

Downtown Circulation Study

HARTFORD, CT

VHB

DRAFT Final Report

September, 2010



submitted to
CITY OF HARTFORD, CT



presented by
VANASSE HANGEN BRUSTLIN, INC.

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Executive Summary

The Hartford Downtown Circulation Study led to the development of a series of improvement projects aimed at improving mobility for a variety of transportation modes in the core of the city. These improvement projects will enable the City to enhance the downtown transportation network in an effort to support economic growth and investments, improve regional and local connectivity, and create accessibility through a variety of transportation modes, including walking, transit, and driving. The recommendations developed through this study have been specifically tailored to the current transportation needs of downtown Hartford based on a broad analysis of existing conditions in the study area, combining both quantitative and qualitative measures of all transportation modes.

Based on this comprehensive understanding of the downtown transportation system, the project team developed a set of alternatives—organized into five groups of improvement projects—that would offer the most effective solutions for addressing many of the key issues uncovered through this study. In the development of potential solutions, the need to provide a balanced transportation network that could accommodate all modes in an efficient and safe network served as a guiding principle. Additionally, an emphasis was also placed on identifying improvement projects that are attainable in the near future. By developing alternatives targeting key transportation issues that could realistically be implemented in a short time frame, the project team has ensured the City of Hartford has a variety of options that it can begin to implement immediately to improve downtown mobility for all users. These recommendations have been incorporated into the *One City, One Plan – Plan of Conservation and Development 2020*, which will enable them to help guide the City's development into the future.

The following five groups of projects will enable the City to move forward with targeted improvements as funding becomes available. While implementing all of the components of each group is essential for success, each individual group of improvement projects is discrete and does not depend on the implementation of any of the other groups to improve downtown mobility. Since it is possible to begin with any one of a number of manageable projects that will immediately improve downtown transportation, the City will have maximum flexibility in moving forward. A map depicting the general locations and an overview of these improvement projects is provided in Figure ES-1.

Asylum Street Improvement Projects

The Asylum Street improvement projects are centered on the conversion of Asylum Street to two-way traffic between Ford Street and Trumbull Street. The following improvements will need to be made to successfully support this change:

- > Convert Asylum Street to Two-Way Traffic Flow between Trumbull and Ford
- > Replace Traffic Signals to Facilitate Two-Way Traffic
- > Modify Intersection Geometry on Asylum Street at Ford Street
- > Provide On-Street Parking along North Side of Asylum Street

- > Accommodate Limited On-Street Parking along South Side of Asylum Street with Bump Outs

The conceptual cost estimate for this group of improvement projects is \$1,570,000.

North Chapel/Walnut Street Improvement Projects

The introduction of a two-way traffic flow along North Chapel Street is the primary improvement proposed for this area. The following improvements will need to be made to successfully support this change:

- > Convert North Chapel Street to Two-Way Traffic Flow between High and Pleasant Streets
- > Replace Traffic Signals to Facilitate Two-Way Traffic
- > Modify Intersection Geometry of North Chapel Street at High Street and Pleasant Street
- > Install Planted Medians

The conceptual cost estimate for this group of improvement projects is \$3,390,000.

Columbus Boulevard/Market Street Improvement Projects

The recommendations to convert Columbus Boulevard between State Street and Talcott Street as well as Market Street between American Row and Temple Street to two-way traffic flow will significantly improve the ability of all travelers to access the section of the city to the southwest of the I-91 and I-84 junction. The following improvements will support this change for transportation users of all modes:

- > Enhance Founders Bridge Gateway
- > Enhance Pedestrian Refuges Associated with State Street
- > Convert Columbus Boulevard to Two-Way Traffic Flow between State and Talcott
- > Replace Traffic Signals to Facilitate Two-Way Traffic
- > Install New Traffic Signal to Control I-84 Southbound Off Ramp
- > Convert Market Street to Two-Way Traffic Flow between State and Kinsley
- > Modify Intersection Geometry of Market Street at American Row
- > Limit Northbound Prospect Street to Right Turn Only

The conceptual cost estimate for this group of improvement projects is \$2,690,000.

Market Street and Morgan Street Improvement Projects

The heavy volume of vehicles departing from the many offices and parking structures in this section of downtown creates considerable traffic congestion during the evening commute. By improving the ability of this intersection to process vehicles safely and efficiently to reduce congestion, the City will help to keep these office spaces attractive for businesses. The following improvements will help reduce congestion over both the short- and long-terms:

- > Revise the timings, phasings, and offsets associated with a traffic signal system serving both the Market Street and Morgan Street corridors (short-term)
- > Provide Two Additional Northbound Through Lanes on Market Street under I-84 (long-term)
- > Provide Two Exclusive Northbound Left-Turn Lanes from Market Street to Morgan Street (long-term)

The conceptual cost estimate for this group of improvement projects is \$2,010,000.

Area-Wide Improvement Projects

The area-wide improvement projects are primarily designed to reduce delay and improve confidence for both pedestrians and motorists traveling throughout downtown Hartford. Each of the following recommended projects will make it easier and quicker for travelers navigating the downtown.

- > Initiate Wayfinding Signage Program
- > Adjust Signal Operations to Provide a Concurrent Pedestrian Phase
- > Upgrade the Traffic Control Signal System
- > Reevaluate No-Turn-On-Red Program

No conceptual costs were estimated for this group of improvement projects.



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2. North Chapel Street Walnut Street

- Two-Way Traffic Flow on North Chapel Street
- Provide Planted Median
- Improved Access to the North End

1. Asylum Street

- Two-Way Traffic Flow on Asylum Street
- Improved Vehicle Access From the West
- Reduced Travel Speeds
- Improved Pedestrian Environment
- Creates New "Activity Center" at Asylum/Trumbull

5. Area Wide

- Implement Way Finding Signage Program for All Modes of Travel
- Consider Utilizing Concurrent Pedestrian Phase at All Signal Locations
- Consider Re-Evaluating "No Turn On Red" Program

4. Morgan Street Market Street

- Revise Traffic Signal Timings, Phasings, and Offsets
- Consider Two New NB Bypass Lanes

3. Columbus Boulevard Market Street

- Two-Way Traffic Flow on Columbus Boulevard
- Two-Way Traffic Flow on Market Street
- Enhanced Gateway Treatments to Downtown
- Improved Pedestrian Refuge
- Improved Access to Area Parking and Attractions

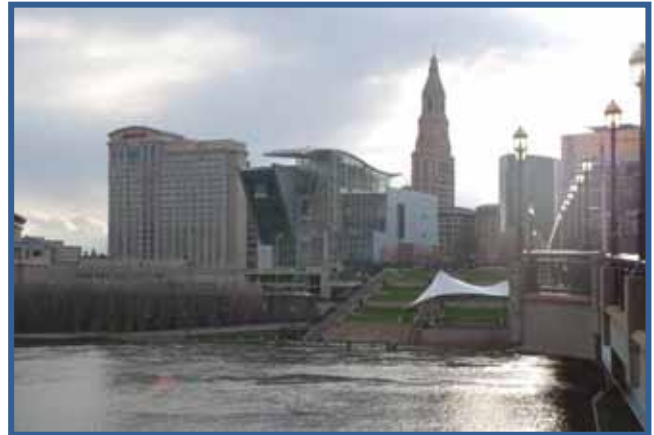


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Figure ES-1 April 2010
Improvement Project

Introduction

Downtown Hartford provides city and regional residents with a wealth of employment, residential, and entertainment opportunities. The ability of residents and visitors to access this multitude of opportunities depends on an efficient and intuitive downtown transportation network. Without clear and easy ways into and around the city, Hartford will have difficulty attracting businesses, institutions, residents, shoppers, and tourists to its downtown. Even just the perception that downtown is difficult to navigate will prevent the City from realizing its full potential.



Through undertaking this downtown circulation study—which has been incorporated into the *One City, One Plan – Plan of Conservation and Development 2020*—the City of Hartford can begin to improve downtown accessibility by identifying potential strategies designed to:

- Strengthen pedestrian connections
- Improve wayfinding
- Improve roadways and intersections within specific focus areas
- Enhance access/egress for residents, visitors, and employees



The improvement strategies recommended through the course of this study will provide the City of Hartford with clear direction during future improvement projects and development. The ability of these improvement strategies to enhance downtown mobility will be further advanced by their inclusion in the *Plan of Conservation and Development 2020*, which guides the development of the city. Additionally, the improvements implemented as a result of this study will both support and be supported by other mobility improvement projects underway, such as the iQuilt project.

This study is an important step in better connecting people to the places they want to go in the City of Hartford. Through reinforcing and enhancing connections to and around downtown across various modes of transportation, the City will be able to support economic growth in the central business district and improve the quality of life for everyone spending time in downtown.

Study Area

The study area is generally bound by I-91 to the east, I-84 to the north, I-84 and Bushnell Park to the west, and the Whitehead Highway to the south (see Figure 1-1). Within these general project limits, this study qualitatively addresses pedestrian and vehicle circulation, pedestrian and vehicle wayfinding, and regional access/egress patterns to/from downtown.

Additionally, four focus areas received a more detailed quantitative analysis of pedestrian mobility, vehicle circulation patterns, traffic operation issues, and access/egress for residents, visitors, and employees. The four focus areas are defined in Figure 1-1 and include:

- > Morgan Street System
- > Columbus Boulevard Corridor
- > Asylum Street Corridor
- > Union Station Area





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Project Limits

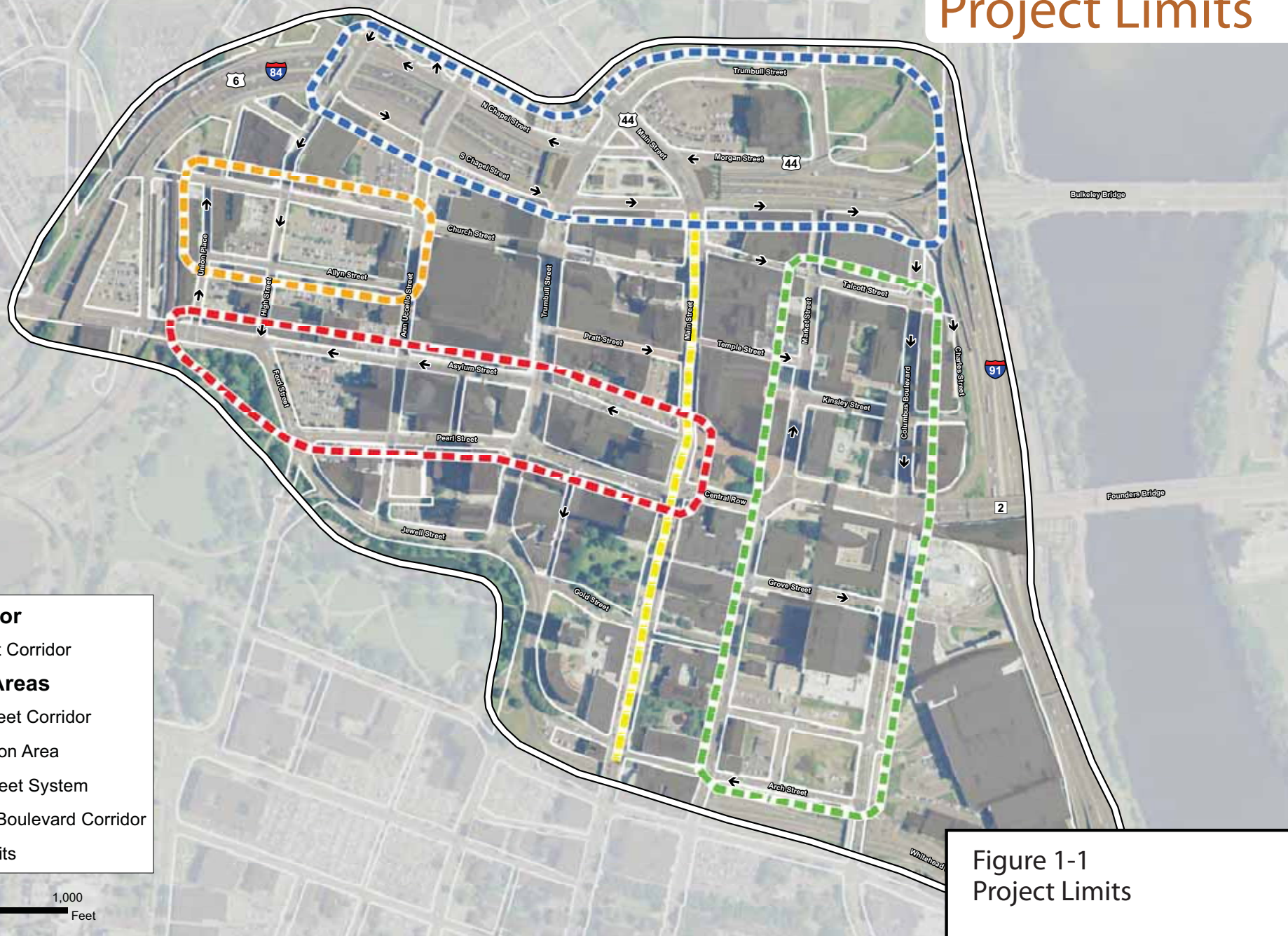


Figure 1-1
Project Limits

Study Approach

The key to identifying successful circulation improvement strategies is a sound study process, which develops implementable solutions based on a combination of local knowledge and quantitative data. The study approach for this downtown circulation study is outlined below:

1. Establish Goal and Objectives

The study goal and objectives were developed in conjunction with City staff and various stakeholders. The goal and objectives helped guide the project team in the identification of key study-area mobility issues and the development of alternatives capable of addressing those issues. The goal and objectives also provided a basis for screening alternatives for inclusion in the recommended improvement strategies.

2. Establish Existing Conditions

In this step of the study, the project team collected qualitative and quantitative transportation data from a variety of sources. Qualitative data—including City input, stakeholder representative input, and field observations—was collected for the entire study area. Detailed quantitative data—including traffic operations, intersection layout, and vehicle access/egress—were collected for the four identified focus areas. The totality of this information provided a complete picture of existing study-area mobility.

3. Identify Key Study-Area Issues and Challenges

Based on the findings of the existing conditions evaluation, the project team identified key study-area issues and challenges for downtown as a whole and each specific focus area. The identified key issues highlighted aspects of the downtown transportation network most in need of improvement to enhance downtown mobility.

4. Identification and Analysis of Alternatives

The project team developed alternatives designed to address the issues revealed through existing conditions analysis. These alternatives were developed at the concept level and then analyzed and tested to ensure successful implementation. A key factor in developing alternatives was finding solutions with the ability to have an impact on downtown mobility in the near future.

5. Recommend Improvement Projects

The preferred alternatives were organized into groups of recommended improvement projects. Each group of improvement projects includes recommendations that can be implemented in the immediate future as funding becomes available. As part of the development of the improvement projects, planning level cost and right-of-way impacts were investigated to aid the City in moving forward. The inclusion of the recommended improvement projects in the *One City, One Plan – Plan of Conservation and Development 2020* will help ensure their implementation as the city continues to develop.

Throughout the study process, input from the City of Hartford and downtown stakeholders was essential in the accurate identification of transportation issues and development of workable

solutions. To obtain this participation, City staff guided the study process and continually engaged various stakeholders throughout the process (see Appendix A for a list of stakeholders). This participation by the residents, business owners, and officials that live and work in downtown Hartford provided important insights into the mobility issues facing the city.

Study Goal and Objectives

VHB, the City of Hartford, and various stakeholders developed a study goal and supporting objectives for the downtown study area. The study goal and objectives will be used to measure and confirm various alternatives in the development of improvement strategies.

Goal

The Downtown Circulation Study will identify opportunities to enhance the downtown transportation network in an effort to support economic growth and investments, improve regional and local connectivity, and create accessibility through a variety of transportation modes, including walking, transit, and driving.



Objectives

- > Enhance the economic vitality of downtown
- > Strengthen connections between areas of the city
- > Support a walkable environment and strengthen pedestrian connections
- > Improve vehicle access/egress for residents, visitors, and employees
- > Reinforce/establish key gateway intersections and roadway corridors
- > Improve wayfinding for pedestrians and motorists
- > Support on-going transit initiatives
- > Target key downtown corridors for transportation improvements

In addition to the study-wide goal and objectives, the specific characteristics and functions of four specific focus areas within downtown are also an important consideration in developing and selecting improvement strategies. The general characteristics and functions of the four focus areas will be clarified through the analysis of existing conditions data.

Study-Area Mobility

Among residents and visitors alike, there is a general sense that it can be difficult to get into downtown Hartford and complicated to travel within the city. One-way streets, contraflow lanes, wide street cross sections, and tiered pedestrian facilities all contribute to the perception that to efficiently navigate the city, a visitor must already be an expert on all aspects of the transportation system. This perception has the potential to prevent regional residents from venturing into downtown and existing visitors from straying from the few routes they confidently know. Although these perceptions may or may not always match the reality of the transportation system, they potentially have very real consequences for downtown. This study will examine the issues behind those perceptions in an effort to identify solutions to improve the reality and perceptions of downtown mobility.

The following analysis of existing conditions examines mobility in the study area from both qualitative and quantitative perspectives. Through collecting transportation data and receiving input from City staff and stakeholder representatives, the project team gathered the necessary information to identify the key transportation mobility issues in the general study area and four focus areas. This evaluation will help determine what issues impede downtown mobility and lay the foundation for the identification of appropriate types of solutions, ensuring technical concerns are met with sound engineering alternatives and perception issues are overcome with improved communication and access to information.

Review of Previous Studies

The desire to improve mobility in downtown is a long-standing issue for the City of Hartford. The City provided the project team with a variety of previous studies touching on downtown circulation issues reaching back to 1972 (see Appendix B for list of previous studies). These studies offer a larger context for understanding the current state of the downtown transportation network, both by elucidating decisions behind certain aspects of the existing system and identifying historical concerns that have never been adequately addressed.

While these studies include a vast amount of specific data, as a whole they suggest that there has long been concern over the ability of residents, employees, and visitors to easily access downtown and move around the city once they are there.

Existing Conditions

The existing conditions data presented below come from a variety of sources, including transportation data collected in the field, City and stakeholder input, and field observations. The evaluation of existing conditions includes both qualitative and quantitative analysis, casting a wide net over the issues facing downtown mobility. An evaluation of existing conditions was conducted area-wide and for each focus area: Morgan Street System, Columbus Boulevard Corridor, Asylum Street Corridor, and Union Station Area.

Area-Wide

The study area in downtown Hartford consists of a compact urban environment with the diversity of land uses typically associated with a central business district: business, institutional, residential, and entertainment. As a large center for the insurance industry, downtown Hartford is a major employment hub, resulting in a swelling daytime population. The historic development of the downtown, stemming back over 400 years, contributed to the compact built environment, which generally has established pedestrian facilities. During the 1960s, the downtown was bisected by the construction of Interstate 84 (I-84), which had the effect of isolating the northern portion of the city and causing development to concentrate in the southern portion. In addition to I-84, I-91 and the Connecticut River also serve as barriers along the eastern side of downtown.

Traffic Operations

The efficient operation of traffic in Hartford is essential to mobility in the downtown. Although downtown has many residents and visitors that arrive by transit, private vehicle is the dominate mode of transportation into and out of downtown. An overview of traffic operations at the study-area level, provides a broader context for understanding which vehicle corridors are most heavily used and how traffic operations compare throughout the downtown. A more detailed evaluation of traffic operations for each focus area is discussed in the following sections.

Figure 2-1 shows the estimated daily traffic volumes along several corridors in the study area. The bandwidths depicted in the figure provide insight into the major corridors drivers use in downtown. Only three of the segments for which data was collected registered an estimated daily volume of more than 15,000 vehicles (on Main Street, State Street, and Columbus Boulevard), all on the eastern half of the downtown. Estimated traffic volumes were generally much higher on the eastern half of the city, which is correlated to the high density of office space and regional destinations located in this part of downtown. Morgan/North and South Chapel Streets and to a lesser extent Pearl Street appear to be the primary east-west downtown access corridors based on traffic volumes, with Main Street and Columbus Boulevard providing the primary north-south access corridors.

An analysis of intersection operations based on turning movement counts conducted over a three-month period beginning in March 2009 was completed for key intersections in the four focus areas (detailed intersection operations data is available in Appendix C). The turning movement count program was conducted at 29 intersections during the morning and afternoon peak periods. The peak period traffic volume data was used to assess the quality of intersection operations under current conditions. It should be noted that in some cases the LOS information presented in the appendix does not accurately represent actual LOS experienced due to downstream congestion primarily associated with I-84 and I-91 and their corresponding ramp systems.

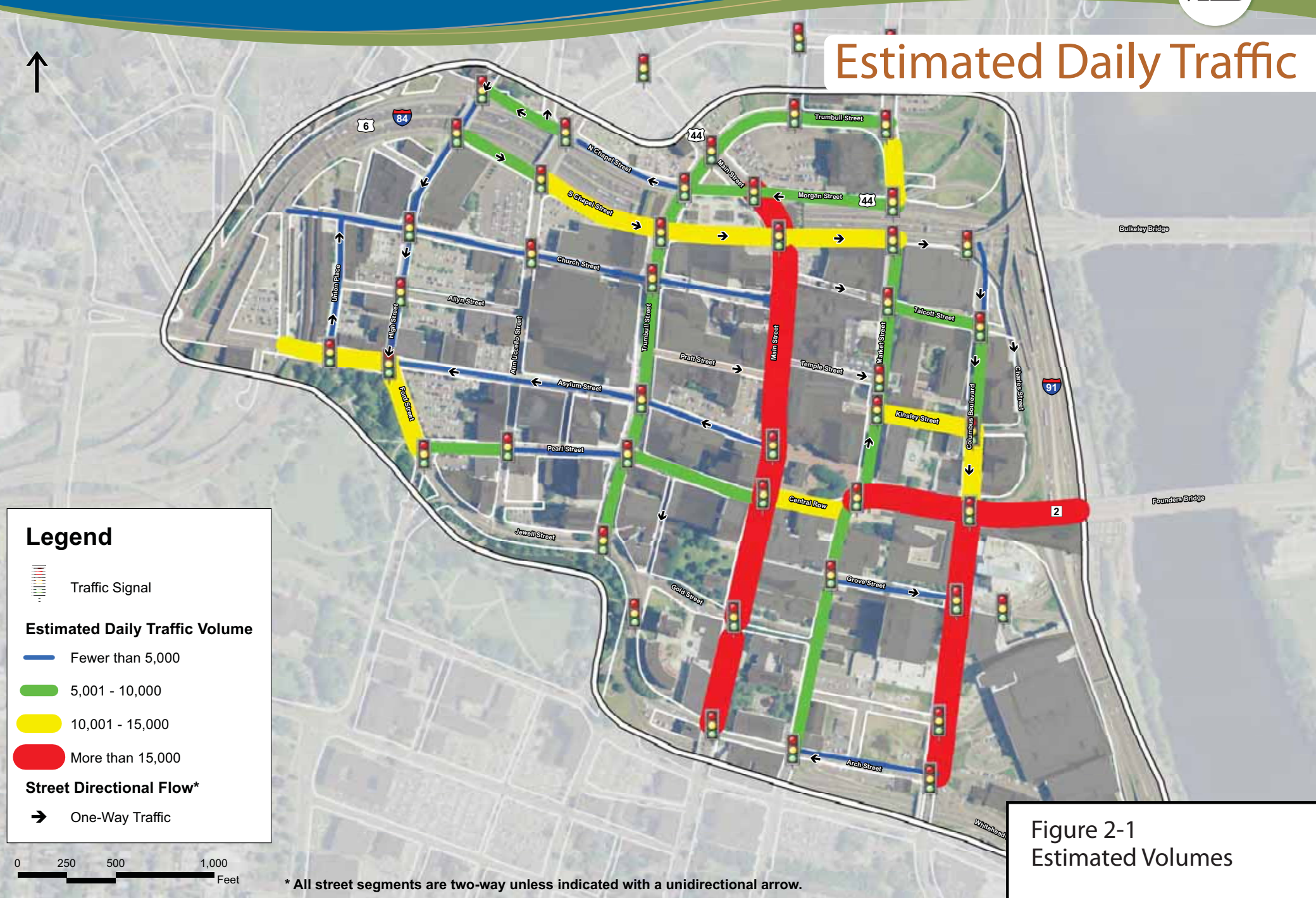


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Estimated Daily Traffic



The following observations and issues were identified for traffic operations in the entire study area:

- > There is poor east-west access into downtown as a result of one-way street patterns
- > Contraflow lanes are used on portions of State Street, Central Row, and Prospect Street to improve operations into and out of downtown during peak periods
- > Estimated traffic volumes are heaviest on the eastern portion of the city, which has a higher density of office space and parking garages in addition to regional attractions
- > Exclusive pedestrian phases at signalized intersections degrade the overall level of service
- > The City's aggressive "no turn on red" program degrades the overall level of service

Ped/Bike Mobility

The compact layout of downtown Hartford means most destinations are within manageable walking distances of one another. As shown in Figure 2-2, the majority of the study area falls within a 1,500-foot radius (just over a quarter of a mile) from State House Square, one of the central activity nodes in downtown. It is possible to walk from one end of the study area—either east to west or north to south—in under a mile.





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Pedestrian Facilities

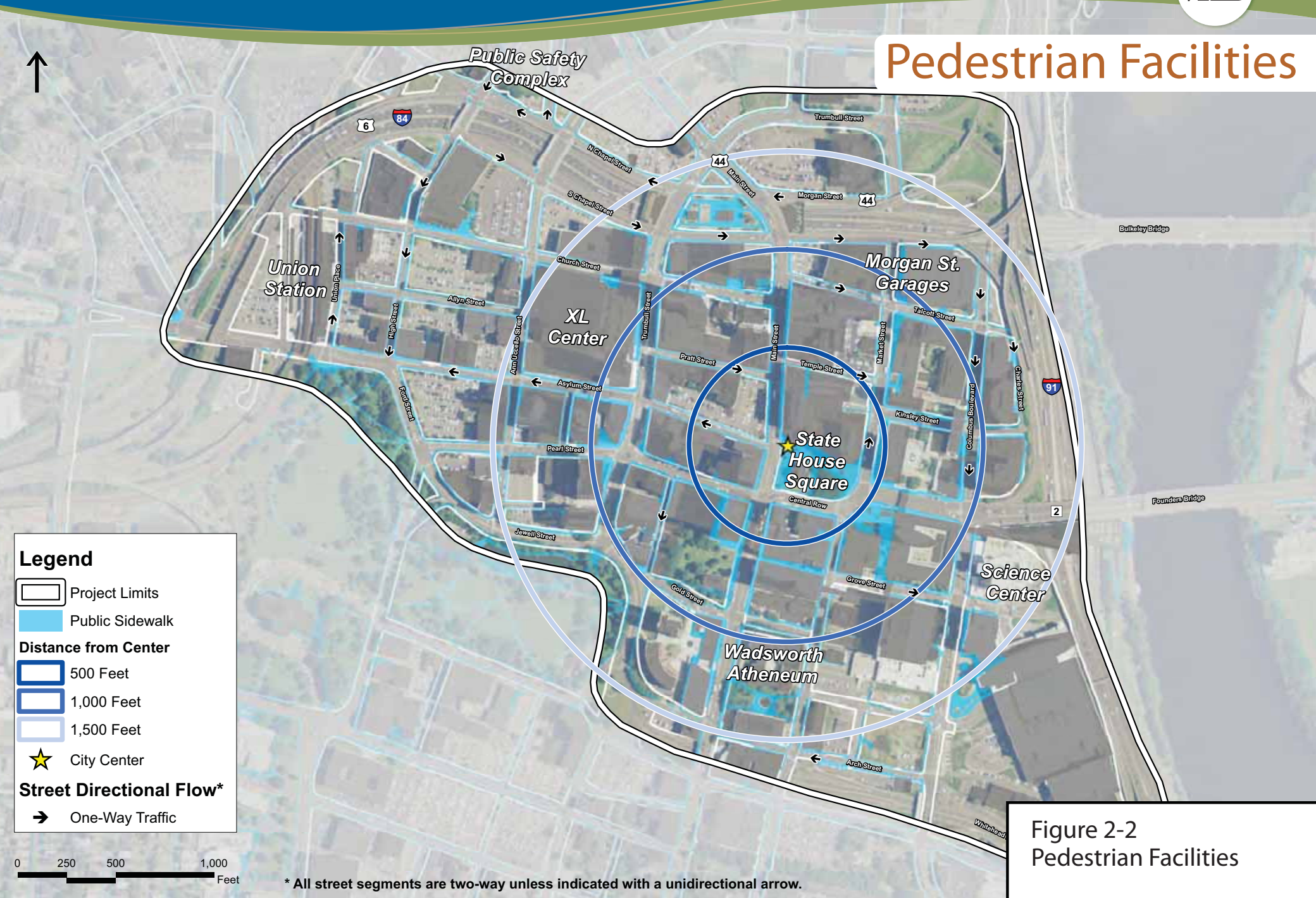


Figure 2-2
Pedestrian Facilities

To underscore the proximity of major destinations in the downtown, the project team conducted a sample of walking times between select points of interest. This sample of walking times is presented in the matrix shown in Table 2-1 below.

Table 2-1: Sample Walking Times (in Minutes) between Select Points of Interest

	Science Center	XL Center	State House Square	Wadsworth Atheneum	Union Station	Area of Interest (Asylum at Trumbull)	North End Hotel	Future Public Safety Complex	Morgan St. Garages
Science Center									
XL Center	10-15								
State House Square	5-10	5-10							
Wadsworth Atheneum	10-15	10-15	1-5						
Union Station	20-25	5-10	10-15	15-20					
Activity Center (Asylum at Trumbull)	10-15	1-5	5-10	10-15	5-10				
North End Hotel	10-15	1-5	5-10	10-15	10-15	5-10			
Future Public Safety Complex	25-30	5-10	10-15	15-20	5-10	5-10	5-10		
Morgan St. Garages	5-10	5-10	1-5	5-10	15-20	5-10	1-5	10-15	

Note: Walk times represent actual observed times including intersection delays.

As the matrix shows, many points of interest can be reached from State House Square in fewer than 10 minutes, a reasonable walk for many people in an urban environment. Even destinations in seemingly disparate sections of the city are not unreasonably far for pedestrians: the XL Center and Science Center can be reached from one another on foot in approximately 10 to 15 minutes. These walking times could be even further reduced if intersections permitted concurrent pedestrian phases rather than exclusive pedestrian phases. A concurrent pedestrian phase would allow pedestrians to cross in the same (or opposite) direction as traffic flows (parallel to moving traffic), which greatly increases the amount of time pedestrians have to cross at each intersection, helping to reduce walking times in downtown. For instance, walking from Union Station to Wadsworth Atheneum currently can take between 15 to 20 minutes, even though a person walking at a reasonable speed of 3.5 feet per second should be able to cover that distance in only 13 minutes. By reducing delay at intersections associated with the exclusive pedestrian signal phases, pedestrian mobility in the downtown will improve.

Although the distances need not pose significant obstacles for pedestrians, there are other factors that contribute to the perception that it is difficult to walk between points in downtown. Several wide street cross sections make it difficult for pedestrians to cross the street in a single attempt. Instead, pedestrians are stranded in pedestrian refuge islands. While these refuge islands are essential for pedestrians to be able to cross the street, they may be uncomfortable for many pedestrians—especially people walking with small children—unaccustomed to being positioned in the middle of several lanes of fast moving traffic. Additionally, the large blocks downtown limit the number of pedestrian paths through the city.

While the street grid in urban environments generally benefits bicyclists in addition to motor vehicles, some of the obstacles facing pedestrians in downtown are also challenges for bicyclists. The existing street network makes it possible for a bicyclist to reach almost any destination in downtown, but the wide cross sections can make it difficult for riders to make left turns across several lanes of traffic. Additionally, the large blocks and one-way streets can force bicyclists to take circuitous routes to reach their destination. The lack of official bicycle facilities in the downtown—such as bike racks, bike lanes, or bike signs—coupled with the other obstacles (e.g., one-way circulation patterns) suggests bike use in the downtown will generally be limited to experienced and dedicated riders.

The following observations and issues were identified for pedestrian and bicycle mobility in the entire study area:

- > There is inadequate wayfinding signage for pedestrians, contributing to the perception that destinations are far apart and difficult to walk between
- > The scale of the city contributes to a manageable walking environment, where most downtown destinations are within comfortable walking distances of one another
- > I-84 acts as a significant barrier for pedestrian traffic between the northern and southern portions of the city
- > There is a general lack of pedestrian connectivity between different portions of downtown
- > The exclusive pedestrian signal phases at intersections contribute to longer trip times for pedestrians in downtown by creating delays
- > While the downtown street grid is generally equipped with adequate sidewalk facilities, including appropriate sidewalk widths and ADA accommodations, there are several instances where sidewalks are not accessible via curb cuts or would be difficult to use for a person with a mobility aid
- > The general bicycle environment—lack of bicycle facilities, one-way streets, and wide street cross sections—is uninviting for casual bicyclists, resulting in either limited use of bicycles downtown or bicyclists using the sidewalk
- > The need for pedestrian refuge islands on several major streets are essential for pedestrians, but the existing islands can be an uncomfortable to use based on high traffic volumes and insufficient refuge protection



- > The large blocks limit the number of paths pedestrians and bicyclists have in downtown, potentially contributing to longer travel times
- > The second-tier pedestrian facility located at Constitution Plaza is not intuitive for visitors unfamiliar with the downtown

Parking

Downtown Hartford has numerous parking facilities located in the study area (shown in Figure 2-3). The facilities include a mix of enclosed garages and surface lots operated by several different companies and the Hartford Parking Authority. Additionally, on-street parking is available throughout much of the downtown with pay-and-display parking meters.

The greatest density of parking is located in the Columbus Boulevard Corridor focus area to the southwest of the intersection of I-84 and I-91. This portion of the city has several large garages and good proximity to the interstate system that serve both employees and visitors given the nature of land uses and visitor parking demands for this area. The western edge of the study area and the portion of downtown north of I-84 typically accommodate parking through surface lots. While finding an available parking space in a facility may not typically be a problem for drivers, navigating to the most appropriate facility is more of a challenge. The diversity of choice combined with the one way street pattern can make it difficult for a driver to determine which facility to choose. There is generally insufficient wayfinding signage to direct a driver unfamiliar with downtown Hartford confidently to an appropriate parking facility.



The following observations and issues were identified for parking in the entire study area:

- > There are parking facilities spread throughout downtown Hartford, including surface lots, garages, and on-street parking
- > There is insufficient wayfinding signage to parking facilities, making it difficult for drivers to know which facility is most appropriate for their destination
- > The greatest density of parking is located southwest of the intersection of I-84 and I-91, providing relatively good access to employees and visitors looking to avoid driving through downtown
- > The one-way street patterns can make it difficult for drivers to access the several parking garages southwest of the intersection of I-84 and I-91
- > The greatest density of parking is somewhat disconnected from popular pedestrian destinations, making it a less obvious place to park despite its capacity



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Parking Facilities

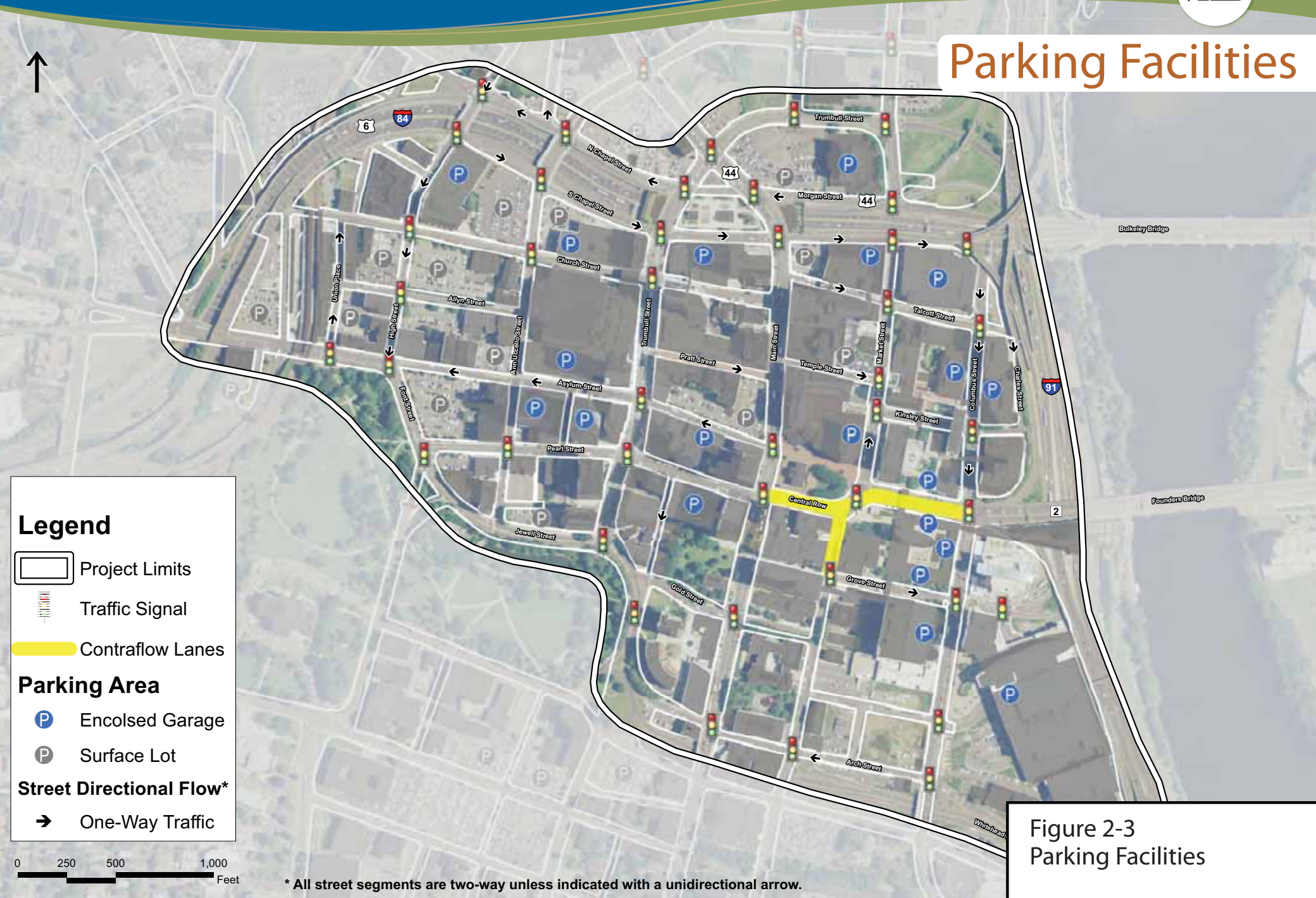


Figure 2-3
Parking Facilities

Transit

The walkable scale of the city and its function as a major regional employment hub have contributed to a transit network in downtown Hartford primarily designed to move people in to and out of the city. CT Transit provides several bus routes from all directions into downtown, which serves as a major transfer hub between routes for the transit system. There are several major transfer points clustered around State House Square, both on Main Street and Market Street. There are also several other transfer points throughout downtown (see Figure 2-4).



Since CT Transit's routes are focused on broader regional transportation, the City has supplemented the regular bus routes with a free downtown shuttle service, the Star Shuttle. The Star Shuttle operates downtown in a unidirectional loop every 10 to 12 minutes, connecting together many restaurants, nightlife locations, hotels, schools, landmarks, arts destinations, and parking facilities (see Figure 2-4 for shuttle route). The shuttle is in service Monday through Friday from 7:00 a.m. to 11:00 p.m. and Saturday from 3:00 p.m. to 11:00 p.m.

The following observations and issues were identified for transit in the entire study area:

- > Downtown Hartford serves as a regional transit hub for CT Transit
- > The major CT Transit transfer points have bus shelters and other passenger amenities
- > CT Transit routes are primarily designed to move people—often employees—into and out of the downtown
- > The City provides a free STAR Shuttle service to supplement transit travel within downtown, connecting many popular entertainment-related destinations
- > Not all Star Shuttle stops are signed, making it difficult for pedestrians to know where to catch the shuttle in some areas of downtown
- > The major CT Transit transfer hubs on Main Street and Market Street can significantly contribute to peak-period congestion along these key corridors





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Transit Facilities

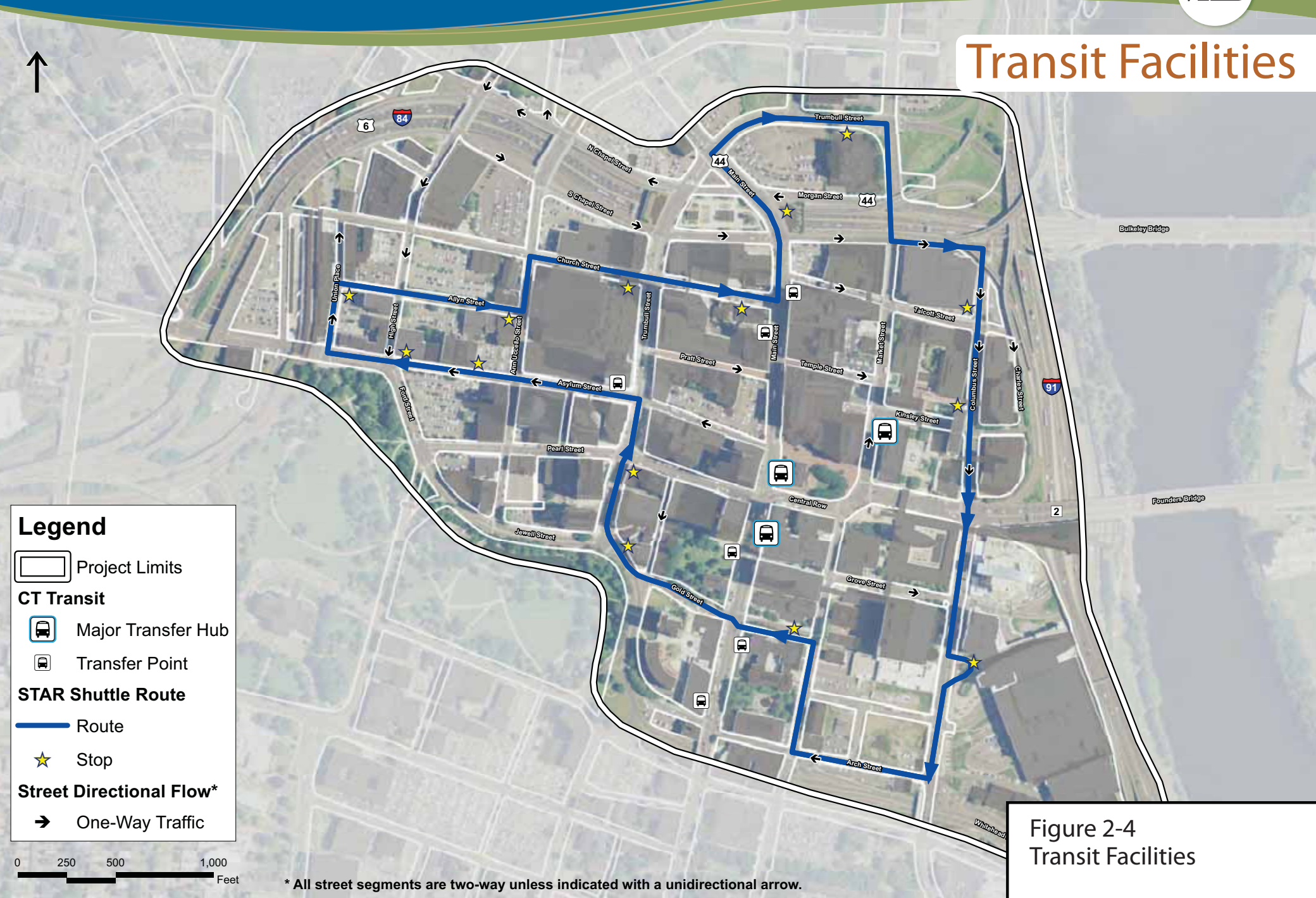


Figure 2-4
Transit Facilities

Recent & Planned Development

Downtown Hartford is a dynamic urban environment that is always evolving and attracting new investments. The City of Hartford's Development Services Division provided the project team with a list of major development projects recently completed, underway, or planned as of July 2009 (see Appendix D for descriptions and locations of projects in the study area).



Many of these new developments will have implications for downtown mobility, creating new destinations that attract and generate car, transit, bicycle, and pedestrian trips. City staff are committed to working with each new project through the Planning and Zoning approval process to ensure new developments maintain and improve mobility in the City of Hartford. Accounting for these new developments will ensure that improvement strategies will continue to be effective in the future.



Morgan Street System

The Morgan Street System focus area is located on the northern edge of the study area in the vicinity of I-84 (see Figure 2-5). This corridor provides regional access via I-84 and State Route 44. The interstate along with a pair of one-way streets (Morgan and North/South Chapel Streets) flanking the highway act as barriers to the northern portion of downtown—which remains underdeveloped—for both vehicles and pedestrians. The one-way streets on either side of I-84 function to transition vehicles onto and off of the highway as a collector/distributor system. As a



regional access corridor, this focus area experiences some of the heaviest traffic volumes in the city. Significant numbers of vehicles traveling to offices and parking garages southwest of the intersection of I-84 and I-91 contribute to congestion in this area, especially during afternoon rush hour as many vehicles leaving downtown attempt to access congested I-84 at the same time.

Observations and identified issues regarding mobility in the Morgan Street System focus area are provided below:

Traffic Operations

- > City streets in this focus area generally had heavy estimated volumes, particularly along Main Street, South Morgan Street, and Market Street
- > There are PM traffic operations issues at the I-84 underpass on Market Street due to congestion stemming from I-84 and its corresponding ramp system
- > I-84 and parallel one-way streets act as barriers to the northern portion of downtown for vehicles
- > The one-way street pattern inhibits eastbound vehicle access along Walnut Street, particularly to the northern portion of downtown
- > Without the influence of congestion on I-84, which leads to blockage of adjacent local intersections, the surrounding roadway network could accommodate peak traffic demands



Ped/Bike Mobility

- > I-84 acts as a barrier to the northern portion of downtown for pedestrians
- > The character of the pedestrian environment changes while crossing I-84, contributing to a less comfortable pedestrian experience in the northern portion of downtown, especially where the pedestrian crosses under the highway
- > There is a lack of official bicycle facilities, which may discourage bicycling in this focus area
- > The Crowne Plaza Hotel north of I-84 feels disconnected from the rest of downtown for pedestrians, requiring walking under a bridge or along large surface lots to reach activity centers

Parking

- > Land use just north of I-84 in this focus area is dominated by large surface parking lots

Transit

- > The free Star Shuttle serves the Crowne Plaza Hotel via Main Street, then Trumbull Street, then Market Street
- > CT Transit routes serve this focus area, but there are no transfer points or bus stop amenities





Downtown Circulation Study

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Morgan St. System

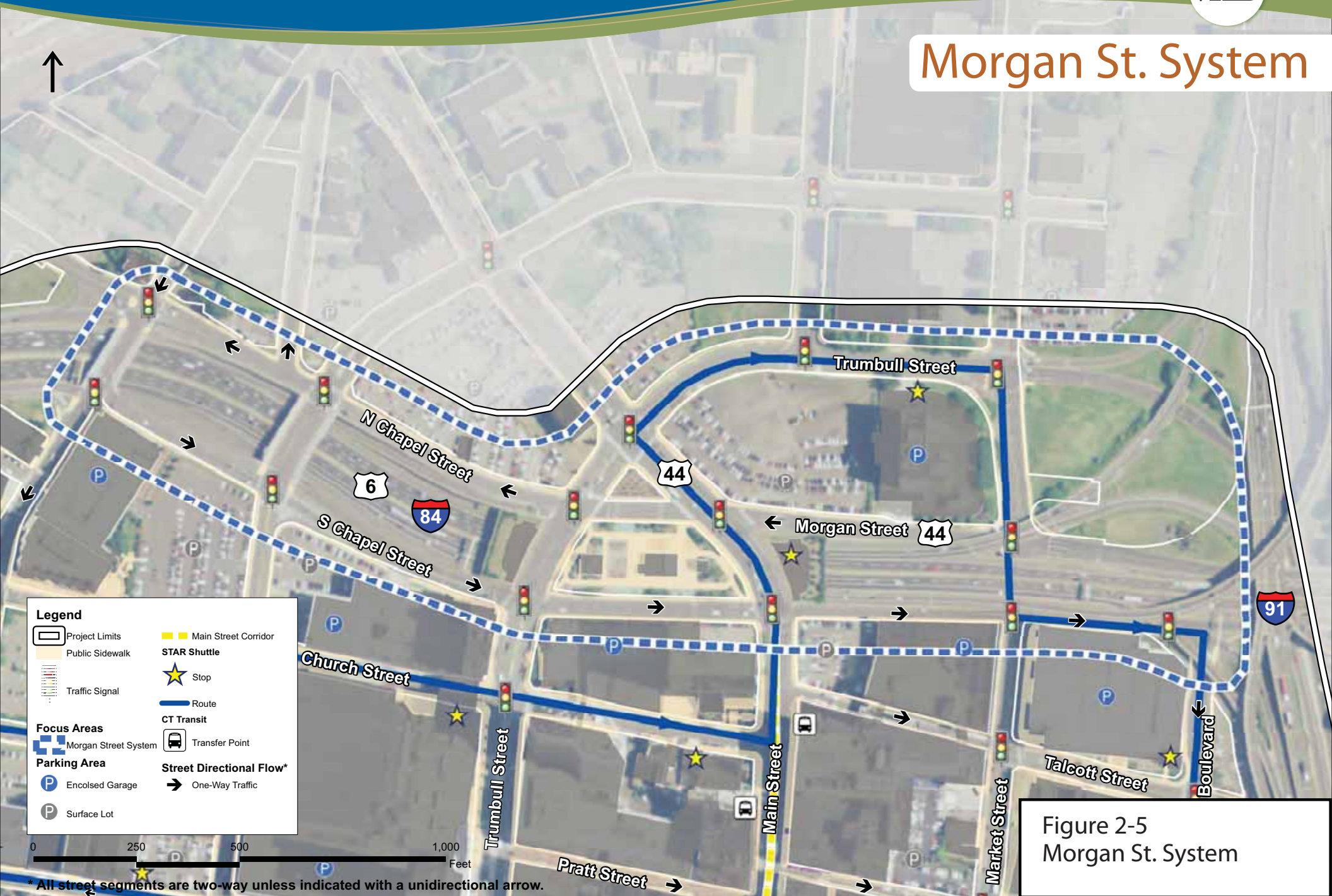


Figure 2-5
Morgan St. System

Columbus Boulevard Corridor



The Columbus Boulevard Corridor is typified by the regional nature of the destinations in this focus area; the corridor serves as a major downtown employment hub and as home to the Science and Convention Centers. The proximity of this focus area to I-84 and I-91 creates relatively convenient access to many regional destinations (see Figure 2-6), which has spurred several recent and ongoing major investments, including the Convention Center, Science Center, and Front Street development.

The characteristics of the Columbus Boulevard Corridor change markedly above and below State Street (Route 2), which accommodates high-speed, high-volume traffic entering the city from the east. To the north of State Street, there is a high density of office space and parking garages, attracting employees on a daily basis. The one-way street pattern in this portion of the focus area is designed to accommodate existing rush hour traffic. To the south of State Street, the type of land uses expand to include the Science and Convention Centers in addition to office space, with the road network supporting these land uses. The recent addition of the Science and Convention Centers accompanied a significant alteration to this southern segment of Columbus Boulevard. Columbus Boulevard had been originally designed as a seven-lane cross section, but was modified to six lanes to better reflect the surrounding aesthetics and pedestrian flow in exchange for a reduction in efficiency of vehicle operations.



Although the regional destinations draw many visitors and residents to the Columbus Boulevard area, it is one of the least friendly areas for vehicles and pedestrians to navigate. Many vehicles enter downtown and this focus area via westbound Route 2/State Street. At the entrance point to downtown, State Street is a seven-lane cross section that accommodates a high volume of high-speed traffic, but no significant wayfinding signage. Pedestrian crossing of State Street is facilitated by a pedestrian refuge, but the refuge is of limited width for protecting pedestrians in a way that would make them feel secure in the middle of a seven-lane, high-speed roadway. The one-way circulation pattern north of State Street makes it confusing for drivers looking to access parking—many of whom are regional visitors unfamiliar with downtown—requiring a circuitous path to access a parking garage directly across the street. This issue is magnified during the weekday morning peak period when State Street becomes a one-way westbound roadway. These aspects of the transportation system in the vicinity of Columbus Boulevard make much of this focus area unpleasant for both pedestrians and vehicle traffic. In effect, the northern and

southern segments of Columbus Boulevard are isolated from one another and other activity centers in downtown.

Traffic Operations

- > High-speed traffic enters the city via westbound Route 2
- > There are PM operations issues associated with vehicles accessing regional roadways from large parking garages, inhibiting egress to the north and west
- > This area had the heaviest estimated traffic volumes of any roadway segments in a focus area, particularly along Columbus Boulevard in the vicinity of the Convention Center and State Street
- > The one-way street pattern north of State Street can be confusing to drivers and requires circuitous navigation that in effect restricts access to parking garages and other destinations
- > The existing street network in this focus area is designed only to enhance regional access to downtown
- > Contraflow lanes along State Street, Central Row, and Prospect Street complicate access to downtown
- > Market Street functions as a “back door” to Main Street, supporting traffic and transit access to the core of downtown, but lacks its own identity and purpose

Ped/Bike Mobility

- > The pedestrian refuge facilitating the crossing of State Street is insufficient to make pedestrians feel secure in the middle of a high-volume, high-speed, seven-lane roadway
- > There is a lack of strong pedestrian connectivity to other activity centers in downtown
- > The wide cross section of State Street and necessity of using pedestrian refuge islands act as a barrier for pedestrians between parking garages and regional destinations
- > A pedestrian bridge is under construction to connect the upper tier pedestrian areas of the Science Center and Convention Center, which will also connect the Convention Center to the Riverfront Recapture and Constitution Plaza
- > Constitution Plaza provides an upper tier pedestrian facility allowing pedestrians to access several office buildings and destinations without walking on the street level
- > The upper tier pedestrian facility at Constitution Plaza is not intuitive to new visitors to downtown Hartford



Parking

- > There is a high density of parking located in several garages north of State Street
- > The Science Center and Convention Center each offer on-site parking for visitors

Transit

- > The free Star Shuttle serves this focus area along Columbus Boulevard, making two stops north of State Street and one stop to the south at the Convention Center
- > There is a major CT Transit transfer center located on Market Street just north of State Street





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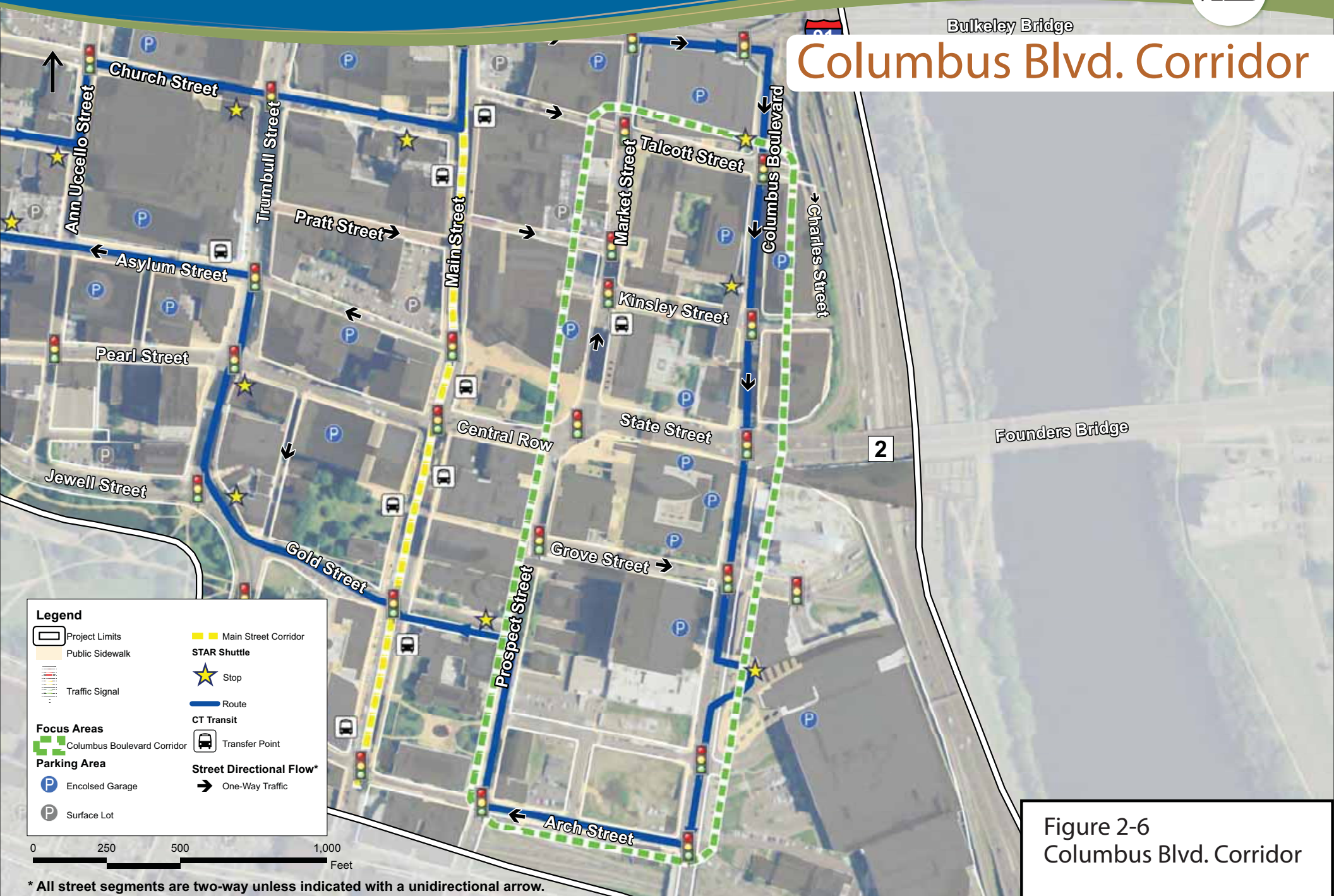


Figure 2-6
Columbus Blvd. Corridor

Asylum Street Corridor

The Asylum Street Corridor is home to several restaurants, bars, and entertainment venues, making this focus area a dining and entertainment hub for downtown Hartford (see Figure 2-7). The corridor changed markedly with the development of State House Square by eliminating direct access to the Asylum Street/Asylum Avenue corridor, leaving it a local street that accesses significant land uses. The types of entertainment land uses prominent in this focus area encourage pedestrian activity, as visitors travel between venues or to parking areas in other sections of downtown. Since visitors seek this area for the variety of entertainment options it provides, parking close to one particular destination is less of a priority, especially since parking tends to be concentrated in surface lots at either end of the focus area.



In addition to attracting pedestrians to the many dining and entertainment venues, this focus area is a primary east-west corridor into downtown. Beyond connecting eastbound traffic to downtown, the Asylum Street Corridor also supports the XL Center, a 15,000-to-18,000-seat sports arena and convention center. The eastbound one-way street pattern on Asylum Street facilitates traffic leaving downtown, creating a more complicated inbound route along Pearl Street.

Traffic Operations

- > The Asylum Street Corridor currently operates as a significant local east-west corridor
- > The one-way westbound traffic pattern on Asylum Street facilitates travel out of the city and impedes direct access to downtown
- > The street network must be capable of supporting XL Center events
- > There is poor signal coordination between the intersections of Asylum/Ford and Ford/Pearl
- > Contraflow lanes on Central Row complicate downtown navigation
- > Separate street names for the Jewell/Ford Streets corridor can be confusing

Ped/Bike Mobility

- > In addition to the restaurants and nightlife spots along Asylum, the intersections of Asylum/Trumbull and Asylum/Main (State House Square) are major activity centers that attract pedestrians

- > The activity center at the intersection of Asylum and Trumbull lacks a strong identity and pedestrian environment/amenities to function as a gathering point
- > The one-way traffic pattern along Asylum detracts from the pedestrian and bicycle environment by inducing traffic to travel at higher speeds in the same direction
- > There is a lack of official bicycle facilities in this focus area (e.g., bike racks, bike lanes, or bike signage)

Parking

- > Parking tends to be concentrated in surface lots at the eastern and western edges of this focus area, although there are also multiple garages located in proximity to the XL Center

Transit

- > The free Star Shuttle runs through this focus area up Trumbull Street and then along Asylum Street
- > This focus area also reaches to State House Square, where CT Transit offers a major transfer point
- > Other CT Transit transfer points and bus stops are also located in this focus area





Downtown Circulation Study

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Asylum St. Corridor

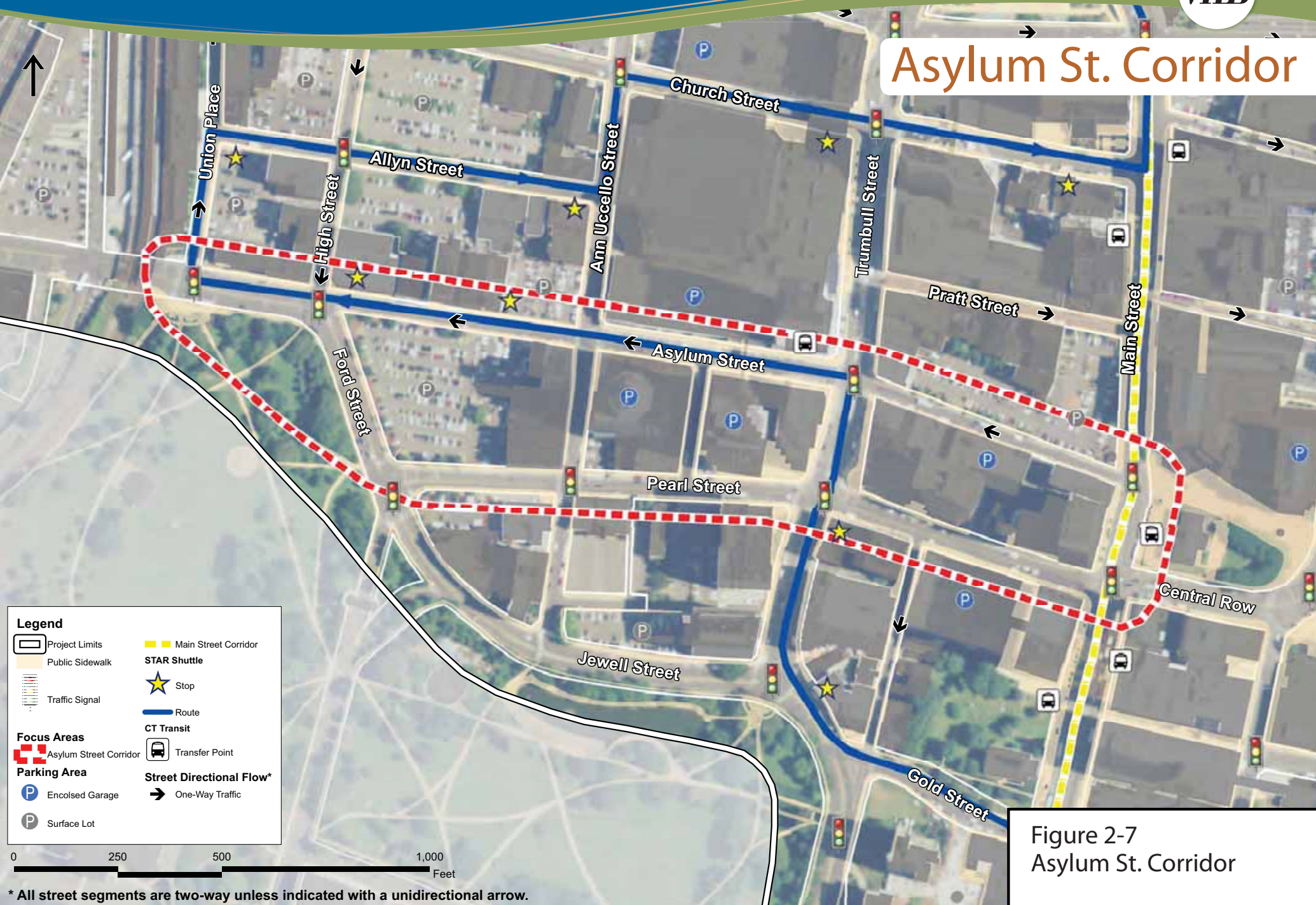


Figure 2-7
Asylum St. Corridor

Union Station Area



The Union Station Area is a major multi-modal hub for downtown Hartford, including national train and bus service operated out of Union Station (see Figure 2-8). In addition to its role as a multi-modal hub, this focus area is also a popular entertainment area with several bars and nightlife attractions. These two functions combined make it a common area for pedestrian activity. The street network in this focus area is focused on providing local access rather than as acting as major corridors. The ability of this area to handle a greater share of traffic is partially limited by height restrictions along Church

Street associated with the railroad track bridge.

Traffic Operations

- > This focus area generally had the lowest estimated traffic volumes in the study area, supporting the notion that use of the street network is largely limited to local access
- > The ability to increase traffic capacity in this focus area is inhibited by the 11'4" height restriction on Church Street associated with the railroad track bridge



Ped/Bike Mobility

- > The uses associated with this focus area—multi-modal center and entertainment—require good pedestrian facilities, both within the area and connecting to other portions of downtown that are not readily evident
- > There is a lack of official bicycle facilities in this focus area (e.g., bike racks, bike lanes, or bike signage)

Parking

- > There are several surface lots in the vicinity of Union Station

Transit

- > This focus area is a major multi-modal center with national train and bus service
- > The Free Star Shuttle serves Union Station via Union Place then Allyn Street

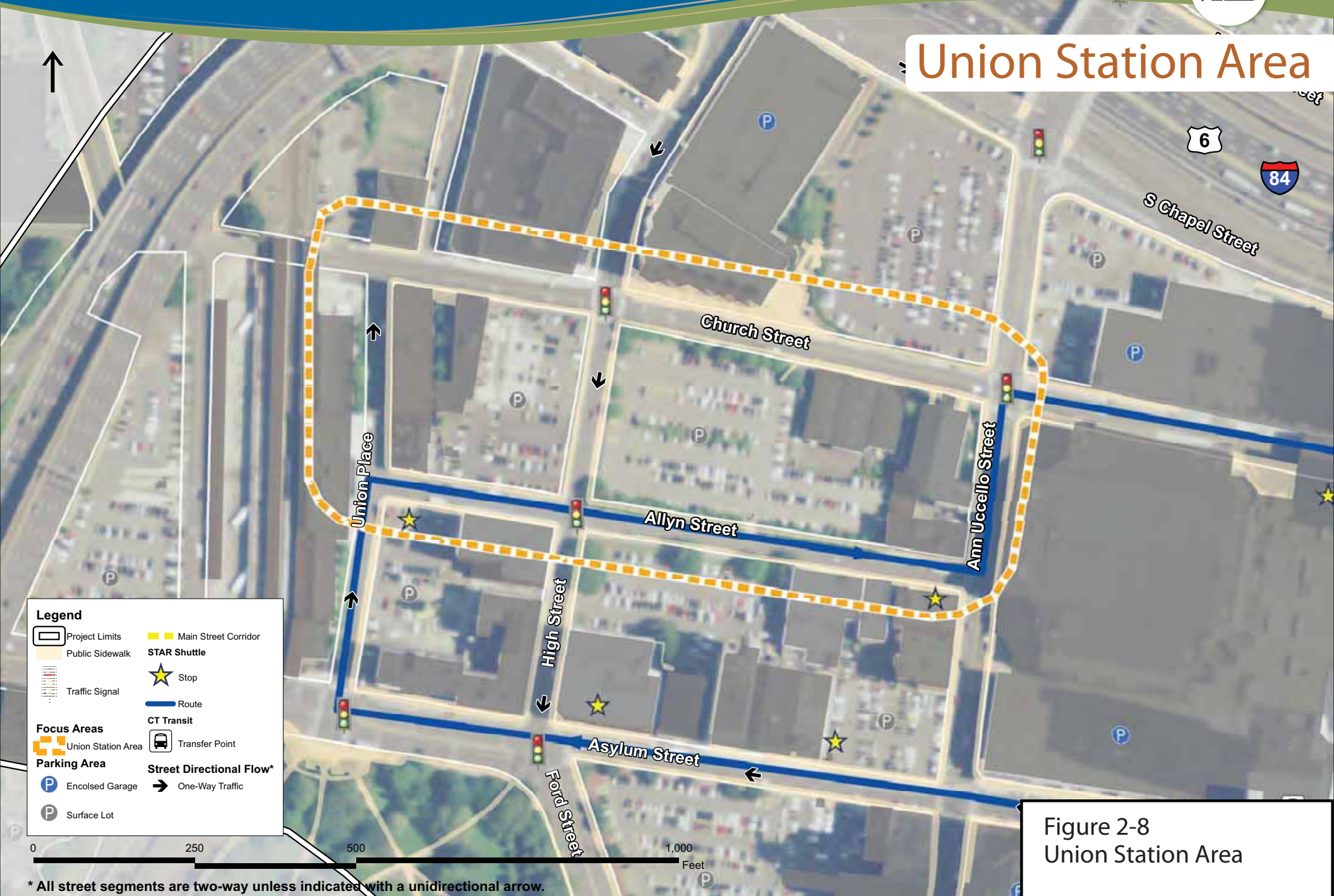


Downtown Circulation Study

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Union Station Area



Key Issues

The analysis of existing conditions in the study area and four focus areas revealed several key issues to be considered during the alternative development phase of this Downtown Circulation Study. While all of the observations and issues identified through this evaluation will inform the creation of alternatives, the key issues identified below—and illustrated in Figure 2-9—summarize the major findings that should be addressed to improve downtown mobility.

Area-Wide

- > There is poor east-west access into downtown as a result of one-way street patterns
- > Contraflow lanes on State Street, Central Row, and Prospect Street complicate downtown navigation, especially for those unfamiliar with morning peak operations in the area
- > There is a poor pedestrian level of service throughout the city due to exclusive pedestrian phases, which also reduce vehicle level of service
- > There is a general lack of pedestrian connectivity between different sections of downtown
- > The general bicycle environment—lack of bicycle facilities, one-way streets, and wide street cross sections—is uninviting for casual bicyclists, resulting in limited use of bicycles downtown or bicyclists using the sidewalk
- > The large blocks limit the number of paths pedestrians and bicyclists have in downtown, potentially contributing to longer travel times
- > I-84 acts as a significant barrier for pedestrian traffic between the northern and southern portions of the city
- > There is inadequate wayfinding signage for vehicles and pedestrians
- > The major CT Transit transfer hubs on Main Street and Market Street can significantly contribute to peak-period congestion along these key corridors
- > Not all Star Shuttle stops are signed, making it difficult for pedestrians to know where to catch the shuttle in some areas of downtown

Morgan Street System

- > City streets in this focus area had the heavy estimated traffic volumes, particularly along Main Street and South Morgan Street
- > There are PM traffic operations issues at the I-84 underpass on Market Street due to congestion stemming from I-84 and its corresponding ramp system
- > I-84 and parallel one-way streets act as barriers to the northern portion of downtown for vehicles and pedestrians
- > The one-way street pattern inhibits eastbound vehicle access along Walnut Street, particularly to the northern portion of downtown
- > The character of the pedestrian environment changes while crossing I-84, contributing to a less comfortable pedestrian experience in the northern portion of downtown

Columbus Boulevard Corridor

- > There are PM operations issues associated with vehicles accessing regional roadways from large parking garages, inhibiting egress to the north and west

- > The heaviest estimated traffic volumes of any roadway segments in a focus area were estimated along the Columbus Boulevard Corridor in the vicinity of the Convention Center and on State Street
- > The one-way street pattern north of State Street can be confusing to drivers and requires circuitous navigation that in effect restricts access to parking garages and other destinations and limits existing/entering points to/from the local and regional system
- > High-speed traffic enters the city via westbound Route 2
- > The pedestrian refuge facilitating the crossing of State Street is insufficient to make pedestrians feel secure in the middle of a high-volume, high-speed seven-lane roadway
- > There is a lack of strong pedestrian connectivity to other activity centers in downtown
- > The wide cross section of State Street and necessity of using pedestrian refuge islands act as a barrier for pedestrians between parking garages and regional destinations
- > Market Street functions as a “back door” to Main Street, supporting traffic and transit access to the core of downtown, but lacks its own identity and purpose
- > 2nd tier pedestrian system of Constitution Plaza reduces pedestrian connectivity down this area to the street grid

Asylum Street Corridor

- > The one-way westbound traffic pattern on Asylum Street facilitates travel out of the city and impedes direct access to downtown
- > The street network must be capable of supporting XL Center events
- > There is poor signal coordination between the intersections of Asylum/Ford and Ford/Pearl
- > The one-way traffic pattern along Asylum detracts from the pedestrian and bicycle environment by inducing traffic to travel at higher speeds in the same direction
- > Separate street names for the Jewell/Ford Streets corridor can be confusing

Union Station Area

- > The ability to increase traffic capacity in this focus area is inhibited by the 11'4" height restriction on Church Street associated with the railroad track bridge
- > The uses associated with this focus area—multi-modal center and entertainment—require good pedestrian facilities, both within the area and connecting to other portions of downtown



Downtown Circulation Study

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Key Issues

Focus Areas

Morgan Street System

- 1 - PM traffic operations issues
- 2 - I-84 acts as barrier
- 3 - One-way streets isolate northern downtown
- 4 - Pedestrian environment is less inviting north of I-84

Columbus Boulevard Corridor

- 1 - PM traffic operations issues
- 2 - One-way streets are confusing
- 3 - High-speed traffic bisects area
- 4 - Insufficient pedestrian refuge
- 5 - Lack of pedestrian connectivity
- 6 - Market street functions as "back door" for Main Street

Asylum Street Corridor

- 1 - One-way traffic pattern facilitates vehicles leaving downtown
- 2 - One-way traffic pattern detracts from pedestrian and bicycle environment
- 3 - Poor signal coordination
- 4 - Confusing change in street names

Union Station Area

- 1 - 11'4" bridge restricts traffic
- 2 - Multi-modal Center

Area-Wide

- Inadequate wayfinding signage for vehicles and pedestrians
- Poor east-west access into downtown
- Exclusive pedestrian signal phases contribute to poor pedestrian and vehicle LOS
- Lack of pedestrian connectivity between sections of downtown
- Contraflow lanes complicate downtown navigation

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Feet

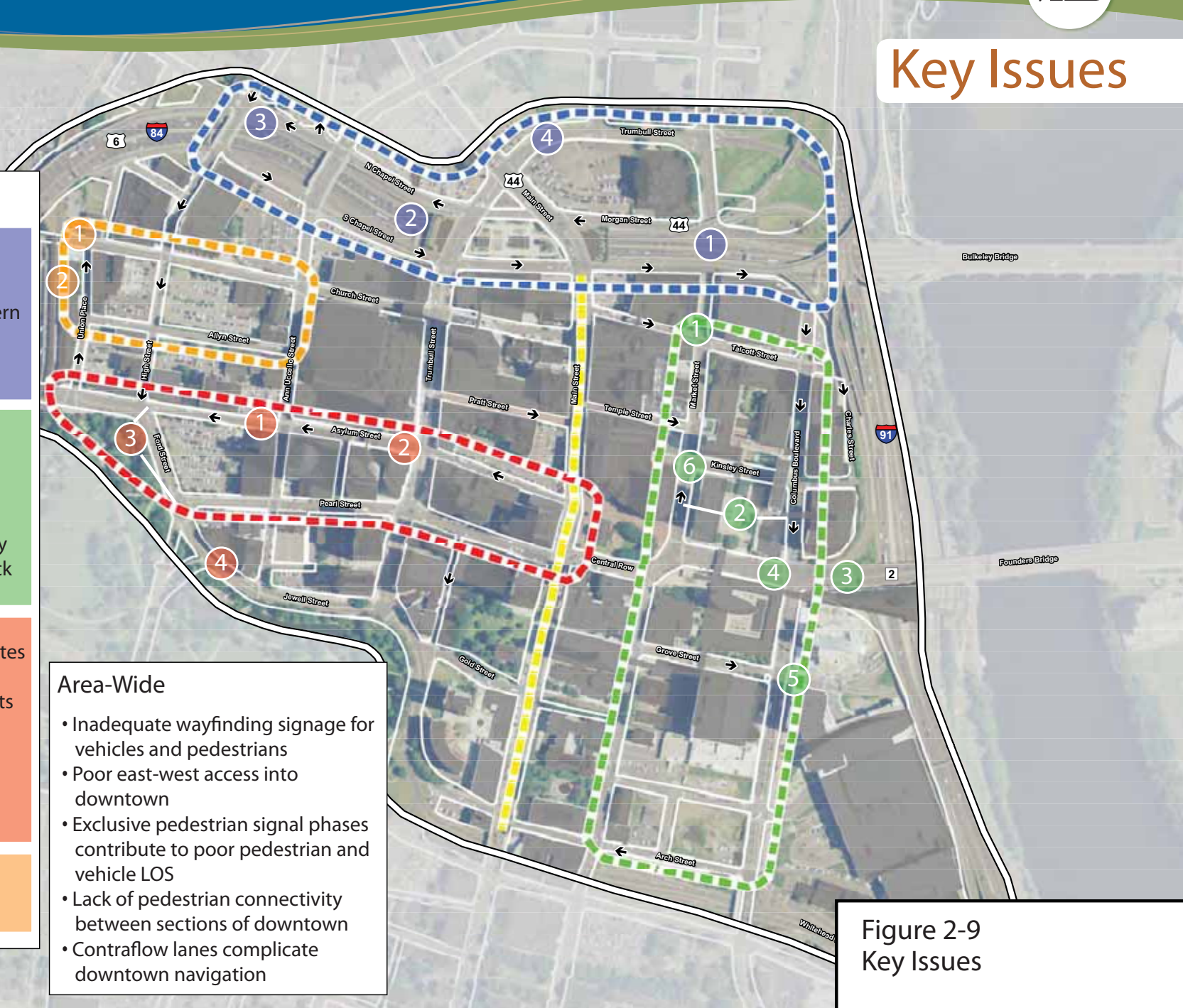


Figure 2-9
Key Issues

Alternatives

The Downtown Circulation Study existing conditions analysis revealed several potential targets for improving pedestrian, transit, bicycle, and motor vehicle mobility in the core of Hartford. While many of these transportation concerns facing downtown will already be obvious to residents and visitors, identifying the appropriate solutions for addressing these key issues can be complicated.



The downtown transportation network must achieve a delicate balance between multiple transportation modes over a large geographical space; disruptions to this system—even if beneficial for a specific transportation mode at a specific place —can have unintended consequences that reverberate for other modes throughout downtown. Additionally, even if imperfect in its current state, the downtown transportation network is the sum result of many well planned and engineered transportation improvements designed to meet specific needs over the history of the development of Hartford. In moving forward to improve downtown mobility, all of these factors must be taken into account. It is not enough to simply address specific issues in future projects; the successful aspects of the system must also be protected to ensure the overall integrity of the downtown transportation network.



Based on the information and data collected through the existing conditions analysis, the project team sought to develop a set of alternatives that would offer the most effective solutions for addressing many of the key issues uncovered through this study. In the development of these alternatives, an emphasis was also placed on identifying improvement projects that are attainable in the near future as funding becomes available. The ability of an alternative to satisfy the project goal and objectives also helped guide development of alternatives particularly tailored to meet the current transportation needs in downtown. By

developing alternatives targeting key transportation issues that could realistically be implemented in a short time frame, the project team has ensured the City of Hartford has a variety of options that it can begin to implement immediately to improve downtown mobility for all users and which will help guide the City's development into the future.

Alternatives Development

Although many specific transportation concerns became apparent through this study, downtown mobility is generally inhibited by a single overarching issue: the heart of the city is difficult to navigate because the transportation network is not porous enough to allow people to intuitively and confidently travel to their destinations. In particular, the one-way streets—even though they are designed for motor vehicle traffic flow—have the effect of breaking the city into discrete sections that feel distant from one another for all transportation modes. By emphasizing particular motor vehicle traffic patterns through one-way streets, bicycles, transit vehicles, and pedestrians are influenced by the available routes, which also contributes to a poor understanding of downtown geography by regional residents and visitors. To surmount the segmentation of downtown, the project team prioritized alternatives capable of making the city more permeable for travelers regardless of their mode of transportation.

It was also essential to the project team that alternatives developed through this study maintain or reestablish a balance between transportation modes in downtown. For this reason, vehicle operations were not prioritized as the primary indicator of a successful transportation improvement. In fact, a minimal amount of congestion during peak traffic periods—the morning and evening rushes—was considered acceptable if it was the price for adequately providing for safe, convenient, or inviting pedestrian, bicycle, or transit transportation. Achieving an appropriate balance between these disparate, and occasionally competing, transportation modes can be a difficult task, but is essential to the health of the city. Since motor vehicle travel is the dominant mode of transportation to downtown, the project team employed planning-level analysis tools outlined in the Highway Capacity Manual to ensure that all alternatives would continue to satisfy or improve motor vehicle operational requirements. Solutions capable of improving vehicle operations and other modes of transportation were especially prized during the alternative development phase.



To further ensure that all alternatives not only meet specific transportation needs, but also advance the overall interests of the City, each alternative was compared to the objectives created at the outset of the Downtown Circulation Study. This process helps prevent a sound engineering solution from detracting from the larger goal of creating an integrated, robust transportation network that will support the livability and economic health of downtown Hartford. Developing transportation solutions designed to further the broader goals of the City has the additional advantage of allowing the City to target its investments to create the biggest impacts on the downtown environment.

Area-Wide

When taken as a whole, the study area in downtown suffers from the perception that destinations are far apart and difficult to travel between. As the transportation system currently stands, it is difficult to navigate through the city because of the one-way streets limiting route options. While

this is can be confusing for drivers, it also affects pedestrians, most of whom arrive downtown via personal automobile. This initial impression of downtown as a confusing and segmented place influences drivers impressions of downtown geography as they set off on foot to complete their trip, making destinations appear farther apart and more difficult to walk between than they really are. Additionally, the traffic signal operations regulating vehicle and pedestrian movement downtown serves to impede both types of trips. By increasing visitors' access to information through wayfinding signs and adjusting traffic signal operations, the City can make it easier and faster for residents and visitors to travel in the downtown. The following alternatives were developed to improve mobility throughout the study area:

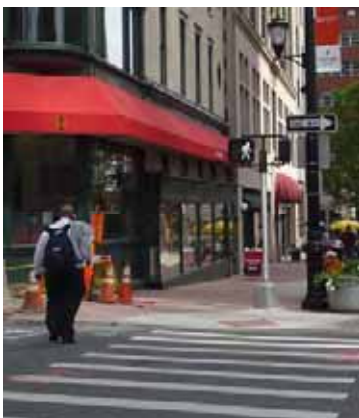
Initiate Wayfinding Signage Program

The implementation of a comprehensive wayfinding signage program would guide pedestrians, motorists, and bicyclists efficiently and effectively to key destinations and parking areas throughout the city. Wayfinding signage can take many forms and can potentially contribute to the character of the downtown through decorative or distinctive signage. Using signage to create



enhance downtown character can be especially beneficial with pedestrian wayfinding signage, such as urban trails stamped in the sidewalk leading pedestrians to major destinations. The most basic function of wayfinding signage is to provide information about the direction of popular destinations at critical decision making points during the course of travel. For downtown Hartford, three of the most important activity hubs are State Street Square, the intersection of Trumbull Street and Asylum Street, and the Columbus Boulevard gateway (proposed below). Wayfinding signage should direct both motorists and pedestrians to these activity centers and then from these centers to the many other destinations throughout the downtown. By clearly indicating how to reach major destinations, both motorists and pedestrians can confidently and quickly navigate the city.

Adjust Signal Operations to Provide a Concurrent Pedestrian Phase



The traffic signals in downtown regulate more than just motorists, they also regulate the movement of pedestrians. Currently, pedestrians are limited to crossing the street during an exclusive pedestrian phase of traffic signals. During the exclusive pedestrian phase, motorists at all intersection approaches are stopped and pedestrians can cross any of the streets. Although pedestrians are prioritized during this one phase of the traffic signal, they are forced to wait until this phase to cross the street, which significantly increases pedestrian travel times in downtown. By shifting to a concurrent pedestrian

phase—pedestrians are permitted to cross the street in the same direction as flowing traffic—the City can reduce the amount of delay experienced by pedestrians, making downtown a more inviting and convenient walking environment. In addition to benefiting pedestrians, eliminating the exclusive pedestrian phase would also reduce the delay of motorists at traffic signals. By reducing the amount of delay all modes of transportation face at traffic signals, the City will help reduce travel times for everyone downtown. Following this effort, the City should continue to strive for improved pedestrian level of service whenever assessing downtown traffic operations.

Upgrade the Traffic Control Signal System

The City's traffic control system is antiquated and has difficulty responding to various peak period traffic demands. Within the study area, some of the signalized intersections have fallen out of coordination with the central system. This lack of coordination contributes to traffic congestion at key locations. Through an evaluation of the existing central system and communication equipment, the City can determine the most cost-effective approach for creating a system capable of efficiently regulating downtown traffic flow. One of the most effective strategies the City should consider to maximize signal coordination to reduce periods of peak traffic congestion is to install a new citywide central system.

Reevaluate No-Turn-On-Red Program



When the State of Connecticut enacted the law allowing motorists to turn right on red lights, the City of Hartford in many cases restricted this movement through posted signs to maintain the status of vehicle operations existing before the law took effect. At the time, the City implemented this program to reduce the potential conflict between pedestrians crossing the street during the walk phase of a traffic signal and motorists turning right during this phase. Over time both motorists and pedestrians better understand this traffic movement and how to avoid potential conflicts. The ability for motorists to turn right on red is now commonly practiced in most major cities.

While the initial intention of this restriction helped protect pedestrians at the time, it now contributes to congestion at key intersections and delay for motorists throughout the downtown. Permitting motorists to turn on red when it is safe to do so would contribute to a more efficient use of the transportation network, preventing intersections from becoming unnecessarily congested.

Morgan Street System

The street network in the Morgan Street System focus area serves to transfer heavy volumes of traffic between local streets and I-91. As a key point of access and egress to and from the city, it is important that the transportation system in this part of downtown supports access to all destinations. Furthermore, the transportation network has to efficiently operate to process the arrival and departure of the heavy volumes of vehicles heading to and from downtown office spaces, helping to keep those spaces desirable and occupied. Because the Morgan Street System includes I-91, it is essential that this area be designed to accommodate motor vehicles,

but not at the exclusion of provisions to help strengthen the connection between the north and south parts of the city. The following alternatives were developed to improve traffic operations while simultaneously contributing to a stronger pedestrian environment:

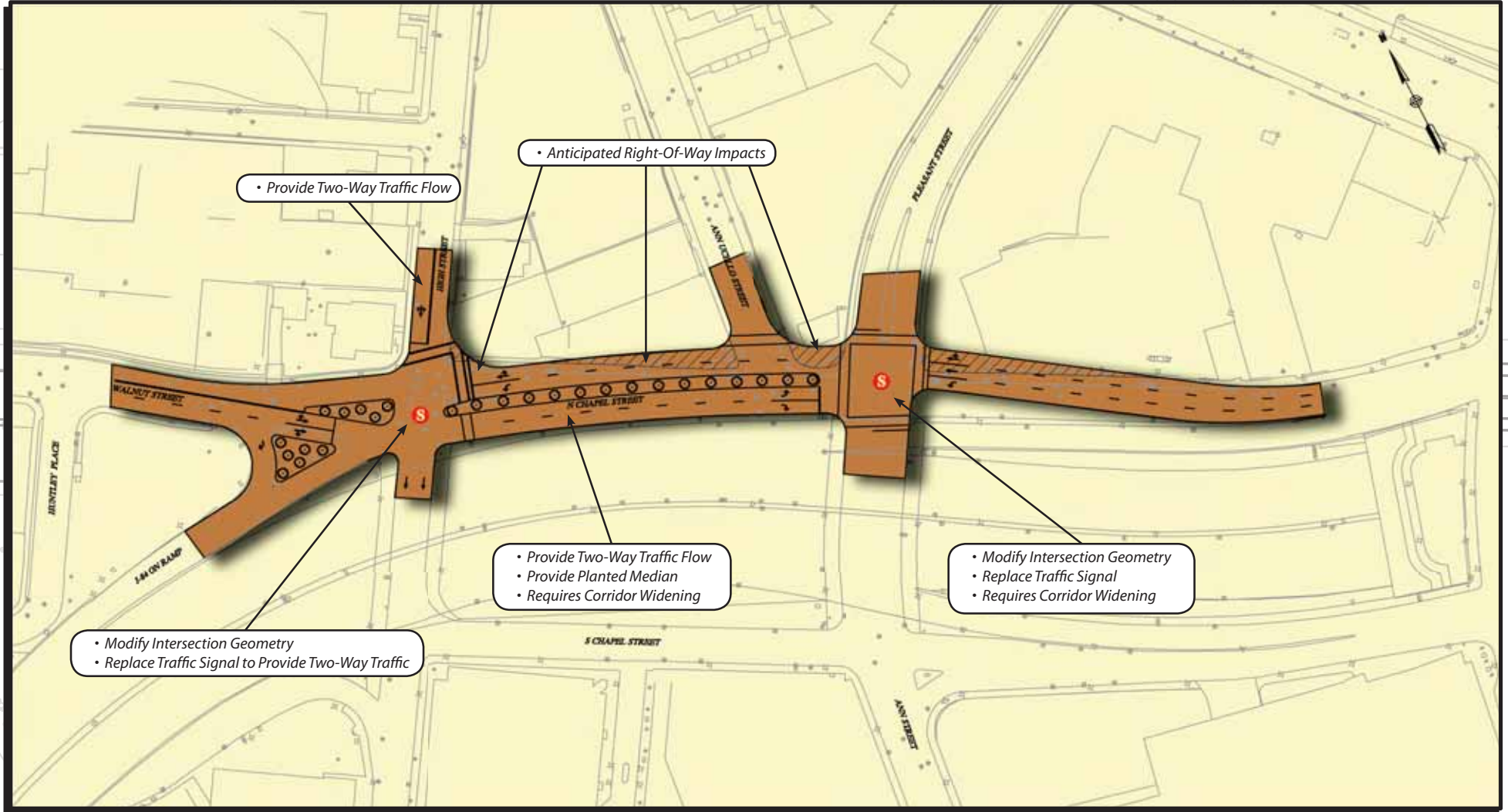
Convert North Chapel Street to Two-Way Traffic Flow between High and Pleasant

One of the key issues associated with the Morgan Street System focus area is a lack of connectivity to the northern portion of the city for motorists approaching eastbound along Walnut Street. The northern portion of Hartford—the area north of I-91—is poised for redevelopment if access to this area can be improved. By converting North Chapel Street to two-way traffic flow between High Street and Pleasant Street, the City can facilitate traffic flow to an area of downtown that is currently limited by the one-way street pattern. Motorists traveling along Walnut Street will immediately benefit from this improvement through the improved access to the multitude of parking options currently located in the northern area of downtown. The improved connectivity will also help make the undeveloped and underdeveloped land more attractive for private development. Creating two-way traffic flow on North Chapel street also has the benefit of supporting better access to the Public Safety Complex currently under construction on High Street.

As part of this alternative, the final specific improvements will need to be made to enable successful implementation (see Figure 3-1):

- > *Replace Traffic Signals to Facilitate Two-Way Traffic* – The traffic signals at High Street and Pleasant Street will need to be replaced to accommodate two-way traffic.
- > *Modify Intersection Geometry of North Chapel Street at High Street and Pleasant Street* – The ability to fit two-way traffic along this segment of North Chapel Street will require widening and modifying the roadway and intersections.
- > *Install Planted Medians* – The planted medians will help establish this point of entry into downtown as a gateway. Additionally, the planted medians will act as pedestrian refuges, improving pedestrian access between the north and south portions of the city.

During the alternatives development, the project team also considered providing two-way traffic flow on the southbound leg of High Street approaching the intersection of Walnut Street, High Street, and North Chapel Street. Due to the significant amount of latent traffic demand associated with this approach, it was not feasible to implement this change and maintain efficient and safe traffic operations at this intersection. The project team also evaluated the feasibility to provide two-way traffic flow along the entire High Street corridor. Through a qualitative analysis it was found determined this would create a great deal of traffic congestion and would be counterproductive to other potential improvement alternatives.



Vanasse Hangen Brustlin, Inc.

Figure 3-1 April 2010
Downtown Circulation Study
N. Chapel Street

Enhance the Intersection of Market Street and Morgan Street

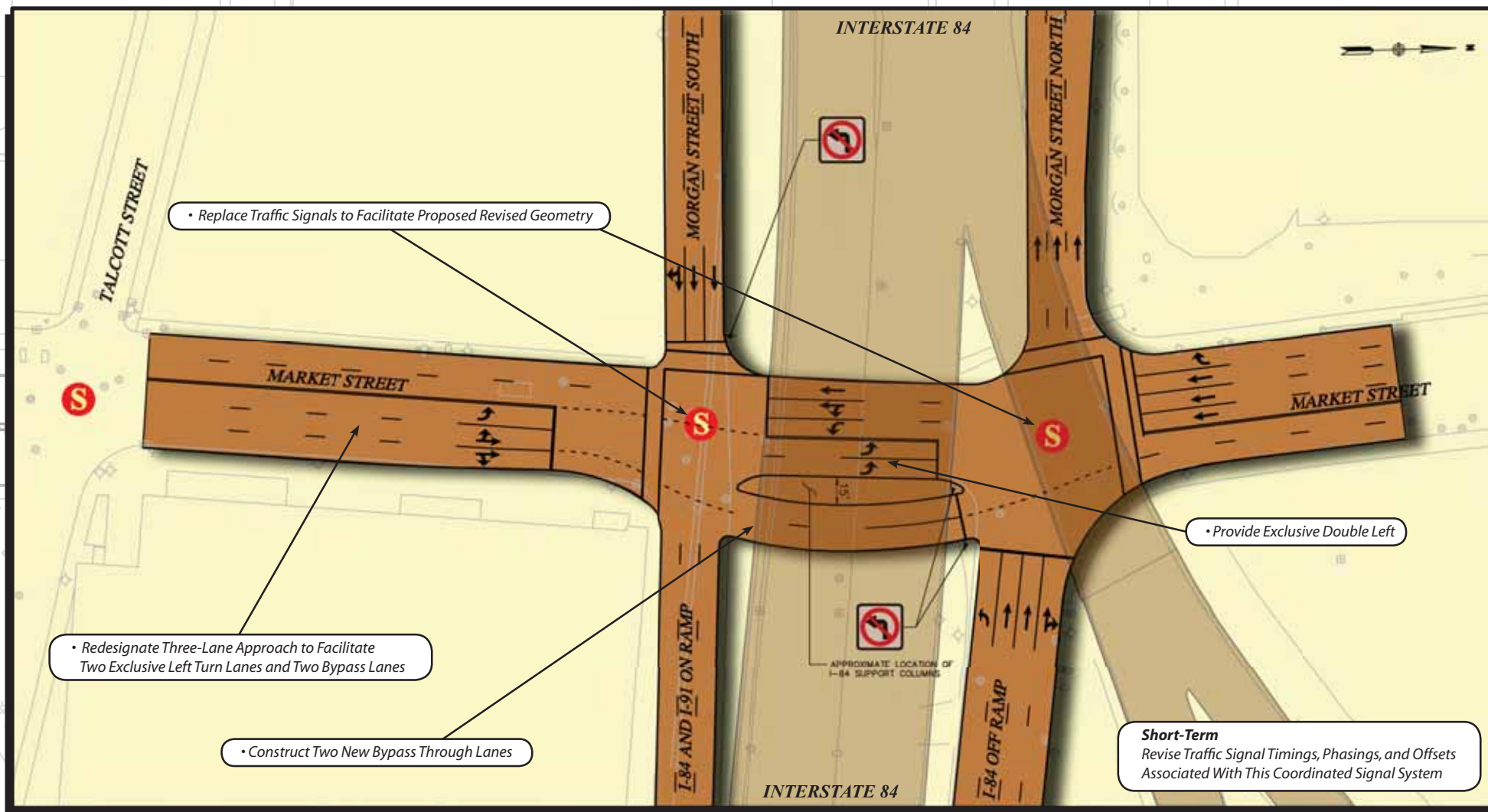
The high concentration of office space and parking areas in the vicinity of downtown to the southwest of the intersection of I-84 and I-91 contributes to traffic patterns primarily oriented to the traditional business day with peak volumes during the morning and evening rush hours. The peak-period traffic congestion is especially heavy northbound on Market Street near the intersection with Morgan Street in the evenings as workers attempt to access I-84 as they leave the city. The peak-period traffic congestion at the Market Street and Morgan Street intersection can be addressed in the short term by revising the timings, phasings, and offsets associated with a traffic signal system serving both the Market Street and Morgan Street corridors.

A more permanent solution to consider for the future is for the City to make the following geometric modifications (see Figure 3-2):

- > *Provide Two Additional Northbound Through Lanes on Market Street* – Creating additional roadway capacity under the I-84 ramp system for traffic exiting the city on Market Street would facilitate northbound through traffic currently delayed by vehicles accessing I-84 during the evening commute.
- > *Provide Two Exclusive Northbound Left-Turn Lanes from Market Street* – The implementation of two exclusive northbound left-turn lanes on Market Street will facilitate motorists accessing the I-84 westbound ramp system via North Morgan Street during the evening commute.

The project team also considered prohibiting left-turns from Market Street to Morgan Street and displacing this heavy traffic movement to Market Street and Trumbull Street. Through a qualitative analysis, the project team determined that this displacement of traffic would significantly contribute to the existing traffic congestion experienced within the Main Street, Trumbull Street and Morgan Street triangle.





Vannase Hangen Brustlin, Inc.

Figure 3-2 April 2010
Downtown Circulation Study
Market / Morgan Street

Columbus Boulevard Corridor

The Columbus Boulevard Corridor covers two distinct areas, one north and one south of State Street. While these two areas are nominally linked by a common roadway—Columbus Boulevard—they lack connectivity. The one-way street patterns along Market Street and Columbus Boulevard north of State Street make it difficult for motorists to navigate to the many parking structures and destinations in the northern half of the Columbus Boulevard Corridor, making it feel isolated from other parts of the city. Additionally, the pedestrian facilities leading out of this area, such as the pedestrian refuge crossing State Street are inadequate for comfortable pedestrian travel. These issues prevent many visitors heading to the regional destinations on the south half of the corridor from taking advantage of the parking opportunities north of State Street. The following alternatives provide the City with options for overcoming the transportation challenges facing this focus area:

Enhance Founders Bridge Gateway

The Founders Bridge—a major downtown access point via Route 2—transports motorists directly into the Columbus Boulevard Corridor. This entry point currently serves as a high-speed, high-volume conduit into the center of the city. By enhancing the intersection of Route 2 and Columbus Boulevard as a gateway to downtown Hartford, the City can achieve numerous transportation benefits (see Figure 3-3). As part of the gateway, the City can provide wayfinding signage that will make it easy for motorists to take the most efficient routes to their destination (e.g., the Science Center, Convention Center, Statehouse Square, XL Center, etc.). A series of intersection improvements can also help to calm traffic as it enters the city, helping motorists to appropriately readjust their speeds and driving behaviors to reflect the urban environment they are entering. These type of intersection improvements include landscape improvements and an enhanced pedestrian refuge (see below). The Founders Bridge Gateway will ensure that motorists recognize they have arrived in downtown Hartford and make the intersection more amenable to the transportation needs of both motorists and pedestrians.

Enhance Pedestrian Refuges Associated with State Street

One of the greatest impediments to pedestrian mobility in this area of downtown is the wide street cross sections. Wide streets full of fast moving vehicles are uninviting and often difficult to cross, especially for senior citizens, young children, and anyone with a mobility limitation. The City has done a great job acknowledging the need for making these grand streets more accessible to pedestrians through the installation of pedestrian refuge islands. These refuge islands permit pedestrians to cross the street part of the way during the pedestrian phase of the traffic signal and wait in the center of the street for the next walk signal. Unfortunately, the existing pedestrian islands do not offer enough of a protected refuge to make pedestrians feel comfortable waiting in the center of the street. By enhancing and introducing the existing pedestrian refuges, specifically on State Street at Columbus Boulevard and on Market Street at American Row (see Figure 3-3). In addition to these improvements making it easier for pedestrians to access many popular destinations, they will also help pedestrians access the transit hub in the vicinity of Statehouse Square.

Convert Columbus Boulevard to Two-Way Traffic Flow between State and Talcott

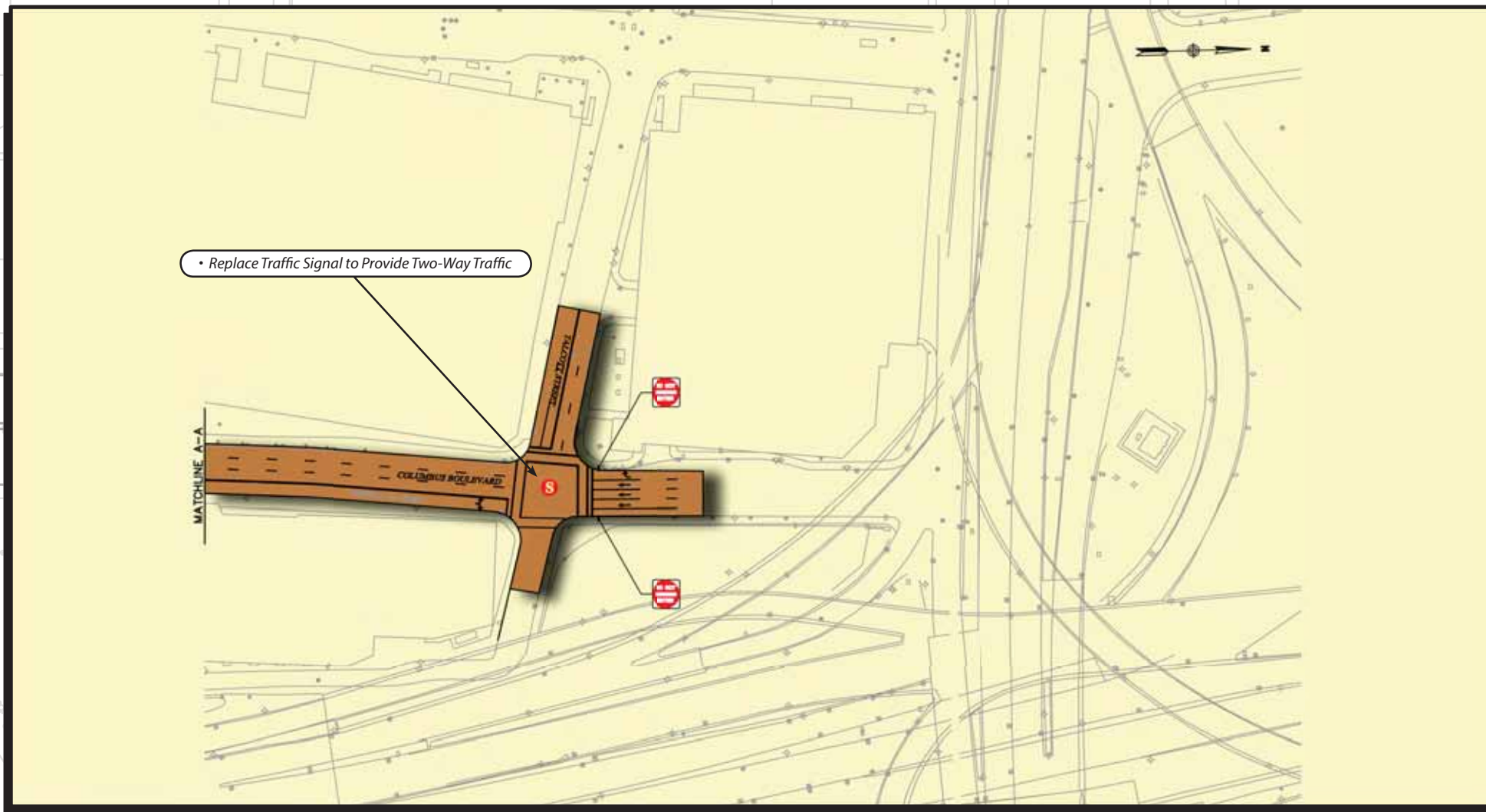
The one-way traffic patterns in the Columbus Boulevard Corridor focus area are one of the key reasons it is difficult to travel in downtown Hartford. By converting Columbus Boulevard to two-way traffic flow between State Street and Talcott Street, the City can reap myriad transportation benefits (see Figure 3-3). Opening this section of Columbus Boulevard to two-way traffic will enable motorists and bicyclists to continue heading north on the same street to access the multitude of destinations, services, and parking areas north of State Street, rather than be diverted off course. This direct route will be especially beneficial to visitors looking for public parking within proximity to the Science Center and Convention Center. It will also allow motorists to clearly understand where they parked in relation to their destination because they will be able to follow a direct route along a single major road.



The successful implementation of this alternative will require the conversion of Market Street to two-way traffic as well (see below). The elimination of this one-way couple will reduce recirculating traffic on these roads because motorists will be able to navigate more efficiently to their destinations. The introduction of two-way traffic on Columbus Boulevard also has the potential to make this roadway a more inviting pedestrian environment. Two-way traffic often has the effect of slowing down traffic as drivers become more aware of their surroundings and potential conflicts on the roadway as compared to one-way roads. This change in the transportation network does have the potential to induce additional peak hour traffic congestion. Despite the potential increase in congestion during the morning and evening commute times, the access and mobility benefits are significant enough to outweigh this drawback.

While this change can dramatically improve the ability of all visitors to intuitively find their way around downtown, it is a significant change that will require the following alterations to make it feasible:

- > *Replace Traffic Signals to Facilitate Two-Way Traffic* – The traffic signals at Columbus Boulevard and State Street as well as Columbus Boulevard and Talcott Street (see Figure 3-4) will need to be replaced to accommodate two-way traffic.
- > *Install New Traffic Signal to Control I-84 Southbound Off Ramp* – The new two-way traffic pattern on Columbus Boulevard has the potential to cause conflicts between vehicles on the southbound I-84 exit ramp and westbound vehicle coming across Founders Bridge looking to turn right on Columbus Boulevard. The installation of a traffic signal to control the I-84 southbound off ramp traffic will prevent conflicts before Columbus Boulevard.



100 0 100 200
SCALE IN FEET

Vannasse Hangen Brustlin, Inc.

Figure 3-4 April 2010
Downtown Circulation Study
Columbus Boulevard

Convert Market Street to Two-Way Traffic Flow between State and Kinsley



Much like the introduction of two-way traffic flow on Columbus Street, the conversion of Market Street to two-way traffic flow between State Street and Kinsley Street has the ability to make the downtown Hartford easier to navigate (see Figure 3-3). This change in the traffic pattern is only feasible if the corresponding change is made on Columbus Boulevard. The two-way traffic on Market Street will help reduce recirculating traffic in the vicinity of the Columbus Boulevard Corridor north of State Street, improve the pedestrian environment by slowing down motor vehicles, and

create better access to Main Street via Central Row. This new traffic pattern also has the potential to induce additional peak-hour traffic congestion, but once again, the access and mobility benefits will improve the transportation experiences of countless visitors and residents.

The following specific changes will need to be implemented in support of two-way traffic flow on Market Street:

- > *Replace Traffic Signals to Facilitate Two-Way Traffic* – The traffic signals at Columbus Boulevard and State Street will need to be replaced to accommodate two-way traffic.
- > *Modify Intersection Geometry of Market Street at American Row* – This intersection will need to be modified and enlarged to accommodate southbound traffic on Market Street.
- > *Limit Northbound Prospect Street to Right Turn Only* – To avoid conflicts between right-turning southbound traffic on Market Street, northbound traffic on Prospect Street will be limited to right turns only.

Asylum Street Corridor

The Asylum Street Corridor provides one of the major east-west links into downtown Hartford. Beyond being a conduit into the heart of downtown, this corridor has many dining and nightlife establishments, making this area of downtown popular destination in its own right. While many regional residents and visitors use this corridor to access the destinations in this area and throughout the city, the corridor currently operates to facilitate transportation out of the city. The one-way traffic pattern makes it difficult and confusing for motorists to take a direct route into the city, but makes it simple for them to leave. This impeded access into the city helps foster the perception that it is difficult to get to the center of the city, which leads to many regional residents to avoid visiting downtown Hartford.

Convert Asylum Street to Two-Way Traffic Flow between Trumbull and Ford

Currently, Asylum Street provides one-way travel in the westbound direction, which is away from the heart of downtown. This one-way traffic pattern facilitates visitors egress from the city and actively impedes their access to the downtown from the west. The one-way flow of traffic has the

additional detrimental effect of detracting from the pedestrian environment by inducing motorists to travel at high speeds on an unencumbered straight route out of the city. By converting Asylum Street to two-way traffic flow between Trumbull Street and Ford Street, the City would establish an intuitive east-west corridor right into the heart of the city through one of its most vibrant entertainment areas (see Figure 3-5). In addition to providing improved motor vehicle access, the implementation of two-way traffic on this segment of Asylum Street will reduce vehicle travel speeds by creating more “friction” as a result of oncoming traffic. The slower vehicle speeds will make this corridor a more inviting place for pedestrians, supporting the entertainment and nightlife scene.

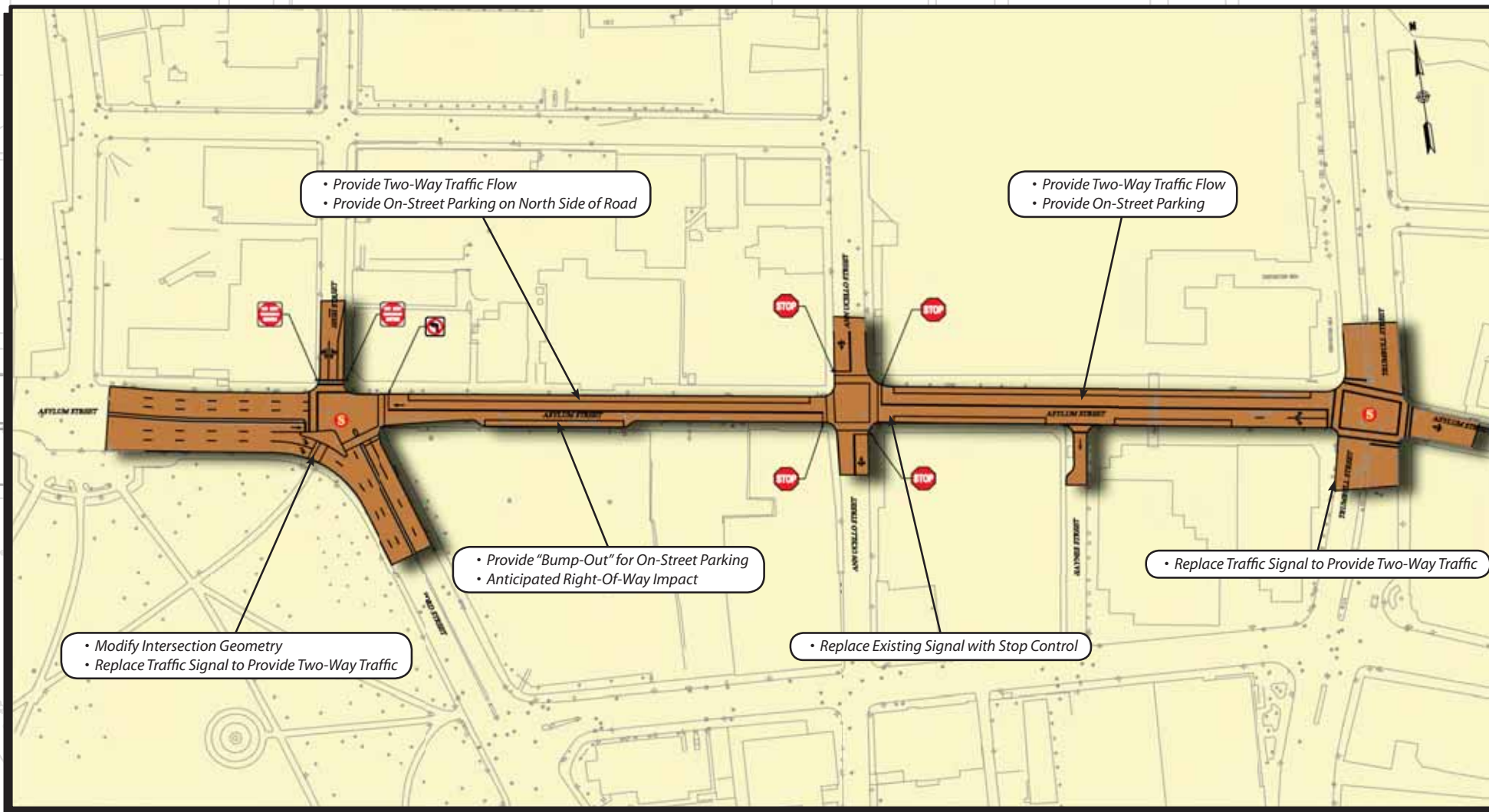
The introduction of two-way traffic on this segment of Asylum Street will provide a direct east-west corridor that will complement the north-south corridors of Trumbull Street and Main Street. Furthermore, the conversion of Asylum Street to a more pedestrian friendly corridor that provides direct access for motorists into the city will reinforce the activity center at the intersection of Asylum Street and Trumbull Street. Asylum Street will remain one-way westbound between Main Street and Trumbull Street in order to preserve the City’s current streetscape investment and to avoid creating traffic problems associated with the anticipated number of left turns from Main Street to Central Row that would originate from Asylum Street.



Other improvements required to accommodate two-way traffic on Asylum Street are as follows:

- > *Replace Traffic Signals to Facilitate Two-Way Traffic* – The traffic signals along Asylum Street at Ford Street and Ann Uccello Street will need to be replaced to accommodate two-way traffic.
- > *Modify Intersection Geometry on Asylum Street at Ford Street* – The intersection is currently configured to accommodate one-way traffic westbound from Asylum Street. Two-way traffic on Asylum Street will require modifying the intersection geometry to accommodate eastbound traffic through the intersection.
- > *Provide On-Street Parking along North Side of Asylum Street* – On-street parking is currently possible on both the north and south sides of Asylum Street. Converting the street to two-way traffic flow will require limiting on-street parking to just the north side of the street for the most part.
- > *Accommodate Limited On-Street Parking along South Side of Asylum Street with Bump Outs* – Although the new two-way traffic flow will not permit on-street parking on both sides of the street, there is an opportunity to provide some on-street parking on the south side of the street near the intersection with Ford Street. This parking will be protected by bump outs.

During the alternatives development, the project team studied the possibility of providing two-way traffic flow along High Street at the intersection of Asylum Street and Ford Street. This option was not feasible because the latent traffic demand that would seek access to High Street from eastbound Asylum Street via a left-turn movement. It was found that this would significantly degrade intersection operations to an unacceptable level of service. Additionally, if this left-turn movement was prohibited, the traffic accessing High Street from both Ford Street (northbound through traffic) and Asylum Street (westbound right-turning traffic) could not be accommodated without introducing a concurrent pedestrian phase at this location. Therefore, it was not further pursued.



Vannase Hangen Brustlin, Inc.

Figure 3-5 April 2010
Downtown Circulation Study
Asylum Street

Union Station Area

As a major multi-modal transportation hub, it is important for the City to continue maintaining and enhancing connections between the Union Station Area and the rest of downtown. Fortunately, the City has already long been concerned with improving the transportation framework surrounding Union Station. As part of the *One City, One Plan – Plan of Conservation and Development 2020*, the City has brought together many of plans and projects underway in this area of downtown through the *Hartford Transportation Pathways Strategy and Union Station Connectivity Project* (HTPS). The HTPS



calls for several initiatives presented in the *Plan of Conservation and Development 2020* to improve downtown mobility through the series of four “pathways” presented below. A more detailed description of the initiatives associated with each of these “pathways” can be found in of the *One City, One Plan – Plan of Conservation and Development 2020*.

- > *Model Pathways* – The Model Pathways component of the HTPS includes initiatives aimed at adding and augmenting a variety of transportation modes.
- > *Service Pathways* – The Service Pathways component of the HTPS includes initiatives designed to create supportive services for multi-modal transportation.
- > *Connection Pathways* – The Connection Pathways component of the HTPS includes initiatives to facilitate connections to neighborhoods and jobs.
- > *Development Pathways* – The Development Pathways component of the HTPS includes initiatives to create transit-oriented development generated by multi-modal transportation.

Alignment of Alternatives with Study Objectives

The project objectives developed at the outset of the Downtown Circulation Study provide a key connection between specific transportation improvements and the broader interests of the City. Each of the alternatives developed to address the key transportation issues is compared against the objectives in Table 3-1. As the table shows, each alternative presented above meets several of the objectives. Since no single alternative can meet all of the City's transportation needs, it is important that a balance of alternatives is advanced to fully cover the goal of the study. Taken as a group, the alternatives provide significant improvements in all areas of transportation and advance the goal of enhancing the downtown transportation network in an effort to support economic growth and investments, improve regional and local connectivity, and create accessibility through a variety of transportation modes, including walking, transit, and driving.

City of Hartford – Downtown Circulation Study

Table 3-1: Alignment of Alternatives with Study Objectives

Alternatives
3-18

Alternative	Enhance economic vitality of downtown	Strengthen connections between areas of city	Support a walkable environment and strengthen pedestrian connections	Improve vehicle access/egress for residents, visitors, and employees	Reinforce/establish key gateway intersections and roadway corridors	Improve wayfinding for pedestrians and motorists	Support on-going transit initiatives
Area Wide							
Initiate Wayfinding Signage Program	✓	✓	✓	✓	✓	✓	
Provide a Concurrent Pedestrian Phase at Traffic Signals	✓	✓	✓				✓
Reevaluate No-Turn-On-Red Program	✓	✓		✓			
Morgan Street System							
Convert North Chapel Street to Two-Way Traffic Flow	✓	✓	✓	✓	✓		
Revise Timings, Phasings, and Offsets of Market/Morgan Traffic Signal System	✓			✓			
Enhance Market/Morgan Intersection Geometry	✓			✓			
Columbus Boulevard Corridor							
Enhance Founders Bridge Gateway	✓				✓	✓	
Enhance Pedestrian Refuges Associated with State Street	✓	✓	✓		✓		
Convert Columbus Boulevard to Two-Way Traffic Flow	✓	✓	✓	✓	✓		✓
Convert Market Street to Two-Way Traffic Flow	✓	✓	✓	✓			
Asylum Street Corridor							
Convert Asylum Street to Two-Way Traffic Flow	✓	✓	✓	✓	✓		

Recommendations

To help guide the implementation of the alternatives in an efficient manner, the alternatives identified above have been organized into five groups of improvement projects. These groups of projects will enable the City to move forward with targeted improvements as funding becomes available. While implementing all of the components of each group is essential for success, each individual group of improvement projects is discrete and does not depend on the implementation of any of the other groups to improve downtown mobility. Since it is possible to begin with any one of a number of manageable projects that will immediately improve downtown transportation, the City will have maximum flexibility in moving forward.

In deciding which group of alternatives to pursue in what order, the City will need to consider multiple factors. Two of the most important factors in determining the viability of an improvement project is its cost, both in financial terms and right-of-way (ROW) impacts. While it is beyond the scope of this study to provide detailed cost estimates and analyses of ROW impacts, a general overview of what should be expected is provided below to help the City in planning its schedule of improvements.

Each of the five groups of improvement projects is presented below along with estimated costs and ROW impacts. A map depicting the general locations and an overview of these improvement projects is provided in Figure 4-1.

Asylum Street Improvement Projects

The Asylum Street improvement projects are centered on the conversion of Asylum Street to two-way traffic between Ford Street and Trumbull Street. The following improvements will need to be made to successfully support this change:

- > Convert Asylum Street to Two-Way Traffic Flow between Trumbull and Ford
- > Replace Traffic Signals to Facilitate Two-Way Traffic
- > Modify Intersection Geometry on Asylum Street at Ford Street
- > Provide On-Street Parking along North Side of Asylum Street
- > Accommodate Limited On-Street Parking along South Side of Asylum Street with Bump Outs

Costs and Impacts

As part of the conversion of Asylum Street to two-way traffic flow, on-street parking will be provided on the south side of the street near the intersection with Ford Street. This parking has an anticipated ROW impact because it will encroach into the existing sidewalk area.

The conceptual cost estimate for this group of improvement projects is \$1,570,000.



Downtown Circulation Study

Hartford, CT

VHB

2. North Chapel Street Walnut Street

- Two-Way Traffic Flow on North Chapel Street
- Provide Planted Median
- Improved Access to the North End

1. Asylum Street

- Two-Way Traffic Flow on Asylum Street
- Improved Vehicle Access From the West
- Reduced Travel Speeds
- Improved Pedestrian Environment
- Creates New "Activity Center" at Asylum/Trumbull

5. Area Wide

- Implement Way Finding Signage Program for All Modes of Travel
- Consider Utilizing Concurrent Pedestrian Phase at All Signal Locations
- Consider Re-Evaluating "No Turn On Red" Program

4. Morgan Street Market Street

- Revise Traffic Signal Timings, Phasings, and Offsets
- Consider Two New NB Bypass Lanes

3. Columbus Boulevard Market Street

- Two-Way Traffic Flow on Columbus Boulevard
- Two-Way Traffic Flow on Market Street
- Enhanced Gateway Treatments to Downtown
- Improved Pedestrian Refuge
- Improved Access to Area Parking and Attractions



Vannasse Hangen Brustlin, Inc.

Figure 4-1 April 2010
improvement project

North Chapel/Walnut Street Improvement Projects

The introduction of a two-way traffic flow along North Chapel Street is the primary improvement proposed for this area. The following improvements will need to be made to successfully support this change:

- > Convert North Chapel Street to Two-Way Traffic Flow between High and Pleasant
- > Replace Traffic Signals to Facilitate Two-Way Traffic
- > Modify Intersection Geometry of North Chapel Street at High Street and Pleasant Street
- > Install Planted Medians

Costs and Impacts

The widening of North Chapel Street to accommodate two-way traffic flow is anticipated to have ROW impacts throughout the northern limit of the proposed roadway.

The conceptual cost estimate for this group of improvement projects is \$3,390,000.

Columbus Boulevard/Market Street Improvement Projects

The recommendations to convert Columbus Boulevard between State Street and Talcott Street as well as Market Street between American Row and Temple Street to two-way traffic flow will significantly improve the ability of all travelers to access the section of the city to the southwest of the I-91 and I-84 junction. The following improvements will support this change for transportation users of all modes:

- > Enhance Founders Bridge Gateway
- > Enhance Pedestrian Refuges Associated with State Street
- > Convert Columbus Boulevard to Two-Way Traffic Flow between State and Talcott
- > Replace Traffic Signals to Facilitate Two-Way Traffic
- > Install New Traffic Signal to Control I-84 Southbound Off Ramp
- > Convert Market Street to Two-Way Traffic Flow between State and Kinsley
- > Modify Intersection Geometry of Market Street at American Row
- > Limit Northbound Prospect Street to Right Turn Only

Costs and Impacts

The widening of the intersection of American Row at Market Street to accommodate southbound traffic from Market Street will encroach on an existing sidewalk bump out.

The conceptual cost estimate for this group of improvement projects is \$2,690,000.

Market Street and Morgan Street Improvement Projects

The heavy volume of vehicles departing from the many offices and parking structures in this section of downtown creates considerable traffic congestion during the evening commute. By improving the ability of this intersection to process vehicles safely and efficiently to reduce congestion, the City will help to keep these office spaces attractive for businesses. The following improvements will help reduce congestion over both the short- and long-terms:

- > Revise the timings, phasings, and offsets associated with the traffic signal system serving both the Market Street and Morgan Street corridors (short-term)
- > Provide Two Additional Northbound Through Lanes on Market Street under I-84 (long-term)
- > Provide Two Exclusive Northbound Left-Turn Lanes from Market Street to Morgan Street (long-term)

Costs and Impacts

The conceptual cost estimate for this group of improvement projects is \$2,010,000.

Area-Wide Improvement Projects

The area-wide improvement projects are primarily designed to reduce delay and improve confidence for both pedestrians and motorists traveling throughout downtown Hartford. Each of the following recommended projects will make it easier and quicker for travelers navigating the downtown.

- > Initiate Wayfinding Signage Program
- > Adjust Signal Operations to Provide a Concurrent Pedestrian Phase
- > Upgrade the Traffic Control Signal System
- > Reevaluate No-Turn-On-Red Program

Costs and Impacts

No ROW impacts are anticipated in the implementation of these improvement projects.

No conceptual costs were estimated for this group of improvement projects.

Appendix

Appendix A: Stakeholder Representatives

Appendix B: Previous Studies

Appendix C: Level of Service (LOS) Analysis

Appendix D: Recent and Planned Development

Appendix A: Stakeholder Representatives

- > Jim Abromaitis, *Capital City Economic Development Authority*
- > Sandra Bobowski, *Planning and Zoning Commission*
- > Matt Fleury, *Science Center*
- > Oz Griebel, *Metro Hartford Alliance*
- > Marc Levine, *942 Main Street*
- > Thomas Luskak, *Travelers Insurance*
- > James Kopencey, *Hartford Parking Authority*
- > Eve Moore, *Crowne Plaza Hotel*
- > Charles Steedman, *XL Center*
- > Calvin Woodland, *Capital Community College*
- > Michael Zaleski, *Hartford Business Improvement District*

Appendix B: Previous Studies

A review of the following studies offered valuable insights into the existing transportation network and historical efforts to improve downtown mobility:

- > Hartford West Major Investment Study – Technical Report 3: Assessment of Transportation Performance, (1997)
- > Hartford West Major Investment Study – Statement of Purpose and Needs (1997)
- > Effect of I-84 & I-91 Reconstruction on Downtown Hartford Traffic Circulation (1991)
- > Traffic/Transit Report (1985)
- > Hartford Transportation Component – Comprehensive Plan of Development (1985)
- > Pre-Design Study Hartford Computerized Signal System (1983)
- > Transportation Policy and Program Issues – A Briefing Paper (1983)
- > Walking City Plan (1982)
- > Downtown Transportation Project – Policy & Action Recommendations (1982)
- > Downtown Transportation Project – Proposed Goals, Policies, & Actions (1982)
- > Downtown Transportation Project – Technical Memorandum 1.3: Current, Three-Year and Ten-Year Deficiencies (1982)
- > Downtown Transportation Project – Conditions Assessment (1982)
- > Topics – Central Business District (1973)
- > Topics – Area Wide Plan (1972)

Appendix C: Level of Service (LOS) Analysis

Intersection operating conditions are classified by levels of service (LOS). Levels of service provide an index to the operational qualities of an intersection and highlight operational problems. Level of service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst. The evaluation criteria used to analyze focus area intersections are based on the 2000 Highway Capacity Manual.¹ A summary of traffic operations for key intersections in the study area is provided in Table C-1.

Table C-1: Signalized Intersection Level of Service Summary, 2009 Existing Conditions

Signalized Intersections	Time Period	2009 Existing Conditions		
		LOS*	V/C**	Delay***
Ann Street at Asylum Street	Morning Peak Hour	D	0.17	37.6
	Evening Peak Hour	C	0.21	30.8
Asylum Street at Trumbull Street	Morning Peak Hour	B	0.28	14.0
	Evening Peak Hour	A	0.31	9.8
Asylum Street at High Street and Ford Street	Morning Peak Hour	C	0.31	24.9
	Evening Peak Hour	D	0.43	35.7
Asylum Street at Main Street and State Street	Morning Peak Hour	A	0.20	5.4
	Evening Peak Hour	A	0.18	2.7
Asylum Street at Union Place	Morning Peak Hour	A	0.32	0.4
	Evening Peak Hour	A	0.26	0.7
Columbus Boulevard at Arch Street	Morning Peak Hour	B	0.54	17.4
	Evening Peak Hour	B	0.41	12.1
Columbus Boulevard at Sheldon Street	Morning Peak Hour	B	0.57	11.7
	Evening Peak Hour	C	0.82	33.3
Columbus Boulevard at Grove Street	Morning Peak Hour	B	0.55	11.4
	Evening Peak Hour	B	0.72	17.5
Columbus Boulevard at Kinsley Street and I-91 Off Ramp	Morning Peak Hour	B	0.09	14.1
	Evening Peak Hour	B	0.20	15.6
Columbus Boulevard at State Street	Morning Peak Hour	F	0.97	>80
	Evening Peak Hour	F	1.18	>80
Columbus Boulevard at Talcott Street	Morning Peak Hour	B	0.13	13.8
	Evening Peak Hour	B	0.07	18.1
North Chapel Street at North Morgan Street and Main Street	Morning Peak Hour	C	0.31	22.7
	Evening Peak Hour	C	0.29	26.6
Main Street at Pearl Street and Central ROW	Morning Peak Hour	C	0.48	20.4

¹ *Highway Capacity Manual*, Transportation Research Board, National Research Council – Washington, D.C., 2000.

Table C-1: Signalized Intersection Level of Service Summary, 2009 Existing Conditions

Signalized Intersections	Time Period	2009 Existing Conditions		
		LOS*	V/C**	Delay***
	Evening Peak Hour	C	0.42	24.3
South Chapel street at South Morgan Street and Main Street	Morning Peak Hour	D	0.38	43.1
	Evening Peak Hour	C	0.46	32.8
North Morgan Street at I-84 WB Off-Ramp and Market Street	Morning Peak Hour	C	0.37	25.2
	Evening Peak Hour	C	0.52	20.3
Market Street at South Morgan Street	Morning Peak Hour	D	0.54	39.1
	Evening Peak Hour	C	0.83	32.0
Market Street at Talcott Street	Morning Peak Hour	C	0.38	31.2
	Evening Peak Hour	C	0.35	24.0
North Chapel Street at Ann Street and Pleasant Street	Morning Peak Hour	C	0.23	22.6
	Evening Peak Hour	C	0.35	32.5
North Chapel Street at Trumbull Street	Morning Peak Hour	B	0.22	15.0
	Evening Peak Hour	B	0.27	17.5
Pearl Street at Jewell Street and Ford Street	Morning Peak Hour	C	0.53	22.3
	Evening Peak Hour	C	0.64	24.7
Prospect Street at Arch Street and Whitehead Highway WB Off Ramp	Morning Peak Hour	C	0.54	25.6
	Evening Peak Hour	B	0.45	17.9
South Chapel Street at High Street and I-84 EB Off Ramp	Morning Peak Hour	B	0.23	17.0
	Evening Peak Hour	B	0.13	10.7
South Chapel Street at Ann Street	Morning Peak Hour	B	0.21	15.3
	Evening Peak Hour	C	0.25	20.6
South Chapel Street at Trumbull Street	Morning Peak Hour	B	0.31	18.5
	Evening Peak Hour	C	0.31	21.3
State Street at Market Street and Prospect Street	Morning Peak Hour	B	0.41	11.1
	Evening Peak Hour	B	0.62	13.7
Trumbull Street at Market Street	Morning Peak Hour	D	0.47	40.7
	Evening Peak Hour	C	0.47	29.5
Trumbull Street at Pearl Street	Morning Peak Hour	C	0.39	27.4
	Evening Peak Hour	C	0.33	22.6
Walnut Street at North Chapel Street and High Street	Morning Peak Hour	C	0.45	24.0
	Evening Peak Hour	C	0.46	25.3

Source: Vanasse Hangen Brustlin, Inc.

Note: Boldface intersections operate at LOS E or F during one or both peak periods.

* Level of Service

** Volume to Capacity Ratio

*** Delay = Average control delay to all vehicles entering the intersection in seconds / vehicle.

Table C-2: Unsignalized Intersection Level of Service Summary, 2009 Existing Conditions

Unsignalized Intersections	Time Period	2009 Existing Conditions		
		Demand*	Delay**	LOS***
Church Street at Union Place	Morning			
	-- Northbound	179	10.7	B
	Evening			
	-- Northbound	123	12.8	B

Note: Boldface intersections operate at LOS E or F during one or both peak periods

* Demand in vehicles per hour.

** Delay = Average control delay in seconds per vehicle.

*** Level of Service.

Appendix D: Recent and Planned Development

Table D-1 below outlines major development projects planned for the study area as of July 2009 provided by the City of Hartford's Development Services Division. The location of each of these projects is depicted on Figure D-1.

Table D-1: Major Study-Area Development Projects as of July 2009

Project		Property Address	Description
1	AI Engineering Inc.	3 Constitution Plaza	<ul style="list-style-type: none"> Current abatement and planned demolition of the former Broadcast House Proposed 260,000 s.f. office building
2	Front Street	Front Street & Columbus Boulevard	<ul style="list-style-type: none"> 68,000 square feet of retail space scheduled for completion in spring of 2010
3	Connecticut Science Center	50 Columbus Boulevard	<ul style="list-style-type: none"> Expected to draw over 350,000 patrons annually on schedule to open in June 2009
4	410 Asylum Street The Hollander Center	410 Asylum Street	<ul style="list-style-type: none"> Conversion of a vacant office building into 70 mixed income apartments, 13,000 square feet retail Completion date summer 2009
5	Public Safety Complex	253 High Street	<ul style="list-style-type: none"> Conversion of the former Board of Ed. Building and addition for HPD/HFD HQ facility Completion by spring 2011
6	One American Plaza	900 – 915 Main Street	<ul style="list-style-type: none"> Residential conversion of class b office tower into 101 market rate apartments; ground floor retail space

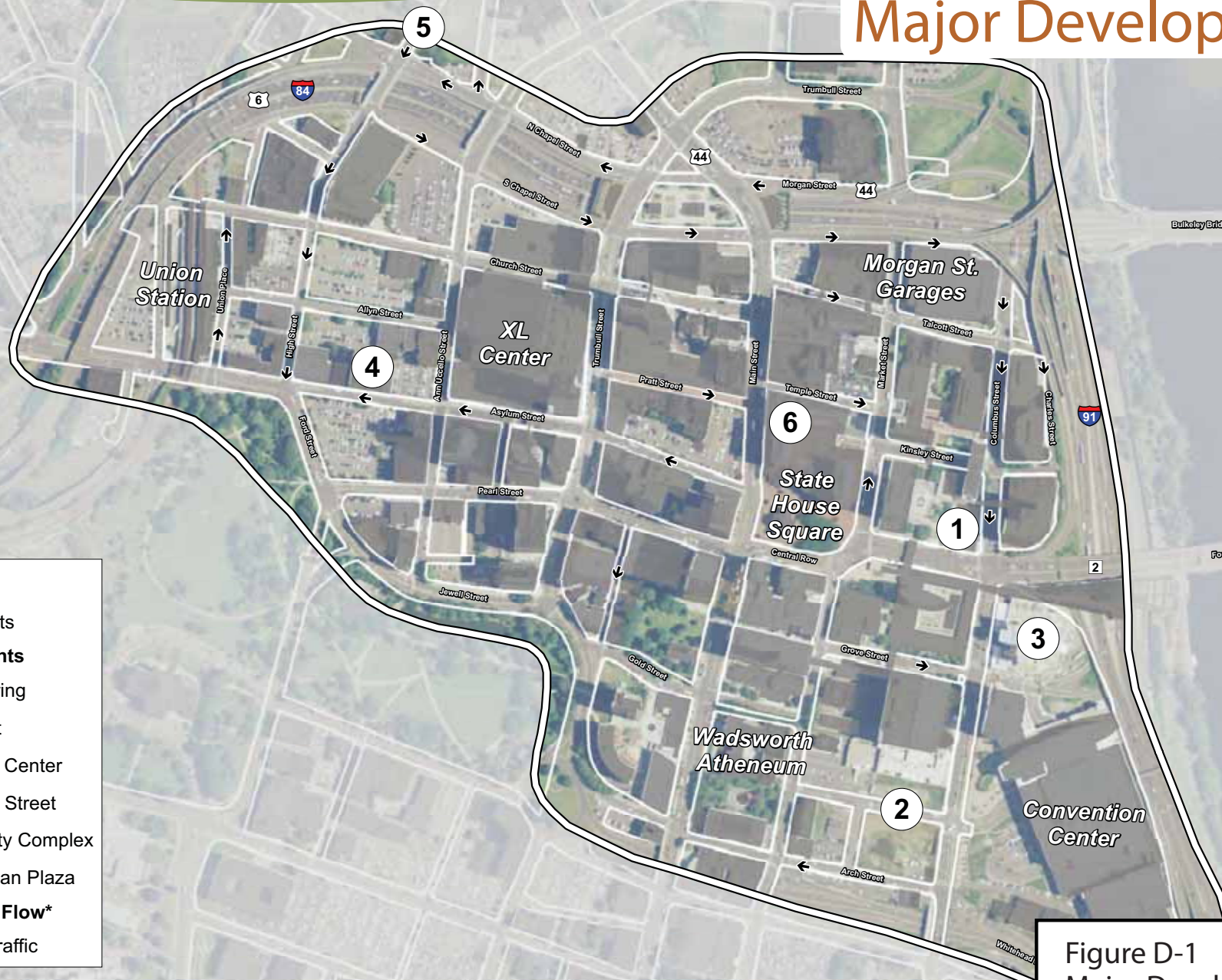


Downtown Circulation Study

Hartford, CT

VHB

Major Developments



0 250 500 1,000
Feet

* All street segments are two-way unless indicated with a unidirectional arrow.