MOTT MACDONALD

Milldale Development - Argent Lane to Dairy Flat Highway

Preliminary Design Report

October 2020

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October 2020

Mott MacDonald New Zealand Limited
Registered in New Zealand no. 3338812

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	07/08/20	Ivan Ho	Greg Booth	Devon Rollo	Rev A
B	24/09/20	Ivan Ho	Greg Booth	Devon Rollo	Amendments from AT comments
C	30/09/20	Ivan Ho	Greg Booth	Devon Rollo	Amendments from Bell Gully comments
D	7/10/2020	Ivan Ho	Greg Booth	Devon Rollo	Amendments from AT

Document reference: 402828-MMD-XX-XX-RP-HW-007

Information class: Standard

Contents

1 Introduction

Mott MacDonald has been commissioned by Fulton Hogan Land Development Ltd to provide design services for the upgrade of the Dairy Flat Highway and Pine Valley Road to serve as part of the proposed collector road to the new Milldale Subdivision. This design report supplements the preliminary design drawings for the Resource Consenting application and notices of requirement.

The design includes the upgrade of the existing Dairy Flat Highway give-way T-intersection to a 3-leg signalised intersection. Pine Valley Road is to include new pedestrian and cycling facilities and road realignment to tie into the proposed Old Pine Valley Road roundabout intersection designed by Wood's Consultant Ltd. The Milldale Silverdale off-ramp project also ties into the Dairy Flat Highway extent of works.

The preliminary design includes two construction stages with supplementary details and information for land acquisition and notice of requirement boundaries for consenting purposes.

The extent of work is largely situated within the existing Auckland Transport designation and the notice of requirement is required for the widening of Dairy Flat Highway and the realignment of Pine Valley Road.

Auckland Transport has been kept informed of progress during the design process.

A preliminary design road safety audit has been conducted by Stantec in June 2020.

1.1 Context

This preliminary design report provides further detail based on the design and supplements the design drawings for the designation and resource consent application.

1.2 Scope of Services

In summary the scope of this contract is to:

- Prepare an options assessment for the realignment and upgrade of the vehicle route from Argent Lane Extension at Old Pine Valley Road to the Silverdale interchange.
- Prepare road and stormwater design for the preparation of the resource consent and notice of requirement applications and associated land acquisition requirements including;
  - Preliminary road design for the Stage 1 two lane collector road with pedestrian and cycling facilities along the realigned Pine Valley Road, a new signalised intersection at Pine Valley Road, and upgrade of the Dairy Flat Highway; and
  - Concept design for the Stage 2 four-lane arterial road along Pine Valley Road and a new bridge structure replacing the existing galvanised corrugated armco culvert, a new signalised intersection as part of the Pine Valley Road and Dairy Flat Highway upgrade, and land acquisition requirements.
- Prepare land requirement plans for the required land for Stage 1 and 2.

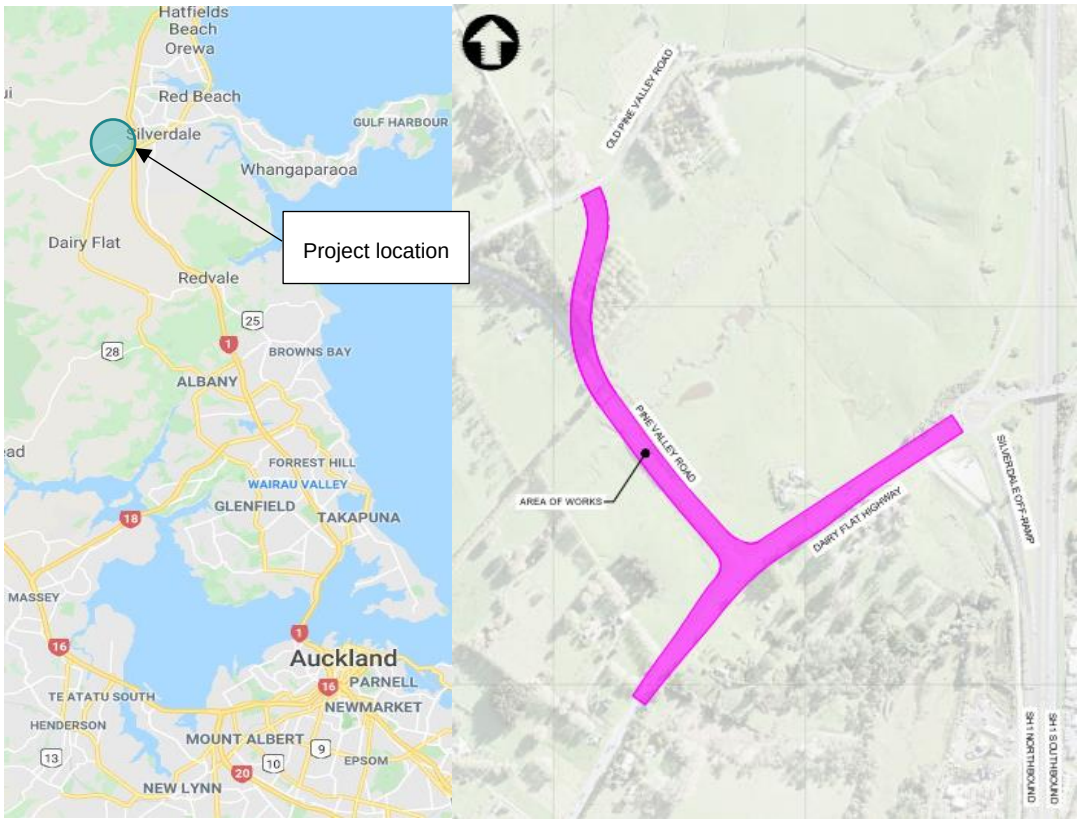
2 Site Description

2.1 Location

The site is situated west of the Northbound Exit Ramp of the Silverdale Interchange on State Highway 1, approximately 30km north of Auckland.

The extent of works is approximately 600m along the Dairy Flat Highway. The existing Pine Valley Road and intersection will be upgraded to provide pedestrian and cycling facilities and re-aligned to tie-in with the proposed roundabout intersection (designed by Woods Consultant Ltd) at Old Pine Valley Road.

The locality plan and enlarged site plan is shown below.



Source: Auckland Council GeoMap and aerial imagery from topographical survey source.

2.1 Exclusions

The following items are excluded from this report and will be covered at a later design stage:

- Geotechnical investigation (Refer to Geotechnical Interpretive Report).
- Structural assessment of the existing armco culvert structure under Pine Valley Road.
- Existing road surface investigation.
- Proposed pavement design.
- Pedestrian signals design.

- Landscape design.
- Lighting design.
- Stormwater design (refer to the stormwater preliminary design report).

2.2 Existing Road alignment

Dairy Flat Highway

The terrain and vertical gradient are gentle with a large radius horizontal bend at the Pine Valley Road intersection. The majority of the earthworks will be constructed in low-cut situation and significant fill batter is required at the proposed Pine Valley Road intersection and towards the western portion of the Dairy Flat Highway.

Pine Valley Road

The vertical gradient is approximately 12.3% downhill from the Dairy Flat Highway intersection to the existing armco culvert section on Pine Valley Road and flattens northbound towards the proposed Old Pine Valley Road intersection roundabout.

The horizontal alignment is predominantly straight with a large radius horizontal curve past the existing armco culvert section westbound towards Waitoki. Pine Valley Road will be realigned northbound towards the Milldale development introducing a reverse horizontal curve to tie-in with Wood's roundabout intersection at Old Pine Valley Road.

2.3 Pedestrian and Cycling Facilities

There are no provisions for pedestrian and cycling facilities on Dairy Flat Highway.

Pine Valley Road will be upgraded with an off-road grade separated pedestrian and cycle path on both sides of the road corridor, and these facilities will follow the existing vertical gradient of Pine Valley Road.

Auckland Transport's Project Design Advisory Group (PDAG) has given guidance on the arrangement of the cycle and pedestrian facilities on the steep gradient portion of Pine Valley Road, confirming a preference for off-carriageway cyclist path provision.

Works in the margins of Dairy Flat Highway are to allow for future pedestrian and cycle facilities that are not within the scope of this project.

2.4 Existing Services

An existing underground telecommunication cable and power line runs along the northern and southern side of the Dairy Flat Highway corridor respectively. These lines are within the extent of works, however the position of these lines does not appear to be in conflict with the road upgrade. Further investigation will be required prior to earthworks. There are no records of underground telecommunications or power lines located on Pine Valley Road.

There are two existing stormwater field cesspits situated opposite the roadside berm on Dairy Flat Highway near the Silverdale off-ramp interchange. The existing underground gravity pipe network connecting to these pits runs east towards the Silverdale interchange. The western portion of Dairy Flat Highway and Pine Valley Road conveys road surface runoff via existing roadside swales and wetlands and into the existing Weiti Stream.

There are no records of underground Watercare assets located within the extent of works area.

3 Data Collection

3.1 Topographical Surveys and GIS Investigation

A detailed topographical survey has been undertaken by Woods Consultant Ltd.

The survey included:

- Detailed spot height/ground level definition (particularly defining the existing sealed edge) and 3d triangulation terrain model of the existing surface.
- Existing road line markings.
- Existing pavement extents i.e. edge of seal, edge of existing shoulder.
- Existing kerb and channel.
- Lighting columns.
- Road signages.
- Stormwater infrastructures i.e. open drains, catch-pits, the edge of concrete of the existing armco culvert structure under Pine Valley Road.
- Existing underground utilities showing pipe sizes and connections.
- Roadside barriers.
- Fence lines.
- Vegetations and drip-lines of major trees.

3.2 Outputs and datum

Datum:

Mt Eden NZGD2000

Auckland vertical datum 1946.

Origin of levels:

IT I DP 68886 (EHET) RL = 44.47m

Survey accuracy and tolerances to Z16 NZTA specification.

Outputs are in 12da and 3d dwg formats.

The design has been based on this survey.

Note: The perimeter of the existing wetland areas adjacent to Pine Valley Road has been defined and surveyed by Epoch Ecology with an RTK GPS unit in November 2019.

4 Roading Design

4.1 Geometric Design

4.1.1 General

The Dairy Flat Highway has a single westbound lane and dual lanes heading eastbound towards the Silverdale interchange. The intersection and Dairy Flat Highway require widening to accommodate the future two right-turning lanes to Pine Valley Road.

The existing Pine Valley Road has a single north and single southbound lane, and the road corridor will need to be widened to futureproof for the 4-lane arterial road. The road will need to be realigned in order to connect to the proposed Old Pine Valley Road roundabout (designed by Woods Consultant Ltd) heading northbound towards the Milldale subdivision.

4.1.2 Design Basis

4.1.2.1 Design Speed

The existing posted speed limit is 80 km/hr along Dairy Flat Highway west from the Silverdale off-ramp and Pine Valley Road.

The design speed for the road will be 80 km/hr and 30 km/hr at the Dairy Flat Highway and Pine Valley Road at the approach and departure lanes at the proposed signalised and roundabout intersections. A 50-percentile car tracking will also be used to assess the intersection's operating speed, and this speed parameter will be used to assess sight distances and other design safety checks.

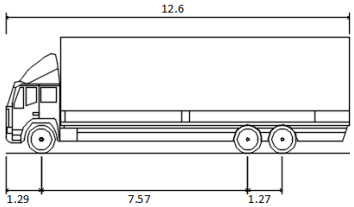
4.1.2.2 Design Vehicle

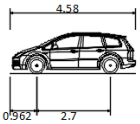
All vehicle swept path analysis has been carried out on the preliminary design layouts using the AutoTrack software.

Figure 4.1.2.2 shows the design and check vehicle profiles that have been used to perform the sweep path for this design. The vehicle profiles are in terms of the Auckland Transport TDM – Urban and Rural roadway design guide table 2 for collector road classification.

Figure 4.1.2.2:

Design vehicle(s) – 12.6m rigid and the 50th percentile car

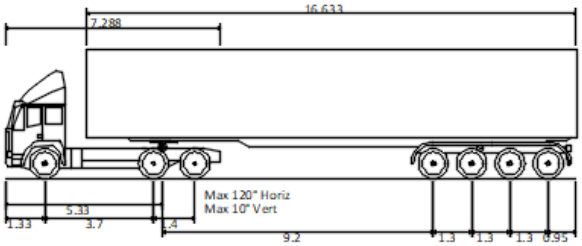




AT - Truck - 12.6m	
Overall Length	12.600m
Overall Width	2.550m
Overall Body Height	4.249m
Min Body Ground Clearance	0.385m
Track Width	2.550m
Lock-to-lock time	6.00s
Max Wheel Angle	49.00°

AT - 50th - Car	
Overall Length	4.580m
Overall Width	1.805m
Overall Body Height	1.505m
Min Body Ground Clearance	0.150m
Max Track Width	1.746m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	5.350m

Check vehicle – 19.45m semi-trailer



AT - Truck - 19.45m Semi-Trailer

Overall Length	19.380m
Overall Width	2.550m
Overall Body Height	4.386m
Min Body Ground Clearance	0.311m
Track Width	2.550m
Lock-to-lock time	6.00s
Wall to Wall Turning Radius	12.500m

4.1.2.3 Cross Section

The typical cross sections for Dairy Flat Highway and Pine Valley Road have been confirmed by AT and are shown in Table 4.1.2.3. Refer to Appendix A for the typical cross-section drawings.

Table 4.1.2.3: Road corridor

Stage 1

	Footpaths		Cycle Facilities		Traffic Lanes		Median
	No.	Width (m)	No.	Width (m)	No.	Width (m)	Width (m)
Dairy Flat Highway							
Road Corridor	-	-	-	-	3	3.2	2
Intersection	-	-	-	-	4	3.2	5.2 (futureproof for stage 2)
Pine Valley Road							
Road Corridor	2	1.8	2	1.8	2	3.2	8.9 (futureproof for stage 2)
Intersection	2	1.8	2	1.8	4	3.2	Central median (varies) + 3.2m (futureproof for stage 2)
Armco culvert section (existing)	2	1.4 (approx.)	2	1.4 (approx.)	2	3.2 + 0.3 shoulders	0.6

Stage 2

	Footpaths		Cycle Facilities		Traffic Lanes		Median
	No.	Width (m)	No.	Width (m)	No.	Width (m)	Width (m)
Dairy Flat Highway							
Road Corridor	-	-	-	-	3	3.2	2
Intersection	-	-	-	-	5	3.2	2
Pine Valley Road							
Road Corridor	2	1.8	2	1.8	4	3.2	2.5
Intersection	2	1.8	2	1.8	4	3.2	varies

	Footpaths		Cycle Facilities		Traffic Lanes		Median
	No.	Width (m)	No.	Width (m)	No.	Width (m)	Width (m)
Bridge (new)	2	1.8	2	1.8	4	3.2	2.5

Note: The corridor for stage 1 and 2 includes a 2.2m wide rain garden between the carriageway and the proposed cycleway/berm on both sides of the road. Refer to the stormwater preliminary design report.

4.1.2.4 Vertical and Horizontal Alignment

Dairy Flat Highway

The Dairy Flat Highway upgrade will require seal widening of the existing carriageway to accommodate the proposed dual right-turning lane into Pine Valley Road. The horizontal and vertical alignment ties into the Silverdale interchange and the existing Dairy Flat Highway alignment heading westbound.

The corridor widening includes a 2.2m front berm area reserved for the proposed raingarden and a 1.8m footpath at the intersection to serve as a connection to the pedestrian crossing points. The widening will affect the neighbouring properties and land acquisition will be required on both sides of the road corridor.

Pine Valley Road

It has been agreed with AT that the existing 12.3% vertical gradient of Pine Valley Road is to be retained, and the existing carriageway is to be widened to futureproof for the 4-lane collector road to the Milldale development. Pine Valley Road will include off-road grade separated pedestrian footpaths and cycle lanes on both sides of the road corridor, and the steep section of the off-road facilities will require a design departure from AT standard design requirements.

The existing armco culvert under Pine Valley Road will be retained for the Stage 1 works. The proposed off-road pedestrian and cycling facilities will be located from road edge to the concrete capping on the culvert. Minor earthworks will be done to raise the level to the footpath to tie into the existing road levels. The proposed shared path width at this location is less than Auckland Transports 3m minimum standard width as the available width is constrained by the length of the existing culvert. This has been discussed with and approved by Auckland Transport's Project Design Approval Group for the Milldale development noting that a design departure from standards will be required. The existing armco culvert section will be replaced with a new bridge structure for Stage 2 to accommodate for the width of the full 4 lane collector road and pedestrian and cycling facilities. Refer to Appendix A for typical cross-section drawings.

A new vehicle access will be included for service vehicles accessing the proposed super rain-garden adjacent to Pine Valley Road (refer to the stormwater report).

Pine Valley Road will be realigned with a reverse horizontal curve, and the horizontal and vertical alignment will tie into the Wood's roundabout design on the Old Pine Valley Road intersection.

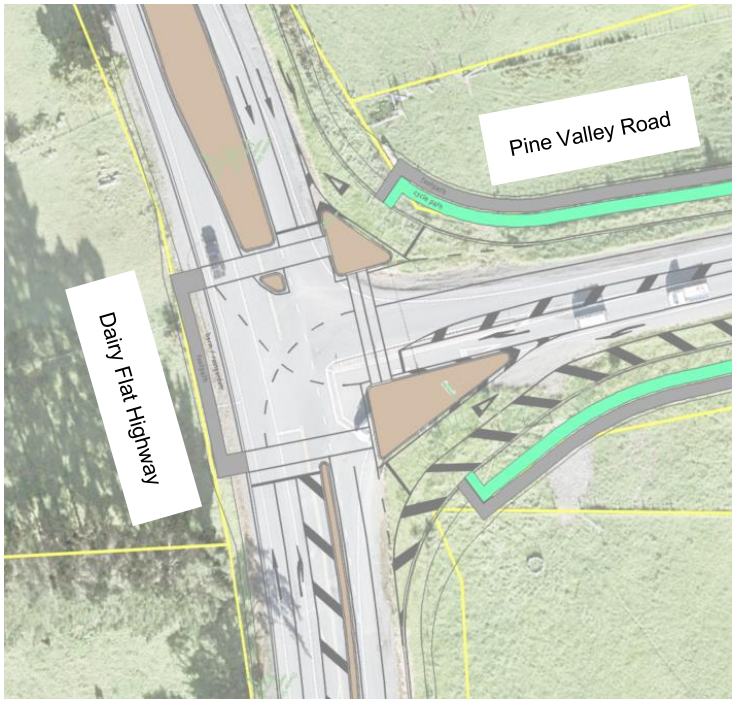
4.1.2.5 Proposed Signalised Intersection by the Dairy Flat Highway

The construction of the proposed 3-leg signalised intersection will be split into 2 stages.

Stage 1

The proposed sealed widening extent of the existing Dairy Flat Highway and Pine Valley Road carriageway has been designed to the ultimate stage 2 width. The futureproof traffic lane areas will either be marked as a flush median with safe hit posts in the interim phase, or traffic islands will be installed over the widened area for a more permanent mitigation measure. The islands will then be removed and the pavement areas will be re-surfaced when the additional traffic lanes open.

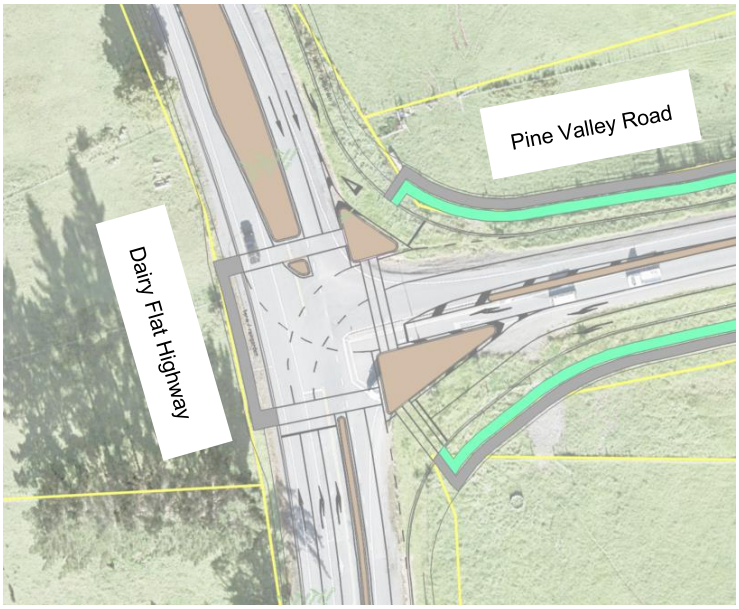
The signalised intersection will include provisions for pedestrian and cycle lane crossings, and the signal phasing will be included at a later design stage.



Source: MM Issued for resource consent drawing RD-1101 – Stage 1 general layout

Stage 2

The stage 2 intersection will be re-marked to cater for the ultimate 4-lane Pine Valley Road corridor. The dual left-turn lanes from Pine Valley Road to Dairy Flat Highway will be changed to a signalised crossing for pedestrian safety improvement.



Source: MM Issued for resource consent drawing RD-2101 – Stage 2 general layout

4.1.2.6 Proposed Roundabout by the Old Pine Valley Road intersection

The single lane 4-leg roundabout has been designed by Wood's Consultant Ltd serving as the connector to the Milldale Subdivision heading north. This roundabout will be upgraded to a dual lane when Pine Valley Road becomes a 4-lane collector road.

MM has been commissioned by AT to review the roundabout design and have included the tie-in of the southern leg to the proposed Pine Valley Road alignment. Refer to appendix B to the Milldale – Argent Lane Roundabout Intersection Technical Note.

4.2 Design Standards

The standards, guidelines and manuals used in developing the detailed design for the project are listed below:

- Auckland Transport - Transport Design Manual (TDM) Engineering Design Code
- Austroads
- New Zealand Transport Agency (NZTA)
- Auckland Council
- Other guidelines/manuals

Clarification from NZTA and AT will be sought to advise the preferred standards/guidelines/manuals to be used for the detailed design of each of the roads that are to be built or upgraded as part of the Milldale development.

4.2.1 Auckland Transport Transport Design Manual (TDM) Engineering Design Code

- Chapter 1: Urban and Rural Roadway Design
- Chapter 2: Footpaths and the Public Realm

- Chapter 3: Cycling Infrastructure
- Chapter 4: Traffic Calming
- Chapter 5: Road Drainage and Surface Water Control
- Chapter 6: Street Lighting
- Auckland Transport - TDM Standard Engineering Details

4.2.2 Austroads

- Part 3: Geometric Design
- Part 4: Intersections and Crossings
- Part 4A: Unsignalised and Signalised Intersections
- Part 4B: Roundabouts
- Part 5: Drainage Design
- Part 6: Roadside Design
- Part 6A: Pedestrian and Cyclist Paths
- Pavement Design – A Guide to the Structural Design of Road Pavements

4.2.3 New Zealand Transport Agency (NZTA)

- NZTA Manual of Traffic Signs and Markings (MOTSAM)
- NZTA Traffic Control Devices 2004 and subsequent amendments
- NZTA, Road Traffic Standards (RTS) series RTS 6: Guidelines for Visibility at Driveways
- NZTA Road Traffic Standards (RTS) series RTS4 - Guidelines for Flush Medians
- NZTA, RTS 18: New Zealand on Road Tracking Curves for Heavy Vehicle
- NZTA, Pedestrian Planning Guide
- NZTA, Cycle Network and Route Planning Guide (CNRPG)
- New Zealand Supplement to the 2004 Austroads Pavement Design Guide
- NZTA M10/2014 Specification for Dense Graded and Stone Mastic Asphalts
- Asphalt Surfacing Treatment Selection Guidelines NZTA / Roading NZ 2012
- Code of Practice for Temporary Traffic Management (CoPTTM)
- Over dimensional route maps
- NZTA M23 Appendix A: Approved Road Safety Barrier Systems

4.2.4 Auckland Council

- Auckland Council Stormwater Code of Practice, including Standard Engineering Detail drawings.
- Auckland Council – Stormwater Management Devices in the Auckland Region GD01.
- ARC Technical Publication No. 108 (TP108) – Hydraulic Calculations.

4.2.5 Other Guidelines and Manuals

- NZ Heavy Haulage Association – Road Design Guidelines for Over Dimensional Loads

4.3 Road marking and Signage

4.3.1 Road marking and delineations

The road marking of the proposed Pine Valley Road/Dairy Flat Highway signalised intersection is to be staged (refer to section 4.1.2.5), and the futureproof flush median areas in stage one could be marked with temporary safe-hit posts to reduce the speed environment for drivers on the road corridor.

New audio tactile edge-line and raised reflective pavement markers (RRPMs) could also be used to delineate the lane lines on Dairy Flat Highway and Pine Valley Road to improve road safety. These design details will be included at a later stage.

The off-road pedestrian and cycle paths on Pine Valley Road are grade separated. The paths will be marked and clearly defined. New pedestrian tactile indicators for visually impaired will be installed at the proposed signalised intersection and the details will be included at a later design stage once the proposed intersection layout has been confirmed.

All road markings have been designed in accordance with MOTSAM – Part 2: Markings.

4.3.2 Signage

All existing signage will be relocated in accordance with the proposed road widening extent, and additional pre-warning signage will be installed for the proposed signalised intersection on Dairy Flat Highway and the proposed roundabout on Old Pine Valley Road intersection.

Due to the steepness of the existing Pine Valley Road alignment approaching the proposed Dairy Flat Highway intersection, it is recommended that the driver visibility of the existing T-intersection chevron sign be reassessed once the proposed signalised intersection layout has been confirmed at detailed design.

Source: MM site photograph – Pine Valley Road southbound towards the Dairy Flat Highway intersection

All road signage will be designed in accordance with MOTSAM – Part 1: Traffic signs at a later design stage.

4.3.3 Way Finding

From the Milldale Silverdale off-ramp project, it has been confirmed with NZTA that way finding signages for the Milldale subdivision will not be included in the road corridors at this stage.

4.4 Roadside Barrier

4.4.1 General

There are two existing lengths of TL-3 wooden post W-beam barriers installed on both sides of the Pine Valley Road section where the existing armco culvert is situated. These barrier sections are to be removed and reinstalled once the proposed shared paths are constructed. The new barrier installation is to comply with the standard conditions;

- Within 200mm horizontally from the new kerb face to barrier face.
- Height to be 550mm from finished road surface to rail centreline.
- Barrier, end terminals and system anchorage to be compliant with the current standards.

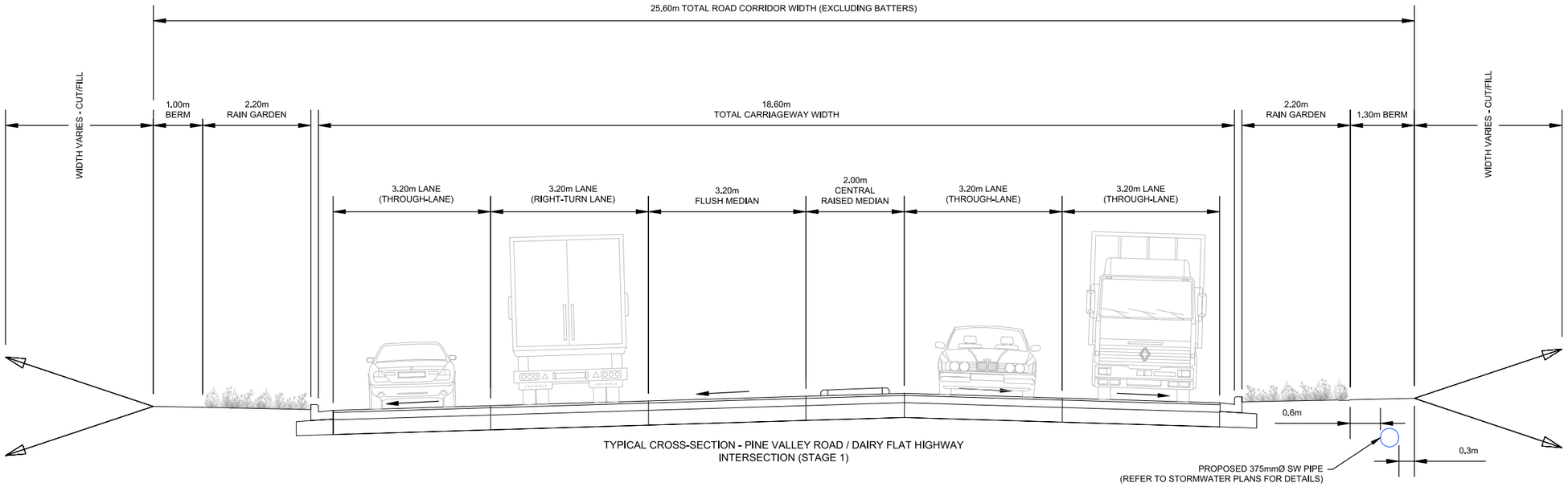
4.4.2 Design Standards

All new barriers are to be installed and comply with the NZTA M23 specification: Appendix A: Approved Road Safety Barrier Systems.

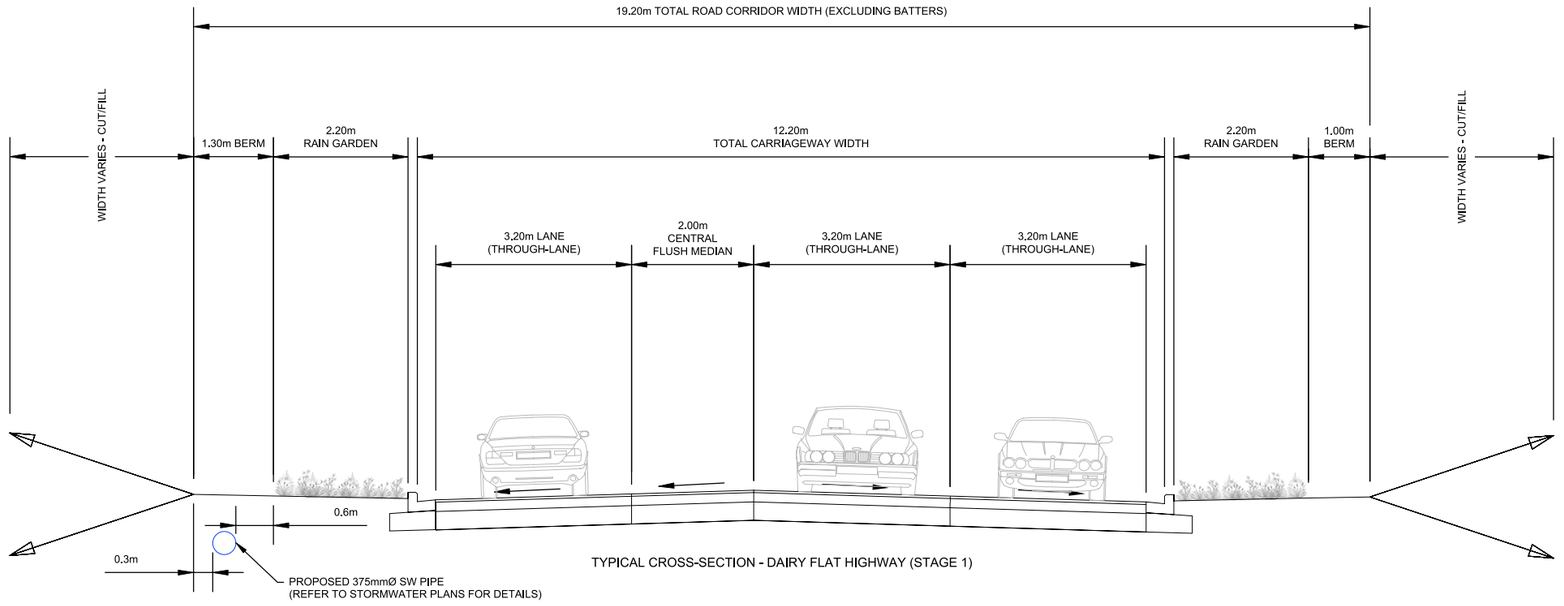
Appendix A: Typical Cross-sections

NOTE:

1. REFER TO CROSS-SECTIONS FOR DETAILS.
2. ROAD PAVEMENT DETAILS TO BE CONFIRMED AT DETAILED DESIGN.



TYPICAL CROSS-SECTION - PINE VALLEY ROAD / DAIRY FLAT HIGHWAY INTERSECTION (STAGE 1)



TYPICAL CROSS-SECTION - DAIRY FLAT HIGHWAY (STAGE 1)

DRAFT - FOR RESOURCE CONSENT

REV	DESCRIPTION	DATE
F	DRAFT - AMENDMENTS FROM AT COMMENTS 04/09/20	11/09/2020
B	DRAFT - FOR RESOURCE CONSENT	15/05/2020
C	DRAFT - AMENDMENTS FROM AT COMMENTS 29/05/20	03/06/2020
D	DRAFT - REVISED DFH TIE-IN AND STAGE 1 OPTION	24/06/2020
E	DRAFT - AMENDMENTS FROM AT COMMENTS	17/07/2020

DRAWING Q.A.	
DRAWN	L.HO
CHECKED	D.ROLLO
APPROVED	G.BOOTH

DO NOT SCALE OFF THIS DRAWING.
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CLIENT
MILLDALE

ROAD CONTROLLING AUTHORITY
Auckland Transport
An Auckland Council Organisation

PROJECT
MILLDALE DEVELOPMENT
INFRASTRUCTURE PROJECTS

PROJECT TYPE: NEW CONSTRUCTION
PROJECT PHASE: PRELIMINARY DESIGN
CONSULTANT PROJECT NO.: 402828

DRAWING
Milldale Development,Argent Lane - Dairy Flat Highway
Typical cross-section - Dairy Flat Highway (STAGE 1)

DRAWING NO.: 402828-MM-DWG-02-CV-RD-1401
REVISION: F

FOR RESOURCE CONSENT
SCALE (A1): 1:50

NOTE:

1. REFER TO CROSS-SECTIONS FOR DETAILS.
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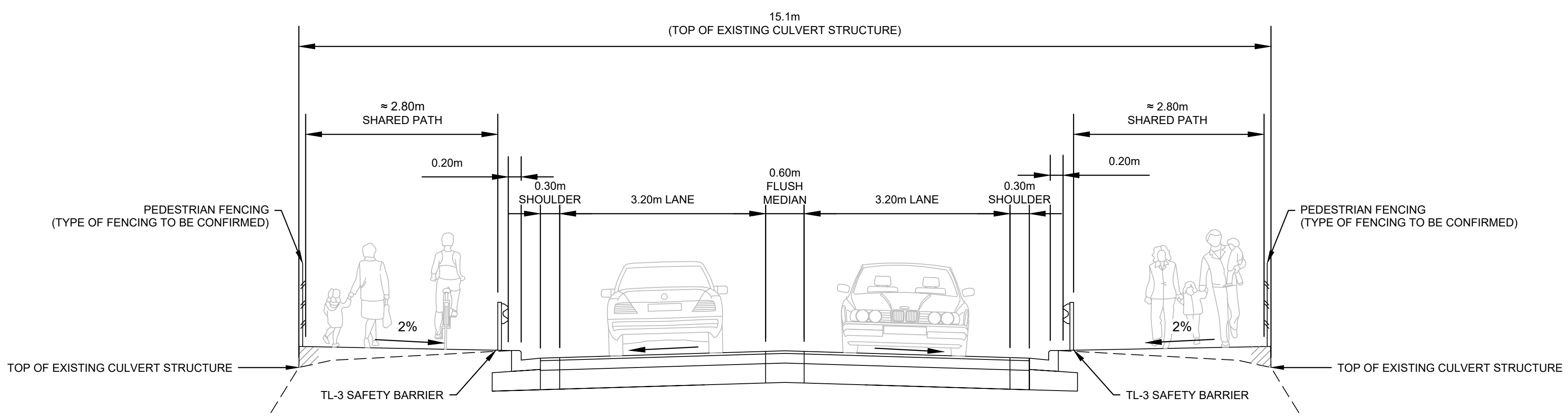
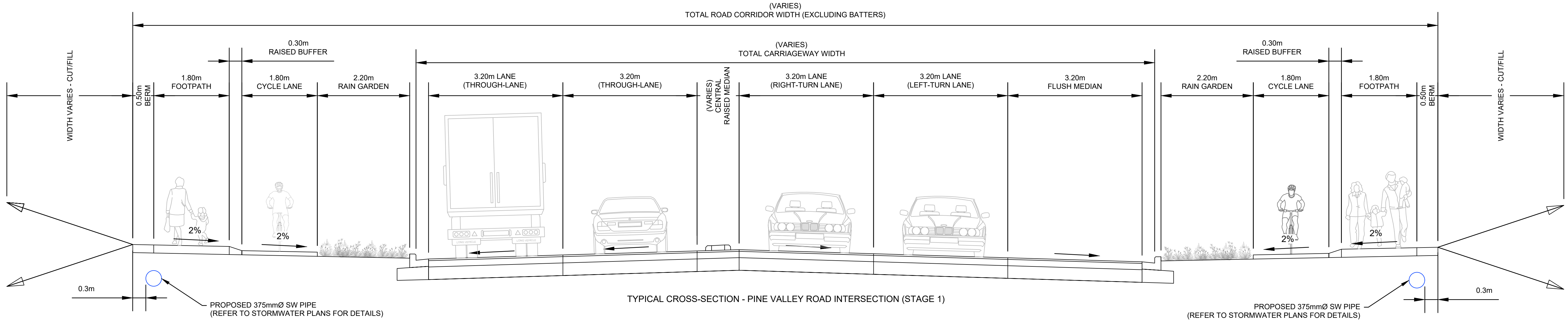
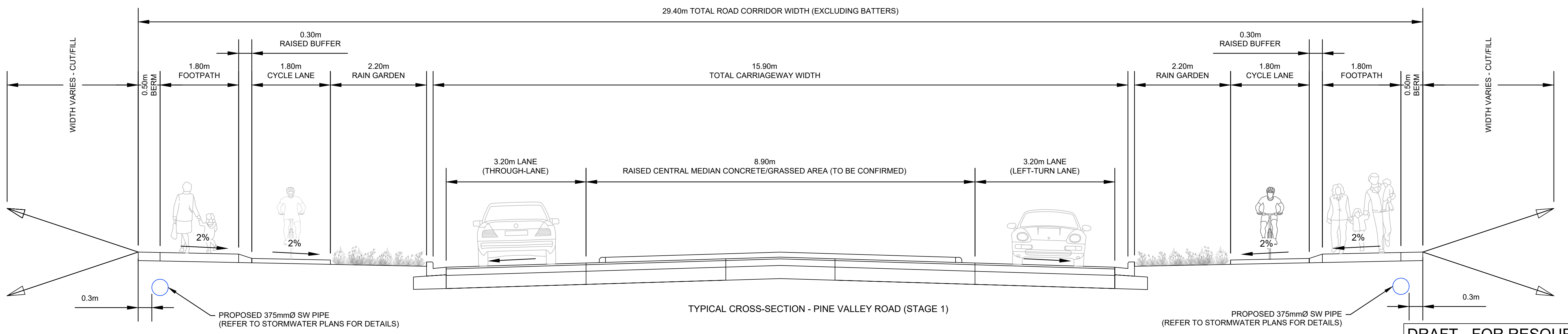


TYPICAL CROSS-SECTION - PINE VALLEY ROAD EXISTING CULVERT SECTION (STAGE 1)



TYPICAL CROSS-SECTION - PINE VALLEY ROAD INTERSECTION (STAGE 1)



TYPICAL CROSS-SECTION - PINE VALLEY ROAD (STAGE 1)

DRAFT - FOR RESOURCE CONSENT

REV	DESCRIPTION	DATE
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B	DRAFT - FOR RESOURCE CONSENT	15/05/2020
C	DRAFT - AMENDMENTS FROM AT COMMENTS 29/05/20	03/06/2020
D	DRAFT - REVISED DFH TIE-IN AND STAGE 1 OPTION	24/06/2020
E	DRAFT - AMENDMENTS FROM AT COMMENTS	17/07/20

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DRAWN	I.HO
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APPROVED	G.BOOTH

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MOTT MACDONALD

CLIENT
MILLDALE

ROAD CONTROLLING AUTHORITY
Auckland Transport
An Auckland Council Organisation

PROJECT
MILLDALE DEVELOPMENT
INFRASTRUCTURE PROJECTS

PROJECT TYPE
NEW CONSTRUCTION

PROJECT PHASE
PRELIMINARY DESIGN

CONSULTANT PROJECT NO.
402828

DRAWING
Milldale Development, Argent Lane - Dairy Flat Highway
Typical cross-section - Pine Valley Road (STAGE 1)

DRAWING NO.
402828-MM-DWG-02-CV-RD-1402

REVISION
F

FOR RESOURCE CONSENT

SCALE (A1)
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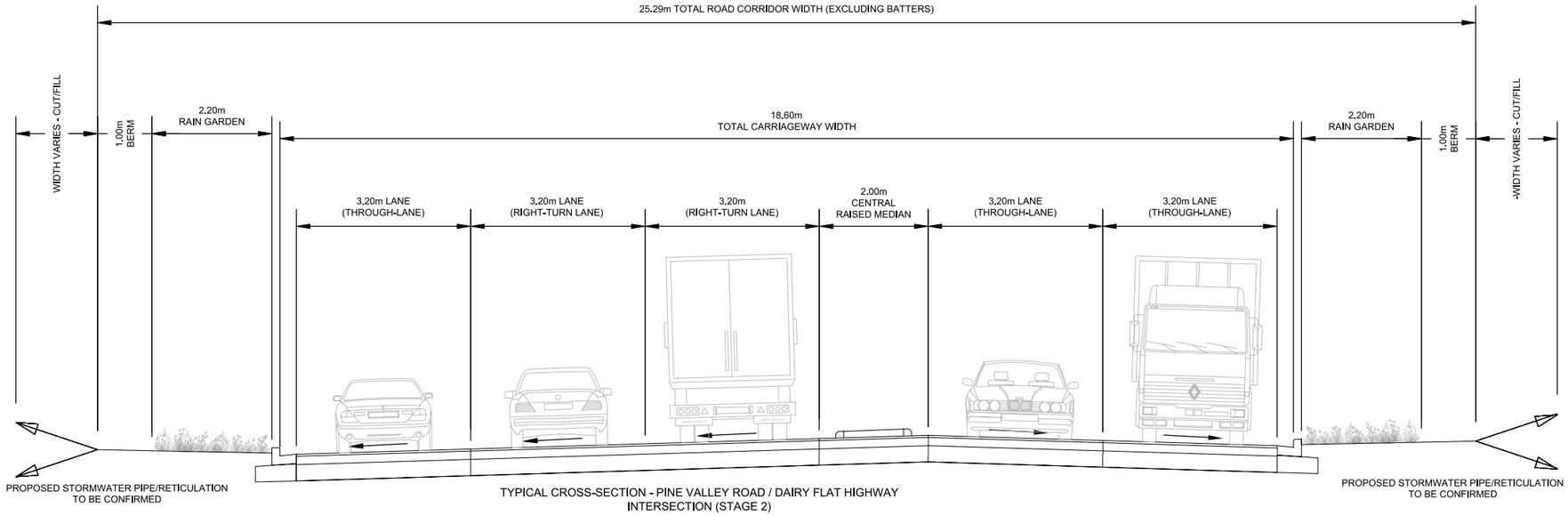
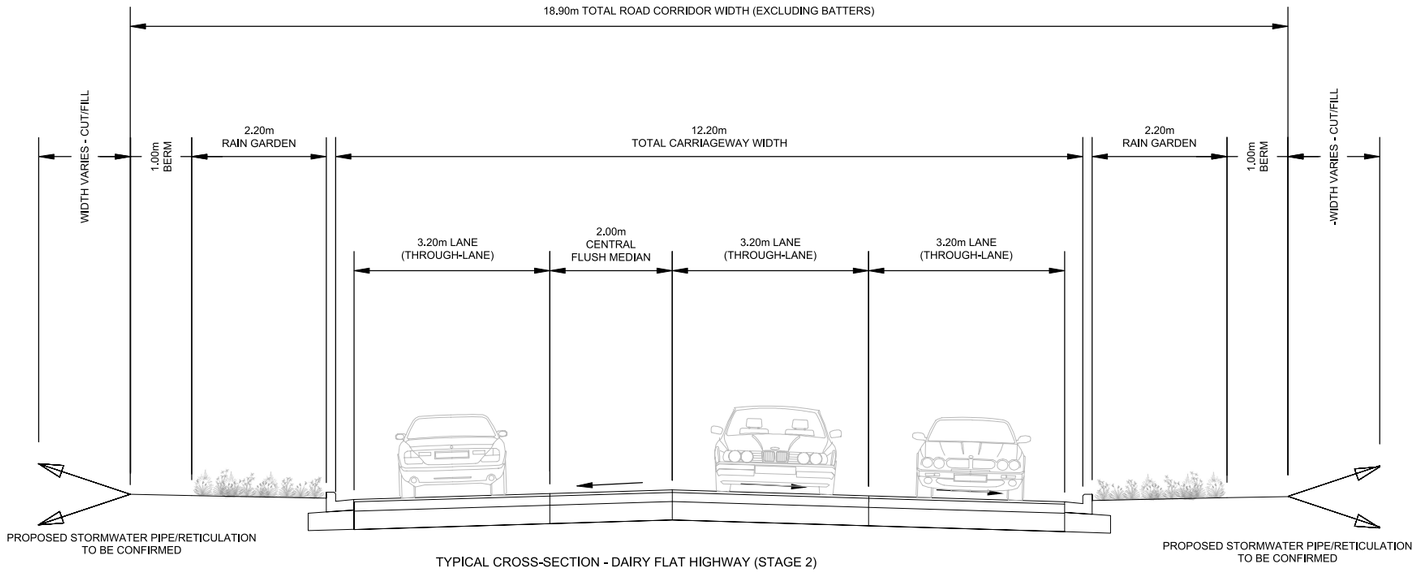
NOTE:

1. REFER TO CROSS-SECTIONS FOR DETAILS.
2. ROAD PAVEMENT DETAILS TO BE CONFIRMED AT DETAILED DESIGN.



TYPICAL CROSS-SECTION - PINE VALLEY ROAD / DAIRY FLAT HIGHWAY INTERSECTION (STAGE 2)



TYPICAL CROSS-SECTION - DAIRY FLAT HIGHWAY (STAGE 2)

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REV	DESCRIPTION	DATE
F	DRAFT - AMENDMENTS FROM AT COMMENTS 04/09/20	11/09/2020
B	DRAFT - FOR RESOURCE CONSENT	15/05/2020
C	DRAFT - AMENDMENTS FROM AT COMMENTS 29/05/20	03/06/2020
D	DRAFT - REVISED DFH TIE-IN AND STAGE 1 OPTION	24/06/2020
E	DRAFT - REVISED STAGE 2 DFH LANE CONFIGURATION	17/07/2020

DRAWING Q.A.

DRAWN	L.HO
CHECKED	D.ROLLO
APPROVED	G.BOOTH

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PROJECT
MILLDALE DEVELOPMENT
INFRASTRUCTURE PROJECTS

PROJECT TYPE: NEW CONSTRUCTION
PROJECT PHASE: PRELIMINARY DESIGN
CONSULTANT PROJECT NO.: 402828

DRAWING
Milldale Development,Argent Lane - Dairy Flat Highway
Typical cross-section - Dairy Flat Highway (STAGE 2)

DRAWING NO.: 402828-MM-DWG-02-CV-RD-2401
REVISION: F

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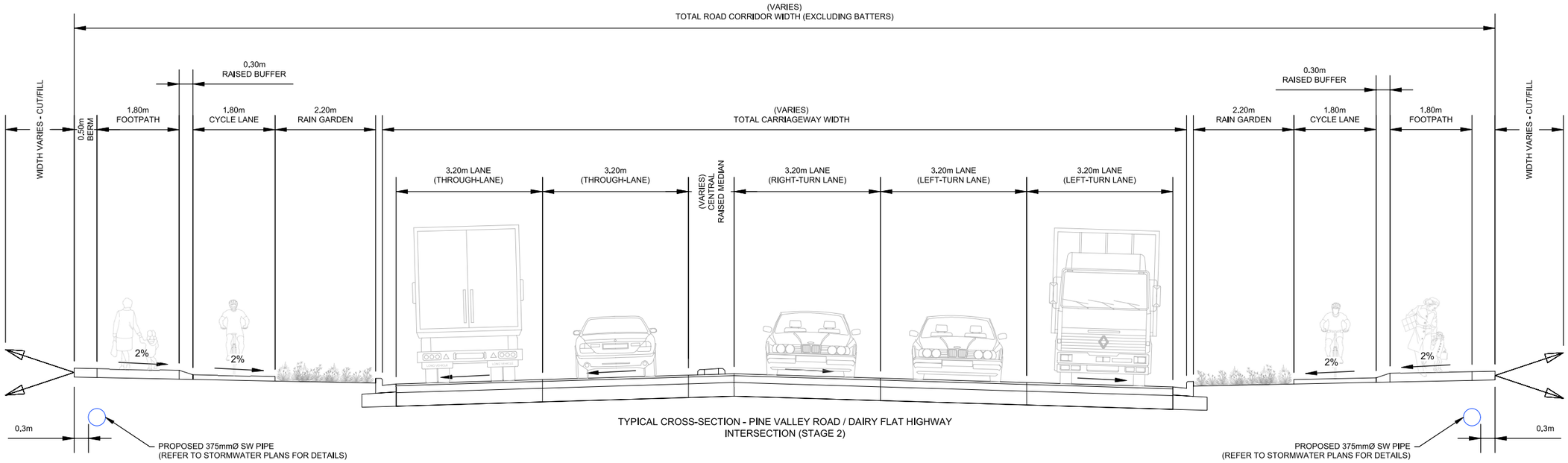
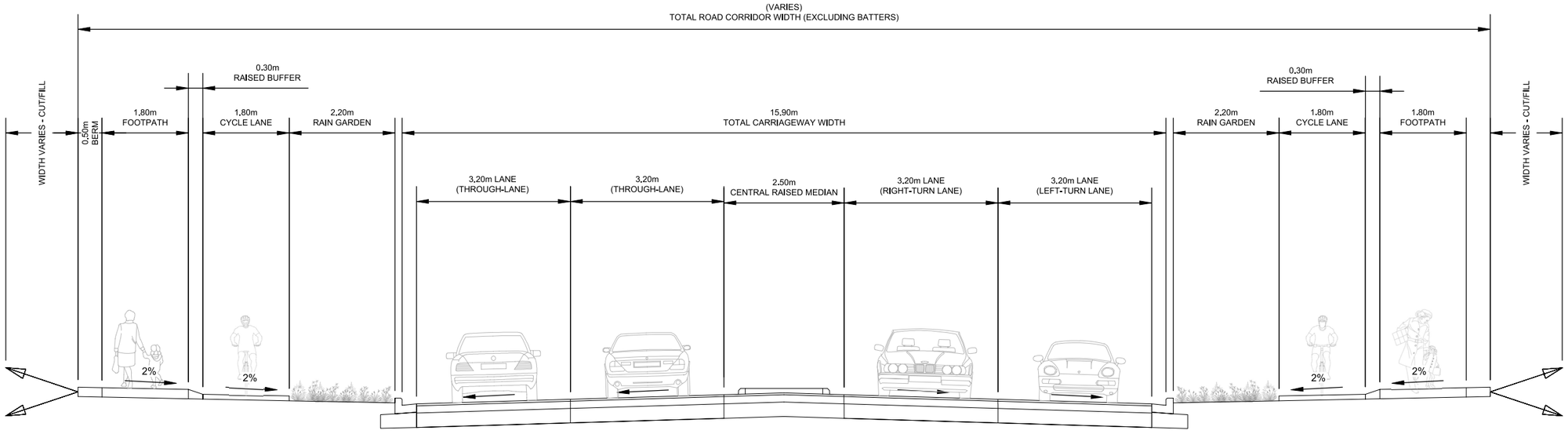
SCALE (A1): 1:50

NOTE:

1. REFER TO CROSS-SECTIONS FOR DETAILS.
2. ROAD PAVEMENT DETAILS TO BE CONFIRMED AT DETAILED DESIGN.



TYPICAL CROSS-SECTION - PINE VALLEY ROAD / DAIRY FLAT HIGHWAY INTERSECTION (STAGE 2)



TYPICAL CROSS-SECTION - PINE VALLEY ROAD (STAGE 2)

DRAFT - FOR RESOURCE CONSENT

REV	DESCRIPTION	DATE
F	DRAFT - AMENDMENTS FROM AT COMMENTS 04/09/20	11/09/2020
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PROJECT TYPE: NEW CONSTRUCTION
PROJECT PHASE: PRELIMINARY DESIGN
CONSULTANT PROJECT NO.: 402828

DRAWING
Milldale Development, Argent Lane - Dairy Flat Highway
Typical cross-section - Pine Valley Road (STAGE 2)

DRAWING NO.: 402828-MM-DWG-02-CV-RD-2402
REVISION: F

FOR RESOURCE CONSENT
SCALE (A1): 1:50

Appendix B: Milldale – Argent Lane Roundabout Intersection Technical Note

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Technical Note

Milldale – Argent Lane Roundabout Intersection Concept Design

Project:	Milldale – Argent Lane Roundabout Intersection – Concept Design		
Reference:	402828		
Prepared by:	Ivan Ho	**Date:**	03/07/20
Approved by:	Greg Booth	**Checked by:**	Greg Booth
Subject:	Milldale / Argent Lane Roundabout Intersection – Concept Design Technical Note		

1.1 Introduction

Mott MacDonald (MM) has been commissioned by Auckland Transport (AT) to review the concept 2D layout of the proposed Old Pine Valley Road roundabout provided by Woods Consulting and design the additional Pine Valley Road connection.

The design includes:

- The four-leg single lane roundabout at the Old Pine Valley Road intersection connecting to;
- Pine Valley Road tie-in (southern leg) from the Milldale Argent Lane to Dairy Flat Highway.

The roundabout design will require a departure from standards, and it is understood that AT will apply and approve this departure.

1.2 Data Collection and Design Basis

The concept 2D roundabout intersection layout has been designed by Wood Consulting and the digital file has been provided and initially approved by AT. MM has made changes to the original design to include the southern leg tie-in.

As instructed by AT, the amendments include:

- The proposed splitter island at the entry of the southern-leg and;
- The proposed splitter island at the departure side of the western-leg (refer to vehicle tracking plans).
- Reshape the proposed roundabout at the southern approach to cater for the left turning movements for large vehicles (refer to vehicle tracking plans).

It is also agreed that south-western kerb return of the intersection will need to be rebuilt at the future dual-laning stage of the intersection and Pine Valley Road.

The position and central radius of the roundabout, and the horizontal alignments of the legs are to be retained from Wood's original design.

1.3 Geometrics

Refer to the design geometrics below:

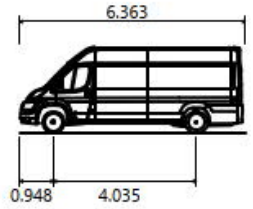
Design Parameters	**Roundabout Carriageway** Speed Parameters 35 km/hr (max) and 10 km/hr (min) operating speed	Relevant Reference Source
Lane Width	5.0m single lane roundabout	Wood's original design parameter
Roundabout	22.8m radius with a 2m wide mountable collar.	Wood's original design parameter
Footpath	1.8m width – connects to roundabout (0.3m grade separated from cycleway)	AT TDM: Footpaths and the Public Realm – 3.1
Cycleway	1.8m width – connects to roundabout (0.3m grade separated from footpath)	AT TDM: Cycling Infrastructure
Berm/raingarden	Varies - 2.2m minimum width	AT TDM: Footpaths and the Public Realm – 3.1

1.4 Vehicle tracking

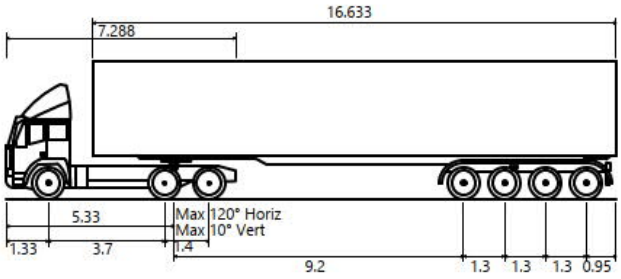
The following profiles have been used for the vehicle tracking in terms of the TDM – Urban and Rural roadway design guide table 2.

Design vehicle(s) – 6.3m delivery van and the 50th-percentile car (to assess for maximum operating speed).

Check vehicle – 19.45m semi-trailer.



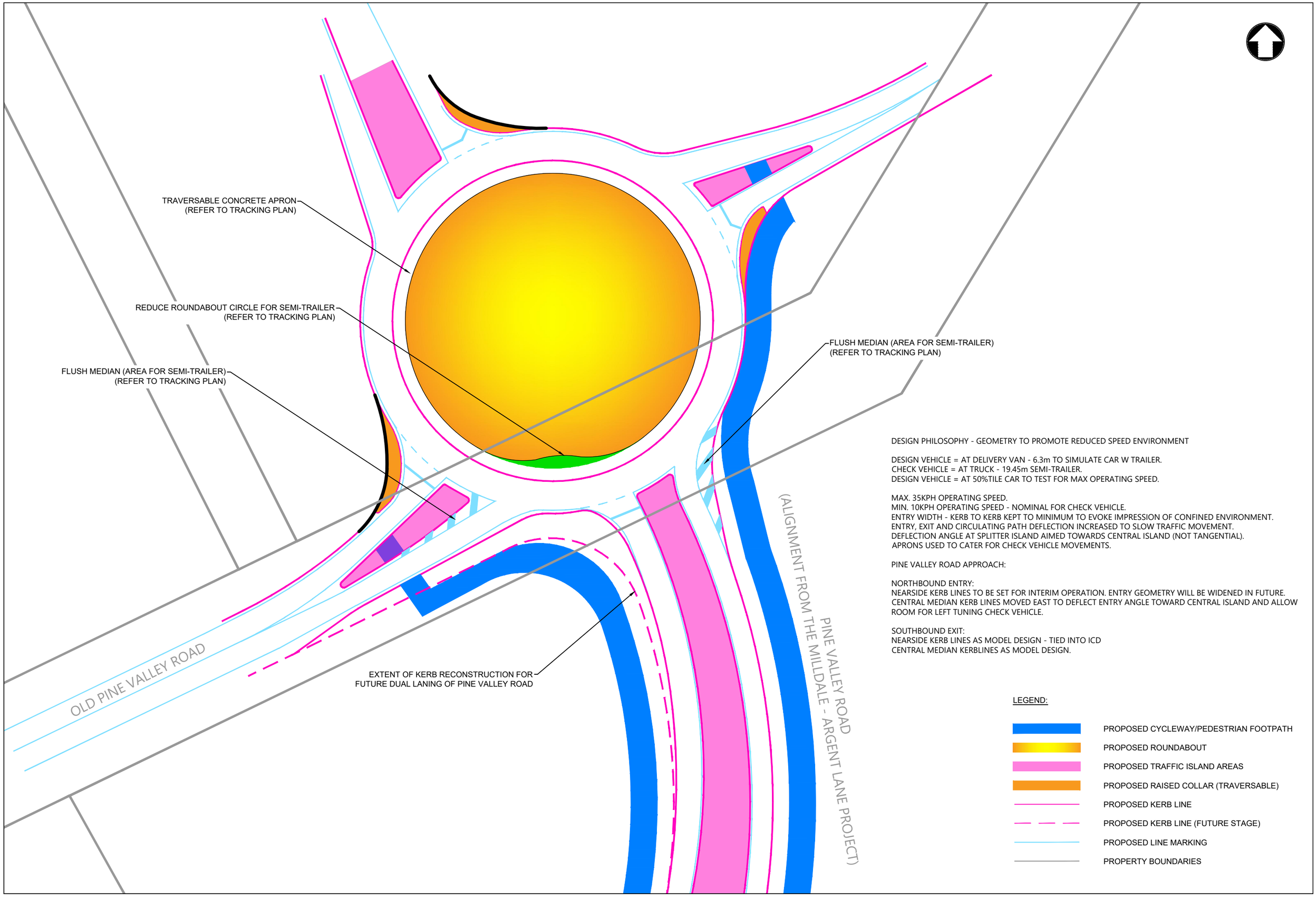
AT - Delivery Van	
Overall Length	6.363m
Overall Width	2.050m
Overall Body Height	2.432m
Min Body Ground Clearance	0.206m
Max Track Width	1.810m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	7.200m



AT - Truck - HPMV - 19.45m Semi-Trailer (Rear steer)	
Overall Length	19.380m
Overall Width	2.550m
Overall Body Height	4.386m
Min Body Ground Clearance	0.311m
Track Width	2.550m
Lock-to-lock time	6.00s
Wall to Wall Turning Radius	12.500m

Refer to Appendix A for tracking swept path plans.

Appendix A: Concept layout and vehicle tracking swept paths



DESIGN PHILOSOPHY - GEOMETRY TO PROMOTE REDUCED SPEED ENVIRONMENT

DESIGN VEHICLE = AT DELIVERY VAN - 6.3m TO SIMULATE CAR W TRAILER.
CHECK VEHICLE = AT TRUCK - 19.45m SEMI-TRAILER.
DESIGN VEHICLE = AT 50%TILE CAR TO TEST FOR MAX OPERATING SPEED.

MAX. 35KPH OPERATING SPEED.
MIN. 10KPH OPERATING SPEED - NOMINAL FOR CHECK VEHICLE.
ENTRY WIDTH - KERB TO KERB KEPT TO MINIMUM TO EVOKE IMPRESSION OF CONFINED ENVIRONMENT.
ENTRY, EXIT AND CIRCULATING PATH DEFLECTION INCREASED TO SLOW TRAFFIC MOVEMENT.
DEFLECTION ANGLE AT SPLITTER ISLAND AIMED TOWARDS CENTRAL ISLAND (NOT TANGENTIAL).
APRONS USED TO CATER FOR CHECK VEHICLE MOVEMENTS.

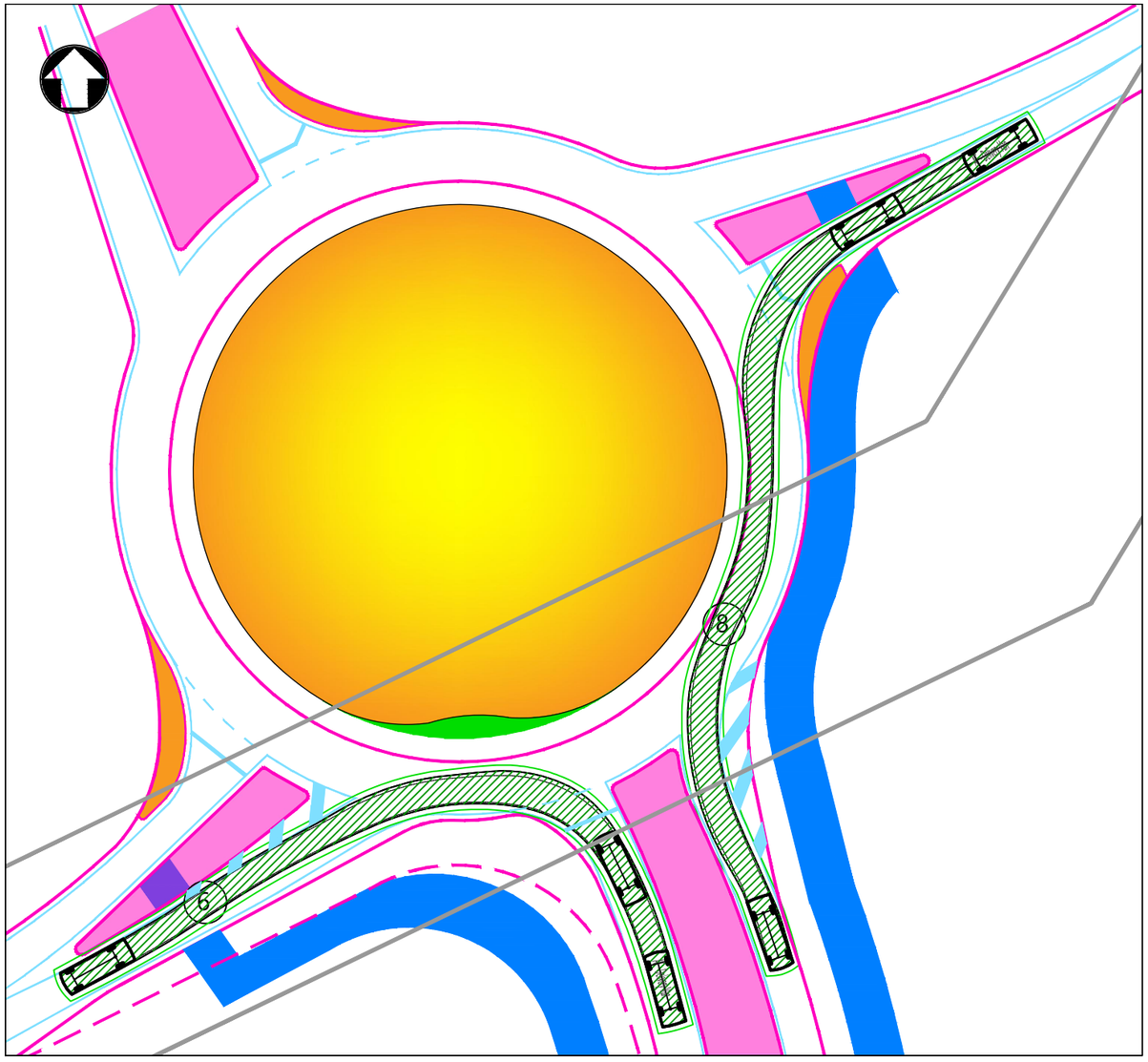
PINE VALLEY ROAD APPROACH:

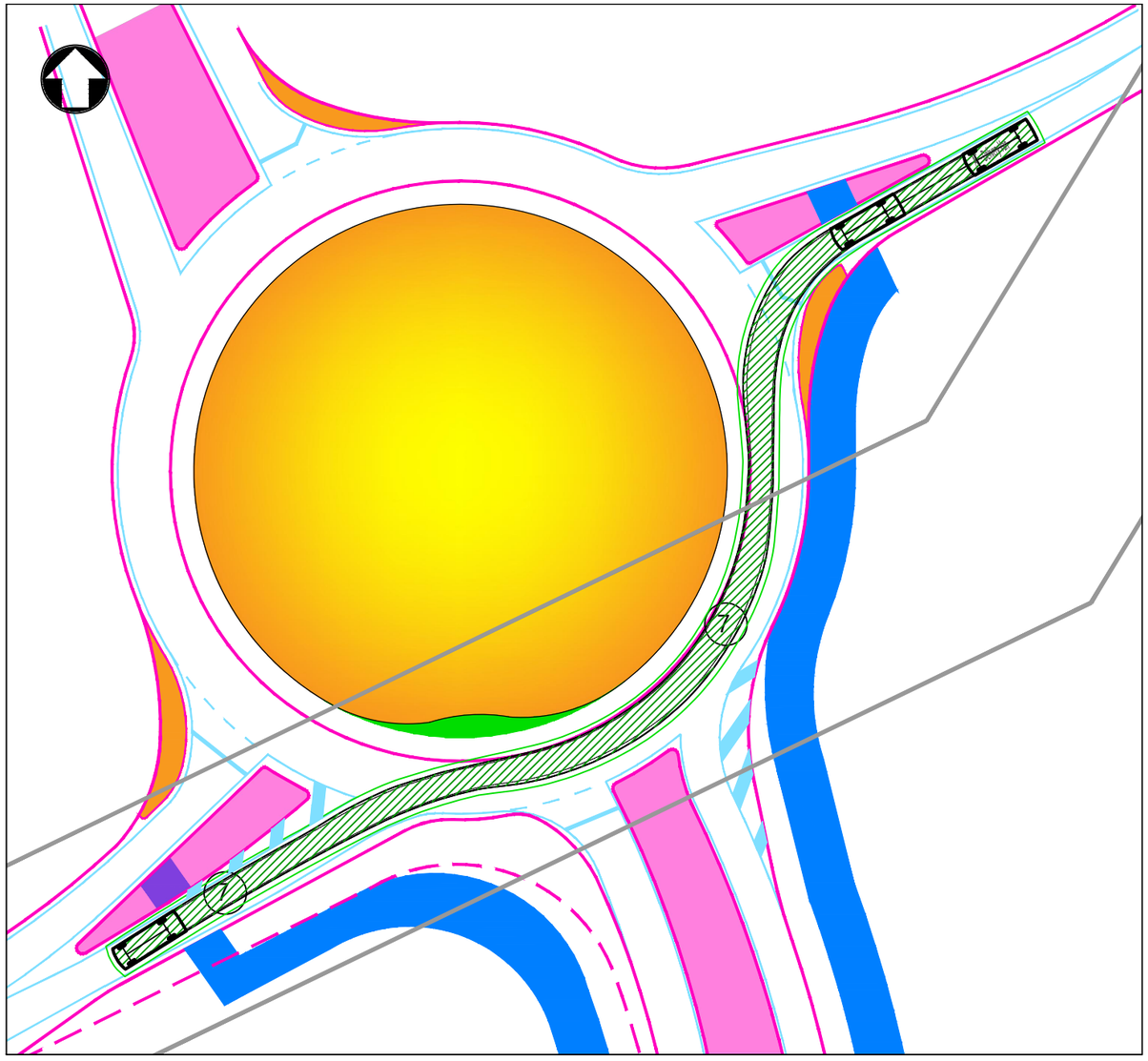
NORTHBOUND ENTRY:
NEARSIDE KERB LINES TO BE SET FOR INTERIM OPERATION. ENTRY GEOMETRY WILL BE WIDENED IN FUTURE.
CENTRAL MEDIAN KERB LINES MOVED EAST TO DEFLECT ENTRY ANGLE TOWARD CENTRAL ISLAND AND ALLOW ROOM FOR LEFT TUNING CHECK VEHICLE.

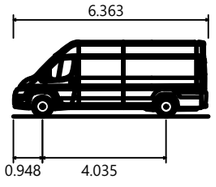
SOUTHBOUND EXIT:
NEARSIDE KERB LINES AS MODEL DESIGN - TIED INTO ICD
CENTRAL MEDIAN KERBLINES AS MODEL DESIGN.

LEGEND:

- PROPOSED CYCLEWAY/PEDESTRIAN FOOTPATH
- PROPOSED ROUNDABOUT
- PROPOSED TRAFFIC ISLAND AREAS
- PROPOSED RAISED COLLAR (TRAVERSABLE)
- PROPOSED KERB LINE
- PROPOSED KERB LINE (FUTURE STAGE)
- PROPOSED LINE MARKING
- PROPERTY BOUNDARIES







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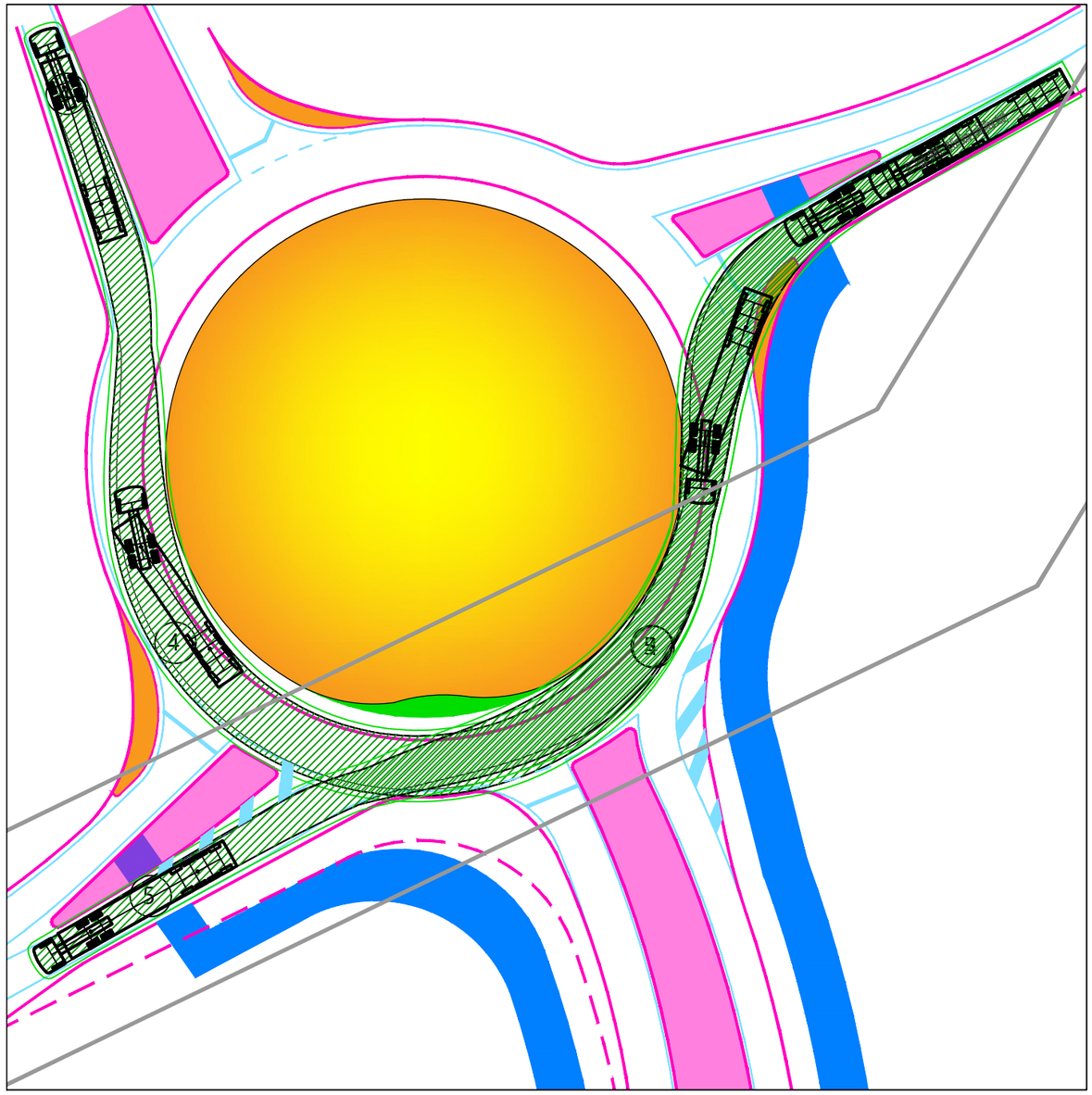

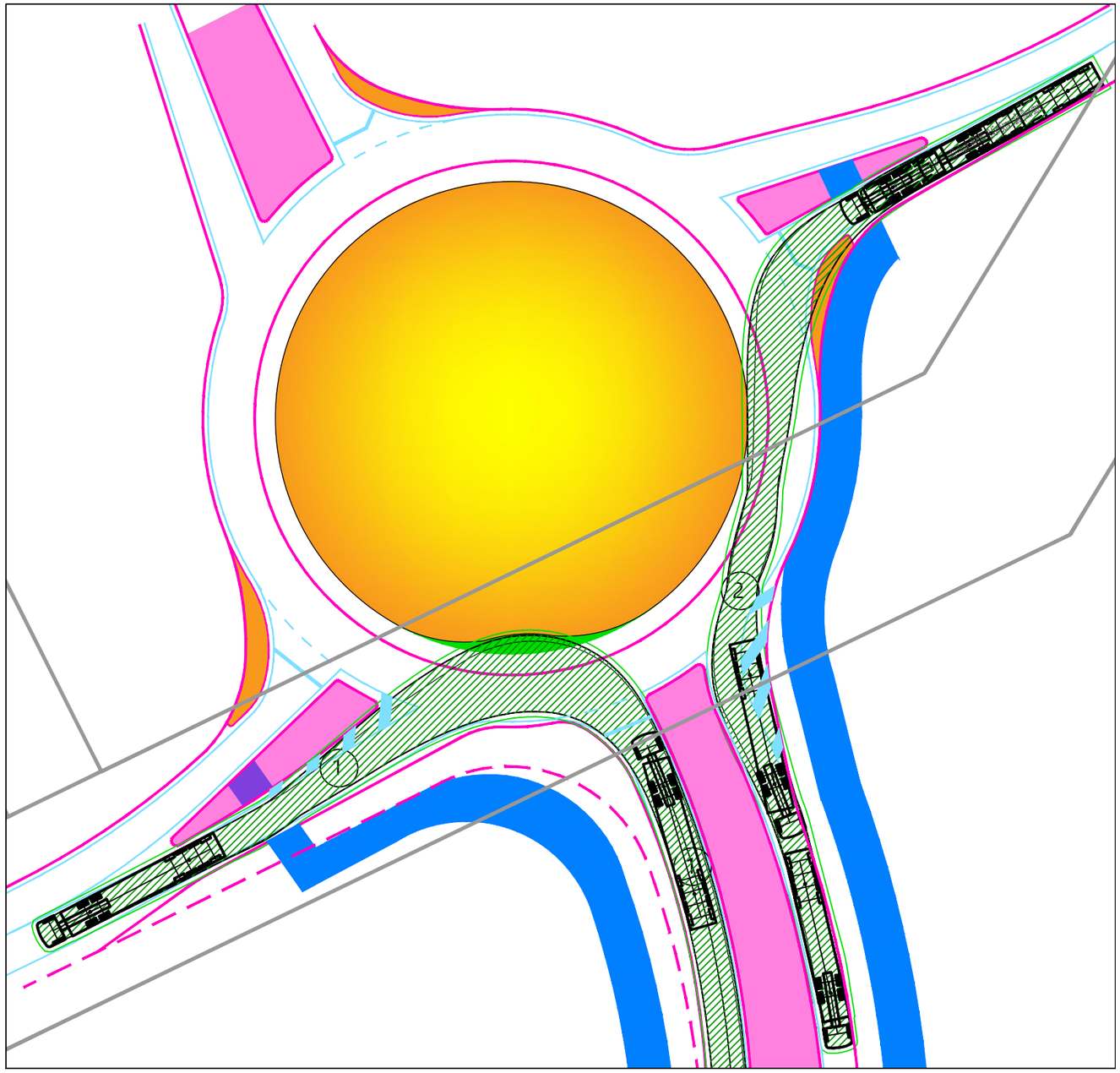

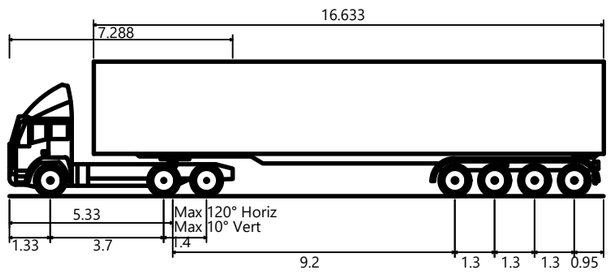

AT - Truck - HPMV - 19.45m Semi-Trailer (Rear steer)	
Overall Length	19.380m
Overall Width	2.550m
Overall Body Height	4.386m
Min Body Ground Clearance	0.311m
Track Width	2.550m
Lock-to-lock time	6.00s
Wall to Wall Turning Radius	12.500m

LEGEND:

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- PROPOSED KERB LINE
- PROPOSED KERB LINE (FUTURE STAGE)
- PROPOSED LINE MARKING
- PROPERTY BOUNDARIES

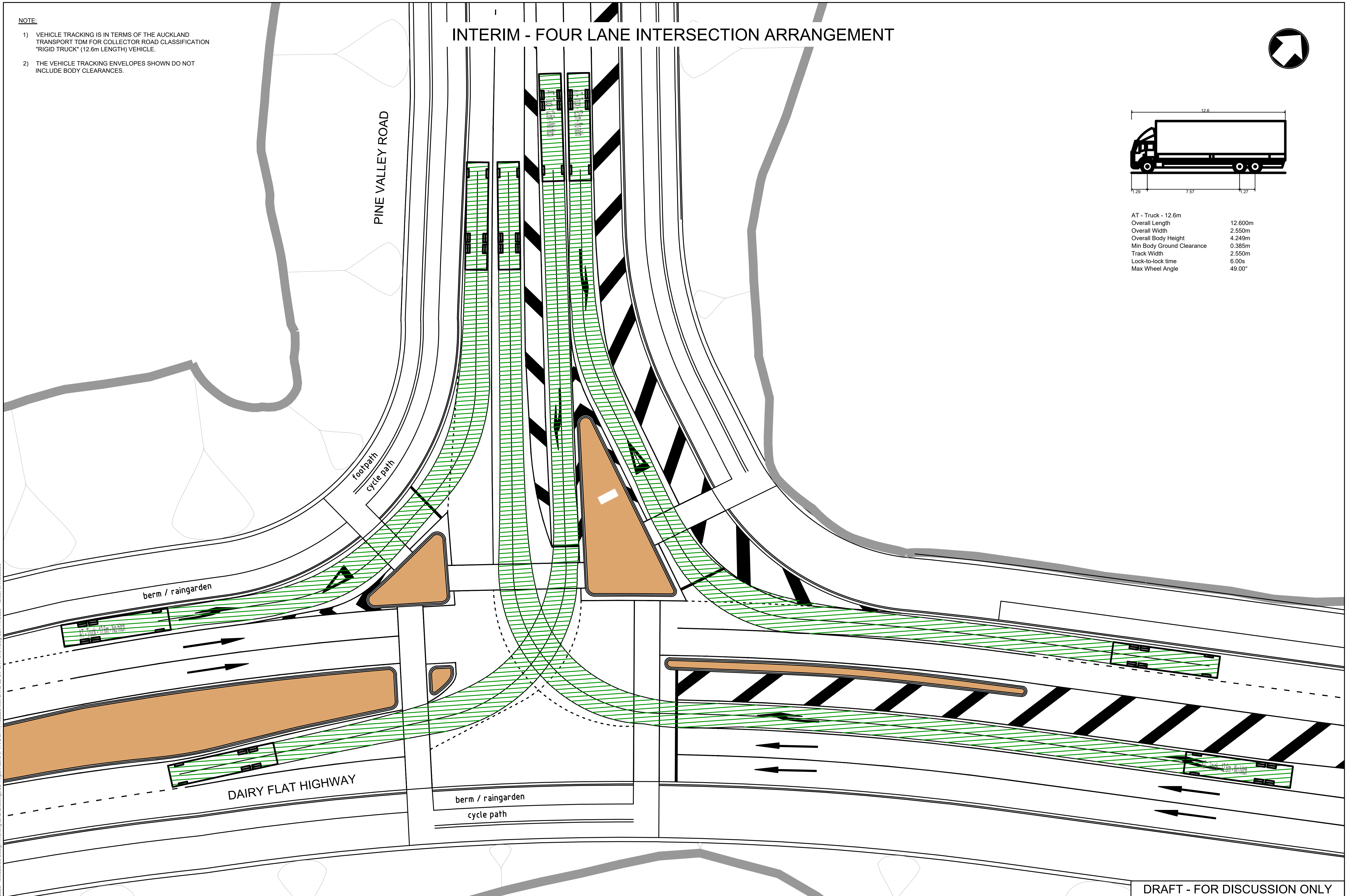
Appendix C: Milldale – Vehicle Tracking

INTERIM - FOUR LANE INTERSECTION ARRANGEMENT

NOTE:

1) VEHICLE TRACKING IS IN TERMS OF THE AUCKLAND TRANSPORT TDM FOR COLLECTOR ROAD CLASSIFICATION "RIGID TRUCK" (12.6m LENGTH) VEHICLE.

2) THE VEHICLE TRACKING ENVELOPES SHOWN DO NOT INCLUDE BODY CLEARANCES.



AT - Truck - 12.6m	
Overall Length	12.600m
Overall Width	2.550m
Overall Body Height	4.249m
Min Body Ground Clearance	0.385m
Track Width	2.550m
Lock-to-lock time	6.00s
Max Wheel Angle	49.00°

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REV	DESCRIPTION	DATE
A	FOR INFORMATION ONLY	27/08/2019

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DRAWN I.HO
CHECKED G.BOOTH
APPROVED -

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PROJECT
MILLDALE DEVELOPMENT INFRASTRUCTURE PROJECTS

PROJECT TYPE: NEW CONSTRUCTION
PROJECT PHASE: PRELIMINARY DESIGN
CONSULTANT PROJECT NO.: 402828

DRAWING
Pine Valley Road / Dairy Flat Highway
Interim Road Design - Vehicle Tracking (Sheet 1 of 2)

DRAWING NO. 402828-MM-DWG-02-CV-SKT-5101
REVISION A
CONSULTATION
SCALE (A1) 1:200

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NOTE:

1) VEHICLE TRACKING IS IN TERMS OF THE AUCKLAND TRANSPORT TDM FOR COLLECTOR ROAD CLASSIFICATION "SEMI TRAILER" (19.45m LENGTH) VEHICLE.

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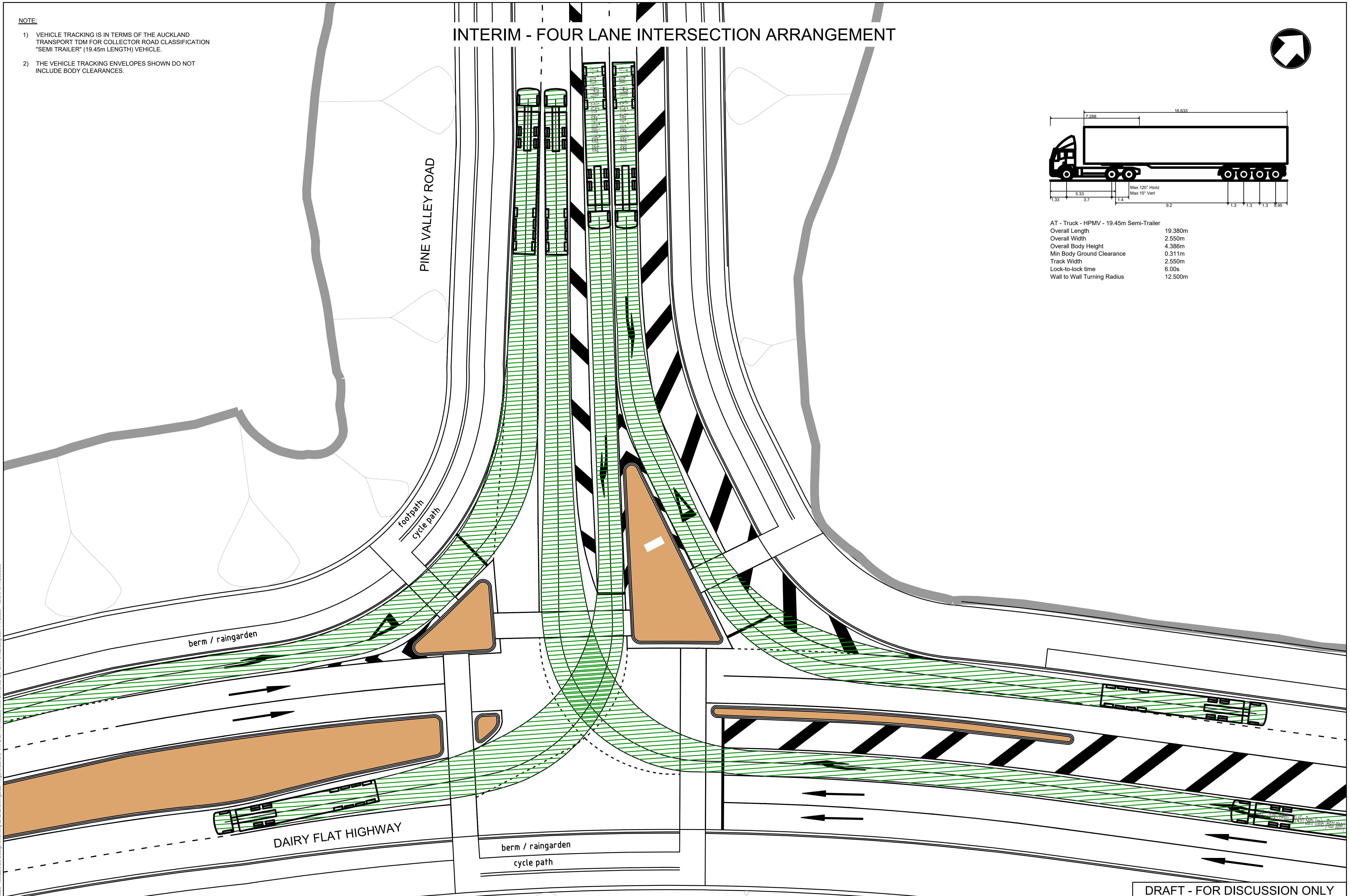
INTERIM - FOUR LANE INTERSECTION ARRANGEMENT



AT - Truck - HPMV - 19.45m Semi-Trailer

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DRAWN	I.HO
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PROJECT PHASE: PRELIMINARY DESIGN

CONSULTANT PROJECT NO.: 402828

DRAWING

Pine Valley Road / Dairy Flat Highway
Interim Road Design - Vehicle Tracking (Sheet 2 of 2)

DRAWING NO.: 402828-MM-DWG-02-CV-SKT-5102

REVISION: A

CONSULTATION

SCALE (A1) 1:200

STAGE 2 - FOUR LANE INTERSECTION ARRANGEMENT

NOTE:

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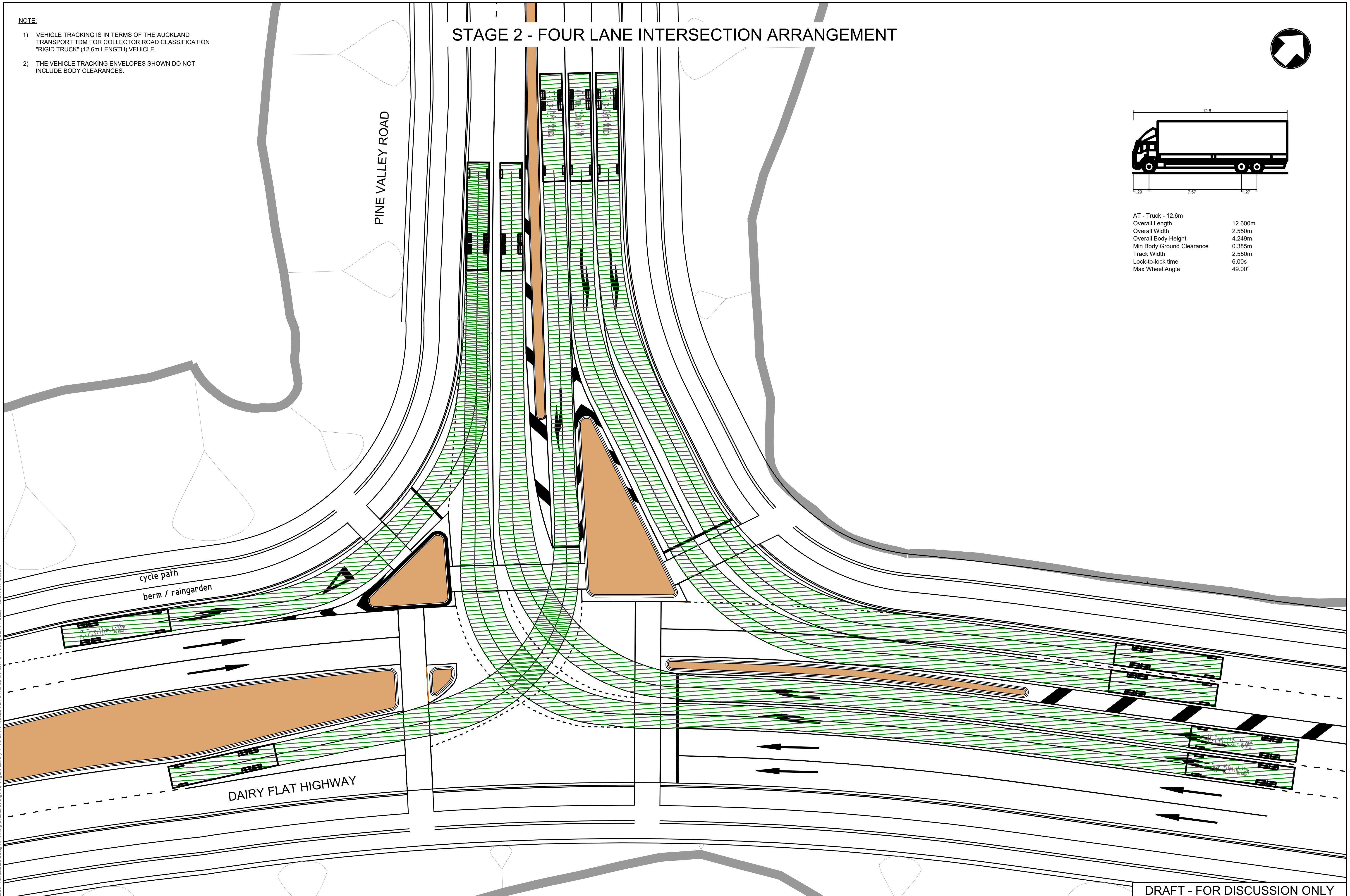

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CONSULTANT PROJECT NO.: 402828

DRAWING
Pine Valley Road / Dairy Flat Highway
STAGE 2 Road Design - Vehicle Tracking (Sheet 1 of 3)

DRAWING NO.: 402828-MM-DWG-02-CV-SKT-5111
REVISION: A
CONSULTATION
SCALE (A1) 1:200

NOTE:

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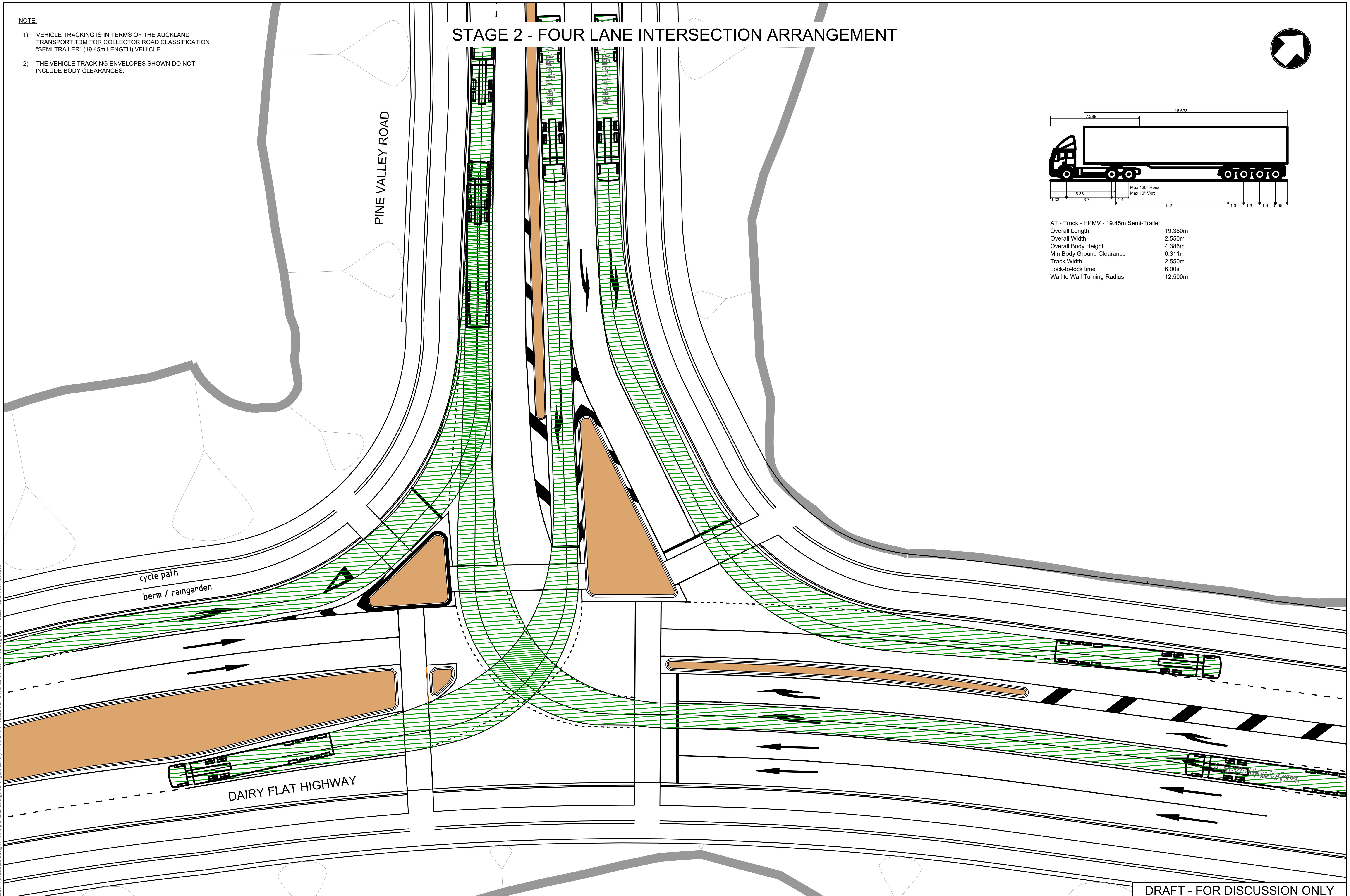
STAGE 2 - FOUR LANE INTERSECTION ARRANGEMENT



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PROJECT PHASE: PRELIMINARY DESIGN
CONSULTANT PROJECT NO.: 402828

DRAWING
Pine Valley Road / Dairy Flat Highway
STAGE 2 Road Design - Vehicle Tracking (Sheet 2 of 3)

DRAWING NO. 402828-MM-DWG-02-CV-SKT-5112
REVISION A

CONSULTATION
SCALE (A1) 1:200

STAGE 2 - FOUR LANE INTERSECTION ARRANGEMENT

NOTE:

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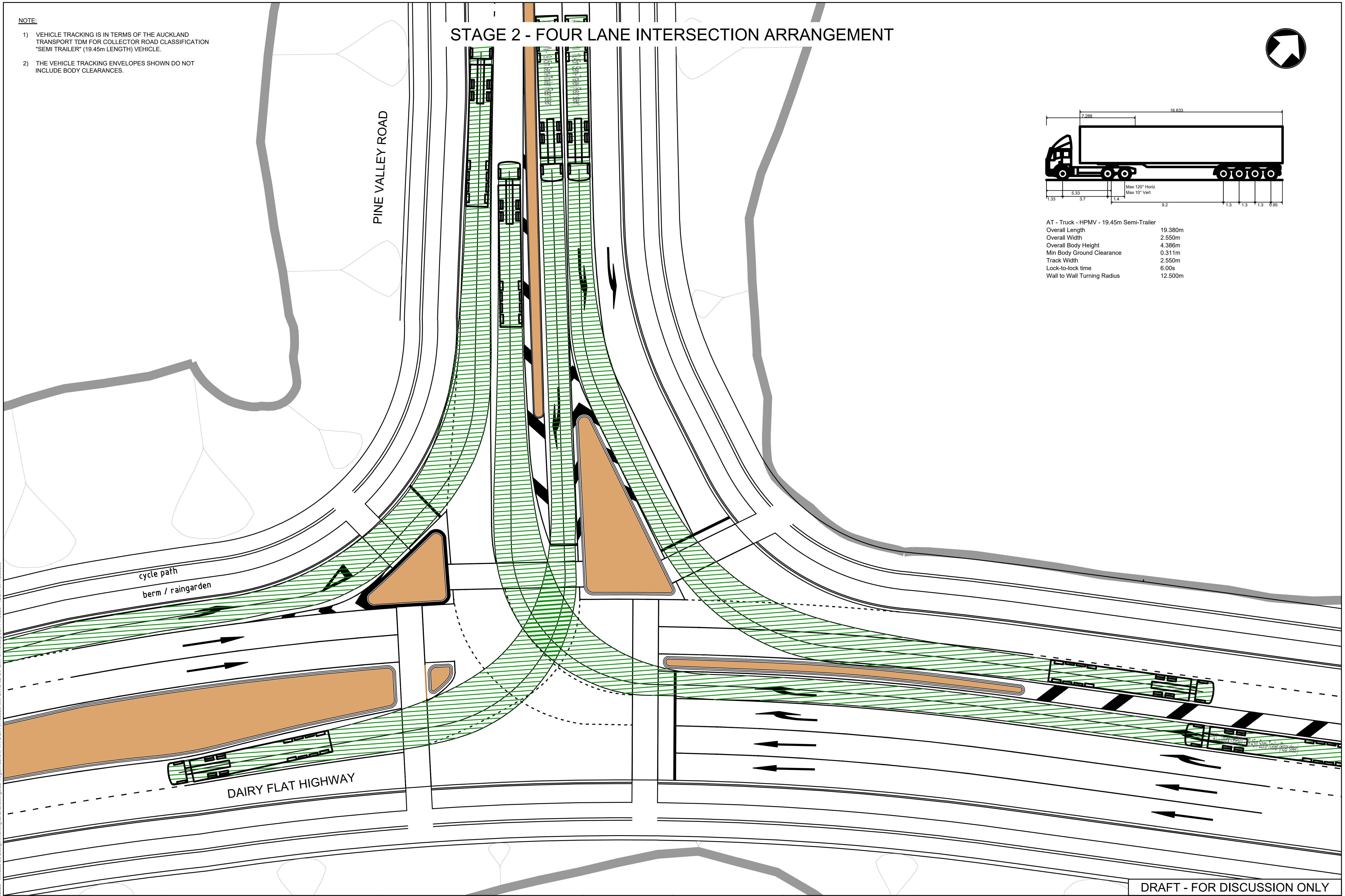

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DRAWING
Pine Valley Road / Dairy Flat Highway
STAGE 2 Road Design - Vehicle Tracking (Sheet 3 of 3)

DRAWING NO.: 402828-MM-DWG-02-CV-SKT-5113
REVISION: A

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SCALE (A1) 1:200

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