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Mr. Neil Fougere, P.Eng.
Senior Engineer & Principal
DesignPoint Engineering & Surveying Ltd.
222 Waterfront Drive, Suite 104
Bedford, NS B4A 0H3

RE: A Traffic Impact Statement for proposed changes to civic #158 Greenhead Road

Dear Mr. Fougere:

1.0 INTRODUCTION

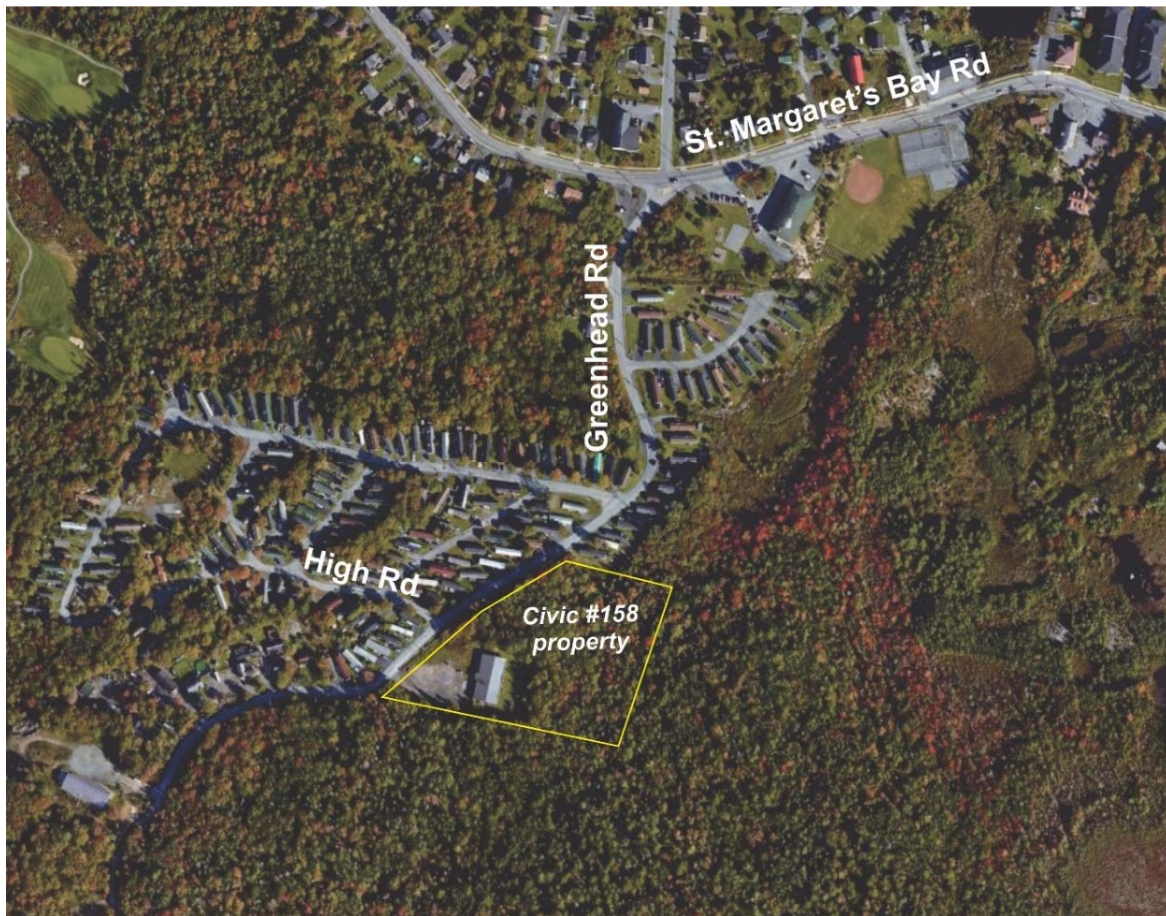
At the request of *DesignPoint Engineering & Surveying Ltd. (DesignPoint)*, the GRIFFIN transportation group inc. has completed a qualitative Stage 1 - Traffic Impact Assessment in support of a Development Agreement application being submitted to the Halifax Regional Municipality's Planning and Development Department, for a proposed expansion of the existing Residential Care Facility located at civic #158 Greenhead Road, in the community of Lakeside, Halifax Regional Municipality (HRM).

The subject property (PID #40050593) is located on the east side of Greenhead Road and has an area of about 6 acres. The existing Residential Care Facility is contained in a single-storey building located near the southwest corner of the property. The property is located in the Timberlea/Lakeside/Beechville Land Use By-Law area and currently has an R-2 (Two Unit Dwelling) zone designation. The existing site context is generally illustrated in *Figure 1*.

It is understood that the existing building will be renovated and will continue to offer two transitional residential units, a community space for residents as well as a small office space for administrative staff. The proposed expansion of this facility will include an additional 24 apartment style residential units and the future site layout is illustrated in *Figure 2*.

The existing facility is served by a single vehicle access that connects to Greenhead Road near the southwest corner of the property – directly opposite civic #161. As shown in *Figure 2*, the future site layout maintains the existing driveway location and will continue to be the only driveway serving the property.

Figure 1: Study Area and Site Context



Source: Google

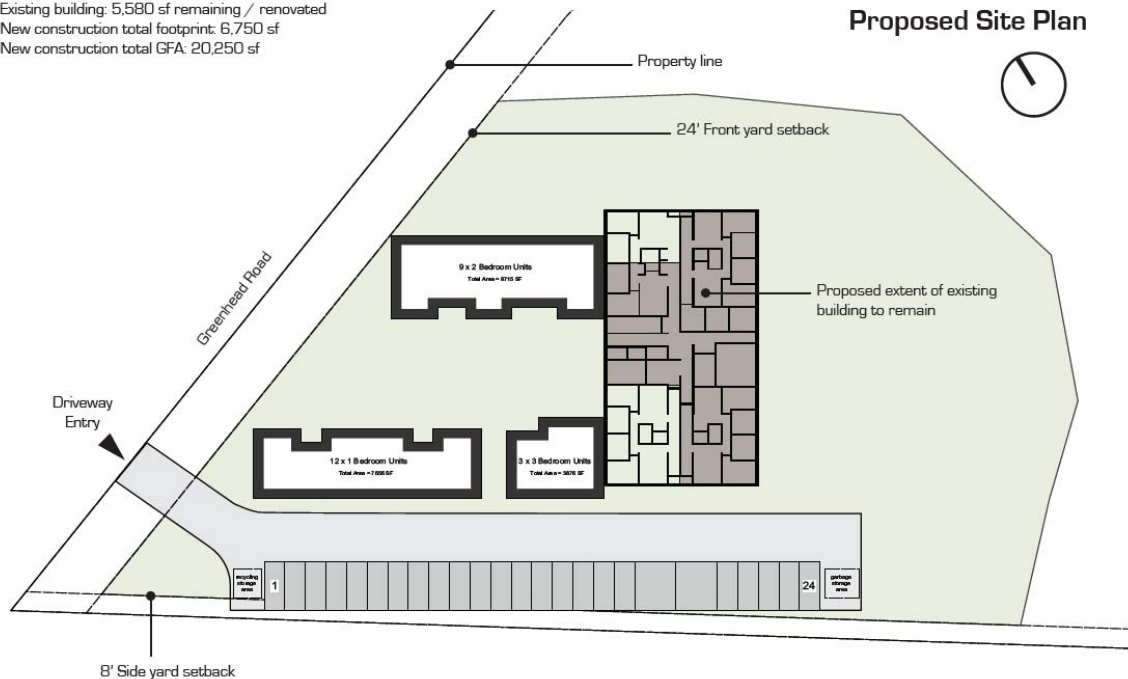
2.0 STUDY AREA AND SITE CONEXT

2.1 Overview

Greenhead Road is generally aligned in a north-south direction with a two-lane, two-way rural cross-section (one travel lane in each direction), with no functional shoulders and open ditches. The roadway is under the jurisdiction of the Halifax Regional Municipality (HRM), and in the vicinity of civic #158, appears to function as a low-volume local residential street. To the north it connects to the St. Margaret's Bay Road (Trunk 3) corridor. It terminates as a dead-end about 225m south of the subject property.

Figure 2: Proposed Internal Site Layout

Existing building: 5,580 sf remaining / renovated
New construction total footprint: 6,750 sf
New construction total GFA: 20,250 sf



Source: Passive Design Solutions

2.2 Existing Traffic Volumes

There are only about 9-10 detached residential homes and a Royal Canadian Legion located south of the civic #158 access. This results in very low traffic volumes traveling along the southern end of Greenhead Road, and in particular, in the vicinity of the civic #158 access.

Due to a provincial state of emergency GRIFFIN was not able to gather representative traffic volumes traveling along Greenhead Road. However, since this is a dead-end road, and there are only about 9-10 detached residential homes and a Royal Canadian Legion located south of the civic #158 access, GRIFFIN estimates that the typical peak hour vehicle demand in the study area is less than 20 vehicles/hour (vph), and likely less than 200 vehicles/day. This level of vehicle demand is considered to be well below the capacity of a typical local residential roadway and it was concluded that there is a considerable amount of residual capacity to accommodate future traffic growth.

2.3 Roadway Geometry and Characteristics

The asphalt width along Greenhead Road is relatively narrow, measuring about 6.4m wide, with little to no gravel shoulders. The alignment in the vicinity of civic #158 is varied, including:

- A crest vertical curve with limited visibility immediately north of the civic #158 access.
- Back-to-back horizontal (s-curves) with limited visibility immediately south of the civic #158 access.

The regulatory posted speed limit on Greenhead Road is 50 km/h. However, the combination of the relatively low traffic volumes, limited driver visibility and narrow cross-section all appear to suggest that the practical vehicle operating speeds are less than 50 km/h in vicinity of civic #158.

Figure 3: Driver Views Along Greenhead Road



*Centre of existing access
Looking south (left)*



*Centre of existing access
Looking north (right)*



*South edge of existing access
Looking south (left)*



*South edge of existing access
Looking north (right)*

3.0 DRIVER STOPPING SIGHT DISTANCE REVIEW

The sight distance review was based on the guidelines contained in the latest Transportation Association of Canada's (TAC) Geometric Design Guide for Canadian Roads document (2017). At this early stage of the planning process only the minimum requirement for vehicles approaching the new access was reviewed. This is referred to as stopping sight distance (SSD). The provision of adequate SSD for vehicles traveling on the main roadway – in this case Greenhead Road – ensures that drivers have sufficient forward visibility to identify a hazard in the roadway, and if needed, bring their vehicle to a stop.

The field measurements were carried out by GRIFFIN and followed HRM/NSTIR best practices and TAC guidelines including a driver eye height of 1.05 m and an object/hazard height of 0.60 m. The 0.60 m object was placed at the approximate centre of the driveway connection, on the edge of the northbound travel lane.

A summary of the field measured sight distances relative to the minimum requirements for a 40 km/h operating speed and a 50 km/h operating speed are provided in *Tables 1* and *2*.

Table 1: Summary of Stopping Sight Distance Measurements (40 km/h Requirement)

Location	Travel Direction	Available SSD	TAC Required SSD		Does Available Exceed Required?
			Base ^A	Slope Adjusted	
Centre of Existing Driveway	Northbound	53 m	50 m (40 km/h)	50 m (-2%) ^B	Yes
	Southbound	58 m		45 m (+4%) ^B	Yes
South edge of Existing Driveway	Northbound	73m	50 m (40 km/h)	50 m (-2%) ^B	Yes
	Southbound	58m		45 m (+4%) ^B	Yes

A – 2017 TAC Chapter 2, Table 2.5.2

B – An estimate of the actual slope along Greenhead Road on the approaches to the measurement location.

Table 2: Summary of Stopping Sight Distance Measurements (50 km/h Requirement)

Location	Travel Direction	Available SSD	TAC Required SSD		Does Available Exceed Required?
			Base ^A	Slope Adjusted	
Centre of Existing Driveway	Northbound	53 m	65 m (50 km/h)	65 m (-2%) ^B	No
	Southbound	58 m		60 m (+4%) ^B	No
South edge of Existing Driveway	Northbound	73m	65 m (50 km/h)	65 m (-2%) ^B	Yes
	Southbound	58m		60 m (+4%) ^B	No

A – 2017 TAC Chapter 2, Table 2.5.2

B – An estimate of the actual slope along Greenhead Road on the approaches to the measurement location.

The results contained in *Tables 1* and *2* indicate the existing geometry along Greenhead does not provide sufficient SSD for vehicle operating speeds of 50 km/h. However, vehicles traveling at 40 km/h appear to be provided with sufficient minimum visibility along the roadway alignment.

In summary, the existing alignment of Greenhead Road is varied and its width is narrow with vegetation growth encroaching up to the edge of asphalt. This limits driver visibility through horizontal curves, not only towards the existing civic #158 driveway but also adjacent driveways at civic # 165, 171 and 173. As such, HRM should give consideration to implementing some mitigating measures such as reducing the regulatory speed limit to 40 km/h (should it be permitted by the provincial legislation), trimming vegetation back from the edge of the travel way and installing warnings signs with advisory speed tabs.

4.0 SITE TRIP GENERATION

In order to assess the change in traffic volumes in the study area under future conditions, there was a need to determine the number of new vehicles that would be added to the study area roads and intersections with the proposed Residential Care Facility expansion built and operational. This task is referred to as the trip generation calculation process.

Based on information provided by the client, 24 new apartment-style residential units will be added to the existing facility. Since the existing community space and administrative office space will remain, the trip generation calculations were only carried out for the 24 new residential units.

Discussions were held with the client regarding the socio-economic conditions of residents that will occupy the new apartment style units. Research has shown that socio-economic conditions correlates strongly with a person's travel behaviour, such as:

- *Mode of Travel:* Does a person travel by public transit or by private automobile.
- *Vehicle Ownership:* Does a person own a private automobile and/or multiple vehicles per residential unit.
- *Travel Frequency:* Does the person make many individual trips per day, and at what time of day do these trips predominantly occur.

It was concluded that the socio-economic conditions that currently exist at the Residential Care Facility will also apply to the new residents of the new 24-unit expansion. Thus, the per unit private automobile ownership is expected to be relatively low, compared to other typical rental apartment buildings located in HRM. A low vehicle ownership rate is expected to in turn minimize the number of new vehicle trips moving in/out of the facility.

Since this is an existing facility, GRIFFIN would typically carry out a trip generation survey of the existing facility to get an accurate and locally representative set of per unit vehicle trip rates that could be applied to the facility expansion. However, given the provincial state of emergency that

was in place, GRIFFIN opted to utilize the higher (and more conservative) trip rates published in the Institute of Transportation Engineers' (ITE) most recent *Trip Generation, 10th Edition* document. Although higher than will be expected, the most applicable vehicle trip rate was determined to be ITE's Multifamily Housing (Mid-Rise) – ITE Land Use Code 221.

A review was carried out of the ITE survey data graphs in order to select the most appropriate trip rate for this specific land use type. Upon reviewing the graphs for Land Use Code 221, it was determined that the regression formula method yielded a slightly higher number of new trips during the PM peak hour compared to using the average rate method. As such, the formula method was applied to this review in order to use a worst-case scenario. The trip generation calculations using land use code 221 are summarized in *Table 3*.

Table 3: Vehicle Trip Generation for the Proposed Residential Development

	Size	Vehicle Trip Rate	New Vehicle Trips / Hour		
			In	Out	Total
AM Peak Hour					
MultiFamily Housing (Mid-Rise) (Code 221)	24 Units	0.33/unit ^A	2 (26%)	6 (74%)	8
AM Peak Total Trips ^B			2	6	8
PM Peak Hour					
MultiFamily Housing (Mid-Rise) (Code 221)	24 Units	0.46/unit ^A	7 (61%)	4 (39%)	11
PM Peak Total Trips ^B			7	4	11

A – ITE's formula rate used.

B – New trips equal total site trips, no discounts for pass-by trip making or transit have been applied.

Based on the results contained in *Table 3*, and using ITE's higher vehicle trip rates, the proposed 24-unit development is expected to generate up to 8 trips/hour (2 inbound and 6 outbound) during the weekday morning peak period and 11 trips/hour (7 inbound and 4 outbound) during the weekday afternoon peak period. This generally equates to one additional vehicle trip added to the Greenhead Road corridor every 5 to 7 minutes during peak times of the day. This is considered to be a very small increase that will have a negligible impact on traffic operations – both along the street and at the site driveway.

As noted earlier in this section, the hourly vehicle trip rates contained in *Table 3* represent a worst-case scenario, and these additional vehicle trips are highly likely to be reduced. This will also reduce the on-site parking demand and thus the number of parking spaces provided.

5.0 PARKING

A review was carried out to compare the proposed off-street parking supply with the requirements contained in the Timberlea/Lakeside/Beechville Land Use By-Law document. Since the Land Use By-Law did not specifically identify Residential Care Facilities as a separate land use type, there was no specific parking requirement that was directly applicable to this situation. As such, GRIFFIN referred to the other residential land uses identified in the parking requirements section of the By-Law document, which included:

- Multiple Unit Dwellings (1.5 spaces / unit);
- Senior Citizen Multiple Use Dwelling (1.0 space / unit);
- Boarding and Rooming Houses (1.0 space / unit); and
- All other residential Dwellings (1.0 space / unit)

Since Residential Care Facilities were not explicitly identified – and these facilities do not exactly fit the Planning definition of a “multiple unit dwellings” development – it appeared reasonable to consider an on-site parking supply rate of less than 1.0 space / unit.

As noted earlier in Section 4, the proposed new residential units are an expansion of the existing facility, and the vehicle ownership and trip-making trends of residents are expected to remain the same. Thus, typical parking supply rates associated with traditional “multiple unit dwellings” developments are expected to over-state the parking needs of the expanded Residential Care Facility. Therefore, the proposed parking supply of 24 spaces appears sufficient for the expanded facility.

6.0 FINDINGS & CONCLUSIONS

The following conclusions were gleaned from the qualitative traffic impact assessment of the proposed 24-unit residential development:

- The proposed expansion of the existing Residential Care Facility will include an additional 24 apartment style units. This is estimated to generate up to a maximum 8 trips/hour (2 inbound and 6 outbound) during the weekday morning peak period and 11 trips/hour (7 inbound and 4 outbound) during the weekday afternoon peak period. Since the trip rates used to calculate the number of new hourly vehicle trips does not reflect the current socio-economic conditions of existing and future residents, these trip forecasts are expected to be less than forecast.
- Vehicle access to the proposed development will be provided via the existing driveway connecting to Greenhead Road in the vicinity of civic #161. Under the proposed future conditions, the relatively low traffic volumes both on Greenhead Road and at the site driveway suggest there is sufficient capacity provided by the existing road infrastructure.

As such, the existing driveway will provide sufficient capacity with one inbound and one outbound lane.

- GRIFFIN has determined there is limited driver visibility along Greenhead Road in the vicinity of civic #158 at operating speeds of 50 km/h. This is due to the varied curvilinear alignment, narrow roadway width and vegetation growth encroaching up to the edge of asphalt. Our review has determined that the existing geometry along Greenhead Road provides sufficient SSD for vehicles traveling at 40 km/h.
- Our review of the parking needs at the existing Residential Care Facility suggest that an on-site parking supply rate of 1.0 space / residential unit, or less, will provide a sufficient amount of on-site parking for the expanded facility – considering the residents current and future anticipated automobile ownership and trip-making patterns via private automobiles.
- The qualitative traffic operational assessment suggests the very small number of new peak hour site-generated trips will have a negligible impact on the Greenhead Road traffic operations as well as the future operations at the St. Margaret's Bay Road / Greenhead Road intersection.

Based on the findings of this qualitative review the following steps are recommended:

1. That the existing driveway remain and provide sufficient width for one inbound travel lane and one outbound travel lane. During the design stage of the project, it would be prudent to review the existing site driveway design to ensure it follows the latest HRM and Transportation Association of Canada (TAC) geometric design guidelines. This includes the accommodation of an appropriate design vehicle (i.e. garbage truck, fire truck, etc.).
2. That the road agency carry out their own review of available stopping sight distances along the section of Greenhead Road south of High Road to ensure the existing roadway design is consistent with the expected vehicle operating speeds (i.e. 85th percentile speed, regulatory speed limit, etc.). Special consideration should be given to the very low volume conditions that exist south of the High Road intersection and the associated cost-effectiveness of any mitigating measures that may be implemented. HRM should give consideration to implementing some mitigating measures such as reducing the regulatory speed limit to 40 km/h (should it be permitted by the provincial legislation), trimming vegetation back from the edge of the travel way and installing warnings signs with advisory speed tabs. All missing or newly required signs and/or pavement markings should be installed following the latest guidelines contained in TAC's Manual of Uniform Traffic Control Devices for Canada (MUTCDC) document.
3. That all municipal and road agency By-law/Policy requirements for corner clearance, sight triangles and driver visibility are met to ensure driver sight distances are maintained throughout the planning, design and construction phases of this project.

7.0 CLOSING

The findings flowing from this qualitative traffic impact review suggest the new trips generated by the proposed 24-unit expansion of the existing Residential Care Facility at civic #158 are expected to have a negligible impact on the existing traffic operations in the Greenhead Road corridor and its intersection with St. Margaret's Bay Road.

I would be happy to provide you with additional information or clarification regarding these matters and can be reached anytime by phone at (902) 266-9436 or by email at jcopeland@griffininc.ca.

Sincerely,

Original Signed

James J. Copeland, P.Eng.

*Managing Principal – Traffic & Road Safety Engineer
GRIFFIN transportation group inc.*

