



To: Kersten Nitsche, City of Ottawa
Mike Giampa, City of Ottawa

From: Dan Lim, TYLin
Amar Lad, TYLin

Address: 110 Laurier Avenue West,
Ottawa, ON, K1P 1J1

Date: February 7, 2023

CC: Dream Asset Management

Re: LeBreton Flats Library Parcel – 665 Albert Street, City of Ottawa
Booth Street and Albert Street NE Roadside Safety Assessment
TYLin Ref. 10399

MEMORANDUM

Introduction

TYLin International Canada Inc. was retained by Dream Asset Management for transportation planning and engineering services in support of the proposed development of the LeBreton Flats Library Parcel (LBLP), located at 665 Albert Street, in the City of Ottawa. A Transportation Impact Assessment (TIA) was completed and submitted in November 2022.

To facilitate the construction of an at-grade plaza connection between the LBLP site and the Pimisi LRT Station entrance on Booth Street, the project design team proposes structural modifications to the Bridge, specifically the removal of a portion of the concrete parapet and adjacent guardrail along the east side of the roadway. A conceptual rendering of the future development is provided in **Figure 1** which illustrates the public realm on the east side of Booth Street, where the concrete parapet will be removed to allow seamless pedestrianized access to the site.

This memorandum has been prepared as supporting documentation for the evaluation of structural changes to pedestrian, cyclist, and vehicular safety, and to recommend measures to improve multi-modal user safety along the bridge, addressing concerns raised by the City of Ottawa ("the City"). As detailed below, the integration of removable bollards along the property line in the northwest corner of the subject site are recommended to sufficiently provide an equivalent level of safety as the removed concrete parapet. Additional recommendations are provided, for consideration by the City within the Public ROW, however, are not necessary to replace the concrete parapet but rather to further enhance safety along the corridor.

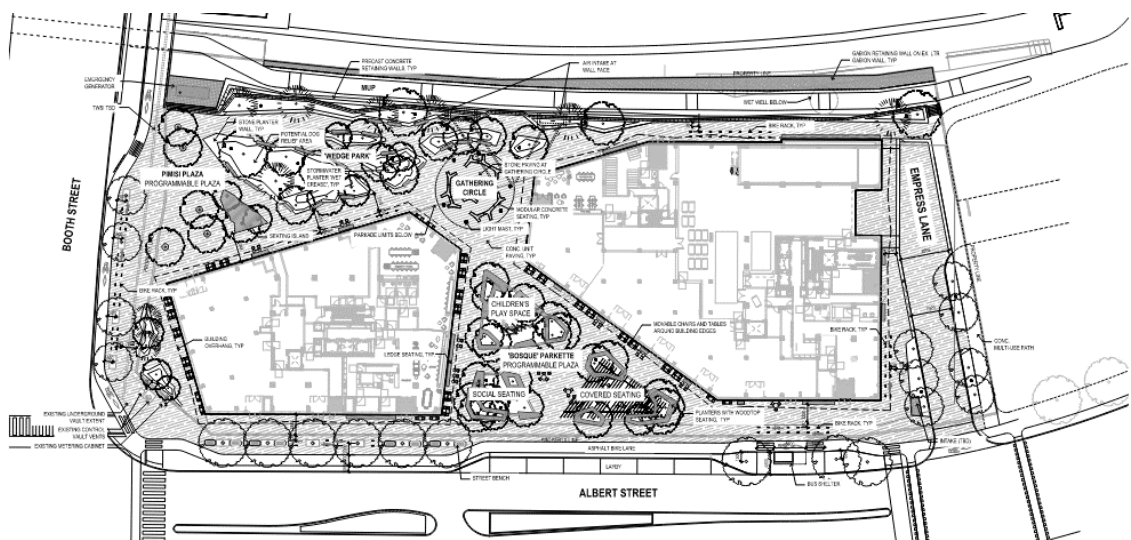
Figure 1 West Site access after the removal of parapet (2022-11-09)



Development Context

According to the latest site plan (dated 2022-11-09), the development proposes a wide pedestrian access and public realm (Pimisi Plaza) in the northwest corner of the subject site. The plaza will provide direct access to the east side of Booth Street, providing seamless connections to and from the Pimisi LRT Station. The existing northbound dedicated bicycle lane on the east side of Booth Street will also be integrated into the at-grade public realm. The latest proposed site plan is shown in **Figure 2**.

Figure 2 Proposed Site Plan (2022-11-09)



Existing Roadway & Collision Assessment

The area of concern along the western edge of the proposed site is bounded by the following streets:

- **Booth Street** is a north-south arterial roadway, with a four-lane urban cross section north of Albert Street, with a centre median and additional left and right turn lanes at the intersection with Albert Street. Wide boulevards are provided on each side to support active transportation to the rapid transit station, with distinct materials for pedestrian and cyclist pathways. Booth Street has a posted speed limit of 50km/h and is under the jurisdiction of City of Ottawa.
- **Albert Street** is an east-west arterial roadway with a 7-lane multi-modal urban cross-section along the frontage of the subject site, inclusive of dedicated eastbound/westbound left turn lanes, a westbound right turn lane, a westbound bus lane, and two through lanes in each direction. A multi-use pathway is provided along the north side of the road and the path will be slightly revised with the current development in place. Albert Street has a posted speed limit of 50km/h in the study area and is under the jurisdiction of City of Ottawa.

Based on a review of transportation collisions (2014-2020) in the area via the City of Ottawa's Open dataset map, there have been fifteen (15) collisions reported near the northeast corner of the intersection of Booth Street and Albert Street. Notably, the reported collision incidents did not involve any vulnerable road users.

The city's open data map illustrates collisions across the north leg of Booth Street, with a concentration of reports related to vehicle-to-vehicle conflicts near the transit stop on the Booth Street bridge. Despite the concentration of incidents adjacent to a transit stop, there are no reported collisions with pedestrians and cyclists at this location. It is likely these were minor conflicts between vehicles and around buses that frequently stop at the station.

Out of fifteen (15) collisions reported, thirteen (13) were Property Damage (P.D) only (87%) and two (2) were non-fatal injuries (13%). It was reported that no fatal collisions occurred between 2014-2020 near the northeast corner of the intersection. The majority of the collision occurred in a 'clear' environment and with the 'day-light' lighting at 93% and 60%, respectively. Additional details and a summary of the collision report table can be found in **Attachment 1**.

Booth Street Bridge Modifications

It is understood that the city has expressed concern for multi-modal user safety in relation to the proposed removal of a portion of the east-side concrete parapet immediately south of the Pimisi LRT Station entrance on the Booth Street bridge to facilitate construction of an at-grade plaza connection.

As illustrated in a 3D rendering of the subject site's west frontage in **Figure 3**, the public realm is designed to seamlessly connect the right-of-way and pedestrian boulevard into the public-accessible plaza in the northwest corner of the site.

Figure 3 Proposed Site Plan Conceptual Rendering (2022-11-09)



Landscaping measures including trees, shrubs, and bicycle parking racks are proposed between the existing dedicated bicycle lane and the pedestrian realm, to protect vulnerable road users from passing vehicles, while improving the vibrancy and amenities of the public realm.

The planned separation of vehicles and bicycles with a curb and landscaping protecting pedestrians will improve safety and awareness for all road users. However, while active modes are separated from vehicular traffic, TYLin notes that the area where landscaping ends and pedestrians cross the bike lane to access the bus stop could represent a safety concern based on the increased chance of conflicts between active modes.



Multi-Modal Safety Recommendations

With the removal of a portion of the concrete parapet and adjacent guardrail to regrade the surface and create cohesive public realm, TYLin recommends the following measures be implemented to improve the safety of pedestrians, cyclists, and vehicles along the Booth Street bridge. All interventions align with Vision Zero objectives and reflect best practices in designing Safe Systems.

Please refer to the drawing in **Attachment 1** for a visual representation of the recommended safety measures.

[Recommended Measures for Implementation by Dream within the Subject Site](#)

1. Removable Bollards along the Property Line

To replicate the function of the eliminated concrete parapet, TYLin recommends the installation of 6-7 removable bollards within the property line of the subject site, appropriately spaced from the northwest corner adjacent to the norther retaining wall, and towards the open space in Pimisi Plaza.

The bollards are chosen to replace the existing safety function of a removed concrete parapet, preventing out-of-control vehicles from hitting the retaining wall and falling into the LRT corridor, while also preventing entry into the public realm. The bollards aim to fill a 'gap' in the street wall, where the proposed trees end to accommodate the curvature of the bike lane and required pedestrian crossing to access the LRT station. It is understood that the location of trees within the public right-of-way, fronting Booth Street, may be modified and integrated by the city, however the placement of the bollards is deemed to be appropriate.

In addition to acting as a vehicular barrier the bollards will enhance multi-modal safety within the public realm. The structural requirements have been discussed with the Landscape Architect and it is noted that the bollards may be designed to be visually consistent and a feature within the public plaza.

It is noted that the bollards are required to be removable to accommodate service vehicles which require periodic access along this route to the wet well. The truck swept path analysis is enclosed as a separate drawing for reference.

The installation of bollards will be at the cost of the developer and phased appropriately during construction of the surrounding landscape features.

Recommended Measures for Consideration by the City within the Public ROW

While the proposed removable bollards are expected to appropriately replicate the function of the concrete parapet along the Booth Street bridge, additional measures are proposed to further enhance the safety of the corridor. The recommendations are based on the review of vehicle speeds, collision data, and road design as part of the Road Safety Assessment, while not directly linked with the replacement of the concrete parapet. These measures are *not required* but are being shared with the municipality as a proactive effort to present Safe Systems best practices to enhance pedestrian and cyclist safety along Booth Street, and slow vehicular speeds approaching the sensitive area around Pimisi LRT Station and busy bus stop.

As the following optional measures consider modifications within the publicly owned right-of-way, any changes would be at the cost of the municipality.

1. Additional Planter Boxes along the Booth Street Curb

The proposed redevelopment will create a vibrant pedestrian environment, as active mode users (pedestrians and cyclists) connect to and from the Pimisi LRT station. The proposed landscape plan shows trees and bike racks on the west-end of the site which separates between the road and bicycle lane from the sidewalk.

TYLin recommends installing additional tall planter boxes along the northbound curb, from the point where the bicycle lane shifts right, up to the bus stop and LRT station entrance. This will provide physical separation between the roadway and public realm in a sensitive location where cyclists and pedestrians cross paths and the landscaping buffer ends.

This low-cost measure will achieve the same function as in-ground bollards along the edge of the roadway, while maintaining an attractive and consistent aesthetic across the public realm. The visual “tightening” of the right-of-way by the shift in landscaping to the left of the bike lane will serve to alert drivers, slow speeds, and increase situational awareness approaching the LRT station and bus stop.

The size and configuration of planter boxes may be coordinated with the Landscape Architect to provide consistency with the design of the adjacent public realm.

2. Reduce Driving Lane Widths with Pavement Markings and Lane Separators

A key physical measure to guide drivers to reduce their speed is narrowing the width of vehicle travel lanes. Research conducted by various organizations has found that there is a direct correlation between lane widths and vehicle speeds. Wide lanes allow for and can encourage vehicles to travel at excessively high speeds, while narrower lanes guide drivers to slow down.

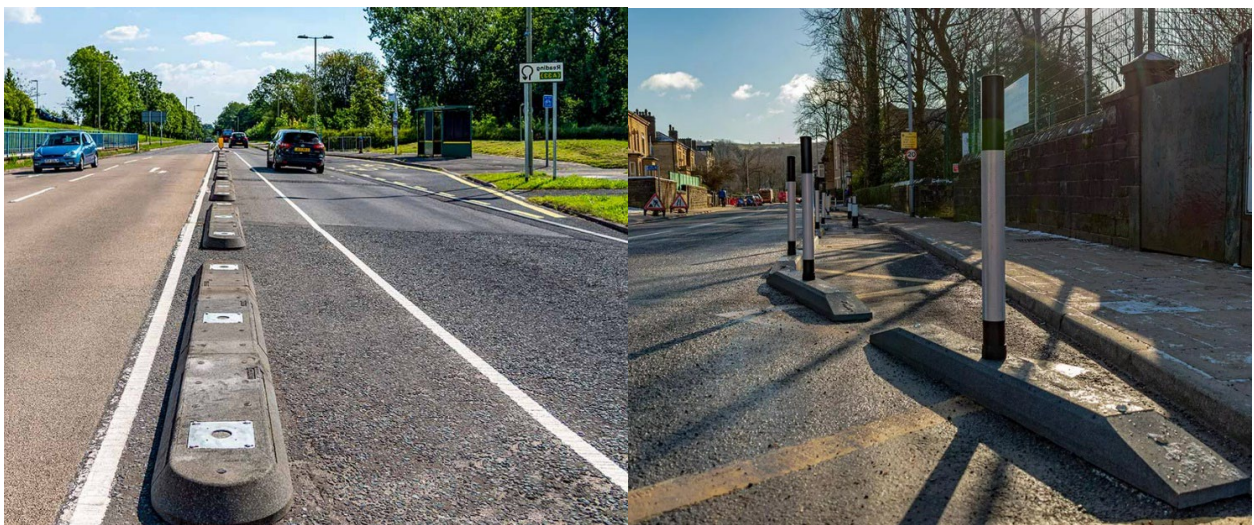
TYLin

It is observed from an aerial map that the pavement width along the northbound leg of Booth Street is approximately 8.0m, wider at the intersection with Albert Street, providing vehicles travel lanes of approximately 4.0m in width. Travel lane widths can be safely reduced to 3.5m, which can accommodate larger transit, delivery, garbage, and emergency service vehicles, while not impacting the flow of traffic along the arterial road.

TYLin proposes a hatched pavement marking as a low-cost but effective measure to narrow the travel lanes and create a buffer along the curb, while leaving the physical curb geometry of the lane unchanged. This painted zone will visually cue drivers to the changed roadway environment and slow speeds, while mitigating the need for costly curb and roadway reconstruction.

As an additional safety measure, it is recommended that removable lane separators be considered for implementation along the hatched area to physically narrow down the roadway and protect cyclists in the bike lane. While slightly more costly than paint alone, these surface-mounted barriers are an affordable alternative to curb reconstruction, with minimal disruption. In addition to being removable in winter months (i.e., to aid snow clearing operations – however these can also be maintained year-round), rubber options also help absorb impacts from vehicles. **Figure 4** illustrates examples of lane separator options in place.

Figure 4 Example of Lane Separators



Source: Rosehill Highways

3. Implement Curb Reflectors

Unforeseen incidents occur when a driver's sightline is obstructed or during low-light conditions. Curb reflectors are a low-cost safety solution to improve the visibility of curbs and medians on Booth Street. It is recommended to install curb reflectors on the curb radius at the northeast corner of the Booth Street and Albert intersection to improve driver awareness of traffic calming measures, while making an eastbound left-turn onto Booth Street.

The addition of curb reflectors to the centre median island in the north leg of the intersection will also improve visual awareness for vehicles making a westbound right-turn. **Figure 5** illustrates an example of curb reflectors implemented to improve the visibility of raised curbs.

Figure 5 Example of Lane Separators



Source: Pexco.com

4. Additional Lighting and Signage

In addition to the above key recommendations, the design team should ensure that the cycling facilities and connections to and from the public realm are well-lit. Pedestrian-oriented lighting will improve the visibility of vulnerable users for both drivers and cyclists during low-light and nighttime conditions, while also enhancing perceived safety for all users in the public realm.

Furthermore, supplementary signage may be considered near the northeast corner of the Booth Street and Albert Street intersection to alert drivers of a traffic-calmed zone ahead. This may be in addition to the required sign indicating the change in speed limits within the area.



Wet Well Access Circulation

TYLin was informed of the need for select vehicles to access the subject site from Booth Street to service the wet well in the northeast corner of the property. It is understood that this required access would be periodic and would require the safe and clear circulation of a boom truck outfitted with a crane, vacuum truck, and standard vans.

Swept Path Analyses was conducted for all three types of vehicles, based on vehicle specifications provided from the service partners. As illustrated in the **enclosed drawing package**, vehicle swept path analysis confirmed that the service vehicles *will* be able to access the wet well and egress the subject site via the proposed pathway along the northern boundary of the site. An additional 1.0 metre horizontal buffer was considered for each vehicle in the analysis and is visualized within the attached drawings.

It is understood that the trucks would be required to reverse-in towards the wet well and requires 5' clearance on either side of the vehicle for the extension of boom arms, which has been illustrated accordingly. It is recommended that this manoeuvre be conducted with a trained flag-person for safe operations within the subject site.

Conclusions

As detailed throughout this memorandum, the development of the subject site and the removal of the east side concrete parapet on the Booth Street Bridge provide an opportunity to enhance multi-modal safety along the Booth Street bridge, while improving connectivity and flow between the Pimisi LRT Station and the future Pimisi Plaza public realm. The recommended integration of removable bollards along the property line in the northwest corner of the subject site are expected to sufficiently provide an equivalent level of safety as the removed concrete parapet.

Additional recommendations are provided throughout the memo, for consideration by the City of Ottawa, and at cost to the city. These elements, while not necessary to replace the safety function of the concrete parapet, consider changes within the Public ROW to further enhance multi-modal user safety along the corridor, in alignment with road safety best practices.

TYLin

Please do not hesitate to contact the undersigned should you have any questions regarding this roadway safety assessment.

Sincerely,

TYLin Canada Inc.



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Attachments:

Attachment 1 – Roadside Safety Review Comment Drawing, Wet Well Swept Path Analysis Package, and Collision Report Summary

NOTE:

- Drawing shown is based on Landscape Plan received on Feb 03, 2023 by PFS.
- Comments highlighted in **Orange** are recommended measures for the City's considerations. While these changes are not considered necessary to replace the function of the concrete parapet, they are being presented as best practices identified by the Road Safety Assessment to enhance safety within the public right-of-way. Any changes to the public right-of-way would be considered optional and at the cost of the municipality.
- Comments highlighted in **Blue** are recommended measures for Dream's implementation, to replicate the function of the to-be-removed east-side concrete parapet from the Booth Street bridge. All recommendations are proposed within the owner's property and serve to prevent vehicular infiltration into Pimisi Plaza and towards the northern retaining wall.

Recommend to install tall planter boxes to provide physical separation between the roadway and public realm.

Recommend hatched pavement along the curbside edge of the roadway to reduce the widths of driving lanes along Booth Street. Additional safety measure such as removable lane separators may be considered within the hatched area. Both recommended measures are low-cost solutions in lieu of full curb reconstruction, and would serve as traffic calming measures to slow vehicular speeds and enhance the safety of cyclists in the adjacent bike lane within the public right-of-way.

Approximate location of existing median.

Consider installing Curb Reflectors along the curb radius to improve the visibility of the curb and entrance into a traffic-calmed roadway during low-light conditions.

7.0 m

TYLin recommends the installation of 6-7 removable bollards within the property line to enhance multi-modal safety within Pimisi Plaza and replace the existing function of the concrete parapet, which will be removed.

The bollards are required to be removable, to accommodate service vehicles which require periodic access along this route to the wet well. The truck swept path analysis is enclosed as a separate drawing for reference.

Bollards have been discussed with the Landscape Architect and are included in the landscape base plan. These may be designed to be visually consistent with the adjacent public realm.

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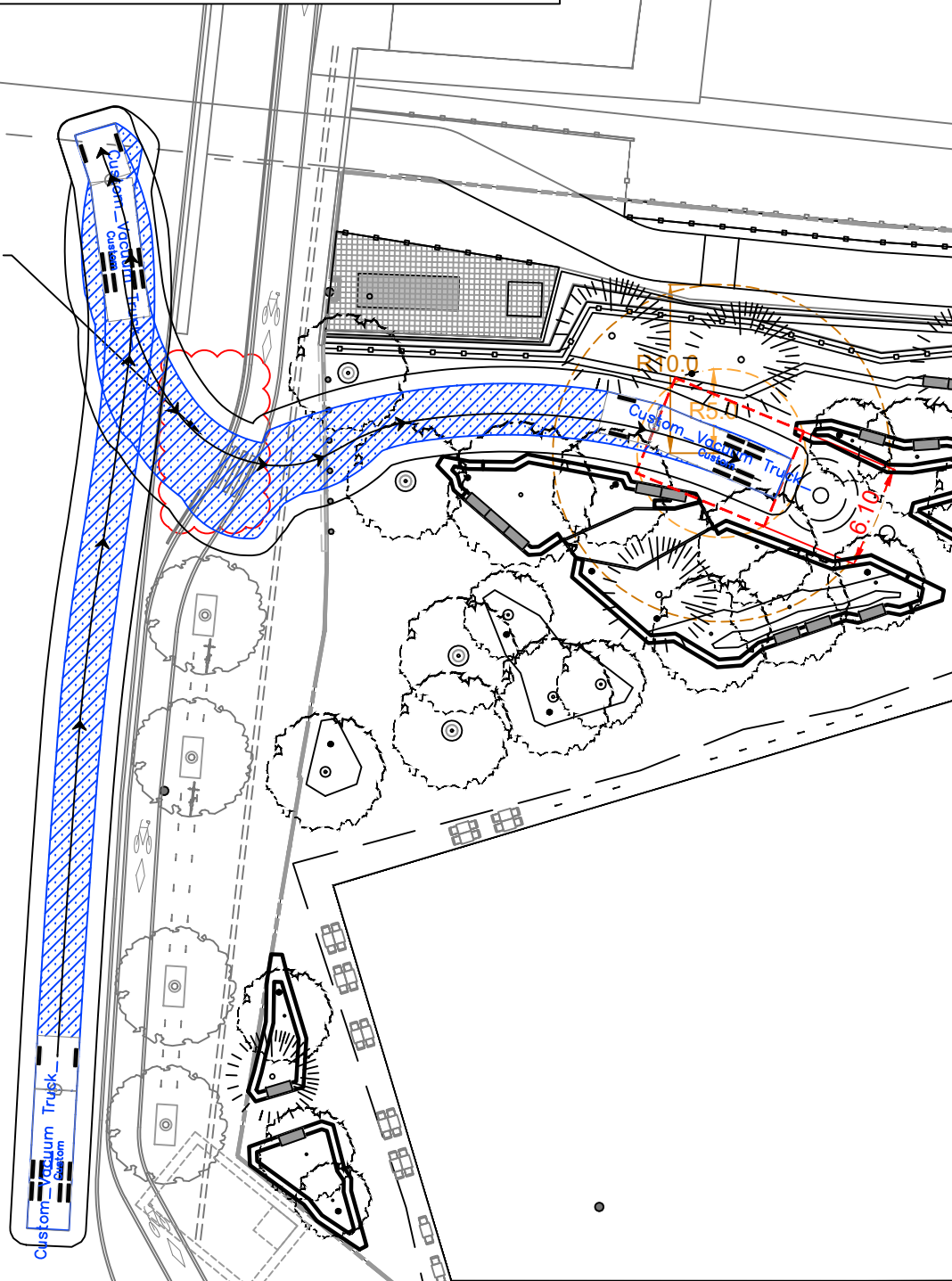


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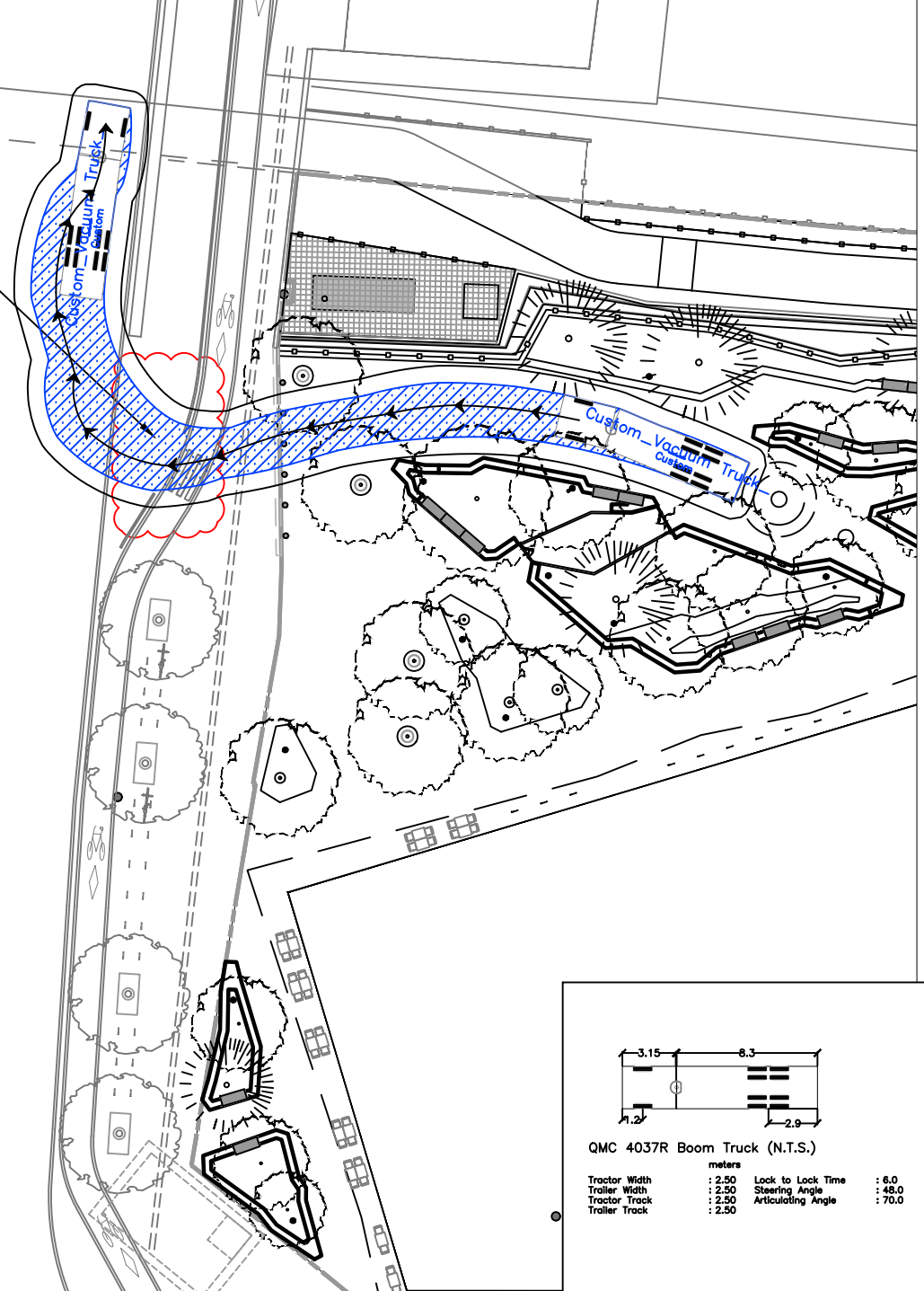
Please note that the design vehicle used for the simulation may be different than the operating vehicle. A custom boom truck was created based on the truck specs provided from their partners. Please confirm if the design vehicle's detail dimensions and specs corresponds to the operating vehicle on site.

- 1.0m horizontal buffer was considered throughout the truck swept path
- It is strongly recommended that trained staffs from the city or property management staffs be present to assist circulation of the service truck. The truck will reverse in to the pedestrian realm from a public road, therefore vulnerable users shall be warned during this operation.

Larger curb cut may be required to accommodate the service truck



Larger curb cut may be required to accommodate the service truck



QMC 4037R Boom Truck (N.T.S.)			
meters			
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 48.0
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

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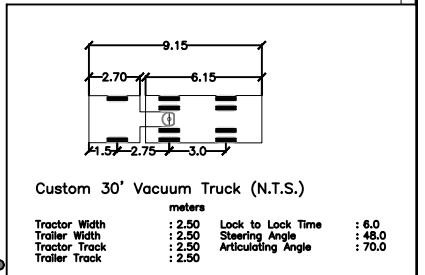
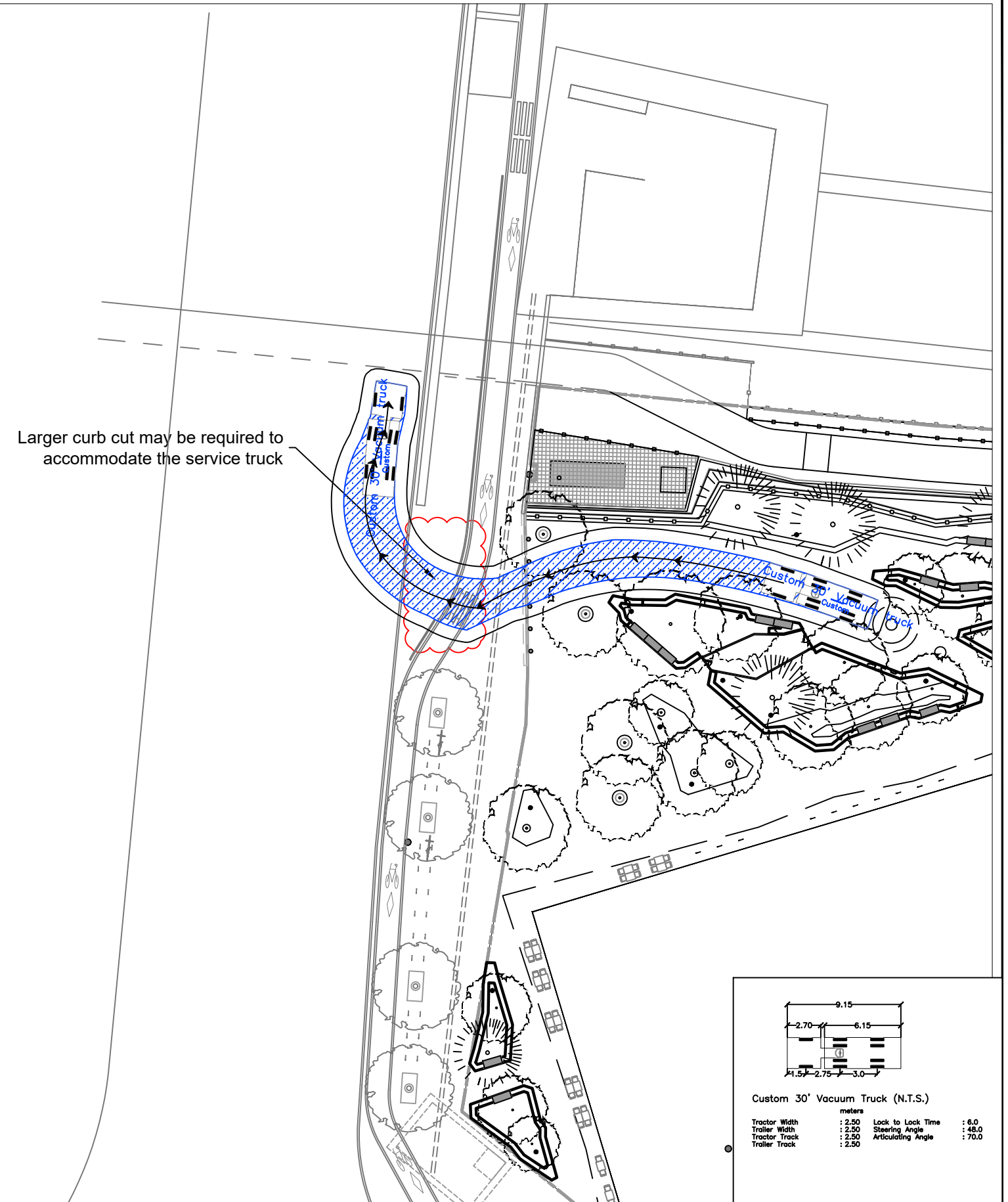
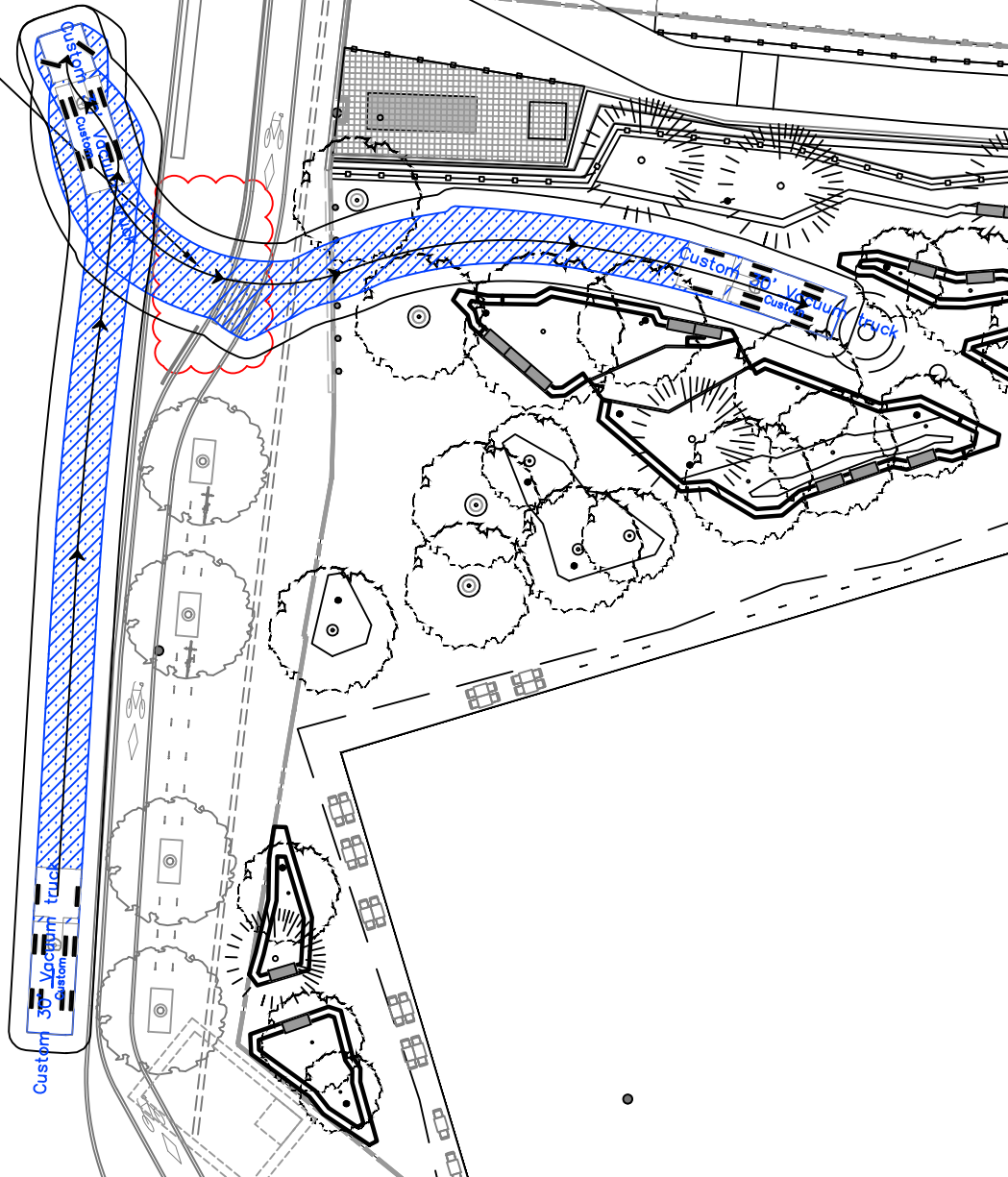
NOTE:

Please note that the design vehicle used for the simulation may be different than the operating vehicle. A custom vacuum truck was created based on the length of the truck provided by their partners. Please confirm if the design vehicle's detail dimensions and specs corresponds to the operating vehicle on site.

- 1.0m horizontal buffer was considered throughout the truck swept path
- It is strongly recommended that trained staffs from the city or property management staffs be present to assist circulation of the service truck. The truck will reverse in to the pedestrian realm from a public road, therefore vulnerable users shall be warned during this operation.

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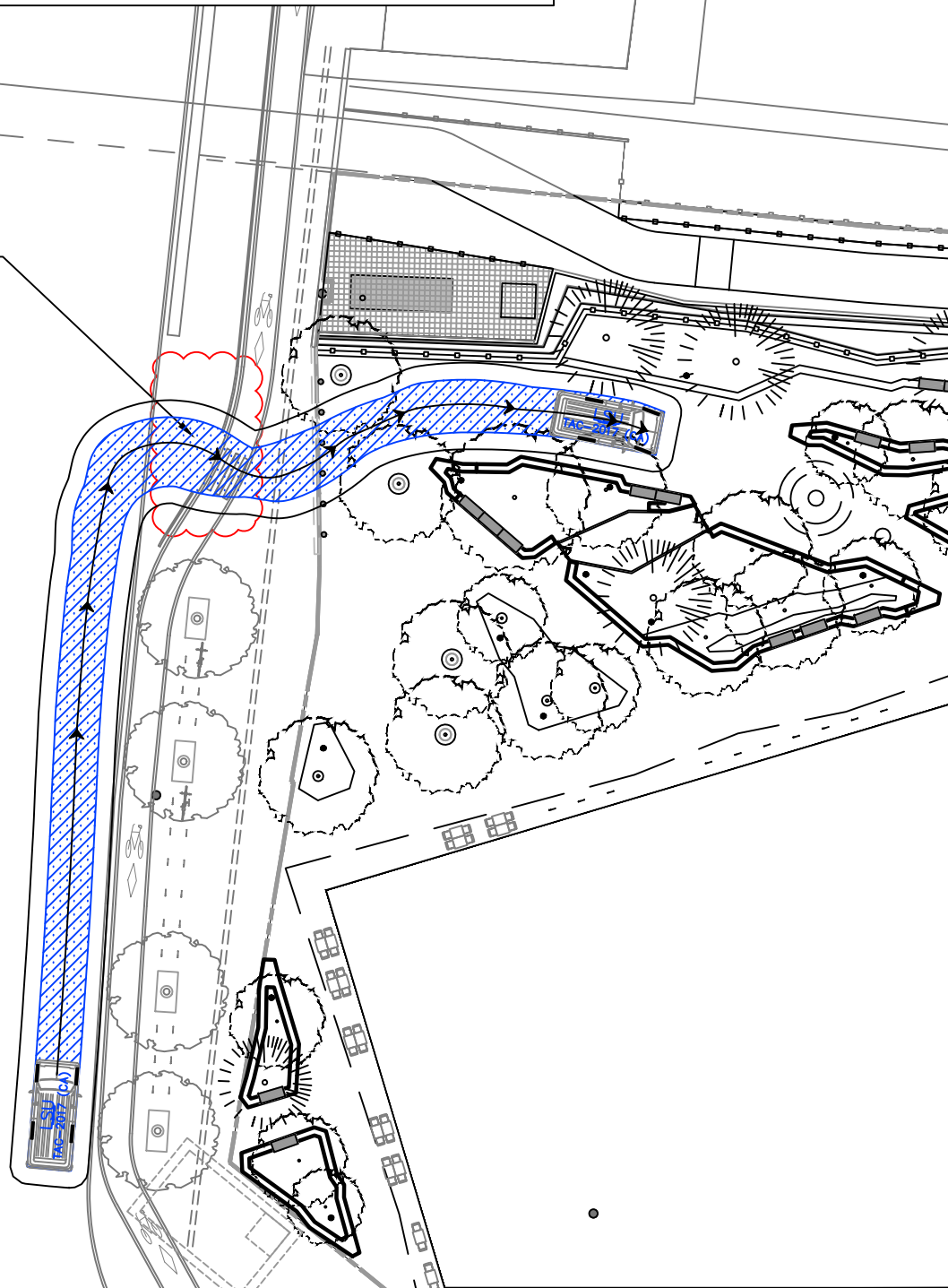
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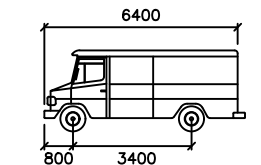
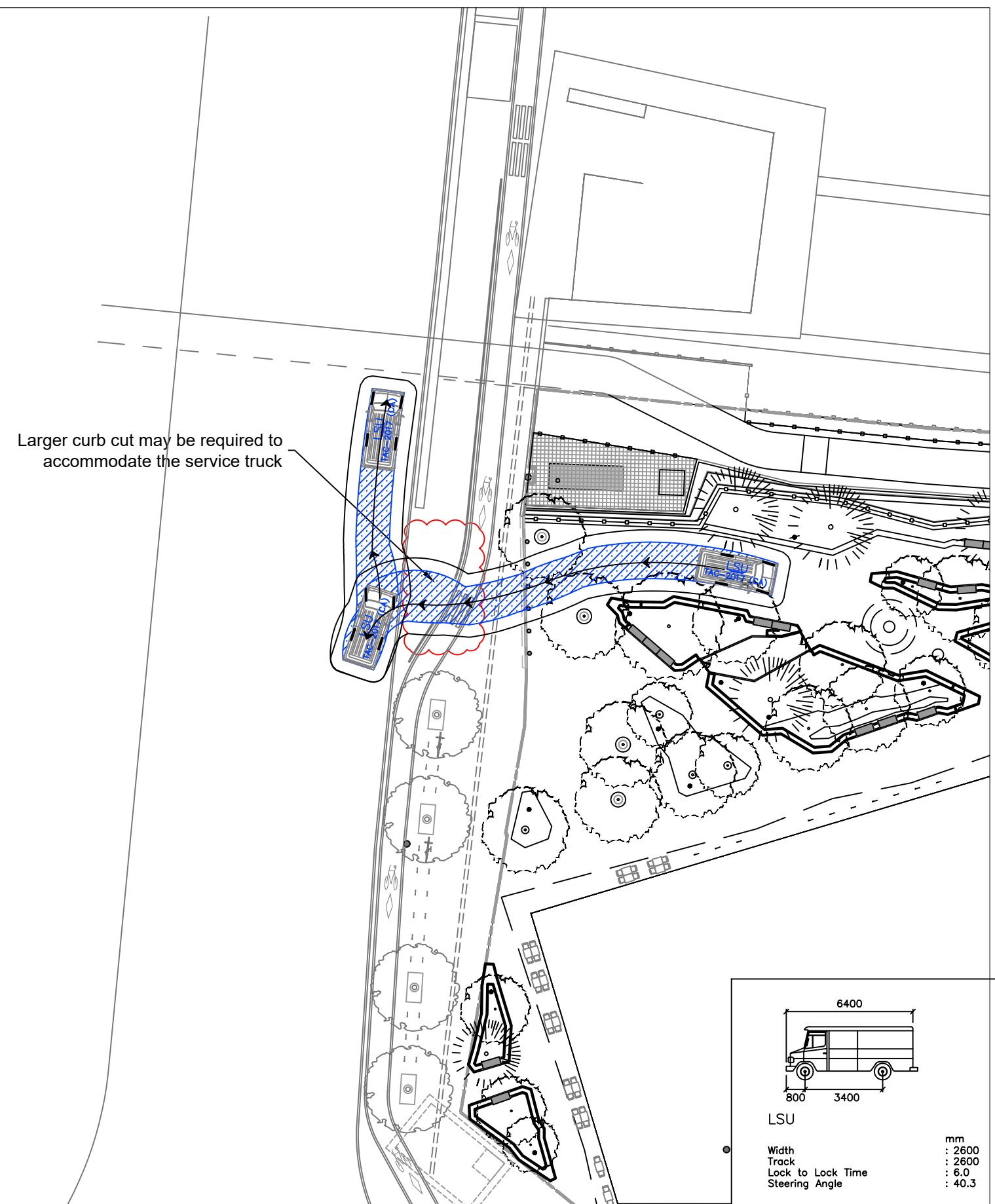
Please note that the design vehicle used for the simulation may be different than the operating vehicle. It is our understanding that two small vans will also access the site. A typical delivery truck (TAC-LSU) was used for this exercise. Please confirm with the design vehicle's dimensions and specs.

- 1.0m horizontal buffer was considered throughout the truck swept path
- It is strongly recommended that trained staffs from the city or property management staffs be present to assist circulation of the service truck. The truck will reverse in to the pedestrian realm from a public road, therefore vulnerable users shall be warned during this operation.

Larger curb cut may be required to accommodate the service truck



Larger curb cut may be required to accommodate the service truck



LSU	
Width	: 2600 mm
Track	: 2600 mm
Lock to Lock Time	: 6.0
Steering Angle	: 40.3



