

## MEMORANDUM

**DATE:** July 1, 2014 (Revised July 17, 2014)

**TO:** Mr. Marc Levin  
Chestnut Hill Realty  
300 Independence Drive  
Chestnut Hill, MA 02446

**FROM:** Robert J. Michaud, P.E. – Managing Principal  
Courtney E. Jones, P.E. – Senior Transportation Engineer

**RE:** Updated Traffic Impact Assessment – 184 Units  
Proposed Residences of South Brookline - 40B  
Brookline, MA



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MDM Transportation Consultants, Inc. (MDM) has prepared this updated traffic impact assessment (TIA) for the proposed Residences of South Brookline to reflect modifications to the site plan for 184 apartment units. This memorandum documents existing (baseline) 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 related improvements are identified for the development to meet operational needs of the Site and the adjacent roadways.

Key findings of the preliminary traffic assessment are as follows:

- *Existing Traffic Characteristics.* Independence Drive, a minor arterial roadway in the study area, carries approximately 14,000 vehicles per day (vpd) with peak hour volumes ranging from approximately 1,175 vehicles per hour (vph) to 1,275 vph. Directional flow of traffic exhibits commuter trends (eastbound in the AM peak hour and westbound in the PM peak hour).
- *Safety Characteristics.* Safe stopping sight distance (SSD) is available for oncoming vehicles to detect, react and stop for vehicles exiting the proposed site driveways onto Independence Drive and Russett Road based on the regulatory speed limits. No immediate safety countermeasures are required at the study intersections based on historic crash data and trends.

- *Traffic Generation.* The proposed residential development is estimated to generate approximately 94 vehicle trips (19 entering and 75 exiting) during the weekday morning peak hour and 119 vehicle trips (77 entering and 42 exiting) during the weekday evening peak hour. These trips are likely to be oriented 35% to/from the west (toward VFW Parkway) and 65% to/from the east (W. Roxbury Parkway and Newton Street) based on observed trends for the existing Hancock Village site. Empirical data collected at the site indicated that the site is generating trips at a lower rate than published by ITE during the weekday peak hours. However, as a conservative measure and to be consistent with standard industry practice, the higher-volume ITE-based estimates were used in this analysis rather than trip rates calculated using empirical data for the existing site. Furthermore, data published by the US Census, indicated that approximately 30 percent of residents in the immediate study area utilize modes of transportation other than single-occupancy vehicles. Again, as a conservative measure, no reduction in site trips is taken as a result of available public transportation.
  
- *Adequate Roadway Capacity.* Adequate capacity is available along Independence Drive, Russett Road and at study intersections to accommodate modest projected traffic increases for the proposed Residences of South Brookline. Signalized intersection operations are generally at LOS D or better (overall). No change in overall LOS at the study intersections expected as a result of the project. The mainline approaches to unsignalized intersections operate unimpeded at LOS A operations under existing and future year conditions.
  
- *Proposed Access and Pedestrian Improvements.* Driveway and sidewalk improvements are identified and proposed by the Applicant to ensure efficient traffic operations are achieved, adequate sight lines are provided to meet or exceed recommended safety standards and that pedestrian features (sidewalks) are expanded to integrate the Site with the surrounding roadway system. Travel demand management (TDM) programs already available to existing residents are shown to have a notable reduction in auto trip generation that is well below typical suburban standards and will be expanded to promote alternative travel modes and to accommodate the anticipated increase in resident use of the Hancock Village shuttle service connecting residents to the MBTA Cleveland Circle station, public transportation, ZIPCAR use and walking/bicycle travel.

## PROJECT DESCRIPTION

Hancock Village currently includes 789 apartment units that are located on approximately 80.8 acres of land located off Independence Drive in Brookline and West Roxbury, MA. Access to the site is currently provided via Sherman Road, Gerry Road, Thornton Road and Asheville Road. The location of the site relative to adjacent roadways is shown in **Figure 1**.



Figure 1

Site Location

The site primarily consists of one and two bedroom units with an effective occupancy that exceeds 98 percent at the time the traffic counts were conducted (April 2012). The 789 existing units at Hancock Village include the following breakdown in terms of bedrooms:

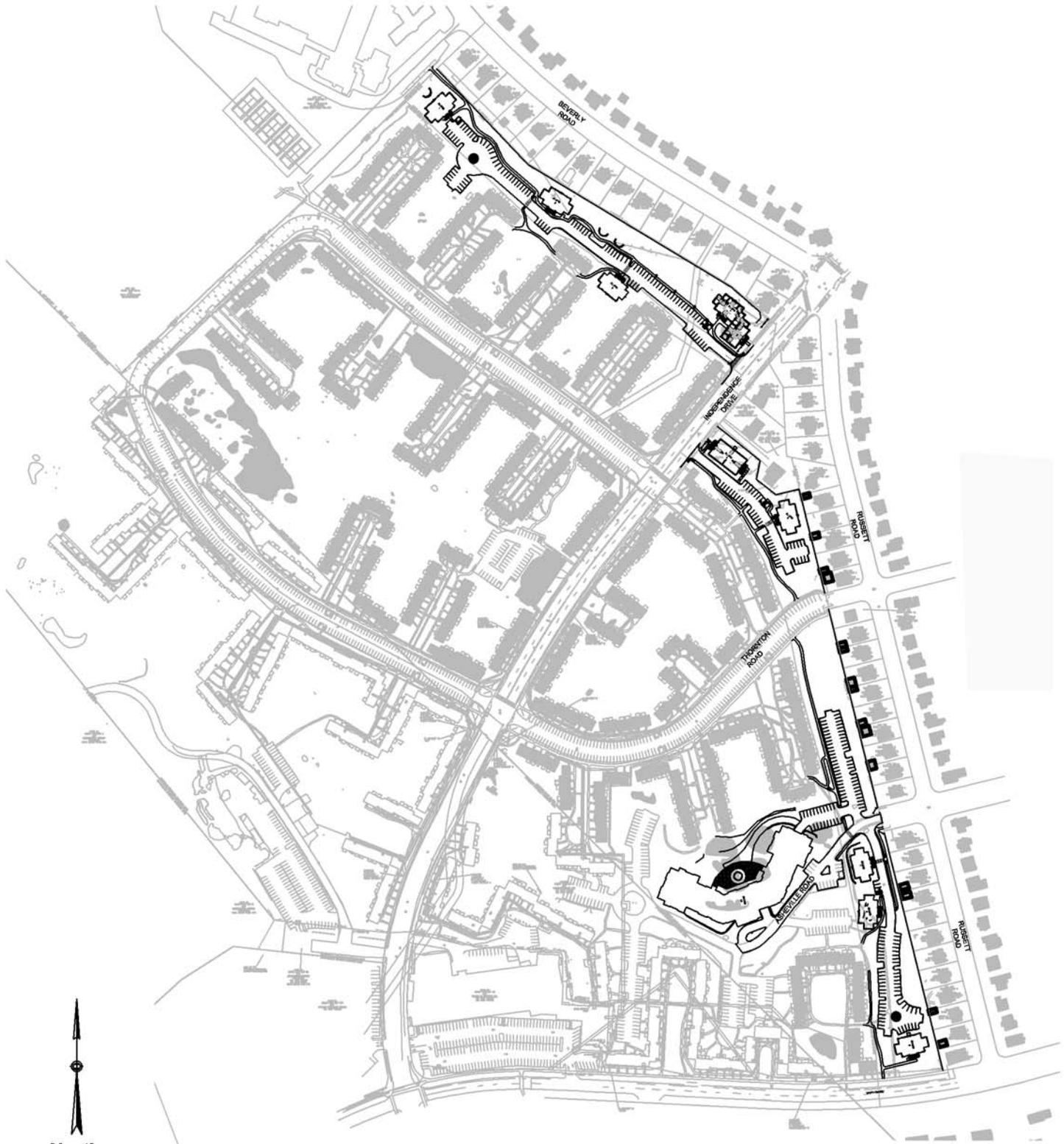
- 353 – One bedroom units
- 401 – Two bedroom units
- 35 – Three bedroom units

The site currently has approximately 1,073 on-site parking spaces for residents of Hancock Village. An additional supply of 46± on-street parking spaces (in West Roxbury) was also observed; however, these spaces are not specifically reserved for Hancock Village residents.

Under the proposed development program, the Brookline portion of the site will be expanded to include approximately 184 additional apartment units and approximately 420 additional on-site parking spaces. As currently proposed, access to the additional residences will be provided by the existing site roadway network via Asheville Road and two additional driveway connections to undeveloped curb-cuts which exist along Independence Drive. The preliminary site layout is presented in **Figure 2**. For more detailed site layout, see plan full plan set prepared by Stantec.

## STUDY METHODOLOGY

This traffic impact assessment is conducted in accordance with industry standard traffic study 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 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 study intersections. Specific attention is given to the incremental impacts of the proposed development. Finally, improvements are described that address specific development-related operational needs as required.



Site Plan Source: Stantec

Figure 2

## STUDY AREA

This TIA 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. The study area includes the following intersections, which are also identified in **Figure 1**:

- Independence Drive at Sherman Road/ Thornton Road (Unsignalized)
- Independence Drive at Gerry Road (Unsignalized)
- Independence Drive at Beverly Road/ Russett Road (Signalized)
- Independence Drive at Proposed Site Driveways (Unsignalized)
- Grove Street at South Street (Signalized)
- Russett Road at Asheville Road (Unsignalized)
- South Street at Asheville Road (Unsignalized)

## EXISTING TRAFFIC & SAFETY CHARACTERISTICS

An overview of existing roadway conditions, traffic volumes and safety characteristics is provided below.

### Roadways

#### **Independence Drive**

Independence Drive is a roadway under local (Town) jurisdiction that is classified by the Massachusetts Department of Transportation (MassDOT) as an Urban Minor Arterial roadway. Independence Drive provides a connection between Grove Street in Brookline and VFW Parkway in West Roxbury. Within the site vicinity, Independence Drive has a generally straight alignment with roadway grades of less than 3 percent. Two travel lanes are provided in each direction with a total roadway width of approximately 48 feet. The regulatory speed limit along Independence Drive is 35 miles per hour (mph). Regulated on-street parking is provided along both sides of Independence Drive. Land use along Independence Drive is primarily residential with some commercial and medical uses near its intersection with VFW Parkway.

## **Grove Street**

Grove Street is generally an east-west roadway under local (Town) jurisdiction. Grove Street is classified by the MassDOT as an Urban Minor Arterial roadway. The roadway provides a connection between Independence Drive, West Roxbury Parkway, and Newton Street in Brookline. Within the study area, Grove Street has a generally straight alignment and provides two lanes of travel in each direction. The regulatory speed limit along Grove Street in the study area ranges between 25 mph and 30 mph. Land use along Grove Street in the study area is primarily residential with some commercial and religious land uses near South Street.

## **Russett Road**

Russett Road is generally a north-south roadway that is under local (Town) jurisdiction. Russett Road is classified by the MassDOT as an Urban Local roadway and provides a connection between Grove Street and VFW Parkway in Brookline. Russett Road provides one travel lane in each direction. Sidewalks are provided along both sides of the roadway. Land use along Russett Road includes residential homes.

## **Intersections**

### **Independence Drive at Sherman Road/ Thornton Road**

Independence Drive meets Sherman Road and Thornton Road to form a four-way, unsignalized intersection. The Independence Drive approaches both provide two general-purpose travel lanes in each direction. The Thornton Road approach provides a single lane departure lane to Independence Drive under "STOP" sign control. Sherman Road is restricted to one-way travel entering Hancock Village. Sidewalks are provided on both sides of all the approaches and brick crosswalks are provided across the eastern approach of Independence Drive as well as across the Sherman Road and Thornton Road approaches. A Massachusetts Bay Transportation Authority (MBTA) bus stop is located at the intersection. Land use at the intersection consists of residential apartments associated with Hancock Village.

### **Independence Drive at Gerry Road**

Independence Drive meets Gerry Road to form a "T"-type unsignalized intersection. The Independence Drive approaches provide two travel lanes in each direction. The Gerry Road approach provides unmarked exclusive left and right turn departure lanes to Independence Drive under "STOP" sign control. Sidewalks are provided on both sides of all the approaches and brick crosswalks are provided across the eastern approach of Independence Drive as well as across the Gerry Road approach. An MBTA bus stop is located at the intersection. Land use at the intersection consists of residential apartments associated with Hancock Village.

### **Independence Drive/ Grove Street at Beverly Road/ Russett Road**

Independence Drive/ Grove Street meet Beverly Road/ Russett Road to form a four-way, signalized intersection. The Independence Drive and Grove Street approaches provide a shared through/left-turn lane and a shared through/right-turn lane in each travel direction. The Beverly Road and Russett Road approaches each provide a single general-purpose travel lane. Sidewalks are provided on both sides of all the approaches and marked crosswalks are provided across each approach. An MBTA bus stop is located at the intersection. Land use at the intersection consists of residential homes.

### **Grove Street at South Street/ Walnut Hill Road**

Independence Drive meets South Street/Walnut Hill Road to form a five-way, signalized intersection. The Grove Street approaches to the intersection provide a shared through/left-turn lane and a shared through/right-turn lane in each travel direction. The South Street and Walnut Hill Road southbound approaches each provide a single general-purpose travel lane. The South Street northbound approach generally operates as an exclusive left turn lane and a shared through/ right turn lane. Sidewalks are provided on both sides of all the approaches and marked crosswalks are provided across each approach. An MBTA bus stop is located at the intersection. Land use at the intersection consists of residential homes, commercial buildings, and a religious temple use.

### **Russett Road at Asheville Road**

Russett Road meets Asheville Road to form a four-way, unsignalized intersection. The Russett Road approaches to the intersection both provide a single travel lane in each direction. The Asheville Road approaches are generally unmarked but are wide enough to provide a separate left/ through lane and exclusive right turn departure lanes under "STOP" sign control. Sidewalks are provided at each approach to the intersection. Land use at the intersection consists of residential use.

### **South Street at Asheville Road**

South Street meets Asheville Road to form a three-way, unsignalized intersection. Each approach to the intersection provides a single travel lane in each direction with Asheville Road under STOP-control. Sidewalks are provided along Asheville Road and the easterly side of South Street. Land use at the intersection consists of residential uses and Bournemouth Hospital.

## Existing Traffic Data

Traffic volume data were collected at the study intersections during the weekday morning (7:00 AM - 9:00 AM) and weekday evening (4:00 PM – 6:00 PM) periods to coincide with peak traffic activity of the proposed residential uses and the adjacent streets. Traffic data used in this evaluation were collected in April 2012 and reflect typical area traffic conditions with schools in session. The month of April represents above-average traffic conditions based on review of MassDOT permanent count station data for the area. Therefore, as a conservative measure, no adjustment (reduction) to the observed traffic volumes was made to reflect average season conditions. Additionally, traffic volumes in the Brookline area have generally declined over the past few years based on MassDOT permanent count station data. However, in order to provide a conservative planning based analysis for the project, the observed traffic volumes were grown by an annual growth rate of one percent (1%) for one year to obtain the 2013 Existing (Baseline) conditions networks. Traffic count data and MassDOT permanent count station data are provided in the **Attachments**. The weekday morning and evening peak hours of traffic volumes for the study intersections are shown in **Figure 3** and **Figure 4**.

Historical daily traffic volumes along Independence Drive in the site vicinity were collected using an automated traffic recorder (ATR) in September 2007 with detailed count data provided in the **Attachments**. Independence Drive, a minor arterial roadway in the study area, carries approximately 14,000 vehicles per day with peak hour volumes of approximately 1,175 vph to 1,275 vph vehicles per hour. Directional flow of traffic exhibits commuter trends (eastbound in the AM peak hour and westbound in the PM peak hour).

## Existing (Hancock Village) Trip Generation

Trip generation characteristics for the existing Hancock Village based on empirical data collected in April 2012 is summarized in **Table 1**. At the time of the collection of the empirical data approximately 700 apartment units were occupied along the observed driveways. Detailed trip generation calculations are included in the **Attachments**.

As summarized in **Table 1**, the following key trip characteristics for the existing Hancock Village apartments are noted:

- The existing Hancock Village generates approximately 356 vehicle trips per hour (vph) during a weekday morning peak hour and approximately 254 vph during the weekday evening peak hour.
- The Hancock Village generates approximately 0.51 trips per unit during the weekday morning peak hour and 0.36 trips per unit during the weekday evening peak hour.



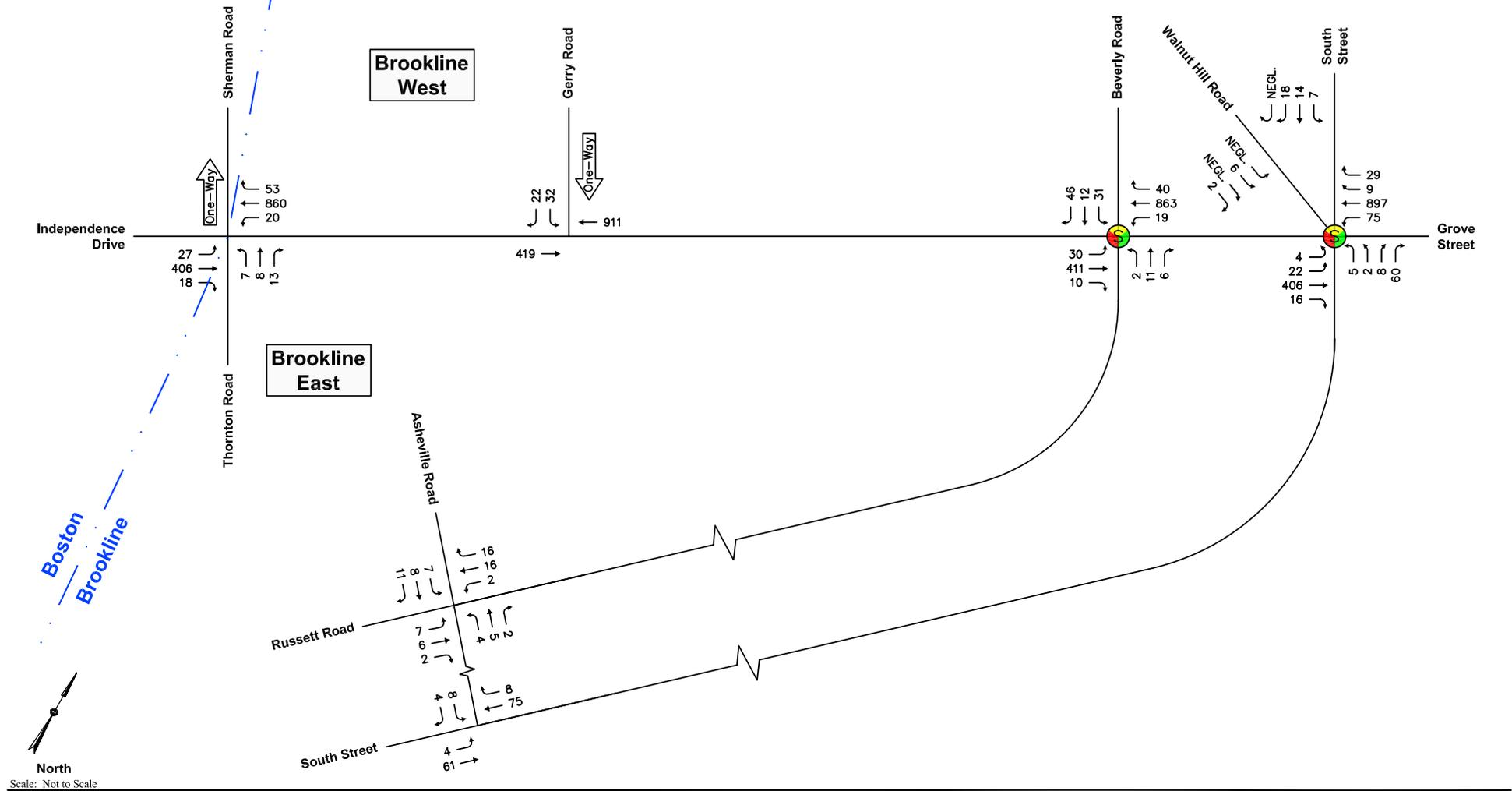


Figure 4

2013 Existing (Baseline) Weekday Evening  
 Peak Hour Traffic Volumes

**TABLE 1  
EXISTING TRIP-GENERATION  
HANCOCK VILLAGE APARTMENTS**

<b>Peak Hour/ Direction of Travel</b>	<b>Trip Generation<sup>1</sup></b>	<b>Trip Rate (Empirical)<sup>2</sup></b>
<i>Weekday Morning Peak Hour:</i>		
Entering	93	0.13
<u>Exiting</u>	<u>263</u>	<u>0.38</u>
Total	356	0.51
<i>Weekday Evening Peak Hour:</i>		
Entering	146	0.21
<u>Exiting</u>	<u>108</u>	<u>0.15</u>
Total	254	0.36

<sup>1</sup> Based on empirical data collected in April 2012

<sup>2</sup> Empirical trip generation per unit based on 700 units in trips per unit.

**Intersection Crash History**

In order to identify crash trends and safety characteristics for study area intersections, crash data were obtained from MassDOT for the Town of Brookline for the three-year period 2009 through 2011 (the most recent data currently available from MassDOT). Crash data for the study intersections is summarized in **Table 2** with detailed data provided in the **Attachments**.

Crash rates were calculated for the study area intersections as reported in **Table 2**. This rate quantifies the number of crashes per million entering vehicles. MassDOT has determined the official District 6 (which includes the Town of Brookline) crash rate to be 0.58 for unsignalized intersections and 0.76 for signalized intersections. These rates represent MassDOT's "average" crash experience for District 6 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 2  
INTERSECTION CRASH SUMMARY  
2009 THROUGH 2011<sup>1</sup>**

Data Category	Grove St at South St/ Walnut Hill Rd	Grove St at Beverly Rd/ Russett Rd	Independence Dr at Gerry Rd	Independence Dr at Sherman Rd/ Thornton Rd
Traffic Control	Signalized	Signalized	Unsignalized	Unsignalized
Crash Rate <sup>2</sup>	<b>0.21</b>	<b>0.06</b>	<b>0.18</b>	<b>0.17</b>
District 6 Avg <sup>3</sup>	0.76	0.76	0.58	0.58
<i>Year:</i>				
2009	2	0	2	1
2010	1	0	0	0
<u>2011</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>2</u>
Total	4	1	3	3
<i>Type:</i>				
Angle	1	1	0	1
Rear-End	1	0	1	2
Head-On	0	0	0	0
Sideswipe	0	0	0	0
Single Vehicle	2	0	1	0
Other/Unknown	0	0	1	0
<i>Severity:</i>				
P. Damage Only	3	0	2	0
Personal Injury	0	1	1	3
Fatality	0	0	0	0
Unknown	1	0	0	0
<i>Conditions:</i>				
Dry	3	1	2	2
Wet	1	0	0	1
Snow	0	0	0	0
Other	0	0	1	0
<i>Time:</i>				
7:00 to 9:00 AM	0	0	2	1
4:00 to 6:00 PM	1	0	0	1
Rest of Day	3	1	1	1

<sup>1</sup>Source: MassDOT Crash Database

<sup>2</sup>Crashes per million entering vehicles

<sup>3</sup>District 6 averages = 0.76 (signalized) and 0.58 (unsignalized)

As summarized in **Table 2**:

- *Grove Street/South Street.* A total of four (4) crashes were reported at the Grove Street/South Street signalized intersection during the three-year study period resulting in a crash rate of 0.21 which is well below the District 6 average of 0.76 for signalized intersections. Of the reported crashes, one (1) involved an angle-type collision, one (1) involved a rear-end collision and two (2) involved single vehicle crashes. The majority resulted in property damage only (75%) and occurred under dry roadway conditions (75%). Only one (1) reported crash occurred during the weekday peak periods. No fatalities were reported at this location during the three-year study period.
- *Grove Street/Beverly Road.* There was one (1) reported crash at the Grove Street/Beverly Road signalized intersection during the three-year study period resulting in a crash rate of 0.06 which is well below the District 6 average of 0.76 for signalized intersections. The reported crash involved an angle-type collision resulting in a non-fatal injury and occurring under dry roadway conditions. The crash occurred outside of the weekday morning and evening peak periods.
- *Independence Drive/Gerry Road.* A total of three (3) crashes were reported at the Independence Drive/Gerry Road unsignalized intersection during the three-year study period resulting in a crash rate of 0.18 which is well below the District 6 average of 0.58 for unsignalized intersections. Of the reported crashes, one (1) involved a rear-end type collision, one (1) involved a single vehicle crash and one (1) is of unknown severity. Two (2) of the crashes resulted in property damage only and occurred under dry roadway conditions. Two (2) of the reported crashes (67%) of crashes occurred during the weekday morning peak period. No fatalities were reported at this location during the three-year study period.
- *Independence Drive/Sherman Road/Thornton Road.* A total of three (3) crashes were reported at the Independence Drive/Sherman Road/Thornton Road unsignalized intersection during the three-year study period resulting in a crash rate of 0.17 which is well below the District 6 average of 0.58 for unsignalized intersections. Of the reported crashes, one (1) involved an angle-type collision and two (2) involved rear-end type collisions. All of the reported crashes resulted in non-fatal injuries. Two (2) of the reported crashes occurred under dry roadway conditions and one (1) of the reported crashes occurred under wet roadway conditions. Two (2) of the reported crashes (67%) of crashes occurred during the weekday morning and weekday evening peak periods. No fatalities were reported at this location during the three-year study period.
- There were no reported crashes at the unsignalized intersections of Asheville Road at Russett Road and at South Street during the three-year study period.

In summary, the study intersections all experienced crash rates well below the District 6 average and no immediate safety countermeasures are warranted based on the crash history at the study intersections.

## Sight Line Evaluation

An evaluation of sight lines was conducted at the site driveway locations providing access to the proposed residential units to ensure that minimum recommended sight lines are available at the site driveway intersections with Independence Drive and Russett Road. The evaluation documents sight lines under proposed conditions for vehicles as they relate to Independence Drive and existing conditions for vehicles as they relate to Russett Road with comparison to recommended guidelines.

The American Association of State Highway and Transportation Officials' (AASHTO) standards<sup>1</sup> reference two types of sight distance which are relevant at the proposed site driveway intersections along Independence Drive and the existing site driveway along Russett Road: stopping sight distance (SSD) and intersection sight distance (ISD). Sight lines for critical vehicle movements at the site driveway intersections were compared to minimum SSD and ISD recommendations for the regulatory speed limit posted in the area near the site. As a point of reference, MDM has also evaluated SSD and ISD along Asheville Road within the Site in the vicinity of the proposed garage driveway that will serve the southeast apartment building complex using the latest available site layout and grading plans prepared by Stantec. An exhibit depicting proposed driveway layout and sight lines is presented in the **Appendix**.

### **Stopping Sight Distance**

Sight distance is the length of roadway visible to the motorist to a fixed object. The minimum sight distance available on a roadway should be sufficiently long enough to enable a below-average operator, traveling at or near a regulatory speed limit, to stop safely before reaching a stationary object in its path, in this case, a vehicle exiting onto Independence Drive or Russett Road. The SSD criteria are defined by AASHTO based on design and operating speeds, anticipated driver behavior and vehicle performance, as well as physical roadway conditions. SSD includes the length of roadway traveled during the perception and reaction time of a driver to an object, and the distance traveled during brake application on wet level pavement. Adjustment factors are applied to account for roadway grades when applicable.

SSD was estimated in the field using AASHTO standards for driver's eye (3.5 feet) and object height equivalent to the taillight height of a passenger car (2.0 feet) for the northbound and southbound Independence Drive and Russett Road approaches to the site driveways. **Table 3** presents a summary of the available SSD as they relate to Independence Drive and Russett Road and AASHTO's recommended SSD based on posted speeds along Independence Drive and Russett Road.

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<sup>1</sup> *A policy on Geometric Design of Highways and Streets*, American Association of State Highway and Transportation Officials (AASHTO), 2011.

**TABLE 3  
STOPPING SIGHT DISTANCE SUMMARY  
APPROACHES TO SITE DRIVEWAYS**

Approach/ Travel Direction	Available SSD	AASHTO Recommended <sup>1</sup> (Regulatory Speed Limit <sup>2</sup> )
<i>Independence Drive at Proposed Brookline West Drive</i>		
Northbound	>500 Feet	250 Feet
Southbound	>500 Feet	250 Feet
<i>Independence Drive at Proposed Brookline East Drive</i>		
Northbound	>500 Feet	250 Feet
Southbound	>500 Feet	250 Feet
<i>Russett Road at Site Drive (Asheville Road)</i>		
Eastbound	>500 Feet	200 Feet
Westbound	300± Feet	200 Feet

<sup>1</sup>Recommended sight distance based on AASHTO, A Policy on Geometric Design of Highways and Streets. Based on driver height of eye of 3.5 feet to object height of 2.0 feet.

<sup>2</sup>Regulatory posted speed = 35 mph on Independence Drive & Regulatory prima facie speed = 30 mph on Russett Road

As summarized in **Table 3**, analysis results indicate that the existing available sight lines exceed AASHTO’s recommended SSD criteria for both travel directions along Independence Drive and Russett Road. Stopping sight distance calculations are provided in the **Attachments**.

### **Intersection Sight Distance**

Clear sight lines provide sufficient sight distance for a stopped driver on a minor-road approach to depart from the intersection and enter or cross the major road. As stated under AASHTO’s Intersection Sight Distance (ISD) considerations, “...If the available sight distance for an entering ...vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to avoid collisions...To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road.” AASHTO’s ISD criteria are defined into several “cases”. In this case, the proposed site driveway approaches to the intersections are proposed to be under STOP signal control and the ISD in question relates to the ability to turn left or turn right onto Independence Drive or Russett Road.

Available ISD was estimated in the field using AASHTO standards for driver's eye (3.5 feet), object height (3.5 feet) and decision point (14.5 feet from the edge of travel lane) for the northbound and southbound directions along Independence Drive and Russett Road. **Table 4** presents a summary of the available ISD for the departure from the site driveways and AASHTO's recommended ISD.

**TABLE 4  
INTERSECTION SIGHT DISTANCE SUMMARY  
SITE DRIVEWAY DEPARTURES**

Approach/ Travel Direction	Available ISD	AASHTO Minimum <sup>1</sup> (Regulatory Speed Limit <sup>2</sup> )
<i>Independence Drive at Proposed Brookline West Drive</i>		
Looking North	>500 Feet	250 Feet
Looking South	>500 Feet	250 Feet
<i>Independence Drive at Proposed Brookline East Drive</i>		
Looking North	>500 Feet	250 Feet
Looking South	>500 Feet	250 Feet
<i>Russett Road at Site Drive (Asheville Road)</i>		
Looking East	>225 Feet	200 Feet
Looking West	350± Feet	200 Feet

<sup>1</sup>Recommended sight distance based on AASHTO, A Policy on Geometric Design of Highways and Streets. Based on driver height of eye of 3.5 feet and an object height of 3.5 feet and adjustments for roadway grade if required. Minimum value as noted represents SSD per AASHTO guidance.

<sup>2</sup>Regulatory posted speed = 35 mph on Independence Drive & Regulatory prima facie speed = 30 mph on Russett Road

The results of the ISD analysis presented in **Table 4** indicate that the available ISD looking both directions from the proposed site driveways onto Independence Drive and Russett Road exceed the recommended minimum sight line requirements. MDM recommends that any new plantings (shrubs, bushes) or physical landscape features to be located within the driveway sight lines should also be maintained at a height of 2 feet or less to ensure unobstructed lines of sight.

## PUBLIC TRANSPORTATION

Based on data published by the US Census, approximately 30 percent of residents in the immediate study area utilize modes of transportation other than single-occupancy vehicles. US Census transportation mode data for the area are provided in the **Attachments**. Alternative transportation modes include, but are not limited to, using public transportation, walking, bicycling, carpooling, and working at home. Alternative modes of transportation are available to Hancock Village residents and include MBTA Bus Route 51, the Hancock Village MBTA Shuttle and available on-site Zipcar with operating specifics as follows:

- **Route 51 – Reservoir (Cleveland Circle) – Forest Hills Station:** This Route provides a connection to the “T” at the Green Line (Reservoir Station) and Orange Line (Forest Hills Station). The Route generally provides Weekday service between 5:55 AM and 10:26 PM with 1 inbound and 1 outbound bus arriving at Hancock Village approximately every 25 minutes during the peak commuter hours. Saturday service is generally provided between 6:15 AM and 10:10 PM with 1 inbound and 1 outbound bus per hour. This Route does not currently operate on Sundays. Specific MBTA route and schedule information is provided in the **Attachments**.
- **Hancock Village MBTA Shuttle** – A shuttle service provided by Hancock Village to its residents transports passengers between the site and Reservoir Station (Cleveland Circle) during the weekday morning (6:00 AM to 9:00 AM) and evening (4:30 PM to 7:30 PM) commuter periods. The shuttle service runs every 20 minutes and experiences a rider-ship of approximately 3 to 8 passengers per trip.
- **Zipcar** – Zipcar is a privately-owned company providing rental cars stationed at various locations throughout select cities allowing local residents (with membership) access to rental vehicles without the traditional rental car protocol. Zipcar provides two vehicles on-site that are parked in the southeast portion of the site. These vehicles can be rented by the hour or by the day and the rental fee typically includes gas, reserved parking, insurance (deductible applies) and a pre-determined mileage limit. Specific information is available on the Zipcar website.

As summarized, the existing residents of Hancock Village have access to a wide variety of alternative modes of transportation. The existing sidewalk system onsite and in the neighborhood is extensive and provides access to nearby commercial establishments, on-site amenities, the Baker Elementary School and other area attractions. Thus, the site provides a well established alternative transportation program. As a conservative measure, no reduction in site trips is taken as a result of available public transportation.

## PROJECTED FUTURE TRAFFIC CONDITIONS

Evaluation of the proposed development impacts requires the establishment of a future analysis condition. This section estimates future roadway and traffic conditions with and without the proposed development. For this evaluation, a five-year planning horizon (year 2018) was selected consistent with standard-industry practice.

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, Existing (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), includes existing traffic, new traffic due to general background traffic growth, and traffic related to specific developments by others that are 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 the future traffic volumes.

### Background Growth

Background traffic includes demand generated by other planned developments in the area as well as demand increases caused by external factors. External factors are general increases in traffic not attributable to a specific development and are determined using historical data.

Nearby permanent count station data published by MassDOT indicates a declining growth rate. For purposes of this evaluation, a 1 percent growth rate was used (approximate 5 percent increase over a 5-year horizon). This growth rate is higher than historic rates, and as such is also expected to account for any small fluctuation in hourly traffic as may occur from time to time in the study area. Background growth rate calculations are provided in the **Attachments**.

Also, Massachusetts Environmental Policy Act (MEPA) files and Boston Redevelopment Authority (BRA) files were reviewed to determine if any background projects are proposed in the area that may affect the study area intersections. Based on the files available, there are currently no known new developments proposed for the Town of Brookline and the surrounding areas likely to significantly impact the study area intersections. Therefore, only the 1 percent background growth rate was applied to determine the No-Build traffic volumes.

### 2018 No-Build Traffic Volume Networks

In summary, to account for future traffic growth in the study area future No-Build traffic volumes are developed by increasing the existing (baseline) volumes by approximately 5

percent (1 percent compounded annually over 5 years). The resulting No-Build traffic volumes are displayed in **Figure 5** and **Figure 6**.

**Site Traffic**

The trip generation estimates for the proposed residential development are provided for the weekday morning and weekday evening periods, which correspond to the critical weekday analysis periods for the proposed use and adjacent street traffic flow. New traffic generated by the project was estimated using trip rates published in ITE’s *Trip Generation*<sup>2</sup> for Land Use Codes (LUCs) that most closely reflect the characteristics of individual residential uses within the site. **Table 5** presents the trip-generation estimates for the proposed development based on ITE methodology.

As summarized in **Table 5**, the proposed development is estimated to generate approximately 94 vehicle trips (19 entering and 75 exiting) during the weekday morning peak hour and 119 vehicle trips (77 entering and 42 exiting) during the weekday evening peak hour. On a daily basis, the proposed residential uses are estimated to generate approximately 1,238 vehicle trips on a weekday with 50 percent entering and exiting. Trip generation calculations are provided in the **Attachments**.

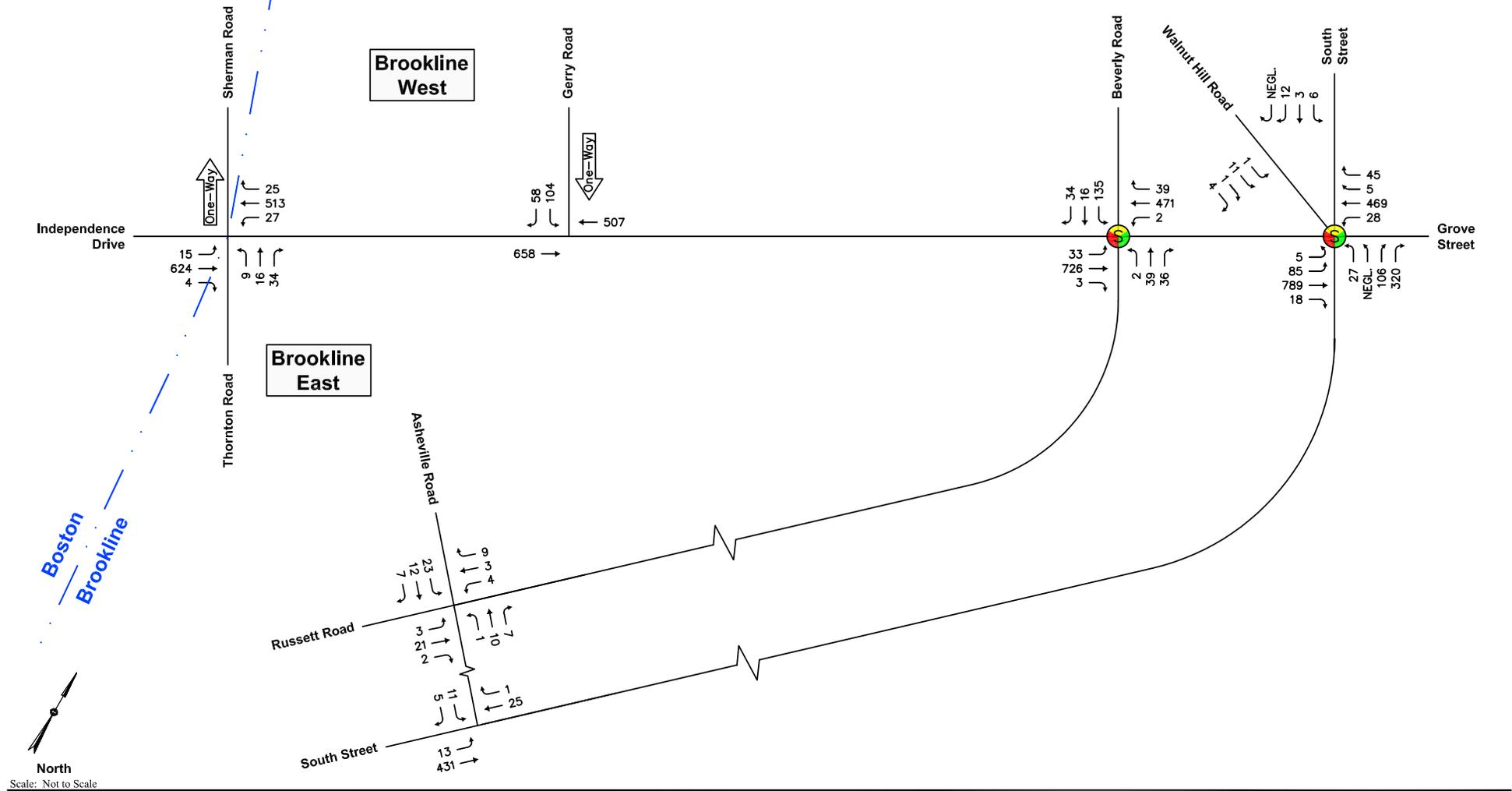
**TABLE 5  
UPDATED TRIP-GENERATION SUMMARY (184 Units)**

Period/Direction	ITE Basis Apartment Trips <sup>1</sup>
<i>Weekday Morning Peak Hour</i>	
Entering	19
<u>Exiting</u>	<u>75</u>
Total	94
<i>Weekday Evening Peak Hour</i>	
Entering	77
<u>Exiting</u>	<u>42</u>
Total	119
<i>Weekday Daily</i>	1,238

Source: ITE *Trip Generation*, Ninth Edition; 2012.

<sup>1</sup>Based on ITE LUC 220 (Apartment) applied to 184 units.

<sup>2</sup>*Trip Generation*, Ninth Edition; Institute of Transportation Engineers; Washington, DC; 2012.



Scale: Not to Scale

Figure 5

2018 No-Build Weekday Morning  
 Peak Hour Traffic Volumes

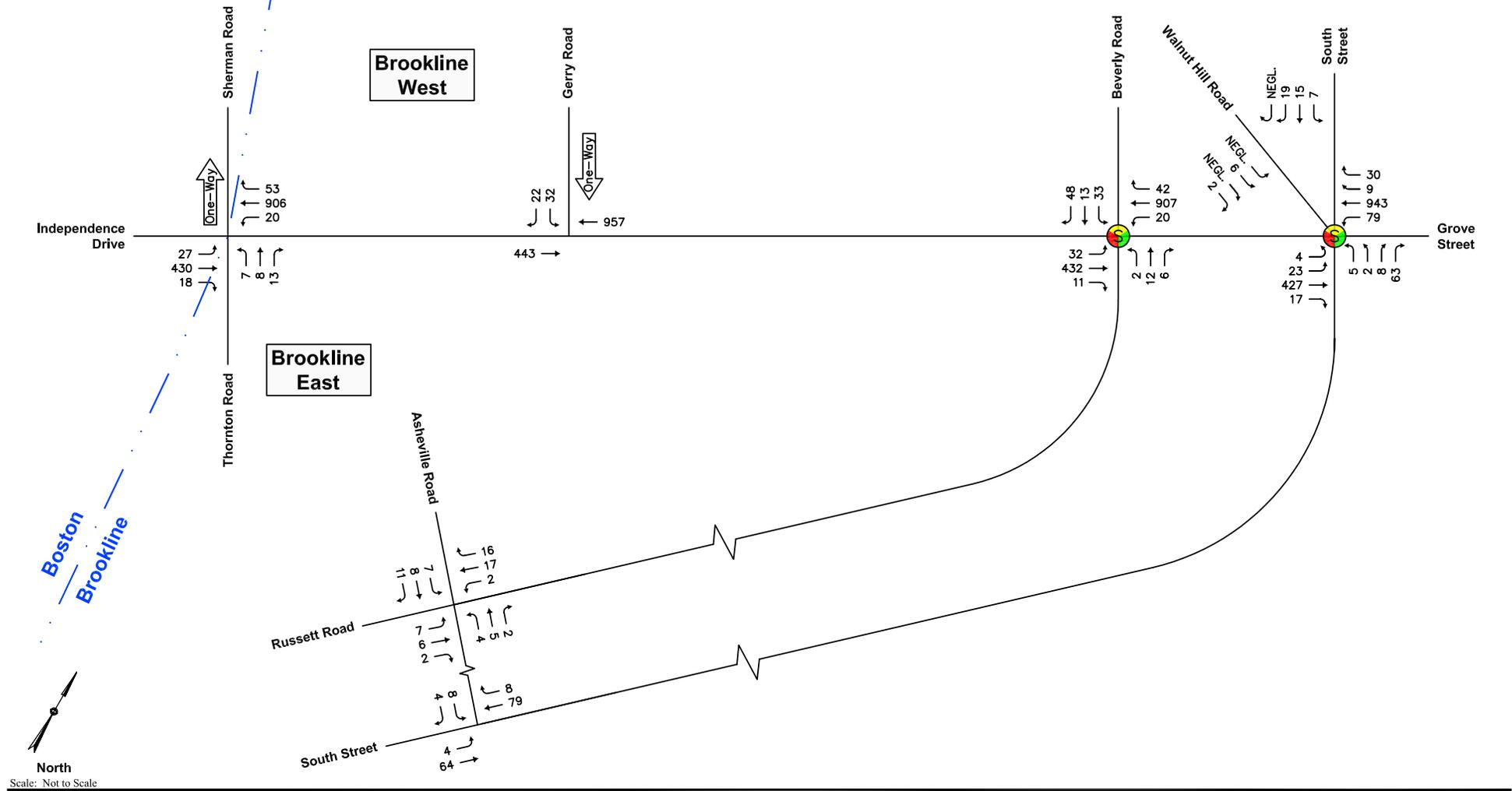


Figure 6

2018 No-Build Weekday Evening  
 Peak Hour Traffic Volumes

Date: July 2014  
 Dwg No. 389 TIAS\_40E\_Updated\_Jul 2014.dwg  
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## Trip Generation Comparison – Observed Site Trips

ITE estimates for LUC 220 (Apartment) presented in **Table 5** were compared to empirical trip estimates based on trip rates that were calculated based on the existing peak hour activity at the Hancock Village driveways. **Table 6** provides a trip generation comparison for the empirically estimated and ITE estimated site trips during the weekday morning and weekday evening peak hours. Trip generation calculations are provided in the **Attachments**.

**TABLE 6**  
**UPDATED TRIP-GENERATION COMPARISON (184 Units)**

Period/Direction	Empirical Basis Apartment Trips <sup>1</sup>	ITE Basis Apartment Trips <sup>2</sup>	Difference (Δ)
<i>Weekday Morning Peak Hour</i>			
Entering	24	19	+5
<u>Exiting</u>	<u>70</u>	<u>75</u>	<u>-5</u>
Total	94	94	0
<i>Weekday Evening Peak Hour</i>			
Entering	39	77	-38
<u>Exiting</u>	<u>28</u>	<u>42</u>	<u>-14</u>
Total	67	119	-52

Source: ITE *Trip Generation*, Ninth Edition; 2012.

<sup>1</sup>Based on observed trip rates at the existing Hancock Village applied to 184 units.

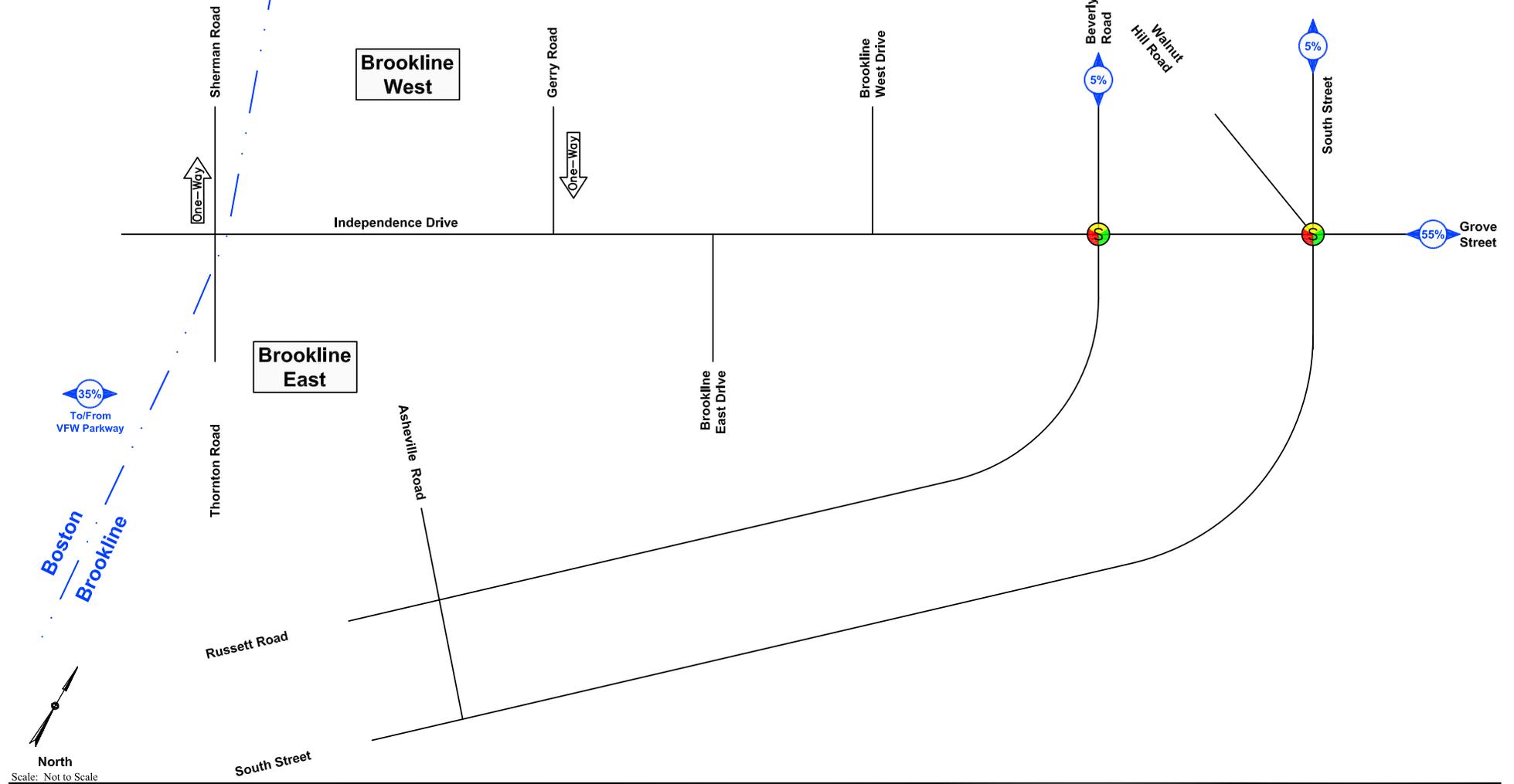
<sup>2</sup>Based on ITE LUC 220 (Apartment) applied to 184 units.

As shown in **Table 6**, the number of observed trips at the site is similar to ITE projections for the weekday morning peak hour and approximately 44 percent less than ITE projections for the weekday evening peak hour based on the same number of apartment units. As a conservative measure and to be consistent with standard industry practice, the higher-volume ITE-based estimates were used in this analysis rather than trip rates calculated using empirical data for the existing site.

### Trip Distribution

The distribution for projected traffic for the proposed expansion project is based on existing travel patterns at the Hancock Village site driveways and of the adjacent roadway system. The resulting trip distribution is presented in **Figure 7** with detailed calculations provided in the **Attachments**.

**Figure 8** and **Figure 9** presents projected site-generated traffic volumes for the weekday morning and weekday evening peak hours for the proposed residential development based on the trip generation presented in **Table 5** and projected travel patterns presented in **Figure 7**.



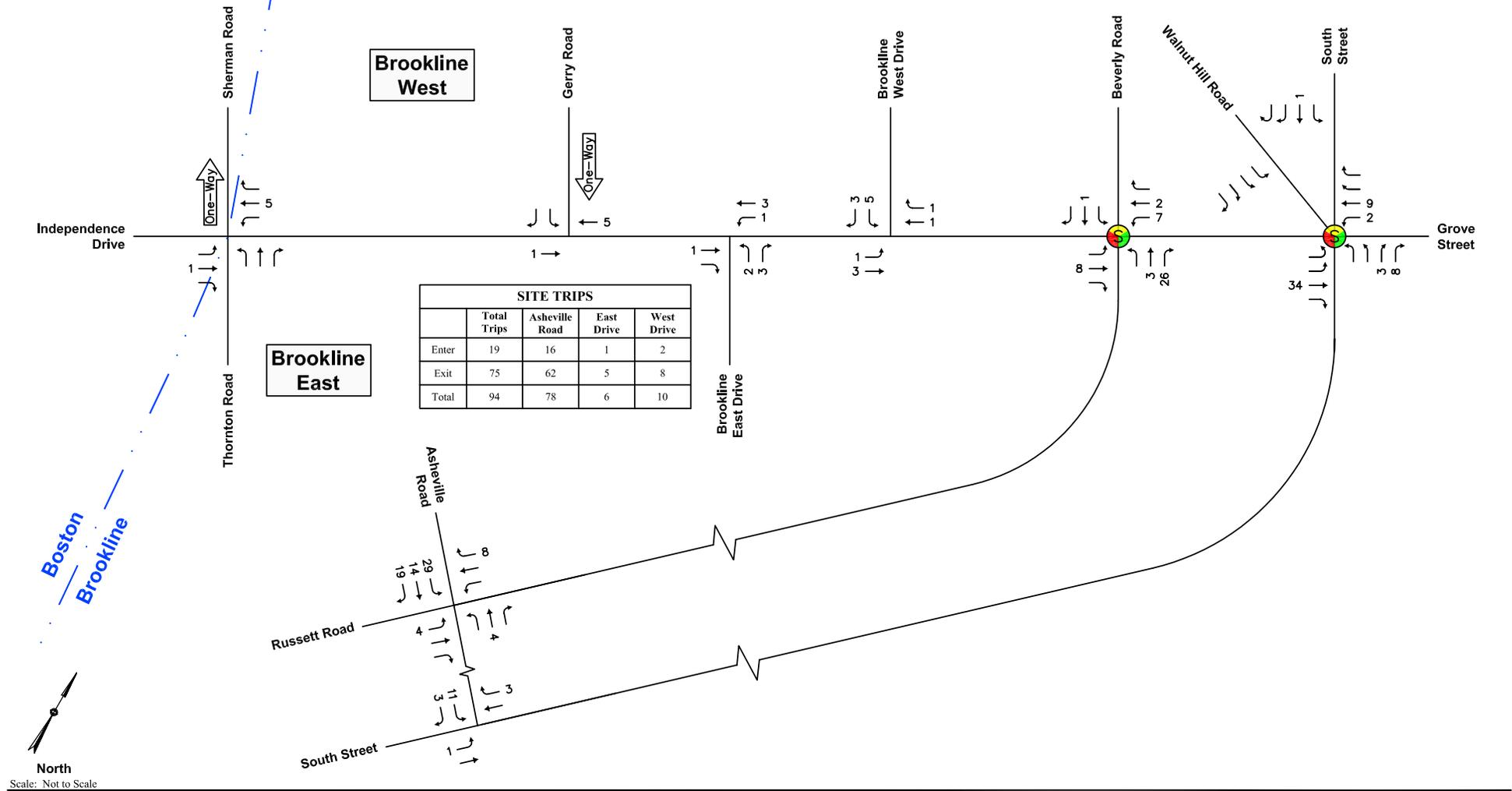


Figure 8

Site-Generated Trips  
 Weekday Morning Peak Hour Traffic Volumes

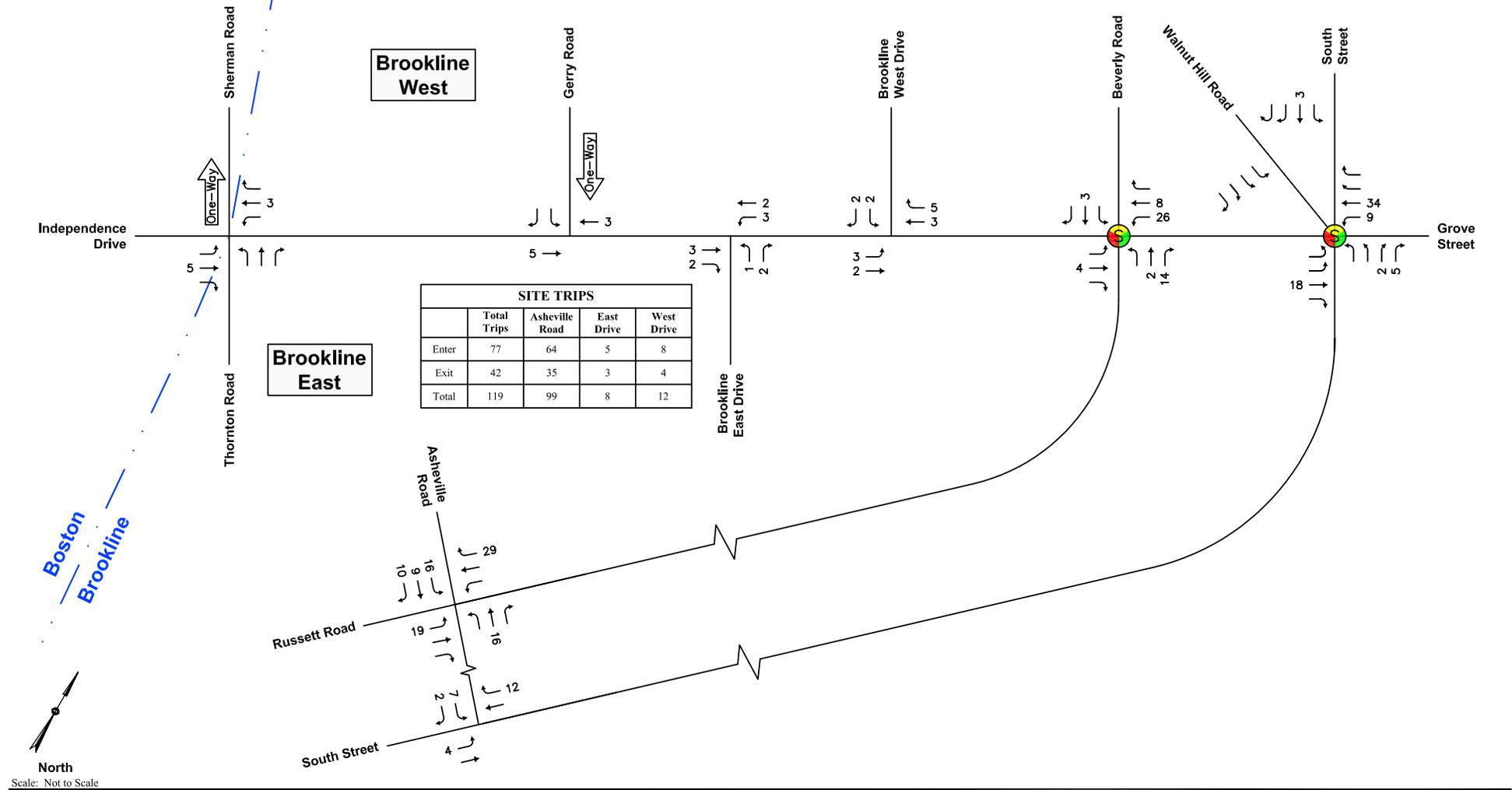


Figure 9

Site-Generated Trips  
 Weekday Evening Peak Hour Traffic Volumes

## **2018 Build Traffic Conditions**

2018 Build condition traffic volumes are derived by adding the incremental traffic increases for the proposed expansion at the site to the 2018 No-Build conditions. The resulting Build traffic volumes used for analysis are shown in **Figure 10** and **Figure 11**.

## **OPERATIONS ANALYSIS**

This section provides an overview of operational analysis methodology, an assessment of driveway operations under Existing (Baseline) and projected future No-Build and Build conditions and a summary of the vehicular queues at the signalized intersections.

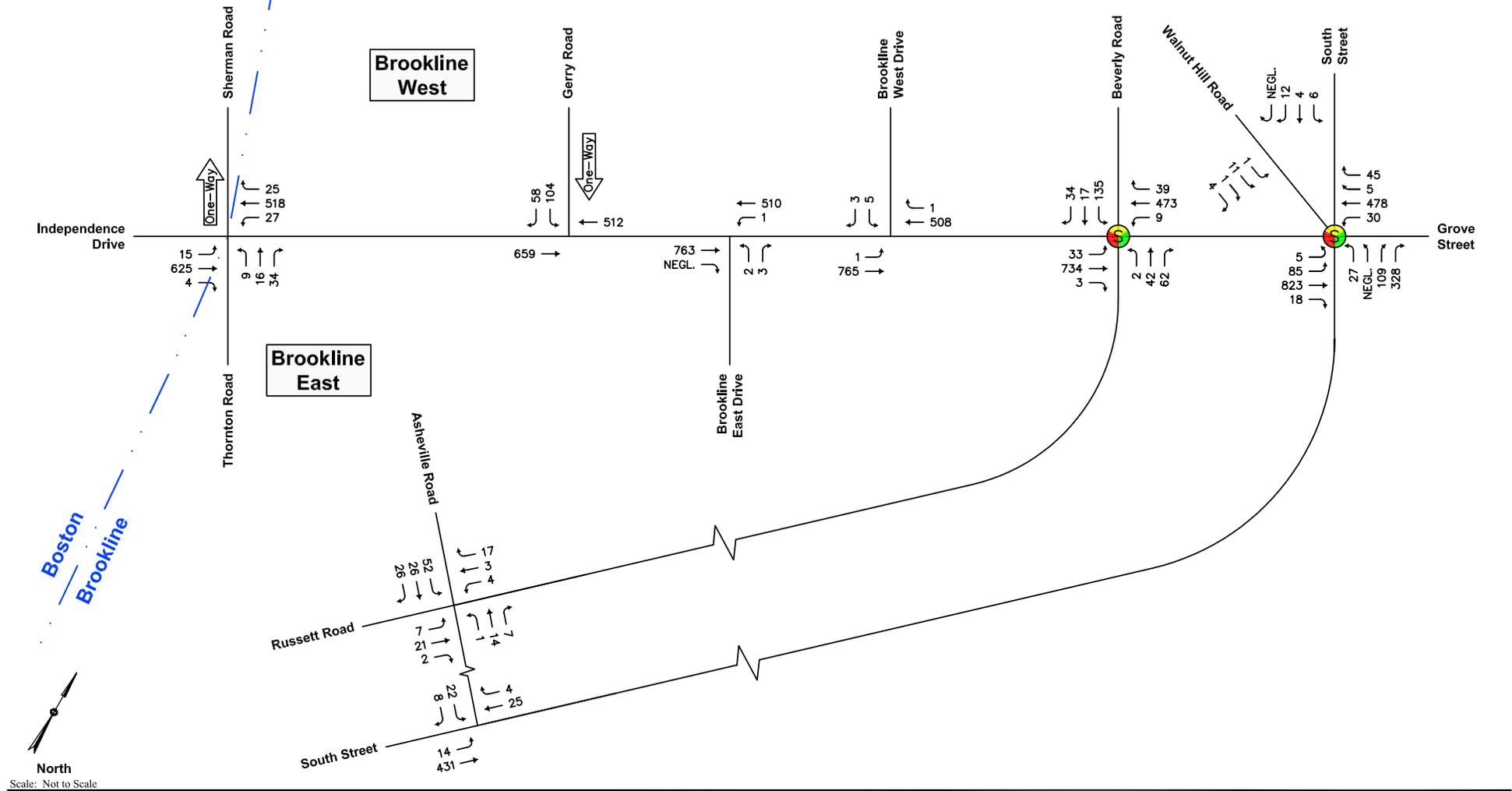
### **Analysis Methodology**

Intersection capacity analyses are presented in this section for the Existing (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.

Capacity analysis of intersections is developed using the Synchro® computer software, which implements the methods of the 2010 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 is 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). The specific control delays and associated LOS designations are presented in the **Attachments**.

### **Analysis Results**

Level-of-Service (LOS) analyses were conducted for the Existing (Baseline), No-Build, and Build conditions for the study intersections. The results of the intersection capacity are summarized below in **Table 7**, **Table 8**, **Table 9** and **Table 10**. Detailed analysis results are presented in the **Attachments**.



Scale: Not to Scale

Figure 10

2018 Build Weekday Morning  
 Peak Hour Traffic Volumes

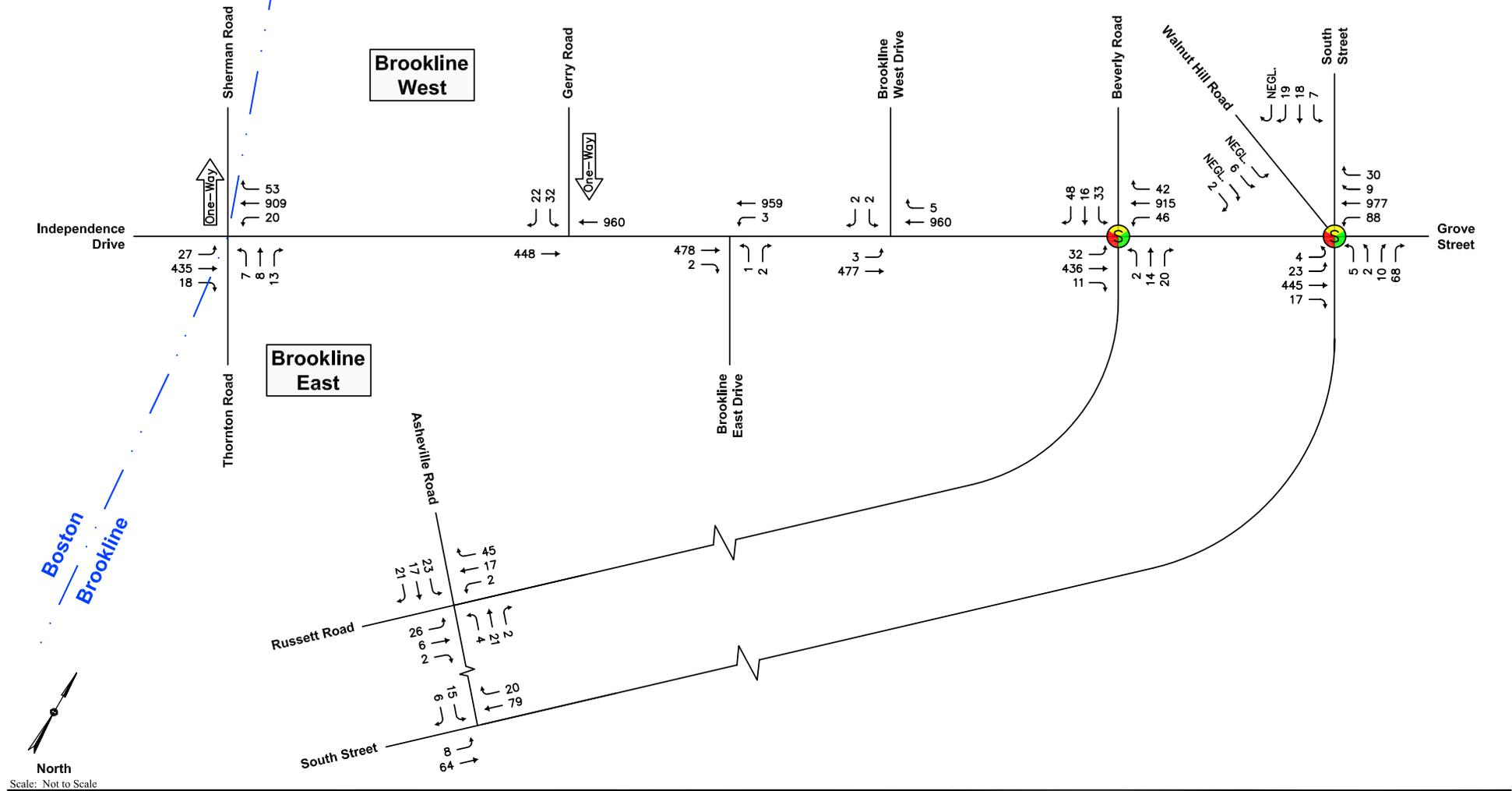


Figure 11

**TABLE 7**  
**UPDATED SIGNALIZED INTERSECTION CAPACITY ANALYSIS RESULTS (184 Units)**  
**WEEKDAY MORNING PEAK HOUR**

Period	Approach	2013 Existing (Baseline)			2018 No-Build			2018 Build		
		v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	v/c	Delay	LOS	v/c	Delay	LOS
<i>Grove Street at South Street</i>	Eastbound	0.69	21	C	0.80	27	C	0.86	31	C
	Westbound	0.38	17	B	0.45	19	B	0.49	20	B
	Northbound	0.84	39	D	0.82	37	D	0.82	37	D
	Southbound	0.05	29	C	0.05	29	C	0.05	29	C
	<u>Southeastbound</u>	<u>0.15</u>	<u>45</u>	<u>D</u>	<u>0.16</u>	<u>46</u>	<u>D</u>	<u>0.16</u>	<u>46</u>	<u>D</u>
	<b>Overall</b>	<b>0.84</b>	<b>25</b>	<b>C</b>	<b>0.82</b>	<b>27</b>	<b>C</b>	<b>0.86</b>	<b>29</b>	<b>C</b>
<i>Independence Drive at Beverly Road and Russett Road</i>	Eastbound	0.45	14	B	0.48	15	B	0.50	16	B
	Westbound	0.37	34	C	0.40	34	C	0.42	35	C
	Northbound	0.26	33	C	0.26	32	C	0.34	32	C
	<u>Southbound</u>	<u>0.73</u>	<u>50</u>	<u>D</u>	<u>0.75</u>	<u>51</u>	<u>D</u>	<u>0.80</u>	<u>55</u>	<u>D</u>
	<b>Overall</b>	<b>0.73</b>	<b>26</b>	<b>C</b>	<b>0.75</b>	<b>27</b>	<b>C</b>	<b>0.80</b>	<b>28</b>	<b>C</b>

<sup>1</sup>Volume-to-capacity ratio

<sup>2</sup>Average control delay per vehicle (in seconds)

<sup>3</sup>Level of service

**TABLE 8**  
**UPDATED SIGNALIZED INTERSECTION CAPACITY ANALYSIS RESULTS (184 Units)**  
**WEEKDAY EVENING PEAK HOUR**

Period	Approach	2013 Existing (Baseline)			2018 No-Build			2018 Build		
		v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	v/c	Delay	LOS	v/c	Delay	LOS
<i>Grove Street at South Street</i>	Eastbound	0.22	<5	A	0.23	<5	A	0.24	<5	A
	Westbound	0.49	11	B	0.52	12	B	0.55	13	B
	Northbound	0.34	19	B	0.35	18	B	0.37	18	B
	Southbound	0.23	40	D	0.24	41	D	0.25	41	D
	<u>Southeastbound</u>	<u>0.07</u>	<u>40</u>	<u>D</u>	<u>0.07</u>	<u>40</u>	<u>D</u>	<u>0.07</u>	<u>40</u>	<u>D</u>
	<b>Overall</b>	<b>0.49</b>	<b>10</b>	<b>A</b>	<b>0.52</b>	<b>11</b>	<b>B</b>	<b>0.55</b>	<b>11</b>	<b>B</b>
<i>Independence Drive at Beverly Road and Russett Road</i>	Eastbound	0.22	8	A	0.23	8	A	0.24	8	A
	Westbound	0.47	20	B	0.49	20	B	0.53	21	C
	Northbound	0.09	35	C	0.09	35	C	0.18	36	D
	<u>Southbound</u>	<u>0.47</u>	<u>44</u>	<u>D</u>	<u>0.49</u>	<u>44</u>	<u>D</u>	<u>0.49</u>	<u>44</u>	<u>D</u>
	<b>Overall</b>	<b>0.47</b>	<b>18</b>	<b>B</b>	<b>0.49</b>	<b>18</b>	<b>B</b>	<b>0.53</b>	<b>19</b>	<b>B</b>

<sup>1</sup>Volume-to-capacity ratio

<sup>2</sup>Average control delay per vehicle (in seconds)

<sup>3</sup>Level of service

**TABLE 9**  
**UPDATED UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS RESULTS (184 Units)**  
**WEEKDAY MORNING PEAK HOUR**

Period	Approach	2013 Existing (Baseline)			2018 No-Build			2018 Build		
		v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	v/c	Delay	LOS	v/c	Delay	LOS
<i>Independence Drive at Gerry Road</i>										
	SB Left Exit	0.35	23	C	0.38	25	C	0.38	25	C
	SB Right Exit	0.08	10	A	0.08	10	A	0.08	10	A
<i>Independence Drive at Sherman Road and Thornton Road</i>										
	EB LT/TH	0.02	<5	A	0.02	<5	A	0.02	<5	A
	WB LT/TH	0.03	<5	A	0.03	<5	A	0.03	<5	A
	NB Exit	0.11	13	B	0.12	13	B	0.12	13	B
<i>Russett Road at Asheville Road</i>										
	Eastbound	0.00	<5	A	0.00	<5	A	0.01	<5	A
	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Northbound	0.03	9	A	0.03	9	A	0.04	9	A
	Southbound	0.07	9	A	0.07	9	A	0.17	10	A
<i>South Street at Asheville Road</i>										
	Eastbound	0.01	<5	A	0.01	<5	A	0.01	<5	A
	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Southbound	0.03	11	B	0.03	11	B	0.06	12	B
<i>Independence Drive at Site Drive (East)</i>										
	EB LT/TH	n/a <sup>4</sup>	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
	SB Exit	n/a	n/a	n/a	n/a	n/a	n/a	0.03	16	C
<i>Independence Drive at Site Drive (West)</i>										
	WB LT/TH	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
	NB Exit	n/a	n/a	n/a	n/a	n/a	n/a	0.02	16	C

<sup>1</sup>Volume-to-capacity ratio

<sup>2</sup>Average control delay per vehicle (in seconds)

<sup>3</sup>Level of service

<sup>4</sup>n/a = not applicable

**TABLE 10**  
**UPDATED UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS RESULTS (184 Units)**  
**WEEKDAY EVENING PEAK HOUR**

Period	Approach	2013 Existing (Baseline)			2018 No-Build			2018 Build		
		v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	v/c	Delay	LOS	v/c	Delay	LOS
<i>Independence Drive at Gerry Road</i>	SB Left Exit	0.20	30	D	0.22	34	D	0.22	34	D
	SB Right Exit	0.05	12	B	0.05	13	B	0.05	13	B
<i>Independence Drive at Sherman Road and Thornton Road</i>	EB LT/TH	0.04	<5	A	0.04	<5	A	0.04	<5	A
	WB LT/TH	0.02	<5	A	0.02	<5	A	0.02	<5	A
	NB Exit	0.07	14	B	0.07	14	B	0.07	14	B
<i>Russett Road at Asheville Road</i>	Eastbound	0.01	<5	A	0.01	<5	A	0.02	6	A
	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Northbound	0.01	9	A	0.01	9	A	0.04	10	A
	Southbound	0.03	9	A	0.03	9	A	0.08	10	A
<i>South Street at Asheville Road</i>	Eastbound	0.00	<5	A	0.00	<5	A	0.01	<5	A
	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Southbound	0.02	9	A	0.02	9	A	0.03	10	A
<i>Independence Drive at Site Drive (East)</i>	EB LT/TH	n/a <sup>4</sup>	n/a	n/a	n/a	n/a	n/a	0.01	<5	A
	SB Exit	n/a	n/a	n/a	n/a	n/a	n/a	0.02	21	C
<i>Independence Drive at Site Drive (West)</i>	WB LT/TH	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
	NB Exit	n/a	n/a	n/a	n/a	n/a	n/a	0.01	14	B

<sup>1</sup>Volume-to-capacity ratio

<sup>2</sup>Average control delay per vehicle (in seconds)

<sup>3</sup>Level of service

<sup>4</sup>n/a = not applicable

As summarized in Table 7, Table 8, Table 9 and Table 10:

- Capacity analysis results show that the proposed 184-unit expansion will have little or no impact at signalized study intersections. Operational analysis of the signalized intersections indicates the intersections operate below capacity (LOS D or better) under existing and projected future conditions. Project impacts result in a 4 seconds or less increase in approach delays between No-Build and Build conditions with no change in overall LOS.
- Operational analysis of the unsignalized intersections indicates the main line movements at the unsignalized study intersections operate unimpeded at LOS A operations. Side street delays are expected to operate below capacity at LOS D or better. This operating condition is well within operating levels and delays typical of urban settings; adequate capacity is projected at unsignalized study intersections to accommodate the proposed residential expansion as provided by traffic gaps created by nearby traffic signals.

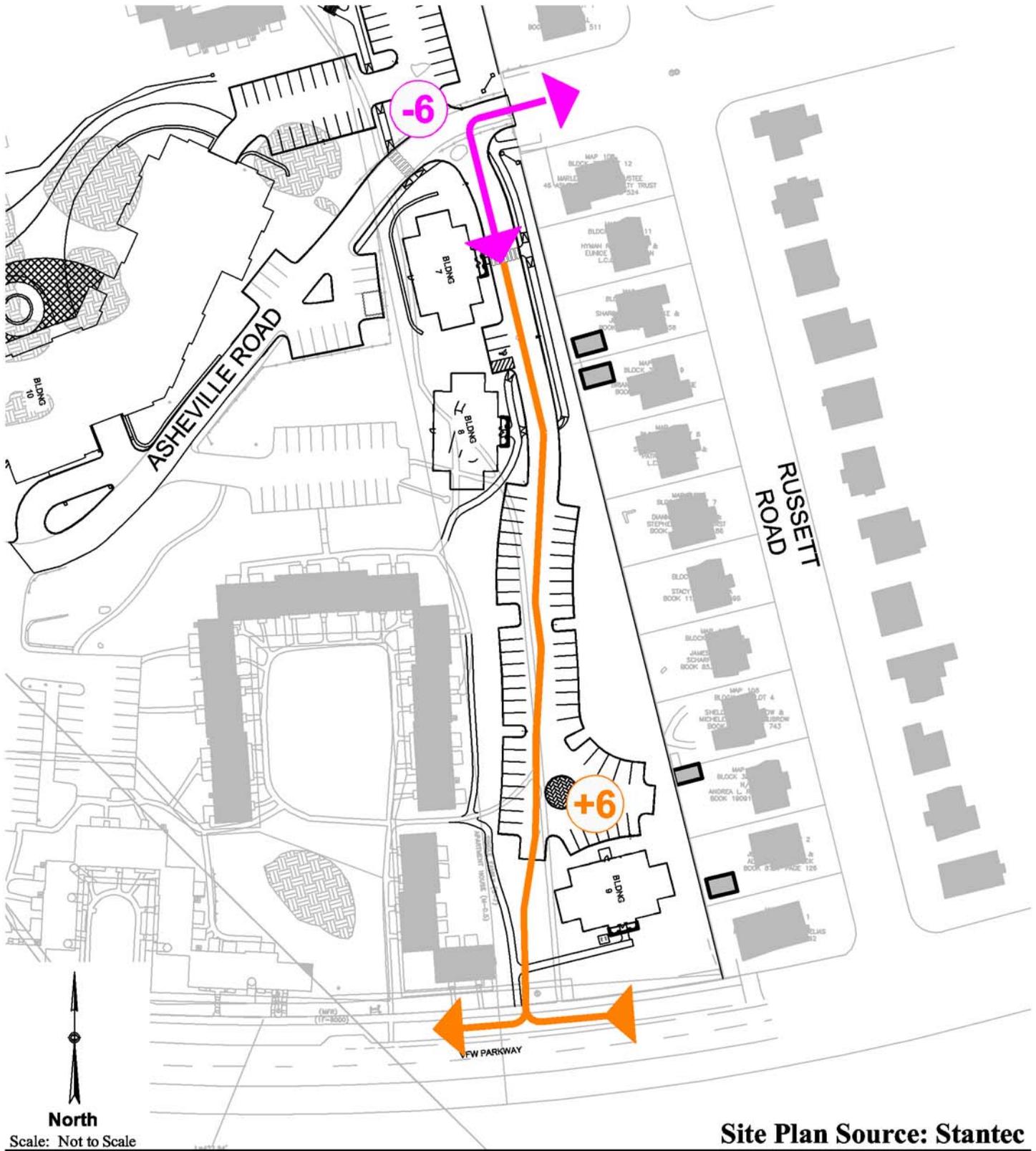
The above analysis results are based on a conservatively high trip generation methodology for the project; use of empirical trip rates for Hancock Village (which reflect transit and alternative travel modes) would result in trip generation reductions of approximately 50% relative to ITE during the weekday evening peak hour. Accordingly, actual site traffic impacts are likely to be lower than reported above.

### **Potential VFW Parkway Access – Qualitative Assessment**

At the request of the Town, a qualitative assessment of traffic operations has been conducted relative to the construction of a potential site access driveway along VFW Parkway that, along with the existing Asheville Road site access driveway, would serve approximately 287 units (135 existing plus 152 proposed) on the east side of the site. The VFW Parkway access would generally run parallel to Russett Road and tie into VFW Parkway approximately 250 feet west of the VFW Parkway/Russett Road unsignalized intersection.

Based on the proximity of the residential units to the two site driveways, anticipated travel times and the efficiency of the roadways leading to the site, it is estimated that approximately 12 of the approximately 287 units along Asheville Road are most likely to use the VFW Parkway connection. If all of the traffic associated with these 12 units use the VFW Parkway connection, the VFW Parkway driveway would likely experience traffic levels of approximately 8 vehicle-trips or less (entering and exiting) during the critical weekday morning and weekday evening peak hours – approximately 1 vehicle-trip or less every 7 minutes. A graphical representation of the anticipated reassignment of traffic is shown in **Figure 12** and **Figure 13** for the weekday morning and weekday evening peak hours, respectively.

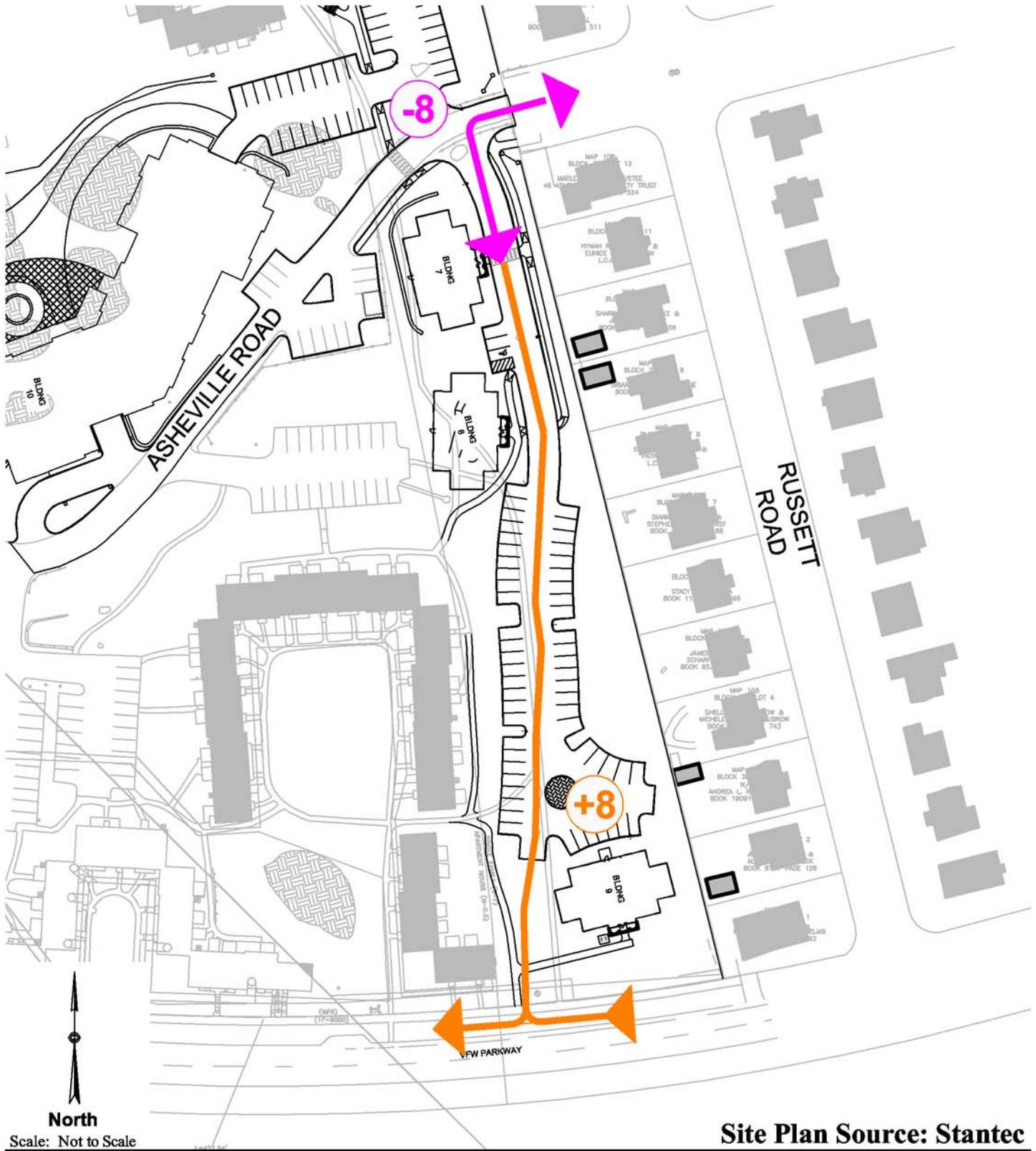
Although not as proximate to the potential VFW Parkway access driveway, some of the residents of the existing and proposed 287 Asheville Road units that are located closer to the Asheville Road access, including the proposed apartment building, may find it more desirable to use the potential VFW Parkway access for reasons other than travel time. MDM has the added benefit of existing (observed) travel patterns of the Asheville Road residents who currently use Russett Road to get to/from VFW Parkway, a path that is highly characteristic of the potential VFW Parkway site driveway given a) their similar parallel alignment, b) close proximity to one another (within 250 feet), c) both are unsignalized at their intersections with VFW Parkway and d) both are restricted to right-in/right-out movements. As such, existing use of Russett Road at VFW Parkway by Hancock Village residents is highly indicative of potential use of a direct site connection to VFW Parkway by the 287 existing and proposed residential units on the east side of the site. As a result, a potential VFW Parkway connection may experience traffic levels up to 38 total vehicle trips per hour (entering and exiting) should all of the VFW Parkway site traffic expected to use Russett Road instead use the potential VFW Parkway site driveway.



Site Plan Source: Stantec

Figure 12

**Reassignment of Site Trips  
Potential VFW Parkway Access Driveway  
Weekday Morning Peak Hour Traffic Volumes**



Site Plan Source: Stantec

Figure 13

**Reassignment of Site Trips  
Potential VFW Parkway Access Driveway  
Weekday Morning Peak Hour Traffic Volumes**

In summary, a potential VFW Parkway driveway is likely to accommodate less than 10 vehicle trips during peak hours. Based on proximity of residential units and associated parking, a more conservative estimate of approximately 38 vehicle trips per hour is also considered. Under either scenario, there is no significant or material change in traffic levels on adjoining neighborhood streets that would result if a VFW Parkway driveway were approved. Consequently, findings of the TIAS remain valid.

## CONCLUSIONS AND RECOMMENDATIONS

MDM finds that travel conditions in the site vicinity along Independence Drive and Russett Road are generally unconstrained. Trip generation estimates based on ITE methodology trip generation for the development is estimated at approximately 94 vehicle-trips during the weekday morning peak hour and 119 vehicle-trips during the weekday evening peak hour. Traffic impacts associated with the proposed Residences of South Brookline are not expected to notably affect travel or safety conditions in the site vicinity. However, MDM recommends access-related improvements aimed at enhancing traffic operations and/or travel safety. Elements of a Transportation Demand Management (TDM) program are also described below.

**Independence Drive at Brookline West Drive.** An existing un-utilized curb-cut along the westerly side of Independence Drive is proposed to be modified to serve as the access/egress to the site for approximately 20 apartment units. MDM recommends the following improvements:

- A “STOP” sign (R1-1) and STOP line pavement markings are recommended on the driveway approach to Independence Drive.
- A proposed sidewalk along the proposed Brookline West Drive will connect all of the units to the existing sidewalk system along Independence Drive. Marked crosswalks should be provided as needed.
- Any new plantings (shrubs, bushes) and structures (walls, fences, etc.) should be maintained at a height of 2 feet or less within the sight lines in vicinity of the site driveway to provide unobstructed sight lines.

**Independence Drive at Brookline East Drive:** A driveway is proposed along the easterly side of Independence Drive approximately 100 feet east of Gerry Road which will serve as the access/egress to the site for approximately 12 apartment units. MDM recommends the following improvements:

- A “STOP” sign (R1-1) and STOP line pavement markings are recommended on the driveway approach to Independence Drive.

- A proposed sidewalk along the proposed Brookline East Drive will connect all of the units to the existing sidewalk system along Independence Drive. Marked crosswalks should be provided as needed.
- Any new plantings (shrubs, bushes) and structures (walls, fences, etc.) should be maintained at a height of 2 feet or less within the sight lines in vicinity of the site driveway to provide unobstructed sight lines.

**Russett Road at Asheville Road:** The existing Asheville Road will serve as access/egress to the site for approximately 152 additional apartment units. MDM recommends the following improvements:

- Given the traffic patterns at the intersection of Russett Road and Asheville Road it may be desirable to convert said location to 4-way stop control. Under existing (baseline) conditions the traffic volumes during the peak periods on Asheville Road are generally equal to or higher than volumes along Russett Road.
- The site driveway connection to Asheville Road as proposed will be widened to 22 feet to accommodate two-way traffic flows. The final design of the roadway should accommodate passenger cars, delivery traffic, and emergency apparatus as needed. Currently, the driveway is limited to approximately 17 feet wide near where it becomes a public roadway (Asheville Road).
- A sidewalk connection is proposed to provide a connection between Asheville Road and the internal sidewalk/path system. Marked crosswalks should be provided as needed.
- Any new plantings (shrubs, bushes) and structures (walls, fences, etc.) should be maintained at a height of 2 feet or less within the sight lines in vicinity of the site driveway to provide unobstructed sight lines.

### **Transportation Demand Management**

Transportation demand management programs are currently serving Hancock Village residents and are aimed at reducing dependence on single occupant vehicle travel. These TDM measures include (a) implementation of the Hancock Village shuttle service connecting residents to the MBTA Cleveland Circle station; (b) access to ZIPCAR service, with two (2) on-site ZIPCAR spaces to provide residents with direct access to private automobile, thereby accommodating occasional private auto use for residents who choose public transportation as a preferred travel mode and do not own a vehicle; (c) an integrated system of sidewalks that connect the residential buildings to the public sidewalk system and bus/shuttle stops along Independence Way to facilitate walking access to area land uses and public transportation. Expansion of these

existing TDM initiatives is recommended to further promote non-auto travel by residents include continued promotion of the shuttle service and ZIPCAR access in informational products for existing and potential residents, provision of additional ZIPCAR spaces within the site to accommodate additional anticipated resident demand, inclusion of additional sidewalk connections for proposed buildings to the sidewalk system along Russett Road, and provision of on-site secure bicycle storage facilities within the proposed buildings. Specific elements of the TDM programming for the Site will be identified under local permitting of the project.