

MEMORANDUM

DATE: February 16, 2018

TO: Surfside Crossing, LLC
c/o Donald F. Bracken, Jr., P.E.
Bracken Engineering
19 Old South Road
Nantucket, MA 02554

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

RE: **Proposed Surfside Crossing Residential Development**
3-9 South Shore Road – Nantucket, MA

MDM Transportation Consultants, Inc. (MDM) has prepared this traffic impact assessment (TIA) for the proposed residential development to be located at 3-9 South Shore Road in Nantucket, Massachusetts. The location of the site relative to adjacent roadways is shown in **Figure 1**. This memorandum describes existing traffic volumes and travel speeds for South Shore Road, evaluates sight lines to/from the site driveway, estimates trip generation characteristics of the proposed development, quantifies incremental traffic impacts of the Site development on the adjacent roadways, and evaluates safety-related conditions at key study locations that provide access to the Site.

Key findings of the traffic assessment are as follows:

- *Safety Characteristics.* A review of the crash data indicated that no immediate safety countermeasures are warranted based on the crash history at the study intersection of Surfside Road at Fairgrounds Road/South Shore Road.
- *Measured Travel Speeds.* The observed 85th percentile travel speed of 38 mph is highly consistent with the posted regulatory speed limit of 35 mph along South Shore Road in the Site vicinity. The regulatory and observed travel speeds provide an appropriate basis for determining driveway sight lines to conform with sight line criteria published by AASHTO.

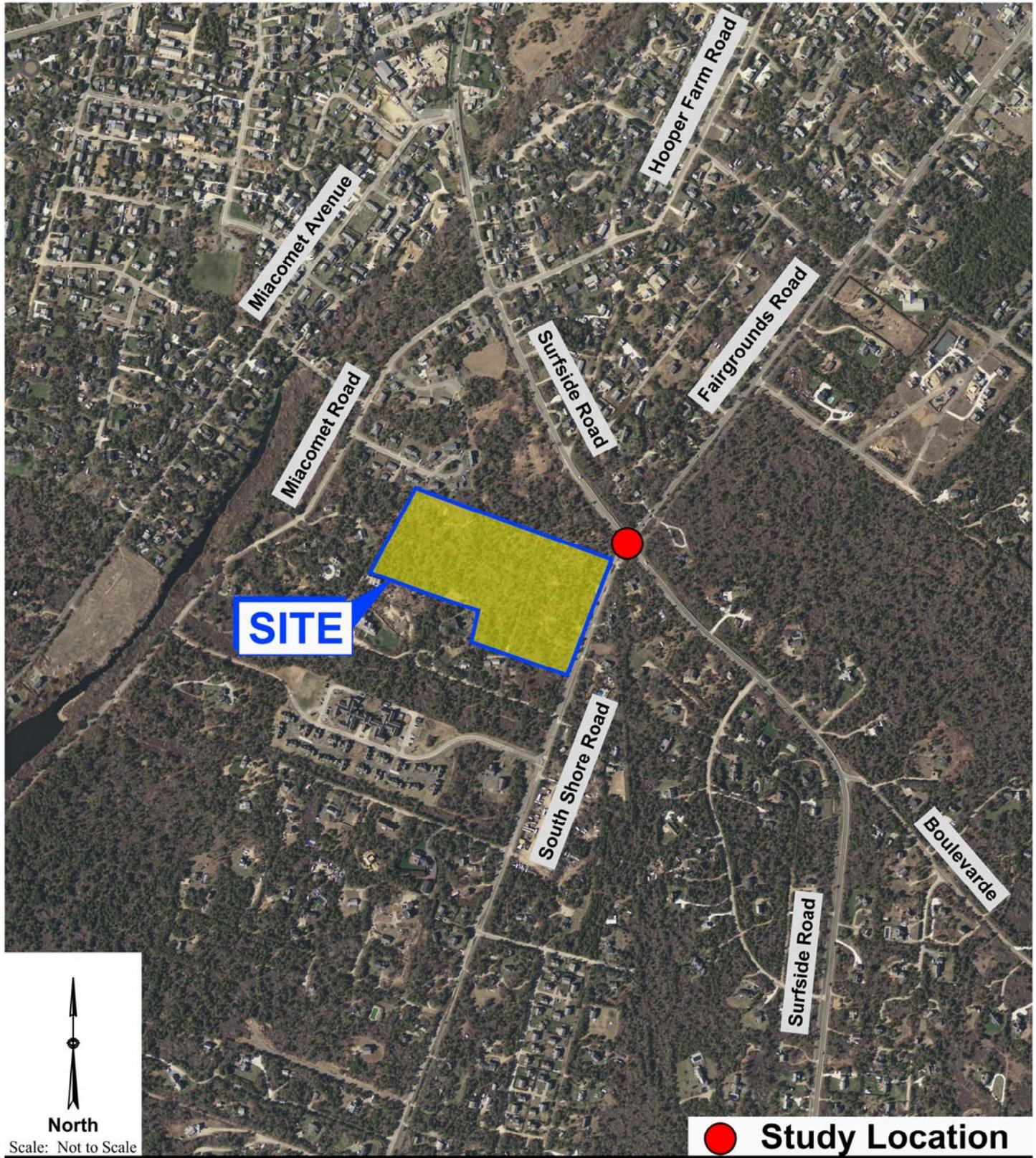


Figure 1

- *Sight Line Safety Characteristics.* Proposed clearing and regrading associated with construction of the proposed Site driveway will provide sight lines that exceed AASHTO's recommended criteria both stopping sight distance (SSD) and intersection sight distance (ISD) based on the regulatory speed limit and observed travel speeds along South Shore Road. This will provide ample visibility for vehicles approaching and leaving the Site driveways to properly exit/enter the South Shore Road traffic stream in a safe manner.
- *Modest Trip Generation.* The proposed development is estimated to generate approximately 88 vehicle trips (21 entering and 67 exiting) during the weekday morning peak hour and 113 vehicle trips (71 entering and 42 exiting) during the weekday evening peak hour. On a daily basis the project is estimated to generate approximately 1,272 trips with half entering and half exiting over a 24 hour period. While the Site is likely to benefit by its close proximity to public transportation and opportunities for pedestrian/bicycle use, the analysis utilizes ITE-based trip generation without downward adjustment to present a conservative analysis.
- *Adequate Roadway Capacity.* Under future Build conditions, capacity analyses indicate that the unsignalized Site Driveway approaches to South Shore Road will operate at level of service (LOS) B or better during the weekday morning and weekday evening peak hours. Under future Build conditions, capacity analyses indicate that the Surfside Road intersection with Fairgrounds Road and South Shore Road will continue to operate with long delays during the peak season, specifically, for the eastbound Surfside Road and southbound Fairgrounds Road approaches to the intersection. The project will have a minor impact to operations and queue lengths.
- *Site Access/Circulation.* AutoTURN analysis has been completed for the preliminary site plan using the Town's Ladder truck and single unit (SU) delivery truck. Site access, circulation aisles and parking layout provide adequate maneuvering area for the largest potential responding vehicle (ladder truck).

In summary, trip generation for the development is projected to be modest. MDM finds that incremental traffic associated with the proposed development is not expected to materially impact operating conditions at the study intersections. The study intersections exhibit below-average crash rates based on historic crash data; safety countermeasures are therefore not warranted. Likewise, the available sight lines at the Site Driveway intersections with South Shore Road exceed the recommended sight line requirements from AASHTO. Implementation of access/egress improvements, proposed pedestrian, and bicycle improvements along with a Transportation Demand Management (TDM) program will establish a framework of minimizing Site traffic impacts by encouraging non-motorized travel modes and pedestrian/bicycle accommodation that is compatible with other projects in the area.

PROJECT DESCRIPTION

The existing Site consists of approximately 13.6± acres of undeveloped land located along South Shore Road in Nantucket, MA. Under the proposed site programming, 60 single family homes and 96 condominium units will be constructed. The proposed access/egress will be via three full-access/egress driveways along South Shore Road. The northern driveway will service the multi-family condominium units. The central and southern driveways will service 60 residential lots. A preliminary site plan prepared by Bracken Engineering, Inc. is presented in **Figure 2**.

EXISTING TRAFFIC & SAFETY CHARACTERISTICS

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

South Shore Road

South Shore Road is generally a north-south local roadway under Town jurisdiction. South Shore Road provides a connection between Surfside Road to the north and Hillside Avenue to the south. South Shore Road provides a single travel lane in each direction with a multi-use path (South Shore Bike Path) along its eastern side. The posted (regulatory) speed limit on South Shore Road is 35 miles per hour (mph). Land use along South Shore Street are primarily residential homes but also include the South Shore Wastewater Treatment Plant and a junk yard.



North

Scale: Not to Scale

Site Plan Source: Bracken Engineering, Inc.
Figure 2

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Preliminary Site Layout

Peak Hour Traffic Volumes

Traffic volume data was collected within the study area along South Shore Road in January 2018 during the weekday morning (7:00 – 9:00 AM) and weekday evening (4:00 – 6:00 PM) peak periods. Review of Cape Cod Commission data for the Cape and Islands indicates that January is a below average traffic month (approximately 26 percent below average month conditions) and approximately 66 percent below peak traffic conditions. Thus, the traffic counts were adjusted by 66% (increase) to represent peak season conditions. The resulting Baseline weekday morning and weekday evening peak-hour traffic volumes for the study intersection are depicted in **Figure 3**. Turning movement counts and permanent count station data are provided in the **Attachments**.

MDM also has the benefit of historical peak season counts at Fairgrounds Road/South Shore Road from a recent traffic report for Surfside Commons in 2015 and 2014 Design volumes for the Mid-Island Study. Based on a review of the counts it appears that several movements appear to be over-inflated based on the historical counts. Upon further research, it is our understanding that a social medial campaign appears to have led to the inflated counts at the study intersection. Therefore, the analysis represented in this report represents a highly conservative analysis scenario. The historical peak season traffic volume networks are provided in the **Attachments** for reference.

Measured Travel Speeds

Vehicle speeds were obtained for South Shore Road adjacent to the Site using a radar recorder. These measured travel speeds provide a basis for determining sight line requirements at the proposed site driveway. **Table 1** presents a summary of the travel speed data collected for South Shore Road in the site vicinity. Collected speed data are provided in the **Attachments**.

TABLE 1
SPEED STUDY RESULTS – SOUTH SHORE ROAD

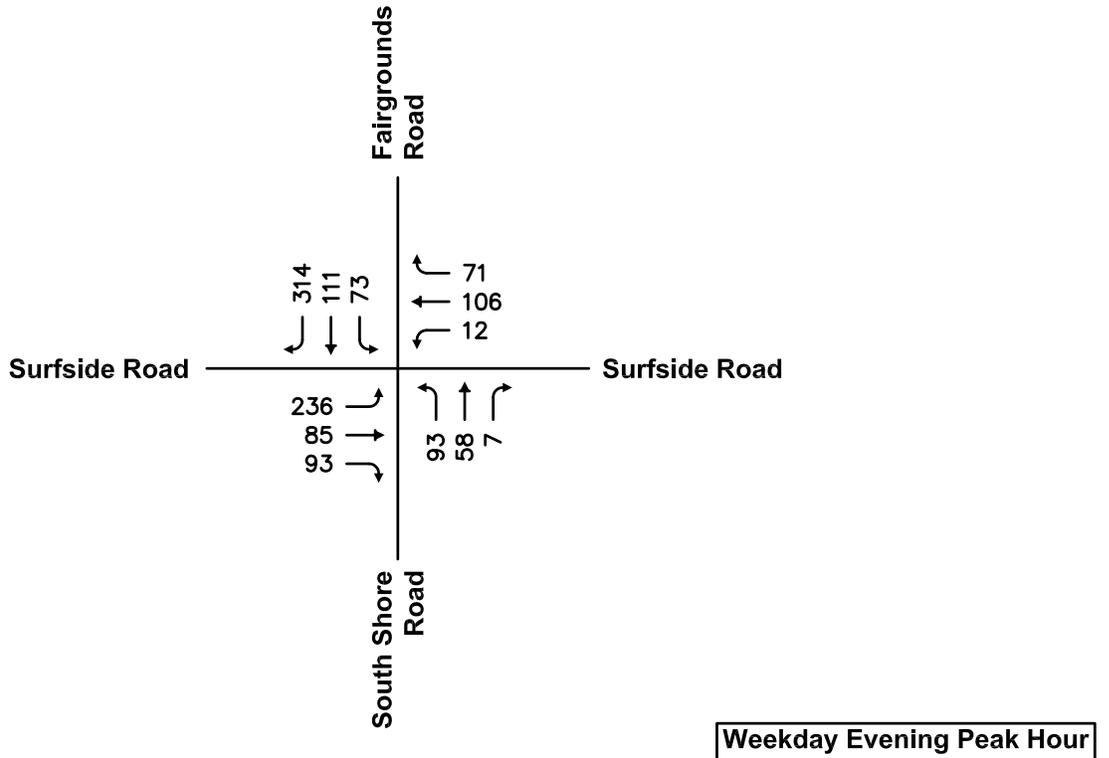
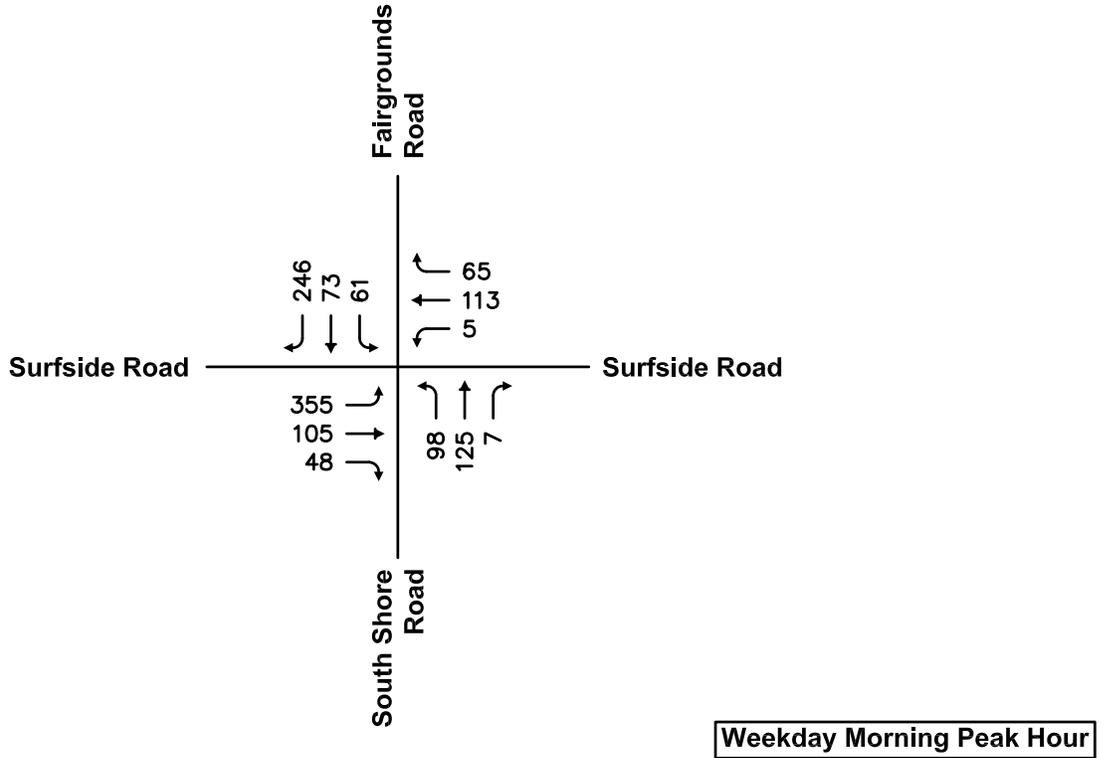
Travel Direction	Regulatory Speed Limit ¹	Travel Speed	
		Mean ²	85 th Percentile ³
Northbound	35	33	38
Southbound	35	33	38

¹Regulatory Speed limit in miles per hour (mph).

²Arithmetic mean

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

As summarized in **Table 1**, the mean (average) travel speed on South Shore Road was observed to be 33 mph and the 85th percentile travel speeds were observed to be 38 mph in both the northbound and southbound directions. The observed travel speeds are highly consistent with the 35 mph regulatory speed limit.



North

Scale: Not to Scale

Figure 3

**2018 Baseline Conditions
Weekday Peak Hour Volumes**

Intersection Crash History

In order to identify crash trends and safety characteristics for study area intersections, crash data were obtained from MassDOT for the Town of Nantucket for the three-year period 2013 through 2015 (the most recent data currently available from MassDOT). Crash data for the study intersections is summarized in **Table 2** with detailed data provided in the **Attachments**.

Crash rates were calculated for the study area intersection as reported in **Table 2**. This rate quantifies the number of crashes per million entering vehicles. MassDOT has determined the official District 5 (which includes the Town of Nantucket) crash rate to be 0.58 for unsignalized intersections. This rate represents MassDOT's "average" crash experience for District 5 communities and serves as a basis for comparing reported crash rates for the study intersections. Where calculated crash rates notably exceed the district average, some form of safety countermeasures may be warranted.

**TABLE 2
INTERSECTION CRASH SUMMARY
2013 THROUGH 2015¹**

Data Category	Surfside Road at Fairgrounds Road/South Shore Road
Traffic Control	Unsignalized
Crash Rate ²	0.22
District 5 Avg ³	0.58
<i>Year:</i>	
2013	1
2014	1
<u>2015</u>	<u>0</u>
Total	2
<i>Type:</i>	
Angle	0
Rear-End	1
Head-On	0
Sideswipe	1
Single Vehicle	0
Other/Unknown	0
<i>Severity:</i>	
P. Damage Only	1
Personal Injury	0
Other/Unknown	1
<i>Conditions:</i>	
Dry	0
Wet	1
Snow	1
Other/Unknown	0
<i>Time:</i>	
7:00 to 9:00 AM	0
4:00 to 6:00 PM	1
Rest of Day	1

¹ Source: MassDOT Crash Database

² Crashes per million entering vehicles

³ District 5 averages = 0.76 (signalized)

As summarized in **Table 2**:

- *Surfside Road at Fairgrounds Road/South Shore Road.* There are a total of two (2) crashes reported at the intersection during the three-year study period resulting crash rate of 0.22. The crashes involved one rear-end type collisions and one sideswipe collision. One of the two resulted in property damage type collisions. Both of the collisions occurred under wet or snow roadway conditions. One of the collisions occurred during the weekday evening peak travel times. No pedestrian related crashes or fatalities were reported.

In summary, the study intersection experienced a crash rate below the District 5 average and no immediate safety countermeasures are warranted based on the crash history at the study intersection.

Public Transportation Facilities

The Nantucket Regional Transit Authority operates two (2) bus Routes with service within ¼ mile of the Site as follows:

- The Surfside Beach Route provides service between Washington Street and Surfside Beach with a stop at the intersection of Surfside Road and Fairgrounds Road. Service is provided everyday between late June and early September between 10:00 am and 6:00 pm and generally runs every 40 minutes.
- The Miacomet Loop provides service between Washington Street and Surfside Beach with a stop at the intersection of Surfside Road and Fairgrounds Road. Service is provided everyday between late April and early October between 7:00 am and 9:00 pm – 12:00 am depending on the season and generally runs every 15 to 30 minutes.

To remain conservative no credit (trip reduction) was taken for the use of nearby public transportation. Specific route and schedule information is provided in the **Attachments**.

Bike Path

The South Shore Bike Path is located along South Shore Road along its eastern side between South Shore Wastewater Treatment Plant to the south and Surfside Road to the north. The Bike Path connects to the Fairgrounds Bike Path and Surfside Bike Path at the intersection of Surfside Road and Fairgrounds Road/South Shore Road. To remain conservative no credit (trip reduction) was taken for the use of the adjunct bike path.

Sight Line Evaluation

An evaluation of sight lines was conducted to ensure that minimum recommended sight lines are available at the site driveway intersections with South Shore Road. The evaluation documents sight lines under proposed conditions for vehicles as they relate to these roadways with comparison to recommended guidelines.

The American Association of State Highway and Transportation Officials' (AASHTO) standards¹ reference two types of sight distance which are relevant at the site driveway intersection: stopping sight distance (SSD) and intersection sight distance (ISD). Sight lines for critical vehicle movements at the site driveway intersections along South Shore Road were compared to minimum SSD and ISD recommendations for the regulatory and observed travel speeds in the area.

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 the design speed limit, to stop safely before reaching a stationary object in its path, in this case, a vehicle exiting onto South Shore Road. The SSD criteria are defined by AASHTO based on design and operating speeds, anticipated driver behavior and vehicle performance, as well as physical roadway conditions. SSD includes the length of roadway traveled during the perception and reaction time of a driver to an object, and the distance traveled during brake application on wet level pavement. Adjustment factors are applied to account for roadway grades when applicable.

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

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

**TABLE 3
STOPPING SIGHT DISTANCE SUMMARY
SOUTH SHORE ROAD APPROACHES TO SITE DRIVEWAYS**

Approach/ Travel Direction	Available SSD	AASHTO Recommended ¹		
		Regulatory Speed Limit ²	Average Travel Speed ³	85 th Percentile Travel Speed ⁴
<i>Northern Site Driveway</i>				
<i>Northbound</i>	>500 Feet	250 Feet	230 Feet	280 Feet
<i>Southbound</i>	280± Feet	80 Feet ⁵	--	--
<i>Central Site Driveway</i>				
<i>Northbound</i>	>500 Feet	250 Feet	230 Feet	280 Feet
<i>Southbound</i>	450± Feet	250 Feet	230 Feet	280 Feet
<i>Southern Site Driveway</i>				
<i>Northbound</i>	>500 Feet	250 Feet	230 Feet	280 Feet
<i>Southbound</i>	>500 Feet	250 Feet	230 Feet	280 Feet

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

²Regulatory speed limit: 35 mph

³Average Speed: 33 mph NB & SB.

⁴85th Percentile travel speed: 38 mph NB & SB.

⁵Based on 15 mile per hour travel speed for vehicles turning from 4-way STOP at Surfside Road/Fairgrounds Road.

As summarized in **Table 3**, analysis results indicate that the existing available sight lines exceed AASHTO's recommended SSD criteria along South Shore Road for the posted and observed travel speeds. Stopping sight distance calculations are provided in the **Attachments**.

Intersection Sight Distance

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

Available ISD was estimated in the field using AASHTO standards for driver's eye (3.5 feet), object height (3.5 feet) and decision point (8 to 14.5 feet from the edge of the travel lane) for the northbound and southbound travel directions on South Shore Road. **Table 4** presents a summary of the available ISD for the departures from the site driveway and AASHTO's recommended ISD assuming continued maintenance of vegetation within the sight line triangles.

**TABLE 4
INTERSECTION SIGHT DISTANCE SUMMARY
SITE DRIVEWAY DEPARTURES TO SOUTH SHORE ROAD**

Approach/ Travel Direction	Available ISD	AASHTO Minimum ¹	AASHTO Ideal ¹
		85 th Percentile Travel Speed ⁴	Regulatory Speed Limit ²
<i>Northern Site Driveway</i>			
<i>Looking North</i>	280± Feet	--	145 Feet ⁵
<i>Looking South</i>	>500 Feet	280 Feet	230 Feet
<i>Central Site Driveway</i>			
<i>Looking North</i>	450± Feet	280 Feet	335 Feet
<i>Looking South</i>	>500 Feet	280 Feet	390 Feet
<i>Southern Site Driveway</i>			
<i>Looking North</i>	>500 Feet	280 Feet	335 Feet
<i>Looking South</i>	>500 Feet	280 Feet	390 Feet

¹Recommended sight distance based on AASHTO, A Policy on Geometric Design of Highways and Streets. Based on driver height of eye of 3.5 feet to object height of 2.0 feet. Minimum value as noted represents SSD per AASHTO guidance.

²Regulatory speed limit: 35 mph

³Average Speed: 33 mph NB & SB.

⁴85th Percentile travel speed: 38 mph NB & SB.

⁵Based on 15 mile per hour travel speed for vehicles turning from 4-way STOP at Surfside Road/Fairgrounds Road.

The results of the ISD analysis presented in **Table 4** indicate that with clearing and grading associated with the construction of the proposed site driveways, the available sight lines looking north and south from the site driveways onto South Shore Road exceed the sight line requirements from AASHTO for the regulatory and 85th percentile 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 roadway grade to ensure unobstructed lines of sight.

PROJECTED FUTURE TRAFFIC CONDITIONS

Evaluation of the proposed development impacts requires the establishment of a future baseline analysis condition. This section estimates future roadway and traffic conditions with and without the proposed development. For planning purposes, a five-year planning horizon (year 2023) was selected consistent with standard industry practice.

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

The following sections provide an overview of the future No-Build and Build traffic volumes.

Background Growth

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

Consistent with recent traffic studies on the island, a 1.0-percent compounded annual growth rate was used (5.1 percent increase over a 5-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 **Attachments**.

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 there are no Site-specific development projects in the area that may increase baseline traffic at the study intersections.

2023 No-Build Traffic Volume Networks

In summary, to account for future traffic growth in the study area future No-Build traffic volumes are developed by increasing the baseline (2018) volumes by approximately 5.1 percent (1.0 percent compounded annually over 5 years). The resulting 2023 No-Build traffic volumes are displayed in **Figure 4**.

Trip Generation

The trip generation estimates for the proposed development of the Site are provided for the weekday morning and weekday evening periods, which correspond to the critical analysis periods for the proposed use and adjacent street traffic flow. New traffic generated by the project was estimated using trip rates published in ITE's *Trip Generation*² for the Land Use Code (LUC) 210 – Single-Family Detached Housing and LUC 220 – Multifamily Housing (Low-Rise).

Table 5 presents the trip-generation estimates for the proposed development based on ITE methodology for the 60 single family units and 96 condominium units.

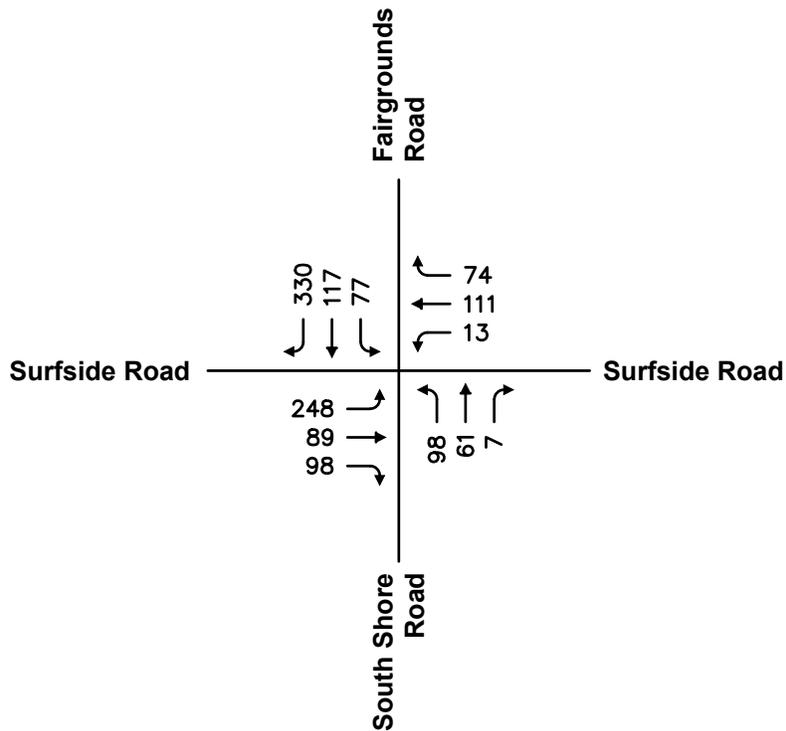
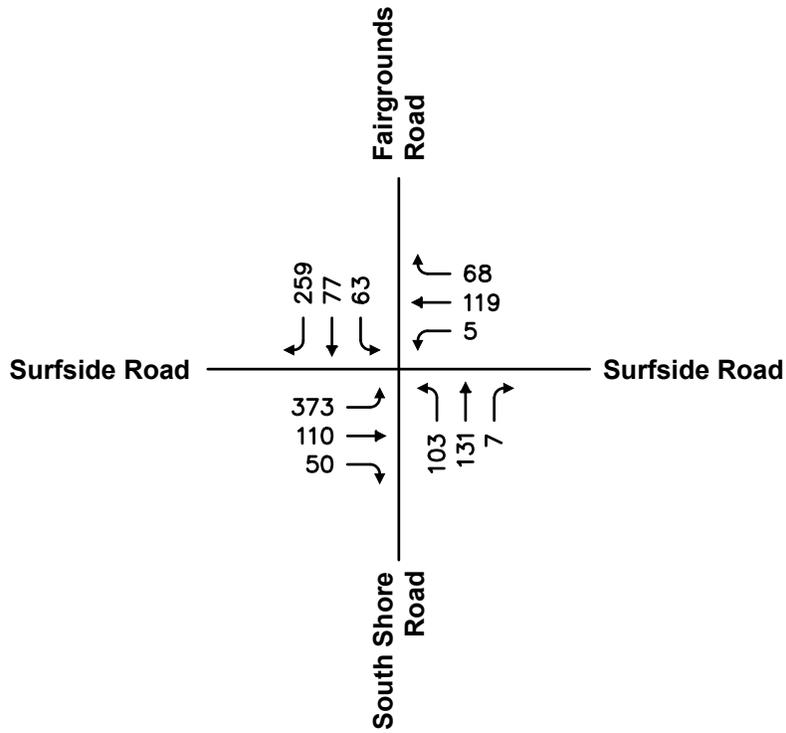
TABLE 5
TRIP-GENERATION SUMMARY

<u>Period/Direction</u>	<u>Single Family¹</u>	<u>Condominiums²</u>	<u>Total</u>
<i>Weekday Morning Peak Hour:</i>			
Entering	11	10	21
<u>Exiting</u>	<u>33</u>	<u>34</u>	<u>67</u>
Total	44	44	88
<i>Weekday Evening Peak Hour:</i>			
Entering	37	34	71
<u>Exiting</u>	<u>22</u>	<u>20</u>	<u>42</u>
Total	59	54	113
<i>Weekday Daily</i>	570	702	1,272

¹Based on ITE LUC 210 Single-Family Detached Housing trip rates applied to 60 units.

²Based on ITE LUC 220 Multifamily Housing (Low-Rise) trip rates applied to 96 units.

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



North

Scale: Not to Scale

Figure 4

As summarized in **Table 5**, the proposed development is estimated to generate approximately 88 vehicle trips (21 entering and 67 exiting) during the weekday morning peak hour and 113 vehicle trips (71 entering and 42 exiting) during the weekday evening peak hour. On a daily basis the project is estimated to generate approximately 1,272 trips with half entering and half exiting over a 24 hour period. Trip generation calculations are provided in the **Attachments**. While the Site is likely to benefit by its close proximity to public transportation and opportunities for pedestrian/bicycle use, the analysis utilizes ITE-based trip generation without downward adjustment to present a conservative analysis.

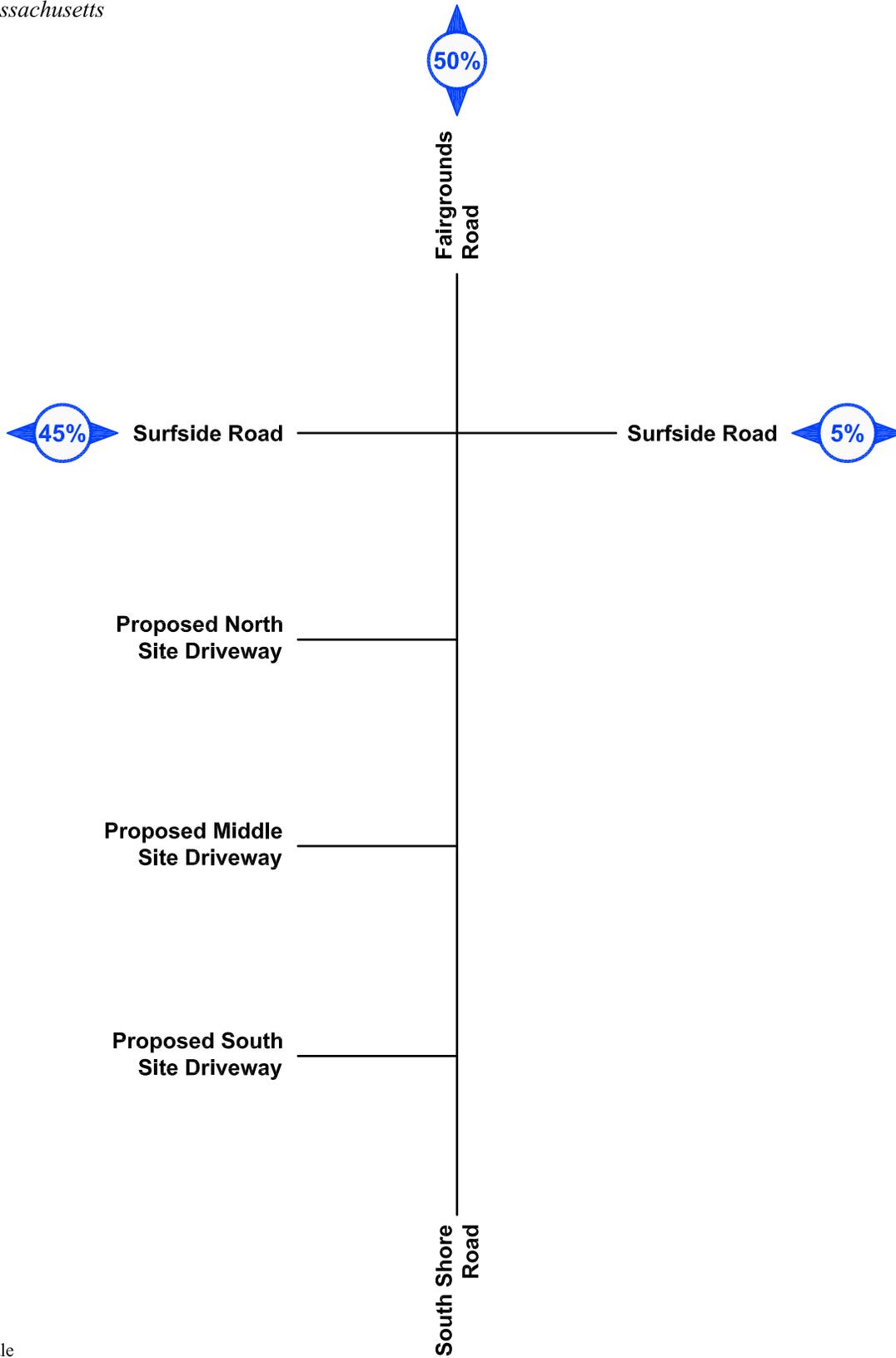
Trip Distribution

Trip distribution patterns for the proposed residential development are based on existing travel patterns observed at the study intersection of Surfside Road at Fairgrounds Road/South Shore Road. For planning purposes it was assumed that all of the trips used the study intersection to present a conservative analysis. The trip distribution percentages and new development-related trips at the Surfside Road intersection with Fairgrounds Road/South Shore Road for the weekday morning and weekday evening peak hours are quantified in **Figure 5**. Trip distribution calculations are provided in the **Attachments**.

Development-related trips for the residential development were assigned to the roadway network using the trip-generation estimates shown in **Table 5** and the distribution patterns presented in **Figure 5**. New development-related trips at each intersection approach for the weekday morning and weekday evening peak hours are quantified in **Figure 6** and **Figure 7**, respectively. Trip distribution calculations are provided in the **Attachments**.

2023 Build Traffic Conditions

2023 Build condition traffic volumes are derived by adding the incremental traffic increases for the Site to the 2023 No-Build conditions. **Figure 8** and **Figure 9** present the 2023 Build condition traffic-volume networks for the weekday morning and weekday evening peak hours.



North

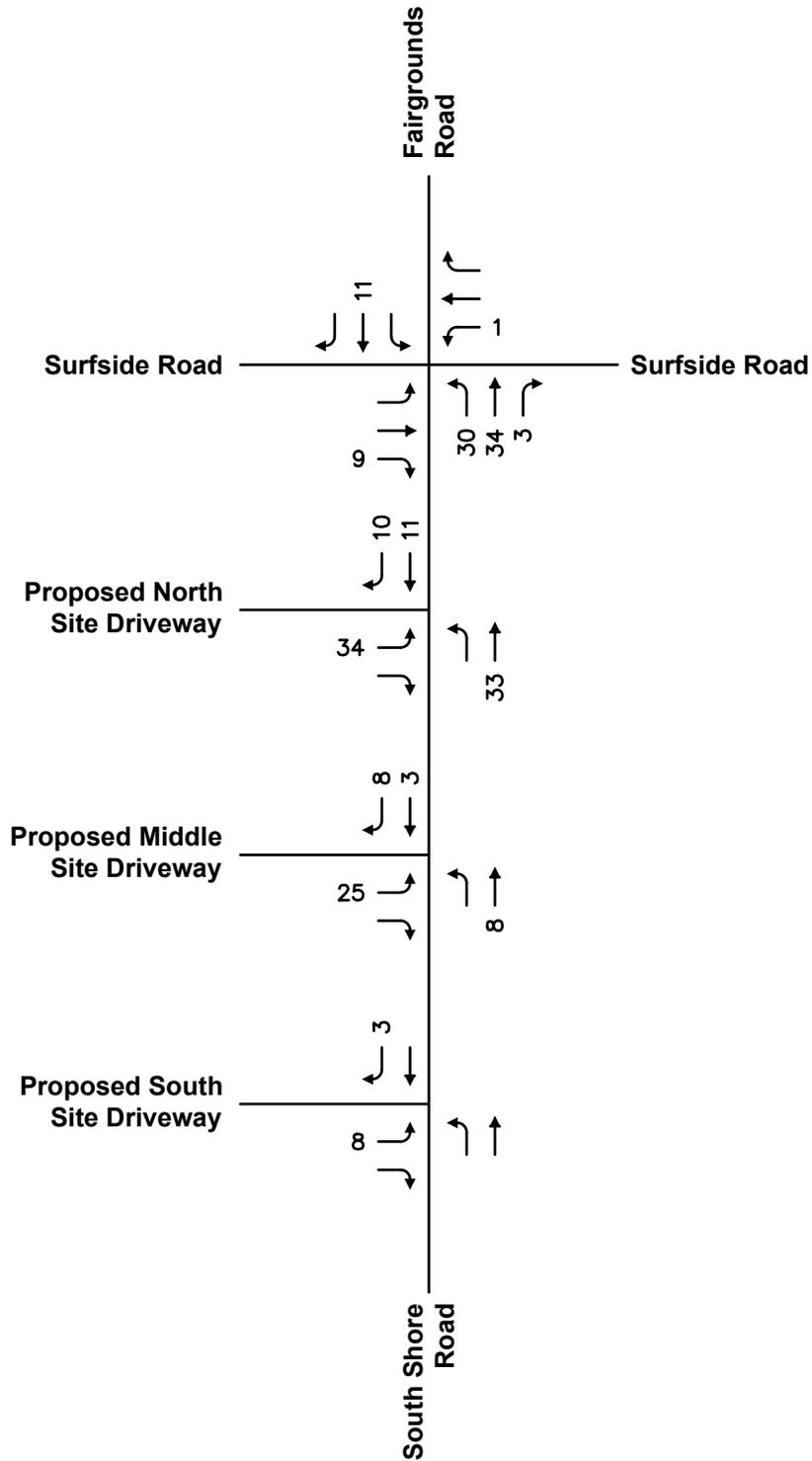
Scale: Not to Scale

Figure 5

Trip Distribution

96 Apartments	
Enter	10
Exit	34
Total	44

60 Single-Family Detached Houses	
Enter	11
Exit	33
Total	44



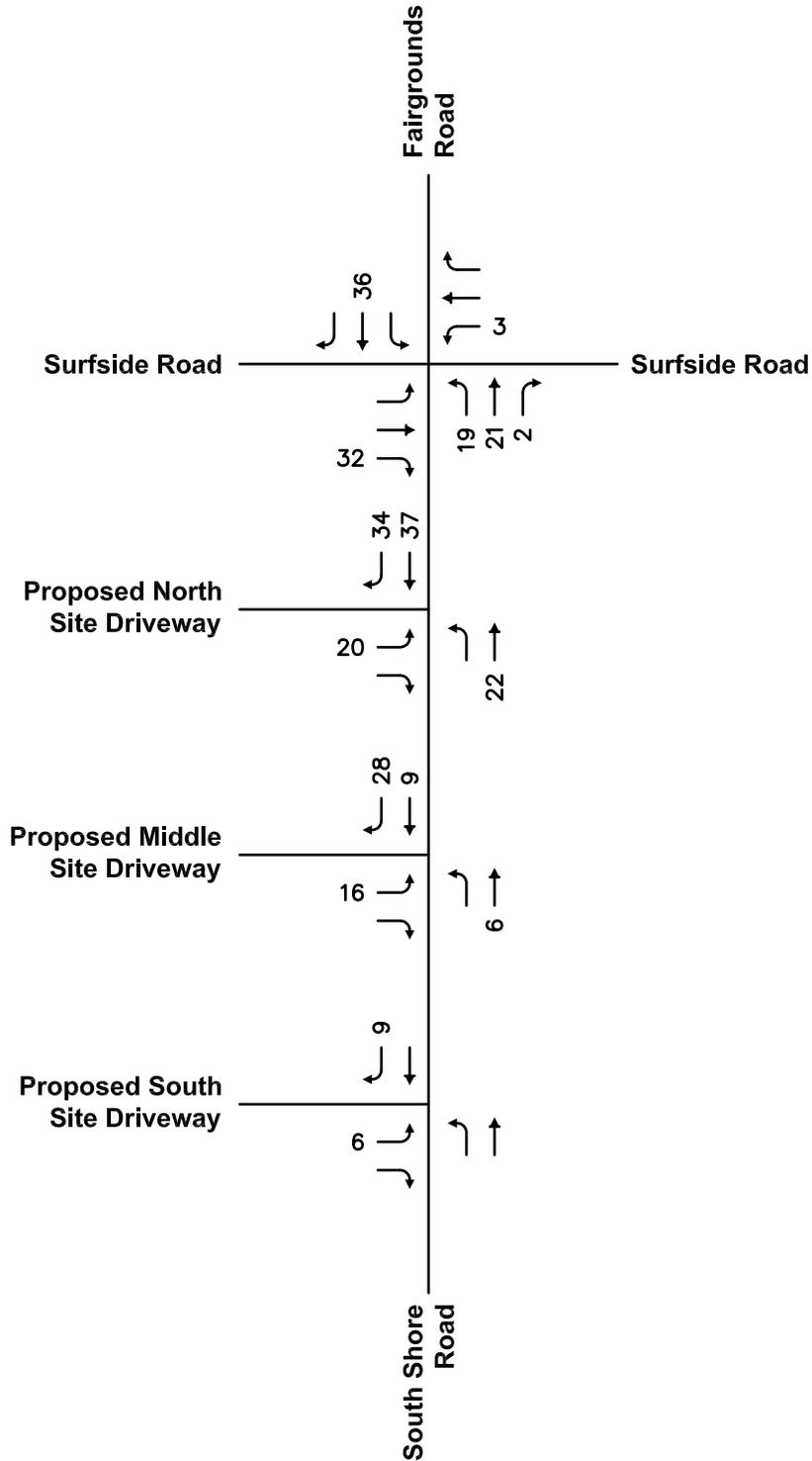
North

Scale: Not to Scale

Figure 6

96 Apartments	
Enter	34
Exit	20
Total	54

60 Single-Family Detached Houses	
Enter	37
Exit	22
Total	59

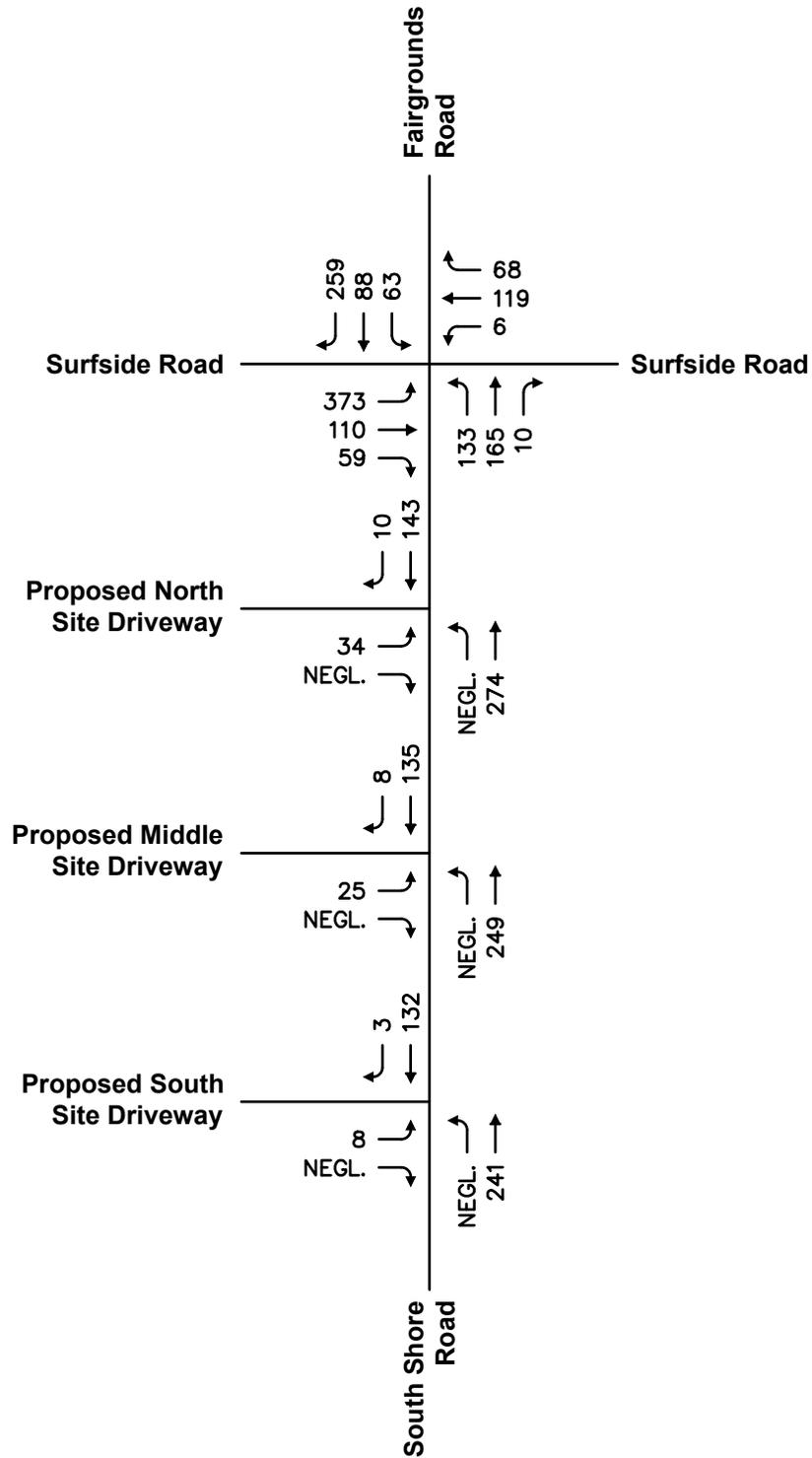


North

Scale: Not to Scale

Figure 7

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



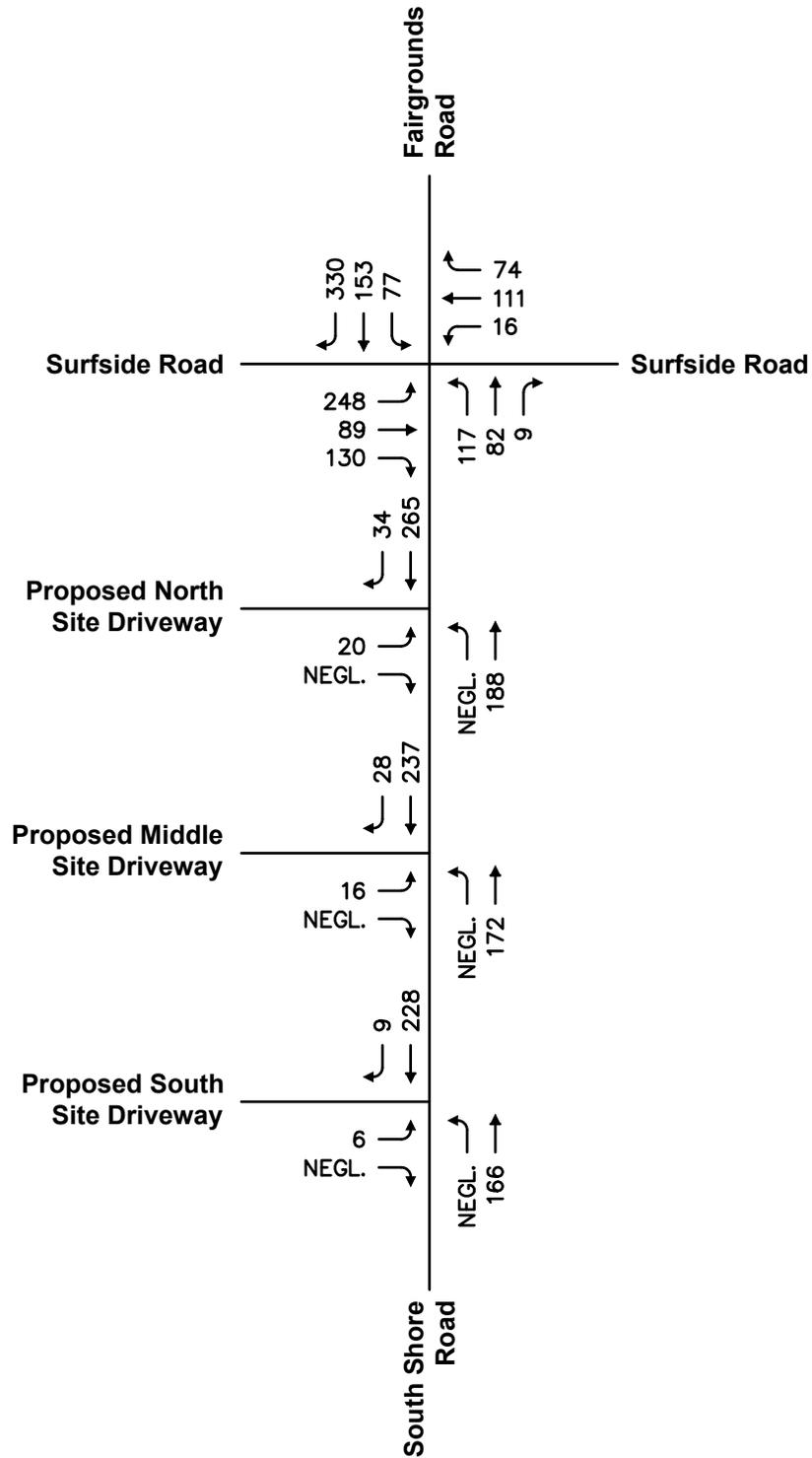
North

Scale: Not to Scale

NOTES:
NEGL. = Negligible

Figure 8

2023 Build Conditions
Weekday Morning Peak Hour Volumes



North

Scale: Not to Scale

NOTES:
NEGL. = Negligible

Figure 9

2023 Build Conditions
Weekday Evening Peak Hour Volumes

OPERATIONS ANALYSIS

This section provides an overview of operational analysis methodology, an assessment of driveway operations under Existing (Baseline) and projected future No-Build and Build conditions.

Analysis Methodology

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

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

Analysis Results

Level-of-Service (LOS) analyses were conducted for the Baseline, No-Build, and Build conditions for the study intersections. The results of the intersection capacity are summarized below in **Table 6** and **Table 7**. Detailed analysis results are presented in the **Attachments**.

TABLE 6
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY MORNING PEAK HOUR (PEAK SEASON)

Period	Approach	2018 Baseline			2023 No-Build			2023 Build		
		v/c ¹	Delay ²	LOS ³	v/c	Delay	LOS	v/c	Delay	LOS
<i>Surfside Road at Fairgrounds Road/South Shore Road</i>	Eastbound	>1.0	>50	F	>1.0	>50	F	>1.0	>50	F
	Westbound	0.51	20	C	0.49	20	C	0.54	23	C
	Northbound	0.61	23	C	0.59	22	C	0.78	36	E
	Southbound	0.89	45	E	0.86	41	E	0.95	>50	F
<i>South Shore Road at North Site Driveway</i>	Eastbound	n/a	n/a	n/a	n/a	n/a	n/a	0.06	12	B
	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
<i>South Shore Road at Middle Site Driveway</i>	Eastbound	n/a	n/a	n/a	n/a	n/a	n/a	0.04	11	B
	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
<i>South Shore Road at South Site Driveway</i>	Eastbound	n/a	n/a	n/a	n/a	n/a	n/a	0.01	11	B
	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A

¹Volume-to-capacity ratio

²Average control delay per vehicle (in seconds)

³Level of service

⁴n/a = not applicable

TABLE 7
INTERSECTION CAPACITY ANALYSIS RESULTS
WEEKDAY EVENING PEAK HOUR (PEAK SEASON)

Period	Approach	2018 Baseline			2023 No-Build			2023 Build		
		v/c ¹	Delay ²	LOS ³	v/c	Delay	LOS	v/c	Delay	LOS
<i>Surfside Road at Fairgrounds Road/South Shore Road</i>	Eastbound	0.81	34	D	0.89	46	E	0.97	>50	F
	Westbound	0.40	15	C	0.44	17	C	0.47	18	C
	Northbound	0.35	15	B	0.39	16	C	0.50	19	C
	Southbound	0.90	42	E	>1.0	>50	F	>1.0	>50	F
<i>South Shore Road at North Site Driveway</i>	Eastbound	n/a	n/a	n/a	n/a	n/a	n/a	0.04	12	B
	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
<i>South Shore Road at Middle Site Driveway</i>	Eastbound	n/a	n/a	n/a	n/a	n/a	n/a	0.03	12	B
	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
<i>South Shore Road at South Site Driveway</i>	Eastbound	n/a	n/a	n/a	n/a	n/a	n/a	0.01	11	B
	Northbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A
	Southbound	n/a	n/a	n/a	n/a	n/a	n/a	0.00	<5	A

¹Volume-to-capacity ratio

²Average control delay per vehicle (in seconds)

³Level of service

⁴n/a = not applicable

As summarized in **Table 6 and Table 7**:

- *Surfside Road at Fairgrounds Road/South Shore Road.* Under future conditions, capacity analyses indicate that the Surfside Road intersection with Fairgrounds Road and South Shore Road will operate with long delays during the peak season, specifically, for the eastbound Surfside Road and southbound Fairgrounds Road approaches to the intersection. The project will have a minor impact to operations. Furthermore, field observations indicate the delays are overstated for the four-way STOP condition.
- *South Shore Road at Site Driveways.* Under future Build conditions, capacity analyses indicate that the unsignalized Site Driveway approaches to South Shore Road will operate at level of service (LOS) B or better during the weekday morning and weekday evening peak hours.

Queue Results

The results of the approach queue lengths from the capacity analysis are summarized below in **Table 8**. Detailed analysis results are presented in the **Attachments**.

**TABLE 8
VEHICLE QUEUE ANALYSIS SUMMARY
SURFSIDE ROAD AT FAIRGROUNDS ROAD/SOUTH SHORE ROAD**

Approach	Available Queue Storage Length (feet)	2018 Baseline	2023 No-Build	2023 Build	Difference (Δ)
		Maximum Queue Length¹	Maximum Queue Length¹	Maximum Queue Length¹	No-Build to Build
<i>Weekday Morning Peak Hour</i>					
Eastbound L/T/R	>1000	4	4	7	+3
Westbound L/T/R	>1000	13	13	13	+0
Northbound L/T/R	>1000	3	3	4	+1
Southbound L/T/R	>1000	10	10	12	+2
<i>Weekday Evening Peak Hour</i>					
Eastbound L/T/R	>1000	2	2	3	+1
Westbound L/T/R	>1000	8	11	14	+3
Northbound L/T/R	>1000	2	3	3	+0
Southbound L/T/R	>1000	11	14	14	+0

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

As presented in **Table 8**, the 95th percentile vehicle queues at the study intersections will generally be contained within available storage lanes during peak hours. During peak hours under peak summer conditions the westbound Surfside Road approach and southbound Fairgrounds Road approach has queues that extend several hundred feet from the intersection. The project will not significantly change queue lengths compared to No-Build conditions and will generally result in an increase of 3 vehicles or less on all approaches.

SITE ACCESS/CIRCULATION

AutoTURN analysis has been completed for the preliminary site plan using the Town's Ladder truck and a single unit (SU) delivery truck. Site access, circulation aisles and parking layout provide adequate maneuvering area for the largest potential responding vehicle (ladder truck). Supporting AutoTurn® truck turn analysis and exhibits are provided to confirm this finding (refer to the **Attachments**).

RECOMMENDATIONS AND CONCLUSIONS

Trip generation for the development is projected to be moderate with approximately 88 vehicle trips during the weekday morning peak hour and 113 vehicle trips during the weekday evening peak hour. The project will result in 1 to 2 additional trips per minute during the peak commute hours. MDM finds that incremental traffic associated with the proposed development is not expected to materially impact operating conditions at the study intersections. The study intersections exhibit below-average crash rates based on historic crash data; safety countermeasures are therefore not warranted. Likewise, the available sight lines at the Site Driveway intersection with South Shore Road exceed the recommended sight line requirements from AASHTO.

MDM recommends the following access/egress elements to enhance safety and capacity:

- *Signage and Markings.* A STOP sign (R1-1) and STOP line pavement markings are recommended on the site driveway approaches to South Shore Road. The sign and pavement markings shall be compliant with the Manual on Uniform Traffic Control Devices (MUTCD).
- *Pedestrian Accommodation.* The Proponent proposes a sidewalk along the site driveways as part of the development which will provide a connection between the various units and South Shore Road. Additionally, sidewalk extends along the frontage of South Shore Road between the driveways and marked crosswalks provide access to the existing multi-use path.

- *Bicycle Accommodations.* The development should incorporate bicycle storage racks near the multi-family buildings with specific locations to be identified in the final approved Site Plans. Provide bicycle parking, including weather protected racks for residents within or proximate to the multi-family building entrances.
- *Driveway Design.* The final curb radii between the site driveways and South Shore Road should be designed to accommodate the Towns largest fire apparatus (ladder truck) and single unit delivery vehicles.
- *Sight Line Maintenance.* The sight lines should be cleared and graded with the construction of the proposed primary site driveway approaches to South Shore Road. Any new plantings (shrubs, bushes) or physical landscape features to be located within the project driveway sight lines should also be maintained at a height of 2 feet or less above the adjacent roadway grade to ensure unobstructed lines of sight.
- *Transportation Demand Management (TDM).* TDM actions should be considered that may be appropriate to encourage alternative travel modes for residents and visitors. These include on-site amenities, bicycle storage racks, pedestrian connections, and other methods of reducing automobile use.

In summary, trip generation for the development is projected to be modest. MDM finds that incremental traffic associated with the proposed development is not expected to materially impact operating conditions at the study intersections. The study intersections exhibit below-average crash rates based on historic crash data; safety countermeasures are therefore not warranted. Likewise, the available sight lines at the Site Driveway intersections with South Shore Road exceed the recommended sight line requirements from AASHTO. Implementation of access/egress improvements, proposed pedestrian, and bicycle improvements along with a Transportation Demand Management (TDM) program will establish a framework of minimizing Site traffic impacts by encouraging non-motorized travel modes and pedestrian/bicycle accommodation that is compatible with other projects in the area.

ATTACHMENTS

- Traffic Volume Data
- Historical Traffic Volumes
- Seasonal/ Yearly Growth Data
- Speed Data
- Crash Data
- Public Transportation Information
- Sight Distance Calculations
- Trip Generation
- Trip Distribution Calculations
- Capacity Analysis
- AutoTURN® Analysis

□ Traffic Volume Data

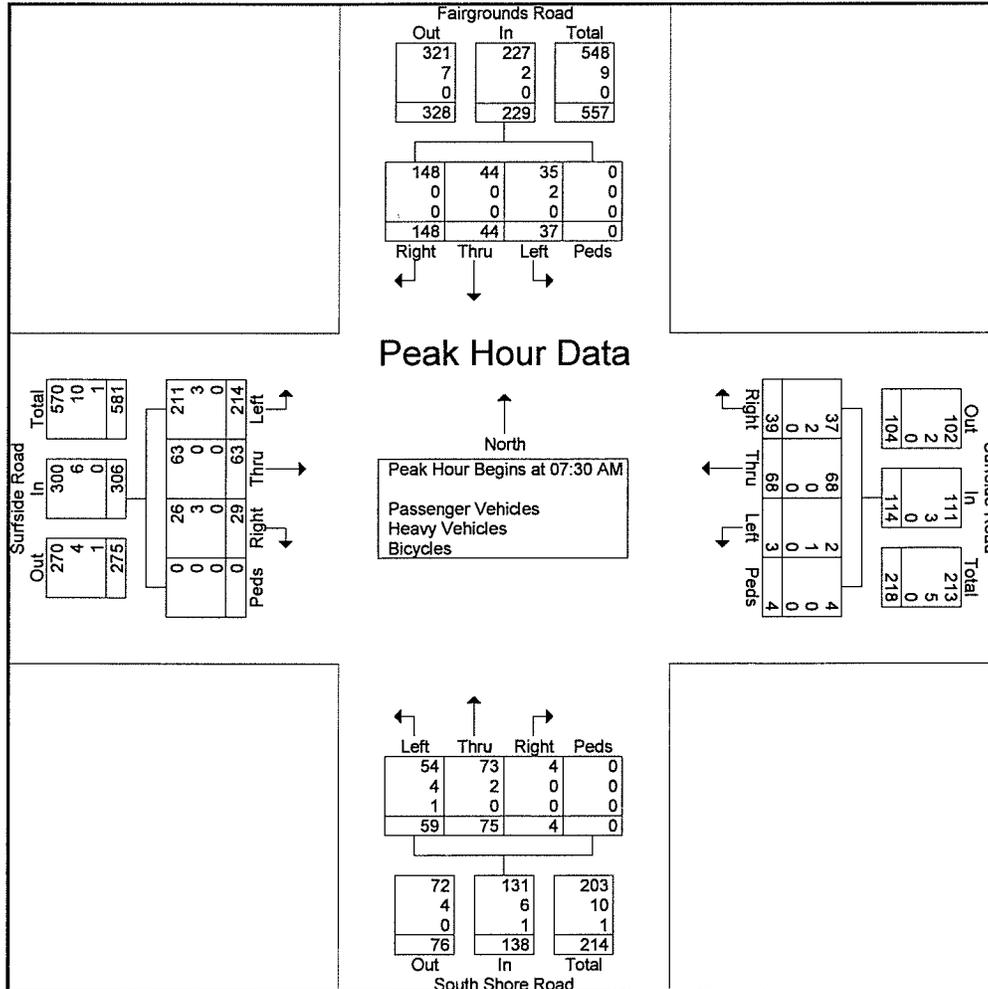
MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280
Marlborough, MA

N/S: Fairgrounds Rd/South Shore Rd
E/W: Surfside Rd
Nantucket, MA

File Name : Surfside at South Shore AM
Site Code : 959
Start Date : 1/25/2018
Page No : 2

Start Time	Fairgrounds Road From North					Surfside Road From East					South Shore Road From South					Surfside Road From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	46	12	5	0	63	18	30	1	0	49	1	22	25	0	48	7	17	45	0	69	229
07:45 AM	33	11	10	0	54	6	12	1	1	20	1	25	8	0	34	8	16	72	0	96	204
08:00 AM	42	10	11	0	63	5	9	1	2	17	2	13	14	0	29	9	16	39	0	64	173
08:15 AM	27	11	11	0	49	10	17	0	1	28	0	15	12	0	27	5	14	58	0	77	181
Total Volume	148	44	37	0	229	39	68	3	4	114	4	75	59	0	138	29	63	214	0	306	787
% App. Total	64.6	19.2	16.2	0		34.2	59.6	2.6	3.5		2.9	54.3	42.8	0		9.5	20.6	69.9	0		
PHF	.804	.917	.841	.000	.909	.542	.567	.750	.500	.582	.500	.750	.590	.000	.719	.806	.926	.743	.000	.797	.859
Passenger Vehicles	100	100	94.6	0	99.1	94.9	100	66.7	100	97.4	100	97.3	91.5	0	94.9	89.7	100	98.6	0	98.0	97.7
% Passenger Vehicles																					
Heavy Vehicles	0	0	5.4	0	0.9	5.1	0	33.3	0	2.6	0	2.7	6.8	0	4.3	10.3	0	1.4	0	2.0	2.2
% Heavy Vehicles																					
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
% Bicycles																					



MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280
Marlborough, MA

N/S: Fairgrounds Rd/South Shore Rd
E/W: Surfside Rd
Nantucket, MA

File Name : Surfside at South Shore AM
Site Code : 959
Start Date : 1/25/2018
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles - Bicycles

Start Time	Fairgrounds Road From North					Surfside Road From East					South Shore Road From South					Surfside Road From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
07:00 AM	16	2	8	0	26	3	9	0	0	12	2	14	12	1	29	6	4	20	0	30	97
07:15 AM	28	5	7	0	40	10	20	0	0	30	0	14	17	0	31	6	8	38	0	52	153
07:30 AM	46	12	5	0	63	18	30	1	0	49	1	22	25	0	48	7	17	45	0	69	229
07:45 AM	33	11	10	0	54	6	12	1	1	20	1	25	8	0	34	8	16	72	0	96	204
Total	123	30	30	0	183	37	71	2	1	111	4	75	62	1	142	27	45	175	0	247	683
08:00 AM	42	10	11	0	63	5	9	1	2	17	2	13	14	0	29	9	16	39	0	64	173
08:15 AM	27	11	11	0	49	10	17	0	1	28	0	15	12	0	27	5	14	58	0	77	181
08:30 AM	25	8	14	0	47	9	16	1	0	26	1	12	9	1	23	6	12	32	0	50	146
08:45 AM	23	10	11	0	44	12	13	2	4	31	3	9	18	2	32	14	12	40	0	66	173
Total	117	39	47	0	203	36	55	4	7	102	6	49	53	3	111	34	54	169	0	257	673
Grand Total	240	69	77	0	386	73	126	6	8	213	10	124	115	4	253	61	99	344	0	504	1356
Apprch %	62.2	17.9	19.9	0		34.3	59.2	2.8	3.8		4	49	45.5	1.6		12.1	19.6	68.3	0		
Total %	17.7	5.1	5.7	0	28.5	5.4	9.3	0.4	0.6	15.7	0.7	9.1	8.5	0.3	18.7	4.5	7.3	25.4	0	37.2	
Passenger Vehicles																					
% Passenger Vehicles	99.2	98.6	94.8	0	98.2	97.3	98.4	83.3	100	97.7	100	97.6	93.9	100	96	91.8	100	98.8	0	98.2	97.7
Heavy Vehicles																					
% Heavy Vehicles	0.8	1.4	5.2	0	1.8	2.7	1.6	16.7	0	2.3	0	2.4	5.2	0	3.6	8.2	0	1.2	0	1.8	2.2
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
% Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0.9	0	0.4	0	0	0	0	0	0.1

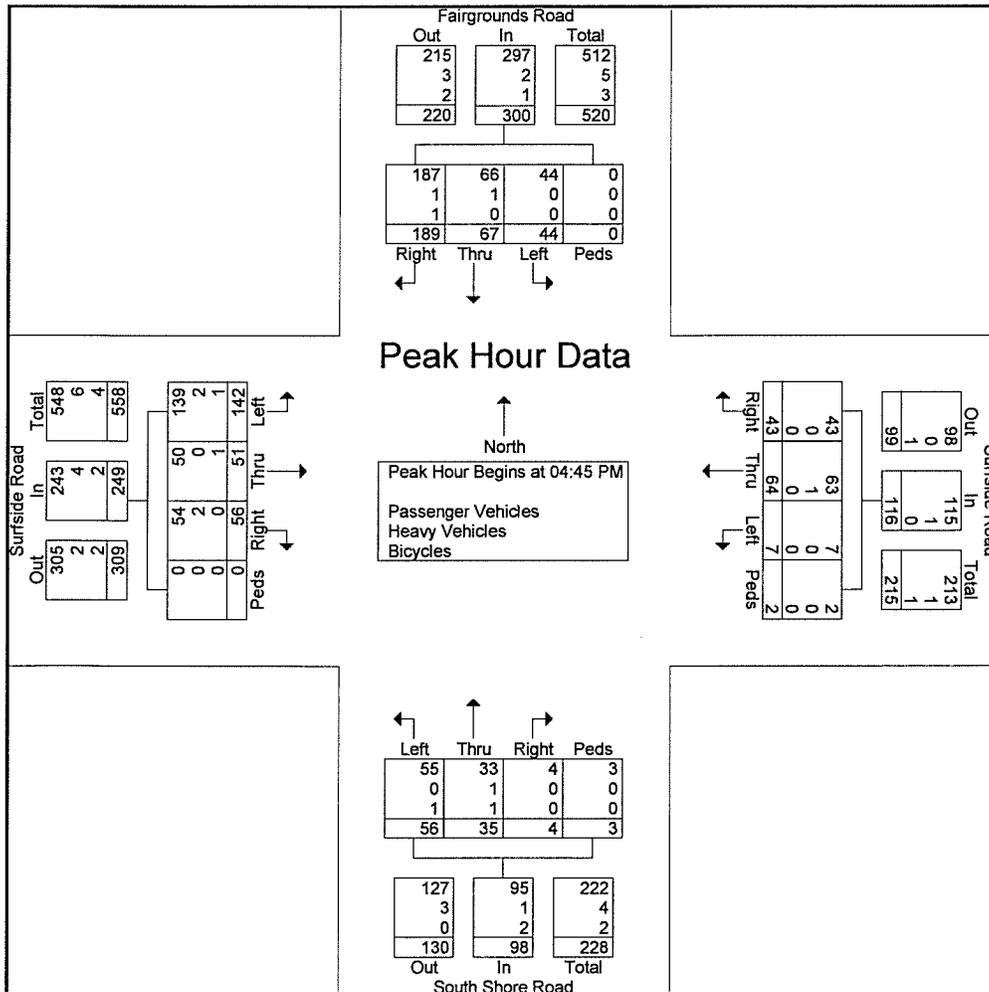
MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280
Marlborough, MA

N/S: Fairgrounds Rd/South Shore Rd
E/W: Surfside Rd
Nantucket, MA

File Name : Surfside at South Shore PM
Site Code : 959
Start Date : 1/24/2018
Page No : 2

Start Time	Fairgrounds Road From North					Surfside Road From East					South Shore Road From South					Surfside Road From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	39	19	17	0	75	10	20	3	1	34	1	10	10	1	22	15	15	40	0	70	201
05:00 PM	60	18	11	0	89	15	16	2	0	33	1	7	11	0	19	10	13	28	0	51	192
05:15 PM	53	17	7	0	77	15	12	2	1	30	0	11	17	0	28	14	13	34	0	61	196
05:30 PM	37	13	9	0	59	3	16	0	0	19	2	7	18	2	29	17	10	40	0	67	174
Total Volume	189	67	44	0	300	43	64	7	2	116	4	35	56	3	98	56	51	142	0	249	763
% App. Total	63	22.3	14.7	0		37.1	55.2	6	1.7		4.1	35.7	57.1	3.1		22.5	20.5	57	0		
PHF	.788	.882	.647	.000	.843	.717	.800	.583	.500	.853	.500	.795	.778	.375	.845	.824	.850	.888	.000	.889	.949
Passenger Vehicles	98.9	98.5	100	0	99.0	100	98.4	100	100	99.1	100	94.3	98.2	100	96.9	96.4	98.0	97.9	0	97.6	98.3
% Passenger Vehicles																					
Heavy Vehicles																					
% Heavy Vehicles	0.5	1.5	0	0	0.7	0	1.6	0	0	0.9	0	2.9	0	1.0	3.6	0	1.4	0	1.6	1.0	
Bicycles	1	0	0	0	1	0	0	0	0	0	0	1	1	0	2	0	1	1	0	2	5
% Bicycles	0.5	0	0	0	0.3	0	0	0	0	0	0	2.9	1.8	0	2.0	0	2.0	0.7	0	0.8	0.7



MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280
Marlborough, MA

N/S: Fairgrounds Rd/South Shore Rd
E/W: Surfside Rd
Nantucket, MA

File Name : Surfside at South Shore PM
Site Code : 959
Start Date : 1/24/2018
Page No : 1

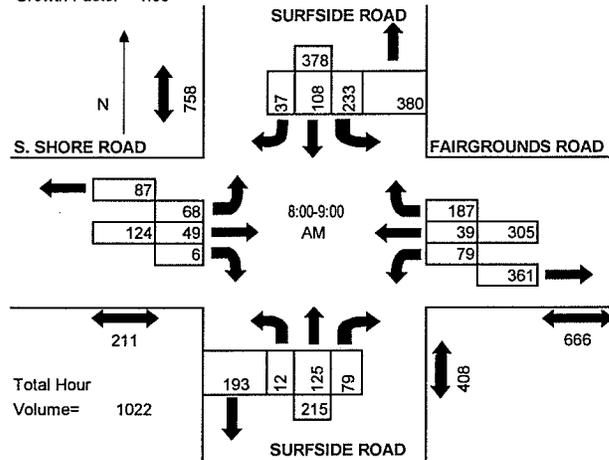
Groups Printed- Passenger Vehicles - Heavy Vehicles - Bicycles

Start Time	Fairgrounds Road From North					Surfside Road From East					South Shore Road From South					Surfside Road From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	36	15	17	0	68	7	14	1	1	23	4	10	9	1	24	18	23	37	1	79	194
04:15 PM	31	19	14	0	64	11	17	1	1	30	3	10	13	2	28	21	15	36	0	72	194
04:30 PM	34	14	20	0	68	5	17	0	0	22	1	11	9	1	22	7	18	30	0	55	167
04:45 PM	39	19	17	0	75	10	20	3	1	34	1	10	10	1	22	15	15	40	0	70	201
Total	140	67	68	0	275	33	68	5	3	109	9	41	41	5	96	61	71	143	1	276	756
05:00 PM	60	18	11	0	89	15	16	2	0	33	1	7	11	0	19	10	13	28	0	51	192
05:15 PM	53	17	7	0	77	15	12	2	1	30	0	11	17	0	28	14	13	34	0	61	196
05:30 PM	37	13	9	0	59	3	16	0	0	19	2	7	18	2	29	17	10	40	0	67	174
05:45 PM	30	10	11	0	51	14	12	0	3	29	0	10	8	2	20	12	11	48	0	71	171
Total	180	58	38	0	276	47	56	4	4	111	3	35	54	4	96	53	47	150	0	250	733
Grand Total	320	125	106	0	551	80	124	9	7	220	12	76	95	9	192	114	118	293	1	526	1489
Apprch %	58.1	22.7	19.2	0		36.4	56.4	4.1	3.2		6.2	39.6	49.5	4.7		21.7	22.4	55.7	0.2		
Total %	21.5	8.4	7.1	0	37	5.4	8.3	0.6	0.5	14.8	0.8	5.1	6.4	0.6	12.9	7.7	7.9	19.7	0.1	35.3	
Passenger Vehicles																					
% Passenger Vehicles	99.4	97.6	99.1	0	98.9	100	96	100	100	97.7	100	96.1	98.9	100	97.9	98.2	97.5	98.3	100	98.1	98.3
Heavy Vehicles																					
% Heavy Vehicles	0.3	0.8	0.9	0	0.5	0	1.6	0	0	0.9	0	2.6	0	0	1	1.8	0	1	0	1	0.8
Bicycles	1	2	0	0	3	0	3	0	0	3	0	1	1	0	2	0	3	2	0	5	13
% Bicycles	0.3	1.6	0	0	0.5	0	2.4	0	0	1.4	0	1.3	1.1	0	1	0	2.5	0.7	0	1	0.9

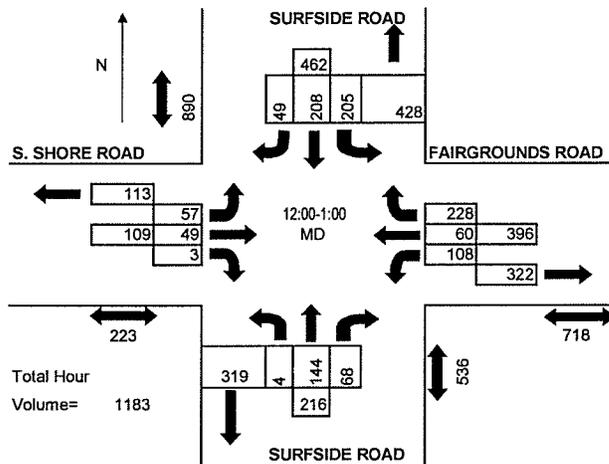
□ Historical Traffic Volumes

Surfside Road at Fairgrounds Road / South Shore Road Future No-Build 2020 Weekday AM, MD, PM Peak Hour Turning Movement Counts

Nantucket, MA - Surfside Rd. at Fairgrounds Rd. / S. Shore Rd.
 Turning Movements for One hour Starting with 8:00 AM (Vehicles)
 Counts conducted by Precision Data Industries - Thurs. 8-13-15 Weather: Clear
 Growth Factor = 1.05



Turning Movements for One hour Starting with 12:00 PM (Vehicles)
 Counts conducted by Precision Data Industries - Thurs. 8-13-15 Weather: Clear



Turning Movements for One hour Starting with 4:00 PM (Vehicles)
 Counts conducted by Precision Data Industries - Thurs. 8-13-15 Weather: Clear

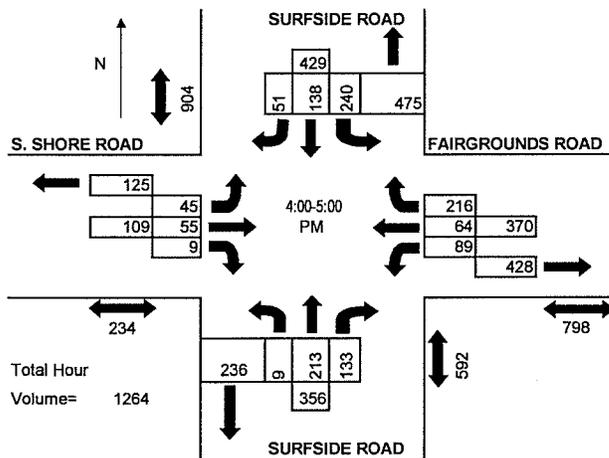


Figure 5

□ Seasonal Data/ Yearly Growth



Table 5: Monthly Adjustment Factors for Cape Cod

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011*	1.26	1.25	1.20	1.06	0.96	0.89	0.76	0.76	0.92	0.99	1.08	1.14
2010	1.26	1.25	1.19	1.08	0.95	0.88	0.77	0.76	0.93	1.00	1.08	1.15
2009	1.26	1.25	1.19	1.08	0.95	0.88	0.77	0.76	0.93	1.00	1.08	1.15
2008	1.21	1.25	1.19	1.08	0.96	0.89	0.78	0.76	0.93	1.00	1.07	1.14
2007	1.25	1.21	1.17	1.06	0.96	0.86	0.78	0.79	0.93	1.00	1.08	1.14
2006	1.26	1.20	1.18	1.04	0.96	0.86	0.78	0.79	0.93	0.99	1.07	1.12
2005	1.27	1.23	1.18	1.06	0.96	0.85	0.77	0.78	0.93	0.99	1.08	1.15
2004	1.27	1.23	1.18	1.06	0.96	0.85	0.77	0.78	0.93	0.99	1.08	1.15
2003	1.29	1.23	1.16	1.06	0.99	0.87	0.79	0.77	0.95	0.99	1.07	1.14
2002	1.30	1.24	1.16	1.06	0.98	0.86	0.79	0.78	0.93	0.97	1.08	1.14
2001	1.34	1.27	1.18	1.06	0.97	0.86	0.78	0.78	0.94	0.97	1.08	1.13
2000	1.37	1.28	1.20	1.07	0.96	0.87	0.77	0.78	0.93	0.97	1.09	1.14
1999	1.37	1.29	1.23	1.09	0.96	0.87	0.76	0.77	0.94	0.99	1.10	1.15
1998	1.39	1.27	1.23	1.11	0.95	0.87	0.76	0.76	0.93	0.99	1.10	1.16
1997	1.38	1.29	1.22	1.10	0.96	0.86	0.76	0.75	0.92	0.99	1.10	1.19
1996	1.41	1.30	1.22	1.07	0.96	0.86	0.75	0.75	0.91	0.99	1.10	1.19
1995	1.36	1.33	1.24	1.07	0.97	0.86	0.75	0.75	0.90	0.99	1.10	1.19
1994	1.35	1.31	1.25	1.06	0.93	0.86	0.73	0.74	0.89	0.97	1.09	1.15
1993	1.35	1.30	1.24	1.07	0.92	0.85	0.75	0.75	0.90	0.99	1.10	1.17
1992	1.37	1.32	1.29	1.08	0.94	0.87	0.75	0.76	0.90	1.01	1.14	1.21
1991	1.39	1.30	1.22	1.08	0.94	0.87	0.76	0.77	0.95	1.02	1.12	1.20
1990	1.31	1.26	1.16	1.06	0.96	0.85	0.73	0.74	0.94	0.99	1.10	1.22
1989	1.37	1.38	1.25	1.13	0.99	0.89	0.72	0.73	0.94	1.03	1.15	1.17
1988	1.38	1.30	1.21	1.10	0.99	0.83	0.72	0.73	0.91	1.02	1.11	1.15
1987	1.40	1.39	1.23	1.10	0.94	0.85	0.71	0.73	0.96	1.02	1.18	1.25
1986	1.35	1.31	1.21	1.09	1.05	0.84	0.73	0.75	0.96	1.04	1.17	1.22
1985	1.31	1.26	1.17	1.07	0.96	0.92	0.84	0.83	0.97	0.97	1.14	1.16
1984	1.55	1.36	1.46	1.12	1.03	0.85	0.73	0.73	0.94	1.07	1.14	1.24
1983	1.53	1.51	1.30	1.15	0.98	0.82	0.65	0.66	0.87	1.07	1.23	1.30

Source: Massachusetts Highway Department / Mass DOT

*2011 is the last year that MassDOT has supplied monthly adjustment factors

□ Speed Data

MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280
Marlborough, MA 01752
508-303-0370
www.mdmtrans.com

N/S: South Shore Road
Near Proposed Site Driveway
Nantucket, MA

Date Start: 24-Jan-18
Site Code: 959
Station ID:

Date Start: 24-Jan-18

Start Time	15	16	20	21	25	26	30	31	35	36	40	41	45	46	50	51	55	56	60	61	65	66	70	71	75	76	999	Total	85th Percent	
01/24/18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	4	5	7	7	7	30	38	23	17	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	24	28	17	4	4	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	1	0	0	4	4	18	34	23	5	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	1	1	6	6	6	22	34	19	7	7	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	2	5	5	5	30	47	36	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	4	2	8	8	8	36	46	15	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	2	0	3	3	3	15	25	16	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	2	1	1	1	6	20	7	4	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	8	13	11	2	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	1	1	0	0	0	4	9	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	1	1	0	0	3	4	2	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	4	1	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Statistics	10 MPH Pace Speed :	26-35 MPH
	85th Percentile :	38 MPH
	95th Percentile :	41 MPH
	Number of Vehicles > 30 MPH :	533
	Percent of Vehicles > 30 MPH :	67.5%
	Mean Speed(Average) :	33 MPH

MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280
Marlborough, MA 01752
508-303-0370
www.mdmtrans.com

N/S: South Shore Road
Near Proposed Site Driveway
Nantucket, MA

Date Start: 24-Jan-18
Site Code: 959
Station ID:

Date Start: 24-Jan-18

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	Total	85th Percent
01/25/18	0	0	0	1	0	0	1	0	0	0	0	0	0	0	2	43
01:00	0	0	0	1	0	1	0	0	0	0	0	0	0	0	2	38
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*
03:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	34
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*
05:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	34
06:00	0	0	0	4	7	5	5	1	0	0	0	0	0	0	22	42
07:00	2	1	0	19	13	17	6	1	1	0	0	0	0	0	60	39
08:00	1	2	3	9	32	17	5	2	0	0	0	0	0	0	71	38
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Statistics

10 MPH Pace Speed : 31-40 MPH

85th Percentile : 39 MPH

95th Percentile : 44 MPH

Number of Vehicles > 30 MPH : 116

Percent of Vehicles > 30 MPH : 73.0%

Mean Speed(Average) : 34 MPH

Stats

Mean Speed(Average) : 33 MPH

85th Percentile : 38 MPH

95th Percentile : 42 MPH

Number of Vehicles > 30 MPH : 649

Percent of Vehicles > 30 MPH : 68.4%

MDM Transportation Consultants, Inc.

N/S: South Shore Road
Near Proposed Site Driveway
Nantucket, MA

28 Lord Road, Suite 280
Marlborough, MA 01752
508-303-0370
www.mdmtrans.com

Date Start: 24-Jan-18
Site Code: 959
Station ID:

Northbound		Date Start: 24-Jan-18															85th Percent	
Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	Total	85th Percent		
	15	20	25	30	35	40	45	50	55	60	65	70	75	80		Percent		
01/24/18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
12 PM	3	3	10	26	51	27	3	0	0	0	0	0	0	0	123	37		
13:00	1	0	1	17	28	18	10	4	0	0	0	0	0	0	79	41		
14:00	1	0	0	10	27	16	10	1	0	0	0	0	0	0	65	40		
15:00	1	1	2	20	36	31	9	1	0	0	0	0	0	0	101	39		
16:00	1	1	5	16	40	22	8	1	0	0	0	0	0	0	94	38		
17:00	1	1	9	26	35	17	5	0	0	0	0	0	0	0	94	37		
18:00	0	0	0	14	15	12	0	0	0	0	0	0	0	0	41	37		
19:00	0	1	1	4	10	9	4	0	0	0	0	0	0	0	28	39		
20:00	0	1	1	5	3	5	2	0	0	0	0	0	0	0	17	39		
21:00	0	0	2	8	8	5	1	0	1	0	0	0	0	0	25	38		
22:00	0	0	1	4	1	0	2	1	0	0	0	0	0	0	9	44		
23:00	0	0	0	1	2	0	0	0	0	0	0	0	0	0	3	33		

Statistics	10 MPH Pace Speed :	31-40 MPH
85th Percentile :	38 MPH	
95th Percentile :	42 MPH	
Number of Vehicles > 30 MPH :	481	
Percent of Vehicles > 30 MPH :	70.8%	
Mean Speed(Average) :	33 MPH	

□ Crash Data

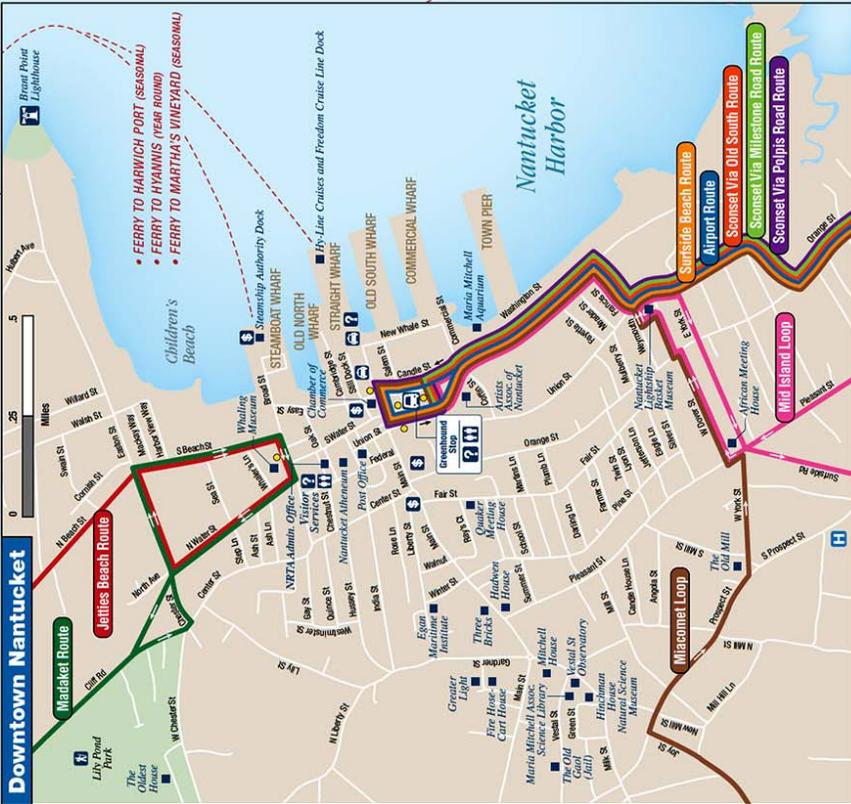
MassDOT																								
MassDOT Crash Report for NANTUCKET																								
Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Number of Injured	Total Number of Injured	Number of Fatalities	Vehicle Status	Vehicle Status at Collision	Vehicle Status Prior to Collision	Vehicle Travel Direction	Vehicle Travel Direction	Vehicle Condition	Distance from nearest roadway / Freeway	Distance from nearest structure	Distance from nearest intersection	Distance from nearest driveway	Distance from nearest utility	Distance from nearest structure	Distance from nearest utility	Distance from nearest structure	Distance from nearest utility	Distance from nearest structure	Distance from nearest utility
2015																								
2014	NANTUCKET	26-Jun-2015	4:10 PM	Not Reported	2	0	0	0	Retained	W1: Stopping or stopped in traffic / V2: Stopping or stopped in traffic	W1: Not reported / V2: Not reported	W1: Not reported / V2: Not reported	W1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	W1: Light truck/minivan, pickup, sport utility with only four tires / V2: Light truck/minivan, pickup, sport utility with only four tires	Wet	Dark	Snow/Blowing sand, snow	FAIRGROUNDS ROAD / SURFSEIDE ROAD						
2013	NANTUCKET	17-Oct-2014	6:59 AM	Property damage only (none injured)	2	0	0	0	Side/slip, opposite direction	W1: Traveling straight ahead / V2: Traveling straight ahead	W1: Eastbound / V2: Southbound	W1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	W1: Passenger car / V2: Light truck/minivan, pickup, sport utility with only four tires	Wet	Daylight	Clear/Clear	FAIR GROUND ROAD / SURFSEIDE ROAD							

□ **Public Transportation Information**

LEGEND

- Airport Route
- Jetties Beach Route
- Market Loop
- Misconnet Loop
- Mid Island Loop
- Scotest Via Old South Route
- Scotest Via Milestone Road Route
- Scotest Via Polpis Road Route
- Scotest Via Old South Route
- Surfside Beach Route
- Bike Path
- Major Downtown Bus Stop (see color and list at bottom inset)
- Greenhouse Bus Stop
- Park and Ride Lot
- Point of Interest
- Hospital
- ATM
- Information
- Lighthouse
- Public Restrooms
- Taxi Stand
- Walking Area

©2017 Nantucket Regional Transit Authority
Design by SmartMaps, Inc.



Scan in the QR Code to download your real-time WAVE app.

Access real time information about bus locations, routes, and schedules. Download the app for your smartphone or tablet. For more information, visit www.waveapp.com.

Make Possible By

re Main **NANTUCKET** Local • Investments • Initiatives

Transit Local • Investments • Initiatives

©2017 Nantucket Regional Transit Authority

□ Sight Distance Calculations

Stopping Sight Distance - Regulatory

Approaches to Site Driveway

		SPEED (MPH)	BRAKE REACTION DISTANCE (FT)	BRAKING DISTANCE (FT)	CALCULATED STOPPING SIGHT DISTANCE (FT)
Direction 1	NB	35	128.625	117.4	246.0
Direction 2	SB	35	128.625	117.4	246.0

<u>INPUTS</u>	<u>Direction 1</u>	<u>Direction 2</u>
Travel Direction	NB	SB
Speed	35	35
Grade	0	0
t	2.5	2.5
a	11.2	11.2

Stopping Sight Distance (SSD) - Source: AASHTO

SSD = Reaction Distance + Brake Distance

Reaction Distance = 1.47 x t x V

Brake Distance = $V^2 / (30 \times ((a/32.2)+G))$

Where:

t = reaction time (sec)

V = travel speed (mph)

G= roadway grade

a - deceleration rate (ft/sec²)

Stopping Sight Distance - Average

Approaches to Site Driveway

		SPEED (MPH)	BRAKE REACTION DISTANCE (FT)	BRAKING DISTANCE (FT)	CALCULATED STOPPING SIGHT DISTANCE (FT)
Direction 1	NB	33	121.275	104.4	226
Direction 2	SB	33	121.275	104.4	226

INPUTS

Direction 1

Direction 2

Travel Direction	NB	SB
Speed	33	33
Grade	0	0
t	2.5	2.5
a	11.2	11.2

Stopping Sight Distance (SSD) - Source: AASHTO

SSD = Reaction Distance + Brake Distance

Reaction Distance = $1.47 \times t \times V$

Brake Distance = $V^2 / (30 \times ((a/32.2)+G))$

Where:

t = reaction time (sec)

V = travel speed (mph)

G= roadway grade

a - deceleration rate (ft/sec²)

Stopping Sight Distance - Observed 85th Percentile

Approaches to Site Driveway

		SPEED (MPH)	BRAKE REACTION DISTANCE (FT)	BRAKING DISTANCE (FT)	CALCULATED STOPPING SIGHT DISTANCE (FT)
Direction 1	NB	38	139.65	138.4	278
Direction 2	SB	38	139.65	138.4	278

INPUTS

Direction 1

Direction 2

Travel Direction

NB

SB

Speed

38

38

Grade

0

0

t

2.5

2.5

a

11.2

11.2

Stopping Sight Distance (SSD) - Source: AASHTO

SSD = Reaction Distance + Brake Distance

Reaction Distance = $1.47 \times t \times V$

Brake Distance = $V^2 / (30 \times ((a/32.2)+G))$

Where:

t = reaction time (sec)

V = travel speed (mph)

G= roadway grade

a - deceleration rate (ft/sec²)

□ Trip Generation

**Institute of Transportation Engineers (ITE) 10th Edition
Land Use Code (LUC) 210 - Single-Family Detached Housing**

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 60

AVERAGE WEEKDAY DAILY

T = 9.5* (X)
T = 9.5* 60
T = 570.00
T = 570 vehicle trips
with 50% (285 vpd) entering and 50% (285 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.74* (X)
T = 0.74 * 60
T = 44.40
T = 44 vehicle trips
with 25% (11 vph) entering and 75% (33 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.99* (X)
T = 0.99* 60
T = 59.40
T = 59 vehicle trips
with 63% (37 vph) entering and 37% (22 vph) exiting.

SATURDAY DAILY

T = 9.54* (X)
T = 9.54* 60
T = 572.40
T = 572 vehicle trips
with 50% (286 vph) entering and 50% (286 vph) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

T = 0.93* (X)
T = 0.93* 60
T = 55.80
T = 56 vehicle trips
with 54% (30 vph) entering and 46% (26 vph) exiting.

**Institute of Transportation Engineers (ITE) 10th Edition
Land Use Code (LUC) 220 - Multifamily Housing (Low-Rise)**

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 96

AVERAGE WEEKDAY DAILY

$T = 7.32 * X$
 $T = 7.32 * 96$
 $T = 702.72$
 $T = 702$ vehicle trips
with 50% (351 vpd) entering and 50% (351 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.46 * X$
 $T = 0.46 * 96$
 $T = 44.16$
 $T = 44$ vehicle trips
with 23% (10 vph) entering and 77% (34 vph) exiting.

WEEKDAY MORNING PEAK HOUR OF GENERATOR

$T = 0.56 * X$
 $T = 0.56 * 96$
 $T = 53.76$
 $T = 54$ vehicle trips
with 28% (15 vph) entering and 72% (39 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.56 * X$
 $T = 0.56 * 96$
 $T = 53.76$
 $T = 54$ vehicle trips
with 63% (34 vph) entering and 37% (20 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF GENERATOR

$T = 0.67 * X$
 $T = 0.67 * 96$
 $T = 64.32$
 $T = 64$ vehicle trips
with 59% (38 vph) entering and 41% (26 vph) exiting.

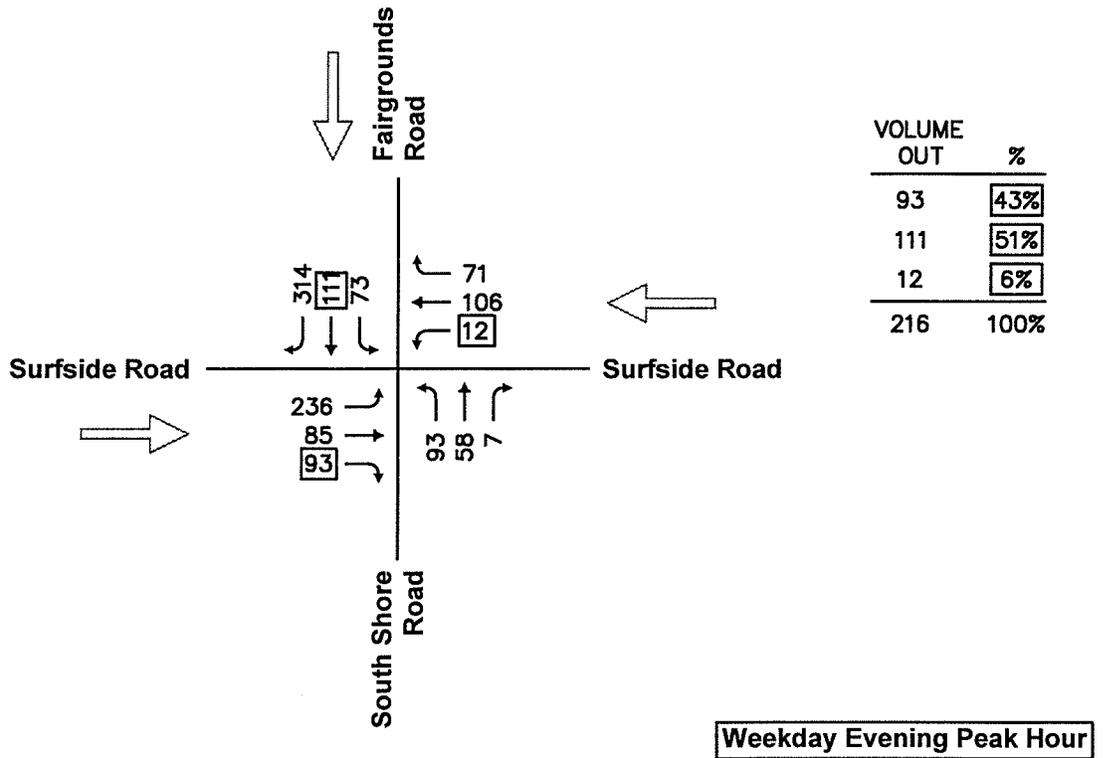
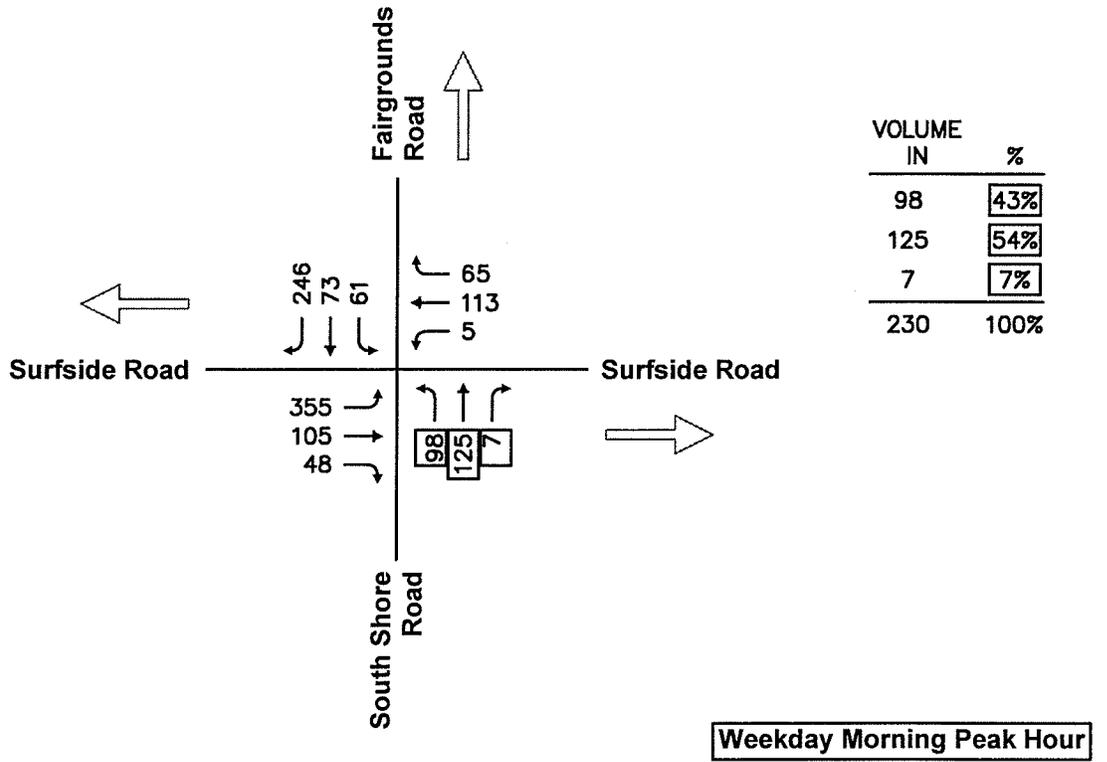
SATURDAY DAILY

$T = 8.14 * X$
 $T = 8.14 * 96$
 $T = 781.44$
 $T = 782$ vehicle trips
with 50% (391 vpd) entering and 50% (391 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

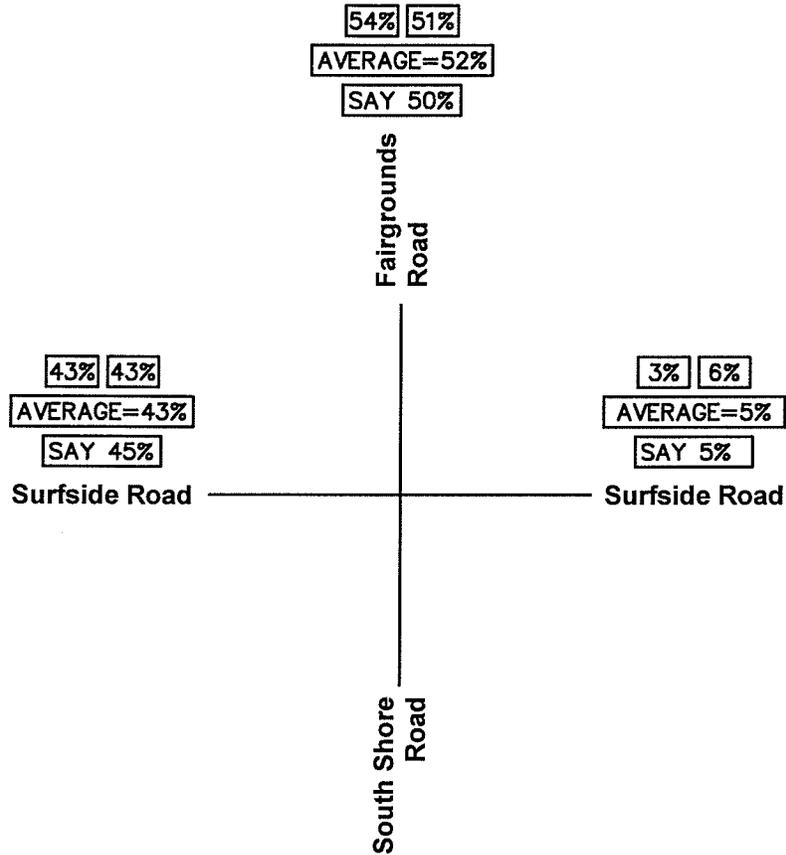
$T = 0.70 * X$
 $T = 0.70 * 96$
 $T = 67.20$
 $T = 67$ vehicle trips
with 49% (33 vph) entering and 51% (34 vph) exiting.

□ Trip Distribution Calculations



North

Scale: Not to Scale



North

Scale: Not to Scale

□ Capacity Analysis

HCM 2010 AWSC
 1: South Shore Road/Fairgrounds Road & Surfside Road

2018 Baseline Condition
 Weekday Morning Peak Hour

Intersection

Intersection Delay, s/veh	47											
Intersection LOS	E											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	355	105	48	0	5	113	65	0	98	125	7
Peak Hour Factor	0.92	0.86	0.86	0.86	0.92	0.86	0.86	0.86	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	1	0	10	2	33	0	5	2	7	3	0
Mvmt Flow	0	413	122	56	0	6	131	76	0	114	145	8
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	69	20.3	23.4
HCM LOS	F	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	43%	70%	3%	16%
Vol Thru, %	54%	21%	62%	19%
Vol Right, %	3%	9%	36%	65%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	230	508	183	380
LT Vol	98	355	5	61
Through Vol	125	105	113	73
RT Vol	7	48	65	246
Lane Flow Rate	267	591	213	442
Geometry Grp	1	1	1	1
Degree of Util (X)	0.61	1	0.507	0.889
Departure Headway (Hd)	8.217	7.584	8.584	7.24
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	439	484	417	499
Service Time	6.294	5.584	6.678	5.301
HCM Lane V/C Ratio	0.608	1.221	0.511	0.886
HCM Control Delay	23.4	69	20.3	44.9
HCM Lane LOS	C	F	C	E
HCM 95th-tile Q	4	13.3	2.8	9.8

Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	61	73	246
Peak Hour Factor	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	5	0	0
Mvmt Flow	0	71	85	286
Number of Lanes	0	0	1	0

Approach SB

Opposing Approach NB

Opposing Lanes 1

Conflicting Approach Left WB

Conflicting Lanes Left 1

Conflicting Approach Right EB

Conflicting Lanes Right 1

HCM Control Delay 44.9

HCM LOS E

Lane

Intersection

Intersection Delay, s/veh	45.4											
Intersection LOS	E											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	373	110	50	0	5	119	68	0	103	131	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	0	10	2	33	0	5	2	7	3	0
Mvmt Flow	0	405	120	54	0	5	129	74	0	112	142	8
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	68.4	19.6	22.4
HCM LOS	F	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	43%	70%	3%	16%
Vol Thru, %	54%	21%	62%	19%
Vol Right, %	3%	9%	35%	65%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	241	533	192	399
LT Vol	103	373	5	63
Through Vol	131	110	119	77
RT Vol	7	50	68	259
Lane Flow Rate	262	579	209	434
Geometry Grp	1	1	1	1
Degree of Util (X)	0.592	1	0.492	0.864
Departure Headway (Hd)	8.134	7.468	8.481	7.173
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	443	492	424	503
Service Time	6.211	5.468	6.569	5.234
HCM Lane V/C Ratio	0.591	1.177	0.493	0.863
HCM Control Delay	22.4	68.4	19.6	40.9
HCM Lane LOS	C	F	C	E
HCM 95th-tile Q	3.7	13.4	2.6	9.2

HCM 2010 AWSC
 1: South Shore Road/Fairgrounds Road & Surfside Road

2023 No-Build Condition
 Weekday Morning Peak Hour

Intersection

Intersection Delay, s/veh
 Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	63	77	259
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	5	0	0
Mvmt Flow	0	68	84	282
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	40.9
HCM LOS	E

Lane

HCM 2010 AWSC
 1: South Shore Road/Fairgrounds Road & Surfside Road

2023 Build Condition
 Weekday Morning Peak Hour

Intersection

Intersection Delay, s/veh	53.1											
Intersection LOS	F											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	373	110	59	0	6	119	68	0	133	165	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	0	10	2	33	0	5	2	7	3	0
Mvmt Flow	0	405	120	64	0	7	129	74	0	145	179	11
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	71.5	22.6	36.2
HCM LOS	F	C	E

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	43%	69%	3%	15%
Vol Thru, %	54%	20%	62%	21%
Vol Right, %	3%	11%	35%	63%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	308	542	193	410
LT Vol	133	373	6	63
Through Vol	165	110	119	88
RT Vol	10	59	68	259
Lane Flow Rate	335	589	210	446
Geometry Grp	1	1	1	1
Degree of Util (X)	0.786	1	0.539	0.94
Departure Headway (Hd)	8.452	8.065	9.241	7.721
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	429	454	392	472
Service Time	6.472	6.101	7.264	5.721
HCM Lane V/C Ratio	0.781	1.297	0.536	0.945
HCM Control Delay	36.2	71.5	22.6	55.9
HCM Lane LOS	E	F	C	F
HCM 95th-tile Q	6.9	12.9	3.1	11.2

Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	63	88	259
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	5	0	0
Mvmt Flow	0	68	96	282
Number of Lanes	0	0	1	0

Approach SB

Opposing Approach NB

Opposing Lanes 1

Conflicting Approach Left WB

Conflicting Lanes Left 1

Conflicting Approach Right EB

Conflicting Lanes Right 1

HCM Control Delay 55.9

HCM LOS F

Lane

HCM 2010 TWSC
 2: South Shore Road & North Site Driveway

2023 Build Condition
 Weekday Morning Peak Hour

Intersection

Int Delay, s/veh 0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	34	0	0	274	143	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	36	0	0	288	151	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	444	156	161	0	-	0
Stage 1	156	-	-	-	-	-
Stage 2	288	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	575	895	1430	-	-	-
Stage 1	877	-	-	-	-	-
Stage 2	766	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	575	895	1430	-	-	-
Mov Cap-2 Maneuver	575	-	-	-	-	-
Stage 1	877	-	-	-	-	-
Stage 2	766	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.7	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1430	-	575	-	-
HCM Lane V/C Ratio	-	-	0.062	-	-
HCM Control Delay (s)	0	-	11.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

HCM 2010 TWSC
3: South Shore Road & Middle Site Driveway

2023 Build Condition
Weekday Morning Peak Hour

Intersection

Int Delay, s/veh 0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	25	0	0	249	135	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	26	0	0	262	142	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	408	146	151	0	-	0
Stage 1	146	-	-	-	-	-
Stage 2	262	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	603	906	1442	-	-	-
Stage 1	886	-	-	-	-	-
Stage 2	786	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	603	906	1442	-	-	-
Mov Cap-2 Maneuver	603	-	-	-	-	-
Stage 1	886	-	-	-	-	-
Stage 2	786	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1442	-	603	-	-
HCM Lane V/C Ratio	-	-	0.044	-	-
HCM Control Delay (s)	0	-	11.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 2010 TWSC
4: South Shore Road & South Site Driveway

2023 Build Condition
Weekday Morning Peak Hour

Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	8	0	0	241	132	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	8	0	0	254	139	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	395	141	142	0	-	0
Stage 1	141	-	-	-	-	-
Stage 2	254	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	614	912	1453	-	-	-
Stage 1	891	-	-	-	-	-
Stage 2	793	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	614	912	1453	-	-	-
Mov Cap-2 Maneuver	614	-	-	-	-	-
Stage 1	891	-	-	-	-	-
Stage 2	793	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1453	-	614	-	-
HCM Lane V/C Ratio	-	-	0.014	-	-
HCM Control Delay (s)	0	-	10.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

HCM 2010 AWSC
 1: South Shore Road/Fairgrounds Road & Surfside Road

2018 Baseline Condition
 Weekday Evening Peak Hour

Intersection

Intersection Delay, s/veh	31.7											
Intersection LOS	D											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	236	85	93	0	12	106	71	0	93	58	7
Peak Hour Factor	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95
Heavy Vehicles, %	2	1	0	4	2	0	2	0	2	0	3	0
Mvmt Flow	0	248	89	98	0	13	112	75	0	98	61	7
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	33.7	15.1	14.8
HCM LOS	D	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	59%	57%	6%	15%
Vol Thru, %	37%	21%	56%	22%
Vol Right, %	4%	22%	38%	63%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	158	414	189	498
LT Vol	93	236	12	73
Through Vol	58	85	106	111
RT Vol	7	93	71	314
Lane Flow Rate	166	436	199	524
Geometry Grp	1	1	1	1
Degree of Util (X)	0.352	0.82	0.401	0.897
Departure Headway (Hd)	7.619	6.775	7.254	6.3
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	472	536	497	582
Service Time	5.668	4.8	5.288	4.3
HCM Lane V/C Ratio	0.352	0.813	0.4	0.9
HCM Control Delay	14.8	33.7	15.1	41.6
HCM Lane LOS	B	D	C	E
HCM 95th-tile Q	1.6	8.1	1.9	10.7

Intersection

Intersection Delay, s/veh
 Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	73	111	314
Peak Hour Factor	0.92	0.95	0.95	0.95
Heavy Vehicles, %	2	0	2	1
Mvmt Flow	0	77	117	331
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	41.6
HCM LOS	E

Lane

HCM 2010 AWSC
1: South Shore Road/Fairgrounds Road & Surfside Road

2023 No-Build Condition
Weekday Evening Peak Hour

Intersection

Intersection Delay, s/veh	44.9											
Intersection LOS	E											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	248	89	98	0	13	111	74	0	98	61	7
Peak Hour Factor	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95
Heavy Vehicles, %	2	1	0	4	2	0	2	0	2	0	3	0
Mvmt Flow	0	261	94	103	0	14	117	78	0	103	64	7
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	45.6	16.6	16.1
HCM LOS	E	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	59%	57%	7%	15%
Vol Thru, %	37%	20%	56%	22%
Vol Right, %	4%	23%	37%	63%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	166	435	198	524
LT Vol	98	248	13	77
Through Vol	61	89	111	117
RT Vol	7	98	74	330
Lane Flow Rate	175	458	208	552
Geometry Grp	1	1	1	1
Degree of Util (X)	0.391	0.901	0.444	1
Departure Headway (Hd)	8.053	7.084	7.674	6.535
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	451	517	475	552
Service Time	6.018	5.037	5.633	4.607
HCM Lane V/C Ratio	0.388	0.886	0.438	1
HCM Control Delay	16.1	45.6	16.6	64.1
HCM Lane LOS	C	E	C	F
HCM 95th-tile Q	1.8	10.4	2.2	14.3

Intersection

Intersection Delay, s/veh
 Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	77	117	330
Peak Hour Factor	0.92	0.95	0.95	0.95
Heavy Vehicles, %	2	0	2	1
Mvmt Flow	0	81	123	347
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	64.1
HCM LOS	F

Lane

HCM 2010 AWSC
 1: South Shore Road/Fairgrounds Road & Surfside Road

2023 Build Condition
 Weekday Evening Peak Hour

Intersection

Intersection Delay, s/veh	50.8											
Intersection LOS	F											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	248	89	130	0	16	111	74	0	117	82	9
Peak Hour Factor	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95
Heavy Vehicles, %	2	1	0	4	2	0	2	0	2	0	3	0
Mvmt Flow	0	261	94	137	0	17	117	78	0	123	86	9
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	60.4	18	19.2
HCM LOS	F	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	56%	53%	8%	14%
Vol Thru, %	39%	19%	55%	27%
Vol Right, %	4%	28%	37%	59%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	208	467	201	560
LT Vol	117	248	16	77
Through Vol	82	89	111	153
RT Vol	9	130	74	330
Lane Flow Rate	219	492	212	589
Geometry Grp	1	1	1	1
Degree of Util (X)	0.5	0.971	0.471	1
Departure Headway (Hd)	8.224	7.249	8.006	6.976
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	440	506	451	519
Service Time	6.253	5.249	6.042	5.024
HCM Lane V/C Ratio	0.498	0.972	0.47	1.135
HCM Control Delay	19.2	60.4	18	66.2
HCM Lane LOS	C	F	C	F
HCM 95th-tile Q	2.7	12.6	2.5	13.9

Intersection

Intersection Delay, s/veh
Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	77	153	330
Peak Hour Factor	0.92	0.95	0.95	0.95
Heavy Vehicles, %	2	0	2	1
Mvmt Flow	0	81	161	347
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	66.2
HCM LOS	F

Lane

HCM 2010 TWSC
2: South Shore Road & North Site Driveway

2023 Build Condition
Weekday Evening Peak Hour

Intersection

Int Delay, s/veh 0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	20	0	0	188	265	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	21	0	0	198	279	36

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	495	297	315	0	-	0
Stage 1	297	-	-	-	-	-
Stage 2	198	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	537	747	1257	-	-	-
Stage 1	758	-	-	-	-	-
Stage 2	840	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	537	747	1257	-	-	-
Mov Cap-2 Maneuver	537	-	-	-	-	-
Stage 1	758	-	-	-	-	-
Stage 2	840	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1257	-	537	-	-
HCM Lane V/C Ratio	-	-	0.039	-	-
HCM Control Delay (s)	0	-	12	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 2010 TWSC
 3: South Shore Road & Middle Site Driveway

2023 Build Condition
 Weekday Evening Peak Hour

Intersection

Int Delay, s/veh 0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	16	0	0	172	237	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	17	0	0	181	249	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	445	264	279	0	-	0
Stage 1	264	-	-	-	-	-
Stage 2	181	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	574	780	1295	-	-	-
Stage 1	785	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	574	780	1295	-	-	-
Mov Cap-2 Maneuver	574	-	-	-	-	-
Stage 1	785	-	-	-	-	-
Stage 2	855	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	11.5		0		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1295	-	574	-	-
HCM Lane V/C Ratio	-	-	0.029	-	-
HCM Control Delay (s)	0	-	11.5	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 2010 TWSC
 4: South Shore Road & South Site Driveway

2023 Build Condition
 Weekday Evening Peak Hour

Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	6	0	0	166	228	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	6	0	0	175	240	9

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	420	245	249	0	-	0
Stage 1	245	-	-	-	-	-
Stage 2	175	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	594	799	1328	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	860	-	-	-	-	-
Platoon blocked, %						
Mov Cap-1 Maneuver	594	799	1328	-	-	-
Mov Cap-2 Maneuver	594	-	-	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	860	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	11.1		0		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1328	-	594	-	-
HCM Lane V/C Ratio	-	-	0.011	-	-
HCM Control Delay (s)	0	-	11.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

□ AutoTURN® Analysis



MAP 87 PARCELS 5/23/2018-2018/506,506,507-502,4095
SEE PLANS FOR SCHEDULE OF WORK

#8-12 MORGAN DRIVE
MAP 87 PARCEL 501

#20 MACKAY ROAD
MAP 87 PARCEL 336 J

#15 MORGAN DRIVE
MAP 87 PARCELS 472

Site Plan Source: Bracken Engineering, Inc.

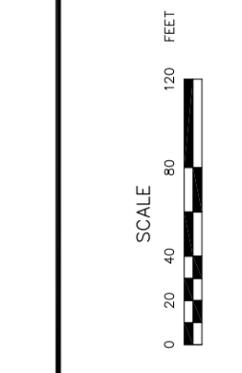
MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers
28 Lord Road, Suite 280
Marlborough, MA 01752

Date: February 2018
Project No. 959

Proposed Development
Nantucket, Massachusetts

Exhibit 1
Autoturn Analysis
Nantucket Fire Truck

Nantucket Ladder 1
Width : 9.5 FT.
Track : 9.5 FT.
Lock to Lock Time : 6.0 SEC.
Steering Angle : 45.0°



DWG No. 959 Autoturn.dwg

Scale: As Noted



SOUTH SHORE ROAD

Exhibit 2
Autoturn Analysis
Single Unit Truck

Proposed Development
 Nantucket, Massachusetts

Site Plan Source: Bracken Engineering, Inc.

MDM TRANSPORTATION CONSULTANTS, INC.
 Planners & Engineers

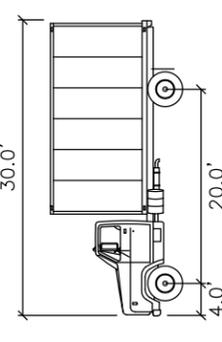
28 Lord Road, Suite 280
 Marlborough, MA 01752

Date: February 2018
 Project No. 959

Scale: As Noted
 DWG No. 959 Autoturn.dwg



SU
 Width : 8.0 FT.
 Track : 8.0 FT.
 Lock to Lock Time : 6.0 SEC.
 Steering Angle : 31.8°



MAP 67 PARCELS 5/23/2018-2018/506,506,507-502,4055
 SEE PLANS FOR SCHEDULE OF WORK

MAP 12 NANTUCKET DRIVE
 MAP 67 PARCEL 501

MAP 67 PARCEL 502

MAP 67 PARCEL 503

MAP 67 PARCEL 504

MAP 67 PARCEL 505

MAP 67 PARCEL 506

MAP 67 PARCEL 507

MAP 67 PARCEL 508

MAP 67 PARCEL 509

MAP 67 PARCEL 510

MAP 67 PARCEL 511

MAP 67 PARCEL 512

MAP 67 PARCEL 513

MAP 67 PARCEL 514

MAP 67 PARCEL 515

MAP 67 PARCEL 516

MAP 67 PARCEL 517

MAP 67 PARCEL 518

MAP 67 PARCEL 519

MAP 67 PARCEL 520

MAP 67 PARCEL 521

MAP 67 PARCEL 522

MAP 67 PARCEL 523

MAP 67 PARCEL 524

MAP 67 PARCEL 525

MAP 67 PARCEL 526

MAP 67 PARCEL 527

MAP 67 PARCEL 528

MAP 67 PARCEL 529

MAP 67 PARCEL 530

MAP 67 PARCEL 531

MAP 67 PARCEL 532

MAP 67 PARCEL 533

MAP 67 PARCEL 534

MAP 67 PARCEL 535

MAP 67 PARCEL 536

MAP 67 PARCEL 537

MAP 67 PARCEL 538

MAP 67 PARCEL 539

MAP 67 PARCEL 540

MAP 67 PARCEL 541

MAP 67 PARCEL 542

MAP 67 PARCEL 543

MAP 67 PARCEL 544

MAP 67 PARCEL 545

MAP 67 PARCEL 546

MAP 67 PARCEL 547

MAP 67 PARCEL 548

MAP 67 PARCEL 549

MAP 67 PARCEL 550

MAP 67 PARCEL 551

MAP 67 PARCEL 552

MAP 67 PARCEL 553

MAP 67 PARCEL 554

MAP 67 PARCEL 555

MAP 67 PARCEL 556

MAP 67 PARCEL 557

MAP 67 PARCEL 558

MAP 67 PARCEL 559

MAP 67 PARCEL 560

MAP 67 PARCEL 561

MAP 67 PARCEL 562

MAP 67 PARCEL 563

MAP 67 PARCEL 564

MAP 67 PARCEL 565

MAP 67 PARCEL 566

MAP 67 PARCEL 567

MAP 67 PARCEL 568

MAP 67 PARCEL 569

MAP 67 PARCEL 570

MAP 67 PARCEL 571

MAP 67 PARCEL 572

MAP 67 PARCEL 573

MAP 67 PARCEL 574

MAP 67 PARCEL 575

MAP 67 PARCEL 576

MAP 67 PARCEL 577

MAP 67 PARCEL 578

MAP 67 PARCEL 579

MAP 67 PARCEL 580

MAP 67 PARCEL 581

MAP 67 PARCEL 582

MAP 67 PARCEL 583

MAP 67 PARCEL 584

MAP 67 PARCEL 585

MAP 67 PARCEL 586

MAP 67 PARCEL 587

MAP 67 PARCEL 588

MAP 67 PARCEL 589

MAP 67 PARCEL 590

MAP 67 PARCEL 591

MAP 67 PARCEL 592

MAP 67 PARCEL 593

MAP 67 PARCEL 594

MAP 67 PARCEL 595

MAP 67 PARCEL 596

MAP 67 PARCEL 597

MAP 67 PARCEL 598

MAP 67 PARCEL 599

MAP 67 PARCEL 600