TRAFFIC IMPACT AND ACCESS STUDY

PROPOSED SPORTS COMPLEX

900 Worcester Street (Route 9)
Wellesley, Massachusetts

Prepared for:
ESG Associates, Inc.

Updated May 2017

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

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PROPOSED SPORTS COMPLEX

Worcester Street (Route 9)
Wellesley, Massachusetts

Prepared for:
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MDM.

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EXECUTIVE SUMMARY

MDM Transportation Consultants, Inc. (MDM) has prepared a Traffic Impact and Access Study (TIAS) for a proposed sports complex at the site of the former Saint James Church (900 Worcester Road) in Wellesley, Massachusetts. The location of the site relative to adjacent roadways is shown in **Figure 1**. This report documents existing operational and safety-related characteristics of roadways serving the development Site, estimates development-related trip generation and operational impacts, estimates project parking requirements, and identifies potential mitigation actions to support the development.

This TIAS has been developed in conformance with guidelines for preparation of traffic studies as jointly issued by the Commonwealth of Massachusetts Executive Office of Energy & Environmental Affairs/Massachusetts Department of Transportation (EEA/MassDOT).

E.1 PROJECT DESCRIPTION

The Site located at 900 Worcester Road (Route 9) comprises approximately 7.8± acres bounded by Route 9 and Dale Street – the former location of Saint James Church. Site access/egress includes two driveways along Route 9 and a connection to Dale Street.

Under the proposed development program, the Site will be redeveloped to include a 130,000± sf sport complex which will include two (2) regulation-size ice rink surfaces, a synthetic turf field and a 35,000± sf Health Club facility that includes an Aquatics Center with Olympic-size pool. On-site parking will include 355± surface parking spaces. Site access/egress is proposed via two (2) driveways along Worcester Street (Route 9). Access to the property is planned to be signalized subject to approval of MassDOT, under which scenario a cross-connecting driveway to the adjacent office building at 888 – 892 Worcester Street would be provided. Signal control at the Site would also accommodate a controlled pedestrian crossing that connects the adjoining residential neighborhoods to the property, and that is consistent with the Town objectives of providing a Route 9 crossing point that is proximate to the Cochituate Aquifer Trail system. In lieu of signalized traffic control, site access/egress will remain unsignalized consistent with historic site operations, relying on the nearby Weston Road interchange for trips destined

toward Metrowest communities. A secondary driveway will allow exit-only movements onto Route 9 eastbound from the Site, which is principally intended to accommodate bus egress from a designated bus loading/unloading area located along the northerly portion of the building.

E.2 STUDY AREA

This report evaluates transportation characteristics of roadways and intersections that provide a primary means of access to the Site, and that are likely to sustain a measurable level of traffic impact from the development. The study area includes the following primary intersections:

- Route 9 at Overbrook Drive/ CVS Driveway – Signalized
- Route 9 eastbound on/off ramp at Weston Road – Unsignalized
- Route 9 westbound on/off ramp at Weston Road/ Cleveland Road – Unsignalized
- Route 9 westbound on ramp at Weston Road – Unsignalized
- Route 9 at Proposed Primary Site Driveway/ Lexington Road
- Route 9 at Secondary Site Driveway (right-out-only) - Unsignalized

E.3 TRIP GENERATION

In accordance with EEA/MassDOT guidelines, the traffic generated by the proposed development was estimated using trip rates published in ITE's *Trip Generation* for Land Use Codes (LUC's) that most closely correlate with site programming – specifically Soccer Complex (LUC 488) and Health/Fitness Club (LUC 492). Trips for the Ice Rink use are estimated based on empirical trip data collected at the Essex Sports complex in Middleton, MA and New England Sports Center in Marlborough, MA. On this basis, the proposed development is estimated to generate approximately 201 trips during the weekday morning peak hour (45 entering and 156 exiting), 283 trips during the weekday evening peak hour (151 entering and 132 exiting) and 249 vehicle trips during the Saturday midday peak hour (122 entering and 127 exiting). On a daily basis, the development is estimated to generate approximately 2,928 vehicle trips on a weekday and 2,614 vehicle trips on a Saturday.

E.4 SUMMARY OF ANALYSIS AND FINDINGS

Capacity analyses were conducted for each study area intersection to quantify existing and future year traffic operations with and without the development for the weekday morning, weekday evening and Saturday midday peak hours. These time periods represent the highest activity periods of the proposed project and the adjacent roadway system. A traffic signal is planned for the primary site driveway which is projected to meet applicable 8-hour volume warrants under Build conditions assuming a cross-connecting driveway to the adjacent office use; this scenario is the preferred Build option and is subject to MassDOT review and approval. The capacity analysis result indicated the following:

- *Route 9 at Overbrook Drive.* Under No-Build conditions this signalized intersection operates at overall level of service (LOS) C or better during peak hours. The proposed development does not result in any significant change in operations at the signalized intersection compared to No-Build conditions.

- *Route 9 at Lexington Street/Primary Site Driveway.* Under No-Build (unsignalized) conditions the westbound U-Turns at this intersection operates with long delays during the peak hours. Signal control would improve operations to LOS B or better during the peak hours. Assuming coordinated signal control with the nearby Overbrook Drive and Oak Street intersections, the mainline travel along Route 9 will continue to operate with minimal delay during the weekday morning and evening peak hours; westbound U-Turns/left turns will be facilitated with delays of approximately 1 minute or less with queues that are entirely accommodated within available lane storage.

- *Route 9 Eastbound ramps at Weston Road.* Under No-Build conditions left-turns onto Weston Road operate with moderate delays during peak hours. Assuming signal control is implemented at the Site and driveway cross-connection to the adjacent office building, the intersection of Route 9 eastbound ramps at Weston Road will experience a net trip reduction of up to 100 vehicles during the peak hours with associated net reduction in travel delay for left-turns.

- *Route 9 Westbound ramps at Weston Road.* Under No-Build conditions left-turns onto Weston Road will operate with long delays during the weekday evening peak hour. Assuming signal control is implemented at the Site and driveway cross-connection to the adjacent office building, the intersection of Route 9 eastbound ramps at Weston Road will incur a net trip reduction of up to 100 vehicles during the peak hours with associated net reduction in travel delay for left-turns.

- *Route 9 at Secondary Site Driveway (Right-out only).* Under Build conditions, the proposed secondary site driveways approach to Route 9 will operate below capacity during the peak hours. Mainline travel along Route 9 eastbound will remain unimpeded.

In summary, proposed signal control at the primary Site driveway will accommodate peak Site operations with modest delays (LOS B or better) with neutral impact to the nearby interchange of Weston Road at Route 9. A cross-connecting driveway between the property and adjoining office building at 888-894 Worcester Road would result in a further net trip reduction at the interchange during peak hours relative to existing conditions that would result in reduced delays/improved operations relative to No-Build conditions. Signal control at the Site would also accommodate a controlled pedestrian crossing that connects the adjoining residential neighborhoods to the property, and that is consistent with the Town objectives of providing a Route 9 crossing point that is proximate to the Cochituate Aquifer Trail system.

Build (Alternative) Conditions – Unsignalized Primary Site Driveway

The proposed development without a signal at the primary site driveway does not result in any significant change in operations at the study intersections of Route 9 at Overbrook Drive or Route 9/Weston Road interchange compared to No-Build conditions; under this scenario a moderate increase in left-turns (60-70 peak hour trips) at the Route 9 eastbound ramp/Weston Road is projected during peak facility operating periods.

E.5 RECOMMENDATIONS

Roadway improvements that support projected traffic increases associated with the proposed development are identified that aim to minimize/offset project-related traffic impacts and address access needs for the Site. Recommended improvements include (a) access-related improvements, (b) off-site improvements, (c) special event parking management protocol, and (d) implement a robust TDM program. The mitigation commitments by the Proponent will be further refined as the project undergoes the local and state-level review processes and the MassDOT Access Permit process.

Access-Related Improvements

MDM recommends access-related improvements aimed at enhancing traffic operations and/or travel safety including the following which are subject to MassDOT permit requirements:

- *Pedestrian Facilities.* Sidewalks connecting the development to the existing sidewalk system along Route 9 are anticipated to encourage non-vehicle travel. Signal control at the Site would also accommodate a controlled pedestrian crossing that connects the adjoining residential neighborhoods to the property, and that is consistent with the Town objectives of providing a Route 9 crossing point that is proximate to the Cochituate Aquifer Trail system.

- *Secondary Driveway Restriction.* The existing secondary driveways serving Site will be restricted to right-turn egress-only movements.

- A "STOP" sign (R1-1), "One-Way" (R6-1), and "Do-Not Enter" (R5-1) signs are recommended on the proposed secondary site driveway intersection with Route 9. Accordingly, a marked "STOP" line and right turn arrow pavement marking will also be installed. The signs and pavement markings will 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 Route 9 in order to continue to provide unobstructed sight lines.

Route 9 at Lexington Road/Primary Site Driveway

In order to accommodate the proposed sports complex and to mitigate traffic impacts at the Route 9 eastbound off-ramp/Weston Road intersection (most notably, the eastbound left-turns), MDM recommends that geometric improvements be implemented at the Primary Site Driveway/Lexington Road intersection along Route 9. As these improvements represent a preferred Build program for access/egress at the Site, they are assumed under the Build condition capacity analyses presented in *Section 4* of this TIAS. Proponent-sponsored improvements at the intersection of Route 9 and Primary Site Driveway/Lexington Road are shown in **Figure 22** and include a) coordinated signal control with the nearby signals at Overbrook Drive and Oak Street; b) an exclusive westbound left-turn lane along Route 9 to enter the site; c) a two-lane Site driveway approach to Route 9 with separate left- and right-turn exiting lanes; d) exclusive pedestrian crossing of Route 9 with pushbutton activation; and (e) closure of the median island break along Route 9 near the secondary site driveway. The design specifically excludes an eastbound left-turn lane and through movements between the Site and Lexington Road on the basis that eastbound Route 9 access to the neighborhoods north of Route 9 are accommodated at nearby Overbrook Drive which has been subject to a monitoring program as part of the recently completed CVS development approvals.

Special Event Parking Management

The proposed parking supply at the site of 355± marked parking spaces is projected to adequately accommodate the anticipated parking demand of up to 322 parked vehicles under typical facility operating conditions. To the extent special programming is planned for the sports complex facility (for example, hockey tournaments and swim meets) additional parking may be required subject to a parking management protocol to be developed by Proponent. The Proponent anticipates 10-15 events a year that may require overflow parking and is currently in discussions with owner of the adjacent office buildings located at 888-892 Worcester Street as one potential location to accommodate the special event parking overflow if necessary. The special events typically occur on holiday weekends and are also anticipated to include the Wellesley/Newton hockey games.

Transportation Demand Management (TDM)

The Proponent commits to reduce auto dependency for the sports complex by implementing a TDM program. A preliminary list of potential TDM program elements may include the following, subject to refinement of the development program and further evaluation by the Proponent:

- □ *On-Site Transportation Coordinator*. The Proponent will designate an on-site transportation coordinator. The transportation coordinator will be responsible for disseminating relevant TDM information to employees including posting TDM information at appropriate locations within the buildings. Such postings may include making information on MassRides available to employees at orientation.

- □ *MassRides*. MassRides is the Executive Office of Transportation's statewide travel options program providing free assistance to commuters, employers, students, and other traveler markets. MassRides programs may encourage workers to use alternative forms of transportation such as carpooling, vanpooling, and to utilize a large database for rideshare matching. The Proponent will promote commuter assistance programs available through MassRides as part of the employee orientation programs. MassRides information will also be posted.

- □ *Regional Transit Authority (MWRTA) Transit Stop*. The Proponent will work with the MWRTA to dedicated bus stop on-site or adjacent to the Site along Route 9 as part of the existing Bus Route 1 which currently provides flag down service along Route 9.

- □ *Provide a Bus Drop-Off/Parking Area.* The Proponent will provide a dedicated bus drop-off/ parking area on-site that is adjacent to a main entranceway to promote bus use by local and regional sports teams.

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

- □ *Consideration of an Employee Transit Pass Subsidy.* The Proponent will consider providing a transit pass subsidy for all full-time employees.

- □ *Pedestrian Infrastructure/Walking Incentives*. The proposed site layout will include additional sidewalks to proposed building that connects to the existing sidewalk system along Route 9 and to the parking areas.

- □ *Tenant Manual for Employee Services*. The Proponent will prepare a Tenant Manual that will offer their employees: 1) direct deposit of paychecks; 2) transit pass subsidies; and 3) a guaranteed ride home program for employees who van/carpool.

- □ *On-Site Amenities.* The project will include a number of on-site amenities that will promote employees and patrons to remain on-site. These services include but are not limed to food services, an on-site pro-shop, on-site equipment sales and services, and on-site showers.

- *Electric Vehicle Charging Stations and Preferential Parking for Low-Emission Vehicles.* Preferential parking locations for those who use low-emission vehicles will be provided on-site. The number and location of the electric vehicle charging station(s) will be identified more specifically during the local site plan review and approval process.

- *Preferential Parking for Carpools and Vanpools.* Preferential parking locations for those who for carpools and vanpools will be provide on-site. The number and location of the parking space(s) will be identified more specifically during the local site plan review and approval process.

- *No Idling Signage*. Installation of "No Idling" signs at the site's commercial vehicle parking areas/bus area to reduce the amount of greenhouse gasses emitted.

Conclusions

In summary, trip generation for the development is projected to only moderately increase traffic activity on area roadways relative to existing/baseline conditions with no material impact to operating conditions at primary study intersections. This assessment indicates that there is ample capacity at these study locations to accommodate these project-related traffic increases without the need for major infrastructure enhancements.

Proposed signal control at the primary Site driveway will accommodate peak Site operations with modest delays (LOS B or better) with neutral impact to the nearby interchange of Weston Road at Route 9. A cross-connecting driveway between the property and adjoining office building at 888-894 Worcester Road would result in a further net trip reduction at the interchange during peak hours relative to existing conditions that would result in reduced delays/improved operations relative to No-Build conditions. Signal control at the Site would also accommodate a controlled pedestrian crossing that connects the adjoining residential neighborhoods to the property, and that is consistent with the Town objectives of providing a Route 9 crossing point that is proximate to the Cochituate Aquifer Trail system.

Potential mitigation actions that are subject to MassDOT input and permits are identified that include access/egress improvements; special event parking management protocol, and Transportation Demand Management (TDM) actions including coordination with the regional transit authority (MWRTA) to integrate the Site as a stop with connections to the nearby intermodal and commuter rail facility.

1.0 INTRODUCTION

MDM Transportation Consultants, Inc. (MDM) has prepared a Traffic Impact and Access Study (TIAS) for a proposed sports complex at the site of the former Saint James Church in Wellesley, Massachusetts. The location of the site relative to adjacent roadways is shown in **Figure 1**. This report documents existing operational and safety-related characteristics of roadways serving the development Site, estimates future year operating characteristics of these roadways independent of the development, estimates development-related trip generation, and identifies incremental traffic impacts and parking requirements, and identifies potential mitigation actions to support the development as required.

This TIAS has been developed in conformance with guidelines for preparation of traffic studies as jointly issued by the Commonwealth of Massachusetts Executive Office of Energy & Environmental Affairs/ Massachusetts Department of Transportation (EEA/MassDOT).

1.1 PROPOSED DEVELOPMENT

The Site located at 900 Worcester Road (Route 9) comprises approximately 7.8± acres bounded by Route 9 and Dale Street – the former location of Saint James Church. Site access/egress includes two driveways along Route 9 and a connection to Dale Street.

Under the proposed development program, the Site will be redeveloped to include a 130,000± sf sport complex which will include two (2) regulation-size ice rink surfaces, a synthetic turf field and a 35,000± sf Health Club facility that includes an Aquatics Center with Olympic-size pool. On-site parking will include 355± surface parking spaces. Site access/egress is proposed via two (2) driveways along Worcester Street (Route 9). Access to the property is planned to be signalized subject to approval of MassDOT, under which scenario a cross-connecting driveway to the adjacent office building at 888 – 892 Worcester Street would be provided. Signal control at the Site would also accommodate a controlled pedestrian crossing that connects the adjoining residential neighborhoods to the property, and that is consistent with the Town objectives of providing a Route 9 crossing point that is proximate to the Cochituate Aquifer Trail system. In lieu of signalized traffic control, site access/egress will remain unsignalized consistent with

Figure 1

Site Location

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

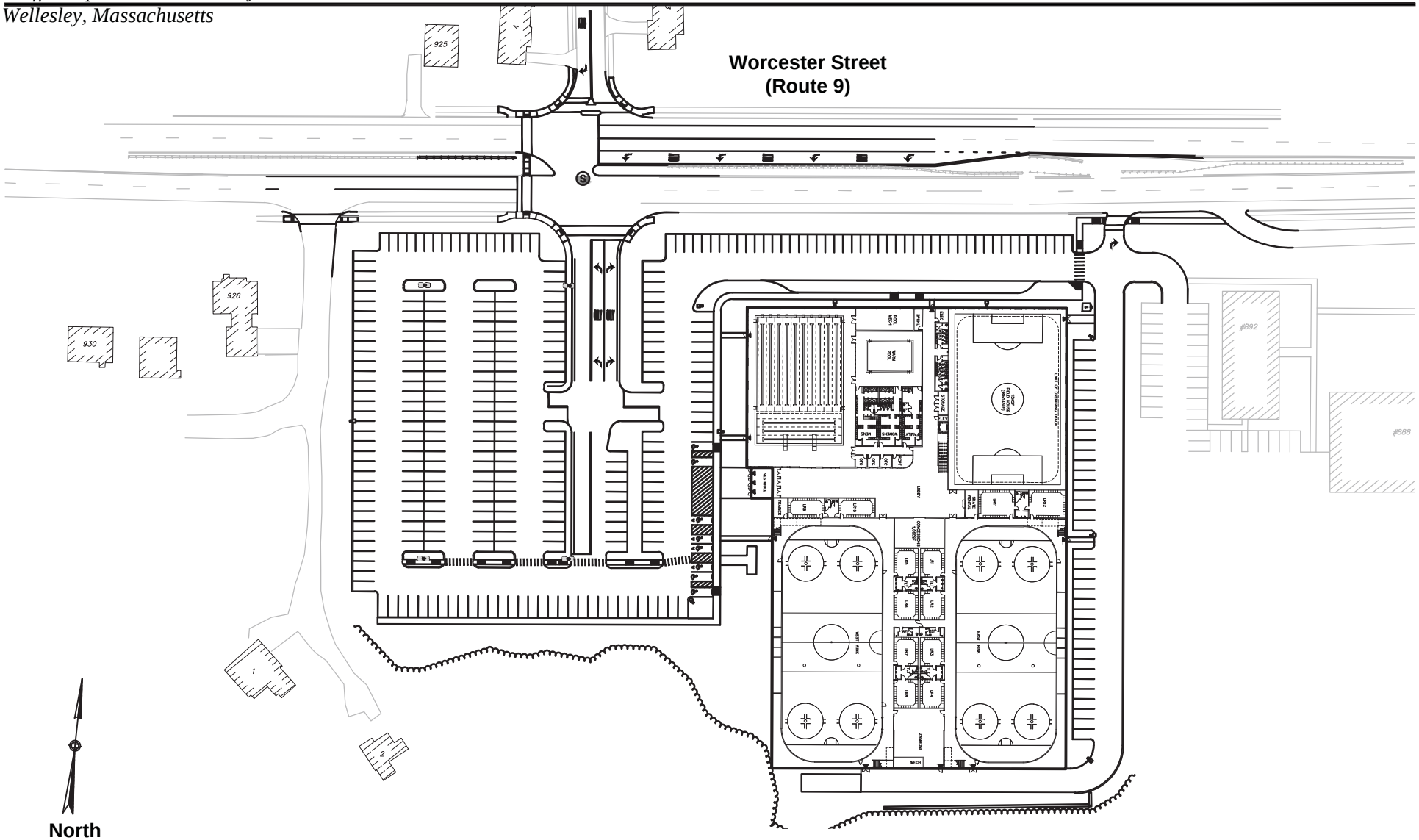
Date: May 2017
Dwg No. 923 TIAS02.dwg

historic site operations, relying on the nearby Weston Road interchange for trips destined toward Metrowest communities. A secondary driveway will allow exit-only movements onto Route 9 eastbound from the Site, which is principally intended to accommodate bus egress from a designated bus loading/unloading area located along the northerly portion of the building. The preliminary Site layout plan prepared by Allen & Major Associates, Inc. is presented in **Figure 2**.

1.2 STUDY AREA

This report evaluates transportation characteristics of roadways and intersections that provide a primary means of access to the Site, and that are likely to sustain a measurable level of traffic impact from the development. The study area includes the following primary intersections:

- Route 9 at Overbrook Drive/ CVS Driveway – Signalized
- Route 9 eastbound on/off ramp at Weston Road – Unsignalized
- Route 9 westbound on/off ramp at Weston Road/ Cleveland Road – Unsignalized
- Route 9 westbound on ramp at Weston Road – Unsignalized
- Route 9 at Proposed Primary Site Driveway/ Lexington Road
- Route 9 at Secondary Site Driveway (right-out-only) - Unsignalized



Scale: Not to Scale

Site Plan Source: Allen & Major Associates, Inc.

Figure 2

Preliminary Site Layout

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Planners & Engineers

Date: April 2017
Dwg No. 923 Concept Plan (5-26-2017).dwg

2.0 BASELINE CONDITIONS

In order to provide a basis for quantifying the transportation impacts of the development, the Baseline roadway system and the baseline traffic operations of study area roadways were reviewed. This section describes the existing traffic characteristics and operations of roadways and intersection within the study area. Specifically, this section presents an overview of baseline traffic volumes, an inventory of crash data, a review of sight lines, and accounting of public transportation systems serving the area.

2.1 STUDY AREA ROADWAY NETWORK

The study area roadways, intersection, and pedestrian facilities are described briefly in this section. A general description of the physical roadway, intersection features, and pedestrian accommodations is provided. The study area includes roadways under local and MassDOT jurisdiction. The study area and intersection are depicted in **Figure 1**.

2.1.1 Roadways

Route 9

Worcester Street is generally an east-west roadway under state jurisdiction within the study area. Worcester Street is classified by the Massachusetts DOT as an Urban Principal Arterial roadway, and it provides a connection between the Mass Pike (via Exit 12) to the west and Interstate 95 (via Exit 20) to the east. Worcester Street provides two travel lanes in each direction within the study area with additional turn lanes provided at its major intersections. Sidewalks are provided along both sides of Worcester Street. The posted (regulatory) speed limit on Worcester Street in the study area is 50 mph in both travel directions. Land use along Worcester Street in the study area is a mix of residential, commercial, and office uses.

Weston Road

Weston Road is generally a north-south roadway under local jurisdiction within the study area that connects Route 16 to the south and the Weston town line to the north. Weston Road is classified as an Urban Minor Arterial roadway, and it provides a single travel lane in each direction separated by a double yellow centerline with access to on/off ramps provided at its intersection with Worcester Street. There is a mix of land uses along Weston Road in the study area that includes residential homes, a commercial plaza including a local market, and an elementary school.

Lexington Road

Lexington Road is a north-south roadway under local jurisdiction within the study area that connects Beechwood Street to the north with a right in/right out access to Route 9 to the south. Lexington Street provides a single travel lane in each direction with sidewalks provided on both sides of the roadway. The only land use along Lexington Street in the study area is residential.

2.1.2 Intersections

Route 9 at Overbrook Drive/ CVS Driveway

Worcester Street meets Overbrook Drive to form a four-legged, signalized intersection under state jurisdiction. The eastbound and westbound Worcester Street approaches provide an exclusive left turn lane, a through lane, and a shared through/right travel lane. The Overbrook Drive southbound approach provides a shared left/through/right travel lane. The CVS driveway northbound approach provides an exclusive left turn lane and an exclusive right turn lane. Land uses at the intersection include a CVS Pharmacy, a commercial plaza with a Dunkin' Donuts, an insurance office building, a bank, car dealerships, and a gas station.

Weston Road at Route 9 Westbound Ramp/Cleveland Road

Weston Road meets the Route 9 Westbound Ramp and Cleveland Road to form a four-legged unsignalized intersections under state jurisdiction. Weston Road provides a single travel lane in the northbound and southbound directions. Cleveland Road provides a single flared approach used as a left and through-right lane under STOP sign control. The Route 9 Eastbound ramp provide a single travel lane under STOP sign control. Land uses at the ramp intersections include a pizza place, a gas station, a local market and cafe, and an animal hospital.

Weston Road at Route 9 Eastbound Ramp

Weston Road meets the Route 9 Eastbound Ramps to form a three-legged, unsignalized intersections under state jurisdiction. The ramps provide a single travel lane under STOP sign control. The northbound Weston Road approach to the intersection provides a left turn land and a through lane. The southbound Weston Road approach provides a travel lane. Land uses at the ramp intersections include a library and residences.

2.1.3 Pedestrian Facilities

An inventory of the existing sidewalk system and pedestrian crossings in the study area connecting the site to the nearby public transportation centers has been conducted and is documented in **Figure 2A**. The review indicated the following existing characteristics along the primary pedestrian paths as summarized below:

- *Worcester Street (Route 9).* The sidewalk system along the northern and southern side of Worcester Street is approximately 5 feet wide. There is no sidewalk segment along the northern side of Route 9 between the westbound on/off ramp for Weston Road and #889 Worcester Street. The sidewalk system varies between poor and average condition with some cracking and deterioration. A signalized marked pedestrian crossing is provided at the intersection of Route 9/Overbrook Drive/CVS Pharmacy. The handicap ramps and pedestrian signal push buttons within the study area appear to be ADA compliant.

- *Cochituate Aquifer (Crosstown) Trail.* Within the study area, the Crosstown Trail provides a trail connection between Weston Road to the east, travels to the south of the Site adjacent to Morses Pond, intersects with Route 9 between the Site and Overbrook Drive, travels along Route 9 and Overbrook Drive and continues to the northwest into Natick.

- *Weston Road*. A sidewalk system exists along the eastern and western side of Weston Road. This section of sidewalk is approximately 5 feet wide and is generally in average or better condition with minimal cracking or deterioration. The sidewalk section near the Fells Market building is between 10 and 12 feet wide. All the handicapped ramps on appear to be ADA compliant.

- *Overbrook Drive*. A sidewalk system exists along the eastern and western side of Overbrook Drive between Route 9 and Edgemoor Circle and only along the eastern side to the north of Edgemoor Circle. This section of sidewalk is varies between 5 and 9 feet wide and is generally in average or better condition with minimal cracking or deterioration. With the exception of the section near the 5 Overbrook Drive along the eastern side of Overbrook Drive, all the handicapped ramps on appear to be ADA compliant.

- *Lexington Road*. A sidewalk system exists along the eastern side of Lexington Road Drive to a point 350 feet north or Route 9 and along the western side of Lexington Road to a point 440 feet north of Route 9. The sidewalk segments are approximately 5 feet wide and are generally in average condition with some minor cracking and deterioration.

Figure 2A

Existing Pedestrian Facilities

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Planners & Engineers

Date: May 2017
Dwg No. 923 TIAS02.dwg

2.2 BASELINE TRAFFIC, PEDESTIAN & BICYCLE VOLUMES

Traffic-volume data used in this study were obtained by mechanical and manual methods in March 2017. Automatic traffic recorder counts (ATRs) were conducted along Route 9 adjacent to the Site while manual turning movement counts (TMCs) were conducted at the existing study intersections. Traffic data were collected during the weekday morning (7:00 to 9:00 AM), weekday evening (4:00 to 6:00 PM), and Saturday midday (11:00 AM to 1:00 PM) peak periods. These hours represent the combination of busiest activity periods of the Site and adjacent roadway network.

2.2.1 Daily Traffic

Daily traffic volumes along Route 9 adjacent to the Site were collected in March 2017 and are summarized in **Table 1** and included in the **Appendix**.

TABLE 1
EXISTING TRAFFIC VOLUME SUMMARY
ROUTE 9 EAST OF LEXINGTON ROAD

Time Period	Daily Volume (vpd)[1]	Percent Daily Traffic[2]	Peak Hour Volume (vph)[3]	Peak Flow Direction[4]	Peak Hour Directional Volume (vph)
Weekday Morning Peak Hour	53,400	8%	4,243	57% EB	2,403
Weekday Evening Peak Hour	53,400	7%	3,809	53% EB	2,039
Saturday Midday Peak Hour	46,428	8%	3,644	54% WB	1,956

[1]Two-way daily traffic expressed in vehicles per day without seasonal adjustment.
[2]The percent of daily traffic that occurs during the peak hour.
[3]Two-way peak-hour volume expressed in vehicles per hour.
[4]EB = Eastbound, WB = Westbound

As summarized in **Table 1**, the weekday daily traffic volume on Route 9 adjacent to the Site is approximately 53,400 vehicles per day (vpd) on a weekday and 46,428 vpd on a Saturday. Peak hour traffic flow on Route 9 ranges from approximately 3,644 to 4,243 vehicles per hour (vph) representing 7 to 8 percent of daily traffic flow. Vehicle flow is skewed towards the eastbound direction during the weekday morning and weekday evening peak hours, and skewed towards the westbound direction during the Saturday midday peak hour.

2.2.2 Peak-Hour Volumes

Peak-hour traffic volumes at the study area intersections were collected in March 2017. Comparison of the traffic count data maintained by MassDOT for nearby permanent count stations indicates that March is representative of slightly below-average volume conditions. Therefore, a seasonal adjustment (2 percent increase) was made to observed traffic volumes to represent average traffic conditions. Permanent count station data is provided in the **Appendix**. The resulting 2017 Baseline weekday morning, weekday evening, and Saturday midday peak hour traffic volume networks for the study intersections are depicted in **Figure 3**, **Figure 4** and **Figure 5**.

Peak-hour pedestrian and bicycle traffic activity was also observed in March 2017. The resulting 2017 Baseline weekday morning, weekday evening, and Saturday midday peak hour pedestrian and bicycle traffic volumes at the study intersections are provided in **Figure 3A**, **Figure 4A**, and **Figure 5A**.

2.3 MEASURED TRAVEL SPEEDS

Vehicle speeds were obtained for Route 9 adjacent to the Site using a *Spot Speed* study. Vehicles traveling both eastbound and westbound were timed over a known distance and then the travel times were converted into travel speeds in miles per hour (mph). **Table 2** summarizes the average and 85th percentile speeds along Route 9 adjacent to the Site. This speed data provides a basis for determining appropriate sight lines for the proposed driveways. Speed data is provided in the **Appendix**.

TABLE 2
SPEED STUDY RESULTS – ROUTE 9

Travel Direction	Travel Speeds		
	Posted[1]	Mean[2]	85th Percentile[3]
Eastbound	50	45	51
Westbound	50	47	52

[1] Regulatory Speed Limit (mph)
[2] Arithmetic mean (mph)
[3] The speed at or below which 85 percent of the vehicles are traveling

As summarized in **Table 2**, the mean (average) travel speed on Route 9 traveling eastbound is 45 mph and the 85th percentile travel speed is 51 mph. In the westbound direction, the mean travel speed is 47 mph and the 85th percentile travel speed is 52 mph. The observed 85th percentile travel speeds are consistent with the 50 mph regulatory speed limit on this section of Route 9 in both travel directions.

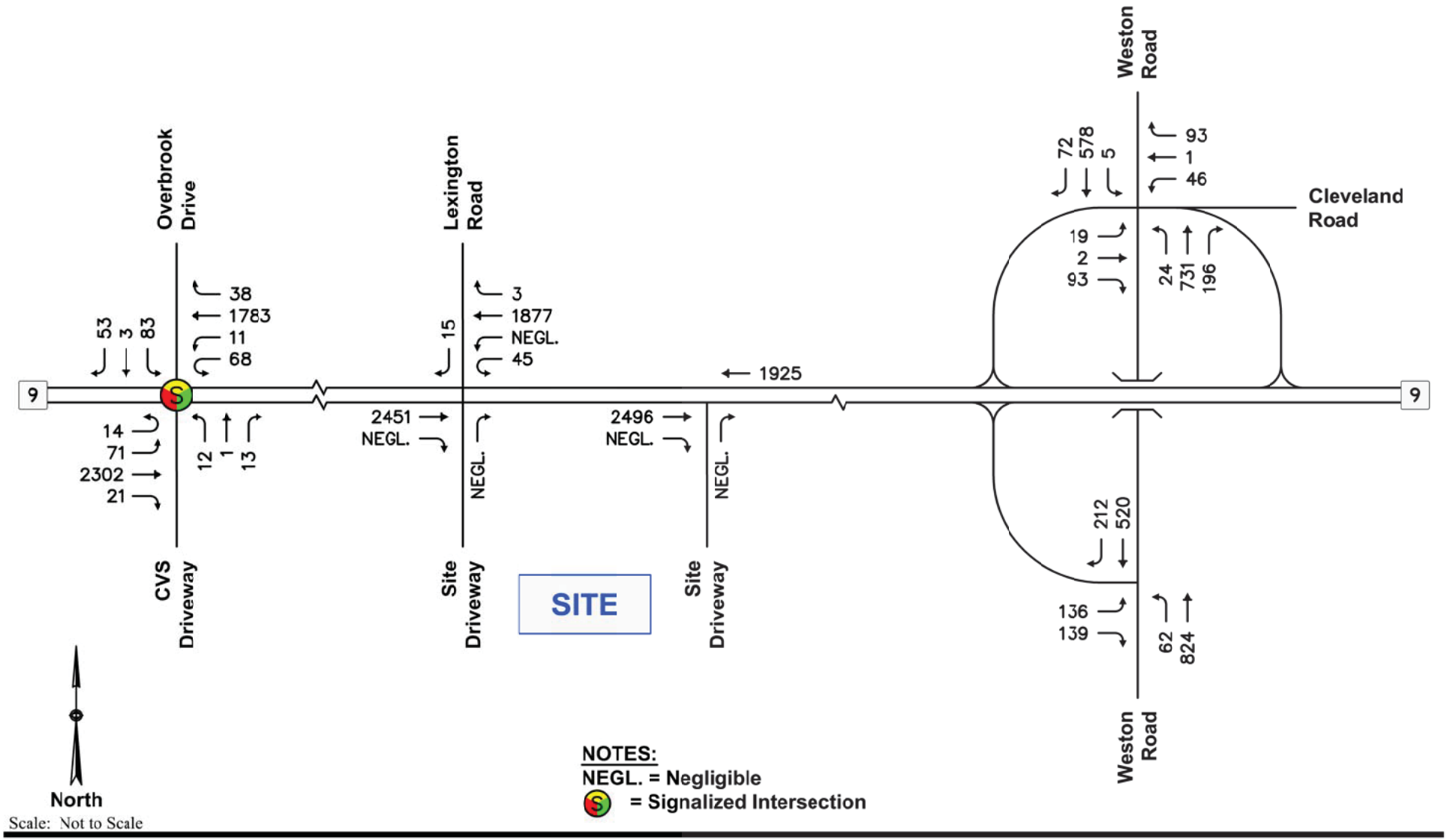

Figure 3

MDM TRANSPORTATION CONSULTANTS, INC.
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2017 Baseline Conditions
Weekday Morning Peak Hour Traffic Volumes

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

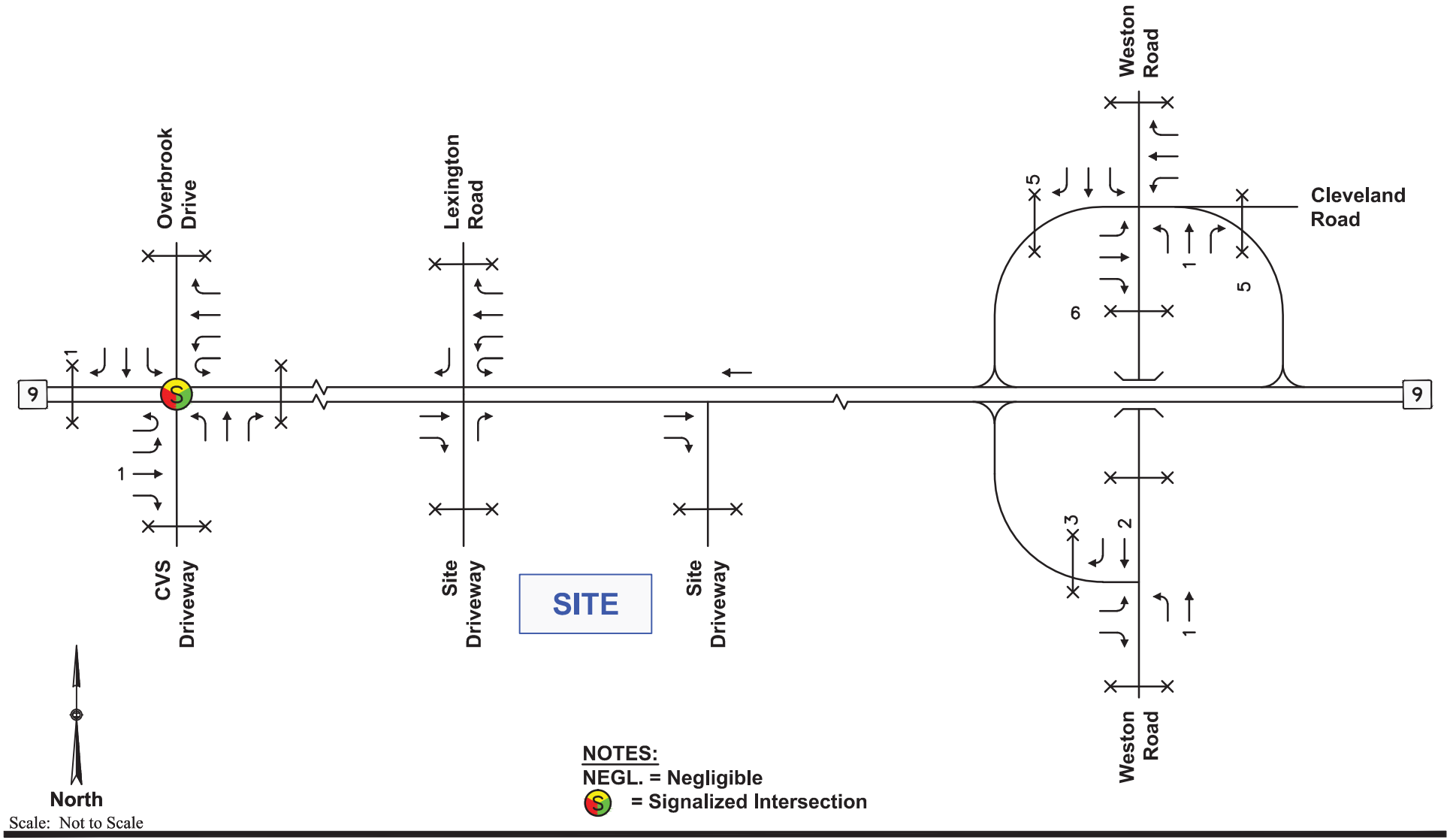

Figure 3A

MDM TRANSPORTATION CONSULTANTS, INC.
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2017 Baseline Conditions
Weekday Morning Peak Hour Traffic Volumes
Pedestrian and Bicycle Volumes

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

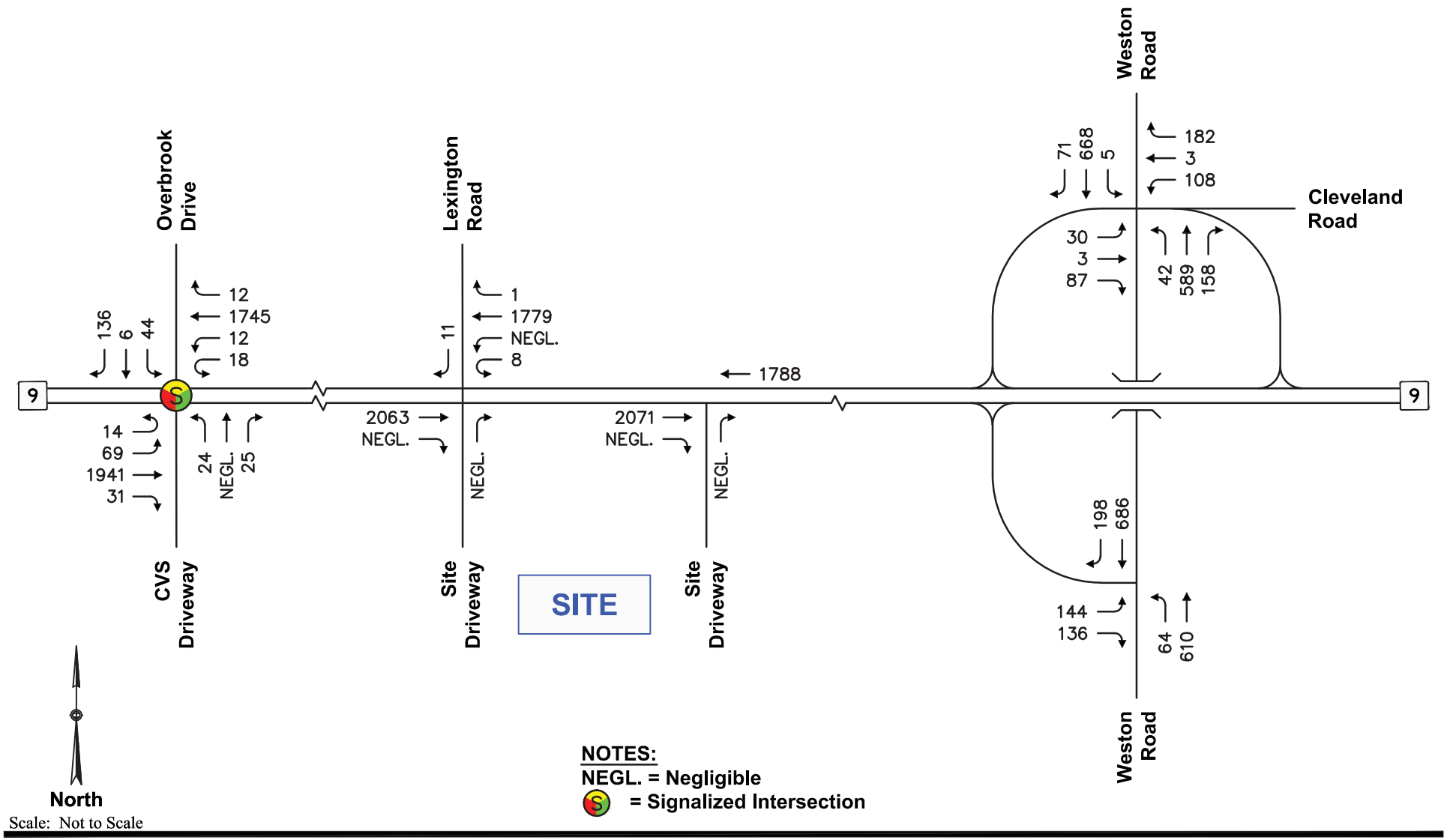

Figure 4

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Planners & Engineers

2017 Baseline Conditions
Weekday Evening Peak Hour Traffic Volumes

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

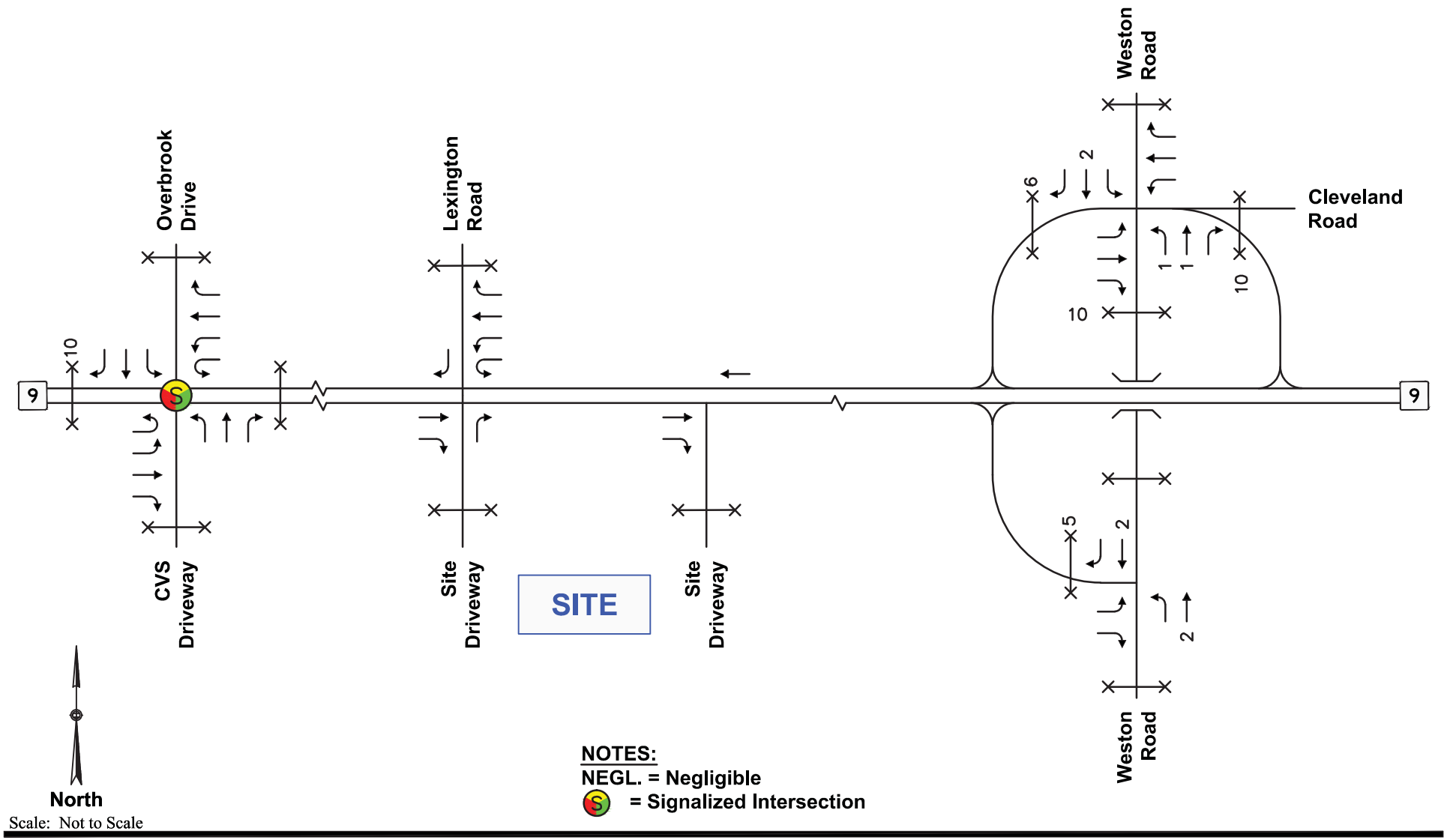

Figure 4A

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2017 Baseline Conditions
Weekday Evening Peak Hour Traffic Volumes
Pedestrian and Bicycle Volumes

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

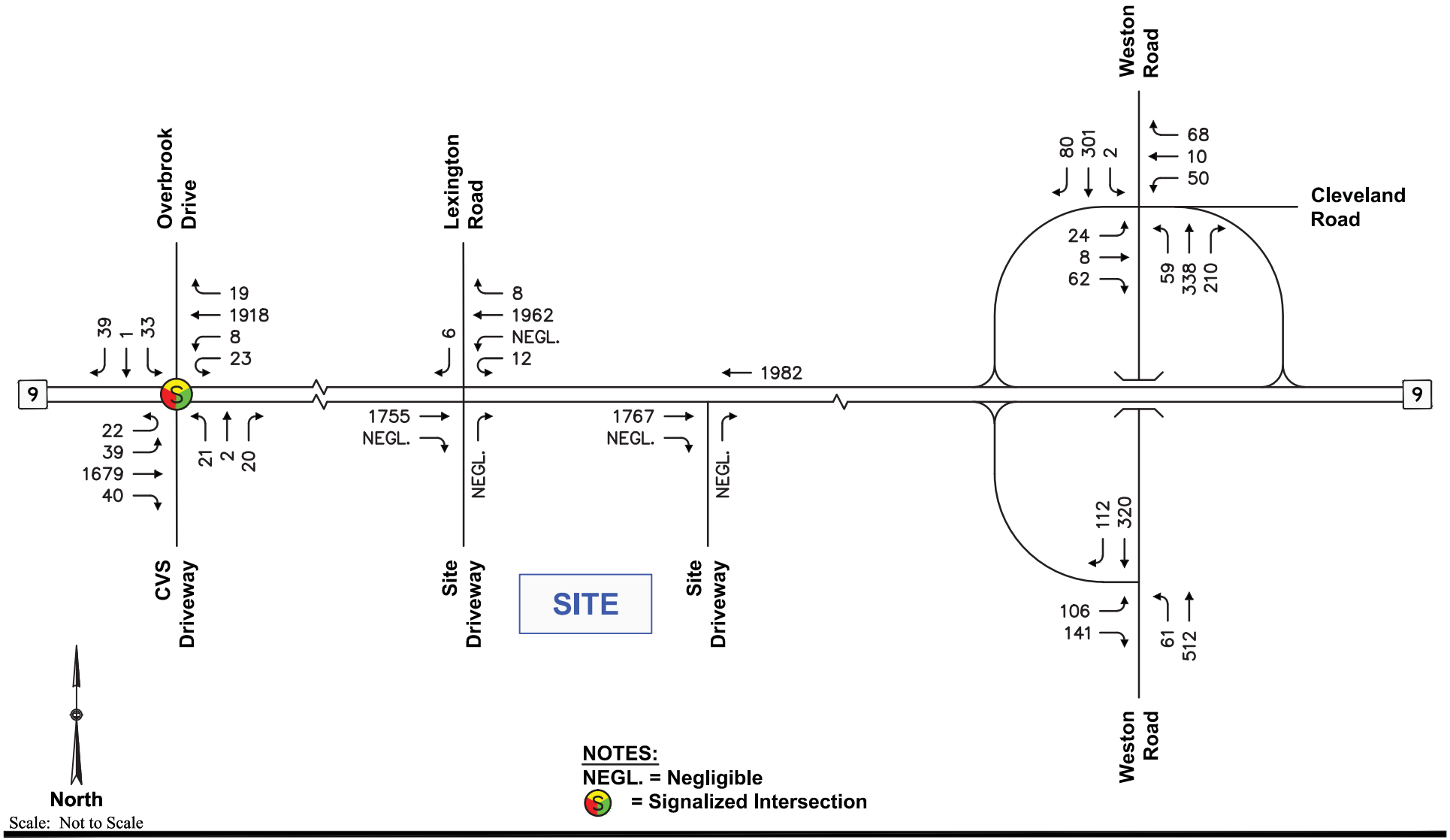

Figure 5

2017 Baseline Conditions
Saturday Midday Peak Hour Traffic Volumes

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Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

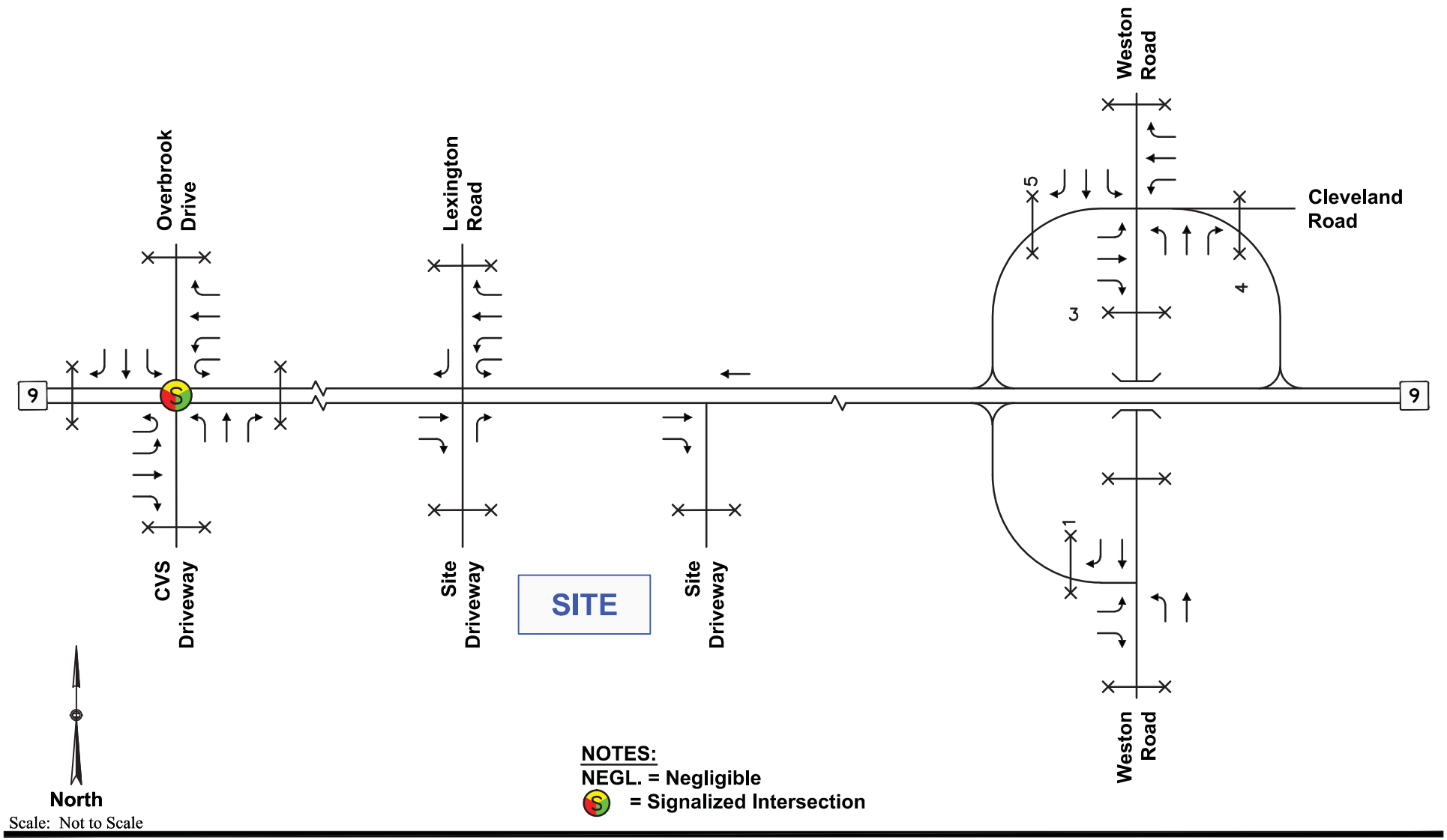

Figure 5A

MDM TRANSPORTATION CONSULTANTS, INC.
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2017 Baseline Conditions
Saturday Midday Peak Hour Traffic Volumes
Pedestrian and Bicycle Volumes

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

2.4 SAFETY/CRASH EVALUATION

Crash data were obtained from MassDOT for the Town of Wellesley for the three-year period 2012 through 2014 (the most recent 3-year period available) to identify crash trends and safety characteristics for study area intersections. In addition, review of the MassDOT high crash cluster mapping was conducted to determine locations listed as eligible for Highway Safety Improvement Program (HSIP) evaluation and funding. Crash data for the study intersections is summarized in **Table 3** with detailed data provided in the **Appendix.**

Crash rates were calculated for the study area intersections as reported in **Table 3**. This rate quantifies the number of crashes per million entering vehicles. MassDOT has determined the official District 6 (which includes the Town of Wellesley) crash rate to be 0.53 for unsignalized intersections and 0.70 for signalized intersections and the official District 3 (which includes the Town of Natick) crash rate to be 0.65 for unsignalized intersections and 0.90 for signalized intersections. These rates represent MassDOT's "average" crash experience for study area and serve as a basis for comparing reported crash rates for the study intersections. Where calculated crash rates notably exceed the district average, some form of safety countermeasures may be warranted.

TABLE 3
INTERSECTION CRASH SUMMARY — 2012 THROUGH 2014[1]

Data Category	INTERSECTION			
	Route 9 at Overbrook Dr/ CVS Driveway	Route 9 at Lexington Rd/ 900 Worcester St	Weston Road at Route 9 Ramps (WB)	Weston Road at Route 9 Ramps (EB)
Traffic Control	Signalized	Unsignalized	Unsignalized	Unsignalized
Crash Rate[2]	**0.63**	**0.18**	**0.32**	**0.49**
District Avg.[3]	0.90	0.53	0.53	0.53
Year:				
2012	13	3	3	4
2013	13	4	2	5
2014	11	3	4	4
Total	37	10	9	13
Type:				
Angle	8	0	3	6
Rear-End	25	9	4	5
Head-On	0	0	0	0
Sideswipe	3	1	2	1
Single Vehicle	1	0	0	1
Other/Unknown	0	0	0	0
Severity:				
P. Damage Only	30	10	8	11
Personal Injury	7	0	1	2
Fatality	0	0	0	0
Conditions:				
Dry	30	8	9	10
Wet	6	2	0	2
Snow	1	0	0	1
Other/Unknown	0	0	0	0
Time:				
7:00 to 9:00 AM	7	1	1	3
4:00 to 6:00 PM	6	4	1	3
Rest of Day	24	5	7	7

[1] Source: MassDOT Crash Database
[2] Crashes per million entering vehicles
[3] District 3 average = 0.90 for signalized intersections and 0.65 for unsignalized intersections
District 6 average = 0.70 for signalized intersections and 0.53 for unsignalized intersections

As summarized in **Table 3**:

- *Route 9 at Overbrook Drive/CVS Driveway:* Thirty-seven (37) crashes were reported at or near the Route 9 signalized intersection with Overbrook Drive over the three-year study period resulting crash rate of 0.63, which is below the District 3 average of 0.90. MassDOT has listed the intersection as a Highway Safety Improvement Program (HSIP) crash cluster for 2012-2014. Roadway improvements were completed for this location in August 2014 as part of the CVS Pharmacy re-development, however, no Road Safety Audit has been completed to date. The reported crashes included twenty-five (25) rear-end type collisions, eleven (11) angle/sideswipe type collisions, and one (1) single vehicle crash. The majority (81%) resulted in property damage type collision under dry (81%) roadway conditions during off-peak travel periods (65%). No fatalities or pedestrian-related incidents were reported during the study period.

- *Route 9 at Lexington Road/900 Worcester Street:* Ten (10) crashes were reported at or near the Site Driveway on Route 9 over the three-year study period resulting crash rate of 0.18, which is above the District 6 average of 0.53. The reported crashes included one (1) angle/sideswipe type collision and nine (9) rear-end type collisions. All of the crashes resulted in property damage type collision with the majority of crashes under dry (80%) roadway conditions during off-peak travel periods (50%). No fatalities or pedestrian-related incidents were reported during the study period.

- *Weston Road at Route 9 Ramps (WB):* Nine (9) crashes were reported at or near the unsignalized stop-controlled intersection over the three-year study period resulting crash rate of 0.32, which is below the District 6 average of 0.53. The reported crashes included six (6) angle/sideswipe type collisions and three (3) rear-end type collisions. The majority (89%) resulted in property damage type collision under dry (100%) roadway conditions during off-peak travel periods (78%). No fatalities or pedestrian-related incidents were reported during the study period.

- *Weston Road at Route 9 Ramps (EB):* Thirteen (13) crashes were reported at or near the unsignalized stop-controlled intersection over the three-year study period resulting crash rate of 0.49, which is below the District 6 average of 0.53. The reported crashes included seven (7) angle/sideswipe type collisions, five (5) rear-end type collisions, and one (1) single-vehicle crash. The majority (85%) resulted in property damage type collisions under dry (77%) roadway conditions during off-peak travel periods (54%). No fatalities or pedestrian-related incidents were reported during the study period.

In summary, based on extensive review of MassDOT crash data, all of the study intersections experienced crash rates that are below the MassDOT District averages. The signalized intersection of Route 9 and Overbrook Drive/CVS Driveway is listed as a 2012-2014 HSIP location. Accordingly, this HSIP location is subject to a Road Safety Audit (RSA) to identify potential short-term, medium term and long-term safety/operational improvements. Under current MassDOT policy, projects subject to MEPA review that impact HSIP clusters must complete a RSA prior to issuance of a Section 61 Finding for the project.

2.5 PUBLIC TRANSPORTATION FACILITIES

The Metro-West Regional Transit Authority (MWRTA) provides fixed route bus service, Route 1, between Framingham (Central Hub – 37 Waverly Street) and Newton (MBTA Station) with stops in Framingham, Natick, Wellesley, and Newton (Woodland MBTA Station). To remain somewhat conservative, no specific reduction in Site trips was taken to account for use of these travel modes. Specific route and schedule information is provided in the **Appendix**.

2.6 SIGHT LINE ANALYSIS

An evaluation of sight lines was conducted at the proposed Site driveway locations to ensure that minimum recommended sight lines are available at the proposed Site driveway intersections with Route 9. The evaluation documents existing sight lines for vehicles as they relate to the two (2) driveways along Route 9 with comparison to recommended guidelines.

The American Association of State Highway and Transportation Officials' (AASHTO) standards[1] reference two types of sight distance which are relevant at the proposed Site driveway intersections: stopping sight distance (SSD) and intersection sight distance (ISD). Sight lines for critical vehicle movements at the proposed Site driveway intersections were compared to minimum SSD and ISD recommendations for the travel speeds along Route 9 in the Site vicinity.

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 Route 9. 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 eastbound and westbound Route 9 approaches to the proposed Site driveways. **Table 4** presents a summary of the available SSD as they relate to Route 9 and AASHTO's recommended SSD.

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

TABLE 4
STOPPING SIGHT DISTANCE SUMMARY
ROUTE 9 APPROACHES TO SITE DRIVEWAYS

		AASHTO Recommended[1]	
Approach/ Travel Direction	**Available SSD**	**Posted Speed[2]**	**85th Percentile Travel Speed[3]**
Route 9 at Primary Site Driveway/ Lexington Street			
Eastbound	950± Feet	425 Feet	440 Feet
Westbound	>1000 Feet	425 Feet	450 Feet
Route 9 at Secondary Site Driveway (Eastern) – Right out Only			
Eastbound	>1000 Feet	425 Feet	450 Feet

[1]Recommended sight distance based on AASHTO, A Policy on Geometric Design of Highways and Streets. Based on driver height of eye of 3.5 feet to object height of 2.0 feet.
[2]Regulatory (Posted) Speed on Route 9 is 50 mph EB and WB.
[3]85th Percentile Speed on Route 9 is 51 mph EB and 52 mph WB.

As summarized in **Table 4** analysis results indicate that the available sight lines exceed AASHTO's recommended SSD criteria for both travel directions along Route 9 based on the regulatory posted speed limit and observed travel speeds.

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". For the primary site driveway location which is proposed to be under traffic signal control, the ISD in question relates to the ability to turn right on red from the proposed primary driveway intersection with Route 9. For the secondary Site driveway location which is proposed to be under STOP sign control, the ISD in question relates to the ability to turn right from the proposed secondary driveway intersection with Route 9.

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 (8 to 14.5 feet from the edge of the travel way) for the eastbound and westbound directions along Route 9. **Table 5** presents a summary of the available ISD for the departure from the Site driveways and Lexington Road and AASHTO's recommended ISD.

TABLE 5
INTERSECTION SIGHT DISTANCE SUMMARY
SITE DRIVEWAY/ LEXINGTON ROAD APPROACHES TO ROUTE 9

Approach/ Travel Direction	Available ISD	AASHTO Minimum[1] 85th Percentile Travel Speed[3]	AASHTO Ideal[1] Posted Travel Speed[3]
Route 9 at Primary Site Driveway/ Lexington Street			
Looking East	>800 Feet	450 Feet	478 Feet
Looking West	>800 Feet	440 Feet	478 Feet
Route 9 at Secondary Site Driveway (Eastern) – Right out Only			
Looking West	>800 Feet	440 Feet	478 Feet

[1]Recommended sight distance based on AASHTO, A Policy on Geometric Design of Highways and Streets. Based on driver height of eye of 3.5 feet and an object height of 3.5 feet and adjustments for roadway grade if required. Minimum value as noted represents SSD per AASHTO guidance.
[2]Regulatory (Posted Speed) on Worcester Street is 50 mph EB and WB.
[2]85th Percentile Speed on Worcester Street is 51 mph EB and 52 mph WB.

The results of the ISD analysis presented in **Table 5** indicate that the available sight lines looking west from the proposed Site driveways onto Worcester Street and looking east from Lexington Road onto Worcester Street will exceed the recommended minimum sight line requirements from AASHTO for the travel speeds. MDM recommends that any new plantings (shrubs, bushes) or physical landscape features to be located within the 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.

3.0 FUTURE CONDITIONS

Evaluation of the proposed development impacts requires the establishment of a future baseline analysis condition. This section estimates future roadway and traffic conditions with and without the proposed development. To be consistent with EEA/MassDOT guidelines, a seven-year planning horizon was selected.

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

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

3.1 PLANNED ROADWAY IMPROVEMENTS

MassDOT is planning transportation improvements (Project 608180) to the Route 9 that will include resurfacing using NHS funding. The project limits will include Route 9 from MassDOT's limits of its Add-A-Lane project at Route 128 to a point just east of Overbrook Drive at the Natick Town Line. The resurfacing project is pending through the District 6 office. A larger planned roadway improvement (Project 607340) which includes sidewalk repairs, signal improvements, reflectorized pavement markings and recessed roadway reflectors is also in the preliminary design stage. The project limits will include Route 9 between Dearborn Street and the Natick Town Line.

3.2 BACKGROUND TRAFFIC GROWTH

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

3.2.1 Historical Area Growth

Nearby permanent count station data published by MassDOT indicates a neutral (-0.1 percent per year) growth rate. For purposes of this evaluation, a 1.0 percent compounded annual growth rate was used (7.2 percent increase over a 7-year horizon). This growth rate is higher than historic rates and 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 **Appendix.**

3.2.2 Background Development-Related Growth

Development of future No-Build traffic volumes also considers traffic generated through the study area from other specific area developments. Review of Massachusetts Environmental Policy Act (MEPA) files indicates that the following site-specific development projects in the area may increase baseline traffic at the study intersections include the following

- ***MathWorks Lakeside Campus:*** The MathWorks re-development of the former Boston Scientific campus located at 1 Lakeside Campus Drive in Natick, MA is under construction and will include 510,000± sf of general office space. Traffic associated with the redevelopment building was estimated using ITE trip generation rates and assigned to the study area roadway network based on Journey to Work Data for the Town of Natick. Site-specific trip tracings are provided in the **Appendix**.

3.3 NO-BUILD TRAFFIC VOLUMES

To account for future traffic growth along the corridor, the 0.5 percent annual growth rate was applied to existing traffic volumes over a seven-year period, as well as traffic associated with the MathWorks Lakeside Campus project. Future 2024 No-Build traffic volumes are displayed in **Figure 6**, **Figure 7**, and **Figure 8**.

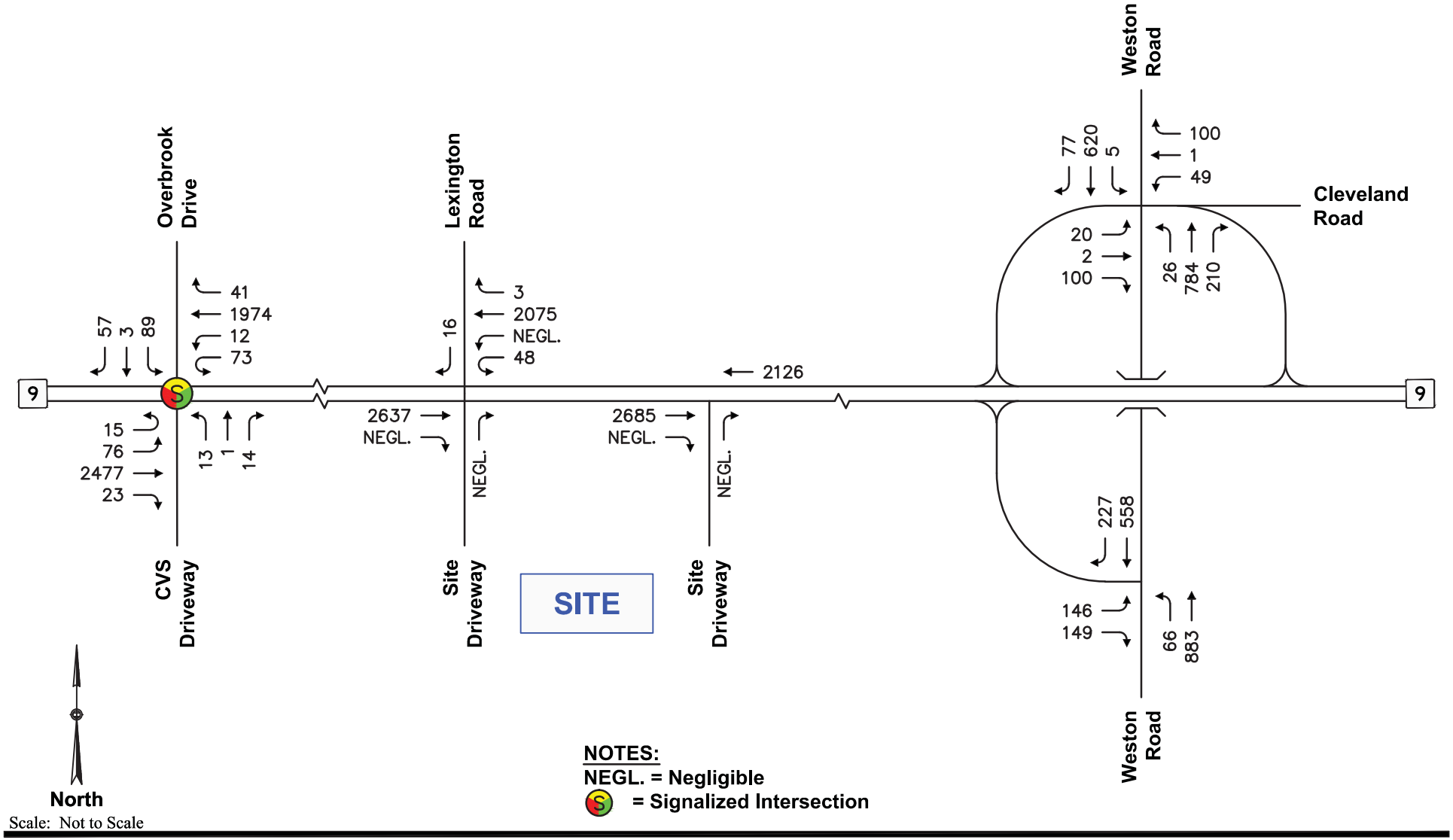

Figure 6

MDM TRANSPORTATION CONSULTANTS, INC.
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2024 No-Build Conditions
Weekday Morning Peak Hour Traffic Volumes

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

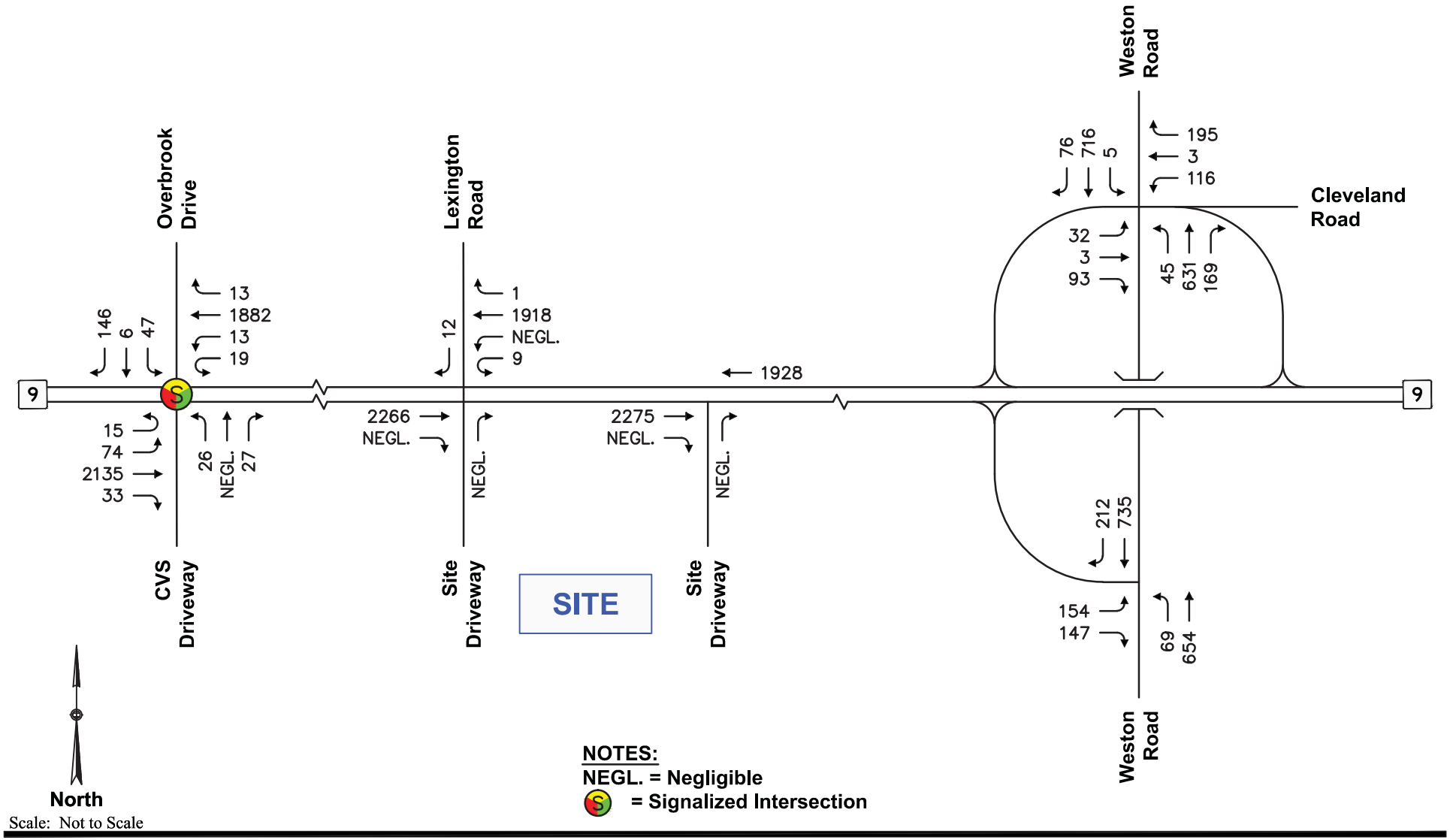

Figure 7

2024 No-Build Conditions
Weekday Evening Peak Hour Traffic Volumes

MDM TRANSPORTATION CONSULTANTS, INC.
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Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

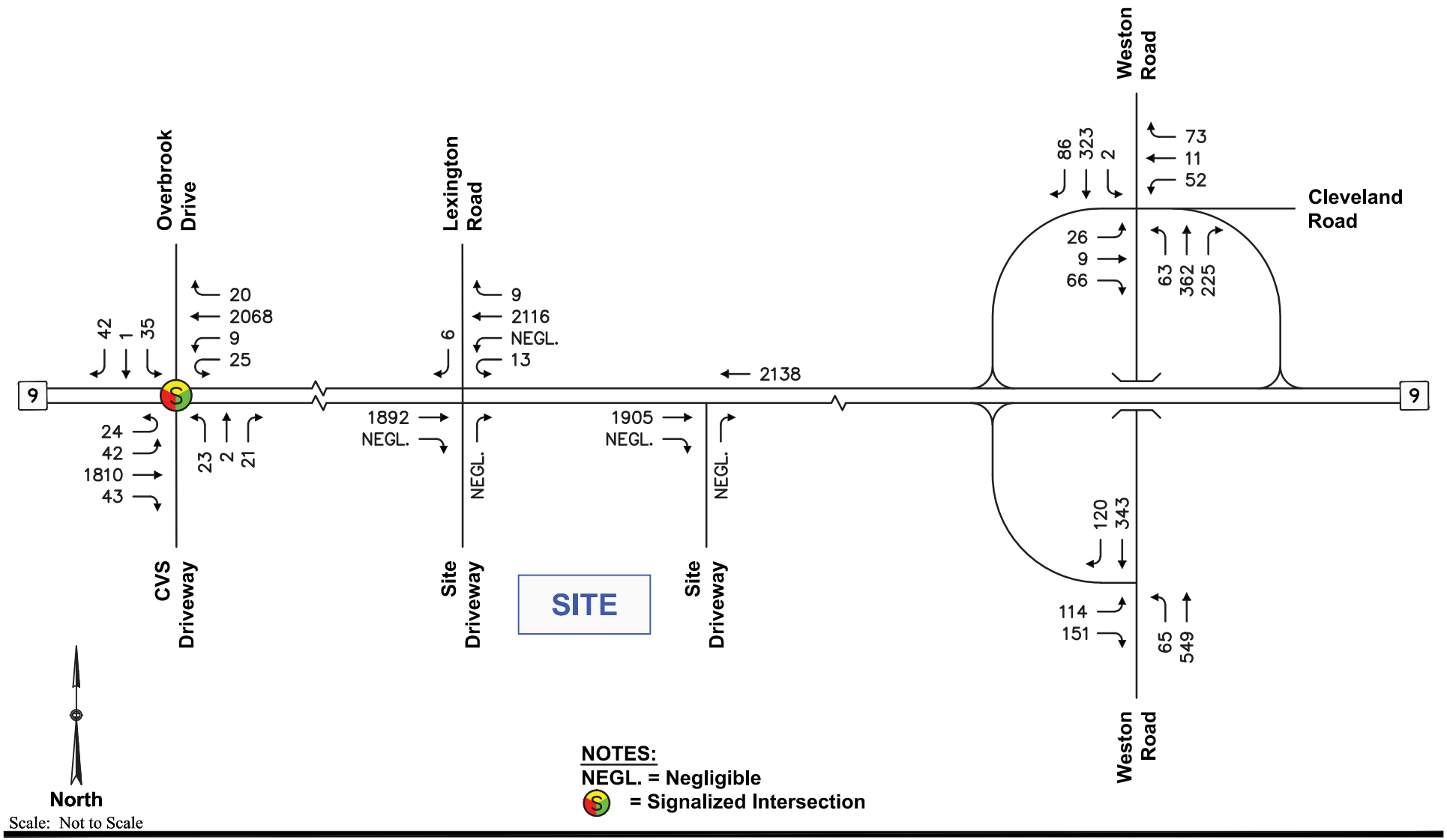

Figure 8

2024 No-Build Conditions
Saturday Midday Peak Hour Traffic Volumes

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

3.4 SITE-GENERATED TRAFFIC – ITE BASIS

Future Build condition traffic volumes were developed by estimating the number of peak-hour trips expected to be generated by the proposed development and distributing this additional traffic onto the local roadway network. These future development-related trips were added to future No-Build traffic volumes to evaluate future traffic operations with the proposed residential development in place. The methodology utilized to estimate the future trip-generation characteristics of the proposed development are summarized below.

In accordance with EEA/MassDOT guidelines, the traffic generated by the proposed development was estimated using trip rates published in ITE's *Trip Generation* for the Land Use Code (LUC) based on trip rates for Soccer Complex (LUC 488) and Health/Fitness Club (LUC 492). Trips for the Ice Rink use was estimated based on empirical ice rink observations at the Essex Sports Complex in Middleton, MA on Thursday, March 23, 2017 and Saturday, March 25, 2017 and at the New England Sports Center in Marlborough, MA on Tuesday, October 20, 2015 and Saturday, October 17, 2015. **Table 6** presents the trip-generation estimates for the proposed development. No pass-by trips were assumed for proposed sports complex uses. Detailed trip generation comparison is provided in the **Appendix**.

TABLE 6
TRIP-GENERATION SUMMARY

Peak Hour/Direction	Ice Rinks[1]	Turf Field[2]	Health Club[3]	Total Trips
Weekday Morning Peak Hour:				
Entering	20	1	24	**45**
Exiting	130	0	26	**156**
Total	150	1	50	**201**
Weekday Evening Peak Hour:				
Entering	67	12	72	**151**
Exiting	56	6	70	**132**
Total	123	18	142	**283**
Saturday Midday Peak Hour:				
Entering	64	14	44	**122**
Exiting	58	16	53	**127**
Total	122	30	97	**249**
Weekday Daily (24 hours)	1,476	300	1,152	**2,928**
Saturday Daily (24 hours)	1,464	420	730	**2,614**

[1] Based on empirical data for ice rink use in Middleton and Marlborough, MA. Assumes maximum potential use of ice rinks for early AM periods; typical ice sheet use during early AM periods may exhibit lower trip characteristics.
[2] ITE LUC 488 – Soccer Complex applied to 1 field.
[3] ITE LUC 492 – Health/ Fitness Club applied to 35,000 sf.

As summarized in **Table 6**, the proposed development is estimated to generate approximately 201 trips during the weekday morning peak hour (45 entering and 156 exiting), 283 trips during the weekday evening peak hour (151 entering and 132 exiting) and 249 vehicle trips during the Saturday midday peak hour (122 entering and 127 exiting). On a daily basis, the development is estimated to generate approximately 2,928 vehicle trips on a weekday and 2,614 vehicle trips on a Saturday.

3.5 TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of development-generated trips on the roadway network is a function of a number of variables including area population centers and the efficiency of these roadways leading to the Site. Area population centers within a 20-minute drive of the site serve as the primary basis for determining the trip distribution pattern for the sports complex. The resulting trip distribution pattern for the Site is presented in **Figure 9**, with detailed calculations provided in the **Appendix.**

Figure 10, **Figure 11**, and **Figure 12** present projected site-generated traffic volumes for the weekday morning, weekday evening, and Saturday midday peak hours for the proposed sports complex based on the trip generation presented in **Table 6** and projected travel patterns presented in **Figure 9**.

3.6 ADJACENT OFFICE RE-DISTRIBUTION

The project anticipates the possibility of a cross-connecting driveway with the adjacent office development at 888 – 892 Worcester Street (74,790± sf of general office space) to provide access to the proposed signal at the Site, thereby facilitating westbound egress toward Metrowest communities. Trips for the office space were estimated based on ITE trip generation rates for LUC 710 General Office applied to 74,790 sf with an observed arrival pattern of 40% from the east based on TMC data collected in March 2017. The resulting trip re-distribution tracings for the internal connection during the peak hours are provided in the **Appendix.**

3.7 BUILD TRAFFIC VOLUMES

Future Build condition traffic volumes were arrived at by re-distributing trips for the adjacent office building and adding development-specific traffic volumes to the 2024 No-Build conditions. The resulting 2024 Build condition traffic-volume networks for the weekday morning, weekday evening and Saturday midday peak hours are displayed in **Figure 13**, **Figure 14**, and **Figure 15**, respectively.

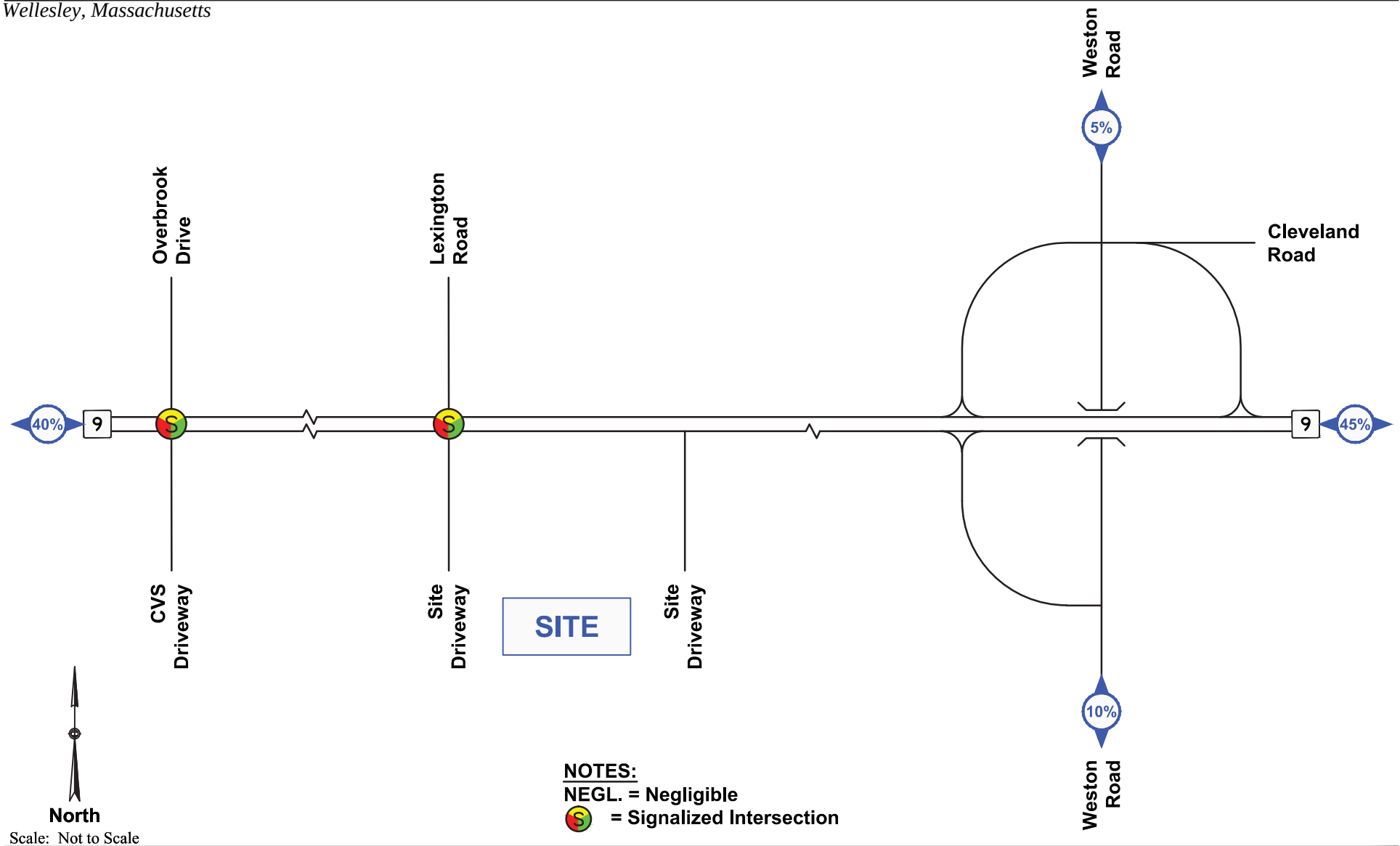

Figure 9

Trip Distribution

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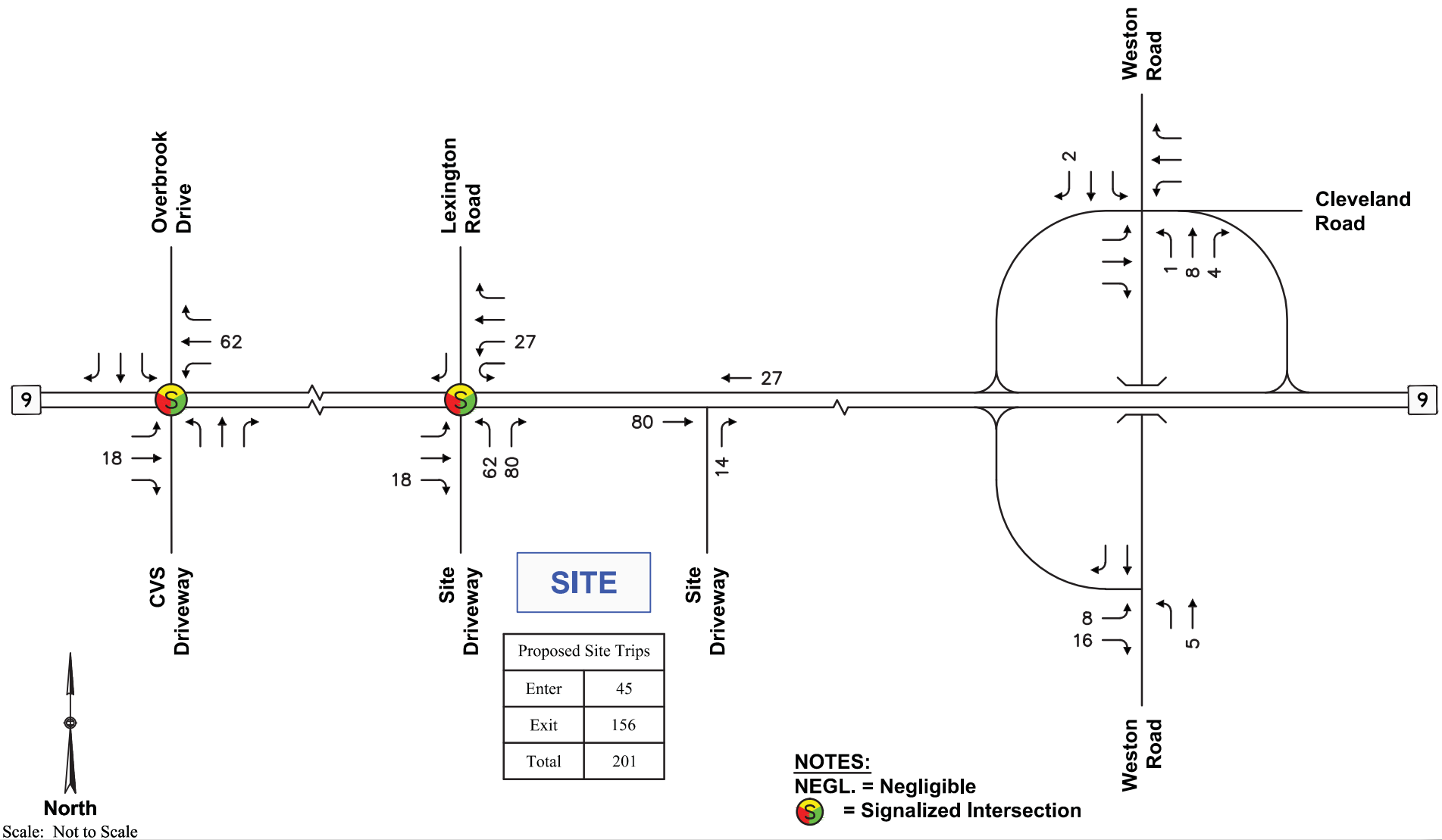

Proposed Site Trips	
Enter	45
Exit	156
Total	201

Figure 10

Site Generated Trips
Weekday Morning Peak Hour Traffic Volumes

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Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

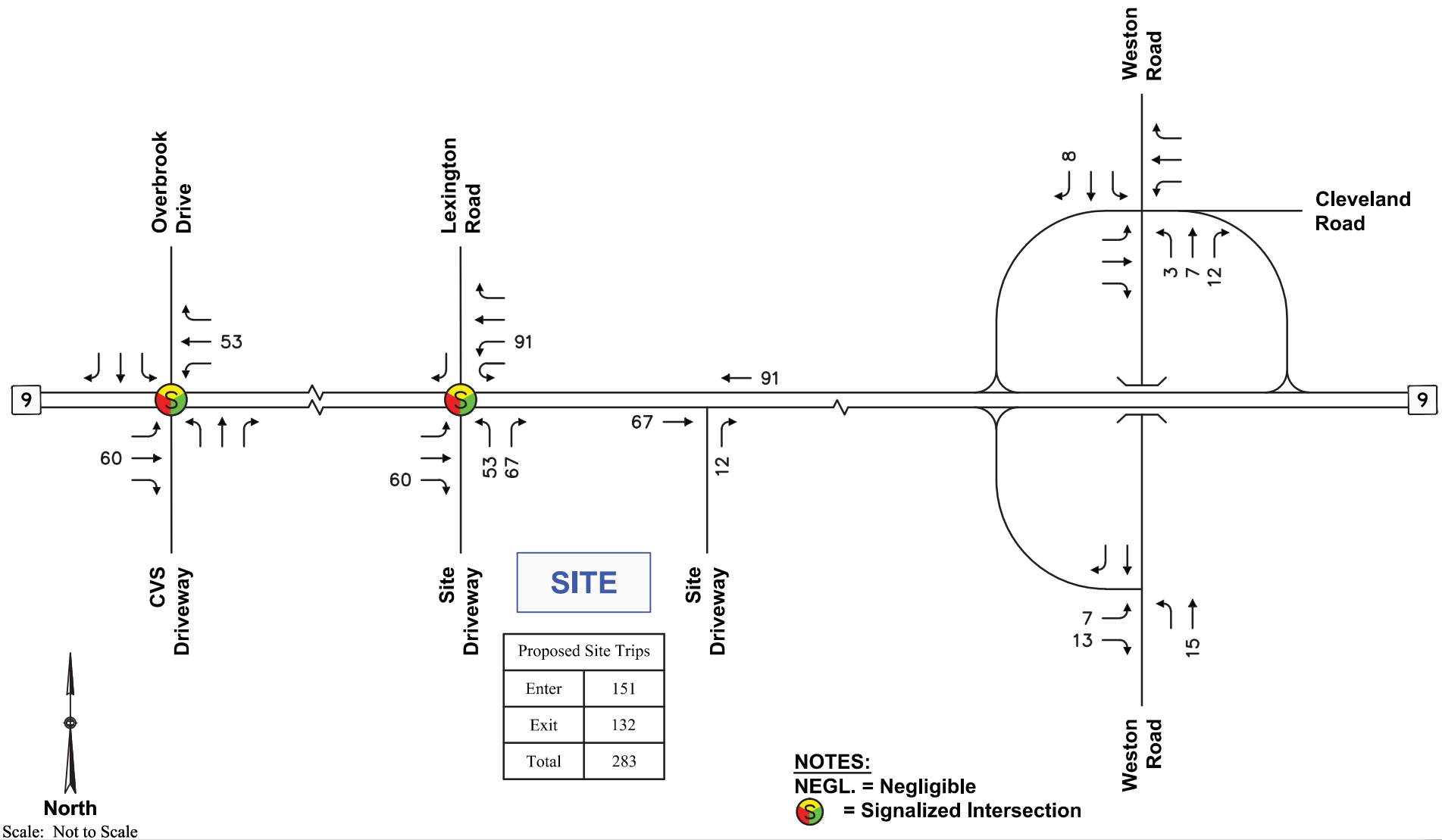

Figure 11

Site Generated Trips
Weekday Evening Peak Hour Traffic Volumes

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

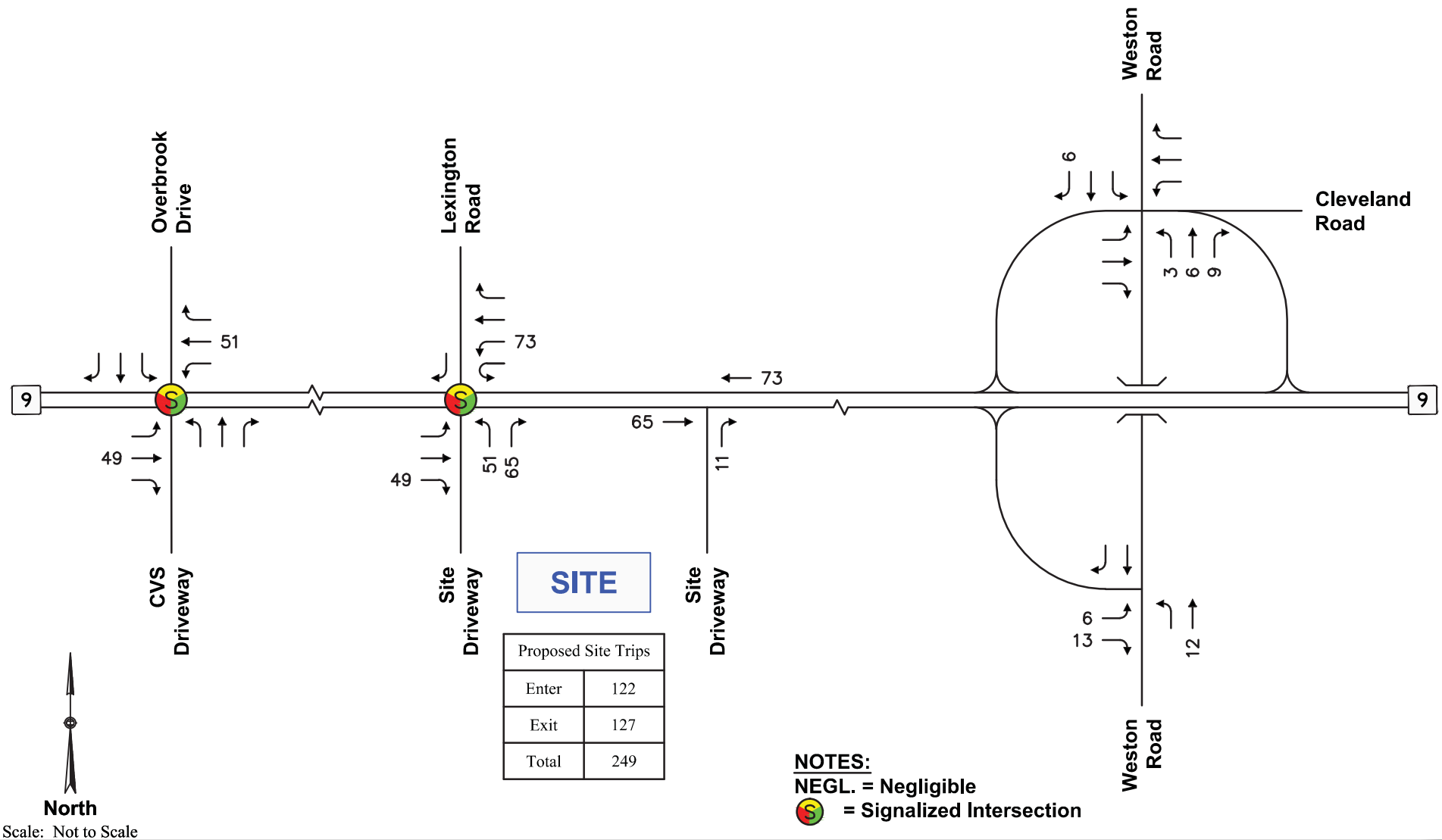

Figure 12

Site Generated Trips
Saturday Midday Peak Hour Traffic Volumes

MDM TRANSPORTATION CONSULTANTS, INC.
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Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

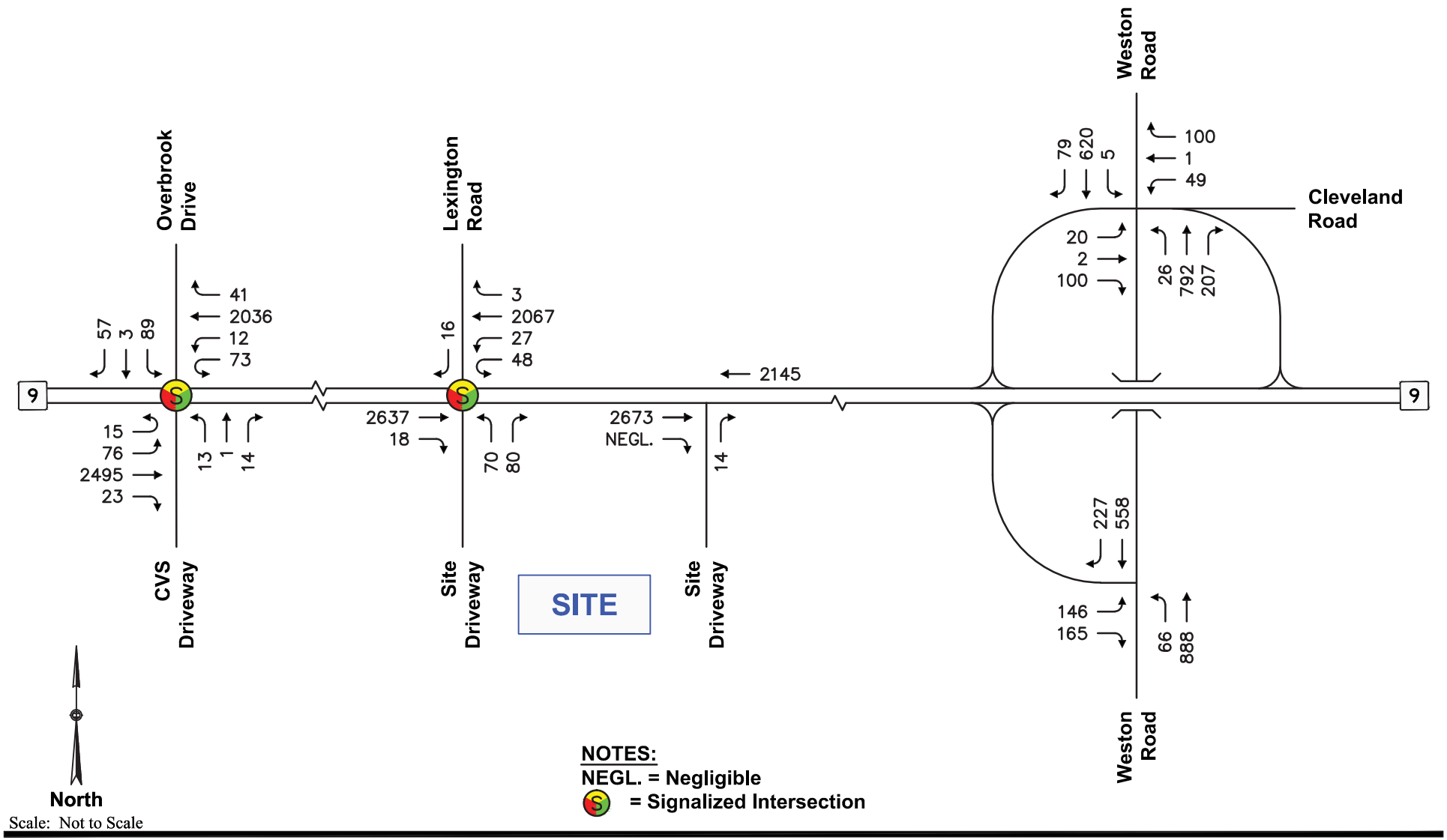


Figure 13

2024 Build Conditions
Weekday Morning Peak Hour Traffic Volumes

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

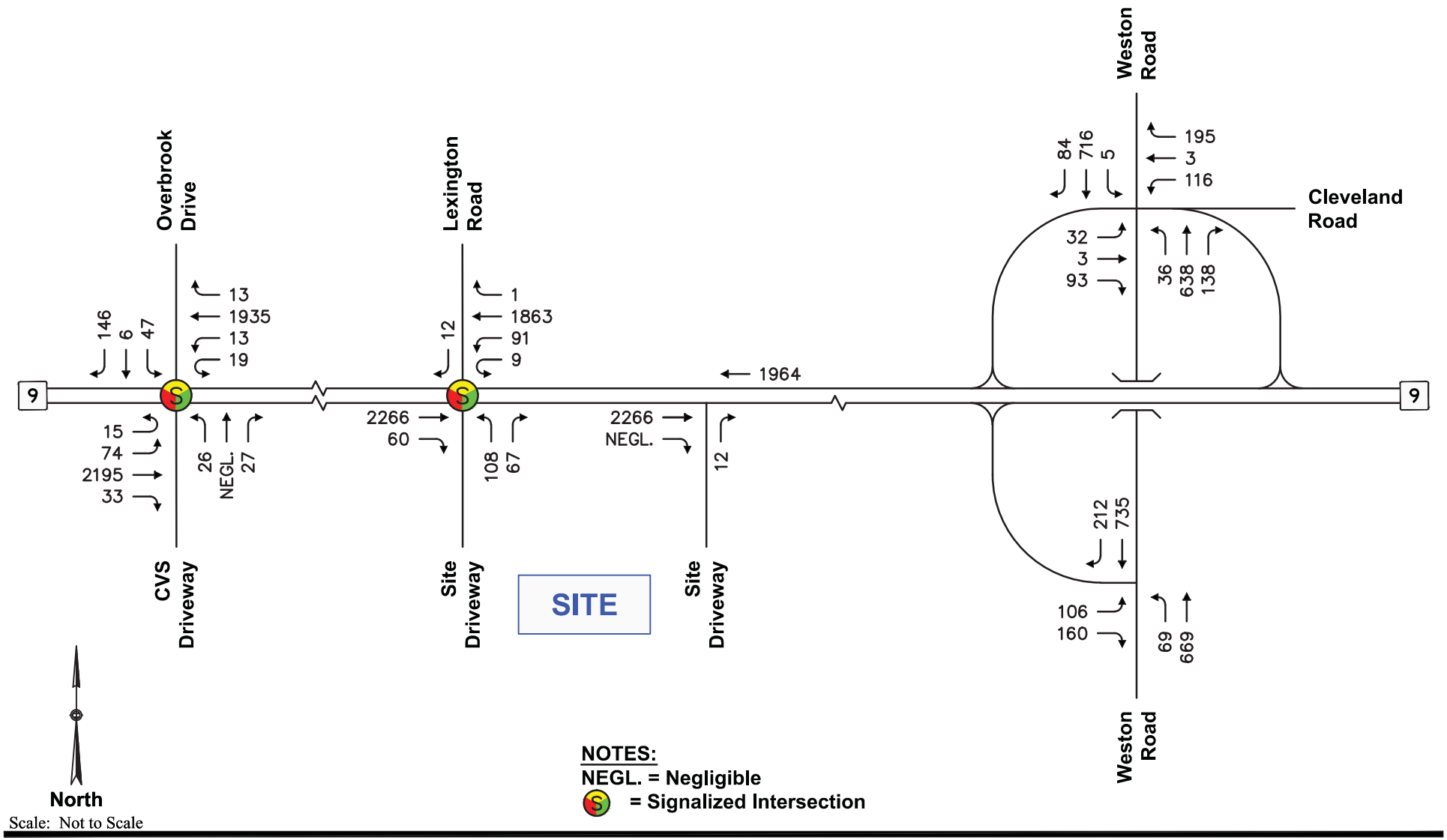


Figure 14

2024 Build Conditions
Weekday Evening Peak Hour Traffic Volumes

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

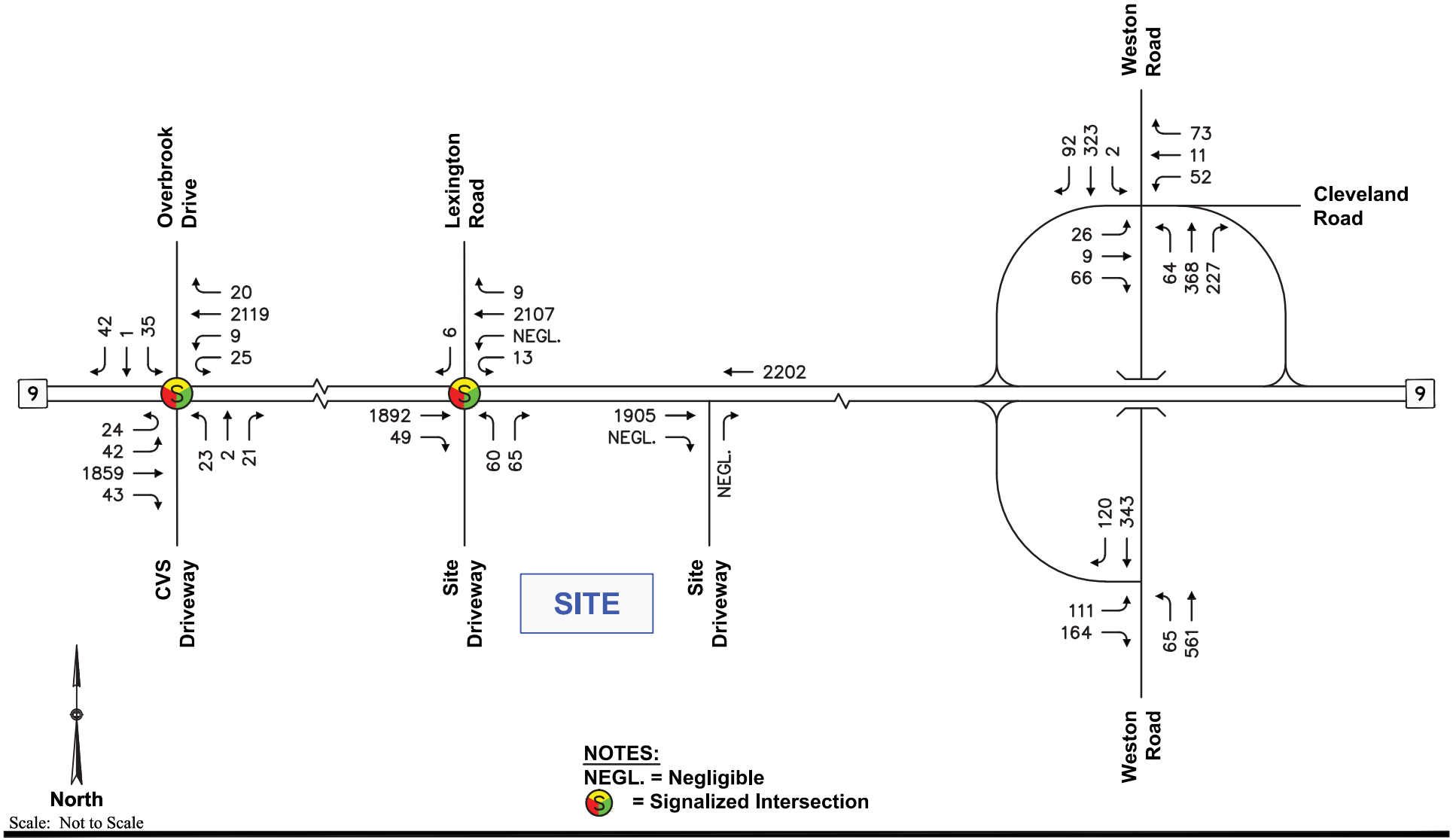


Figure 15

2024 Build Conditions
Saturday Midday Peak Hour Traffic Volumes

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

4.0 TRAFFIC SIGNAL WARRANT ANALYSIS

Traffic signal warrant criteria were reviewed to justify signal installation at the Lexington Road/Primary Site Drive intersection. The warrant reviewed for this report is based on the Manual on Uniform Traffic Control Devices[2]. (MUTCD) 2009 Edition and include Warrant 1: Eight-Hour Vehicular Volume which is the signal warrant most typically used by MassDOT in justifying traffic signal installation. The traffic signal warrant was reviewed based on existing traffic volumes on Route 9 and estimated trips for the proposed sports complex. Detailed calculation sheets are included in the **Appendix**.

The regulatory operating speed of Route 9 is currently 50 mph with 2 through travel lanes in each direction. The Primary Site Driveway approach will have a left and right turn lane; however, for this analysis only the left-turn volume was considered in the traffic signal warrant analysis. Based on these conditions, the minimum criteria needed to satisfy the signal Warrant 1B is 53 or more vehicles on the minor approach (left turn lane) and 630 or more on the major approaches. The traffic signal analysis for Warrant 1 is summarized in **Table 7** for the core operation hours of the proposed sports complex.

[2] *Manual on Uniform Traffic Control Devices, 2009 Edition,* ATSSA /ITE/AASHTO, 2009.

TABLE 7
TRAFFIC SIGNAL WARRENT 1 ANALYSIS SUMMARY

Time Period	Total Major Street Volume[1]	Minor Street Volume[2]	Warrant Satisfied? Condition B[3]
6:00 – 7:00 AM	2977	25	No
7:00 – 8:00 AM	3789	64	Yes
8:00 – 9:00 AM	4243	64	Yes
9:00 – 10:00 AM	3179	57	Yes
10:00 – 11:00 AM	2985	56	Yes
11:00 – 12:00 PM	3098	41	No
12:00 – 1:00 PM	4690	60	Yes
1:00 – 2:00 PM	4455	37	No
2:00 – 3:00 PM	5219	31	No
3:00 – 4:00 PM	5539	63	Yes
4:00 – 5:00 PM	5624	100	Yes
5:00 – 6:00 PM	5759	108	Yes
6:00 – 7:00 PM	5089	55	Yes
7:00 – 8:00 PM	3579	39	No
8:00 – 9:00 PM	2731	8	No
9:00 – 10:00 PM	2182	20	No
		HOURS MET	**9**

[1]Route 9 existing volumes from ATR adjacent to the Site.
[2]Primary Site Drive – left turn volume only
[3]Condition B requirements: Major = 630 vph, Minor = 53 vph

As summarized in **Table 7**, the criteria for traffic signal warrant 1 are satisfied for Condition B. Thus, with the proposed sports complex in place and cross-connecting driveway to the adjacent 88-892 Worcester Road office building a traffic signal is warranted and justified at the Route 9 intersection with Lexington Road/Primary Site Driveway. While not directly accounted for in the traffic signal warrant analysis, it should be noted that signal control would also specifically benefit pedestrian crossings of Route 9 along a route that is proximate to the Cochituate Aquifer (Crosstown) Trail system and would create gaps for westbound left turns into the facility and right turns onto Route 9 from the facility.

5.0 TRAFFIC OPERATIONS ANALYSIS

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

5.1 CAPACITY ANALYSIS PROCEDURES

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 and 80 seconds for signalized movements). The specific control delays and associated LOS designations are presented in the **Appendix.**

5.2 INTERSECTION CAPACITY ANALYSIS RESULTS

Capacity analysis results for the weekday morning weekday evening and Saturday midday peak hour capacity analysis results for the study intersections are described below, with detailed analysis results presented in the **Appendix**.

5.2.1 Level of Service Analysis

The capacity analysis results for the intersections in the study area are summarized in **Table 8**, **Table 9** and **Table 10** for the weekday morning, weekday evening, and Saturday midday peak hours, respectively. Detailed analysis results are presented in the **Appendix**.

TABLE 8
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY MORNING PEAK HOUR

		2017 Baseline			2024 No-Build			2024 Build		
Intersection	Approach	v/c[1]	Delay[2]	LOS[3]	v/c	Delay	LOS	v/c	Delay	LOS
Route 9 at Overbrook	Eastbound	0.96	30	C	>1.0	49	D	>1.0	51	D
Dr/	Westbound	0.78	19	B	0.86	24	C	0.89	21	C
CVS Driveway	Northbound	0.12	54	D	0.14	55	D	0.14	55	D
	Southbound	0.90	>80	F	0.97	>80	F	0.97	>80	F
	OVERALL	**0.96**	**27**	**C**	**>1.0**	**40**	**D**	**>1.0**	**40**	**D**
Route 9 at	Eastbound	0.00	<5	A	0.00	<5	A	0.97	11	B
Lexington Rd/	Westbound	0.00	<5	A	0.00	<5	A	0.67	6	A
Site Driveway	WB U-Turn/ L	>1.0	>50	F	>1.0	>50	F	0.51	64	E
	Northbound	0.00	<5	A	0.00	<5	A	0.51	40	D
	Southbound	0.06	20	C	0.08	23	C	0.08	<5	A
	OVERALL	**n/a[4]**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**0.97**	**10**	**A**
Route 9 EB Ramps	EB L/R Exit[5]	0.70	31	D	0.81	44	E	0.83	46	E
at Weston Rd	Northbound	0.08	10	A	0.09	10	A	0.09	10	A
	Southbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Route 9 WB Ramps	EB L Exit	0.21	>50	F	0.27	>50	F	0.27	>50	F
at Weston Rd/	EB T/R Exit	0.21	15	B	0.23	16	C	0.23	16	C
Cleveland Rd	WB L/R Exit	0.52	38	E	0.67	>50	F	0.68	>50	F
	Northbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Southbound	0.01	<5	A	0.01	<5	A	0.01	<5	A
Route 9 at	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Site Driveway	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	NB R Exit	0.00	<5	A	0.00	<5	A	0.14	42	E

[1] Volume-to-capacity ratio
[2] Average control delay per vehicle (in seconds)
[3] Level of service
[4] n/a = not applicable
[5] The Route 9 eastbound approach to Weston Road was calibrated based on observed conditions.

TABLE 9
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY EVENING PEAK HOUR

		2017 Baseline			2024 No-Build			2024 Build		
Intersection	Approach	v/c[1]	Delay[2]	LOS[3]	v/c	Delay	LOS	v/c	Delay	LOS
Route 9 at	Eastbound	0.83	20	C	0.89	27	C	0.92	29	C
Overbrook Dr/	Westbound	0.73	15	B	0.80	17	B	0.82	15	B
CVS Driveway	Northbound	0.40	69	E	0.43	71	E	0.43	71	E
	Southbound	0.79	49	D	0.82	56	E	0.83	57	E
	OVERALL	**0.83**	**19**	**B**	**0.89**	**24**	**C**	**0.92**	**24**	**C**
Route 9 at	Eastbound	0.00	<5	A	0.00	<5	A	0.90	8	A
Lexington Rd/	Westbound	0.00	<5	A	0.00	<5	A	0.61	6	A
Site Driveway	WB U-Turn/ L	0.13	>50	F	0.20	>50	F	0.59	66	E
	Northbound	0.00	<5	A	0.00	<5	A	0.61	44	D
	Southbound	0.04	19	C	0.05	20	C	0.05	<5	A
	OVERALL	**n/a[4]**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**0.90**	**10**	**A**
Route 9 EB Ramps	EB L/R Exit[5]	0.65	27	D	0.76	36	E	0.61	25	C
at Weston Rd	Northbound	0.09	10	A	0.10	11	B	0.10	11	B
	Southbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Route 9 WB Ramps	EB L Exit	0.45	>50	F	0.62	>50	F	0.61	>50	F
at Weston Rd/	EB T/R Exit	0.23	16	C	0.26	18	C	0.26	18	C
Cleveland Rd	WB L/R Exit	>1.0	>50	F	>1.0	>50	F	>1.0	>50	F
	Northbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Southbound	0.01	<5	A	0.01	<5	A	0.01	<5	A
Route 9 at	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Site Driveway	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	NB R Exit	0.00	<5	A	0.00	<5	A	0.08	29	D

[1] Volume-to-capacity ratio
[2] Average control delay per vehicle (in seconds)
[3] Level of service
[4] n/a = not applicable
[5] The Route 9 eastbound approach to Weston Road was calibrated based on observed conditions.

TABLE 10
INTERSECTION CAPACITY ANALYSIS RESULTS
SATURDAY MIDDAY PEAK HOUR

		2017 Baseline			2024 No-Build			2024 Build		
Intersection	Approach	v/c[1]	Delay[2]	LOS[3]	v/c	Delay	LOS	v/c	Delay	LOS
Route 9 at	Eastbound	0.74	16	B	0.80	18	B	0.82	19	B
Overbrook Dr/	Westbound	0.87	22	C	0.94	29	C	0.97	32	C
CVS Driveway	Northbound	0.16	39	D	0.18	39	D	0.18	39	D
	Southbound	0.40	27	C	0.42	28	C	0.42	28	C
	OVERALL	**0.87**	**19**	**B**	**0.94**	**24**	**C**	**0.97**	**26**	**C**
Route 9 at	Eastbound	0.00	<5	A	0.00	<5	A	0.78	18	B
Lexington Rd/	Westbound	0.00	<5	A	0.00	<5	A	0.70	7	A
Site Driveway	WB U-Turn/ L	0.13	47	E	0.17	>50	F	0.42	41	D
	Northbound	0.00	<5	A	0.00	<5	A	0.33	22	C
	Southbound	0.03	21	C	0.03	23	C	0.02	<5	A
	OVERALL	**n/a[4]**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**0.78**	**13**	**B**
Route 9 EB Ramps	EB L/R Exit[5]	0.42	15	B	0.47	16	C	0.48	16	C
at Weston Rd	Northbound	0.06	9	A	0.07	9	A	0.06	9	A
	Southbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Route 9 WB Ramps	EB L Exit	0.09	19	C	0.11	21	C	0.11	21	C
at Weston Rd/	EB T/R Exit	0.11	11	B	0.13	12	B	0.13	12	B
Cleveland Rd	WB L/R Exit	0.22	16	C	0.25	17	C	0.25	17	C
	Northbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Southbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Route 9 at	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Site Driveway	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	NB R Exit	0.00	<5	A	0.00	<5	A	0.05	22	C

[1] Volume-to-capacity ratio
[2] Average control delay per vehicle (in seconds)
[3] Level of service
[4] n/a = not applicable
[5] The Route 9 eastbound approach to Weston Road was calibrated based on observed conditions.

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

- *Route 9 at Lexington Street/Primary Site Driveway.* Under No-Build (unsignalized) conditions the westbound U-Turns at this intersection operates with long delays during the peak hours. Signal control would improve overall operations to LOS B or better during the peak hours. Assuming coordinated signal control with the nearby Overbrook Drive and Oak Street intersections, the mainline travel along Route 9 will continue to operate with minimal delay during the weekday morning and evening peak hours; westbound U-Turns/left turns will be facilitated with delays of approximately 1 minute or less with queues that are entirely accommodated within available lane storage.

- *Route 9 Eastbound ramps at Weston Road.* Under No-Build conditions left-turns onto Weston Road operate with moderate delays during peak hours. Assuming signal control is implemented at the Site and driveway cross-connection to the adjacent office building, the intersection of Route 9 eastbound ramps at Weston Road will experience a net trip reduction of up to 100 vehicles during the peak hours with associated net reduction in travel delay for left-turns.

- *Route 9 Westbound ramps at Weston Road.* Under No-Build conditions left-turns onto Weston Road will operate with long delays during the weekday evening peak hour. Assuming signal control is implemented at the Site and driveway cross-connection to the adjacent office building, the intersection of Route 9 eastbound ramps at Weston Road will incur a net trip reduction of up to 100 vehicles during the peak hours with associated net reduction in travel delay for left-turns.

- *Route 9 at Secondary Site Driveway (Right-out only).* Under Build conditions, the proposed secondary site driveways approach to Route 9 will operate below capacity during the peak hours. Mainline travel along Route 9 eastbound will remain unimpeded.

In summary, proposed signal control at the primary Site driveway will accommodate peak Site operations with modest delays (LOS B or better) with neutral impact to the nearby interchange of Weston Road at Route 9. A cross-connecting driveway between the property and adjoining office building at 888-894 Worcester Road would result in a further net trip reduction at the interchange during peak hours relative to existing conditions that would result in reduced delays/improved operations relative to No-Build conditions. Signal control at the Site would also accommodate a controlled pedestrian crossing that connects the adjoining residential neighborhoods to the property, and that is consistent with the Town objectives of providing a Route 9 crossing point that is proximate to the Cochituate Aquifer Trail system.

5.2.2 Vehicle Queue Analysis

Vehicle queue results are presented for the signalized intersections in the study area. These vehicle queues are compared to available storage lengths, which are defined as lengths of exclusive turn lanes or the distance to the nearest major intersection for through lanes. Vehicle queue results from the capacity analysis are summarized in **Table 11** and **Table 12**. Detailed worksheets of the queuing analysis are provided in the **Appendix**.

TABLE 11
VEHICLE QUEUE ANALYSIS SUMMARY
WORCESTER STREET ROUTE 9 AT OVERBROOK DRIVE/CVS DRIVEWAY

Approach	Storage Length (feet)	2024 No-Build		2024 Build	
		Average Queue Length[1]	95th Percentile Queue Length[1]	Average Queue Length	95th Percentile Queue Length
Weekday Morning Peak Hour					
Eastbound L	250+	70	126	70	126
Eastbound T/R	1850±	1123	1256	1138	1271
Westbound L	355±	67	163	67	123
Westbound T/R	1700±	610	764	487	570
Northbound L	150±	<25	31	<25	31
Northbound R	50±	<25	<25	<25	<25
Southbound L/T/R	>1000	104	242	104	242
Weekday Evening Peak Hour					
Eastbound L	250+	71	173	71	173
Eastbound T/R	1850±	857	1087	1003	1140
Westbound L	355±	<25	56	<25	33
Westbound T/R	1700±	526	635	404	456
Northbound L	150±	<25	52	<25	52
Northbound R	50±	<25	<25	<25	<25
Southbound L/T/R	>1000	88	198	89	201
Saturday Midday Peak Hour					
Eastbound L	250+	36	78	36	78
Eastbound T/R	1850±	465	784	494	818
Westbound L	355±	<25	48	<25	48
Westbound T/R	1700±	697	948	729	982
Northbound L	150±	<25	37	<25	37
Northbound R	50±	<25	<25	<25	<25
Southbound L/T/R	>1000	<25	66	<25	66

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

TABLE 12
VEHICLE QUEUE ANALYSIS SUMMARY
WORCESTER STREET ROUTE 9 AT SITE DRIVEWAY/ LEXINGTON ROAD

		2024 Build	
Approach	**Storage Length (feet)**	**Average Queue Length**	**95th Percentile Queue Length**
Weekday Morning Peak Hour			
Eastbound T/R	1700±	703	894
Westbound L	250±	58	106
Westbound T/R	>2000	278	348
Northbound L/T	200±	54	103
Northbound R	125±	<25	49
Southbound L/T/R	>1000	<25	<25
Weekday Evening Peak Hour			
Eastbound T/R	1700±	35	1096
Westbound L	250±	77	135
Westbound T/R	>2000	258	341
Northbound L/T	200±	83	142
Northbound R	125±	<25	34
Southbound L/T/R	>1000	<25	<25
Saturday Midday Peak Hour			
Eastbound T/R	1700±	439	739
Westbound L	250±	45	89
Westbound T/R	>2000	261	403
Northbound L/T	200±	31	69
Northbound R	125±	<25	<25
Southbound L/T/R	>1000	<25	<25

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

As presented in **Table 11** and **Table 12,** the average and 95th percentile vehicle queues at the signalized study intersection will generally be contained within available storage lanes under Build conditions during peak hours. The project will not significantly change queue lengths compared to No-Build conditions and will generally result in an increase of 1 vehicle or less on all approaches.

6.0 PARKING ANALYSIS

This parking evaluation has been prepared in support of the sports complex which is proposed to be supported by 355± parking spaces. Peak parking requirements are based on parking rates published by the Institute of Transportation Engineers (ITE) and empirical parking data.

6.1 PROJECTED PEAK PARKING DEMAND

Empirical time-of-day factors based on observations at health clubs in Framingham and Westborough, MA in January 2007 and the Essex Sports Club in Middleton, MA in March 2017 were used to model the parking demands at the Site and to estimate the peak parking demand on a weekday and on a Saturday. The estimated peak parking demands for the site are therefore based on a database of parking characteristics for the various uses as published in *ITE's Parking Generation* and empirical data. **Table 13** summarizes the peak parking demand for the sports complex based on ITE and empirical parking methodology. Projected hourly peak parking demand calculations are presented in the **Appendix**.

TABLE 13
PEAK PARKING DEMAND

Day of Week	Empirical Data[1]	ITE Data[2]
Weekday	**308**	300
Saturday	**322**	279

[1]Based on empirical parking data for health club (35,000 sf) and soccer complex uses (3 fields).
[2]Based on ITE Parking Generation 4th Edition applied to LUC 492 Health/Fitness Club (35,000 sf) and LUC Soccer Complex (3 fields).

As shown in **Table 13:**

- *Empirical Parking Rates.* Applying empirical parking demand rates for the sports complex results in a peak parking demand for the Site of 308 spaces on a weekday and 322 spaces on a Saturday.

- *ITE Parking Rates.* Applying ITE parking demand rates for the sports complex results in a peak parking demand for the Site of 300 spaces on a weekday and 279 spaces on a Saturday.

The proposed parking supply at the site of 355± marked parking spaces is projected to adequately accommodate the anticipated parking demand of up to 322 parked vehicles under typical facility operating conditions. To the extent special programming is planned for the sports complex facility (for example, hockey tournaments and swim meets) additional parking may be required subject to a parking management protocol to be developed by Proponent. The Proponent anticipates 10-15 events a year that may require overflow parking and is currently in discussions with owner of the adjacent office buildings located at 888-892 Worcester Street as one potential location to accommodate the special event parking overflow if necessary. The special events typically occur on holiday weekends and are also anticipated to include the Wellesley/Newton hockey games.

7.0 UNSIGNALIZED ACCESS ALTERNATIVE

To the extent MassDOT does not support a traffic signal at the primary site driveway, the Proponent is considering an alternative unsignalized access plan for the primary site driveway intersection with Route 9. Under this unsignalized scenario the primary site driveway will allow left-in and right-in access but would restrict egress onto Route 9 to right-turn only. Assessment of this unsignalized access alternative is provided below.

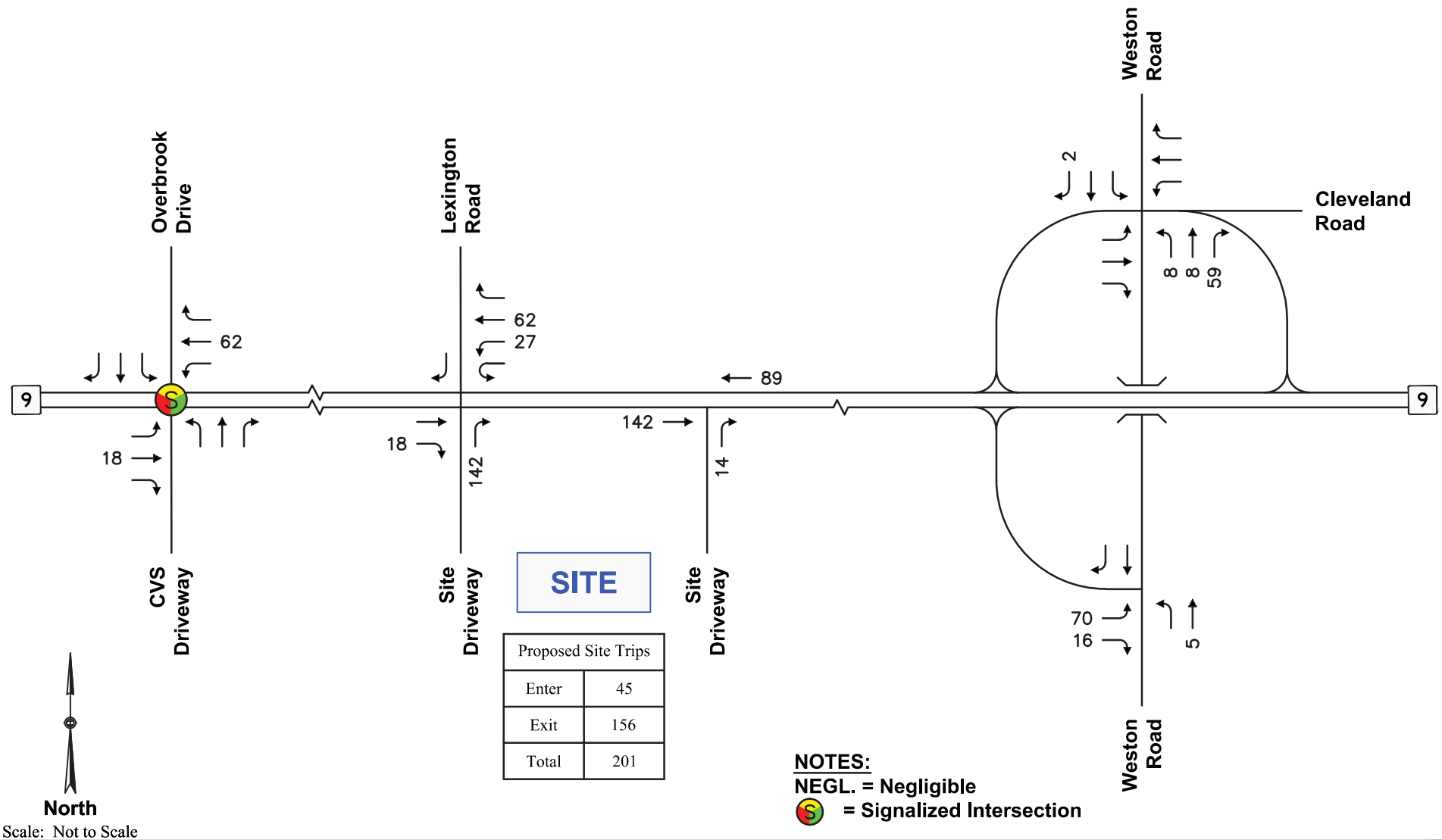
7.1 TRIP DISTRIBUTION

The distribution for projected traffic for the proposed sports complex under the unsignalized access alternative would continue to be distributed as presented in **Figure 9**. However, with left-turn egress restricted onto Route 9, vehicle trips from the Site would be required to use Weston Road to reverse direction to access Route 9 westbound. Likewise, the adjacent office development at 888 – 892 Worcester Street would also continue to use Weston Road to access Route 9 westbound. As previously mentioned 60% of the trips from the adjacent office building are projected to arrive and depart to/from the west along Route 9.

Development-related trips for the sports complex were assigned to the roadway network using the trip-generation estimates shown in **Table 6** and the distribution patterns presented in **Figure 9**. New development-related trips under the alternative access plan at each intersection approach for the weekday morning, weekday evening, and Saturday peak hours are quantified in **Figure 16**, **Figure 17**, and **Figure 18,** respectively.

7.2 ALTERNATIVE BUILD TRAFFIC VOLUMES

Future Build condition traffic volumes were arrived at by adding development-specific traffic volumes to the 2024 No-Build conditions. The resulting 2024 Build condition (Alternative) traffic-volume networks for the weekday morning, weekday evening and Saturday midday peak hours are displayed in **Figure 19**, **Figure 20**, and **Figure 21**, respectively.



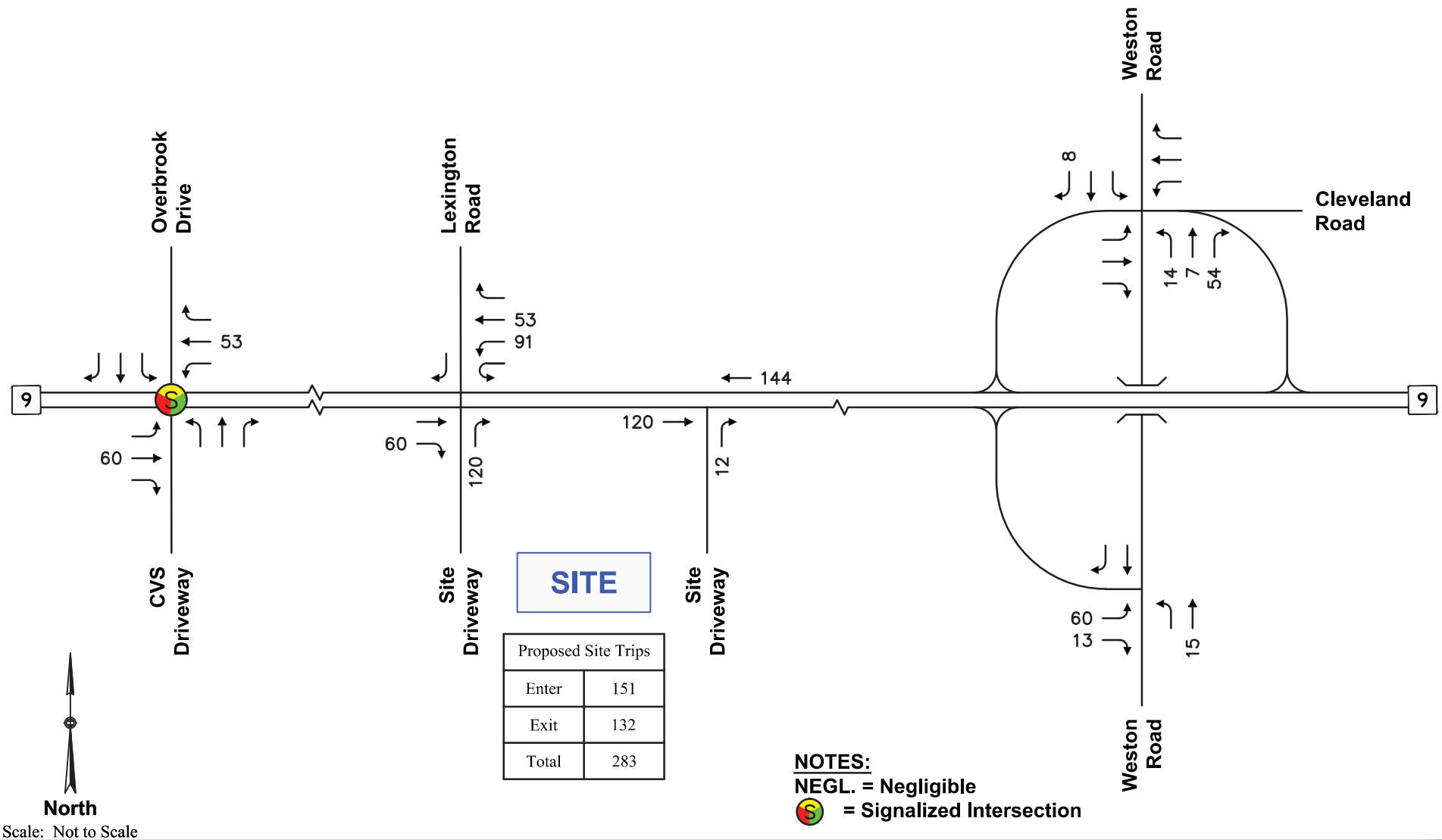
Proposed Site Trips	
Enter	45
Exit	156
Total	201

Figure 16

Site Generated Trips
Weekday Morning Peak Hour Traffic Volumes
(Unsignalized Access Alternative)

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg



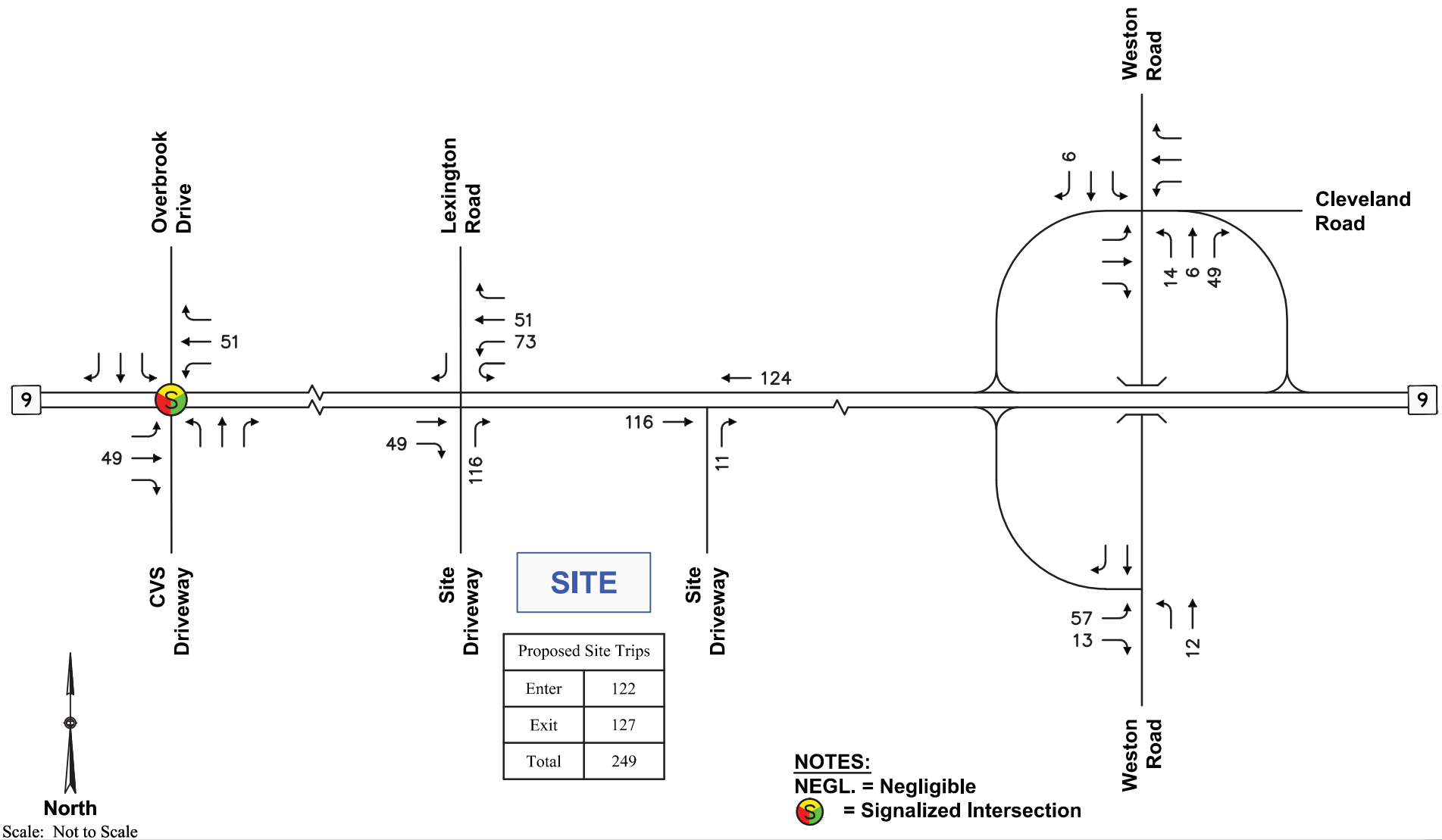
Proposed Site Trips	
Enter	151
Exit	132
Total	283

Figure 17

Site Generated Trips
Weekday Evening Peak Hour Traffic Volumes
(Unsignalized Access Alternative)

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg



Proposed Site Trips	
Enter	122
Exit	127
Total	249

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Figure 18

Site Generated Trips
Saturday Midday Peak Hour Traffic Volumes
(Unsignalized Access Alternative)

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

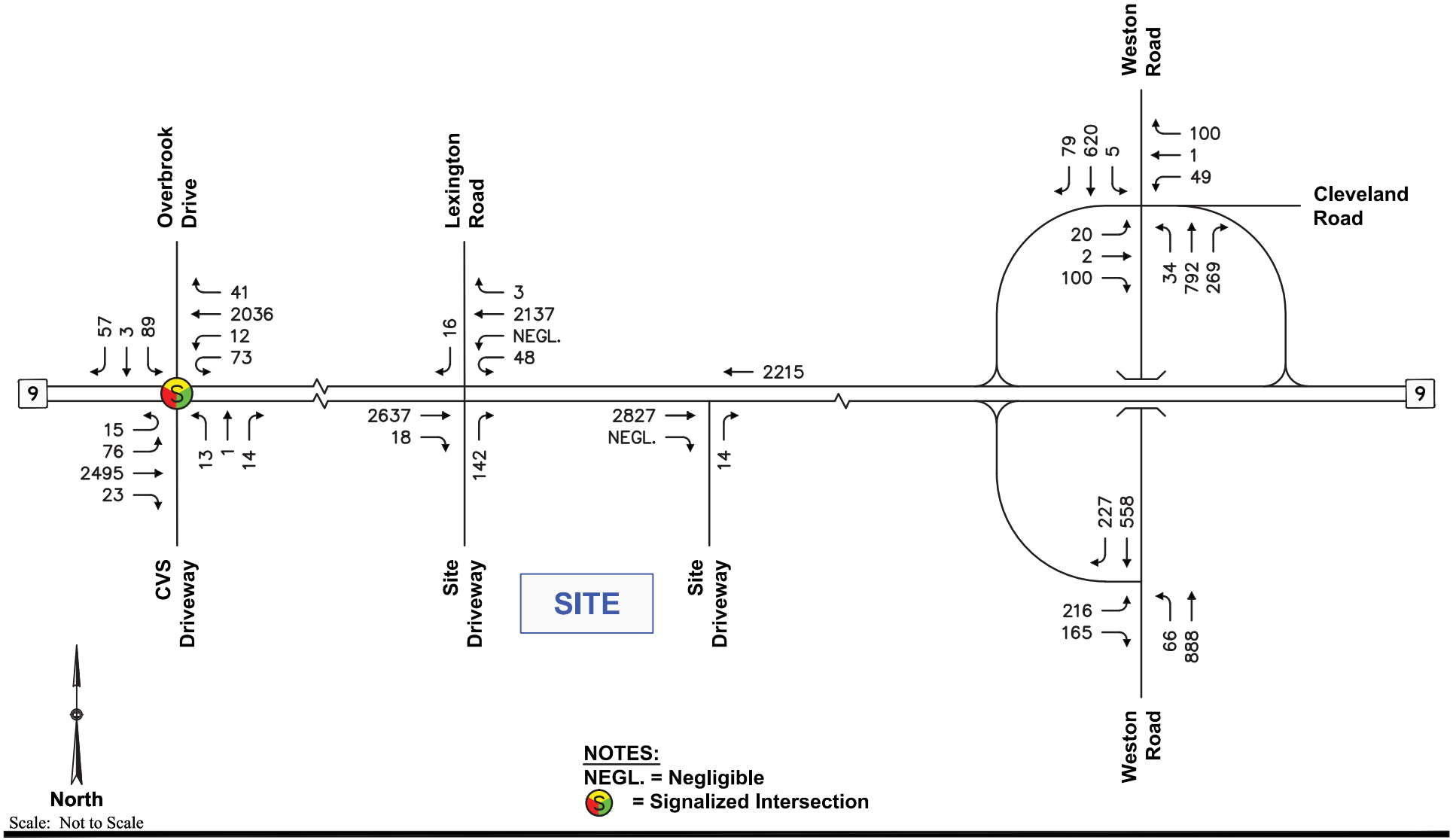


Figure 19

2024 Alternate Build Conditions
Weekday Morning Peak Hour Traffic Volumes
(Unsignalized Access Alternative)

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

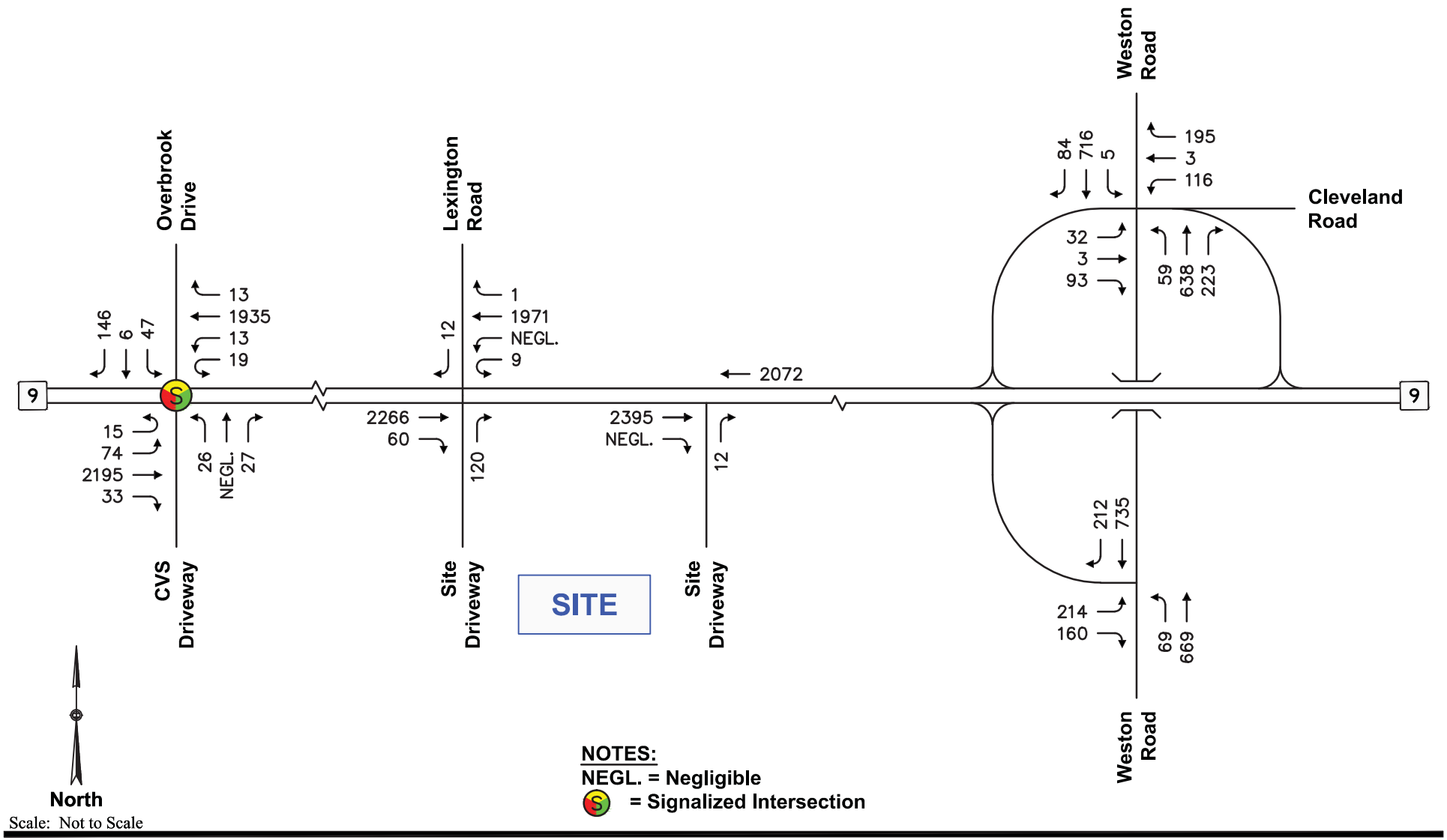


Figure 20

2024 Alternate Build Conditions
Weekday Evening Peak Hour Traffic Volumes
(Unsignalized Access Alternative)

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: March 2017
Dwg No. 923 TIAS.dwg

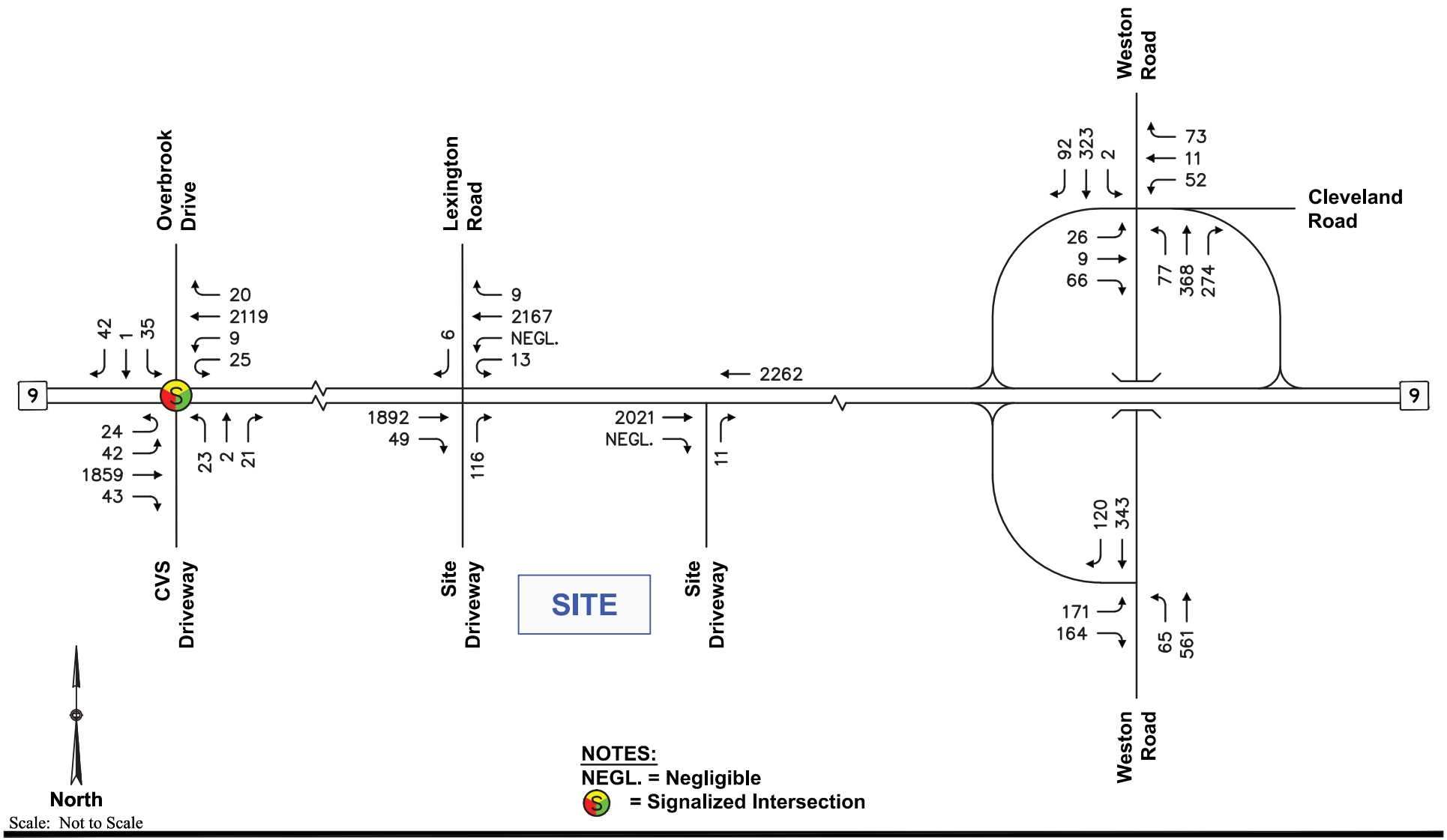


Figure 21

2024 Alternate Build
Saturday Midday Peak Hour Traffic Volumes
(Unsignalized Access Alternative)

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2017
Dwg No. 923 TIAS02 (5-24-17).dwg

7.3 INTERSECTION CAPACITY ANALYSIS RESULTS

Capacity analysis results for the weekday morning, weekday evening and Saturday midday peak hour capacity analysis results for the study intersections under the unsignalized access alternative are described below, with detailed analysis results presented in the **Appendix**.

7.3.1 Level of Service Analysis

The capacity analysis results for the intersections in the study area are summarized in **Table 14**, **Table 15** and **Table 16** for the weekday morning, weekday evening, and Saturday midday peak hours, respectively. Detailed analysis results are presented in the **Appendix**.

TABLE 14
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY MORNING PEAK HOUR
(UNSIGNALIZED ACCESS ALTERNATIVE)

		2024 No-Build			2024 Build (Signalized)			2024 Build (Alternative)		
Intersection	Approach	v/c[1]	Delay[2]	LOS[3]	v/c	Delay	LOS	v/c	Delay	LOS
Route 9 at	Eastbound	>1.0	49	D	>1.0	51	D	>1.0	51	D
Overbrook Dr/	Westbound	0.86	24	C	0.89	21	C	0.89	26	C
CVS Driveway	Northbound	0.14	55	D	0.14	55	D	0.14	55	D
	Southbound	0.97	>80	F	0.97	>80	F	0.97	>80	F
	OVERALL	**>1.0**	**40**	**D**	**>1.0**	**40**	**D**	**>1.0**	**42**	**D**
Route 9 at	Eastbound	0.00	<5	A	0.97	11	B	0.00	<5	A
Lexington Rd/	Westbound	0.00	<5	A	0.67	6	A	0.00	<5	A
Site Driveway	WB U-Turn/ L	>1.0	>50	F	0.51	64	E	>1.0	>50	F
	Northbound	0.00	<5	A	0.51	40	D	>1.0	>50	F
	Southbound	0.08	23	C	0.08	<5	A	0.08	24	C
	OVERALL	**n/a**	**n/a**	**n/a**	**0.97**	**10**	**A**	**n/a**	**n/a**	**n/a**
Route 9 EB Ramps	EB L/R Exit[5]	0.81	44	E	0.83	46	E	>1.0	>50	F
at Weston Rd	Northbound	0.09	10	A	0.09	10	A	0.09	<5	A
	Southbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Route 9 WB Ramps	EB L Exit	0.27	69	F	0.27	>50	F	0.28	71	F
at Weston Rd/	EB T/R Exit	0.23	16	C	0.23	16	C	0.23	16	C
Cleveland Rd	WB L/R Exit	0.67	>50	F	0.68	>50	F	0.69	>50	F
	Northbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Southbound	0.01	<5	A	0.01	<5	A	0.01	<5	A
Route 9 at	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Site Driveway	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	NB R Exit	0.00	<5	A	0.14	42	E	0.14	44	E

[1] Volume-to-capacity ratio
[2] Average control delay per vehicle (in seconds)
[3] Level of service
[4] n/a = not applicable

TABLE 15
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY EVENING PEAK HOUR
(UNSIGNALIZED ACCESS ALTERNATIVE)

		2024 No-Build			2024 Build (Signalized)			2024 Build (Alternative)		
Intersection	Approach	v/c[1]	Delay[2]	LOS[3]	v/c	Delay	LOS	v/c	Delay	LOS
Route 9 at	Eastbound	0.89	27	C	0.92	29	C	0.92	29	C
Overbrook Dr/	Westbound	0.80	17	B	0.82	15	B	0.82	18	B
CVS Driveway	Northbound	0.43	71	E	0.43	71	E	0.43	71	E
	Southbound	0.82	56	E	0.83	57	E	0.83	57	E
	OVERALL	**0.89**	**24**	**C**	**0.92**	**24**	**C**	**0.92**	**25**	**C**
Route 9 at	Eastbound	0.00	<5	A	0.90	8	A	0.00	<5	A
Lexington Rd/	Westbound	0.00	<5	A	0.61	6	A	0.00	<5	A
Site Driveway	WB U-Turn/ L	0.20	>50	F	0.59	66	E	>1.0	>50	F
	Northbound	0.00	<5	A	0.61	44	D	0.68	>50	F
	Southbound	0.05	20	C	0.05	<5	A	0.05	21	C
	OVERALL	**n/a**	**n/a**	**n/a**	**0.90**	**10**	**A**	**n/a**	**n/a**	**n/a**
Route 9 EB Ramps	EB L/R Exit[5]	0.76	36	E	0.61	25	C	>1.0	>50	F
at Weston Rd	Northbound	0.10	11	B	0.10	11	B	0.10	11	B
	Southbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Route 9 WB Ramps	EB L Exit	0.62	>50	F	0.61	>50	F	0.66	>50	F
at Weston Rd/	EB T/R Exit	0.26	18	C	0.26	18	C	0.26	18	C
Cleveland Rd	WB L/R Exit	>1.0	>50	F	>1.0	>50	F	>1.0	>50	F
	Northbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Southbound	0.01	<5	A	0.01	<5	A	0.01	<5	A
Route 9 at	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Site Driveway	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	NB R Exit	0.00	<5	A	0.08	29	D	0.09	31	D

[1] Volume-to-capacity ratio
[2] Average control delay per vehicle (in seconds)
[3] Level of service
[4] n/a = not applicable

TABLE 16
INTERSECTION CAPACITY ANALYSIS RESULTS
SATURDAY MIDDAY PEAK HOUR
(UNSIGNALIZED ACCESS ALTERNATIVE)

		2024 No-Build			2024 Build (Signalized)			2024 Build (Alternative)		
Intersection	Approach	v/c[1]	Delay[2]	LOS[3]	v/c	Delay	LOS	v/c	Delay	LOS
Route 9 at	Eastbound	0.80	18	B	0.82	19	B	0.82	19	B
Overbrook Dr/	Westbound	0.94	29	C	0.97	32	C	0.94	29	C
CVS Driveway	Northbound	0.18	39	D	0.18	39	D	0.18	39	D
	Southbound	0.42	28	C	0.42	28	C	0.42	28	C
	OVERALL	**0.94**	**24**	**C**	**0.97**	**26**	**C**	**0.94**	**24**	**C**
Route 9 at	Eastbound	0.00	<5	A	0.78	18	B	0.00	<5	A
Lexington Rd/	Westbound	0.00	<5	A	0.70	7	A	0.00	<5	A
Site Driveway	WB U-Turn/ L	0.17	>50	F	0.42	41	D	0.69	>50	F
	Northbound	0.00	<5	A	0.33	22	C	0.50	34	D
	Southbound	0.03	23	C	0.02	<5	A	0.03	24	C
	OVERALL	**n/a**	**n/a**	**n/a**	**0.78**	**13**	**B**	**n/a**	**n/a**	**n/a**
Route 9 EB Ramps	EB L/R Exit[5]	0.47	16	C	0.48	16	C	0.63	21	C
at Weston Rd	Northbound	0.07	9	A	0.06	9	A	0.07	<5	A
	Southbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Route 9 WB Ramps	EB L Exit	0.11	21	C	0.11	21	C	0.11	21	C
at Weston Rd/	EB T/R Exit	0.13	12	B	0.13	12	B	0.13	12	B
Cleveland Rd	WB L/R Exit	0.25	17	C	0.25	17	C	0.26	18	C
	Northbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Southbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Route 9 at	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
Site Driveway	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	NB R Exit	0.00	<5	A	0.05	22	C	0.06	23	C

[1] Volume-to-capacity ratio
[2] Average control delay per vehicle (in seconds)
[3] Level of service
[4] n/a = not applicable

As summarized in **Table 14, Table 15, and Table 16**, the proposed development without a signal at the primary site driveway does not result in any significant change in operations at the study intersections of Route 9 at Overbrook Drive or Route 9/Weston Road interchange compared to No-Build conditions; under this scenario a moderate increase in left-turns (60-70 peak hour trips) at the Route 9 eastbound ramp/Weston Road is projected during peak facility operating periods.

8.0 RECOMMENDATIONS AND CONCLUSIONS

8.1 RECOMMENDATIONS

Trip generation for the development is estimated at approximately 201 trips during the weekday morning peak hour, 283 trips during the weekday evening peak hour, and 249 vehicle trips during the Saturday midday peak hour. The incremental traffic associated with the proposed development is not expected to materially impact operating conditions at the study intersections compared to No-Build conditions away from the primary site driveway. Relative to No-Build conditions, the project, by providing a cross-connecting driveway to the adjacent office building, will provide a net *reduction* in trips (on the order of 60 fewer trips) at the Weston Road interchange during the peak hours. Access improvements, as shown conceptually in **Figure 22,** that support projected traffic increases associated with the proposed development at the Route 9/Lexington Road/Primary Site Driveway intersection are identified that aim to minimize/offset project-related traffic impacts and address access needs for the Site. Recommended improvements include (a) access-related improvements, (b) off-site improvements, (c) special event parking management protocol, and (d) implement a robust TDM program. The mitigation commitments by the Proponent will be further refined as the project undergoes the local and state-level review processes and the MassDOT Access Permit process.

8.2 ACCESS/EGRESS IMPROVEMENTS

MDM recommends access-related improvements aimed at enhancing traffic operations and/or travel safety including the following which are subject to MassDOT permit requirements:

- *Pedestrian Facilities.* Sidewalks connecting the development to the existing sidewalk system along Route 9 are anticipated to encourage non-vehicle travel. Signal control at the Site would also accommodate a controlled pedestrian crossing that connects the adjoining residential neighborhoods to the property, and that is consistent with the Town objectives of providing a Route 9 crossing point that is proximate to the Cochituate Aquifer Trail system.

LEGEND

DYCL	DOUBLE YELLOW CENTER LINE	BWLL	BROKEN WHITE LANE LINE
SWEL	SOLID WHITE EDGE LINE	BWEL	BROKEN WHITE EXTENSION LINE (3' LINE W/ 9' GAP)
SWLL	SOLID WHITE LANE LINE	SL	STOP LINE – 12" SOLID WHITE
SYEL	SOLID YELLOW EDGE LINE	CW	CROSSWALK

NOTES

1. THIS PLAN INTENDED FOR DISCUSSION PURPOSES ONLY; IT IS NOT FOR CONSTRUCTION.
2. FINAL DESIGN IS SUBJECT TO ADDITIONAL FIELD SURVEY BY OTHERS.
3. PROPERTY LINES AND ACCESS LINE LOCATIONS ARE APPROXIMATE ONLY.
4. BASE PLAN SOURCE: PLANS BY ALLEN & MAJOR ASSOCIATES, INC.

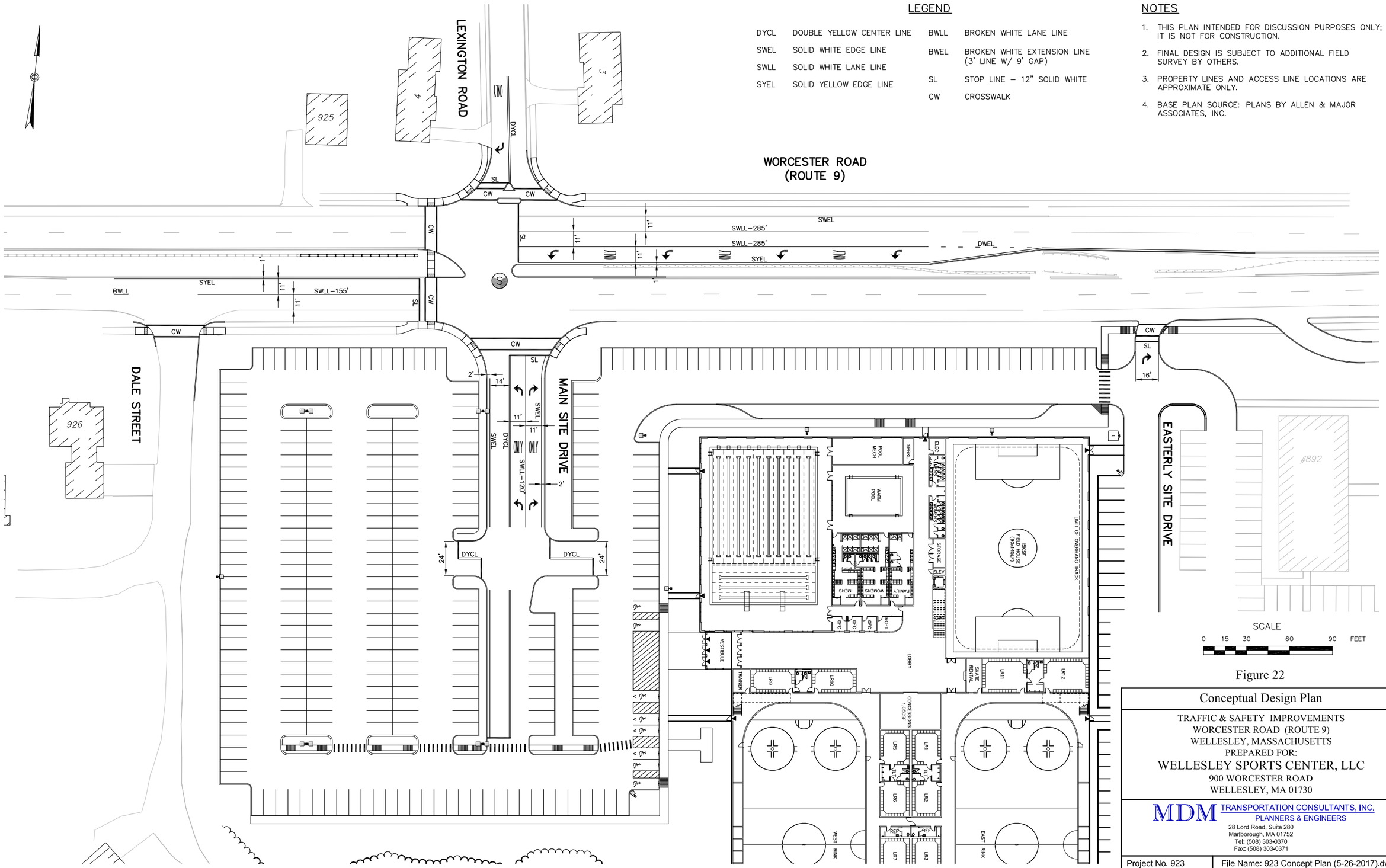


Figure 22

Conceptual Design Plan

TRAFFIC & SAFETY IMPROVEMENTS
WORCESTER ROAD (ROUTE 9)
WELLESLEY, MASSACHUSETTS
PREPARED FOR:
WELLESLEY SPORTS CENTER, LLC
900 WORCESTER ROAD
WELLESLEY, MA 01730

MDM TRANSPORTATION CONSULTANTS, INC.
PLANNERS & ENGINEERS
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Date: May 26, 2017	Scale: As Noted	Sheet 1 of 1

- *Secondary Driveway Restriction.* The existing secondary driveways serving Site will be restricted to right-turn egress-only movements.

- A "STOP" sign (R1-1), "One-Way" (R6-1), and "Do-Not Enter" (R5-1) signs are recommended on the proposed secondary site driveway intersection with Route 9. Accordingly, a marked "STOP" line and right turn arrow pavement marking will also be installed. The signs and pavement markings will 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 Route 9 in order to continue to provide unobstructed sight lines.

Route 9 at Lexington Road/Primary Site Driveway

In order to accommodate the proposed sports complex and to mitigate traffic impacts at the Route 9 eastbound off-ramp/Weston Road intersection (most notably, the eastbound left-turns), MDM recommends that geometric improvements be implemented at the Primary Site Driveway/Lexington Road intersection along Route 9. As these improvements represent a preferred Build program for access/egress at the Site, they are assumed under the Build condition capacity analyses presented in *Section 4* of this TIAS. Proponent-sponsored improvements at the intersection of Route 9 and Primary Site Driveway/Lexington Road are shown in **Figure 22** and include a) coordinated signal control with the nearby signals at Overbrook Drive and Oak Street; b) an exclusive westbound left-turn lane along Route 9 to enter the site; c) a two-lane Site driveway approach to Route 9 with separate left- and right-turn exiting lanes; d) exclusive pedestrian crossing of Route 9 with pushbutton activation; and (e) closure of the median island break along Route 9 near the secondary site driveway. The design specifically excludes an eastbound left-turn lane and through movements between the Site and Lexington Road on the basis that eastbound Route 9 access to the neighborhoods north of Route 9 are accommodated at nearby Overbrook Drive which has been subject to a monitoring program as part of the recently completed CVS development approvals.

8.3 SPECIAL EVENT PARKING MANAGMENT

The proposed parking supply at the site of 355± marked parking spaces is projected to adequately accommodate the anticipated parking demand of up to 322 parked vehicles under typical facility operating conditions. To the extent special programming is planned for the sports complex facility (for example, hockey tournaments and swim meets) additional parking may be required subject to a parking management protocol to be developed by Proponent. The Proponent anticipates 10-15 events a year that may require overflow parking and is currently in discussions with owner of the adjacent office buildings located at 888-892 Worcester Street as one potential location to accommodate the special event parking overflow if necessary. The special events typically occur on holiday weekends and are also anticipated to include the Wellesley/Newton hockey games.

8.4 TRANSPORTATION DEMAND MANAGEMENT (TDM)

The Proponent commits to reduce auto dependency for the sports complex by implementing a TDM program. A preliminary list of potential TDM program elements may include the following, subject to refinement of the development program and further evaluation by the Proponent:

- *On-Site Transportation Coordinator*. The Proponent will designate an on-site transportation coordinator. The transportation coordinator will be responsible for disseminating relevant TDM information to employees including posting TDM information at appropriate locations within the buildings. Such postings may include making information on MassRides available to employees at orientation.

- *MassRides*. MassRides is the Executive Office of Transportation's statewide travel options program providing free assistance to commuters, employers, students, and other traveler markets. MassRides programs may encourage workers to use alternative forms of transportation such as carpooling, vanpooling, and to utilize a large database for rideshare matching. The Proponent will promote commuter assistance programs available through MassRides as part of the employee orientation programs. MassRides information will also be posted.

- *Regional Transit Authority (MWRTA) Transit Stop*. The Proponent will work with the MWRTA to dedicated bus stop on-site or adjacent to the Site along Route 9 as part of the existing Bus Route 1 which currently provides flag down service along Route 9.

- *Provide a Bus Drop-Off/Parking Area.* The Proponent will provide a dedicated bus drop-off/ parking area on-site that is adjacent to a main entranceway to promote bus use by local and regional sports teams.

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

- *Consideration of an Employee Transit Pass Subsidy*. The Proponent will consider providing a transit pass subsidy for all full-time employees.

- *Pedestrian Infrastructure/Walking Incentives*. The proposed site layout will include additional sidewalks to proposed building that connects to the existing sidewalk system along Route 9 and to the parking areas.

- *Tenant Manual for Employee Services*. The Proponent will prepare a Tenant Manual that will offer their employees: 1) direct deposit of paychecks; 2) transit pass subsidies; and 3) a guaranteed ride home program for employees who van/carpool.

- *On-Site Amenities.* The project will include a number of on-site amenities that will promote employees and patrons to remain on-site. These services include but are not limed to food services, an on-site pro-shop, on-site equipment sales and services, and on-site showers.

- *Electric Vehicle Charging Stations and Preferential Parking for Low-Emission Vehicles.* Preferential parking locations for those who use low-emission vehicles will be provided on-site. The number and location of the electric vehicle charging station(s) will be identified more specifically during the local site plan review and approval process.

- *Preferential Parking for Carpools and Vanpools.* Preferential parking locations for those who for carpools and vanpools will be provide on-site. The number and location of the parking space(s) will be identified more specifically during the local site plan review and approval process.

- *No Idling Signage.* Installation of "No Idling" signs at the site's commercial vehicle parking areas/bus area to reduce the amount of greenhouse gasses emitted.

8.5 CONCLUSIONS

In summary, trip generation for the development is projected to only moderately increase traffic activity on area roadways relative to existing/baseline conditions with no material impact to operating conditions at primary study intersections. This assessment indicates that there is ample capacity at these study locations to accommodate these project-related traffic increases without the need for major infrastructure enhancements.

Proposed signal control at the primary Site driveway will accommodate peak Site operations with modest delays (LOS B or better) with neutral impact to the nearby interchange of Weston Road at Route 9. A cross-connecting driveway between the property and adjoining office building at 888-894 Worcester Road would result in a further net trip reduction at the interchange during peak hours relative to existing conditions that would result in reduced delays/improved operations relative to No-Build conditions. Signal control at the Site would also accommodate a controlled pedestrian crossing that connects the adjoining residential neighborhoods to the property, and that is consistent with the Town objectives of providing a Route 9 crossing point that is proximate to the Cochituate Aquifer Trail system.

Potential mitigation actions that are subject to MassDOT input and permits are identified that include access/egress improvements; special event parking management protocol, and Transportation Demand Management (TDM) actions including coordination with the regional transit authority (MWRTA) to integrate the Site as a stop with connections to the nearby intermodal and commuter rail facility.