



**(53A, 53B, 55) Russell Road and (30, 32, 130, 132)  
Upper Ōrewa Road  
Proposed Delmore Residential Development**

Integrated Transportation Assessment Report

23 December 2025





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## EXECUTIVE SUMMARY

Commute Transportation Consultants (“Commuter”) has been engaged to prepare an Integrated Transport Assessment (“ITA”) Report for the proposed Delmore residential housing development at 88, 130, 133 Upper Ōrewa Road and 53A, 53B and 55 Russell Road, Ōrewa (the location is referred to as “the site” and the overall project is referred to as “the development”).

The development comprises of approximately 1,213 dwellings and 27 new roads. The internal road network will connect to Grand Drive to the east via an existing roundabout / interchange during Stage 1 and to Upper Ōrewa Road at later Stages.

The proposed development includes the establishment and construction of a part of the NoR6 transport corridor which is considered to be a regionally significant road providing wider benefits to the surrounding area, including connecting residents of the development and residents to the east of State Highway 1. In terms of access:

- Initial development for Stage 1 will be via Grand Drive, which is located outside the eastern boundary of the site which links to the Grand Drive / SH1 interchange.
- There is approximately 120m between where Grand Drive currently terminates and the site’s eastern boundary. For the road network within the site to connect to Grand Drive, this portion of road needs to be constructed (known as the “Grand Drive extension”).
- The Grand Drive extension is located on land owned by AVJ Hobsonville Pty Ltd (AVJ) and forms part of the Ara Hills development. AVJ is required to vest this portion of road to the Delmore Boundary by April 2028<sup>1</sup>. The width of the area identified as road to vest in the Ara Hills scheme plan is not sufficient to construct the full NoR6 Road. The alignment of the area identified as road to vest is also not aligned with the alignment of the NoR6 road as shown on the NoR6 concept plan<sup>2</sup>.
- If not constructed by others, the applicant will construct the Grand Drive extension.
- The Grand Drive extension is subject to a Notice of Requirement, which provides a clear indication that this road will be delivered in the future. The Grand Drive extension could be in accordance with the NoR6 concept plan, or it could be constructed as a temporary road designed to fit within the envelope of the area identified as road reserve to vest.

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<sup>1</sup> Statement of Evidence of [REDACTED] for AVJ Hobsonville Pty Ltd.

<sup>2</sup> This is because the subdivision consent approved for the Ara Hills development was granted prior to the NoR6 being notified.

- If the Grand Drive extension is constructed as a temporary road within the area to be vested as road reserve, it would not be constructed as the full road. Rather it will include a 7m road carriageway (complying with Auckland Transport requirement) and footpath / cycle path only on the north side of the NoR road.

Further, the applicant will work with Auckland Transport to deliver the portion of the NoR6 road that runs from the edge of the Stage 1 boundary to Russell Road / Upper Ōrewa Road after completion of the entire Delmore development. This needs to be a collaborative effort between the applicant and Auckland Transport as the applicant does not have an interest in all the properties required to deliver this portion of the road

Assessment of traffic generation of the site has been undertaken, which shows the Grand Drive interchange can accommodate approximately 40% of the sites traffic before additional mitigation is required. This corresponds to the 575 Ara Hills consented dwellings and 750 Delmore dwellings or **1,325 dwellings in total**. At this level of development an additional link to Upper Orewa Road should be provided to relieve pressure on the Grand Drive interchange. Once this link is provided additional mitigation is required in the wider area including:

- Provide a minimum 1m shoulder widening in both directions on Upper Orewa Road between the Road 17 / Upper Orewa Road intersection and the Wainui Road / Upper Orewa Road intersection to address potential safety concerns for traffic and cyclists.
- A pedestrian footpath should be provided between the Road 17 / Upper Orewa Intersection and the end of Russell Road to accommodate pedestrian and cyclist movements between stages of the Delmore development.
- Upper Orewa Road/ Wainui Road intersection should be upgraded to include a right turn bay on Wainui Road and a left turn lane on Upper Orewa Road

A further monitoring condition is proposed once development (Delmore + Ara Hills) reaches 1,425 dwellings which will confirm if additional mitigation should be provided to the Grand Drive interchange (such as an additional left turn lane on the eastern approach to the eastern roundabout or other facilities as required).

Road 1 in Stage 1 and Roads 5 and 17 in Stage 2 are proposed to be constructed as Collector roads including a 7.0m carriageway to accommodate bus services.

- Road 1 provides a 17m road reserve including a 7.0m carriageway and 1.8m footpaths in both directions. Road 1 allows for a future bus route (by providing a 7.0m carriageway) but does not include separate specific provisions of cyclists. Given the expected low traffic volume on this road the separate cycling provision is not considered to be required and thus the reduced road width is considered appropriate.

- Roads 5 and 17 which are anticipated to eventually carry close to 3,000 vpd and provide a road reserve of 21.5m including a separated two-way cycle lane on one side of the road connecting to cycling facilities on the NoR6 to encourage active mode travel and throughout the site.

An assessment has been undertaken of the related truck movements for a private, on-site wastewater treatment plant and discharge infrastructure for the development (via Russell Road). Generally, (with proposed conditions) the proposed wastewater treatment plan is considered to have minimal impact on the surrounding transport network and is considered to be acceptable

The proposed driveways, JOALS and roading design have been assessed. While there are some non-compliances with the Unitary Plan / Engineering standards, these are either considered to be acceptable or can be appropriately mitigated by proposed conditions.

Overall, it is concluded that there is no reason from a traffic engineering or transportation planning perspective to preclude approval of the development.

## 1 INTRODUCTION

Commute Transportation Consultants (“Commuter”) has been engaged to prepare an Integrated Transport Assessment (“ITA”) Report for a proposed residential housing development at 88, 130, 133 Upper Ōrewa Road and 53A, 53B and 55 Russell Road, Ōrewa (the location is referred to as “the site” and the overall project is referred to as “the development”).

The development comprises of approximately 1,213 dwellings and 27 new roads. The internal road network will connect to Grand Drive to the east via an existing roundabout / interchange during Stage 1 and to Upper Ōrewa Road at later Stages. Of note, the application for approvals for the development will be lodged under the Fast-track Approvals Act 2024.

This report also reviews the traffic engineering components of the development and assesses their compliance with relevant Auckland Unitary Plan’s (“AUP”) criteria. In particular, this report reviews the following:

- A description of the site and its surrounding transport environment;
- A description of the key transport-related aspects of the development;
- Intersection design;
- Ability of the existing transport network to accommodate the estimated dwelling yield;
- Road cross sections and long sections;
- The proposed form of access and egress arrangements for vehicles and pedestrians;
- Parking and access provisions;
- Construction traffic management; and
- The adequacy of the proposed servicing arrangements.

By way of summary, it is considered that the development, as detailed in this ITA, will have minimal traffic effects on the function, capacity and safety of the surrounding transport network. The development has good accessibility to various transport modes: walking, cycling, bus (assuming services are provided in the future), and private vehicles. The surrounding intersections are capable of accommodating the additional traffic.

The proposed development includes the establishment and construction of a part of the NoR6 transport corridor which is considered to be a regionally significant road providing wider benefits to the surrounding area, including connecting residents of the development and residents to the east of State Highway 1. The NoR6 corridor established as part of the application activity is considered to be appropriately designed and will operate safely and efficiently while improving connectivity, safety, and efficiency of the surrounding area.

Overall, it is concluded that there is no reason from a traffic engineering or transportation planning perspective to preclude approval of the development.

## 2 EXISTING ENVIRONMENT

### 2.1 SITE LOCATION

The site is approximately 109ha in size and is located to the west of the Northern Gateway Toll Road (State Highway 1) and North of Russell and Upper Ōrewa Roads.

The site is currently zoned Future Urban Zone.

Figure 1 shows the site location with respect to the existing road network while Figure 2 shows the current zoning.

Figure 1: Site Location

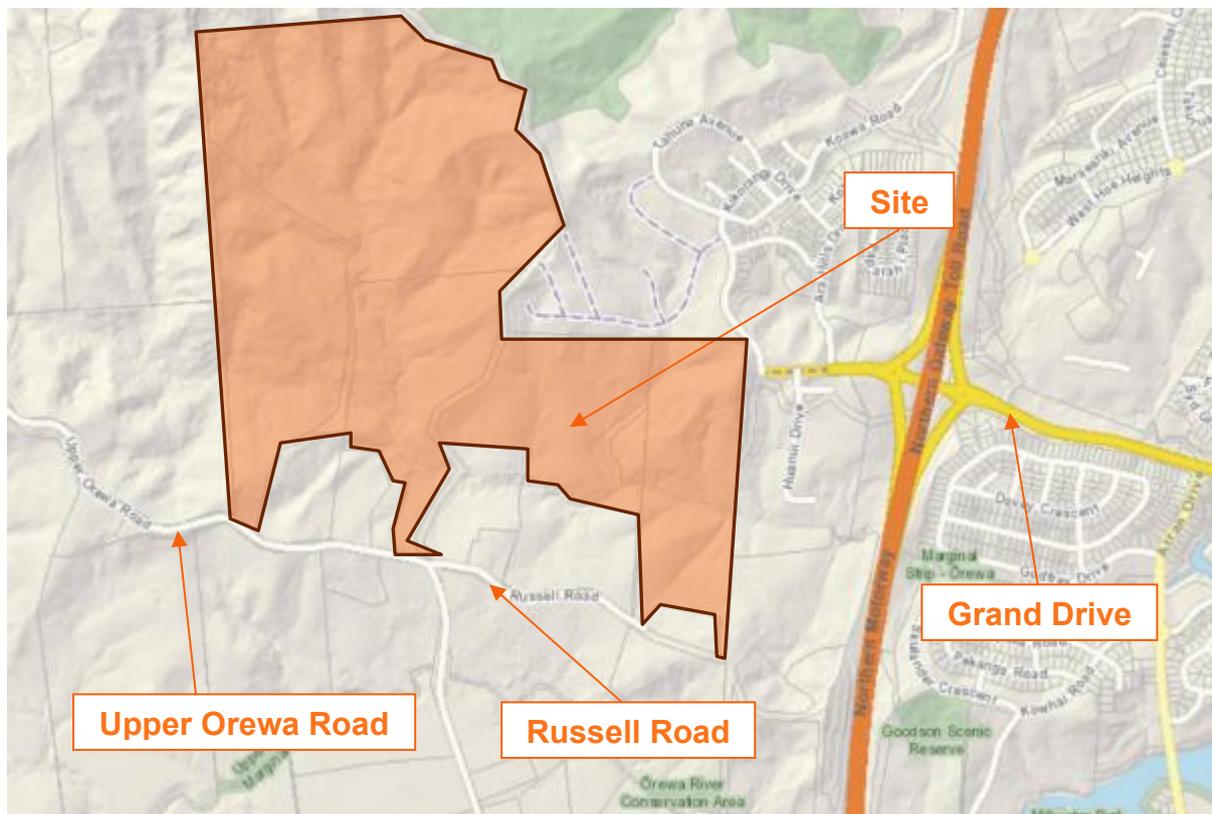
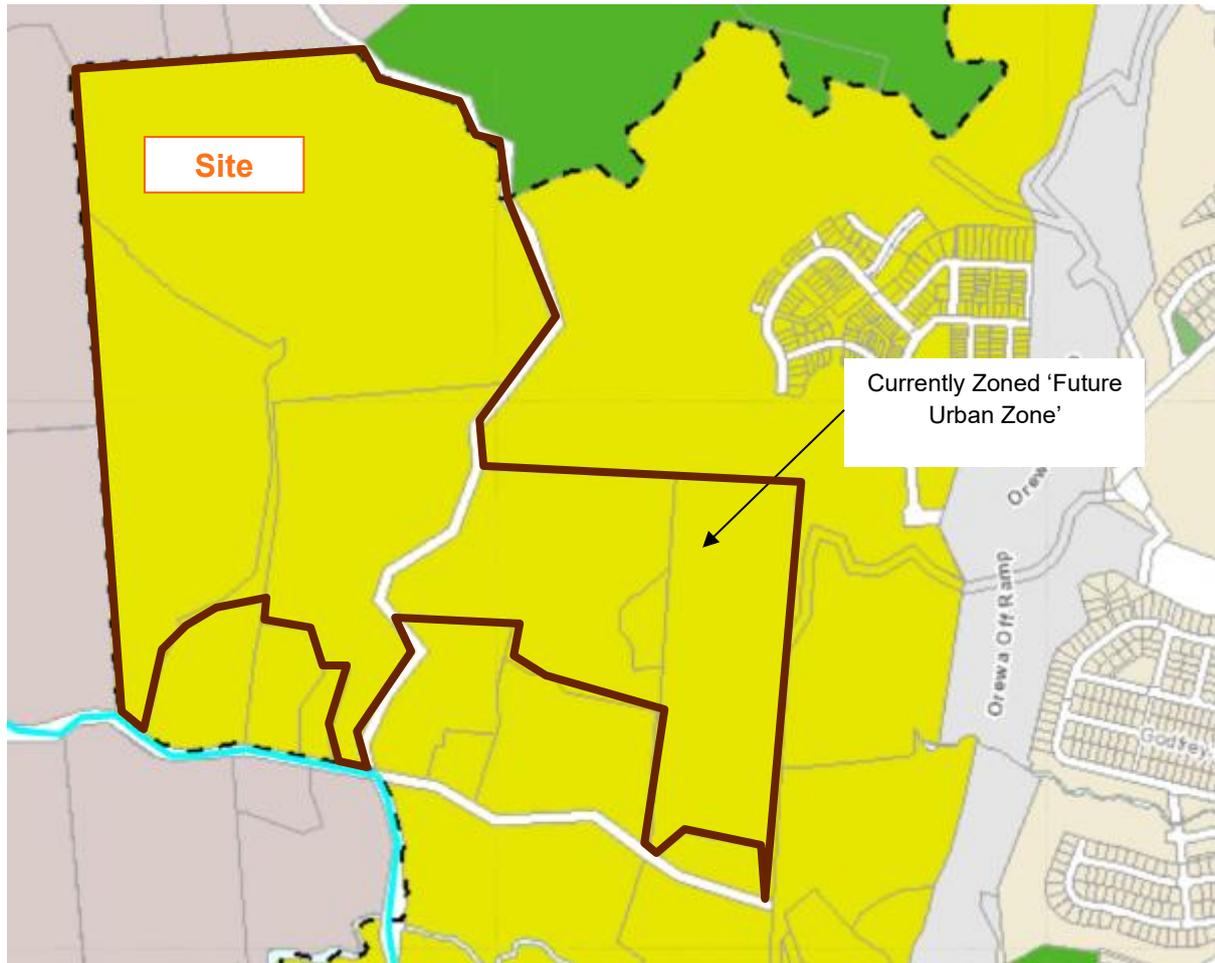


Figure 2. AUP Zoning Map



## 2.2 EXISTING ROAD ENVIRONMENT

Upper Ōrewa Road, which is not classified as an arterial road under the AUP, connects to Wainui Road to the south and Weranui Road to the north, neither of which are classified as arterial roads. Upper Ōrewa Road is a rural road and has an approximate carriageway width of 8.5 metres, accommodating one traffic lane in each direction. No specific cycling or pedestrian facilities are provided.

Russell Road, which is not classified as an arterial road under the AUP, is a no-exit road and connects to Upper Ōrewa Road at a give way-controlled intersection. Russell Road has an approximate carriageway width of 6 metres, accommodating one traffic lane in each direction and is currently metal formation. No pedestrian or cycling facilities are provided in either direction.

Upper Ōrewa Road has a posted speed limit of 60km/h which increases to 100km/h outside the site and Russell Road has a posted speed limit of 40km/h.

Grand Drive is classified as an arterial road under the AUP and connects to West Hoe Road (Ōrewa) to the east and the site to the west. Grand Drive connects to State Highway 1 / Northern Motorway via the Grand Drive / Ōrewa grade-separated interchange (“Grand Drive Interchange”). Grand Drive (west of State Highway 1) has an approximate carriageway width of 10 metres, accommodating one traffic lane in each direction and a painted median. On street parking is prohibited on both sides of the road and pedestrian facilities are provided on both sides including a 3 metre shared path on the northern side.

Figure 3 shows a recent aerial image of the site and surrounding area of Grand Drive.

Figure 3: Site Aerial



## 2.3 CURRENT TRAFFIC VOLUMES

Traffic data obtained from Auckland Transport reveals Upper Ōrewa Road (which connects Wainui Road and Weranui Road and runs south of the site) had a 5-day average annual daily traffic (“AADT”) volume of 1,189 vehicles (two-way) in June 2017. Furthermore, it indicated that during the morning peak hour, the peak volume was 121 vehicles per hour (“vph”) and during the evening peak hour, the evening peak volume was 137 vph.

No traffic data was available for Russell Road; however, considering that Russell Road is a rural no exit road some 700 metres long, minimal traffic volumes are expected.

Auckland Transport traffic data also revealed that the eastern section of Grand Drive (between West Hoe Road and Grovenor Drive, which is located on the opposite side of State Highway 1 to the site in a part of Ōrewa which is already residentially developed) had a 5-day AADT volume of 12,006 vehicles (two-way) in April 2024.

Furthermore, it indicated that during the morning peak hour (8:45am) the peak volume was 1,159 vph (peak hour not specified) and during the evening peak hour (peak hour not specified) the peak volume was 1,280 vph.

Given the absence of reported traffic counts and in order to obtain a relevant picture of current traffic volumes in this western section of Grand Drive towards the site, traffic surveys were conducted at the Grand Drive Interchange roundabouts on the 11<sup>th</sup> November 2024. The northbound intersection had 614 vehicles through the intersection during the morning peak hour (7:45-8:45) and 958 vehicles through the intersection during the evening peak hour (16:15-17:15). The southbound intersection observed 1,365 vehicles through the intersection during the morning peak period (7:00-8:00) and 1,480 vehicles through the intersection during the evening peak period (16:30-17:30).

Figure 4 shows the traffic volumes through the Grand Drive Interchange, using traffic count data, during the AM peak period.

**Figure 4: Movements through western & eastern roundabout interchange during AM Peak Period**

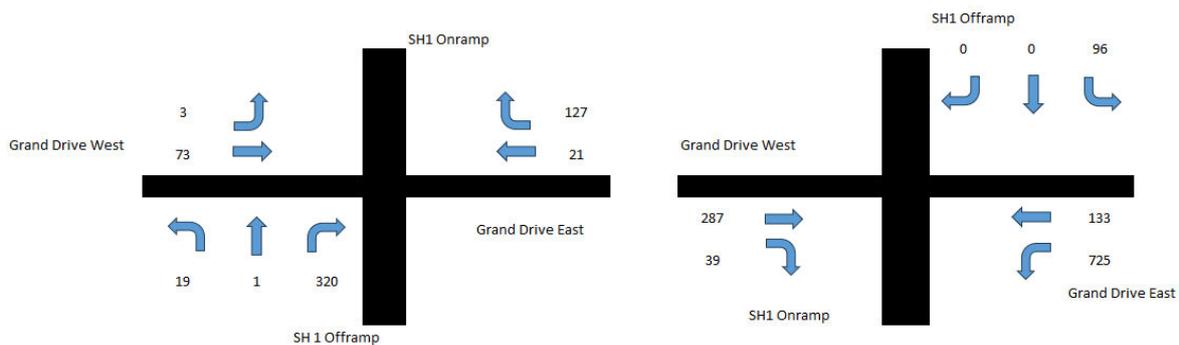
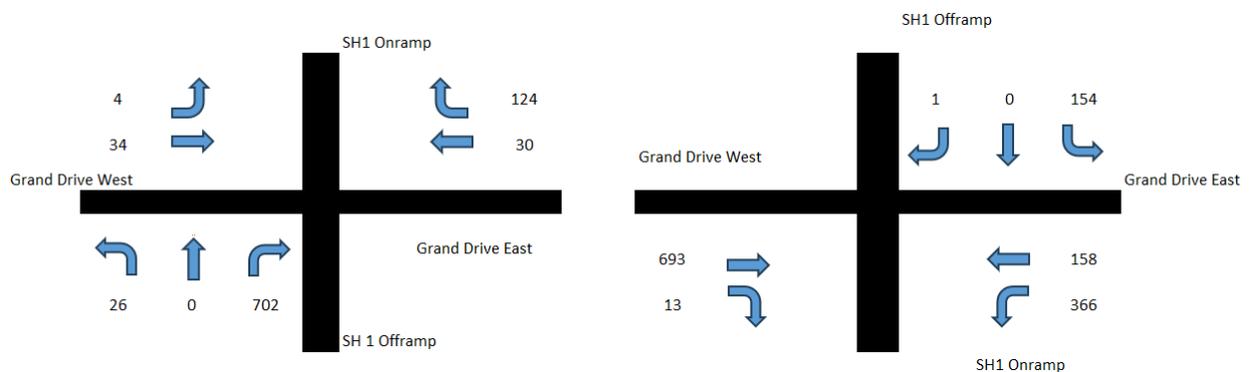


Figure 5 shows the traffic volumes through the Grand Drive Interchange, using traffic count data, during the PM peak period.

**Figure 5: Movements through western & eastern Interchange during PM peak period**



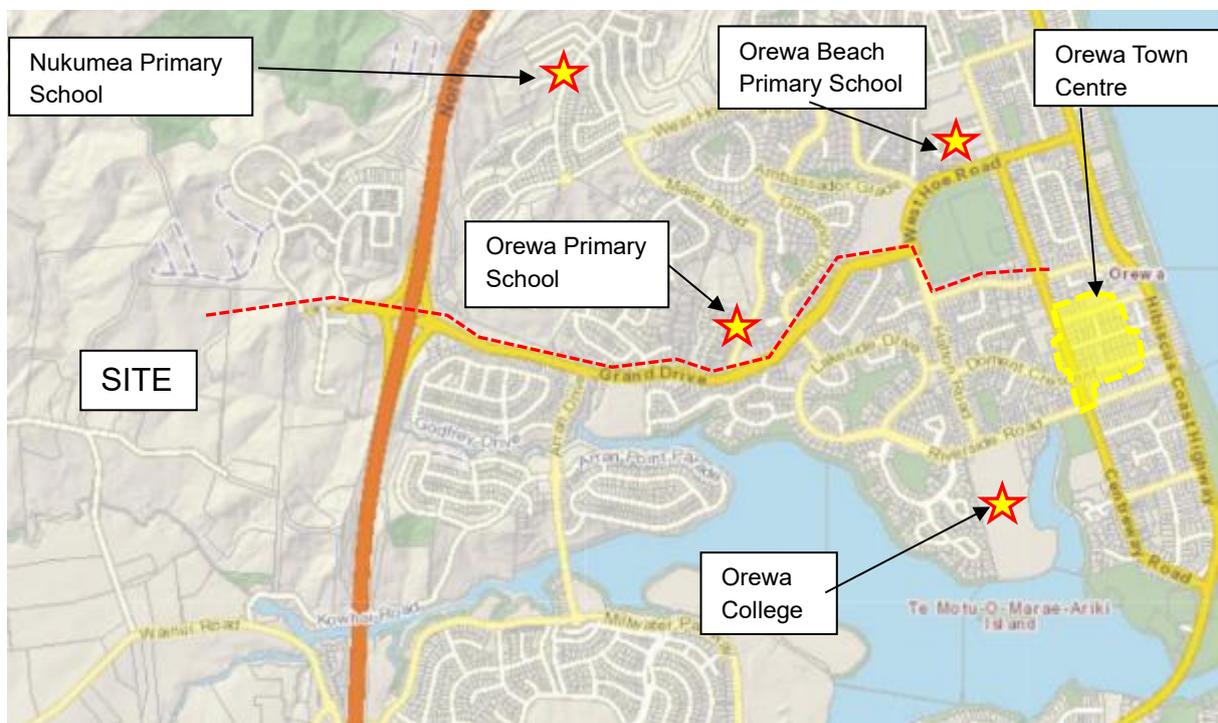
## 2.4 SITE ACCESSIBILITY

### 2.4.1 PRIVATE VEHICLES

The site will be well connected to the Ōrewa area once the proposed Grand Drive extension road is constructed which is located 3km drive away (4 minutes) from the site via Grand Drive. The Ōrewa town centre includes offices, supermarkets, retail stores and restaurants which for the purposes of this ITA, is considered to satisfy the day to day needs of Delmore residents. There are also a number of schools located within Ōrewa for children of all ages. Given the amenities in the local area, residents will likely conduct trips within Ōrewa for day-to-day activities (other than work commutes).

Figure 6 shows the likely route from the site to the town centre and shows the primary schools and high schools in the nearby area.

Figure 6: Local Attractions



The site is also well located with regard to road connectivity to the wider Auckland Region. The site is located directly west of Grand Drive which connects to State Highway 1 and directly into the strategic road network. State Highway 1 provides the

primary connection between Ōrewa, Auckland city to the south, and Warkworth to the north. This corridor also connects to Albany Metropolitan Centre and Silverdale Town Centre, which are anticipated to be attractions for residents of the site and also the place of work for some residents.

Travel times between the site and these key attractions are varied, with typical off peak and peak period travel times shown in Table 1 based on travel data from Google Maps.

**Table 1: Travel Time Between Site and Key Attractions**

Origin / Destination	Distance	Off-Peak Travel Time (Outside of peak travel times)	During Peak Travel Time (7-9 am and 4-6pm)
Site (Ōrewa) to Silverdale	4km	6-10 minutes	8-10 minutes
Site (Ōrewa) to Albany	20km	15-20 minutes	20-40 minutes
Site (Ōrewa) to Auckland City	35km	30-40 minutes	40 minutes-1 hour 15 minutes

## 2.4.2 PUBLIC TRANSPORT

The current public transport options near the site are limited, with the nearest bus stop located on Grand Drive, approximately 3.5km from the site. This bus stop provides access to bus route 985.

This bus service connects Hibiscus Coast Station to Ōrewa via Millwater. This service operates every 20 minutes during morning peak period on weekdays and then every 30 minutes during weekday off peak periods and on weekends.

Figure 7 shows the public transport provisions in the local area.

**Figure 7: Public transport provisions in the area**



### 2.4.3 WALKING

Within the proposed NoR6 road and internal local roading, 2m and 1.8m pedestrian footpaths will be provided respectively (further discussed in our assessment of the development below); however, at the access points to the site, there are no existing pedestrian facilities and no pedestrian connections from the site to the surrounding pedestrian network east of State Highway 1. On the eastern side of State Highway 1, there are pedestrian footpaths along one side of West Hoe Heights and 3.0 metre wide footpaths on either side of Flavell Drive. The footpaths on Flavell Drive connect to 1.8 metre and 3.0 metre wide footpaths on the near side and far side of Grand Drive, respectively.

Using a practical walking distance of 1.5 km and the 15th percentile walking speed of a typical fit, healthy adult of 1.2 m/s, a practical journey time is established as approximately 20 minutes. As the site does not have a pedestrian connection to the wider pedestrian network, pedestrians are currently physically unable to access nearby commercial and schooling activities.

It is noted that the resource consent for Stage 1, Stage 2 and Stage 3A of the Ara Hills development (BUN20441333), was granted by Auckland Council in August 2017. The applicant for that project was conditioned to construct a shared path from the Ara Hills development across SH1 via the Grand Drive overbridge to the Arran Drive / Grand Drive intersection. The applicant was issued s176(1)(b) and s178(2) approval from NZTA to construct the shared path within NZTA's designations and

notices of requirement in September 2024<sup>3</sup>. This is discussed further in 7.7.2 of the report.

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#### 2.4.4 CYCLING

Given the site's location in a semi-rural area, bounded by State Highway 1, there are limited cycling routes available. To the east of the site there are cycle lanes along West Hoe Heights and a cycleway along a portion of Grand Drive. There is no connection between the cycleways along West Hoe Heights to the wider cycle network.

That being said, the speed limit around the site is 50 km/hr and therefore on-road cycling is a viable mode of transport between the site and local attractions, via local and low volume roads both to local shopping areas on Grand Drive and more widely to the Ōrewa town centre and Milldale.

There is a potential for the site to provide cycle facilities and connect the cycleways to the east and south of the site to the cycleways on Grand Drive and Wainui Road. This would offer cycling connectivity to a wider range of residential, employment, education, recreational and commercial activities.

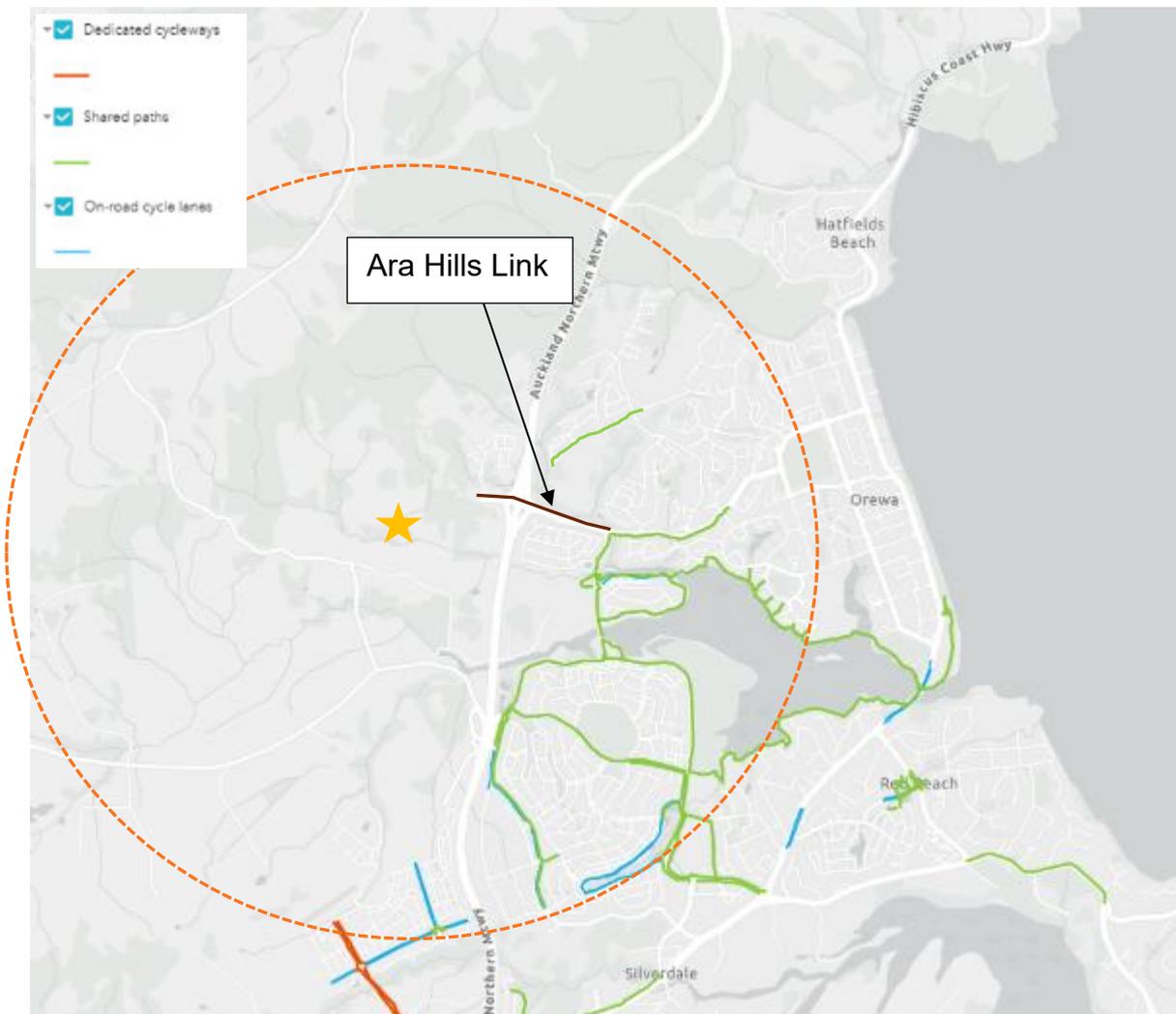
As highlighted in Section 2.4.3, the Ara Hills development was conditioned to provide a shared path across SH1 via the Grand Drive interchange to the Arran Drive / Grand Drive intersection.

Based on NZTA's Research Report 426, the average cycling trip length is approximately 3 kilometres. Figure 8 shows an approximate cycling catchment for the site based on a 3.0km radius, on the Auckland Regional Cycle Network Map.

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<sup>3</sup> Conditions 13(m) and 110B of resource consent LUC60010513-J & SUB60035991-J.

Figure 8: Cycling Catchment



## 2.5 ROAD SAFETY

A search of the New Zealand Transport Agency Waka Kotahi (“NZTA”) Crash Analysis System (“CAS”) database has been undertaken for all reported crashes occurring near the site for the last five-year period from 2020-2024 including all available data for 2025. The crash search area includes crashes occurring at both Grand Drive roundabouts, Grand Drive west of the interchange, Grand Drive east of the interchange as far as Arran Drive, Russell Road, Upper Orewa Road between the Road 17 / Upper Orewa Road intersection and Wainui Road, Upper Orewa Road / Russell Road and, Upper Orewa Road / Wainui Road intersection.

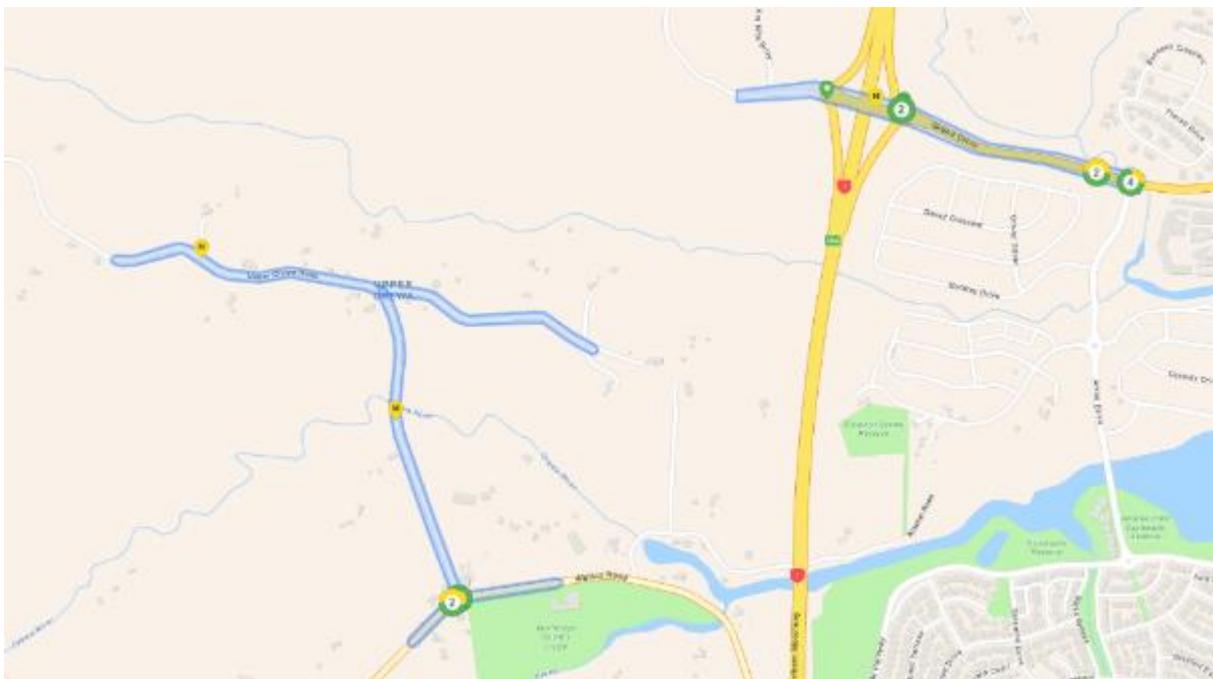
Table 2 below provides a summary of the crash results and Figure 9: CAS Search highlights the crash search area and location of identified crashes. It is noted that a single minor injury collision was not included as it was not located on the Grand Drive interchange; therefore, is not relevant to the development.

**Table 2: Crash Summary**

Intersection/Midblock	Crash Description
Grand Drive Interchange East	Three non-injury collisions: <ul style="list-style-type: none"> <li>• A non-injury collision due to vehicle losing control in heavy rain at the roundabout and colliding with a traffic sign</li> <li>• A non-injury collision due to vehicle failing to give way to a vehicle heading east through the interchange</li> <li>• A non-injury collision due to vehicle exiting the southern motorway speeding and failing to navigate the roundabout and losing control</li> </ul>
Grand Drive Interchange West	One non-injury collision: <ul style="list-style-type: none"> <li>• A non-injury collision due to vehicle exiting the northern motorway rear ending another vehicle when they stopped at the Grand Drive interchange to give way</li> </ul>
Upper Orewa Road / Russell Road Intersection	No crashes
Grand Drive / Arran Drive Intersection	Three non-injury collisions & one minor injury collision: <ul style="list-style-type: none"> <li>• Two non-injury collisions due to vehicle travelling East on Grand Drive failing to give way when turning right onto Arran Drive at green light (without arrow) and colliding with an westbound vehicle</li> <li>• One non-injury collision due to vehicle travelling west on Grand Drive failing to stop at a red light and colliding with a right turning vehicle from Arran Drive</li> <li>• One minor injury collision due to vehicle performing a right turn onto Arran Road when they did not have a green light and colliding with oncoming vehicle</li> </ul>
Upper Orewa Road / Wainui Road Intersection	Two non-injury collisions & one minor injury collision: <ul style="list-style-type: none"> <li>• A minor injury collision due to vehicle travelling northeast on Wainui Road towards the Wainui Road / Upper Orewa Road intersection losing control of the vehicle in wet conditions</li> <li>• A non-injury collision due to vehicle travelling West on Wainui Road towards the Wainui Road / Upper Orewa Road intersection losing control in wet conditions</li> <li>• A non-injury collision due to vehicle traveling east on Wainui Road towards the Wainui Road / Upper Orewa Road intersection failing to navigate the slight bend in the road lost control of the vehicle</li> </ul>
Grand Drive Midblock	One non-injury collision and One minor injury collision: <ul style="list-style-type: none"> <li>• A minor injury collision due to vehicle travelling east on Grand Drive through temporary</li> </ul>

	<p>roadworks colliding with barriers on left hand side</p> <ul style="list-style-type: none"> <li>A non-injury collision due to vehicle travelling east on Grand Drive through temporary roadworks colliding with barriers on the left side</li> </ul>
Upper Orewa Road Midblock	<p>Two minor injury collisions:</p> <ul style="list-style-type: none"> <li>A single minor collision near the proposed Road 17 / Upper Orewa Road intersection occurred due to driver losing control in wet weather; however, the development includes a roundabout at this intersection which is anticipated to remedy this potential crash risk</li> <li>A single minor collision occurred between Russell Road and Wainui Road due to a driver travelling north losing control in wet conditions</li> </ul>
Russell Road Midblock	No crashes
Wainui Road Midblock	<p>One non-injury collision:</p> <ul style="list-style-type: none"> <li>A learner driver without supervisor failing to stop for a vehicle slowing down to turn into a driveway</li> </ul>

Figure 9: CAS Search



There were no reported crashes involving movements into and out of the site or pattern of accidents around the site. It is noted that four crashes occurred at / near the Wainui Road / Upper Ōrewa Road intersection, however, as will be discussed later in this report, the level of additional traffic through this intersection due to the development is considered minimal. Therefore, from the assessment of the crash history, there is no indication of any significant safety concerns from the site.

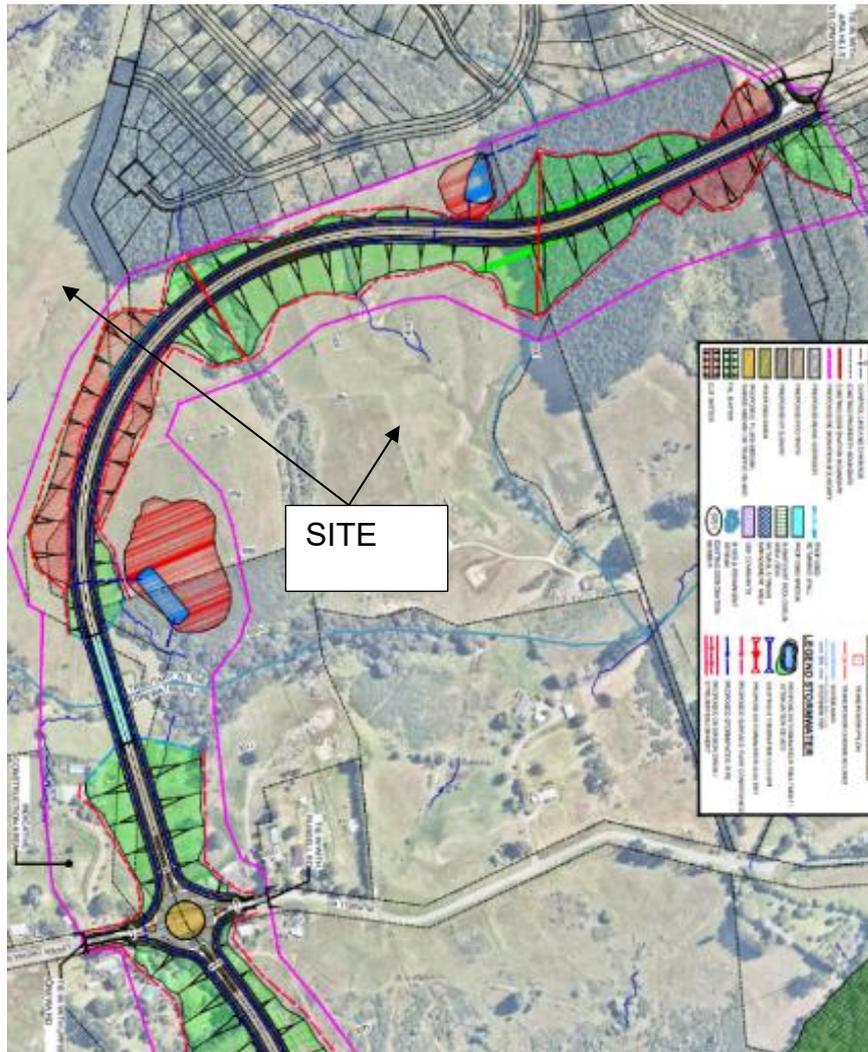
## 2.6 GRAND DRIVE EXTENSION DESIGNATION

NZTA and AT, as part of Te Tupu Ngātahi - Supporting Growth Alliance (“SGA”), as the Requiring Authorities, gave notice to the Auckland Council (“the Council”) to designate land known as the ‘North (Strategic and Local) Project’ (“North Project”), located within North Auckland, under the AUP.

These comprised nine new designations and included ‘NoR6 - North: New Connection between Milldale and Grand Drive, Ōrewa – AT: Notice of requirement for a designation for a new urban arterial corridor with active mode facilities between Wainui Road in Milldale and Grand Drive in Upper Ōrewa’. This was lodged on 20 October 2023, notified on 16 November 2023, Submissions closed 14 December 2023 and the Hearings’ Panel recommendation was notified on 08 November 2024. A decision by AT under s171 of the RMA to confirm the NoR was made on the 23rd January 2025. The appeals period closed on the 14th February 2025. One appeal was lodged with the Environment Court relating to NoR6. Consent orders resolving the appeal are currently before the Environment Court. We understand these do not result in changes to the designation as it applies to the site.

Figure 10 shows the general arrangement of this road as included in the notice of requirement.

Figure 10: NoR 6 Grand Drive



The NoR6 transport corridor is regionally significant and will provide wide reaching benefits to the community and surrounding area by providing a viable connection between the State Highway 1 interchange, Orewa town centre, the Delmore site, and surrounding local community. This is further discussed in Section 3.2.

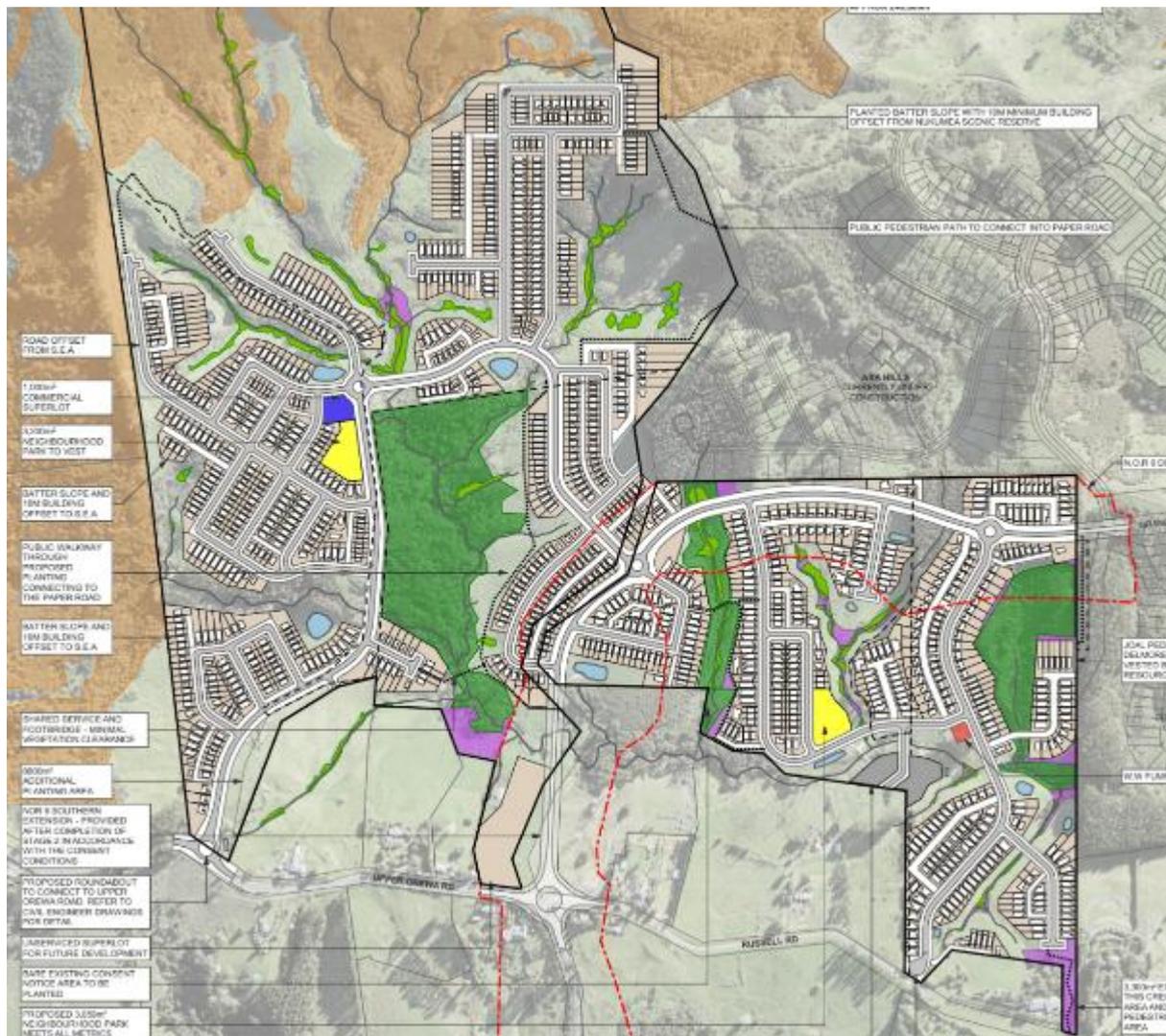
### 3 DEVELOPMENT

#### 3.1 GENERAL

The development will comprise a new internal road network which connects to the wider road network at Grand Drive to the east as part of Stage 1 and connects to Upper Ōrewa Road to the south as part of Stage 2. The development will yield 1,213 dwellings.

Figure 11 shows the proposed layout of the development.

Figure 11. Proposed Site Layout



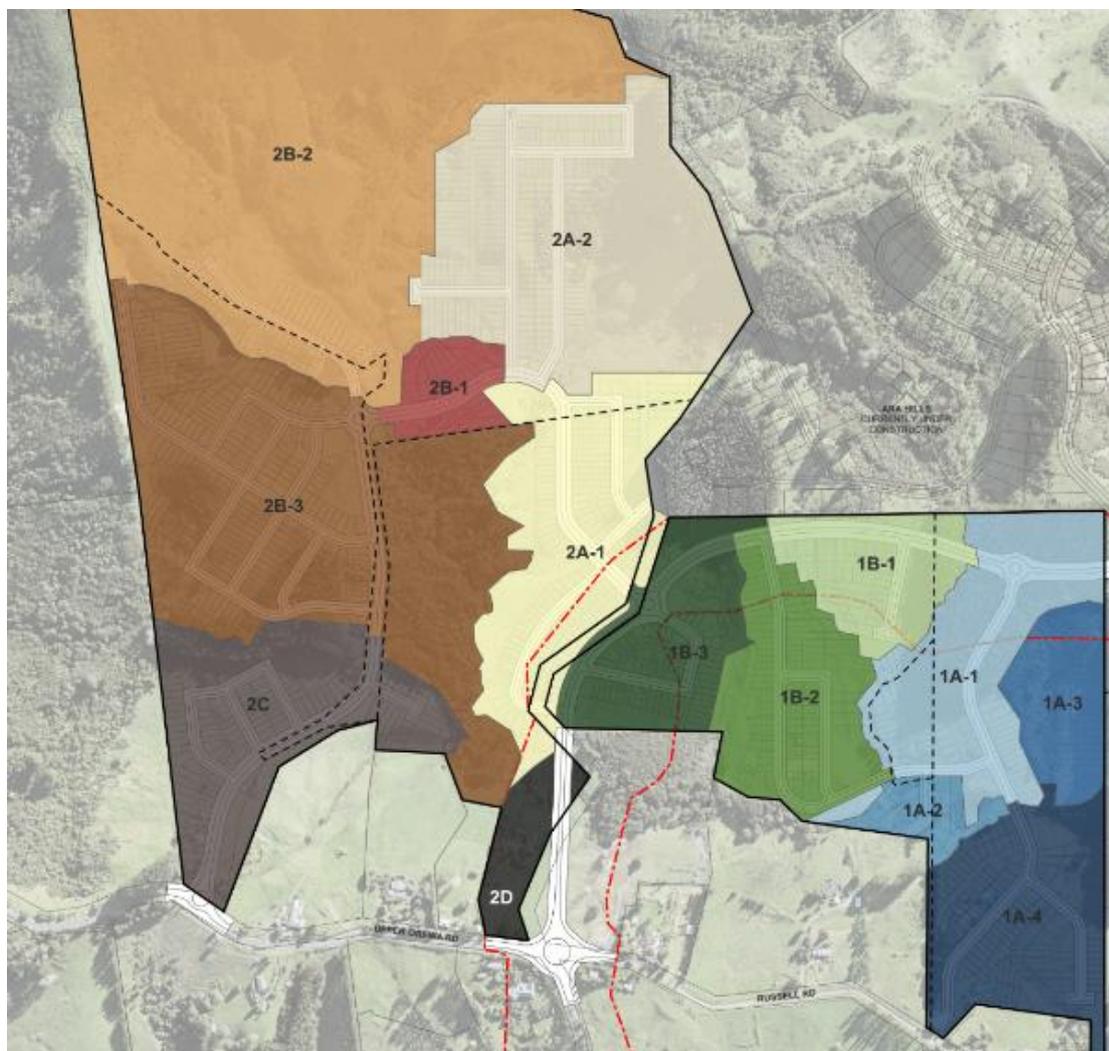
The development is proposed to be completed in two stages which will be broken down into substages (refer to Figure 12 below). Stage 1 captures the eastern half of the development and includes the NoR6 road and a collector road to the east of the NoR6 road. Stage 1 is broken down into substages 1A and 1B. Stage 2 is broken down into substages 2A through to 2D and captures the rest of the development west of the NoR6 road. Another collector road runs through the Stage 2 area connecting to Upper Ōrewa Road.

The development does not initially intend to extend the NoR6 road to Russell Road / Upper Ōrewa Road. This is because the applicant does not have an interest in the properties through which most of this part of the NoR6 road runs. Furthermore, a connection to the south is only required for Stage 2 of the development and this is provided through the proposed collector road running through the Stage 2 area. The applicant will however work with Auckland Transport to deliver the portion of the

NoR6 road that runs from the edge of the stage 1 boundary to Russell Road / Upper Ōrewa Road after completion of the entire Delmore development. This needs to be a collaborative effort between the applicant and Auckland Transport because the applicant does not have an interest in all the properties required to deliver this portion of the road.

This means that in the short term (including all of Stage 1 and part of Stage 2), all of the site traffic will enter / exit via the Grand Drive interchange. This is considered to be acceptable from a traffic perspective. In the longer term, traffic will be able to enter and exit via Upper Ōrewa Road and we have recommended road upgrades to accommodate this (discussed in Section 8 below).

**Figure 12: Staging of Development**



### 3.2 NOR 6

A key aspect of the development includes the delivery of a significant portion (over 40%) of the NoR6 road.

The portion of the NoR6 road being delivered by the applicant, through the land that they control, is around 0.85km in length and includes a full arterial specification road, including cycle facilities and carriageway accommodating a frequent bus route. The specific part of the road being delivered is the steepest/most complex part of the NoR6 road from an engineering perspective, as outlined in the NoR6 Memorandum prepared by McKenzie & Co. Its construction by the applicant reflects a cost saving to Council of approximately \$10 million.

The NoR6 road is a regionally significant piece of road infrastructure because of the important role it plays in connecting development in the northern part of Auckland.

It provides an arterial road connection for urban development occurring across the western side of Stage Highway 1 from Ara Hills, through the development, and down to the Milldale development. The proposed design of the NoR6 road is further discussed below but is considered to be appropriately designed and is anticipated to operate safely and efficiently while improving connectivity, safety, and efficiency of the surrounding area.

The Assessment of Environmental Effects (“AEE”) lodged by Council in relation to the designation for the NoR6 road explained that: “The notices are to designate land for future strategic transport corridors and stations as part of Te Tupu Ngātahi Supporting Growth Alliance to enable the future construction, operation and maintenance of transport infrastructure in the North area of Auckland”.

The AEE also notes: *“The North Projects are intended to support growth in Northern future urban areas and without these projects, growth would be constrained. The purpose of the North Projects is to provide key infrastructure to enable anticipated growth to occur. A number of the corridors involve the addition of walking and cycling infrastructure (active mode facilities) and urbanising of existing rural roads in anticipation of the growth. Route protection of the projects will prevent build out of the optimal transport corridors/stations, reduce future construction costs and deliver enhanced outcomes through integration with urban development”.*

The NoR6 road generally, and the part of the road within the site specifically, will provide transport choice and provide safe and efficient options for future public transport and active transport in addition to private vehicles. Users will have an opportunity to be more active and connect to places by active transport modes such as walking or cycling. The road will (when completed) provide a new transport corridor that connects the growth areas of Milldale, Ara Hills and Ōrewa and is integrated with the surrounding urban growth areas. It will enable access to economic and social opportunities by providing an integrated multimodal corridor. It will integrate and support the future transport network including other “North Projects”, and support the development of an efficient, resilient and reliable multi-modal transport network for Hibiscus Coast area. The NoR6 road is also considered

to have positive impacts on the efficiency of freight in the area, improving the way businesses operate, providing potential further economic benefits to the region.

As such, given the benefits of the NoR6 road, and the extent of the NoR6 road to be delivered by the applicant, we consider that the development will deliver new regionally significant roading infrastructure.

### 3.3 SITE ACCESS/ GRAND DRIVE EXTENSION

The overall site access provision for the site is outlined below.

- Access to the development for Stage 1 will be via Grand Drive, which is located outside the eastern boundary of the site.
- There is approximately 120m between where Grand Drive currently terminates and the Delmore site's eastern boundary. For the road network within the site to connect to Grand Drive, this portion of road needs to be constructed (known as the "Grand Drive extension").
- The Grand Drive extension is located on land owned by AVJ Hobsonville Pty Ltd (AVJ) and forms part of the Ara Hills development. AVJ is required to vest this portion of road to the Delmore Boundary by April 2028<sup>4</sup>. The width of the area identified as road to vest in the Ara Hills scheme plan is not sufficient to construct the full NoR6 Road. The alignment of the area identified as road to vest is also not aligned with the alignment of the NoR6 road as shown on the NoR6 concept plan<sup>5</sup>.
- If not constructed by others, the applicant will construct the Grand Drive extension. However, resource consent is not sought for the Grand Drive extension as part of this fast-track application because the land is not owned by the applicant, the land does not form part of the project description in Schedule 2 of the FTAA, and the road may be built by others prior to it being required by the Delmore development.
- The Grand Drive extension is subject to a Notice of Requirement (with Auckland Transport being the Requiring Authority), which provides a clear indication that this road will be delivered in the future. This could be in accordance with the NoR6 concept plan, or it could be constructed as a temporary road designed to fit within the envelope of the area identified as road reserve to vest in Auckland Transport.
- If the Grand Drive extension is constructed in accordance with the NoR6 concept plan, it would require:
  - Auckland Transport to acquire the additional land that is required.

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<sup>4</sup> Statement of Evidence of Ila Roma Daniels for AVJ Hobsonville Pty Ltd.

<sup>5</sup> This is because the subdivision consent approved for the Ara Hills development was granted prior to the NoR6 being notified.

- An Outline Plan of Works that has been through the required statutory process.
- Compliance with any pre-construction conditions applying to the designation.
- Regional consents under the following chapters of the AUP, with specific consents confirmed through detailed design:
- If the Grand Drive extension is constructed as a temporary road within the area to be vested as road reserve, it would not be constructed as the full road. Rather it will include a 7m road carriageway (complying with Auckland Transport requirement) and footpath / cycle path only on the north side of the NoR road. Mckenzie drawing 3725-1-3965 shows this concept which is considered acceptable as a temporary road.

Further, the applicant will work with Auckland Transport to deliver the portion of the NoR6 road that runs from the edge of the stage 1 boundary to Russell Road / Upper Ōrewa Road after completion of the entire development. This needs to be a collaborative effort between the applicant and Auckland Transport as the applicant does not have an interest in all the properties required to deliver this portion of the road.

## 4 EXISTING TRAVEL PATTERNS

### 4.1 EXISTING TRIP GENERATION

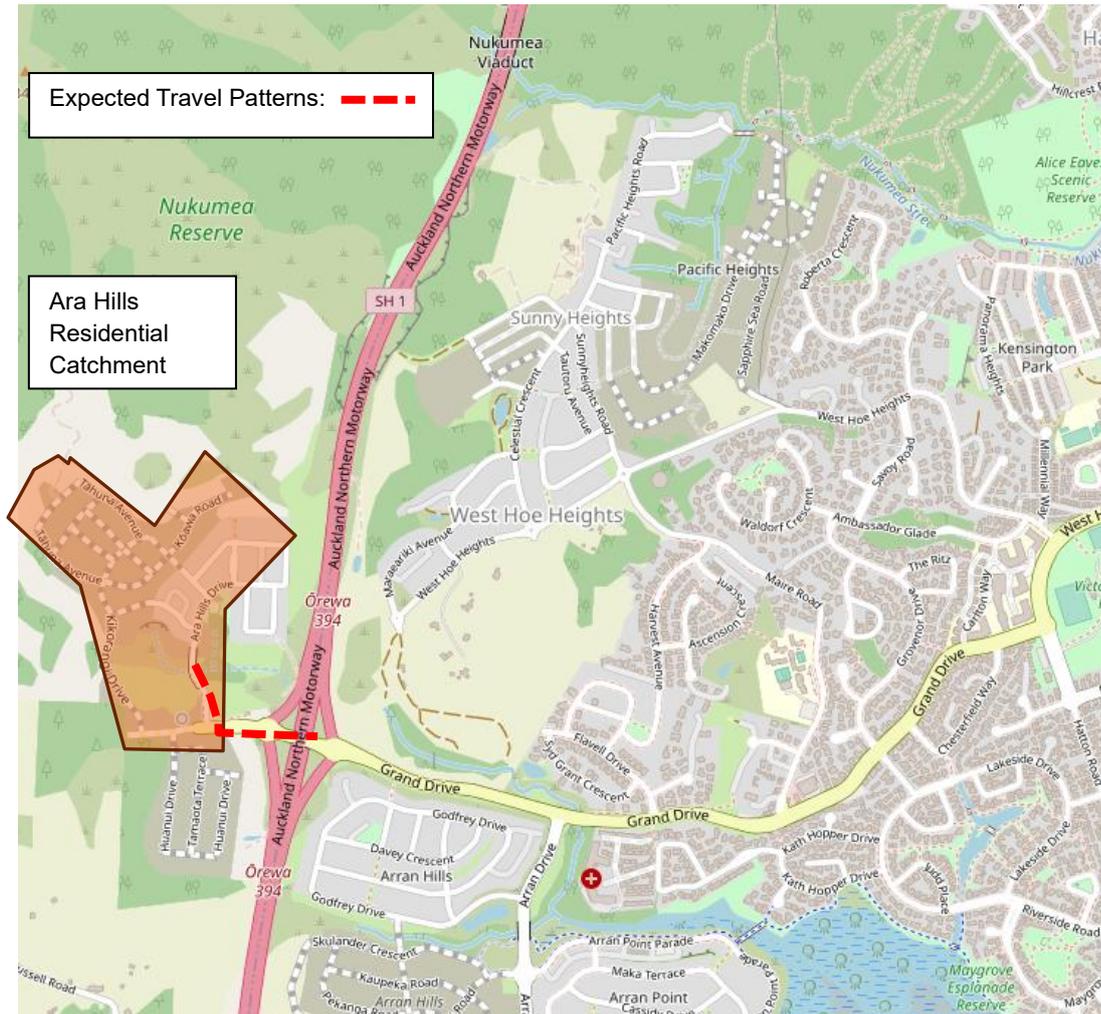
The site is currently occupied by several rural residential developments and farmland. These lots are expected to generate a relatively low volume of trips both during peak hours and throughout a typical day.

### 4.2 EXISTING TRIP DISTRIBUTION

As mentioned above, the volume of existing trips from the site is likely to be low and scattered over the network.

With regard to travel patterns near the site, the site is situated to the north of Upper Ōrewa and Russell Road and surrounded by residential activity to the east. Currently, it is the residents located to the east of the site (eastern residential catchment) who would access Grand Drive and State Highway 1 via Ara Hill Drive. The assumed existing travel patterns from the residential area (Ara Hills) immediately to the east of the site are shown in Figure 13.

Figure 13: Expected Travel Patterns near the Site during Peak Hours



## 5 TRIP GENERATION

### 5.1 TRIP GENERATION OF DEVELOPMENT

The RTA Guide<sup>6</sup> is commonly used by traffic engineering practitioners in Australasia to assess the traffic generating potential of various land uses. In New Zealand, the RTA Guide is frequently used for assessing residential developments such as that proposed.

As discussed in Section 2.4 of this ITA, the site is located in reasonably close proximity to local attractions and there are future viable active mode routes between

<sup>6</sup> The Roads and Traffic Authority of New South Wales – Guide to Traffic Generating Developments (RTA), Version 2.2, October 2002

the site and these attractions. Where there are deficiencies in walking and cycling provisions to these attractions, the development involves improving walking and cycling connectivity and local bus services (as discussed in Section 8.4 of this ITA). As such, the site is expected to have viable alternative transport modes to private vehicle transport to nearby attractions.

The RTA Guide suggests that the trip rate for “*medium density residential flat buildings*”<sup>7</sup> is applicable where there are adequate public transport accessibility and connectivity to local shopping, schools and local social visits. Therefore, the trip generation of the development is considered to be best represented by the medium density residential flat building RTA rate.

It is noted that whilst adequate public transport is not currently provided to the existing site, it is anticipated that future public transport accessibility (by the time that dwellings are established within the development) will be improved dramatically and provide adequate public transport accessibility.

Similarly, active mode connections are currently limited to the existing site especially across the Grand Drive interchange; however, as highlighted previously, the Ara Hills development includes a condition of consent requiring the provision of an active mode connection across the Grand Drive interchange which is conditioned to be required prior to any Delmore dwellings being occupied and will dramatically improve active mode connectivity and reduce reliance on private vehicles.

For medium density residential flat buildings, the conservative rate for “larger units and town houses (three or more bedrooms)” has been used, which is 0.65 trips per dwelling for peak hour trips and 6.5 trips per dwelling for daily trips.

For approximately 1,213 dwellings (1,250 dwellings conservatively used for assessments), the anticipated trip generation of the site is 813 peak hour trips and 8,125 daily trips.

The above traffic generation rates have been further reviewed. In this regard:

- The RTA Guide has recently been updated by the TfNSW Guide to Transport Impact Assessment (November 2024);
- The TfNSW suggests the following traffic generation rates for medium density residential dwellings (Regional) based on 2021/2 surveys in Australia;
  - AM peak – 0.41 per dwelling
  - PM peak – 0.6 per dwelling

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<sup>7</sup> The RTA definition states “A *medium density residential flat building* is a building containing at least 2 but less than 20 dwellings. This includes villas, town houses, flats, semi-detached houses, terrace or row houses and other medium density developments. This does not include aged or disabled persons’ housing”

- Commute has also undertaken traffic surveys of one of the established sections of Ara Hills as shown in Figure 14 below. The surveys (98 dwellings + two under construction) show (peak hour of the adjacent network):
  - AM peak – 0.75 per dwelling
  - PM peak – 0.66 per dwelling

Figure 14: Ara Hills Established



It is noted that all trips in / out of the Ara Hills area at the moment are via cars due to the limited pedestrian / cycling facilities in the nearby area. This is expected to change in the near future, because as highlighted previously in 2.4.3, the Ara Hills development is conditioned to construct a shared path from the Ara Hills development across SH1 via the Grand Drive overbridge to the Arran Drive / Grand Drive intersection. Additionally, a local centre is proposed as part of the Ara Hills development and it is anticipated that the above observed trip generation rate will reduce further.

Additionally, the TfNSW updated RTA Guide indicated a general reduction in trip generation for the previous RTA Guide as noted above. This is likely due to changes in work habits since the original RTA surveys in 2002 including wider congestion (peak spreading) and remote working becoming more accessible.

Based on the above the adopted trip generation rates are considered to be acceptable, and likely conservative.

## 5.2 TRAFFIC EFFECTS

Rule E27.6.1 (1) “Trip generation” of the AUP sets out trip generation limits, the exceedance of which means that resource consent for a restricted discretionary activity is required under E27.4.1 (A3). For residential dwellings, this limit is 100 dwellings.

The development is for approximately 1,213 dwellings and 813 peak hour trips, exceeding this limit. As such, an assessment of the wider effects on the network from the development is required.

The site is located near the Grand Drive Interchange. Unless a connection between the site and Upper Ōrewa Road is provided, the only route to / from the site will be via the interchange along the NoR6 Road. As such, the Grand Drive Interchange is expected to cater for all generated traffic during peak hours. It is recommended that a condition of consent is established requiring the development to be connected to Grand Drive prior to the development occurring.

To assess the local impact and what mitigation upgrades may be required, a modelling assessment has been undertaken of the Grand Drive Interchange.

As a result of that analysis, it is recommended a condition of consent be included requiring a connection to Upper Ōrewa Road once 750 dwellings are occupied to ensure the continued safe and efficient operation of the Grand Drive interchange. This recommendation is based on the assessment that follows.

## 5.3 TRIP DISTRIBUTION

### 5.3.1 DEVELOPMENT

All trips associated with the development and redirected traffic from nearby residential activity have been added to the existing road network traffic volumes. The trip generation of the development is based on an approximate 1,213 dwelling yield.

In terms of inbound/outbound percentages to and from the site, the following has been assumed based on historical traffic observations and surveys:

- Morning Peak Hour – 70% outbound, 30% inbound
- Evening Peak Hour – 40% outbound, 60% inbound.

In terms of directional distribution patterns to and from the site, the following has been assumed:

- Morning and Evening Peak Hour – 100% of trips will occur via Grand Drive Interchange (initial before Upper Orewa link is created).

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### 5.3.2 ARA HILLS

The consented Ara Hills subdivision comprises a total of 575 dwellings<sup>8</sup> which will all travel via Grand Drive to get to State Highway 1 and vice versa, during peak hours. At the time of the survey in November 2024 it was estimated that 30% or 173 dwellings of the Ara Hills site were constructed and occupied and so part of the existing traffic (as surveyed).

Using a conservative, upper estimate of trip generation for the remaining 70% of Ara Hills or 402 dwellings, it is expected that 261 additional trips during the morning peak and evening peak, will pass through the Grand Drive Interchange (above that in the existing surveys). The remaining 402 dwellings will be considered as additional traffic in the traffic modelling scenario, thus assuming all of Ara Hills is constructed for the purposes of our traffic modelling.

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### 5.3.3 TOTAL

As a worst case (no links to Upper Ōrewa Road) a total of 1,074 additional peak hour trips is therefore anticipated to occur through the Grand Drive Interchange during the morning and evening peak hours. This includes all of Ara Hills (the 173 constructed and the remaining 402 dwellings to be constructed) and approximately 1,213 dwellings proposed.

It is acknowledged that a Private Plan Change has been notified for Ara Hills which seeks to increase the number of dwellings and this is discussed in Section 5.3.4 below.

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#### 5.3.3.1 TRIP DISTRIBUTION ANALYSIS

Further investigation and assessment of the anticipated trip distribution of the site between the Grand Drive Interchange and the Upper Orewa access (via Wainui interchange) has been undertaken and is set out below. It is noted that the assessment has been made during the AM peak period which is when the Grand Drive Interchange was found to be at capacity when all Delmore traffic is added (this is not the case in the PM peak).

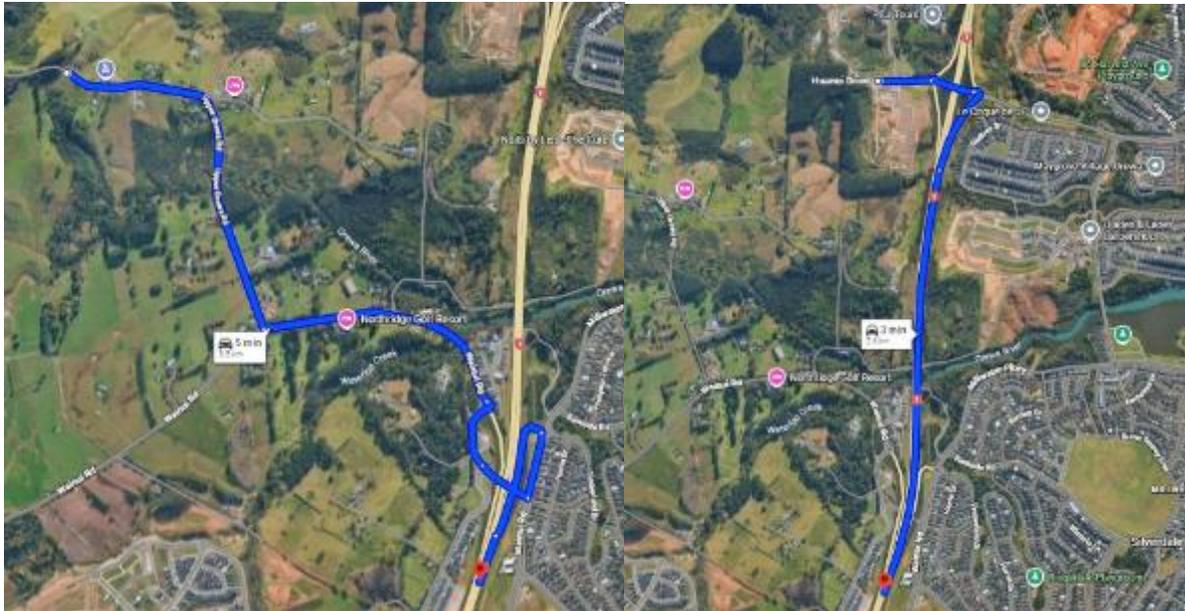
In general, drivers will find the quickest and most efficient route. If one route (State Highway 1 via Grand Drive Interchange) becomes congested, then the alternative route (Upper Orewa Road via Wainui interchange) will likely be used more. The travel times during the AM peak hour (8am) from the site (external) to SH1 using the Grand Drive Interchange and Upper Orewa Road (via Wainui Road interchange)

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<sup>8</sup> Consent reference: LUC60010513-J & SUB60035991-J

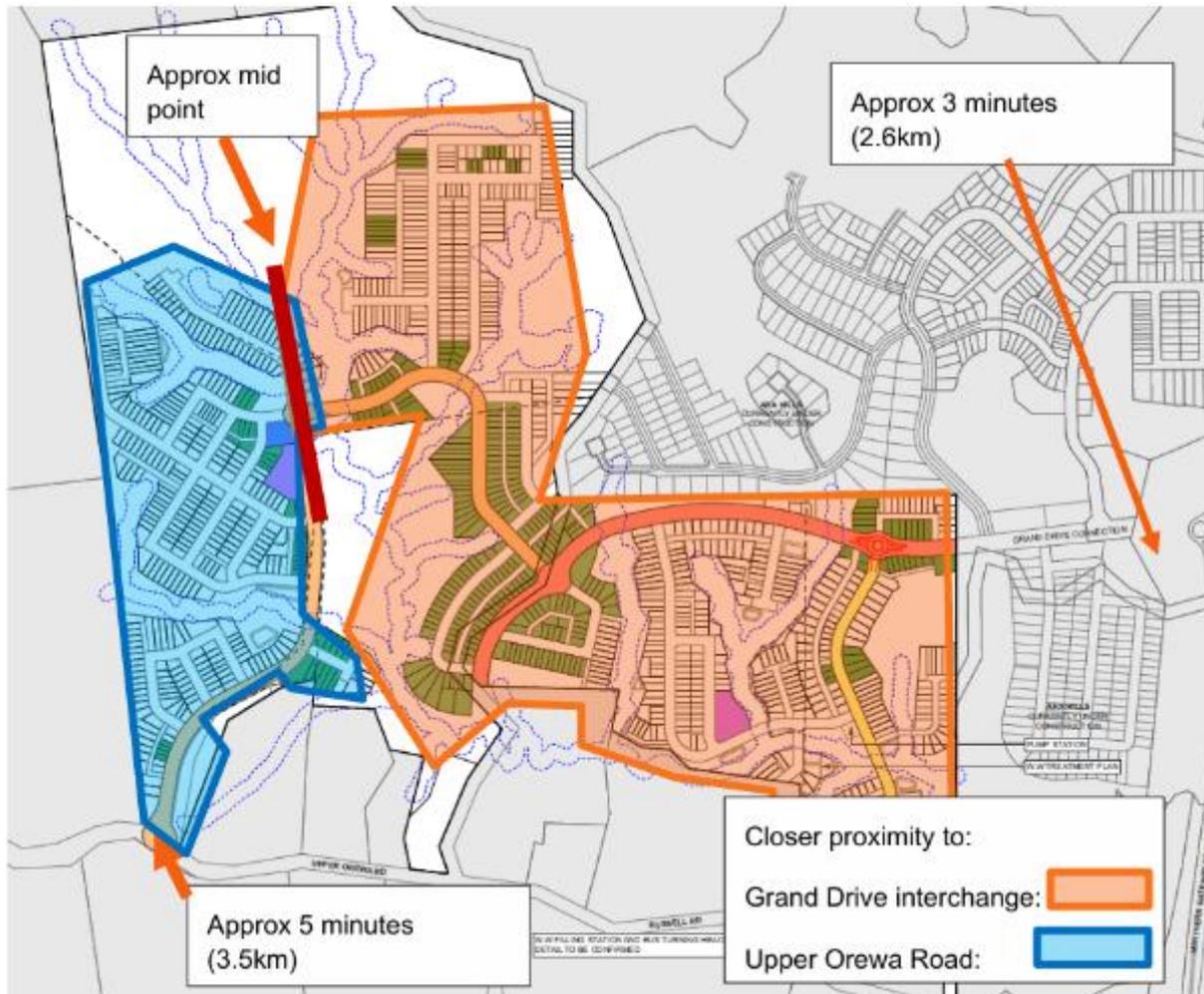
have been compared in Figure 15 below. It is highlighted that the Grand Drive interchange provides a shorter travel time (3 minutes or 2.6km) compared to the Upper Orewa Road access (5 minutes or 3.5km).

**Figure 15: Travel Times Upper Orewa Road via Wainui Road interchange (left) vs Grand Drive Interchange (right)**



Assuming an average on-road travel speed within the Delmore internal roads (including the effect of intersections and collector / local roads on average speeds) of 40km/hr, the 2-minute difference in travel time equates to approximately 1.3km. This is broadly similar to the difference in distance of 0.9km. As highlighted above, generally drivers will find the quickest and most efficient route. As per Figure 16 below, within the site, all of Stage 1 (485 dwellings) and approximately 40% of Stage 2 (~290 dwellings) are located in closer proximity to the Grand Drive Interchange, leaving the remainder of Stage 2 (~440 dwellings) in closer proximity to the Upper Orewa Road route. Based on the above, it is anticipated that approximately 730 dwellings would use the Grand Drive interchange which falls just below what was previously assessed as the capacity of the interchange (750 dwellings). It is recognised that this is at the level where potential capacity-related issues have been predicted at the Grand Drive Interchange and thus additional mitigation has been investigated.

Figure 16: Trip Distribution



### 5.3.4 ARA HILLS PLAN CHANGE

It is further noted that the Ara Hills Plan Change 119 (“PC119”) has been notified and submissions and further submissions have been lodged. As per the Integrated Transport Assessment Report prepared by Flow in July 2025 (“Flow ITA”) in support of the Ara Hills Plan Change, the Plan Change as notified would allow for up to a total of 900 dwellings<sup>9</sup> and a small commercial / neighbourhood centre (which itself is not anticipated to generate external trips).

Given that the application for the development is for the approvals needed for construction, and PC119 is only a change to the AUP (and is currently in its early stages), it is anticipated that the Delmore development would occur ahead of the

<sup>9</sup> It is acknowledged that there are discrepancies between the proposed number of dwellings identified in the FLOW ITA and the Plan Change Report. 900 dwellings has been taken from the Plan Change Report.

additional 325 dwellings PC119 provides for over and above the consented 575 which we have factored into our analysis. However, we have nevertheless undertaken a sensitivity test including the additional PC119 traffic (i.e. traffic associated with the additional 325 dwellings).

Those 325 dwellings are estimated to result in a further 244 additional trips through the Grand Drive interchange during the morning and evening peak periods.

It is noted that in Section 4.2 the Flow ITA highlights a trip generation rate of 1 per dwelling in the peak hour or 950 peak hour trips. It is considered that the trip rate adopted by Flow ITA is unrealistic and unlikely to eventuate in practice due to:

- PC119 (and existing consent) includes a pedestrian / cycling footbridge across State Highway 1 alongside the Grand Drive interchange connecting to Arran Drive which will allow for active mode trips to nearby attraction centres, reducing reliance on private vehicles;
- PC119 also includes a local retail / café area which will generally serve local shopping trips within the Ara Hills area and be within walking / cycling distance of both Ara Hills and the development, again reducing reliance on private vehicles especially for trips external to the Ara Hills area.
- A trip rate of 1 per dwelling in the peak hour is in excess of best practice based on the RTA and TfNSW guides and considered highly conservative and unlikely to eventuate.

As highlighted above, additional active mode connections to the wider network are anticipated to be provided as discussed in Section 2.4.3 alongside local attraction centres, which is anticipated to result in lower private vehicle trips closer to 0.65 vph/dwelling. This number has been adopted for this sensitivity assessment.

## 5.4 MOVEMENT DISTRIBUTION

The movement distribution at the Grand Drive Interchange (east and west roundabouts) is based on the existing distribution ratio.

Figures 17-24 show the consented and proposed trip distribution at the east and west Grand Drive roundabouts. The consented trip distribution includes the remaining 70% of the Ara Hills PC119 site currently under construction, and the proposed trip distribution includes consented and 100% of the development.

Figure 17: Existing AM Peak Eastern & Western roundabout traffic volumes

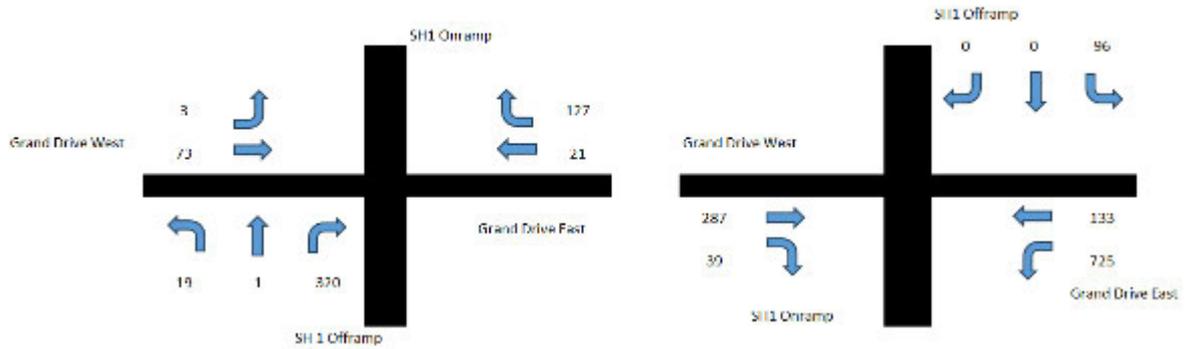


Figure 18: Additional AM Peak Hour Consented Traffic Volumes Eastern & Western roundabouts

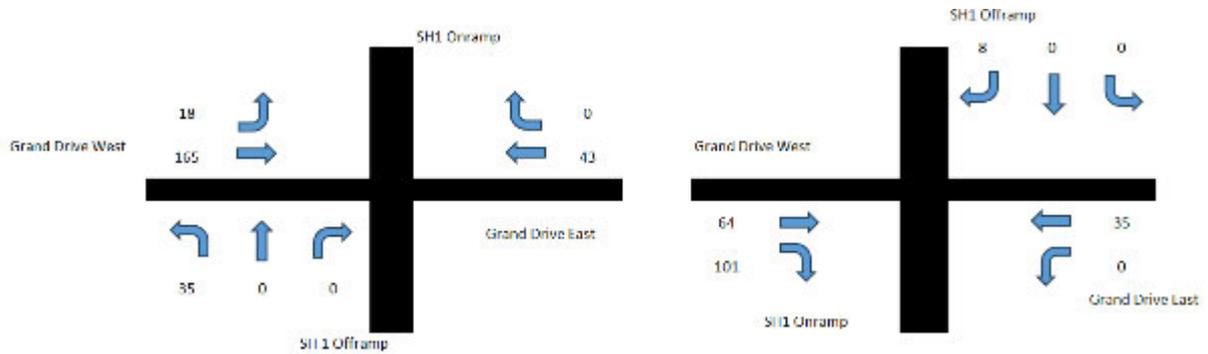


Figure 19: Delmore Generated AM Peak Hour Traffic Volumes Eastern & Western roundabout

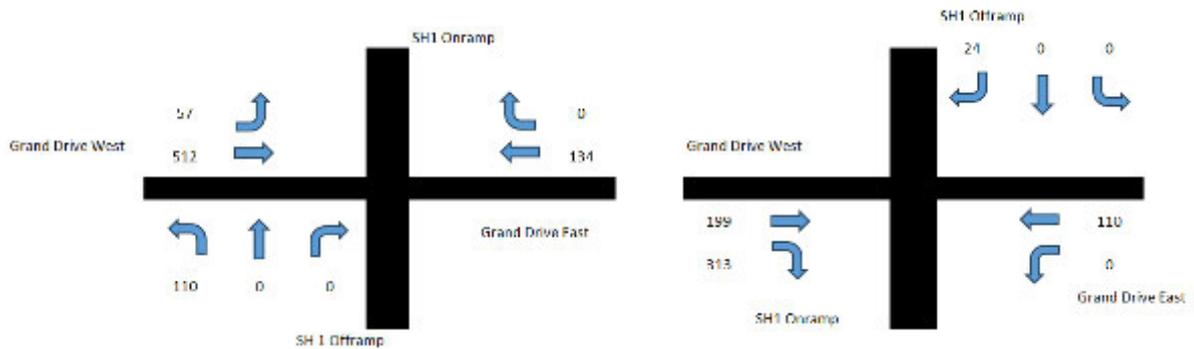


Figure 20: Total AM Peak Hour Consented + 100% Delmore Traffic Volumes Eastern & Western Roundabout

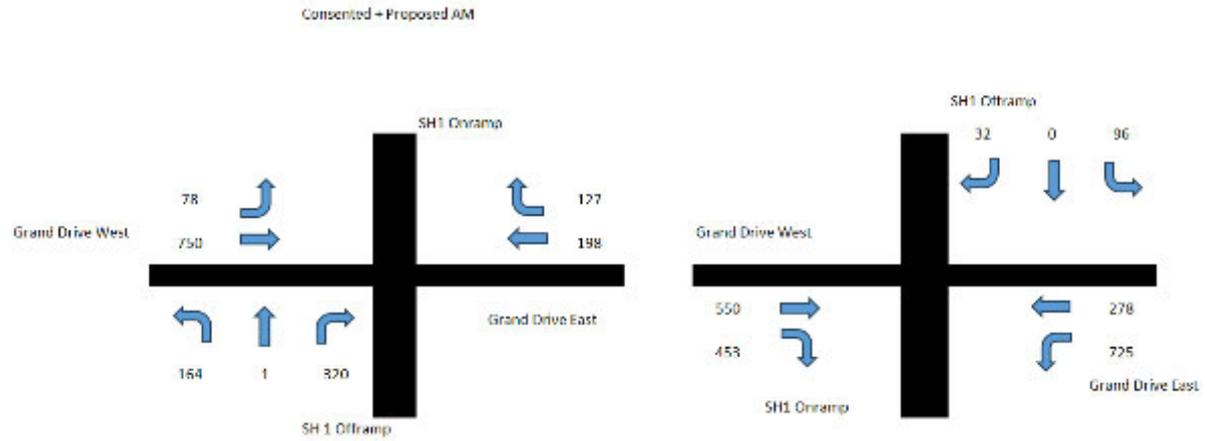


Figure 21: PM Peak Hour Existing traffic volumes Eastern & Western roundabout



Figure 22: Additional PM Peak Hour Consented Traffic Volumes Eastern & Western Roundabout

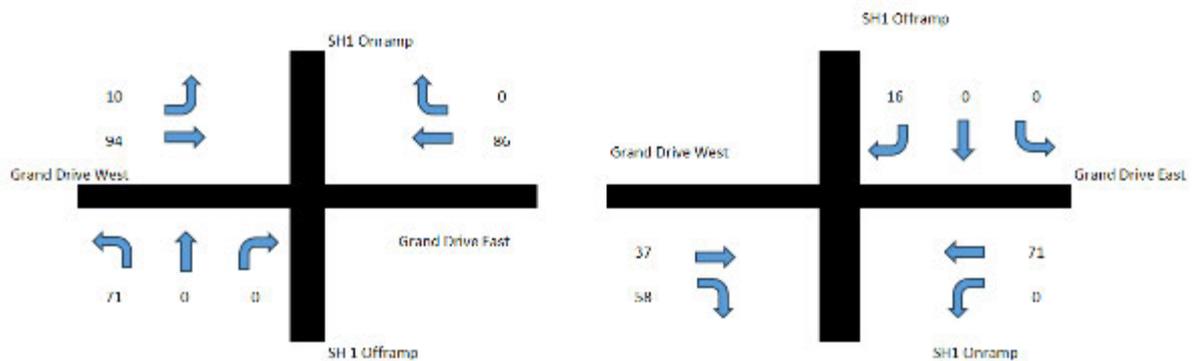


Figure 23: Additional PM Peak Hour Delmore Traffic Volumes Eastern & Western Roundabout

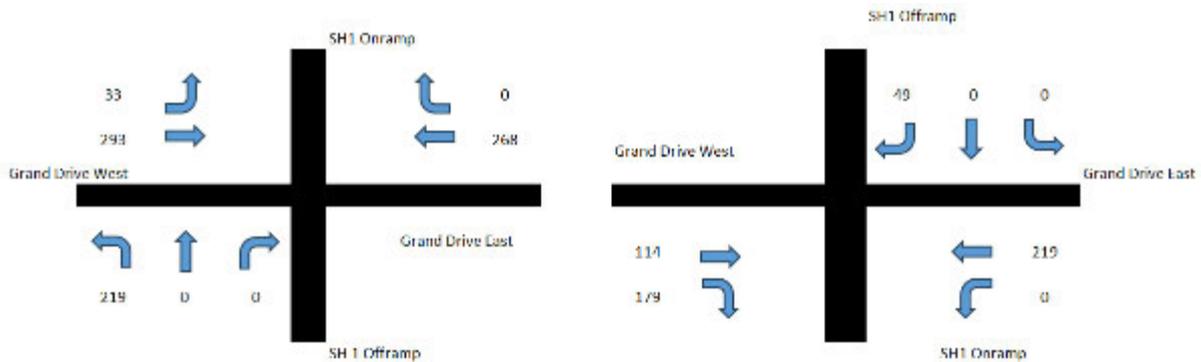
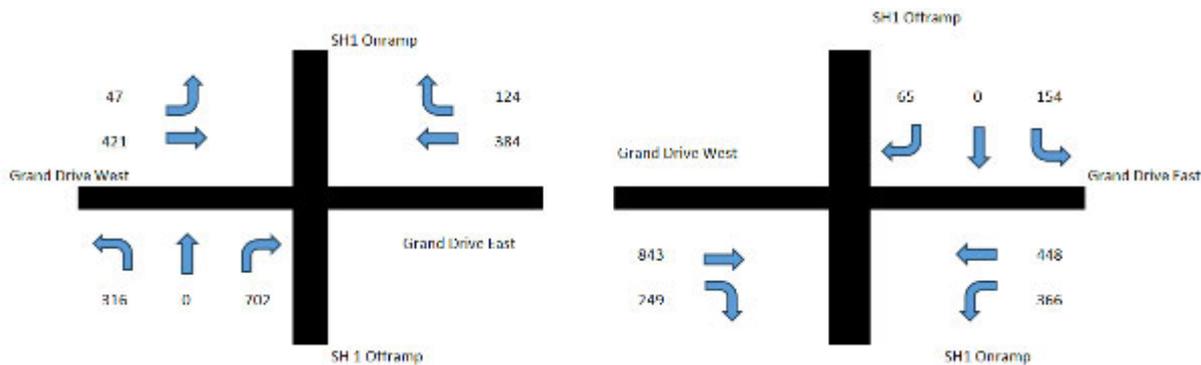


Figure 24: Total PM Peak Consented + 100% Delmore Traffic Volumes Eastern & Western Roundabout



## 6 ASSESSMENT OF EFFECTS

### 6.1 ASSESSMENT TIERS

The traffic effects of the development have been assessed by modelling the current Grand Drive Interchange using the traffic modelling software SIDRA.

The results presented in this report include the Degree of Saturation, which is a measure of the proportion of the modelled volumes in relation to the available capacity, queue length and the Level of Service (“LOS”), which is a generalised function of delay.

The assessment below identifies the effect of the additional vehicle trips generated by the development on the existing road network taking into account the Ara Hills development.

## 6.2 DELMORE TRAFFIC

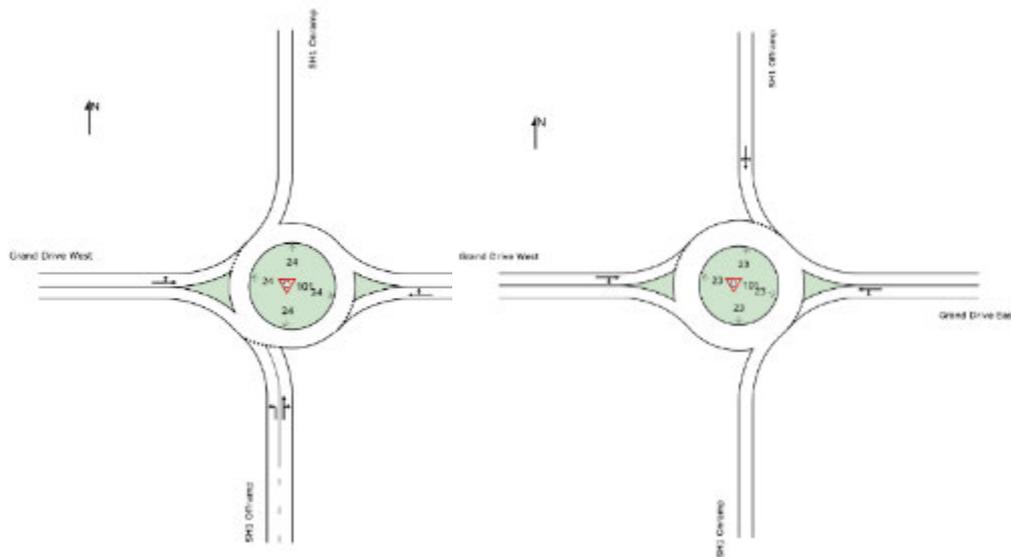
### 6.2.1 METHODOLOGY

As discussed, the Grand Drive Interchange will cater for all traffic to and from the site—at least in the short term—attributed to residents commuting out of Ōrewa via State Highway 1.

A review of the Grand Drive Interchange (eastern and western roundabouts) has been undertaken, assessing the existing performance of the intersection and the performance of the intersection after the completion of the development. The intersection review was conducted using traffic survey data discussed in Section 2.3 above, and the industry-standard SIDRA Intersection software analysis platform.

Figure 25 shows the intersection layout used to model the intersection performance.

**Figure 25: SIDRA Intersection Layout Northbound roundabout on the left and Southbound roundabout on the right**



### 6.2.2 SUMMARY

A summary of the modelling results for the various scenarios can be seen below in Table 3. A description and explanation of results is conducted below. The full SIDRA modelling results can be found in **Appendix C**.

**Table 3: SIDRA Results Summary**

Intersection	Grand Drive Western Roundabout	Grand Drive Eastern Roundabout
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<b>Existing</b>			
<b>Average LOS</b>	AM	LOS A	LOS A
	PM	LOS A	LOS A
<b>Average Delay</b>	AM	7.3 Seconds	3.3 Seconds
	PM	8 Seconds	3.3 Seconds
<b>Average Queue Length</b>	AM	11m	43m
	PM	27m	21m
<b>Consented (Existing in combination with consented Ara Hills traffic at completion)</b>			
<b>Average LOS</b>	AM	LOS A	LOS A
	PM	LOS A	LOS A
<b>Average Delay</b>	AM	6.8 Seconds	4.5 Seconds
	PM	8 Seconds	3.8 Seconds
<b>Average Queue Length</b>	AM	14m	59m
	PM	29m	29m
<b>Proposed (100% Delmore in combination with consented Ara Hills at completion)</b>			
<b>Average LOS</b>	AM	LOS C	LOS F (Eastern Approach only)
	PM	LOS B (LOS D on Western approach)	LOS B
<b>Average Delay</b>	AM	20.3 Seconds	56.6 Seconds
	PM	17.2 Seconds	7.0 Seconds
<b>Average Queue Length</b>	AM	221m	638m
	PM	135m	83m

### 6.2.3 INTERSECTION PERFORMANCE

Overall, as seen above in Table 3, all modelled scenarios except for the Proposed AM peak eastern roundabout scenario operate at an acceptable level with LOS A-C delays below 20 seconds and vehicle queuing not exceeding 230m. However, under the future full development scenario in the morning peak period, the intersection overall is expected to be operating at LOS E on average, with the Grand Drive East approach in the morning peak hour operating at an LOS of F, vehicle queues over 600m, and average delays of over 100 seconds.

Therefore, from a traffic perspective, the intersection operates within acceptable thresholds during all periods, except the Grand Drive East approach in morning peak. It is noted that vehicle queues of over 600m and LOS F are not acceptable and as such, additional mitigation is considered necessary as per the matters and approaches discussed in Section 6.3 below.

### 6.3 MITIGATION

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### 6.3.1 REVISED SIDRA MODEL

As the previously discussed modelling shows, the Grand Drive East leg of the eastern roundabout would not operate within acceptable boundaries with all the additional traffic included in the proposal (100% of Ara Hills consented dwellings and approximately 1,213 dwellings from the development) assuming all traffic has only one way in and out of the area through Grand Drive (ie. none of the southern legs such as the NoR6 transport corridor connection or local Road 17 connections to Upper Orewa Road proposed within Stage 2 of the Delmore development, are available).

To test the sensitivity of this analysis, a series of reductions in the subject site traffic generation has been undertaken on the eastern roundabout in the morning peak to assess where / when this intersection reaches capacity. This has been found to be approximately 40% of the Delmore traffic. This corresponds to the 575 Ara Hills consented dwellings and 750 Delmore dwellings or **1,325 dwellings in total**.

Other connections on the southern side of the site are proposed including the NoR6 arterial road, and a connection to Upper Orewa Road (Road 17) will provide alternative routes for residents, this is in combination with the proposed cyclist and pedestrian connections to the wider network. From a traffic perspective, a 40% traffic volume reduction on the Grand Drive intersections due to the alternative connections is considered to be likely. This assumption is further assessed in Section 5.3.3.1.

As the construction of Stage 2 expressly includes the construction of the connection to Upper Orewa Road, the 40% reduced traffic volumes on Grand Drive are considered to be likely; therefore, ensuring that the operation of the roundabout will operate within acceptable boundaries.

Further, it is noted that as part of “The North Assessment Package”, an Assessment of Transport Effects (August 2023) was undertaken by SGA (which included the NoR6 road). Significantly, the assessment which included growth in the wider area (including the subject site), did not identify any required upgrades to the Grand Drive Interchange. This assessment was based on a wider assessment including the use of the regional multi-modal model (“MSM”).

It is recognised that there is no guarantee that 40% of the generated Delmore traffic will use the Upper Orewa Road access; however, it is generally found that travellers will use the least congested route and if the Grand Drive Interchange is congested, residents will make use of alternative routes.

Notwithstanding, *we recommend a condition of consent which monitors the trip distribution of the Delmore development once development (Delmore + Ara Hills) reaches 1,425 dwellings and prior to the occupation of more than 1,450 dwellings (approximately 70% of the development), which corresponds to approximately halfway through Delmore Stage 2.* If it is found that the assumed trip distribution rate

highlighted above does not eventuate, then further upgrades to the Grand Drive Interchange are recommended. This most likely would be an additional left turn lane on the eastern roundabout eastern approach which can be seen in Figure 26, and would be finalised through consultation with NZTA at that point in time.

### 6.3.1.1 GRAND DRIVE INTERCHANGE UPGRADES

As highlighted above, if the monitoring condition finds that the assumed distribution rate between the Grand Drive interchange and the alternative Upper Orewa Road access does not eventuate, then further upgrades to the Grand Drive interchange are recommended. This is most likely in the form of an additional left turn lane on the eastern approach of the eastern roundabout. Additional SIDRA modelling has been conducted to test the proposed scenario (Full Delmore development + Consented Ara Hills) in the critical period (AM Peak) where the intersection was found to not be operating acceptably.

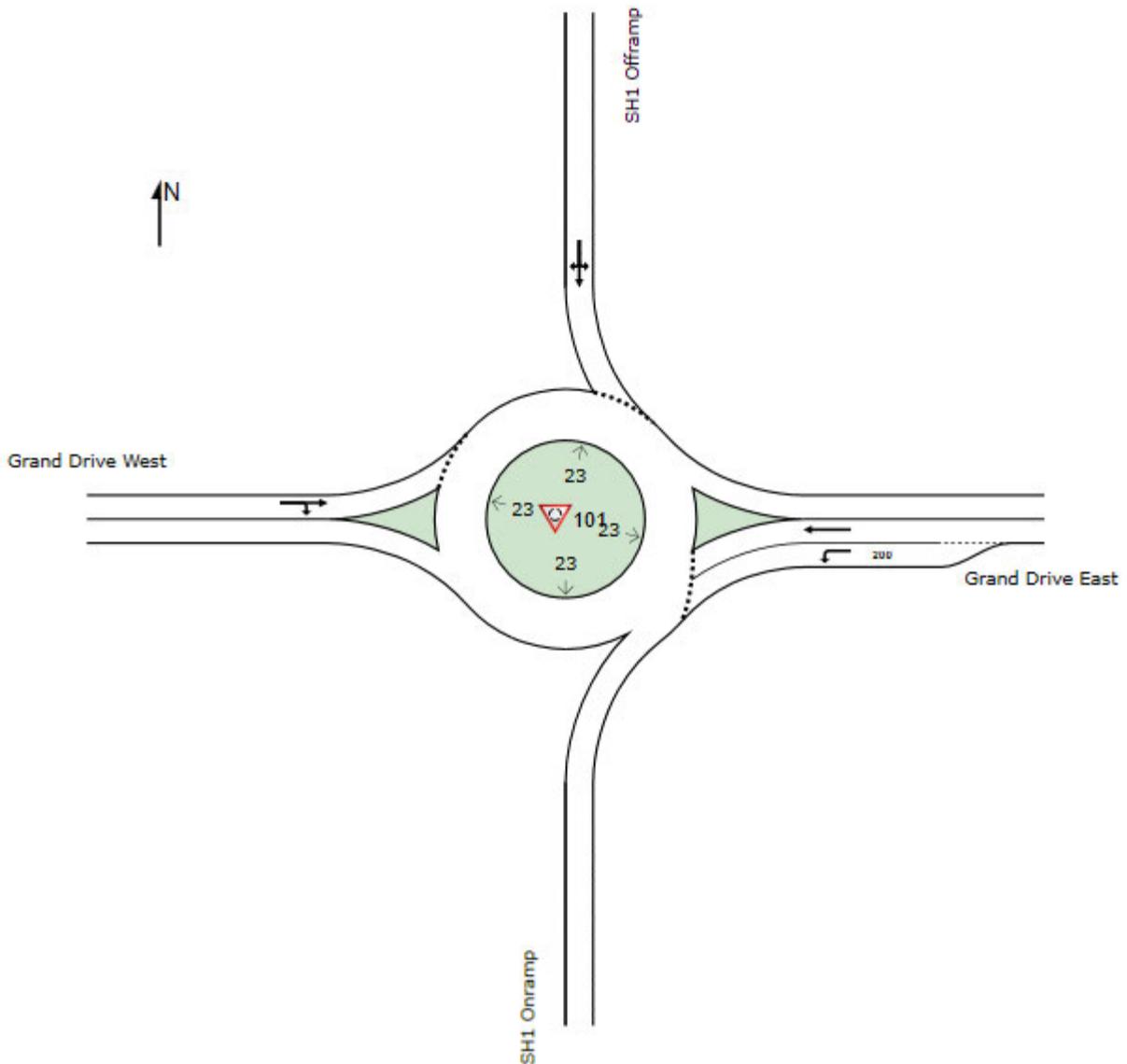
The proposed upgrade SIDRA layout for the eastern roundabout can be seen in Figure 26.

Table 4 highlights that with the additional left turn lane, the intersection operates at an average LOS A/B, 52m queueing, and 7 second average delays which is considered to be acceptable.

**Table 4: SIDRA Results Summary (additional mitigation)**

Intersection		Grand Drive Western Roundabout	Grand Drive Eastern Roundabout
<b>Eastern Roundabout with Additional eastern approach left lane (all 100% Delmore + Consented Ara Hills)</b>			
<b>Average LOS</b>	AM	-	LOS B
	PM	-	-
<b>Average Delay</b>	AM	-	7 Seconds
	PM	-	-
<b>Average Queue Length</b>	AM	-	52m
	PM	-	-

Figure 26: Revised SIDRA Layout Including Additional Left Turn Lane



#### 6.4 ARA HILLS SENSITIVITY TESTING

As highlighted above, the Ara Hills PC119 is currently underway and will increase the yield of the Ara Hills development from 575 dwellings to approximately 900 dwellings. Taking a total of 900 dwellings (as per the Plan Change Report) as a conservative estimate, an additional 325 dwellings are anticipated to use the Grand Drive Interchange.

As previously calculated, up to 1,325 dwellings can be occupied within both developments (Delmore and Ara Hills) before additional mitigation is required (either additional connection to the external transport network or provision of additional

capacity for the critical eastern approach of the eastern SH1/Grand Drive roundabout).

With up to 900 Ara Hills dwellings facilitated by PC119, this would reduce the available capacity for Delmore dwellings to 425 before the additional link would be required. However, as the application for the development is for the approvals needed for construction, and the Plan Change is only a change to the AUP and at the early stage of the process, it is anticipated that the Delmore development would occur ahead of the additional 325 dwellings that PC119 provides for.

## 7 PROPOSED ROAD NETWORK

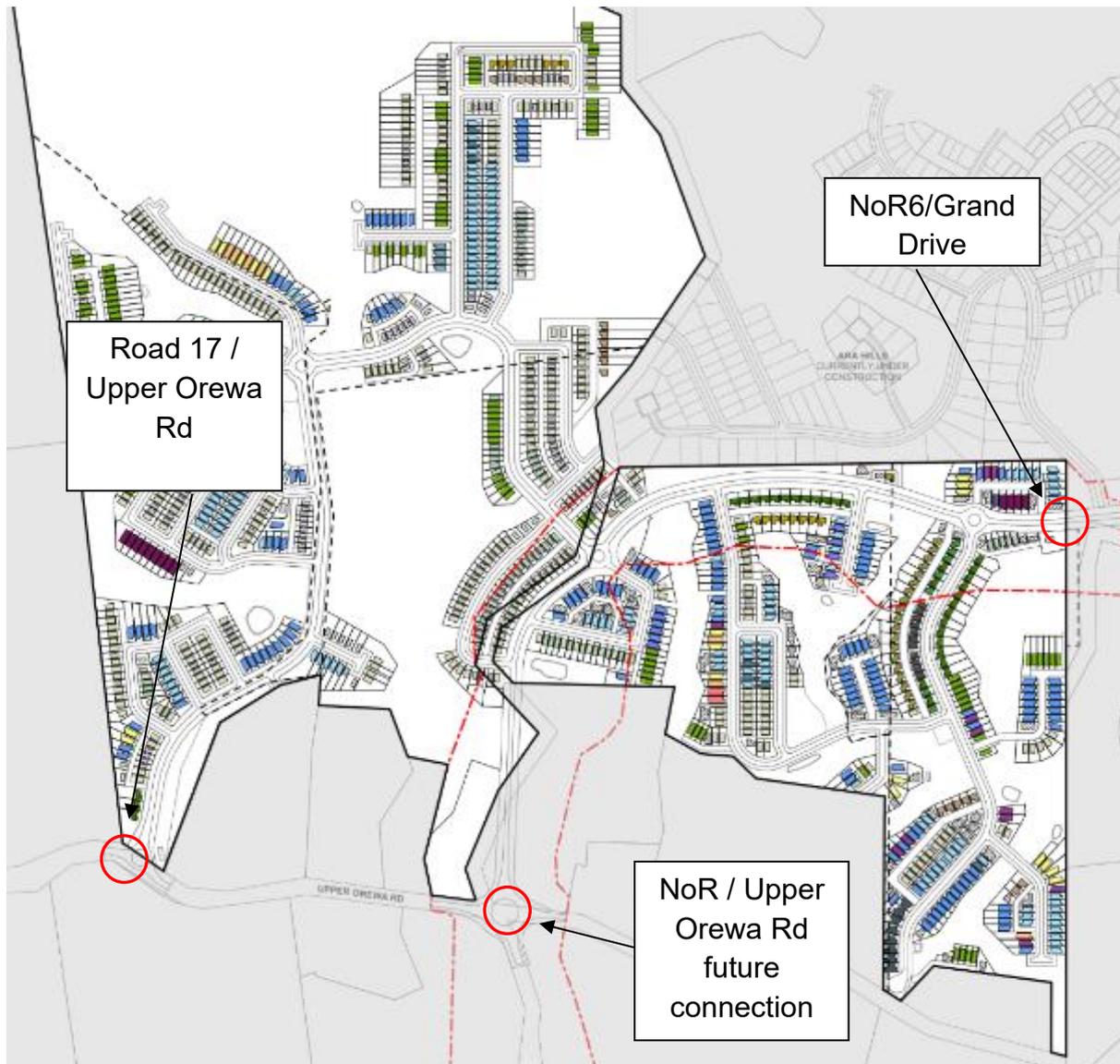
### 7.1 ROAD LAYOUT

Stage 1 of the development connects to the wider road network at one location, being Grand Drive. Provision has also been made in the design to connect in future stages to Russell Road and Upper Ōrewa Road. It is noted that the Russell Road connection will provide access to pedestrians and trucks only.

Internal to the site, Stage 1 of the development includes seven local roads and a single collector Road (Road 1), and a total of 18 JOALs. Figure 27 shows the proposed internal road layout and the connections to Upper Ōrewa Road and Grand Drive.

It is noted that vehicle crossings and intersections onto the NoR6 have been reduced as much as possible. Roundabouts are proposed at the Road 1 / NoR6 and Road 5 / NoR6 intersections and vehicle crossings gain access from local roads / collector roads where possible. A total of four vehicle crossings (JOAL 1 twice, JOAL 34 and, JOAL 13) and five intersections (Road 1, Road 3, Road 2, Road 6 twice) are proposed onto the NoR6 which is considered to be acceptable.

Figure 27. Proposed Road Network



Stage 2 of the development proposal includes 20 internal roads and 19 JOALS. Table 7-5 outlines the proposed Roads / JOALS and the number of dwellings they serve.

**Table 7-5: Road / JOALs**

Stage 1 Road & JOAL	Number of Dwellings served	Stage 2AB Roads and JOALs	Number of Dwellings served	Stage 2CD Roads and JOALs	Number of Dwellings served
NOR6	N/A	Road 5	18	Road 17(S2CD)	12
Road 1	63	Road 7	0	Road 23	16
Road 2	46	JOAL 11	41	Road 24	41
Road 3	17	Road 12	28	Road 25	16
Road 4	21	Road 13	43	Road 26	16
Road 6	34	Road 14	89	Road 27	22
Road 8	23	Road 15	0	JOAL 38	6
Road 10	10	Road 16	16	JOAL 39	14
JOAL 1	27	Road 17(S2AB)	42		
JOAL 2	8	Road 18	21		
JOAL 3	44	Road 19	11		
JOAL 4a	17	Road 20	12		
JOAL 4b	6	Road 21	37		
JOAL 5a	5	Road 22	41		
JOAL 5b	15	JOAL 13 (S2)	15		
JOAL 6	6	JOAL 18	5		
JOAL 8	18	JOAL 20	4		
JOAL 9	28	JOAL 21	14		
JOAL 10	7	JOAL 22	16		
JOAL 11	6	JOAL 23	5		
JOAL 13 (S1)	7	JOAL 24	3		
JOAL 30	12	JOAL 25	6		
JOAL 34	3	JOAL 26	15		
JOAL 37	3	JOAL 27	11		
JOAL 40	18	JOAL 28	38		
JOAL 40a	6	JOAL 31	4		
JOAL X	12	JOAL 32	6		
		JOAL 33	10		
		JOAL 35	12		
		JOAL 36	10		
		JOAL 41	5		

## 7.2 COLLECTOR ROADS

Due to the nature of the development and planned provision of bus services throughout the site as advised by Auckland Transport, Road 1 in Stage 1 and Roads 5 and 17 in Stage 2 are proposed to be constructed as collector roads including a 7.0m carriageway to accommodate bus services.

Road 1 provides a 17m road reserve including a 7.0m carriageway and 1.8m footpaths in both directions. It is recognised that the proposed road reserve of Road 1 does not meet the full collector road width requirement. Rather it allows for a future bus route (by providing a 7.0m carriageway) but does not include separate specific provisions of cyclists. In this regard, in terms of Auckland Transport requirements, separated cycle protection is typically only required after 3,000 vehicle per day<sup>10</sup>. Stage 1 accommodates approximately 470 dwellings, however not all would use Road 1 due to other routes available to the NoR6 arterial Road (eg Road 2 and Road 3). It is estimated that 50% of these dwellings would use Road 1, or 240 dwellings. Using the RTA daily trip rate of 0.65 daily trips per dwelling, this equates to 1,500 vehicle per day on Road 1 (maximum at its northern end). As such the separate cycling component of Road 1 is not considered to be required and thus the reduced road width is considered appropriate.

Roads 5 and 17 which are anticipated to eventually carry close to 3,000 vpd and provide a road reserve of 21.5m including a 3.2m separated two-way cycle lane on one side of the road connecting to cycling facilities on the NoR6 to encourage active mode travel and throughout the site. This is considered to be acceptable and meets the minimum road reserve width of Auckland Transport's requirements by providing

- 7.0m carriageway (allows for buses)
- 1.8m footpaths on both sides
- 1.0m back berms
- 3.2m cyclelane
- 2.2m front berms

## 7.3 CROSSINGS ON COLLECTOR ROADS / NOR

Vehicle crossings and intersections across cycling facilities on the proposed collector roads / NoR has been minimised as much as practicable. However, a total of nine

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<sup>10</sup> Auckland Transport Roads and Streets Framework (pg 33-50) & Engineering Design Code - Cycling infrastructure section 3.2

vehicle crossings are proposed across cycling facilities on Road 5 and four vehicle crossings are proposed across cycling facilities on the NoR6. In this regard:

- Vehicle crossings on Road 5 serve individual dwellings and are therefore considered to be very low volume. Additionally, adequate visibility will be provided to ensure any vehicles entering or exiting private driveways will have a clear view of the cycle way in both directions;
- Vehicle crossings on the NoR6 are minimal and have adequate spacing where cyclists and drivers will have a clear view of any potential conflict.

Minimal safety impacts are anticipated as a result of the proposed vehicle crossings across cycling facilities on collector roads or the NoR6.

#### 7.4 SPEED CALMING MEASURES

Because of the residential nature of the proposed development, slower traffic speeds are desirable to enhance the safety, amenity, and liveability of the neighbourhood.

The Traffic Calming Chapter 8: Traffic Calming Devices and Local Area Traffic Management (LATM) provides a range of recommended measures to achieve slower speeds.

Within the site, traffic calming in the form of speed tables is proposed at approximately 60m intervals on all local roads. While the proposed roads have an intended posted speed limit of 50km/hr, they have been designed to operate at lower speeds (30-40km/hr) with traffic calming provisions.

It is noted that speed calming measures are not proposed on collector Roads (Roads 1, 5 and 17) or the NoR6 road.

#### 7.5 BUS STOPS

It is noted that both the NoR6 road and the collector roads in Stage 1 and 2 (Road 1, 5 and 17) are all future bus routes. As the exact routes are yet to be established it is considered appropriate to locate any bus stops along any future bus routes at Engineering Approval Stage.

#### 7.6 ROAD CROSS SECTION

Table 6 shows the cross sections of the proposed internal roads. In this regard there are three road types proposed being the NoR 6 road, collector roads and local roads. Additionally, several JOALs are proposed.

**Table 6: Road Cross Section**

Roads	Road Reserve Width	Lane Width	Pedestrian Footpath / Cycle Lane Width	Parking Provisions
<b>NoR6 Road</b>	24 metres	3.8m in either direction plus 2.8m median (10.4 total width)	1.8m footpath in both directions. 3.2m two-way cycle way in one side	NA
<b>Road 1 (Collector Road)</b>	17m	3.5m in each direction (7.0m total width)	1.8m footpath in both directions	NA
<b>Road 5 &amp; 17 (Collector Roads)</b>	21.5m	3.5m in each direction (7.0m total)	3.2m two-way cycle lane in one direction (western) and 1.8m footpath in both directions	NA
<b>All other local Roads</b>	16 metres	3.0m in either direction (6.0m total width)	1.8m width on both sides	2.25m allocated for berm/on street parking
<b>JOAL 37</b>	4.0m	4.0m carriageway (one-way)	NA	NA
<b>JOAL 5A</b>	5.0m	4.0m carriageway (one-way)	1.0m footpath in one direction	NA
<b>JOAL 34</b>	6.0m	5.0m carriageway (one-way)	NA	NA
<b>JOAL 30</b>	6.5m	5.5m carriageway (two-way)	1.0m footpath in one direction	NA
<b>JOALs 2,6,8</b>	6.5m	5m carriageway (two-way)	1.5m footpath in one direction	NA
<b>JOAL 11</b>	7.0m	5.5m carriageway (two-way)	1.5m footpath in one direction	NA
<b>JOAL 4B</b>	7.5m	5.5m carriageway (two-way)	1.5m footpath in one direction	NA
<b>JOALs 5B, 40, 40A</b>	9.1m	6.0m carriageway (two-way)	1.55m footpaths in both directions	NA
<b>JOAL 13</b>	10.0m	6.0m carriageway (two-way)	1.0m footpath in both directions	NA
<b>JOALs 3, 3A, 9, and 10</b>	10.0m	6.0m carriageway (two-way)	1.5m footpath in both directions	NA
<b>JOAL 4A</b>	11.0m	6.0m carriageway (two-way)	1.5m footpath in both directions	NA
<b>JOAL 1</b>	10.0m	6.0m carriageway (two-way)	1.5m footpath in both directions	NA

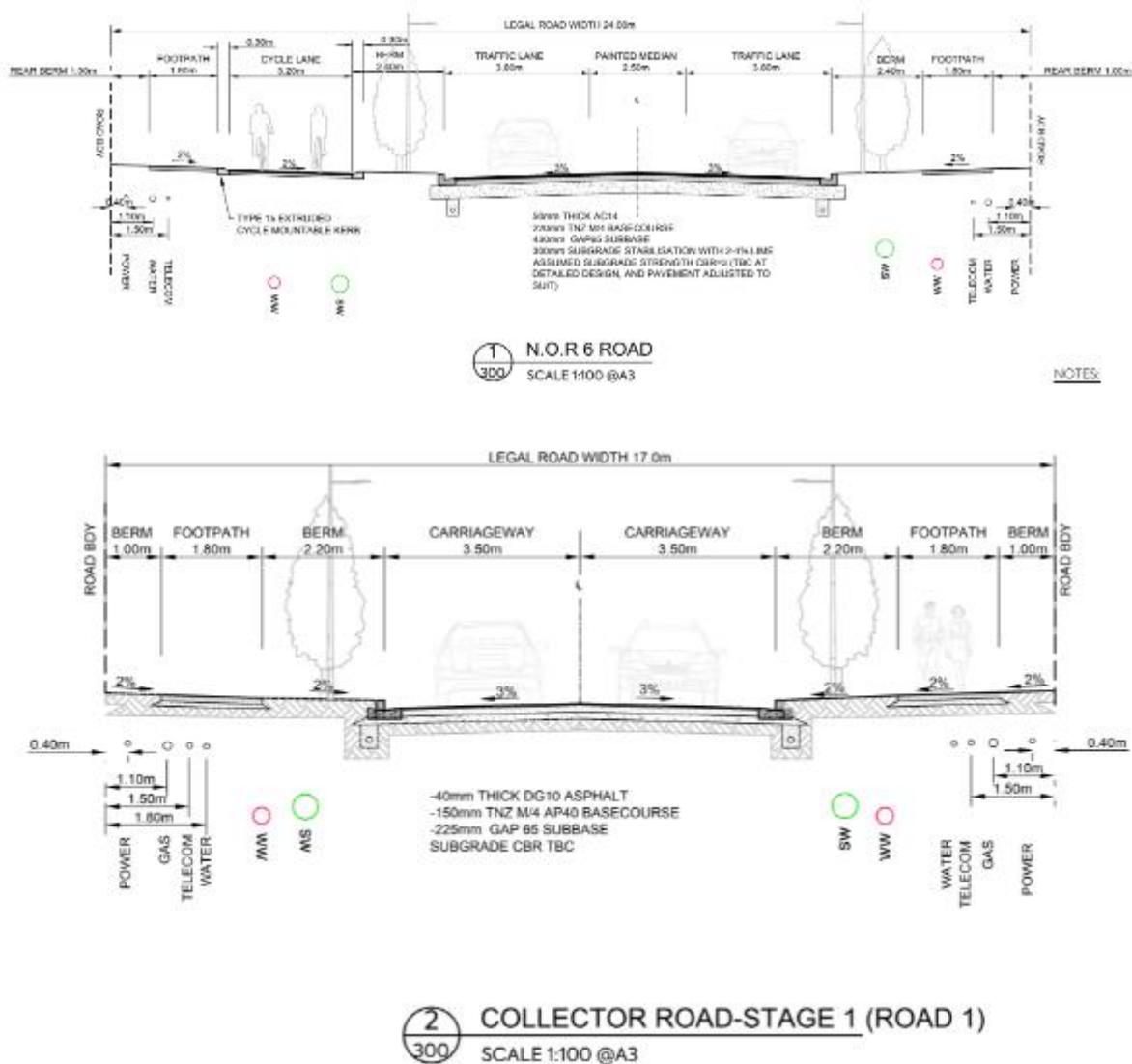
It is noted that the carriageway width on local and collector roads will have localised widening at the bends to accommodate truck/bus movements as required under AT TDM requirements and as shown in **Appendix F**.

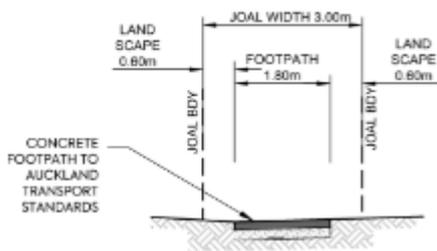
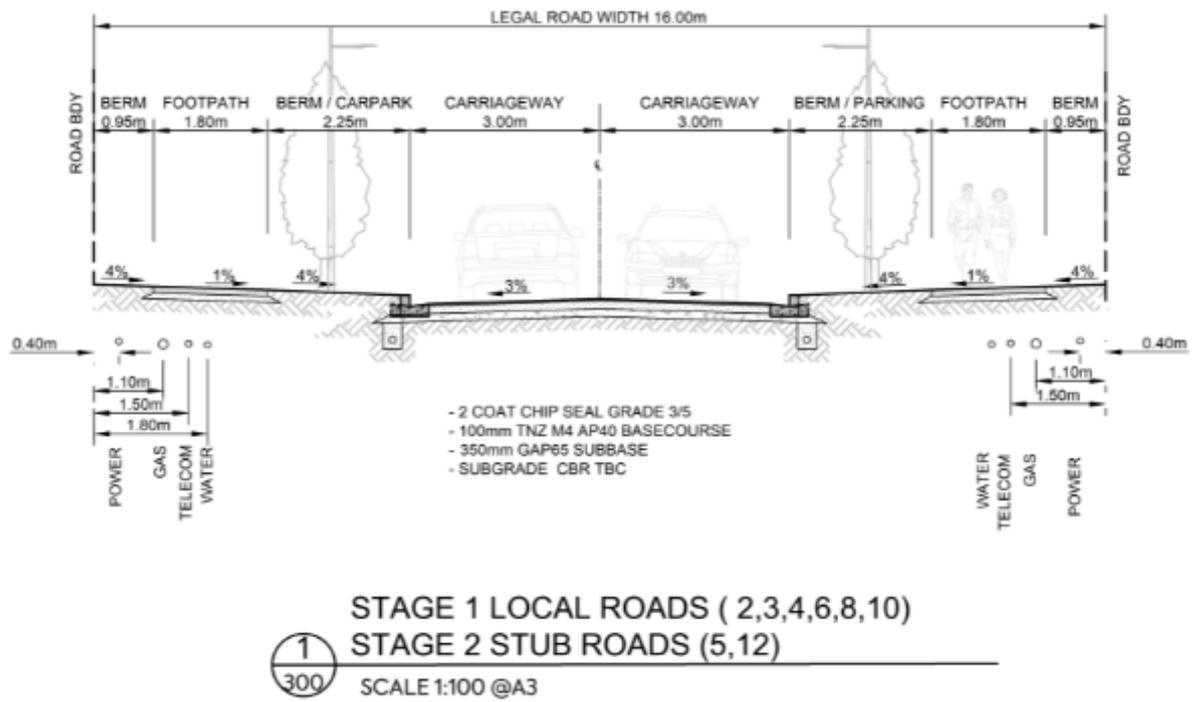
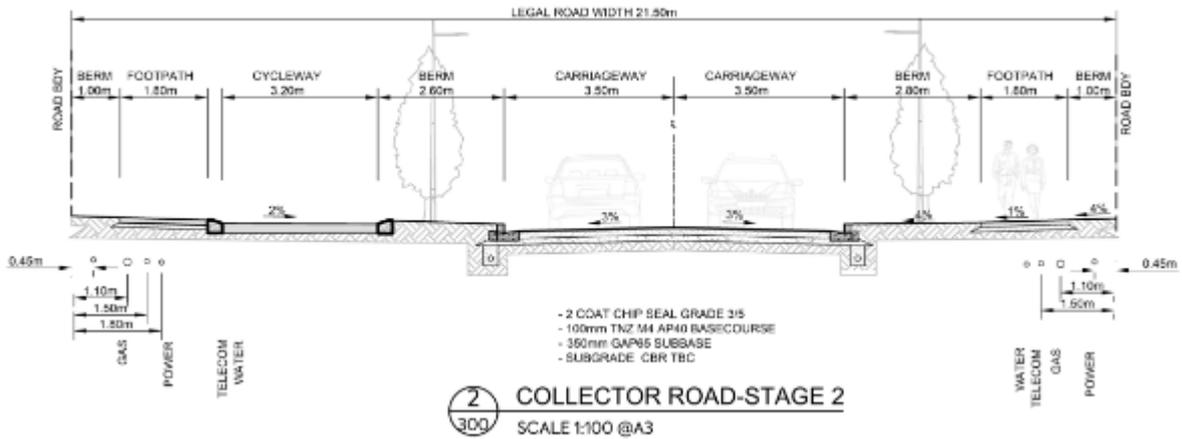
An assessment has been undertaken of the proposed new roads against the local road cross-sectional requirements in the Auckland Transport Design Manual (“ATDM”) standards.

The proposed road reserve, lane width and footpath dimensions comply with the applicable cross-section in the ATDM.

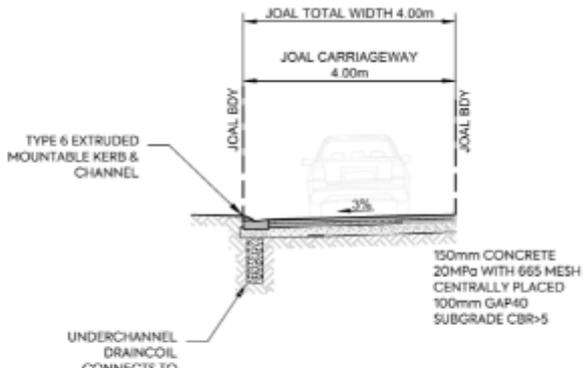
The cross sections of the proposed roads and JOALs are shown in Figure 28.

Figure 28. Road Cross Sections

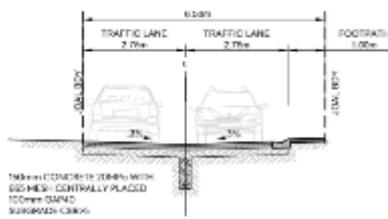
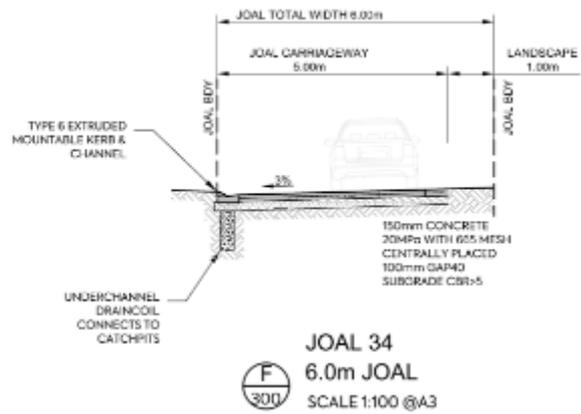
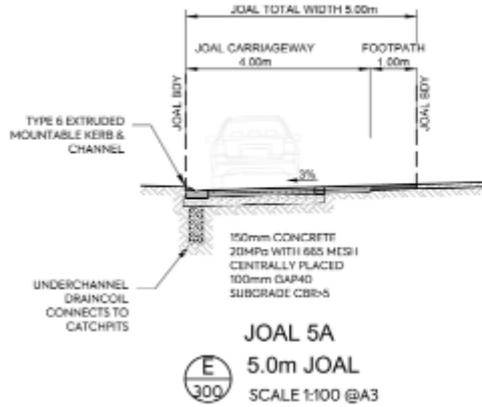




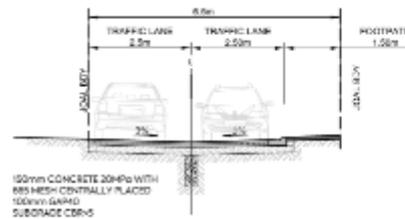
**A**  
**WALKWAY 1**  
**3.0m PEDESTRIAN ACCESS**  
SCALE 1:100 @A3



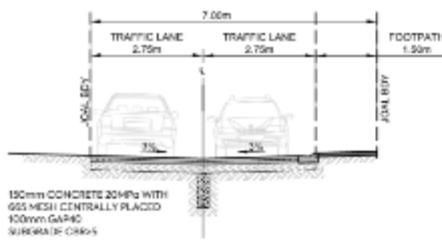
**B**  
**JOAL 37**  
**4.0m JOAL**  
SCALE 1:100 @A3



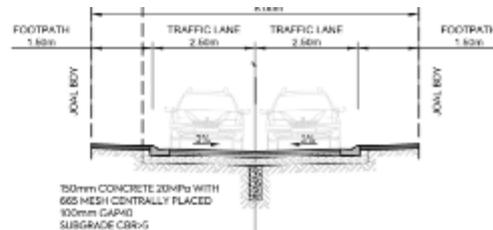
**JOAL 30**  
 6.5m JOAL, FOOTPATH ON REAR LOT SIDE  
 SCALE 1:100 @A3



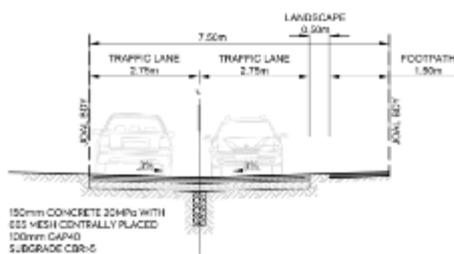
**JOAL 2,6,8**  
 6.5m JOAL, FOOTPATH ON REAR LOT SIDE  
 SCALE 1:100 @A3



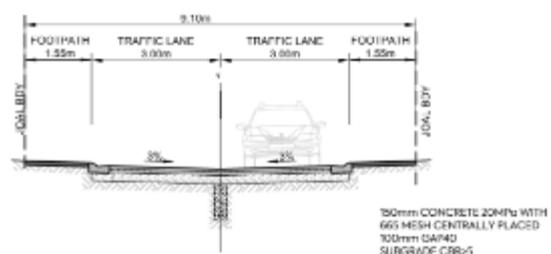
**JOAL 11**  
 7.0m JOAL, FOOTPATH ON REAR LOT SIDE  
 SCALE 1:100 @A3



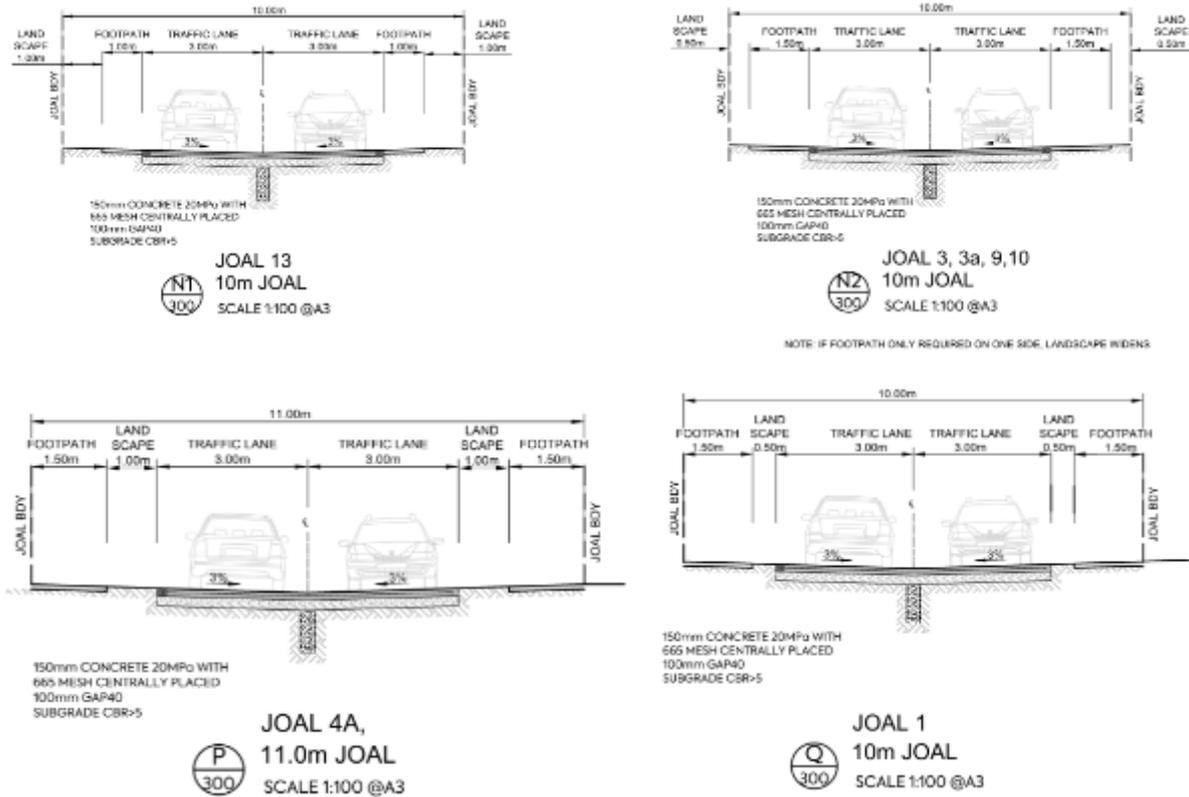
**JOAL 11**  
 8m JOAL, FOOTPATH BOTH SIDES  
 SCALE 1:100 @A3



**JOAL 4B**  
 7.5m JOAL, FOOTPATH ON REAR LOT SIDE  
 SCALE 1:100 @A3



**JOAL 5B, 40, 40A**  
 9.1m JOAL, 6.0m FORMED WIDTH  
 SCALE 1:100 @A3



Overall, all road / pedestrian footpath / cycle-lanes and berm / parking areas comply with the Auckland Transport Technical Design Manual (“ATDM”) requirements.

## 7.7 FUTURE EFFECTS

### 7.7.1 PUBLIC TRANSPORT

The proposed road network will provide a through connection for potential bus services. Based on the existing public transport network, the 985-bus service could be extended (with increased frequency) through the site as shown in Figure 29.

In the long term, a new bus service (987) referenced in the Auckland Regional Public Transport Plan (“ARPTP”)11 is planned by Auckland Transport to connect Orewa, West Hoe Heights, Ara Hills, and Hibiscus Coast Station from 2027. The route of this service is yet to be determined, and therefore it could be extended to route through the site.

<sup>11</sup> <https://at.govt.nz/about-us/transport-plans-strategies/regional-public-transport-plan-2023-2031-rptp>

Figure 29: Potential Public Transport Route



The surrounding area has deficiencies in alternative modes of transport to private vehicle travel; however, both the Ara Hills and Delmore development will create more active and public transport mode connections and decrease reliance on private vehicles.

As discussed earlier, under the Ara Hills consented development, a new pedestrian and cycling connection will be provided along Grand Drive and over SH1, connecting the existing pedestrian facilities to the site, providing the site and surrounding residential areas with a viable mode of public transport to travel to the key attractions in the area.

It is noted that whilst driving a private vehicle from the site to the Hibiscus Coast Station takes approximately 10-15 minutes during peak hours and is therefore likely

to be attractive in a time-sense, there are limited park-n-ride spaces available at the Hibiscus Coast Station.

### 7.7.2 ACTIVE MODES

As discussed in Section 2.4.3, the site and residential area to the north of the site currently has poor accessibility in the north-south direction towards Grand Drive.

It is proposed to provide a cycle path along both sides of the NoR6 road within the site. This would connect into the Ara Hills development and as noted earlier, Ara Hills has a condition of consent to provide a footpath along Grand Drive and over SH1 to the existing paths to the east as seen in Figure 30 below.

**Figure 30: Ara Hills Pedestrian Facilities Consent Requirement**



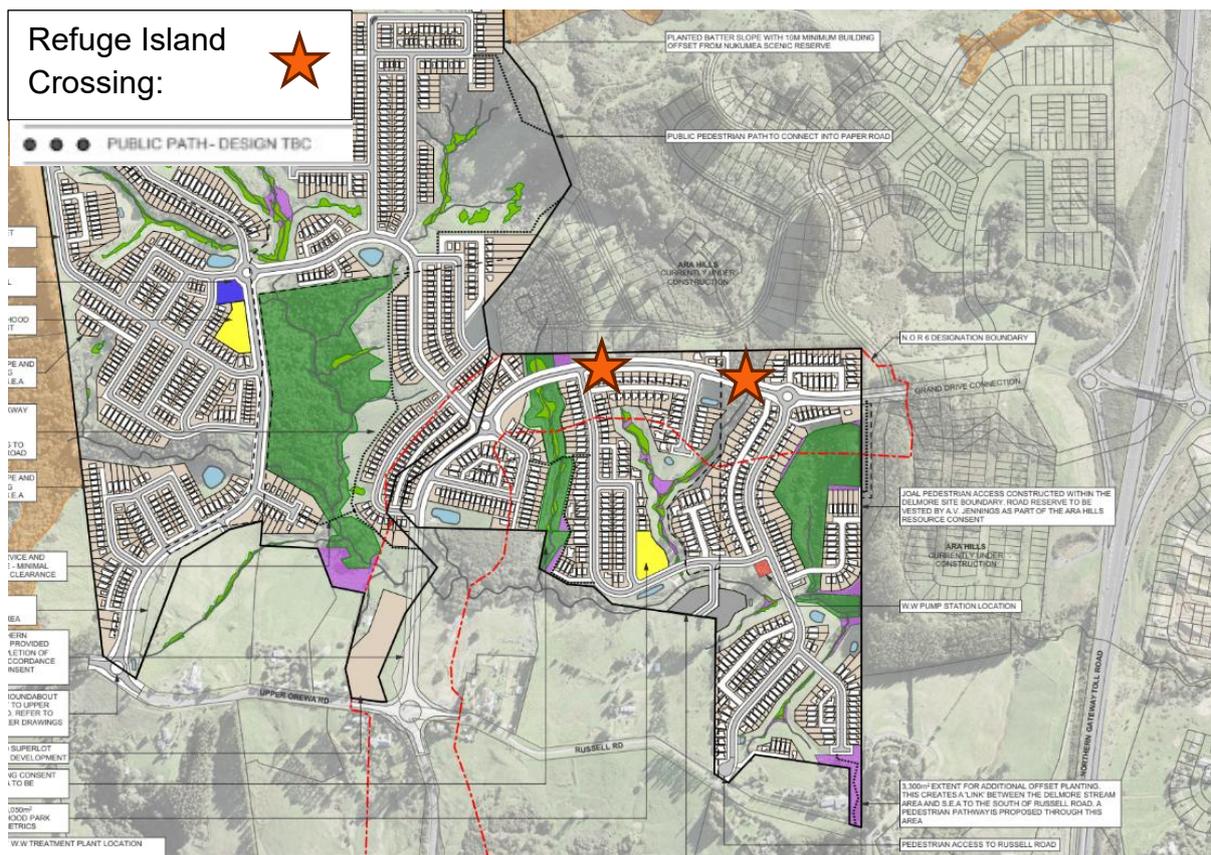
It is recognised that, while the Ara Hills applicant is conditioned (and has approval) to construct a shared path from their site over SH1 via a Grand Drive overbridge, this may not occur if Ara Hills ceases development. While this is considered unlikely, it is

considered appropriate to allow for this and thus have a similar condition on the subject site. It is however considered unreasonable to require this at the start of the subject site development and further, there is no particular science behind such a number. Of note is that the Ara Hills development has previously had the condition imposed at approximately one third of development.

Pedestrian footpaths are provided on either side of the NoR6 road as 1.8m footpaths which will be able to connect into the proposed footpaths and cycle ways along Grand Drive, resulting in an effective pedestrian connection from the site to Ōrewa.

Figure 31 provides a plan of the key pedestrian and cycle links through the site. The proposed arrangement provides footpaths in both directions on the NoR6 and all local roads and provides connections to key walking and cycling corridors external to the site in the future. Pram crossings are provided at all local road intersections. Refuge islands including pram crossings are provided across the NoR6 road in two places as indicated below.

Figure 31: Active Mode Facilities within the site



## 8 NEARBY ROADING / INTERSECTION ARRANGEMENT

### 8.1 UPPER OREWA ROAD

As highlighted previously, Upper Ōrewa Road connects to Wainui Road to the south and Weranui Road to the north, neither of which are arterial roads. Upper Ōrewa Road is a rural road and has an approximate carriageway width of 8.5 metres, accommodating one traffic lane in each direction. No specific cycling or pedestrian facilities are provided.

As per the trip distribution assessment, it is anticipated that approximately 40% of the site will utilise the Upper Orewa Road access leading to a significant increase in vehicle traffic along Upper Orewa Road which is currently a narrow rural road with limited road shoulders or pedestrian facilities.

It is therefore proposed to provide a minimum 1m shoulder widening in both directions between the Road 17 / Upper Orewa Road intersection and the Wainui Road / Upper Orewa Road intersection to address potential safety concerns for traffic and cyclists.

The above upgrades would only be required in Stage 2 of the development, whence the site gains access from Upper Orewa Road. As per the trip distribution and SIDRA modelling analysis, this would be at the point of 750 dwellings being occupied.

Suggested conditions are as follows:

*“Prior to the opening of the roundabout at Road 17 and Upper Orewa Road, the consent holder must upgrade Upper Orewa Road between Road 17 and Wainui Road to provide minimum 1m sealed shoulders on both sides of the road”*

*“Prior to the opening of the roundabout at Road 17 and Upper Orewa Road, the consent holder must construct a temporary off-road footpath (minimum 1.8m in width and an all-weather surface) along Upper Orewa Road and Russell Road between the Road 17 / Upper Orewa Road intersection and the end of Russell Road.”*

Refer to Section 15 for proposed conditions.

### 8.2 WAINUI ROAD

Wainui Road generally runs in an east-west alignment, connecting to Weranui Road to the west and Millwater Parkway to the east. Wainui Road is a rural road and is not classified as an arterial route under the AUP. Wainui Road provides an approximate

carriageway width of 8 m accommodating one traffic lane in each direction and no cycling or pedestrian facilities are provided.

As per Figure 32 below, Wainui Road already provides road shoulders between 0.5-1.0m as follows:

- East of Orewa River, the road is essentially urban with kerbs;
- West of Orewa River, the road is typically 7.6m wide (edgeline to edgeline);
- The shoulder widths varies from 0.4m to 1.2m.
- The upgrade required to the Upper Orewa Road / Wainui Road will already require approximately 200m of widening / upgrade on Wainui Road (east side).

Figure 32: Wainui Shoulder Widths



No specific shoulder widening is considered to be required in this case due to:

- The shoulder widths already provided are typically near or at 1m;
- The actual road width (edge line to edge line) is typically well over the 7.0m minimum (typically 7.4-7.6m; and
- The upgrade of the Wainui Road / Upper Orewa road intersection noted below will improve general safety in this area.

## 8.3 WAINUI ROAD / UPPER OREWA ROAD INTERSECTION

### 8.3.1 GENERAL

The Wainui Road / Upper Orewa Road intersection can be seen in Figure 33 below. The Wainui Road / Upper Orewa Road intersection is a standard give way controlled T-intersection with the major approach being Wainui Road with a general east-west

alignment and the minor approach being Upper Orewa Road with a north-south alignment.

**Figure 33: Existing Wainui Road / Upper Orewa Road Intersection**

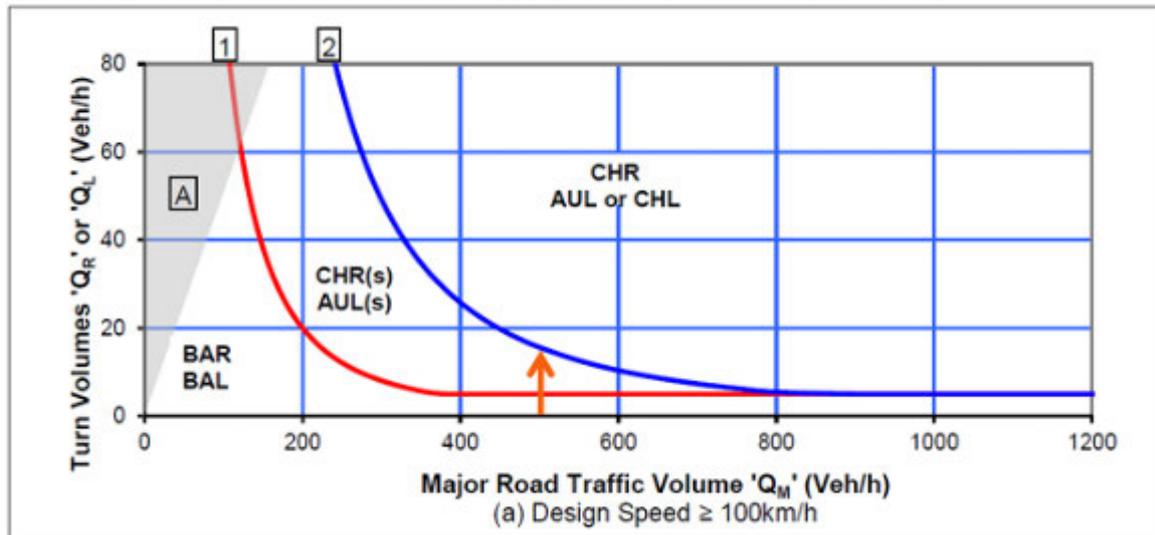


### 8.3.2 INTERSECTION ASSESSMENT

As highlighted previously, it is anticipated that approximately 40% of the Delmore development (375 dwellings or 244 vph) will use the Upper Orewa Road access and therefore the Wainui Road / Upper Orewa Road intersection.

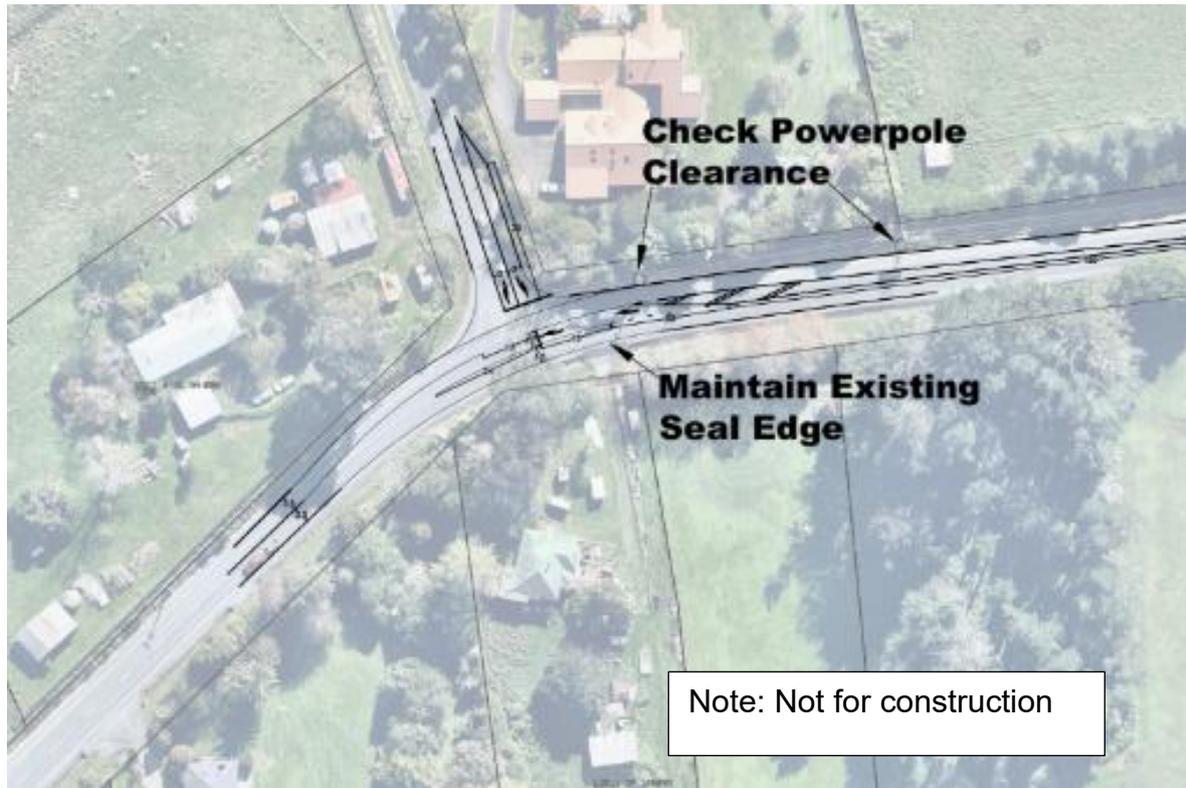
It is our opinion that a right turn bay (or at least localised widening) is already warranted at the intersection of Wainui Road / Upper Orewa Road intersection regardless of the Delmore development. This is evident below, where from Austroads in a 100km/hr environment with 500 vph (10% of Wainui Roads daily volume) only 5-6 right turning vehicles per hour warrant a “short” auxiliary lane (AUL) and around 15 right turning vehicles per hour warrant a full auxiliary lane (right turn bay). With Upper Orewa Road already having over 130 vph in the commuter peak, the right turn will be well over this level.

Figure 3.25: Warrants for turn treatments on major roads at unsignalised intersections



A concept upgrade for the Wainui Road / Upper Orewa Road intersection can be seen in Figure 34 below. It is noted that:

- Widening is required on the eastern side of Upper Orewa Road (to create separate left and right turning lanes) and the northern side of Wainui Road (for the right turn bay);
- Existing seal edge on the southern side of Wainui Road and western side of Upper Orewa Road can likely remain unchanged; and
- Power pole clearances on Wainui Road should be checked at EPA stage.
- It is noted that the Wainui Road / Upper Orewa Road intersection has been surveyed and modelled with 40% of the development (500 dwellings) using Upper Orewa Road. The upgraded intersection is proposed to operate efficiently and well below capacity as can be seen in Section 8.3.3.3.
- The Wainui Road / Upper Orewa Road intersection is planned to be eventually replaced by the NoR6.

**Figure 34: Proposed Wainui Road / Upper Orewa Road Intersection Upgrades**

It is proposed that a new condition of consent be imposed relating to the Wainui Road / Upper Orewa Road intersection by providing a right turn bay on Wainui Road and a left turn lane on Upper Orewa Road once the proposed site provides access onto Upper Orewa Road. The suggested wording is as follows:

*“Prior to the opening of the roundabout at Road 17 and Upper Orewa Road, the consent holder must upgrade the Upper Orewa Road / Wainui Road intersection to provide a right turn bay on Wainui Road and a left turn lane on Upper Orewa Road.*

*Advice note: These upgrades would not be required if the NoR road has been constructed through this intersection, or if upgrades have been undertaken by another party.”*

Refer to Section 15 for conditions.

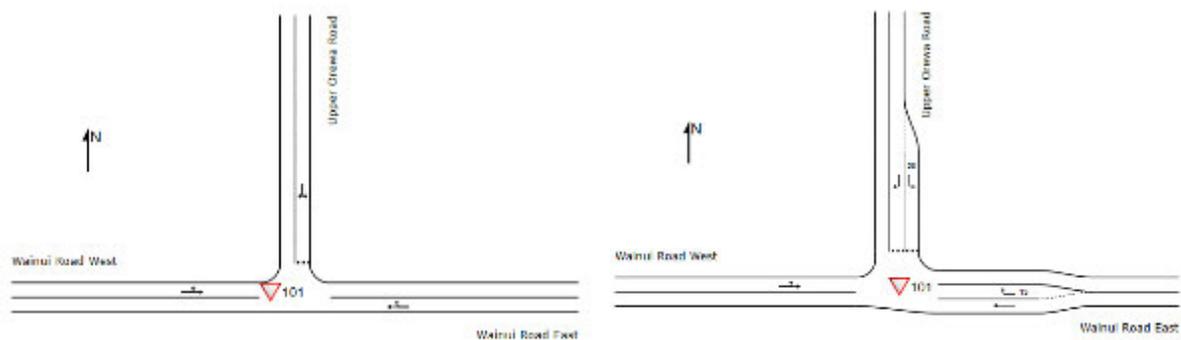
### 8.3.3 UPPER OREWA ROAD / WAINUI ROAD INTERSECTION MODEL

As discussed, the Upper Orewa Road / Russell Road intersection is anticipated to cater for approximately 40% of development traffic (500 dwellings or 325 trips in the peak hour).

A review of the Upper Orewa Road / Wainui Road intersection has been undertaken, assessing the existing performance of the intersection and the performance of the intersection after the completion of the development (including the proposed upgrades to the Upper Orewa Road / Wainui Road intersection). The intersection review was conducted using the industry-standard SIDRA Intersection software analysis platform.

The existing and proposed SIDRA layout can be seen in Figure 35 below.

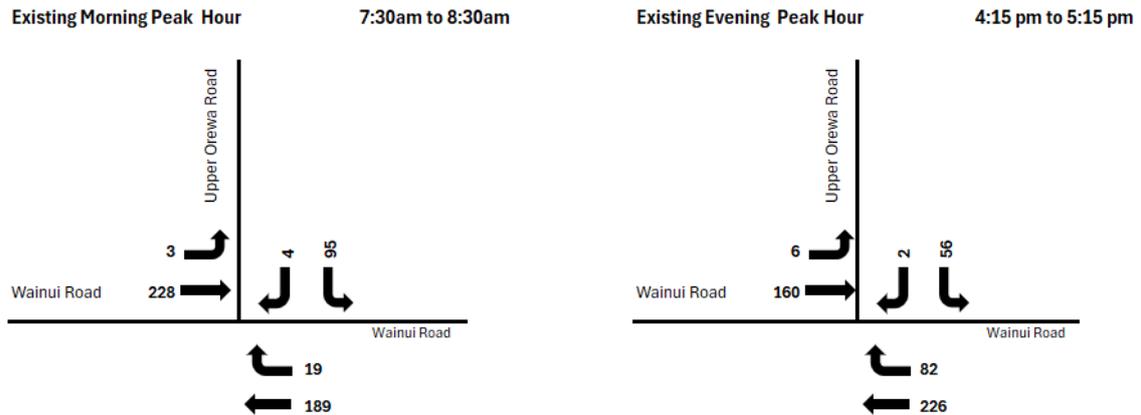
**Figure 35: Existing and Proposed Intersection Layout**



#### 8.3.3.1 TRAFFIC SURVEYS

Traffic surveys were conducted at the Upper Orewa Road / Wainui Road intersection during the AM and PM peak hour periods (December 2025). The resulting survey results can be seen in Figure 36 below.

Figure 36: Upper Orewa Road / Russell Road Traffic Surveys

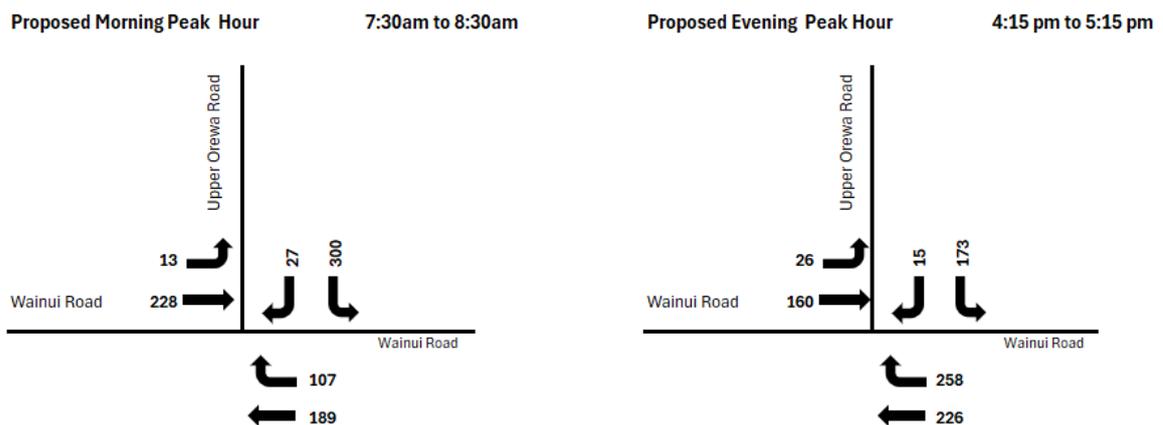


### 8.3.3.2 TRIP DISTRIBUTION

As discussed previously, approximately 40% of the development is anticipated to use the Upper Orewa Road access point and therefore the Upper Orewa Road / Russell Road intersection, which is equivalent to 500 dwellings or 325 trips during the peak hour.

The resulting proposed traffic volumes at the Upper Orewa Road / Russell Road intersection (existing traffic plus 40% development traffic) can be seen in Figure 37 below.

Figure 37: Proposed Trip Distribution Upper Orewa Road / Russell Road AM and PM Peak



### 8.3.3.3 INTERSECTION PERFORMANCE

A summary of the modelling results for both the existing and proposed scenarios can be seen below in Table 7. A description and explanation of results is conducted below. The full SIDRA modelling results can be found in **Appendix C**.

**Table 7: SIDRA Results Summary**

Intersection		Upper Orewa Road / Russell Road Intersection	
<b>Existing</b>			
<b>Average LOS</b>	AM	LOS A	
	PM	LOS A	
<b>Average Delay</b>	AM	2 Seconds	
	PM	2 Seconds	
<b>Average Queue Length</b>	AM	3m	
	PM	5m	
<b>Proposed</b>			
<b>Average LOS</b>	AM	LOS A	
	PM	LOS A	
<b>Average Delay</b>	AM	3 Seconds	
	PM	3 Seconds	
<b>Average Queue Length</b>	AM	8m	
	PM	7m	

As highlighted above, the intersection is anticipated to operate at acceptable levels with minimal delays and queues. As such, it is considered that the proposed upgrades to the Upper Orewa Road / Wainui Road adequately address potential safety and efficiency concerns regarding additional development traffic through the intersection.

#### 8.4 UPPER OREWA ROAD / RUSSELL ROAD

The Upper Orewa Road / Russell Road intersection can be seen in Figure 38 below. The Upper Orewa Road / Russell Road intersection is a standard give-way intersection with Upper Orewa Road being the major approach running in a general south to west alignment.

**Figure 38: Existing Russell Road / Upper Orewa Road Intersection**



#### 8.4.1 INTERSECTION ASSESSMENT

As per Section 13 of this ITA, it is anticipated for up to two trucks per hour to use the Russell Road / Upper Orewa Road intersection (wastewater). It is considered that a right turn bay is not required as no residential vehicle traffic will be added to the intersection and compliant sight lines are provided for right turning vehicles from Upper Orewa Road onto Russell Road as seen in Figure 39 below.

**Figure 39: Upper Orewa Road / Russell Road Intersection Sight Distance**

## 9 ROAD GEOMETRY

### 9.1 VEHICLE TRACKING

The ATDM requires that local roads must be capable of accommodating:

- Mid-block:
  - Simultaneous movement of two AT 6.3m vans
  - Simultaneous movement of an AT 6.3m van and 10.3 m truck
- Intersections:
  - 10.3m truck (essentially a public collection rubbish truck) using full road width to turn
  - Simultaneous turning movement of two AT 6.8m vans

For collector roads accommodating bus routes, the roads must be capable of accommodating:

- Midblock:
  - Simultaneous movement of two 12.6m buses
  - 13.5m bus not crossing the marked centreline to avoid penetrating opposing traffic lane

Vehicle tracking has been undertaken for all roads within the proposed internal road network. The following parameters were used for vehicle tracking:

- 500mm body clearance for vans, trucks, and buses;
- Body clearance provided to the kerb and any oncoming vehicle (where simultaneous movement is occurring); and
- 20km/h speed midblock and 15km/h speed when turning within intersections

In general, the design complies with the above requirements. It is however recognised that there are small number of intersections (typically local / local intersections in Stage 2) that will require some minor adjustment to kerb locations. *A condition of consent is recommended requiring that vehicle tracking is re-checked at EPA / detailed design stage and localised widening is provided as required.*

Generally, intersection movements are well accommodated within the local road network. Vehicle tracking is shown in **Appendix F** and demonstrates the above requirements.

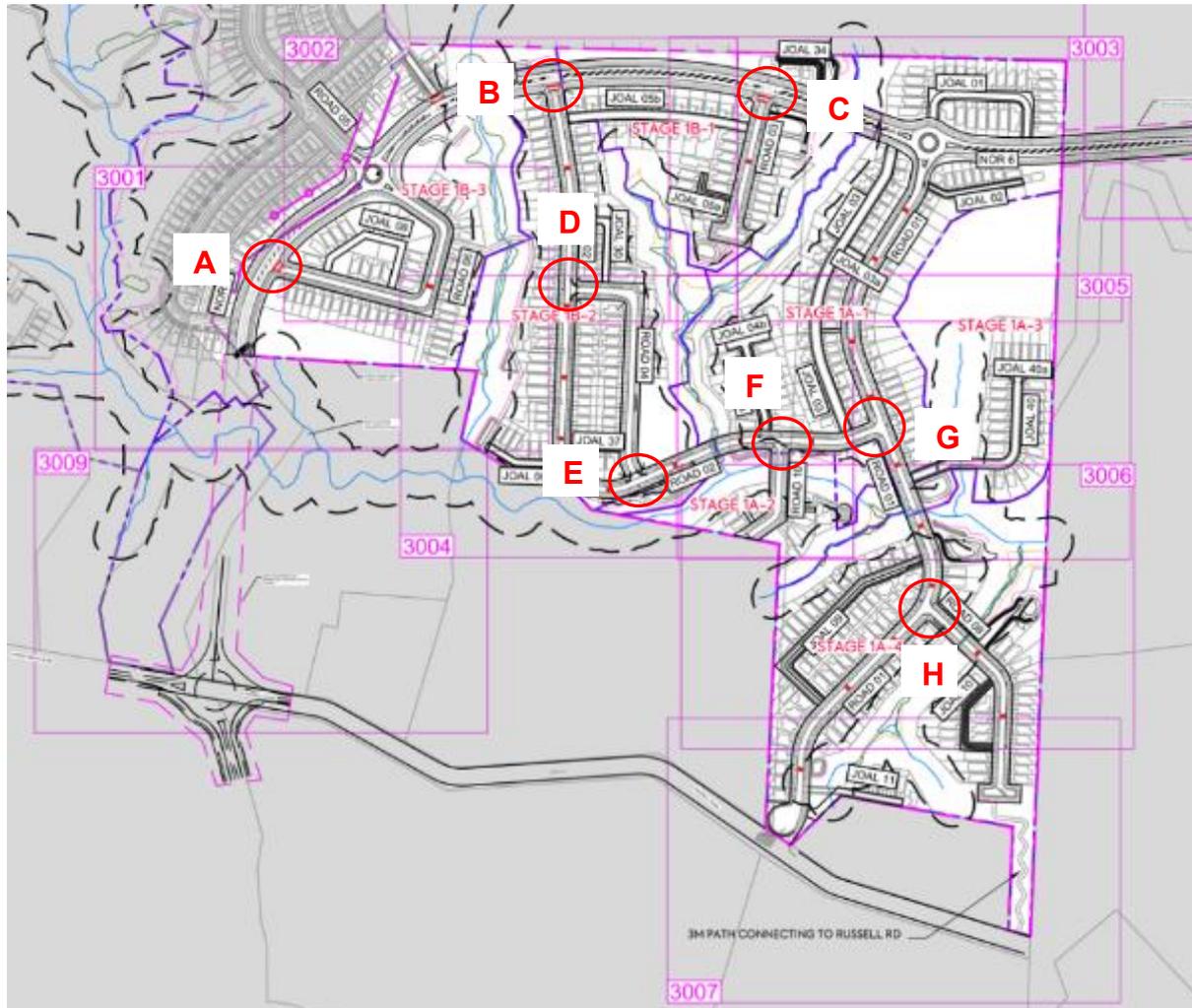
## 9.2 LOCAL ROAD INTERSECTIONS

### 9.2.1 STAGE 1

A total of 10 intersections have been proposed within stage 1, with all intersections characterised as local / local road or local / collector road, priority-controlled 'T' intersections and priority afforded to the major approach. As discussed in Section 9.1 of this ITA, each intersection has been designed to accommodate the simultaneous turning manoeuvres of a 6.3m van and 6.3m van, and a 10.3m truck utilising both lanes when manoeuvring on the local road. Priority controlled intersections are considered appropriate from a capacity perspective within the development.

These local road intersections are shown in Figure 40 below.

Figure 40. Stage 1 Proposed Local Road Intersection locations



### 9.2.1.1 SAFE INTERSECTION SIGHT DISTANCE (SISD)

Safe Intersection Sight Distance (SISD) is the minimum distance that should be provided on the major road at any intersection, for a driver on the major road to observe a vehicle moving into a collision position from the minor road and to decelerate to a stop before reaching the collision point.

All new internal intersections as part of this development will be controlled with give way road markings. It is noted that Road 1 and the NoR6 road in Stage one and Roads 5 and 17 in Stage 2 have been assessed against the posted speed limit of 50km/hr while all other local roads within stage one have been designed to be lower operating speed roads (30-40km/hr) as traffic calming provisions such as speed tables are proposed.

The Austroads: Guide to Road Design Part 4A Table 3.2 requires for intersections on a 30 km/h carriageway that a safe sight distance of 52m be provided and 97m for intersections of a 50km/hr carriageway.

Table 8 shows the SISD provided at each proposed intersection and the compliance based on the SISD requirement of 52m or 97m.

**Table 8: Safe Intersection Sight Distance at all local road intersections**

Intersection	Recommended SISD	SISD northern/western direction	SISD southern/eastern direction	Compliance
<b>A</b>	97	97+ metres	97+ metres	Yes
<b>B</b>	97	97+ metres	97+ metres	Yes
<b>C</b>	97	97+ metres	97+ metres	Yes
<b>D</b>	52	52+ metres	52+ metres	Yes
<b>E</b>	52	33 metres to corner	52+ metres	Yes (To Corner & planned speed management)
<b>F</b>	52	52+ metres	52+ metres	Yes
<b>G</b>	97	97+ metres	97+ metres	Yes
<b>H</b>	97	97+ metres	97+ metres	Yes

As shown in the table above, all proposed intersections except for intersection E meet the full minimum SISD requirement of 97/52 metres.

In the case of intersection E which does meet the SISD in the western direction the limited sight distance is a result of another intersection, corner, or end of road. Speedbumps have been implemented in both approach directions in the vicinity of intersection E, thus vehicles will be travelling at a much slower speed upon their approach and as such the lower sight distances are considered to be acceptable.

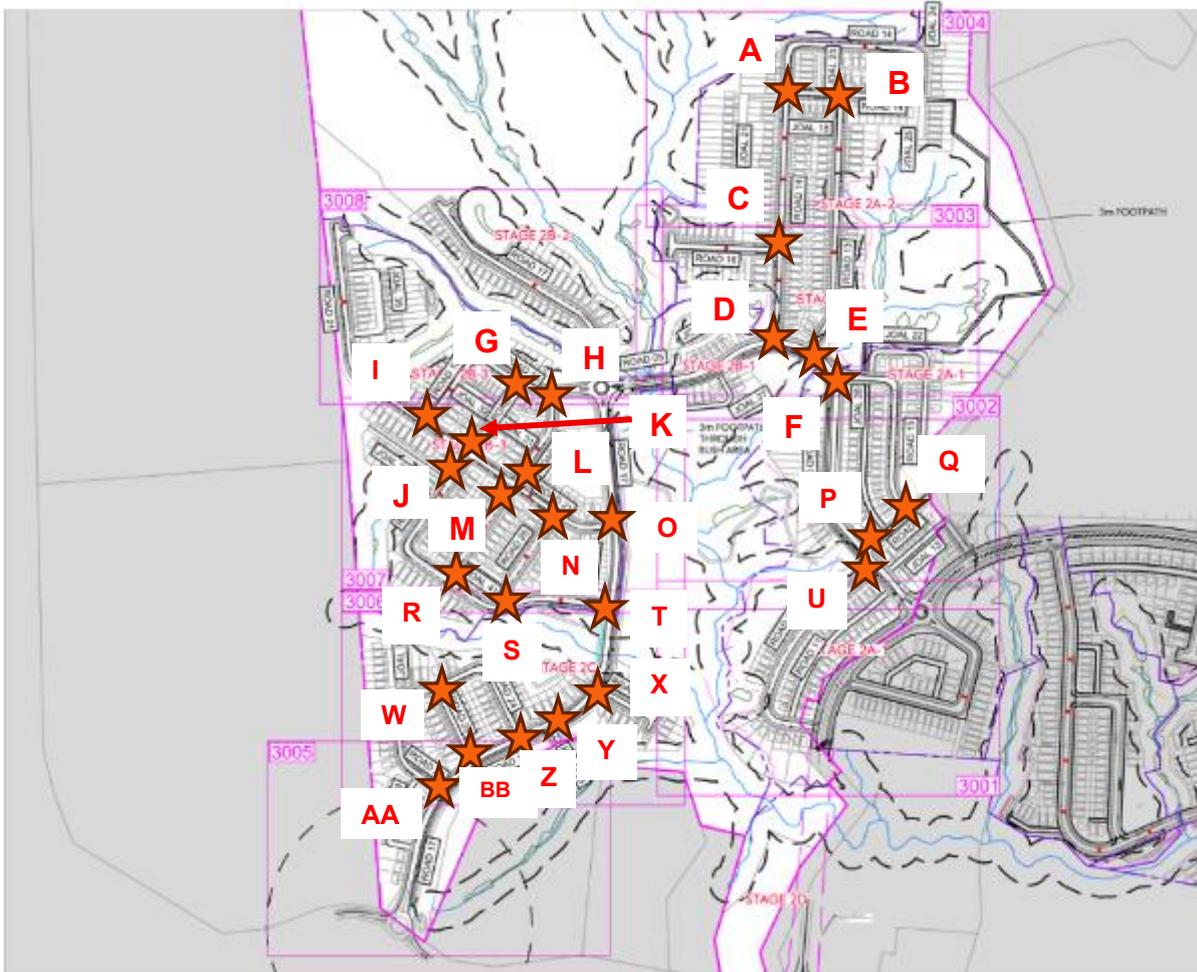
Sight distance diagrams can be seen in **Appendix E**.

### 9.2.2 STAGE 2

A total of 29 intersections have been proposed within Stage 2, with all intersections characterised as local / local road or local / collector road, priority-controlled 'T' intersections and priority afforded to the major approach. As discussed in Section 9.1, each intersection has been designed to accommodate the simultaneous turning manoeuvres of a 6.3m van and 6.3m van, and a 10.3m truck utilising both lanes when manoeuvring on the local road. Priority controlled intersections are considered appropriate from a capacity perspective within the development. It is considered that all proposed intersections provide adequate spacing to ensure conflicting movements do not occur which is considered to be acceptable.

These local road intersections are shown in Figure 41 below. These intersections will be referred to by these labels in this report.

Figure 41. Stage 2 Proposed Local Road Intersection locations



### 9.2.2.1 SAFE INTERSECTION SIGHT DISTANCE (SISD)

Table 9 shows the SISD provided at each proposed intersection and the compliance based on the SISD recommendation of 52m or 97m. Noted that a sight distance recommendation of 97m was used on collector roads (5 & 17) where no speed calming is proposed.

Table 9: Safe Intersection Sight Distance at all local road intersections

Intersection	Recommended SISD	SISD northern/western direction	SISD southern/eastern direction	Compliance
A	52	52+ metres	52+ metres	Yes
B	52	52+ metres	52+ metres	Yes
C	52	52+ metres	52+ metres	Yes
D	97	97+ metres	86 metres to corner	Yes (To corner)
E	97	97+ metres	97+ metres	Yes

F	97	97+ metres	97+ metres	Yes
G	52	52+ metres	52+ metres	Yes
H	52	52+ metres	52+ metres	Yes
I	52	52+ metres	52+ metres	Yes
J	52	52+ metres	52+ metres	Yes
K	52	52+ metres	52+ metres	Yes
L	52	52+ metres	52+ metres	Yes
M	52	52+ metres	52+ metres	Yes
N	52	52+ metres	52+ metres	Yes
O	97	97+ metres	97+ metres	Yes
P	97	72 metres to corner	97+ metres	Yes (To corner)
Q	52	52+ metres	52+ metres	Yes
R	52	52+ metres	52+ metres	Yes
S	52	35 metres to corner	52+ metres	Yes (To corner & planned speed management)
T	97	97+ metres	97+ metres	Yes
U	97	97+ metres	60 metres to intersection	Yes (To intersection)
W	52	52 metres	52+ metres	Yes
X	97	97+ metres	97+ metres	Yes
Y	97	97+ metres	97+ metres	Yes
Z	97	97+ metres	97+metres	<b>Yes</b>
AA	97	97+ metres	97+ metres	Yes
BB	97	97+ metres	97+ metres	Yes

As shown in Table 9 above, six intersections do not meet the minimum SISD recommendation of 97 or 52 metres. Generally, the lower sight distance values can be considered to be acceptable as sight distance is limited due to other intersections or corners where oncoming vehicles will be travelling at lower speeds when turning the corner or exiting an intersection, combined with traffic calming measures on local roads. This is considered to be acceptable from a traffic perspective.

Sight distance diagrams can be seen in **Appendix E**.

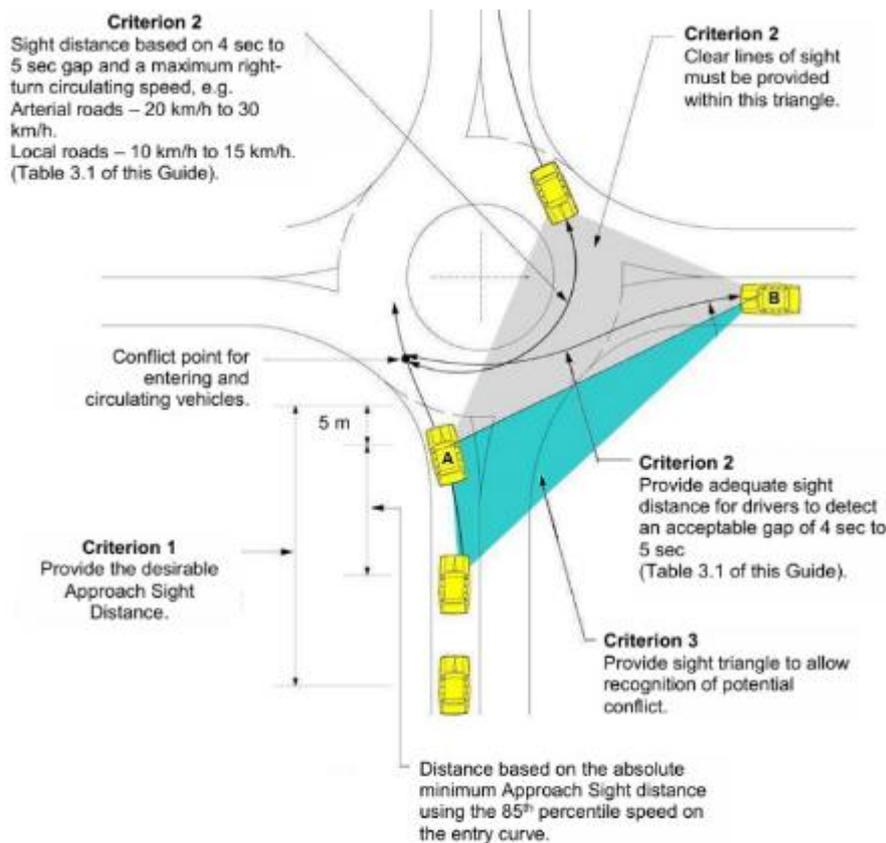
### 9.2.3 ROUNDABOUTS

As part of both Stages 1 and 2, roundabouts are proposed where collector roads intersect with other collector roads or the NoR6 road. Section 3 of Austroads Guide

to Road Design Part 4B: Roundabouts specifies sight distance recommendations at roundabouts.

An approach speed of 30km/hr has been adopted with a gap acceptance of 5 seconds which is typical for circulating speeds through an arterial road roundabout the resulting recommended sight distance is 42m.

**Figure 42: Austroads Sight Distance at Roundabouts Recommendations**



Note: Values for approach sight distance are provided in Table 3.1 of AGRD Part 4A.

Source: Adapted from Department of Main Roads (2006).

Each of the proposed roundabouts has been assessed against the above recommendations and can be seen in **Appendix E**. Overall, the proposed roundabouts provide the required approach sight distance and sight distance between oncoming vehicles which is considered to be acceptable.

### 9.2.3.1 STAYING IN LANE / DEFLECTION

Section 4.5 of Austroads Guide to Road Design Part 4B Roundabouts specifies approach and entry treatments to ensure control of entering vehicles speeds can be controlled and vehicles are able to stay within the lane.

Table 4.2 of the Austroad guide specifies the maximum entry path radii for one and two lane roundabouts. All roundabouts included in the proposed site are single lane therefore requiring a maximum entry path radii or deflection of 55m.

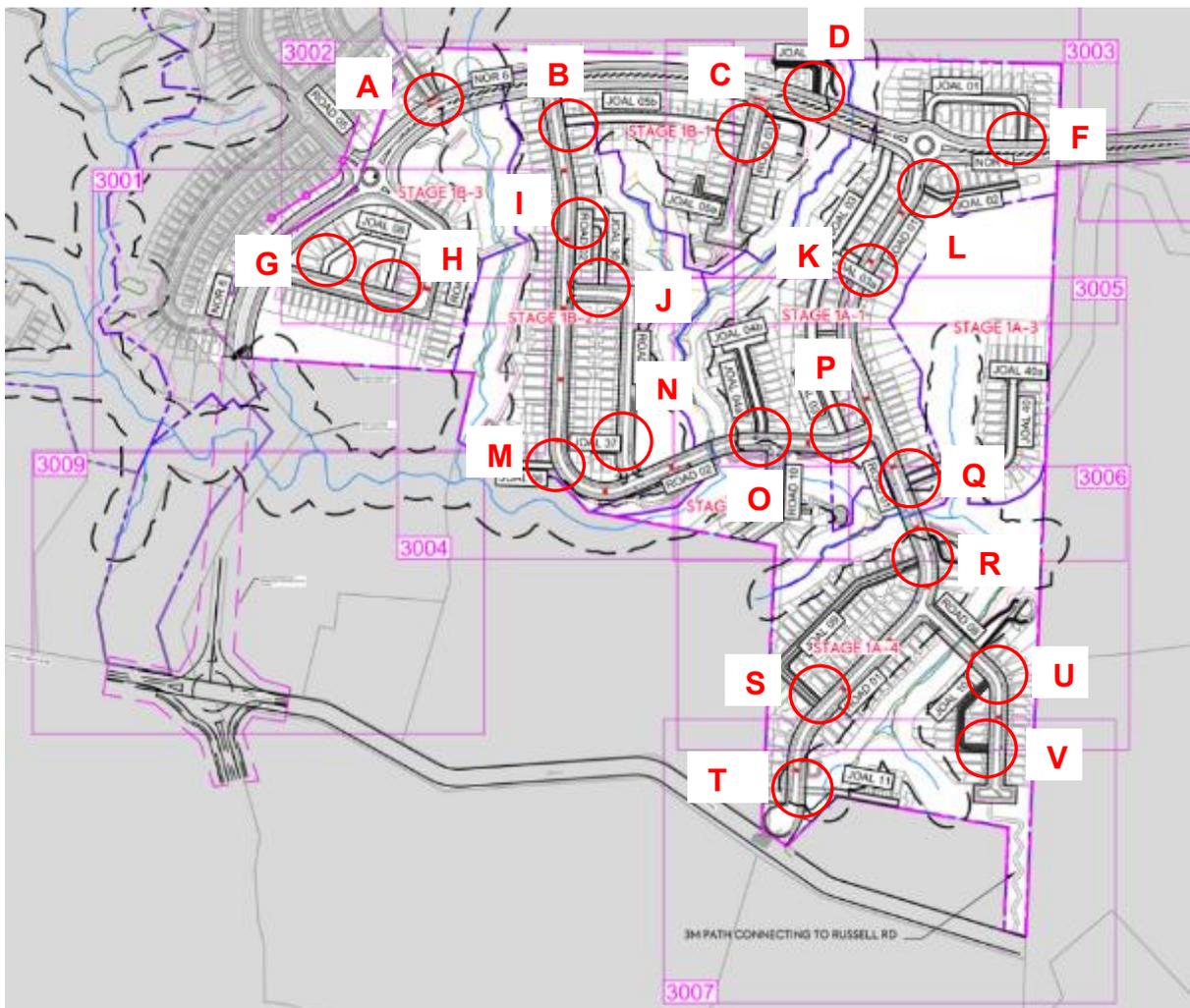
All proposed roundabouts have been designed to include a maximum 55m deflection radius at all entries which complies with Austroads requirements.

### 9.3 LOCAL JOAL INTERSECTIONS

#### 9.3.1 STAGE 1

A total of 19 Local Joal intersections have been proposed within stage 1, with all intersections characterised as JOAL / local Road or JOAL / collector Road ‘T’ intersections. These local JOAL intersections are shown in Figure 43 below.

Figure 43. Stage 1 proposed JOAL / local road Intersection locations



### 9.3.1.1 SAFE INTERSECTION SIGHT DISTANCE (SISD)

Safe Intersection Sight Distance (SISD) is the minimum distance that should be provided on the major road at any intersection, for a driver on the major road to observe a vehicle moving into a collision position from the minor road and to decelerate to a stop before reaching the collision point.

While the proposed local roads have an intended posted speed limit of 50km/hr, they have been designed to be lower operating speed roads (30-40km/hr) with the provisions for traffic calming devices such as speed tables. As such, sight distance has been calculated based on 30km/h, which is considered a conservative operating speed of the road.

Sight distance for locations where JOAL's intersect with collector roads has been calculated based on 50km/h.

The Austroads: Guide to Road Design Part 4A Table 3.2 requires for intersections on a 30 km/h carriageway that a safe sight distance of 52m be provided and for a 50 km/h carriageway that a safe sight distance of 97m is provided.

Table 10 shows the SISD provided at each proposed JOAL intersection and the compliance based on the SISD recommendation of 52m or 97m.

**Table 10: Stage 1 Safe Intersection Sight Distance at all JOAL / local road intersections**

Intersection	Recommended SISD	SISD northern/western direction	SISD southern/eastern direction	Compliance
<b>A</b>	97	97+ metres	97+ metres	Yes
<b>B</b>	52	39 metres to Intersection	52+ metres	Yes (To intersection)
<b>C</b>	52	43 metres (to intersection)	52+ metres	Yes (To intersection)
<b>D</b>	97	97+ metres	97+ metres	Yes
<b>F</b>	97	97+ metres	97+ metres	Yes
<b>G</b>	52	52+ metres	52+ metres	Yes
<b>H</b>	52	52+ metres	38 metres to corner	Yes (To corner & planned speed management)
<b>I</b>	52	52+ metres	52+ metres	Yes
<b>J</b>	52	38 metres to intersection	34 metres to corner	Yes (To intersection or corner with planned speed management)
<b>K</b>	97	97+ metres	97+ metres	Yes

<b>L</b>	97	38 metres to intersection	97+ metres	Yes (To intersection)
<b>M</b>	52	52+ metres	52+ metres	Yes
<b>N</b>	52	52+ metres	30 metres, to corner	Yes (To corner)
<b>O</b>	52	52+ metres	52+ metres	Yes
<b>P</b>	52	52+ metres	40 metres to intersection	Yes (To intersection)
<b>Q</b>	97	97+ metres	97+ metres	Yes
<b>R</b>	97	Entry only	61 metres	No
<b>S</b>	97	97+ metres	97+ metres	Yes
<b>T</b>	97	80 metres	NA	No in western direction
<b>U</b>	52	32 metres to corner	52+ metres	Yes (To corner & planned speed management)
<b>V</b>	52	52+ metres	42 metres to the end of the road	Yes

As shown in the table above, there are a number of intersections do not meet the full minimum SISD recommendation of 52 or 97 metres.

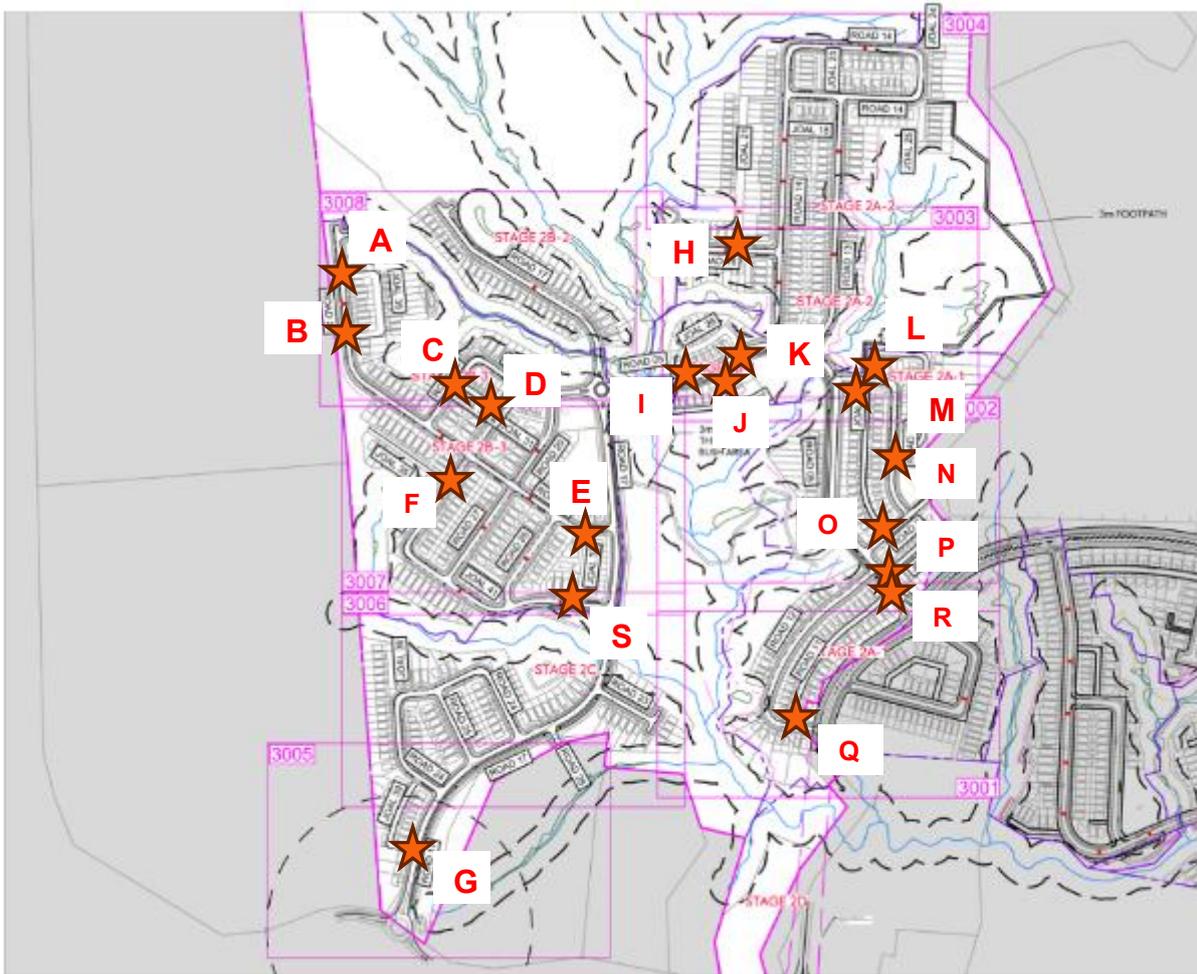
Generally, sight distance is limited is a result of another intersection, corner, or end of road. As vehicles turning corners or into intersections will be travelling at a much slower speed, the lower sight distances are considered to be acceptable in this case.

In other cases where sight distance is limited by adjacent lots, a consent notice is recommended limiting planting and buildings within the consent notice area to ensure compliant sight lines can be provided at all times.

### 9.3.2 STAGE 2

A total of 35 JOAL / local road intersections has been proposed within stage 2, with all intersections characterised as JOAL / local road 'T' intersections. These local road intersections are shown in Figure 44 below. These intersections will be referred to by these labels in this report.

Figure 44. Stage 2 proposed JOAL / Local Road intersection locations



### 9.3.2.1 SAFE INTERSECTION SIGHT DISTANCE (SISD)

Table 11 shows the SISD provided at each proposed JOAL intersection and the compliance based on the SISD requirement of 52m or 97m.

Table 11: Stage 2 Safe Intersection Sight Distance at all JOAL / local road intersections

Intersection		SISD northern/western direction	SISD southern/eastern direction	Compliance
A	52	52+ metres	52+ metres	Yes
B	52	52+ metres	52+ metres	Yes
C	52	37 metres to corner	52+ metres	Yes (To corner)
D	52	44 metres to intersection	52+ metres	Yes (To intersection)

<b>E</b>	52	52+ metres	40 metres (to intersection)	Yes (To intersection)
<b>F</b>	52	42 metres to intersection	52+ metres	Yes (To intersection)
<b>G</b>	97	97+ metres	59 metres (to roundabout)	Yes (To intersection)
<b>H</b>	52	52+ metres	52+ metres	Yes
<b>I</b>	97	97+ metres	97+ metres	Yes
<b>J</b>	97	97+ metres	<b>82 metres</b>	No in eastern direction
<b>K</b>	97	<b>81 metres</b>	97+ metres	No in western direction
<b>L</b>	52	47 metres (to intersection)	35 metres (to corner)	Yes (To intersection or corner)
<b>M</b>	52	52+ metres	30 metres (to corner)	Yes (To corner)
<b>N</b>	52	52+ metres	52+ metres	Yes
<b>O</b>	52	36 metres to intersection	52+ metres	Yes (To intersection)
<b>P</b>	97	97+ metres	65 metres (to roundabout)	Yes (To intersection)
<b>Q</b>	97	27 metres to corner	33 metres to corner	Yes (To corner)
<b>R</b>	97	97+ metres	34 metres (to roundabout)	Yes (To intersection)
<b>S</b>	54	54+ metres	40 metres (to intersection)	Yes (To intersection)

As shown in the table above, many JOAL / Local road intersections do not meet the minimum SISD recommendation of 52 or 97 metres. This non-compliance is assessed below.

Generally, sight distances at JOAL / local road intersections are reduced due to intersections or corners; therefore, the lower sight distance values can be considered to be acceptable as vehicles will be travelling at lower speeds when turning the corner or exiting an intersection, combined with traffic calming measures. This is considered to be acceptable from a traffic perspective.

A consent notice is recommended for intersections J and K limiting planting and buildings within the consent notice area to ensure compliant sight lines can be provided at all times.

## 9.4 VERTICAL ALIGNMENT

Vertical alignment is the longitudinal profile along the centreline of a road. It is made up of a series of grades forming a vertical curve. The grades are generally expressed as a percentage of the vertical component divided by the horizontal component.

The vertical curves are usually parabolic in shape and are expressed as a K value. The K value is the vertical curve constant, used to define the size of a parabola. It is the length (m) required for a 1% change of grade.

NZS4404:2010 provides no K-values for roads. In this regard, the Austroads Guide to Road Design Part 3: Geometric design, Table 8.7 and Figure 8.9 gives K values for crest and sag curves respectively which are outlined in Table 12 below.

**Table 12: Minimum K-values for a crest and sag (requirements)**

Minimum K-values	Crest	Sag
<b>40km/hr</b>	Desirable minimum: 3.5 Absolute minimum: 2.9	Desirable minimum: 3 Absolute minimum: 1
<b>50 km/hr</b>	Desirable minimum: 6.8 Absolute minimum: 5.4	Desirable minimum: 4 Absolute minimum: 2

The civil design long sections generally show all roads meet the desirable minimum for 50km/hr with the speed calming provided.

*A condition of consent is recommended requiring that K-values of the proposed roads will be rechecked at EPA stage to comply with the above Austroads requirements.*

## 9.5 LONGITUDINAL GRADIENTS

With reference to the Auckland Transport TDM *“the maximum longitudinal grade accepted by Auckland Transport for new footpaths is 8%. This is to ensure that all new footpaths can be accessed by users with mobility impairments. Any footpaths above this gradient up to the legal limit of 12.5% must be assessed through the departure of standard process.”*

In this regard, with reference to the Civil Engineering *“Delmore Access and Roding Report”* the steepest grade on the arterial road (NoR6) is 8% which is considered to be acceptable and meets Auckland Transport requirements. The steepest gradient on the local or collector roads is 12.5% which exceeds the ATDM requirement of 8% for footpaths; however, these are considered acceptable due to:

- They are generally small sections / length

- These are local roads and thus do not have specific cycling components
- The site is not flat in nature and thus requires roads to be steeper than 8% to practically gain access;
- 12.5% (1 in 8) meets the legal limit for public road gradients and have been used in local residential streets all over Auckland for a number of years.
- *A condition of consent is recommended requiring a high friction finish on the concrete footpaths with gradients steeper than 8%.*

Figure 45 and Figure 46 below, show the road gradients for both Stage 1 and Stage 2 (including NoR). It is noted that:

- No colour indicates a grade of less than 8%
- Orange indicates a grade of 8-10%
- Red indicates a grade of 10-12.5%

Figure 45: Stage 1 Road Gradients

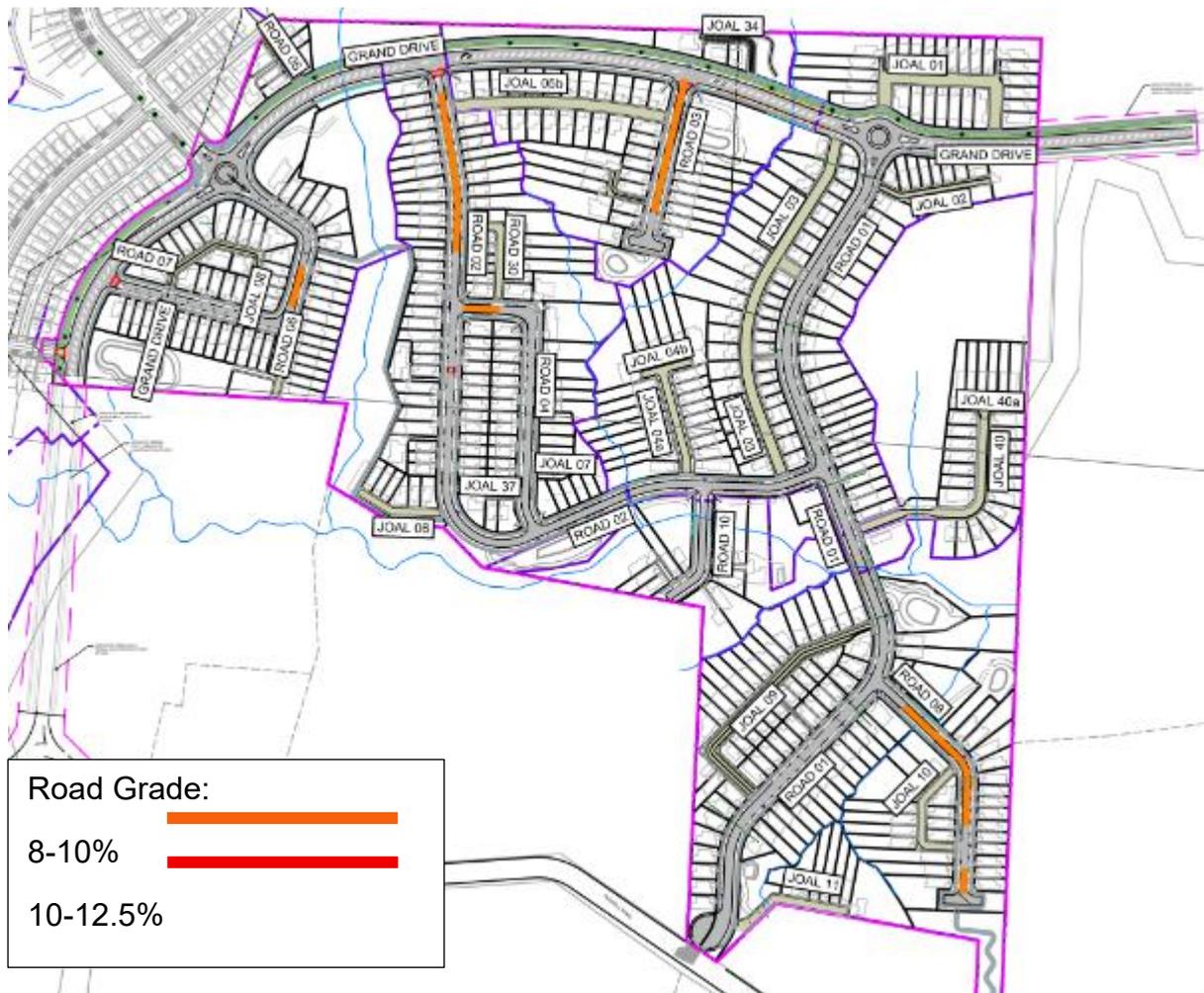
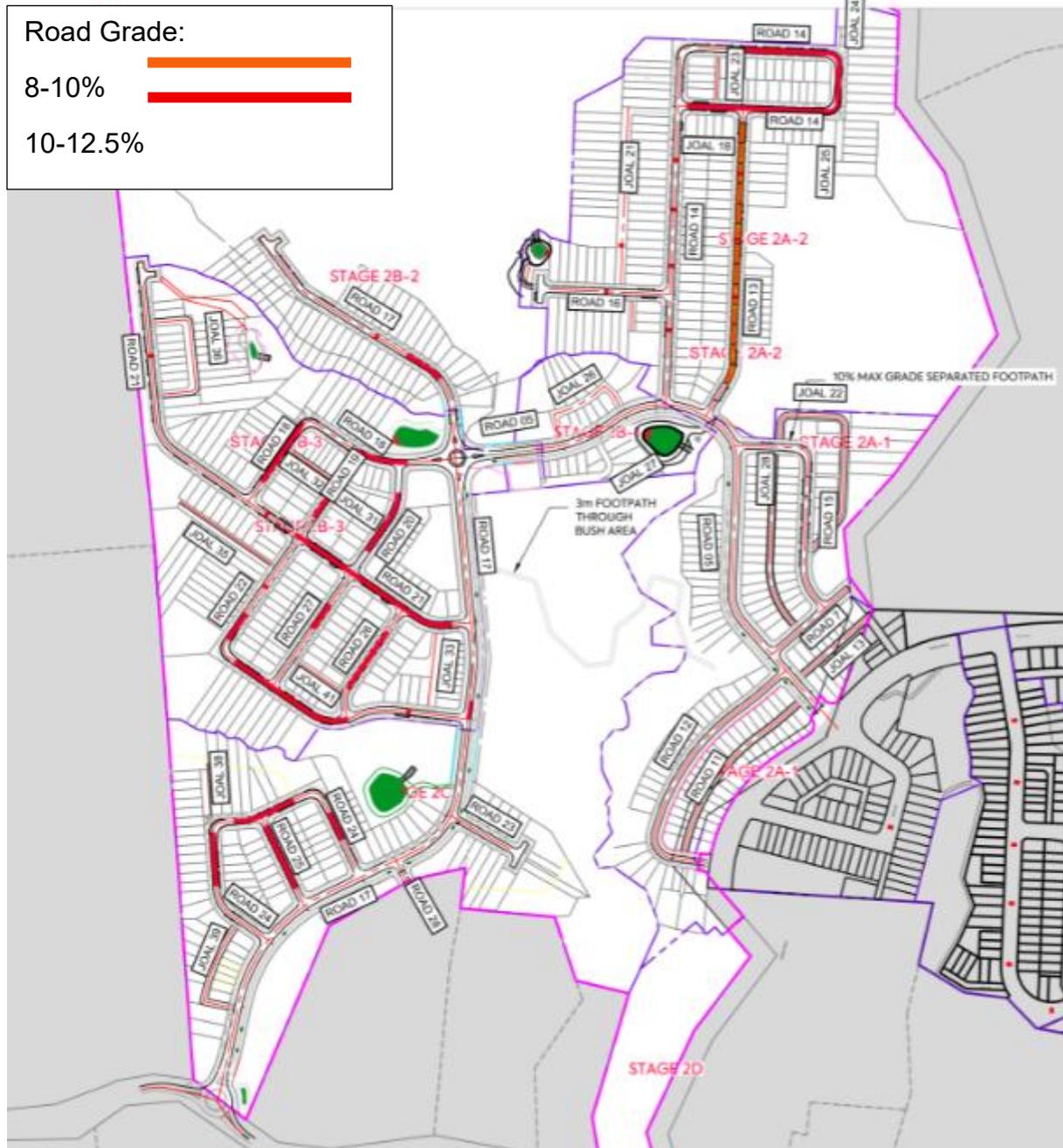


Figure 46: Stage 2 Road Gradients



## 10 PROPERTY ACCESS

### 10.1 GENERAL

Access to individual lots has been provided directly onto the road via individual vehicle crossings, combined vehicle crossings or via JOALs. Vehicle crossings have been combined to minimise crossing points and maximise crossing separation and JOALs have been provided on higher volume roads to minimise the number of vehicle crossings.

The following conditions are proposed with respect to vehicle crossings:

- *All vehicle crossings are designed as per the Auckland Transport Standard GD017A-1B (or VX0103 as per the TDM working draft 14/02/20)*
- *A pedestrian visibility splay of 2m x 2.5m (2m along the property boundary) must be provided on both sides of all the proposed vehicle crossings. Any obstructions including boundary fencing and/or landscaping within the visibility splay areas must not exceed 900mm in height. If fencing is provided above 900mm height stipulation it must be at least 80% visually permeable. Landscaping in the visibility splay area must be trimmed and maintained in perpetuity to comply with the stipulated height by the consent holder*

The following sections outline the applicable AUP access requirements.

## 10.2 PROXIMITY TO INTERSECTIONS

### 10.2.1 REQUIREMENTS

AUP E27.6.4.1(3) states that vehicle crossings should be located to provide a separation distance greater than 10m from an intersection, measured at the property boundary (illustrated in Figure 27.6.4.1.1 of the AUP). Otherwise, the driveway is within the vehicle access restriction, and a restricted discretionary assessment is required.

### 10.2.2 NON-COMPLIANT VEHICLE CROSSINGS STAGE 1

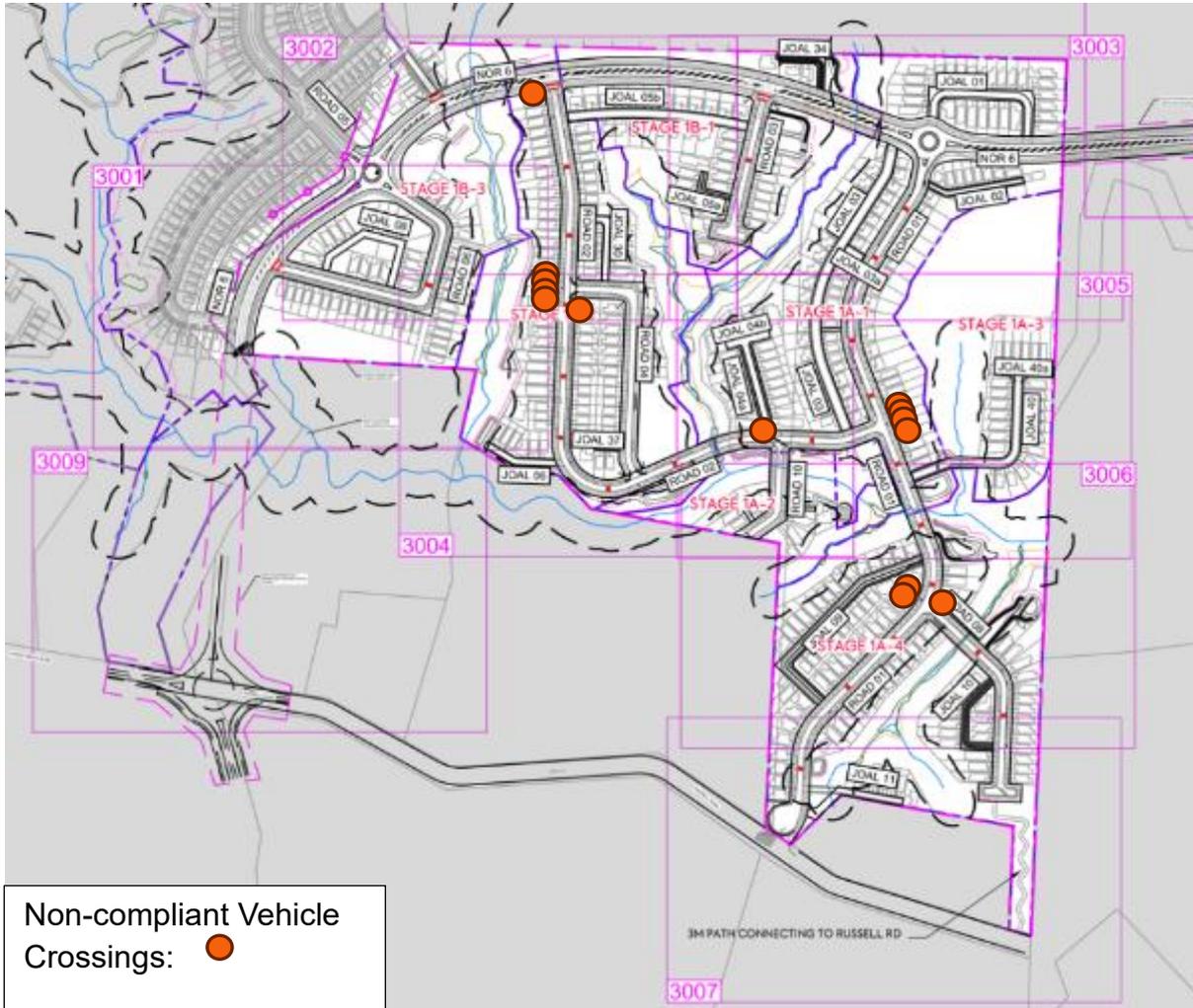
The majority of vehicle crossings have been located outside of the vehicle access restriction area (i.e. greater than 10m). There are 14 proposed crossings as listed in Table 9 and indicated in Figure 47 which do not meet this requirement and thus require resource consent in Stage 1. The majority (14) of these non-compliant vehicle crossings are located on the major road at the top of a T intersection which is discussed below.

**Table 13: Vehicle Crossings Located within 10 metres of an intersection**

Intersection reference	Intersection	Lot/JOAL	
		Located at top of T	Located on minor road
<b>A</b>	Road 1 / Road 2	Lots 49-52	
<b>B</b>	Road 2 / Road 10	JOAL 4	
<b>C</b>	Road 2 / Road 4	Lots 390-393, Lot 321	

<b>D</b>	Road 1 / Road 8	Lot 183 & 184	Lot 227 (9.6m from intersection)
<b>E</b>	Road 2 / N0R 6		Lot 409 (8.3m from intersection)

**Figure 47: Vehicle Crossings Located within 10 metres of an intersection**



### 10.2.3 NON-COMPLIANT VEHICLE CROSSINGS STAGE 2

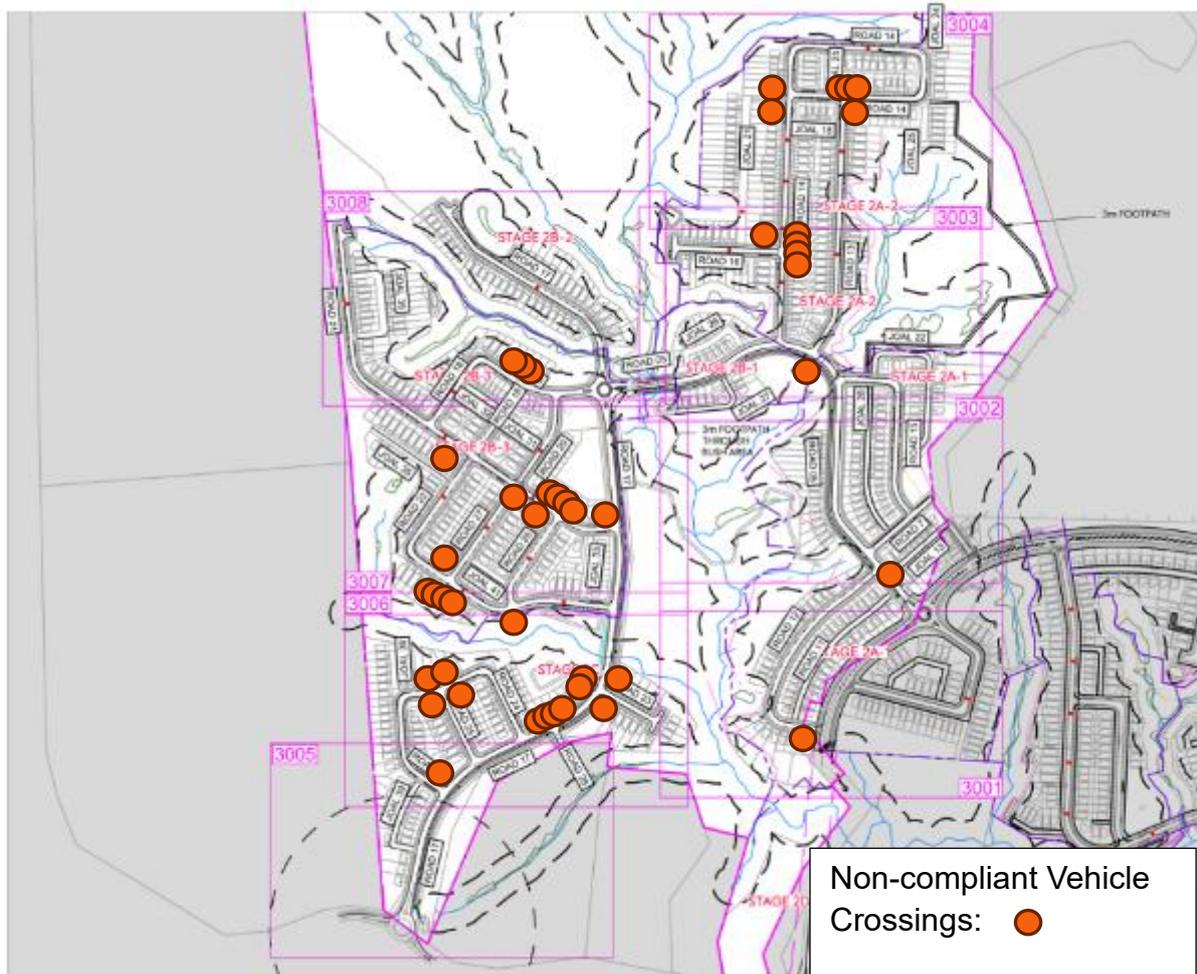
The majority of vehicle crossings have been located outside of the vehicle access restriction area (i.e. greater than 10m). There are 44 proposed non-compliant crossings as listed in as listed in Table 14 and indicated in Figure 48 which do not meet this requirement and thus require resource consent in Stage 2. The majority of the non-complaint vehicle crossings are located on the major road at the top of the T intersection which is discussed below.

**Table 14: Vehicle Crossings Located within 10 metres of an intersection**

Intersection reference	Intersection	Lot/JOAL	Located on the major road	Located on minor road
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<b>A</b>	Road 12 / NoR6		Lot 606 (9m from intersection)
<b>B</b>	Road 5 / Road 12	JOAL 13	
<b>C</b>	Road 13 / Road 5	Lot 1628 (pond)	
<b>D</b>	Road 16 / Road 14	Lot 780-783 & Lot 918	
<b>E</b>	Road 14 / Road 14	Lot 897-898 & Lot 900	
<b>F</b>	Road 14 / Road 13	Lot 882-885 & Lot 845 (9.8m from intersection)	
<b>G</b>	Road 19 / Road 18	Lot 1030-1033	
<b>H</b>	Road 19 / Road 21 / Road 22		Lot 1201 (8.75m from intersection)
<b>I</b>	Road 21 / Road 20 / Road 27		Lot 1174 (9.7m from intersection)
<b>J</b>	Road 21 / Road 26	Lot 1122-1125	Lot 1152 (9.4m from intersection)
<b>K</b>	Road 17 / Road 21		Lot 1127 (9.8m from intersection)
<b>L</b>	Road 26 / Road 22	Lot 1627 (pond)	
<b>M</b>	Road 27 / Road 22	Lot 1232-1234	Lot 1187 (9.3m from intersection)
<b>N</b>	Road 17 / Road 23	1255-1256	Lot 1254 (3.7m from intersection) & Lot 1239 (4.3m from intersection)
<b>O</b>	Road 17 / Road 28	Lot 1259-1263	
<b>P</b>	Road 24 / Road 25	Lot 1273-1275	Lot 1345 (9.1m from intersection) & Lot 1330 (6m from intersection)
<b>Q</b>	Road 17 / Road 24		Lot 1320 (9.5m from intersection)

Figure 48: Vehicle Crossings Located within 10 metres of an intersection

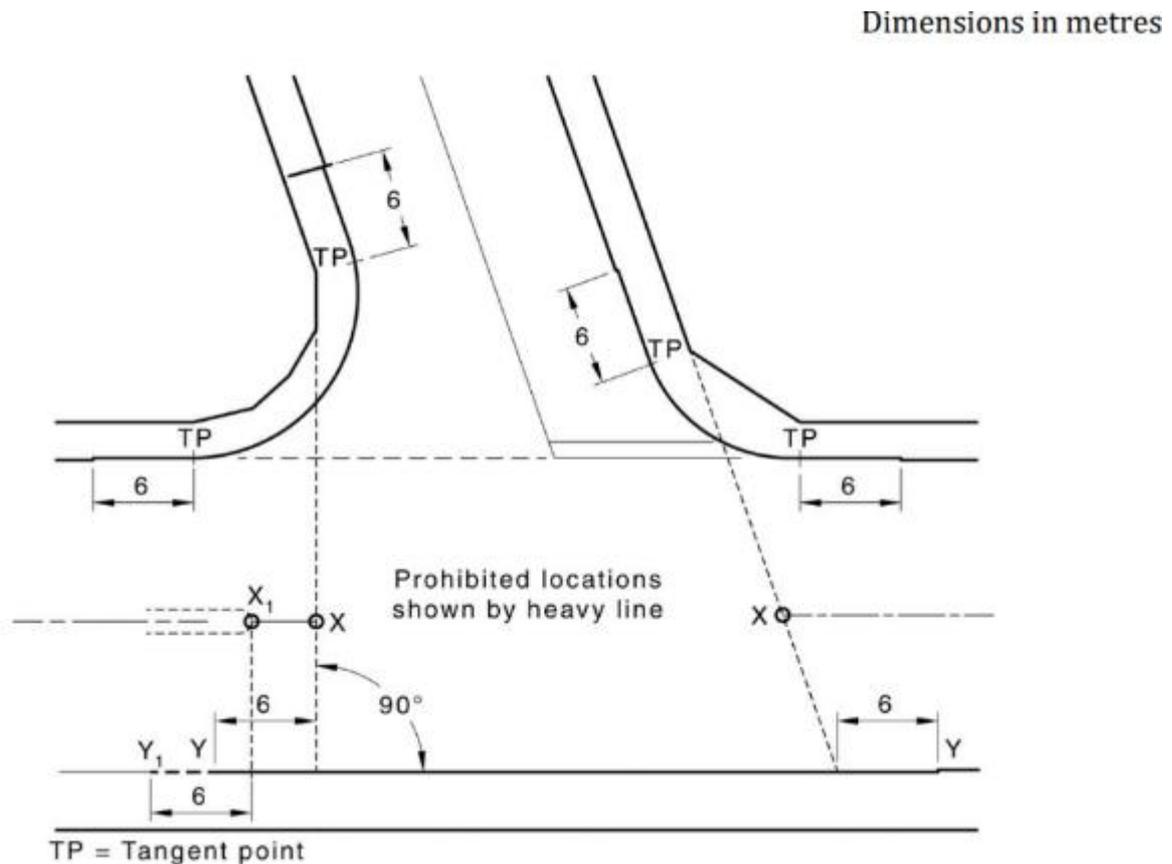


10.2.4 NON-COMPLIANT VEHICLE CROSSINGS ON MAJOR ROAD

In both stages, all driveways located on a major road intersection are located at the top of a 'T' intersection.

In this regard, Figure 3.1 of AS / NZS 2890.1 details prohibited locations for driveways. As seen in Figure 49 below (taken from this standard), domestic driveways located at 'the top of a 'T' are excluded from this prohibition and are considered acceptable. This is due to driveways in this location access domestic driveways are low volume and being opposite the intersection (i.e top of the T) have excellent visibility to the intersection. These have been approved for this reason in most subdivisions in Auckland.

Figure 49: AS / NZS 2890.1 (Figure 3.1)



### 10.2.5 VEHICLE CROSSINGS ON A MINOR ROAD

Table 13 and Table 14 also outlines the vehicle crossings located on a minor road (not located at the top of a 'T' intersection).

The majority of the vehicle crossings located on a minor are located with the furthest possible separation to their respective intersection whilst remaining within the lot boundary. Given that these vehicle crossings have approximately 8-10 metres separation the non-compliance is considered to be minimal and is considered acceptable.

Additionally, these crossing locations are considered acceptable for the following reasons:

- Given the local and slow speed road environment proposed the location of these vehicle crossings are considered acceptable and will be able to operate safely. The local and slow speed road environment, as a result of speed calming measures, will provide any exiting vehicles with sufficient visibility of oncoming vehicles (SISD) and for oncoming vehicles to see exiting vehicles (ASD) the locations of these vehicle crossings are considered acceptable and will be able to operate safely.

- For the majority of vehicle crossings located within 10 metres of the intersection, the lot boundary is located entirely within 10 metres of the nearby intersection. In most instances, the vehicle crossing has been located as far away from the intersection as is practicable whilst keeping with the lot boundaries.
- *A condition of consent is recommended requiring a pedestrian visibility splay of 2m x 2.5m (2m along the property boundary) on both sides of all the proposed vehicle crossings. Any obstructions including boundary fencing and/or landscaping within the visibility splay areas should not exceed 900mm in height. If fencing is provided above 900mm height stipulation it must be at least 80% visually permeable.*
- For vehicle crossings on a minor road, the sight distance from the minor road approach is sufficient given the straight horizontal alignment. For sight distance towards the intersection (major road), vehicles will be turning into a minor road at a very slow speed (10-15km/hr) in order to navigate the turn. As such, the available sight distance is unlikely to factor into conflict between vehicles egressing the site and oncoming vehicles.
- For Lot 1330 the intersection distance is reduced due to the lot boundaries, the distance to the kerb is ~14m and thus deemed acceptable. For Lots 1254 and,1239 it is noted that the distance to the main road kerb is over 14m due to the presence of the separated cycle path. As such these are considered acceptable.

## 10.3 VEHICLE CROSSING NUMBER AND WIDTHS

### 10.3.1 REQUIREMENTS

It is recognised that the underlying zoning is rural and thus technically the rural standards of the AUP apply. In this regard the rural standard is a minimum driveway width of 3m and maximum of 6m. As such technically all single width driveways do not comply with this rural standard. However, given the site will in fact be urban in nature, it is considered the urban standards are more applicable and an assessment against these standards has been undertaken.

Table E27.6.4.2.1 (T146) of the AUP indicates that one vehicle crossing is a permitted activity per 25m of road frontage. Vehicle crossings should be separated by a minimum of 6m when serving the same site and a minimum of 2m when serving adjacent sites. Two vehicle crossings can be combined (thus have no separation) providing the total width of the crossing does not exceed 6m.

Table E27.6.4.3.2 of the AUP outlines the dimensional requirements for vehicle crossing and access widths in residential zones as follows:

**Table 15: Unitary Plan vehicle crossing dimensional requirements**

Zone	No. of parking spaces served	Minimum width of crossing at site boundary	Maximum width of crossing at site boundary	Minimum formed access width
Residential	1 or 2 parking spaces	2.75m	3.0m	2.5m, provided is contained within a clear corridor 3m wide
	3 to 9 parking spaces	3.0m (one-way)	3.5m (one-way)	3.0m, provided is contained within a clear corridor 3.5m wide
	10 or more parking spaces	5.5m (two-way)	6.0m (two-way)	5.5m (two-way)

With reference to Table E27.6.4.2.1 (T146) of the AUP, two crossings on adjacent sites can be combined where they do not exceed a total width of 6 m at the property boundary.

### 10.3.2 NUMBER OF DRIVEWAYS

As noted above, Table E27.6.4.2.1 specifies that one driveway per 25 m of frontage (or part thereof) needs to be provided for residential sites to be a permitted activity.

Approximately 1,213 dwellings are provided on site. 748 dwellings are within 'front lots' and gain direct access off the fronting roads. The remaining dwellings are served by JOALs (465 dwellings served by 37 JOALs).

Based on the above, the overall development site does not comply with the maximum of one crossing per 25m of road frontage permitted activity rule outlined in the AUP. However, this assessment is based on considering the development site as a whole, whereas in reality, dwellings will be located within their own lots (sites) and therefore the AUP requirements can be satisfied after subdivision (with maximum one crossing proposed for each subdivided lot). The number of vehicle crossings is not considered to be excessive and is typical of many high density developments.

In terms of pedestrian safety:

- Where possible driveways have been combined;
- All proposed vehicle crossings comply with the minimum separation distance requirements, therefore, provides the necessary ability for pedestrians to have a 'refuge' between crossings;
- *A condition of consent is recommended requiring vehicle crossings to be constructed as per the Auckland Transport Standard GD017A-1B or (VX0103 as per the TDM working draft, 14/02/20); and*

- *A condition of consent is recommended requiring pedestrian visibility splays of 2m x 2.5m (2m along the property boundary) must be provided on both sides of all the proposed vehicle crossings. Any obstructions including boundary fencing and/or landscaping within the visibility splay areas must not exceed 900mm in height. If fencing is provided above 900mm height stipulation it must be at least 80% visually permeable. Landscaping in the visibility splay area must be trimmed and maintained in perpetuity to comply with the stipulated height by the consent holder.*

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### 10.3.3 INDIVIDUAL LOTS

Each lot within the site is served by one vehicle crossing leading to 1-2 parking spaces or a parking area serving up to three parking spaces. All vehicle crossings are designed in accordance with one of three vehicle crossing options:

- a single 2.75m – 3.5m wide vehicle crossing, serving that lot only and separated from any adjacent vehicle crossings by at least 2m;
- a double 5.5m – 6.0m wide vehicle crossing, serving that lot only and separated from any adjacent vehicle crossings by at least 2.0m; and
- a combined vehicle crossing (with the neighbouring lot), maximum 6.0m wide at the property boundary with 0m separation between lots.

Overall, all proposed vehicle crossings serving individual lots comply with the AUP dimensional permitted activity requirements and are considered acceptable except for.

- Lots 120/121 (1.2m separation)
- Lots 658/659 (1.4m separation)
- Lots 660/661 (1.4m separation)
- Lots 662/663 (1.4m separation)
- Lots 664/665 (1.4m separation)
- Lots 666/667 (1.4m separation)
- Lots 668/669 (1.4m separation)

Although these vehicle crossings currently do not comply with the AUP, all vehicle crossings are not located on the boundary and can be shifted or combined.

*A condition of consent is recommended that vehicle crossings not meeting the minimum 2m separation are shifted slightly to allow the 2m separation or more likely each pair above is combined into one 6m wide driveway pair.*

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### 10.3.4 REAR LOTS (SHARED ACCESSWAY / JOALS)

All proposed JOALs have been designed to comply (or exceed width) with the AUP access width requirements.

No JOALs providing a formed width less than 5.5m for more than 50m are proposed which complies with E27.6.4.3 (a) and (b).

All JOALs without direct pedestrian access to a public road include 1.2m wide footpaths.

## 10.4 VEHICLE ACCESS GRADIENTS

### 10.4.1 INDIVIDUAL LOTS

Unitary Plan Rule E27.6.4.4.1 requires that all vehicle accesses be designed so that where the access adjoins the road there is sufficient space on-site for a platform to enable vehicles to stop safely and check for pedestrians and other vehicles prior to exiting. The platform must have a maximum gradient no steeper than 1 in 20 (5 per cent) and a minimum length of 4m. The parking areas themselves should be designed to have a maximum gradient of 1 in 20 (5 per cent).

Further, to avoid the underside of the car striking the ground, the Unitary Plan states that access with a change in gradient exceeding 1 in 8 (greater than 12.5 per cent change) at the summit or a 1 in 6.7 (15 per cent change) at a sag, must include transition sections to achieve adequate ground clearance, (Figure E27.6.4.4.3 of the Unitary Plan). Typically, a transition section requires a minimum length of 2m.

In assessing the effects of not providing the 1:20 platform, we have referred to relevant Australian and New Zealand standards. AS/NZS2890.1<sup>[1]</sup> requires a 1:20 platform for domestic driveways however notes that a maximum gradient of 1:8 can be applied if all three of the following conditions are met:

- (i) *The grade is a downgrade for traffic leaving the property and entering the frontage road.*
- (ii) *The user class is Class 1, 1A or 2 only.*
- (iii) *The maximum car park size is –*
  - (1) *for entry into an arterial road – 25 car spaces, or*
  - (2) *for entry into a local road – 100 car spaces.*

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<sup>[1]</sup> AS/NZS2890.1:2004, Australian/ New Zealand Standard, Parking Facilities Part 1: Off-street car parking, August 2005

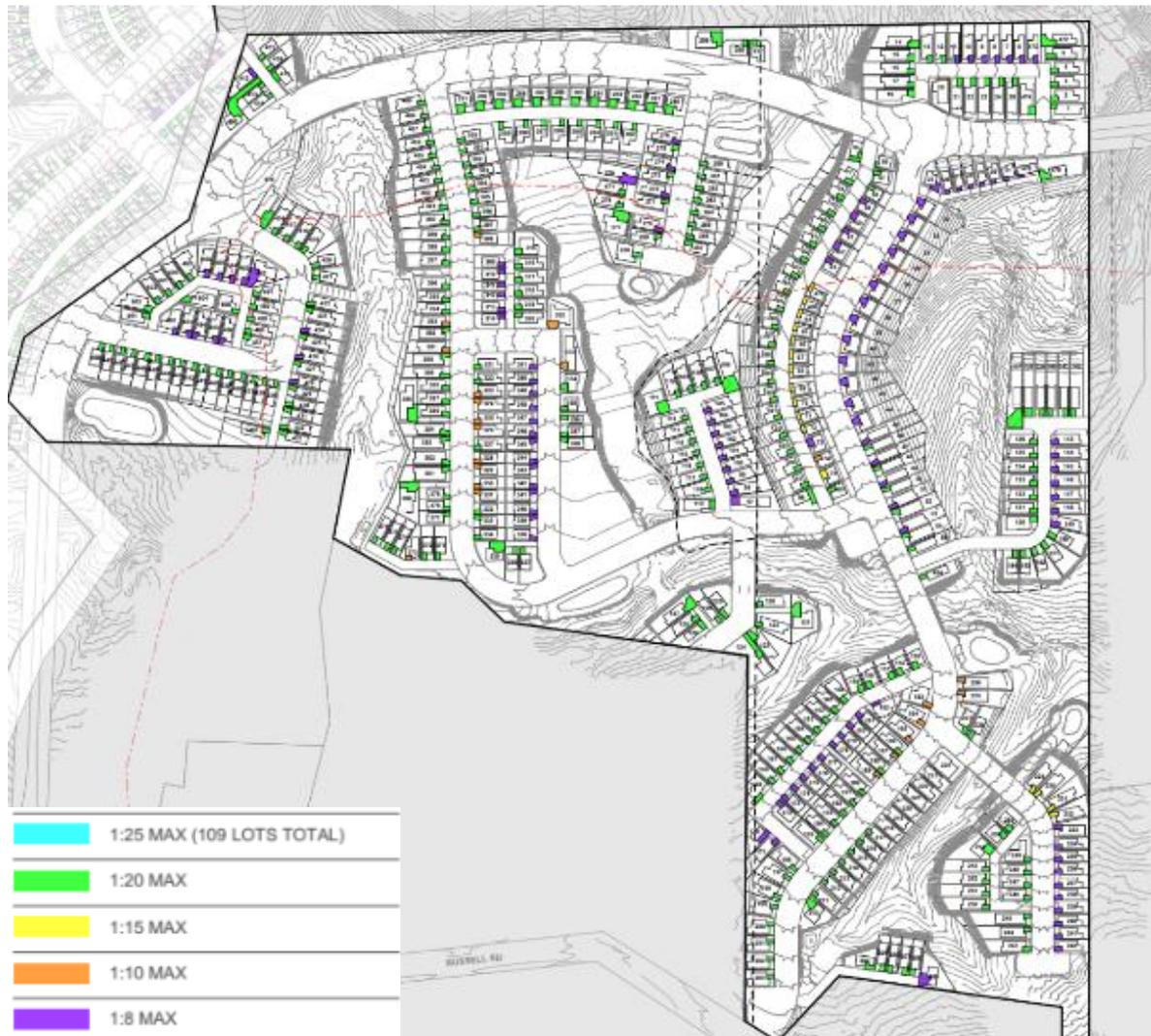
The driveways for the non-compliant lots identified below all provide a downgrade from the site to the fronting road, the user class is Class 1A (*residential, domestic and employee parking*) and the maximum car park size is two parking spaces (fronting a local road). On this basis, Australian and New Zealand standards support the use of 1:8 gradients within the site without a 1:20 platform. Our view is that the effects of the non-provision of the 1:20 platform (with 1:8 provided as a maximum) are acceptable, typical of development on steep topography, and less than minor.

**10.4.1.1 STAGE 1**

The majority of lots proposing a single car pad space will provide a maximum gradient of 1 in 20 along the length of the car pad as per Rule E27.6.3.6 (3) of the Unitary Plan (which satisfies the 1 in 20 safety platform requirement).

The non-compliant driveway gradients are indicated in yellow (maximum 1:15), orange (maximum 1:10) and purple (maximum 1:8) below. Detailed plans are provided in the architectural set.

**Figure 50: Non-compliant driveways Stage 1**

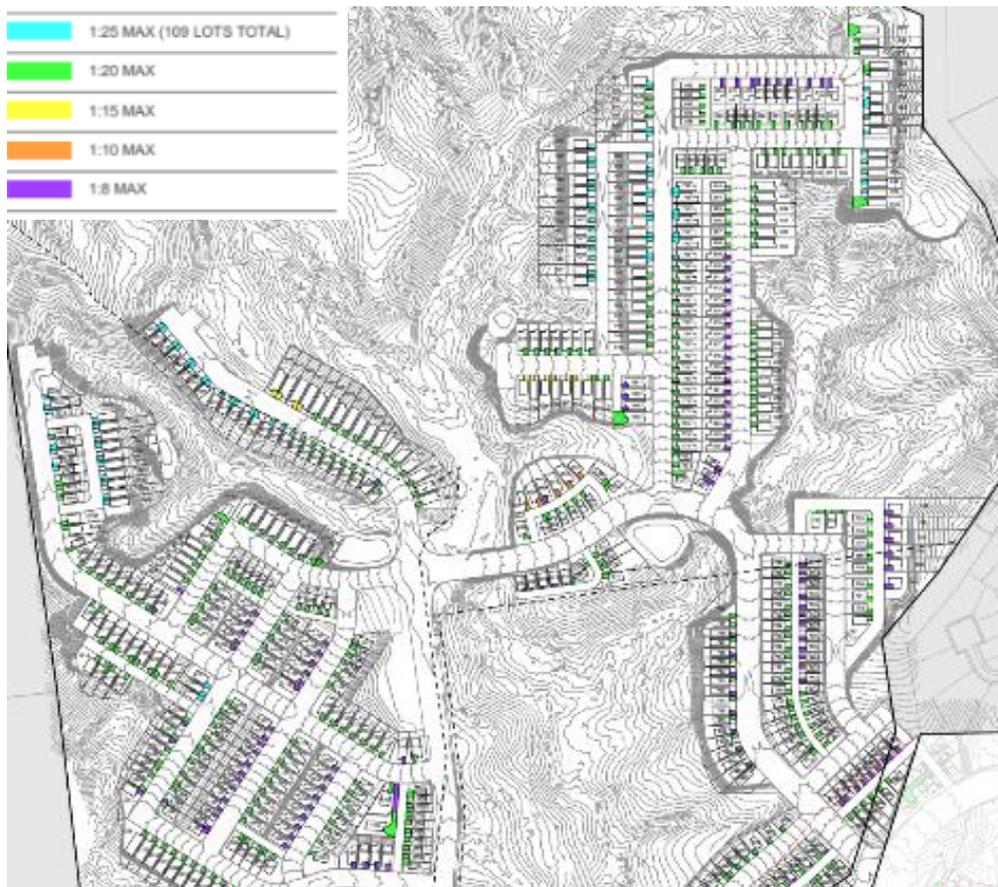


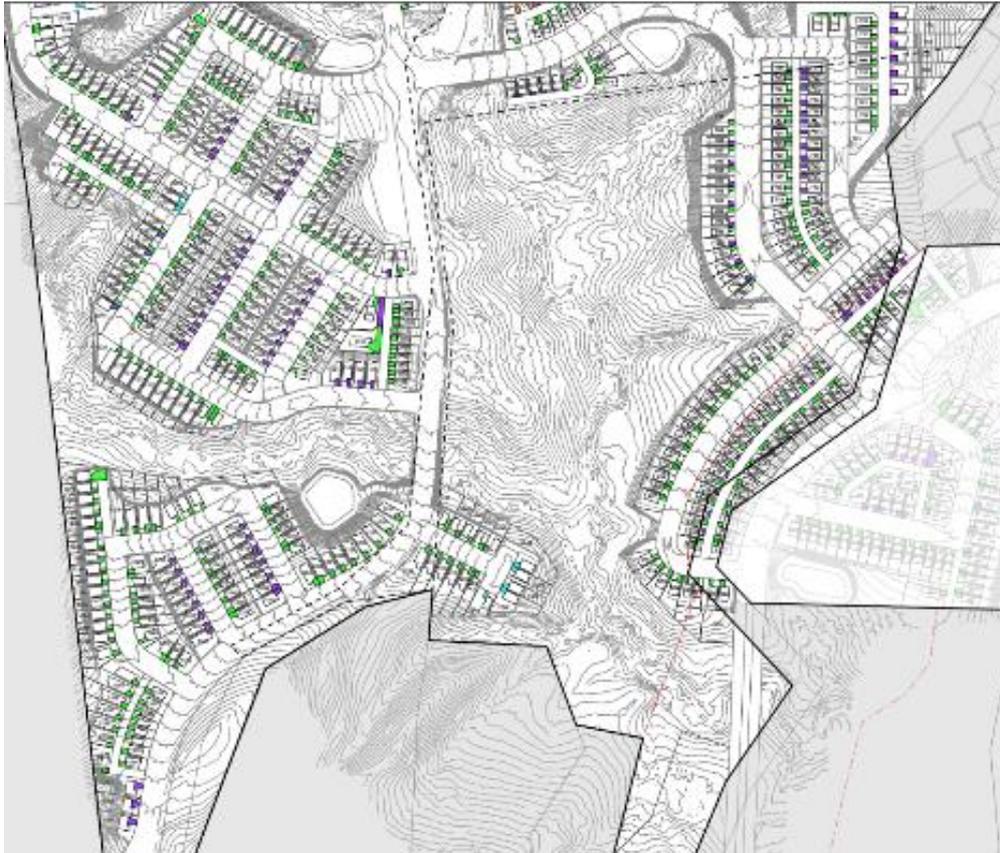
### 10.4.1.2 STAGE 2

The majority of lots proposing a single car pad space will provide a maximum gradient of 1 in 20 along the length of the car pad as per Rule E27.6.3.6 (3) of the Unitary Plan (which satisfies the 1 in 20 safety platform requirement).

The non-compliant driveway gradients are indicated in yellow (maximum 1:15), orange (maximum 1:10) and purple (maximum 1:8) below. Detailed plans are provided in the architectural set.

Figure 51: Non-compliant driveways Stage 2





#### 10.4.2 REAR LOTS (SHARED ACCESSWAY / JOALS)

The gradients along the proposed JOAL have been assessed based on the 'Delmore Access and Roding Report' plans prepared by McKenzie & Co.

The proposed JOALS have been designed to have at least a 4m platform with a maximum grade of 5% adjacent to the road reserve, thus meeting AUP requirements.

## 11 PARKING

### 11.1 PARKING PROVISIONS

Each lot is supported by at least one of the following parking provision options:

- One at-grade uncovered parking pad;
- A single garage space; or
- A single garage space with a secondary at-grade uncovered parking pad (stacked).

In addition, some on-street parking spaces will also be provided throughout the site.

## 11.2 PARKING DIMENSIONS

Table E27.6.3.1.1 of the AUP sets out the minimum permitted activity car parking space and manoeuvring dimensions for “regular users”. As such for resident parking spaces, the following dimensional requirements are set out in Table 12.

**Table 16: Parking Dimensions**

User Type	Space Width	Space length	Manoeuvring Aisle
Regular 90-degree parking space	2.4m	5m	7.1m
	2.5m		6.7m
	2.6m		6.3m
	2.7m		5.9m
0 degrees (parallel)	6m	2.4m	3.7m

All proposed parking spaces have compliant space width and space length.

For all parking spaces accessed via the road, the manoeuvring width meeting AUP permitted activity requirements.

For all vehicles accessed off JOALs, the proposed JOAL widths generally provide sufficient manoeuvring width.

Vehicle tracking has been undertaken on the most difficult to access spaces proposed on the JOALs to determine their accessibility. **Appendix F** shows vehicle tracking for an 85<sup>th</sup> percentile Unitary Plan car accessing these spaces, which are all considered acceptable and comply with the AUP.

## 11.3 PARKING GRADIENTS

Rule E27.6.3.6 relates to formation and gradients of car parks and their manoeuvring areas and requires that the gradient of all manoeuvring areas does not exceed 1 in 8 (12.5%) and that the gradient within all parking spaces does not exceed 1 in 20 (5%) in any direction and 1 in 25 (4%) for accessible spaces, for these to be permitted

The car park and manoeuvring area gradients have been assessed based on the ‘Stage 1 and 2 Parking Gradients Plan’.

All lots proposing a car pad space provide a maximum gradient of 1 in 20 along the length of the car pad and manoeuvring areas do not exceed a gradient of 1 in 8, thus satisfying the Unitary Plan permitted activity requirements.

JOAL long sections will comply with manoeuvring area requirements and is discussed below.

## 11.4 REVERSE MANOEUVRING

All proposed residential lots not accessed off JOALS, will require vehicles to reverse manoeuvre onto the fronting local road.

Rule E27.6.3.4 in the Unitary Plan outlines the following: “Sufficient space must be provided on the site, so vehicles do not need to reverse off the site or onto the road from any site where any of the following apply:

- Four or more required parking spaces are served by a single access;
- There is more than 30 m between the parking space and the road boundary of the site; or
- Access would be from an arterial road or otherwise within a Vehicle Access Restriction covered in Standard E27.6.4.1.”

The proposed residential lots satisfy all these requirements, with no reversing onto the NoR6 road.

As discussed in 10.2 of this report, 58 vehicle crossings are located within 10m of an intersection (14 in stage 1 and 44 in stage 2), therefore considered a vehicle access restriction. As detailed previously, the crossing locations are considered acceptable from a traffic perspective provided the following condition is implemented:

*A pedestrian visibility splay of 2m x 2.5m (2m along the property boundary) must be provided on both sides of all the proposed vehicle crossings. Any obstructions including boundary fencing and/or landscaping within the visibility splay areas must not exceed 900mm in height. If fencing is provided above 900mm height stipulation it must be at least 80% visually permeable. Landscaping in the visibility splay area must be trimmed and maintained in perpetuity to comply with the stipulated height by the consent holder.*

Provided the above is implemented, it is considered acceptable for vehicles to reverse manoeuvre out of these crossings onto the fronting road.

Vehicle tracking has been checked using an 85th percentile Unitary Plan car to ensure that manoeuvring into and out of the crossings is workable with any road. This is provided in **Appendix F**.

The above non-compliance is assessed against the criteria outlines in Rule E27.8.2(8) of the Unitary Plan and is provided in table A-3.

## 11.5 CYCLE PARKING

Secure garages to secure a bicycle will be provided for dwellings. This is further discussed in the PC 79 assessment in **Appendix A**.

## 11.6 VERTICAL CLEARANCE

Under the AUP rule E27.6.3.5 a minimum clearance between the formed surface and the structure must be:

- 2.1m where access and/or parking for cars is provided for residential activities;
- 2.3m where access and/or parking for cars is provided for all other activities;
- 2.5m where access and/or accessible parking for people with disabilities is provided; or
- 3.8m where loading is required.

All garages have at least 2.1m vertical clearance; therefore, there will be no vertical clearance concerns for this development.

## 12 SERVICING / LOADING

### 12.1 GENERAL

Servicing requirements for residential activity are typically minimal and generally limited to public rubbish collection and occasional deliveries (e.g. furniture or appliances). These can be easily accommodated on-street.

Occasional servicing (deliveries) by heavy vehicles may occur (e.g. deliveries of furniture / appliances). Such events can be accommodated within the proposed internal road network.

In terms of waste management strategy, it is anticipated that all residential lots will be serviced by public on-street kerbside collection (using the Auckland Transport 10.3m truck). Waste management should be confirmed for the lots accessed via JOALs in later stages of the development.

### 12.2 UNITARY PLAN

For residential activity the Unitary Plan (Table E27.6.2.7) does not require a dedicated loading space unless the activity on the site exceed 5,000sqm. No residential sites created by the proposal exceed 5,000sqm.

### 12.3 PC79 REQUIREMENTS

Table E27.6.2.7A within PC79 specifies requirements for small loading spaces:

- For developments where all dwellings have individual pedestrian access directly from a public road, no loading spaces is required;
- Up to nine dwellings without individual pedestrian access directly from a public road does not require a loading spaces;

- More than nine dwellings up to 5,000 sqm without individual pedestrian access directly from a public road requires a single loading space; and
- GFA greater than 5,000 sqm does not require a small loading space however requires a full size loading bay.

It is noted that the above requirements only apply where JOALs access arterial roads (NoR6).

An assessment of each JOAL against the above requirements can be seen In **Appendix B**. Overall only JOAL 1 in Stage 1 is required to provide a small loading space as it gains access from the NoR 6 Road for more than nine dwellings; therefore, it is recommended that a small loading space is provided on JOAL 1.

## 13 WASTEWATER REMOVAL

### 13.1 GENERAL

Apex Water has prepared a Water and Wastewater Design Report relating to the development of private, on-site wastewater treatment and discharge infrastructure for the development.

The two scenarios detailed in the Apex report are as follows:

**Scenario 1** – *Treated wastewater to be trucked off-site, up to a maximum of 475 lots. This is only required for a portion of the treated wastewater that cannot be discharged on site during the summer months.*

**Scenario 2** – *Raw wastewater to be trucked off-site, up to a maximum of 475 lots.*

An assessment of the related truck movements and traffic related matters is discussed below. Generally, from a traffic perspective the proposed wastewater treatment plan is considered to have minimal impact on the surrounding transport network and is considered to be acceptable.

### 13.2 REMOVAL OF TREATED WASTEWATER

It is proposed that a truck with a capacity of 28.8m<sup>3</sup> will be used for the transportation of treated wastewater. The truck is based on a Fonterra Truck and Trailer which is approximately 19.5m long.

From the Apex report, the anticipated large truck (19.5m) visits (one entry and one exit movement per visit) for scenarios one and two are as follows:

- Scenario 1 (only required between December – February):
  - Average daily truck visits: 5.4; and
  - Maximum number of daily truck visits: 6.9.

- Scenario 2:
  - Average daily truck visits: 9.

In both Scenario 1 and 2, smaller truck movements visiting the wastewater treatment plant is anticipated to be on average 0.21 trucks per day or about 1 every 5 days. As such, the majority of the truck movements are the large wastewater trucks.

### 13.3 TRUCK ROUTES

The location of the proposed Wastewater Treatment Plant (WWTP) is shown in Figure 52 below. The WWTP will be within Stage 1 of the subdivision, however due to limitations within the roading network (ie it cannot accommodate a large truck and trailer), there will be a remote filling point located on Russell Road.

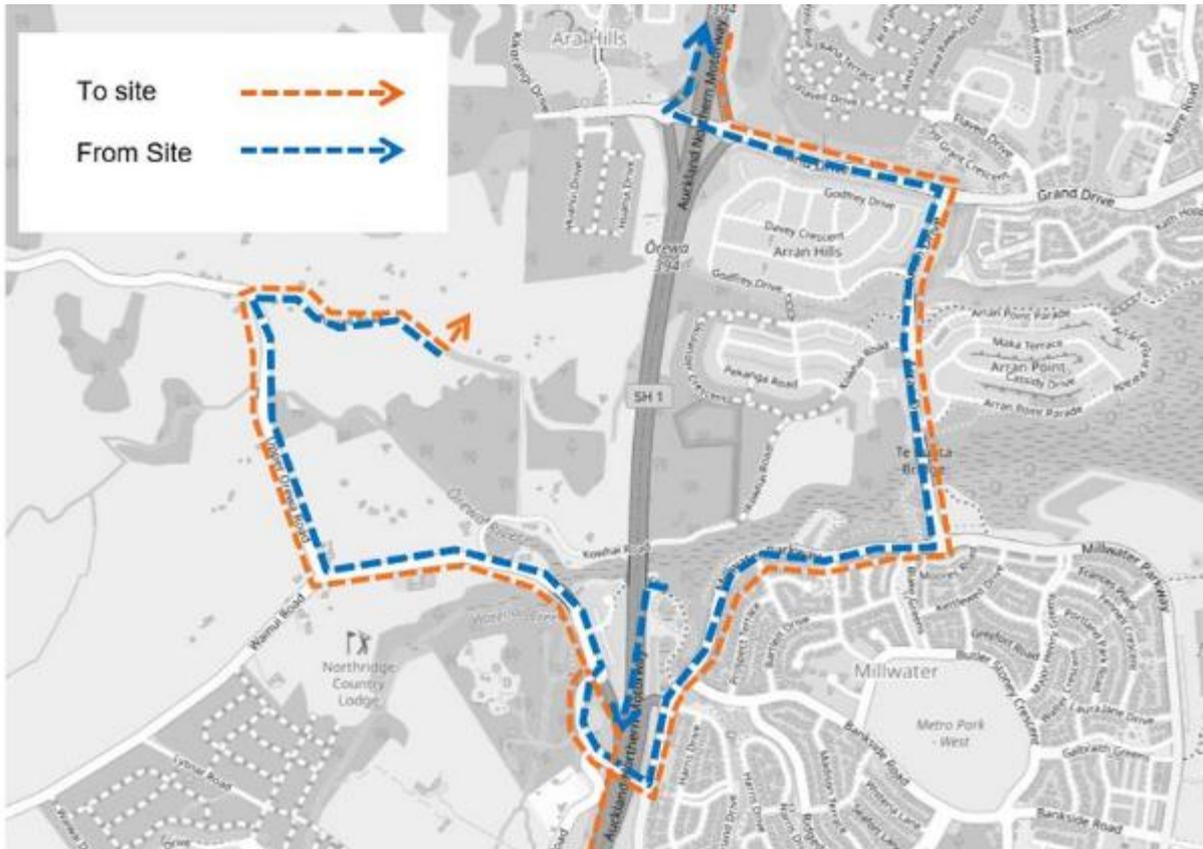
Figure 52: Station Location



The exact location for the disposal of the wastewater is unknown and could be a variety of locations. In all cases however access for large Fonterra/tanker type truck and trailer will be to / from the northern motorway.

Figure 53 below shows the route to / from the northern motorway (to south and north).

Figure 53: Large Truck Routes



The smaller trucks servicing the wastewater treatment plant are anticipated to access the treatment plant through the site via Grand Drive.

Figure 54 below shows the route to and from Grand Drive.

Figure 54: Smaller Truck Routes



### 13.4 OVERALL EFFECTS

In terms of the movement of a large size truck / trailer, it is considered:

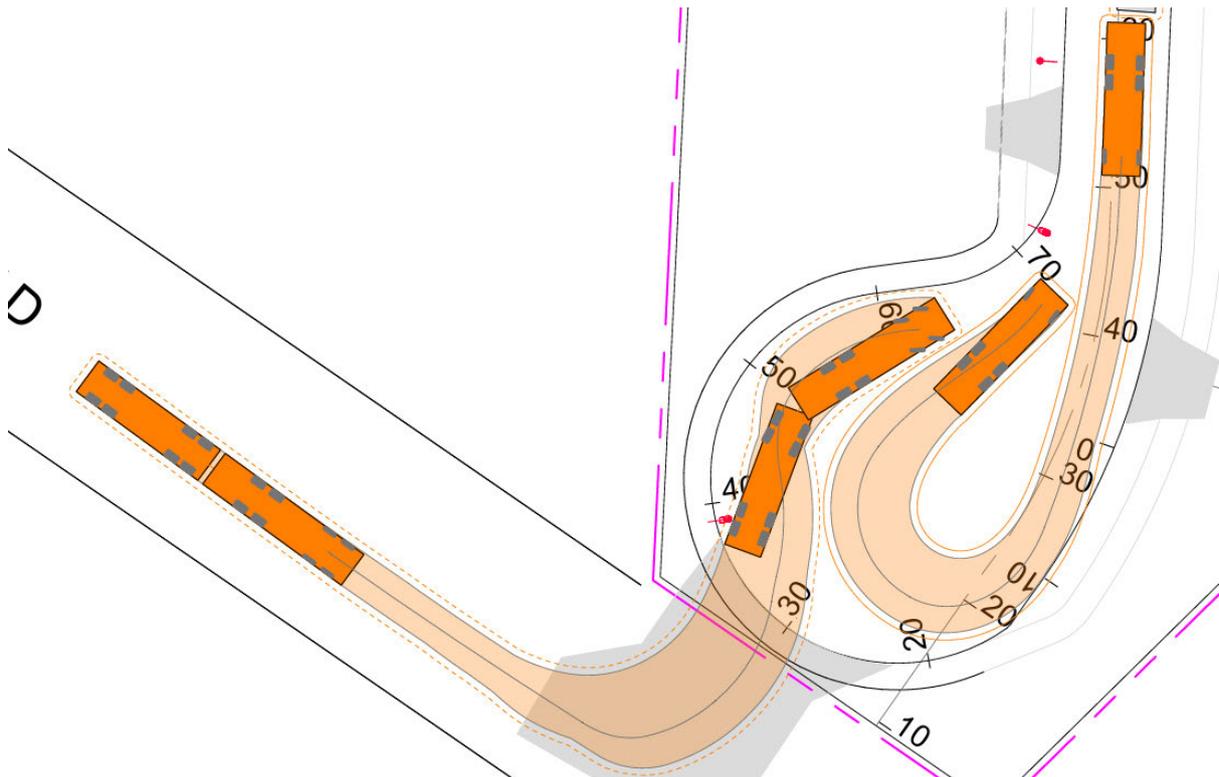
- The motorway network including the associated interchanges are all designed to accommodate these sized vehicles;
- Wainui Road and Upper Orewa Road are able to accommodate large trucks; and
- Russell Road and the intersection with Upper Orewa Road cannot currently accommodate this size truck and an opposing car. As such it is recommended that Russell Road be widened once trucking starts as required based on an on-site assessment. **Appendix F** shows the tracking of the truck/trailer vs a car.

The movement of the smaller trucks within the site to the WWTP location is considered to be acceptable as the site has been designed to accommodate rubbish trucks and the proposed vehicles to the WTTTP will be smaller than the rubbish trucks

Figure 55 shows the on-site arrangement for the large truck / trailers. In terms of traffic engineering:

- The truck will enter the site via Russell Road via a barrier activated by push-button;
- It will then use the proposed (enlarged) cul-de-sac head to stop, fill the truck and turn around;
- It will then exit via the same barrier arm activated by push-button.

Figure 55: On-site arrangement



This arrangement is considered to be acceptable. It is additionally noted that the actual increase in traffic on Russell Road is generally two truck movements per hour (one in and one out), increasing at peak times to a realistic maximum of three truck movements per hour.

This level of increase is considered to be negligible and will not alter the performance of the roading network in any noticeable way.

## 14 CONSTRUCTION

### 14.1 GENERAL

The development site is currently unoccupied for the most part. To facilitate construction, access would be established via Grand Drive.

As is typical with a development of this scale, it is recommended that as part of any resource consent, a Construction Traffic Management Plan (CTMP) should be required as a condition (or an equivalent be required as a component of a Construction Management Plan). It is considered that this Construction Traffic Management Plan should include:

- (i) Construction dates and hours of operation including any specific non-working hours for traffic congestion/noise etc.
- (ii) Truck route diagrams both internal to the site and external to the local road network. This should take into account of the large trucks expected delivering the houses.
- (iii) Temporary traffic management signage/details for both pedestrians and vehicles to appropriately manage the interaction of these road users with heavy construction traffic.
- (iv) Details of site access/egress over the entire construction period. Noting that all egress points to be positioned so that they achieve appropriate site distance as per the Land Transport Safety Authority "Guidelines for visibility at driveways" RTS-6 document.
- (v) Location of construction vehicle parking onsite.

Based on experience of constructing similar projects and bearing in mind capacity within the existing road network, with the appropriate Construction Traffic Management Plan in place and the above measures implemented, it is considered that construction activities can be managed to ensure any generated traffic effects are appropriately mitigated

## 14.2 SITE ACCESS

Construction vehicles are expected to access the site using both the Grand Drive, Upper Ōrewa Road, and Russell Road access. In this regard all three roads have appropriate width to safely and efficiently accommodate heavy vehicles associated with construction of residential dwellings.

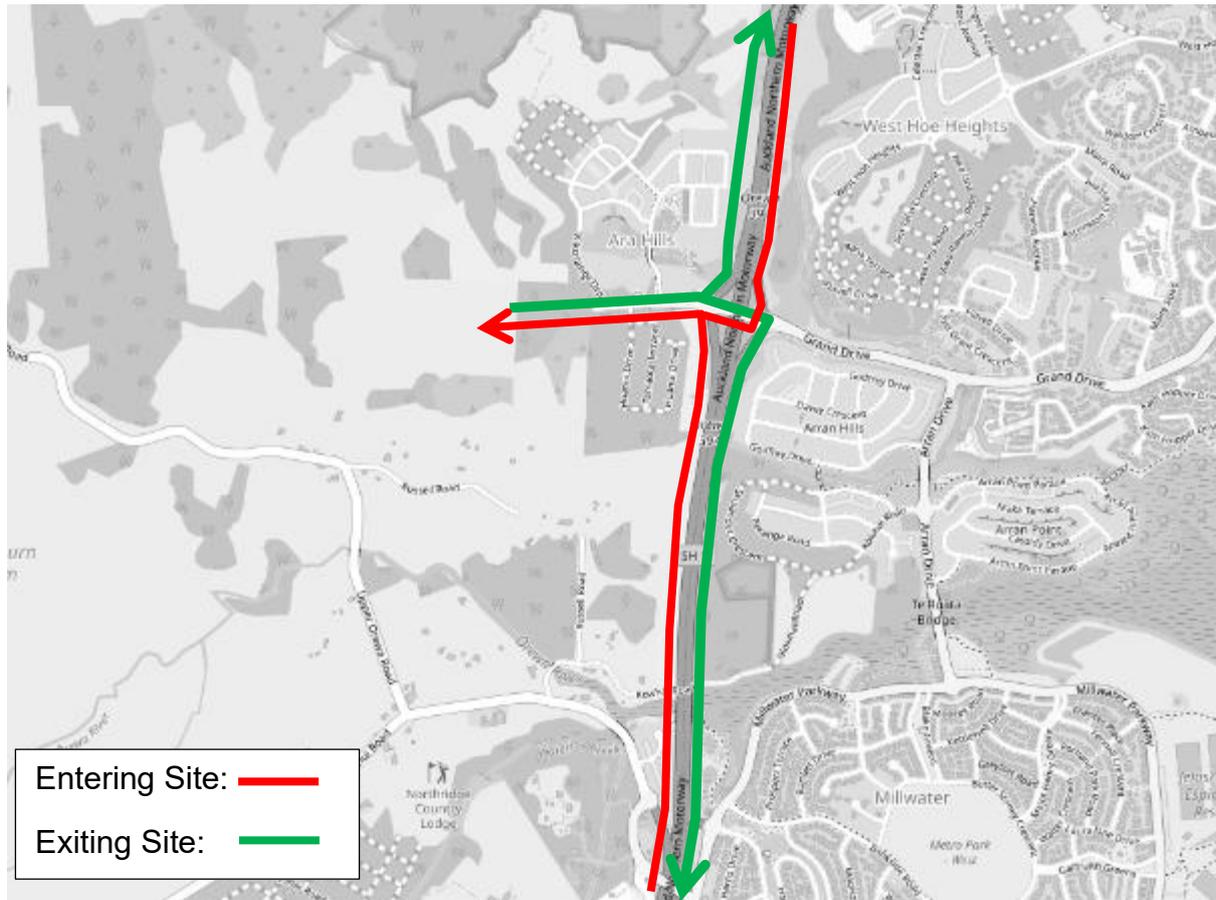
## 14.3 VEHICLES OF WORKERS AND SUBCONTRACTORS

Given the size of the site, construction parking requirements can be accommodated on-site and thus not need to require parking in existing residential areas.

## 14.4 TRUCK ROUTES

Using the strategic freight network map, SH1 is the safest and most efficient route for trucks, routes to and from the site are expected to be focused to and from SH1 as shown in Figure 56.

Figure 56: Routes to and from the SH1



### 14.5 CONSTRUCTION HOURS

Construction hours are expected to be between 7am-7pm Monday to Saturday.

Based on the existing road network no further times restrictions are considered to be required from a traffic / transportation point of view.

### 14.6 CONSRTRUCTION CONCLUSIONS

Based on experience of constructing similar residential development and bearing in mind the capacity within the existing roading network, with the appropriate CTMP in place and the measures implemented by way of a condition of consent, it is considered that construction activities will be managed to ensure an appropriately low level of traffic effects and in accordance with best practice.

The construction activities are temporary and anticipated by the AUP development expectations for the site. The construction traffic effects can be appropriately managed and are considered minimal.

## 15 RECOMMENDED CONDITIONS OF CONSENT

As highlighted in earlier sections of the report, to ensure that the surrounding road network is able to efficiently and safely accommodate the proposed development the following conditions of consent are proposed:

1. *Prior to the occupation of more than 750 dwellings within the Delmore site (1,325 Delmore + Ara Hills dwellings), the intersection of Road 17 and Upper Orewa Road shall be constructed as a single-lane roundabout and designed to achieve sight distances in accordance with Austroads Guide to Road Design Part 4B: Roundabouts Part 4B for 60km/h operating speeds.*
2. *Prior to the opening of the roundabout at Road 17 and Upper Orewa Road, as required by Condition 1, the consent holder must:*
  - a. *Upgrade Upper Orewa Road between Road 17 and Wainui Road to provide minimum 1m sealed shoulders on both sides of the road.*
  - b. *Upgrade the Upper Orewa Road / Wainui Road intersection to provide a right turn bay on Wainui Road and a left turn lane on Upper Orewa Road.*
  - c. *Construct a temporary off-road footpath (minimum 1.8m in width and an all-weather surface) along Upper Orewa Road and Russell Road between the Road 17 / Upper Orewa Road intersection and the end of Russell Road.*

*Advice note: Condition 2(b) upgrades would not be required if the NoR road has been constructed through this intersection, or if upgrades have been undertaken by another party.*

3. *Once development reaches 1,425 dwellings, and prior to the occupation of more than 1,450 within the Delmore and Ara Hills sites, the consent holder must:*
  - a. *Provide a written report to Council, prepared by a suitably qualified traffic engineer, setting out the following:*
    - i. *Results of a survey outlining the level of traffic generated from the Delmore site using the Grand Drive interchange.*
    - ii. *Results of a survey outlining the level of traffic generated from the Delmore site using the Upper Orewa access (from Road 17).*



## 16 IMPLEMENTATION PLAN

As stated above in this report, there are a number of roading and infrastructure projects programmed for the area. Several projects are directly relevant to this site and these are therefore included in the Implementation Plan summarised in Table 17.

**Table 17: Implementation Plan**

Project	Responsibility	Upgrade	Trigger / Timing
<b>Construction of NoR6 road</b>	Developer	Access to the site is provided via NoR6 road	Initial development
<b>New street network through the site</b>	Developer	As the site develops, the internal road network will be required. Pedestrian / cycling provisions to be included.	Any site with frontage to a new street
<b>Public transport</b>	Auckland Transport	A local service should be provided between the site and Hibiscus Station. The wider area would benefit by this service.	Ideally, should be implemented early on given the surrounding area is occupied and lacks public transport

## 17 CONCLUSION

The development is for a residential subdivision and development (approximately 1,213 dwellings) at 53A, 53B, 55 Russell Road and 88, 130 and 132 Upper Ōrewa Road, Ōrewa Auckland. The development includes a new internal road network which will connect to Grand Drive.

Following a review of the development, the following can be concluded:

- The site and surrounding area currently have poor pedestrian and cyclist connectivity to nearby activities, however the Application will bring about significant positive benefits for both the Delmore site and wider network of linking the NoR6 road and Grand Drive for pedestrians, cyclists, and potentially for public transport by providing a new arterial route through the site;
- Generally, no traffic safety issues have been identified near the proposed development. Given the local residential nature of the surrounding roads, the proposed development is considered unlikely to exacerbate the road safety in any way both during construction and once the development is completed;
- The Wainui Road / Upper Orewa Road was identified to exhibit potential safety concerns that could be exacerbated by the proposed Development; however, it is proposed for the Wainui Road / Upper Orewa Road intersection to be upgraded once traffic is linked to Upper Orewa Road which is considered to be appropriate mitigation.
- The key intersection anticipated to be used by residents to access the wider area and road network is that at the Grand Drive interchange with SH1. Intersection modelling shows that the Grand Drive / NoR 6 (roundabout intersection) will be able to accommodate the additional trips generated by the proposed residential development and diverted trips from the surrounding area and will continue to operate acceptably in the future. It is noted that without mitigation or other connections to Upper Orewa Road, the eastern roundabout at the SH1/Grand Drive interchange will be over capacity in the morning peak (Grand Drive east approach); however, this is considered to be acceptable once the additional southern connection to Upper Orewa Road is provided. A further monitoring condition is proposed which will confirm if additional mitigation should be provided (such as an additional left turn lane on the eastern approach to the eastern roundabout or other facilities as required).
- The internal road layout and cross-sections comply with ATDM standards and are considered be appropriate. All vehicle tracking shown in Attachment B is considered acceptable once minor widening has been conducted for some curves and intersections.

- All proposed intersections have been reviewed in relation to the relevant sight distance requirements and have been found to be appropriate to ensure a safe and efficient roading environment subject to mitigation measures proposed via consent conditions;
- The driveway locations are considered appropriate. While a small number do not meet the intersection separation requirement of the AUP, they have all been assessed as appropriate subject to mitigation measures proposed via consent conditions;
- All waste is expected to be accommodated on-street via public or private on JOAL collection; and
- The effects relating to construction are temporary and the site is well positioned for safe and efficient access for construction vehicles.

Overall, there is no transportation reason to preclude acceptance of the development as currently intended, subject to the recommendations and conditions set out above. Accordingly, it is concluded that there are no traffic engineering or transportation planning reasons that would preclude the development of the subject site as proposed.

## APPENDIX A- PLAN CHANGE 79 ASSESSMENT

### PLAN CHANGE 79 ASSESSMENTS

**Table A-1: Plan Change 79 Amendment Assessment**

PC79 ID	Assessment Criteria	Assessment						
18	<p><b>E27.6.1 Tip generation</b></p> <p>(1) Where a development (except where excluded in Standard E27.6.1(2)) exceeds one of the following thresholds:</p> <p>(a) A new development or subdivision in Table E27.6.1.1;</p> <p>(b) 100 v/hr (any hour) for activities not specified in Table E27.6.1.1 requiring a controlled or restricted discretionary land use activity consent in the applicable zone where there are no requirements for an assessment of transport or trip generation effects. This standard does not apply to development activities provided for as permitted in the applicable zone.</p>	<p>The proposed development is for approximately 1213 dwellings and 813 peak hour trips; therefore, exceeds thresholds in Table E27.6.1. of TA1 and T1.</p> <p><b>Requires Assessment.</b></p> <p>The vehicle trip generation assessment is triggered regardless of PC79 and is assessed in Section 6 of this report. The alternative mode assessment is provided after this Table.</p>						
20	<p><b>E27.6.2 Number of parking and loading spaces</b></p> <p>(6) Bicycle parking:</p> <p>(e) The activities specified in Table E27.6.2.5 must provide the minimum number of bicycle parking spaces specified;</p> <p>(aa) For residential developments, the required secure long-stay bicycle parking must be located and designed in a manner that (is):</p> <p>i) Not required of any required outdoor living space or landscaped area;</p> <p>ii) In a location accessible from either the road, vehicle access, pedestrian access or car parking area;</p> <p>iii) Sheltered from the weather;</p> <p>iv) Lockable and secure;</p> <p>xii) The following bicycle parking requirements apply to new buildings and developments.</p> <p><b>Table E27.6.2.5 Required bicycle parking rates</b> (T81)</p> <p><b>Visitor (short-stay) minimum rate</b> 1 per 20 for developments of 20 or more dwellings</p> <p><b>Secure (long-stay) minimum rate</b> 1 per dwelling without a dedicated garage or basement car parking space</p>	<p>Approximately 1213 dwellings are proposed with a garage car parking space. Each dwelling has a dedicated garage; therefore, no dedicated bicycle parks are required.</p> <p>Upon subdivision each Lot will hold a single residential dwelling and therefore no short stay spaces are considered to be required. It is likely that visitors will park their bicycles within the garage of the resident they are visiting.</p> <p>As such, it is considered that the proposed bicycle parking arrangement is satisfactory and compliant.</p> <p><b>Complies.</b></p>						
21	<p><b>E27.6.2 Number of parking and loading spaces</b></p> <p>(8) Number of loading spaces:</p> <p>(a) All activities must provide loading as specified in Table E27.6.2.7.</p> <p>(b) Residential activities where part of the site has frontage to an arterial road as identified on the planning maps, must provide loading as specified in Table E27.6.2.7A</p> <p><b>Table E27.6.2.7A Minimum small loading space requirements</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Activity</th> <th>GFA/Number of dwellings</th> <th>Minimum rate</th> </tr> </thead> <tbody> <tr> <td>(T111B)</td> <td>Developments where all dwellings have individual pedestrian access directly from a public road</td> <td>No loading space required</td> </tr> </tbody> </table>	Activity	GFA/Number of dwellings	Minimum rate	(T111B)	Developments where all dwellings have individual pedestrian access directly from a public road	No loading space required	<p>Upon subdivision one dwelling is proposed per Lot which will not trigger the requirement for loading when assessed as residential activity. Similarly, if assessed as a rural activity no loading is required.</p> <p>Dwellings which front NoR6 are anticipated to have direct pedestrian access to this road.</p> <p>As highlighted in Section 12.3, a small loading area will be provided on JOAL 1 to comply with PC 79 requirements.</p> <p><b>Complies</b></p>
Activity	GFA/Number of dwellings	Minimum rate						
(T111B)	Developments where all dwellings have individual pedestrian access directly from a public road	No loading space required						

	<p>Up to 9 dwellings without individual pedestrian access directly from a public road</p> <p>Greater than 9 dwellings up to 5,000m<sup>2</sup> without individual pedestrian access directly from a public road</p> <p>Greater than 5,000m<sup>2</sup></p> <p>No loading space required</p> <p>1*</p> <p>N/A</p> <p>* Refer to T137A of Table E27.6.3.2.1 Minimum loading space dimensions</p>					
22	<p><b>E27.6.2 (9)</b></p> <p>(9) Fractional spaces:</p> <p>(c) Where the calculation of the permitted parking results in a fractional space, any fraction that is less than one-half will be disregarded and any fraction of one-half or more will be counted as one space. If there are different activities within a development, the parking permitted for each activity must be added together prior to rounding.</p>	<p>Fractional space calculations are considered when assessing PC79.</p> <p><b>Complies.</b></p>				
23	<p><b>E27.6.3.1 Size and location of parking spaces</b></p> <p>(1) Every parking space must:</p> <p>(a) Comply with the minimum dimensions given in Table E27.6.3.1.1 and Figure E27.6.3.1.1; except accessible parking dimensions and accessible route requirements must be designed in accordance with the New Zealand Standard for Design for Access and Mobility – Buildings and Associated Facilities (NZS: 4121-2001).</p>	<p>All proposed car parking spaces comply with the minimum Unitary Plan dimensions.</p> <p><b>Complies.</b></p>				
24	<p><b>E27.6.3.2 Size and location of loading spaces</b></p> <p>(1) Every loading space must:</p> <p>(d) Comply with the following when any yard of a site is used to provide the loading space (where it is permitted within the zone).</p> <p>i) The use of the loading space does not create a traffic hazard on the road at any time; and</p> <p>(e) Have a maximum crossfall of 1:50 (2%) in all directions.</p> <p><b>Table E27.6.3.2.1 Minimum loading space dimensions (T137A)</b></p> <p><b>Activities requiring a small loading space under Standard E27.6.2(8)(b)</b></p> <table border="0"> <tr> <td>Length of loading space(m)</td> <td>6.4</td> </tr> <tr> <td>Width of loading space (m)</td> <td>3.5</td> </tr> </table>	Length of loading space(m)	6.4	Width of loading space (m)	3.5	<p>A single small loading space is required on JOAL 1, which has been provided.</p> <p><b>Complies</b></p>
Length of loading space(m)	6.4					
Width of loading space (m)	3.5					
25	<p><b>E27.6.3.2(A) Accessible parking</b></p> <p>(1) Accessible parking must be provided for all new activities, changes of activity type, and / or the expansion or intensification of an existing activity in all zones, except for those listed below in E27.6.3.2(A)(2);</p> <p>(2) Accessible parking is not required in the following zones, unless car parking is provided on site, in which case the required number of accessible parking spaces must be determined in accordance with Table 1 or Table 2 below, whichever is relevant:</p> <p>Business Zones:</p> <p>(a) Business – City Centre Zone;</p> <p>(b) Business – Metropolitan Centre Zone;</p> <p>(c) Business – Town Centre Zone;</p> <p>(d) Business – Local Centre Zone;</p> <p>(e) Business – Mixed Use Zone;</p> <p>(f) Business – Neighbourhood Centre Zone.</p>	<p>For approximately 1213 dwellings 51 accessible parking spaces are required, which the development does not achieve.</p> <p>Accessible users could utilise the vehicle access to park their vehicle instead of using the garage. Many of the dwellings are anticipated to have a pedestrian path adjacent to the vehicle access (indicated by the front door location), which could be used as a clear zone.</p> <p>A total of 109 1:25 parking pads across the development are proposed allowing the</p>				

	<p>Residential Zones:</p> <p>(a) Residential – Terrace Housing and Apartment Buildings Zone.</p> <p>(3) For residential developments in residential zones (excluding the Terrace Housing and Apartment Buildings Zone unless car parking is provided on site), accessible parking spaces must be provided for developments of 10 or more dwellings on a site.</p> <p>(4) The required number of onsite accessible parking spaces provided must be calculated using the following method:</p> <p>(i) For non-residential land uses:                  Step 1 – Use the Parking Demand Guidelines in Appendix 23 to determine the theoretical parking demand                  Step 2 – Use Table 1 – Number of accessible parking spaces – Non-Residential, below to determine the required number of accessible car park spaces based on either the number of parking spaces that are proposed to be provided or the theoretical parking demand calculated in Step 1, whichever is higher.</p> <p><b>Table 1 – Number of accessible parking spaces – Non-Residential land uses</b></p> <table border="1"> <thead> <tr> <th>Total number of parking spaces provided or theoretical parking spaces, whichever is the higher</th> <th>Number of accessible parking spaces</th> </tr> </thead> <tbody> <tr> <td>1-20</td> <td>Not less than 1</td> </tr> <tr> <td>21-50</td> <td>Not less than 2</td> </tr> <tr> <td>For every additional 50 parking spaces or part of a parking space</td> <td>Not less than 1</td> </tr> </tbody> </table> <p>(ii) For retirement villages, supported residential care, visitor accommodation and boarding houses                  The same method for calculating the required number of onsite accessible parking spaces for non-residential uses in 4(i) applies.</p> <p>(iii) For residential land uses                  The required number of accessible parking spaces provided must be in accordance with Table 2 below:</p> <p><b>Table 2 – Number of accessible parking spaces – Residential land uses</b></p> <table border="1"> <thead> <tr> <th>Number of dwellings</th> <th>Number of accessible parking spaces</th> </tr> </thead> <tbody> <tr> <td>10-19</td> <td>Not less than 1</td> </tr> <tr> <td>20-29</td> <td>Not less than 2</td> </tr> <tr> <td>30-50</td> <td>Not less than 3</td> </tr> <tr> <td>For every additional 25 dwellings or units</td> <td>Not less than 1</td> </tr> </tbody> </table>	Total number of parking spaces provided or theoretical parking spaces, whichever is the higher	Number of accessible parking spaces	1-20	Not less than 1	21-50	Not less than 2	For every additional 50 parking spaces or part of a parking space	Not less than 1	Number of dwellings	Number of accessible parking spaces	10-19	Not less than 1	20-29	Not less than 2	30-50	Not less than 3	For every additional 25 dwellings or units	Not less than 1	<p>development to informally meet PC79.</p> <p>This non-compliance is assessed against the criteria outlines in Rule E27.8.2 (8) of the Unitary Plan and is provided in Table A-3.</p> <p><b>Does not comply.</b></p>
Total number of parking spaces provided or theoretical parking spaces, whichever is the higher	Number of accessible parking spaces																			
1-20	Not less than 1																			
21-50	Not less than 2																			
For every additional 50 parking spaces or part of a parking space	Not less than 1																			
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10-19	Not less than 1																			
20-29	Not less than 2																			
30-50	Not less than 3																			
For every additional 25 dwellings or units	Not less than 1																			
<p><b>26</b></p>	<p><b>E27.6.3.3 Access and manoeuvring</b></p> <p>(2A) For every loading space required by Table E27.6.3.2.1 (T137A) the access and manoeuvring areas associated with that loading space must accommodate the 6.4m van tracking curves set out in Figure E27.6.3.3.3.</p>	<p>No loading spaces are required <b>N/A.</b></p>																		
<p><b>27</b></p>	<p><b>E27.6.3.4 Reverse manoeuvring</b></p> <p>(1) Sufficient space must be provided on the site so vehicles do not need to reverse off the site or onto or off the road from any site where any of the following apply:</p>	<p>Where a vehicle access services a single dwelling, and therefore 1 or 2 parking spaces, the vehicle will reverse onto the road network.</p>																		

	<ul style="list-style-type: none"> <li>(a) Four or more parking spaces are served by a single access;</li> <li>(b) There is more than 30m between the parking space and the road boundary of the site; or</li> <li>(c) Access would be from an arterial road or otherwise within a Vehicle Access Restriction covered in Standard E27.6.4.1</li> </ul>	<p>Where a vehicle access services multiple dwellings and at least 4 parking spaces it will be able to turn either within the Lot or within the adjacent JOAL.</p> <p><b>Complies.</b></p>
28	<p><b>E27.6.3.4A Heavy vehicle access</b></p> <ul style="list-style-type: none"> <li>(1) Where a site in a residential zone provides heavy vehicle access it must provide sufficient space on the site so an 8m heavy vehicle does not need to reverse onto or off the site or road, with a maximum reverse manoeuvring distance within the site of 12m.</li> <li>(2) Heavy vehicle access and manoeuvring areas associated with access required by E27.6.3.4A (1) must comply with the tracking curves set out in the Land Transport New Zealand Road and traffic guidelines: RTS 18: New Zealand on-road tracking curves for heavy motor vehicles (2007).</li> </ul>	<p>No loading spaces are required</p> <p><b>N/A.</b></p>
29	<p><b>E27.6.3.5 Vertical clearance</b></p> <ul style="list-style-type: none"> <li>(1) To ensure vehicles can pass safely under overhead structures to access any parking and loading spaces, the minimum clearance between the formed surface and the structure must be: <ul style="list-style-type: none"> <li>(a) 2.1m where access and/or parking for cars is provided for residential activities;</li> <li>(b) 2.3m where access and/or parking for cars is provided for all other activities;</li> <li>(c) 2.5m where access and/or accessible parking is provided and/or required;</li> <li>(ca) 2.8m where loading is required for residential activities denoted with an asterisk (*) in Table E27.6.2.7A;</li> <li>(cb) 3.8m where heavy vehicle access in Standard E27.6.3.4A is provided; or</li> <li>(d) 3.8m where loading is required in Table E27.6.2.7</li> </ul> </li> </ul>	<p>All garages will have at least 2.1m vertical clearance.</p> <p><b>Complies.</b></p>
30	<p><b>E27.6.3.7 Lighting</b></p> <ul style="list-style-type: none"> <li>(1) Lighting is required where there are 10 or more parking spaces which are likely to be used during the hours of darkness. The parking and manoeuvring areas and associated pedestrian routes must be adequately lit during use in a manner that complies with the rules in Section E24 Lighting.</li> <li>(2) Lighting is required, in residential zones to primary pedestrian access, vehicle access, parking and manoeuvring areas, where any of the following apply: <ul style="list-style-type: none"> <li>(a) There are four or more dwellings accessible from a primary pedestrian access which is not adjacent to a vehicle access;</li> <li>(b) There are 10 or more parking spaces; or</li> <li>(c) There are 10 or more dwellings.</li> </ul> </li> </ul> <p>Adequate must be provided during the hours of darkness in a manner that complies with the rules in Section E24 Lighting.</p>	<p>Given the development is more comparable to a residential activity, assessing the site against the residential requirements lighting needs to be considered. There are proposed to be more than 10 parking spaces which are likely to be used during hours of darkness; therefore, lighting will be provided. Refer to Greenwood's JOAL lighting plan.</p>
31	<p><b>E27.6.4.3 Width of vehicle access, queuing and speed management requirements</b></p> <ul style="list-style-type: none"> <li>(1) Every on-site parking and loading space must have vehicle access from a road, with the vehicle access complying with the following standards: <ul style="list-style-type: none"> <li>(a) Passing bays are provided in accordance with Table E27.6.4.3.1; and</li> </ul> </li> </ul>	<p>Traffic calming in the form of vertical traffic calming will be provided within the JOALs as required.</p> <p>A minimum of 5.5m formed access width is provided in the JOALs where the JOAL services 10 or</p>

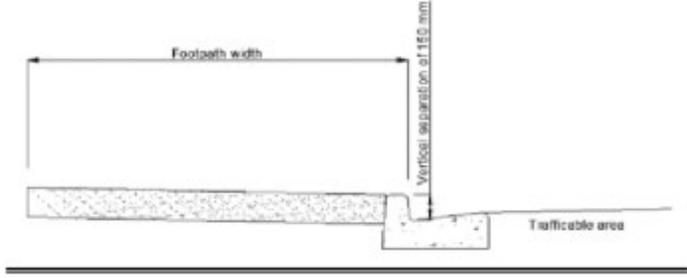
	<p>(b) Meeting the minimum formed access width specified in Table E27.6.4.3.2; and</p> <p>(c) Meeting the minimum speed management measure spacing specified in Table E27.6.4.3.3.</p> <p>...</p> <p>Emergency responder access requirements are further controlled by the Building Code. Plan users should refer to the Building Code to ensure compliance can be achieved at building consent stage. Granting of a resource consent does not imply that waivers of Building Code requirements will be granted. Fire and Emergency New Zealand publishes guidance in the context of Building Code requirements.</p> <p><b>Table E27.6.4.3.3 Speed management requirements</b></p> <p>(T156A) Residential Zones</p> <p><b>Length of vehicle access</b> Exceeds 30m</p> <p><b>Location of minimum speed management measures</b> Not more than 10m from the site boundary with the legal road; and</p> <p>Not more than 30m spacing between speed management measures.</p> <p><i>Note: Where heavy vehicle access and speed management measures are required, the design of speed management measures should include consideration of heavy vehicle requirements.</i></p>	<p>more parking spaces, therefore, no passing bay will be required.</p> <p><b>Complies</b></p>
<p><b>32</b></p>	<p><b>E27.6.6 Design and location of pedestrian access in residential zones</b></p> <p>(1) Where two or more dwellings are proposed in residential zones, primary pedestrian access must be provided which meets the following:</p> <p>(a) Have the minimum pedestrian access width and separation specified in Table E27.6.6.1 for its full length;</p> <p>(c) Have a gradient no greater than:</p> <p>(i) 1 in 12 for pedestrian access which is not adjacent to vehicle access;</p> <p>(ii) The maximum vehicle access gradient as specified in Table E27.6.4.4.1 where the pedestrian access is adjacent to vehicle access;</p> <p>(e) Have a surface treatment which is firm, stable and slip resistant in any weather conditions;</p> <p>(f) Provide direct and continuous access to the dwellings from a public footpath;</p> <p>(g) Be free from permanent obstructions and have a clear height of at least 2.1m;</p> <p>(2) A minimum clear width of 3m and a minimum clear height of 2.1m for its full length is required for primary pedestrian access where not adjacent to vehicle access and serving:</p> <p>(a) Up to three dwellings and has a length greater than 50m; or</p> <p>(b) Four or more dwellings.</p> <p>(3) For the purposes of (2) above, the clear width may include:</p> <p>(a) The minimum 1.8m formed primary pedestrian access width;</p> <p>(b) Landscape treatment with a maximum mature height of 600mm;</p> <p>(c) Lighting infrastructure.</p> <p>(4) Standards E27.6.6(1), (2) and (3) above do not apply where:</p> <p>(a) Up to three dwellings are proposed on a site and vehicle access is provided to each dwelling; or</p> <p>(b) A dwelling directly fronts and has direct access to a street.</p>	<p>The design of the JOALs is discussed in Section 10.3.4.</p> <p>(T156C) applies in this instance for the vehicle access, which serves 20 or more parking spaces.</p> <p>Grade separated pedestrian facilities are provided on all local roads, this is discussed in further detail in section 7 and <b>Appendix B</b>.</p> <p>As per <b>Appendix B</b> JOALs 5A, 9, 13, 30, 40/30A from Stage 1 and JOAL 39 from Stage 2 do not meet PC79 pedestrian footpath requirements.</p> <p><b>Does not comply</b></p> <p>This non-compliance is assessed against the criteria outlines in Rule E27.8.2 (8) of the Unitary Plan and is provided in Table A-3.</p>

- (5) For four or more dwellings in residential zones, pedestrian access must be provided to each parking space within a parking area consisting of four or more parking spaces served by the same vehicle access and:
  - (a) Have a minimum width of 1.2m;
  - (b) Be vertically separated from trafficable areas as shown in Figure E27.6.4.3.1;
  - (c) Connect to the primary pedestrian access or the dwellings associated with those parking spaces;
  - (d) Have a surface treatment which is firm, stable and slip resistant in any weather condition; and
  - (e) Be free from permanent obstructions and have a clear height of 2.1m for its full length.

This standard does not apply where the pedestrian access forms part of a primary pedestrian access.

**Table E27.6.6.1 Primary Pedestrian Access width and separation requirements**

Location of site	The total number of parking spaces or dwellings served by a vehicle and/or Primary Pedestrian Access	Minimum formed Primary Pedestrian Access width where not adjacent to vehicle access	Minimum formed Primary Pedestrian Access width and separation where adjacent to vehicle access
(T156A)	Serves 2-3 dwellings	1.8m	No requirement under E27.6.6(1) to (3)
(T156B)	Serves 4 to 19 parking spaces or 4 to 19 dwellings, whichever is the greater	1.8m	1.4m (including the kerb), which must be vertically separated from trafficable areas as shown in Figure E27.6.4.3.1
(T156C)	Serves 20 or more parking spaces or 20 or more dwellings, whichever is the greater	1.8m	1.8m (including the kerb), which must be vertically separated from trafficable areas as shown in Figure E27.6.4.3.1

	<p><b>Figure E27.6.4.3.1 Vertical separation of pedestrian access</b></p> 	
<p><b>33</b></p>	<p><b>E27.6.7 Provision for electric vehicle charging</b></p> <p><i>Purpose: to ensure that any undercover car parks for new semi-detached dwellings or for new dwellings within a terrace or apartment building are provided with the capability to install Electric Vehicle Supply Equipment.</i></p> <p>(1) Any new dwellings with car parking (with the exception of new detached dwellings) must provide each undercover car park with the capability to install Electric Vehicle Supply Equipment with designated space for the necessary conduit, circuit and metering between the car park and an electrical distribution board on the same building storey, or ground level if the car parking space is at ground level.</p> <p>Note:</p> <p>(a) This standard does not apply to any car parking permanently allocated to visitors.</p> <p><i>Refer to the following standards and guidelines:</i></p> <ul style="list-style-type: none"> <li>- Australian/New Zealand Wiring Rules AS/NZS 3000:2018</li> <li>- SNZ PAS 6011:2021 Electric Vehicle Chargers for Residential Use</li> <li>- SNZ PAS 6011:2021 Electric Vehicle Chargers for Commercial Applications</li> <li>- WorkSafe EV charging safety guidelines 2<sup>nd</sup> addition plus addendums 1 and 2</li> </ul>	<p>All detached dwellings are exempt from this rule. In terms zero-lot dwellings with garage parking, the garages have capacity for electric vehicle charging provisions to be added in future as required.</p> <p><b>Complies.</b></p>

## APPENDIX A-2 ASSESSMENT TABLES

As discussed in Table A-1 above, the proposed development generally complies with the Plan Change 79 amendments, with the primary exception being the trip generation.

The proposed trip generation triggers the 40 dwelling threshold and has been assessed against the amended criteria outlined in E27.8.2 (3) of Plan Change 79 and is provided in Table A-2 below.

**Table A-2: Plan Change 79 Amended Assessment Criteria E27.8.2 (3)**

Assessment Criteria	Comment
<p>(3) any activity or subdivision which exceeds the trip generation thresholds under Standard E27.6., with the exception of the thresholds (TA1), (T1A), (T2A) and (T3A) in Table E27.6.1.1:</p>	
<p>a) the effects on the function and the safe and efficient operation of the transport</p>	<p>All new roads provide pedestrian footpaths on both sides, providing pedestrian access through the site to the wider network.</p>

<p><b>network with consideration of all modes of transport, particularly at peak times;</b></p>	<p>Cycle paths are provided on both sides of NoR6 and Road 5 and 17 in Stage 2, which will connect to the neighbouring developments at Ara Hills and Milldale North when these are constructed (as discussed in Section 7.7.2).</p> <p>Currently there are limited public transport facilities in the area, however Auckland Transport Public Transport Plan shows future services connecting to Ara Hills (as discussed in Section 7.7.1) and it is considered by the time Delmore dwellings are constructed, public transport accessibility will have improved dramatically. This service could be extended to the subject site by AT.</p> <p>The effects of vehicle traffic have been assessed in the original transport assessment.</p>
<p><b>b) the implementation of mitigation measures proposed to address adverse effects which may include, but are not limited to, the following measures:</b></p> <ul style="list-style-type: none"> <li>i. <b>travel planning;</b></li> <li>ii. <b>providing alternatives to private vehicle trips including accessibility to public transport;</b></li> <li>iii. <b>staging development;</b></li> <li>iv. <b>providing or contributing to improvements to the local transport network across all modes; or</b></li> </ul>	<p>As above, pedestrian facilities are provided within the site which will connect to neighbouring developments. Similarly cycle paths are proposed on NoR6 and Roads 5 &amp; 17 which will also connect to neighbouring projects.</p> <p>It is also anticipated that as development occurs in the area that it will become more feasible to provide bus services. The public bus network is operated by Auckland Transport and therefore this decision ultimately sits with Auckland Transport.</p>
<p><b>c) the trip characteristics of the proposed activity on the site.</b></p>	<p>The development is for residential, which is anticipated to primarily result in vehicle trips. The nearby Ara Hills development which has been consented includes a commercial area on Grand Drive west of the motorway. Which is within walking and cycling distance of the site and therefore anticipated to lead to some walking and cycling trips. Similarly, as the area is developed it becomes more feasible to provide public transport facilities.</p>
<p><b>(3A) any activity or subdivision which exceeds the thresholds (TA1), (T1A), (T2A) and (T3A) in Table E27.6.1.1:</b></p>	
<p><b>a) the effects on the function and the safe and efficient operation of the transport network as they relate to active modes (walking and cycling) and public transport infrastructure, particularly at peak times; and</b></p>	<p>Please see above the response to (3) a) above.</p>
<p><b>b) the assessment criteria at E27.8.2(3)(b) and (c) above apply, but with consideration of the implementation of mitigation measures and trip characteristics focused on active modes (walking and cycling) and public transport infrastructure; and</b></p>	<p>Please see above the response to (3) b) above.</p>
<p><b>c) for the purpose of assessing E27.8.2(3A) a) and b) only*, the local transport network refers to the area in the immediate vicinity of the site. For the purpose of this assessment, public transport infrastructure includes infrastructure associated with public transport stops, and excludes bus lanes. Any mitigation measures must relate to the effects of the development on the environment, demand on public transport infrastructure and active mode journeys from the site.</b></p>	<p>Until such time that Auckland Transport provide a service to Ara Hills as per the Regional Public Transport Plan, provision of bus facilities (stops, shelters, etc) would be premature. The exact route of the bus is yet to be determined and therefore providing facilities at this stage is not recommended.</p> <p>With regards to pedestrian connectivity, the proposed site will have internal footpaths, as well as connect to neighbouring projects.</p>

**\* Note: this does not alter the meaning of 'local transport network' in any other context.**

Standard E27.6.4.4 specifies the maximum gradient for access is 1 in 20 (5%), Standard 6.3.4 specifies that reversing onto the local road network should not occur within a vehicle access restriction, Standard E276.6 specifies that 1.4m vertically separated pedestrian access is required for accesses serving more than 3 Lots and Standard E27.6.3.2(A) specifies that 51 accessible formal parking spaces are required. The development does not comply with any of the above standards; Accordingly, an assessment against the criteria outlined in Rule E27.8.2 (8) of the Unitary Plan has been undertaken and is provided in Table A-3.

**Table A-3: Plan Change 79 Amended Assessment Criteria E27.8.2 (8)**

Assessment Criteria	Comment
<b>E27.8.2 (8) any activity or development which infringes the standards for design of parking and loading areas or access under Standard E27.6.3, E27.6.4.2, E27.6.4.3, E27.6.4.4 and E27.6.6:</b>	
<b>(a) effects on the safe and efficient operation of the adjacent transport network having regard to:</b>	
<b>(i) the effect of the modification on visibility and safe sight distances;</b>	The non-compliance of maximum parking gradients, vertically separated pedestrian access, reversing onto the road network within a vehicle access restriction and accessible parking is not expected to impact the visibility or safe sight distances.
<b>(ii) existing and future traffic conditions including speed, volume, type, current accident rate and the need for safe manoeuvring;</b>	<p>The non-compliance of maximum manoeuvring gradients is unlikely to affect the existing and future traffic conditions, as mentioned in Section 10.4 all non-compliant Lot driveways provide a downgrade from the site to the fronting road, the user class is 1A (residential, domestic and employee parking) and the maximum car park size is two parking spaces (fronting a local road). Based on this, Australian and New Zealand standards support the use of 1:8 gradients within the site without a 1:20 platform, the development meets the use of 1:8 gradients.</p> <p>The non-compliance of reversing onto the road network within a vehicle access restriction is also unlikely to affect the existing and future traffic conditions. As mentioned in Section 11.4, all driveways located on a major road of an intersection are located at the top of a 'T' intersection. Figure 3.1 of AS / NZS 2890.1 details prohibited locations for driveways. As seen in the Section 10.2.4, domestic driveways located at 'the top of a 'T' are excluded from this prohibition and are considered acceptable. This is due to driveways in this location access domestic driveways are low volume and being opposite the intersection (i.e. top of the T) have excellent visibility to the intersection. These have been approved for this reason in most subdivision in Auckland. Driveways within a vehicle access restriction on a minor road generally provide 8-10m of separation which is considered to be minimal non-compliance and unlikely to affect existing and future traffic conditions.</p> <p>In regard to the non-compliance of vertically separated pedestrian access or accessible parking it is not anticipated to affect existing and future traffic conditions.</p>

<b>(iii) existing pedestrian numbers, and estimated future pedestrian numbers having regard to the level of development provided for in this Plan;</b>	Existing pedestrian numbers are negligible as there is minimal development on the proposed site. The non-compliance outlined above is unlikely to affect existing and future pedestrians.
<b>(iv) existing community or public infrastructure located in the adjoining road, such as bus stops, bus lanes and cycleways; and</b>	There are no bus stops, bus lanes or cycleways along in the vicinity of the site.
<b>(v) The extent to which the management plan for the development identifies and mitigates risk to all site and road users</b>	No management plan is considered necessary to be provided.
<b>(b) effects on pedestrian amenity or the amenity of the streetscape, having regard to;</b>	
<b>(i) the effect of additional crossings or crossings which exceed the maximum width; or</b>	NA.
<b>(ii) effects on pedestrian amenity and the continuity of activities and pedestrian movement at street level in the Business – City Centre Zone, Business – Metropolitan Centre Zone, Business – Town Centre Zone and Business – Local Centre Zone</b>	NA.
<b>(c) the practicality and adequacy of parking, loading and access arrangements having regard to:</b>	
<b>(i) site limitations, configuration of buildings and activities, user requirements and operational requirements;</b>	As highlighted in Section 9.5, the site is not flat in nature and therefore roads are required to be steeper than 8% to practicably gain access. All accesses do not exceed a gradient of 1 in 8 which is considered to be acceptable.  In regard to accessible parking provisions, no dedicated accessible parking has been provided; however, the applicant has informally provided accessible parking across the site. Accessible parking users could make use of the access instead of the garage which is understood to provide the required width and comply with the 1 in 25 gradient. Parking gradient plans demonstrate that 109 lots are able to provide a 1 in 25 gradient parking pad which exceeds the 51 accessible parking spaces provided and informally meets PC79 requirements.
<b>(d) the safety and practicality of pedestrian access, in residential zones, having regard to:</b>	
<b>(i) site limitations, configuration of buildings and activities, user requirements and operational requirements;</b>	See above.
<b>(ii) the number of dwellings / future occupants that a primary pedestrian access is serving;</b>	The anticipated number of dwellings each JOAL will be serving can be seen above in Table 18.
<b>(iii) the extent to which a primary pedestrian access is direct, continuous, obstruction free and safely accommodates different users and abilities including minimisation of gradients, provision of landing areas and avoidance of steps;</b>	Generally primary pedestrian access is direct, continuous and obstruction free. All local roads are proposed to include a pedestrian footpath in both directions; road gradients meet the legal limits for public roads in Auckland.
<b>(iv) space limitations and constraints within basement parking areas;</b>	N/A.
<b>(v) the safety of pedestrians where a pedestrian access crosses trafficable areas,</b>	In regard to safety of pedestrians in and around trafficable areas:

<p><b>considering the design of the crossing, visibility between drivers and pedestrians, and vehicle speeds;</b></p>	<ul style="list-style-type: none"> <li>- Trafficable areas within JOALs have been designed to be low-speed environments as PC79 compliant speed management measures being provided to enforce lower vehicle speeds;</li> <li>- All proposed accessways provide a downgrade from the site to the fronting Road/JOAL ensuring adequate pedestrian-vehicle visibility; and</li> <li>- 1.2m pedestrian footpaths are provided on both sides of all JOALs where required which does comply with NZS 4121 for accessible users and reduces the need to cross trafficable areas.</li> </ul> <p>It is considered to be unlikely for conflict between pedestrians and vehicles to occur and therefore no safety concerns are anticipated for pedestrians.</p>
<p><b>(vi) the extent to which the design incorporates Crime Prevention Through Environmental Design Principles;</b></p>	<p>This is not considered to be a traffic engineering matter and is understood to have been addressed via other disciplines within this resource consent application.</p>
<p><b>(vii) the extent to which the design incorporates Universal Design principles, including the extent to which a primary pedestrian access is not adjacent to vehicle access and includes steps, provides a footpath and/or ramps as specified in NZS 4121:2001 Design for access and mobility: Buildings and associated facilities;</b></p>	<p>It is understood that universal design principles have been implemented.</p> <p>Not a traffic engineering matter.</p>
<p><b>(viii) the need to separate pedestrian areas from vehicle access, parking, manoeuvring and reversing areas; and</b></p>	<p>See response to (v).</p>
<p><b>(ix) the avoidance of conflict between users.</b></p>	<p>See response to (v).</p>
<p><b>(e) the safety and functionality of emergency responder access.</b></p>	<p>Not a traffic engineering matter.</p>

**APPENDIX B – E38 COMPLIANCE ASSESSMENT TABLE**

**Table 18: E38.8.1.2.1 & E27.6.6 compliance assessment table**

JOAL	Scheme Plan	Units	Rear Access Units Served	Legal Width	Formed width	Service Strip Width	Pedestrian Access Width	Max Gradient	Turning Radius	Maximum length	Compliance – E38 AUP (OP)	Compliance – E38 PC 79	E27.6.6 PC79 – Compliance	Private/Public Collection
1	1500	27	17	10m	6.0m	0.5m	1.5m both sides	7.5%	7.0m	165m	<b>Does not comply:</b> - More than 10 lots - Exceeds 100m length - Less than 1m service strip	<b>Does not comply:</b> - Exceeds 100m length - More than 10 lots -Less than 1m service strip	<b>Complies</b>	<b>Recommend Private on JOAL collection due to length</b>
2	1501	8	0	6.5m	5.0m	NA	1.5m one side	14%	8.0m	90m	<b>Does not comply:</b> -No service strip	<b>Does not comply:</b> <b>-No service strip</b>	<b>Complies</b>	<b>Recommend private on JOAL collection. Recommend addition of turning head</b>
3	1502	44	19	10m	6.0m	0.5m	1.5m both sides	11.5%	>6.0m	290m	<b>Does not comply:</b> -More than 10 lots -Longer than 100m -Less than 1m service strip	<b>Does not comply:</b> -Exceeds 100m length -Less than 1m service strip -More than 10 lots	<b>Complies</b>	<b>Recommend Private on JOAL collection due to length</b>
4A	1503	17	15	11.0m	6.0m	1.0m	1.5m both sides	5%	>6.0m	91m	<b>Does not comply:</b>	<b>Does not comply:</b>	<b>Complies</b>	<b>Private on JOAL</b>

											-More than 10 rear lots	-More than 10 lots		collection due to length  Recommend addition of turning head
4B	1503	6	6	7.5m	5.5m	0.5m	1.5m in one direction	5%	NA	40m	<b>Does not comply:</b> -Less than 1m service strip	<b>Does not comply:</b> -Less than 1m service strip	<b>Complies</b>	Private on JOAL collection due to length.  Recommend addition of turning head
5A	1508	4	4	5.0m	4.0m	NA	1.0m in one direction	5%	3.5m	50m	<b>Does not comply:</b> -Less than 6.5m turning radius -Less than 0.5m service strip	<b>Does not comply:</b> -Less than 0.5m service strip	<b>Does not comply</b>	Public on road collection
5B	1509	15	8	9.1m	6.0m	NA	1.5m in one direction	8.5%	NA	170m	<b>Does not comply:</b> -Exceeds 100m length -Less than 1m service strip	<b>Does not comply:</b> -Less than 1.0m service strip - Exceeds 100m length	<b>Complies</b>	Private on JOAL collection due to length
6	1513	6	5	7.0m	5m	NA	1.5m in one direction	2.3%	10.0m	75m	<b>Does not comply:</b> -Exceeds 50m length -Less than 0.5m service strip	<b>Does not comply:</b> -Less than 0.5m service strip - Exceeds 50m length	<b>Complies</b>	Due to length, recommend private on JOAL collection with turning head

8	1514	18	2	6.5m	5.0m	NA	1.5m in one direction	12%	NA	140m	<b>Does not comply:</b> -Exceeds 50m length	<b>Does not comply:</b> -Exceeds 50m length	<b>Complies</b>	<b>Recommend all public on Road collection</b>
9	1506	28	27	10.0m	6.0m	0.5m	1.5m in both directions	10%	2.5m	220m	<b>Does not comply:</b> -More than 10 rear lots -Less than 6.5m turning radius -Less than 1m service strip	<b>Does not comply:</b> -More than 10 rear lots - Less than 1m service strip	<b>Does not comply</b>	<b>Recommend Private on JOAL collection due to length</b>
10	1505	7	6	10.0m	6.0m	0.5m	1.5m in both directions	12.5%	2.5m	105m	<b>Does not comply:</b> -Less than 6.5m turning radius -Less than 1.0m service strip -Exceeds 100m length	<b>Does not comply:</b> -Less than 1.0m service strip -Exceeds 100m length	<b>Complies</b>	<b>Private on JOAL collection</b>
11	1507	6	6	8.0m	5.0m	NA	1.5m footpath in both directions	8%	NA	120m	<b>Does not comply:</b> -Less than 1.0m service strip -Exceeds 100m length	<b>Does not comply:</b> -Less than 1.0m service strip -Exceeds 100m length	<b>Complies</b>	<b>Recommend Private on JOAL collection with turning head due to length</b>
13	1616	7	4	10.0m	6.0m	1.0m	1.0m in both directions	17%	8.5m	50m	<b>Complies</b>	<b>Complies</b>	<b>Does not comply</b>	<b>Private on JOAL collection</b>

37	1511	3	0	4.0m	4.0m	NA	N/A	4.5%	NA	20m	Complies	Complies	Complies	Public on Road collection
30	1510	12	5	6.5m	5.5m	NA	1.0m footpath In one direction	12.1%	0m	80m	Does not comply: -Exceeds 50m length -Less than 6.5m turning radius -Less than 0.5m service strip	Does not comply: -Exceeds 50m length -Less than 0.5m service strip	Does not comply	Private on JOAL collection
34	1515	3	0	6.0m	5.0m	1.0m	NA	12.1%	<6.5m	70m	Complies	Complies	Complies	Public on Road collection
40 & 40A	1504	25	25	9.1m	6.0m	NA	1.55m	12.5%	7-12m	200m	Does not comply: -More than 10 lots -Exceeds 100m length	Does not comply: -More than 10 lots -Exceeds 100m length	Does not comply	Recommend Private on JOAL collection due to length
<b>Stage 2</b>														
13	1526	15	5	10.0m	6.0m	0.5m	1.5m both sides	8.6%	NA	190m	Complies	Complies	Complies	Public on Road collection
18	1528	5	0	4.0m	4.0m	NA	NA	11.5%	NA	55m	Complies	Complies	Complies	Public on Road collection
20	1533	4	0	6.5m	5.5m	1.0m	NA	8% or (100% for 3m)	NA	40m	Complies	Complies	Complies	Public on Road collection

23	1531	5	0	4.5m	4.5m	NA	NA	9.6%	NA	50m	Complies	Complies	Complies	Public on Road collection
26	1534	15	7	7.5m	5.5m	0.5m	1.5m footpath in one direction	12.5%	0m	130m	Does not comply: -Exceeds 100m length -Less than 1.0m service strip -Less than 6.5m turning radius	Does not comply: -Exceeds 100m length -Less than 1.0m service strip	Complies	Recommend Private on JOAL collection due to length
27	1535	11	4	7.5m	5.5m	0.5m	1.5m footpath in one direction	12.5%	0m	100m	Does not comply: -Less than 1.0m service strip -Less than 6.5m turning radius	Does not comply: -Less than 1.0m service strip	Complies	Private on JOAL collection
28	1524	38	0	5.0m	4.0m	NA	1.0m footpath in one direction	20%	NA	45m	Complies	Complies	Complies	Recommend Public on Road collection
31	1539	4	0	6.5m	5.5m	1.0m	NA	17.4%	NA	45m	Complies	Complies	Complies	Recommend Public on Road collection due to frontage
32	1538	6	0	6.5m	5.5m	1.0m	NA	13.1%	NA	45m	Complies	Complies	Complies	Private on JOAL collection Recommend Public on Road

															collection due to frontage
33	1540	10	0	7.3m	6.0m	0.5m	NA	20%	NA	70m	Complies	Complies	Complies	Private on JOAL collection Recommend Public on Road collection due to frontage	
35	1542	12	4	9.0m	5.5m	1.0m	1.5m footpath in one direction	20%	NA	110m	Does not comply: -Exceeds 50m length	Does not comply: -Exceeds 50m length	Complies	Recommended private on JOAL collection due to length (Turning head required)	
36	1537	10	10	10.5m	6.0m	0.75m	1.5m footpath	12.5%	0m	135m	Does not comply: -Exceeds 100m length -Less than 1.0m service strip -Less than 6.5m turning radius	Does not comply: -Exceeds 100m length -Less than 1.0m service strip	Complies	Private on JOAL collection	
38	1543	6	6	8.0m	5.5m	1.0m	1.5m footpath in one direction	12.5%	NA	45m	Complies	Complies	Complies	Recommended Public on Road Collection	
39	1544	14	6	6.5m	5.5m	NA	1.0m footpath	10%	0m	105m	Does not comply:	Does not comply:	Does not comply	Private on JOAL collection	

							in one direction				-Exceeds 100m length -Less than 6.5m turning radius	-Exceeds 100m length		
22	1525	16	7	10.0m	6.0m	0.5m	1.5m both sides	10%	NA	220m	Does not comply: -Exceeds 100m length -Less than 1.0m service strip	Does not comply: -Exceeds 100m length - Less than 1.0m service strip	Complies	Recommend Private on JOAL collection due to length
24	1530	0	0	4.5m	3.5m	NA	1.0m footpath in one direction	2.7%	NA	20m	Complies	Complies	Complies	Public on Road collection
25	1529	6	6	7.5m	5.5m	0.5m	1.5m footpath in one direction	1.7%	NA	40m	Complies	Complies	Complies	Public
21	1532	14	14	10.0m	6.0m	0.5m	1.5m both sides	8.0%	NA	175m	Does not comply: -Exceeds 100m length -Exceeds 10 Lots -Less than 1.0m service strip	Does not comply: -Exceeds 100m length -Exceeds 10 Lots -Less than 1.0m service strip	Complies	Recommend Private on JOAL collection with turning head due to length



## APPENDIX C - SIDRA MODELLING RESULTS

**Figure 57: Grand Drive West Existing AM**

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Sat'n	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			Total	HV	Total	HV				veh	m				
			veh/h	%	veh/h	%	w/c	sec		veh	m				km/h
<b>South: SH1 Offramp</b>															
1	L2	All MCs	27	29.6	27	29.6	0.094	4.5	LOS A	0.2	1.5	0.39	0.47	0.39	46.3
2	T1	All MCs	2	50.0	2	50.0	0.246	3.8	LOS A	1.5	11.1	0.37	0.57	0.37	44.3
3	R2	All MCs	340	5.9	340	5.9	0.248	8.7	LOS A	1.5	11.1	0.37	0.57	0.37	43.8
Approach			369	7.9	369	7.9	0.246	7.9	LOS A	1.5	11.1	0.37	0.57	0.37	44.0
<b>East: Grand Drive East</b>															
5	T1	All MCs	22	4.5	22	4.5	0.090	2.3	LOS A	0.0	0.0	0.00	0.59	0.00	45.7
6	R2	All MCs	141	9.9	141	9.9	0.098	7.4	LOS A	0.0	0.0	0.00	0.59	0.00	45.0
Approach			163	9.2	163	9.2	0.098	8.7	LOS A	0.0	0.0	0.00	0.59	0.00	45.1
<b>West: Grand Drive West</b>															
10	L2	All MCs	3	0.0	3	0.0	0.098	5.5	LOS A	0.5	4.0	0.82	0.55	0.82	45.9
11	T1	All MCs	76	6.4	76	6.4	0.096	5.5	LOS A	0.5	4.0	0.82	0.55	0.82	46.1
Approach			81	6.7	81	6.7	0.098	5.5	LOS A	0.5	4.0	0.82	0.55	0.82	46.1
All Vehicles			613	8.0	613	8.0	0.248	7.3	LOS A	1.5	11.1	0.31	0.57	0.31	44.6

**Figure 58: Grand Drive West Existing PM**

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Sat'n	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			Total	HV	Total	HV				veh	m				
			veh/h	%	veh/h	%	w/c	sec		veh	m				km/h
<b>South: SH1 Offramp</b>															
1	L2	All MCs	30	13.3	30	13.3	0.035	4.3	LOS A	0.2	1.3	0.38	0.46	0.38	46.5
2	T1	All MCs	1	0.0	1	0.0	0.408	3.4	LOS A	3.9	27.3	0.47	0.58	0.47	44.3
3	R2	All MCs	711	1.3	711	1.3	0.488	8.5	LOS A	3.9	27.3	0.47	0.58	0.47	43.7
Approach			742	1.6	742	1.6	0.408	8.3	LOS A	3.9	27.3	0.46	0.57	0.46	43.8
<b>East: Grand Drive East</b>															
5	T1	All MCs	34	11.8	34	11.8	0.099	2.3	LOS A	0.0	0.0	0.00	0.57	0.00	45.8
6	R2	All MCs	132	6.1	132	6.1	0.099	7.4	LOS A	0.0	0.0	0.00	0.57	0.00	45.2
Approach			166	7.2	166	7.2	0.099	8.3	LOS A	0.0	0.0	0.00	0.57	0.00	45.3
<b>West: Grand Drive West</b>															
10	L2	All MCs	4	0.0	4	0.0	0.100	8.9	LOS A	0.6	5.0	0.81	0.72	0.81	43.7
11	T1	All MCs	46	26.1	46	26.1	0.100	10.1	LOS B	0.6	5.0	0.81	0.72	0.81	43.8
Approach			50	24.0	50	24.0	0.100	10.0	LOS A	0.6	5.0	0.81	0.72	0.81	43.8
All Vehicles			958	3.9	958	3.9	0.408	8.0	LOS A	3.9	27.3	0.40	0.58	0.40	44.0

**Figure 59: Grand Drive West Consented AM**

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Sat'n	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			Total	HV	Total	HV				veh	m				
			veh/h	%	veh/h	%	w/c	sec		veh	m				km/h
<b>South: SH1 Offramp</b>															
1	L2	All MCs	62	12.9	62	12.9	0.075	4.7	LOS A	0.4	2.9	0.43	0.50	0.43	46.3
2	T1	All MCs	1	100.0	1	100.0	0.255	4.9	LOS A	1.6	11.6	0.42	0.59	0.42	44.0
3	R2	All MCs	340	5.9	340	5.9	0.255	8.5	LOS A	1.6	11.6	0.42	0.59	0.42	43.7
Approach			403	7.2	403	7.2	0.255	7.9	LOS A	1.6	11.6	0.42	0.57	0.42	44.1
<b>East: Grand Drive East</b>															
5	T1	All MCs	65	1.5	65	1.5	0.123	2.3	LOS A	0.0	0.0	0.00	0.54	0.00	46.3
6	R2	All MCs	141	9.9	141	9.9	0.123	7.4	LOS A	0.0	0.0	0.00	0.54	0.00	45.5
Approach			206	7.3	206	7.3	0.123	5.8	LOS A	0.0	0.0	0.00	0.54	0.00	45.8
<b>West: Grand Drive West</b>															
10	L2	All MCs	21	0.0	21	0.0	0.304	6.1	LOS A	2.0	14.2	0.69	0.59	0.69	45.6
11	T1	All MCs	243	2.1	243	2.1	0.304	5.9	LOS A	2.0	14.2	0.69	0.59	0.69	45.8
Approach			264	1.9	264	1.9	0.304	5.9	LOS A	2.0	14.2	0.69	0.59	0.69	45.8
All Vehicles			573	5.6	573	5.6	0.304	6.8	LOS A	2.0	14.2	0.40	0.57	0.40	45.0

Figure 60: Grand Drive West Consented PM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	[ HV ]	[ Total	[ HV ]				[ Veh.	[ Dist ]				
			veh/h	%	veh/h	%	vc	sec		veh	m				km/h
<b>South: SH1 Offramp</b>															
1	L2	All MCs	101	4.0	101	4.0	0.120	5.0	LOS A	0.6	4.6	0.48	0.52	0.48	46.2
2	T1	All MCs	1	0.0	1	0.0	0.525	4.0	LOS A	4.2	29.9	0.58	0.61	0.58	44.0
3	R2	All MCs	711	1.3	711	1.3	0.525	9.1	LOS A	4.2	29.9	0.58	0.61	0.58	43.4
Approach			813	1.8	813	1.8	0.525	8.6	LOS A	4.2	29.9	0.57	0.60	0.57	43.7
<b>East: Grand Drive East</b>															
5	T1	All MCs	120	3.3	120	3.3	0.148	2.3	LOS A	0.0	0.0	0.00	0.50	0.00	48.7
6	R2	All MCs	132	6.1	132	6.1	0.140	7.4	LOS A	0.0	0.0	0.00	0.50	0.00	46.0
Approach			252	4.6	252	4.6	0.146	4.9	LOS A	0.0	0.0	0.00	0.50	0.00	46.3
<b>West: Grand Drive West</b>															
10	L2	All MCs	14	0.0	14	0.0	0.280	9.5	LOS A	1.9	14.2	0.67	0.74	0.67	43.8
11	T1	All MCs	140	8.6	140	8.6	0.280	9.6	LOS A	1.9	14.2	0.67	0.74	0.67	43.9
Approach			154	7.8	154	7.8	0.280	9.7	LOS A	1.9	14.2	0.67	0.74	0.67	43.9
All Vehicles			1219	3.0	1219	3.0	0.525	8.0	LOS A	4.2	29.9	0.48	0.60	0.49	44.3

Figure 61: Grand Drive West Proposed AM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	[ HV ]	[ Total	[ HV ]				[ Veh.	[ Dist ]				
			veh/h	%	veh/h	%	vc	sec		veh	m				km/h
<b>South: SH1 Offramp</b>															
1	L2	All MCs	172	4.7	172	4.7	0.182	5.2	LOS A	1.0	7.4	0.53	0.55	0.53	46.0
2	T1	All MCs	1	0.0	1	0.0	0.202	4.1	LOS A	1.8	13.0	0.54	0.63	0.54	44.1
3	R2	All MCs	340	5.9	340	5.9	0.202	8.3	LOS A	1.8	13.0	0.54	0.63	0.54	43.5
Approach			513	5.5	513	5.5	0.202	7.9	LOS A	1.8	13.0	0.54	0.60	0.54	44.3
<b>East: Grand Drive East</b>															
5	T1	All MCs	199	0.5	199	0.5	0.199	2.3	LOS A	0.0	0.0	0.00	0.45	0.00	47.1
6	R2	All MCs	141	9.9	141	9.9	0.189	7.4	LOS A	0.0	0.0	0.00	0.45	0.00	46.3
Approach			340	4.4	340	4.4	0.190	4.4	LOS A	0.0	0.0	0.00	0.45	0.00	46.7
<b>West: Grand Drive West</b>															
10	L2	All MCs	78	0.0	78	0.0	0.943	34.8	LOS C	31.4	221.1	1.00	1.81	2.74	33.9
11	T1	All MCs	755	0.7	755	0.7	0.943	34.3	LOS C	31.4	221.1	1.00	1.81	2.74	34.0
Approach			833	0.8	833	0.8	0.943	34.4	LOS C	31.4	221.1	1.00	1.81	2.74	34.0
All Vehicles			1686	2.8	1686	2.8	0.943	20.3	LOS C	31.4	221.1	0.86	1.17	1.52	38.9

Figure 62: Grand Drive West Proposed PM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	[ HV ]	[ Total	[ HV ]				[ Veh.	[ Dist ]				
			veh/h	%	veh/h	%	vc	sec		veh	m				km/h
<b>South: SH1 Offramp</b>															
1	L2	All MCs	320	1.3	320	1.3	0.308	7.3	LOS A	2.5	17.7	0.71	0.65	0.71	44.9
2	T1	All MCs	1	0.0	1	0.0	0.639	8.3	LOS A	7.1	50.1	0.83	0.83	1.03	42.3
3	R2	All MCs	711	1.3	711	1.3	0.639	13.4	LOS B	7.1	50.1	0.83	0.83	1.03	41.8
Approach			1032	1.3	1032	1.3	0.639	11.5	LOS B	7.1	50.1	0.79	0.78	0.93	42.7
<b>East: Grand Drive East</b>															
5	T1	All MCs	366	1.0	366	1.0	0.302	2.3	LOS A	0.0	0.0	0.00	0.39	0.00	47.5
6	R2	All MCs	132	6.1	132	6.1	0.302	7.4	LOS A	0.0	0.0	0.00	0.39	0.00	46.8
Approach			520	2.3	520	2.3	0.302	3.6	LOS A	0.0	0.0	0.00	0.39	0.00	47.3
<b>West: Grand Drive West</b>															
10	L2	All MCs	47	0.0	47	0.0	0.895	44.3	LOS D	18.9	134.9	1.00	1.69	2.64	31.1
11	T1	All MCs	433	2.8	433	2.8	0.895	44.2	LOS D	18.9	134.9	1.00	1.69	2.64	31.2
Approach			480	2.5	480	2.5	0.895	44.2	LOS D	18.9	134.9	1.00	1.69	2.64	31.2
All Vehicles			2032	1.0	2032	1.0	0.895	17.2	LOS B	18.9	134.9	0.64	0.69	1.10	40.2

Figure 63: Grand Drive West Proposed With Ara Hills Plan Change AM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total]	[HV]	[Total]	[HV]				[Veh]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
<b>South: SH1 Offramp</b>															
1	L2	All MCs	205	3.9	205	3.9	0.215	5.5	LOS A	1.2	9.0	0.57	0.58	0.57	45.9
2	T1	All MCs	1	100.0	1	100.0	0.290	6.8	LOS A	1.8	13.6	0.57	0.64	0.57	43.7
3	R2	All MCs	340	5.9	340	5.9	0.290	8.5	LOS A	1.8	13.6	0.57	0.84	0.57	43.4
Approach			546	5.3	546	5.3	0.290	8.0	LOS A	1.8	13.6	0.57	0.61	0.57	44.3
<b>East: Grand Drive East</b>															
5	T1	All MCs	239	0.4	239	0.4	0.222	2.3	LOS A	0.0	0.0	0.00	0.44	0.00	47.2
6	R2	All MCs	141	9.8	141	8.8	0.222	7.4	LOS A	0.0	0.0	0.00	0.44	0.00	46.4
Approach			380	3.9	380	3.9	0.222	4.2	LOS A	0.0	0.0	0.00	0.44	0.00	46.9
<b>West: Grand Drive West</b>															
10	L2	All MCs	85	0.0	85	0.0	1.126	250.3	LOS F	185.1	1160.4	1.00	6.85	12.73	11.4
11	T1	All MCs	800	0.6	800	0.6	1.126	250.0	LOS F	185.1	1160.4	1.00	6.85	12.73	11.4
Approach			1003	0.5	1003	0.5	1.126	250.1	LOS F	185.1	1160.4	1.00	6.85	12.73	11.4
All Vehicles			1929	2.5	1929	2.5	1.126	133.1	LOS F	185.1	1160.4	0.88	3.87	8.78	17.9

Figure 64: Grand Drive West Proposed With Ara Hills Plan Change PM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total]	[HV]	[Total]	[HV]				[Veh]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
<b>South: SH1 Offramp</b>															
1	L2	All MCs	386	1.0	386	1.0	0.480	9.1	LOS A	3.7	25.9	0.79	0.75	0.89	43.9
2	T1	All MCs	1	0.0	1	0.0	0.674	10.3	LOS D	6.3	59.0	0.80	0.92	1.20	41.4
3	R2	All MCs	711	1.3	711	1.3	0.674	15.5	LOS B	8.3	59.0	0.88	0.92	1.20	40.8
Approach			1098	1.2	1090	1.2	0.674	13.2	LOS D	6.3	59.0	0.85	0.86	1.09	41.9
<b>East: Grand Drive East</b>															
5	T1	All MCs	469	0.9	469	0.9	0.340	2.3	LOS A	0.0	0.0	0.00	0.30	0.00	47.6
6	R2	All MCs	132	6.1	132	6.1	0.348	7.4	LOS A	0.0	0.0	0.00	0.38	0.00	46.9
Approach			601	2.0	601	2.0	0.348	3.4	LOS A	0.0	0.0	0.00	0.38	0.00	47.4
<b>West: Grand Drive West</b>															
10	L2	All MCs	57	0.0	57	0.0	1.091	215.0	LOS F	83.7	596.5	1.00	4.67	9.18	12.8
11	T1	All MCs	520	2.3	520	2.3	1.091	214.9	LOS F	83.7	596.5	1.00	4.67	9.18	12.8
Approach			577	2.1	577	2.1	1.091	214.9	LOS F	83.7	596.5	1.00	4.67	9.18	12.8
All Vehicles			2276	1.6	2276	1.6	1.091	61.8	LOS E	83.7	596.5	0.96	1.70	2.65	27.2

Figure 65: Grand Drive East Existing AM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total]	[HV]	[Total]	[HV]				[Veh]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
<b>East: Grand Drive East</b>															
4	L2	All MCs	744	2.6	744	2.6	0.595	3.1	LOS A	6.0	43.2	0.32	0.37	0.32	46.8
5	T1	All MCs	153	13.1	153	13.1	0.595	3.1	LOS A	6.0	43.2	0.32	0.37	0.32	47.0
Approach			897	4.3	897	4.3	0.595	3.1	LOS A	6.0	43.2	0.32	0.37	0.32	46.9
<b>North: SH1 Offramp</b>															
7	L2	All MCs	108	11.9	108	11.9	0.113	4.0	LOS A	0.6	4.3	0.48	0.52	0.40	46.3
8	T1	All MCs	1	0.0	1	0.0	0.113	4.3	LOS A	0.6	4.3	0.48	0.52	0.48	46.7
9	R2	All MCs	1	0.0	1	0.0	0.113	8.1	LOS A	0.6	4.3	0.48	0.52	0.40	46.0
Approach			111	11.7	111	11.7	0.113	4.0	LOS A	0.6	4.3	0.48	0.52	0.40	46.3
<b>West: Grand Drive West</b>															
11	T1	All MCs	310	7.4	310	7.4	0.211	2.5	LOS A	0.0	0.0	0.00	0.35	0.00	47.7
12	R2	All MCs	46	15.2	46	15.2	0.211	7.5	LOS A	0.0	0.0	0.00	0.35	0.00	46.9
Approach			356	8.4	356	8.4	0.211	3.2	LOS A	0.0	0.0	0.00	0.35	0.00	47.6
All Vehicles			1384	8.0	1364	8.0	0.595	3.3	LOS A	6.0	43.2	0.25	0.38	0.25	47.0

Figure 66: Grand Drive East Existing PM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total]	[HV]	[Total]	[HV]				[Veh.]	[Dist.]				
			veh/h	%	veh/h	%	veh	sec		veh	m				km/h
<b>East: Grand Drive East</b>															
4	L2	All MCs	390	6.2	390	6.2	0.367	2.9	LOS A	2.7	20.1	0.18	0.34	0.18	47.2
5	T1	All MCs	170	7.1	170	7.1	0.387	2.7	LOS A	2.7	20.1	0.18	0.34	0.18	47.4
Approach			560	6.4	560	6.4	0.367	2.8	LOS A	2.7	20.1	0.18	0.34	0.18	47.3
<b>North: SH1 Offramp</b>															
7	L2	All MCs	164	6.1	164	6.1	0.217	7.7	LOS A	1.2	9.3	0.70	0.66	0.70	44.7
8	T1	All MCs	3	100.0	3	100.0	0.217	11.8	LOS B	1.2	9.3	0.70	0.66	0.70	44.5
9	R2	All MCs	1	0.0	1	0.0	0.217	12.1	LOS B	1.2	9.3	0.70	0.66	0.70	44.4
Approach			168	7.7	168	7.7	0.217	7.8	LOS A	1.2	9.3	0.70	0.66	0.70	44.7
<b>West: Grand Drive West</b>															
11	T1	All MCs	707	2.0	707	2.0	0.421	2.5	LOS A	0.0	0.0	0.00	0.30	0.00	48.0
12	R2	All MCs	21	38.1	21	38.1	0.421	7.6	LOS A	0.0	0.0	0.00	0.30	0.00	46.9
Approach			728	3.0	728	3.0	0.421	2.7	LOS A	0.0	0.0	0.00	0.30	0.00	48.0
All Vehicles			1458	4.9	1458	4.9	0.421	3.3	LOS A	2.7	20.1	0.15	0.38	0.15	47.3

Figure 67: Grand Drive East Consented AM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total]	[HV]	[Total]	[HV]				[Veh.]	[Dist.]				
			veh/h	%	veh/h	%	veh	sec		veh	m				km/h
<b>East: Grand Drive East</b>															
4	L2	All MCs	744	2.8	744	2.8	0.722	4.8	LOS A	8.2	59.2	0.68	0.51	0.68	45.9
5	T1	All MCs	188	10.6	188	10.6	0.722	4.7	LOS A	8.2	59.2	0.68	0.51	0.68	46.1
Approach			932	4.2	932	4.2	0.722	4.6	LOS A	8.2	59.2	0.68	0.51	0.68	45.9
<b>North: SH1 Offramp</b>															
7	L2	All MCs	109	11.9	109	11.9	0.135	5.9	LOS A	0.7	5.3	0.58	0.60	0.58	45.5
8	T1	All MCs	1	0.0	1	0.0	0.135	5.3	LOS A	0.7	5.3	0.58	0.60	0.58	45.8
9	R2	All MCs	8	0.0	8	0.0	0.135	10.2	LOS B	0.7	5.3	0.58	0.60	0.58	45.3
Approach			118	11.0	118	11.0	0.135	6.2	LOS A	0.7	5.3	0.58	0.60	0.58	45.5
<b>West: Grand Drive West</b>															
11	T1	All MCs	374	6.1	374	6.1	0.305	2.5	LOS A	0.0	0.0	0.00	0.41	0.00	47.2
12	R2	All MCs	147	4.8	147	4.8	0.305	7.4	LOS A	0.0	0.0	0.00	0.41	0.00	46.6
Approach			521	5.8	521	5.8	0.305	3.9	LOS A	0.0	0.0	0.00	0.41	0.00	47.0
All Vehicles			1571	5.2	1571	5.2	0.722	4.5	LOS A	8.2	59.2	0.45	0.48	0.45	48.3

Figure 68: Grand Drive East Consented PM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total]	[HV]	[Total]	[HV]				[Veh.]	[Dist.]				
			veh/h	%	veh/h	%	veh	sec		veh	m				km/h
<b>East: Grand Drive East</b>															
4	L2	All MCs	390	6.2	390	6.2	0.469	3.5	LOS A	3.8	28.3	0.40	0.39	0.40	46.5
5	T1	All MCs	241	5.8	241	5.8	0.469	3.4	LOS A	3.8	28.3	0.40	0.39	0.40	46.8
Approach			631	5.7	631	5.7	0.469	3.5	LOS A	3.8	28.3	0.40	0.39	0.40	46.6
<b>North: SH1 Offramp</b>															
7	L2	All MCs	164	6.1	164	6.1	0.256	8.9	LOS A	1.5	11.3	0.75	0.71	0.75	43.8
8	T1	All MCs	3	100.0	3	100.0	0.256	13.6	LOS B	1.5	11.3	0.75	0.71	0.75	43.7
9	R2	All MCs	17	0.0	17	0.0	0.256	13.2	LOS B	1.5	11.3	0.75	0.71	0.75	43.5
Approach			184	7.1	184	7.1	0.256	9.3	LOS A	1.5	11.3	0.75	0.71	0.75	43.8
<b>West: Grand Drive West</b>															
11	T1	All MCs	744	1.9	744	1.9	0.475	2.5	LOS A	0.0	0.0	0.00	0.33	0.00	47.8
12	R2	All MCs	79	10.1	79	10.1	0.475	7.4	LOS A	0.0	0.0	0.00	0.33	0.00	47.1
Approach			823	2.7	823	2.7	0.475	3.0	LOS A	0.0	0.0	0.00	0.33	0.00	47.7
All Vehicles			1638	4.3	1638	4.3	0.475	3.9	LOS A	3.8	28.3	0.24	0.40	0.24	46.8

Figure 69: Grand Drive East Proposed AM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%				veh	m				
East: Grand Drive East															
4	L2	All MCs	744	2.6	744	2.8	1.116	233.5	LOS F	161.7	1168.1	1.00	6.94	12.56	11.9
5	T1	All MCs	295	6.7	290	6.7	1.116	233.7	LOS F	161.7	1168.1	1.00	6.94	12.56	11.9
Approach			1042	3.7	1042	3.7	1.116	233.5	LOS F	161.7	1168.1	1.00	6.94	12.56	11.9
North: SH1 Offramp															
7	L2	All MCs	109	11.5	109	11.9	0.248	12.6	LOS B	1.5	11.6	0.84	0.77	0.84	41.8
8	T1	All MCs	1	0.0	1	0.0	0.246	11.6	LOS B	1.5	11.6	0.84	0.77	0.84	42.0
9	R2	All MCs	32	0.0	32	0.0	0.248	18.4	LOS B	1.5	11.6	0.84	0.77	0.84	41.5
Approach			142	9.2	142	9.2	0.248	13.5	LOS B	1.5	11.6	0.84	0.77	0.84	41.7
West: Grand Drive West															
11	T1	All MCs	573	4.0	573	4.0	0.507	2.5	LOS A	0.0	0.0	0.00	0.47	0.00	46.8
12	R2	All MCs	480	1.5	480	1.5	0.507	7.3	LOS A	0.0	0.0	0.00	0.47	0.00	46.2
Approach			1033	2.9	1033	2.9	0.507	4.7	LOS A	0.0	0.0	0.00	0.47	0.00	46.5
All Vehicles			2217	3.7	2217	3.7	1.116	112.0	LOS F	161.7	1168.1	0.52	3.53	5.96	19.0

Figure 70: Grand Drive East Proposed PM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%				veh	m				
East: Grand Drive East															
4	L2	All MCs	390	6.2	390	6.2	0.790	11.1	LOS B	13.3	96.6	0.94	0.87	1.25	43.1
5	T1	All MCs	480	2.8	480	2.8	0.798	10.8	LOS B	13.3	96.6	0.94	0.87	1.25	43.3
Approach			850	4.2	850	4.2	0.798	10.9	LOS B	13.3	96.6	0.94	0.87	1.25	43.2
North: SH1 Offramp															
7	L2	All MCs	164	6.1	164	6.1	0.426	17.0	LOS B	3.3	24.1	0.92	0.89	1.11	39.7
8	T1	All MCs	3	100.0	3	100.0	0.426	24.5	LOS C	3.3	24.1	0.92	0.89	1.11	39.8
9	R2	All MCs	65	0.0	65	0.0	0.426	21.2	LOS C	3.3	24.1	0.92	0.89	1.11	39.4
Approach			232	5.6	232	5.6	0.426	10.3	LOS B	3.3	24.1	0.92	0.89	1.11	39.6
West: Grand Drive West															
11	T1	All MCs	857	1.6	857	1.6	0.641	2.5	LOS A	0.0	0.0	0.00	0.39	0.00	47.4
12	R2	All MCs	257	3.1	257	3.1	0.641	7.4	LOS A	0.0	0.0	0.00	0.39	0.00	46.8
Approach			1114	2.0	1114	2.0	0.641	3.6	LOS A	0.0	0.0	0.00	0.39	0.00	47.2
All Vehicles			2196	3.2	2196	3.2	0.780	8.0	LOS A	13.3	96.6	0.46	0.83	0.69	44.7

Figure 71: Grand Drive East Proposed With Additional East Approach Left Turn Lane

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%				veh	m				
East: Grand Drive East															
4	L2	All MCs	744	2.6	744	2.6	0.646	8.5	LOS A	7.3	51.9	0.82	0.78	1.00	44.2
5	T1	All MCs	290	6.7	290	6.7	0.308	6.8	LOS A	2.3	17.4	0.70	0.61	0.70	45.5
Approach			1042	3.7	1042	3.7	0.646	8.0	LOS A	7.3	51.9	0.79	0.73	0.82	44.6
North: SH1 Offramp															
7	L2	All MCs	109	11.9	109	11.9	0.248	12.6	LOS B	1.5	11.6	0.84	0.77	0.84	41.8
8	T1	All MCs	1	0.0	1	0.0	0.246	11.6	LOS B	1.5	11.6	0.84	0.77	0.84	42.0
9	R2	All MCs	32	0.0	32	0.0	0.248	18.4	LOS B	1.5	11.6	0.84	0.77	0.84	41.5
Approach			142	9.2	142	9.2	0.248	13.5	LOS B	1.5	11.6	0.84	0.77	0.84	41.7
West: Grand Drive West															
11	T1	All MCs	573	4.0	573	4.0	0.507	2.5	LOS A	0.0	0.0	0.00	0.47	0.00	46.8
12	R2	All MCs	480	1.5	480	1.5	0.507	7.3	LOS A	0.0	0.0	0.00	0.47	0.00	46.2
Approach			1033	2.9	1033	2.9	0.507	4.7	LOS A	0.0	0.0	0.00	0.47	0.00	46.5
All Vehicles			2217	3.7	2217	3.7	0.646	6.0	LOS A	7.3	51.9	0.42	0.61	0.40	45.3

Figure 72: Grand Drive East Proposed With Ara Hills Plan Change AM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%				veh	m				
<b>East: Grand Drive East</b>															
4	L2	All MCs	744	2.6	744	2.6	1.256	479.7	LOS F	291.0	2100.6	1.00	11.67	22.77	6.6
5	T1	All MCs	331	6.0	331	6.0	1.258	479.9	LOS F	291.0	2100.6	1.00	11.67	22.77	6.8
Approach			1075	3.8	1075	3.8	1.258	479.8	LOS F	291.0	2100.6	1.00	11.67	22.77	6.8
<b>North: SH1 Offramp</b>															
7	L2	All MCs	109	11.9	109	11.9	0.313	17.0	LOS B	2.1	15.7	0.92	0.81	0.92	39.8
8	T1	All MCs	1	0.0	1	0.0	0.313	15.8	LOS B	2.1	15.7	0.92	0.81	0.92	40.0
9	R2	All MCs	40	0.0	40	0.0	0.313	20.6	LOS C	2.1	15.7	0.92	0.81	0.92	39.5
Approach			150	8.7	150	8.7	0.313	18.0	LOS B	2.1	15.7	0.92	0.81	0.92	39.7
<b>West: Grand Drive West</b>															
11	T1	All MCs	633	3.8	633	3.8	0.685	2.5	LOS A	0.0	0.0	0.00	0.48	0.00	46.7
12	R2	All MCs	553	1.3	553	1.3	0.685	7.3	LOS A	0.0	0.0	0.00	0.48	0.00	46.1
Approach			1186	2.5	1186	2.5	0.685	4.8	LOS A	0.0	0.0	0.00	0.48	0.00	46.4
All Vehicles			2411	3.4	2411	3.4	1.256	217.4	LOS F	291.0	2100.6	0.50	5.49	10.21	12.7

Figure 73: Grand Drive East Proposed With Ara Hills Plan Change PM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%				veh	m				
<b>East: Grand Drive East</b>															
4	L2	All MCs	390	6.2	390	6.2	0.918	23.7	LOS C	26.7	192.9	1.00	1.45	2.07	37.6
5	T1	All MCs	528	2.3	528	2.3	0.919	23.5	LOS C	26.7	192.9	1.00	1.45	2.07	37.8
Approach			916	3.9	916	3.9	0.919	23.5	LOS C	26.7	192.9	1.00	1.45	2.07	37.7
<b>North: SH1 Offramp</b>															
7	L2	All MCs	164	6.1	164	6.1	0.508	24.2	LOS C	4.7	34.1	0.98	1.03	1.41	36.8
8	T1	All MCs	3	100.0	3	100.0	0.509	33.0	LOS C	4.7	34.1	0.98	1.03	1.41	36.7
9	R2	All MCs	80	0.0	80	0.0	0.509	28.2	LOS C	4.7	34.1	0.98	1.03	1.41	36.6
Approach			247	5.3	247	5.3	0.508	25.6	LOS C	4.7	34.1	0.98	1.03	1.41	36.7
<b>West: Grand Drive West</b>															
11	T1	All MCs	892	1.6	892	1.6	0.682	2.5	LOS A	0.0	0.0	0.00	0.40	0.00	47.3
12	R2	All MCs	311	2.6	311	2.6	0.682	7.4	LOS A	0.0	0.0	0.00	0.40	0.00	46.7
Approach			1203	1.8	1203	1.8	0.682	3.8	LOS A	0.0	0.0	0.00	0.40	0.00	47.2
All Vehicles			2388	3.0	2388	3.0	0.919	13.7	LOS B	26.7	192.9	0.40	0.87	0.95	41.9

Figure 74: Grand Drive West Proposed With Ara Hills Plan Change AM (With 30% Delmore reduction) AM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%				veh	m				
<b>South: SH1 Offramp</b>															
1	L2	All MCs	172	4.7	172	4.7	0.182	5.2	LOS A	1.0	7.4	0.53	0.55	0.53	46.0
2	T1	All MCs	1	100.0	1	100.0	0.282	6.4	LOS A	1.8	13.1	0.54	0.63	0.54	43.8
3	R2	All MCs	340	5.9	340	5.9	0.282	9.3	LOS A	1.8	13.1	0.54	0.63	0.54	43.5
Approach			513	5.7	513	5.7	0.282	7.9	LOS A	1.8	13.1	0.54	0.60	0.54	44.3
<b>East: Grand Drive East</b>															
5	T1	All MCs	199	0.5	199	0.5	0.199	2.3	LOS A	0.0	0.0	0.00	0.45	0.00	47.1
6	R2	All MCs	141	9.9	141	9.9	0.199	7.4	LOS A	0.0	0.0	0.00	0.45	0.00	46.3
Approach			340	4.4	340	4.4	0.199	4.4	LOS A	0.0	0.0	0.00	0.45	0.00	46.7
<b>West: Grand Drive West</b>															
10	L2	All MCs	78	0.0	78	0.0	0.944	34.8	LOS C	31.6	222.1	1.00	1.81	2.76	33.8
11	T1	All MCs	755	0.7	755	0.7	0.944	34.6	LOS C	31.6	222.1	1.00	1.81	2.76	34.0
Approach			833	0.6	833	0.6	0.944	34.6	LOS C	31.6	222.1	1.00	1.81	2.76	34.0
All Vehicles			1686	2.9	1686	2.9	0.944	20.4	LOS C	31.6	222.1	0.66	1.17	1.53	38.9

Figure 75: Grand Drive West Proposed With Ara Hills Plan Change PM (With 30% Delmore Reduction) PM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec			veh	m			km/h
<b>South: SH1 Offramp</b>															
1	L2	All MCs	320	1.3	320	1.3	0.388	7.3	LOS A	2.5	17.7	0.71	0.65	0.71	44.9
2	T1	All MCs	1	0.0	1	0.0	0.639	8.3	LOS A	7.1	50.1	0.83	0.83	1.03	42.3
3	R2	All MCs	711	1.3	711	1.3	0.639	13.4	LOS B	7.1	50.1	0.83	0.83	1.03	41.8
Approach			1032	1.3	1032	1.3	0.639	11.5	LOS B	7.1	50.1	0.79	0.78	0.93	42.7
<b>East: Grand Drive East</b>															
5	T1	All MCs	388	1.0	388	1.0	0.302	2.3	LOS A	0.0	0.0	0.00	0.39	0.00	47.5
6	R2	All MCs	132	6.1	132	6.1	0.302	7.4	LOS A	0.0	0.0	0.00	0.39	0.00	46.8
Approach			520	2.3	520	2.3	0.302	3.6	LOS A	0.0	0.0	0.00	0.39	0.00	47.3
<b>West: Grand Drive West</b>															
10	L2	All MCs	47	0.0	47	0.0	0.895	44.3	LOS D	18.9	134.9	1.00	1.69	2.64	31.1
11	T1	All MCs	433	2.8	433	2.8	0.895	44.2	LOS D	18.9	134.9	1.00	1.69	2.64	31.2
Approach			480	2.5	480	2.5	0.895	44.2	LOS D	18.9	134.9	1.00	1.69	2.64	31.2
All Vehicles			2032	1.8	2032	1.8	0.895	17.2	LOS B	18.9	134.9	0.64	0.89	1.10	40.2

Figure 76: Grand Drive East With Ara Hills Plan Change AM (With 30% Delmore Reduction & Additional Eastern LT Lane)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec			veh	m			km/h
<b>East: Grand Drive East</b>															
4	L2	All MCs	744	2.8	744	2.8	0.646	8.5	LOS A	7.3	51.9	0.82	0.78	1.00	44.2
5	T1	All MCs	298	6.7	298	6.7	0.369	6.8	LOS A	2.3	17.4	0.70	0.61	0.70	45.5
Approach			1042	3.7	1042	3.7	0.646	8.0	LOS A	7.3	51.9	0.79	0.73	0.92	44.6
<b>North: SH1 Offramp</b>															
7	L2	All MCs	109	11.9	109	11.9	0.246	12.6	LOS B	1.5	11.6	0.84	0.77	0.84	41.8
8	T1	All MCs	1	0.0	1	0.0	0.246	11.6	LOS B	1.5	11.6	0.84	0.77	0.84	42.0
9	R2	All MCs	32	0.0	32	0.0	0.246	16.4	LOS B	1.5	11.6	0.84	0.77	0.84	41.5
Approach			142	9.2	142	9.2	0.246	13.5	LOS B	1.5	11.6	0.84	0.77	0.84	41.7
<b>West: Grand Drive West</b>															
11	T1	All MCs	573	4.0	573	4.0	0.597	2.5	LOS A	0.0	0.0	0.00	0.47	0.00	46.8
12	R2	All MCs	460	1.5	460	1.5	0.597	7.3	LOS A	0.0	0.0	0.00	0.47	0.00	46.2
Approach			1033	2.9	1033	2.9	0.597	4.7	LOS A	0.0	0.0	0.00	0.47	0.00	46.5
All Vehicles			2217	3.7	2217	3.7	0.646	8.8	LOS A	7.3	51.9	0.42	0.61	0.48	45.3

Figure 77: Grand Drive East With Ara Hills Plan Change PM (With 30% Delmore Reduction & Additional Eastern LT Lane)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
<b>East: Grand Drive East</b>															
4	L2	All MCs	385	4.9	385	4.9	0.366	5.3	LOS A	2.5	18.3	0.60	0.55	0.60	45.9
5	T1	All MCs	468	4.3	468	4.3	0.369	4.4	LOS A	2.6	19.1	0.58	0.49	0.58	46.0
Approach			853	4.6	853	4.6	0.369	4.8	LOS A	2.6	19.1	0.59	0.52	0.59	46.0
<b>North: SH1 Offramp</b>															
7	L2	All MCs	167	7.8	167	7.8	0.434	17.8	LOS B	3.4	25.0	0.93	0.91	1.14	39.4
8	T1	All MCs	1	0.0	1	0.0	0.434	17.0	LOS B	3.4	25.0	0.93	0.91	1.14	39.6
9	R2	All MCs	65	0.0	65	0.0	0.434	21.8	LOS C	3.4	25.0	0.93	0.91	1.14	39.1
Approach			233	5.6	233	5.6	0.434	18.9	LOS B	3.4	25.0	0.93	0.91	1.14	39.3
<b>West: Grand Drive West</b>															
11	T1	All MCs	866	2.7	866	2.7	0.648	2.5	LOS A	0.0	0.0	0.00	0.39	0.00	47.4
12	R2	All MCs	256	2.7	256	2.7	0.648	7.4	LOS A	0.0	0.0	0.00	0.39	0.00	46.8
Approach			1122	2.7	1122	2.7	0.648	3.6	LOS A	0.0	0.0	0.00	0.39	0.00	47.2
All Vehicles			2208	3.7	2208	3.7	0.648	5.7	LOS A	3.4	25.0	0.32	0.49	0.35	45.8

Upper Orewa Road / Wainui Road Intersection SIDRA Results

Figure 78: Existing AM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
<b>East: Wainui Road East</b>															
5	T1	All MCs	199	17.5	199	17.5	0.129	0.1	LOS A	0.2	1.3	0.08	0.10	0.08	49.5
6	R2	All MCs	20	10.5	20	10.5	0.129	5.7	LOS A	0.2	1.3	0.08	0.10	0.08	47.8
Approach			219	16.8	219	16.8	0.129	0.8	NA	0.2	1.3	0.08	0.10	0.08	49.3
<b>North: Upper Orewa Road</b>															
7	L2	All MCs	100	5.3	100	5.3	0.086	5.5	LOS A	0.3	2.5	0.35	0.56	0.35	45.1
9	R2	All MCs	4	25.0	4	25.0	0.086	7.8	LOS A	0.3	2.5	0.35	0.56	0.35	44.6
Approach			104	6.1	104	6.1	0.086	5.6	LOS A	0.3	2.5	0.35	0.56	0.35	45.1
<b>West: Wainui Road West</b>															
10	L2	All MCs	3	0.0	3	0.0	0.134	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	48.7
11	T1	All MCs	240	11.4	240	11.4	0.134	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
Approach			243	11.3	243	11.3	0.134	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.0
All Vehicles			568	12.5	568	12.5	0.134	1.3	NA	0.3	2.5	0.10	0.15	0.10	48.7

Figure 79: Existing PM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
<b>East: Wainui Road East</b>															
5	T1	All MCs	238	7.5	238	7.5	0.188	0.3	LOS A	0.8	4.4	0.18	0.22	0.18	48.7
6	R2	All MCs	86	2.4	86	2.4	0.188	5.3	LOS A	0.8	4.4	0.18	0.22	0.18	47.2
Approach			324	6.2	324	6.2	0.188	1.8	NA	0.8	4.4	0.18	0.22	0.18	48.3
<b>North: Upper Orewa Road</b>															
7	L2	All MCs	59	1.8	59	1.8	0.045	5.1	LOS A	0.2	1.3	0.27	0.52	0.27	45.3
9	R2	All MCs	2	0.0	2	0.0	0.045	6.8	LOS A	0.2	1.3	0.27	0.52	0.27	45.1
Approach			61	1.7	61	1.7	0.045	5.2	LOS A	0.2	1.3	0.27	0.52	0.27	45.3
<b>West: Wainui Road West</b>															
10	L2	All MCs	6	0.0	6	0.0	0.095	4.6	LOS A	0.0	0.0	0.00	0.02	0.00	48.6
11	T1	All MCs	160	10.0	160	10.0	0.095	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	49.0
Approach			175	9.6	175	9.6	0.095	0.2	NA	0.0	0.0	0.00	0.02	0.00	49.8
All Vehicles			580	8.8	580	8.8	0.188	1.8	NA	0.8	4.4	0.14	0.19	0.14	48.4

Figure 80: Proposed AM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
			veh/h	%	veh/h	%	veh	sec	veh	m					
<b>East Walnut Road East</b>															
5	T1	All MCs	188	17.5	189	17.5	0.114	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
6	R2	All MCs	113	1.9	113	1.9	0.051	5.5	LOS A	0.4	2.6	0.37	0.57	0.37	45.0
Approach			312	11.8	312	11.8	0.114	2.0	NA	0.4	2.6	0.13	0.20	0.13	48.1
<b>North Upper Orewa Road</b>															
7	L2	All MCs	316	1.7	316	1.7	0.245	5.6	LOS A	1.1	7.9	0.38	0.58	0.38	45.1
9	R2	All MCs	28	3.7	28	3.7	0.050	9.0	LOS A	0.2	1.3	0.55	0.73	0.55	43.3
Approach			344	1.0	344	1.0	0.245	5.9	LOS A	1.1	7.9	0.39	0.58	0.39	44.9
<b>West Walnut Road West</b>															
10	L2	All MCs	14	0.0	14	0.0	0.140	4.6	LOS A	0.0	0.0	0.00	0.03	0.00	48.5
11	T1	All MCs	240	11.4	240	11.4	0.140	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	49.8
Approach			254	10.8	254	10.8	0.140	0.3	NA	0.0	0.0	0.00	0.03	0.00	49.7
All Vehicles			900	7.8	900	7.8	0.245	3.0	NA	1.1	7.9	0.19	0.30	0.19	47.2

Figure 81: Proposed PM

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total	HV ]	[ Total	HV ]				[ Veh.	Dist ]				
			veh/h	%	veh/h	%	veh	sec	veh	m					
<b>East Walnut Road East</b>															
5	T1	All MCs	236	7.5	236	7.5	0.126	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
6	R2	All MCs	272	0.8	272	0.8	0.182	5.3	LOS A	0.9	6.3	0.34	0.56	0.34	45.1
Approach			508	3.9	509	3.9	0.182	2.9	NA	0.9	6.3	0.18	0.30	0.18	47.2
<b>North Upper Orewa Road</b>															
7	L2	All MCs	182	0.6	182	0.6	0.130	5.2	LOS A	0.6	3.9	0.28	0.54	0.28	45.3
9	R2	All MCs	16	0.0	16	0.0	0.031	9.8	LOS A	0.1	0.6	0.59	0.75	0.59	42.9
Approach			198	0.5	198	0.5	0.130	5.5	LOS A	0.6	3.9	0.31	0.55	0.31	45.1
<b>West Walnut Road West</b>															
10	L2	All MCs	27	0.0	27	0.0	0.107	4.6	LOS A	0.0	0.0	0.00	0.06	0.00	48.3
11	T1	All MCs	168	10.0	168	10.0	0.107	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	49.5
Approach			196	8.6	196	8.6	0.107	0.7	NA	0.0	0.0	0.00	0.06	0.00	49.3
All Vehicles			903	4.2	903	4.2	0.102	3.0	NA	0.9	6.3	0.17	0.30	0.17	47.2

## APPENDIX D – SIDRA LAYOUT DRAWINGS

Figure 82: Grand Drive West Layout

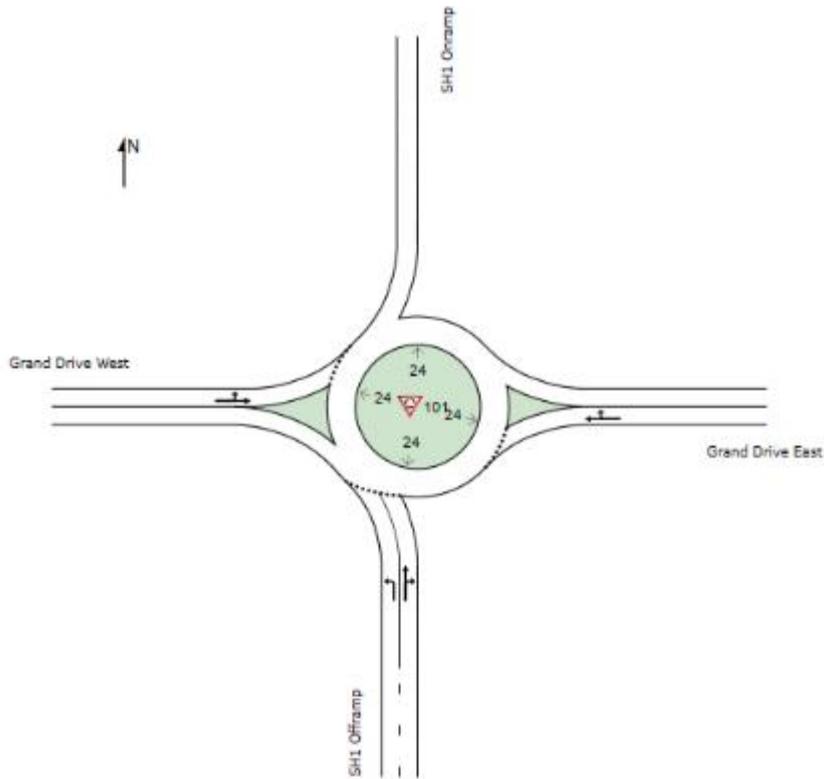


Figure 83: Grand Drive East Layout

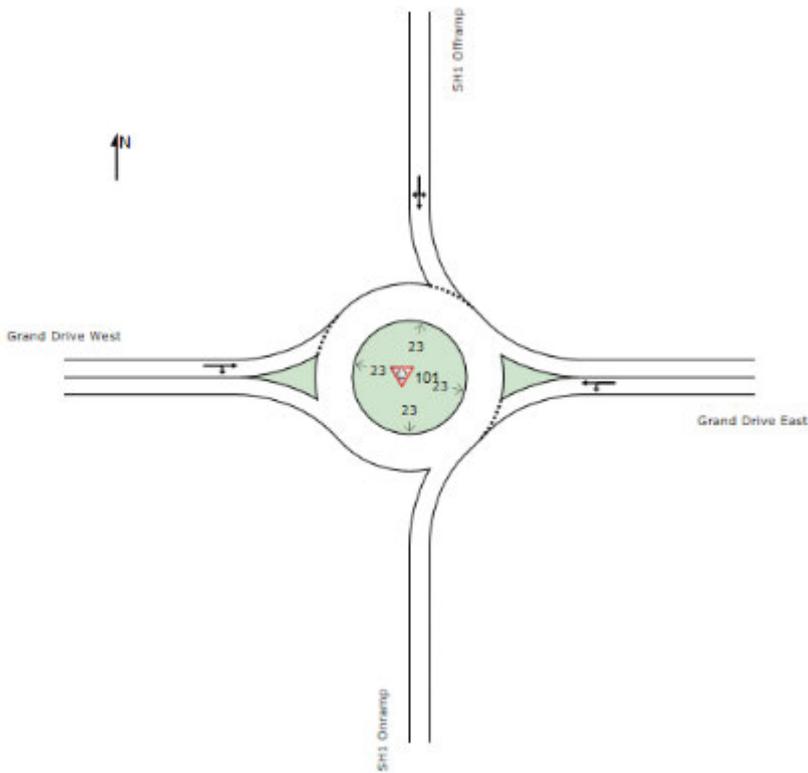
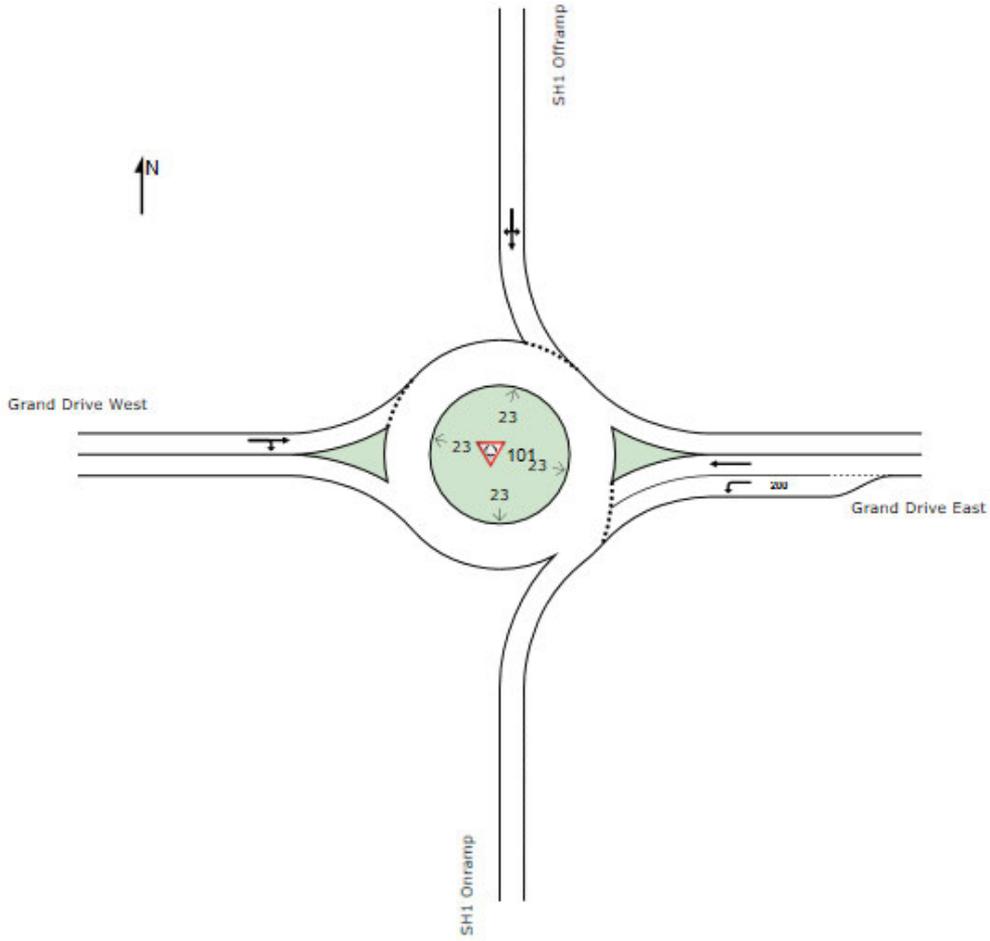
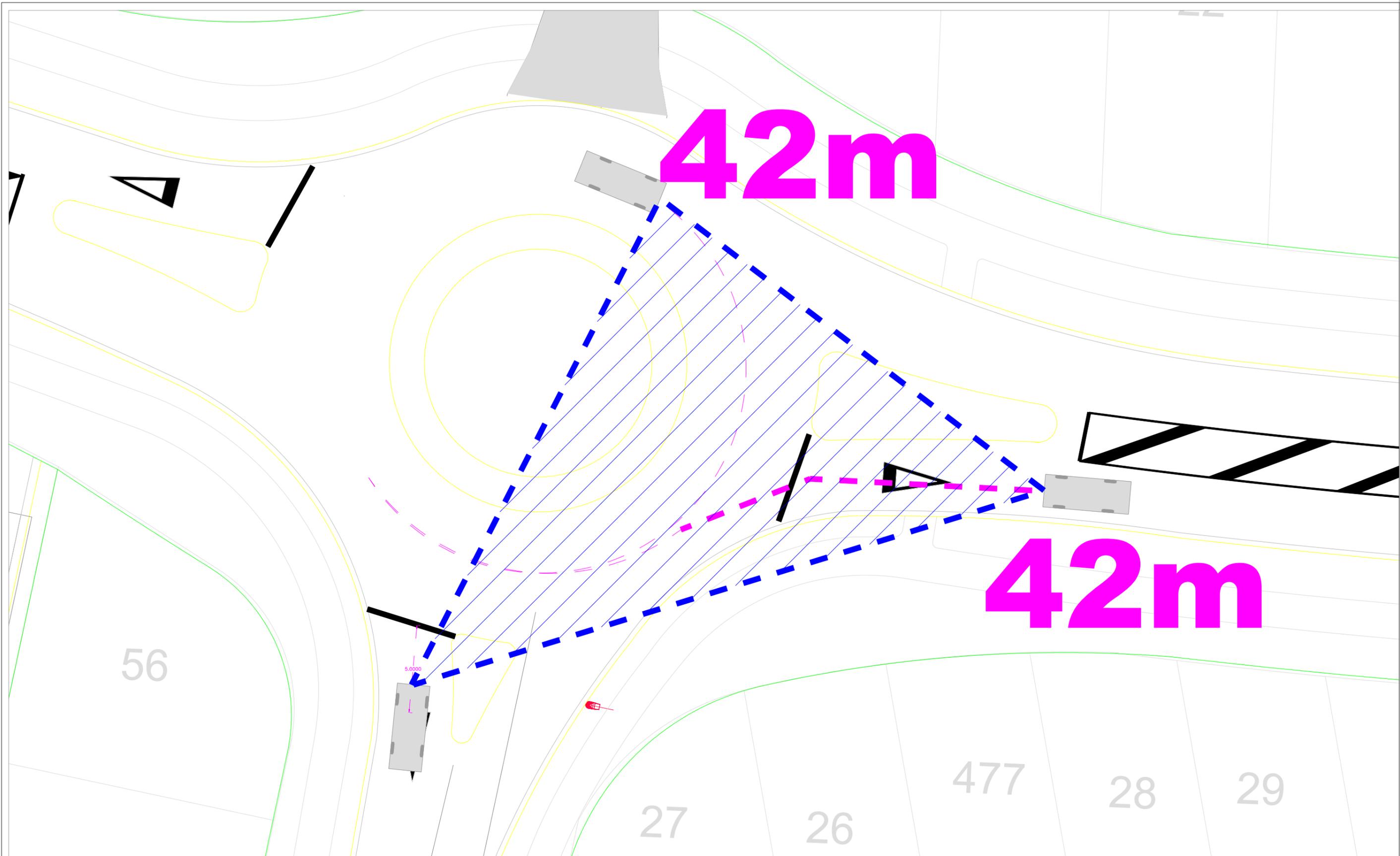


Figure 84: Grand Drive East Layout With Additional Left Turn Lane



---

## APPENDIX E – SIGHT DISTANCE DRAWINGS



Revision notes:		
Rev:	Date:	Notes:

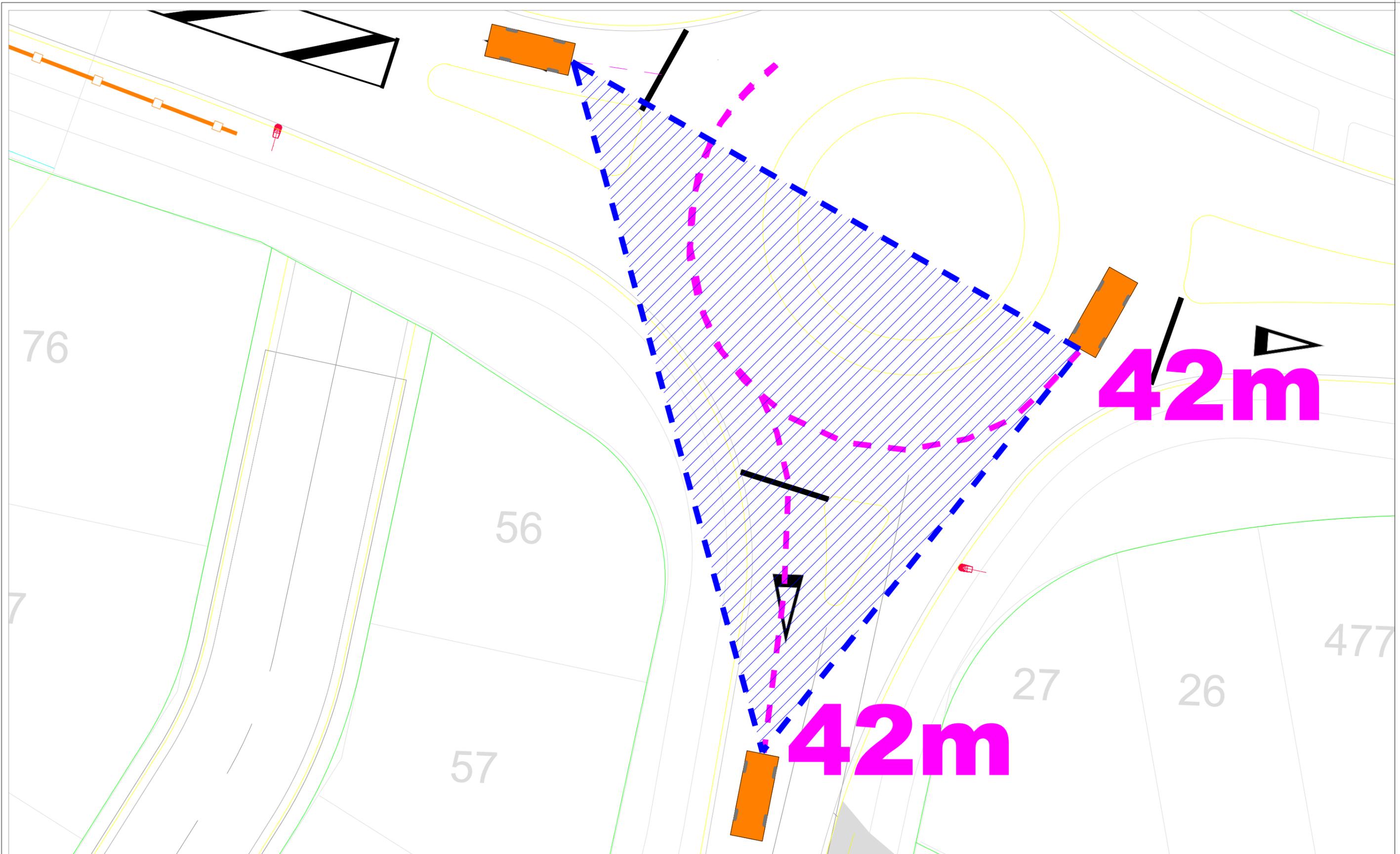
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Sight Distance Assessment Intersection - Road 1 / NoR6 / JOAL 1

<b>Date:</b> 23 December 2025
<b>Scale @ A3:</b> 1:0.2
<b>Revision:</b> A



<b>Figure:</b> 1
---------------------



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment  
Intersection - Road 1 / NoR6 / JOAL 1

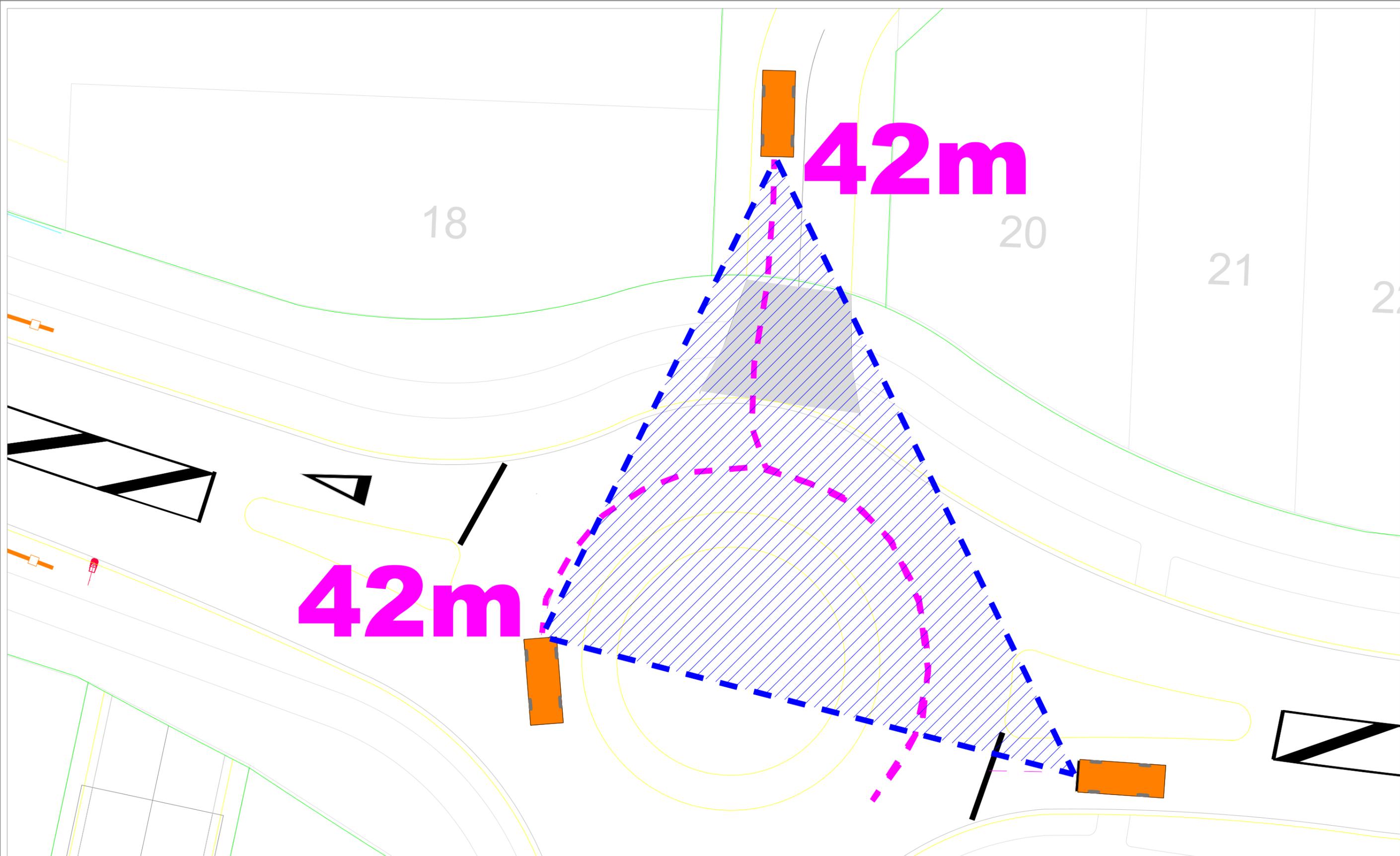
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.2

**Revision:**  
A



**Figure:**  
2



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment  
Intersection - Road 1 / NoR6 / JOAL 1

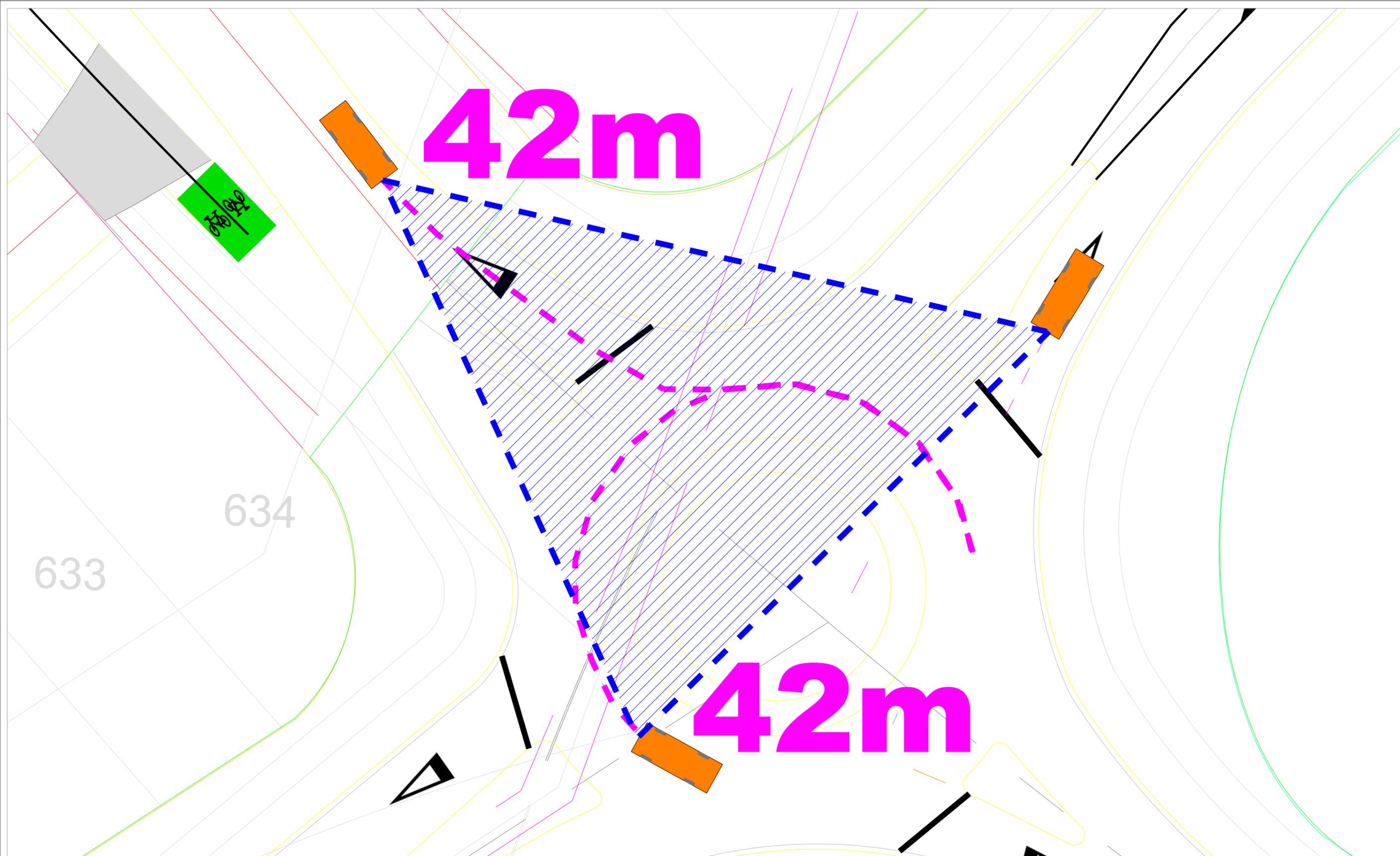
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.2

**Revision:**  
A



**Figure:**  
3



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

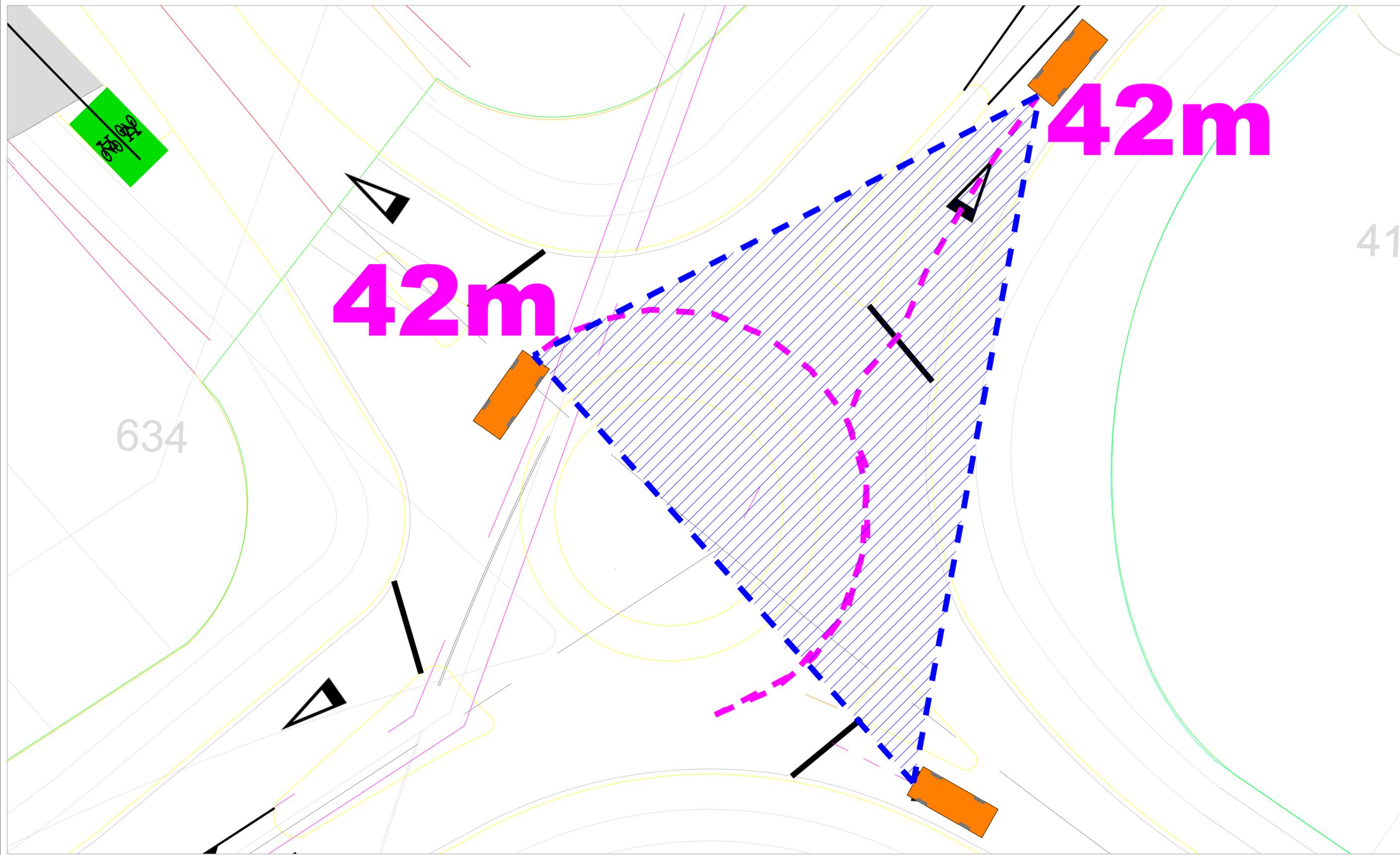
**Drawing Title:**  
Sight Distance Assessment  
Intersection - Road 5 / NoR6 / Road 6

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.2

**Revision:**  
A





Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment  
 Intersection - Road 5 / NoR6 / Road 6

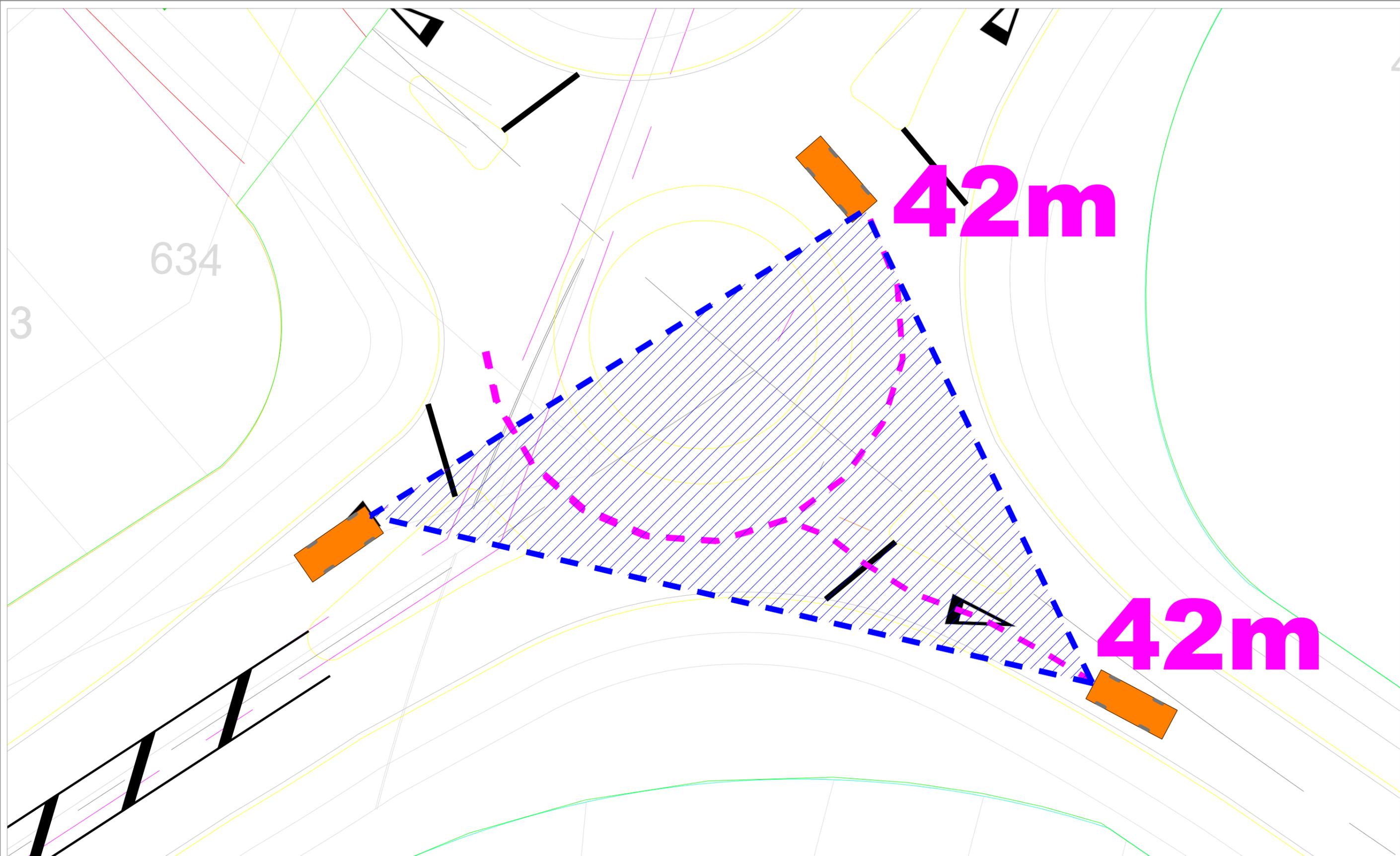
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 5



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment  
Intersection - Road 5 / NoR6 / Road 6

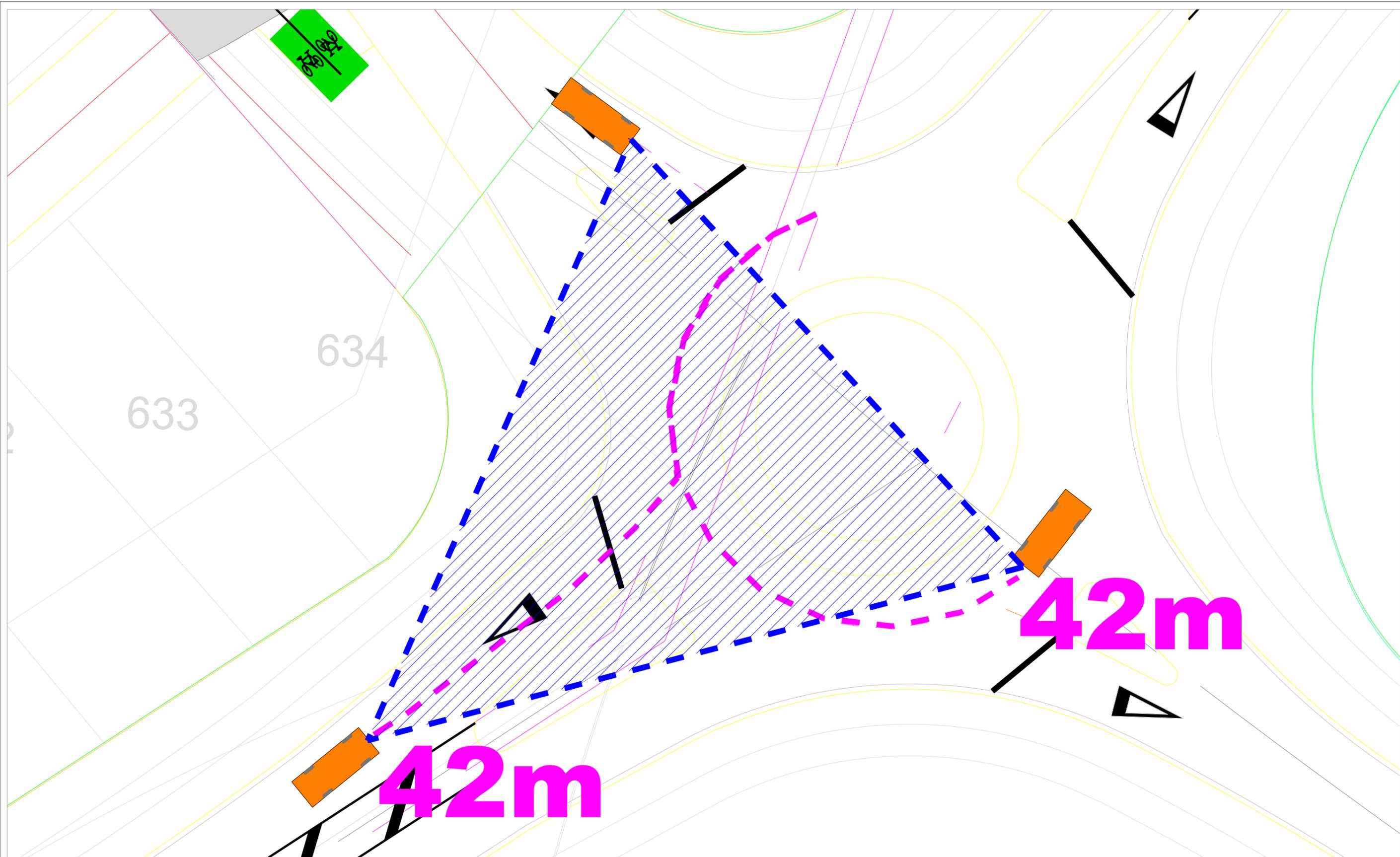
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.2

**Revision:**  
A



**Figure:**  
6



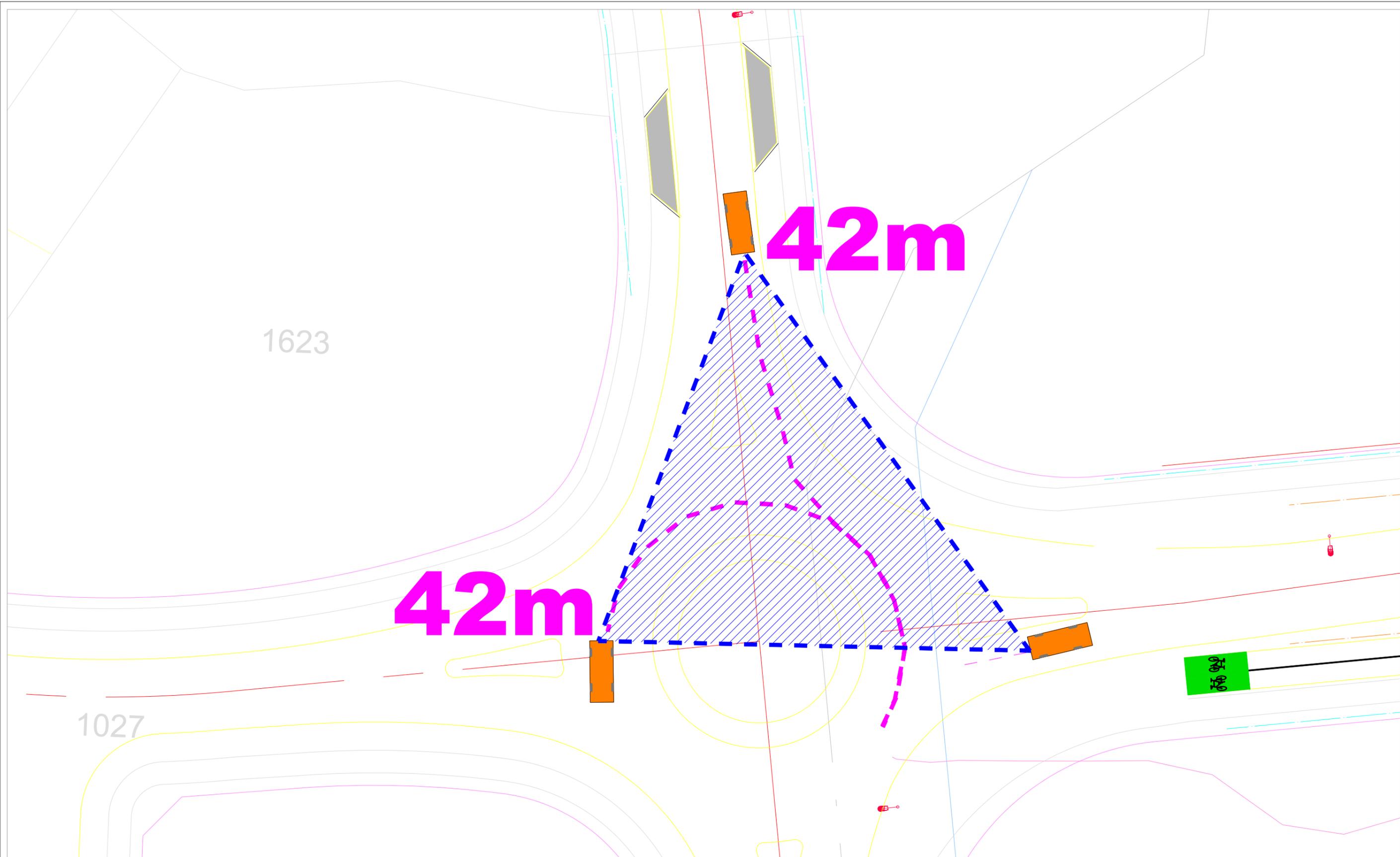
Revision notes:		
Rev:	Date:	Notes:

<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Sight Distance Assessment Intersection - Road 5 / NoR6 / Road 6

<b>Date:</b> 23 December 2025
<b>Scale @ A3:</b> 1:0.2
<b>Revision:</b> A





1623

42m

42m

1027

STOP

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment  
Intersection - Road 5 / Road 17 / Road 18

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.28

**Revision:**  
A



**Figure:**  
8

1623

1027

6000



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.28

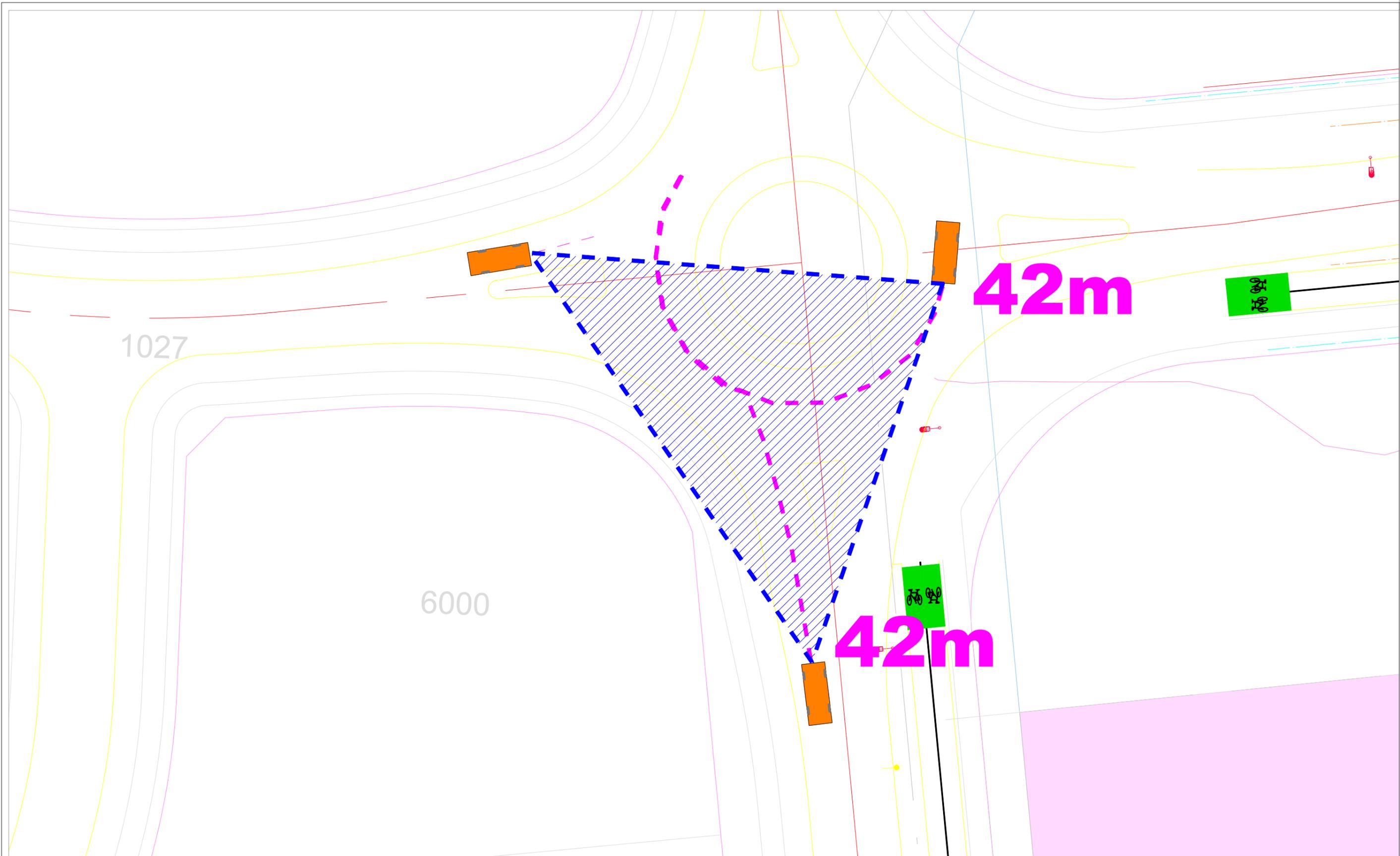
**Revision:**  
A

**Client:**

**Drawing Title:**  
Sight Distance Assessment  
Intersection - Road 5 / Road 17 / Road 18



**Figure:**  
9



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment  
Intersection - Road 5 / Road 17 / Road 18

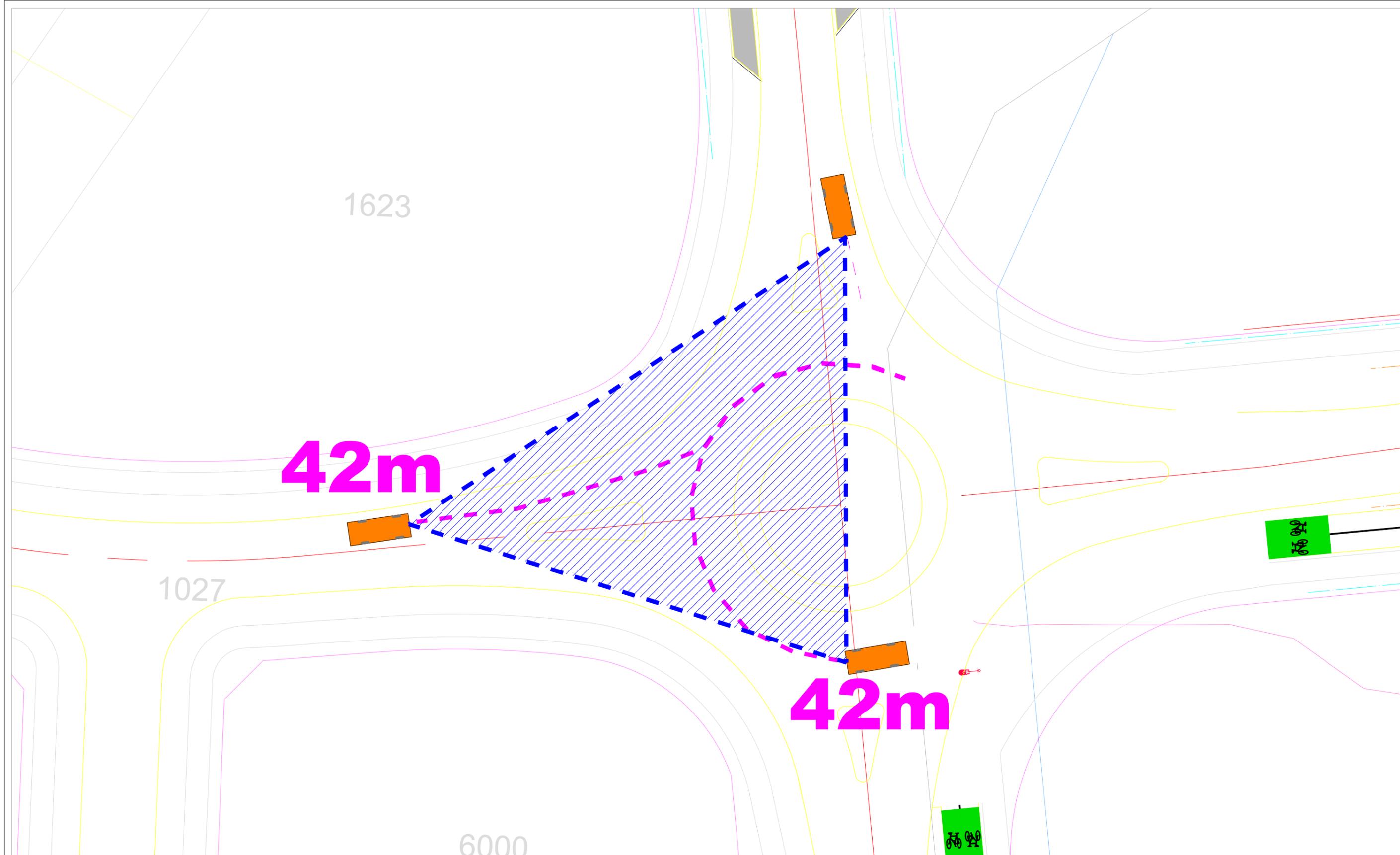
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.28

**Revision:**  
A



**Figure:**  
10



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

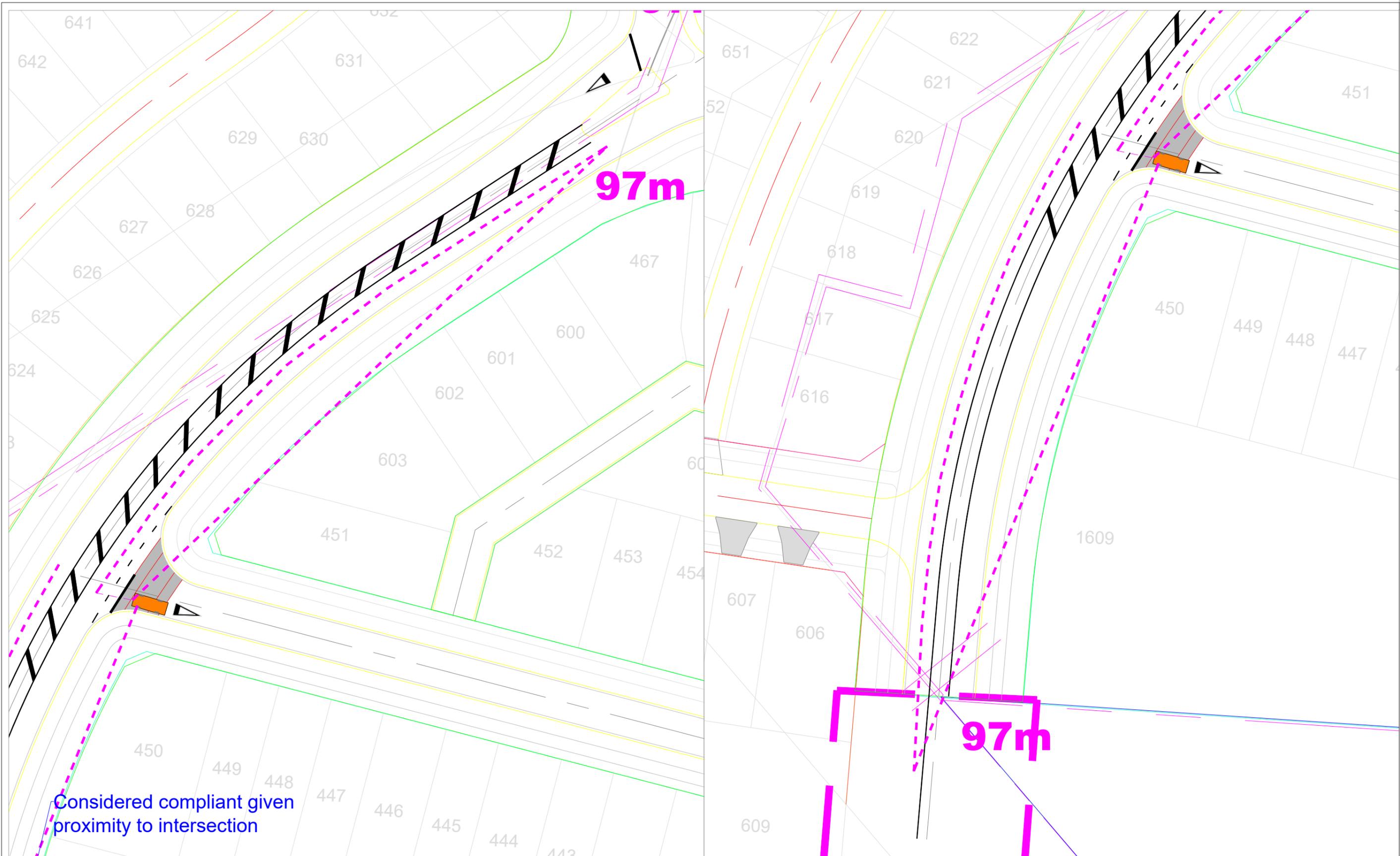
**Client:**

**Drawing Title:**  
Sight Distance Assessment  
Intersection - Road 5 / Road 17 / Road 18

**Scale @ A3:**  
1:0.28

**Revision:**  
A





Considered compliant given proximity to intersection

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "A" - Road 6 / NoR6

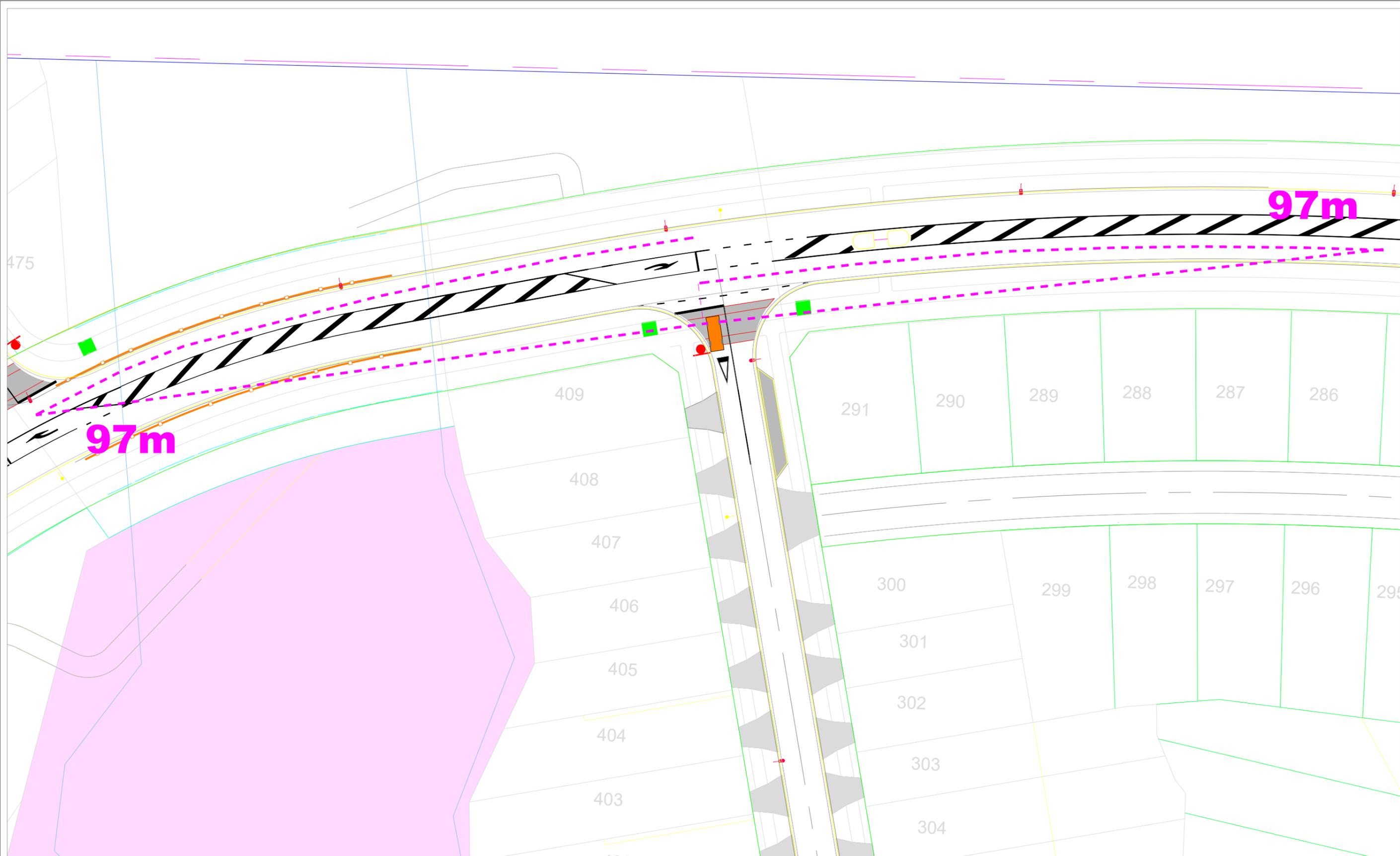
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
1A



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "B" - Road 2 / NoR6

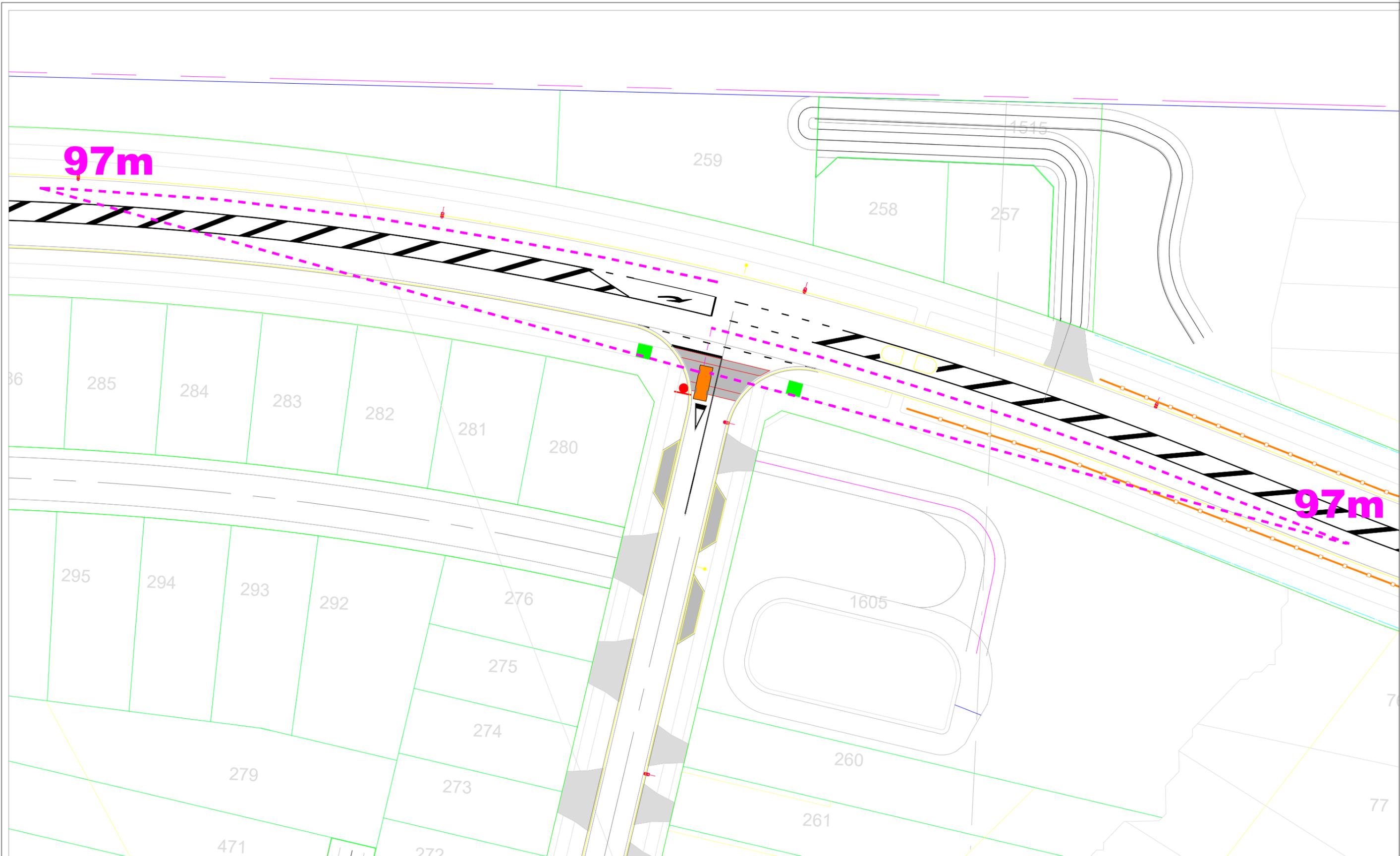
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
2A



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "C" - Road 3 / NoR6

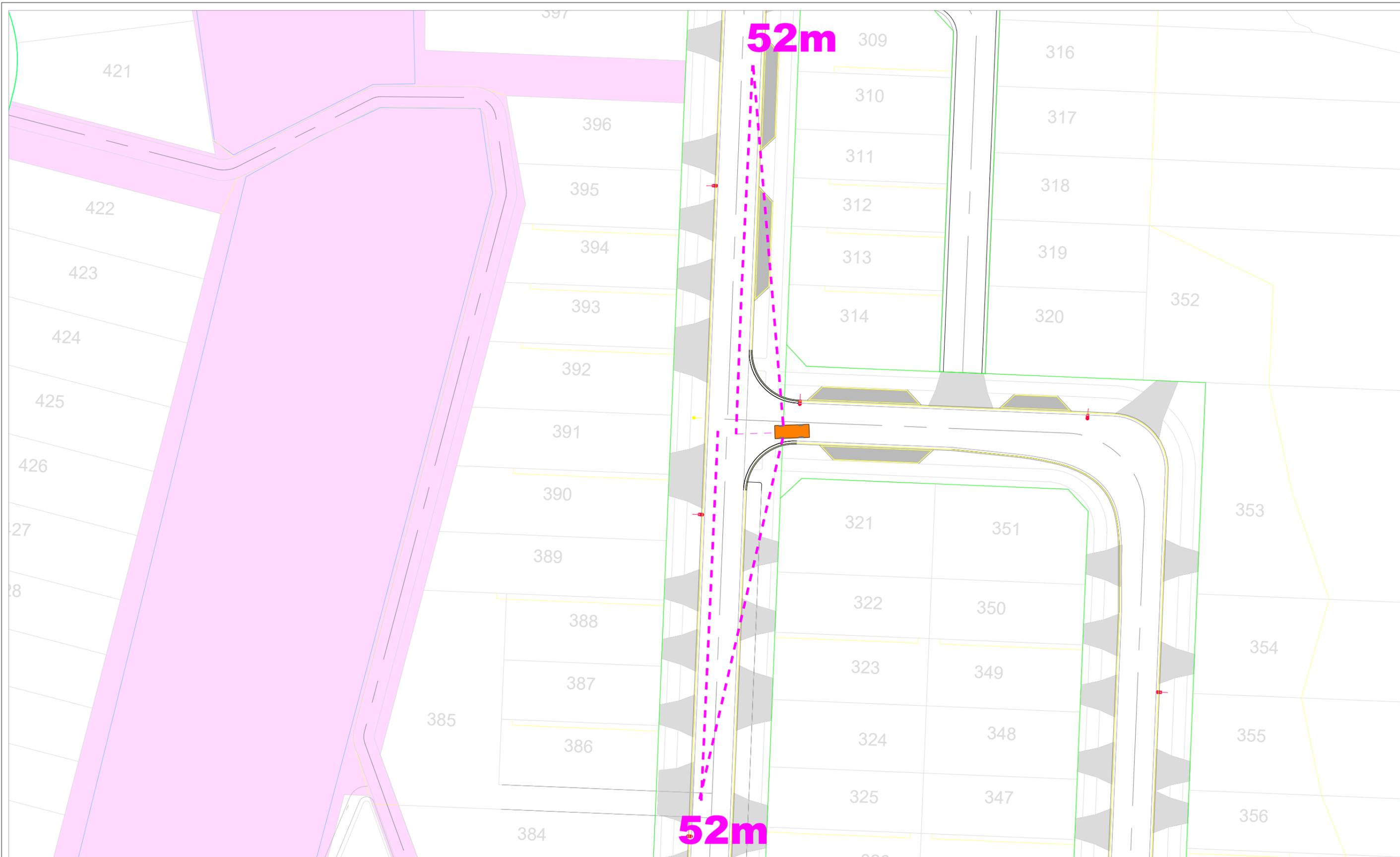
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23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
3A



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "D" - Road 4 / Road 2

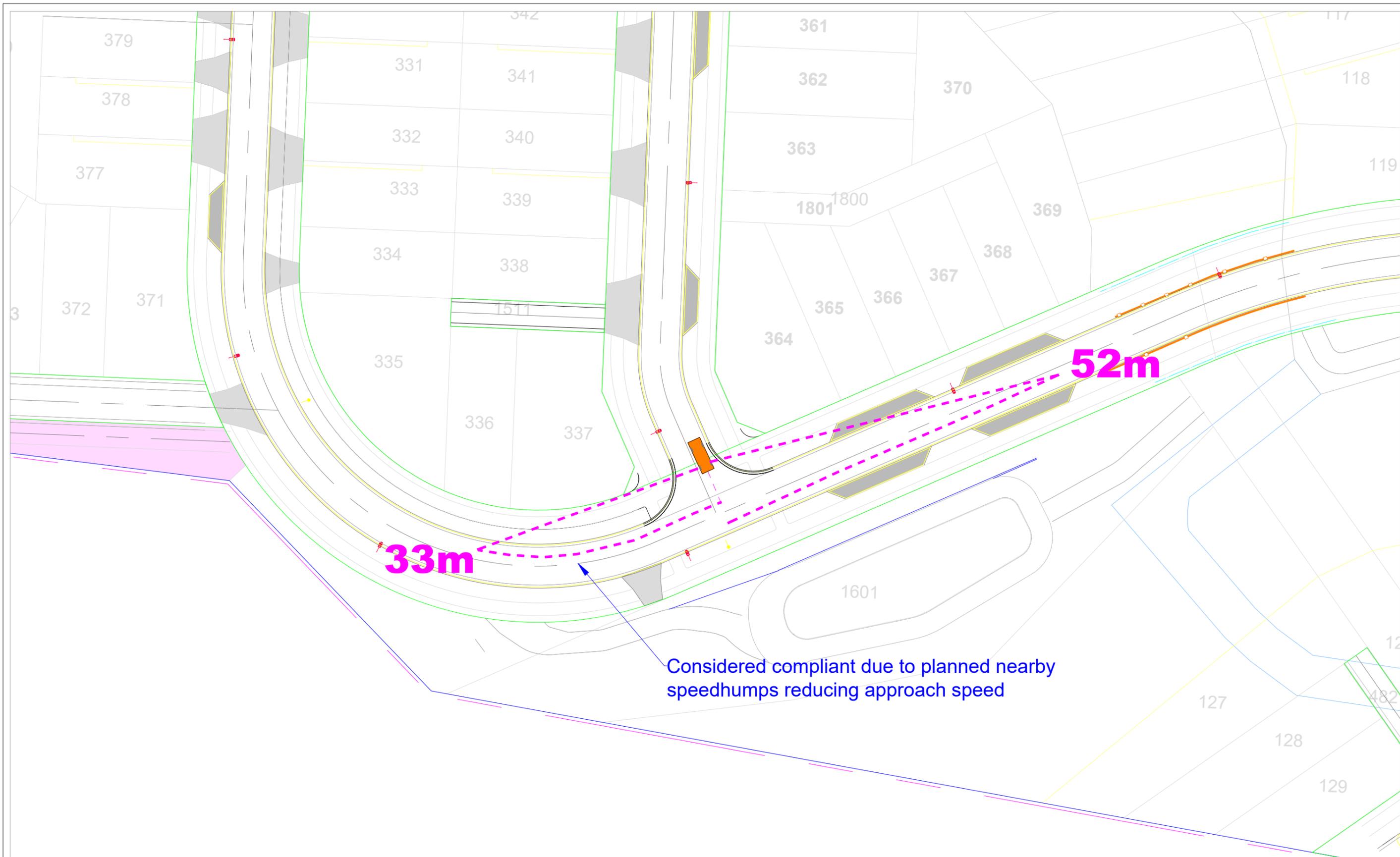
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
4A



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "E" - Road 2 / Road 4

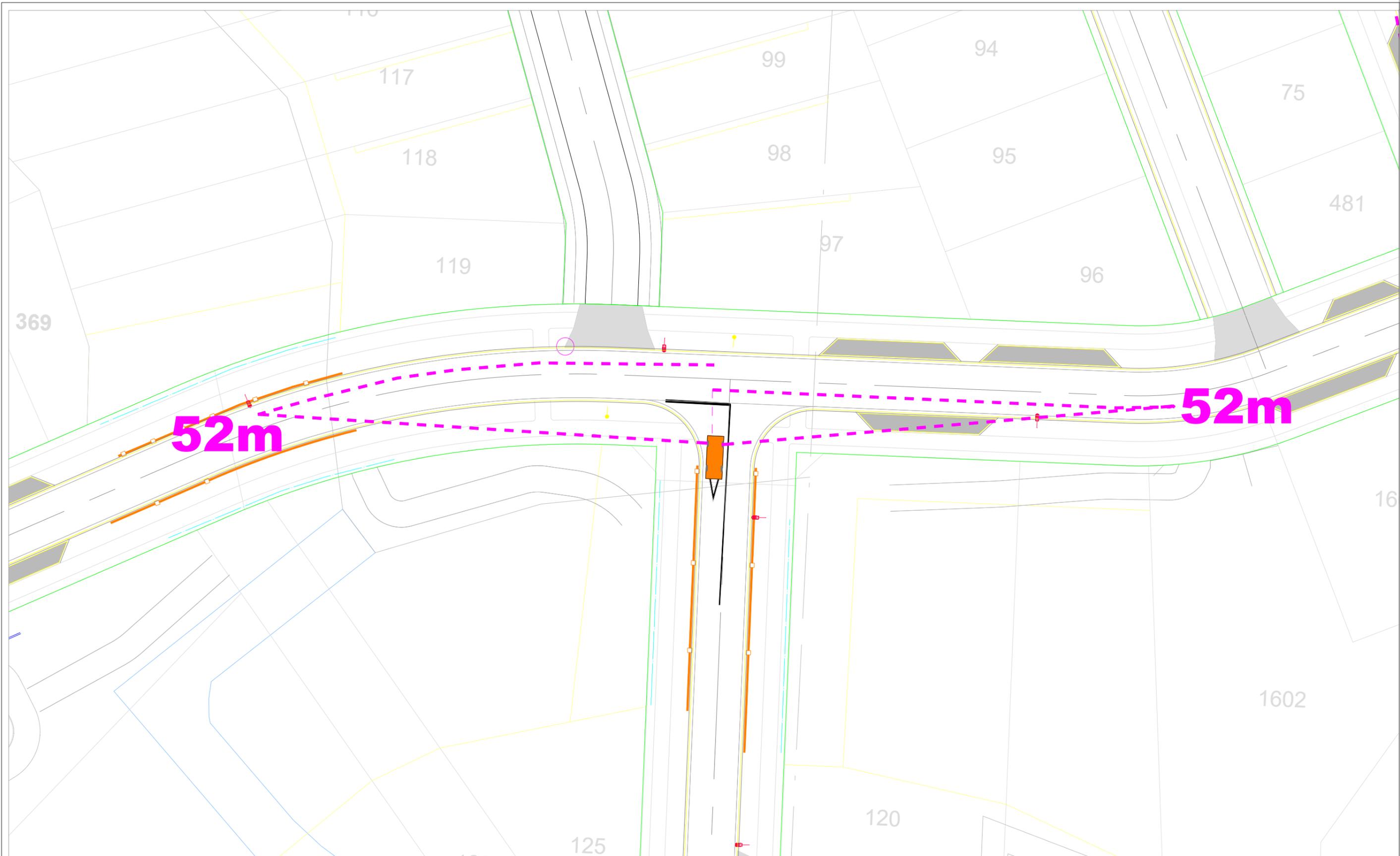
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
5A



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "F" - Road 10 / Road 2

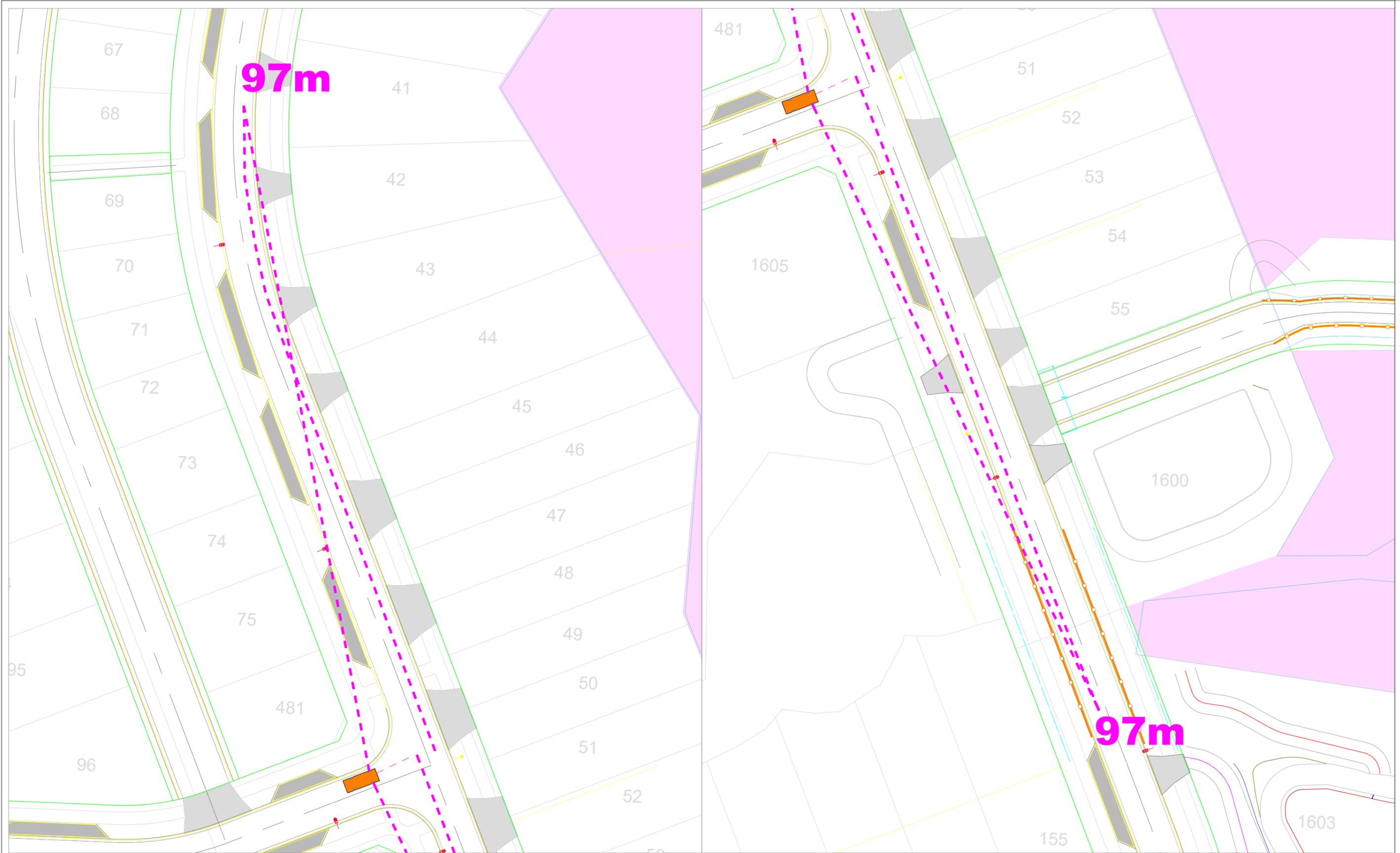
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.4

**Revision:**  
A



**Figure:**  
6A



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 1  
 Intersection "G" - Road 2 / Road 1

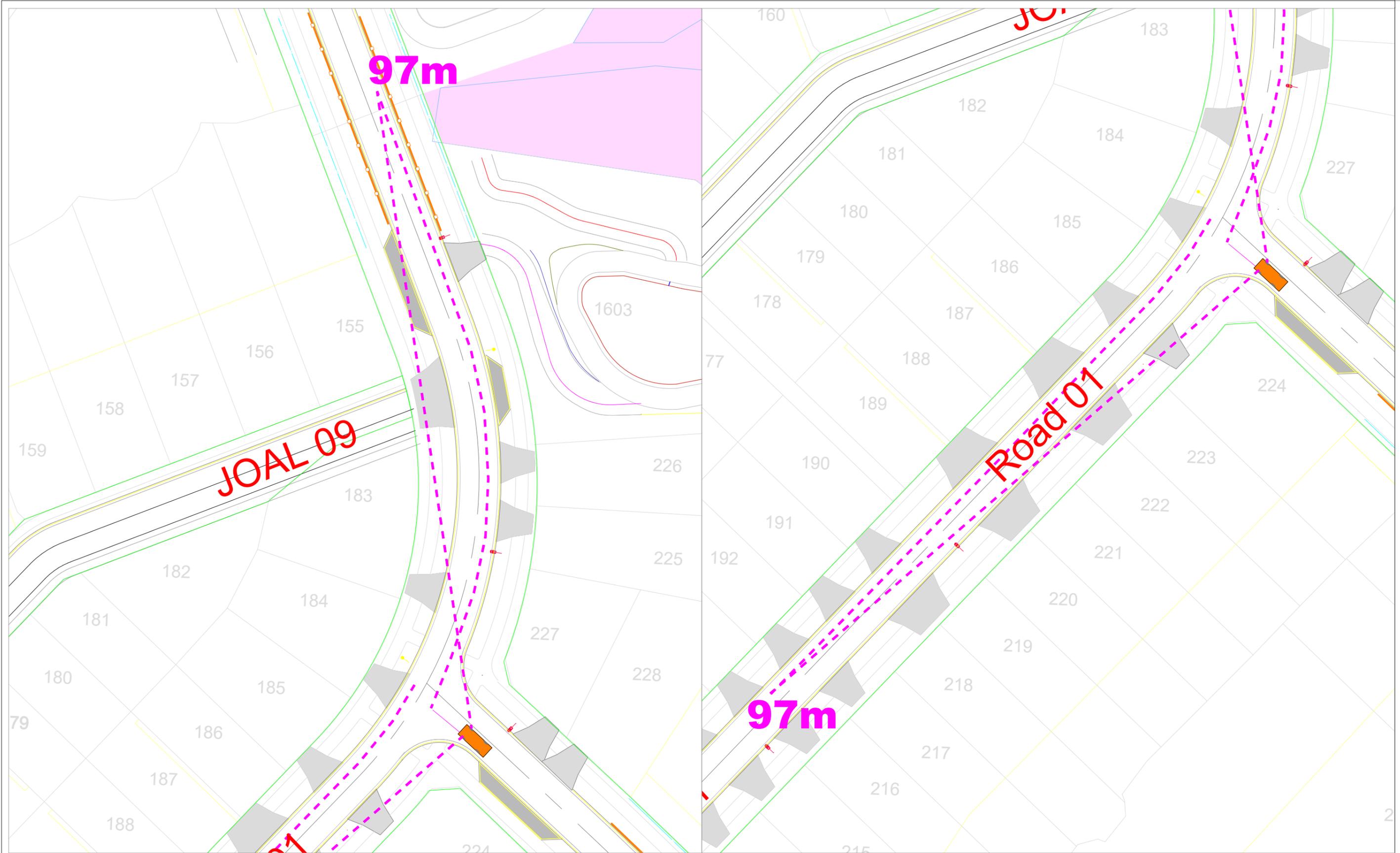
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.5

**Revision:**  
 A



**Figure:**  
 7A



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 1  
 Intersection "H" - Road 8 / Road 1

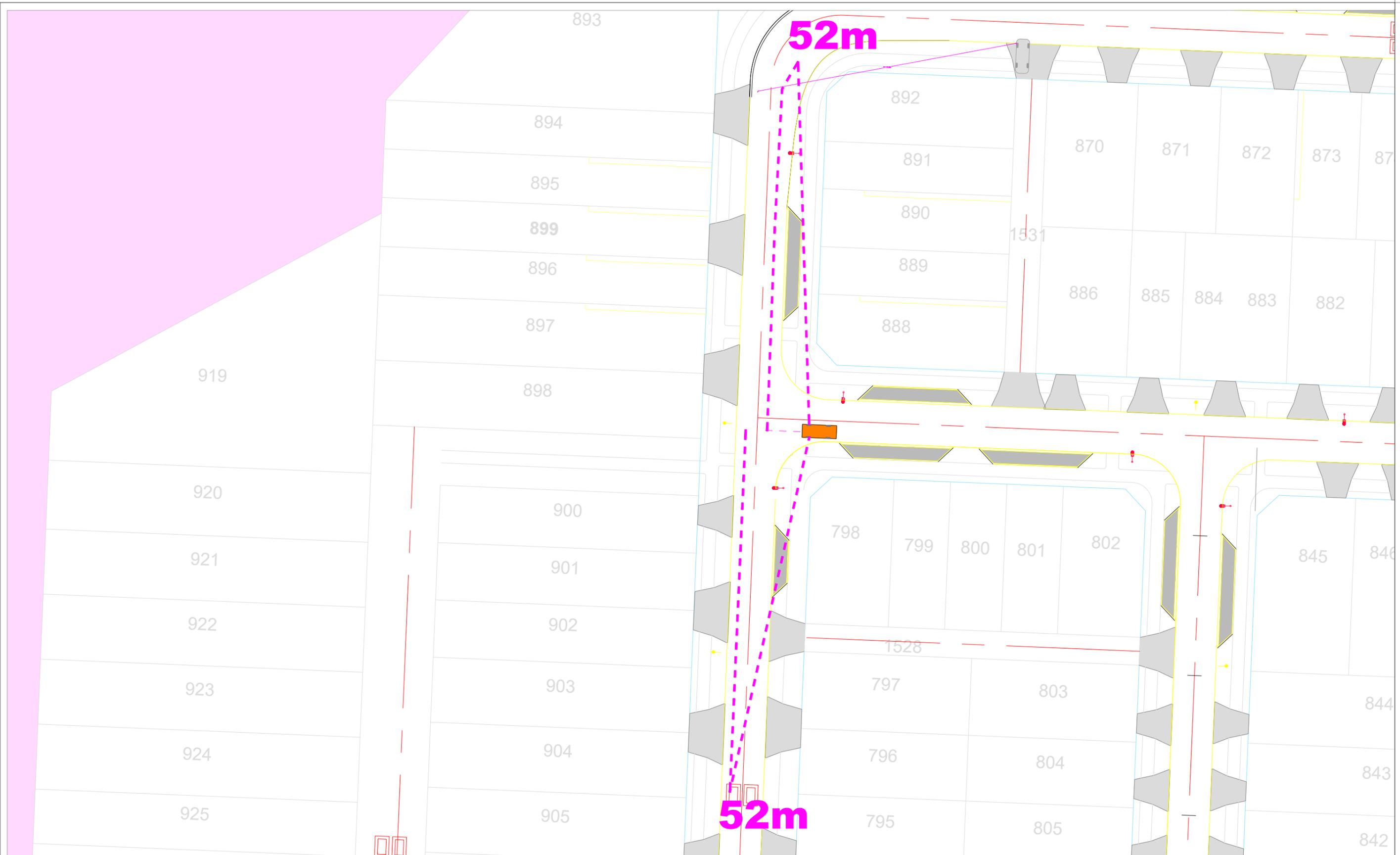
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.5

**Revision:**  
 A



**Figure:**  
 8A



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "A" - Road 14 / Road 14

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
1B



52m

52m

Revision notes:		
Rev:	Date:	Notes:

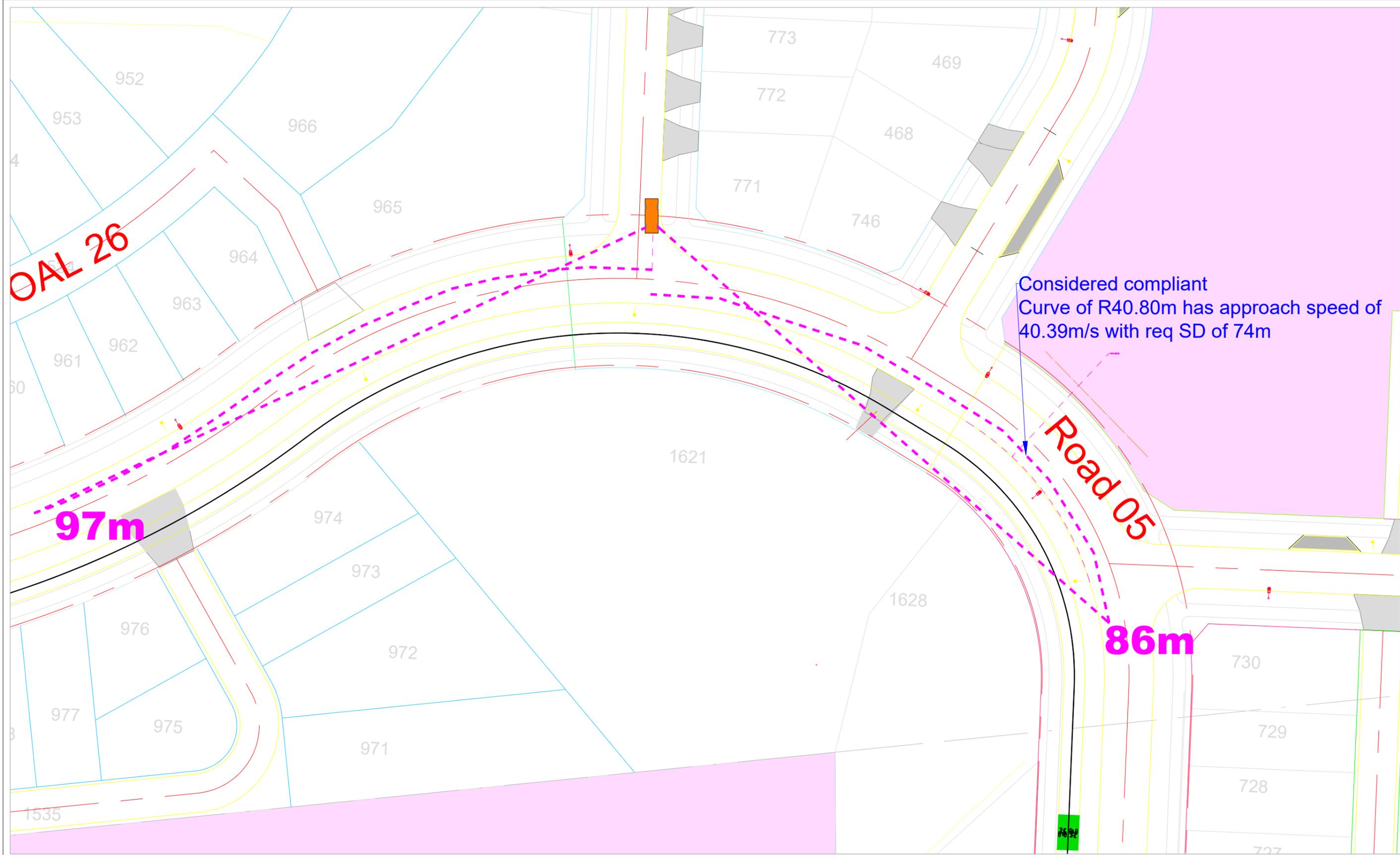
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Sight Distance Assessment - Stage 2 Intersection "B" - Road 13 / Road 14

<b>Date:</b> 23 December 2025
<b>Scale @ A3:</b> 1:0.4
<b>Revision:</b> A

**Figure:**  
2B





Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "D" - Road 14 / Road 5

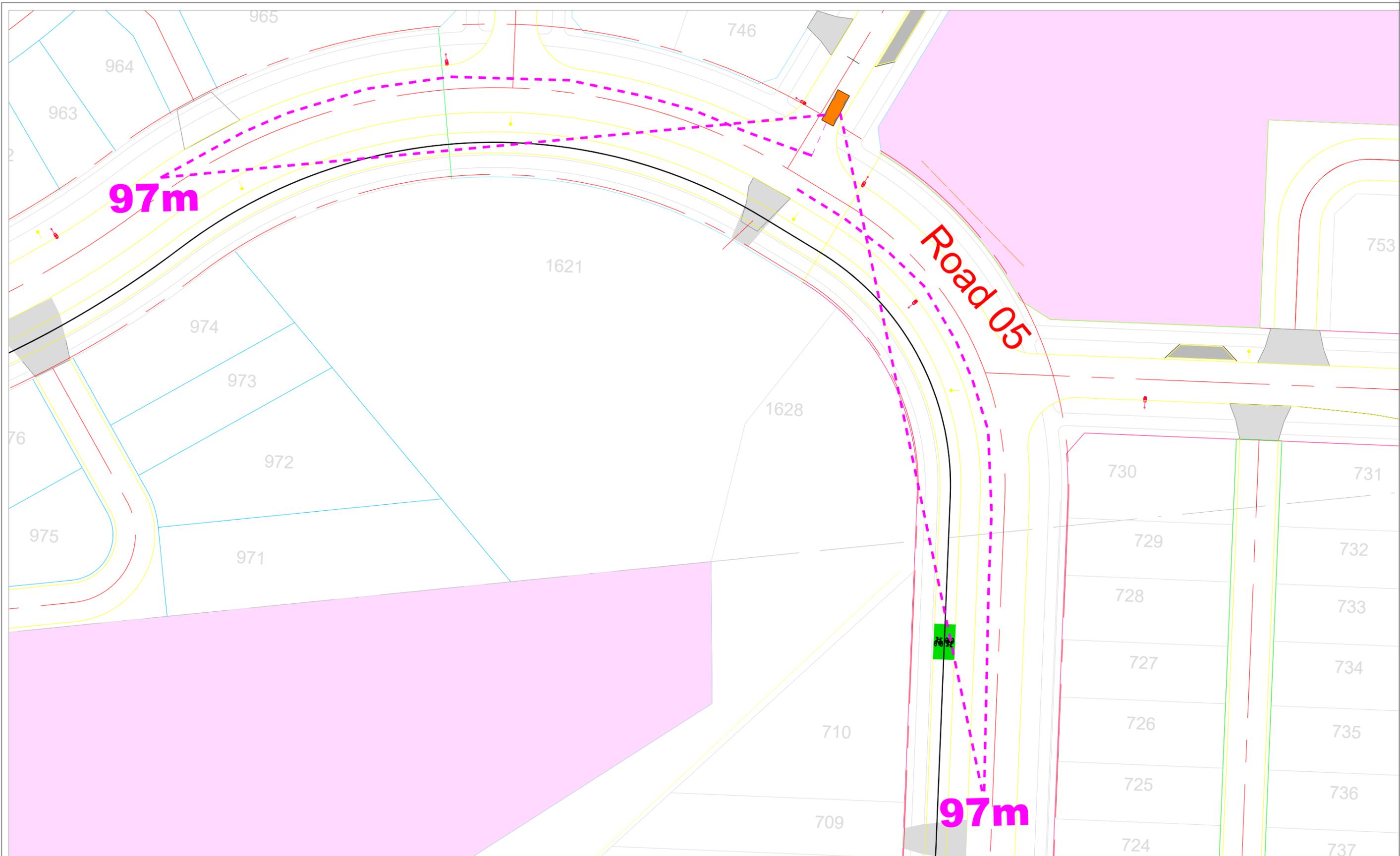
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
4B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "E" - Road 13 / Road 5

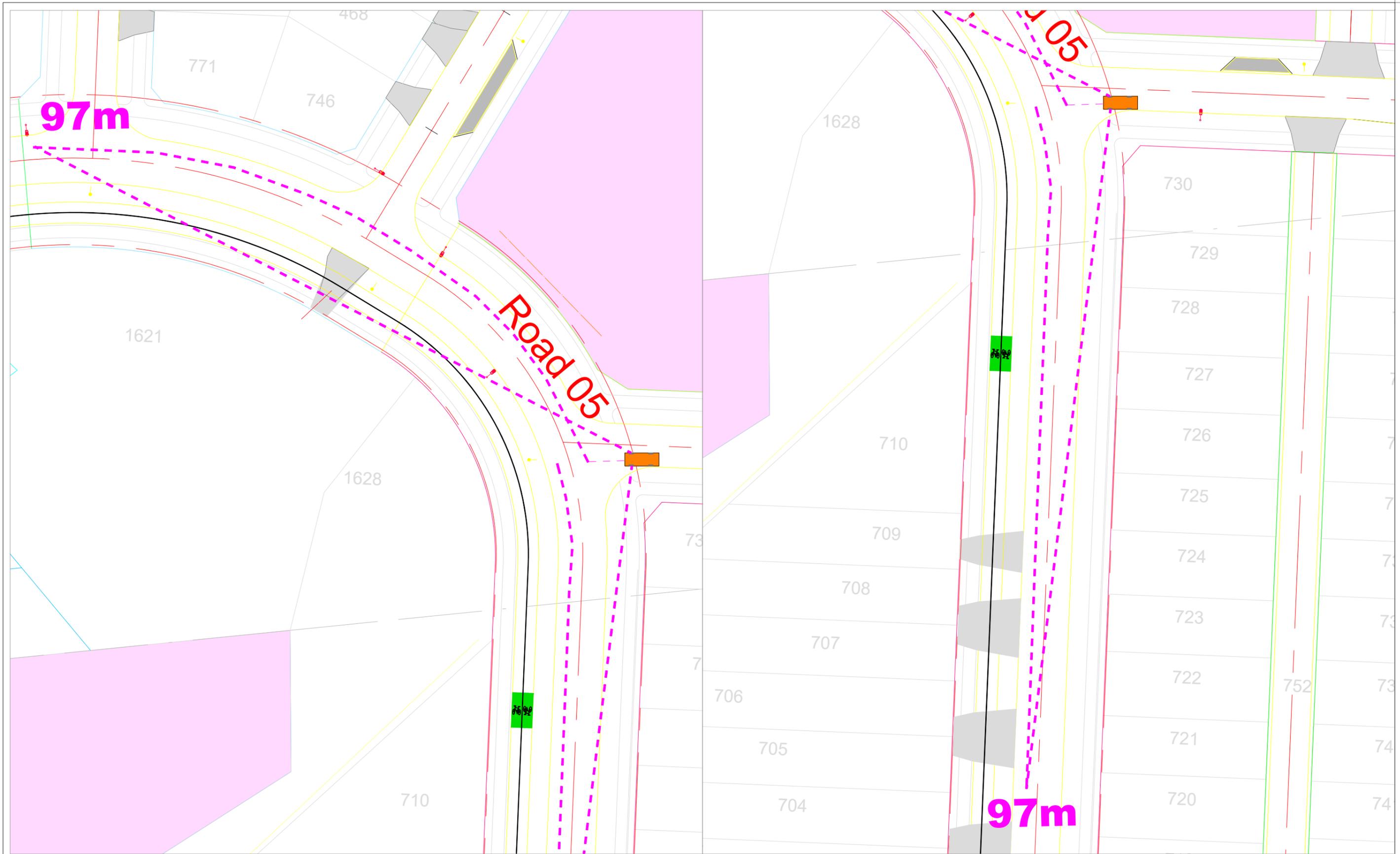
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
5B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "F" - Road 15 / Road 5

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
6B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "G" - Road 19 / Road 18

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.4

**Revision:**  
A



**Figure:**  
7B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "H" - Road 18 / Road 20

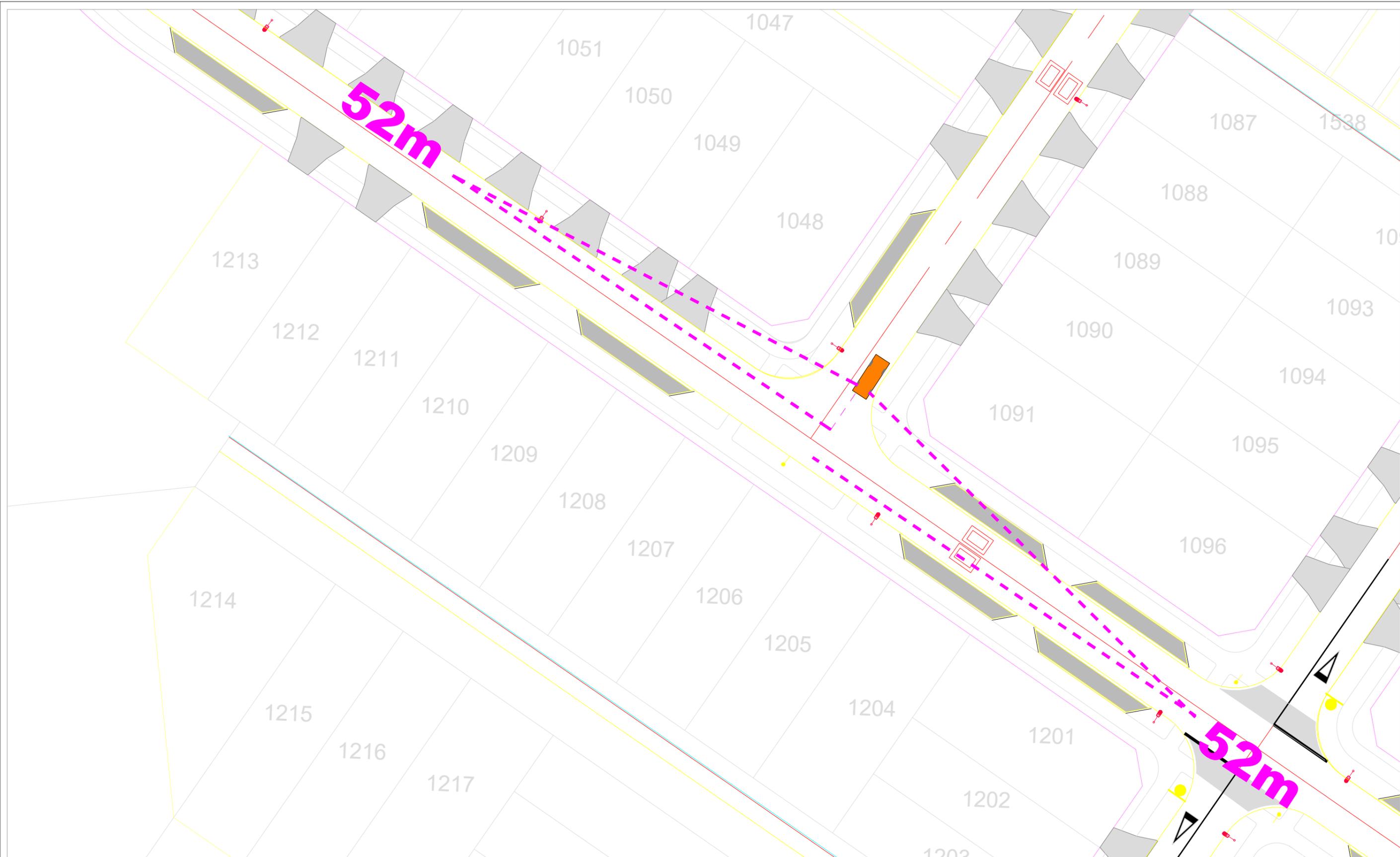
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.4

**Revision:**  
A



**Figure:**  
8B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "I" - Road 18 / Road 21

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.4

**Revision:**  
A



**Figure:**  
9B



**52m**

**52m**

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.4

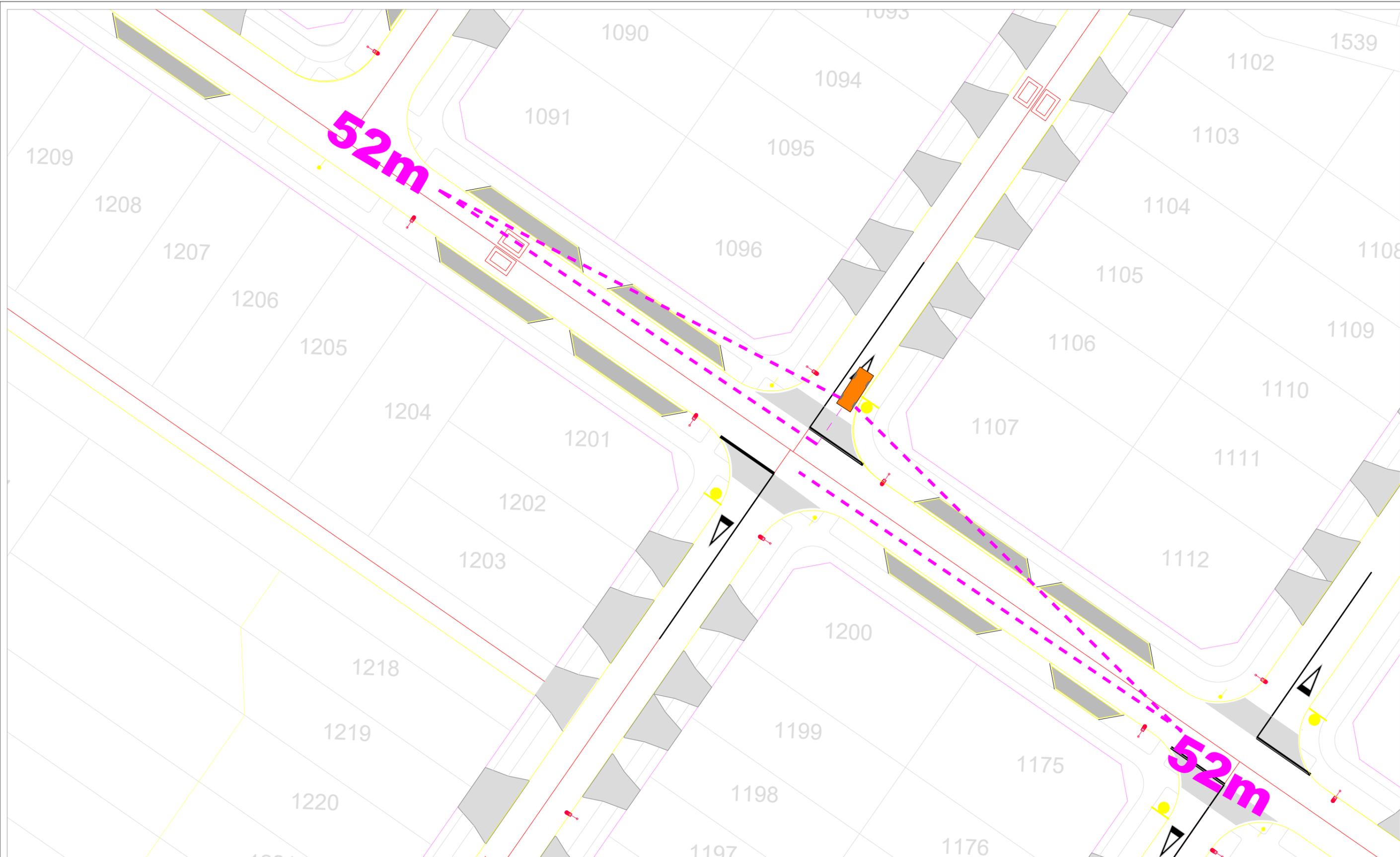
**Revision:**  
A

**Client:**

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "J" - Road 22 / Road 21



**Figure:**  
10B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "K" - Road 19 / Road 21

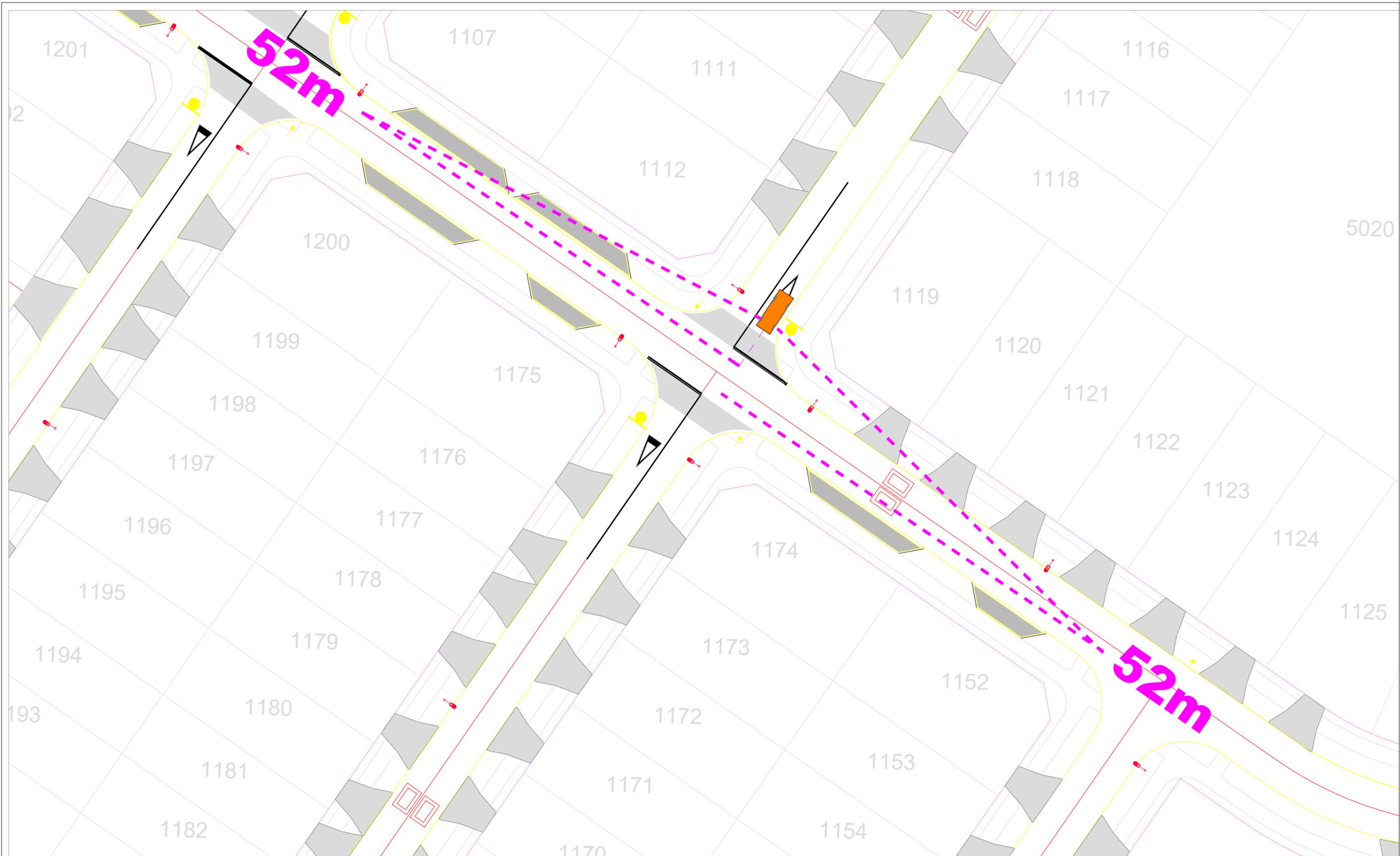
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.4

**Revision:**  
A



**Figure:**  
11B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "L" - Road 20 / Road 21

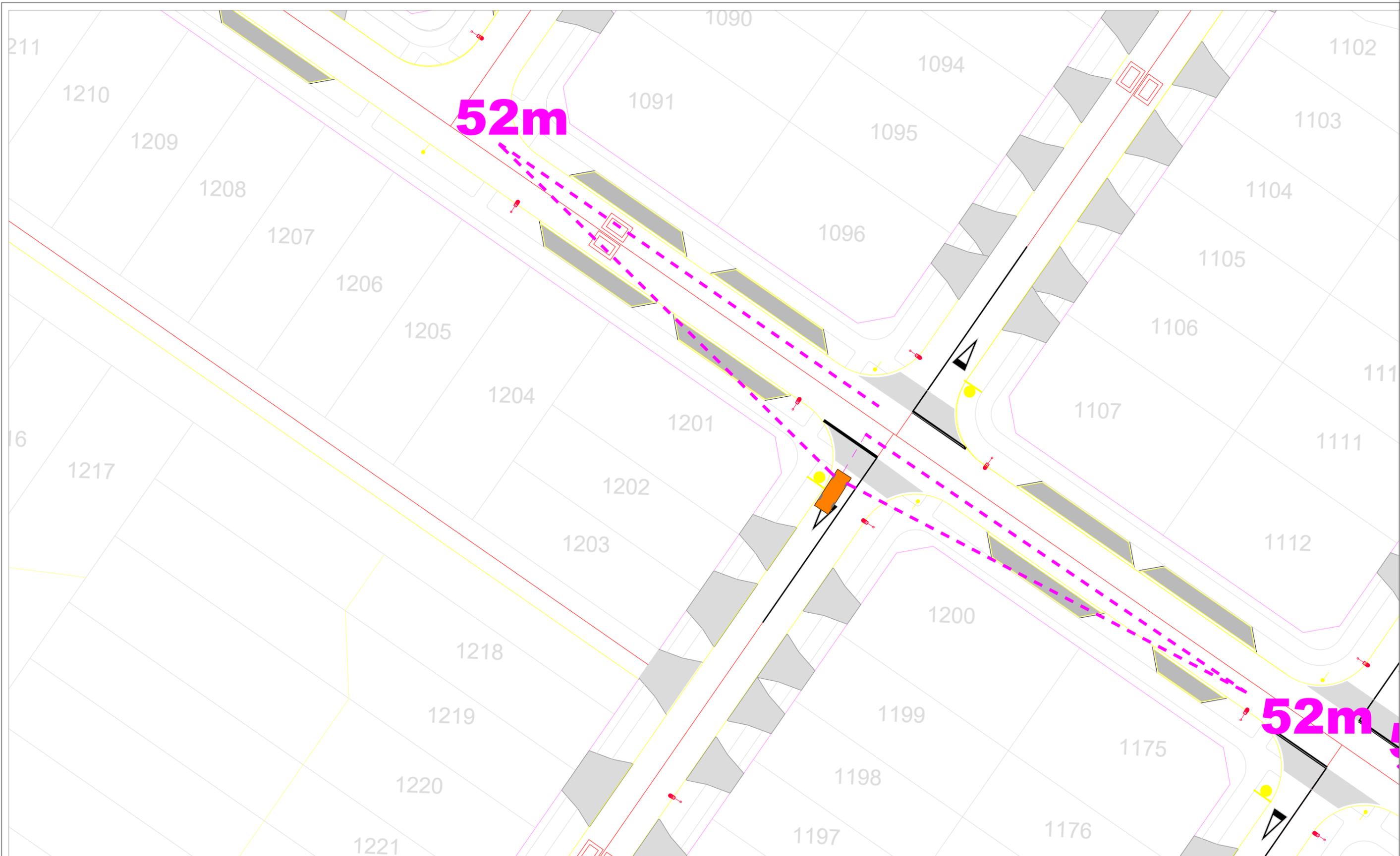
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.4

**Revision:**  
 A



**Figure:**  
 12B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "M" - Road 21 / Road 27

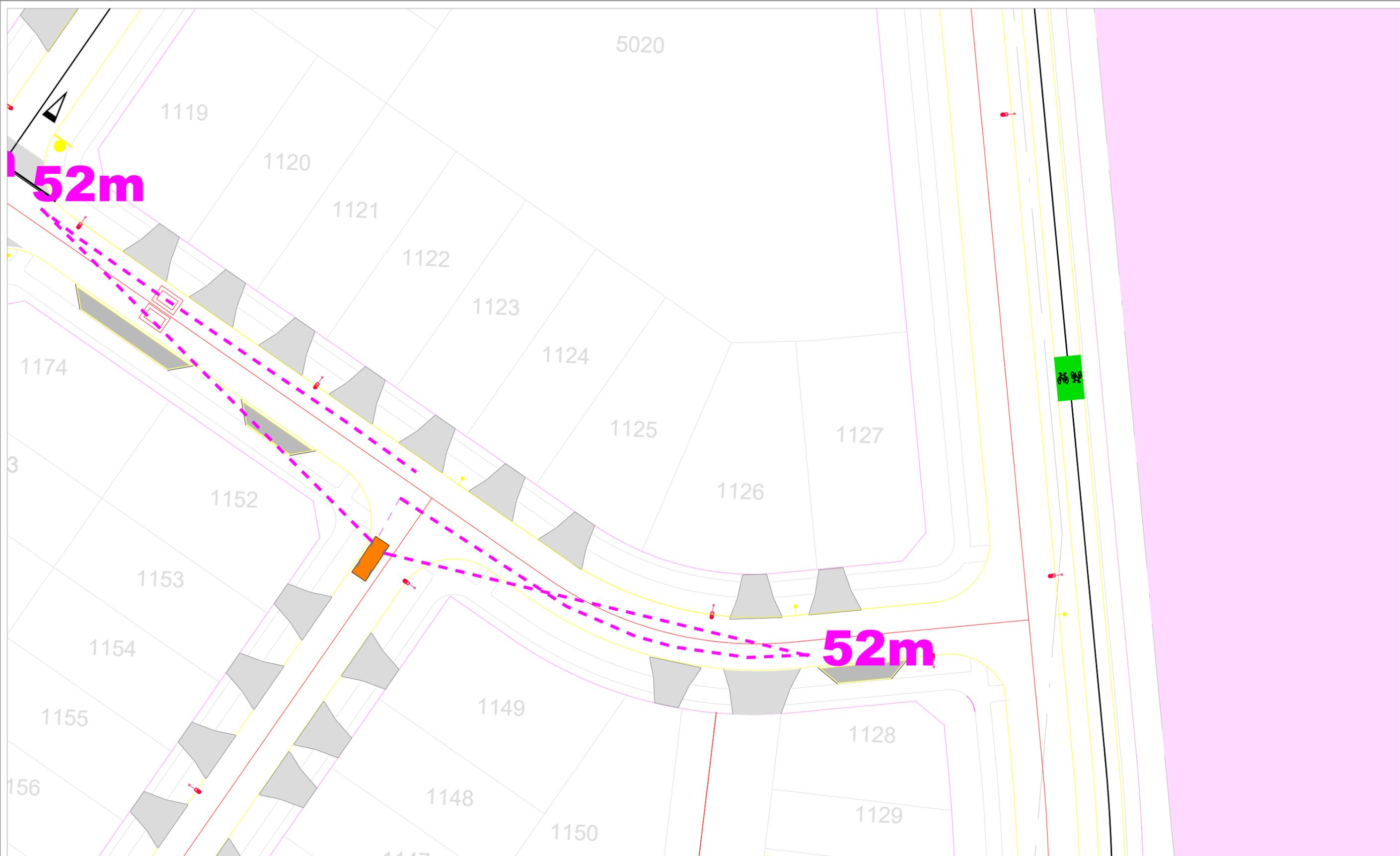
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.4

**Revision:**  
A



**Figure:**  
13B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "N" - Road 21 / Road 26

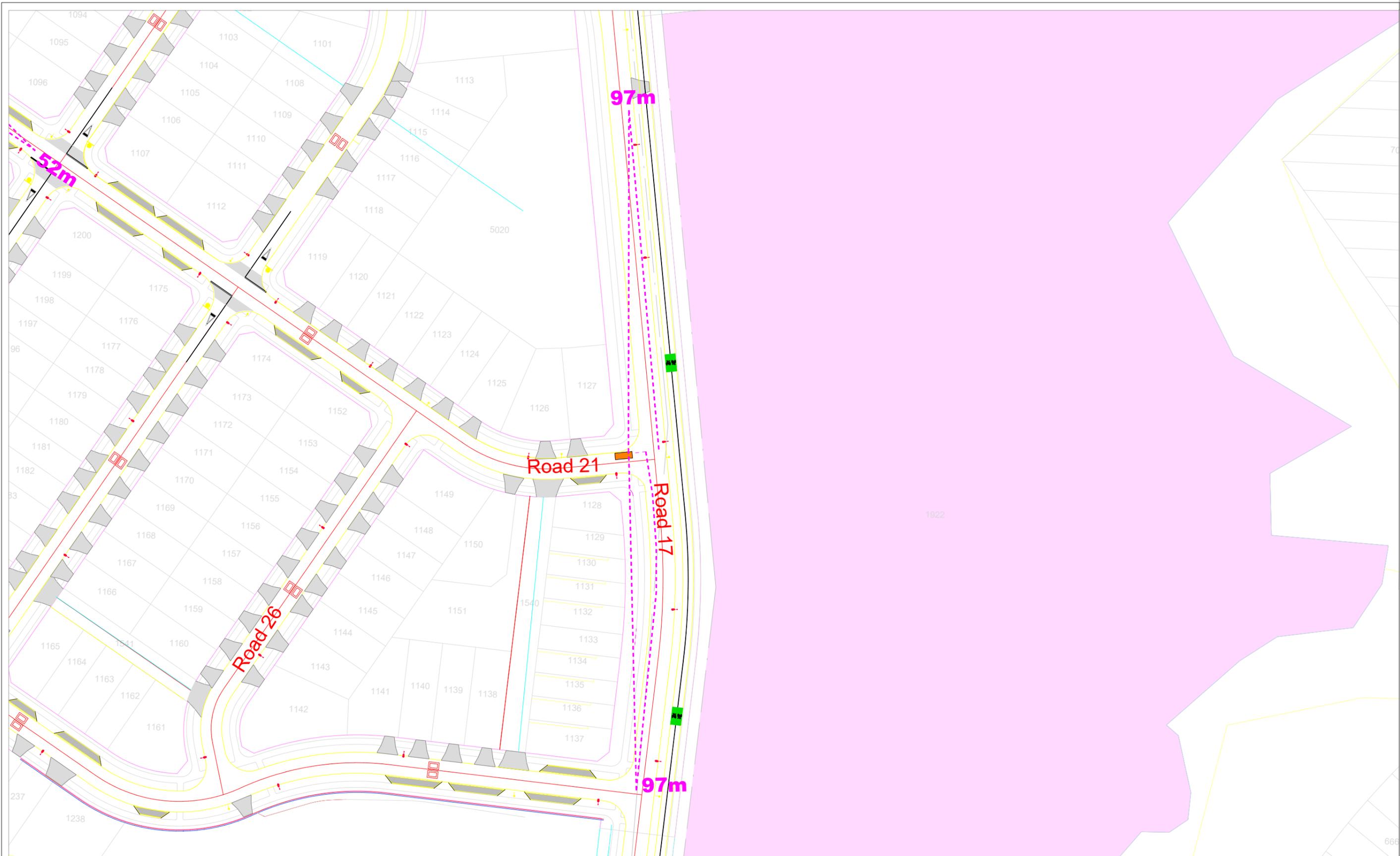
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.4

**Revision:**  
 A



**Figure:**  
 14B



Revision notes:		
Rev:	Date:	Notes:

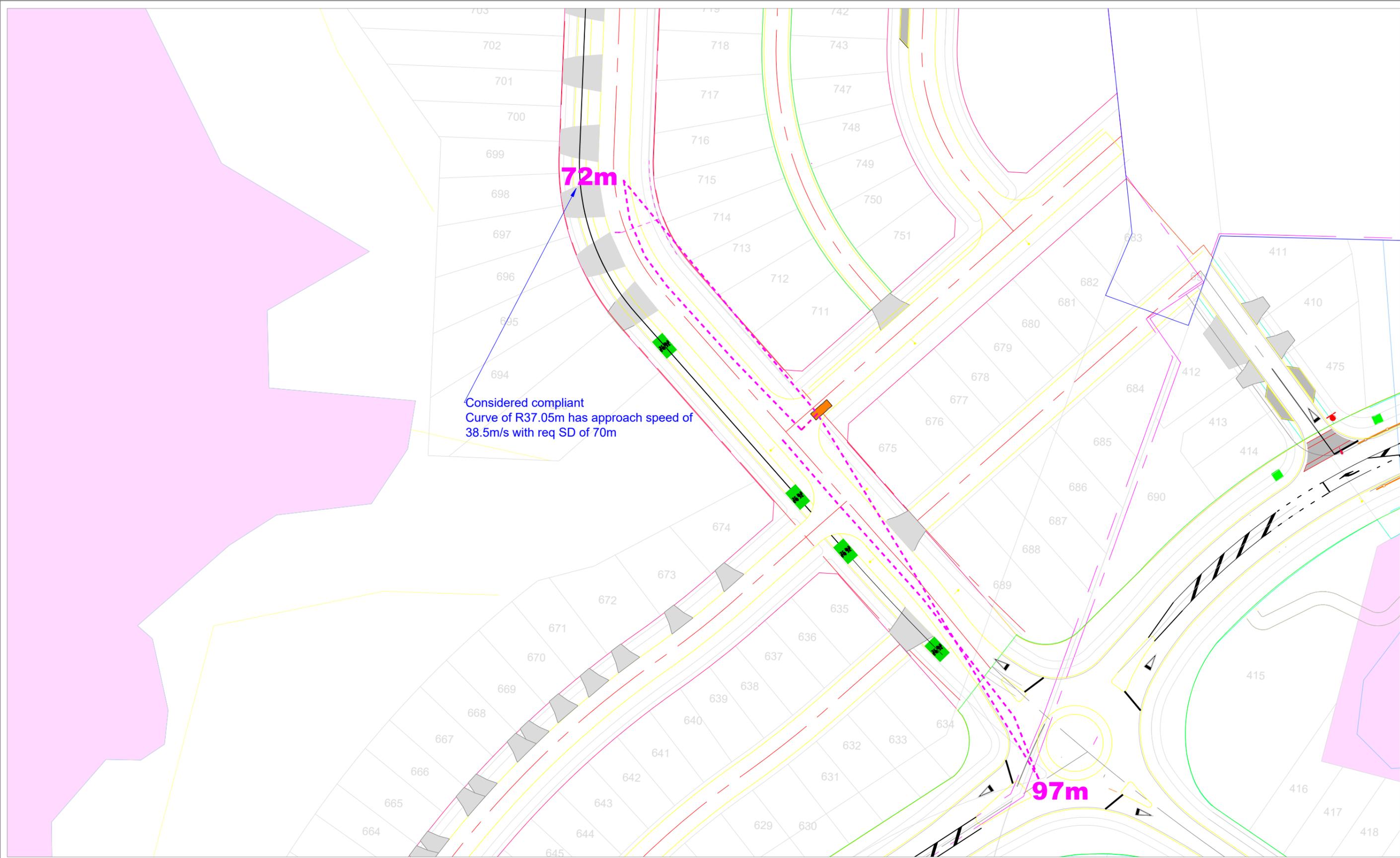
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Sight Distance Assessment - Stage 2 Intersection "O" - Road 17 / Road 21

<b>Date:</b> 23 December 2025
<b>Scale @ A3:</b> 1:1
<b>Revision:</b> A



**Figure:**  
15B



Considered compliant  
 Curve of R37.05m has approach speed of  
 38.5m/s with req SD of 70m

**Revision notes:**

Rev:	Date:	Notes:

**Drawn by:**

HA  
 J003135

**Client:**

**Project:**

Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**

Sight Distance Assessment - Stage 2  
 Intersection "P" - Road 05 / Road 07

**Date:**

23 December 2025

**Scale @ A3:**

1:0.8

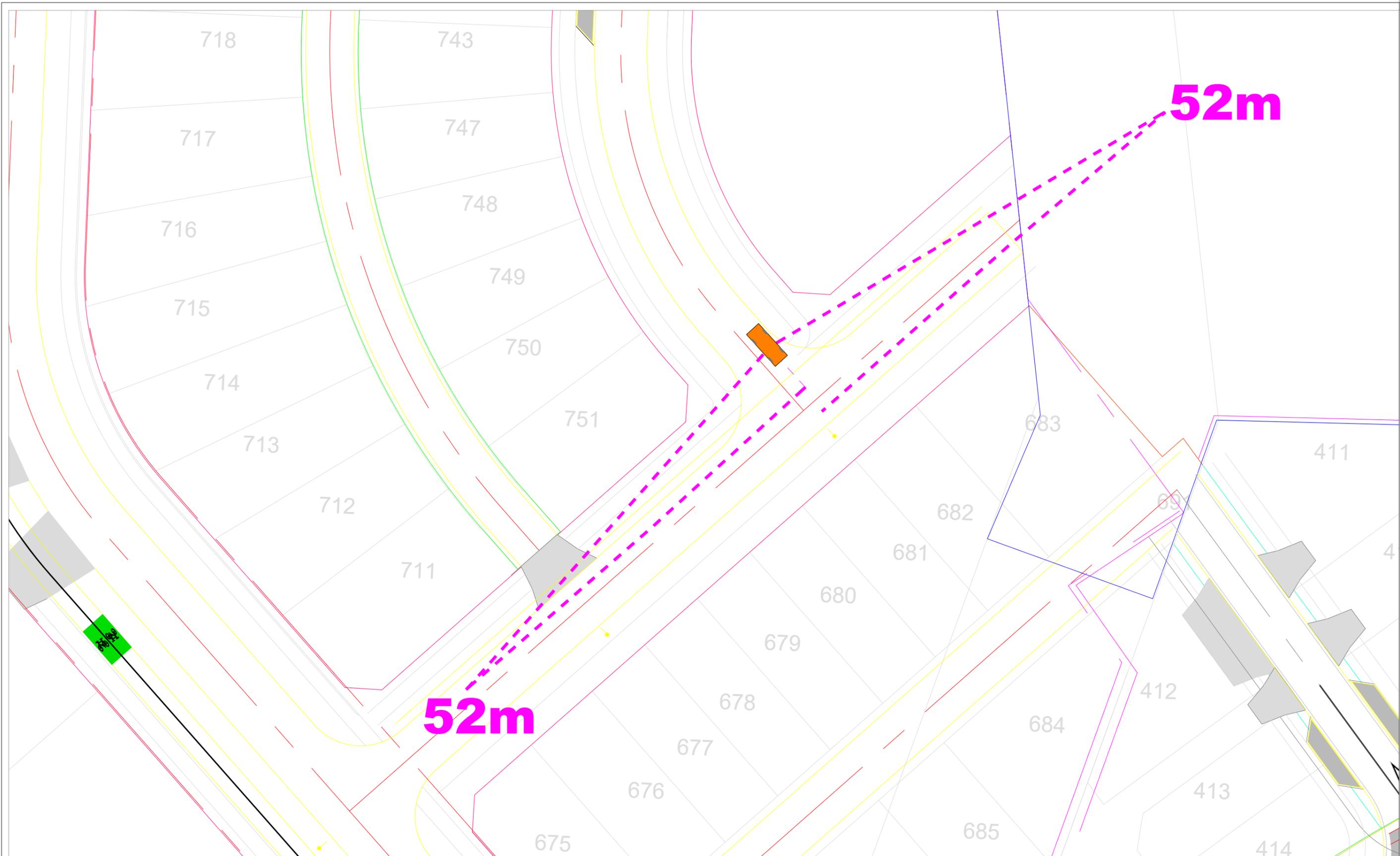
**Revision:**

A



**Figure:**

16B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "Q" - Road 07 / Road 15

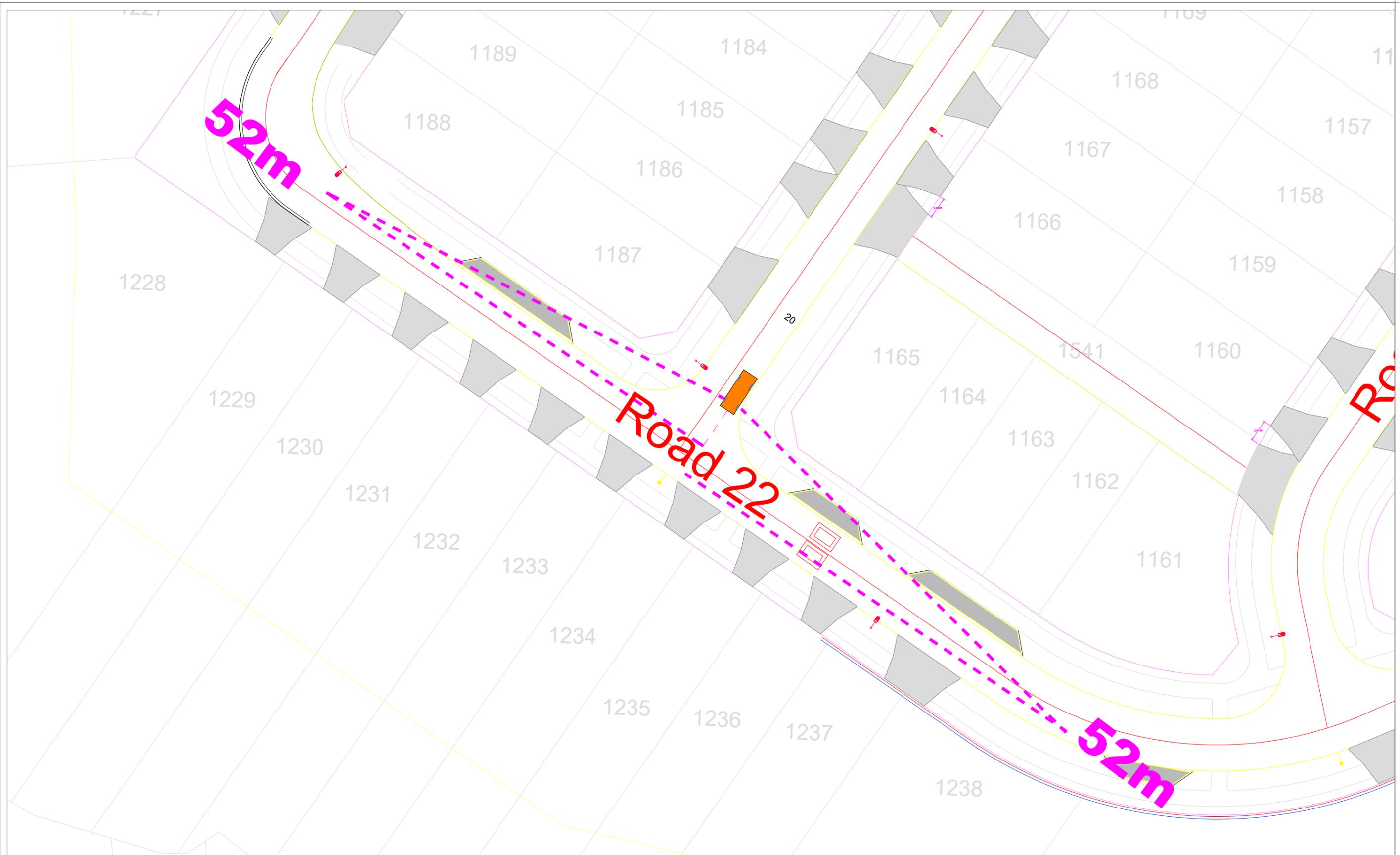
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.4

**Revision:**  
A



**Figure:**  
17B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "R" - Road 22 / Road 27

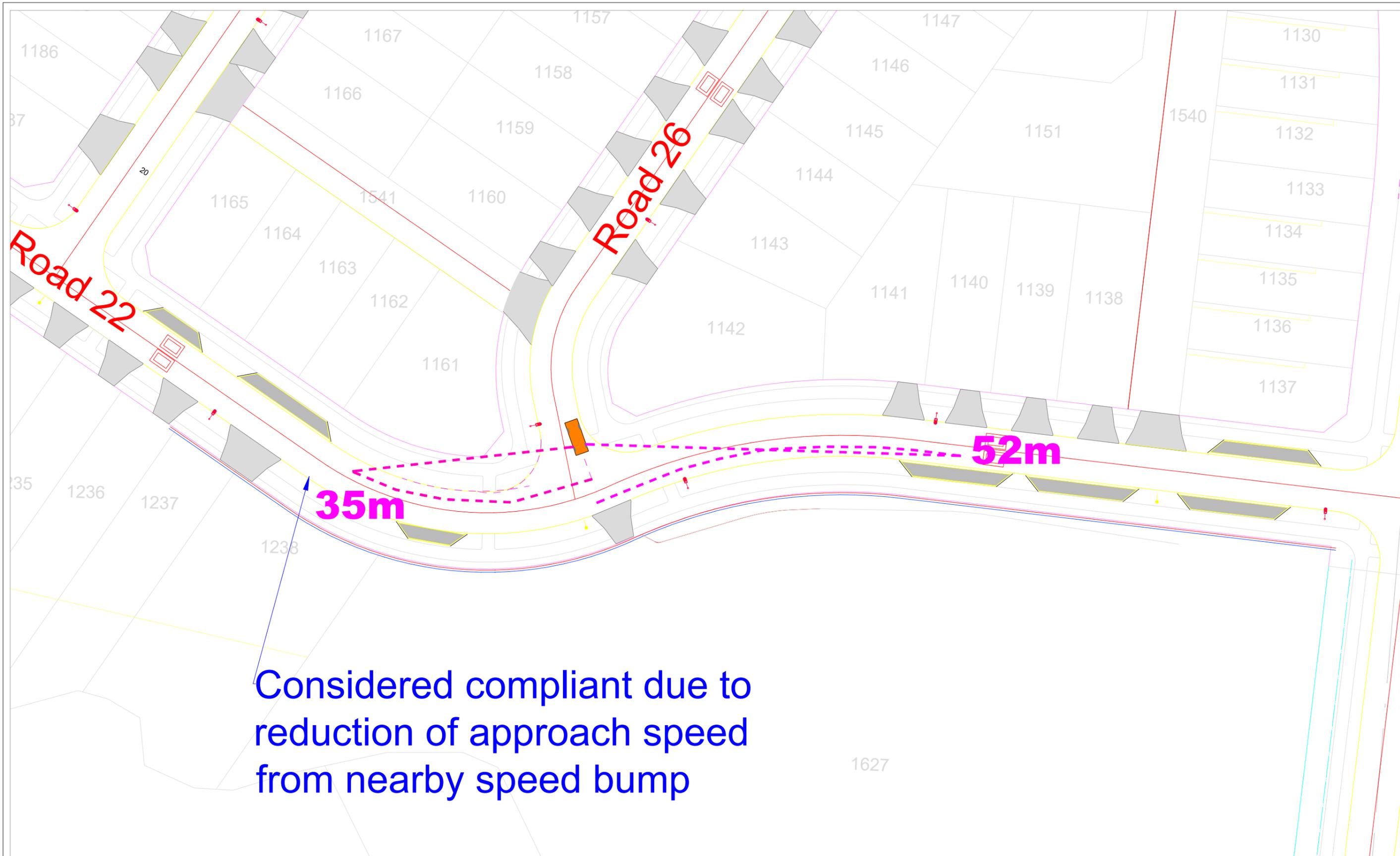
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.4

**Revision:**  
 A



**Figure:**  
 18B



Considered compliant due to reduction of approach speed from nearby speed bump

Revision notes:		
Rev:	Date:	Notes:

<b>Drawn by:</b> HA J003135
<b>Client:</b>

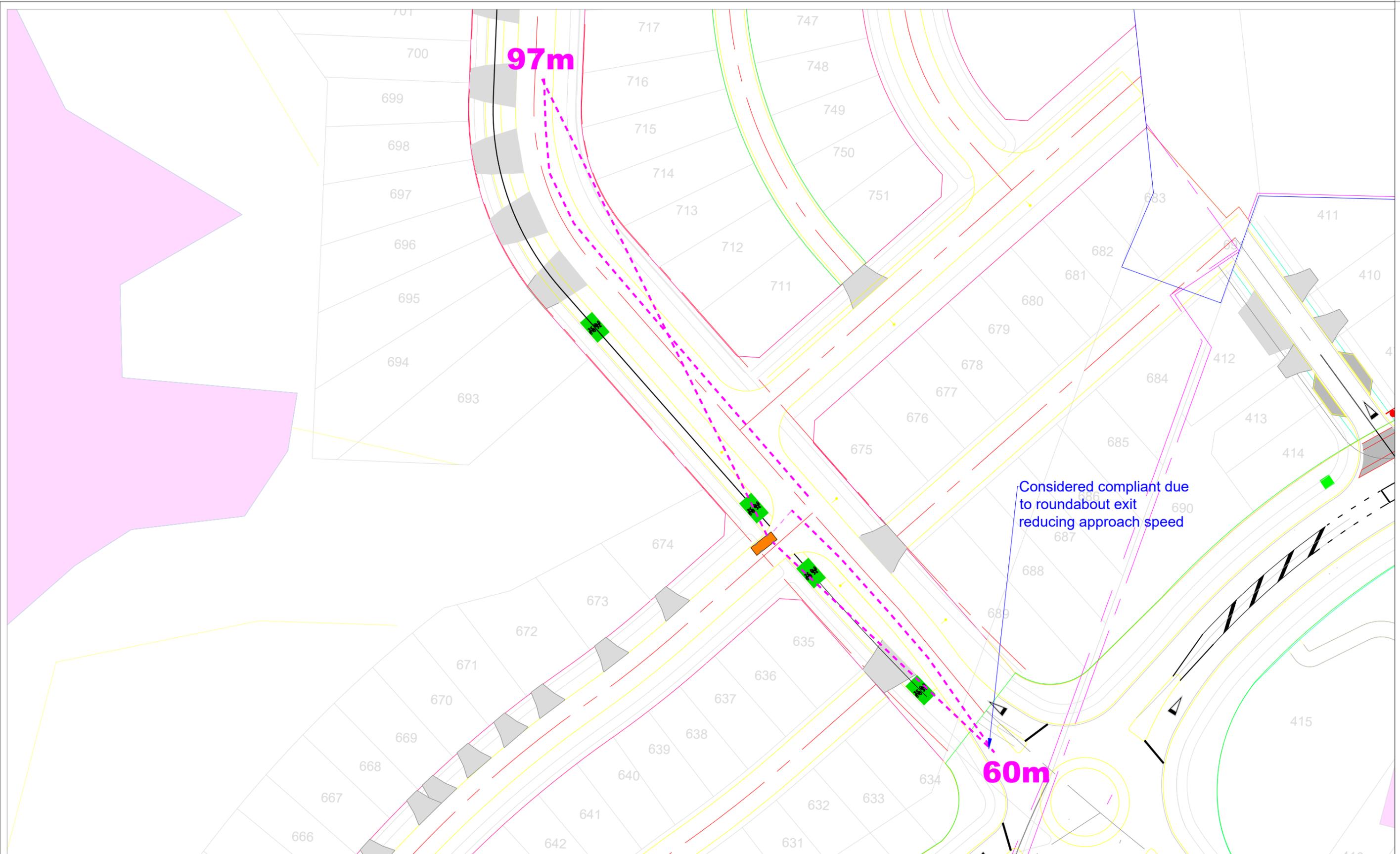
<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Sight Distance Assessment - Stage 2 Intersection "S" - Road 22 / Road 26

<b>Date:</b> 23 December 2025
<b>Scale @ A3:</b> 1:0.5
<b>Revision:</b> A



**Figure:**  
19B





Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "U" - Road 05 / Road 12

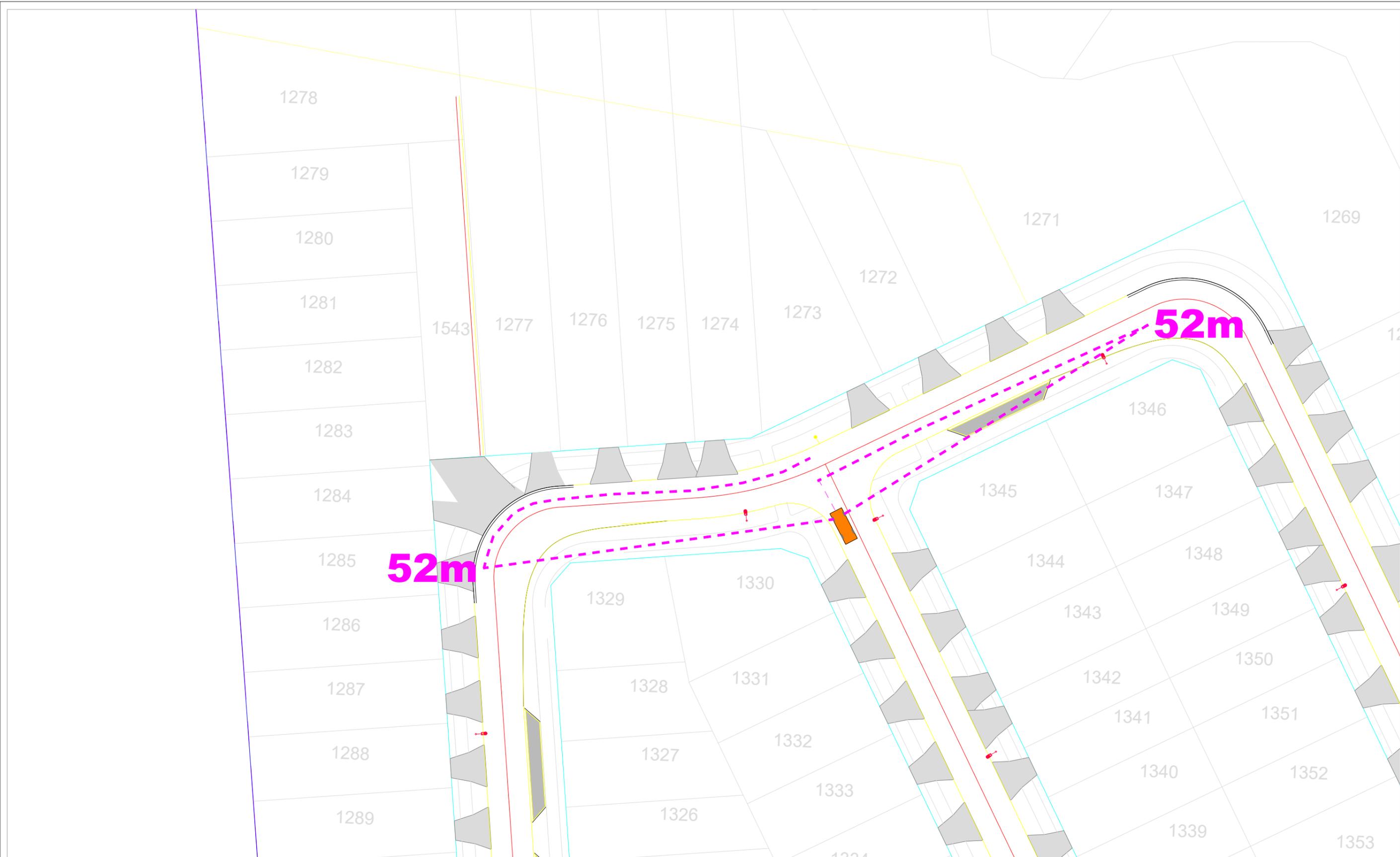
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.6667

**Revision:**  
 A



**Figure:**  
 21B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "W" - Road 24 / Road 25

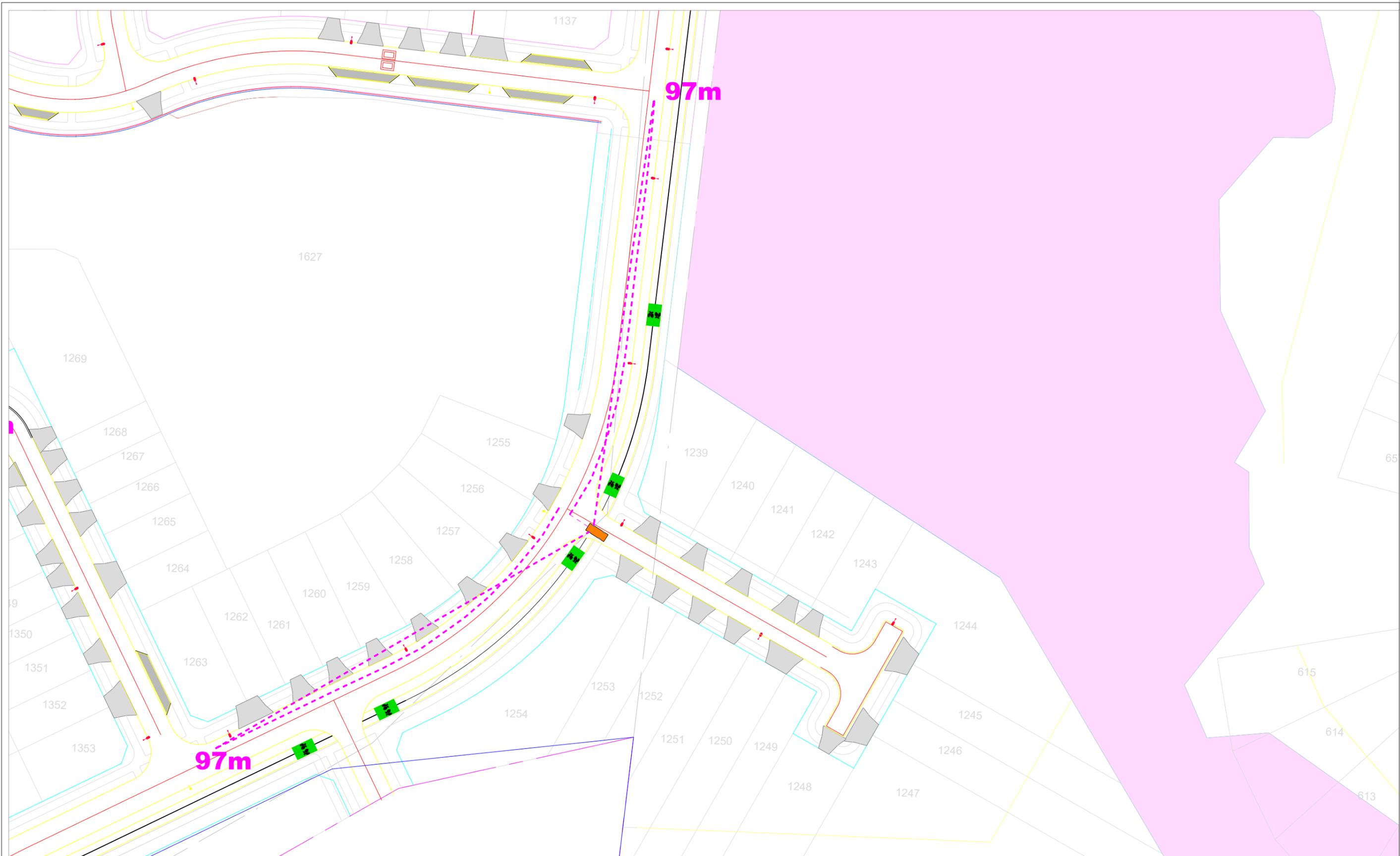
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.5

**Revision:**  
 A



**Figure:**  
 22B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "X" - Road 17 / Road 23

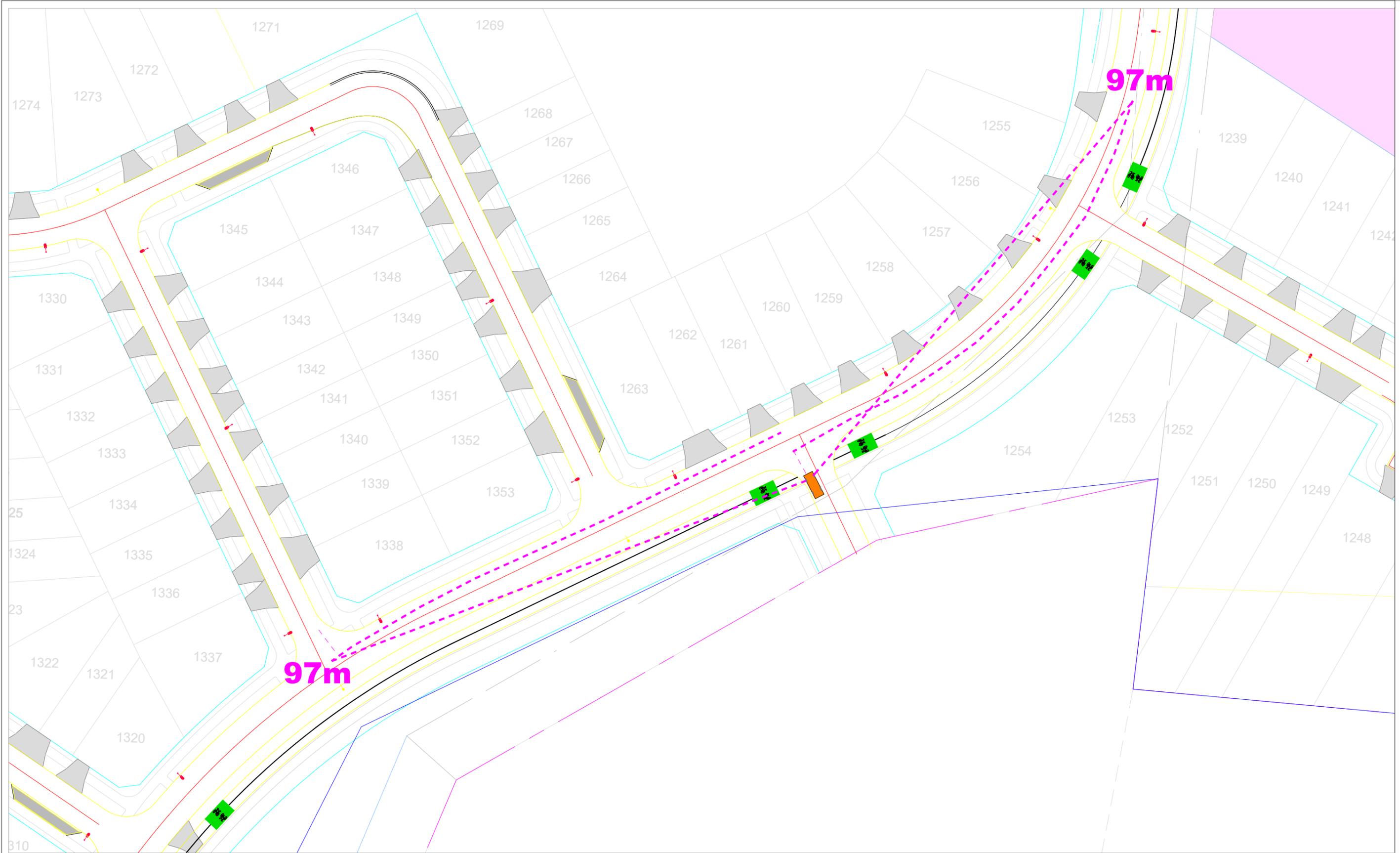
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.8

**Revision:**  
 A



**Figure:**  
 23B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.6667

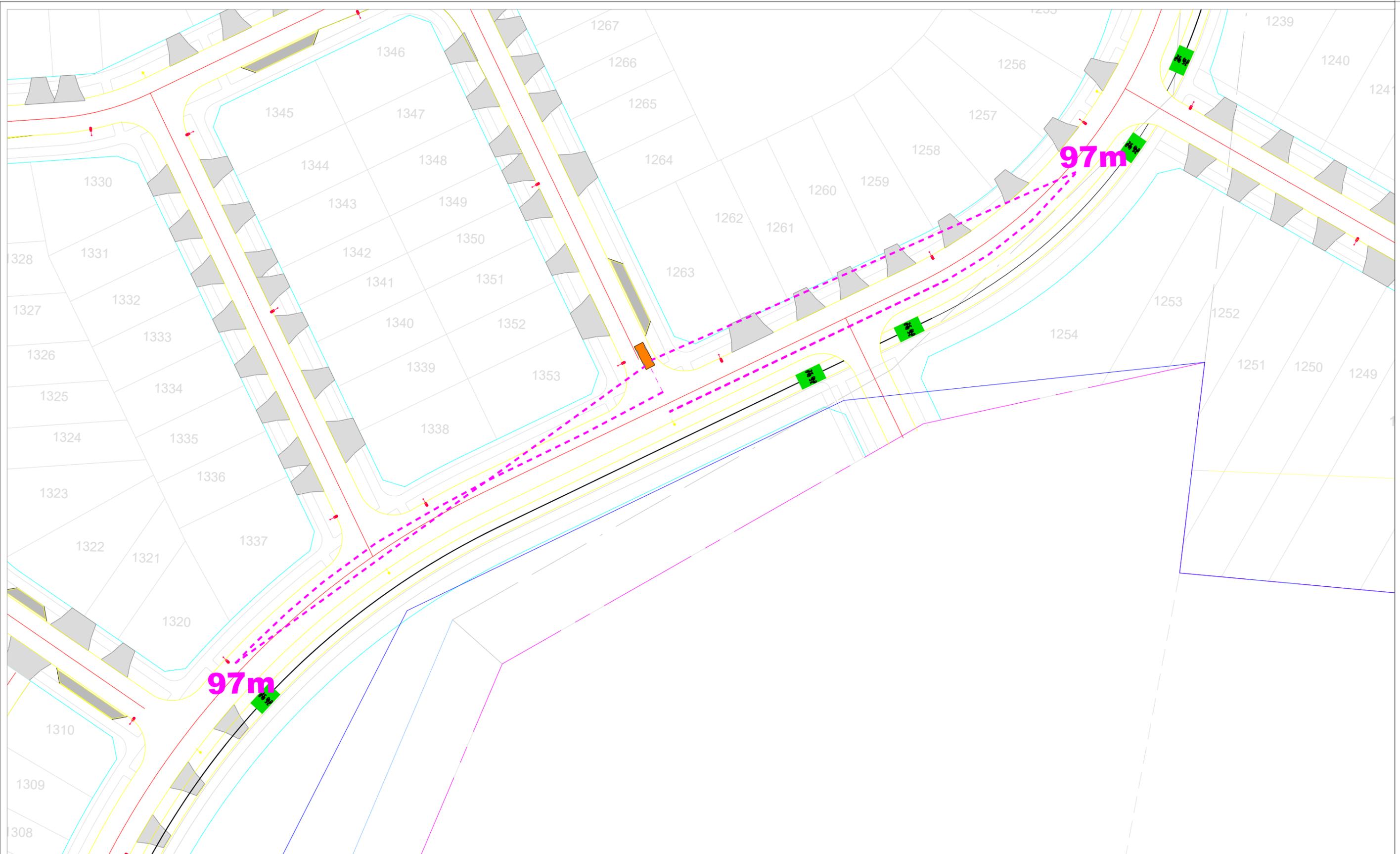
**Revision:**  
 A

**Client:**

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "Y" - Road 17 / Road 28



**Figure:**  
 24B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "Z" - Road 17 / Road 24

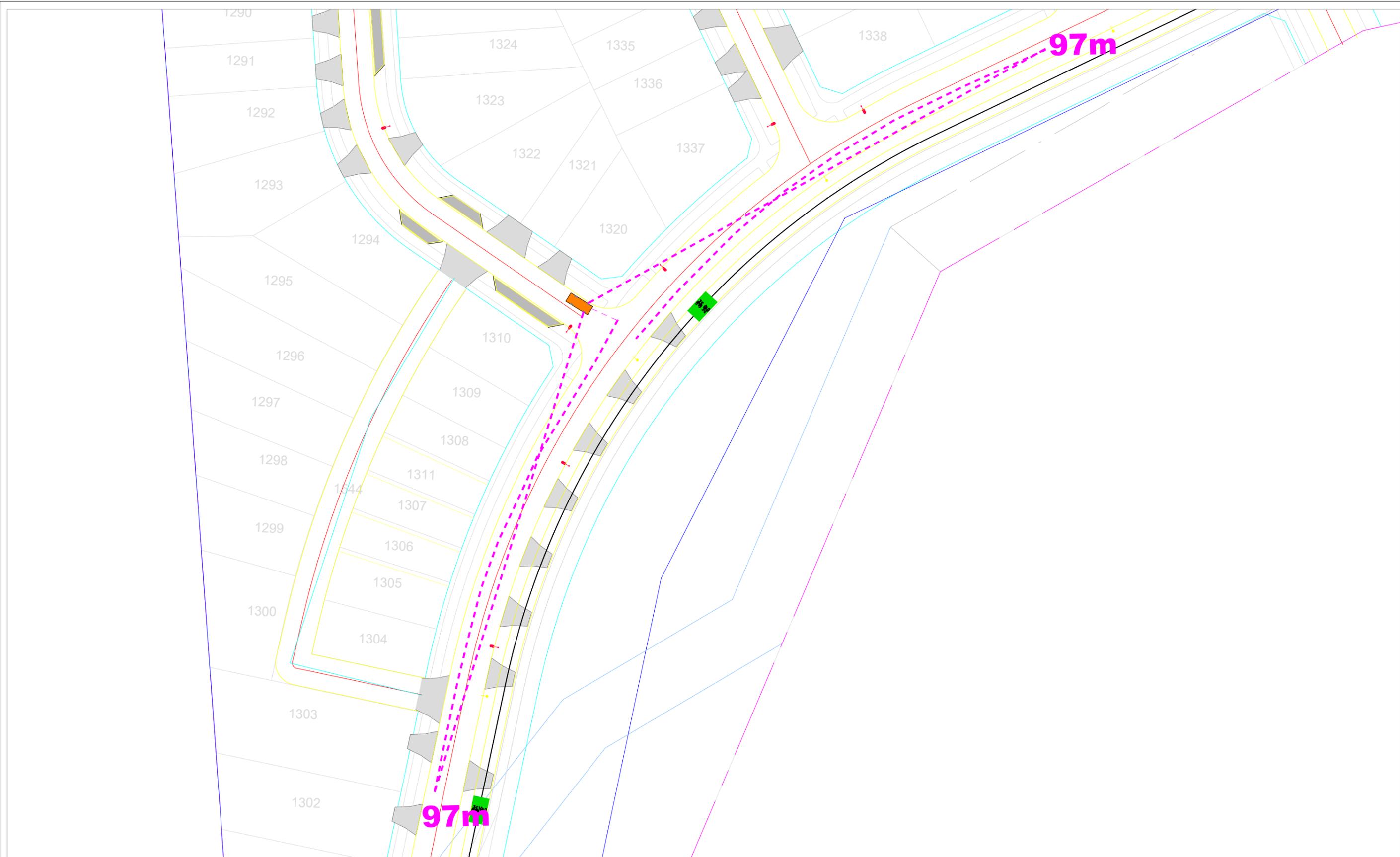
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.6667

**Revision:**  
A



**Figure:**  
25B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "AA" - Road 17 / Road 24

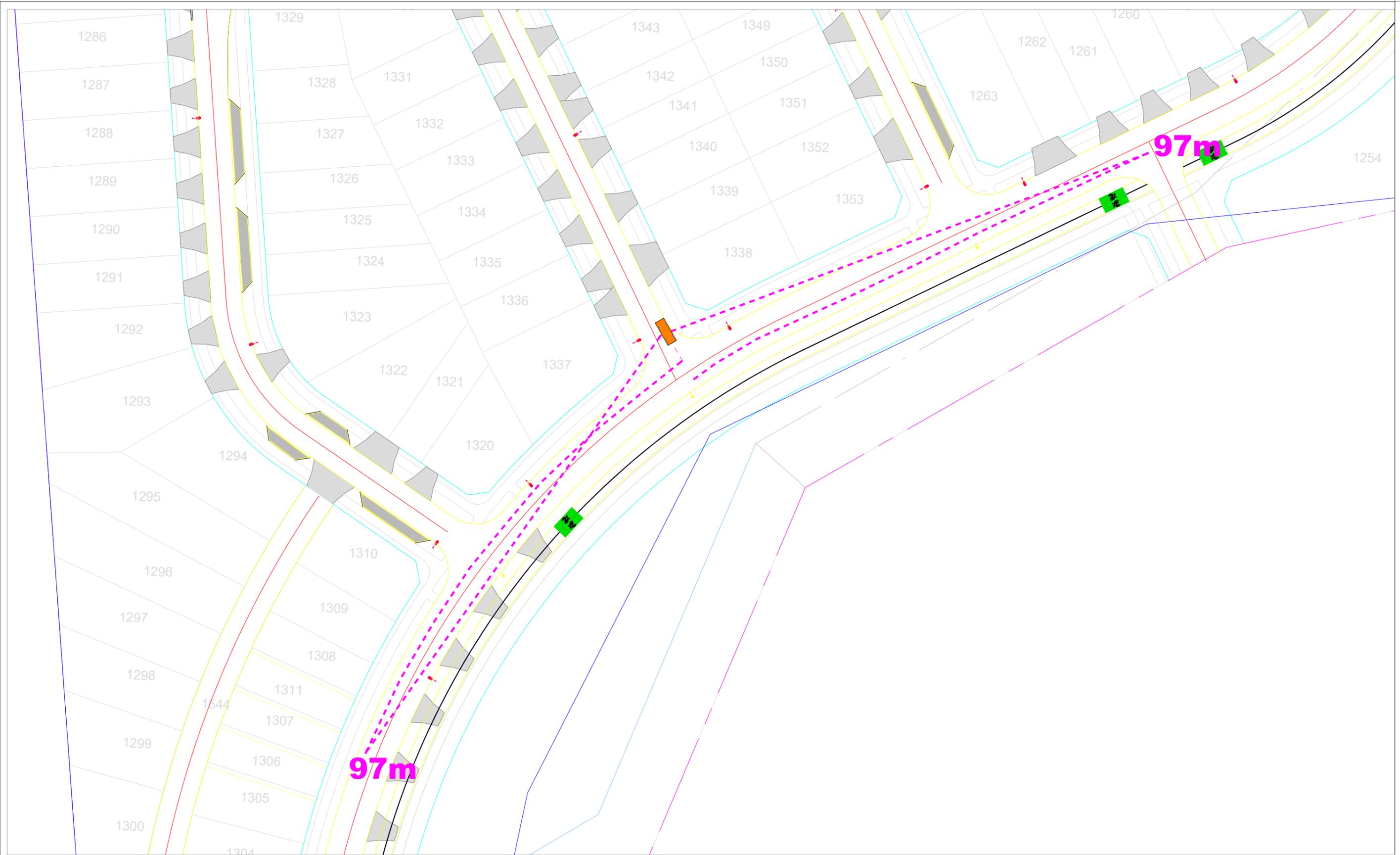
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.6667

**Revision:**  
 A



**Figure:**  
 26B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "BB" - Road 17 / Road 25

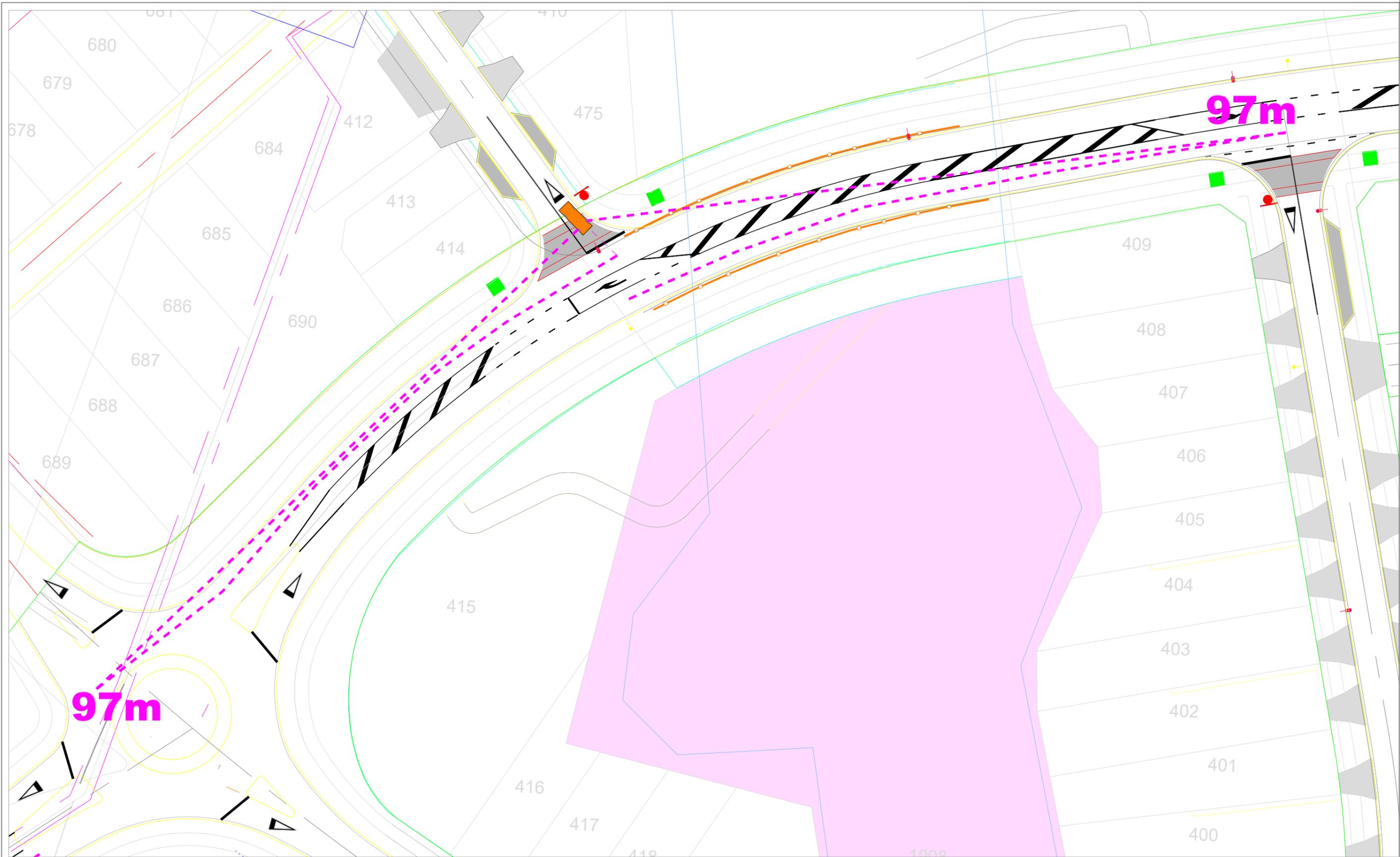
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.6667

**Revision:**  
 A



**Figure:**  
 27B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "A" - NOR 6/Joal 13

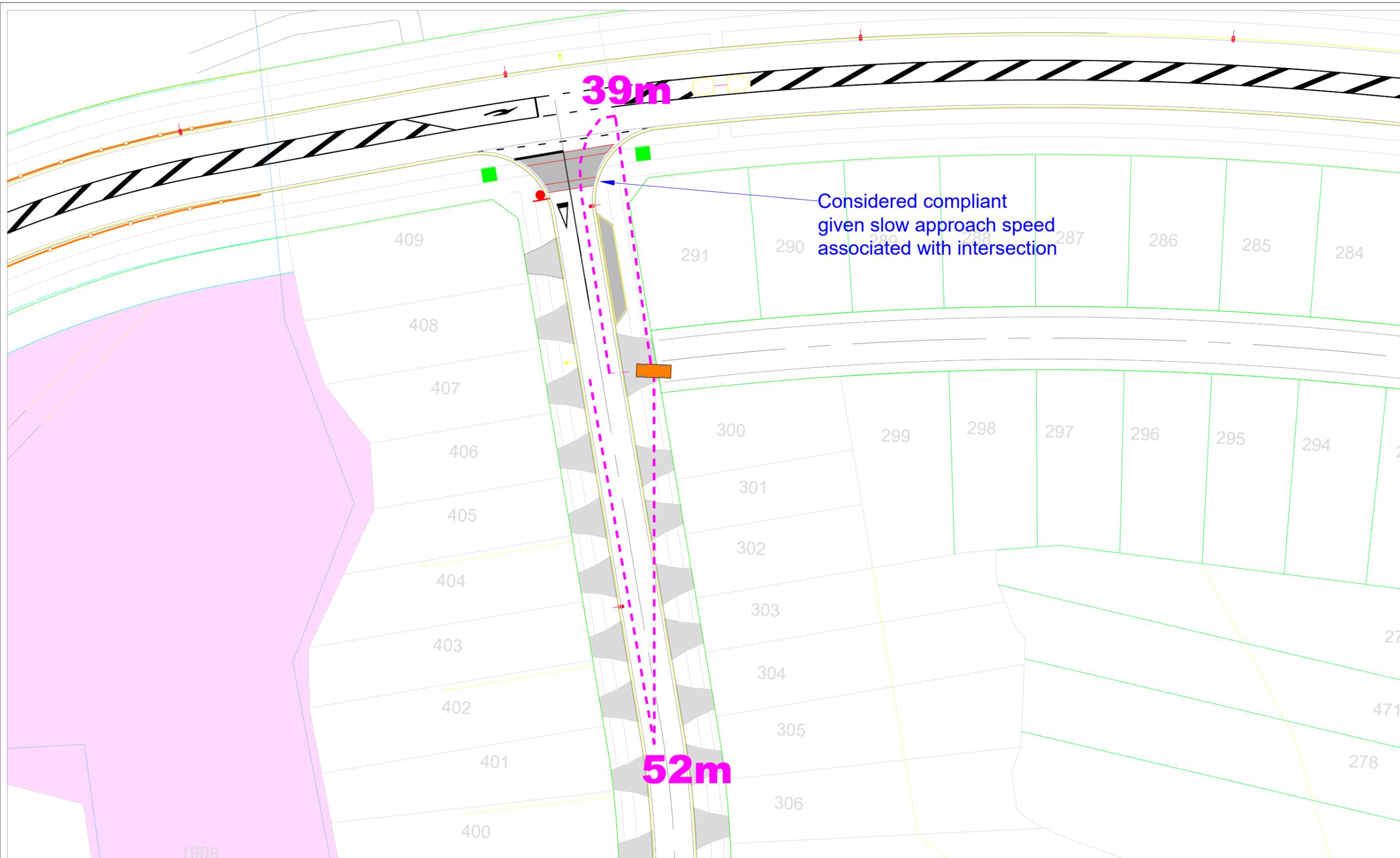
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
1AA



Considered compliant given slow approach speed associated with intersection

39m

52m

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A

**Client:**

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "B" - Road 02 / JOAL 05b



**Figure:**  
2AA





97m

97m

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "D" - NOR 6/JOAL 34

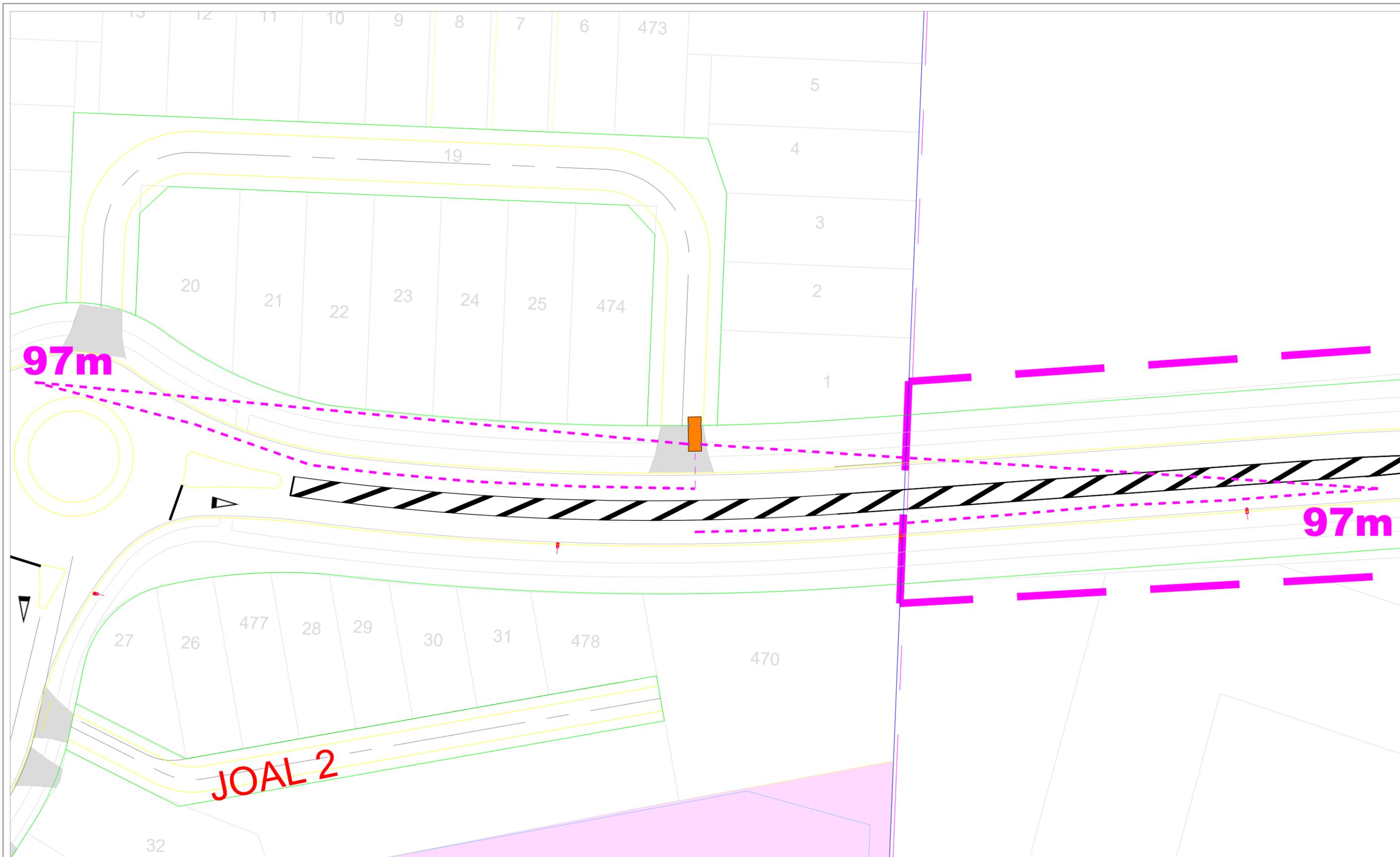
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
4AA



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "F" - NOR 6 / JOAL 01

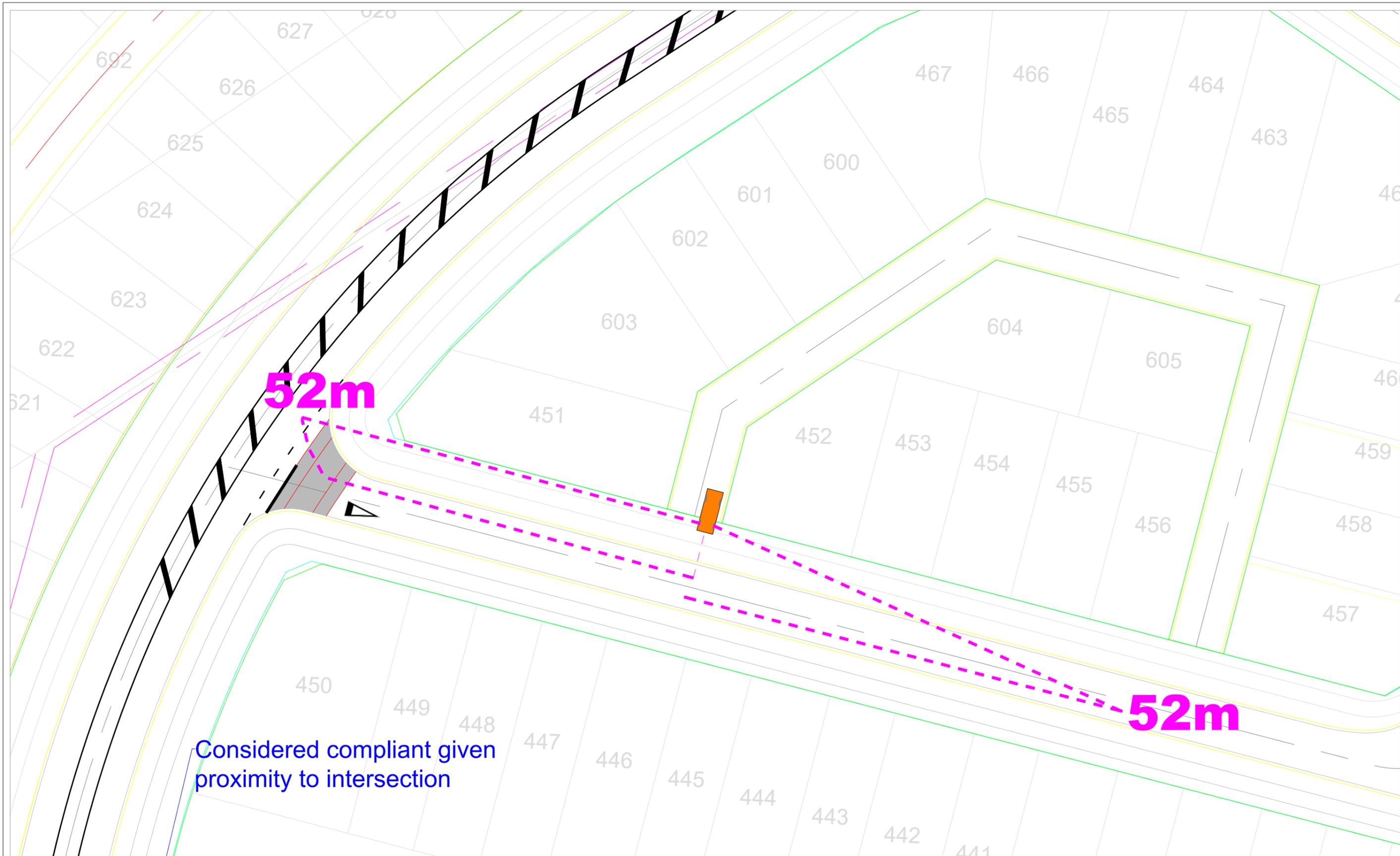
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
5AA



Considered compliant given proximity to intersection

52m

52m

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "G" - Road 06 / JOAL 08

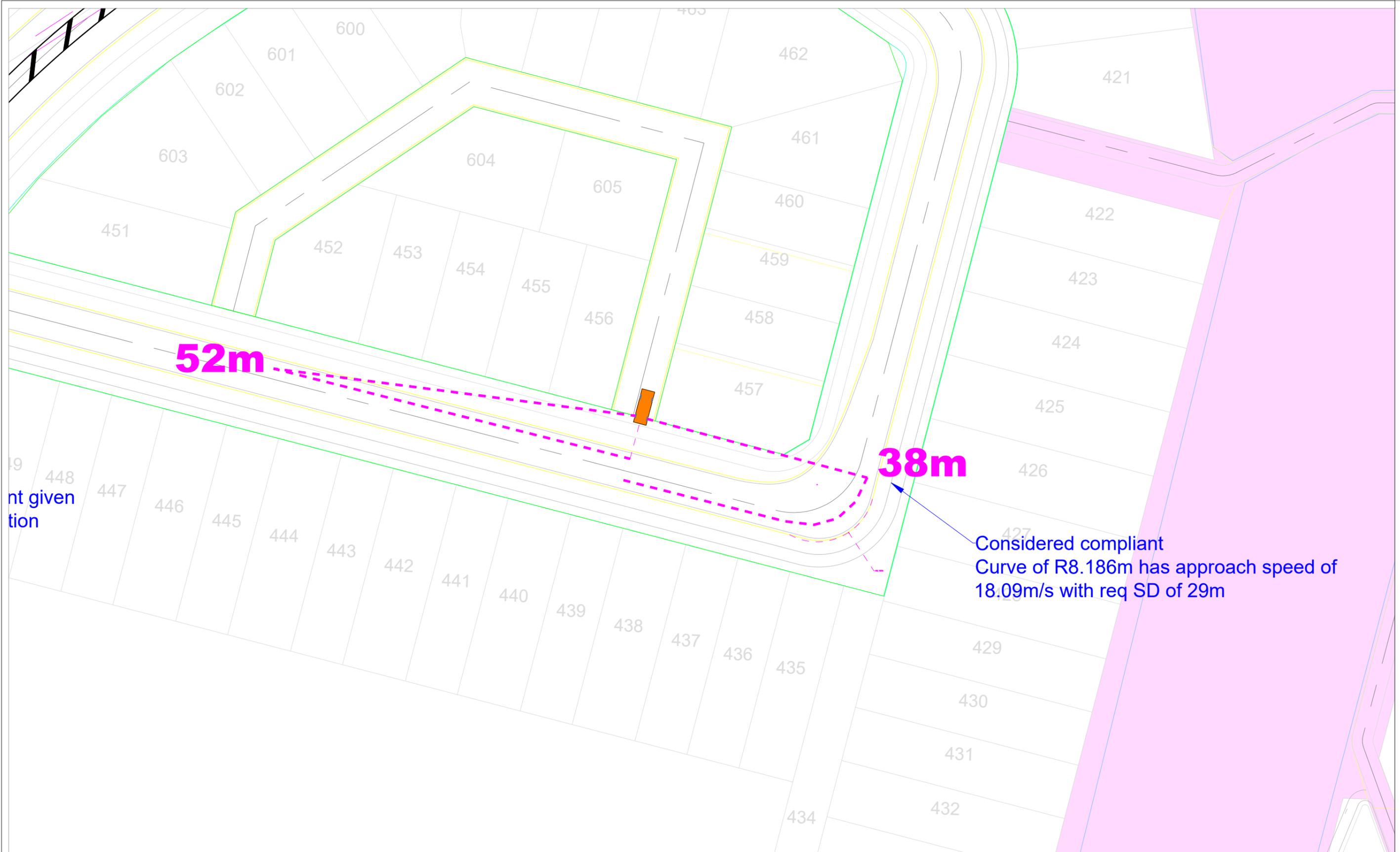
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.4

**Revision:**  
A



**Figure:**  
6AA



nt given  
tion

**52m**

**38m**

Considered compliant  
Curve of R8.186m has approach speed of  
18.09m/s with req SD of 29m

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

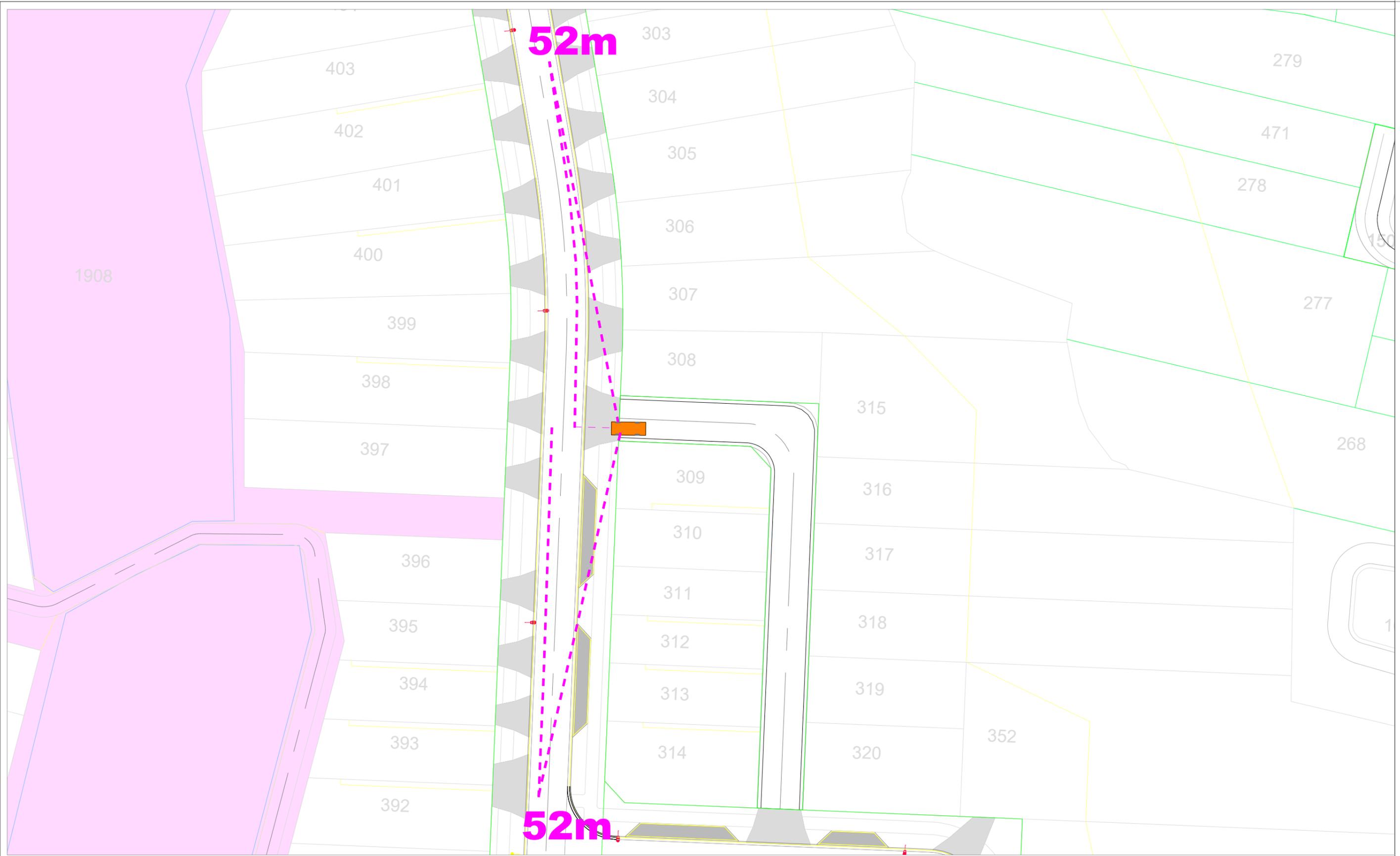
**Revision:**  
A

**Client:**

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "H" - Road 06 / JOAL 08



**Figure:**  
7AA



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "I" - Road 02 / JOAL 30

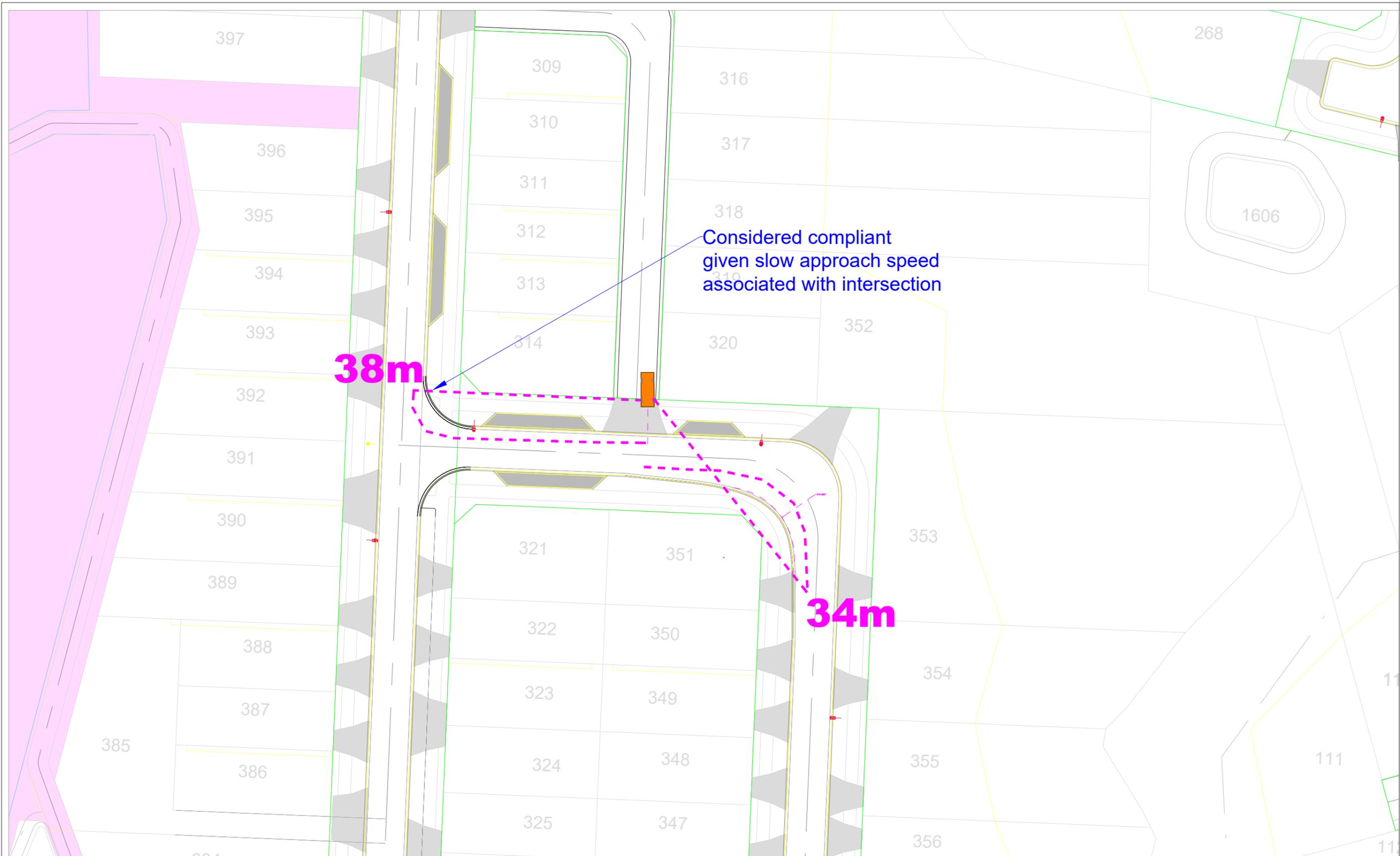
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
8AA



**38m**

Considered compliant  
given slow approach speed  
associated with intersection

**34m**

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A

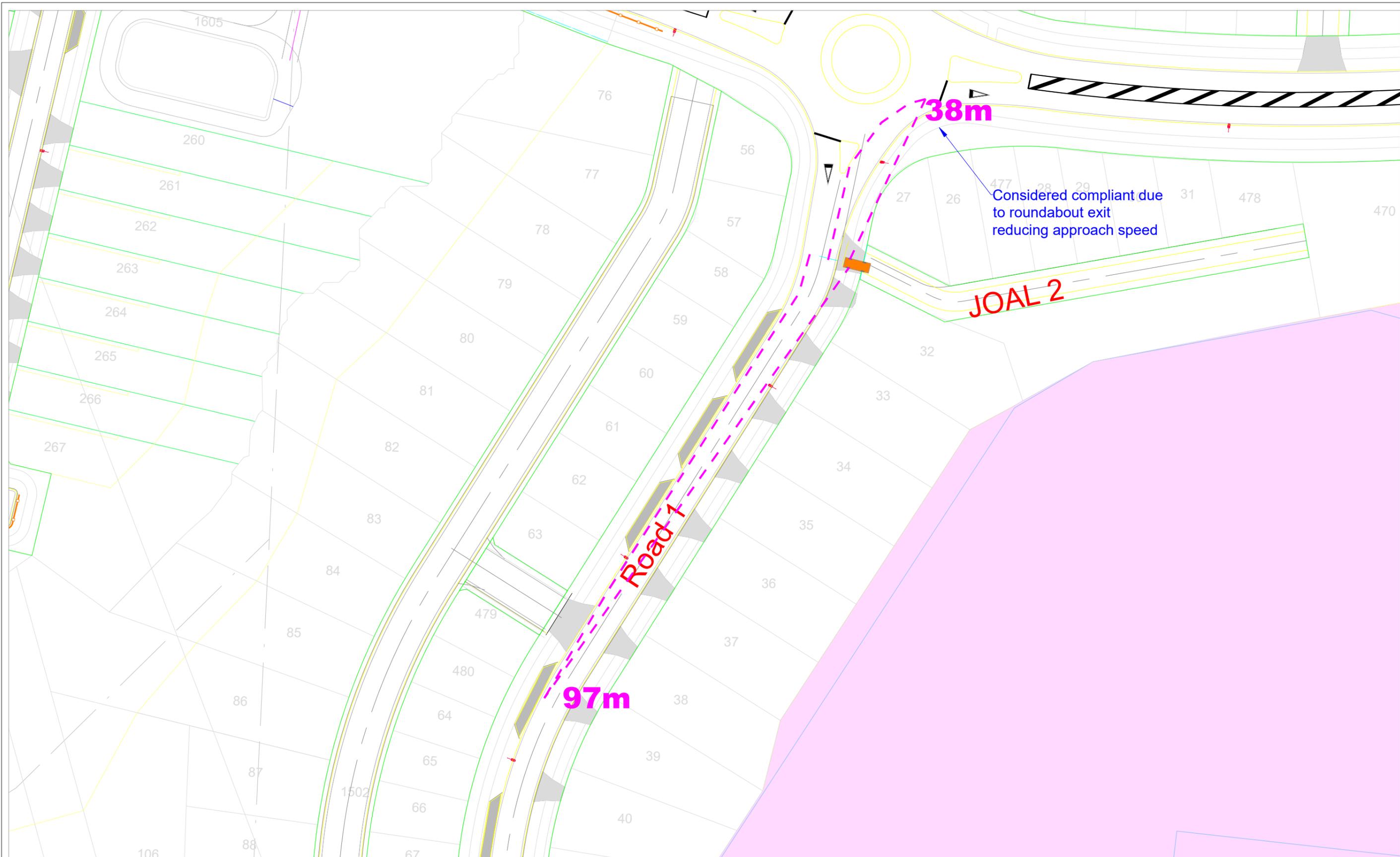
**Client:**

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "J" - Road 04 / JOAL 30



**Figure:**  
9AA





Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "L" - Road 01 / JOAL 02

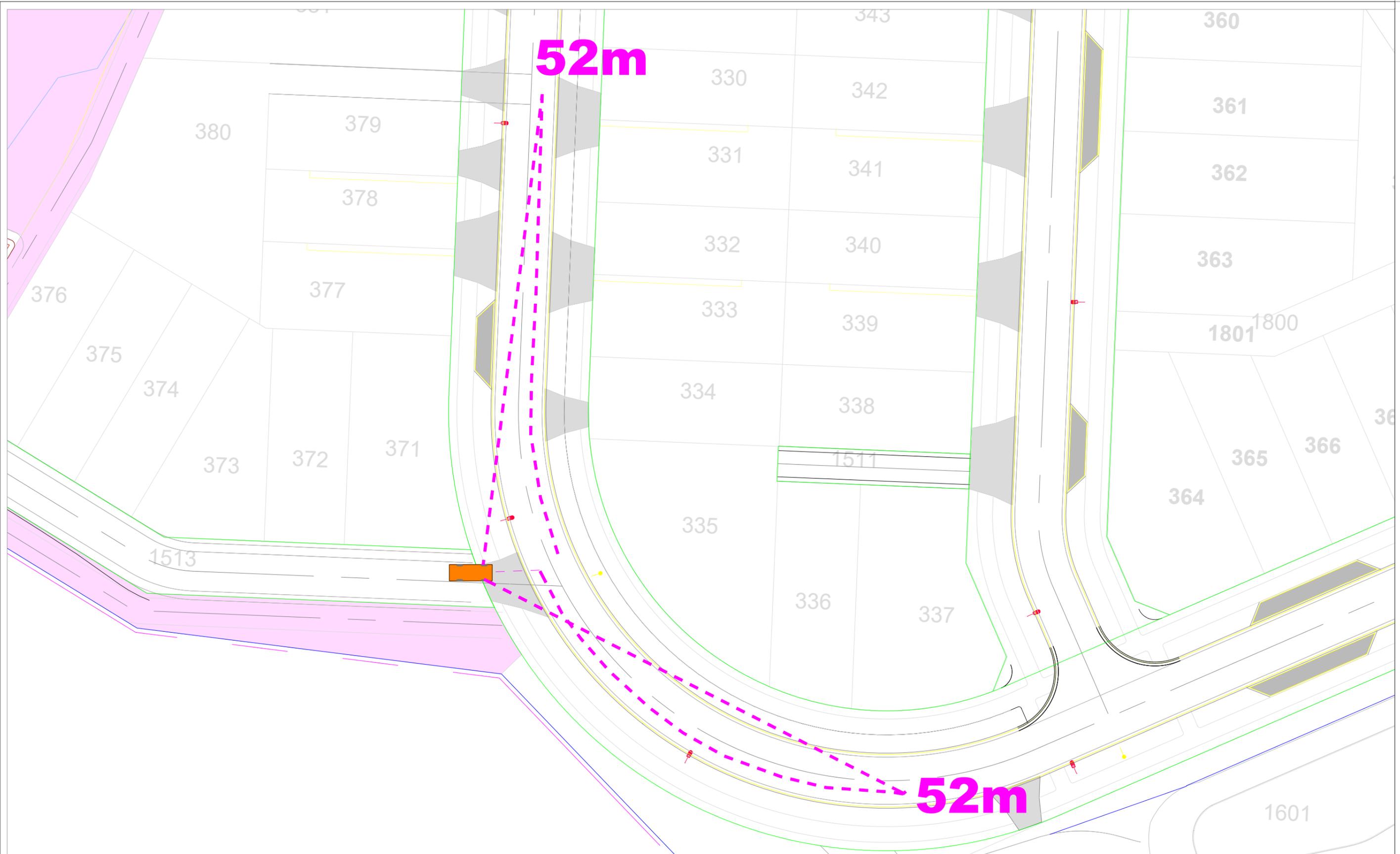
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.6667

**Revision:**  
A



**Figure:**  
11AA



52m

52m

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.4

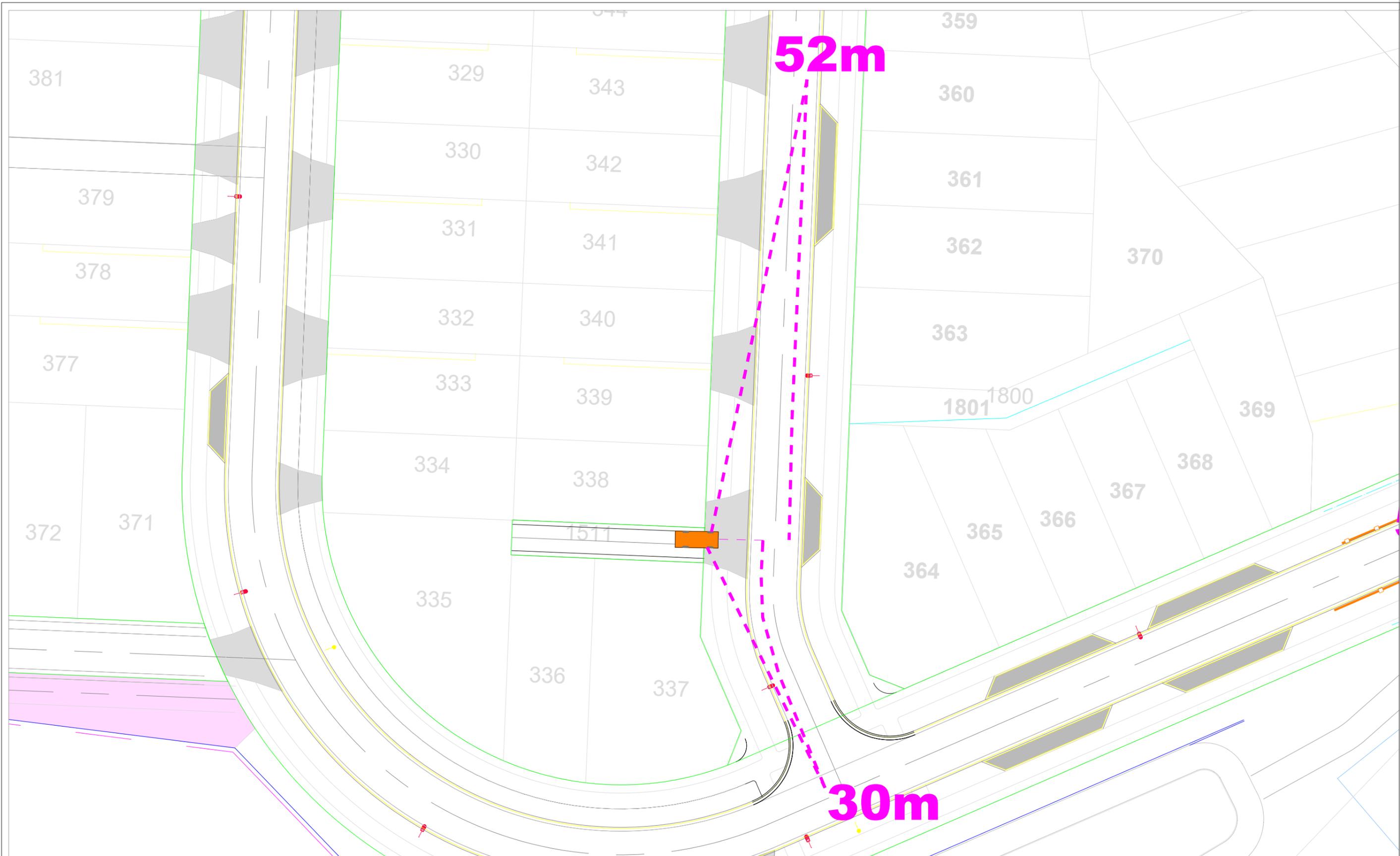
**Revision:**  
A

**Client:**

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "M" - Road 02 / JOAL 06



**Figure:**  
12AA



Revision notes:		
Rev:	Date:	Notes:

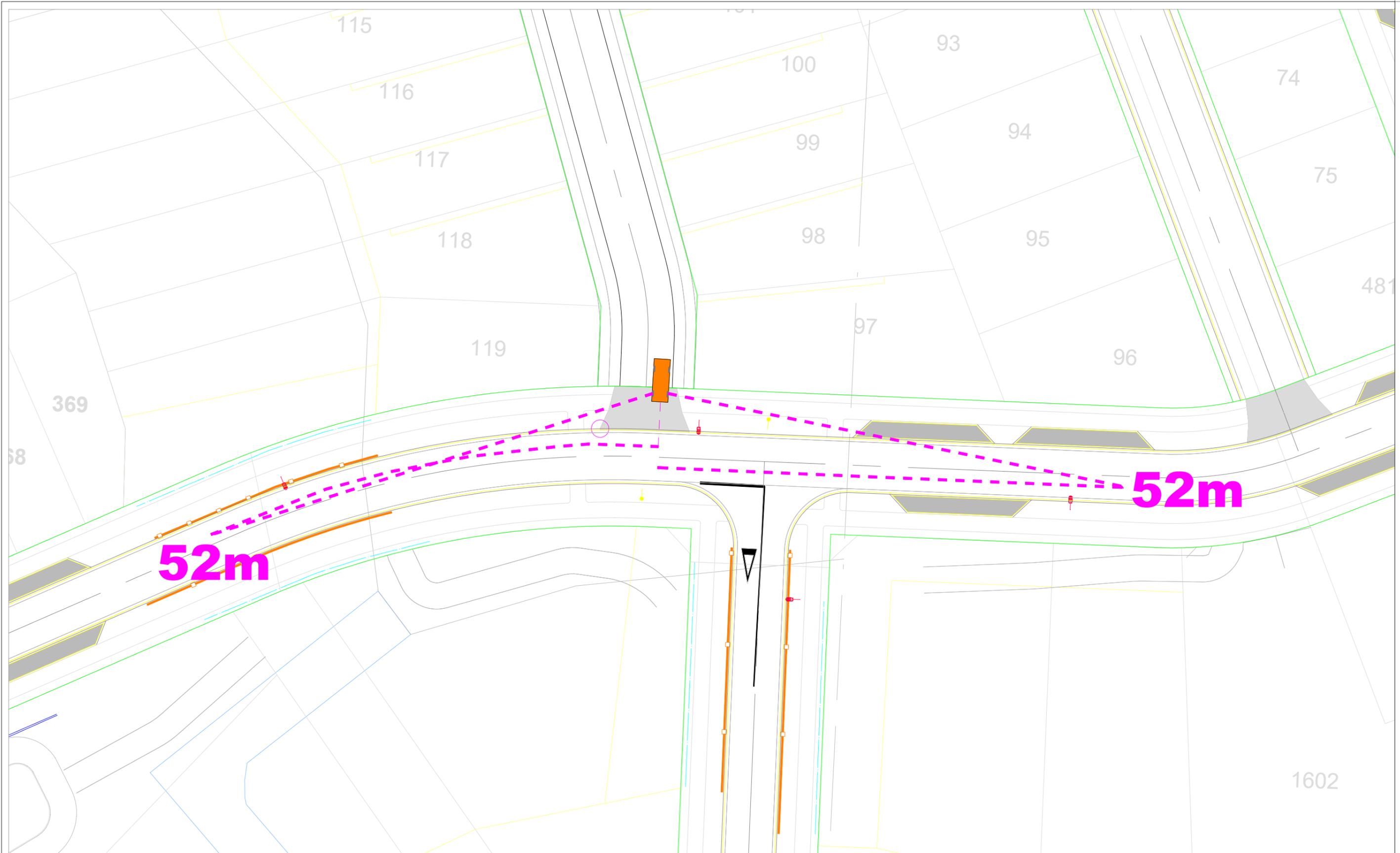
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Sight Distance Assessment - Stage 1 Intersection "N" - Road 04 / JOAL 37

<b>Date:</b> 23 December 2025
<b>Scale @ A3:</b> 1:0.4
<b>Revision:</b> A



**Figure:**  
13AA



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 1  
 Intersection "O" - Road 02 / JOAL 04a

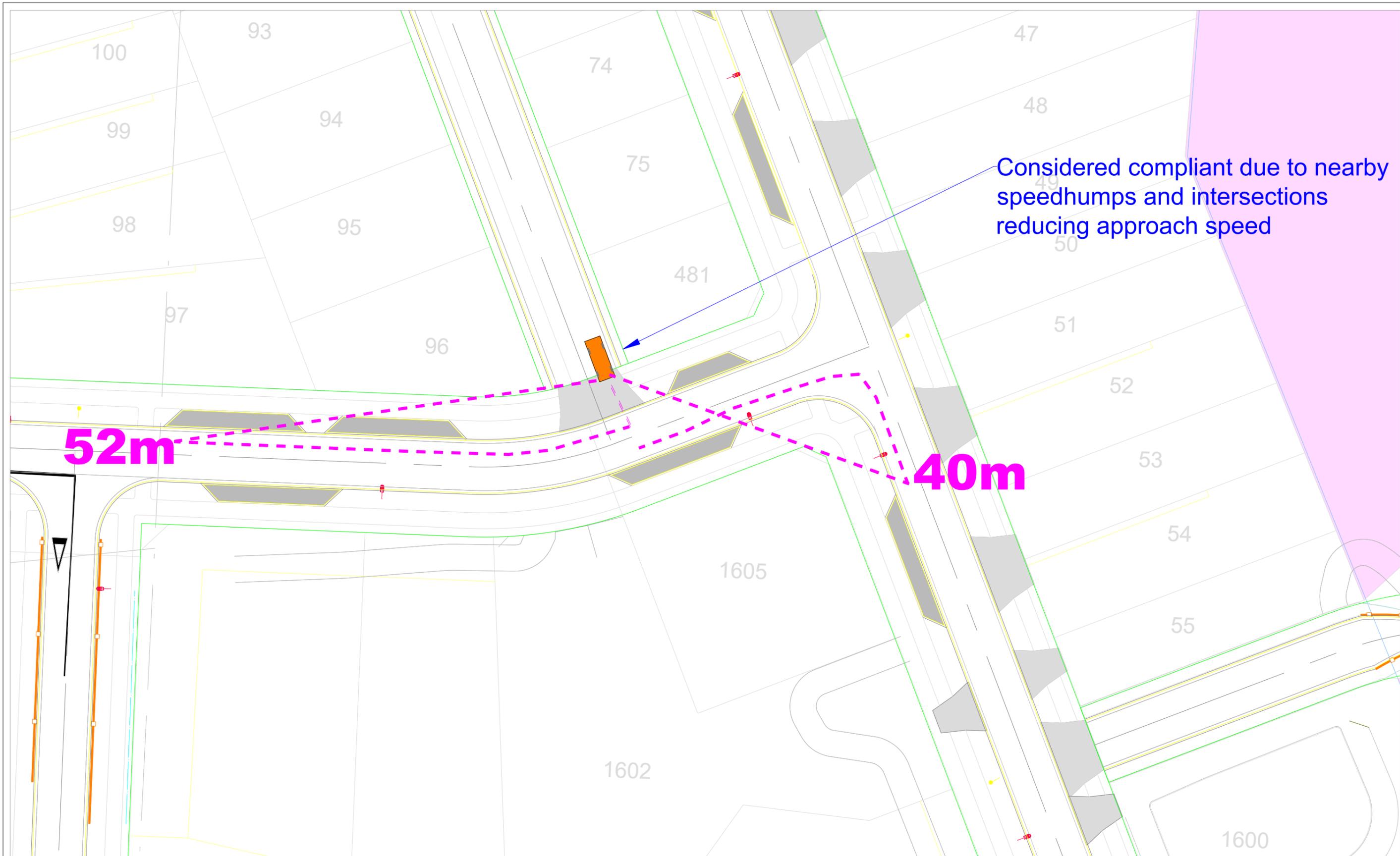
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.4

**Revision:**  
 A



**Figure:**  
 14AA



Considered compliant due to nearby speedhumps and intersections reducing approach speed

52m

40m

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.4

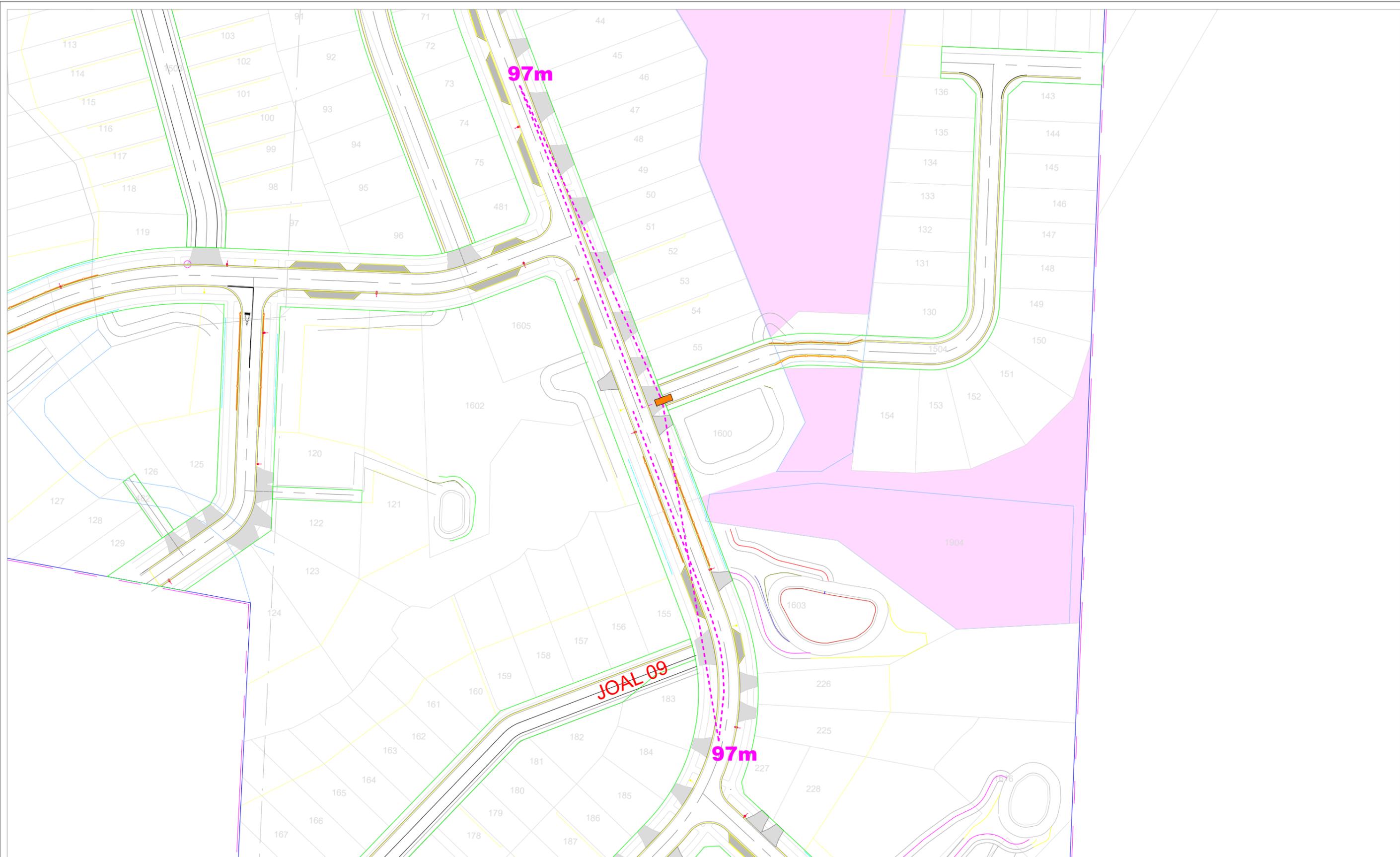
**Revision:**  
A

**Client:**

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "P" - Road 02 / Road JOAL 03



**Figure:**  
15AA



Revision notes:		
Rev:	Date:	Notes:

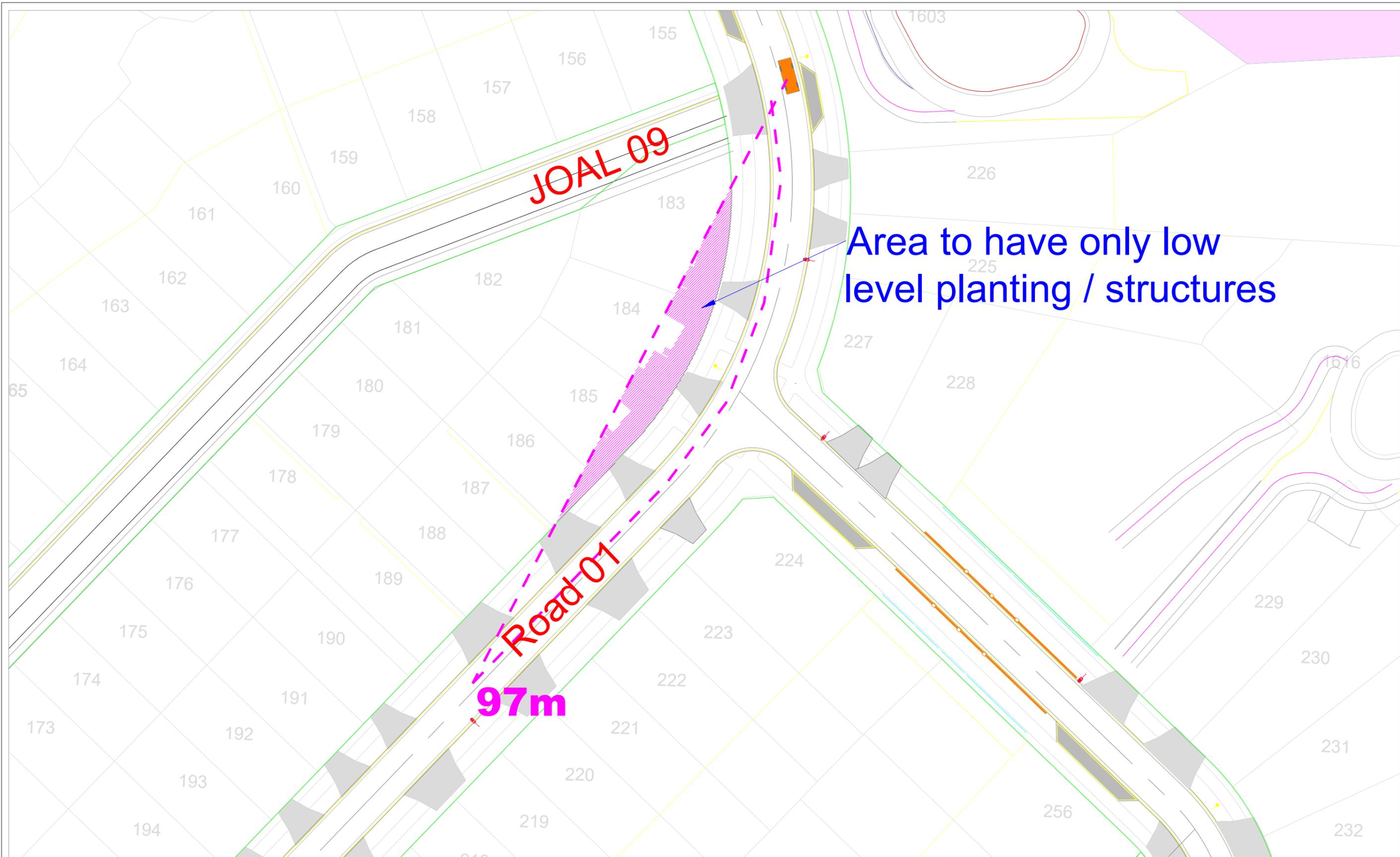
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Sight Distance Assessment - Stage 1 Intersection "Q" - Road 01 / JOAL 40

<b>Date:</b> 23 December 2025
<b>Scale @ A3:</b> 1:1
<b>Revision:</b> A



**Figure:**  
16AA



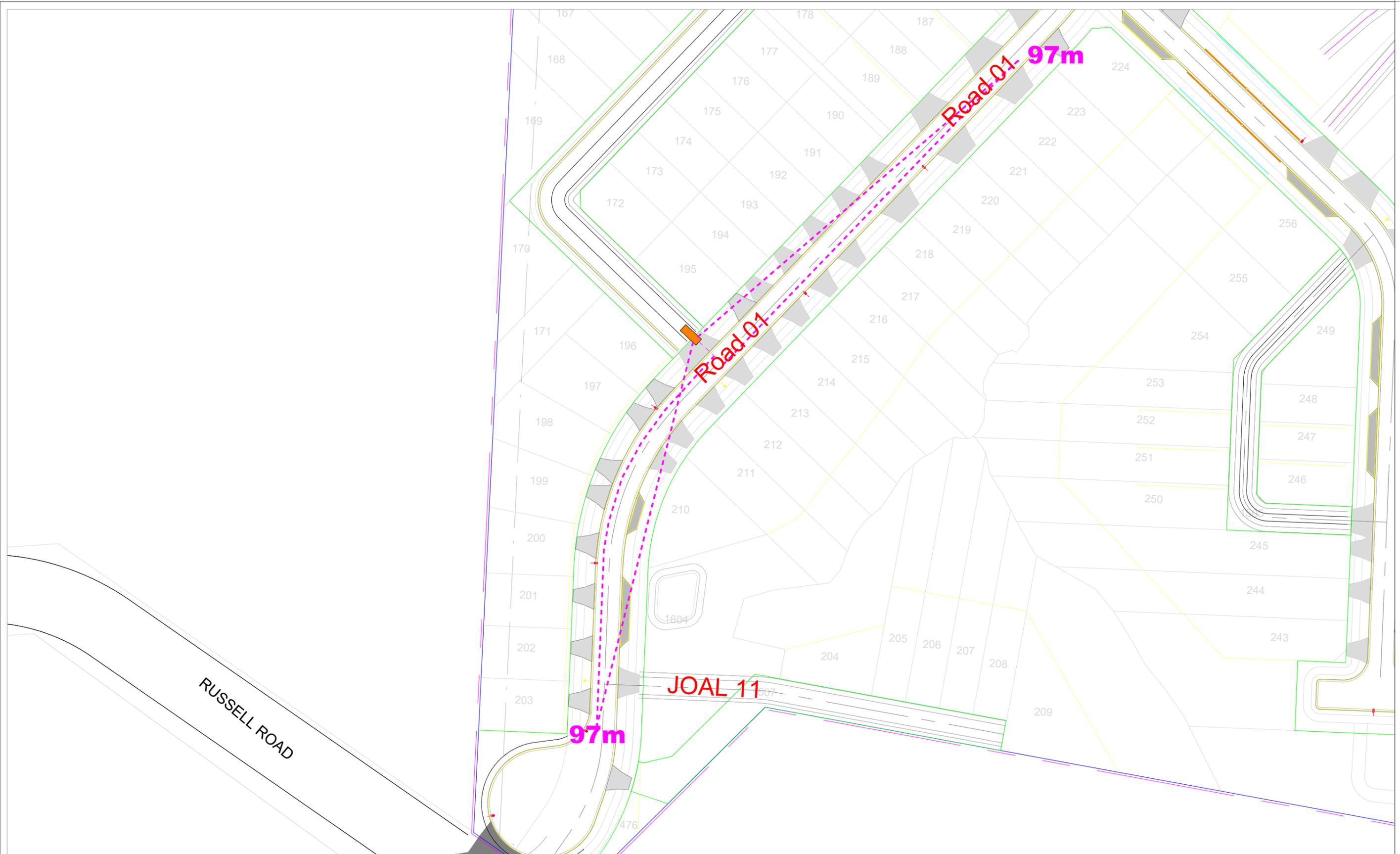
Revision notes:		
Rev:	Date:	Notes:

<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Sight Distance Assessment - Stage 1 Intersection "R" - Road 01 / JOAL 09

<b>Date:</b> 23 December 2025
<b>Scale @ A3:</b> 1:0.5
<b>Revision:</b> A

	Figure: 17AA
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Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 1  
 Intersection "S" - Road 01 / JOAL 09

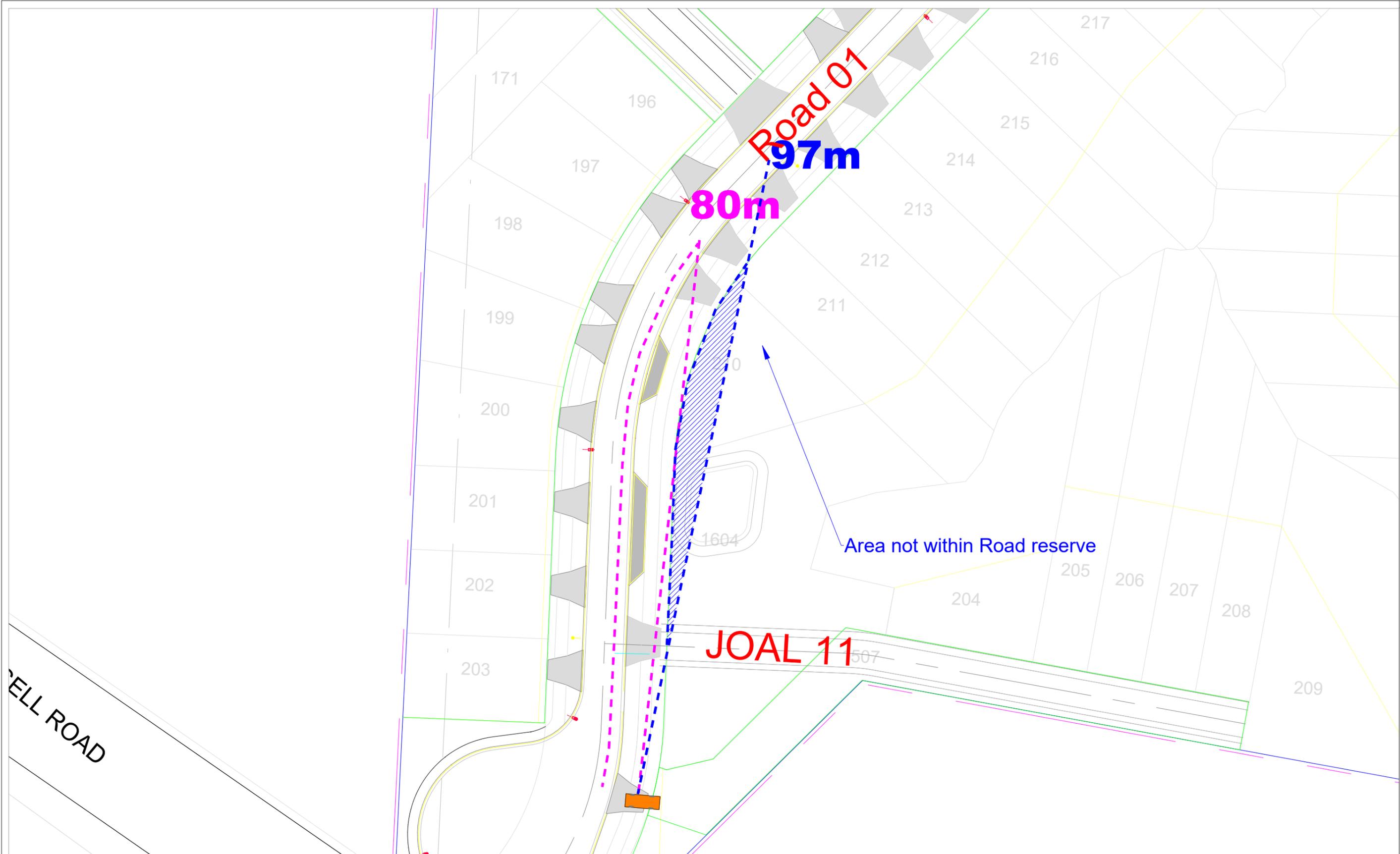
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.8

**Revision:**  
 A



**Figure:**  
 18AA



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 1  
 Intersection "T" - Road 01 / JOAL 11

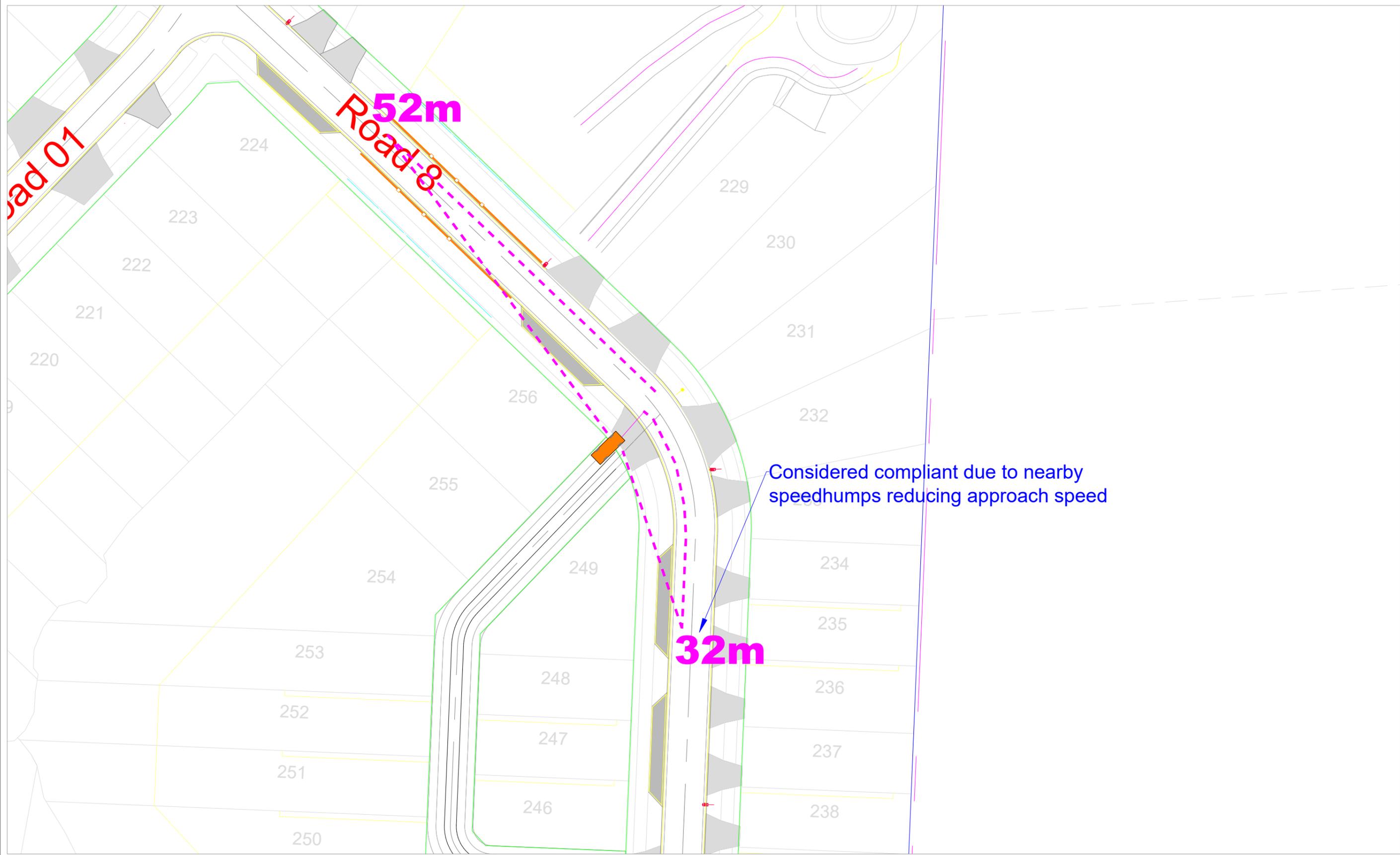
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.5

**Revision:**  
 A



**Figure:**  
 19AA



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "U" - Road 08 / JOAL 10

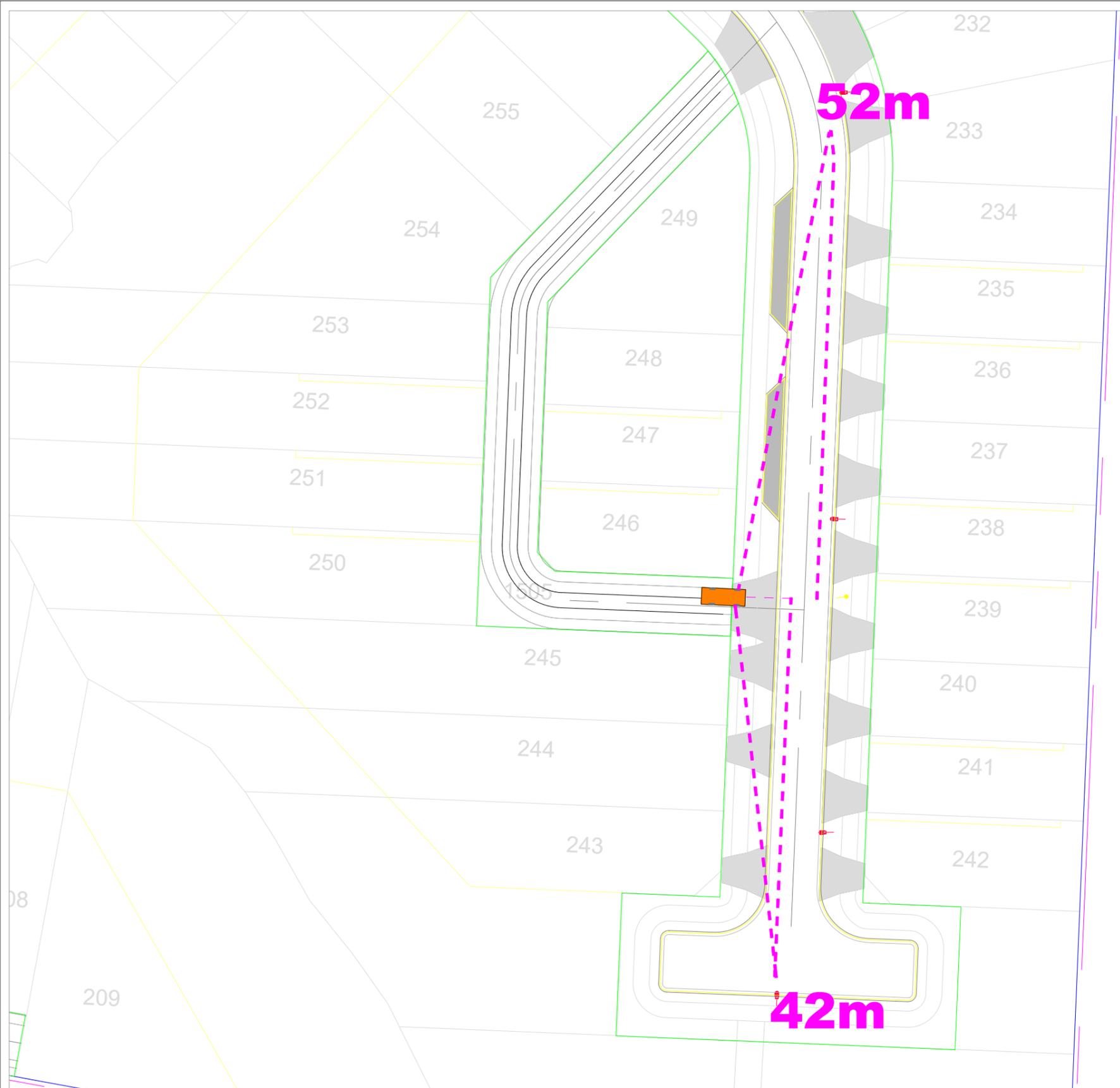
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
20AA



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 1  
Intersection "V" - Road 08 / JOAL 10

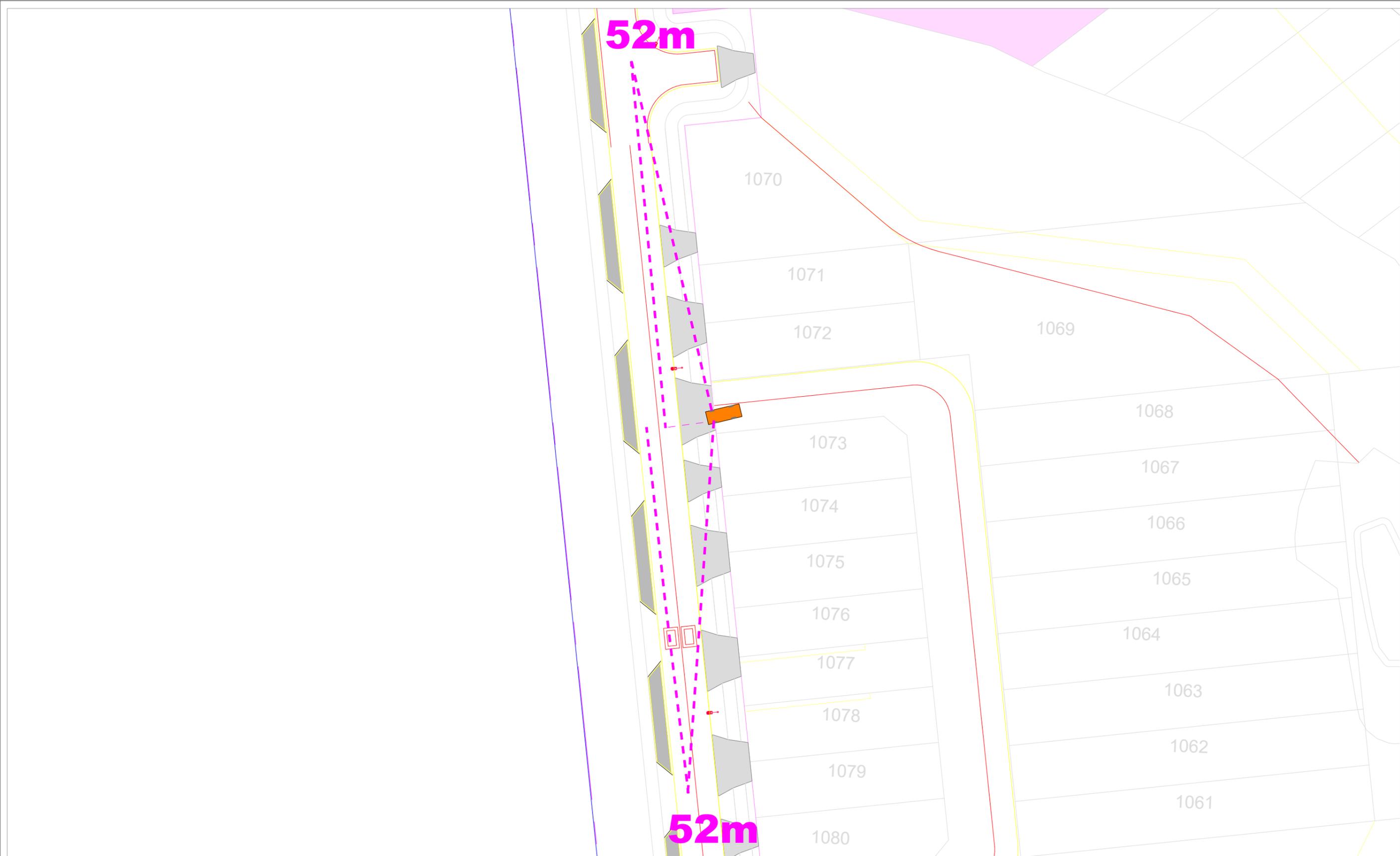
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
21AA



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "A" - Road 21 / JOAL 36

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
1BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "B" - Road 21 / JOAL 36

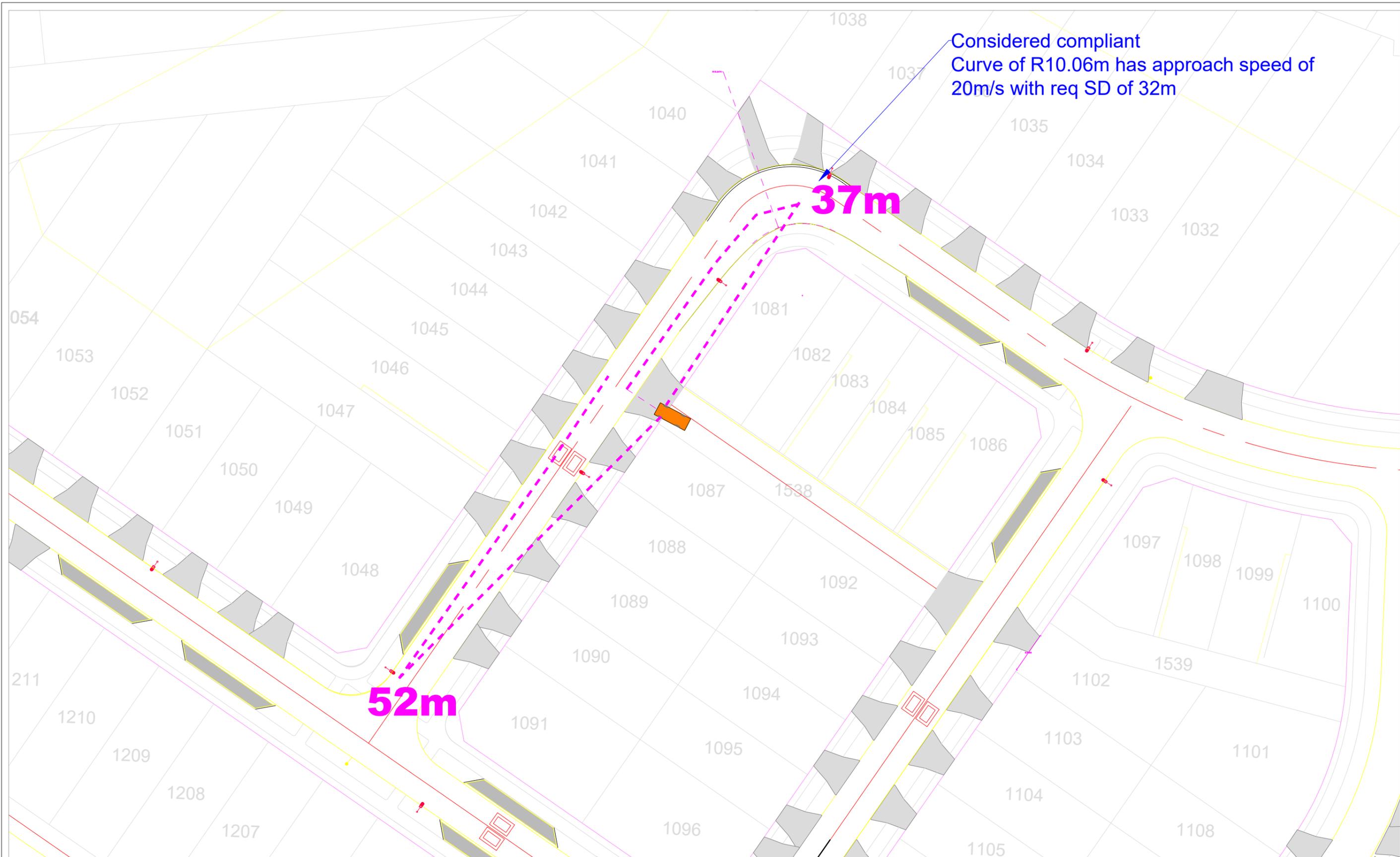
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
2BB



Considered compliant  
 Curve of R10.06m has approach speed of  
 20m/s with req SD of 32m

37m

52m

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.5

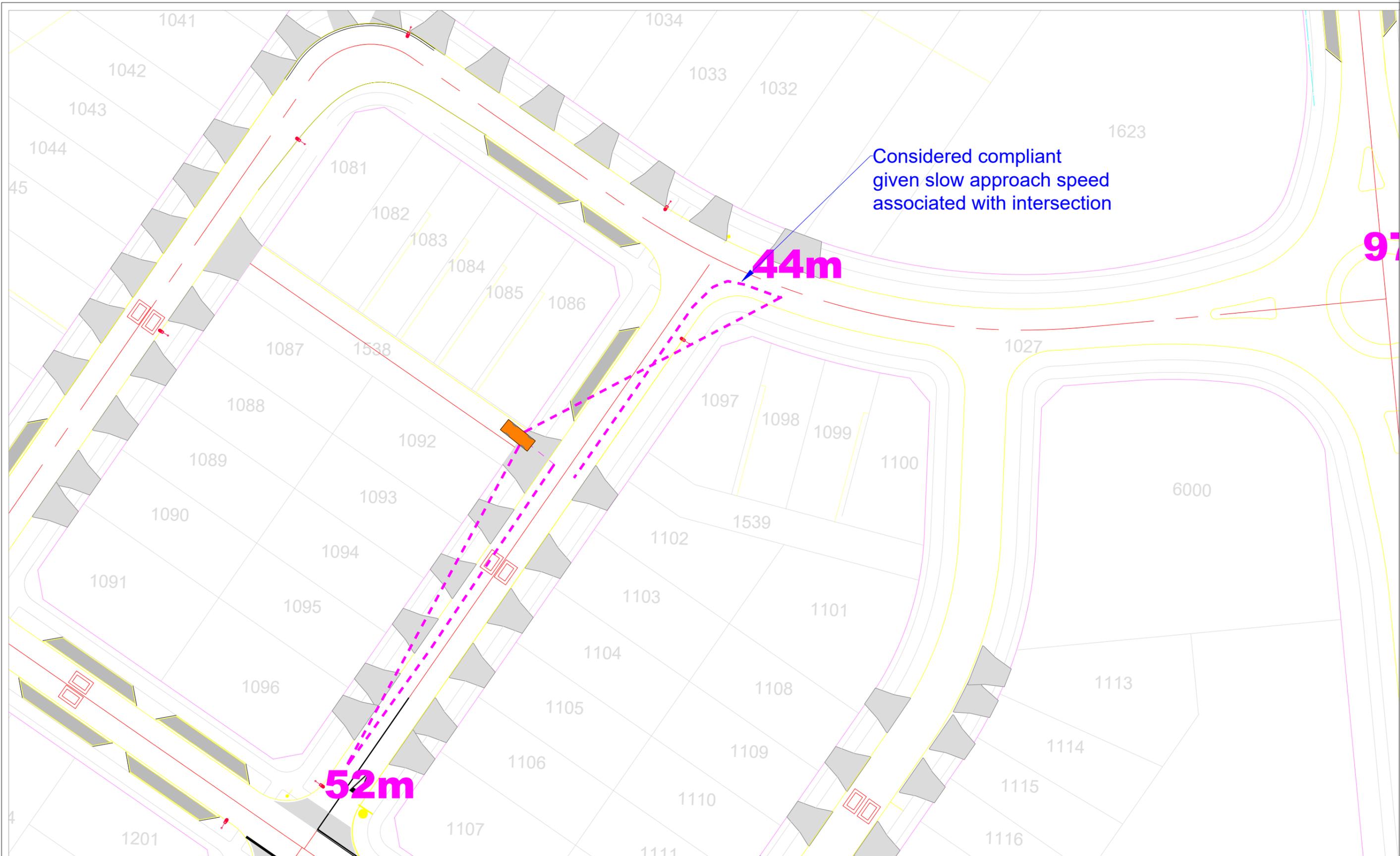
**Revision:**  
 A

**Client:**

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "C" - Road 18 / JOAL 31



**Figure:**  
 3BB



Considered compliant given slow approach speed associated with intersection

44m

52m

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

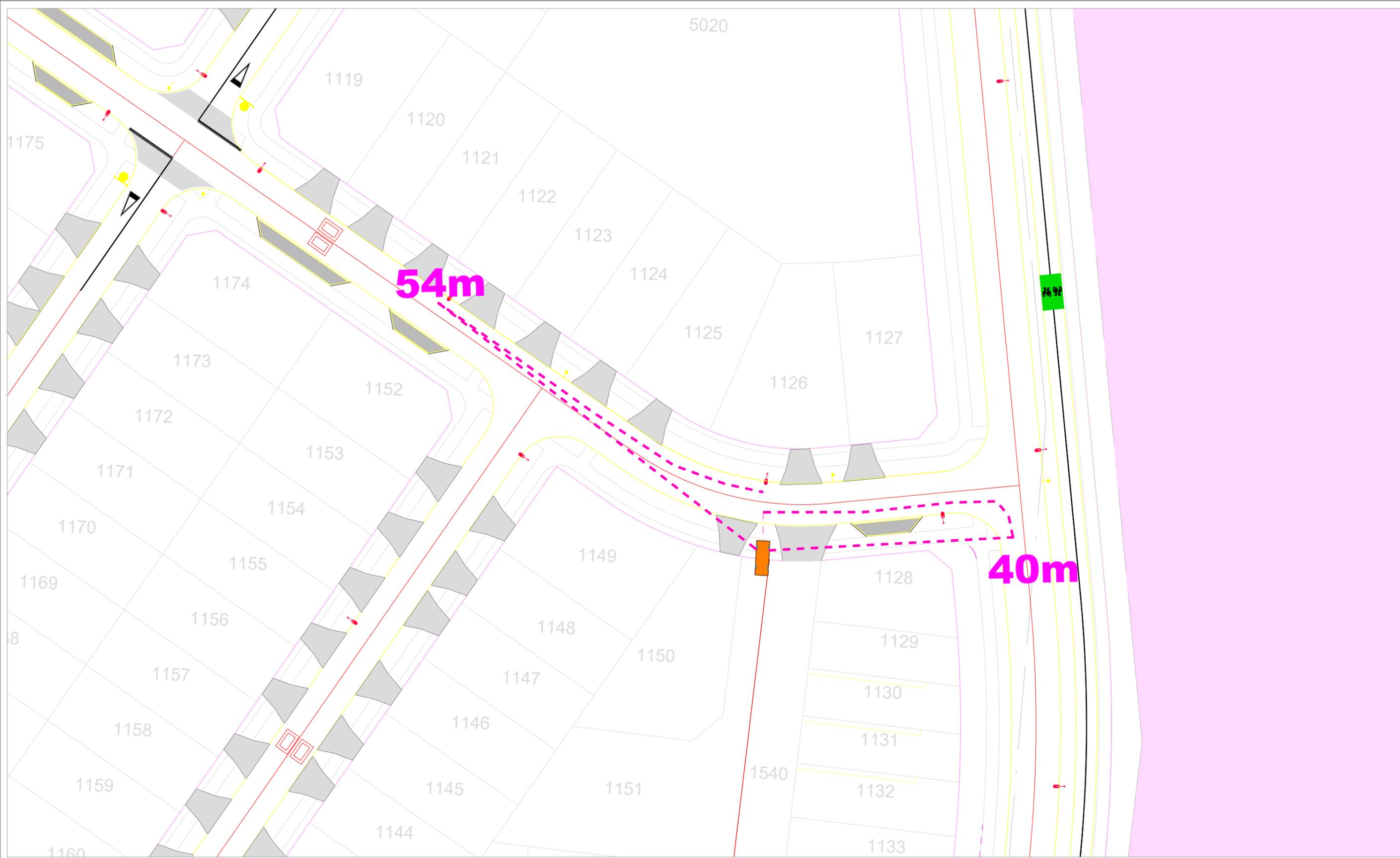
**Revision:**  
A

**Client:**

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "D" - Road 19 / JOAL 31



**Figure:**  
4BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "E" - Road 21 / JOAL 33

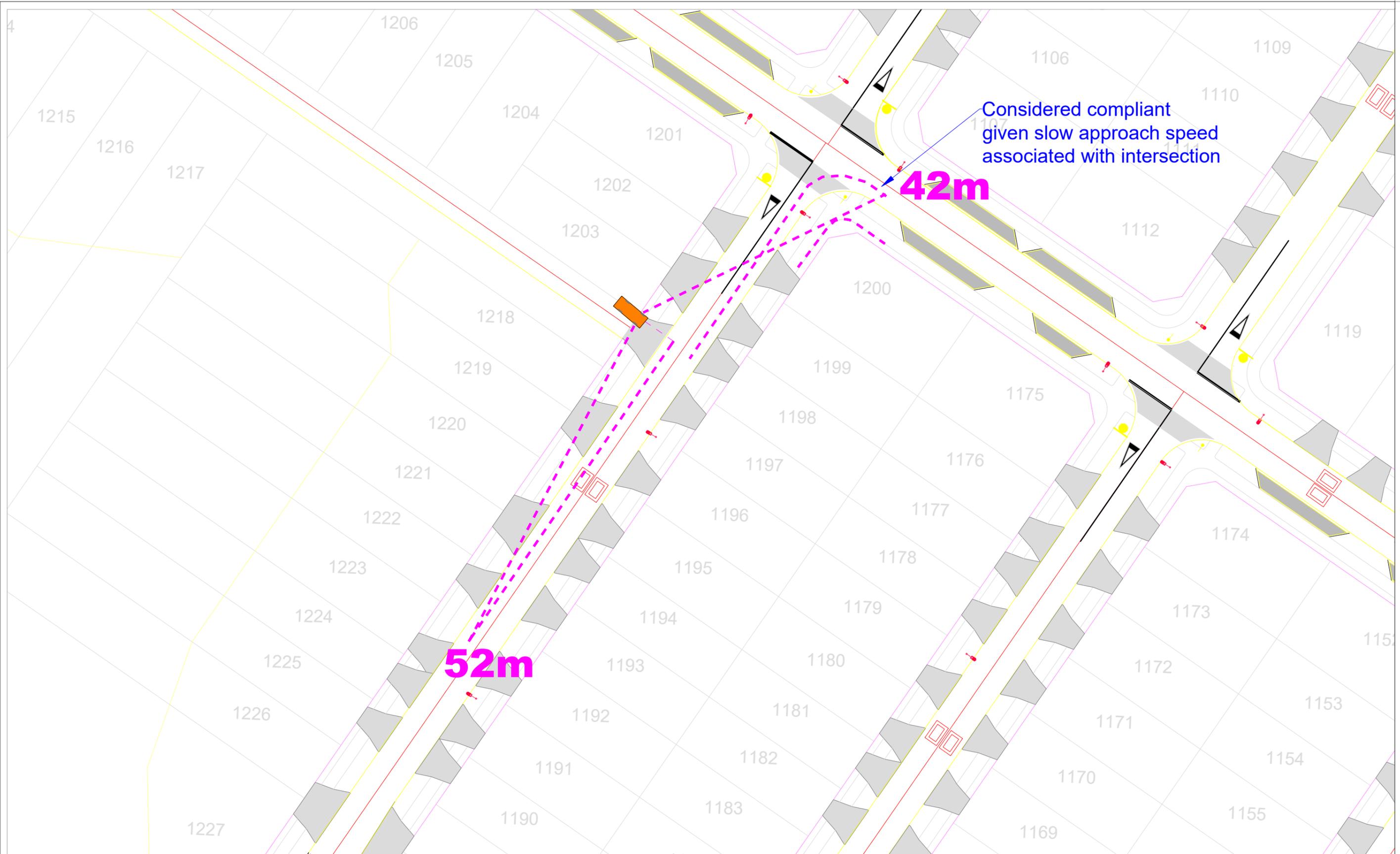
**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.5

**Revision:**  
 A



**Figure:**  
 5BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

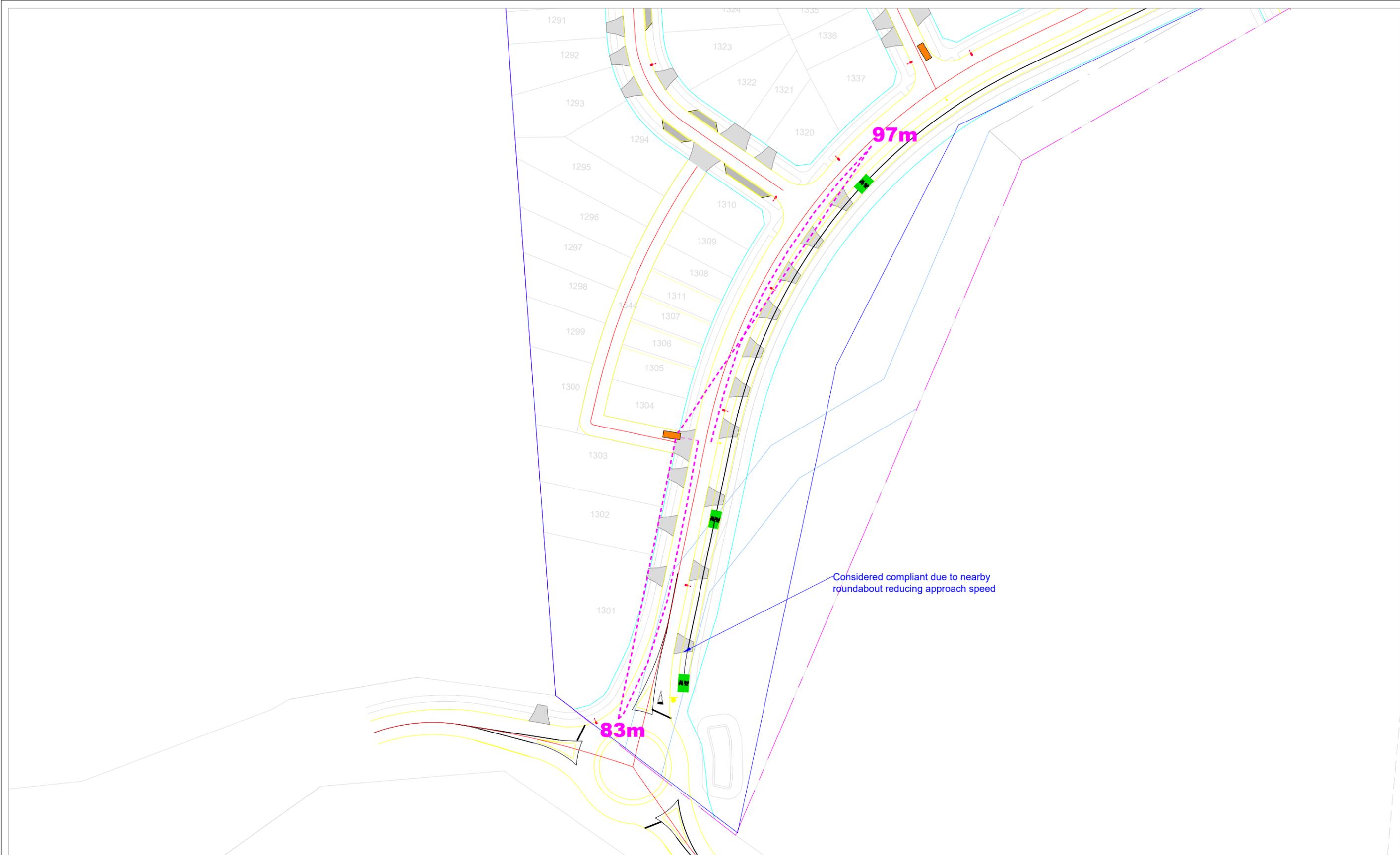
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Sight Distance Assessment - Stage 2  
Intersection "F" - Road 22 / JOAL 35

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A

**Figure:**  
6BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "G" - Road 17 / JOAL 39

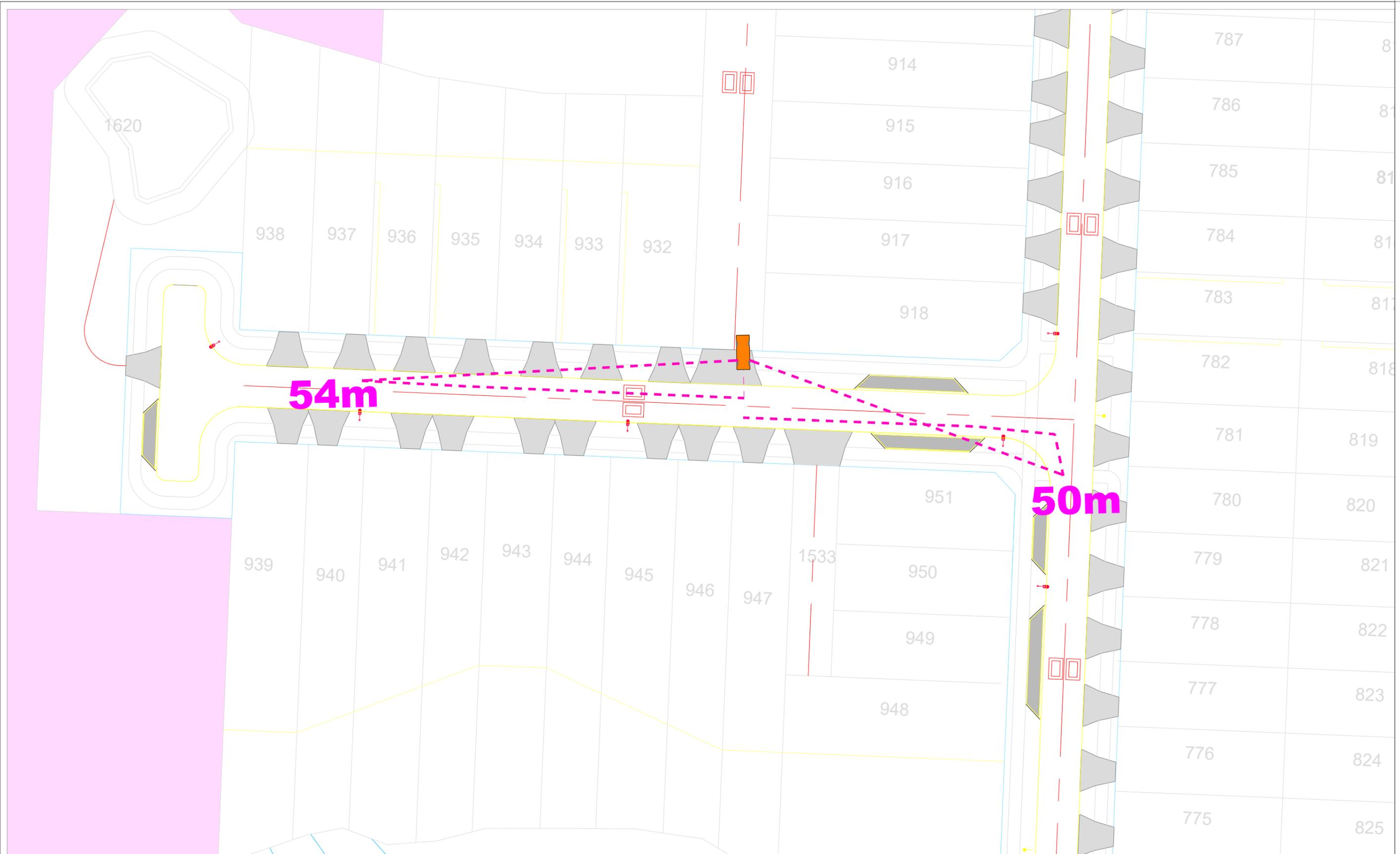
**Date:**  
23 December 2025

**Scale @ A3:**  
1:1

**Revision:**  
A



**Figure:**  
7BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "H" - Road 16 / JOAL 21

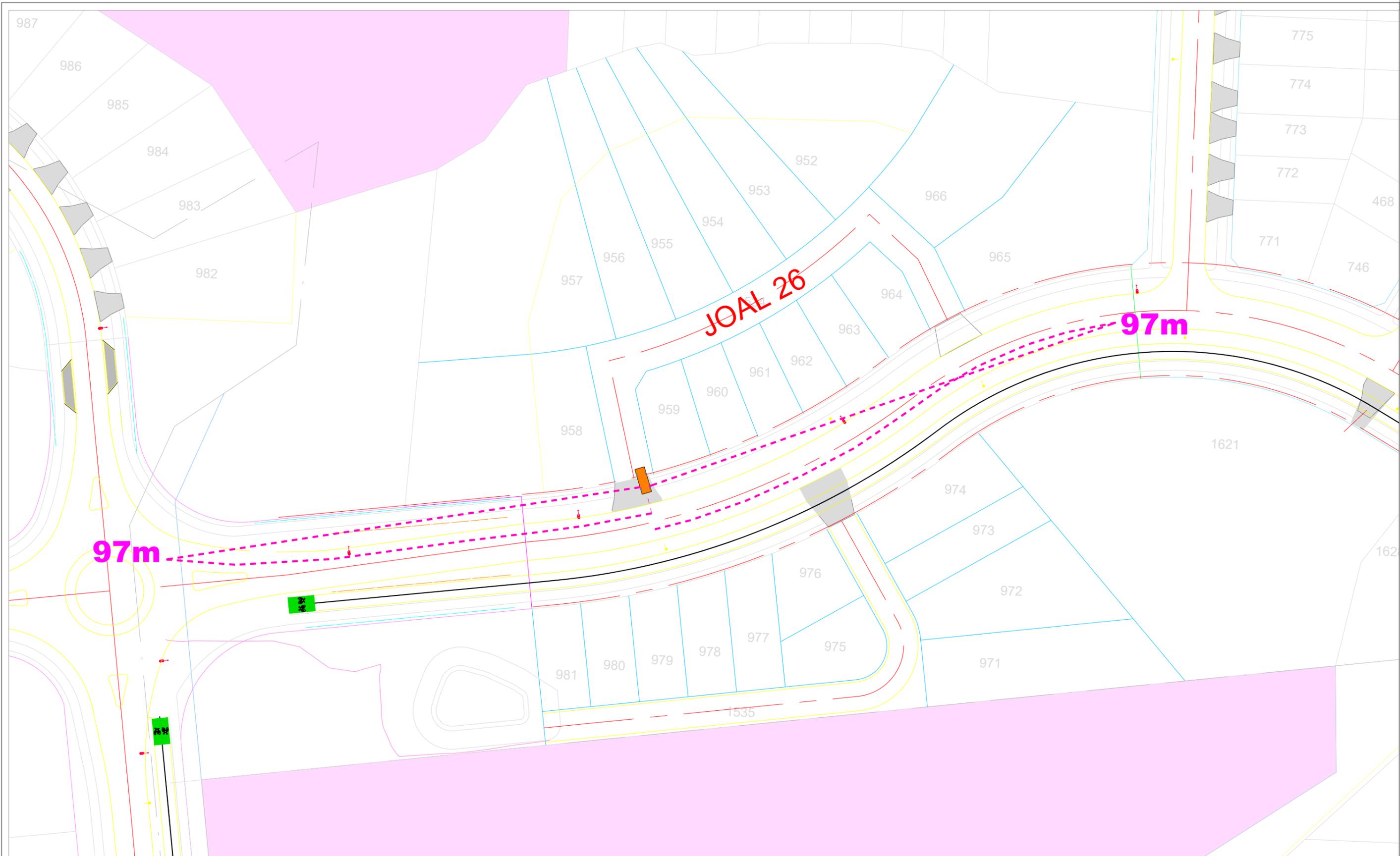
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
8BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "I" - Road 05 / JOAL 26

**Date:**  
23 December 2025

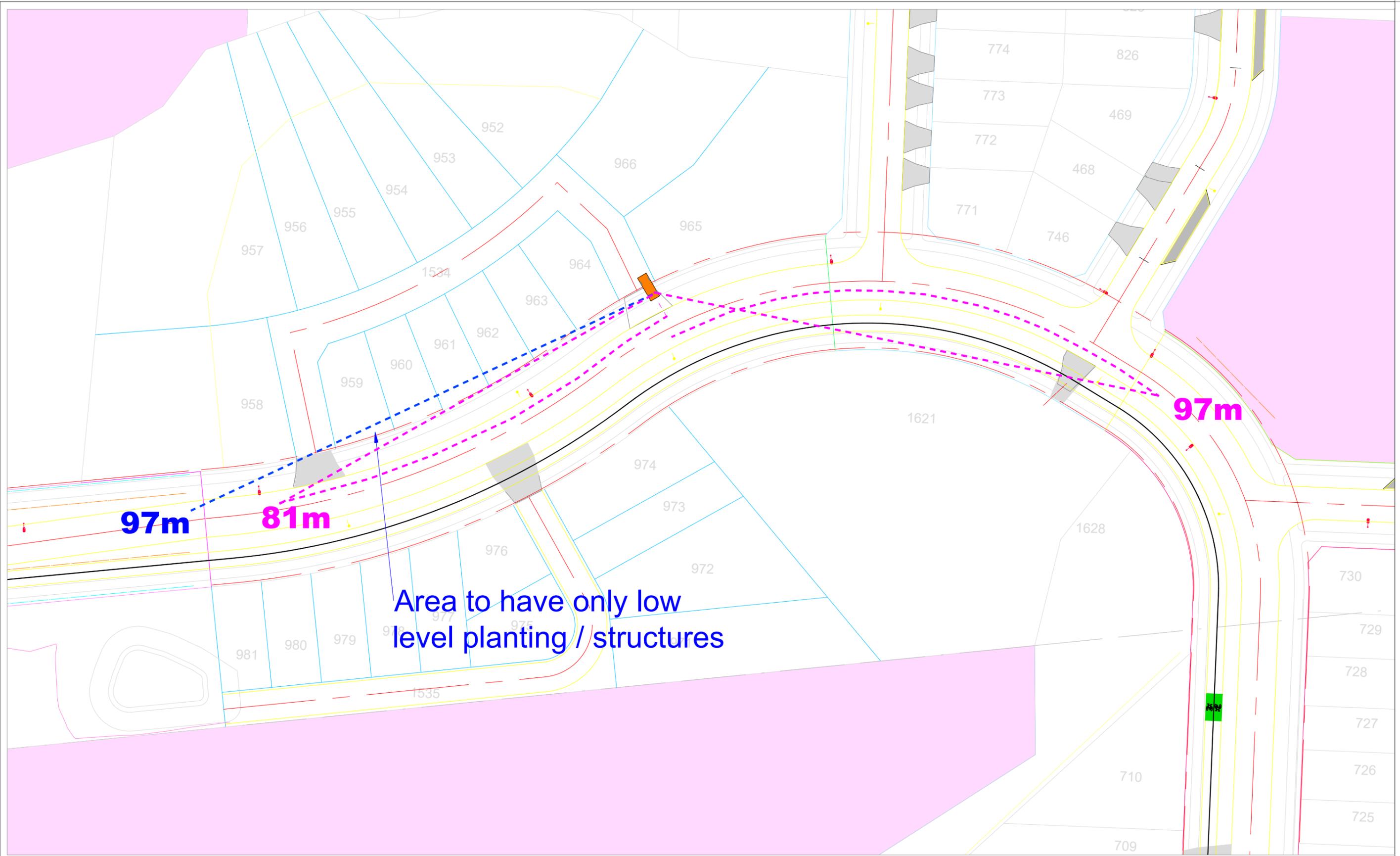
**Scale @ A3:**  
1:0.6667

**Revision:**  
A



**Figure:**  
9BB





Area to have only low level planting / structures

97m

81m

97m

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

**Client:**

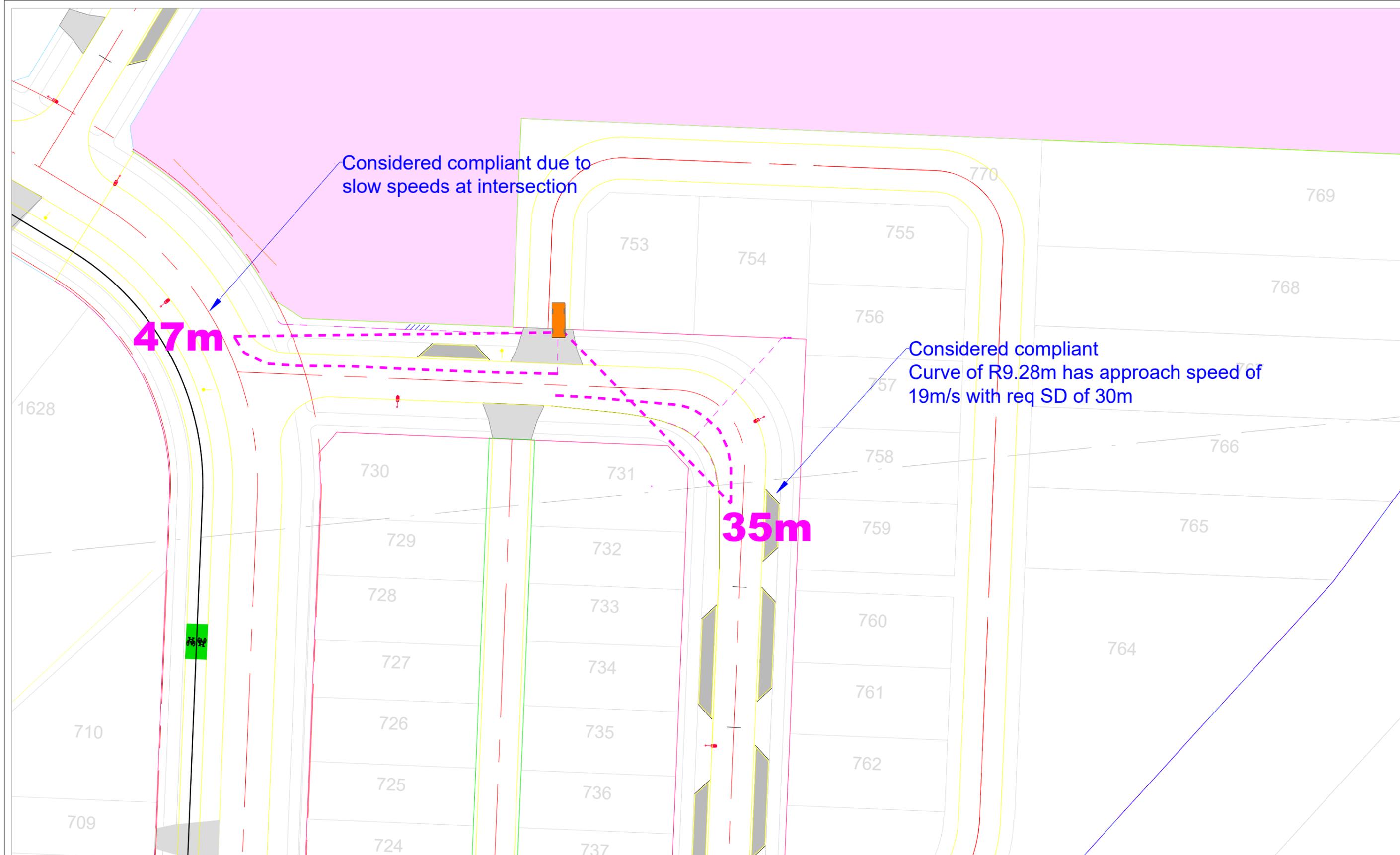
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Intersection "K" - Road 05 / JOAL 26

**Scale @ A3:**  
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**Revision:**  
A



**Figure:**  
1 BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

**Scale @ A3:**  
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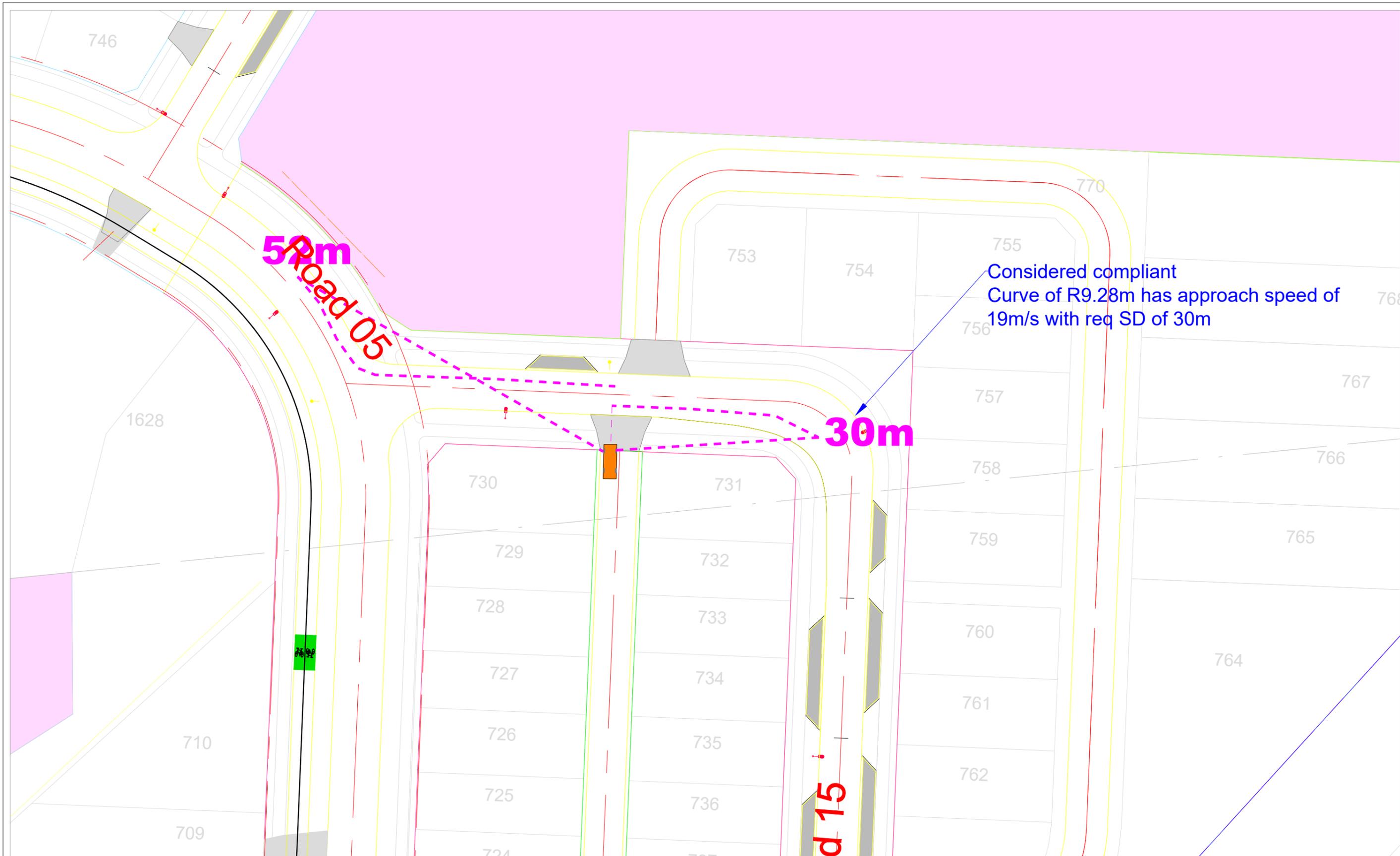
**Revision:**  
A

**Client:**

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "L" - Road 15 / JOAL 22



**Figure:**  
2BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Date:**  
 23 December 2025

**Scale @ A3:**  
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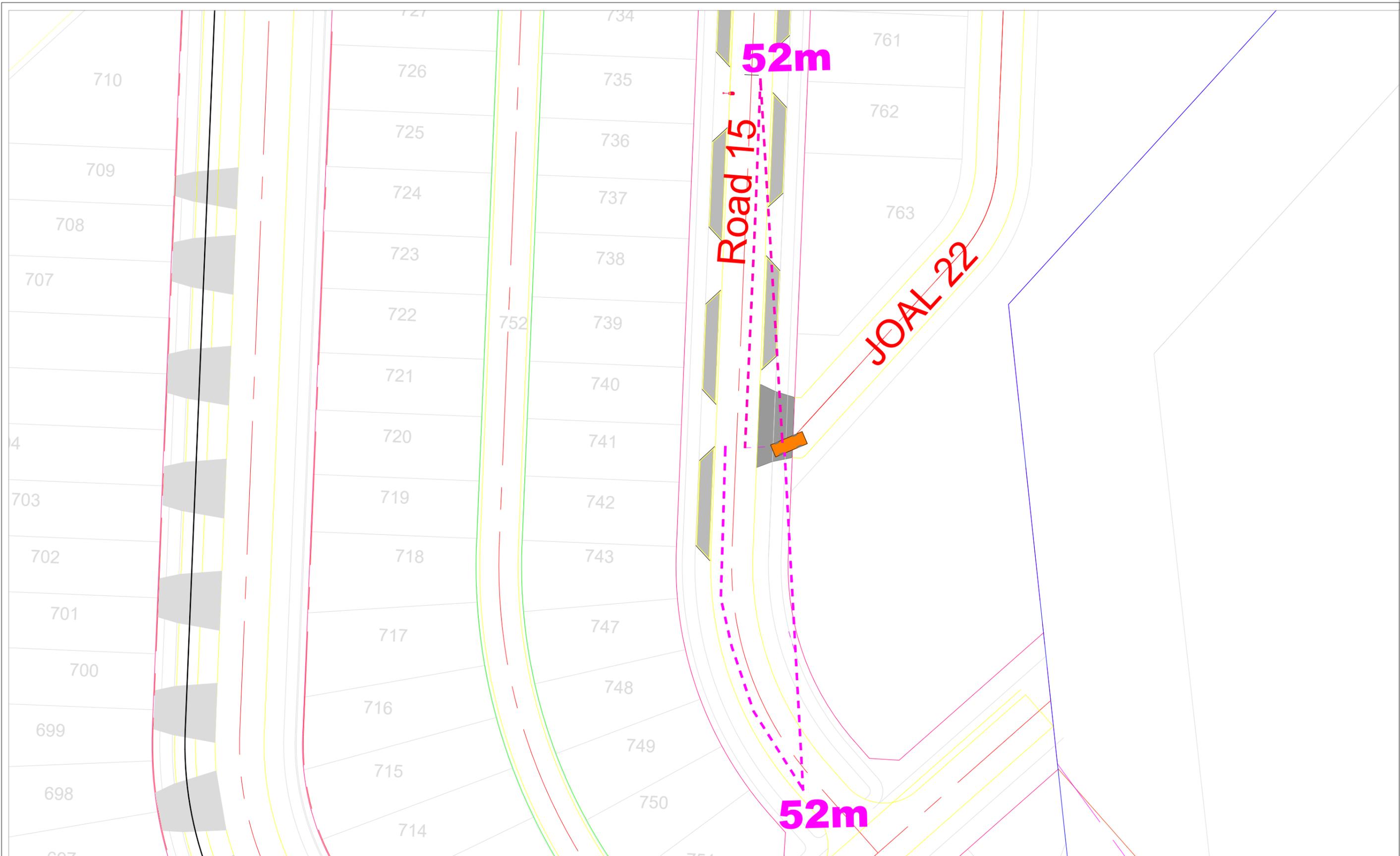
**Revision:**  
 A

**Client:**

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "M" - Road 15 / JOAL 28



Figure: 3BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.5

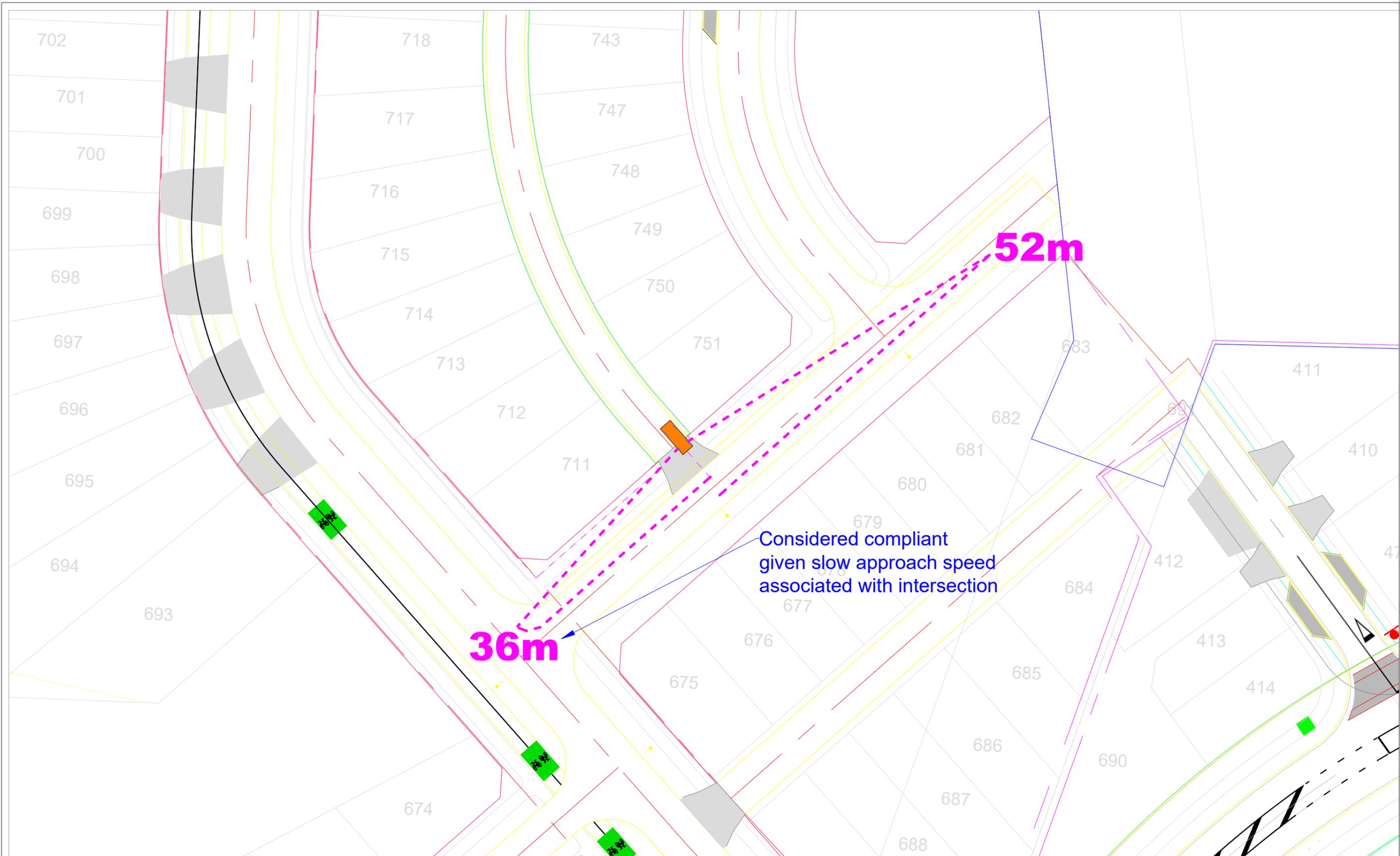
**Revision:**  
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**Client:**

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "N" - Road 15 / Road 22



**Figure:**  
 4BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Date:**  
 23 December 2025

**Scale @ A3:**  
 1:0.5

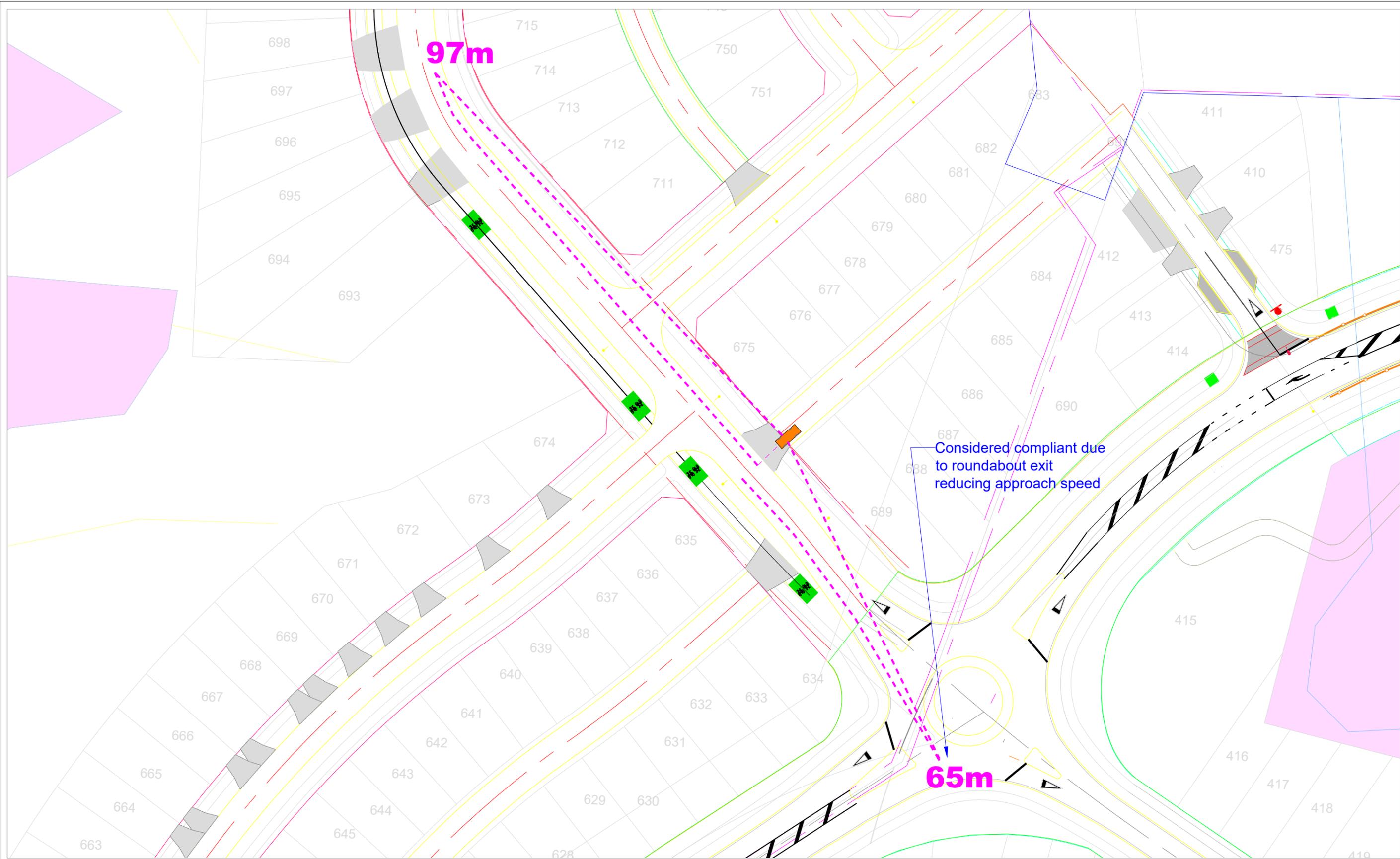
**Revision:**  
 A

**Client:**

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "O" - Road 07 / JOAL 28



**Figure:**  
 5BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 Sight Distance Assessment - Stage 2  
 Intersection "P" - Road 05 / JOAL 13

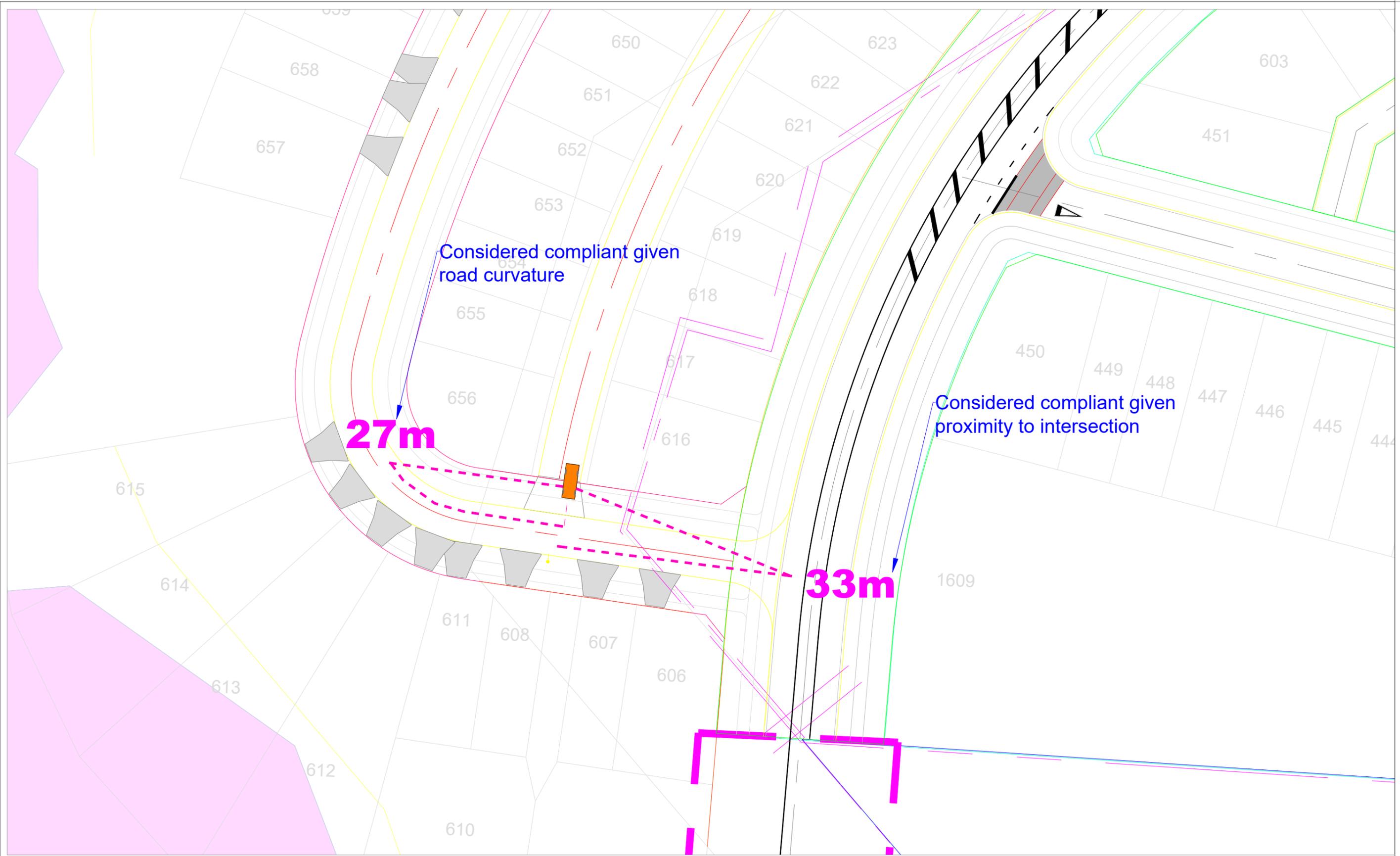
**Date:**  
 23 December 2025

**Scale @ A3:**  
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**Revision:**  
 A



**Figure:**  
 6BB



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "Q" - Road 12 / JOAL 11

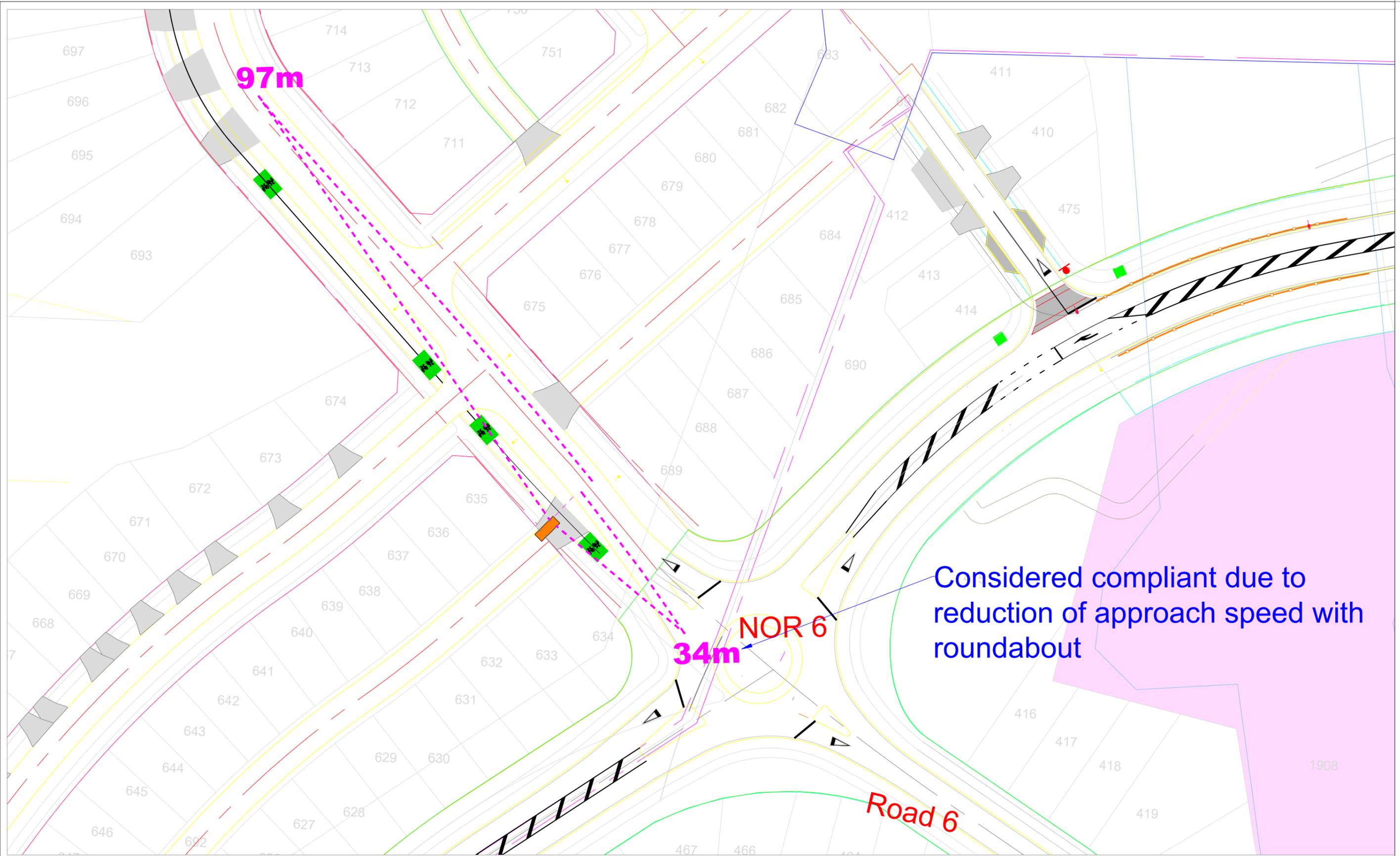
**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
7BB



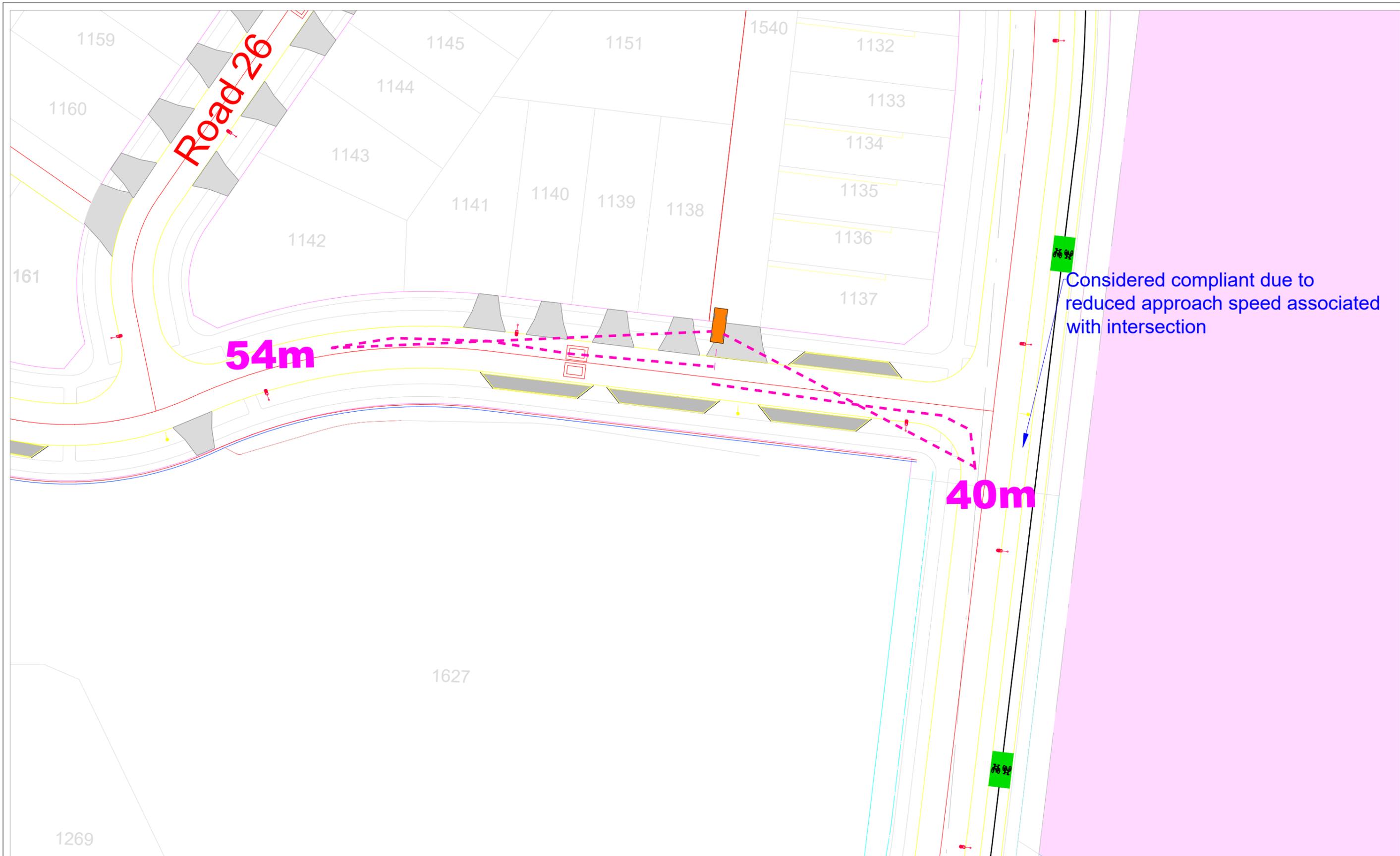
Revision notes:		
Rev:	Date:	Notes:

<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Sight Distance Assessment - Stage 2 Intersection "R" - Road 05 / JOAL 11

<b>Date:</b> 23 December 2025
<b>Scale @ A3:</b> 1:0.6667
<b>Revision:</b> A

<b>Figure:</b> 8BB
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Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
23 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A

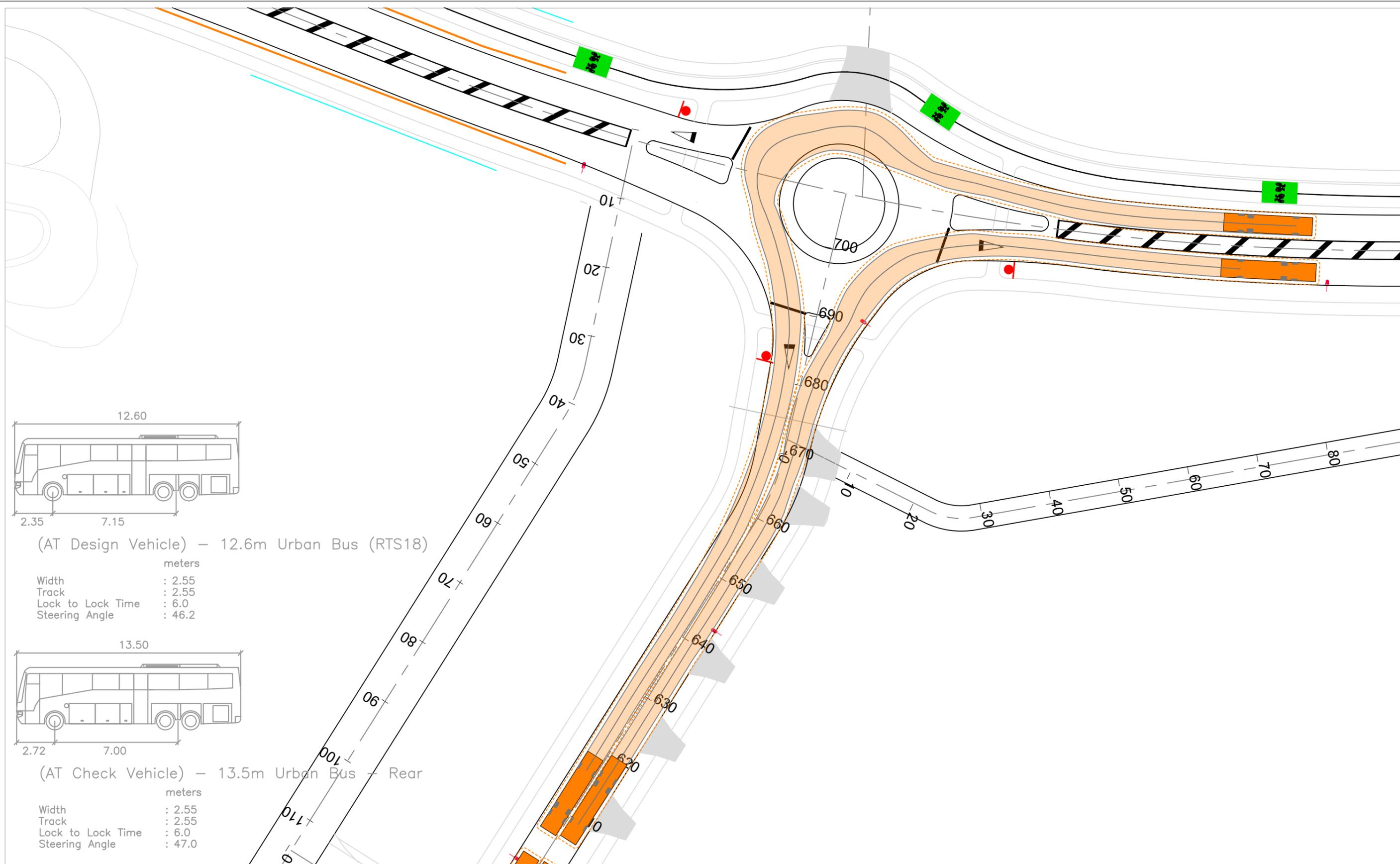
**Client:**

**Drawing Title:**  
Sight Distance Assessment - Stage 2  
Intersection "S" - Road 22 / JOAL 33



**Figure:**  
9BB

## APPENDIX F – VEHICLE TRACKING



**Revision notes:**

Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

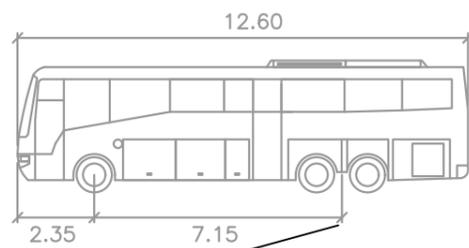
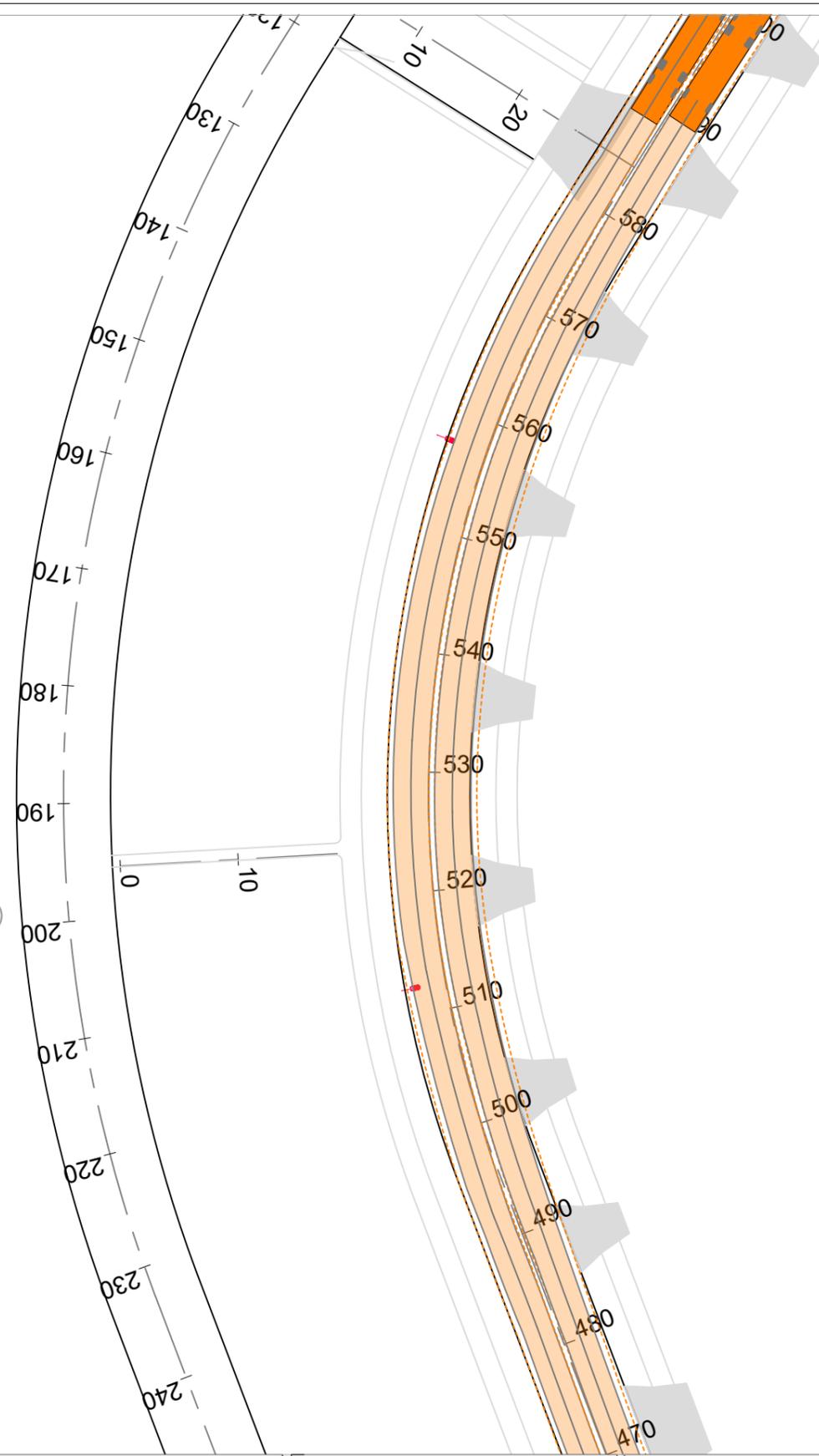
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Bus Tracking Road 1 / NoR6 Roundabout  
Intersection 1

**Date:**  
12/11/25

**Scale @ A3:**  
1:500

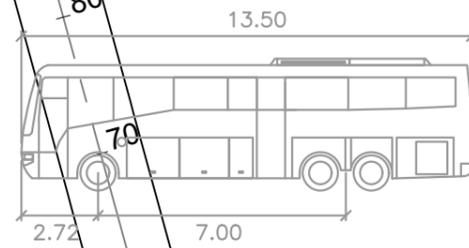
**Revision:**  
A





(AT Design Vehicle) – 12.6m Urban Bus (RTS18)

Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 46.2



(AT Check Vehicle) – 13.5m Urban Bus – Rear

Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

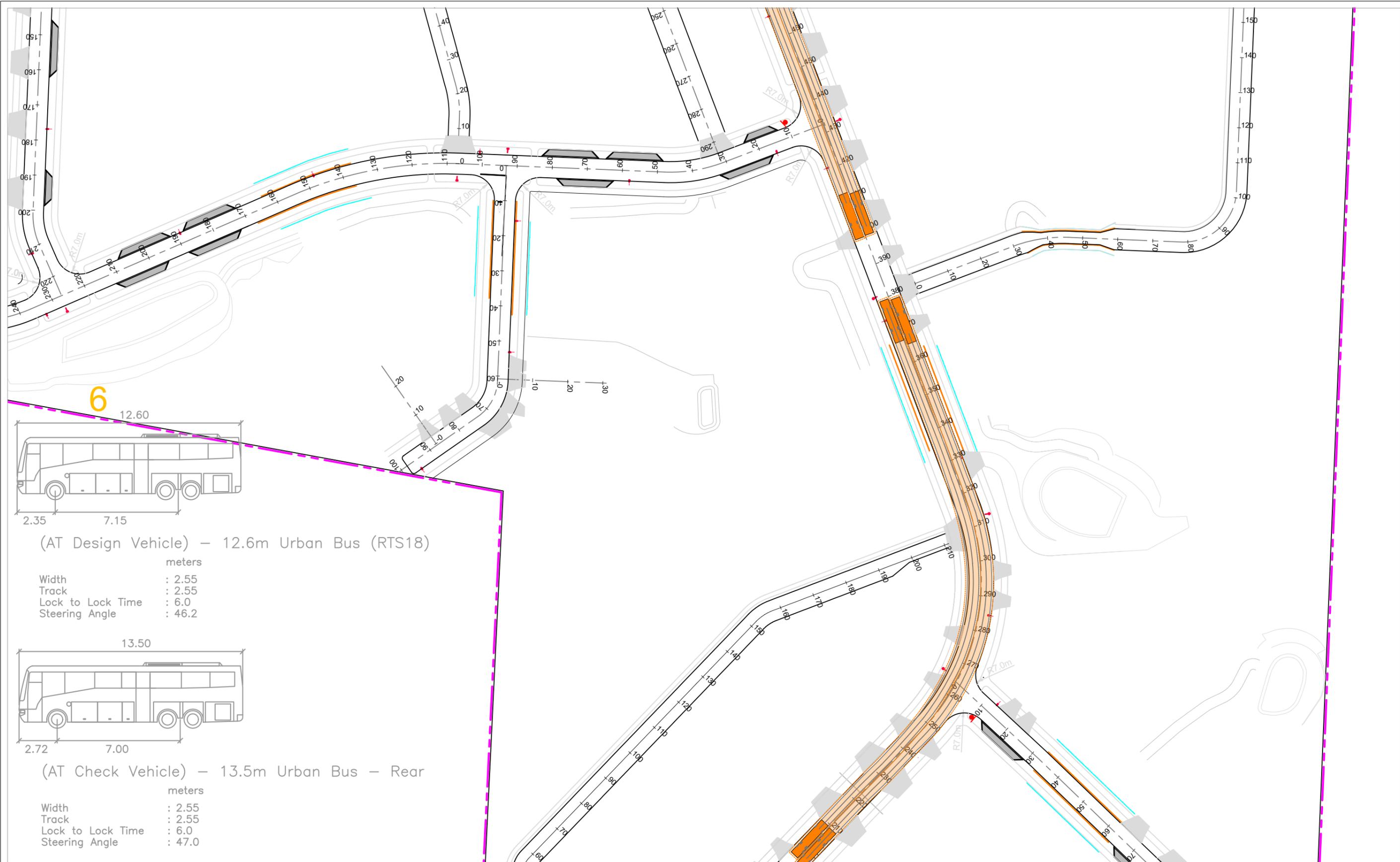
Revision notes:		
Rev:	Date:	Notes:

<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Bus Tracking Road 1 12.6m vs 13.6m Bus Midblock

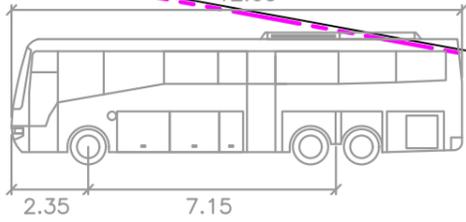
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<b>Revision:</b> A





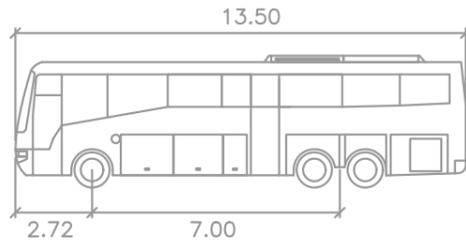
6

12.60



(AT Design Vehicle) – 12.6m Urban Bus (RTS18)

- Width : 2.55 meters
- Track : 2.55
- Lock to Lock Time : 6.0
- Steering Angle : 46.2



(AT Check Vehicle) – 13.5m Urban Bus – Rear

- Width : 2.55 meters
- Track : 2.55
- Lock to Lock Time : 6.0
- Steering Angle : 47.0

Revision notes:

Rev:	Date:	Notes:

Drawn by:

HA  
J003135

Client:

Project:

Delmore, Orewa  
Proposed Residential Development

Drawing Title:

Bus Tracking Road 1  
12.6m vs 13.6m Bus Midblock

Date:

12/11/25

Scale @ A3:

1:1000

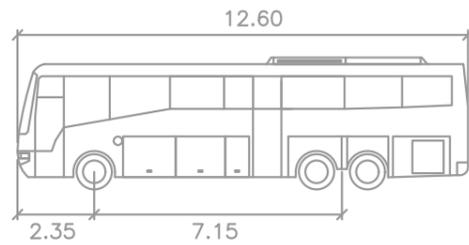
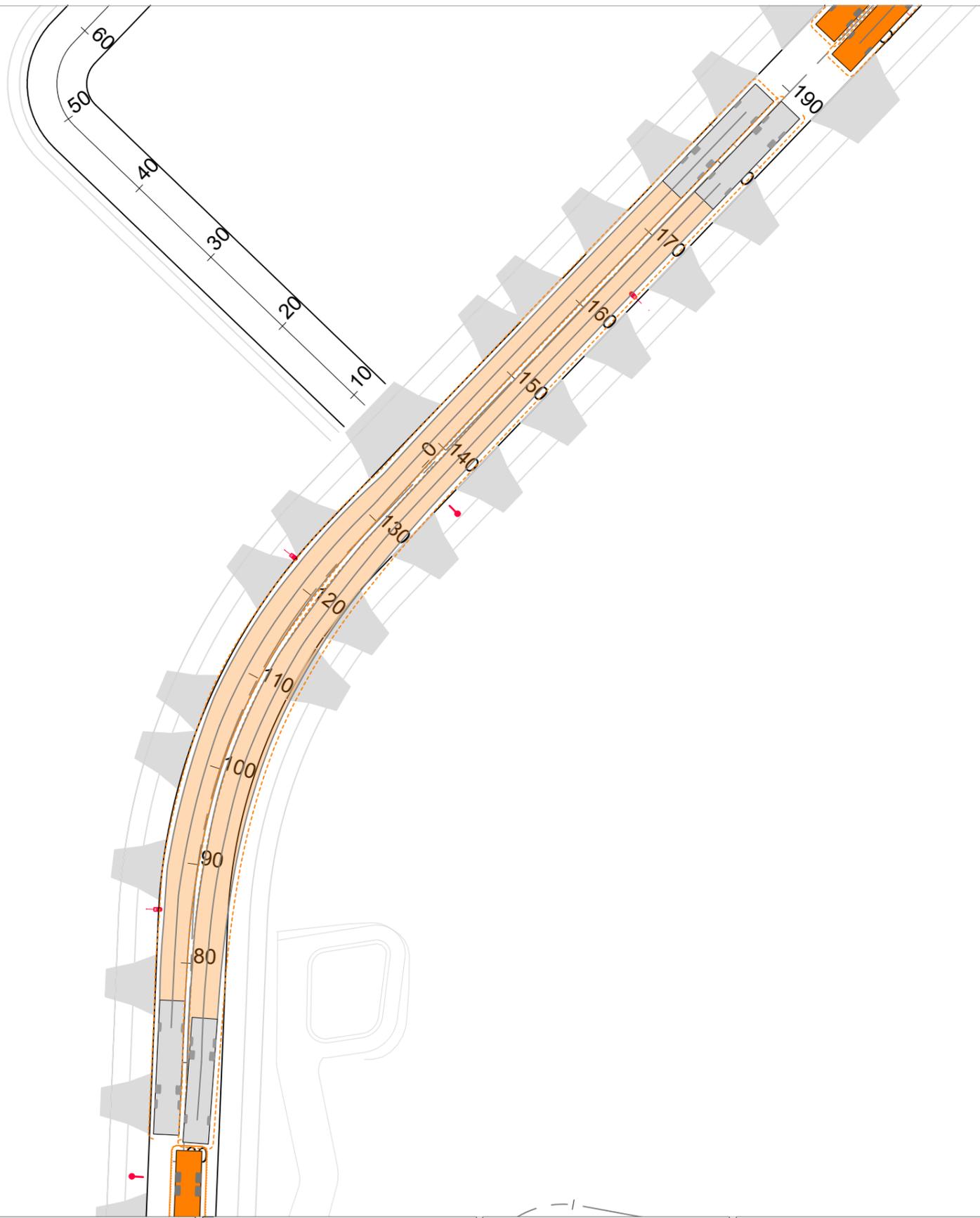
Revision:

A



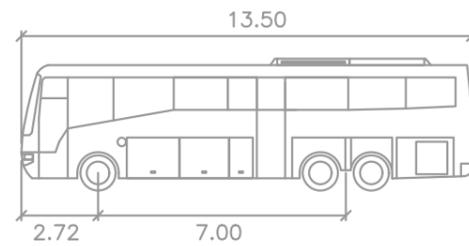
Figure:

3



(AT Design Vehicle) – 12.6m Urban Bus (RTS18)

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 46.2



(AT Check Vehicle) – 13.5m Urban Bus – Rear

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:

Rev:	Date:	Notes:

Drawn by:

HA  
 J003135

Client:

Project:

Delmore, Orewa  
 Proposed Residential Development

Drawing Title:

Bus Tracking Road 1  
 12.6m vs 13.6m Bus Midblock

Date:

12/11/25

Scale @ A3:

1:1000

Revision:

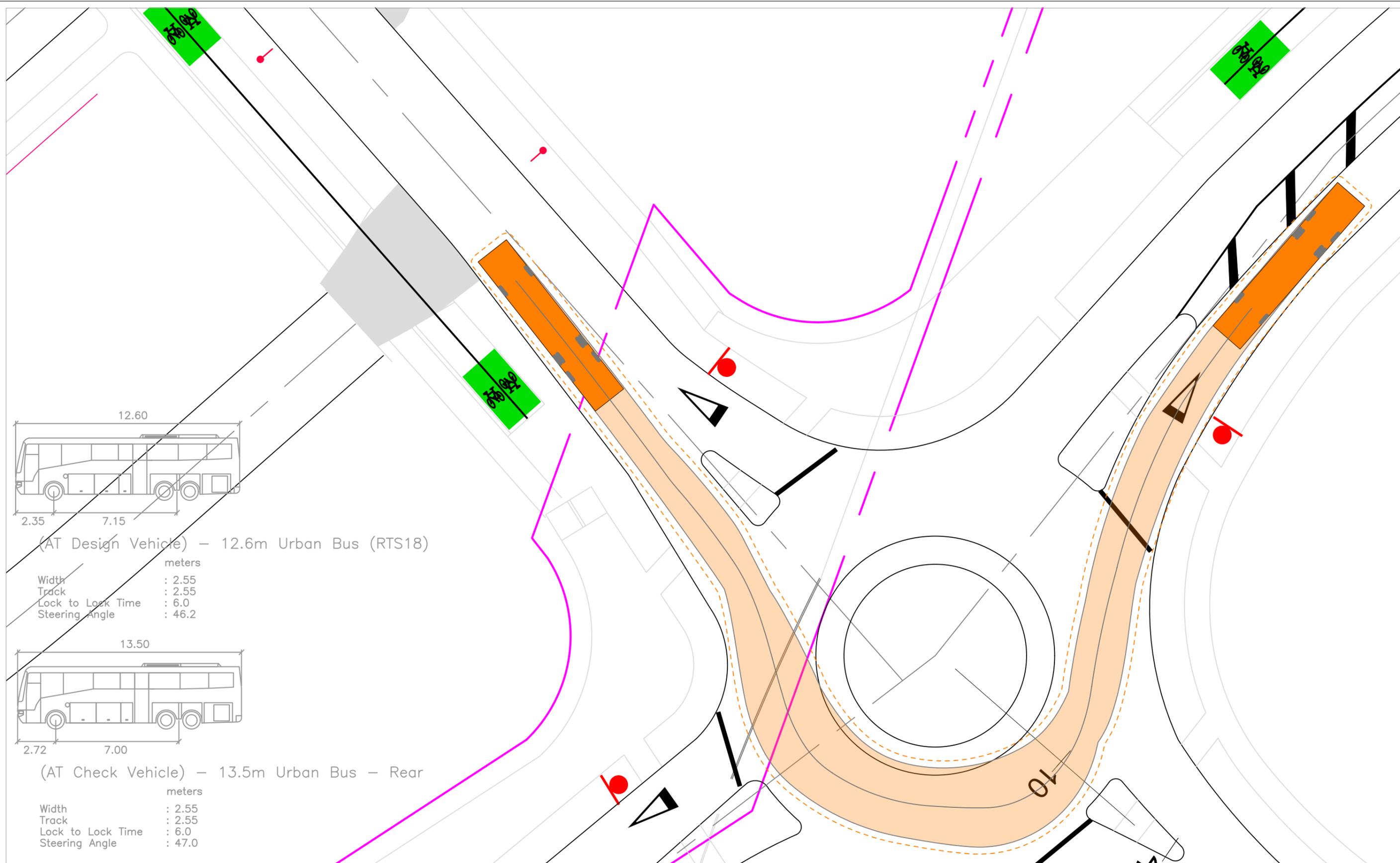
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Figure:

4





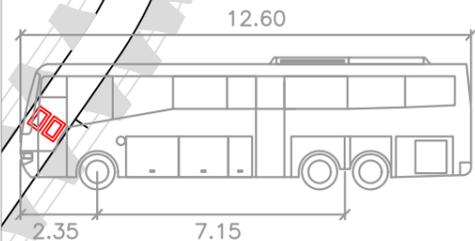
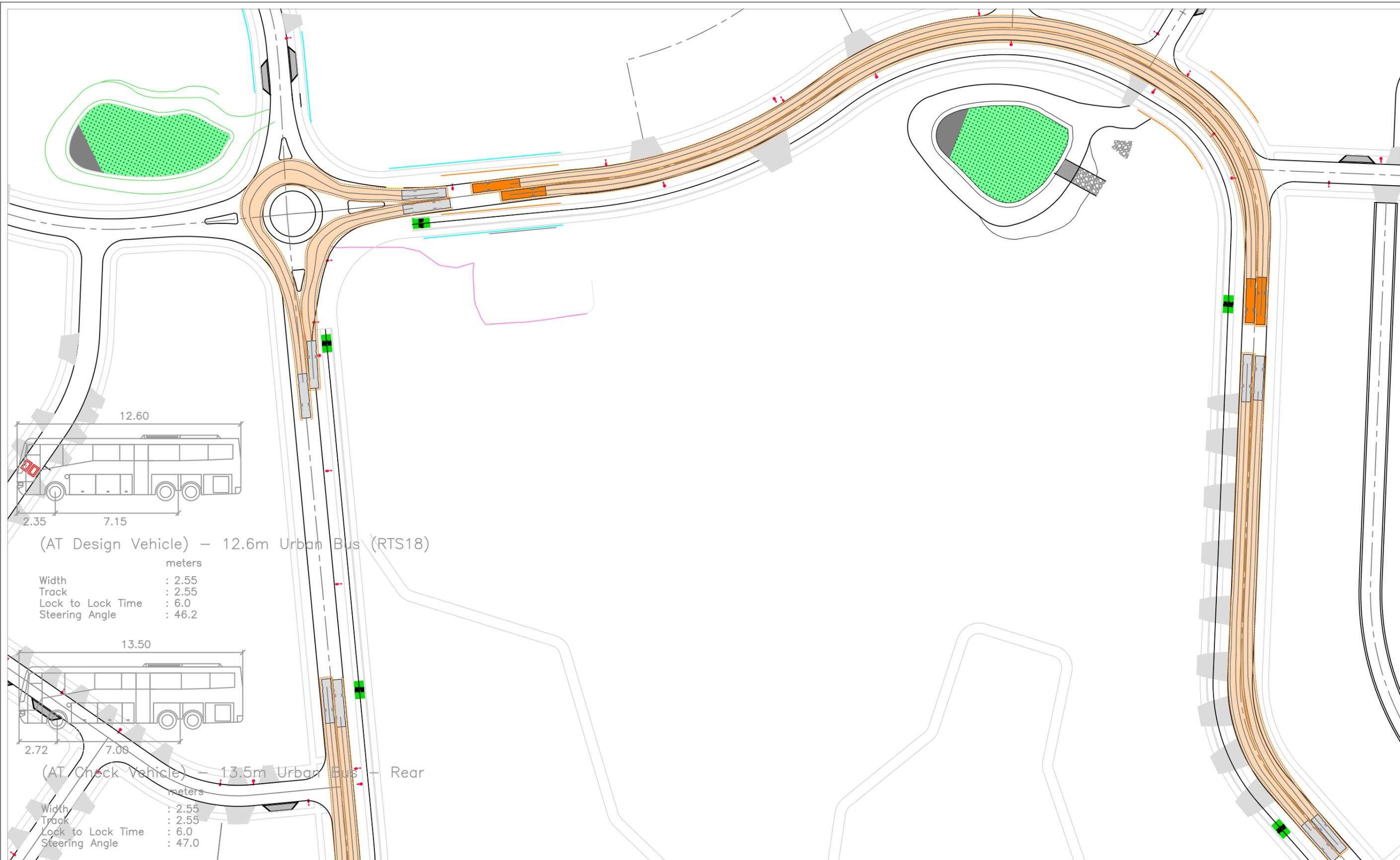
Revision notes:		
Rev:	Date:	Notes:

<b>Drawn by:</b> HA J003135	<b>Client:</b>
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<b>Project:</b> Delmore, Orewa Proposed Residential Development	<b>Drawing Title:</b> Bus Tracking NoR6 / Road 5 12.6m vs 13.6m Bus Midblock
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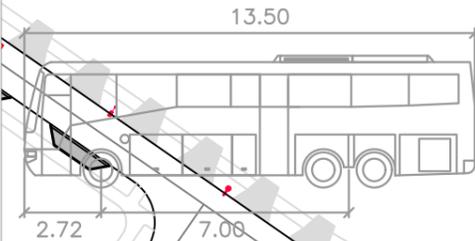
<b>Date:</b> 12/11/25	<b>Scale @ A3:</b> 1:1000
<b>Revision:</b> A	





(AT Design Vehicle) – 12.6m Urban Bus (RTS18)

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 46.2



(AT Check Vehicle) – 13.5m Urban Bus – Rear

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

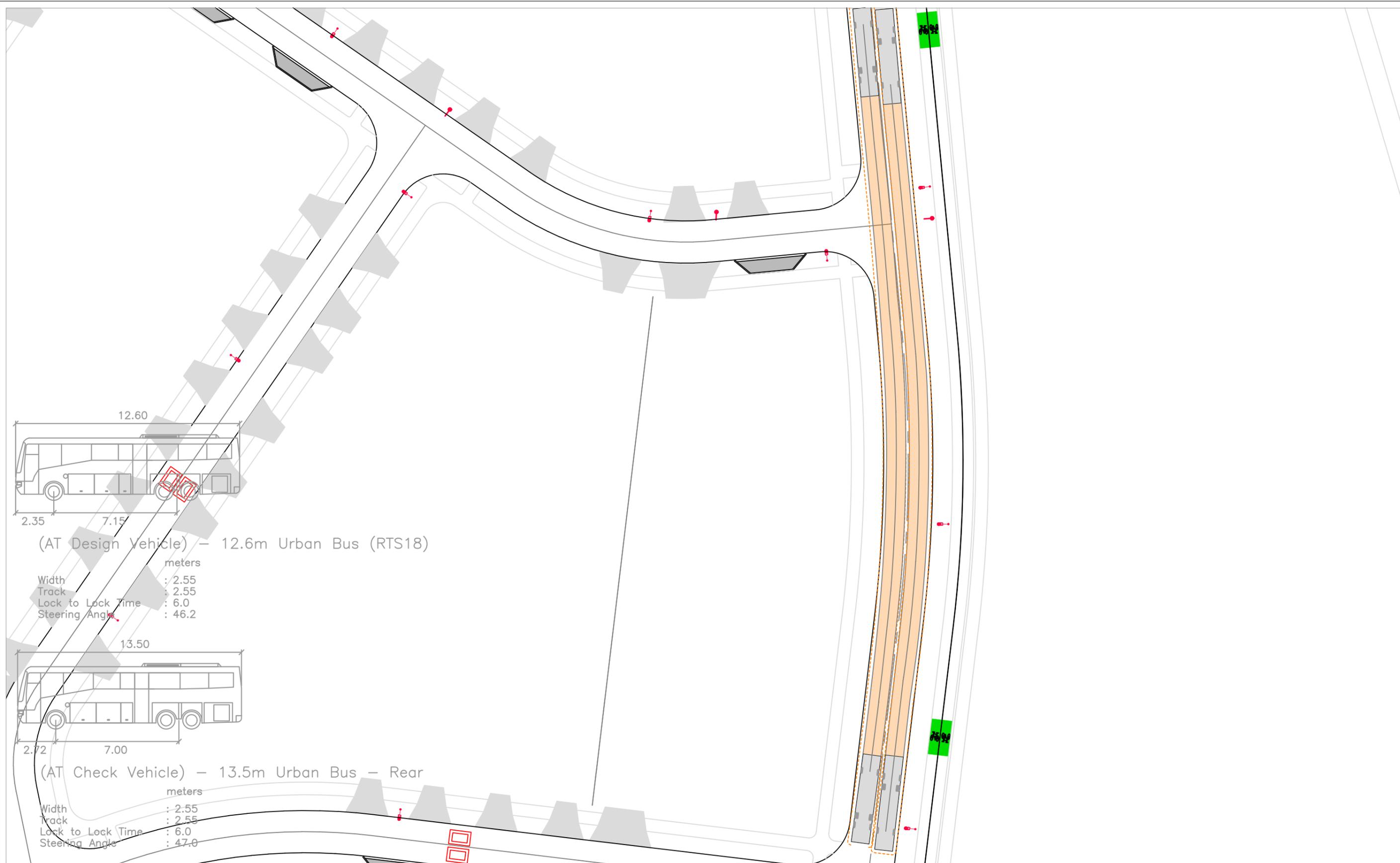
Revision notes:		
Rev:	Date:	Notes:

<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Bus Tracking Road 5 12.6m vs 13.6m Bus Midblock

<b>Date:</b> 12/11/25
<b>Scale @ A3:</b> 1:1000
<b>Revision:</b> A





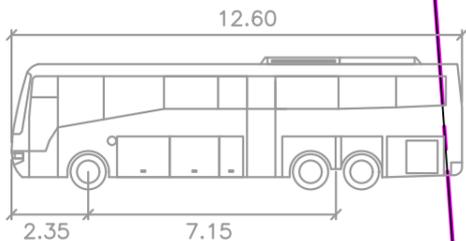
Revision notes:		
Rev:	Date:	Notes:

<b>Drawn by:</b> HA J003135	<b>Client:</b>  
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<b>Project:</b> Delmore, Orewa Proposed Residential Development	<b>Drawing Title:</b> Bus Tracking Road 17 12.6m vs 13.6m Bus Midblock
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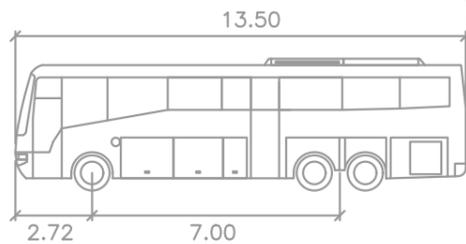
<b>Date:</b> 12/11/25	<b>Scale @ A3:</b> 1:1000
<b>Revision:</b> A	





(AT Design Vehicle) – 12.6m Urban Bus (RTS18)

- meters
- Width : 2.55
  - Track : 2.55
  - Lock to Lock Time : 6.0
  - Steering Angle : 46.2



(AT Check Vehicle) – 13.5m Urban Bus – Rear

- meters
- Width : 2.55
  - Track : 2.55
  - Lock to Lock Time : 6.0
  - Steering Angle : 47.0

Revision notes:

Rev:	Date:	Notes:

Drawn by:

HA  
J003135

Client:

Project:

Delmore, Orewa  
Proposed Residential Development

Drawing Title:

Bus Tracking Road 17  
12.6m vs 13.6m Bus Midblock

Date:

12/11/25

Scale @ A3:

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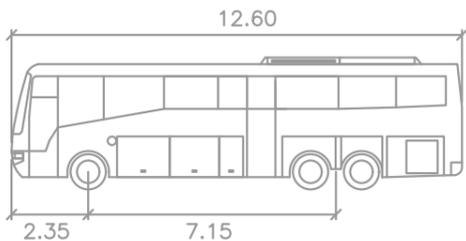
Revision:

A



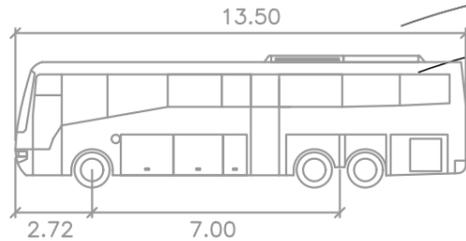
Figure:

9



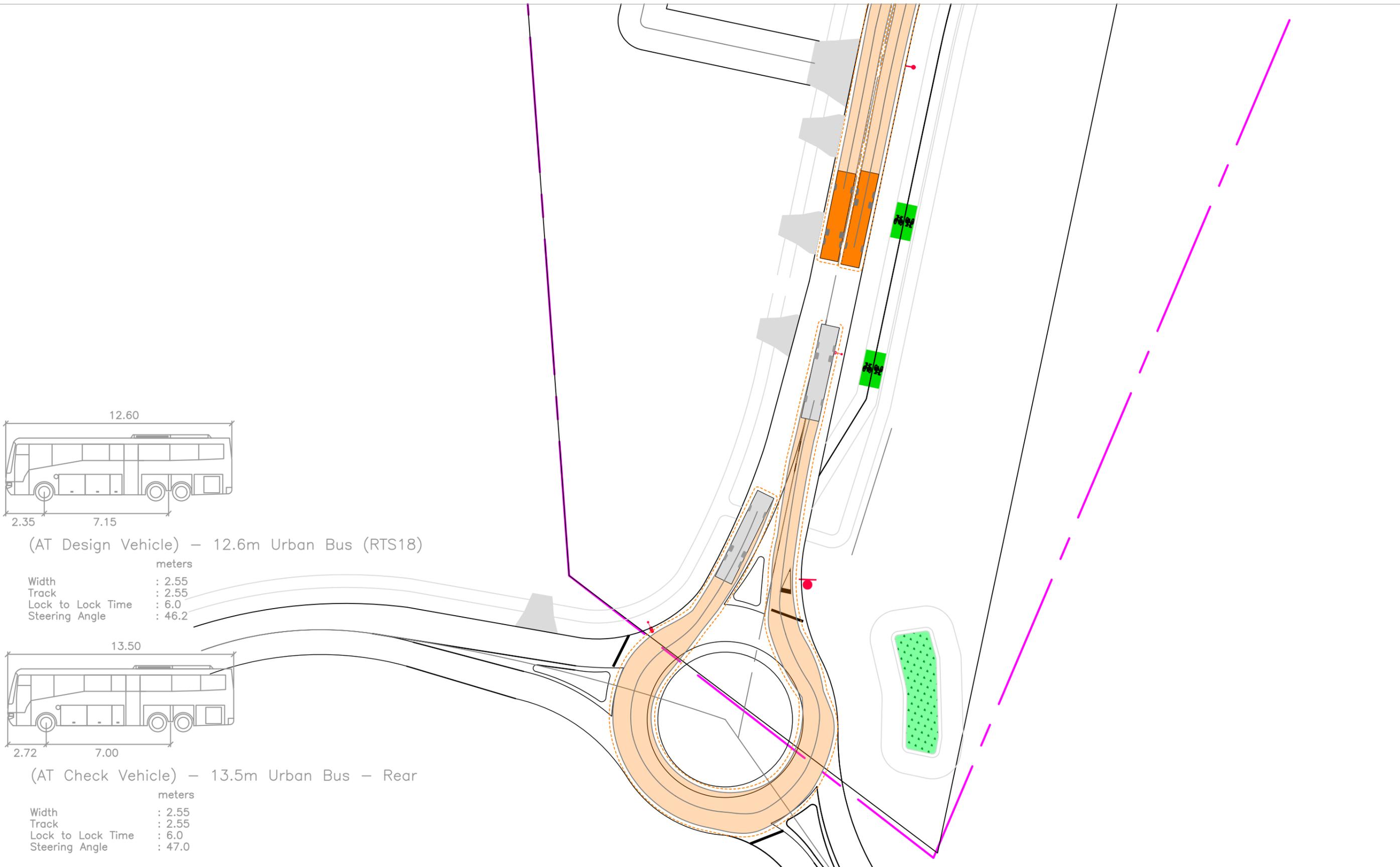
(AT Design Vehicle) – 12.6m Urban Bus (RTS18)

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 46.2



(AT Check Vehicle) – 13.5m Urban Bus – Rear

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0



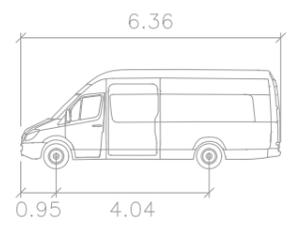
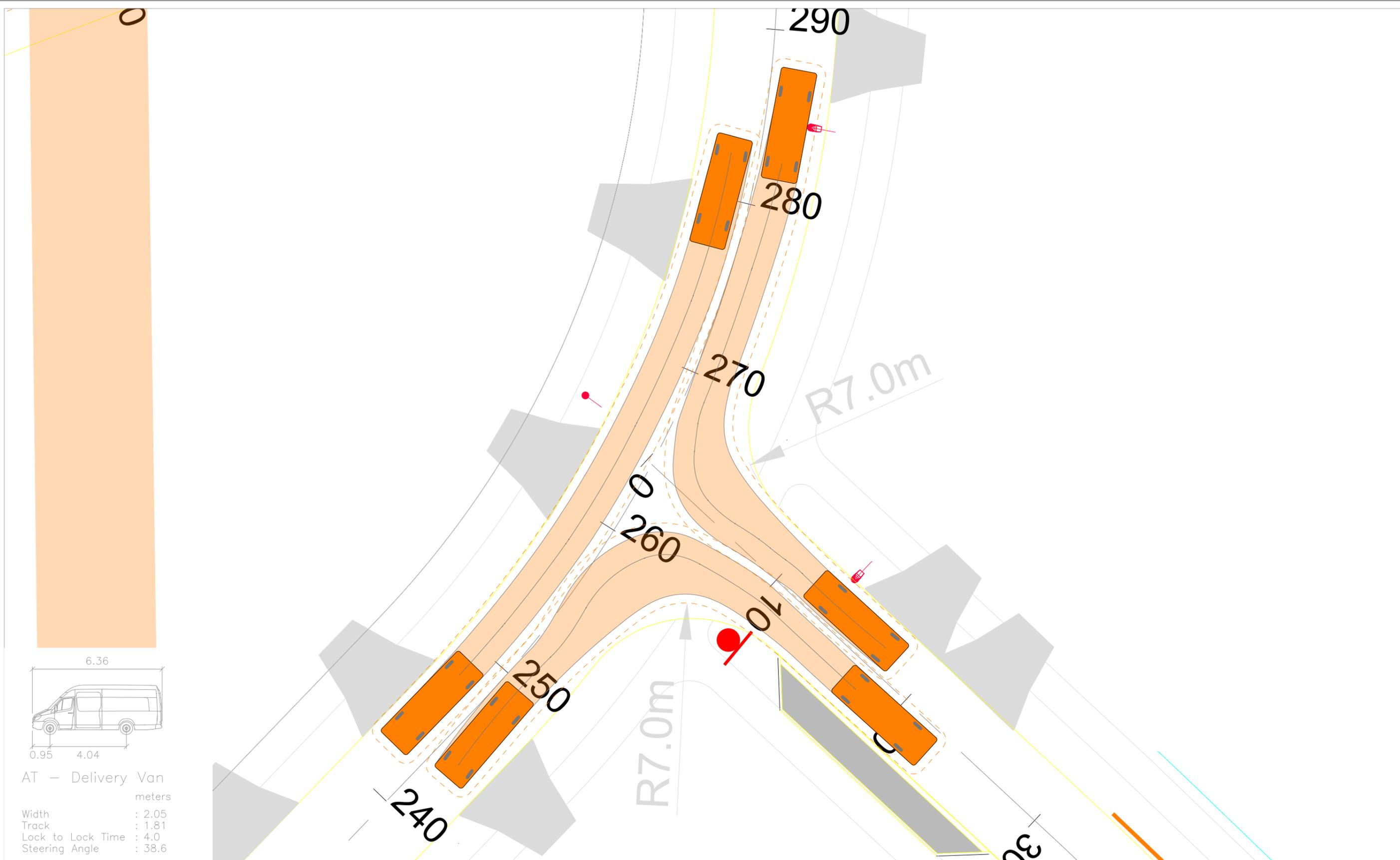
Revision notes:		
Rev:	Date:	Notes:

<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> Bus Tracking Road 17 12.6m vs 13.6m Bus Midblock

<b>Date:</b> 12/11/25
<b>Scale @ A3:</b> 1:1000
<b>Revision:</b> A





AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 1 / Road 8

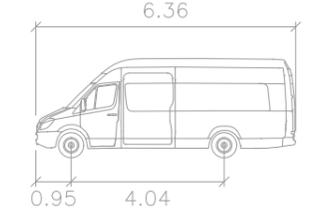
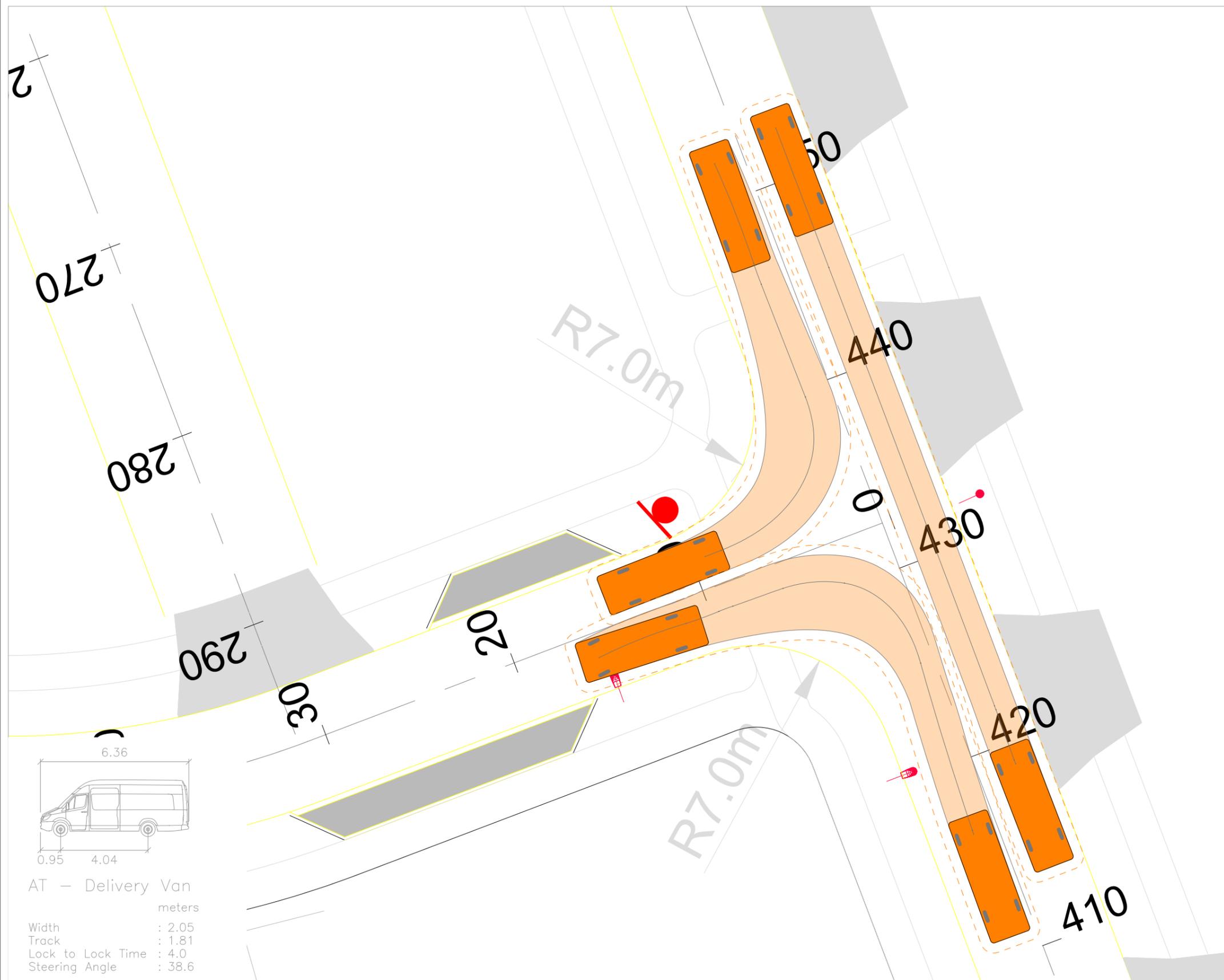
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 1A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 1 / Road 2

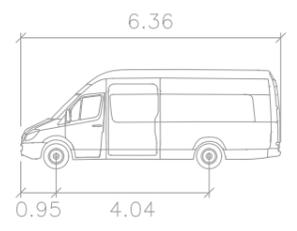
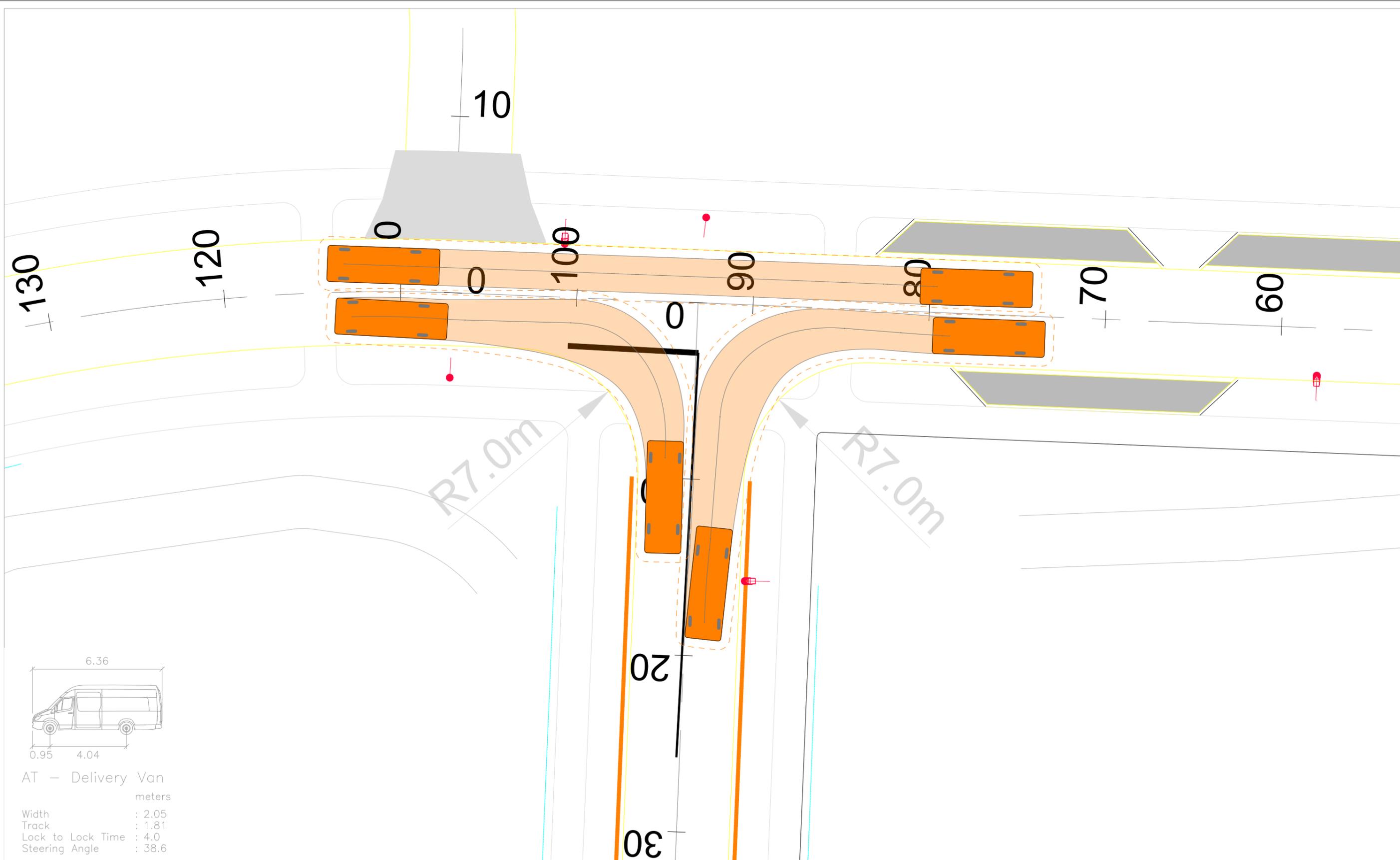
**Date:**  
 22 December 2025

**Scale @ A3:**  
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**Revision:**  
 A



**Figure:**  
 2A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 2 / Road 10

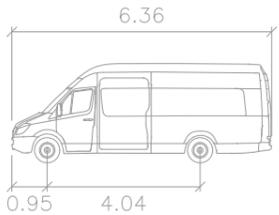
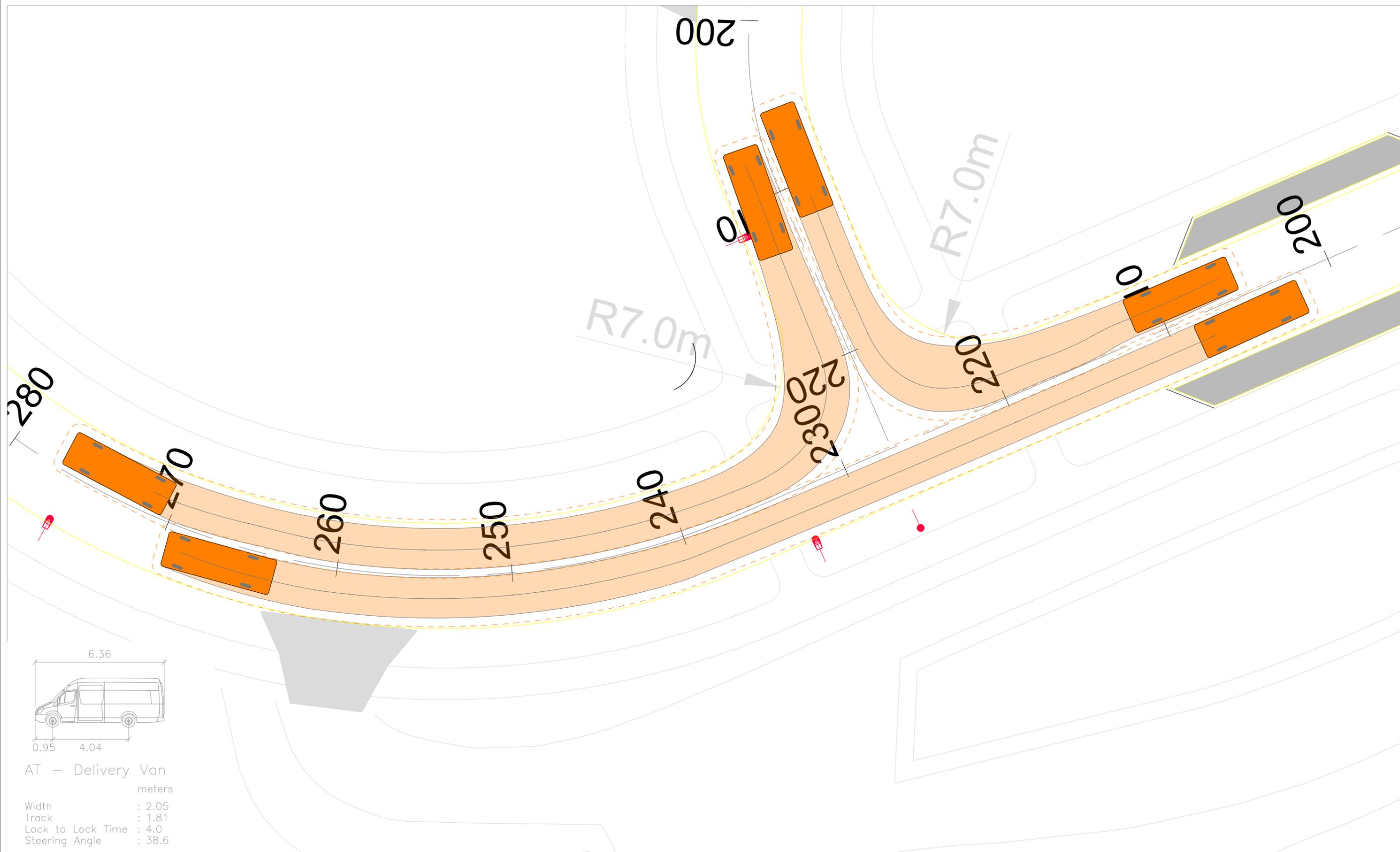
**Date:**  
 22 December 2025

**Scale @ A3:**  
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**Revision:**  
 A



**Figure:**  
 3A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 2 / Road 4 Southern

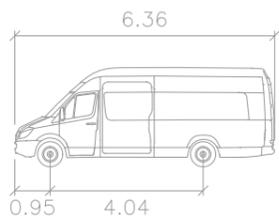
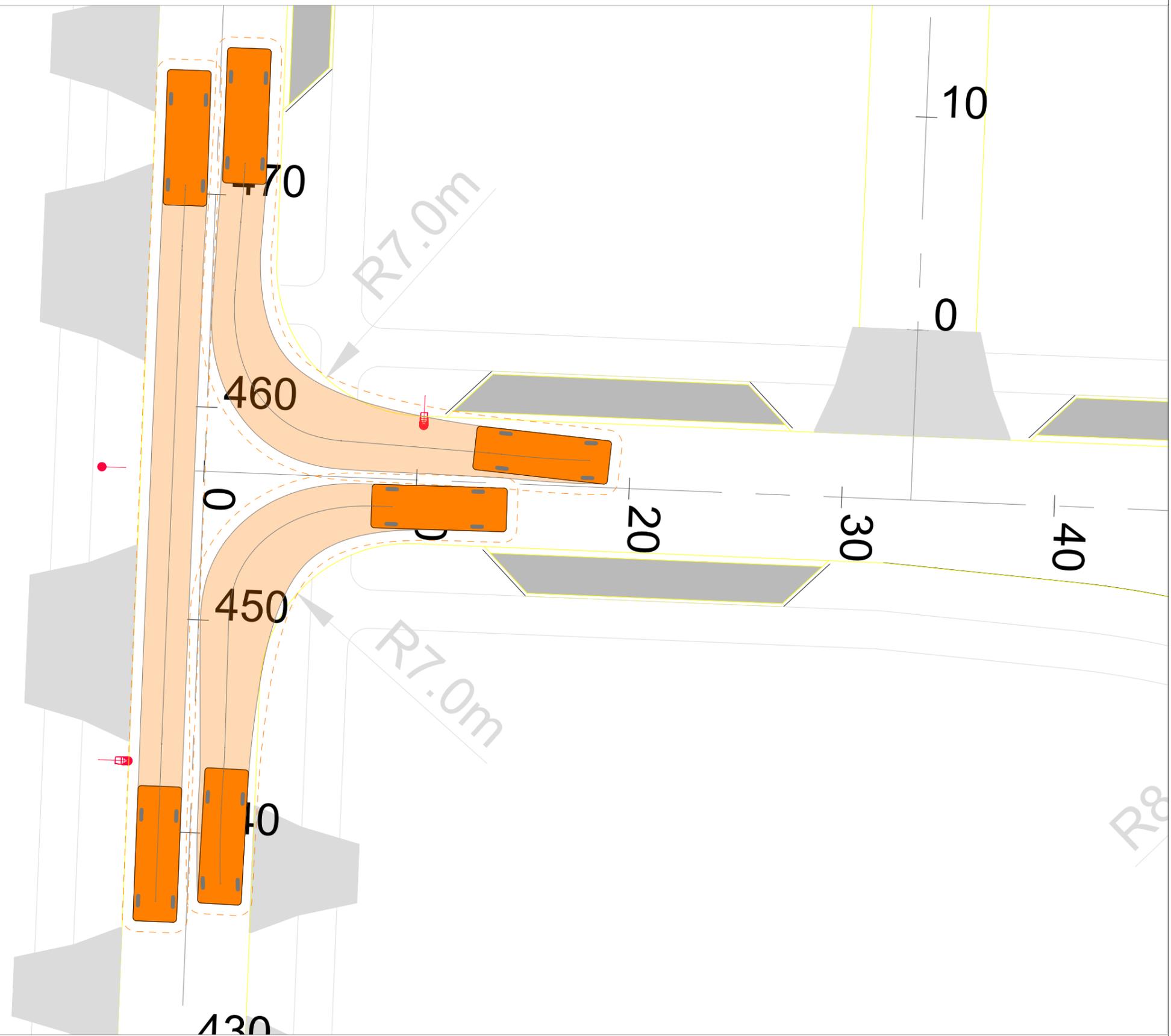
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 4A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

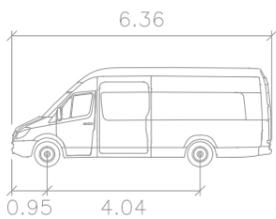
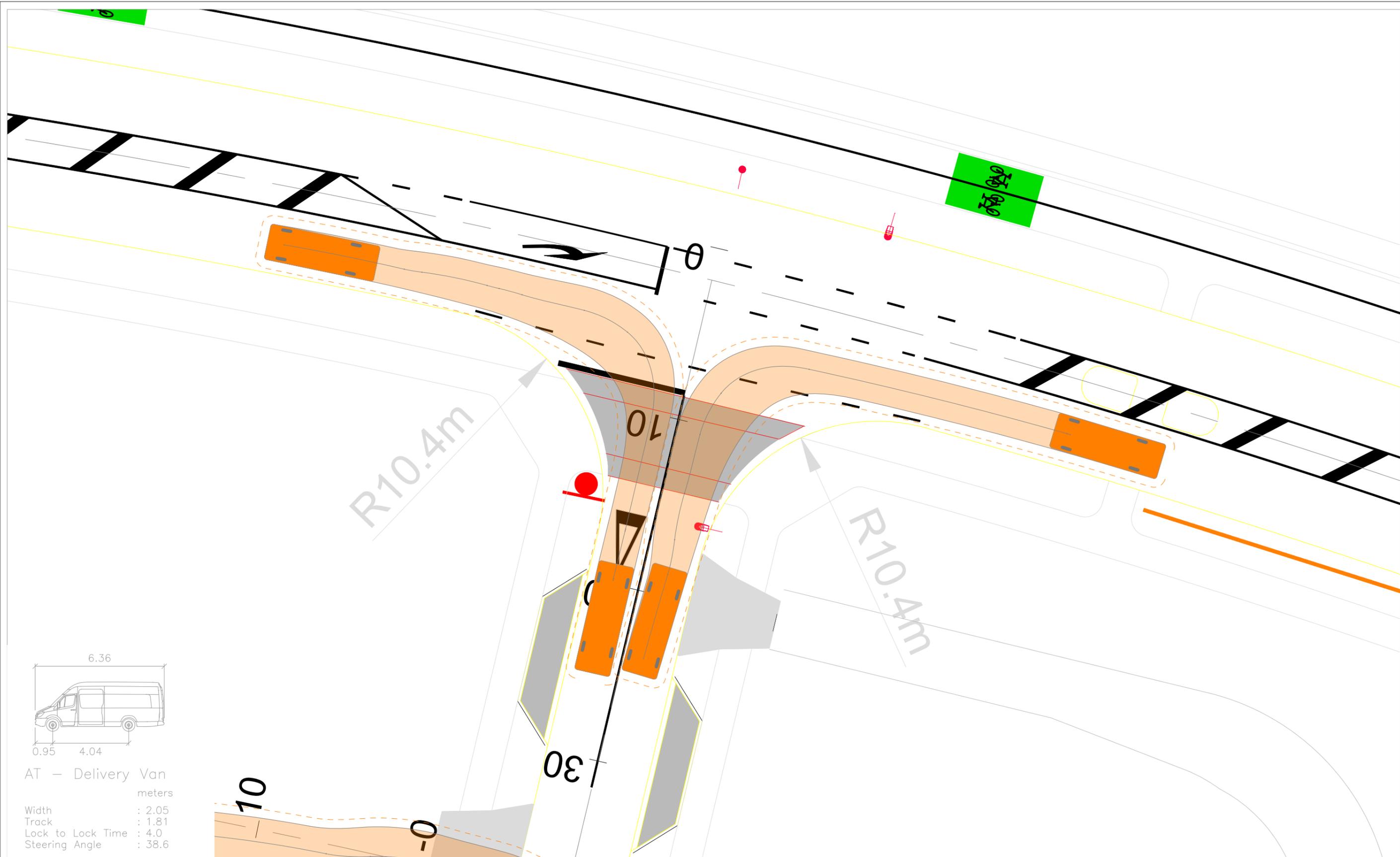
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT Intersection - Road 2 / Road 4 Northern

<b>Date:</b> 22 December 2025
<b>Scale @ A3:</b> 1:0.2
<b>Revision:</b> A



Figure:  
5A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

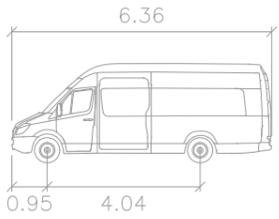
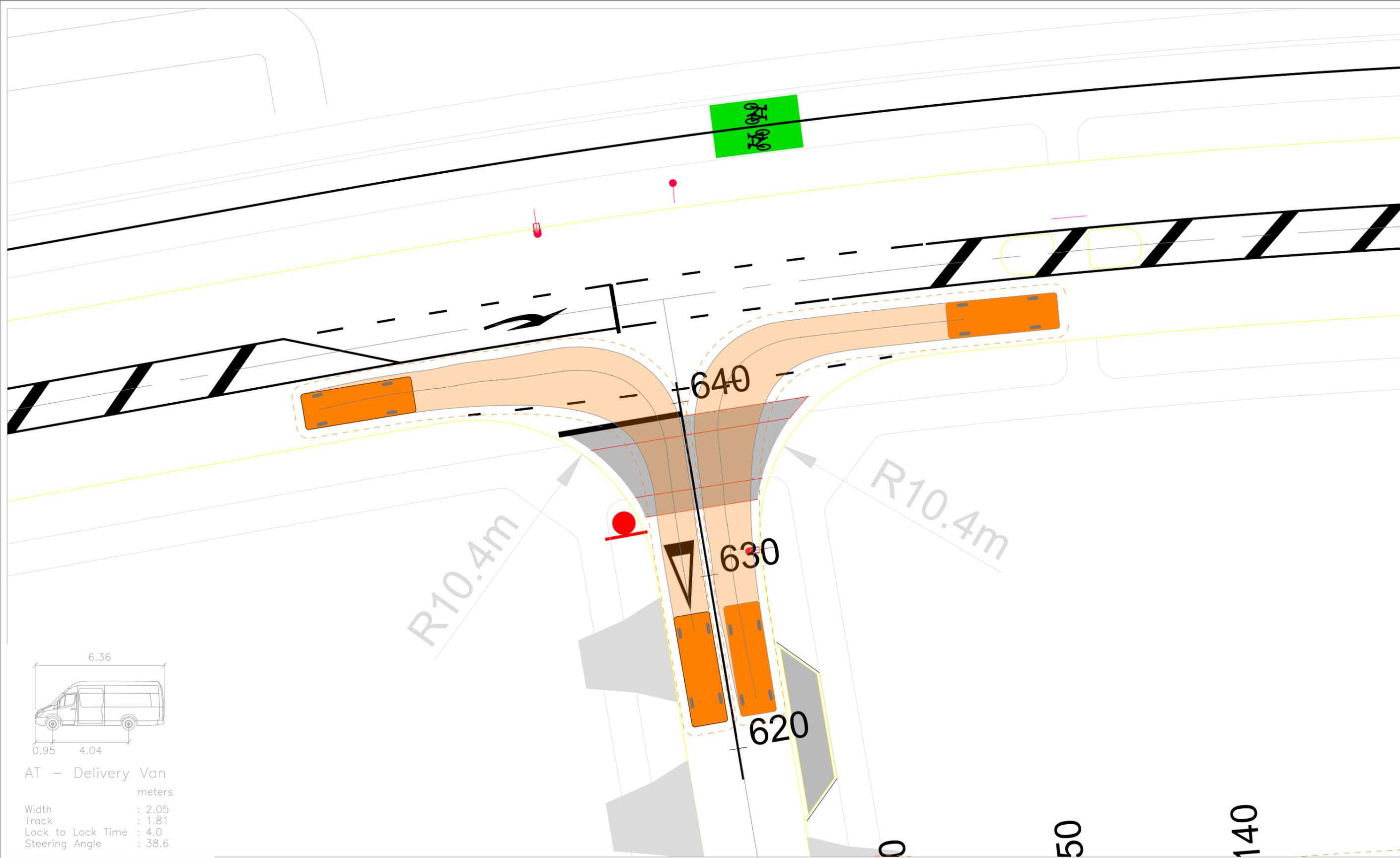
Revision notes:		
Rev:	Date:	Notes:

<b>Drawn by:</b> HA J003135	<b>Client:</b>
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<b>Project:</b> Delmore, Orewa Proposed Residential Development	<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT Intersection - Road 3 / NoR6
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<b>Date:</b> 22 December 2025	<b>Scale @ A3:</b> 1:0.2
<b>Revision:</b> A	

**Figure:**  
6A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

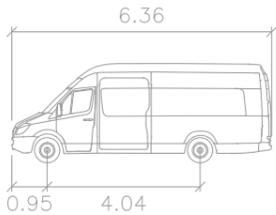
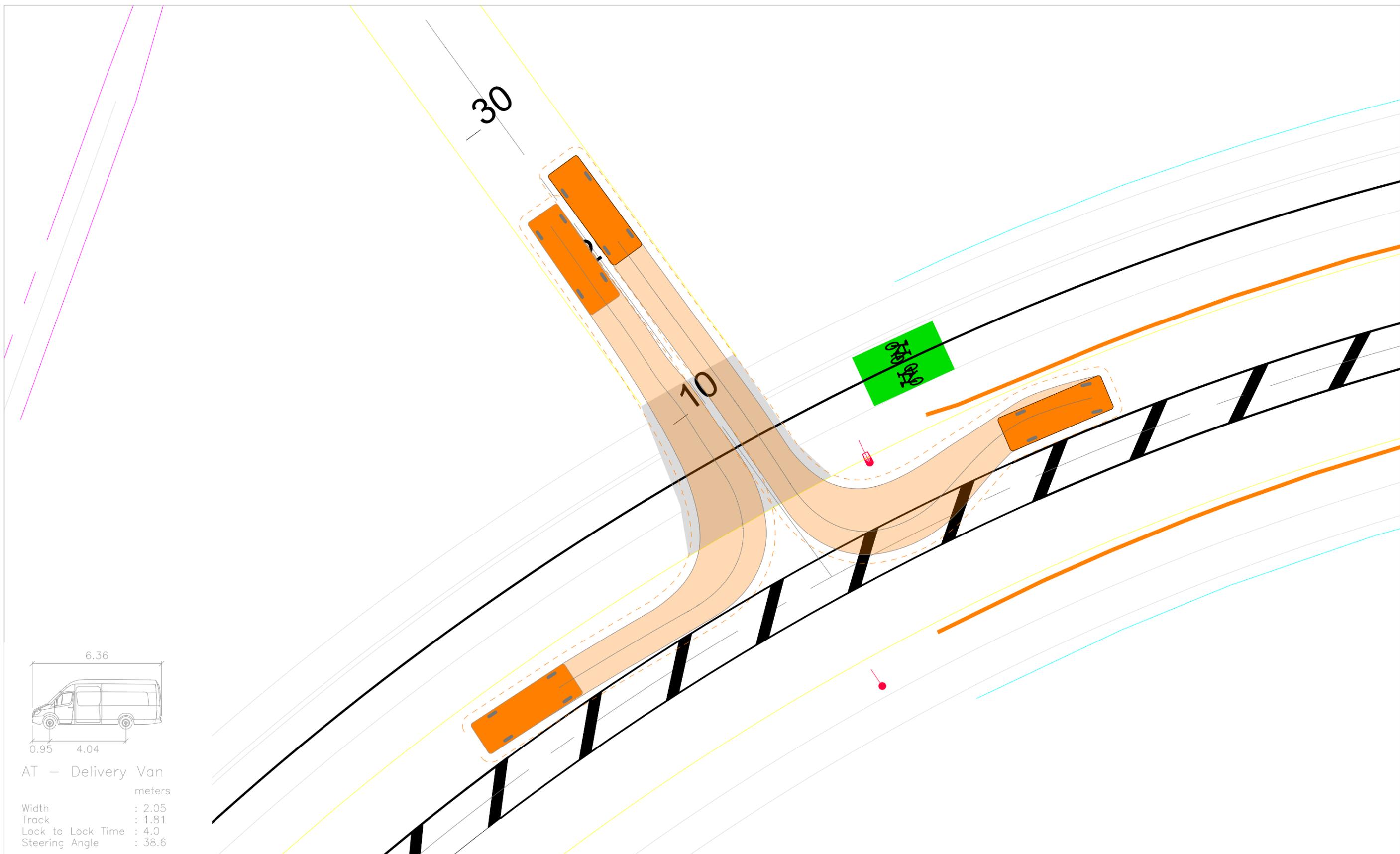
**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 2 / NoR6

**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A

**Figure:**  
 7A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road X / NoR6

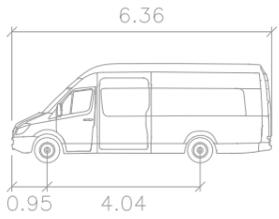
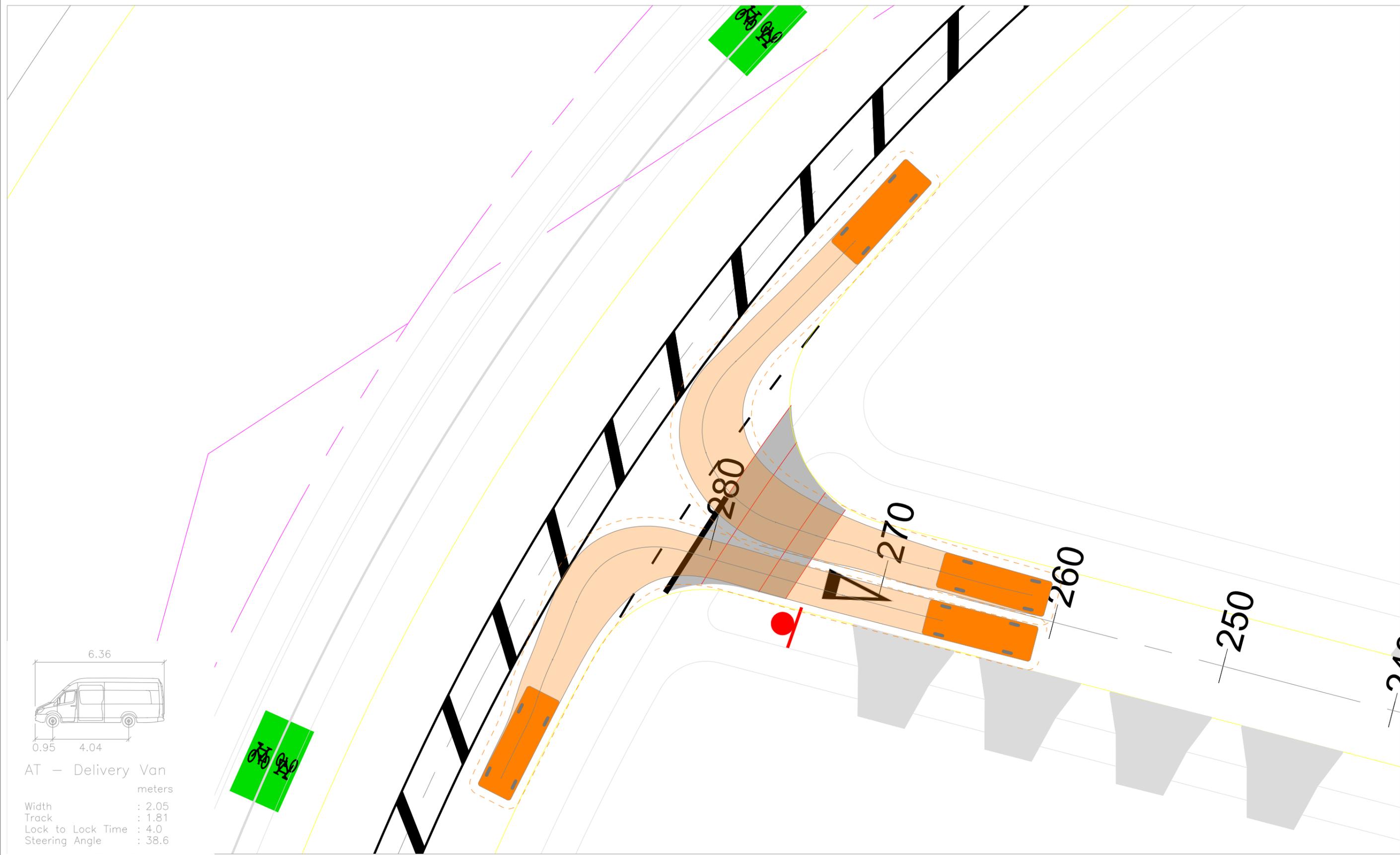
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 8A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 6 / NoR6

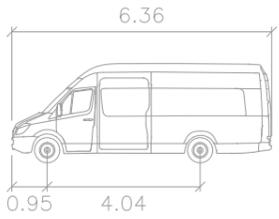
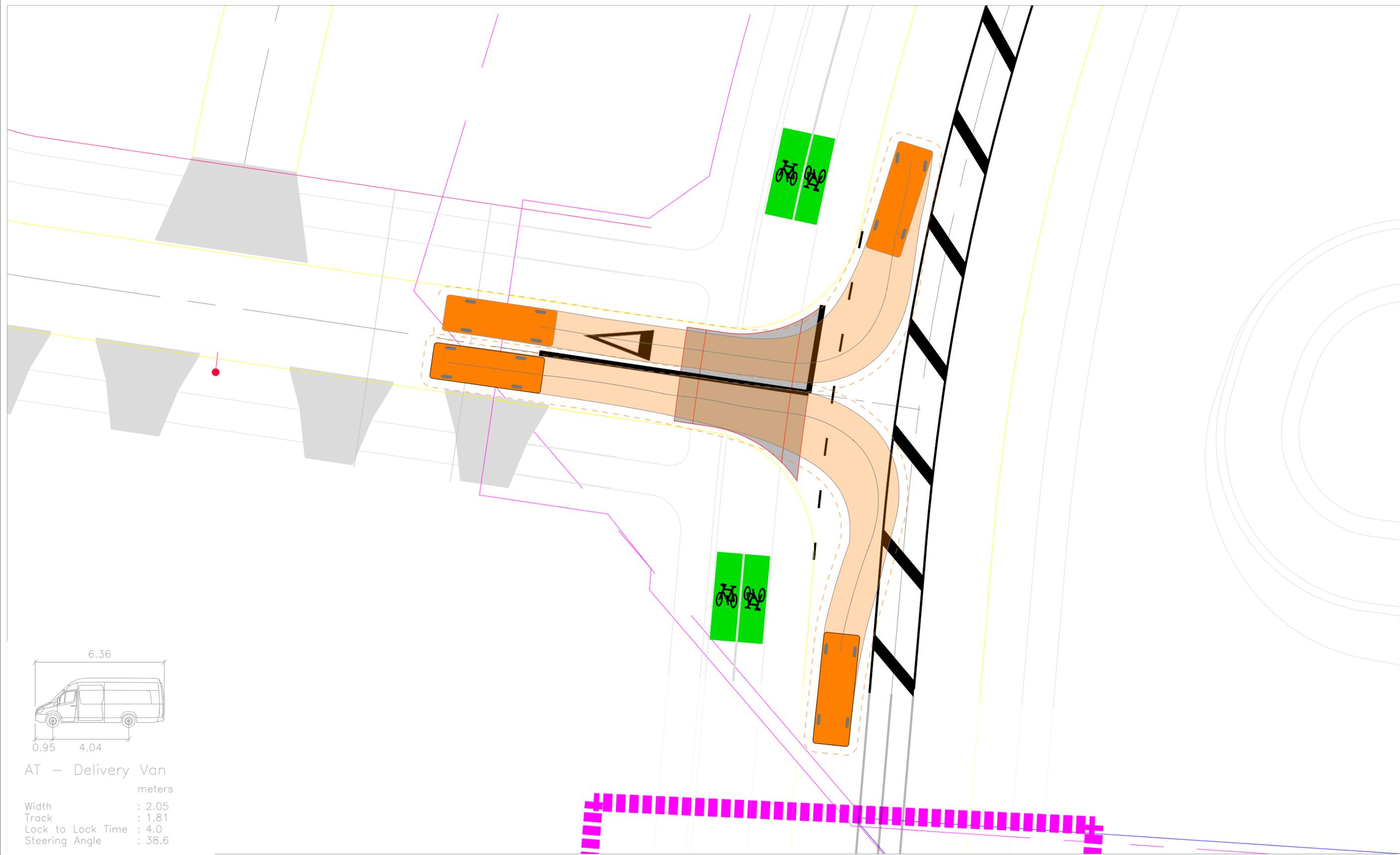
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 9A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 12 / NoR6

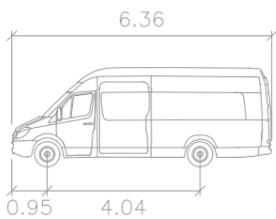
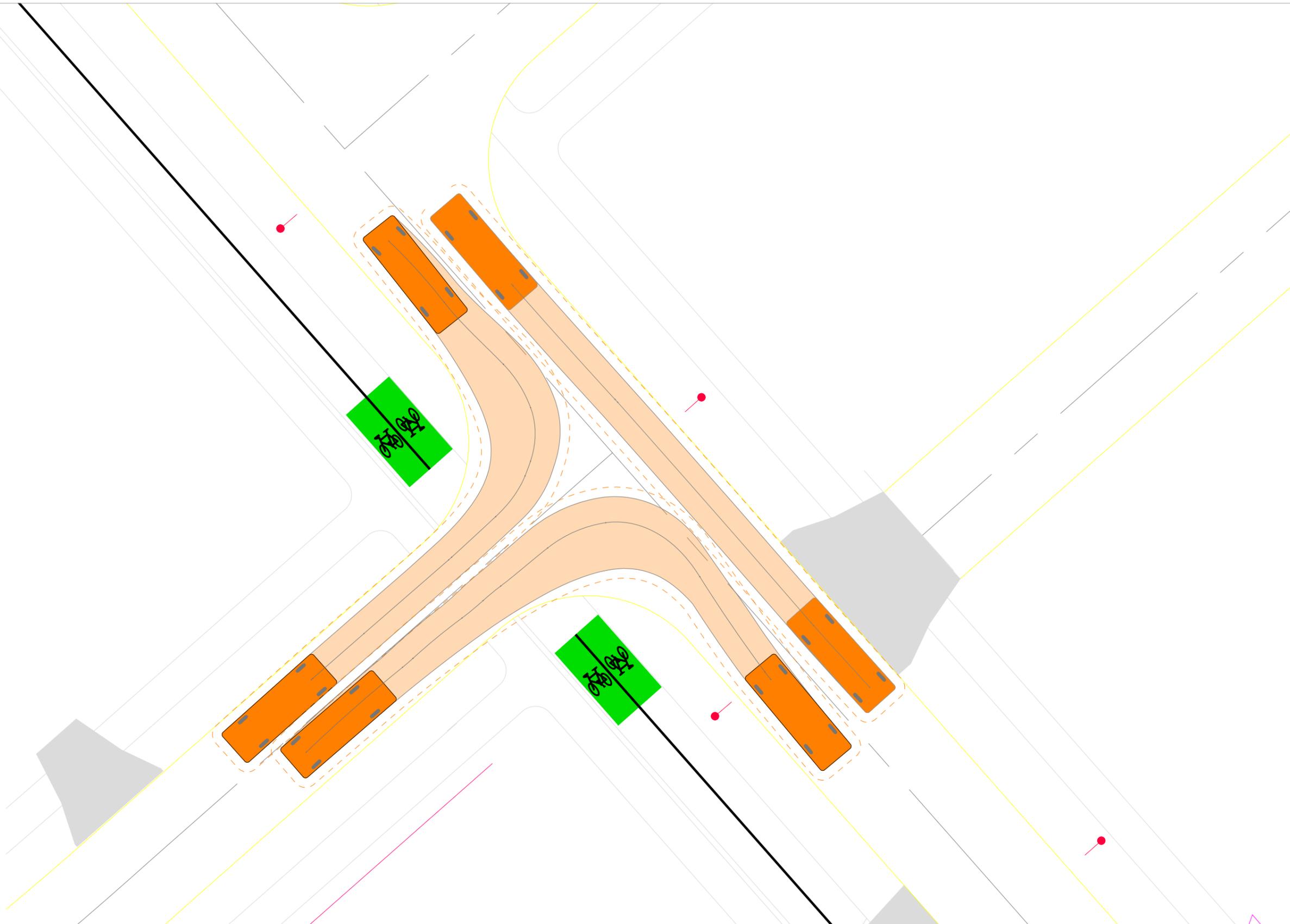
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 10A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

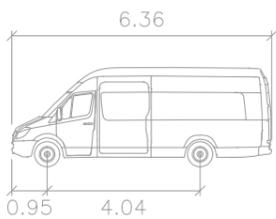
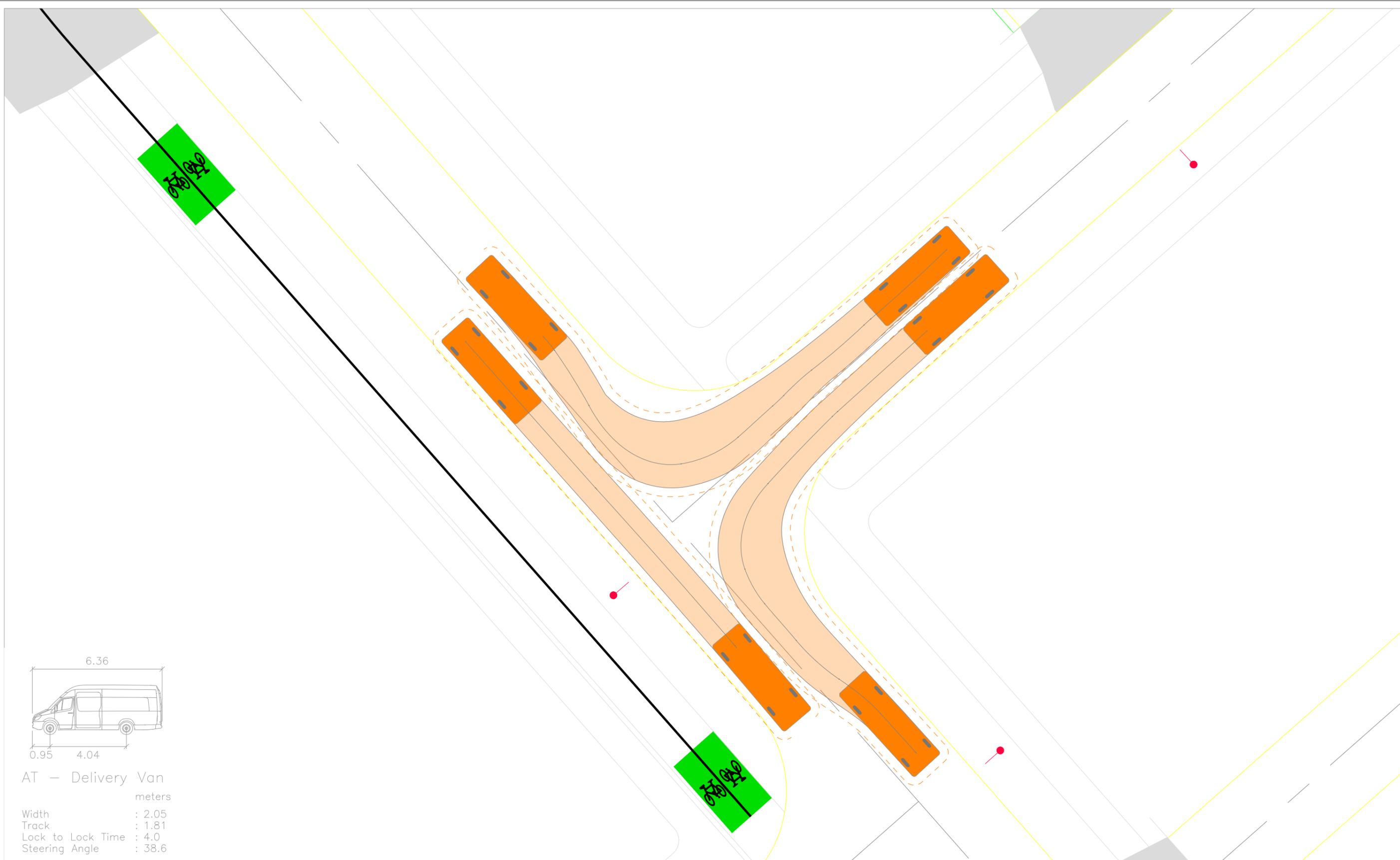
<b>Drawn by:</b> HA J003135	<b>Client:</b>
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<b>Project:</b> Delmore, Orewa Proposed Residential Development	<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT Intersection - Road 12 / Road 5
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<b>Date:</b> 22 December 2025	<b>Scale @ A3:</b> 1:0.2
<b>Revision:</b> A	



Figure:  
11A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

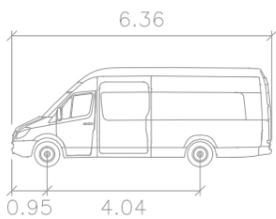
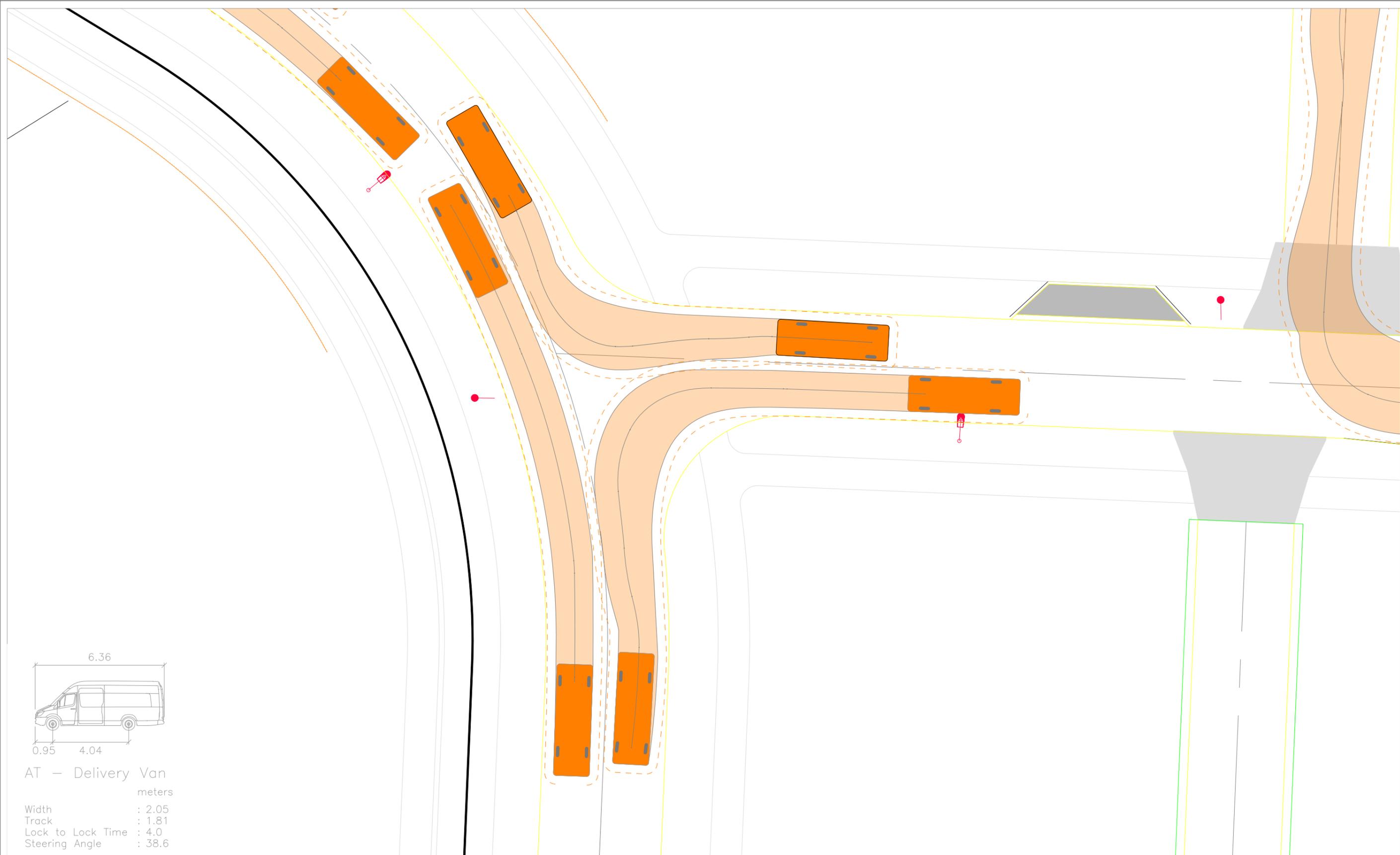
**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 7 / Road 5

**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A

**Figure:**  
 12A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 15 / Road 5

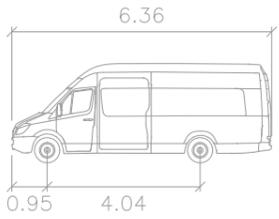
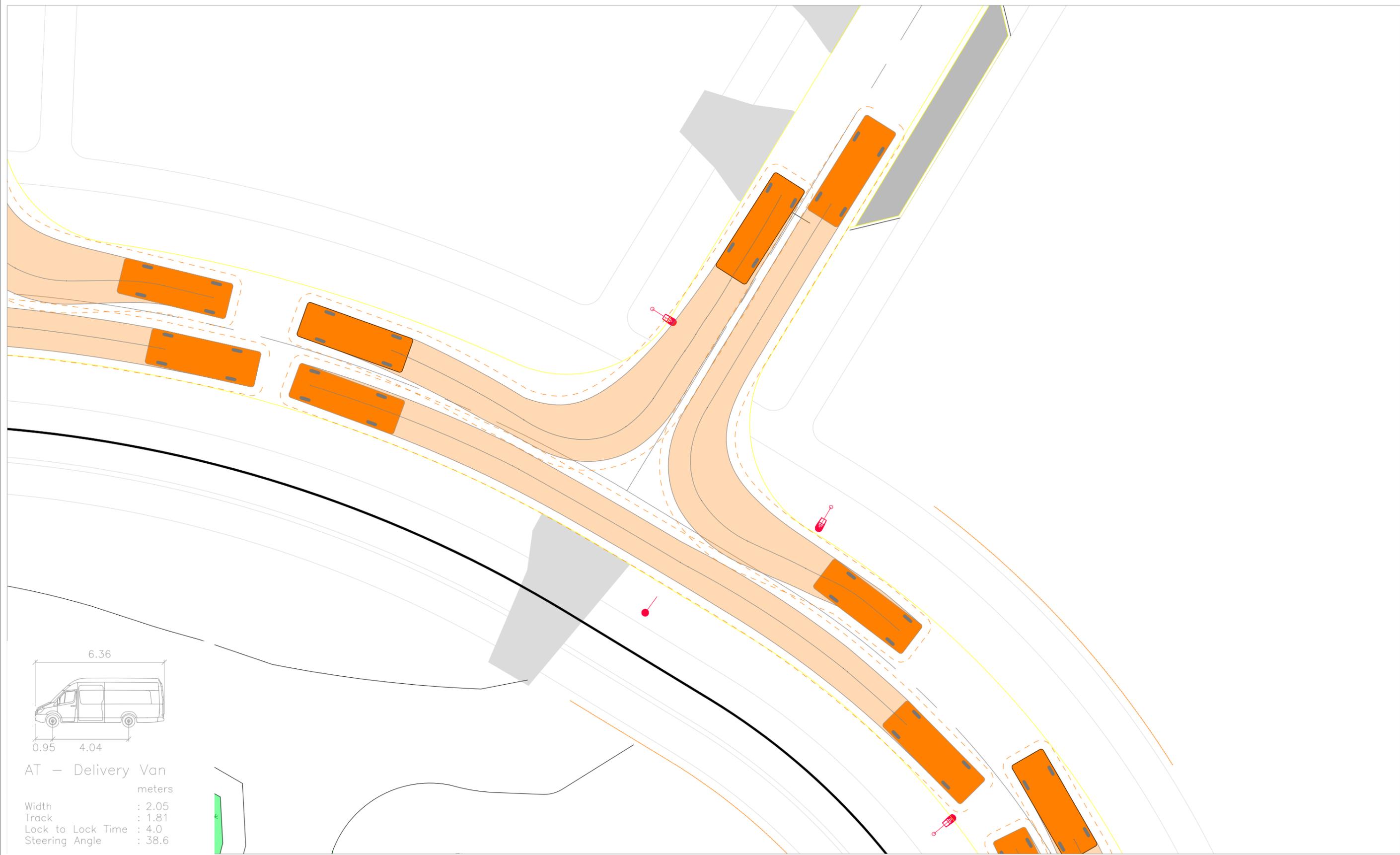
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 13A



AT – Delivery Van  
meters  
Width : 2.05  
Track : 1.81  
Lock to Lock Time : 4.0  
Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
Intersection - Road 13 / Road 5

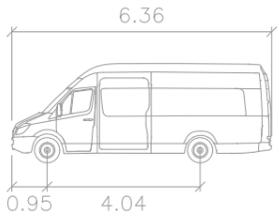
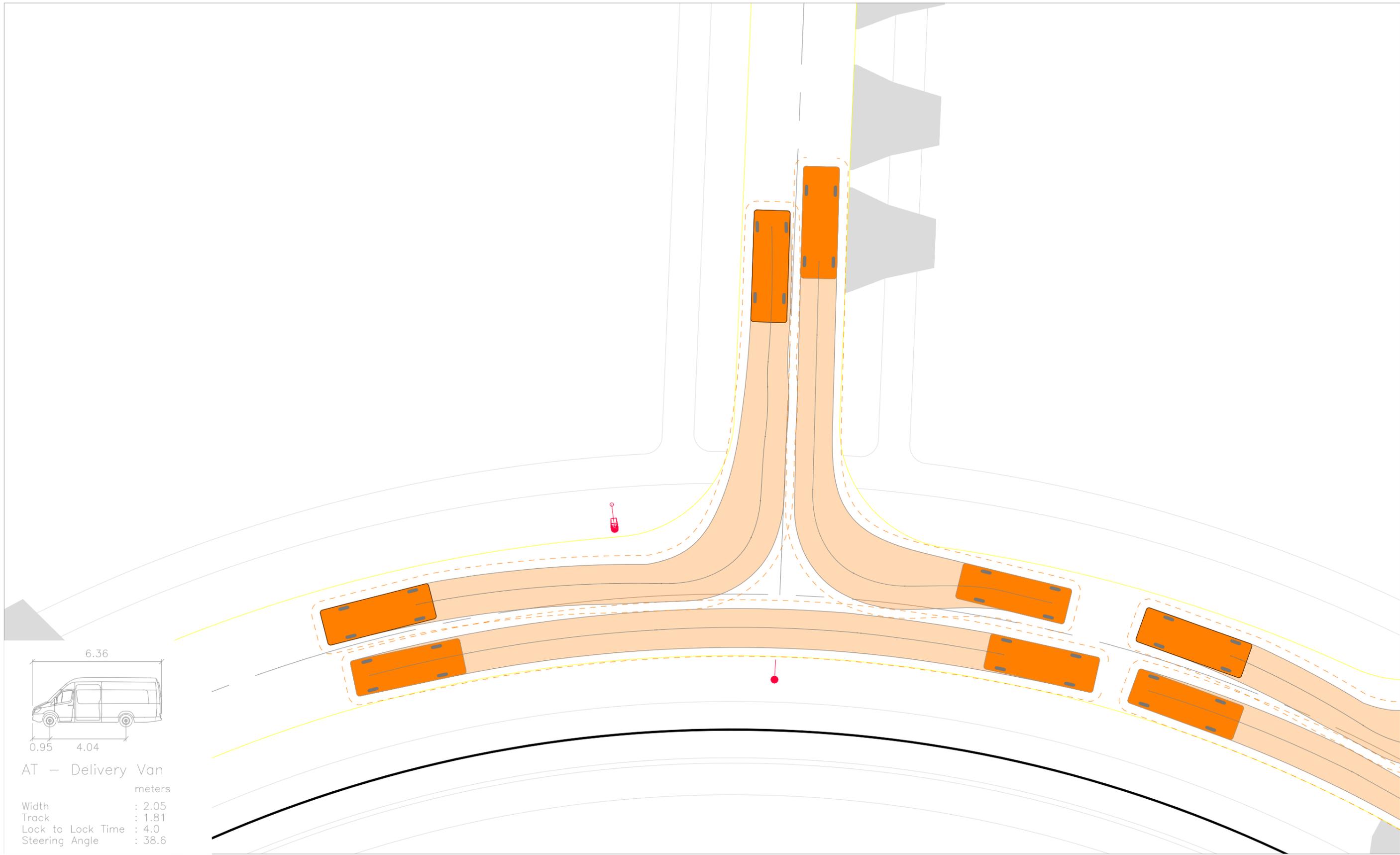
**Date:**  
22 December 2025

**Scale @ A3:**  
1:0.2

**Revision:**  
A



**Figure:**  
14A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 14 / Road 5

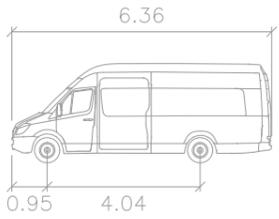
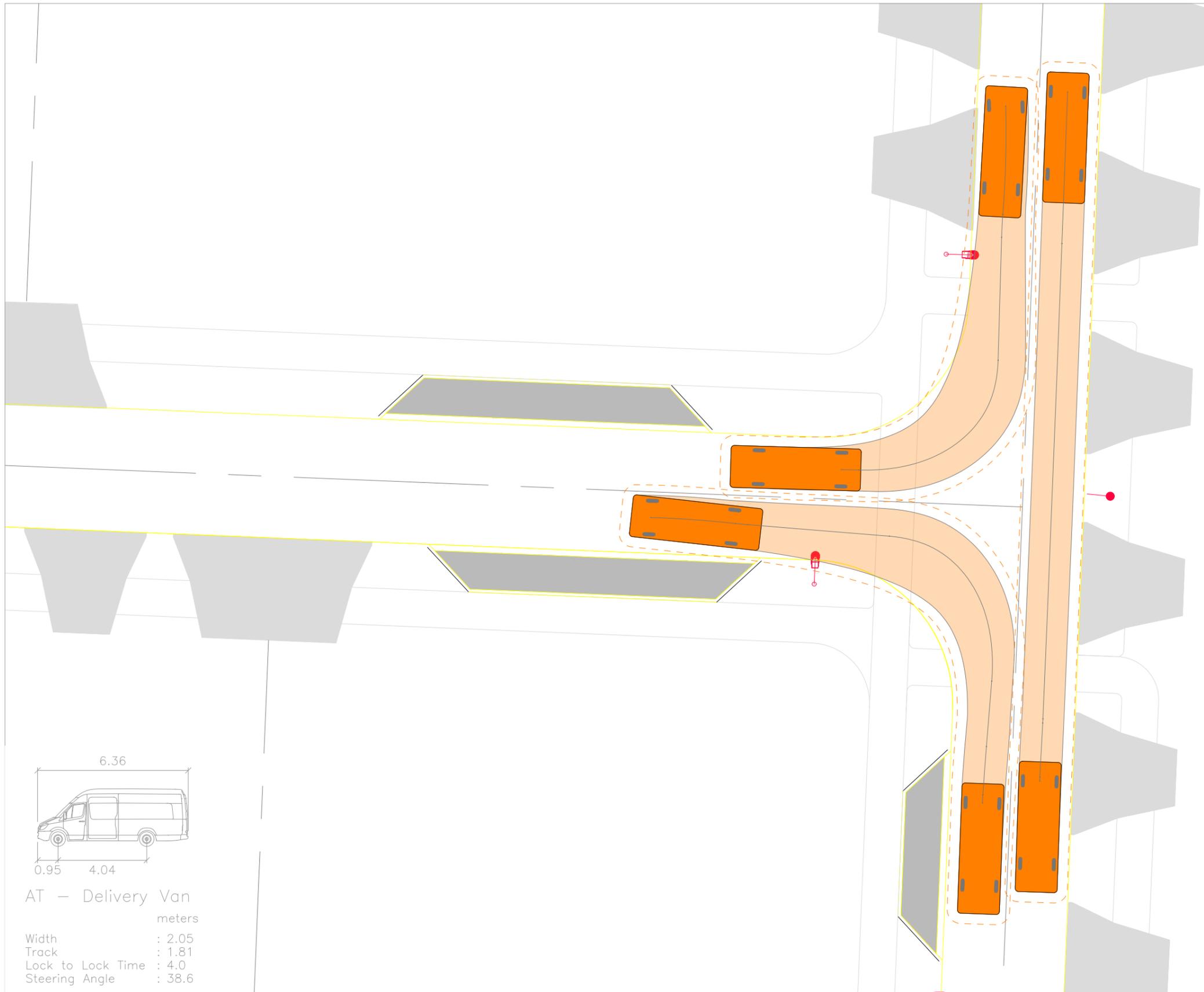
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 15A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 14 / Road 16

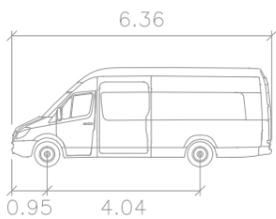
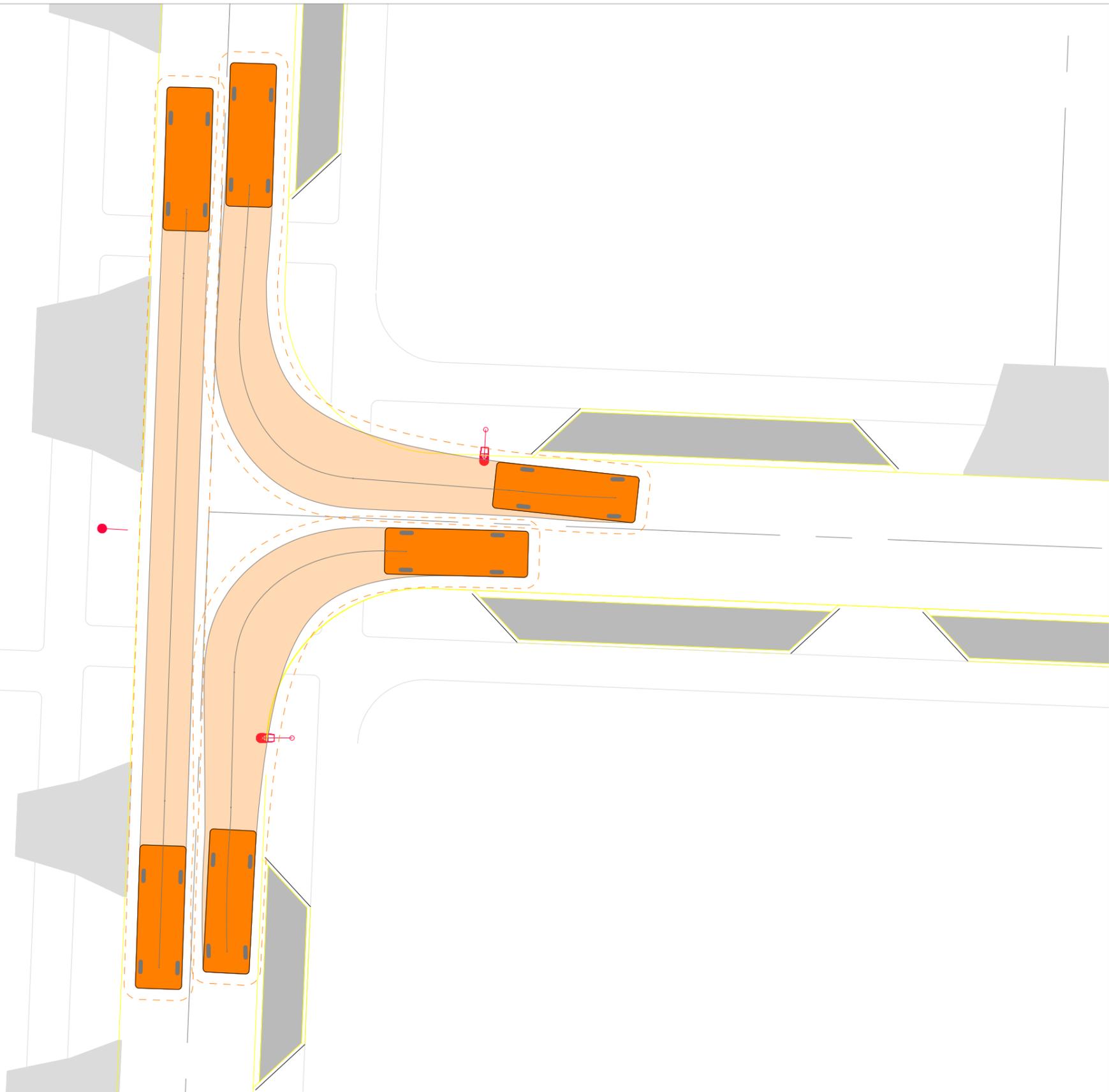
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 16A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 14 / Road 14

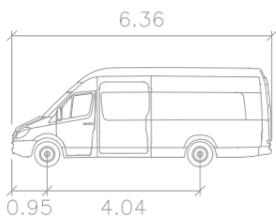
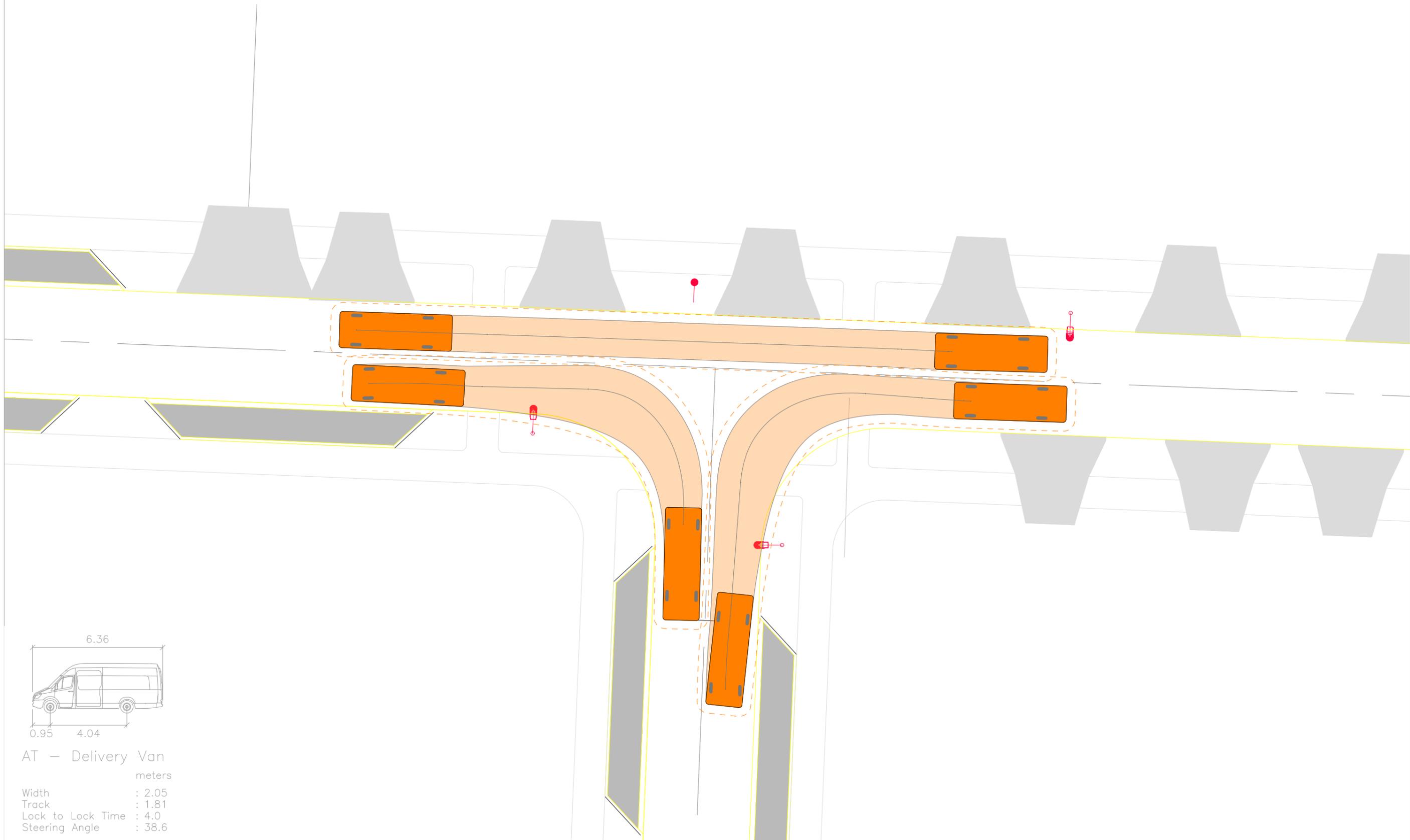
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 17A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 13 / Road 14

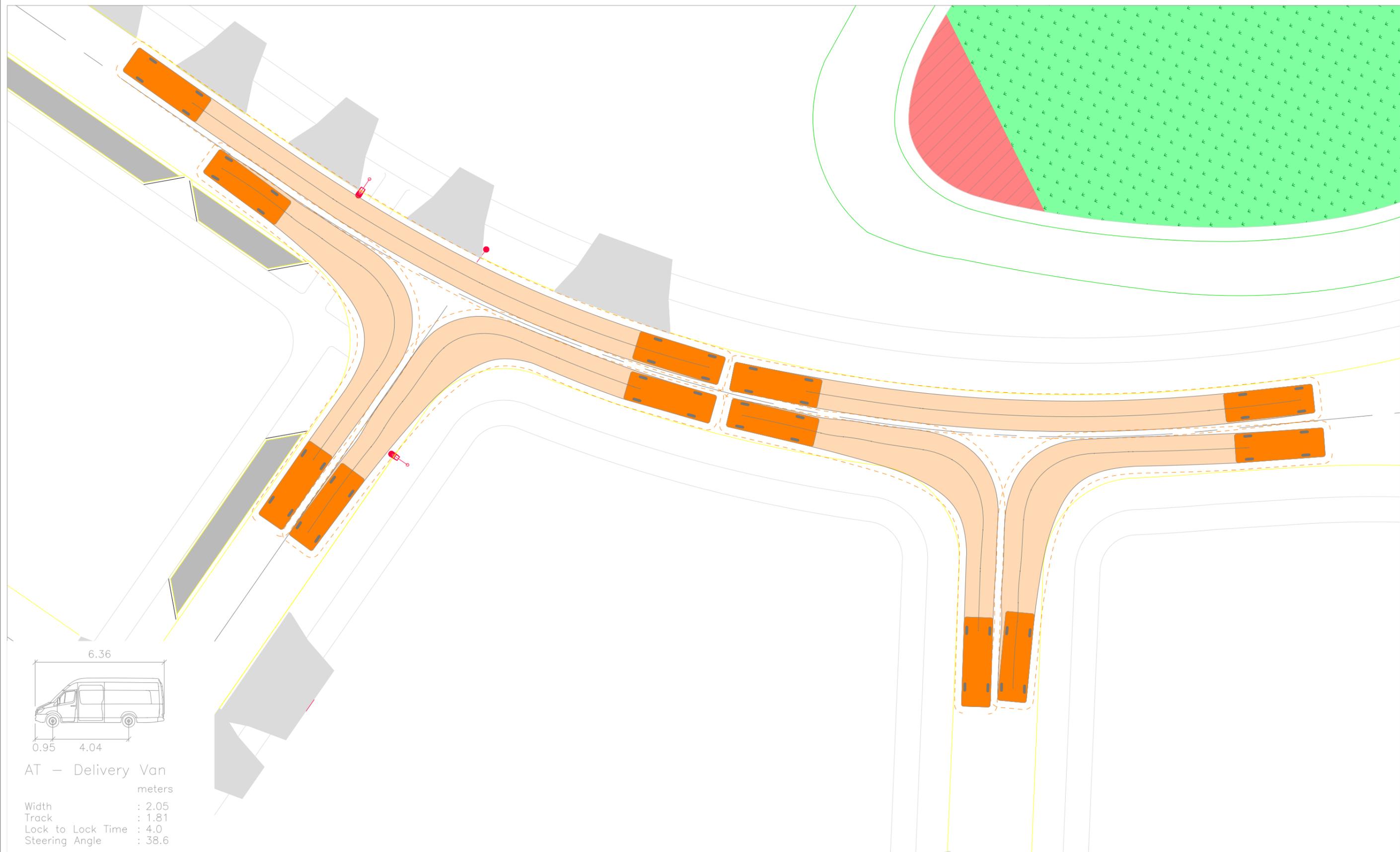
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 18A



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
Intersection - Roads 19 & 20 / Road 18

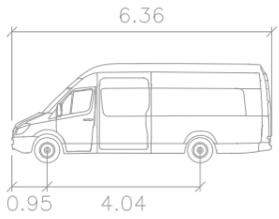
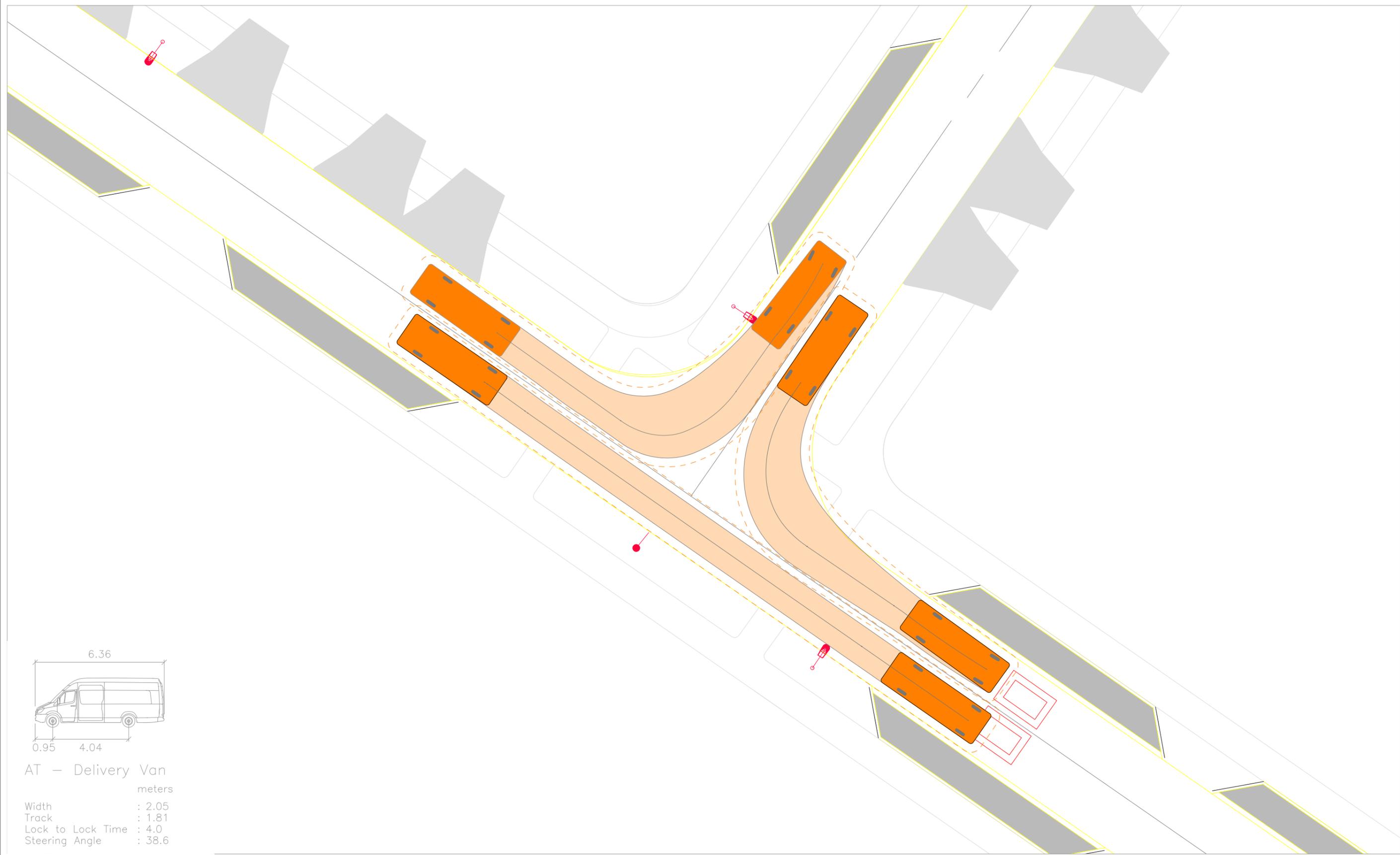
**Date:**  
22 December 2025

**Scale @ A3:**  
1:0.25

**Revision:**  
A



**Figure:**  
19A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 21 / Road 18

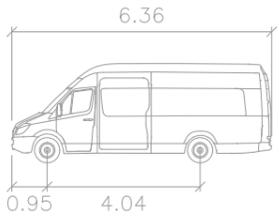
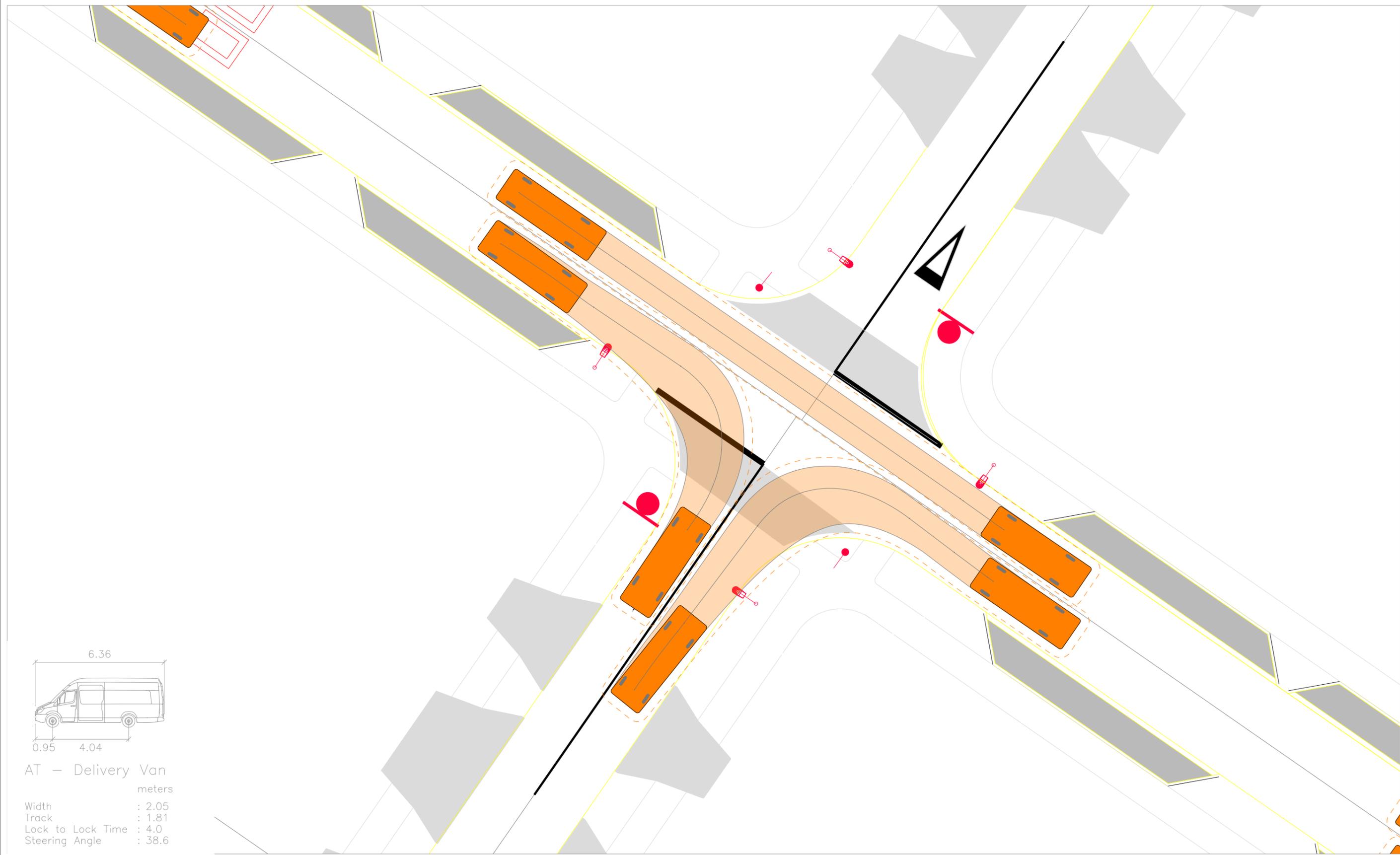
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 20A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 21 / Road 22 / Road 19

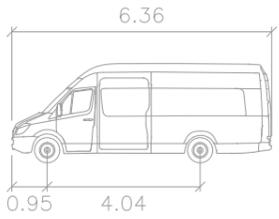
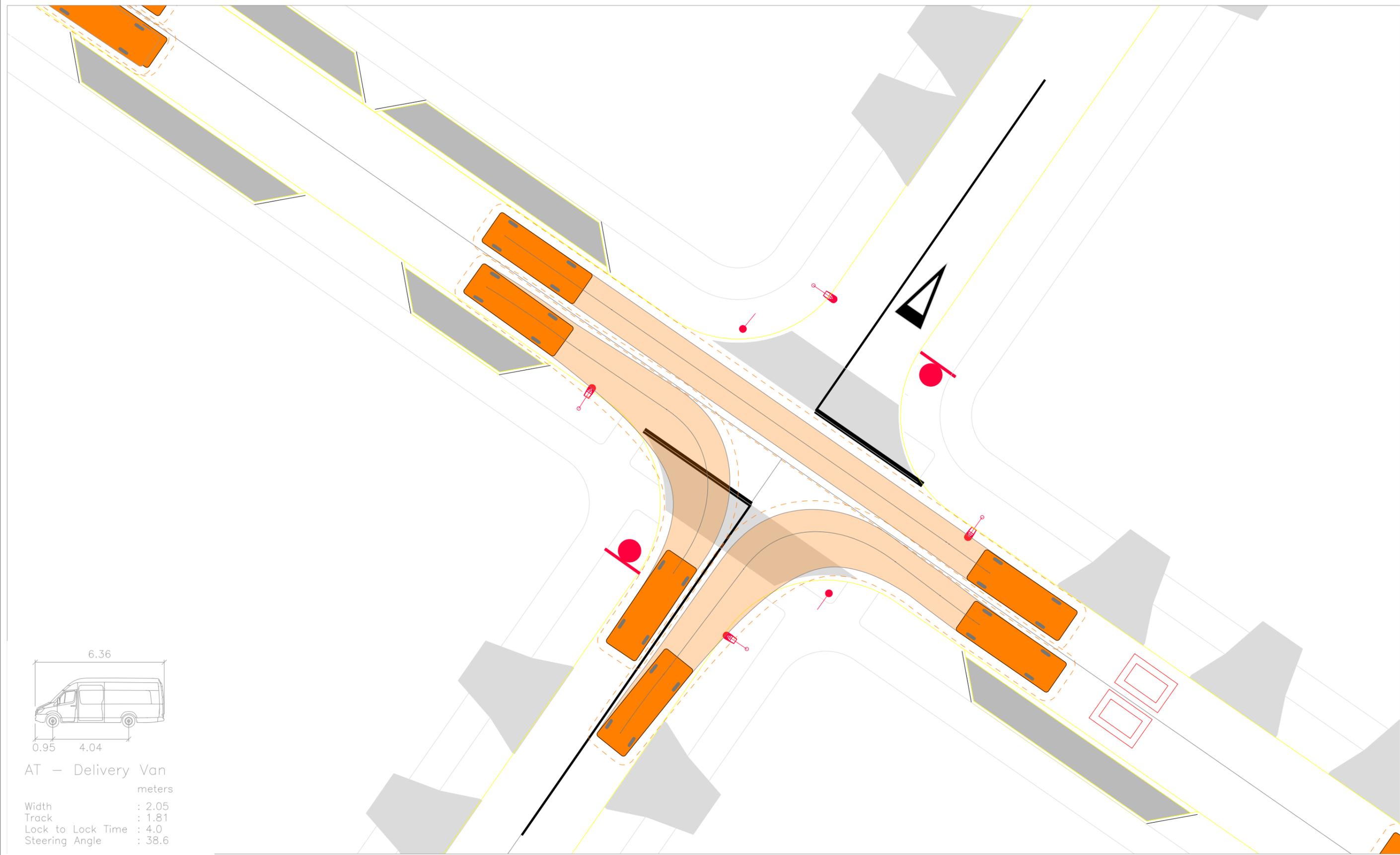
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 21A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 21 / Road 27 / Road 20

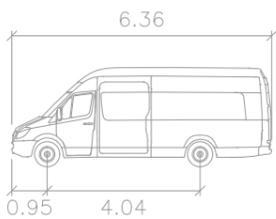
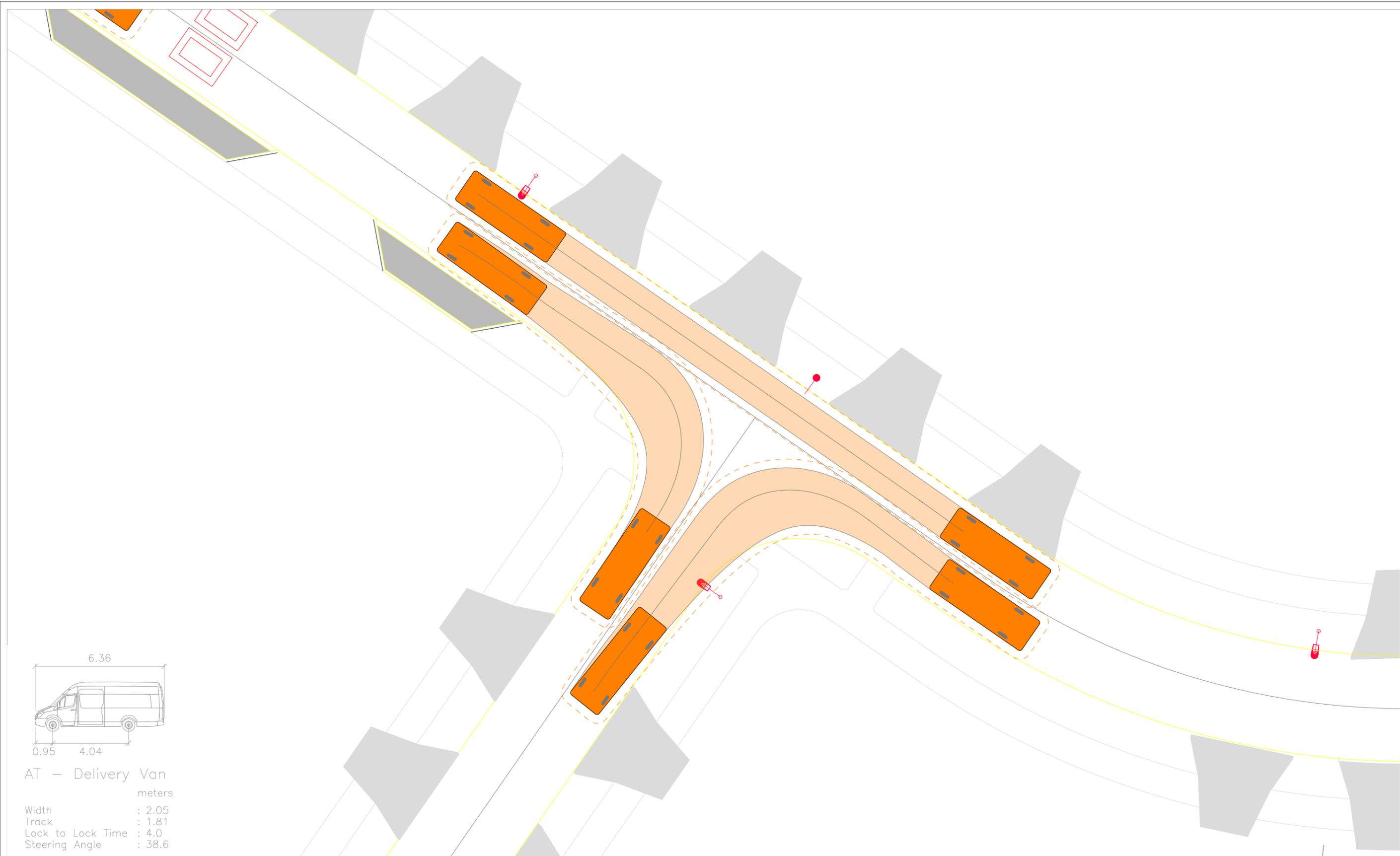
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 22A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 21 / Road 26

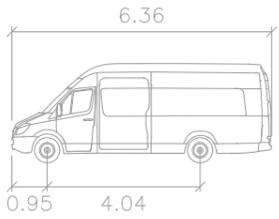
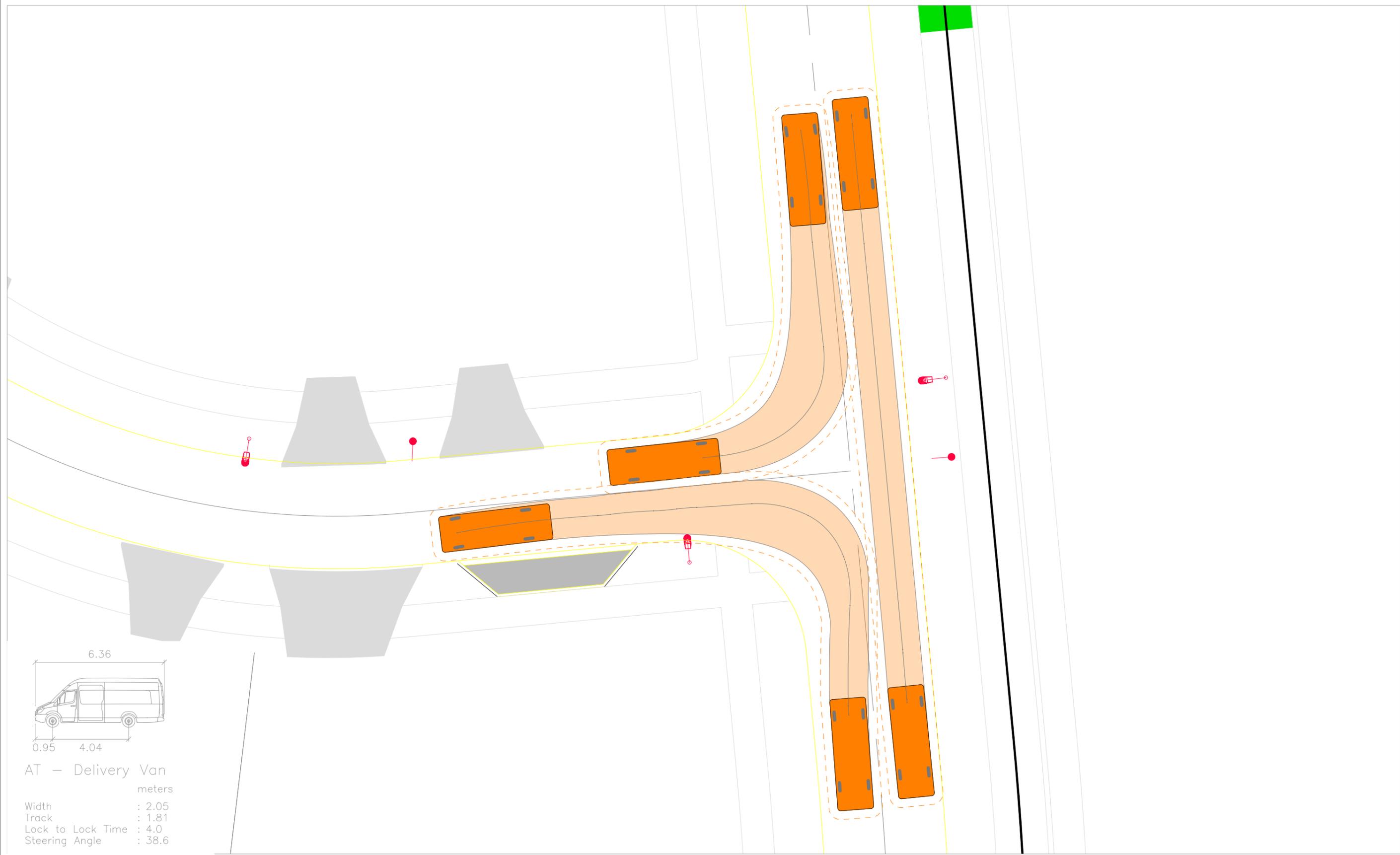
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 23A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 21 / Road 17

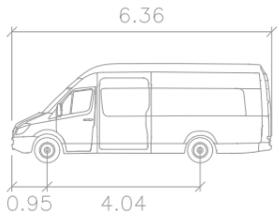
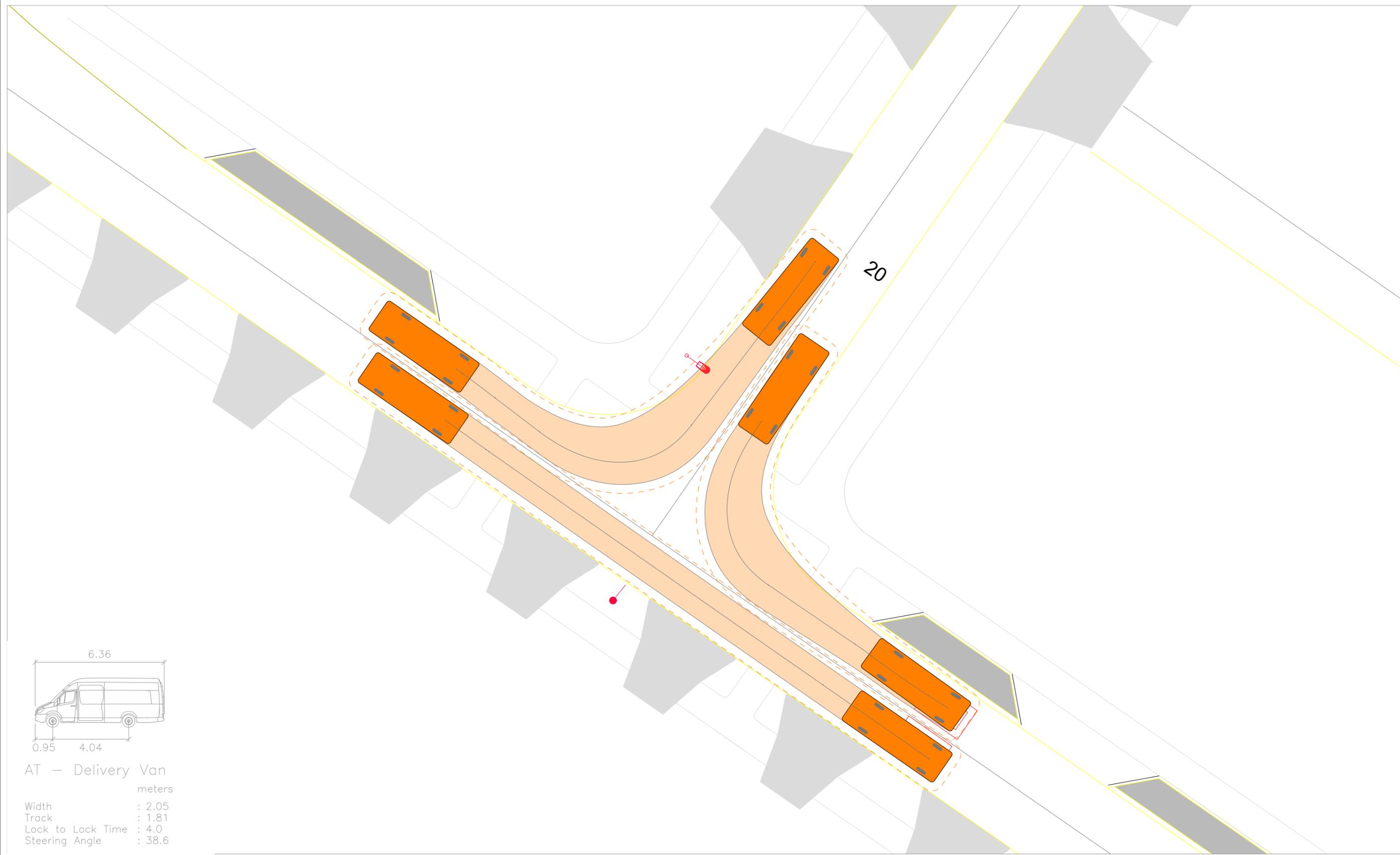
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 24A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 22 / Road 27

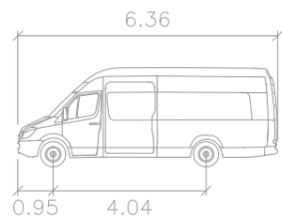
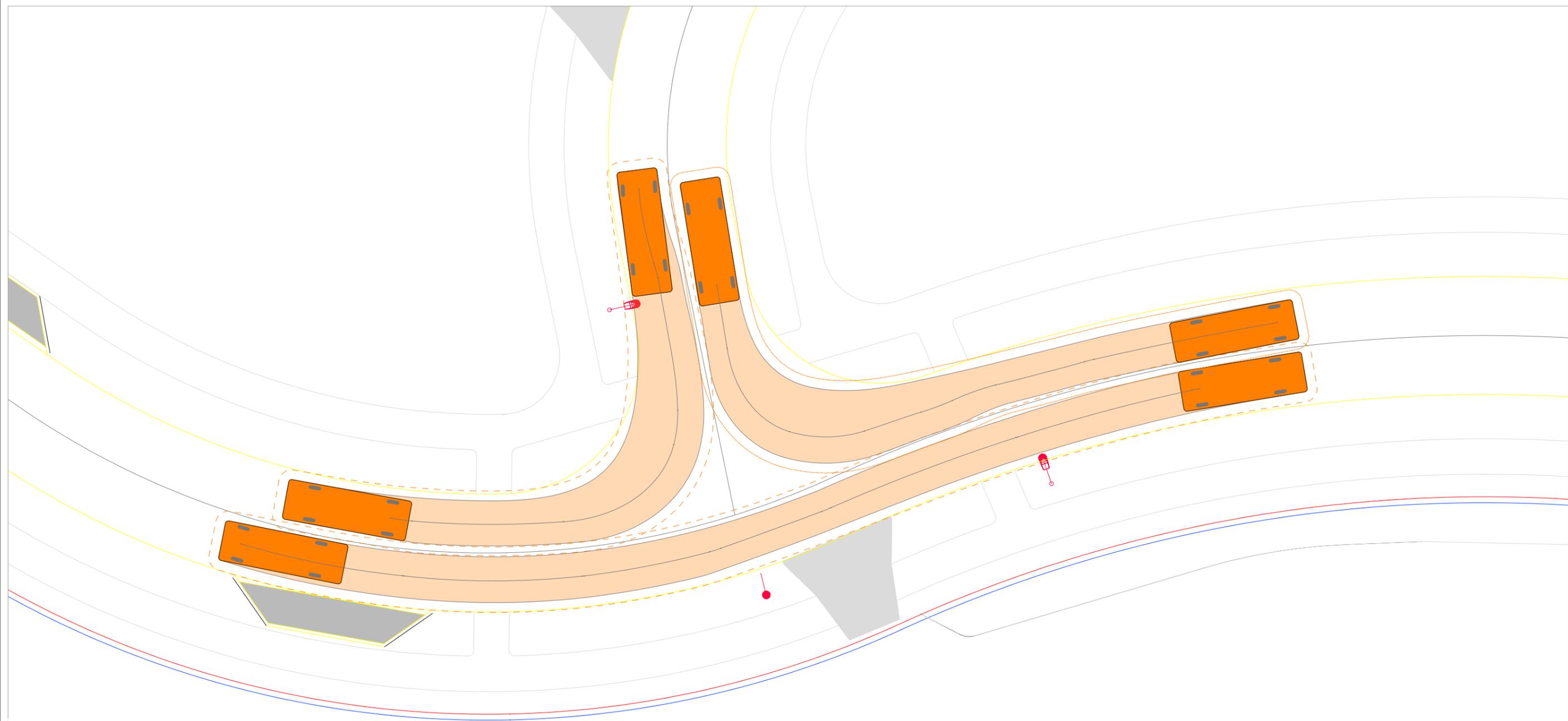
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 25A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 22 / Road 26

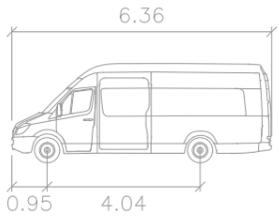
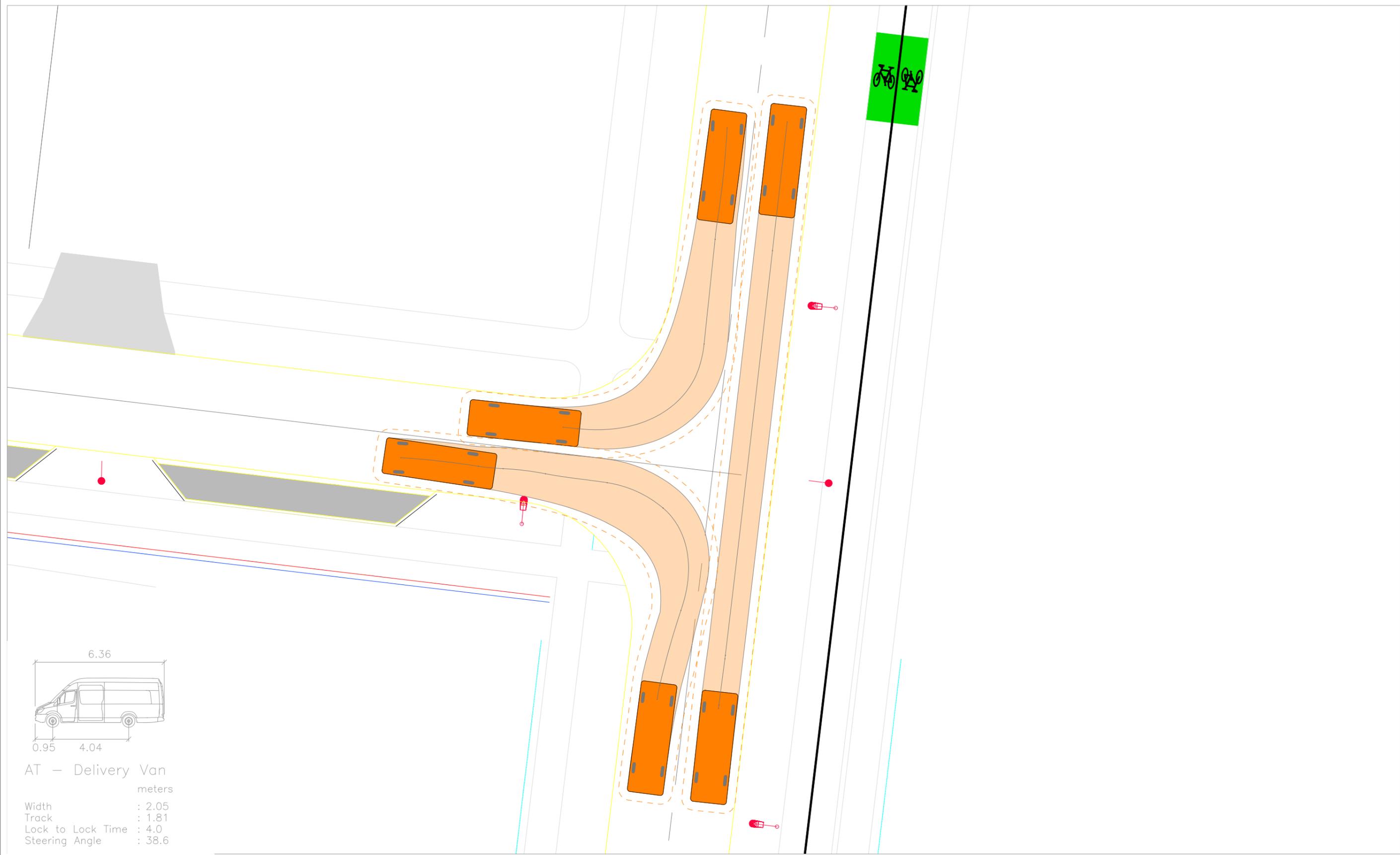
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 26A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 22 / Road 17

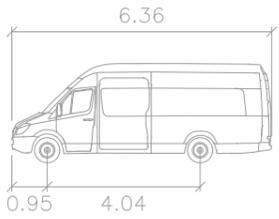
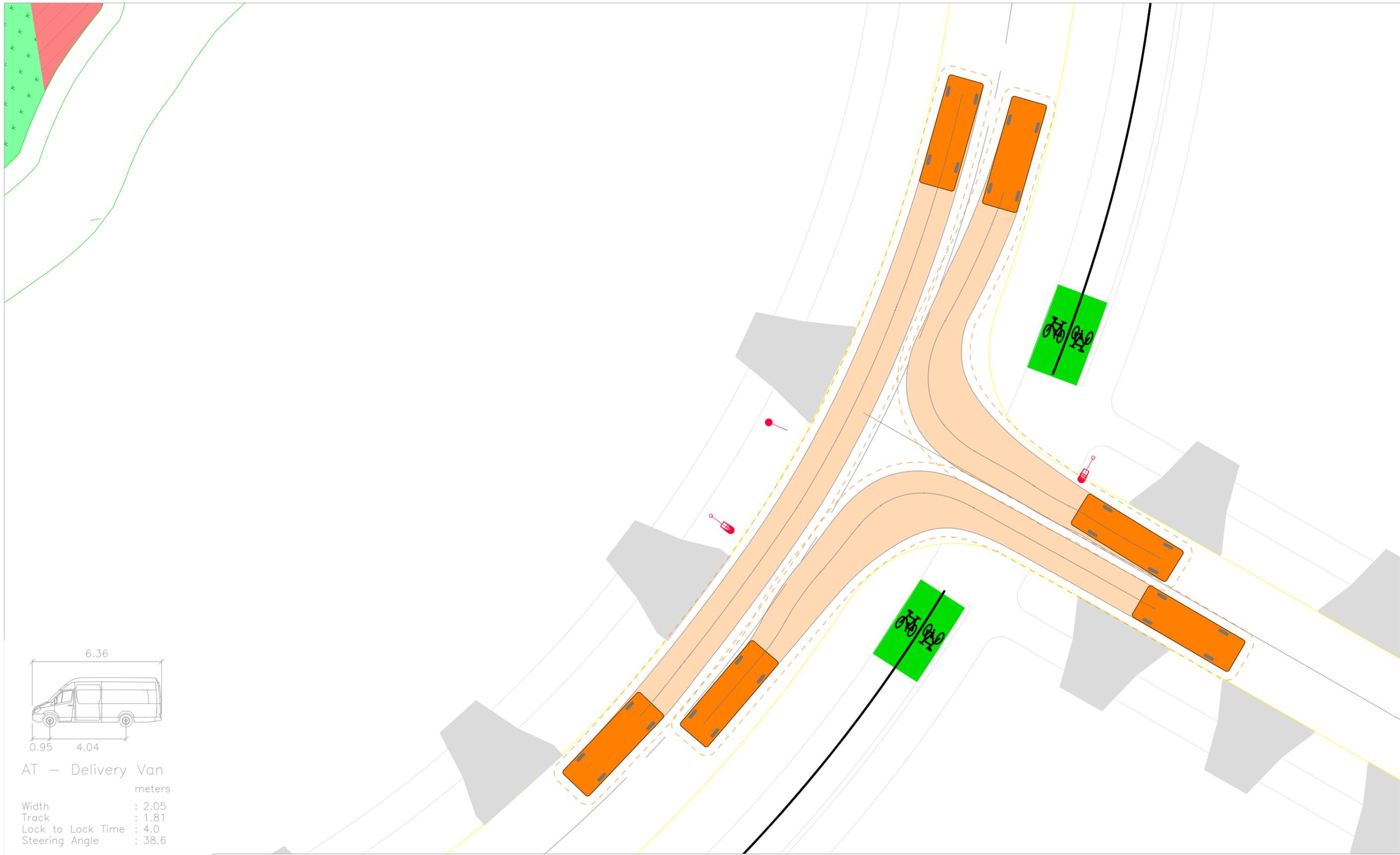
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 27A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 23 / Road 17

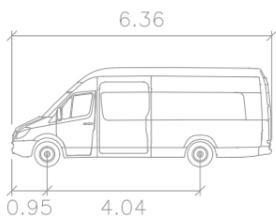
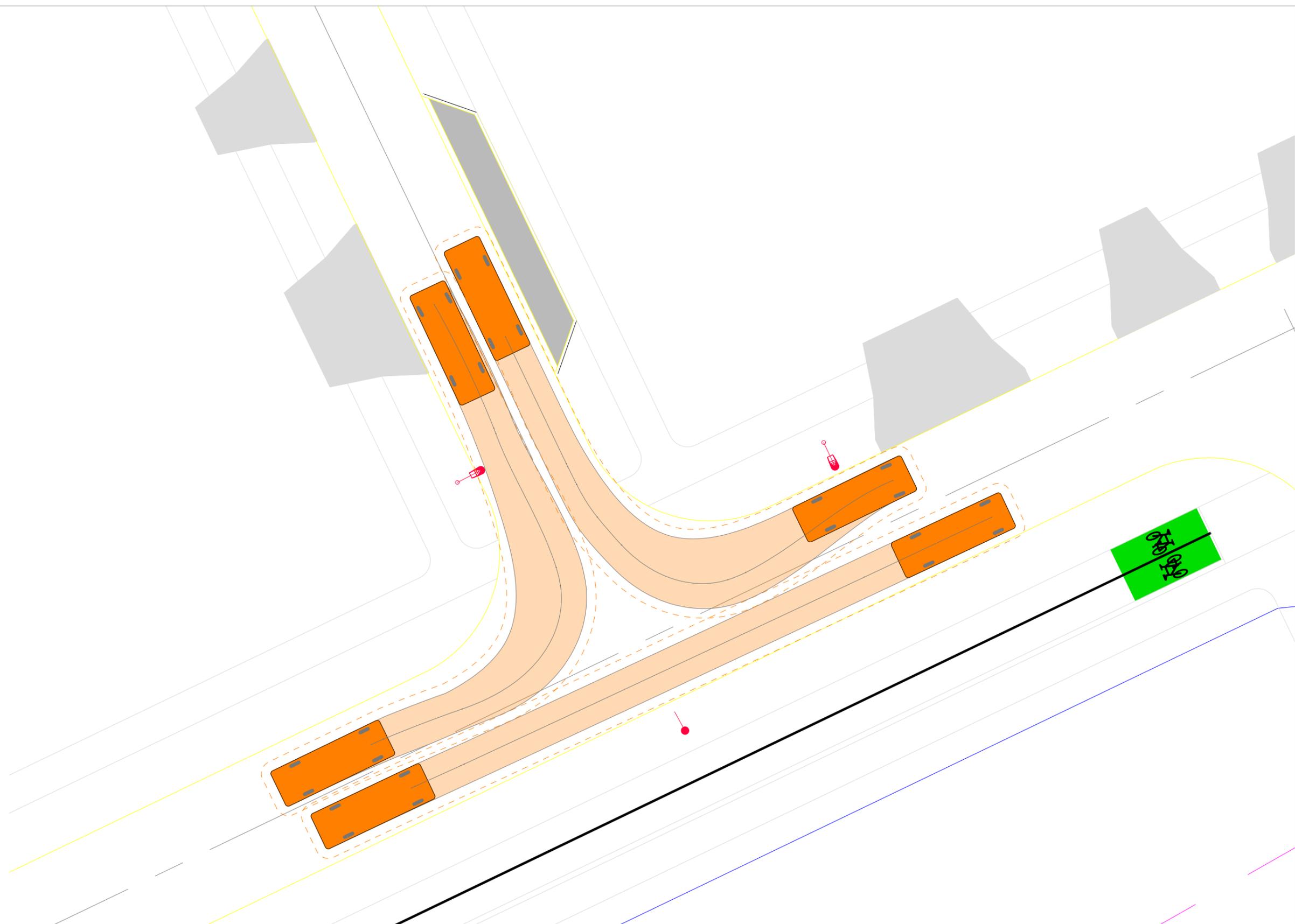
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 28A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

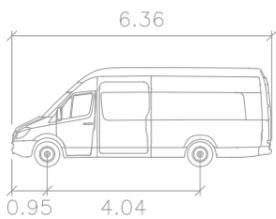
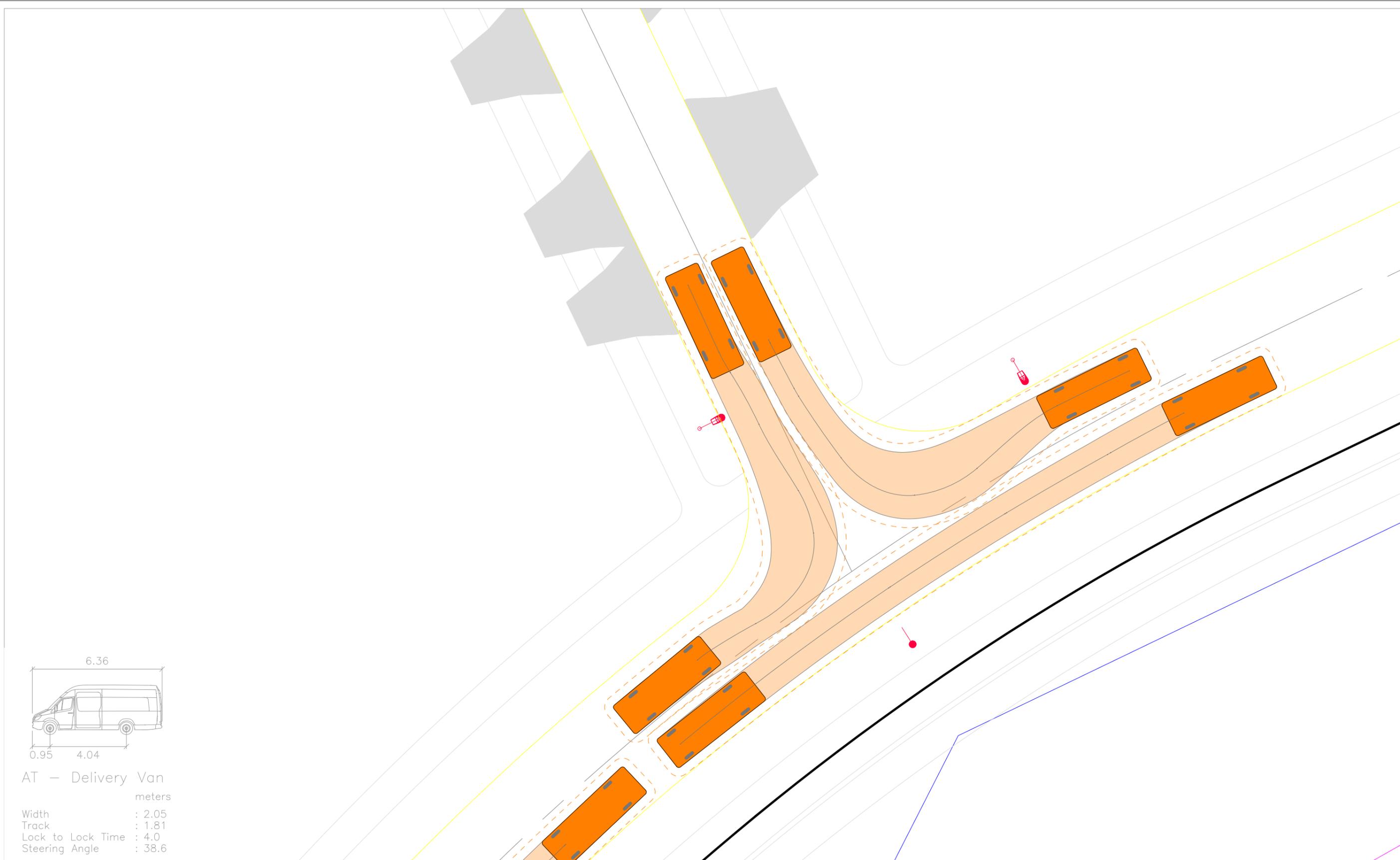
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT Intersection - Roads 24 / Road 17

<b>Date:</b> 22 December 2025
<b>Scale @ A3:</b> 1:0.2
<b>Revision:</b> A

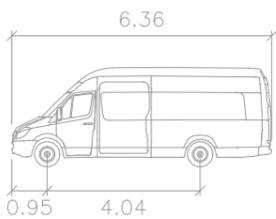
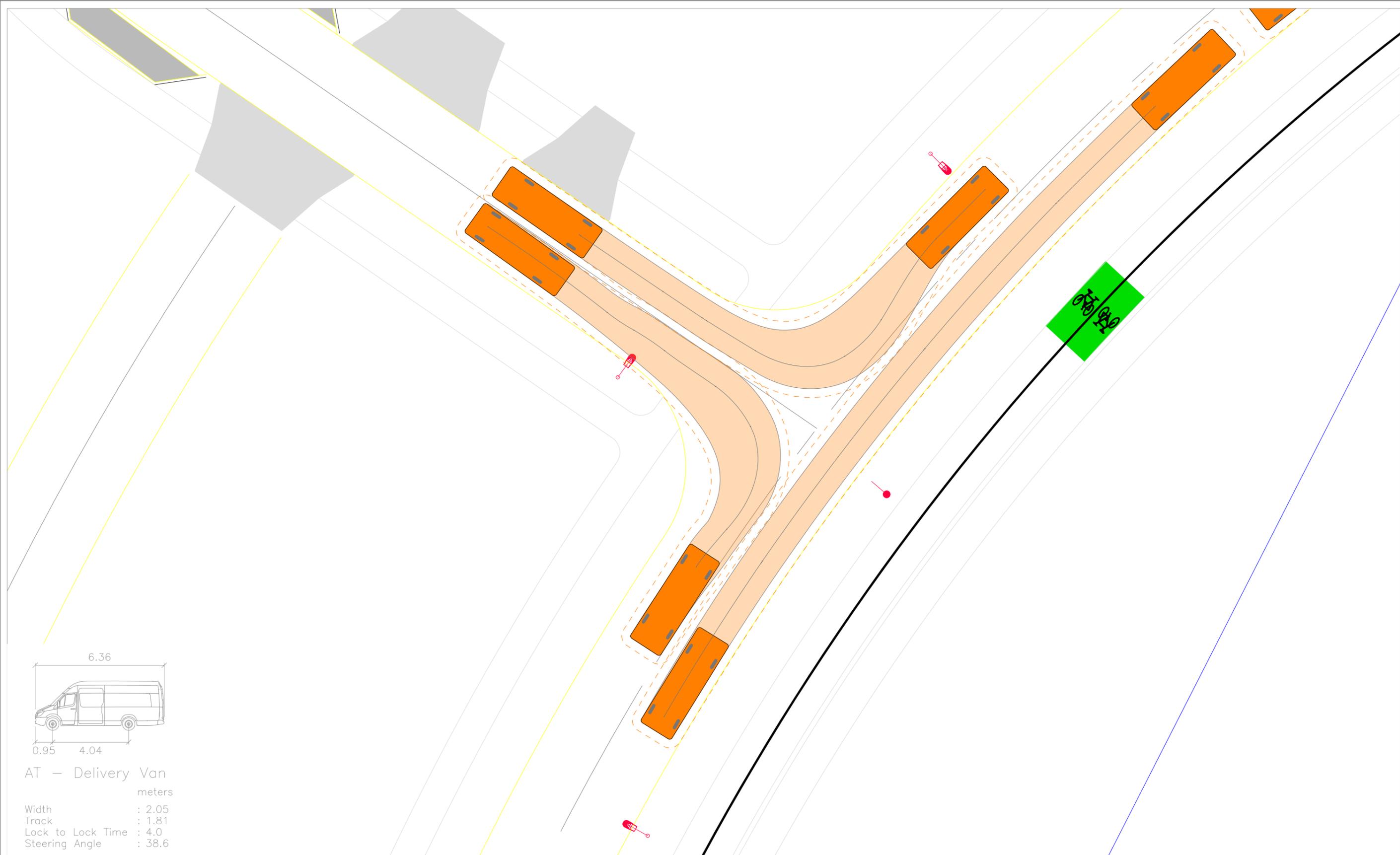


**Figure:**  
29A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

<b>Revision notes:</b>			<b>Drawn by:</b> HA J003135	<b>Project:</b> Delmore, Orewa Proposed Residential Development	<b>Date:</b> 22 December 2025		<b>Figure:</b> 30A
<b>Rev:</b>	<b>Date:</b>	<b>Notes:</b>					
			<b>Client:</b>	<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT Intersection - Roads 25 / Road 17			



AT – Delivery Van  
meters  
Width : 2.05  
Track : 1.81  
Lock to Lock Time : 4.0  
Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

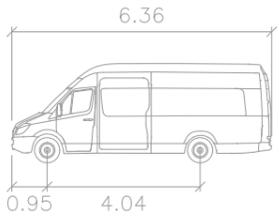
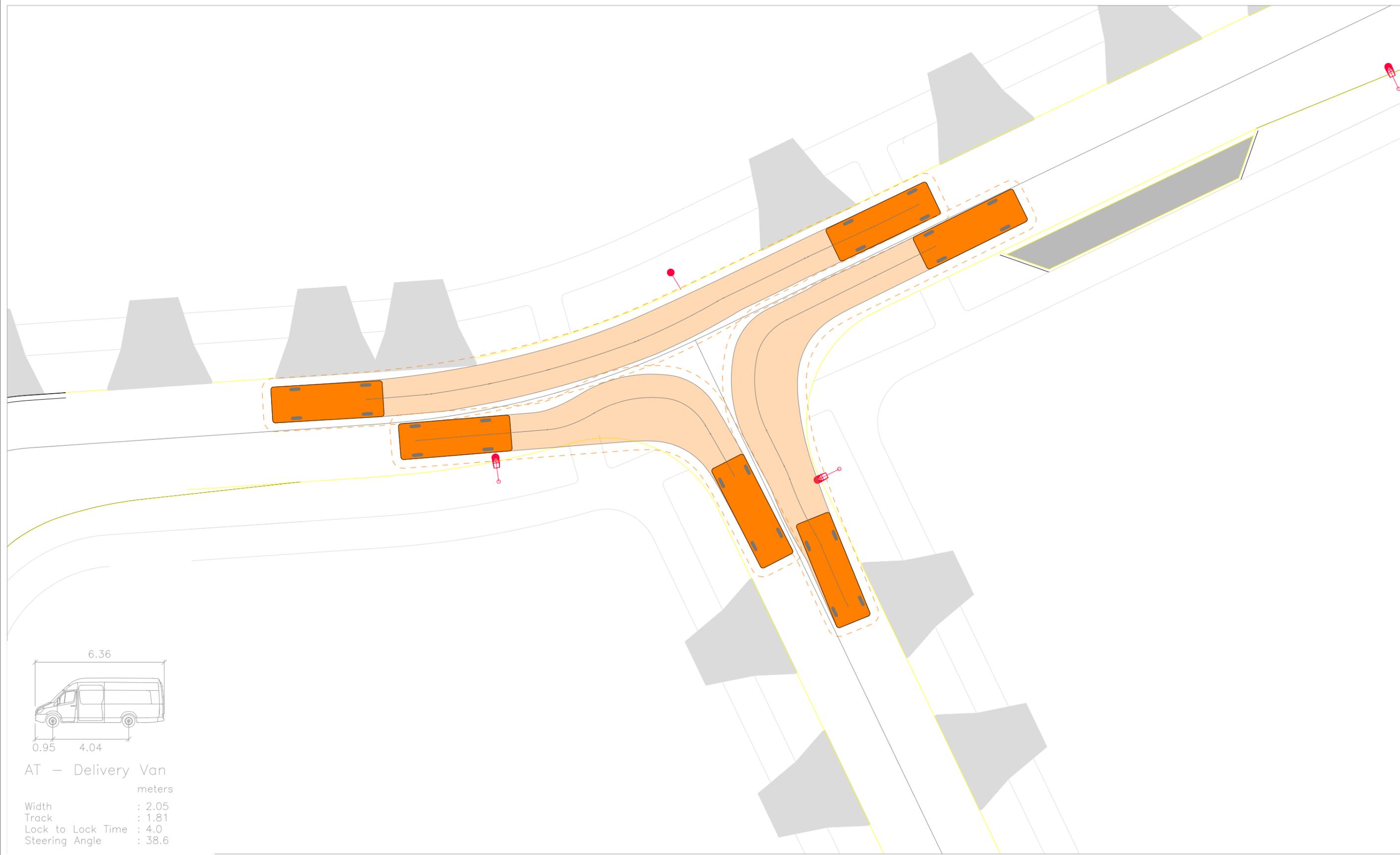
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT Intersection - Roads 25 / Road 17

<b>Date:</b> 22 December 2025
<b>Scale @ A3:</b> 1:0.2
<b>Revision:</b> A



**Figure:**  
31A



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 25 / Road 24

**Date:**  
 22 December 2025

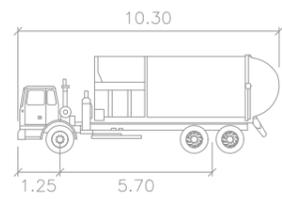
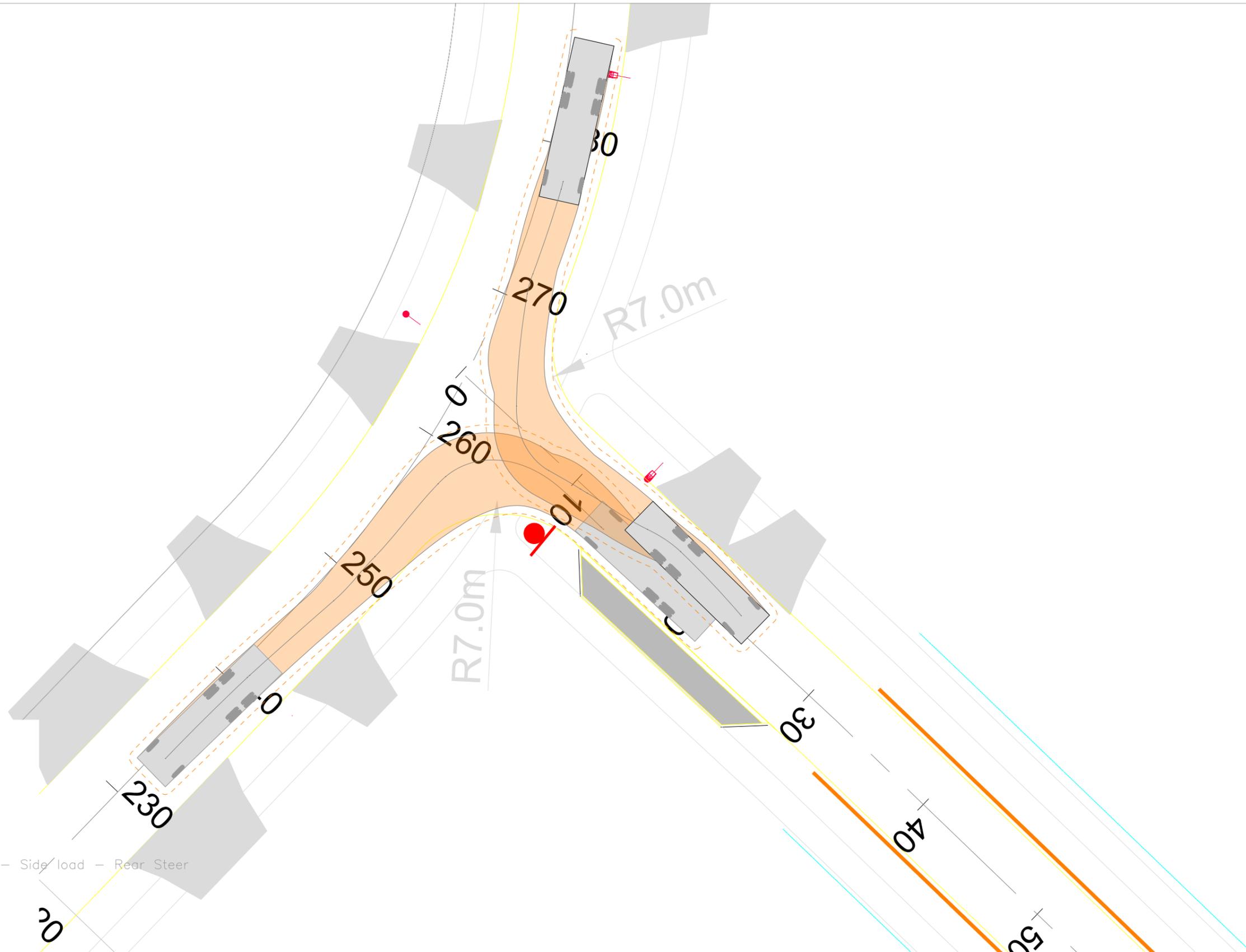
**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 32A

07



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 1 / Road 8

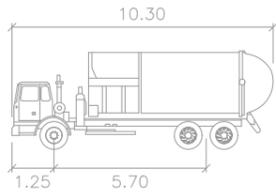
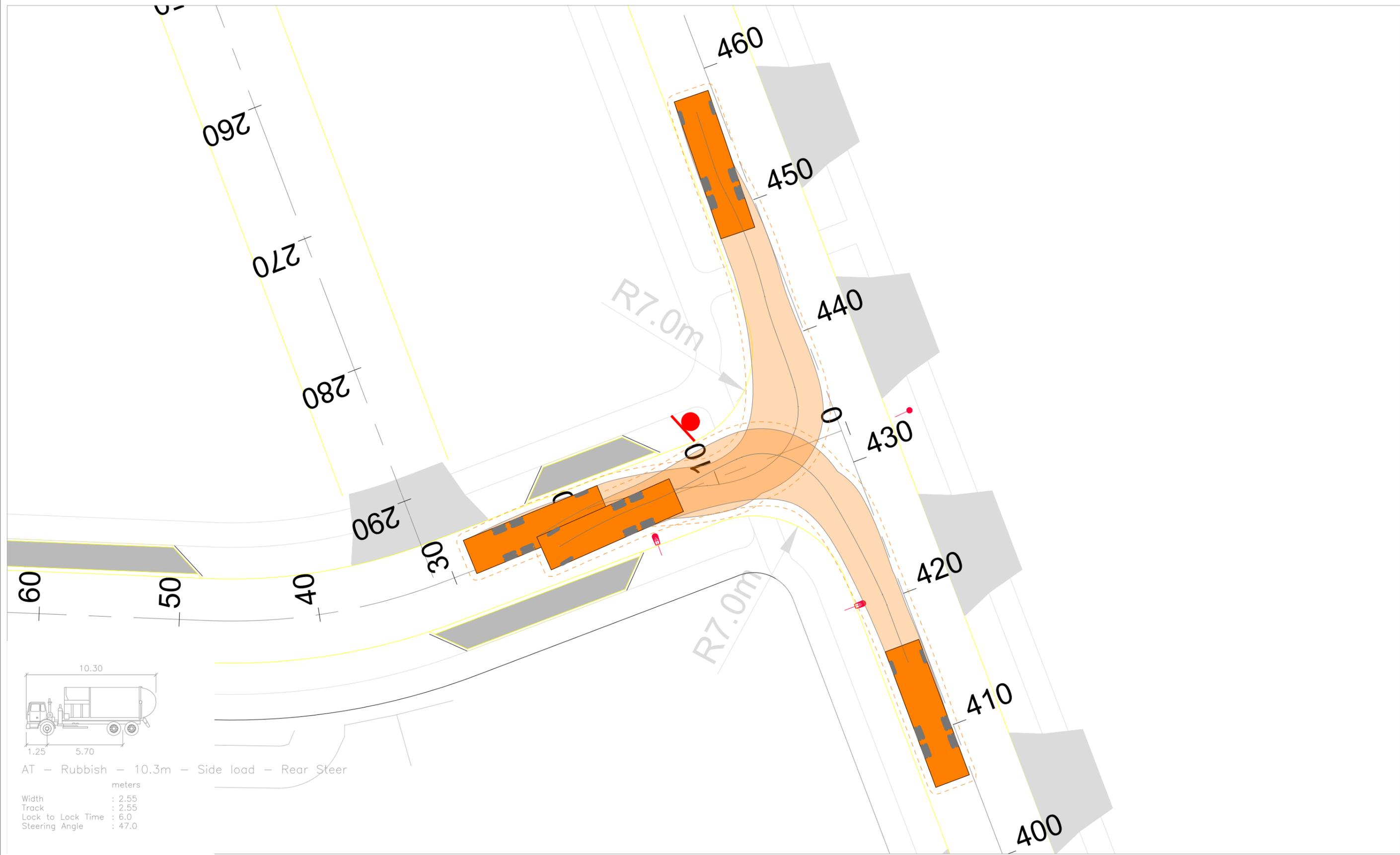
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A



**Figure:**  
 1 B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 1 / Road 2

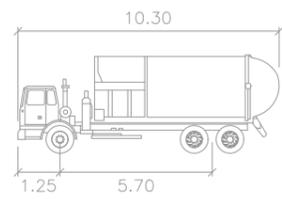
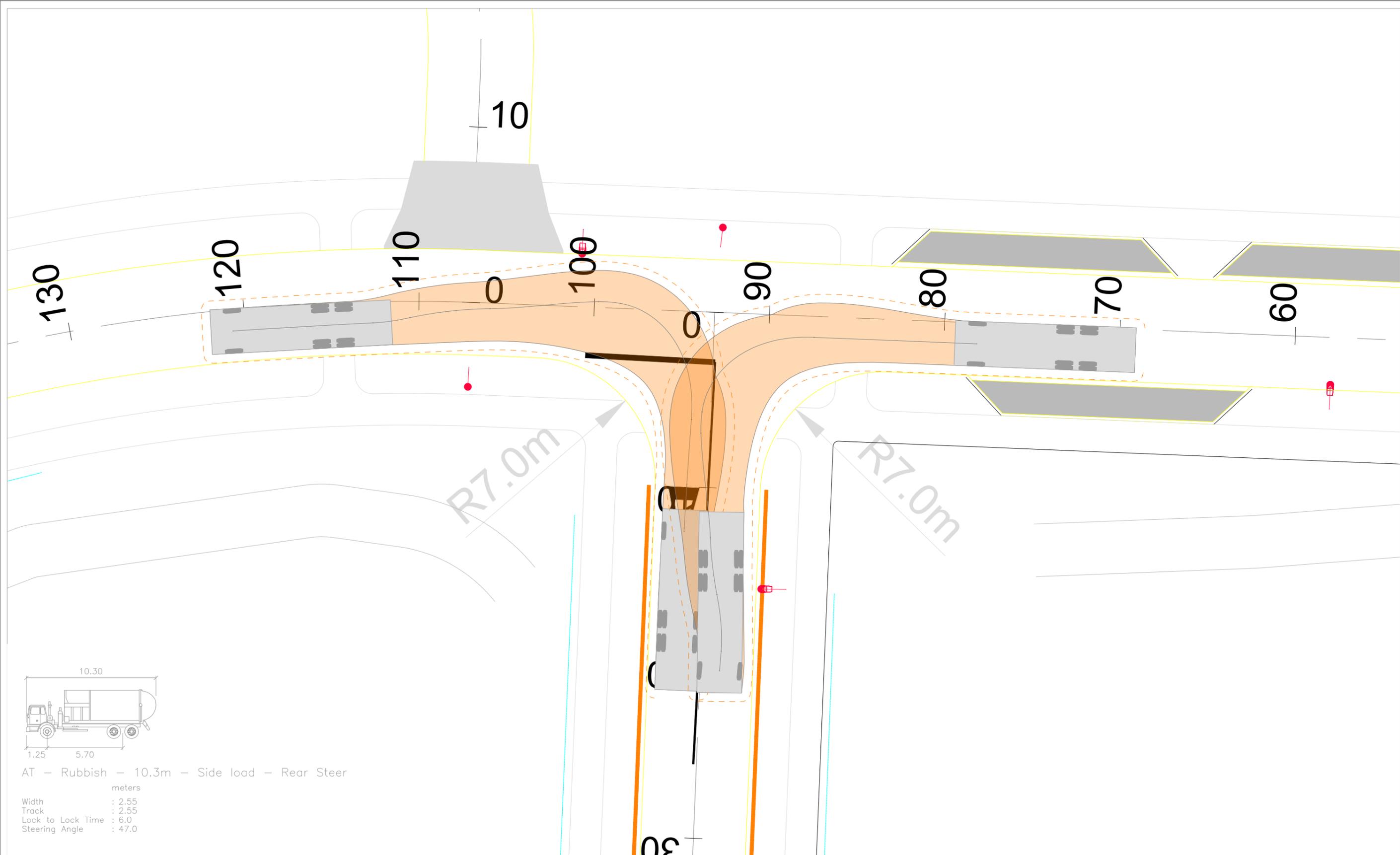
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A



**Figure:**  
 2B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 2 / Road 10

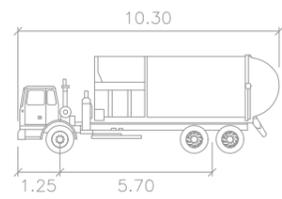
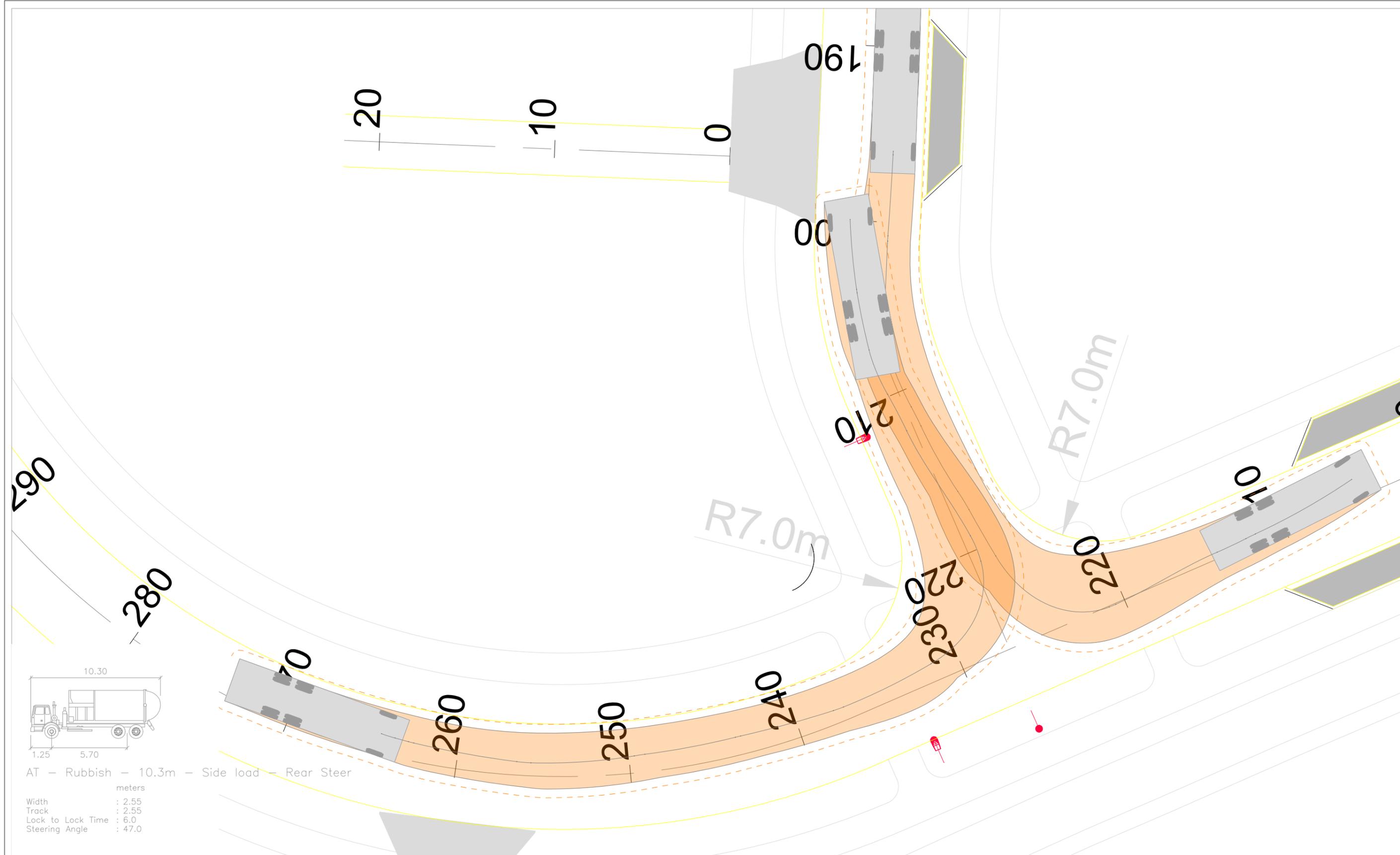
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 3B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters

Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 2 / Road 4 Southern

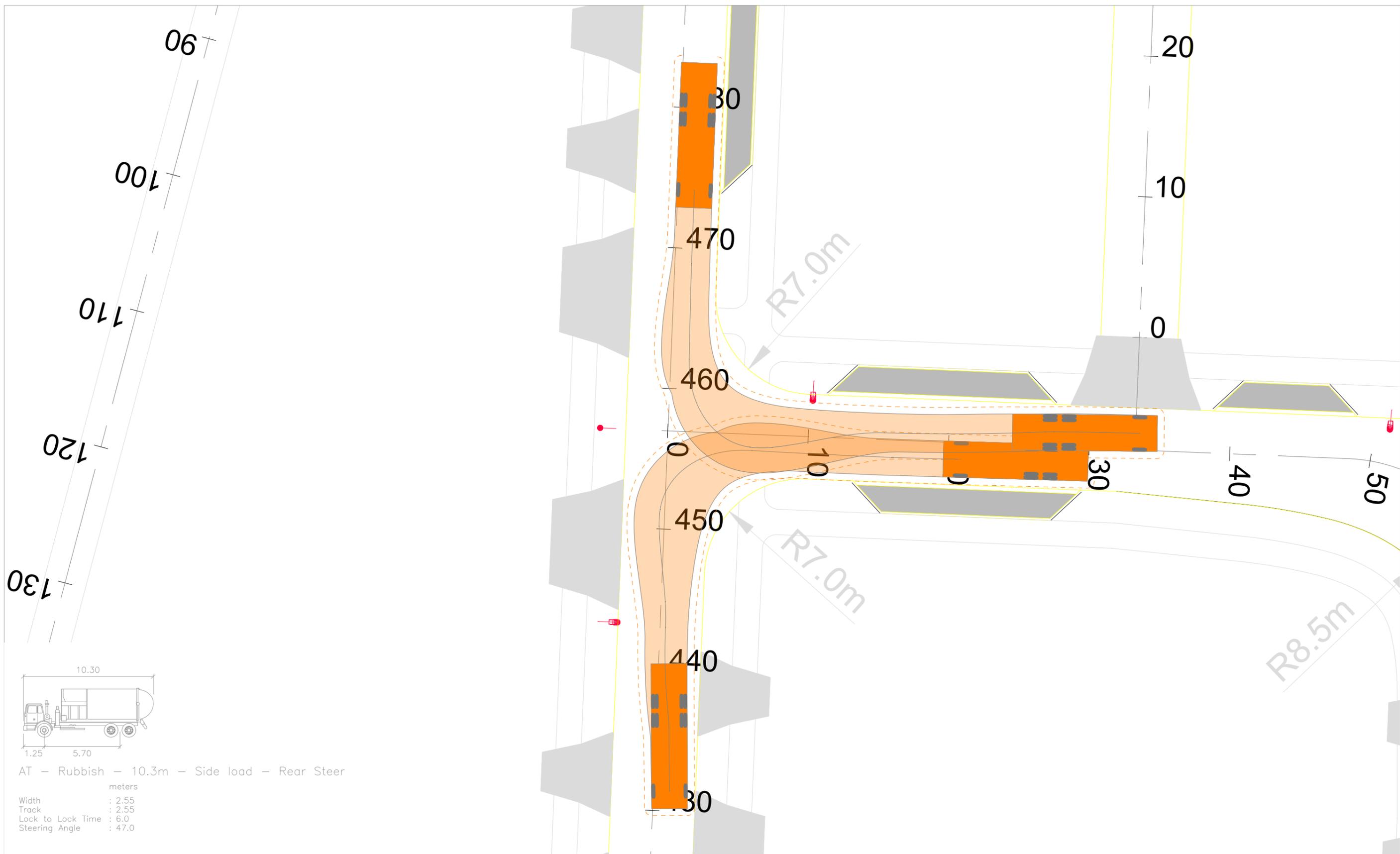
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 4B



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
22 December 2025

**Scale @ A3:**  
1:0.25

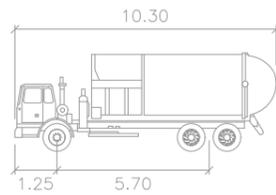
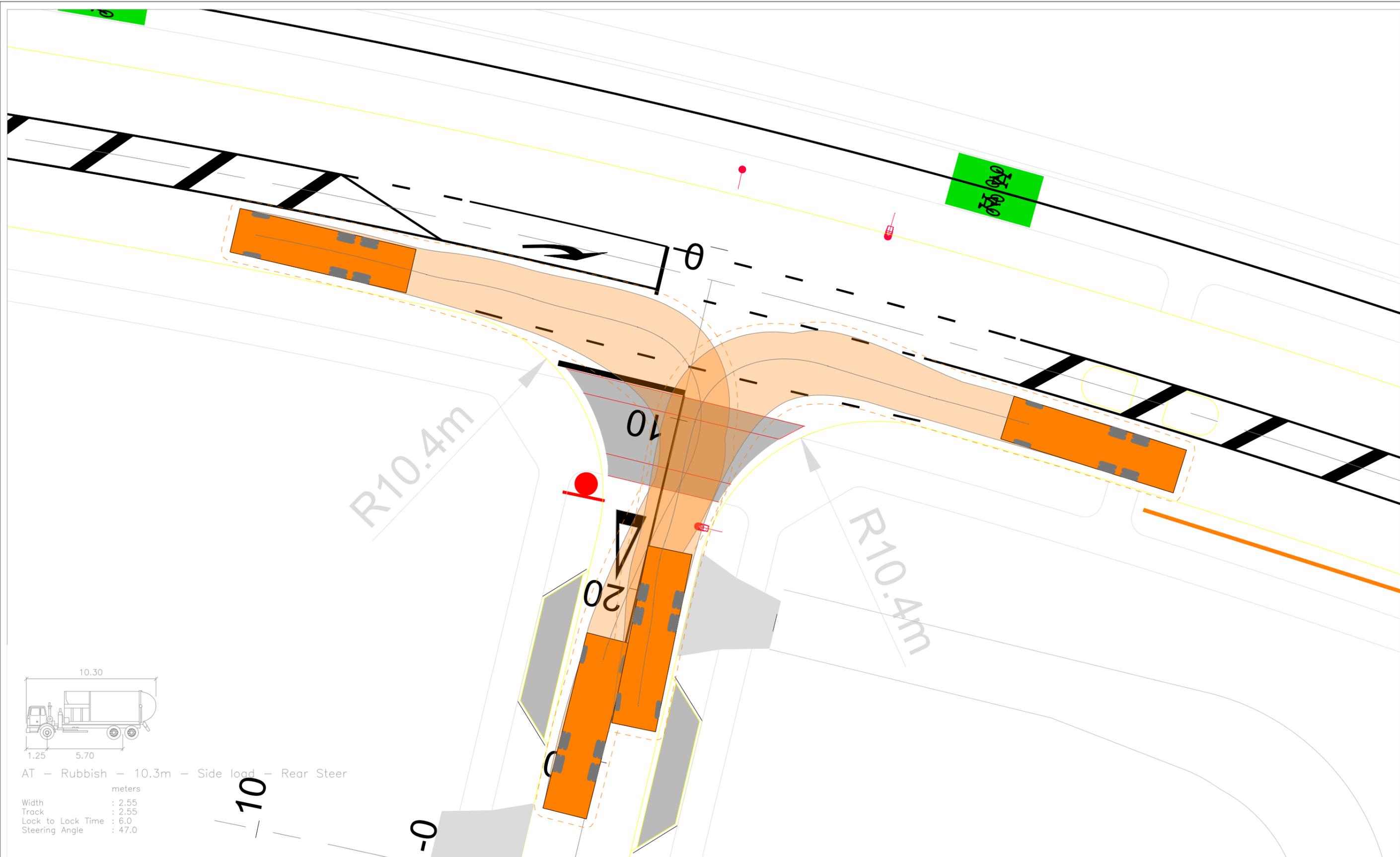
**Revision:**  
A

**Client:**

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
Intersection - Road 2 / Road 4 Northern



**Figure:**  
5B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

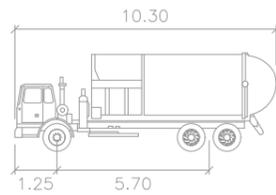
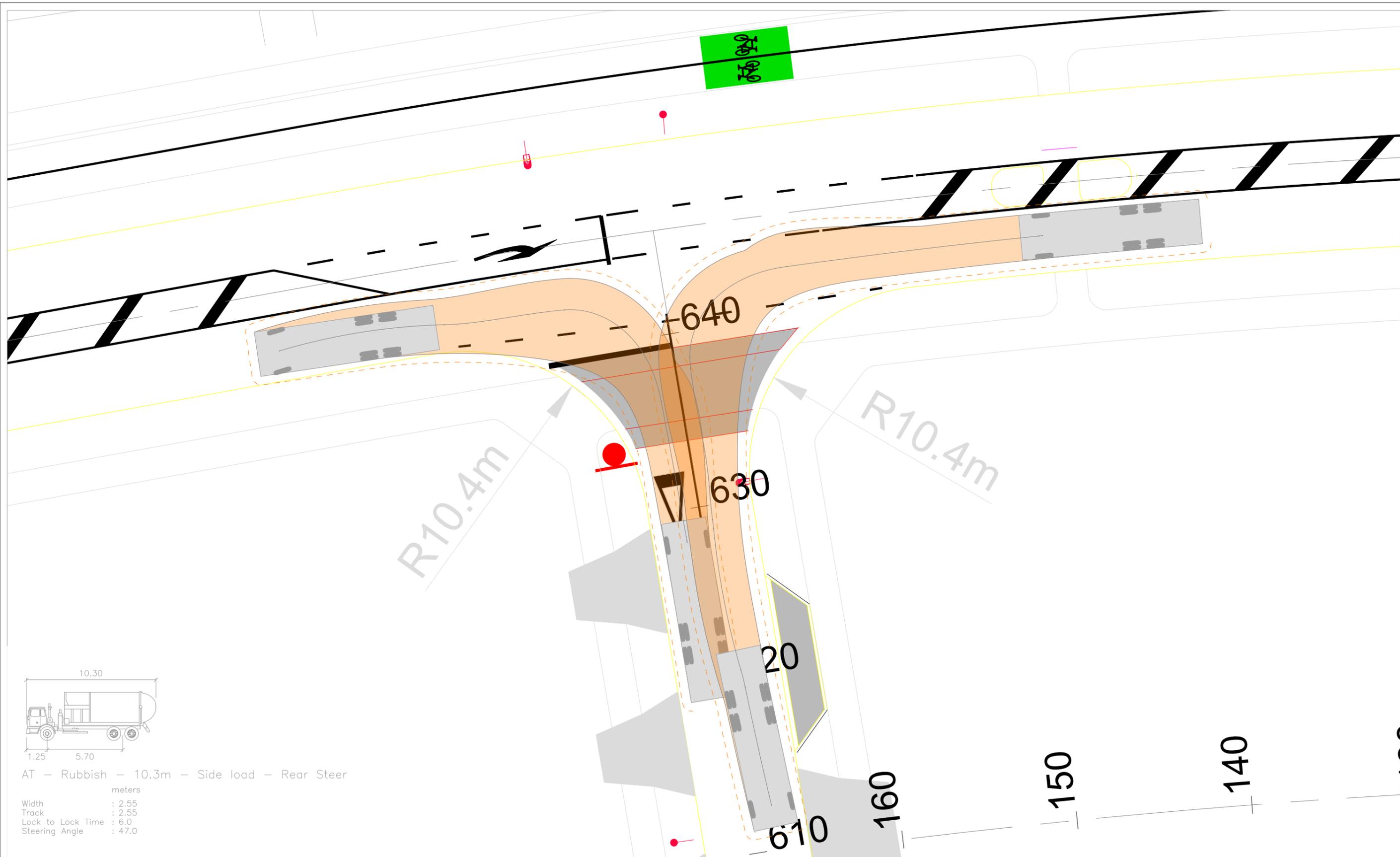
<b>Drawn by:</b> HA J003135	<b>Client:</b>
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<b>Project:</b> Delmore, Orewa Proposed Residential Development	<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT Intersection - Road 3 / NoR6
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<b>Date:</b> 22 December 2025	<b>Scale @ A3:</b> 1:0.2
<b>Revision:</b> A	



Figure:  
6B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 2 / NoR6

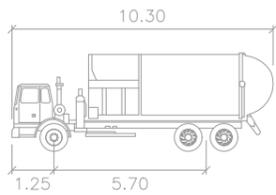
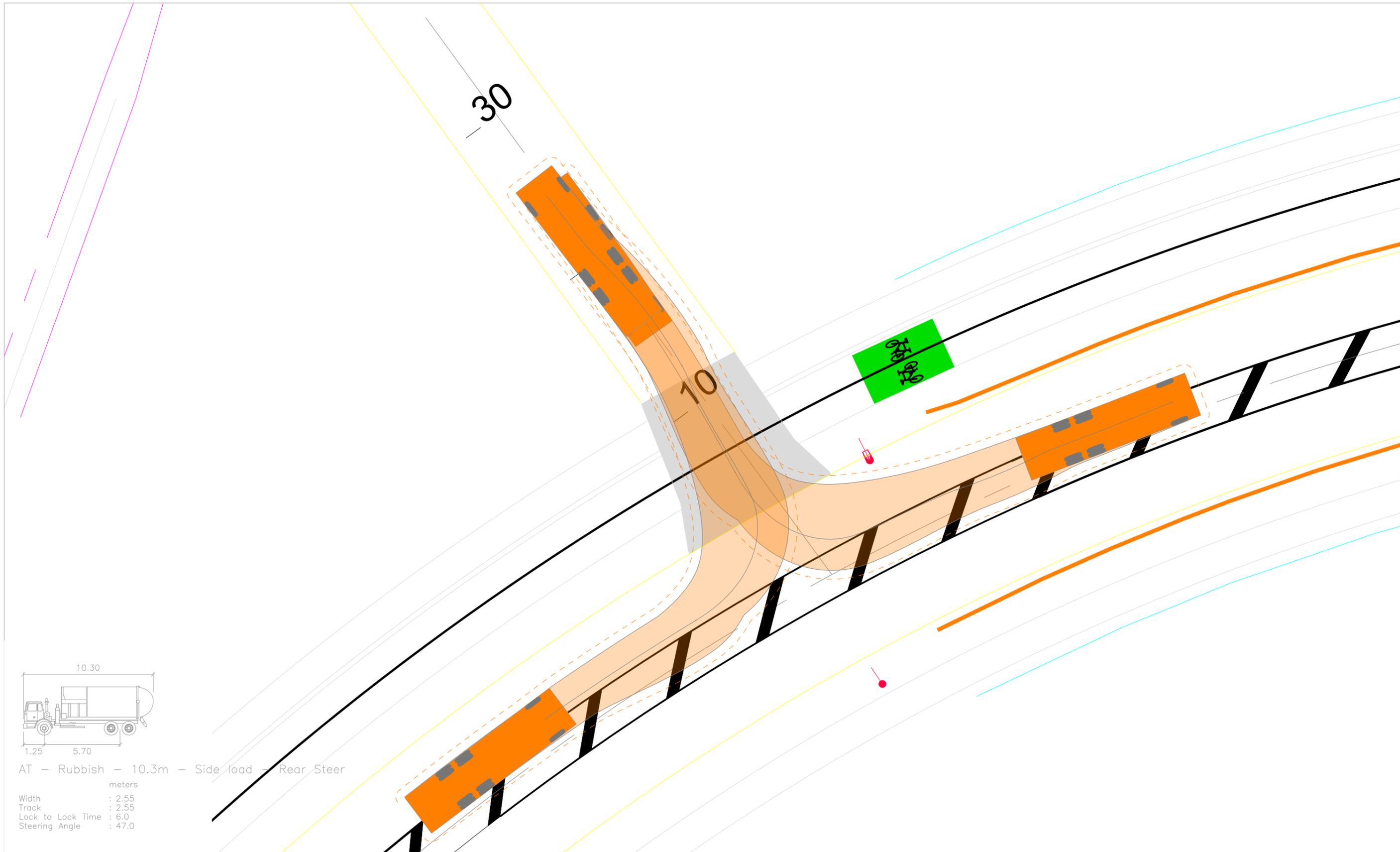
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 7B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**  
 [Blank]

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road X / NoR6

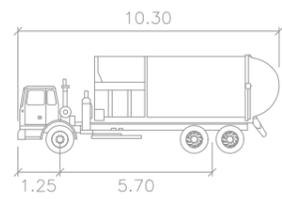
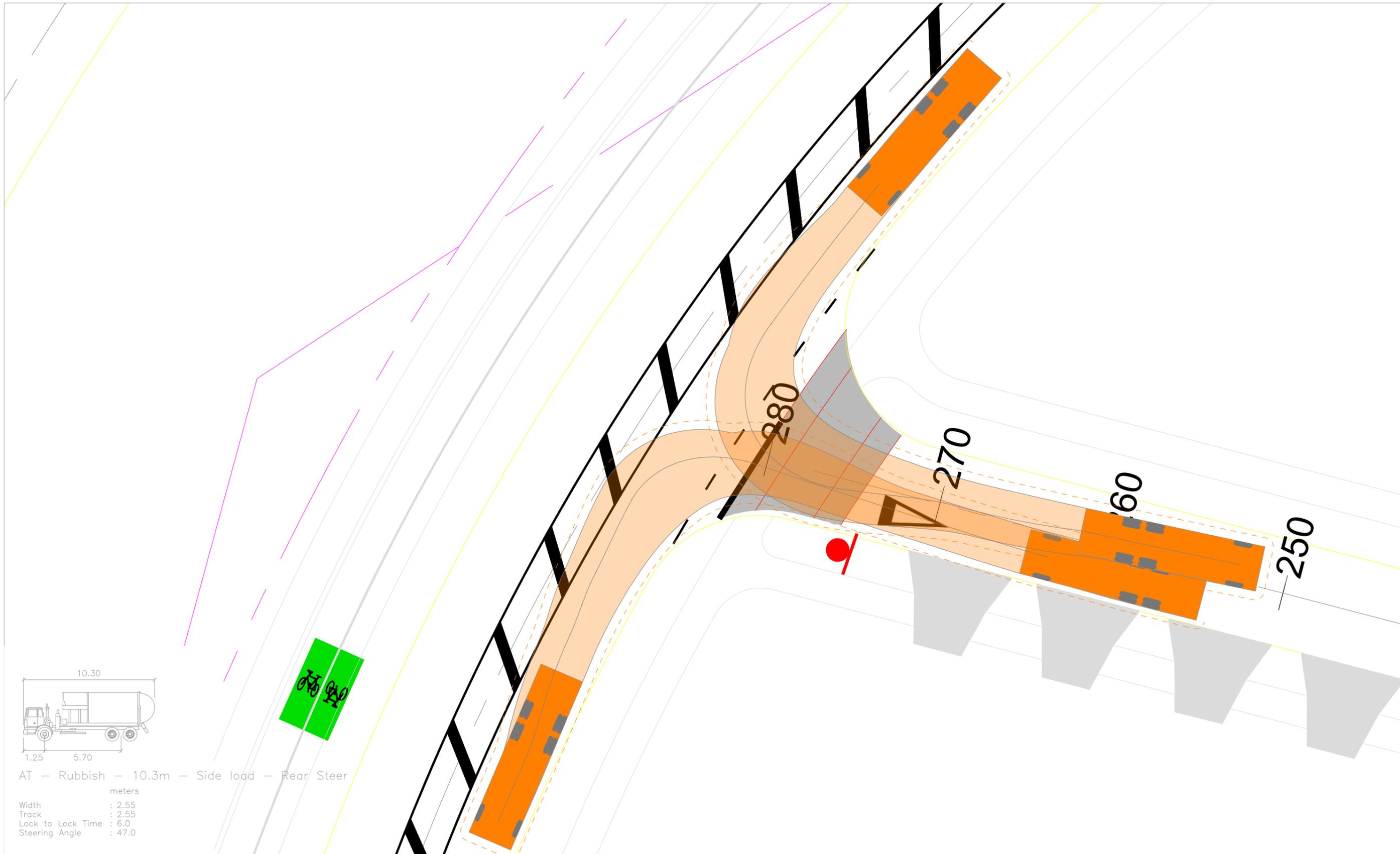
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 8B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 6 / NoR6

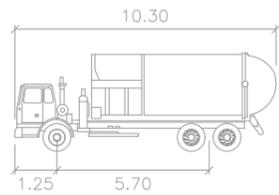
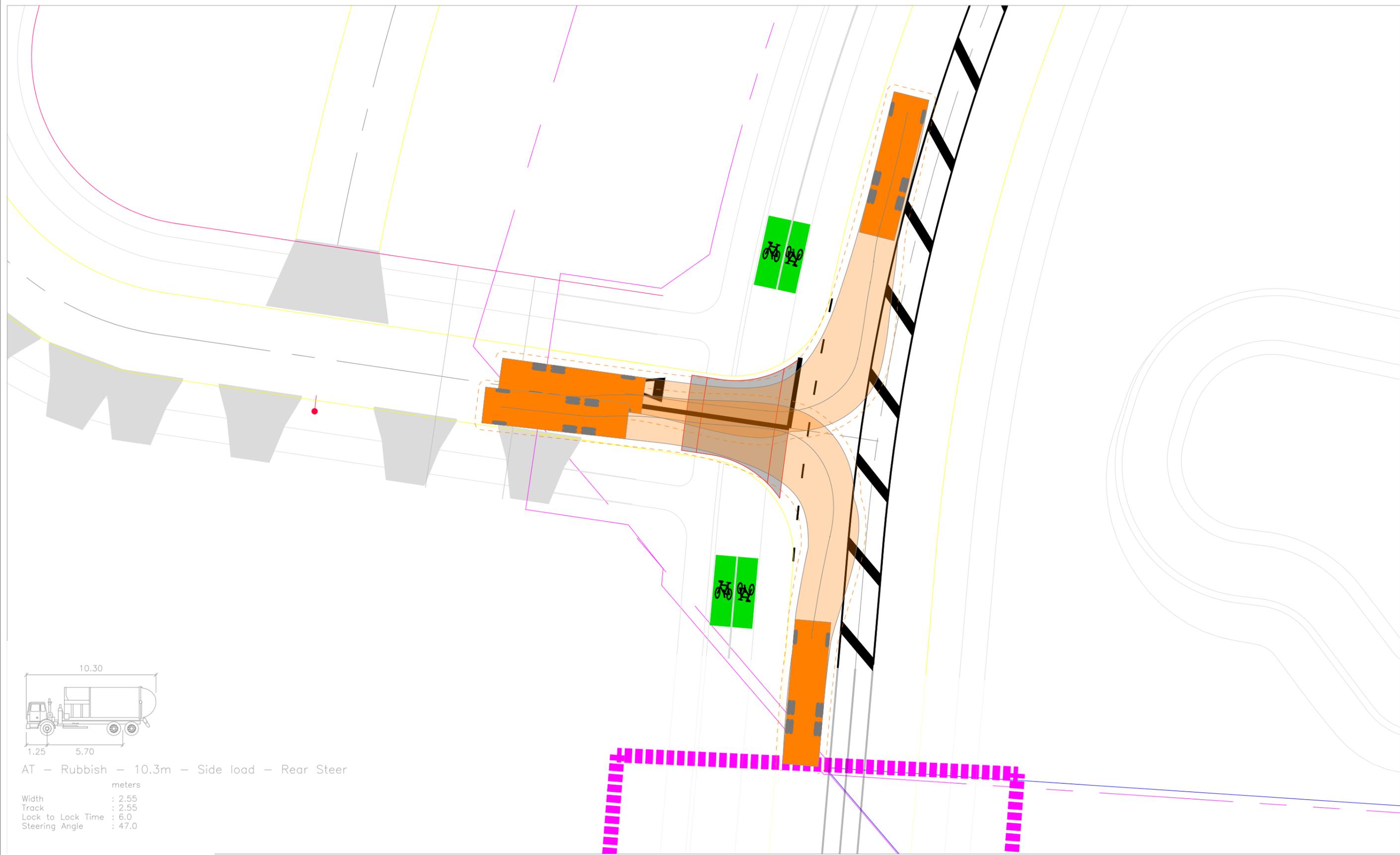
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 9B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 12 / NoR6

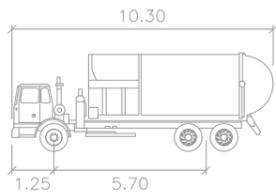
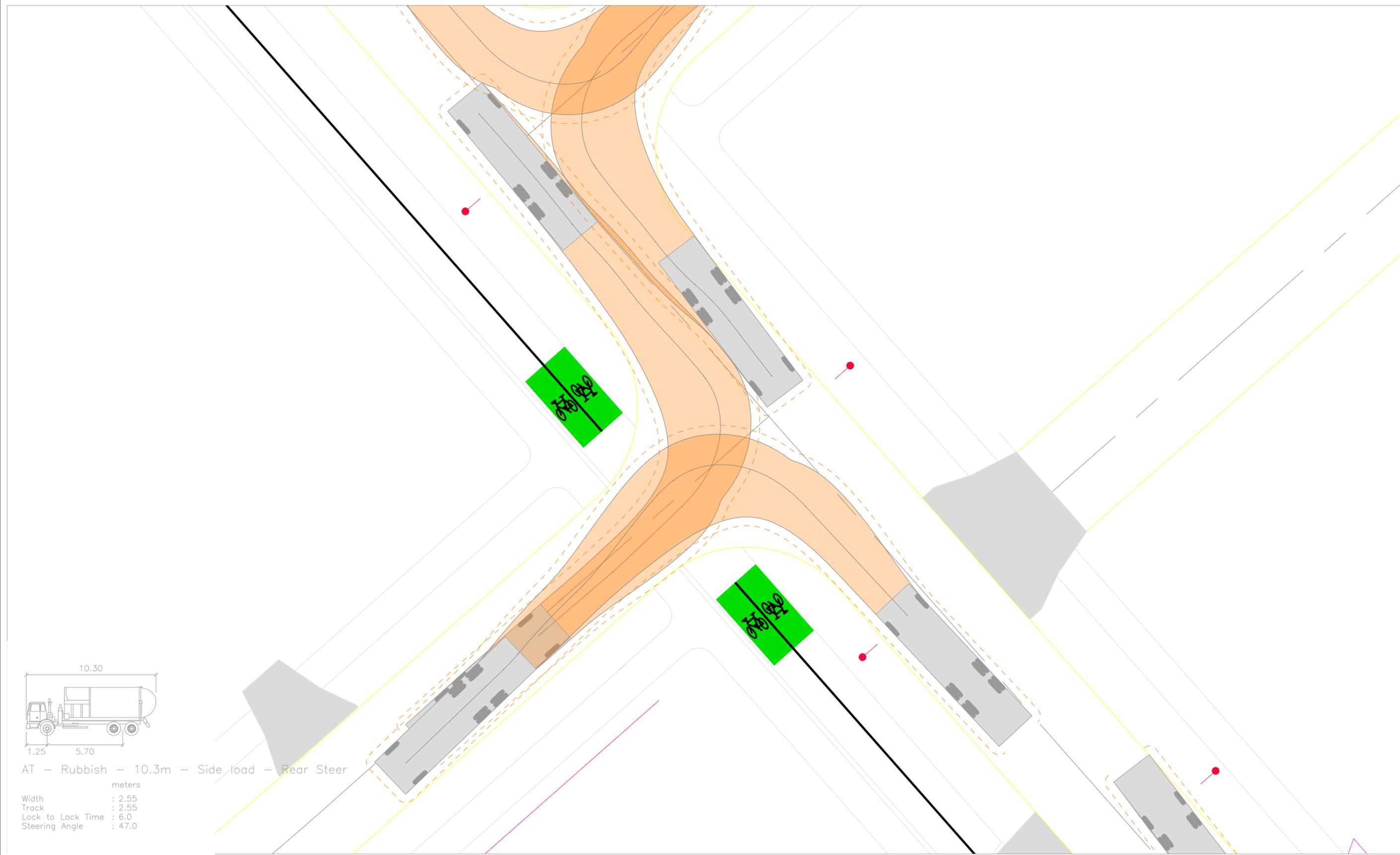
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A



**Figure:**  
 10B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 12 / Road 5

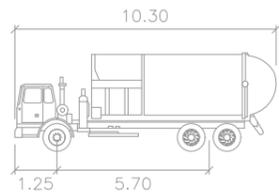
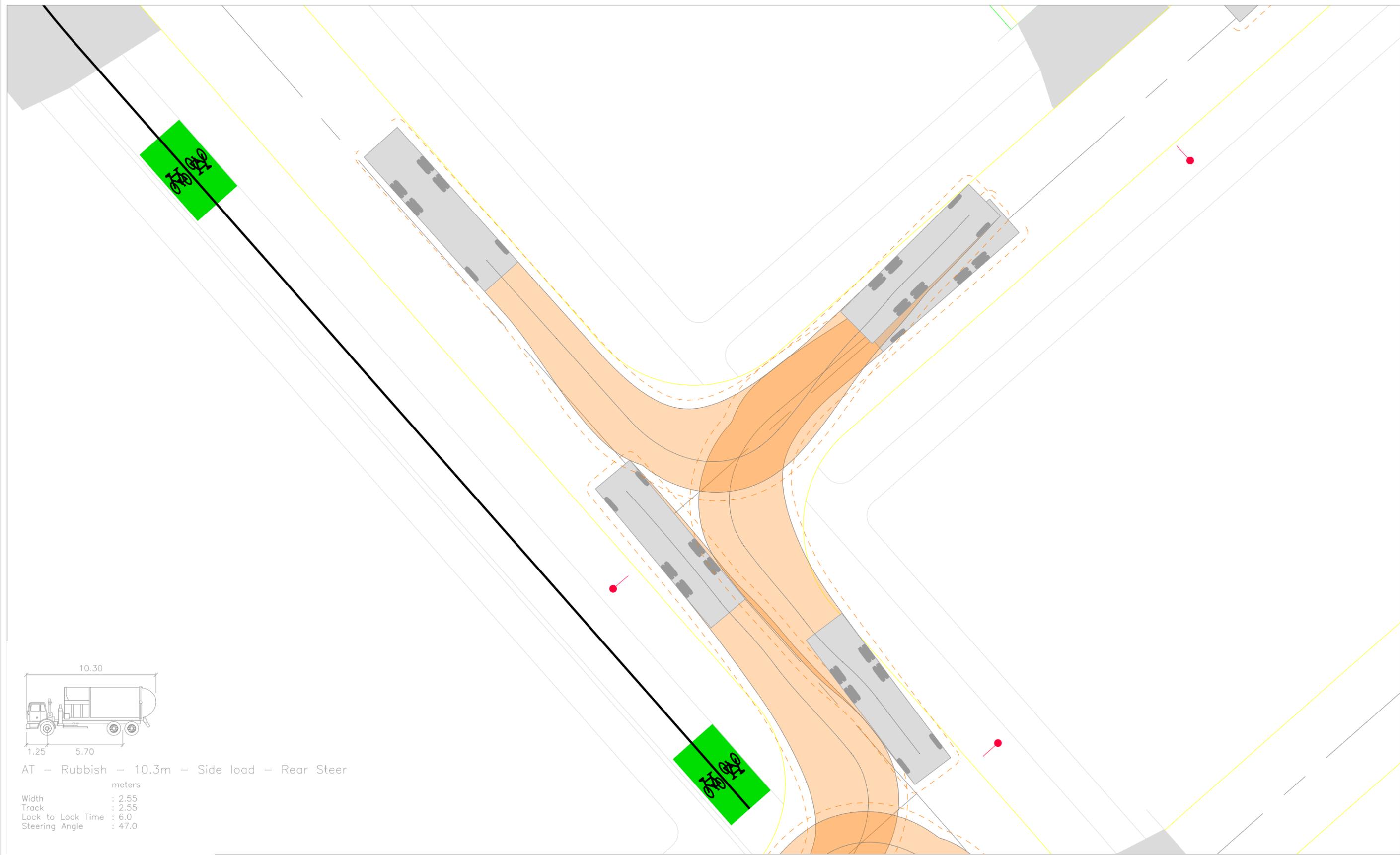
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 11B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 7 / Road 5

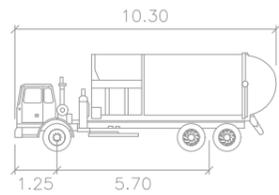
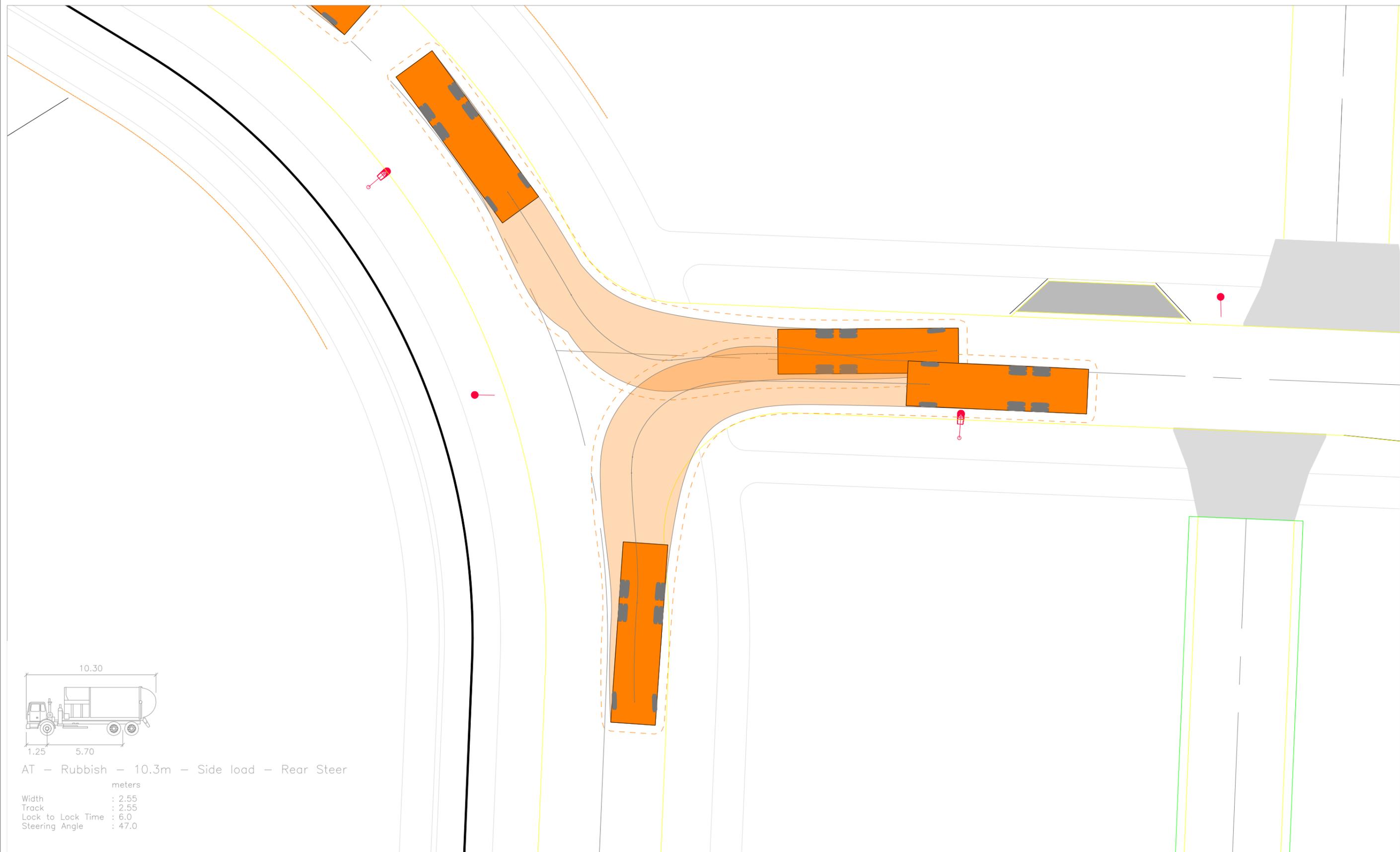
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 12B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 15 / Road 5

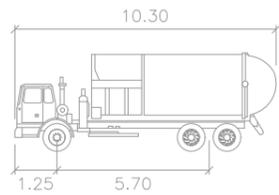
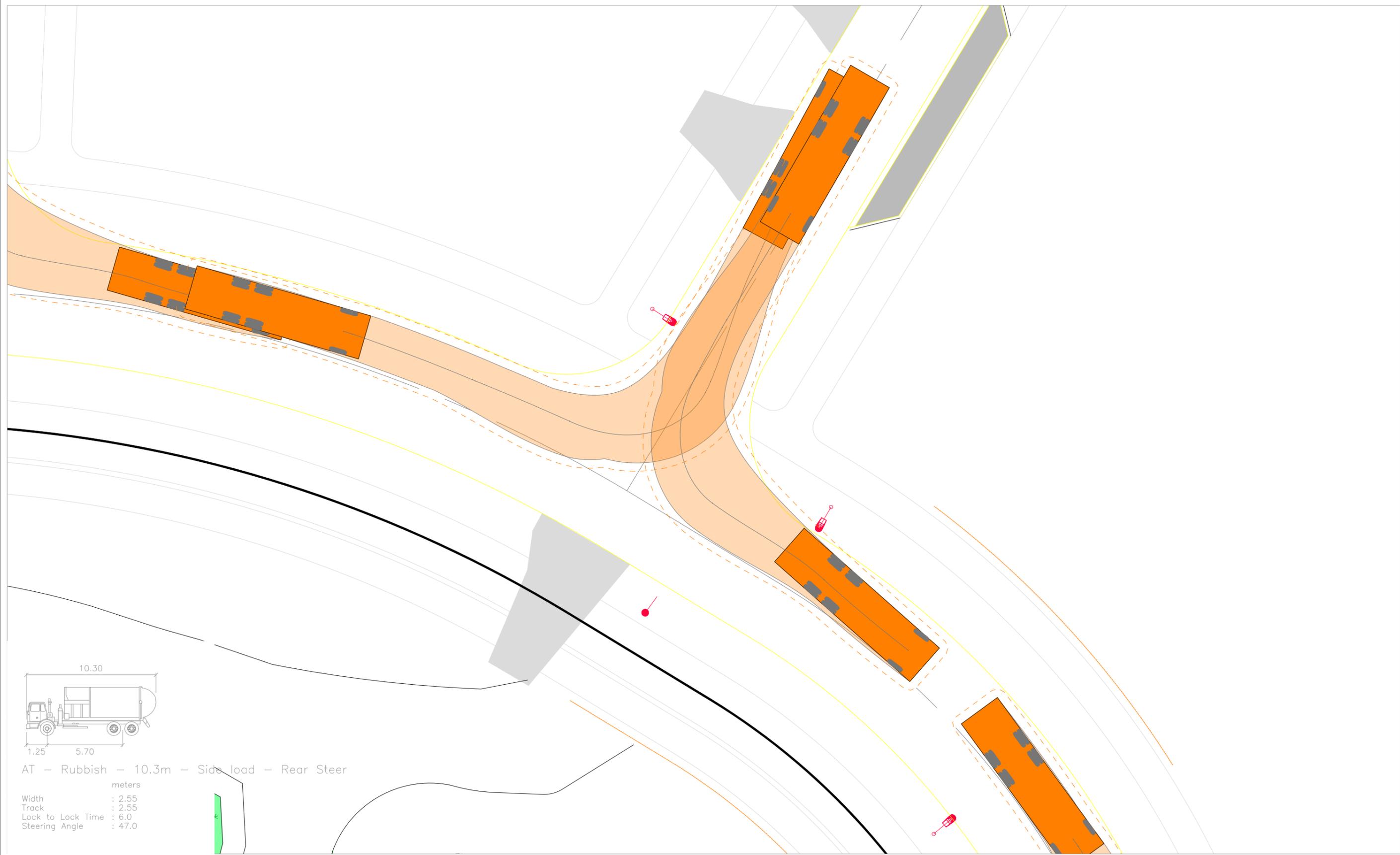
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 13B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 13 / Road 5

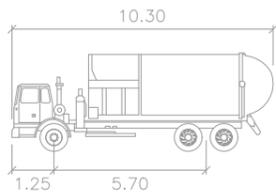
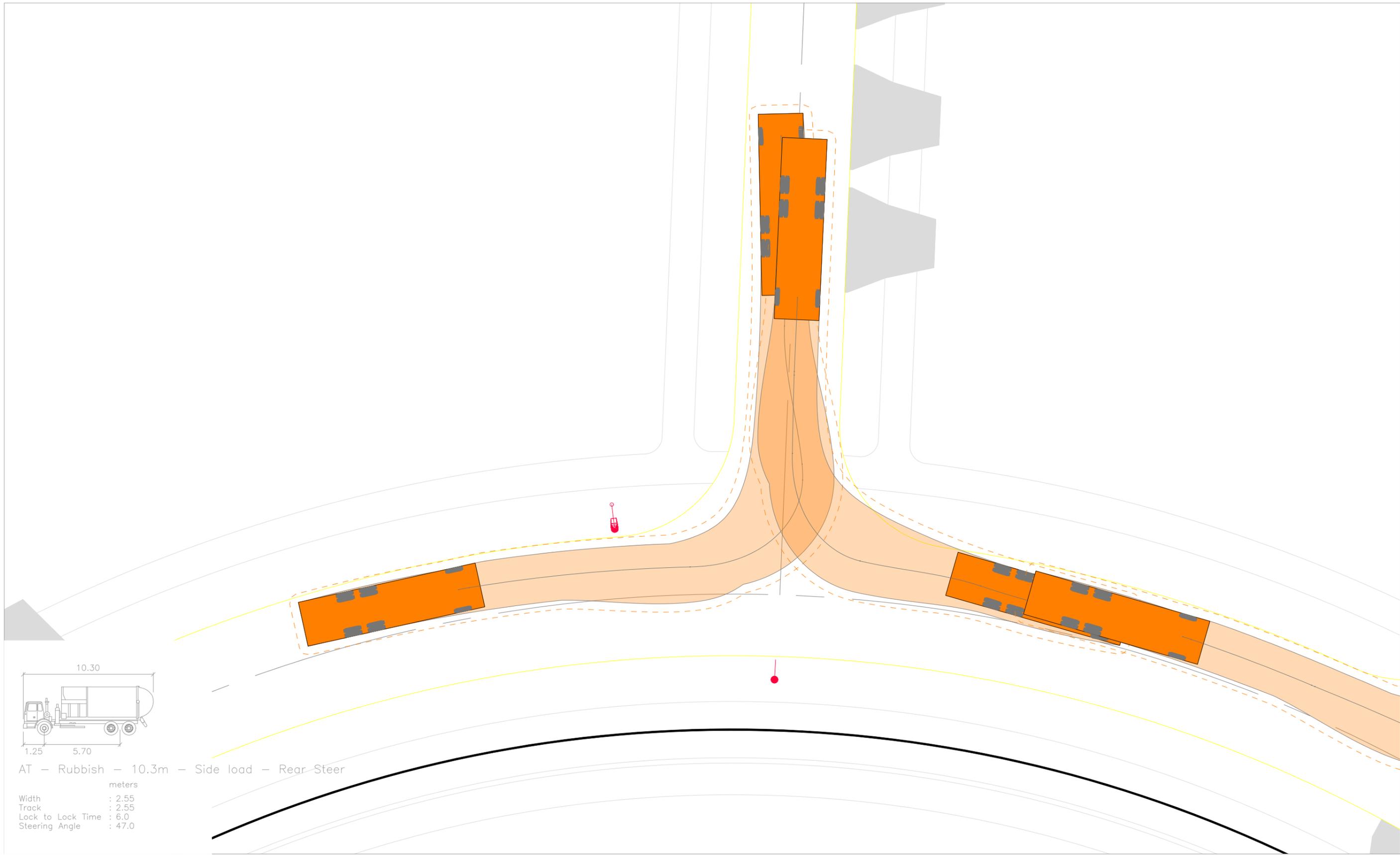
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 14B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**  
 [Blank]

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 14 / Road 5

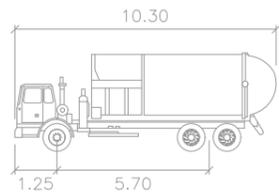
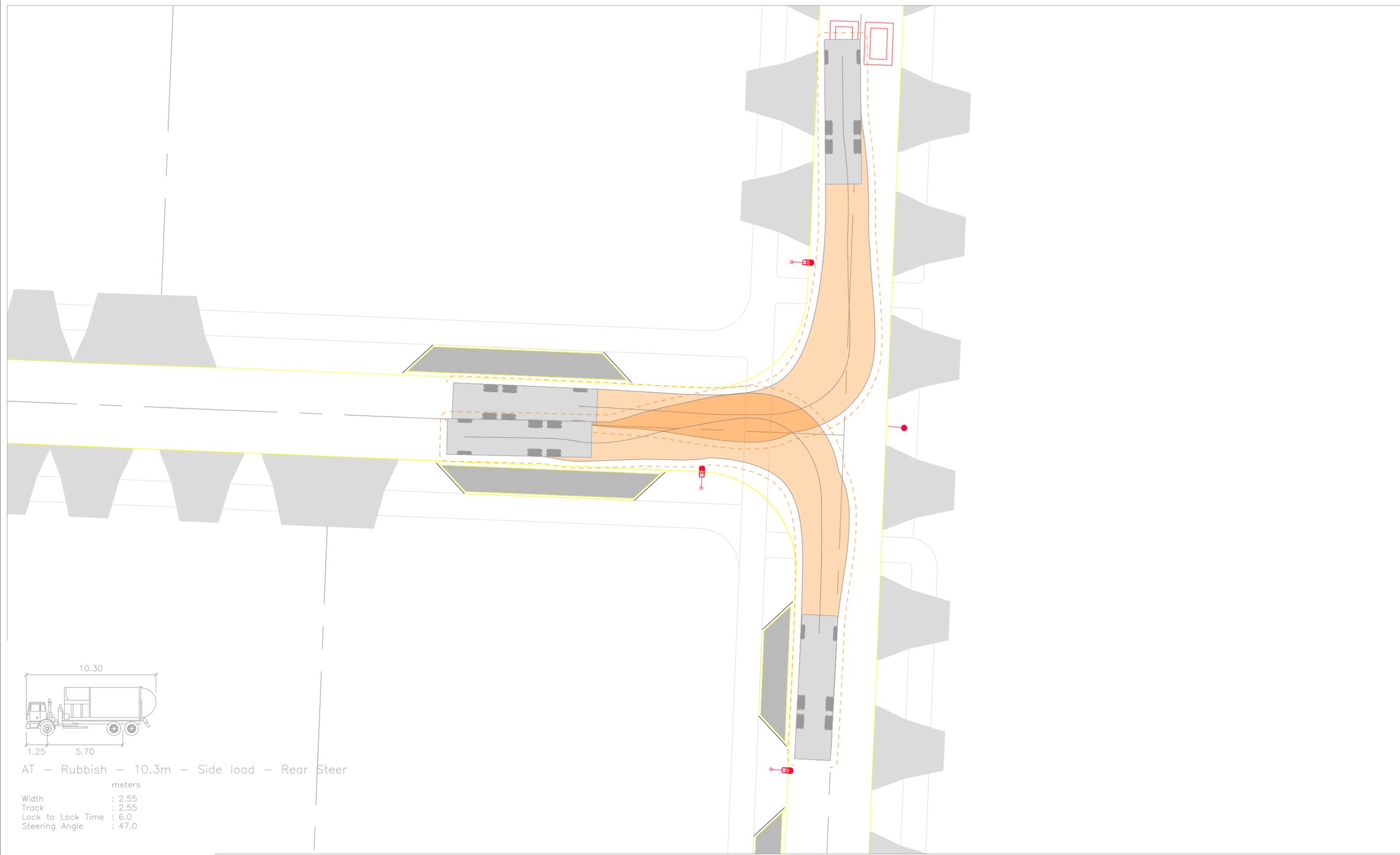
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 15B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 14 / Road 16

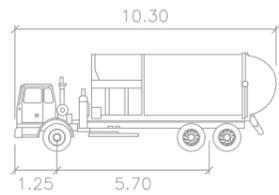
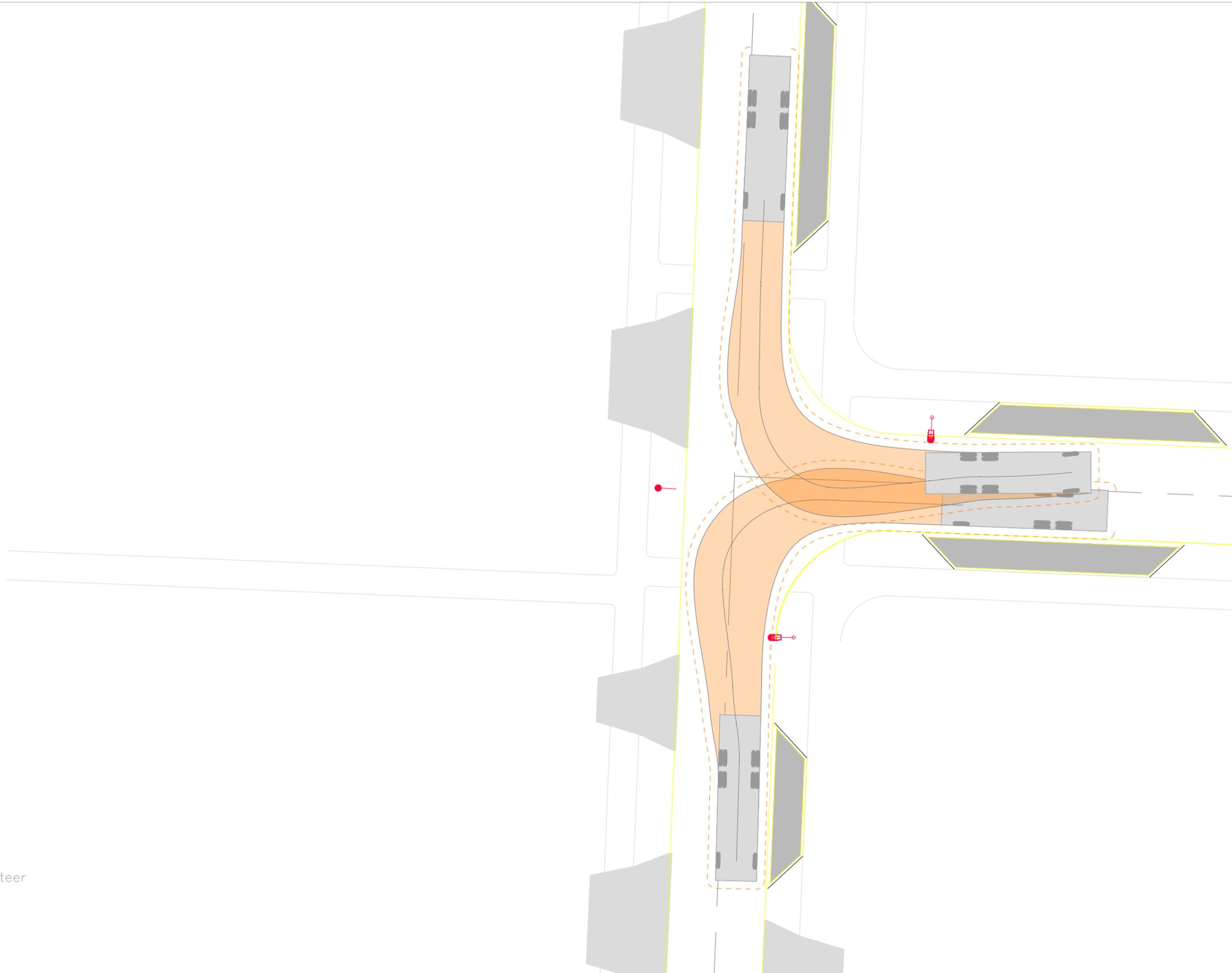
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A



**Figure:**  
 16B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 14 / Road 14

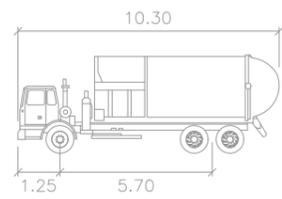
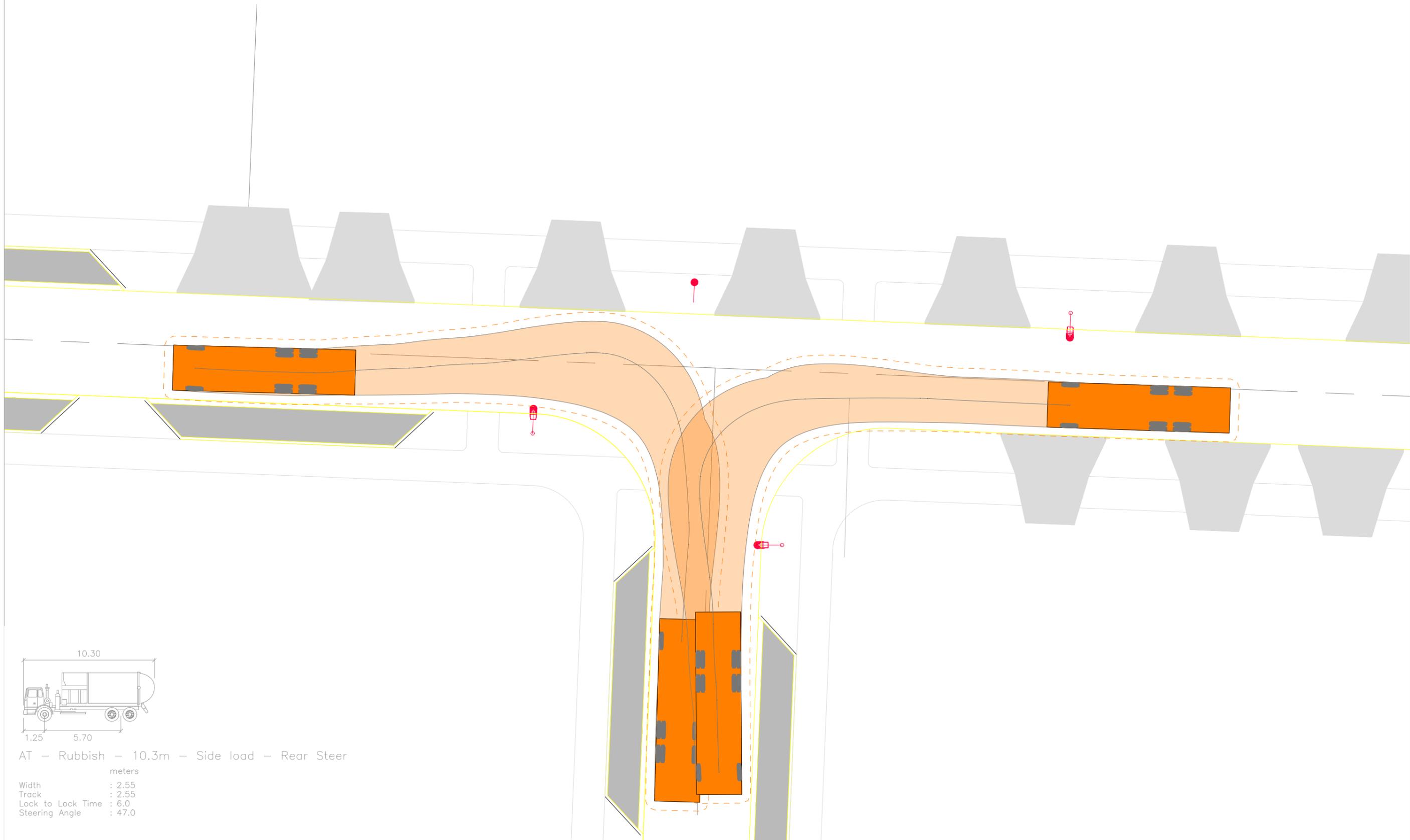
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A



**Figure:**  
 17B



AT - Rubbish - 10.3m - Side load - Rear Steer

Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Road 13 / Road 14

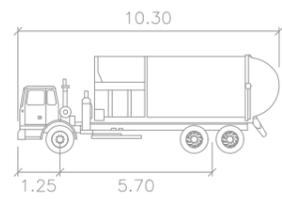
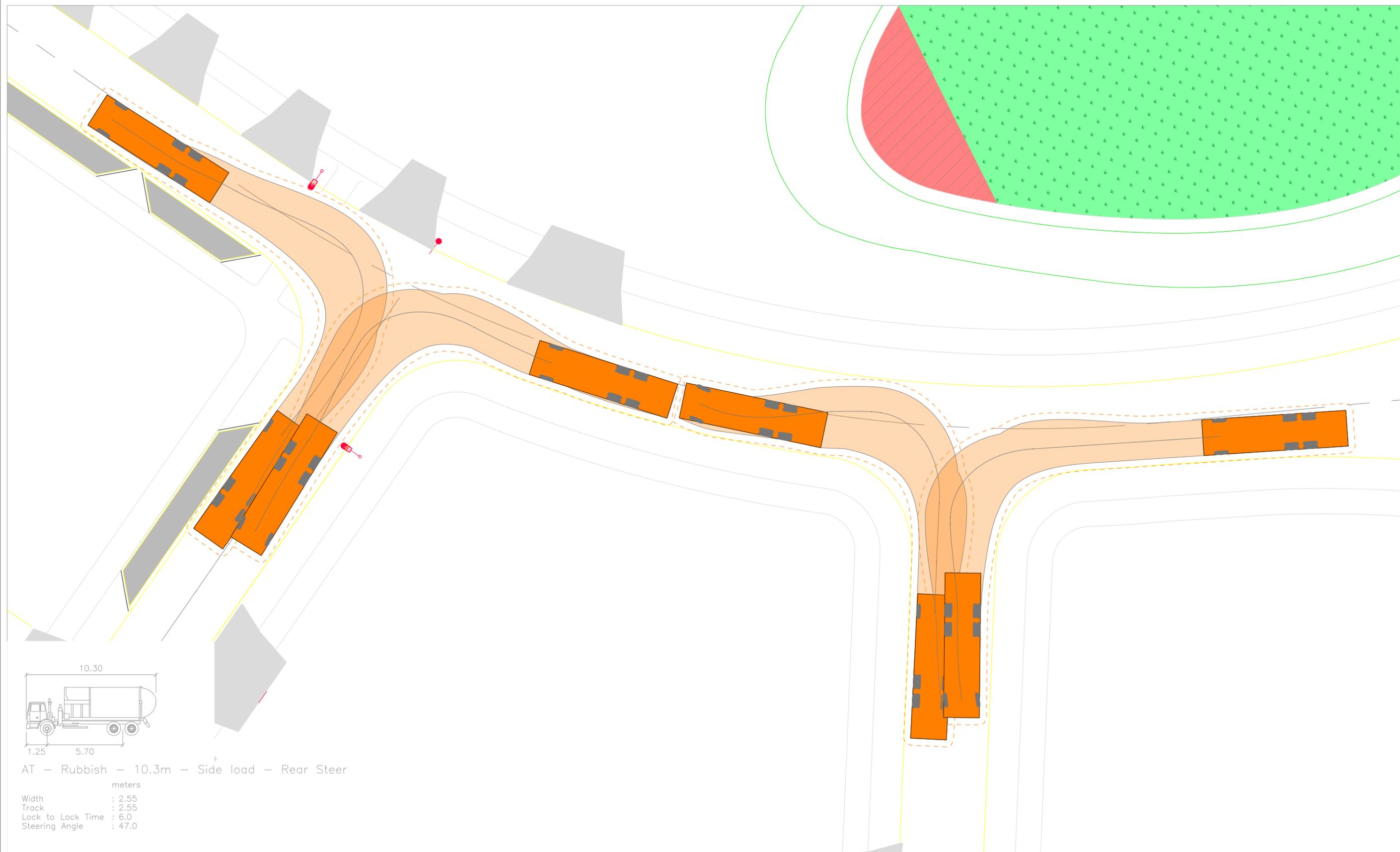
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 18B



AT – Rubbish – 10.3m – Side load – Rear Steer

- Width : 2.55
- Track : 2.55
- Lock to Lock Time : 6.0
- Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
Intersection - Roads 19 & 20 / Road 18

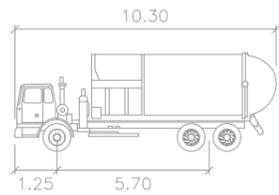
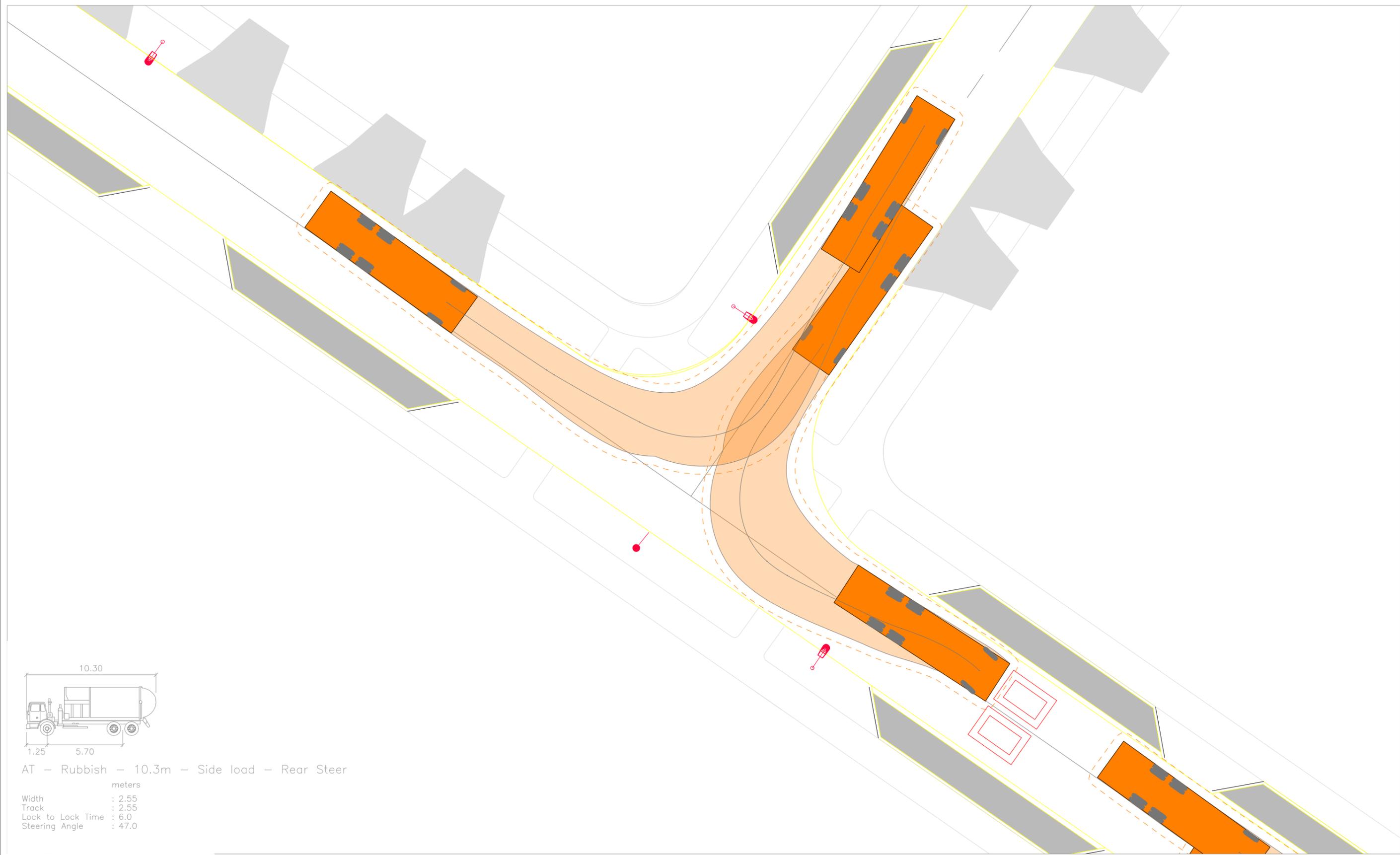
**Date:**  
22 December 2025

**Scale @ A3:**  
1:0.25

**Revision:**  
A



**Figure:**  
19B



AT – Rubbish – 10.3m – Side load – Rear Steer

	units
Width	: 2.55
Track	: 2.55
Lock to Lock Time	: 6.0
Steering Angle	: 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
Intersection - Roads 21 / Road 18

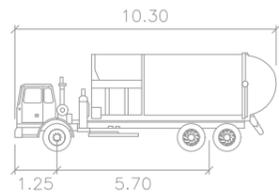
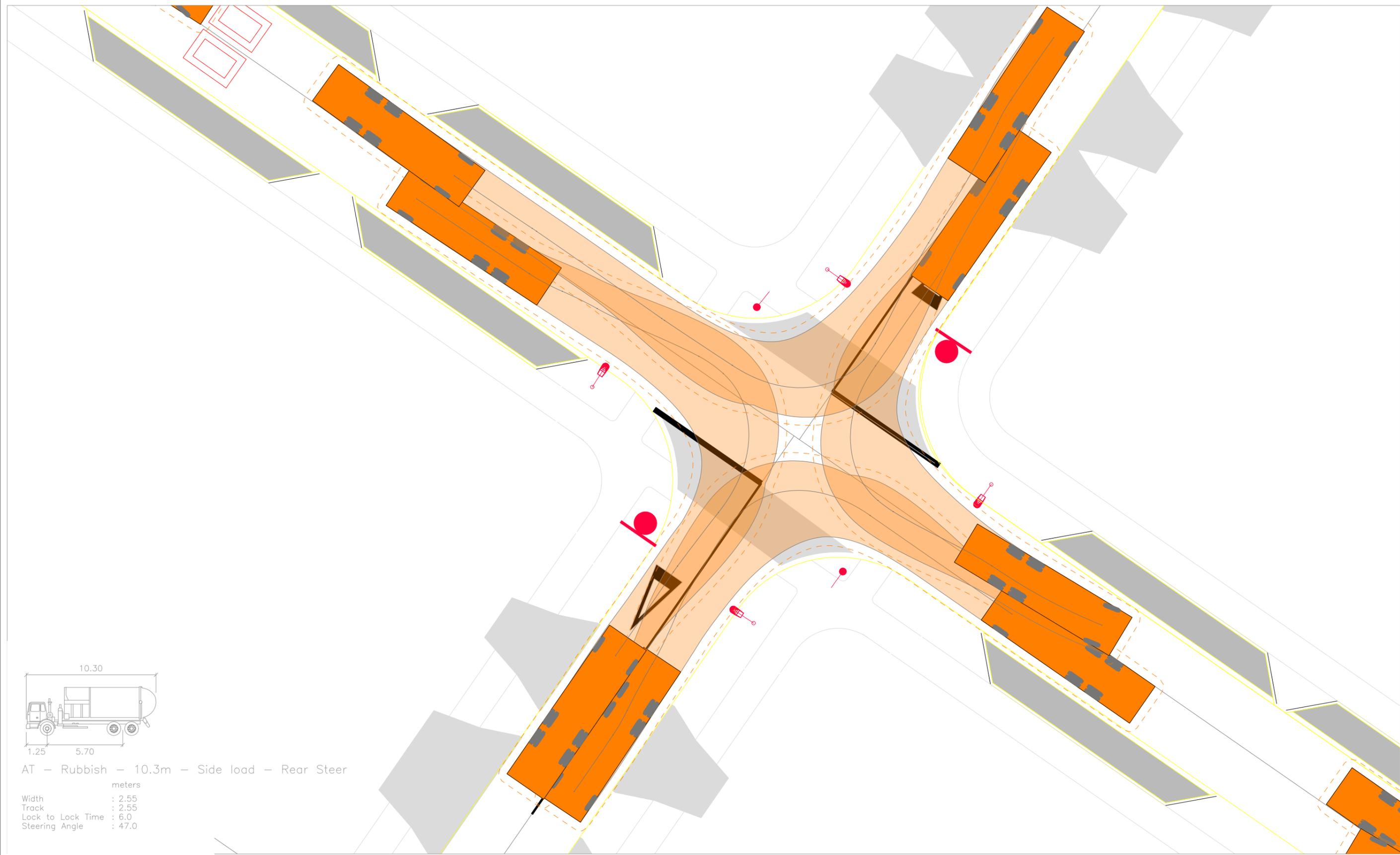
**Date:**  
22 December 2025

**Scale @ A3:**  
1:0.2

**Revision:**  
A



**Figure:**  
20B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 21 / Road 22 / Road 19

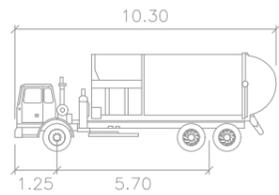
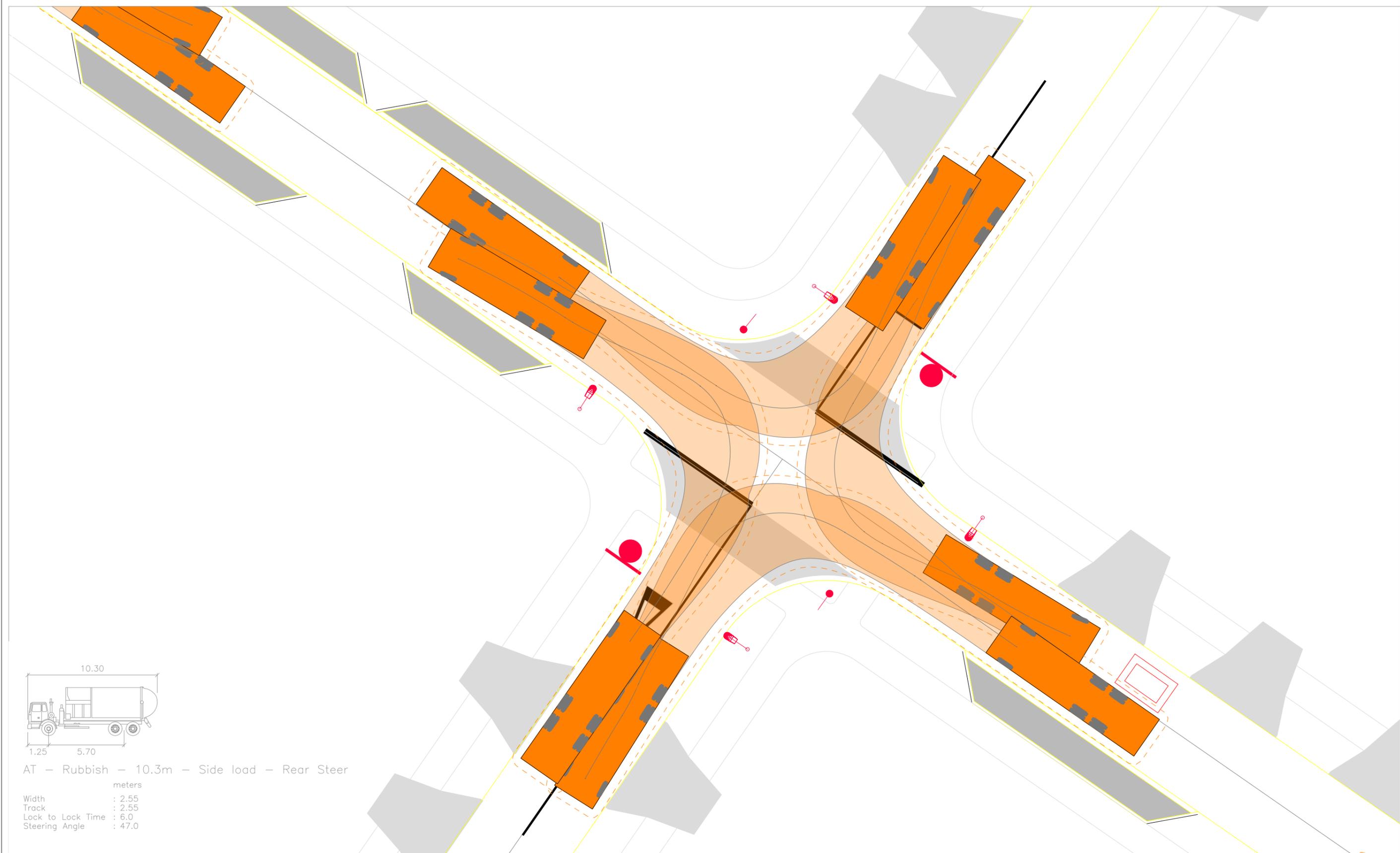
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 21B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 21 / Road 27 / Road 20

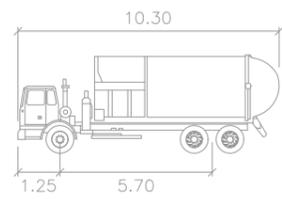
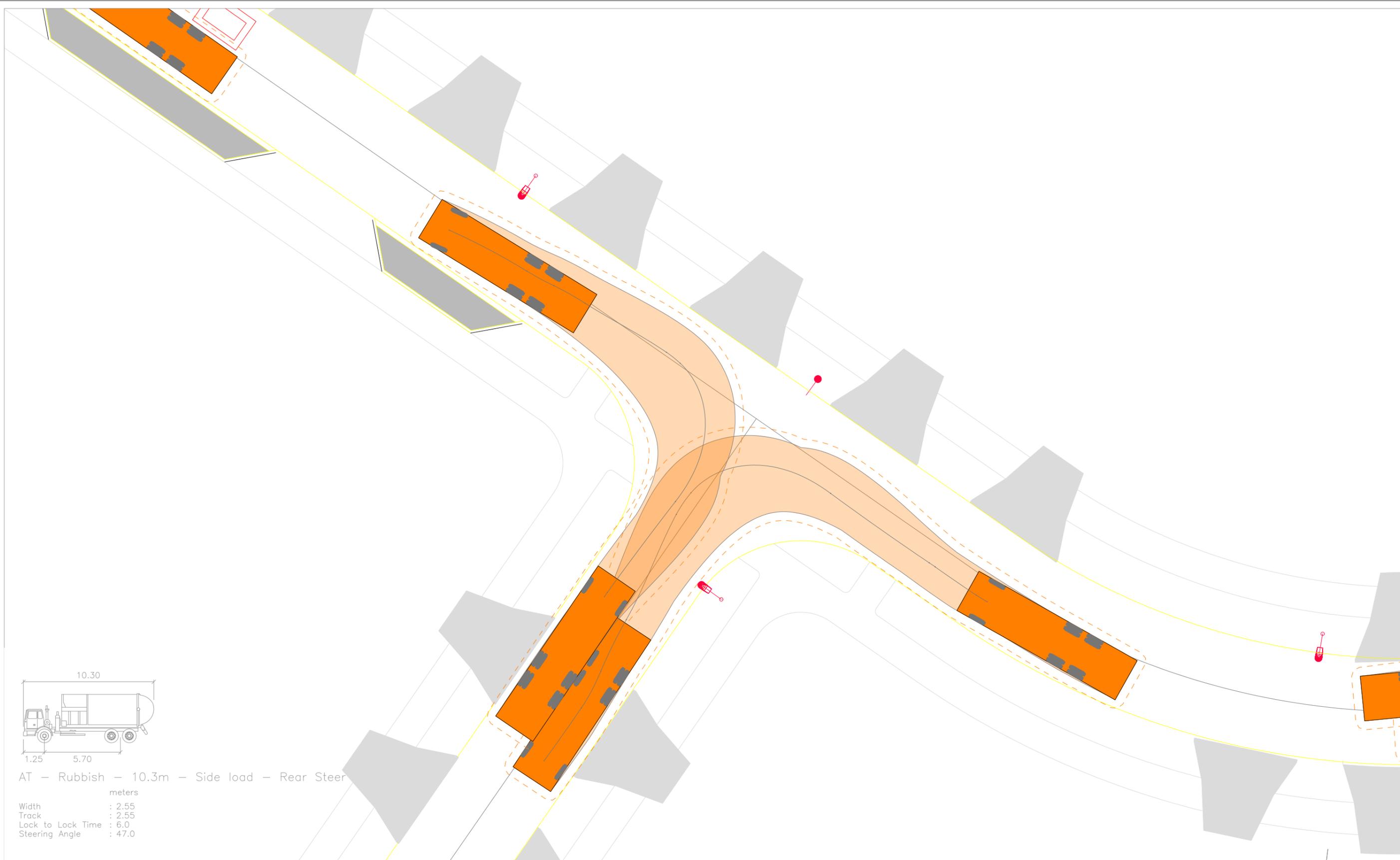
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 22B



AT - Rubbish - 10.3m - Side load - Rear Steer

Width : 2.55 meters  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 21 / Road 26

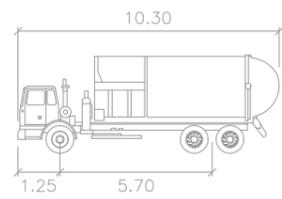
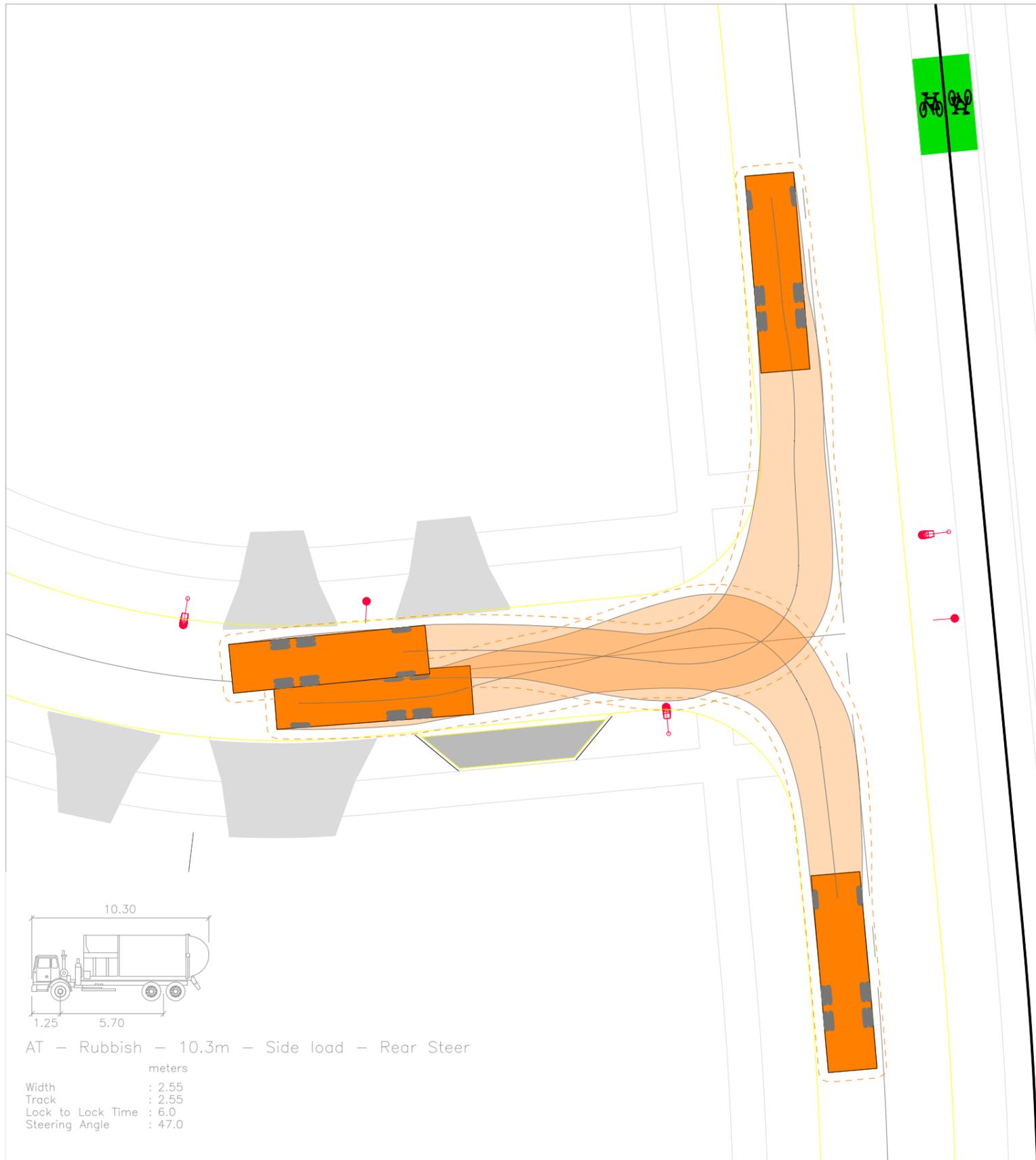
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 23B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 21 / Road 17

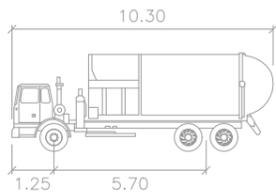
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A



**Figure:**  
 24B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 22 / Road 27

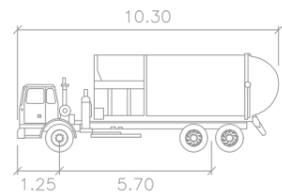
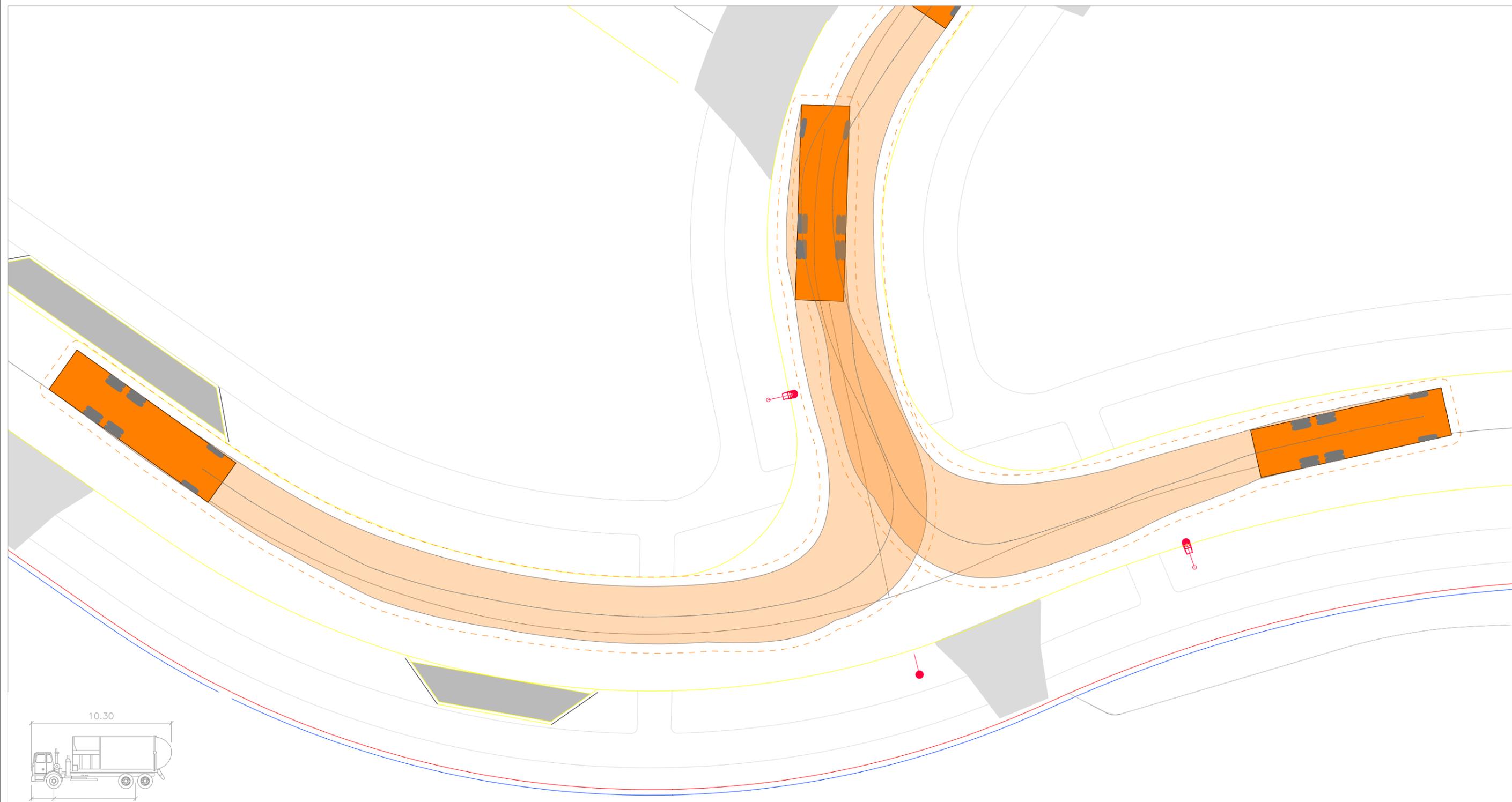
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 25B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters

Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 22 / Road 26

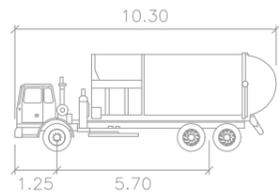
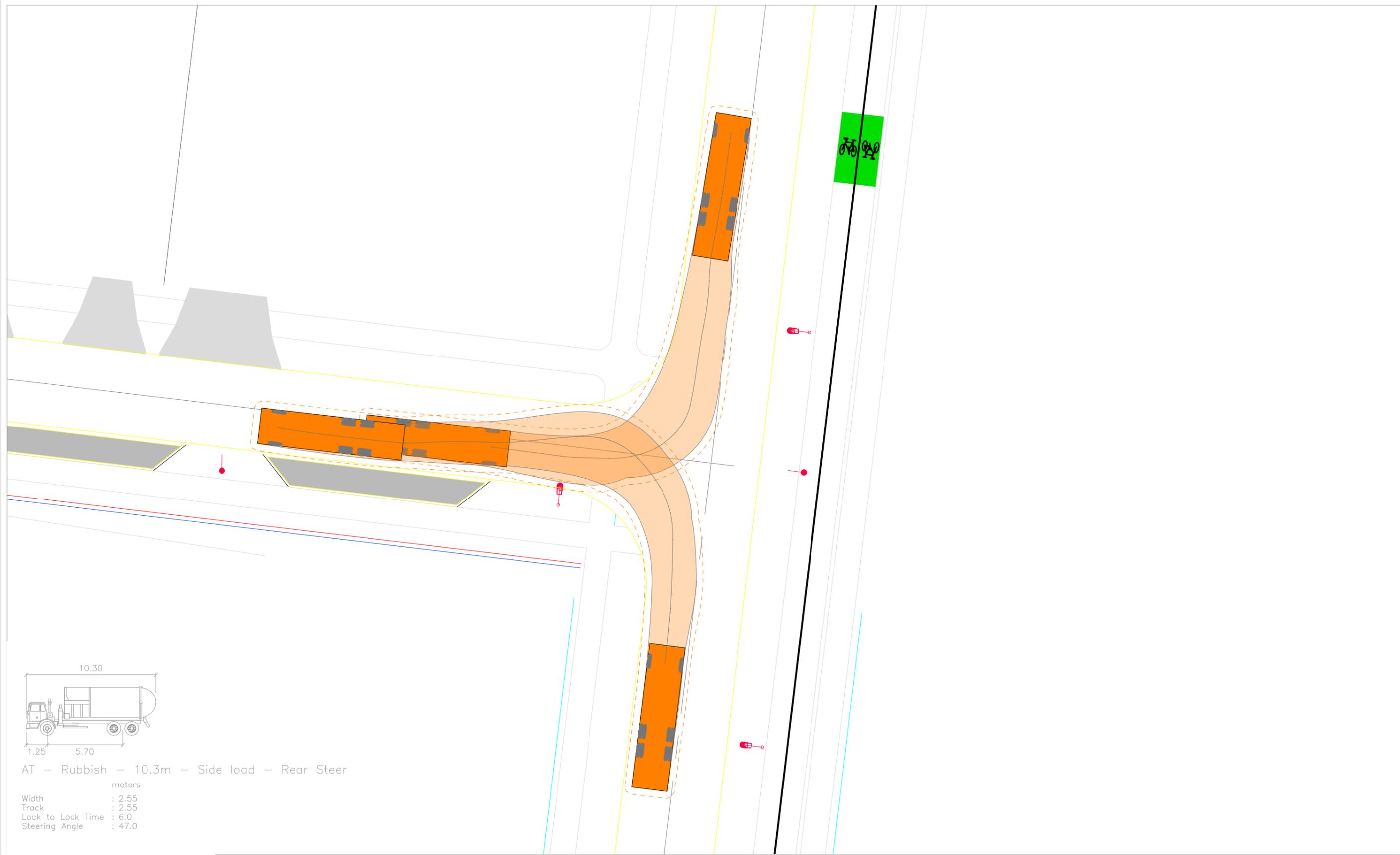
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 26B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 22 / Road 17

**Date:**  
 22 December 2025

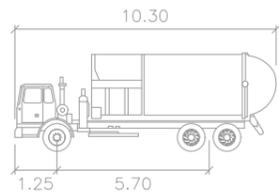
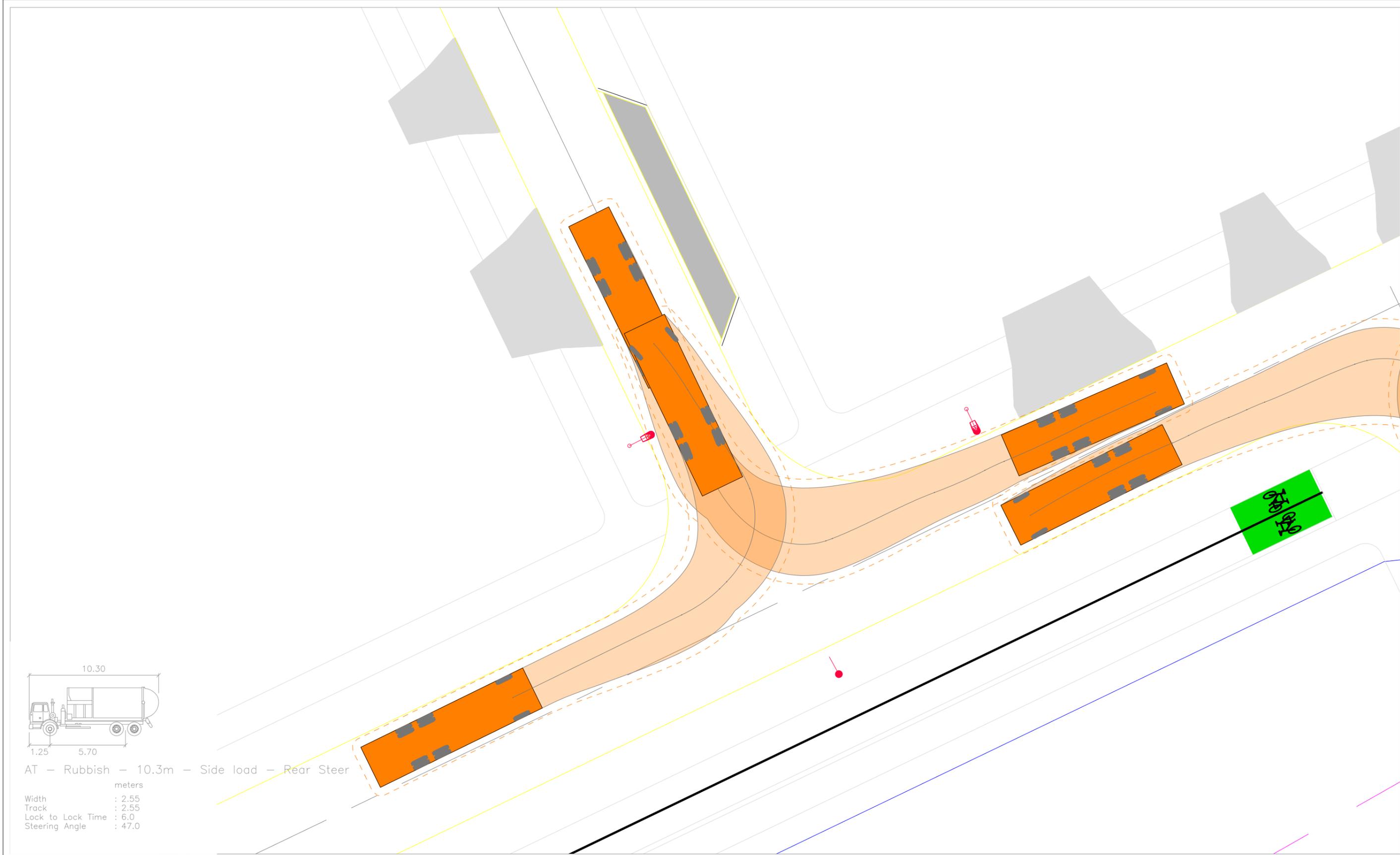
**Scale @ A3:**  
 1:0.25

**Revision:**  
 A



**Figure:**  
 27B





AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 24 / Road 17

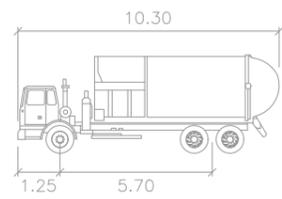
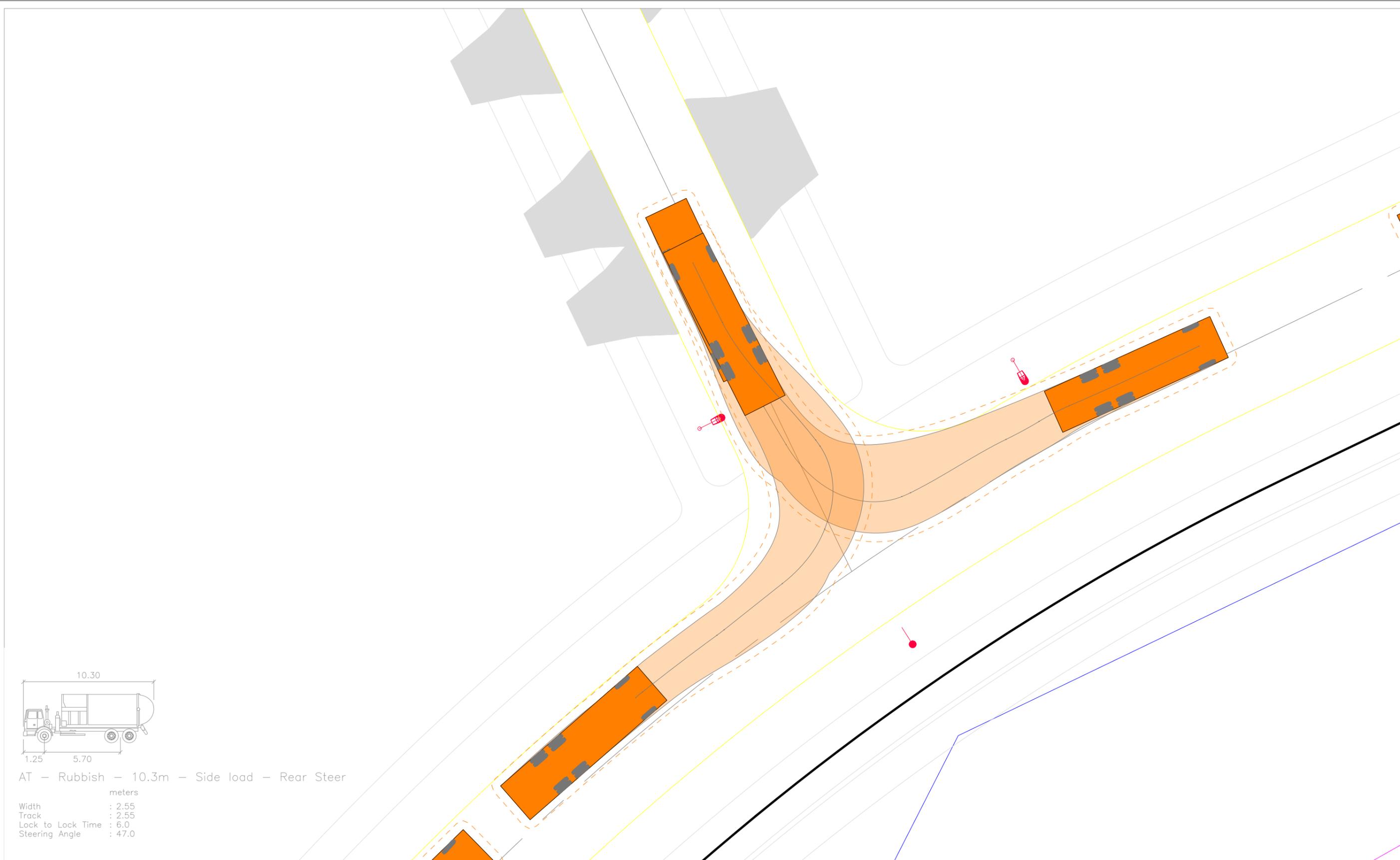
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 29B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 25 / Road 17

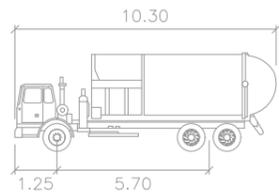
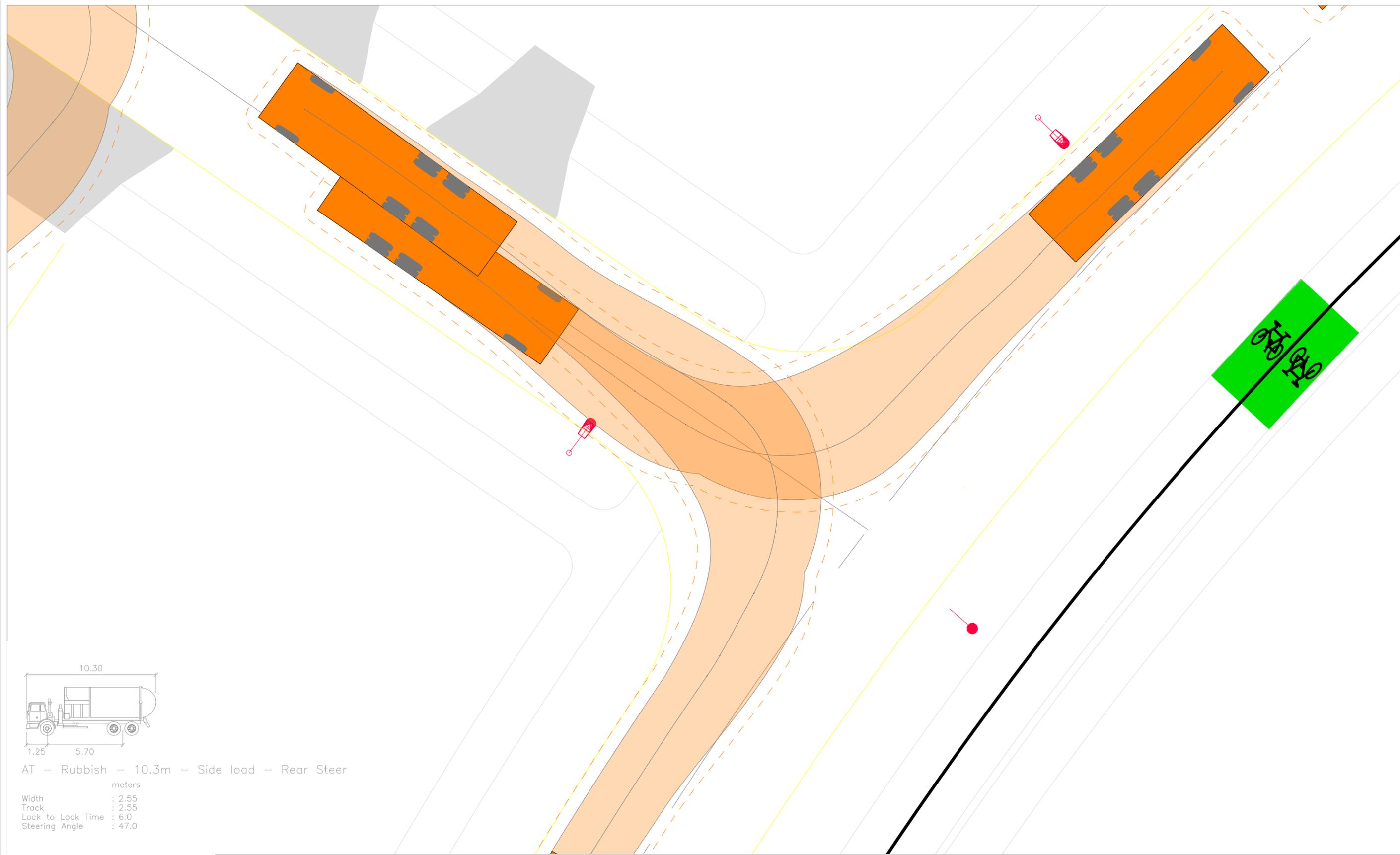
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 30B



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 25 / Road 17

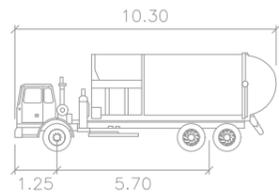
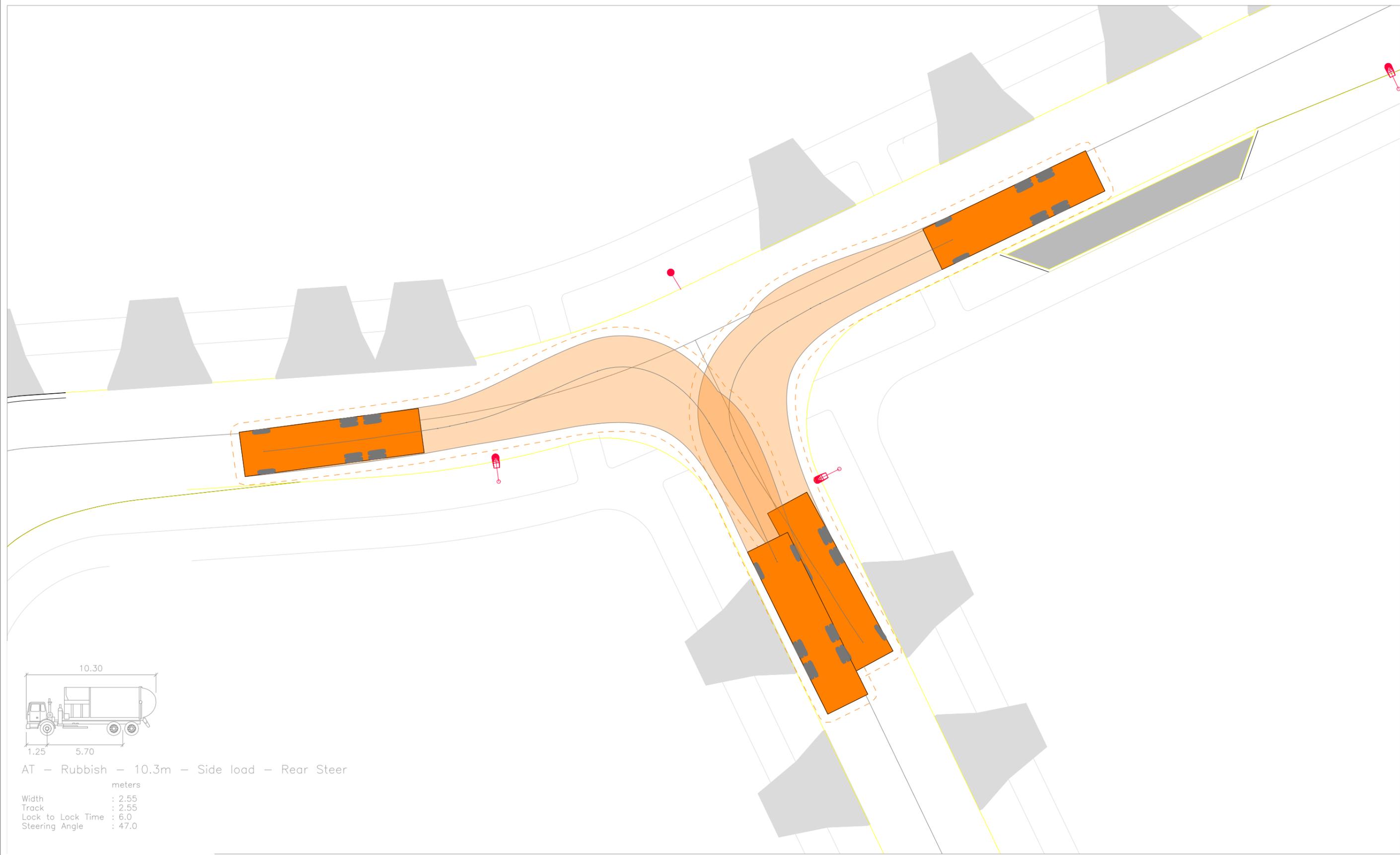
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.1333

**Revision:**  
 A



**Figure:**  
 31B



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Intersection - Roads 25 / Road 24

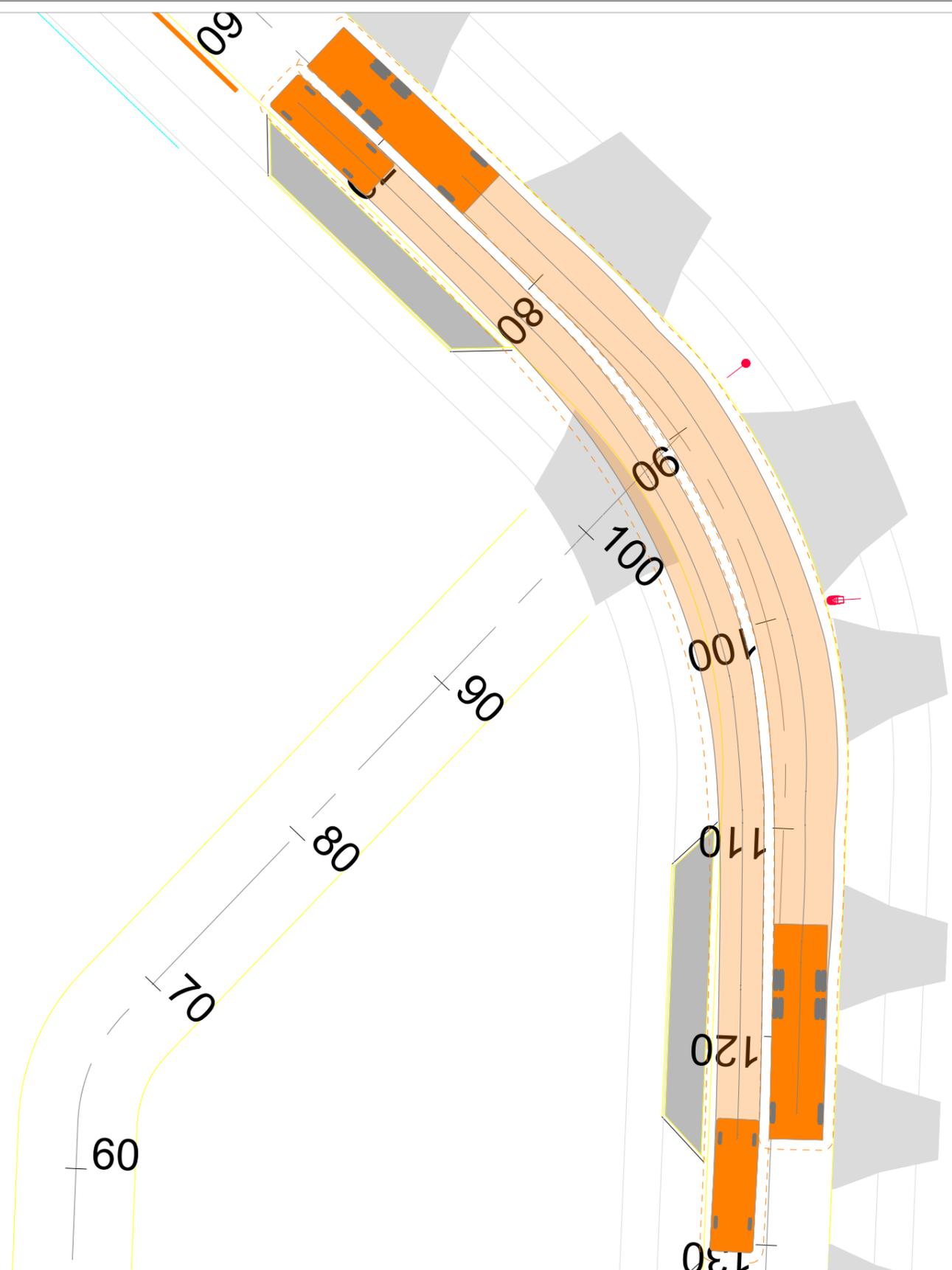
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

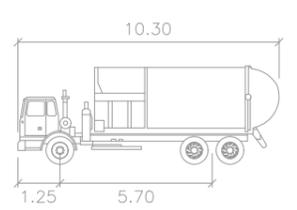
**Revision:**  
 A



**Figure:**  
 32B



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer  
 meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Date:**  
 22 December 2025

**Client:**

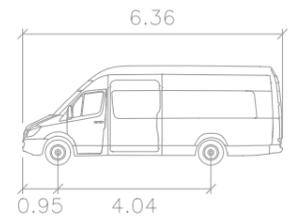
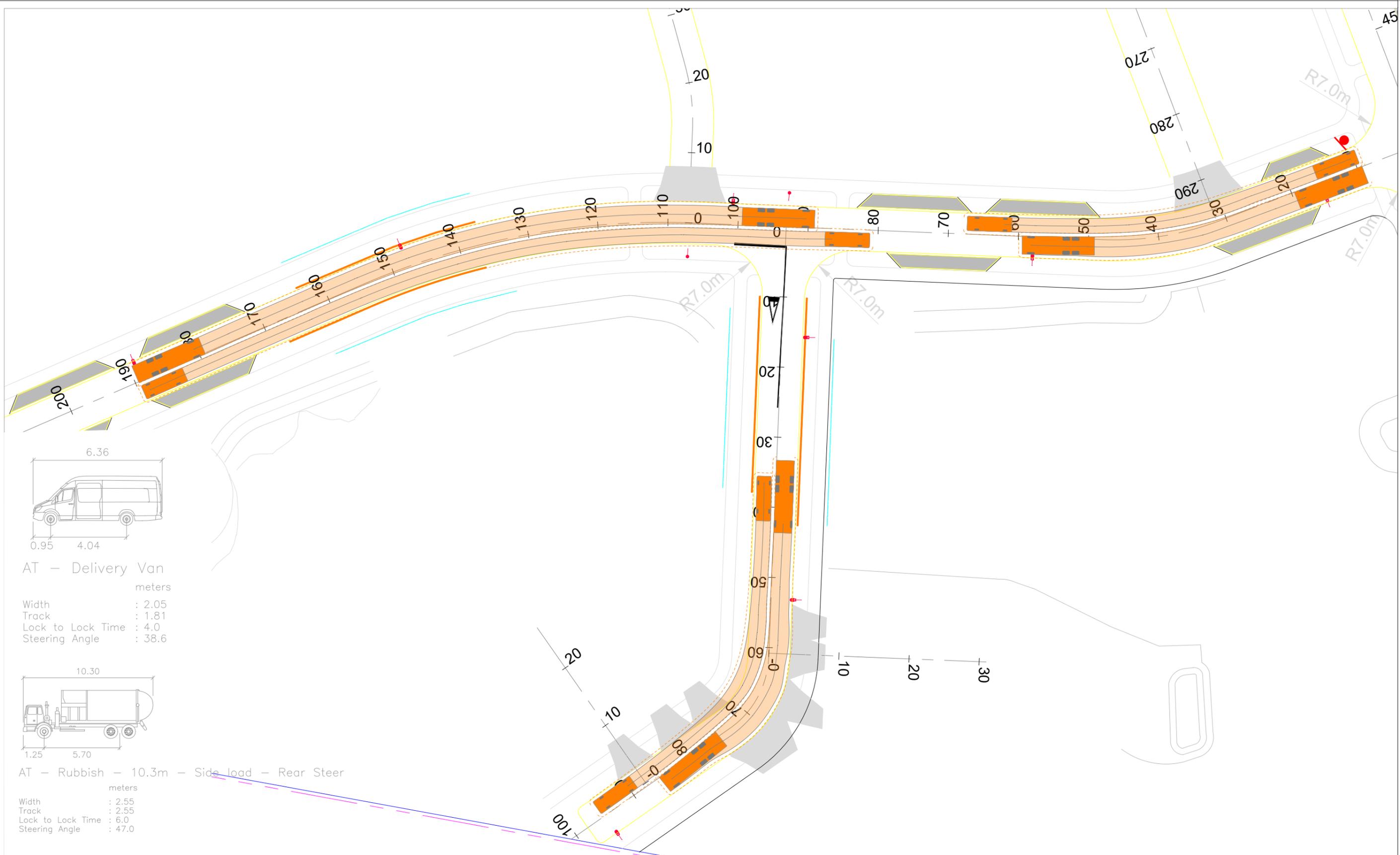
**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 8

**Scale @ A3:**  
 1:0.25

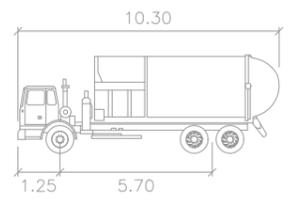
**Revision:**  
 A



**Figure:**  
 1C



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer  
 meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 2 & 10

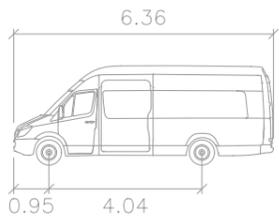
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.5

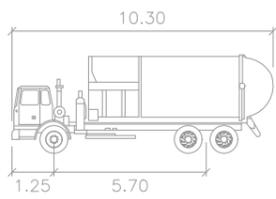
**Revision:**  
 A



**Figure:**  
 2C



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer  
 meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 2

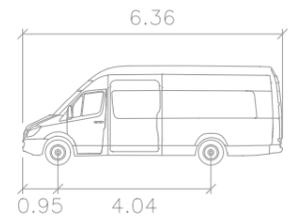
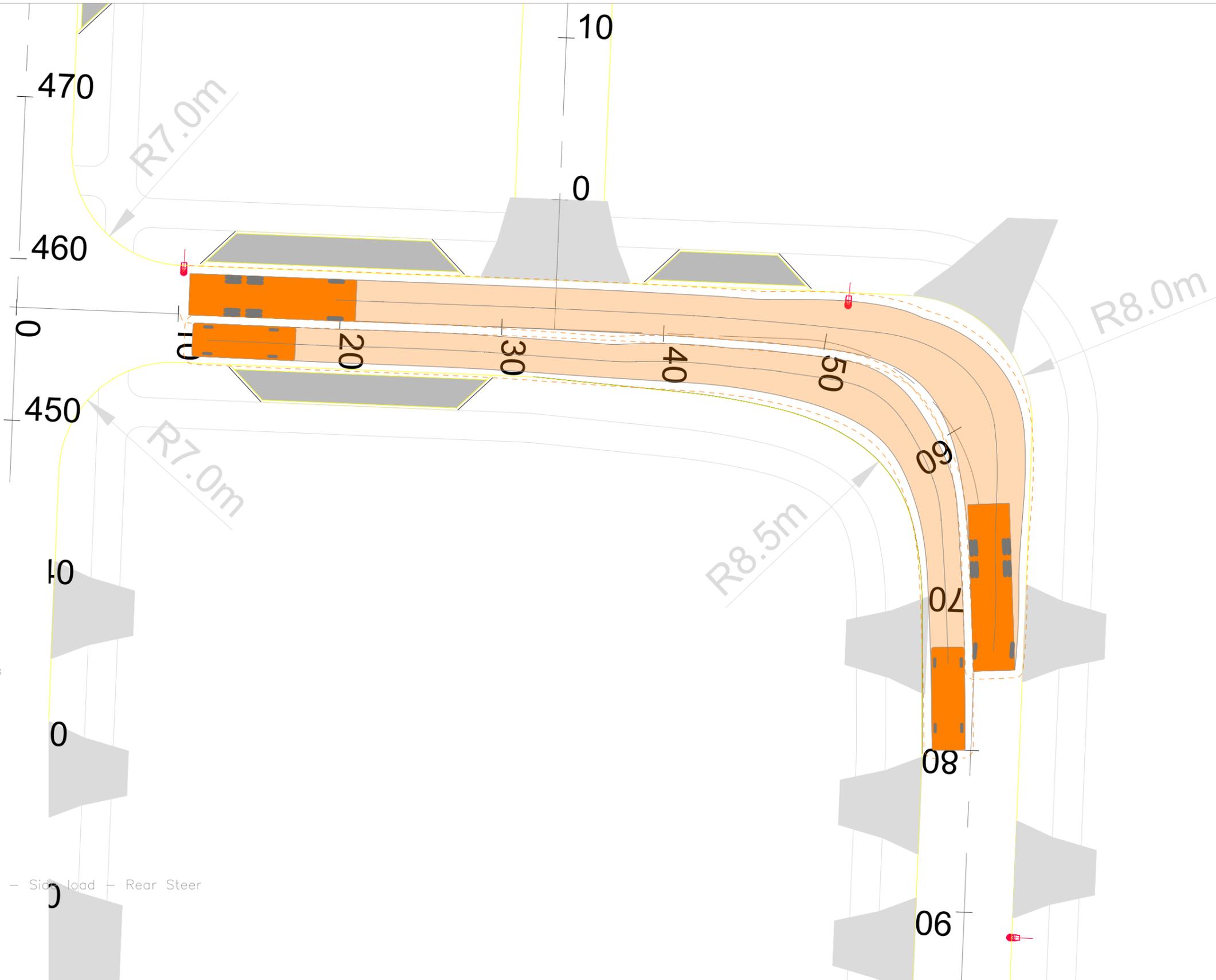
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.5

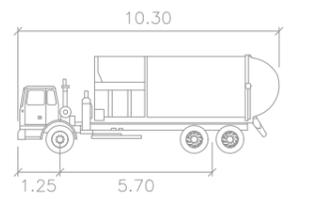
**Revision:**  
 A



**Figure:**  
 3C



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer  
 meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

Drawn by:  
 HA  
 J003135

Client:

Project:  
 Delmore, Orewa  
 Proposed Residential Development

Drawing Title:  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 4

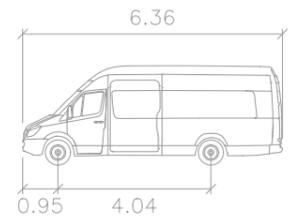
Date:  
 22 December 2025

Scale @ A3:  
 1:0.25

Revision:  
 A

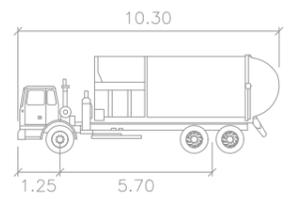


Figure:  
 4C



AT – Delivery Van

meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Date:**  
 22 December 2025

**Client:**

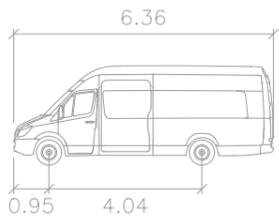
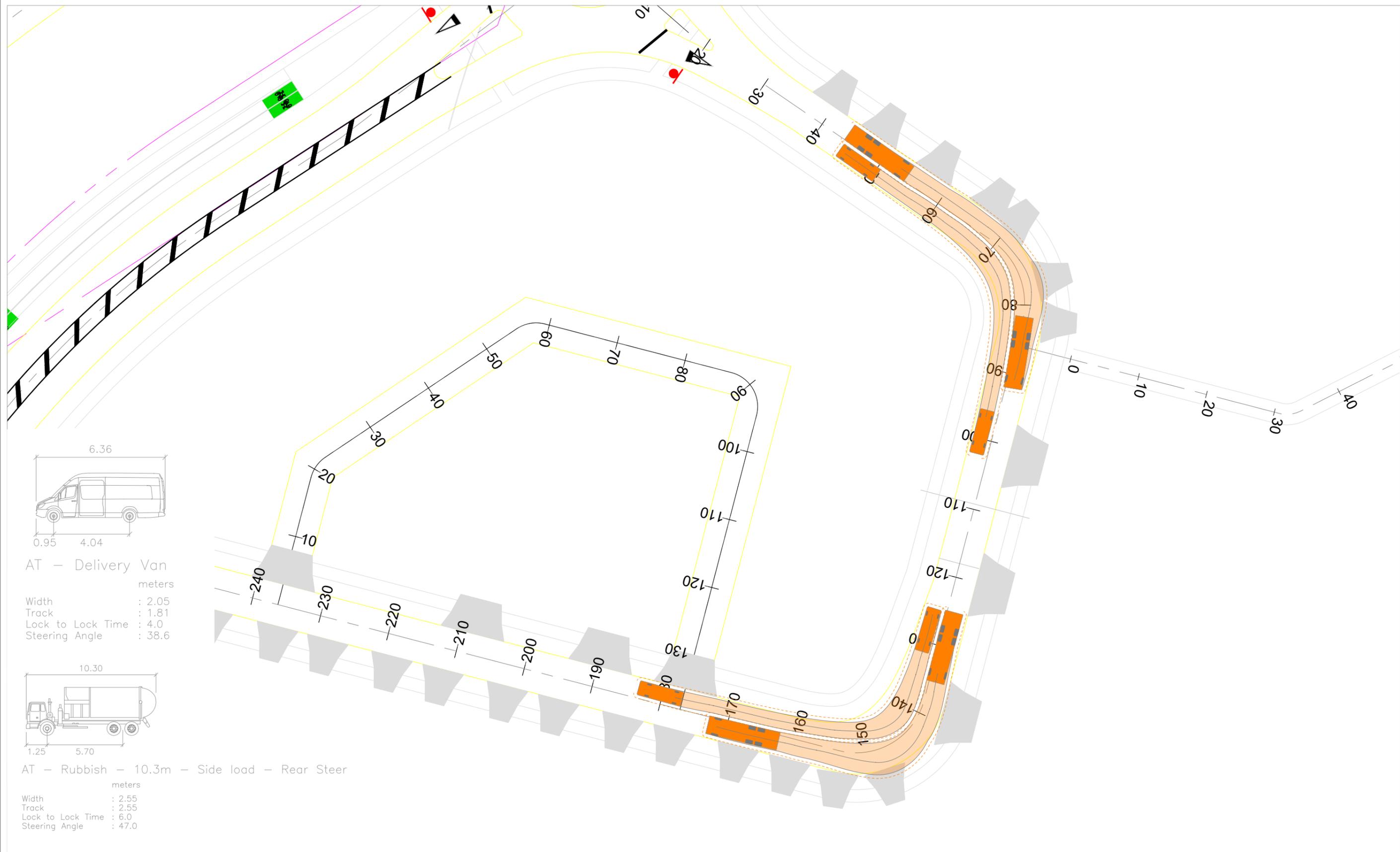
**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 2

**Scale @ A3:**  
 1:0.5

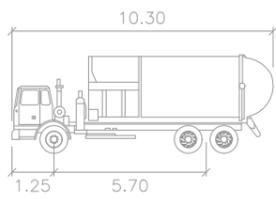
**Revision:**  
 A



**Figure:**  
 5C



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer  
 meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 6

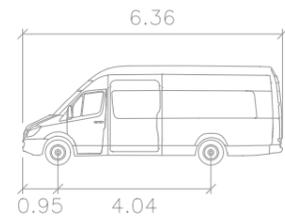
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.5

**Revision:**  
 A



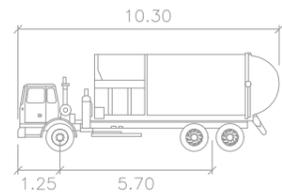
**Figure:**  
 6C



AT – Delivery Van

meters

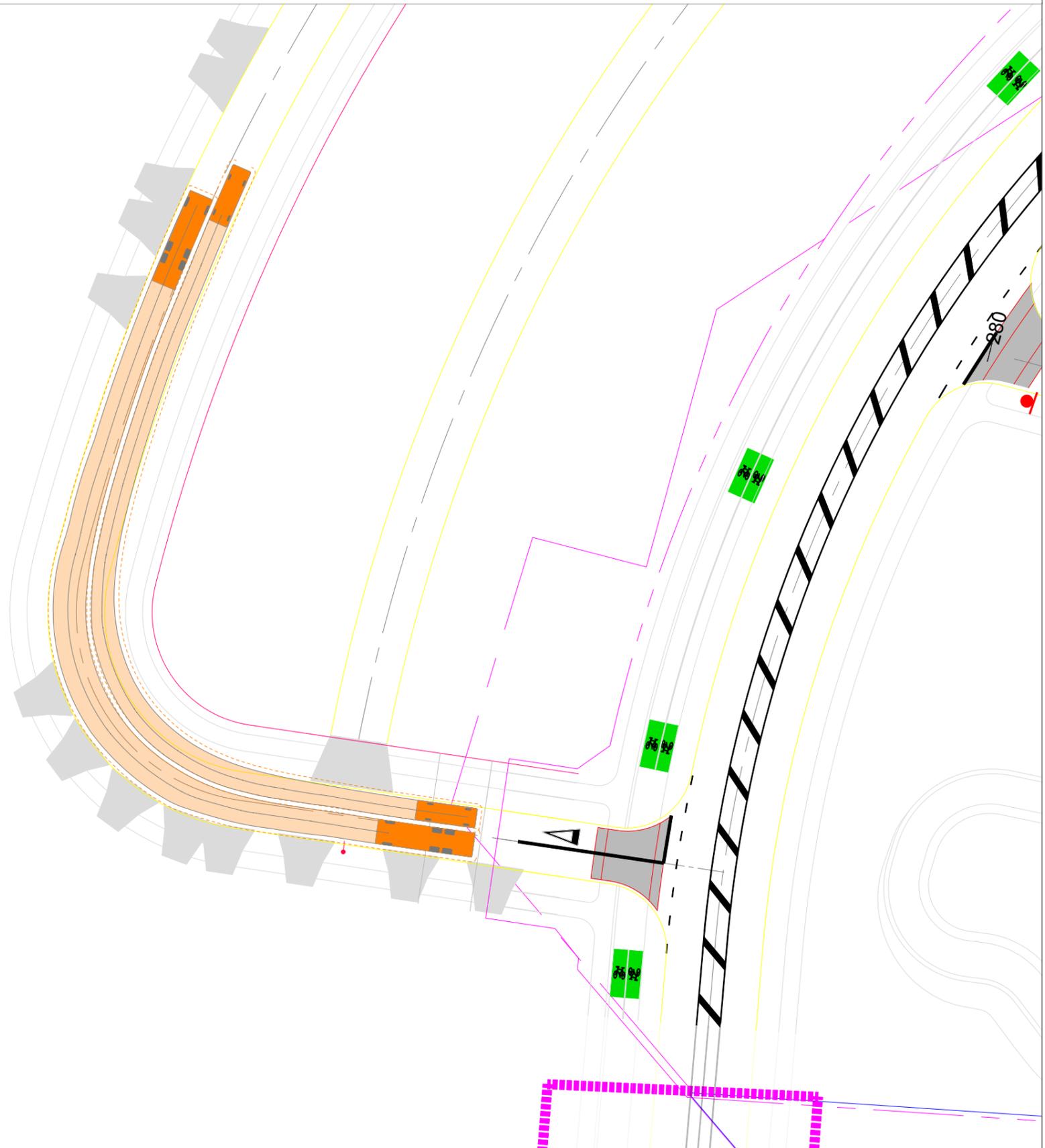
- Width : 2.05
- Track : 1.81
- Lock to Lock Time : 4.0
- Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters

- Width : 2.55
- Track : 2.55
- Lock to Lock Time : 6.0
- Steering Angle : 47.0



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Date:**  
22 December 2025

**Client:**

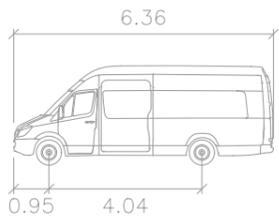
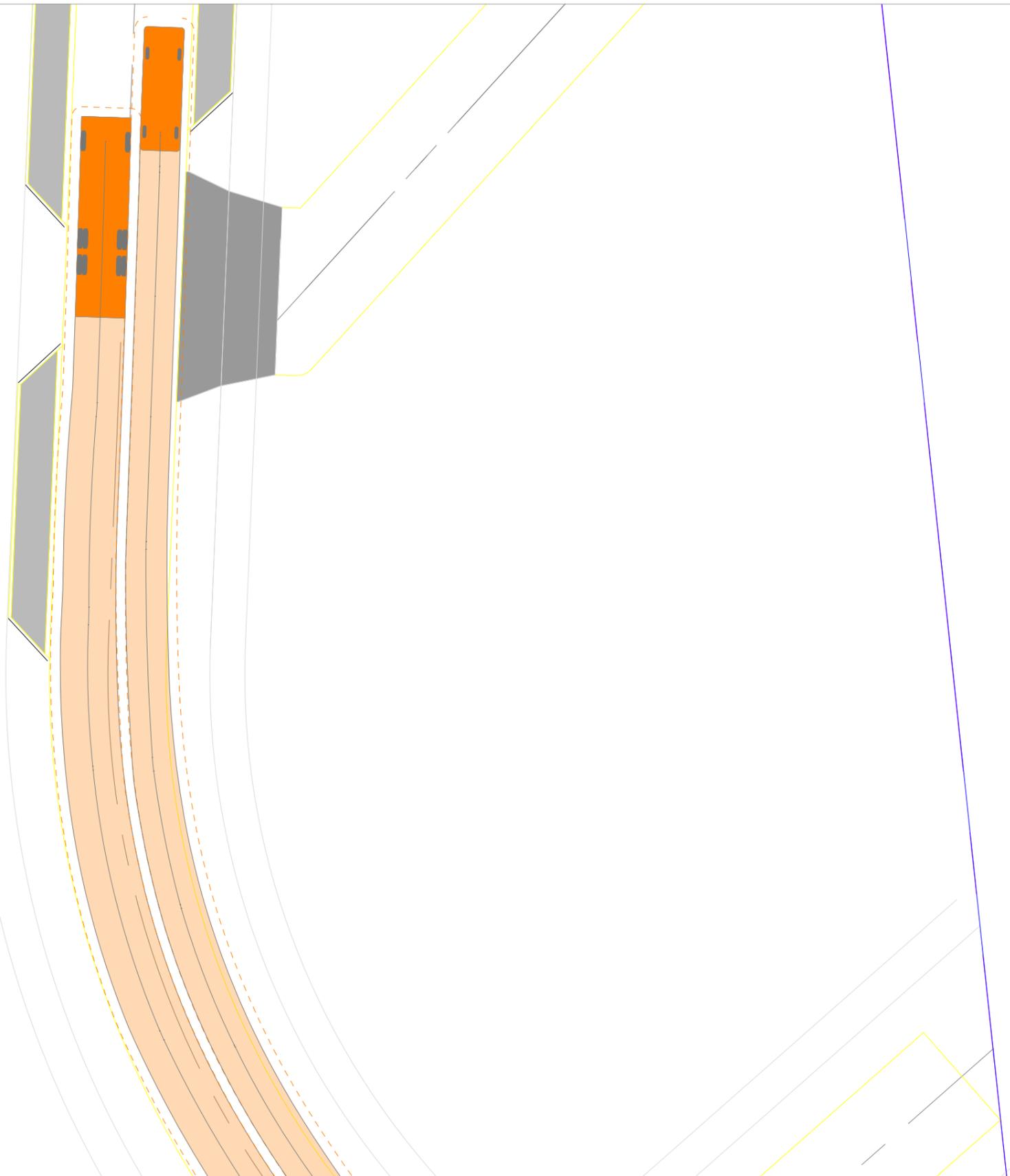
**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
Midblock - Road 12

**Scale @ A3:**  
1:0.5

**Revision:**  
A

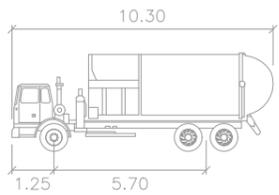


**Figure:**  
7C



AT – Delivery Van

meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 15

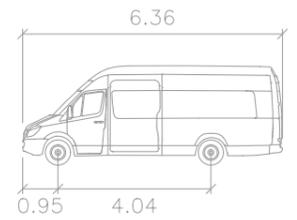
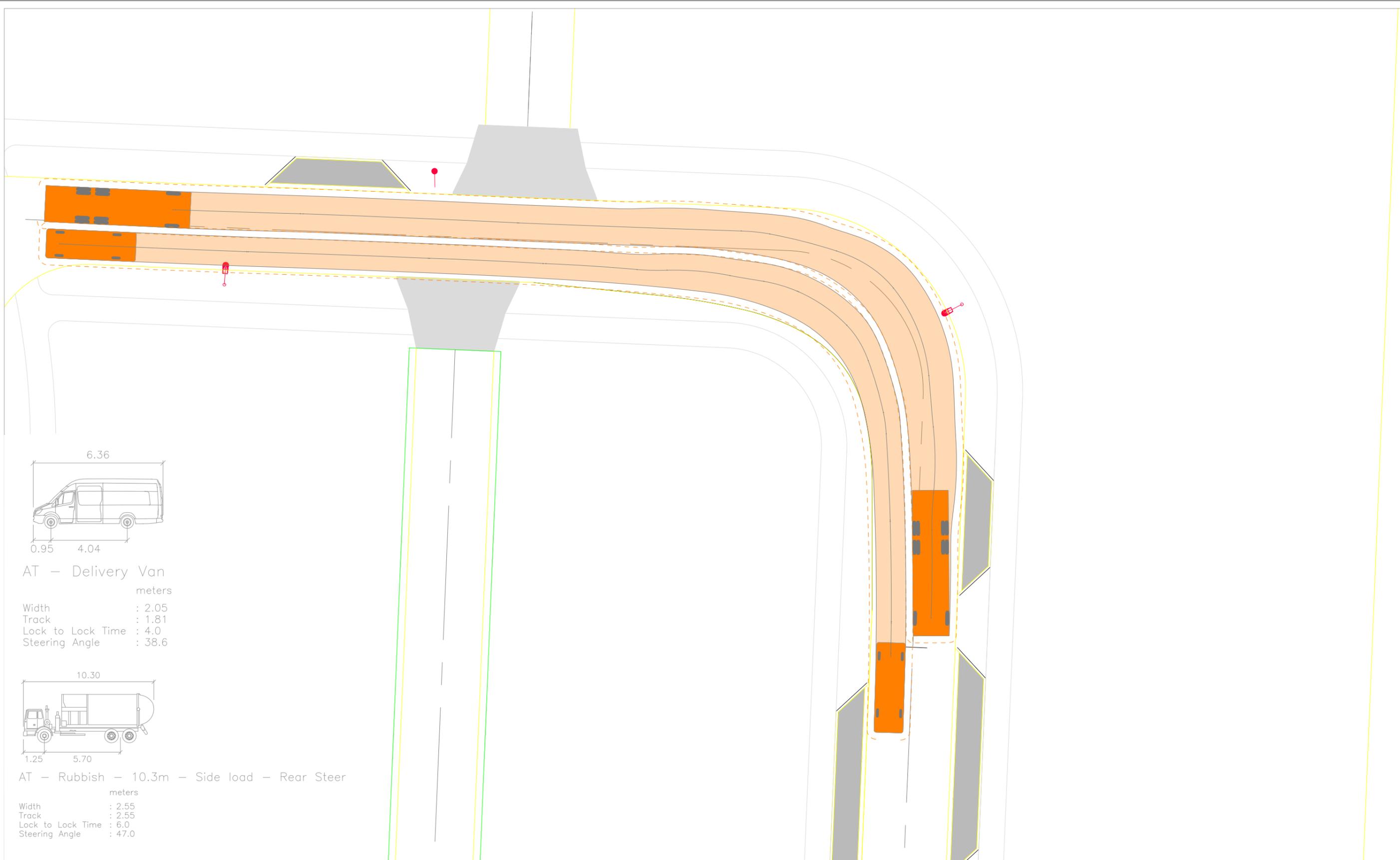
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

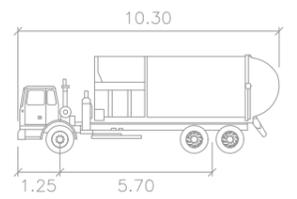
**Revision:**  
 A



**Figure:**  
 8C



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer  
 meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 15

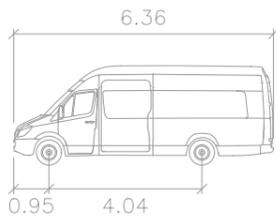
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A

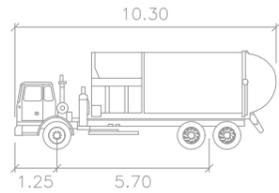


**Figure:**  
 9C



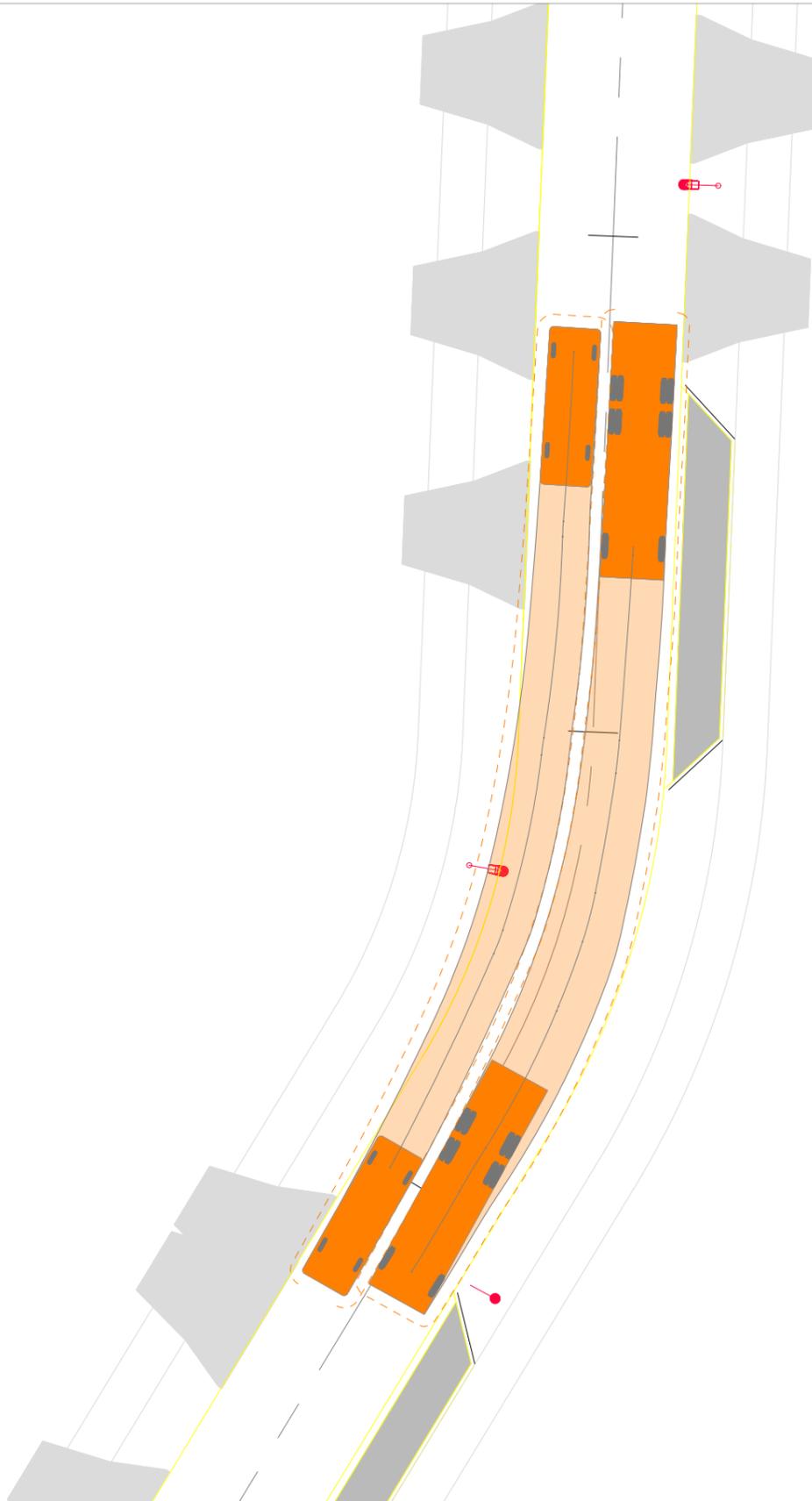
AT – Delivery Van

meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0



Revision notes:		
Rev:	Date:	Notes:

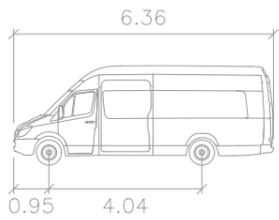
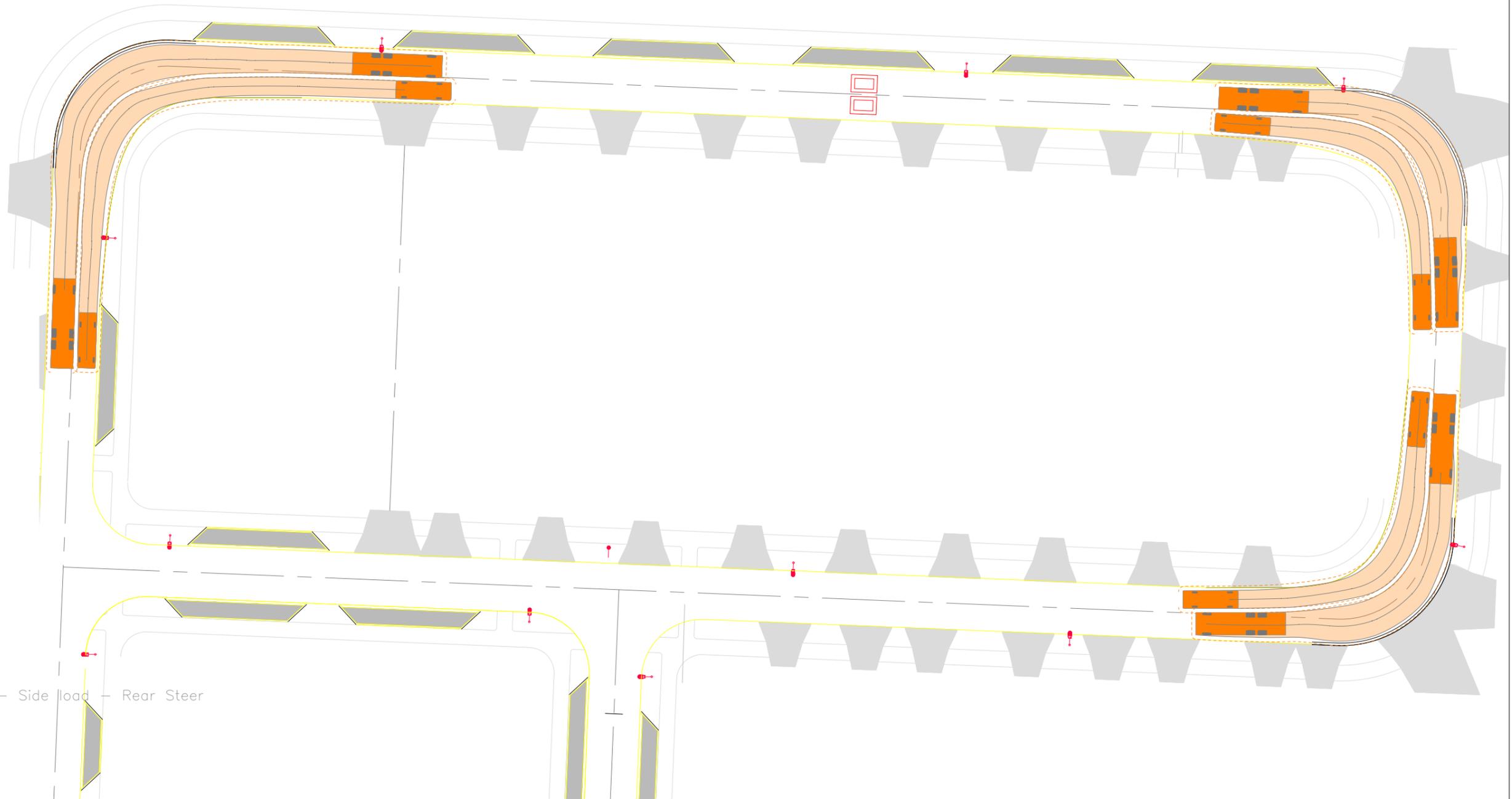
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT Midblock - Road 13

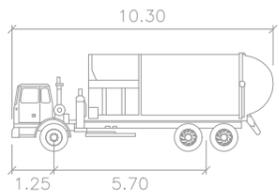
<b>Date:</b> 22 December 2025
<b>Scale @ A3:</b> 1:0.25
<b>Revision:</b> A



**Figure:**  
10C



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer  
 meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

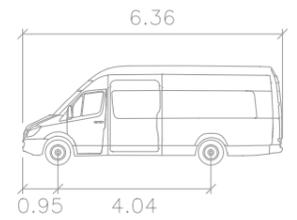
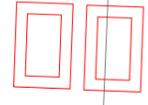
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT Midblock - Road 14

<b>Date:</b> 22 December 2025
<b>Scale @ A3:</b> 1:0.5
<b>Revision:</b> A

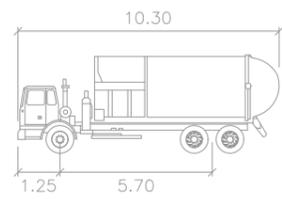


**Figure:**  
11C



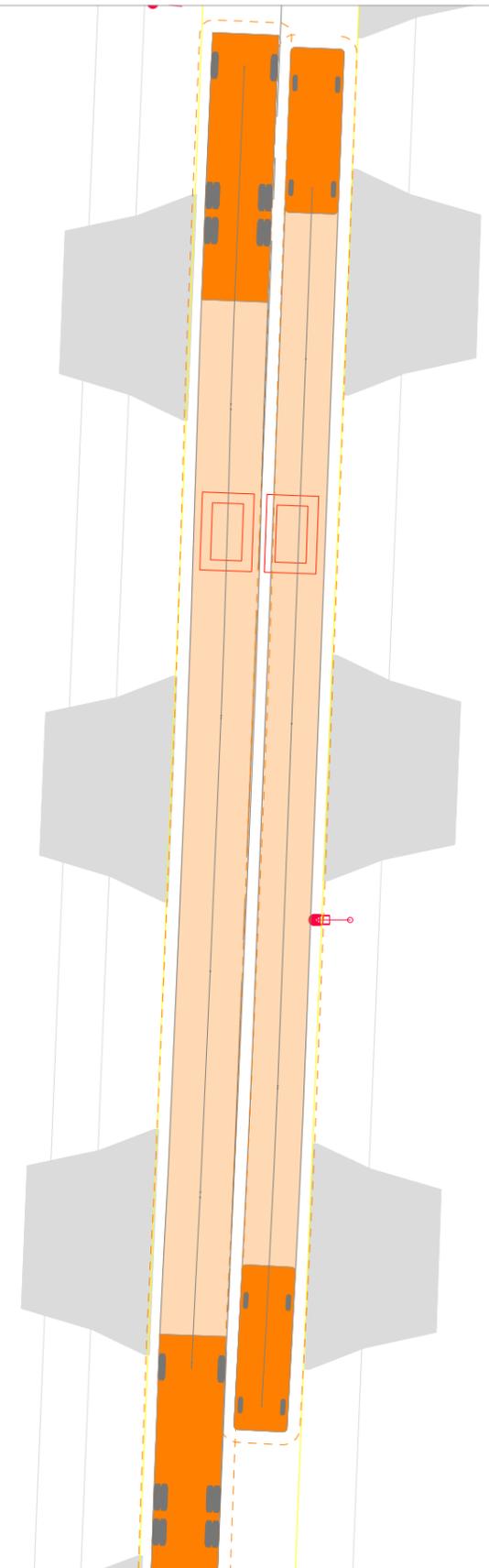
AT – Delivery Van

meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 14

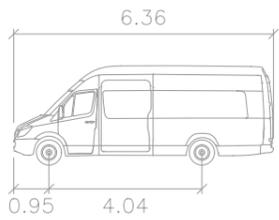
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A

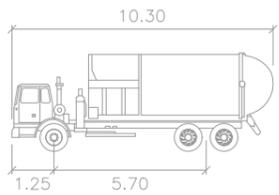


**Figure:**  
 12C



AT – Delivery Van

meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 17

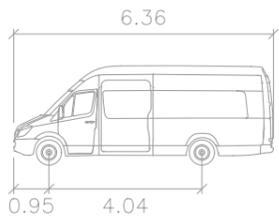
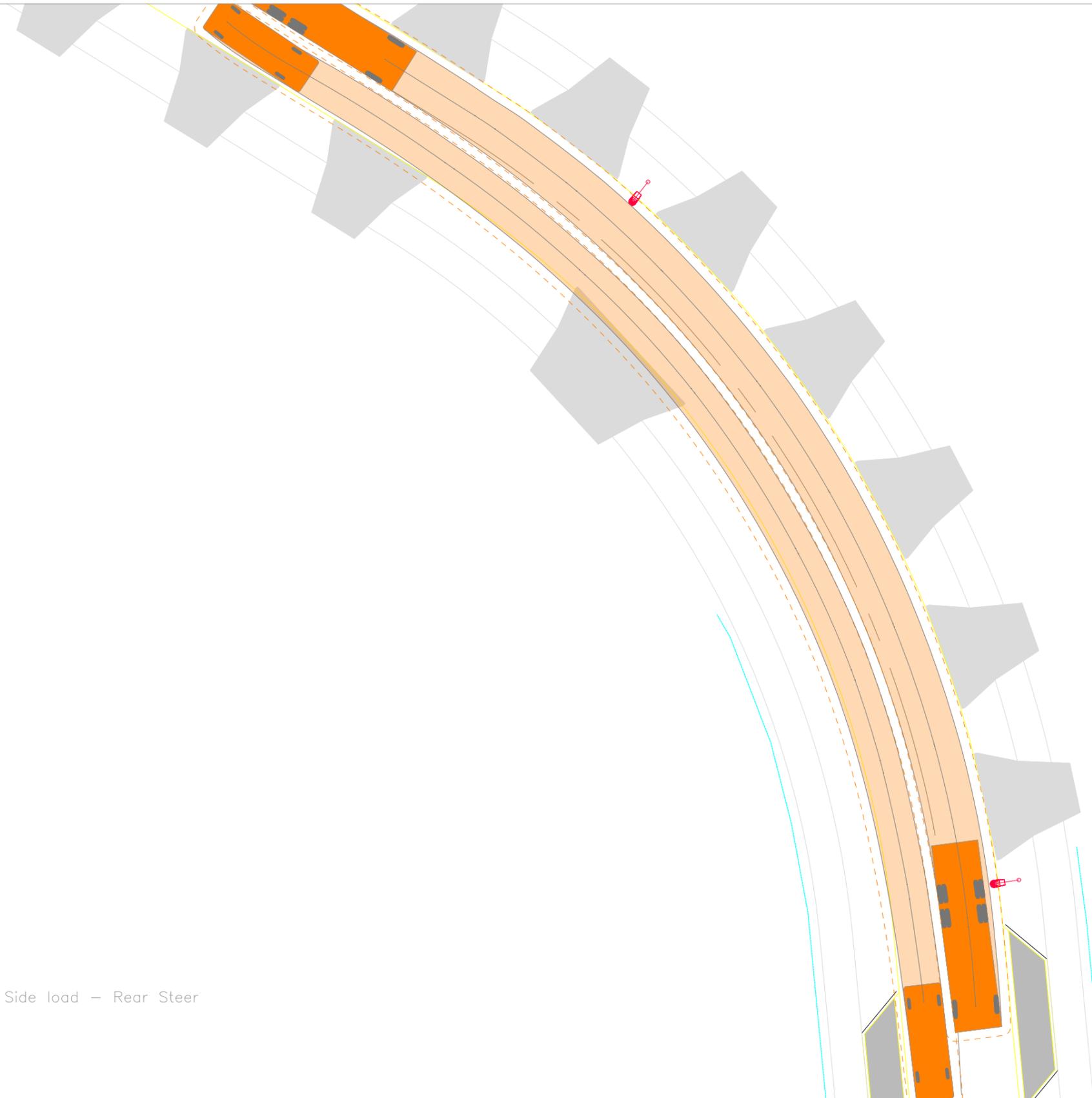
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A

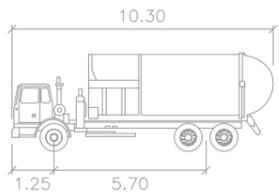


**Figure:**  
 13C



AT – Delivery Van

meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 17

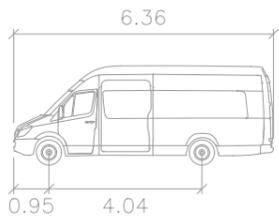
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

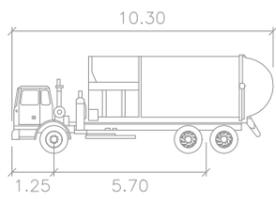
**Revision:**  
 A



**Figure:**  
 14C



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer  
 meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 20

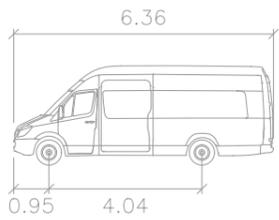
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A

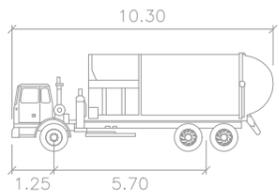


**Figure:**  
 15C



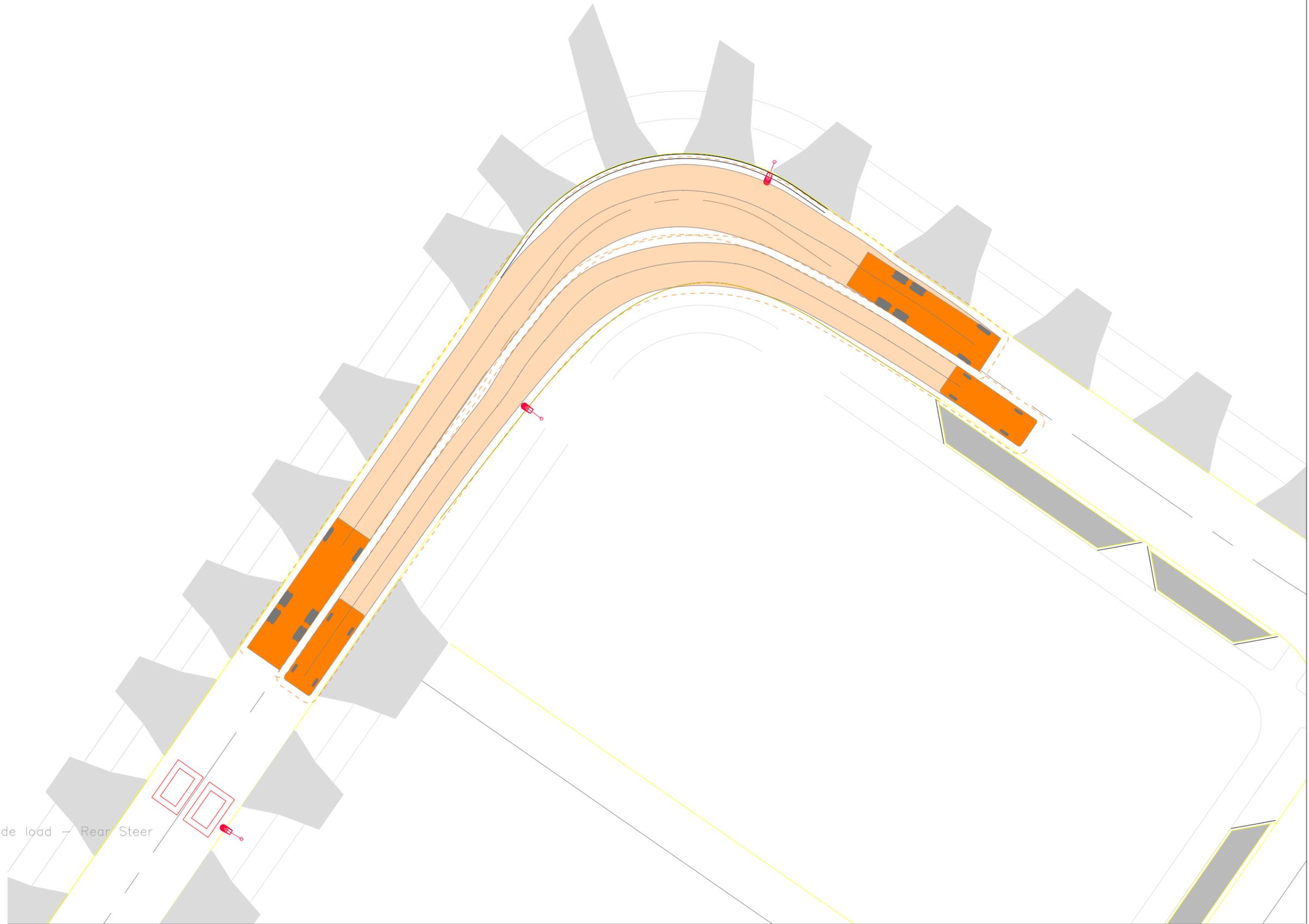
AT – Delivery Van

meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0



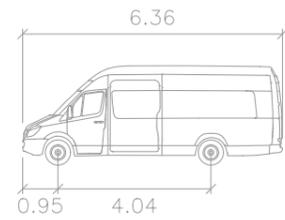
Revision notes:		
Rev:	Date:	Notes:

<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT Midblock - Road 18

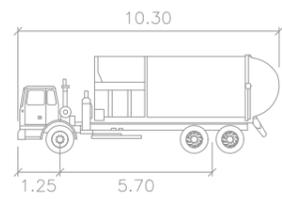
<b>Date:</b> 22 December 2025
<b>Scale @ A3:</b> 1:0.25
<b>Revision:</b> A

**Figure:**  
16C



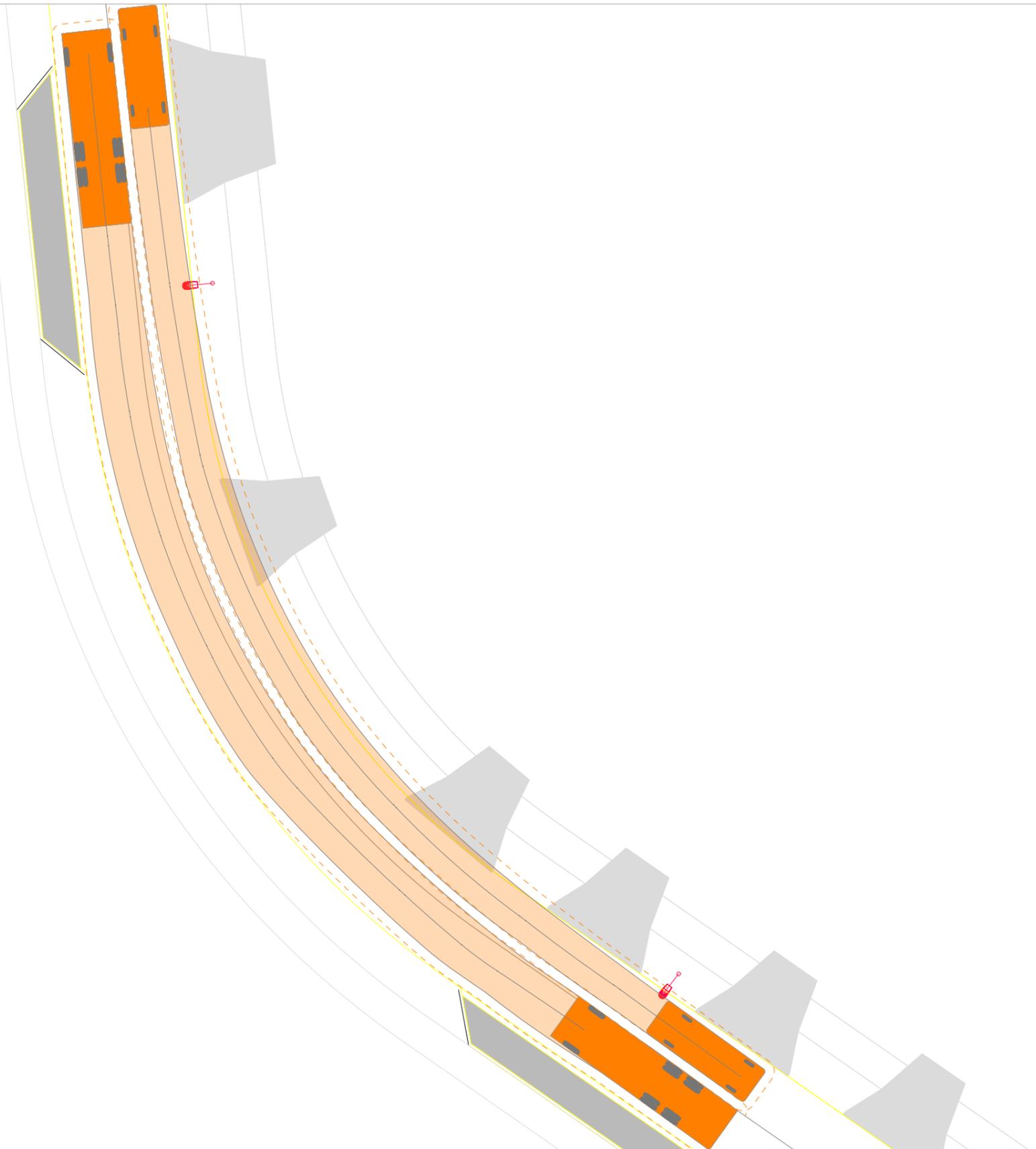
AT – Delivery Van

meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 21

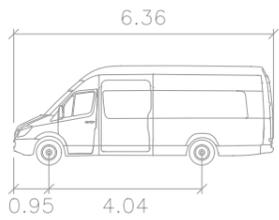
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A

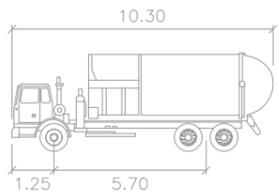


**Figure:**  
 17C



AT – Delivery Van  
meters

- Width : 2.05
- Track : 1.81
- Lock to Lock Time : 4.0
- Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer  
meters

- Width : 2.55
- Track : 2.55
- Lock to Lock Time : 6.0
- Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
Midblock - Road 21

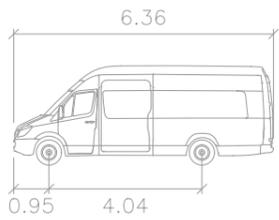
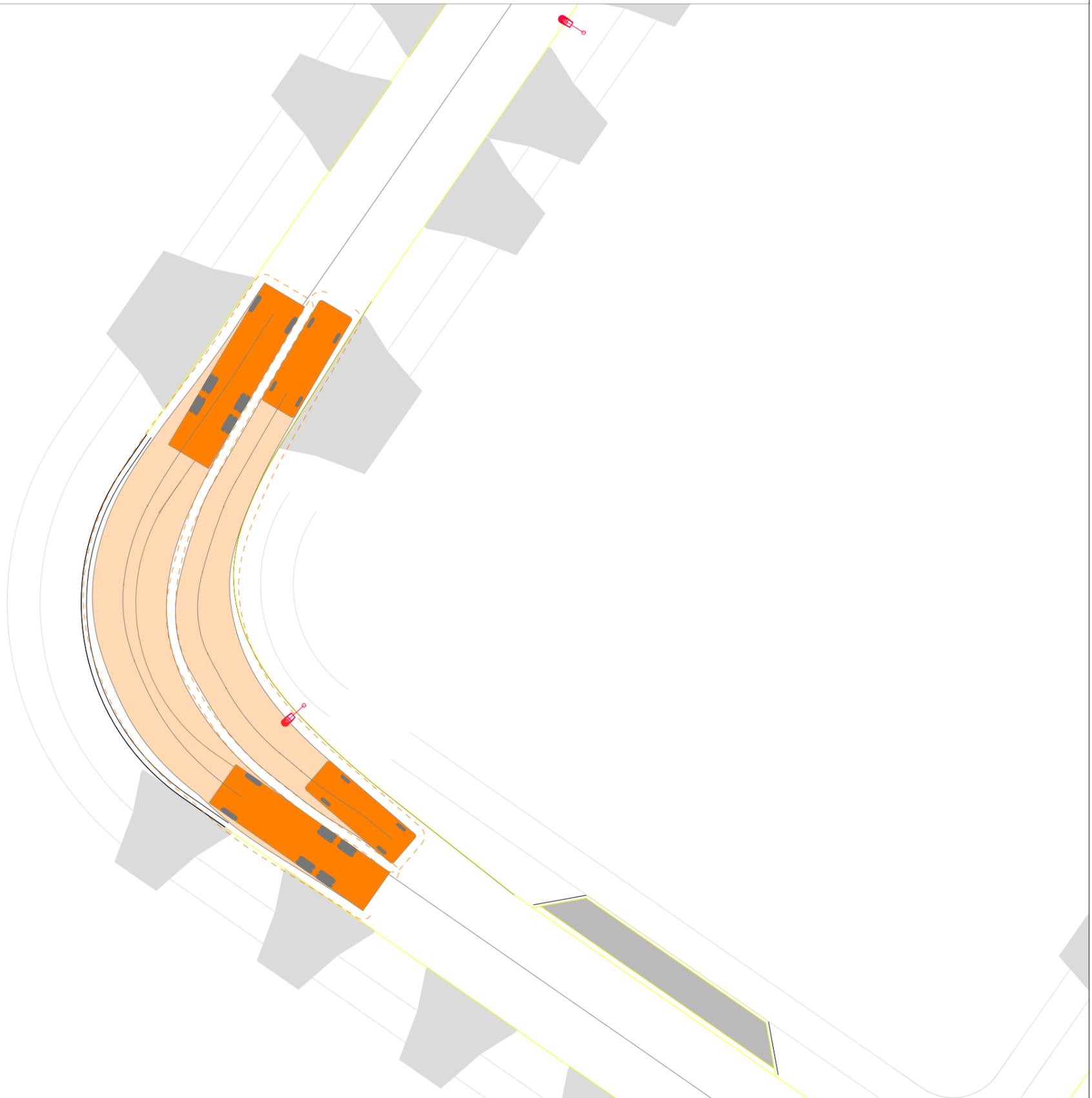
**Date:**  
22 December 2025

**Scale @ A3:**  
1:0.25

**Revision:**  
A

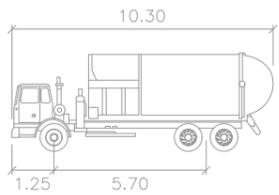


**Figure:**  
18C



AT – Delivery Van

meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 22

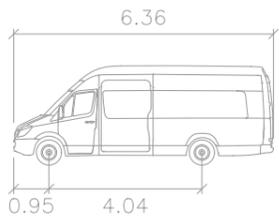
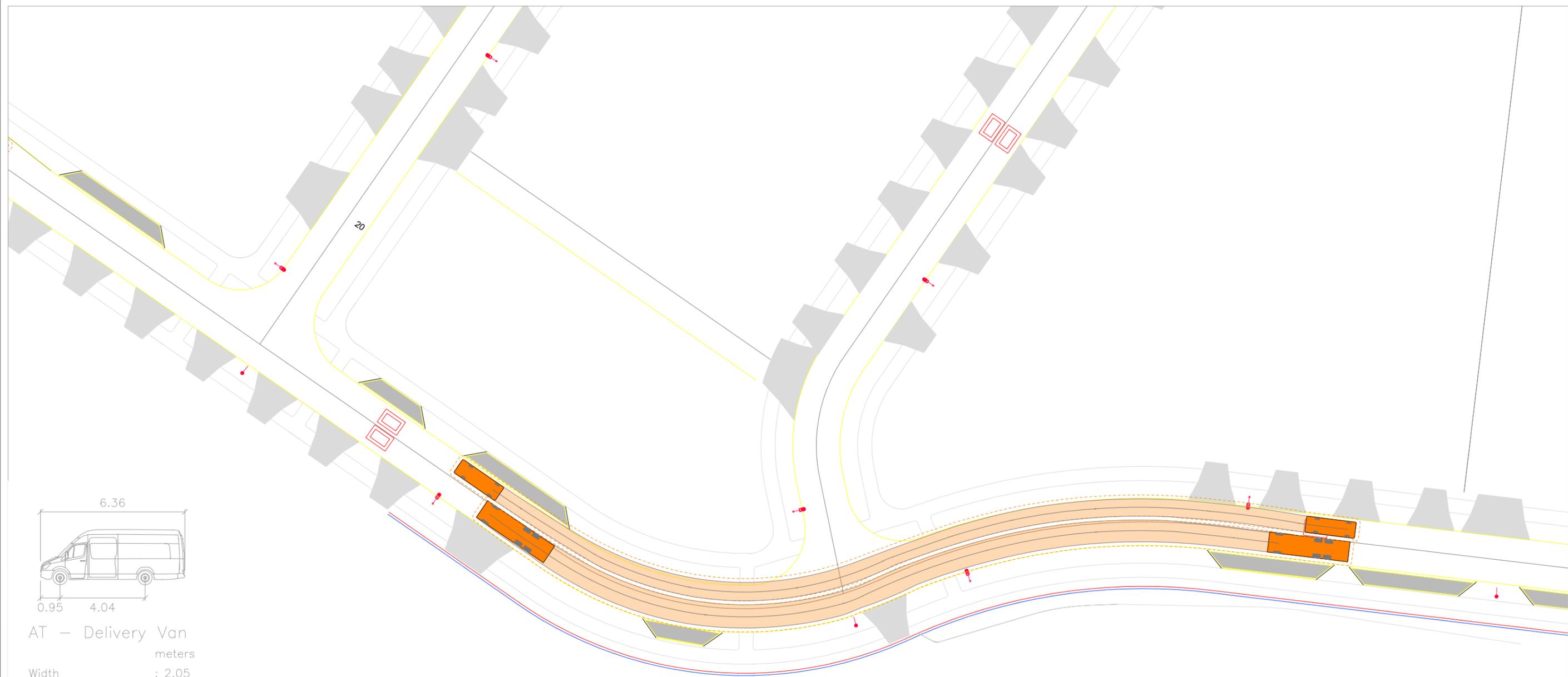
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

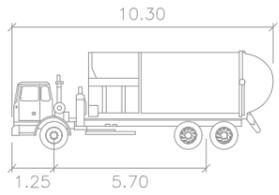
**Revision:**  
 A



**Figure:**  
 19C



AT – Delivery Van  
 meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer  
 meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 22

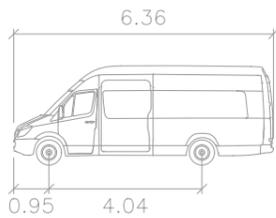
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.5

**Revision:**  
 A

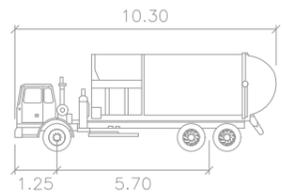


**Figure:**  
 20C



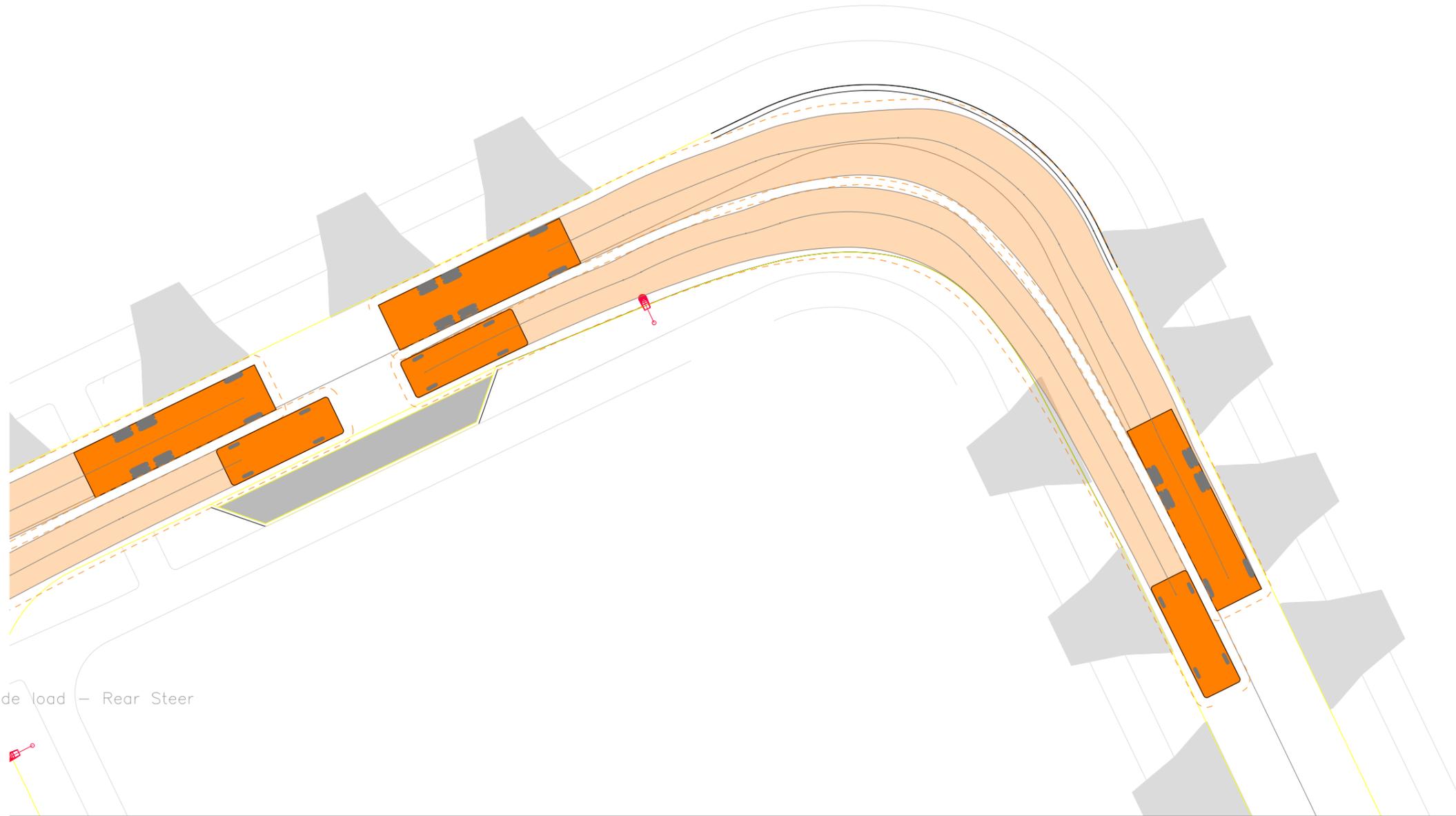
AT – Delivery Van

meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 24

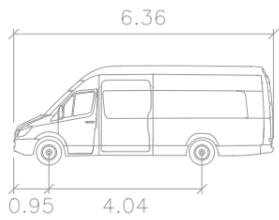
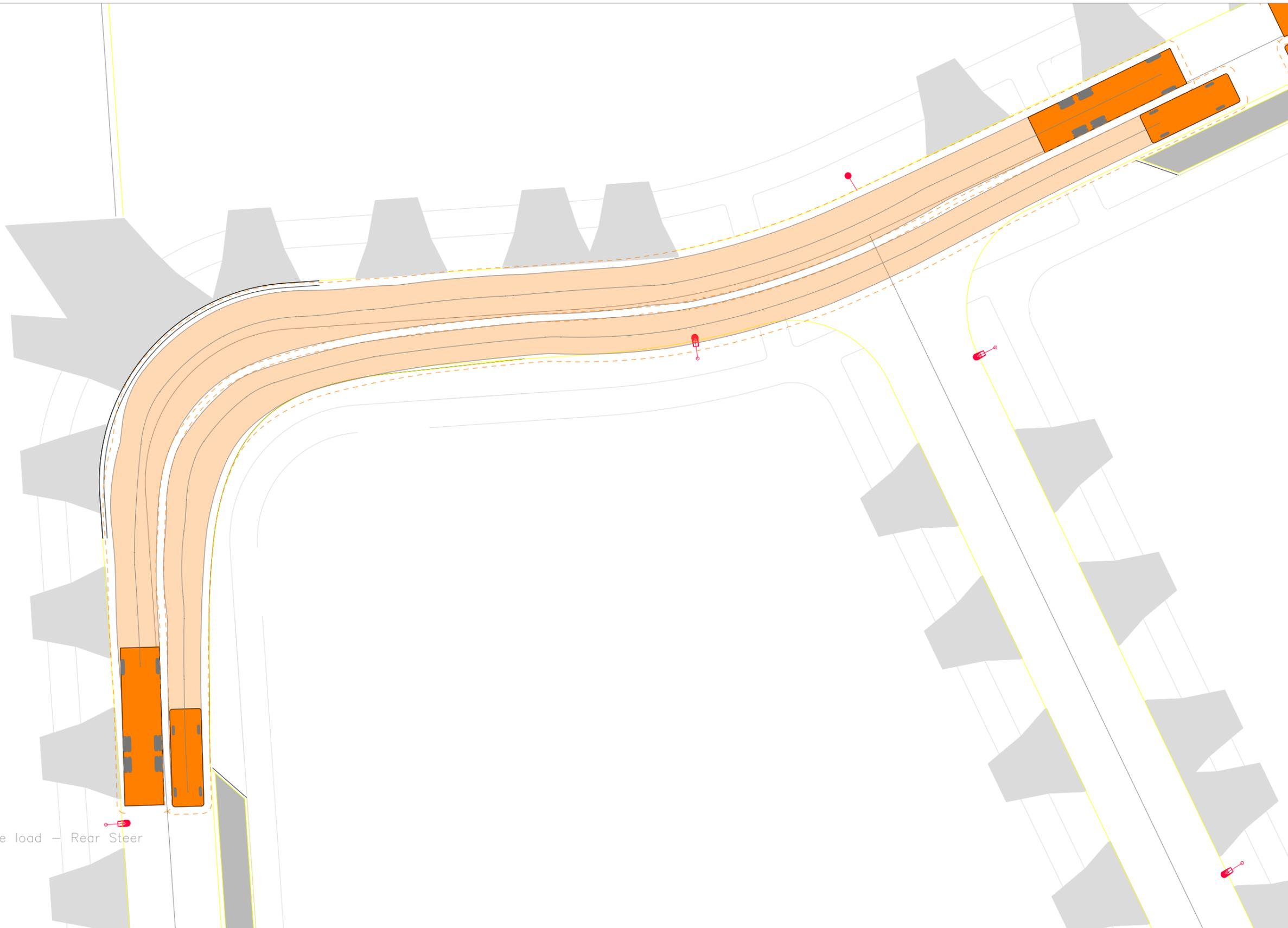
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A

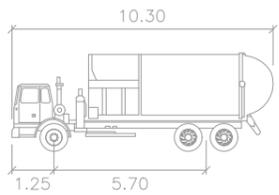


**Figure:**  
 21C



AT – Delivery Van

meters  
 Width : 2.05  
 Track : 1.81  
 Lock to Lock Time : 4.0  
 Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 Midblock - Road 24

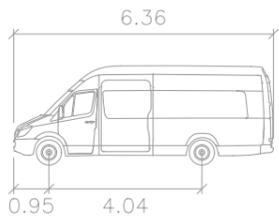
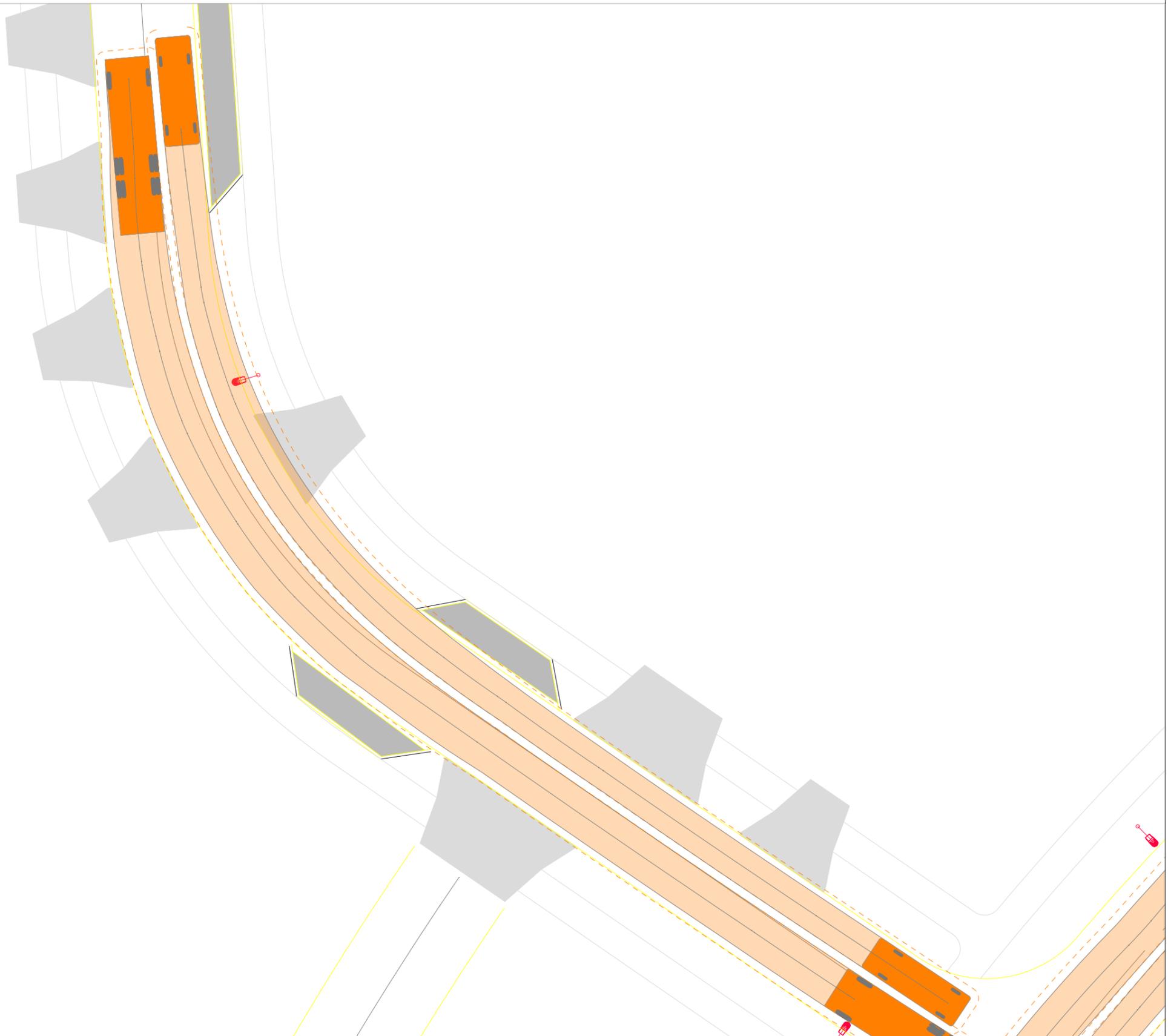
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.25

**Revision:**  
 A

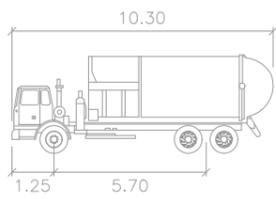


**Figure:**  
 22C



AT – Delivery Van

- Width : 2.05 meters
- Track : 1.81
- Lock to Lock Time : 4.0
- Steering Angle : 38.6



AT – Rubbish – 10.3m – Side load – Rear Steer

- Width : 2.55 meters
- Track : 2.55
- Lock to Lock Time : 6.0
- Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
Midblock - Road 24

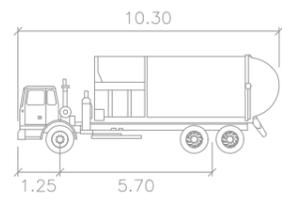
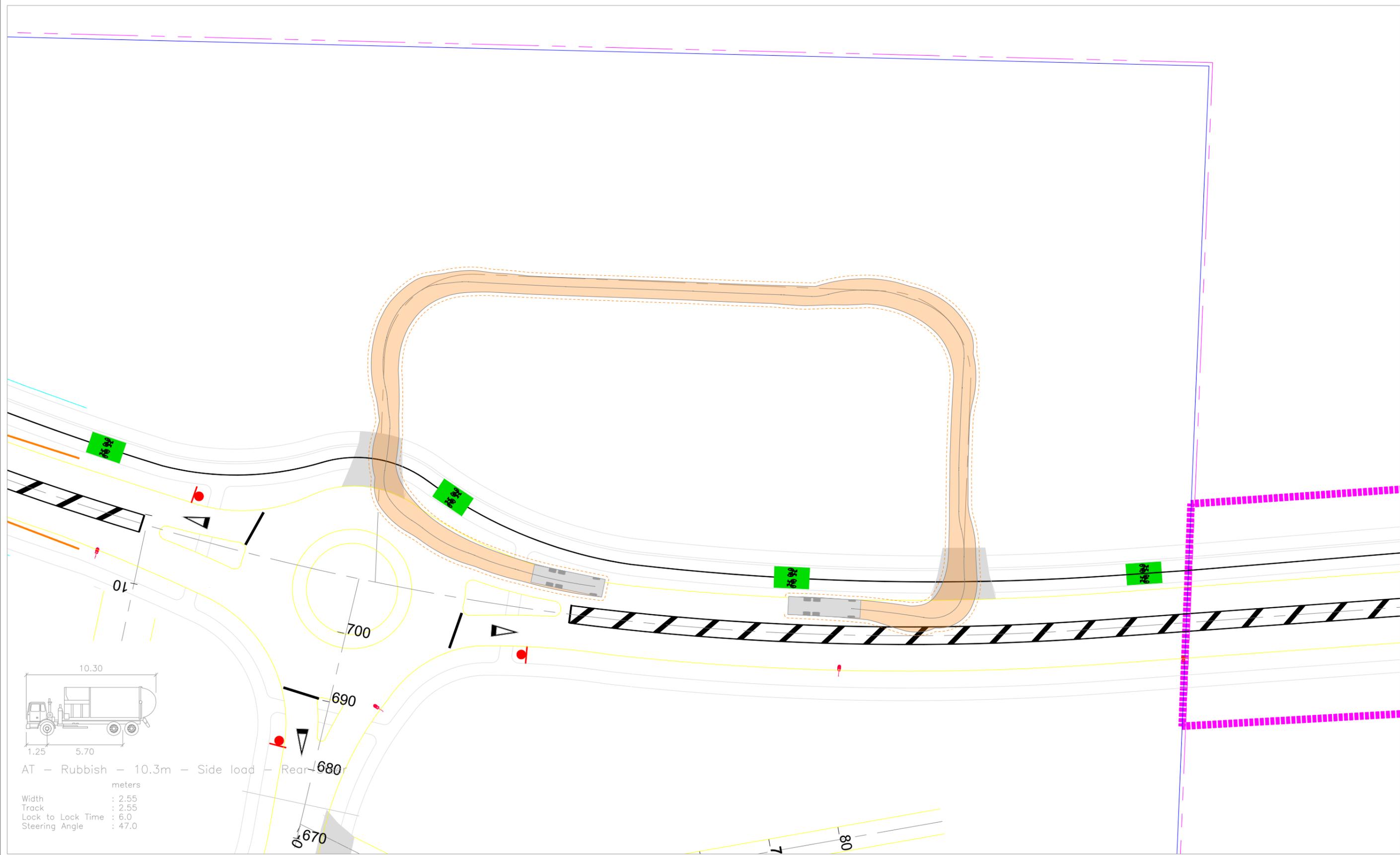
**Date:**  
22 December 2025

**Scale @ A3:**  
1:0.25

**Revision:**  
A



**Figure:**  
23C



AT - Rubbish - 10.3m - Side load - Rear

Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 10.3m Truck Tracking JOAL 1

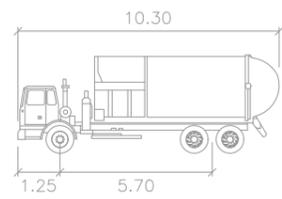
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.5

**Revision:**  
 A



**Figure:**  
 1D



AT – Rubbish – 10.3m – Side load – Rear Steer

meters

Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 10.3m Truck Tracking JOAL 40/40A

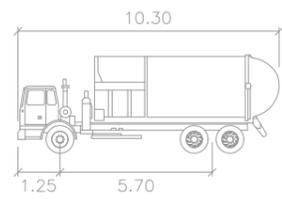
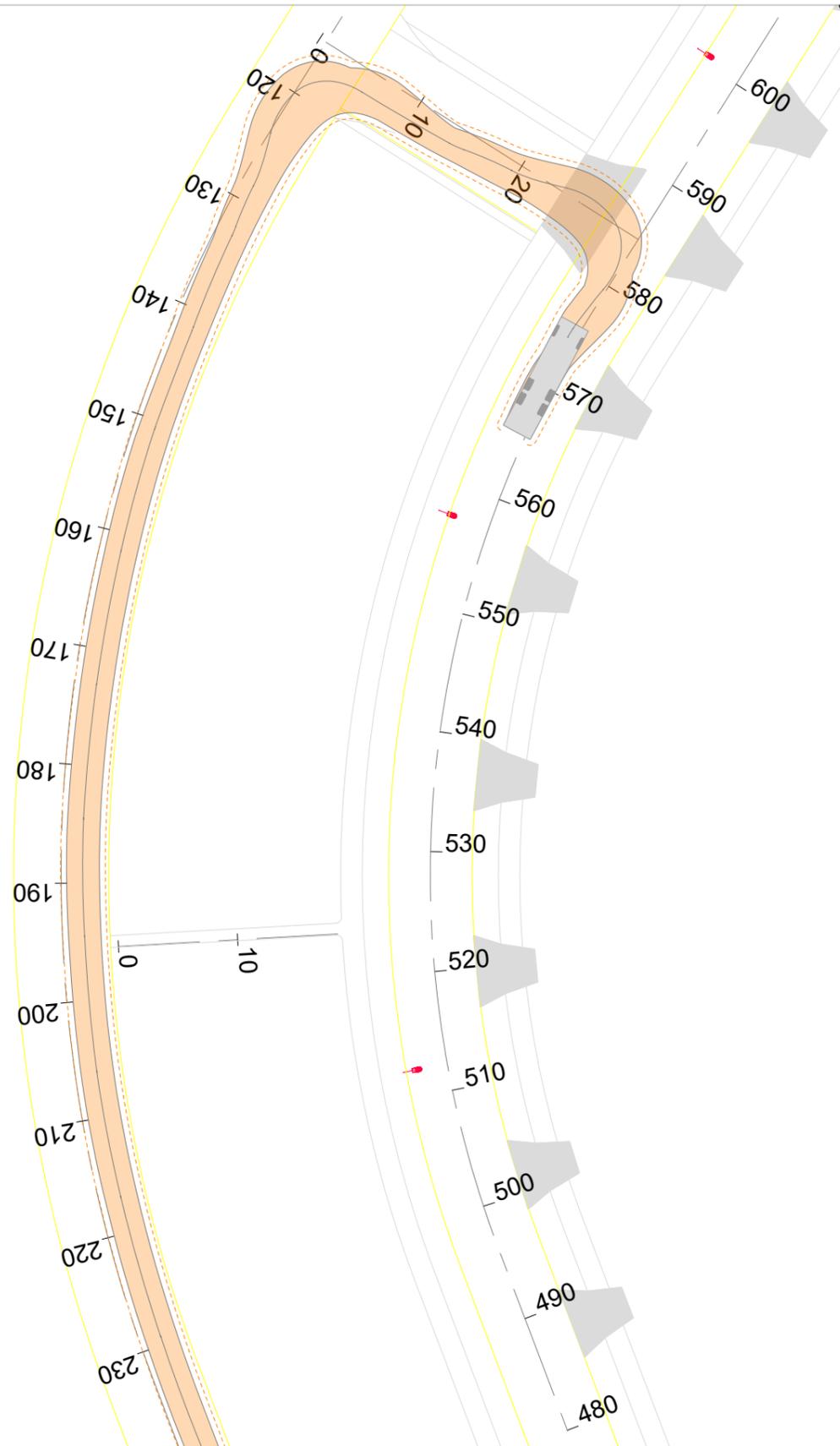
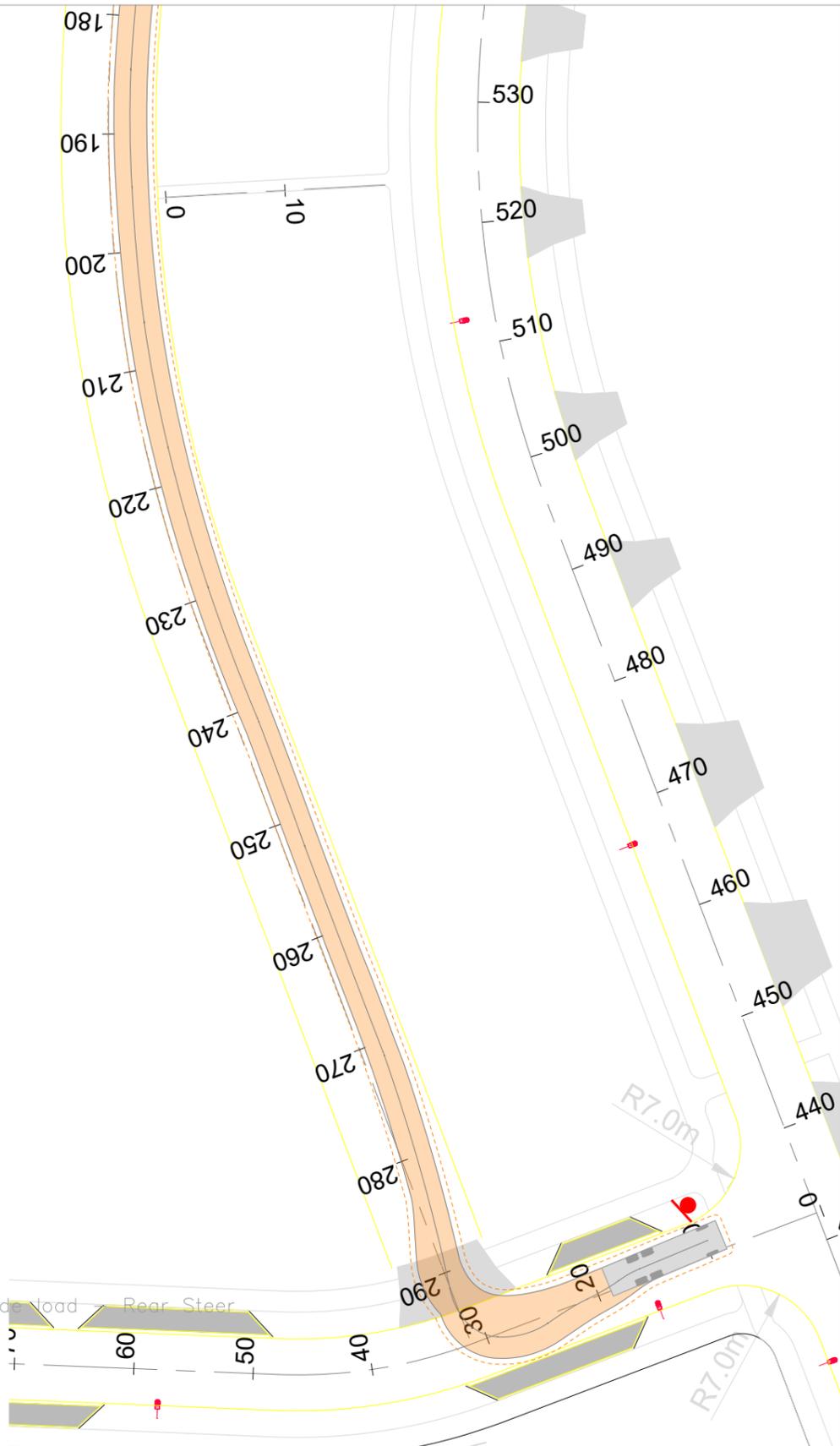
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.5

**Revision:**  
 A



**Figure:**  
 2D



AT - Rubbish - 10.3m - Side load - Rear Steer

Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

Drawn by:  
 HA  
 J003135

Client:

Project:  
 Delmore, Orewa  
 Proposed Residential Development

Drawing Title:  
 VEHICLE TRACKING ASSESSMENT  
 10.3m Truck Tracking JOAL 3

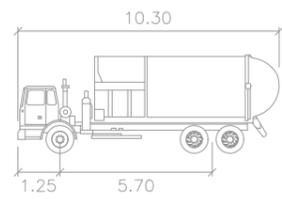
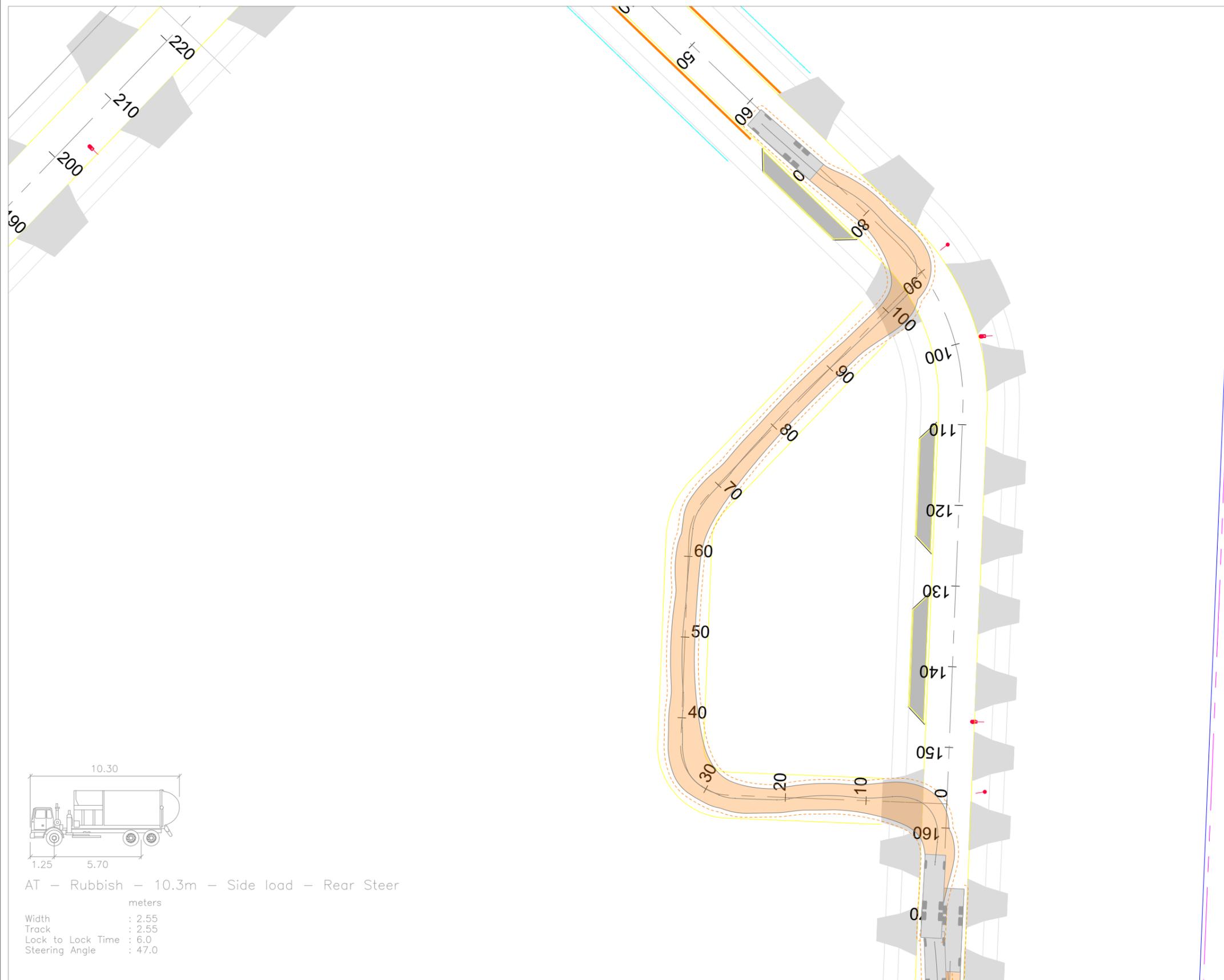
Date:  
 22 December 2025

Scale @ A3:  
 1:0.5

Revision:  
 A



Figure:  
 3D



AT - Rubbish - 10.3m - Side load - Rear Steer

	units
Width	: 2.55
Track	: 2.55
Lock to Lock Time	: 6.0
Steering Angle	: 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
10.3m Truck Tracking JOAL 10

**Date:**  
22 December 2025

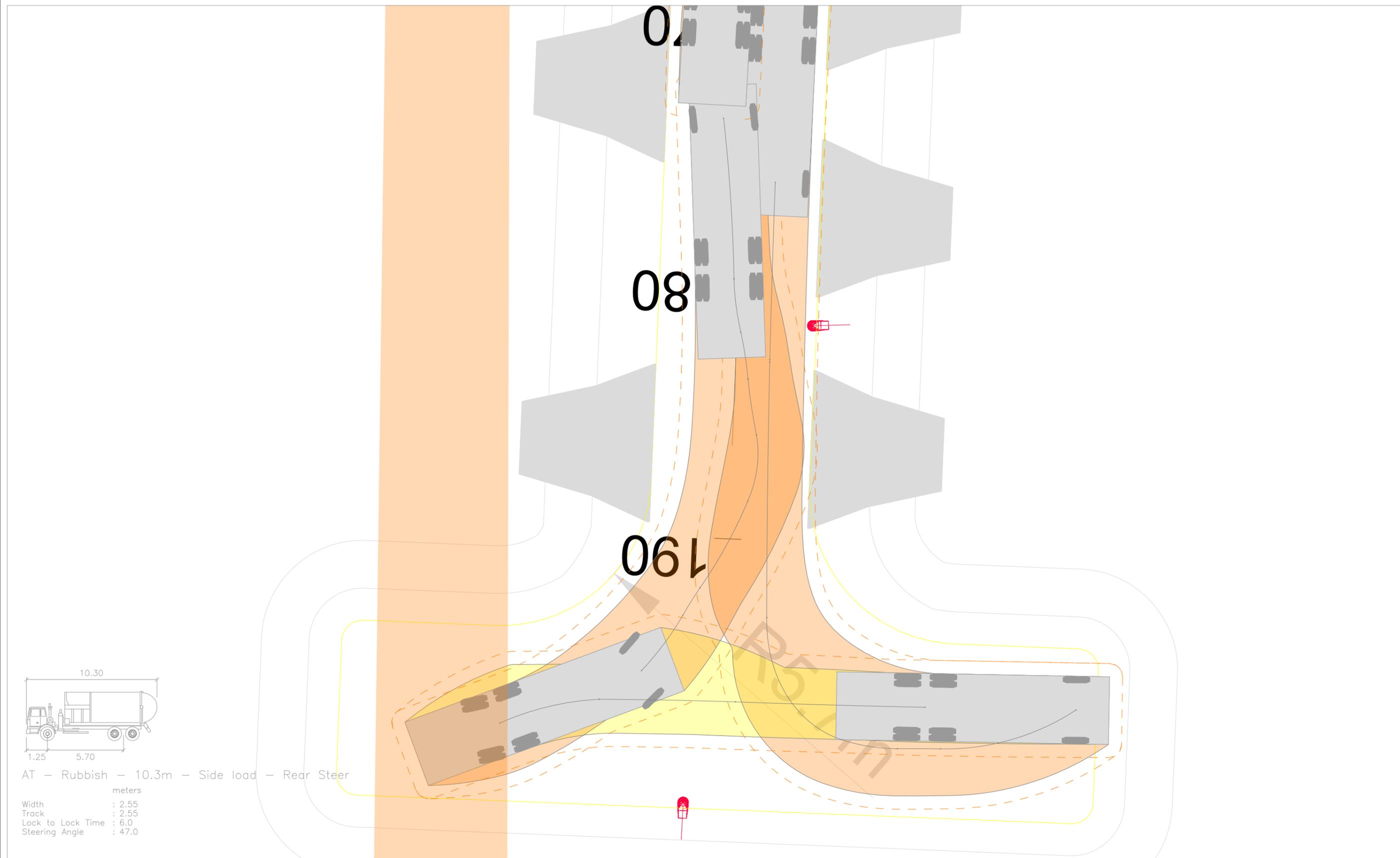
**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
4D





Revision notes:		
Rev:	Date:	Notes:

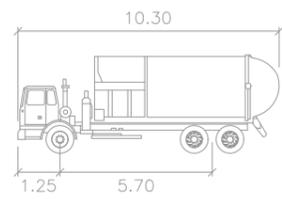
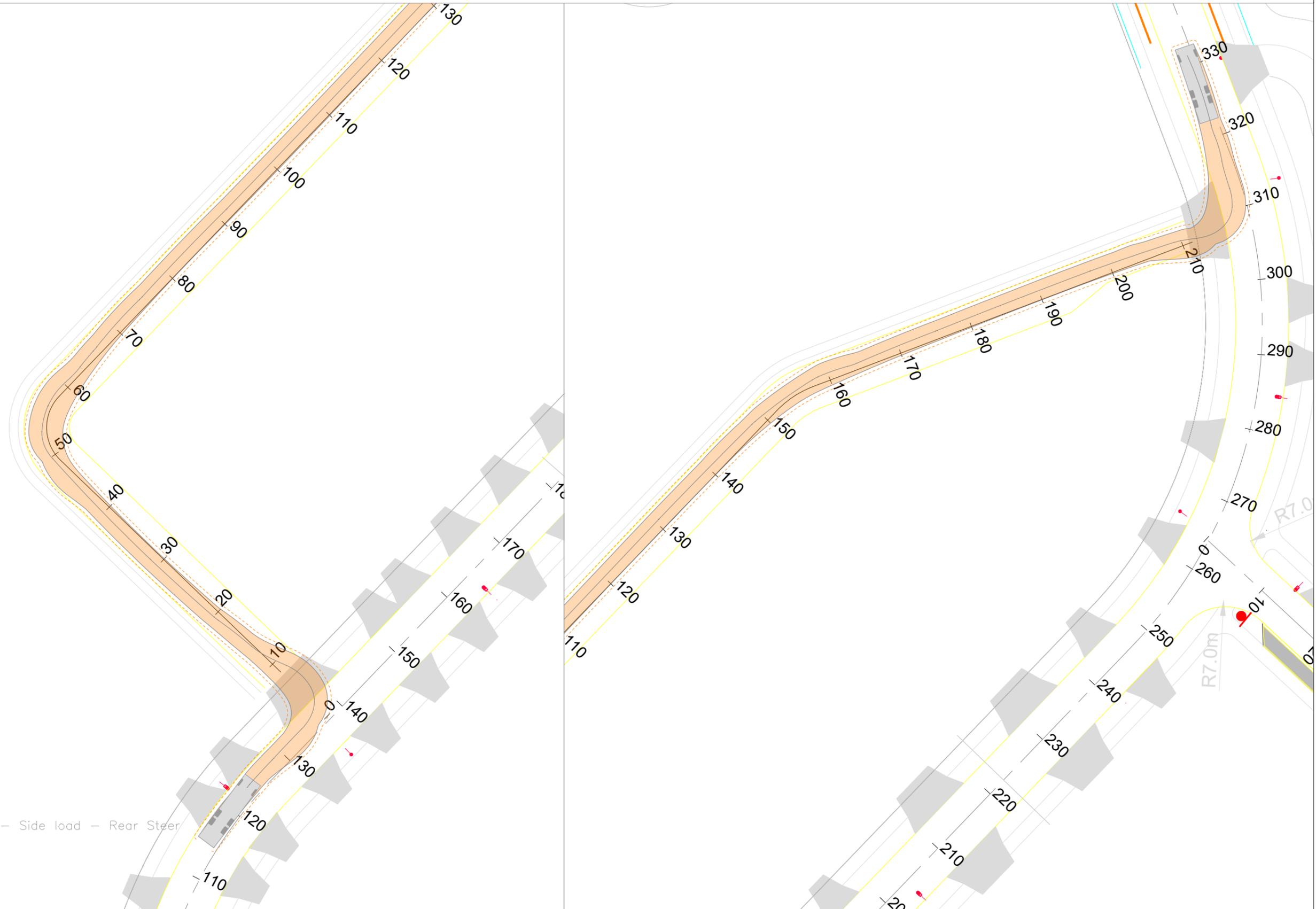
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT 10.3m Truck Tracking Road 8

<b>Date:</b> 22 December 2025
<b>Scale @ A3:</b> 1:0.1333
<b>Revision:</b> A



**Figure:**  
6D



AT - Rubbish - 10.3m - Side load - Rear Steer

meters

Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 10.3m Truck Tracking JOAL 9

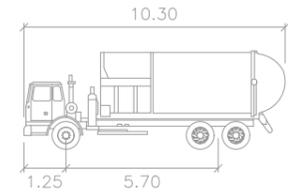
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.5

**Revision:**  
 A



**Figure:**  
 7D



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 10.3m Truck Tracking JOAL 4A/4B

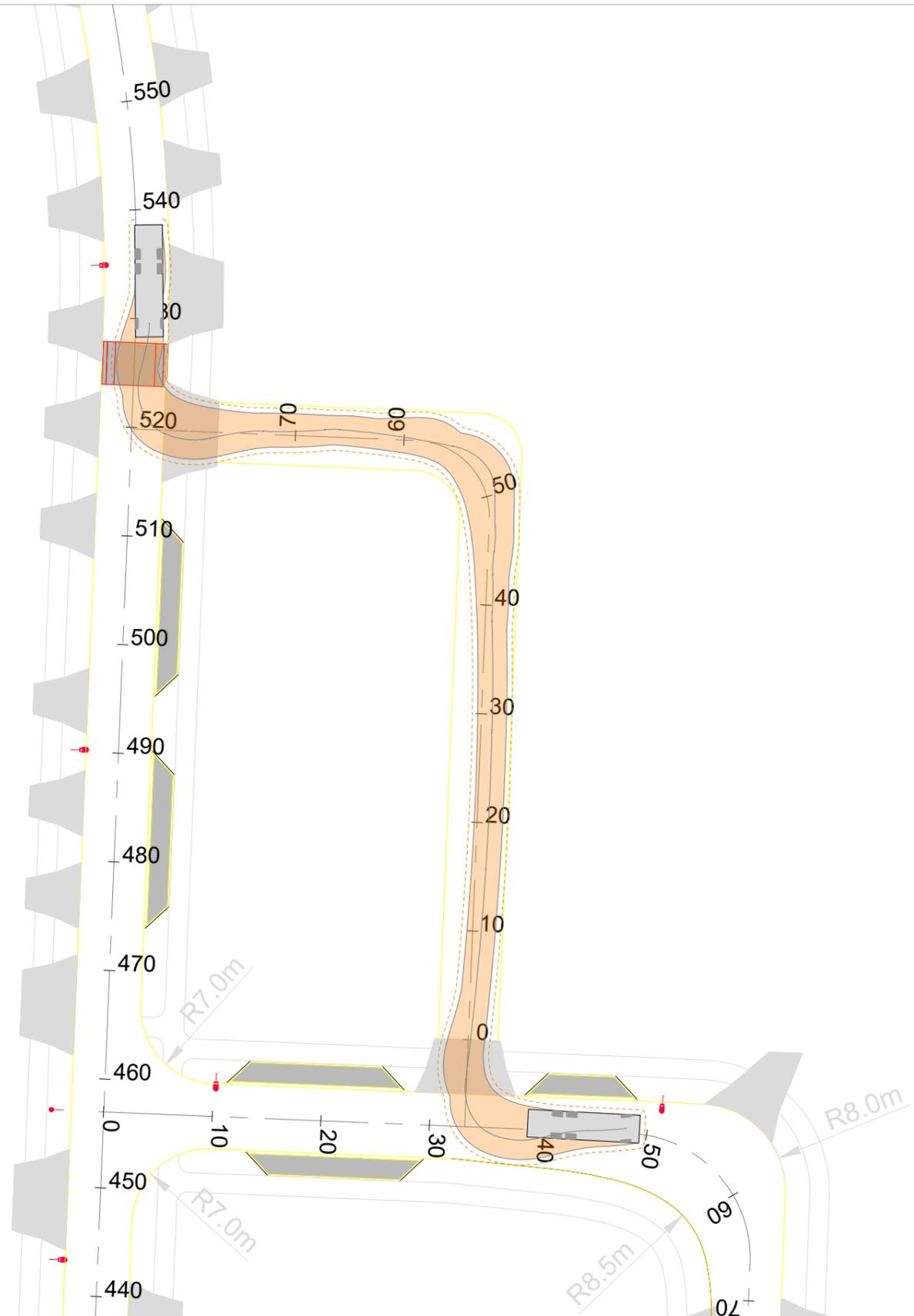
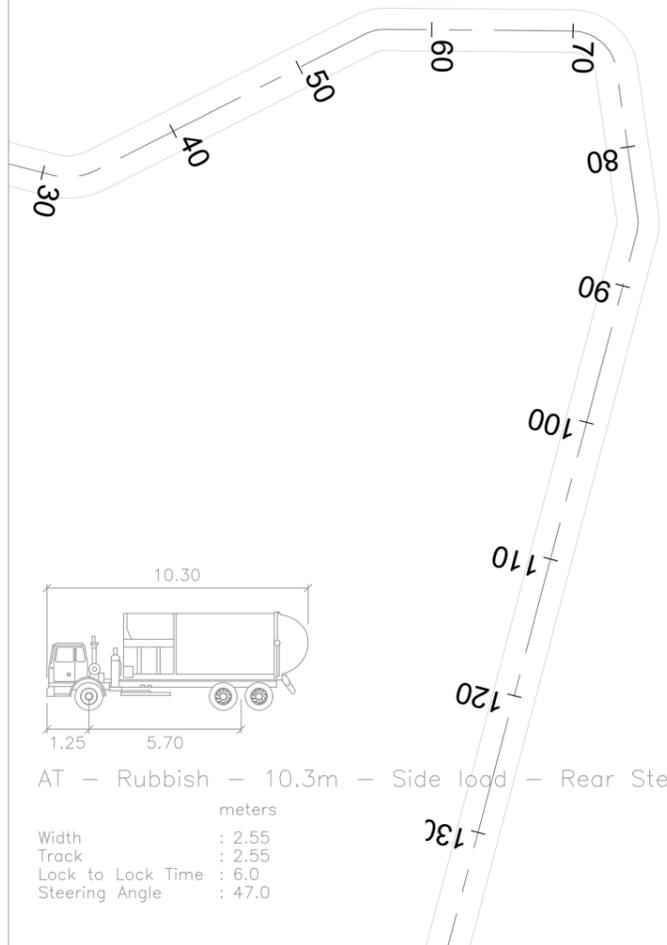
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.5

**Revision:**  
 A



**Figure:**  
 8D



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
10.3m Truck Tracking JOAL 30

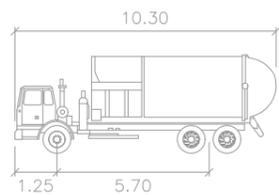
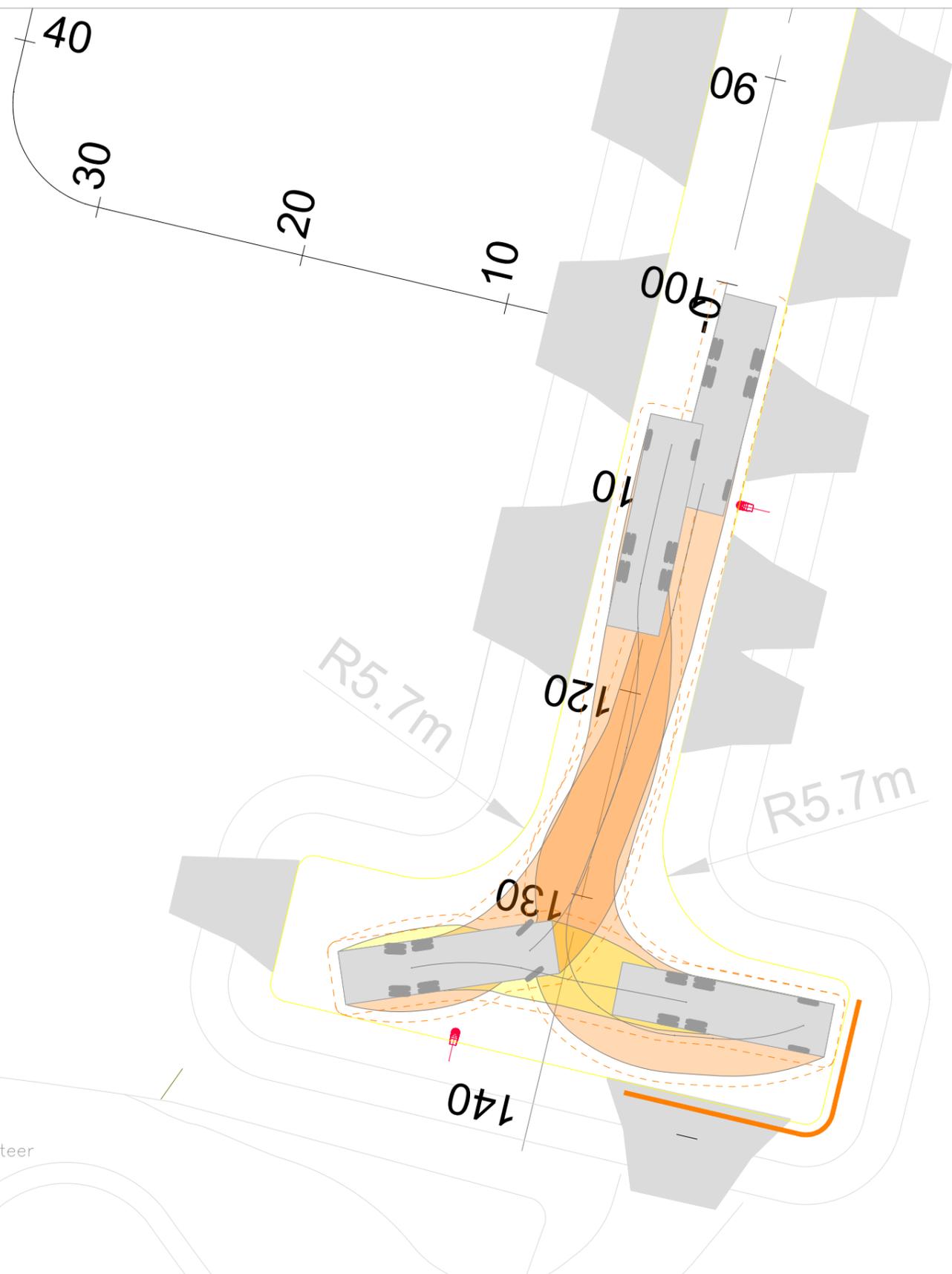
**Date:**  
22 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
9D



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 10.3m Truck Tracking Road 3

**Date:**  
 22 December 2025

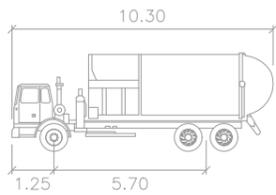
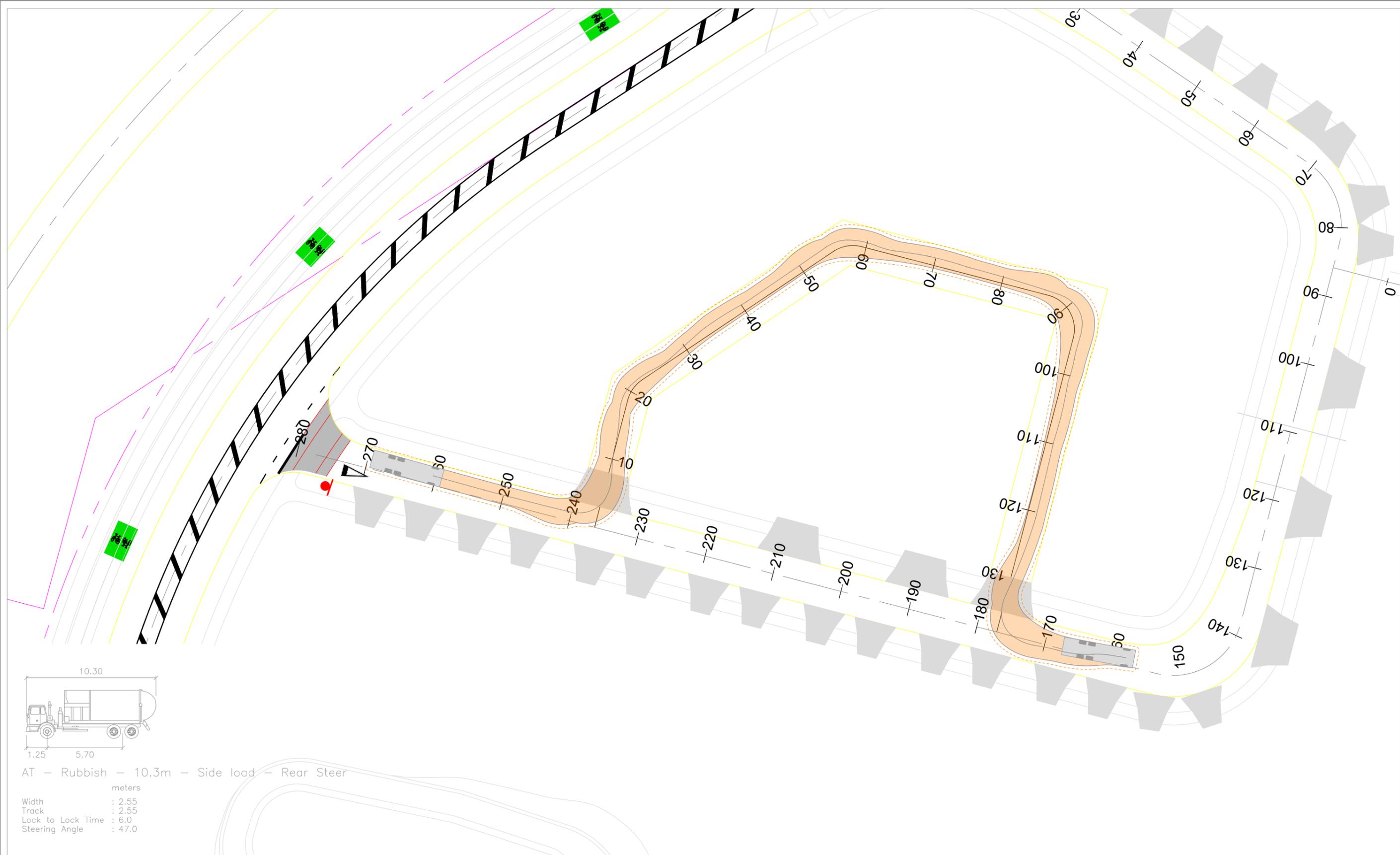
**Scale @ A3:**  
 1:0.25

**Revision:**  
 A



**Figure:**  
 10D





AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

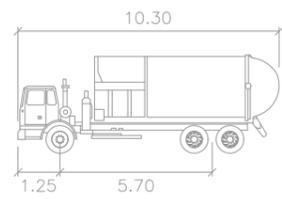
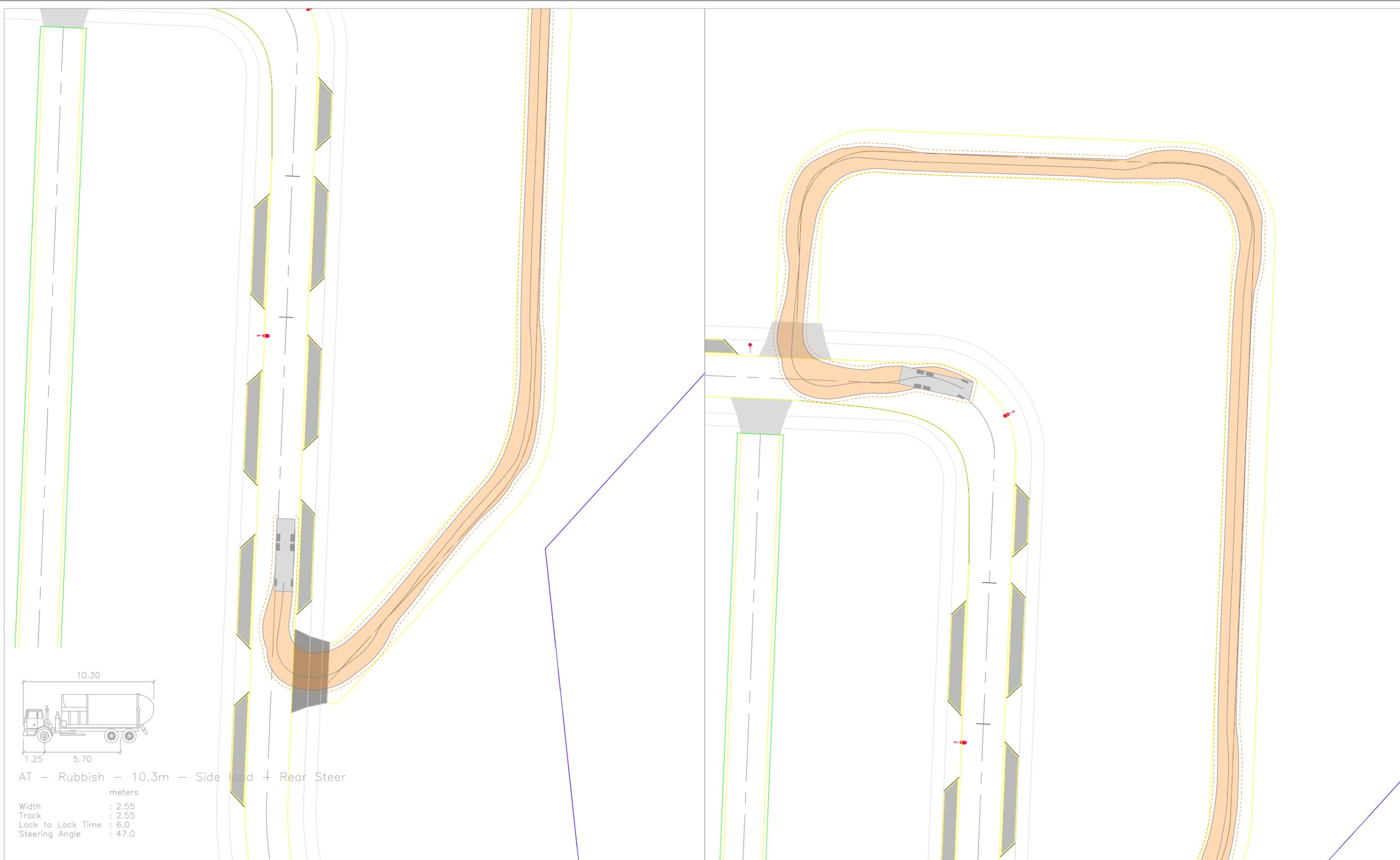
<b>Drawn by:</b> HA J003135
<b>Client:</b>

<b>Project:</b> Delmore, Orewa Proposed Residential Development
<b>Drawing Title:</b> VEHICLE TRACKING ASSESSMENT 10.3m Truck Tracking JOAL 8

<b>Date:</b> 22 December 2025
<b>Scale @ A3:</b> 1:0.5
<b>Revision:</b> A



Figure:  
12D



AT - Rubbish - 10.3m - Side load + Rear Steer

- Width : 2.55
- Track : 2.55
- Lock to Lock Time : 6.0
- Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
10.3m Truck Tracking JOAL 22

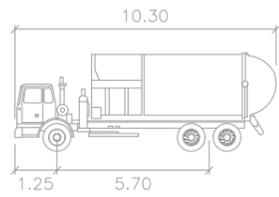
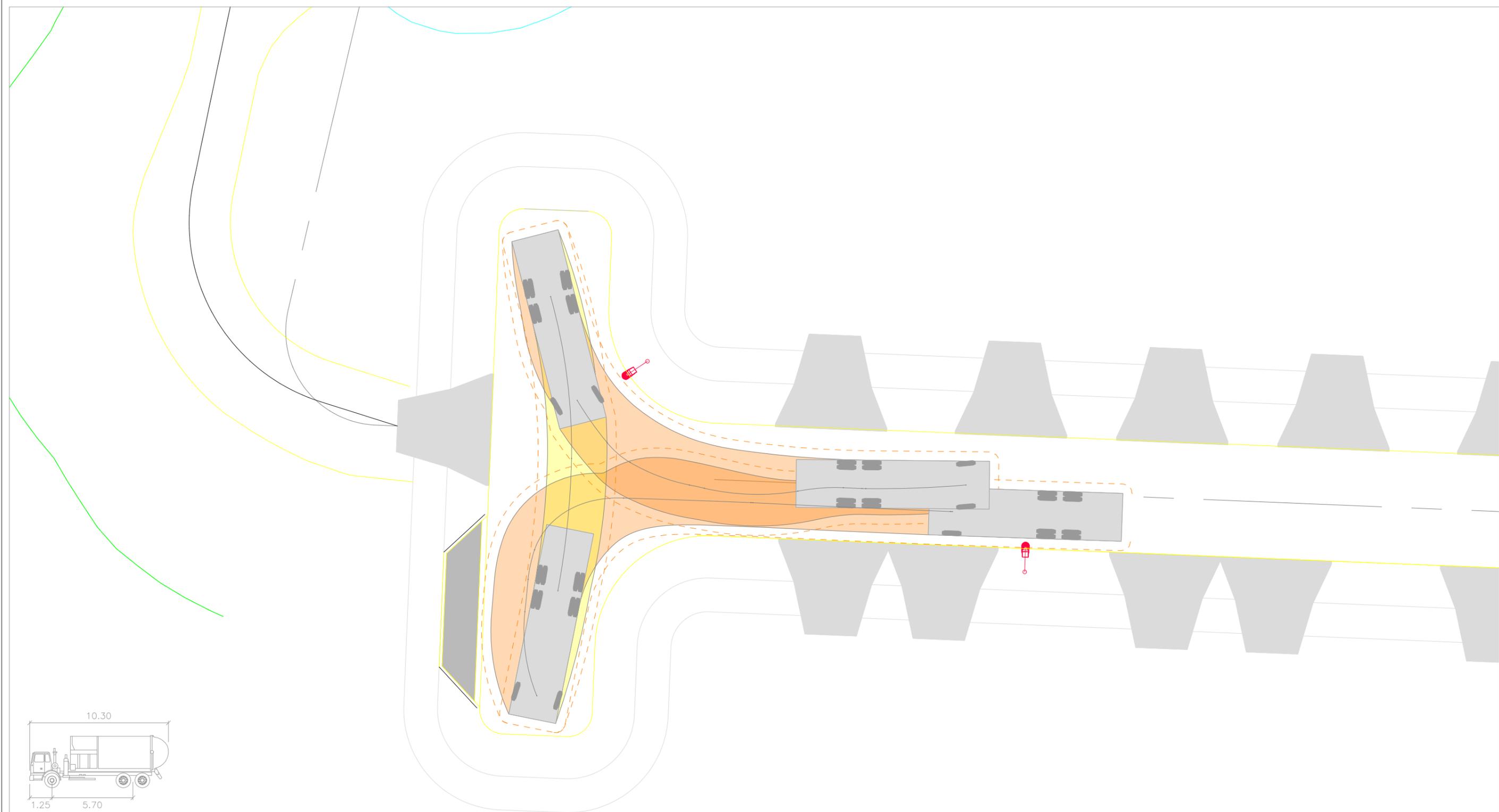
**Date:**  
22 December 2025

**Scale @ A3:**  
1:0.5

**Revision:**  
A



**Figure:**  
13D



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 10.3m Truck Tracking Road 16

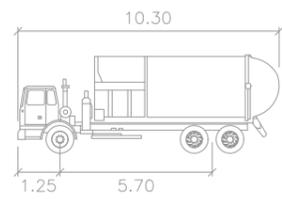
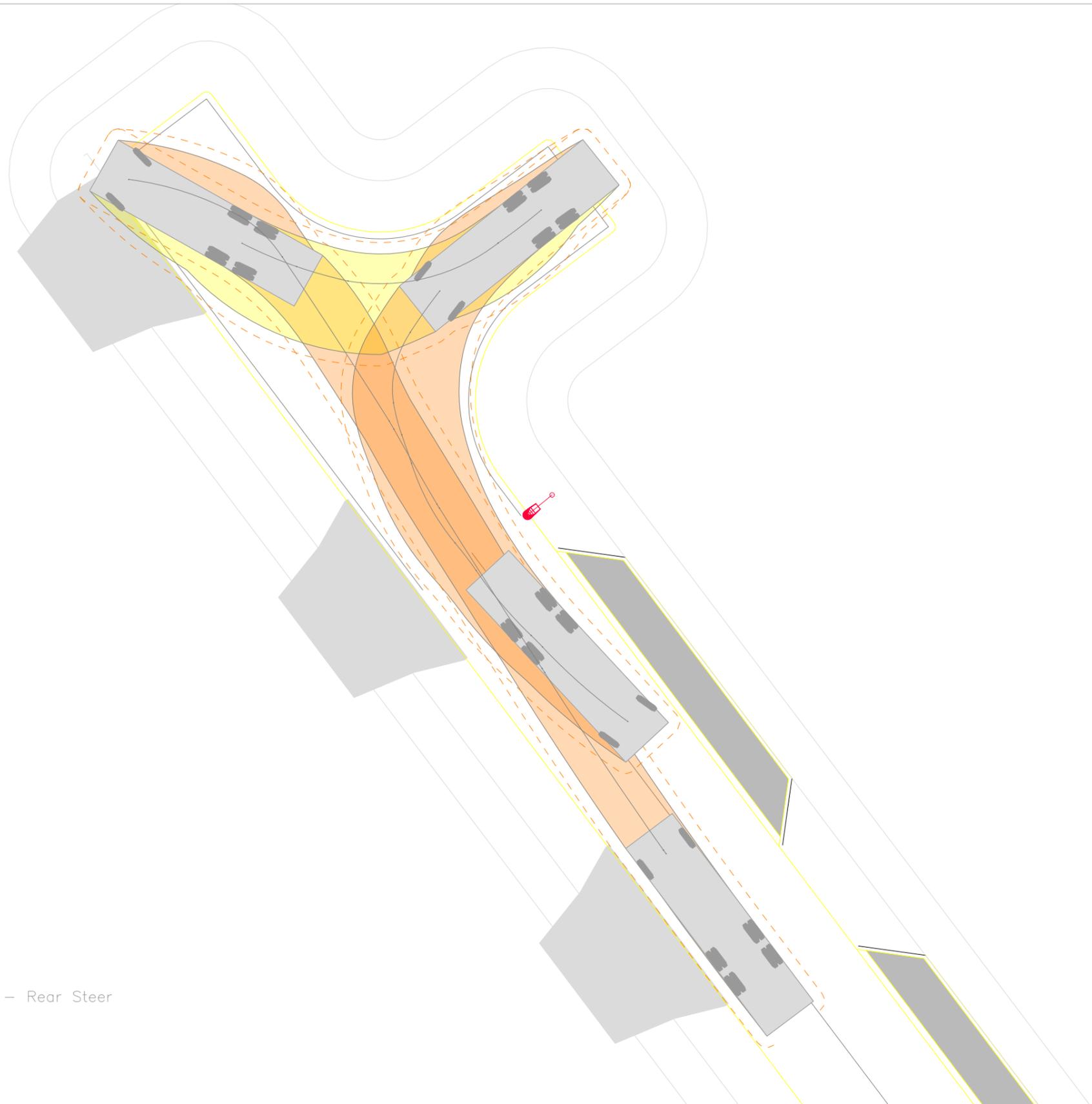
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 14D



AT – Rubbish – 10.3m – Side load – Rear Steer

- Width : 2.55 meters
- Track : 2.55
- Lock to Lock Time : 6.0
- Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
10.3m Truck Tracking Road 17

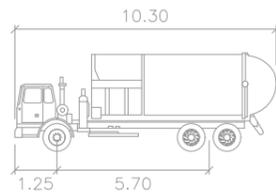
**Date:**  
22 December 2025

**Scale @ A3:**  
1:0.2

**Revision:**  
A

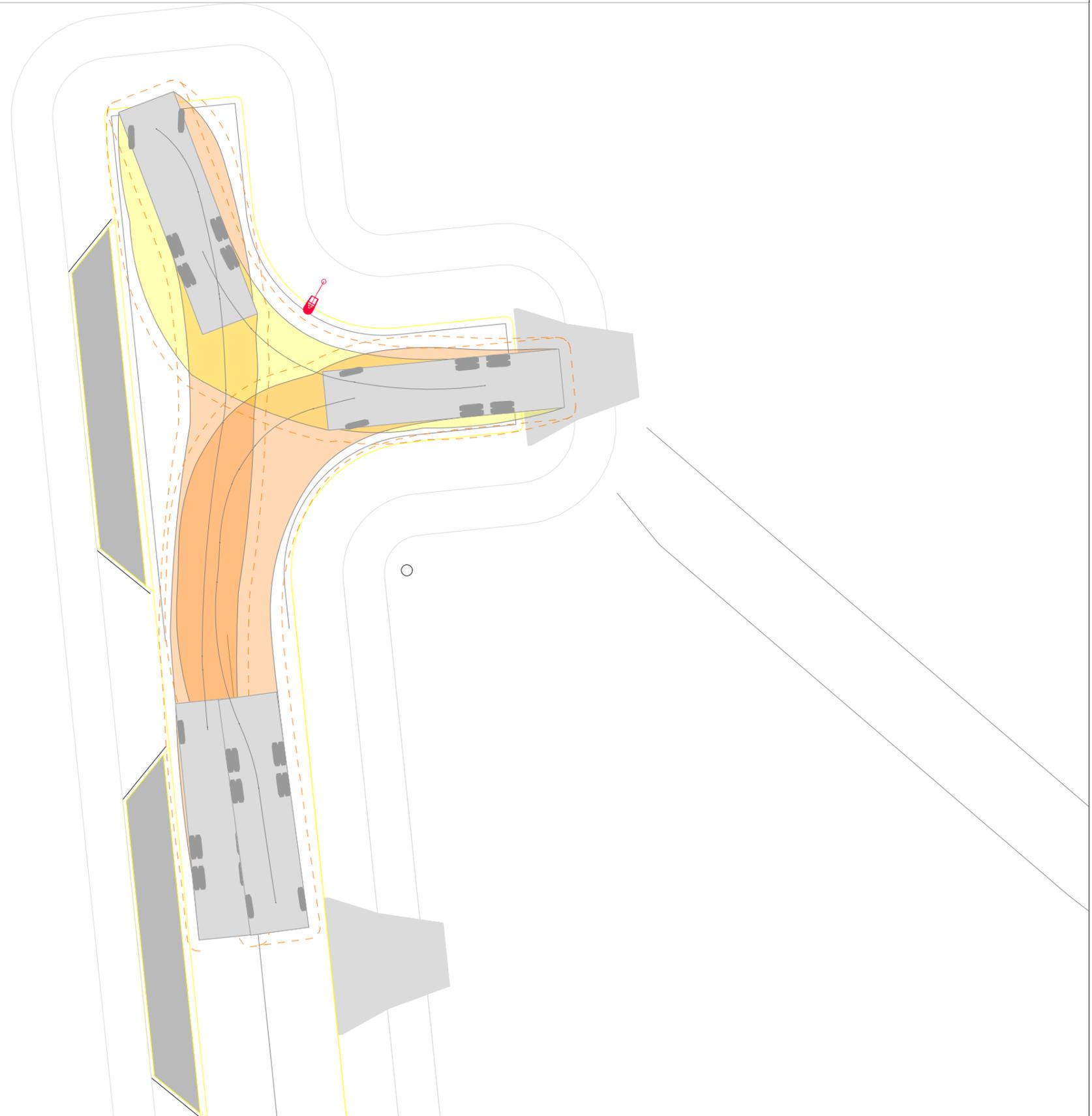


**Figure:**  
15D



AT - Rubbish - 10.3m - Side load - Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0



Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 10.3m Truck Tracking Road 21

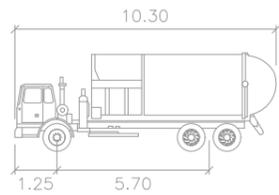
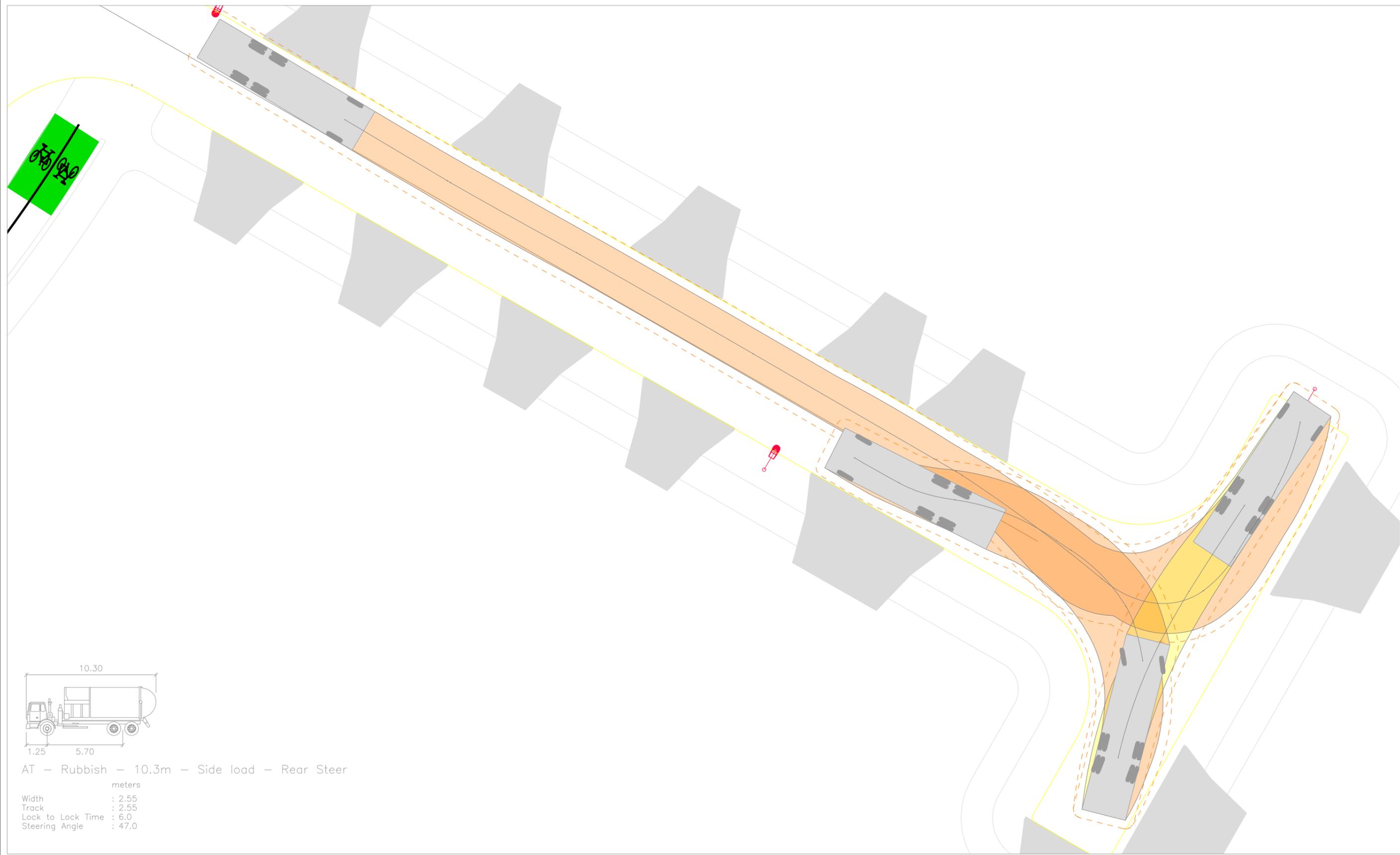
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 16D



AT – Rubbish – 10.3m – Side load – Rear Steer

meters  
 Width : 2.55  
 Track : 2.55  
 Lock to Lock Time : 6.0  
 Steering Angle : 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
 HA  
 J003135

**Client:**

**Project:**  
 Delmore, Orewa  
 Proposed Residential Development

**Drawing Title:**  
 VEHICLE TRACKING ASSESSMENT  
 10.3m Truck Tracking Road 23

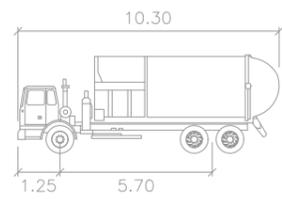
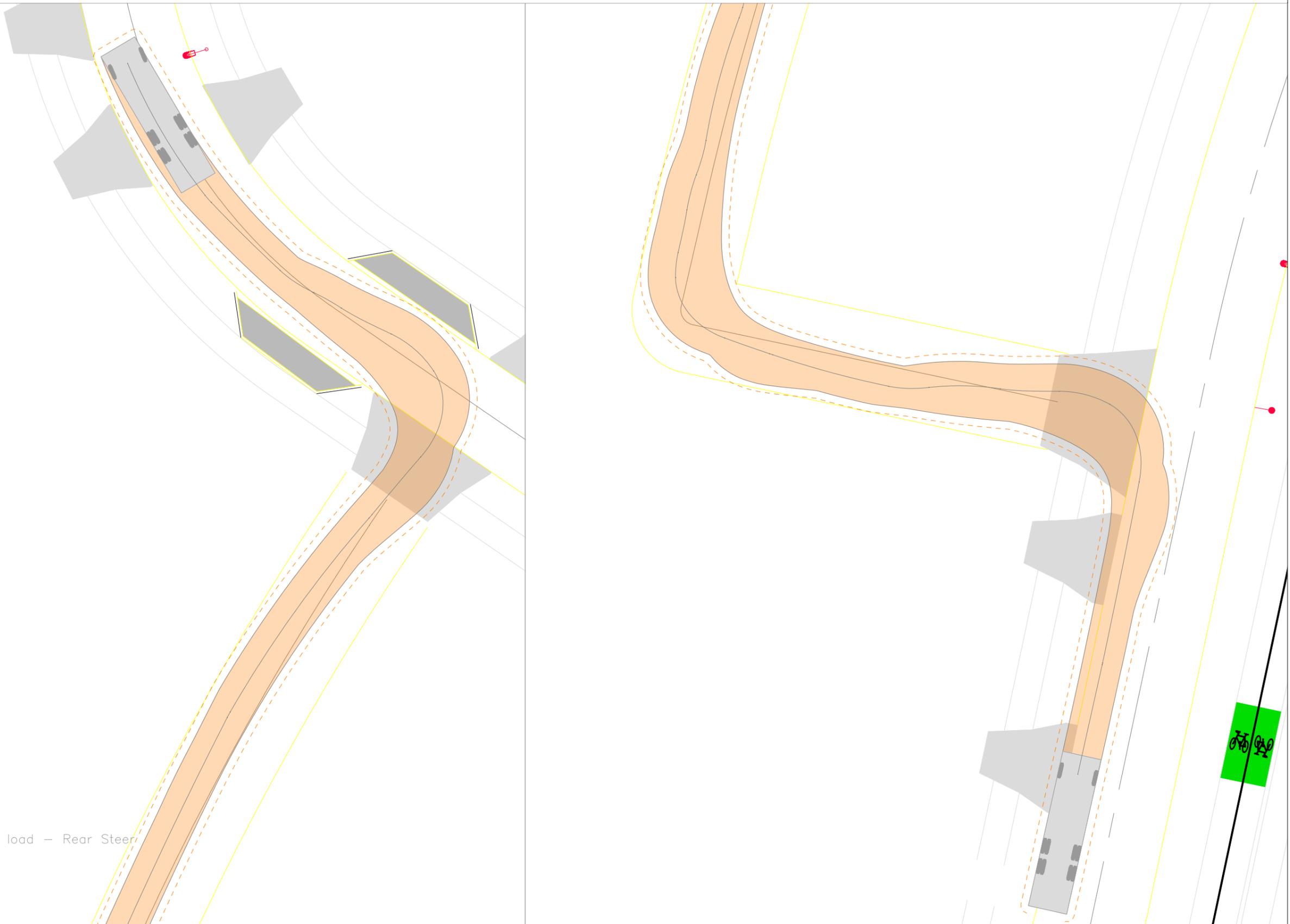
**Date:**  
 22 December 2025

**Scale @ A3:**  
 1:0.2

**Revision:**  
 A



**Figure:**  
 17D



AT - Rubbish - 10.3m - Side load - Rear Steer

	units
Width	: 2.55
Track	: 2.55
Lock to Lock Time	: 6.0
Steering Angle	: 47.0

Revision notes:		
Rev:	Date:	Notes:

**Drawn by:**  
HA  
J003135

**Client:**

**Project:**  
Delmore, Orewa  
Proposed Residential Development

**Drawing Title:**  
VEHICLE TRACKING ASSESSMENT  
10.3m Truck Tracking JOAL 22

**Date:**  
22 December 2025

**Scale @ A3:**  
1:0.25

**Revision:**  
A



**Figure:**  
18D