

Feasibility Impact Analysis:
Traffic, Parking, Infrastructure
Proposed Municipal Development
In Downtown North Redevelopment Area
City of Hartford

Submitted to:

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INTRODUCTION

The City of Hartford is considering a redevelopment project in the Downtown North area to include a 6,000-seat municipally owned baseball park. Main Street, Trumbull Street, Pleasant Street and Windsor Street surround the subject site as shown in Exhibit 1. Due to the size of the facility, a variety of potential impacts to the surrounding roadway network needed to be considered. BETA Group, Inc. (BETA) has provided this analysis to address the feasibility of the redevelopment.

The City requested that several roadway layout options be assessed since the venue layout could require narrowing or closing adjacent roadways. BETA also reviewed one additional option based on the progression of the conceptual site layout plan.

This report will outline the methodologies and findings of BETA's assessment, and will serve as a reference to understand impacts related to traffic, parking, pedestrian access, and safety.

DATA COLLECTION

BETA collected both roadway and traffic data. The study area includes the following intersections:

1. Pleasant St at Chapel St (south)
2. Pleasant St at Chapel St (north)
3. Main St at Pleasant St
4. Pleasant St at Winthrop St
5. Pleasant St at Windsor St
6. Market St at Pleasant St
7. Trumbull St at Chapel St/Morgan St (north)
8. Main St at Trumbull St
9. Trumbull St at Windsor St
10. Market St at Trumbull St/I-91 ramps
11. Main St at Morgan St (south)
12. Main St at Morgan St (north)
13. Market St at Morgan St (north)

BETA collected existing traffic volume data within the study area. Spot turning movement counts were collected on Tuesday, March 18, 2014 during the morning and afternoon commuter peak periods (7:30 – 9:30 a.m. and 4:00 – 6:00 p.m.). These study periods were selected to understand the impacts during the weekday commuter peaks. The morning peak will not be affected by site-generated traffic, but the site will impact the afternoon peak hour. The site activity during weekend hours will affect area roadway operations, but the ambient traffic is typically lower on the weekends than during the weekday. The same is true during the weekday evening event dismissal period. Automatic Traffic Recorders (ATRs) were also used to collect 48-

hour data on March 18 and 19, 2014 at four locations. This data was compared to previously recorded traffic data. The volumes were balanced between intersections where appropriate and baseline 2013 existing morning and afternoon peak hour turning movement networks were developed.

In addition to traffic data, BETA gathered parking data. The City of Hartford provided information on parking lots and garages within the downtown area via the Hartford Parking Authority website. It is assumed that visitors will walk up to 10 minutes, or one half mile. More detailed discussion on area parking is included in following sections of this report.

Accident data was also reviewed within the study area with particular focus on pedestrian accidents, since the baseball park will draw visitors by foot from the surrounding area. The Connecticut Department of Transportation accident records for the most recent three years of available data (2010-2012) revealed a total of three pedestrian accidents occurred within the study area. This is considered a relatively low frequency. Automobile accidents are not considered a significant issue at most locations with the exception of the Market Street/North Morgan Street/I-84 exit ramp intersection. This location experienced a total of 136 crashes during the study period. Since this intersection will serve pedestrian access for ballpark patrons, the City should consider safety improvements at this location.

PROPOSED FACILITY

The City of Hartford is seeking to redevelop the block bounded by Main Street, Trumbull Street, Pleasant Street, and Windsor Street into a baseball park. The ballpark will serve a Major League Baseball AA Minor League team. The park will contain approximately 6,000 seats with open space and luxury boxes to serve approximately 1,000 additional patrons. The main entrance(s) and ticketing areas will be located along Main Street, while secondary access for staff, players, and utilities will be located along Windsor Street. It is understood at this time that the surface parking lot along the southern side of Trumbull Street opposite the project site will serve as off-street parking for the baseball team ownership, players, and ballpark staff. A concept of the ballpark is shown in Exhibit 2.

ALTERNATIVES

Five alternate roadway layouts, based on possible site design impacts, were reviewed. These include:

- Alternative 1: Close Trumbull Street between Main Street and Windsor Street
- Alternative 2: Relocate Trumbull Street to the south, with realignment of Trumbull Street and Main Street
- Alternative 3: Narrow rights of way on Trumbull Street and Pleasant Street and provide one-way designations
- Alternative 4: Narrow the right of way on Trumbull Street and establish a reversible lane for morning and afternoon rush hours

Alternative 5: Close Windsor Street between Trumbull Street and Pleasant Street

Based on the adjustments made to the facility layout since the proposal submission, additional site needs have affected the rights of way along Windsor Street between Trumbull Street and Pleasant Street. Therefore, BETA reviewed traffic operations for Alternative 5.

The existing peak hour traffic volumes were redistributed to account for roadway closures, directional changes, and lane reductions. Existing morning and afternoon peak hour traffic volume networks for each alternative were generated to understand the revised traffic flows. Note that Alternative 2 does not require alternate analysis since the existing roadway capacities are being maintained; however, the queues were reviewed for potential deficiencies related to the relocation of intersections and shortening of storage capacities. These are considered non-game day peak hour traffic volumes. Game-day volumes will add site-generated traffic to the weekday afternoon peak hour volumes, which is discussed in following sections of this report.

The City originally requested BETA consider a reversible lane along Trumbull Street between Main Street and Windsor Street, which would reverse direction by time of day (Alternate 4). The existing traffic volumes revealed that the westbound volumes are greater than the eastbound volumes during all hours of the day. Game day traffic is also expected to follow this distribution trend. Therefore, this alternative was dismissed since no benefit would be realized by providing eastbound one-way operation.

SITE TRAFFIC AND PARKING

BETA was provided development plan information, which includes facility capacity information, by Pendulum (project architect) and Brailsford & Dunlavy (project management team). Based on these sources and reviewing in-house data¹, the proposed sports facility is expected to attract an average of 5,600 patrons per game. Since this is an average, the site will likely host fewer people during weekday games (Monday through Thursday) and more people on weekend games (Friday through Sunday). Approximately 90% of visitors are expected to arrive to the site by automobile, while the remaining 10% will arrive by other means including bus, taxi, walking, and bicycling.

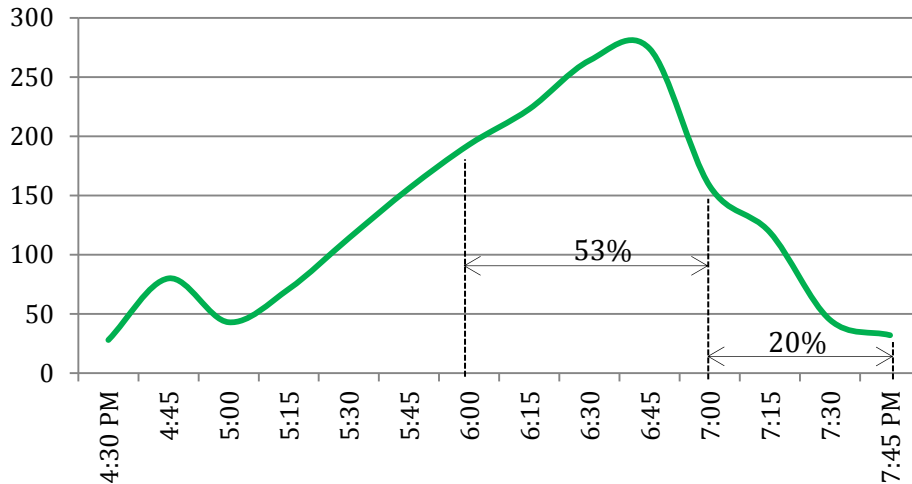
Citing the aforementioned sources, the average estimated vehicle occupancy for minor league baseball game attendees is approximately 3.0 persons per vehicle. Therefore, the proposed ballpark is expected to generate a total of approximately 1,700 vehicles on a typical weekday.

The Mitchel Field report provided data associated with pre-game arrival patterns for a minor league baseball game starting at 7:00 p.m. The location studied was at Citibank Park in Central Islip, New York on Tuesday, July 28, 2009. This data was reviewed to determine specifically how many vehicles will enter the study area during the on-street peak hour (assuming a weekday

¹ *Technical Memorandum: Appendix C224 – Cumulative Impacts: Baseball Stadium at Mitchel Field*; Vanasse Hangen Brustlin, Inc.; Robert S. Brown, AICP; September 9, 2009.

evening game). The following graph illustrates the arrival pattern. The sourced data was consistent with data provided by Pendulum.

Arrivals Patterns at Citibank Park



Approximately 53% of patrons arrive within the hour prior to the first pitch. This is the greatest percentage of site trips within an hour period. Thus, approximately 900 vehicles will enter the study area during the weekday 6:00 to 7:00 p.m. period. Area traffic patterns in Hartford show the commuter peak drops off after 6:00 p.m. To be conservative, BETA assumed both peaks were simultaneous.

The trip distribution was estimated by reviewing a 30-mile radius surrounding the project site. Within this radius each town and its population were assigned a likely route to the site. Based on these factors, the following trip distribution was developed for the baseball park:

<u>Direction</u>	<u>Percentage</u>	<u>Site Trips</u>
North (I-91)	25%	225
South (I-91)	20%	180
East (I-84)	20%	180
West (I-84)	25%	225
Northwest (U.S. Route 44)	10%	90
TOTAL	100%	900

These trips were then assigned to the overall network as shown in Exhibit 3. The assignment to the local roadway network was influenced by parking opportunities. The site trips were added to the existing traffic volumes for the baseline and each of the roadway alternatives to develop the build condition traffic volume networks. Note that site traffic was only added to the weekday afternoon peak hour network, since typical events will not require morning arrivals.

Exhibit 4 illustrates existing parking lots and garages, and their parking capacities. The total number of parking capacity illustrated in this exhibit is 19,210 spaces. Based on experience,

BETA assumed each parking facility experiences a 20% vacancy rate during the weekday afternoon period – the time during which site traffic will typically arrive. This can be confirmed by data provided by parking facility operators. A 20% vacancy rate for 19,210 spaces equals approximately 3,840 spaces. Patrons are assumed to first occupy the lots and garages nearest the ballpark and move farther from the ballpark as needed. For example, visitors will likely occupy the parking facilities north of I-84 prior to utilizing the parking facilities south of I-84.

BETA's assessment of parking facilities within the area shows that all visitors should be accommodated within parking lots and garages north of Asylum Street. Based on these findings, traffic from I-91 is assumed to use the Trumbull Street exit, traffic from I-84 westbound will use the Route 44 West exit, traffic from I-84 eastbound will use the Main Street exit, and the Route 44 traffic will arrive via Route 44.

The site-generated traffic was added to the existing baseline traffic volumes where no geometric modifications to the roadway network were assumed, and also to the alternative layouts with the various roadway relocations, changes in travel direction, and lane configurations. These volumes represent the build conditions.

Based on the overall parking capacity and the 20% usable parking assumption, visitors will have access to approximately 3,800 parking spaces. With a maximum attendance of 7,000 patrons, the maximum parking demand is expected to be approximately 2,300 spaces. The available 3,800 parking spaces will provide ample parking supply for the proposed baseball park.

Due to the presence of the 500-space parking lot along the eastern side of Market Street, and its proximity to the I-91 exit ramps, the City should consider operating a shuttle service between the parking lot and the ballpark. This lot could provide the majority of parking for patrons traveling to the ballpark via I-91. A Parking Management Plan should be implemented, which focuses on utilizing specific parking facilities, most notably the Market Street lot, for visitors.

PEDESTRIAN ACCESS

Sidewalks in the area surrounding the project site were reviewed. For a facility such as a baseball park, BETA recommends a minimum of 10-foot wide sidewalks be provided to accommodate the attendees, especially the families that will visit the ballpark. The roadways that provide 10-foot wide sidewalks include Trumbull Street (between Main Street and the Downtown area), and Main Street (between high Street (north of the site) and the Downtown area). These are the primary pedestrian routes between the downtown businesses and parking facilities; however, visitors parking within the 500-space lot located east of Market Street will be required to traverse five-foot wide sidewalks. All other roadways in the area provide five- to eight-foot wide sidewalks.

BETA reviewed likely pedestrian routes based on parking facility locations. A heavy concentration of parking garage space between Market Street and Main Street south of the I-84 viaduct creates a significant demand of pedestrian movement in this area. The pedestrian access along local roadways is estimated as follows:

- Pleasant Street east – 100+ pedestrians
- Main Street north – 200 pedestrians
- Trumbull Street east – 200+ pedestrians
- Market Street south to Trumbull Street – 1,800 pedestrians
- Main Street south – 1,200 pedestrians
- Trumbull Street south – 1,500 pedestrians
- Pleasant Street/Ann Uccello Street southwest – 1,000 pedestrians

These values are graphically shown in Exhibit 5. Based on these findings, BETA recommends the City explore widening the sidewalks along Market Street, Pleasant Street, and Ann Uccello Street to at least 10-foot wide.

PUBLIC TRANSIT

BETA reviewed the public transit routes located in the immediate area that would be affected by the potential modifications to the local roadway network. The CT Transit currently operates four local busses (#32, 34, 36, and 28) and two express busses (#5 and 15) that travel from Main Street eastbound onto Trumbull Street, and turn northbound onto Windsor Street. With the potential closure of Windsor Street, these busses will require alternate routing.

The DASH shuttle provides free service throughout downtown Hartford. Its route travels north along Main Street, turns right onto Trumbull Street, and right onto Market Street at 15-minute headways Monday through Friday from 7:00 a.m. to 7:00 p.m. This service provides extended hours during large events. It is not likely that this service will require alternate routing, though extended hours on game days could benefit patrons traveling to the ballpark from other points within the downtown.

TRAFFIC ANALYSES

The 2013 existing and traffic volumes were analyzed using the SimTraffic (component of SYNCHRO) operational modeling software to determine a baseline condition. This model calculates traffic Level of Service (LOS), capacity, delay, queues, etc. Based on the output from this model, the existing overall intersection conditions generally operate at acceptable Levels of Service (LOS D or better) during both the morning and afternoon peak hours. Operations are also generally acceptable under the alternative scenarios. The following is a list of deficiencies realized for specific roadway approaches under the various alternatives:

- Existing Baseline Condition
 - AM Peak – I-91 northbound and southbound off ramps are LOS F
 - PM Peak - Market St northbound at North Morgan St is LOS F and 95th percentile queues exceed 525'
- Existing Alternative – Close Trumbull Street
 - AM Peak – I-91 southbound off ramp is LOS F

- AM Peak – Market Street southbound at Pleasant Street is LOS E
- AM Peak – Main Street southbound at Trumbull Street is LOS F
- AM Peak – Main Street northbound queue at Trumbull Street exceeds 150'
- PM Peak – I-91 southbound off ramp is LOS F
- PM Peak – Main Street southbound queue at Trumbull Street exceeds 465'

- Existing Alternative – One-Way Trumbull Street and Pleasant Street
 - AM Peak - None
 - PM Peak – None
- Existing Alternative – Close Windsor Street
 - AM Peak – None
 - PM Peak – I-91 southbound off ramp is LOS E
 - PM Peak – I-91 northbound off ramp 95th percentile queue exceeds 595'
 - PM Peak – Market St northbound 95th percentile queue exceeds 330'

BETA also analyzed the build volumes (existing baseline traffic volumes plus site generated traffic) for existing geometry and proposed alternatives. The overall intersections operations are LOS D or better. The following is a list of deficiencies realized for specific roadway approaches under the various alternatives:

- Build Baseline Condition
 - Market St northbound at North Morgan St is LOS F and 95th percentile queues exceed 540'
- Build Alternative – Close Trumbull Street
 - Market St northbound at North Morgan St is LOS F and 95th percentile queues exceed 550'
- Build Alternative – One-Way Trumbull Street and Pleasant Street
 - Market St northbound at North Morgan St is LOS F and 95th percentile queues exceed 560'
- Build Alternative – Close Windsor Street
 - Market St northbound at Pleasant St is LOS E and 95th percentile queues exceed 335'
 - I-91 northbound off ramp 95th percentile queue exceeds 595'

Based on these findings, additional delay and queues will be experienced along the northbound Market Street approach to North Morgan Street under existing geometry and all alternatives. The closure of Windsor Street creates long but manageable queues on the I-91 northbound off ramp. Ultimately, the alternative roadway layouts and the addition of baseball patron traffic will not create failing traffic conditions. The overall intersection level of service results are shown in Exhibits 6A through 6H. Detailed analysis electronic files are included in the appended CD located in the back cover of this report.

PREFERRED ALTERNATIVE – TRUMBULL STREET RELOCATION

Based on the findings above, the preferred alternative to accommodate the proposed ballpark is to relocate Trumbull Street from its existing alignment between Main Street and Windsor Street. The realignment can be accommodated and will provide the existing level of capacity for vehicular traffic, while maintaining pedestrian and transit accommodations. This option will not alter existing traffic patterns.

The proposed Trumbull Street realignment requires a centerline shift of approximately 70 feet to the south, requiring the relocation of the Main Street/Trumbull Street intersection. The segment of Trumbull Street between Main Street and North Morgan Street also required realignment to avoid an offset intersection. The proximity of this intersection with proximity to the adjacent intersections along North Morgan Street is critical due to queue storage; however, analysis has revealed adequate storage length will be provided for queues between the intersections. The lane arrangements along Trumbull Street have been maintained as the existing geometry provides. Minimum ten-foot wide sidewalks have been furnished along both the north and south sides of Trumbull Street to ensure adequate pedestrian maneuverability.

Pedestrian accommodations are provided at the intersection of Main Street at Trumbull Street. An additional pedestrian crossing is possible at the Trumbull Street/Windsor Street intersection. BETA recommends pedestrian channelization along Trumbull Street between Main Street and Windsor Street to direct pedestrians to designated crossing locations.

As part of the Trumbull Street relocation, the intersection with Windsor Street has been redesigned. This intersection will accommodate coach busses and WB-62 semi-trailers used for deliveries to the ballpark. The proposed design provides a 30' wide roadway cross section along Windsor Street, which will accommodate either one travel lane in each direction, or one northbound travel lane with on-street parking and/or loading areas. On game days, Windsor Street could be blocked off for stadium use.

Public utilities that require relocation as a result in the alignment shift to Trumbull Street include:

- 1) Connecticut Natural Gas Corporation - 450' of 12" steel gas main;
- 2) Northeast Utilities - 450' of multi-duct concrete encased conduit and 3 structures;
- 3) Metropolitan District Commission (MDC) – 600' of 12" water main with appurtenances and hydrant relocations. A portion of the existing 12" RCP sanitary sewer on Trumbull Street will need to be abandoned as it conflicts with the site development; however, it is believed that the easterly down gradient portion of the sewer can be maintained and used for site discharge. A portion of the existing 15" RCP storm drainage system on Trumbull Street will also require abandonment and new storm drainage will be required on the realigned portion of Trumbull Street;
- 4) AT&T - 450' of AT&T communication duct bank will require relocation;
- 5) Comcast and Hartford Steam facilities are not present in the immediate area.

Without more specific information with regard to peak flows, plant equipment, energy requirements and related data, it is premature to conclude if existing utilities have adequate capacity to support the proposed site development. However, in discussion with the MDC it is believed that the existing domestic water supply system is adequate. A water and storm modeling analysis will be required by the MDC during the design process to confirm the adequacy of these systems. Any site design should consider the use of storm water infiltration and low impact design techniques to reduce and improve site storm discharge. Future site assessment should also include the potential for handling environmentally impacted soils.

COST ESTIMATE

BETA has prepared a preliminary cost estimate that addresses the relocation of Trumbull Street with respect to roadway reconstruction, utility relocation, traffic signal replacement and modification, sidewalks, illumination, drainage, mill and overlay adjacent streets along the site frontage up to and including sidewalks. Based on standard unit bid pricing used by the City of Hartford, the total construction cost of contract items and contingencies (10%) is approximately \$3.9 million.

CONCLUSION

BETA has reviewed the impacts of a potential 6,000-seat Major League Baseball AA Minor League ballpark development in the city block bounded by Main Street, Trumbull Street, Pleasant Street and Windsor Street in Hartford's Downtown North area. The impacts relate to traffic operations, parking demands, pedestrian access, safety, public transit, and roadway constructability. This facility is expected to draw a typical attendance of approximately 5,600 visitors.

The City originally proposed four alternative roadway layouts based on the potential development footprint, to which BETA added an additional alternative involving the closure of Windsor Street between Trumbull Street and Pleasant Street. Based on the analyses, **BETA's preferred alternative involves relocating Trumbull Street from its existing location approximately 70 feet to the south.** This design will not decrease roadway capacities within the network, with the exception that Windsor Street will be 30 feet wide. **Windsor Street will accommodate one- or two-way traffic, and can be closed on game days for stadium use.** If the section of Windsor Street between Trumbull Street and Pleasant Street is eliminated, this would affect several CT Transit bus lines. Instead of turning onto Windsor Street from Trumbull Street, these routes would be required to relocate to Pleasant Street to access Windsor Street to the north. The cost estimate to complete these improvements (including contract items and contingencies) is approximately \$3.9 million.

The baseball park will generate approximately 900 weekday afternoon peak hour vehicle trips (expected to arrive within the hour prior to the first pitch). The maximum estimated parking demand will be 2,300 spaces, which can be accommodated by the available 3,800 spaces located within walking distance of the site. To accommodate the pedestrian traffic, **BETA recommends widening sidewalks along Market Street, Pleasant Street, and Ann Uccello Street to at least 10 feet. BETA also recommends developing a Parking Management Plan to direct patrons to parking areas and reduce confusion.**

Traffic analyses indicate that the modifications to the local roadway system and the addition of site traffic will not create overall failing operations at any of the study intersections. However, several locations experience relatively long delays and/or queues for specific approaches, but these are typically locations where longer delays and queues already exist.



Project Site and Study Area

Exhibit 1

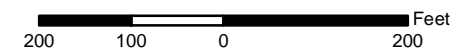
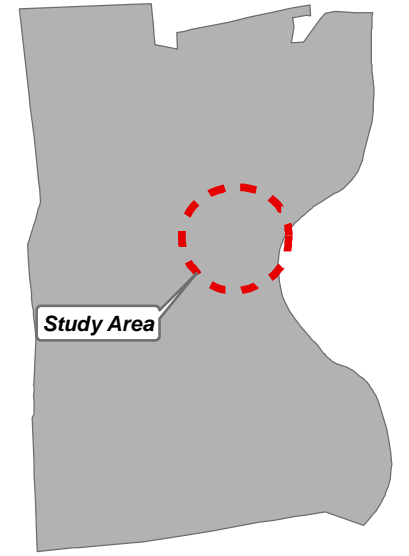


City of Hartford

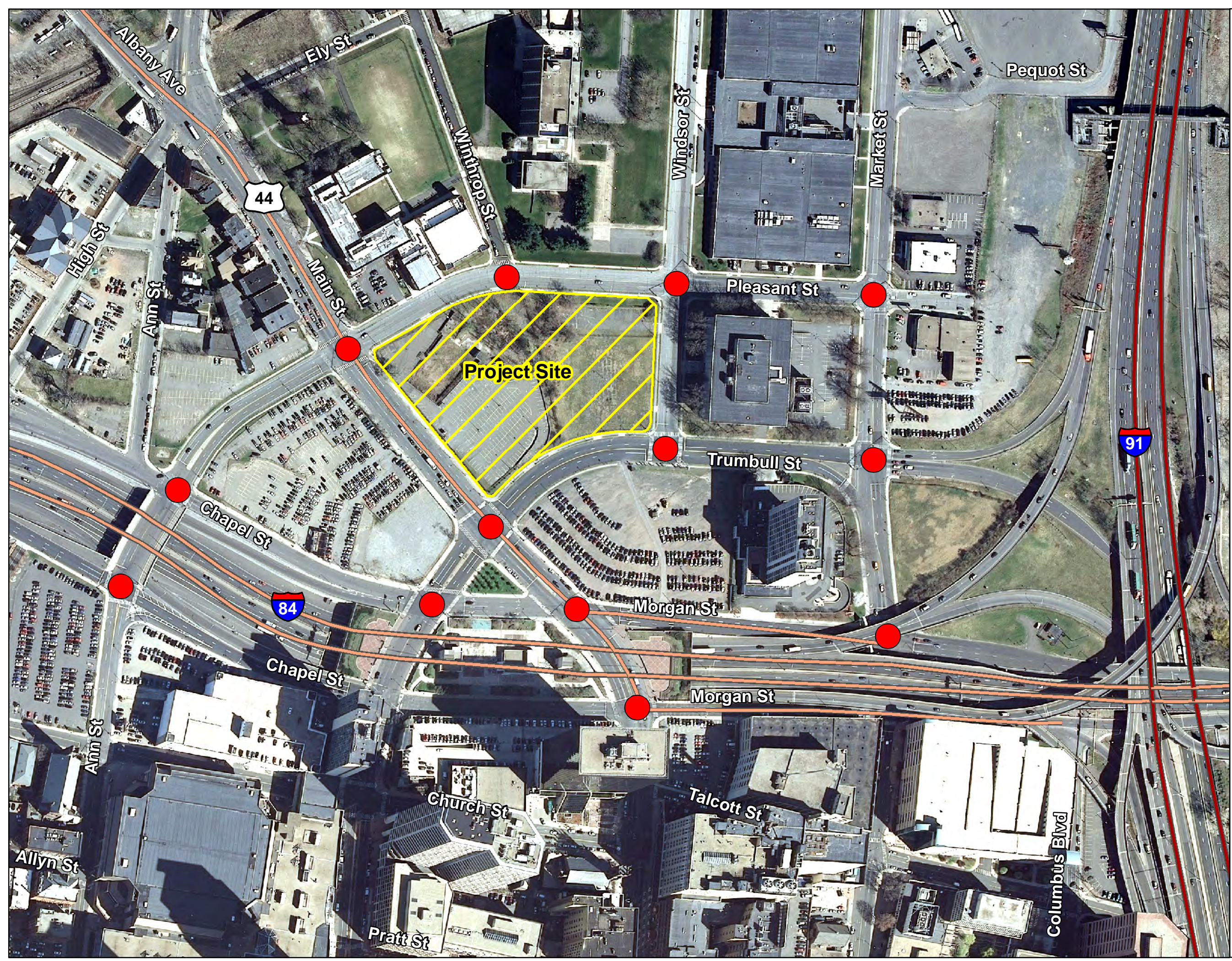
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-  Study Intersections
-  Project Site

Inset map: City of Hartford, CT



Base Map Source: Connecticut 2012 National Agriculture Imagery Program (NAIP) Color Orthophotography (1 – meter resolution)

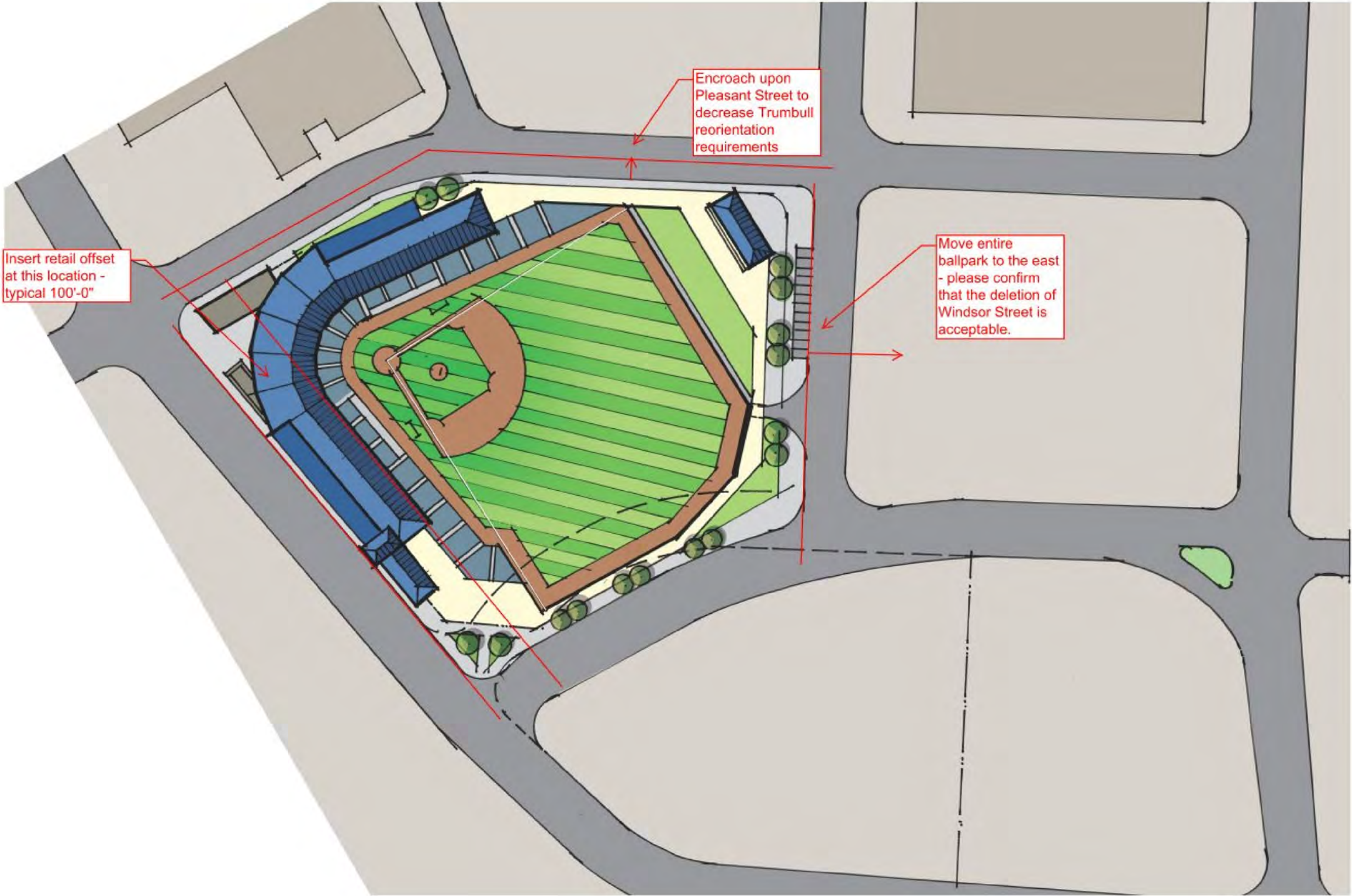


Concept Plan

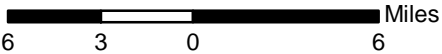
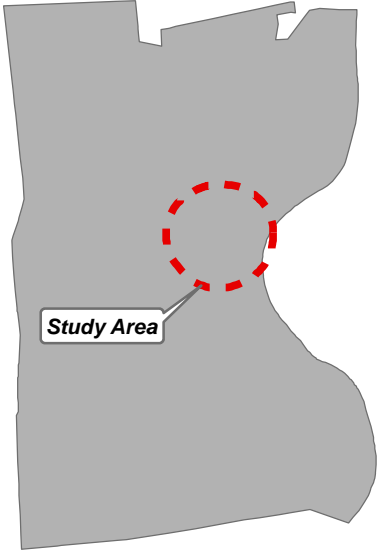
Exhibit 2



City of Hartford



Inset map: City of Hartford, CT



Overall Peak Hour Trip Distribution

Exhibit 3

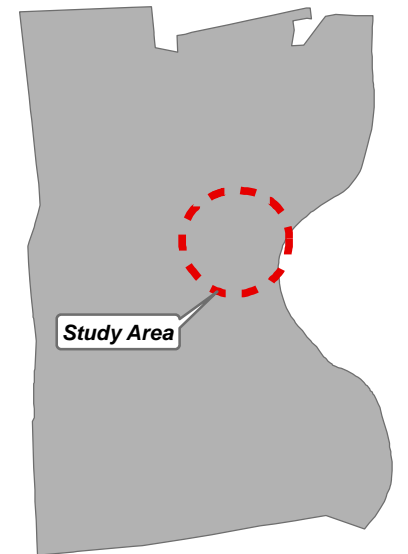


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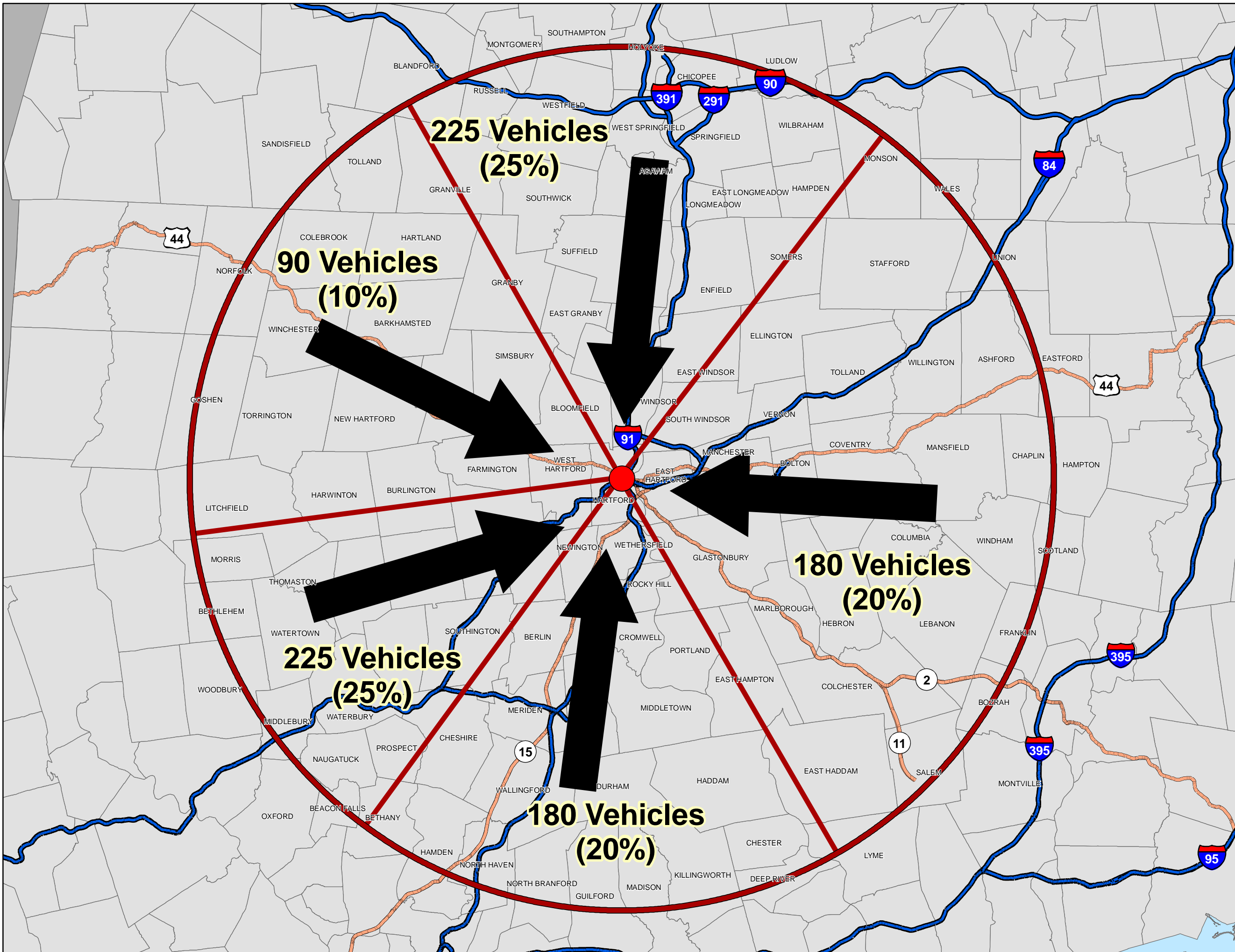
Legend

- Project Site
- 30 Miles

Inset map: City of Hartford, CT



6 3 0 6 Miles



	Capacity	Assumed Vacancy
Parking Lot	4,463	892
Parking Garage	14,747	2,949
Total	19,210	3,841

City Furnished Parking Lot & Garage Capacities in Downtown Exhibit 4

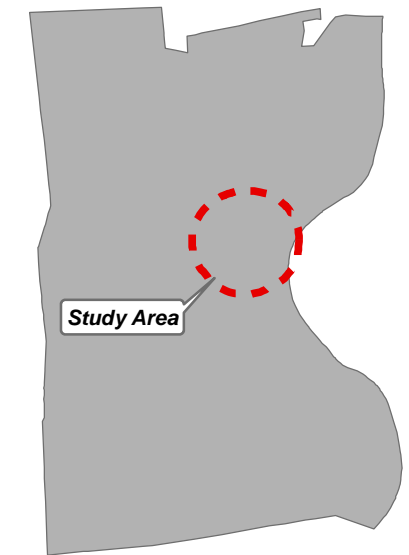


City of Hartford

Legend

- 342 Parking Capacity
- Parking Garage
- Parking Lot
- 1/2 Mile Radius
- Project Site

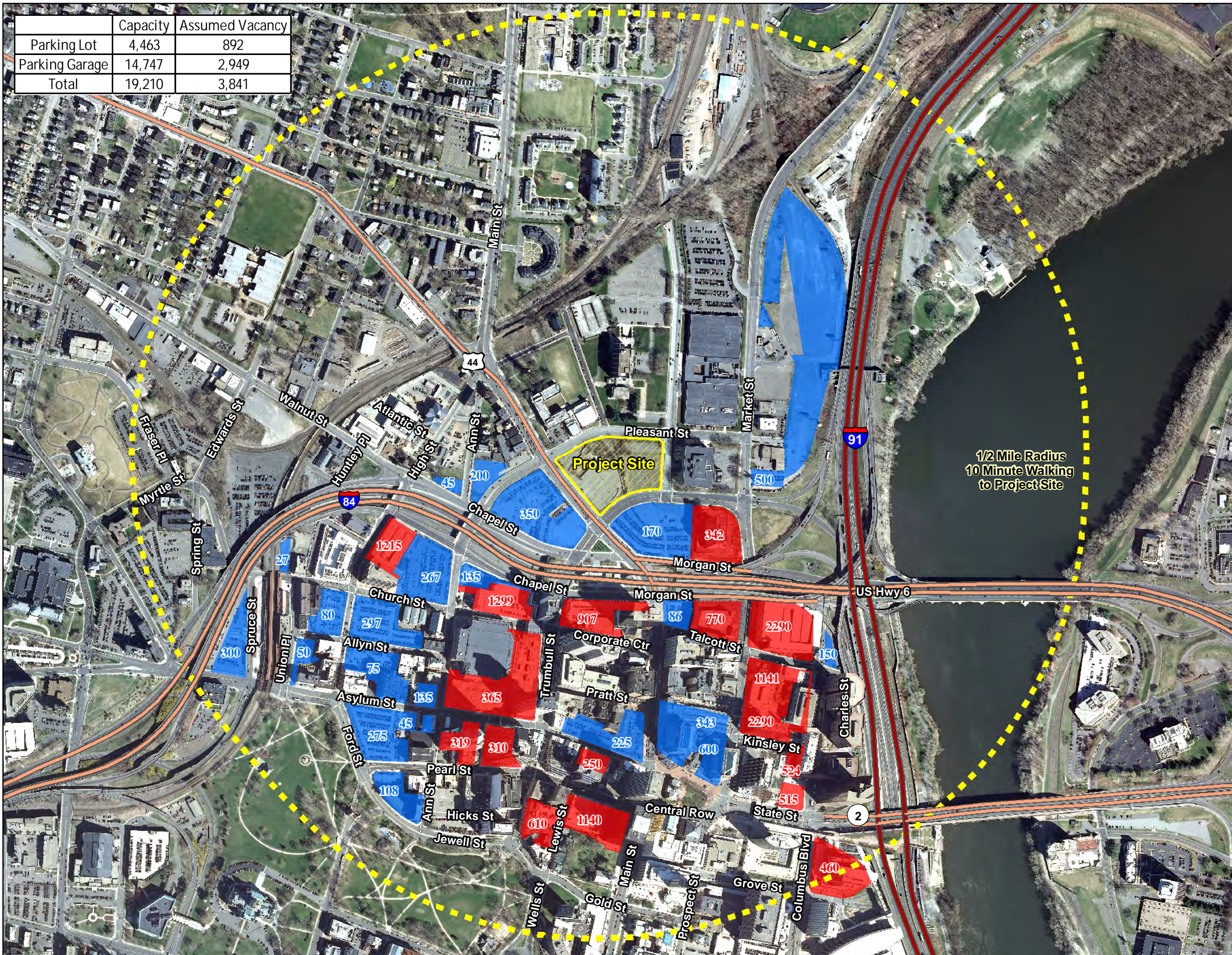
Inset map: City of Hartford, CT



500 250 0 500 Feet



Base Map Source: Connecticut 2012 National Agriculture Imagery Program (NAIP) Color Orthophotography (1-meter resolution)



1/2 Mile Radius
10 Minute Walking
to Project Site


Pedestrian Access Routes

Exhibit 5

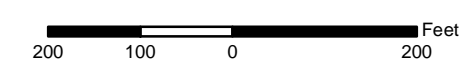
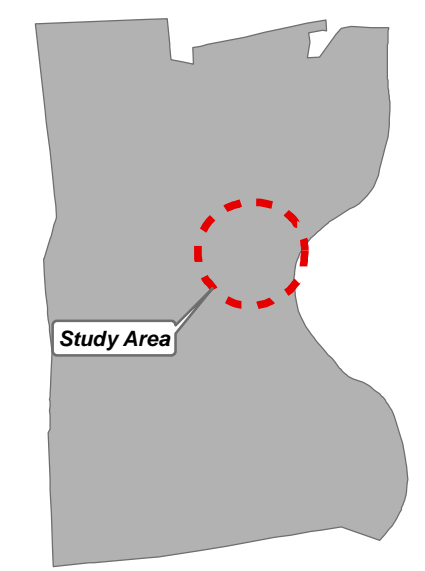


City of Hartford

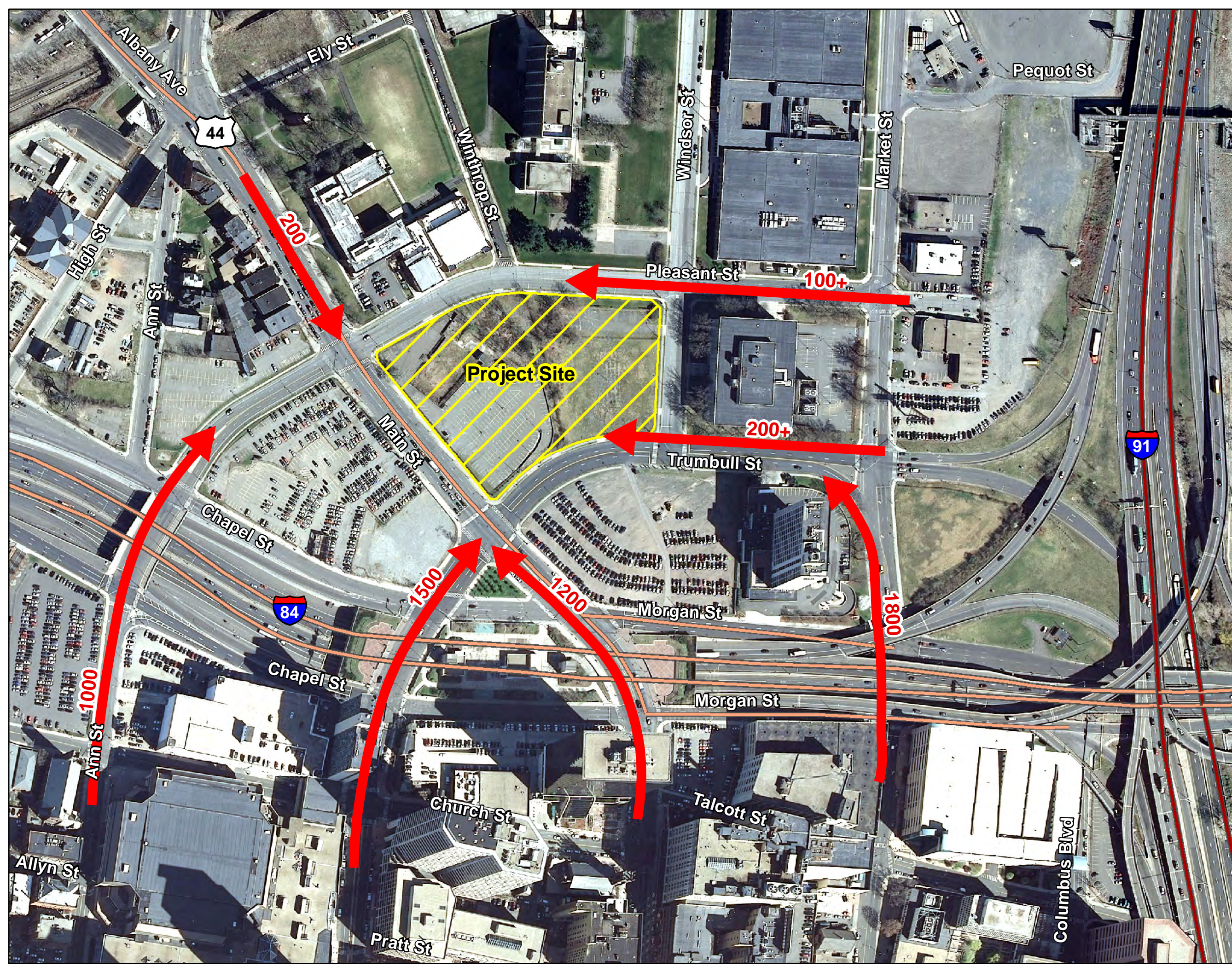
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 Pedestrian Routes

Inset map: City of Hartford, CT



Base Map Source: Connecticut 2012 National Agriculture Imagery Program (NAIP) Color Orthophotography (1 - meter resolution)



Intersection Level of Service

Existing AM Peak Hour
Baseline

Exhibit 6A

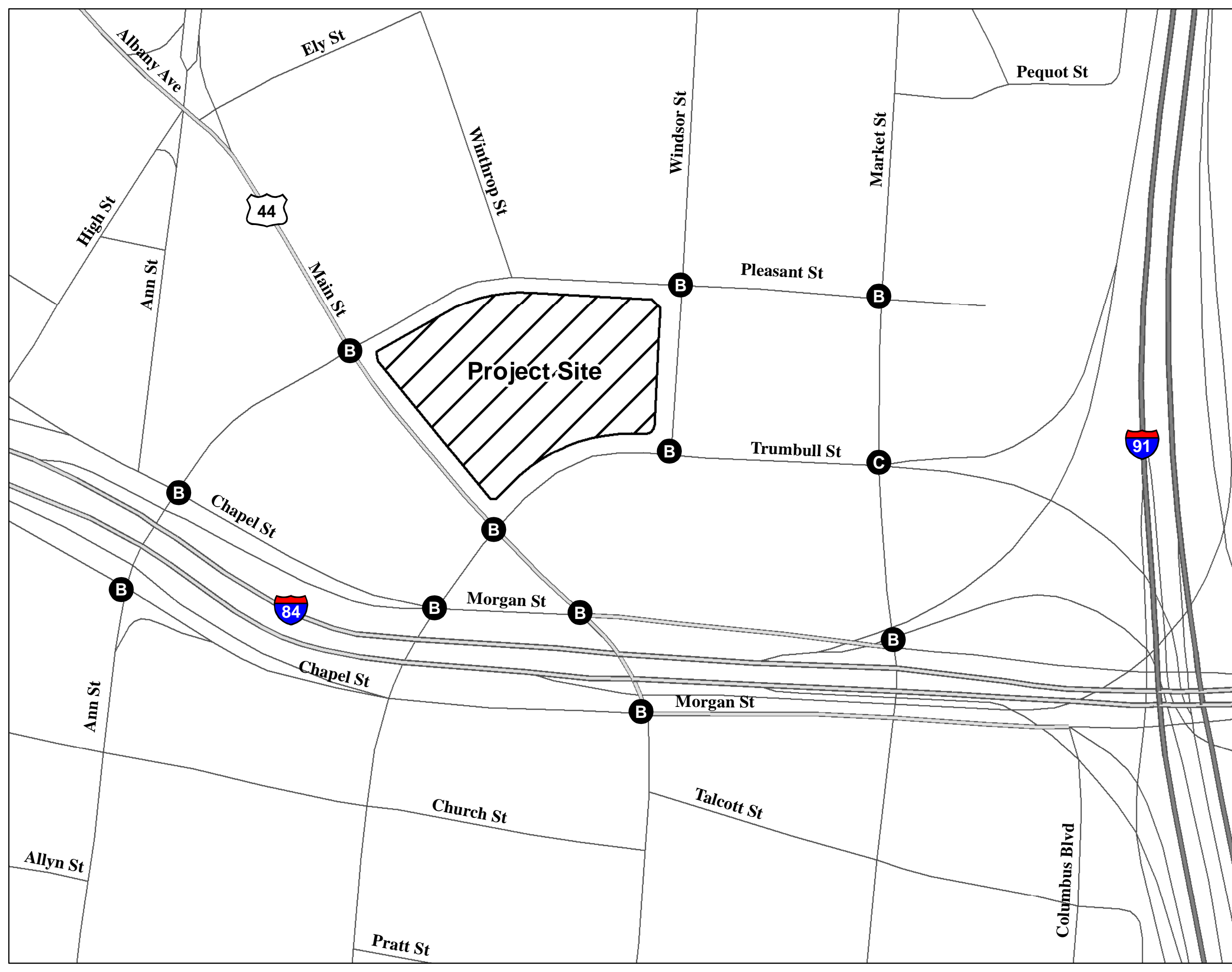
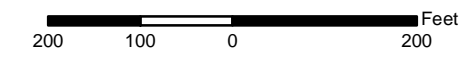
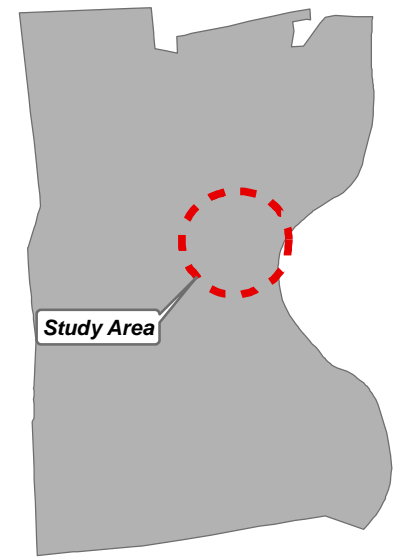


City of Hartford

Legend

B Level of Service

Inset map: City of Hartford, CT



Intersection Level of Service

Existing AM Peak Hour

Alternative 1: Close Trumbull Street

Exhibit 6B

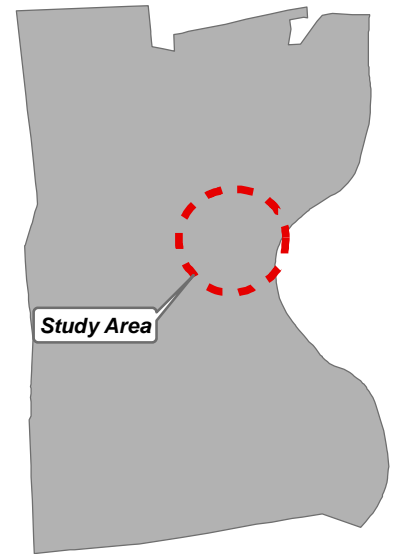


City of Hartford

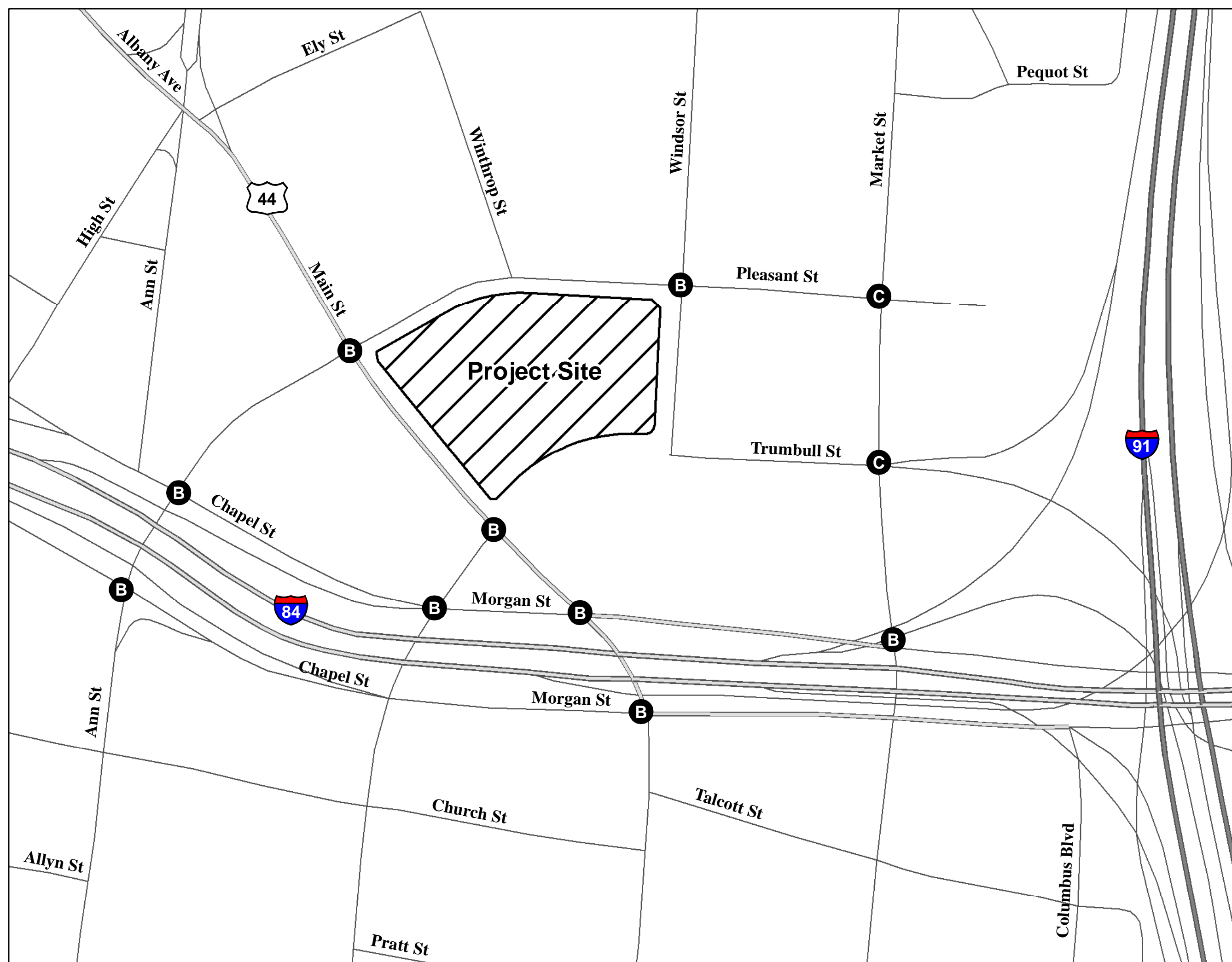
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B Level of Service

Inset map: City of Hartford, CT



200 100 0 200 Feet



Intersection Level of Service

Existing AM Peak Hour
Alternative 3:
Trumbull Street One-Way WB
Pleasant Steet One-Way EB

Exhibit 6C

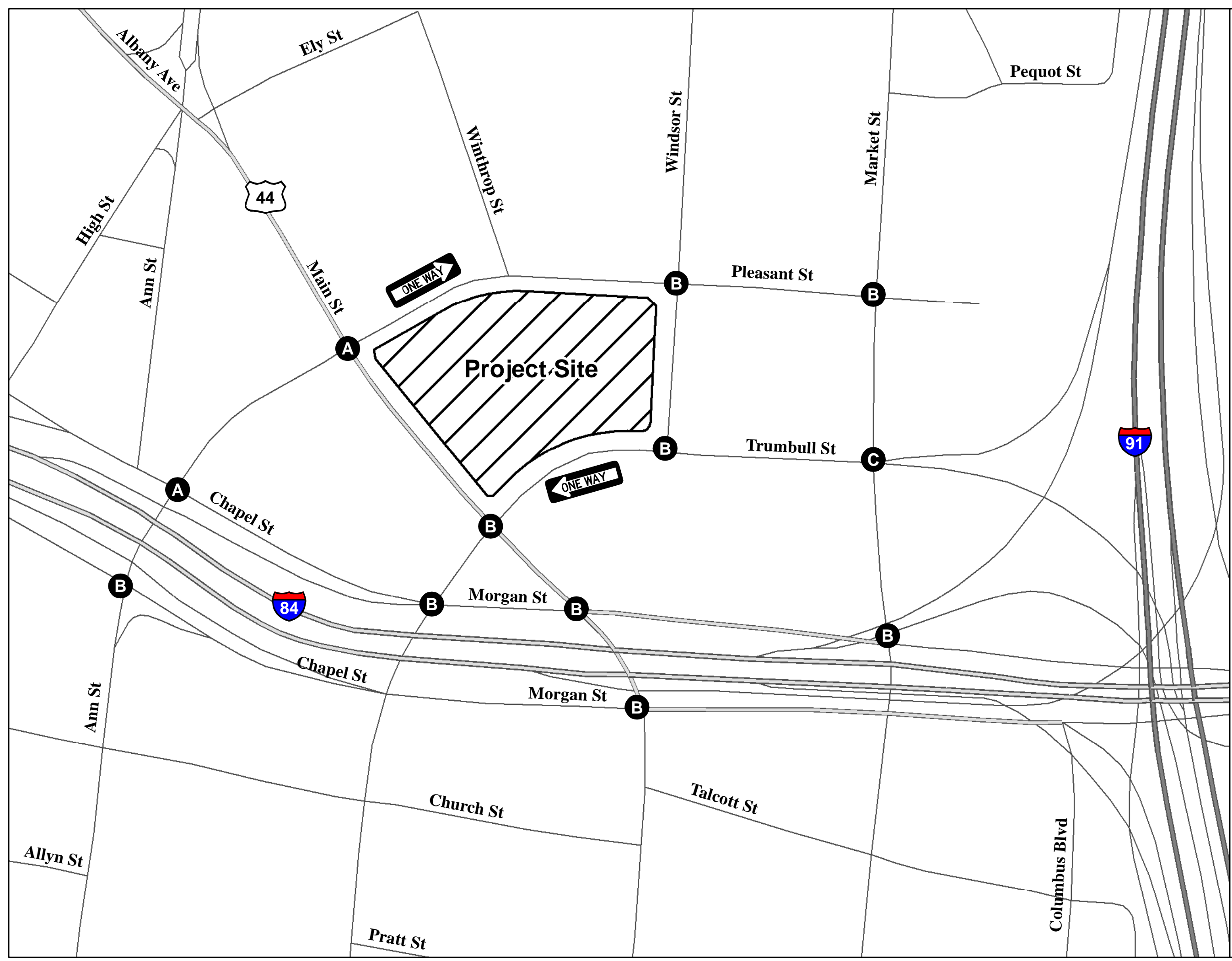
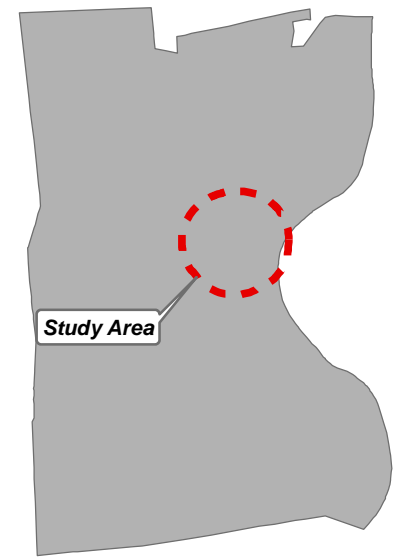


City of Hartford

Legend

B Level of Service

Inset map: City of Hartford, CT



Intersection Level of Service

Existing AM Peak Hour
Alternative 5:
Close Windsor Street

Exhibit 6D

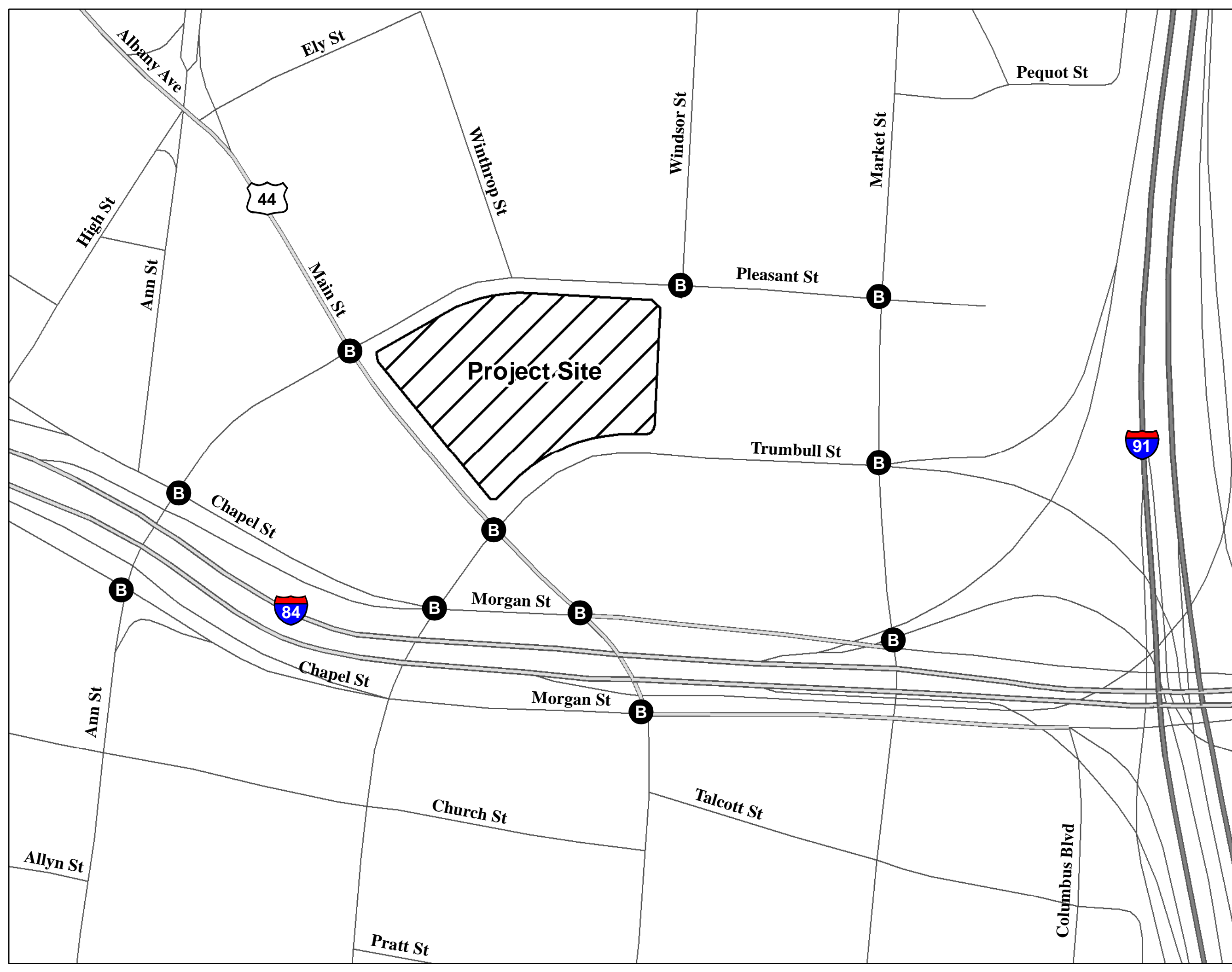
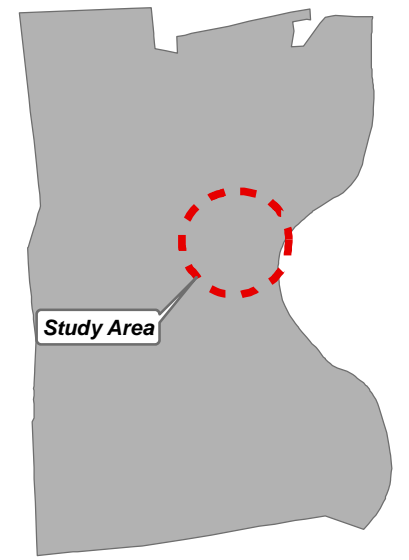


City of Hartford

Legend

B Level of Service

Inset map: City of Hartford, CT



Intersection Level of Service

Existing PM Peak Hour
Baseline

Exhibit 6E

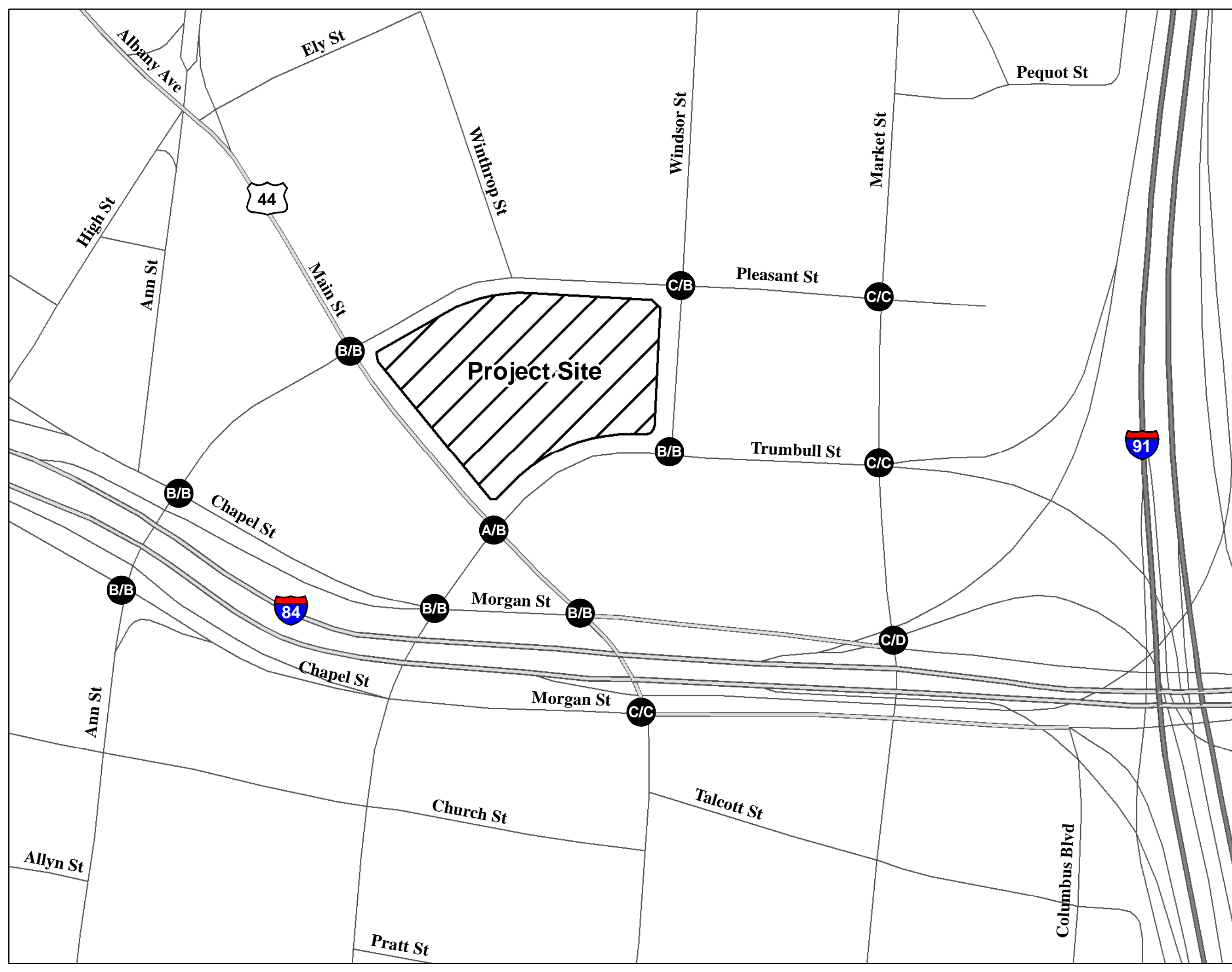
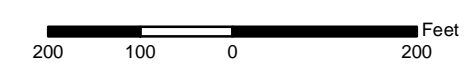
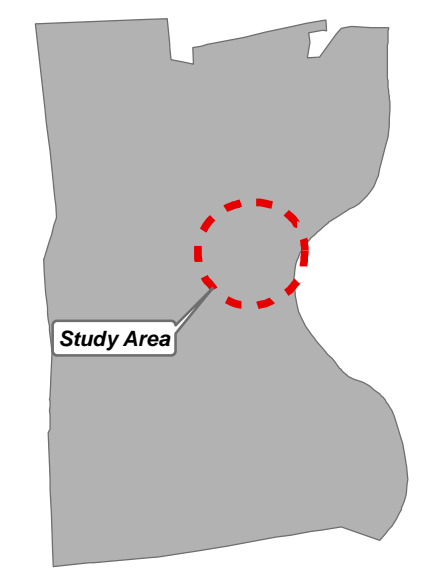


City of Hartford

Legend

B/B No Build LOS / Build LOS

Inset map: City of Hartford, CT



Intersection Level of Service

Existing PM Peak Hour
Alternative 1:
Close Trumbull Street

Exhibit 6F

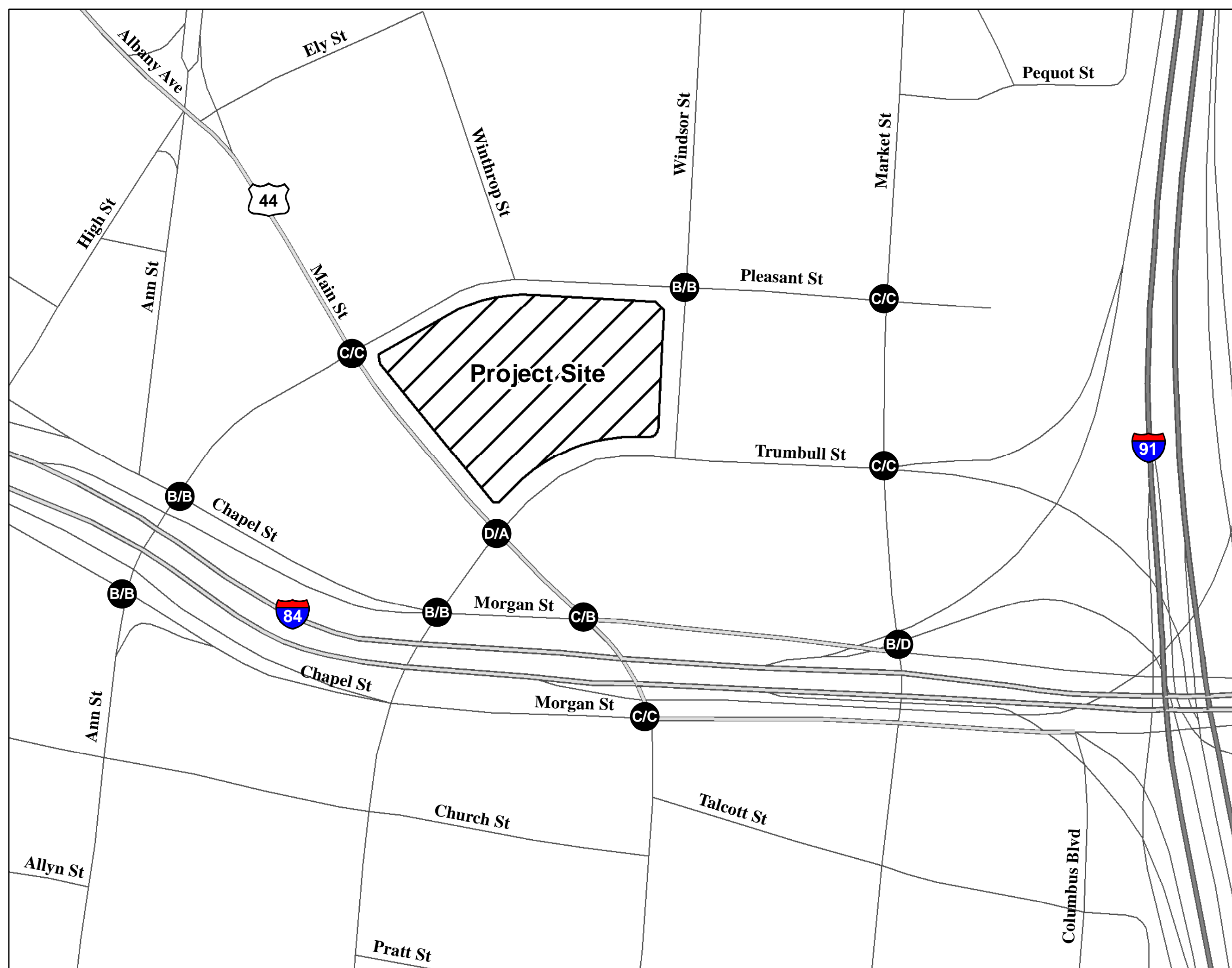
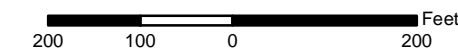
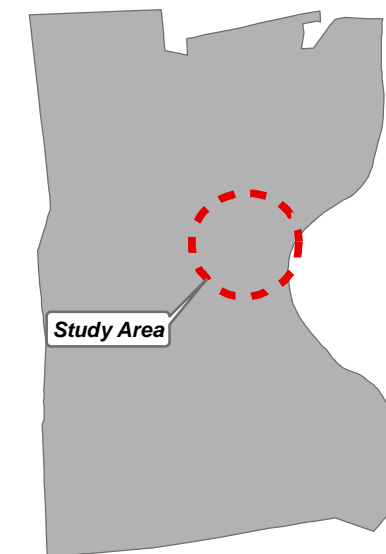


City of Hartford

Legend

B/B No Build LOS / Build LOS

Inset map: City of Hartford, CT



Intersection Level of Service

Existing PM Peak Hour
Alternative 3:
Trumbull Street One-Way WB
Pleasant Steet One-Way EB

Exhibit 6G

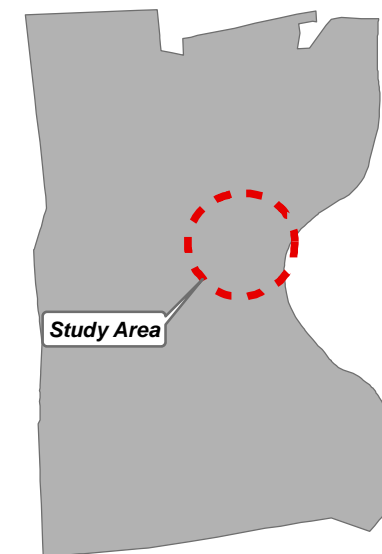


City of Hartford

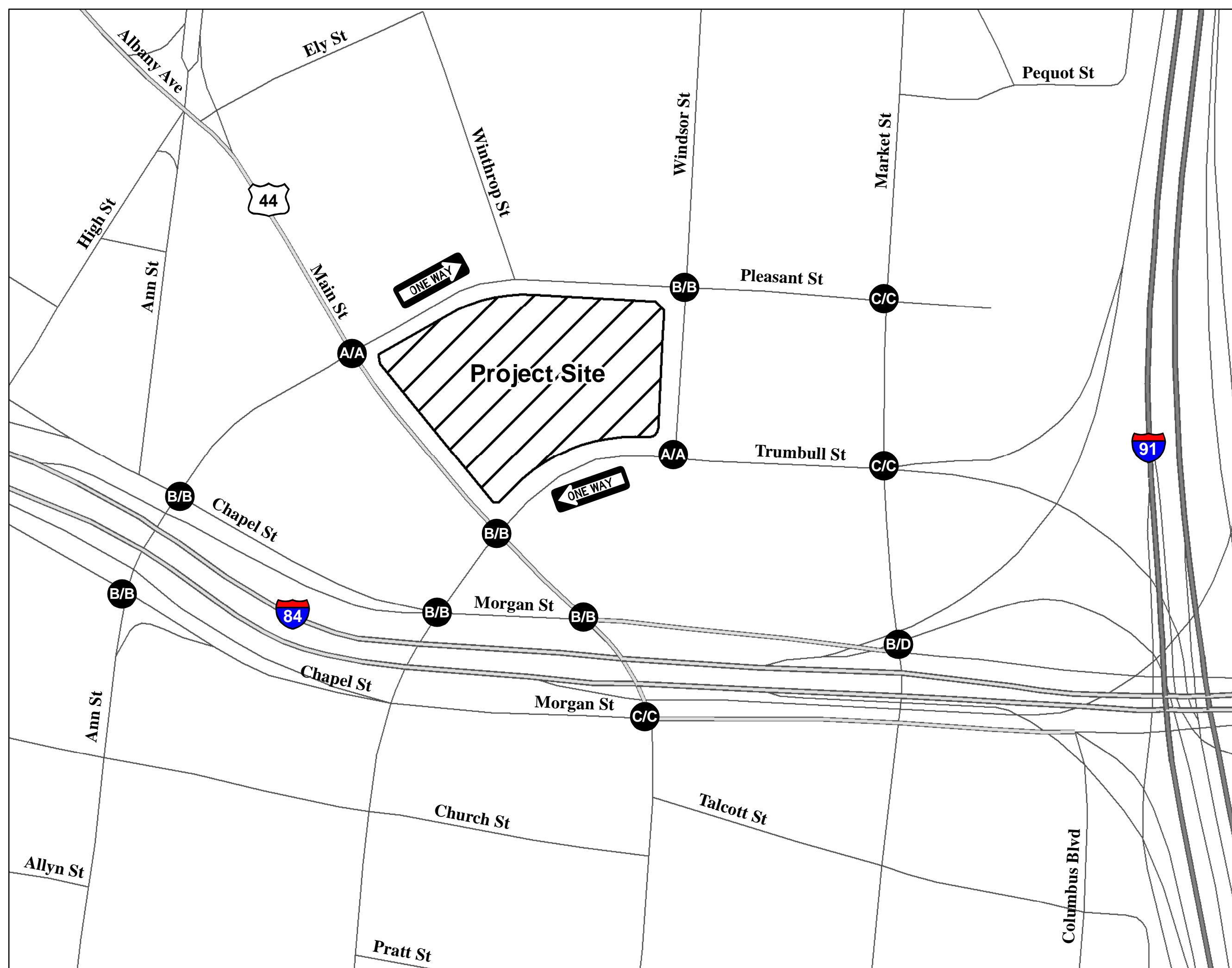
Legend

B/B No Build LOS / Build LOS

Inset map: City of Hartford, CT



200 100 0 200 Feet



Intersection Level of Service

Existing PM Peak Hour
Alternative 5:
Close Windsor Street

Exhibit 6H

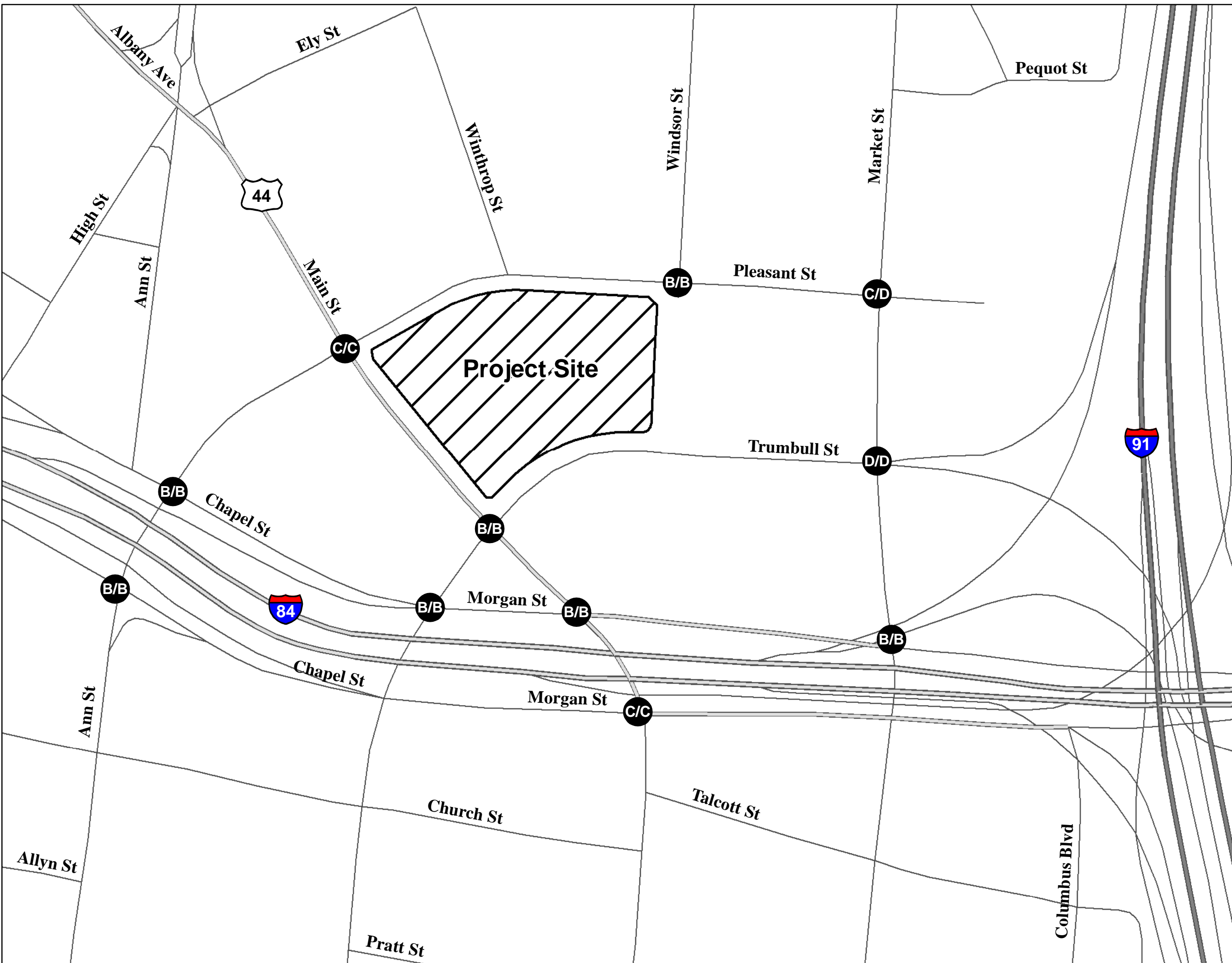
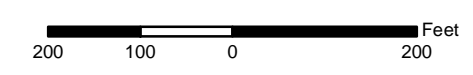
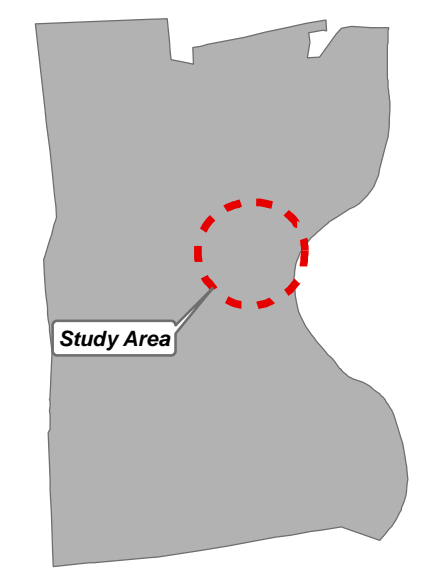


City of Hartford

Legend

B/B No Build LOS / Build LOS

Inset map: City of Hartford, CT



Preferred Alternative Plan

Exhibit 7



City of Hartford

Inset map: City of Hartford, CT

