Traffic Impact Assessment

For:

Child Care Facility

At:

647 North Main Street

In:

Randolph, Massachusetts

Prepared For:

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Prepared By:

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Child Care Facility

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Randolph, Massachusetts

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EXECUTIVE SUMMARY

- **North Main Street carries approximately 25,000 vehicles per day in the vicinity of the site. Approximately seven percent of this daily volume occurs during both the morning and evening peak hour.**

- **This project is expected to generate approximately 71 morning driveway peak hour trips with 38 inbound and 33 outbound. This project is also expected to generate approximately 72 driveway evening peak hour trips with 34 inbound and 38 outbound.**

- **The signalized intersection on North Main Street opposite the Simon C. Fireman Community Life housing complex will be the site's main driveway. Current site plans call for adding a fourth leg to this existing "T"-type intersection. One option of modifying the intersection includes adding traffic signal heads to regulate the proposed new driveway.**

- **Increased traffic volume at this North Main Street / Senior Life driveway / Site driveway intersection is expected to result in virtually no noticeable increase in delay. The morning delay here is not expected to increase more than 0.8 seconds. The evening delay at this intersection is expected to increase only about 2.9 seconds. All approaches will continue to operate at their baseline or "Base" level with one exception. The N. Main Street southbound approach is expected to decrease slightly from an excellent "A" level with short or no delay to a "B" level with short delay. These Levels of Service indicate the intersection to have no noticeable increase in delay to Randolph motorists travelling these roadways.**

- **The un-signalized intersection of North Main Street at Vasey Road will continue to result in no additional delay on North Main Street. The additional 13 trips southbound and 15 trips northbound in the morning peak hour will have de minimis impact on this intersection. Similarly, the additional 15 trips southbound and 14 trips northbound in the evening peak hour will be equivalent to about one vehicle every four minutes in either direction and have minimal impact. However, there are extensive delays currently exiting Vasey Road, thus, the new site driveway onto Orchard Street will mitigate any possible impact from this project.**

- **The required stopping sight distance at the site driveway intersection on North Main Street is provided.**

- **Crash data for the entire Study Area was researched from the Massachusetts Department of Transportation records over the latest available three-year period. While only one crash was reported near the North Main Street driveway, eight crashes were reported within the Study Area. No fatality or personal injury crashes were reported The crashes did involve property damage only. Most crashes occurred during daylight hours on dry pavement. This intersection crash history is not considered unusually high or uniquely hazardous.**

INTRODUCTION

Gillon Associates has evaluated the anticipated traffic impacts resulting from the construction of a new 6,453 Square-Foot Child Care facility to be located on the easterly side of North Main Street (State Route 28) in Randolph, Massachusetts (Figure 1).

The purpose of this report is to evaluate potential traffic impacts, which may be created by the expected addition of vehicular traffic either originating from or destined to the site. Specifically, this report assesses traffic operational characteristics of the following intersections:

- N. Main St. at Senior Life Driveway / Site Dr.
- N. Main St. at Vasey Road

This report provides an identification of the expected traffic generated by the project along with an assessment of existing, baseline, and projected traffic operating characteristics. Existing traffic volumes were identified by obtaining new volume from PDI., a traffic counting sub-contractor and adhering to the MassDOT protocol for assessing roadway traffic volume during and after the Covid-19 Pandemic. Pre-Covid counts were identified by previous MassDOT counts just north of the site and were increased by an identified normal growth factor for existing conditions notwithstanding the decrease due to Covid.

No Credit was taken for the previous land-use on this site. Site Generated traffic projections are based on similar land use and size.

PROJECT DESCRIPTION

The project includes preparing the site and building a new structure where a new modern 6,453 Square-Foot Child Care facility will be built (Figure 2).

EXISTING TRAFFIC CONDITIONS

Regional Roadway Network

North Main Street (Route 28) will continue to serve the site and provide access to both local and regional roadway facilities. North Main Street provides linkage to the north to Milton, Dorchester, and Route I-93 as well as the MBTA Rapid Rail Station at Ashmont. North Main Street also connects with Randolph Center and Brockton to the south.

Traffic Setting

The project is situated on the easterly side of North Main Street. Adjacent to the site, North Main Street has one lane of traffic in each direction. North Main Street has a roadway pavement width of approximately 39 feet adjacent to the site with sidewalk on both sides.

Existing Traffic Volumes

North Main Street carries approximately 25,000 vehicles per day in the vicinity of the site (Figure 3). Morning and evening peak hour traffic volumes were obtained from the sub-consultant and are provided for both morning and evening peak hours on Figures 4 and 5 respectively.

Although these counts were obtained recently, we also looked at pre and post traffic counts obtained in Randolph at the continuous traffic counting on North Main Street north of the site (Figure 6). These counts showed about a nineteen percent decrease in 2021 over the 2018 pre-covid counts. Therefore,

the North Main Street counts were increased by the 19 percent to conservatively adjust the North Main Street post covid count. The manual Covid-19 adjusted upward morning and evening turning movement counts for 2021 are provided on Figures 7 and 8 respectively.

FUTURE TRAFFIC CONDITIONS

In order to assess the future traffic demands on the adjacent roadways, the latent demand or normal growth in traffic volumes which will occur prior to occupying the new apartments has to be identified. This growth in traffic volume will be associated with normal increases due to new development and an increase of licensed drivers, as well as employment opportunities in the area.

Background Traffic Growth

The normal growth rate was established after reviewing the closest MassDOT counting station to the site. A conservative positive increase of one percent growth rate per year was adopted for this analysis based on MassDOT Station #6745 (Figure 9). The Base year, seven years out in the year 2028, traffic flow onto which the site related traffic will be added for analysis purposes are shown for weekday morning and evening peak hours on Figures 10 and 11 respectively.

Trip Generation and Distribution

It is expected that the proposed child care facility will exhibit the same general trip generating characteristics as in other suburban residential communities. In addition to local rates observed and compiled by this firm, the Institute of Transportation Engineers (ITE) provides data on a variety of land uses and there is a considerable amount of empirical data available. The ITE-Land-Use Code 565 was used for the child care center and no credit was taken for the previous use. Figure 12 provides a trip generation summary listing the ITE equations along with the resulting trip generation values for the new 6,453 square-foot child care center. This project is expected to generate approximately 71 morning driveway peak hour trips with 38 inbound and 33 outbound. This project is also expected to generate approximately 72 driveway evening peak hour trips with 34 inbound and 38 outbound.

Directional distribution trip assignments are shown on Figure 13. This projected directional distribution reflects the existing arrival and departure patterns at the site and the relation of major commuting corridors and the Interstate system. Site generated weekday morning and afternoon traffic volumes associated with the project are shown on Figures 14 and 15 respectively.

Projected weekday morning and evening peak hour traffic volumes representing a build condition for the site in the year 2028 for this child care project are provided on Figures 16 and 17 respectively.

TRAFFIC OPERATIONAL ANALYSIS

This section of the report provides a quantitative analysis of anticipated traffic operational characteristics for the build scenarios. These series of capacity analyses were conducted for weekday morning and evening peak hours to determine the potential impact of the proposed child care center.

Analysis Methodology and Findings

The analysis is based on the "Highway Capacity Manual" for both signalized and non-signalized intersections. This manual has been published by the Transportation Board of the National Research Council and approved by the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine. The latest Synchro Software version 11 was utilized in the assessment.

At un-signalized intersections the manual assumes that the through and right-turn movements along any main street will operate unrestricted but conflicting movements will be subjected to various periods of delay depending primarily on the frequency of adequate safe gaps to complete these movements. These periods of delay are generally categorized in "Levels of Service" (LOS) ranging from "A" for very short or no delays through "F" for extensive delays. The Massachusetts Highway Design Manual indicates that a "D" Level of Service is acceptable on roadways such as those in the study area. A table comparing levels of service and seconds of delay is provided in the Appendix of this report.

North Main Street at Senior Life / Site Drive

This signalized intersection which will be the site's main driveway is opposite the Simon C. Fireman Community Life housing complex. Current site plans call for adding a fourth leg to this existing "T"-type intersection. Figure 18 shows one option of modifying the intersection to include traffic signal heads to regulate the proposed new driveway.

As can be seen on Figure 19 and the calculations provided herein, increased traffic volume at this North Main Street / Senior Life driveway / Site driveway intersection is expected to result in virtually no noticeable increase in delay. The morning delay here is not expected to increase more than 0.8 seconds. The evening delay at this intersection is expected to increase only about 2.9 seconds. All approaches will continue to operate at their baseline or "Base" level with one exception. The N. Main Street southbound approach is expected to decrease slightly from an excellent "A" level with short or no delay to a "B" level with short delay. These Levels of Service indicate the intersection to have no noticeable increase in delay to Randolph motorists travelling these roadways.

North Main Street at Vasey Road

This un-signalized intersection will continue to result in no additional delay on North Main Street. The additional 13 trips southbound and 15 trips northbound in the morning peak hour will have de minimis impact on this intersection. Similarly, the additional 15 trips southbound and 14 trips northbound in the evening peak hour will be equivalent to about one vehicle every four minutes in either direction and have minimal impact. However, there are extensive delays currently exiting Vasey Road, thus, the new site driveway onto Orchard Street will mitigate any possible impact from this project.

Vasey Road at Orchard Street

This un-signalized intersection will continue to result in no delay on North Main Street, Vasey Road, or Orchard Street and there are sufficient gaps in this traffic stream to accommodate any increase in volumes from the site during both the morning and evening peak hours. All approaches will continue to operate with an "A" level of service with short or no delay.

SIGHT DISTANCE EVALUATION

The approaching northbound and southbound vehicle on North Main Street must be able to stop in time to avoid making contact with a vehicle slowing or stopping at the site entrance driveway. The required stopping sight distance from either a minor street or driveway is obtained from "A Policy on Geometric

Design of Highways and Streets" as published by the American Association of State Highway and Transportation Officials (AASHTO) 7th Edition published in 2018.

Unlike the minimum safe stopping distance (MSSD) along a section of roadway, stopping sight distance at a driveway is not measured along either the center line or gutter line of a roadway. On page 9-29 of the American Association of State Highway and Transportation Officials (AASHTO) manual, it is stated "If the available sight distance for an entering or crossing vehicle (at an intersection corner) is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions."

The motorist leaving the minor roadway or driveway has an eye height of 3.5 feet and he must be able to see another object (approaching vehicle) with a height of 3.5 feet. The required stopping distance for each minor roadway or driveway is based on the following formula:

$$d = 1.47\,Vt + 1.075\,\frac{V^2}{a}$$

Where: V = Speed in miles per hour (mph)
t = perception & Reaction time (2.5 seconds)
a = deceleration of vehicle (11.2 ft/sec.2)

A speed survey was conducted on North Main Street where both the average northerly and southerly speed was calculated as 33 to 36 mph (Figure 20). However, the 85th percentile speed or speed at which all motorists were traveling at or below in the northbound direction was 38 mph and the 85th percentile southbound speed was calculated as 41 mph. This characteristic is commonly used as the roadway design speed. Therefore, the required stopping sight distance for the North Main Street driveway is computed as shown below:

$$d = 1.47*41*2.5 + 1.075 * \frac{(41)^2}{11.2}$$

d = 150.3 ft + 161.3 = 312 feet

There is over 450 feet of stopping sight distance available in both directions. Therefore, all through motorists, do have clear stopping sight distance and the driveway onto North Main Street is safe.

CRASH ASSESSMENT

Crash data for the entire Study Area was researched from the Massachusetts Department of Transportation records over the latest available three-year period. While only one crash was reported near the North Main Street driveway eight crashes were reported within the Study Area (Figure 21). No fatality or personal injury crashes were reported The crashes did involve property damage only. Most crashes occurred during daylight hours on dry pavement. This intersection crash history is not considered unusually high or uniquely hazardous.