

## MEMORANDUM

To: Doug Jones, Playvalue Toys

From: Thomas Gryz, P.Eng., Senior Traffic Engineer, Mitchell Patenaude, EIT, Traffic Engineering Intern

Date: June 28, 2021

Re: Sight Lines Review at 130 Manchester Road, Ottawa (D07-12-20-0194)

### 1.0 INTRODUCTION

McIntosh Perry Consulting Engineers Ltd. (MP) has been retained by Playvalue Toys, to complete a sight line review in support of a proposed Site Plan Control Application for a revised Site Plan Agreement of a proposed Phase 2 expansion of the Playvalue retail store and warehouse. The subject site is located at 130 David Manchester Road in the City of Ottawa.

**Figure 1-1** illustrates the Site Plan which has also been provided in **Attachment #1**. As illustrated, the existing Playvalue Toys site consists of a single building with a footprint of 1282.5 m<sup>2</sup>. The Phase 2 expansion is to include a one-storey warehouse with a building footprint of 1480 m<sup>2</sup> which could result in additional heavy vehicle traffic.

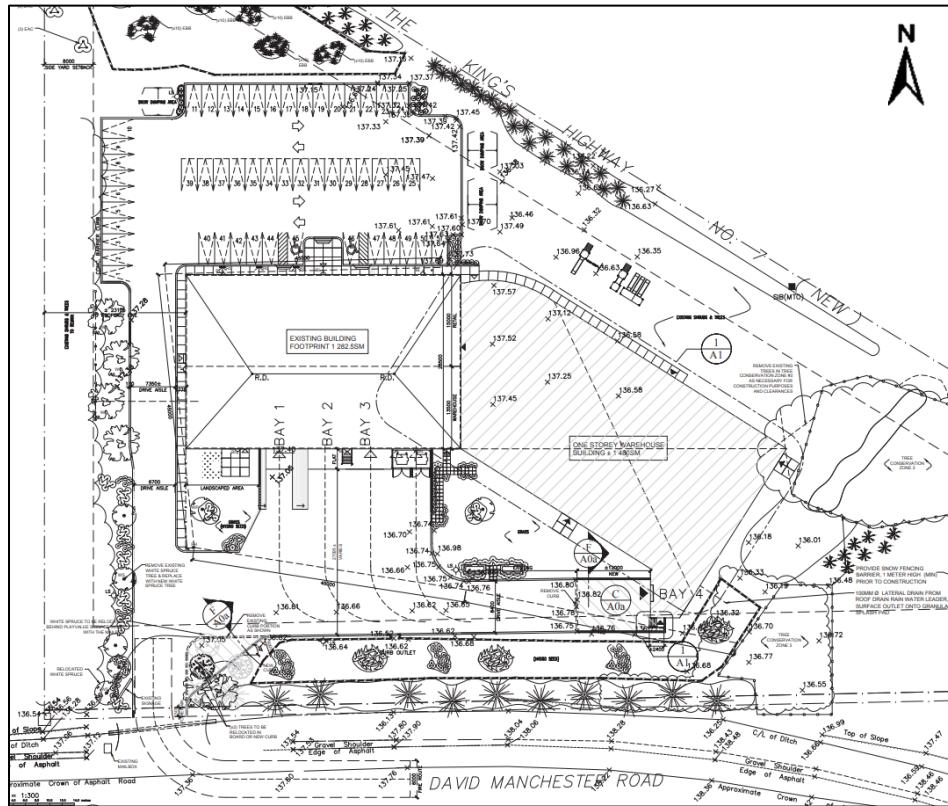


Figure 1-1: Site Plan

As part of the Site Plan Control Approval Application, City staff has raised concerns regarding potentially limited available sight lines at the existing site which might pose a safety hazard considering the potential additional Phase 2 generated heavy truck traffic. This memo will review the sightlines at site access on David Manchester Road to determine if they meet the *Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads* (June 2019) standards and to provide mitigation recommendations if necessary.

**Figure 1-2** illustrates the subject site and the surrounding area. As illustrated, the development access is located on David Manchester Road, which for the purposes of this report is assumed to run east-west from Hazeldean Road in the east, westerly past the site access. David Manchester Road within the study area begins at a low point at Hazeldean Road. The elevation of the roadway increases to a vertical crest approximately 130 m west of the site access. In addition to the vertical curve, east of the site access there is a horizontal curve. The roadway approaching the horizontal curve from the east and west have warning signs indicating a sharp bend with a safe maximum speed for the curve of 60 km/h. The roadway, however, does not have posted speed limits. Since the subject site is in a rural area, a statutory speed limit of 80 km/h applies. This study will review sight lines based on design speed between 60 km/h and 80 km/h.

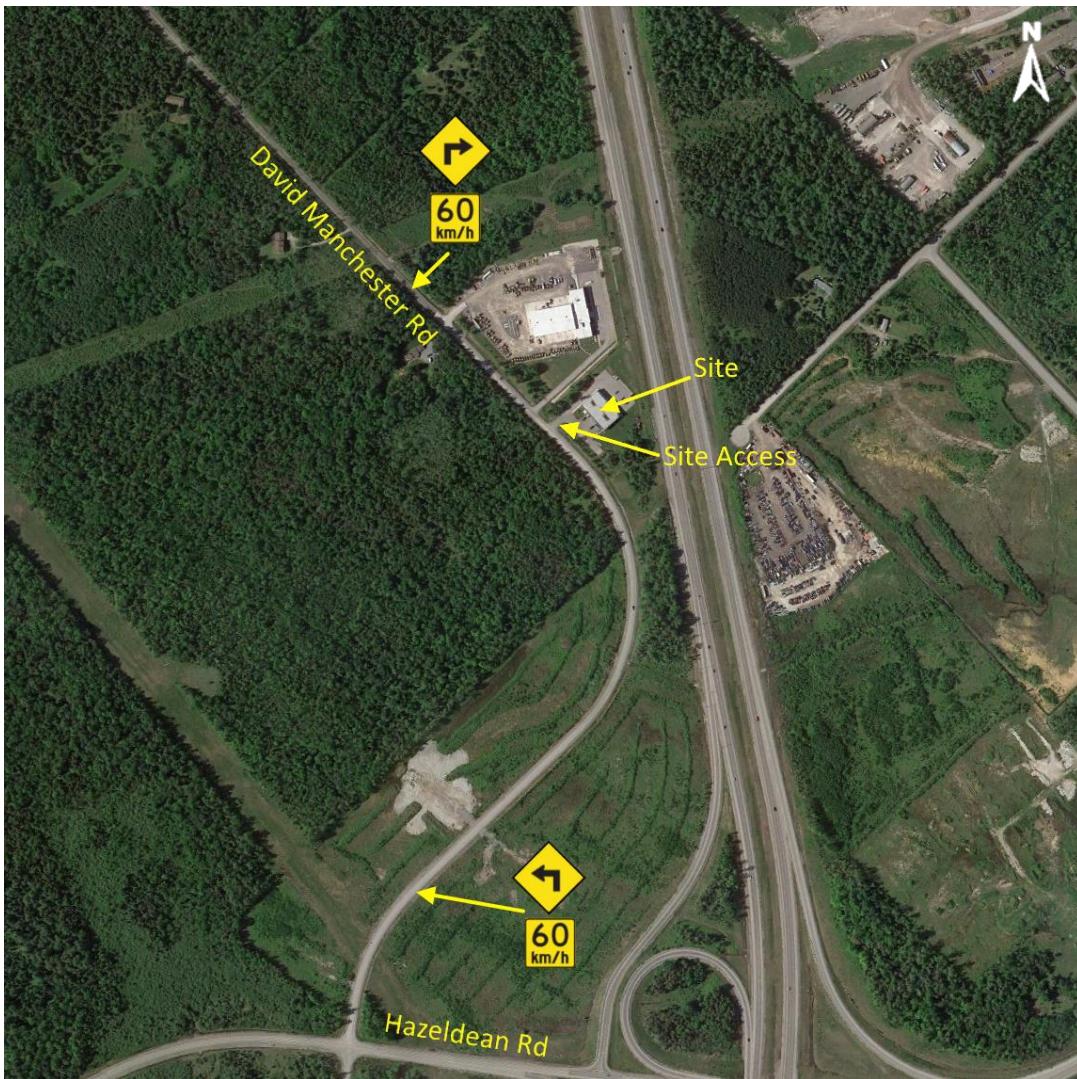


Figure 1-2: Site Location

## 2.0 SIGHTLINE REVIEW

### 2.1 Standards

TAC *Geometric Design Guide for Canadian Roads* (June 2019) was used to determine the required sight distances. Chapter 9 of the Tac guidelines provided tables to determine the minimum requirements for the design Intersection Sight Distance (ISD) while Chapter 2 provided the minimum Stopping Sight Distance (SSD). The required ISD is determined by using the Time Gap required by a vehicle to perform a maneuver and accelerate to the design speed of the road. The TAC Guidelines use different “Cases” to determine the Time Gap. Requirements for sight distances will therefore vary based on the type of intersection, the approach grade of the road, as well as the maneuver being performed by the vehicle. The Cases investigated for the site access in this memo are as follows:

1. Case B (TAC Chapter 9) – Intersections with stop control on minor road;
  - o Case B1 – left turn from minor road;
  - o Case B2 – right turn from the minor road;
2. Stopping Sight Distance (TAC Chapter 2).

Based on TAC, assumptions made for the vertical alignment check were as follows:

- Height of eye for the turning vehicle was 1.08 m;
- An object height of 0.6 m (the typical height of a vehicle taillight).

It should be noted that the City of Ottawa has raised concerns pertaining specifically to WB-20 truck traffic exiting the site. The driver eye height for a WB-20 truck would be increased from 1.08 m to 2.3 m. Additionally, as there is limited illumination within the vicinity of the site access, an object height of 0.6 m was used which corresponds with the typical height of vehicle brake lights.

### 2.2 Available Sight Lines

MP completed a field review on June 22, 2021 to measure the available sight lines. **Figure 2-1** illustrates the available sight distance of a driver exiting the site looking west while **Figure 2-2** illustrates the available sight distance looking east. As illustrated, David Manchester Road, west of the site access is relatively straight, however, sight distance was found to be limited by the vertical curvature of the roadway. While there is a significant grade on David Manchester Road east of the access, the available sight distance was found to be limited by the horizontal curvature of the roadway and the existing vegetation inside the turn radius.



Figure 2-1: Site Access – Looking West



Figure 2-2: Site Access – Looking East

**Figure 2-3** summarizes the available sight distance from the site access. As shown, there is approximately 220 m available sight distance for the west approach and approximately 190 m for the east approach. As there are no obstructions surrounding the site access, the available stopping sight distances are expected to be relatively similar to the intersection sight distance. It should also be mentioned that the available sight distance was measured from the perspective of a passenger vehicle. As the horizontal curvature for the east approach is the limiting factor, the available sight distance is not expected to significantly vary for a WB-20 truck. The west approach sight distance, however, is limited by the vertical curvatures. The available ISD and SSD would be slightly higher for a WB-20 truck as the height of the driver's eye is typically higher (2.3 m compared to 1.08 m for a passenger vehicle).



Figure 2-3: Intersection Sight Distance Summary

## 2.3 Minimum Recommended Sight Lines

As stated in **Section 1.0**, there are no posted speed limits on David Manchester Road with the exception of the warning signs indicating a 60 km/h safe operating speed. As such, both a 60 km/h design speed and 80 km/h design speed were considered as part of this review.

### 2.3.1 *Intersection Sight Distance for Case B1 – Left Turn from Minor Road*

The minimum required ISD for left turn from a minor road is based on the time gap required for a vehicle to complete a left turn onto the major roadway and accelerate to the operating speed. For a passenger vehicle the time gap used for analysis is 7.5 seconds. For a WB-20 truck the time gap is increased to 11.5 seconds, accounting for the slower acceleration rate of WB-20 trucks. This requires WB-20 trucks to wait for longer gaps in major road traffic compared to a passenger vehicle and thus requires longer ISD. The minimum required ISD for a WB-20 turning left from the site access with a design speed of 60 km/h was calculated as follows:

$$\begin{aligned} \text{ISD} &= 0.278V_{\text{major}}t_g \\ &= 0.278 \times (60 \text{ km/h}) \times 11.5 \text{ seconds} \\ &= 191.82 \text{ m} \end{aligned}$$

Where:

ISD = intersection sight distance (length of the leg of sight triangle along the major road (m));

$V_{\text{major}}$  = design speed of the major road (km/h), and;

$t_g$  = time gap for minor road vehicle to enter the major road (s)

For the case of a left turning vehicle from the site access, the opposing major road traffic would be in the west approach which has 220 m of available ISD. **Table 2-1** summarizes the available and required ISD for Case B1. The available sight distance of 220 m is sufficient to meet the TAC minimum required ISD of 191.82 at a design speed of 60 km/h. The minimum required ISD for a design speed of 80 km/h is 255.76 m, 35.76 m greater than the available ISD for this case.

**Table 2-1: Case B1 – Sightline Distance Summary**

| Approach | Design Speed (km/h) | TAC (Intersection Sight Distance - Case B1 (m)) | Measured Available Sight Distance (m) | Meets Standard |
|----------|---------------------|---|---------------------------------------|----------------|
| West     | 60                  | 191.82  | 220                                   | YES            |
|          | 80                  | 255.76  |                                       | NO             |

### 2.3.2 *Intersection Sight Distance for Case B2 – Right Turn from Minor Road*

The ISD for right turns is determined in the same manner as for case B1, except the time gap is reduced. The time gap for a WB-20 in this case is 10.5 second. Using the same methodology as case B1, the minimum required ISD was calculated as 175.14 m for a design speed of 60 km/h and 233.52 m for a design speed of 80 km/h.

For the case of a right turning vehicle from the site access, the opposing major road traffic would be in the east approach which has 195 m of available ISD. **Table 2-2** summarizes the ISD for Case B2. As illustrated, the 220 m of available sight distance is sufficient to meet the TAC minimum required ISD for a 60 km/h design speed but insufficient for a design speed of 80 km/h.

**Table 2-2: Case B2 – Sightline Distance Summary**

| Approach | Design Speed (km/h) | TAC (Intersection Sight Distance - Case B1 (m)) | Measured Available Sight Distance (m) | Meets Standard |
|----------|---------------------|---|---------------------------------------|----------------|
| East     | 60                  | 175.14  | 195                                   | YES            |
|          | 80                  | 233.52  |                                       | NO             |

### 2.3.3 Minimum Stopping Sight Distance

The minimum SSD is the required sight distance for a vehicle to safely brake and stop without compromising the safety of the driver. As, described in **Section 1.0**, the available SSD is expected to be similar to the available ISD. **Table 2-3** shows the TAC required compared to the available SSD.

**Table 2-3: Stopping Sight Distance Summary**

| Approach | Design Speed (km/h) | TAC Required Sight Distance (m) | Measured Available Stopping Sight Distance (m) | Meets Standard |
|----------|---------------------|---------------------------------|--|----------------|
| West     | 60                  | 85                              | 220  | YES            |
|          | 80                  | 130                             |  | YES            |
| East     | 60                  | 85                              | 195  | YES            |
|          | 80                  | 130                             |  | YES            |

As shown, there is sufficient SSD for vehicles to be able to come to a complete stop as necessary prior to the development access for a design speed of 60 km/h and 80 km/h.

It should be noted that the TAC required minimum SSD is based on passenger vehicle operations and do not consider design for truck operations. As described in **Section 2.1**, the driver eye height of a typical WB-20 is 2.3 m compared to 1.08 for a passenger vehicle. In general trucks need longer SSD compared to passenger vehicle, however, because trucks can generally see further, SSD for trucks are typically not considered in highway design.

## 3.0 CONCLUSION

Overall, based on our field observations/review and assessment of industry acceptable guidelines, there are no concerns with the available sight distance at the site access. The City of Ottawa has raised concerns regarding the vertical curve along David Manchester Road. On June 22, 2021, MP team conducted a field review where it was observed that the horizontal curve at this location was limiting sight lines and not the vertical curve. Therefore, the available sight distance along the horizontal curve would be similar for both a passenger vehicle and a WB-20 truck. For a design speed of 60 km/h, there is sufficient ISD and SSD.

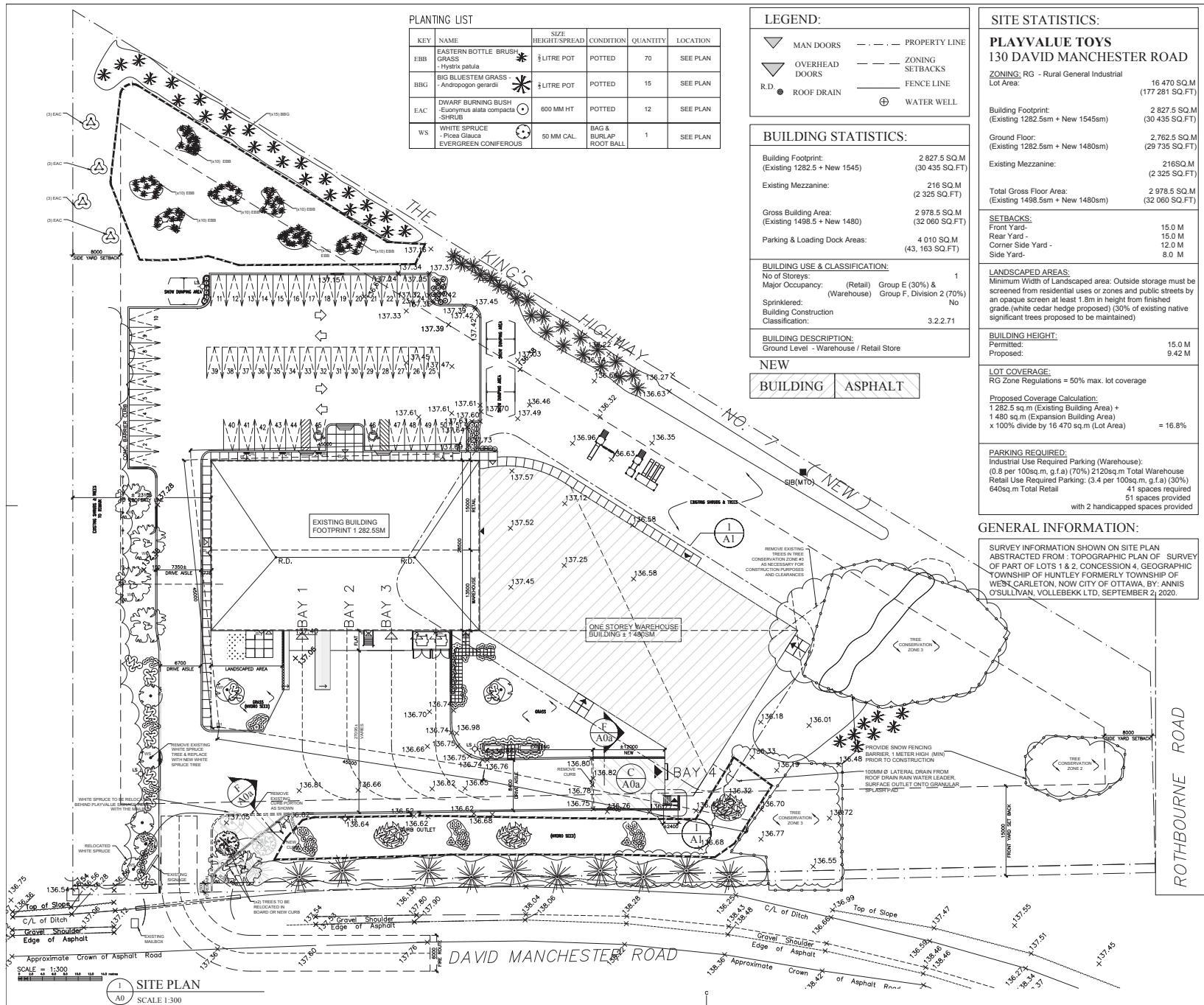
A design speed of 80 km/h was also considered as part of this sight line review. The minimum required ISD for WB-20 trucks at a design of 80 km/h speed was found to be greater than the available sight distance in both approaches. However, as there is sufficient SSD for vehicles to come to a complete stop prior to the site access at a design speed of 80 km/h, the lower ISD is not expected to result in safety issues. It is expected that the lower ISD could result in vehicles which are travelling at speeds greater than 60 km/h approaching the site access, to reduce their speed to accommodate a maneuvering WB 20 truck exiting the site.

It should also be noted that a review of City of Ottawa collision data (2013 to 2019) shows that no collisions have occurred within the vicinity of the site access. Additionally, Playvalue Toys has reported that it receives on average 2 to 3 WB-20 trucks per week and that the Phase 2 development is likely to generate minimal additional WB-20 traffic.

Based on the above, It is recommended that operations at the site access be monitored after build-out of the Phase 2 warehouse and if any safety concerns are present, consideration should be given to implementation mitigation measures such as hidden drive way signs (Wa-15A) and brush clearing the inside turn radius of the east approach.

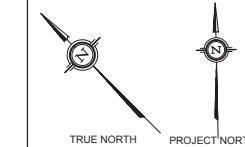
McINTOSH PERRY

**ATTACHMENT #1**



|   |
|---|
| <b>RICKSON OUTHET ARCHITECT</b><br>319 Daly Avenue<br>Ottawa - Ontario - K1N 6G6<br>613.728-1637 - FAX 613.728-8501 |
|---|

APPROXIMATE LOCATION



|          |  |           |
|----------|--|-----------|
| 1        | SITE PLAN CONTROL  | DEC 18 20 |
| revision |  | date      |
| project  | A design no.<br>B location drawing no.<br>C drawing no.<br>no. du dessin | projet    |

|             |               |               |
|-------------|---------------|---------------|
| designed    | J.G.          | cont'd        |
| date        | APRIL 27 2020 |               |
| drawn       | J.G.          | dessin?       |
| date        | APRIL 20 20   |               |
| revised     | R.O.          | rev'd?        |
| date        | APRIL 22 2020 |               |
| approved    | R.O.          | approv'd      |
| date        | APRIL 27 2020 |               |
| tender      | R.O.          | submission    |
| date        | TBD           |               |
| project no. | 2020-06       | no. du projet |
| drawing no. |               | no. du dessin |
|             | A-0-          |               |