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Technical Memorandum

To/Attention	Jennifer Martens, President Farmhouse Investments Inc.	Date	July 6, 2018
From	Austin Shih, IBI Group	Project No	117308
cc	Demetrius Yannoulopoulos, IBI Group		
Subject	20 Cope Drive Site Plan Access and On-site Circulation Design Evaluations		

IBI Group (IBI) has been retained by Farmhouse Investments Inc. (the “Client”) to provide transportation engineering consulting services in support of a proposed expansion to an existing site located at 20 Cope Drive in the City of Ottawa. The following technical memo will outline the approach, methodology, analysis and results of the evaluations. All relevant extracts from reference design standards have been attached for reference.

BACKGROUND

The primary objectives of this technical memo were based on initial discussions with the Client:

- To review the proposed site plan to ensure truck access/egress and internal circulation could be accommodated; particularly within the loading bay area; and,
- To confirm with City staff and address, if necessary, any Transportation requirements in support of the site plan application.

The latest site plan (from A+ Architecture Inc.) was provided on July 1, 2018 to use in the evaluations, which has been attached at the end of this memo.

In early discussions with City staff, it was confirmed that the TIA requirement would be waived upon completion of the Screening Form, since none of the TIA triggers were met by the proposed development. However, the City did raise concerns with sightlines at the existing access intersection off Cope Dr., since the proposed expansion will introduce combination trucks to site traffic. The City requested a review of sightline requirements to determine if additional modifications would be required at this intersection.

SIGHT LINE EVALUATIONS

There is an existing horizontal curve along Cope Dr. west of the existing intersection at 20 Cope Dr. that limits the view between oncoming and exiting vehicles. Eastbound vehicles have less time to react to a vehicle exiting (northbound) at the intersection and vice versa.

Passenger Vehicle Requirements

Transportation Association of Canada (TAC) Geometric Design Standards for Canadian Roads, 2017 (Section 9.10) outlines minimum stopping and decision sight distances for a passenger vehicle based on various design speeds. The stopping sight distance represents the minimum distance required to physically stop at a specific travel speed. The decision sight distance adds

to the stopping sight distance accounting for time to allow the driver to process/perceive information. The latter would be considered the ideal design criteria.

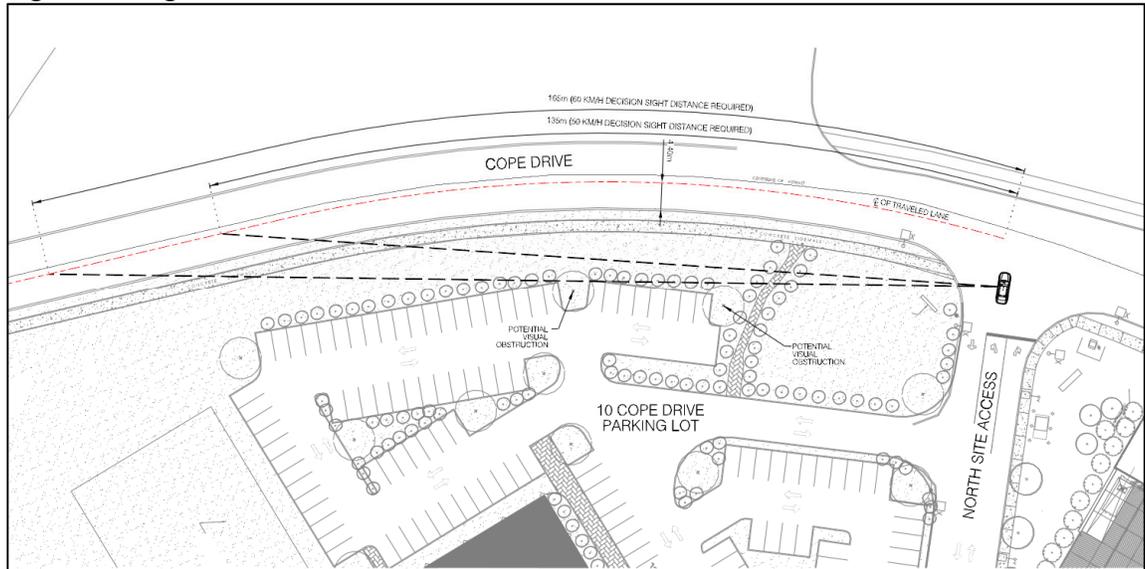
Cope Road has a posted speed limit of 50km/h at the existing access, which represents a 60 km/h design speed. The minimum stopping and decision sight distances based on these speeds are as follows:

- Minimum Stopping Sight Distance; @ 50km/h = 65m; @ 60 km/h = 85m
- Minimum Decision Sight Distance; @ 50km/h = 135m; @ 60 km/h = 165m

It has been assumed the departing position of the passenger vehicle is located with the driver's eye being offset 4.4m from the major road curb line, as per TAC requirements.

The sight distance evaluation results, based on the proposed site plan, are shown in Figure 1 below.

Figure 1 – Sight Distance Results



Note: Solid lines = travel distance; Dotted lines = line of sight.

A key factor in the evaluation was identifying potential visual obstructions to sight lines. It was assumed that there would be no significant sight obstructions within the City right-of-way and that all existing vegetation west of the site access would be removed as part of the expansion. Furthermore, it was expected that the smaller landscaping features along the proposed path and northwest parking area were not high enough to obstruct the field of view of the driver. These are important considerations for the Client in refining the site plan.

The result of the sight distance evaluation for passenger vehicles showed that the proposed site plan provided adequate minimum stopping sight distance requirements at 50 km/h and 60 km/h, and minimum decision sight distance requirement at 50 km/h.

The minimum decision sight distance requirement at 60 km/h may potentially be obstructed by trees adjacent to the parking area. If this potential conflict is mitigated, there would be sufficient decision sight distance to meet TAC standards. Note, there is very little room to gain additional

sight distance beyond 165m due to the orientation of parking stalls; parked vehicles would block the driver's view.

Combination Truck (WB-19 and WB-20) Requirements

The proposed expansion introduces combination trucks to the Cope Dr. intersection. Departing vehicle requirements for combination trucks are more conservative than passenger vehicles due to the slower acceleration and longer trailers. TAC provides the following formula to calculate the sight distance requirements for combination trucks (Section 9.9.2.3):

$$ISD = 0.278 V_{\text{major}} t_g$$

Where:

ISD = intersection sight distance (m)

V_{major} = design speed of major road (km/h)

T_g = time gap for minor road vehicle to enter major road (s)

Based on the above formula, the sight distance requirements for combination trucks are:

- @ 60km/h = 195m; @ 50km/h = 160m.

The sight distance requirement cannot be met with the proposed site plan, due to the location and orientation of the parking area, at the 60 km/h design speed along Cope Dr., but can be met at 50 km/h. Additional warning signs can be implemented to mitigate this deficiency; to ensure drivers are not speeding around the corner in advance of the intersection.

Recommendations

The evaluation of sight distance requirements at the 20 Cope Dr. access intersection prompts the following recommendations:

- Ensure there are no major sight obstructions within the City right-of-way and all existing vegetation that obstructs field of view to the west of the existing site access be removed as part of the expansion.
- Ensure smaller landscaping features along proposed path closest and the northwest parking area are not high enough to obstruct driver's field of view.
- Implement Truck Entrance Sign and Tab Sign (Wc-8R & Wc-8t) along the curve in advance of the Cope Dr. intersection to inform oncoming drivers to adjust speed for a slow-moving truck. This item should be confirmed by the City during detailed design.

TRUCK TURNING SIMULATIONS

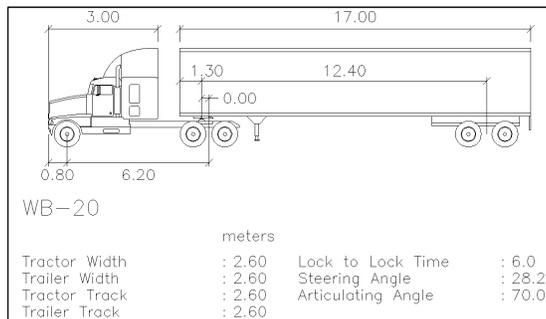
The proposed expansion will introduce combination trucks to the existing site. The Client requested IBI review the proposed site plan to ensure truck circulation can be accommodated, and recommend modifications to the existing internal roadways and loading bay areas if deficiencies are found.

The truck turning templates used in the simulations were also based on the TAC, 2017 standards. The simulations were completed using AutoTURN 10 software.

AutoTURN Design Vehicle

The designated design vehicle for the truck turning simulations was the WB-20, which is a heavy vehicle with a trailer spanning 20m in length. The dimensions of the WB-20 are shown in Figure 2.

Figure 2 - WB-20 design vehicle (TAC 2017)



Loading Bay AutoTURN Simulations

WB-20 trucks turning simulations were completed within the proposed loading area for 10 Cope Drive. The simulations confirmed a WB-20 truck can safely enter and exit the loading area to access the loading dock at its current location. No modifications were required. The results of the simulations have been provided in Figures 3 to 6.

Figure 3 - WB-20 Reverse into Left Loading Bay

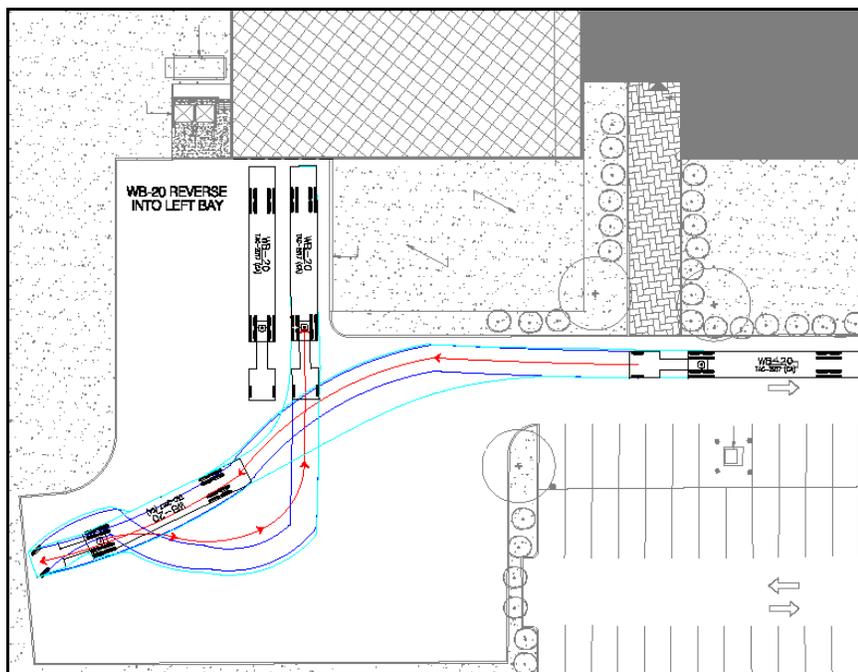


Figure 4 - WB-20 Reverse into Right Loading Bay

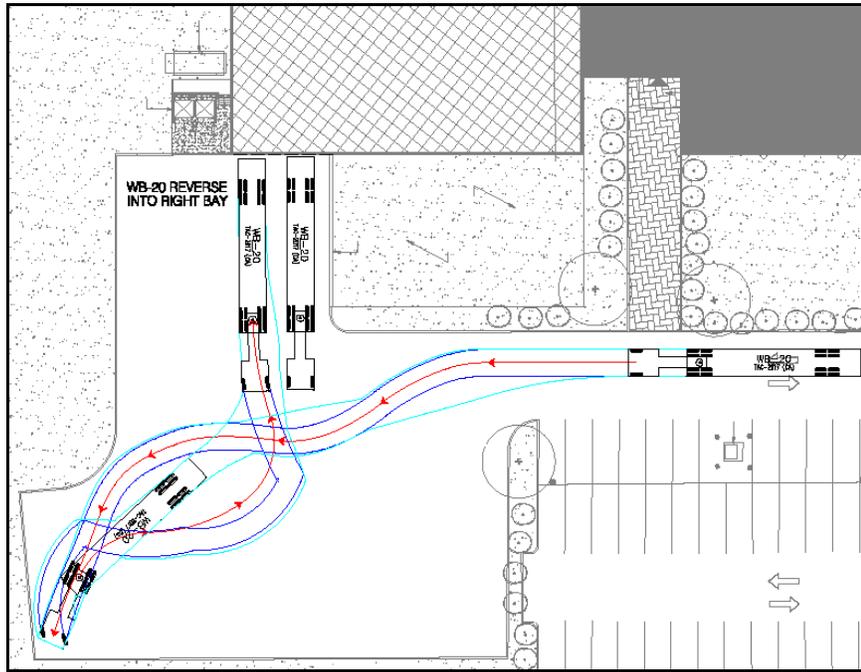


Figure 5 - WB-20 Exit Left Loading Bay

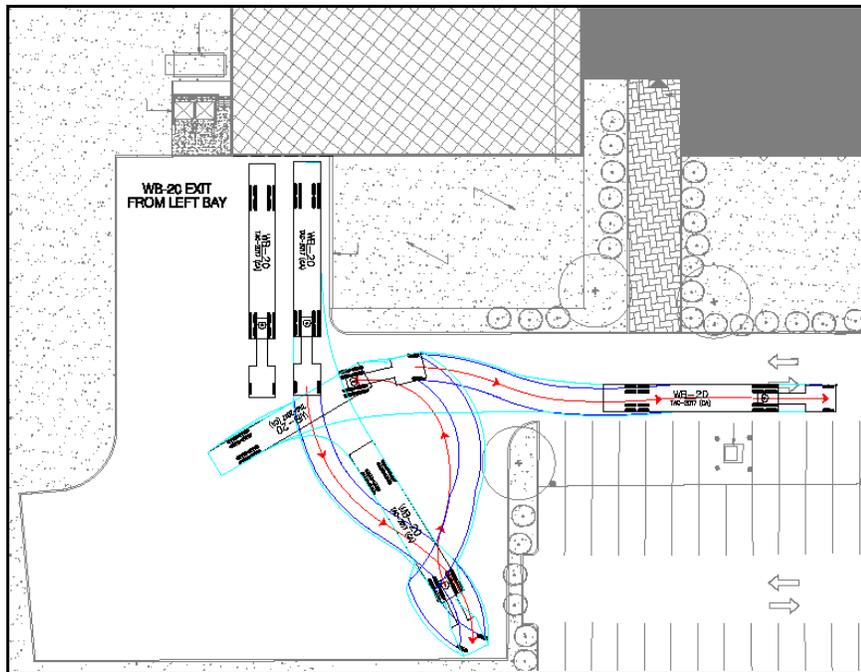
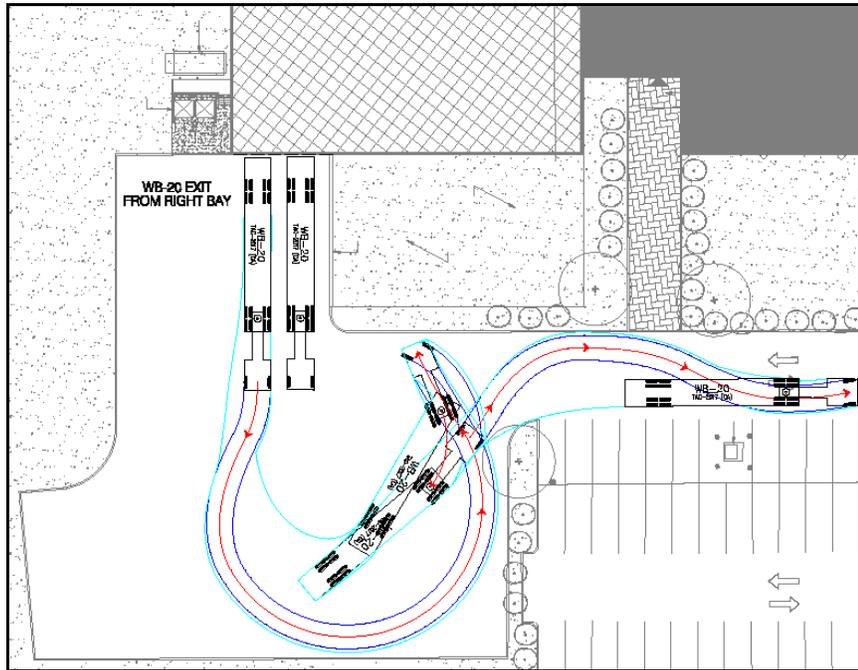


Figure 6 - WB-20 Exit Right Loading Bay

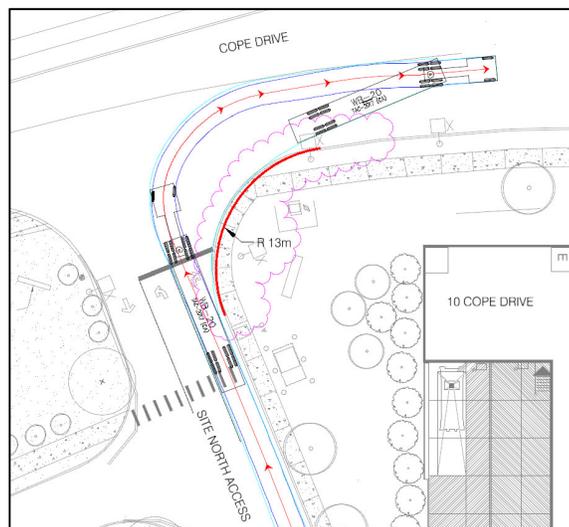


Site Circulation Evaluations

WB-20 simulations were completed on the internal access roads at 20 Cope Drive. Below are the listed results and site modification recommendations from the resulting simulations:

- **20 Cope Drive Site Access – Right Turn Out:** Modify the south-east radius to 13 meters to allow the right turning WB-20 to progress unobstructed heading east onto Cope Drive, as shown in Figure 7.

Figure 7 - Main Site Entrance & Cope Drive (Right Turn Out)



- North Entrance & Cope Drive – Left Turn and Right Turn In:** Modify west curbs of the intersection to 15m radius curve, 7.92m tangent, and 9m radius curve to allow the left turning WB-20 to enter the site north access and avoid impeding the westbound left turning lane, as shown in Figure 8. These modifications also function for the right turn in movement, as shown in Figure 9.

Figure 8 – Main Site Entrance & Cope Drive (Left Turn In)

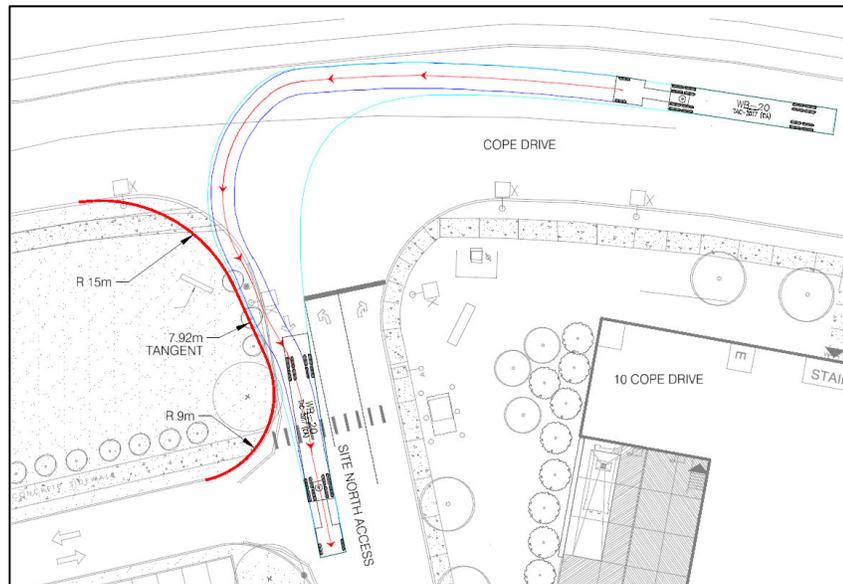
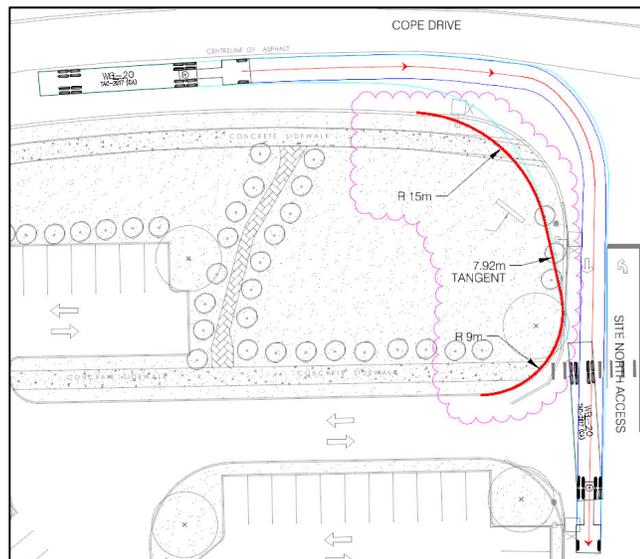


Figure 9 – Main Site Entrance & Cope Drive (Right Turn In)



- 10 Cope Drive Site Access:** Modify the west curb radius to 15 meters to allow southbound traffic to progress unobstructed if a WB-20 is heading northbound, as shown in Figure 10.

Figure 10 - 10 Cope Drive West Site Entrance

