MEMORANDUM: TECHNICAL REVIEW FOR COMMERCIAL VEHILCE SAFETY CENTRE TIA	
To	Catherine Absil-Couzins
From	Tim Segedin
Date	5/01/2023
Address	253 Mill Road, Bombay, Auckland.

1.0 INTRODUCTION

Edin has been asked by Auckland Transport to provide feedback on the construction of a commercial vehicle safety centre (CVSC) at 253 Mill Road, Bombay, Auckland.

The CVSC is a heavy commercial vehicle inspection centre, in which vehicles are alerted along state highway one by the police to undergo a vehicle inspection at the proposed site. The vehicles exit the state highway at the Bombay interchange and then enter the site from Great South Road via a one-way vehicle access to the north of the site, undergo the inspection, and then exit the site through a one-way vehicle access to the south of the site. The CVSC has a six heavy commercial vehicle capacity, with typical operating hours being from 6am to 9pm and an expected trip generation of 15 heavy vehicles per hour. The current road layout adjacent to the site includes parking on both sides, two vehicle lanes, and no passing line markings.

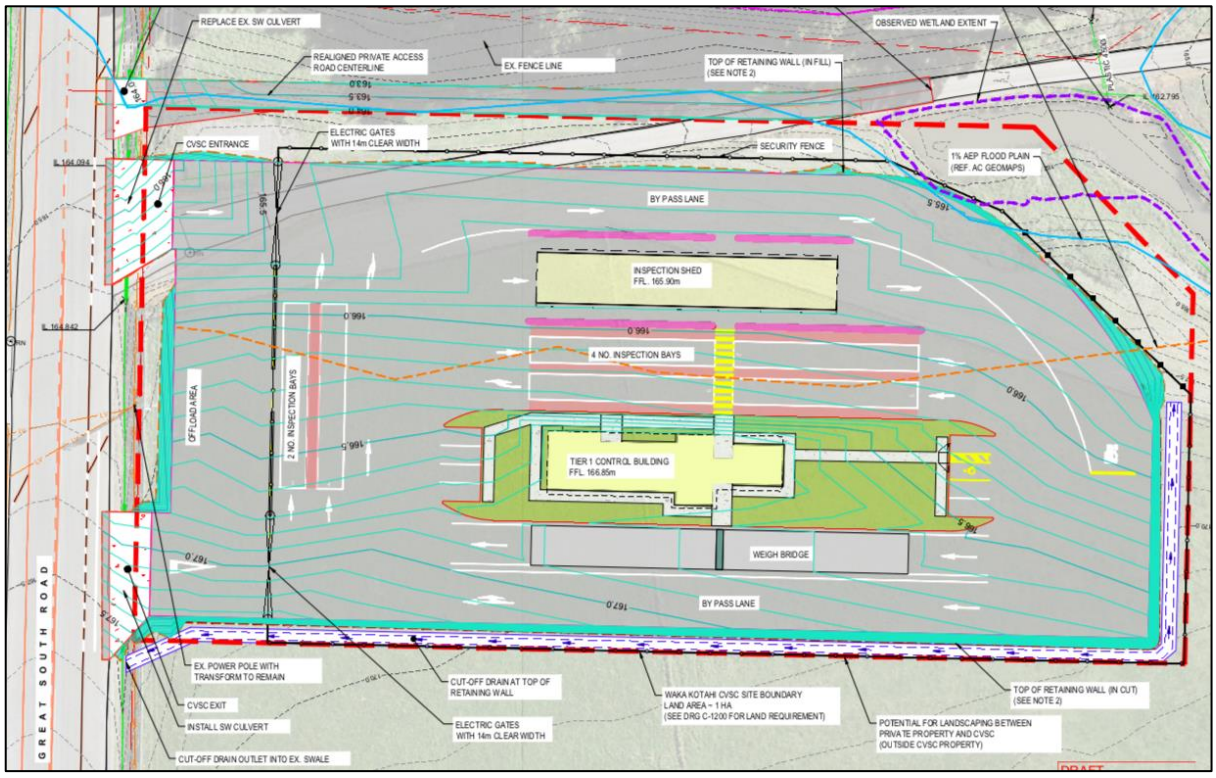

Figure 1: Site Plan (Source: Traffic Impact Assessment)

2.0 ASSESSMENT

2.1 Existing Great South Road Operation

The proposed site accesses are located on the eastern side of Great South Road just to the north of the roundabout intersection with Mill Road. This section of Great south Road experiences low traffic volumes. Directly adjacent the proposed site on the western kerb is a Sikh temple and to the south a Z service which caters for heavy vehicles.

Over the last five years, there have been three non injury crashes on Great South Road to the north of the roundabout. The first was a loss of control crash in which the driver lost control and swerved off the road. The second was another loss of control crash in which a truck's skip bin came unattached causing the bin to hit another vehicle. The final crash involved a vehicle overtaking and hitting the side of a truck. All of the crashes took place before the recent speed limit change on 30th June 2022. These crashes do not represent a significant existing crash pattern along Great South Road.

2.2 Trip Generation

Trip Generation analysis provided in the Traffic Impact Assessment states that the expected volume of heavy vehicles accessing the site will be in the order of 15 vehicles per hour or approximately one vehicle every four minutes. All heavy vehicles would be entering the site undertaking a right turn manoeuvre. The applicant states that "*based on a turning speed of 5km/hr and with a truck with trailer crossing distance of 24m it is estimated that right turn manoeuvres would take between 16 to 17 seconds for turning manoeuvres into the site"*. The applicant reviewed opposing general traffic data and found that during peak hour there could be up to 90 vehicles travelling southbound. This equates to general traffic passing the site at a rate of one every 40 seconds, due to the low level of opposing traffic the applicant reasons that the proposal will not have a negative impact on the current operation of Great South Road.

Edin agrees that the proposed trip generation and frequency of right turn manoeuvres is unlikely to have significant adverse effects on general traffic travelling southbound along the road. It is expected that some southbound vehicles will be required to slow for right turning heavy vehicles. It is considered that due to the long manoeuvre time for heavy vehicles and the potential to require approaching vehicles to slow, suitable street lighting should be installed to ensure good visibility of turning vehicles during night time operation.

Failed Inspection

The CVSC is an inspection facility for heavy vehicles, in which it can be expected that some of the vehicles would fail the inspection and be unable to return to the road until these issues are resolved. In the case of failed inspections, it is unclear what will happen to the vehicles during the repair process. The applicant should confirm whether these repairs would take place on-site or whether these vehicles are to be transported to another facility. In the case of either, a more in-depth explanation outlining the operational impacts of failed inspections should be provided.

Subsequently, it is mentioned in the Traffic Impact Assessment that the identification points set up along State Highway One are to be disabled when the CVSC is at full capacity. It is unclear whether this process is manual or automatic. The applicant should provide more information on the operation of the identification of heavy vehicles along State Highway One, including how the process safeguards against over capacity within the centre.

2.3 Proposed Vehicle Crossings

Visibility

The 14m wide exit-only vehicle access was assessed for visibility in the applicant's TIA which included checking for Safe Stopping Distance (SSD) stating that in both directions the required sight distance of 87.12m was available. The applicant used an estimated operating speed of 70km/h (based on the 60km/h posted speed) for both directions and factored in a gradient of -6% for the southbound direction. However, just to the north of the site the posted speed limit is 80km/h and although the posted speed adjacent to the site is 60km/h, significantly higher approach operating speeds could be expected and should be factored into the visibility assessment. A 2020 speed count undertaken before the speed limit change from 100km/h measured speeds in the vicinity of the site at 84.6km/h, the TIA recognises that as no change in road alignment has taken place operating speeds may not have reduced yet.

It is also considered that Safe Intersection Sight Distance (SISD) as recommended in Austroads Guide to Road Design Part 4A should be achieved for the proposed accesses which is a significantly higher visibility requirement than SSD. SISD is especially important in this instance due to the significant time heavy vehicles require to complete a turning manoeuvre.

Edin has estimated the available sight distance to the north of the proposed site is approximately 215m before a vertical curve in the road obstructs visibility based on desktop analysis. The below table shows SISD based on an operating speed of 84.6km/h and a downhill gradient of 6% equates to 211m.

Table 1: Edin Visibility Assessment to the North

Direction	**Available sight distance (m)**	**Operating Speed of approaching traffic (km/h)***	**Longitudinal grade in %**	**SSD (m)**	**SISD (m)**
North of the proposed site	Approx 215	84.6	-6	140	211

**2020 speed counts*

The desktop analysis therefore demonstrates that visibility to the north of the site is likely to achieve SISD. However as suitable visibility is critical to the safe operation of the site it is considered that a sample speed survey should be undertaken to confirm the operating speed on the northern approach to the proposed accesses taking into consideration the change in speed over the approach. Maximum visibility should also be measured on site for both the vehicle accesses into and out of the proposed CVSC. Visibility should also be assessed for the new access to be constructed for the neighbouring property.

Vehicle Tracking

According to Standard E27.6.4.2(2) of the AUP, the width of vehicle crossings at the site boundary must not exceed 6.0m (or provided that a maximum width of 9.0m is permitted where the crossing needs to accommodate the tracking path of large heavy vehicles).

The proposed entrance only vehicle crossing is 12m wide and the proposed exit only vehicle crossing is 14m wide at the site boundary both have nonstandard flares to the road seal.

The applicant states in the TIA the following with regard to the vehicle crossings "*the site will also service over-dimensional vehicles and due to tracking requirements, it is not able to meet this standard. However, the vehicle crossing width of the CVSC site will be further reviewed during the detailed design stage to ensure crossing width*

is minimised where possible". After reviewing the tracking plans provided it can be concluded that the proposed access widths currently shown are not required.

Due to the tracking required for heavy vehicles accessing the site and the absence of pedestrian and cyclist demand wider than standard accesses can be accommodated, however AT will need to approve the final design and as stated in the TIA the vehicle crossing widths should be minimised and suitable tracking provided to illustrate this.

2.4 Proposed Changes to Great South Road

NSAAT Line Markings

'No stopping at all times' (NSAAT) line markings are proposed between the vehicle access points of the CVSC site and south of the exit-only access along Great South Road towards the roundabout. In the TIA, the applicant recommends that the proposal includes NSAAT line markings along both the eastern side of the road and next to the Sikh Temple access on the western side of the road.

The Sikh Temple has its access on the western side of Great South Road north of the proposed site, the temple has onsite parking that can cater to visitors the majority of the time. However larger events such as weddings result in visitors parking along Great South Road adjacent to the site. These overflow parked vehicles could create operational and safety issues when heavy vehicles make right turn manoeuvres into the site without suitable restrictions. It is considered that introduction of NSAAT line marking as proposed will support safe operation of the site.

Right Turn Bay

All of the heavy vehicles entering the site from state highway one will be making a right turn into the site. Trip generation completed by the applicant estimates that during the peak hour there will be 15 heavy vehicles making the right turn manoeuvre. For general traffic peak periods could result in approximately 200 vehicles per hour along Great South Road.

The applicant has suggested the following road configuration could be accommodated adjacent to the site:

- 2m parking
- 3.5m lane
- 3.0m flush/Right Turn Bay
- 3.5m lane
- 1.4m shoulder with NSAAT

Figure 2 illustrates the layout suggested adjacent to the site highlighting the proposed right turn bay where vehicles entering the site can wait to make the right turn manoeuvre while not restricting general traffic.

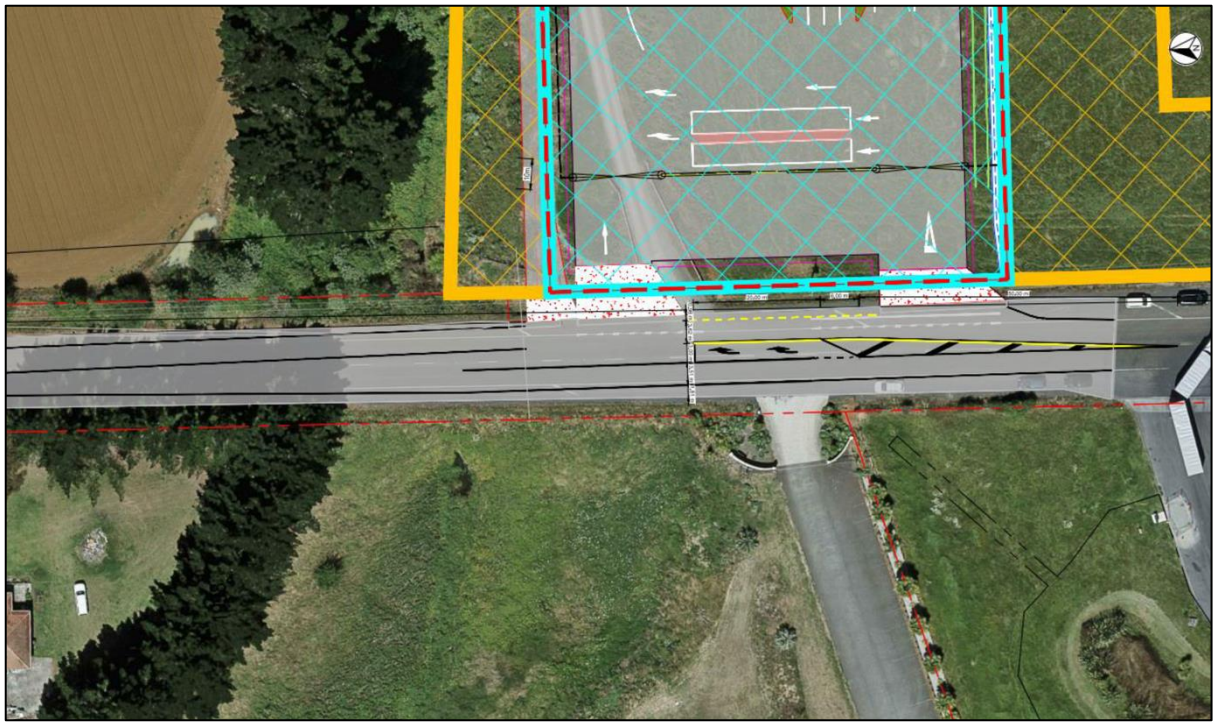

Figure 2: Geomatic Design Changes (Source: Traffic Impact Assessment)

The applicant also states in the TIA that "*there are adequate gaps in opposing traffic on Great South Road outside the CVSC site for heavy vehicles without needing to wait long to turn right, i.e. unlikely to experience long queues or delays"* and concludes with "*For the low volume of turning traffic a dedicated right turn bay is not warranted on Great South Road outside the CVSC site*".

The TIA Assessment highlights that the rate of 15 trucks turning per hour and the maximum through traffic of 200 vph that a right turn bay is not required based on Austroads Guide to Traffic Management: Part 6 (2020). However, due to the increased time required for turning movements of heavy vehicles, it is considered formal provision should be made to ensure the safe uninterrupted operation of general traffic.

The final design of the turning facility needs to account for the Sikh Temple entrance, where it can be expected that vehicles will need to make a right turn manoeuvre. Therefore a section of flush median along Great South Road could be more appropriate to accommodate the existing vehicle movements entering and exiting the Sikh Temple.

2.5 Traffic Modelling and the Wider Network

The Transport Assessment for the proposal has modelled the impact of the CVSC proposal on the North and Southbound interchanges with Mill Road for both the existing stop controlled layout and a potential signalisation of the interchanges.

The TIA assessment for the PM peak has reported in the that "*the CVSC site can operate at the interchange without affecting the flow of traffic on State Highway under all scenarios except for the signalisation option for southbound off-ramp*." For the southbound scenario it is stated "*the southbound off-ramp signalisation would require an intervention on signal timings to ensure the off-ramp queue never reaches the motorway. This can be readily achieved by installing an extra detection loop part way down the ramp which, when triggered, extends the green time for the ramp.*"

While only the southbound signalised interchange scenario was highlighted as a concern the modelling assessment of the northbound interchange highlighted that additional right turning vehicles generated by the CVSC site would result in right turning delays increasing from 117 seconds to 235 seconds and the DoS for the

northbound off-ramp is changed from "B" to "E". While the assessment indicates this can be accommodated withing the existing queuing space this could exacerbate an existing safety concern with drivers of heavy vehicles taking risks in making turning manoeuvres as a result of driver frustration. The recent crash record shows two crashes involving right turning vehicles at the northbound off-ramp.

The modelling also does not take into account heavy vehicles leaving the CVSC site which would further impact the northbound interchange. Northbound vehicles post testing will make a right turn onto the northbound on-ramp, which will introduce further delay for right turning heavy vehicles from the off-ramp.

It is also considered that the increased queue length for northbound vehicles has been underestimated as this has not considered that all the additional vehicles will be HGVs.

It is therefore considered that suitable mitigation measures should be outlined to address the safety concern for right turning vehicles at the northbound off ramp such as operational restrictions for the CVSC site during peak periods.

The GHD modelling undertaken as part of State Highway 1 Mill Road SB Off Ramp Improvements – Optioneering indicate the Mill Road/Great South Road roundabout is operating at a high level of service and it is not expected that the additional CSVC generated traffic will significantly affect the operation of the roundabout.

3.0 ASSESSMENT OF TIA CONCLUSIONS AND RECOMMENDATIONS

Ref	TIA Conclusions	Response
1	The PM peak is the critical peak for the off-ramp intersections on Mill Road at Bombay Interchange.	Accepted
2	It is estimated that only 15 heavy vehicles are expected to the CVSC site from SH1 during the peak hour.	Accepted
3	The key off-ramps intersection at Bombay interchange are expected to experience minor delays for the current stop control layout at PM peak.	Assessment of the northbound off ramp shows right turn delays increasing from 117 seconds to 235 seconds which could be underestimated. This is considered a significant increase and could result in increased crashes due to driver frustration.
4	The existing off-ramp traffic already experiences significant delay, but the queue does not extend into the State Highway and are not expected to do so with the small number of heavy vehicles.	It is considered that a methodology for monitoring operation of the off ramps should be outlined and an operating plan agreed for peak periods to mitigate concerns around increased delays and queue lengths.
5	The future signalisation of the off-ramps will result in significant queues on the southbound off-ramp during the PM peak if an intervention on southbound off-ramp signal timings is not implemented.	The impact on Mill Road and the local road network will need to be considered as part of signalisation.

6	There are adequate gaps in opposing traffic on Great South Road outside the CVSC site for heavy vehicles without needing to wait long to turn right, i.e. unlikely to experience long queues or delays.	Agree that there should be suitable gaps for turning traffic
7	The additional traffic generated by the site is expected to have a minor impact on crash risk at most key intersections within the vicinity of the development. The greatest increase in crash risk is expected on Mill Road northbound off-ramp because of increased right-turning movements into and from Mill Road from the development. However, given the small amount of traffic involved with CVSC operation, this risk is minor.	It is considered that this risk could be more than minor due to the significant increase in delay for right turning vehicles. It is recommended that suitable mitigation such as restricting operating times during peak periods should be considered while the northbound off ramp operates with a stop control.
8	For the low volume of turning traffic a dedicated right turn bay is not warranted on Great South Road outside the CVSC site. Subject to the implementation of recommendations outlined below, the additional traffic effects of the development are no more than minor for both Great South Road and Mill Road corridor.	It is considered that due to the relatively high numbers of heavy vehicles making right turns and the significant time required to undertake the manoeuvre a right turn facility should be included in the design for the site.

Ref	**TIA Recommendations**	**Response**
1	The site can operate at all peaks using existing northbound and southbound stop control Mill Road off-ramps without blocking SH1 traffic.	It is recommended that a methodology for monitoring operation of the off ramps is outlined and an operating plan agreed for peak periods to mitigate concerns around increased delays and queue lengths.
2	For the future southbound off-ramp traffic signal option install an extra detection loop part way down the ramp which, when triggered, extends the green time for the ramp. This will ensure that off-ramp queues during peak hour never reaches the motorway. Northbound however, can continue to operate at all periods without any intervention.	The impact on Mill Road and the local road network will need to be assessed as part of this mitigation.
3	Undertake regular annual monitoring of the safety performance of on-ramp and off ramps at Bombay interchange and roads within the vicinity of the CVSC site to identify and respond to emerging crash trends on the network.	Agree this should be adopted in any agreed conditions for the site.
4	Consider installing below listed road configuration for Great South Road. This should be further investigated during detailed design stage.	It is considered this change should be included before operation of the site.

	Total Great South Road width of 13.4m which comprises of (west to east): • 2m parking + • 3.5m lane + • 3.0m flush/Right Turn Bay + • 3.5m lane + • 1.4m shoulder with NSAAT	
5	Install 3m flush median and right turn bay for vehicles to turn right into the CVSC without blocking live traffic.	It is considered this change should be included before operation of the site.
6	Place NSAAT markings along the eastern side and next to the Sikh temple access on western side of Great South Road.	Agree
7	The flush median would require lateral lane shift with diverge taper on Great South Road. To minimise carpark loss on eastern side near the roundabout on Great South Road, it is proposed that the lateral shift of traffic lane should commence from north of the CVSC site to south on Great South Road as shown in Figure 6-6. This should be examined further at the Detailed Design stage with reference to the Auckland Transport Traffic Design Manual.	Can be developed as part of detailed design
8	Review existing road surfacing condition on Great South Road outside the CVSC site.	Agree
9	Operational parameters, as outlined in the Operational Plan for the CVSC, should ensure community needs are balanced with policing requirements.	Agree
10	Require that a Construction Traffic Management Plan (CTMP) is developed to manage all construction related traffic movements during construction	Agree

4.0 RECOMMENDATIONS

The following recommendations are made with respect to the TIA for the proposal:

- Maximum available visibility to the north should be assessed for both CSVC accesses and the new access to be formed for the neighbouring property. The applicant should undertake a speed survey on the northern approach adjacent to the site to accurately measure southbound approach speeds. This will need to consider changing speeds due to vehicles decelerating for the speed limit change. This should then be used to assess SISD.
- Suitable street lighting should be included in the proposal to ensure good visibility of turning vehicles during night time operation.
- Access widths at the site should be minimised as part of detailed design.
- A suitable right turn facility should be included in the design for the site accesses
- Mitigation measures such as restricted operating times should be considered and outlined to address the concern of significant increased delay at the interchange off ramps, this is of particular importance for right turning vehicles at the northbound off ramp.
- The operation of the site with respect to failed vehicles should be confirmed and mitigation to ensure no stacking of vehicles on the local road network.