

2.0 Existing Transportation Conditions

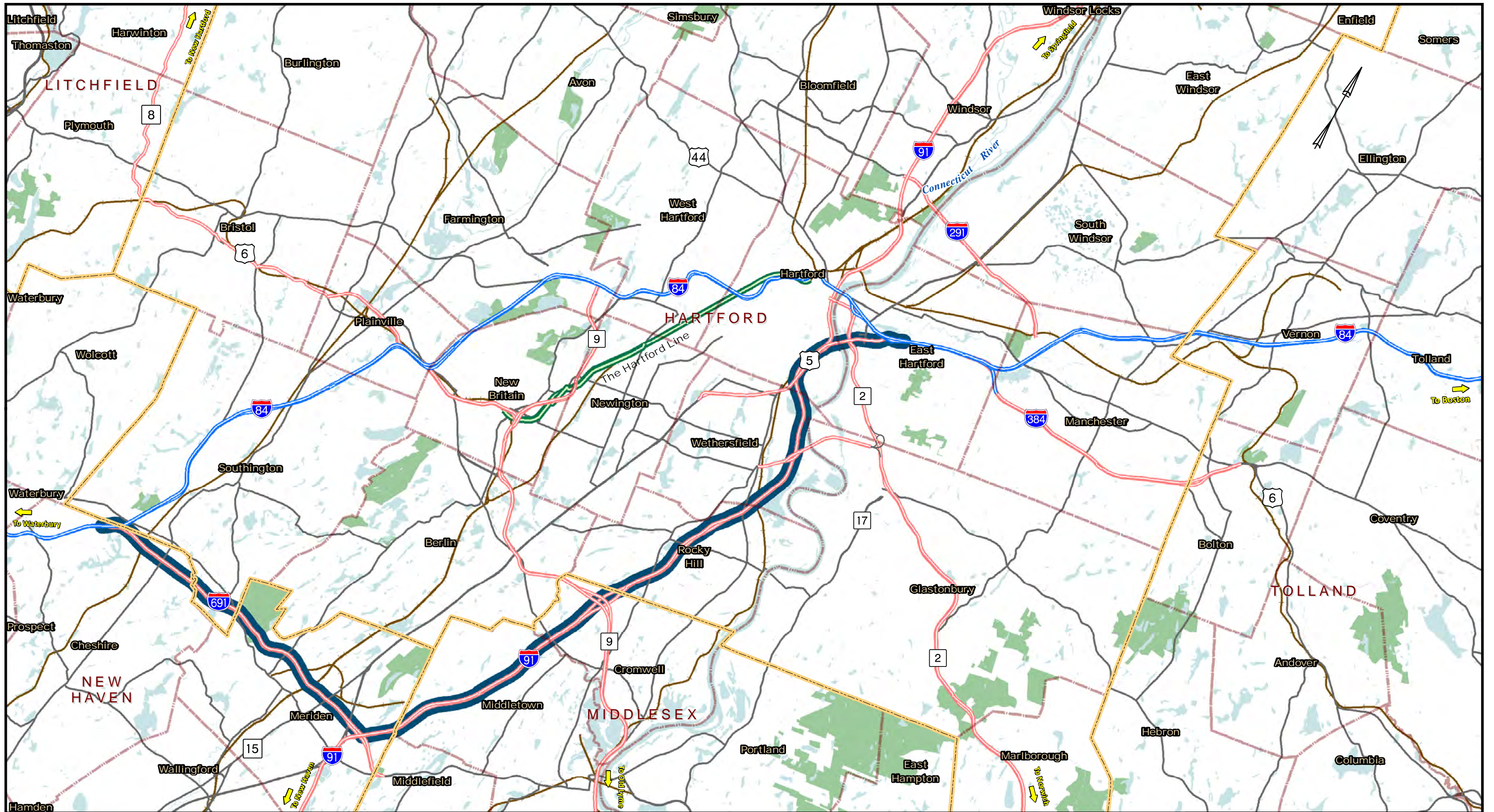
The existing transportation conditions within the I-84 Hartford study areas have been analyzed to identify the needs and deficiencies that the Project will address. Assessment of the existing conditions establishes a baseline to which anticipated future conditions can be measured and various improvement alternatives can be compared.

2.1 Overall Transportation Network Summary

The transportation system in the study areas consists of I-84 and other major highways, the local roadway network, several transit modes, and bicycle and pedestrian paths and routes. Befitting its status as a major employment center, Hartford serves as a major transportation hub and offers transportation connections to destinations worldwide via Bradley International Airport, located approximately 15 miles north of Downtown Hartford.

Overall, the transportation system in Hartford is heavily influenced by the 1950s/1960s era of automobile-centric urban planning, with both I-84 and I-91 cutting through downtown areas. Transportation officials within the State are seeking to enhance transit options and enable pedestrian and bicycle mobility. The CTfastrak bus rapid transit system, which opened on March 28, 2015, provides fast and reliable transit access between Hartford and communities to the south, east, and west. Efforts are underway to improve the regional rail system, including the introduction of commuter rail service to the Hartford region.

The existing regional transportation system depends heavily on Interstates 84 and 91, together two of New England's crucial transportation arteries, which provide regional east-west and north-south connectivity. An alternate route around the City of Hartford is available for east-west travelers, via I-691, I-91, the Charter Oak Bridge, and the Wilbur Cross Highway (US 5/CT 15). This alternate route is approximately three miles longer than taking I-84 directly through Hartford. CT Route 2 provides a freeway connection from Hartford to points south and east. The existing freeway network through the Hartford area is a fraction of what was originally planned. Figure 2-1, following, presents the existing highway network, highlighting the I-691/I-91 alternate route. Figure 2-2 on page 2-3 illustrates the planned freeways which were never constructed (all routes approximate). As discussed further in Section 2.1.1, the I-84 interchanges with Sisson Avenue (Interchange 46) and Capitol Avenue (Interchange 48) were originally designed as to accommodate direct connections to other planned freeways. Having never been constructed at these locations, there is an overbuilt network of direct connection ramps to local streets. In the following sections of Chapter 2, the existing conditions of the transportation facilities within the Project Study Corridor are discussed in detail.



LEGEND

- Alternate Route
- Railroad
- Recreational Area
- Water
- I-84
- Other Freeway
- U.S. Highway/State Road
- CTfastrak

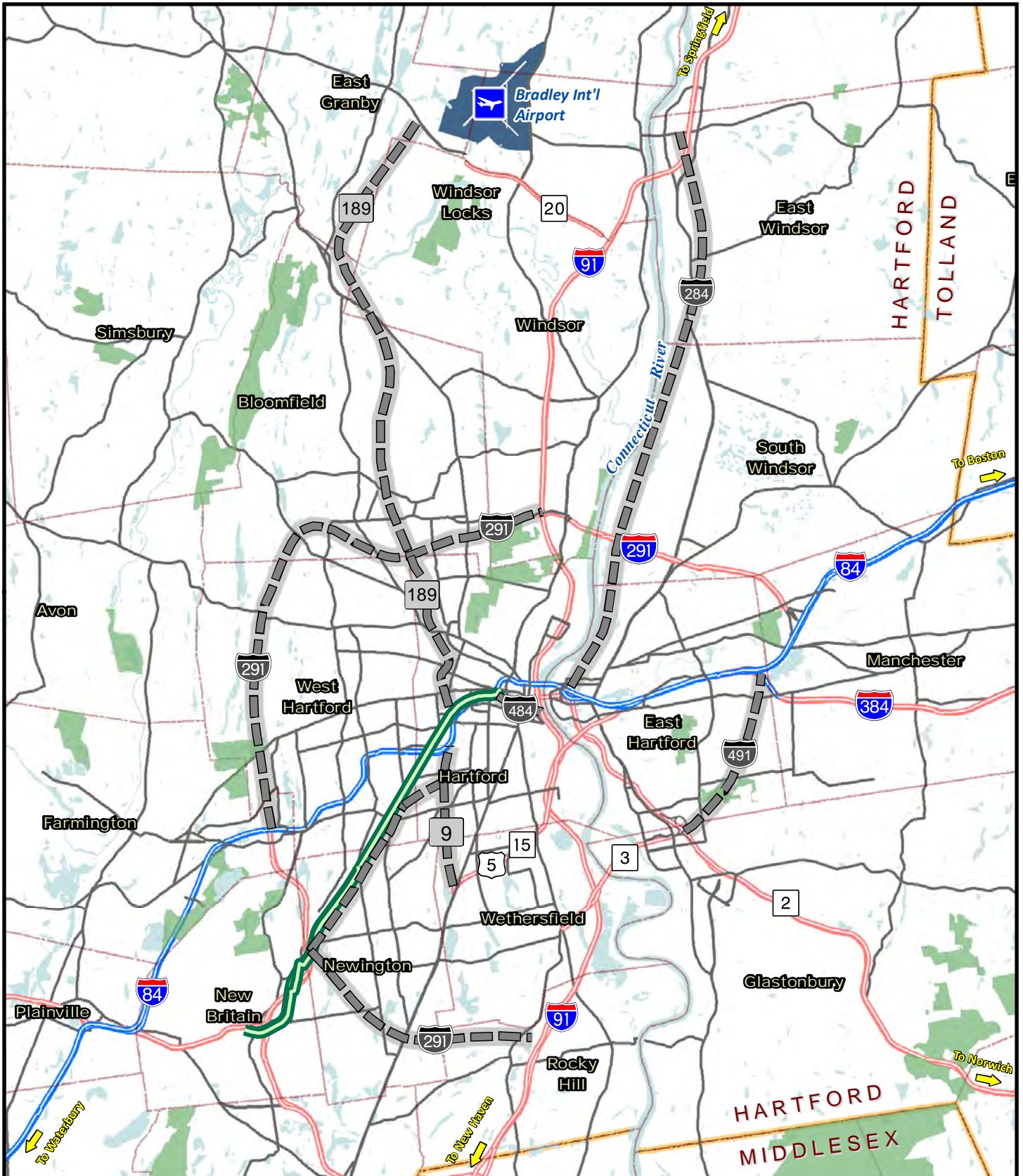
0 700 1,400
Feet

Sources of Data: City of Hartford, ESRI
<http://www.ctfastrak.com/>


The I-84 Hartford Project

Regional Highways Map

Date: 7/17/2015 Drawn By: TranSystems Figure No: 2-1



LEGEND

- | | | | |
|---|--|---|-------------------------|
|  | Proposed Regional Freeways (Not Constructed) | | I-84 |
| | CTfastrak | | Other Freeways |
| | Railroad | | U.S. Highway/State Road |
| | Recreational Area | | Major Road |
| | Water | | Local Road |

 **The I-84 Hartford Project**

Planned Hartford Area Freeways

Date: 7/17/2015

Drawn By: TranSystems

Figure No: 2-2

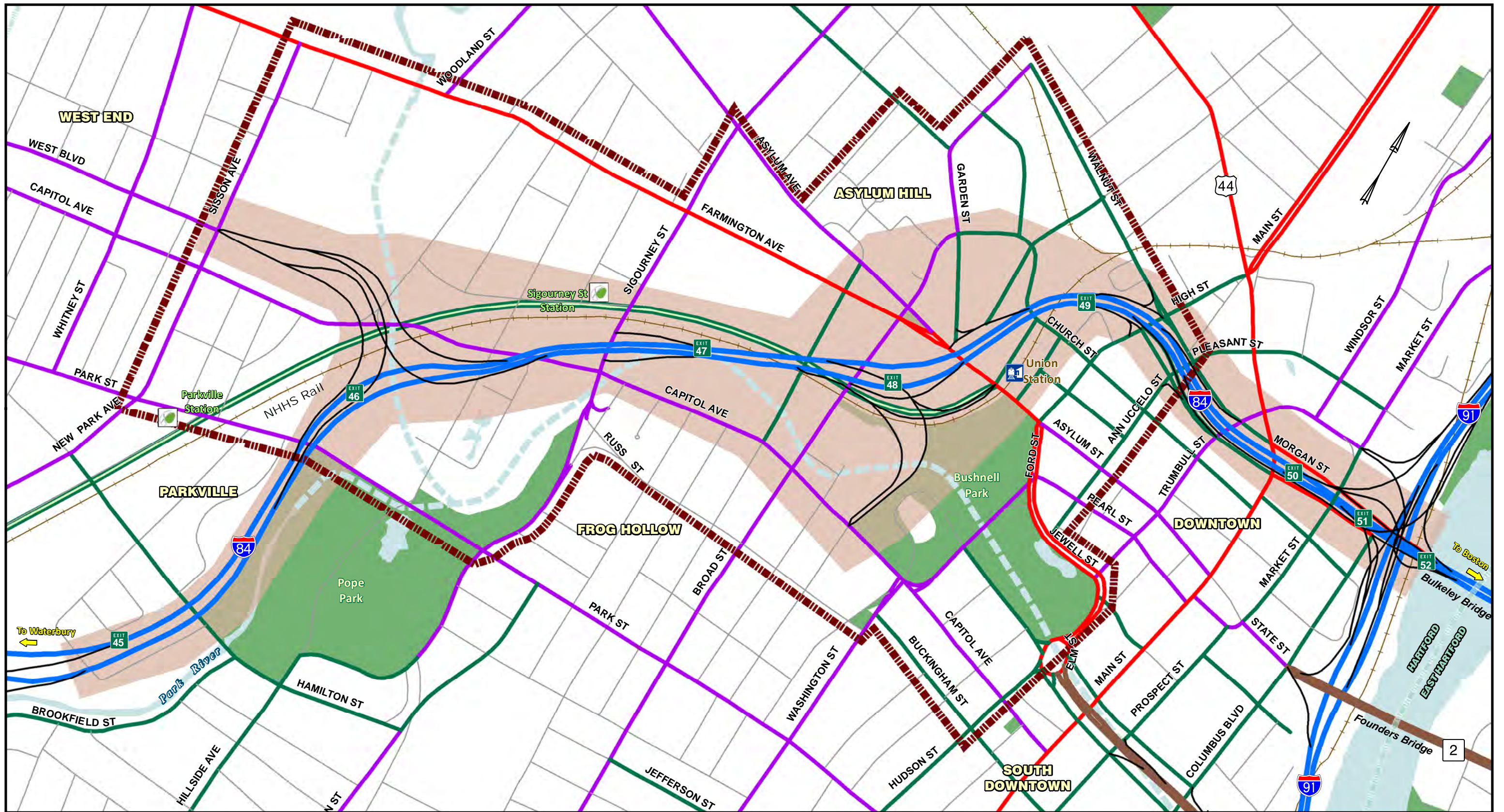
2.1.1 Mainline and Interchange Ramps

I-84 within the Project Study Corridor includes 4.86 miles of mainline roadway, which is divided between 2.28 miles in the westbound direction and 2.58 miles in the eastbound direction. Total travel lanes vary from two to five lanes in each direction. The Project Study Corridor includes seven interchanges consisting of twenty-two ramps of varying lengths and complexities. These interchanges are listed in Table 2-1 below. The majority of the roadways were designed and constructed between the 1950s and 1980s; maintenance and rehabilitation continue through the present. Two interchanges within the Project Study Corridor were originally constructed with future freeway connections in mind: Interchange 46 (Sisson Avenue) and Interchange 48 (Capitol Avenue/Asylum Street), specifically the eastbound off-ramps, 48A/B. Interchange 46 remains broadly as constructed in the 1960s, whereas Interchange 48 was modified in the 1980s once the planned freeway connections had been abandoned. The I-84 mainline and its interchanges within the Project Study Corridor are illustrated in Figure 2-3, following. The roadway geometry features of these facilities are analyzed in detail in Section 2.5: Roadway Geometry Review.

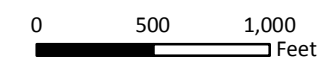
Table 2-1: I-84 Interchanges within the Project Study Corridor

I-84 Interchange #	Connection(s) To	Directions Served	# of Ramps	Style
46	Sisson Avenue	Eastbound and Westbound On- and Off-Ramps	4	Three-Leg Directional
47	Sigourney Street	Eastbound On-Ramp and Westbound Off-Ramp	2	Partial Diamond
48	Capitol Avenue/Broad Street/Asylum Street	Eastbound and Westbound On- and Off-Ramps*	6	Complex
49	Ann Uccello Street/High Street	Eastbound Off-Ramp and Westbound On-Ramp	2	Partial Diamond
50	Main Street (US 44)/Trumbull Street/Morgan Street	Eastbound and Westbound On- and Off-Ramps	4	Diamond
51	I-91 Northbound	Eastbound Off-Ramp and Westbound On- and Off-Ramps	3	Semi-Directional
52	I-91 Southbound	Eastbound On- and Off-Ramps and Westbound On-Ramp	3	Semi-Directional

* Two ramps either split or come together for the eastbound off-ramp and the westbound on-ramp



LEGEND	Principal Arterial - Interstate (Urban)	CTfastrak Station	I-84 Exit #	Park River Conduit
	Principal Arterial-Other Expressway (Urban)	CTfastrak	Union Station	Ramp
	Principal Arterial-Other (Urban)	Railroad	Park	Town/City Limit
	Minor Arterial (Urban)	Project Study Corridor	Water	
	Collector (Urban)	Parking, Bicycle and Pedestrian Accessibility Study Area		
	Local (Urban)			



Sources of Data: City of Hartford, ESRI
<http://www.ctfastrak.com/>

The I-84 Hartford Project		
Project Study Corridor Map		
Date: 6/27/2014	Drawn By: TranSystems	Figure No: 2-3

2.1.2 Local Road Network

Within the Project Study Corridor, I-84 passes through six of Hartford's neighborhoods. From west to east, they are Parkville, Behind the Rocks, the West End, Frog Hollow, Asylum Hill, and Downtown. In many places, the boundary between these neighborhoods coincides with the highway. These divisions are exacerbated at locations where the highway and its ramps are carried on the elevated structures that constitute the majority of the Project Study Corridor.

The local road network is shown by functional classification on Figure 2-3, previous. Through the study areas, illustrated on Figure 1-1, there is a predominant availability of east-west mobility and a general lack of north-south mobility. Due to recent safety concerns with the at-grade *CTfastrak* crossing, Flower Street is no longer a through north-south connection. The north and south legs of Flower Street operate independently and are closed to through traffic at the railroad and *CTfastrak* crossings, including all bicycles, pedestrians, and automobiles.

There are several arterial roads bringing traffic from West Hartford and the West End and Parkville neighborhoods of Hartford towards Downtown, including Farmington Avenue, Asylum Avenue, Albany Avenue (US 44), Park Street/Road, and Boulevard/West Boulevard. However, there are just two arterials conveying north-south traffic in the western part of the corridor: Sigourney Street and Broad Street. The road network in Downtown Hartford generally consists of a grid network, including some one-way streets and turn restrictions. Community stakeholders have noted that connectivity to and from I-84 and transit uses (*CTfastrak* stations and Union Station) and the surrounding areas can and should be improved¹. Additional deficiencies for transit operations, and pedestrian and bicycle accessibility are discussed in the following sections.

The Project Team has undertaken extensive data collection throughout the local road network to help evaluate what impacts may be caused during construction and by the final build condition. For a review of data collection efforts within the Project Study Corridor, see Section 2.2: Existing Traffic Data; for a review of existing traffic operations, see Section 2.4: Existing Traffic Operations. In Appendix 2, there is a review of data collection and traffic operations within the entire Traffic Data Collection Area.

2.1.3 Corridor Parking Analysis

The Project Team has compiled and evaluated existing parking conditions. A Parking, Bicycle, and Pedestrian Accessibility Study Area (the Study Area for the duration of this section), illustrated on Figure 2-3, previous, was defined by the Project Team for this analysis. This Study Area was used to evaluate off-street and on-street parking.

The Study Area has a considerable amount of on-street curbside parking and off-street parking facilities, both publicly and privately owned. The parking areas affected by the proposed alternatives studied for this corridor may vary; therefore both qualitative and quantitative analyses were conducted to

¹ See Stakeholder Interview Summaries, Appendix A.3.1.

determine existing and future parking needs for the Study Area. The Study Area contains approximately 22,826 parking spaces in a combination of off-street and on-street parking facilities. The vast majority of the total parking capacity is made up of private (employee) off-street parking lots and garages. Study Area parking is presented in Table 2-2, below.

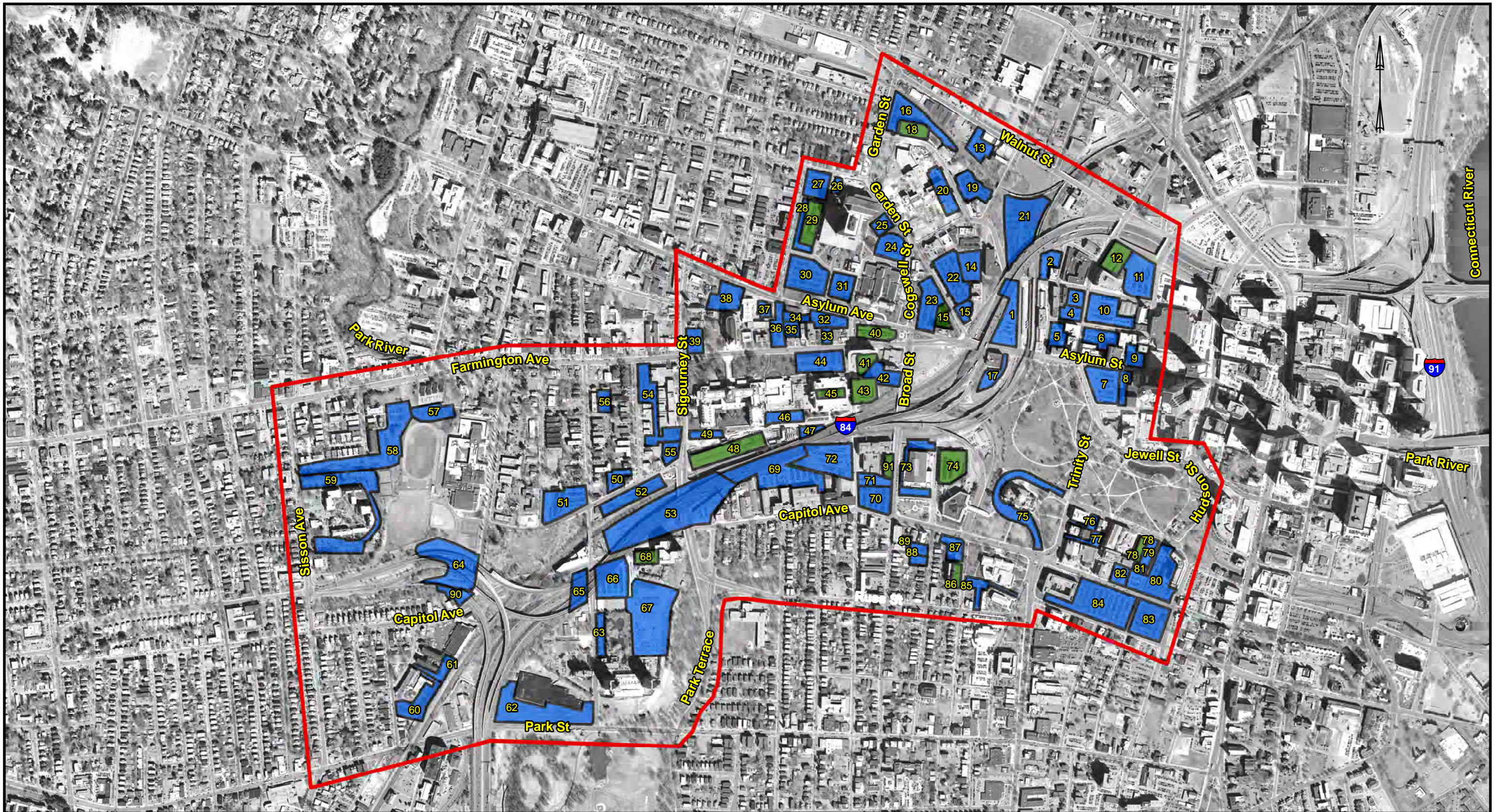
Table 2-2: Existing Parking within the Study Area

Off-Street Parking	
Public Parking	
<i>Type</i>	<i># of Spaces</i>
Surface Lots	1,522
Structures	1,504
Total Public	3,026
Private Parking	
<i>Type</i>	<i># of Spaces</i>
Surface Lots	12,154
Structures	6,480
Total Private	18,634
Total Off-Street Parking:	21,660
On-Street Parking	
<i>Type</i>	<i># of Spaces</i>
Metered- Coin	56
Metered- Pay-to-Park	192
Unmetered	970
Total On-Street Parking:	1,218
Total Parking	22,826

As more in depth analysis of options is conducted, potential impacts to existing parking areas will be documented and potential solutions highlighted. In addition, the City of Hartford undertook a parking study to review existing parking and determine future parking needs within the Downtown neighborhood. The study looked at challenges and opportunities of the City's owned parking sites and infrastructure as well as recommendations for changes of parking, pricing, and transportation policies.

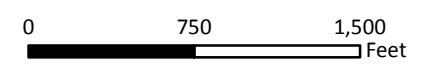
Off-Street Parking Facilities

Off-street parking facilities within the Study Area were evaluated and documented via aerial photo survey, field reconnaissance, and interviews with Project Stakeholders. Interviews with Project Stakeholders were conducted in the summer and fall of 2013 and are included in full in Appendix A.3.1. This information was supplemented by data gathered in field visits and aerial photography review conducted during 2014. Off-street parking facilities with a capacity of over 20 parking spaces were included in this analysis. Based on this criterion, 14 parking structures and 78 parking lots have been evaluated. There are no City- or State-designated Park & Ride lots within the Study Area. Figure 2-4, following, illustrates the surface parking lots and parking garages identified within the Study Area. Each surface parking lot and parking structure was assigned an identification number that correlates to the Surface Parking Lots and Parking Structures Inventory in the Parking Analysis Appendix, Appendix A.3.2.



LEGEND

- Parking Lot
- Parking Garage
- Parking, Bicycle and Pedestrian Accessibility Study Area



Sources of Data: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, swisstopo, and the GIS User Community

The I-84 Hartford Project

Off-Street Parking Facilities Map

Date: 7/22/2015	Drawn By: Parsons Brinckerhoff	Figure 2-4
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Inventory data include property owners, lessees, lease terms, operators, operating hours, capacity, Americans with Disabilities Act (ADA) capacity, utilization, and ingress/egress points, as available. Additional information on off-street parking facilities was gathered through interviews with Project Stakeholders including The Hartford, Aetna, CT Department of Administrative Services (DAS), and The Hartford Courant to detail current capacity and usage of their off-street parking facilities and future parking needs. Summaries of major off-street parking facilities within the Study Area are included below.

The Hartford

The Hartford, located between Asylum Avenue, Cogswell Street, and Garden Street, currently has about 6,000 employees. The Hartford is in the process of selling its Simsbury location and 700 employees will relocate to the Hartford campus. All employees are provided a parking space for free. The Hartford has fourteen lots with approximately 2,400 parking spaces and two garages with an unconfirmed number of parking spaces. The Hartford's parking lots are identified as lot No. 16, No. 19, No. 20, No. 21, No. 22, No. 23, No. 24, No. 25, No. 26, No. 27, No. 28, No. 30, No. 31 and No. 32 and the garages No. 18 and No. 29 in Figure 2-4: Off-Street Parking Facilities Map. The Hartford leases lot No. 33, off Farmington Avenue and west of Asylum Avenue, to Bank of America and the Junior Achievement of Southwest New England on a long-term lease. The Hartford leases lot No. 21 (The Hartford's North Transportation Lot) from Spruce Reality, LLC. Utilization data on lot No. 21 was collected on Tuesday, June 24, 2014 with the lot approximately 49% utilized.

The Hartford feels they may have significant needs for future parking though they have no set plans defined to increase parking at this time.

Aetna

Aetna is located between Farmington Avenue, Broad Street, and Sigourney Street. The company estimates 4,500 employees travel by car to the campus and utilize on-campus parking. In addition, the company receives about 180 visitors per day. Aetna has a progressive parking policy – employees must pay for a parking spot. Those who choose to use transit are provided a stipend, which has resulted in increased participation in transit programs. Despite this, Aetna has more employees who pay for a parking spot than they have parking spots. They oversell parking spots and operate them on a first come first serve basis. Aetna has not had any complaints or concerns raised from their employees regarding parking, as they estimate that on any given day a certain number of employees are not on campus due to flex work schedules, paid sick leave or paid time off. Their garages and "primary" surface lots are 100% utilized, and employees pay a premium for these closer parking spots. Remote surface lots are less utilized, at approximately 80% on any given day.

Aetna has three parking garages - the Sigourney Street garage with 1,650 spaces, Flower Street garage with 1,150 spaces, and the Atrium underground garage with 212 spaces. All of their garages provide two electric vehicle spaces. Aetna's three garages are identified as lot/garage No. 43, No. 45 and No. 48 respectively, in Figure 2-4, previous.

Aetna also has ten surface parking lots that provide approximately 1,820 employee and visitor spaces. These lots are identified as lots No. 44, No. 46, No. 47, No. 49, No. 50, No. 51, No. 52 and No. 53, in Figure 2-4, previous.

Lot No. 53, located beneath I-84 is a mixed lease/owner lot with partial ownership to the Connecticut Department of Transportation (CTDOT), the City of Hartford, and Aetna. Of 1,100 parking spaces, Aetna owns approximately 375 of them with the remaining 725 located within the CTDOT right-of-way for I-84 or the City of Hartford right-of-way for the Park River Conduit. The lease with CTDOT is a 20 year lease that was signed in 1995 and expires on February 28, 2015 with four rights to renew - (2) 5 year renewals and (2) 10 year renewals that ultimately expire in 2045. There is a 180-day termination clause for either party to terminate the lease at any point for any reason.

The Woodbine Lot (No. 67), off Laurel Street and south of Capitol Avenue, is leased to the State of Connecticut. The lot is leased for three calendar years with an option to extend for one year then an option to extend for 6 months. The Office of the Attorney General (OAG) signed the lease on March 6, 2012.

Aetna has commented that their parking needs are currently met sufficiently, though their future parking needs may increase.

CT Department of Administrative Services (DAS)

According to DAS, 1,200 state employees are located in the Capitol Avenue complex (located on the north side of Capitol Avenue, from Columbia Street to Babcock Street) and another 1,400 employees are located in the 25 Sigourney Street building. The State intends to move all 1,400 employees from the Sigourney Street building to two separate locations in Hartford by 2016 with no plans to re-populate the building. The Sigourney Street building, owned by the State, needs significant work as it has been designated a "sick" building. The State will determine whether to attempt to rehabilitate or sell this property within the next one to two years. The parking structure at the Sigourney Street location, with a total capacity of 910 spaces, is also in poor condition. The lower section of the garage, which connects the garage to the adjacent building, has been closed indefinitely, rendering 863 spaces inaccessible. The State will determine whether the garage will be demolished.

The State is required per union contract to provide one parking spot per employee. The State (not including CTDOT owned lots) owns or partially owns three parking garages and nine parking lots within the Study Area. Three surface lots are located partially within the I-84 right-of-way. The State leases the sections below I-84 from CTDOT. These lots are located between Flower Street and Sigourney Street; between Sigourney Street and Laurel Street; and on the corner of Forest Street and Capitol Avenue (beneath the Interchange 46 (Sisson Avenue) ramps). The combined parking capacity currently used by DAS is approximately 3,600 spaces at locations within the Study Area. Surface lots are identified as lots No. 64, No. 65, No. 66, No. 69, No. 70, No. 73, No. 75, No. 84 and No. 87; the garages are No. 40, No. 41, and No. 68 in Figure 2-4, page 2-8.

The State also currently leases a parking lot from Aetna, (Woodbine Lot, No. 67, with a capacity of 667 spaces) located off Laurel Street south of Capitol Avenue. The lot is leased for three calendar years with an option to extend for one year then an option to extend for 6 months. The OAG signed the lease on March 6, 2012. Including parking lots leased to Aetna, the State-owned parking capacity within the Study Area is approximately 5,000 spaces, not including the closed section of the garage at 25 Sigourney Street.

State employees are provided shuttles between parking lots and State offices. DAS indicated that the State would lose approximately 1,000 parking spaces if the I-84 were lowered to grade. Generally, DAS owned and operated lots are fully utilized (see I-84 Surface Parking Lot Parking Garages Inventory Appendix, located in Appendix A.3.2). Based on current and future parking needs, this loss would negatively affect their parking needs.

The Hartford Courant

The Hartford Courant, the State's most widely distributed newspaper, is located at 285 Broad Street. Employees park in a parking lot to the west of the building, off of Flower Street (Lot No. 72) which provides 410 parking spaces. Approximately 60 of the parking spaces are in a parcel leased from Amtrak underneath I-84. There is no current signed lease between Amtrak and the Hartford Courant. The past lease ended in 2012 and due to the construction of the *CTfastrak*, the lease was not renewed. Amtrak has plans to restart negotiations with the Courant later this year. The Courant has already lost several spaces to *CTfastrak*, and is interested in the possibility of having a garage built. These parking lots are identified as lots No. 71 and No. 72 in Figure 2-4, page 2-8.

The Hartford Courant estimates utilization of lot No. 72 to be between 63% and 73% during working hours, Monday through Friday, 8:00 AM to 5:00 PM. Lot No. 71 is approximately 36% utilized during working hours.

Union Station

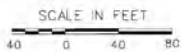
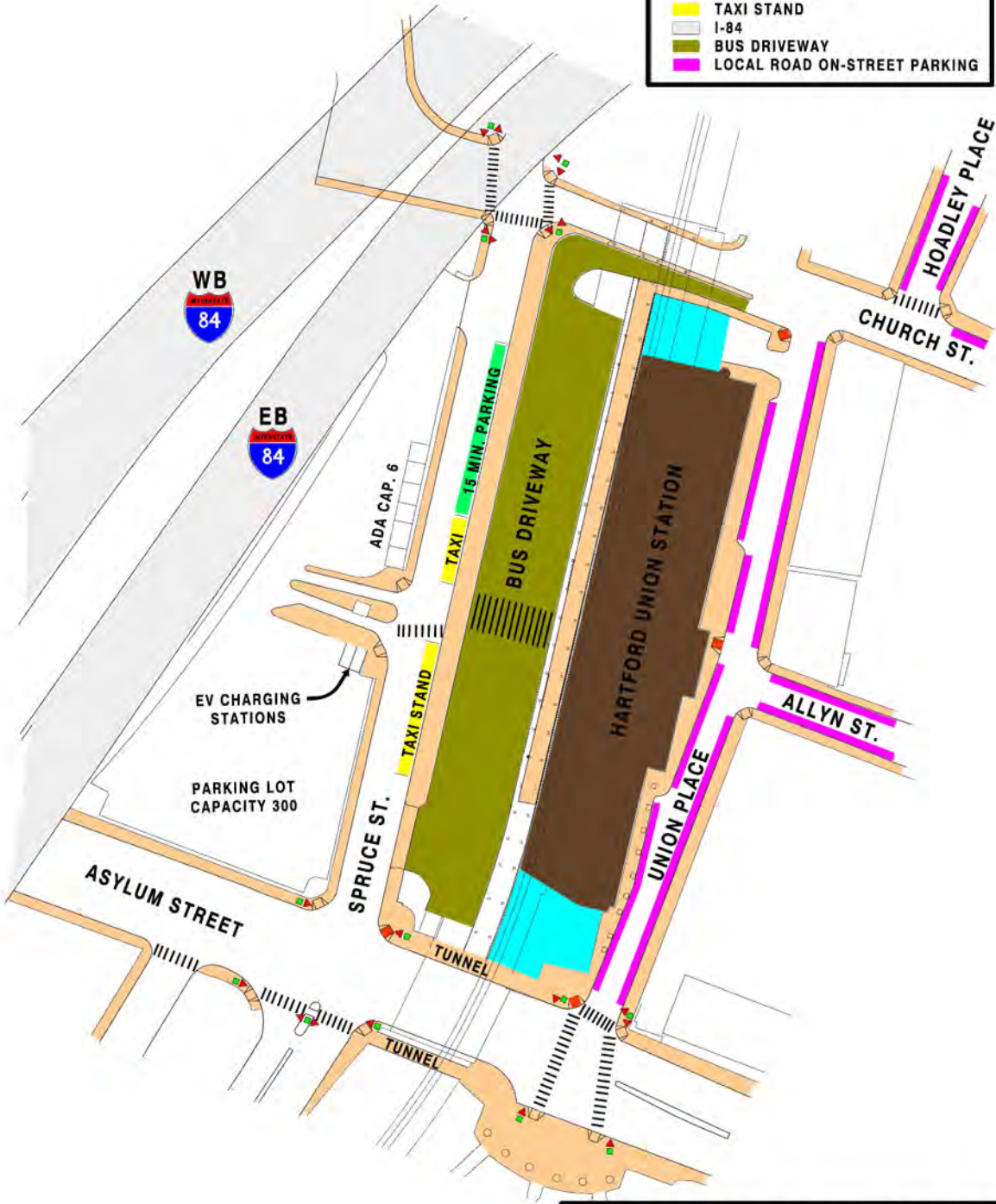
Hartford's Union Station is located on at 1 Union Place, between Asylum and Church Streets. The historic Union Station is served by Amtrak's Hartford line. In addition to rail service, the station serves as a local transportation hub, serving inter-city, regional and local buses, including *CTfastrak* bus rapid transit service (BRT), which opened on March 28, 2015. Existing services will be augmented with the introduction of commuter rail service on the Hartford Line. For further information on these transportation modes see Section 2.1.4: Bus Transportation and Section 2.1.5: Rail Transportation.

The parking lot adjacent to Union Station was inventoried for parking capacity, ingress and egress off Spruce Street, passenger drop-off and pick-up operations, and pedestrian walkways. Figure 2-5, following, illustrates different on-street and off-street parking amenities at the station.

The Union Station lot is owned by the Connecticut Department of Transportation (CTDOT) as part of the I-84 right-of-way. It is leased by the Greater Hartford Transit District (GHTD) and operated by Pro Park.

LEGEND

- PUSH BUTTON
- VISUAL SIGNAL
- RAMP WITH TACTILE STRIP
- RAMP
- CROSSWALK
- EMPLOYEE PARKING
- 15 MIN. PARKING
- SIDEWALKS
- TAXI STAND
- I-84
- BUS DRIVEWAY
- LOCAL ROAD ON-STREET PARKING



	The I-84 Hartford Project
Union Station Parking Map	
Date: 4/11/2014	Drawn By: Parsons Brinckerhoff
Figure 2-5	

There is a 40-year lease agreement that expires on January 1, 2022. There are (2) 20 year renewals options after the 2022 expiration. There is no early termination clause.

This lot also has two free electric vehicle spaces available, sponsored by the GHTD. These are the only known public electric spaces throughout the Study Area. According to the GHTD, the parking lot is consistently filled to capacity. On Tuesday, June 24, 2014 at 9:50 AM, utilization data was collected with the lot approximately 57% utilized.

A more detailed report, the *NW Corridor Transit Planning Project: Part 2 – Union Station Planning Final Report*,² completed for the Capitol Region Council of Governments (CRCOG) in April 2010, identifies existing conditions at and around Union Station. Parking information from that report has been included in Appendix A.3.2.

On-Street Curbside Parking

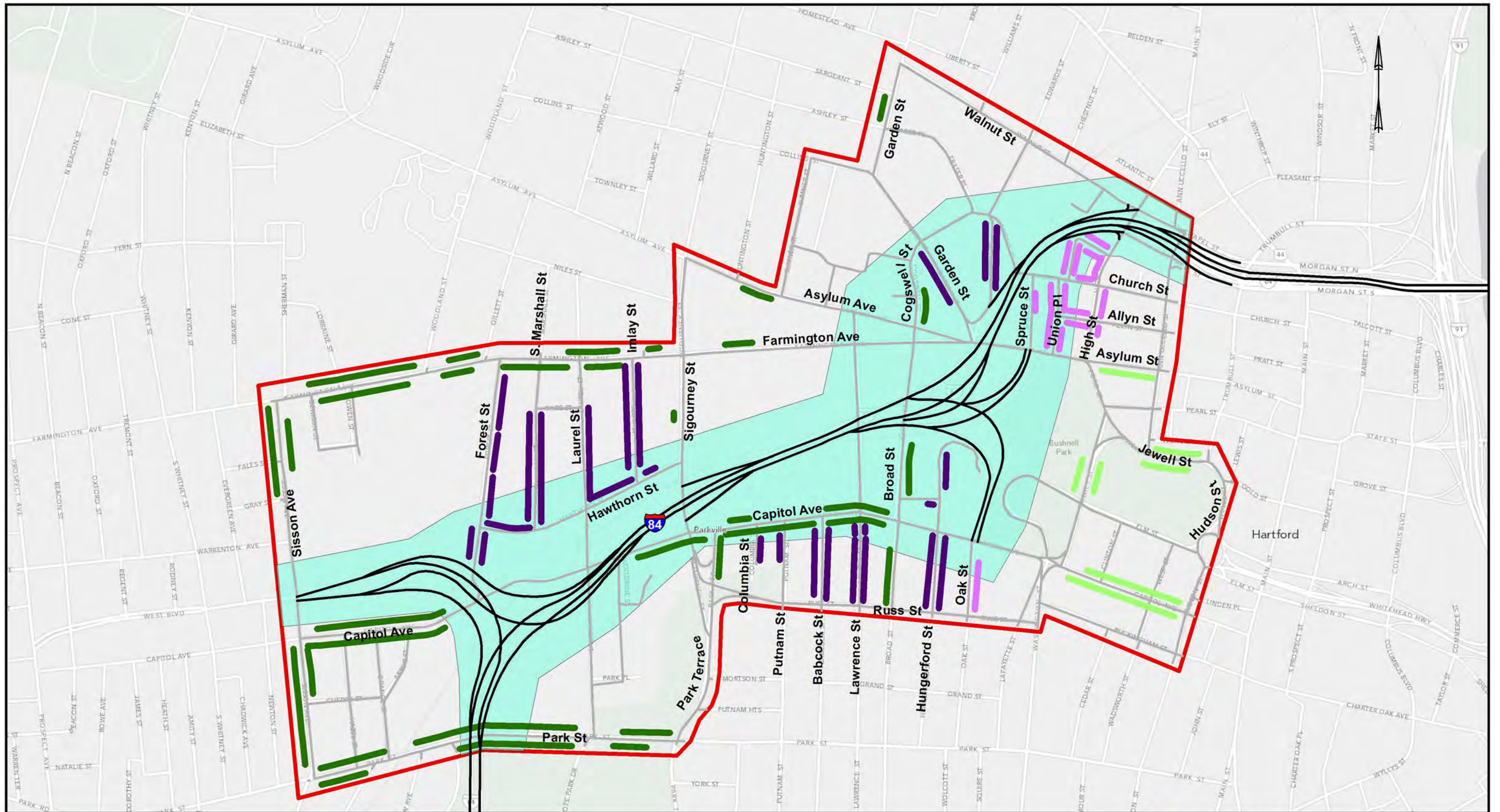
On-Street parking within the Study Area was evaluated and documented via aerial photo survey, field reconnaissance, and coordination with the City of Hartford conducted from 2013 up to the publication of this report. According to the Hartford Parking Authority (HPA), there are approximately 1,800 metered parking spaces throughout the City. Of these, 248 spaces are located within the Study Area. Locations of metered spaces are High Street, Church Street, Union Place, Spruce Street, Hadley Place/Foot Guard Place, Allyn Street, Asylum Street, Jewell Street, Capitol Avenue, Oak Street, and Trinity Street. These locations are illustrated on Figure 2-6, following.

The majority of metered spaces throughout the Study Area are part of the Pay to Park system, with approximately 192 spaces. Pay to Park is a solar powered pay station that allows a motorist to pay via credit/debit card, cash or coin, for an amount of time specified by the user. Parking is limited to two-hour windows. A paper receipt is printed that is to be mounted on the motorist's windshield dashboard. Motorists may move their vehicles and re-park at any location with a Pay to Park station as long as it is within the purchased time limit. Motorists are required to pay meters Monday through Friday, 8:00 AM to 6:00 PM, except on holidays. The minimum purchase for parking is twenty-five cents for fifteen minutes. On-street parking in Hartford is free after 6:00 PM on weekdays and all day on weekends unless otherwise noted.

Two locations within the Study Area operate coin operated meters. One location is Jewell Street adjacent to Bushnell Park with 16 metered spaces. The second location is on Hadley Place/Foot Guard Place, bordered by High Street and Church Street. This location has 40 metered spaces. The cost to park at coin-operated meters is twenty-five cents for fifteen minutes and is limited to two-hour windows.

All on-street parking throughout the Study Area is parallel in configuration. In general, the HPA does not delineate individual on-street curbside parking spaces and is in the process of eliminating all previously delineated on-street parking spaces whenever possible. Instead, the City allows motorists to park their

² http://www.crcog.org/transportation/current_stud/northwest.html



LEGEND

- Arterial Road Parking
- Local Road Parking
- Local Road Metered Parking
- Arterial Road Metered Parking
- I-84
- Roads
- Parking, Bicycle and Pedestrian Accessibility Study Area
- Project Study Corridor

0 500 1,000 Feet

Sources of Data: ESRI, DeLorme, NAVTEQ

The I-84 Hartford Project

On-Street Curbside Parking Map

Date: 10/13/2014	Drawn By: Parsons Brinckerhoff	Figure 2-6
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vehicles in designated parking areas. Some of the designated parking areas may be as long as the entire block. As individual spaces for on-street curbside parking are not delineated, it was necessary to estimate the number of parking spaces available throughout the Study Area.

On-street parking was first identified through field observations taken throughout the Study Area. Once on-street parking was identified, segments of allowable parking were digitized and measured utilizing aerial photographs in ArcGIS and in Google Earth Street View. Using the length of individual segments of allowable curbside parking and 23 feet of curb space per vehicle (per the ITE Manual of Traffic Engineering Studies), an estimated number of equivalent parking spaces was determined. The following State Statutes or assumptions about prohibited parking areas were incorporated:

- Ingress and egress access points of parking lots and driveways
- 10 feet from a fire hydrant (2005 CT Code - Sec.14-251. Parking vehicles)
- 25 feet from a marked intersection crosswalk (2005 CT Code - Sec. 14-251. Parking vehicles)
- 25 feet from a stop sign (2005 CT Code - Sec. 14-251. Parking vehicles)

There are an estimated 620 on-street parking spaces located on arterial roads and 599 on-street parking spaces on local roads within the Study Area. Hours and days of restricted parking are identified in the Appendix A.3.2.

Parking on Capitol Avenue within the Study Area is prohibited on weekdays between the hours of 7 AM and 9 AM and 3:30 PM and 6 PM. For the remainder of the day, Capitol Avenue uses the curbside travel lane for parking in both directions. When the parking prohibition is in effect, this travel lane is available for peak period travel demand. Additionally, several local streets have daily alternating one-side parking in effect. For a full illustration of on-street parking restrictions, see Appendix A.3.2.

On-Street Parking Utilization

Field observations were taken on two weekdays and one weekend day during a non-holiday week to estimate on-street curbside parking utilization. Adjacent land use and parking restrictions were taken into consideration when determining the time of day for data collection. The results of the data collection are presented in full in Appendix A.3.2.

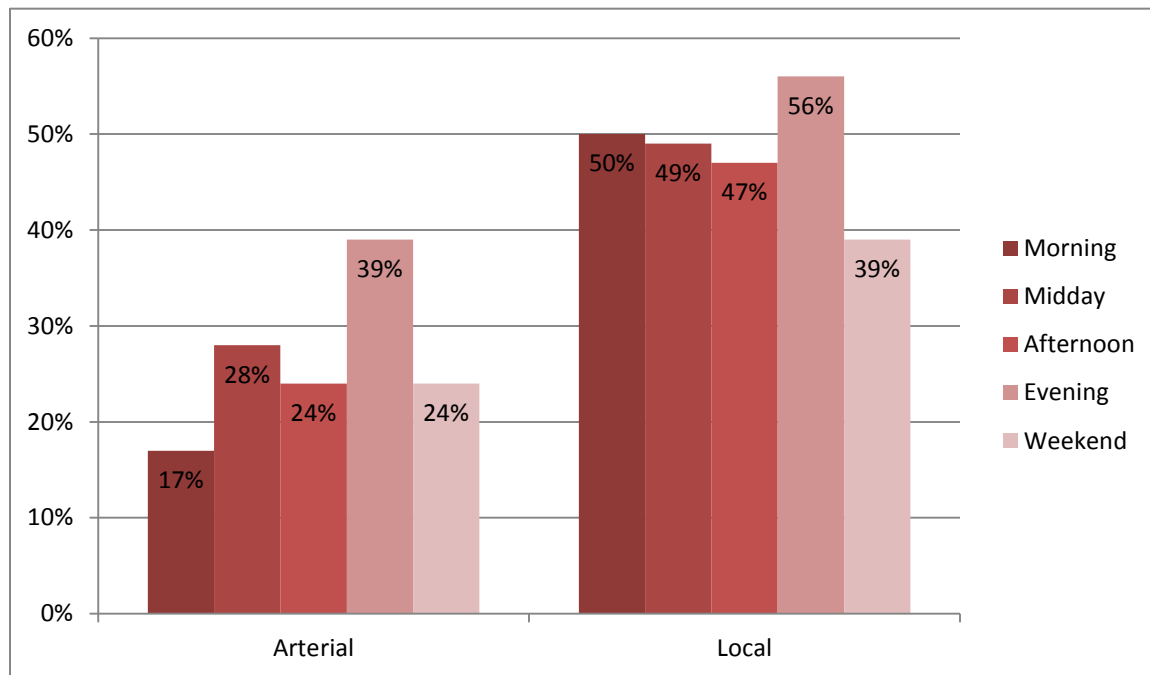
All parked vehicles were counted in two separate data collection periods: arterial road parking data was collected in October 2013 and local road parking data was collected in January 2014. In both periods, data was collected on two weekdays, one weeknight, and one weekend day. Utilization rates were calculated by dividing parking counts by the estimated parking capacities for each local and arterial road. Utilization rates are presented in Appendix A.3.2. As the capacity of each segment is calculated by dividing the overall segment length by 23 feet per ITE standards, some segments were calculated as over 100% utilized when the number of vehicles parked exceeded the theoretical capacity.

The average highest on-street parking utilization rates for arterial streets throughout the Study Area occurred during weekday evenings, between 7:00 PM and 8:00 PM, at thirty-eight percent. The average

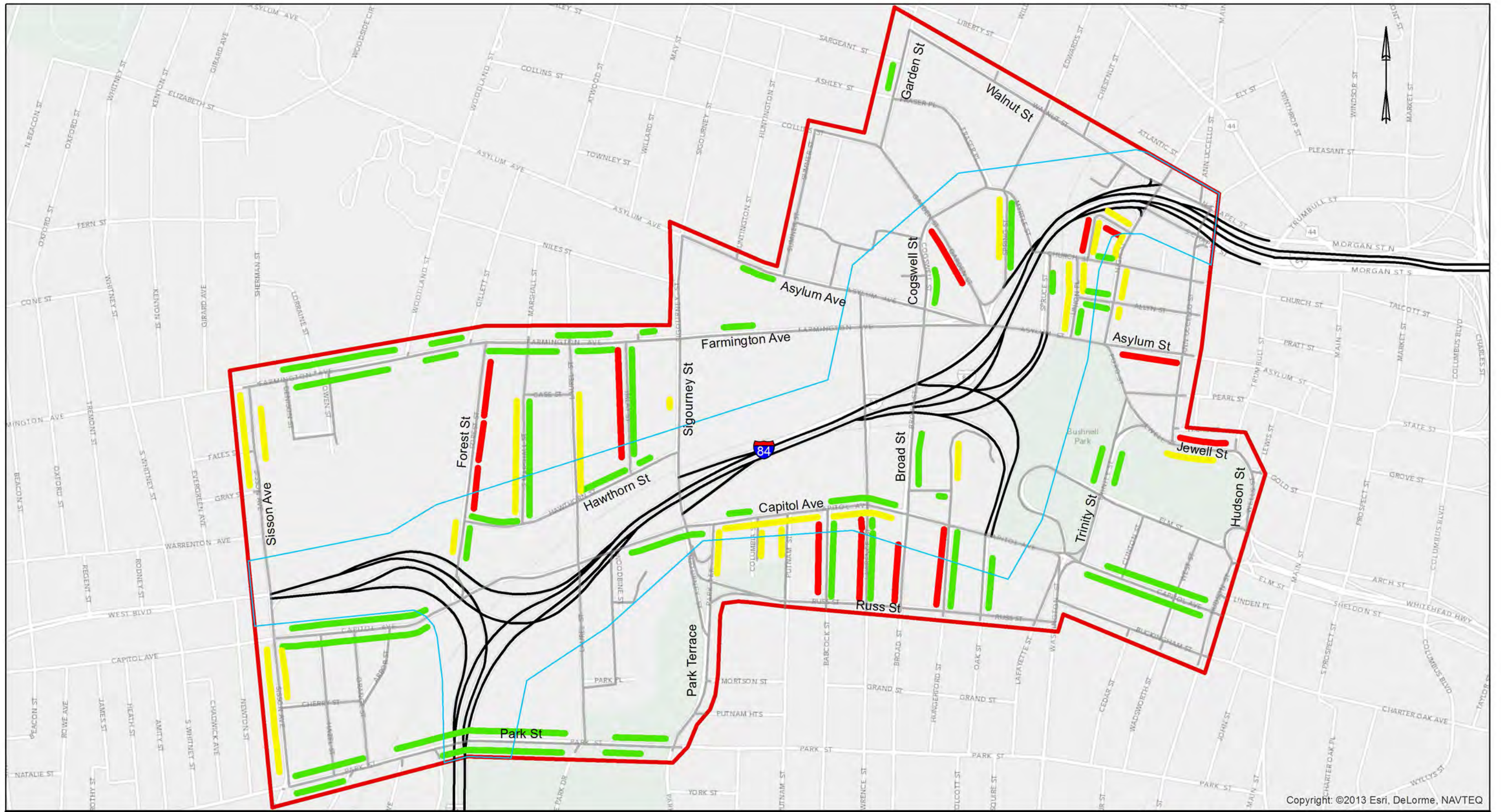
lowest on-street parking utilization rates for arterial streets throughout the Study Area occurred during weekday mornings, between 9:00 AM and 10:00 AM, at seventeen percent.

The average highest on-street parking utilization rates for local roads throughout the Study Area occurred weekday evenings, between 7:00 PM and 8:00 PM, at fifty-six percent. The average lowest on-street parking utilization rates for local roads throughout the Study Area occurred weekend afternoons, between 1:00 PM and 2:00 PM, at thirty-eight percent. Average utilization rates for on-street curbside parking are presented in Figure 2-7, below. Alternate side parking is not accounted for on the six local streets with alternate side parking schemes.

Figure 2-7: Average Utilization of On-Street Curbside Parking



On-street parking utilization is illustrated within the Parking, Bicycle, and Pedestrian Accessibility Study Area in Figure 2-8, following. Four locations within the study area were near capacity with higher than average parking utilizations at/near 90%, and six additional locations had high parking utilization rates at/near 66%. See Table 2.1.3-1 and 2.1.3-3 in Appendix A.3.2 for parking utilization rates in the Study Area. The four locations near capacity are the southwest side of Garden Street (100% utilization), the west side of Babcock Street (100% utilization), the east side of Forest Street (99% utilization), and the west side of Hungerford Street (91% utilization). The six other locations with high parking utilization rates are: the west side of Lawrence Street (87% utilization), the west side of Broad Street (77% utilization), the west side of Imlay Street (73% utilization), the north side of Jewell Street (73% utilization), the south side of Asylum Street (73% utilization), and the west side of Hoadley Place (69% utilization).



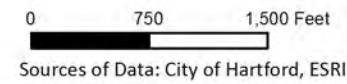
Copyright: ©2013 Esri, DeLorme, NAVTEQ

LEGEND

On-Street Parking Utilization

- █ Low (Under 33%)
- █ Medium (Between 33% and 66%)
- █ High (Over 66%)

- Road
- I-84
- Parking, Bicycle and Pedestrian Accessibility Study Area
- Project Study Corridor



The I-84 Hartford Project

On-Street Parking Utilization Map

Date: 10/13/2014

Drawn By:
Parsons Brinckerhoff

Figure 2-8

2.1.4 Bus Transportation

The Project Study Corridor is served by several different types of bus service. Local buses making frequent stops operate on city streets, crossing I-84 at several points. Commuter buses operate as express services to downtown from suburban park and ride locations. Some of the commuter routes operate on I-84 while others cross I-84 on city streets near Downtown. *CTfastrak* bus rapid transit service began operation on March 28, 2015 on a dedicated guideway into downtown which parallels I-84. Several private intercity carriers operate along I-84 through Hartford, stopping at Hartford Union Station. Paratransit service for people with disabilities operates throughout the Study Area.

Research included stakeholder interviews conducted during summer and fall 2013 supplemented by field visits and reviews of studies and initiatives up to the publication of this report.

Local Bus Service

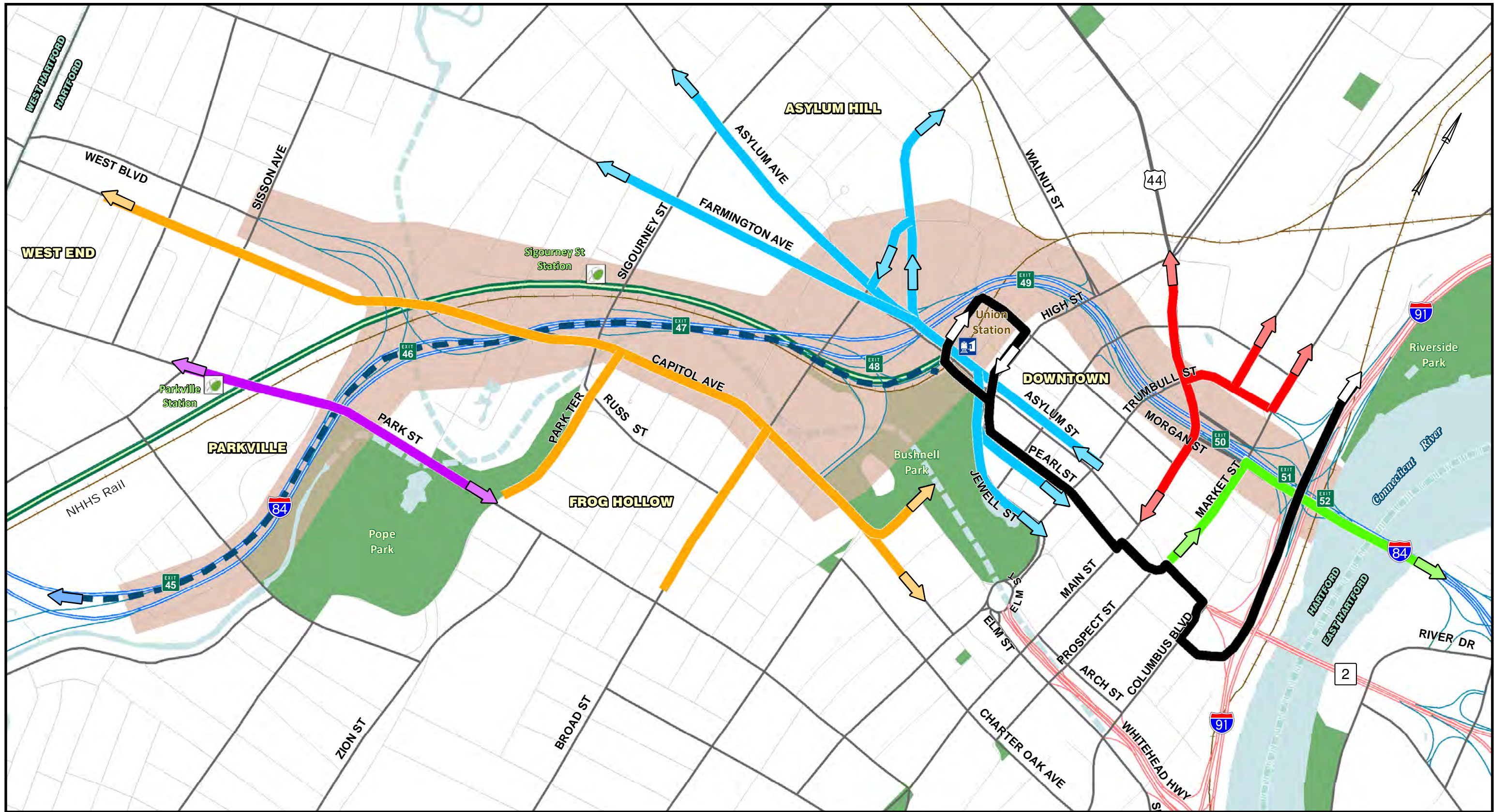
Connecticut Transit (CTTransit) is the CTDOT-owned bus service. CTTransit Hartford Division local bus service is provided through a contract operator and operates over 30 local bus routes in Hartford and in 25 other towns in the Capitol Region. The fleet of over 200 buses is garaged at CTTransit headquarters at 100 Leibert Road, less than two miles north of I-84 and Downtown Hartford.

Nearly all CTTransit Hartford Division routes serve Downtown Hartford. As a result, these routes intersect the Project Study Corridor at some point between I-91 and Hamilton Street. The routes can be grouped based on their alignment crossing I-84. These groups are illustrated on Figure 2-9: Local Bus Service Map, following. The groups (moving through the Project Study Corridor from west to east) are summarized below.

Park Street (Routes 31 and 33): These routes leave Downtown heading south on Main Street, then turn west onto Park Street into the Project Study Corridor. Both continue through the Project Study Corridor crossing I-84 on Park Street.

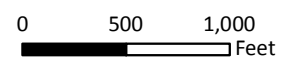
Capitol Avenue (Routes 61, 63 and 69): These routes leave Downtown heading south on Main Street, then turn west onto Capitol Avenue into the Project Study Corridor. Route 61 turns south onto Broad Street; Route 63 travels further west and turns south onto Park Terrace; Route 69 continues west through the Project Study Corridor and across I-84 along Capitol Avenue.

Asylum Street/Avenue (Routes 35, 60, 62, 64, 66, 72, 74, and 76): Outbound, these routes leave Downtown and cross I-84 along Asylum Street. Route 76 then turns north onto Garden Street. Routes 72 and 74 continue along Asylum Avenue, while Routes 60 through 64 continue along Farmington Avenue. These routes all return inbound via the same paths except that Route 76 enters the Project Study Corridor on Cogswell Street rather than Garden. Inbound, after crossing I-84 into Downtown, all of these routes turn right onto Ford Street and left onto Pearl Street. Route 35 is an express service between Downtown and Westfarms Mall via I-84 that enters and exits I-84 at Asylum Street.



LEGEND

- | | | | | |
|---|--------------------------------|-------------------------|-------------------|-------|
| Asylum Street/Avenue (Routes 35, 60, 62, 64, 66, 72, 74, and 76) | Park Street (Routes 31 and 33) | I-84 | CTfastrak | Park |
| Bradley Flyer (Route 30) | Route 35 (weekends only) | I-84 Ramp | CTfastrak Station | Water |
| Capitol Avenue (Routes 61, 63 and 69) | Project Study Corridor | Other Highway | I-84 Exit # | |
| East of the River (Routes 80, 82, 83, 84, 85, 86, 87, 88, 94, 95 and 96) | Town/City Limit | U.S. Highway/State Road | Union Station | |
| Main Street North (Routes 32, 34, 36, 38, 40, 42, 44, 46, 50, 52, 54, 56, and 58) | Park River Conduit | Major Road | | |



The I-84 Hartford Project

Local Bus Service Map

Date: 1/12/2015 Drawn By: TranSystems Figure No: 2-9

Sources of Data: City of Hartford, CT Transit

Bradley Flyer (Route 30): This route originates in the Project Study Corridor at Union Station making a clockwise loop on Asylum, Spruce, Church, and High streets. It then passes into Downtown along Asylum, Ford, and Pearl streets. It enters I-91 North traveling express to Bradley International Airport and other nearby destinations.

dash: The *dash* is a circulator route that operates in a clockwise loop in Downtown Hartford, shown in Figure 2-10, following. It serves stops in or near the Project Study Corridor just south of I-84 and makes one stop in the Project Study Corridor north of I-84. It also serves the Convention Center, Main Street area, and Bushnell Park.

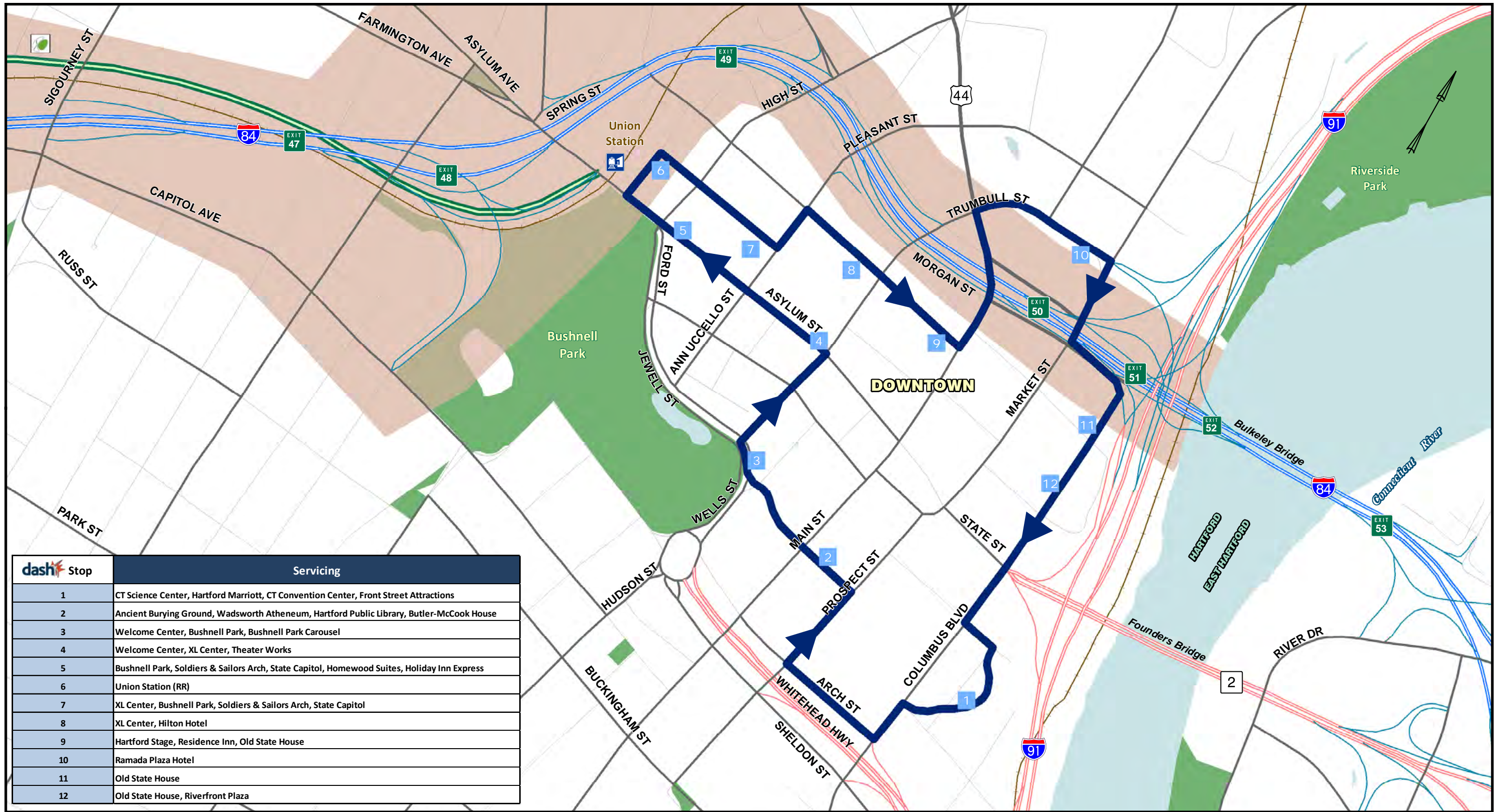
Main Street North (Routes 32, 34, 36, 38, 40, 42, 44, 46, 50, 52, 54, 56, and 58): These routes cross I-84 following Main Street, both inbound and outbound.

East of the River (Routes 80, 82, 83, 84, 85, 86, 87, 88, 94, 95 and 96): These routes touch only the eastern tip of the Project Study Corridor, and only in the outbound direction. From their Downtown terminus on Market Street, they travel north on Market Street and then east on Morgan Street entering I-84 on the ramp at the end of Morgan Street.

Other Routes: The only other routes serving Downtown all leave Downtown traveling south on Main Street and do not enter the Project Study Corridor. These include Routes 37, 39, 41, 43, 45, 47, 53, 55 and 59. Most of these routes, however, are through-routed with Main Street North Routes. Therefore, anything that impacts service on the Main Street North routes will also impact service on the Main Street South routes.

Most of the routes serving Downtown follow one of three circulation patterns in the core of Downtown Hartford. Main Street routes travel north-south along Main Street. Most routes to the north are through-routed with routes to the south. That is, the same bus will enter Downtown as a north route, keep going through Downtown and leave to the south as a south route. East of the river routes enter downtown via the Founders Bridge and make a loop along State, Market and Morgan streets before returning east on the Bulkeley Bridge (I-84). Routes from the west enter Downtown along Asylum, Ford, Jewell, and Gold streets before stopping on Main Street and returning to the west on Asylum Street.

The City of Hartford has received a U.S. Department of Transportation (USDOT) Transportation Investment Generating Economic Recovery (TIGER) grant for its Intermodal Triangle Project. The project will facilitate improvements in bus circulation for routes from the east and west by focusing on turning Pearl and Asylum streets into transit-priority streets allowing buses to be through-routed through downtown, much as the north and south routes are today. To identify specific routing changes, CRCOG recently completed the Downtown Hartford Transit Circulation and Through Routing Study. The study was a cooperative effort with the City, CRCOG, CTTransit, and CTDOT participating. The study identified east and west routes that could be through-routed and recommended that routes from the east that are not through-routed could be extended to a new local bus facility on the Union Place side of Union Station, increasing the number of local buses serving Union Station.

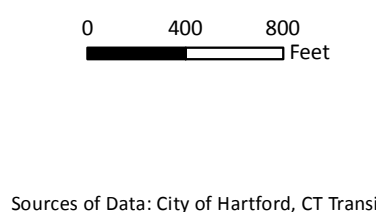


dash Stop	Servicing
1	CT Science Center, Hartford Marriott, CT Convention Center, Front Street Attractions
2	Ancient Burying Ground, Wadsworth Atheneum, Hartford Public Library, Butler-McCook House
3	Welcome Center, Bushnell Park, Bushnell Park Carousel
4	Welcome Center, XL Center, Theater Works
5	Bushnell Park, Soldiers & Sailors Arch, State Capitol, Homewood Suites, Holiday Inn Express
6	Union Station (RR)
7	XL Center, Bushnell Park, Soldiers & Sailors Arch, State Capitol
8	XL Center, Hilton Hotel
9	Hartford Stage, Residence Inn, Old State House
10	Ramada Plaza Hotel
11	Old State House
12	Old State House, Riverfront Plaza

LEGEND

- Dash Service Route
- Dash Stop
- I-84
- I-84 Ramp
- Other Highway
- U.S. Highway/State Road
- Major Road
- Railroad
- Project Corridor
- Town/City Limit
- I-84 Exit #
- Union Station
- Park River Conduit
- Park
- Water
- CTfastrak Station
- CTfastrak

dash Free downtown shuttle departs CT Convention Center every 15 minutes Monday through Friday from 7:00am to 7:00pm. Extended hours during special large events—check www.cttransit.com for details.



The I-84 Hartford Project

Dash Service Map

Date: 1/12/2015 Drawn By: TranSystems Figure No: 2-10

The base fare for local bus service, including free transfers, is \$1.30. A 90-minute pass is available for the same price. Youth fares (age 5-18) are \$1.05. Children under five ride for free. Seniors and persons with disabilities pay half fare at all times. Ten-ride tickets are available for the price of nine rides. 3-day, 5-day, 7-day and monthly passes are also available.

Service headways (the time interval between buses) on all Downtown Hartford local bus routes are shown in Table 2-3 below, presenting the grouping of routes described above.

Typical weekday ridership and performance measures on all Downtown Hartford local bus routes prior to the opening of *CTfastrak* are shown in Table 2-4, page 2-24. The three highest ridership routes all have very similar typical daily ridership (over 5,000 per day) and all cross I-84 in the Project Study Corridor. Route 60-66 travels across I-84 on Asylum Street; Route 50-54 passes over I-84 on Main Street; and Route 31-33 passes under I-84 on Park Street. Most routes operate with productivities (measured in terms of passengers per revenue-hour) of between 30 and 60, with only three routes below that range and two above. 22 of the 31 routes exceed 75% of the system average productivity, a level typically considered normal. Only one route falls below 50% of the system average, a level often considered in the industry to warrant an evaluation of options to improve performance.

The Capitol Region Council of Governments (CRCOG) is currently embarking on a Comprehensive Transit Service Analysis that will examine all local, commuter and *CTfastrak* bus service in the Capitol Region. The study will consider the performance of existing routes and identify options for service improvements. Study recommendations are not expected until late 2015 or 2016. Recommendations could include changes in bus routing and frequency, new crosstown routes and new connection points outside Downtown. Possible impacts on the Project Study Corridor could include additional routes crossing I-84 to provide service to Asylum Hill.

Table 2-3: CTTransit Hartford Division Local Routes and Headways

Route	AM	Midday	PM	Saturday	Sunday
Park Street					
31-33-Park Street	15	15	30-60	15	60
Capitol Avenue					
61-Broad Street	30	30	30	30	
63-Hillside Avenue	60	60	60	60	60
69-Capitol Avenue	60	60	60	60	
Asylum Street/Avenue					
35-Westfarms Flyer	60				60
60-66-Farmington Avenue	15	10	30-60	10	60
72-Asylum Avenue	20	30	30		
74-Granby Street	60	60	60	60	
76-Ashley Street	30	30	60	30	60

Table 2-3 (ctd.): CTTransit Hartford Division Local Routes and Headways

Route	AM	Midday	PM	Saturday	Sunday
Bradley Flyer					
30-Bradley Flyer	60	60	120	60	120
Main Street North					
32-36-Windsor Avenue	60	60	60	60	60
38-Weston Street	30	30	30	30	60
40-42-North Main Street	15-30	15	60	15	60
44-Garden Street	60	60	60	60	
46-Vine Street	20	20	30-60	20	
50-54-Blue Hills Avenue	30	15	60	15	60
56-58-Albany/Bloomfield Avenue	30	30	20-40	30	60
East of the River					
80-Buckland Flyer	60	60	60	60	
82-84-Tolland Street	60	60	60	60	60
83-Silver Lane	30	60	60	60	60
85-MCC Flyer	60	60	60		
86-Burnside Avenue-Sunset Hills	30	120	30		
87-Brewer Street	120	120	120	120	
88-Burnside Avenue-Manchester	30	30	30	30	60
94-96-Park Avenue/John Fitch Boulevard	120	40	60	40	
95-Glastonbury	60	60	60	60	
Other Downtown Routes					
37-39-New Britain Avenue	20	20	35-60	20	60
41-New Britain	30-40	35	30	35	
43-Campfield Avenue	60	60	60	60	
45-Berlin Turnpike Flyer	120	120	120	120	60
47-Franklin Avenue	30	15	60	15	60
53-55-Wethersfield Avenue/Middletown	20-40	30	25-35	30	
59-Locust Street	60	60	60	60	

Table 2-4: CTTransit Hartford Division Local Route Ridership and Performance

Route	Weekday Daily Passengers	Pass./ Hour	Pass./ Mile	Pass./ Trip
60-66	5,867	46.3	3.7	31.1
50-54	5,670	51.4	4.1	30.0
31-33	5,625	75.7	7.2	34.3
47	4,173	58.8	4.6	25.3
37-39	3,569	56.0	5.1	30.3
40-42	3,525	60.0	6.0	19.6
83	2,800	48.0	3.0	42.4
82-84	2,505	41.7	2.4	33.0
88	2,348	44.0	2.7	28.3
46	1,952	48.7	4.5	17.1
53-55	1,910	36.9	2.4	23.0
76	1,821	38.0	3.5	17.5
56-58	1,620	41.5	3.3	20.5
32-36	1,604	30.0	1.6	20.1
41	1,570	36.2	2.5	28.1
95	1,368	37.2	2.4	19.6
61	1,241	40.1	3.1	16.8
63	1,064	41.0	3.8	16.6
74	968	32.9	2.8	20.6
72	960	30.9	2.2	14.1
69	736	31.4	2.1	20.5
43	694	36.4	3.7	12.0
94-96	658	33.0	1.9	13.7
30	576	23.1	0.9	14.4
59	555	42.2	3.5	15.0
38	551	34.4	2.4	7.9
85	458	121.6	3.9	25.4
44	439	48.1	5.1	12.6
87	409	28.2	1.8	10.0
86	388	31.7	2.1	11.8
45	66	14.5	0.6	6.7

Commuter Bus Service

CTTransit commuter bus service in Hartford operates primarily in peak periods, with a few midday trips on some routes. The service is provided by a mix of operators. The CTTransit Hartford Division, operator of the local bus service, runs 12 of the 21 routes. A variety of private operators provide service on nine more routes. The 21 routes can be grouped based on their alignment crossing, entering or exiting I-84. The commuter bus routes are illustrated in Figure 2-11, following.

Asylum Street/ I-84 West Routes:

Routes 2, 9: These routes leave Downtown outbound on Asylum Street westbound and turn left onto I-84 westbound. Inbound, after exiting I-84 onto Asylum Street towards Downtown, these routes turn right onto Ford Street and left onto Pearl Street.

Routes 23 and 24: These routes operate on a loop through Downtown in the same direction morning and afternoon. Most trips pass through Asylum Hill to Downtown, exiting from I-84 eastbound to Capitol Avenue, then following Capitol Avenue westbound to Park Terrace, north on Sigourney across I-84 and east on Farmington Avenue to Asylum Avenue and across I-84 again. They then follow Ford Street and Pearl Street into Downtown turning north on Main Street and west on Morgan Street before entering I-84 westbound at Trumbull Street to begin the return trip. Some inbound trips exit I-84 directly onto Asylum Street and follow a shorter loop on Asylum, Ford, Pearl, Main and Morgan streets to I-84 westbound.

Asylum Street/Avenue West Routes:

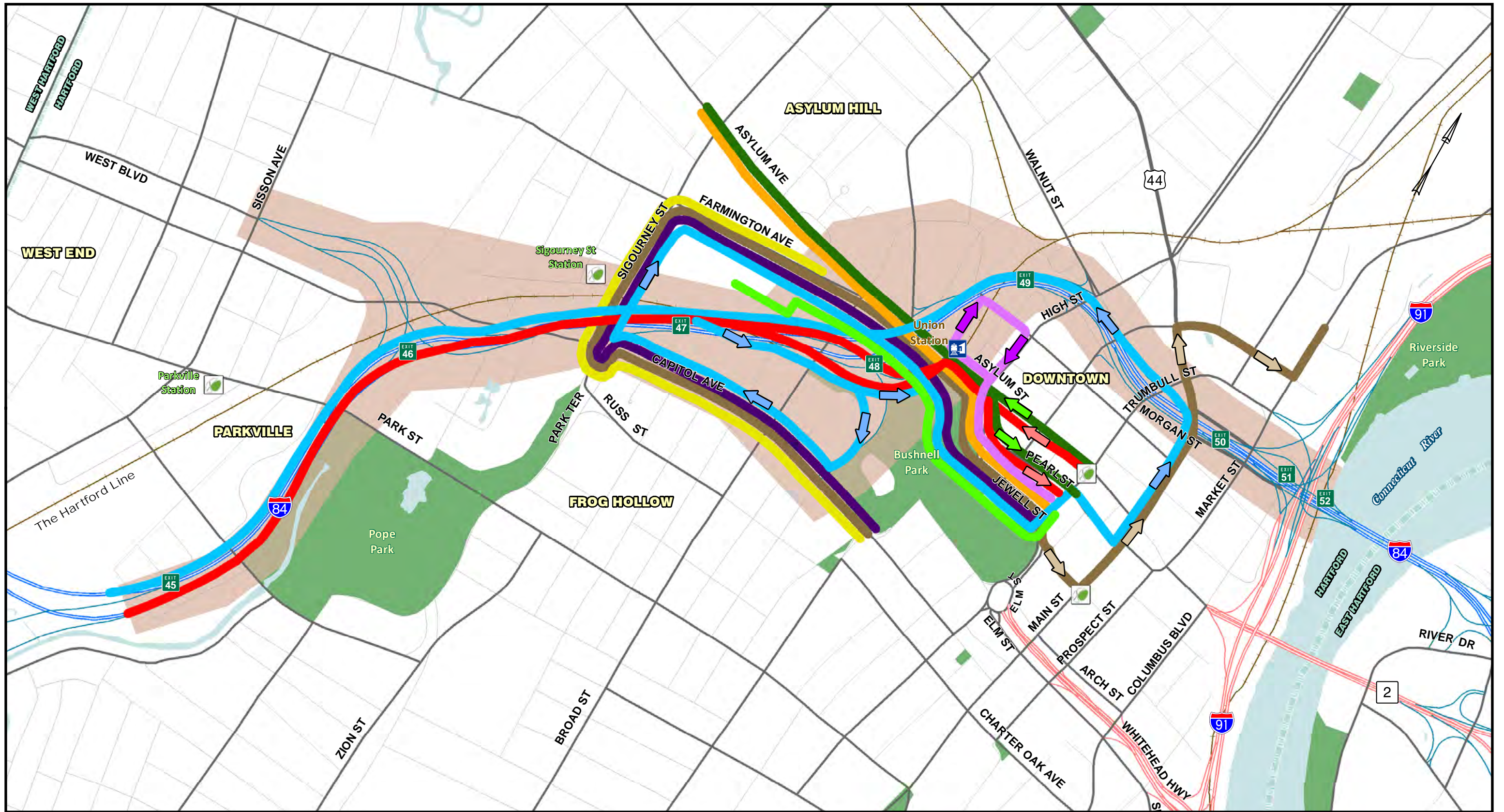
Routes 1, 11: These routes leave Downtown outbound on Asylum Street and cross I-84 continuing west along Asylum Avenue. Inbound, after crossing I-84 into Downtown, these routes turn right onto Ford Street and left onto Pearl Street.

Routes 26, 27: These routes begin outbound at the Capitol and circulate through Downtown. They then travel west on Pearl Street to Ford Street and Asylum Street crossing I-84 and continue west on Asylum Avenue. The reverse route is followed inbound.

Asylum Street/Avenue East and South Routes:

Routes 17 and 18: These routes travel east from Downtown across the Founders Bridge. Most trips do not cross the Project Study Corridor. Several trips, however, begin at Aetna in Asylum Hill and turn north onto Flower Street and east on Farmington Avenue and Asylum Avenue/Street through the Project Study Corridor, turning right onto Ford Street and left onto Pearl Street into downtown before heading east. Several morning trips also continue west through downtown on Asylum Street/Avenue to Aetna.








Route 20: This route begins in the Union Station intercity bus terminal, exiting to Church and High Streets and following Ford Street to Pearl Street to pass through downtown before heading south on I-91. Inbound it follows Pearl Street to Ford Street, then Asylum and Spruce streets into the station. It serves the Project Study Corridor at Union Station, but does not actually cross I-84.

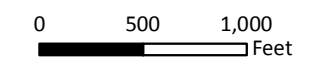


LEGEND

Commuter Bus Routes

- | | |
|--|--|
| █ 17, 18 | █ 23, 24 |
| █ 1, 11 | █ 26, 27 |
| █ 19 | █ Free Commuter Shuttle (3, 4, 6, 7, 10, 14), 21 |
| █ 2, 9 | █ Free Commuter Shuttle (5, 15) |
| █ 20 | |

- | | |
|---|---|
|  Railroad |  I-84 Exit # |
|  Project Study Corridor |  Union Station |
|  Town/City Limit |  Park |
| |  Water |



Sources of Data: City of Hartford, ESRI
<http://www.ctfastrak.com/>

 **The I-84 Hartford Project**

Commuter Bus Service

Date: 7/17/2015

Drawn By: TranSystems

Figure No: 2-11

Sigourney Street and Asylum Avenue/Street:

Routes 3, 4, 6, 7, 10, and 14: These routes travel east outbound from Downtown across the Founders Bridge or south from Downtown on I-91. Some outbound trips originate Downtown and do not cross the Project Study Corridor. Several trips, however, provide the service known as the “Free Commuter Shuttle”. These trips begin at the Capitol and follow Capitol Avenue westbound to Park Terrace, turning north on Sigourney Street across I-84, east on Farmington Avenue and Asylum Avenue, crossing I-84 again into Downtown, then turning right on Ford Street and left on Pearl Street. Inbound trips follow the exact same route in the opposite direction.

Routes 5 and 15: These routes cross I-84 following Main Street outbound and Market Street inbound. Several trips, however, provide service on the “Free Commuter Shuttle” following the route described above.

Route 21: This route begins outbound at the Capitol and follows Capitol Avenue westbound to Park Terrace, turning north on Sigourney Street across I-84, east on Farmington Avenue and Asylum Avenue, crossing I-84 again into Downtown, then turning right on Ford Street and left on Pearl Street before passing through downtown and heading south on I-91. Inbound trips follow the exact same route in the opposite direction.

Sigourney Street Only:

Route 19: This route begins outbound in Asylum Hill at Farmington Avenue and Flower Street and travels west on Farmington Avenue, turning right on Sigourney Street across I-84, left on Park Terrace, right on Capitol Avenue and left on Trinity Street before passing through Downtown and south on I-91. Inbound trips follow the exact same route in the opposite direction.

Table 2-5, following, shows the volume of commuter buses passing three key locations in the Project Study Corridor: Asylum Street at Hartford Union Station, Sigourney Street at I-84, and Main Street/Market Street at I-84. The volume on Asylum Street crossing I-84 would be slightly less than that at Hartford Union Station since Routes 2 and 9 and some trips on Route 23 turn onto or off the I-84 ramps between Hartford Union Station and the I-84 viaduct. The table shows bus volumes by time period. AM is generally 6-9 AM, midday is noon to 3 PM, and PM is 3-7 PM.

Table 2-5: Commuter Route Weekday Trips at Key Locations

Route	AM		Midday		PM	
	East	West	East	West	East	West
Asylum at Union Station						
Free Commuter Shuttle*		34	3		32	
1	6			1		5
2	6					6
9	2					2
11	7			1		9
17		4	1		6	
18		5	1		5	
20		3			3	
21		4	1		4	
23	7		1		7	
24	4				4	
26	2					2
27	2					2
Total	36	50	7	2	61	26
Sigourney Street at I-84	North	South	North	South	North	South
Free Commuter Shuttle*		34	3		32	
19	2					2
21		4	1		4	
23	3		1		5	
24	4				4	
Total	9	38	5	0	45	2
Main Northbound/Market Southbound at I-84	North	South	North	South	North	South
5		17	1		20	
15		3	1		4	
23	7		1		7	
24	4				4	
Total	11	20	3	0	35	0

* Includes some buses on Routes 3, 4, 5, 6, 7, 10, 14, and 15

As can be seen from the above descriptions, there are many different circulation patterns for the 21 commuter routes. In general most commuter routes travel east-west through Downtown. Outbound service either travels west through Downtown to I-84 or Asylum Avenue, or east through Downtown to Main Street north, the Founders Bridge east or I-91 south. Inbound service does the reverse. All routes use Pearl Street when traveling east through downtown, while service going west is split between Asylum Street and Pearl Street. Generally, CTTransit Hartford Division routes (Routes 1-15) use Asylum Street westbound while the other routes use Pearl Street.

As part of the planning for the City of Hartford's Intermodal Triangle Project, CRCOG's Downtown Hartford Transit Circulation and Through Routing Study recommended that all commuter service also be consolidated along the improved Pearl Street, along with the local buses, leaving *CTfastrak* and local service on Asylum Street.

Typical weekday ridership and performance measures on Hartford commuter bus routes operated by CTTransit Hartford Division prior to the opening of *CTfastrak* are shown in Table 2-6, below. The other private operators do not provide ridership data.

Commuter bus service operates on a zonal fare structure. Single ride fares range from \$2.35 to \$4.45. Children under the age of five ride for free but there are no discounted youth fares. Seniors and persons with disabilities pay just under half fare at all times. Ten ride tickets are available for the price of nine rides. Monthly passes are also available.

Table 2-6: CTTransit Hartford Division Commuter Route Ridership and Performance

Route	Passengers	Pass./ Hour	Pass./ Mile	Pass./ Trip
5	887	25.7	0.8	15.0
3	702	69.1	2.2	17.1
14	429	26.0	0.6	14.8
11	332	17.1	0.8	13.8
6	263	23.9	0.7	9.8
1	255	17.6	0.9	12.8
4	241	33.3	1.4	12.1
10	201	29.1	1.2	16.8
2	154	22.5	0.9	9.1
7	85	26.6	1.0	8.6
9	83	24.7	1.0	13.8
15	61	27.7	1.2	10.2

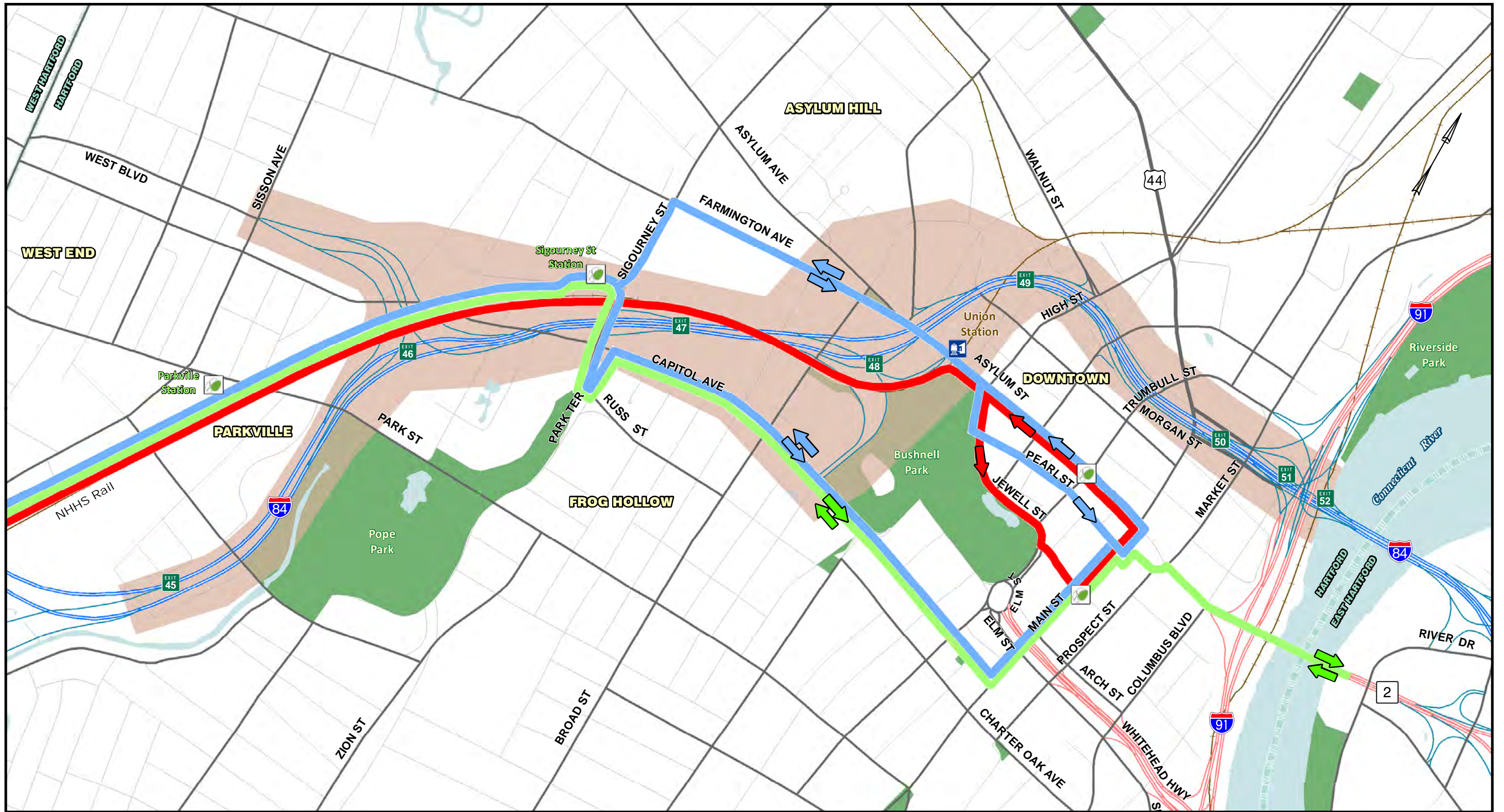
CTfastrak

CTfastrak is a new bus rapid transit (BRT) system that initiated service on March 28, 2015. The system utilizes a 9.4-mile dedicated guideway between New Britain and Hartford and also provides service beyond the guideway and across the river to East Hartford and Manchester. Several new routes have been created to provide a transfer-free, one-seat ride to popular destinations throughout the region. With connections to local and express bus routes as well as the interstate rail system, travelers are able to get to destinations throughout the central Connecticut region and beyond. *CTfastrak* has ten dedicated stations along the guideway and stops throughout downtown, including Union Station. The guideway is immediately adjacent to, and passes under, I-84 between Sigourney Street and the terminus of the guideway at Asylum Street. Three stations are within the Project Study Corridor: the downtown stop at Hartford Union Station (on Asylum Street) and the stations at Sigourney Street and Park Street. In addition to the stations, some *CTfastrak* routes to exit the guideway and provide service to stops in downtown, Asylum Hill, and south to Hartford Hospital in the South Green neighborhood.

CTfastrak provides frequent, daily service from approximately 4:00 AM to 1:00 AM, with beginning and end times varying by route. *CTfastrak* has twelve routes following different routing patterns through the Study Area. The routes are categorized by function: Local, Shuttle, and Express. These routes and patterns are illustrated on Figure 2-12, following.

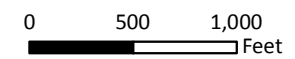
CTfastrak Local Routes: The four local routes are 101-Hartford/New Britain, 102-Hartford/New Britain-Bristol, 121-Manchester Community College/Hartford/UConn Health Center, and 128-Hartford/Westfarms-New Britain via Stanley Street. Three (101, 102, and 128) of the four all-day local routes in the morning exit the guideway at Sigourney Street Station, travel east on Hawthorn Street, and turn left on Sigourney Street and right on Farmington Avenue before continuing across I-84 into downtown via Asylum Street. These routes loop through Downtown returning to the Project Study Corridor via Capitol Avenue before turning right onto Sigourney Street across I-84 and left on Hawthorn before re-entering the guideway. In the afternoon, this loop is reversed. The 121-Manchester Community College/Hartford/UConn Health Center route exits the guideway at Sigourney Street Station, travels east on Hawthorn Street, and turns right on Sigourney Street across I-84, turns left on Park Terrace, and right onto Capitol Avenue to head into Downtown. Once Downtown the 121 turns left on Main Street, then right onto Central Row and a left on Market Street, then a right onto Morgan Street and over the Bulkeley Bridge into East Hartford and on to Manchester. On the return trip, the 121 takes the Founders Bridge back into Hartford, following State Street to turn left onto Main Street and continues back to Capitol Avenue.

CTfastrak Shuttle Routes: There are four shuttle routes: 140-Central Connecticut State University (CCSU) Shuttle, 144-Wethersfield/Westfarms via Newington Center & Brittany Farms, 153-Flatbush/Copaco via West Hartford Center, and 161-St. Francis Hospital/Hartford Hospital via State Capitol. Both the 140 and the 161 are high frequency routes at 15 minute headways in the peak. The 140, 144, and 153 serve as feeder services to local *CTfastrak* stations outside of the Project Study Corridor. The 161 carries passengers between St. Francis Hospital, Downtown, and the Hartford



LEGEND

- CTfastrak Station/Stop
- CTfastrak Express and Local
- CTfastrak Shuttle and Local
- Railroad
- Project Study Corridor
- Town/City Limit
- I-84 Exit #
- Union Station
- Park
- Water



Sources of Data: City of Hartford, ESRI
<http://www.ctfastrak.com/>

The I-84 Hartford Project

CTfastrak Service Map within Hartford

Date: 1/12/2015

Drawn By: TranSystems

Figure No: 2-12

Hospital. Beginning at St. Francis Hospital, the 161 travels down Ashley Street, taking a right onto Sigourney Street, and then left from Park Terrace onto Capitol Avenue, a right onto Washington Street and turns right on Jefferson Street and circles around Hartford Hospital to come back up Washington Street. On the return trip from Sigourney Street, the 161 turns left onto Asylum Avenue and a right onto Woodland Avenue to reach St. Francis Hospital.

CTfastrak Express Routes: The four express routes are 923-Bristol Express, 924-Southington-Cheshire Express, 925-Waterbury Express, and 928-Southington-Cheshire-Waterbury Express. These four routes follow the same loop as the local routes after Sigourney Street Station.

Weekday headways for each route are shown in Table 2-7, below. Saturday daytime headways are the same as the weekday midday headways, while Sunday headways are the same as evening headways (except where noted).

Table 2-7: CTfastrak Routes and Weekday Headways

CTfastrak Routes	Peak Headway	Midday Headway	Evening Headway
Local Routes			
101-Hartford/New Britain*	7-8	12	20
102-Hartford/New Britain-Bristol	30	60	60
121-Manchester Community College/Hartford/UConn Health Center	20	30	60
128-Hartford/Westfarms-New Britain via Stanley Street	20	30	60
Shuttle Routes			
140-Central Connecticut State University (CCSU) Shuttle,	15	20	30
144-Wethersfield/Westfarms via Newington Center & Brittany Farms	60	60	60
153-Flatbush/Copaco via West Hartford Center	60	60	60
161-St. Francis Hospital/Hartford Hospital via State Capitol	15	20	30
Express Routes			
923-Bristol Express	20	120	N/A
924-Southington-Cheshire Express	30	N/A	N/A
925-Waterbury Express	30	N/A	N/A
928-Southington-Cheshire-Waterbury Express	60	60	60

*Saturday peak headway is 15 minutes.

CTfastrak follows the same zonal fare structure as the existing local and commuter buses. In the month of May 2015, there were over 13,500 CTfastrak boardings on an average weekday. Previous projections anticipated 11,200 boardings. In 2030, CTfastrak is estimated to serve 16,300 boardings for an average weekday.

Intercity Bus Service

Hartford Union Station lies adjacent to I-84 between Asylum Street and Church Street. The Spruce Street side of the station serves as an intercity bus terminal. The station is served by Greyhound, Peter Pan Bus Lines, and Bonanza (a subsidiary of Peter Pan). All intercity bus service west of Hartford begins or ends in New York City. A few northbound trips end in Hartford but most continue to the north (via I-91) or east (via I-84) ending in either Boston or Springfield.

Intercity buses from the west generally exit I-84 using the Asylum Street exit (Interchange 48B) and continue straight across Asylum Street onto Spruce Street where they enter the station. The exit from the station is onto Church Street. Eastbound exiting buses generally continue east on Church Street and use one of the north-south streets to cross over to Morgan Street where they can enter I-84 eastbound just before the Bulkeley Bridge.

Intercity buses from the east generally exit I-84 at the Asylum Street exit (Interchange 48), turn left on Asylum Street and left onto Spruce Street where they enter the station. Westbound buses must exit onto Church Street and turn right on High Street, right on Asylum Street and then left onto I-84.

Intercity bus service operates from Union Station from 5:00 AM until 1:15 AM. There are approximately 26 daily departures to New York, 13 to Boston and 11 to Springfield. Four trips operate to the University of Connecticut main campus in Storrs. One trip daily travels to White River Junction, VT.

Paratransit Service

ADA complementary paratransit service in the Hartford region is provided by the Greater Hartford Transit District. They operate a fleet of 117 vehicles that provides pre-scheduled demand responsive service for people with disabilities that prevent them from using fixed route bus service. Service is provided within $\frac{3}{4}$ mile of each fixed route during the hours that each route operates. Accordingly, service hours vary from place to place within the region. The fare is \$3.00 per one-way trip.

2.1.5 Rail Transportation

I-84 closely parallels Amtrak's Hartford Line railroad through the Project Study Corridor. The line currently operates a single track through the Corridor used for both passenger and freight operations. The existing and proposed rail transportation conditions on The Hartford Line through the Project Study Corridor are documented in this report. Research into both passenger and freight service was conducted in late 2013 and reviewed for accuracy up to the publishing of this report.



Amtrak "Shuttle" Train North of Union Station

Amtrak Passenger Rail Service

Hartford Union Station, located immediately east of I-84 between Church Street and Asylum Street, is the hub of passenger rail activity in the region. Amtrak ridership has been increasing steadily, both nationally as well as in Hartford. Recently released Amtrak ridership figures indicate that Hartford Union Station ranks #57 nationally among Amtrak stations with 179,186 riders (boardings and alightings) in FY 2014.

Three Amtrak operated intercity rail passenger services operate seven days per week at Hartford Union Station. Several short two-car “shuttle” trains operate between Springfield, MA and New Haven, CT. These trains provide cross platform connections at New Haven Union Station to and from Amtrak Northeast Corridor (NEC) Regional trains operating to New York and Washington, DC. A longer distance service serves Hartford as well; Amtrak’s Vermonter provides a daily roundtrip between St. Albans, VT and Washington, DC via Hartford.

Additionally, one NEC Regional train operates roundtrip from Springfield, MA to New York, NY and Washington, DC via Hartford each weekday. A second northbound train operates through Hartford on Friday nights, while a second southbound train operates on Sunday. Two NEC roundtrips serve Hartford on Saturdays. Select weekend NEC Regional trains continues as far south as Lynchburg, VA (southbound direction only).

In total, 11 arrivals and departures serve Union Station Monday-Friday with one additional northbound service occurring only on Friday. These services operate between 6:35 AM and 11:47 PM. On Saturday, Amtrak service increases to 14 arrivals and departures beginning at 7:08 AM and ending with the last train at (northbound) 10:42 PM. Service peaks on Sunday, with 15 arrivals and departures beginning at 7:08 AM and ending with the last train at (northbound) 10:10 PM. Table 2-8, below, summarizes the passenger rail service provided at Union Station in Hartford.

Table 2-8: Passenger Rail Service Schedule

Hartford, CT Trains Departing South (towards New Haven)														
141	143	495	405	147	493	401	463	57	55	475	465	467	479	497
M-F	Sa/Su	M-F	Sa/Su	Sa/Su	M-F	Sa/Su	Sa/Su	Sa/Su	M-F	M-F	Sun.	Sat.	M-F	Sun.
6:35 AM	7:08 AM	7:45 AM	8:05 AM	8:37 AM	11:03 AM	11:14 AM	1:16 PM	3:26 PM	3:32 PM	4:42 PM	4:47 PM	6:04 PM	8:01 PM	8:15 PM
Hartford, CT Trains Departing North (towards Springfield)														
450	490	470	460	54	56	464	488	476	140	148	432	146	136	
Sa/Su	M-F	M-F	Sa/Su	Sa/Su	M-F	Sa/Su	Sa/Su	M-F	Sa/Su	M-F	Sun.	Sat.	Fri.	
9:23 AM	9:29 AM	11:14 AM	11:28 AM	2:11 PM	2:13 PM	3:41 PM	5:36 PM	6:10 PM	7:19 PM	9:31 PM	10:10 PM	10:42 PM	11:47 PM	

Future Plans: The Hartford Line Rail Program

The Hartford Line rail program will result in substantial increases to rail passenger service at Hartford Union Station when it begins in late 2016. Monday through Friday, intercity passenger rail service will increase to 34 arrivals and departures, tripling the current service frequency. On Saturday and Sunday,

22 arrivals and departures are planned. According to previously conducted ridership estimates by CTDOT, Hartford ridership is projected to grow to approximately 375,000 annual riders by 2030. This doubling of rail ridership at Hartford Union Station will make it a much busier station than today.

The Hartford Line Program Planned Station Improvements

As part of The Hartford Line Rail Program, the Connecticut Department of Transportation is proposing limited improvements to Hartford Union Station, focused primarily on the center platform boarding area. The center platform is approximately 750 feet long by approximately 24 feet wide. It serves one track and sits 8 inches above the top of rail height. The existing station-side platform is not used.



Existing Center Platform at Hartford Union Station

Planned improvements will rebuild approximately 260 feet of the north end of the center platform to create an ADA compliant high-level platform. The rebuilt high-level platform will be approximately 16 feet wide and have a fold-up edge to enable extra-wide freight cars to pass through the station. Other customer amenity improvements will include new passenger information systems, expanded video monitoring system, and new ticket vending machines. This new high-level platform will substantially improve the overall boarding process for passengers at Hartford Union Station and reduce dwell time for trains at the station. In addition, a new stairway is being installed at the south end of the existing platform to facilitate pedestrian access directly from the north sidewalk of Asylum Street.

Freight Rail Operations

There are two primary rail freight carriers that operate on The Hartford Line through the Project Study Corridor: Connecticut Southern Railroad (CSO) and Pan Am Southern Railway. The CSO operating hub is the Hartford Yard, located one mile north of the station. CSO operates two scheduled daily freight trains during weekdays, though schedules are flexible and can change due to customer demands and scheduling considerations for connecting railroads.

Pan Am Southern Railway operates freight trains from East Deerfield, MA to Plainville, CT via Hartford. They operate extra trains as needed and do not follow a set schedule. Currently this service can range from one to three round trips per week. Since these freight trains are unscheduled, Amtrak dispatchers will route freight trains from Springfield, MA to Berlin, CT when track time and space is available. See Table 2-9, below, for a listing of freight train services.

Table 2-9: Freight Train Services

Days Operated	Train	Schedule	Service Plan	Size
Monday-Friday	CSO-1	1700-0500	Hartford to Cedar Hill New Haven	Up to 90 cars
Monday-Friday	CSO-5	1830-0630	Hartford to Cedar Hill New Haven	Local switching
As Needed	EDPL	Varies	East Deerfield to Plainville	Varies
As Needed	PLED	Varies	Plainville to East Deerfield	Varies

Hartford Union Station Condition and Amenities

The Hartford Union Station is a historic building, listed on the National Register of Historic Places. The existing level of customer amenities at Hartford Union Station is typical for a station of this size. The lower lobby level is the main location for most transportation services, and has the following features:

- Subway
- Dunkin Donuts
- Union Station News and Gifts
- Men's Restrooms
- Women's Restrooms
- Vending Machines
- Rental Car Phone
- Bank of America ATM
- Information Kiosk
- Amtrak Ticket Window
- Greyhound Ticket Window
- Peter Pan Bus Line Ticket Window
- Electronic Information Kiosk
- Brochure Racks
- Security Booth



West Entrance of Hartford Union Station



Lower Lobby of Hartford Union Station

Access/Egress

The primary access point into the lower lobby is located on the west side of the station. This ADA accessible access point serves as the main drop off/pick up site, taxi stand, intercity motor coach, and primary parking facilities. There are two elevators in the lower lobby level. One elevator provides access to the Amtrak boarding platform directly above the lower lobby level. The second elevator provides access to the historic station building for patrons using mobility aid devices or unable to use the stairs.

The historic main waiting room area is located just to the east of the lower lobby and has two main stairway entrances: one via the lower lobby level and the other on the east side of the building on Union Place. These are not ADA accessible pathways as the waiting room is approximately eight feet higher than the lower lobby. Mobility challenged individuals must use the elevator to access the main waiting room. There is secondary access to Union Place on the southeast and northeast corners of the waiting room. The west side of the waiting room also has two staircases which lead up to the unused station side platform. Since the platform is not used and fenced off, the stairs are not used to access passenger rail services. In addition, the historic main waiting room area has limited seating available.

Leased office spaces are located on the north and south sides of the main waiting room. On the north end of the Union Station building are the offices of the Greater Hartford Transit District (GHTD), owner of the station. These offices are on an ADA pathway, providing access to individuals using mobility aid devices. The *Hot Tomatoes* restaurant is also located on the main station level, but it is not accessible from inside the station. Customers must access the restaurant from a separate entrance on the southeast side of the building off of Union Place.

GHTD Planned improvements for Union Station

The Greater Hartford Transit District (GHTD) is currently undertaking a major project to improve connectivity at Hartford Union Station. This project will add a new CTTransit Center to the northeast side of Union Station on Union Place. The enhancements will include a new bus customer waiting area, 3 new bus bays, streetscaping, ADA accessibility improvements, and a reconfiguration of GHTD offices. This project, funded by a USDOT TIGER Grant, will significantly enhance the facilities' capabilities as an intermodal transfer location. In addition, GHTD is reviewing proposals to install a new passenger information display system in the station. This will include new electronic outdoor information displays at all 14 intercity motor coach bays, as well as new transportation information displays for passengers inside the station.

Future Capabilities of Hartford Union Station and Rail Corridor

Hartford Union Station has historically handled much larger numbers of rail passengers and train service



**Location of Planned CTTransit Center at
Harford Union Station**

than it does today. The key issue with the facility is not the building capacity, but the limitations of the track and platform at the station. As currently configured, the station can only accommodate one train at a time due to the single track arrangement through the station. In the past, Hartford Union Station had three tracks and was able to accommodate up to three trains at a time. However, two of these tracks were removed

in the late 1980s, leaving only one for all trains to use.

In the future, this limitation will begin to cause delays and congestion to the overall rail system, as trains must be precisely scheduled to arrive when the single track is available. Any delays in the system could impact the overall rail services reliability. To improve rail service, the Hartford Line's 2030 Full Build scenario proposes adding a second track through Hartford. Additionally, the viaduct carrying the railroad through and adjacent to Union Station is in need of structural repair or replacement. A study is underway which will evaluate potential rehabilitation or replacement strategies. The study will be coordinated with the I-84 Hartford Project, which could relocate the railroad north of I-84. The I-84 Hartford Project will not include any improvements to the rail corridor unless the railroad is relocated. FRA has no current program funding identified for a second track or the railroad viaduct replacement.

The historic main waiting room has the potential to be recaptured and utilized in the future if needed with the addition of passenger information systems and new seating. However, a set of doors and stairs separates this area from the lower lobby currently in use.

Intermodal Connectivity

Hartford Union Station is an important intermodal connector today. In addition to the Amtrak rail services described previously, taxi cabs, intercity motor coach services, local transit buses, rental cars, parking, and bicycle facilities are available at Hartford Union Station. Intercity and local bus service is discussed in Section 2.1.4: Bus Transportation, parking at Union Station is discussed in Section 2.1.3, and bicycle accessibility is discussed in Section 2.1.6: Bicyclist Accessibility.



Taxi Cabs at Hartford Union Station

Taxi Cabs

The taxi cab drop off and pick up location is on the west side of Hartford Union Station near the intercity bus parking area. There is room for approximately seven cabs at this location.

Rental and Shared Cars

Hertz is listed as a rental car service at Hartford Union Station, though no staff or rental vehicles are stationed onsite. Instead, a phone for Hertz rental car services is located in the lower lobby of Hartford Union Station near the Subway. Renters must arrange a pick-up and drop-off with Hertz. However, the hours are limited to Monday through Friday, 8:00 AM to 5:30 PM and 9:00 AM to 11:30 AM on Saturdays. Enterprise Rent-A-Car has several locations near downtown Hartford. They offer free pick up service for renters and will meet renters at the station if requested. Hours are limited to 7:30 AM to 6:00 PM Monday through Friday and 9:00 AM to noon on Saturdays.

There are two active car sharing services in the Hartford area. Neither has a site at Union Station. Hertz 24/7 car sharing service is located at Central Connecticut State University, which is approximately 9.5 miles from Union Station. Zipcar car sharing service has two nearby sites: University of Hartford (approximately 3 miles) and Trinity College (approximately 1.75 miles).

2.1.6 Bicyclist Accessibility

Bicyclist Accessibility has been assessed for the Parking, Bicycle, and Pedestrian Accessibility Study Area (the Study Area, for the duration of this section). Existing and proposed on-street and off-street bicycle networks were analyzed for gaps and improvements. Research included stakeholder interviews conducted during summer and fall 2013 supplemented by field visits and reviews of studies and initiatives. Figure 2-13, following, illustrates the on- and off-street bicycle facilities within the Study Area. On June 5, 2015, SB 502, "An Act Concerning Bicycle Safety," was signed into law, which now allows left-handed bike lanes, contraflow bike lanes, and two-way cycle tracks.

On-Street Facilities

On-street bicycle facilities typically take the form of bicycle routes and bicycle lanes. With the exception of signed prohibitions, bicyclists are permitted on any street within the City of Hartford. However, certain roadways in the Study Area can be considered more applicable for bicycle use.

There are two existing bike lanes within the Study Area. One, located on Capitol Avenue between Laurel Street and Sisson Avenue, is part of the current East Coast Greenway route, and has fading or missing lane markings. The other bike lane is on Broad Street between Farmington Avenue and Capitol Avenue and was initially installed in October 2013.

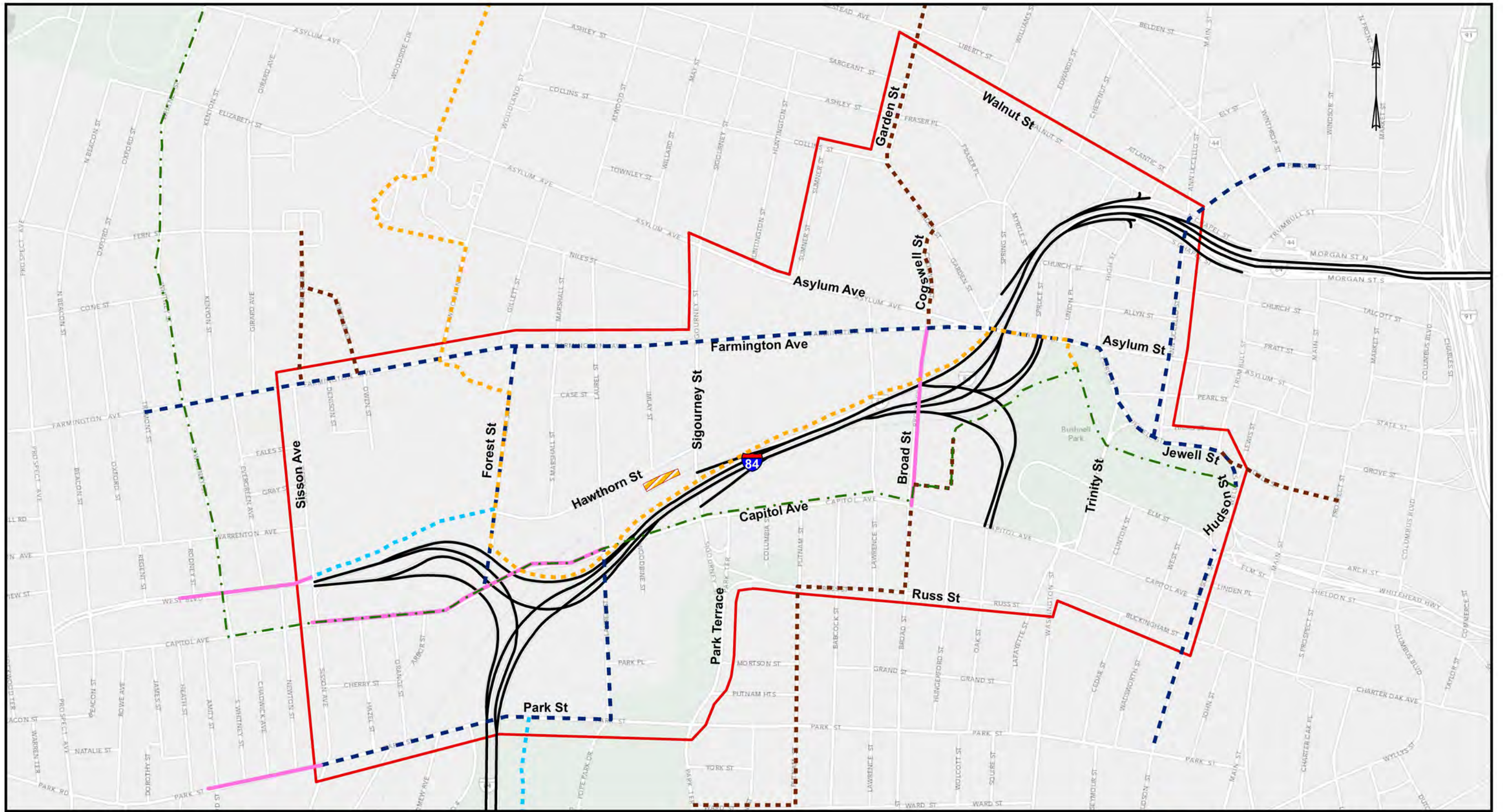


Fading Bike Lane Markings on Capitol Avenue

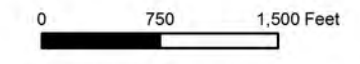
Recent and Ongoing Initiatives and Studies

The City of Hartford and CROG have been involved in many initiatives and studies aimed to improve upon the existing bicyclist safety and connectivity throughout the Study Area and the City. The *Regional Pedestrian and Bicycle Plan*, completed for CROG in April 2008, identified existing conditions and proposed recommendations to improve pedestrian and bicycle conditions throughout the region, which included the Study Area. Specific recommendations included:

- Complete the East Coast Greenway (discussed further in off-street bicyclist facilities)
- Address the deficient on-road bicycle network in the City of Hartford
- Provide bicycle parking facilities, such as racks
- Develop bike stations that will provide storage and shower amenities
- Develop a bicycle rental program
- Implement targeted crosswalk enforcement



LEGEND	Existing East Coast Greenway	Proposed Sharrow
	Proposed East Coast Greenway	Sigourney CTfastrak Station
	Existing Bike Lane	I-84
	Proposed Bike Lane	Parking, Bicycle and Pedestrian Accessibility Study Area
	Proposed Multi Use Path	

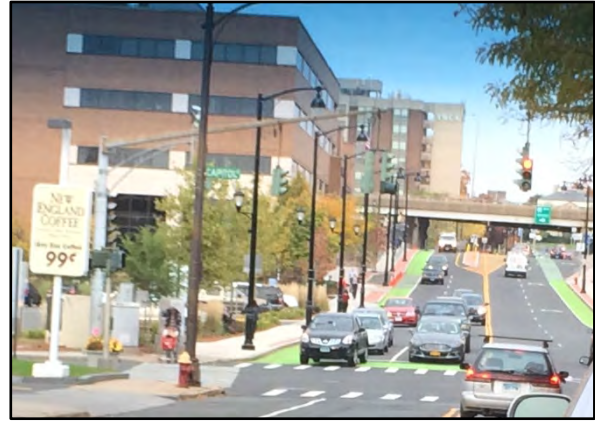


Sources of Data: ESRI, DeLorme, NAVTEQ

	The I-84 Hartford Project	
	Bicycle Facility Map	
Date: 01/29/2015	Drawn By: Parsons Brinckerhoff	Figure 2-13

According to The City of Hartford's 2010 *Downtown Circulation Study*, the general bicycle environment in Hartford is uninviting for casual bicyclists. This is caused by lack of bike lanes, one-way streets, and wide street cross-sections. As a result, bicyclists sometimes use sidewalks in conflict with pedestrians, an action not prohibited by City Ordinances.

The Capitol Region Council of Governments (CROCG) published a *Pedestrian/Bicycle Crash Study* in 2012 after completing an analysis of crashes in the region between 1995 and 2010. It was determined that the region had a higher percentage of pedestrian fatalities than both the state and the nation. Hartford ranked highest in the region for per capita crash totals of both pedestrians and bicyclists with 15.8 crashes per 1,000 population for the fifteen year period. East Hartford ranked second with 5.4 crashes per 1,000 population.



Existing Bike Lane on Broad Street

Of bicycle crashes, sixty-four percent were attributed to the bicyclist and thirty-four percent to motorists. Of the bicyclist at fault incidents, over one-third is attributed to bicyclist behavior such as violation of traffic control and another third occurred when the bicyclist failed to grant the right of way. At twenty percent of bicyclist at fault incidents, the next largest category of crashes is attributed to wrong way riding.

The City of Hartford's Capitol City Connectivity Plan, published in the August 2014 Capital City Parks Guide: Plans for Hartford's Regional Community, and Neighborhood Parks recommends the expansion of bicycle paths, sharrows, and multi-use paths with the goal of enhancing pedestrian and bicycle connections between and within City parks.

According to the Plan, the City is proposing a number of new bike lanes. A proposed new bike lane along Farmington Avenue to Asylum Avenue would provide access to Union Station and the new CTfastrak stop at Union Station. The new lane would continue along Bushnell Park to Wells Street and into Downtown. A new bike lane is also proposed for Ann Uccello Street between Bushnell Park and North Chapel Street. The City is also proposing a new bike lane on Forest Street to provide access to Hartford Public High School and connect the existing bike lane on Capitol Avenue to the proposed path on Farmington Avenue. The proposed Forest Street bike lane would also connect to a proposed multi-use path that would route behind the high school towards Sisson Avenue and connect to the existing bike lane on West Boulevard. This route is currently used by bicyclists and pedestrians as an off-road alternative instead of the Capitol Avenue bike lane. Additionally, the City is proposing a sharrow, or a marked path indicating the road is to be shared with bikes and cars, on Cogswell/Broad Street to connect to the existing bike lane on Broad Street.

Bicyclist Stakeholder Interview Summary

I-84 Project Team members conducted an informal interview and two walking tours with Bike Walk Connecticut to discuss the organization's views and issues regarding bicyclist accessibility within portions of the Study Area. The following paragraphs represent a summary of the opinions of Bike Walk Connecticut members who participated in the interview and walking tours. See Appendix A.3.1, Stakeholder Interview Summaries for further information.

Capitol Avenue is considered the safest cycling route, as there are bike lanes present in some portions. However, the lanes abruptly end in places and share space with on-street parking, forcing bicyclists into traffic lanes. Specifically, the Capitol Avenue bike lanes end suddenly before Sisson Avenue where the parking lane and bike lane turn into a right-turn only lane for the Capitol Avenue and Sisson Avenue intersection. Farmington Avenue is considered the worst route for bicyclists, as there are no bike lanes, a lot of on-street parking, and the roadway is often congested.

Asylum Avenue lacks an eastbound shoulder and bicycling westbound on Asylum Avenue is difficult with both the uphill grade and vehicles preparing to turn right at Garden Street. It was also noted that it is difficult for bicyclists to turn left from Asylum Avenue to Farmington Avenue due to the non-traditional four square intersection geometry and vehicular free flow conditions.

There is a lack of north/south connections for bicyclists and pedestrians, and that those that do exist are poorly lit and difficult to navigate. The closure of Flower Street has exacerbated this issue. Homestead Avenue has become a popular bike route to Downtown from the West Hartford/Bloomfield area.

Other difficult to navigate sections include Capitol Avenue into Bushnell Park, as the pedestrian bridge behind the Armory, part of the East Coast Greenway, is unattractive. The City streets that pass under the Sisson Avenue ramps are poorly lit and are unattractive. Park Street would be a viable option for bicyclists but is narrow and has on-street parking.

The group agreed that improvements to city streets should include more continuous and protected bike lanes, better enforcement of traffic rules regarding bikes, clearer markings, and enforcement of no parking in bike lanes.

The Project Team has identified a deficiency in the City's existing and proposed bicycle network in the vicinity of the Sigourney Street *CTfastrak* station. Plans are in place to improve bicycle facilities around the station, located near the corner of Sigourney and Hawthorn Streets, opposite Imlay Street. The construction contract for this project is scheduled to be awarded in late August 2015.

As a separate project, CTDOT has discussed potentially installing bike paths on both sides of Sigourney Street between Capitol Avenue and Farmington Avenue. The I-84 Hartford Project Team will track the progress of these plans.

Off-Street Facilities

Bicycle or multi-use paths are exclusive vehicle-free facilities that are typically located outside the roadway cross-section. Off-street paths are generally located within or adjacent to flood control channels, transit corridors, utility corridors, greenways, and/or parks. These paths are popular for



Interim Route of the East Coast Greenway behind the State Armory

utilitarian and recreational riding, are typically preferred by less experienced riders and bicycle commuters whose trips are longer than a couple of miles.

The East Coast Greenway is a project to create a linked network of multi-use paths stretching from Maine to Florida. The Greenway traverses east to west through Bolton and Manchester prior to crossing the Connecticut River via the Founders Bridge. The Greenway currently exits Hartford to the northwest via Whitney Street. The route continues northwest to meet the Farmington Canal Trail in Simsbury.

The interim route and the proposed final route of the East Coast Greenway through Hartford were provided by CRCOG. The proposed final route, illustrated in Figure 2-13, page 2-40, is not defined at its crossing of I-84. According to CRCOG, the task force committee that was looking at routes wanted to keep options open as changes to I-84 would potentially open new opportunities for the Greenway. The initial concept had been laid out to use the parking lots behind the buildings on Capitol Avenue for the Greenway alignment.

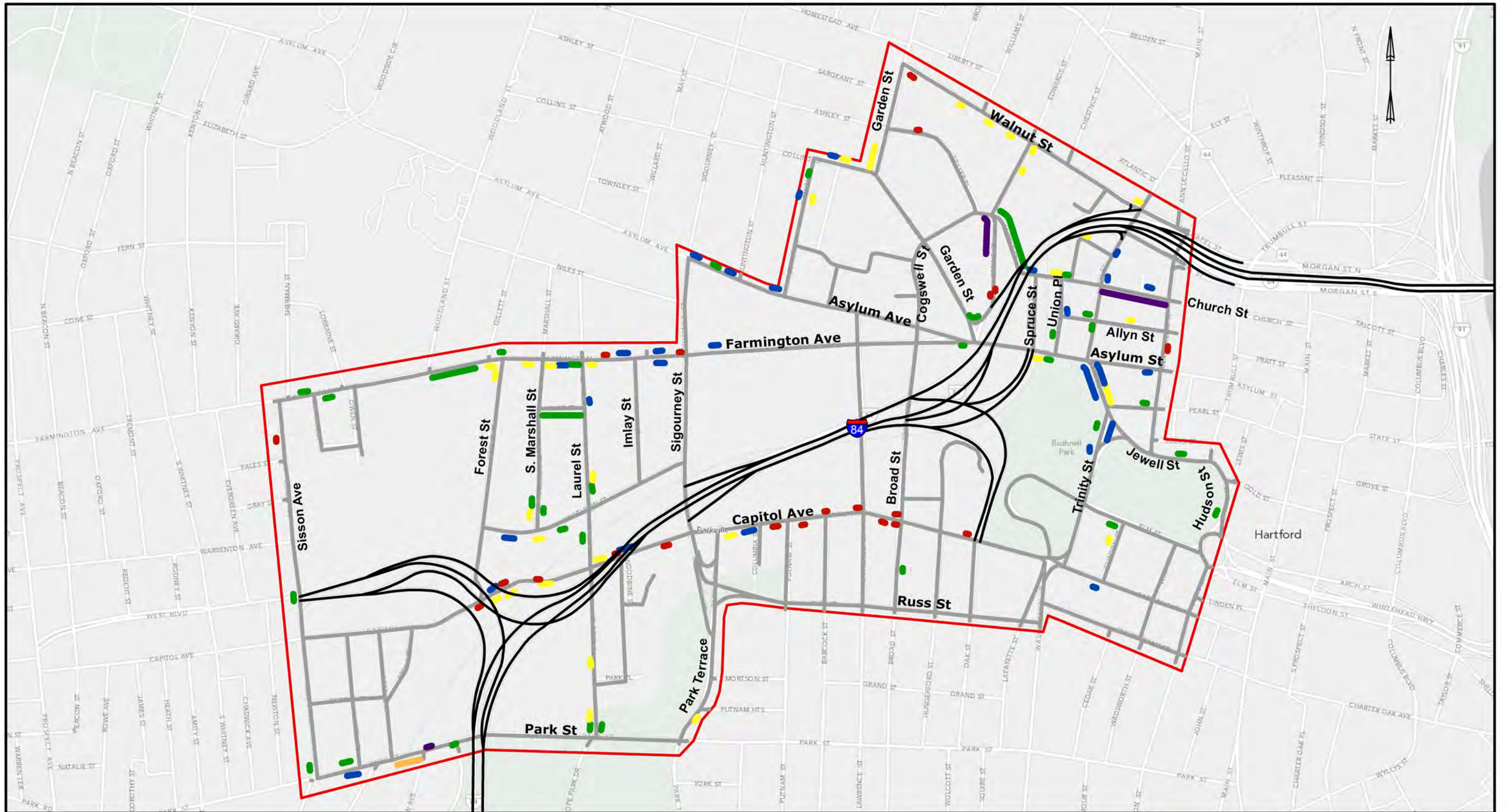
An unofficial multi-use path is utilized by pedestrians and bicyclists between Sisson Avenue and Forest Street. The path begins by the Fire Station on Sisson Avenue, routes through a basketball court and through the Hartford Public High School grounds where it ends on Forest Street.

2.1.7 Pedestrian Accessibility

Pedestrian Accessibility has been assessed for the Parking, Bicycle, and Pedestrian Accessibility Study Area (the Study Area, for the duration of this Section). Research included stakeholder interviews conducted during summer and fall 2013 supplemented by field visits and reviews of studies and initiatives up to the publication of this report.

Sidewalks and Pedestrian Routes

Sidewalks were evaluated along arterial roads, local roads, and transit routes to document their condition and assist in determining pedestrian accessibility within the Study Area. These conditions, as well as the Study Area, are illustrated in Figure 2-14, following. Within the Study Area, the majority of



Sidewalk Deficiencies

- Uneven
- Large Cracks and Holes
- Missing Section
- Abrupt Edge
- Non-Accessible
- Obstruction

- I-84
- Roads
- Parking, Bicycle and Pedestrian Accessibility Study Area

LEGEND



Sources of Data: ESRI, DeLorme, NAVTEQ



The I-84 Hartford Project

Pedestrian Accessibility Map

Date: 5/7/2014

Drawn By:
Parsons Brinckerhoff

Figure 2-14

sidewalks were deemed to be in acceptable condition, with the exception of a few locations. Sections of Capitol Avenue, Park Street, and the intersection of Elm Street and West Street were missing portions of the sidewalk.

In several locations, substandard sidewalk widths restrict or obstruct access where structures have been built into in the sidewalk, including bridge columns and utility/signal poles. Capitol Avenue, between Sigourney Street and Forest Street, has bridge columns in the middle of the sidewalk that reduce the effective width to inadequate levels. The corner of High Street and Chapel Street North has a portion of the sidewalk missing as well as having three utility poles in the sidewalk.

Sigourney Street has a stairway at the Capitol Avenue overpass to provide pedestrian connectivity at this grade separated crossing. There is no bicycle, stroller, or handicap access at this location, violating the Americans with Disabilities Act (ADA) provisions for pedestrian amenities. During field visits, pedestrians were observed bypassing the stairway and instead cutting up a grassy hill to Sigourney Street.

There are several tunnels and underpasses conveying pedestrians beneath the railroad within the Study Area, including on Capitol Avenue, Park Street, and Asylum Street. The Capitol Avenue and Park Street underpasses were observed to be poorly lit, unkempt, and narrow. Although the Asylum Street tunnel is illuminated, the sidewalk is in poor condition.

Flower Street has been permanently closed to traffic and to pedestrians. A pedestrian walkway has been constructed underneath I-84 between Broad Street and Flower Street to provide a pedestrian and bicyclist bypass.

Intersections

Crosswalk conditions, pedestrian signal operations, and ADA compliance were assessed at Study Area intersections. A detailed intersection by intersection breakdown is provided in Appendix A.3.3. According the Connecticut Department of Transportation's *2009 Connecticut Statewide Bicycle and Pedestrian Plan*, specific guidelines for pedestrian intersection accessibility include:

- Tactile warning strips are required at all ramps
- Separate curbs ramps should be installed at each crosswalk, instead of one ramp at the corner
- Consider use of Accessible Pedestrian Signals (APS) which provide non-visual information to pedestrians such as audible tones, verbal messages, and/or vibrating surfaces

Pedestrian accessibility conditions at intersections were mostly acceptable with some recurring non-conformities, including sidewalk ramps not aligned with the crosswalk and deteriorated crosswalk pavement markings. Vibrant crosswalk pavement markings increase motorists' awareness of the potential presence of pedestrians and guide pedestrians at appropriate crossing locations. Sidewalk ramps that are not in line with the crosswalk make crossing the street difficult for disabled or blind pedestrians. An ADA-compliant sidewalk ramp should be placed at each crossing location.

Unobstructed signals and pedestrian walkways are important to provide clear sight lines for both motorists and pedestrians. Blocking a motorist's view of pedestrians is a safety concern, especially on right turns. One such obstruction is at the intersection of Broad Street and the I-84 eastbound on-ramp where the pedestrian signal and ramp are behind an I-84 bridge pier.

There are locations where tactile warning strips and audio signals are missing. The intersections of the I-84 eastbound on- and westbound off-ramps with Sigourney Street have pedestrian push buttons and pedestrian signals. However, there are missing ramps and crosswalks.

Pedestrian push buttons at many intersections are not easily accessible. For example, at the intersection at Broad Street and Capitol Avenue, the pedestrian button is located on the back side of the pole and the traffic signal controller cabinet blocks access to the push button and to the ramp.

The location of greatest concern is the Sisson Avenue intersection with the I-84 Interchange 46 ramps. The eastern approach (the I-84 ramps) is very wide and takes two pedestrian phases to cross. The median is narrow and not protected from traffic. The pedestrian push button and pole on the median may have been damaged by traffic.

Recent and Ongoing Initiatives and Studies

The City of Hartford, CROCOG, and other local agencies have numerous ongoing initiatives focused on creating a more walkable city. Central to these initiatives is the iQuilt Plan, a culture-based urban design plan for Downtown Hartford, focused on signage, wayfinding, and placemaking. The Intermodal Triangle is a localized implementation of the iQuilt Plan; funded by a TIGER Grant from USDOT and the City of Hartford, it seeks to enhance walkability through connectivity of Union Station and Main Street using complete streets infrastructure.

Key elements of the Hartford Intermodal Triangle project include:

- partial renovation of Union Station,
- special signal and lane treatment for the CTfastrak terminus,
- major bus stop enhancements around Union Station,
- sidewalk and pedestrian crossing enhancements, and
- wayfinding signage for pedestrians and vehicles.

Also as part of this project Jewell Street will be transformed into Bushnell Park North, a pedestrian- and bicycle-friendly "green boulevard" featuring a narrower roadway, wider sidewalks, and bicycle lanes. These improvements will encourage pedestrian movement and improve pedestrian accessibility between Bushnell Park and Union Station. The Intermodal Triangle is currently in the design phase with construction anticipated to begin in summer 2014 and project completion scheduled for fall 2015.

The Greater Hartford Transit District (GHTD) *Bus Livability Project* is also planned. This project includes the *Union Station Pedestrian Neighborhood Connectivity Project* and the *GHTD Streetscape Project* that includes streetscape improvements to portions of Asylum Avenue, Sigourney Street, and Farmington Avenue. The *Union Station Pedestrian Neighborhood Connectivity Project* will improve pedestrian

connectivity in the Asylum Avenue/Farmington Avenue Trident, linking it with Union Station and extending it to the High Street/Ford Street intersection. Included as part of this project are improvements to streetscaping, sidewalks, landscaping and lighting. Also proposed is a new pedestrian crossing on Spruce Street between the parking lot and Union Station and new traffic signals that will be more responsive to pedestrians.

The City of Hartford's 2010 *Downtown Circulation Study* identified opportunities to enhance the connectivity of the transportation network and the accessibility of walking, transit, and driving. Included as part of this project are the following pedestrian objectives:

- Strengthen connections between areas of the city
- Create a walkable environment and strengthen pedestrian connections
- Improve wayfinding for pedestrians and motorists

The City of Hartford is also undertaking a Sidewalk Accessibility Study that will provide detailed sidewalk condition and accessibility information throughout Hartford.

According to the Capitol Region Council of Governments (CRCOG) 2012 *Pedestrian/Bicycle Crash Study*, fifty percent of pedestrian crashes were attributed to unsafe practices in the road by a pedestrian. Of these crashes, the majority (60%) occurred between intersections. The remaining pedestrian at fault crashes are evenly split between signalized and unsignalized intersections.

In addition to these studies, the development of the Hartford Yard Goats minor league baseball field, which is scheduled to open in Spring 2016, will also provide pedestrian improvements in the vicinity of the ballpark.

Stakeholder Interview Summaries

Informal interviews were held with The Hartford, Council of Churches, ArtSpace Residents Association, and the Asylum Hill Neighborhood Association to discuss their concerns and issues regarding pedestrian facilities within the Study Area. The following are brief summaries of these interviews, presented as stated by the Stakeholders to the Project Team. The full Stakeholder Interviews are provided in Appendix A.3.1.1

ArtSpace Residents Association

Pedestrian access in the Asylum Avenue and Farmington Avenue Trident area is poor. ArtSpace, located at 555 Asylum Avenue, across the street from Union Station, has an art gallery and hosts many events. However, visitors must park across the street in the Union Station parking lot on Spruce Street and cross Asylum Avenue. As there is no pedestrian access across Asylum Avenue at Spruce Street, pedestrians are required to use crosswalks at Union Place or Garden Street. The Trident area is a large, busy intersection without illumination, which is an unappealing and undesirable pedestrian environment.

Asylum Hill Neighborhood Association

According to one interviewee of the Asylum Hill Neighborhood Association, the Asylum Hill Neighborhood is not considered part of Downtown. The representative opined that the closing of Flower Street was a “disaster” and I-84 cut-off the neighborhood. If Asylum Hill were considered part of the Downtown, the interviewee felt that developers would be showing more interest. Currently, pedestrian connections to Downtown are poorly maintained, dangerous, and make the area feel ‘cut-off’.

Bike Walk CT

The Project Team conducted one informal interview and two walking tours with Bike Walk CT. At these events, members of Bike Walk CT identified safety concerns for bicyclists and pedestrians within the study area, including dim lighting, poor road maintenance, and competition with automobile traffic. They noted dim lighting and poor bike path conditions on Capitol Avenue between Sisson Avenue and Laurel Street and on the pedestrian bridge over I-84 to Bushnell Park behind the Armory. There are also cars frequently blocking bike lanes at the intersections of Sisson Avenue and Capitol Avenue, and Farmington Avenue and Asylum Street.

The group recommended to improve safety and to expand bike lanes in the Study Area. Continuous and protected bike lanes, better enforcement of traffic rules regarding bikes, clearer marking and enforcement of no parking in bike lanes were suggested remedies. The group also called for more north/south bike and pedestrian connections, observing that existing north/south routes were poorly lit and difficult to navigate.

The Hartford

The Hartford discussed the potential to connect the Asylum Hill neighborhood to Downtown. Currently, The Hartford feels that very few of its employees travel to Downtown, as it seems to be an unappealing and difficult trip as a pedestrian.

Council of Churches

The churches which make up the Council attract a large amount of visitors from outside Hartford. Emmanuel Church estimates that eighty percent of its parishioners are from the suburbs (mainly West Hartford, Farmington, and Glastonbury) and travel in for services. The Frog Hollow neighborhood where the church is located has had concerns regarding the CTfastrak and street closures such as Flower Street. The church is working in coordination with Billings Forge Neighborhood Works to continue to improve the neighborhood.

The Cathedral of Saint Joseph hosts over 100,000 visitors each year, including 1,500 each week at mass. The cathedral also hosts concerts, community events, graduations, and weddings. Farmington Avenue in the area of the cathedral can become very congested during large events. Trinity Episcopal has a more local congregation, with a large percentage of the Burmese community living in the Laurel Street/South Marshall Street neighborhood that walk to the church. A large Indian community attends the church

from the Union Station area. A safe and accessible pedestrian environment is important to these churches and their communities.

2.2 Existing Traffic Data

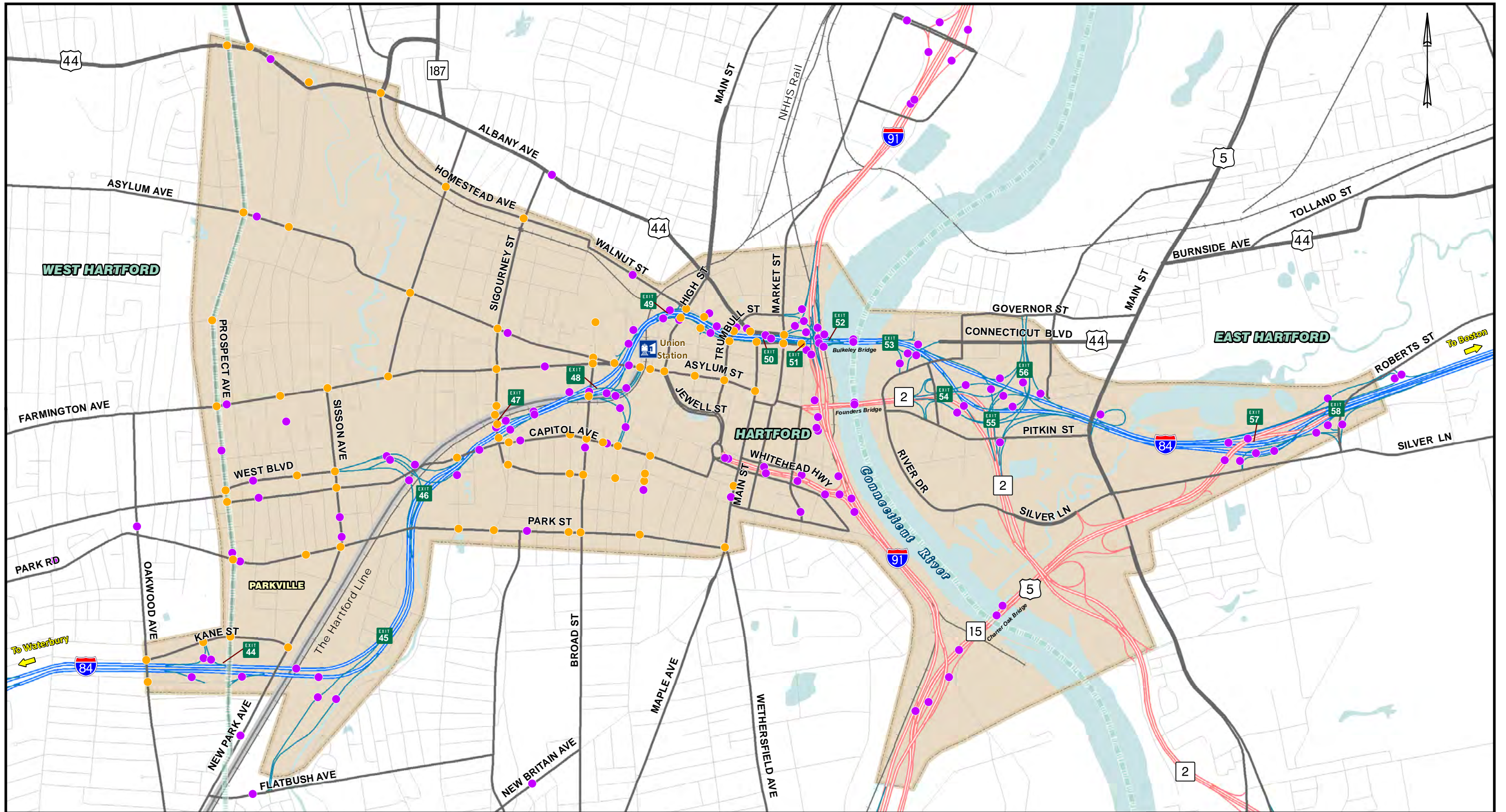
Existing traffic data was collected to use as the basis for assessing existing traffic operations and to determine a baseline for future conditions. The existing traffic conditions are assessed in Section 2.4: Existing Traffic Operations.

In order to get a full picture of traffic patterns throughout the Project Study Corridor, data was gathered for adjacent segments of I-84, as well as intersecting freeways and local streets. The Traffic Data Collection Area (the Study Area, for the duration of this Section), illustrated on Figure 2-15, following, was selected to encompass the roads deemed most critical to travel in and around Hartford. Most of these routes experience recurring congestion during peak hours. Others operate below capacity currently but may be impacted (temporarily or permanently) by the Project. The traffic analysis is concerned primarily with the Project Study Corridor. The Project Team notes that at the time of traffic data collection and analysis in preparation of this report, the minor league baseball park had not yet been announced. Traffic analysis in future studies will include traffic patterns altered as a result of the new ballpark, which is scheduled to open in 2016.

2.2.1 Traffic Volumes

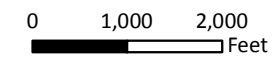
Traffic volumes were obtained for I-84, other freeways, and the secondary roadway network (local streets). For calibration, all counts were factored to 2012 average weekday equivalents using two CTDOT continuous count stations: Continuous Count Station 49, located at the west end of the Study Area in West Hartford, and Continuous Count Station 26 in Manchester, located west of Interchange 63. Combined with 24-hour ramp counts taken every three years, these count stations provide a reliable overview of weekday traffic patterns along the freeway.

Figure 2-16, page 2-51, illustrates the historical average daily traffic (ADT) at Continuous Count Stations 26 and 49 on I-84 for the ten year period from 2003 to 2012 relative to national average gas price. In the last four years, the traffic has remained fairly constant with a unidirectional ADT of 58,000 to 60,000 in Manchester and 63,000 to 66,000 in West Hartford. 2008 brought the lowest volumes for Manchester counts but also marked the beginning of an 18-month recession that led to declining economic growth rates on a global level. The gas prices in the graph have been adjusted for inflation based on the Consumer Price Index (CPI) at the time of the gasoline purchase. Thus from 2009 onwards the graph illustrates slow recovery in traffic volumes and a gradual increase in gasoline price. Prior to 2008, the traffic volumes ranged from 58,000 to 66,000 in Manchester with a peak ADT of 69,000 in 2005. West Hartford volumes have shown little or no variation in the westbound direction; the traffic remained constant at 68,000 between 2003 and 2007. In the eastbound direction, traffic volumes varied between 62,000 to 64,000 prior to the recession.



LEGEND

- MTM - Manual Turning Movement Counts Obtained
- ATR - Automatic Traffic Recorder Counts Obtained
- Railroad
- CTfastrak
- I-84 Exit #
- Union Station
- Traffic Data Collection Area
- Town/City Limit
- Water
- I-84
- I-84 Ramp
- Other Freeway
- U.S. Highway/State Road
- Major Road
- Local Road



The I-84 Hartford Project

Traffic Data Collection Map

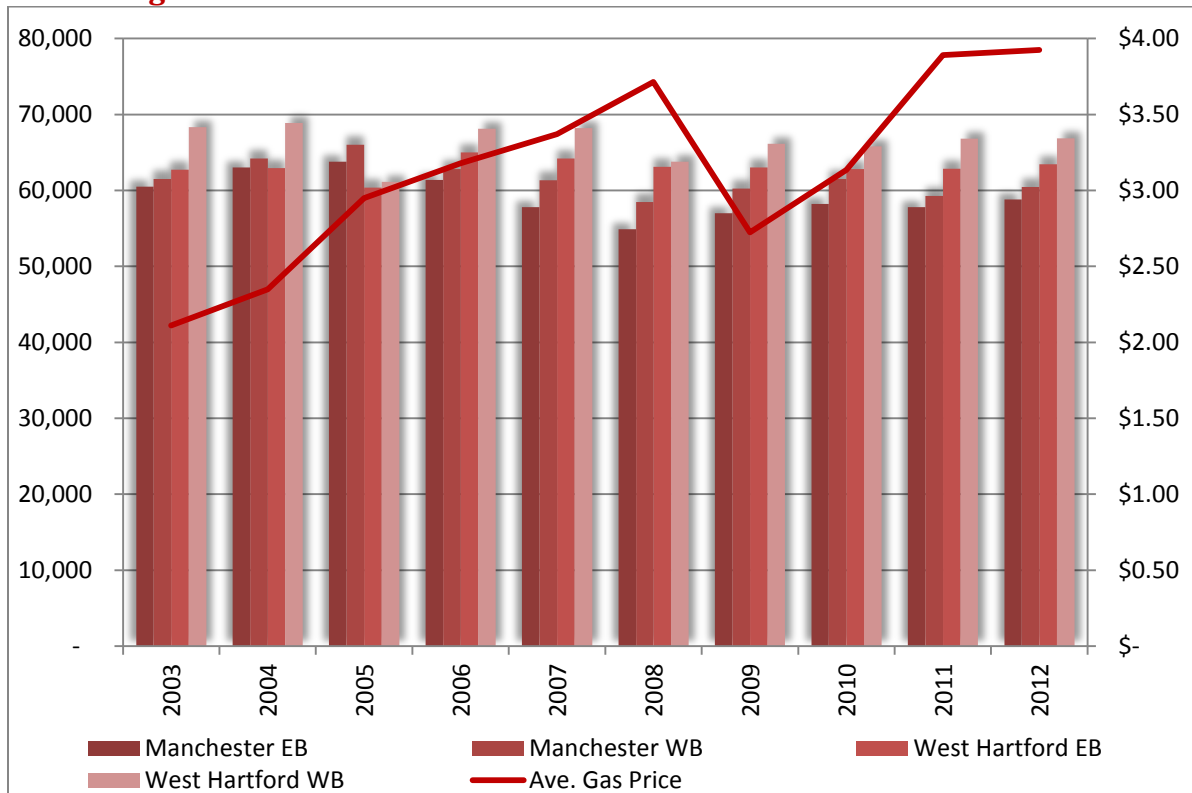
Sources of Data: City of Hartford, ESRI, and TranSystems
<http://www.ctfastrak.com/>

Date: 1/12/2015

Drawn By: TranSystems

Figure No. 2-15

Figure 2-16: Continuous Count Station Historical Traffic Variations



In addition to the two continuous count stations (CCS), the historical average daily traffic (ADT) for I-84 and I-91 was collected from CTDOT’s Traffic Monitoring Volume Information Traffic Count Data. Table 2-10, following, displays 19 years of historical ADT data, from 1992 to 2010. Daily traffic volumes on I-84 over the Connecticut River have remained fairly constant over the last 19 years and particularly over the last 10 years with ADTs near 141,000 vehicles per day. This is likely due to the recurring congestion throughout Hartford; most of the city’s freeways have operated at or near capacity for decades, leaving little room for growth. While the peak periods have spread into traditionally off-peak hours, the overall daily volumes have not increased substantially, reflecting the time-sensitive nature of commuter traffic. In addition to these two mainline locations, a High Occupancy Vehicle (HOV) connector location and five ramps connecting I-91 and I-84 are shown. Most of these ramps have seen little or no growth in the last 19 years. The largest growth, about one percent per year, has been experienced on the I-84 eastbound off-ramp to I-91 northbound (Exit 51).

Table 2-10: Historical Average Daily Traffic Volumes

Year	I-84 on the Bulkeley Bridge	I-84 WB Off-Ramp to I-91 NB (Exit 51)	I-84 EB Off-Ramp to I-91 SB (Exit 52)	I-84 EB On-Ramp from I-91 SB	I-84 EB Off-Ramp to I-91 NB (Exit 51)	I-84 WB On-Ramp from I-91 NB
1992	138,900	10,000	18,500	-	9,800	22,200
1993	144,700	-	-	-	-	-
1994	140,800	-	15,100	21,100	-	-
1995	134,600	10,700	15,100	22,300	10,500	23,600
1996	132,900	-	-	-	-	-
1997	135,500	-	-	-	-	-
1998	139,000	10,200	14,400	22,600	10,200	23,200
1999	143,500	-	-	-	-	-
2000	-	-	-	-	-	-
2001	141,800	10,200	14,500	21,900	11,200	23,300
2002	-	-	-	-	-	-
2003	-	-	-	-	-	-
2004	141,400	11,300	15,500	23,600	12,400	23,100
2005	-	-	-	-	-	-
2006	-	-	-	-	-	-
2007	141,400	9,400	13,100	20,500	11,900	21,300
2008	-	15,200	14,500	-	12,500	21,900
2009	-	-	15,900	-	12,500	23,000
2010	141,100	10,900	14,500	22,000	11,800	23,100
Average Annual Percent Change (AAPC)						
92-10	0.09%	0.48%	-1.34%	-	1.04%	0.22%
95-10	0.31%	0.12%	-0.27%	-0.09%	0.78%	-0.14%
98-10	0.13%	0.55%	0.06%	-0.22%	1.22%	-0.04%

Source: Existing Conditions Technical Memorandum, CDM Smith

Summary of CT DOT Counts using Traffic Count Locator Program (TCLP)

The two mainline continuous count stations (CCS) provide day-of-week, monthly, and yearly variations in traffic volumes. For ease of comparison, traffic volumes at all locations are extrapolated to a year 2012 baseline. Figure 2-17, following, summarizes the traffic on I-84 by month as a ratio compared to the year-round average daily traffic.

Volumes during the summer months are approximately five to ten percent higher than average weekday traffic. Winter months show volumes five to ten percent lower than the year-round average daily traffic.

Figure 2-17: I-84 Monthly Traffic Variation

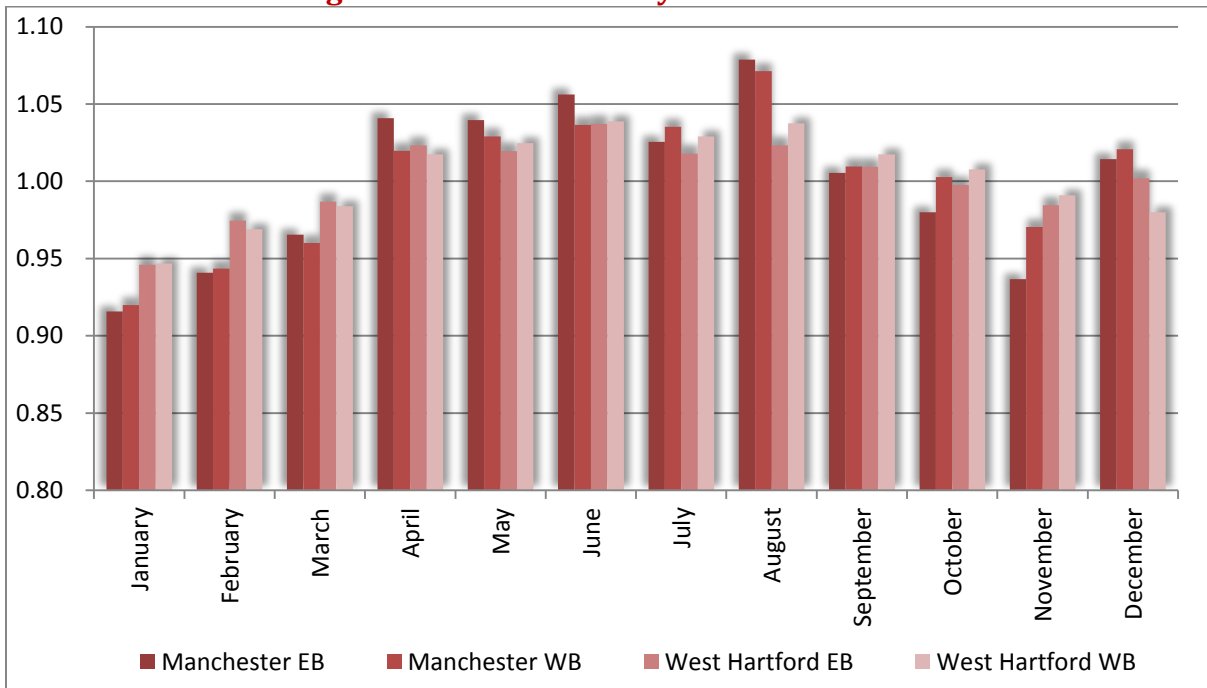
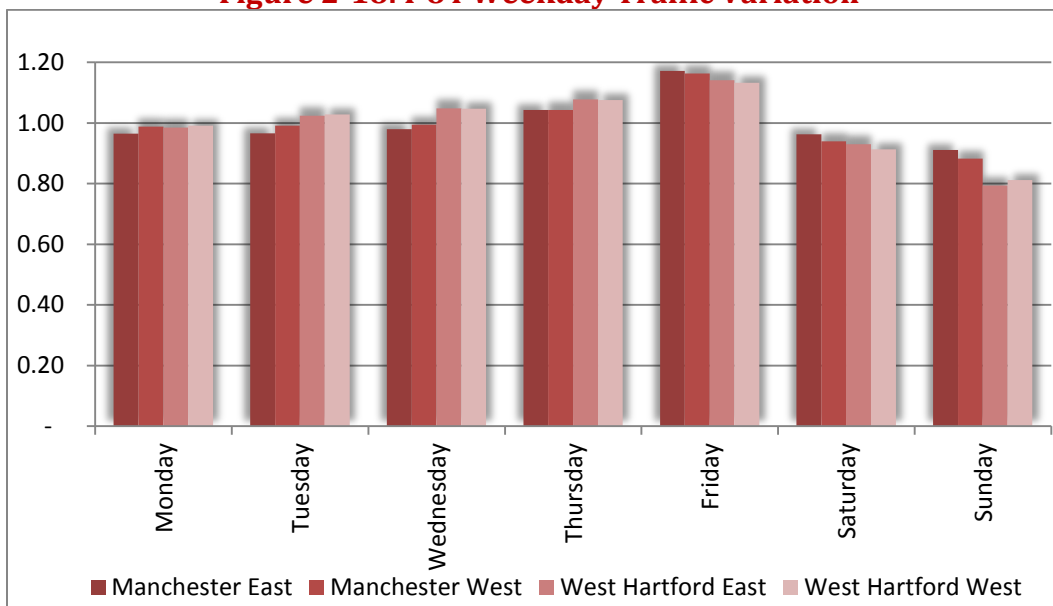


Figure 2-18, below, illustrates the daily variations as a ratio compared to the year-round average daily traffic at the same locations as presented in the monthly variations. Traffic increases throughout the week to the highest level on Friday, which is roughly twelve to twenty percent higher than the average daily traffic. Weekend traffic is roughly eighty to ninety percent of average weekday traffic. The lowest volumes are typically experienced on Sundays.

Figure 2-18: I-84 Weekday Traffic Variation



In the course of its I-84 Viaduct Value Pricing Study, CDM Smith developed a balanced count profile, a 24-hour normalized set of volumes for each ramp and freeway segment on I-84 from Farmington to Vernon and on I-91 from Hartford to Windsor Locks. The balanced count profile provides traffic volumes for a typical day for both I-84 and I-91 within and beyond the Study Area. It is also critical for calibrating the existing conditions microsimulation model (discussed in further detail in Section 2.4: Existing Traffic Operations) and the Study Area time of day travel demand model. The balanced count profile is included as Appendix A.2.1.

Daily Traffic Volumes

I-84 in Hartford carries more vehicles per day than any other route in Connecticut: nearly 175,000 at its busiest point. Eastbound, 61,000 vehicles enter Hartford from West Hartford, building up to a peak of 84,000 just after the Broad Street on-ramp. At the East Hartford town line, 70,000 vehicles travel east across the Connecticut River on an average day. Westbound, 69,000 vehicles cross the Bulkeley Bridge, increasing to 91,000 just before the ramp to Asylum Street, Exit 48. 64,000 of these continue to the West Hartford town line.

The busiest interchange in the Study Area is the three-level interchange of I-84 and I-91: 270,000 vehicles pass through this interchange every day. In particular, the busiest ramps in the corridor are from I-84 eastbound to I-91 northbound (22,800 vehicles per day) and from I-91 southbound to I-84 westbound (24,100 vehicles per day). Eight other ramps on I-84 carry more than 10,000 vehicles per day. Average daily traffic on I-84 through the Project Study Corridor is listed in Table 2-11, following. Appendix A.2.2 includes all supplemental counts obtained in December 2013 and April 2014 and utilized in the study.

Peak Hour Traffic Volumes

Like any road with recurring congestion, I-84 in Hartford exhibits flattened peak hours. That is, rather than distinct peaks in the morning and in the afternoon, traffic volumes plateau near a maximum value for multiple consecutive hours. The morning peak lasts from 7:30 to 9:00 AM, and in the afternoon, the peak period stretches from 3:30 to 6:00 PM. Peak hour volumes presented in Table 2-12, page 2-56, and discussed below are hourly volumes taken from the highest single hour within these peak periods.

West of Broad Street traffic primarily flows eastbound in the morning and westbound in the afternoon. East of Broad Street this pattern is reversed. This reflects Hartford's status as the main regional attractor of volume: in the morning, commuters pour into the city and the evening sees them head back out. Of particular relevance are Hartford's insurance and government offices, which attract thousands of trips from the surrounding suburbs each day. Overall, volumes are slightly higher in the afternoon peak than in the morning.

In the morning peak period, mainline traffic is heaviest eastbound just after the Sigourney Street on-ramp at 6,955 vehicles per hour. 1,580 vehicles take Exits 48A and 48B off-ramps to Asylum Street and Capitol Avenue and 1,560 leave I-84 for I-91 northbound. Westbound the mainline volume is highest

with 7,170 vehicles just before Asylum Street (Exit 48). Other than the I-91 ramps, the Asylum Street off-ramp is the busiest I-84 off-ramp within the Project Study Corridor carrying 1,770 vehicles from I-84 to Garden Street, Asylum Street, and Farmington Avenue.

In the afternoon, eastbound mainline traffic peaks at 6,985 just after the Broad Street on-ramp. 1,585 vehicles enter I-84 eastbound from Broad Street and 1,685 take Exit 51 to I-91 northbound. Westbound the highest traffic volume is 7,050 vehicles just before the off-ramp to Sigourney Street (Exit 47). The westbound on-ramp with the greatest contributing volume is the turning roadway from I-91 southbound carrying 1,685 vehicles.

Table 2-11: I-84 Average Daily Traffic Summary

Westbound	ADT	Eastbound	ADT
Mainline – West of Flatbush	64,405	Mainline – West of Flatbush	60,880
Flatbush Ave. Off-Ramp	9,275	Flatbush Ave. On-Ramp	8,555
Sisson Ave. On	5,335	Sisson Ave. Off-Ramp	4,780
Sisson Ave. Off-Ramp	8,695	Sisson Ave. On-Ramp	10,675
Sigourney St. Off-Ramp	8,565	Sigourney St. On-Ramp	8,265
Mainline	85,600	Mainline	83,595
Capitol Ave. On-Ramp	5,410	Capitol Ave. Off-Ramp	6,295
Asylum St. On-Ramp	4,245	Asylum St. Off-Ramp	5,865
Asylum Ave. Off-Ramp	14,715	Broad St. On-Ramp	12,505
Mainline	90,665	Mainline	83,935
High St. On-Ramp	5,225	High St. Off-Ramp	1,740
Trumbull St. On-Ramp	3,130	Trumbull St. Off-Ramp	3,080
Mainline	82,310	Mainline	79,115
I-91 Northbound On-Ramp	12,225	I-91 Northbound Off-Ramp	22,760
I-91 Southbound On-Ramp	24,110	I-91 Southbound Off-Ramp	11,220
Morgan St. Off-Ramp	8,275	Morgan St. On-Ramp	10,440
I-91 Northbound Off-Ramp	15,220	I-91 Southbound On-Ramp	14,030
Bulkeley Bridge	69,470	Bulkeley Bridge	69,605

Table 2-12: Existing (2012) I-84 Peak Hour Volumes and Directional Distributions

Description	Westbound							Description	Eastbound						
	AM Peak Hour (7:30 – 9 AM)			PM Peak Hour (3:30 – 6 PM)			ADT		AM Peak Hour (7:30 – 9 AM)			PM Peak Hour (3:30 – 6 PM)			ADT
	Volume (Vehicles per Hour)	% of Daily Traffic	Directional Distribution	Volume (Vehicles per Hour)	% of Daily Traffic	Directional Distribution			Volume (Vehicles per Hour)	% of Daily Traffic	Directional Distribution	Volume (Vehicles per Hour)	% of Daily Traffic	Directional Distribution	
Mainline	3,730	6%	42%	5,450	8%	59%	64,405	Mainline	5,070	8%	58%	3,865	6%	41%	60,880
Flatbush Ave. Off	690	7%	50%	860	9%	54%	9,275	Flatbush Ave. On	680	8%	50%	745	9%	46%	8,555
Sisson Ave. On	245	5%	37%	495	9%	63%	5,335	Sisson Ave. Off	410	9%	63%	285	6%	37%	4,780
Sisson Ave. Off	760	9%	39%	965	11%	53%	8,695	Sisson Ave. On	1,200	11%	61%	860	8%	47%	10,675
Sigourney St. Off	1,160	14%	71%	630	7%	34%	8,565	Sigourney St. On	470	6%	29%	1,235	15%	66%	8,265
Mainline	5,855	7%	46%	7,050	8%	53%	85,600	Mainline	6,955	8%	54%	6,265	7%	47%	83,595
Capitol Ave. On	195	4%	19%	685	13%	70%	5,410	Capitol Ave. Off	840	13%	81%	290	5%	30%	6,295
Asylum St. On	130	3%	15%	680	16%	69%	4,245	Asylum St. Off	740	13%	85%	310	5%	31%	5,865
Asylum Ave. Off	1,770	12%	76%	770	5%	33%	14,715	Broad St. On	550	4%	24%	1,585	13%	67%	12,505
Mainline	7,170	8%	54%	6,775	7%	49%	90,665	Mainline	6,050	7%	46%	6,985	8%	51%	83,935
High St. On	280	5%	52%	565	11%	84%	5,225	High St. Off	260	15%	48%	110	6%	16%	1,740
Trumbull St. On	130	4%	21%	470	15%	80%	3,130	Trumbull St. Off	490	16%	79%	120	4%	20%	3,080
Mainline	6,765	8%	56%	6,110	7%	47%	82,310	Mainline	5,300	7%	44%	6,755	9%	53%	79,115
I-91 NB On	1,095	9%	41%	860	7%	34%	12,225	I-91 NB Off	1,560	7%	59%	1,685	7%	66%	22,760
I-91 SB On	1,565	6%	66%	1,685	7%	64%	24,110	I-91 SB Off	810	7%	34%	940	8%	36%	11,220
Morgan St. Off	945	11%	64%	500	6%	28%	8,275	Morgan St. On	530	5%	36%	1,285	12%	72%	10,440
I-91 NB Off	1,315	9%	57%	1,175	8%	48%	15,220	I-91 SB On	990	7%	43%	1,290	9%	52%	14,030
Bulkeley Bridge	6,490	9%	60%	5,135	7%	44%	69,470	Bulkeley Bridge	4,350	6%	40%	6,515	9%	56%	69,605

Turning Count Volumes

In addition to mainline and ramp traffic counts, turning movement (TM) counts were performed at 78 intersections within the Study Area. Manual turning counts and automated traffic recorder volumes were collected along Hartford's major secondary roads. These count locations are illustrated on Figure 2-15, page 2-50. The count data is included in Appendix A.2.2. Supplemental counts were obtained in December 2013 and April 2014. These TM Counts were used for intersection analyses and calibration of existing conditions microsimulation models (see Section 2.4: Existing Traffic Operations for further detail). In special cases, where TM counts and traffic counts were not comparable, engineering judgment was used to account for any discrepancy between the two sources. A roadway segment can have multiple access points (e.g., mid-block driveways, minor streets, parking garages) and thus, the number of cars departing an upstream intersection may not match the number arriving at the next intersection downstream.

Origin and Destination Data

On freeways, weaving traffic tends to degrade the level of service and reduce capacity. Closely spaced interchanges, left-hand ramps, lane drops, and high numbers of lanes tend to increase the severity of weaving; all of these features are present on I-84 within the Project Study Corridor. Origin-destination data is critical to understanding and modeling traffic flow, especially when evaluating weave conditions.

Using multiple helicopter-mounted cameras hovering in place over Hartford for ninety minutes at a time, as well as two cameras on the ground to record the 'tunnel' downtown, Skycomp recorded 5,400 sets of high-resolution photos for each peak period. A computer algorithm then tracked individual vehicles through the network to produce the required data. Skycomp summarized the origin-destination data into a matrix format for the AM and PM periods in the westbound and eastbound directions. The adjusted origin-destination matrix is included in Appendix A.2.3. The procedure and results are summarized in the Aerial Photo Survey Data Collection Summary Report, included in Appendix A.2.4.

For the majority of off-ramps, knowing the associated origin-destination data and the turning counts at the adjacent intersection is sufficient to develop a microsimulation model. The sole exception within the Study Area is Exit 46, the off-ramps to Sisson Avenue. The two I-84 off-ramps converge 580 feet before the intersection, which results in a significant weave during peak hours. To determine the proportion of turning traffic coming from each ramp, vehicles were manually tracked during both peak hours.

Using the origin-destination matrices from Skycomp and the balanced count profile from CDM Smith, the number of vehicles on each route was calculated. Where mismatches existed between the two data sources, the volumes were held constant and the routes modified as little as possible. The results are summarized in Figure 2-19 through Figure 2-22, pages 2-59 through 2-62. Each figure represents one direction of I-84 trips for one of the two peak periods. All vehicle trips are broken down into six categories: trips that cross Hartford on I-84 (through), trips entering Hartford on I-84 and exiting somewhere in the City (inbound), trips between I-84 and I-91, trips entering the freeway within the City and leaving Hartford on I-84 (outbound), trips between I-91 and other exits within Hartford, and trips

that both enter and leave I-84 within Hartford (local). Each category has been assigned a fixed color band with a width proportional to traffic volume. These color bands are identified and described below.

For the morning peak, the Skycomp data extends from 7:30 AM to 9:00 AM, similar to the observed peak from 7:00 AM to 9:00 AM. Some adjustments and interpolation were necessary. Figure 2-19 and Figure 2-20 illustrate how traffic flows primarily into Hartford during the AM peak period. Out of 22,500 trips in the 120-minute interval, 5,700 (25%) are through trips (yellow band), 3,000 (13%) go between I-84 and I-91 (orange band), 5,700 (25%) are inbound trips exiting I-84 within Hartford (blue band), 2,400 (10%) originate in Hartford and exit the city on I-84 (magenta band), 4,300 (19%) go between I-91 and local roads via I-84 (green band), and 1,500 (7%) are purely local trips (black band).

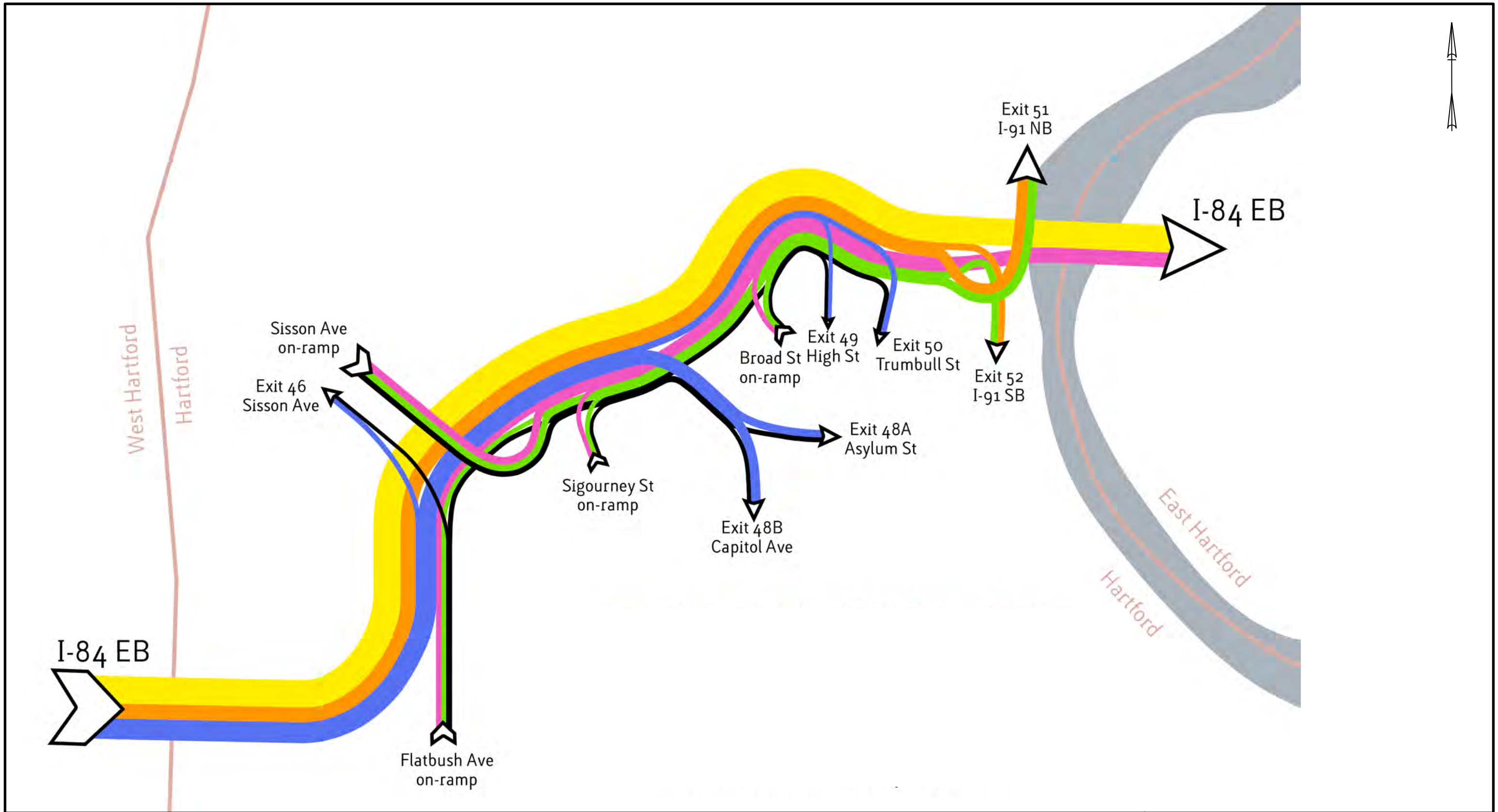
In the afternoon, the trend reverses, and traffic flows primarily out of Hartford, as illustrated in Figure 2-21 and Figure 2-22. For the analysis, Skycomp data was collected between 3:00 PM and 4:30 PM, and was adjusted and interpolated to reflect the afternoon peak period from 3:00 PM to 6:00 PM. Out of 37,700 total trips in the 180-minute interval, 9,800 (26%) are through trips (yellow band), 5,000 (13%) go between I-84 and I-91 (orange band), 4,500 (12%) are inbound trips exiting I-84 within Hartford (blue band), 9,700 (26%) originate in Hartford and exit the city on I-84 (magenta band), 6,300 (17%) go between I-91 and local roads via I-84 (green band), and 2,300 (6%) are purely local trips (black band).

Many of these routes require significant weaving maneuvers due to the presence of left-hand ramps and the lack of lane balance. Even where crossing the freeway is legally prohibited, such as between the Capitol Avenue on-ramp and Exits 47 (Sigourney Street) and 46 (Sisson Avenue), hundreds of motorists make these maneuvers every day. Microsimulation modeling of this weaving behavior is essential to understanding traffic operations on I-84 in Hartford.

2.2.2 Travel Speeds

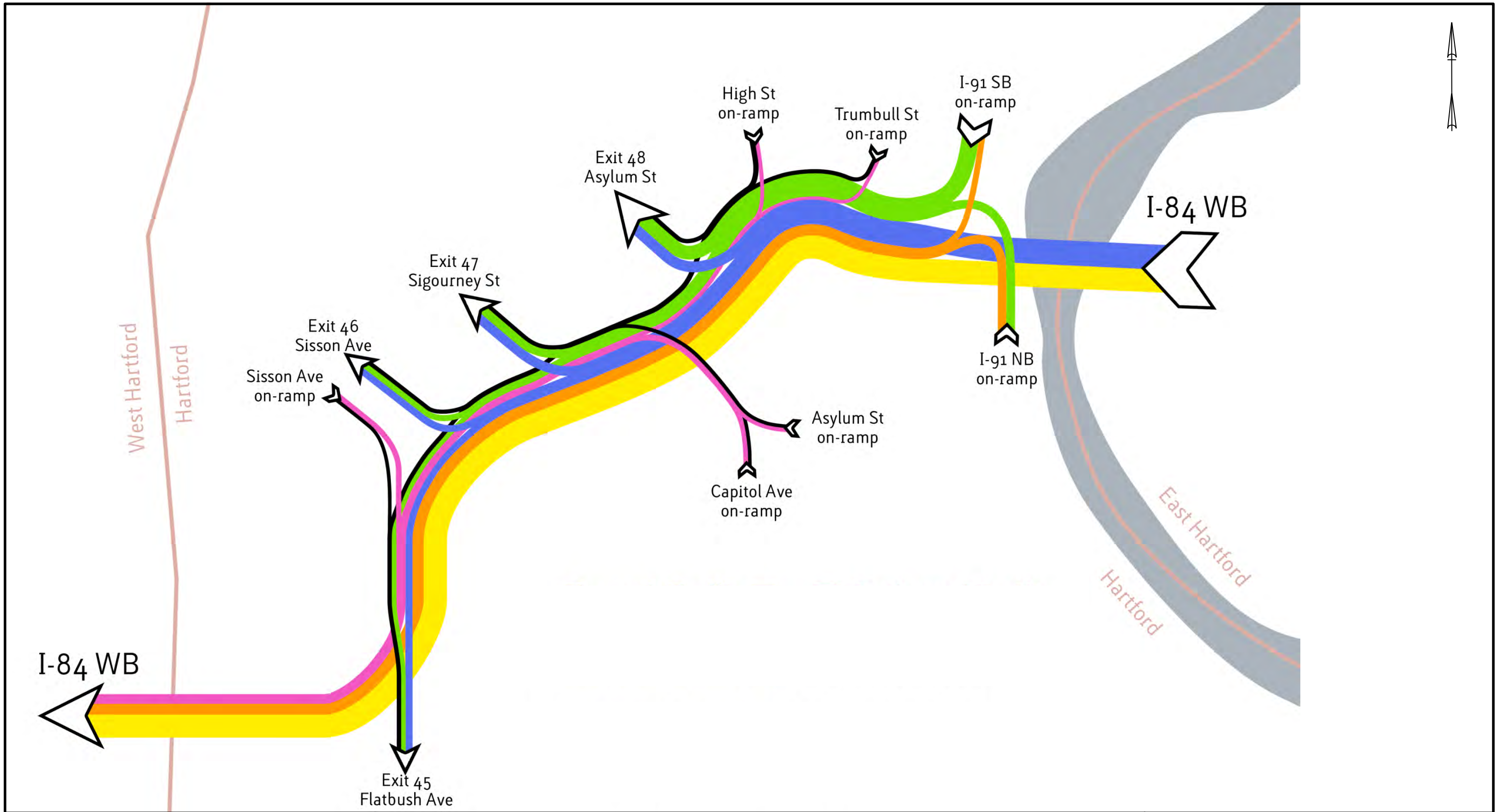
In order to develop a comprehensive understanding of recurring congestion and to calibrate various models, travel speed data was acquired from INRIX from the year 2012. INRIX operates the largest crowd-sourced data network in the world, tapping into 30 million anonymous GPS and smartphone devices worldwide. This real-time traffic source, including everyday users such as trucks, delivery vans, and other fleet vehicles equipped with GPS locator devices, and everyday smart phone GPS application users, provides reference travel speeds data along the Connecticut roadway network. For analysis, only Tuesdays through Thursdays were used as inputs, and outliers (e.g., holidays, traffic incidents) were removed.

INRIX averages speeds across all lanes, and removes outliers considered excessively high or low. Because of this, if one lane is moving at 50 mph and the adjacent lane is only going 10 mph, INRIX will report a speed of 30 mph, which does not provide a full picture of traffic conditions.




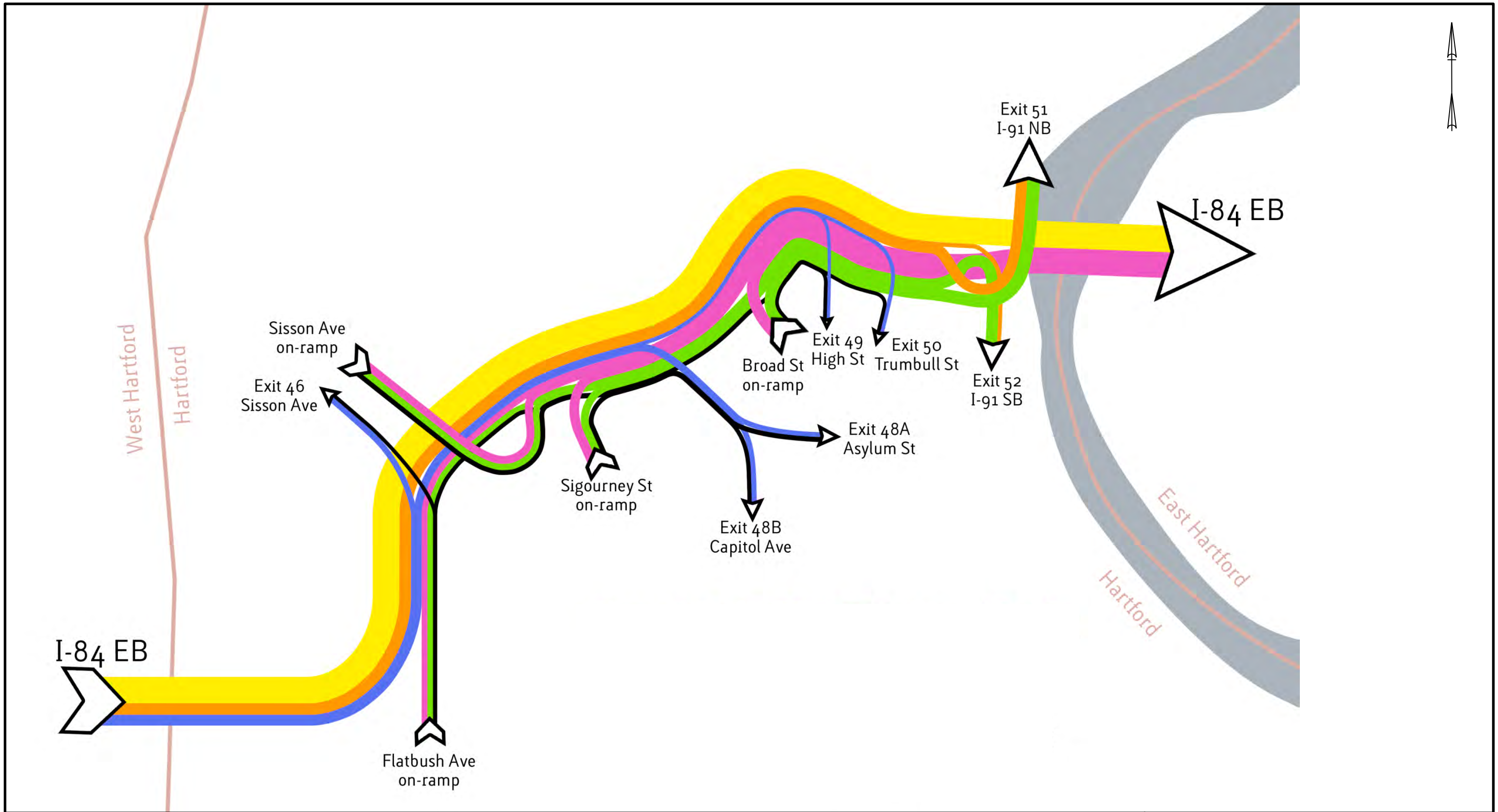
LEGEND	
Through Traffic	Yellow
I-84 to I-91	Orange
Inbound Traffic	Blue
Outbound Traffic	Pink
Local to I-91	Green
Local Traffic	Black

	The I-84 Hartford Project	
	I-84 Origin Destination Map - Eastbound, AM Peak	
	Date: 5/19/2014	Drawn By: TranSystems




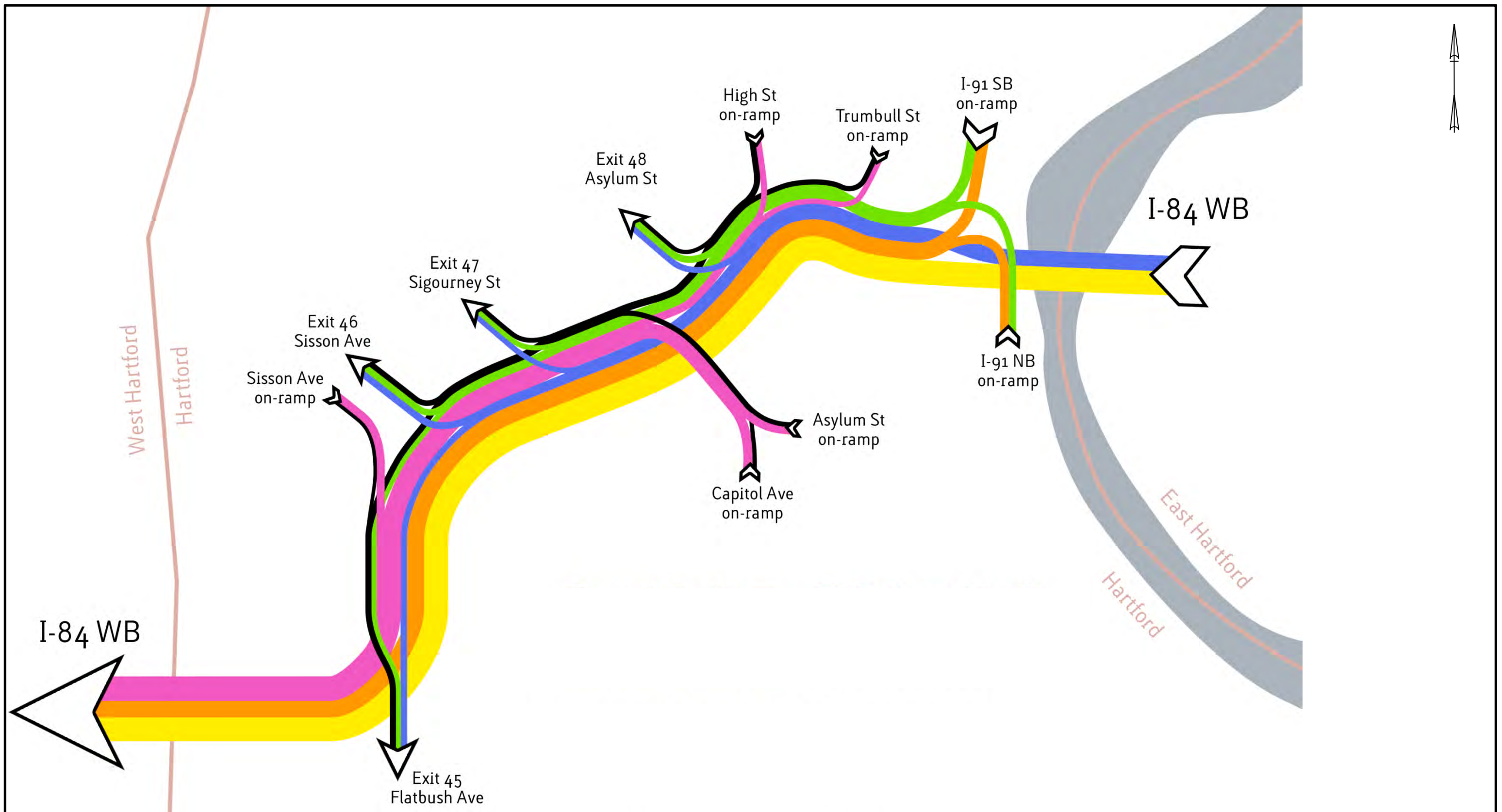
LEGEND	
Through Traffic	Yellow
I-84 to I-91	Orange
Inbound Traffic	Blue
Outbound Traffic	Pink
Local to I-91	Green
Local Traffic	Black

 The I-84 Hartford Project		
I-84 Origin Destination Map - Westbound, AM Peak		
Date: 5/19/2014	Drawn By: TranSystems	Figure No: 2-20



LEGEND	
Through Traffic	Yellow
I-84 to I-91	Orange
Inbound Traffic	Blue
Outbound Traffic	Pink
Local to I-91	Green
Local Traffic	Black

 The I-84 Hartford Project		
I-84 Origin Destination Map - Eastbound, PM Peak		
Date: 5/19/2014	Drawn By: TranSystems	Figure No: 2-21



LEGEND	
Through Traffic	Yellow
I-84 to I-91	Orange
Inbound Traffic	Blue
Outbound Traffic	Pink
Local to I-91	Green
Local Traffic	Black


 The I-84 Hartford Project		
I-84 Origin Destination Map - Westbound, PM Peak		
Date: 5/19/2014	Drawn By: TranSystems	Figure No: 2-22

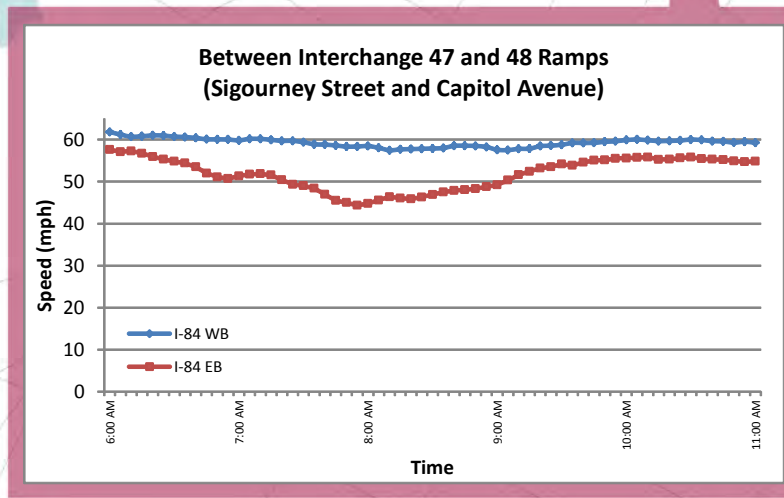
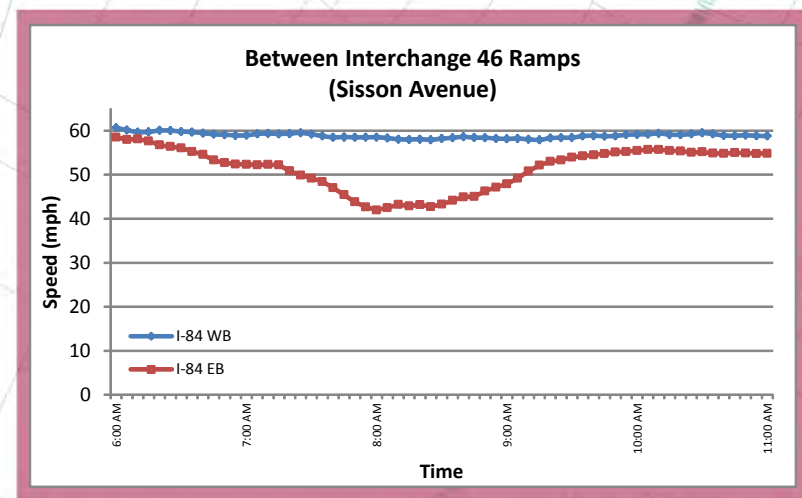
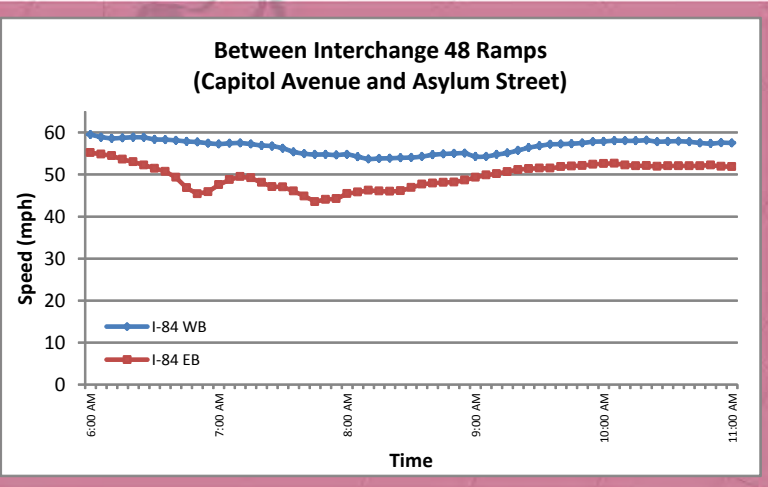
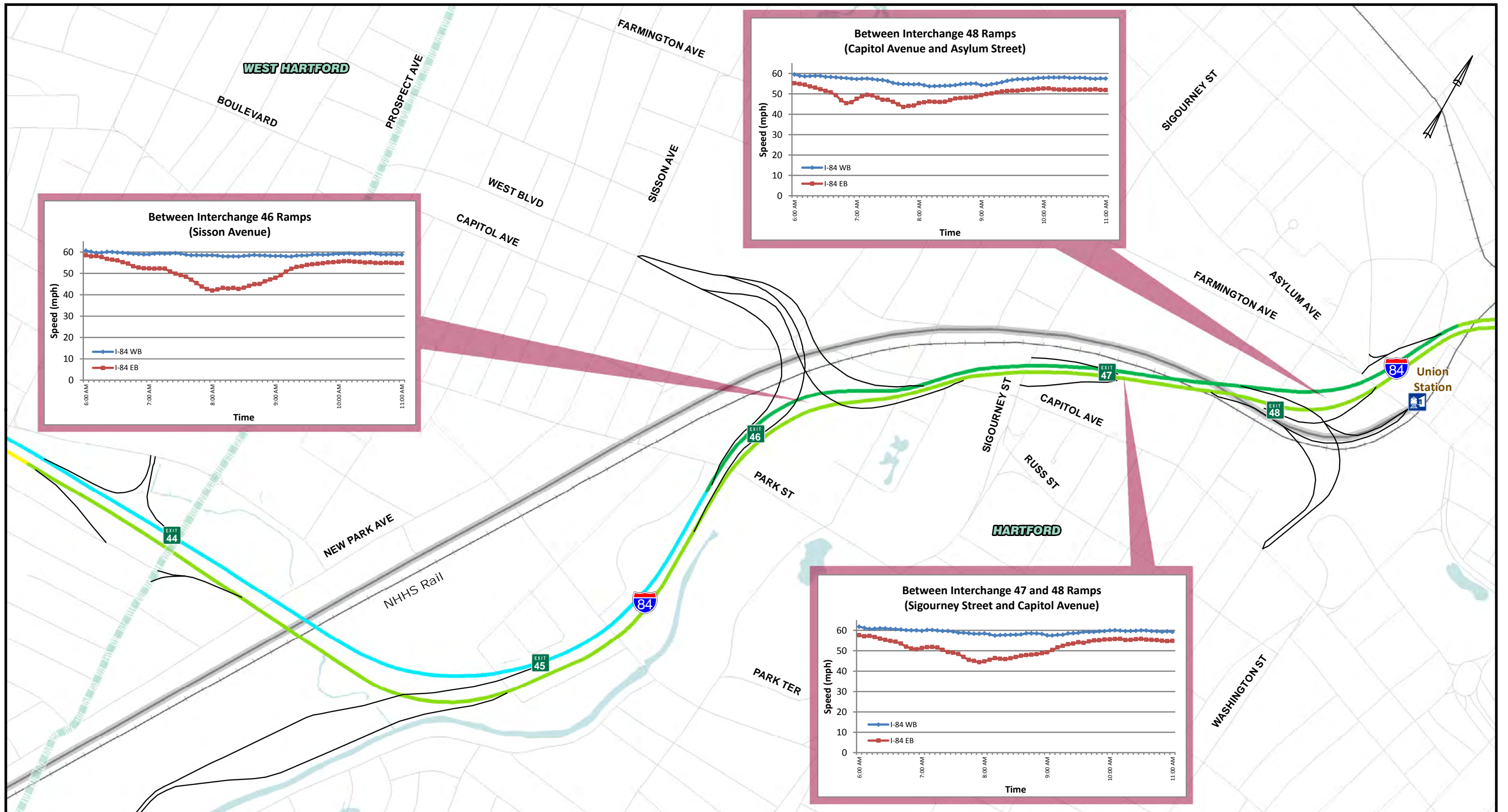
Figure 2-23 through Figure 2-26, pages 2-64 through 2-67, illustrate the average travel speeds during AM and PM peak periods. Average vehicle speeds throughout a typical weekday are presented in graphical heat maps in Appendix A.2.5. The time-of-day variations in travel speed are displayed in graphs in Figure 2-23 through Figure 2-26. The substantial dips in travel speeds and consequential increases in delay are readily visible. It is important to remember that INRIX averages speeds across all lanes. For example, on I-84 westbound just before Exit 47 (Sigourney Street), the right lane is typically congested in the AM peak but adjacent lanes move at normal speed. INRIX reports an average speed of 54 mph here at 8:10 AM; the speed differential across the lanes, though, is significant. The speed limit on I-84 throughout the Project Study Corridor is 50 mph.

Travel speeds on I-84 in Hartford are heavily time-dependent. Speeds tend to stay between 55 and 65 mph during off-peak time periods, generally constrained by the roadway geometry. Segments of I-84 with full acceleration and deceleration lanes and wide shoulders generally have average speeds above 60 mph. On the viaduct itself, where shoulders are very narrow and intense weaving is present, average speeds dip below 60 mph. At the curve just north of Union Station, where the geometry is most constraining, eastbound traffic does not exceed 55 mph on average. Westbound traffic flows at an average speed of 55 mph from the Bulkeley Bridge through the depressed section downtown.

Traffic speeds vary far more during the peak hours than in off-peak hours, due to traffic congestion. Because of the fine gradations afforded by the data, it is possible to track how congestion affects different roadway segments over time. On I-84 eastbound in the morning peak, average speeds around the Union Station curve hover around 45 mph from 6:45 AM to 8:00 AM. Speeds in West Hartford are even slower. Half a mile before Exit 44 (Prospect Avenue), traffic moves slower than 40 mph between 7:30 AM and 8:50 AM, to as slow as 24 mph at 8:00 AM. Farther downstream, along the weaving section between the Flatbush Avenue on-ramp and the Exit 46 (Sisson Avenue) off-ramp, average speeds stay below 50 mph between 7:30 AM and 9:10 AM with a minimum of 36 mph at 8:00 AM.

Westbound commuters see even worse traffic in the morning. Average speeds first dip below 50 mph in the short weaving section between the High Street on-ramp and Exit 48 (Asylum Street) at 6:55 AM and remain below 50 mph until 9:40 AM. The majority of congestion occurs east of the Connecticut River. At 8:00 AM, travel speeds are below 45 mph between Exit 57 (CT 15) and Exit 48 (Asylum Street), a distance of 2.8 miles. Traffic moves slowest between Exit 56 (Governor Street) and the Bulkeley Bridge: below 20 mph between 7:45 AM and 8:30 AM.

In contrast to the morning peak, Hartford itself bears the brunt of afternoon congestion. In the eastbound direction, speeds first drop below 45 mph at 3:10 PM between the Sisson Avenue on-ramp and Exit 48A-B (Capitol Avenue and Asylum Street). This heavy weave segment remains congested for over three hours, until 6:30 PM. The worst congestion occurs at 5:30 PM with sub-45 mph average speeds spanning the entirety of Hartford's city limits. In the most congested segment of the freeway, eastbound between the Sigourney Street on-ramp and the Capitol Avenue/Asylum Street off-ramp, average speeds drop as low as 13 mph at 5:30 PM.



AM Peak Average Speeds

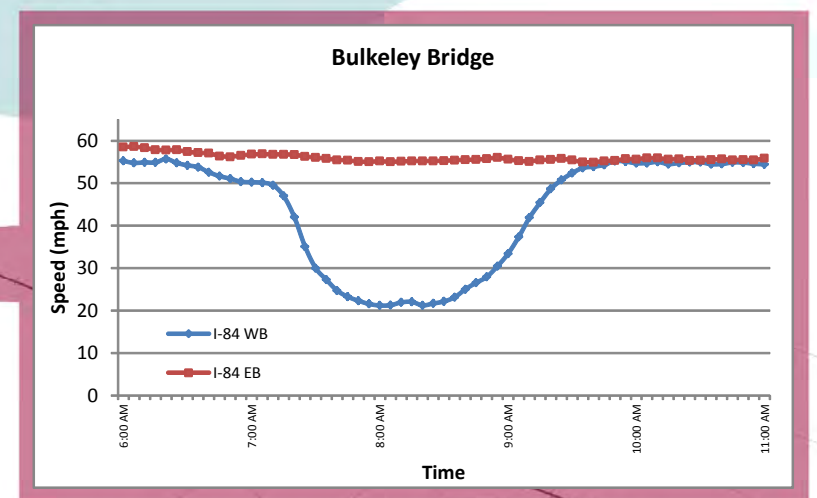
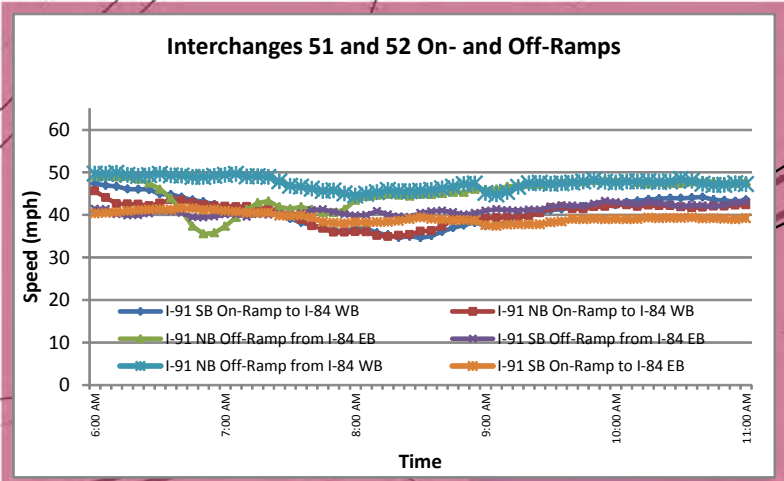
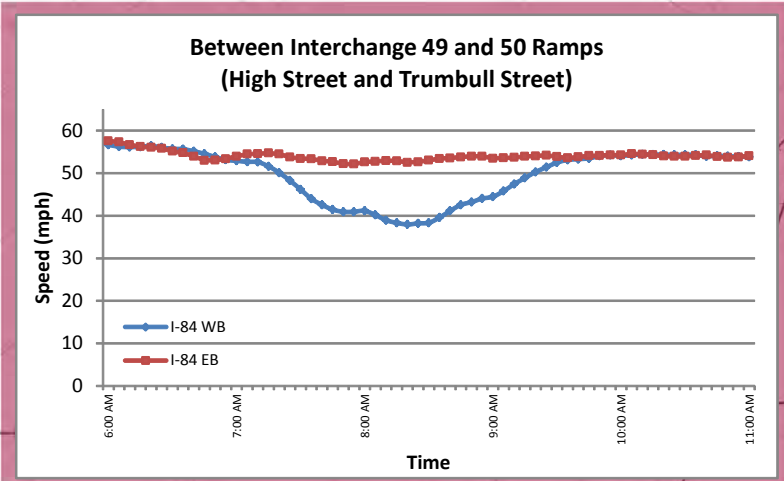
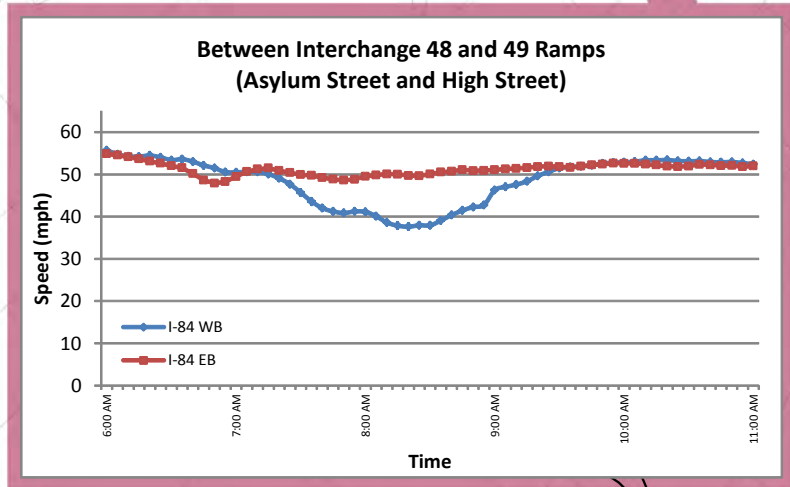
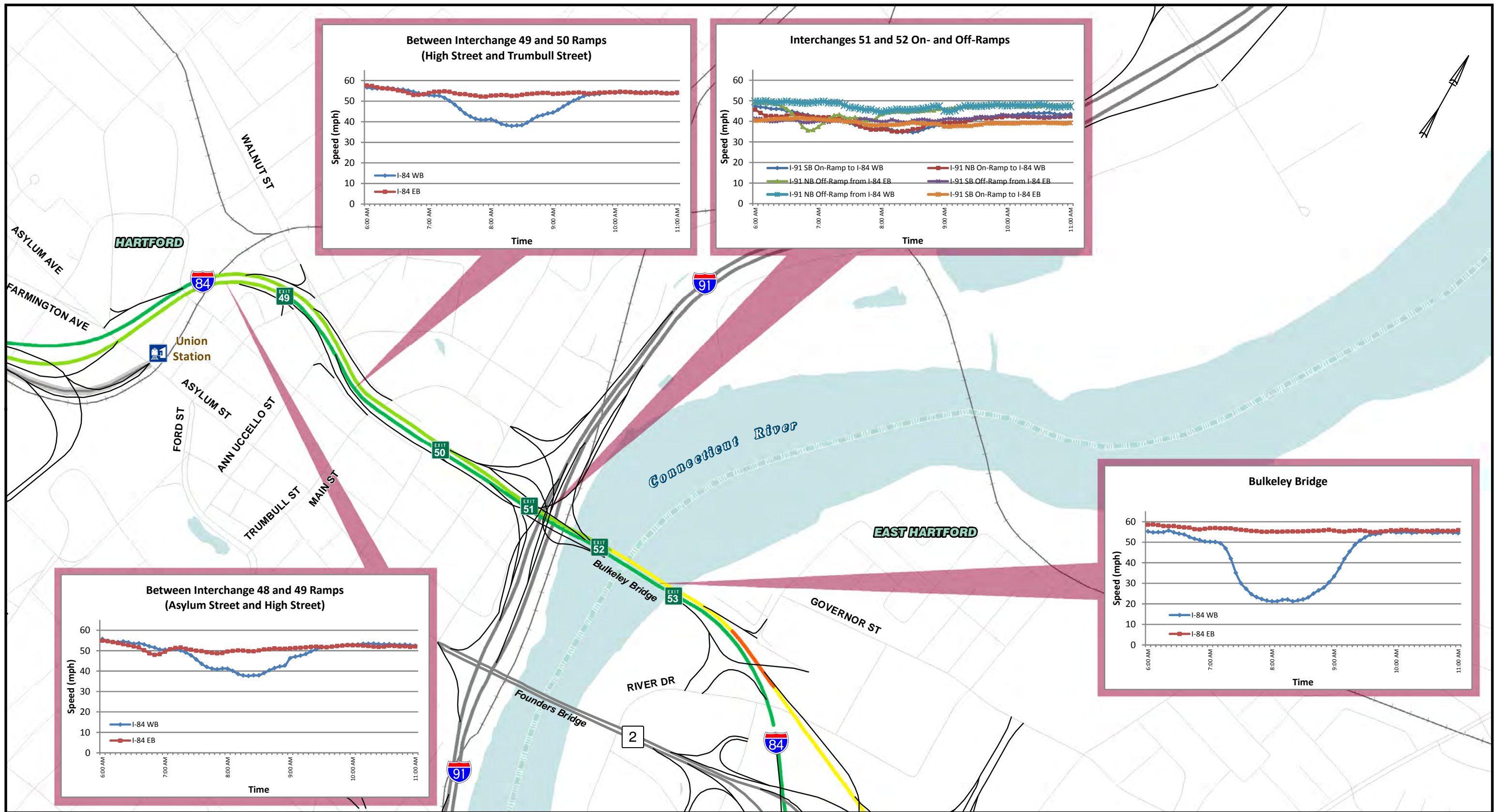
<10 mph	40-50 mph	Railroad	I-84 Exit #	Ramp
10-20 mph	50-60 mph	CTfastrak	Union Station	
20-30 mph	>60 mph	Town/City Limit	Park	
30-40 mph		Water		

Sources of Data: INRIX, City of Hartford, ESRI
<http://www.ctfastrak.com/>

The I-84 Hartford Project

Existing (2012) I-84 Inrix Average Speed Map – AM Peak, West End

Date: 1/12/2015 Drawn By: TranSystems Figure No: 2-23



AM Peak Average Speeds

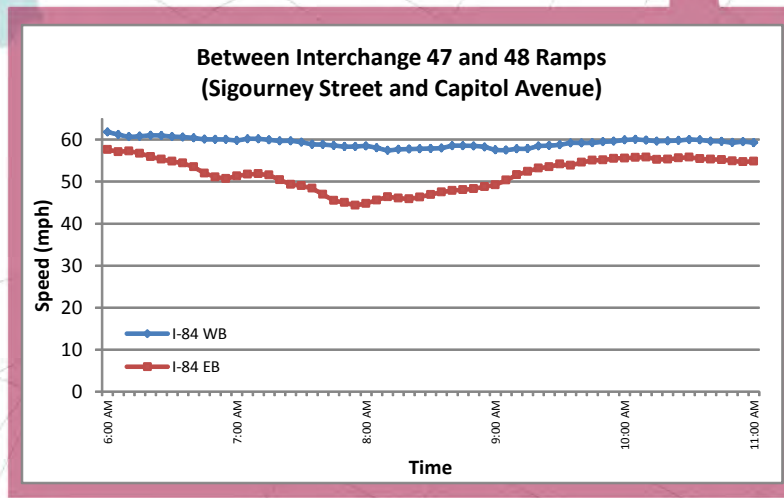
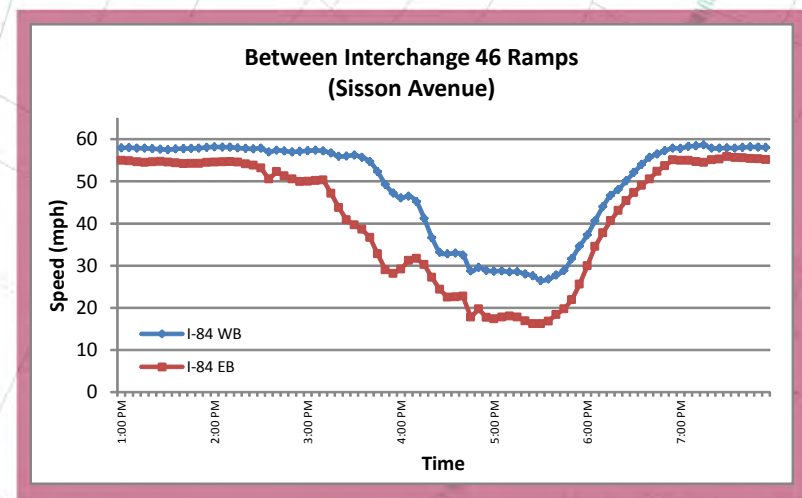
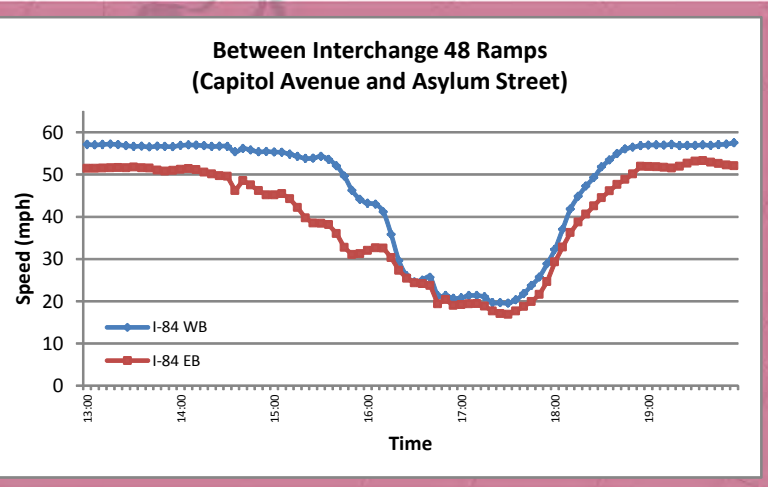
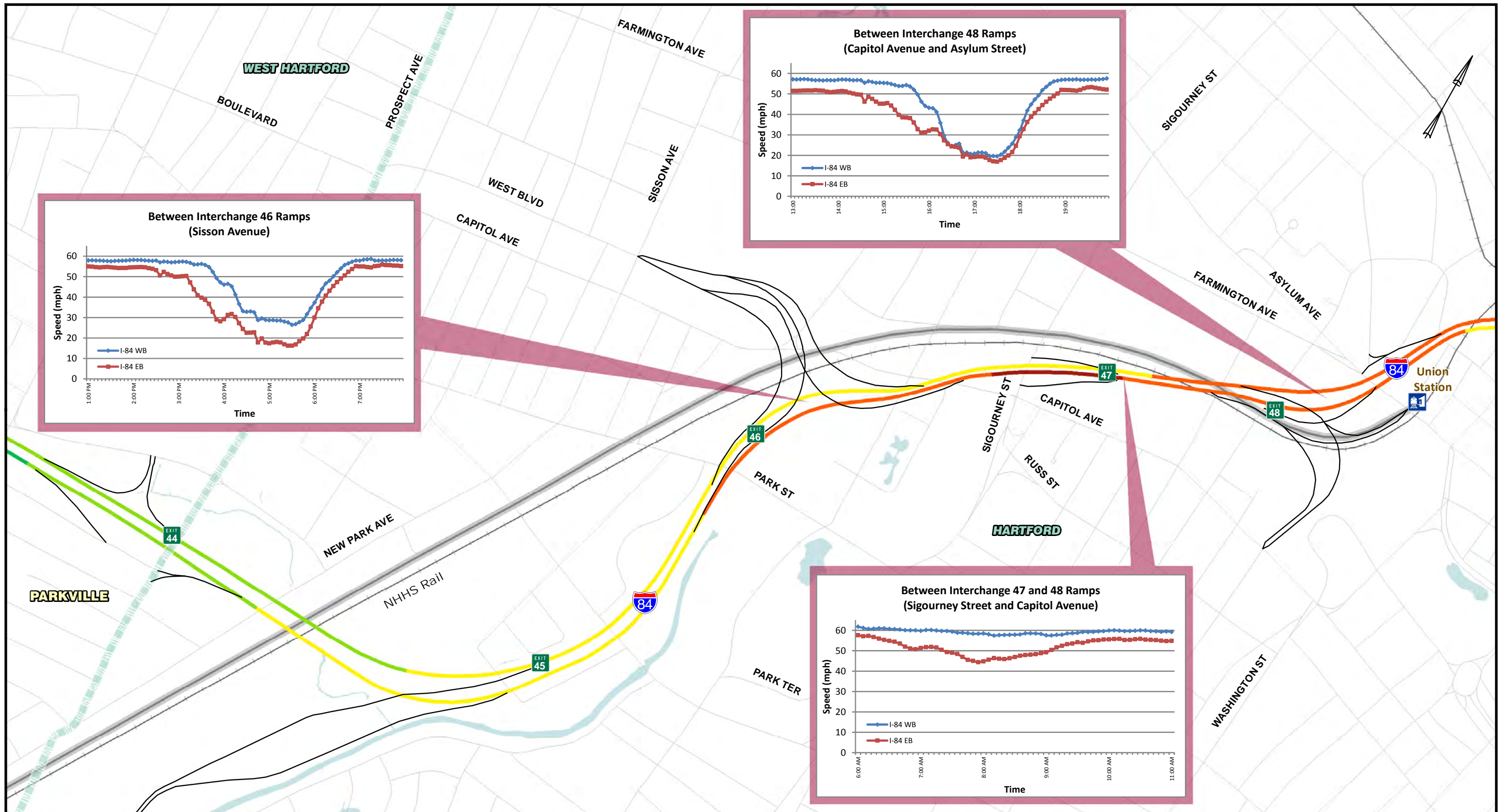
<10 mph	40-50 mph	Railroad	I-84 Exit #	Ramp
10-20 mph	50-60 mph	CTfastrak	Union Station	
20-30 mph	>60 mph	Town/City Limit	Park	
30-40 mph		Water		

Sources of Data: INRIX, City of Hartford, ESRI
<http://www.ctfastrak.com/>

The I-84 Hartford Project

Existing (2012) I-84 Inrix Average Speed Map – AM Peak, East End

Date: 1/12/2015 Drawn By: TranSystems Figure No: 2-24



PM Peak Average Speeds

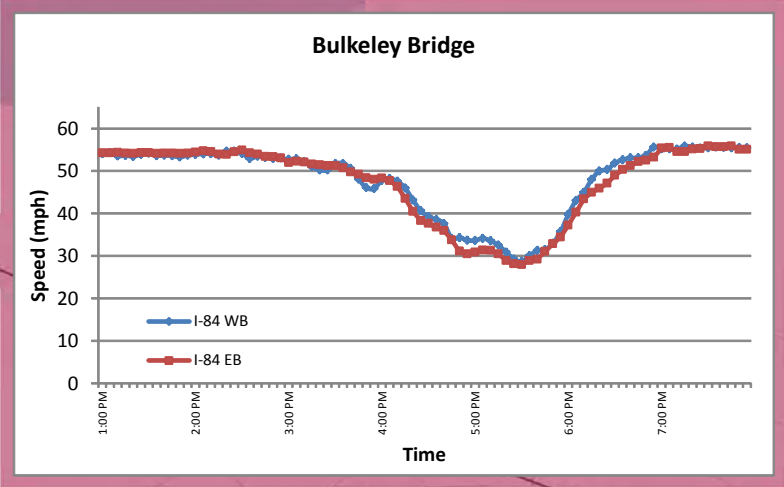
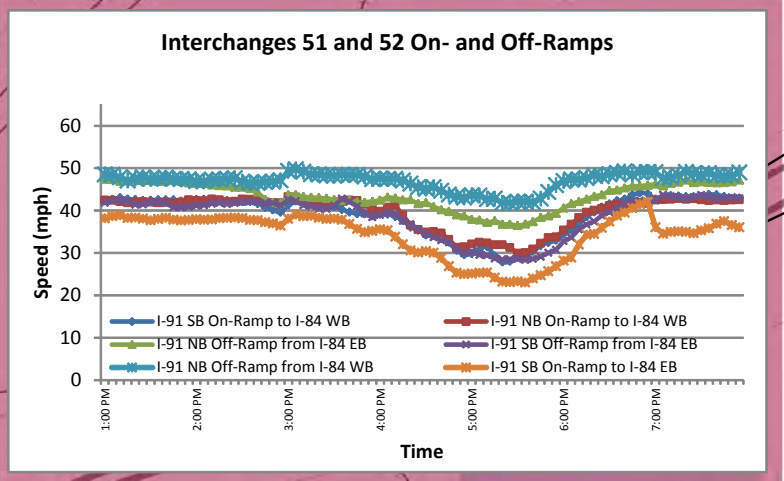
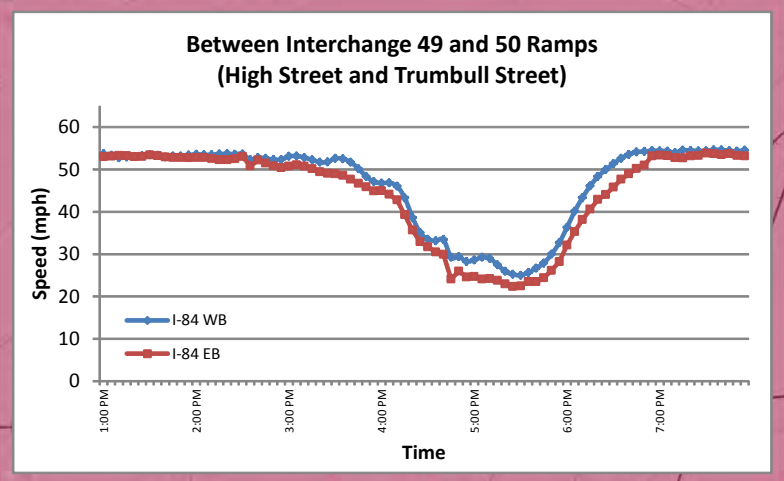
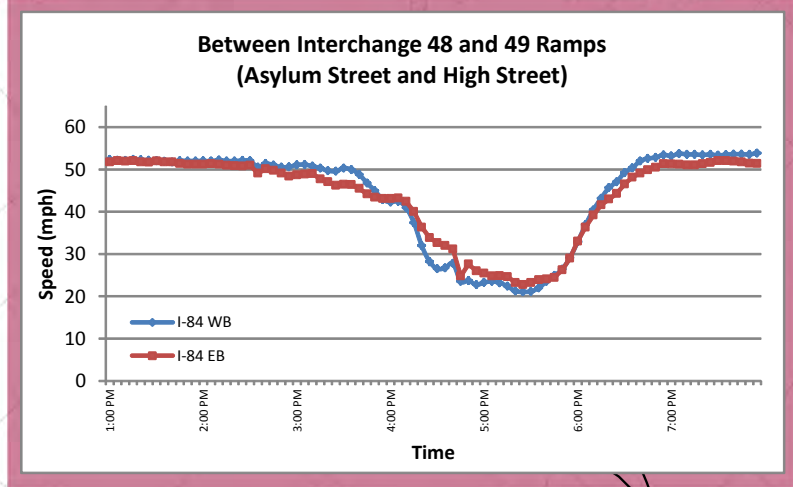
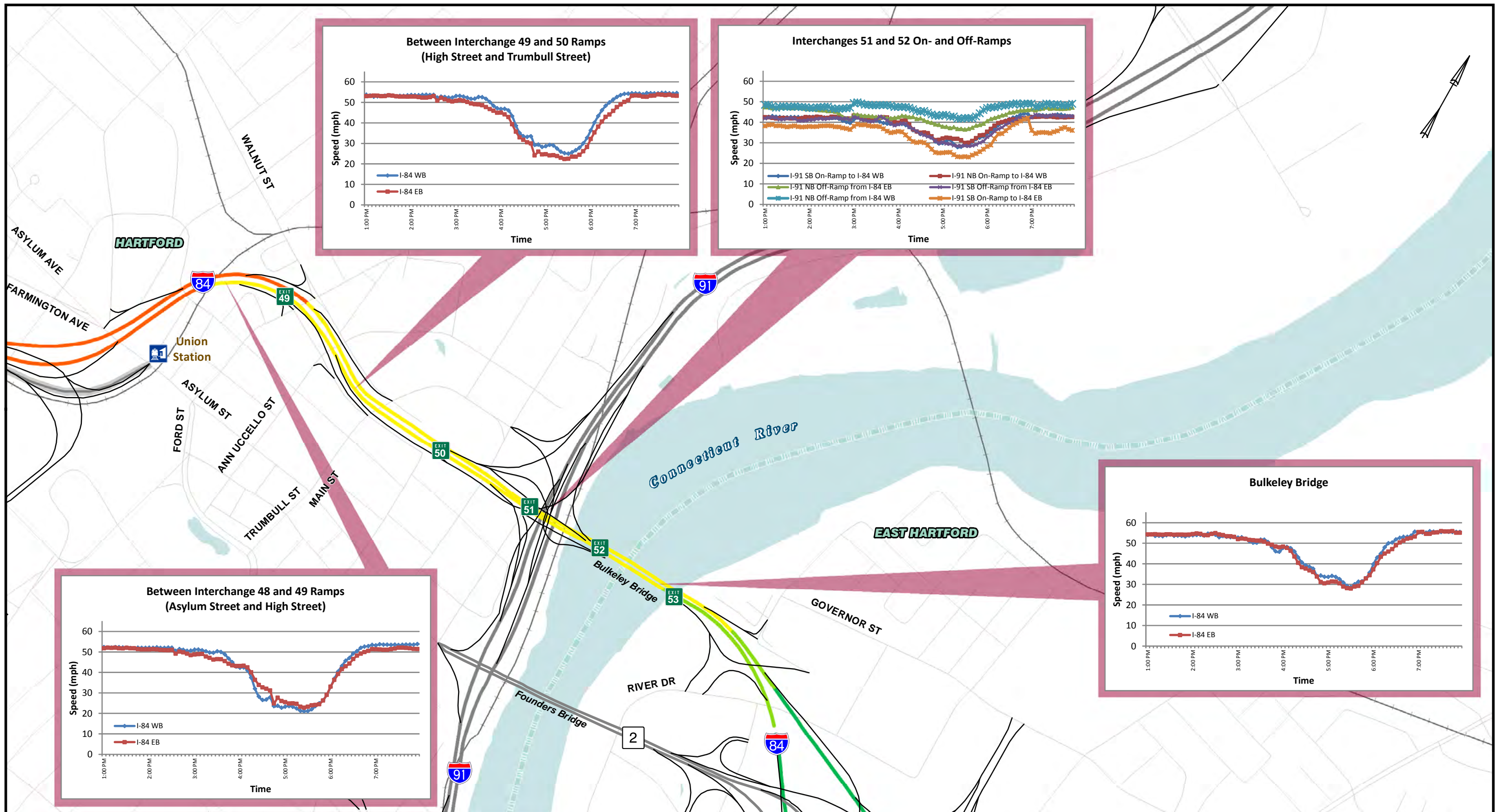
<10 mph	40-50 mph	Railroad	I-84 Exit #	Ramp
10-20 mph	50-60 mph	CTfastrak	Union Station	
20-30 mph	>60 mph	Town/City Limit	Park	
30-40 mph		Water		

Sources of Data: INRIX, City of Hartford, ESRI
<http://www.ctfastrak.com/>

The I-84 Hartford Project

Existing (2012) I-84 Inrix Average Speed Map – PM Peak, West End

Date: 1/12/2015 Drawn By: TranSystems Figure No: 2-25



PM Peak Average Speeds

<10 mph	40-50 mph	Railroad	I-84 Exit #	Ramp
10-20 mph	50-60 mph	CTfastrak	Union Station	
20-30 mph	>60 mph	Town/City Limit	Park	
30-40 mph		Water		

Scale: 0, 650, 1,300 Feet

Sources of Data: INRIX, City of Hartford, ESRI
<http://www.ctfastrak.com/>

The I-84 Hartford Project

Existing (2012) I-84 Inrix Average Speed Map – PM Peak, East End

Date: 1/12/2015 Drawn By: TranSystems Figure No: 2-26

On I-84 westbound, the epicenter of congestion is the segment between the High Street on-ramp and the off-ramp to Exit 48 (Asylum Street). Speeds here hover around 50 mph at midday, then drop below 45 mph at 3:50 PM and stay there until 6:20 PM. From 5:20 PM to 5:30 PM, traffic flows through downtown Hartford at 20 – 25 mph with sub-45 mph average speeds extending out from the Exit 56 (Governor Street) off-ramp to the on-ramp from CT 173 (South Main Street) in West Hartford.

2.2.3 Supplemental Data Collection

The City of Hartford's Department of Public Works provided signal plans and timings for most of their signalized intersections within the Study Area. Each intersection to be modeled was observed in the field during both peak periods including signal phasing, lane use, and turn restrictions, as well as counting queue lengths on each approach for model calibration.

Traffic-relevant road geometry was collected using online mapping services, i.e., Google Maps, Bing Maps, and Pictometry Online. This includes lane use, storage length, stop bar location, elevation, on-street parking, and pedestrian and bicycle facilities. Street-level imagery from Google and Bing was used to gather information on speed limits, turn restrictions, guide signs, and bus stop locations. On I-84, construction plans contained detailed elevations and grades for use in the microsimulation model.

2.2.4 Heavy Vehicles

Heavy vehicle volumes were measured at six locations along I-84: in Farmington, between CT 4 and CT 9; at the West Hartford-Hartford town line; in Hartford, between Sigourney Street and Flower Street; on the Bulkeley Bridge; in East Hartford, between CT 15 and I-384; and in Vernon, between CT 30 and Tunnel Road. These one-day counts classified vehicles as cars, medium heavy vehicles, and large heavy vehicles. Additional counts were taken on many local roads throughout the Study Area, with more detailed classifications. The full results are available in Appendix A.2.16.

In the Project Study Corridor, heavy vehicle volumes tend to peak in the middle of the day, between the morning and evening rush hours. The percentage of heavy vehicles during the peak hours drops as low as 3%. The overall heavy vehicle volumes fall at night, but since car volumes drop off by a much greater amount, the heavy vehicle percentage is universally highest between 2:00 am and 4:00 am. The magnitude of this early morning peak varies significantly throughout the region. In downtown Hartford, the proportion of heavy vehicles reaches 30% at 3:00 am. For comparison, in Vernon, the heavy vehicle fraction reaches 66% during the same time. While total volumes are significantly higher in Hartford than in Vernon, the truck volumes are almost identical. This suggests that heavy vehicle traffic is much more likely to take longer trips and also more likely to be through traffic. Heavy vehicle volumes are split approximately evenly between eastbound and westbound throughout the day. This is consistent with Hartford being a major destination for commuter traffic but not for heavy vehicles, which enter and leave the city at roughly the same rate throughout the day.

Breaking heavy vehicles down into medium heavy and large heavy vehicle classifications offers additional insights. In Hartford, during the daytime, heavy vehicle volumes are split evenly between the

two. At night, large heavy vehicles comprise the vast majority of heavy vehicles. The proportion of large heavy vehicles increases outside the city: in Vernon, during the daytime, 70% of heavy vehicle traffic is large heavy. This leads to the conclusion that medium heavy trucks are used for short trips in and around Hartford, primarily during the daytime, while large heavy trucks are used for long-haul, primarily through, trips.

2.2.5 I-84 Spot Speed Analysis

A spot speed analysis was conducted within the study area to determine the 85th percentile free-flow vehicular speeds on I-84. Data was collected from four locations: I-84 at Park Street, I-84 at Broad Street, I-84 between Asylum Street and High Street, and I-84 over the Connecticut River (Bulkeley Bridge). Data collection locations are illustrated in Figure 2-27, page 2-71. The outer locations were selected to establish an understanding of vehicular speeds entering and exiting the Project Study Corridor. Data was collected on dry pavement conditions from 10 AM to 2 PM on March 11th and March 12th, 2015. The time period was selected after review of travel speed data from INRIX to best approximate free-flow conditions. The data was collected using mast-mounted microwave detectors.

Data

Speed and volume data was collected in one minute intervals for each travel lane. The speed data included average speeds and 85th percentile speeds. There were some locations where the raw data contained outlier results and were, therefore, removed from the data set. These anomalies included one minute intervals where speeds were uncharacteristically low, had duplicate time entries, or were repeated for consecutive intervals. In some cases the filtered data results were not significantly different from the unfiltered data. However, there were some locations where the filtered data was 6-8 mph higher than the unfiltered data. In all cases, the filtered data sets consisted of over 200 time intervals, which is a sufficient sample size for representative results.

Due to the nature of the corridor, using data from travel lanes influenced by ramp traffic would not yield true free-flow vehicular speeds. This is due to the friction created between the vehicles entering and exiting the highway. Therefore, the inside (median) lanes were used to determine the overall 85th percentile speeds at each location.

Results

The speed data indicates there is a moderate speed differential between the outer limits of the study area and the anticipated project construction limits. On the west end of the study area, eastbound traffic entering the anticipated project construction limits has an 85th percentile speed of 70.9 mph. On the east end of the study area, westbound traffic entering the anticipated project construction limits has an 85th percentile speed of 66.0 mph. Whereas, eastbound and westbound traffic at the horizontal curve between Asylum Street and High Street have 85th percentile speeds of 57.3 mph and 59.5 mph, respectively. The average 85th percentile speed within the anticipated construction limits is

approximately 60 mph. The posted speed limit throughout the study area is 50 mph. The results of the spot speed study are presented in Table 2-13, below.

Table 2-13: I-84 Spot Speed Study Results

I-84 Location	Posted Speed Limit	Calculated Speed¹	85th Percentile Speed
Park Street	50 mph	Eastbound: 44 mph ² Westbound: 44 mph ²	Eastbound: 70.9 mph Westbound: 69.5 mph
Broad Street	50 mph	Eastbound: 35 mph ² Westbound: 37 mph ³	Eastbound: 60.8 mph Westbound: 63.4 mph
Curve between Asylum St./Broad St.	50 mph	Eastbound: 35 mph ² Westbound: 39 mph ²	Eastbound: 57.3 mph Westbound: 59.5 mph
Bulkeley Bridge	50 mph	Eastbound: 50+ mph ⁴ Westbound: 50+ mph ⁴	Eastbound: 63.6 mph Westbound: 66.0 mph

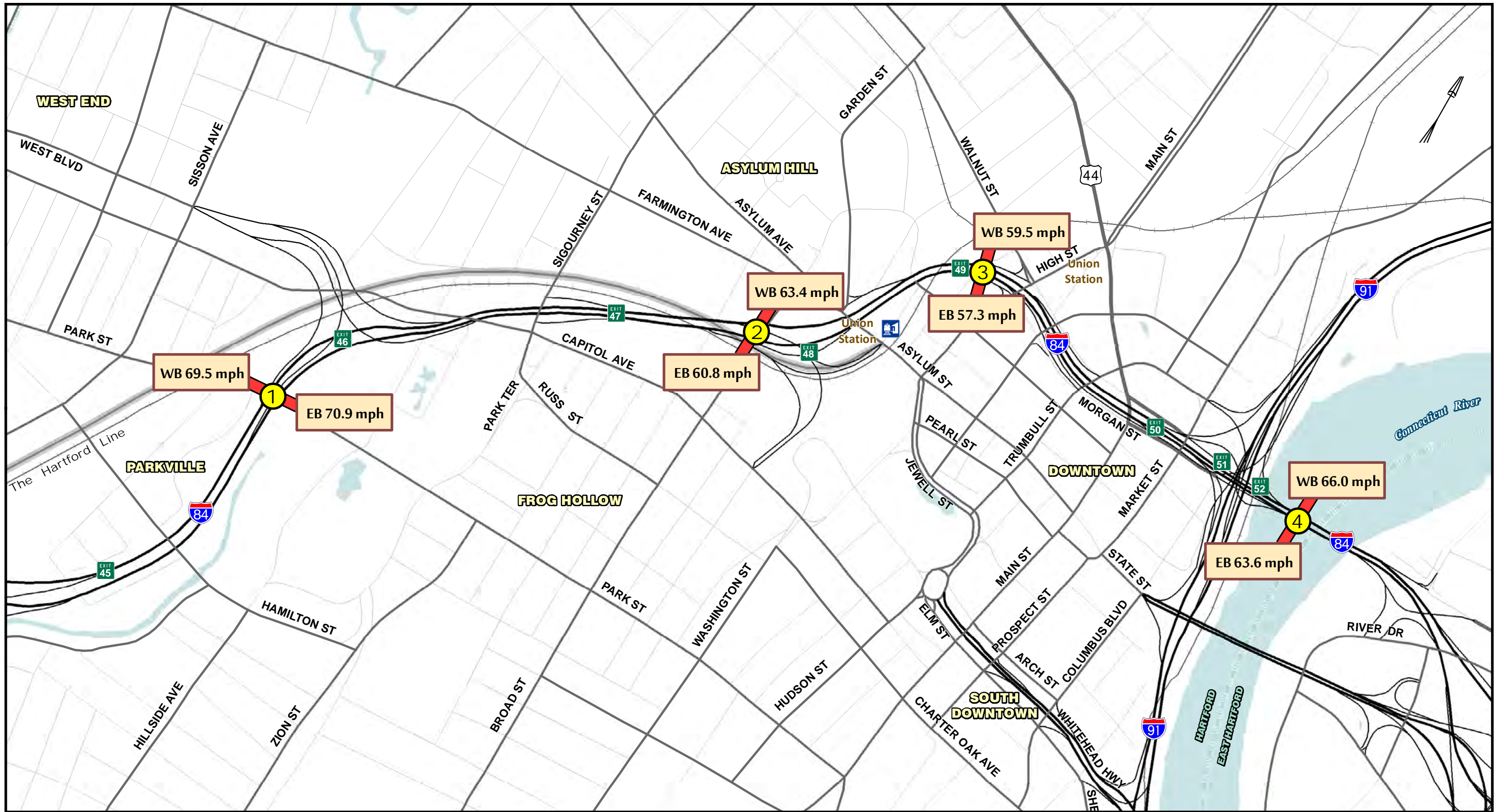
- 1) Based on design criteria (see Section 2.5, Roadway Geometry Review)
- 2) Speed limited by stopping sight distance (horizontal sightline)
- 3) Speed limited by stopping sight distance (vertical sag curve)
- 4) Horizontal tangent section not limited by stopping sight distance or vertical geometry

Analysis

Observed 85th percentile speeds are significantly higher than the calculated speeds for the existing highway geometry. Since the majority of freeways within the region are posted for 65 mph, drivers typically expect to travel safely at speeds in that range. However, due to the geometry and substandard shoulder widths within the corridor, driver expectations for safe traveling speed may be higher than the corridor provides and could, therefore, lead to higher crash rates.

Recommended I-84 Design Speed for Alternatives Development

The CTDOT Highway Design Manual recommends a range of design speeds between 50 and 55 mph for an Urban Freeway (Built Up) roadway classification (Chapter 5, Figure 5A). There is also guidance on selecting a design speed based on 85th percentile speed data (Chapter 2-4.01 Design Speed, Figure 2-4A). For an 85th percentile speed of 60 mph, the recommended design speed is between 55 and 60 mph.

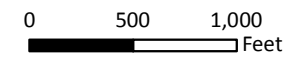


I-84 85th Percentile Speeds - Study Locations

- 1 Location No. 1 (Park Street)
- 2 Location No. 2 (Broad Street)
- 3 Location No. 3 (Curve)
- 4 Location No. 4 (Bulkeley Bridge)

- Railroad
- CTfastrak
- Town/City Limit

- I-84 Exit #
- Union Station
- Water



Sources of Data: City of Hartford, ESRI
<http://www.ctfastrak.com/>

The I-84 Hartford Project

I-84 85th Percentile Speeds

Date: 7/23/2015

Drawn By: TranSystems

Figure No: 2-27