

Figure 3-9 Aerial View E Looking West

Aerial Looking West

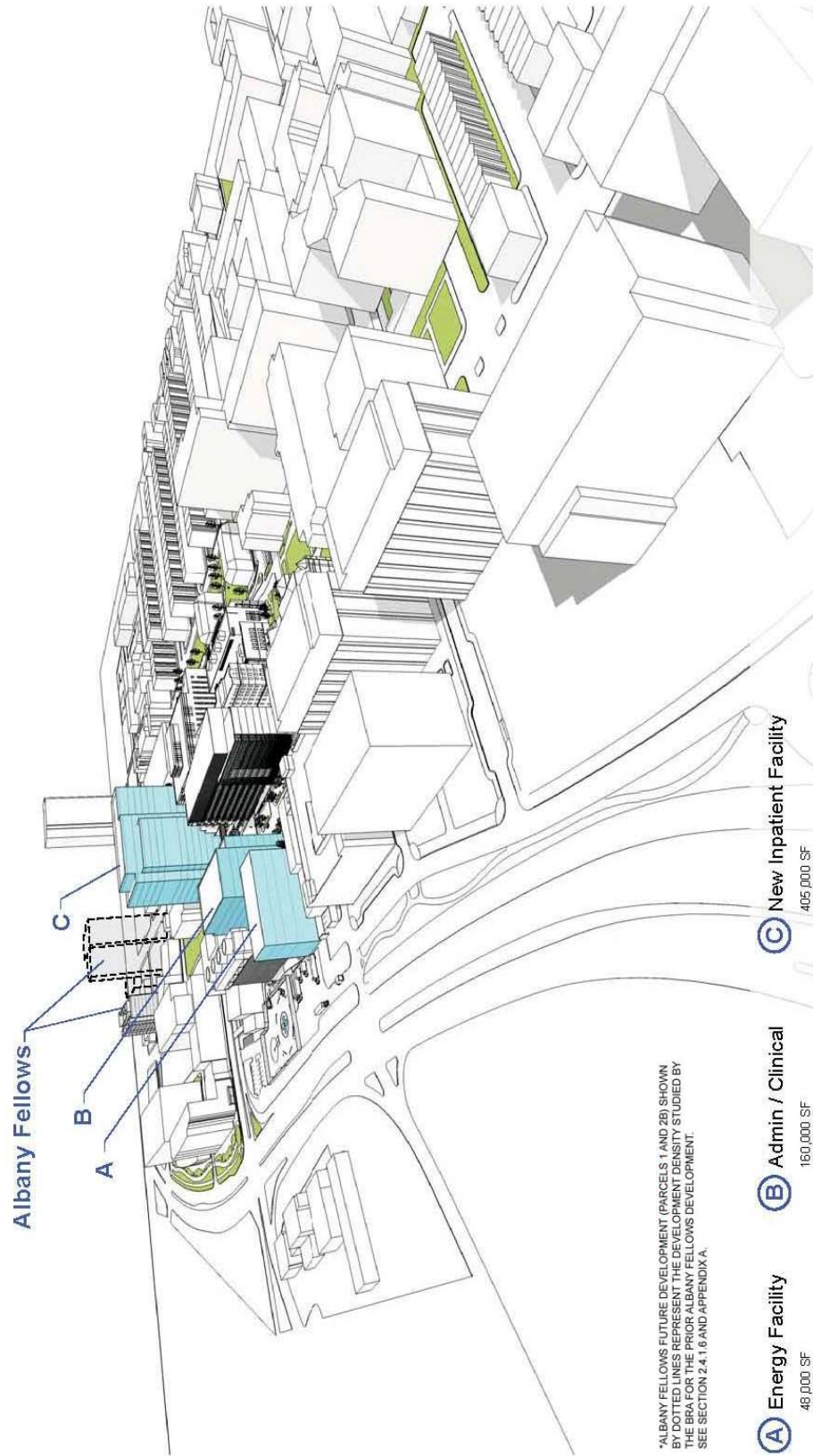


Figure 3-10 Aerial View F Looking North West

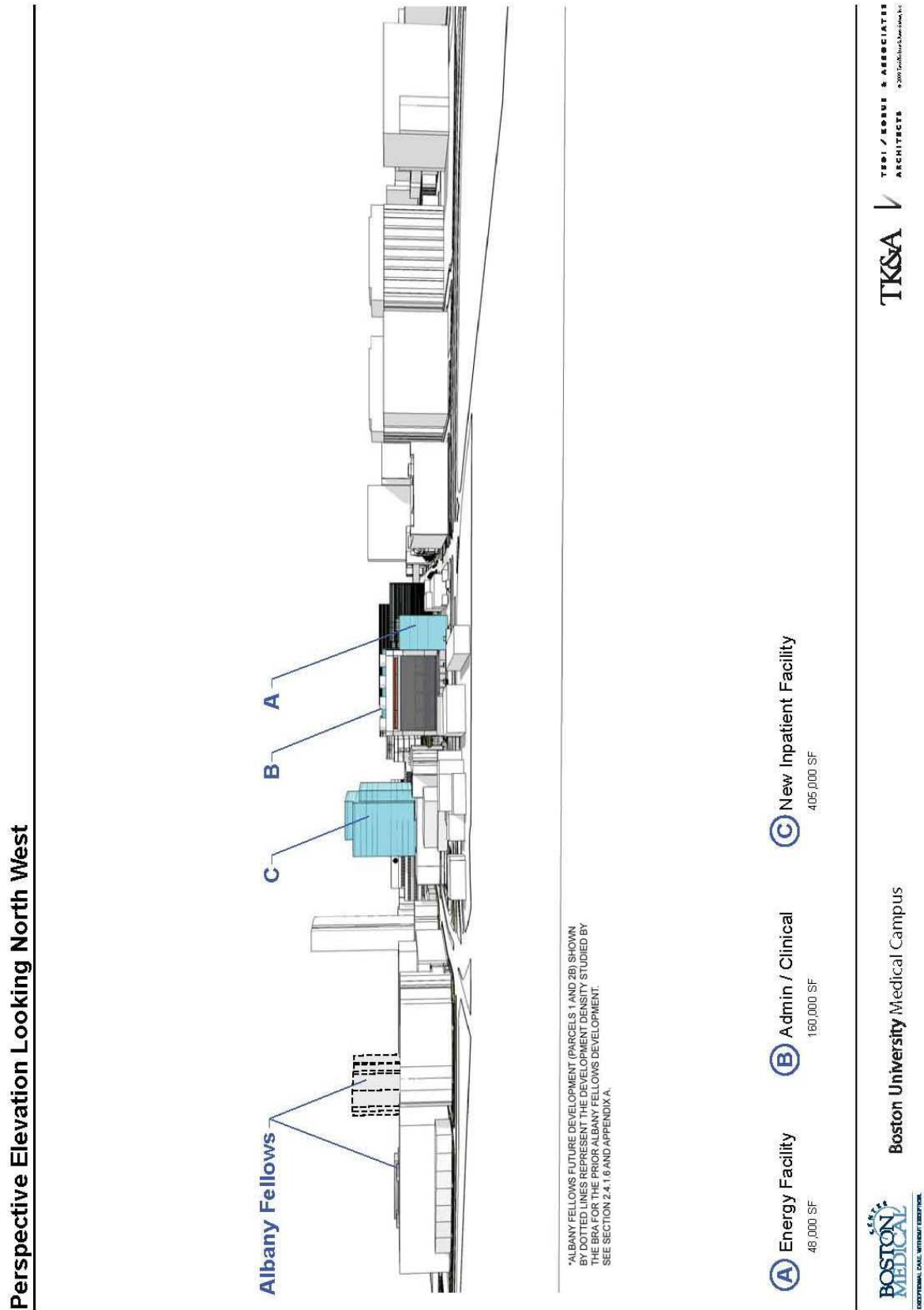
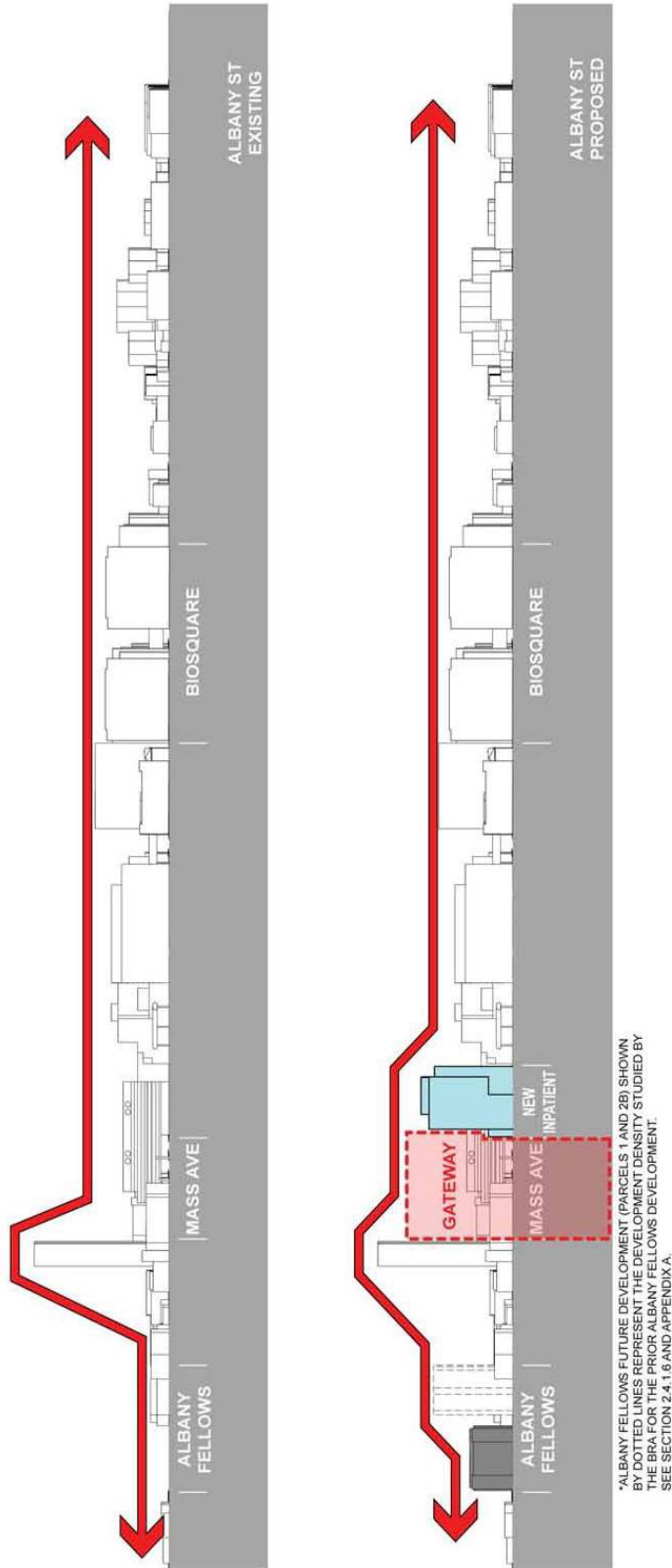


Figure 3-11 Skyline and Massachusetts Avenue Gateway

Skyline and Mass Ave Gateway



Section 4

4.0 TRANSPORTATION

4.1 Introduction and Purpose of Report

This section provides an overview of the Boston University Medical Center transportation system and its history of successful transportation management on the BUMC Campus as well as its commitment to managing transportation impacts related to future development.

Article 80 of the Boston Zoning Code proscribes that an Institutional Master Plan (IMP) include a description of the institution's existing transportation and parking characteristics, a description of future parking characteristics, a projection of any impacts associated with the IMP, and a set of transportation goals and mitigation measures to address any impacts. These items, as well as a discussion of other important characteristics of the campus transportation network, are addressed in the following sections of this chapter.

4.2 BUMC Campus Growth and Sustainability

4.2.1 Background

Since 1980, Boston University Medical Center has expanded its campus through an ambitious program of renovation and new construction to ensure its viability as an academic medical center as the delivery of healthcare, education and research in health sciences has evolved. In addition, development of the BioSquare research park and two parking garages have been added since 1991. Since the 2000 Boston University Medical Center IMP study, other recent projects have included the rehabilitation of 85 East Concord Street, completion of the Moakley Building, and the Shapiro Ambulatory Care Center which is currently under construction. With over 3 million square feet in operation or under construction today, the overall transportation network has been able to accommodate campus growth through a dedicated approach to careful site planning and transportation demand management.

As the area has become more densely developed, Boston University Medical Center has initiated a number of transportation and parking management strategies to help ensure convenient, environmentally friendly, and efficient access for its staff, students, patients, and visitors while minimizing negative effects on residential neighbors. Many of these strategies are managed through Boston University Medical Center's Transportation Management Association (TMA) and its Transportation Solutions for Commuters, Inc. (TranSComm) program.

TranSComm was founded in 1991 and was one of the first organizations of its kind in Boston. TranSComm's members include BioSquare, BU Medical Campus, Boston Medical Center, Boston Public Health Commission, and Boston Health Care for the

Homeless Program. TranSComm also serves the lower South End and Albany Street corridor companies and institutions. Boston University Medical Center provides funding for the Transportation Coordinator position employed by TranSComm whose primary responsibilities include identifying and responding to transportation-related issues and concerns of members and developing long-term transportation strategies.

4.2.2 Transportation Management Strategies

Boston University Medical Center has been working with City and State agencies over many years to improve transportation conditions on the campus. Boston University Medical Center also coordinates its transportation planning with its neighbors by investing in transportation studies covering the broader community in order to mitigate potential impacts and improve area transportation efficiencies and operations.

In conjunction with its development planning, Boston University Medical Center has created new roadways and pedestrian links, added signals, traffic monitoring cameras and crosswalks, adjusted curb use and on-street parking, implemented a comprehensive signage and wayfinding program and relocated the busiest outpatient activities from the Doctors Office Building on Harrison Avenue to the new Shapiro Ambulatory Care Center on Albany Street.

Boston University Medical Center continues to implement strategies on its campus to effectively mitigate potential impacts on roadway operations. Valet service is available for a modest charge to patients and visitors arriving at the Yawkey Ambulatory Care Center, Menino Pavilion, Moakley Building, Preston Building and Doctors Office Building for short-term parking in order to eliminate vehicle back-up on local roadways. This service will also be available at the new Shapiro Ambulatory Care Center.

The recently reconfigured vehicle access at the West Campus in front of the Yawkey Ambulatory Care Center and Menino Pavilion created a one-way pull-in from Harrison Avenue and a one-way exit onto East Concord Street to lead vehicles directly back to regional highway access and eliminate traffic impacts to the abutting residential neighborhood. The previously approved Southbound Frontage Road connection via BioSquare Drive is expected to relocate traffic from Albany Street to BioSquare Drive and improve the roadway capacity and traffic operations within the Medical Center. Additionally, previous campus planning and design has accommodated connections for the City's South Bay Harbor Trail project to improve pedestrian and bicycle movement through the campus and encourage healthy and environmentally sensitive modes of transportation.

4.2.3 Parking Management Strategies

Boston University Medical Center at present controls approximately 3,255 spaces in 6 garages and 7 surface lots. Approximately 2,817 of the spaces are owned by Boston

University Medical Center and approximately 438 are leased from others. The two largest garages are on the BioSquare site at 710 Albany Street (1,000 spaces) and the more recently opened 610 Albany Street (1,461 spaces). Each of these garages replaced surface lot parking due to BioSquare construction. The 710 Albany Street facility is the primary patient/visitor garage for the BUMC campus, while the 610 Albany Street facility serves as the main employee garage for the campus. The existing parking serves over 3 million s.f. bringing the campus parking ratio to 0.85 spaces per 1,000 s.f., in line with BTM ratios of 0.75 to 1.0 spaces per 1,000 s.f.

Since TranSComm was founded in 1991, the campus has changed significantly as discussed above. Over this period of time, parking availability and parking fees have been impacted as surface parking lots were replaced with new buildings or new structured parking. Remote facilities have been maintained for Boston University Medical Center employees and staff as needed. As structured parking and remote lots with shuttle services are typically more expensive to construct and operate, parking fees have risen accordingly. As parking has become less convenient and more expensive, Boston University Medical Center employees have changed their commuting habits by incorporating other alternative modes of transportation involving mass transit, walking, ridesharing, and cycling.

Historically, parking ratios for Boston University Medical Center and BioSquare based upon prevailing BTM guidelines have steadily decreased as development has increased as a result of the strong transportation demand management program in effect at the campus. At the same time, Boston University Medical Center has carefully managed its parking to preserve the most convenient spaces for patients and visitors by increasing fees to single occupant, employee parkers. These measures, combined with the offering of mass transit pass subsidies to employees, have incentivized employees to make greater use of mass transit and allow the campus to expand with minimal traffic impacts. TranSComm has continually promoted the use of alternative modes and has worked with the MBTA to improve services to the area. Additionally, Boston University Medical Center continues to coordinate with City and State agencies on the implementation of pedestrian improvements and bicycle connections in order to encourage these alternative modes. As a result, single occupancy vehicle use has steadily decreased over the past several years. Boston University Medical Center targeted to reduce the employee auto mode use rate from 54% to 48% in the BioSquare Phase II study. Current employee auto mode use rate at Boston University Medical Center is now only 35%.

4.2.4 Transportation Demand Management Services and Programs

Boston University Medical Center has consistently worked to reduce the number of drive-alone trips to the medical area both through efforts of the individual institutions and through TranSComm. TranSComm's objectives are to promote alternatives to driving

alone, reduce traffic congestion and air pollution, and enhance accessibility to the BUMC Campus, the Albany Street corridor and the lower South End.

TranSComm fosters transportation demand management in several ways:

- Providing or coordinating the management of inter-institutional transportation services such as shuttle services and transit pass sales;
- Collaborating with local transportation agencies and other stakeholders to enhance public transportation service to the campus and solving day-to-day problems;
- Marketing and communicating both internally to the campus population and externally to agencies and the public about transportation issues and strategies, encouraging feedback and input from its constituencies and responding to complaints; and
- Assisting institutional leaders in refining transportation plans and policies to the benefit of the campus and its neighbors.

As indicated in Section 4.2.3, existing employees and students at Boston University Medical Center have a significantly lower auto use than the BTM mode share rates, at only 35%, with 40% transit use and 25% bike/walk/other use. The low auto use rate reflects the strong transportation demand management program in effect. Through TranSComm, Boston University Medical Center will continue to encourage and assist its employees, students, as well as patients and visitors to use many of the demand management and trip reduction programs offered including:

- Boston Medical Center offers a 32% transit subsidy to all employees;
- On-site transit pass sales and schedules;
- On-line transit and rideshare information provided on the TranSComm Web site;
- TranSComm working with the MBTA and BTM to improve bus service, wayfinding, and pedestrian safety around the campus;
- Boston University Medical Center providing 7 free shuttle services covering:
 - o Inner Campus Shuttle for patients and employees run on a continuous loop between the institutions.
 - o All-Day Medical Campus Shuttle for employees (which can also be used by neighbors in the South End), runs every 30 minutes within the campus boundaries.
 - o Boston VA/Medical Center Shuttle (patients, medical staff), running hourly.

- o Evening Shuttle (to T stations, the South End neighborhood and campus parking lots and garages for staff and students).
 - o BMC HealthNet Shuttle for BMC patients only (traveling from Boston neighborhoods and neighborhood health centers to BMC).
 - o Boston University Shuttle (The BUS), with 11 stops between Boston University Charles River campus and the BU Medical Campus for students, staff and faculty running every 15-20 minutes during peak-time service.
 - o 610 Albany Shuttle to the employee parking garage.
- Since June 2007, preferential parking is provided for Carpool/Hybrid program participants on the first level of the 610 Albany Garage. Currently, spaces fill up very early. There are 76 carpooling groups (158 people) and 62 hybrids registered. Due to the popularity of this program, additional capacity was added in October 2008;
 - Scooter parking for six scooters is provided in the 610 Albany Garage;
 - In cooperation with MassRIDES, BUMC is participating in a statewide demonstration project testing the effectiveness of the “GOOSE Network,” a service offering occasional carpooling via cell phone, text messaging and e-mail. The service includes both plan-ahead ride-matching of commuters with similar routes as well as “real time” matching of riders and drivers;
 - TranSComm offers sheltered and secured bicycle parking at several locations, participation in the Annual Bike to Work/School week, a free Cyclists’ Luncheon and a free Bike Safety Checkup. See Section 4.6.5 for the bicycle facilities located on the BUMC Campus;
 - Boston University Medical Center provides an on-site car-sharing service and two dedicated parking spaces for shared-use vehicles (Zip-Car), one of which is a hybrid vehicle;
 - TranSComm publishes a medical area walking map and offers neighborhood walks for the South End’s medical history and South of Washington Area (SOWA) at lunchtime for employees and others. This map also shows the mileage from the BUMC Campus to the neighboring MBTA stations; and
 - Boston University Medical Center, through TranSComm, publishes a periodic transportation newsletter and holds events to encourage its employees and students to use the alternative commuter transportation system. TranSComm also contributes a column in the Masscommuter newsletter once a year.

4.3 Summary of IMP Transportation Impacts

The impetus for the IMP projects is to “right-size” the existing campus facilities to serve current patient and clinical care standards. The proposed New Inpatient Building and the

Administration/Clinical Building will replace current uses in outdated facilities on campus. Although there is new program space created, a portion of it will replace current uses on the campus and is not expected to generate additional trips. Furthermore, there are no transportation related impacts associated with the Energy Facility project.

4.3.1 Summary of Findings

The IMP analyzes impacts over the 10-year term of the IMP. For a more accurate understanding of how the IMP projects will impact traffic, it is important to note that the largest traffic generator – the New Inpatient Building – will not be constructed until near the expiration of the IMP. IMP traffic and parking analyses currently show that there exist approximately 400 spaces within the current supply of owned and leased parking spaces to accommodate the parking demand for additional development over the second half of the IMP. Additionally, the traffic analysis shows there is no significant degradation in intersection operations.

Within the 10-year time frame of the IMP, growth not associated with the medical area combined with IMP developments on the BUMC Campus and the BioSquare campus will impact operations at a few intersections. Of the intersections studied in the Build condition, only 4 out of 18 intersections that accommodate large proportions of projected traffic will be impacted. Although the IMP developments will place further demands on existing parking resources, the campus parking ratio will still be in line with BTD ratios at 0.76 per 1,000 s.f. Boston University Medical Center will continue to implement parking management strategies that have proven to be effective as evidenced by steadily decreasing auto use. Boston University Medical Center's goal is to ensure that BUMC Campus parking needs do not encroach on the available supply of on-street parking in the neighborhood.

Recognizing the potential of these impacts, Boston University Medical Center proposes to review each project in detail as the programs are more clearly defined and as they move into design review through the Article 80 Large Project Review process. This process will also allow new traffic data to be collected and recalibrated to existing conditions and new projects so that traffic impacts can be accurately assessed and planned.

4.3.2 Proposed Mitigation and Long Term Sustainability

Boston University Medical Center realizes the effect of the IMP development to its campus roadways and knows it is necessary to manage transportation demand while improving the transportation network in order to maintain good access for its employees and patients, and maintain access to its high level of care.

When addressing the transportation impacts in the study area for projects associated with the IMP, our recommended approach is to evaluate the project impacts and the

transportation networks in two phases: the five-year plus (2014) and 10-year periods (2019) of the IMP. Within these two periods, should the proposed IMP projects advance, Boston University Medical Center will identify and mitigate individual project impacts while considering the overall transportation operations in the study area.

Because the IMP horizon year is distant and development needs and goals of the Medical Center change depending on public need, this project based mitigation approach will ensure that the measures used to offset impacts are administered efficiently and at the most effective locations.

To accomplish this, Boston University Medical Center, through the Article 80 Large Project Review process, will present detailed building programs, design options, and measures to mitigate impacts as the programs for each project are advanced through planning and design. It is believed that this approach will be an effective collaboration of design development and City and Community review that will allow for the most efficient project mitigation measures.

Boston University Medical Center has identified transportation improvement goals for the 10-year master plan and will continue to advance important mitigation commitments made previously in the form of policies and management actions. **Table 4-1** lists transportation mitigation elements that Boston University Medical Center is proposing to pursue in order to ensure that future development can be sustained at the BUMC Campus with minimal impact to the neighborhood.

Table 4-1 Proposed Transportation Improvement and Mitigation Plan

IMPROVEMENT ELEMENT		DESCRIPTION	PURPOSE/BENEFIT
<u>Traffic Management Plan / Local Street Network Improvements</u>			
1	Relocation of West Campus Central Loading Dock	Relocate loading at the Menino Pavilion on Albany Street and move activities to the south side of Albany Street upon development of the Administration/Clinical Building.	Access will occur from BioSquare Drive removing trucks from Albany Street. This will improve roadway operations and pedestrian movement along Albany Street.
2	Reduction in Curb cuts	Goal to reduce number of curb cuts in front of the Emergency Department and Trauma Center entrance along Albany Street upon development of the New Inpatient Building.	Improve pedestrian experience along edge of Albany Street. Improve vehicular access, reduce confusion and traffic back-ups to roadway.
3	Sidewalk and Streetscape Improvements	Additional improvements along Albany Street including installing new sidewalk paving, street trees, lighting, signage, etc. as each new development project is advanced.	Establish a unified streetscape to assist patients and visitors in wayfinding. This will improve pedestrian safety and movement and create better connectivity to future developments across Massachusetts Avenue.
4	Regional Highway Access	Implement the Southbound Frontage Road connection, continue to support additional access and connectivity from the BUMC Campus to the regional highway system.	Allows access for vehicles from the regional roadway network to access at BioSquare Drive removing traffic from Albany Street and the local street network.
5	Improved Access to Bus Stops	Continue to work with the MBTA to provide improved bus shelters and pedestrian connections to the MBTA bus stops within the Medical Center	Will encourage shift in employee and student mode share from auto to transit use.

Parking Management Plan

1	Employee Parking Pricing	Continue to evaluate and charge market rates for employee parking.	Encourages transit use and will reduce parking demand.
2	Off-site Employee Parking Options	Continue to evaluate off-site locations for employee parking as needed. Areas of interest previously discussed are Crosstown and under the elevated I-93 expressway between W. Fourth St. and Randolph St.	Encourages transit use and removes employee vehicles from medical area roadways.

Transportation Demand Management Plan

1	Maintain active role in TransComm	Continue to encourage and assist BUMC Campus employees, students, patients and visitors as well as other area institutions and businesses to use many of the demand management programs offered.	Will encourage shift in employee and student mode share from auto to alternative modes such as transit, bicycle, and walk.
2	Employee Transit Subsidy	32% transit pass subsidy to employees .	Will encourage shift in employee mode share from auto to transit.
3	Bicycle Parking	Continue to install bicycle racks and cages throughout the campus where feasible. Will install short-term bicycle racks for new projects where feasible.	Will encourage shift in employee and student mode share from auto to bicycle.
4	Zip-Car	Coordinate with Zip-Car representatives to continue discounted membership for BU Medical Campus, BMC and its affiliates. Maintain 1 vehicle as a hybrid vehicle.	Will encourage shift in employee and student mode share from auto to transit and improve air quality.

City Planning Initiatives / Community Benefits

1	Community Parking Benefit	Provide reduced rate evening public parking, and free evening public parking during snow emergencies.	Will continue to offer this benefit to resident neighbors and the local community.
2	Support Transit Service Improvements	Through TanSComm continue to work with the MBTA to promote transit service improvements such as the Urban Ring project, and the Indigo Commuter Rail Line.	Will improve access for employees and student to transit service at the Medical Center and encourage shift in auto use to transit.
3	South Bay Harbor Trail	Continue campus planning to accommodate connections to the City's South Bay Harbor Trail project.	Will encourage walking and bicycling as an alternative mode of transportation for the surrounding community with connections to other city neighborhoods along the Boston Harbor.

Sustainability

1	Bicycle User Group	Through TranSComm, a network of cyclists work together to improve biking on the campus.	Will encourage employee, student as well as patient and visitor shift in auto use to bicycle. Helps promote bicycling as an important health benefit.
2	Carpool and Hybrid Program	Offer designated and priority parking for carpool and hybrid cars.	Encourages employees to not drive alone and relieves traffic congestion and improves air quality.
3	Walking Initiative	Continue to promote walking programs in coordination with WalkBoston	Will encourage employee and student as well as patient and visitor shift in auto use to transit and walking. Encourage walking as an important health benefit.

4.5 Transportation Impact Study

4.5.1 Existing Campus Description

Boston University Medical Center is located in the South End neighborhood of Boston. See **Figure 4-1**. Regional vehicular access to the BUMC Campus via the north and south is provided directly via the Massachusetts Avenue Connector. At Massachusetts Avenue, the Connector joins Melnea Cass Boulevard, which provides a direct connection to the Longwood Medical and Academic Area. Local vehicular access is primarily from Harrison Avenue, Massachusetts Avenue and Albany Street. East Concord Street and East Newton Street provide connections from the primary campus parking facilities, the 710 Albany Street and 610 Albany Street garages, to other facilities within the campus.

4.5.2 Study Description

The Institutional Master Plan transportation impact study is presented in three sections. The first is an analysis of existing transportation conditions including roadway capacities, parking, loading and service, public transit, pedestrian connections and bicycle facilities. The second evaluates future transportation conditions, 10-years from the present, and assesses the cumulative impacts associated with other approved projects and with the proposed IMP projects. The second section includes the following two scenarios:

- ◆ “No-Build Condition” (2019) – a baseline scenario that presents traffic changes exclusive of the IMP projects, including background growth of .05% per year and traffic contributions from specific approved projects. The following projects were included in the analysis: BioSquare Building E and Building G, the NEIDL Building, the Shapiro Ambulatory Care Center, 275 Albany Street and the Albany Fellows Graduate Student Housing Project.
- ◆ “Build Condition” (2019) - a scenario in which the specific travel demand forecasts associated with the IMP projects are added to the No-Build scenario.

The third section of the transportation impact study discusses appropriate measures to mitigate potential Project related impacts.

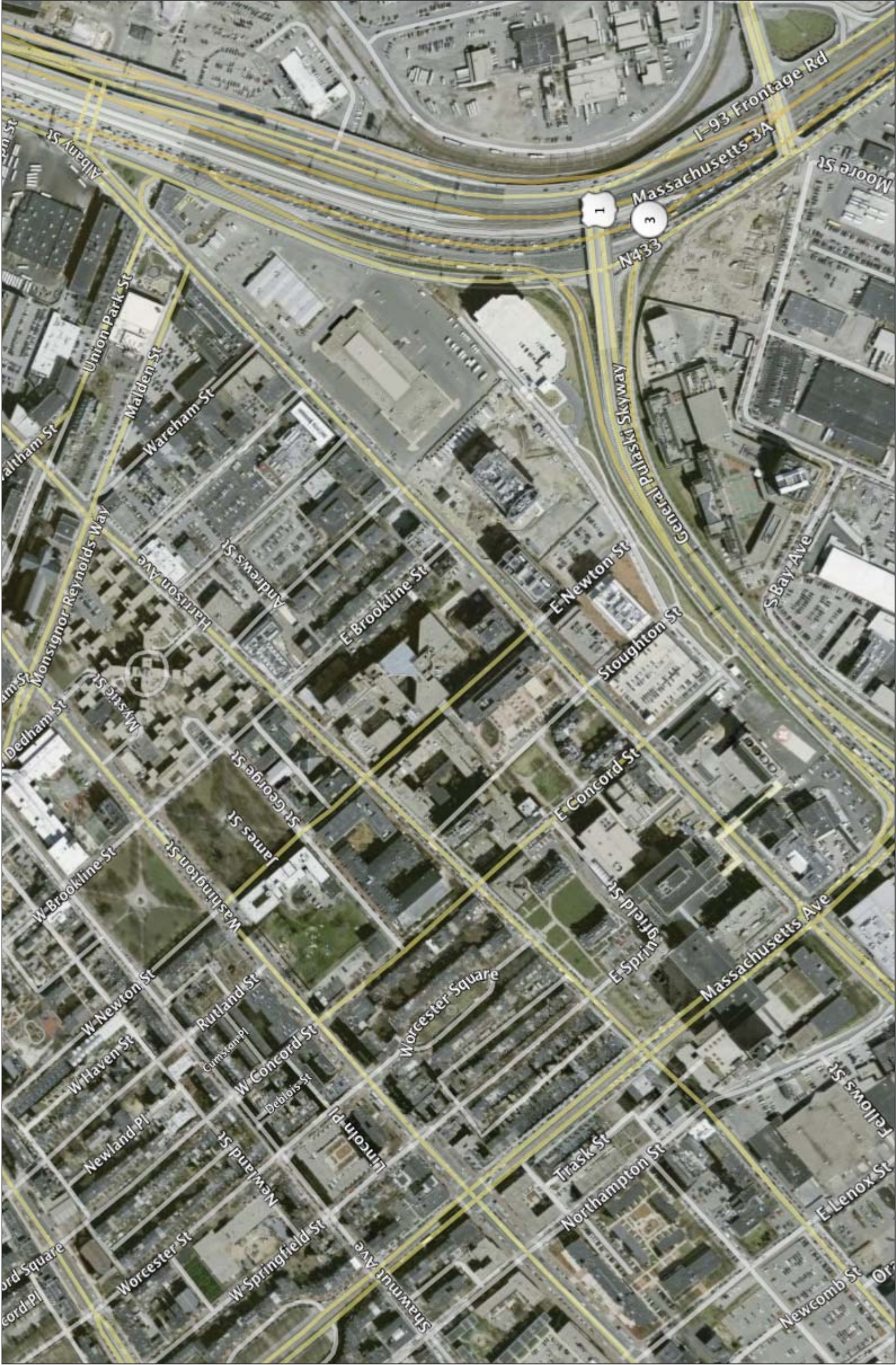


Figure 4-1. Locus Map

4.5.3 Study Area Roadways

The following roadway descriptions reflect classification by the Massachusetts Department of Transportation Planning.

Melnea Cass Boulevard is a 4-lane urban principal arterial with 2 travel lanes in each direction running in an east-west direction between Massachusetts Avenue to the east and Tremont Street to the west. Built as a local roadway in the corridor of the abandoned “Inner Belt,” Melnea Cass Boulevard provides direct access between the BUMC Campus and the Longwood Medical and Academic Area. Approximately 40,000 vehicles use Melnea Cass Boulevard daily, according to April 2008 Automatic Traffic Recorder (ATR) data. For this reason it is an important link for autos, bicycles and transit riders.

Massachusetts Avenue (Route 2A) is an urban principal arterial running in a north to south direction, providing access between Boston, Cambridge, and Arlington. Approximately 32,000 vehicles use Massachusetts Avenue north of Melnea Cass Boulevard and approximately 37,000 vehicles use Massachusetts Avenue south of Melnea Cass Boulevard daily, according to April 2008 Automatic Traffic Recorder (ATR) data. Massachusetts Avenue features two travel lanes in each direction, divided by a narrow concrete median. Additional turning lanes are provided at the intersections with Harrison Avenue and Albany Street. Metered on-street parking is provided in the northbound direction between Albany Street and Harrison Avenue, while resident parking is found in both directions of Massachusetts Avenue west of Harrison Avenue. Near the site, the mix of land uses includes medical, retail, office, and residential.

Albany Street is an urban minor arterial roadway that runs parallel to Harrison Avenue within the study area from Herald Street in the east to Eustis Street in the west. It provides one travel lane in each direction near the site. Approximately 16,000 vehicles use Albany Street east of Massachusetts Avenue daily, according to April 2008 Automatic Traffic Recorder (ATR) data. Parking is allowed on both sides of the street, with various uses from meters to special use vehicles only (e.g., EMS vehicles) to no restrictions. The BUMC Campus is located on the north side of the street and the BioSquare site on the south side. Land uses along Albany Street include a mix of research, educational, city services, medical uses, and in and out patient medical uses.

East Concord Street is a local street running 1-way south. Normally, parking is allowed on both sides of the street, but parking will be removed near Albany Street upon completion of the Shapiro Ambulatory Care Center to increase operational efficiency. Two bus shelters—one near Harrison Avenue and one near Albany Street—serve several MBTA routes and the Boston University Medical Center shuttle routes within the BUMC campus. BU Medical Campus and BMC buildings are located along both sides of the street.

East Newton Street is an urban minor arterial running one-way north, with parking on both sides of the street. Approximately 5,000 vehicles use East Newton Street daily, according to 1999 Automatic Traffic Recorder (ATR) data. A bus shelter is located on Atrium Plaza on the north side of the street between Harrison Avenue and Albany Street. BU Medical Campus and BUMC buildings are located along both sides of the street.

Frontage Road Southbound is a state-owned one-way collector/distributor roadway allowing movements between I-93 southbound and City owned streets that provide access to local land uses. It is classified as an urban principal arterial. Frontage Road Southbound has two lanes, extending from Albany Street at its northern terminus to the South Bay Mall Driveway at its southern terminus. South of the South Bay Mall Driveway, an on-ramp to I-93 southbound is provided from Frontage Road Southbound. Near the site, Frontage Road Southbound features two travel lanes.

Harrison Avenue is an urban minor arterial running in a northeast to southwest direction, providing access between Essex Street in the east to Warren Street in Roxbury. Harrison Avenue provides one travel lane in each direction near the Boston University Medical Campus. Parking is permitted on both sides of the street, and additional travel lanes are provided at the intersection with Massachusetts Avenue. Approximately 16,000 vehicles use Harrison Avenue east of Massachusetts Avenue daily, according to April 2008 Automatic Traffic Recorder (ATR) data. Harrison Avenue is a boundary between the BUMC campus on its south side and the primarily residential areas along the north side.

East Brookline Street is a one-way urban minor arterial running from Washington Street in the north to Albany Street in the south. On-street parking, is permitted on both sides of the street, consists of metered, residential only, and unrestricted spaces. The street is approximately 30 feet wide. Approximately 2,500 vehicles use East Brookline Street daily, according to 2002 Automatic Traffic Recorder (ATR) data.

Malden Street is a 2-way urban minor arterial that runs north-south connecting Harrison Avenue in the north to Albany Street in the south. Parking is unregulated on the north side of the street and metered on the south side.

Wareham Street is a 1-way local road that runs southbound between Harrison Avenue in the north and Albany Street in the south. Metered and commercial vehicle parking is provided on the east side of the street and unregulated parking on the west side.

Massachusetts Avenue Connector is a state-owned urban principal arterial roadway that links Massachusetts Avenue, Melnea Cass Boulevard, and Southampton Street to I-93, a distance of approximately one-half mile. It is a median divided roadway with 3 lanes in each direction. Of the 6 total lanes, 4 continue across I-93 to connect to Frontage Road Northbound, with the outside lanes designated as right-turn lanes to/from Frontage Road Southbound.

Frontage Road Northbound is a state-owned one-way collector/distributor roadway allowing movements between I-93 northbound and City-owned streets that provide access to local land uses. It is classified as an urban principal arterial. Frontage Road Northbound has 3 lanes and extends from Southampton Street at its southern terminus to Kneeland Street at its northern terminus.

4.5.4 Study Area Intersections

The study area for the Boston University Medical Center IMP includes the following 18 intersections, as shown in **Figure 4-2**.

1. Melnea Cass Boulevard at Massachusetts Avenue;
2. Melnea Cass Boulevard at Albany Street;
3. Massachusetts Avenue at Albany Street;
4. East Concord Street at Albany Street;
5. East Newton Street at Albany Street;
6. Albany Street at Frontage Road Southbound;
7. Melnea Cass Boulevard at Harrison Avenue;
8. Massachusetts Avenue at Harrison Avenue;
9. East Concord Street at Harrison Avenue;
10. East Newton Street at Harrison Avenue;
11. East Brookline Street at Harrison Avenue;
12. Malden Street/Wareham Street at Harrison Avenue;
13. Frontage Road Southbound at Massachusetts Avenue Connector;
14. Frontage Road Northbound at Massachusetts Avenue Connector;
15. Frontage Road Northbound at South Boston Bypass Road;
16. East Brookline Street at Albany Street (unsignalized);
17. Wareham Street at Albany Street(unsignalized); and
18. Malden Street at Albany Street (unsignalized).

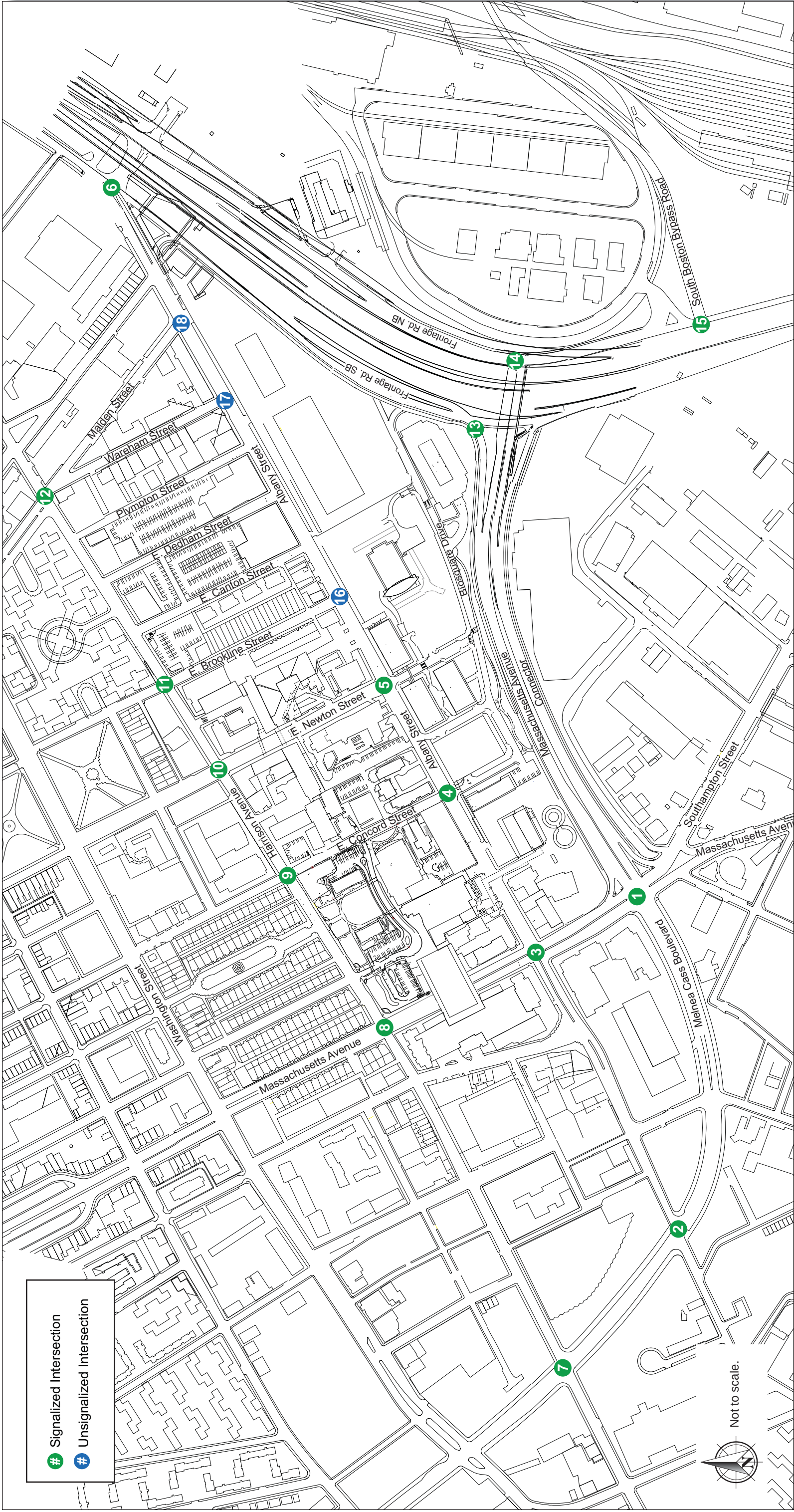


Figure 4-2. Study Area Intersections

4.5.4.1 Description of Study Area Intersections

The following descriptions of the study area intersections include geometry, pedestrian facilities, and intersection traffic control. (Note that in these descriptions, an exclusive pedestrian phase refers to a phase where all vehicular traffic is stopped and pedestrians in all crosswalks can proceed. A concurrent pedestrian phase permits some pedestrian crossings to occur concurrent with vehicular movements.)

Signalized Intersections

Melnea Cass Boulevard/Massachusetts Avenue/Massachusetts Avenue Connector is a signalized, 5-approach intersection, connecting Melnea Cass Blvd., Massachusetts Avenue, Southampton Street and the Massachusetts Avenue Connector (to and from I-93 north and southbound). The eastbound Melnea Cass Boulevard approach consists of two through lanes and an exclusive right-turn lane. The Melnea Cass Boulevard westbound approach contains five travel lanes: two exclusive left-turn lanes, two through lanes, and a channelized right turn lane. Massachusetts Avenue south of the intersection runs one way departing; the northbound traffic enters from the adjacent Southampton Street leg. The northbound Southampton Street approach consists of two left-turn lanes, two exclusive through lanes, and a channelized right-turn lane. The southbound Massachusetts Avenue approach is comprised of two left-turn lanes, one exclusive through lane, and a shared through/right-turn lane. Crosswalks and wheelchair ramps are located across the all approaches.

Melnea Cass Boulevard at Albany Street is a four-approach signalized intersection. The eastbound Albany Street approach provides a shared left-turn/through/right-turn lane. The westbound approach consists of a shared left-turn/through/right-turn lane. The northbound Melnea Cass Boulevard approach includes shared left-turn/through lane and a shared through/right-turn lane. The southbound Melnea Cass Boulevard approach consists of a shared left-turn/through lane and a shared through/right-turn lane. A bus stop is located just east of the intersection along the westbound approach. Crosswalks and wheelchair ramps are provided across all approaches.

Massachusetts Avenue at Albany Street is a four-approach signalized intersection. The eastbound approach on Albany Street provides a shared left-turn/through lane, an exclusive through lane, and an exclusive right-turn lane. The westbound approach on Albany Street provides a shared left-turn/through lane and a shared through/right-turn lane. The northbound Massachusetts Avenue approach provides two through lanes and one right-turn-only lane. The southbound Massachusetts Avenue approach provides one left-turn-only lane, one through lane, and one shared through/right-turn lane. Crosswalks and wheelchair ramps are provided on all approaches. Pedestrian pushbuttons and indications are provided on all approaches.

East Concord Street at Albany Street is a four-approach signalized intersection. The eastbound Albany Street approach provides one through lane and one exclusive right-turn lane. The westbound Albany Street approach provides one shared left-turn/through lane and one through lane. East Concord Street is one-way southbound and currently operates with one exclusive left-turn lane and one through/right-turn lane. Wheelchair ramps and crosswalks are provided across all approaches. Pedestrian pushbuttons and indicators are provided across the eastbound, westbound, and southbound approaches. An exclusive pedestrian phase is provided. Due to construction adjacent to this intersection temporary lane use may differ from this description.

East Newton Street at Albany Street is a four-approach signalized intersection. At this intersection, the eastbound approach on Albany Street provides one left-turn-only lane and one through lane. The westbound Albany Street approach provides one through and one exclusive right-turn lane. East Newton Street is one-way northbound and provides one exclusive left-turn lane and one through/right-turn lane. Wheelchair ramps and crosswalks with pedestrian pushbuttons and indicators are provided across all approaches. Pedestrian phases are both concurrent with vehicular movements and exclusive.

Albany Street at Frontage Road Southbound is a signalized five-approach intersection. The eastbound Albany Street approach features two travel lanes; a right-turn lane and a right-turn/hard right-turn lane. The westbound Albany Street approach provides three travel lanes; a hard left-turn lane, a hard left-turn/left-turn lane, and an exclusive through lane. The southbound driveway provides one through/right-turn lane. The southern and southeastern legs of the intersection, Albany Connector and Frontage Road Southbound, respectively, are both one-way departing the intersection. Albany Connector provides three travel lanes and Frontage Road Southbound provides two travel lanes. Wheelchair ramps and a crosswalk are provided across the eastbound approach.

Melnea Cass Boulevard/Harrison Avenue is a four-approach signalized intersection. The eastbound Harrison Avenue approach provides a shared left-turn/through/right-turn lane. During the morning and evening peak hours, parking is not permitted along the eastbound approach, allowing for the approach to operate as an exclusive left-turn lane and a shared through/right-turn lane. The westbound approach consists of an exclusive left-turn lane and a shared through/right-turn lane. The northbound approach includes an exclusive left-turn lane, an exclusive through lane, and a shared through/right-turn lane. The southbound Melnea Cass Boulevard approach consists of a left-turn lane, an exclusive through lane, and a shared through/right-turn lane. Bus stops are located to the south of the intersection along the northbound approach and to the north of the intersection along the southbound approach. Crosswalks and wheelchair ramps are provided across all approaches.

Massachusetts Avenue at Harrison Avenue is a four-approach signalized intersection. The eastbound and westbound approaches off Harrison Avenue both provide one left-turn/through/right-turn lane. Both the northbound and southbound Massachusetts Avenue approaches provide three travel lanes; an exclusive left-turn lane, an exclusive through lane, and a shared through/right-turn lane. Crosswalks and wheelchair ramps are provided on all approaches. Pedestrian pushbuttons and indications are provided on all approaches.

East Concord Street at Harrison Avenue is a four-approach signalized intersection. The eastbound approach on Harrison Avenue provides one through/right-turn lane. The westbound approach provides one left-turn/through lane. East Concord Street is one-way in the southbound direction; one left-turn/through/right-turn lane is provided. Crosswalks and wheelchair ramps are provided on all approaches.

East Newton Street at Harrison Avenue is a four-approach signalized intersection. The eastbound approach on Harrison Avenue provides one shared left-turn/through lane. The westbound Harrison Avenue approach provides one through/right-turn lane. East Newton Street is one-way in the northbound direction, with one shared left-turn/through/right-turn lane. Wheelchair ramps and crosswalks are provided across every approach.

East Brookline Street at Harrison Avenue is a 4-approach signalized intersection. The eastbound Harrison Avenue approach is a shared through/right-turn lane. The westbound Harrison Avenue approach is a shared left-turn/through lane. The East Brookline Street approach operates with 1 travel lane: a left-turn/through/right-turn lane. An MBTA bus stop is located on the west side of East Brookline Street, directly north of the intersection. Residential parking is permitted on the east side of the East Brookline Street approach, and on the departing side of East Brookline Street on both the east and west sides. Metered parking is located adjacent to each approach on Harrison Avenue; wheelchair ramps and crosswalks are provided across each approach.

Malden Street/Wareham Street/Monsignor Reynolds Way at Harrison Avenue is a five-approach signalized intersection. The eastbound Harrison Avenue approach provides two travel lanes; an exclusive left-turn only lane and a shared through/right-turn lane. The westbound Harrison Avenue approach features a shared hard left-turn/left-turn lane and a shared through/right-turn lane. The northbound Malden Street approach provides one left-turn/through/right-turn lane. The southbound Monsignor Reynolds Way approach features a shared left-turn/through lane and an exclusive right-turn lane. Wareham Street is one-way departing the intersection and provides one travel lane in the southbound direction. Wheelchair ramps and crosswalks are provided across all approaches.

Frontage Road Southbound/I-93 Off-Ramp at Massachusetts Avenue Connector is a 3-approach signalized intersection. The Frontage Road Southbound approach

features an exclusive through lane and a shared through/right-turn lane. The southbound I-93 Off-Ramp approach provides a shared left-turn/through lane and an exclusive through lane. The western leg of the intersection is one-way away from the intersection. Wheelchair ramps and a crosswalk are provided across the western leg of the intersection.

Frontage Road Northbound at Massachusetts Avenue Connector is a 3-approach signalized T intersection. The eastbound Massachusetts Avenue Connector approach features two exclusive left-turn lanes. The Frontage Road Northbound approach features an exclusive left-turn lane, a shared left-turn/through lane, and an exclusive through lane. Neither wheelchair ramps nor crosswalks are provided at this intersection.

Frontage Road Northbound at South Boston Bypass Road is a 3-approach signalized intersection. The eastbound South Boston Bypass Road approach features a left-turn/through lane and an exclusive through lane. The westbound South Boston Bypass Road provides an exclusive through lane and a shared through/right-turn lane. The Frontage Road Northbound approach features a shared left-turn/through lane, an exclusive through lane, and a shared through/right-turn lane. Wheelchair ramps and a crosswalk are provided across the westbound approach.

Unsignalized Intersections

East Brookline Street at Albany Street/Parking Lot Driveway is a 3-approach unsignalized T intersection. The Albany Street eastbound and westbound approaches each feature one travel lane. The southbound approach of East Brookline Street is stop controlled and consists of two lanes; an exclusive left-turn lane and an exclusive right-turn lane. Wheelchair ramps and crosswalks are provided across the southbound and eastbound approaches.

Wareham Street at Albany Street is a 3-approach unsignalized T intersection. The Albany Street eastbound and westbound approaches each feature one travel lane. The one-way southbound Wareham Street approach is stop-controlled. Wareham Street is wide enough that vehicles occasionally form two exiting lanes. On-street parking is provided on all approaches. Wheelchair ramps and a crosswalk are provided across Wareham Street only.

Malden Street at Albany Street is an unsignalized T intersection that is used by vehicles traveling between the Frontage Road and Back Bay/South End neighborhoods. The eastbound approach features one left-turn/through lane. The westbound Albany Street approach consists of one through/right-turn lane. The southbound Malden Street approach is stop controlled and operates as one exiting lane. On-street parking on Albany Street is permitted. Wheelchair ramps and a crosswalk are provided across the Malden Street approach.

4.5.5 Data Collection

Howard/Stein-Hudson Associates (HSH) collected morning (7:30–9:30 a.m.) and afternoon (3:30–5:30 p.m.) manual turning movement count data at the majority of the study area intersections in May, 2008 and November, 2009. In addition, HSH compiled count data from other sources from April, June, and December 2008, as well as February, 2009. Based on these data, HSH determined the morning and evening peak one-hour traffic volumes for analysis are 7:30–8:30 a.m. and 4:30–5:30 p.m. See **Figure 4-3** and **Figure 4-4**.

In addition to the peak-hour traffic data, HSH collected 48 hours of continuous traffic data on May 7 and 8, 2008, using Automatic Traffic Recorders (ATR). These data provide information on how traffic volumes fluctuate during the day and identify the peak periods for further study. The ATR data were collected at the following seven locations:

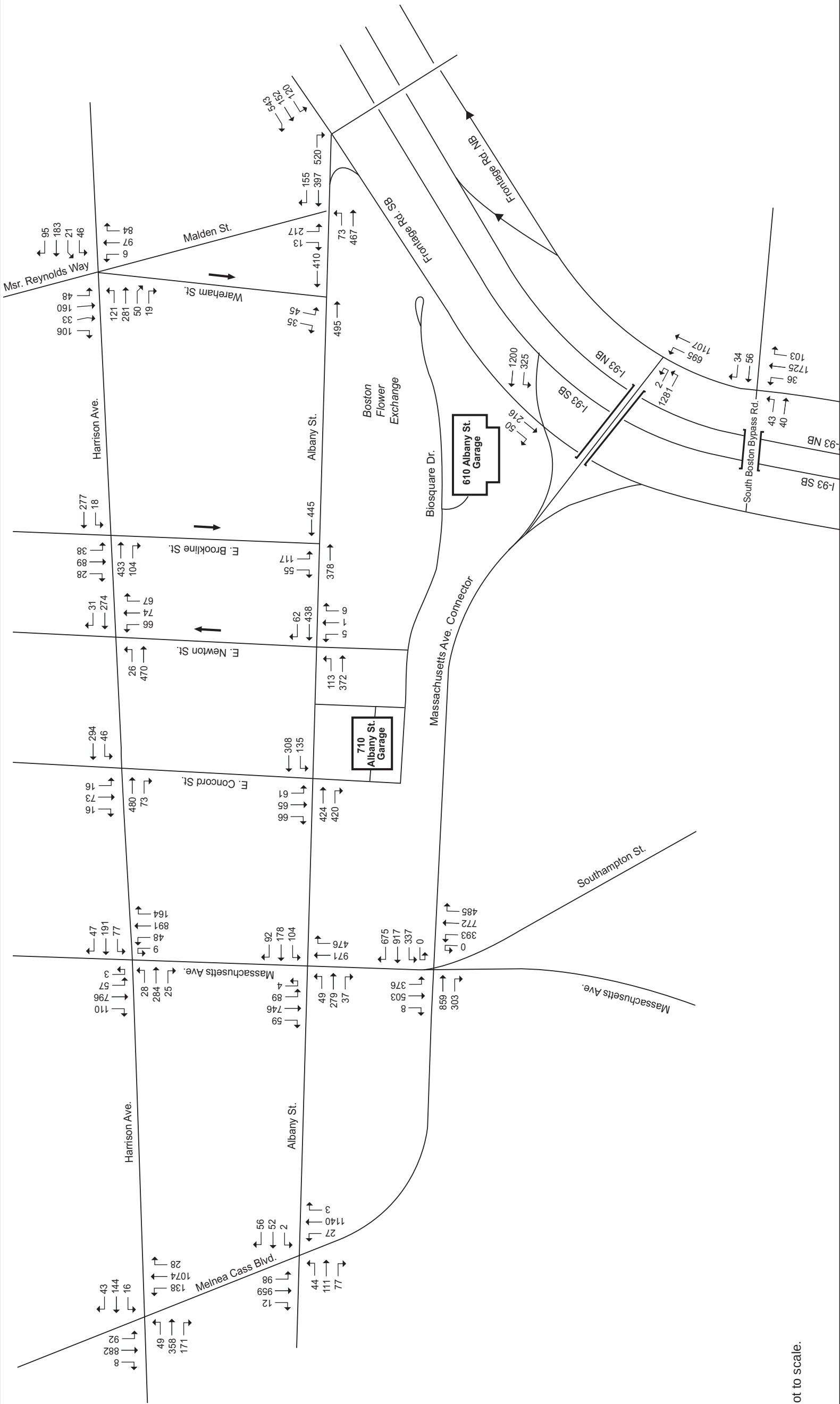
- ◆ Massachusetts Avenue south of Melnea Cass Boulevard;
- ◆ Melnea Cass Boulevard west of Massachusetts Avenue;
- ◆ Massachusetts Avenue north of Melnea Cass Boulevard;
- ◆ Albany Street east of Massachusetts Avenue;
- ◆ Harrison Avenue east of Massachusetts Avenue;
- ◆ Albany Street east of Malden Street; and
- ◆ Harrison Avenue east of Malden Street.

Based on the ATR data, the average daily traffic for each location is as follows.

◆ Massachusetts Avenue south of Melnea Cass Boulevard	36,642 veh.
◆ Melnea Cass Boulevard west of Massachusetts Avenue	39,609 veh.
◆ Massachusetts Avenue north of Melnea Cass Boulevard	31,788 veh.
◆ Albany Street east of Massachusetts Avenue	16,113 veh.
◆ Harrison Avenue east of Massachusetts Avenue	15,662 veh.
◆ Albany Street east of Malden Street	7,470 veh.
◆ Harrison Avenue east of Malden Street	10,401 veh.

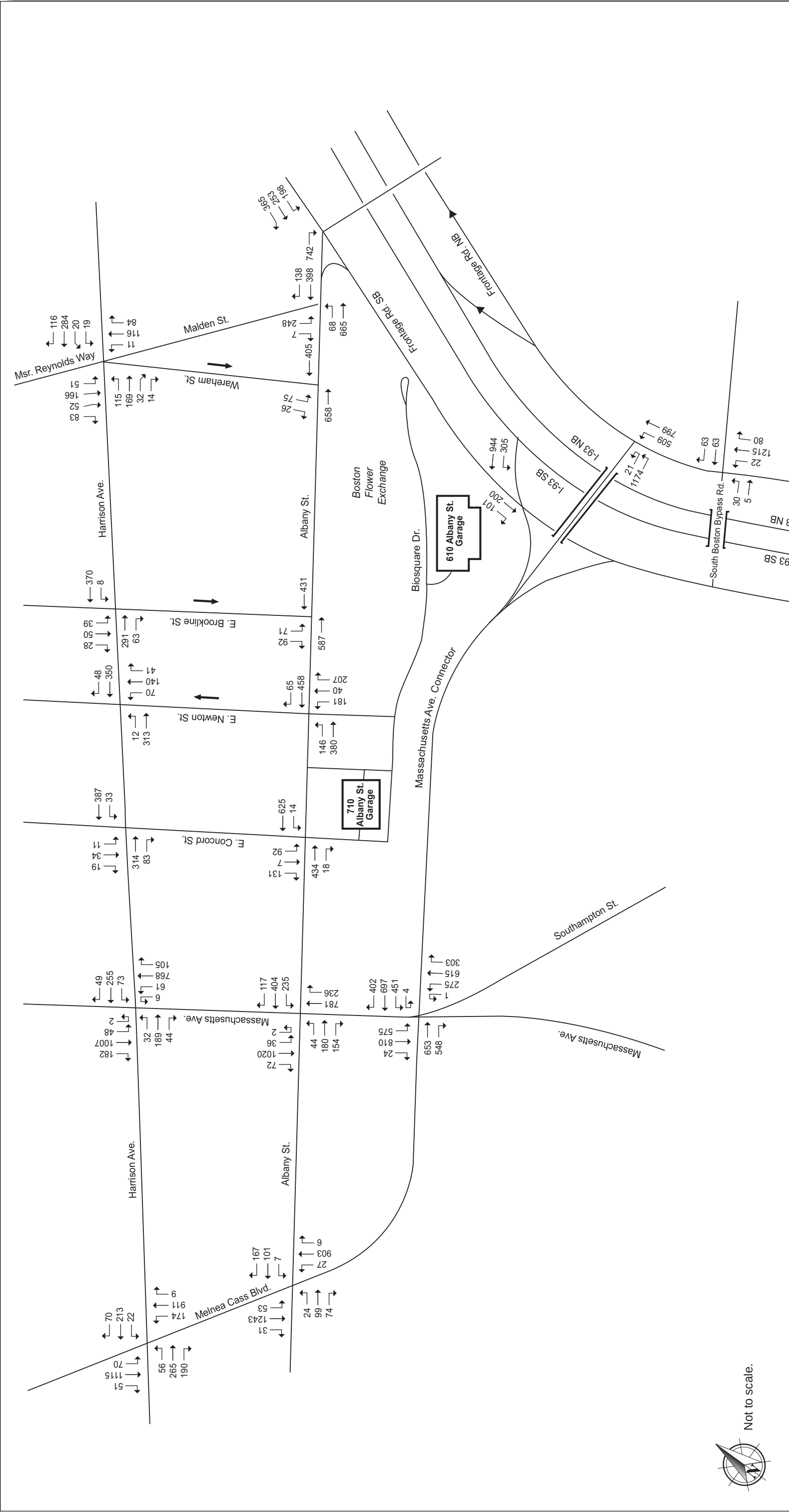
Additional Data on existing conditions can be found in the following sections:

- ◆ On-site and Off-site Parking (Section 4.6.2)
- ◆ Public Transportation (Section 4.6.3)
- ◆ TranSComm Private shuttle service (Section 4.6.3)
- ◆ Pedestrian Conditions (Section 4.6.4)
- ◆ Bicycle Storage (Section 4.6.5)



Not to scale.

Figure 4-3. Existing Conditions (2009) a.m. Peak-hour Traffic Volumes



Not to scale.

Figure 4-4. Existing Conditions (2009) p.m. Peak-hour Traffic Volumes

4.6 Existing Transportation Conditions

4.6.1 Traffic Operations

Of the 18 intersections in the study area 15 are currently signalized and 3 are unsignalized. Traffic operations are determined through an analysis of intersection Level of Service (LOS). Version 6 of the traffic analysis program Synchro was used to calculate the traffic operations. Synchro analysis is based on criteria established by the Transportation Research Board in its *2000 Highway Capacity Manual* (HCM 2000). HCM 2000 determines the LOS and delay (in seconds), based on intersection geometry and available traffic data for each intersection. **Table 4-2** an excerpt from HCM 2000, provides LOS criteria for signalized and unsignalized intersections. LOS A defines the most favorable condition, with minimum traffic delay. LOS F represents the worst condition (unacceptable), with significant traffic delay and driver frustration. LOS D is generally considered acceptable for urban conditions.

Operational analysis performed for the IMP are based on an existing Synchro model developed and provided by the Boston Transportation Department and updated to reflect existing field conditions and traffic volumes.

Table 4-2 Intersection Level of Service (LOS) Criteria

Level of Service	Average Control Delay (sec./veh.)	
	Signalized Intersection	Unsignalized Intersection
A	≤ 10	≤ 10
B	>10 and ≤ 20	>10 and ≤ 5
C	>20 and ≤ 35	>15 and ≤ 25
D	>35 and ≤ 55	>25 and ≤ 35
E	>55 and ≤ 80	>35 and ≤ 50
F	>80	>50

A level of service analysis was conducted to evaluate the existing intersection operations, for the 18 intersections within the study area for morning and evening peak hours. **Table 4-3** summarizes the existing Morning intersection LOS, queue analysis, and volume to capacity results for the study area intersections.

As presented in **Table 4-3** below, the overall intersection operations of the IMP study area are acceptable during the Morning Peak Period with the following exceptions:

- ♦ The intersection of Albany Street and Massachusetts Avenue operates at an overall LOS F. At this intersection, the Albany eastbound left/through/right approach also operates at LOS F, due primarily to the high northbound and southbound volumes on Massachusetts Avenue. The large volume on Massachusetts Avenue dictates that for the intersection to operate most

effectively, most of the green time is allotted to those approaches. This leads to longer delay for the Albany Street approaches.

- ◆ The intersection of Malden Street/Wareham Street and Harrison Avenue operates at an overall LOS F. At this intersection, the eastbound left-turn approach operates at LOS F, as well as the southbound left-turn/through approach. The westbound left-turn approach operates at LOS E.

In addition, individual approaches at several other intersections operate below an acceptable level of service as shown in the Table.

Table 4-3 Existing Conditions (2009) Peak-hour Intersection Operations, a.m. Peak Hour

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
<i>Signalized Intersections</i>				
1. Melnea Cass Blvd. at Massachusetts Avenue	D	48.9	—	—
Melnea Cass EB thru	E	77.3	>1.0	#534
Melnea Cass EB right	A	8.7	0.58	67
Massachusetts Ave. Connector WB left	F	>80.0	>1.0	#241
Massachusetts Ave. Connector WB thru	C	27.0	0.65	366
Massachusetts Ave. Connector WB right	A	6.4	0.68	132
Southampton NB left	E	55.4	0.75	210
Southampton NB thru	F	>80.0	>1.0	#524
Southampton NB right	A	1.5	0.53	0
Massachusetts Ave. SB left	D	49.1	0.81	173
Massachusetts Ave. SB thru/right	D	41.0	0.72	284
2. Melnea Cass Blvd. at Albany Street	C	33.3	—	—
Albany EB left/thru/right	E	58.2	0.86	#254
Albany WB left/thru/right	C	33.0	0.52	66
Melnea Cass NB left/thru/right	C	24.6	0.81	m257
Melnea Cass SB left/thru/right	D	36.6	0.97	m#512
3. Massachusetts Avenue at Albany Street	F	>80.0	—	—
Albany EB left/thru	F	>80.0	0.95	m#249
Albany EB right	E	62.0	0.41	63
Albany WB left/thru/right	D	42.1	0.77	173
Massachusetts NB thru	B	16.8	0.79	m173
Massachusetts NB right	C	24.4	0.88	m93
Massachusetts SB left	A	9.9	0.30	44
Massachusetts SB thru/right	B	11.3	0.48	209
4. East Concord Street at Albany Street	B	19.6	—	—
Albany EB thru	B	11.0	0.57	244
Albany EB right	B	19.0	0.73	434
Albany WB left/thru	A	7.8	0.44	78
East Concord SB left	D	53.3	0.40	91
East Concord SB thru/right	E	66.2	0.78	131

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
5. East Newton Street at Albany Street	B	19.3	—	—
Albany EB left	A	8.2	0.33	41
Albany EB thru	A	9.1	0.48	132
Albany WB thru	C	30.8	0.72	435
Albany WB right	B	17.1	0.13	54
East Newton NB left	D	46.0	0.04	15
East Newton NB thru/right	C	25.4	0.08	5
6. Albany Street at Frontage Road Southbound	C	20.5	—	—
Albany EB right	D	48.1	0.79	285
Albany WB left	A	3.4	0.16	36
Albany WB thru/right	A	2.2	0.39	133
MBTA Driveway SB thru/right	D	47.0	0.04	16
7. Melnea Cass Blvd. at Harrison Avenue	D	46.1	—	—
Harrison EB left	C	20.1	0.23	42
Harrison EB thru/right	D	50.8	0.94	#531
Harrison WB left	B	17.8	0.18	m12
Harrison WB thru/right	B	16.9	0.40	m108
Melnea Cass. NB left	E	63.2	0.94	m#128
Melnea Cass. NB thru/right	E	64.0	>1.0	#631
Melnea Cass. SB left	D	43.4	0.72	m48
Melnea Cass. SB thru/right	C	26.8	0.87	#426
Signalized Intersections, cont.				
8. Massachusetts Avenue at Harrison Avenue	D	47.0	—	—
Harrison EB left/thru/right	E	74.1	>1.0	m#374
Harrison WB left/thru/right	F	>80.0	>1.0	#424
Massachusetts NB left	F	>80.0	>1.0	#125
Massachusetts NB thru/right	D	37.8	0.92	#492
Massachusetts SB left	E	60.7	0.41	m75
Massachusetts SB thru/right	B	15.8	0.75	m174
9. East Concord Street at Harrison Avenue	B	13.5	—	—
Harrison EB thru/right	A	9.6	0.58	394
Harrison WB left/thru	A	4.4	0.47	m68
East Concord SB left/thru/right	E	56.8	0.69	91
10. East Newton Street at Harrison Avenue	C	21.2	—	—
Albany EB left/thru	B	15.3	0.61	#464
Albany WB thru/right	A	8.6	0.38	84
East Newton NB left/thru/right	D	52.5	0.80	188
11. East Brookline Street at Harrison Avenue	B	10.9	—	—
Harrison EB thru/right	A	2.8	0.50	m54
Harrison WB left/thru	A	6.0	0.27	151
East Brookline SB left/thru/right	D	48.3	0.68	149
12. Malden Street/Wareham Street at Harrison Avenue	F	>80.0	—	—
Harrison EB left	F	>80.0	>1.0	#197
Harrison EB thru/right	C	22.5	0.48	#323
Harrison WB left	E	65.4	0.59	m#102
Harrison WB thru/right	B	16.8	0.40	122
Malden NB left/thru/right	D	39.3	0.59	176
Monsignor Reynolds SB left/thru	F	>80.0	>1.0	#360
Monsignor Reynolds SB right	A	7.9	0.28	42

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
13. Frontage Road Southbound at Massachusetts Avenue Connector	C	26.4	—	—
I-93 Off-ramp WB left/thru	C	27.0	0.90	432
Frontage SB thru/right	C	23.4	0.23	110
14. Frontage Road Northbound at Massachusetts Avenue Connector	C	32.3	—	—
Massachusetts Ave. Connector EB left	D	37.5	0.94	#525
Frontage NB left	C	33.1	0.88	#595
Frontage NB left/thru	C	26.3	0.88	#525
15. Frontage Road Northbound at South Boston Bypass Road	A	5.6	—	—
South Boston Bypass EB left/thru	C	31.0	0.29	m31
South Boston Bypass WB thru/right	D	38.2	0.27	50
Frontage NB left/thru/right	A	2.8	0.50	19
Unsignalized Intersections				
16. East Brookline Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.23	0
Albany WB thru	A	0.0	0.31	0
East Brookline SB left	E	43.5	0.60	87
East Brookline SB right	B	13.3	0.13	11
17. Wareham Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.32	0
Albany WB thru	A	0.0	0.26	0
Wareham SB left/right	C	18.0	0.24	23
18. Malden Street at Albany Street	—	—	—	—
Albany EB left/thru	A	2.2	0.08	7
Albany WB thru/right	A	0.0	0.35	0
Malden SB left/right	F	>50.0	>1.0	345

Table 4-4 summarizes the existing Evening intersection LOS, queue analysis, and volume to capacity results for the study area intersections.

As presented in **Table 4-4** below, the overall operations of the IMP study area operate at an acceptable level of service, LOS D or better, during the Evening Peak Period with the following exceptions:

- ◆ The intersection of Melnea Cass Boulevard and Massachusetts Avenue operates at an overall LOS F. The high volumes at all approaches account for the intersection's poor operations. The eastbound through, westbound left-turn, northbound left-turn, and southbound through/right all operate at LOS F. In addition, the eastbound right-turn and southbound left-turn approaches operate at LOS E.
- ◆ The intersection of Massachusetts Avenue and Harrison Avenue operates at an overall LOS E. The high volumes on Massachusetts Avenue dictate that for the intersection to operate most efficiently, most of the green time must be allotted to Massachusetts Avenue movements. As result, delay is incurred by Harrison Avenue approaches. The eastbound left/through/right and

southbound left-turn approaches both operate at LOS E. The westbound left/through/right and northbound left-turn approaches operate at LOS F.

- ◆ The intersection of Malden Street/Wareham Street and Harrison Avenue operates at an overall LOS E. The eastbound left-turn and southbound left/through approaches operate at LOS F. The westbound left-turn approach operates at LOS E.

In addition, several individual approaches at other locations operate below LOS D as highlighted in the Table.

Table 4-4 Existing Conditions (2009) Peak-hour Intersection Operations, p.m. Peak Hour

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
<i>Signalized Intersections</i>				
1. Melnea Cass Blvd. at Massachusetts Avenue	F	>80.0	—	—
Melnea Cass EB thru	F	>80.0	>1.0	#424
Melnea Cass EB right	E	61.3	>1.0	#459
Massachusetts Ave. Connector WB left	F	>80.0	>1.0	#460
Massachusetts Ave. Connector WB thru	C	32.6	0.62	307
Massachusetts Ave. Connector WB right	A	5.0	0.54	68
Southampton NB left	F	>80.0	>1.0	#224
Southampton NB thru	D	50.8	0.83	334
Southampton NB right	A	0.5	0.26	0
Massachusetts Ave. SB left	E	56.4	0.92	m#324
Massachusetts Ave. SB thru/right	F	>80.0	>1.0	m#572
2. Melnea Cass Blvd. at Albany Street	B	19.9	—	—
Albany EB left/thru/right	D	41.1	0.70	145
Albany WB left/thru/right	D	45.5	0.85	219
Melnea Cass NB left/thru/right	B	14.0	0.84	m#515
Melnea Cass SB left/thru/right	B	14.4	0.94	m#410
3. Massachusetts Avenue at Albany Street	D	36.7	—	—
Albany EB left/thru	D	38.0	0.56	m133
Albany EB right	D	35.8	0.44	m172
Albany WB left/thru/right	D	46.9	0.95	#285
Massachusetts NB thru	D	51.2	0.83	357
Massachusetts NB right	B	13.3	0.55	93
Massachusetts SB left	B	14.3	0.16	31
Massachusetts SB thru/right	C	24.8	0.75	447
4. East Concord Street at Albany Street	B	17.5	—	—
Albany EB thru	B	10.8	0.59	251
Albany EB right	A	5.9	0.04	16
Albany WB left/thru	B	13.8	0.44	m158
East Concord SB left	E	70.3	0.70	121
East Concord SB thru/right	B	15.7	0.55	52

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
5. East Newton Street at Albany Street	D	40.7	—	—
Albany EB left	B	15.6	0.57	51
Albany EB thru	B	11.3	0.51	138
Albany WB thru	D	45.9	0.87	#524
Albany WB right	B	19.8	0.14	60
East Newton NB left	E	71.9	0.80	#261
East Newton NB thru/right	E	71.3	0.96	111
6. Albany Street at Frontage Road Southbound	C	23.8	—	—
Albany EB right	D	41.6	0.85	362
Albany WB left	B	12.2	0.30	129
Albany WB thru/right	A	1.3	0.26	83
MBTA Driveway SB thru/right	D	42.4	0.04	15
7. Melnea Cass Blvd. at Harrison Avenue	D	48.2	—	—
Harrison EB left	C	24.1	0.25	59
Harrison EB thru/right	E	58.8	0.96	#471
Harrison WB left	C	23.1	0.29	m16
Harrison WB thru/right	C	22.4	0.56	m150
Melnea Cass. NB left	F	>80.0	>1.0	m#163
Melnea Cass. NB thru/right	C	32.4	0.78	m411
Melnea Cass. SB left	B	19.9	0.63	m14
Melnea Cass. SB thru/right	E	55.4	>1.0	m#464
Signalized Intersections, cont.				
8. Massachusetts Avenue at Harrison Avenue	E	57.2	—	—
Harrison EB left/thru/right	E	59.3	0.95	m#303
Harrison WB left/thru/right	F	>80.0	>1.0	#520
Massachusetts NB left	F	>80.0	>1.0	#140
Massachusetts NB thru/right	C	26.8	0.79	332
Massachusetts SB left	E	56.1	0.52	m62
Massachusetts SB thru/right	C	32.2	0.95	#556
9. East Concord Street at Harrison Avenue	A	8.2	—	—
Harrison EB thru/right	A	5.6	0.38	197
Harrison WB left/thru	A	2.9	0.38	m71
East Concord SB left/thru/right	D	47.4	0.50	66
10. East Newton Street at Harrison Avenue	C	22.9	—	—
Albany EB left/thru	B	10.2	0.40	153
Albany WB thru/right	B	13.9	0.48	236
East Newton NB left/thru/right	D	52.6	0.83	210
11. East Brookline Street at Harrison Avenue	B	10.6	—	—
Harrison EB thru/right	A	5.5	0.31	m179
Harrison WB left/thru	A	5.3	0.31	181
East Brookline SB left/thru/right	D	43.6	0.59	105
12. Malden Street/Wareham Street at Harrison Avenue	E	67.0	—	—
Harrison EB left	F	>80.0	>1.0	#185
Harrison EB thru/right	C	22.1	0.31	189
Harrison WB left	E	55.9	0.35	m54
Harrison WB thru/right	C	29.5	0.65	m#423
Malden NB left/thru/right	C	32.9	0.53	183
Monsignor Reynolds SB left/thru	F	>80.0	>1.0	#367
Monsignor Reynolds SB right	A	6.9	0.20	35

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
13. Frontage Road Southbound at Massachusetts Avenue Connector	C	29.0	—	—
I-93 Off-ramp WB left/thru	C	31.5	0.90	374
Frontage SB thru/right	B	18.4	0.23	115
14. Frontage Road Northbound at Massachusetts Avenue Connector	C	25.1	—	—
Massachusetts Ave. Connector EB left	C	32.5	0.90	416
Frontage NB left	C	20.0	0.63	271
Frontage NB left/thru	B	17.6	0.63	208
15. Frontage Road Northbound at South Boston Bypass Road	A	6.1	—	—
South Boston Bypass EB left/thru	C	25.9	0.13	m7
South Boston Bypass WB thru/right	D	39.7	0.37	65
Frontage NB left/thru/right	A	2.4	0.37	69
Unsignalized Intersections				
16. East Brookline Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.38	0
Albany WB thru	A	0.0	0.29	0
East Brookline SB left	F	58.4	0.58	75
East Brookline SB right	B	13.5	0.21	19
17. Wareham Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.42	0
Albany WB thru	A	0.0	0.26	0
Wareham SB left/right	D	28.4	0.42	49
18. Malden Street at Albany Street	—	—	—	—
Albany EB left/thru	A	1.9	0.08	6
Albany WB thru/right	A	0.0	0.34	0
Malden SB left/right	F	>50.0	>1.0	531

4.6.2 Parking

This section documents the existing on-street and off-street parking facilities in the study area. The parking inventory comprises off-street parking on the BUMC campus, distinguished between spaces for Boston University Medical Center employees and Boston University Medical Center visitors and patients.

Existing Off-Street Parking

Figure 4-5 illustrates the locations of the existing off-street Boston University Medical Center owned and leased parking garages and surface lots. Currently, Boston University Medical Center owns three (3) parking garages and four (4) surface parking lots and leases parking in two (2) parking garages and one (1) surface parking lot.

In October 2009, HSH studied supply and occupancy of all parking facilities on the campus. In December 2009 the capacity and occupancy were subsequently updated by Boston University Medical Center's Office of Parking Transportation Services. The study determined an overall occupancy rate of 88%. Approximately 400 spaces were available mid-day, according to the data. Capacity and occupancy of each facility is shown in **Table 4-5**.

A total of 2,817 parking spaces are owned by Boston University Medical Center within or near the medical area, with an additional 438 employee spaces leased nearby for a total of 3,255 parking spaces serving the medical area; 87% of the total are in facilities owned by Boston University Medical Center. Further information about the facilities is provided **Table 4-6**. The parking facilities serve a total of 3,643,516 square feet of space, including 520,000 square feet of occupied BioSquare space. In total the ratio of 0.85 spaces per 1,000 square feet is in line with suggested BTD ratios of 0.75 to 1.0 spaces per 1,000 square feet.

Of the owned, on-campus spaces, approximately 1,120 are currently public spaces, available for patients and visitors of the campus. The Doctors Office Building and the 710 Albany Street Garage are open to the public on a market rate, hourly basis. The 610 Albany Street garage is for Medical Center employees who pay market rate for spaces on a monthly basis.

Table 4-5 Campus Parking Supply and Occupancy

Facility	Lot/ Garage	Own/ Lease	Existing Spaces	Occupied Spaces	Occupancy	User
Owned Parking						
610 Albany	G	O	1,461	1,250	86%	Staff
710 Albany	G	O	1,000	890	89%	Primarily patients.
DOB	G	O	230	210	91%	Patients. Staff after 5:30 p.m.
BioSquare	L	O	80	72	90%	Staff
D Lot	L	O	22	13	59%	Staff
Naval Blood Lab	L	O	7	5	71%	Staff
Gambro	L	O	17	15	88%	
Leased Parking						
700 Harrison	G	L	80	80	100%	
Crosstown	G	L	202	202	100%	
Perkin Elmer	L	L	156	119	76%	
Summary			Existing Spaces	Occupied Spaces	Occupancy	
Total Owned			2,817	2,455	87%	
Total Off-site Leased			438	401	92%	
Total Parking			3,255	2,856	88%	

Source: BUMC 12-17-09.

Existing On-street Parking

Figure 4-6 illustrates the City of Boston on-street parking supply in the study area along with regulations within the campus.

As shown, parking in the quarter-mile surrounding the project site can be thought of in three large segments. The segment between Harrison Avenue and Washington Street

is composed primarily of South End resident parking. The segment between Harrison Avenue and Albany Street consists primarily of metered and unrestricted parking. East Brookline Street and East Canton Street are signed for South End Resident Parking. There are several areas within this zone that cannot be used for parking for a variety of reasons including MBTA bus stops, loading zones and construction. The third segment, south of Albany Street is dominated by Melnea Cass Boulevard and the Massachusetts Avenue Connector. Parking is not permitted on either of these major roads.



Figure 4-5. Off-street Parking in the Study Area

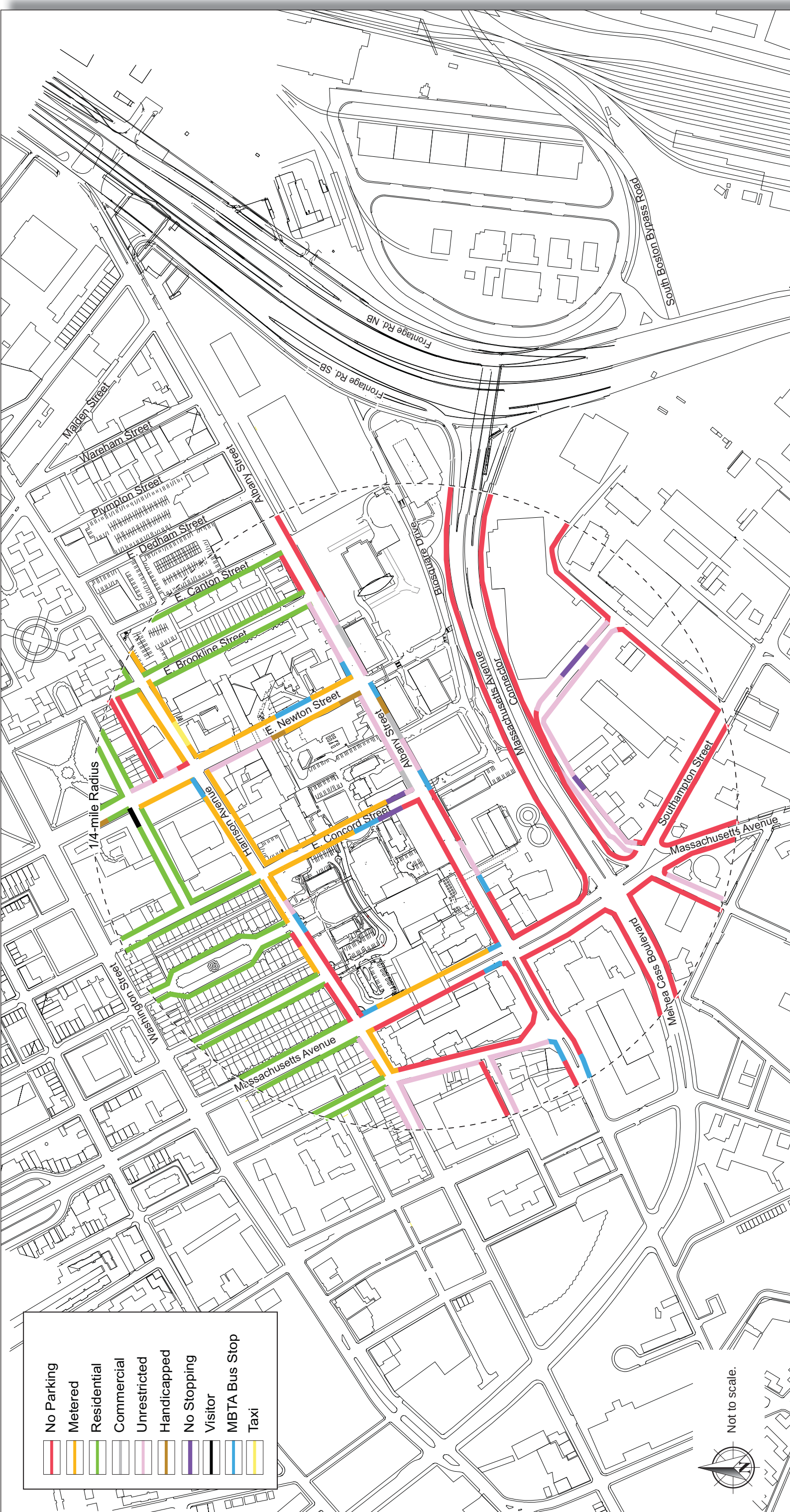


Figure 4-6. On-street Parking in the Study Area

4.6.3 Public Transportation

This section highlights the transportation routes, schedules, and capacity of public transportation within the Medical Center.

MBTA Bus Service

As shown in **Table 4-6** and **Figure 4-7**, seven Massachusetts Bay Transportation Authority (MBTA) bus route and the Silver Line Bus Rapid Transit currently provide public transit service to the site and the medical area as a whole. The bus and bus rapid transit routes connect the Boston University Medical Center area with Cambridge, Longwood Medical and Academic Area (LMA), South Boston, Back Bay/South End, Lower Roxbury, and Downtown, as well as with MBTA subway stations, including the Red Line (Broadway, Andrew, and JFK/UMass) and the Orange Line (Massachusetts Avenue, Back Bay, and Ruggles). Major bus stops with shelters on the BUMC Campus are located on East Newton Street and East Concord Street between Harrison Avenue and Albany Street. Buses also stop along Albany Street, Harrison Avenue, and Massachusetts Avenue.

Table 4-6 Existing MBTA Bus Service in the Study Area

Bus Route	Origin–Destination	Rush-hour Frequency (min)
CT #1	Central Square (Cambridge)–BUMC	20
CT #3	Beth Israel Hospital–Andrew Station	15
1	Harvard–Dudley Square	6–11
8	UMass–Kenmore	13–20
10	City Point–Copley Square	10–20
47	Central Square–Broadway	20–25
Silver Line (#49)	Dudley Square–Downtown	5

Sources: www.mbta.com and MBTA Ridership & Service Statistics, March 1997, based on 1996 Ridecheck Program.

MBTA Silver Line

In July 2002, Boston's first Bus Rapid Transit service, the "Silver Line," opened along Washington Street between Dudley Square and Downtown Crossing. In the fall of 2009, the route was extended and now runs between Dudley Square, Downtown Crossing, and South Station. A transit priority lane is provided in each direction between Melnea Cass Boulevard and the Massachusetts Turnpike along Washington Street (the lane is shared with general traffic turning right). The Silver Line replaces the existing Route #49 bus, which previously operated on Washington Street, and operates at five-minute headways during peak periods. The Silver Line stop closest to the campus is on Washington Street at East Newton Street, approximately a five-minute (one-quarter mile) walk, or two blocks from the intersection of Albany Street and East Newton Street.

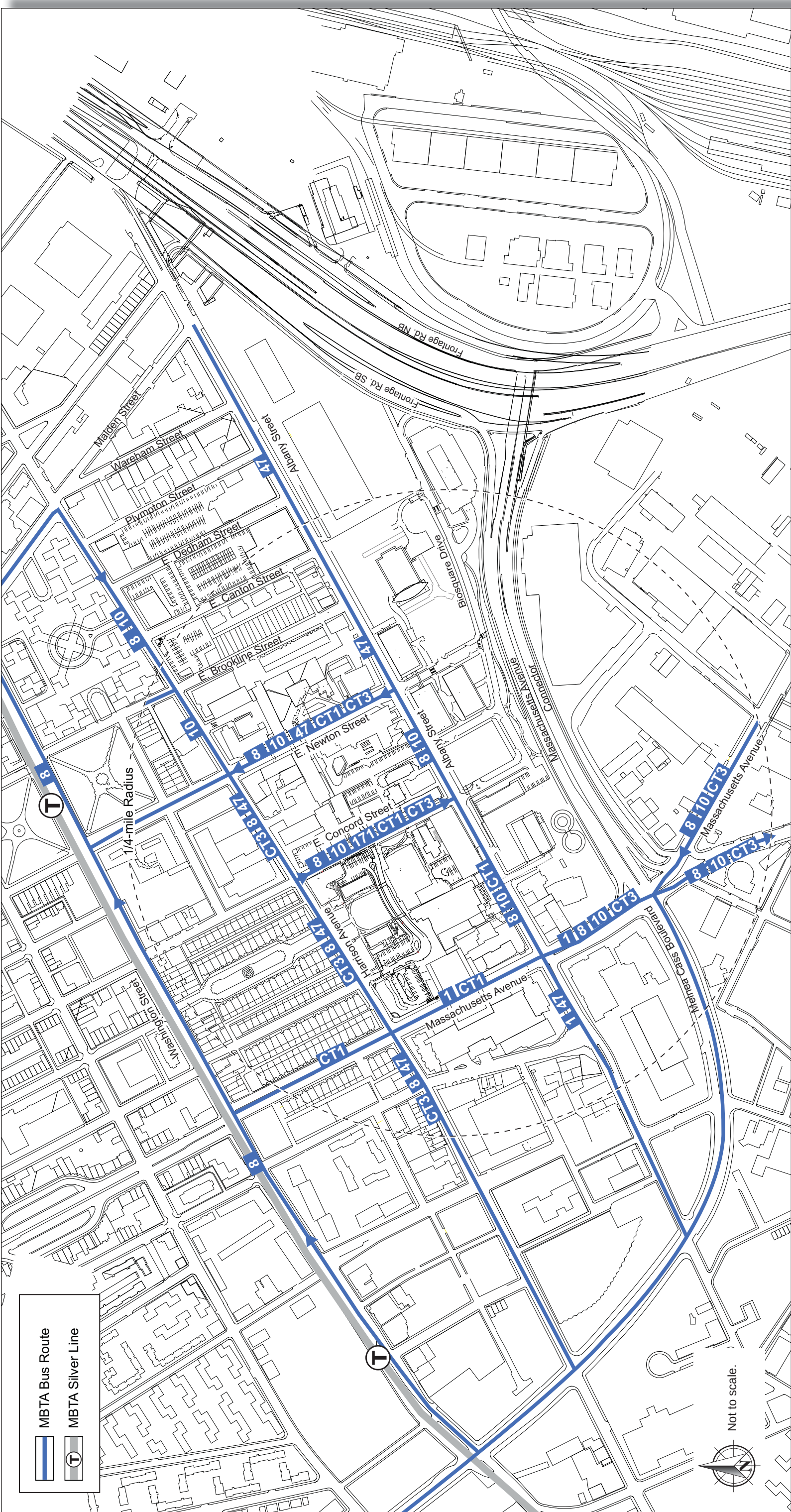


Figure 4-7. Existing Public Transportation

TranSComm Shuttle Services

TranSComm works to bring more frequent and accessible public transportation to the Medical Center community and provides information on transportation services in the area (see www.transcomm.org). Additional information on TranSComm programs is found in Section 4.2.4.

With its dedicated bus and shuttle program Boston University Medical Center through TranSComm can significantly reduce the number of inter campus vehicle trips. The radial routes can reduce the number of vehicle trips made by patients.

TranSComm allows South End residents to use its shuttle services at no cost such as the All-Day Campus shuttle. TranSComm operates the following 15- to 30-passenger shuttles:

- ◆ VA Shuttle travels from Boston Veterans Administration Medical Center (VA) in Jamaica Plain to the BUMC Campus several times per day on the hour, from 10:00 a.m. to 5:00 p.m., leaving the BUMC Campus.
- ◆ All-Day Campus Shuttle runs every 30 minutes within the campus boundaries (from 1010 Massachusetts Avenue to 560 Harrison Avenue) from 6:30 a.m. to 6:30 p.m.
- ◆ Evening Shuttle travels from the BUMC Campus to MBTA subway stations, the South End neighborhood, and Boston University Medical Center parking lots and garages from 5:15 p.m. to 12:15 a.m.
- ◆ Inner Campus Shuttle travels on a continuous loop between institutions, primarily for patients and employees, from 8:30 a.m. to 5:30 p.m.
- ◆ Healthnet Shuttles travels from Boston neighborhoods to Boston Medical Center (for patients only).
- ◆ The Boston University Shuttle (The BUS), travels between the BU Charles River Campus and the BU Medical Campus, and operates every 15 minutes at peak-time from 7:00 a.m. to 10:00 a.m. Monday through Thursday and 20 minutes on Fridays. It runs every 30 minutes at off peak-time from 7:00 a.m. to 11:00 p.m.

4.6.4 Pedestrian Conditions

The medical campus, with its treatment and academic functions, generates a significant number of pedestrian trips throughout the study area, including trips along and across many of the study area roadways. Generally speaking, the sidewalks on Albany Street are in good condition and are of adequate width. Most sidewalks are 8–10 feet wide.

Pedestrian conditions within the Medical Center are acceptable along the most heavily traveled roadways; Massachusetts Avenue, Harrison Avenue, Albany Street, and the

mid block East Concord Street crossing that connects the Moakley Building to the educational programs of the medical center. Four study area intersections have exclusive pedestrian phases: East Concord Street/Albany Street, East Newton Street/Albany Street, East Concord Street/Harrison Avenue, and East Newton Street/Harrison Avenue. During the exclusive pedestrian phase, all vehicular traffic is stopped to allow pedestrians to cross. Pedestrian pathways are shown in **Figure 4-8**.

4.6.5 Bicycle and Scooter Facilities

Albany Street, Massachusetts Avenue, Harrison Avenue, and East Newton Street are generally considered on-street bicycle routes in this area. The Southwest Corridor bike path can be reached via Massachusetts Avenue or Melnea Cass Boulevard. According to a 2002 survey of Boston University Medical Center employees conducted by TranSComm, only about 1% of employees rode bicycles to work at Boston University Medical Center (most of the cyclists are likely students). TranSComm continues to encourage cycling as a healthy, inexpensive, and environmentally positive alternative to driving alone and provides many amenities and programs, including:

- ◆ Installing two secure, weather protected bike cages. The first one installed in March, 2006 is located on East Newton Street between the Newton Pavilion and the School of Dental Medicine and houses approximately 132 bicycles with the second one installed in October 2006 housing approximately 90 bicycles with room for expansion. Both cages are well utilized. Bicycle and scooter facilities on campus are shown in **Figure 4-9**.
- ◆ Providing showers for cyclists in the basement of the School of Medicine building.
- ◆ Organizing free bike safety and mechanical check-ups, twice per year: TranSComm works with local bike shops to bring this popular event to the Medical Center to encourage cyclists to bike to work/school.
- ◆ Registering bikes on-line: For students and Boston University Medical Center employees, bike registration continues to be offered on-line.
- ◆ Installing new racks and repairing existing bike racks located throughout the campus.
- ◆ Boston University Medical Center will work with Boston's Director of Bike Programs to identify ways to improve bicycle use.
- ◆ Six scooter parking spaces are provided for employees in the 610 Albany Garage. Bicycle and scooter facilities on campus are shown in **Figure 4-9**.

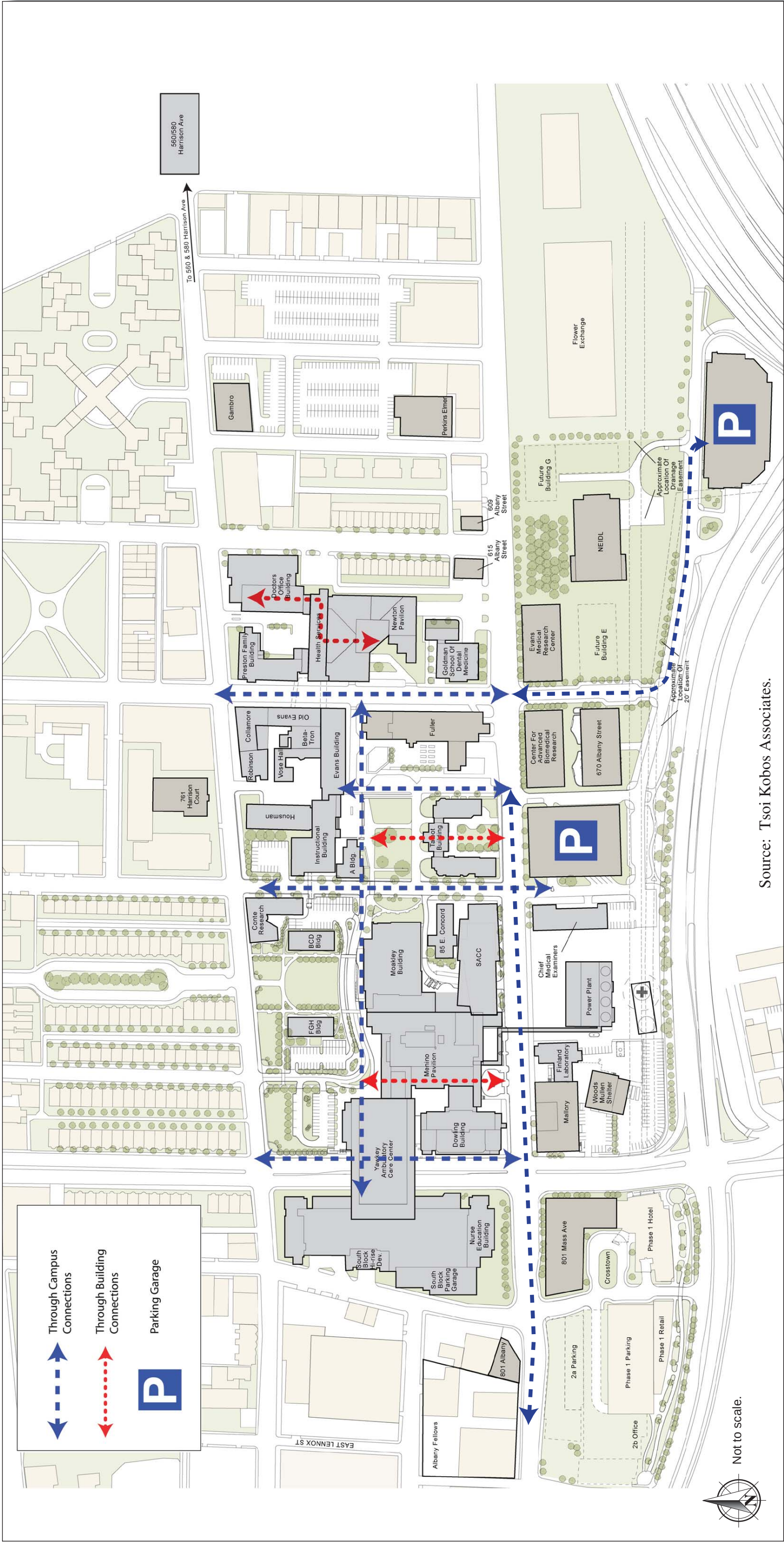


Figure 4-8. Pedestrian Pathways

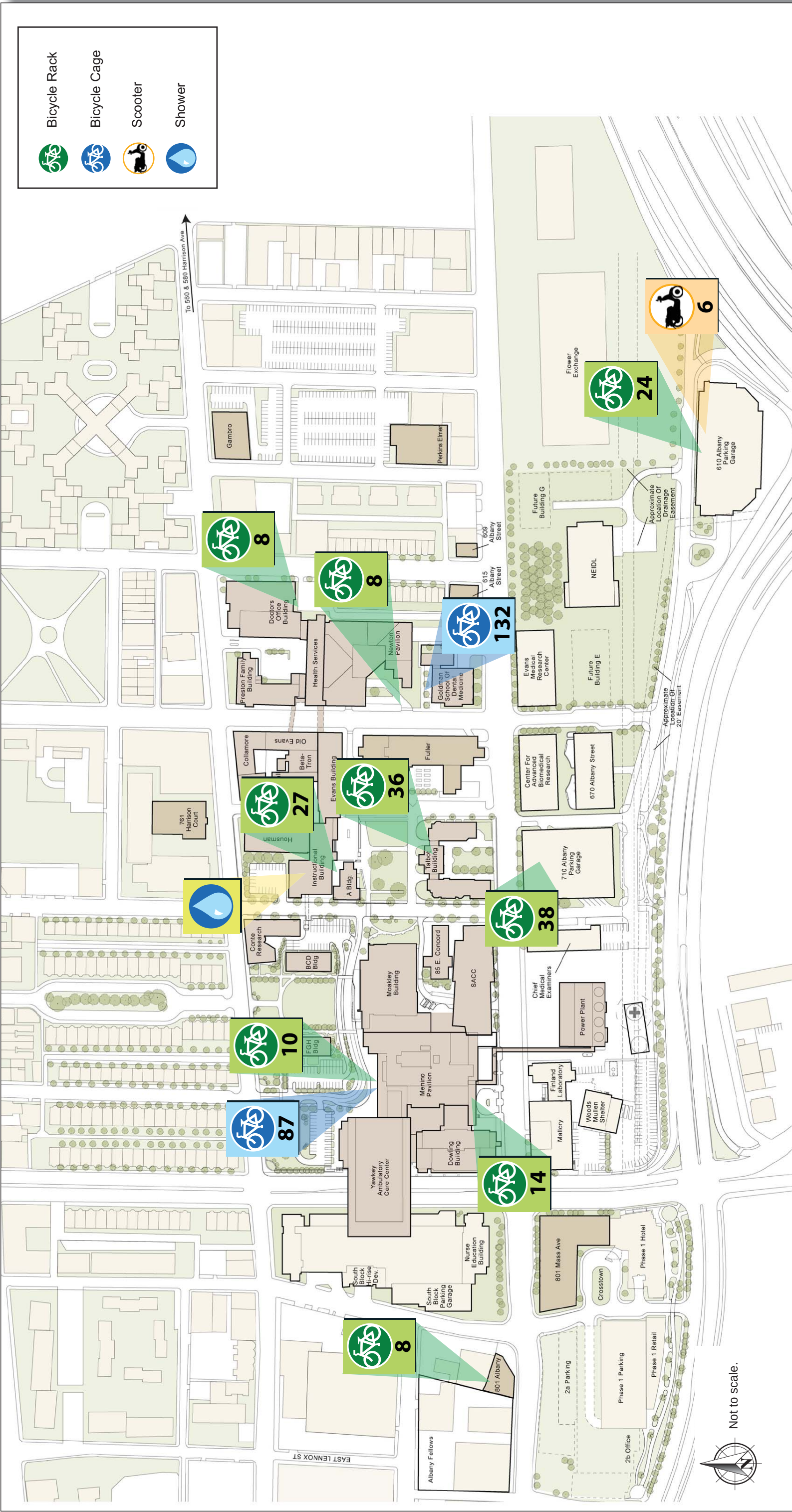


Figure 4-9. Bicycle and Scooter Facilities on Campus

4.6.6 Loading and Service

The main campus loading dock at 751 Albany Street has three dedicated bays, with occasional loading for small vehicles occurring in front of the trash compactors. Trucks access the loading dock from Albany Street, and it serves the BMC West Campus – the Menino Pavilion, the Yawkey Ambulatory Care Center, the Dowling Building, South Block, and the Moakley Building. It will also serve the new Shapiro Ambulatory Care Center. Its operating hours are 7:00 a.m. to 3:00 p.m., Monday through Friday. The loading docks accommodate vehicles ranging from a small van to a WB-50 truck. The docks carry approximately 39 vehicles on an average day; the typical duration at the dock is 10–30 minutes, according to a nine-hour survey conducted on July 31, 2007. (Delivery activity has not changed substantially since the survey was conducted.) As the table indicates, most loading is performed by single unit trucks or smaller vehicles, which have less impact on the roadway. On several occasions, trucks were observed waiting on-street for an empty bay. Based on the survey, **Table 4-7** indicates the number of deliveries and vehicle types.

Table 4-7 Existing (2007) Daily Truck Activity

Vehicle Type	Vehicles Observed
Car/Van/Pick-up	8
Panel Truck	3
Single-Unit Truck	19
Dumpster Pick-up/Drop Off	4
WB (Tractor Trailer)	5
Total	39

Figure 4-10 shows the existing BUMC Campus plan, including driveways, surface parking spaces, circulation, and loading facilities

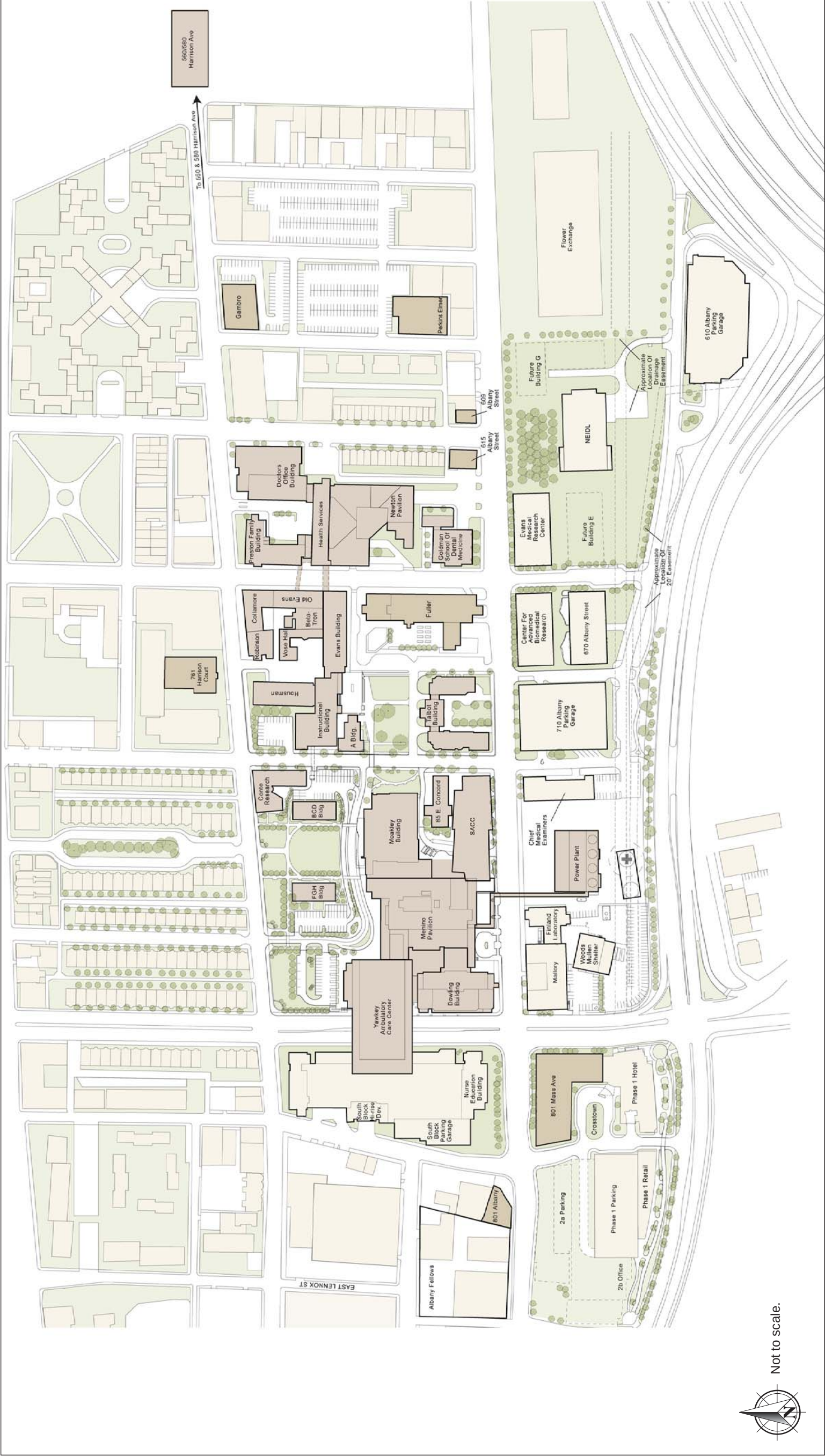


Figure 4-10. Existing Campus Plan

4.7 Evaluation of Long-term Transportation Impacts

Long-term transportation impacts were estimated for 2019, to reflect the 10-year term of the Institutional Master Plan.

4.7.1 No-Build Scenario 2019

The no-build scenario models traffic operations for a horizon year without considering any IMP project traffic estimates. No-Build traffic volumes were developed by applying a general traffic growth factor, along with specific study area traffic added to the street network by individual projects.

Background Growth Factor

A background growth factor of 0.5% per year is assumed for the project, consistent with the *Massachusetts Avenue Connector/Frontage Road Southbound Justification for Proposed State Highway Access Report* (HSH, September 2003). All existing traffic volumes are increased by 0.5% per year for a period of 10 years.

Projects included in the No-Build Scenario

To provide a conservative analysis, the no-build scenario also adds traffic contributions from specific projects approved and/or under construction. These projects are shown in **Figure 4-11**.

Traffic volumes from the following projects were specifically traced through the study area traffic network:

- ◆ BioSquare Building E – 160,000 s.f. of research and development space (approved, not constructed). Although its traffic has been added to the No-Build network, it is not anticipated that this project will be built within the 10-year term of the IMP;
- ◆ BioSquare Building G – 215,000 s.f. of research and development space (approved, not constructed). Although its traffic has been added to the No-Build network, it is not anticipated that this project will be built within the 10-year term of the IMP;
- ◆ NEIDL Building – 250 employees (not yet occupied);
- ◆ Shapiro Ambulatory Care Center – 245,000 s.f. of outpatient care space (under construction);
- ◆ 275 Albany Street – hotel consisting of 210 hotel rooms plus 198 extended stay hotel suites (in Article 80 permitting). Because most of its vehicle trips will be accessing the regional roadways north of E. Berkeley Street, traffic from this project was included in the overall growth factor.

- ◆ Albany Fellows Graduate Student Housing – approximately 104 units of graduate student housing, primarily for Boston University School of Medicine students. The project also includes approximately 5,000 s.f. of ground-floor retail. Again, because it generates virtually no vehicle trips in peak hours, impacts from this project were reflected in the area-wide growth factor.

Roadway Improvements and Transit Access

Southbound Frontage Road Connection

The BioSquare Phase II project permitting included a connection from BioSquare Drive to the Frontage Road Southbound, which was approved. The BioSquare Phase II project also included a proposed second connection to and from the BUMC Campus and BioSquare to the regional highway system, which Boston University Medical Center will continue to consider as a long-term planning goal.

Currently, BioSquare Drive has been constructed just short of its intersection of Frontage Road Southbound and the right-turn in/right-turn out intersection is anticipated to be completed prior to the completion of IMP projects. Although traffic generally operates at an acceptable level without either connection, the Frontage Road connection is expected to relocate traffic from Albany Street to BioSquare Drive and improve the roadway capacity and traffic operations within the Medical Center. Earlier studies have shown that 27% of all vehicle trips are expected to access the site from the Frontage Road Southbound Connection, as well as 40% of all exiting vehicle trips.

MBTA Urban Ring

As noted in prior filings, Boston University Medical Center is located within the corridor of the MBTA's planned "Urban Ring" or circumferential transit project. At the present time, bus routes CT1 and CT3 serve as circumferential routes through the campus. Boston University Medical Center has worked with the MBTA over the years on long-term plans for the Urban Ring. At present, the locally preferred alternative for the Urban Ring Phase 2 is outlined in the November 2008 *Revised Draft Environmental Impact Report/Draft Environmental Impact Statement* (DEIR/DEIS) and expanded upon in a June, 2009 *Notice of Project Change* (NPC). This option calls for Bus Rapid Transit in both mixed traffic and exclusive lanes travelling through the BUMC Campus on Albany Street between Broadway Station and a new Crosstown Station. A new BU Medical Center Station would also be provided between E. Newton Street and E. Concord Street. In January 2010, the Massachusetts Department of Transportation notified the Executive Office of Environmental Affairs that it was suspending further environmental review of the Urban Ring Phase 2 project. Thus, no changes to MBTA transit services were assumed to be implemented by 2019.

MBTA Indigo Line

The MBTA is improving the Fairmount Branch of the commuter rail that runs from South Station to Readville in Hyde Park, calling it the "Indigo Line." Boston University Medical Center and TranSComm have been advocating with the MBTA to build a new station at Newmarket Square which will increase transit options to the BUMC Campus for a densely populated area in Boston. Construction of Phase 1 of the "Indigo Line" is under construction now. This will rebuild Uphams Corner and Morton St. stations so they are ADA compliant, with high level platforms, and better shelter from the elements. Phase 2 will construct new stations along the route at Newmarket, Five Corners, Talbot Ave, and Blue Hill Ave. The MBTA estimates that service to the new Newmarket Station will begin in 2012. No increased transit mode share was estimated as a result of this new service in the interest of a conservative analysis.

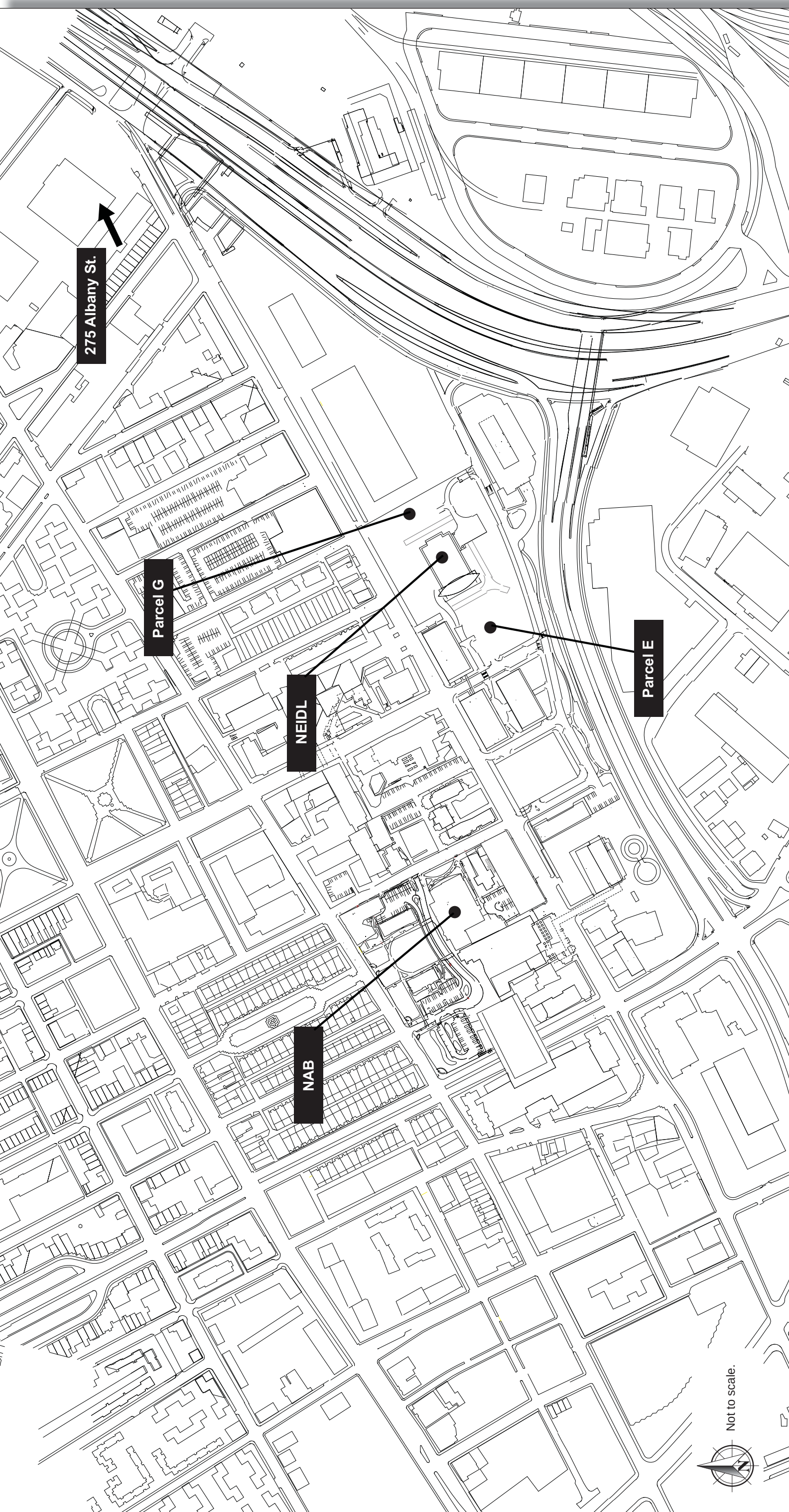


Figure 4-11. No-Build Projects

No-Build Traffic Impacts 2019

No-Build traffic volumes were calculated by factoring the existing volumes up by a .05 percent annual growth rate over 10-years and totaling the project-added trips for each development described above. The No-Build street networks, shown in **Figure 4-12** and **Figure 4-13**, include the Frontage Road Southbound connection to BioSquare Drive east of Albany Street, which has been approved by the City. Morning peak hour overall intersection traffic operations under No-Build conditions are shown in **Table 4-8** on the next page.

The results of the Morning peak hour No-Build analysis indicates that of the 18 intersections studied, the following intersection operations are brought to a lower LOS during the morning peak period:

- ◆ The intersection of Melnea Cass Boulevard and Massachusetts Avenue operates at LOS E. The northbound left-turn operates at LOS E. The eastbound through, westbound left-turn, northbound through, and southbound left-turn approaches all operate at LOS F.
- ◆ The intersection of Melnea Cass Boulevard and Albany Street operates at an overall LOS E. The eastbound left/through/right approach operates at LOS E and the southbound left/through/right approach operates at LOS F.
- ◆ At Massachusetts Avenue/Albany Street, the Massachusetts Avenue northbound through and northbound right-turn approaches operate at LOS E. The southbound left-turn Massachusetts Avenue approach operates at LOS F.
- ◆ The intersection of East Concord Street and Albany Street operates at an overall LOS E. The eastbound right-turn and southbound through/right approaches operate at LOS F.
- ◆ The intersection of Melnea Cass Boulevard and Harrison Avenue operates at an overall LOS E. The northbound left-turn and northbound through/right turn approaches operate at LOS F. The eastbound through/right and southbound left-turn approaches operate at LOS E.

In addition, several approaches are brought below LOS D under No-Build Conditions as shown in **Table 4-8** on the next page.

Table 4-8 No-Build Conditions (2019) Peak-hour Intersection Operations, a.m. Peak Hour

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
<i>Signalized Intersections</i>				
1. Melnea Cass Blvd. at Massachusetts Avenue	E	67.1	—	—
Melnea Cass EB thru	F	>80.0	>1.0	#588
Melnea Cass EB right	B	10.8	0.62	89
Massachusetts Ave. Connector WB left	F	>80.0	>1.0	#259
Massachusetts Ave. Connector WB thru	C	28.9	0.69	399
Massachusetts Ave. Connector WB right	C	34.3	0.93	#683
Southampton NB left	E	63.9	0.84	#247
Southampton NB thru	F	>80.0	>1.0	#536
Southampton NB right	A	1.7	0.55	0
Massachusetts Ave. SB left	F	>80.0	>1.0	#267
Massachusetts Ave. SB thru/right	C	28.0	0.71	228
2. Melnea Cass Blvd. at Albany Street	E	75.9	—	—
Albany EB left/thru/right	E	62.6	0.89	#284
Albany WB left/thru/right	C	33.5	0.56	72
Melnea Cass NB left/thru/right	C	30.7	0.91	m298
Melnea Cass SB left/thru/right	F	>80.0	>1.0	m#532
3. Massachusetts Avenue at Albany Street	F	>80.0	—	—
Albany EB left/thru	F	>80.0	>1.0	#309
Albany EB right	E	58.1	0.39	60
Albany WB left/thru/right	C	27.4	0.47	203
Massachusetts NB thru	E	77.3	>1.0	m#510
Massachusetts NB right	E	76.0	>1.0	m#626
Massachusetts SB left	F	>80.0	>1.0	#214
* Massachusetts SB thru/right	C	28.2	0.70	366
4. East Concord Street at Albany Street	E	79.0	—	—
Albany EB thru	B	17.3	0.63	188
Albany EB right	F	>80.0	>1.0	#953
Albany WB left/thru	A	9.0	0.62	m85
East Concord SB left	D	49.0	0.33	95
East Concord SB thru/right	F	>80.0	>1.0	#325
5. East Newton Street at Albany Street	C	24.4	—	—
Albany EB left	A	9.6	0.43	37
Albany EB thru	A	9.2	0.53	147
Albany WB thru	D	35.2	0.83	#528
Albany WB right	B	14.7	0.13	51
East Newton NB left	D	52.9	0.36	62
East Newton NB thru/right	D	42.2	0.41	32
6. Albany Street at Frontage Road Southbound	B	19.3	—	—
Albany EB right	D	45.6	0.78	298
Albany WB left	A	5.4	0.20	53
Albany WB thru/right	A	2.4	0.43	156
MBTA Driveway SB thru/right	D	47.0	0.04	16

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
7. Melnea Cass Blvd. at Harrison Avenue	E	79.2	—	—
Harrison EB left	B	19.9	0.24	45
Harrison EB thru/right	E	59.5	0.99	#631
Harrison WB left	C	22.1	0.25	m14
Harrison WB thru/right	B	17.3	0.41	m115
Melnea Cass. NB left	F	>80.0	>1.0	m#124
Melnea Cass. NB thru/right	F	>80.0	>1.0	m#670
Melnea Cass. SB left	E	71.6	0.91	m#94
Melnea Cass. SB thru/right	D	52.8	>1.0	#487
<i>Signalized Intersections, cont.</i>				
8. Massachusetts Avenue at Harrison Avenue	D	53.9	—	—
Harrison EB left/thru/right	E	63.5	0.99	m#371
Harrison WB left/thru/right	F	>80.0	>1.0	#436
Massachusetts NB left	F	>80.0	>1.0	#130
Massachusetts NB thru/right	D	53.8	1.00	#554
Massachusetts SB left	F	>80.0	0.77	m#124
Massachusetts SB thru/right	C	28.3	0.91	m#355
9. East Concord Street at Harrison Avenue	B	16.9	—	—
Harrison EB thru/right	B	12.4	0.67	#574
Harrison WB left/thru	B	10.8	0.64	m#367
East Concord SB left/thru/right	E	56.6	0.70	94
10. East Newton Street at Harrison Avenue	C	23.8	—	—
Albany EB left/thru	B	17.4	0.66	#501
Albany WB thru/right	A	9.5	0.41	88
East Newton NB left/thru/right	E	55.3	0.85	219
11. East Brookline Street at Harrison Avenue	B	11.1	—	—
Harrison EB thru/right	A	3.0	0.54	m59
Harrison WB left/thru	A	6.4	0.29	163
East Brookline SB left/thru/right	D	48.7	0.69	157
12. Malden Street/Wareham Street at Harrison Avenue	F	>80.0	—	—
Harrison EB left	F	>80.0	>1.0	#216
Harrison EB thru/right	C	24.3	0.54	#357
Harrison WB left	F	>80.0	0.87	#160
Harrison WB thru/right	B	17.2	0.42	129
Malden NB left/thru/right	D	45.1	0.69	#213
Monsignor Reynolds SB left/thru	F	>80.0	>1.0	#462
Monsignor Reynolds SB right	A	7.8	0.29	43
13. Frontage Road Southbound at Massachusetts Avenue Connector	C	25.1	—	—
I-93 Off-ramp WB left/thru	C	24.8	0.90	449
Frontage SB thru/right	C	26.6	0.29	132
14. Frontage Road Northbound at Massachusetts Avenue Connector	D	42.8	—	—
Massachusetts Ave. Connector EB left	D	49.4	1.00	#581
Frontage NB left	D	44.2	0.96	#678
Frontage NB left/thru	D	35.5	0.97	#606
15. Frontage Road Northbound at South Boston Bypass Road	A	5.9	—	—
South Boston Bypass EB left/thru	C	33.0	0.35	m39
South Boston Bypass WB thru/right	D	38.0	0.27	52
Frontage NB left/thru/right	A	3.1	0.58	28

Unsignalized Intersections				
16. East Brookline Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.25	0
Albany WB thru	A	0.0	0.36	0
East Brookline SB left	F	>50.0	0.81	137
East Brookline SB right	B	14.6	0.15	13
17. Wareham Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.34	0
Albany WB thru	A	0.0	0.29	0
Wareham SB left/right	C	19.8	0.33	36
18. Malden Street at Albany Street	—	—	—	—
Albany EB left/thru	A	2.6	0.10	9
Albany WB thru/right	A	0.0	0.39	0
Malden SB left/right	F	>50.0	>1.0	670

*Signifies *de facto* lane.

*Shading indicates increased delay from the previous condition.

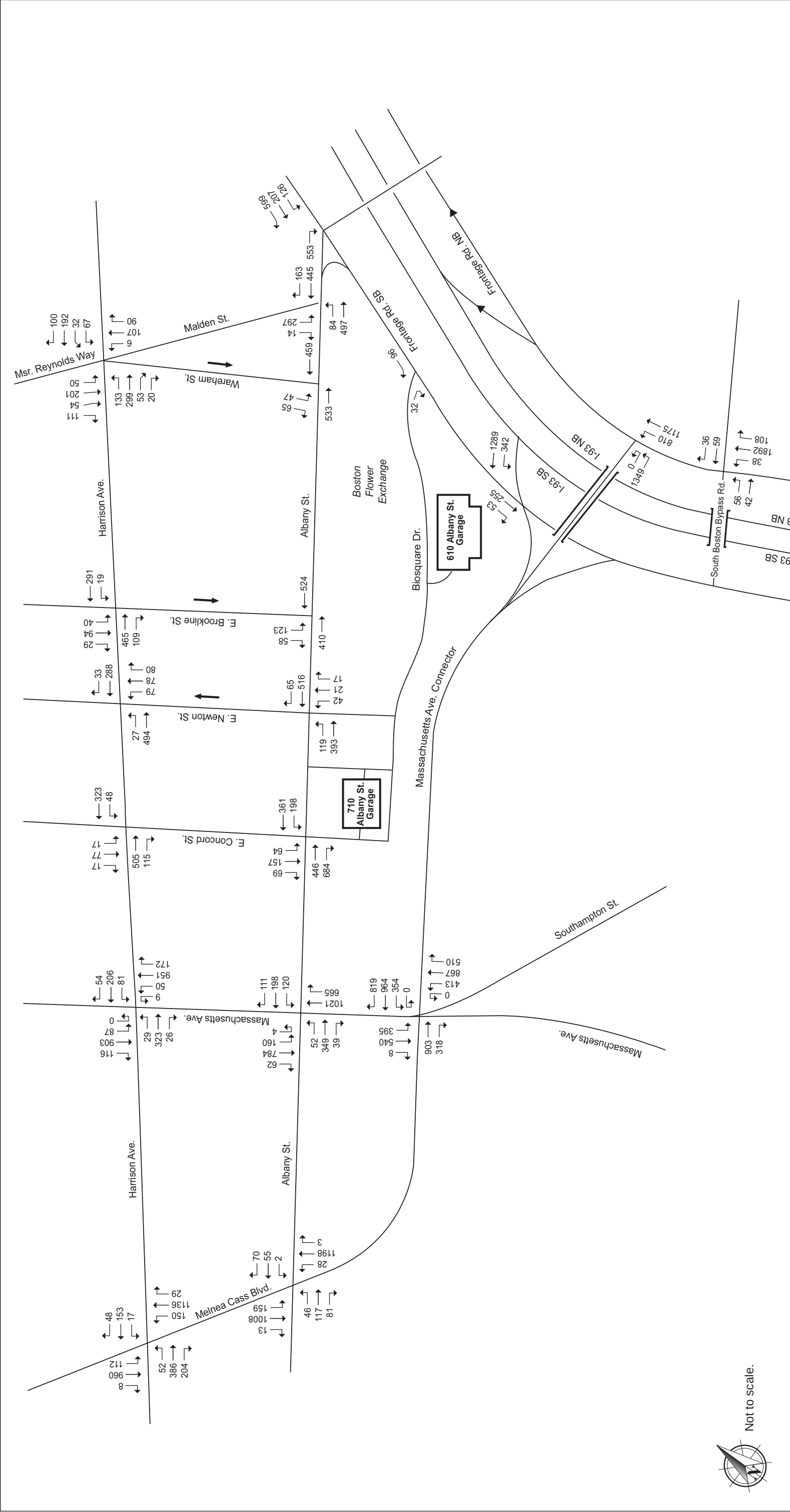
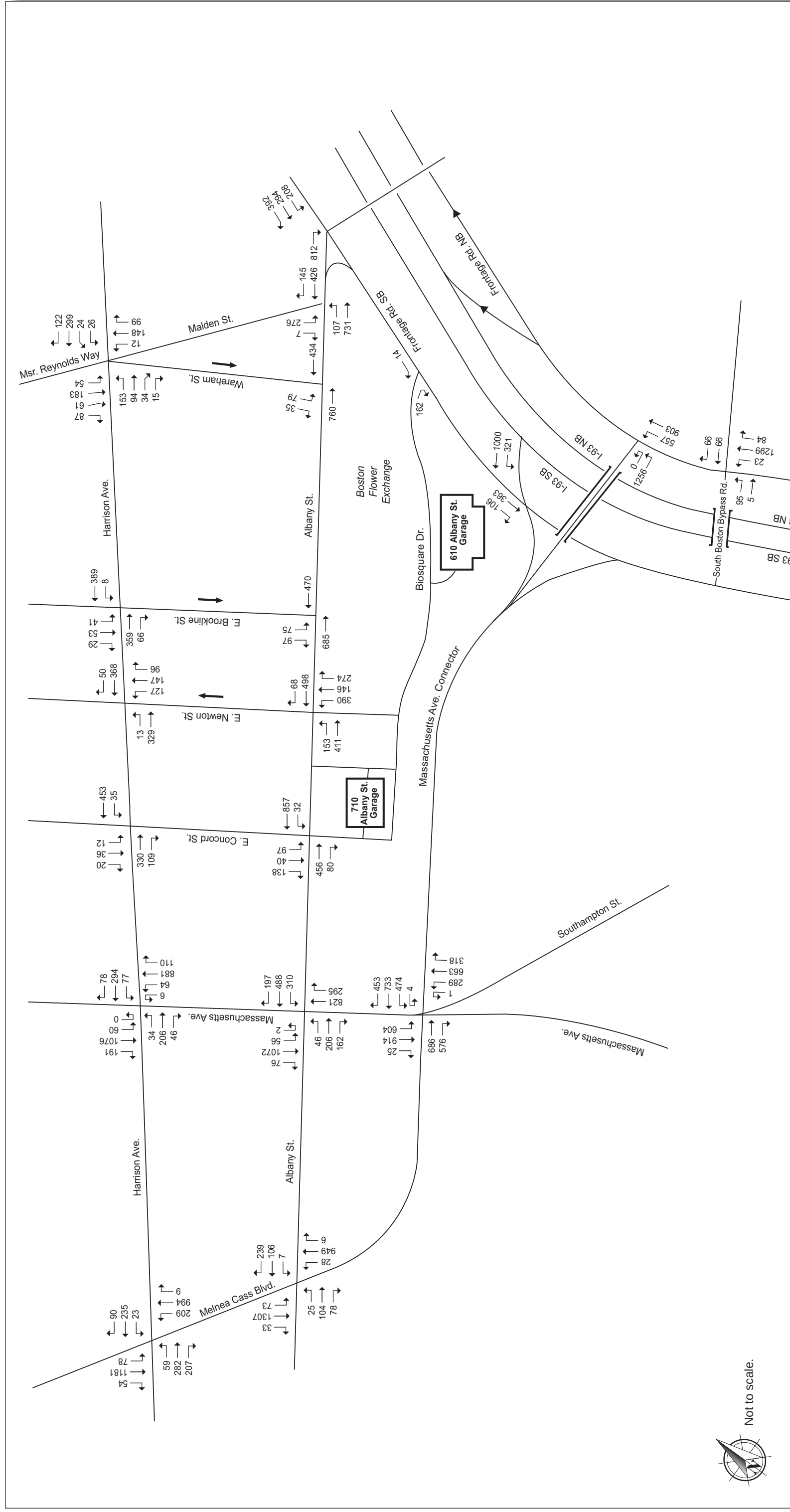


Figure 4-12. No-Build Conditions (2019) a.m. Peak-hour Traffic Volumes



The Evening peak analysis indicates that of the 18 intersections studied the following intersection operations are brought to a lower LOS during the evening peak period under No Build conditions:

- ◆ The intersection of Melnea Cass Boulevard and Albany Street operates at an overall LOS E. The southbound left/through/right approach operates at LOS F.
- ◆ The intersection of East Newton Street and Albany Street operates at an overall LOS F. The eastbound left-turn, westbound through, and northbound through/right approaches operate at LOS F. The northbound left-turn approach operates at LOS E.
- ◆ The intersection of Melnea Cass Boulevard and Harrison Avenue operates at an overall LOS E. The northbound left-turn and southbound through/right approaches operate at LOS F. The eastbound through/right approach operates at LOS E.
- ◆ The intersection of Massachusetts Avenue and Harrison Avenue operates at an overall LOS F. The high volumes on Massachusetts Avenue dictate that for the intersection to operate most efficiently, most of the green time must be allotted to Massachusetts Avenue movements. As result, delay is incurred by the Harrison Avenue approaches. The eastbound left/through/right and southbound left-turn approaches both operate at LOS E. The westbound left/through/right, northbound left-turn, and southbound through/right approaches operate at LOS F.
- ◆ The intersection of Malden Street/Wareham Street and Harrison Avenue operates at an overall LOS F. The eastbound left-turn and southbound left/through approaches operate at LOS F. The westbound left-turn approach operates at LOS E.

In addition, several approaches experience a reduction in LOS under No-Build conditions as shown in the table.

The results of the P.M. peak No-Build analysis are summarized in **Table 4-9** below.

Table 4-9 No-Build Conditions (2019) Peak-hour Intersection Operations, p.m. Peak Hour

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
<i>Signalized Intersections</i>				
1. Melnea Cass Blvd. at Massachusetts Avenue	F	>80.0	—	—
Melnea Cass EB thru	F	>80.0	>1.0	#443
Melnea Cass EB right	F	>80.0	>1.0	#628
Massachusetts Ave. Connector WB left	F	>80.0	>1.0	#460
Massachusetts Ave. Connector WB thru	C	26.0	0.55	289
Massachusetts Ave. Connector WB right	A	4.7	0.55	73

Southampton NB left	F	>80.0	>1.0	#268
Southampton NB thru	D	54.2	0.87	#382
Southampton NB right	A	0.5	0.27	0
Massachusetts Ave. SB left	F	>80.0	>1.0	m#413
Massachusetts Ave. SB thru/right	F	>80.0	>1.0	m#687
2. Melnea Cass Blvd. at Albany Street	E	72.5	—	—
Albany EB left/thru/right	C	33.7	0.62	146
Albany WB left/thru/right	D	46.2	0.90	280
Melnea Cass NB left/thru/right	D	40.9	>1.0	m#597
Melnea Cass SB left/thru/right	F	>80.0	>1.0	m#543
3. Massachusetts Avenue at Albany Street	D	46.3	—	—
Albany EB left*	F	>80.0	0.95	m#90
Albany EB thru	D	53.6	0.72	m249
Albany EB right	D	47.1	0.57	m197
Albany WB left/thru/right	D	44.1	0.97	#393
Massachusetts NB thru	E	57.5	0.91	368
Massachusetts NB right	A	5.5	0.53	m41
Massachusetts SB left	C	26.5	0.43	52
Massachusetts SB thru/right	D	46.3	0.94	#624
4. East Concord Street at Albany Street	B	18.9	—	—
Albany EB thru	B	16.9	0.62	386
Albany EB right	A	9.0	0.17	28
Albany WB left/thru	B	11.2	0.68	m201
East Concord SB left	E	69.3	0.71	125
East Concord SB thru/right	D	36.0	0.74	119
5. East Newton Street at Albany Street	F	>80.0	—	—
Albany EB left	F	>80.0	>1.0	#241
Albany EB thru	C	27.2	0.70	264
Albany WB thru	F	>80.0	>1.0	#701
Albany WB right	C	27.4	0.19	74
East Newton NB left	E	69.7	0.93	#514
East Newton NB thru/right	F	>80.0	>1.0	311
6. Albany Street at Frontage Road Southbound	C	25.7	—	—
Albany EB right	D	44.1	0.90	#418
Albany WB left	B	14.3	0.35	157
Albany WB thru/right	A	1.4	0.28	93
MBTA Driveway SB thru/right	D	42.4	0.04	15
7. Melnea Cass Blvd. at Harrison Avenue	E	71.4	—	—
Harrison EB left	C	25.5	0.29	64
Harrison EB thru/right	E	68.0	1.00	#527
Harrison WB left	C	27.9	0.36	m17
Harrison WB thru/right	C	24.6	0.63	m168
Melnea Cass. NB left	F	>80.0	>1.0	m#170
Melnea Cass. NB thru/right	C	32.0	0.88	m375
Melnea Cass. SB left	C	24.6	0.71	m22
Melnea Cass. SB thru/right	F	>80.0	>1.0	m#519
Signalized Intersections, cont.				
8. Massachusetts Avenue at Harrison Avenue	F	>80.0	—	—
Harrison EB left/thru/right	E	66.4	0.99	m#322
Harrison WB left/thru/right	F	>80.0	>1.0	#631
Massachusetts NB left	F	>80.0	>1.0	#145
Massachusetts NB thru/right	D	43.8	0.95	#475
Massachusetts SB left	E	56.7	0.57	m74
Massachusetts SB thru/right	F	>80.0	>1.0	#730

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
9. East Concord Street at Harrison Avenue	A	9.1	—	—
Harrison EB thru/right	A	6.2	0.42	233
Harrison WB left/thru	A	4.5	0.45	m133
East Concord SB left/thru/right	D	48.3	0.53	71
10. East Newton Street at Harrison Avenue	C	30.0	—	—
Albany EB left/thru	B	14.4	0.47	177
Albany WB thru/right	B	18.5	0.57	#268
East Newton NB left/thru/right	E	56.5	0.92	#346
11. East Brookline Street at Harrison Avenue	B	11.3	—	—
Harrison EB thru/right	A	6.8	0.39	m73
Harrison WB left/thru	A	5.9	0.34	198
East Brookline SB left/thru/right	D	44.2	0.61	110
12. Malden Street/Wareham Street at Harrison Avenue	F	>80.0	—	—
Harrison EB left	F	>80.0	>1.0	#249
Harrison EB thru/right	C	21.5	0.22	127
Harrison WB left	E	59.2	0.44	m64
Harrison WB thru/right	C	31.4	0.69	m#454
Malden NB left/thru/right	D	37.0	0.65	229
Monsignor Reynolds SB left/thru	F	>80.0	>1.0	#430
Monsignor Reynolds SB right	A	6.8	0.20	35
13. Frontage Road Southbound at Massachusetts Avenue Connector	C	27.2	—	—
I-93 Off-ramp WB left/thru	C	29.0	0.90	375
Frontage SB thru/right	C	22.1	0.37	190
14. Frontage Road Northbound at Massachusetts Avenue Connector	C	27.0	—	—
Massachusetts Ave. Connector EB left	C	31.2	0.90	430
Frontage NB left	C	26.0	0.73	#454
Frontage NB left/thru	C	22.0	0.73	378
15. Frontage Road Northbound at South Boston Bypass Road	A	7.6	—	—
South Boston Bypass EB left/thru	C	33.7	0.39	m37
South Boston Bypass WB thru/right	D	39.3	0.38	67
Frontage NB left/thru/right	A	2.7	0.40	86
Unsignalized Intersections				
16. East Brookline Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.44	0
Albany WB thru	A	0.0	0.32	0
East Brookline SB left	F	>50.0	0.96	140
East Brookline SB right	B	14.2	0.23	22
17. Wareham Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.49	0
Albany WB thru	A	0.0	0.28	0
Wareham SB left/right	E	38.4	0.55	73
18. Malden Street at Albany Street	—	—	—	—
Albany EB left/thru	A	4.5	0.17	15
Albany WB thru/right	A	0.0	0.56	0
Malden SB left/right	F	>50.0	>1.0	—

*Signifies *de facto* lane.

*Shading indicates increased delay from the previous condition.

4.7.2 Build Scenario - 2019

As previously described, the Build Scenario transportation analysis estimates the cumulative impacts of the proposed Institutional Master Plan projects. The three new building projects proposed in the IMP include:

An approximately 48,000-square foot **Energy Facility** that will be located adjacent to and connect to the existing Power Plant to reduce Boston University Medical Center's demand on the existing taxed infrastructure, create energy efficiencies, and ensure reliability. The Energy Facility will have no transportation-related impacts. This project is the first to move forward in the IMP.

An approximately 160,000-square foot **Administration/Clinical Building**. This building will consolidate administrative functions, improve campus efficiency through this consolidation, and provide space for clinical programs transferred from the Dowling Building. No new parking is proposed for this facility as part of the new IMP. This building is expected to move forward within the 5- to 10-year IMP term.

An approximately 405,000-square foot **New Inpatient Building** on the site of the existing Dowling Building. The new building will support increased inpatient volumes and Emergency Department and Trauma Center visits, and consolidate clinical functions on the west side of the campus. No new parking is proposed for this facility as part of the new IMP. This building is not expected to move forward until the end of the 10-year IMP term, if not later.

Mode Use

Daily and peak-hour mode use for person trips to and from the BUMC Campus was derived from BTS mode split data for the Medical Area (BTD Area 15) and from Boston University Medical Center employee data. The "All Purposes" category was used to capture the travel patterns of graduate students, and patients. By employing BTS data and Boston University Medical Center data, separate mode shares were developed for patients and employees. This approach provides a more accurate representation because of the extremely low auto use by Boston University Medical Center employees.

Daily mode shares, shown in **Table 4-10**, vary during peak hours.

Table 4-10 BTD Area 15 Daily Mode Shares

Mode	Percentage
Auto	56%
Public Transportation	17%
Walk/Bike/Other	27%
Total	100%

Boston University Medical Center employee and student mode shares, derived from 2008 Rideshare Survey data of its employees and students are shown below in **Table 4-11**. The survey is conducted to determine travel patterns at the BUMC Campus, as required by the Massachusetts Department of Environmental Protection. As the table indicates, existing employees and students have a significantly lower auto use than reflected in the BTM mode share rates—only approximately 35%.

Table 4-11. Boston University Medical Center Employee Daily Mode Shares

Mode	Percentage
Auto	35%
Public Transportation	40%
Walk/Bike/Other	25%
Total	100%

The survey results reflect the strong transportation demand management program and low auto use in effect at Boston University Medical Center.

Trip Generation

It is important to note that although standard methodology for trip generation estimates will be employed for the IMP, a significant amount of the construction will be to right-size and update outdated building space for existing programs. Therefore, some of the building area to be constructed will not generate additional traffic and the actual transportation impact may be less.

Using the ITE *Trip Generation* 7th edition and applying the mode share, **Table 4-12** summarizes the total projected trip generation estimates of the Administration/Clinical Building, one of the two projects expected to be implemented in the five to ten year timeframe of the IMP. Because the number of new employees required for the Energy Facility, the first project moving forward, is minimal, person trips generated by it will be negligible.

The table also summarizes expected trip generation for the New Inpatient Building, which will not proceed until the end of the 10-year IMP planning period, if then.

Table 4-12 on the next page summarizes the combined work and non-work project trips for the two projects based on the two different mode shares employed for each group.

Table 4-12 Net New Trip Generation Summary

Short Term Building Program—Administration/Clinical Building			
	Vehicle Trips	Transit Trips	Bike/Walk Trips
<i>Daily</i>			
Total	1,120	816	760
In	560	408	380
Out	560	408	380
<i>a.m. Peak Hour</i>			
Total	108	107	81
In	88	97	69
Out	20	10	12
<i>p.m. Peak Hour</i>			
Total	122	110	89
In	30	16	19
Out	92	94	70
Long Term Building Program—New Inpatient Building			
	Vehicle Trips	Transit Trips	Bike/Walk Trips
<i>Daily</i>			
Total	3,146	2,148	2,096
In	1,573	1,074	1,048
Out	1,573	1,074	1,048
<i>a.m. Peak Hour</i>			
Total	187	180	139
In	109	108	82
Out	78	72	57
<i>p.m. Peak Hour</i>			
Total	210	157	144
In	95	57	61
Out	115	100	83

As shown in the table, the Administration/Clinical Building to be implemented in the short-term will contribute only a modest share (approximately 26%) of 4,266 estimated daily IMP vehicle trips. In each peak hour, the Administration/Clinical Building accounts for less than 37% of IMP vehicle trips. When its design advances, a specific Project Impact Report will be prepared to outline the traffic impacts of this project.

The New Inpatient Building (planned for a later phase of the IMP) accounts for the remaining 74% of projected daily IMP vehicle trips and 63% of peak hour IMP vehicle trips. As far as the New Inpatient Building is concerned, approximately 75% of its daily trips will be patients and these trips will be distributed across a much broader time period than typical commuter trips. These two populations will have separate parking areas,

differing trip origins and increased access from the regional roadway network. The result will be a peak hour traffic impact that will be diffused throughout different roadways and several intersections as to lessen the impact. Again, a specific Project Impact Report will be issued at such time as the Inpatient Building moves into permitting.

Trip Distribution

Trip distribution describes the different roadways used for trips originating or destined to the BUMC Campus. The roadways that vehicles are assigned to are based on BTD trip origin/destination information for this district and from Boston University Medical Center employee data.

All employee trips were assigned to the 610 Albany Street garage, and all patient/visitor trips were assigned to the 710 Albany Street garage. Trip distribution for vehicle trips entering and leaving the campus is shown in **Figure 4-14** and **Figure 4-15**.

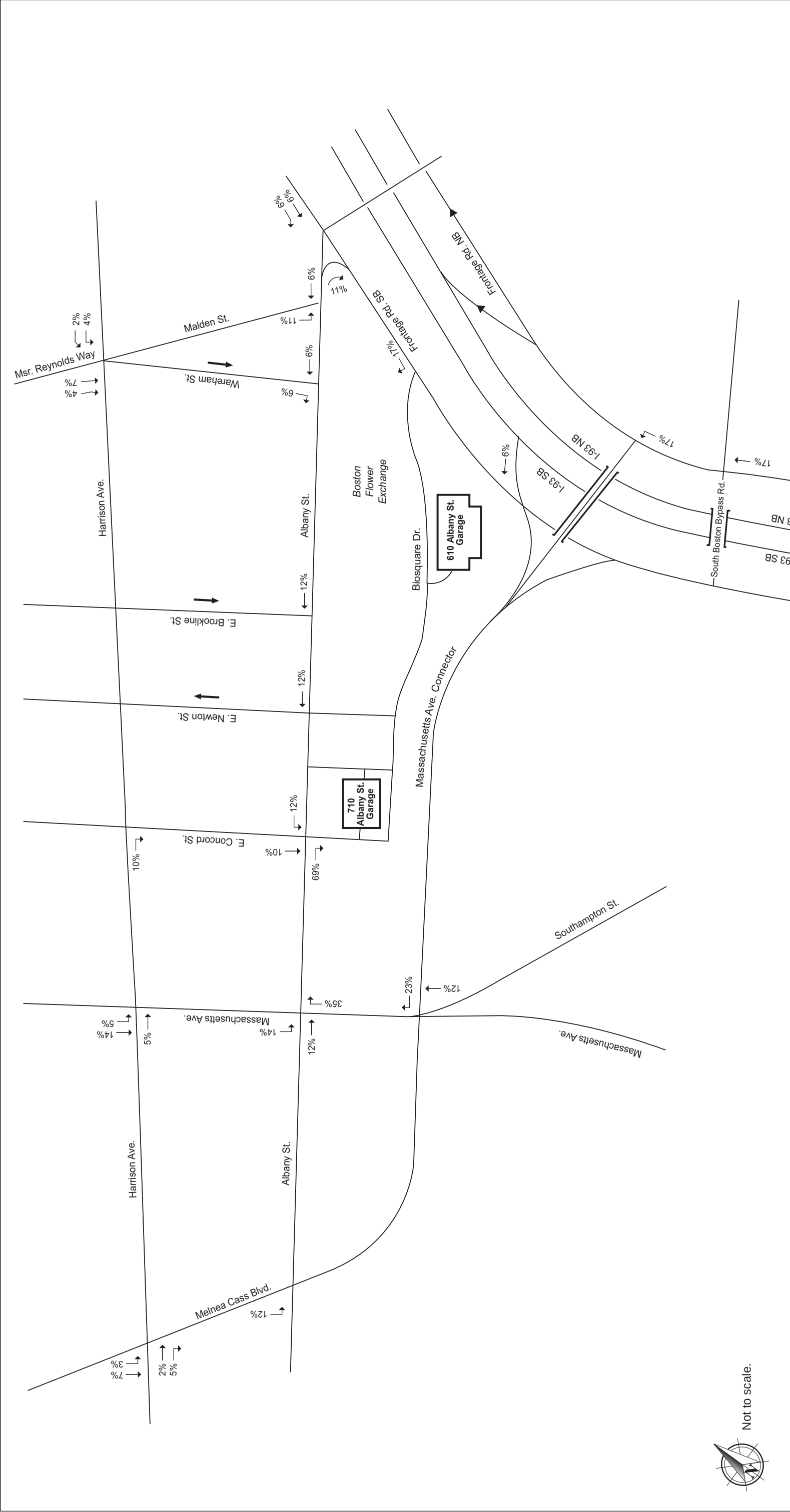


Figure 4-14. Project Trip Distribution: Trips Entering the Campus

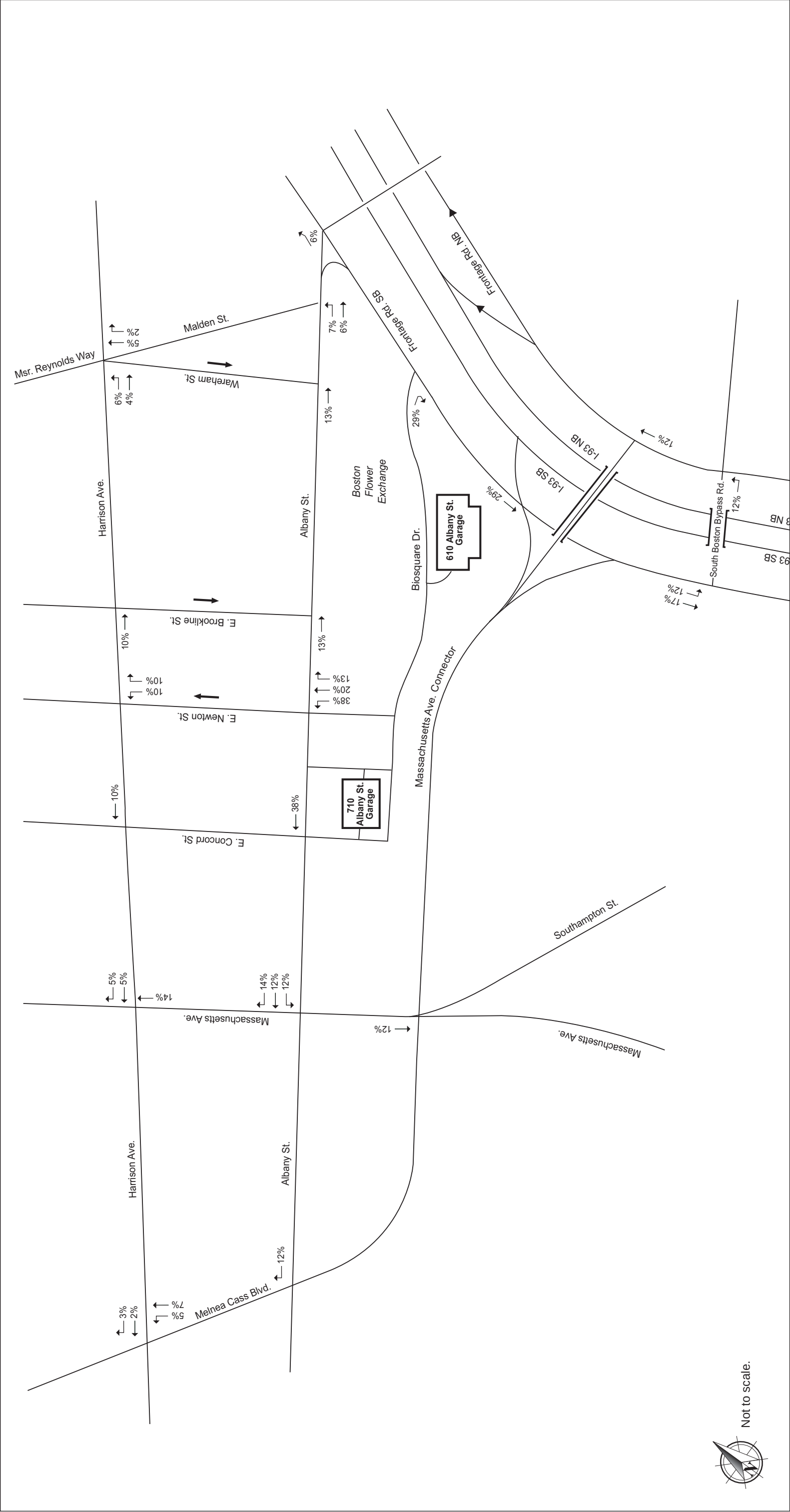


Figure 4-15. Project Trip Distribution: Trips Exiting the Campus

Build Traffic Impacts 2019

The 2019 Build traffic operations analysis was performed under a scenario that considered the traffic and transportation impacts for the projects identified in the 2010 IMP, the two un-built BioSquare Phase II projects and unoccupied project, the 3 projects approved in the study area, and application of a 10-year background traffic growth rate.

The Build analysis can be considered a “worst-case” evaluation of the study area with all project impacts plus background growth for a 10-year period being evaluated at one point in time with no improvements to the transportation network.

Project-generated trips are shown in **Figure 4-16** and **Figure 4-17**. Build vehicle trips are shown in **Figure 4-18** and **4-19**.

Traffic Operations: 2019 Build Conditions

The analysis indicates that at 4 of the 18 intersections studied overall Morning peak hour intersection operations worsened as a result of the IMP Build Traffic volumes:

- ◆ The intersection of Melnea Cass Boulevard and Albany Street operates at an overall LOS F.
- ◆ The intersection of East Concord Street and Albany Street operates at an overall LOS F.
- ◆ The intersection of Melnea Cass Boulevard and Harrison Avenue operates at an overall LOS F. The northbound left-turn, northbound through/right, and southbound left-turn approaches operate at LOS F. The eastbound through/right approach operates at LOS E.
- ◆ The intersection of Massachusetts Avenue and Harrison Avenue operates at an overall LOS E. The westbound left/through/right, northbound left-turn, and southbound left-turn approaches operate at LOS F. The eastbound left/through/right and northbound through/right approaches operate at LOS E.

In addition, several approaches are worsened in the a.m. peak hour as shown in the table.

The results of the morning peak hour Build Scenario are shown in **Table 4-13** on the next page.

Table 4-13 Build Conditions (2019) Peak-hour Intersection Operations, a.m. Peak Hour

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
<i>Signalized Intersections</i>				
1. Melnea Cass Blvd. at Massachusetts Avenue	E	72.2	—	—
Melnea Cass EB thru	F	>80.0	>1.0	#588
Melnea Cass EB right	C	27.1	0.74	212
Massachusetts Ave. Connector WB left	F	>80.0	>1.0	#259
Massachusetts Ave. Connector WB thru	C	28.9	0.69	399
Massachusetts Ave. Connector WB right	D	51.9	0.98	#763
Southampton NB left	E	63.9	0.84	#247
Southampton NB thru	F	>80.0	>1.0	#558
Southampton NB right	A	1.7	0.55	0
Massachusetts Ave. SB left	F	>80.0	>1.0	#265
Massachusetts Ave. SB thru/right	C	28.9	0.72	239
2. Melnea Cass Blvd. at Albany Street	F	>80.0	—	—
Albany EB left/thru/right	E	63.6	0.90	#288
Albany WB left/thru/right	C	33.8	0.59	74
Melnea Cass NB left/thru/right	C	31.9	0.92	m#308
Melnea Cass SB left/thru/right	F	>80.0	>1.0	m#543
3. Massachusetts Avenue at Albany Street	F	>80.0	—	—
Albany EB left/thru	F	>80.0	>1.0	#336
Albany EB right	E	57.8	0.39	60
Albany WB left/thru/right	C	29.5	0.52	222
Massachusetts NB thru	E	78.2	>1.0	m#476
Massachusetts NB right	F	>80.0	>1.0	m#460
Massachusetts SB left	F	>80.0	>1.0	#273
Massachusetts SB thru/right	C	28.2	0.70	366
4. East Concord Street at Albany Street	F	>80.0	—	—
Albany EB thru	B	18.2	0.63	213
Albany EB right	F	>80.0	>1.0	#1180
Albany WB left/thru	B	11.6	0.68	m114
East Concord SB left	D	49.0	0.33	95
East Concord SB thru/right	F	>80.0	>1.0	#366
5. East Newton Street at Albany Street	C	31.0	—	—
Albany EB left	B	10.2	0.46	36
Albany EB thru	A	9.3	0.54	148
Albany WB thru	D	39.0	0.87	#615
Albany WB right	B	14.7	0.13	51
East Newton NB left	E	67.5	0.68	106
East Newton NB thru/right	E	62.4	0.70	61
6. Albany Street at Frontage Road Southbound	B	18.9	—	—
Albany EB right	D	44.1	0.77	299
Albany WB left	A	6.5	0.21	67
Albany WB thru/right	A	2.4	0.44	161
MBTA Driveway SB thru/right	D	47.0	0.04	16

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
7. Melnea Cass Blvd. at Harrison Avenue	F	>80.0	—	—
Harrison EB left	C	20.0	0.24	45
Harrison EB thru/right	E	65.2	>1.0	#652
Harrison WB left	C	23.4	0.27	m15
Harrison WB thru/right	B	17.4	0.42	m117
Melnea Cass. NB left	F	>80.0	>1.0	m#132
Melnea Cass. NB thru/right	F	>80.0	>1.0	m#663
Melnea Cass. SB left	F	>80.0	0.96	m#109
Melnea Cass. SB thru/right	E	57.4	>1.0	#499
Signalized Intersections, cont.				
8. Massachusetts Avenue at Harrison Avenue	E	58.4	—	—
Harrison EB left/thru/right	E	69.2	>1.0	m#375
Harrison WB left/thru/right	F	>80.0	>1.0	#452
Massachusetts NB left	F	>80.0	>1.0	#130
Massachusetts NB thru/right	E	56.9	>1.0	#565
Massachusetts SB left	F	>80.0	0.86	m#145
Massachusetts SB thru/right	C	31.4	0.93	m#475
9. East Concord Street at Harrison Avenue	B	18.4	—	—
Harrison EB thru/right	B	13.3	0.69	#609
Harrison WB left/thru	B	14.4	0.71	m#403
East Concord SB left/thru/right	E	56.6	0.70	94
10. East Newton Street at Harrison Avenue	C	25.1	—	—
Albany EB left/thru	B	18.5	0.68	#501
Albany WB thru/right	B	10.1	0.42	88
East Newton NB left/thru/right	E	55.5	0.86	239
11. East Brookline Street at Harrison Avenue	B	11.2	—	—
Harrison EB thru/right	A	3.2	0.55	m65
Harrison WB left/thru	A	6.5	0.29	165
East Brookline SB left/thru/right	D	48.7	0.69	157
12. Malden Street/Wareham Street at Harrison Avenue	F	>80.0	—	—
Harrison EB left	F	>80.0	>1.0	#226
Harrison EB thru/right	C	24.4	0.54	#362
Harrison WB left	F	>80.0	0.98	#182
Harrison WB thru/right	B	17.2	0.42	129
Malden NB left/thru/right	D	52.3	0.77	#238
Monsignor Reynolds SB left/thru	F	>80.0	>1.0	#498
Monsignor Reynolds SB right	A	7.8	0.29	43
13. Frontage Road Southbound at Massachusetts Avenue Connector	C	25.2	—	—
I-93 Off-ramp WB left/thru	C	24.8	0.90	456
Frontage SB thru/right	C	27.2	0.32	144
14. Frontage Road Northbound at Massachusetts Avenue Connector	D	45.4	—	—
Massachusetts Ave. Connector EB left	D	49.4	1.00	#581
Frontage NB left	D	48.4	0.98	#696
Frontage NB left/thru	D	40.0	0.99	#630
15. Frontage Road Northbound at South Boston Bypass Road	A	6.3	—	—
South Boston Bypass EB left/thru	C	34.1	0.38	m44
South Boston Bypass WB thru/right	D	37.5	0.27	52
Frontage NB left/thru/right	A	3.4	0.59	30

<i>Unsignalized Intersections</i>				
16. East Brookline Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.26	0
Albany WB thru	A	0.0	0.38	0
East Brookline SB left	F	>50.0	0.88	153
East Brookline SB right	C	15.0	0.16	14
17. Wareham Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.35	0
Albany WB thru	A	0.0	0.30	0
Wareham SB left/right	C	20.4	0.37	41
18. Malden Street at Albany Street	—	—	—	—
Albany EB left/thru	A	2.8	0.11	9
Albany WB thru/right	A	0.0	0.40	0
Malden SB left/right	F	>50.0	>1.0	707

* Signifies de facto lane.

Cell shading indicates increased delay from the previous condition.

Overall 2019 Build Conditions intersection operations for the Evening peak hour are shown in **Table 4-14**.

The results of the P.M. Peak hour Build analysis indicates that at 3 of the 18 intersections studied, the overall traffic operations worsened as a result of the IMP Build traffic volumes.

- ◆ At the intersection of Melnea Cass Boulevard and Albany Street, the northbound approach on Melnea Cass from a D to an E.
- ◆ At the intersection of Massachusetts Avenue and Albany Street, the eastbound left-turn approach operates at LOS F. The eastbound through, westbound left/through/right, and northbound through approaches operate at LOS E.
- ◆ At the intersection of East Newton Street and Albany Street, the E. Newton northbound left turn LOS leaving BioSquare is worsened from a LOS E to a LOS F under Build conditions.

Table 4-14 Build Conditions (2019) Peak-hour Intersection Operations, p.m. Peak Hour

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
<i>Signalized Intersections</i>				
1. Melnea Cass Blvd. at Massachusetts Avenue	F	>80.0	—	—
Melnea Cass EB thru	F	>80.0	>1.0	#443
Melnea Cass EB right	F	>80.0	>1.0	#791
Massachusetts Ave. Connector WB left	F	>80.0	>1.0	#470
Massachusetts Ave. Connector WB thru	C	25.2	0.54	284
Massachusetts Ave. Connector WB right	A	5.4	0.57	93
Southampton NB left	F	>80.0	>1.0	#315
Southampton NB thru	E	62.0	0.92	#405
Southampton NB right	A	0.5	0.27	0
Massachusetts Ave. SB left	F	>80.0	>1.0	m#407
Massachusetts Ave. SB thru/right	F	>80.0	>1.0	m#670
2. Melnea Cass Blvd. at Albany Street	F	>80.0	—	—
Albany EB left/thru/right	C	31.5	0.59	147
Albany WB left/thru/right	D	45.4	0.91	303
Melnea Cass NB left/thru/right	E	56.3	>1.0	m#601
Melnea Cass SB left/thru/right	F	>80.0	>1.0	m#574
3. Massachusetts Avenue at Albany Street	D	54.6	—	—
Albany EB left*	F	>80.0	>1.0	m#96
Albany EB thru	E	57.4	0.78	m267
Albany EB right	D	47.2	0.57	m197
Albany WB left/thru/right	E	74.7	>1.0	#485
Massachusetts NB thru	E	57.6	0.91	371
Massachusetts NB right	A	7.7	0.61	m58
Massachusetts SB left	C	32.7	0.56	65
Massachusetts SB thru/right	D	46.3	0.94	#624

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
4. East Concord Street at Albany Street	C	24.7	—	—
Albany EB thru	B	19.6	0.63	408
Albany EB right	B	12.8	0.33	96
Albany WB left/thru	B	19.2	0.84	m234
East Concord SB left	E	62.7	0.65	122
East Concord SB thru/right	D	53.8	0.84	160
5. East Newton Street at Albany Street	F	>80.0	—	—
Albany EB left	F	>80.0	>1.0	#255
Albany EB thru	C	27.4	0.72	280
Albany WB thru	F	>80.0	>1.0	#732
Albany WB right	C	27.4	0.19	74
East Newton NB left	F	>80.0	>1.0	#668
East Newton NB thru/right	F	>80.0	>1.0	#416
6. Albany Street at Frontage Road Southbound	C	25.9	—	—
Albany EB right	D	44.5	0.90	#431
Albany WB left	B	14.5	0.36	161
Albany WB thru/right	A	1.4	0.29	96
MBTA Driveway SB thru/right	D	42.4	0.04	15
7. Melnea Cass Blvd. at Harrison Avenue	E	74.7	—	—
Harrison EB left	C	26.0	0.30	65
Harrison EB thru/right	E	72.8	>1.0	#541
Harrison WB left	C	29.4	0.39	m17
Harrison WB thru/right	C	25.2	0.65	m175
Melnea Cass. NB left	F	>80.0	>1.0	m#178
Melnea Cass. NB thru/right	C	30.0	0.89	m365
Melnea Cass. SB left	C	27.1	0.74	m24
Melnea Cass. SB thru/right	F	>80.0	>1.0	m#528
8. Massachusetts Avenue at Harrison Avenue	F	>80.0	—	—
Harrison EB left/thru/right	E	74.3	>1.0	m#333
Harrison WB left/thru/right	F	>80.0	>1.0	#672
Massachusetts NB left	F	>80.0	>1.0	#145
Massachusetts NB thru/right	D	49.0	0.98	#498
Massachusetts SB left	E	60.4	0.63	80
Massachusetts SB thru/right	F	>80.0	>1.0	#744
9. East Concord Street at Harrison Avenue	A	9.4	—	—
Harrison EB thru/right	A	6.3	0.44	243
Harrison WB left/thru	A	5.2	0.47	m153
East Concord SB left/thru/right	D	48.3	0.53	71
10. East Newton Street at Harrison Avenue	C	33.5	—	—
Albany EB left/thru	B	15.4	0.49	182
Albany WB thru/right	B	19.5	0.59	#268
East Newton NB left/thru/right	E	61.7	0.95	#408
11. East Brookline Street at Harrison Avenue	B	11.5	—	—
Harrison EB thru/right	A	7.3	0.40	m88
Harrison WB left/thru	A	5.9	0.34	198
East Brookline SB left/thru/right	D	44.2	0.61	110

Intersection Approach	LOS	Delay (sec./veh.)	V/C Ratio	95% Queue Length (ft.)
12. Malden Street/Wareham Street at Harrison Avenue	F	>80.0	—	—
Harrison EB left	F	>80.0	>1.0	#268
Harrison EB thru/right	C	21.7	0.24	134
Harrison WB left	E	62.1	0.50	m73
Harrison WB thru/right	C	31.4	0.69	m#454
Malden NB left/thru/right	D	38.5	0.69	242
Monsignor Reynolds SB left/thru	F	>80.0	>1.0	#458
Monsignor Reynolds SB right	A	6.8	0.20	35
13. Frontage Road Southbound at Massachusetts Avenue Connector	C	27.2	—	—
I-93 Off-ramp WB left/thru	C	28.8	0.90	375
Frontage SB thru/right	C	22.9	0.42	218
14. Frontage Road Northbound at Massachusetts Avenue Connector	C	26.8	—	—
Massachusetts Ave. Connector EB left	C	31.2	0.90	430
Frontage NB left	C	26.0	0.75	#480
Frontage NB left/thru	C	21.7	0.76	402
15. Frontage Road Northbound at South Boston Bypass Road	A	9.1	—	—
South Boston Bypass EB left*	D	43.3	0.63	m93
South Boston Bypass EB thru	C	25.2	0.02	m7
South Boston Bypass WB thru/right	C	32.0	0.26	58
Frontage NB left/thru/right	A	4.0	0.43	110
Unsignalized Intersections				
16. East Brookline Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.46	0
Albany WB thru	A	0.0	0.33	0
East Brookline SB left	F	>50.0	>1.0	157
East Brookline SB right	B	14.5	0.24	23
17. Wareham Street at Albany Street	—	—	—	—
Albany EB thru	A	0.0	0.50	0
Albany WB thru	A	0.0	0.28	0
Wareham SB left/right	E	41.4	0.59	83
18. Malden Street at Albany Street	—	—	—	—
Albany EB left/thru	A	3.6	0.14	12
Albany WB thru/right	A	0.0	0.37	0
Malden SB left/right	F	>50.0	>1.0	—

* Signifies de facto lane.

Cell shading indicates increased delay from the previous condition.