

MEMORANDUM

DATE: August 6, 2015

TO: Mr. Randy A. Goldberg
180 Wells Realty LLC
60 Wells Avenue, Suite 100
Newton, MA 02459

FROM: Robert J. Michaud, P.E. – Managing Principal
Daniel A. Dumais, P.E. – Senior Project Manager

RE: **Proposed Office Expansion**
180 Wells Avenue – Newton, Massachusetts



MDM Transportation Consultants, Inc. (MDM) has prepared this traffic impact assessment (TIA) for a proposed office expansion at 180 Wells Avenue in Newton, Massachusetts. This memorandum describes existing (baseline) traffic conditions for adjacent roadways, trip generation characteristics of the proposed development, quantifies incremental traffic impacts of the Site development on area roadways, and evaluates safety-related conditions at key study locations that provide access to the Site.

This TIA builds upon prior analysis of the Wells Avenue office park as documented by MDM for the proposed expansion of the 2 Wells Avenue site¹, augmenting prior data and analysis to reflect empirical (observed) traffic flow characteristics at the traffic signal at Wells Avenue/Nahanton Street. This intersection currently provides a sole means of access/egress for the park. These observed data indicate that actual operations at the signal are up to 35 percent more efficient for critical intersection movements than otherwise calculated using standard traffic models, providing sufficient capacity to accommodate the modest traffic increases for planned development (2 Wells Avenue) and the proposed expansion at 180 Wells Avenue. Notwithstanding the modest traffic increases associated with office expansion at 180 Wells Avenue, planned improvements by the City at the Wells Avenue signal and nearby intersection of Winchester Street/Nahanton Street will provide further capacity enhancements to support future development within the park.

¹ *Traffic Impact Assessment, 2 Wells Avenue Office Expansion*, prepared by MDM Transportation Consultants, Inc. dated May 7, 2015

Key findings of the traffic assessment are as follows:

- *Baseline Traffic Volumes.* Wells Avenue just north of the Site carries approximately 12,376 vehicles per day (vpd) on weekdays. Peak hour traffic flow on Wells Avenue is approximately 8 to 10 percent of the daily flow with directional flow heavily skewed southbound during the weekday morning peak traffic hour (85% SB) and heavily skewed northbound during the weekday evening peak hour (75% NB). The travel patterns are highly consistent commuter travel patterns for an office park.
- *Safety Characteristics.* Study intersections exhibit below-average crash rates based on historic crash data; safety countermeasures are therefore not warranted. Likewise, the available sight lines at the site driveway intersections along Wells Avenue exceed the recommended minimum sight line requirements (safety based criteria) from AASHTO for the regulatory speed limit and observed travel speeds.
- *Site Traffic Generation.* As observed, the existing office building at 180 Wells Avenue currently generates approximately 67 vehicle trips during the weekday morning peak hour and 77 vehicle trips during the weekday evening peak hour, generally consistent with (but lower than) industry standard trip characteristics for an office use. Based on unadjusted trip rates published by the Institute of Transportation Engineers (ITE) for office use, the proposed expansion is estimated to generate up to 94 new vehicle trips during the peak hours, representing less than a 3 percent change in overall traffic volumes at the Wells Avenue signal that serves the office park.
- *Adequate Roadway Capacity.* Observation and modeling of traffic operations at study intersections, most notably the Wells Avenue/Nahanton Street signal, indicates that traffic operates below capacity with average delays that are considered acceptable for urban areas (level-of-service D or better). Traffic increases at the study intersections resulting from proposed expansion at 180 Wells Avenue result in inconsequential changes in intersection operations compared to No-Build conditions, which includes the development of the 2 Wells Avenue property. Specifically, additional delays at the Wells Avenue/Nahanton Street signal are projected at only 2 seconds on average with average vehicle queues increasing by only 2 vehicles or less during peak hours. Proposed improvement plans by the City at the nearby Nahanton Street intersections with Wells Avenue and Winchester Street will provide further capacity enhancements to support future development within the park.
- *Mitigation Commitments.* The limited nature of delay and queue impacts resulting from expansion of 180 Wells Avenue do not independently warrant roadway improvements to accommodate modest projected traffic increases within the park. However, the Applicant proposes a mitigation package that includes (a) implementing a transportation management plan (TMP) that will encourage lower trip activity for the expansion including membership in the Route 128 Business Council Transportation

Management Association (TMA); and (b) a monetary contribution to the City that is commensurate with the proportional capacity impact of the expansion on study intersections, which funds shall be used to advance planned improvements by the City along Nahanton Street including intersections at Wells Avenue and at Winchester Street. Site access improvements are also proposed that facilitate access to the main parking field from two locations along Wells Avenue which have ample capacity to accommodate projected traffic.

In summary, additional trip generation for the office expansion on area roadways will not materially impact traffic flow relative to No Build conditions. However, notwithstanding the modest traffic increases associated with office expansion at 180 Wells Avenue, planned improvements by the City at the Wells Avenue signal and nearby intersection of Winchester Street/Nahanton Street will provide further capacity enhancements to support future development within the park. Proposed monetary contribution by the Applicant to the City that is commensurate with the proportional capacity impact of the project to area intersections will serve to advance these planned improvements. Likewise, the TMP commitments by the Applicant will serve to encourage lower traffic generation for the expansion by offering alternatives to single occupant vehicle travel, flexible work arrangements, carpooling opportunities and other measures.

PROJECT DESCRIPTION

Existing Conditions

The existing site consists of a fully leased 55,776± square foot (sf) office building. Existing marked on-site parking includes 215± total parking spaces consisting of 165± general parking spaces, 42± reserved parking spaces (24 reserved for 200 Wells Avenue)² and 8± handicapped parking spaces. Access to the site is currently provided via two full-access/egress driveways along Wells Avenue. The site location relative to area roadways is shown in **Figure 1**.

Proposed Conditions

Under the proposed site programming an expansion of 60,565± sf will be constructed resulting in an overall building size of 116,341± sf. The on-site parking supply will be increased by approximately 164 spaces for a total on-site parking supply of 379± marked spaces. Access/egress to the facility will include a modification of the existing northern site driveway, elimination of the southern site driveway, and installation of a new driveway with full access/egress on the west side of the site between the office buildings for #70 and #88 Wells Avenue. A preliminary site plan rendering prepared by Elkus Manfredi Architects is presented in **Figure 2**.

² MDM understands that spaces currently reserved and assigned to 200 Wells Avenue are subject to a revocable license agreement and will revert to general use spaces for exclusive use by 180 Wells Avenue under the proposed development program.

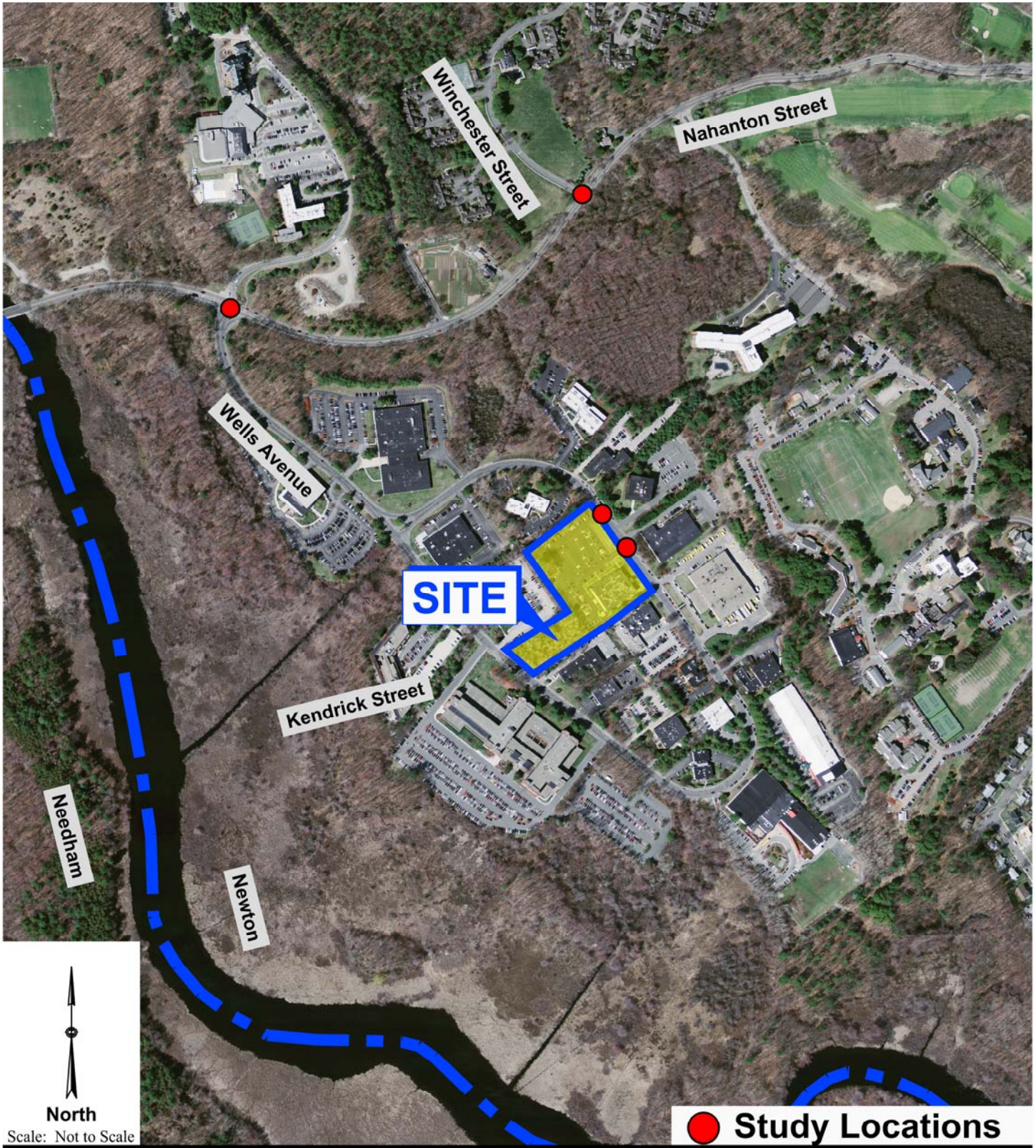
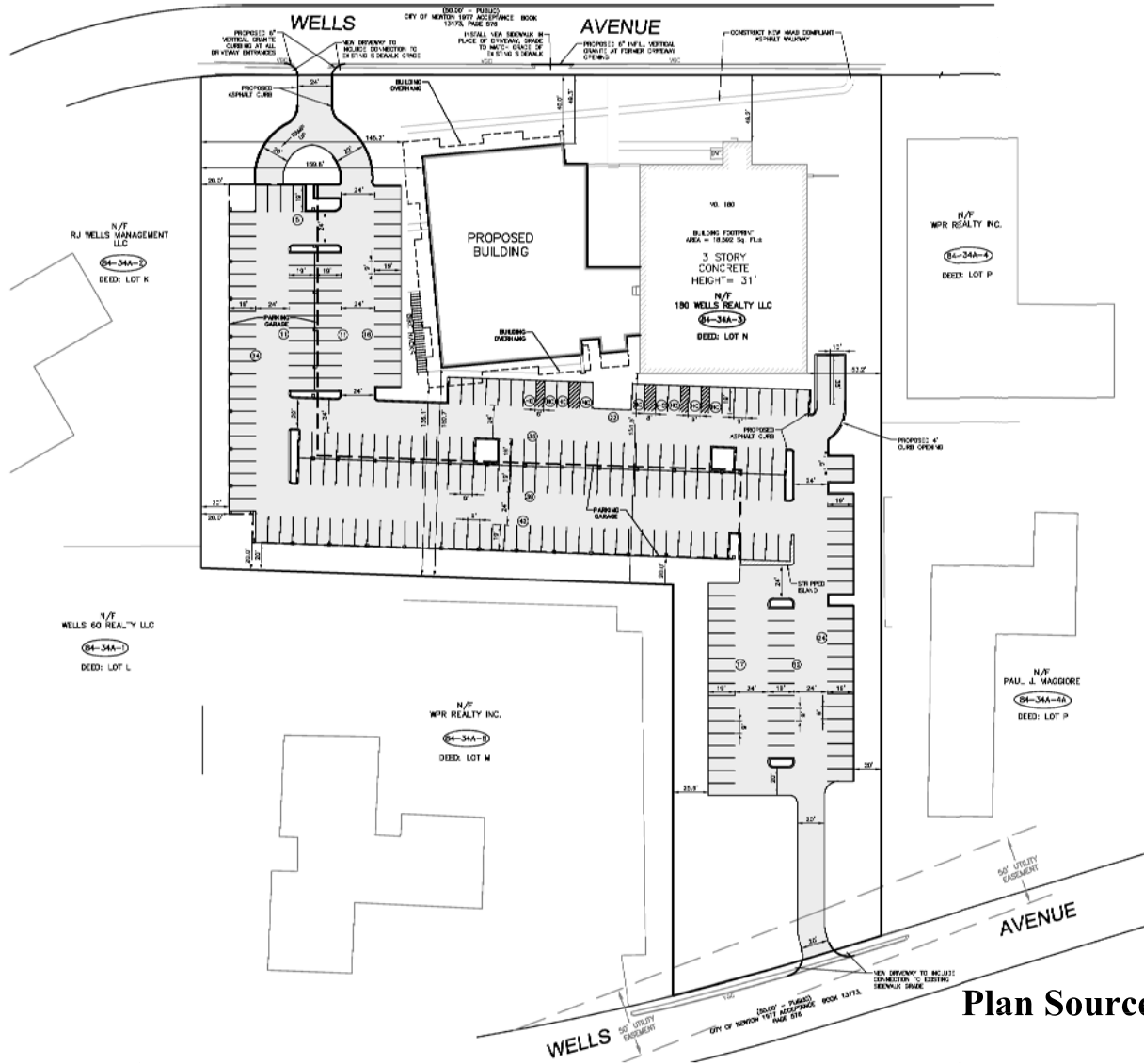


Figure 1

Site Location



Plan Source: Elkus Manfredi Architects &
Site Design Engineering, LLC.

Figure 2

Preliminary Site Plan

EXISTING TRAFFIC & SAFETY CHARACTERISTICS

An overview of existing roadway conditions, traffic volumes, safety characteristics, and public transportation facilities serving the area is provided below.

Roadways

Nahanton Street

Nahanton Street is classified by the Massachusetts Department of Transportation (MassDOT) as an urban minor arterial under local (Town) jurisdiction within the study area. Nahanton Street an east-west roadway. The roadway generally provides a single travel lane in each direction with additional turn lanes provided at its major intersections. A bituminous sidewalk is provided along the southern side of the roadway to the west of Wells Avenue. Within the study area, the posted (regulatory) speed limit along Nahanton Street is 35 miles per hour mph in the eastbound direction and 30 mph in the westbound direction. Land uses along Nahanton Street include an office park, the Jewish Community Centers of Greater Boston, a golf course, farm land and residential uses.

Wells Avenue

Wells Avenue is classified by the Massachusetts Department of Transportation (MassDOT) as a local roadway under local (Town) jurisdiction within the study area. Wells Avenue an office park loop roadway that provides one wide single travel lane in each direction. Bituminous sidewalks are provided along the both sides of the roadway throughout the office park. Land uses along Wells Avenue include a diverse mix of uses including office buildings, R&D buildings, the Boston Sports Club, and several educational uses.

Winchester Street

Winchester Street is classified by the Massachusetts Department of Transportation (MassDOT) as and urban collector roadway under local (Town) jurisdiction within the study area. Winchester Street provides on travel lane in each direction connecting Nahanton Street to the South with Route 9/ Centre Street to the north. In the immediate study area, bituminous sidewalks are provided along the both sides of the roadway. Land uses along Winchester Street in the study area include the Jewish Community Centers of Greater Boston, a golf course, farm land and residential uses.

Baseline Traffic Data

Existing Trip Generation – 2 Wells Avenue

Estimated trip generation for the existing office uses at the Site has been determined based on turning movement counts conducted at the Site Driveway intersections with Wells Avenue in June 2015. **Table 1** presents the 180 Wells Avenue office building’s existing trip generation characteristics during the study periods.

TABLE 1
EXISTING TRIP GENERATION – 180 Wells Avenue

<u>Period/Direction</u>	<u>Existing Site Trips^{1 2}</u>	<u>Existing Trip Rate² Per 1,000 sf</u>
<i>Weekday Morning Peak Hour:</i>		
Entering	55	0.99
<u>Exiting</u>	<u>12</u>	<u>0.22</u>
Total	67	1.21
<i>Weekday Evening Peak Hour:</i>		
Entering	23	0.41
<u>Exiting</u>	<u>54</u>	<u>0.97</u>
Total	77	1.38

¹Turning movement counts at the 180 Wells Avenue Site Driveways in June 2015; the existing building is 55,776± gsf of office use.

²Observed Trips per 1,000 sf.

As summarized in **Table 1**, the existing office building at 180 Wells Avenue currently generates approximately 67 vehicle trips (55 entering and 12 exiting) during the weekday morning peak hour and 77 vehicle trips (23 entering and 54 exiting) during the weekday evening peak hour.

Peak Hour Traffic

Traffic volume data was collected in May/June 2014 during the weekday morning (7:00 – 9:00 AM) and weekday evening (4:00 – 6:00 PM) peak periods consistent with data used for the nearby 2 Wells Avenue development filing so as to provide a common/established database upon which to evaluate project traffic impacts. Review of MassDOT permanent count station data indicates that May/June are above-average traffic months (both approximately 5 percent higher than average month conditions). In order to provide a conservative analysis, no seasonal adjustment (reduction) of the data was made to the May/June traffic volume counts. The 2014 traffic volumes were grown (increased by 0.5%) to reflect 2015 Baseline conditions. Supplemental turning movement count data was collected at the Site driveways along Wells Avenue and at the Nahanton Street intersection with Wells Avenue in July 2015 during the weekday morning and weekday evening peak study periods. The supplemental count at the Nahanton Street at Wells Avenue was used for traffic signal calibration in a subsequent section

of this report. Turning movement counts and permanent count station data are provided in the **Attachments**. The resulting Baseline weekday morning and weekday evening peak-hour traffic volumes for the study intersections are depicted in **Figure 3** and **Figure 4**.

Daily Traffic Counts

Daily traffic volumes along Wells Avenue to the south of Nahanton Street were collected in May 2014 using an automatic traffic recorder (ATR) using radar technology with results summarized in **Table 2** and illustrated graphically in **Figure 5**.

TABLE 2
ROADWAY TRAFFIC-VOLUME SUMMARY – WELLS AVENUE

Roadway	Weekday	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Daily Volume (vpd) ¹	Volume (vph) ²	Percent of Daily Traffic ³	Peak Flow Direction	Volume (vph)	Percent of Daily Traffic	Peak Flow Direction
Wells Avenue	12,376	1,135	9%	85% SB ⁴	1,292	10%	75% NB ⁴

¹Two-way daily traffic expressed in vehicles per day.

²Two-way peak-hour volume expressed in vehicles per hour.

³The percent of daily traffic that occurs during the peak hour.

⁴NB = northbound, SB = Southbound

As summarized in **Table 2** and illustrated in **Figure 5**:

- Wells Avenue just north of the Site carries approximately 12,376 vehicles per day (vpd) on weekdays. Peak hour traffic flow on Wells Avenue is approximately 8 to 10 percent of the daily flow with directional flow heavily skewed southbound during the weekday morning peak traffic hour (85% SB) and heavily skewed northbound during the weekday evening peak hour (75% NB). The travel patterns are highly consistent commuter travel patterns for an office park.
- Given the high diversity of land uses in the park (pre-school, day school, continuing education, office, R&D, and sports/athletic club), Wells Avenue experiences traffic activity with less pronounced/less concentrated peaking during traditional commuter peak hours (7-9 am and 4-6 pm). Park traffic activity is more evenly distributed over an extended period in the mornings from 7:00 AM to 10:00 AM and in the afternoons between 3:00 PM to 7:00 PM. These traffic characteristics are also indicative of tenant programs that likely include “flex time” where employees have discretion in arriving or departing the park outside traditional commuter peak periods, thereby reducing the occurrence of sharp traffic peaking and longer delays during these time periods.

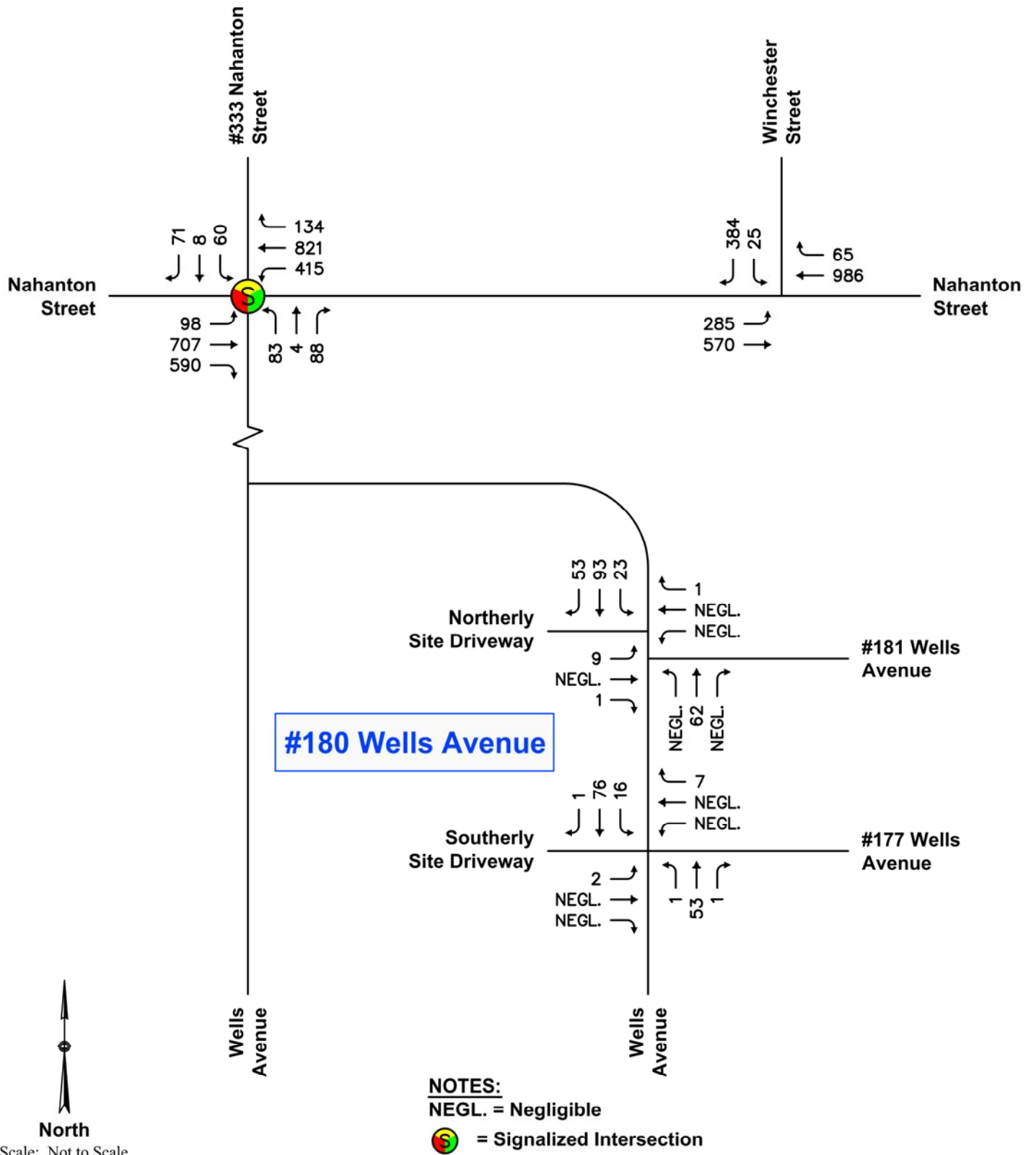


Figure 3

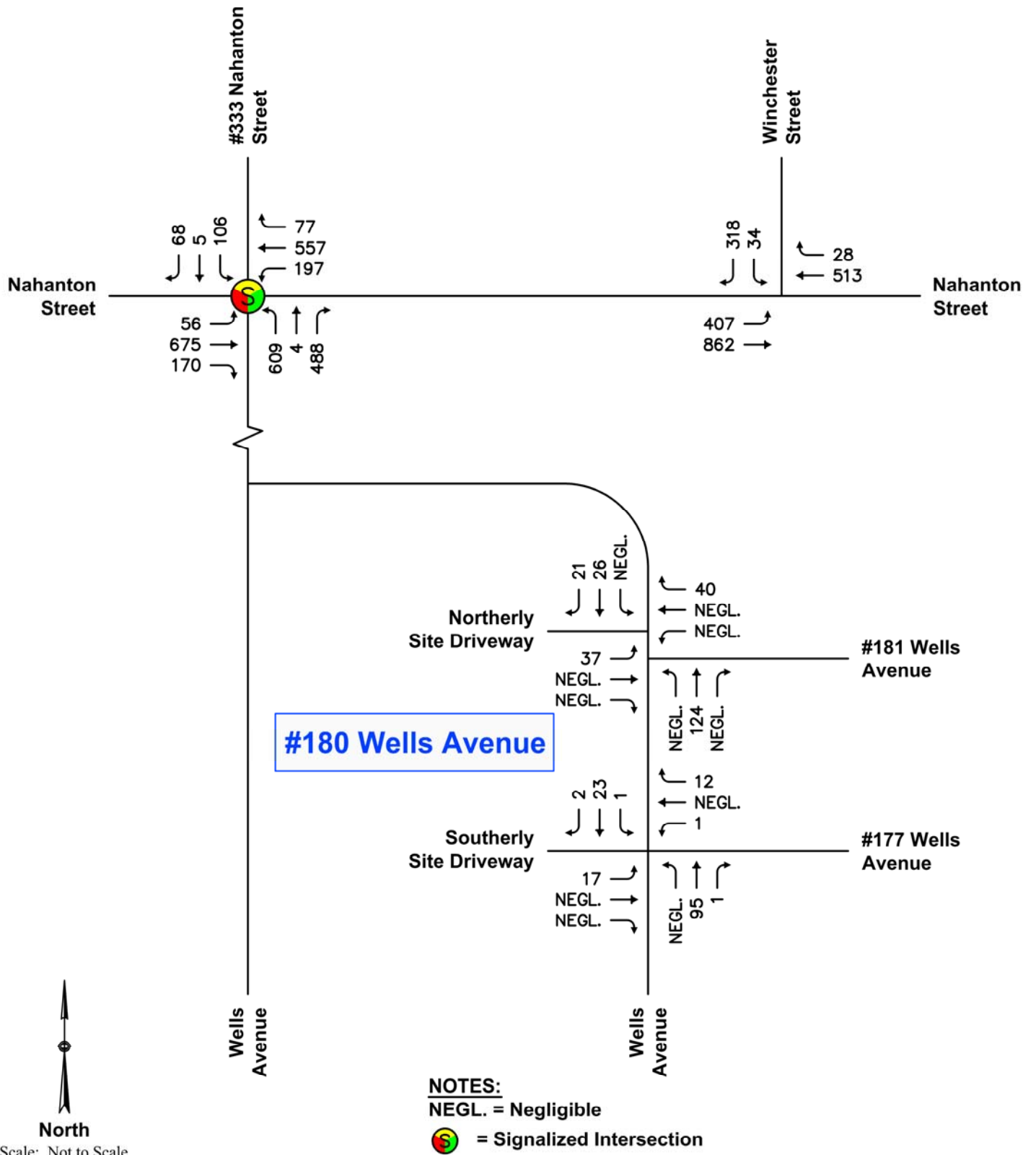


Figure 4

Observed Travel Speeds

Vehicle speeds were obtained for the northbound and southbound travel directions on Wells in June 2015 using an Automatic Traffic Recorder (ATR) machine equipped with speed radar. **Table 3** summarizes the average and 85th percentile speeds for the location and time period studied. MDM notes that the travel speeds are likely conservative given the location along a straight section of Wells Avenue (just north of 2 Wells Avenue) compared to the curved nature of the roadway just north of the existing Site driveways. Speed data is provided in the **Attachments**.

TABLE 3
SPEED STUDY RESULTS – WELLS AVENUE

Travel Direction	Regulatory Speed Limit (mph)	Observed Travel Speed (mph)	
		Mean ²	85 th Percentile ³
Northbound	30	29	33
Southbound	30	32	35

¹Regulatory (prima facie) speed limit as no speed limit is posted.

²Arithmetic mean.

³The speed at or below which 85 percent of the vehicles are traveling.

As summarized in **Table 3**, the mean (average) travel speed on Wells Avenue traveling northbound is 29 mph and the 85th percentile travel speed is 33 mph. In the southbound direction, the mean travel speed is 32 mph and the 85th percentile travel speed is 35 mph. The speed study results are highly consistent with the regulatory speed limit and were collected for use in the sight line evaluations presented in a subsequent section of this report.

Intersection Crash History

Crash trends and safety characteristics for study area intersections are evaluated using the MassDOT crash database for the City of Newton for the five-year period 2009 through 2013 (the most recent available data). Crash data for the study intersections is summarized in **Table 4** with detailed data provided in the **Attachments**.

Crash rates are calculated for the study area intersections and are summarized in **Table 4**. The calculated crash rate quantifies the number of crashes per million entering vehicles. MassDOT has determined the official District 6 (which includes the City of Newton) crash rate to be 0.58 for unsignalized intersections and 0.76 for signalized intersections. This rate represents MassDOT's "average" crash experience for District 6 communities and serves as a basis for comparing reported crash rates for the study intersections. Where calculated crash rates notably exceed the district average, some form of safety countermeasures may be warranted for further evaluation.

**TABLE 4
INTERSECTION CRASH SUMMARY
2009 THROUGH 2013¹**

Data Category	Nahanton Street at Wells Avenue	Nahanton Street at Winchester street
Traffic Control	Signalized	Unsignalized
Crash Rate ²	0.42	0.32
District 3 Avg ³	0.76	0.58
<i>Year:</i>		
2009	7	3
2010	5	3
2011	4	2
2012	2	0
<u>2013</u>	<u>4</u>	<u>4</u>
Total	22	12
<i>Type:</i>		
Angle	9	3
Rear-End	5	0
Head-On	2	1
Sideswipe	2	2
Single Vehicle	4	6
Other/Unknown	0	0
<i>Severity:</i>		
P. Damage Only	16	8
Personal Injury	6	4
Fatality	0	0
<i>Conditions:</i>		
Dry	17	4
Wet	1	2
Snow	0	2
Other/Unknown	2	0
<i>Time:</i>		
7:00 to 9:00 AM	4	1
4:00 to 6:00 PM	7	0
Rest of Day	11	11

¹ Source: MassDOT Crash Database

² Crashes per million entering vehicles

³ District 6 averages = 0.76 (signalized) and 0.58 (unsignalized)

As summarized in **Table 4**:

- *Nahanton Street at Wells Avenue.* There are a total of twenty-two (22) crashes reported at the Nahanton Street/Wells Avenue signalized intersection during the four-year study period. The resulting crash rate for the intersection is 0.42 which is below the District 6 average of 0.76 for signalized intersections. Four of the crashes involved single vehicle type crashes with fixed objects and six (6) crashes involved parked vehicles. The majority (73%) resulted in property damage only under dry roadway conditions (77%). Half (50%) occurred during the weekday morning or evening peak periods. No fatalities were reported and one pedestrian-related incident was reported during the five-year study period.
- *Nahanton Street at Winchester Street.* There are a total of twelve (12) crashes reported at the Nahanton Street/ Winchester Street unsignalized intersection during the four-year study period. The resulting crash rate for the intersection is 0.32 which is below the District 6 average of 0.58 for unsignalized intersections. The crashes included six (6) single vehicle-type crashes, two (2) sideswipe type crash, three (3) angle type crash, and one (1) head on collision. The majority resulted in property damage only (67%) with half under wet/ snowy roadway conditions. One (1) crash was reported during the weekday morning peak period.
- *Wells Avenue at Site Driveways.* There were no reported crashes at the existing site driveway intersections with Wells Avenue during the five-year study period.

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

Public Transportation Facilities

The Massachusetts Bay Transportation Authority (MBTA) operates the following bus and commuter rail lines in the site vicinity (specific route and schedule information is provided in the **Attachments**).

- **Route 52e – Dedham Mall or Charles River Loop – Watertown Yard:** This bus line provides weekday service between Watertown Yard to the north and the Dedham Mall to the south. This bus service provides a stop at the intersection of Nahanton Street and Winchester Street and stops at the Newton Centre “T” station. This bus service generally provides service on weekdays during the morning, midday and early evening periods.
- **Newton Centre – Green Line:** The green line “D” branch provides service between Riverside Station and Lechmere Station with connections to the blue, orange, red, and

silver lines. This subway rail service generally operates approximately every 10 minutes on weekdays.

As a conservative measure, no credit (reduction) in site trips was taken in the following section as a result of the available public transportation services.

Sight Line Evaluation

An evaluation of sight lines was conducted at the existing northern site driveway and proposed site driveway locations to ensure that minimum recommended sight lines are available at the site driveway intersections with Wells Avenue. The evaluation documents sight lines under proposed conditions for vehicles as they relate to Wells Avenue with comparison to recommended guidelines.

The American Association of State Highway and Transportation Officials' (AASHTO) standards³ reference two types of sight distance which are relevant at the site driveway intersections along Wells Avenue: stopping sight distance (SSD) and intersection sight distance (ISD). Sight lines for critical vehicle movements at the site driveway intersections with Wells Avenue were compared to minimum SSD and ISD recommendations for the regulatory speed limit in the area as well as ambient travel speeds recorded along Wells Avenue near the site.

Stopping Sight Distance

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

SSD was estimated in the field using AASHTO standards for driver's eye (3.5 feet) and object height equivalent to the taillight height of a passenger car (2.0 feet) for the Wells Avenue approaches to the site driveways. **Table 5** presents a summary of the available SSD as they relate to Wells Avenue and AASHTO's recommended SSD based on posted and observed ambient travel speeds along Wells Avenue.

³ *A policy on Geometric Design of Highways and Streets*, American Association of State Highway and Transportation Officials (AASHTO), 2011.

**TABLE 5
STOPPING SIGHT DISTANCE SUMMARY
WELLS AVENUE APPROACHES TO SITE DRIVEWAYS**

Approach/ Travel Direction	Available SSD	AASHTO Recommended ¹		
		Posted Speed Limit (30 mph)	Average Observed Speed ²	85 th Percentile Observed Speed ³
<i>Wells Avenue at Existing Northern Site Driveway</i>				
Northbound	290± Feet	200 Feet	190 Feet	230 Feet
Southbound	>400 Feet	200 Feet	215 Feet	250 Feet
<i>Wells Avenue at Proposed Site Driveway</i>				
Northbound	>400 Feet	200 Feet	190 Feet	230 Feet
Southbound	>400 Feet	200 Feet	215 Feet	250 Feet

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

²Average Speed on Wells Avenue: 29 mph NB, 32 mph SB.

³85th Percentile travel speed on Wells Avenue: 33 mph NB, 35 mph SB.

As summarized in **Table 5**, analysis results indicate that the existing available sight lines exceed AASHTO’s recommended SSD criteria for both travel directions along Wells Avenue. Stopping sight distance calculations are provided in the **Attachments**.

Intersection Sight Distance

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

Available ISD was estimated in the field using AASHTO standards for driver’s eye (3.5 feet), object height (3.5 feet) and decision point (between 8.0 feet and 14.5 feet from edge of travel way) for the travel directions along Wells Avenue. **Table 6** presents a summary of the available ISD for the departure from the site driveways and AASHTO’s recommended ISD.

**TABLE 6
INTERSECTION SIGHT DISTANCE SUMMARY
SITE DRIVEWAY DEPARTURES TO WELLS AVENUE**

Approach/ Travel Direction	Available ISD	AASHTO Minimum ¹		AASHTO Ideal ³
		Posted Speed Limit (30 mph)	85 th Percentile Observed Speed ²	Posted Speed Limit (30 mph)
<i>Wells Avenue at Existing Northern Site Driveway</i>				
<i>Looking North</i>	260± Feet	200 Feet	250 Feet	290 Feet
<i>Looking South</i>	>400 Feet	200 Feet	230 Feet	335 Feet
<i>Wells Avenue at Proposed Site Driveway</i>				
<i>Looking North</i>	>400 Feet	200 Feet	250 Feet	290 Feet
<i>Looking South</i>	>400 Feet	200 Feet	230 Feet	335 Feet

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

²85th Percentile travel speed on Wells Avenue: 33 mph NB, 35 mph SB.

³Ideal sight distance represents a convenience based criteria to facilitate selection of appropriate gaps in traffic along the roadway for turning movements from the driveway; AASHTO recommends that this sight distance be provided where practical. However, minimum sight lines that equal or exceed stopping sight distance requirements is all that is required to meet safety-based criteria which is the case for both site driveways.

The results of the ISD analysis presented in **Table 6** indicate that the available sight lines looking north and south from the site driveways onto Wells Avenue exceed the recommended minimum sight line requirements from AASHTO for the posted speed limit and observed travel speeds. Ideal ISD looking north from the existing northern driveway is only slightly higher than available (within approximately 30 feet of the criteria), but may be met subject to selective clearing of roadside vegetation with permission of adjoining land owner (200 Wells Avenue). In the absence of securing agreements to conduct selective clearing, MDM recommends a 25 mph speed advisory sign (W1-2a) be installed along the southbound Wells Avenue approach to the Site. MDM also recommends that any new plantings (shrubs, bushes) or physical landscape features to be located within the driveway sight lines should also be maintained at a height of 2 feet or less above the adjacent existing roadway grade to ensure unobstructed lines of sight.

PROJECTED FUTURE TRAFFIC CONDITIONS

Evaluation of the proposed development impacts requires the establishment of a future baseline analysis condition. This section estimates future roadway and traffic conditions with and without the proposed development. For this evaluation, a five-year planning horizon (year 2020) was selected consistent with industry standard guidelines.

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

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

Planned Area Roadway Improvements

Route 128/I-95 Add-a-lane Project – Kendrick Street Interchange

MassDOT is planning improvements (project 603711) along Route 128/I-95 includes the addition of a travel lane and shoulder from just south of Kendrick Street to just north of Route 9, installing a new connector/distributor roads between Highland Avenue and Kendrick Street, installing a new 5-lane Kendrick Street bridge over Route 128/I-95 and installing a new interchange with both northbound and southbound ramps to/from Kendrick Street. The improvements are aimed at improving access for the business parks along Kendrick Street and have been estimated in the transportation evaluation of that project to shift traffic flow patterns along Kendrick Street and Nahanton Street. Projected peak hour traffic volume shifts along Nahanton Street at Wells Avenue and Winchester Street prepared by McMahon Associates as part of the MassDOT Add-a-lane project is provided in the **Attachments**.

Nahanton Street at Winchester Street

The City of Newton is planning improvements which include geometric improvements and installing a fully actuated traffic signal at this location. The construction is expected to improve vehicular, bicycle and pedestrian movements. Geometric improvements include the addition of an exclusive right turn lane along Nahanton Street and providing an exclusive left turn departure lane and an exclusive right turn departure lane from Winchester Street. An alternative improvement plan would include the installation of a modern roundabout at said intersection; however, this alternative appears unfeasible given existing right-of-way constraints.

Nahanton Street at Wells Avenue

The City of Newton has identified short term and long term improvements to the signalized intersection of Nahanton Street and Wells Avenue. Short term improvements include traffic signal optimization, upgrading traffic signal equipment and installing an actuated pedestrian crossing of Nahanton Street and associated pedestrian traffic signal equipment. Long term improvements being considered include geometric improvements and replacing the traffic signal with a modern roundabout. Given the limited specifics regarding the long term improvements, for analysis purposes only the short term improvements are included in the future year analysis conditions.

The three (3) improvement projects have been assumed to be complete under future No-Build and Build conditions. Therefore, the future capacity analysis is reflective of the improvements.

Background Growth

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

Nearby permanent count station data published by MassDOT indicates a flat or slightly declining (-0.3 percent per year) growth rate. For purposes of this evaluation, a 0.5 percent growth rate was used (2.5 percent increase over a 5-year horizon). This growth rate is higher than historic rates, and, as such, is also expected to account for any small fluctuation in hourly traffic as may occur from time to time in the study area and traffic associated with other potential small developments or vacancies in the area. MassDOT permanent count station data and background growth calculations are provided in the **Attachments**.

Additionally, there are three (3) site-specific area development projects identified that may increase traffic at the study intersection compared to baseline conditions:

- ***Proposed Residential Development – 135 Wells Avenue***: This development is a proposed residential apartment development to be located at 135 Wells Avenue in Newton MA. As proposed, the project will include the demolition of the 62,000± sf Boston Sports Club (BSC) and the construction of 334 apartment units and a co-work café (6,000 sf). Traffic associated with this development was estimated based on the Traffic Impact and Access Study prepared for the project. The Site-specific trip tracings are provided in the **Attachments**.
- ***Center 128***: This development is a permitted 740,000 sf general office development that is proposed at 400 First Avenue in Needham, MA. Traffic associated with this development was estimated based on the Site-specific trip tracings that were prepared for the project which are provided in the **Attachments**.

- **Proposed Office Expansion – 2 Wells Avenue:** Under the proposed site programming an expansion of 66,510± sf will be constructed at 2 Wells Avenue resulting in an overall building size of 132,598± sf. CCS Companies, which current uses Suite 100 as a high density calling center with 184± employees will vacate 32,472± sf of office space while the tenants of the 34,038 sf (80± employees) are expected to remain. Under proposed conditions the 132,598 sf office building is projected to accommodate 416± employees based on normal building occupancy rates. Traffic associated with this development was estimated based on the Site-specific trip tracings that were prepared for the project which are provided in the **Attachments**.

2020 No-Build Traffic Volume Networks

In summary, to account for future traffic growth in the study area future No-Build traffic volumes are developed by increasing the Baseline volumes by approximately 2.5 percent (0.5 percent compounded annually over 5 years), as well as traffic associated with specific area developments and projected traffic shifts due to MassDOT's Add-a-lane project. The resulting 2020 No-Build traffic volumes are displayed in **Figure 6** and **Figure 7**.

Site Traffic

The trip generation estimates for the proposed office expansion development are provided for the weekday morning and weekday evening periods, which correspond to the critical analysis periods for the proposed use and adjacent street traffic flow. New traffic generated by the project was estimated using trip rates published in ITE's *Trip Generation*⁴ for the Land Use Code (LUC) 710 – General Office Building.

Table 7 presents the trip-generation estimates for the proposed office expansion based on ITE methodology.

⁴*Trip Generation*, Ninth Edition; Institute of Transportation Engineers; Washington, DC; 2012.

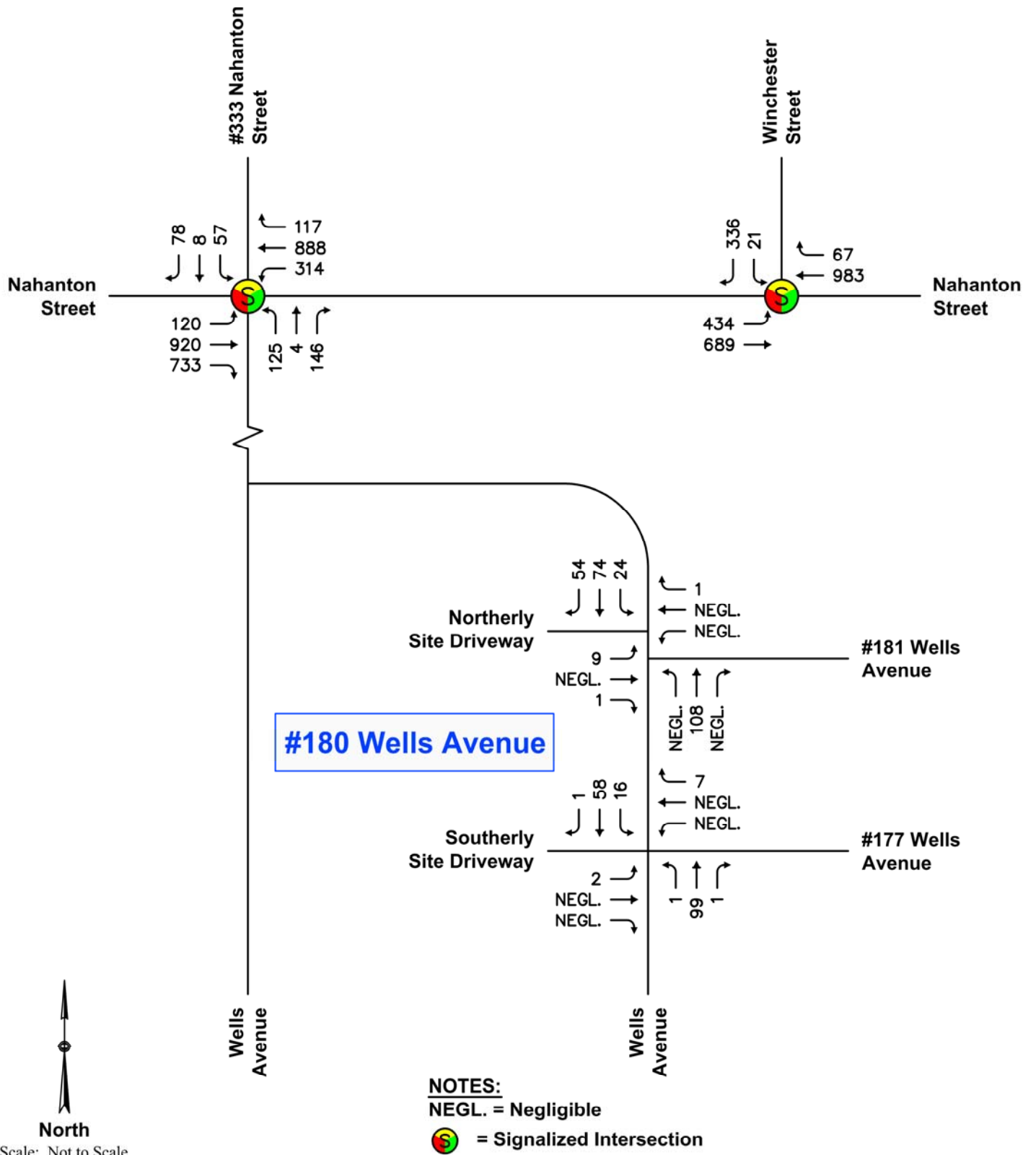
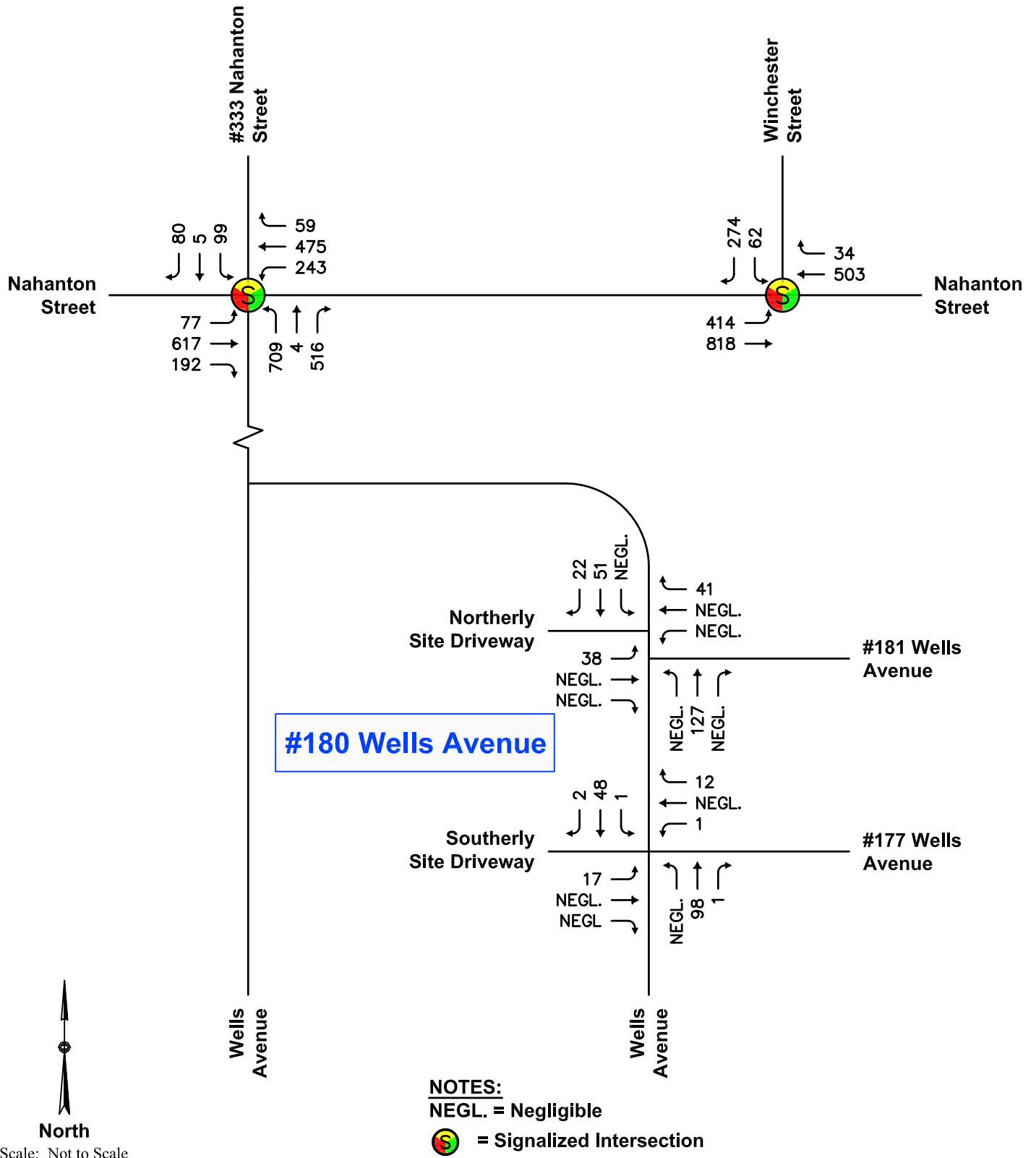


Figure 6



North
 Scale: Not to Scale

Figure 7
 2020 No-Build Condition
 Weekday Evening Peak Hour
 Traffic Volumes

**TABLE 7
TRIP-GENERATION**

Period/Direction	Site Trips		
	Existing Site Trips (55,776± gsf) ¹	Expansion (60,565± gsf) ²	Total (116,341± gsf)
<i>Weekday Morning Peak Hour:</i>			
Entering	55	+83	138
Exiting	<u>12</u>	<u>+11</u>	<u>23</u>
Total	67	+94	161
<i>Weekday Evening Peak Hour:</i>			
Entering	23	+15	38
Exiting	<u>54</u>	<u>+75</u>	<u>129</u>
Total	77	+90	167

¹Turning movement counts at the 180 Wells Avenue Site Driveways in June 2015; the existing building is 55,776± gsf of office uses

²Based on ITE LUC 710 trip rates applied to 60,565± gsf

As summarized in **Table 7**, the expansion project is estimated to generate approximately 94 new vehicle trips (83 entering and 11 exiting) during the weekday morning peak hour and 90 new vehicle trips (15 entering and 75 exiting) during the weekday evening peak hour. Trip generation calculations are provided in the **Attachments**.

Trip Distribution

The directional distribution of development-generated trips on the roadway network is a function of a number of variables including local area populations and the efficiency of the roadways leading to the Site. Existing (baseline) travel patterns and volumes of the adjacent roadway system as well as Journey to work census data served as the primary basis for determining the trip distribution pattern for the proposed development. The resulting trip distribution for new trips is presented in **Figure 8**. Trip distribution calculations are provided in the **Attachments**.

Development-related trips for the proposed Site are assigned to the roadway network using the ITE trip-generation estimates shown in **Table 7** and the distribution patterns presented in **Figure 8**. Development-related trips at each intersection approach for the weekday morning, and weekday evening peak hours are quantified in **Figure 9** and **Figure 10**.

2020 Build Traffic Conditions

2020 Build condition traffic volumes are derived by adding the incremental traffic increases for the office expansion at the Site to the 2020 No-Build conditions. **Figure 11** and **Figure 12** present the 2020 Build condition traffic-volume networks for the weekday morning, weekday evening and Saturday midday peak hours.

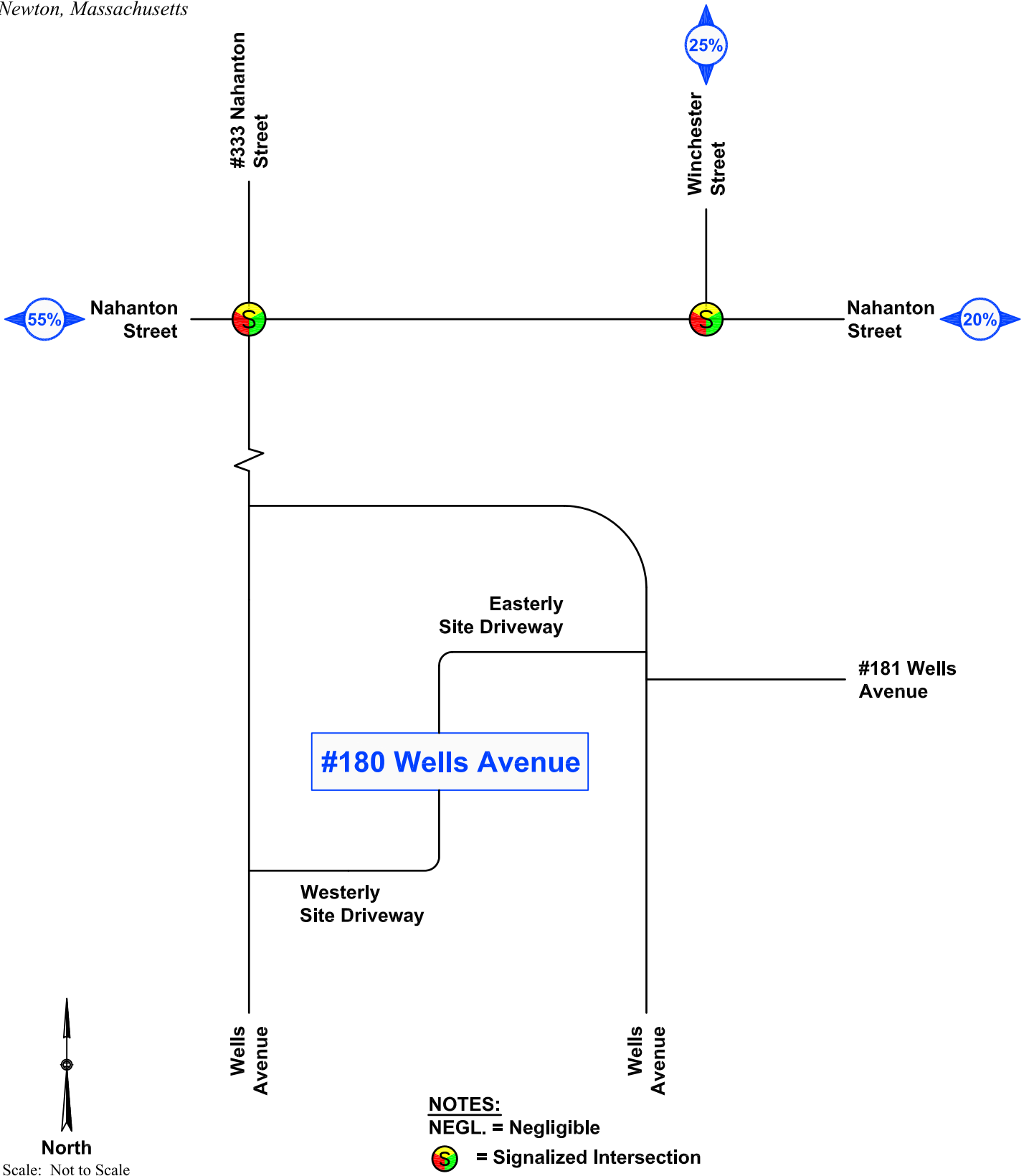


Figure 8

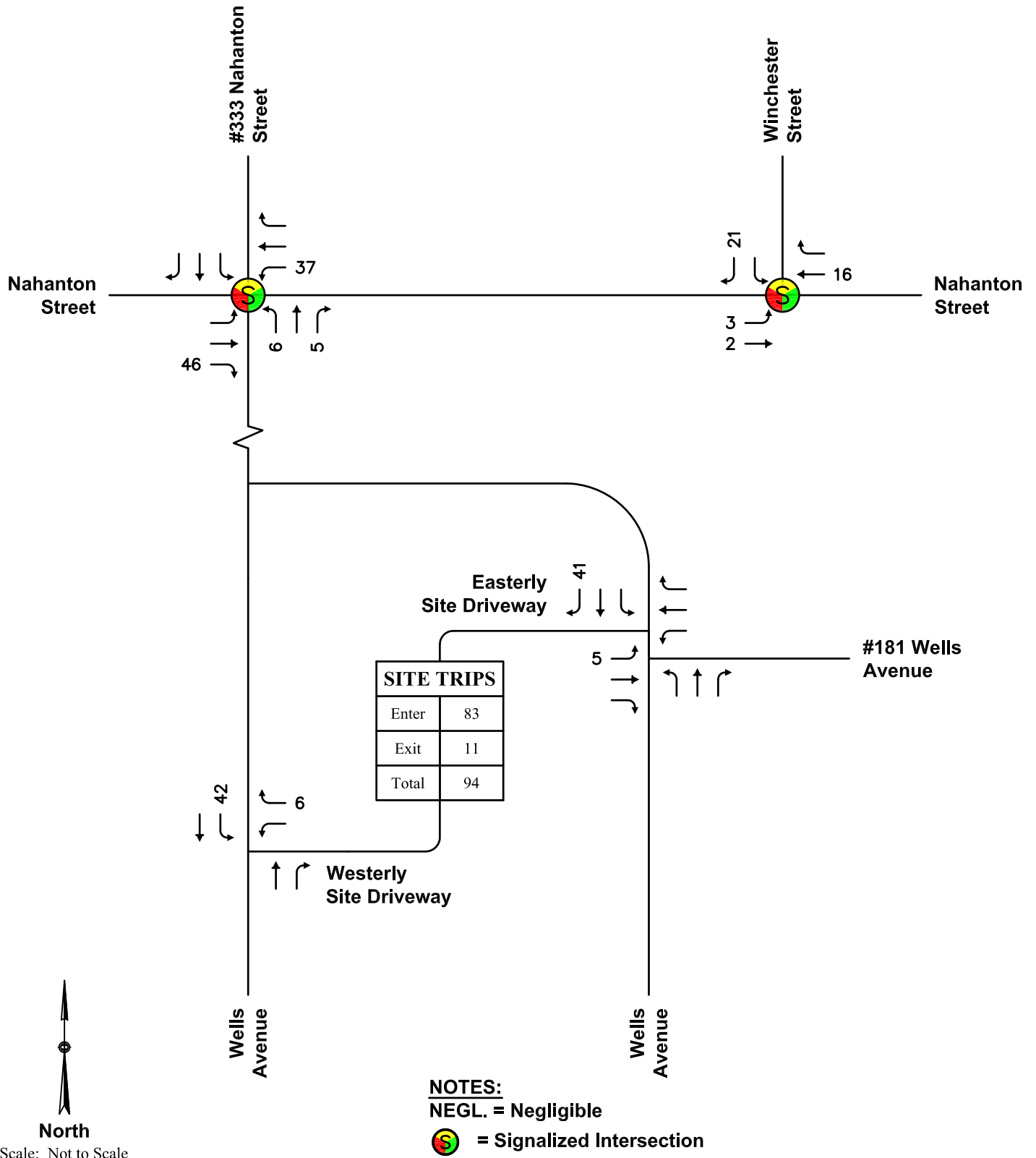
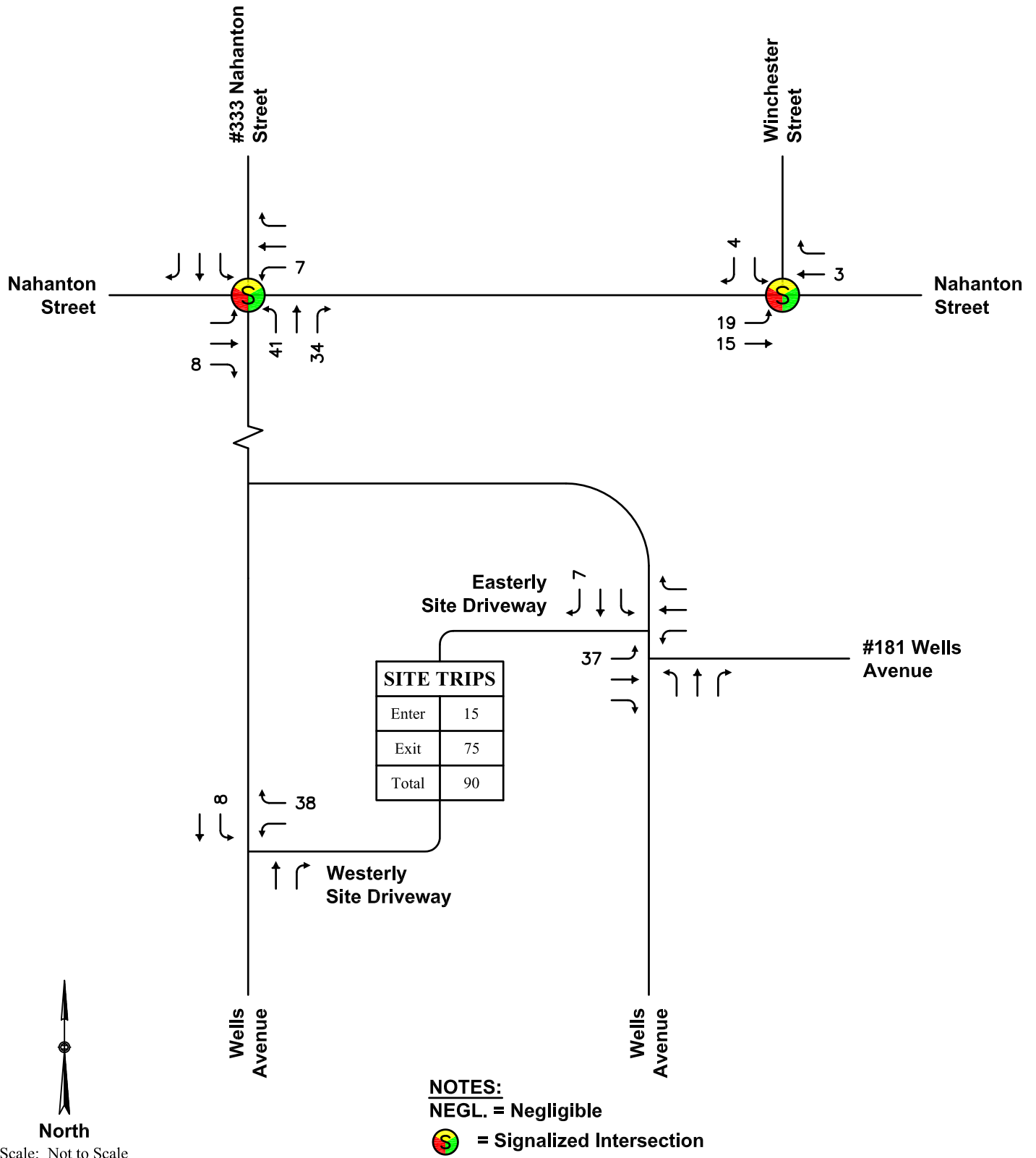


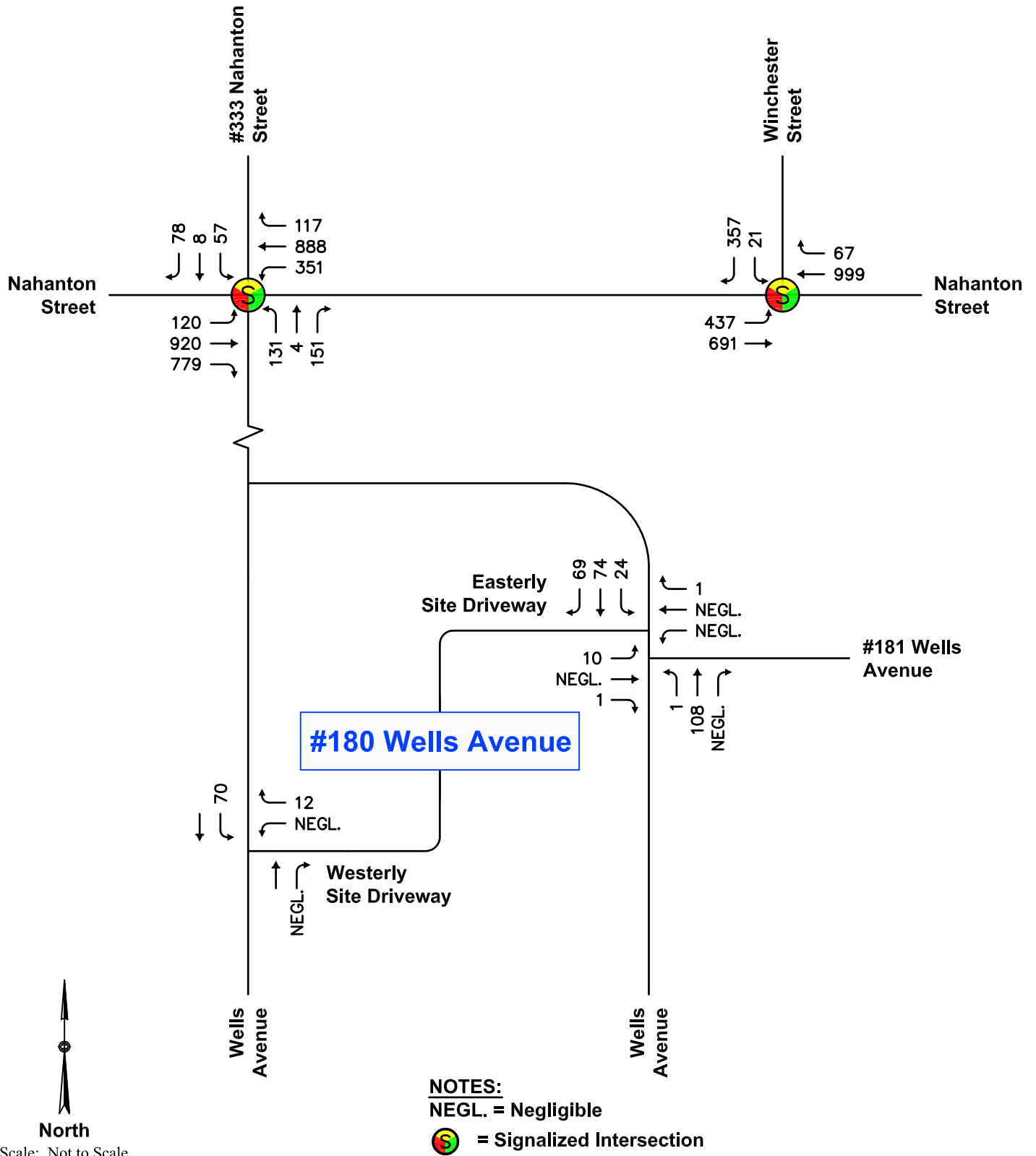
Figure 9



Scale: Not to Scale

Figure 10

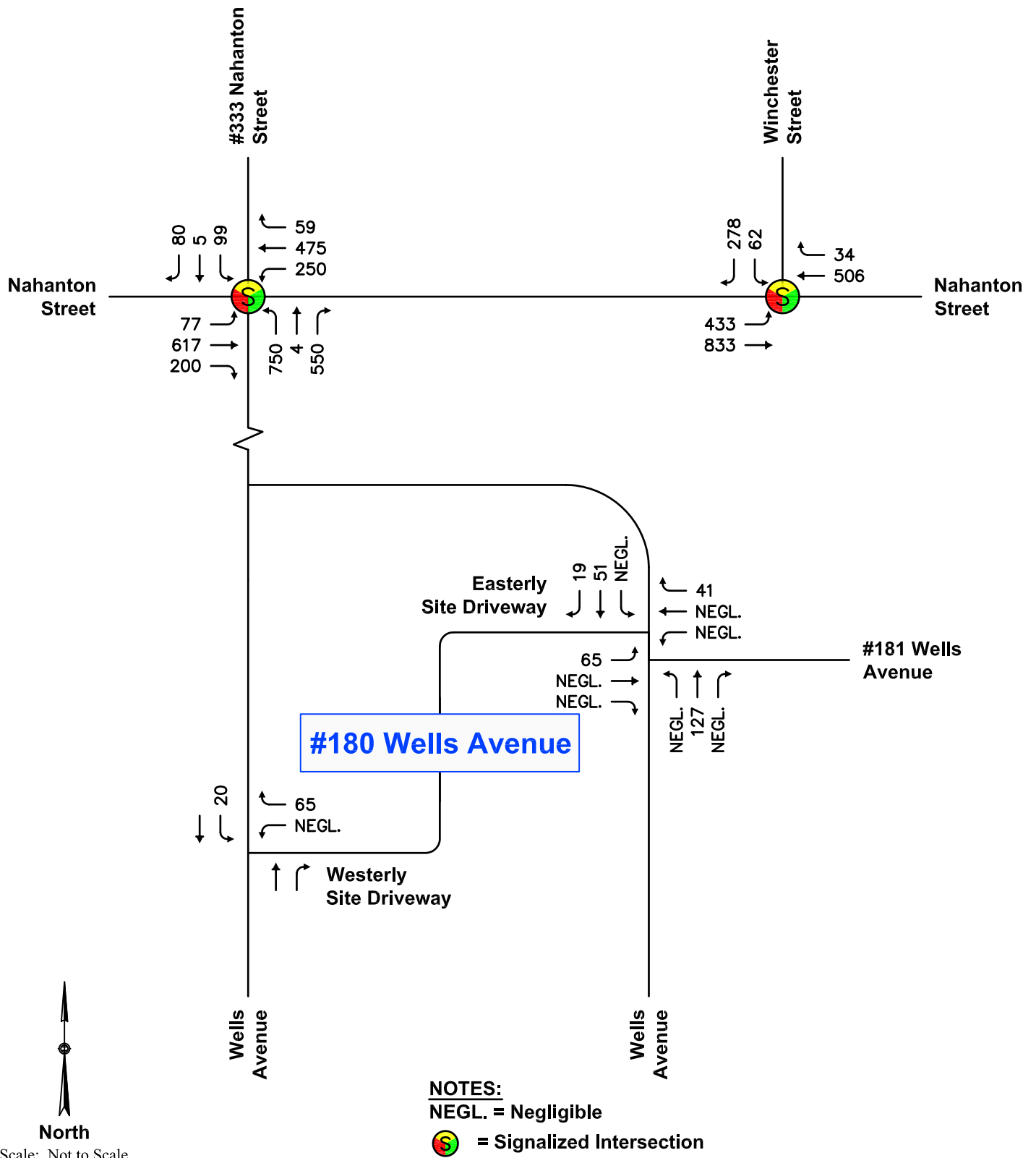
**Site-Generated Trips
 Weekday Evening Peak Hour**



Scale: Not to Scale

Figure 11

**2020 Build Condition
 Weekday Morning Peak Hour
 Traffic Volumes**



North
 Scale: Not to Scale

Figure 12
 2020 Build Condition
 Weekday Evening Peak Hour
 Traffic Volumes

OPERATIONS ANALYSIS

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

Analysis Methodology

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

Capacity analysis of intersections is developed using the Synchro® computer software, which implements the methods of the 2010 Highway Capacity Manual (HCM). The resulting analysis presents a level-of-service (LOS) designation for individual intersection movements. The LOS is a letter designation that provides a qualitative measure of operating conditions based on several factors including roadway geometry, speeds, ambient traffic volumes, traffic controls, and driver characteristics. Since the LOS of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of LOS, depending on the time of day, day of week, or period of year. A range of six levels of service are defined on the basis of average delay, ranging from LOS A (the least delay) to LOS F (delays greater than 50 seconds for unsignalized movements). The specific control delays and associated LOS designations are presented in the **Attachments**.

Model Calibration

In order to calibrate the Synchro® model to reflect actual delays and queues on Wells Avenue and Nahanton Street during the peak hours, vehicle queues and average vehicle delays were observed on the critical lanes which included the westbound Nahanton Street left turn lane onto Wells Avenue during the weekday morning peak hour and the Wells Avenue left- and right-turn lanes onto Nahanton Street during the weekday evening peak hour. The actual delay and queue data was collected in July 2015 and compared to the calculated delay and queue data based on the Synchro® model. The following specific calibrations to the model were made and are documented in more detail in the **Attachments**:

1. The traffic signal “lost time” was first adjusted to reflect the observed characteristic that vehicles currently utilize at least 2 seconds of available yellow time to process through the intersection.
2. The saturated flow rate for the Wells Avenue left turn lane onto Nahanton Street was adjusted until the calculated delay matched the actual observed delay for the weekday evening peak hour. This resulted in an adjustment in saturated flow rate from 1,345 vehicles per hour (vph) to 1,818 vph indicating that the actual capacity of the lane is approximately 35% higher than calculated in the model.
3. Modeled results for maximum vehicle queuing were checked against observed conditions to ensure that the calibrated modeling is reasonably consistent with field conditions.

Adjustments to saturation flow for the Nahanton Street westbound left-turn lane and Wells Avenue right-turn lane were also made to reflect observed delays as identified in more detail in the **Attachments**. Accordingly, the modeled intersection operations described below more accurately reflect the actual field conditions for the intersection and provide a more accurate estimate of incremental delays and queuing that would occur with traffic increases for the 180 Wells Avenue office expansion.

The calibrated model was used to analyze the Baseline, No-Build, and Build conditions during the weekday morning and weekday evening peak hour.

Analysis Results

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

**TABLE 8
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY MORNING PEAK HOUR**

Period	Approach	2015 Existing			2020 No-Build			2020 Build		
		v/c ¹	Delay ²	LOS ³	v/c	Delay	LOS	v/c	Delay	LOS
<i>Nahanton Street at Wells Avenue/ JCC Driveway</i>	Eastbound	0.70	10	B	0.86	14	B	0.87	15	B
	Westbound	0.92	30	C	0.91	25	C	0.92	27	C
	Northbound	0.36	24	C	0.57	27	C	0.60	28	C
	<u>Southbound</u>	<u>0.41</u>	<u>25</u>	<u>C</u>	<u>0.61</u>	<u>34</u>	<u>C</u>	<u>0.65</u>	<u>36</u>	<u>D</u>
	Overall	0.92	20	C	0.91	20	C	0.92	21	C
<i>Nahanton Street at Winchester Street</i>	Eastbound	0.46	15	C	0.85	17	B	0.86	18	B
	Westbound	n/a ⁴	n/a	n/a	>1.0	49	D	>1.0	54	D
	<u>Southbound</u>	<u>>1.0</u>	<u>>50</u>	<u>F</u>	<u>0.48</u>	<u>20</u>	<u>C</u>	<u>0.51</u>	<u>21</u>	<u>C</u>
	Overall	n/a	n/a	n/a	>1.0	31	C	>1.0	33	C
<i>Wells Avenue at Northern Site Driveway</i>	Northbound	0.00	<5	A	0.00	<5	A	n/a	n/a	n/a
	EB Exit	0.01	10	B	0.01	10	B	n/a	n/a	n/a
<i>Wells Avenue at Southern Site Driveway</i>	Northbound	0.00	7	A	0.00	7	A	n/a	n/a	n/a
	EB Exit	0.00	10	B	0.00	10	B	n/a	n/a	n/a
<i>Wells Avenue at Proposed Eastbound Driveway</i>	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	8	A
	EB Exit	n/a	n/a	n/a	n/a	n/a	n/a	0.02	10	B
<i>Wells Avenue at Proposed Westbound Driveway</i>	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.06	8	A
	WB Exit	n/a	n/a	n/a	n/a	n/a	n/a	0.02	10	B

¹Volume-to-capacity ratio

²Average control delay per vehicle (in seconds)

³Level of service

⁴n/a = not applicable

**TABLE 9
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY EVENING PEAK HOUR**

Period	Approach	2015 Baseline			2020 No-Build			2020 Build		
		v/c ¹	Delay ²	LOS ³	v/c	Delay	LOS	v/c	Delay	LOS
<i>Nahanton Street at Wells Avenue/ JCC Driveway</i>	Eastbound	>1.0	72	E	0.99	44	D	0.98	44	D
	Westbound	>1.0	59	E	0.86	38	D	0.91	43	D
	Northbound	0.84	30	C	0.94	35	D	0.95	37	D
	Southbound	<u>0.57</u>	<u>22</u>	<u>C</u>	<u>0.53</u>	<u>18</u>	<u>B</u>	<u>0.55</u>	<u>19</u>	<u>B</u>
	Overall	>1.0	50	D	0.99	37	D	0.98	40	D
<i>Nahanton Street at Winchester Street</i>	Eastbound	0.42	11	B	0.73	11	B	0.76	12	B
	Westbound	n/a ⁴	n/a	n/a	0.77	24	C	0.78	24	C
	Southbound	<u>>1.0</u>	<u>>50</u>	<u>F</u>	<u>0.30</u>	<u>9</u>	<u>A</u>	<u>0.31</u>	<u>9</u>	<u>A</u>
	Overall	n/a	n/a	n/a	0.77	14	B	0.78	14	B
<i>Wells Avenue at Northern Site Driveway</i>	Northbound	0.00	<5	A	0.00	<5	A	n/a	n/a	n/a
	EB Exit	0.05	10	B	0.05	10	B	n/a	n/a	n/a
<i>Wells Avenue at Southern Site Driveway</i>	Northbound	0.00	<5	A	0.00	<5	A	n/a	n/a	n/a
	EB Exit	0.02	10	B	0.02	10	B	n/a	n/a	n/a
<i>Wells Avenue at Proposed Eastbound Driveway</i>	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
	EB Exit	n/a	n/a	n/a	n/a	n/a	n/a	0.10	10	B
<i>Wells Avenue at Proposed Westbound Driveway</i>	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.02	9	A
	WB Exit	n/a	n/a	n/a	n/a	n/a	n/a	0.14	13	B

¹Volume-to-capacity ratio

²Average control delay per vehicle (in seconds)

³Level of service

⁴n/a = not applicable

As summarized in **Tables 8 – 9**:

- *Nahanton Street at Wells Avenue/ JCC Driveway.* Under future No-Build conditions, capacity analyses indicate that the signalized study intersection will operate at LOS C (overall) or better during the morning peak hour and will operate at LOS D (overall) during the weekday evening peak hour. Under future Build conditions, capacity analyses indicate that the signalized intersection will incur nominal increases in delay due to the proposed office expansion project. Long range geometric improvements are proposed by the City at this location which is aimed at improving operations and queue management. The proposed expansion project will not alter operating conditions compared to No-Build conditions, therefore, will have no impact on the long range improvement plans by the City.
- *Nahanton Street at Winchester Street.* Under existing conditions, southbound movements from the unsignalized study intersection onto Nahanton Street generally operate at with long delays during the peak hours. With the installation by the City under future No-Build conditions, capacity analyses indicate that the signalized intersection will operate at LOS C (overall) or better during peak hours. Under Build conditions the intersection will continue to operate at LOS C (overall) or better with minor increases in delay due to the proposed expansion project.
- *Wells Avenue at Site Driveway(s).* The intersection of Wells Avenue with the proposed Site Driveway is expected to operate below capacity at LOS B or better during the weekday morning and weekday evening peak hours under future year conditions.

In summary, incremental traffic increases at the study intersections due to the proposed development generally result in inconsequential changes in intersection operations compared to existing conditions (independent of proposed/planned area improvements by others) and No-Build conditions. Therefore, no additional roadway improvements are warranted to accommodate the expansion project.

Signal Queue Impacts

The estimated average and 95th percentile vehicle queue lengths for the signalized study intersections for the Baseline, No-build and Build conditions are presented in **Table 10** and **Table 11**. The estimated queue lengths are based on the capacity analysis results provided using Synchro® computer software.

TABLE 10
VEHICLE QUEUE ANALYSIS SUMMARY
NAHANTON STREET AT WELLS AVENUE

Approach	Storage Length (feet)	2015 Baseline		2020 No-Build		2020 Build	
		Average Queue Length ¹	95 th Percentile Queue Length ¹	Average Queue Length ¹	95 th Percentile Queue Length ¹	Average Queue Length ¹	95 th Percentile Queue Length ¹
<i>Weekday Morning Peak Hour</i>							
Eastbound L	175±	<25	45	<25	56	<25	61
Eastbound T	>1000	241	445	378	743	419	743
Eastbound R	175±	<25	44	36	107	57	153
Westbound L	250±	87	291	31	118	49	163
Westbound TR	>1000	421	827	443	836	492	836
Northbound L	>1000	43	86	68	130	74	134
Northbound TR	125±	<25	43	<25	57	<25	57
Southbound L	120±	31	70	31	90	33	94
Southbound TR	>1000	<25	42	<25	47	<25	47
<i>Weekday Evening Peak Hour</i>							
Eastbound L	175±	<25	38	<25	42	<25	48
Eastbound T	>1000	508	724	317	538	359	587
Eastbound R	175±	25	73	<25	50	<25	64
Westbound L	250±	67	110	71	177	86	211
Westbound TR	>1000	450	667	252	438	283	465
Northbound L	>1000	317	466	343	575	417	668
Northbound TR	125±	202	322	185	310	226	364
Southbound L	120±	47	110	37	93	41	103
Southbound TR	>1000	<25	26	<25	26	<25	27

¹Average and 95th percentile queue lengths are reported in feet per lane.

**TABLE 11
VEHICLE QUEUE ANALYSIS SUMMARY
NAHANTON STREET AT WINCHESTER STREET**

Approach	Storage Length (feet)	2015 Baseline		2020 No-Build		2020 Build	
		Average Queue Length ¹	95 th Percentile Queue Length ¹	Average Queue Length ¹	95 th Percentile Queue Length ¹	Average Queue Length ¹	95 th Percentile Queue Length ¹
<i>Weekday Morning Peak Hour</i>							
Eastbound L	400±			185	348	188	355
Eastbound T	950±			81	121	81	122
Westbound T	>1000	Unsignalized		566	846	631	868
Westbound R	250±			<25	<25	<25	<25
Southbound L	200±			<25	36	<25	36
Southbound TR	>1000			112	189	124	207
<i>Weekday Evening Peak Hour</i>							
Eastbound L	400±			67	209	72	206
Eastbound T	950±			120	208	113	197
Westbound T	>1000	Unsignalized		164	264	152	248
Westbound R	250±			<25	<25	<25	<25
Southbound L	250±			<25	60	<25	54
Southbound TR	>1000			<25	58	<25	60

¹Average and 95th percentile queue lengths are reported in feet per lane.

As summarized in **Table 10** and **Table 11**, average and 95th percentile vehicle queues at the signalized study intersection are generally contained within available storage lanes during weekday morning and weekday evening peak hours under existing and No-Build conditions. The proposed office expansion project results in the following increases in vehicle queues compared to No-Build conditions:

- Average vehicle queues during weekday morning peak hours increase by only one (1) additional vehicle in the eastbound (Nahanton Street) right-turn lane and westbound (Nahanton Street) left-turn lane under Build conditions.
- Average vehicle queues during weekday evening peak hours increase by only two (2) vehicles in the northbound (Wells Avenue) left-turn lane and right-turn lane under Build conditions.

In summary, the proposed office expansion at 180 Wells Avenue does not materially alter operating conditions in the near term and would not alter the viability of any long range improvements being planned by the City. Long-term improvements which are beyond the timeline of the project would include geometric improvements or replacing the traffic signal with a modern roundabout.

RECOMMENDATIONS AND CONCLUSIONS

Trip generation for the office expansion is projected to be up to 94 additional vehicles during the peak hours. This level of impact is nominal with less than 2 new vehicles per minute on average during commuter peak hours. MDM finds that incremental traffic associated with the proposed expansion is not expected to materially impact operating conditions at the study intersections. Study intersections exhibit below-average crash rates based on historic crash data; safety countermeasures are therefore not warranted. Likewise, the available sight lines at the site driveway intersections Wells Avenue exceed the recommended minimum sight line requirements (safety based criteria) from AASHTO for the posted speed limit and observed travel speeds. Specific improvements include (a) site access improvements and (b) a transportation demand management (TDM) plan, and (c) a monetary contribution to the City that is proportional to the capacity impact of the proposed office expansion on area intersections where City-sponsored improvements are planned.

(a) Site Access Improvements

MDM recommends the following site access design elements which will provide ample capacity to accommodate site-generated traffic while also enhancing safety and capacity:

- STOP signs (R1-1) and STOP line pavement markings are recommended on driveway approaches to Wells Avenue. The signs and pavement markings shall be compliant with the Manual on Uniform Traffic Control Devices (MUTCD).
- Plantings (shrubs, bushes) and structures (walls, fences, etc.) should be maintained at a height of 2 feet or less above the adjacent roadway grade within the sight lines in vicinity of the Site driveways in order to continue to provide unobstructed sight lines.
- A MUTCD compliant 25 mph speed advisory sign (W1-2a) should be installed along the southbound Wells Avenue approach to the Site.

(b) Transportation Demand Management (TDM)

TDM programs include a series of measures that are designed to encourage the use of alternative modes of travel to single-occupant vehicles (SOVs) through influencing the choice of travel modes by employees and customers. The benefits that are derived from an effective TDM program include less congestion on the roadway network; improved air quality; reduced parking demands and the need for construction of new parking spaces; and health benefits through walking and bicycling. The Proponent is committed to reduce auto dependency by employees, patrons and residents by implementing a robust TDM program. These elements are also consistent with the Massachusetts Department of Environmental Protection (MADEP) directive to use all reasonable and feasible mitigation

actions to reduce auto emissions. A preliminary list of potential TDM program elements may include the following:

- *TDM Program Coordinator.* An on-site employee will be designated as the TDM Program Coordinator to facilitate the implementation of the TDM program. The Program Coordinator will administer the TDM program and coordinate the elements of the program with tenants. Contact information for the TDM Program Coordinator will be provided to tenants, along with information concerning the TDM program.
- *Route 128 Business Council Membership.* The Project, by and through the Owner, will join the Route 128 Business Council Transportation Management Association (TMA). The TDM Program Coordinator will work with the Route 128 Business Council to develop and manage the TDM Program.
- *Employee Information Packet.* Employees will be provided with an information packet that includes the details of the TDM Program, TDM Program Coordinator contact information, contact information for the Route 128 Business Council, employee incentives for participating in the program, and the benefits of TDM activities. The information packet will be updated on a periodic basis in order to reflect current benefits and services that may be available.
- *Information Posting.* Information concerning the TDM Program will be posed in a central location in employee break rooms, and will include the following information:
 - Contact information for the TDM Program Coordinator
 - Contact information for the Route 128 Business Council
 - Carpool sign-up sheet
 - MBTA bus schedules and fare information
 - MassRIDES program information
 - MassRIDES NuRides sign-up information
 - Local taxi services

These materials will be reviewed and updated on a quarterly basis in order to ensure that the information is current.

- *Carpool/Rideshare Programs.* A coordinated rideshare program will be offered to employees and will be coordinated by TDM Program Coordinator and the Route 128 Business Council.
- *Route 128 Business Council Shuttle.* The TDM Program Coordinator will coordinate with the Route 128 Business Council to evaluate the feasibility to establish a fixed-route shuttle service to the Area. User costs for the service would be determined by the Route 128 Business Council. The Route 128 Business Council would market the shuttle service to other area commercial and residential developments.

- *Guaranteed-Ride-Home Program.* A "guaranteed-ride-home" program will be provided through the Route 128 Business Council for employees that participate in a registered car/vanpool, use public transportation, walk or bicycle to the site for emergencies that may arise during the workday. The "guaranteed-ride-home" program will be managed by the TDM Program Coordinator and implemented through the Route 128 Business Council.
- *Bicycle Accommodations.* Secure, weather protected bicycle parking will be provided within the Project for use by employees and customers. The facilities will consist of 30 bicycle parking spaces. In addition, the "guaranteed-ride-home" program policy will apply to employees that bicycle to work.
- *Pedestrian Accommodations.* Internal sidewalks and pathways will be provided within the site, with wheelchair ramps and crosswalks provided where pedestrian crossings are present for barrier free access. In addition, the "guaranteed-ride-home" program policy will apply to employees that walk to work.
- *Alternative Work Arrangements.* Alternative work arrangements such as flextime, compressed workweek and telecommuting will be encouraged to be implemented by tenants for eligible employees with supervisor approval in order to allow employees to balance work and personal commitments, and to reduce traffic and parking demands. The TDM Program Coordinator will facilitate alternative work arrangements with tenants for eligible employees.
- *On-Site and Operational Trip-Reduction Measures.* On-site services to decrease off-site trips by employees including lunch rooms equipped with a microwave and refrigerator will be encouraged to be made available by tenants to employees in employee break rooms. Tenants will also be encouraged to offer direct deposit of employee paychecks as an additional means to reduce off-site trip making.
- *TDM Monitoring Program.* In order to document the success of the trip reduction program, the TDM Program Coordinator, by and through the Route 128 Business Council, will conduct an annual survey of employee participation in the program. The results of the survey will be made available to the City of Newton and will be used, in part, to develop additional strategies as may be necessary to increase and expand participation in the Trip Reduction Program. The monitoring program will commence one year after full occupancy of the Project and continue for a period of five years thereafter.

(c) **Monetary Contribution**

The applicant is willing to make a voluntary contribution towards a Traffic Mitigation Fund to be established by the City. The methodology to calculate the voluntary donation offered by the Applicant is the “Cost Allocation Procedure” (“CAP”) which bases a fee on the proportion of an impacted intersection’s operating capacity. In this instance the Applicant’s traffic study estimates that the 180 Wells Avenue expansion uses approximately 5 percent of the Wells Avenue/Nahanton Street intersection capacity and up to 2 percent of the Winchester Street/Nahanton Street intersection capacity. According to the City’s preliminary estimates, the cost to improve the Winchester Street/Nahanton Street intersection is funded at approximately \$250,000; the cost to improve the Wells Avenue signal and associated geometry of that intersection is estimated at approximately \$1,250,000. The contribution is based on the percentage of capacity utilized at each of these intersections by the project times the approximate estimated cost of the long-range improvements. The mitigation funds would be paid at the time a building permit is issued and the City would have seven (7) years to appropriate the funds.