TRAFFIC IMPACT AND ACCESS STUDY

Environmental Notification Form – Transportation Component

PROPOSED CATEGORY 1 CASINO

Brockton Fairgrounds
Brockton, Massachusetts

Prepared for:
Mass Gaming & Entertainment, LLC

April 17, 2015

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

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Prepared for:
Mass Gaming & Entertainment, LLC, Chicago, Il

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April 17, 2015

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EXECUTIVE SUMMARY

MDM Transportation Consultants, Inc. (MDM) has prepared this preliminary Traffic Impact and Access Study (TIAS) for the proposed Category 1 Casino to be located at the Brockton Fairgrounds site along Belmont Street in Brockton, Massachusetts. This preliminary TIAS provides an initial planning framework for transportation and access improvements necessary to support the project and to inform transportation-related discussions under the local host community agreement process.

This report documents existing operational and safety-related characteristics of roadways serving the development Site, estimates future year operating characteristics of these roadways independent of the development, estimates development-related trip generation, and identifies incremental impacts of Site-related traffic. Access improvements are identified for the development to meet operational needs of the Site and the adjacent roadways under future year (10-year horizon) Build conditions. In addition to traffic, an inventory of existing and proposed public transportation routes and facilities is provided to facilitate development of non-auto transportation programming for the proposed facility.

This TIAS has been prepared in general accordance with traffic study guidelines as jointly issued by the Commonwealth of Massachusetts Executive Office of Energy & Environmental Affairs/Massachusetts Department of Transportation (EEA/MassDOT). The study parameters include study intersections which are the primary gateways serving the Site as well as locations included as part of the recently completed Southwest Brockton Corridor Study prepared by the Old Colony Planning Council.

E.1 PROJECT DESCRIPTION

The Site is located at the Brockton Fairgrounds which includes approximately 45 acres with frontage along Belmont Street, West Street, and Forest Avenue. The Site is located approximately 1.5 miles east of Route 24 (Exit 17 onto Route 123). The proximity of the Site and the study intersections in relation to the regional transportation system is shown in **Figure 1**.

For purposes of this TIAS, the proposed Site programming is assumed to consist of re-developing the Brockton Fairgrounds for a Category 1 Casino with 3,000± gaming positions. Ancillary amenities are assumed to include restaurants, a 300-room[1] resort hotel with fitness center, spa and pool and 25,000± of multi-function event and entertainment space. On-Site parking is planned to include a total of 3,000± parking spaces split between surface and structured parking and the casino will have a fully staffed valet service.

Public transportation routes are available in the area to facilitate non-auto access options; the Proponent will coordinate with the Brockton Area Transit Authority (BAT) to evaluate integrating the Site as a stop on the BAT routes which includes a connection to the BAT Intermodal Transit Centre.

Planned access improvements are informed by area transportation initiatives by MassDOT and the City of Brockton, including recommendations identified in the recently completed *Southwest Brockton Corridor Study* prepared by the Old Colony Planning Council (OCPC). Proposed access/egress improvements for the Site include reconstruction of West Street at Forest Avenue to include a modern roundabout, thereby enhancing traffic capacity and reduced vehicle conflicts in the Site vicinity; widening of Forest Avenue and signalizing the primary Site access/egress driveway and the Memorial Drive intersections; and widening of West Street east of Forest Avenue to provide a secondary (unsignalized) driveway for the Site. The existing unsignalized Site access along Belmont Street opposite Kenelworth Avenue is assumed to serve as an employee/service way.

E.2 STUDY AREA

This TIAS evaluates transportation characteristics of roadways and intersections that provide a primary means of access to the Site, and that are likely to sustain a measurable level of traffic impact from the development, including locations recently evaluated by the Old Colony Planning Council as part of the *Southwest Brockton Corridor Study*. The study includes the following intersections serving the Site as shown in **Figure 1**:

1 - Belmont Street at Manley Street (Signalized)
2 - Belmont Street at VA Hospital/ Belmont Court (Signalized)
3 - Belmont Street at Linwood Street/ Lorraine Avenue (Unsignalized)

[1] Current programming for the casino site includes a 225-room hotel; a 300-room hotel scenario is presented in this TIAS to provide a conservative analysis condition.

4 - Belmont Street at Belmont West Plaza/ Angus Beaton Drive (Signalized)
5 - Belmont Street at Westside Plaza/ West Street (Signalized)
6 - Belmont Street at Westside Plaza/ Forest Avenue (Signalized)
7 - Belmont Street at West Street (Signalized)
8 - Belmont Street at Torrey Street (Signalized)
9 - Belmont Street at Fairgrounds Driveway/ Kenelworth Avenue (Unsignalized)
10 - West Street at Torrey Street (Signalized)
11 - West Street at Forest Avenue – Four Way Intersection (Unsignalized)
12 - West Street at Forest Avenue – Three Way Intersection (Unsignalized)
13 - Forest Avenue at Memorial Drive (Future Signalized)
14 - Forest Avenue at Ash Street (Signalized)
15 - Forest Avenue at Manomet Street/ Bouve Avenue (Signalized)
16 - Forest Avenue at Warren Avenue (Signalized)
17 - Forest Avenue at Main Street/ Martin Place (Future Signalized)
18 - Route 24 Southbound Ramps at Belmont St (Unsignalized)
19 - Route 24 Northbound Ramp at Belmont St (Unsignalized)
20 - West Street at Proposed Casino Driveway (Unsignalized)
21 - Forest Avenue at Proposed Primary Site Drive (Future Signalized)

E.3 SUMMARY OF ANALYSIS AND FINDINGS

A principal finding of the TIAS is that traffic flow and pedestrian conditions along the Belmont Street and Forest Avenue corridors in the study area, even with additional casino traffic, will improve relative to today's existing conditions following implementation of a $6.5 Million roadway improvement package currently underway by MassDOT and as a result of an additional $8.6 Million roadway improvement package proposed by the casino Proponent.

Traffic generation for the proposed Category 1 Casino is developed based on empirical trip generation rates for similar gaming facilities located in the United States, including available documented trip data for casino facilities that are located in the eastern United States. Review of all available empirical data, including data for a similar venue casino that is owned and operated by the Proponent's affiliate, resulted in selection of a trip rate that is consistent with those accepted for other similar gaming facilities in Massachusetts. On this basis, the proposed casino development is estimated to generate approximately 1,107 vehicle trips during the Friday evening peak hour (483 entering and 624 exiting) and 1,411 vehicle trips during the Saturday evening peak hour (686 entering and 725 exiting). This trip estimate does not reflect the potential for "shared" trips between the casino and hotel components, which results in a conservative estimate of traffic activity for the Site. Also noteworthy is that casino trip generation during most weekdays (Monday through Thursday) is expected to be up to 30 percent lower than these projections based on the Proponent's operational data for its other affiliated casino facilities.

The proximity of the Site to various regional highways and detailed review and inventory of available local routes serving the Site indicates that patron trips will be principally oriented to

the Route 24 Corridor via Belmont Street (78%), with a smaller percentage oriented to/from the east via local roadways, which reflects the likelihood that the majority of employee trips will be generated from within to the local community based on a local hiring preference.

Independent of the Category 1 Casino, MassDOT is undertaking $6.5 Million in roadway, signal and pedestrian improvements along the Belmont Street corridor between Route 24 and Angus Beaton Drive in 2015/2016 that will enhance safety, capacity and pedestrian/bicycle accommodations. In addition to these funded MassDOT improvements, the Proponent will implement an estimated $8.6 Million package of roadway and traffic signal improvements along portions of Belmont Street and Forest Avenue; these proposed improvements are consistent with planned improvements by MassDOT and recommendations cited in the Southwest Brockton Corridor Study but for which no funding currently exists.

Key findings of capacity analysis indicate the following:

- *The Belmont Street corridor currently experiences traffic operating and pedestrian safety deficiencies at numerous intersections that are the focus of funded improvements by MassDOT.*

    - The Belmont Street intersections at Manley Street, Lorraine Street, Linwood Street, and West Street currently experience long delays (LOS F conditions), long vehicle queues and/or high crash rates. Contributing factors include the lack of exclusive turn lanes at some locations, inefficient traffic signal phasing/timing, a lack of appropriate roadway shoulders and lack of appropriate pedestrian crossings and associated traffic controls.

- *Following implementation of $6.5 Million roadway and signal upgrades by MassDOT, Belmont Street traffic operations will be below capacity (LOS C operation or better).*

    - MassDOT-sponsored improvements along Belmont Street between Route 24 and Angus Beaton Drive (study intersections 1 through 6) as described under Section 3.1 are currently underway and will be in place prior to casino operations. These improvements will enhance traffic flow along the corridor by adding turn lanes at major intersections and implementing coordinated signal operation. Enhanced pedestrian safety will result from new signal-controlled pedestrian crossings, improved sidewalks and a wider roadway that includes 4-foot wide shoulders.

- *Following implementation of an additional $8.6 Million of roadway and signal improvements by the Proponent, traffic operations during weekday evening peak hours and will also continue to operate below capacity at LOS C operation with the additional Casino traffic.*

    - Proponent-sponsored improvements along Belmont Street east of Angus Beaton Drive to West Street are consistent with planned (long-range) improvements by

MassDOT, with traffic operations along Belmont Street of LOS C or better operation with additional casino traffic.

- Signals at Belmont Street intersections with West Street/Plaza Drive, Forest Avenue and West Street will be modified and upgraded by the casino Proponent to provide coordinated control, consistent with MassDOT's planned long-range improvements (intersections 5, 6 and 7). These upgrades represent a component of the $8.6 Million improvement package by the Proponent.

□ *Forest Avenue traffic operations indicate several intersections that currently operate at LOS F (failing conditions) and/or that have high crash rates that are planned for improvement but are not funded at this time. The casino proponent will work with the City of Brockton to advance improvements along Forest Avenue as a component of the $8.6 Million improvement package that are consistent with recommendations of the Southwest Brockton Corridor Study that results in improved operation (LOS C or better operations) with additional casino traffic.*

- Locations along Forest Avenue are currently subject to failing operation and long delays (LOS F conditions) include West Street, Memorial Drive, Manomet Street and Main Street. Proposed access improvements and implementation of new signals or upgraded signal equipment along Forest Avenue as described under Section 5.0 will result in traffic operations of LOS C or better at these failing locations with additional casino traffic.

- Pedestrian infrastructure will be improved along Forest Avenue by the Proponent to enhance safety including: new sidewalks on both sides of the road along the Site frontage; roadway shoulders for bicycle accommodation; signal controlled pedestrian crossings at new signalized intersections of Memorial Drive, the Site driveway and Main Street; pedestrian crossings and refuge islands at the proposed roundabout; and upgraded pedestrian crossings at upgraded signalized intersections including Ash Street, Manomet Street and Warren Avenue.

In summary, completion of ongoing corridor improvements by MassDOT and additional Proponent-sponsored improvements along Belmont Street and Forest Avenue as described under Section 5.0 *Conclusions and Recommendations* result in traffic operations of LOS C or better at all primary signalized study locations and enhanced pedestrian safety. These improvements directly address today's capacity needs independent of the casino, resulting in efficient traffic flow and pedestrian accommodation in the area with the casino traffic and effectively advancing needed improvements that are not likely to otherwise occur in the near future.

E.4 RECOMMENDATIONS

Roadway improvements that support projected traffic increases associated with the proposed Category 1 Casino are identified to mitigate project-related traffic impacts, address access needs for the Site and that enhance pedestrian safety and accommodation. In addition, non-auto transportation programming is proposed to integrate the Site with various bus and rail transportation options serving the area. Specific improvements include (a) access-related improvements, (b) off-site improvements, (c) non-auto transportation programming; and (d) transportation demand management. The mitigation commitments by the Proponent will be further refined as the project undergoes the local and state (MEPA) review process.

SITE ACCESS IMPROVEMENTS

Site access improvements are proposed by the Proponent to support the casino operations, but that also serve to advance improvement initiatives along Belmont Street identified in the MassDOT Project No. 608088 and along Forest Avenue as identified in the Southwest Brockton Corridor Study.

A: Site Access Improvements: West Street & Forest Avenue

Proposed site access improvements along Forest Avenue and West Street will enhance traffic flow and reduce vehicle conflicts relative to existing conditions and include pedestrian and bicycle design features that facilitate walking access to/from the Site and vicinity. These roadway improvements will follow MassDOT "Complete Streets" design standards that are contemplated as part of the currently ongoing Belmont Street corridor improvement projects being undertaken by MassDOT, and that advance recommended improvements identified in the *Southwest Brockton Corridor Study*.

Primary site access/egress is proposed along Forest Avenue opposite the Brockton Registry of Motor Vehicles (Intersection 21). Secondary site access/egress is proposed via a driveway connection to West Street (Intersection 20) which will restrict egress movements to right turn movements to minimize conflict points along West Street. To provide improved traffic operations in the immediate area, a modern roundabout is proposed at the Forest Avenue intersection with West Street as well as the relocation and conversion of roadway segments to one-way travel. Primary access improvement features are depicted on the conceptual design plan in Section 5.0 with primary features as follows:

- *Modern Roundabout.* A two-lane modern roundabout is contemplated at the Forest Avenue intersection with West Street (Intersections 11 & 12). The roundabout is proposed to be designed for three-legged operation, under which a portion of West Street between Feinberg Way and Forest Avenue will be converted to one-way (eastbound) traffic flow toward the roundabout and the portion of Forest Avenue between West Street and Belmont Street will be converted to one way traffic flow (northbound) away from the roundabout. The easterly segment of West Street will be re-aligned and widened to provide a 4 travel lanes. All roundabout improvements and associated widening will be on property under control of the Proponent and/or within City jurisdiction.

- *Forest Avenue Widening*. Forest Avenue will be widened to a four lane cross-section between the proposed modern roundabout and Memorial Drive. These roadway improvements will follow MassDOT "Complete Streets" design standards and will include shoulders for bicycle accommodation, and ADA-compliant sidewalks and crossings. This cross-section will allow adequate capacity that serves the casino's primary driveway which will accommodate approximately 60% of patron trips, thereby reducing impact to Belmont Street to the east of West Street/Plaza Drive.

- *Site Drive Signal*. Install a fully actuated traffic signal and associated pedestrian control equipment at the intersection of the Forest Avenue/Primary Site Driveway (Intersection 21). This signal will provide capacity to accommodate existing traffic flow and additional turning traffic for the casino and will operate in coordination with a traffic signal at Memorial Drive as outlined below.

- *Memorial Drive Signal*. Install a fully actuated traffic signal and associated pedestrian control equipment at the intersection of the Forest Avenue/Memorial Drive (Intersection 13). This signal has been identified as a recommended improvement in the *Southwest Brockton Corridor Study* that is currently warranted independent of the proposed casino.

- *West Street Widening & Realignment*. The existing 2-lane alignment of West Street between Belmont Street and Forest Avenue (east of Forest Avenue) will be re-aligned on property controlled by the Proponent and widened to provide a 4-lane cross-section. This will allow proper roadway alignment and separation of traffic movements at the modern roundabout and lane capacity to accommodate existing traffic flow and additional turning traffic for the casino.

- *West Street Driveway.* Proposed site egress to West Street will be restricted to right-turn movements by a raised, landscaped island to minimize conflict points along West Street. This driveway is expected to accommodate approximately 19% to 24% of casino patron traffic based on orientation of parking at the Site.

- *Forest Avenue One-Way Conversion*. The portion of Forest Avenue between West Street and Belmont Street will be converted to one-way northbound traffic flow to accommodate existing traffic flow patterns headed toward the West Gate Plaza and the primary outbound (exiting) traffic flow for the casino. This will allow for dual left-turn capability onto Belmont Street and efficient signal operations under Build traffic conditions. This will require modification of the lanes opposite Forest Avenue at the plaza driveway to provide dual left-turns, and will re-distribute trips currently using Forest Avenue southbound from the plaza to the re-aligned and expanded West Street.

- *West Street One-Way Conversion*. The portion of West Street between Feinberg Way and Forest Avenue will be converted to one-way (eastbound) traffic flow toward the modern roundabout. This orientation will retain the two-way flow along the remaining portion of West Street between Belmont Street and Feinberg Way to accommodate the existing fire station access/circulation and traffic flow associated with the sports stadium activities. To facilitate access onto West Street from Belmont Street, the existing eastbound right-turn lane will be expanded (lengthened), requiring an adjustment of the roadway right-of-way onto property owned by the City.

- *Belmont Street Signal Modifications*. Signal equipment, signal timing and signal phasing modifications will be implemented at the Belmont Street intersections with West Street/West Gate Plaza, Forest Avenue, and West Street. These signal upgrades and modifications are subject to MassDOT permitting but are consistent with anticipated long-range improvements that would be included under the MassDOT Project No. 608088 described under Section 3.1, and recommended improvements identified in the *Southwest Brockton Corridor Study* independent of the casino. Signal operations would be coordinated among these three locations to maximize traffic efficiency along Belmont Street.

With these access improvements in place, capacity analyses indicate that intersections serving the Site will operate below capacity at LOS C or better during peak hours.

OFF-SITE TRANSPORTATION IMPROVEMENTS

B: Forest Avenue Signal Improvements

The *Southwest Brockton Corridor Study* identifies traffic signal improvements and upgrades along the Forest Avenue corridor that are warranted under existing conditions independent of the proposed casino development. Although the Forest Avenue corridor is not expected to serve as a primary travel route to/from the casino and will sustain only modest traffic impact as a result, the Proponent will work with the City of Brockton to implement new signal control at Main Street and upgrades to existing signals at Ash Street, Manomet Street and Warren Avenue to enhance capacity and to meet current ADA requirements. These improvements will result in a notable reduction in delays with projected operations of LOS C or better with additional casino traffic – thereby eliminating failing conditions (LOS F) that currently exist for several of these intersections.

C: Belmont Street Signal Optimization

The casino Proponent commits to monitoring traffic volumes and signal operations at the signalized Belmont Street intersections at Manley Street, VA Hospital and Linwood Street/Lorraine Avenue within 6 months of casino occupancy and to make any necessary signal timing/phasing modifications necessary at that time to ensure optimal operations during peak traffic hours. Specific provisions for traffic monitoring and signal timing adjustments will be identified under the MassDOT Section 61 Finding process.

NON- AUTO TRANSPORTATION PROGRAMMING

D: Shuttle Service

The Proponent is evaluating a community shuttle bus loop that would augment available transit services to facilitate access to area businesses and connections to existing available public transportation (BAT) serving the area. The Proponent will work with the BAT to identify feasibility of integrating the Site as a stop on its existing service for the area, thereby providing connections to other area public transportation options including the BAT Centre in Brockton which serves as a hub for additional regional BAT bus service and the MBTA Old Colony Line commuter rail service. Specific operating parameters for the proposed shuttle service for the Site and feasibility of integration with existing BAT bus service will be identified following discussions and coordination with the City of Brockton and BAT.

TRANSPORTATION DEMAND MANAGEMENT (TDM)

The Proponent is committed to reduce auto dependency by employees and patrons by implementing a robust TDM program. Specific TDM program elements will be identified in more detail under the state review process. A preliminary list of potential TDM program elements may include the following, subject to refinement of the development program and further evaluation by the Proponent:

- *Shuttle and Bus Options.* Shuttle bus loop serving the local community (currently under evaluation) and integration of the Site as a stop on current BAT bus routes.

- *Public Transportation Information & Promotion*. Posting of service and schedule information for employees and patrons; on-site sale of transit passes to promote the use of public transportation by employees and patrons.

- *Bicycle Facilities and Promotion*. Bicycle racks at appropriate on-site locations; a bicycle sharing program to promote the use of bicycles as an alternative commuting method; dissemination of area bicycle route maps.

- *Pedestrian Infrastructure*. Sidewalk connections within the property along primary pedestrian desire lines that connect building entrances with the public sidewalk network; posting of area maps that highlight area walking routes to promote walking and bicycle travel to/from the Site and area businesses. The design of improvements along Forest Avenue will also include sidewalks and shoulders that are consistent with complete streets objectives.

- *On-Site Employee Transportation Coordinator*. The Proponent will identify an on-site employee whose responsibilities will include serving as an employee transportation coordinator responsible for disseminating relevant TDM information to employees including posting TDM information at appropriate locations within the buildings and during employee orientation.

- *On-Site Employee Services.* On-site banking facilities (ATM), employee showers, cafeteria, direct deposit of employee payroll checks, secure bicycle accommodations.

- *Preferential Parking for Carpools and Vanpools.* Preferential parking locations for employees within the employee parking area who use carpools and vanpools.

- *Preferential Parking for Low-Emission Vehicles.* Preferential parking locations for employees and patrons who use low-emission vehicles; charging stations for electric vehicles; VIP parking access for patrons who travel to the site using alternative fuel vehicles.

- *Transit Pass Subsidization.* Subsidize commuter rail and local bus passes for employees.

- *MassRides*. Promotion of commuter assistance programs available through Executive Office of Transportation's MassRides as part of the employee orientation program.

- *Guaranteed Ride Home*. A guaranteed ride home program that subsidizes taxi service for employees using non-auto commute options in cases of unexpected circumstances.

- *No Idling Signage*. Installation of "No Idling" signs throughout the site's parking areas to reduce the amount of greenhouse gasses emitted.

- *On-Site Patron Services.* Restaurants, ancillary retail, coat/bag check facilities, dissemination of shuttle and public transportation options, coordination of local taxi services, promotion of bicycle and walking options to area attractions.

- *Bus Shelter/Taxi Stand*. Bus shelter/taxi stand for patrons to wait for services on-site.

- *Valet Parking Operations*. A parking option for patrons for preferred parking spaces to facilitate parking operations at the Site.

1.0 INTRODUCTION

MDM Transportation Consultants, Inc. (MDM) has prepared this preliminary Traffic Impact and Access Study (TIAS) for the proposed Category 1 Casino to be located at the Brockton Fairgrounds site along Belmont Street in Brockton, Massachusetts. This TIAS provides an initial planning framework for transportation and access improvements necessary to support the project and to inform transportation-related discussions.

This report documents existing operational and safety-related characteristics of roadways serving the development Site, estimates future year operating characteristics of these roadways independent of the development, estimates development-related trip generation, and identifies incremental impacts of Site-related traffic. Access improvements are identified for the development to meet operational needs of the Site and the adjacent roadways under future year (10-year horizon) Build conditions. In addition to traffic, an inventory of existing and proposed public transportation routes and facilities is provided to facilitate development of non-auto transportation programming for the proposed facility.

This TIAS has been prepared in general accordance with traffic study guidelines as jointly issued by the Commonwealth of Massachusetts Executive Office of Energy & Environmental Affairs/Massachusetts Department of Transportation (EEA/MassDOT). The study parameters include study intersections which are the primary gateways serving the Site as well as locations included as part of the recently completed Southwest Brockton Corridor Study prepared by the Old Colony Planning Council.

1.1 PROPOSED DEVELOPMENT

The Site is located at the Brockton Fairgrounds which includes approximately 45 acres with frontage along Belmont Street, West Street, and Forest Avenue. The Site is located approximately 1.5 miles east of Route 24 (Exit 17 onto Route 123). The proximity of the Site and the study intersections in relation to the regional transportation system is shown in **Figure 1**.

For purposes of this TIAS, the proposed Site programming is assumed to consist of re-developing the Brockton Fairgrounds for a Category 1 Casino with 3,000± gaming positions. Ancillary amenities are assumed to include restaurants, a 300-room[2] resort hotel with fitness center, spa and pool and 25,000± of multi-function event and entertainment space. On-Site parking is planned to include a total of 3,000± parking spaces split between surface and structured parking and the casino will have a fully staffed valet service.

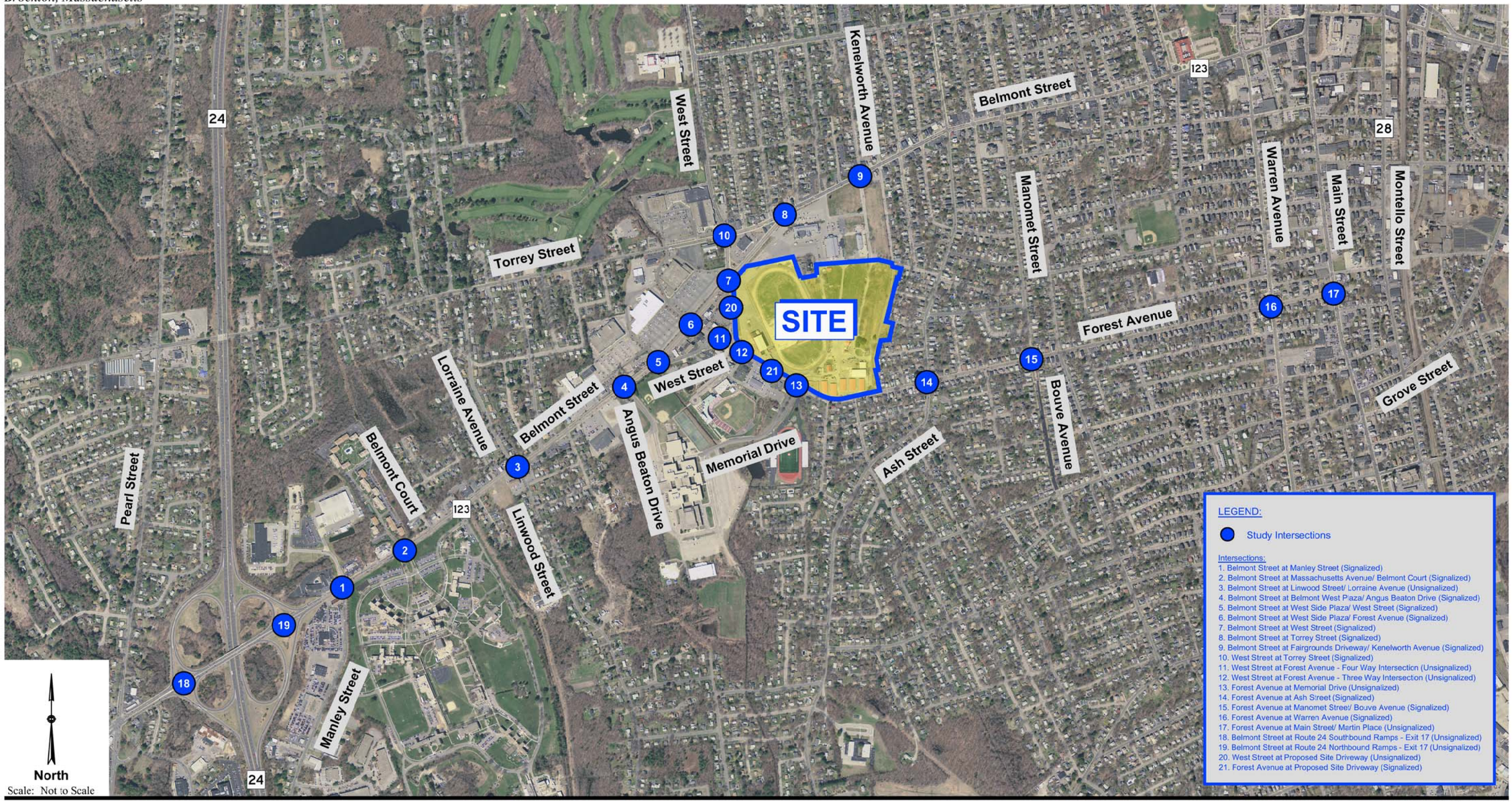
Public transportation routes are available in the area to facilitate non-auto access options; the Proponent will coordinate with the Brockton Area Transit Authority (BAT) to evaluate integrating the Site as a stop on the BAT routes which includes a connection to the BAT Intermodal Transit Centre.

Planned access improvements are informed by area transportation initiatives by MassDOT and the City of Brockton, including recommendations identified in the recently completed *Southwest Brockton Corridor Study* prepared by the Old Colony Planning Council (OCPC). Proposed access/egress improvements for the Site include reconstruction of West Street at Forest Avenue to include a modern roundabout, thereby enhancing traffic capacity and reduced vehicle conflicts in the Site vicinity; widening of Forest Avenue and signalizing the primary Site access/egress driveway and the Memorial Drive intersections; and widening of West Street east of Forest Avenue to provide a secondary (unsignalized) driveway for the Site. The existing unsignalized Site access along Belmont Street opposite Kenelworth Avenue is assumed to serve as an employee/service way. A preliminary site plan showing the site boundaries relative to local roadways is presented in **Figure 2.**

1.2 STUDY METHODOLOGY

This transportation impact and access evaluation is conducted in accordance with EEA/MassDOT guidelines, and consists of several steps. The first step documents existing conditions in the transportation study area including an inventory of roadway geometry, observed traffic volumes, public transportation, and safety characteristics. Next, future year traffic conditions are forecast that account for other planned area developments, normal area growth, and development-related traffic increases. The third step quantifies operating characteristics of the study intersection. Specific attention is given to the incremental impacts of the proposed development. Finally, improvements are identified to address specific

[2] Current programming for the casino site includes a 225-room hotel; a 300-room hotel scenario is presented in this TIAS to provide a conservative analysis condition.



MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 1

Study Locations

Date: March 2015
Dwg No. 820 TIAS.dwg
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North

Scale: Not to Scale

Site Plan Source: Klai Juba Wald Architects

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Figure 2

Site Locus

Date: March 2015
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development-related transportation requirements as needed.

1.3 STUDY AREA

This TIAS evaluates transportation characteristics of roadways and intersections that provide a primary means of access to the Site, and that are likely to sustain a measurable level of traffic impact from the development, including locations recently evaluated by the Old Colony Planning Council as part of the *Southwest Brockton Corridor Study*. The study includes the following intersections serving the Site as shown in **Figure 1**:

1 - Belmont Street at Manley Street (Signalized)
2 - Belmont Street at VA Hospital/ Belmont Court (Signalized)
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20 - West Street at Proposed Casino Driveway (Unsignalized)
21 - Forest Avenue at Proposed Primary Site Drive (Future Signalized)

2.0 EXISTING CONDITIONS

In order to provide a basis for quantifying the transportation impacts of the development, the existing roadway system and the existing traffic operations of study area roadways were reviewed. This section describes the existing traffic characteristics and operations of roadways and intersection within the study area. Specifically, this section presents an overview of the traffic data collection program, existing traffic volumes, safety issues and public transportation systems serving the area.

2.1 STUDY AREA ROADWAY NETWORK

The study area roadways and intersections are described briefly in this section. A general description of the physical roadway and intersection features is provided. The study area includes roadways under State (MassDOT) and local (Town) jurisdiction. The study area and intersections are depicted in **Figure 1**.

2.1.1 Roadways

Route 24

Route 24 is generally a north-south roadway under state jurisdiction (MassDOT). Route 24 is classified by the MassDOT Urban Other Freeway & Expressway which provides a connection between I-93 in Randolph, MA to the north with Route 114 in Portsmouth, RI to the south with major connections to regional roadways including I-195, Route 123, and I-495. Within the study area, the roadway is a limited access highway with a median that generally provides three travel lanes in each direction with additional acceleration/deceleration lanes provided at its major interchanges. The posted speed limit in the immediate area is 65 mph. Pedestrians and bicycles are restricted from the highway.

Belmont Street (Route 123)

Belmont Street is generally an east-west roadway under state jurisdiction (MassDOT) near the Route 24 ramps through West Street to the east and under local (Town) jurisdiction between West Street and Main Street to the east. Belmont Street is classified by the MassDOT as an Urban Other Principal Arterial roadway which provides a connection between Washington Street (Route 123) to the west and Main Street to the east. Between Route 24 and Torrey Street, the roadway generally provides two travel lanes in each direction separated by a double yellow centerline with additional turn lanes provided at its major intersections. Between Torrey Street and Main Street the roadway generally provides one travel lane in each direction separated by a double yellow centerline with additional turn lanes provided at its major intersections. Sidewalks are provided along both sides of Belmont Street throughout the study area. The posted speed limit ranges from 35 to 40 mph. Land uses along Belmont Street include a mix of land uses including but not limited to fairgrounds (Site), commercial plazas, residential homes, the Brockton High School, and general/ medical office uses.

West Street

West Street is generally a north-south roadway under local (Town) jurisdiction. West Street is classified by the MassDOT as an Urban Collector roadway which provides a connection between Route 27 to the north and Belmont Street to the south. Within the study area, the roadway generally provides one travel lane in each direction with additional travel lanes provided at its major intersections. Sidewalks are provided along both sides of West Street throughout the study area. The posted speed limit in the immediate area is 30 mph. Land uses along West Street include a mix of land uses including but not limited to Brockton Fire Station 6, commercial properties, fairgrounds (Site), the West Middle School, a recreational golf course and residential homes.

Forest Avenue

Forest Avenue is generally an east-west roadway under local (Town) jurisdiction. Forest Avenue is classified by the MassDOT as an Urban Major Collector roadway which provides a connection between Belmont Street to the west and Main Street to the east. Within the study area, the roadway generally provides one travel lane in each direction with additional travel lanes provided at its major intersections. Sidewalks are provided along both sides of Forest Avenue throughout the study area. The posted speed limit in the study area is 30 mph. Land uses along Forest Avenue include a mix of land uses including but not limited to commercial properties, fairgrounds (Site), the Brockton High School, Massachusetts Registry of Motor Vehicles, and residential homes.

2.2 PEDESTRIAN FACILITIES

The existing pedestrian and sidewalk system serving the study area has been documented. Sidewalks are provided along study area roadways as well as along the Site Driveway to connect Forest Street and West Street to the on-site buildings. **Figure 3** presents the existing sidewalk and crosswalk locations within the study area.

As described in more detail under Section 3.1, the Belmont Street corridor is scheduled to be widened and reconstructed by MassDOT to include enhancements to pedestrian and bicycle features following MassDOT Complete Streets design standards; additional enhancements include new or modified traffic signals along the corridor between Route 24 and West Street that will also enhance pedestrian safety and compliance with current ADA requirements.

2.3 BASELINE TRAFFIC VOLUMES

Traffic-volume data used in this study was collected at the study intersections in February 2015. Manual turning movement counts (TMCs) were conducted at each of the study intersections. Traffic data were collected during the Friday evening (4:00 to 7:00 PM) and Saturday evening (4:00 to 7:00 PM) peak periods. These hours represent the combination of busiest activity periods of the Site and adjacent roadway network.

Review of hourly traffic count data collected by MDM on Belmont Street in the Site vicinity and projected traffic generation for the casino (described in more detail under *Section 3: Future Conditions*) indicates that the highest combined traffic activity on area roads is the Friday evening (4 PM to 5 PM) period. The Friday evening peak hour data used in this evaluation therefore represents the critical "Design Hour" traffic conditions for purposes of determining worst-case traffic impacts of the casino and necessary traffic improvements to support the proposed use.

2.3.1 DAILY TRAFFIC

Baseline daily traffic volumes along Route 24, Belmont Street, Forest Avenue and West Street in the site vicinity as summarized in the *2014 Southwest Brockton Corridor Study*[3] and from historical MassDOT counts are summarized in **Table 1.**

[3] *2014 Southwest Brockton Corridor Study*, prepared by Old Colony Planning Council dated December 2014.

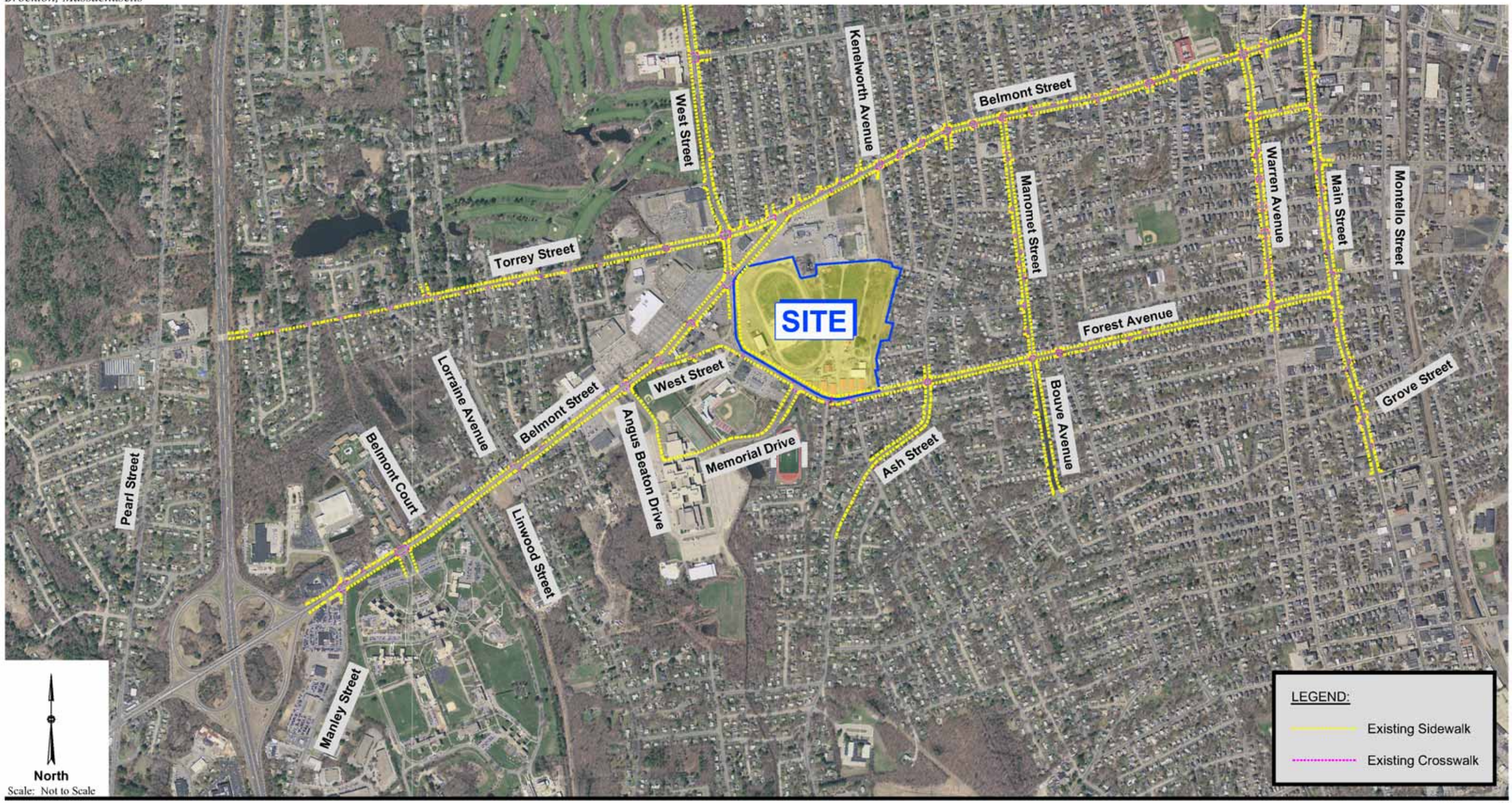

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Figure 3

Existing Pedestrian Facilities

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TABLE 1
BASELINE ROADWAY TRAFFIC VOLUME SUMMARY

Location	Daily Volume (vpd)[1]
Route 24 north of Belmont Street (MassDOT – September 2013)	105,340
Belmont Street west of Angus Beaton Drive[2]	24,900
Belmont Street west of Moraine Street[2]	20,220
Forest Avenue west of Ash Street[2]	15,050

[1]Two-way daily traffic expressed in vehicles per day without seasonal adjustment.
[2]Unadjusted daily two-way flow traffic volume data obtained from the 2014 Southwest Brockton Corridor Study.

Summary data presented in **Table 1** indicate that daily traffic volumes on Belmont Street range from approximately 20,000 to 25,000 vehicles per day (vpd) indicating its importance as a primary arterial roadway serving Brockton. Forest Avenue, a local collector roadway, exhibits daily traffic volumes of approximately 15,000 vpd and serves as a primary roadway connection to the Belmont Street corridor for points south. These routes provide a connection for regional travel via Route 24 which carries approximately 105,000 vpd based on recent data collected by MassDOT.

2.3.2 PEAK–HOUR TRAFFIC

Manual turning movement counts (TMCs) were conducted along study area roadways and intersections in February 2015. These traffic data were collected during the Friday evening and Saturday evening (4:00 to 7:00 PM) peak periods.

The traffic volume count months are representative of slightly below-average traffic volume conditions based on review of traffic count data maintained by MassDOT for the nearby permanent count station along Route 123. Accordingly, an upward adjustment of 3% (increase) of the count data was made to reflect average 2015 Baseline traffic conditions in accordance with MassDOT analysis protocol. Permanent count station data is provided in the **Appendix** for reference. The resulting 2015 Baseline Friday evening and Saturday evening peak hour traffic volumes for study intersections are depicted in **Figure 4** and **Figure 5**. As a point of reference, weekday peak hour traffic volume data for study intersections along Belmont Street and Forest Avenue as published in various studies by the Old Colony Planning Council and MassDOT indicates a high degree of consistency with the Baseline data (seasonally adjusted February 2015 counts) used in this study.

2.4 MEASURED TRAVEL SPEEDS

Vehicle speeds were obtained for Belmont Street, West Street, and Forest Avenue adjacent to the Site over a 48-hour weekday period in September 2013 as summarized in the 2014 Southwest Brockton Corridor Study. **Table 2** summarizes the posted and 85th percentile speeds for in the Site vicinity.

TABLE 2
ROADWAY TRAVEL SPEEDS

	Travel Speeds	
Location	**Posted Speed[1]**	**85th Percentile[2]**
Belmont Street west of Angus Beaton Drive[3]	35	40
West Street north of Forest Avenue[3]	30	32
Forest Avenue west of Ash Street[3]	30	35

[1] Posted Speed (mph)
[2]The speed at or below which 85 percent of the vehicles are traveling
[3]Unadjusted travel speed data obtained from the 2014 Southwest Brockton Corridor Study.

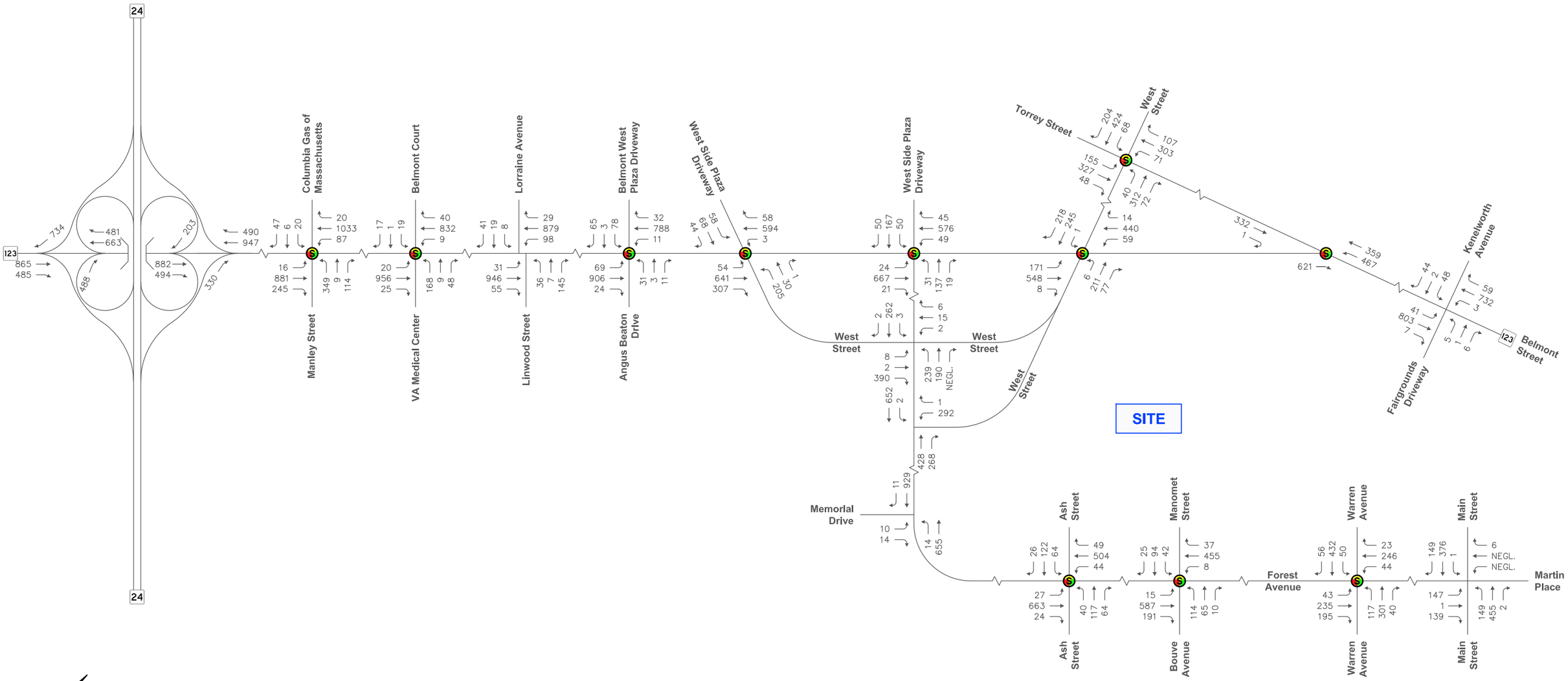

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Figure 4

2015 Existing Friday Evening Peak Hour Traffic Volumes

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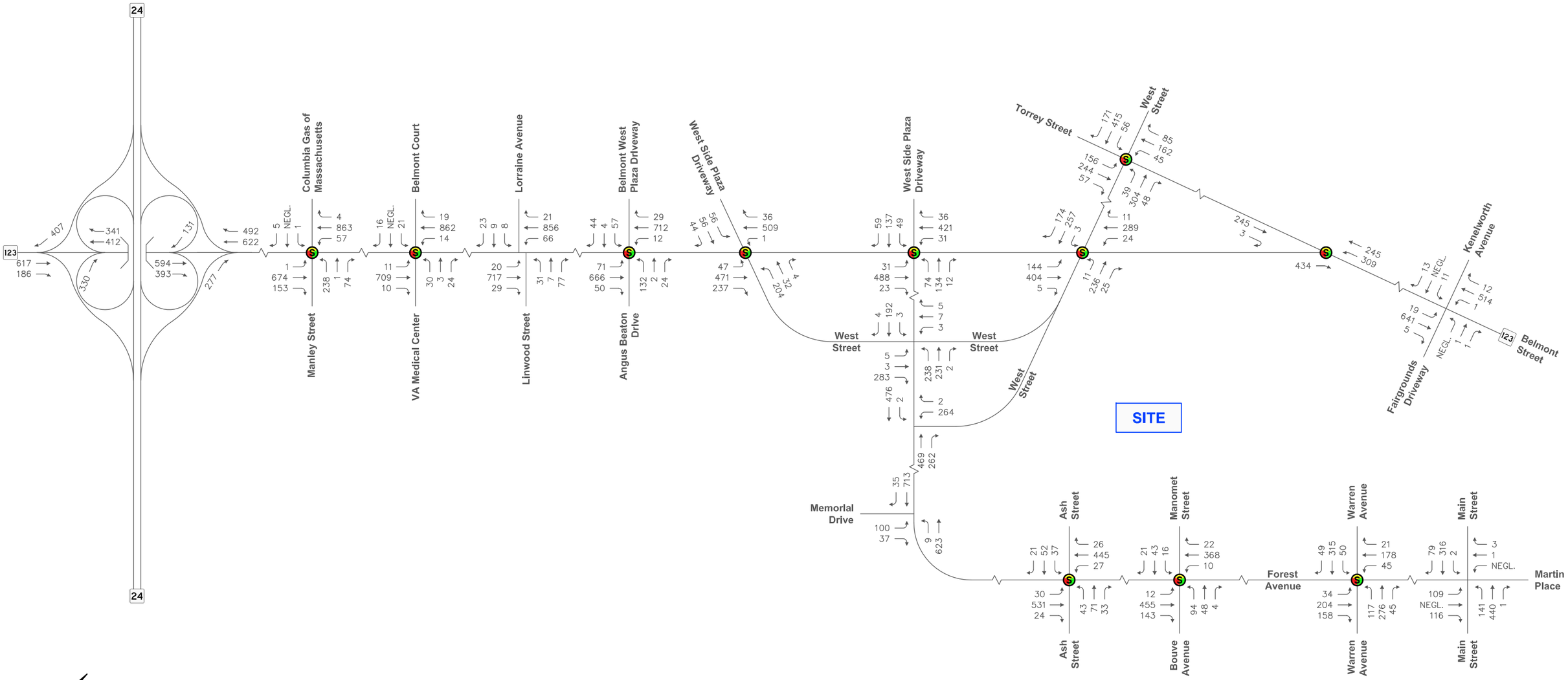

North
Scale: Not to Scale

NOTES:
NEGL. = Negligible
S = Signalized Intersection

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Figure 5

2015 Existing Saturday Evening Peak Hour Traffic Volumes

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As summarized in **Table 2**, the 85th percentile travel speeds along Belmont Street, West Street, and Forest Avenue are slightly higher but consistent with the posted speed limits. Within the immediate study area, the observed travel speeds are between 2 and 5 mph above the posted speed limits.

2.5 SAFETY

In order to identify crash trends and safety characteristics for study area intersections, crash data were obtained from MassDOT for the City of Brockton for the three-year period 2010 through 2012 (the most recent data currently available from MassDOT). Crash data for the study intersections is summarized in **Table 3** with detailed data provided in the **Appendices.**

Crash rates were calculated for the study area intersections as reported in **Table 3**. This rate quantifies the number of crashes per million entering vehicles. MassDOT has determined the official District 5 crash rate to be 0.58 for unsignalized intersections and 0.77 for signalized intersections. This rate represents MassDOT's "average" crash experience for District 5 communities and serves as a basis for comparing reported crash rates for the study intersections. Where calculated crash rates notably exceed the district average, some form of safety countermeasures may be warranted.

TABLE 3
INTERSECTION CRASH SUMMARY - 2010 THROUGH 2012[1]

	INTERSECTION									
Data Category	(1) Belmont St at Manley St	(2) Belmont St at VA Hospital/ Belmont Court	(3) Belmont St at Linwood St/ Lorraine Ave	(4) Belmont St at Belmont West Plaza/ Angus Beaton Drive	(5) Belmont St at Westside Plaza/ West St	(6) Belmont St at Westside Plaza/ Forest Ave	(7) Belmont St at West St	(8) Belmont St at Torrey St	(9) Belmont St at Fairgrounds Dwy/ Kenelworth Ave	(10) West St at Torrey St
Traffic Control	Signalized	Signalized	Unsignalized	Signalized	Signalized	Signalized	Signalized	Signalized	Unsignalized	Signalized
Crash Rate[2]	**0.63**	**0.21**	**0.70**	**0.03**	**0.03**	**0.73**	**1.02**	**0.47**	**0.15**	**0.51**
District 5 Avg[3]	0.77	0.77	0.58	0.77	0.77	0.77	0.77	0.77	0.58	0.77
Year										
2010	8	3	7	0	0	7	11	7	0	6
2011	15	0	11	0	1	8	9	5	1	4
2012	5	4	8	1	0	6	12	1	3	7
Total	**28**	**7**	**26**	**1**	**1**	**21**	**32**	**13**	**4**	**17**
Type:										
Angle	15	1	19	0	0	15	20	7	1	8
Rear-End	6	3	6	1	1	3	9	3	2	7
Head-On	0	0	0	0	0	1	1	0	1	0
Sideswipe	1	1	0	0	0	2	0	2	0	2
Single Vehicle	4	2	1	0	0	0	2	0	0	0
Unknown	0	0	0	0	0	0	0	1	0	0
Severity:										
P. Damage Only	16	3	16	1	1	13	20	8	3	11
Personal Injury	11	4	10	0	0	8	12	5	1	6
Fatality	0	0	0	0	0	0	0	0	0	0
Unknown	1	0	0	0	0	0	0	0	0	0
Conditions:										
Dry	20	5	19	0	0	13	24	9	3	9
Wet	7	2	7	1	1	8	8	3	0	4
Snow	0	0	0	0	0	0	0	0	1	4
Other/Unknown	1	0	0	0	0	0	0	1	0	0
Time:										
7:00 to 9:00 AM	2	1	5	0	0	2	0	1	0	2
4:00 to 6:00 PM	4	3	3	1	1	4	6	2	1	2
Rest of Day	22	3	18	0	0	15	26	10	3	13

[1]Source: MassDOT Crash Database
[2]Crashes per million entering vehicles
[3]District 5 averages = 0.58 (unsignalized) and 0.77 (signalized)

TABLE 3 (Continued)
INTERSECTION CRASH SUMMARY - 2010 THROUGH 2012[1]

	INTERSECTION									
Data Category	(11) & (12) West St at Forest Ave	(13) Forest Ave at Memorial Drive	(14) Forest Ave at Ash St	(15) Forest Ave at Manomet St/ Bouve Ave	(16) Forest Ave at Warren Ave	(17) Forest Ave at Main St/ Martin Place	(18) Route 24 SB Ramp at Belmont St WB	(19) Route 24 SB Ramp at Belmont St EB	(20) Route 24 NB Ramp at Belmont St WB	(21) Route 24 NB Ramp at Belmont St EB
Traffic Control	Unsignalized	Unsignalized	Signalized	Signalized	Signalized	Unsignalized	Unsignalized	Unsignalized	Unsignalized	Unsignalized
Crash Rate[2]	**0.53**	**0.04**	**0.66**	**1.01**	**1.22**	**0.81**	**0.00**	**0.15**	**0.23**	**0.27**
District 5 Avg[3]	0.58	0.58	0.77	0.77	0.77	0.58	0.58	0.58	0.58	0.58
Year										
2010	9	0	5	11	12	6	0	0	5	2
2011	3	0	6	7	7	7	0	2	3	4
2012	2	1	7	8	15	5	0	4	1	5
Total	**14**	**1**	**18**	**26**	**34**	**18**	**0**	**6**	**9**	**11**
Type:										
Angle	5	0	9	20	22	13	0	0	0	2
Rear-End	6	0	7	4	6	3	0	5	7	9
Head-On	2	0	0	1	2	0	0	0	0	0
Sideswipe	0	0	2	0	0	1	0	0	1	0
Single Vehicle	0	1	0	0	4	0	0	1	1	0
Unknown	1	0	0	1	0	1	0	0	0	0
Severity:										
P. Damage Only	10	0	11	13	14	10	0	3	6	5
Personal Injury	3	0	6	13	20	8	0	4	3	6
Fatality	0	0	0	0	0	0	0	0	0	0
Unknown	1	1	1	0	0	0	0	0	0	0
Conditions:										
Dry	7	0	12	23	21	12	0	6	7	7
Wet	4	1	4	3	12	4	0	0	2	4
Snow	2	0	2	0	1	2	0	0	0	0
Other/Unknown	1	0	0	0	0	0	0	0	0	0
Time:										
7:00 to 9:00 AM	1	0	0	3	1	0	0	2	0	4
4:00 to 6:00 PM	7	0	3	5	5	2	0	0	0	0
Rest of Day	6	1	15	18	28	16	0	4	9	7

[1]Source: MassDOT Crash Database
[2]Crashes per million entering vehicles
[3]District 5 averages = 0.58 (unsignalized) and 0.77 (signalized)

As summarized in **Table 3**, the majority of the study intersections generally experience crash rates that are below the District 5 averages for signalized and unsignalized intersections and there were no fatalities reported for any of the study intersections. However, five (5) study locations experienced crash rates higher than the District-wide averages as described in more detail below:

- *Belmont Street at Lorraine Ave/Linwood Street.* The Belmont Street/Linwood Street intersection is ranked #145 in MassDOT's *2010 Top 200 Crash Locations Report*. A total of twenty-six (26) crashes were reported for the Belmont Street at Linwood Street/Lorraine Street unsignalized intersection – approximately 9 per year – resulting in a crash rate of 0.71. The majority of reported crashes at the intersection were angle type collisions (73%) resulting in property-damage only (62%) and occurring under dry pavement conditions (73%). The majority (69%) of crashes occurred outside of the peak commuting periods. Intersection safety and capacity improvements are planned for this location by MassDOT (project Numbers 608025 and 606036) as described in more detail under Section 3.1.

- *Belmont Street at West Street*. A total of thirty-two (32) crashes were reported for the Belmont Street/West Street signalized intersection – approximately 11 per year – resulting in a crash rate of 1.15. The majority of reported crashes at the intersection angle-type collisions (63%) resulting in property-damage only (63%) and occurring under dry pavement conditions (75%). The majority (81%) of crashes occurred outside of the peak commuting periods. Intersection safety and capacity improvements are planned for this location by MassDOT (project No. 608088) as described in more detail under Section 3.1. Proponent-sponsored improvements are also identified in Section 5.0 along this stretch of Belmont Street that include signal equipment upgrades that are consistent with the longer range MassDOT improvements and that will enhance capacity and safety.

- *Forest Ave at Manomet Street/Bouve Ave*. Twenty-six (26) crashes were reported for the Forest Avenue/Manomet Street/Bouve Avenue signalized intersection – approximately 9 per year – resulting in a crash rate of 1.23. The majority of reported crashes at the intersection were rear-end and angle-type collisions (77%) and occurring under dry pavement conditions (88%). The majority (69%) of crashes occurred outside of the peak commuting periods. Half of the crashes resulted in property damage only while the remaining half of the crashes resulted in personal injury. As described under *Recommendations*, the Proponent proposes to implement signal equipment updgrades and signal timing improvements at the Forest Ave at Manomet Street/Bouve Ave intersection that are aimed at improving safety and operations at this location.

- *Forest Ave at Warren Ave.* A total of thirty-four (34) crashes were reported for the Forest Ave/Warren Street signalized intersection – approximately 11 per year – resulting in a crash rate of 1.53. The intersection is ranked #53 on MassDOT's *2010 Top 200 Crash Locations Report*. The majority of reported crashes at the intersection were angle-type collisions (65%) that occurring under dry pavement conditions (62%) outside of the peak commuting periods. Fourteen (14) of the crashes (41%) resulted in property damage only and twenty (20) of the crashes (59%) of the crashes resulted in personal injury. As described under *Recommendations*, the Proponent proposes to implement signal equipment upgrades, signal timing improvements and pedestrian crossing improvements at the Forest Ave/Warren Street intersection that are aimed at improving safety and operations at this location.

- *Forest Ave at Main Street*. A total of eighteen (18) crashes were reported for the Forest Ave/Main Street unsignalized intersection – approximately 9 per year – resulting in a crash rate of 0.85. The majority of reported crashes at the intersection were angle-type collisions (72%) resulting in property-damage only (56%) and occurring under dry pavement conditions (67%). The majority (89%) of crashes occurred outside of the peak commuting periods. As described under *Recommendations*, the Proponent proposes to implement signal equipment upgrades, signal timing improvements and pedestrian crossing improvements at the Forest Ave/Main Street intersection that are aimed at improving safety and operations at this location.

2.6 PUBLIC TRANSPORTATION FACILITIES

The Brockton Regional Transportation Authority (BAT) currently operates bus service to the site vicinity with connections to various regional transit connections at the BAT Centre in Brockton, thereby presenting an opportunity for alternative travel modes to the project Site. The BAT Centre in Brockton serves as a hub for additional regional BAT bus service and the MBTA Old Colony Lines commuter rail service. **Figure 6** presents the existing public transportation facilities in the area with specific route and schedule information for all available services through the BAT Centre is provided in the **Appendices**.

Specific BAT bus routes currently operate in the immediate area of the Site as follows:

- **BAT Route 3:** Bus Route 3 runs from the BAT Centre to the VA Hospital via Belmont Street. The bus route passes immediately in front of the Site along Belmont Street. Service generally runs M-F 6:00am to 9:00pm, Saturdays 7:00am to 9:00pm, and Sundays 11:00am to 6:30 pm.

- **BAT Route 9:** Bus Route 3 runs from the BAT Centre to Stonehill via Belmont Street, Torrey Street, and West Street. The bus route passes near Site with the closet stop at the Torrey Street intersection with West Street. Service generally runs M-F 6:00am to 6:00pm with no weekend service.

- **BAT Route 13 (Mini Maller):** Bus Route 13 runs from the BAT Centre to the Westgate Mall via Belmont Street, Torrey Street, and West Street. The bus route passes near Site with the closet stop at the Belmont Street intersection with West Street. Service generally runs M-F 9:30am to 4:30pm, Saturdays 10:30am to 5:30pm with no Sunday service.

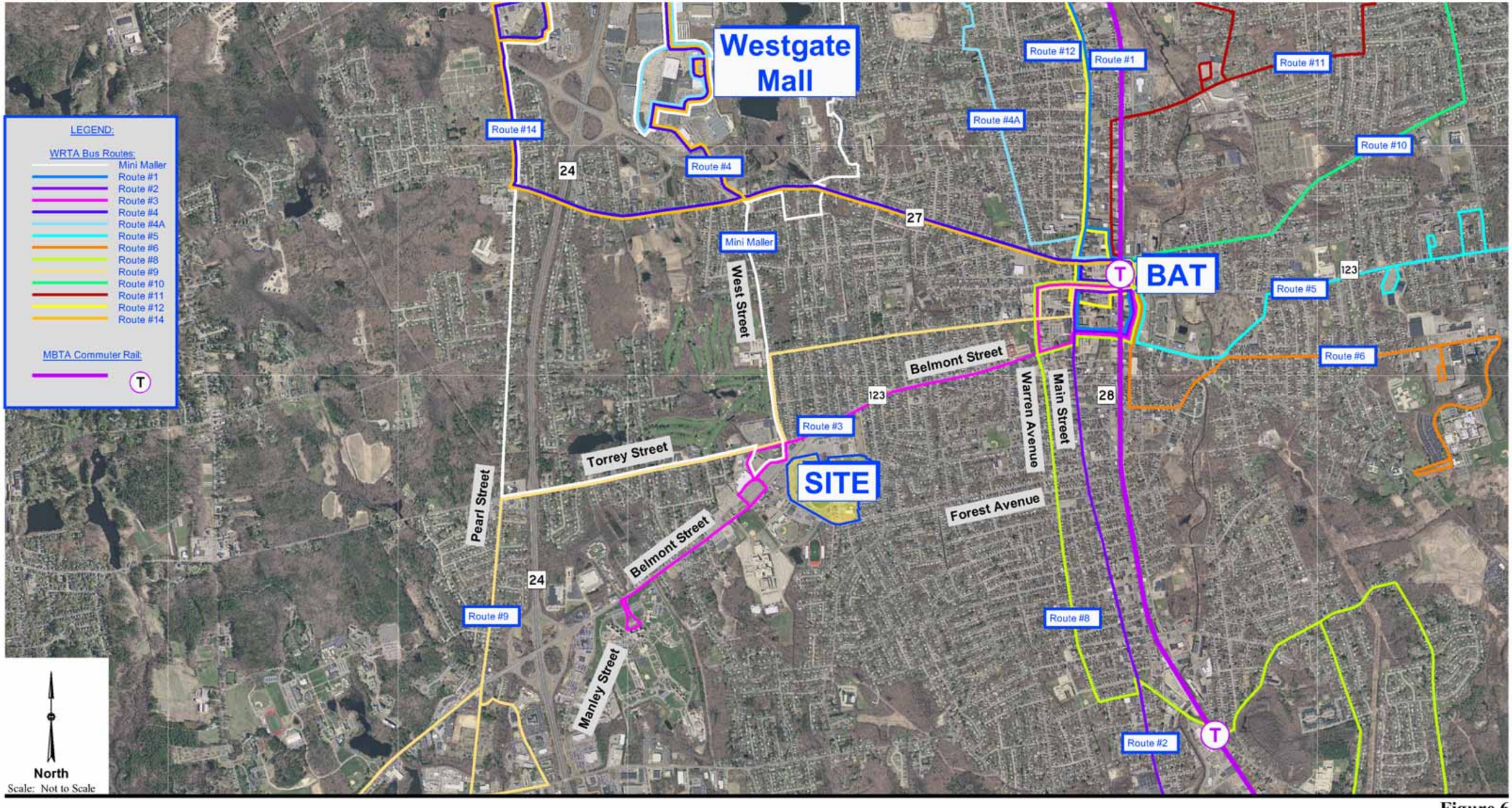

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Figure 6

Brockton Area Transit Authority Map

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3.0 FUTURE CONDITIONS

Evaluation of the proposed development impacts requires the establishment of a future baseline analysis condition. This section estimates future roadway and traffic conditions with and without the proposed development. Current EEA/MassDOT guidelines require a minimum 7-year planning horizon; for purposes of this study a 10-year horizon was selected as a conservative measure and consistency with submissions of other gaming facility applications in Massachusetts.

To determine the impact of Site-generated traffic volumes on the roadway network under future conditions, baseline traffic volumes in the study area were projected to a future year condition. Traffic volumes on the roadway network at that time, in the absence of the development (that is, the No-Build condition), would include existing traffic, new traffic due to general background traffic growth, and traffic related to specific development by others that is currently under review at the local and/or state level. Consideration of these factors resulted in the development of No-Build traffic volumes. Anticipated Site-generated traffic volumes were then superimposed upon these No-Build traffic-flow networks to develop future Build conditions.

The following sections provide an overview of planned roadway improvement, future No-Build traffic volumes and projected Build traffic volumes.

3.1 STUDY AREA ROADWAY IMPROVEMENTS

This section provides an overview of roadway improvements in the study area that are currently programmed and under construction, planned for future implementation or that have been identified as recommendations in recent studies based on consultation with MassDOT, the Old Colony Planning Council and City of Brockton. For discussion purposes, the identified improvements are categorized and described as (a) MassDOT improvements that have been funded and are pending construction; (b) MassDOT planned improvements that are subject to funding allocation under the state's Transportation Improvement Program (TIP), and (c)

recommended roadway improvements under the OCPC Southwest Corridor Study. A key map showing the locations for each of these roadway improvement categories is presented in **Figure 7** for reference; a summary of improvements is provided below.

MassDOT Funded Corridor Improvements

MassDOT has completed design and has allocated funding for roadway, traffic signal and pedestrian/bicycle improvements along the Belmont Street corridor (MassDOT project Numbers 608025 and 606036) as highlighted on **Figure 7** in green. The project limits include Belmont Street from the Route 24 ramps through Angus Beaton Drive, the signalized intersections of Belmont Street with Manley Street, VA Hospital Driveway, and Angus Beaton Drive and the unsignalized intersection of Belmont Street with Linwood Street/Lorraine Avenue. These projects have a combined estimated construction cost of approximately $6.5 million and are funded through the State's Transportation Improvement Program (TIP). Construction on project No. 606025, which includes the portion of Belmont Street from Route 24 to the VA Hospital, is scheduled to begin in summer 2015. Project No. 608036 is currently in the final design stage with construction planned for Spring 2016. Available design plans showing specific work to be completed are included in the **Appendices** and include the following features:

- **Roadway Widening**: Widening and geometric improvements on Belmont Street within the project limits to provide turn lanes at major intersections and Complete Streets design standards including 4-foot wide paved shoulders for bicycle accommodation and reconstruction of sidewalks to ADA-compliant standards. A dedicated bus turnout area is also proposed along the eastern side of Belmont Street just east of Angus Beaton Drive.

- **Traffic Signal Upgrades:** Upgrade of existing traffic signal equipment at the intersections of Manley Street and VA Hospital including new controller cabinets and bases, mast arms, traffic signal heads, pedestrian signal heads, traffic signal conduit, pull-boxes, interconnection conduit and loop detection (vehicular and bicycle).

- **Signal Coordination:** Programmed traffic signal operation for actuated, coordinated traffic signal control for the Belmont Street intersections with Manley Street and VA Hospital Driveway for the weekday morning and weekday evening peak periods and full actuated traffic signal operations during all other time periods.

- **Linwood/Lorraine Improvements and Signalization:** Re-align the Linwood Street and Lorraine Street approaches to create a single four-way intersection with Belmont Street. Modify the Lorraine Street approach to provide additional turn lanes. Widening of Belmont Street to install a westbound left-turn lane. Install a fully actuated traffic signal control for the Belmont Street intersection with Linwood Street/Lorraine Avenue.

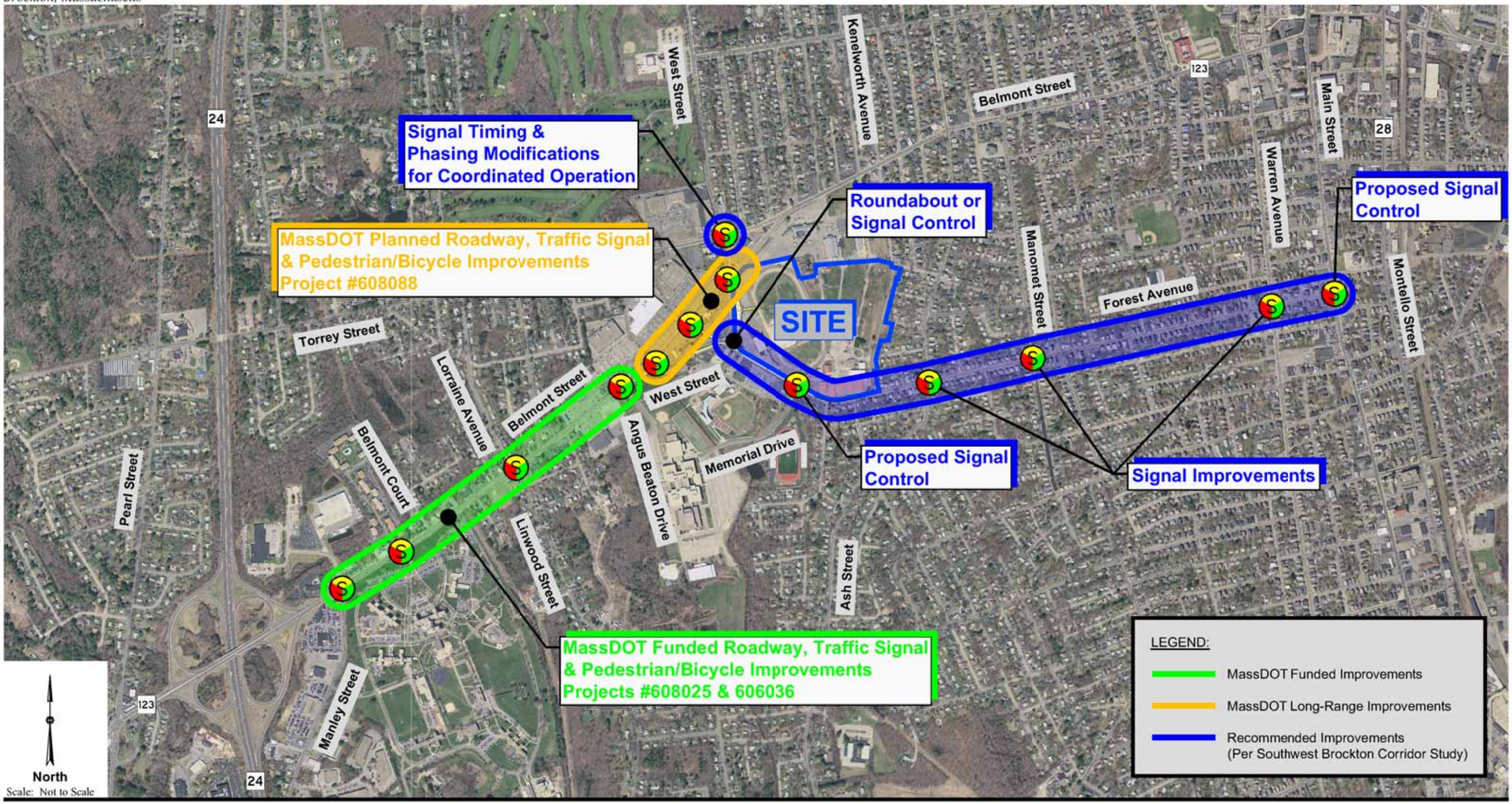

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Figure 7

Planned Area Improvements

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- **Angus Beaton/Belmont West Plaza Drive Improvements.** Modify the Belmont West Plaza Driveway and Angus Beaton Drive approaches to Belmont Street to improve lane geometry. Upgrade traffic signal operation to implement fully actuated traffic signal control for the Belmont Street intersections with Angus Beaton Drive. An optimized traffic signal phasing and timing plan will be implemented at the intersection.

MassDOT Planned Corridor Improvements

MassDOT has initiated preliminary design of the remaining portion of Belmont Street between Angus Beaton Drive and West Street as outlined in a Project Initiation Form (PIF) filed in October 2014 (MassDOT project No. 608088). The project limits are depicted in **Figure 7** in orange. This area represents the last section of Belmont Street in the corridor which is under MassDOT jurisdiction. The improvements are to include box widening and resurfacing along Belmont Street to provide a consistent cross section along the corridor to meet Complete Streets standards including shoulders for bicycle accommodation, sidewalk reconstruction and anticipated upgrades to traffic signals at West Street/Plaza Drive, Forest Avenue/Plaza Drive and West Street/Belmont Street. The estimated construction cost of the improvements is approximately $4 Million and is subject to the upcoming round of funding under the state's Transportation Improvement Program.

Old Colony Planning Council Recommended Improvements

As part of its *2014 Southwest Brockton Corridor Study*, the Old Colony Planning Council identified recommended transportation improvements along portions of the Belmont Street and Forest Avenue corridors. Specific improvement locations are shown in **Figure 7** in blue. These recommended improvements are identified for planning purposes as part of the Old Colony's Uniform Planning Work Program (UPWP) and have not advanced to the preliminary design or funding stages. The recommended improvements include the following:

- Update the traffic signal equipment and implement actuated coordinated traffic signal control for three locations along Belmont Street including both signalized intersections with West Street and the signalized intersection with Forest Avenue. (This improvement overlaps with MassDOT project No. 608088 described above under which this improvement is expected to be addressed).

- Upgrade of the traffic signal equipment to provide fully actuated traffic signal operation with optimized traffic signal timing plans for the signalized intersections of Forest Avenue with Ash Street, Manomet Street, and Warren Avenue.

- Reconstruct the West Street and Forest Avenue intersections to provide improved geometry including either signalized traffic operations or a modern roundabout.

- Install a fully actuated traffic signal and equipment at the intersection of Forest Avenue and Memorial Drive (Brockton High School). The inclusions of pedestrian crossings at the proposed traffic signal are highly desired to increase pedestrian mobility and safety at the High School driveway which includes a high pedestrian volume. This intersection was identified in the OCPC study as satisfying the MUTCD traffic signal warrants under existing conditions.

- Install a fully actuated traffic signal and equipment at the intersection of Forest Avenue and Main Street. This intersection was identified in the OCPC study as satisfying the MUTCD traffic signal warrants under existing conditions.

Given the lack of funding it is assumed that the improvement initiatives identified in the OCPC study will not be in place under the No-Build analysis condition in this study. However, the Proponent anticipates implementing access improvements that address most of the recommended improvements and further commits to work with the City to advance and implement additional improvements along Forest Avenue that are consistent with those recommended in the Southwest Brockton Corridor Study as described in more detail under *Section 5.0 Conclusions and Recommendations*.

3.2 BACKGROUND TRAFFIC GROWTH

Background traffic includes demand generated by other planned developments in the area as well as demand increases caused by external (regional) growth factors. External growth factors are general increases in traffic not attributable to a specific development and are determined using historical traffic data for permanent count stations in the region and growth patterns that are consistent with trends documented in the *2014 Southwest Brockton Corridor Study*.

3.2.1 Historical Area Growth

Nearby permanent count station data published by MassDOT indicates a declining (-0.4 percent per year) growth rate. For purposes of this evaluation, a 1.0 percent compounded annual growth rate was used (10.5 percent increase over a 10-year horizon). This growth rate is consistent with methodology used in the Southwest Brockton Corridor Study and represents a growth rate that is higher than historic rates. As such, application of this growth rate is expected to account for reasonable fluctuations in hourly traffic as may occur from time to time in the study area as well as traffic associated with other potential small developments or vacancies in the area. MassDOT permanent count station data and background growth calculations are provided in the **Appendices.**

3.2.2 Background Development-Related Growth

Development of future No-Build traffic volumes also considers traffic generated from specific area developments. Based on review of Massachusetts Environmental Policy Act (MEPA) files, there are currently no significant development projects planned to be completed in the study area in the near future.

3.3 NO-BUILD TRAFFIC VOLUMES

In summary, to account for future traffic growth in the study area future No-Build traffic volumes are developed by increasing the 2015 Baseline volumes by approximately 10.5 percent (1.0 percent compounded annually over 10 years). The resulting 2025 No-Build traffic volumes for the Friday evening and Saturday evening peak hours are displayed in **Figure 8** and **Figure 9**, respectively.

3.4 SITE-GENERATED TRAFFIC

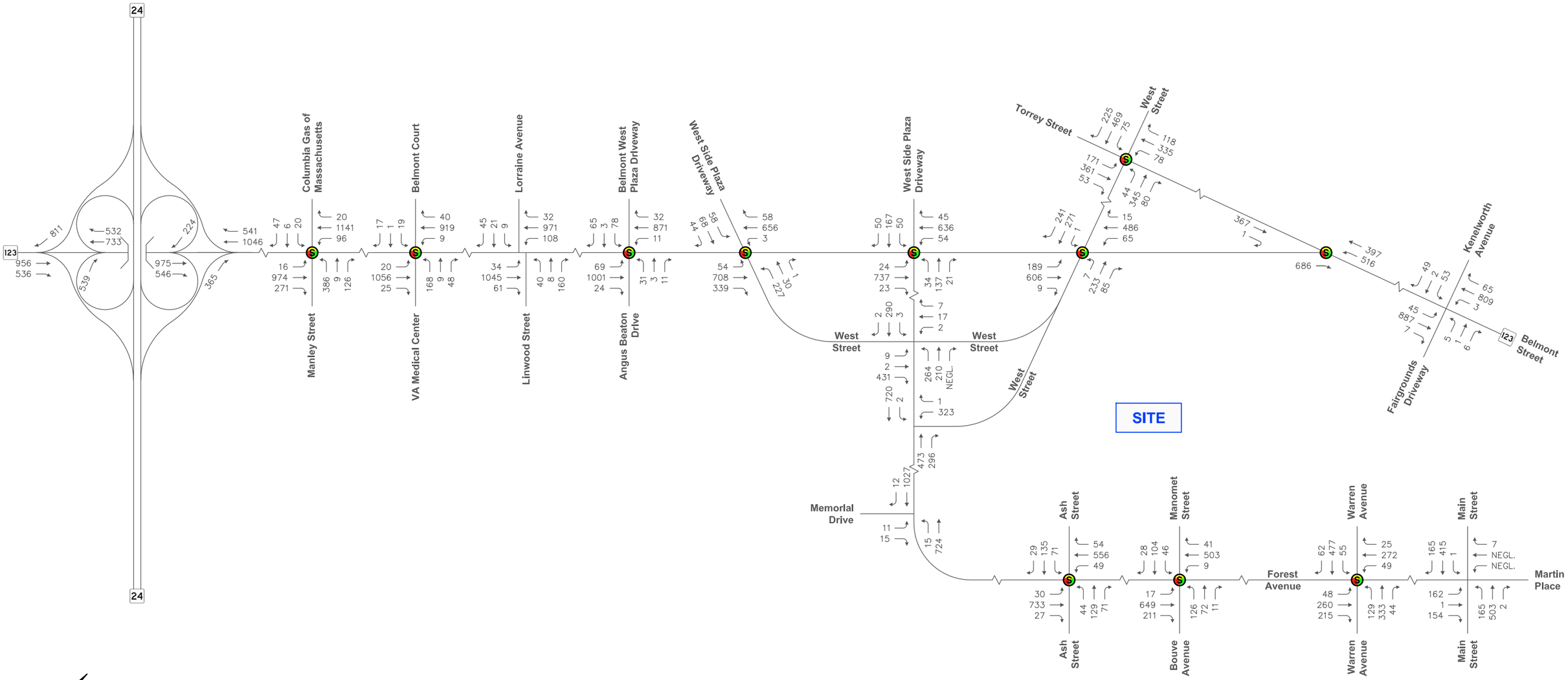
Traffic generation characteristics for the proposed Category 1 Casino are estimated based on available trip generation data for several similar size/venue gaming facilities located in the eastern United States, including a Proponent-affiliated facility in Philadelphia, Pennsylvania. Trip rates per gaming-position are developed to allow a uniform comparison of trip characteristics among the surveyed facilities. Detailed hourly trip data for the Proponent's Pennsylvania facility as well as a comparable casino as documented in the *ITE Journal*[4] provide the basis for determining hourly trip characteristics for the proposed facility for planning purposes. Casino facilities that serve as the basis for estimating trip activity for the Site are described below. Summary trip data for the surveyed facilities are included in the **Appendices**.

Empirical Casino Trip Data

Empirical data for several casino facilities with programming similar to the proposed Fairgrounds facility are considered in determining likely traffic characteristics for the Site that including the following:

- *Sugarhouse Casino, Philadelphia, PA:* The Sugarhouse Casino is a Proponent-affiliated facility that has approximately 1,956 gaming positions comprising slot machines and table games. Surveys of this facility were conducted in June 2012 as documented in a traffic impact assessment for Sugarhouse Casino[5] which include peak Friday and Saturday trip data and hourly Automatic traffic recorder (ATR) data.

[4] *ITE Journal/ March 1998, Gaming Casino Traffic*, by Paul C. Box and William Bunte.
[5] *Sugarhouse Casino Traffic Impact Assessment Report*, prepared by Urban Engineers, Inc. dated February 27, 2013.



NOTES:
NEGL. = Negligible
S = Signalized Intersection

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Figure 8

2025 No-Build Friday Evening Peak Hour Traffic Volumes

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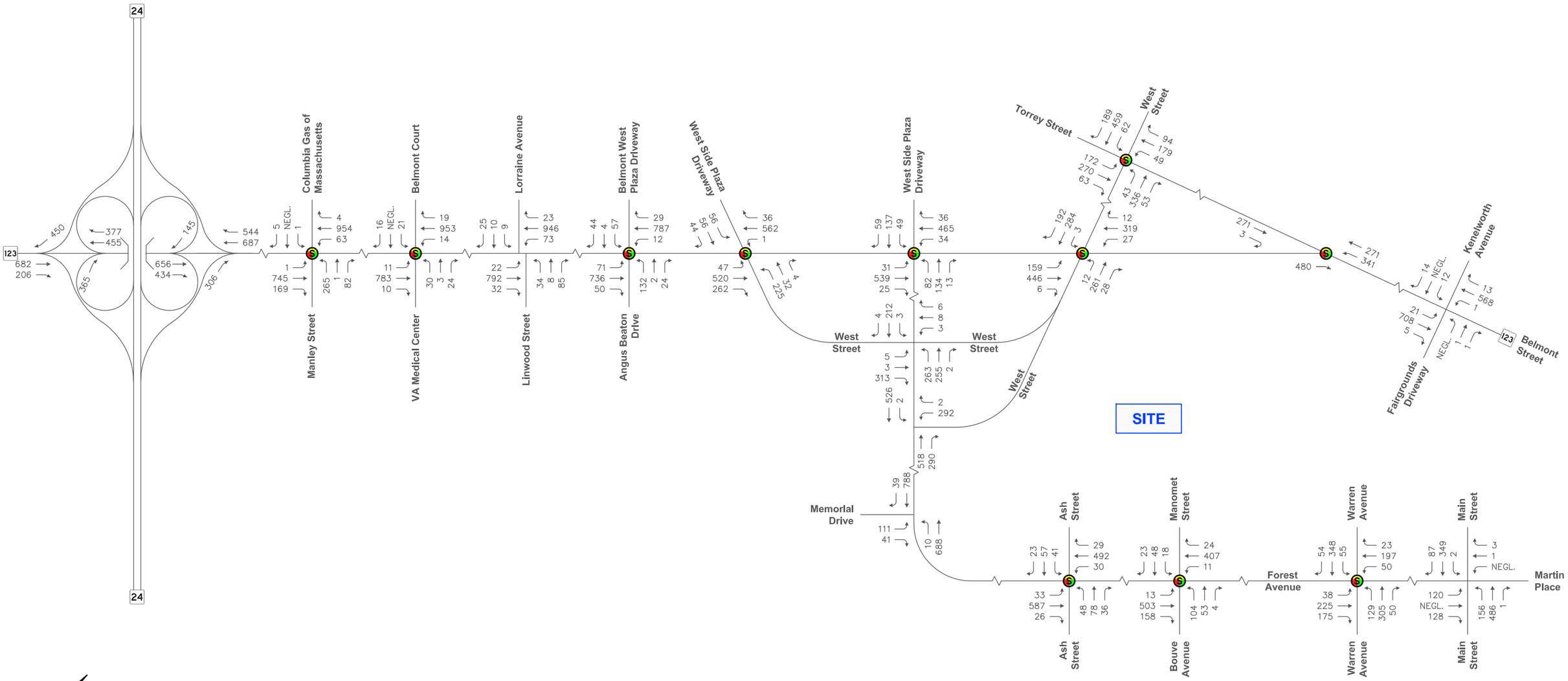

North
Scale: Not to Scale

NOTES:
NEGL. = Negligible
S = Signalized Intersection

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Figure 9

2025 No-Build Saturday Evening Peak Hour Traffic Volumes

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- *Twin River Casino, Lincoln, RI:* The Twin River Casino has approximately 4,700 slot machines and associated (ancillary) restaurant and entertainment venues. Twin River Casino also offers simulcasting of horse and greyhound racing. Trip data for this facility were collected in March 2012[6] for weekday and weekend periods.

- *Casino St. Charles, Metro Saint Louis, Il*: Located in the St. Louis metropolitan area, the Casino St. Charles has approximately 2,500 gaming positions of which the vast majority (80 percent) are video poker machines. Surveys of this facility were conducted for weekdays and weekends in 1995 as documented in the *ITE Journal*. Average seasonal trip rates for this facility serve as the basis for trip rates presented in this section and are based on trends as summarized in the *ITE Journal* publication.

- *First Light/Mohegan Sun Trip Rates*: Trip rate data published for a nearby proposed Casino facility (First Light)[7] is considered as an additional comparable facility; trip generation estimates for this facility are primarily based on empirical trip generation characteristics of Mohegan Sun Resort and Casino located in New England (Connecticut).

Empirical trip data for the above casino gaming facilities are summarized using gaming positions as the independent variable to derive trip rates for peak facility operations; peak facility operations are documented to occur on Friday evenings and Saturdays evening periods. **Table 4** provides a summary of resulting peak period trip rates for the surveyed casino facilities and trip rates from comparable facilities.

[6] *DEIR, Plainridge Racecourse, EOEA 11431*, prepared by Tilton Associates, December 2012.
[7] DEIR, Project First Light Destination Resort Casino, located in Taunton MA, prepared by Epsilon Associates dated 5/15/2013

TABLE 4
EMPIRICAL TRIP RATES – CASINO GAMING FACILITIES
4:00 – 5:00 PM

		Vehicle-Trips		Trip Rate (Per Gaming Position)	
Facility	Gaming Positions	Friday Peak	Saturday Peak	Friday Peak	Saturday Peak
Proponent-affiliated Facility					
Sugarhouse Casino[1]	1,956	626	567	0.32	0.29
St. Louis Facility (ITE Journal)					
Casino St. Charles[2]	2,500	978	1,300	0.39	0.52
East Coast Facilities					
Twin River Casino[3]	4,700	1,397	1,643	0.29	0.35
Proposed First Light[4]	4,500	1,710	1,580	0.28	0.31
			Average Trip Rate Used for Analysis:	**0.32**	**0.37**

[1] June 2012 count data as reported in *Sugarhouse Casino Traffic Impact Assessment Report*, prepared by Urban Engineers, Inc. dated February 27, 2013.
[2] January 1995 count data adjusted to average season casino operating conditions; derived from *ITE Journal/ March 1998, Gaming Casino Traffic*, by Paul C. Box and William Bunte.
[3] March 2012 count data as reported in *DEIR, Plainridge Racecourse, EOEA 11431*, prepared by Tilton Associates, 12/2012.
[4] DEIR, Project First Light Destination Resort Casino, located in Taunton MA, prepared by Epsilon Associates dated 5/15/2013

As summarized in **Table 4**, facility trip generation rates for which current data is available are highly consistent among casinos located in the eastern United States inclusive of the Proponent-affiliatedSugarhouse Casino facility in Pennsylvania, averaging 0.29 to 0.35 vehicle-trips per gaming position. Trip rates based on the St. Louis casino location as documented in ITE Journal is notably higher with 0.39 to 0.52 vehicle-trips per gaming position; this higher rate is potentially the result of survey data that reflected a lack of competing casino uses in the St. Louis area in the mid 1990's. For analysis purposes, an average of the four (4) casino venues were used for the Casino portion of the development result in 0.32 trips per gaming position (0.14 inbound trips/ 0.18 outbound trips) for a peak weekday evening peak period (Friday evening scenario) and result in 0.37 trips per gaming position (0.18 inbound trips/0.19 outbound trips) for a peak Saturday evening peak period.

The empirical trip rates include trip activity associated with restaurant and entertainment venues at comparable gaming facilities including the Pennsylvania facility that is affiliated with the Proponent.

Projected Trip Generation

Projected trip generation for the Brockton Fairgrounds Category 1 casino facility are estimated using the average per-gaming-position trip rates summarized in **Table 4**, which include activity associated with ancillary facilities such as restaurants and entertainment venues. As a conservative measure, additional trip activity is estimated for the hotel component; however, trip activity for this portion of the development will be attributed almost exclusively to casino patrons and is inherently included in the average trip rates cited in **Table 4**. Trip rates published in ITE's *Trip Generation*[8] for land use code (LUC) 330 *Resort Hotel* present the best-fit category for the proposed hotel, which is described in ITE *Trip Generation* as follows:

> *"Resort Hotels are similar to hotels in that they provide sleeping accommodations, restaurants, cocktail lounges, retail shops, and guest services. The primary difference is that resort hotels cater to the tourist and vacation industry, often providing a wide variety of recreational facilities/programs….Resort hotels are normally located in suburban or outlying location on larger sites than conventional hotels."*

Table 5 presents the trip-generation estimates for the proposed development based on trip generation rates presented in **Table 4** applied to the 3,000 total gaming positions proposed at the site and ITE trip generation rates for a Resort Hotel applied to 300 occupied rooms.

TABLE 5
TRIP-GENERATION
PROPOSED BROCKTON DESTINATION CASINO

	Site Trips[1]		
Period/Direction	**Casino**	**Hotel**	**Total**
Friday Evening Peak Hour (4-5PM)			
Entering	420	63	483
Exiting	540	84	624
Total	960	147	1,107
Saturday Evening Peak Hour (4-5PM)			
Entering	540	146	686
Exiting	570	155	725
Total	1,110	301	1,411
Friday Daily (24 hrs)	15,484	1,874	17,358
Saturday Daily (24 hrs)	18,500	4,030	22,530

[1] Based on average trip rates presented in **Table 4** applied to 3,000 gaming positions and ITE LUC 330 applied to 300 occupied rooms.

[8] *Ibid*

As summarized in **Table 5**, the proposed development is estimated to generate approximately 1,107 vehicle trips during the weekday (Friday) evening peak hour design hour (483 entering and 624 exiting). On a Saturday evening peak hour the proposed development is estimated to generate approximately 1,411 vehicle trips (686 entering and 725 exiting).

Noteworthy is that casino trip generation during most weekdays (Monday through Thursday) is expected to be up to 30 percent lower than these projections based on the Proponent's operational data for other affiliated casino facilities.

Hourly Trip Characteristics

For planning purposes, hourly trip characteristics for Site-generated trips are expected to follow patterns that are documented for the St. Louis facilities in the *ITE Journal,* as these hourly patterns are generally consistent with the Proponent-affiliated Philadelphia casino patterns but are also slightly more conservative (i.e., show higher proportion of trip activity during early evening peak hours). These patterns show peak trip activity for casino use occurs during early evening hours between 4 PM and 7 PM.

Documented and empirical trip patterns for casino uses support the selection of a Friday evening peak design hour and Saturday evening peak hour as documented in this TIAS, which represent the highest combination of Site trip activity and adjacent street traffic activity. While the Saturday evening trip rate is slightly higher for the casino, traffic volumes data for Belmont Street are approximately 30% less on Saturday peak hours than the Friday evening design hour used in this study. Detailed hourly distribution calculations and graphs are provided in the **Appendix**. For reference, **Figure 10** presents a graphical summary of the projected hourly traffic volumes on Belmont Street, indicating that the weekday (Friday) evening period from 4 PM to 5PM represents the critical "Design Hour" condition – i.e., the highest volume condition when compared to average Friday and peak weekend periods.

3.5 TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of development-generated trips on the roadway network is a function of a number of variables including market area population density, competing facilities, proprietary market demographic data and the travel time efficiency of roadways serving the Site. Trip distribution for the proposed Category 1 Casino is based on a gravity model that includes these factors to approximate trip distribution for casino trip assignment. Communities located within a 90-minute market area were used for determining the trip distribution pattern for the proposed development. Supporting gravity model calculations are provided in the **Appendices.** A summary of regional and local trip distribution patterns for the Site based on the gravity model is provided in **Table 6** and presented in **Figure 11.** Local trip assignment to individual site driveways is based on proximity and distribution of site parking spaces with resulting trip assignment presented in **Figure 12**.

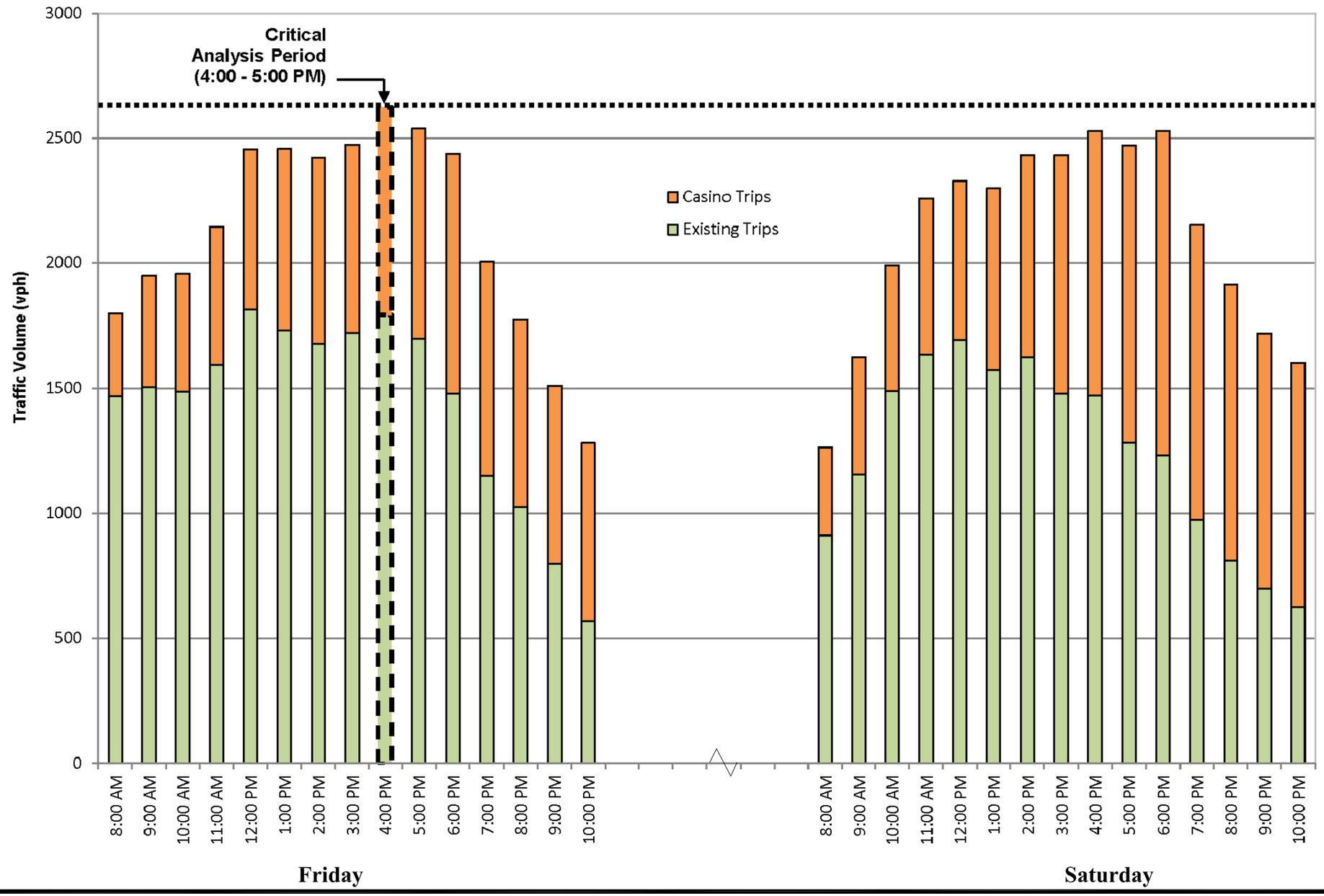

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Figure 10

Hourly Traffic Volumes
(Belmont Street to the west of West Street)

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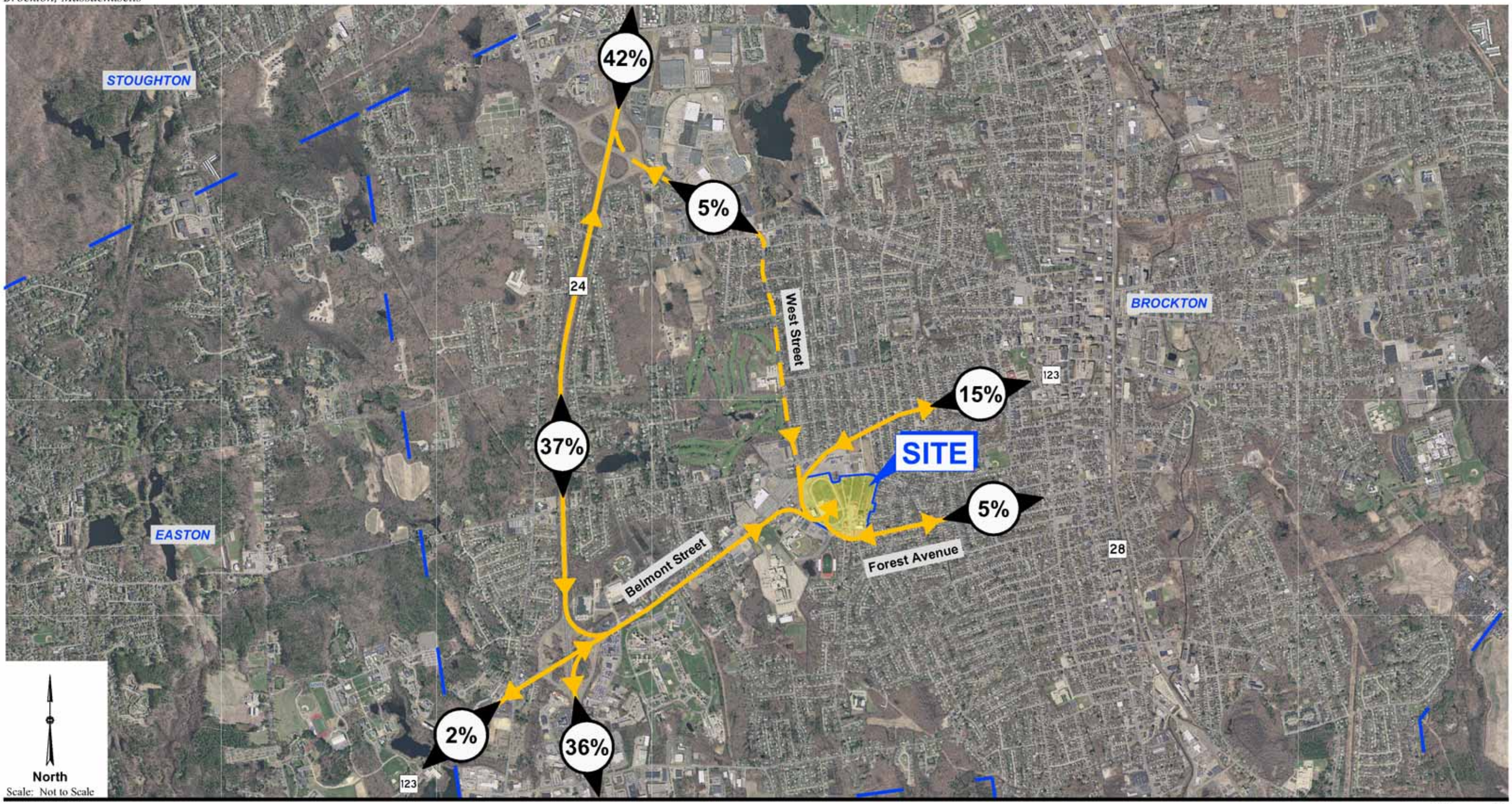

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Figure 11

Regional Trip Distribution Patterns

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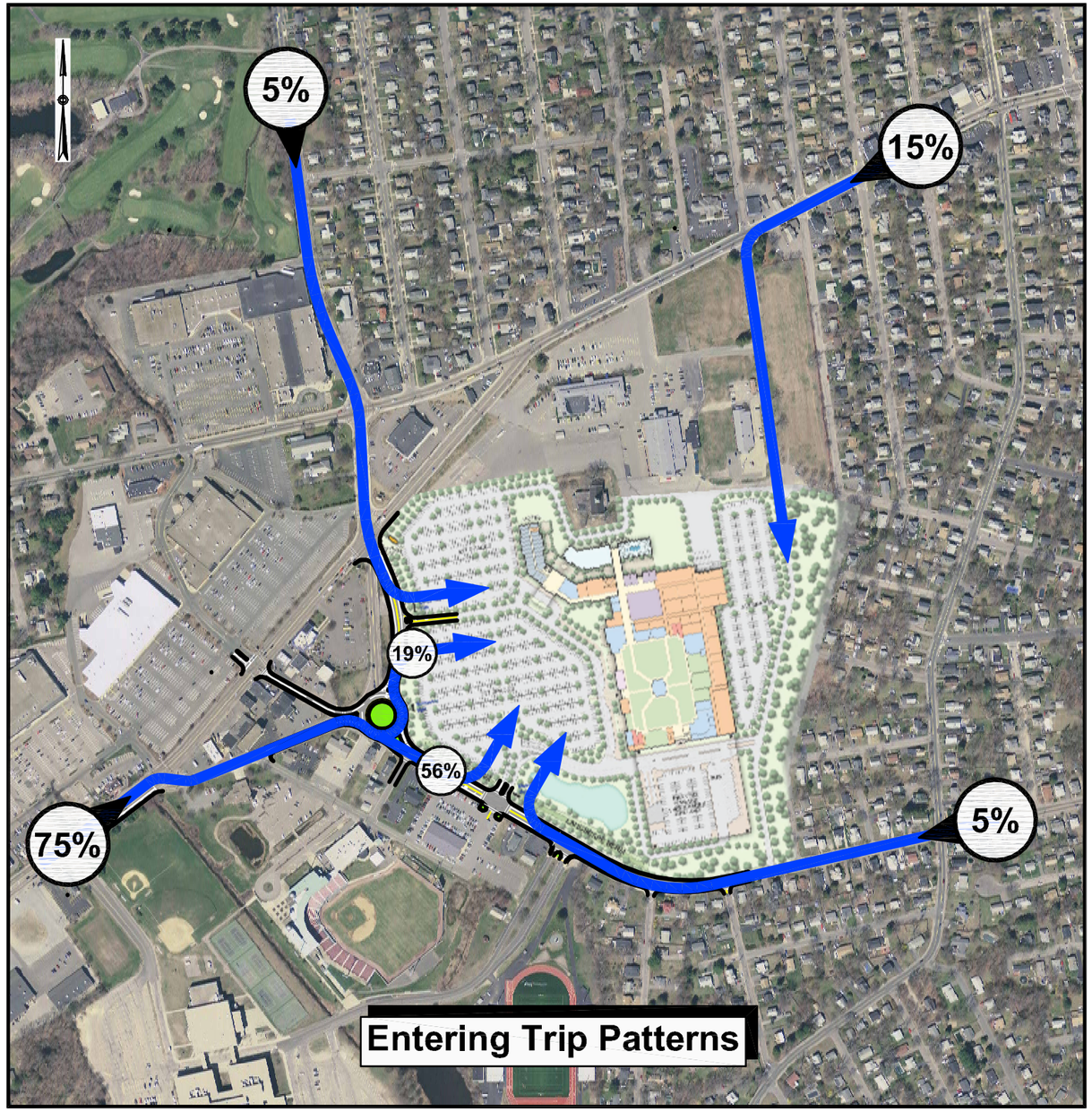

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Figure 12

Local Trip Distribution Patterns

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TABLE 6
TRIP-DISTRIBUTION PATTERNS

Roadway Segment (To/From)	Trip Percentage[1]
Route 24 (North)	42%
Route 24 (South)	36%
Route 123 (East)	15%
Route 123 (West)	2%
Forest Avenue (East)	5%
TOTAL	**100%**

[1]Based on Population Densities within a 90 minute travel time, weighted by market zone and travel propensity. Refer to Appendices for gravity model inputs and projections.

As summarized in **Table 6**, gravity modeling results indicate that trip activity for the proposed facility will be principally oriented to the Route 24 corridor which accounts for approximately 78 percent of the trips, followed by the Route 123 corridor to/from the east (15 percent) and the Forrest Avenue corridor (5 percent).

Regional distribution of trips along Route 24 has a higher orientation to/from the north (42 percent) than from the south (36 percent) due to slightly higher market population densities and proprietary market demographic data; the distribution also factors in travel times for various route options and existing competing casino facilities in Rhode Island (Twin River Casino), Connecticut (Foxwood Casino, Mohegan Sun Casino) and the planned Massachusetts casino facilities in Springfield and Everett. The regional trip distribution along Route 24 to/from the north is also informed by traffic-calibrated GPS route assignment and travel time runs for peak weekday evening periods, which indicates that most trips will be oriented to the Belmont Street (Route 123) interchange; a small percentage of trips from the north are assigned to the Route 27 interchange and West Street corridors representing 5% of total casino trips. Supporting travel time run data are included in the **Appendices.** Trip distribution from communities east of the Site are assumed to be oriented principally to the Belmont Street corridor, though population density for this segment of the regional market is relatively modest and a substantial proportion of trips generated along this roadway are expected to be from employees, assuming a local hiring preference for the casino.

Site Trip Assignment

Site-generated trips are assigned to the roadway network using the trip-generation estimates presented in **Table 5** and the trip distribution patterns summarized in **Table 6.** Site-generated peak hour trips for each study intersection for the Friday evening and Saturday evening peak hours are identified in **Figure 13** and **Figure 14**.

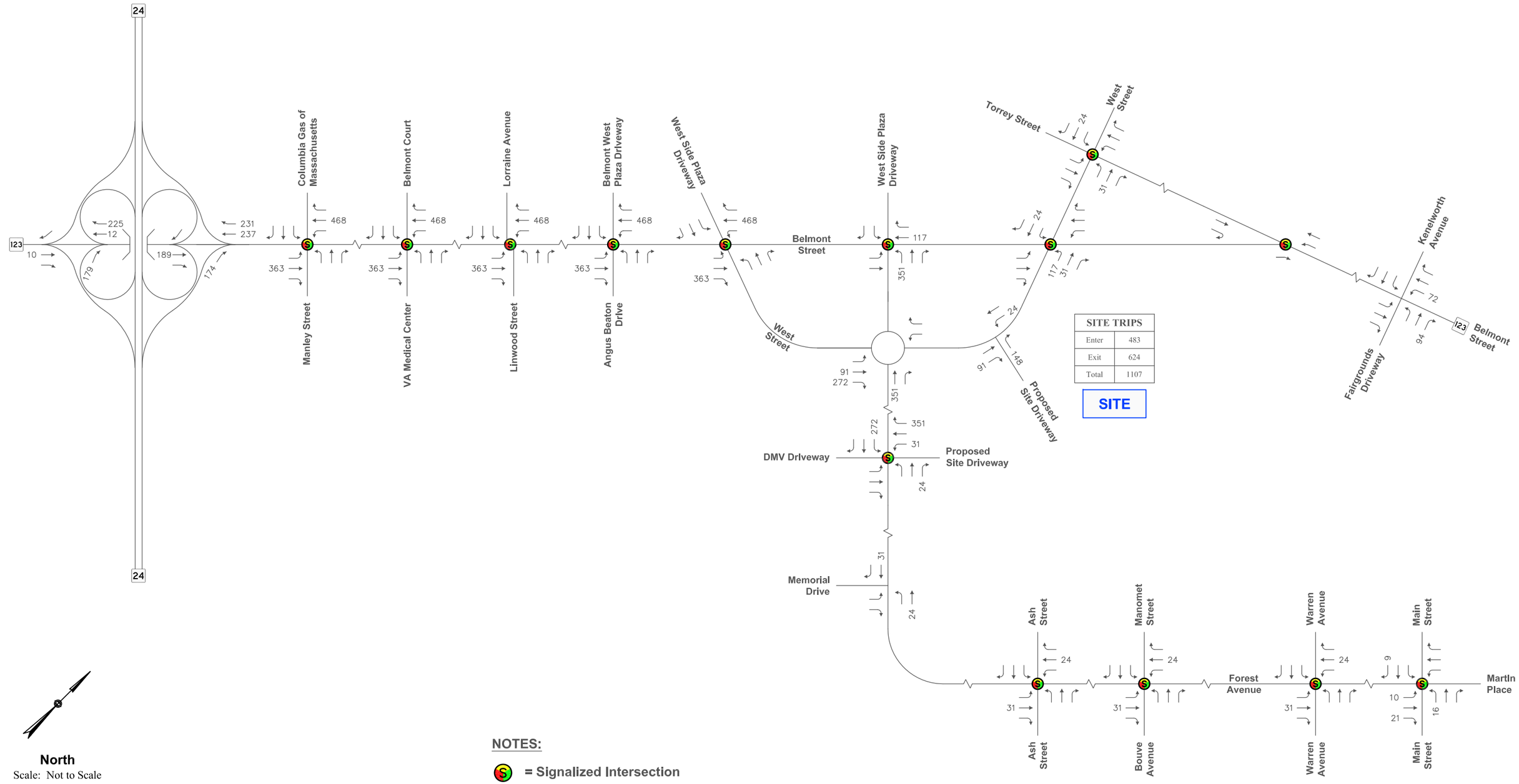

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Figure 13

Site Generated Trips Friday Evening Peak Hour Traffic Volumes

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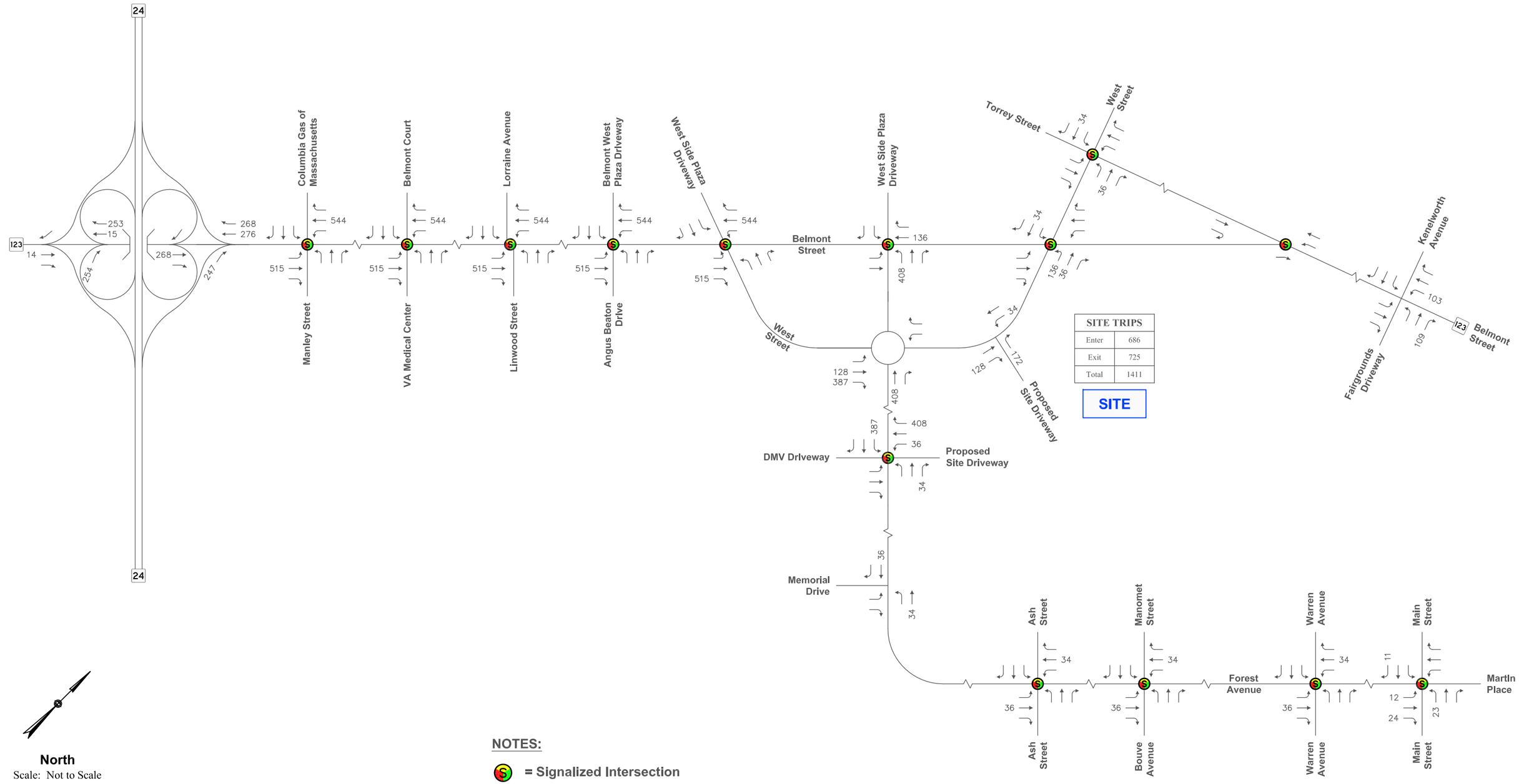

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Figure 14

Site Generated Trips Saturday Evening Peak Hour Traffic Volumes

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3.6 BUILD TRAFFIC VOLUMES

Future Build condition traffic volumes were arrived at by adding development-specific traffic volumes to the 2025 No-Build conditions. The 2025 Build condition traffic-volume networks for the Friday evening and Saturday evening peak hours are displayed in **Figure 15** and **Figure 16**.

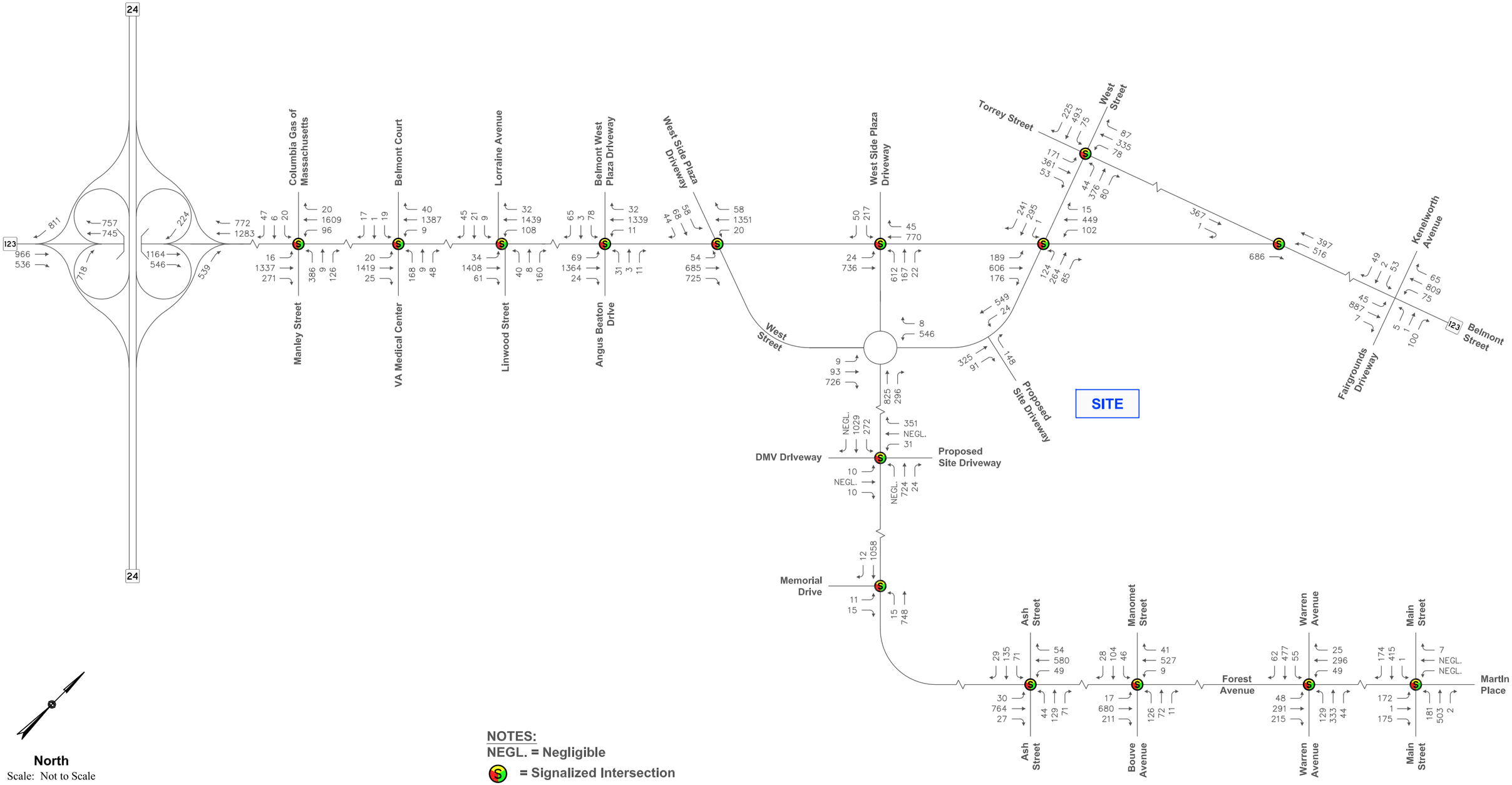

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Figure 15

2025 Build Friday Evening Peak Hour Traffic Volumes

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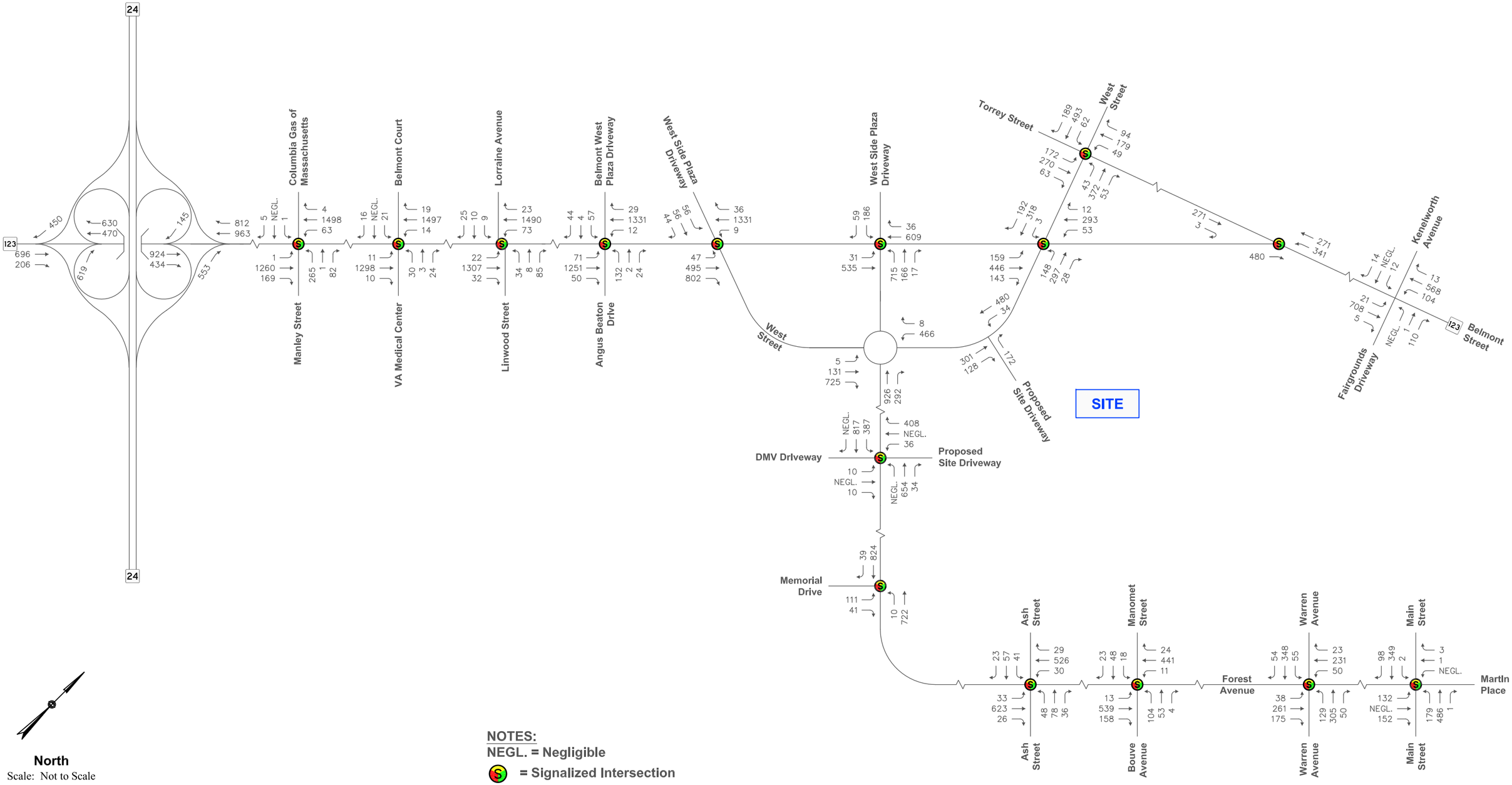

North
Scale: Not to Scale

NOTES:
NEGL. = Negligible
S = Signalized Intersection

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Figure 16

2025 Build Saturday Evening Peak Hour Traffic Volumes

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4.0 TRAFFIC OPERATIONS ANALYSIS

Intersection capacity analyses for the primary study intersections are presented in this section for the Baseline, No-Build, and Build traffic-volume conditions. Capacity analyses, conducted in accordance with EEA/MassDOT guidelines, provide an index of how well the roadway facilities serve the traffic demands placed upon them. The operational results provide the basis for recommended access and roadway improvements in the following section.

4.1 CAPACITY ANALYSIS PROCEDURES

Capacity analysis of intersections is developed using the Synchro® and Sidra® computer software, which implement the methods of the Highway Capacity Manual (HCM). The resulting analysis presents a level-of-service (LOS) designation for individual intersection movements. The LOS is a letter designation that provides a qualitative measure of operating conditions based on several factors including roadway geometry, speeds, ambient traffic volumes, traffic controls, and driver characteristics. Since the LOS of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of LOS, depending on the time of day, day of week, or period of year. A range of six levels of service are defined on the basis of average delay, ranging from LOS A (the least delay) to LOS F (delays greater than 50 seconds for unsignalized movements and 80 seconds for signalized movements). The specific control delays and associated LOS designations are presented in the **Appendices.**

4.2 INTERSECTION ANALYSIS RESULTS

Capacity analysis results for the Friday evening and Saturday evening peak hours for the study intersections are described below, with detailed capacity and queuing analysis results presented in the **Appendices**.

4.2.1 Level of Service Analysis

The capacity analysis results for the intersections in the study area are summarized in **Table 7** and **Table 8** for the Friday evening and Saturday evening peak hours, respectively. Detailed capacity analysis results are presented in the **Appendices**.

TABLE 7
INTERSECTION CAPACITY ANALYSIS RESULTS
FRIDAY EVENING PEAK HOUR

		2015 Baseline			2025 No-Build[4]			2025 Build (w/ Mitigation)[5]		
Intersection	**Approach**	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
1 – Belmont Street	Eastbound	0.98	50	D	0.83	28	C	0.91	33	C
(Route 123) at	Westbound	0.88	22	C	0.69	18	B	0.83	21	C
Manley Street/	Northbound	>1.0	>80	F	0.86	50	D	0.91	67	E
Columbia Gas	Southbound	0.18	13	B	0.45	27	C	0.59	43	D
	Overall	**>1.0**	**56**	**E**	**0.86**	**28**	**C**	**0.91**	**32**	**C**
2 - Belmont Street	Eastbound	0.61	11	B	0.52	7	A	0.66	<5	A
(Route 123) at	Westbound	0.54	10	A	0.46	8	A	0.63	8	A
VA Hospital/Belmont	Northbound	0.52	19	B	0.69	38	D	0.77	55	D
Court	Southbound	0.06	12	B	0.08	20	C	0.09	30	C
	Overall	0.61	11	B	**0.69**	10	**A**	**0.77**	**9**	**A**
3 - Belmont Street	Eastbound	0.05	<5	A	0.76	20	C	0.77	7	A
(Route 123) at	Westbound	0.16	<5	A	0.45	8	A	0.66	8	A
Linwood Street/	Northbound	>1.0	>50	F	0.33	19	B	0.58	43	D
Lorraine Avenue	Southbound	>1.0	>50	F	0.31	19	B	0.47	35	C
	Overall	**n/a**	**n/a**	**n/a**	**0.76**	**15**	**B**	**0.77**	**10**	**A**
4 - Belmont Street	Eastbound	0.41	12	B	0.46	12	B	0.59	11	B
(Route 123) at	Westbound	0.44	15	B	0.48	16	B	0.69	5	A
Angus Beaton Drive/	Northbound	0.25	34	C	0.25	34	C	0.20	27	C
Belmont West Plaza	Southbound	0.34	23	C	0.34	23	C	0.71	40	D
	Overall	**0.44**	**14**	**B**	**0.48**	15	**B**	**0.71**	**10**	**A**
5 - Belmont Street	Eastbound	0.37	47	A	0.38	7	A	0.57	<5	A
(Route 123) at	Westbound	0.44	15	B	0.49	15	B	0.74	12	B
West Street/	Northbound	0.69	34	C	0.71	34	C	0.00	24	C
West Side Plaza	Southbound	0.38	20	B	0.36	19	B	0.66	37	D
	Overall	**0.69**	**13**	**B**	**0.71**	**14**	**B**	**0.74**	**10**	**A**
6 - Belmont Street	Eastbound	0.34	5	A	0.38	5	A	0.53	12	B
(Route 123) at	Westbound	0.35	6	A	0.39	7	A	0.53	13	B
Forest avenue/	Northbound	0.74	46	D	0.78	50	D	0.91	40	D
West Side Plaza	Southbound	0.66	35	D	0.66	35	D	0.60	19	B
	Overall	**0.74**	**14**	**B**	**0.78**	**14**	**B**	**0.91**	**22**	**C**
7 - Belmont Street	Eastbound	0.68	14	B	0.73	17	B	0.67	6	A
(Route 123) at	Westbound	0.42	10	B	0.46	11	B	0.41	9	A
West Street	Northbound	0.58	19	B	0.63	21	C	0.78	39	D
	Southbound	0.48	12	B	0.53	13	B	0.66	20	B
	Overall	**0.68**	**13**	**B**	**0.73**	**15**	**B**	**0.78**	**16**	**B**

[1]Volume-to-capacity ratio
[2]Average control delay per vehicle (in seconds)
[3]Level of service
[4]No Build assumes implementation of programmed/funded improvements along Belmont Street by MassDOT.
[5]See Section 5.0 for description of mitigation.
na = Not Applicable

TABLE 7 (CONT.)
INTERSECTION CAPACITY ANALYSIS RESULTS
FRIDAY EVENING PEAK HOUR

		2015 Baseline			2025 No-Build[4]			2025 Build (w/ Mitigation)[5]		
Intersection	**Approach**	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
8 – Belmont Street	Eastbound	0.51	10	A	0.57	11	B	0.57	11	B
(Route 123) at	Westbound	0.44	6	A	0.49	6	A	0.49	6	A
Torrey Street	Southbound	0.71	32	C	0.76	34	C	0.76	34	C
	Overall	**0.71**	**12**	**B**	**0.76**	**13**	**B**	**0.76**	**13**	**B**
9 - Belmont Street	Eastbound	0.05	<5	A	0.06	<5	A	0.06	<5	A
(Route 123) at	Westbound	0.01	<5	A	0.01	<5	A	0.13	<5	A
Fairgrounds Driveway/	Northbound	0.10	45	E	0.14	>50	F	0.22	>50	F
Kenelworth Avenue	Southbound	0.10	>50	F	>1.0	>50	F	>1.0	>50	F
10 – West Street at	Eastbound	0.80	24	C	0.88	32	C	0.79	24	C
Torrey Street	Westbound	0.61	15	B	0.65	16	B	0.57	14	B
	Northbound	0.72	24	C	0.85	35	D	0.88	37	D
	Southbound	0.69	18	B	0.77	21	C	0.77	21	C
	Overall	**0.80**	**20**	**B**	**0.88**	**26**	**C**	**0.88**	**24**	**C**
11 - West Street at	Eastbound	0.73	23	C	0.81	31	E			
Forest Avenue	Westbound	0.68	21	C	0.06	11	D	Roundabout		
	Northbound	0.05	10	B	0.86	36	B	See Location 12 Below		
	Southbound	0.47	14	B	0.56	18	C			
12 - West Street at	Eastbound	>1.0	9	F	0.00	<5	A	0.30	11	B
Forest Avenue	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.39	<5	A
	Southbound	0.00	>50	A	>1.0	>50	F	0.41	6	A
13 – Forest Avenue at	EB L Exit	0.11	46	E	0.15	>50	F	0.08	30	C
Memorial Drive	EB R Exit	0.05	17	C	0.06	19	C	0.10	16	B
	Northbound	0.02	10	B	0.02	11	B	0.24	<5	A
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.35	<5	A
	Overall	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**0.35**	**<5**	**A**
14 - Forest Avenue at	Eastbound	0.73	15	B	0.82	19	B	0.85	20	B
Ash Street	Westbound	0.65	13	B	0.73	15	B	0.76	16	B
	Northbound	0.46	19	B	0.50	20	B	0.62	27	C
	Southbound	0.47	21	C	0.53	22	C	0.70	34	C
	Overall	**0.73**	**16**	**B**	**0.82**	**18**	**B**	**0.85**	**21**	**C**

[1]Volume-to-capacity ratio
[2]Average control delay per vehicle (in seconds)
[3]Level of service
[4]No Build assumes implementation of programmed/funded improvements along Belmont Street by MassDOT.
[5]See Section 5.0 for description of mitigation.
na = Not Applicable

TABLE 7 (CONT.)
INTERSECTION CAPACITY ANALYSIS RESULTS
FRIDAY EVENING PEAK HOUR

		2015 Baseline			2025 No-Build[4]			2025 Build (w/ Mitigation)[5]		
Intersection	**Approach**	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
15 – Forest Avenue at	Eastbound	0.68	11	B	0.87	20	C	0.85	19	B
Manomet Street/	Westbound	0.42	7	A	0.54	9	A	0.54	9	A
Bouve Avenue	Northbound	0.51	24	C	0.67	33	C	0.71	40	D
	Southbound	0.40	20	C	0.48	23	C	0.49	26	C
	Overall	**0.68**	**13**	**B**	**0.87**	**18**	**B**	**0.85**	**19**	**B**
16 - Forest Avenue at	Eastbound	0.78	25	C	0.87	32	C	0.85	31	C
Warren Avenue	Westbound	0.54	18	B	0.62	19	B	0.58	20	B
	Northbound	0.58	13	B	0.67	15	B	0.84	30	C
	Southbound	0.63	13	B	0.70	15	B	0.80	25	C
	Overall	**0.78**	**17**	**B**	**0.87**	**20**	**C**	**0.85**	**27**	**C**
17 – Forest Avenue at	Eastbound	>1.0	>50	F	>1.0	>50	F	0.86	40	D
Main Street/Martin Place	Westbound	0.07	12	B	0.02	13	B	0.01	<5	A
	Northbound	0.17	10	A	0.20	10	B	0.60	13	B
	Southbound	0.00	9	A	0.00	9	A	0.93	43	D
	Overall	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**0.93**	**30**	**C**
18 – Belmont Street at	Eastbound				Ramp Merge Junction					
Route 24 SB off-ramp to	Westbound				See Table 9 Below					
Belmont Street eastbound	NB R Exit									
(Exit 17A)	SB R Exit									
19 – Belmont Street at	Eastbound				Ramp Merge Junction					
Route 24 NB off-ramp to	Westbound				See Table 9 Below					
Belmont Street eastbound	NB R Exit									
(Exit 17A)	SB									
20 – West Street at	Westbound	n/a	n/a	n/a	n/a	n/a	n/a	0.21	11	B
Proposed Site Driveway	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.02	8	A
21 – Forest Avenue at	Eastbound	n/a	n/a	n/a	n/a	n/a	n/a	0.07	<5	A
Proposed Site Driveway	Westbound	n/a	n/a	n/a	n/a	n/a	n/a	0.70	22	C
	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.36	8	A
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.57	<5	A
	Overall	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**0.70**	**8**	**A**

[1]Volume-to-capacity ratio
[2]Average control delay per vehicle (in seconds)
[3]Level of service
[4]No Build assumes implementation of programmed/funded improvements along Belmont Street by MassDOT.
[5]See Section 5.0 for description of mitigation.
na = Not Applicable

TABLE 8
INTERSECTION CAPACITY ANALYSIS RESULTS
SATURDAY EVENING PEAK HOUR

		2015 Baseline			2025 No-Build[4]			2025 Build (w/ Mitigation)[5]		
Intersection	**Approach**	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
1 – Belmont Street	Eastbound	0.73	29	C	0.48	14	B	0.85	24	C
(Route 123) at	Westbound	0.64	14	B	0.43	9	A	0.74	16	B
Manley Street/	Northbound	0.86	53	D	0.67	39	D	0.64	36	D
Columbia Gas	Southbound	0.01	<5	A	0.03	<5	A	0.02	<5	A
	Overall	**0.86**	**25**	**C**	**0.67**	**15**	**B**	**0.85**	**21**	**C**
2 - Belmont Street	Eastbound	0.34	<5	A	0.30	<5	A	0.50	<5	A
(Route 123) at	Westbound	0.42	5	A	0.36	<5	A	0.59	5	A
VA Hospital/Belmont	Northbound	0.11	13	B	0.29	32	C	0.22	27	C
Court	Southbound	0.08	10	A	0.21	24	C	0.15	22	C
	Overall	**0.42**	**5**	**A**	**0.36**	**<5**	**A**	**0.59**	**5**	**A**
3 - Belmont Street	Eastbound	0.03	<5	A	0.51	14	B	0.66	14	B
(Route 123) at	Westbound	0.01	<5	A	0.36	6	A	0.54	7	A
Linwood Street/	Northbound	>1.0	>50	F	0.17	15	B	0.33	26	C
Lorraine Avenue	Southbound	0.57	>50	F	0.14	17	B	0.24	24	C
	Overall	**n/a**	**n/a**	**n/a**	**0.51**	**10**	**A**	**0.66**	**11**	**B**
4 - Belmont Street	Eastbound	0.43	12	B	0.43	12	B	0.60	11	B
(Route 123) at	Westbound	0.47	14	B	0.47	15	B	0.74	<5	A
Angus Beaton Drive/	Northbound	>1.0	>80	F	>1.0	>80	F	0.86	32	C
Belmont West Plaza	Southbound	0.30	26	C	0.30	26	C	0.67	40	D
	Overall	**>1.0**	**23**	**C**	**>1.0**	**23**	**C**	**0.74**	**10**	**A**
5 - Belmont Street	Eastbound	0.34	7	A	0.36	7	A	0.69	6	A
(Route 123) at	Westbound	0.39	16	B	0.44	17	B	0.76	13	B
West Street/	Northbound	0.72	34	C	0.74	34	C	0.00	22	C
West Side Plaza	Southbound	0.36	19	B	0.34	18	B	0.62	33	C
	Overall	**0.72**	**15**	**B**	**0.74**	**15**	**B**	**0.76**	**11**	**B**
6 - Belmont Street	Eastbound	0.27	4	A	0.30	5	A	0.46	14	B
(Route 123) at	Westbound	0.25	6	A	0.27	7	A	0.46	13	B
Forest avenue/	Northbound	0.87	61	E	0.88	60	E	0.89	35	C
West Side Plaza	Southbound	0.51	28	C	0.50	27	C	0.51	13	B
	Overall	**0.87**	**17**	**B**	**0.88**	**17**	**B**	**0.89**	**22**	**C**
7 - Belmont Street	Eastbound	0.54	12	B	0.60	13	B	0.48	5	A
(Route 123) at	Westbound	0.27	9	A	0.29	10	A	0.21	8	A
West Street	Northbound	0.50	15	B	0.54	16	B	0.84	38	D
	Southbound	0.47	11	B	0.50	11	B	0.66	20	B
	Overall	**0.54**	**12**	**B**	**0.59**	**12**	**B**	**0.84**	**17**	**B**

[1]Volume-to-capacity ratio
[2]Average control delay per vehicle (in seconds)
[3]Level of service
[4]No Build assumes implementation of programmed/funded improvements along Belmont Street by MassDOT.
[5]See Section 5.0 for description of mitigation.
na = Not Applicable

TABLE 8 (CONT.)
INTERSECTION CAPACITY ANALYSIS RESULTS
SATURDAY EVENING PEAK HOUR

		2015 Baseline			2025 No-Build			2025 Build (w/ Mitigation)[5]		
Intersection	**Approach**	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
8 – Belmont Street	Eastbound	0.33	7	A	0.37	8	A	0.37	8	A
(Route 123) at	Westbound	0.26	<5	A	0.30	<5	A	0.30	<5	A
Torrey Street	Southbound	0.60	29	C	0.63	29	C	0.63	29	C
	Overall	**0.60**	**10**	**A**	**0.76**	**13**	**B**	**0.76**	**13**	**B**
9 - Belmont Street	Eastbound	0.02	<5	A	0.02	<5	A	0.02	<5	A
(Route 123) at	Westbound	0.00	<5	A	0.00	<5	A	0.15	<5	A
Fairgrounds Driveway/	Northbound	0.01	<5	C	0.01	23	C	0.29	17	C
Kenelworth Avenue	Southbound	0.10	22	C	0.18	26	D	0.30	>50	F
10 – West Street at	Eastbound	0.69	18	B	0.76	21	C	0.76	22	C
Torrey Street	Westbound	0.40	11	B	0.43	11	B	0.43	12	B
	Northbound	0.33	21	C	0.72	24	C	0.73	24	C
	Southbound	0.33	15	B	0.66	17	B	0.67	17	B
	Overall	**0.69**	**16**	**B**	**0.76**	**19**	**B**	**0.76**	**19**	**B**
11 - West Street at	Eastbound	0.82	29	D	0.95	48	E			
Forest Avenue	Westbound	0.51	14	B	0.60	47	C	Roundabout		
	Northbound	0.03	10	A	0.04	11	B	See Location 12 Below		
	Southbound	0.37	12	B	0.44	14	B			
12 - West Street at	Westbound	>1.0	>50	F	>1.0	>50	F	0.27	11	B
Forest Avenue	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.43	<5	A
	Southbound	0.00	10	A	0.00	10	A	0.41	6	A
13 – Forest Avenue at	EB L Exit	0.82	>50	F	>1.0	>50	F	0.46	33	C
Memorial Drive	EB R Exit	0.10	15	C	0.13	17	C	0.16	10	A
	Northbound	0.01	10	A	0.01	10	A	0.30	<5	A
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.33	<5	A
	Overall	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**0.46**	**6**	**A**
14 - Forest Avenue at	Eastbound	0.62	12	B	0.68	14	B	0.62	10	A
Ash Street	Westbound	0.52	10	B	0.59	12	B	0.54	8	A
	Northbound	0.32	17	B	0.35	17	B	0.49	22	C
	Southbound	0.24	16	B	0.27	16	B	0.38	20	C
	Overall	**0.62**	**12**	**B**	**0.68**	**14**	**B**	**0.62**	11	**B**

[1]Volume-to-capacity ratio
[2]Average control delay per vehicle (in seconds)
[3]Level of service
[4]No Build assumes implementation of programmed/funded improvements along Belmont Street by MassDOT.
[5]See Section 5.0 for description of mitigation.
na = Not Applicable

TABLE 8 (CONT.)
INTERSECTION CAPACITY ANALYSIS RESULTS
SATURDAY EVENING PEAK HOUR

		2015 Baseline			2025 No-Build			2025 Build (w/ Mitigation)[5]		
Intersection	**Approach**	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
15 – Forest Avenue at Manomet Street/ Bouve Avenue	Eastbound	0.59	9	A	0.64	10	A	0.62	10	A
	Westbound	0.38	7	A	0.41	7	A	0.41	7	A
	Northbound	0.40	20	B	0.46	22	C	0.53	25	C
	Southbound	0.19	14	B	0.21	15	B	0.24	16	B
	Overall	**0.59**	**10**	**B**	**0.64**	**11**	**B**	**0.62**	**11**	**B**
16 - Forest Avenue at Warren Avenue	Eastbound	0.65	17	B	0.72	21	C	0.74	22	C
	Westbound	0.42	15	B	0.48	16	B	0.50	17	B
	Northbound	0.53	11	B	0.60	13	B	0.76	23	C
	Southbound	0.49	11	B	0.55	12	B	0.65	18	B
	Overall	**0.65**	**13**	**B**	**0.72**	**15**	**B**	**0.76**	**20**	**C**
17 – Forest Avenue at Main Street/Martin Place	Eastbound	>1.0	>50	F	>1.0	>50	F	0.71	23	C
	Westbound	0.02	18	C	0.02	20	C	0.01	14	B
	Northbound	0.15	<5	A	0.17	<5	A	0.54	11	B
	Southbound	0.00	<5	A	0.00	<5	A	0.72	22	C
	Overall	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**0.72**	**17**	**B**
18 – Belmont Street at Route 24 SB off-ramp to Belmont Street eastbound (Exit 17A)					Ramp Merge Junction See Table 9 Below					
19 – Belmont Street at Route 24 NB off-ramp to Belmont Street eastbound (Exit 17A)					Ramp Merge Junction See Table 9 Below					
20 – West Street at Proposed Site Driveway	Westbound	n/a	n/a	n/a	n/a	n/a	n/a	0.24	11	B
	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.03	8	A
21 – Forest Avenue at Proposed Site Driveway	Eastbound	n/a	n/a	n/a	n/a	n/a	n/a	0.07	<5	A
	Westbound	n/a	n/a	n/a	n/a	n/a	n/a	0.71	24	C
	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.46	11	B
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.57	<5	A
	Overall	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**0.71**	**10**	**A**

[1]Volume-to-capacity ratio
[2]Average control delay per vehicle (in seconds)
[3]Level of service
[4]No Build assumes implementation of programmed/funded improvements along Belmont Street by MassDOT.
[5]See Section 5.0 for description of mitigation.
na = Not Applicable

Summary of Traffic Operations

A principal finding of the TIAS is that traffic flow and pedestrian conditions along the Belmont Street and Forest Avenue corridors in the study area, even with additional casino traffic, will improve relative to today's existing conditions following implementation of a $6.5 Million roadway improvement package currently underway by MassDOT and as a result of an additional $8.6 Million roadway improvement package proposed by the casino Proponent.

Key findings of capacity analysis presented in **Table 7**and **Table 8** are as follows:

- *The Belmont Street corridor currently experiences traffic operating and pedestrian safety deficiencies at numerous intersections that are the focus of funded improvements by MassDOT.*

    - The Belmont Street intersections at Manley Street, Lorraine Street, Linwood Street, and West Street currently experience long delays (LOS F conditions), long vehicle queues and/or high crash rates. Contributing factors include the lack of exclusive turn lanes at some locations, inefficient traffic signal phasing/timing, a lack of appropriate roadway shoulders and lack of appropriate pedestrian crossings and associated traffic controls.

- *Following implementation of $6.5 Million roadway and signal upgrades by MassDOT, Belmont Street traffic operations will be below capacity (LOS C operation or better).*

    - MassDOT-sponsored improvements along Belmont Street between Route 24 and Angus Beaton Drive (study intersections 1 through 6) as described under Section 3.1 are currently underway and will be in place prior to casino operations. These improvements will enhance traffic flow along the corridor by adding turn lanes at major intersections and implementing coordinated signal operation. Enhanced pedestrian safety will result from new signal-controlled pedestrian crossings, improved sidewalks and a wider roadway that includes 4-foot wide shoulders.

- *Following implementation of an additional $8.6 Million of roadway and signal improvements by the Proponent, traffic operations during weekday evening peak hours and will also continue to operate below capacity at LOS C operation with the additional Casino traffic.*

    - Proponent-sponsored improvements along Belmont Street east of Angus Beaton Drive to West Street are consistent with planned (long-range) improvements by MassDOT, with traffic operations along Belmont Street of LOS C or better operation with additional casino traffic.

- Signals at Belmont Street intersections with West Street/Plaza Drive, Forest Avenue and West Street will be modified and upgraded by the casino Proponent to provide coordinated control, consistent with MassDOT's planned long-range improvements (intersections 5, 6 and 7). These upgrades represent a component of the $8.6 Million improvement package by the Proponent.

□ *Forest Avenue traffic operations indicate several intersections that currently operate at LOS F (failing conditions) and/or that have high crash rates that are planned for improvement but are not funded at this time. The casino proponent will work with the City of Brockton to advance improvements along Forest Avenue as a component of the $8.6 Million improvement package that are consistent with recommendations of the Southwest Brockton Corridor Study that results in improved operation (LOS C or better operations) with additional casino traffic.*

- Locations along Forest Avenue are currently subject to failing operation and long delays (LOS F conditions) include West Street, Memorial Drive, Manomet Street and Main Street. Proposed access improvements and implementation of new signals or upgraded signal equipment along Forest Avenue as described under Section 5.0 will result in traffic operations of LOS C or better at these failing locations with additional casino traffic.

- Pedestrian infrastructure will be improved along Forest Avenue by the Proponent to enhance safety including: new sidewalks on both sides of the road along the Site frontage; roadway shoulders for bicycle accommodation; signal controlled pedestrian crossings at new signalized intersections of Memorial Drive, the Site driveway and Main Street; pedestrian crossings and refuge islands at the proposed roundabout; and upgraded pedestrian crossings at upgraded signalized intersections including Ash Street, Manomet Street and Warren Avenue.

In summary, completion of ongoing corridor improvements by MassDOT and additional Proponent-sponsored improvements along Belmont Street and Forest Avenue as described under Section 5.0 *Conclusions and Recommendations* result in traffic operations of LOS C or better at all primary signalized study locations and enhanced pedestrian safety. These improvements directly address today's capacity needs independent of the casino, resulting in efficient traffic flow and pedestrian accommodation in the area with the casino traffic and effectively advancing needed improvements that are not likely to otherwise occur in the near future.

4.2.2 Highway Ramp Capacity Analysis

Highway ramp capacity analysis was also reviewed for the Route 24 northbound and southbound off-ramp merge junction areas with Belmont Street (Exit 17) are summarized in **Table 9** for the weekday morning and weekday evening peak hours, respectively. Detailed analysis results are presented in the **Appendix**.

TABLE 9
CAPACITY ANALYSIS RESULTS
HIGHWAY RAMP MERGE JUNCTIONS

	2015 Baseline			2025 No-Build			2025 Build		
Highway Ramp/ Peak Hour	v/c[1]	Density[2]	LOS[3]	v/c[1]	Density[2]	LOS[3]	v/c[1]	Density[2]	LOS[3]
18a – Route 24 Southbound Off-ramp to Belmont Street Eastbound (Exit 17A)									
Friday PM Peak Hour	0.36	18.9	B	0.39	20.3	C	0.44	23.1	C
Saturday PM Peak Hour	0.25	14.5	B	0.28	15.6	B	0.35	19.5	B
18b – Route 24 Southbound Off-ramp to Belmont Street Westbound (Exit 17B)									
Friday PM Peak Hour	0.37	20.5	C	0.41	22.2	C	0.41	22.3	C
Saturday PM Peak Hour	0.22	13.6	B	0.24	14.6	B	0.24	14.7	B
19a– Route 24 Northbound Off-ramp to Belmont Street Eastbound (Exit 17A)									
Friday PM Peak Hour	0.32	16.7	B	0.35	18.0	B	0.45	22.1	C
Saturday PM Peak Hour	0.23	13.7	B	0.25	14.6	B	0.39	20.4	C
19b – Route 24 Northbound Off-ramp to Belmont Street Westbound (Exit 17B)									
Friday PM Peak Hour	0.30	15.3	B	0.33	16.4	B	0.40	18.3	B
Saturday PM Peak Hour	0.20	11.7	B	0.22	12.4	B	0.29	14.6	B

[1]Volume-to-capacity ratio
[2] Density in passenger cars per mile per lane (pc/mi/ln)
[3]Level of service

As summarized in **Table 9**, under Build conditions the merge junction areas with Route 24 northbound and southbound off-ramps to Belmont Street (Exit 17) will continue to operate below capacity at LOS C or better during the Friday evening and Saturday evening peak hours.

4.2.3 Vehicle Queue Analysis

Vehicle queue results are presented for the signalized study intersections. These vehicle queues are compared to available storage lengths, which are defined as lengths of exclusive turn lanes or the distance to the nearest major intersection for through lanes. Vehicle queue results from the capacity analysis are summarized in **Table 10** and **Table 11.** Detailed worksheets of the queuing analysis are provided in the **Appendices**.

As presented in **Table 10** and **Table 11,** vehicle queues at the signalized study intersections are contained within available storage lanes during the Friday evening and Saturday evening peak hours. The Proponent proposes to implement traffic signal timing optimization at many of the study intersections aimed at improving operations and queue management as described in more detail under *Conclusions and Recommendations***.**

TABLE 10
VEHICLE QUEUE ANALYSIS SUMMARY
FRIDAY EVENING PEAK HOUR

Approach	Storage Length (feet)	2025 No-Build[2] Average Queue Length	2025 No-Build[2] 95th Percentile Queue Length[1]	2025 Build Average Queue Length	2025 Build 95th Percentile Queue Length
1-Belmont Street (Route 123) at Manley Street					
Eastbound L	175±	<25	<25	<25	<25
Eastbound T/R	>1000	372	529	640	837
Westbound L	225±	<25	69	37	118
Westbound T/R	730±	202	456	307	830
Northbound L	300±	166	307	230	394
Northbound T/R	>1000	126	220	186	309
Southbound L/T/R	>1000	<25	60	<25	83
2-Belmont Street (Route 123) at VA Hospital/Belmont Court					
Eastbound L/T/R	175±	85	144	55	67
Westbound L/ T/R	550±	118	204	234	276
Northbound L	250±	96	151	133	204
Northbound T/R	250±	<25	34	<25	43
Southbound L	100±	<25	26	<25	34
Southbound T/R	>1000	<25	<25	<25	<25
3-Belmont Street (Route 123) at Linwood Street/Lorraine Avenue					
Eastbound L/T/R	550±	221	413	75	120
Westbound L	200±	47	97	87	146
Westbound T/R	420±	82	133	160	193
Northbound L/T	>1000	<25	56	40	94
Northbound R	75	39	79	81	141
Southbound L/T/R	>1000	<25	52	<25	75
4-Belmont Street (Route 123) at Angus Beaton Drive					
Eastbound L	230±	36	77	34	76
Eastbound T/R	800±	136	318	168	371
Westbound L	175±	<25	<25	<25	<25
Westbound T/R	420±	123	242	<25	38
Northbound L/T/R	600±	<25	44	<25	39
Southbound L/T/R	400±	34	81	100	170
5-Belmont Street (Route 123) at West Street/West Side Plaza					
Eastbound L	175±	<25	69	26	40
Eastbound T/R	420±	30	39	25	50
Eastbound R	130±	n/a	n/a	<25	75
Westbound L/T/R	520±	163	238	255	358
Northbound L/T/R	710±	116	178	n/a	n/a
Southbound L/T/R	400±	58	96	69	127
6-Belmont Street (Route 123) at Forest Avenue/West Side Plaza					
Eastbound L/T/R	520±	42	112	83	164
Westbound L/T/R	570±	71	133	120	173
Northbound L&L/T/R	420±	95	154	182	358
Southbound L	170±	<25	51	50	118
Southbound T/R	900±	100	156	<25	55
7-Belmont Street (Route 123) at West Street					
Eastbound L/T/R	570±	96	204	48	70
Westbound L/T/R	420±	56	118	68	113
Northbound L	370±	n/a	n/a	53	120
Northbound T/R	600±	79	166	144	227
Southbound L/T	400±	70	145	125	195
Southbound R	400±	<25	45	<25	48

[1] Average and 95th percentile queue lengths are reported in feet per lane.
[2] Assumes implementation of planned/funded MassDOT improvements along Belmont Street.

TABLE 10 (CONT.)
VEHICLE QUEUE ANALYSIS SUMMARY
FRIDAY EVENING PEAK HOUR

Approach	Storage Length (feet)	2025 No-Build[2] Average Queue Length	2025 No-Build[2] 95th Percentile Queue Length[1]	2025 Build Average Queue Length	2025 Build 95th Percentile Queue Length
8-Belmont Street (Route 123) at Torrey Street					
Eastbound L/T	800±	173	276	173	276
Westbound T	>1000	122	202	122	202
Westbound R	130±	<25	<25	<25	<25
Southbound L/T/R	550±	145	234	145	234
10-West Street at Torrey Street					
Eastbound L/T/R	>1000	190	384	177	384
Westbound L/T/R	550±	140	237	123	225
Northbound L/T/R	400±	159	313	166	320
Southbound L/T & T/R	>1000	118	180	117	177
13-Forest Avenue at Memorial Drive					
Eastbound L	375±	n/a	n/a	<25	<25
Eastbound R	>400	n/a	n/a	<25	<25
Northbound L/T	>1000	n/a	n/a	<25	51
Southbound T/R	250±	n/a	n/a	<25	<25
14-Forest Avenue at Ash Street					
Eastbound L/T/R	>1000	229	465	245	412
Westbound L/T/R	900±	172	298	183	310
Northbound L/T/R	>1000	69	133	77	163
Southbound L/T/R	>1000	75	140	83	196
15-Forest Avenue at Manomet Street/Bouve Avenue					
Eastbound L/T/R	900±	210	466	240	418
Westbound L/T/R	>1000	99	168	112	181
Northbound L/T/R	>1000	69	154	74	188
Southbound L/T/R	>1000	52	105	57	123
16-Forest Avenue at Warren Avenue					
Eastbound L/T/R	>1000	126	290	181	377
Westbound L/T/R	650±	84	157	113	205
Northbound L/T/R	>1000	104	196	171	340
Southbound L/T/R	>1000	126	228	197	322
17-Forest Avenue at Main Street/Martin Street					
Eastbound L/T/R	650±	n/a	n/a	117	259
Westbound L/T/R	150±	n/a	n/a	<25	<25
Northbound L	250±	n/a	n/a	39	76
Northbound T/R	>1000	n/a	n/a	133	213
Southbound L/T/R	>1000	n/a	n/a	241	450
21-Forest Avenue at Site Drive					
Eastbound L/T/R	200±	n/a	n/a	<25	<25
Westbound L/T	300±	n/a	n/a	<25	40
Westbound R	300±	n/a	n/a	91	145
Northbound T/R	250±	n/a	n/a	72	54
Southbound L	425±	n/a	n/a	<25	44
Southbound TR	425±	n/a	n/a	<25	273

[1] Average and 95th percentile queue lengths are reported in feet per lane.
[2] Assumes implementation of planned/funded MassDOT improvements along Belmont Street.

TABLE 11
VEHICLE QUEUE ANALYSIS SUMMARY
SATURDAY EVENING PEAK HOUR

Approach	Storage Length (feet)	2025 No-Build[2] Average Queue Length	2025 No-Build[2] 95th Percentile Queue Length[1]	2025 Build Average Queue Length	2025 Build 95th Percentile Queue Length
1-Belmont Street (Route 123) at Manley Street					
Eastbound L	175±	<25	<25	<25	<25
Eastbound T/R	>1000	151	268	308	728
Westbound L	225±	<25	<25	<25	39
Westbound T/R	730±	74	292	206	741
Northbound L	300±	107	158	90	185
Northbound T/R	>1000	70	120	67	152
Southbound L/T/R	>1000	<25	<25	<25	<25
2-Belmont Street (Route 123) at VA Hospital/Belmont Court					
Eastbound L/T/R	175±	28	38	113	178
Westbound L/ T/R	550±	70	104	151	240
Northbound L	250±	<25	44	<25	41
Northbound T/R	250±	<25	26	<25	25
Southbound L	100±	<25	35	<25	31
Southbound T/R	>1000	<25	<25	<25	<25
3-Belmont Street (Route 123) at Linwood Street/Lorraine Avenue					
Eastbound L/T/R	550±	128	202	288	468
Westbound L	200±	<25	66	43	87
Westbound T/R	420±	75	115	166	258
Northbound L/T	>1000	<25	45	25	58
Northbound R	75	<25	37	<25	55
Southbound L/T/R	>1000	<25	34	<25	44
4-Belmont Street (Route 123) at Angus Beaton Drive					
Eastbound L	230±	40	77	33	85
Eastbound T/R	800±	93	197	133	314
Westbound L	175±	<25	<25	<25	<25
Westbound T/R	420±	106	198	<25	<25
Northbound L/T/R	600±	95	191	31	60
Southbound L/T/R	400±	27	64	27	83
5-Belmont Street (Route 123) at West Street/West Side Plaza					
Eastbound L	175±	<25	64	<25	33
Eastbound T/R	420±	56	37	21	40
Eastbound R	130±	n/a	n/a	41	141
Westbound L/T/R	520±	152	210	261	444
Northbound L/T/R	710±	125	190	n/a	n/a
Southbound L/T/R	400±	55	91	61	111
6-Belmont Street (Route 123) at Forest Avenue/West Side Plaza					
Eastbound L/T/R	520±	34	54	73	152
Westbound L/T/R	570±	57	87	100	124
Northbound L&L/T/R	420±	114	222	176	358
Southbound L	170±	<25	50	36	90
Southbound T/R	900±	77	137	<25	35
7-Belmont Street (Route 123) at West Street					
Eastbound L/T/R	570±	55	126	37	69
Westbound L/T/R	420±	27	65	33	70
Northbound L	370±	n/a	n/a	62	130
Northbound T/R	600±	54	143	125	175
Southbound L/T	400±	52	137	127	175
Southbound R	400±	<25	35	<25	37

[1] Average and 95th percentile queue lengths are reported in feet per lane.
[2] Assumes implementation of planned/funded MassDOT improvements along Belmont Street.

TABLE 11 (CONT.)
VEHICLE QUEUE ANALYSIS SUMMARY
SATURDAY EVENING PEAK HOUR

Approach	Storage Length (feet)	2025 No-Build[2] Average Queue Length	2025 No-Build[2] 95th Percentile Queue Length[1]	2025 Build Average Queue Length	2025 Build 95th Percentile Queue Length
8-Belmont Street (Route 123) at Torrey Street					
Eastbound L/T	800±	78	166	78	166
Westbound T	>1000	53	117	53	117
Westbound R	130±	<25	<25	<25	<25
Southbound L/T/R	550±	99	166	99	166
10-West Street at Torrey Street					
Eastbound L/T/R	580±	127	246	136	241
Westbound L/T/R	>1000	59	121	63	118
Northbound L/T/R	400±	115	244	125	289
Southbound L/T/ & T/R	420±	86	163	171	171
13-Forest Avenue at Memorial Drive					
Eastbound L	375±	n/a	n/a	47	88
Eastbound R	>400	n/a	n/a	<25	<25
Northbound L/T	>1000	n/a	n/a	51	90
Southbound T/R	250±	n/a	n/a	70	42
14-Forest Avenue at Ash Street					
Eastbound L/T/R	>1000	167	279	113	241
Westbound L/T/R	900±	130	216	89	188
Northbound L/T/R	>1000	45	92	33	106
Southbound L/T/R	>1000	32	71	<25	82
15-Forest Avenue at Manomet Street/Bouve Avenue					
Eastbound L/T/R	900±	117	254	108	240
Westbound L/T/R	>1000	65	136	63	135
Northbound L/T/R	>1000	38	111	35	110
Southbound L/T/R	>1000	<25	55	<25	55
16-Forest Avenue at Warren Avenue					
Eastbound L/T/R	>1000	95	217	116	246
Westbound L/T/R	650±	61	118	72	154
Northbound L/T/R	>1000	93	172	123	276
Southbound L/T/R	>1000	84	154	109	237
17-Forest Avenue at Main Street/Martin Street					
Eastbound L/T/R	650±	n/a	n/a	56	153
Westbound L/T/R	150±	n/a	n/a	<25	<25
Northbound L	250±	n/a	n/a	27	67
Northbound T/R	>1000	n/a	n/a	90	194
Southbound L/T/R	>1000	n/a	n/a	125	253
21-Forest Avenue at Site Drive					
Eastbound L/T/R	200±	n/a	n/a	<25	<25
Westbound L/T	300±	n/a	n/a	<25	42
Westbound R	300±	n/a	n/a	141	178
Northbound T/R	250±	n/a	n/a	67	85
Southbound L	425±	n/a	n/a	<25	117
Southbound TR	425±	n/a	n/a	<25	171

[1] Average and 95th percentile queue lengths are reported in feet per lane.
[2] Assumes implementation of planned/funded MassDOT improvements along Belmont Street.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Roadway improvements that support projected traffic increases associated with the proposed Category 1 Casino are identified to mitigate project-related traffic impacts, address access needs for the Site and that enhance pedestrian safety and accommodation. In addition, non-auto transportation programming is proposed to integrate the Site with various bus and rail transportation options serving the area. Specific improvements include (a) access-related improvements, (b) off-site improvements, (c) non-auto transportation programming; and (d) transportation demand management. The mitigation commitments by the Proponent will be further refined as the project undergoes the local and state (MEPA) review process.

5.1 ACCESS IMPROVEMENTS

Site access improvements are proposed by the Proponent to support the casino operations, but that also serve to advance improvement initiatives along Belmont Street identified in the MassDOT Project No. 608088 and along Forest Avenue as identified in the Southwest Brockton Corridor Study.

A: Site Access Improvements: West Street & Forest Avenue

Proposed site access improvements along Forest Avenue and West Street will enhance traffic flow and reduce vehicle conflicts relative to existing conditions and include pedestrian and bicycle design features that facilitate walking access to/from the Site and vicinity. These roadway improvements will follow MassDOT "Complete Streets" design standards that are contemplated as part of the currently ongoing Belmont Street corridor improvement projects being undertaken by MassDOT, and that advance recommended improvements identified in the *Southwest Brockton Corridor Study*.

Primary site access/egress is proposed along Forest Avenue opposite the Brockton Registry of Motor Vehicles (Intersection 21). Secondary site access/egress is proposed via a driveway connection to West Street (Intersection 20) which will restrict egress movements to right turn

movements to minimize conflict points along West Street. To provide improved traffic operations in the immediate area, a modern roundabout is proposed at the Forest Avenue intersection with West Street as well as the relocation and conversion of roadway segments to one-way travel. Primary access improvement features are depicted on the conceptual design plan as shown in **Figure 17** with primary features as follows:

- *Modern Roundabout.* A two-lane modern roundabout is contemplated at the Forest Avenue intersection with West Street (Intersections 11 & 12). The roundabout is proposed to be designed for three-legged operation, under which a portion of West Street between Feinberg Way and Forest Avenue will be converted to one-way (eastbound) traffic flow toward the roundabout and the portion of Forest Avenue between West Street and Belmont Street will be converted to one way traffic flow (northbound) away from the roundabout. The easterly segment of West Street will be re-aligned and widened to provide a 4 travel lanes. All roundabout improvements and associated widening will be on property under control of the Proponent and/or within City jurisdiction.

- *Forest Avenue Widening*. Forest Avenue will be widened to a four lane cross-section between the proposed modern roundabout and Memorial Drive. These roadway improvements will follow MassDOT "Complete Streets" design standards and will include shoulders for bicycle accommodation, and ADA-compliant sidewalks and crossings. This cross-section will allow adequate capacity that serves the casino's primary driveway which will accommodate approximately 65% of patron trips, thereby reducing impact to Belmont Street to the east of West Street/Plaza Drive.

- *Site Drive Signal*. Install a fully actuated traffic signal and associated pedestrian control equipment at the intersection of the Forest Avenue/Primary Site Driveway. This signal will provide capacity to accommodate existing traffic flow and additional turning traffic for the casino and will operate in coordination with a traffic signal at Memorial Drive as outlined below.

- *Memorial Drive Signal*. Install a fully actuated traffic signal and associated pedestrian control equipment at the intersection of the Forest Avenue/ Memorial Drive. This signal has been identified as a recommended improvement in the *Southwest Brockton Corridor Study* that is currently warranted independent of the proposed casino.

- *West Street Widening & Realignment*. The existing 2-lane alignment of West Street between Belmont Street and Forest Avenue (east of Forest Avenue) will be re-aligned on property controlled by the Proponent and widened to provide a 4-lane cross-section. This will allow proper roadway alignment and separation of traffic movements at the modern roundabout and lane capacity to accommodate existing traffic flow and additional turning traffic for the casino.

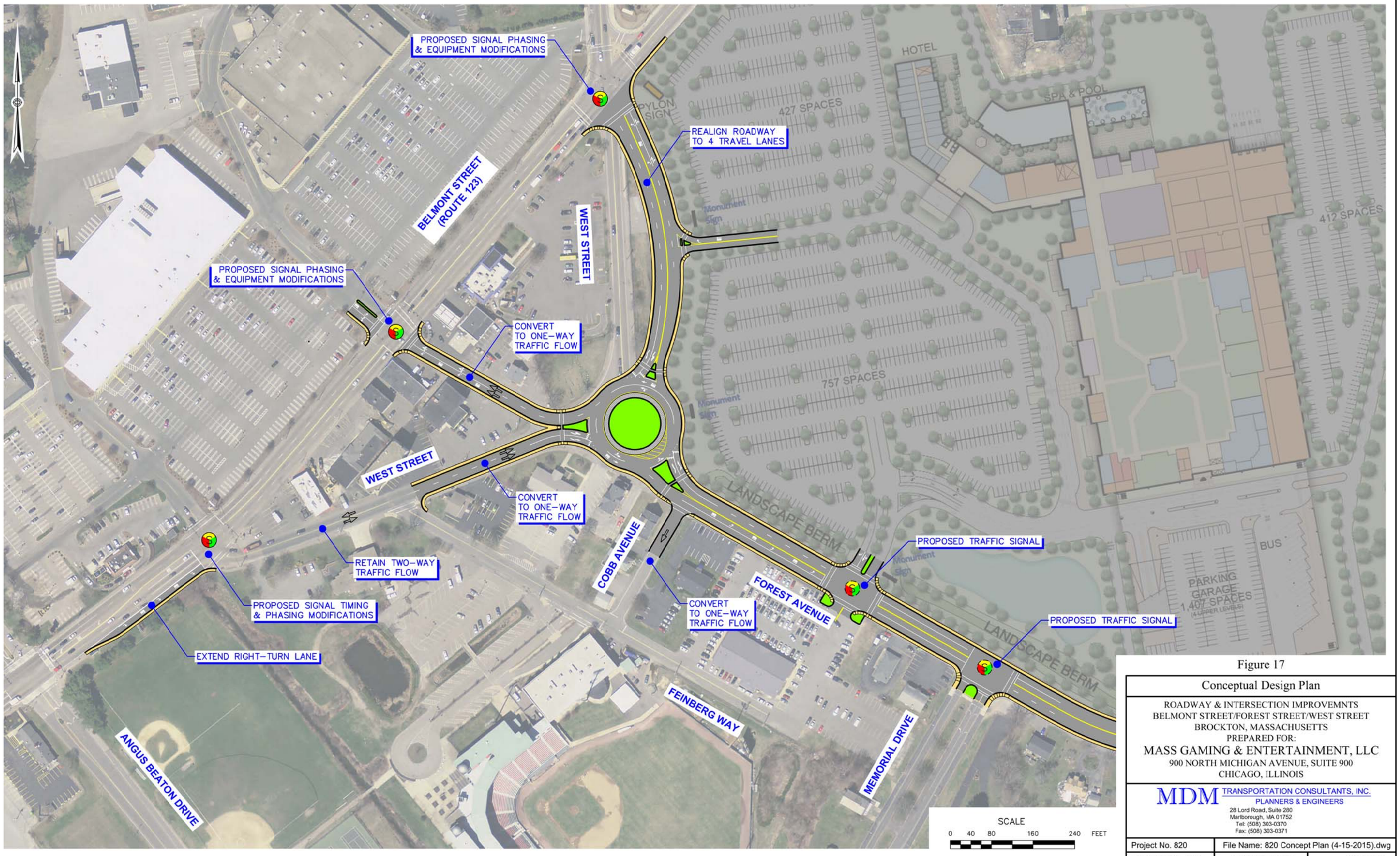

Figure 17

Conceptual Design Plan

ROADWAY & INTERSECTION IMPROVEMNTS
BELMONT STREET/FOREST STREET/WEST STREET
BROCKTON, MASSACHUSETTS
PREPARED FOR:
MASS GAMING & ENTERTAINMENT, LLC
900 NORTH MICHIGAN AVENUE, SUITE 900
CHICAGO, ILLINOIS

MDM TRANSPORTATION CONSULTANTS, INC.
PLANNERS & ENGINEERS
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Project No. 820	File Name: 820 Concept Plan (4-15-2015).dwg	
Date: April 15, 2015	Scale: As Noted	Sheet 1 of 1

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- *West Street Driveway.* Proposed site egress to West Street will be restricted to right-turn movements by a raised, landscaped island to minimize conflict points along West Street. This driveway is expected to accommodate approximately 25% of casino patron traffic based on orientation of parking at the Site.

- *Forest Avenue One-Way Conversion*. The portion of Forest Avenue between West Street and Belmont Street will be converted to one-way northbound traffic flow to accommodate existing traffic flow patterns headed toward the West Gate Plaza and the primary outbound (exiting) traffic flow for the casino. This will allow for dual left-turn capability onto Belmont Street and efficient signal operations under Build traffic conditions. This will require modification of the lanes opposite Forest Avenue at the plaza driveway to provide dual left-turns, and will re-distribute trips currently using Forest Avenue southbound from the plaza to the re-aligned and expanded West Street.

- *West Street On-Way Conversion*. The portion of West Street between Feinberg Way and Forest Avenue will be converted to one-way (eastbound) traffic flow toward the modern roundabout. This orientation will retain the two-way flow along the remaining portion of West Street between Belmont Street and Feinberg Way to accommodate the existing fire station access/circulation and traffic flow associated with the sports stadium activities. To facilitate access onto West Street from Belmont Street, the existing eastbound right-turn lane will be expanded (lengthened), requiring an adjustment of the roadway right-of-way onto property owned by the City.

- *Belmont Street Signal Modifications*. Signal equipment, signal timing and signal phasing modifications will be implemented at the Belmont Street intersections with West Street/West Gate Plaza, Forest Avenue, and West Street. These signal upgrades and modifications are subject to MassDOT permitting but are consistent with anticipated long-range improvements that would be included under the MassDOT Project No. 608088 described under Section 3.1, and recommended improvements identified in the *Southwest Brockton Corridor Study* independent of the casino. Signal operations would be coordinated among these three locations to maximize traffic efficiency along Belmont Street.

With these access improvements in place, capacity analyses indicate that intersections serving the Site will operate below capacity at LOS C or better during peak hours.

5.2 OFF-SITE TRANSPORTATION IMPROVEMENTS

B: Forest Avenue Signal Improvements

The *Southwest Brockton Corridor Study* identifies traffic signal improvements and upgrades along the Forest Avenue corridor that are warranted under existing conditions independent of the proposed casino development. Although the Forest Avenue corridor is not expected to serve as a primary travel route to/from the casino and will sustain only modest traffic impact as a result, the Proponent will work with the City of Brockton to implement new signal control at Main Street and upgrades to existing signals at Ash Street, Manomet Street and Warren Avenue to enhance capacity and to meet current ADA requirements. These improvements will result in a notable reduction in delays with projected operations of LOS C or better with additional casino traffic – thereby eliminating failing conditions (LOS F) that currently exist for several of these intersections.

C: Belmont Street Signal Optimization

The casino Proponent commits to monitoring traffic volumes and signal operations at the signalized Belmont Street intersections at Manley Street, VA Hospital and Linwood Street/Lorraine Avenue within 6 months of casino occupancy and to make any necessary signal timing/phasing modifications necessary at that time to ensure optimal operations during peak traffic hours. Specific provisions for traffic monitoring and signal timing adjustments will be identified under the MassDOT Section 61 Finding process.

5.3 NON-AUTO TRANSPORTATION PROGRAMMING

D: Shuttle Service

The Proponent is evaluating a community shuttle bus loop that would augment available transit services to facilitate access to area businesses and connections to existing available public transportation (BAT) serving the area. The Proponent will work with the BAT to identify feasibility of integrating the Site as a stop on its existing service for the area, thereby providing connections to other area public transportation options including the BAT Centre in Brockton which serves as a hub for additional regional BAT bus service and the MBTA Old Colony Line commuter rail service. Specific operating parameters for the proposed shuttle service for the Site and feasibility of integration with existing BAT bus service will be identified following discussions and coordination with the City of Brockton and BAT.

5.4 TRANSPORTATION DEMAND MANAGEMENT (TDM)

The Proponent is committed to reduce auto dependency by employees and patrons by implementing a robust TDM program. Specific TDM program elements will be identified in more detail under the state review process. A preliminary list of potential TDM program elements may include the following, subject to refinement of the development program and further evaluation by the Proponent:

- *Shuttle and Bus Options.* Shuttle bus loop serving the local community (currently under evaluation) and integration of the Site as a stop on current BAT bus routes.

- *Public Transportation Information & Promotion*. Posting of service and schedule information for employees and patrons; on-site sale of transit passes to promote the use of public transportation by employees and patrons.

- *Bicycle Facilities and Promotion*. Bicycle racks at appropriate on-site locations; a bicycle sharing program to promote the use of bicycles as an alternative commuting method; dissemination of area bicycle route maps.

- *Pedestrian Infrastructure*. Sidewalk connections within the property along primary pedestrian desire lines that connect building entrances with the public sidewalk network; posting of area maps that highlight area walking routes to promote walking and bicycle travel to/from the Site and area businesses. The design of improvements along Forest Avenue will also include sidewalks and shoulders that are consistent with complete streets objectives.

- *On-Site Employee Transportation Coordinator*. The Proponent will identify an on-site employee whose responsibilities will include serving as an employee transportation coordinator responsible for disseminating relevant TDM information to employees including posting TDM information at appropriate locations within the buildings and during employee orientation.

- *On-Site Employee Services.* On-site banking facilities (ATM), employee showers, cafeteria, direct deposit of employee payroll checks, secure bicycle accommodations.

- *Preferential Parking for Carpools and Vanpools.* Preferential parking locations for employees within the employee parking area who use carpools and vanpools.

- *Preferential Parking for Low-Emission Vehicles.* Preferential parking locations for employees and patrons who use low-emission vehicles; charging stations for electric vehicles; VIP parking access for patrons who travel to the site using alternative fuel vehicles.

- *Transit Pass Subsidization.* Subsidize commuter rail and local bus passes for employees.

- *MassRides*. Promotion of commuter assistance programs available through Executive Office of Transportation's MassRides as part of the employee orientation program.

- *Guaranteed Ride Home*. A guaranteed ride home program that subsidizes taxi service for employees using non-auto commute options in cases of unexpected circumstances.

- *No Idling Signage*. Installation of "No Idling" signs throughout the site's parking areas to reduce the amount of greenhouse gasses emitted.

- *On-Site Patron Services.* Restaurants, ancillary retail, coat/bag check facilities, dissemination of shuttle and public transportation options, coordination of local taxi services, promotion of bicycle and walking options to area attractions.

- *Bus Shelter/Taxi Stand*. Bus shelter/taxi stand for patrons to wait for services on-site.

- *Valet Parking Operations*. A parking option for patrons for preferred parking spaces to facilitate parking operations at the Site.

5.5 MITIGATION SUMMARY

A summary of primary Proponent-sponsored transportation mitigation measures and estimated construction costs are outlined in **Table 12** and are described in more detail under Sections 5.1 through 5.3 above.

TABLE 12
TRANSPORTATION IMPROVEMENT SUMMARY (Proponent Sponsored)

Improvement Action	Estimated Construction Cost
A: Access Improvements Construction of modern roundabout at Forest Avenue, widening of Forest Avenue and West Street with "Complete Streets" design elements, new signal at Forest Avenue, signal equipment upgrades to Belmont Street (3 locations).	$5,300,000 ±
B: Forest Avenue Corridor and Signal Improvements New traffic signal at Memorial Drive, signal equipment upgrades and sidewalk reconstruction at Ash Street, Manomet Street and Warren Avenue, new traffic signal and roadway improvements at Main Street.	$3,300,000 ±