



**CRCOG** CAPITAL REGION  
COUNCIL OF GOVERNMENTS  
*Working together for a better region.*

 **CTtransit**



**Comprehensive Service Analysis**

# Existing Conditions & Service Overview

**December 2014**

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NELSON  
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In association with:  
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# 1 INTRODUCTION

The Capitol Region Council of Governments (CROG) and the Connecticut Department of Transportation (CTDOT) retained a consulting team led by Nelson\Nygaard Consulting Associates to prepare a Comprehensive Service Analysis (CSA) focused on inventorying transit needs in the Greater Hartford area and reviewing existing services provided by CTtransit's Hartford Division to ensure they are matched with demand and operated as efficiently and effectively as possible. The CSA began in September 2014 and is scheduled to be completed by the end of 2015.

The CSA consists of several large tasks, including a review of existing conditions, an assessment of the demand for travel in the CTtransit service area, outreach with stakeholders and members of the public, a detailed evaluation of CTtransit's fixed-route services, and the development of service improvement recommendations. These recommendations will be developed as part of an open and transparent process, with numerous opportunities for stakeholder and public input.

The overall goal of the CSA is to lay out a Comprehensive Transit Service Plan to better match CTtransit services to existing demand, address gaps, and identify opportunities to improve the delivery of CTtransit services. While the analysis and resulting recommendations will focus primarily on transit services, the CSA will also consider the full spectrum of service delivery including passenger information systems, and passenger facilities.

This memo, *Technical Memo 1: Existing Conditions and Service Overview*, provides an overview of service area characteristics, evaluates the underlying market for transit service in the CTtransit service area, and assesses the "system-wide" productivity of the CTtransit Hartford Division. The document is organized into four chapters:

- **Chapter 2: Agency Overview** describes the organizational structure of CTtransit and describes CTtransit's existing transit services in the Capitol Region and their current operating characteristics.
- **Chapter 3: Systemwide Performance** discusses the methods and measures for evaluating transit service performance and presents an initial assessment of CTtransit - Hartford Division ridership and productivity.
- **Chapter 4: Market Analysis** provides an overview of the demographic, employment, and development patterns of the Capitol Region, and discusses how these patterns (as well as other initiatives in the Hartford metro area) may affect the need for CTtransit services
- **Chapter 5: Travel Patterns** identifies existing travel flows within the CTtransit service area, and analyzes these travel patterns with regard to the design of CTtransit service.

Technical Memo 1 is the first memo in a series and is intended as a working document. All findings and recommendations should be considered preliminary.



## SUMMARY OF FINDINGS

Overall, *CTtransit* services in the Capital Region appear to be well matched to local demand, at least in terms of service coverage. The urban core of Hartford is well served by both local services and by commuter express routes that connect suburban park-and-rides to downtown. The strongest markets for transit are the City of Hartford, West Hartford, and East Hartford. These areas have the highest density of population and employment, as well as concentrations of individuals more likely to rely on public transportation services.

However, several potential actions should be considered as part of examining and enhancing *CTtransit* service. These include:

### ➔ Regional Transit Initiatives

There are two major initiatives in the Capitol Region that will have an impact on local transit demand in the near future:

- *CTfastrak*: *CTfastrak*, scheduled to begin service in March 2015, will be the first bus rapid transit system in Connecticut, and will include a 9.4-mile dedicated guideway between New Britain and Hartford, a heavily congested corridor. Passengers will benefit from the additional of faster, more direct service between downtown Hartford and New Britain as well as several destinations in between. As the service is implemented, *CTtransit* will need to monitor the specific local transit connections desired by *CTfastrak* passengers coming to and from Hartford, and consider service adjustments as appropriate.
- New Haven-Hartford-Springfield (NHHS) Commuter Rail: The addition of commuter rail service to and from Hartford in 2016 will complement the local and express bus services that currently serve downtown Hartford. However, like *CTfastrak*, *CTtransit* should pay attention to the key connections that passengers need to make between commuter rail and local and express buses.

In the longer term, several project associated with I-84 are also expected to have an impact on Hartford's transportation network, including transit services. I-84 through Hartford is the busiest section of highway in the State of Connecticut and is reaching the end of its useful life. CTDOT is currently studying various options for reconstruction or other modifications that will certainly impact traffic patterns during and after construction.

### ➔ Regional East-West Transit Corridor

The combined markets of New Britain, Hartford, West Hartford, East Hartford and Manchester form a rough east west corridor with considerable population and employment. Demand along the corridor is not evenly distributed, nor is it defined by a single roadway. Instead the corridor contains a series of neighborhoods, activity centers and job clusters that are located near and around a series of smaller roadways. However, combined the overall corridor is the region's strongest transit market. The role of transit along this corridor will be strengthened significantly when *CTfastrak* opens in the spring, 2015 and then again when the New-Haven-Hartford-Springfield commuter rail service opens (see above). As part of creating a stronger transit corridor, transit service needs to not only provide service along the east-west corridor (and in and out of downtown Hartford), it will also need to create connections to and from the corridor in many different locations, including at the outer ends (New Britain and Manchester). Transit service development, therefore, needs to identify ways to respond to these needs by connecting to the corridor at several points, without always relying on connections through downtown Hartford.



## ➔ Emerging Geographic Markets and Activity Centers

The *CTtransit* service area is oriented around Hartford as the urban regional center, but there are also secondary destinations throughout the region and additional markets that may warrant new or enhanced transit service. Some opportunities include the following:

- Major destinations and transfer locations outside of downtown Hartford, such as Buckland Hills and Westfarms Mall, are directly connected to Hartford, but access across the region requires a trip into downtown and another trip to reach the destination. Connections between regional activity centers can improve access to destinations across the region and make transit travel more convenient. *CTfastraks* can help with cross town travel, but additional strategies are needed.
- There are portions of the service area that do not have sufficient densities to support frequent fixed-route service. Other service options, ranging from less-frequent fixed-route service to flexible or dial-a-ride service should be considered as alternatives for these areas.

## ➔ Emerging Demographic Trends

A market analysis prepared for CROCOG, “A Market Analysis for Transit Oriented Development in the Region’s Bus Rapid Transit and Rail Corridors” documents trends in Hartford (and the region) where some sub segments of the population are looking for more for “urban” or transit oriented housing, amenities and services. These regional trends are mirrored nationally and highlight the inter-related effects of demographic changes (more single person and smaller sized households) and resulting demand for smaller housing units plus lifestyle preferences that are more oriented around biking, walking and transit than driving. As the development market responds to these trends and new housing is located in downtown Hartford, as well as other ‘urban’ center communities, the demand for transit will increase. In addition, transit investment, as in the case of *CTfastrak* and the commuter rail, will help create new transit oriented communities.

## ➔ Simplify Routes and Service Structure

In 2009, *CTtransit* completed a system wide renaming of routes, which made service clearer and easier for riders to understand. However, there is more that can be done to improve the legibility of *CTtransit* service. Most *CTtransit* routes have at least two variants, serving different destinations and traveling along different alignments depending on the day or time. Several routes have three or more variants. Multiple route deviations and variants can contribute to irregular schedules and make service confusing for riders, while simplifying routes and reducing multiple variants will service easier to understand and use by existing and potential riders alike.







## 2 OVERVIEW OF CTTRANSIT

### BACKGROUND

The Hartford Division of Connecticut Transit (*CTtransit*) operates fixed-route transit service throughout the Hartford metro area. The agency's service area spans over 600 square miles across Hartford County and the Capitol Region Council of Governments (CRCOG) region. Service operates in Hartford, a city of just over 125,000 people, as well as 26 surrounding towns in the Capitol Region, with a total service area population of approximately 850,000.

In 2012, *CTtransit*'s Hartford Division provided nearly 14.7 million passenger trips in the Capitol Region. The service network includes 44 local routes, five "flyer" limited-stop routes, and 12 express routes, with most local routes offering service seven days a week. Service is heavily oriented around Hartford, with the vast majority of routes terminating in downtown Hartford. In addition, buses make connections to *CTtransit* services in Bristol and New Britain, as well as Middletown Area Transit and Pioneer Valley Transit Authority.

### AGENCY ORGANIZATION

Bus service in Hartford is owned and operated by the Connecticut Department of Transportation (CTDOT) under the *CTtransit* brand. ConnDOT operates local *CTtransit* service in eight metro areas of the state, including Hartford. Connecticut transit systems that are not operated by *CTtransit* are instead operated by local transit districts, which are incorporated by member towns that wish to participate in the service. *CTtransit* services carry approximately 80% of all bus ridership in Connecticut.

As the owner and operator of *CTtransit*, ConnDOT is solely responsible for the operations, service planning, and funding of *CTtransit* service. The state owns all *CTtransit* rolling stock, as well as storage and maintenance facilities in Hartford, Stamford, and New Haven. ConnDOT is responsible for key roles such as policy oversight and contract administration, and the agency oversees the annual budget approval process and performs financial and service reporting. In addition, ConnDOT staff are responsible for long-range planning, capital procurement, and service and fare planning. ConnDOT provides the majority of funding for *CTtransit* service, and is also responsible for federal grant applications. *CTtransit* service does not receive any local funding for operations, and there is no formal or direct oversight of *CTtransit* service at the local or regional level.

Service planning for *CTtransit* is conducted by a combination of CRCOG, ConnDOT, *CTtransit* and local stakeholder groups. For example, for the past 17 years, the Capitol Region Council of Governments has been working with job developers, employers, state agencies, and transportation providers to manage the Capitol Region Jobs Access Task Force. The Task Force is a coalition of job development agencies, transportation providers, and state government agencies whose main focus is to provide transportation services to Jobs First Employment Services (JFES) clients, Temporary Family Assistance (TFA) clients and low-income individuals by enhancing public transit services to welfare recipients and other low-



income populations for the purposes of commuting to places of employment or employment related activities.

ConnDOT contracts with private companies to perform the day-to-day management and operation of *CTtransit* services. Transit service in Hartford, New Haven, and Stamford has been operated and managed by H.N.S. Management, a subsidiary of First Transit, since 1979. *CTtransit* operates only fixed-route bus service, while other services, such as paratransit and ride sharing, are operated by ConnDOT through separate contracts.

## EXISTING CTRANSIT SERVICES

*CTtransit*'s Hartford Division operates fixed-route services (or scheduled bus service running on a set route) throughout the City of Hartford and 26 surrounding towns in the Capitol Region. *CTtransit* operates bus service in Hartford as a radial system, with all routes beginning or ending in downtown Hartford and radiating out to surrounding destinations.

*CTtransit* only operates fixed-route service, and does not operate complementary paratransit service or other demand-response service in Hartford. Rather, ConnDOT contracts separately for paratransit service operations throughout Connecticut.

All Hartford Division buses are operated out of the Hartford *CTtransit* bus storage and maintenance facility, owned by ConnDOT. *CTtransit* operates 44 local routes, 5 “flyer” routes, and 12 express routes (see Figure 1). Routes are designated by number and destination. Local and flyer routes are numbered according to the direction they travel from downtown: Routes 30-59 travel north or south, Routes 60-76 travel west, and routes 80-96 travel east across the Connecticut River. This numbering system was implemented in 2009, and replaced a letter-based designation system. Express route names are also numbered, although previously they only had one or two digits; under the current system, all express routes have three-digit numbers that begin with a “9” (e.g., Route 1 became Route 901 and Route 14 became 914).

## Fixed-Route Service Characteristics

Hartford Division routes are divided into three “types” of routes, each of which offer unique service characteristics: Local routes, flyer routes, and express routes. A list of all *CTtransit* Hartford routes is presented in Figure 1.

- **Local Routes:** The majority of *CTtransit*'s Hartford service consists of local routes, operate between downtown Hartford and the surrounding region. All except for two routes originate in downtown Hartford, and they travel outward from downtown in a radial pattern. Nearly all local routes operate on Saturdays, and most also operate on Sundays as well.
- **Flyer Routes:** *CTtransit*'s “Flyer” routes provide limited stop service between downtown Hartford and specific destinations in the region. Route 30, the Bradley Flyer, provides limited-stop service between Hartford Union Station, downtown Hartford, and Bradley International Airport. Route 35 Westfarms Flyer operates directly between downtown Hartford and Westfarms Mall on weekends.
- **Express Routes:** *CTtransit* operates 12 of the 21 Express routes that serve the Greater Hartford area. These routes provide nonstop or limited-stop service to downtown Hartford from park-and-ride facilities and other key locations in surrounding towns. Most express routes operate only during peak hours, and are oriented towards commuters. With the exception of route 905, all express routes operate only on weekdays.



Figure 2-1 | CTtransit Fixed-route Services

Route	Name	Service Type	Service Description
<b>North-South Routes</b>			
30	Bradley Flyer	Flyer	Connects to Bradley International Airport
31	Park Street – New Park Avenue	Local	Connects to West Hartford Place Shopping Center
32	Windsor Avenue	Local	Connects to Windsor Center Park-and-Ride and Windsor Railroad Station
33	Park Street – Park Road	Local	Connects to West Hartford and Westfarms Mall
34	Windsor Avenue – Poquonock	Local	Connects to Windsor Railroad Station and International Drive
35	Westfarms Flyer	Flyer	Limited stop service to Westfarms Mall (weekends only)
36	Windsor – Day Hill Road	Local	Connects to Windsor Railroad Station and Griffin Center South
37	New Britain Avenue via Jefferson	Local	Connects to Charter Oak Marketplace and West Hartford Place
38	Weston Street	Local	Connects to CTtransit Offices and Hartford Correctional Center
39	New Britain Avenue via Retreat	Local	Connects to Elmwood and Westfarms Mall
40	North Main Street	Local	Connects to Windsor
41	New Britain/Hartford	Local	Local service to New Britain
42	Barbour Street	Local	Connects to North Hartford
43	Campfield Avenue	Local	Connects to Jordan Lane and CT Department of Labor
44	Garden Street	Local	Connects to Garden Street and Charlotte Street in North Hartford
45	Berlin Turnpike Flyer	Flyer	Limited stop service to Newington Park-and-Ride and Pascone Place Shopping Center
46	Vine Street	Local	Serves St. Francis/Mt. Sinai Medical Center, Northend Senior Center
47	Franklin Avenue	Local	Connects to Jordan Lane, Rocky Hill, and Pascone Place Shopping Center
50	Blue Hills Avenue – Cottage Grove Road	Local	Connects to Copaco Center, CIGNA/Metlife, and Bloomfield Center/Sacred Heart Park-and-Ride
52	Blue Hills Avenue	Local	Connects to Rockwell Corner and Wedgewood
53	Wethersfield Avenue	Local	Connects to Jordan Lane and Wethersfield Shopping Center
54	Blue Hills Avenue – Blue Hills Extension	Local	Connects to Rockwell Corner, Griffin Center South, and Poquonock Park-and-Ride
55	Middletown	Local	Connects to Middletown
56	Bloomfield Avenue	Local	Connects to Bloomfield Center, Sacred Heart Park-and-Ride, Woodside Village, and Federation Home



Route	Name	Service Type	Service Description
58	Albany Avenue	Local	Connects to Bishops Corner
59	Locust Street	Local	Connects to Regional Market and Brainard Industrial Park
<b>West Routes</b>			
60	Farmington Avenue/West Hartford Center	Local	Connects to West Hartford Center
61	Broad Street	Local	Connects to Jordan Lane and Wethersfield
62	Farmington Avenue/Bishops Corner	Local	Connects to West Hartford Center and Bishops Corner
63	Hillside Avenue	Local	Connects to Mountain Street and Charter Oak Marketplace
64	Farmington Avenue/Westfarms Mall	Local	Connects to West Hartford Center and Westfarms Mall
66	Farmington Avenue/UConn/Unionville	Local	Connects to West Hartford Center, UConn Health Center, Farmington Center, Unionville, and Tunxis Community College
69	Capitol Avenue	Local	Connects to Elmwood Center, Veterans Hospital, and Central Connecticut State University
72	Asylum Avenue	Local	Connects to Fern Street, Bishops Corner, CIGNA, and MetLife
74	Granby Street	Local	Connects to St. Francis Hospital, Copaco Shopping Center, and Seabury Retirement Community
76	Ashley Street	Local	Connects to St. Francis Hospital and Copaco Shopping Center
<b>East of the River Routes</b>			
80	Buckland Flyer	Flyer	Limited stop service to the Shoppes at Buckland Hills (Saturdays only)
82	Tolland Street – Buckland Hills	Local	Connects to Church Corner and Buckland Hills
83	Silver Lane	Local	Connects to Church Corner, Manchester Community College, Buckland Hills, Depot Square, and Manchester Business Park
84	Tolland Street – Rockville	Local	Connects to Church Corner and Rockville Center
85	MCC Flyer	Flyer	Limited stop service to Manchester Community College
86	Burnside Avenue – Mayberry Village	Local	Connects to Church Corner and Mayberry Village
87	Brewer Street	Local	Connects to Founders Plaza, Goodwin College, and East Hartford
88	Burnside Avenue	Local	Connects to Church Corner, Manchester Center, and CT Department of Social Services
91	Forbes Street Crosstown	Local	Provides service between Buckland Hills shopping centers, East Hartford, Glastonbury, and Wethersfield Shopping Center (does not serve downtown Hartford)
92	Tower Avenue Crosstown	Local	Provides service between Copaco Center, Windsor Shopping Center, and Buckland Hills shopping centers (does not serve downtown Hartford)



Route	Name	Service Type	Service Description
94	Park Avenue	Local	Connects to Church Corner and East Hartford
95	Glastonbury	Local	Connects to Church Corner, Millbrook Park, Welles Village, and Glastonbury Center
96	John Fitch Boulevard	Local	Connects to East Windsor Hill
<b>Commuter Express Routes</b>			
901	Avon-Canton Express	Express	Commuter express service from Canton and Avon
902	Corbins/Farm Springs Express	Express	Commuter express service from Farmington and New Britain
903	Manchester-Buckland Express	Express	Commuter express service from Manchester
904	Glastonbury-South Glastonbury Express	Express	Commuter express service from South Glastonbury and Glastonbury
905	Enfield-Somers/Windsor Locks Express	Express	Commuter express service from Windsor Locks and Enfield on weekdays; local service in East Windsor and express service to Enfield and Somers on weekends
906	Cromwell Express	Express	Commuter express service from Cromwell
907	Newington Express	Express	Commuter express service from Newington
909	Farmington-Unionville Express	Express	Commuter express service from Unionville and Farmington
910	Rocky Hill-Century Hills Express	Express	Commuter express service from Rocky Hill
912	Simsbury-Granby Express	Express	Commuter express service from Granby and Simsbury
914	Marlborough/Colchester Express	Express	Commuter express service from Colchester and Marlborough
915	Windsor Express	Express	Commuter express service from Windsor
<b>dash Route</b>			
dash	Free Downtown Shuttle	Circulator	Weekdays circulator with expanded special-event service

## Transit Hubs and Major Transfer Locations

CTtransit service is heavily focused around Hartford. All routes except for two begin and terminate in downtown Hartford, and they travel outward from downtown in a radial pattern. This means that Hartford riders can reach any route in the system from downtown Hartford, with the exception of two crosstown routes that do not serve downtown. There is no one physical hub or station where all routes stop. However, all routes circulate through downtown and stop within a two-block radius of the Old State House; all north, south, and west routes stop along Main Street between Talcott Street and Atheneum Square, while all east-of-the-river routes (except 91 and 92) stop at Constitution Plaza.

## Passenger Information

CTtransit information is available on the agency's website ([www.CTtransit.com](http://www.CTtransit.com)). A system map for the Hartford area can be found on the website, as well as individual route maps and schedules for local, flyer,



and express services. *CTtransit*'s website also features an online trip planner, which connects to Google Transit.

A *CTtransit* Customer Service and Sales Outlet is located in downtown Hartford adjacent to the Old State House. The outlet offers sale of tickets and passes, as well as service maps and information. It is open Monday through Friday from 7:00 a.m. to 6:00 p.m., and on Saturday from 9:00 a.m. to 3:00 p.m.

## Regional Transit Services

### Other *CTtransit* Service

Connections are available from Hartford service to *CTtransit*'s Bristol service at the Westfarms Mall. Hartford passengers can reach Westfarms by using Routes 33, 35, 39, and 64. Hartford passengers can also connect to *CTtransit*'s New Britain service by taking Route 41 to downtown New Britain and transferring to any of several New Britain routes. Transfers are free between all *CTtransit* services.

### *CTfastrak*

ConnDOT's *CTfastrak* will be the first bus rapid transit system in Connecticut. It will include a 9.4-mile dedicated guideway for buses between New Britain and Hartford, a heavily congested corridor in central Connecticut. This guideway will function as the spine of the system, providing 20-minute one-way trips between the two cities, and additional routes will be added over time to connect other key destinations in the region. *CTfastrak* will be operated by *CTtransit*, although buses will be uniquely branded as *CTfastrak* service. ConnDOT began construction of the system in 2012, and passenger service is anticipated to begin in early 2015.

### Middletown Area Transit

Hartford passengers can take *CTtransit* Hartford Route 55 to the Middletown Bus Terminal in downtown Middletown, where connections are available to several Middletown Area Transit (MAT) bus routes.

### Pioneer Valley Transit Authority

*CTtransit* Express Route 905 Enfield-Somers/Windsor Locks Express connects with PVRTA Route G5 in Enfield, Connecticut. Route G5 provides service between Enfield in Connecticut and Longmeadow and Springfield in Massachusetts.

### Intercity Bus Services

Peter Pan Bus Lines and Greyhound Lines both serve Hartford Union Station and provide connections to Boston, Springfield, New Haven, Providence, and New York City. Peter Pan also provides service from Farmington and Enfield. Megabus provides intercity bus service to and from downtown Hartford on Columbus Boulevard at Talcott Street, and makes connections to New Haven, Burlington, Amherst, Boston, and New York City.

### Amtrak Intercity Rail Services

Amtrak operates intercity rail service along its Northeast Corridor route through Hartford. Trains stop at Union Station in downtown Hartford, providing connections to Springfield, New Haven, Stamford, and New York City. Amtrak also serves Windsor Station in downtown Windsor, which can be reached by *CTtransit* Routes 32, 34, and 36.



## Fares

The adult cash fare for a single ride on CTtransit buses is \$1.50. Transfers are free with a transfer slip for up to two hours from the time they are issued, and are good for unlimited rides on local CTtransit buses. 10-ride tickets are valid for any 10 trips taken within 10 years of purchase, and cost \$13.50. Older adults and people with disabilities who have a Medicare card or state-issued Reduced Fare ID card pay half fare (\$0.75 per one-way trip, \$6.75 10-ride ticket, and \$27.00 31-Day Pass). Children under the age of 4 travel free, and youth ages 5-18 pay \$1.20 for a single ride or \$10.80 for a 10-ride ticket. CTtransit also offers several passes, which are all valid for unlimited rides for the specified number of days beginning on the date of first use. Fare prices are listed below for local services and commuter express services (Figures 2 and 3).

All CTtransit tickets and passes for both local (including Flyer routes) and commuter express services are available for sale at the CTtransit Customer Service and Sales Outlet in downtown Hartford, at certain Stop & Shop grocery stores, by mail, or online.

Figure 2-2 | Fare Prices, Local Service

Fare Type	Local (Base)	Youth	Senior/Disabled*
Cash Fare	\$1.50	\$1.20	\$0.75
10-Ride Ticket	\$13.50	\$10.80	\$6.75
Two-Hour Pass	\$1.50	-	-
1-Day Pass	\$3.00	-	-
3-Day Pass	\$7.50	-	-
5-Day Pass	\$12.00	-	-
7-Day Pass	\$16.50	-	-
31-Day Pass	\$54.00	-	\$27.00
Transfer	Free	Free	Free

\* Medicare card or state-issued Reduced Fare ID card must be shown upon boarding.

Fares for Hartford Commuter Express service are set using a zone system, where zones are based on the distance traveled to or from Hartford. Transfers from an express bus to a local bus are free; when transferring from a local bus to an express bus, the local fare is subtracted from the express cash fare. Commuter express fares by zone are listed in the table below.

Figure 2-3 | Fare Prices, Commuter Express Service

Fare Type	Zone 2	Zone 3	Zone 4	Zone 5
Regular Cash Fare	\$2.70	\$3.50	\$4.30	\$5.15
Senior/Disabled Cash Fare	\$1.35	\$1.75	\$2.15	\$2.55
10-Ride Ticket	\$24.30	\$31.50	\$38.70	\$46.35
31-Day/Monthly Pass	\$92.00	\$119.00	\$146.00	\$175.00
Transfers	Free	Free	Free	Free





Among passenger revenues, the largest share of passenger trips (1.77 million, or 24%) are paid for using a regular single-trip cash fare. Free transfers account for the second-largest share of passenger boardings, at 1.59 million or 22%. About 1.2 million passenger trips, or 17% of boardings, are paid for using a local 31-day pass.

**Figure 2-4 | Passenger Trips by Fare Type (FY 2014 Year-to-Date)**

Fare Type	Number of Passenger Trips
Local Cash Fares	1,770,251
Transfers	1,590,140
Local 31-Day Pass	1,238,265
Senior/Disabled 31-Day Pass	387,180
Local 10-Ride Tickets	329,064
Youth Cash Fares	322,904
Local 1-Day Pass	289,089
Senior/Disabled Cash Fares	237,057
UPass	234,951
Commuter 31-Day Pass	231,831
NonFare Passengers	165,916
Local 90-Minute Pass	143,307
Commuter 10-Ride Tickets	143,393
Senior/Disabled 10-Ride Tickets	112,450
Youth 10-Ride Tickets	85,991
Local 5-Day Pass	69,077
Local Tokens	50,383
Local 7-Day Pass	50,301
Local 3-Day Pass	12,442
Commuter Cash Fares	27,422
<b>Total Passenger Trips</b>	<b>7,491,414</b>

## Vehicle Fleet

CTtransit’s Hartford Division currently has a fleet of 241 transit bus vehicles, the majority of which are used for local service (see Figure 5). The MCI Commuter vehicles are used for Hartford Express service, and the New Flyer DXE 35 vehicles are used for Dash service. The Hartford Division also operated the first hybrid articulated bus in the state of Connecticut (NovaBus LFS Arctic), as well as the first fuel cell bus in the state (Vanhool A330FC).





Figure 2-5 | Hartford Division Fleet Summary

Vehicle Type	Number of Vehicles	SERVICE TYPE
MCI Commuter	15	Commuter/Express
New Flyer S-40	40	...
New Flyer S-50 EGR	55	...
New Flyer C-ISL	115	...
New Flyer Hybrid H301 & H302	2	...
Vanhool A330FC	1	...
NovaBus LFS Arctic (Hybrid)	10	...
New Flyer DXE 35	3	DASH
<b>Total Vehicles in Fleet</b>	<b>241</b>	

## Financial Summary

Most of CTtransit's operating expenses are comprised of labor costs and fringe benefits, which account for about 76% of operating expenses (Figure 6). The majority of the Hartford Division's revenue comes from ConnDOT, which covers the entirety of CTtransit's operating deficit. Included as a revenue source, this would account for 70% of CTtransit's revenue. The next largest share of revenue comes from passenger fares, which make up 20% of CTtransit's revenue. Contract service reimbursements, advertising revenue, and other funding comprise the remainder of CTtransit's revenue.

Another share of revenue comes from the CT Department of Social Service's Transportation for Employment Independence Program (TEIP). In the Hartford division, approximately \$738,000 is allocated to support fixed routes (30 and 92), early morning and late night weekend services, holiday services, and route extensions through CROG's Job Access program.

Figure 2-6 | Operating Expenses and Revenue Sources (FY 2014 Year-To-Date)

Operating eXPENSEs	FY 2014 YTD
Labor	\$13,540,535.52
Fringe Benefits	\$12,016,226.68
Services	\$1,442,322.29
Materials and Supplies	\$5,727,448.76
Utilities	\$213,149.57
Casualty & Liability Costs	\$588,295.55
Taxes	\$1,804.50
Miscellaneous	\$98,939.03
Lease & Rentals	\$16,225.15
<b>Total Expenses</b>	<b>\$33,644,947.05</b>



**FIGURE 6 CONTINUED**

<b>Revenue Sources</b>	<b>FY 2014 YTD</b>
Passenger Revenue	\$6,861,618.15
Other Service Reimbursements	\$1,866,846.66
Auxiliary Transportation	\$1,343,920.03
Non-Transportation	\$88,420.97
<b>Total Revenue</b>	<b>\$10,160,805.81</b>
<b>Operating Deficit</b>	<b>\$23,484,141.24</b>



## 3 SYSTEM WIDE PERFORMANCE

CTtransit aims to use its resources effectively and evaluates its services on a monthly basis to ensure they achieve a minimum level of productivity. Ridership trends are a good indicator of system performance, but to evaluate overall productivity it is also critical to understand how efficiently each route generates ridership. Transit route productivity and performance are commonly evaluated using three types of indicators:

- **Cost Efficiency measures** how efficiently resources are being allocated. The industry standard for evaluating fixed-route services is Operating Cost per Hour of Service, which reflects the ratio of service inputs (e.g. operating costs) to service outputs (e.g. revenue hours or miles of service).
- **Cost Effectiveness measures** how well services are being utilized. Two indicators are commonly used: Operating Cost per Passenger, or the ratio of operating costs to ridership, and Farebox Recovery, or the percentage of operating expenses recouped by farebox revenues.
- **Service Effectiveness measures** how well service capacity is being utilized by consumers. The most common indicator is Passengers per Revenue Vehicle Hour, which calculates the ratio of ridership to service outputs (e.g. revenue hours of service).

### PERFORMANCE SUMMARY

Data for the analysis is taken from monthly service reporting data provided by CTtransit. An assessment of how well CTtransit's Hartford services have performed with regard to the three categories of performance indicators is provided below (see also Figure 7 and Figure 8).

- **Operating Cost per Hour.** This indicator is a good measure of cost efficiency because it measures the cost of an output of service. In Hartford, cost per hour increased between 2008 and 2013. Although operating hours remained largely unchanged, total operating costs increased by 18%.
- **Operating Cost per Passenger.** This performance indicator measures cost effectiveness by assessing total operating costs over ridership. Between 2008 and 2013, cost per passenger increased 11%, from \$4.04 to \$4.49. Increases in total operating cost were offset by a 6% increase in ridership during this same period.
- **Farebox Recovery Ratio.** This indicator measures cost effectiveness and is the ratio of fare revenue to total operating costs. Although farebox revenue increased by 6% thanks to ridership growth, a greater increase in operating costs (18%) means that farebox recovery has slightly declined since 2008, from 23% to 20%.
- **Passengers per Hour.** This indicator measures how well the service is being consumed in relation to the amount of service available. Passengers per hour increased nearly 6% between 2008 and 2013; although service hours only increased by 0.5%, ridership increases neared 6% over the same time period.

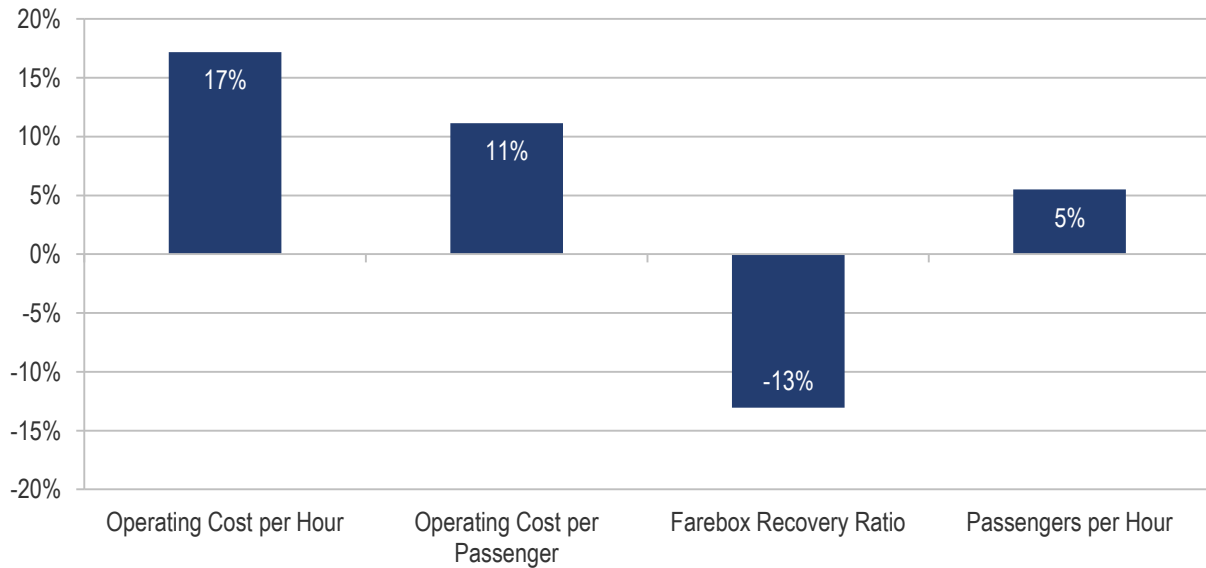


**Figure 3-1 | Systemwide Performance, 2008-2013\***

Operating Data	2008	2009	2010	2011	2012	2013	2008-2013
Operating Costs	\$28,594,410	\$28,930,026	\$28,899,789	\$31,708,960	\$31,651,262	\$33,644,947	+18%
Operating Hours	275,560	274,076	273,011	273,176	272,414	276,655	0%
Passenger Trips	7,074,773	6,713,863	6,995,177	7,365,218	7,322,070	7,491,414	+6%
Farebox Revenue	\$6,476,358	\$6,051,438	\$6,258,214	\$6,699,793	\$6,747,237	\$6,861,618	+6%
Performance indicators	2008	2009	2010	2011	2012	2013	2008-2013
<b>Cost Efficiency</b>							
Operating Cost per Hour	103.77	105.55	105.86	116.08	116.19	121.61	+17%
<b>Cost Effectiveness</b>							
Operating Cost per Passenger	4.04	4.31	4.13	4.31	4.32	4.49	+11%
Farebox Recovery Ratio	23%	21%	22%	21%	21%	20%	-3%
<b>Service Effectiveness</b>							
Passengers per Hour	25.67	24.50	25.62	26.96	26.88	27.08	+5%

\*Data presented includes only July through December for each year.

**Figure 3-2 | Summary of Performance Indicators, 2008-2013\***



\*Data presented includes only July through December for each year.



## 4 MARKET ANALYSIS

CTtransit's Hartford Division serves the City of Hartford and 26 surrounding towns in the Capital Region (see Figure 9). The purpose of this market analysis is to examine the underlying demographic and socio-economic conditions in the CTtransit - Hartford service area, as they relate to the demand and need for transit services.

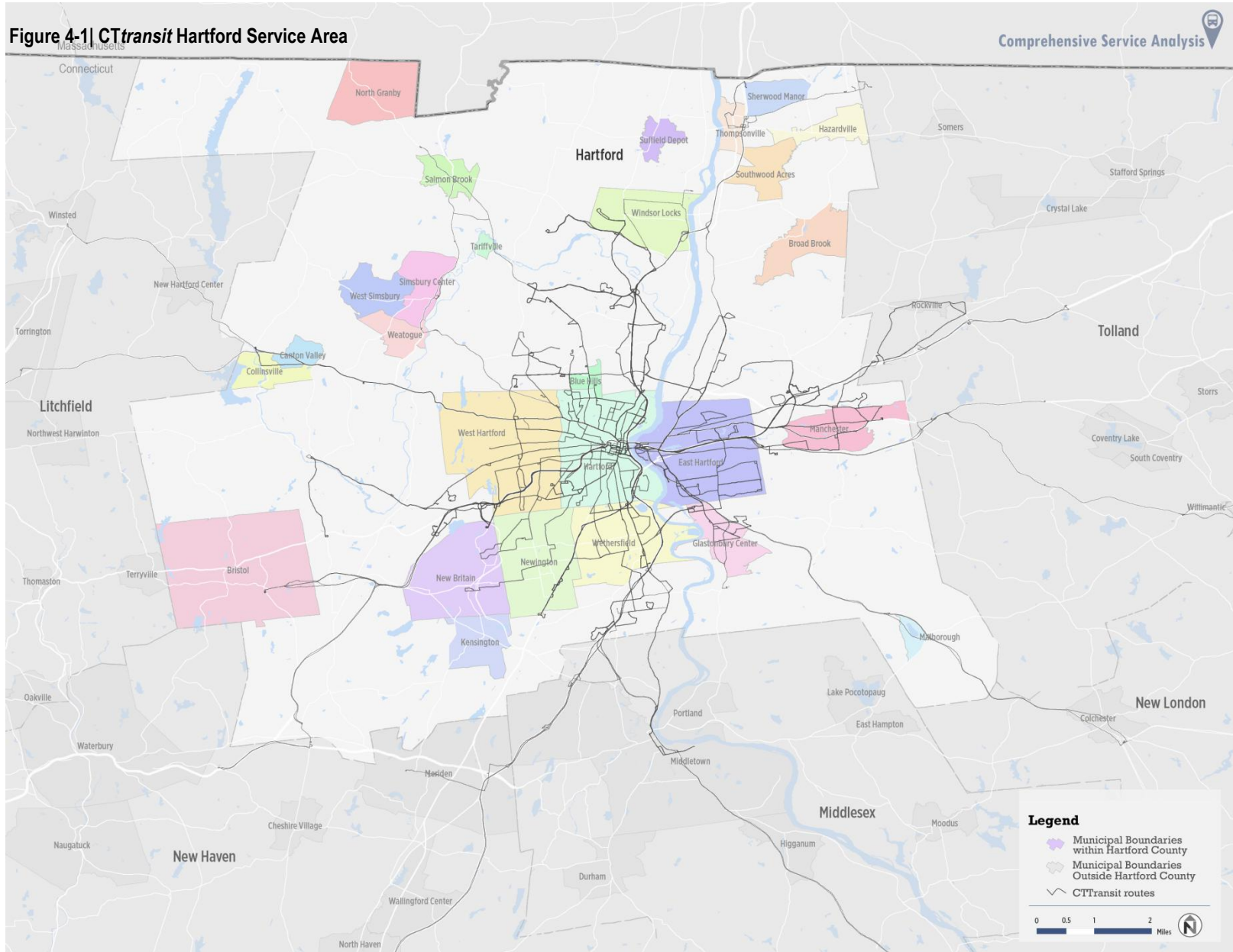
There are a series of factors that determine the demand for transit, indicate the use of transit services, and influence the type of transit needed:

1. Market conditions, including the size, distribution and density of population and employment.
2. Urban form and land uses, including how well the built environment supports pedestrians and, to a lesser extent, cyclists.
3. Transit service design, including the types and frequency of individual routes and the overall structure of the transit network.
4. The convenience and cost of other alternatives; this factor includes congestion and travel times as well as the supply and price of parking.

The focus of this analysis is on understanding the market and demand for transit service, which is largely defined by:

- **Population and employment density**, which are the strongest indicators of the viability or potential for transit service in an area. Put simply, larger numbers of people living and working in close proximity leads to a stronger market for transit.
- **Socio-economic characteristics**, such as income, auto availability, age, and disability, are characteristics indicative of a higher propensity to use transit, and thus highlight where there is a need for transit service.

It should be stressed that while some areas may have a high socio-economic need for transit service, other factors such as density, land uses, and the pedestrian environments will impact the use of traditional fixed-route service. For example, nearly all transit riders walk to/from the bus on at least one end of their trip, thus the pedestrian environment strongly impacts ridership. Industry standards suggest that transit riders will walk one-quarter of a mile to transit; however, in comfortable pedestrian environments, riders will walk longer distances. Likewise, areas with minimal traffic congestion and ample parking will have a more difficult time attracting transit riders. Thus, even in cases where the need for transit is strong, service must be designed appropriately to appeal to local markets and consider the broader travel environment.





## POPULATION AND EMPLOYMENT

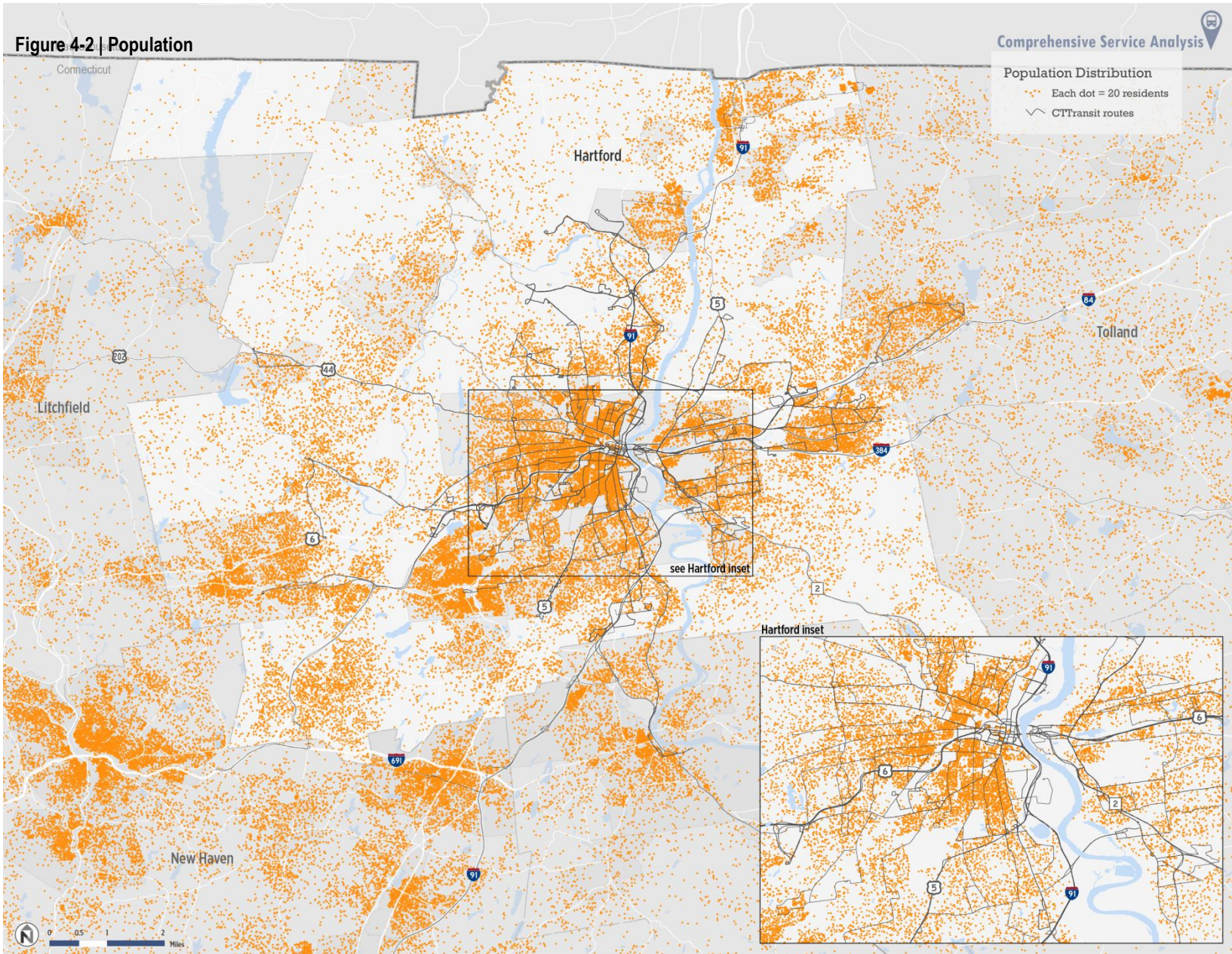
### Population

As discussed, the distribution and density of population is a key factor influencing the viability of transit service because most riders walk to/from the bus on at least one end of the trip.

Nelson\Nygaard's analysis of population is based on data by census block adapted from the 2010 US Census; population is shown together with the *CTtransit* Hartford route network in Figure 10. This data shows:

- Hartford has the highest population in the service area, followed by West Hartford, New Britain, and Manchester. Unsurprisingly, Hartford also has the highest concentration of *CTtransit* Hartford service, while West Hartford and Manchester are also served by multiple routes. Although New Britain is only served by one *CTtransit* Hartford route, it is served by a network of *CTtransit* New Britain routes.
- The immediate suburbs of Hartford, including Blue Hills, East Hartford, and Wethersfield also have a relatively high population. While Blue Hills and East Hartford are well served by *CTtransit* Hartford routes, transit service in Wethersfield is more limited.
- There is a rough population cluster along an east-west corridor between Manchester, East Hartford and Hartford, extending west to West Hartford and slightly south and west towards Newington and New Britain. The majority of the region's population lies along this corridor.
- Outlying communities such as Broad Brook, Marlborough, Tariffville, and Weatogue have significantly fewer residents. In general, these communities have very limited fixed-route service.









## Population Density

Complementary to population, is population density. Higher density communities have more people within walking distance of bus routes, and thus are stronger markets for transit. Together with employment density, population density is the most important determinant of transit demand.

Transit needs to serve sufficiently high volumes of travelers to be cost-effective and the density of development determines the overall size of the travel market. The reach of transit is generally limited to within 1/4- to 1/2-mile of the transit line or station. Thus, the size of the transit market is directly related to the density of development around a route. Areas and corridors with higher densities support higher frequencies, while lower-density communities support different types of transit services, such as lower frequency, flexible or demand-response modes.

Nelson\Nygaard uses national evidence to tie population density to transit service demand in order to determine the likely demand for transit service, expressed in the frequency of service that could be supported by each census block. Nelson\Nygaard's sources for this analysis include a variety of academic studies and our own national transit planning experience. Figure 11, below, shows the minimum population densities required to support various levels of transit service.

**Figure 4-3 | Transit-Supportive Population Densities**

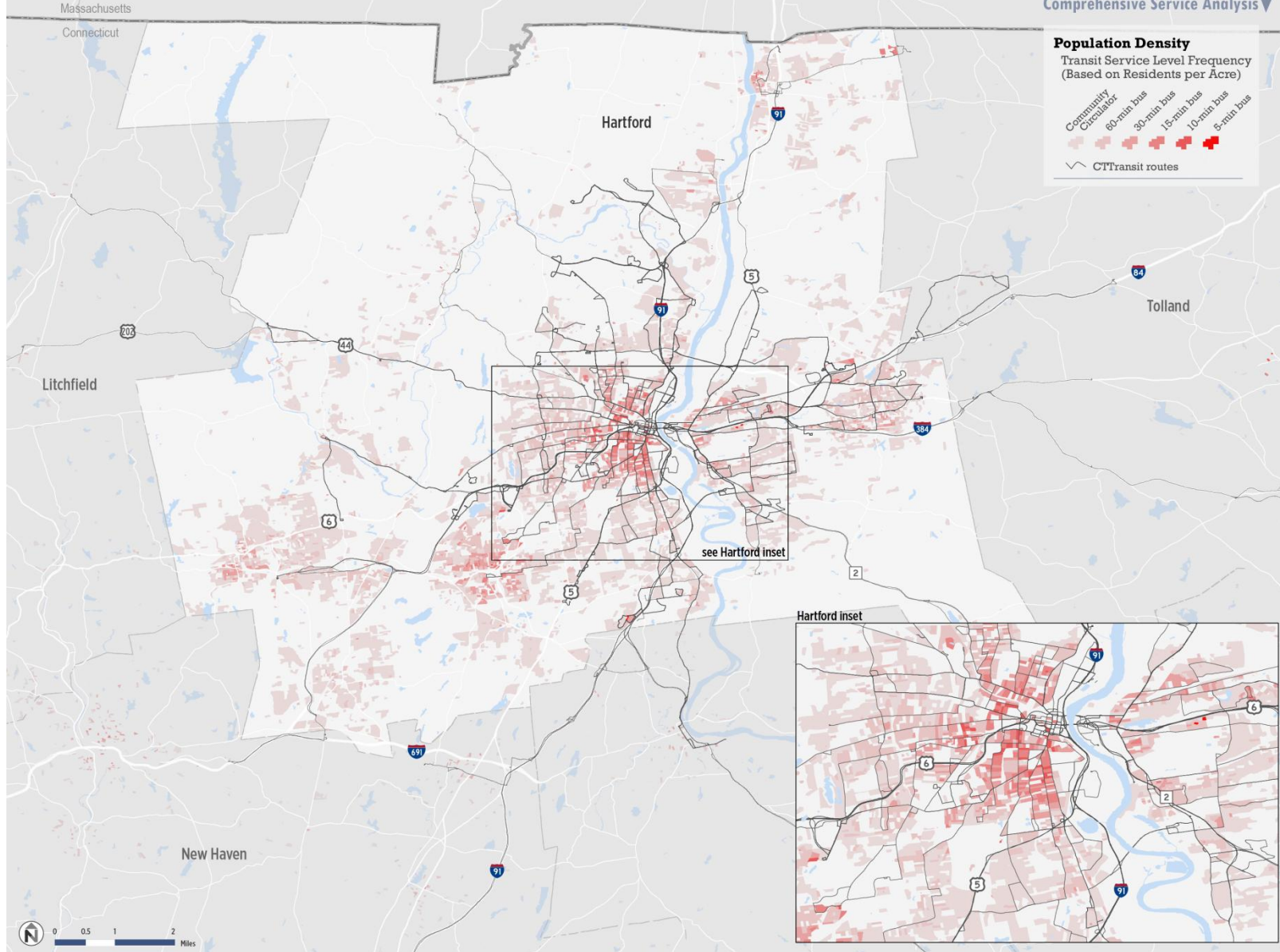
Transit Service Level	Minimum Population/Acre
<b>Flex Bus</b>	0.5
<b>Community Circulator</b>	2
<b>Local Bus</b>	
60-minute frequency	8–16
30-minute frequency	16–31
15-minute frequency	31–47
10-minute frequency	47–92
5-minute frequency	>92

Source: Nelson\Nygaard compiled from various national sources (see Appendix A).

Population density was mapped for the CTtransit Hartford service area (Figure 12). This analysis found:

- Generally, blocks with the highest population density are located in Hartford. Hartford has a number of blocks with a density greater than 47 persons per acre, which, based on national experience, is enough to support transit service at 10-minute frequency.
- Manchester and New Britain contain moderately dense town centers that are relatively transit-supportive. Data suggests parts of these communities could support transit service at 30-minute frequency. However, lower population densities between communities mean services linking various town centers may sacrifice productivity.
- Much of CTtransit Hartford's service area lacks sufficient population density to support more than minimal levels of transit service. Communities such as Broad Brook, Marlborough, North Granby, Salmon Brook, and West Simsbury, for example, are unlikely to warrant fixed-route service in the short term.
- Overall, CTtransit Hartford service appears relatively well-matched to demand. While Bristol and New Britain are not well-served by CTtransit Hartford, they are served by other divisions of CTtransit.

**Figure 4-4 | Population Density**





## Employment

Understanding the size and distribution of employment is also a critical part of understanding travel demand and markets. Transit that serves areas of high employment and employment density provides key connections to job opportunities. Nationally, work trips account for the largest segment of transit trips. For most people, travel to and from work is highly repetitive, making these trips well-suited for fixed-route transit service.

The study team used LEHD data to determine the number of employees per census block. Analysis of this information and Figure 13 reveal several findings:

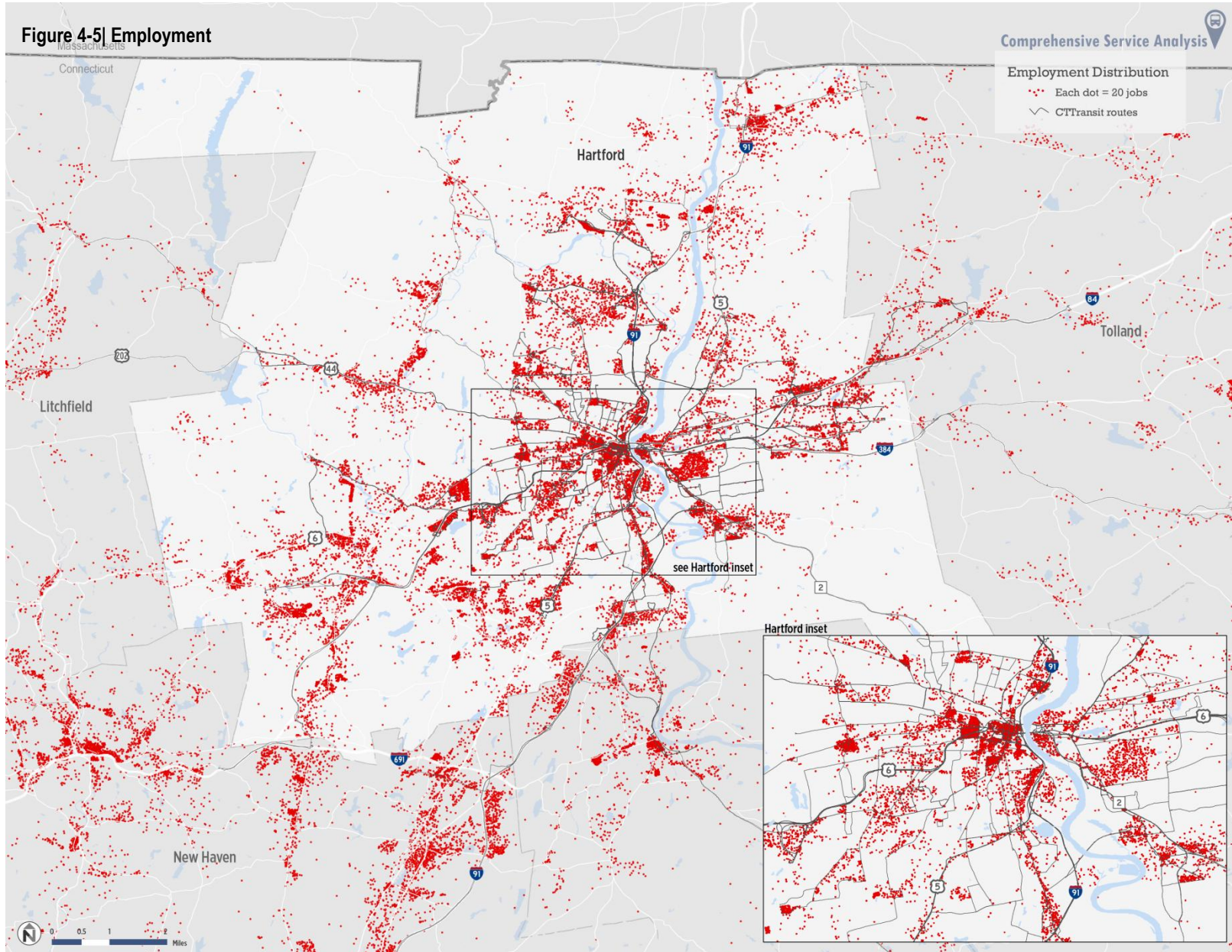
- While Hartford is home to the largest proportion of jobs in the market area, there are also a relatively large number of jobs in East and West Hartford as well as along State Highway 2 in Glastonbury and I-91 north of Rocky Hill. These areas appear to be well-served by the *CTtransit* Hartford network and trips to a wide variety of destinations are possible.
- Manchester and New Britain have moderate job clusters in their community centers. Manchester seems to have a proportionate level of *CTtransit* Hartford transit service, while New Britain is served mostly by *CTtransit* New Britain routes.
- There are also large numbers of jobs that cluster near to and around some of the region's major corridors:
  - East towards Manchester, along the I-84 corridor
  - South and east along US2 (Veterans of Foreign Wars Highway) to the City of East Hartford border
  - South along I-91
  - South and west along I-84 to Newington/New Britain
  - West along Farmington Avenue
  - North along I-91
- A number of communities have very few jobs. These include Broad Brook, Canton Village, Marlborough, North Granby, Tariffville, and West Simsbury.
- Approximately 67% of employment positions in the region are within a reasonable walk distance (1/4 mile) of *CTtransit* service. This figure can only be approximated because LEHD data is only available at the census block level. Thus, in outlying areas where census blocks tend to be larger, it is impossible to say with certainty how many of the employment positions within a census block are within 1/4 mile of a transit route serving that block, and how many are beyond the buffer.

While some areas may lack the employment density to support traditional fixed-route transit service, employment opportunities exist throughout the Greater Hartford Region. To facilitate access to jobs that are not reachable through existing fixed-route service, the Capital Region Council of Governments established the Jobs Access Program in 1997. The program provides transportation to work, job interviews, and job-related training programs, using a variety of modes including vanpools and shuttles operated by social service providers.





Figure 4-5| Employment





## Employment Density

Similar to the population transit index presented earlier in the market analysis, Nelson\Nygaard used national evidence to determine the level of transit service supported by the various employment densities throughout the CT*transit* Hartford service area (see Figure 14). Similar to population density, the employment density of census blocks in the market area was mapped according to the frequency of service that could be supported by different levels of employment per acre.

Figure 4-6| Transit-Supportive Employment Densities

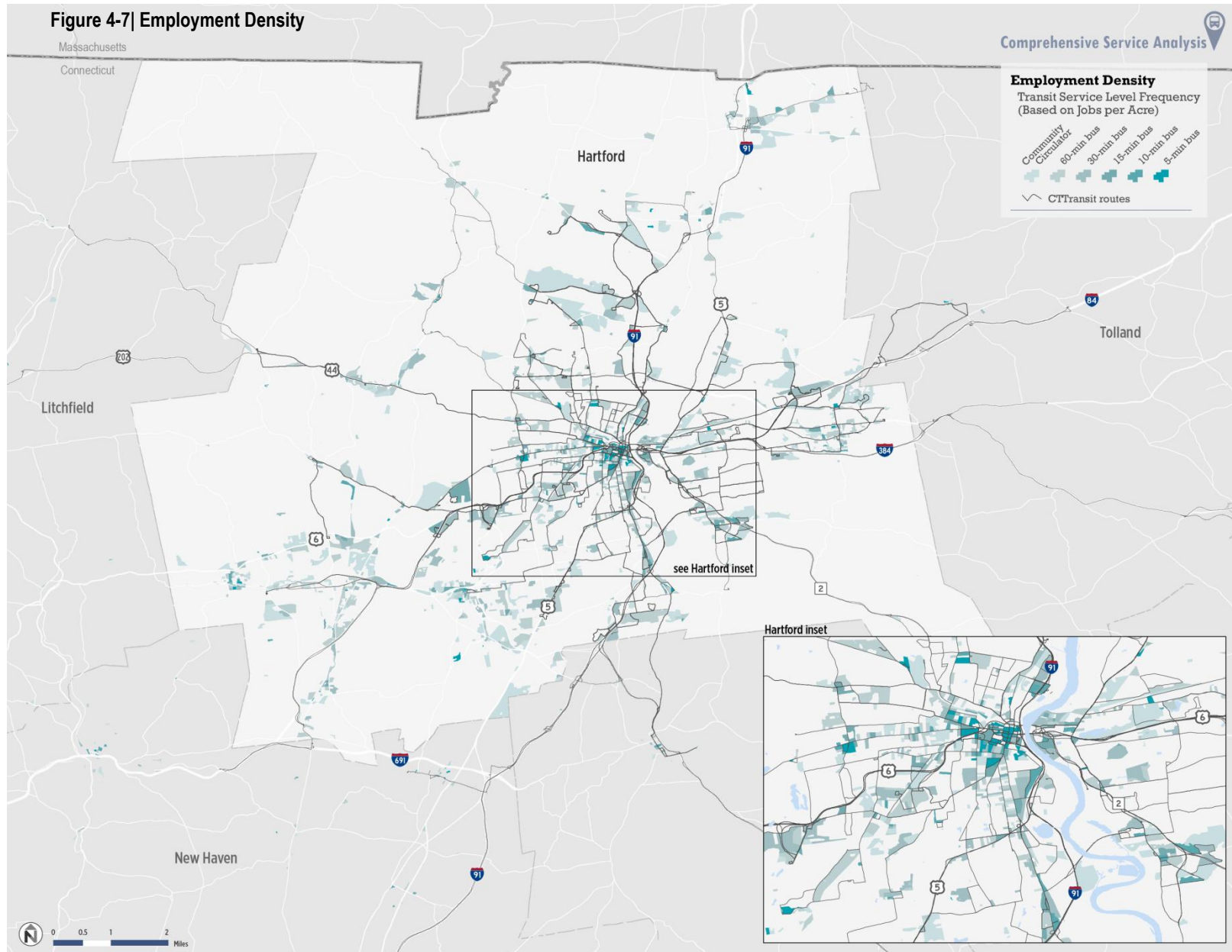
Transit Service Level	Minimum EMPLOYMENT Per Acre
Flex Bus	–
Community Circulator	–
<b>Local Bus</b>	
60-minute frequency	4–8
30-minute frequency	8–16
15-minute frequency	16–24
10-minute frequency	24–48
5-minute frequency	>48

Source: Nelson\Nygaard compiled from various national sources (see Appendix A).

Employment densities suggest several findings relative to transit service:

- Hartford is home to the overwhelming majority of blocks with a high density of jobs. A large portion of blocks within Hartford can support significant transit service, even service at 5-minute frequencies. This is consistent with CT*transit* Hartford’s service structure which has the greatest concentration of transit service in Hartford.
- Looking at employment density, provides a slightly different perspective on the job corridors identified when considering employment alone.
  - While the corridors are still important, corridor densities are much higher inside the jurisdictional boundaries of Hartford and East Hartford.
  - In other cases, such as the I-84, I-91, and US2 corridors, the outer ends of the corridors have higher employment densities than the inner ring suburban communities. For these corridors, the concentration of jobs is in Manchester, the Day Hill Road area in Windsor, and Glastonbury Center.
- For other corridors, transit-supportive employment densities are heavily clustered around major roadways, including New Britain Avenue south of Hartford, East Street in Plainville, and Wethersfield Avenue extending through Wethersfield. These major roadways could support moderate transit service of between 10- and 30-minute frequencies.
- Bristol, Manchester, New Britain, and West Hartford also have moderate clusters of employment, though much less than Hartford. These town centers support moderate transit service, though they are geographically dispersed (particularly Bristol) and more difficult to link efficiently.
- Many portions of the study area do not have sufficient employment density to support fixed-route transit service. This includes the entire communities of Broad Brook, Marlborough, North Granby, Southwood Acres, Suffield Depot, and West Simsbury.







## TRANSIT POTENTIAL INDEX

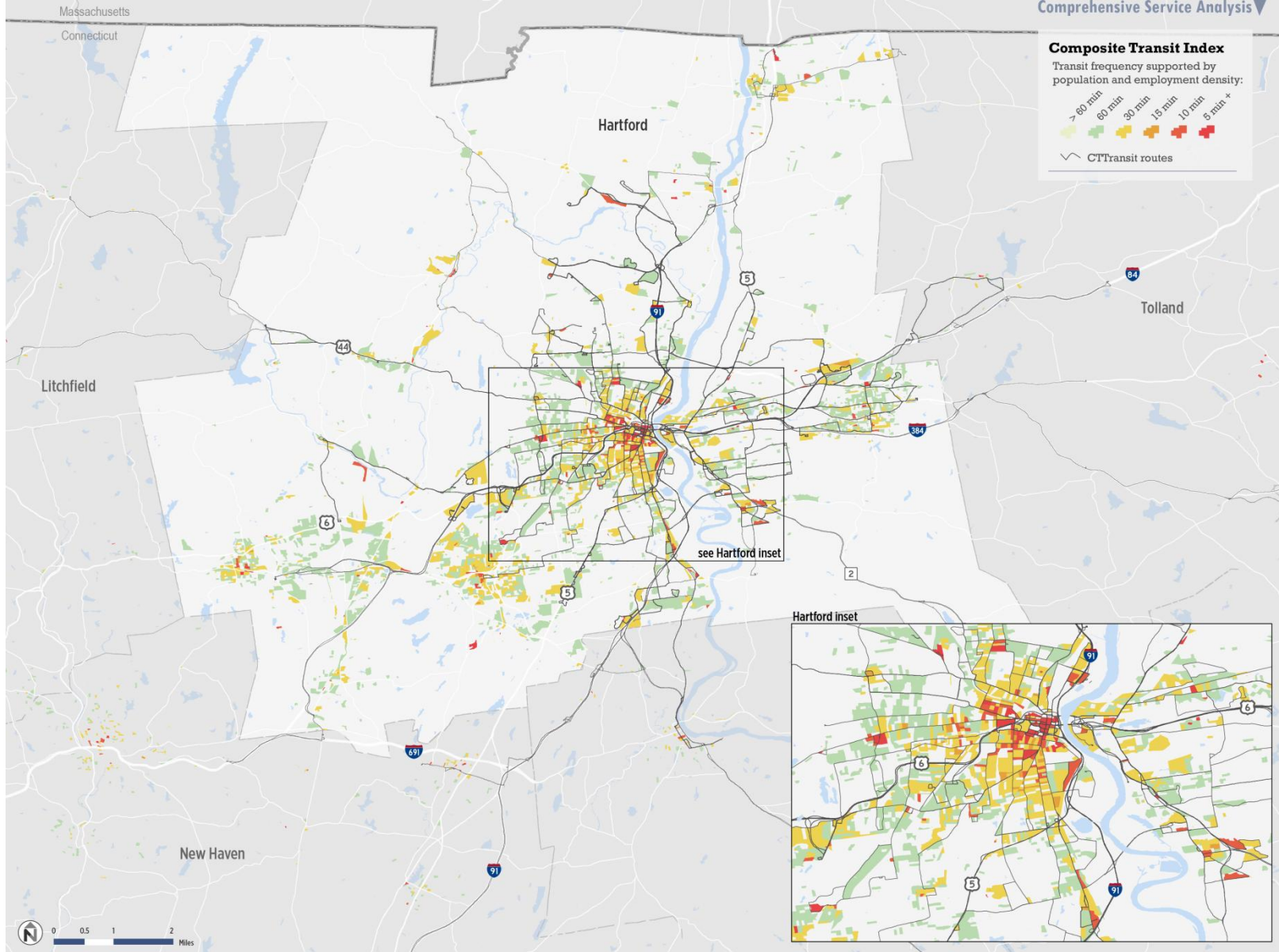
The Transit Potential Index (Figure 16) combines population and employment density to produce a composite index for each block representing its transit potential, or the ability to support different transit service levels. A higher Transit Potential Index score points to a higher likelihood of generating substantial transit ridership in a particular census block. Ideally, a fixed-route transit line would link together several census blocks with relatively high transit potential, thus forming a strong transit corridor.

As previously discussed, it is important to keep in mind that actual ridership and demand for transit is affected by a broader set of circumstances, including land use, urban form, service quality and the relative convenience of other choices. As such, while an area's potential to use transit might be high, ridership will be high only if available service offers comparative convenience to other options. Nonetheless, the composite transit potential index provides a strong indication of the relative demand for transit throughout the market area and identifies areas where demand is highest and transit can be provided most effectively. Findings include:

- Hartford is by far the most transit-supportive area in the study area. Most of the city has sufficient population and employment density to support a very high level of transit service, potentially as high as 5 minutes during peak periods.
- Many of the corridors identified in the employment analysis also demonstrate need and potential when population is incorporated. Some corridors already score high on the transit potential index, while others have pockets of existing demand. There is potential for transit investment in both cases
  - Several of the local corridors south and southwest of Hartford have densities that are sufficient to support high and moderate levels of service. Farmington Avenue to the west, New Britain Avenue to the southwest and Maple and Wethersfield Avenue to the south all have strong transit markets.
  - The planned CTfastrak service corridor between Hartford and New Britain also demonstrates market demand and potential, with high densities of population and employment on either end, plus high to moderate demand closer to downtown.
- Bristol, Manchester, and New Britain have town centers that suggest a moderate to strong market for transit and surrounding areas with lower but still viable transit potential. These areas are somewhat challenged by the fact that they are geographically isolated. Services that link these towns to the CTtransit Hartford network must travel through corridors with significantly less demand.
- Glastonbury, Simsbury, and Thompsonville have small town centers with potential demand, but these are fairly isolated pockets of demand.
- There are 13 or 14 towns that have a low potential for viable fixed-route transit. In these communities, existing densities suggest the communities could support demand response service only. These communities include Broad Brook, Canton Valley, Collinsville, Hazardville, Marlborough, North Granby, Sherwood Manor, Southwood Acres, Suffield Depot, Tariffville, Weatogue, and West Simsbury.



Figure 4-8 | Transit Potential Index







## DEMOGRAPHIC CHARACTERISTICS

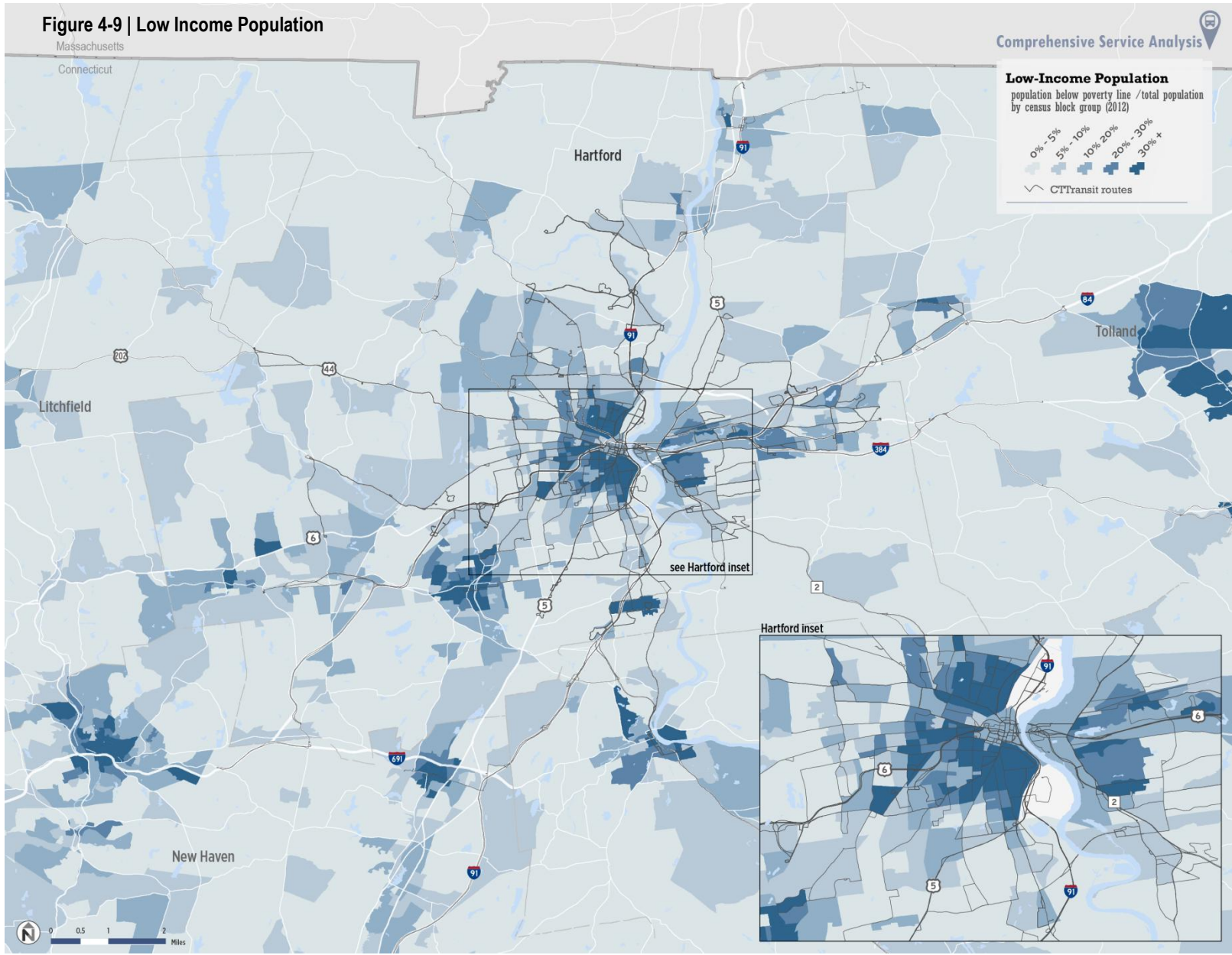
While population and employment density are the strongest predictors of transit use, the characteristics of the population are important indicators as well. In general, when discussing the potential markets for transit, planners consider two types of riders:

- **Transit-dependent riders** use transit services because they always or sometimes are unable to travel by private vehicle. These riders may not be able to afford a private vehicle or may be unable to operate one. They tend to rely more on transit than discretionary riders and are more likely to use transit for most or all of their travel, including to/from appointments, shopping, and entertainment/recreation.
- **Discretionary or “choice” riders**, who have sufficient resources and the ability to operate private vehicles but choose to use transit because it provides a comparatively attractive option or because they make other lifestyle choices that leads them to use transit. Discretionary riders are more likely to use transit to travel to/from work, but may also use transit in other circumstances.

### Low Income Individuals

Income status is the strongest indicator of a higher-than-average reliance on public transportation; people with lower incomes are less likely to be able to reliably afford a private vehicle and thus are more likely to use transit. Nelson\Nygaard used the U.S. Census’ classification of poverty status to define and identify low income individuals, which considers household income and the number of members in the household in classifying a household as in poverty or not. Disposable income is largely a factor of household size and household income and, as such, whether a household is in poverty is a good proxy for whether individuals within the household are likely to use transit. The distribution of individuals with low incomes (those living in a household considered in poverty by the Census) is shown in Figure 17. Findings include:

- The largest cluster of block groups with a high proportion of low-income individuals are in Hartford, primarily on the periphery of downtown Hartford in the Clay Arsenal, Northeast, Asylum Hill, South Green, Sheldon Charter Oak and Barry Square neighborhoods. These areas also have some of *CTtransit* Hartford’s densest concentration of fixed-route service.
- East Hartford, New Britain and Tolland also contain a large cluster block groups with a high proportion of low income individuals. East Hartford is relatively well-served by *CTtransit* Hartford and New Britain’s service is primarily provided by the *CTtransit* New Britain division, while Tolland is only served by one *CTtransit* Hartford route.
- The highest concentration of low income populations are clustered in Manchester, East Hartford, Hartford and New Britain, which is laid out along an east-west corridor.
- Some clusters of block groups with a moderate proportion of low income individuals exist in towns on the northeast and western perimeters of the service area, such as Bristol, Thompsonville, Southwood Acres, and Window Locks. The majority of these communities are without CT Transit service, with the exception of Bristol, which is served by *CTtransit* Bristol’s Bristol Local and Plainville-Bristol routes.
- Many towns have very few low income individuals, such as Canton Valley, Hazardville, Marlborough, North Granby, Salmon Brook, Suffield Depot, Weatogue, and West Simsbury.
- Transit service to low income neighborhoods should be oriented around all needs, but should also consider access employment. The employment analysis described previously suggests this means low income neighborhoods will need service into downtown, but also Manchester, New Britain, Farmington Avenue, Glastonbury and other suburban locations.





## Zero Vehicle Households

For self-evident reasons, individuals without access to a vehicle represent a particularly strong market for transit. In some cases these residents are car-free by choice, while others are unable to drive for legal or financial reasons. Identifying clusters of this group helps highlight areas that have transit-dependent riders, as well as riders who prefer to live car-free.

The study teams used the U.S. Census' annual American Community Survey data, which collects information on individuals who do not have regular access to a vehicle. The geographic unit of analysis for this data is the census block group. The distribution of zero-vehicle households is shown in Figure 18.

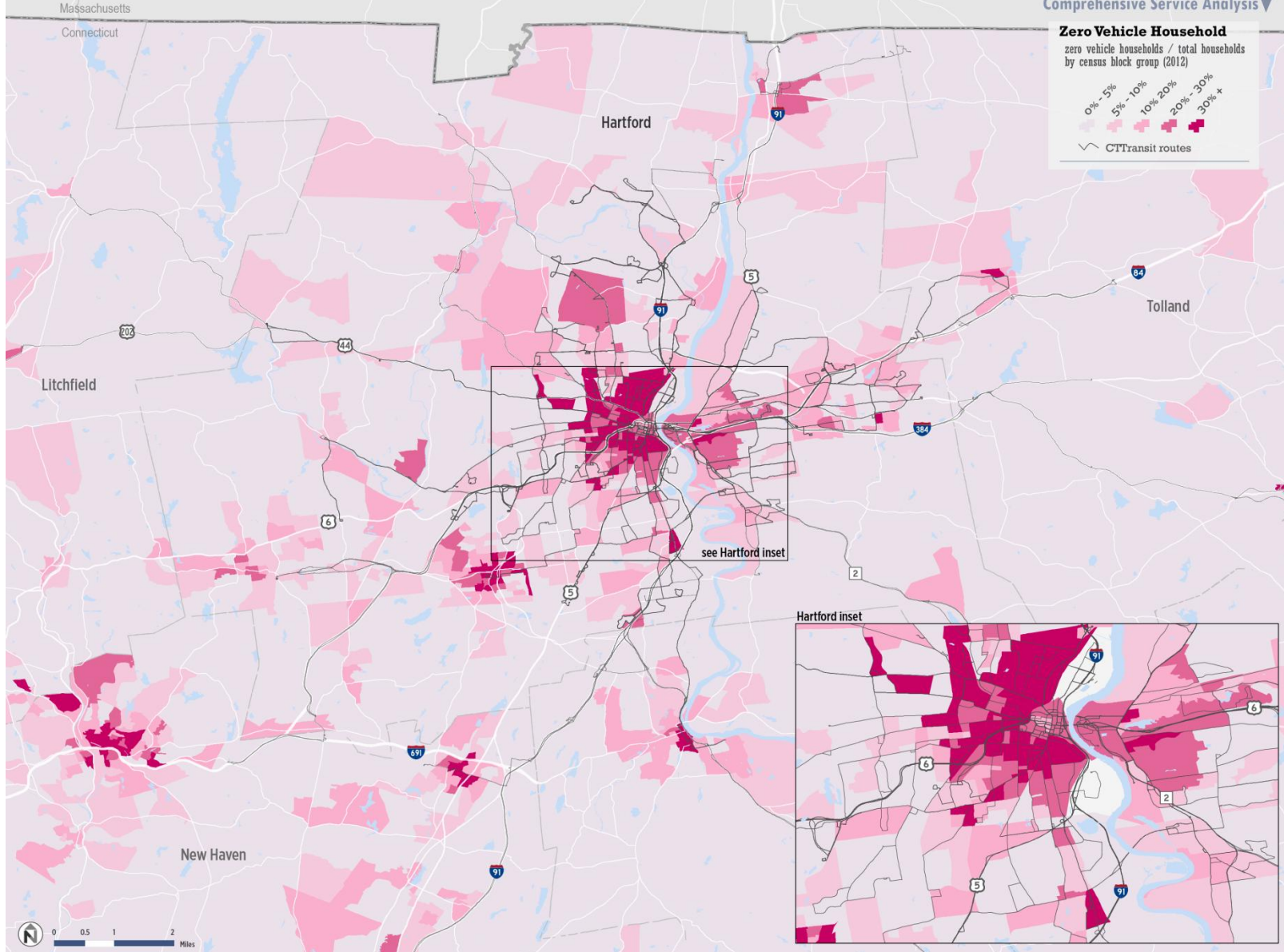
Findings include:

- Individuals without access to a vehicle are heavily clustered in densely developed and populated areas where transit service is most readily available. This is expected, as these highly transit-dependent individuals typically choose to locate in areas where they perceive transit service to be reliably available over the long-term.
- Generally, less densely developed areas have significantly fewer individuals without access to a vehicle. With limited access to transit service in these areas, having access to a vehicle becomes more of a necessity. However, Marlborough, Simsbury, Tariffville, and Thompsonville all have block groups with a moderate percent of individuals without a vehicle, but are not served by *CTtransit* Hartford routes.
- Hartford and the eastern portion of West Hartford have the highest proportion of individuals without access to a vehicle. East Hartford also has a high proportion of individuals without access to a vehicle. All three areas have a high level of transit service with good connectivity throughout the *CTtransit* Hartford network.
- Bristol and New Britain have clusters of block groups with a high proportion of individuals without access to a vehicle. As previously discussed, these cities are served by other divisions of *CTtransit*.





Figure 4-10| Zero Vehicle Households





## Older Adults

Older adults (those 65 years and older) are more likely to ride transit than the general population for a variety of reasons, including increased (relative to the larger population) incidence of an inability to own or operate a private vehicle. Traditionally, transit analyses examined the distribution of older adults based on the assumption that older adults, because they are older and less able to drive, would have an increased reliance on transit. In recent years, however, the pattern of aging in the United States has changed. New trends demonstrate that older adults, particularly Baby Boomers, have shown a growing interest in urban lifestyles where they can walk and use transit. This is a trend observed nationally as well as in Hartford<sup>1</sup>. The impact of this trend on the demand for transit service in Hartford is still unfolding; the data for downtown Hartford shows the City has a relatively small percentage of older adults overall.

The study team used population counts of individuals aged 65+ by census block groups from Census 2010 to highlight significant concentrations of older adults (see Figure 19). Findings include:

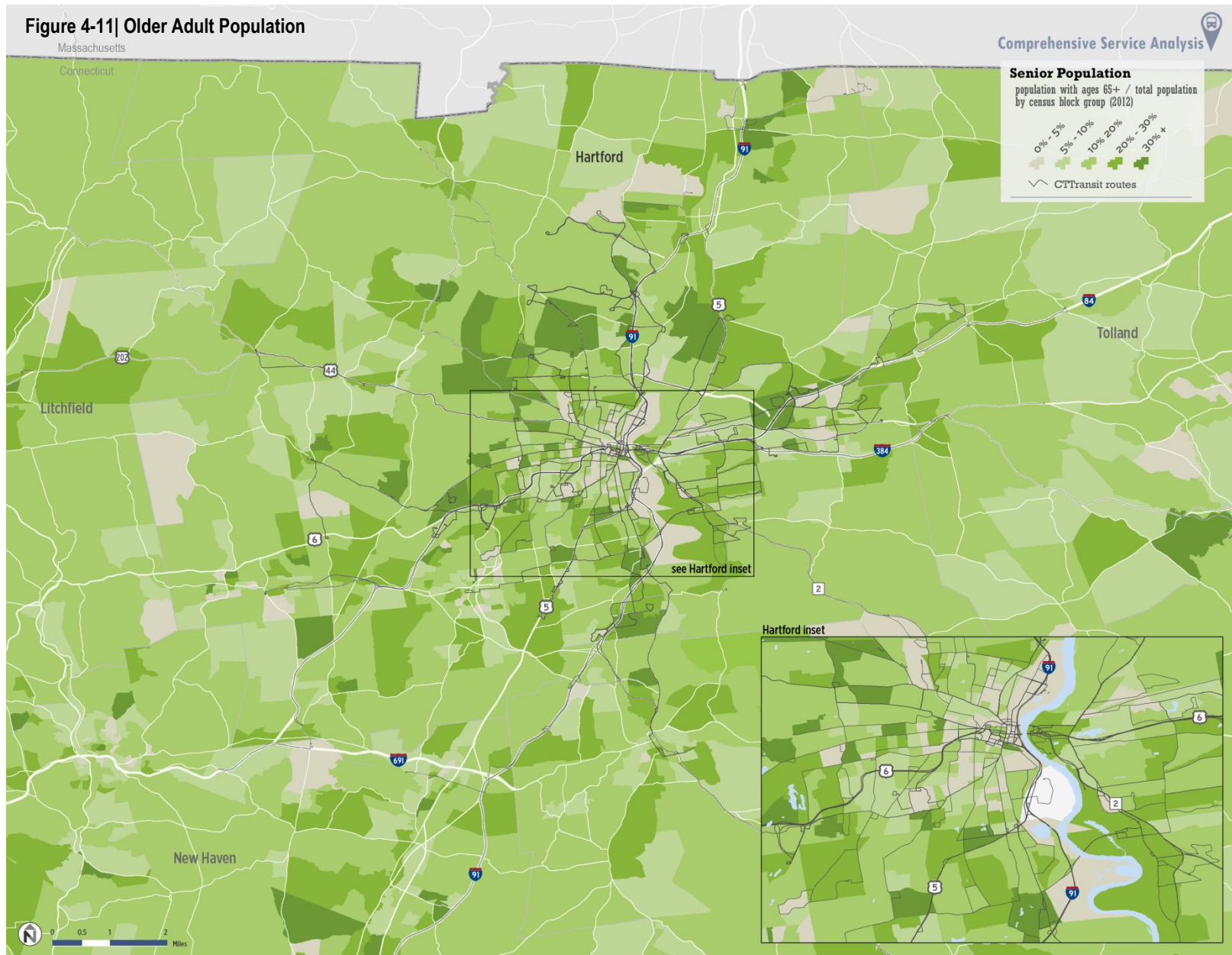
- Overall, the data shows older adults are more likely to live in suburban environments and outlying communities in the study area and are less likely to live in city centers. This is evident in downtown Hartford, which has a lower proportion of older adults to total population.
- Since older adults tend to live outside of town centers, they tend to have less access to fixed-route transit. Outside of town centers, older adults are likely to rely on demand response services. The relationship between demand and supply of these demand response services needs consideration, especially in communities with higher densities of older adults, such as Simsbury, Thompsonville, and Windsor. Several communities in the Greater Hartford Region currently provide dial-a-ride services, with a variety of eligibility requirements based on residency, age, and disability status. A full list of these services can be found at [www.WayToGoCT.org](http://www.WayToGoCT.org).
- Of the transit-dependent groups considered in this market analysis, older adults generally exhibit less clustering and are more dispersed throughout the market area. This makes this group more difficult to serve with fixed-route service.

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<sup>1</sup> Source: "Making it Happen – Opportunities and Strategies for Transit-Oriented Development in the Knowledge Corridor" September 2013



Figure 4-11| Older Adult Population







## Youth and Young Adults

In the same way that older adults are more likely to ride transit than the general population, so are young people, including students and young professionals. Youths and to a certain extent young adults are more likely to use transit because they are less likely to have access to their own vehicle, either because they are not licensed to driver or unable to afford a private vehicle.

Another national and local trend, consistent with the one described for Baby Boomers, is a preference to live in urban environments that are more oriented around walking, biking and using transit than driving. Over the past ten years – for the first time in four decades – the population of the city of Hartford experienced growth. Most of that growth was driven by students and young working adults<sup>2</sup>. As the market responds to this demand by providing more housing and transit oriented amenities, the demand for transit service is likely increase. Thus, understanding the current distribution of youths and young adults is critical to identifying transit needs and demand. It is also important that the analysis anticipates some of the increased demand for more and better transit service.

The concentration of individuals aged between 15 and 30 (relative to the overall population) by census block is shown in Figure 20. Key findings from this figure include:

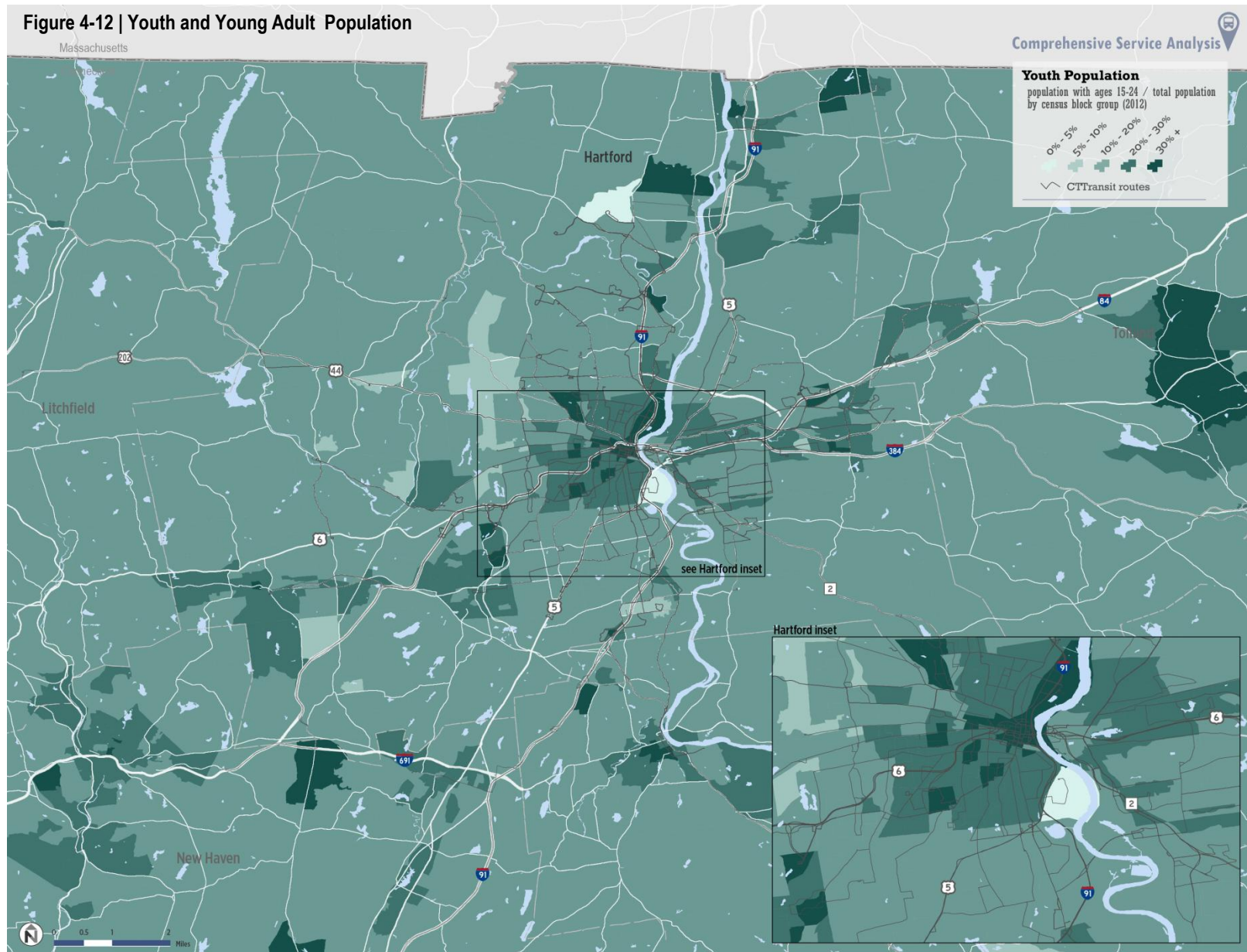
- While there are several areas with high concentrations of youths and young adults, there is a clear concentration of youths and young adults in downtown Hartford, including in the neighborhoods along Asylum and Farmington Avenues.
- There are also concentrations of youths and young adults in New Britain and Manchester.
- Storrs, the location of the University of Connecticut, also has a high concentration of youths and young adults.
- There are also a number of block groups with a high percent of young adult population scattered in the northern portion of the study area around I-91 and in Bristol, Waterbury, and Naugatuck.
- The majority of the study area has a moderate proportion of young adults (between 10% and 20%). There are few locations with a low proportion of young adults (less than 10%).

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<sup>2</sup> Source: “Making it Happen – Opportunities and Strategies for Transit-Oriented Development in the Knowledge Corridor”  
September 2013



Figure 4-12 | Youth and Young Adult Population







## Individuals with Disabilities

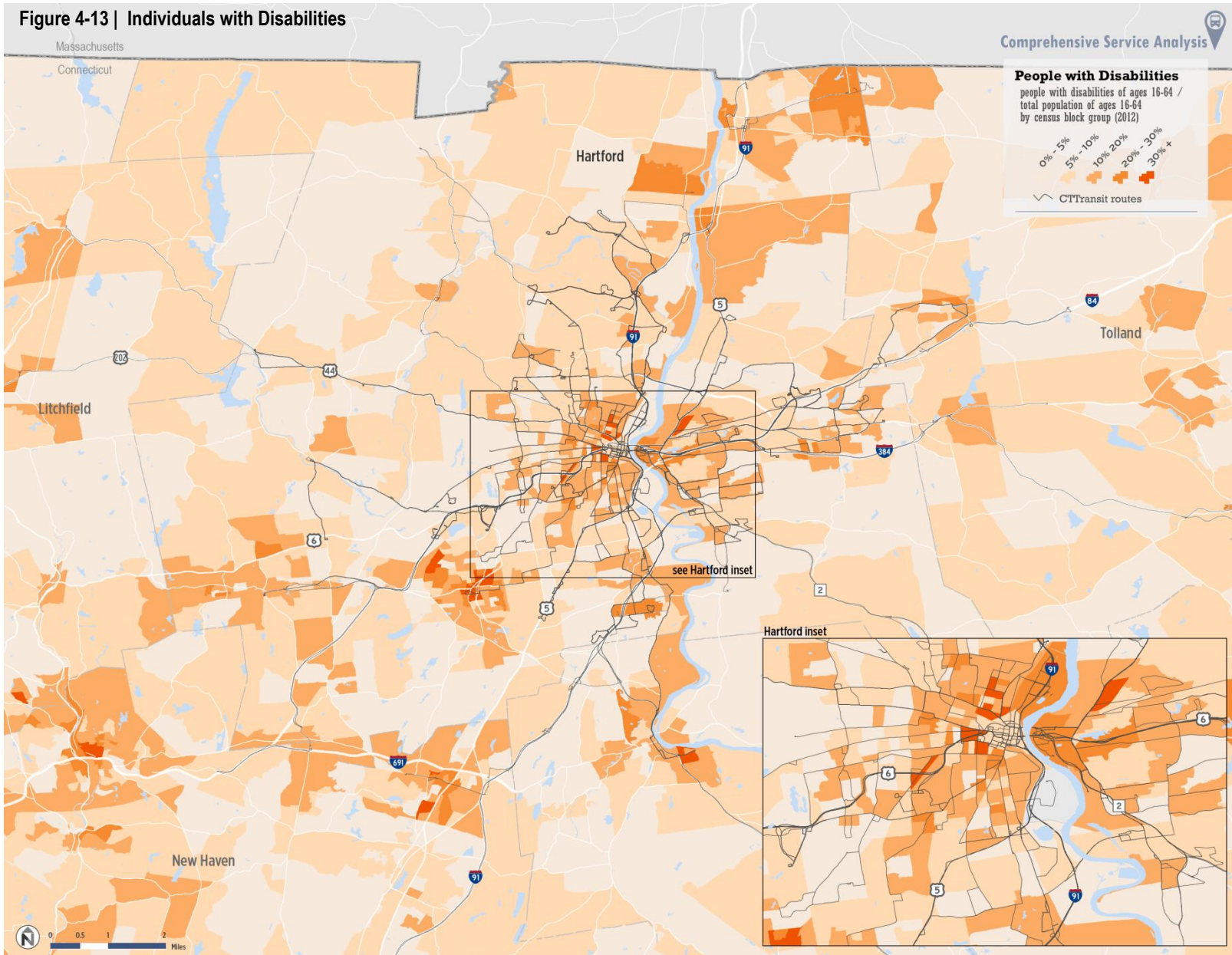
Individuals with disabilities are more likely to ride transit than the general population, especially if they are unable to operate a vehicle. Identifying clusters of this group can help highlight areas of transit-dependent riders.

The proportion of individuals with disabilities by census block group is shown in Figure 21. Key findings from this figure include:

- Block groups with a higher percentage of residents with a disability are predominantly located in East Hartford, Hartford, and New Britain. Within these areas, there are a number of block groups in which over 20% of residents have a disability.
- Towns in the northeast and southwest portion of the market area have a relatively high proportion of residents who have a disability. Northeastern communities including Hazardville, Sherwood Manor, Suffield Depot, Thompsonville, and Windsor Locks, are not served by *CTtransit* Hartford routes. However, given that these areas are geographically isolated, serving these areas efficiently would be a challenge.
- The southeastern and northwestern portions of the market area contain low proportions of individuals with disabilities.



Figure 4-13 | Individuals with Disabilities





## TRANSIT OPPORTUNITY INDEX (TOI)

The Transit Opportunity Index is a measure of transit accessibility, developed by Kelly Bertolaccini et al. at the University of Connecticut. The index takes into account both transit accessibility and transit connectivity. Transit accessibility is determined using spatial and temporal coverage measures, while transit connectivity is determined by measuring origin-destination connectivity. Based on these measures, the TOI assigns a score for each block group, with a higher transit opportunity index indicating higher levels of access. A detailed description of the methodology for calculating the TOI for each block group can be found in “A method to define public transit opportunity space.”<sup>3</sup>

The TOI can be used to determine how well transit is performing as well as how effectively it is serving different population subgroups. Additionally, the TOI can also create a “before” picture of transit opportunity in the *CTtransit* Hartford service area, which can be used to analyze how changes to the transit system put forth in the Comprehensive Transit Service Plan may affect the TOI in the Hartford area as well as service to different subgroups. The findings of the TOI analysis can be seen in Figure 23. Transit opportunity is currently highest in central Hartford. This is to be expected given the hub-and-spoke design of the current network. Other corridors with relatively high transit opportunity are the following:

- Albany Avenue
- Farmington Avenue
- Park Street / New Park Avenue
- New Britain Avenue
- Franklin Avenue
- Burnside Avenue

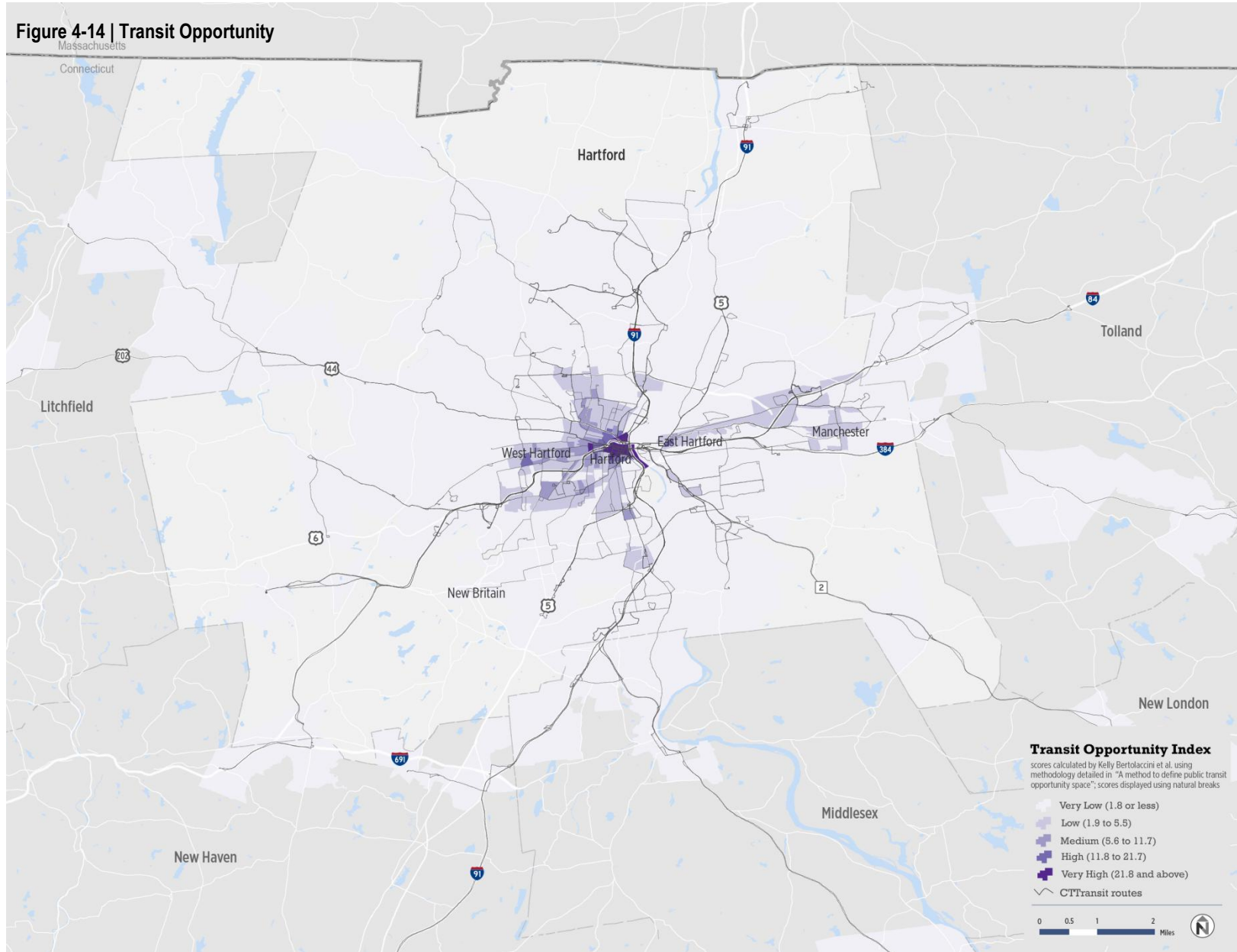
These corridors each have multiple routes operating along them, thus increasing the accessibility to transit for near-by residents and businesses.

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<sup>3</sup> Source: Mamun, S.A., Lownes, N.E., Osleeb, J.P. and Bertolaccini, K. (2013). A method to define public transit opportunity space. *Journal of Transport Geography*, 28(1), 144-154.



Figure 4-14 | Transit Opportunity





## MARKET ANALYSIS FINDINGS

Overall, the market analysis suggests the following:

- The strongest markets for transit are the cities of Hartford, West Hartford and East Hartford. These areas have the highest density of population and employment as well as concentrations of individuals both looking for and more likely to rely on public transportation services. These areas can support the highest levels of transit service in the region.
- Other good markets for transit service are in New Britain and Manchester. Like the City of Hartford, New Britain has high population and employment density, as well as high concentrations of individuals with a higher propensity to rely on transit. New Britain is within a separate *CTtransit* district; the community will have a station on *CTtransit*'s *CTfastrak* service. Local service, however, is provided by *CTtransit* - New Britain.
- The east west corridor created by New Britain, Hartford, West Hartford, East Hartford and Manchester is another strong market for transit service development. Demand along the corridor is not evenly distributed and service is not easily concentrated on by a single roadway. Instead the corridor reflects a series of neighborhoods and job clusters located near and around multiple roadways. As part of understanding future transit demand, it is important to note that people need to not only travel along this east-west corridor (and in and out of downtown Hartford), the data makes a clear case that there is need to connect to and from the corridor in different locations, including at the outer ends (New Britain and Manchester). Transit service development, therefore, needs to identify ways to connect to the corridor at several points, without always relying on connections through downtown Hartford.
- Manchester represents a good market for transit in terms of population and employment density, although the demographic characteristics of Manchester suggest the community is slightly less likely to rely on transit relative to other parts of the service area.
- Employment is particularly clustered in Hartford, East Hartford and along several major corridors extending south from Hartford. There are fewer jobs in the northern portion of the service area and they are generally more dispersed.
- Transit-dependent groups of low-income individuals and individuals without access to a vehicle generally cluster in areas with higher population density overall. These areas should be strong markets for transit service as they have high density and high need.
- Older adults do not exhibit the same level of clustering as other transit dependent groups and tend to be more dispersed throughout the *CTtransit* - Hartford service area. Serving these individuals is more difficult given older adults are not concentrated in strong transit markets.
- Large portions of the service area do not have sufficient densities to support moderately frequent fixed-route service. Densities suggest these communities could support fixed-route service with frequencies of every 30 minutes or less.
- Some areas in the *CTtransit* service area that do not have sufficient densities to support moderately frequent fixed-route service have demographic characteristics that suggest a high, or relatively high need for transit. In these areas, other types of transit services, such as flexible routes or dial-a-ride services may be the best options for balancing community needs with the desire to operate cost efficient services.





## 5 TRAVEL PATTERNS

In general, transit users are interested in accessing the same regional destinations as all other travelers. As part of our understanding of the overall need for transit service, therefore, the study team analyzed major travel patterns in Central Connecticut, regardless of mode. We used this information to be sure transit is matched with the overall travel patterns and is designed to take people where they want to go.

The Nelson\Nygaard team worked closely with CRCOG to create the analysis and relied on 2014 trip tables produced by the CRCOG Regional Travel Demand Model. The model is regularly “validated” and updated by CRCOG staff to ensure that it reflects real-world commuter behavior. 31 towns are included in the travel flow analysis, with each town classified as “center,” “middle,” or “outer.” Center towns are those within the urban core. Middle towns are those within the CRCOG region that are classified as town centers. Outer towns are key areas outside of the CRCOG region that could produce trips into the area.

In addition to examining travel flows between towns, two further analyses focused on travel flows beginning and ending in Hartford only and, as well as travel flows within the City of Hartford. These analyses are illustrated in a series of four maps shown in Figures 23 through 25.

In viewing the travel flow maps, it is important to consider a few facts:

- Trips are not segregated by time of travel (i.e., peak versus off-peak) or by trip type (home-based work travel, home-based other, etc.). They represent all travel for the entire day.
- This point-to-point analysis does not illustrate how trips are assigned to available streets or transit routes. In viewing the data, it is helpful to think about how various point-to-point travel markets aggregate in actual travel corridors.

### Summary of Findings

At the town level, travel flows appear to validate the over-all design of the *CTtransit* network serving the Capital Region. Hartford is clearly the strongest regional hub, attracting heavy travel flows from neighboring communities such as East Hartford, West Hartford, and Wethersfield, as well as non-bordering towns such as Manchester and New Britain. These travel patterns are reflected in the radial design of *CTtransit*'s local and express networks serving the Hartford region.

At the district level, other important travel patterns become more clearly visible, including the strong connection between Newington and Wethersfield. This is not a travel pattern that is well served by *CTtransit*'s existing Hartford-focused network which has a lack of cross-town service options.

A review of travel patterns that begin or end in Hartford only, shows a high volume of internal trips within each of Hartford's districts. These trips require a level of analysis that cannot be provided through the regional travel demand model. To assess how well existing routes are serving local travel patterns, Nelson\Nygaard is developing detailed route profiles that examine the ridership of each route by stop and time of day. These profiles will be included in a subsequent tech memo.



Figure 5-1 | Travel Flows Across the Capitol Region (By Town)

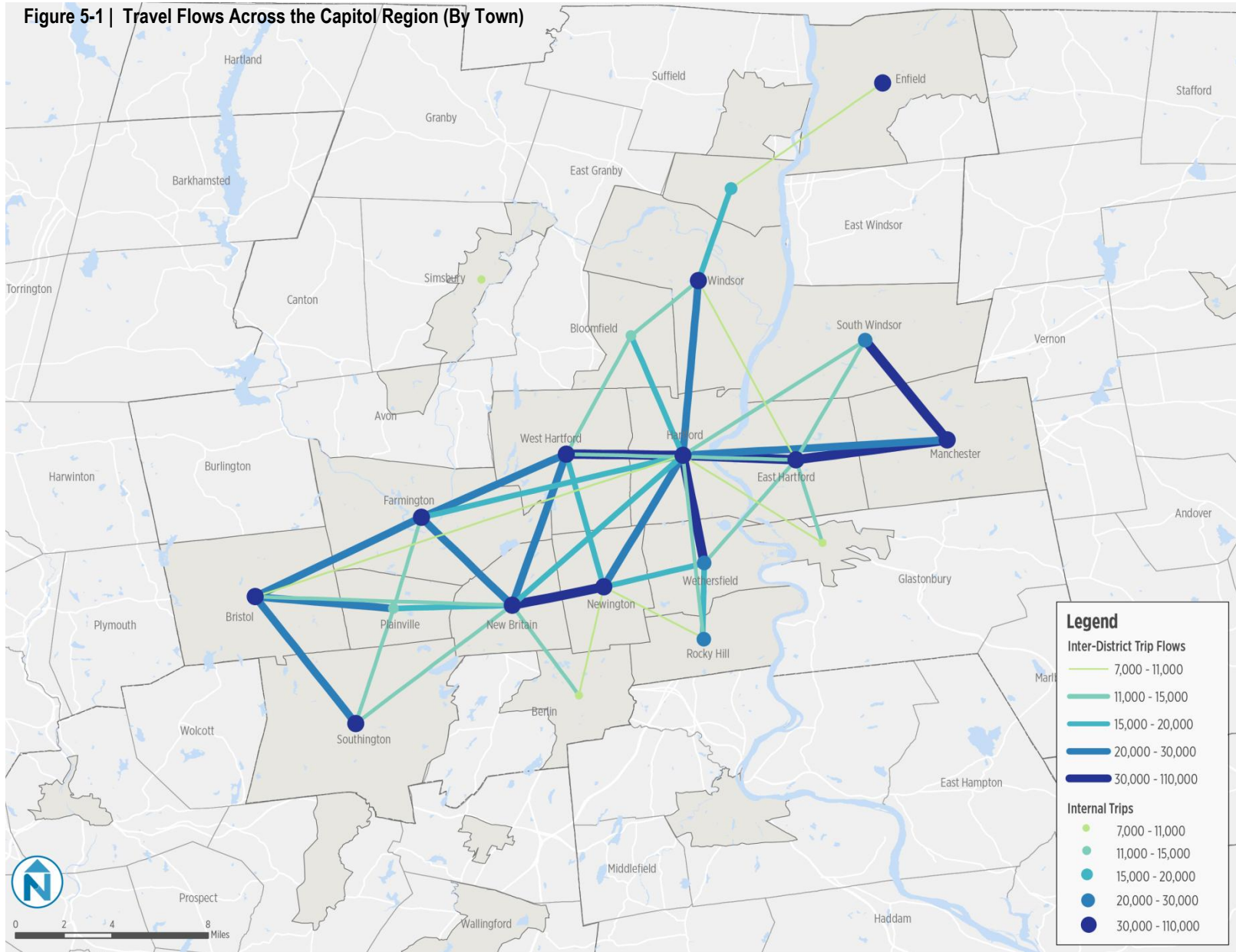




Figure 5-2 | Travel Flows To and From Hartford Only

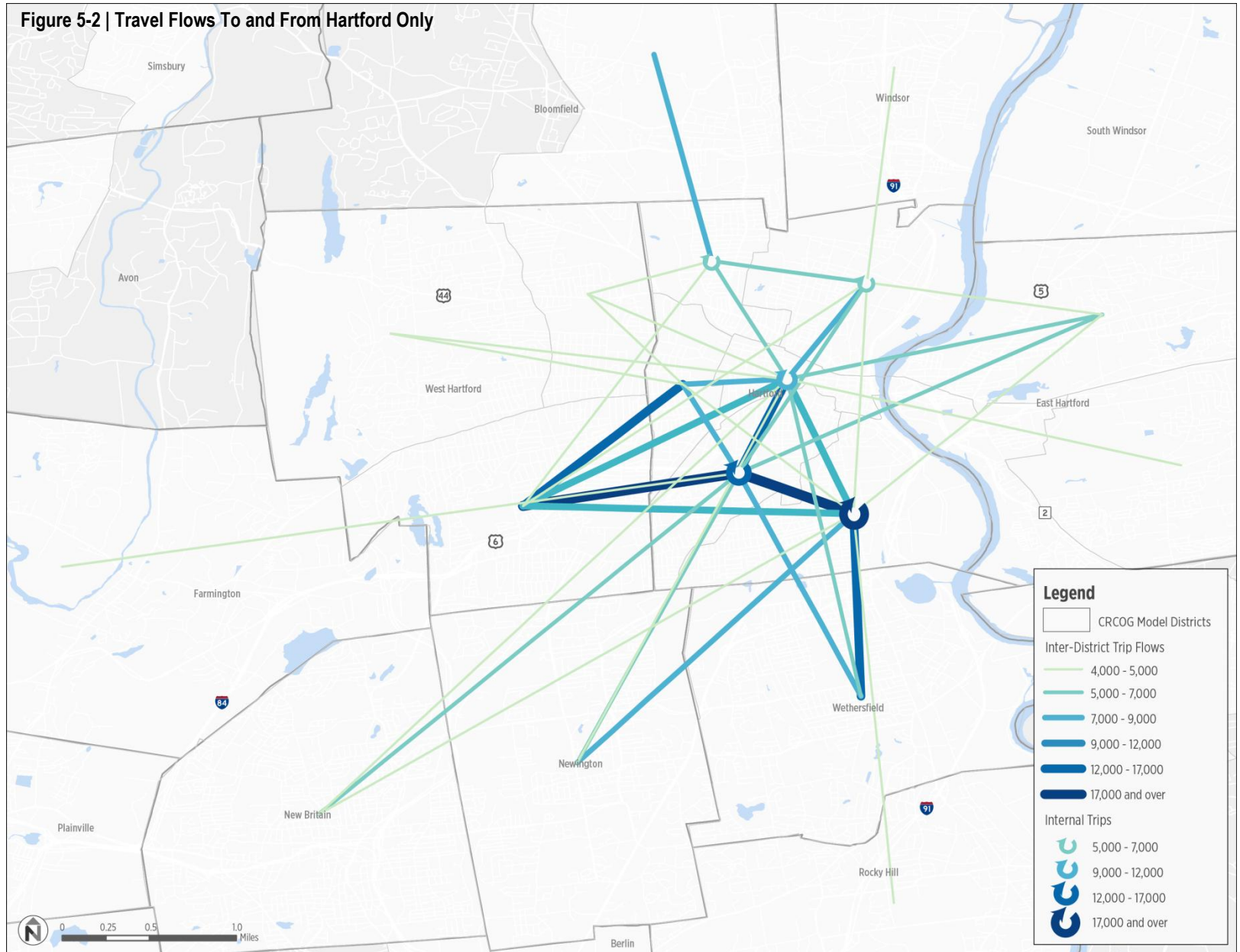
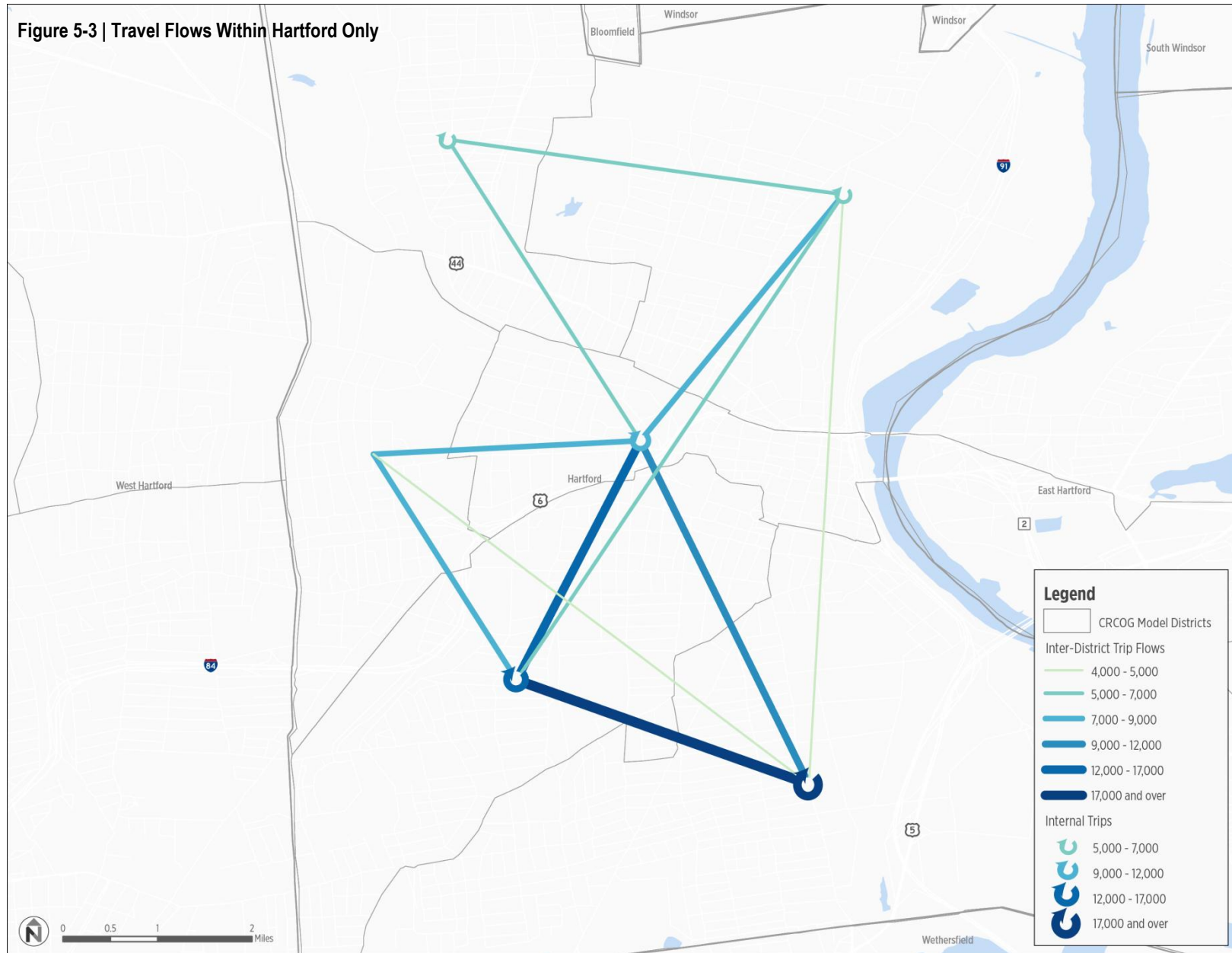






Figure 5-3 | Travel Flows Within Hartford Only



# **APPENDIX A**

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<b>National Sources for Transit Supportive Population and Employment Densities</b>						
<i>Mode/Service Frequencies</i>	<i>Dwelling Units/Acre</i>	<i>Population/Acre</i>	<i>Population/Square Mile</i>	<i>Jobs/Acre</i>	<i>Jobs/Square Mile</i>	<i>Million Square Feet Commercial Space</i>
<b>Transit Capacity and Quality of Service Manual, TCRP, January 1999</b>						
60 minutes	3-6	8-16	5,000-10,000	4-8	2,500-5,000	-
30 minutes	6-12	16-31	10,000-20,000	8-16	5,000-10,000	-
15 minutes	12-18	31-47	20,000-30,000	16-24	10,000-15,000	-
10 minutes	18-36	47-92	30,000-60,000	24-48	15,000-30,000	-
<= 5 minutes	>36	>92	>60,000	>48	>30,000	-
<b>TCRP Report 102: Transit-Oriented Development in the United States: Experiences, Challenges, and Prospect, 2004</b>						
Basic bus	7-15	18-39	12,000-25,000	-	-	-
Premium bus	15-18	39-47	25,000-30,000	-	-	-
Light Rail	-	-	-	-	-	-
Within 1/8 mile	30	78	50,000	-	-	-
1/8 to 1/4 mile	24	62	40,000	-	-	-
1/4 to 1/2 mile	12	31	20,000	-	-	-
<b>Institute of Transportation Engineers (ITE), 1989</b>						
Bus	-	-	-	-	-	-
60 minutes	4-6	10-16	6,400-9,600	-	-	5-8
30 minutes	7-8	17-21	11,200-12,800	-	-	8-20
Light Rail	>=9	>21	>12,800	-	-	35-50
<b>Sacramento County (CA) General Plan (Policy LU-33), Amended 2007</b>						
Feeder Bus	-	-	-	-	-	-
Within 1/8 mile	10	26	17,000	-	-	-
1/8 to 1/4 mile	6	16	10,000	-	-	-
1/4 to 1/2 mile	6	16	10,000	-	-	-
Bus Rapid Transit	-	-	-	-	-	-
Within 1/8 mile	20	52	33,000	-	-	-
1/8 to 1/4 mile	15	29	25,000	-	-	-
1/4 to 1/2 mile	10	26	17,000	-	-	-
Light Rail	-	-	-	-	-	-
Within 1/8 mile	30	78	50,000	-	-	-
1/8 to 1/4 mile	18	47	30,000	-	-	-
1/4 to 1/2 mile	12	31	20,000	-	-	-
<b>Public Transportation and Land Use Policy, Boris Pushkarev and Jeffrey Zupan, 1977</b>						
Dial-a-Ride	3.5-6	-	5,600-9,600	-	-	-



<b>National Sources for Transit Supportive Population and Employment Densities</b>						
<i>Mode/Service Frequencies</i>	<i>Dwelling Units/Acre</i>	<i>Population/Acre</i>	<i>Population/Square Mile</i>	<i>Jobs/Acre</i>	<i>Jobs/Square Mile</i>	<i>Million Square Feet Commercial Space</i>
Bus	-	-	-	-	-	-
60 minutes	4	-	6,400	-	-	-
30 minutes	7	-	11,200	-	-	-
10 minutes	15	-	24,000	-	-	-
Express bus	-	-	-	-	-	-
Walk Access	15	-	24,000	-	-	-
Park & Ride Access	15	-	24,000	-	-	-
Light Rail (<=5 minutes peak)	9	-	14,400	-	-	-
Rapid Transit (<=5 minutes peak)	12	-	19,200	-	-	-
Commuter Rail	1-2	-	1,600-3,200	-	-	-
<b>A Toolbox for Alleviating Traffic Congestion, ITE, Washington, D.C., 1989</b>						
Bus	-	-	-	-	-	-
60 minutes	5-6	-	6,400-9,600	-	-	5-8
30 minutes	8-8	-	11,200-12,800	-	-	8-20
<b>Scott Chapman, Nelson\Nygaard (Compiled from Various Sources)</b>						
Flex Bus	0.2	0.5	320	-	-	-
Community Circulator	0.8	2	1,300	-	-	-
Local Bus	-	-	-	-	-	-
60 minutes	3.2	8	5,000	-	-	-
30 minutes	6.8	17	11,000	-	-	-
BRT or 15 minutes	5	25	8,000-16,000	15	9,600	-
Express Bus (Walk Access)	10	25	16,000	20	12,800	-
LRT	30	75	48,000	50	32,000	-
Commuter Rail	20	50	32,000	25	16,000	-
<b>The Relationship between Land Use and Travel Behavior in the Puget Sound Region, Washington State DOT, 1994</b>						
Intermediate (bus)	-	-	-	20	12,800	-
Frequent (bus)	-	-	-	75	48,000	-



National Sources for Transit Supportive Population and Employment Densities						
<i>Mode/Service Frequencies</i>	<i>Dwelling Units/Acre</i>	<i>Population/Acre</i>	<i>Population/Square Mile</i>	<i>Jobs/Acre</i>	<i>Jobs/Square Mile</i>	<i>Million Square Feet Commercial Space</i>
Light Rail	-	-	-	125	80,000	-