Traffic Impact and Access Study

Proposed Residential
9-15 Taylor Street

Somerville, MA

February 2, 2023
Revised January 11, 2024

Prepared by:

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Prepared for:

Garrett Construction Co.

TRAFFIC IMPACT AND ACCESS STUDY

Proposed Residential
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Somerville, Massachusetts

Prepared for:

City of Somerville

Applicant:

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SECTION 1: EXECUTIVE SUMMARY

Bayside Engineering has prepared this study to assess the traffic impact and to evaluate the access requirements of a proposed residential development to be located at 9-15 Taylor Street in Somerville, Massachusetts.

This report identifies existing traffic operating parameters on key roadways and intersections within the study area, evaluates the anticipated traffic volume increases as a result of the proposed project, analyzes the project's traffic-related impacts, determines the projects access/egress requirements and identifies appropriate mitigating measures designed to minimize the traffic-related impacts created by the project. The following provides a summary of the study findings.

PROJECT DESCRIPTION

The site is located on the southeast side of Taylor Street between Sydney Street and Mystic Avenue. The site is zoned UR. The site is abutted by residential apartments on all sides. Currently, the site consists of two multi-family apartment buildings. Two driveways with curb cuts currently provide access to the site.

As currently proposed, the Project will consist of the demolition of the existing buildings and the construction of a single residential apartment building with 34 dwelling units.

Parking will be provided for 20 vehicles adjacent to the building and four (4) spaces in front of the site on Taylor Street. Access to the site is proposed by way of a single driveway to Taylor Street. Figure 1 shows the site location in relation to the surrounding area.

Figure 1
Site Location Map

STUDY METHODOLOGY

This study has been prepared in three stages. The first stage involved an assessment of existing conditions within the study area and included an inventory of roadway geometrics, pedestrian and bicycle facilities and public transportation services. Existing traffic counts were performed at the study area intersections.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the project were assessed along with future traffic demands due to expected traffic growth independent of the proposed project. In accordance with Massachusetts Department of Transportation (MassDOT) guidelines, the year 2029 was selected as the basis for modeling future transportation impacts of the proposed residential development to reflect the opening year conditions and a seven-year planning horizon.

The third stage of the study presents and evaluates measures to address traffic issues, if any, and necessary improvements to accommodate the residential development.

STUDY AREA

Roadway geometry and traffic control information was collected for the following locations:

- Mystic Avenue, Temple Road and Temple Street
- Mystic Avenue and Taylor Street
- Temple Street and Sydney Street
- Sydney Street and Taylor Street

EXISTING CONDITIONS

Evaluation of existing conditions within the study area includes a description of roadway geometrics, traffic constraints, land uses at the intersections, and quantification of traffic volumes.

Existing Traffic Volumes

To establish base traffic conditions within the study area, manual turning movement and vehicle classification counts were obtained in September and October 2022. The manual turning movement counts were conducted on Thursday September 29, 2022 from 6:00 AM to 8:00 PM and included the weekday morning (7:00 to 9:00 AM) and weekday evening (4:00 to 6:30 PM) peak periods. Manual turning movement counts were also conducted on Saturday October 1, 2022 during the midday (10:00 AM to 2:00 PM) peak period. Analysis of the peak-period traffic counts indicated that the weekday morning commuter peak hour generally occurs between 6:45 and 7:45 AM, the weekday evening commuter

peak hour generally occurs between 5:15 and 6:15 PM, and the Saturday midday peak hour general occurs between 12:30 and 1:30 PM. Data from the MassDOT was reviewed to determine the monthly variations of the traffic volumes. Based upon available data, September and October volumes were found to be slightly higher than average month conditions. To be conservative, the September and October volumes were used to reflect average month conditions.

Due to the COVID-19 pandemic, traffic volumes from Spring 2020 through Winter 2021 were lower than normal. To account for this, data from the Massachusetts Department of Transportation's (MassDOT) Mobility Dashboard website and historical traffic volume data were used to adjust for the downturn in traffic volumes. However, effective March 1, 2022, MassDOT has indicated that overall, traffic volumes have established a 'new normal' and no adjustment for COVID-19 is required. The exception is in areas of high office development. Hence, no COVID-19 adjustment is necessary.

Mystic Avenue south of Taylor Street was recorded to carry approximately 29,550 vehicles per day (vpd) on a weekday. During the weekday morning peak hour, approximately 1,723 vehicles per hour (vph) were recorded and during the weekday evening peak hour, 2,173 vph were recorded. On a Saturday, Mystic Avenue south of Taylor Street was recorded to carry approximately 25,550 vpd with 2,028 vph during the Saturday midday peak hour.

Temple Street, west of Sydney Street was recorded to carry approximately 12,050 vpd on a weekday. During the weekday morning peak hour, approximately 724 vph were recorded and during the weekday evening peak hour, 846 vph were recorded. On a Saturday, Temple Street was recorded to carry approximately 11,500 vpd with 779 vph during the Saturday midday peak hour.

Taylor Street, east of Sydney Street was recorded to carry approximately 190 vpd on a weekday. During the weekday morning peak hour, approximately 12 vph were recorded and during the weekday evening peak hour, 21 vph were recorded. On a Saturday, Temple Street was recorded to carry approximately 200 vpd with 5 vph during the Saturday midday peak hour.

Vehicle Speeds

The average speed of vehicles travelling northbound and southbound on Mystic Avenue, south of Taylor Street was found to be 30 miles per hour (mph). The 85th percentile speed was found to be 36 mph for both northbound and southbound vehicles. The 85th percentile speed is the speed at which sight distances are evaluated.

The average speed of vehicles travelling eastbound and westbound on Temple Street, west of Sydney Street was found to be 22.2 mph to 20.9 mph, respectively. The posted speed limit on Temple Street is 25 mph. The 85th percentile speed was found to be 26 mph for eastbound vehicles and 25 mph for westbound vehicles.

The average speed of vehicles travelling northbound on Taylor Street, east of Sydney Street

was found to be 17.2 mph. There is no posted speed limit on Taylor Street, so the default speed limit is 20 mph. The 85th percentile speed was found to be 21 mph for northbound vehicles.

Motor Vehicle Crash Data

Motor vehicle crash data for the study area intersections were obtained from the MassDOT Crash Portal for 2017 through the end of 2021. The motor vehicle crash data was reviewed to determine crash trends in the study area. Forty-eight (48) crashes were reported at the study area intersections. Of the forty-eight (48) crashes, forty-four (44) crashes were reported at the intersection of Mystic Avenue and Temple Street, two (2) crashes were reported at the intersection of Mystic Avenue and Taylor Street, one (1) crash was reported at the intersection of Taylor Street and Sydney Street, and one (1) crash was reported at the intersection of Temple Street and Sydney Street. No fatalities were reported.

PROBABLE IMPACTS OF THE PROJECT

No-Build Traffic Volumes

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 the year 2029. Traffic volumes on the roadway network at that time, in the absence of the proposed project, would typically include existing traffic, new traffic due to general background traffic growth, and traffic related to specific developments by others expected to be completed by 2029. However, per the City of Somerville's guidance, no projected background growth was used to develop future No-Build conditions, meaning only existing traffic conditions and new traffic related to specific developments were used.

Conversations with the City of Somerville indicated that there are three (3) projects identified in the area that would generate traffic beyond the general background growth rate. Traffic from each of these projects was included in the background projections.

Build Traffic Volumes

Site generated traffic was based on trip-generation data published by the ITE *Trip Generation* manual[1]. The proposed residential development is expected to consist of the construction of 34 residential dwelling units. Trip generation data for ITE LUC 221 – Multifamily Housing (Mid-Rise) was reviewed. The trip generation calculations were then adjusted to consider vehicle occupancy rate and mode split (transit, bike and walk).

On a typical weekday, the proposed residential development is expected to generate 100 daily vehicle trips (50 vehicles entering and 50 vehicles exiting). During the weekday morning peak hour, 10 vehicle trips (3 vehicles entering and 7 vehicles exiting) are expected. During the weekday evening peak hour, 9 vehicle trips (6 vehicles entering and

[1] *Trip Generation,* Eleventh Edition; Institute of Transportation Engineers; Washington, DC; 2021.

3 vehicles exiting) are expected. On a typical Saturday, the proposed residential development is expected to generate 102 daily vehicle trips (51 vehicles entering and 51 vehicles exiting). During the Saturday midday peak hour, 9 vehicle trips (5 vehicles entering and 4 vehicles exiting) are expected.

Trip Distribution

The trip distribution is expected to be regionally oriented. A gravity model was developed based on Somerville Journey-to-Work data from the U.S. Census to determine the expected trip distribution.

TRAFFIC OPERATIONS ANALYSIS

To assess the impacts of the proposed project on the roadway network, traffic operations analyses were performed at the study area intersections under 2022 Existing, 2029 No-Build and 2029 Build conditions. These analyses indicate that the proposed project will generally not result in an impact on traffic operations at the study area intersections over No-Build conditions.

Level-of-service analyses were conducted for 2022 Existing, 2029 No-Build, and 2029 Build conditions for the intersections within the study area. The critical movements at the unsignalized intersections are modeled to operate at LOS D or better during the respective peak hours. The corresponding volume to capacity (v/c) ratios are 0.19 or less with projected 95th percentile queues of one (1) vehicle or less, indicating that there is capacity for the critical movements.

Operating conditions for the signalized intersection of Mystic Avenue, Temple Street and Temple Road was identified to be operating near or at capacity (i.e., LOS "E"), without the Project-related traffic. With the traffic expected to be generated by the project, the predicted increase in vehicle queuing is less than one (1) vehicle.

RECOMMENDATIONS

A comprehensive transportation mitigation program has been developed that is designed to reduce automobile trips associated with the Project and accommodate the additional traffic expected to be generated by the Project in a safe and efficient manner. The elements of the transportation mitigation program have been separated into the following categories: Project Access, Level-of Service/Congestion Mitigation; and Transportation Demand Management and are described in the following sections.

Project Access

Access to the Project site will be provided by way of a new site driveway to Taylor Street. This driveway will provide access to the underground parking, as well as serve as a loading

area. The following recommendations are offered with respect to the design and operation of the Project site driveway:

- The site driveway should be a minimum of twenty (20) feet in width. The driveway will consist of one (1) entering lane and one (1) exiting lane.

- Vehicles exiting the Project site will be placed under STOP-sign control with a marked STOP line provided.

- The Project site driveway and internal circulating aisles will be designed to accommodate the turning and maneuvering requirements of automobiles.

- All signs and pavement markings to be installed within the Project site will conform to the applicable standards of the *Manual on Uniform Traffic Control Devices*[2] (MUTCD).

- A sidewalk will be provided within the Project site to link the proposed building to the sidewalk infrastructure along Taylor Street, with Americans with Disabilities Act (ADA)-compliant wheelchair ramps provided at all pedestrian crossings for crossing the site driveway at Taylor Street.

- Signs and landscaping to be installed as a part of the Project within the intersection sight triangle areas of the Project site driveway will be designed and maintained so as not to restrict lines of sight.

- Snow windrows within sight triangle areas of the Project site driveway to Taylor Street will be promptly removed where such accumulations would impede sight lines.

- Bicycle racks and storage will be installed at convenient locations within the Project site. Five spaces are currently proposed.

- Accommodations will be provided for electric vehicle charging by residents of the Project.

Safety

The intersection of Mystic Avenue, Temple Street and Temple Road was found to have a crash rate higher than the MassDOT District 4 average for signalized intersections. Discussions with MassDOT indicate that the City of Somerville could prepare an Updated RSA where updated crash history is reviewed to see if similar crash trends continue to occur. Also, the status of previous RSA recommendations would be reviewed to determine what has been completed and if additional safety measures are necessary.

[2] *Manual on Uniform Traffic Control Devices;* Federal Highway Administration; Washington D.C.; 2009.

At the intersection of Sydney Street and Taylor Street, the crash rate is also higher than the MassDOT District 4 average for unsignalized intersections. However, this is a result of very low traffic volumes with only one (1) crash in the five-year study period. Safety improvements are not warranted.

Transportation Demand Management

The following Transportation Demand Management (TDM) measures will be implemented as a part of the Project to encourage the use of alternative modes of transportation to single-occupant vehicles:

- A Transportation Coordinator (TC) will be designated for the Project to coordinate the elements of the TDM program,
- The TC will coordinate with the City of Somerville Mobility Division or the Assembly Connect TMA which recently was formed in this area to help promote a reduced reliance on single-occupant automobile travel to the Project. To that end, the TDM measures identified will be implemented under the direction and supervision of the TC.
- Information regarding public transportation services, maps, schedules and fare information will be posted in a central location and/or otherwise made available to residents,
- A "welcome packet" will be provided to residents detailing available public transportation services, bicycle and walking alternatives, and commuter options,
- Explore accommodations for car sharing services (e.g., Zip Car).
- Pedestrian accommodations will be incorporated into the Project and consist of sidewalks and ADA-compliant wheelchair ramps at all pedestrian crossings internal to the Project site that will link building entrances to the sidewalk infrastructure along Taylor Street,
- A mail drop will be provided in a central location; and
- Secure bicycle parking will be provided within the Project site.

CONCLUSION

Based on this assessment, the following can be concluded with respect to the Project:

- One of the study area intersections, Mystic Avenue, Temple Street and Temple Road, is on the MassDOT Highway Safety Improvement Program (HSIP) list.

Discussions with MassDOT indicate that an Updated RSA could be performed where the City reviews updated crash history to see if similar trends continue to occur. Also, the status of previous recommendations would be reviewed to determine what has been completed and if additional safety measures are necessary.

- Using trip-generation statistics published by the Institute of Transportation Engineers (ITE), and adjusting for mode split, the proposed residential development is expected to generate 100 daily vehicle trips (50 vehicles entering and 50 vehicles exiting). During the weekday morning peak hour, 10 vehicle trips (3 vehicles entering and 7 vehicles exiting) are expected. During the weekday evening peak hour, 9 vehicle trips (6 vehicles entering and 3 vehicles exiting) are expected. On a typical Saturday, the proposed residential development is expected to generate 102 daily vehicle trips (51 vehicles entering and 51 vehicles exiting). During the Saturday midday peak hour, 9 vehicle trips (5 vehicles entering and 4 vehicles exiting) are expected

- The Project will not have a significant impact (increase) on motorist delays or vehicle queuing over Existing or anticipated future conditions without the Project (No-Build conditions), with the majority of the critical movements at the unsignalized study area intersections shown to operate at LOS D or better under all analysis conditions where a level-of-service of "D" or better is defined as "acceptable" operating conditions.

- Independent of the Project, operating conditions for several movements at the signalized intersection of Mystic Avenue, Temple Street and Temple Road were identified to be operating at or over capacity (i.e., LOS "E" or "F"), without Project-related impacts. With the traffic expected to be generated by the project, these movements continued to operate at projected No-Build levels with very small increases in delays and predicted increase in vehicle queuing is less than one (1) vehicle.

- Lines of sight at the Project site driveway intersection with Taylor Street were found to exceed the recommended minimum distances for safe and efficient operation based on the appropriate approach speed.

- A review of the Site Plan for the Project indicates that human-made objects, landscaping, and signs have been appropriately designed and located so as not to inhibit sight lines to and from the Project site driveway or along Taylor Street.

SECTION 2: EXISTING TRAFFIC CONDITIONS

STUDY AREA

Roadway geometry and traffic control information was collected for the following locations:

- Mystic Avenue and Temple Street
- Mystic Avenue and Taylor Street
- Temple Street and Sydney Street
- Sydney Street and Taylor Street

FIELD SURVEY

A comprehensive field inventory of the proposed site was conducted in October 2022. The inventory included collection of existing roadway geometrics, traffic volumes, and safety data for the existing study area intersections and site access driveway locations. Traffic volumes were measured by means of automatic traffic recorder (ATR) counts and substantiated by manual turning movement counts (TMCs) conducted at the study area intersections. Traffic volumes were measured in September and October 2022.

GEOMETRICS

Primary study area roadways and intersections are described below. Figure 2 graphically summarizes existing lane use, traffic control, and pedestrian and bicycle accommodations at the study area intersections.

Roadways

Mystic Avenue (Route 38)

Route 38, Mystic Avenue, is under the jurisdiction of the Massachusetts Department of Transportation. Mystic Avenue is functional classified as an Minor Arterial. Mystic

Avenue runs from Main Street in Medford southerly to its southern terminus at Interstate 93 (I-93) in Somerville. Within the study area, Mystic Avenue generally provides two lanes of travel in both directions. In the study area, the rightmost southbound lane is designated as a bus and right-turn only lane from 6:00 to 9:00 AM. This lane also always functions as a shared use bike lane and has sharrows painted along it. The posted speed limit in the vicinity of the site is 25 miles per hour (mph). Illumination is provided by luminaries mounted on poles. The pavement is in fair condition. There is a sidewalk along the west side of Mystic Avenue and along the east side of Mystic Avenue from Taylor Street to Temple Road (serves the bus stop on Mystic Avenue). Land use along Mystic Avenue in the vicinity of the site consists of commercial and residential properties.

Temple Street

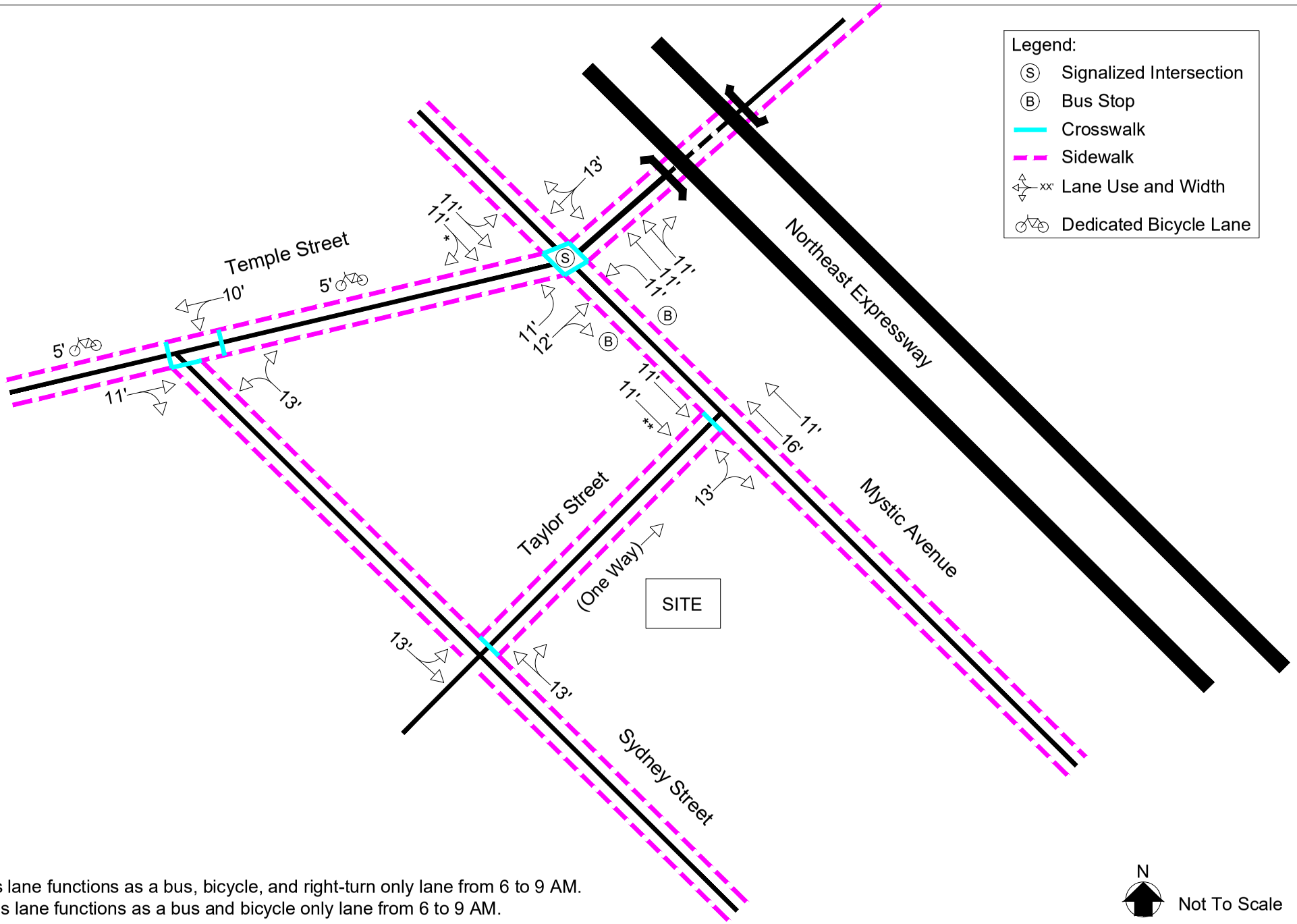
Temple Street is under the jurisdiction of the City of Somerville and is functionally classified as a Major Collector roadway. Temple Street runs in a general east/west direction from Broadway easterly to its eastern terminus just beyond Mystic Avenue at Temple Road. Near the site, Temple Street provides one lane of travel per direction. There is a dedicated bike lake on the north side of Temple Street near the site and parking lanes on both sides. The eastbound lane acts as a shared use bike lane near the site and has sharrows painted along it. The posted speed limit on Temple Street is 25 mph. Illumination is provided by luminaries mounted on poles. The roadway pavement is generally in fair condition. There are sidewalks on both sides of Temple Street. Land use along Temple Street consists of residential properties and churches.

Sydney Street

Sydney Street is under the jurisdiction of the City of Somerville and is functionally classified as a Local Street. Sydney Street runs in a general north/south direction from Temple Street southerly to its terminus at Grant Street. Sydney Street provides one lane of travel per direction. The posted speed limit is 20 mph, and the street is classified as a safety zone. Illumination is provided by luminaries mounted on poles. The roadway pavement is in generally fair condition. There are sidewalks on both sides of Sydney Street. Land use along Sydney Street is residential.

Taylor Street

Taylor Street is under the jurisdiction of the City of Somerville and is functionally classified as a Local Street. Taylor Street runs in a general east/west direction from Sydney Street easterly to its terminus at Mystic Avenue. Taylor Street is a one-way street in a general eastbound direction. Taylor Street provides one lane of travel per direction. There is no posted speed limit on Taylor Street, so the default speed limit is 20 mph, the same as Sydney Street. Illumination is provided by luminaries mounted on poles. The roadway pavement is in generally fair condition. There are sidewalks along both sides of Taylor Street. Land use along Taylor Street is residential.



*This lane functions as a bus, bicycle, and right-turn only lane from 6 to 9 AM.
**This lane functions as a bus and bicycle only lane from 6 to 9 AM.

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Figure 2

Existing Lane Use, Travel Lane Width, and Pedestrian/Bicycle Facilities

Intersections

Mystic Avenue, Temple Street and Temple Road

Temple Street forms the west leg and Temple Road forms the east leg of this four-legged signalized intersection with Mystic Avenue (north and south legs). The Mystic Avenue southbound approach consists of a shared through/left-turn lane and a shared through/right-turn lane. However, the right lane functions as an exclusive right-turn and bus lane from 6:00 to 9:00 AM. The Mystic Avenue northbound approach consists of an exclusive left-turn lane, an exclusive through lane, and a shared through/right-turn lane. The Temple Street eastbound approach consists of an exclusive left-turn lane and a shared through/right-turn lane. The Temple Road westbound approach consists of a single lane permitting all movements. Sidewalks are present on all sides of all roadways approaching the intersection excluding the east side of Mystic Avenue north of the intersection. Crosswalks exist across all approaches. Traffic is controlled by a signal with pedestrian activation. Land use at the intersection consists of high-density residential properties to the west and I-93 to the east.

Temple Street and Sydney Street

Sydney Street intersects Temple Street from the south to form this three-legged unsignalized intersection. The Temple Street eastbound and westbound approaches consist of one general purpose lane in each direction separated by a double yellow centerline. The Sydney Street approach consists of a single lane permitting left and right-turn movements. The Sydney Street approach operates under STOP control. Sidewalks exist along all sides of all approaches. Land use at the intersection consists of residential properties and churches.

Sydney Street and Taylor Street

Taylor Street intersects Sydney Street from the east to form this four-legged unsignalized intersection. The shared driveway to #40 and #44 Sydney Street forms the fourth leg. The Sydney Street approaches consist of one general purpose lane in each direction with no demarcation between the two. The Taylor Street approach consists of a single lane permitting left and right-turn movements. The shared driveway approach operates as a single lane, permitting all movements. The Taylor Street approach operates under STOP control. Sidewalks exist along all sides of all approaches to the intersection, with the exception of the driveway approach. Land use at the intersection consists of residential properties.

Mystic Avenue and Taylor Street

Taylor Street intersects Mystic Avenue from the west to form this three-legged unsignalized intersection. The Mystic Avenue approaches consist of two general purpose through lanes with shared bike lanes. The rightmost lane of the southbound approach operates as a bus and bike only lane from 6:00 to 9:00 AM. Turning movements from

Mystic Avenue onto Taylor Street are not permitted. The Taylor Street approach consists of a single lane permitting left and right-turn movements. The Taylor Street approach is under STOP control. Sidewalks exist along all approaches to the intersection and a crosswalk exists across Taylor Street. Land use consists of residential and commercial properties.

TRAFFIC VOLUMES

Existing Traffic Volumes

To establish base traffic conditions within the study area, manual turning movement and vehicle classification counts were obtained in September and October 2022. The manual turning movement counts were conducted on Thursday September 29, 2022 from 6:00 AM to 8:00 PM and included the weekday morning (7:00 to 9:00 AM) and weekday evening (4:00 to 6:30 PM) peak periods. Manual turning movement counts were also conducted on Saturday October 1, 2022 during the midday (10:00 AM to 2:00 PM) peak period. Counts were performed at the following intersections:

- Mystic Avenue and Temple Street
- Mystic Avenue and Taylor Street
- Temple Street and Sydney Street
- Sydney Street and Taylor Street

Daily traffic counts were conducted on Mystic Avenue, Temple Street and on Taylor Street for a three-day period using automatic traffic recorders (ATR) from Thursday September 29, 2022 to Saturday October 1, 2022.

Analysis of the peak-period traffic counts indicated that the weekday morning commuter peak hour generally occurs between 6:45 and 7:45 AM, the weekday evening commuter peak hour generally occurs between 5:15 and 6:15 PM, and the Saturday midday peak hour occurs between 12:30 and 1:30 PM. The traffic count worksheets are provided in the Appendix.

Seasonal Adjustment

To establish base traffic conditions within the study area, manual turning movement and vehicle classification counts were obtained in September and October 2022. Data from the MassDOT was reviewed to determine the monthly variations of the traffic volumes. Based upon available data, September and October volumes were found to be slightly higher than average month conditions. To be conservative, the September and October volumes were used to reflect average month conditions.

Due to the COVID-19 pandemic, traffic volumes from Spring 2020 through Winter 2021 were lower than normal. To account for this, data from the Massachusetts Department of Transportation's (MassDOT) Mobility Dashboard website and historical traffic volume

data were used to adjust for the downturn in traffic volumes. However, effective March 1, 2022, MassDOT has indicated that overall, traffic volumes have established a 'new normal' and no adjustment for COVID-19 is required. The exception is in areas of high office development. Hence, no COVID-19 adjustment is necessary.

The 2022 existing weekday daily and peak-hour traffic volumes for average-month conditions are summarized below in Table 1. Table 2 summarizes the Saturday daily and midday peak hour volumes. The 2022 Existing weekday morning and weekday evening peak hour traffic flow networks are shown graphically on Figures 3, 4, and 5, respectively. The seasonal worksheets are provided in the Appendix.

Mystic Avenue south of Taylor Street was recorded to carry approximately 29,550 vehicles per day (vpd) on a weekday. During the weekday morning peak hour, approximately 1,723 vehicles per hour (vph) were recorded and during the weekday evening peak hour, 2,173 vph were recorded. On a Saturday, Mystic Avenue south of Taylor Street was recorded to carry approximately 25,550 vpd with 2,028 vph during the Saturday midday peak hour.

Temple Street, west of Sydney Street was recorded to carry approximately 12,050 vpd on a weekday. During the weekday morning peak hour, approximately 724 vph were recorded and during the weekday evening peak hour, 846 vph were recorded. On a Saturday, Temple Street was recorded to carry approximately 11,500 vpd with 779 vph during the Saturday midday peak hour.

Taylor Street, east of Sydney Street was recorded to carry approximately 190 vpd on a weekday. During the weekday morning peak hour, approximately 12 vph were recorded and during the weekday evening peak hour, 21 vph were recorded. On a Saturday, Temple Street was recorded to carry approximately 200 vpd with 5 vph during the Saturday midday peak hour.

TABLE 1
EXISTING WEEKDAY TRAFFIC-VOLUME SUMMARY[a]

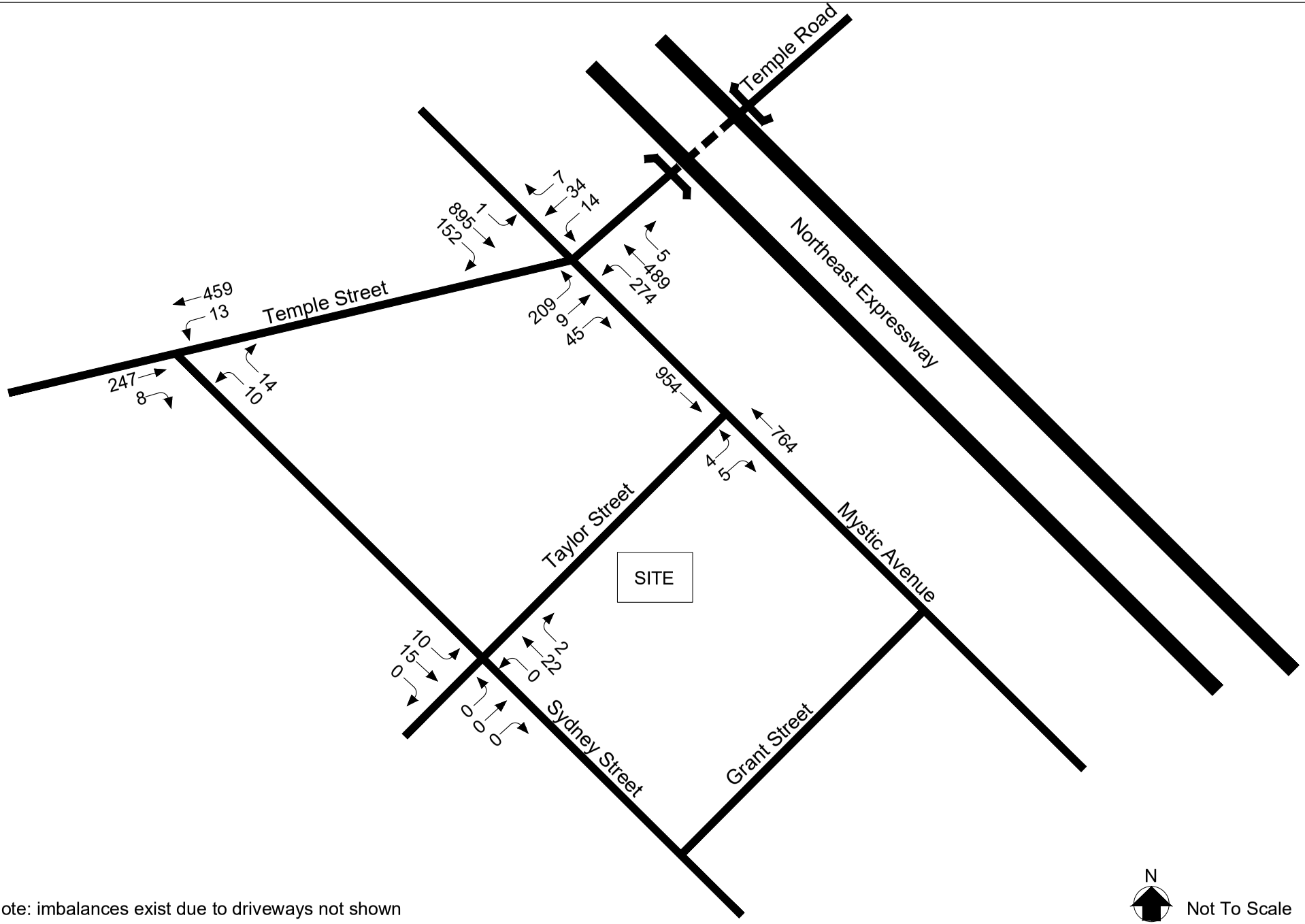
Location	Daily Traffic Volume[b]	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
		Traffic Volume[c]	K Factor[d]	Directional Distribution[e]	Traffic Volume	K Factor	Directional Distribution
Mystic Avenue, south of Taylor Street	29,550	1,723	5.8	55.7% SB	2,173	7.4	62.3% NB
Temple Street, west of Sydney Street	12,050	724	6.0	64.8% WB	846	7.0	62.9% WB
Taylor Street, east of Sydney Street	190	12	6.3	100% EB	21	11.1	100% EB

[a]Two-way traffic volume.
[b]Daily traffic expressed in vehicles per day.
[c]Expressed in vehicles per hour.
[d]Percent of daily traffic volumes which occurs during the peak hour.
[e]Percent of peak-hour volume in the predominant direction of travel.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound.

TABLE 2
EXISTING SATURDAY TRAFFIC-VOLUME SUMMARY[a]

Location	Daily Traffic Volume[b]	Saturday Midday Peak Hour		
		Traffic Volume[c]	K Factor[d]	Directional Distribution[e]
Mystic Avenue, south of Taylor Street	25,550	2,028	7.9	53.2% NB
Temple Street, west of Sydney Street	11,500	779	6.8	65.7% WB
Taylor Street, east of Sydney Street	200	5	2.5	100% EB

[a]Two-way traffic volume.
[b]Daily traffic expressed in vehicles per day.
[c]Expressed in vehicles per hour.
[d]Percent of daily traffic volumes which occurs during the peak hour.
[e]Percent of peak-hour volume in the predominant direction of travel.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound.



Note: imbalances exist due to driveways not shown

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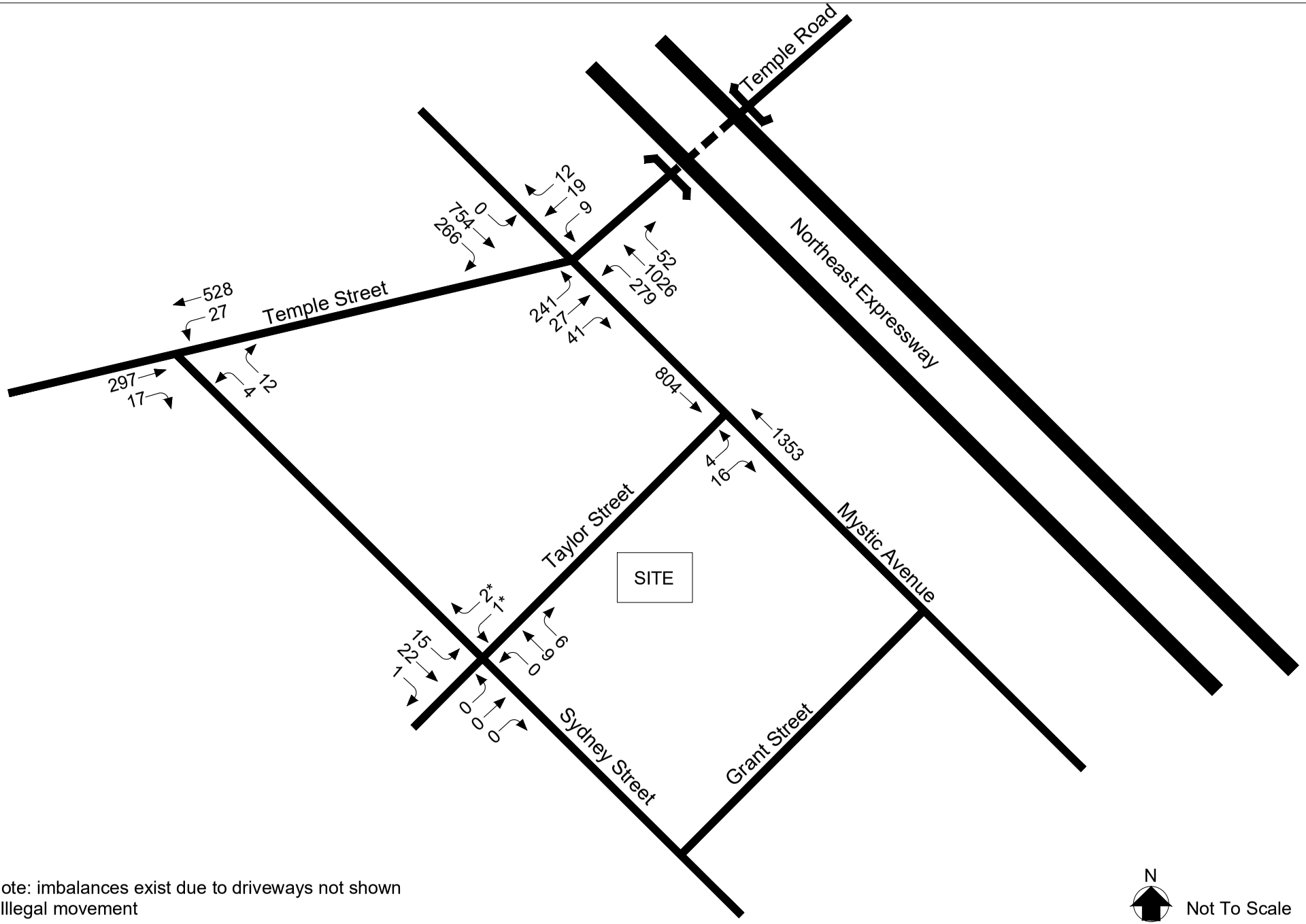
Figure 3

2022 Existing
Weekday Morning
Peak Hour Traffic Volumes



Note: imbalances exist due to driveways not shown
* Illegal movement

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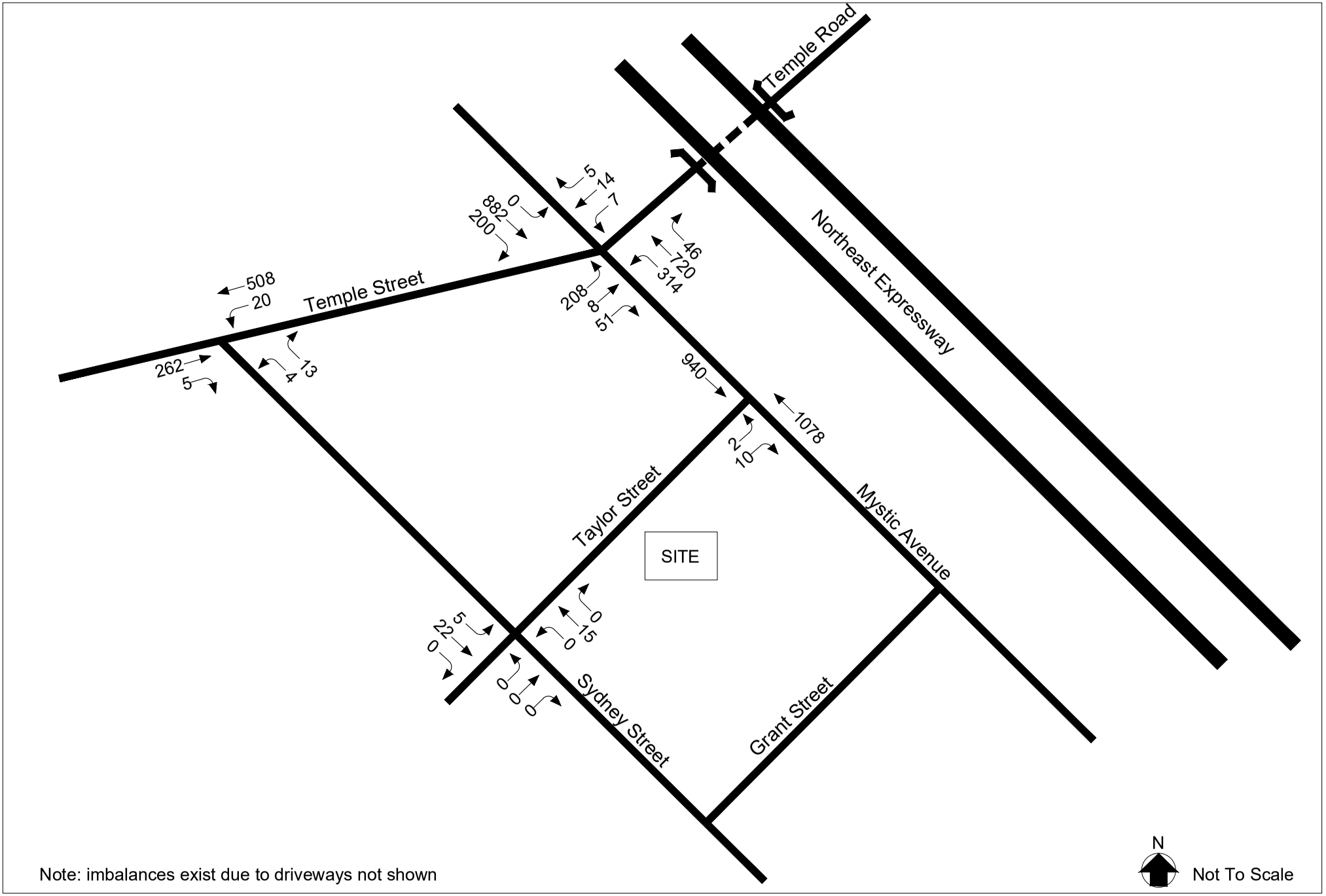
Figure 4

2022 Existing
Weekday Evening
Peak Hour Traffic Volumes



Note: imbalances exist due to driveways not shown

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Figure 5

2022 Existing
Saturday Midday
Peak Hour Traffic Volumes

PEDESTRIAN AND BICYCLE FACILITIES

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in September and October 2022. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study roadways and at the study intersections, as well as the location of existing and planned future bicycle facilities.

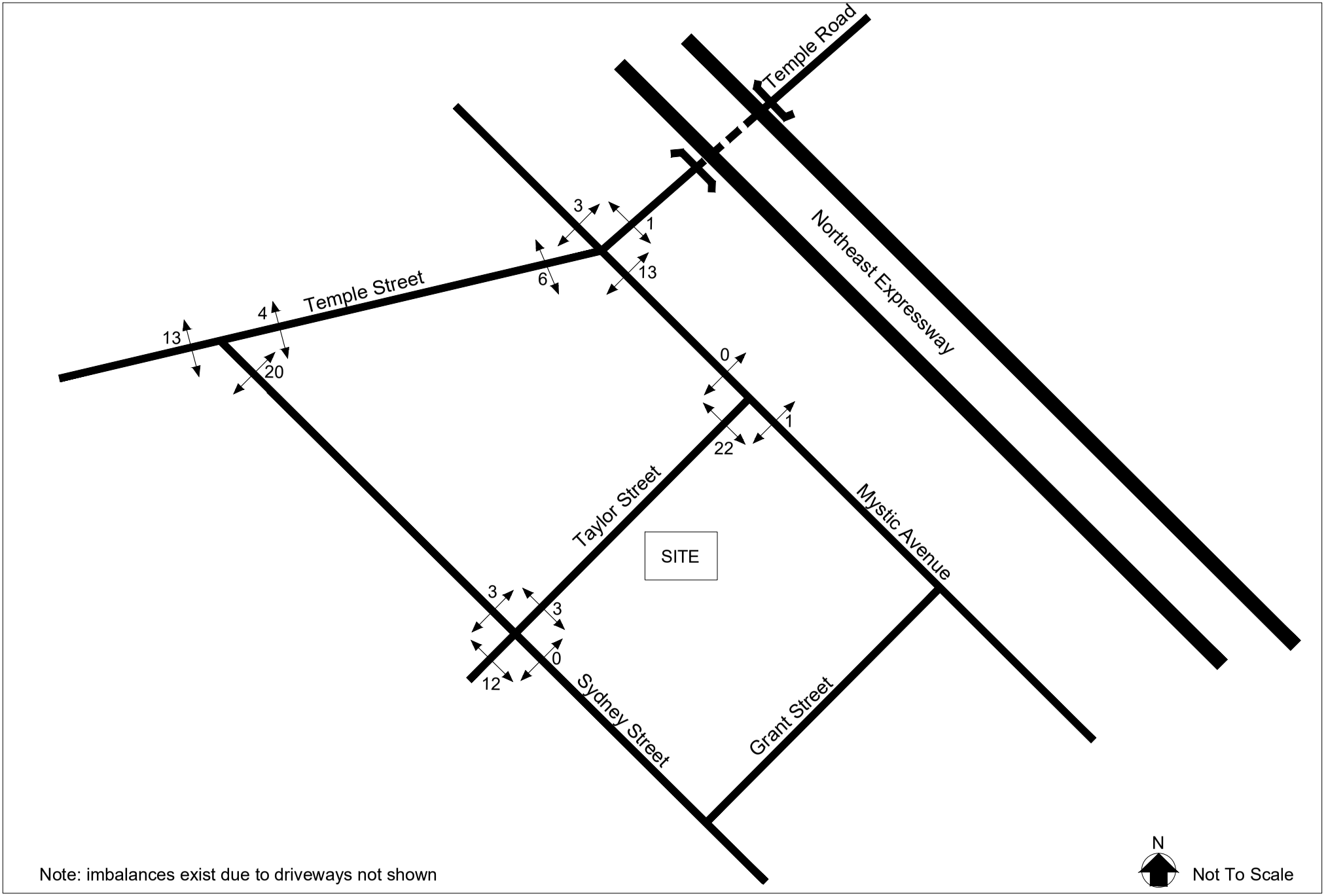
Pedestrian Facilities

As shown on Figure 2, sidewalks are provided along both sides of the study area roadways, with marked crosswalks provided for crossing one or more legs of the study area intersections. Figures 6 through 8 show the 2022 Existing weekday morning, weekday evening and Saturday midday peak-hour pedestrian volumes at the study area intersections, respectively, and were collected in conjunction with the September and October 2022 turning movement counts.

A review of the pedestrian volume data at the study intersections indicates that the Mystic Avenue, Temple Street and Temple Road intersection experienced 23 pedestrian crossings during the weekday morning peak-hour, with the Mystic Avenue northbound approach having crossings of thirteen (13) pedestrians. During the weekday evening peak hour, 63 crossings were recorded, the Mystic Avenue northbound approach having crossings of twenty-nine (29) pedestrians).

Bicycle Facilities

Within the study area, marked bicycle lanes are provided along Mystic Avenue (southbound only) and Temple Street (westbound only), with the remainder of the study area roadways generally providing sufficient width (combined travel lane and paved shoulder) to support bicycle travel in a shared traveled-way configuration. Figures 9 through 11 show the 2022 Existing weekday morning and weekday evening peak-hour bicycle volumes at the study area intersections. Bicycle activity within the study area was primarily focused along the Mystic Avenue corridor, and along Temple Street.



Note: imbalances exist due to driveways not shown

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Figure 6

2022 Existing
Weekday Morning
Peak Hour Pedestrian Volume

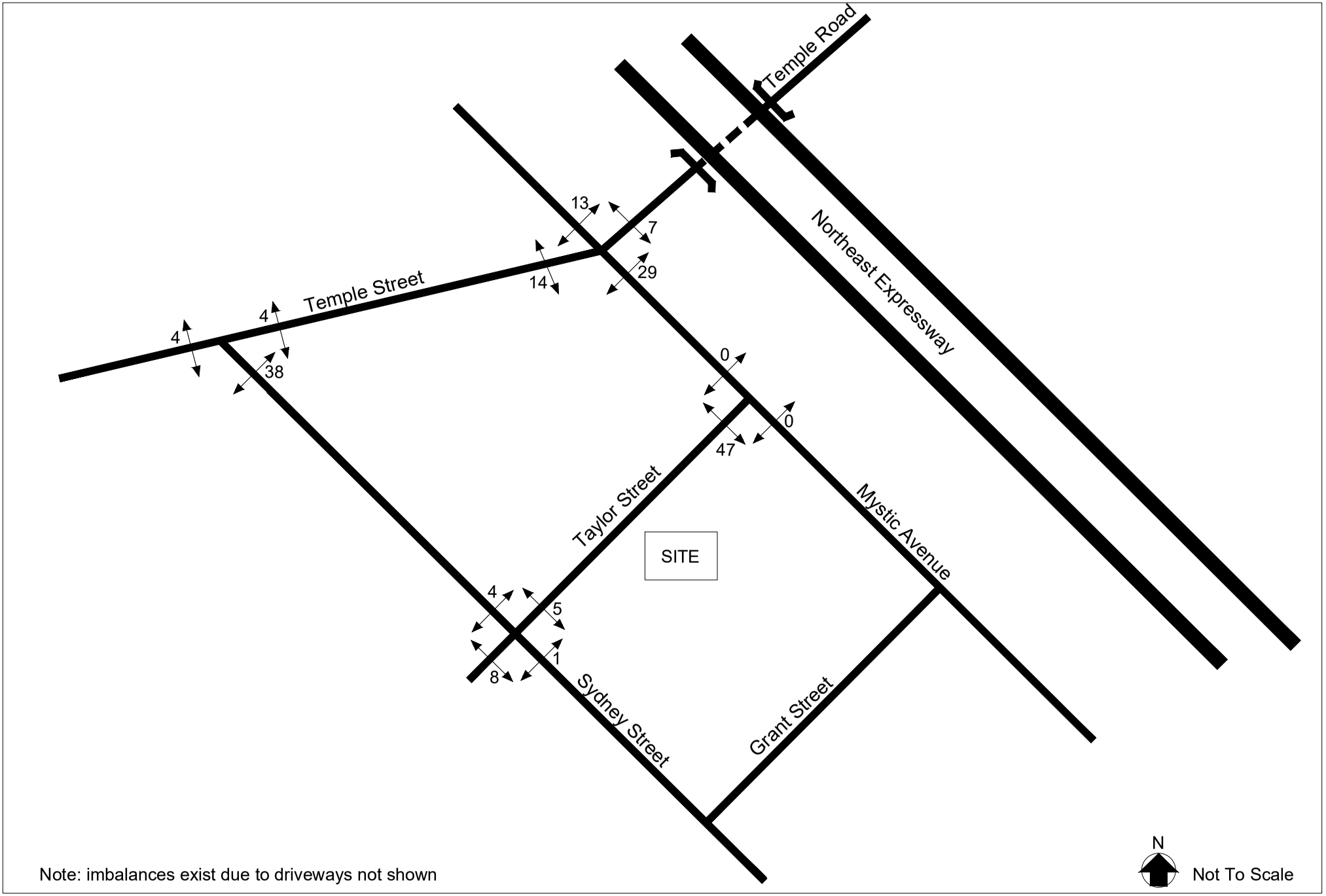

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Figure 7

2022 Existing
Weekday Evening
Peak Hour Pedestrian Volume

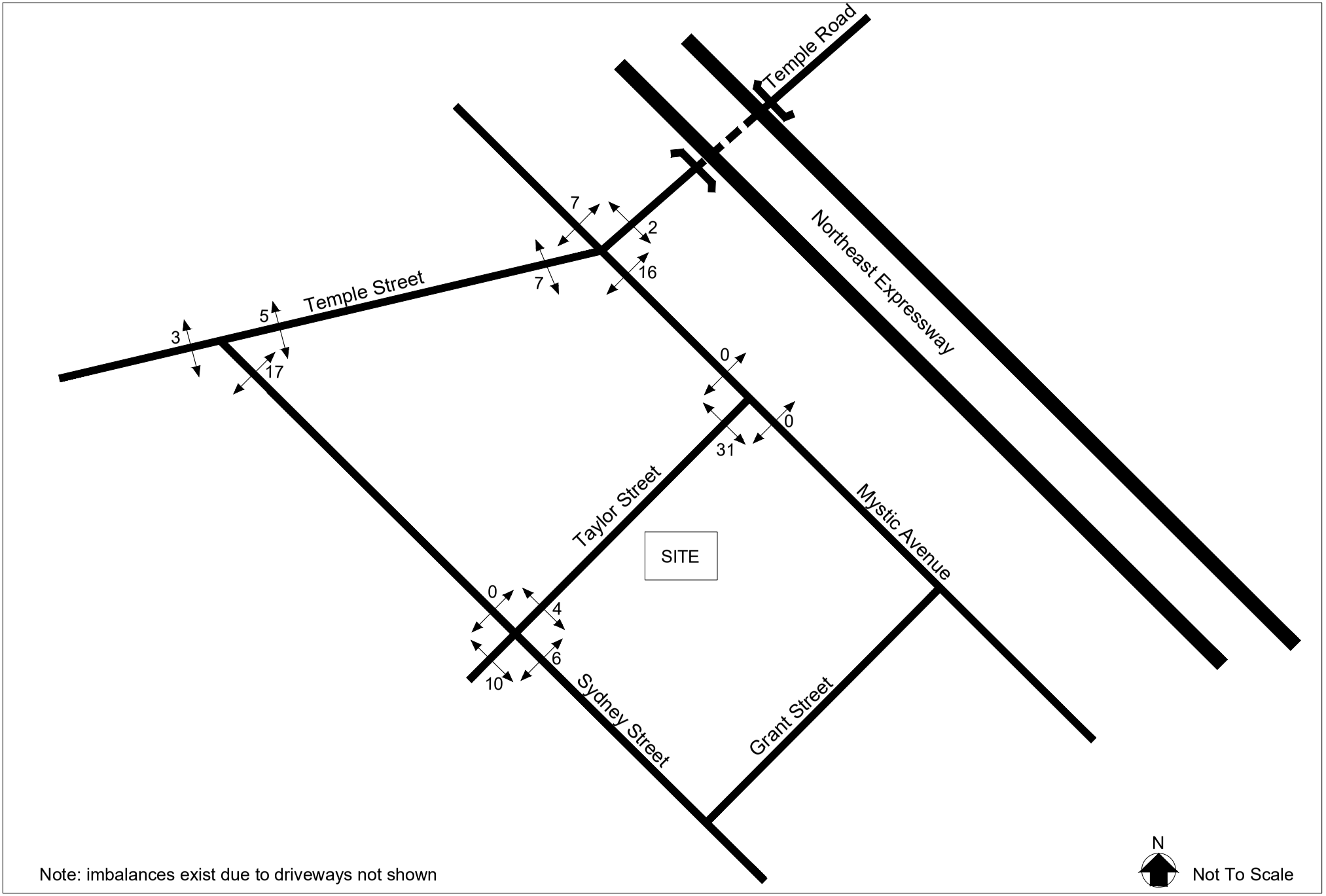

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Figure 8

2022 Existing
Saturday Midday
Peak Hour Pedestrian Volume

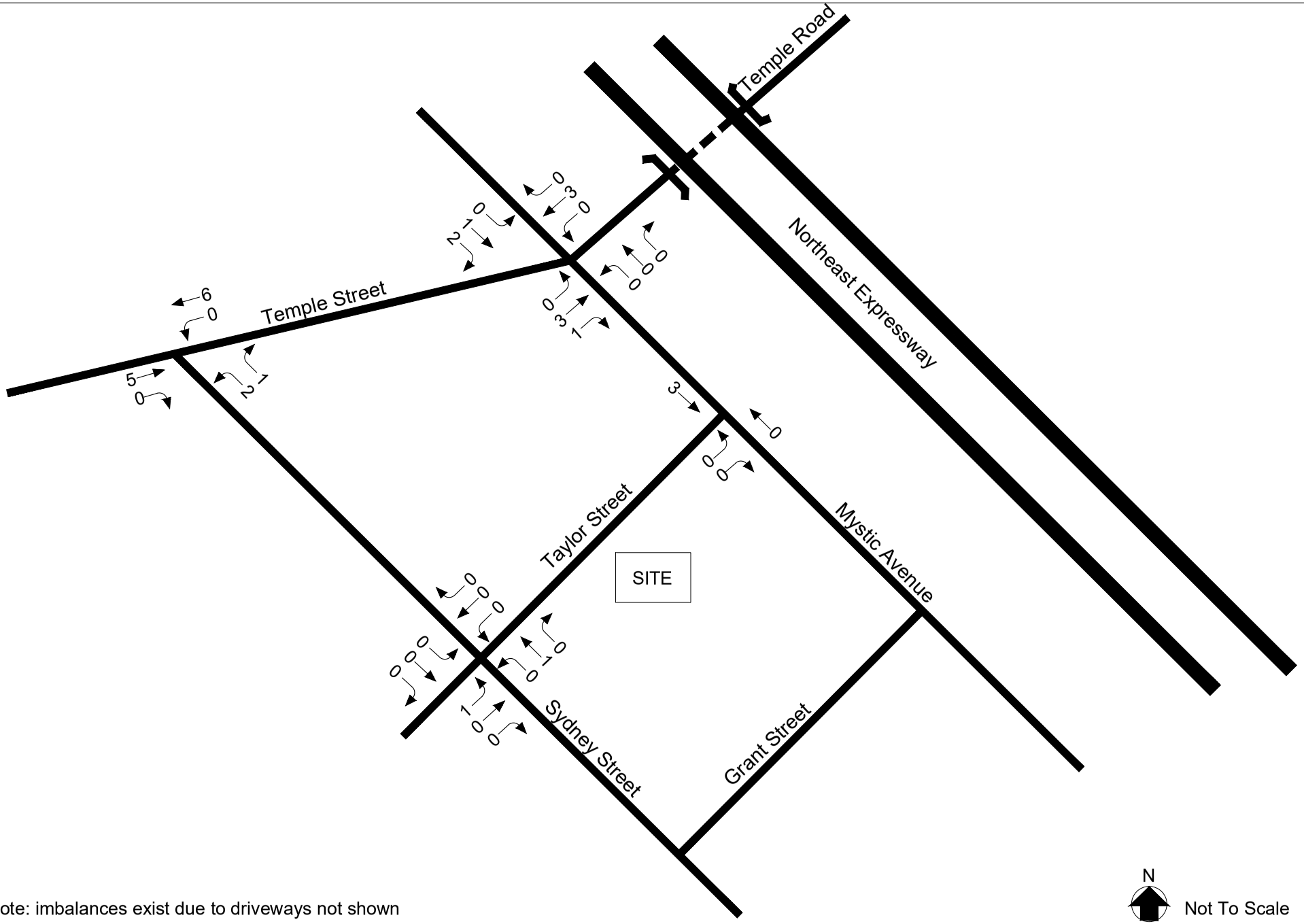

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Figure 9

2022 Existing
Weekday Morning
Peak Hour Bicycle Volumes

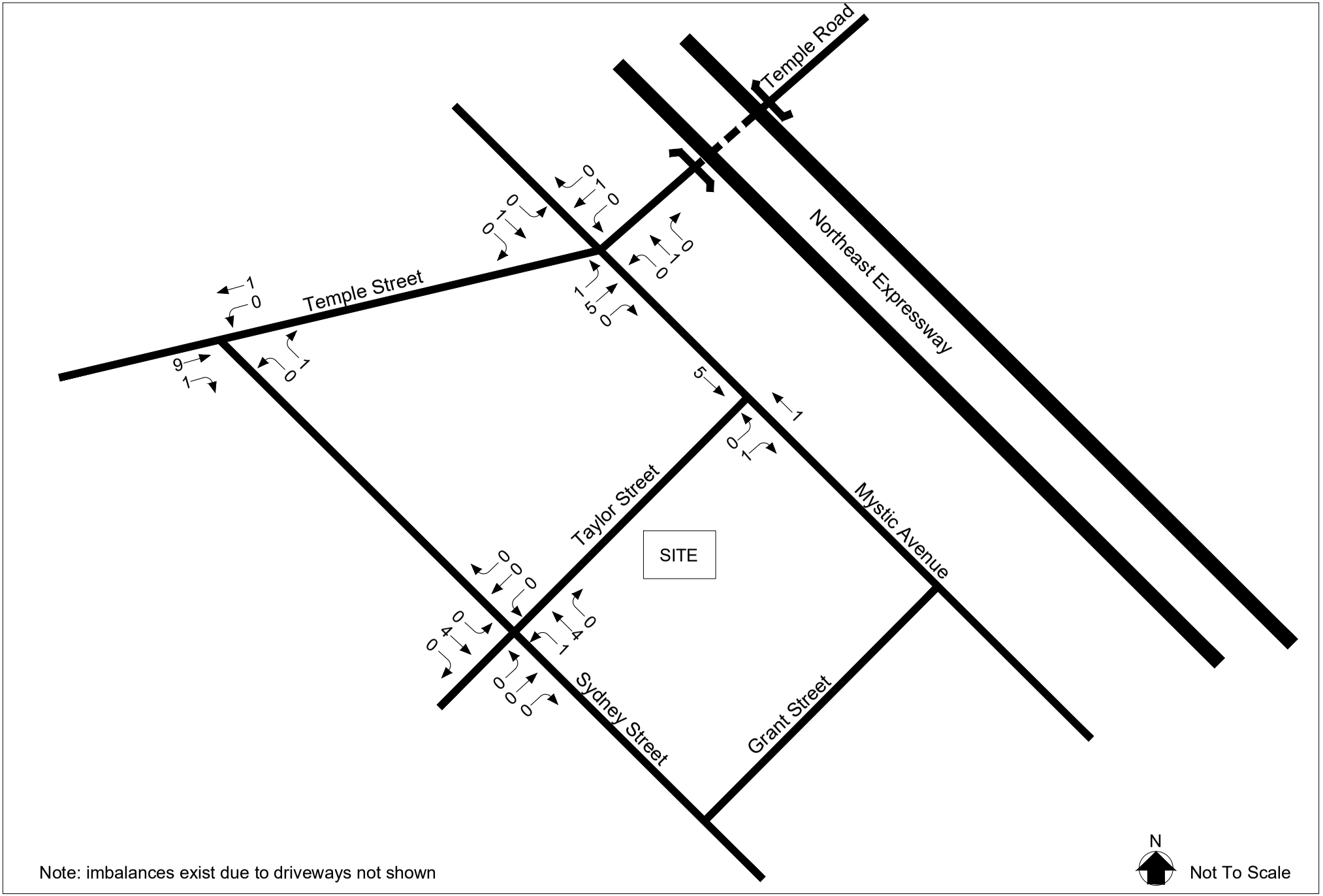

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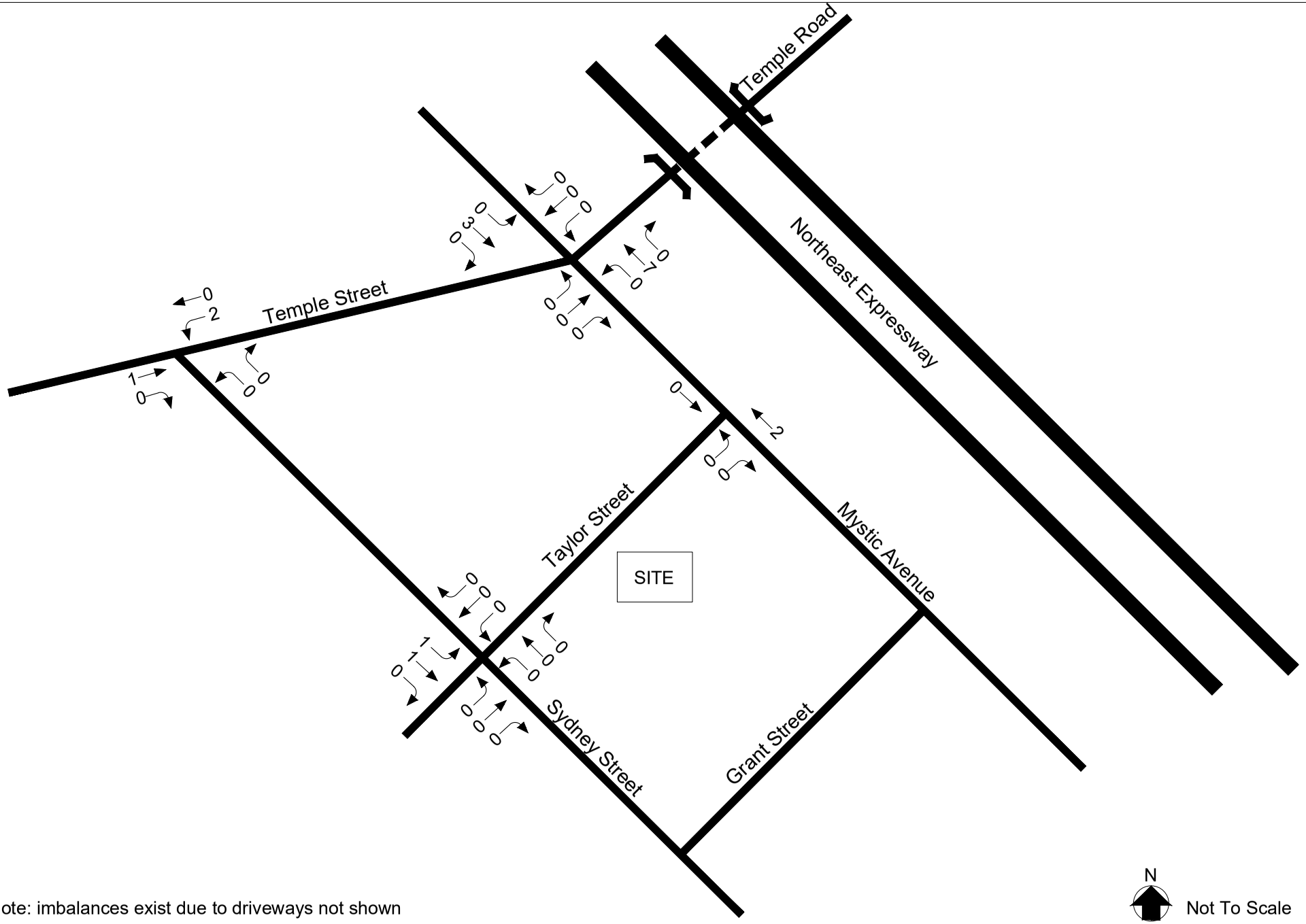
Figure 10

2022 Existing
Weekday Evening
Peak Hour Bicycle Volumes



Note: imbalances exist due to driveways not shown

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Figure 11

2022 Existing
Saturday Midday
Peak Hour Bicycle Volumes

VEHICLE SPEEDS

Existing speed data for Mystic Avenue, Temple Street, and Taylor Street was also collected using the ATRs. The speed data is summarized in Table 3.

TABLE 3
OBSERVED VEHICLE SPEEDS

Location	Posted Speed Limit (mph)	Direction	Average Observed Speed[a] (mph)	85th Percentile Speed (mph)
Mystic Avenue, south of Taylor Street	25	NB	30.0	36
	25	SB	30.0	36
Temple Street, west of Sydney Street	25	EB	22.2	26
	25	WB	20.9	25
Taylor Street, east of Sydney Street	20	EB	17.2	21

[a]Based on speed data compiled on September 29, September 30, and October 1, 2022.

As shown in Table 3, the average speed of vehicles travelling northbound and southbound on Mystic Avenue, south of Taylor Street was found to be 30 miles per hour (mph). The 85th percentile speed was found to be 36 mph for both northbound and southbound vehicles. The 85th percentile speed is the speed at which sight distances are evaluated.

The average speed of vehicles travelling eastbound and westbound on Temple Street, west of Sydney Street was found to be 22.2 mph to 20.9 mph, respectively. The posted speed limit on Temple Street is 25 mph. The 85th percentile speed was found to be 26 mph for eastbound vehicles and 25 mph for westbound vehicles.

The average speed of vehicles travelling northbound on Taylor Street, east of Sydney Street was found to be 17.2 mph. There is no posted speed limit on Taylor Street, so the default speed limit is 20 mph. The 85th percentile speed was found to be 21 mph for northbound vehicles.

MOTOR VEHICLE CRASH DATA

In order to identify crash trends and safety characteristics for study area intersections, crash data were obtained from MassDOT for the City of Somerville for the five-year period covering 2017-2021. A summary of the crash data with crash rates for the study

intersections with reported crashes is provided in Table 4 with detailed data provided in the Appendix. Crash rates were calculated for the study intersections as reported in Table 4. These rates quantify the number of crashes per million entering vehicles. MassDOT has determined the official District 4 (which includes the City of Somerville) crash rate to be 0.73 for signalized intersections and 0.57 for unsignalized intersections. This rate represents MassDOT's "average" crash experience for District 4 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.

Forty-eight (48) crashes were reported at the study area intersections. Of the forty-eight (48) crashes, forty-four (44) crashes were reported at the intersection of Mystic Avenue, Temple Street and Temple Road, two (2) crashes were reported at the intersection of Mystic Avenue and Taylor Street, one (1) crash was reported at the intersection of Taylor Street and Sydney Street, and one (1) crash was reported at the intersection of Temple Street and Sydney Street. No fatalities were reported.

A review of Highway Safety Improvement Project (HSIP) locations was also conducted. The intersection of Mystic Avenue, Temple Street and Temple Road currently appears on MassDOT's HSIP list for the period of 2017 to 2019. A Road Safety Audit (RSA) was performed for this intersection in 2014 for MassDOT and the City of Somerville.

As summarized in Table 4:

- *Mystic Avenue and Temple Street.* Forty-four (44) crashes were reported at this signalized intersection during the five-year study period. This intersection has a crash rate of 0.66 which is slightly below the District 4 average. The crashes included twenty-three (23) angle collisions, fourteen (14) rear-end collisions, three (3) head-on collisions, two (2) sideswipe collisions, and two (2) single vehicle collisions. The majority resulted in only property damage (64%) under dry roadway conditions (84%). Thirty-six percent (36%) occurred during peak commuter travel times. Two (2) pedestrian-related incidents were reported, and no fatalities occurred.

- *Temple Street and Sydney Street.* One (1) crash was reported at this unsignalized intersection during the five-year study period. This intersection has a crash rate of 0.04 which is well below the District 4 average. The crash was a front-to-rear collision which occurred under dry roadway conditions and caused only property damage. The crash did not occur during peak commuter travel times and did not involve any pedestrians or fatalities.

TABLE 4
MOTOR VEHICLE CRASH DATA SUMMARY[a]

Scenario	Mystic Avenue, Temple Street and Temple Road	Mystic Avenue and Taylor Street	Taylor Street and Sydney Street	Temple Street and Sydney Street
Year:				
2017	10	1	0	1
2018	12	0	1	0
2019	10	0	0	0
2020	5	0	0	0
2021	7	1	0	0
Total	44	2	1	1
Average:	8.8	0.4	0.2	0.2
Crash Rate:	0.66	0.04	0.74	0.04
Significance:	No	No	Yes	No
Type:				
Angle	23	0	0	0
Rear-End	14	2	0	0
Head-On	3	0	0	0
Sideswipe	2	0	0	0
Single Vehicle Crash	2	0	0	0
Front-To-Rear	0	0	0	1
Unknown	0	0	1	0
Total	44	2	1	1
Time of Day:				
Weekday (7:00 to 9:00 AM)	4	0	0	0
Weekday (4:00 to 6:00 PM)	12	0	0	0
Remainder of Day	28	2	1	1
Total	44	2	1	1
Pavement Conditions:				
Dry	37	2	0	1
Wet	7	0	0	0
Snow/Ice	0	0	0	0
Other	0	0	0	0
Unknown	0	0	1	0
Total	27	2	1	1
Severity:				
Property Damage Only	28	2	0	1
Personal Injury	15	0	0	0
Fatal Accident	0	0	0	0
Unknown	1	0	1	0
Total	44	2	1	1

[a]Source: MassDOT Impact Crash Portal.
[b]Average crashes over analysis period.
[c]Crash rate per million entering vehicles (mev).
[d]Signalized intersections are significant if rate >0.73 crashes per million vehicles, and unsignalized intersections are significant if rate >0.57 crashes per million vehicles in MassDOT District 4.

- *Sydney Street and Taylor Street.* One (1) crash was reported at this unsignalized intersection during the five-year study period. This intersection has a crash rate of 0.74 which is above the District 4 average. The manner of the crash was not reported, nor was the condition of the roadway surface or the severity of the crash. The crash did not occur during peak commuter travel times. It is unknown if the crash involved any pedestrians or fatalities.

- *Mystic Avenue and Taylor Street.* Two (2) crashes were reported at this unsignalized intersection during the five-year study period. This intersection has a crash rate of 0.04 which is well below the District 4 average. Both crashes were rear-end collisions which occurred under dry roadway conditions and caused only property damage. Neither of the crashes occurred during peak commuter travel times. No pedestrian-related incidents or fatalities were reported.

PUBLIC TRANSPORTATION

The Massachusetts Bay Transportation Authority (MBTA) was reviewed for available public transportation services. The bus route data is summarized in Table 5 and current schedules are in the Appendix.

Bus Route 89 provides access from Sullivan Square to Clarendon Hill or Davis Square. The closest bus stop to the project is on Broadway at Temple Street. Route 89 bus service is provided Monday through Friday from 4:30 AM to 1:47 AM, Saturday 4:38 AM to 1:50 AM, and Sunday from 5:24 AM to 1:40 AM. Route 89 operates during the weekday morning and evening peak periods, with average headways of 10 to 12 minutes, and with approximately 3,479 average daily boardings on weekdays, 1,714 average boardings on a Saturday, and 969 average boardings on a Sunday.

Bus Route 90 provides access from Assembly Row to Davis Square. The closest bus stop to the project is on Broadway at Temple Street. Route 90 bus service is provided Monday through Friday from 6:30 AM to 10:26 PM, Saturday 7:10 AM to 10:35 PM, and Sunday from 10:30 AM to 7:04 PM. Route 90 operates during the weekday morning and evening peak periods, with average headways of 35 minutes, and with approximately 1,073 average daily boardings on weekdays, 564 average boardings on a Saturday, and 330 average boardings on a Sunday.

Bus Route 95 provides access from Sullivan Square to Arlington Center or West Medford. The closest bus stop to the project is on Mystic Avenue at Temple Street. Route 95 bus service is provided Monday through Friday from 4:40 AM to 1:43 AM, Saturday from 5:45 AM to 1:41 AM, and Sunday from 8:00 AM to 1:39 AM. Route 95 operates during the weekday morning and evening peak periods, with average headways of 18 minutes, and with approximately 1,426 average daily boardings on weekdays, 647 average boardings on a Saturday, and 343 average boardings on a Sunday.

TABLE 5
PUBLIC TRANSPORTATION SUMMARY[a]

Bus Route	Origin	Destination	Boardings[b]			Weekday Headway[c]			Weekend Headway[c]		Nearest Stop	Distance
			Total Average Weekday	Total Average Saturday	Total Average Sunday	Average Morning Peak Period	Off-Peak	Average Evening Peak Period	Saturday	Sunday		
89	Sullivan Square Station (Boston, MA; MBTA Orange Line)	Clarendon Hill (Cambridge, MA) / Davis Station (Somerville, MA; MBTA Red Line)	3,479	1,714	969	10	15-45	12	50-58	44-47	Broadway at Temple Street (Outbound) / Broadway at Marshall Street (Inbound)	±1,300 feet / ±1,400 feet
90	Assembly Row (Somerville, MA)	Davis Station (Somerville, MA)	1,073	564	330	35	35-65	35	50-70	50-70	Grand Union Boulevard opp. Artisan Way (Outbound) / Grand Union Boulevard at Canal Street (Inbound)	±2,100 feet / ±2,200 feet
95	Sullivan Square Station (Boston, MA; MBTA Orange Line)	West Medford (Medford, MA) / Arlington Center (Arlington, MA)	1,426	647	343	18	10-60	18	35-70	60-80	Mystic Avenue at Temple Road	±300 feet
101	Sullivan Square Station (Boston, MA; MBTA Orange Line)	Malden Center Station (Malden, MA)	4,236	1,528	1,060	13	5-119	15	40-64	50-65	Broadway at Temple Street (Outbound) / Broadway at Marshall Street (Inbound)	±1,300 feet / ±1,400 feet

[a]Source: MBTA Open Data Portal
[b]Total Daily Passengers, Fall 2019
[c]Headway in minutes

Bus Route 101 provides access from Sullivan Square to Malden Center. The closest bus stop to the project is on Broadway at Temple Street. Route 101 bus service is provided Monday through Friday from 4:55 AM to 12:52 AM, Saturday 5:00 AM to 1:38 AM, and Sunday from 5:45 AM to 12:24 AM. Route 101 operates during the weekday morning and evening peak periods, with average headways of 13 to 15 minutes, and with approximately 4,236 average daily boardings on weekdays, 1,528 average boardings on a Saturday, and 1,060 average boardings on a Sunday.

The Orange Line provides access from Forest Hills to Oak Grove and has stations within one mile of the project site at Sullivan Square and Assembly. Orange Line service is provided from 5:16 AM to 12:30 AM daily.

PLANNED ROADWAY IMRPOVEMENTS

The City of Somerville and MassDOT were contacted to determine if there were any projects in the study area that would affect future conditions. No projects were identified.

SECTION 3:
FUTURE NO-BUILD AND BUILD TRAFFIC CONDITIONS

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 the year 2029. Traffic volumes on the roadway network at that time, in the absence of the proposed project, would include existing traffic, new traffic due to general background traffic growth, and traffic related to specific developments by others expected to be completed by 2029. Consideration of these factors resulted in the development of 2029 No-Build traffic volumes. Anticipated site-generated traffic volumes were then superimposed upon these No-Build traffic flow networks to develop the 2029 Build conditions.

FUTURE 2029 NO-BUILD TRAFFIC VOLUMES

Traffic growth on area roadways is a function of the expected land development in the immediate area as well as the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

To provide a conservative analysis framework, both procedures were used.

Background Traffic Growth

The City of Somerville's Mobility Department indicated that there is no projected

background growth for the city's traffic volumes and that only traffic generated by planned developments in the vicinity of the site should be used for the 2029 No-Build analysis.

Specific Development by Others

Traffic volumes generated by the specific local developments by others were included in the 2029 No-Build condition. Conversations with the City of Somerville indicated that there are three projects identified in the area that could generate traffic beyond the general background growth rate. These include:

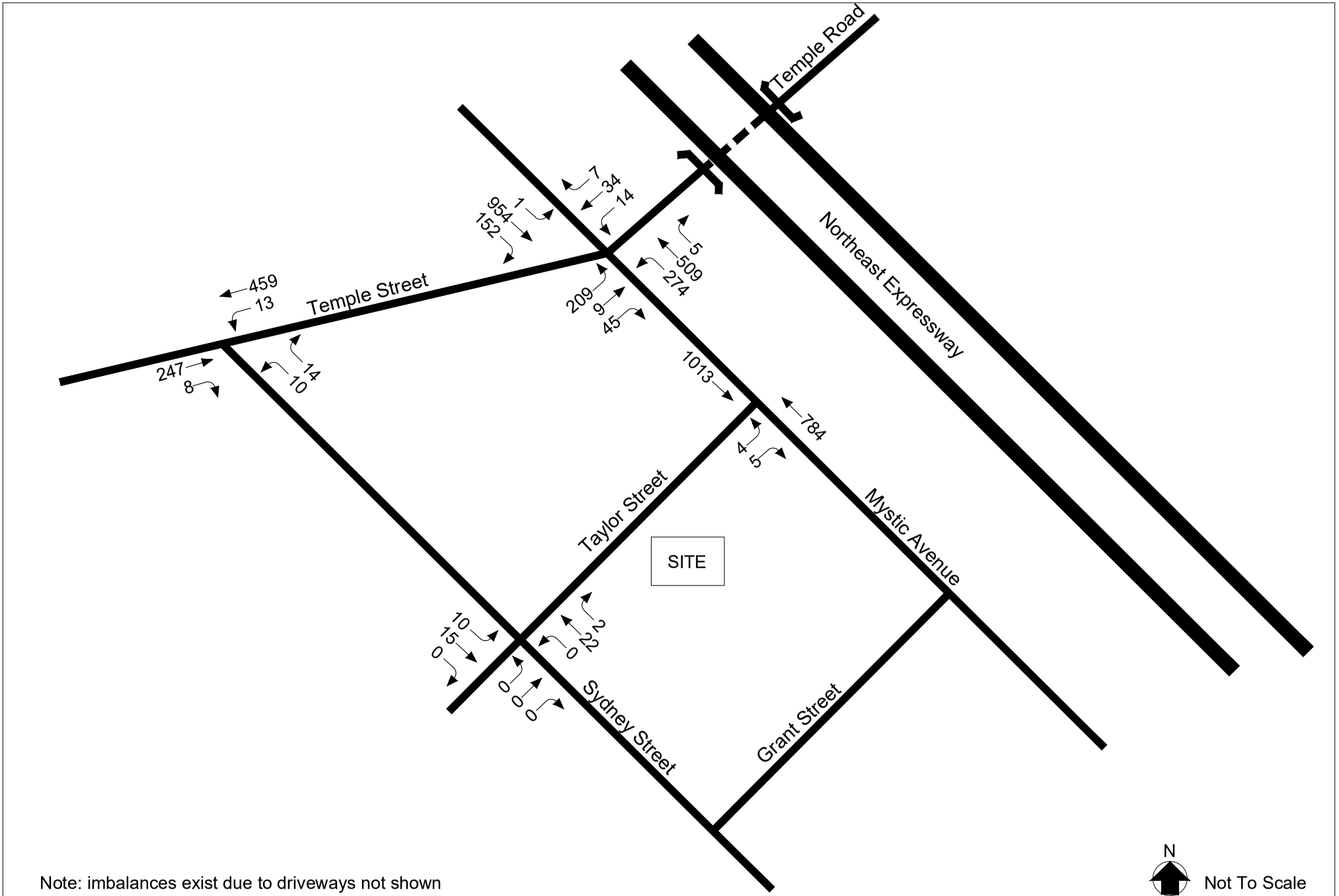
- 5 Middlesex Avenue (1.45-million sf mixed development)
- 74 Middlesex Avenue (525,000 sf residential development)
- 120 Middlesex Avenue (596,000 sf residential development)

Traffic projections for each of these projects was obtained from the relevant traffic studies performed or from the ITE *Trip Generation* manual[3]. The worksheets are included in the Appendix.

No-Build Condition Traffic Volumes

The 2029 No-Build weekday morning, weekday evening, and Saturday midday peak-hour traffic volumes were developed by adding traffic from the identified background projects to the 2022 Existing traffic volumes. Figures 12 through 14 show the projected 2029 No-Build peak hour traffic volumes for the respective weekday morning, weekday evening, and Saturday midday peak-hours.

[3] *Trip Generation,* Eleventh Edition; Institute of Transportation Engineers; Washington, DC; 2021.



Note: imbalances exist due to driveways not shown

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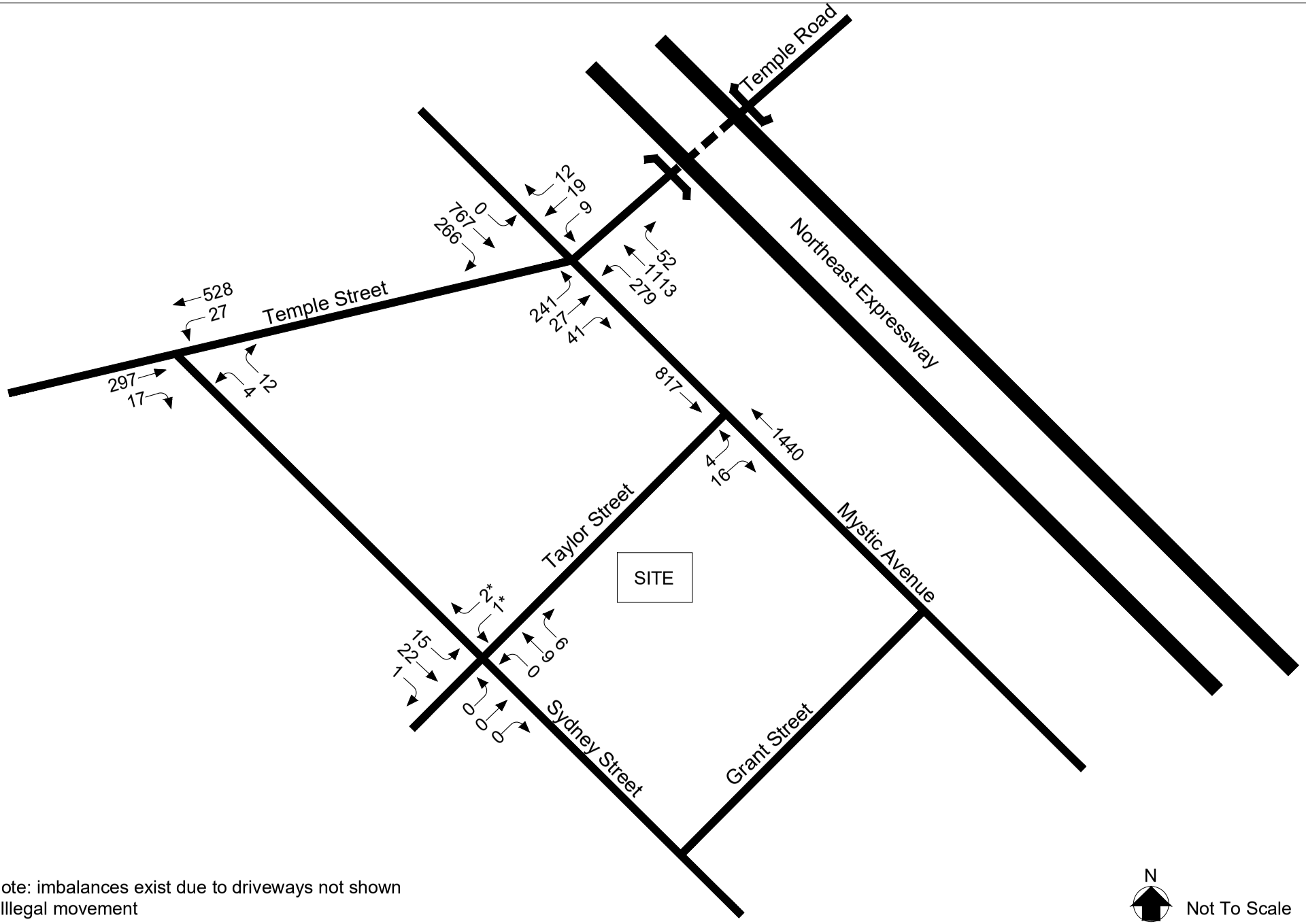
Figure 12

2029 No-Build
Weekday Morning
Peak Hour Traffic Volumes



Note: imbalances exist due to driveways not shown
* Illegal movement

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Figure 13

2029 No-Build
Weekday Evening
Peak Hour Traffic Volumes

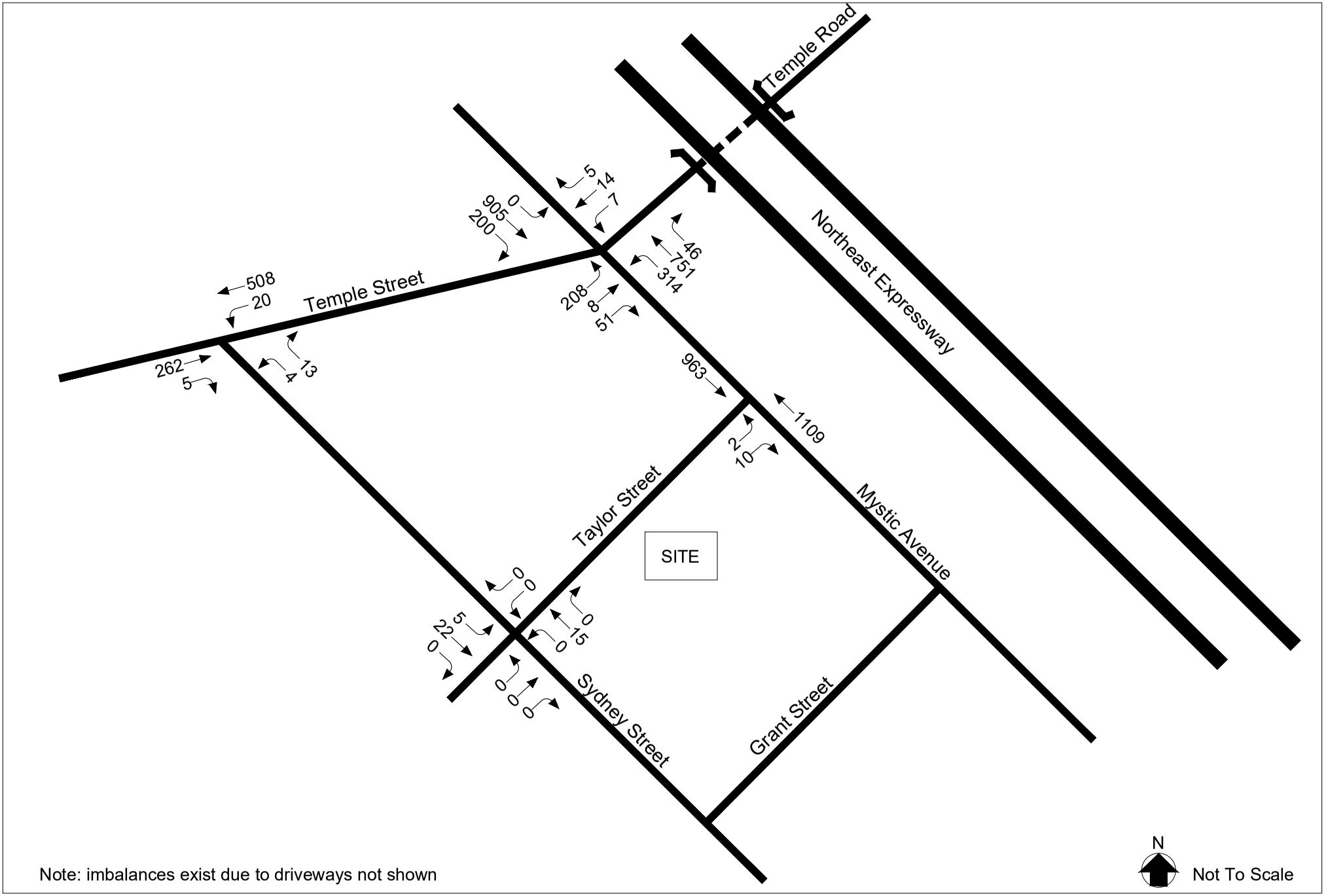

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Figure 14

2029 No-Build
Saturday Midday
Peak Hour Traffic Volumes

FUTURE 2029 BUILD CONDITIONS

Project Description

The site is located on the southeast side of Taylor Street between Sydney Street and Mystic Avenue. The site is zoned UR. The site is abutted by residential apartments on all sides. Currently, the site consists of two multi-family apartment buildings. Two driveways with curb cuts currently provide access to the site.

As currently proposed, the Project will consist of the demolition of the existing buildings and the construction of a single residential apartment building with 34 dwelling units.

Parking will be provided for 20 vehicles adjacent to the building and four (4) spaces in front of the site on Taylor Street. Access to the site is proposed by way of a single driveway to Taylor Street.

Proposed Site Traffic Generation

Site generated traffic was initially based on trip-generation data published by the ITE *Trip Generation* manual[4]. The site generated trips were calculated using fitted curve equations for ITE Land Use Code (LUC) 221 – Multifamily Housing (Mid-Rise) based on the projected number of dwelling units. The trip generation calculations were then adjusted to consider vehicle occupancy rate and mode split (transit, bike and walk). 2017 National vehicle occupancy rates were used in conjunction with American Community Survey data from the U.S. Census data for tract 3501.04 (which encompasses Taylor Street in Somerville). Based on this assessment, the mode share used was approximately 66% auto trips and the remaining 34% non-auto trips. The resulting site generated vehicles trips are summarized in Table 6 for the proposed 34 apartments. The trip generation worksheets are included in the Appendix.

[4] *Trip Generation,* Eleventh Edition; Institute of Transportation Engineers; Washington, DC; 2021.

TABLE 6
PROPOSED TRIP-GENERATION SUMMARY

	Proposed Apartment Trips[a]	Proposed Apartment Person Trips[b]	Transit Trips[c]	Walk Trips[d]	Other Trips[e]	Remaining Person Trips By Auto	Adjusted Vehicular Auto Trips
Average Weekday Daily Traffic	154	182	50	4	10	118	100
Weekday Morning Peak Hour:							
Entering	3	4	1	0	0	3	3
Exiting	10	12	3	0	1	8	7
Total	13	16	4	0	1	11	10
Weekday Evening Peak Hour:							
Entering	8	9	2	0	0	7	6
Exiting	5	6	2	0	0	4	3
Total	13	15	4	0	0	11	9
Saturday Daily Traffic	156	184	50	4	10	120	102
Saturday Midday Peak Hour:							
Entering	7	8	2	0	0	6	5
Exiting	6	7	2	0	0	5	4
Total	13	15	4	0	0	11	9

[a]Based on ITE LUC 221, Multifamily Housing (Mid-Rise); 34 units.
[b]Person trips adjusted based on 2017 National vehicle occupancy rate of 1.18 (home to work).
[c]Transit trips are projected to be 27% of all Person Trips for Census Tract 3501.04.
[d]Walk trips are projected to be 2.2% of all Person Trips for Census Tract 3501.04.
[e]Other means trips, including bicycling, are projected to be 5.0% of all Person Trips for Census Tract 3501.04.

On a typical weekday, the proposed residential development is expected to generate 100 daily vehicle trips (50 vehicles entering and 50 vehicles exiting). During the weekday morning peak hour, 10 vehicle trips (3 vehicles entering and 7 vehicles exiting) are expected. During the weekday evening peak hour, 9 vehicle trips (6 vehicles entering and 3 vehicles exiting) are expected. On a typical Saturday, the proposed residential development is expected to generate 102 daily vehicle trips (51 vehicles entering and 51 vehicles exiting). During the Saturday midday peak hour, 9 vehicle trips (5 vehicles entering and 4 vehicles exiting) are expected.

Trip Distribution

The directional distribution of the vehicular traffic approaching and departing the site is typically a function of population densities, the location of employment, existing travel patterns, similar uses, and the efficiency of the existing roadway system. A gravity model was developed based on Worcester Journey-to-Work data from the U.S. Census to determine the expected trip distribution. Table 7 summarizes the expected trip distribution. The trip distribution is shown graphically in Figure 15 and the gravity model is in the Appendix.

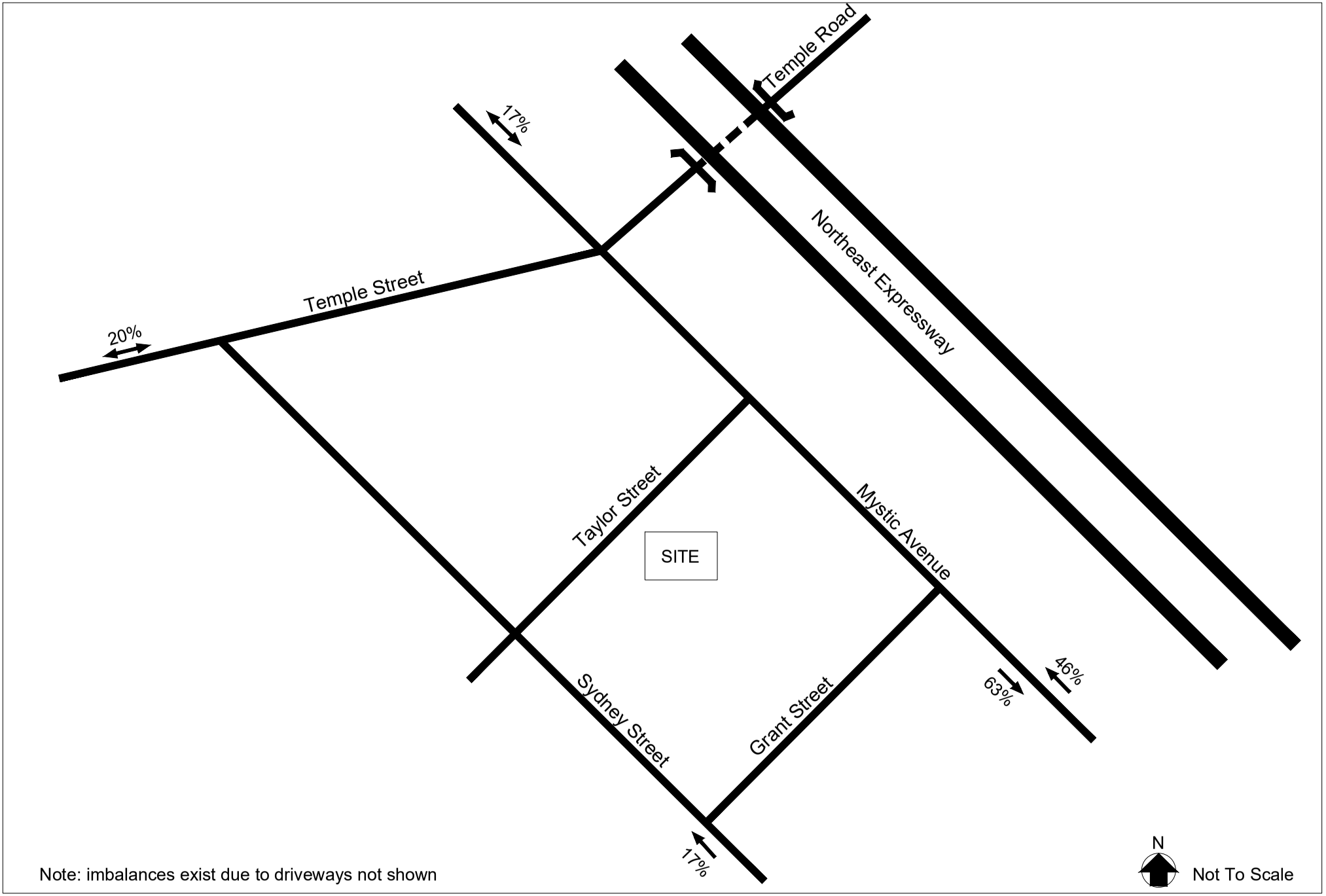

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Figure 15

Trip Distribution

TABLE 7
PROPOSED TRIP DISTRIBUTION

Route	Direction	Percent of Entering Trips	Percent of Exiting Trips
Mystic Avenue	North	17	17
Mystic Avenue	South	46	63
Temple Street	West	20	20
Sydney Street	South	17	0
TOTAL		100	100

Future Traffic Volumes - Build Condition

The site-generated traffic was distributed within the study area according to the percentages summarized in Table 7. The site generated trips are shown in Figures 16 through 18. The site generated volumes were then superimposed onto the 2029 No-Build traffic volumes to represent the 2029 Build traffic-volume conditions. The anticipated 2029 Build weekday morning, weekday evening, and Saturday midday peak-hour traffic volumes are graphically presented in Figures 19 through 21. These volumes were used as the basis for all analysis as well as to identify potential mitigation measures to ameliorate the project's impacts.

A summary of 2029 peak-hour projected traffic-volume changes in the site vicinity are shown in Table 8. These volumes are based on the expected increases from the site traffic generation.

As shown in Table 8, project-related increases are in the range of ___ (___) to ___ (___) bi-directional vehicles during the peak hours entering or exiting the study area. This is equivalent to approximately one additional vehicle every ___ (___) minutes or less per direction on average during the peak hours.

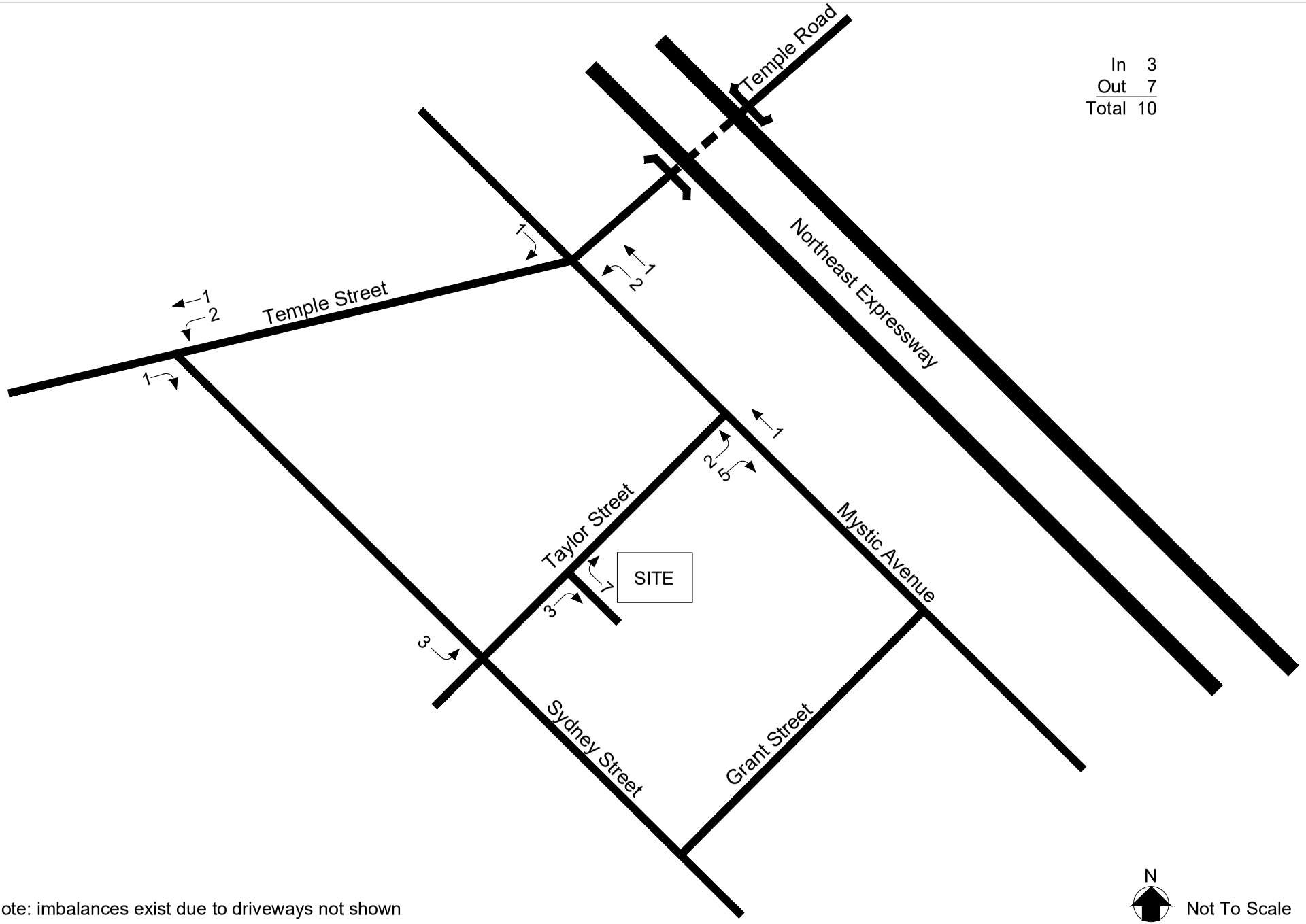

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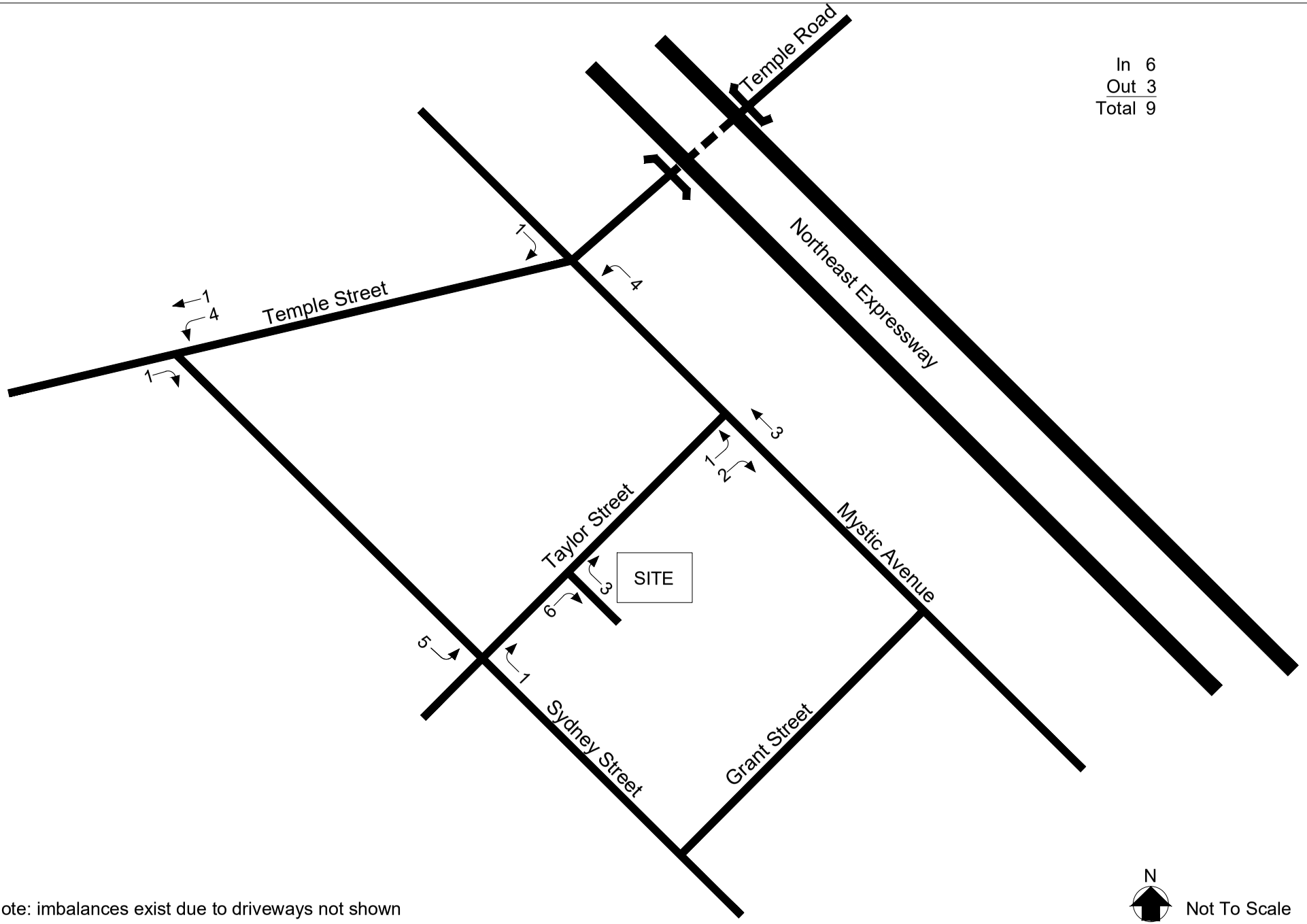
Figure 16

Site Generated
Weekday Morning
Peak Hour Traffic Volumes



Note: imbalances exist due to driveways not shown

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Proposed Residential
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Figure 17

Site Generated
Weekday Evening
Peak Hour Traffic Volumes

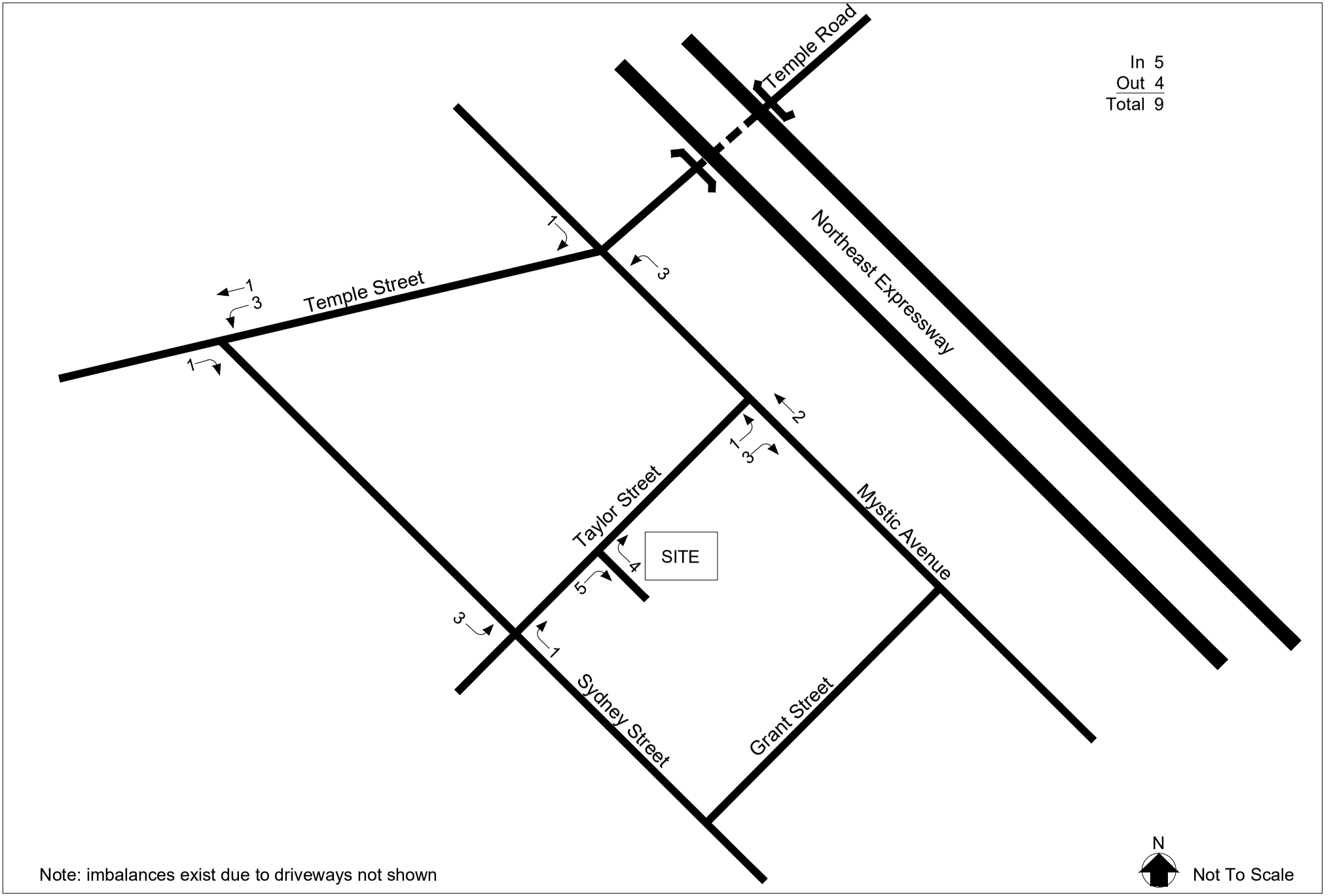

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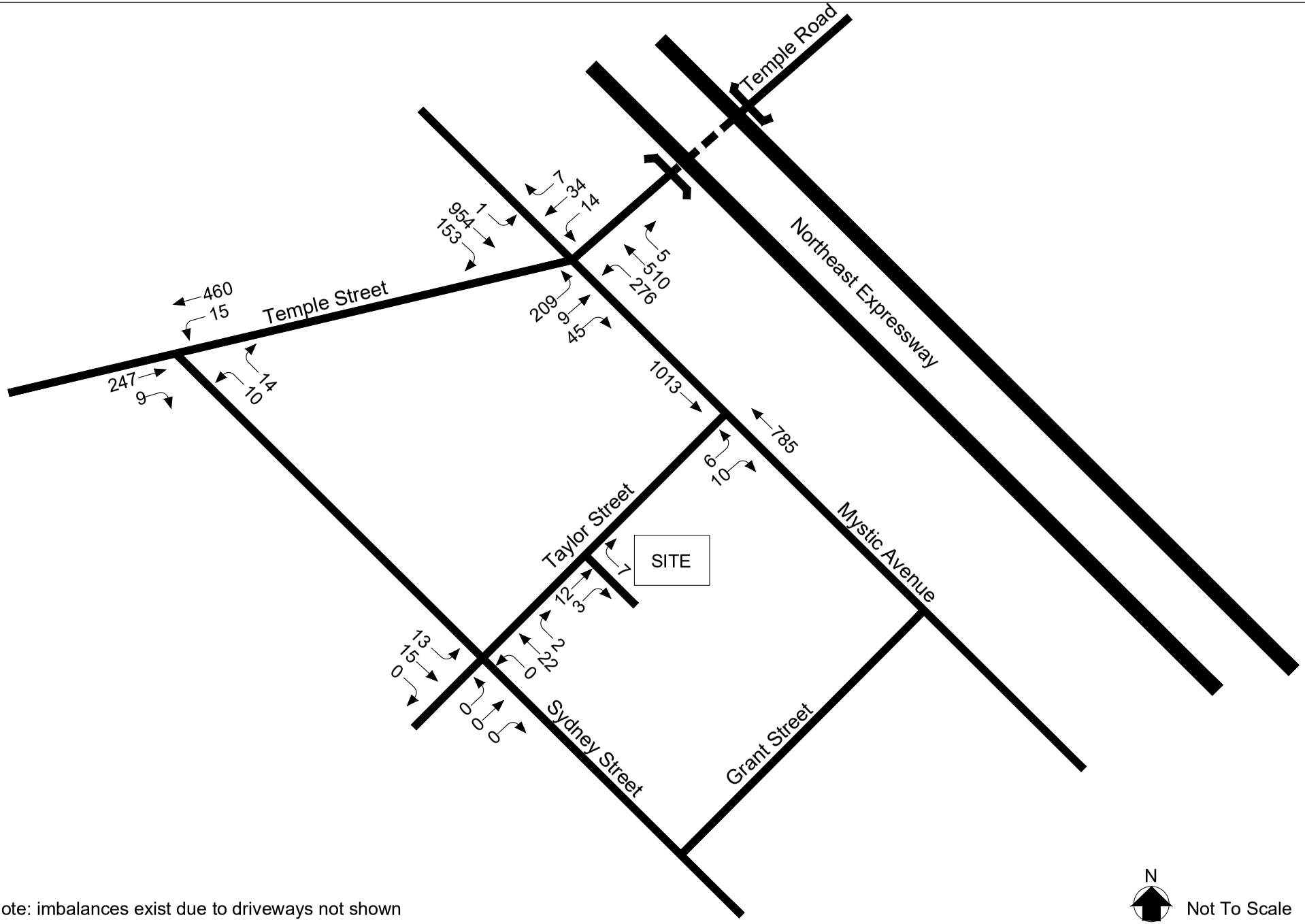
Figure 18

Site Generated
Saturday Midday
Peak Hour Traffic Volumes



Note: imbalances exist due to driveways not shown

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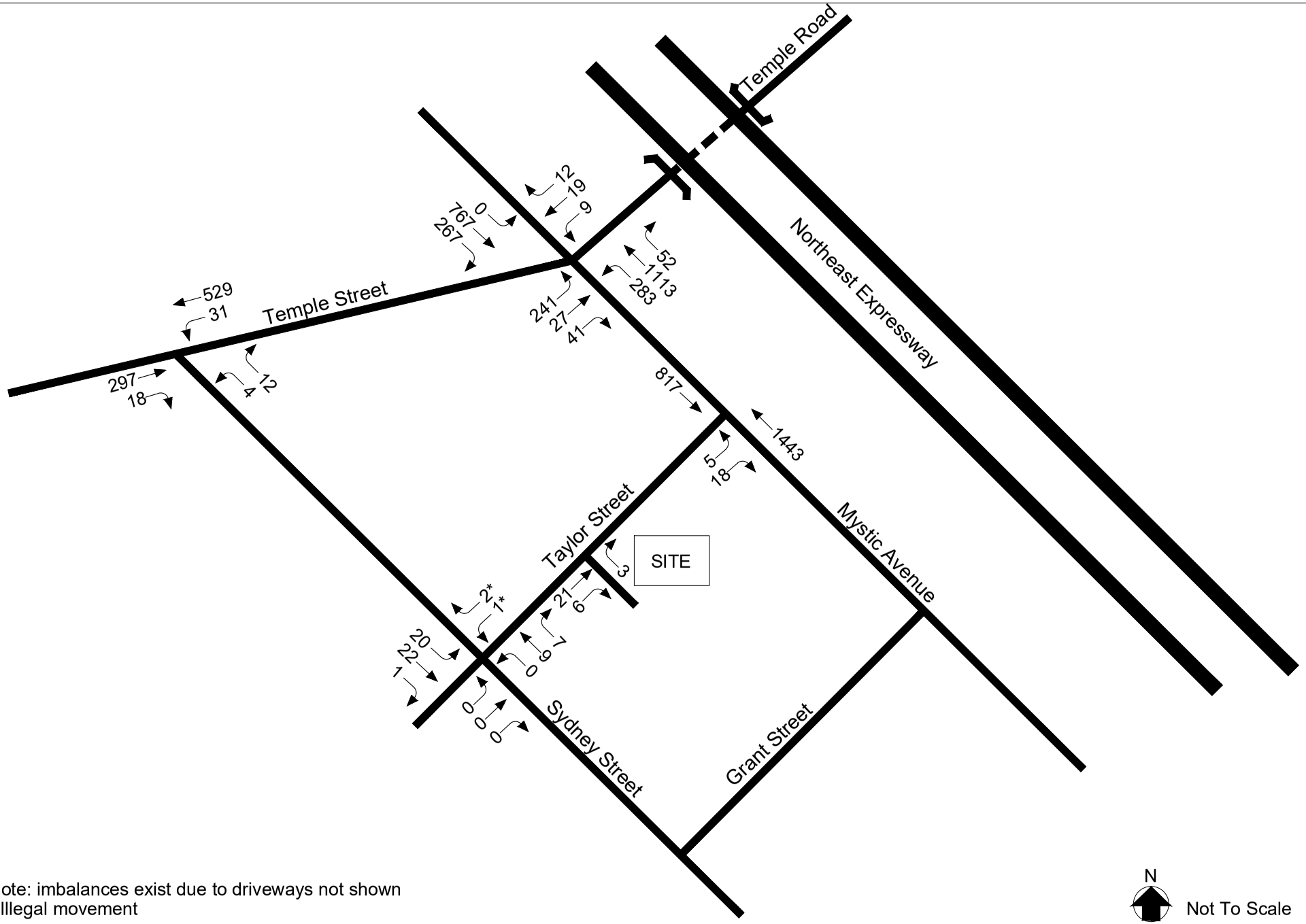
Figure 19

2029 Build
Weekday Morning
Peak Hour Traffic Volumes



Note: imbalances exist due to driveways not shown
* Illegal movement

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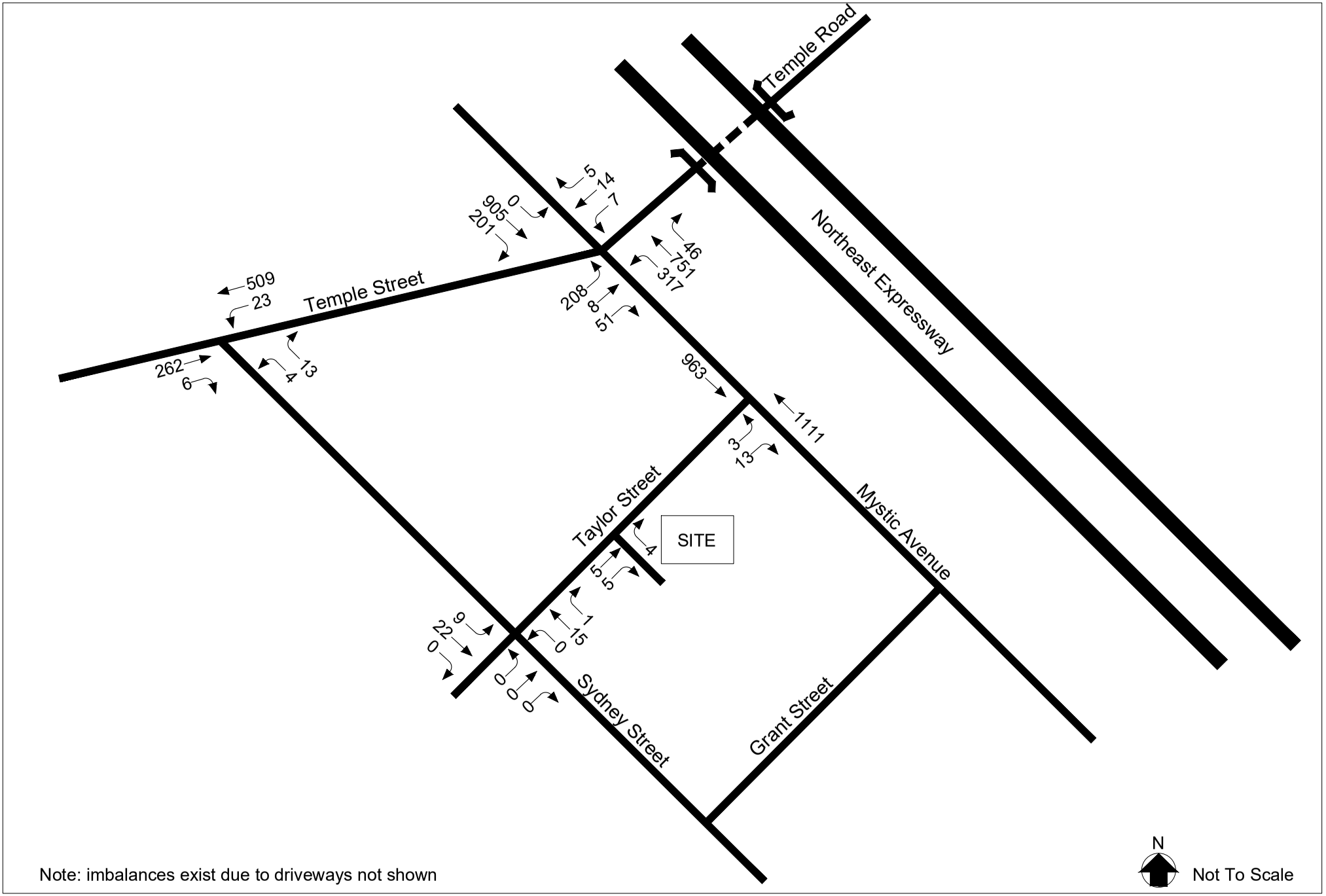
Figure 20

2029 Build
Weekday Evening
Peak Hour Traffic Volumes



Note: imbalances exist due to driveways not shown

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Figure 21

2029 Build
Saturday Midday
Peak Hour Traffic Volumes

TABLE 8
TRAFFIC-VOLUME INCREASES[a]

Location/Peak Hour	2029 No-Build	2029 Build	Volume Increase over No-Build
Mystic Avenue, north of Temple Street			
Weekday Morning	1,832		
Weekday Evening	2,399		
Saturday Midday	2,069		
Mystic Avenue, south of Taylor Street			
Weekday Morning	1,802		
Weekday Evening	2,273		
Saturday Midday	2,082		
Temple Street, west of Sydney Street			
Weekday Morning	724		
Weekday Evening	846		
Saturday Midday	779		
Sydney Street, south of Taylor Street			
Weekday Morning	39		
Weekday Evening	38		
Saturday Midday	37		

[a]All volumes are vehicles per hour, total of both directions.

SECTION 4: ANALYSIS

To assess intersection operations, capacity analyses were conducted for Existing, No-Build, and Build traffic-volume conditions. Capacity analyses provide an indication of how well the study area intersections serve existing and projected traffic volumes. Vehicle queue analyses provide a secondary measure of the operational characteristics of an intersection or section of roadway under study in terms of lane use and demand.

METHODOLOGY

Levels of Service

Level-of-service (LOS) is a quantitative measure used to describe the operation of an intersection or roadway segment. The Level-of-Service definition is described by the quality of traffic flow and is primarily defined in terms of traffic delays. The primary result of capacity analyses[5] is the assignment of a level-of-service to traffic intersections or roadway segments under various traffic-flow conditions. Six levels of service are defined for traffic intersections and roadway segments. Levels-of-service criteria range from LOS A to LOS F. LOS A represents very good operating conditions while LOS F represents very poor operating conditions.

Signalized Intersections

Levels of service for signalized intersections are calculated using the methodology and procedures described in the 7th Edition *Highway Capacity Manual*[6]*(HCM7)*. The methodology assesses the intersection based on type of signal operation, signal timing and phasing, progression, vehicle mix, and intersection geometrics. Level-of-service designations are based on the delay per vehicle. ***Error! Reference source not found.*** s ummarizes the relationship between Level-of-Service and delay for signalized

[5]The capacity analysis methodology is based on procedures presented in the *Highway Capacity Manual 7th Edition;* Transportation Research Board; Washington, DC; 2022.

[6]*Highway Capacity Manual 7th Edition*; Transportation Research Board; Washington, DC; 2022.

intersections. The calculated delay values result in levels-of-service designations which are applied to individual lane groups, to individual intersection approaches, and to the entire intersection. In the HCM7 methodology, the critical lane group volume to capacity ratio is reported.

TABLE 9
LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS[a]

Delay per Vehicle (Seconds)	Defined Level-of-Service $v/c^b < 1.0$	Defined Level-of-Service $v/c^b > 1.0$
≤10.0	A	F
10.1 to 20.0	B	F
20.1 to 35.0	C	F
35.1 to 55.0	D	F
55.1 to 80.0	E	F
>80.0	F	F

[a]*Highway Capacity Manual 7th Edition*; Transportation Research Board; Broad, DC; 2022; page 19-16.
[b]Volume to capacity ratio.

Unsignalized Intersections

The level-of-service (LOS) for an unsignalized intersection is determined by the methodology and procedures described in the HCM7. The level-of-service for unsignalized intersections is measured in terms of average delay for the critical movements (typically side street turning movements or mainline turning movements). The delay for the critical movements is a function of the available capacity for the movement and the degree of saturation of the lane group containing the critical movement. The delay calculation includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. The definitions for level-of-service at unsignalized intersections are also provided in the *Highway Capacity Manual 7th Edition*. TABLE summarizes the relationship between level- of-service and average control delay for the critical movements at unsignalized intersections.

TABLE 10
LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS[a]

Average Delay (seconds per vehicle)	Defined Level-of-Service v/c[b] < 1.0	Defined Level-of-Service v/c > 1.0
≤ 10.0	A	F
10.1 to 15.0	B	F
15.1 to 25.0	C	F
25.1 to 35.0	D	F
35.1 to 50.0	E	F
>50.0	F	F

[a]*Highway Capacity Manual 7th Edition*; Transportation Research Board; Broad, DC; page 20-6
[b]Volume to capacity ratio.

The analytical methodologies used for the analysis of unsignalized intersections use conservative analysis parameters, such as high critical gaps. The critical gap is defined as the minimum time between successive main line vehicles for a side street vehicle to execute the appropriate turning maneuver. Actual field observations indicate that drivers at the study area intersections accept smaller gaps in traffic than those used in the analysis procedures and therefore experience less delay than calculated by the HCM methodology. **The analysis results from the HCM model overstate the actual delays experienced in the field.** It should be noted that the unsignalized intersections along heavily trafficked roadways operate at constrained levels and the resulting calculated results of the unsignalized intersection analyses should be considered highly conservative.

CAPACITY ANALYSIS RESULTS

Level-of-service analyses were conducted for 2022 Existing, 2029 No-Build, and 2029 Build conditions for the intersections within the study area. The critical movements at the unsignalized intersections are modeled to operate at LOS D or better during the respective peak hours. The corresponding volume to capacity (v/c) ratios are 0.20 or less with projected 95th percentile queues of one (1) vehicle or less, indicating that there is capacity for the critical movements.

The results of the unsignalized analyses are summarized in Table 11 and the results of the signalized analyses are summarized in Table 12. Detailed analysis sheets are presented in the Appendix.

TABLE 11
UNSIGNALIZED LEVEL-OF-SERVICE ANALYSIS SUMMARY

Critical Movement/ Peak Hour	2022 Existing					2029 No-Build					2029 Build				
	Demand[a]	V/C[b]	Delay[c]	LOS[d]	Queue[e]	Demand	V/C	Delay	LOS	Queue	Demand	V/C	Delay	LOS	Queue
Mystic Avenue and Taylor Street															
All movements from Taylor Street (EB):															
Weekday Morning	9	0.13	26.2	D	10.0	9	0.14	28.7	D	12.5	16	0.24	30.3	D	22.5
Weekday Evening	20	0.10	18.9	C	7.5	20	0.10	19.9	C	7.5	23	0.13	20.9	C	10.0
Saturday Midday	12	0.05	17.7	C	5.0	12	0.06	18.3	C	5.0	16	0.08	19.3	C	7.5
Taylor Street and Site Driveway															
All movements from Site Driveway (NB):															
Weekday Morning	-	-	-	-	-	-	-	-	-	-	7	0.01	8.4	A	0.0
Weekday Evening	-	-	-	-	-	-	-	-	-	-	3	0.00	8.4	A	0.0
Saturday Midday	-	-	-	-	-	-	-	-	-	-	4	0.00	8.4	A	0.0
Temple Street and Sydney Street															
All movements from Sydney Street (NB):															
Weekday Morning	24	0.07	12.9	B	5.0	24	0.07	12.9	B	5.0	24	0.07	12.9	B	5.0
Weekday Evening	16	0.04	12.4	B	2.5	16	0.04	12.4	B	2.5	16	0.04	12.5	B	2.5
Saturday Midday	17	0.04	11.5	B	2.5	17	0.04	11.5	B	2.5	17	0.04	11.6	B	2.5

[a]Demand of critical movements in vehicles per hour.
[b]Volume-to-capacity ratio.
[c]Delay in seconds per vehicle.
[d]Level of service.
[e]95th percentile queue in feet.

TABLE 12
SIGNALIZED LEVEL-OF-SERVICE SUMMARY
MYSTIC AVENUE AND TEMPLE STREET

	2022 Existing				2029 No-Build				2029 Build			
Peak Hour/Lane Group	V/C[a]	Delay[b]	LOS[c]	Queue[d]	V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Weekday Morning												
Eastbound Lt	0.76	39.5	D	108/186	0.76	39.5	D	108/186	0.76	39.5	D	108/186
Eastbound Th/Rt	0.06	25.1	C	4/33	0.06	25.1	C	4/33	0.06	25.1	C	4/33
Westbound Lt/Th/Rt	0.17	25.8	C	24/50	0.17	25.8	C	24/50	0.17	25.8	C	24/50
Northbound Lt	0.88	45.3	D	93/245	0.88	45.3	D	93/245	0.88	45.3	D	95/248
Northbound Th/Rt	0.24	5.3	A	47/75	0.25	5.3	A	50/78	0.25	5.3	A	50/78
Southbound Lt/Th	1.14	98.8	F	577/831	1.22	129.3	F	643/902	1.22	130.6	F	643/902
Southbound Rt	0.11	11.8	C	3/35	0.12	11.8	B	6/38	0.12	11.9	B	6/39
Overall	**1.00**	**54.3**	**D**	--	**1.04**	**68.0**	**E**	--	**1.05**	**68.5**	**E**	--
Weekday Evening												
Eastbound Lt	0.80	42.1	D	127/234	0.80	42.1	D	127/234	0.80	42.1	D	127/234
Eastbound Th/Rt	0.11	25.0	C	12/45	0.11	25.0	C	12/45	0.11	25.0	C	12/45
Westbound Lt/Th/Rt	0.11	25.1	C	16/32	0.11	25.1	C	16/32	0.11	25.1	C	16/32
Northbound Lt	0.80	24.4	C	70/198	0.80	25.8	C	73/204	0.81	27.0	C	76/210
Northbound Th/Rt	0.52	7.7	A	149/197	0.56	8.2	A	168/223	0.56	8.2	A	169/223
Southbound	0.66	18.3	B	210/283	0.67	18.6	B	214/288	0.67	18.7	B	215/288
Lt/Th/Rt	**0.83**	**17.2**	**B**	--	**0.84**	**17.4**	**B**	--	**0.84**	**17.5**	**B**	--
Overall												
Saturday Midday												
Eastbound Lt	0.80	43.6	D	109/209	0.80	43.6	D	109/209	0.80	43.6	D	109/209
Eastbound Th/Rt	0.06	24.8	C	4/34	0.06	24.8	C	4/34	0.06	24.8	C	4/34
Westbound Lt/Th/Rt	0.08	25.0	C	12/27	0.08	25.0	C	12/27	0.08	25.0	C	12/27
Northbound Lt	0.98	63.5	E	121/298	1.00	69.4	E	130/305	1.01	72.0	E	140/309
Northbound Th/Rt	0.37	6.3	A	90/125	0.38	6.4	A	95/132	0.38	6.4	A	95/132
Southbound	0.74	20.3	C	246/333	0.75	20.8	C	255/343	0.75	20.8	C	255/344
Lt/Th/Rt	**0.97**	**23.6**	**C**	--	**0.98**	**24.4**	**C**	--	**0.99**	**24.7**	**C**	--
Overall												

[a]Maximum volume-to-capacity ratio.
[b]Delay in seconds per vehicle.
[c]Level of service.
[d]Average Queue (ft)/95th %tile Queue (ft)
Lt = Left; Th = Through; Rt = Right.

Mystic Avenue, Temple Street and Temple Road

Under 2022 Existing conditions, this signalized intersection is projected to operate at LOS D during the weekday morning peak hour, at LOS B during the weekday evening peak hour, and at LOS C during the Saturday midday peak hour. Under future 2029 No-Build conditions, the intersection is projected to operate at LOS E during the weekday morning peak hour, at LOS B during the weekday evening peak hour, and at LOS C during the Saturday midday peak hour. Under future 2029 Build conditions, with the project, the intersection is projected to continue to operate at LOS E during the weekday morning peak hour, at LOS B during the weekday evening peak hour, and at LOS C during the Saturday midday peak hour. As can be seen in Table 12, the addition of Project-related traffic to the intersection is not predicted to result in a change in LOS for any movement over No-Build

conditions.

Mystic Avenue and Taylor Street

Under 2022 Existing conditions, the critical movements at this unsignalized intersection (all movements from Taylor Street) are modeled to operate at LOS D during the weekday morning peak hour and at LOS C during the weekday evening and Saturday midday peak hours. Under future 2029 No-Build conditions, the intersection is projected to operate at LOS D during the weekday morning peak hour and at LOS C during the weekday evening and Saturday midday peak hours. Under future 2029 Build conditions, with the project, the intersection is projected to continue to operate at LOS D during the weekday morning peak hour and at LOS C during the weekday evening and Saturday midday peak hours.

Taylor Street and Site Driveway

Under 2029 Build conditions, the critical movements at this unsignalized intersection (all movements from the site driveway) are modeled to operate at LOS A during the weekday morning, weekday evening, and Saturday midday peak hours.

Temple Street and Sydney Street

Under 2022 Existing conditions, the critical movements at this unsignalized intersection (all movements from Sydney Street Street) are modeled to operate at LOS B during the weekday morning, weekday evening, and Saturday midday peak hours. Under future 2029 No-Build conditions, the critical movements are projected to operate at LOS B during the weekday morning, weekday evening, and Saturday midday peak hours. Under 2029 Build conditions, with the project, the critical movements are projected to continue to operate at LOS B during the weekday morning, weekday evening, and Saturday midday peak hours.

BICYCLE ANALYSIS

Within the study area, bicycle facilities are a mix of unprotected and shared on-street lanes. The bicycle network is analyzed using the Bicycle Level of Traffic Stress (BLTS) methodology developed by Mekuria, Furth, and Nixon in the Mineta Transportation Institute (MTI) Report 11-19. This methodology gives a level of stress classification for each segment and intersection based on a set of measurable characteristics or observations. The four tiers of Level of Traffic Stress (LTS) range from LTS 1, which would classify a low-stress location, to LTS 4, which is considered a high-stress environment. The four levels of stress are described in Table 13.

TABLE 13
BICYCLE LEVEL OF TRAFFIC STRESS CHARACTERISTICS

LTS	Description
LTS 1	Strong separation from all except low speed, low volume traffic. Simple crossings. Suitable for children.
LTS 2	Except in low speed/low volume traffic situations, cyclists have their own place to ride that keeps them from having to interact with traffic except at formal crossings. Physical separation from higher speed and multilane traffic. Crossings that are easy for an adult to negotiate. A level of traffic stress that most adults can tolerate, particularly those sometimes classified as "interested but concerned."
LTS 3	Involves iteration with moderate speed traffic or multilane traffic, or close proximity to higher speed traffic. A level of traffic stress acceptable to those classified as "enthused and confident."
LTS 4	Involves iteration with higher speed traffic or close proximity to high-speed traffic. A level of stress acceptable only to those classified as "strong and fearless."

BLTS for a roadway segment or unsignalized intersection is calculated by evaluating the characteristics in the tables found in the Appendix and selecting the lowest score (highest numerical value) to identify each roadway segment or intersection with the classifications in Table 13.

Bicycle Impacts

The Project is expected to generate approximately eight (8) bicycle trips on an average weekday (two-way, 24-hour volume), with 0 bicycle trips expected during the weekday morning peak-hour and 0 bicycle trips expected during the weekday evening peak-hour. Marked bicycle lanes are provided along Mystic Avenue (along the southbound direction, 6:00 to 9:00 AM) with the remaining study area roadways generally providing sufficient width (combined travel lane and paved shoulder) to support bicycle travel in a shared traveled-way configuration.

A Bicycle Level of Traffic Stress (BLTS) analysis was performed for the Project using the standards published in the City of Somerville's *Transportation Impact Study (TIS) Guidelines*. BLTS is a measure of the level of comfort or "stress" that a cyclist experiences using a bicycle facility and considers factors such as

- roadway width,
- vehicle travel speeds,

- the presence (or lack thereof) of a separate bicycle accommodation;
- buffering (or lack thereof) of bicycle accommodations from the adjacent traveled-way (where such accommodations are provided), and
- the width and presence (or absence) of separate accommodations at intersections.

BLTS is reported as a numeric value ranging from 1 (low stress) to 4 (high stress) and is a measure of a bicyclist's comfort using a bicycle facility or shared-use accommodation (where provided).

A graphical summary of the BLTS within the study area is shown on Figure 22. As shown on Figure 22, Mystic Avenue operates at a BLTS of 3, with Temple Street generally operating at a BLTS of 3 in the eastbound direction and 1 in the westbound direction. Sydney Street and Taylor currently operate at a BTLS of 3 and 2, respectively. The Project is expected to produce between 8 bicycle trips daily and minimal trips during the peak-hours, which can be accommodated by the bicycle facilitates that are available in the vicinity of the site.

PEDESTRIAN ANALYSIS

The Project is expected to generate approximately 46 pedestrian trips on an average weekday (two-way, 24-hour volume), with 3 pedestrian trips expected during both the weekday morning and weekday evening peak hours. Sidewalks are provided along both sides of the study area roadways, with marked crosswalks provided for crossing one or more legs of each of the study area intersections.

A Pedestrian Level of Traffic Stress (PLTS) analysis was performed for the Project using the standards published in the City of Somerville's *Transportation Impact Study (TIS) Guidelines*. PLTS is a measure of the level of comfort or "stress" that a pedestrian experiences using a pedestrian facility and considers factors such as:

- sidewalk width,
- sidewalk condition,
- the nature of the abutting roadway (i.e., proximity of the sidewalk to the traveled-way,
- number of travel lanes,
- vehicle travel speeds,
- traffic volumes, etc.), and
- crossing distances at intersections.

PLTS (similar to BLTS) is reported as a numeric value ranging from 1 (low stress) to 4 (high stress) and is a measure of a pedestrian's comfort using a pedestrian facility. PLTS characteristics are in the tables found in the Appendix.

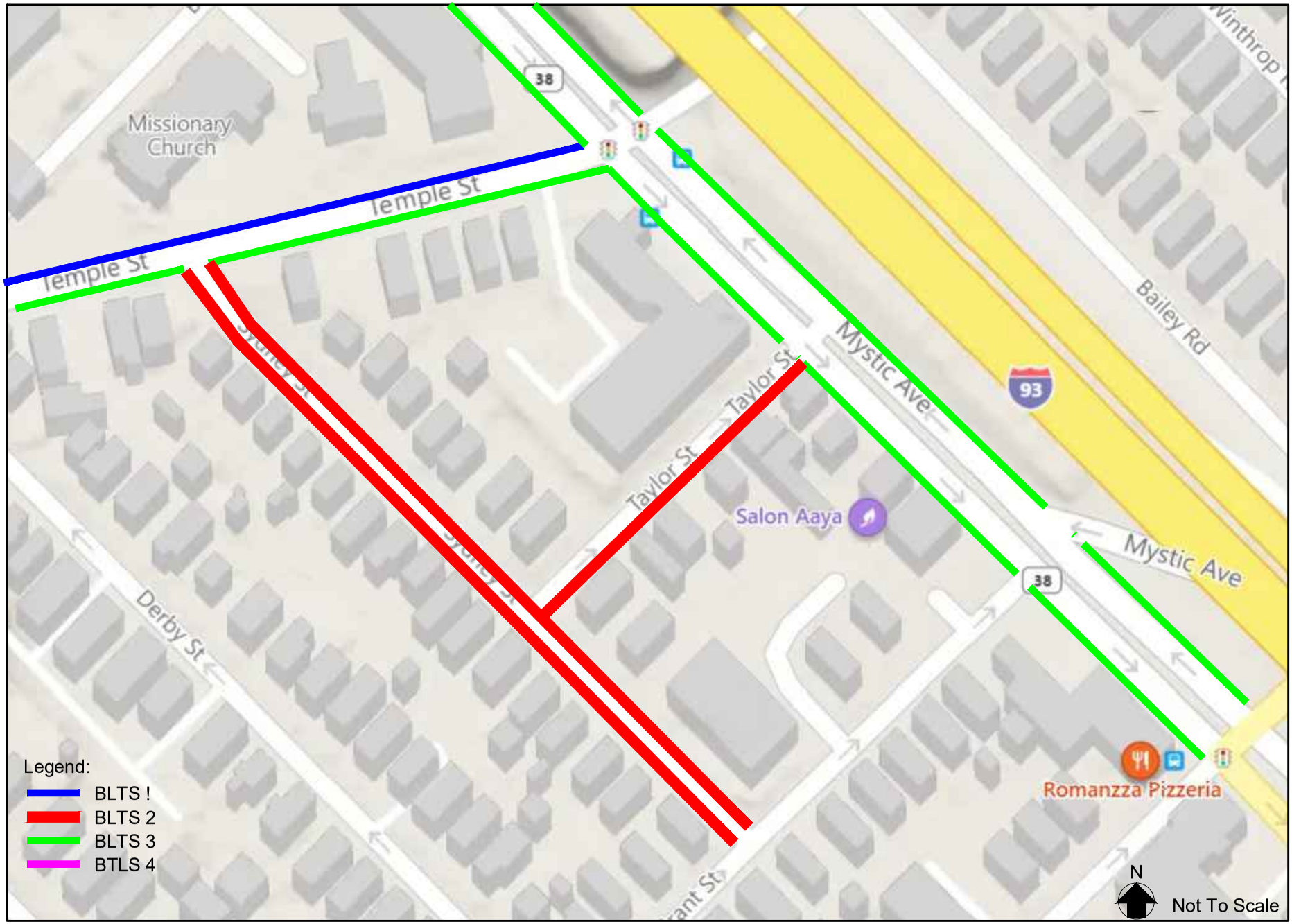

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Figure 22

Bicycle Level of Stress

A graphical summary of the PLTS within the study area is shown on Figure 23. As shown on Figure 23, Mystic Avenue, Temple Street, Sydney Street, and Taylor Street all operate at a PLTS of 2. Pedestrian crossings at the intersection of Sydney Street and Temple Street operate at a PLTS of 3, pedestrian crossings at the intersection of Sydney Street and Taylor Street operate at a PLTS of 2, and pedestrian crossings at the intersection of Taylor Street and Mystic Avenue operate at a PLTS of 1. Considering the low levels of PLTS within the study area, the existing and proposed sidewalk infrastructure is sufficient to accommodate the minor increase pedestrian in volumes that the site is expected to generate.

TRANSIT ANALYSIS

The Project is expected to generate approximately 48 transit trips on an average weekday (two-way, 24-hour volume), with 3 transit trips expected during the weekday morning peak-hour and 4 transit trips expected during the weekday evening peak-hour. These trips are expected to be made on one of the four (4) MBTA fixed route bus routes that are located within 0.5 miles of the Project site (see Table 3), with the majority of the transit riders assumed to use MBTA Bus Route 95, which provides bus stops within a 1-minute walking distance to the Project site.

The MBTA provides 7 bus trips (each way) on Route 95 during both the weekday morning and weekday evening peak service periods (7:00 to 9:00 AM and 4:00 to 6:00 PM, respectively), which have a seating capacity of 39, a service policy capacity[7] of 39 riders and a "crush capacity" of 55 riders. The "crush capacity" is the maximum number of transit riders that can be accommodated by the service or vehicle and exceeds the service policy capacity standards defined in the MBTA's *Service Delivery Policy*.[8] Individual trips or vehicles can exceed the service capacity; however, the average loading should continue to be within the service capacity standard. For Route 89, the MBTA provides 12 bus trips each way during the weekday morning peak service period, and 10 inbound trips and 12 outbound trips in the weekday evening peak service period. For Route 90, the MBTA provides 4 bus trips each way during the weekday morning peak service period, and 3 inbound trips and 4 outbound trips during the weekday evening peak service period. For Route 101, the MBTA provides 8 bus trips each way during the weekday morning peak service period. And 5 bus trips each way during the weekday evening peak service period.

Applying the MBTA bus capacity standards to the Route 95 bus results in a service policy capacity of 429 riders during the weekday morning and evening peak service periods (11 buses x 39 riders per bus), and a "crush capacity" of 605 riders (11 buses x 55 riders per bus). This capacity is sufficient to accommodate the modest increase in peak-hour ridership that is expected as a result of the Project (three (3) additional riders during the weekday morning peak-hour and 3 additional riders during the weekday evening peak-hour) over three (3) nearby potential bus transit options.

[7]The service capacity standards are defined in the MBTA's *Service Delivery Policy* which specifies vehicle loading standards and levels of crowding that are deemed "acceptable" by time period and transit mode.
[8] *Service Delivery Policy*; Massachusetts Bay Transportation Authority; June 2, 2010

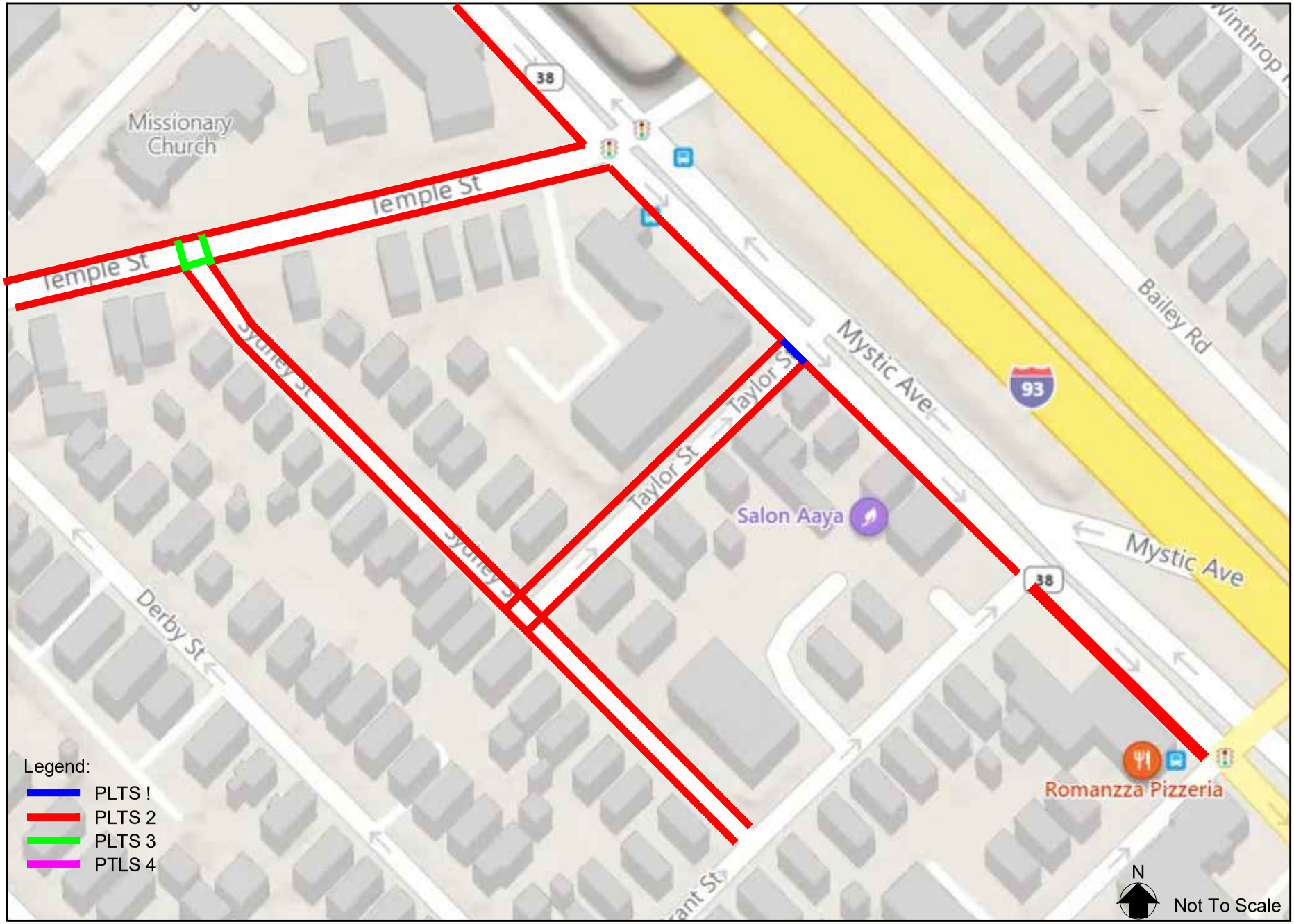

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Figure 23

Pedestrian Level of Traffic Stress

SIGHT DISTANCE

Sight distance measurements were performed at the proposed site driveway intersection with Taylor Street in accordance with Massachusetts Department of Transportation (MassDOT) and American Association of State Highway and Transportation Officials (AASHTO) standards. Stopping sight distance (SSD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. Table 14 presents the measured SSD at the site access intersections. The sight distance calculations are included in the Appendix.

TABLE 14
SIGHT DISTANCE SUMMARY

	Required Minimum (Feet)[a]	Measured (Feet)
Taylor Street and Proposed Site Driveway		
Stopping Sight Distance:		
Taylor Street approaching from the west	119	119[b]
Intersection Sight Distance:		
Site Driveway looking to the west	201[c]	119[b]

[a]Recommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*; American Association of State Highway and Transportation Officials (AASHTO); 2018 and based on observed 85th percentile speed.
[b]Distance to intersection with Sydney Street.
[c]Recommended minimum value for vehicles turning right exiting a roadway under STOP-sign control.

As can be seen in Table 14, the SSD measurements performed at Taylor Street and the proposed site driveway intersection indicate that the intersection exceeds the recommended minimum requirements based on the 85th percentile speeds. In accordance with the AASHTO manual, *"If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, this may require a major-road vehicle to stop or slow to accommodate the maneuver by a minor-road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road."* Accordingly, the ISD should be at least equal to the SSD, which would allow a driver approaching the minor road to safely stop. It is recommended that any landscaping or site signage be set-back from Taylor Street to not impede sight lines.

SECTION 5: CONCLUSION AND RECOMMENDATIONS

CONCLUSION

A detailed assessment of the potential impacts on the transportation infrastructure associated with the proposed construction of the residential development was performed. The final phase of the analysis process is to identify the mitigation measures necessary to minimize the impact of the project on the transportation system. The capacity analyses performed for 2022 Existing and 2029 future No-Build and Build conditions indicate that the proposed project will not result in a significant impact on traffic operations at the study area intersections.

Based on this assessment, the following can be concluded with respect to the Project:

- One of the study area intersections, Mystic Avenue, Temple Street and Temple Road, is on the MassDOT Highway Safety Improvement Program (HSIP) list. Discussions with MassDOT indicate that an Updated RSA could be performed where the City reviews updated crash history to see if similar trends continue to occur. Also, the status of previous recommendations would be reviewed to determine what has been completed and if additional safety measures are necessary.

- Using trip-generation statistics published by the Institute of Transportation Engineers (ITE), and adjusting for mode split, the proposed residential development is expected to generate 100 daily vehicle trips (50 vehicles entering and 50 vehicles exiting). During the weekday morning peak hour, 10 vehicle trips (3 vehicles entering and 7 vehicles exiting) are expected. During the weekday evening peak hour, 9 vehicle trips (6 vehicles entering and 3 vehicles exiting) are expected. On a typical Saturday, the proposed residential development is expected to generate 102 daily vehicle trips (51 vehicles entering and 51 vehicles exiting). During the Saturday midday peak hour, 9 vehicle trips (5 vehicles entering and 4 vehicles exiting) are expected.

- The Project will not have a significant impact (increase) on motorist delays or vehicle queuing over Existing or anticipated future conditions without the Project (No-Build conditions), with the majority of the critical movements at the unsignalized study area intersections shown to operate at LOS D or better under all analysis conditions where a level-of-service of "D" or better is defined as "acceptable" operating conditions.

- Independent of the Project, operating conditions for several movements at the signalized intersection of Mystic Avenue, Temple Street and Temple Road were identified to be operating at or over capacity (i.e., LOS "E" or "F"), without Project-related impacts. With the traffic expected to be generated by the project, these movements continued to operate at projected No-Build levels with very small increases in delays and predicted increase in vehicle queuing is less than one (1) vehicle.

- Lines of sight at the Project site driveway intersection with Taylor Street were found to exceed the recommended minimum distances for safe and efficient operation based on the appropriate approach speed.

- A review of the Site Plan for the Project indicates that human-made objects, landscaping, and signs have been appropriately designed and located so as not to inhibit sight lines to and from the Project site driveway or along Taylor Street.

RECOMMENDATIONS

A comprehensive transportation mitigation program has been developed that is designed to reduce automobile trips associated with the Project and accommodate the additional traffic expected to be generated by the Project in a safe and efficient manner. The elements of the transportation mitigation program have been separated into the following categories: Project Access, Level-of Service/Congestion Mitigation; and Transportation Demand Management and are described in the following sections.

Project Access

Access to the Project site will be provided by way of a new site driveway to Taylor Street. This driveway will provide access to the underground parking, as well as serve as a loading area. The following recommendations are offered with respect to the design and operation of the Project site driveway:

- The site driveway should be a minimum of twenty (20) feet in width. The driveway will consist of one (1) entering lane and one (1) exiting lane.

- Vehicles exiting the Project site will be placed under STOP-sign control with a marked STOP line provided.

- The Project site driveway and internal circulating aisles will be designed to accommodate the turning and maneuvering requirements of automobiles.

- All signs and pavement markings to be installed within the Project site will conform to the applicable standards of the *Manual on Uniform Traffic Control Devices*[9] (MUTCD).

- A sidewalk will be provided within the Project site to link the proposed building to the sidewalk infrastructure along Taylor Street, with Americans with Disabilities Act (ADA)-compliant wheelchair ramps provided at all pedestrian crossings for crossing the site driveway at Taylor Street.

- Signs and landscaping to be installed as a part of the Project within the intersection sight triangle areas of the Project site driveway will be designed and maintained so as not to restrict lines of sight.

- Snow windrows within sight triangle areas of the Project site driveway to Taylor Street will be promptly removed where such accumulations would impede sight lines.

- Bicycle racks and storage will be installed at convenient locations within the Project site. Five spaces are currently proposed.

- Accommodations will be provided for electric vehicle charging by residents of the Project.

Safety

The intersection of Mystic Avenue, Temple Street and Temple Road was found to have a crash rate higher than the MassDOT District 4 average for signalized intersections. Discussions with MassDOT indicate that the City of Somerville could prepare an Updated RSA where updated crash history is reviewed to see if similar crash trends continue to occur. Also, the status of previous RSA recommendations would be reviewed to determine what has been completed and if additional safety measures are necessary.

At the intersections of Sydney Street and Taylor Street, the crash rate is also higher than the MassDOT District 4 average for unsignalized intersections. However, this is a result of very low traffic volumes with only one (1) crash in the five-year study period. Safety improvements are not warranted.

[9] *Manual on Uniform Traffic Control Devices;* Federal Highway Administration; Washington D.C.; 2009.

Transportation Demand Management

The following Transportation Demand Management (TDM) measures will be implemented as a part of the Project to encourage the use of alternative modes of transportation to single-occupant vehicles:

- A Transportation Coordinator (TC) will be designated for the Project to coordinate the elements of the TDM program,

- The TC will coordinate with the City of Somerville Mobility Division or the Assembly Connect TMA which recently was formed in this area to help promote a reduced reliance on single-occupant automobile travel to the Project. To that end, the TDM measures identified will be implemented under the direction and supervision of the TC.

- Information regarding public transportation services, maps, schedules and fare information will be posted in a central location and/or otherwise made available to residents,

- A "welcome packet" will be provided to residents detailing available public transportation services, bicycle and walking alternatives, and commuter options,

- Explore accommodations for car sharing services (e.g., Zip Car).

- Pedestrian accommodations will be incorporated into the Project and consist of sidewalks and ADA-compliant wheelchair ramps at all pedestrian crossings internal to the Project site that will link building entrances to the sidewalk infrastructure along Taylor Street,

- A mail drop will be provided in a central location; and

- Secure bicycle parking will be provided within the Project site.