require coordination between housing and transportation policy to reduce families' combined costs to affordable levels.

In order to make room for the more than 250,000 people expected to join the Boston area by 2030,^{xxi} as well as to accommodate today's residents as they form new and increasingly smaller households, hundreds of thousands of homes—including both rental and for-sale—will have to be built in the coming decades.^{xxii} This provides an important opportunity for the region to shape its growth in a way that reduces combined costs as well as greenhouse gas emissions.



ADDRESSING IDENTIFIED NEEDS

As the region readies itself for the future, it is important that housing, transportation, and land use policies be coordinated to foster the development of communities that are appealing and affordable to families at a range of incomes, include a mix of uses, and have access to a variety of transit options. To achieve this goal while addressing specific findings of this report, the region should consider:

- Developing workforce housing and expanding affordable transportation options in moderate-income communities such as Brockton and

the Merrimack Valley.

- Creating housing affordable to low- and moderate-income households in densely developed, walkable communities where public transit is relatively accessible and amenities are nearby but where housing costs are very high, such as in the city of Boston and in transit-served neighborhoods inside Route 128. Similar efforts to lower combined costs in the Providence and South Coast subregions, where costs are lower but burdens are nonetheless high, are also important.
- Enhancing and extending public

transit service in peripheral communities where housing costs are already low. Efforts to link these communities to major job centers and other nearby destinations through public transit could lower transportation costs significantly.

BUILDING POLITICAL SUPPORT

The states within the study area have a history of supporting affordable housing and efforts to coordinate housing and transportation policy. Prominent examples from Massachusetts include:

- Chapter 40R, which provides financial incentives for cities and towns in Massachusetts to zone for and build high-density residential developments in areas previously identified as highly suitable for development, near transit, or near already concentrated development. The success of Chapter 40R depends in part on a strong Chapter 40B, which helps to fast-track efforts to develop affordable housing in areas where it is lacking.^{xxiii}
- The Community Preservation Act (CPA), which allows municipalities to include a surcharge on real estate taxes and to direct funding

toward housing affordable to low- and moderate-income households (below 100 percent of area median income), historic preservation, and open space conservation.^{xxiv}

■ The Commonwealth Capital Program, which makes some state grant and loan programs for capital projects partly contingent on how well a municipality has incorporated the state's sustainable development principles into its planning and zoning practices. Thirty percent of the scoring for ten to 15 state spending programs is predicated on the Commonwealth Capital score of participating municipalities.^{xxv}

These state programs, and others like them, need to be fully funded in order to have maximal impact. This is particularly important when state funds act as incentives for local action, as they do in the above examples. As the region recovers from the current economic and housing crises, state and local governments should renew their support for these programs and guarantee funding levels to maximize their effectiveness.

RELIABLE AND AFFORDABLE PUBLIC TRANSIT

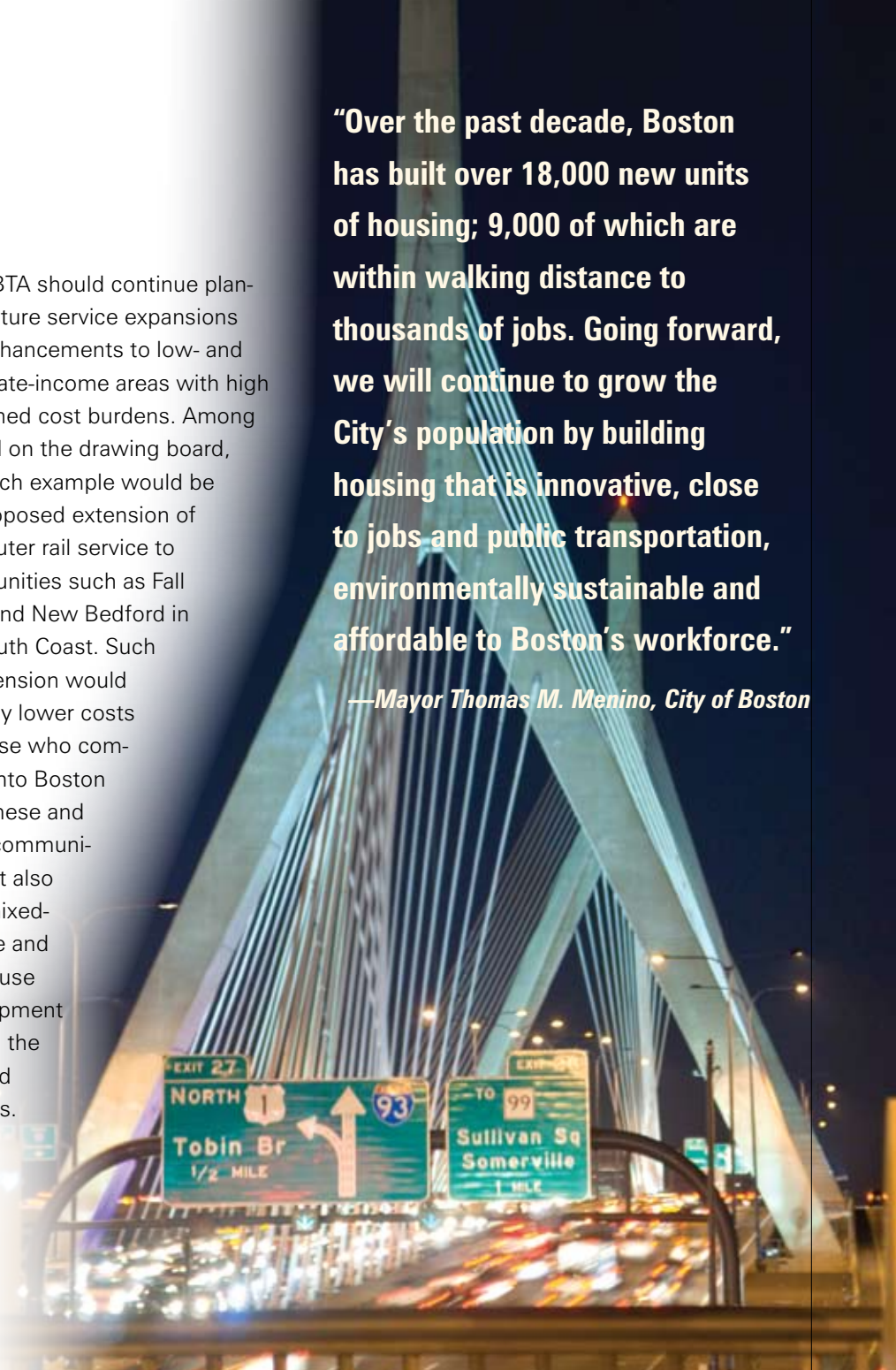
As important as it is to strategically think about the location and transit orientation of new residential developments, housing built in the coming decades will represent only a small fraction of the total housing stock in the region. Therefore, efforts to lower the economic and environmental costs of transportation associated with the housing we already have are also important. In fact, many communities have shown that sound planning, compact development, and access to transit can produce transportation costs that represent only 15 percent of income or less, compared to 19 percent in the Boston study area as a whole. A critical ingredient in the effort to lower transportation costs is a comprehensive, reliable public transit system.

To remain an asset in the communities that it serves, the MBTA needs to receive sufficient funding to address its considerable debt burden and sizable backlog of significant repairs.^{xxvi} Even as financial soundness is being restored,

the MBTA should continue planning future service expansions and enhancements to low- and moderate-income areas with high combined cost burdens. Among several on the drawing board, one such example would be the proposed extension of commuter rail service to communities such as Fall River and New Bedford in the South Coast. Such an extension would not only lower costs for those who commute into Boston from these and other communities but also spur mixed-income and mixed-use development around the planned stations.

“Over the past decade, Boston has built over 18,000 new units of housing; 9,000 of which are within walking distance to thousands of jobs. Going forward, we will continue to grow the City’s population by building housing that is innovative, close to jobs and public transportation, environmentally sustainable and affordable to Boston’s workforce.”

—Mayor Thomas M. Menino, City of Boston



METHODOLOGY

Estimating Housing and Transportation Costs by Neighborhood



THE ORIGINAL HOUSING + TRANSPORTATION COST MODEL

The Housing + Transportation (H+Tsm) Affordability Index was developed by the Center for Neighborhood Technology (CNT) and its collaborative partners, the Center for Transit Oriented Development (CTOD) with support from the Brookings Institution's Metropolitan Policy Program's Urban Markets Initiative. This cost index has been applied to 55 metro areas in the United States, and is unique in that it measures joint transportation and housing affordability at a neighborhood level (see www.htaindex.cnt.org).

TRANSPORTATION COSTS

The transportation costs estimated in this model and used in this report are more than the cost of commuting to and from work. They also include trips to and from school, errands, and other travel that is part of the household daily routine. The methods for the cost model draw from peer-reviewed research findings on the factors that drive household transportation costs. The model assump-

tions, calculations, and methods have been reviewed by practitioners at the Metropolitan Council in Minneapolis-St. Paul, fellows with the Brookings Institution, and academics from the University of Minnesota, Virginia Polytechnic Institute and State University, Temple University, and elsewhere, specializing in transportation modeling, household travel behavior, community indicators, and related topics.

Specifically, the transportation cost model incorporates four neighborhood variables (residential density, average block size, transit connectivity index, and job density) and four household variables (household income, household size, commuters per household, and average journey to work time) as independent variables. These variables are used to predict, at a neighborhood level (census block group), three dependent variables — auto ownership, auto use, and public transit usage — that determine the total transportation costs.

HOUSING COSTS

Housing costs were determined using the census variables Selected

Monthly Owner Costs (SMOC) for Owners with a Mortgage and Gross Rent for Renters Paying Cash (GR). SMOC is defined as the sum of payments for mortgages, deeds of trust, contracts to purchase, or similar debts on the property (including payments for the first mortgage, second mortgage, home equity loans, and other junior mortgages); real estate taxes; fire, hazard, and flood insurance on the property; utilities (electricity, gas, and water and sewer); and fuels (oil, coal, kerosene, wood, etc.). It also includes, where appropriate, the monthly condominium fees or mobile home costs (installment loan payments, personal property taxes, site rent, registration fees, and license fees).

Gross Rent (GR) is defined as the contract rent plus the estimated average monthly cost of utilities (electricity, gas, water, and sewer) and fuels (oil, coal, kerosene, wood, etc.) if these are paid by the renter (or paid for the renter by someone else). Using gross rent eliminates differentials that result



from varying practices with respect to including utilities and fuels as part of the rental payment. The estimated costs of utilities and fuels are reported on an annual basis but are converted to monthly figures for the tabulations.

To calculate an average value for SMOC and GR, an aggregate value is divided by the number of households making up the aggregate. For the purposes of this study, housing costs are estimated using only renters paying cash and owners paying mortgages. Renters paying with vouchers (e.g., subsidized housing) and owners who no longer have mortgage payments are therefore excluded.

For a full description of the methods used in the original Housing + Transportation Affordability

Index, see: <http://htaindex.cnt.org/model/summary>.

UPDATING THE ORIGINAL MODEL TO 2006–2008

Input data for the original model are primarily composed of 2000 U.S. Decennial Census block group data and values that were created and calculated based on these data. Since the most recent data are for 2000, estimates for 2006–2008 were carried out using a recognized procedure called the “constant-share method,” which considered the percent change of variables from 2000 to 2006–2008 within the Public Use Microdata Areas (PUMAs). PUMA data for 2006–2008 were obtained from the American Community Survey (ACS) three year estimates while 2000 U.S. Census

block group data were aggregated to the same PUMA boundaries. Once the percent changes were calculated between the two time periods for each PUMA for each variable, these values were then used as multipliers. Year 2000 values for each block group within each PUMA were multiplied by this percent change to estimate 2006–2008 values at the block group level.

Transportation costs were updated by applying new cost factors to the model’s estimates of vehicle miles traveled and automobiles per household. These cost factors were based on the 2007 AAA estimates of costs for owning and operating a vehicle, which are estimated to be \$5,648 per auto and 14.5 cents/mile for fuel (\$2.26/gallon), maintenance, and tires.

Auto-Related Carbon Dioxide Emissions per Household were estimated using model results for vehicle miles traveled per household, an assumed fuel efficiency of 20.3 miles per gallon, and an emissions factor of .0092 metric tons per gallon.

APPENDIX: Housing and Transportation Cost Estimates for Cities and Towns with at least 10,000 Households



State	City/Town	Average Median Income	Total Households	Average Annual Housing Costs	Average Annual Transportation Costs	Housing as a % of Income	Transportation as a % of Income	H + T as a % of Income
Brockton Subregion		\$67,017	76,101	\$22,722	\$13,342	36%	21%	57%
MA	Brockton	\$53,065	33,359	\$19,362	\$11,441	39%	23%	62%
Central MA Subregion		\$65,489	201,617	\$19,817	\$12,928	32%	21%	53%
MA	Shrewsbury	\$88,899	13,020	\$26,339	\$13,945	30%	16%	47%
MA	Worcester	\$44,933	64,850	\$15,297	\$9,505	36%	23%	59%
City of Boston Subregion		\$52,923	231,988	\$19,918	\$7,013	41%	15%	56%
Dover Subregion		\$59,122	51,371	\$18,354	\$13,671	31%	24%	55%
NH	Dover	\$58,752	12,353	\$17,488	\$12,755	30%	22%	52%
NH	Rochester	\$53,132	12,205	\$16,670	\$12,940	32%	25%	56%
Lowell Subregion		\$73,969	100,465	\$22,707	\$13,026	32%	19%	51
MA	Billerica	\$83,452	13,383	\$24,882	\$14,600	30%	18%	48%
MA	Chelmsford	\$85,884	13,337	\$26,788	\$13,913	32%	17%	48%
MA	Dracut	\$72,634	10,871	\$21,765	\$13,878	30%	19%	50%
MA	Lowell	\$50,915	36,466	\$16,803	\$10,110	35%	21%	56%
MA	Tewksbury	\$84,968	10,376	\$26,098	\$14,581	31%	18%	49%
Manchester Subregion		\$67,820	96,255	\$20,993	\$13,357	32%	21%	52%
NH	Derry	\$70,529	13,330	\$21,541	\$14,350	31%	21%	52%
NH	Manchester	\$53,056	43,944	\$16,602	\$10,884	32%	21%	54%
Merrimack Valley Subregion		\$65,795	118,282	\$23,241	\$12,419	37%	21%	59%
MA	Andover	\$94,863	11,339	\$37,746	\$14,562	42%	16%	58%
MA	Haverhill	\$60,494	23,542	\$19,065	\$12,170	32%	21%	53%
MA	Lawrence	\$31,988	24,440	\$13,813	\$8,442	46%	28%	74%
MA	Methuen	\$55,080	16,587	\$21,504	\$12,338	40%	23%	63%
Nashua Subregion		\$77,704	78,383	\$23,352	\$14,223	31%	19%	50%
NH	Nashua	\$66,291	35,445	\$20,247	\$12,089	31%	19%	51%
North-Central MA Subregion		\$63,693	79,888	\$19,142	\$13,491	31%	22%	53%
MA	Fitchburg	\$47,453	15,232	\$15,177	\$11,322	33%	25%	58%
MA	Leominster	\$59,941	16,716	\$17,117	\$12,393	29%	22%	51%
North MetroWest Subregion		\$95,744	102,594	\$29,423	\$13,721	32%	16%	48%
MA	Framingham	\$67,195	25,888	\$21,747	\$11,545	34%	19%	53%
MA	Marlborough	\$72,507	15,165	\$22,603	\$12,754	32%	19%	51%
North Shore & Suburbs Subregion		\$76,452	143,965	\$25,567	\$12,850	34%	18%	52%
MA	Beverly	\$69,727	15,294	\$22,344	\$12,209	33%	18%	51%
MA	Gloucester	\$60,660	12,519	\$21,489	\$12,152	36%	21%	57%
MA	Peabody	\$62,682	19,112	\$21,680	\$11,785	36%	19%	55%
MA	Salem	\$56,410	17,003	\$18,801	\$10,238	34%	19%	53%
Portsmouth Subregion		\$76,585	88,311	\$25,123	\$14,428	33%	20%	53%
NH	Portsmouth	\$59,416	10,593	\$19,760	\$11,289	34%	20%	53%
NH	Salem	\$77,233	11,631	\$25,144	\$14,252	33%	19%	52%
Providence Subregion		\$57,336	398,713	\$18,888	\$11,697	35%	22%	57%
MA	Attleboro	\$68,635	16,094	\$20,018	\$13,256	30%	20%	49%
MA	North Attleborough	\$80,663	10,601	\$22,414	\$13,939	28%	18%	46%
RI	Coventry	\$65,498	12,769	\$20,235	\$14,188	31%	22%	53%
RI	Cranston	\$57,567	30,304	\$19,226	\$11,243	34%	20%	55%
RI	Cumberland	\$69,283	11,872	\$21,803	\$13,802	32%	21%	53%
RI	East Providence	\$49,147	20,086	\$15,804	\$10,376	33%	22%	55%

State	City/Town	Average Median Income	Total Households	Average Annual Housing Costs	Average Annual Transportation Costs	Housing as a % of Income	Transportation as a % of Income	H+T as a % of Income
RI	Johnston	\$54,087	10,964	\$19,640	\$12,153	37%	23%	60%
RI	North Kingstown	\$78,392	10,595	\$24,187	\$14,448	32%	20%	51%
RI	North Providence	\$50,736	13,967	\$17,236	\$10,598	35%	21%	56%
RI	Pawtucket	\$41,390	29,234	\$14,031	\$9,159	35%	23%	58%
RI	Providence	\$36,342	59,173	\$15,569	\$7,753	47%	25%	72%
RI	Warwick	\$59,863	36,002	\$19,277	\$12,027	33%	21%	53%
RI	West Warwick	\$50,439	12,669	\$15,714	\$11,206	31%	23%	54%
RI	Woonsocket	\$38,398	17,541	\$12,642	\$9,591	34%	27%	61%
Route 128 Subregion		\$69,444	456,596	\$23,754	\$9,794	36%	15%	51%
MA	Arlington	\$73,557	18,630	\$24,240	\$10,071	34%	14%	48%
MA	Brookline	\$87,293	26,248	\$28,562	\$8,284	35%	10%	44%
MA	Cambridge	\$61,923	41,380	\$22,131	\$6,540	37%	11%	48%
MA	Chelsea	\$39,255	12,144	\$16,376	\$6,893	43%	18%	61%
MA	Everett	\$51,801	14,522	\$18,425	\$8,447	36%	16%	53%
MA	Lexington	\$110,740	10,914	\$39,474	\$13,451	36%	12%	48%
MA	Lynn	\$42,928	32,968	\$16,707	\$8,887	41%	22%	63%
MA	Malden	\$58,578	22,372	\$20,096	\$9,349	35%	16%	52%
MA	Medford	\$67,224	21,634	\$24,356	\$9,818	37%	15%	52%
MA	Melrose	\$77,474	10,952	\$23,353	\$11,453	30%	15%	45%
MA	Newton	\$114,576	32,023	\$34,201	\$12,179	31%	11%	42%
MA	Quincy	\$56,883	39,053	\$19,500	\$9,484	35%	17%	53%
MA	Revere	\$48,377	19,891	\$20,607	\$9,047	44%	19%	63%
MA	Somerville	\$59,629	29,560	\$20,319	\$8,278	35%	14%	49%
MA	Wakefield	\$82,277	10,081	\$25,727	\$12,534	32%	16%	47%
MA	Waltham	\$62,839	22,904	\$20,668	\$10,154	33%	17%	50%
MA	Watertown	\$67,315	14,302	\$22,157	\$9,331	34%	14%	48%
MA	Woburn	\$68,647	15,032	\$21,561	\$11,734	32%	17%	49%
South Coast Subregion		\$48,067	134,654	\$16,426	\$11,381	36%	26%	62%
MA	Dartmouth	\$64,611	10,588	\$21,972	\$14,210	36%	23%	59%
MA	Fall River	\$35,051	38,023	\$11,503	\$8,977	35%	27%	62%
MA	New Bedford	\$37,850	38,426	\$13,359	\$9,613	38%	28%	66%
South MetroWest Subregion		\$92,371	167,670	\$28,664	\$14,028	32%	16%	48%
MA	Franklin	\$92,384	10,473	\$27,147	\$14,853	30%	17%	47%
MA	Milford	\$70,490	11,115	\$20,884	\$13,017	31%	20%	51%
MA	Natick	\$82,834	13,032	\$26,892	\$12,805	33%	16%	49%
MA	Needham	\$105,424	10,718	\$33,365	\$12,937	33%	13%	46%
MA	Norwood	\$69,936	11,838	\$20,810	\$11,830	30%	17%	47%
MA	Randolph	\$67,663	11,337	\$22,442	\$12,671	33%	19%	52%
MA	Stoughton	\$71,818	10,413	\$24,378	\$13,135	34%	19%	53%
South Shore Subregion		\$77,812	123,391	\$26,779	\$13,931	35%	19%	54%
MA	Braintree	\$77,063	12,876	\$24,731	\$12,654	32%	17%	49%
MA	Plymouth	\$70,044	19,339	\$24,039	\$14,286	35%	21%	56%
MA	Weymouth	\$64,280	22,281	\$21,167	\$12,041	34%	19%	53%
Taunton Subregion		\$69,032	56,183	\$21,977	\$14,253	32%	21%	54%
MA	Taunton	\$54,883	22,573	\$17,984	\$12,453	33%	23%	57%

Source: Center for Neighborhood Technology.



References

- i *Bay Area Burden*, which evaluates the combined costs of housing and transportation in the San Francisco Bay Area, and *Beltway Burden*, which focuses on the region surrounding the nation's capital, can be found at the website of the ULI Terwilliger Center for Workforce Housing (<http://www.uli.org/ResearchAndPublications/TerwilligerCenterfor-WorkforceHousing.aspx>).
- ii Bluestone, Barry, Chase Billingham, and Jessica Herrmann. 2009, October. *The Greater Boston Housing Report Card 2009: Positioning Boston in a Post-Crisis World*. Boston, MA: The Boston Foundation; The Center for Urban and Regional Policy, Northeastern University. 2003, October. *Building on Our Heritage: A Housing Strategy for Smart Growth and Economic Development*. Boston, MA: The Commonwealth Housing Task Force.
- iii The online cost calculator and the suite of materials that accompany the electronic version of this report are available at www.bostonregionalchallenge.org.
- iv The study area is based on the Boston-Worcester-Lawrence Consolidated Metropolitan Statistical Area and the Providence-Fall River-Warwick Metropolitan Statistical Area, as defined by the Office of Management and Budget in 1999.
- v As most recently defined by the Office of Management and Budget, the Boston-Worcester-Manchester Combined Statistical Area (CSA) is slightly larger than the study area in this report. The primary difference is that the CSA includes greater portions of Hillsborough, Merrimack, and Belknap Counties in New Hampshire and Worcester County in Massachusetts.
- vi Home prices were estimated to be as much as 20 percent below their peak by the end of 2009. Bluestone, Barry, Chase Billingham, and Jessica Herrmann. 2009, October. *The Greater Boston Housing Report Card 2009: Positioning Boston in a Post-Crisis World*. Boston, MA: The Boston Foundation.
- vii Consumer Expenditure Survey data apply to the Boston Combined Statistical Area. Bureau of Labor Statistics. Consumer Expenditure Survey, 2007-2008. Table 21. Retrieved February 5, 2010 from <http://www.bls.gov/cex/csxmsa.htm>.
- viii Estimated costs include ground transportation only and do not include air travel.
- ix Using a methodology developed by the Center for Neighborhood Technology, major job centers identified in this report have at least 5,000 jobs and a minimum density of seven jobs per acre.
- x In 2007-08, households in the Boston Combined Statistical Area allocated 14.4 percent of their total expenditures to transportation costs, compared with a 17.3 percent U.S. average. In 2005-06, the levels were closer (17.1 percent in the Boston CSA vs. 17.8 percent in the U.S.). Bureau of Labor Statistics. Consumer Expenditure Survey, Tables 8 and 21 (2007-2008) and Tables 8 and 3002 (2005-2006). Retrieved February 5, 2010 from <http://www.bls.gov/cex/csxmsa.htm>.
- xi Massachusetts Bay Transportation Authority. 2009, December. *MBTA Scorecard*. Boston, MA: Author. Retrieved February 5, 2010 from http://www.mbta.com/uploadedfiles/About_the_T/Score_Card/Scorecard-2009-12.pdf.
- xii Center for Housing Policy tabulations of 2008 American Community Survey data.
- xiii Center for Housing Policy tabulations of the 2006-2008 American Community Survey Public Use Microdata Sample files.
- xiv Center for Housing Policy tabulations of 2008 American Community Survey data.
- xv U.S. Environmental Protection Agency. 2009, April 15. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007*. Washington, DC: Author.
- xvi Condon, Patrick M., Duncan Cavens, and Nicole Miller. 2009. *Urban Planning Tools for Climate Change Mitigation*. Cambridge, MA: Lincoln Institute of Land Policy.
- xvii Ewing, Reid, Keith Bartholomew, Steve Winkelman, Jerry Walters, and Don Chen. 2007. *Growing Cooler: The Evidence on Urban Development and Climate Change*. Washington, DC: Urban Land Institute; and Committee for the Study on the Relationships Among Development Patterns, Vehicle Miles Traveled, and Energy Consumption, National Research Council. 2009. *Driving and the Built Environment: The Effects of Compact Development on Motorized Travel, Energy Use, and CO2 Emissions*. Washington, DC: Transportation Research Board.
- xviii Calculations of carbon dioxide emissions use an emissions factor of .0092 metric tons per gallon and an assumed fuel efficiency of 20.3 miles per gallon.
- xix Census block groups are used to approximate neighborhoods and form the geographic basis for the housing and transportation cost data presented throughout this report.
- xx Comarow, Avery. 2009, July 15. "America's Best Hospitals: the 2009-10 Honor Roll." *U.S. News & World Report*. Retrieved March 4, 2010 from www.usnews.com/health.
- xxi Center for Housing Policy tabulations of population projections produced by the Metropolitan Area Planning Council in 2006. Retrieved February 3, 2010 from <http://www.mapc.org/data-services/available-data>.
- xxii The Metropolitan Area Planning Council estimates that between 2000 and 2030, roughly 349,000 new units will need to be constructed in an area that includes many, but not all, of the cities and towns inside I-495. Grogan, Jesse. 2009, June. *From Plan to Action: A MetroFuture Summary*. Boston, MA: Metropolitan Area Planning Council.
- xxiii The Center for Urban and Regional Policy, Northeastern University. 2003, October. *Building on Our Heritage: A Housing Strategy for Smart Growth and Economic Development*. Boston, MA: The Commonwealth Housing Task Force. Refer to the Citizens' Housing and Planning Association to learn more about Chapter 40B (<http://www.chapa.org/?q=chapter40B>) and the Commonwealth's Smart Growth/Smart Energy Toolkit for more information on Chapter 40R (http://www.mass.gov/envir/smart_growth_toolkit/pages/mod-40R.html).
- xxiv Massachusetts Executive Office of Energy and Environmental Affairs. Retrieved March 5, 2010 from <http://commpres.env.state.ma.us/content/cpa.asp>.
- xxv Commonwealth of Massachusetts website. Retrieved February 4, 2010 from <http://www.mass.gov/commcap>.
- xxvi D'Alessandro, David F., Paul D. Romary, Lisa J. Scannell, and Bryan Woliner. 2009, November. *MBTA Review*. Retrieved January 8, 2010 from http://www.mbtareview.com/MBTA_Review_2009.pdf.



Calculator

What do housing and transportation in the Boston area cost YOU?

Find out with the Housing and Transportation Cost Calculator.

The ULI Terwilliger Center for Workforce Housing is pleased to announce its Housing + Transportation Cost Calculator to the Boston Area to provide consumers with up-to-date cost data to make informed housing decisions based on housing and transportation costs.

To access the calculator, go to www.bostonregionalchallenge.org.



ULI Terwilliger Center Housing and Transportation Cost Calculator

www.bostonregionalchallenge.org

The Terwilliger Cost Calculator aids individuals, households, planners, government officials and municipalities to understand the true costs of housing and transportation, and how these costs can vary by location within the Boston Area.



Terwilliger Center for Workforce Housing

1025 Thomas Jefferson Street, NW
Suite 500 West
Washington, D.C. 20007
(202) 624-7000

www.uli.org/TerwilligerCenter

Housing + Transportation Calculator

Introduction | Calculator | Help

Urban Land Institute | CENTER FOR WORKFORCE HOUSING | CNT

Map data ©2018 SatNav, Google

+ Add a new location

Comparing Your Locations

Boston, MA, USA	Your Household
Default Profile: Copy Delete	SHOW LESS ▲
Household Size	1
Annual Household Income	\$41,471
Tenure	Not Specified
Number of Workers	1
Commute to Workplace:	22.5Miles
Number of Cars	0
Total Annual Miles Driven	7,830
Gas Price	\$2.41/gal
Miles per Gallon	23.0mpg
Monthly Parking and Tolls	\$0
Transit Cost per Month	\$14
Transit Trips per Day	7
Annual Transportation Costs:	\$2,806
Annual Housing Costs: (For Use of Owners and Renters)	\$17,832
Annual Housing and Transportation Costs:	(45% of Inc.) \$20,638
Transit Connectivity:	Very High
Residential Household Density:	Very High
Job Accessibility:	Very High
Average Block Size:	Very Small

Using the fully customizable tool, users can:

- calculate the combined housing and transportation costs using household characteristics and location;
- assess the true proportion of income being spent on housing and transportation;
- evaluate the factors that determine housing and transportation costs, and how changes can impact expenses;
- compare actual household costs with neighborhood and regional averages.