Milldale Fast Track (Stages 10-13)

Transportation Assessment

Stantec

Prepared for:
Fulton Hogan Land Development Ltd

27 March 2025

Prepared by:
Trevor Lee-Joe

Project/File:
310206322

Stantec New Zealand

Revision Schedule

Revision No.	Date	Description	Prepared by	Quality Reviewer	Independent Reviewer	Project Manager Final Approval
A	27/03/25	Final	TLJ	AMM	AUG	TLJ

Disclaimer

The conclusions in the report are Stantec's professional opinion, as of the time of the report, and concerning the scope described in the report. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. The report relates solely to the specific project for which Stantec was retained and the stated purpose for which the report was prepared. The report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from the client and third parties in the preparation of the report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This report is intended solely for use by the client in accordance with Stantec's contract with the client. While the report may be provided to applicable authorities having jurisdiction and others for whom the client is responsible, Stantec does not warrant the services to any third party. The report may not be relied upon by any other party without the express written consent of Stantec, which may be withheld at Stantec's discretion.

Statement of Qualifications and Experience

Name: Trevor Lee-Joe

I am a Principal Transportation Engineer at Stantec New Zealand (**Stantec**). Stantec is a global multi-disciplinary consultancy with expertise in the areas of building design, environmental engineering, transportation engineering, planning and water infrastructure. However, for this particular project, my focus has been with regard to transportation matters. I have been employed at Stantec (and previously, Traffic Design Group Ltd, which was acquired by Stantec in February 2018) since 1997.

I hold a Master of Engineering (Civil) degree from the University of Auckland, which I completed in 1994. I am a member of Engineering New Zealand and the Transportation Group New Zealand (Auckland Branch).

I have 27 years of professional experience in the transportation engineering field, including roles such as modelling, traffic analysis, expert witness and project management. My experience includes undertaking modelling and transportation assessments for the Wainui Precinct (SHA, original Plan Change applications and resource consent applications for individual stages), Unitec Plan Change application and hearing, Huapai SHA application, St Lukes Mall redevelopment and Albany Mall redevelopment. I have also been involved with undertaking transportation assessments and project management for numerous other smaller residential subdivision and retail resource consent applications throughout Auckland.

I confirm that, in my capacity as author of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Name: Alasdair McGeachie

I am a Principal Transportation Engineer at Stantec New Zealand (**Stantec**) and am also the Transport Delivery Team Leader for the Auckland Transportation Team of Stantec. Stantec is a global multi-disciplinary consultancy with expertise in the areas of building design, environmental engineering, transportation engineering, planning and water infrastructure. However, for this particular project, my focus has been with regard to transportation matters. I have been employed at Stantec (and previously, Traffic Design Group Ltd, which was acquired by Stantec in February 2018) since 2003.

I hold a Bachelor of Science Degree (Geophysics) and a Post-Graduate Diploma in Science (Applied Geophysics) from the University of Auckland, which I completed in 2000. I am a member of Engineering New Zealand and the Transportation Group New Zealand (Auckland Branch). I also hold a Safe Traffic Management Supervisor L2/l3 Non-Practising license through the New Zealand Transport Agency Waka Kotahi (NZTA) and am a Level Crossing Safety Auditor for KiwiRail.

I have 21 years of professional experience in the transportation engineering field, including roles involving road safety audits, level crossing safety assessments, temporary traffic management, traffic engineering analysis, design, traffic surveying and resource consent hearings. My experience includes being an integral member of an Auckland Transport TTEPS Panel Road Safety Auditing Team between 2017 and 2018, and being the team lead for Kiwirail's road and level crossing assessment team. I have also been involved with undertaking transportation assessments and project management for numerous residential subdivision and commercial resource consent applications throughout Auckland.

I confirm that, in my capacity as quality reviewer of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Name: Alaska Upton-Gill

I am a Transportation Engineer at Stantec New Zealand (**Stantec**). Stantec is a global multi-disciplinary consultancy with expertise in the areas of building design, environmental engineering, transportation engineering, planning and water infrastructure. However, for this particular project, my focus has been with regard to transportation matters. I have been employed at Stantec since 2021.

I hold the qualifications of a Bachelor of Civil Engineering (Honours) from the University of Canterbury, which I completed in 2021. I am a member of Engineering New Zealand and the Transportation Group New Zealand (Auckland Branch).

I have four years of professional experience in the transportation engineering field. My experience includes work for plan change applications, master planning, resource consents and providing other transportation specialist design advice for various residential, commercial, and industrial developments across Auckland and the rest of New Zealand. I have carried this work out in partnership with other development project team members including civil, structural, and geotechnical engineers, architects, planners, and other technical professionals as required.

I confirm that, in my capacity as independent reviewer of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Table of Contents

List of Appendices

1 Background

By way of background to the project, a 190-hectare (ha) portion of land within Wainui East was approved as a Special Housing Area (**SHA**) by Auckland Council (**Council**) in 2015. The SHA was at that stage referred to as the Argent Lane SHA. A private Plan Variation (**PV**) application was submitted to Council through the SHA process but was placed on hold, pending the outcome of Council deliberations on the recommendations of the Independent Hearings Panel (**IHP**), as part of the hearings for the Proposed Auckland Unitary Plan (**PAUP**), to recommend live-zoning of land within Wainui East which included the SHA area and a large area surrounding the SHA.

Stantec New Zealand (**Stantec**), previously TDG, originally prepared an Integrated Transportation Assessment (**ITA**) report for the Argent Lane SHA Plan Variation application which considered up to 2,800 dwellings and 40,000m^2 Gross Floor Area (**GFA**) of commercial activity being established within the SHA boundary. This level of development was approved by Council.

The Proposed Auckland Unitary Plan Decision Version (**PAUP-DV**) was released in August 2016. The planning maps for the PAUP-DV indicated a large proportion of land (around 300 hectares) within Wainui East as being live-zoned. This zoning provided for a variety of residential typologies including Single House, Mixed Housing Suburban, Mixed Housing Urban, Terrace Housing and Apartment Building zones, as well as Local Centre, Neighbourhood Centre and Public Open Space - Conservation to enable development of residential, business and recreational activities in the Wainui area which is now known as Milldale.

Since August 2016, the PAUP-DV has been further amended and the Auckland Unitary Plan (Operative in Part – updated 24 January 2025) (**AUP**) is the current plan for the city. The zoning structure for Milldale indicated in the AUP is illustrated in **Figure 1**.

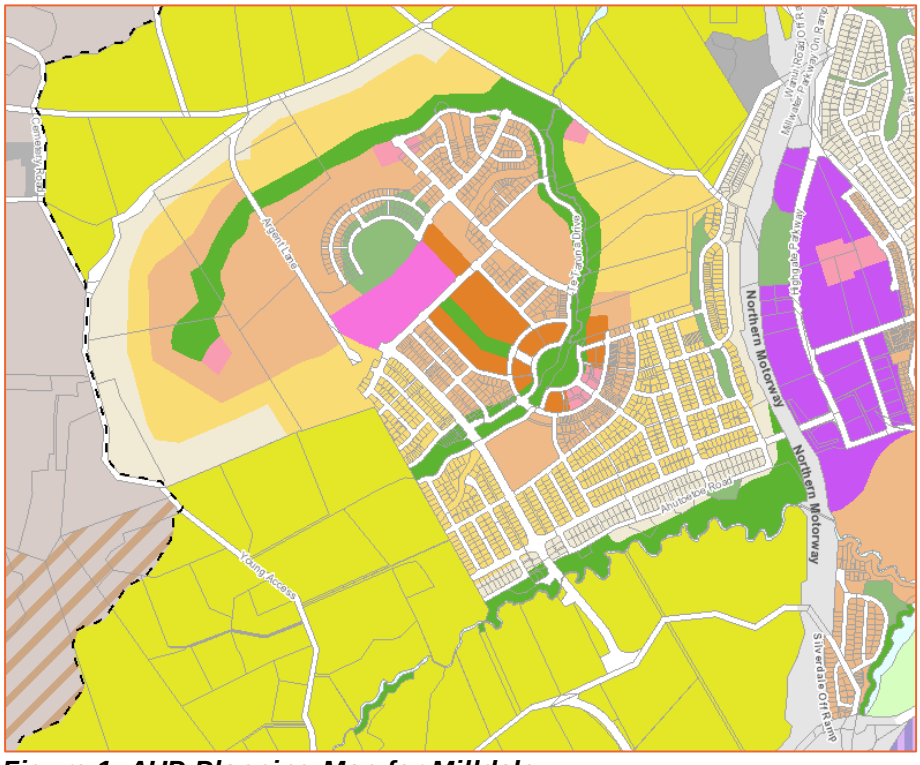


Figure 1: AUP Planning Map for Milldale

An update to the traffic modelling was undertaken in 2018 and an updated ITA for an ultimate yield of up to 4,500 dwellings and 40,000m^2 GFA of commercial area within Milldale was submitted to Auckland Council and Auckland Transport (**AT**) for approval in October 2019 (**2019 ITA**). That ITA provided details regarding:

- the existing and future transport environment in the area;
- accessibility of the site and connections for the various modes of transport; and
- the transportation effects of the proposed yield.

The assessment, and particularly the detailed modelling, which was undertaken to support the 2019 ITA, was subject to review by Council, AT, and Waka Kotahi - New Zealand Transport Agency (**Waka Kotahi**) representatives and subsequently approved. As such, the 2019 ITA provides the framework for the assessment of future development within the Milldale area. A copy of the 2019 ITA is provided in **Appendix A** of this report.

2 Introduction

This report has been prepared in support of the application by Fulton Hogan Land Development (**FHLD**) for a resource consent to the Environmental Protection Authority (**EPA**) under the Fast-Track Approvals Act 2024 (**FTAA**).

Resource consent is required for bulk earthworks, subdivision, streamworks, water permits and discharge consents for the development of 623 residential lots, 27 super lots, one neighbourhood centre lot, Jointly Owned Access Lots (**JOALs**) and roads to vest, reserves to vest, and all associated works, landscaping and infrastructure.

The site subject to this application is located within the Milldale development and referred to as the Milldale Stages 10 to 13 subdivision areas (**the Site**). The Site consists of land covered by Lot 9006 DP 602895; Lot 9007 DP 602895; Lot 1 DP 147739; Lot 1 DP 488814; Lot 2 DP 488814; Lot 3 DP 488814; Lot 2 DP 147739, Lot 4 DP 353309 and Lot 2 DP 130515. Stages 10 to 13 are located within the northern and western extents of the Milldale development and comprise the remaining undeveloped greenfield stages of Milldale.

Overall, the Site covers a total area of approximately 71 ha. The Site is bordered by Wainui Road to the north, incorporates Lysnar Road to the north-east, and undeveloped land to the west. Previously consented Milldale stages are located to the south of the Site including Stages 5 to 8 and the Milldale Town Centre. A full description of the Site and surrounds is provided in the application AEE.

It is anticipated that an additional 623 single-lot sites plus 27 superlots (comprising approximately 301 dwellings) could be developed within the Site (or a total of 924 dwellings), over and above (i.e. in addition to) the yield of previous stages (including Stage 4C) of around 3,071 dwellings. This corresponds to an overall total yield for all stages within Milldale (inclusive of the current application) of around 3,995 dwellings. It should be noted that the proposed dwelling yield within the Site is consistent with the original yield assumed within the original 2019 ITA and masterplan for the Milldale Precinct.

The detail of this report:

- describes the proposed road network; and
- provides a summary of the likely transport effects of the development associated with Stages 10 to 13.

This report should be read in conjunction with the 2019 ITA for the 4,500 dwellings plus 40,000m^2 GFA commercial area located in the Local Centre area within Milldale, the individual transportation assessment reports produced for Stages 1 through 9, and the Local Centre resource consent applications. As of the writing of this report, resource consent has been approved for all these prior applications apart from Stage 4C, which is included within this application, but a separate report has been prepared to address Stage 4C, this report covers only Stages 10-13.

3 Proposal

FHLD are proposing the subdivision and development of the Site into a medium density residential development. As noted earlier, the proposal will result in the development of the site into 623 residential lots, 27 super lots, one neighbourhood centre lot), JOALs and roads to vest, reserves to vest, and all associated works, landscaping and infrastructure.

It should be noted that the neighbourhood centre lot was originally located within the stage 13 area. However, following on from work undertaken by Insight Economics it was determined that the Local Centre was in danger of undermining the economic viability of the neighbourhood centre if it were to remain with the stage 13 area. As a consequence, it was decided that the neighbourhood centre should be relocated to the north, within the stage 12 area and at the south-eastern corner of the collector road / Cemetery Road Link intersection. From a transport perspective this change is not considered to be an issue as the neighbourhood centre would now be adjacent to a collector road and future bus route, enabling good accessibility by public transport. The neighbourhood centre would also be readily accessible by active modes through the dedicated cycle paths on both sides of the collector road and the footpaths provided on all the roads in the area. In this respect the location of the neighbourhood centre within Stage 12 is considered appropriate from a transportation perspective.

The development will require land modification works to facilitate Stages 10 to 13 of the Milldale Fast Track application. This includes bulk earthworks across the site to refine the site to the required finished levels. A full description of the project is provided in the application AEE.

Figure 2 illustrates the Site location (highlighted in green) in the context of the full Milldale Precinct.

3.1 Road Hierarchy

Figure 3 to **Figure 5** show the proposed hierarchy of roads within the Site.

Within the individual Stages themselves, a network of local roads and JOALs provide access to the residential lots.

The local road network within Stage 10 connects to an arterial road (Wainui Road) to the north and collector roads to the west (Waiwai Drive), east (Lysnar Road) and south (Milldale Drive). The Stage 11 local road network connects to arterial roads to the north (Wainui Road) and west (Argent Lane) and a collector road to the east (Waiwai Road). Access to the Stage 12 internal roading network will be gained via the Cemetery Road link. The Stage 13 area will also be accessed via the Cemetery Road link, Milldale Drive and from Parish Drive in the south. A map showing all the current street names throughout Milldale (as of May 2024) is provided in **Appendix B**.

The proposed road hierarchy is considered appropriate with good levels of permeability within the Site and to the main collector and arterial routes running adjacent to the Site.

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

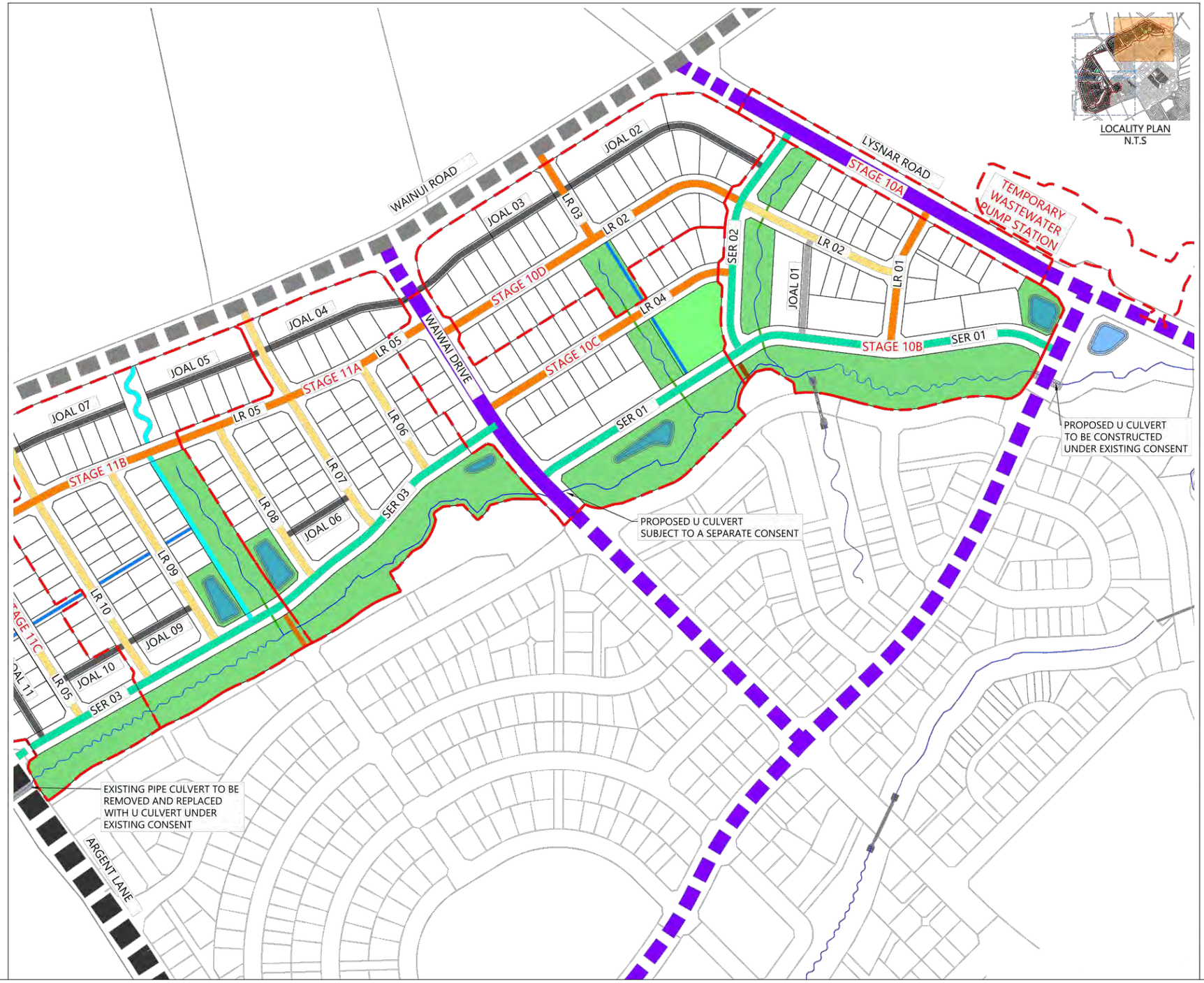
SITE LOCATION

DRAWN: TLJ	---	---
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

Stantec

2

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg



LOCALITY PLAN
N.T.S

WOODS
EST.1970

LEGEND

- EXTENTS OF FAST TRACK APPLICATION
- BOUNDARIES
- STREAM

STREETS

- ARGENT LANE - ARTERIAL ROAD (30m)
- WAINUI ROAD - ARTERIAL ROAD (24m)
- WAIWAI DRIVE / LYSNAR ROAD / COLLECTOR ROAD (24m)
- CEMETERY ROAD LINK COLLECTOR (24m)
- STREAM EDGE ROAD (SER)
- LOCAL ROAD (LR) TYPE 1
- LOCAL ROAD (LR) TYPE 2
- CEMETERY ROAD UPGRADE

JOINT OWNED ACCESS LOTS

- JOAL - TYPE 1 (5m)
- JOAL - TYPE 2 (7m, WITH ROAD FRONTAGE)
- JOAL - TYPE 3 (7m, REAR LOADED ONLY)

DEDICATED PATHS

- ACTIVE MODES PATH (4m)
- RECREATIONAL PATH (3m) / DRAINAGE RESERVE PATH (3.5m)
- RECREATIONAL PATH (2m)
- ACTIVE MODE PATH BRIDGE (4m)
- RECREATIONAL PATH BRIDGE (3m)

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

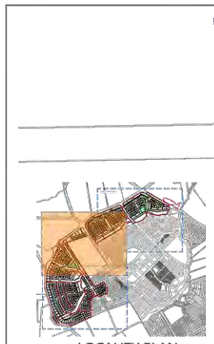
ROAD TYPOLOGY

DRAWN: TLJ	--- ---	
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

Stantec

3

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg



LOCALITY PLAN
N.T.S

LEGEND

- EXTENTS OF FAST TRACK APPLICATION
- BOUNDARIES
- STREAM

STREETS

- ARGENT LANE - ARTERIAL ROAD (30m)
- WAINUI ROAD - ARTERIAL ROAD (24m)
- WAIWAI DRIVE / LYSNAR ROAD / COLLECTOR ROAD (24m)
- CEMETERY ROAD LINK COLLECTOR (24m)
- STREAM EDGE ROAD
- LOCAL ROAD TYPE 1
- LOCAL ROAD TYPE 2
- CEMETERY ROAD UPGRADE

JOINT OWNED ACCESS LOTS

- JOAL - TYPE 1 (5m)
- JOAL - TYPE 2 (7m, WITH ROAD FRONTAGE)
- JOAL - TYPE 3 (7m, REAR LOADED ONLY)

DEDICATED PATHS

- ACTIVE MODES PATH (4m)
- RECREATIONAL PATH (3m) / DRAINAGE RESERVE PATH (3.5m)
- RECREATIONAL PATH (2m)
- ACTIVE MODE PATH BRIDGE (4m)
- RECREATIONAL PATH BRIDGE (3m)

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

ROAD TYPOLOGY

DRAWN: TLJ	---	---
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

Stantec

4

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg

LOCALITY PLAN
N.T.S

WOODS
EST.1970

LEGEND

- EXTENTS OF FAST TRACK APPLICATION
- BOUNDARIES
- STREAM

STREETS

- ARGENT LANE - ARTERIAL ROAD (30m)
- WAINUI ROAD - ARTERIAL ROAD (24m)
- WAIWAI DRIVE / LYSNAR ROAD / COLLECTOR ROAD (24m)
- CEMETERY ROAD LINK COLLECTOR (24m)
- STREAM EDGE ROAD (SER)
- LOCAL ROAD (LR) TYPE 1
- LOCAL ROAD (LR) TYPE 2
- CEMETERY ROAD UPGRADE

JOINT OWNED ACCESS LOTS

- JOAL - TYPE 1 (5m)
- JOAL - TYPE 2 (7m, WITH ROAD FRONTAGE)
- JOAL - TYPE 3 (7m, REAR LOADED ONLY)

DEDICATED PATHS

- ACTIVE MODES PATH (4m)
- RECREATIONAL PATH (3m) / DRAINAGE RESERVE PATH (3.5m)
- RECREATIONAL PATH (2m)
- ACTIVE MODE PATH BRIDGE (4m)
- RECREATIONAL PATH BRIDGE (3m)

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

ROAD TYPOLOGY

DRAWN: TLJ	---	---
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

Stantec

5

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg

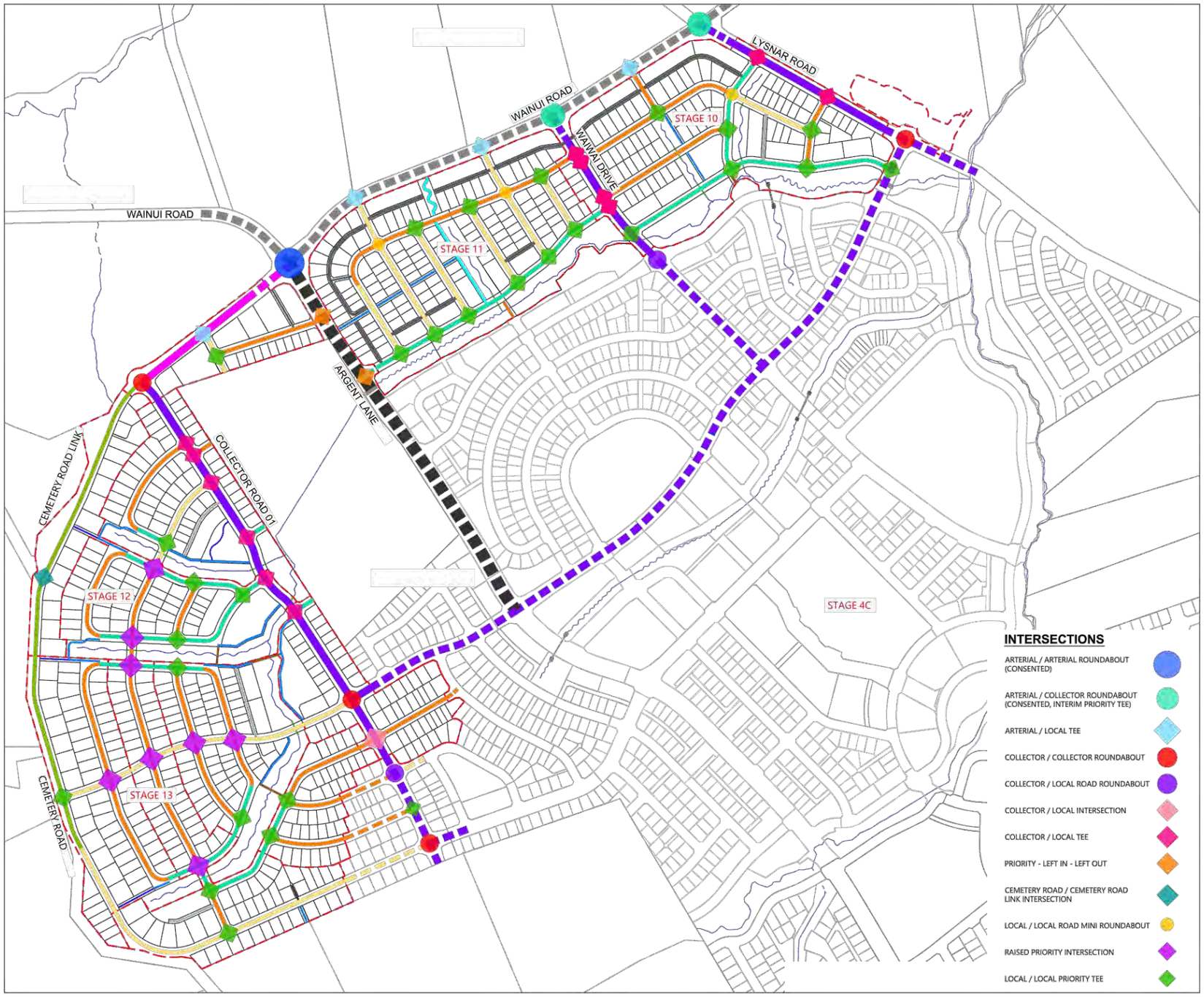
3.2 Proposed Intersection Forms

From a wider transportation perspective, the Site can be accessed through Wainui Road from the Millwater Interchange, or by Argent Lane via Pine Valley Road from the Silverdale Interchange.

A plan showing the proposed intersection forms through the Site is shown in **Figure 6**.

The general rationale adopted with regard to the choice of intersection forms was that where collector roads formed a crossroad with other collector roads or arterial roads then a roundabout has been proposed. In other situations involving local road connections either priority intersections (some of which are raised) or mini-roundabouts are proposed where geometry and gradients permit. Woods Ltd have also included conceptual intersection design layouts as part of their drawing set.

The proposed intersection forms are considered appropriate and capable of catering for the anticipated traffic flows from a capacity and safety perspective.



WOODS
Est.1970

LEGEND

- EXTENTS OF FAST TRACK APPLICATION
- BOUNDARIES
- STREAM

STREETS

- ARGENT LANE - ARTERIAL ROAD (30m)
- WAINUI ROAD - ARTERIAL ROAD (24m)
- WAIWAI DRIVE / LYSNAR ROAD / COLLECTOR ROAD (24m)
- CEMETERY ROAD LINK COLLECTOR (24m)
- STREAM EDGE ROAD (SER)
- LOCAL ROAD (LR) TYPE 1
- LOCAL ROAD (LR) TYPE 2
- CEMETERY ROAD UPGRADE

JOINT OWNED ACCESS LOTS

- JOAL - TYPE 1 (5m)
- JOAL - TYPE 2 (7m, WITH ROAD FRONTAGE)
- JOAL - TYPE 3 (7m, REAR LOADED ONLY)

DEDICATED PATHS

- ACTIVE MODES PATH (4m)
- RECREATIONAL PATH (3m) / DRAINAGE RESERVE PATH (3.5m)
- RECREATIONAL PATH (2m)
- ACTIVE MODE PATH BRIDGE (4m)
- RECREATIONAL PATH BRIDGE (3m)

INTERSECTIONS

- ARTERIAL / ARTERIAL ROUNDABOUT (CONSENTED)
- ARTERIAL / COLLECTOR ROUNDABOUT (CONSENTED, INTERIM PRIORITY TEE)
- ARTERIAL / LOCAL TEE
- COLLECTOR / COLLECTOR ROUNDABOUT
- COLLECTOR / LOCAL ROAD ROUNDABOUT
- COLLECTOR / LOCAL INTERSECTION
- COLLECTOR / LOCAL TEE
- PRIORITY - LEFT IN - LEFT OUT
- CEMETERY ROAD / CEMETERY ROAD LINK INTERSECTION
- LOCAL / LOCAL ROAD MINI ROUNDABOUT
- RAISED PRIORITY INTERSECTION
- LOCAL / LOCAL PRIORITY TEE

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

INTERSECTION FORMS

DRAWN: TLJ	---	---
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

Stantec

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg

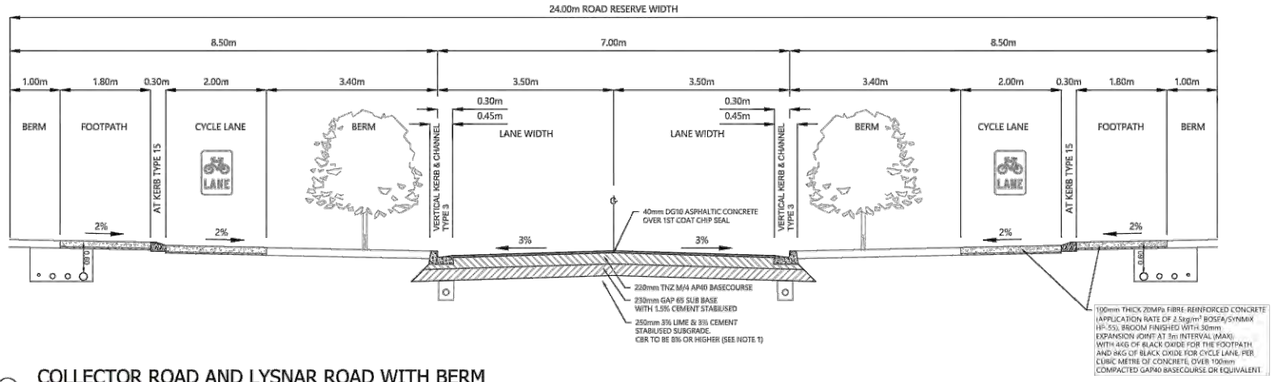
3.3 Road Typologies

The following road typologies are proposed within the Site.

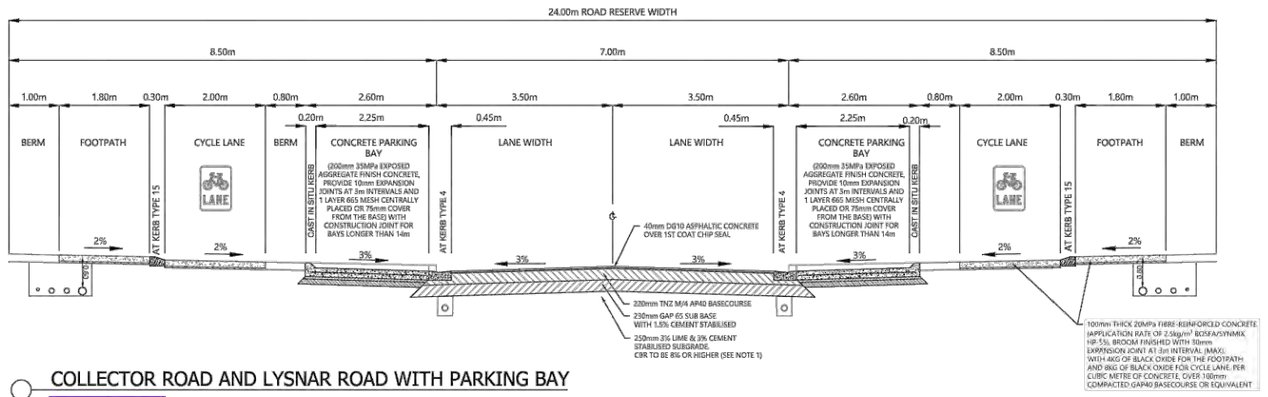
- Collector Road and Lysnar Road. These roads are proposed to have an overall road reserve width of 24m which comprises 1m-wide back berms, 1.8m-wide footpaths and 2m-wide cycle lanes on both sides of the road with 3.5m traffic lanes. The roads include either berms/raingardens or parking bays on both sides of the road carriageway, except where there are bus stops, in which case bus shelter facilities are proposed.
- Cemetery Road Link (Collector Road section). This road typology has been adopted for the section of Cemetery Road which runs between the collector road to the east of the Stage 12 and 13 area and Argent Lane. It is proposed to have a 24m road reserve and its cross-section includes 3.5m wide traffic lanes, 2.1m-wide back berms and 1.8m-wide footpaths on both sides of the road, a two-way cycle path (3.2m wide) on the southern side of the road and either berms or parking bays along its length, except where there are bus stops, in which case bus shelter facilities are proposed.
- Cemetery Road Link / Local Road Type 2. A 16.2m road reserve is proposed for these roads with 1m-wide back berms and 1.8m footpaths on both sides of the road with 3m-wide traffic lanes. Between the traffic lanes and footpaths, either berms or parking bays are proposed.
- Cemetery Road Upgrade (Local Road). This typology extends between the end of the Cemetery Road link and to the south of the intersection of Cemetery Road with Parish Drive. On the western side of the road is rural land and no footpaths are proposed. It is anticipated that the western side will be upgraded when the rural land is developed. A 20.12m road reserve is proposed for this section of Cemetery Road, with a 1m-wide back berm and 1.8m-wide footpath on the eastern side of the road. A two-way carriageway is proposed with 3m traffic lanes and either berm or on-street parking bays on the eastern side.
- Local Road Type 1. This road typology forms the bulk of the roads through the Site. It is proposed to have a 16.2m-wide road reserve which is comprised of 1m-wide back berms and 1.8m-wide footpaths on both sides of the road, and 3m-wide traffic lanes with either berms or parking bays on each side of the road.
- Stream Edge Road. This road type runs along the streams which exist through the Site. A 16.9m road reserve is proposed which includes 3m wide traffic lanes, a 3m-wide recreational path on the stream side of the road and 1.8m-wide footpath plus 1m-wide back berm on the other side of the road. Either raingardens/berms or parking bays are proposed on both sides of the road carriageway.
- JOALs. All JOALs have legal widths of either 5m (with a 3m vehicle zone) or 7m (with a 5.5m vehicle zone). The 5m-wide JOALs have 1m berms on both sides. There are two 7m-wide JOAL typologies, one which has have 0.75m berms on both sides with no footpath (for lots with direct frontage to roads) and another which has a separate 1m footpath running alongside the vehicle carriageway.
- Recreational Paths. Recreational paths are typically between 3m and 4m wide.

It should be noted that all cross sections are generally consistent with what has been provided within other areas of the Milldale Precinct previously approved by AT.

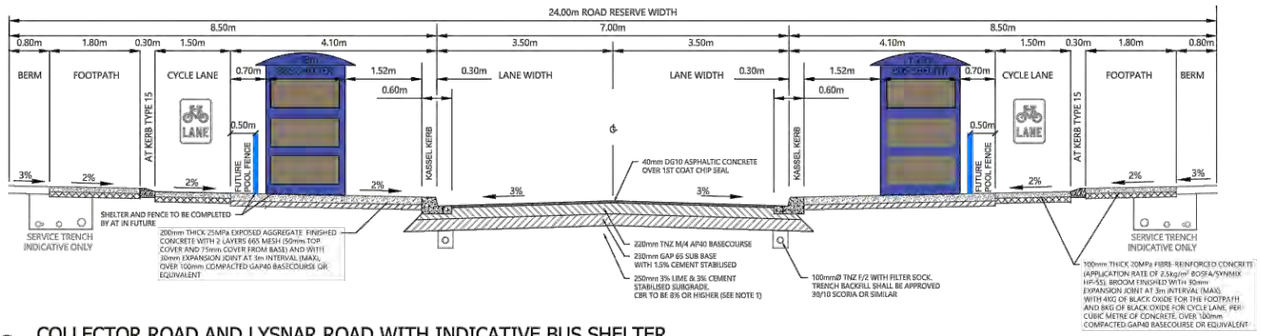
Figure 7 to **Figure 13** show the typical road cross-sections proposed for the roads within and around the Site as provided by the Civil Engineers for the project (Woods Ltd). All dimensions conform to the minimum requirements of the Transport Design Manual (**TDM**) and are considered appropriate for the development.



COLLECTOR ROAD AND LYSNAR ROAD WITH BERM



COLLECTOR ROAD AND LYSNAR ROAD WITH PARKING BAY



COLLECTOR ROAD AND LYSNAR ROAD WITH INDICATIVE BUS SHELTER

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

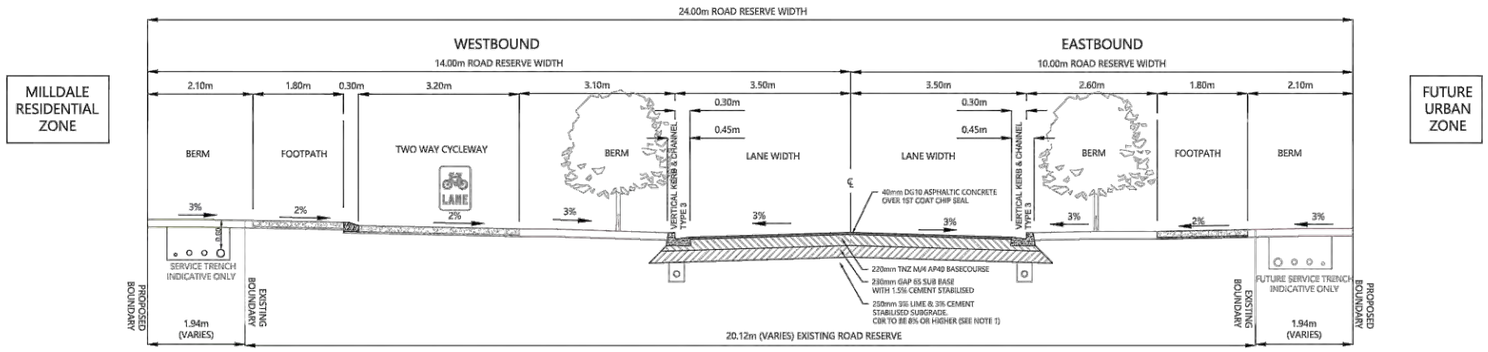
ROAD CROSS-SECTION (COLLECTOR ROAD AND LYSNAR ROAD)

DRAWN: TLJ	---	---
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

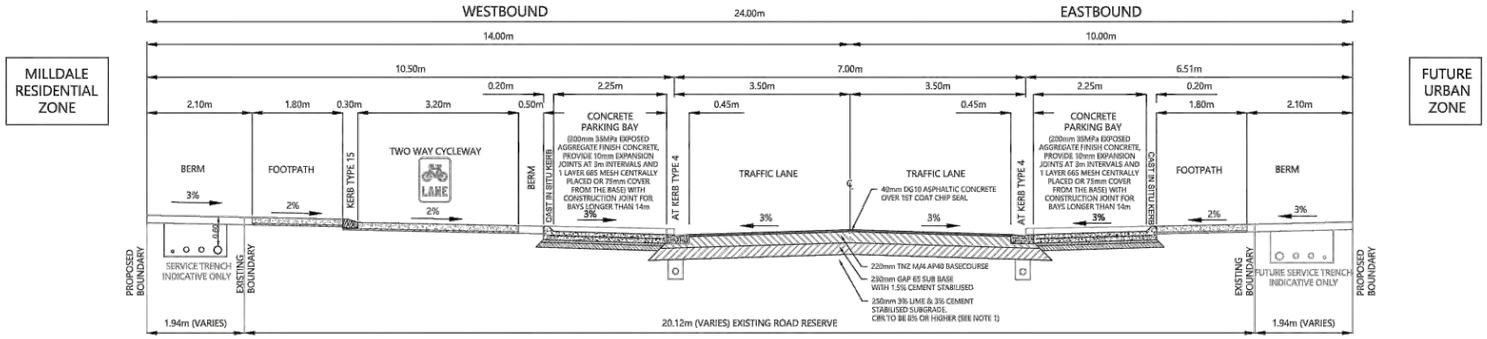
Stantec

7

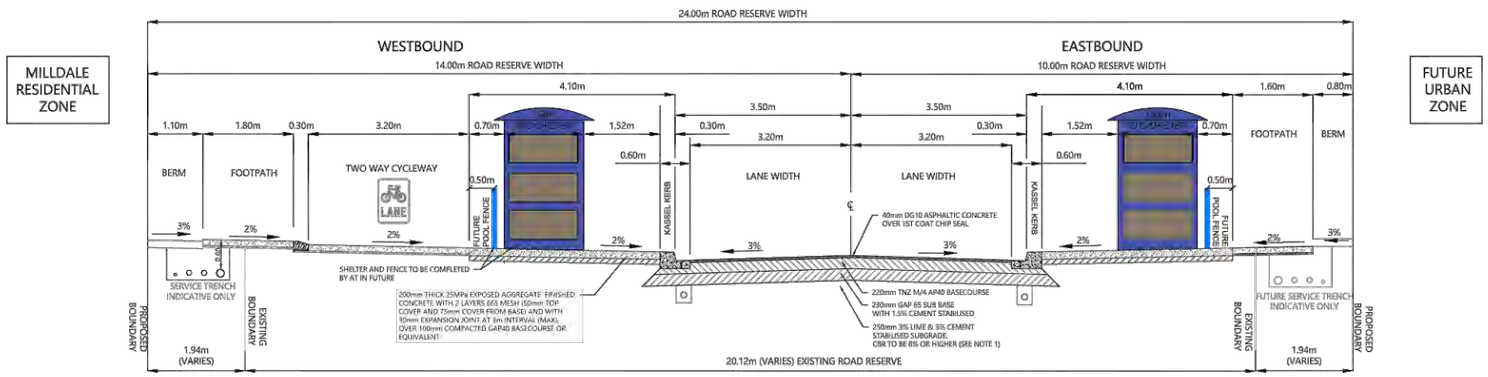
U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg



CEMETERY ROAD LINK (COLLECTOR ROAD) WITH BERM/RAINGARDEN



CEMETERY ROAD LINK (COLLECTOR ROAD) WITH PARKING BAY



CEMETERY ROAD LINK (COLLECTOR ROAD) WITH INDICATIVE BUS STOP

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

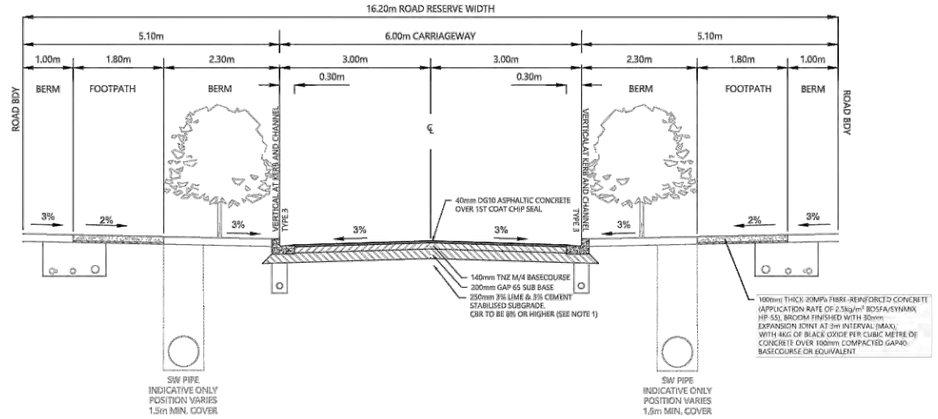
ROAD CROSS-SECTION (CEMETERY ROAD, COLLECTOR ROAD SECTION)

DRAWN: TLJ	---	---
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

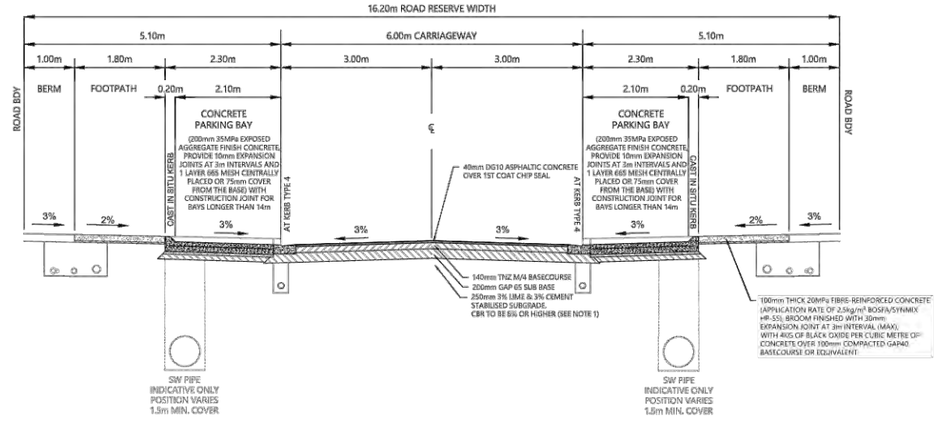
Stantec

8

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg



LOCAL ROAD TYPE 2 AND CEMETERY ROAD LINK WITH BERM



LOCAL ROAD TYPE 2 AND CEMETERY ROAD LINK WITH PARKING BAY

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

ROAD CROSS-SECTION (LOCAL ROAD TYPE 2 AND CEMETERY ROAD)

DRAWN: TLJ | --- | ---

DATE: 24.02.25 | STATUS: RC

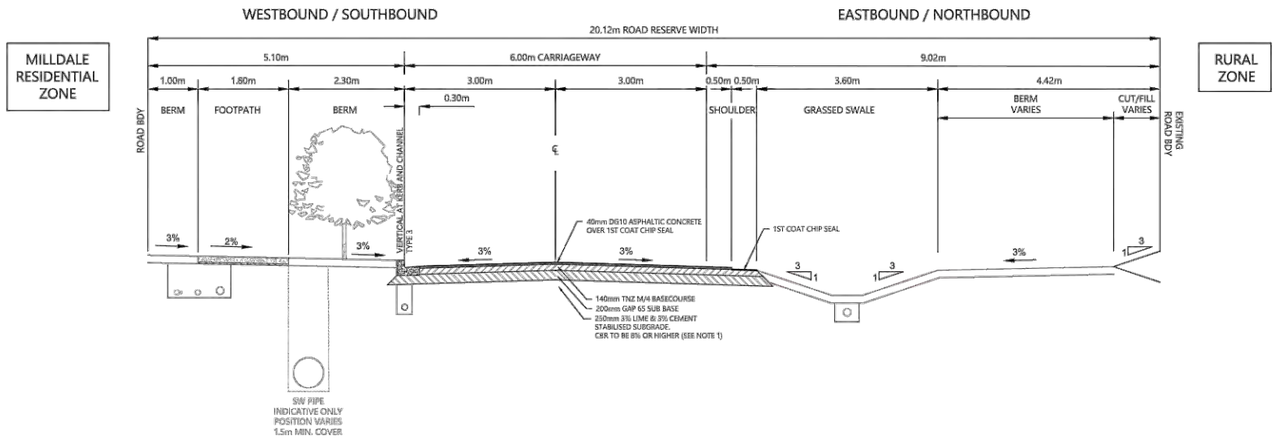
SCALE: NTS

DWG NO:310206322A1A

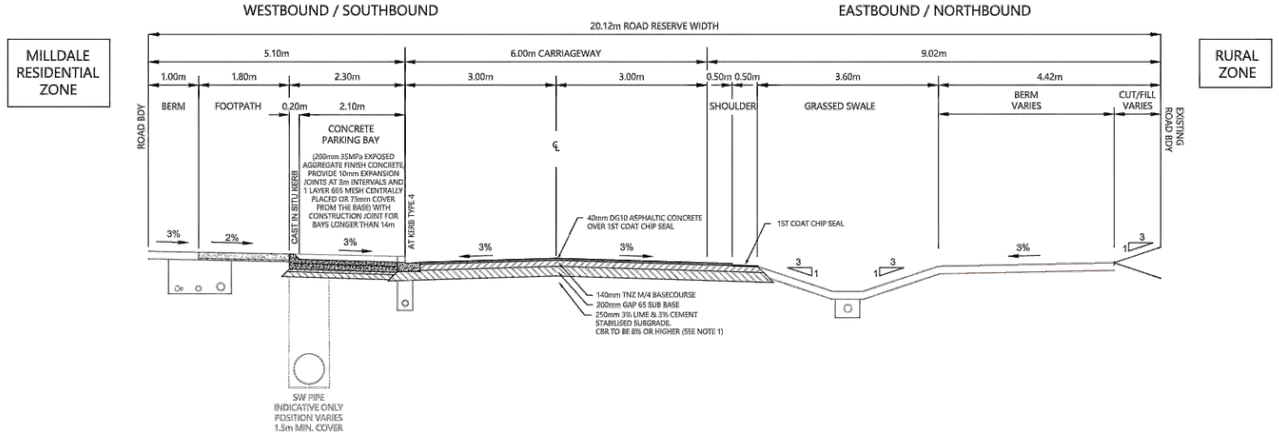
Stantec

9

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg



CEMETERY ROAD UPGRADE (LOCAL ROAD) WITH BERM



CEMETERY ROAD UPGRADE (LOCAL ROAD) WITH PARKING BAY

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

ROAD CROSS-SECTION (CEMETERY ROAD UPGRADE - LOCAL ROAD)

DRAWN: TLJ | --- | ---

DATE: 24.02.25 | STATUS: RC

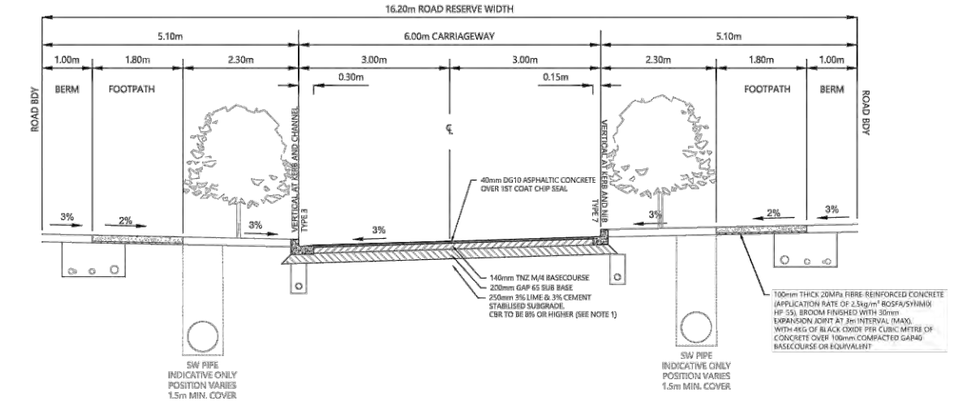
SCALE: NTS

DWG NO:310206322A1A

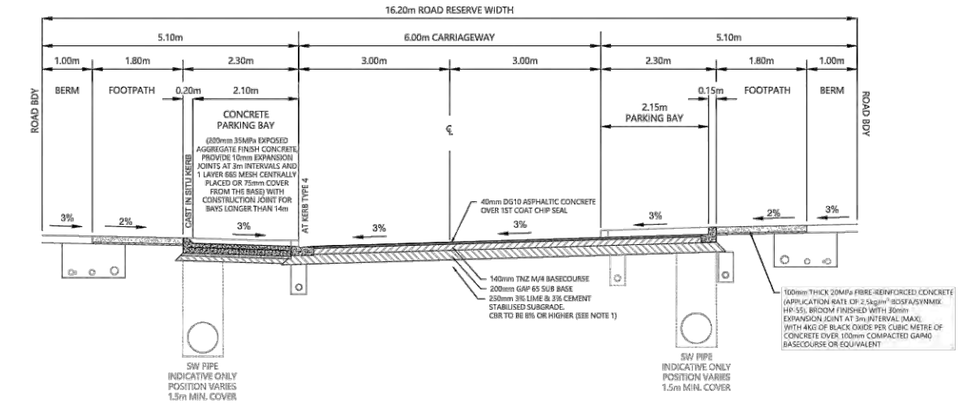
Stantec

10

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg



LOCAL ROAD TYPE 1 WITH BERM



LOCAL ROAD TYPE 1 WITH PARKING BAY

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

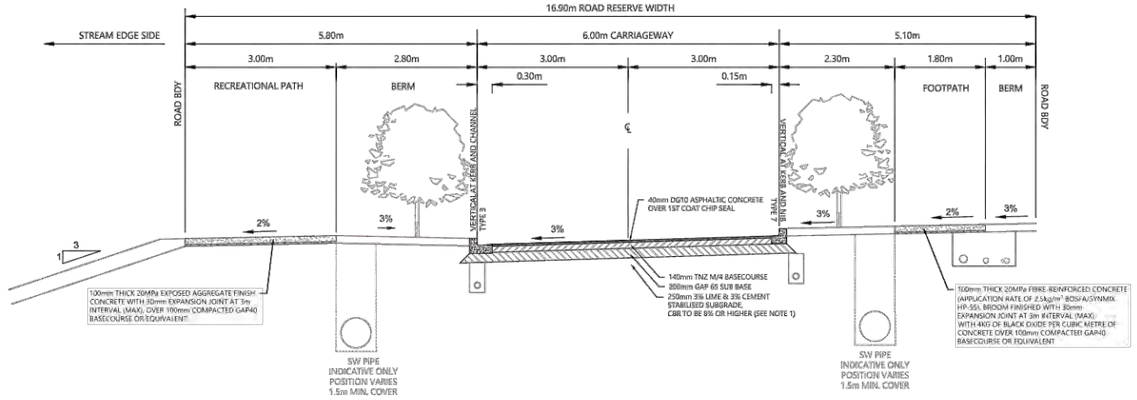
ROAD CROSS-SECTION (LOCAL ROAD TYPE 1)

DRAWN: TLJ	---	---
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

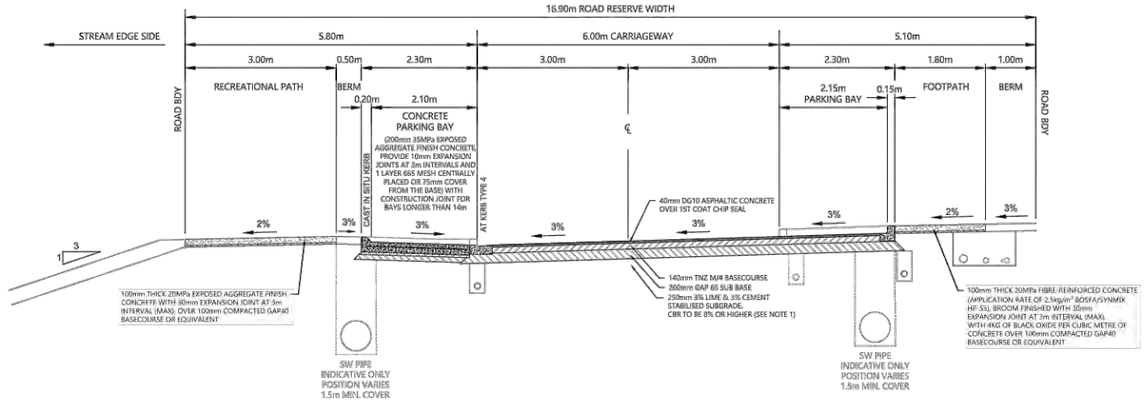
Stantec

11

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg



STREAM EDGE ROAD WITH RECREATIONAL PATH AND BERM/RAINGARDEN



STREAM EDGE ROAD WITH RECREATIONAL PATH & PARKING BAYS

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

ROAD CROSS-SECTION (STREAM EDGE ROAD)

DRAWN: TLJ | --- | ---

DATE: 24.02.25 | STATUS: RC

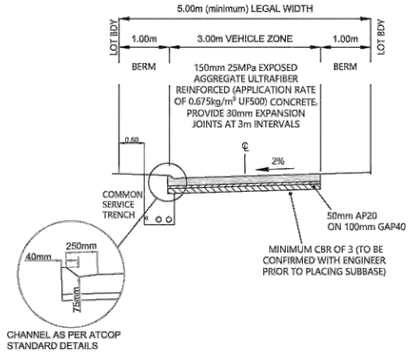
SCALE: NTS

DWG NO:310206322A1A

Stantec

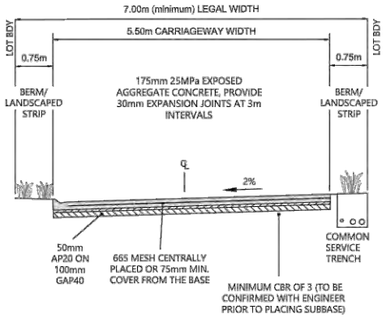
12

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg



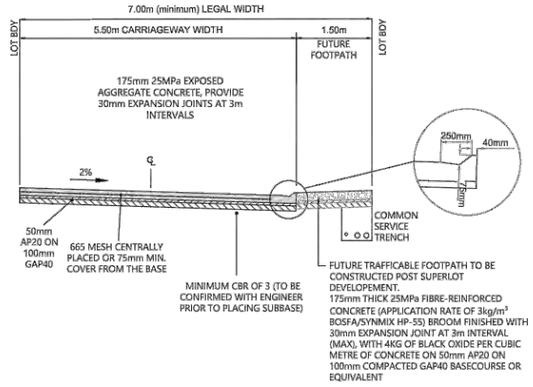
JOAL - 3.0M WIDTH TYPICAL SECTION

Scale: 1:100



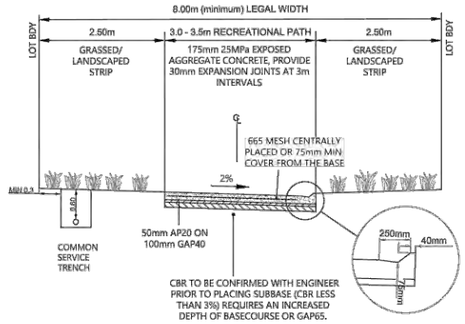
JOAL - 5.5M WIDTH TYPICAL SECTION

Scale: 1:100

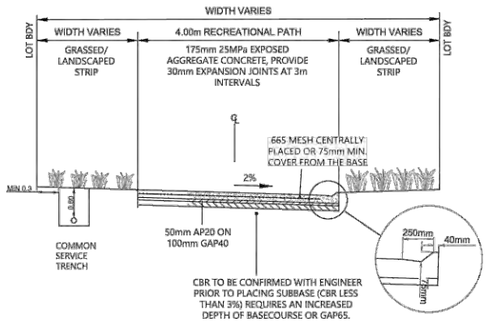


JOAL - 5.5M WIDTH TYPICAL SECTION

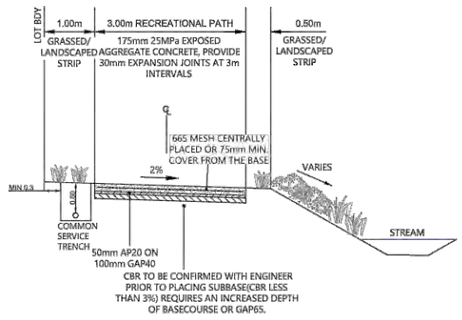
1:100



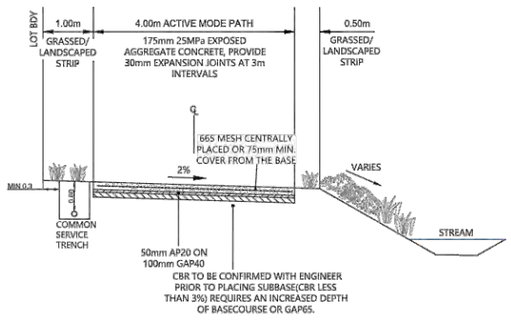
3.0 - 3.5m WIDTH RECREATIONAL PATH DETAIL



4.0M WIDTH ACTIVE MODE PATH DETAIL



3.0 - 3.5m WIDTH RECREATIONAL PATH ADJACENT TO STREAM



4.0M WIDTH ACTIVE MODE PATH ADJACENT TO STREAM

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

ROAD CROSS-SECTION (BRIDGE) - CONCEPT

DRAWN: TLJ	---	---
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

Stantec

13

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg

3.4 Wainui Road Upgrade

It should be noted that an upgrade of Wainui Road between Lysnar Road and Argent Lane, inclusive of the roundabout at the Wainui Road / Argent Lane intersection, has been consented separately, and outside of this Fast Track application.

The upgrade includes a bi-directional cycle path along the southern edge of Wainui Road and allowances for bus stops to be located along the route. This will allow residents residing within the Stage 10 and 11 areas, and particularly the dwellings which front Wainui Road, a good level of connectivity to active mode infrastructure and public transport.

3.5 Global Departures from Standards

For this Fast-Track application, FHLDL proposes to rely on several departures from standards which have been utilised on previous resource consent applications within Milldale, and which have previously been approved by Auckland Transport. Specifically, the departures relate to the following:

- Vehicle Crossing Type A (for vehicle crossings fronting a local road with a front boundary width of less than 14m);
- Vehicle Crossing Type B (for vehicle crossings fronting a local road with a front boundary width of 14m or greater);
- Vehicle Crossing Type C (for vehicle crossings fronting a collector road); and
- Private driveway typical design details (gradients).

Figures illustrating the details are provided in **Appendix C**. Vehicle crossings and driveway designs will conform fully to these departures from standards.

3.6 Active Modes

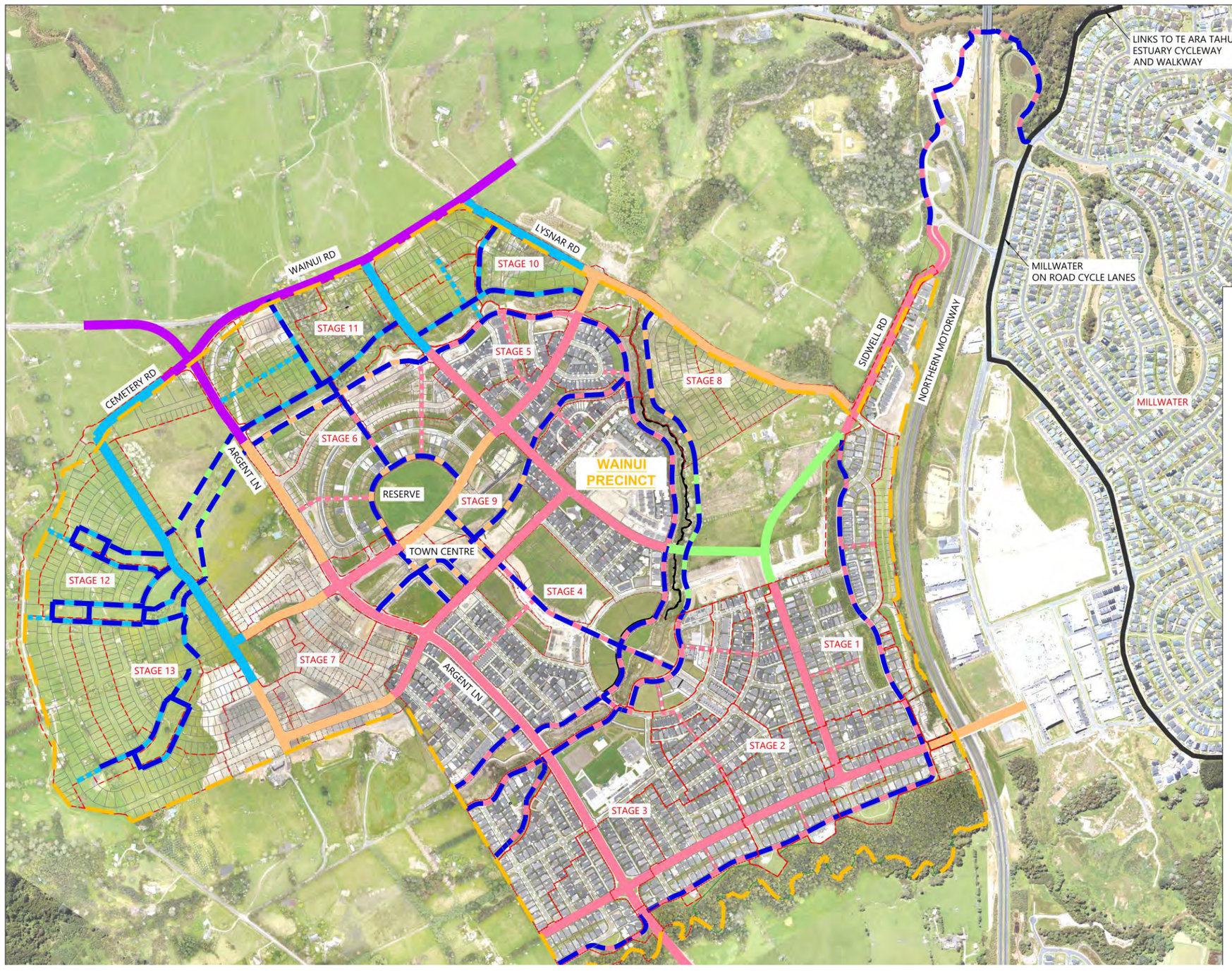
The Milldale Precinct boasts an extensive network for active modes. The current walking and cycling infrastructure plan is shown in **Figure 14**.

All of the roads within the Site have footpaths and all collector roads will have cycling facilities, most separated from the live traffic lanes by berms/raingardens or parking bays.

The cycle lanes proposed within the Site will link to the rest of the active mode network of the wider Precinct and offer an integrated system for pedestrians and cyclists.

The internal network also connects to the neighbouring suburbs of Millwater (via a shared path that runs under the motorway to the north of the Millwater interchange) and Silverdale (via the Highgate Bridge).

Overall, the accessibility to active mode infrastructure in the vicinity of the Site is considered to be very good.



WOODS
EST.1970

LEGEND:

- STAGE BOUNDARIES
- LOT BOUNDARIES
- CONSTRUCTED - DEDICATED CYCLEWAYS - 6,730m
- CONSTRUCTED - SHARED PATH - 7,260m
- CONSTRUCTED - PEDESTRIAN LINK - 1,840m
- UNDER CONSTRUCTION - DEDICATED CYCLEWAYS - 3,190m
- UNDER CONSTRUCTION - SHARED PATH - 1,140m
- UNDER CONSTRUCTION - PEDESTRIAN LINK - 930m
- CONSENTED - DEDICATED CYCLEWAYS - 1,640m
- PROPOSED - DEDICATED CYCLEWAYS - 1,640m
- PROPOSED- SHARED PATH - 2,710m
- PROPOSED - PEDESTRIAN LINK - 1,570m
- FUTURE - DEDICATED CYCLEWAYS - 700m
- FUTURE - SHARED PATH - 1,100m
- WAINUI PRECINCT BOUNDARY

TOTAL LENGTH OF DEDICATED CYCLEWAYS, SHARED PATHS & PEDESTRIAN LINKS:

TOTAL LENGTH OF FACILITIES CONSTRUCTED IN MILLDALE: **15,830m**

TOTAL LENGTH OF FACILITIES UNDER CONSTRUCTION IN MILLDALE: **5,260m**

TOTAL LENGTH OF FACILITIES CONSENTED IN MILLDALE: **1,640m**

TOTAL LENGTH OF FACILITIES PROPOSED IN MILLDALE: **5,920m**

TOTAL LENGTH OF FUTURE FACILITIES IN MILLDALE: **1,800m**

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

ACTIVE MODE PLAN

DRAWN: TLJ	---	---
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

Stantec

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg

3.7 Public Transport

At the present time there is one bus service which services Milldale and runs as a loop service between Milldale and the Hibiscus Coast Bus Station via the local primary school (Ahutoetoe School). The route map, as taken from the Moovit website, is shown in **Figure 15**.

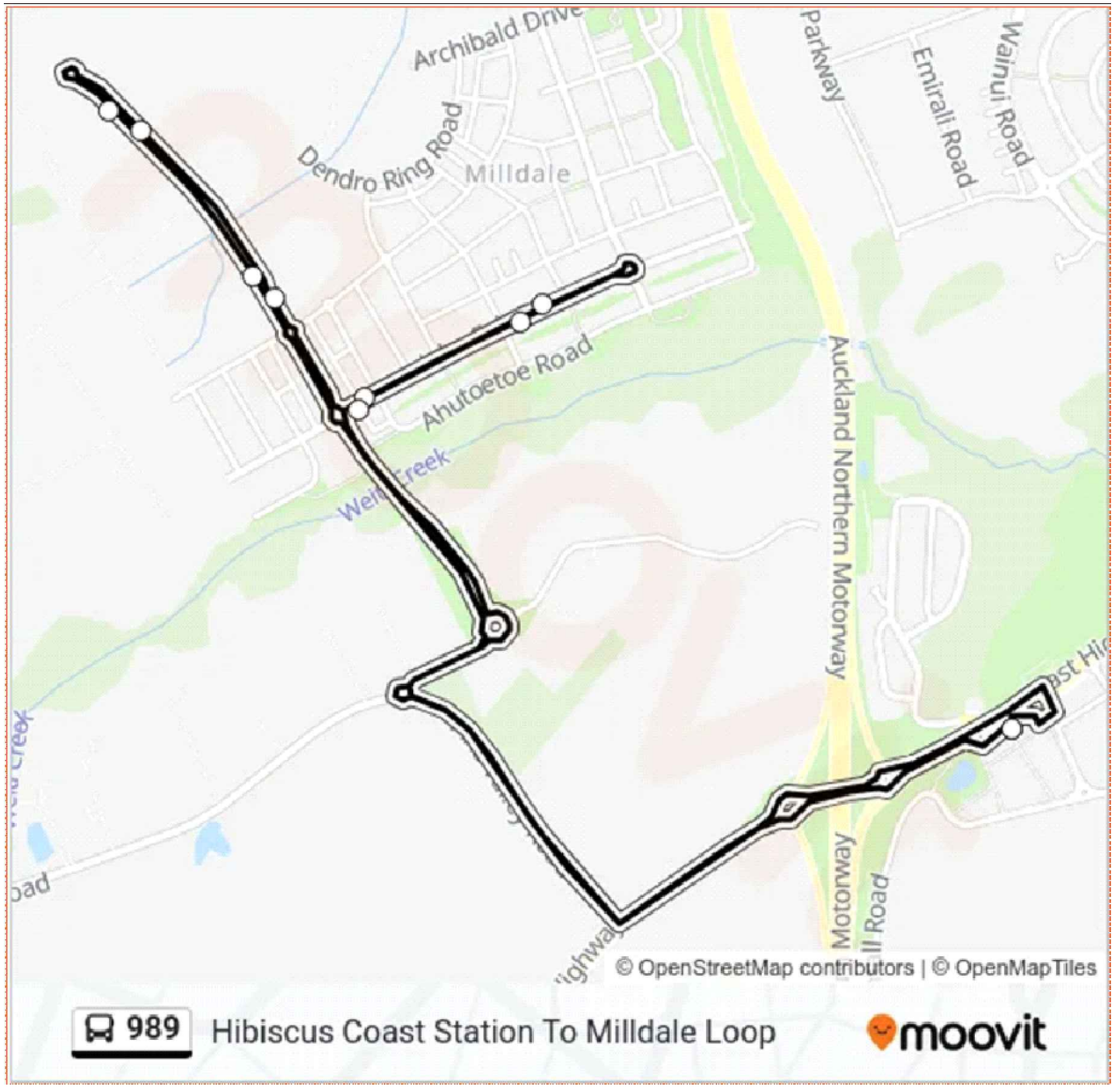
The bus service runs seven days a week between 6am and 7:30am at a 30-minute frequency and recent patronage figures obtained from AT indicate steadily increasing ridership since its inception.

FHLD has also been liaising with the AT Metro team in order to develop a high-level Public Transport (PT) plan for the Precinct as it continues to grow. The PT network will continue to expand and FHLD have developed an indicative PT network into the near future, which is illustrated in **Figure 16**.

Within the diagram, circles of radius 400m are shown to illustrate the proximity of bus stops to the dwellings within the Site, representing a typical distance people are likely to be prepared to walk to public transport infrastructure. As indicated, the bus stops along the proposed PT routes serve the majority of the dwellings within the Site, apart from a relatively small proportion of dwellings in the south-western region of the Stage 13 area for which walk distances to bus stops are around 600m.

All roads along the indicative routes are capable of accommodating buses, taking into consideration road widths and gradients. FHLD will provide the necessary infrastructure, but AT will need to provide the necessary services.

In summary, the bus routes cover the majority of the residential catchments within Stages 10 to 13 to ensure that PT will provide an accessible service for future residents in those areas.



Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	Source: Open Street Maps and Moovit
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----
----	----	----	----	----

MILLDALE STAGES 10 TO 13

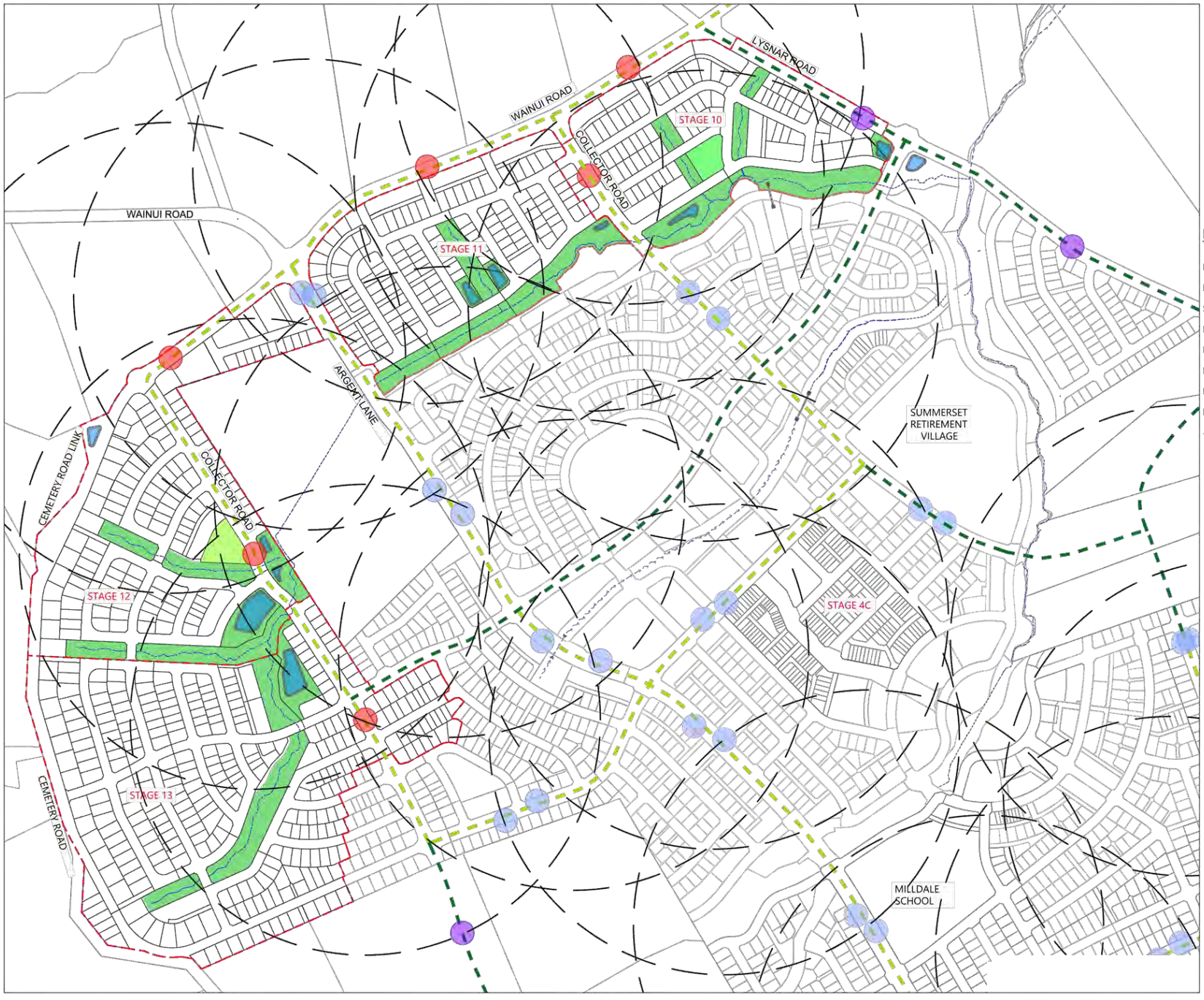
EXISTING BUS SERVICE (MILLDALE)

DRAWN: TLJ	---	---
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

Stantec

15

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg



WOODS Est.1970

LEGEND:

- EXTENTS OF FAST TRACK APPLICATION
- BOUNDARIES
- STREAM
- PROPOSED BUS STOP LOCATION (INDICATIVE)
- FUTURE BUS STOP LOCATION (INDICATIVE)
- EXISTING BUS STOP LOCATION
- PLANNED BUS ROUTE (AT)
- POTENTIAL FUTURE BUS ROUTE
- 400m BUS STOP CATCHMENT

Tuesday, 11 February 2025 10:58:57 am

REV	DATE	DRN	CHK	DESCRIPTION
A	24.02.25	TLJ	AUG	PDF plans issued by Woods Ltd - 24.02.25
---	---	---	---	---
---	---	---	---	---
---	---	---	---	---
---	---	---	---	---
---	---	---	---	---
---	---	---	---	---

MILLDALE STAGES 10 TO 13

INDICATIVE FUTURE BUS ROUTES

DRAWN: TLJ	---	---
DATE: 24.02.25	STATUS: RC	
SCALE: NTS		
DWG NO:310206322A1A		

Stantec

16

U:\310206322\technical\drawings\model\Stg10-13\310206322A1A.dwg

4 Transport Effects Assessment

4.1 Model

The 2019 ITA for Milldale provides a full assessment of the transportation effects of the development of up to 4,500 dwellings plus 40,000m^2 GFA of commercial area located in the Local Centre within the Milldale Precinct. The assessment of traffic effects showed that the proposed mitigation measures as described in Section 7 of the 2019 ITA would satisfactorily accommodate the anticipated level of traffic generated. However, the internal road network was not fully detailed in the ITA model, so whilst the external effects of the development could be quantified, the internal effects were not as clearly defined.

Consequently, a cordon was drawn around the Milldale area in the ITA model and matrix demand traversals were extracted to create the sub-network model demands to assist with the assessment for the transport network within the area. This is a common process when creating demands for a more detailed microsimulation model from a wider area transportation model.

Within the internal area, the road network has been refined based on Civil Engineering roading plans, and additional zones/centroids were added to reflect the internal residential structure. This methodology maintained the consistency of the original ITA modelling whilst providing a higher level of detail within Milldale and is consistent with the approach used for the detailed modelling utilised for the Stage 1 to Stage 9 and Local Centre transportation assessments.

The modelling software used for the assessment was AIMSUN which is the same software used for the ITA. However, the version of the software has been updated to AIMSUN Next 22.0.1 and only the micro-simulation functions have been utilised consistent with the scale and detail of model being assessed.

It should be noted that it has been decided to retain Cemetery Road in the road network. Whilst this road does provide a link between the proposed development area and Wainui Road, it will primarily only provide an access function for abutting properties as the unsealed nature (loose gravel surface), topography and alignment will not make it an attractive through-route for general traffic. Within the model, speeds along this link have been constrained to reflect the underlying road condition.

4.2 Stages 10 to 13

For the Stage 10 to 13 assessment, the roading plans provided by the Civil Engineers were imported into the model and the roading structure within the respective areas was coded into the model

The extent of the refined model (with the Stage 10 to 13 areas shown with red dashed borders) is shown in **Figure 17**.

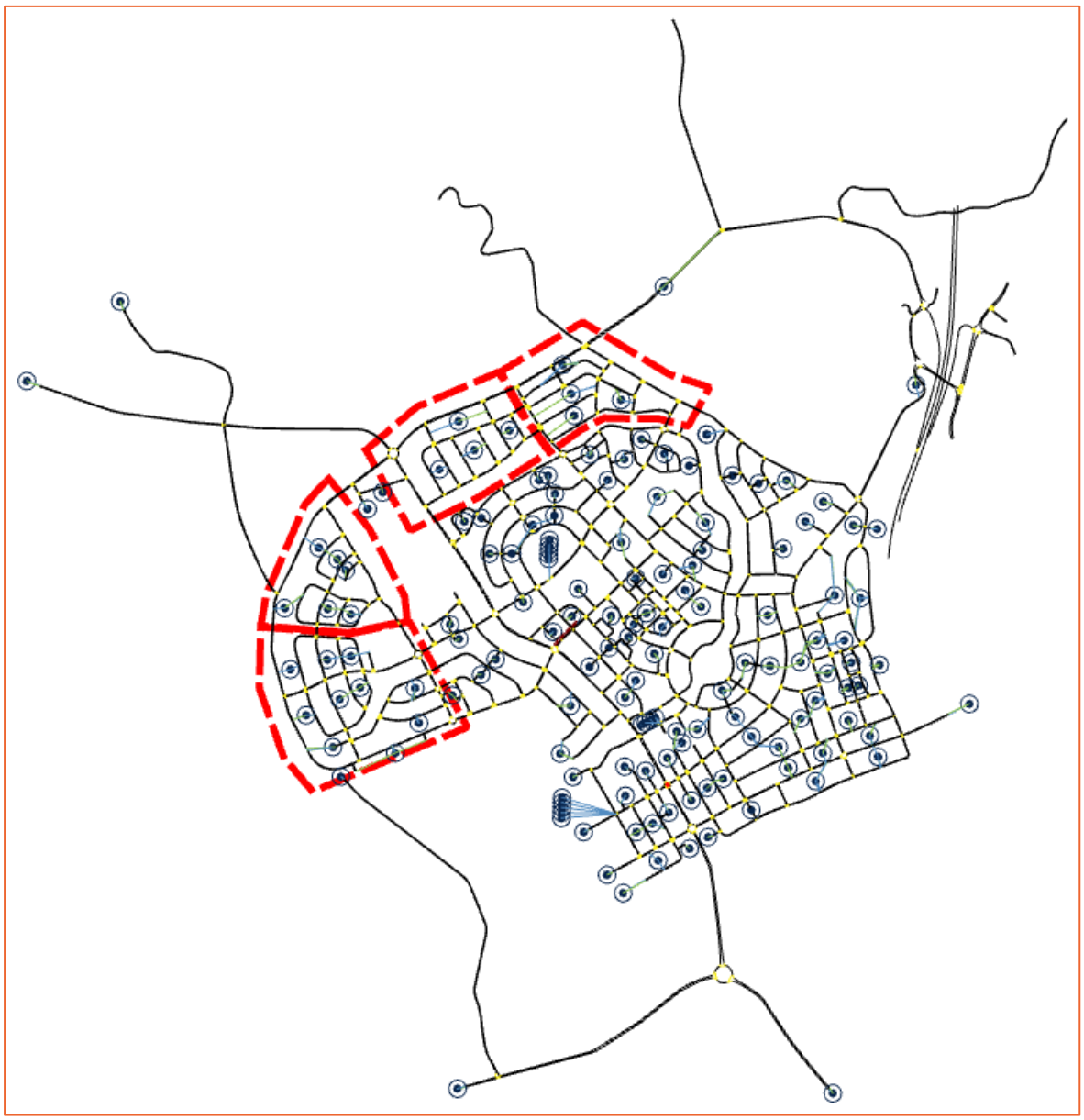


Figure 17: Model Extent

4.3 Trip Generation

The trip generation and distribution for the trips associated with Stages 10 to 13 have been derived from the ITA scenario which assumes 4,500 dwellings and 40,000m^2 GFA commercial area within the Local Centre. The modelling also includes the trip generation from the proposed primary school within Stage 3A. The assessment has been undertaken assuming the full buildout of the primary school to 800 students has been achieved by the time the Site is fully developed.

It can be noted that this analysis provides a conservative assessment of effects as the full combined yield for all Stages represents a yield of around 4,024 dwellings.

4.3.1 Traffic Effects

The effects analysis for the Site has been confined to principal intersections as indicated with red circles and enumerated in **Figure 18**.

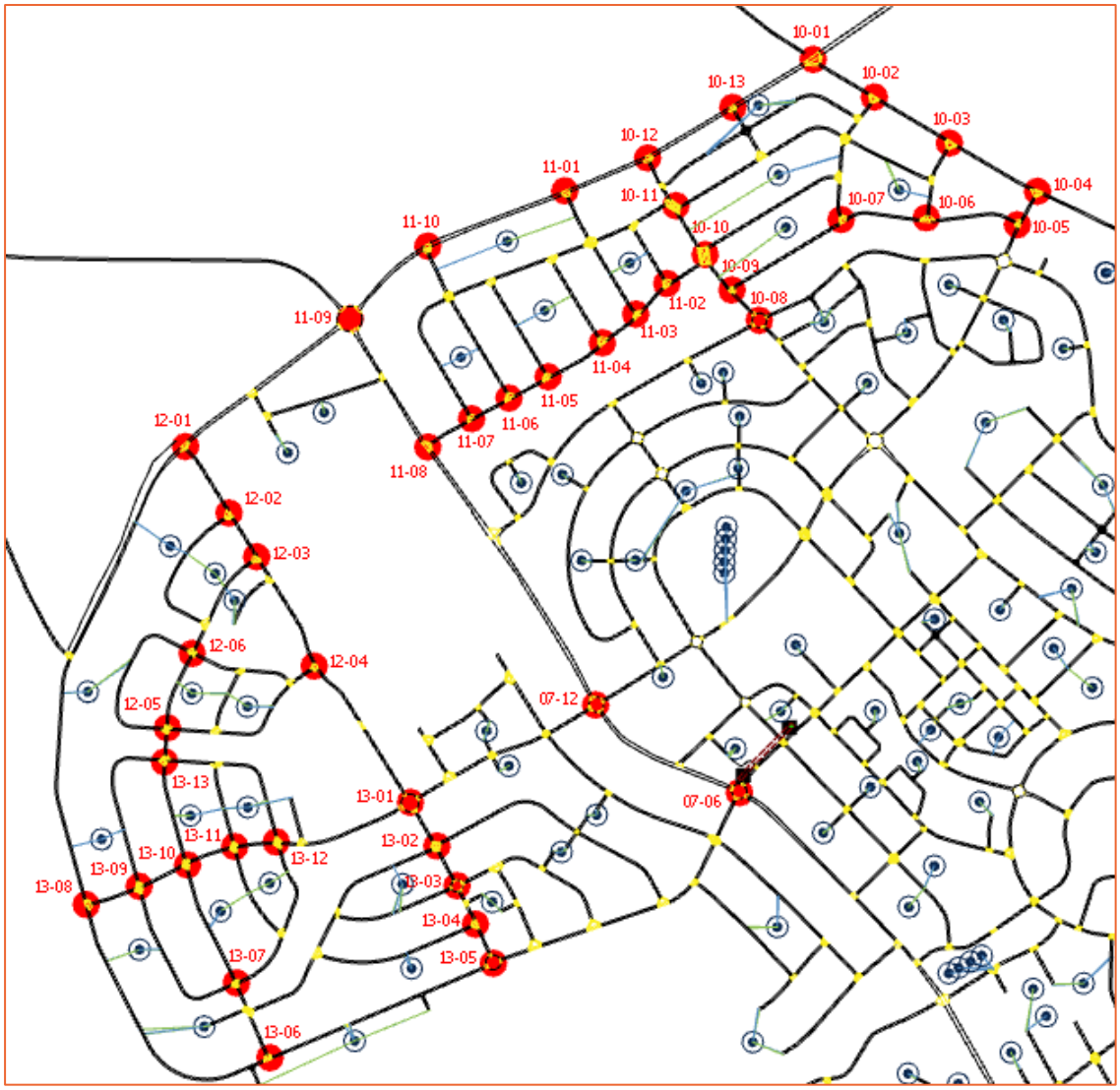


Figure 18: Assessed Intersections

Whilst intersections 07-06 and 07-12 are not within the Site boundaries, they have nevertheless been included for completeness as they represent the key access points for the Stage 12 and 13 areas to the surrounding transport network.

The performance of the intersections is summarised in terms of the average delay in seconds per vehicle (sec/veh) for each movement and the Level of Service **(LOS**) which is defined as an incremental scale using the letters A through F, with A indicating the best LOS and F indicating the worst levels of performance.

Table 1 describes traffic flow operation for each of the LOS scales at a basic level. In general, an average LOS D or better for an intersection during the peak hours is generally considered appropriate for an urbanised area.

Table 1: LOS description

LOS	Description of Operation
A	Free flow conditions; little interaction between vehicles
B	Reasonably free flow condition; speeds similar to LOS A but some movement is restricted due to interaction between vehicles within traffic streams
C	Stable flow conditions; ability to manoeuvre within traffic streams is notably restricted but roads remain below capacity
D	Approaching unstable flow; freedom to manoeuvre is much more limited and driver comfort levels decrease. This is the common level for urban streets during peak hours of travel
E	Unstable flow; operating at capacity; drivers comfort level becoming poor. This would be a more common standard in larger urban areas where some congestion is inevitable during peak hours
F	Forced or breakdown flow; vehicle movement very constrained; traffic demand generally higher than capacity

Detailed outputs from the AIMSUN model are provided in **Appendix D** attached to this report. By way of summary, the overall intersection performance for each intersection is provided in **Table 2**.

Table 2: Overall Intersection Performance

	Morning Peak Hour		Evening Peak Hour	
Intersection	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**
10-01	6	A	19	C
10-02	1	A	2	A
10-03	2	A	3	A
10-04	5	A	8	A
10-05	5	A	6	A
10-06	5	A	7	A
10-07	3	A	4	A
10-08	4	A	6	A
10-09	4	A	8	A
10-10	5	A	11	B
10-11	8	A	4	A
10-12	5	A	18	C
10-13	2	A	9	A
11-01	3	A	12	B
11-02	1	A	3	A
11-03	1	A	2	A
11-04	1	A	1	A
11-05	1	A	2	A
11-06	1	A	2	A
11-07	9	A	10	B
11-08	12	B	16	C
11-09	5	A	10	A
11-10	5	A	20	C
12-01	6	A	10	A
12-02	4	A	5	A
12-03	4	A	4	A
12-04	3	A	6	A
12-05	1	A	12	B
12-06	10	A	9	A

	Morning Peak Hour		Evening Peak Hour	
Intersection	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**
13-01	3	A	4	A
13-02	1	A	1	A
13-03	1	A	1	A
13-04	1	A	1	A
13-05	3	A	4	A
13-06	10	B	12	B
13-07	12	B	15	C
13-08	2	A	4	A
13-09	24	C	18	C
13-10	13	B	15	B
13-11	20	C	30	D
13-12	26	D	27	D
13-13	9	A	10	A
07-06	22	C	22	C
07-12	4	A	4	A

As can be seen from the details of Table 2, the model indicates that all of the intersections will operate well (with an overall LOS of no greater than D) for both the morning and evening peak hours.

Overall, the modelling indicates that the additional traffic generated is not likely to have a significant effect on the critical intersections in the vicinity of the Site.

5 Construction

It is standard practice as part of the consent conditions that a Construction Traffic Management Plan (**CTMP**) is provided to outline how the effects of construction, including delivery of materials, will be managed and mitigated. The CTMP should include the following:

- Construction dates and hours of operation including any specific non-working hours for traffic congestion, noise reasons, etc. aligned with normally accepted construction hours in the Auckland region;
- Truck route diagrams both internal to the site and external to the surrounding road network;
- Temporary traffic management signage/details for both pedestrians and vehicles to appropriately manage the interaction of these existing road users with heavy construction traffic; and
- Details of site vehicles access/egress over the entire construction period, noting that all egress points should be positioned so that they achieve appropriate sight distance as per the relevant guidelines.

Based on experience with the construction planning and traffic management associated with similar developments and bearing in mind the capacity within the existing road network; with the appropriate CTMP in place and the above measures implemented, it is considered that construction activities can be managed to ensure an appropriately low level of construction traffic effects.

6 Council Workshop

A workshop was held with Auckland Council on Thursday 21 November 2024 to discuss the Fast Track applications for Stage 4C and Stages 10 to 13. Following on from that workshop, several matters were raised by Council's Development Planner and transportation representative. These matters are provided below in italics, with an accompanying response to the matters raised.

Tracking drawings for all the roads and intersections

The intersections and roads have been designed to TDM standards. It is considered that vehicle tracking can be undertaken at Engineering Plan Approval (**EPA**) stage.

Intersection types and provision of safe system assessment

Intersection types have been assessed and are considered to be appropriate. If there are any particular safety concerns, then these can be addressed at EPA stage.

Sight distance calculations for all the intersections

This can also be addressed at EPA stage.

Accessible time indication for active modes to services nearby including bus stops, shops and medical centre – accessible times must be provided for active modes to be in line with objectives of E38 – Subdivision of the AUP, which encourages walking and cycling infrastructure

This has been assessed and a diagram which indicates the anticipated walk distances has been provided earlier as Figure 16. With walk distances being no more than 400m for the majority of the dwellings within the Site, the proposed public transport network, in conjunction with the active mode infrastructure will encourage walking, cycling and public transport use for future residents.

Cross sections and long sections for roads and pedestrian accessways

Cross sections have been provided. Road gradients comply with the TDM standards so long sections are not considered necessary. Pedestrian access gradients will be checked for compliance with TDM requirements.

Gradients for Heavy Vehicles: We recommend conducting reviews of rubbish truck routes for longitudinal gradients and crossfalls to ensure berm accessibility and viable lot layouts.

Gradients of all roads within the Precinct will comply with the requirements of the TDM. Gradients of all local roads will not exceed 12.5% and gradients for higher tier roads (collectors and arterials) will not exceed 8%. A plan indicating the gradients for the roads and JOALs trhoughout the Site is included with the Civil Engineering Drawing Package which accompanies the application documents.

Wainui Road Upgrade: We recommend crossing points on Wainui Road to enhance pedestrian and cycling safety and connectivity.

At this stage the land on the northern side of Wainui Road remains undeveloped. The current plans for Wainui Road indicate a two-way cycleway on the southern side of Wainui Road so there is no need for

them to cross Wainui Road itself. Additionally, until the land on the northern side of Wainui Road is developed there would be no need for pedestrians to cross the road.

> *Planned Infrastructure Upgrades: If planned upgrades per the ITA are not implemented before the occupation of the residences in these stages, we would like to understand the impact on the existing network.*

Of the four infrastructure upgrades identified, the creation of a roundabout at the Pine Valley Road / Old Pine Valley Road /Argent Lane intersection has already been completed, the works required for the signalisation of the Pine Valley Road / Dairy Flat intersection is due to commence shortly and the other two upgrades were conditional on Penlink not being in place by the time 3,800 dwellings were occupied within Milldale. Penlink construction has commenced and is due to be completed in early 2028. It is unlikely that there will be 3,800 dwellings occupied in Milldale by early 2028 but it is understood that FHLD is willing to include this as a consent condition to cap the yield to no more than 3,800 dwellings within Milldale until Penlink is operational.

> *Cycle Lane and Driveway Interactions: We recommend addressing safety concerns at driveway crossings on collector roads with cycle lanes, ensuring the safety of cyclists and pedestrians at bus stops and driveways.*

The provision of cycle lanes along collector roads is seen as a positive measure. All attempts will be made to minimise the number of vehicle crossings off the collector roads. but some conflicts will be inevitable and it is not considered necessary or possible to ban all accesses off collector routes. The proposed arrangements are considered acceptable. However, if there are any particular safety concerns then these can be addressed at the EPA stage.

> *Lot Access Design: We recommend reviewing access designs for lots with pedestrian links at their frontage to ensure safety and functionality.*

This has been reviewed by the Urban Design team for the project and access designs have been updated to ensure safety and functionality for pedestrians.

> *Pedestrian Paths: We recommend allocating space for a pedestrian pathway through the park south in Stage 10 to ensure connectivity to the stream edge road.*

This has been reviewed by the Urban Design team for the project and the latest plans indicate a path through the south park to provide pedestrian connectivity to the stream edge road.

7 Statutory Assessment

7.1 E27 Standards

An assessment of the proposal against the key relevant transport-related standards of the AUP has been undertaken. This is detailed in the following **Table 3**.

Table 3: Statutory Assessment

Standard	Description	Comments
E27.6.2.5 (6) Bicycle parking	(T81) 1 per 20 dwellings for visitor and 1 per dwelling without a dedicated garage.	**Not Applicable** Vacant Lot Subdivision.
E27.6.2.7 Loading spaces	(T114) Greater than 90,000m^2 Three spaces plus 1 space for every additional 40,000m^2	**Does not comply** No specific loading spaces proposed but there is sufficient space for loading vehicles to park alongside roads or within JOALs for servicing, as occurs with any subdivision. As servicing will be relatively infrequent and generally of short duration, this is considered acceptable.
E27.6.3 Parking space and manoeuvring dimensions	As per the details of E27.6.3.1.1	**Not Applicable** Vacant Lot Subdivision.
E27.6.3.2 Size and location of loading spaces	(T138) Minimum length 8m and width 3.5m and have a maximum crossfall of 1:50 (2%) in all directions	**Not applicable** No loading spaces proposed.
E27.6.3.4 Reverse manoeuvring	(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: (a) four or more parking spaces are served by a single access; (b) there is more than 30m between the parking space and the road boundary of the site; or (c) access would be from an arterial road or otherwise within a Vehicle Access Restriction covered in Standard E27.6.4.1.	**Will comply** All standalone dwellings will have separate driveways. Superlot layouts have not yet been determined but they will be served by individual JOALs. There are no accesses off arterial roads.
E27.6.4 Access	(3) Vehicle access restrictions apply and vehicle crossings must not be constructed or used to provide vehicle access across that part of a site boundary which: (a) is located within 10m of any intersection as measured from the property boundary, illustrated in Figure E27.6.4.4.1.1; (b) is subject to the following types of Vehicle Access Restriction as identified on the planning maps in the zones listed in Table E27.6.4.1.1;	**Does not comply** (a) Whilst site layouts have not been formulated at this early stage, a number of sites have been identified for which vehicle accesses could be located within 10m of an intersection. These are assessed in the following Section 7.3. (b), (c) and (d) are not applicable.

Standard	Description	Comments
	(c) has frontage to an arterial road as identified on the planning maps; or (d) is located closer than 30m from a railway level crossing limit line.	
E27.6.4.2.1 Separation distances between accesses	2m separation required. Where two crossings on adjacent sites can be combined and where the combined crossings do not exceed a total width of 6m at the property boundary, no minimum separation distance will comply.	**Will comply**
E27.6.4.3.1 Passing Bays	Where an access length exceeds 50m passing bays need to be provided at 50m intervals.	**Will comply** No long accesses are proposed
E27.6.4.3.2 Vehicle crossing and vehicle access widths	Details as shown in Table E27.6.4.3.2 of the AUP	**Will comply**
E27.6.4.4 Gradient of vehicle access	Details as shown in Table E27.6.4.4.1 of the AUP	**May not comply** However, global departures from standards for Milldale have been agreed with AT. Gradients will comply with these departures from standards.

7.2 Assessment Pursuant to PC 79

It should be noted that a decision on the proposed amendments to the transport provisions of the AUP was notified on 9 August 2024. Whilst this is still going through the appeals process (the deadline for appeals was 20 September 2024), the PC79 amendments do still need to be considered. For this project the relevant transportation matters relate to the following matters.

7.2.1 Trip Generation

As the proposed subdivision exceeds the residential subdivision threshold of 100 dwellings a resource consent for a restricted discretionary activity is required. The assessment which has been undertaken and summarised in Section 4 of this transportation assessment indicates the proposed trip generation of the Stage 10 to 13 areas can be accommodated by the surrounding transportation network with no more than minor effects on the operation of roads and intersections within the Precinct.

7.2.2 Bicycle Parking

This standard is not applicable because the proposal involves vacant lot subdivision. However, an assessment of this matter has been provided for completeness.

The PC79 standards specify that secure bicycle parking spaces must be located and designed in a manner that (is):

i) not part of any required outdoor living space of landscaped area
ii) in a location accessible from either the road, the vehicle access, pedestrian access or car parking area;
iii) sheltered from the weather; and
iv) lockable and secure.

Required bicycle parking rates are one visitor (short stay) space per 20 for developments of 20 or more dwellings and one secure (long stay) space per dwelling without a dedicated garage or basement car parking space.

The majority of the dwellings within Stages 10 to 13 will have garages or areas within each site where a bicycle can be stored securely. Specific visitor parking spaces are not considered necessary as visitors would prefer to park their bicycles as close as practicable to their destinations and there will be space on individual lots for visitors to temporarily store their bicycles.

As such, the PC79 standards will be able to be met.

7.2.3 Loading Spaces

The PC79 standard relates to smaller developments and is not applicable in this circumstance. However, as discussed under the general E27 standards, servicing will take place along the roads or JOALs which service the Site and given the relatively infrequent and transitory nature of such servicing, the likely effects will not be significant. This is similar to the servicing that occurs is other subdivisions throughout Auckland.

7.2.4 Accessible Spaces

This standard is not applicable because the proposal involves vacant lot subdivision. However, an assessment of this matter has been provided for completeness.

PC79 requires that

> *(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);*
> *(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:*
> *Residential Zones:*
> *a) Residential – Terrace Housing and Apartment Buildings Zone.*
> *(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.*
> *(4) The required number of onsite accessible parking spaces provided must be calculated using the following method:*
> *(iii) For residential land uses*
> *The required number of accessible parking spaces provided must be in accordance with Table 2 below:*

Table 2 – Number of accessible parking spaces – Residential land uses

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

On the basis of 924 dwellings being established within the Site, PC79 would require a total of around 38 accessible parking spaces. Given that this is a private residential development, of which most of the dwellings will have their own parking space(s) the requirement for dedicated accessible parking is not considered practicable, particularly as:

- not all of the dwellings will necessarily be designed as being fully accessible; and
- accessible parking spaces would be best located as close as possible to their final destinations and with a development which is spread over such a wide geographic area this would be difficult to achieve.

Overall, it is considered that specific allocation for accessible parking is not necessary.

7.2.5 Speed Management

PC79 requires speed management measures to be provided where a vehicle access length exceeds 30m. In all cases vehicle accesses will be for individual dwellings and will not exceed 30m length. Some JOALs may exceed 30m and these can be addressed on a case-by-case basis at a later stage. Notwithstanding this, a traffic calming plan has been developed for the entire Stage 10 to 13 area and these will help control speeds throughout the subdivision. Plans which illustrate the speed management strategy throughout the Site are included in the Civil Engineering Drawing Package which accompanies the application documentation.

7.2.6 Pedestrian Access

Plans haven't been developed to a level of detail to show individual dwellings and pedestrian access paths, but the majority of the dwellings will comply as they will have direct pedestrian access off footpaths on the surrounding street network.

Three JOAL typologies are proposed, one which has an overall 5m legal width and two which have a 7m legal width.

The 5m JOAL typology only services two lots (614 and 615) in the Stage 13 area. No footpath is proposed on this JOAL and this technically complies with the PC79 standard as only two dwellings will be served, and these will likely have garages or on-site parking spaces.

The 7m JOAL typologies feature either a 5.5m vehicle carriageway with 0.75m-wide berms on both sides, or a 5.5m vehicle carriageway with a separate raised footpath of 1.5m width along one side. There is a technical non-compliance with respect to the proposed mountable kerb for the footpath but the footpath is marginally wider than the 1.4m required by PC79 and mountable kerbing is required to

allow access to driveways which abut the JOAL. As such, the mountable kerb detail is not considered to be significant and provides a practicable solution with respect to vehicle access.

In summary, although there is a technical non-compliance with respect to pedestrian access under the PC79 standards, the likely effects arising from the infringement are not considered significant.

7.2.7 EV charging

This standard is not applicable because the proposal involves vacant lot subdivision. However, an assessment of this matter has been provided for completeness.

PC79 requires that "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." The majority of the dwellings will be detached dwellings, and this requirement is therefore not applicable. Where dwellings are not detached or where undercover parking spaces are proposed, the PC79 standards will be able to be achieved.

7.3 Assessment Against E27.6.4

As noted in Table 3, a number of sites have been identified for which vehicle accesses could potentially be located within 10m of an intersection.

These are:

- Lots 6, 7, 80, 82 and 36 in Stage 10;
- Lots 101, 102, 103, 119, 120, 121, 122, 136, 137, 138 and 139 in Stage 11;
- Lots 238, 239, 266, 267, 274, 275, 276 and 1021 in Stage 12; and
- Lots 598, 599 and 600 in Stage 13

However, in all instances the potential driveways would be located on the opposite side of a T-intersection. Whilst it infringes the AUP standard, the other relevant standard AS/NZS2890.1:2004, upon which much of the AUP standards are based, indicates that for domestic driveways the 10m restriction does not apply to accesses opposite a T-intersection.

As such, the effect of the non-compliance is not considered significant.

7.4 Summary

In summary, the proposed provisions have been assessed against the requirements of the AUP and PC79. Whilst several non-compliances have been identified, these infringements have been assessed and overall, it is considered that they are not significant from a transportation perspective.

8 Conclusions

FHLD is proposing to provide a combined total of around 4,024 dwellings within the Milldale precinct representing Stages 1 to 13 plus a Local Centre. In this respect, the proposed overall yield represents 89% of what is anticipated for the full buildout of around 4,500 dwellings anticipated for the entire precinct.

The overall proposal seeks to provide residential lots for the Milldale precinct which promises to deliver much-needed housing to address the housing shortfall in the Auckland region. It also provides continuity for FHLD in terms of construction, with FHLD's delivery of infrastructure to support the neighbouring Millwater area now practically complete and works for the adjacent Orewa West area being well advanced.

This specific report assesses the potential transportation effect of Stages 10 to 13 of the Milldale development. The combined four stages would provide around 606 single-lot sites plus 27 superlots (comprising approximately 308 dwellings) within the Site (or a total of 914 dwellings).

Woods Ltd has provided a more refined road network and road cross-sections for the Site which builds on the roading infrastructure formerly proposed for the wider area and for the earlier Stages 1 through 9 plus the Local Centre. Stantec have reviewed the roading layouts and cross-sections and consider them to be appropriate for the level of development anticipated.

Detailed modelling has been undertaken to assess the likely effects of the combined previous stages plus the development yield associated with Stages 10 to 13. The results of the modelling, as summarised in this report, indicate that the traffic demands are likely to have acceptable effects with respect to the operation of the surrounding road network and for all road-users.

The proposal has been assessed against the requirements of the AUP and PC79. Whilst several infringements have been identified, these have been assessed and are not considered significant from a transportation perspective.

Accordingly, it is concluded that there are no traffic engineering or transportation planning reasons to preclude acceptance of this proposal, since Stages 10 to 13 will be appropriately supported by its own road network and appropriate levels of safety and efficiency on the surrounding transport network will be maintained.

Stantec New Zealand

Appendices

Appendix A 2019 ITA

INTEGRATED TRANSPORTATION ASSESSMENT

MILLDALE

PREPARED FOR - FULTON HOGAN LAND DEVELOPMENT

01/10/19

Stantec

This document has been prepared for the benefit of Fulton Hogan Land Development. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

This disclaimer shall apply notwithstanding that the report may be made available to Auckland Council, Auckland Transport, the New Zealand Transport Agency and other persons for an application for permission or approval to fulfil a legal requirement.

QUALITY STATEMENT

PROJECT MANAGER	PROJECT TECHNICAL LEAD
Trevor Lee-Joe	Trevor Lee-Joe

PREPARED BY		
Michael Hall	.....	01/10/19
CHECKED BY		
Trevor Lee-Joe	.....	01/10/19
REVIEWED BY		
Trevor Lee-Joe	.....	01/10/19
APPROVED FOR ISSUE BY		
Brett Harries	.....	01/10/19

AUCKLAND OFFICE
Level 3, 111 Carlton Gore Road, Newmarket, Auckland 1023
PO Box 13-052, Armagh, Christchurch 8141
TEL +64 9 531 5006

REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
9	01/10/19	Final	MTH	TLJ	TLJ	BH

Executive Summary

TDG now Stantec (**Stantec**) has been commissioned by Fulton Hogan Land Development Limited (**FHLDL**) to provide an Integrated Transportation Assessment (**ITA**) for a proposed development which comprises 4,500 houses and 40,000sqm of commercial area. The total landholding constitutes some 300ha and is located to the west of State Highway (**SH**) 1, being bordered by Wainui Road to the north, Cemetery Road to the west, Pine Valley Road to the south and SH1 to the east and is now referred to as the Milldale suburb.

This ITA has been prepared in accordance with the Auckland Transport (**AT**) ITA guidelines (January 2015) and as such, the purpose of the ITA is to assess the accessibility of the proposal by walking, cycling, public transport and private motor vehicles; assess the potential effects the proposal could have on the transport network; and identify any measures needed to ensure that any adverse transportation effects of the proposal are avoided, remedied or mitigated .

An ITA was previously provided and approved for a lesser extent of development within the same area comprising 2,800 dwellings and 40,000sqm of commercial area. This proposal expands upon this consented development and carries forward its transport related recommendations.

The site has existing road connections to Wainui Road. A new connection to Pine Valley Road has been identified as part of the investigations for the site along with good walking and cycling connectivity throughout the area. The proposed layout of the development area promotes an interconnected internal road network within the site with a tiered approach to road design ranging from 30m wide arterial routes through to narrower local and neighbourhood streets. All roads have been designed to include pedestrian footpaths. Recreational shared pedestrian/cycle paths run adjacent to the green spaces around the centre of the site to provide a high quality recreational facility for residents and visitors.

The site enjoys good connectivity to the motorway system and local roads within the Silverdale area. The expanded park and ride facility at the Hibiscus Coast Station is located nearby and will provide a resource for residents within the Wainui area and the wider region. There is potential for additional park and ride facilities to be provided within Milldale itself as the public transport network continues to expand.

In respect of public transport, roads within Milldale are being designed and aligned to provide good internal connectivity and linkages to future connections externally, with respect to the Supporting Growth Alliance's (**SGA**) proposed road network, which indicates a new north-south connection between Albany and Orewa through Milldale (Argent Lane) and the extension of the northern busway through to Grand Drive (inclusive of a Park and Ride station in south-east Milldale). The proposed new cross-motorway bridge north of the Silverdale interchange, will also allow for direct public transport connectivity between Milldale and Silverdale. Overall, it is considered that the Milldale development will be able to allow for good public transport integration and FHLDL is currently working with the AT public transport team to develop the optimum routes through the suburb.

A review of relevant policy statements and strategy documents including the Government Policy Statement (**GPS**), Auckland Unitary Plan (Operative in Part) (**Unitary Plan**), Auckland Transport Alignment Project (**ATAP**), Regional Land Transport Plan (**RLTP**), Regional Public Transport Plan (**RPTP**) Integrated Transport Programme (ITP), Future Urban Land Supply Strategy (**FULSS**) and the SGA propsals, have been carried out to identify committed projects and proposed timing and ensure the development supports current planning intentions.

A future 2026-year modelling assessment has been undertaken which includes a number of known developments in the surrounding area such as the Highgate Business Park and the Peninsula Golf Course redevelopment.

The traffic modelling has identified recommended road infrastructure upgrades to support the development as follows, and includes those items identified as part of the approved ITA for 2,800 dwellings within the site:

- Provision of a new motorway over-bridge connecting Sidwell Road and Highgate Parkway to the east;
- Providing connectivity to the bridge that crosses Weiti Stream to the south;
- Providing a left turn slip lane at the top of the northbound off-ramp at the Silverdale interchange;
- An interim upgrade to the intersection of Pine Valley Road and Dairy Flat Highway to a signalised intersection at 2,800 dwellings;
- An upgrade to the intersection of Pine Valley Road, Old Pine Valley Road and Argent Lane to a roundabout;

- The addition of a westbound lane to the over-bridge between Hibiscus Coast Highway and Dairy Flat Highway within the Silverdale motorway interchange and the four-laning of Dairy Flat Highway between Pine Valley Road and the Silverdale interchange, if the Penlink project is not operational by the time 3,800 dwellings are occupied in Milldale;
- A full upgrade to the intersection of Pine Valley Road and Dairy Flat Highway, if the addition of the westbound lane to the Silverdale interchange over-bridge and the four-laning of Dairy Flat Highway occurs, and if the Penlink project is not operational by the time 3,800 dwellings are occupied in Milldale;
- The upgrade of the intersection of Argent Lane and Wainui Road to a roundabout, primarily for safety reasons; and
- The provision of a separate cycle path off Sidwell Road, extending under SH1 at a point near the Orewa River and then connecting to Millwater-Parkway, which will serve as a recreational path for cyclists until new motorway over-bridge to Highgate is completed.

This ITA concludes that with the various transportation infrastructure recommendations that are provided, the transport demands generated by the nature and scale of the residential and supporting commercial activities proposed, can be accommodated in a manner that ensures appropriately acceptable land-use / transportation integration. Further, the generated traffic effects on the surrounding transport infrastructure, and on SH1 in particular, will be absorbable and acceptable. There are no evident transportation planning reasons to preclude acceptance of the development as proposed.

Fulton Hogan Land Development

Milldale

CONTENTS

APPENDICES

1. Introduction

FHLDL has engaged Stantec to provide an ITA to accompany the application for a 4,500-dwelling residential development. The development will form a new suburb called Milldale which will border the western side of SH1 between the Silverdale and Millwater interchanges. This ITA focuses on accessibility by various transport modes as well as the internal roading network proposed for the development.

An ITA has been approved and accepted for a 2,800-lot development within the same area. This proposed development is an expansion to that proposal by incorporating extra land and providing a higher development density.

The development site is approximately 300ha in area, within which it will be possible to establish some 4,500 houses, 40,000sqm of commercial area (predominantly local business to support new dwellings, such as a supermarket and other retail services to meet the day to day needs of residents); and areas allocated for educational activities and recreational space. The extent of the development as provided by Woods on behalf of FHLDL is illustrated in **Figure 1** on the following page.

The purpose of this ITA is to assess the land use / transportation implications of the proposed development and recommend measures to avoid, remedy or mitigate adverse transportation effects.

This report will:

- Describe the existing transportation environment in terms of road networks, traffic volumes, walking and cycling networks, and public transport services;
- Describe the future transport environment based on committed developments and established policy objectives;
- Describe the transportation characteristics of the indicative development;
- Predict trip generation of the indicative development during the peak hours by route to and from the site;
- Assess the expected impact of the additional vehicular trips on the transport networks under 'with development' and 'future year' scenarios;
- Define the recommended transport upgrades to support the development; and
- Conclude on the acceptability of the development and recommend measures with regard to transport planning and engineering.

By way of summary, this ITA has found that a number of transportation upgrades are recommended in order to avoid, remedy or mitigate the transportation implications of the indicative development. Assuming the recommended upgrades are provided in due course, then there are no transportation planning reasons that would preclude the proposed development proceeding as planned.

Figure 1: Milldale Illustrative Masterplan

2. Existing Transport Context

2.1 Site Location

Figure 2 shows the location of the Milldale development area with respect to its surrounding environment, as taken from the Auckland Geographic Information System (**GeoMaps**) which is a publicly available mapping database.

Figure 2: Aerial Photograph

The entire area for development covers approximately 300 ha and is located to the west of SH1 in Wainui and is approximately bordered by Wainui Road to the north, Cemetery Road to the west, Pine Valley Road to the south and SH1 to the east. As can be seen, the area is predominantly undeveloped and rural in nature. The site is approximately 6 km from the Silverdale Town Centre, 9 km from Central Orewa, 20 km from Albany Centre, 30 km from Warkworth and 35 km from the Auckland CBD.

To the east of the site on the opposite side of the motorway, the Millwater residential subdivision has been largely completed, along with a commercial and light industrial area (Highgate Business Park) that is still under construction with only some of the subdivided sites completed and operational.

2.2 Road Network

The SH1 motorway runs along the eastern boundary of Milldale. This is a key strategic route between Auckland and Silverdale, Warkworth, Wellsford and onto Northland. The primary function of strategic routes is to provide an efficient through route for traffic. No access to adjacent properties is permitted and all interchanges are grade-separated. In the vicinity of Milldale, SH1 comprises two lanes in each direction separated by a grassed median with a wire fence.

The road network throughout the Wainui East area is currently sparse. Dairy Flat Highway previously formed part of the New Zealand Transport Agency's (**NZTA**) strategic network as State Highway 17. Its State highway designation was revoked in October 2012 and it is now under the control of AT where it is classified by the Unitary Plan as an arterial route. Dairy Flat Highway is a two-way, two lane road with a painted centreline and sealed shoulders. The speed limit on Dairy Flat Highway is 100 km/h.

Pine Valley Road intersects with Dairy Flat Highway approximately 400m west of the Silverdale interchange. It is classified as an arterial in the Unitary Plan and will become a key route for Milldale. This road borders the southern end of the Milldale development and will become a key route for people heading south. It also connects to Kahikatea Flat Road to the west which provides a connection to SH16. SH16 is an alternative route to SH1 for heading north or south.

Wainui Road forms the northern boundary of the development. It is not classified as an arterial road by the Unitary Plan, however this road provides a direct connection between the Milldale and Wainui areas to the SH1 interchange at Millwater. Wainui Road is a two-way, two lane road with unsealed shoulders. There is currently a 100 km/h speed limit on Wainui Road.

Sidwell Road forms the southern leg of the roundabout at the western end of where Wainui Road bridges over SH1. It currently only provides access to adjacent properties, but it will ultimately be extended through the development area to provide another route for people using the Millwater interchange or heading east towards Silverdale.

Figure 3 shows the roading hierarchy taken from the Precinct Plans which focuses on the proposed roading structure within the development area itself. As can be seen, Argent Lane forms the main route adjacent to the commercial area and this links through to Wainui Road to the north. Both Argent Lane and Wainui Road provide the main routes of access between the development and the wider surrounding road network.

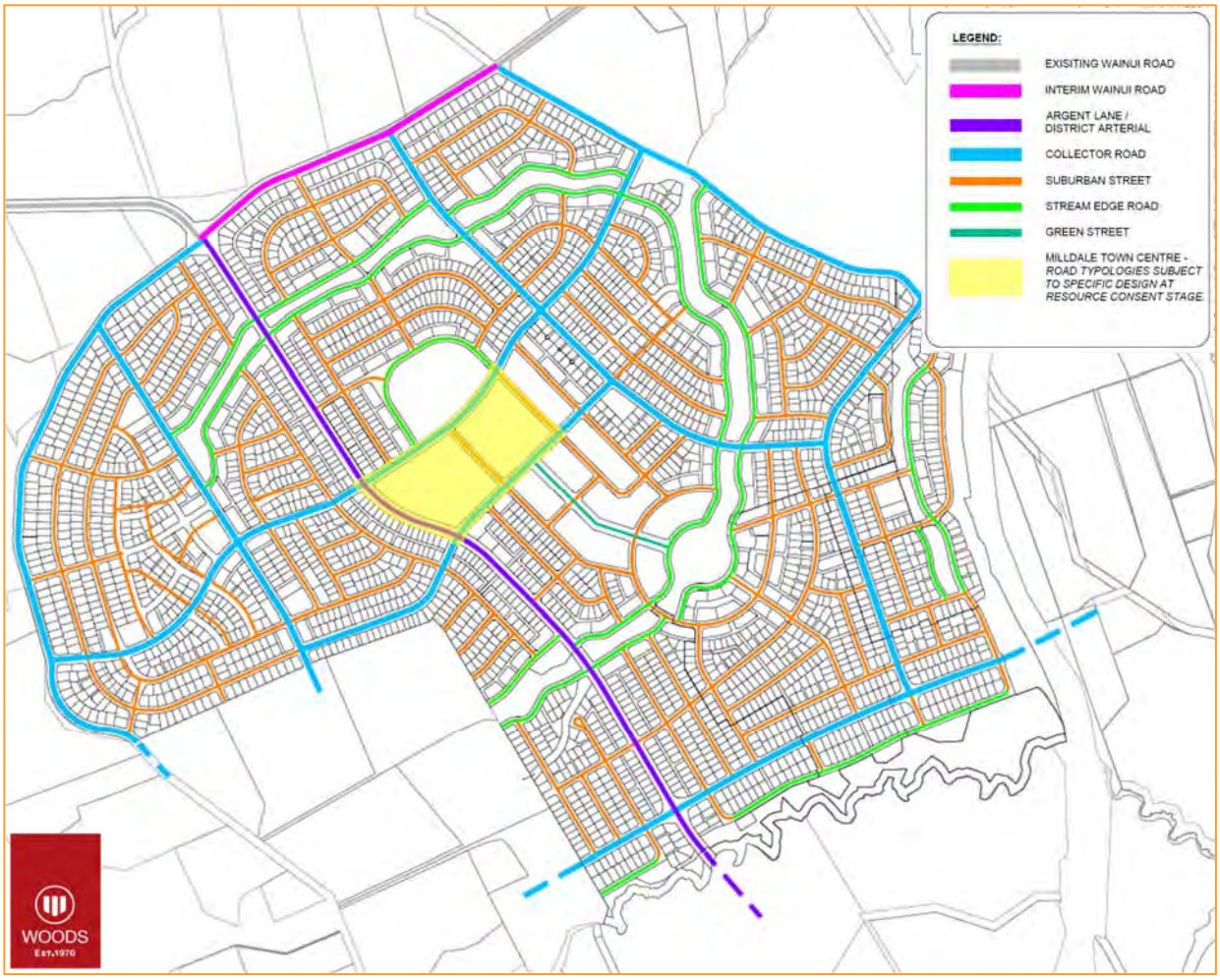


Figure 3: Road Hierarchy

Within the development area, the collector, local and reserve edge roads provide good levels of accessibility between the residential, commercial and green space areas of the site. Overall, the roading structure is considered appropriate for the level of anticipated development.

2.3 Public Transport Network

No public transport services currently serve the Milldale area due to the limited level of development at present. It is anticipated that bus services will be provided through the Milldale area once it is developed.

The nearest public transport services are located at the Hibiscus Coast Station which forms the northern extent of the northern express bus route. Other bus routes from this station provide connections to Whangaparaoa and Orewa. Future bus services through Milldale will likely provide a connection to the Hibiscus Coast Station where buses to the city depart at least every 15 minutes with higher frequencies during the peak periods.

Whilst public transport infrastructure is at present limited, there is an opportunity for FHLDL and AT to work together to ensure that future provisions are appropriate and adequate to provide future residents a good level of accessibility to public transport and thereby make public transport a viable alternative to the private vehicle as Milldale becomes further developed.

Overall, based on the New Zealand Department of Statistics' Journey to Work data from the 2013 census, it is anticipated that mode share for Milldale, in terms of person trips, would be in the order of 80-90% private vehicle, 5-10% public transport and 2-5% active modes. This journey to work data would have been used in the calibration of AT's wider regional Macro Strategic Model (**MSM**), which then provided inputs to the model for the northern area used in the assessment described in a later section of this report. It is likely that the public transport uptake will be enhanced through the future busway extension along State Highway 1

and the proposed new bus interchange/terminal for SH1 buses to connect with local buses, potentially located within Milldale itself.

Potential public transport routes within Milldale have been developed in conjunction with AT's public transport team and these are shown indicatively in **Figure 4**.

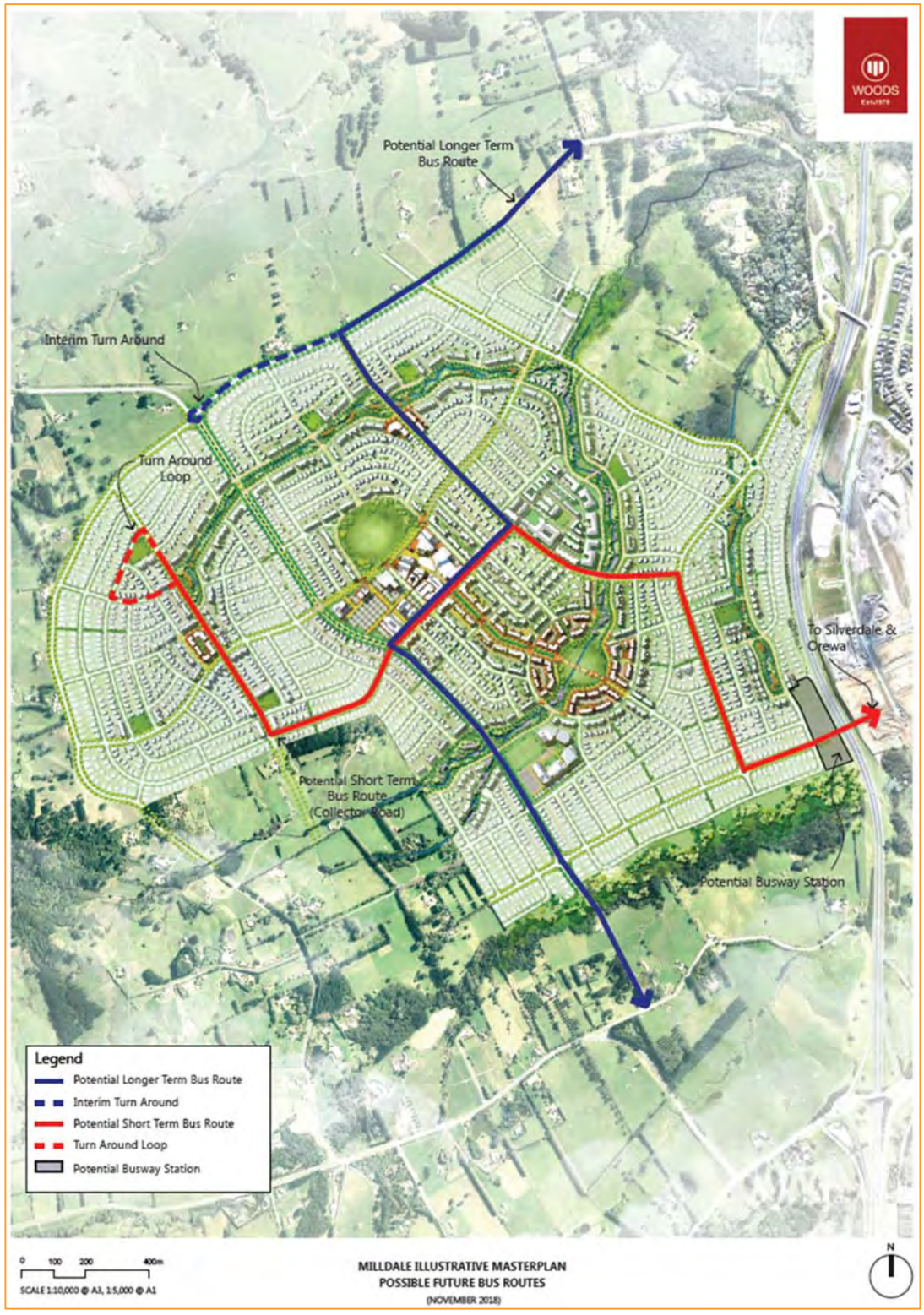


Figure 4: Indicative Public Transport Routes

It should be noted that the route identified by the solid blue line in Figure 4 indicates the roading infrastructure at full build-out. The routes identified in red indicate interim routes which will be developed in conjunction with AT and with the roading infrastructure delivery since only the arterial and collector routes will be designed for buses. The public transport team has also indicated that over time, there may be additional services through this area, to connect the adjacent areas as they are developed to the town centres and busway stations. FHLDL are working to ensure that the roading layouts are generally consistent with the proposed public transport routes and that required infrastructure is properly planned for through the design process.

FHLDL and the public transport team will work collaboratively as the Milldale area is further developed.

2.4 Walking and Cycling Network

An indicative pedestrian and cycle network has been developed for the development area by Woods and is shown in **Figure 5**.

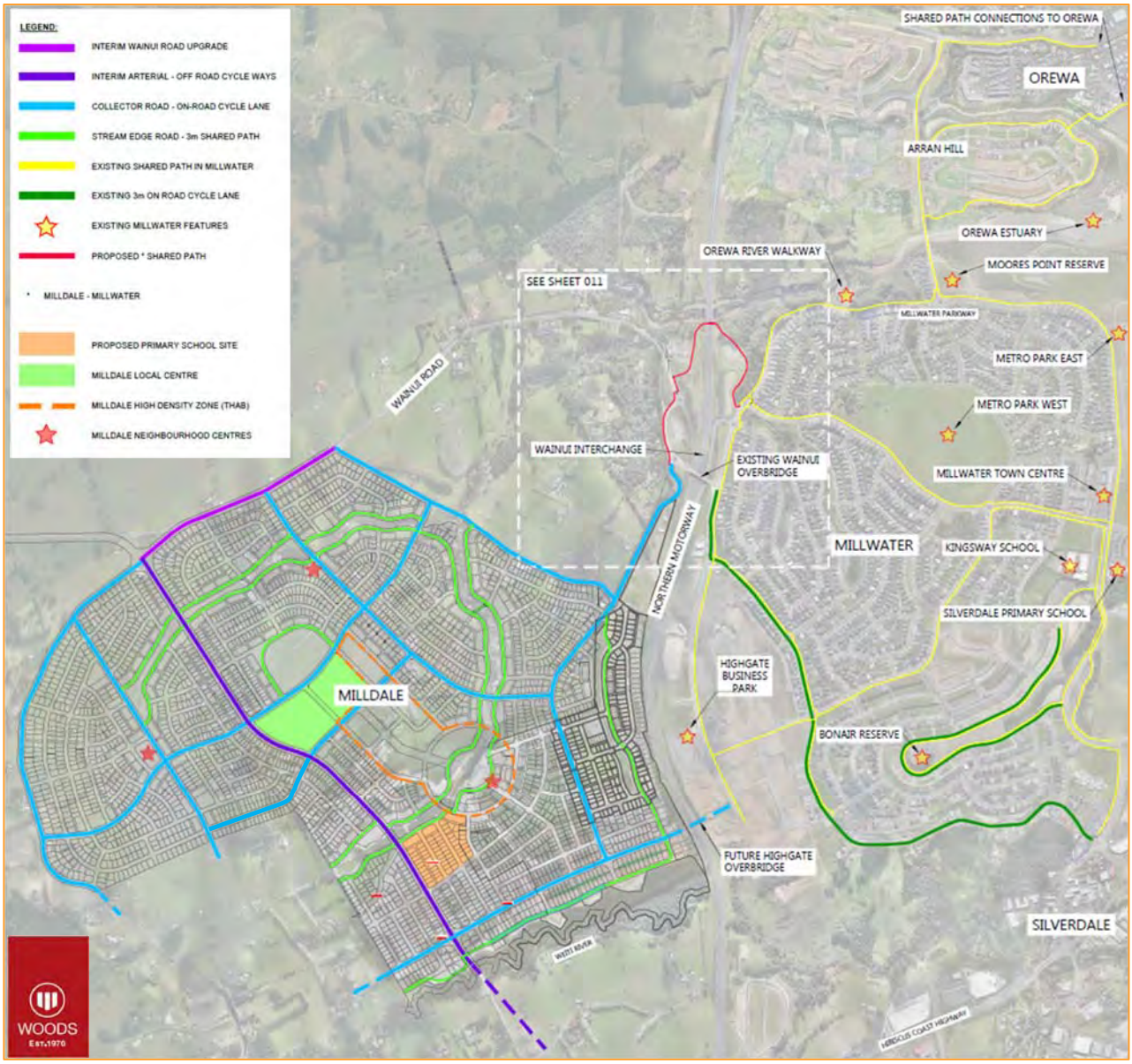


Figure 5: Proposed Pedestrian and Cycle Routes

The proposed road cross-sections, which will be described later in this report, indicate pedestrian footpaths along all road types with shared pedestrian/cycle paths along the green streets and reserve edge roads. In this regard the development will allow for a good level of amenity and accessibility for pedestrians.

The road cross-sections also indicate separate cycle paths along the arterial and collector roads throughout the development. In addition, and as noted earlier, shared pedestrian / cycle paths are shown adjacent to the green streets and reserve edge roads. It can be clearly seen that there is ample provision for cyclists throughout the area.

A new shared path facility is shown in red which provides pedestrians and cyclists an alternative connection between Milldale and Millwater in the north. This also provides connectivity to the existing shared paths within Millwater. The new facility will provide a preliminary east-west pedestrian/cycle connection prior to the construction of the Milldale-Highgate Over-bridge which is tentatively timed for mid-2021. A more close-up view of the proposed facility is provided in **Figure 6**.

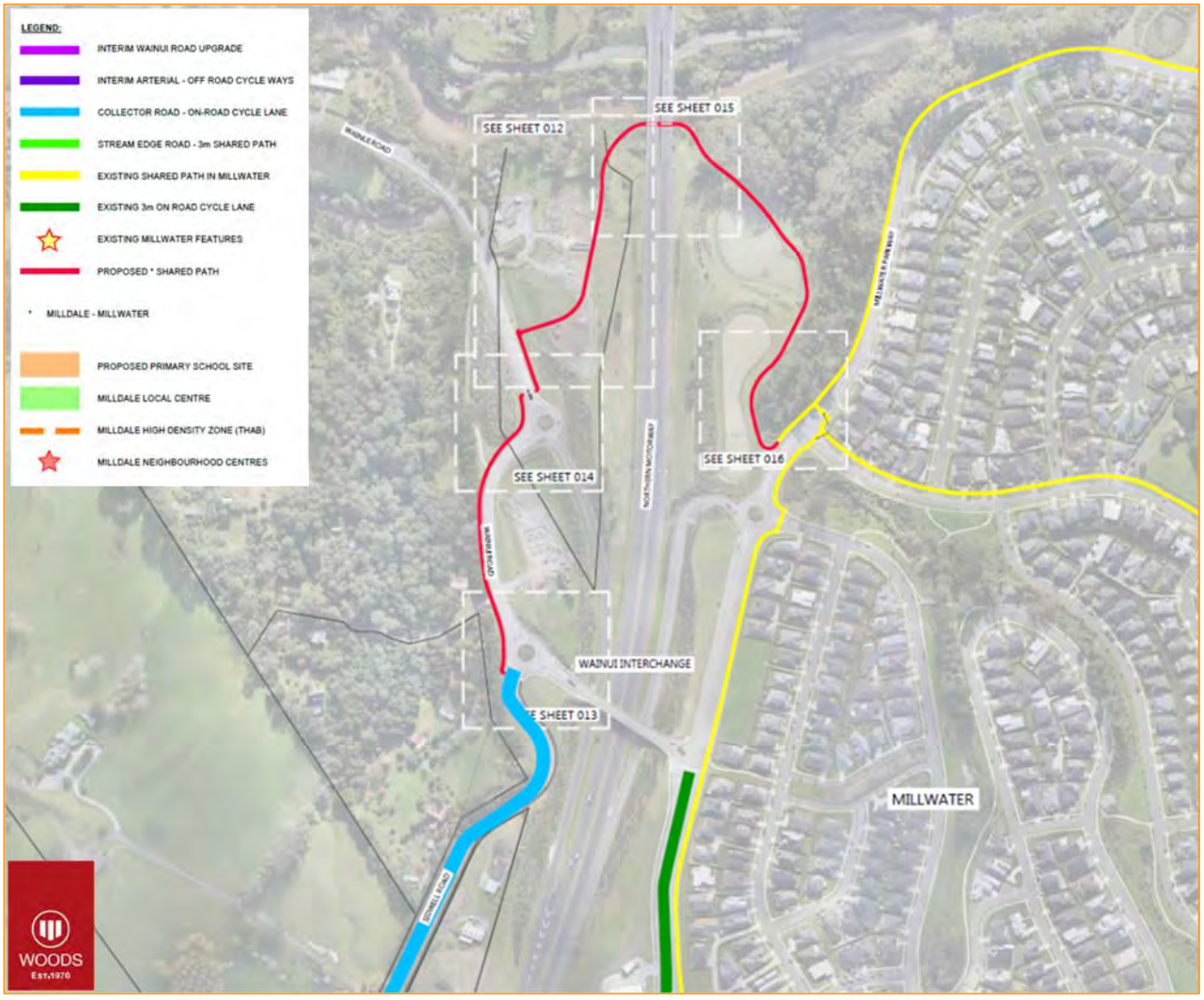


Figure 6: New Proposed Shared Path Facility

The pedestrian/cycle network is currently subject to on-going discussions between FHLDL, NZTA and AT which will ensure that the final provisions are appropriate and acceptable for the Milldale site. The project is being separated into three stages. At this point Stage 1, which links the Millwater-Parkway path, through the reserve to the motorway has already been designed and is scheduled to be completed by mid-December 2019. The second stage, which is the section under the motorway bridge has not yet been designed nor been through consultation with the NZTA. The third stage is on the western side through WFH land, which is currently in concept design, but needs proofing and will be provided as part of the subdivision development of this parcel of land. The timing for Stages 2 and 3 is currently being reviewed by WFH/FHLDL and the earliest that the overall project could be delivered would be mid-2021.

2.5 Existing Traffic Volumes

The average daily traffic (**ADT**) volumes for the roads in the vicinity of the site as sourced from the AT traffic count database and the NZTA are shown in **Table 1**.

Road	Location	5-day ADT	7-day ADT	Survey Date
SH1 Northbound	Within Silverdale Interchange	16,300	15,900	Mar 2018
SH1 Southbound	Within Silverdale Interchange	15,900	16,000	Mar 2018
Southbound On-Ramp	Silverdale Interchange	17,600	16,700	Mar 2018
Northbound Off-Ramp	Silverdale Interchange	16,800	16,100	Mar 2018
Dairy Flat Highway	West of Silverdale Interchange	12,600	11,900	Nov 2012
Dairy Flat Highway	North of Kahikatea Flat Road	6,000	5,600	Jun 2012
Kahikatea Flat Road	Between Dairy Flat and Selman	3,850	3,600	Nov 2013
Pine Valley Road	West of Old Pine Valley Road	5,500	5,200	Oct 2013
Wainui Road	Between Joblin and Waitoki	1,500	1,400	Mar 2015

Table 1: Traffic Counts in the Vicinity

As can be seen, and as expected for a road of national significance, SH1 carries the highest volumes on the road network in the vicinity of the site. The Silverdale off-ramps carry more traffic than the mainline at Silverdale which is indicative of the traffic drawn to and from the Whangaparaoa Peninsula and Silverdale areas.

Dairy Flat Highway, west of the Silverdale Interchange, carries around 12,000 vehicles per day (**vpd**) which is to be expected given its previous designation as a State Highway route. On this section of Dairy Flat Highway, traffic volumes are similar to other primary arterial roads around Auckland, although further to the south traffic volumes are approximately half of what they are to the west of the Silverdale interchange.

As expected, given the rural location, Kahikatea Flat Road, Pine Valley Road and Wainui Road all carry relatively low volumes of traffic despite their arterial road statuses. Nevertheless, all volumes are well within the carrying capacity of the individual roads.

Overall, there is considerable latent capacity available on the various roads surrounding the site. This latent capacity is available to accommodate at least some of the anticipated traffic growth resulting from the proposed development.

2.6 Road Safety

A search was made of the NZTA's Crash Analysis System for all reported crashes in the vicinity of the subject site for the full five-year period from 2013 to 2017 including all available results from 2018 as at 1 May 2018. The search area included:

- Wainui Road from Sidwell Road to 400m west of Cemetery Road;
- Pine Valley Road from Dairy Flat Highway to 1km west of Young Access.;
- Dairy Flat Highway between SH1 and Pine Valley Road;
- The western roundabout and motorway ramps of the Silverdale Interchange;
- The roundabout between Wainui Road and the Millwater Off-Ramp; and
- The full lengths of Sidwell Road, Argent Lane, Old Pine Valley Road and all other local roads within the development area.

A 50m radius was applied around all intersections along the sections of road listed above.

The search found that a total of 36 crashes had been reported within the study area, of which two resulted in serious injuries, seven resulted in minor injuries and the remainder involved property damage only. The crash locations and types are summarised in the following **Table 2**.

Location	Crash Type				Total
	Fatal	Serious	Minor	Non-Injury	
Wainui Road	0	0	2	2	4
Millwater Off-Ramp	0	1	1	2	4
Silverdale Interchange	0	0	1	17	18
Intersection Dairy Flat Highway / Pine Valley Road	0	0	0	2	2
Dairy Flat Highway	0	0	1	0	1
Pine Valley Road	0	0	2	4	6
Internal Roads	0	1	0	0	1
Total	**0**	**2**	**7**	**27**	**36**

Table 2: Crash Location and Injury Type

The total number of crashes over the past five years is considered low given the wide geographic extent of the crash search.

Loss of control and lane changing/overtaking were the most common crash types accounting for nine each. The lane changing crash types were common near the motorway interchanges while the loss of control crashes was located in the rural areas away from the motorway. These crash types are typical for these respective locations.

The western roundabout of the Silverdale Interchange had no loss of control crashes, but experienced eight crashes involving vehicles changing lanes and five rear-end crashes as the most common crash types. The nature of the crashes (no fatal or serious injuries) and their quantum (less than two per year on average) are entirely typical of a roundabout controlled intersection.

In summary, the crash history does not suggest any inherent road safety issues associated with the road network in the vicinity of the subject site. Further, (and as will be demonstrated later in this report), the design of internal road network within the proposed development, the significant enhancements that are proposed to the existing road network, and the proposed additional transportation infrastructure, together all ensure that road safety in the area will not be compromised by the proposed development.

3. Future Transport Context

This chapter summarises known proposals and committed developments that could change the transport environment in this area during or after the delivery of the development. **Figure 7** shows the current extent of the Unitary Plan zoning for the Milldale area.

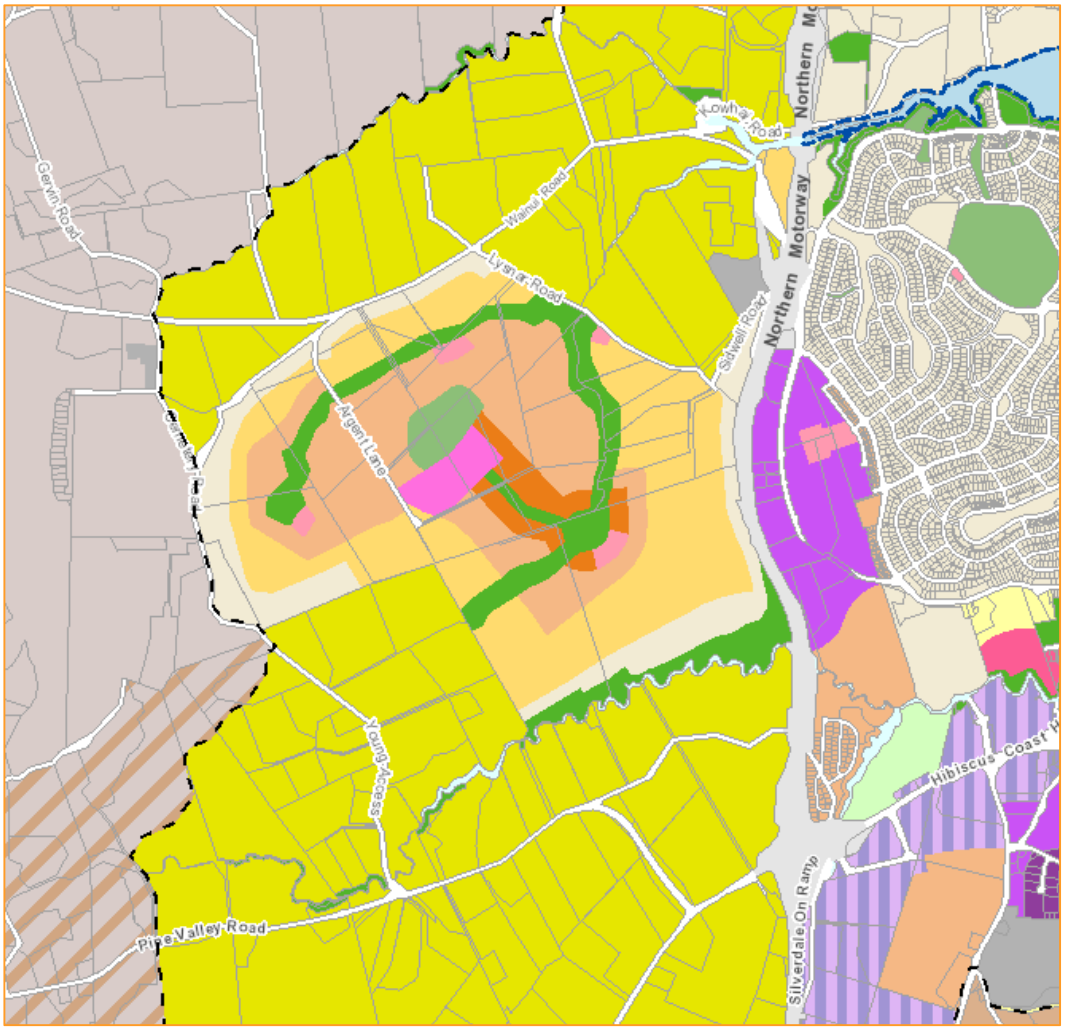


Figure 7: Unitary Plan Zoning

A mix of residential zones are present throughout the development with increasing densities towards the centre. The zoning allows for a greater intensity of development when compared to the Millwater development on the eastern side of SH1. A small local centre and informal recreation zone are also provided in the middle of the development area.

The land surrounding the development is predominantly included within the Future Urban Zone. At present this land is currently rural in nature but is likely to be developed in the future. The exact nature and intensity of development of the Future Urban zone is unknown at this stage.

Land to the west of the site is zoned for rural activities and is therefore less likely to be developed before development of land within the Future Urban zone.

There is a significant piece of roading infrastructure which has been completed within the last few years through a joint venture arrangement between the developers of Milldale, FHLDL and Highgate Business Park Limited (**HBPL**), which is integral to the development of the wider Silverdale North area; this being the Millwater Interchange south-facing motorway ramps. The ramps also provide some relief to the already congested Silverdale ramps which connect to Hibiscus Coast Highway; and they provide an important connection between the motorway and the entire Silverdale area.

The following relevant changes to the road network in vicinity of Milldale are being considered by AT for future years:

- Upgrade the western 1.6 km section of Whangaparaoa Road that intersects with Hibiscus Coast Highway. A trial is currently underway to investigate whether a dynamic lane system is suitable for this road as an alternative to widening. The purpose of the upgrade is to alleviate congestion as this is the only route into and from the remainder of the Whangaparaoa Peninsula.

- Extend the Northern Busway through to Silverdale and expand the Silverdale Park and Ride (**PnR**) facility to accommodate 500 carpark spaces. The car park expansion is almost complete while the northern busway extension is still in the design phase.
- The Peninsula Link project (**Penlink**) is proposed to further alleviate congestion for traffic travelling to and from the Whangaparaoa Peninsula. However, the timing of this project is uncertain although it does have a designation and resource consent approval.

In addition, the SGA's Indicative Strategic Transport Network for north Auckland includes significant improvements to the transportation network are being proposed, in the general vicinity of the subject site.

4. Proposed Development

4.1 Development Activity

The indicative development as proposed has been illustrated previously in Figure 1. It provides an overview of the development and the internal road network with connections to the existing road infrastructure.

Based on the proposed zoning within the development area, the full developable yield of the site is expected to be 4,500 dwellings and 40,000sqm of commercial area. The residential households will comprise a mix of detached houses, townhouses and terrace houses. The commercial areas will be predominantly neighbourhood commercial developments featuring small retail outlets, some small offices, and eateries.

These floor areas and dwelling yields have been used to inform the modelling for the proposal.

4.2 Development Transport Provisions

4.2.1 Site Access (Private Vehicles)

The principal connection points to the surrounding road network will include:

- Wainui Road, providing access to Waitoki Road, Kahikatea Flat Road and SH16 to the west and SH1 to the east via the Millwater interchange;
- Sidwell Road which provides an alternative route between the development area and the Millwater interchange. It also provides a route for people heading east towards Silverdale.
- A bridge at the southern end of the development area that crosses the Weiti Stream connecting to Old Pine Valley Road, providing access to Pine Valley Road, Dairy Flat Highway and the Silverdale interchange; and
- A new motorway over-bridge connecting the subject development area to the Highgate Business Park. This over-bridge is a mitigation measure to reduce the impact of the new developments on the surrounding road network.

The predominant morning peak traffic demands associated with the subject development will likely involve either eastbound travel across the Millwater interchange over-bridge in order to access the motorway south-facing ramps, or via the bridge across the Weiti Stream in order to access the Silverdale interchange.

In the evening peaks, the predominant traffic demands will likely involve traffic exiting SH1 either via the Silverdale interchange and heading north across the bridge crossing the Weiti Stream, or via the northbound south-facing Millwater interchange off-ramp.

It can be noted that the SGA's preferred transport network indicates a new north-south route between Albany and Orewa. This will integrate with the main arterial route through Milldale (Argent Lane), connecting with Wainui Road and then to Grand Drive in the north. As such the Milldale roading infrastructure is consistent with the SGA's intentions.

4.2.2 Site Access (Walking)

All proposed road typologies include footpaths or shared paths for access by walking. The residential areas cluster around the Milldale Local Centre and Neighbourhood Centres which are likely to be the main destination for residents in terms of shopping or general business. The proposed school site is adjacent to the main arterial road (Argent Lane) which travels through the central spine of the suburb.

The principal connections to external destinations for pedestrians are the existing Millwater Interchange Over-bridge which currently has footpaths on both sides of the bridge and the proposed Highgate Over-bridge which will also have pedestrian facilities. These provide pedestrian accessibility to the Millwater suburb and to the employment areas within the Highgate business park.

4.2.3 Site Access (Cycling)

Separate cycle paths are proposed for the arterial and collector roads within Milldale. A shared path route for recreational cyclists runs adjacent to the stream edge route which circumnavigates the central area. Local roads are not proposed to provide separate cycle facilities, but it is likely that traffic volumes on these roads will be such that cyclists and vehicles will be able to readily share the use of the road carriageway.

External connections for experienced cyclists would be via the Millwater Interchange Over-bridge, which does not have any cycle facilities on the bridge itself, although advanced cycle boxes exist at the eastern end of the over-bridge for the north and south approaches.

The proposed Highgate Over-bridge will have separate cycle paths. These connections provide access to Millwater (and the schools to the east), Silverdale Centre and to Orewa via Arran Drive and Grand Drive.

For recreational or inexperienced riders, a shared path is proposed which connects to the end of Sidwell Road (at the north-eastern end of Milldale), crossing Wainui Road, proceeding under the motorway at the Orewa River and connecting to a path which joins the Millwater shared path network. Prior to the construction of the Highgate Over-bridge, the shared path will be the main cycle route for cyclists who do not wish to use the Millwater Interchange Over-bridge.

4.2.4 Site Access (Public Transport)

The proposed public transport routes through Milldale have been discussed previously in Section 2.3 of this report. As indicated, AT's preferred longer-term route through the suburb travels along Argent Lane and exits onto Wainui Road to access the Millwater Interchange Over-bridge to Millwater and then Silverdale or Orewa. As noted earlier in Figure 4, a potential short-term route connects the western areas of Milldale with Highgate via the Highgate Over-bridge, although this could be developed in the future as a long-term route.

FHLDL has allowed for the provision of bus stops and road corridors which are capable of accommodating buses. It is AT's responsibility to provide the services which use this infrastructure.

One of the SGA's major projects is a new rapid transport network which extends from Albany to Grand Drive. This is proposed to be a separate piece of infrastructure which runs alongside SH1 dedicated to public transport. This will provide a high-quality public transport facility which will give residents in the north a viable transport alternative to the private vehicle. The Milldale development is supporting this initiative by reserving land (for a defined period of time) required for the widening of SH1 and for the placement of a bus station within the site.

As such, future public transport connectivity for Milldale will be excellent.

4.2.5 Internal Road Network

An internal network of roads has been proposed within the development area with an indicative internal road hierarchy as shown previously in Figure 3. The network is an expansion upon the previously approved ITA.

Indicative road typologies and road cross sections have also been developed and these are shown in **Figure *8*** to **Figure *16*.**

Figure 8: Wainui Road Interim Cross-Section (25m Road Reserve)

Figure 9: Argent Lane Interim Road Cross Section (30m Road Reserve)

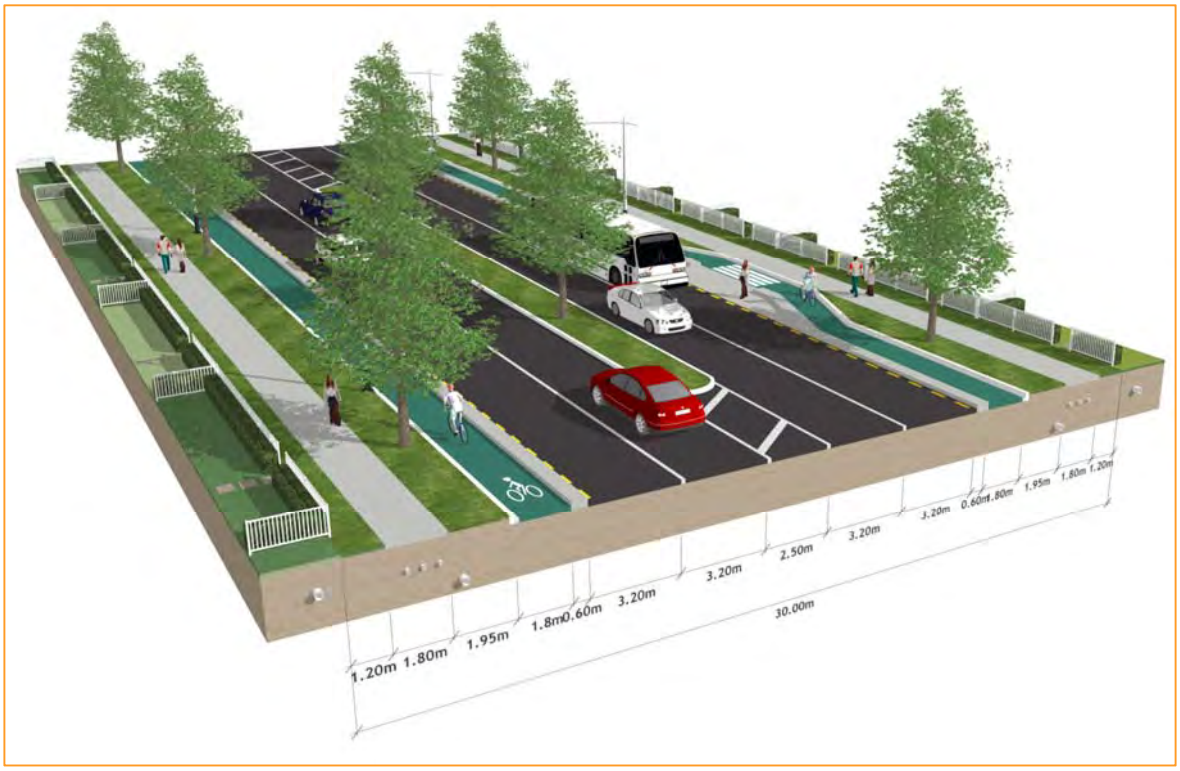


Figure 10: Future Wainui Road / Argent Lane Cross Section

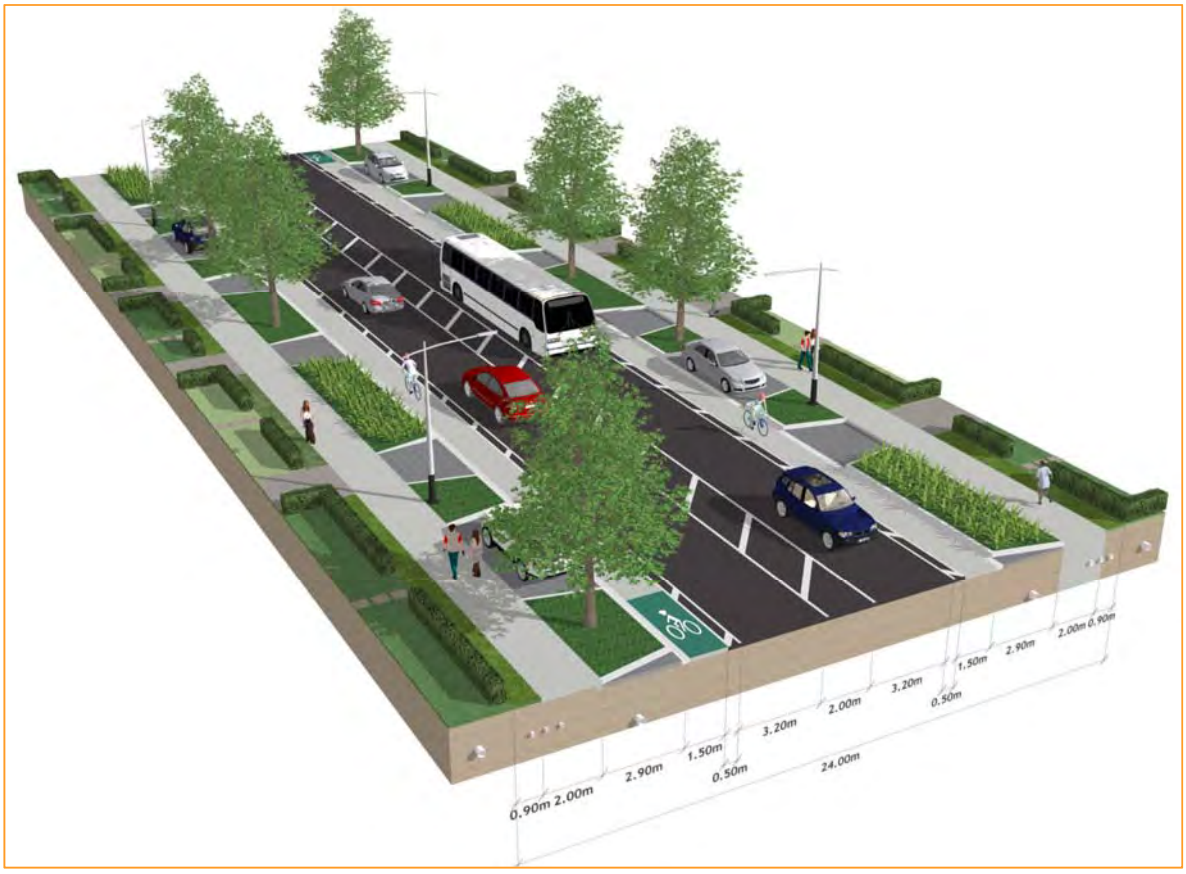


Figure 11: Collector Road

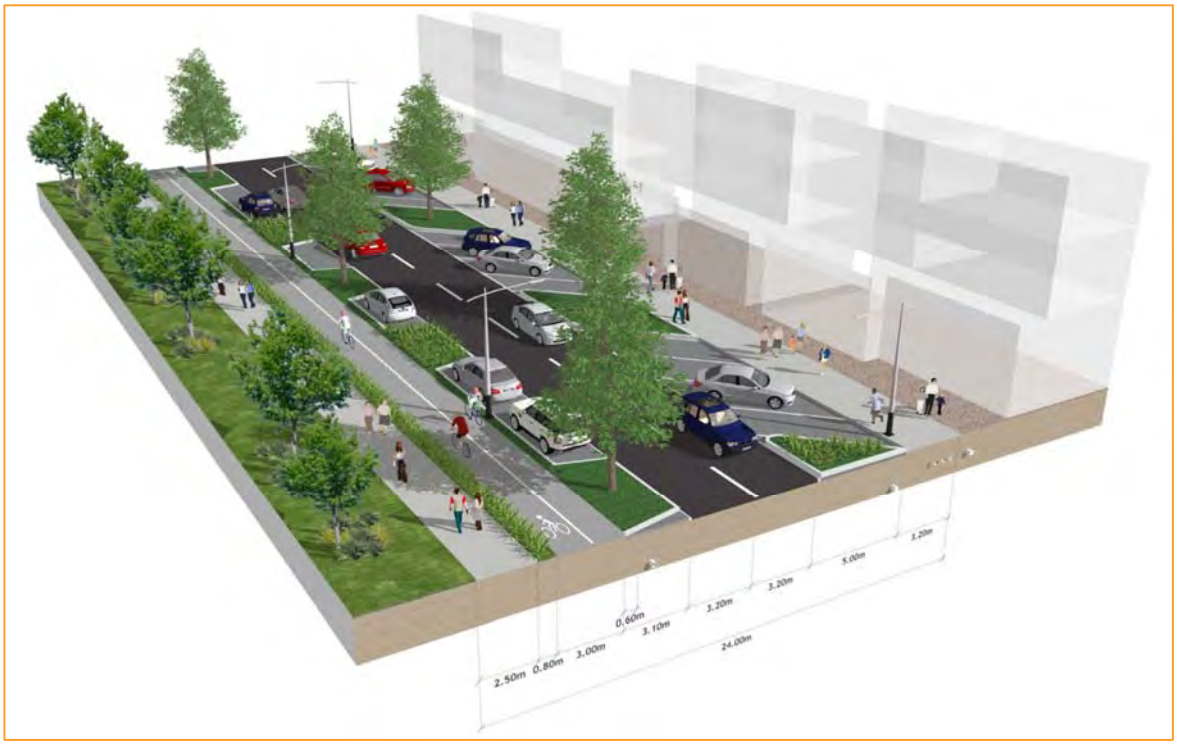


Figure 12: Collector Road - Town Centre Edge

Figure 13: Local Road (16.6m Carriageway)

Figure 14: Local Road (16.6m Variation)

Figure 15: Green Street

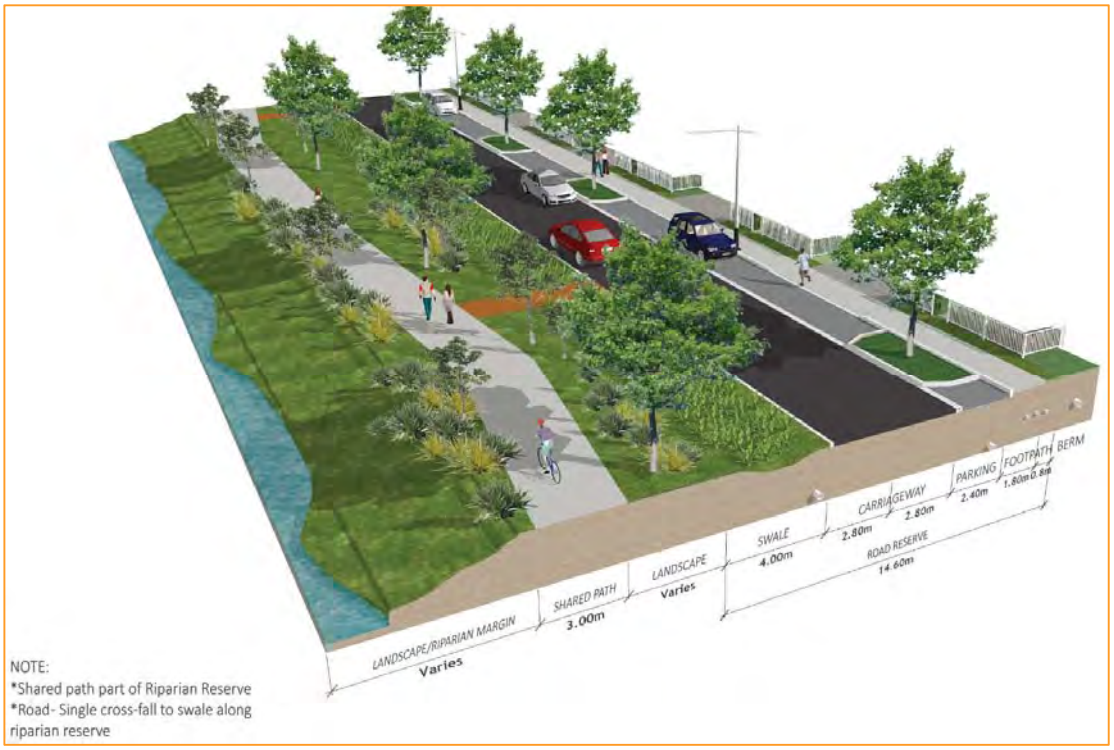


Figure 16: Reserve Edge Road

In respect of Wainui Road, FHLDL is only undertaking to fund and construct road infrastructure on its southern side. The other side of the road will be the responsibility of future developers and/or AT. On this basis, interim road cross-sections for Wainui Road have been provided in addition to the full cross-sections.

In respect of Figure 12, which shows the cross-section for the collector road around the town centre, this road, and any other roads which travel through the town centre, will be subject to more detailed design at a later date. This is simply because there are a number of unknown factors which currently exist at this early stage, such as the design of the town centre itself.

The proposed cross-section for Argent Lane, which is 30m wide, includes one lane in each direction with car parking. This is suitable for the full extent of the proposed development. However, the 30m width allows for future-proofing for a four-lane corridor if the car parking is removed as Milldale is further developed. As such, the road reserve is of sufficient width to provide the additional lanes if required at which time its cross-section will be the same as the final cross section for Wainui Road.

The previous Figure 3 also illustrates the locations within the development of these various road typologies. Overall, it is considered that the road types and cross-sections have been carefully designed to reflect road functions and connectivity through the network in order to provide a high level of amenity throughout the development area, and which are appropriate from a traffic engineering perspective.

Intersection designs will be further developed at a later stage as land use yields become more clearly defined and demands for housing in the area increase. However, practically all internal intersections are likely to be priority controlled. The most notable exception to this general rule is the intersection between Argent Lane and Wainui Road which will initially be a three-legged intersection/roundabout with the potential to include a fourth leg if required in the future, which is required predominantly for safety reasons.

It should be noted that AT has been kept informed and has approved in principle, the proposed road cross-section designs through the resource consent processes of the various stages of the Milldale development.

5. Modelling

5.1 Background

Modelling has been carried out to assess the effects of the proposed development on the surrounding road network. The northern Transport for Future Urban Growth (**TFUG**) model, which was developed by Beca Infrastructure on behalf of AT, was used to assess the effects of the project. This model has been built using the AIMSUN software package and is a hybrid model combining mesoscopic and microscopic elements. Approval has been obtained from AT for the use of the model for the assessment.

The extent of the model includes the Greville Road interchange in the south and Puhoi in the north and includes the Northern Gateway. This model has been used to inform the planning of the transport networks in the northern areas of Wainui and Dairy Flat using the land use forecasts from the Auckland Regional Transport (**ART**) model (now referred to as the MSM).

The MSM model is used to calculate trips across the entire Auckland region. Demands from this model were used by the TFUG model to determine trips passing through the Rodney area; trips solely within the modelled area (internal trips); and the distribution of trips from within the Rodney area to other parts of Auckland. The increase in development intensity within the subject site was accounted for in the MSM model.

The outputs from the MSM model were then exported to the AIMSUN model which provides a better, more refined tool for informing vehicle behaviour and intersection operation.

5.2 Model Calibration

The AIMSUN model was calibrated and validated to a 2016 base year. A separate calibration report was prepared by Beca for AT entitled "*TFUG Silverdale AIMSUN Model Development Report*" dated April 2017.

This report summarises the background to the model in terms of:

- the development of the model;
- the model structure;
- the various input parameters;
- the assumptions made; and the
- level of calibration/validation achieved.

The report concluded that the base year model was considered "*acceptably calibrated and validated for the purposes of the network planning for the TFUG North area.*"

5.3 Model Review

TDG (now Stantec) was commissioned by AT to provide a review of the base AIMSUN model. In this respect a peer review report was released in May 2015 and follow-up meetings and communication between AT, Beca and TDG. The peer review process was completed in July 2017.

The outcome of the peer review process was that whilst there were limitations with regard to the operation of the base AIMSUN model, it was nevertheless fit for purpose.

As part of the review of the modelling undertaken for this ITA, further discussions have been undertaken with representatives from AT and the New Zealand Transport Agency (**NZTA**). Records of the meeting discussions are provided in **Appendix A** of this report.

5.4 Future Land Use Forecasts and Network Improvements

Subsequent to the above, the base AIMSUN model has been updated to include the land use forecasts based on the i11 land use scenarios. The model includes forecast years of 2026, 2036 and 2046.

For the purposes of this assessment, the 2026 forecast year has been used as an approximate future year for when the 4,500 dwellings and 40,000sqm commercial area could be established within Milldale.

Other land uses in the area included within the model are:

- The Highgate Business Park;

- Jack Hawken Lane development; and
- Orewa 2 precinct development (up to 2026).

Road network improvements which have been included in the 2026 Do-Minimum model are:

- The Jack Hawken Lane / Hibiscus Coast Highway signalised intersection;
- Oteha Valley Road / Medallion Drive signalised intersection;
- Busway extension from Constellation Drive to Albany; and
- The Puhoi to Warkworth improvements.

These have been accepted as representing committed land uses and works included for this assessment. It should be noted that the Kowhai Road connection between Wainui Road and Arran Drive and the Penlink project have been **excluded** from the modelling. Ramp signalling at the SH1 interchanges have been modelled as per the 2026 'base-case' model provided by AT.

5.5 Future Site Demands

The trip demands associated with Milldale have been derived from a factoring of the trip matrices for the 2026 scenario which already assumes 2,800 dwellings in Milldale by the year 2026. In this respect all trips originating from and destined to the zones in the AIMSUN model which represent the Milldale suburb have been factored up by around 1.61.

Trip distributions from the model have not been adjusted and signal timings along Hibiscus Coast Highway have also been retained for the purposes of the modelling in order to maintain consistency with the original model. Flow profiles for the morning peak model were adjusted to reflect current flow patterns observed at the Wainui interchange and to marginally increase trip generation in the morning peak hour to match with the anticipated generations of the various household typologies in the Milldale area. This was accepted by the model review team (comprising representatives from AT and NZTA through an iterative process) as an appropriate measure to ensure that the outputs from the TFUG model were robust in terms of trip generation patterns, particularly for the morning peak.

Forecast peak hour trip generations from the model were compared against the Roads and Maritime Services trip generation rates as shown below in **Table 3**:

Typology	Quantity	Percentage	RTA Rate (Vehicle Trips/HH)	Assumed Rate	Trips
Apartments (THAB)	582	13%	0.4-0.5	0.45	262
Apartments (Central)	262	6%	0.4-0.5	0.45	118
Semi-attached Terrace	758	17%	0.4-0.5	0.45	341
Small Standalone	390	9%	0.5-0.65	0.6	234
Medium Standalone	1,181	27%	0.5-0.65	0.6	709
Large Standalone	821	19%	0.85	0.85	698
600sqm and over	424	10%	0.85	0.85	360
Total	4,418				2,722

Table 3: Forecast Peak Hour Trip Generation

On this basis, the overall trip rate for the site is calculated at around 0.62 trips per household. This has been compared against the peak hour rates from the model and this is discussed further in subsequent sections of this report.

6. Traffic Effects

6.1 Trip Generation

The forecast peak period trip generations from the model for the 4,500-lot development area are summarised in **Table 4** below.

Peak Period (4 hours)	Inbound	Outbound	Internal	Total excluding internal
Morning	2,268	5,738	641	7,365
Evening	7,544	3,376	942	9,978

Table 4: Forecast Trip Generation

As noted earlier, only the flow profiles for the morning peak were adjusted in the TFUG model.

The resultant peak period trip generation patterns (by 15-minute interval) for the morning period are shown in **Figure 17**.

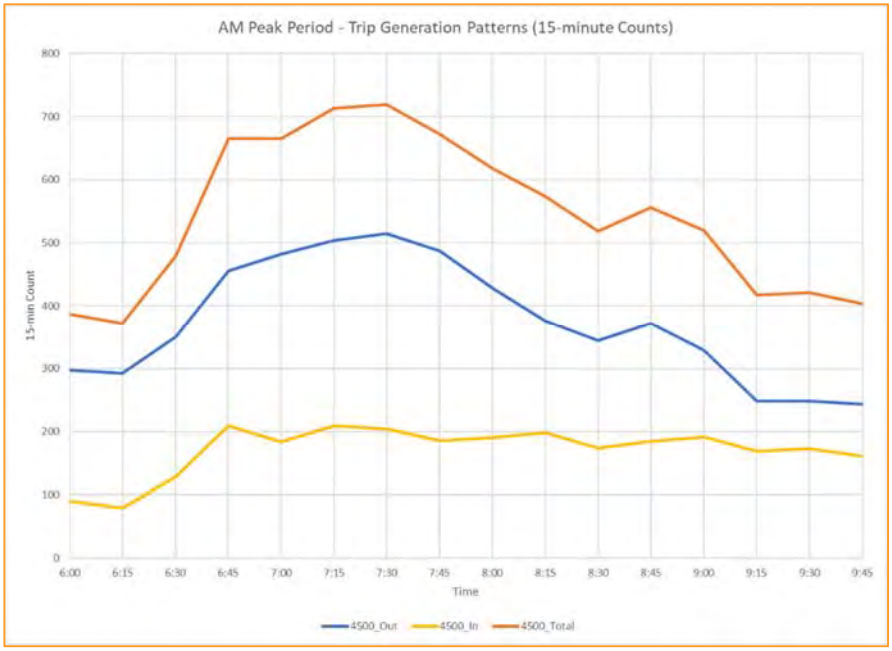


Figure 17: Morning Peak Period Trip Generation Patterns (by 15-minute interval)

The morning hourly trip generation pattern (at 15-minute increments) is shown in **Figure 18**.

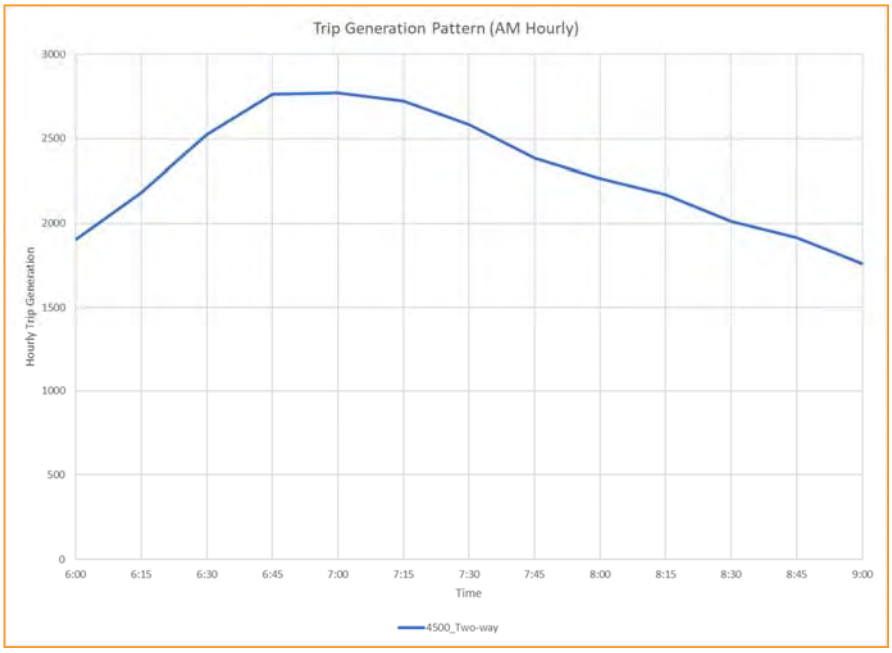


Figure 18: Morning Peak Hour Trip Generation Pattern (every 15 minutes)

As indicated the peak hour in the model occurs around 7am to 8am with a peak hour generation of around 2,770 vehicles/hour. This corresponds to a trip generation rate of around 0.62 which compares well with the RTA rate noted in Section 6.5.

The peak period trip generation patterns (by 15-minute interval) from the model for the evening peak period are shown in **Figure 19**.

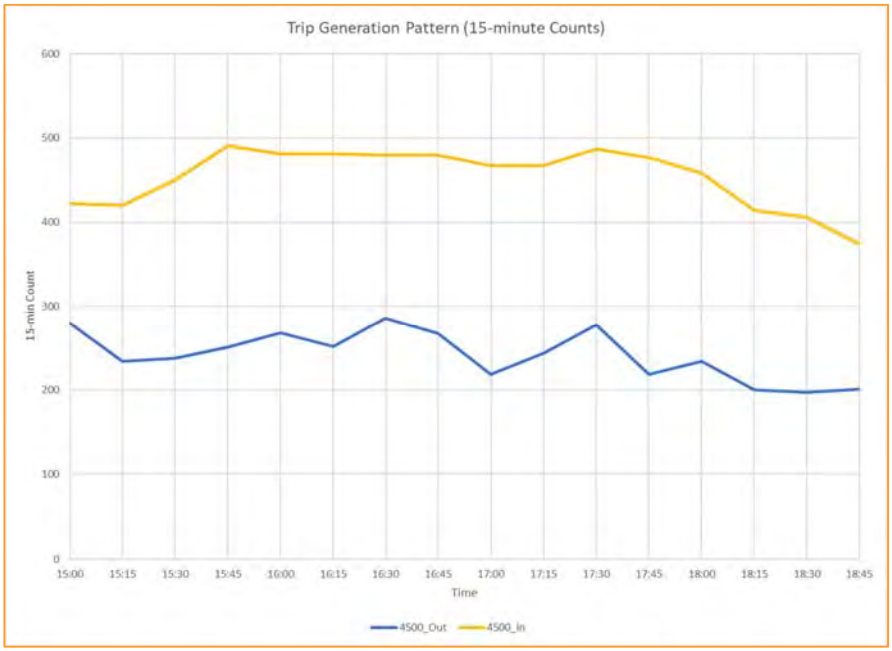


Figure 19: Evening Peak Period Trip Generation Patterns (by 15-minute interval)

The evening peak hourly trip generation pattern (at 15-minute increments) is shown in **Figure 20**.

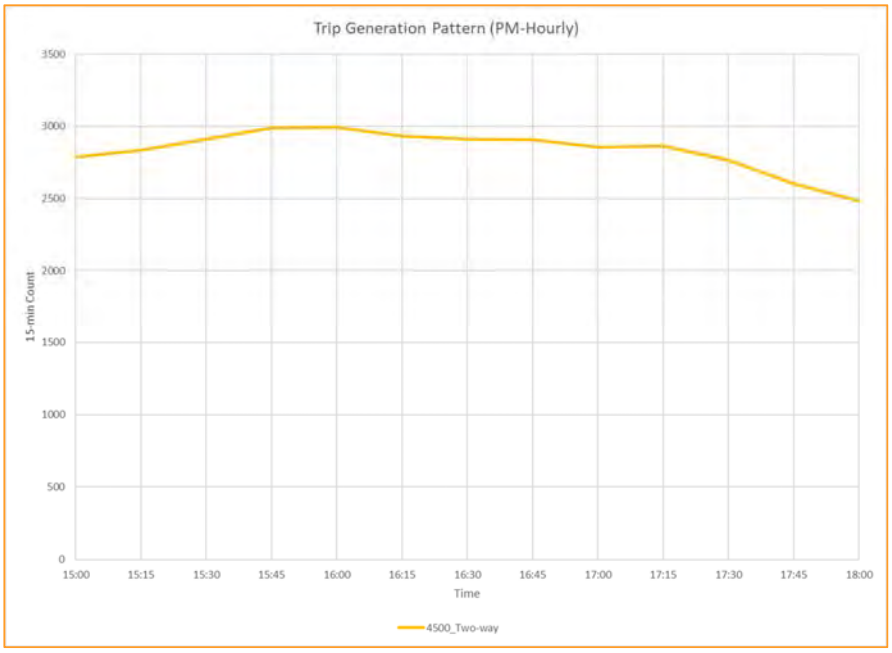


Figure 20: Evening Peak Hour Trip Generation Pattern (every 15 minutes)

As shown, the trip generation profile is a lot flatter in the evening peak period than the morning peak period. This is because trips from the Auckland CBD are to an extent constrained by the motorway system to the south. Nevertheless, the equivalent peak hour trip generation rate from the model for the evening peak hour is 0.66 trips/dwelling. This is marginally higher than the RTA rate indicated previously in Section 5.5.

As noted earlier, the anticipated traffic generation for Milldale has been derived from AT's MSM model. This assumes a certain level of mode share and on the basis of 2013 Census Journey to Work data from the New Zealand Department of Statistics for the northern region, it is likely that person trips would be in the order of 80-90% private vehicle, 5-10% public transport and 2-5% active modes. The private vehicle trip rates have been checked against MSM vehicle demands and land use forecasts for similar residential zones (such as Red Hills and Drury) and found to be similar in magnitude to Milldale, in the context of the relative proposed and future PT infrastructure / service provisions assumed for those residential developments.

In this respect, for 4,500 households, and assuming a household person trip rate of eight trips per day, this equates to 36,000 person trips per day for Milldale. Using the proportions above, the anticipated person trips using public transport would be around 1,800 to 3,600 trips daily and 720 to 1,800 trips daily by active modes such as walking or cycling.

It should be noted that prior to bus services, employment and schools being provided in Milldale, as assumed for the full build-out, vehicle trip rates /mode share will potentially be higher than assumed in the ITA.

6.2 Development Trip Distribution

The manner in which the generated external trips have been distributed to the surrounding road network in the AIMSUN model is summarised in **Table 5** which lists both inbound and outbound traffic for the respective peak periods. The areas have been summarised as north, south, east, west and internal, as follows:

- North refers to traffic that uses SH1 to head north;
- South refers to traffic that would head on either SH1, East Coast Road or Dairy Flat Highway,
- East refers to traffic heading to Silverdale, Orewa or the Whangaparaoa peninsula;
- West refers to any traffic heading west of the development on Kahikatea Road or Waitoki Road; and
- Internal refers to trips made within the development.

Both the absolute number of trips and the proportion of trips in that direction out of the total trips generated in the peak period for both directions, are provided in **Table 5**.

Area	AM Peak		PM Peak	
	To Site	From Site	To Site	From Site
North	57 (1%)	84 (1%)	124 (1%)	74 (1%)
South	507 (6%)	2,565 (32%)	2,941 (27%)	777 (7%)
East	850 (11%)	2,178 (27%)	3,117 (29%)	1,293 (12%)
West	213 (3%)	270 (3%)	421 (4%)	289 (3%)
Internal	641 (8%)	641 (8%)	942 (9%)	942 (9%)
Total	2,268	5,738	7,544	3,376

Table 5: Trip Distribution

It should be noted that these trip distribution patterns taken from the TFUG microsimulation model have been derived from the wider regional MSM, formerly the ART model which is currently the tool used by AT for their transportation forecasting for the Auckland region.

For the AM peak period, the microsimulation model indicates that 16% of the trips exited the site via the Millwater-Interchange, 38% via the Silverdale Over-bridge and 11% via the Highgate Over-bridge. The remaining 35% either used Dairy Flat Highway, travelled west or were internal trips.

For the PM peak period, 33% used the Silverdale interchange, 17% used the Millwater interchange and 11% used the Highgate Over-bridge. The remaining 39% either used Dairy Flat Highway, came from the west or were internal trips.

In terms of walking and cycling, the key destinations would probably be the local centre, neighbourhood centres, the stream edge areas and the local school. There is sufficient permeability within the proposed road network and appropriate infrastructure (i.e footpaths and cycle lanes) to allow these active modes to occur. Further to the east are the Highgate Business Park and the Silverdale Town Centre which would be accessible via the Highgate Over-bridge.

Prior to the full build-out of Milldale, with the local centre, employment and schools included, the proportion of internal trips is likely to be lower, resulting in a higher external trip distribution. However, from a traffic generation perspective, this is not likely to be an issue provided that the proposed roading infrastructure is in place at the appropriate time. It is also important that alternative transport options for residents through walking, cycling and bus connections to external destinations are enabled.

6.3 Traffic Effects Analysis

The principal access points to and from the surrounding road network are the Wainui south-facing ramps (for which the Millwater Interchange over-bridge is the capacity restraint), and the Silverdale interchange (once the link to Old Pine Valley Road is formally integrated with the development). Accordingly, the network performance analyses have focussed on the expected performances of the interchanges, and key intersections in close proximity to the interchanges.

The performance of these intersections is summarised in terms of the average delay in seconds for each movement and the Level of Service (**LOS**) which is defined as an incremental scale using the letters A through F, with A indicating the best LOS and F indicating the worst.

Table 6 describes traffic flow operation for each of the LOS scales at a basic level. In general, an average LOS D or better for an intersection during the peak hours is considered appropriate for an urbanised area.

LOS	Description of operation
A	Free flow conditions; little interaction between vehicles
B	Reasonably free flow condition; speeds similar to LOS A but some movement is restricted due to interaction between vehicles within traffic streams
C	Stable flow conditions; ability to manoeuvre within traffic streams is notably restricted but roads remain below capacity
D	Approaching unstable flow; freedom to manoeuvre is much more limited and driver comfort levels decrease. This is the common level for urban streets during peak hours of travel
E	Unstable flow; operating at capacity; drivers comfort level becoming poor. This would be a more common standard in larger urban areas where some congestion is inevitable during peak hours
F	Forced or breakdown flow; vehicle movement very constrained; traffic demand generally higher than capacity

Table 6: LOS description

Delays and 95 percentile queues have been extracted from the AIMSUN software used for the more detailed assessment of effects. A comparison has then been undertaken between the consented development of 2,800 and the proposed 4,500 houses for the critical intersections in the model. The base year for comparison is 2026 for both scenarios.

6.3.1 Millwater Interchange Over-Bridge / Millwater-Parkway Intersection

The Millwater Interchange over-bridge / Millwater-Parkway intersection is traffic signal controlled. The predicted intersection performance of the intersection is summarised in **Table 7** and **Table 8** for the morning and evening peak hours respectively.

Approach	Movement	Morning Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Millwater Parkway (north)	Through	12	15	B	0	10	8	A	1
	Right	50	25	C		75	25	C	
Wainui Road (south)	Left	32	1	A	1	31	1	A	2
	Through	62	39	D		115	38	D	
Wainui Road (west)	Left	438	11	B	3	636	14	B	4
	Right	40	25	C		37	30	C	
All Vehicles		**634**	**15**	**B**	**3**	**904**	**18**	**B**	**4**

Table 7: Millwater Interchange Over-Bridge / Millwater Parkway Modelling Results (Morning Peak Hour)

Approach	Movement	Evening Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Millwater Parkway (north)	Through	48	14	B	2	52	17	B	2
	Right	162	31	C		203	32	C	
Wainui Road (south)	Left	65	1	A	1	86	2	A	1
	Through	60	39	D		81	39	D	
Wainui Road (west)	Left	241	10	A	2	289	12	B	3
	Right	27	43	D		34	34	C	
All Vehicles		**603**	**20**	**B**	**2**	**745**	**21**	**C**	**3**

Table 8: Millwater Interchange Over-Bridge / Millwater Parkway Modelling Results (Evening Peak Hour)

As can be seen, during the morning peak hour when the majority of traffic would be exiting the development, delays increase for the western approach at this intersection. However, this increase in delay is not of a significant magnitude.

There is little overall difference in the performance of the evening peak with delays and LOS results remaining consistent between the scenarios. This intersection is not a main route for people heading into the development area.

In both peak periods, the intersection operates within an acceptable LOS and differences between the 2,800 and 4,500 household scenarios are marginal.

6.3.2 Millwater Interchange Off-ramp

The end of the northbound off-ramp at the Millwater interchange is roundabout controlled. The predicted performance of the roundabout is summarised in **Table 9** and **Table 10** for each of the respective peak hours.

Approach	Movement	Morning Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Wainui Road (north)	Right	266	4	A	0	337	4	A	0
Off-Ramp (south)	Left	21	3	A	1	30	4	A	0
	Through	7	6	A		7	3	A	
Wainui Road (west)	Left	54	2	A	0	62	2	A	0
All Vehicles		**348**	**4**	**A**	**1**	**436**	**4**	**A**	**0**

Table 9: Millwater Off-Ramp Modelling Results (Morning Peak Hour)

Approach	Movement	Evening Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Wainui Road (north)	Right	109	4	A	0	120	4	A	0
Off-Ramp (south)	Left	158	5	A	2	196	6	A	4
	Through	195	5	A		345	7	A	
Wainui Road (west)	Left	135	4	A	1	145	5	A	2
All Vehicles		**597**	**5**	**A**	**2**	**806**	**6**	**A**	**4**

Table 10: Millwater Off-Ramp Modelling Results (Evening Peak Hour)

There is negligible difference in the modelling results between the two scenarios for both peak periods. This is attributable to the fact that there is little other traffic using Wainui Road and therefore creating little resistance to flows coming off the ramp. The expected level of performance is therefore expected to be very good.

6.3.3 Millwater Interchange On-ramp

The Millwater Interchange southbound on-ramp is also roundabout controlled. Timberland Drive, which provides a fourth eastern leg to this intersection, was not included in the original model. Volumes on this road are not expected to be significant and will use other routes through the modelled network such as Bankside Drive and therefore the omission is not considered significant. The expected performance of the southbound on-ramp is summarised in **Table 11** and **Table 12** for the peak hours of assessment**.**

Approach	Movement	Morning Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Millwater Parkway (north)	Through	62	3	A	2	86	3	A	2
	Right	328	3	A		258	3	A	
Millwater Parkway (south)	Left	292	6	A	1	503	6	A	2
	Through	201	6	A		240	6	A	
All Vehicles		**883**	**5**	**A**	**2**	**1,087**	**5**	**A**	**2**

Table 11: Millwater On-Ramp Modelling Results (Morning Peak Hour)

Approach	Movement	Evening Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Millwater Parkway (north)	Through	213	3	A	3	255	3	A	3
	Right	96	3	A		106	4	A	
Millwater Parkway (south)	Left	82	4	A	0	120	5	A	1
	Through	222	6	A		249	6	A	
All Vehicles		**613**	**4**	**A**	**3**	**730**	**5**	**A**	**3**

Table 12: Millwater On-Ramp Modelling Results (Evening Peak Hour)

The model indicates negligible differences in the both peak hours at the Mlllwater interchange on-ramp.

6.3.4 Wainui Road / Sidwell Road Intersection

The Wainui Road / Sidwell Road intersection is roundabout controlled. The expected morning and evening peak hour performance at this intersection is summarised in **Table 13** and **Table 14** for the analysed peak hours.

Approach	Movement	Morning Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Wainui Road (east)	Left	27	4	A	0	42	5	A	0
	Through	55	3	A		62	3	A	
Sidwell Road (south)	Left	0	0	A	0	1	0	A	1
	Right	207	4	A		331	5	A	
Wainui Road (west)	Through	275	4	A	1	347	5	A	3
	Right	12	2	A		22	8	A	
All Vehicles		**576**	**4**	**A**	**1**	**805**	**5**	**A**	**3**

Table 13: Wainui Road / Sidwell Road Intersection Results (Morning Peak Hour)

Approach	Movement	Evening Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Wainui Road (east)	Left	96	5	A	0	147	7	A	2
	Through	135	4	A		146	5	A	
Sidwell Road (south)	Left	1	0	A	0	1	1	A	1
	Right	69	4	A		105	4	A	
Wainui Road (west)	Through	202	4	A	1	218	4	A	1
	Right	66	5	A		98	5	A	
All Vehicles		**569**	**4**	**A**	**1**	**715**	**5**	**A**	**2**

Table 14: Wainui Road / Sidwell Road Intersection Results (Evening Peak Hour)

The modelling indicates that this intersection will continue to experience excellent performance levels with minimal congestion for both peak periods.

6.3.5 Silverdale Interchange (Western Roundabout) Intersection

The Silverdale interchange comprises a set of two roundabouts at the on and off-ramps to and from SH1. The western roundabout is the critical roundabout in the evening peak period. It is a metered roundabout with the signal control on the eastern approach which activates when queues on the off-ramp extend past a certain point. The modelling assumes the inclusion of a new left turn lane at the top of the northbound off-ramp.

The modelling results of the western roundabout are summarised in **Table 15** and **Table 16**.

Approach	Movement	Morning Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Over-bridge (east)	Through	398	18	B	9	523	16	B	6
	Right	18	26	C		23	26	C	
Off-Ramp (south)	Left	243	7	A	2	283	6	A	3
	Right	661	8	A		661	7	A	
Dairy Flat Highway (west)	Left	144	8	A	6	162	9	A	6
	Through	1,307	9	A		1,261	10	A	
All Vehicles		**2,771**	**10**	**A**	**9**	**2,913**	**10**	**A**	**4**

Table 15: Silverdale Interchange (West) Modelling Results (Morning Peak Hour)

Approach	Movement	Evening Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Over-bridge (east)	Through	598	20	B	20	658	28	C	11
	Right	86	21	C		102	31	C	
Off-Ramp (south)	Left	619	18	B	9	593	12	B	7
	Right	1,394	21	C		1,323	13	B	
Dairy Flat Highway (west)	Left	295	47	D	22	279	49	D	30
	Through	865	52	D		873	60	E	
All Vehicles		**3,857**	**30**	**C**	**22**	**3,828**	**29**	**C**	**30**

Table 16: Silverdale Interchange (West) Modelling Results (Evening Peak Hour)

To mitigate the effects of the proposed development, an additional westbound lane has been added on the bridge over SH1 between Hibiscus Coast Highway and Dairy Flat Highway. This was required as westbound queues tended to form on the single-lane over-bridge which then extended back onto Hibiscus Coast Highway. This subsequently had an effect on vehicles turning right from the southbound off-ramp and in addition, those vehicles trying to access the southbound on-ramp from Hibiscus Coast Highway. However, with the mitigation measures in place, the modelling indicates that there would be no significant deterioration in intersection performance as a result of the additional development. It should be noted that the mitigation measure is only included for the 4,500-dwelling scenario. The 2,800-dwelling scenario does not include the westbound double-laning on the Silverdale Over-bridge. It should be noted that if the Penlink project is completed the need for the additional westbound lane on the Over-bridge is less likely to be required.

The modelling indicates that for the evening peak hour, delays and queues on the western approach increase when comparing the performance of the 2,800-dwelling scenario with the 4,500-dwelling scenario. However, the increases are not considered significant for the peak hour. Furthermore, queues typically do not extend back as far as the Dairy Flat / Pine Valley Road intersection.

At this early stage no designs are available for the upgraded interchange. However, the layout used in the modelling for the western roundabout is provided in **Figure 21**.

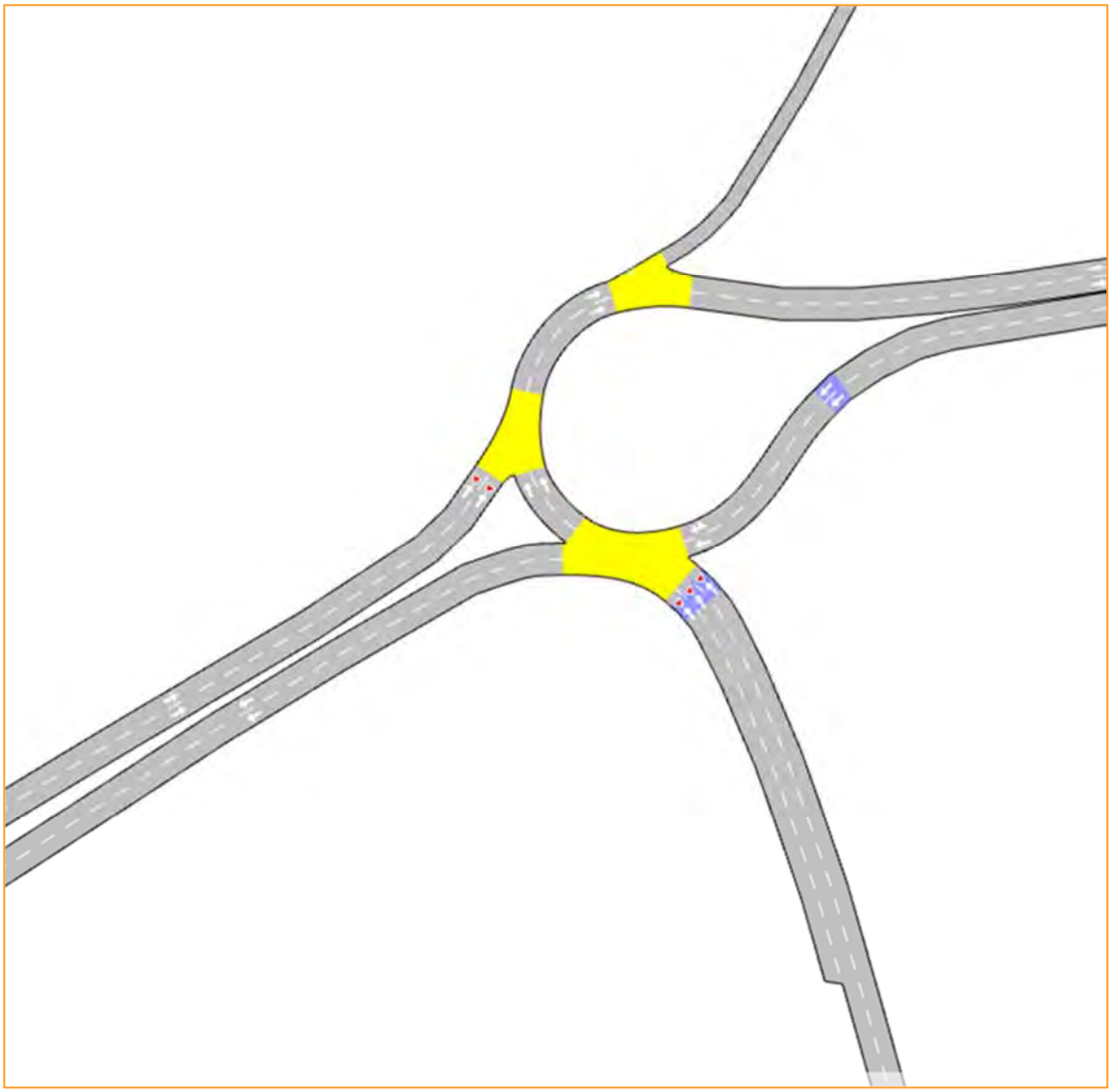


Figure 21: Modelled Layout for the Silverdale Interchange Western Roundabout

6.3.6 Silverdale Interchange (Eastern Roundabout) Intersection

The predicted performance of the eastern roundabout is summarised in **Table 17** and **Table 18** for the morning and evening peak hours respectively**.**

Approach	Movement	Morning Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Off-Ramp (north)	Left	134	8	A	3	122	9	A	3
	Right	214	21	C		238	22	C	
Hibiscus Coast Highway (east)	Left	1,387	4	A	13	1,361	2	A	6
	Through	210	95	F		303	32	C	
Over-bridge (west)	Through	1,134	3	A	2	1,136	2	A	1
	Right	826	3	A		764	4	A	
All Vehicles		**3,905**	**9**	**A**	**13**	**3,924**	**19**	**A**	**6**

Table 17: Silverdale Interchange (East) Modelling Results (Morning Peak Hour)

Approach	Movement	Evening Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Off-Ramp (north)	Left	139	37	D	4	128	21	C	7
	Right	178	38	D		215	28	C	
Hibiscus Coast Highway (east)	Left	762	2	A	10	731	1	A	5
	Through	514	26	C		556	12	B	
Over-bridge (west)	Through	1,875	22	C	20	1,762	9	B	3
	Right	400	7	A		439	4	A	
All Vehicles		**3,868**	**18**	**B**	**20**	**3,831**	**9**	**A**	**6**

Table 18: Silverdale Interchange (East) Modelling Results (Evening Peak Hour)

Noticeable improvements are observed in the morning peak as a result of the additional westbound lane over the motorway reducing queuing extending back along Hibiscus Coast Highway.

The modelling indicates a marginal improvement at the eastern roundabout with the mitigation measures implemented during the evening peak hour.

As for the western roundabout, no designs are currently available for the eastern roundabout at this early stage. However, the modelled layout of the eastern roundabout at the Silverdale interchange is shown in **Figure 22**.

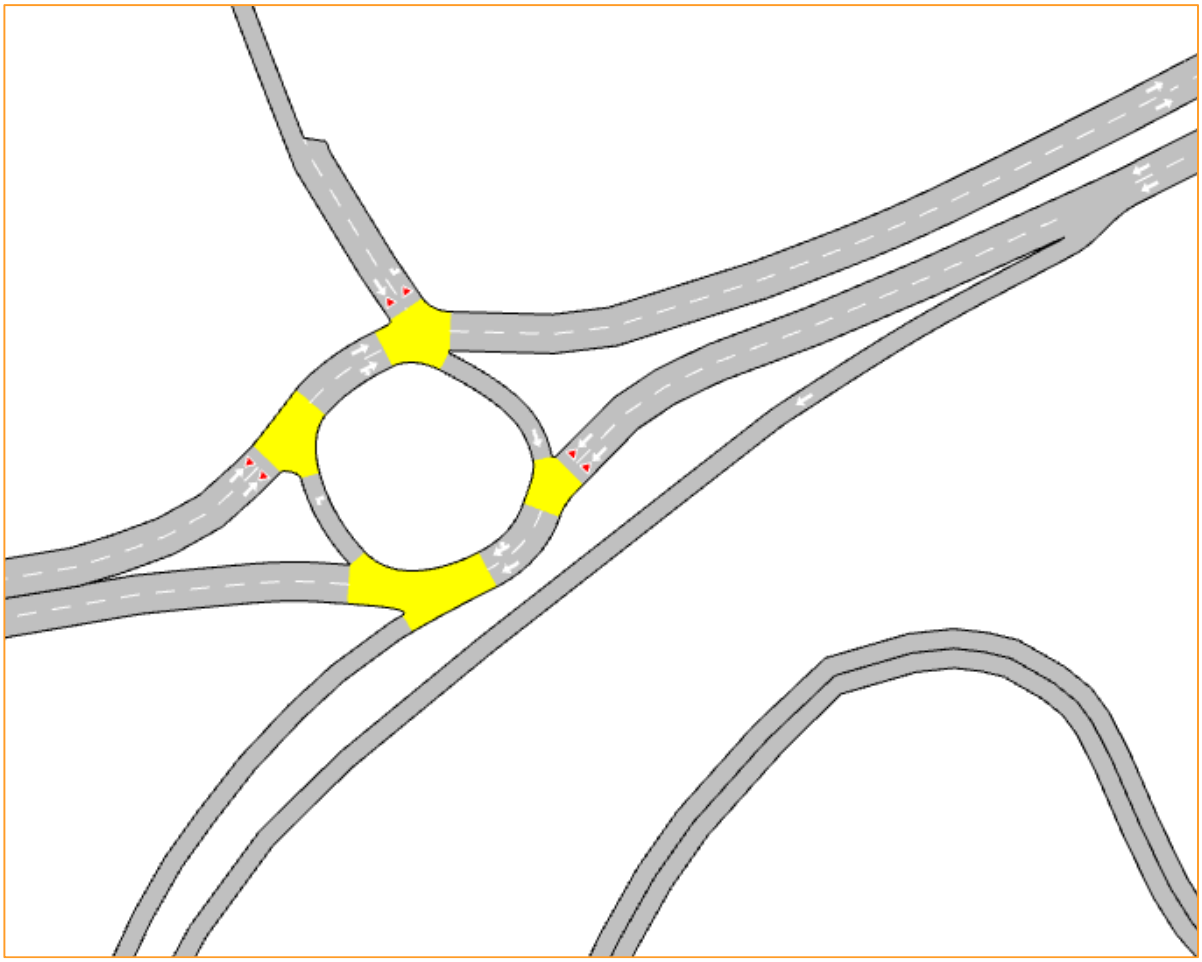


Figure 22: Modelled Layout for the Silverdale Interchange Eastern Roundabout

6.3.7 Dairy Flat Highway / Pine Valley Road Intersection

The Dairy Flat / Pine Valley Road intersection is currently a three-leg priority-controlled intersection. This has been assessed part of the previous ITA assessment as being adequate to accommodate the demands of up to 2,800 households within the Milldale area. The layout of the intersection is shown in ***Figure 23***.

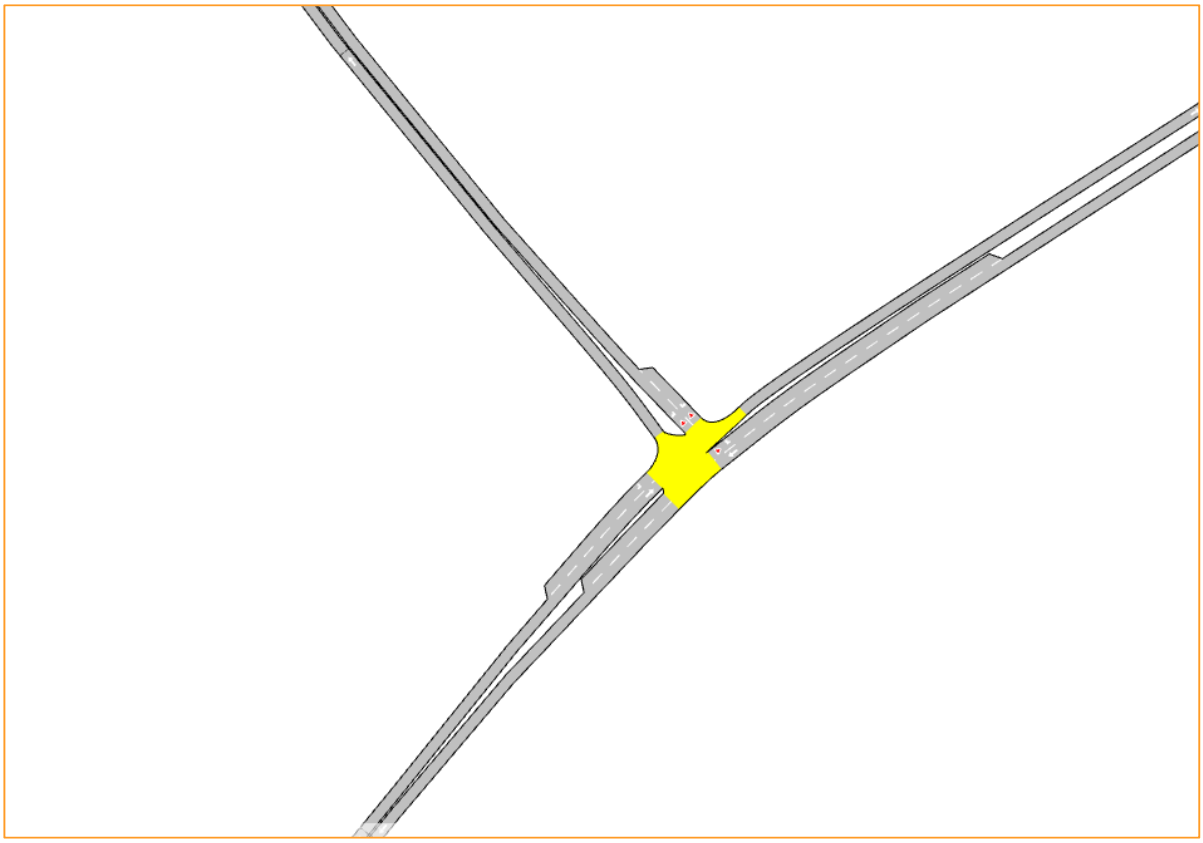


Figure 23: Dairy Flat Highway / Pine Valley Road Intersection (up to 2800 HH scenario)

Whilst the number of lanes remains unchanged from the situation which currently exists there may be some works required around the intersection to help prepare for the future widening anticipated for the longer-term buildout of Milldale.

Table 21 of the previous ITA provided the intersection performance for the key intersections surrounding the Milldale area under the 2,000 household and 2,800 household scenarios and this is reproduced in the following **Table 19**.

Intersection	AM Peak Hour		PM Peak Hour	
	2000 HH	2800 HH	2000HH	2800HH
Wainui Over-bridge / Millwater Parkway	B	B	B	B
Millwater Off-ramp	A	A	A	A
Millwater On-ramp	A	A	A	A
Wainui / Sidwell	A	A	A	A
Silverdale Interchange (Western roundabout) – with mitigation	C	D	C	C
Silverdale Interchange (Eastern roundabout)	B	B	B	B
Dairy Flat Highway / Pine Valley	D	E	D	D

Table 19: Overall Intersection Performance Summary (from previous ITA)

As can be seen, at around 2,800 households the LOS of the Dairy Flat / Pine Valley Road intersection declines to a LOS of E.

It is proposed to upgrade this intersection to a signalised intersection at the point where 2,800 households are operational. At this point the full build to the form proposed for 4,500 households would not be necessary and a more compact form of the intersection was tested in SIDRA[1] and found to be adequate to accommodate the anticipated flows. This indicative intersection form is provided in **Figure 24**.

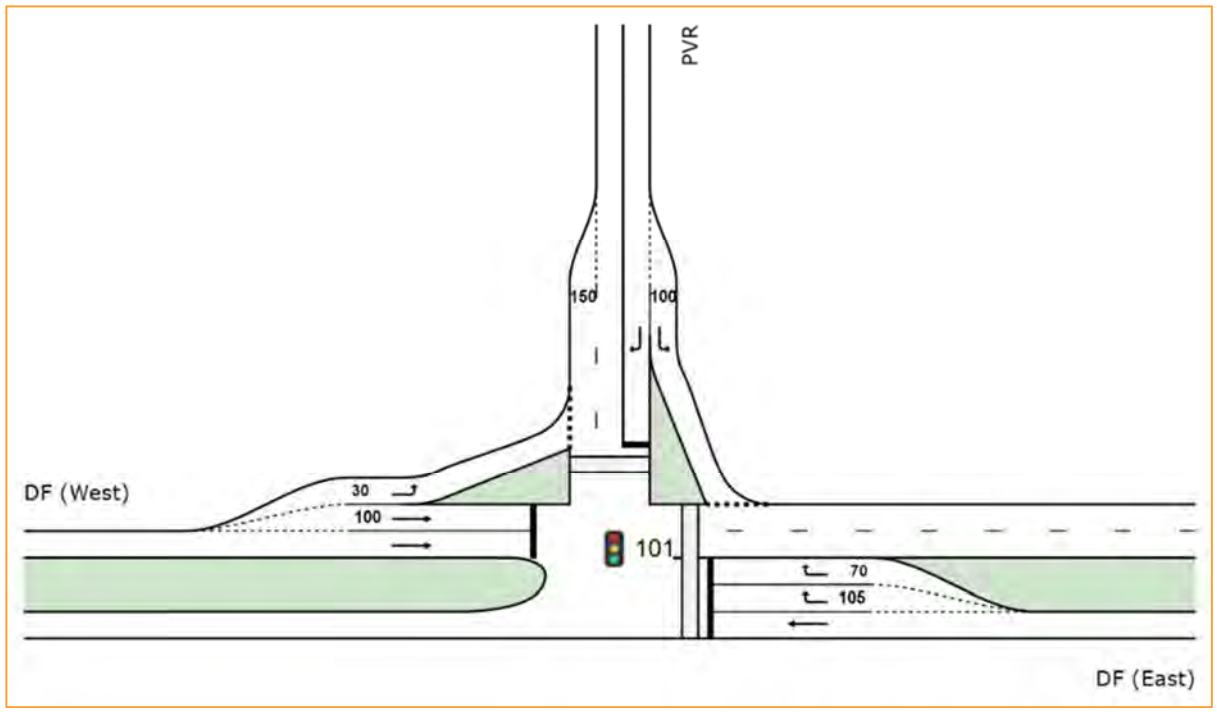


Figure 24: Interim Signalised Intersection Upgrade (2,800 households)

It should be noted that the interim arrangement assumes that two lanes are provided between the Pine Valley Road / Dairy Flat Highway intersection and the Silverdale interchange in the eastbound direction.

The performance of this intersection as reported from the SIDRA modelling for both periods is provided in ***Table 20***.

[1] SIDRA – Signalised and unsignalised Intersection Design and Research Aid – SIDRA Solutions

Approach	Movement	2800HH							
		AM Peak Hour				PM Peak Hour			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Pine Valley Road (north)	Left	1,187	16	B	25	423	9	A	5
	Right	286	23	C		181	31	C	
Dairy Flat Highway (east)	Through	466	12	B	10	381	4	A	17
	Right	209	27	C		896	34	C	
Dairy Flat Highway (west)	Left	78	7	A	5	386	10	B	13
	Through	336	28	C		795	27	C	
All Vehicles		**2,562**	**18**	**B**	**25**	**3,062**	**22**	**C**	**17**

Table 20: Dairy Flat Highway / Pine Valley Road Modelling Results (Interim Signalised Layout) – 2,800 HH

As can be seen, the interim layout improves the operation of the intersection in both peak periods to a LOS of B in the morning peak and C in the evening peak.

It is acknowledged that during the morning peak hour there is a high demand for vehicles turning left out of Pine Valley Road and that consideration of a zebra crossing facility across the free left turn is required to provide amenity for pedestrians. A zebra crossing across the free left turn into Pine Valley Road from Dairy Flat Highway could also be included. However, these are more detailed design issues which can be addressed at a later stage through the Notice of Requirement (**NoR**) work.

The same interim intersection layout has been tested up to the full build-out of 4,500 dwellings. The results of this assessment are provided in ***Table 21***.

Approach	Movement	4500HH							
		AM Peak Hour				PM Peak Hour			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Pine Valley Road (north)	Left	1,112	15	B	22	450	9	A	8
	Right	318	23	C		242	38	D	
Dairy Flat Highway (east)	Through	516	12	B	12	369	4	A	17
	Right	288	26	C		886	31	C	
Dairy Flat Highway (west)	Left	90	7	A	5	502	12	B	13
	Through	323	28	C		671	35	D	
All Vehicles		**2,647**	**18**	**B**	**22**	**3,120**	**23**	**C**	**17**

Table 21: Dairy Flat Highway / Pine Valley Road Modelling Results (Interim Signalised Layout) – 4,500 HH

The results of the modelling indicate that the interim layout is even able to accommodate the full yield of 4,500 dwellings within Milldale. However, the full buildout of this intersection is linked to the westbound dual-laning of the Silverdale Overbridge and this is discussed further in later in this section of the report.

In comparing the key turning volumes at the intersection it is noted that in the morning peak hour, the left turn from Pine Valley Road is not significantly different between the 2,800-dwelling and 4,500-dwelling scenarios (1,187 and 1,112vph respectively) , and this pattern is repeated in the evening peak hour for the right turn into Pine Valley Road (896 and 886vph respectively). There are several factors with regard to the modelling which can explain this:

- Redistribution of flows in the network in the vicinity of the site as a consequence of the geographic distribution of development within Milldale, which results in equilibrating the flows between the Millwater and Silverdale interchanges;
- Rerouting within the wider network (i.e more traffic using Dairy Flat Highway); and
- Peak spreading of traffic due to the capacity restraint on the state highway to the south.

It should be noted that a roundabout configuration has also been tested in SIDRA at the 2,800-dwelling build-out and the layout is provided in **Figure 25**.

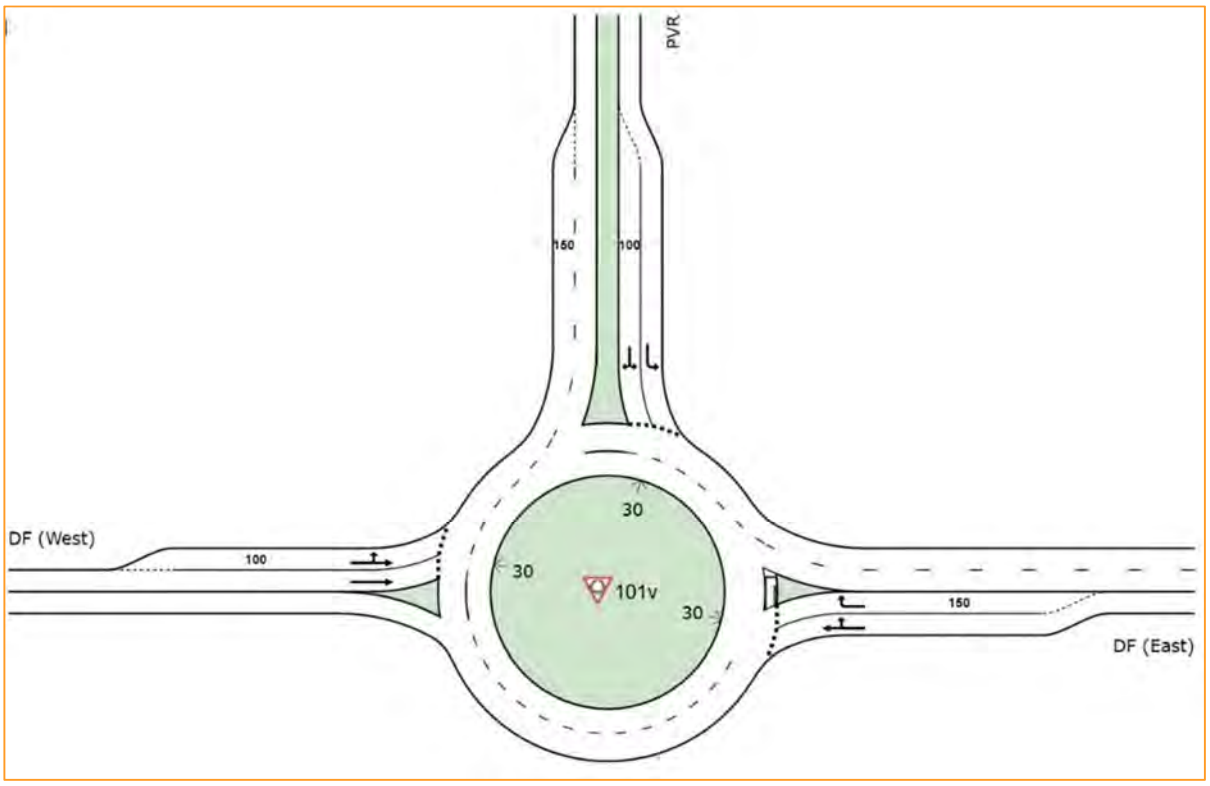


Figure 25: Interim Roundabout Intersection Upgrade (2,800 households)

The intersection performance of the roundabout option is summarised in ***Table 22***.

Approach	Movement	2800HH							
		AM Peak Hour				PM Peak Hour			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Pine Valley Road (north)	Left	1,187	7	A	3	423	7	A	3
	Right	286	13	B		181	14	B	
Dairy Flat Highway (east)	Through	466	5	A	6	381	5	A	5
	Right	209	11	B		896	11	B	
Dairy Flat Highway (west)	Left	78	5	A	1	386	14	B	10
	Through	336	5	A		795	16	B	
All Vehicles		**2,562**	**7**	**A**	**6**	**3,062**	**11**	**B**	**10**

Table 22: Dairy Flat Highway / Pine Valley Road Modelling Results (Interim Roundabout Layout)

For the roundabout option, the delays and queues are less than the signalised option. However, there are a number of factors/safety issues which need to be considered with the roundabout option:

- The lane arrangements will need to be clearly marked, particularly since it assumes an exclusive right turn and a shared right turn/though lane on the eastern approach. Dairy Flat Highway is the main road in this instance and drivers may assume that the through movement is the dominant flow (as per the western approach) and attempt to travel through the roundabout on the inside lane;
- The double left-turn from the north could also be an issue as most of the traffic in the morning peak would be destined for the state highway. This would result in lane-change conflicts downstream. Reducing the northern approach to a single left turn lane results in long queues on the northern approach;
- Roundabouts typically require more land; and
- Roundabouts, particularly two-laned roundabouts, are not safe from a pedestrian/cyclist perspective.

For these reasons, the interim signalised arrangement is preferred.

On the assumption that the Penlink project is delayed, and not in operation prior to the point where the widening of the Silverdale overbridge is required (at approximately 3,800 households), four-laning of Dairy Flat Highway is proposed, with a further upgrade to the Dairy Flat Highway / Pine Valley Road intersection as shown in **Figure 26**.

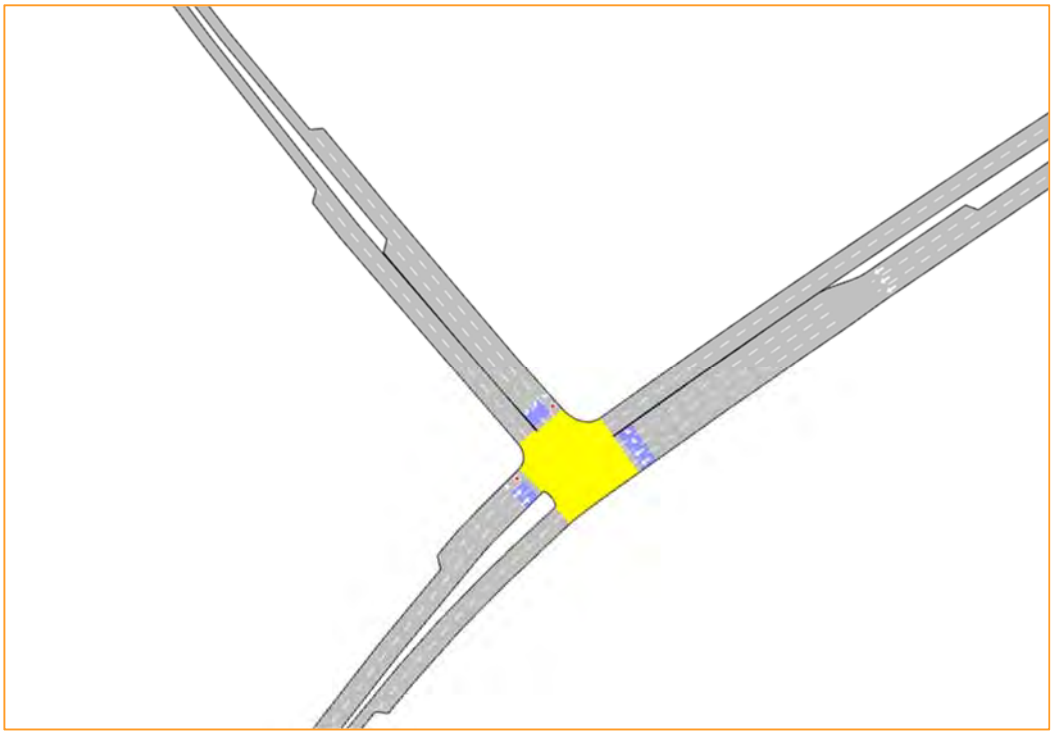


Figure 26: Modelled Layout for the Dairy Flat Highway / Pine Valley Road Intersection (to 4,500 HH)

The necessity for four-laning on Dairy Flat Highway arises as a consequence of two principal factors:

- There is a relatively high traffic demand heading eastbound towards the Silverdale interchange during both peak periods. In the morning peak much of this demand is from Milldale itself and in the evening peak there is a relatively high general traffic demand coming from the south;
- In the westbound direction, double-laning is required partly as a consequence of increased flows heading towards Milldale, but also to provide continuity in road layout with the double-laning of the Silverdale Interchange Over-bridge in the westbound direction. Two westbound lanes would not be required if the additional westbound lane across the Silverdale Over-bridge is not provided. The modelling indicates that the westbound flow between the northbound off-ramp and Pine Valley Road is around 1,300vph which is well within the carrying capacity of a single lane.

The predicted performance of this intersection is provided in **Table 23** for the two time periods, assessed for up to 4,500 households within Milldale**.**

Approach	Movement	4500HH							
		AM Peak Hour				PM Peak Hour			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Pine Valley Road (north)	Left	1,112	38	D	25	450	34	C	6
	Right	318	45	D		242	44	D	
Dairy Flat Highway (east)	Through	516	10	A	2	369	7	A	7
	Right	288	25	C		886	33	C	
Dairy Flat Highway (west)	Left	90	7	A	5	502	29	C	12
	Through	323	18	B		671	54	D	
All Vehicles		**2,647**	**28**	**C**	**25**	**3,120**	**35**	**C**	**12**

Table 23: Dairy Flat Highway / Pine Valley Road Signals - Modelling Results (4,500HH)

In both peaks, the intersection performs at similar levels to the interim layout. It also provides some future-proofing for growth beyond 4,500 households within Milldale and for further growth in the surrounding area. Overall, the performance of the intersection operates within acceptable levels during both peak periods.

The interim roundabout option was also investigated for this intersection at the 4,500-dwelling build-out. The roundabout outputs (as assessed using SIDRA) are provided in ***Table 24***.

Approach	Movement	4500HH							
		AM Peak Hour				PM Peak Hour			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Pine Valley Road (north)	Left	1,112	7	A	7	450	8	A	
	Right	318	14	B		242	14	B	
Dairy Flat Highway (east)	Through	516	5	A	4	369	5	A	
	Right	288	12	B		886	11	B	
Dairy Flat Highway (west)	Left	90	5	A	1	502	20	B	
	Through	323	5	A		671	23	C	
All Vehicles		**2,647**	**8**	**A**	**7**	**3,120**	**14**	**B**	

Table 24: Dairy Flat Highway / Pine Valley Road Roundabout - Modelling Results (4,500HH)

Whilst the results indicate that the roundabout has sufficient capacity to operate well for the 4,500-dwelling scenario, the same factors/safety issues as noted earlier still apply with the addition of one further issue. With the additional westbound lane provided across the Silverdale Over-bridge, the propensity for through traffic to become trapped in the exclusive right turn lane on the eastern approach to the roundabout increases. As such, the signalised option is still preferred over the roundabout.

6.3.8 Wainui Road / Argent Lane Intersection

The Wainui Road / Argent Lane intersection is modelled as a three-leg priority-controlled intersection. It is proposed to upgrade this intersection to a roundabout (single-lane circulatory) for safety reasons due to the limited sight distances available to the east and west on Wainui Road. Whilst this has not been re-coded in the micro-simulation model, flows have been extracted and input to a separate intersection analysis package in order to determine the likely operation. **Table 25** and **Table 26** summarise the expected performance for each peak hour.

Approach	Movement	Morning Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Argent Lane (south)	Left	18	3	A	0	23	3	A	0
	Right	4	8	A		5	8	A	
Wainui Road (east)	Left	4	4	A	0	5	3	A	0
	Through	63	4	A		68	3	A	
Wainui Road (west)	Through	195	2	A	2	241	2	A	2
	Right	178	7	A		130	7	A	
All Vehicles		**462**	**5**	**A**	**2**	**472**	**4**	**A**	**2**

Table 25: Wainui Road / Argent Lane Modelling Results (AM Peak Hour)

Approach	Movement	Evening Peak Hour							
		2800HH				4500HH			
		Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)	Flow (vph)	Delay (s)	LOS	Max 95% Q (vehs)
Argent Lane (south)	Left	207	4	A	1	67	4	A	1
	Right	1	9	A		5	10	A	
Wainui Road (east)	Left	1	3	A	1	5	3	A	2
	Through	239	3	A		395	3	A	
Wainui Road (west)	Through	114	2	A	1	121	2	A	1
	Right	76	7	A		78	8	A	
All Vehicles		**638**	**4**	**A**	**1**	**671**	**4**	**A**	**2**

Table 26: Wainui Road / Argent Lane Modelling Results (PM Peak Hour)

As can be seen, the intersection operates well in both peak hours with only marginal differences between the 2,800 dwelling and 4,500 dwelling scenarios.

6.3.9 State Highway Performance

The travel time along SH1 has been used as the key measure to assess the impact of the development on the motorway.

Table 27 provides the average travel times on SH1 between the southern and northern ends of the model for the scenarios with the approved ITA for the 2,800 dwelling development and the proposed 4,500 dwelling development for the morning and evening peak hour periods. The total length of the motorway within the model is approximately 21.4km running from south of the Greville interchange to north of the Grand Drive interchange. All times are reported in seconds.

Direction of Travel	AM Peak Period		PM Peak Period	
	Northbound	Southbound	Northbound	Southbound
2,800 Households	799	1,276	1,169	814
4,500 Households	801	1,362	1,291	814
Difference	2	86	122	0

Table 27: SH1 Modelled Travel Times

As can be seen, the differences in travel times are negligible for the off-peak directions in both periods. In the peak direction, the average travel time increases by approximately one and a half minutes in the morning peak and just over two minutes in the evening peak. This equates to an increased travel time of approximately 5 seconds per kilometre and 6 seconds per kilometre in the morning and evening peak periods respectively which is considered acceptable.

More detailed travel time patterns for the critical directions have also been extracted from the model. The patterns for the morning peak period (at 15-minute intervals) are illustrated in **Figure 27**.

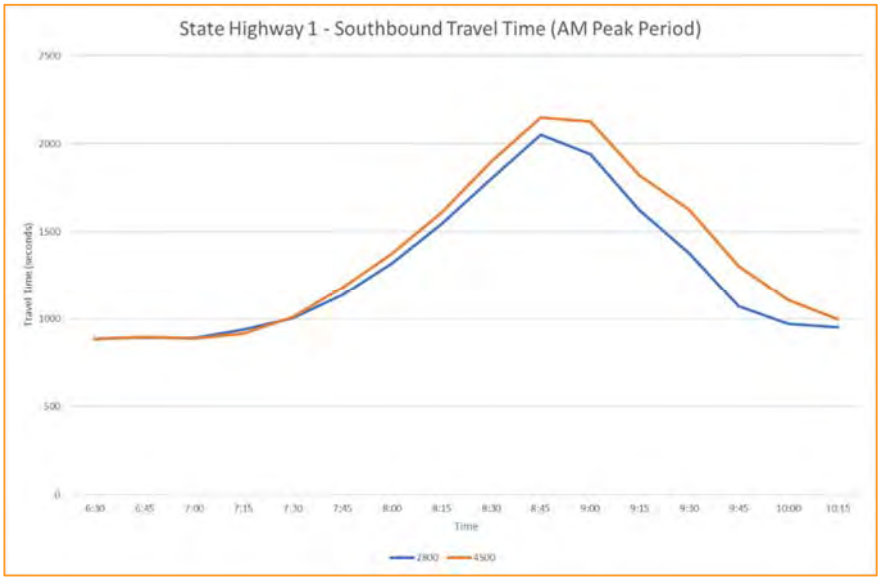


Figure 27: Southbound Travel Time Patterns (morning peak period)

As indicated, travel times are similar for both scenarios up to around 7:00am after which the travel times for the 4,500 dwelling scenario increase to a peak of around 35 minutes (difference of approximately 1.5 minutes over the 2,800 dwelling scenario) then decline to similar levels at the end of the morning period. The highest difference is around four minutes which is not considered significant over a distance of over 21km.

The patterns for the evening peak period are illustrated in **Figure 28**.

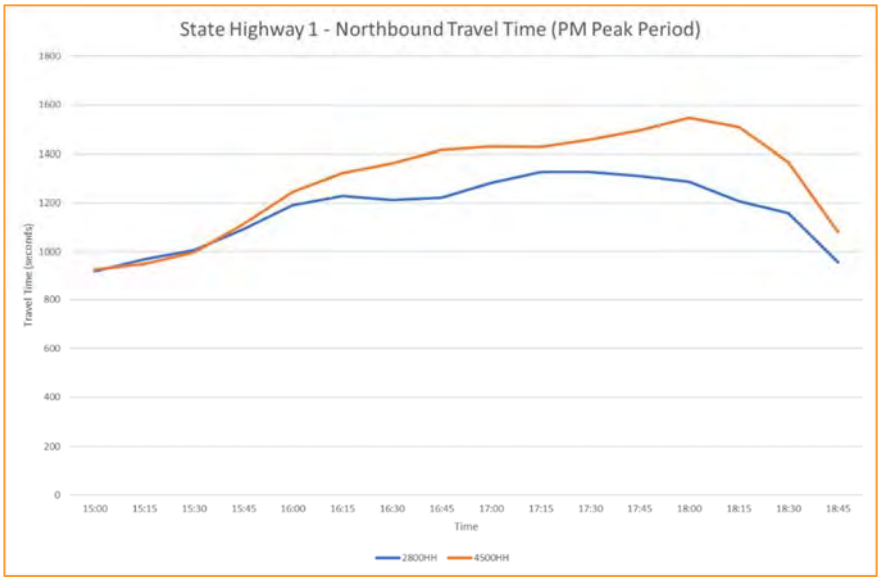


Figure 28: Southbound Travel Time Patterns (evening peak period)

For the evening peak period the highest travel time difference for the two scenarios is around five minutes and this occurs at 6pm. At the end of the period journey times for the 4,500 dwelling scenario drop back towards the 2,800 dwelling scenario. Overall, this peak difference of five minutes is not considered significant.

For both peak periods, there are no significant issues of unreleased vehicles (those which cannot enter the modelled network due to queuing/congestion) at the end of the respective periods.

6.4 Traffic Effects Summary

Overall intersection performances (in terms of LOS) for the critical intersections are summarised in **Table 28** below.

Intersection	Morning Peak Hour	Evening Peak Hour
Wainui Over-bridge / Millwater Parkway	B	B
Millwater Interchange Off-ramp	A	A
Millwater Interchange On-ramp	A	A
Wainui / Sidwell	A	A
Silverdale Interchange (Western roundabout)	A	A
Silverdale Interchange (Eastern roundabout)	A	A
Dairy Flat Highway / Pine Valley (Interim – 2,800HH)	B	C
Dairy Flat Highway / Pine Valley (Full – 4,500HH)	C	C
Wainui Road / Argent Lane	A	A

Table 28: Overall Intersection Performance Summary

In terms of overall delay, the critical intersections in the vicinity of the site all operate within acceptable levels of performance for both the morning and evening peak hours.

The assessment has assumed the following infrastructure is provided as part of the development of the Milldale area to 4,500 dwellings:

- The intersection of Pine Valley Road and Dairy Flat Highway is upgraded into a signalised intersection;
- Four traffic lanes (two in each direction) are provided on Dairy Flat Highway between Pine Valley Road and the Silverdale Interchange;
- The intersection of Pine Valley Road, Old Pine Valley Road and Argent Lane is upgraded into a roundabout; and
- An additional westbound lane is added onto the bridge between Hibiscus Coast Highway and Dairy Flat Highway within the Silverdale motorway interchange.

In summary the results of the modelling indicate that the surrounding road network, augmented by the proposed infrastructure improvement works as described above, will be capable of accommodating the anticipated transportation demands of the development without compromising the function or performance of the wider road network, including SH1.

6.5 Other Transport Modes

The previous sub-sections of Section 6 describe the likely traffic effects associated with private vehicles travelling to and from the site. Other transport modes include walking, cycling and public transport.

6.5.1 Walking

Section 2.4 discusses the pedestrian/cycle network which is proposed for Milldale. Section 4 provides the proposed road cross-sections. As indicated, all roads will provide footpaths on both sides of the road (except for the interim Wainui Road layout since FHDL does not own the land along the northern side of Wainui Road) with either berms or indented parking bays separating footpaths from the live traffic lanes. Footpaths are at least 1.8m wide. There is enough permeability in the road network for pedestrians to walk to all key destinations within the suburb, such as the town and neighbourhood centres, the stream edge recreational areas and the school. Overall, it is considered that the proposed pedestrian infrastructure will provide a high level of service for pedestrians within Milldale. Until the Highgate Over-bridge is constructed external access would be via the Millwater Interchange Over-bridge and the proposed shared path route to the northeast of the suburb.

6.5.2 Cycling

Dedicated cycle lanes are proposed for arterial routes (which have added solid median protection from live traffic lanes) and on all collector roads through the suburb. Collector roads provide connections to the town and neighbourhood centres and to the Millwater Interchange and Highgate Over-bridges while Argent Lane provides access to Dairy Flat Highway. Prior to the construction of the Highgate Over-bridge, more experienced cyclists would use the Millwater Interchange Over-bridge to gain access to the east and a shared path to the northeast of Milldale will provide access to the shared path network around Millwater for less experienced cyclists. The proposed cycle network will provide a good level of accessibility for cyclists within the suburb. External connections for experienced cyclists would be via the Millwater Interchange Over-bridge and Pine Valley Road connection. The shared path route to the northeast of the suburb will provide connectivity to the Millwater shared path network for less experienced cyclists until the Highgate Over-bridge is constructed.

6.5.3 Public Transport

The future arterial road cross-sections show separate bus lanes and the AT Public Transport (**PT**) team have already provided inputs as to the most appropriate routes for PT services through the suburb. When the northern busway is extended to Grand Drive (one of the SGA's proposed improvements for the northern region) this will further enhance PT operation in the area. In anticipation of this, FHLDL is presently reserving land within the suburb for a bus station. It is recommended that AT take advantage of the proposed provisions and implement a good strategy for PT services in Milldale.

In summary it is considered that good provisions have been made throughout Milldale for transport modes other than the private car.

7. Proposed Mitigation

Through the modelling which has been undertaken for the assessment, the following mitigation measures have been identified to support the full potential build-out of the development area up to 4,500 dwellings. The first three items on the list are those measures that have not yet been constructed and were identified for the initial development of 2,800 dwellings which has an approved ITA:

- Provision of a new motorway over-bridge connecting Sidwell Road and Highgate Parkway to the east. As reported previously, the new over-bridge
- Providing connectivity to the bridge that crosses Weiti Stream to the south.
- Providing a left turn slip lane at the top of the northbound off-ramp at the Silverdale interchange.
- Upgrading the intersection of Pine Valley Road and Dairy Flat Highway to a signalised intersection.
- Upgrade the section of Dairy Flat Highway between Pine Valley Road and the Silverdale interchange to four lanes (two lanes per direction).
- Upgrading the intersection of Pine Valley Road, Old Pine Valley Road and Argent Lane to a roundabout.
- Providing an additional westbound lane to the over-bridge between Hibiscus Coast Highway and Dairy Flat Highway within the Silverdale motorway interchange.

The following **Table 29** provides an indicative timeline of when the various improvements might be required on the basis of modelled household yields.

Mitigation	Modelled Households Mitigation Triggers	Funding	Estimated Construction	Estimated Dwellings
Weiti Stream Over-bridge	2,000	Funded	2020	Trigger offered 1,200
Walk / Cycle path off Sidwell Road and under SH1	1,200	Funded	2021	Trigger offered 1,200
Highgate Over-bridge	2,000	Funded	2021-2022	Trigger offered 1,200
Left turn slip lane off Northbound off-ramp at Silverdale	2,800	Funded	2021	Trigger offered 1,600
Pine Valley Road / Dairy Flat (interim intersection improvements as per Figure 24)	2,800	Funded	2021-2022	Trigger offered 2,800
Pine Valley Road / Old Pine Valley Road / Argent Lane roundabout	3,800	Funded	2022	Trigger offered 1,200
Argent Lane / Wainui Road roundabout*	4,500	Funded	2022	Trigger offered 1,600
If Penlink is not operational, additional westbound lane on Silverdale Over-bridge	3,800	Unfunded	2025-2026	Trigger offered 3,800 (No Penlink)
If Penlink is not operational, Dairy Flat four-laning (also dependent on additional westbound lane on Silverdale Overbridge)	3,800	Unfunded	2023-2024	Trigger offered 3,800 (No Penlink)
If Penlink is not operational, Pine Valley Road / Dairy Flat (full buildout improvements as per Figure 26) (dependent on Dairy Flat four-laning and additional westbound lane on Silverdale Overbridge)	3,800	Unfunded	2023-2024	Trigger offered 3,800 (No Penlink)

Table 29: Indicative Mitigation Triggers and Responsibilities

*****as assessed with respect to capacity. However, this project should be brought forward once the number of households increases to a point where higher numbers of vehicles access this intersection i.e as the north western areas of Milldale are developed.*

There are three projects identified as being unfunded at this point and this is because it is uncertain if they will actually be required or what the final form might be as they are primarily dependent on the Penlink project and Silverdale West Structure Plan proposal.

The modelling assumes that required infrastructure identified is in place at the appropriate time and that PT services are operational. Without these the assumed trip generation rates could potentially be higher and this would have an impact on other delivered infrastructure. However, this potential risk will be controlled through resource consent and Section 224c processes and can be considered at that stage. It should also be noted that the "Modelled Households Mitigation Triggers" column in Table 29 refers to the household triggers derived from the modelling whilst the "Estimated Dwellings" column refers to the triggers which have been adopted by the developer, which are typically earlier than the model triggers. This is a conservative approach and will help offset some of the uncertainty regarding the trip generation assumptions in the modelling. The estimated construction dates are based on current FHLD planning which in many cases would see the infrastructure built ahead of when it is required under the trigger offered, which is again a conservative approach.

With respect to the trigger for the left turn slip lane at the end of the northbound off-ramp at Silverdale, it is acknowledged that previous modelling identified the requirement for this to be implemented at a build-out of around 2,000 dwellings, based on the evening peak flows. However, the more recent transportation model, provided by AT, and used to inform the current assessment, indicates that the improvements can be delayed in order to coincide with the proposed improvements along Dairy Flat Highway, which is generally timed to a build-out of 2,800 dwellings in Milldale. The difference in the modelling can generally be attributed to the following:

- Changes to the future land use assumptions in the northern region;
- The extent of the new model is larger (extending to south of Greville Road as opposed to Oteha Valley Road previously);
- The previous regional model was a macroscopic model which fed into a separate microsimulation model with a smaller extent. The current model is a regional mesoscopic model (with microscopic elements) which allows a more detailed representation of vehicle behaviour, particularly on the motorway;
- Intersection modelling in the new model is more detailed than it would have been in the previous model, which would affect wider area route choice; and
- The current model includes effects of downstream congestion, which occurs just north of the Oteha Valley Road interchange where the motorway drops from three lanes to two lanes.

A comparison of the traffic flows at the western roundabout of the Silverdale interchange for the critical evening peak hour is provided in ***Table 30*** for the 2,800 dwelling model scenario.

Approach	Movement	Previous Modelling	Updated Modelling
Northbound Off-Ramp	Left	461	619
	Right	1,703	1,394
Dairy Flat Highway	Left	210	295
	Through	431	865
Over-bridge	Through	236	598
	Right	360	86
All Vehicles		**3,401**	**3,857**

Table 30: Turning Volumes – western roundabout Silverdale Interchange (Evening Peak Hour)

As shown, the updated modelling indicates more vehicles using the western roundabout but a different flow pattern, with around 270 less vehicles using the off-ramp and around 400 more vehicles heading

eastbound from Dairy Flat Highway in the updated modelling. The conflicting flow across the overbridge remains around the same although the through component is noticeably higher in the updated modelling.

Incremental modelling indicates that at the 2,800 dwelling yield the maximum queue on the northbound off-ramp (without the additional left turn slip lane) is around 245m (or approximately 70% of the ramp length). At 3,200 dwellings the maximum queue increases to 322m (92% of the ramp) and at 3,600 dwellings the queue extends beyond the end of the ramp. For this reason, the model trigger for the implementation of the left turn slip is 2,800 dwellings. However, as noted in Table 25, the estimated year of construction is around 2021, coinciding with a build-out of approximately 1,600 dwellings.

It can also be noted that earlier assessments indicated that the Weiti Stream over-bridge improvement was triggered earlier at around 1,200 to 1,400 dwellings. The new modelling, again as shown by the latest transportation model, indicates that this piece of infrastructure could potentially be delayed until 2,000 dwellings are provided, for largely the same reasons noted for the northbound off-ramp slip lane but also due to the sequencing of construction, starting in the northwest and circling down to the south. Notwithstanding this, the estimated year of construction for the Weiti Stream over-bridge is 2020, coinciding with a build-out of approximately 1,200 dwellings.

These triggers are subject to change, but it is understood that as the Milldale area is developed, each subdivision will be subject to its own consenting process and interim assessments can be undertaken at those stages. In this respect it can be noted that subdivision consents to date have relied on recent traffic surveys undertaken at the Millwater interchange (which will be the main access point until the Pine Valley route is connected) and focused on effects at that interchange using a more localised micro-simulation traffic model specifically developed for the earlier stages. The trip generation rates used for those assessment are higher than what has been used for the full development build-out to reflect lower PT provision, no schools in the suburb and no commercial activity.

The main piece of infrastructure included for the full build-out of Milldale to 4,500 dwellings is the additional westbound lane on the Silverdale Over-bridge. The trigger point has been derived from an incremental assessment of yield within Milldale with the key performance measure being the travel time along Hibiscus Coast Highway. Network operation has also been checked visually. The visual assessment indicates that in the morning peak hour the Silverdale over-bridge is a capacity restraint for vehicles travelling westbound. As traffic volumes increase, the queues which form back from the roundabout in the morning peak hour start to affect the southbound on-ramp to the motorway and this starts to affect travel times significantly at around the 3,800 dwellings yield. This is illustrated in the following ***Table 31*** where the travel time route is from the Whangaparaoa Road / Red Beach intersection through to the motorway (a distance of around 4.5km).

Yield (Dwellings)	AM Peak Travel Time (Westbound on HCH) (seconds)	AM Peak Travel Time (Eastbound on HCH) (seconds)	PM Peak Travel Time (Westbound on HCH) (seconds)	PM Peak Travel Time (Eastbound on HCH) (seconds)
3,000	506	393	322	463
3,200	554	405	330	452
3,400	556	401	323	459
3,600	572	403	324	460
3,800	819	411	323	460
4,000	871	408	323	463
4,200	934	414	327	455
4,400	970	405	324	457

Table 31: Sensitivity Testing

As can be seen, between 3,600 and 3,800 dwellings, a noticeable increase in travel time of around 250 seconds is observed in the morning peak model indicating a significant change in traffic patterns. This is

the basis for proposing the additional westbound lane to be included at a yield of around 3,800 dwellings. In this respect, the model outputs suggest that by the time 3,800 dwellings have been constructed and occupied, the additional westbound lane needs to be in place. There would be no point in having the additional westbound lane constructed at the 3,600 dwellings as this would represent an over-supply of infrastructure. It also must be acknowledged that these triggers are indicative and highly dependent on when the Penlink project is completed. If Penlink is constructed earlier than anticipated, then this will free up additional capacity at the Silverdale interchange such that widening may not be required.

With these measures implemented the anticipated transportation demands of the full development can be accommodated without compromising the function or performance of the wider road network, including SH1.

Provisions for walking and cycling have been provided throughout the suburb through footpaths and dedicated cycle lanes along main routes. Such infrastructure will be incorporated at the time of construction of these routes. These provisions are considered appropriate and satisfactory to support the Milldale development in full.

8. Additional Infrastructure Proposals

Two other key potential infrastructure proposals have been identified recently. It should be noted that these proposals are not necessary to support the development as such but will be able to provide additional capacity through the regional network as the wider area continues to develop. The proposals are:

- Penlink
- Northern Busway Extension

The implications of both these proposals from a transportation perspective are discussed below.

8.1 Penlink

Penlink is a proposed new route that connections Whangaparaoa Peninsula directly to SH1. The link would result in traffic from Whangaparaoa not having to travel through the Silverdale interchange, thereby significantly reducing the congestion at this location.

At present, Penlink has a designation and approved resource consent. However, the road is still being designed, and no definite timeframes are in place as to when it may be completed. Once completed, traffic from Milldale will be more readily able to access SH1 via Silverdale.

8.2 Northern Busway Extension

The Northern Busway currently terminates at Constellation Drive. Northern Express buses use the SH1 mainline to complete their trips to Albany and Hibiscus Coast stations. It is currently proposed to extend the busway to Albany as part of the SH1/SH18 interchange upgrade. Further thought is being given to future potential extensions of the busway to Silverdale however there are no timeframes for construction and no funding is currently allocated for such a project.

In general, the extension of the busway to Silverdale will provide residents in the area with a viable transport alternative to the private car. As a consequence, public transport modes would become more attractive, but a good local network will be required to supplement the busway given the limited parking supply at Hibiscus Coast station.

Other infrastructure proposals being investigated by the SGA to support growth in the northern areas or Silverdale, Wainui and Dairy Flat include:

- Rapid Transit Network extending from Albany to Grand Drive;
- A high frequency bus route connecting Orewa and Silverdale with the Rapid Transit Network;
- Penlink and new east-west connection to Dairy Flat;
- New north-south connection between Albany and Orewa;
- Upgraded Dairy Flat Highway;
- Upgraded East Coast Road;

- New and upgraded east-west connections, including Wilks, Kahikatea Flat, Pine Valley and Awanohi Roads;
- Curley Avenue extension east-west connection;
- New connection to Grand Drive; and
- Increased capacity on State Highway 1.

Nevertheless, it should be re-iterated that the traffic modelling for Milldale does not rely on the delivery of any of the projects recorded in this section.

9. Transport Planning and Policy

The following sections provide a review of established policy and plans in relation to the development enabled by the proposed Plan Variation. The documents reviewed comprise:

- Government Policy Statement
- Auckland Plan
- Operative Auckland Regional Policy Statement
- Auckland Regional Land Transport Strategy
- Auckland Regional Public Transport Plan
- Regional Arterial Road Plan
- Sustainable Transport Plan
- Auckland Unitary Plan
- Future Urban Land Supply Strategy
- Transport for Future Urban Growth

These documents provide the principal framework to support long term growth throughout the Auckland region.

9.1 Government Policy Statement (GPS)

The GPS sets out the Government's desired outcomes and priorities for the land transport sector. It describes what the Government expects to achieve through the National Land Transport Fund and the manner in which funding is allocating to upgrade and maintain the land transport network.

A draft GPS was released by the Minister of Transport for public engagement on 14 March 2018. While the current draft GPS is not yet official Government policy, it is anticipated that the majority of the priorities and objectives outlined the draft will be adopted by the Government in the final GPS by 30 June 2018. The final GPS will provide strategic direction for a 10-year period until 2027/2028 to improve the performance of the land transport system.

The four strategic priorities of the draft GPS are safety, access, environment and value for money. The GPS summarises the objectives of these priorities as follows:

- Safety – is a safe system free of death and serious injury;
- Access – provides increased access to economic and social opportunities, enables transport choice and is resilient;
- Environment – reduces the adverse effects on the climate, local environment and public health; and
- Value for money – delivers the right infrastructure and services to the right level at the best cost.

The draft GPS outlines three themes to assist with effectively delivering upon the strategic priorities. These themes for the draft GPS are described below:

- A mode neutral approach to transport planning and investment decisions;

- Incorporating technology and innovation into the design and delivery of land transport investment; and
- Integrating land use and transport planning and delivery.

The internal road network is designed to prevent severe congestion occurring, including at the intersections bordering the site. The new SH1 over-bridge provides an alternative access location to the development area thereby reducing congestion and improving resilience. Reducing congestion improves journey reliability time while reducing the impact of the transportation system on the environment. These roads, as well as the proposed new roads within the development, provide better access to employment areas and will, in turn, contribute to economic growth and productivity.

The design of the internal road network provides resilience in that there are multiple route options available should one section of infrastructure fail. The speed limit in the vicinity of the subject site will be lowered to improve road safety. A more intense level of development in the region makes public transport services more economically viable, providing more transport options for the new development. More viable transport options will reduce the environmental impacts from land transport.

These factors mean that the investment into the land transport features in the vicinity of the site provide good value for money. The development is therefore considered to align with the overarching goals and strategic priorities of the GPS.

9.2 Auckland Plan

The Auckland Plan is Auckland Council's 30-year strategy to create the world's most liveable city. Initially produced in 2012, a new draft plan was released in February 2018. Since the original Plan was released, the Unitary Plan has been introduced and several significant infrastructure developments have been completed, including the completion of the Waterview Tunnel. The new draft Auckland Plan shows how Auckland will prepare for an expected population increase by 39% or up to 2.4million people by 2043, and the key challenges Auckland faces in dealing with this population growth. Other key challenges identified are sharing prosperity with all Aucklanders and reducing environmental degradation.

The draft Auckland Plan is comprised of six outcomes targeting specific areas to progress, one of which addresses transport and access. The draft Auckland Plan summarises this outcome as "Aucklanders will be more easily able to get to where they want to go and will have choices how they get around."

The transport and access outcome outlines three directions:

- Create an integrated transport system connecting people, places, goods and services;
- Increase genuine travel choices for a healthy, vibrant and equitable Auckland; and
- Maximise safety and environmental protection.

The draft Auckland Plan also includes seven focus areas for the transport and access outcome:

- Make better use of existing transport networks, including a greater focus on influencing travel demand;
- Target new transport investment to the most significant challenges;
- Maximise the benefits from transport technology;
- Make walking, cycling and public transport preferred choices for many more Aucklanders;
- Better integrate land use and transport decisions;
- Move to a safe transport network, free from death and serious injury; and
- Develop a sustainable and resilient transport system

Providing a high quality, residential and neighbourhood centre development in Wainui East provides an opportunity for the public transport network to be expanded and further developed, to effectively serve the growing population in this area. Along with developments in Millwater and further development on future urban land surrounding Milldale, public transport routes to serve the area will become much more economically viable. The increased land development intensity allows for an efficient and economical public transport system to operate.

The existing PnR facility in Silverdale on the corner of Hibiscus Coast Highway and Painton Road is currently being expanded, which will further encourage the use of public transport. There are also plans to extend

the northern busway from Albany to Silverdale, improving the efficiency of the bus routes between Silverdale and more central parts of Auckland. Furthermore, there are options to provide an additional PnR facility on the fringe of Milldale which could interlink with the Silverdale facility and future public transport infrastructure.

Overall, this will help to achieve the target of increasing travel choices and developing a sustainable transport network.

9.3 Auckland Unitary Plan (Operative in Part)

The Unitary Plan which has been operative in part since November 2016, has the following objectives with regard to the regions transport infrastructure:

i. Land use and all modes of transport are integrated in a manner that enables
    a. The benefits of an integrated transport network to be realised; and
    b. The adverse effects of traffic generation on the transport network to be managed;
ii. An integrated public transport, walking and cycling network is provided for;
iii. Parking and loading is supports urban growth and the quality compact urban form;
iv. The provision of safe and efficient parking, loading and access is commensurate with the character, scale and intensity of the zone;
v. Pedestrian safety and amenity along public footpaths is priorities; and
vi. Road / rail crossings operate safely with neighbouring land use and development.

While current public transport options for the area are limited, the development provides for enhanced economic viability to support new bus routes and services. These new routes are readily able to integrate with the Northern Busway. Increased pedestrian and cyclist infrastructure will promote these active modes for travel within and around the development area. Providing for these alternative travel modes will increase the accessibility of the site and promote better community health and integration.

Parking will be provided at an appropriate rate to support the future activities within the development area for each of the different land uses while not generating adverse effects by inducing demand for private vehicles. Pedestrian safety and amenity is well considered by providing dedicated pedestrian areas such as the walkways adjacent to the reserve areas. The new bridge over SH1 will include provision for pedestrians to provide a direct access to the employment areas on the eastern side.

The proposed development therefore aligns with the transport objectives of the Unitary Plan.

9.4 Auckland Transport Alignment Project (ATAP)

Given the growth challenges that Auckland is facing, and the need for some big transport decisions to deal with this, the Government and Council have agreed on the need to improve alignment on a long-term strategic approach to transport in Auckland. Originally finalised in September 2016, a new edition of ATAP was released in April 2018 to provide a package to develop Auckland's transport system over the next 30 years.

The direction of ATAP is based upon the latest draft GPS and the draft Auckland Plan. Compared to the previous edition of ATAP, a greater emphasis has been placed on public transport (including rapid transit), walking, cycling and safety. Ultimately, ATAP aims to provide Auckland with a transport system that provides safe, reliable and sustainable access.

It contains investment to be made in projects to assist growth over the next decade (2018 – 2028), while identifying future priorities beyond 2028. The projects identified in ATAP which affect this proposal include the following:

- Rapid transit:
    - Northern Busway Extension (Constellation Station to Albany) – 2018-2028; and
    - North Shore (Orewa to City, including Takapuna connection, upgrade of the Northern Busway and new harbour crossing) – 2028 beyond.
- Strategic and local road network:
    - Northern Corridor Improvements – 2018-2028;

- Penlink; and
- Additional Waitemata Harbour Crossing – 2028 beyond.

The rapid transit connections on the North Shore will directly increase the attractiveness of using public transport as an alternative mode to private vehicles. The short-term project of extending the Northern Busway to Albany will improve bus travel times for that section, which is part of the route between the city and Silverdale. The busway is proposed to be extended further north at some time in the future further improving bus travel times and reliability.

The Northern Corridor improvements involves upgrading the SH1/SH18 interchange allowing for a more efficient route between the North Shore and west Auckland while also improving the attractiveness of the western ring route as an alternative to SH1. The form of the additional Waitemata Harbour crossing is unknown but is likely to provide benefits for private and public vehicle modes.

The Penlink project will have a significant impact on the Silverdale area by providing a more direct route between Whangaparaoa and SH1. This will significantly reduce congestion at the Silverdale interchange, creating capacity for the new development.

The ATAP package is intended to support greenfield growth across Auckland by enabling around 30,000 more houses to be built over the next decade. This includes 6,000 homes in the Silverdale/Dairy Flat area.

9.5 Regional Land Transport Plan (RLTP)

The RLTP, prepared by Auckland Transport with NZTA and Kiwirail, identifies the priority of a number of region-wide transport projects over a 10-year period. The current RLTP was adopted in 2015 and covers the period 2015-2025. The RLTP is reviewed every three years, which means that it will be updated in 2018. The ATAP package released in April 2018 will provide direction for the new RLTP.

The 2015 edition of the RLTP outlines five strategic themes to deliver the transportation components, which include:

- Prioritise rapid, high frequency public transport;
- Transform and elevate customer focus and experience;
- Build network optimisation and resilience;
- Ensure a sustainable funding model; and
- Develop creative, adaptive and innovative implementation.

The development in the wider Silverdale, Wainui and Dairy Flat areas means that increased public transport services become more viable and can therefore be prioritised. The new roads provided as part of the development increase permeability, improving the resilience of the road network by providing alternative routes between locations. The development site will include new cyclist and pedestrian infrastructure. This will encourage a positive behavioural change away from private vehicle use and support the objectives of the RLTP.

9.6 Regional Public Transport Plan (RPTP)

The RPTP seeks to deliver an improved public transport network in Auckland by increasing public transport frequency along key transport corridors and simplifying ticketing to improve user experience.

The vision of the RPTP is to deliver *"An integrated, efficient and effective public transport network that offers a wider range of trips and valued by Aucklanders"*. To achieve this vision, Auckland's public transport system needs to deliver:

- Services that align with future land use patterns;
- Services that meet customer needs;
- Increased passenger numbers;
- Increased public transport mode share; and
- Improved value for money.

The existing park and ride facility at Silverdale is currently being expanded. This will increase the number of commuters able to use public transport to travel towards Auckland city rather than depending on private vehicle trips. The high frequency route will attract city commuters which will help to achieve the vision of this plan.

9.7 Integrated Transport Programme (ITP)

Auckland's 2012-2041 ITP sets out the 30-year investment programme to meet the transport priorities outlined in the draft Auckland Plan across travel modes covering the responsibilities of all transport agencies. The ITP provides a consolidated transport investment programme across the transport system over the next 30 years. The programme covers footpaths, cycle facilities, public transport, State highways and local roads, intermodal transport facilities and supporting facilities such as parking and park-and-ride sites. In particular the ITP:

- Guides transport agencies in their detailed planning activities for maintaining, operating, renewing and developing their transport networks;
- Directs transport asset management, corridor and network development, transport service levels and the transport capital portfolio for each of the 10-year periods to 2041; and
- Informs the detailed programming of activities in the RLTP which is a 10-year plan prioritising region wide transport projects currently for 2015-2025.

Projects identified in the ITP are largely addressed by ATAP, the RLTP and the RPTP, which are all detailed previously in this report. As it has been demonstrated that the proposed development integrates well with these policies.

9.8 Future Urban Land Supply Strategy (FULSS)

The primary purpose of the FULSS is to identify the sequencing and timing of future urban land for development readiness over the next 30 years. The FULSS places development in the Wainui East area in the contracted or planned stage (2012-2017) with the remainder of Wainui East placed in the second half of the second decade (2033 to 2037).

The timing of the proposed development generally aligns with the timing set out in the FULSS.

9.9 Supporting Growth Alliance (SGA)

The SGA programme is being undertaken collaboratively by AT, Auckland Council and NZTA to identify a transport network to support Auckland's new housing and business areas. In this respect, around 11,000 acres of greenfield land has been zoned 'Future Urban' in the Unitary Plan and the SGA are focussed on planning transport infrastructure that will make future communities well-connected and great places to live. The SGA programme recognises that growth areas for Auckland are focussed in:

- North Auckland: Wainui, Silverdale and Dairy Flat
- Northwest: Kumeu, Huapai, Red Hills, Whenuapai and Riverhead
- South: Takanini, Opaheke, Drury, Paerata, and Pukekohe.

Significant new infrastructure will be needed to support this growth.

In July 2019 the SGA released the Indicative Strategic Transport Network map for North Auckland. This is illustrated in ***Figure 29***.

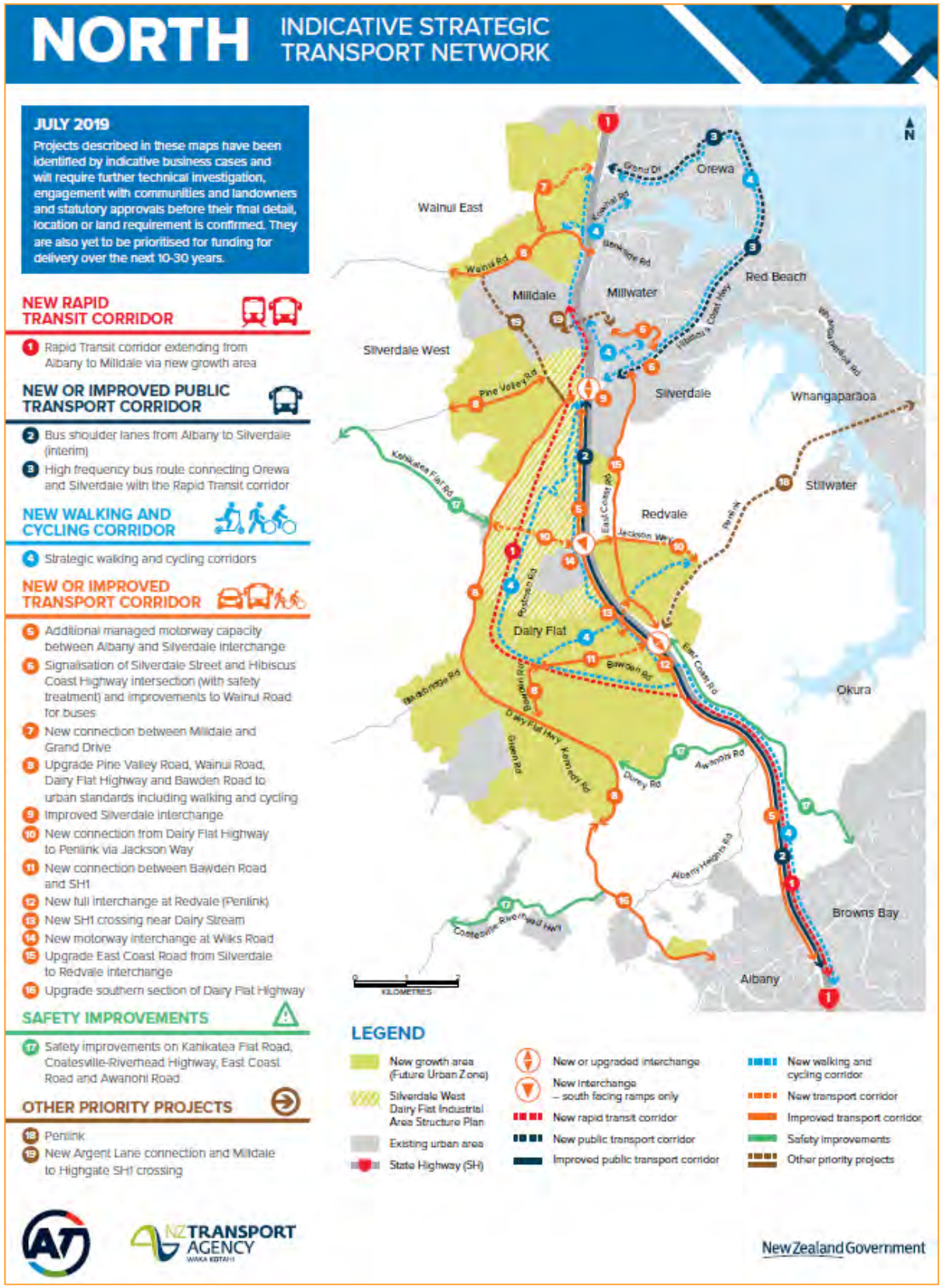


Figure 29: Indicative Strategic Transport Network for North (SGA)

Of note in the diagram is the large number of new or upgraded roading connections in the area, three of which directly connect into the development area. All these connections will provide a greater level of accessibility for the region. Also included on the map are the rapid bus network which will integrate well with the development and provide opportunities for alternative travel modes.

The layout and zoning of the development is not in conflict with any of these initiatives and the proposed park and ride locations identified in the figure will further improve access to the public transport network.

Key feedback from the SGA consultation included:

- Strong support for a Rapid Transit Network (RTN) north of Albany;
- Upgrading Park and Ride stations;
- Safe and separated walking and cycling facilities;
- Improved safety within the transport network;
- Support for new crossings over SH1 to provide additional connectivity;
- Support for bus shoulder lanes between Albany and Silverdale;
- Support for a full interchange at Redvale to relieve some of the pressure at the Silverdale interchange;

The most recent media release from the SGA states "The plans set out a shared vision by central and local government for long-term investment in Auckland's future growth areas. It shows their commitment to working together over the next few decades to plan, fund and deliver a well-integrated transport network."

9.10 Summary

One clear theme which is evident through all of the policy and strategy documents is the desire to reduce travel by private vehicles; the support of development than can provide for suitable travel alternatives; and the support of development that enables a high level of integration between land use and transportation.

Sustainable travel is clearly a key objective, and this is reflected in the zoning of the development area with the high level of integration between land use activities and transportation infrastructure that is proposed. The site will readily be able to realise the high-level policy goals and can deliver a development which supports alternative travel modes within the area and integrates with wider area public transport infrastructure.

10. Summary and Conclusions

An assessment of the transportation effects of a development in Wainui East comprising 4,500 dwellings and 40,000sqm commercial area has been undertaken. The proposed development provides an opportunity to deliver much-needed housing to support population growth in Auckland, particularly in the northern region.

The internal road network within the site features off-road walking and cycling paths with direct access to public parks. There are two new connections to support the development, these being a new over-bridge across SH1 and a new connection to the existing bridge across the Weiti stream. The proposed internal roads and new road connections ensure that the development is suitably integrated with the surrounding road network.

Detailed modelling has been undertaken to assess the likely effects of the development from a transportation perspective, with comparisons made to the approved ITA for the development of 2,800 houses. The modelling has relied on outputs from AT's existing regional models and supplemented with a more detailed micro-simulation model to assess the likely effects on the transportation network.

Improvements to the road network are recommended in order to ensure that the performance of the surrounding road network remains within acceptable levels. These are as follows:

- The provision of a separate cycle path off Sidwell Road, extending under SH1 at a point near the Orewa River and then connecting to Millwater-Parkway, which will serve as a recreational path for cyclists until new motorway over-bridge to Highgate is completed;
- Upgrade the intersection of Pine Valley Road and Dairy Flat Highway to a signalised intersection at the time 2,800 dwellings are occupied in Milldale;

- The addition of a westbound lane to the over-bridge between Hibiscus Coast Highway and Dairy Flat Highway within the Silverdale motorway interchange and the four-laning of Dairy Flat Highway between Pine Valley Road and the Silverdale interchange, if the Penlink project is not operational by the time 3,800 dwellings are occupied in Milldale;
- A full upgrade to the intersection of Pine Valley Road and Dairy Flat Highway, if the addition of the westbound lane to the Silverdale interchange over-bridge and the four-laning of Dairy Flat Highway occurs, and if the Penlink project is not operational by the time 3,800 dwellings are occupied in Milldale; and
- Upgrade the intersection of Pine Valley Road, Old Pine Valley Road and Argent Lane to a roundabout.

This is in addition to previous mitigation measures identified as part of the previous accepted ITA for the Milldale area for 2,800 houses. These are as follows:

- Provide a new motorway over-bridge connecting Sidwell Road and Highgate-Parkway to the east;
- Add a bridge that crosses Weiti Stream to the south of the development; and
- Provide an additional left turn slip lane at the top of the northbound off-ramp at the Silverdale interchange.

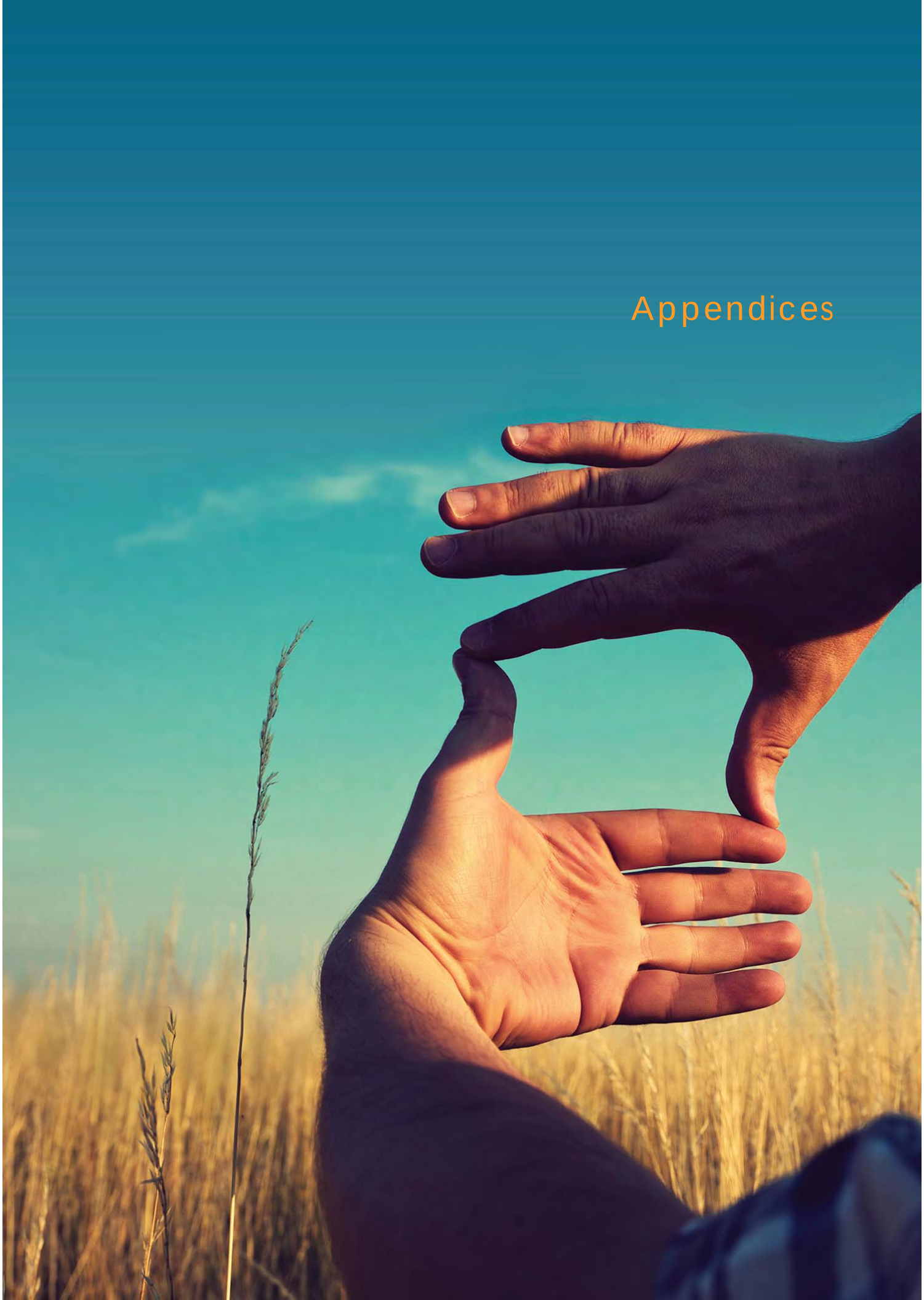
The results of the modelling with theses mitigation measures in place indicate that the integrity of the surrounding road system and the motorway can be maintained.

The relevant high-level policy documents governing transportation throughout Auckland have been reviewed and it has been found that the development is consistent with the policies and objectives in the various documents. The Wainui East area is a location that has been specifically identified as a location for additional future housing provision. On this basis it is considered that Council can confidently accept the proposal as a positive step forward for future growth in Auckland.

With the recommended roading infrastructure implemented, there are no transport planning or engineering reasons to preclude approval of this development.

Stantec

Appendices



Appendix A Minutes from Technical Meetings

Meeting dates:

- 28 June 2018
- 03 July 2018
- 12 July 2018
- 02 August 2018
- 13 August 2018
- 30 August 2018
- 14 September 2018
- 6 August 2019

Filenote

Job: 13041.022

To: Alastair Lovell (AT
Mike Wood (NZTA)
Joe Phillips (Beca, for AT)
Tim James (Woods)
Jamie Whyte (Woods)

From: Trevor Lee-Joe

Date: 26 June 2018

Subject: Technical Discussions - Milldale

These notes summarise the discussions held at a meeting between representatives of Auckland Transport (AT), the New Zealand Transport Agency (NZTA) and TDG, now Stantec, on behalf of Woods Fulton Hogan Land Development Limited (WFHLDL) in respect of the modelling which has been undertaken for Milldale.

Attendees:
Alastair Lovell (AT)
Mike Wood (NZTA)
Joe Phillips (Beca, for AT)
Trevor Lee-Joe (TDG, now Stantec)

Discussions (relevant actions are in bold font):

1. Trevor provided a bit of a background to the project from the SHA application through the Unitary Plan Hearings to the current application for 4,500 households.

2. Alastair asked about the status of the IFAs which are currently in place for the 2,800 dwellings. **Alastair will follow up with other AT parties.**

3. Trevor was questioned about how the trip rates have been derived and what sort of mode share has been assumed. Trevor responded that he has not adjusted the rates which have been assumed in the TFUG model what was provided by AT for the assessment.

4. In terms of the rates, Trevor has discussed this matter with the Auckland Forecasting Centre (AFC) and they have indicated that the Macro Strategic Model (MSM – previously ART) assumes a relatively high proportion of retired/not working adults in the zone and this could be why the rates may be lower than expected. The question is whether this is a reasonable

assumption in the MSM model and what are the implications for all the modelling in the northern area which has been carried out. to date**. Joe is to discuss this with Andrew Murray (Supporting Growth Alliance (SGA))**.

5. Perhaps some sensitivity testing of higher trip rates for the AM peak period should be undertaken. PM rate seems to be okay.

6. Numerous requests were sent to the AFC to provide the mode share assumptions, but Trevor has not yet received any response.

7. Trevor noted that WFHLDL has been discussing potential Public Transport (PT) initiatives with AT and that there are opportunities within the site to allow for PT connectivity. It may be pertinent to discuss this further with Steve Wren and any potential PT opportunities or initiatives included in the ITA. **Trevor to arrange a meeting with WFHLDL and Steve Wren's team to discuss further**.

8. A number of ITA matters were raised:

    a. Confirmation is required as to the timing for the left turn slip lane at the top of the northbound off-ramp at the Silverdale Interchange;

    b. It is recommended that queuing distances should be included in the output Tables in the report;

    c. Four-laning of Dairy Flat Highway should be noted in the ITA;

    d. Timing for the Pine Valley Road / Old Pine Valley Road roundabout improvement should be noted in the ITA;

    e. Some explanation is required in the ITA for the rationale and trigger for the additional westbound lane across the Silverdale Interchange overbridge;

    f. The ITA should confirm that the Kowhai Road link has been excluded from the modelling.

    These matters will be addressed in the next ITA update**. Trevor to provide the next update prior to the next meeting.**

9. Joe Phillips has asked about how traffic is being distributed to the two interchanges (Wainui and Silverdale). Trevor responded that there appears to be a software bug in the version of AIMSUN which is being used in the TFUG model that prevents the select link analysis from being successfully performed. **Joe to check if Beca modellers have a work-around for this.**

10. Joe Phillips has requested a separate meeting for he and Andrew Murray (SGA) to view the model in operation. **Joe to arrange a suitable day/time for this to occur.**

11. Joe Phillips has asked whether a roundabout has been investigated instead of signals at the Dairy Flat/Pine Valley Road intersection. Trevor responded that the relatively high volumes turning right into Pine Valley Road during the evening peak hour would cause queuing and delays to eastbound vehicles on Dairy Flat Highway. The question was then raised as to whether the signals in this relatively rural area would be appropriate. Trevor responded that the area would eventually be more urbanised and perhaps there could be some thought to reducing the speed limits in the vicinity. **Alastair to talk to Warren Budd about the future**

structure plan for the area and whether the speed limits could be reduced.

12. The intersection performance at the Argent Lane / Wainui Road intersection has been requested. **Trevor will provide this with the next ITA update.**

13. Joe Phillips asked if some thought has been made of pedestrian/cycle connectivity prior to the new Milldale-Highgate Overbridge being constructed. **Trevor will discuss with Woods and report back at the next meeting.**

14. Joe Phillips has asked for some clarification on what types of schools would be included within Milldale. **Trevor will discuss with Woods and report back at the next meeting.**

Meeting ended at 10:10am

Filenote

Job: 13041.022

To: Alastair Lovell (AT
Mike Wood (NZTA)
Joe Phillips (Beca, for AT)
Andrew Mein (Flow, for NZTA)
Tim James (Woods)
Jamie Whyte (Woods)
Brett Harries (TDG, now Stantec)

From: Trevor Lee-Joe

Date: 11 July 2018

Subject: Technical Discussions - Milldale

These notes summarise the additional information requested following on from the technical meeting held on Tuesday 3 July 2018 in respect of the Milldale Development.

Attendees at 3 July meeting:
Joe Phillips (Beca, for AT)
Andrew Mein (Flow, for NZTA)
Trevor Lee-Joe (TDG, now Stantec)

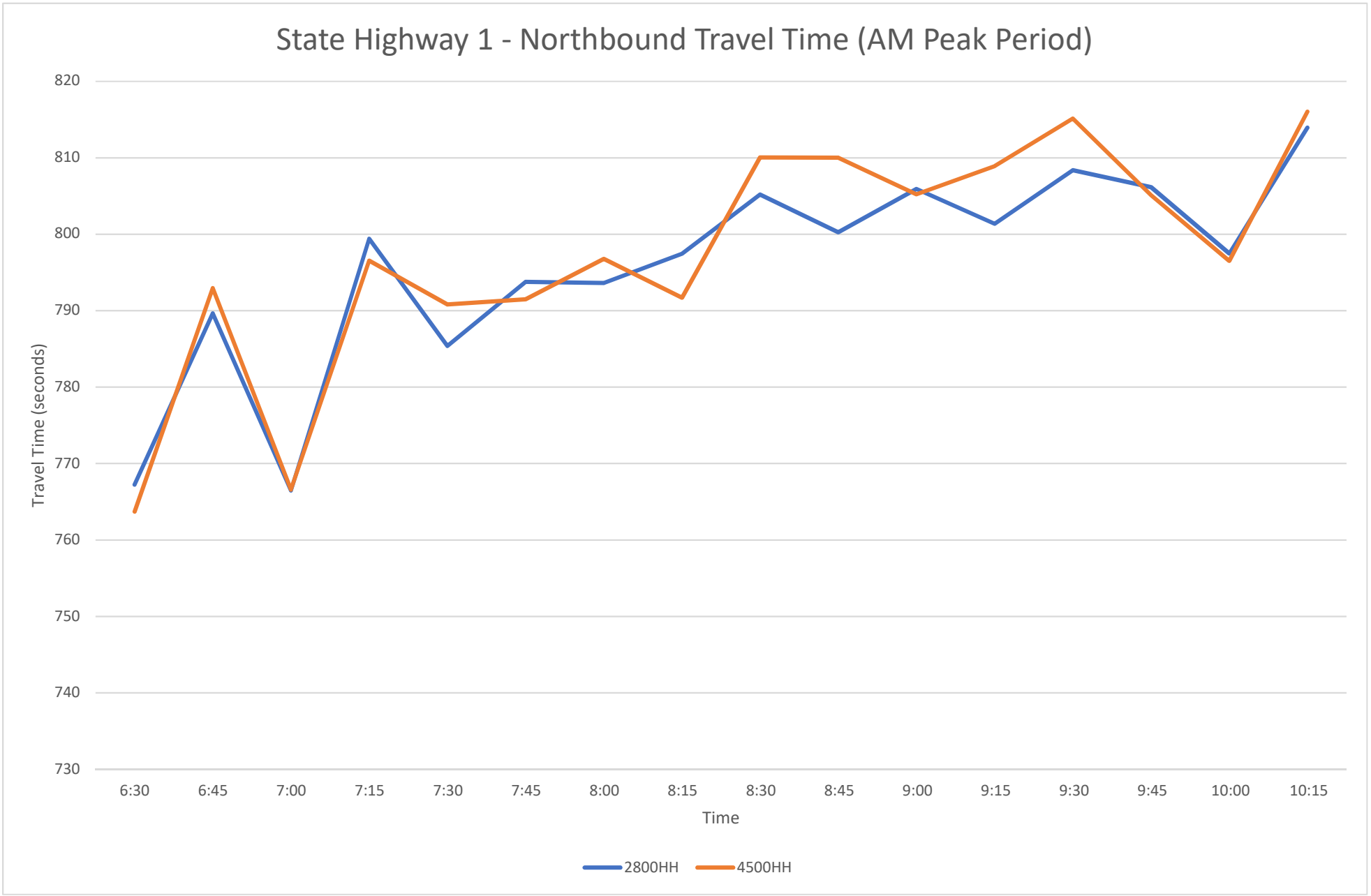
1. **Travel Time plots on State Highway 1**. These are attached for the AM and PM periods (Northbound and Southbound). As expected, there are only minor differences between the 2,800 dwelling and 4,500 dwelling scenarios for the non-critical directions (northbound in the morning period and southbound in the evening period). In the southbound direction for the morning period, travel times are marginally increased through the middle of the period but no noticeable differences at the beginning and end of the period. In the northbound direction for the evening period, travel time differences start to increase around 4pm with the highest difference being around 6 minutes at 6:30pm. However, the pattern shows a decrease in travel times past 6pm for the 4,500 dwelling scenario and there are no residual queues on the motorway at the end of the period.

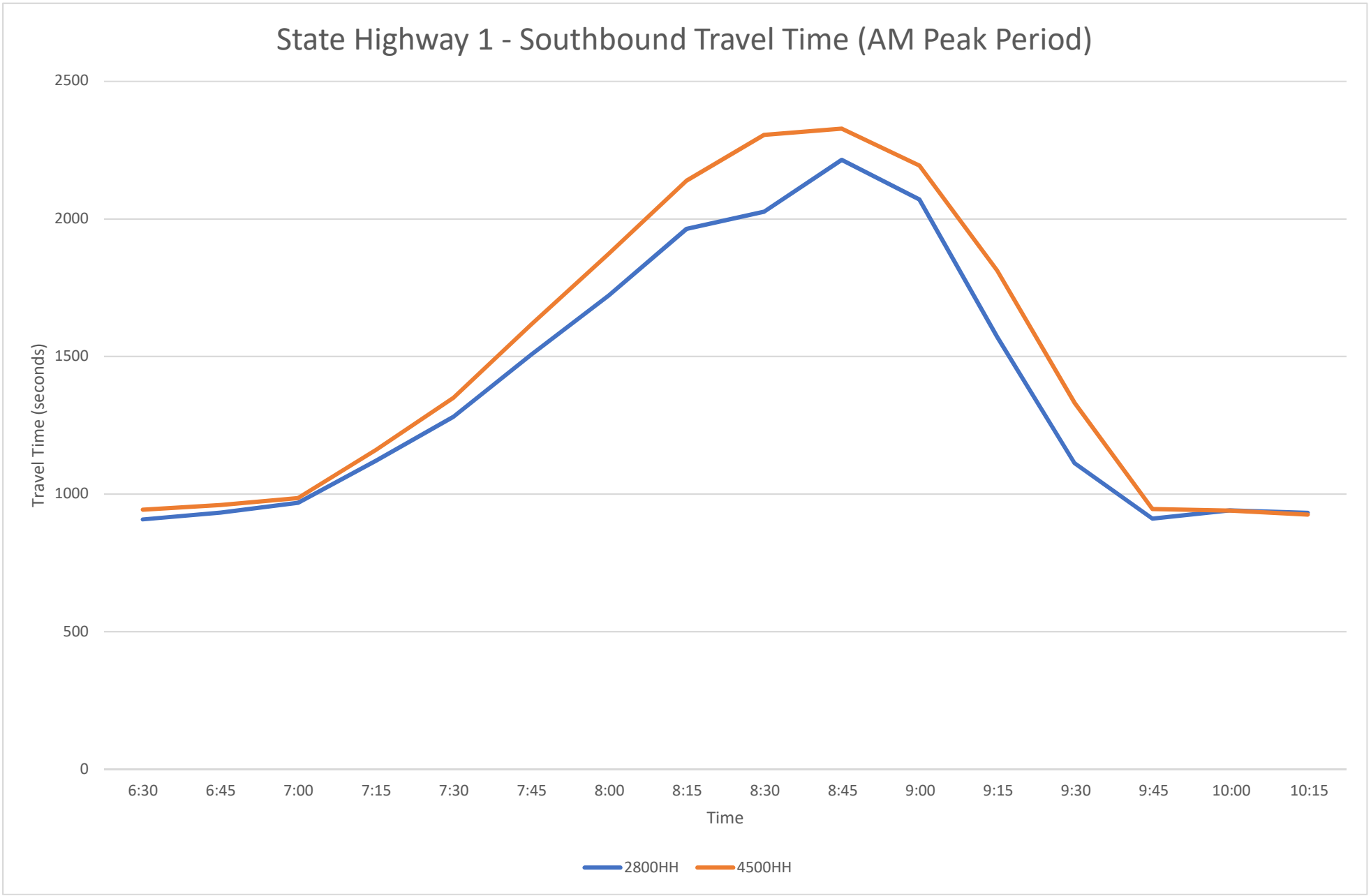
2. **Queue Snapshots**. Screenshots from the model for three critical locations (the Wainui interchange, Silverdale interchange and Hibiscus Coast Highway) are attached. Screenshots have been taken at 15-minute intervals throughout the morning and evening peak periods.

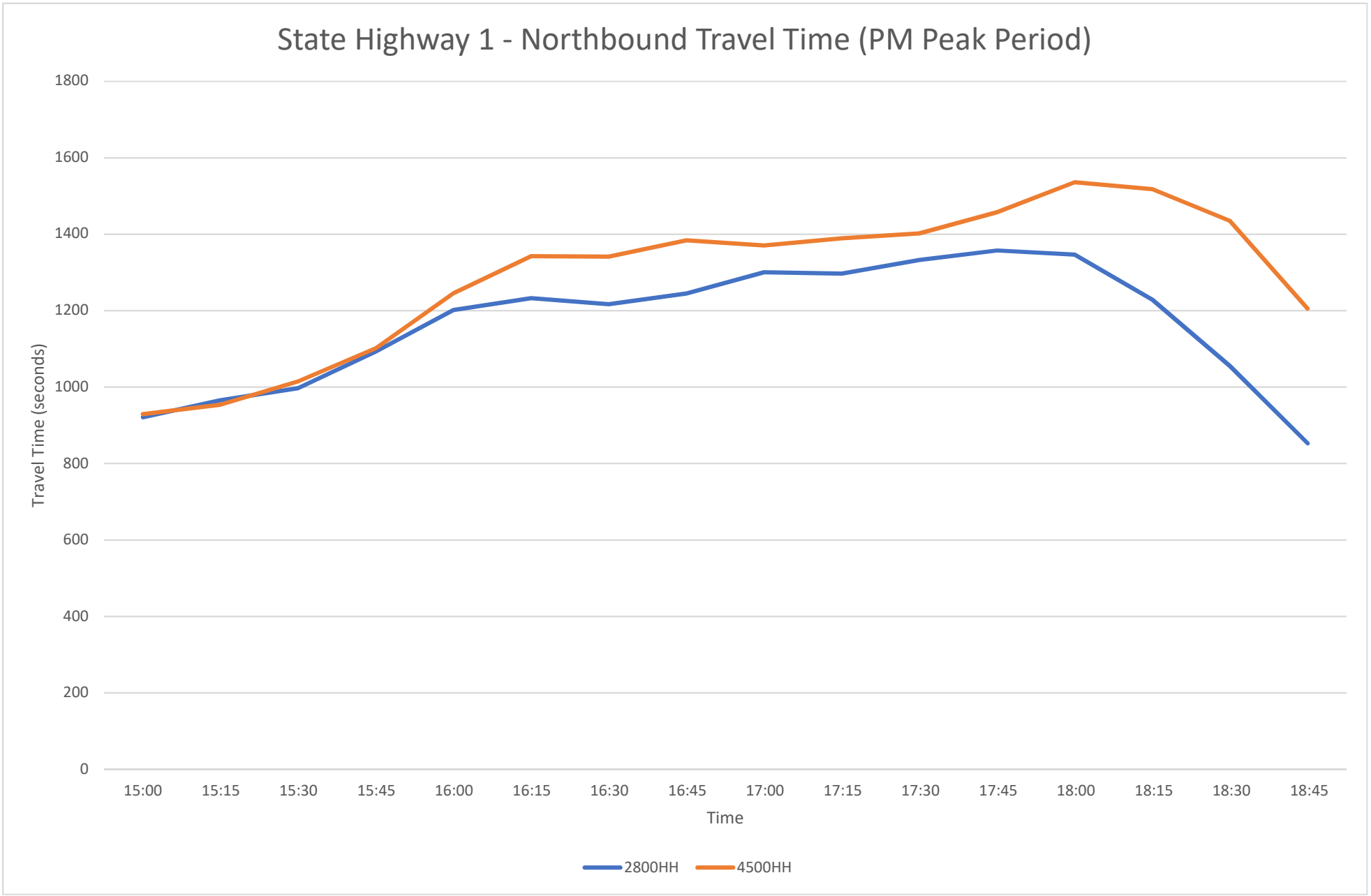
3. **Trip Generation Profiles**. The trip generation profiles as output from the model (at 15-minute intervals) have been plotted and attached. The hourly trip generation patterns are also provided.

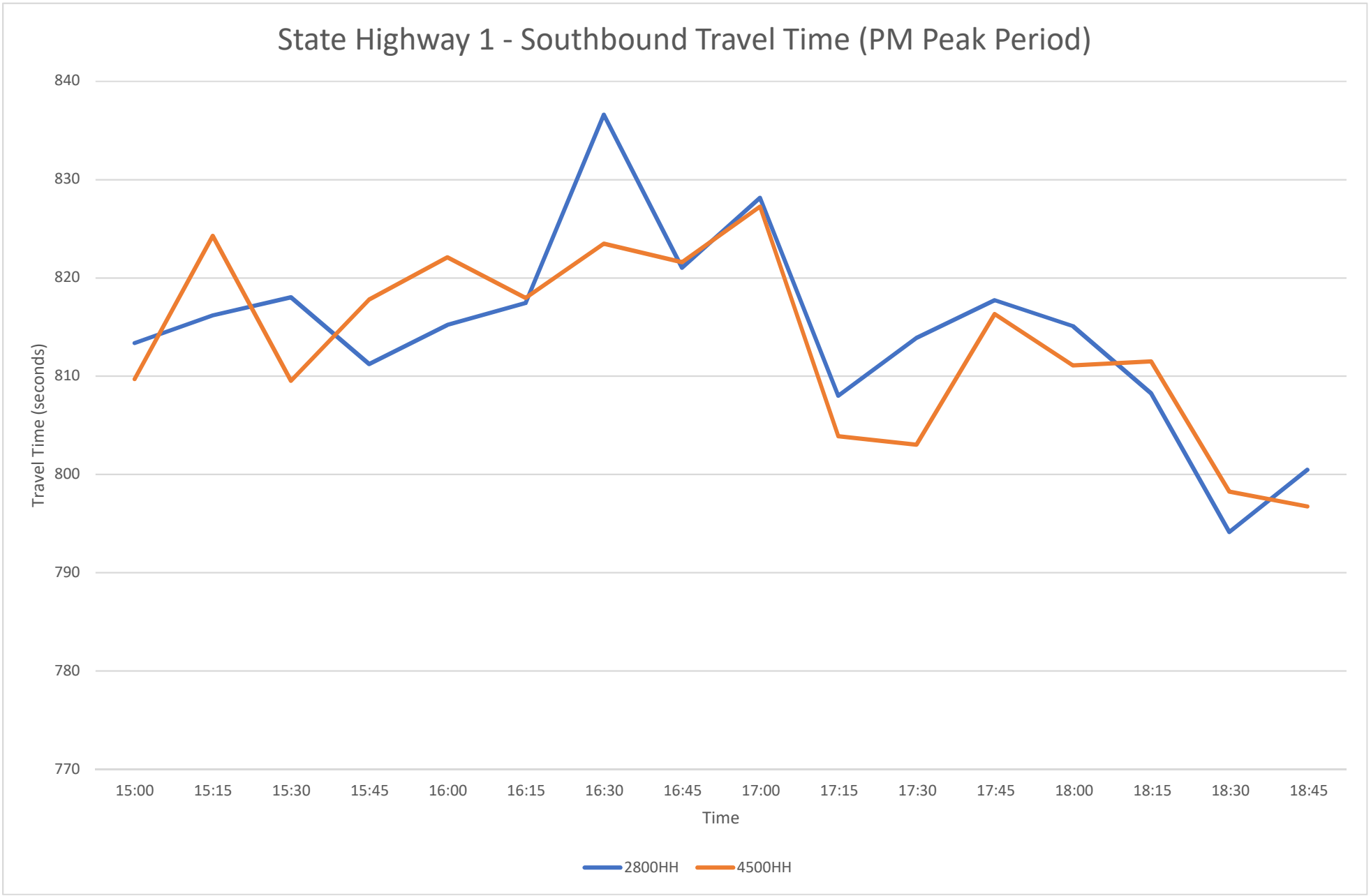
Travel Time Plots on SH1

- AM Northbound
- AM Southbound (critical direction)
- PM Northbound (critical direction)
- PM Southbound


State Highway 1 - Northbound Travel Time (AM Peak Period)
820
810
800
790
780
770
760
750
740
730
Travel Time (seconds)
6:30
6:45
7:00
7:15
7:30
7:45
8:00
8:15
8:30
8:45
9:00
9:15
9:30
9:45
10:00
10:15
Time
2800HH
4500HH


State Highway 1 - Southbound Travel Time (AM Peak Period)
2500
2000
1500
1000
500
0
Travel Time (seconds)
6:30
6:45
7:00
7:15
7:30
7:45
8:00
8:15
8:30
8:45
9:00
9:15
9:30
9:45
10:00
10:15
Time
2800HH
4500HH

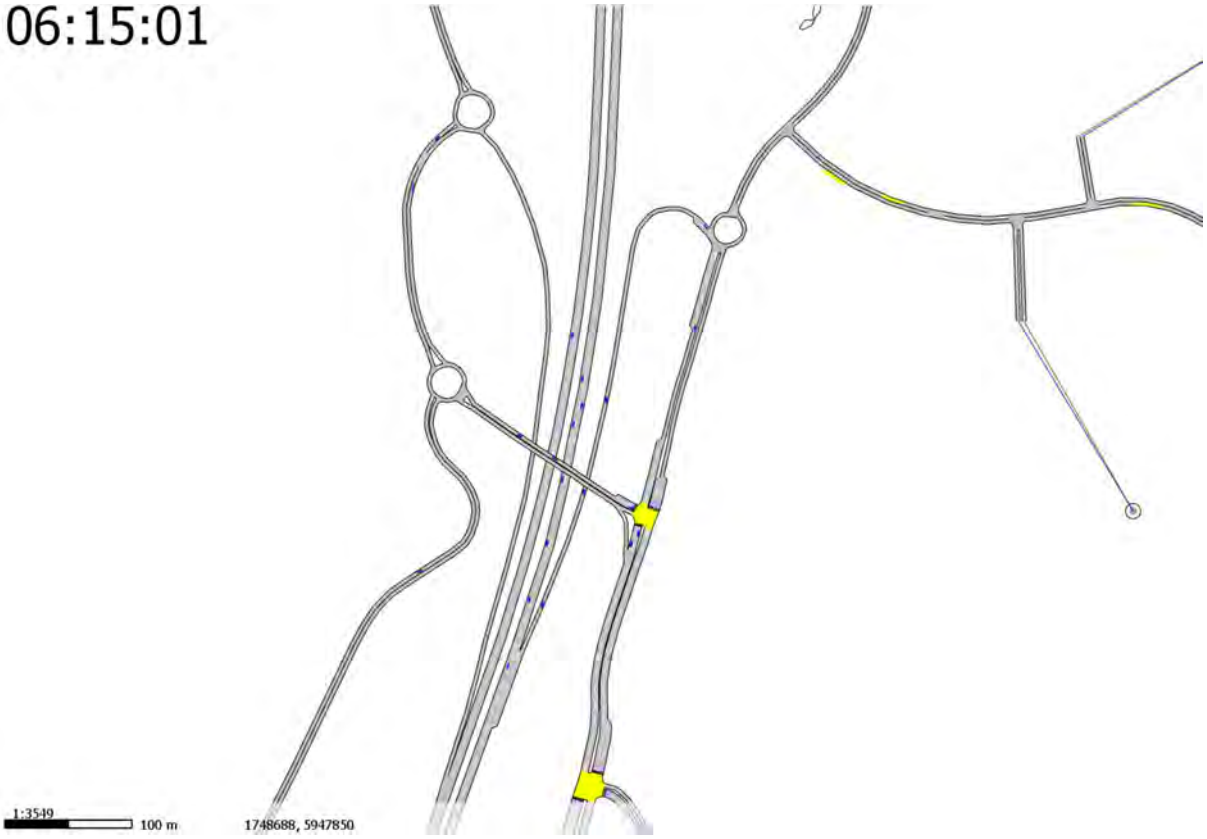

State Highway 1 - Northbound Travel Time (PM Peak Period)
Travel Time (seconds)
1800
1600
1400
1200
1000
800
600
400
200
0
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
17:00
17:15
17:30
17:45
18:00
18:15
18:30
18:45
Time
2800HH
4500HH


State Highway 1 - Southbound Travel Time (PM Peak Period)
840
830
820
810
800
790
780
770
Travel Time (seconds)
15:00
15:15
15:30
15:45
16:00
16:15
16:30
16:45
17:00
17:15
17:30
17:45
18:00
18:15
18:30
18:45
Time
2800HH
4500HH

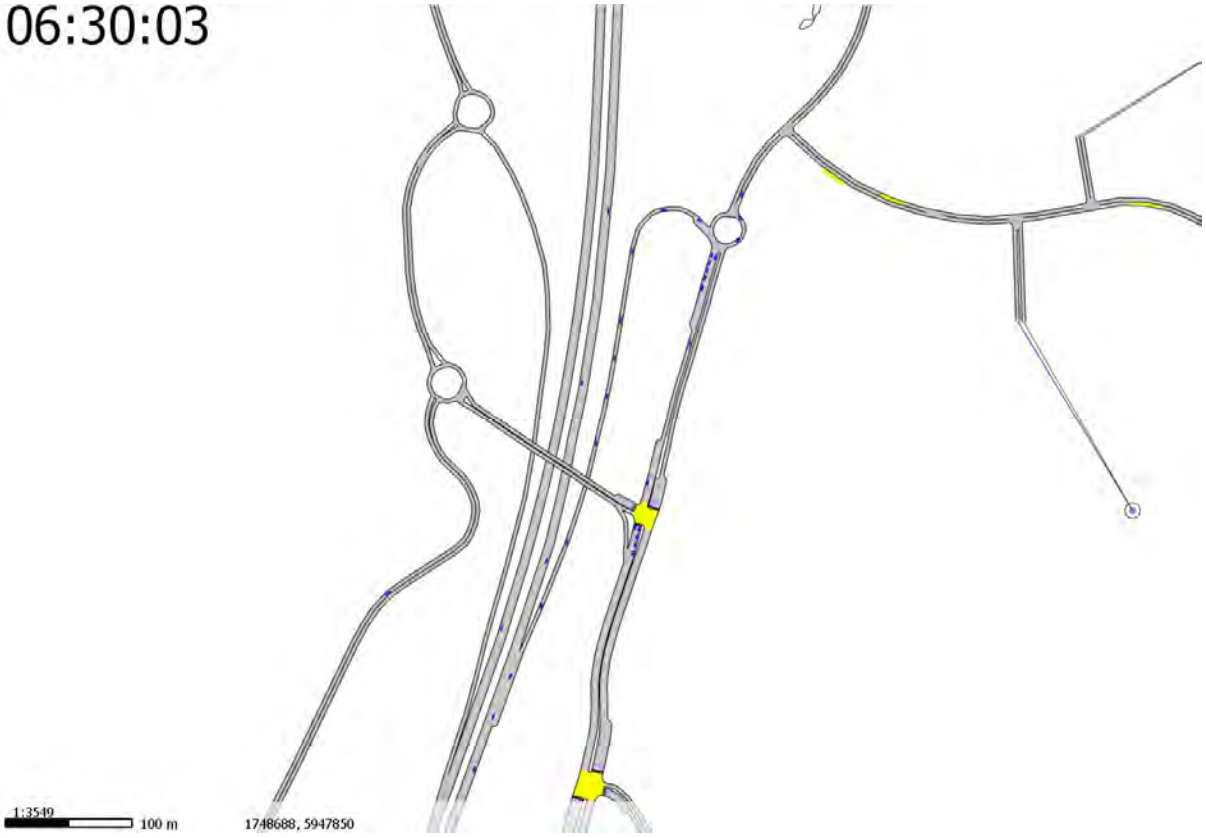
Queue Snapshots

- Wainui Interchange
- Silverdale Interchange
- Hibiscus Coast Highway

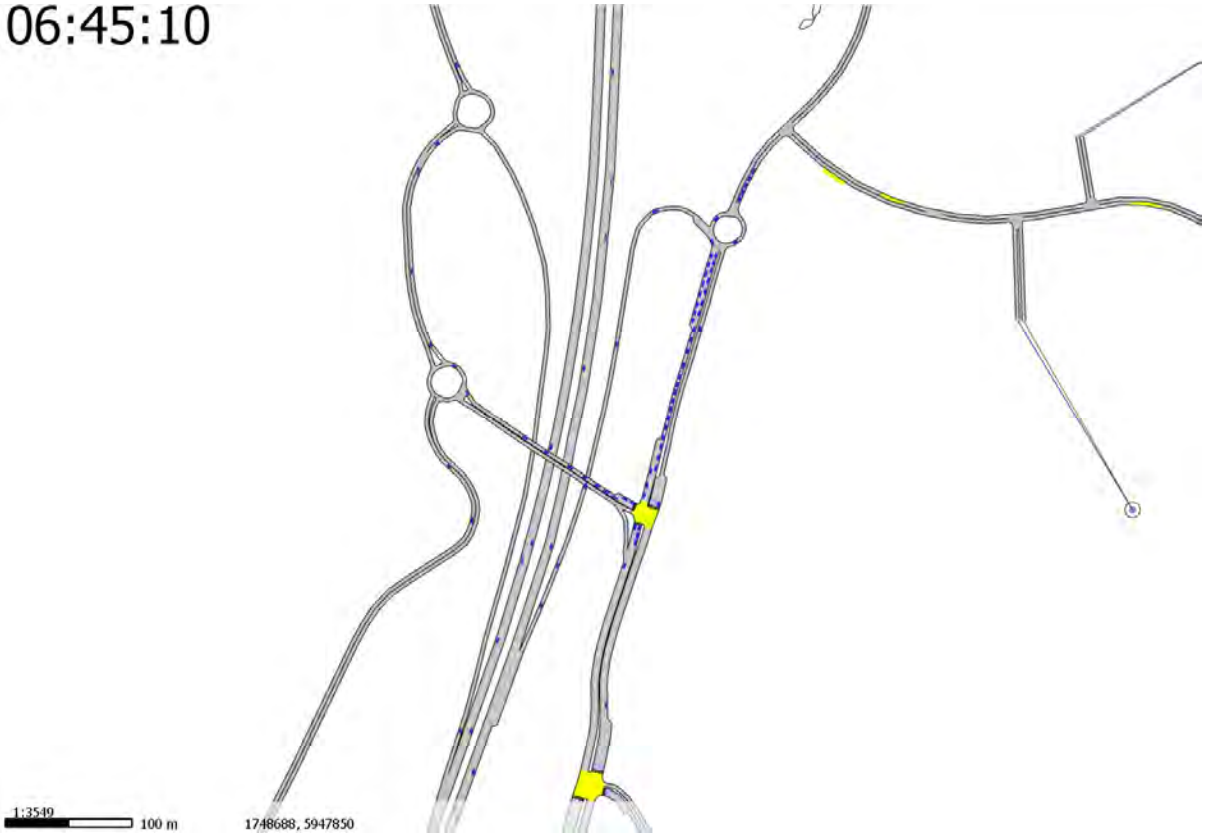
06:15:01



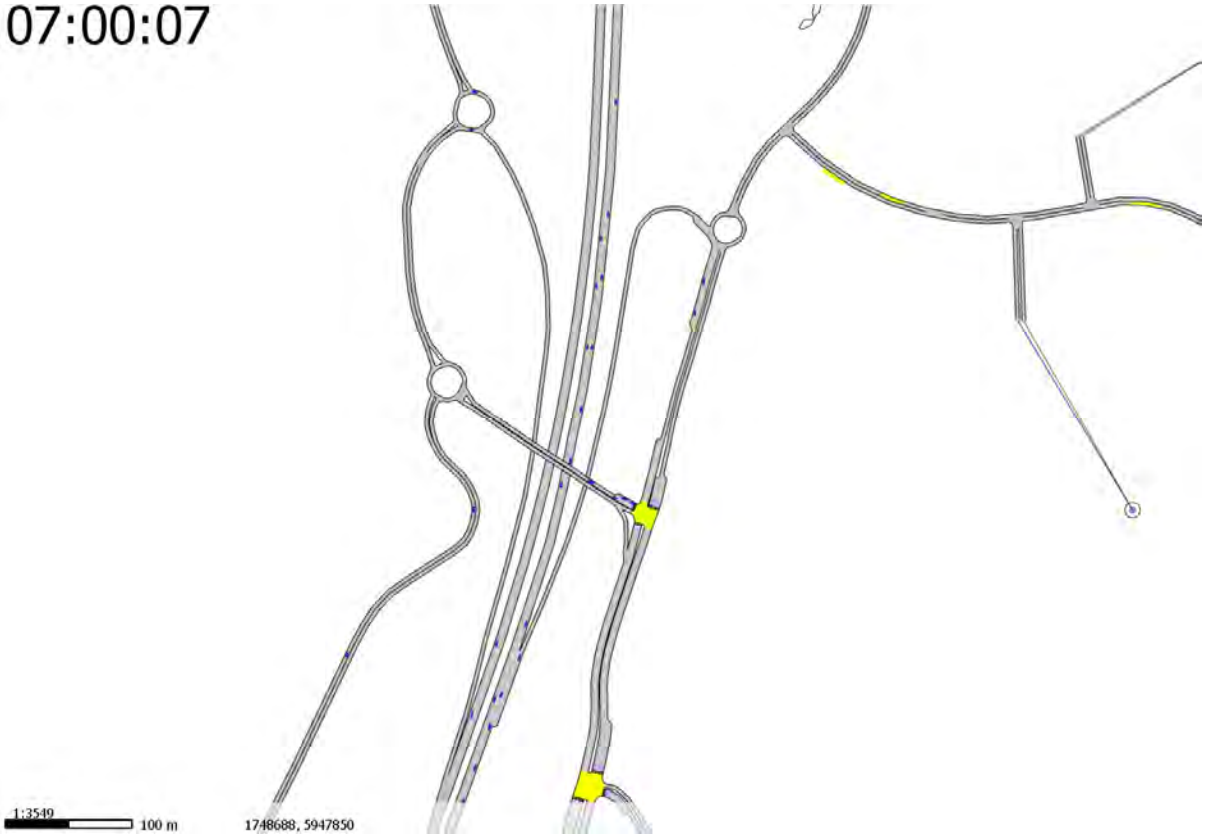
06:30:03



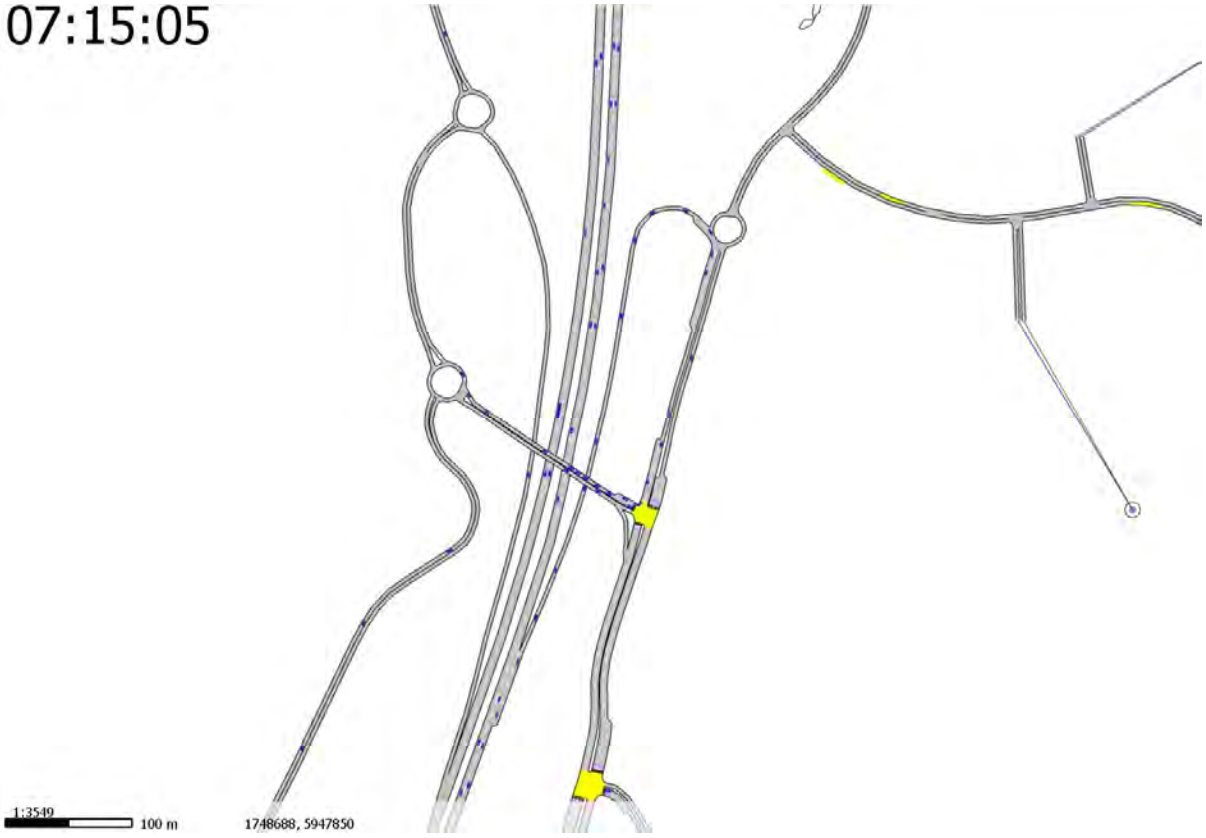
06:45:10



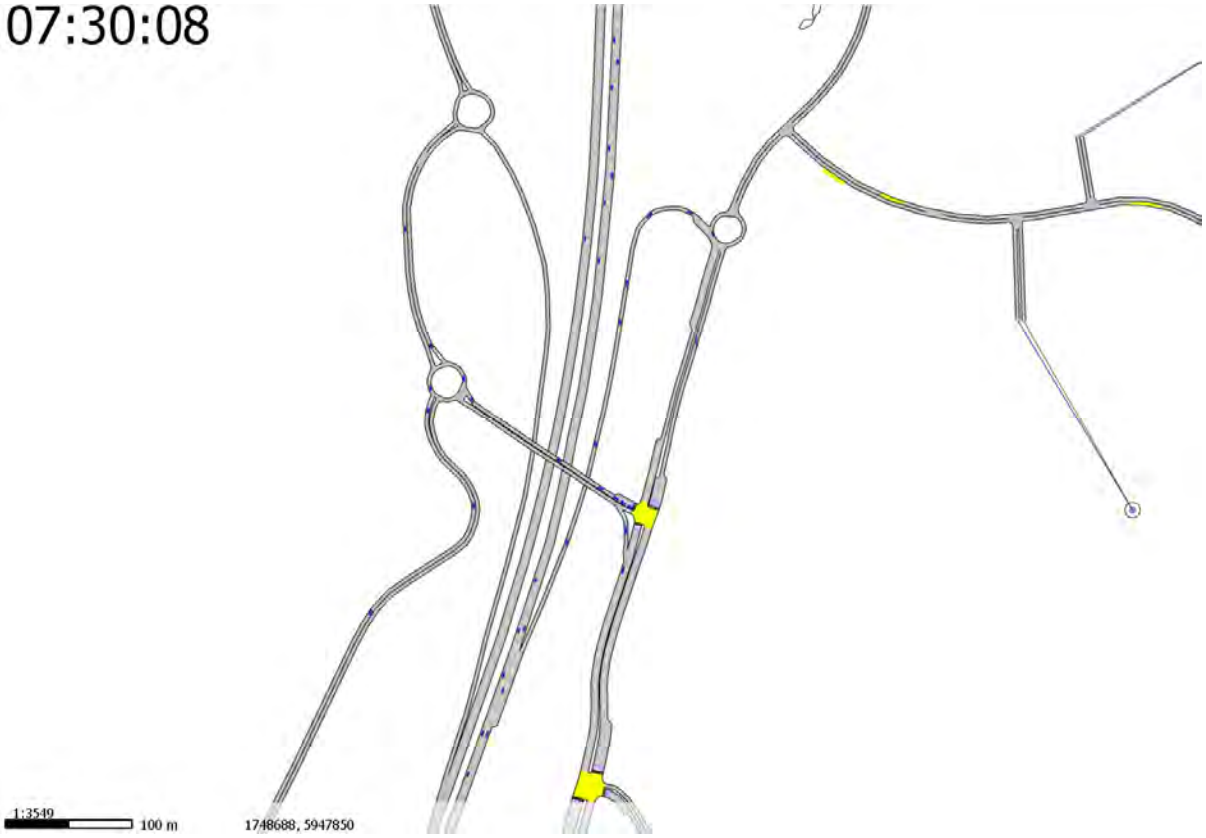
07:00:07



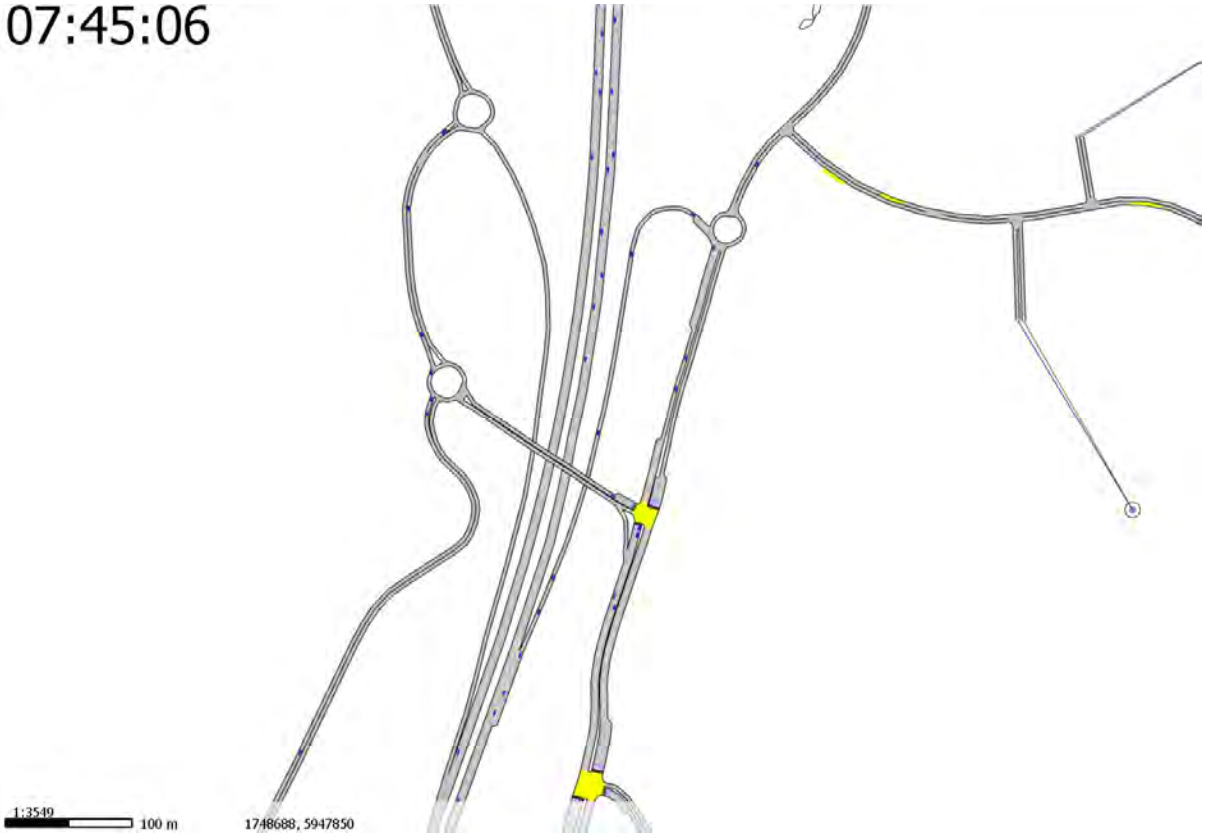
07:15:05



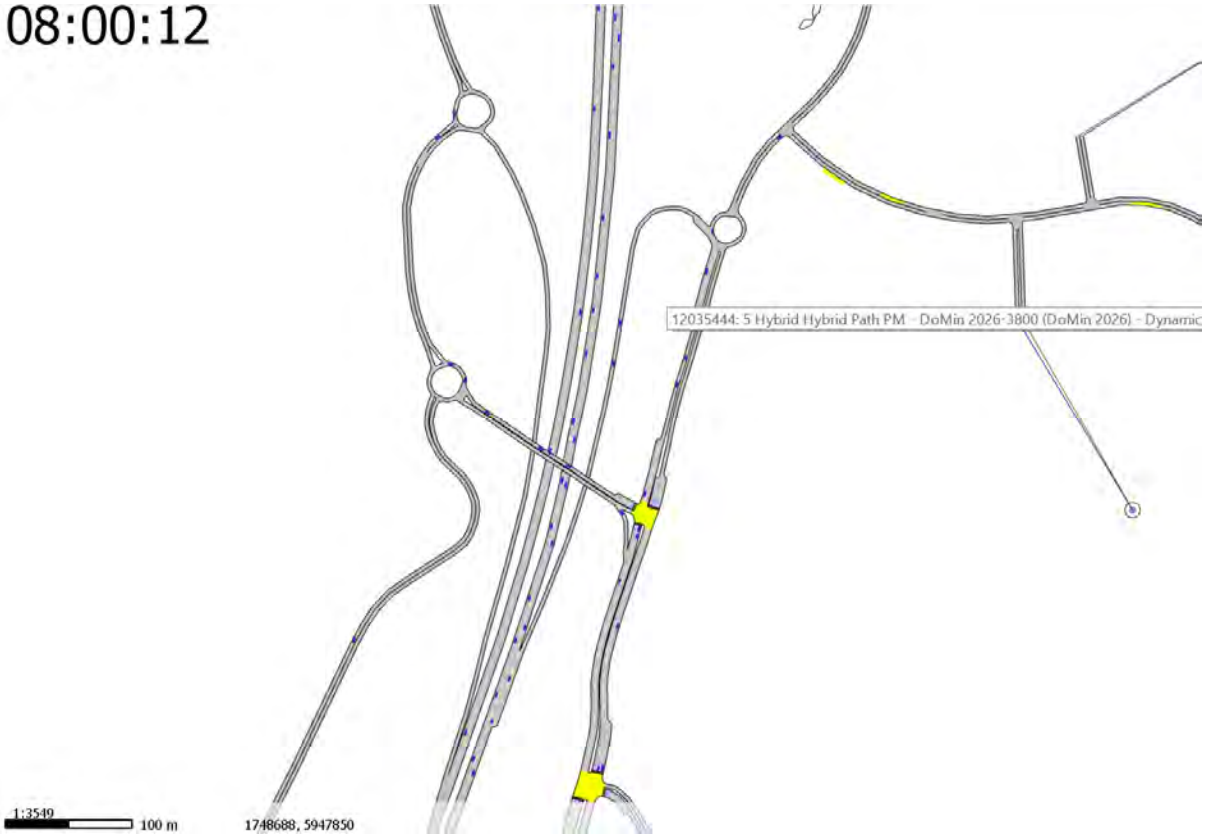
07:30:08



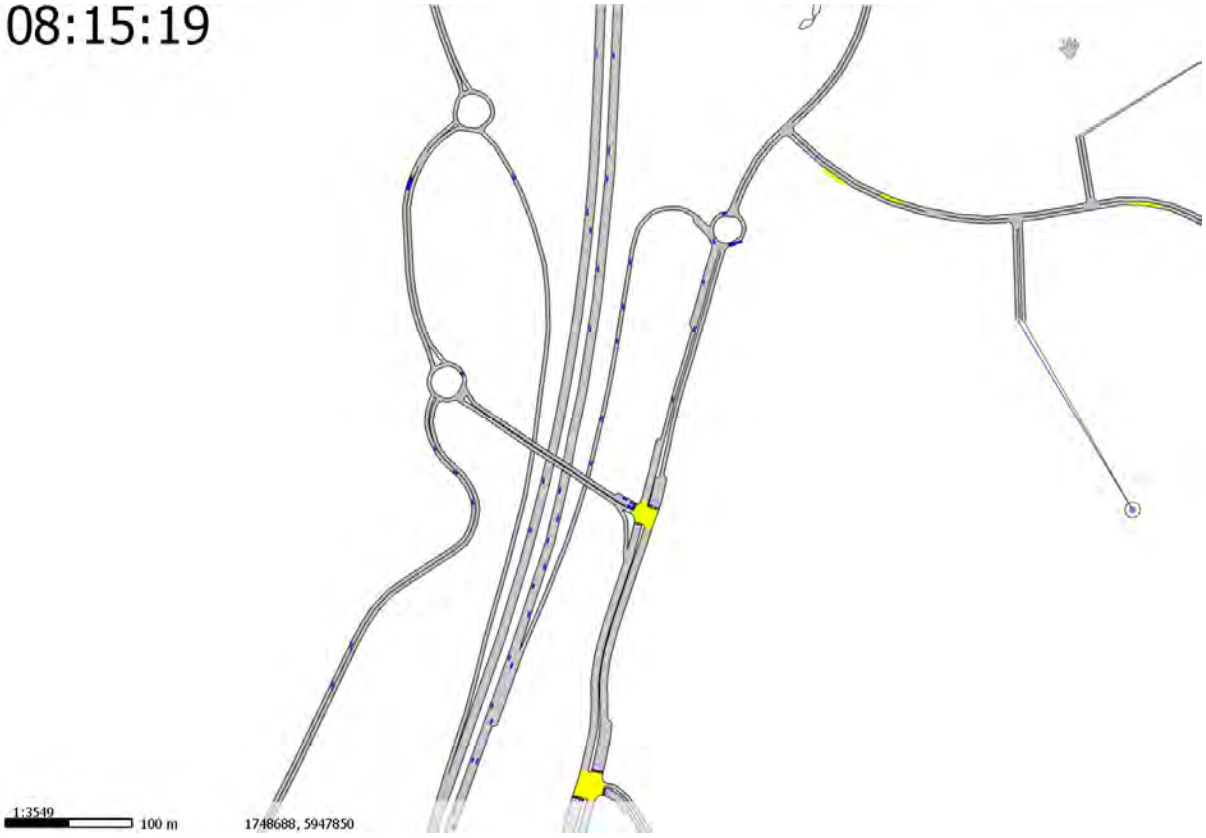
07:45:06



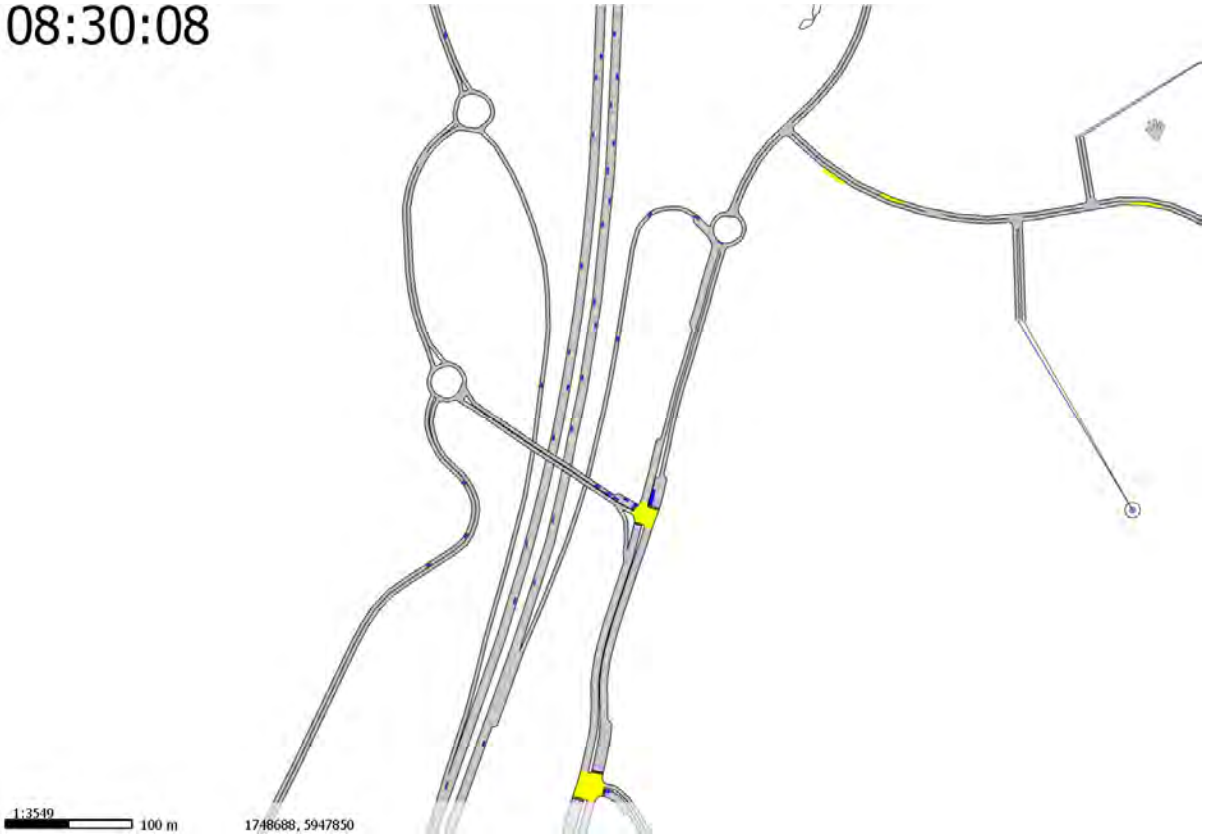
08:00:12



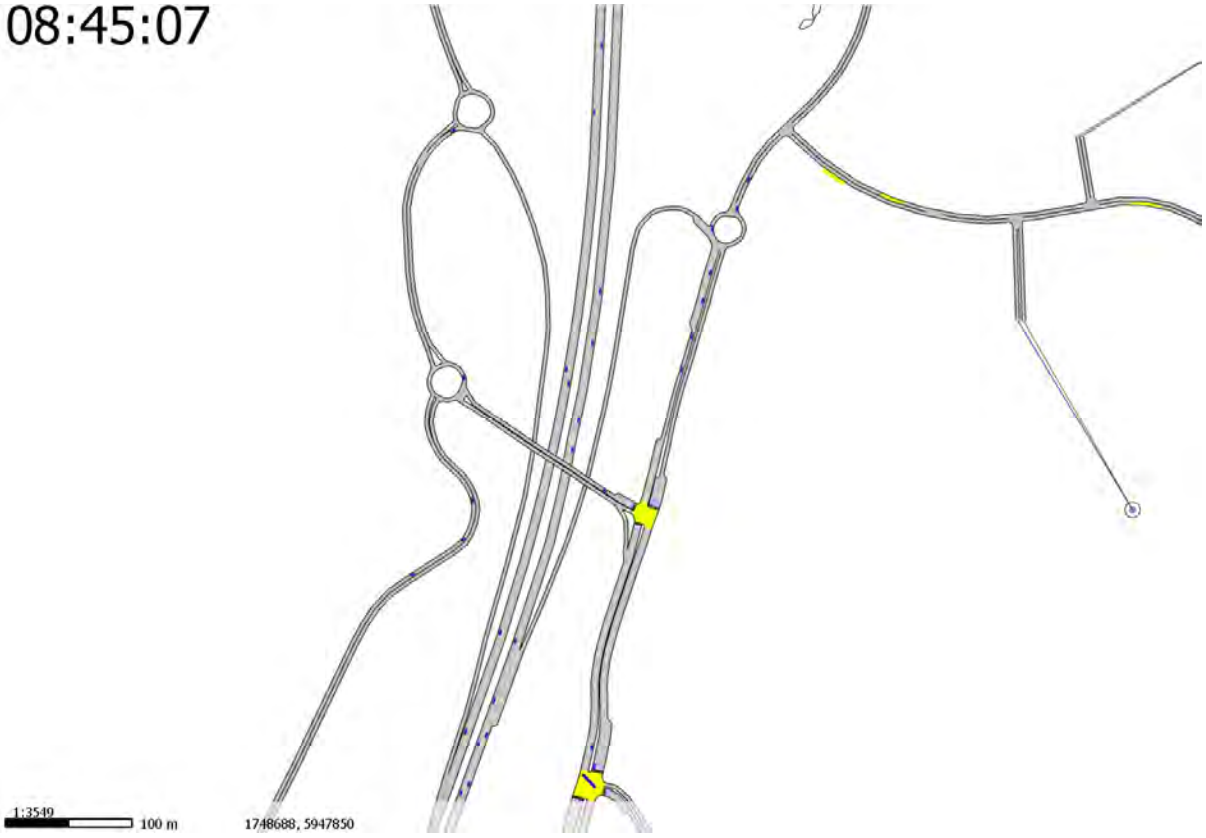
08:15:19



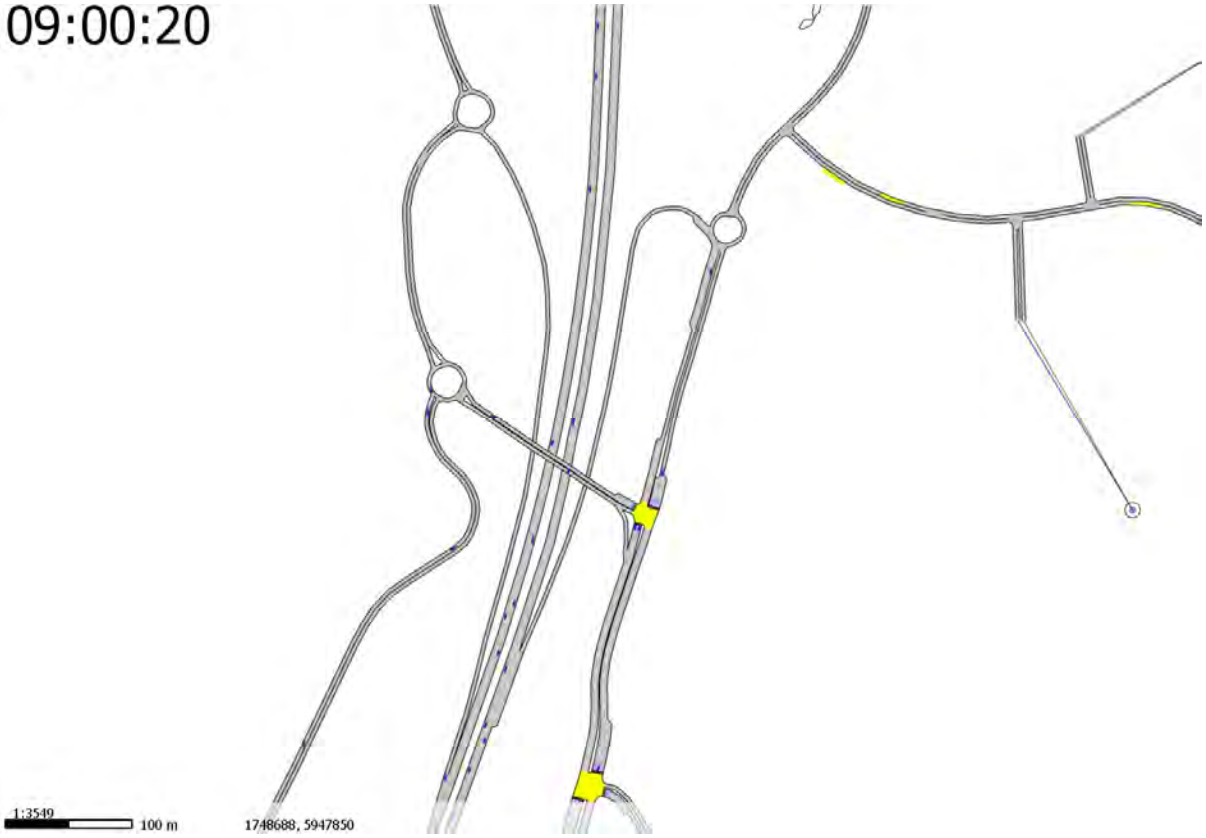
08:30:08



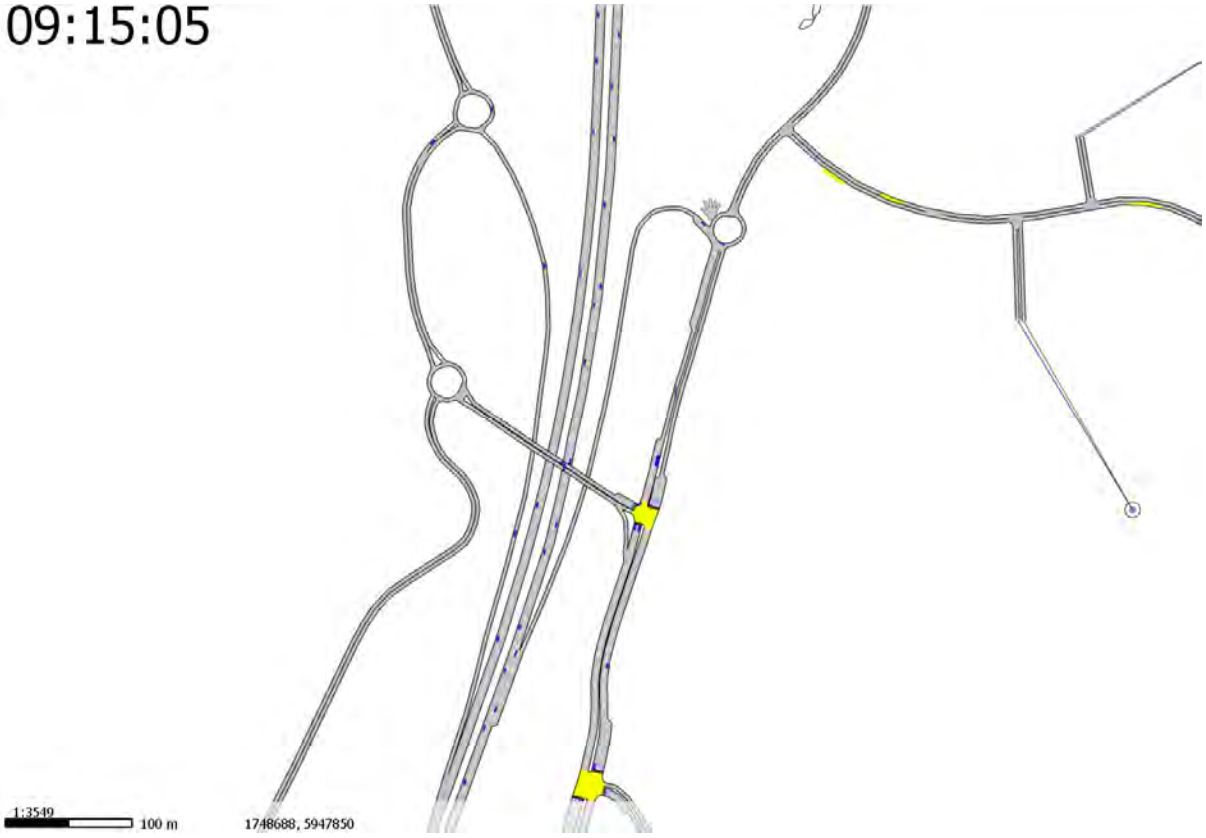
08:45:07



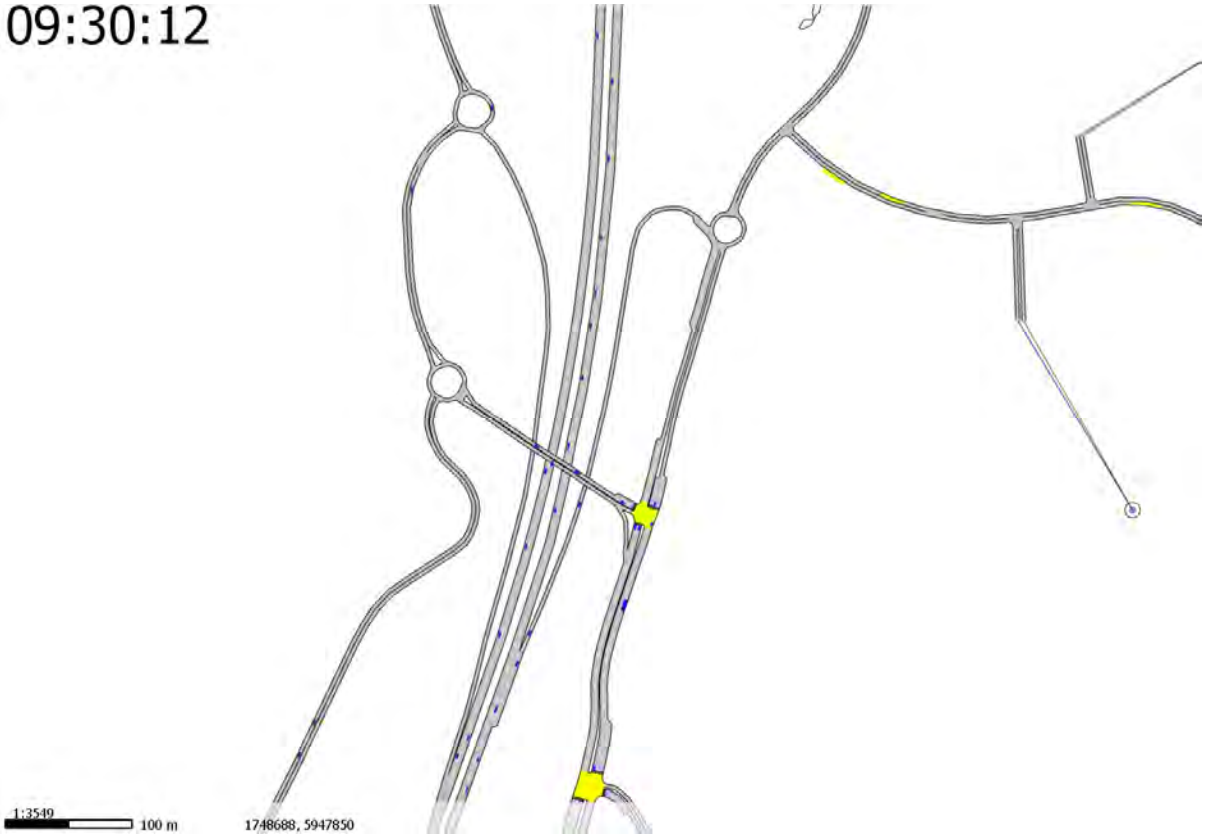
09:00:20



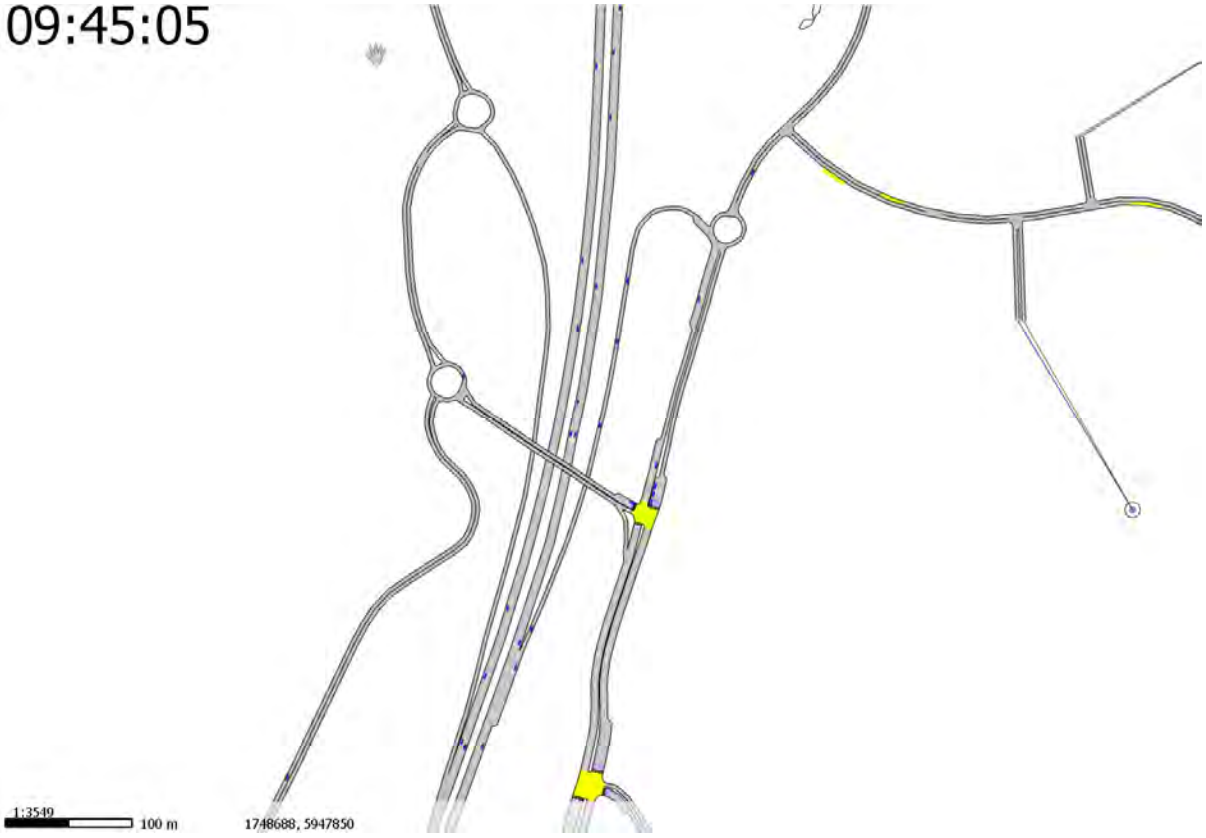
09:15:05



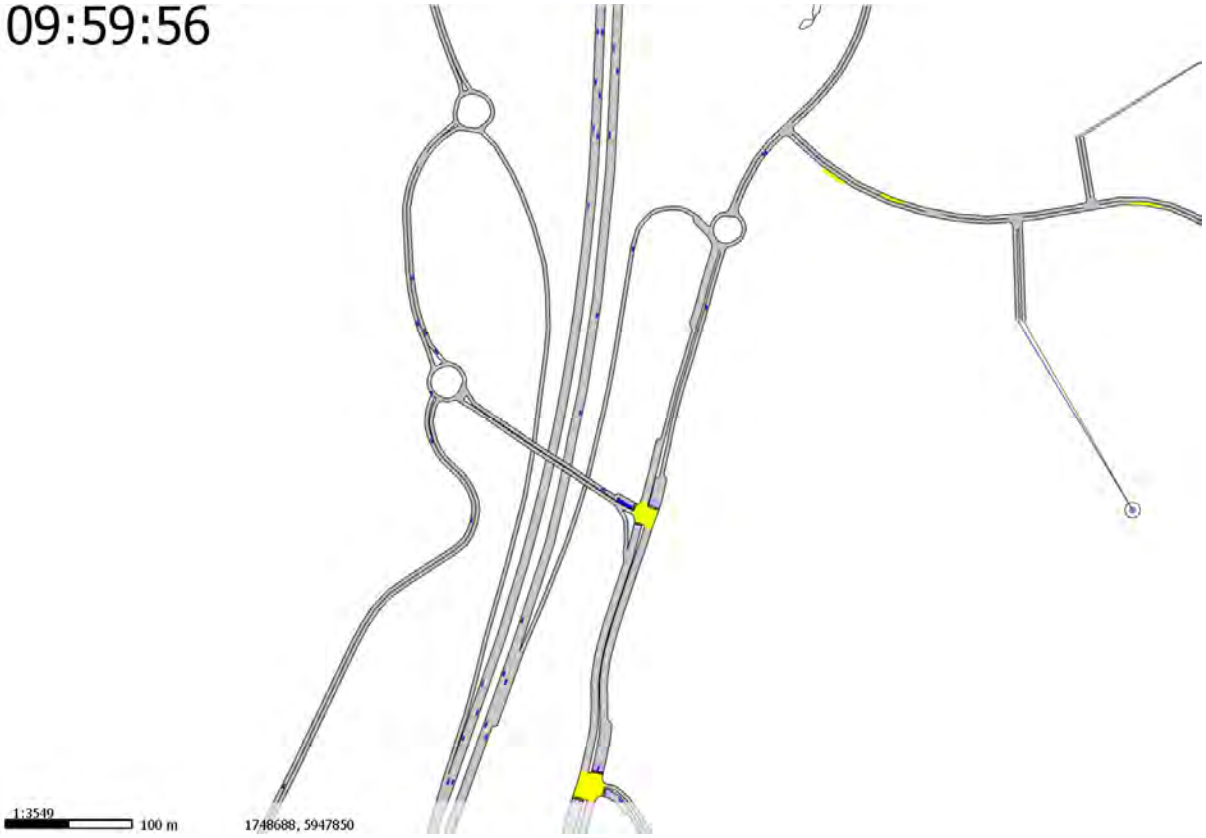
09:30:12



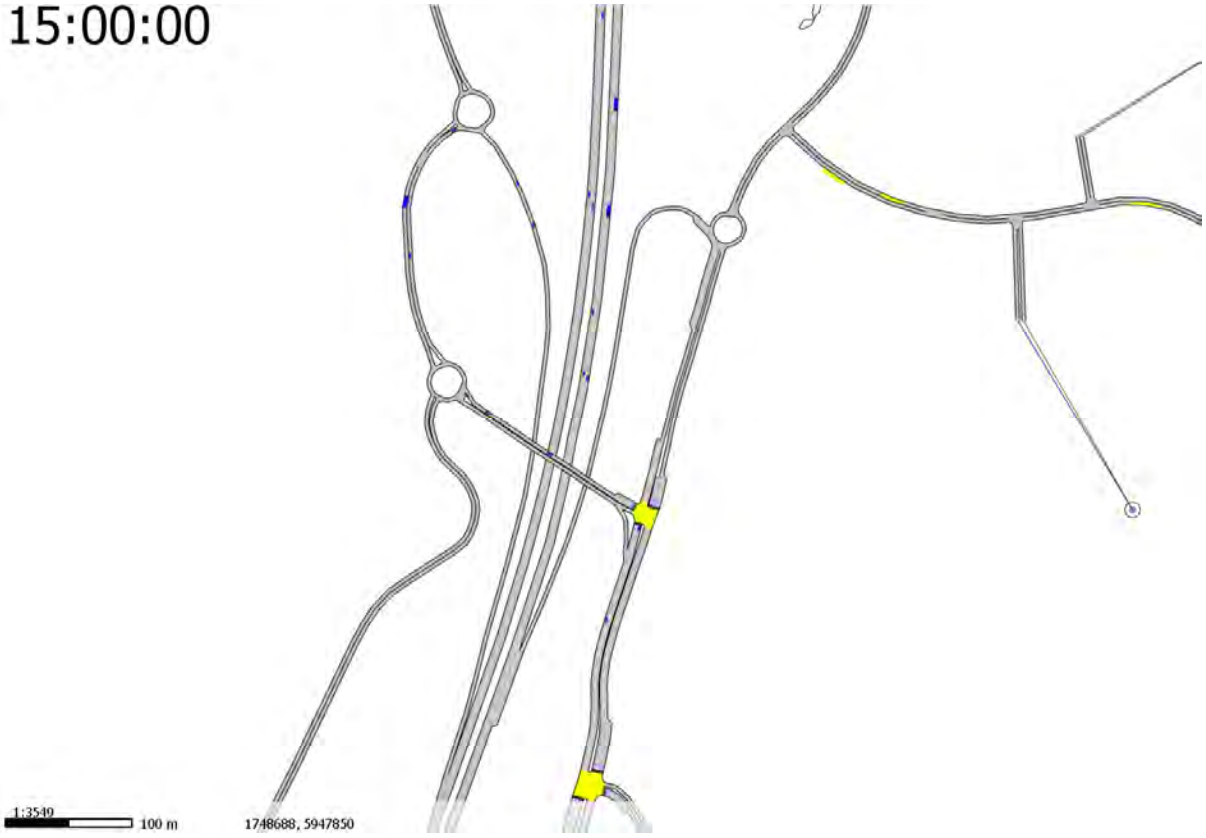
09:45:05



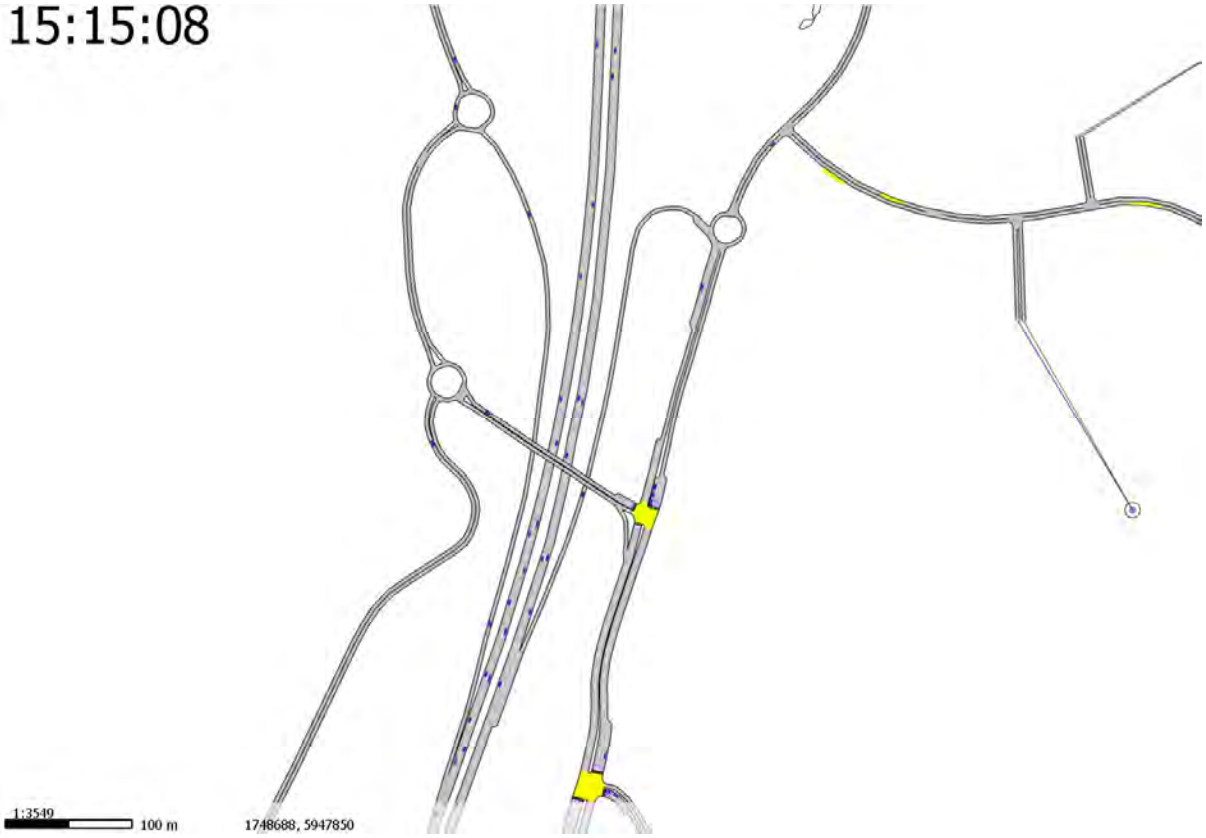
09:59:56



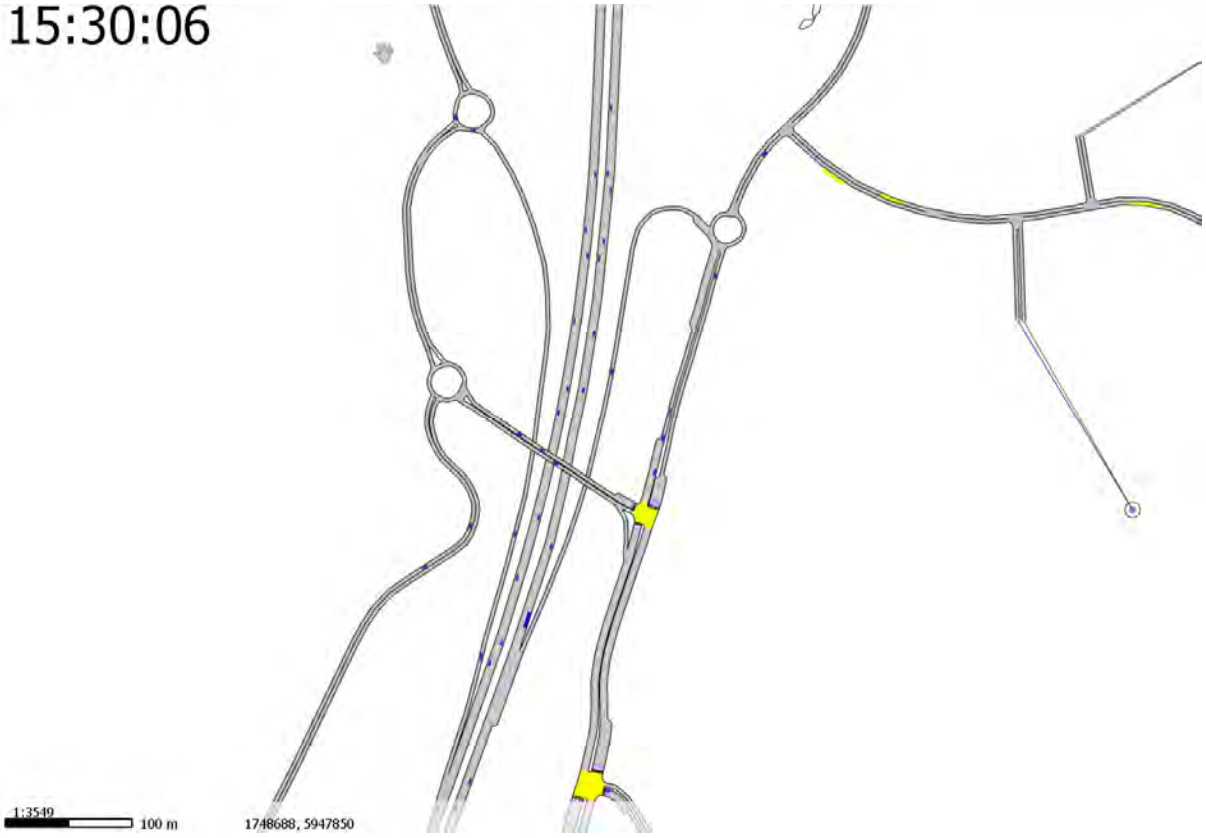
15:00:00



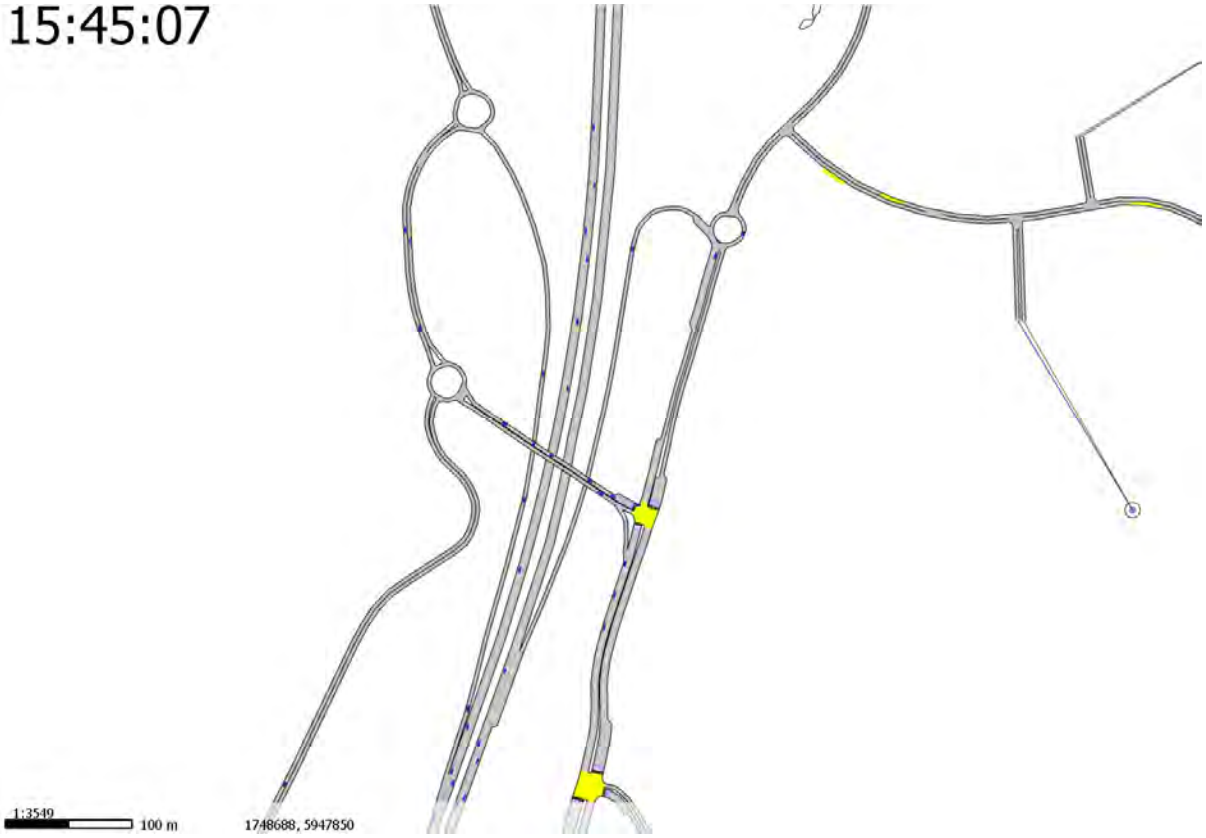
15:15:08



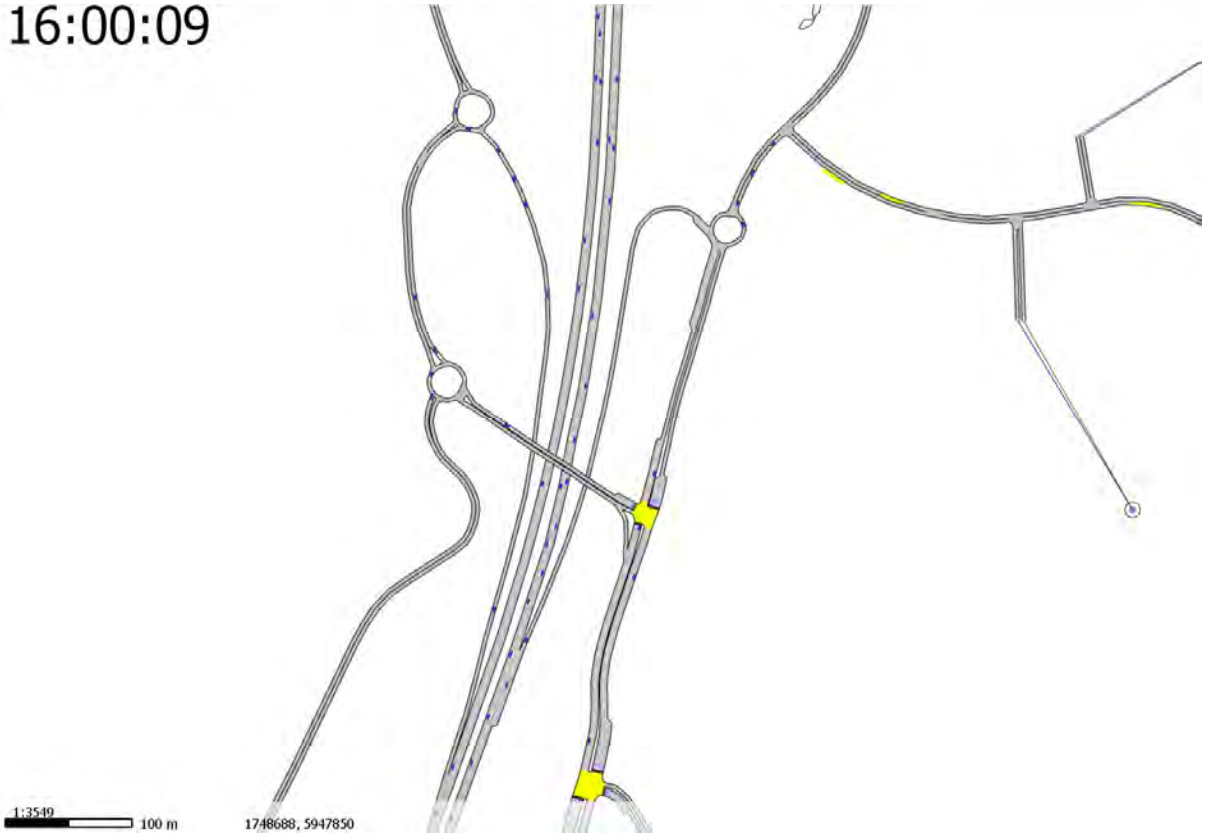
15:30:06



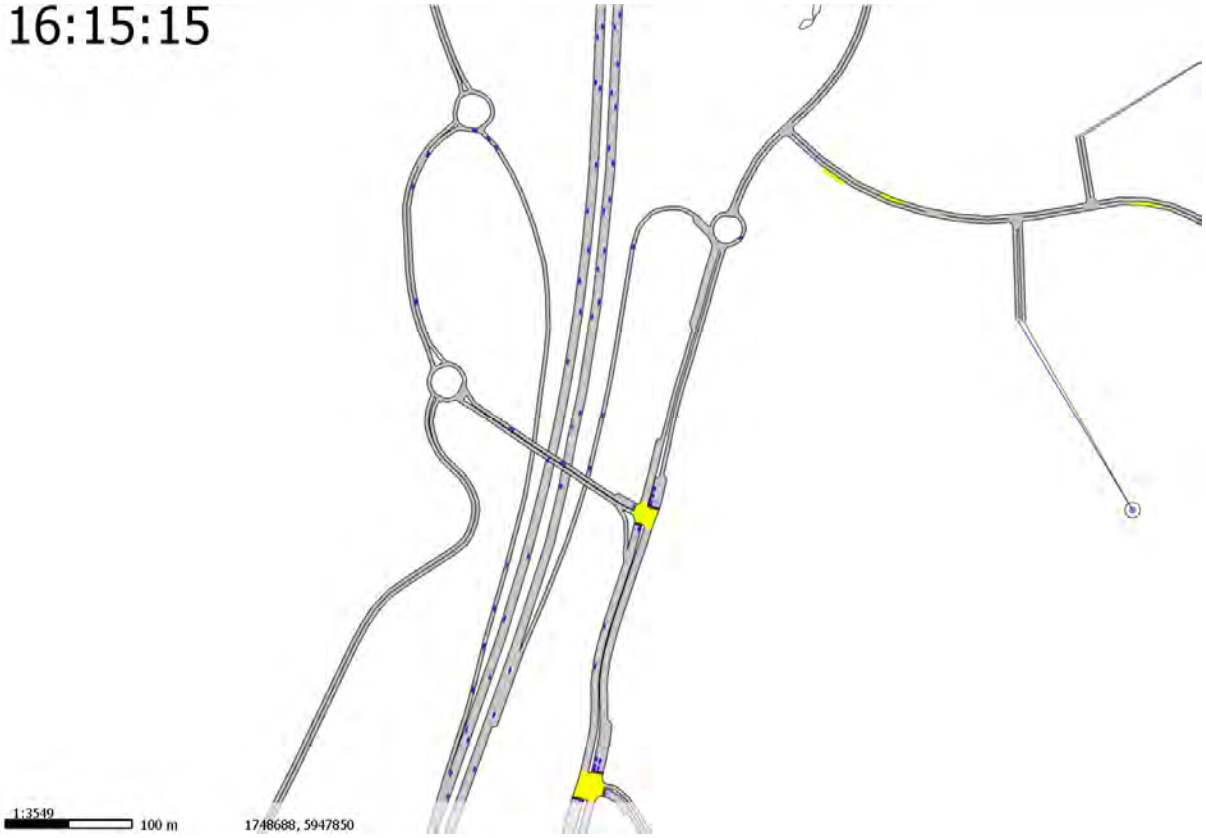
15:45:07



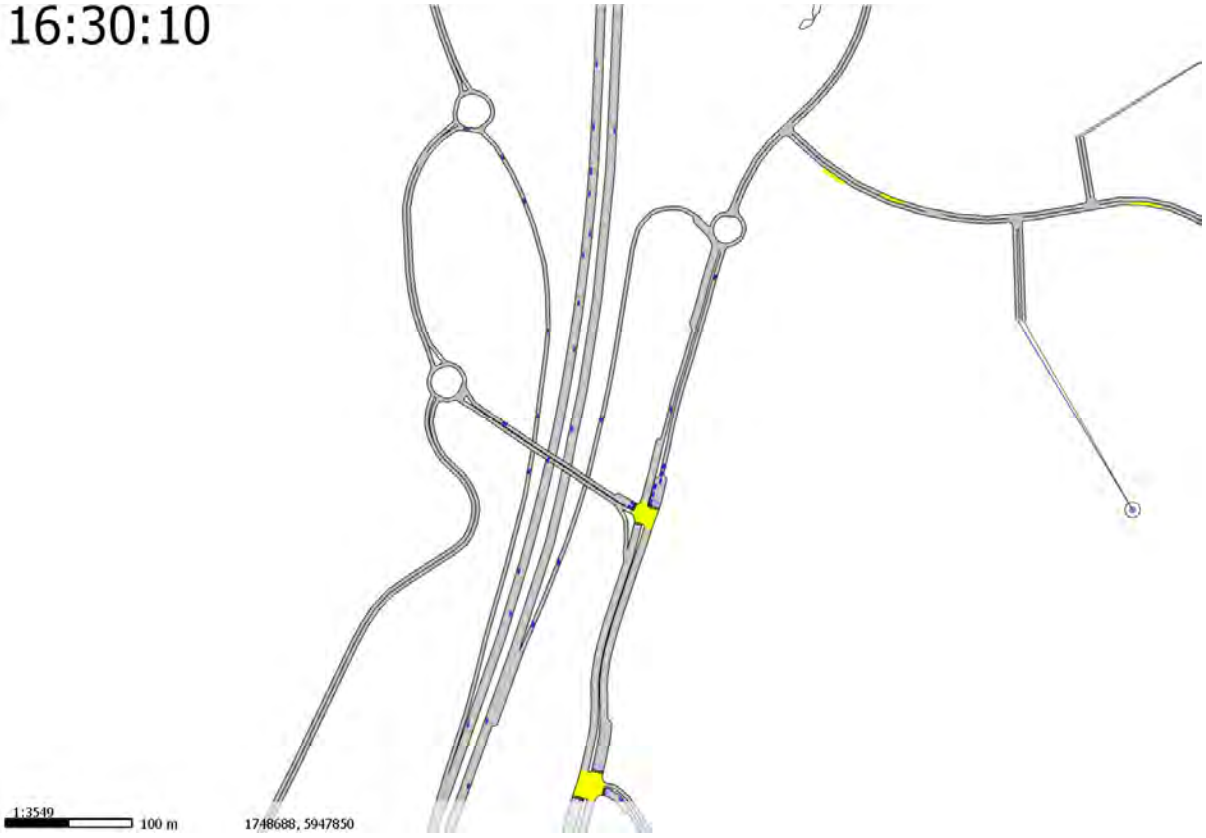
16:00:09



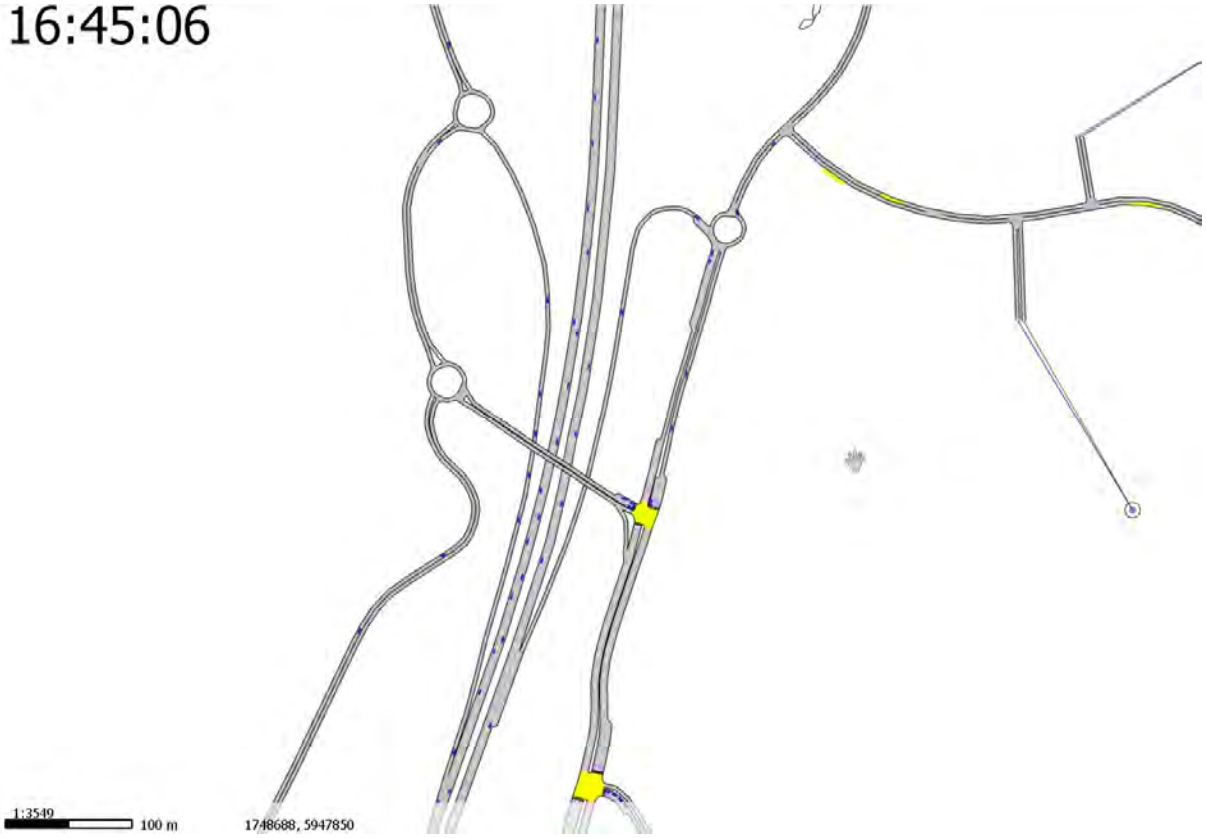
16:15:15



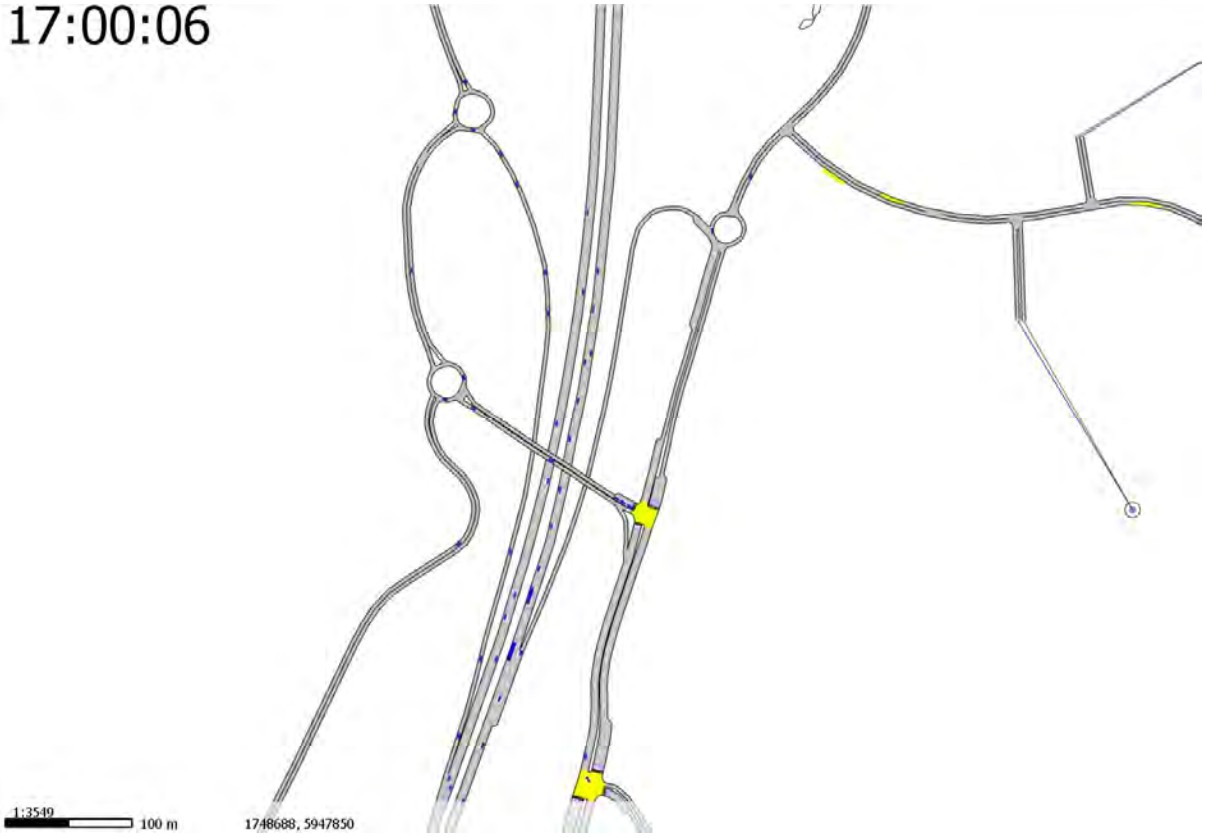
16:30:10



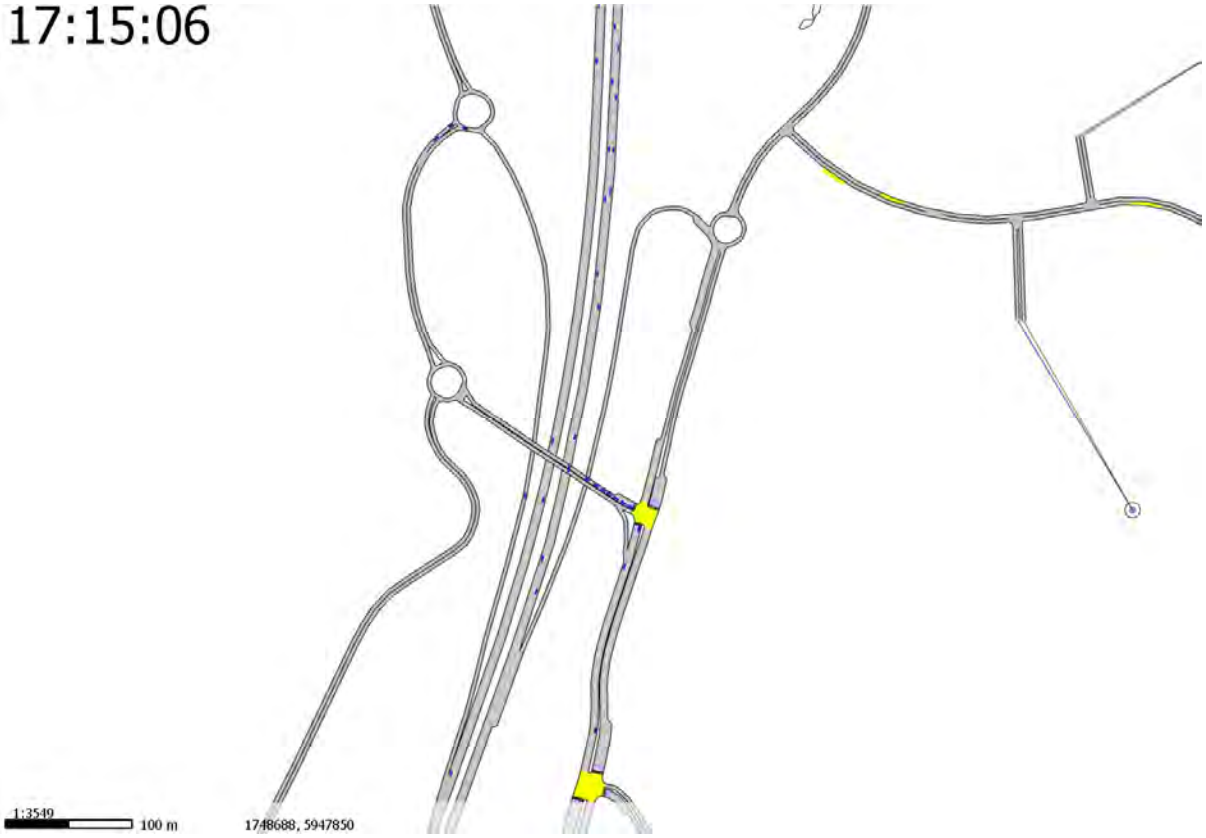
16:45:06



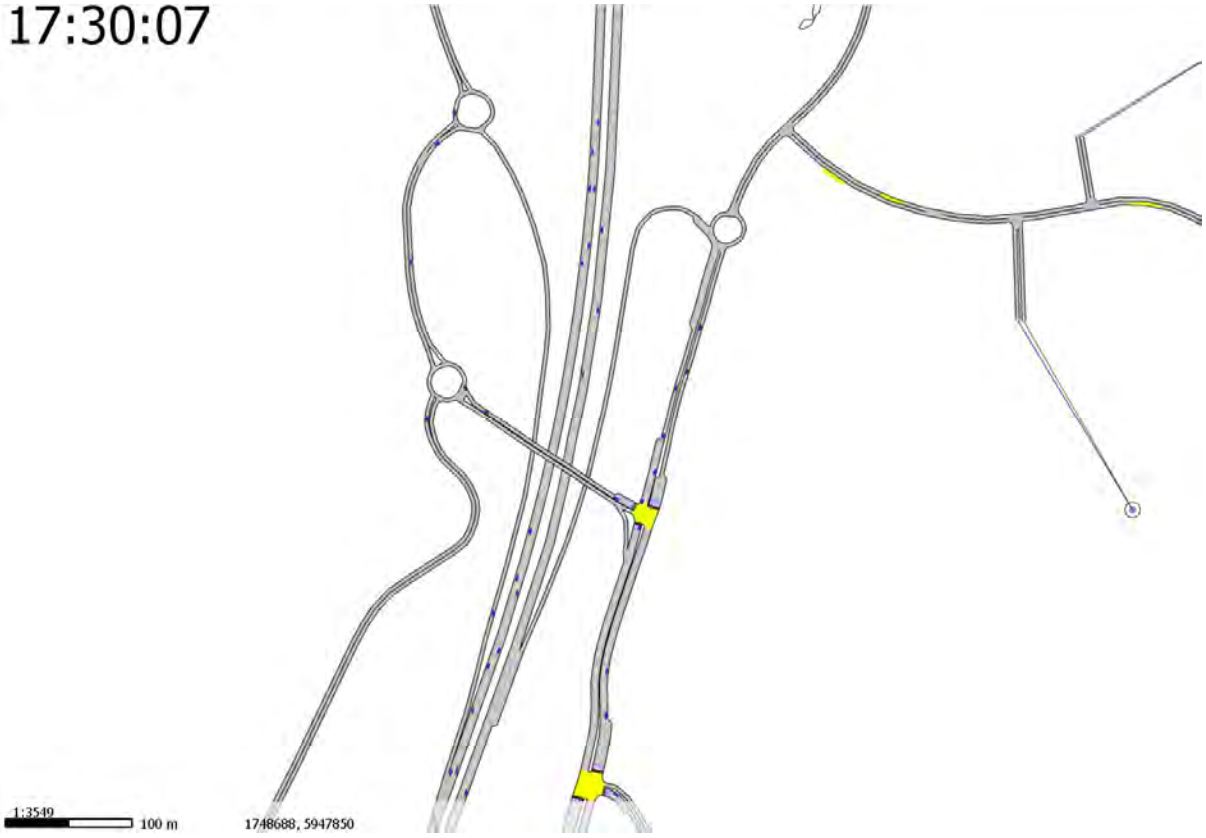
17:00:06



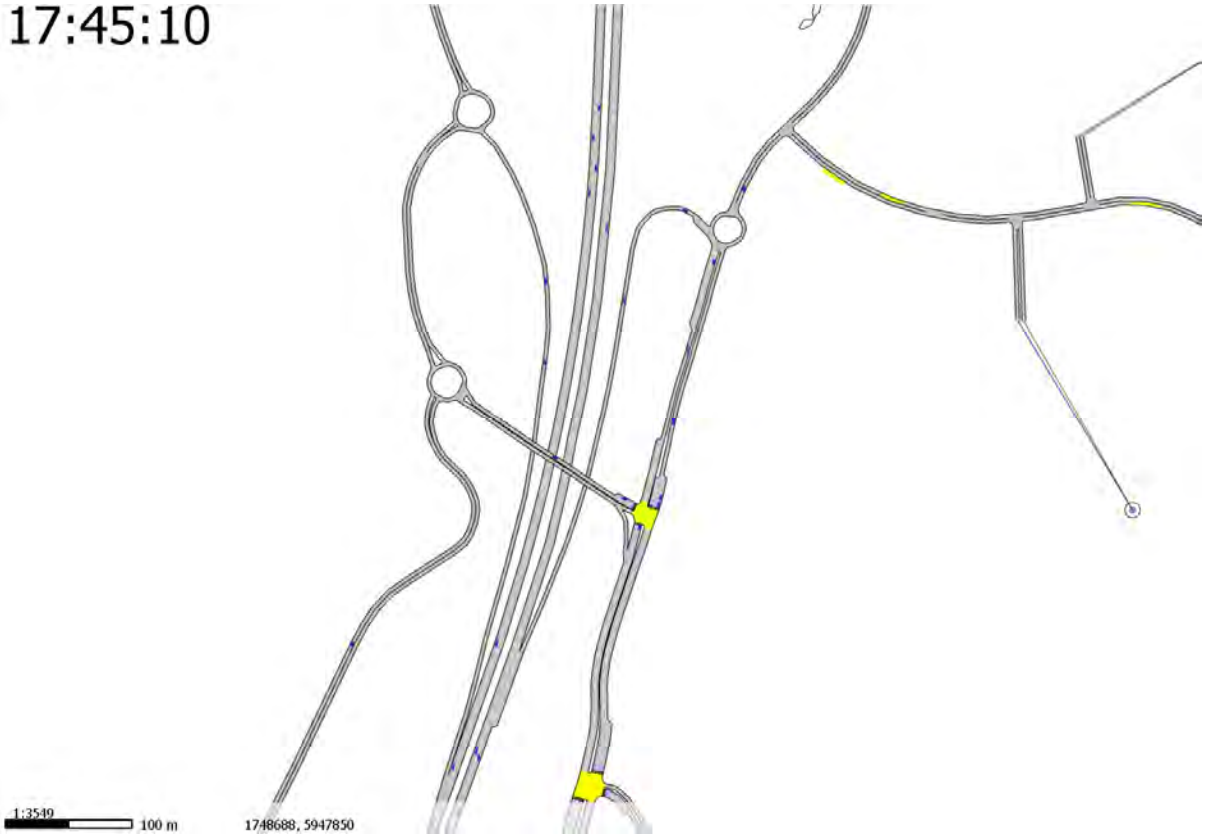
17:15:06



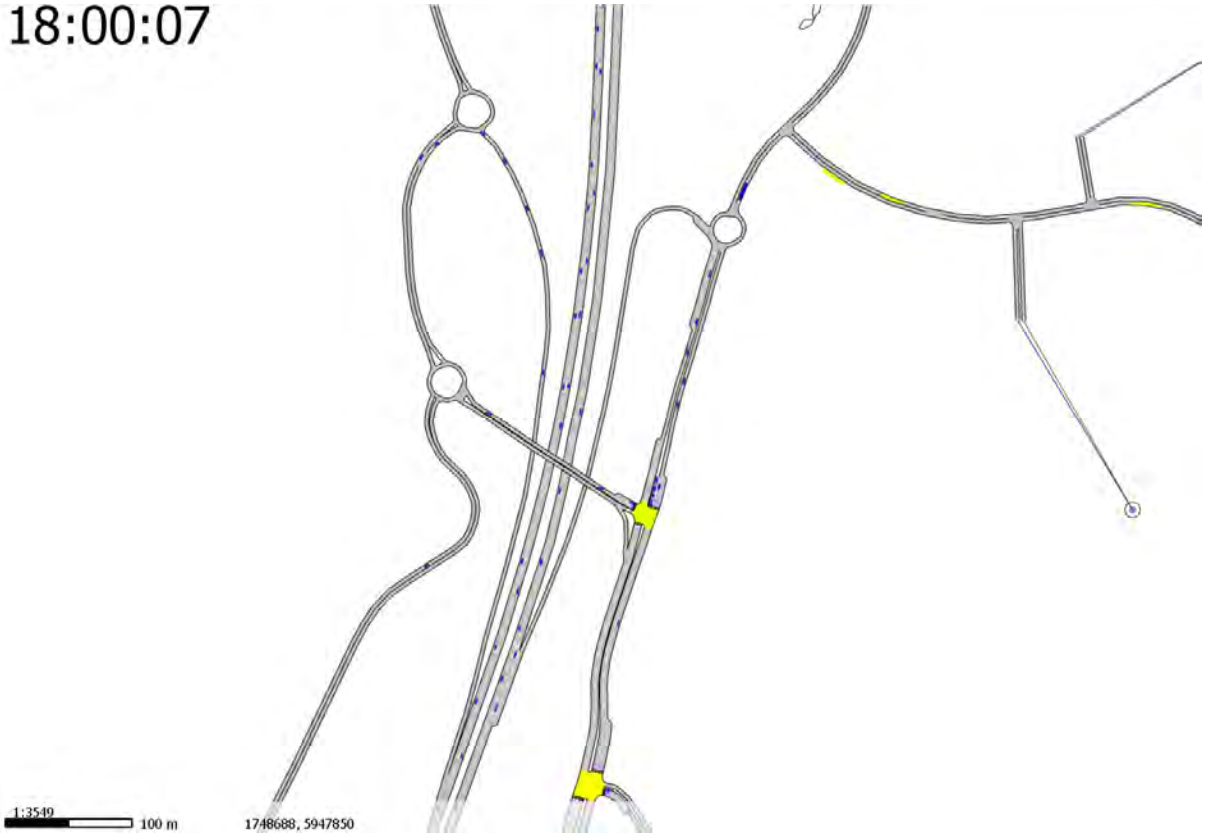
17:30:07



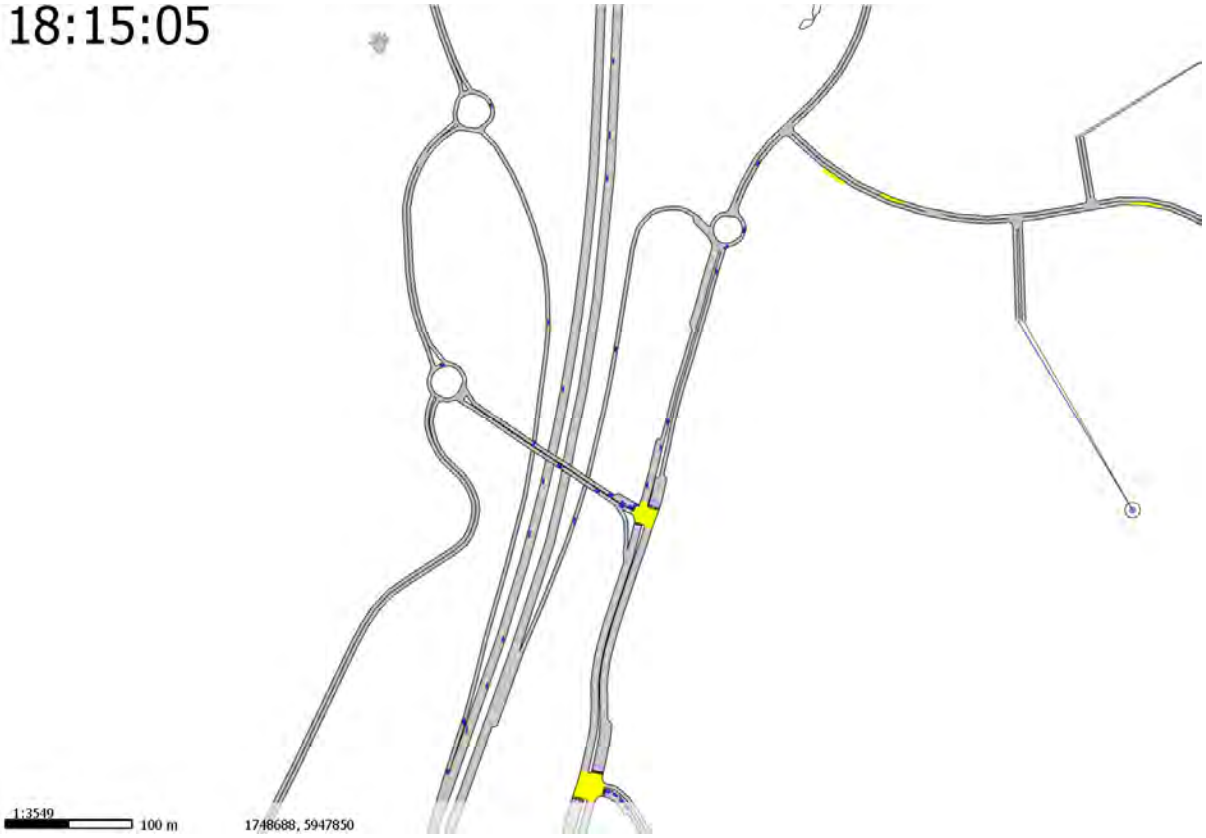
17:45:10



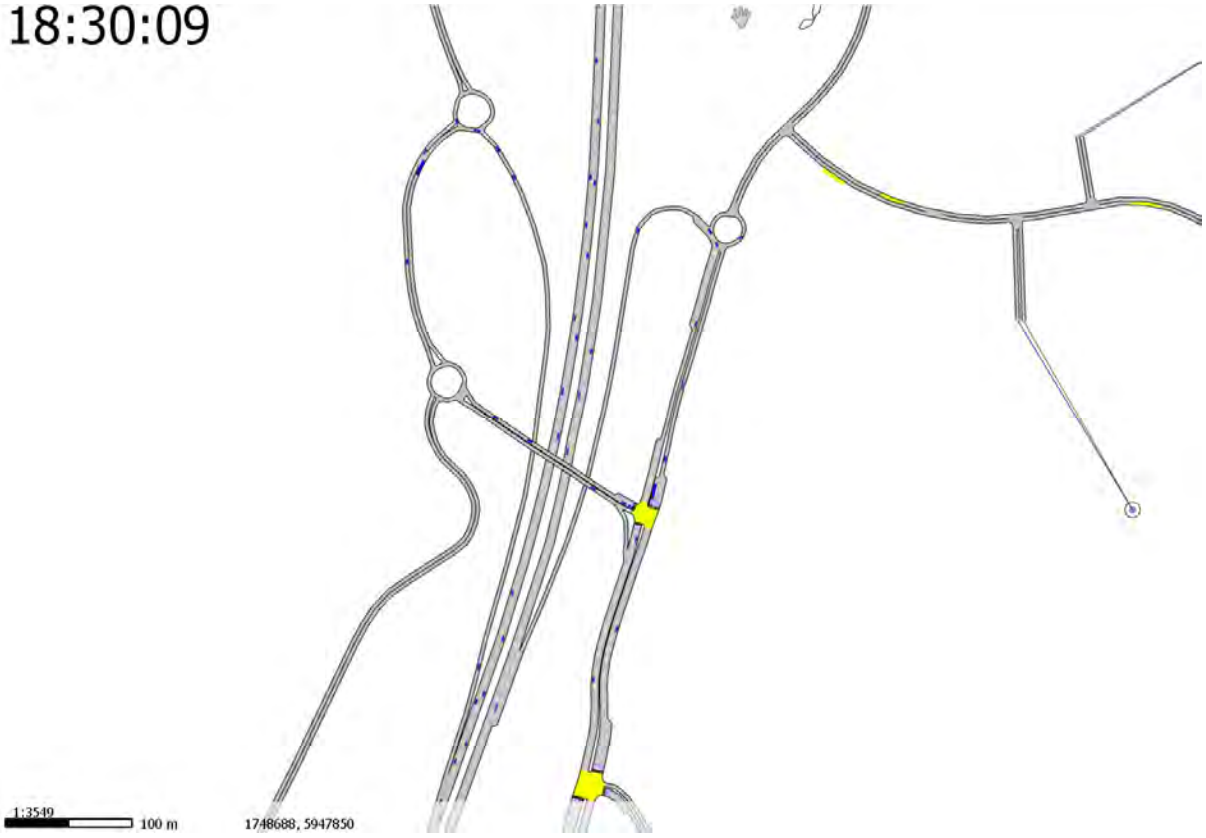
18:00:07



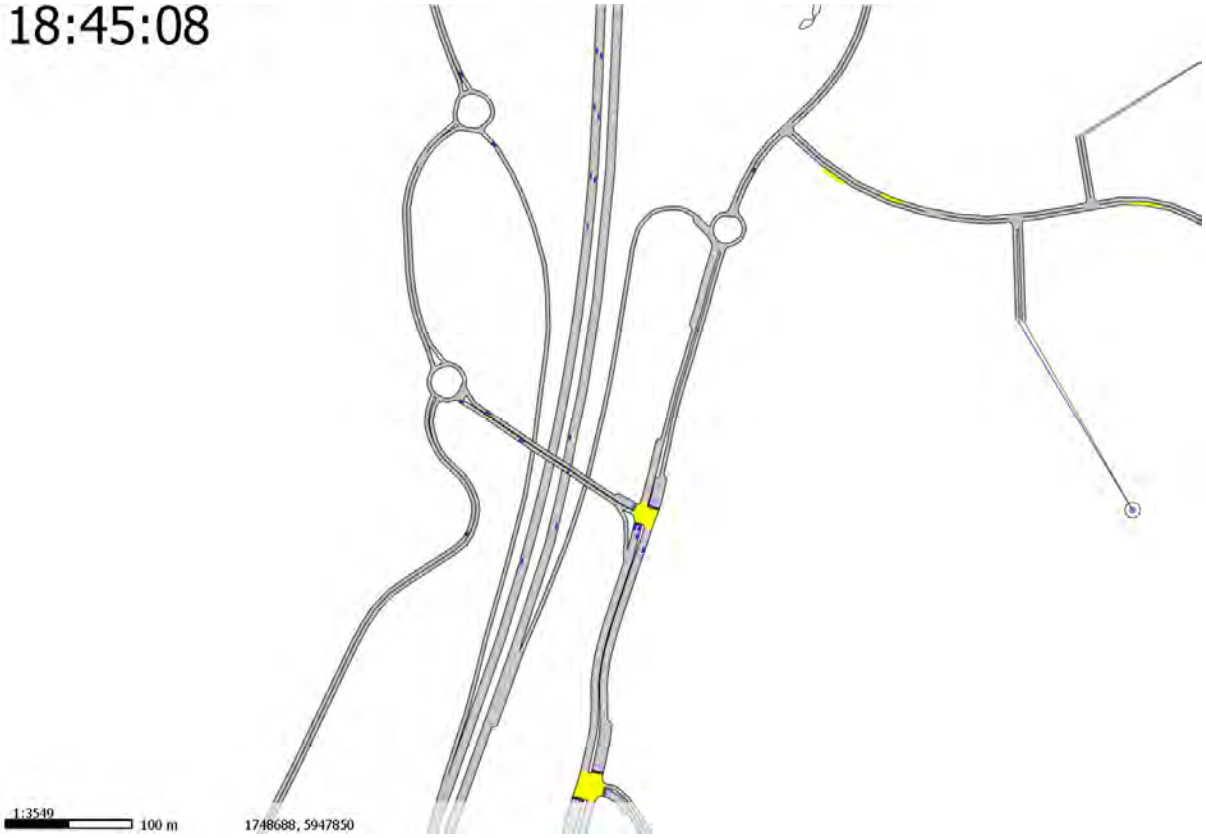
18:15:05

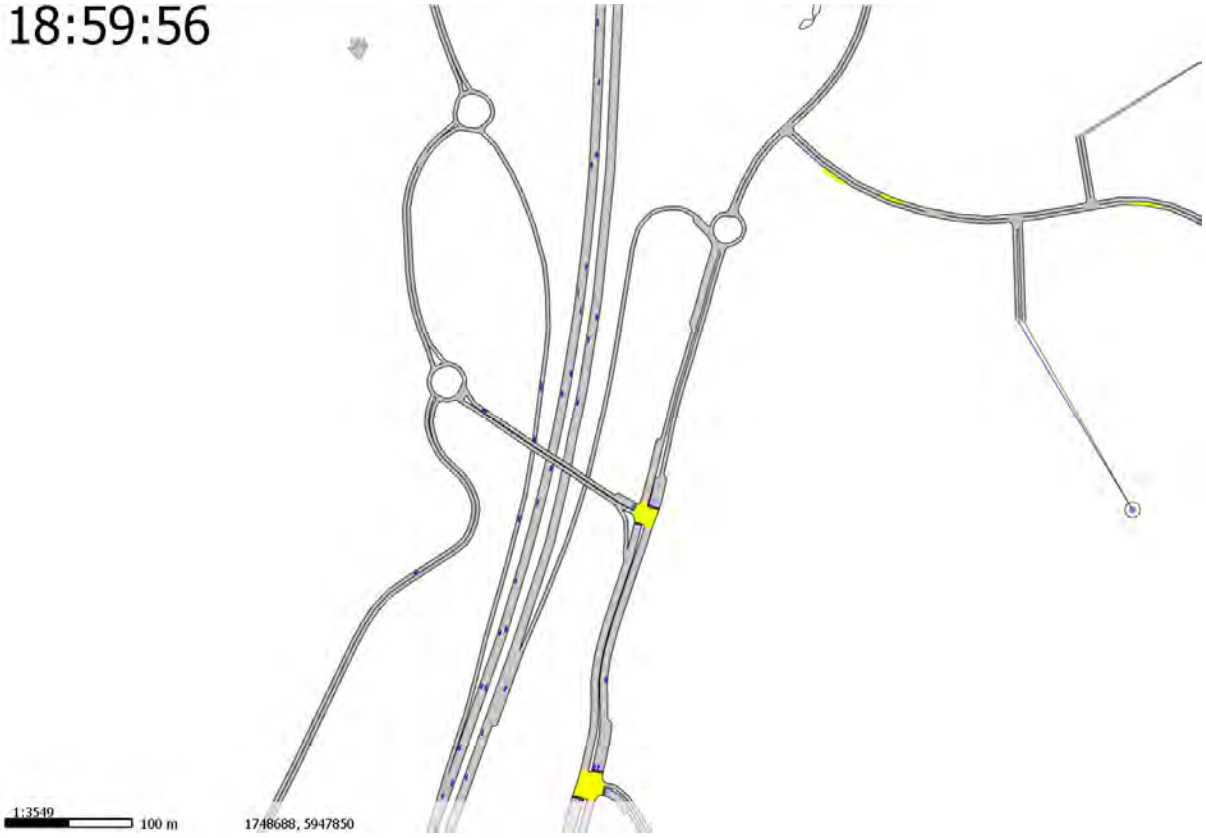


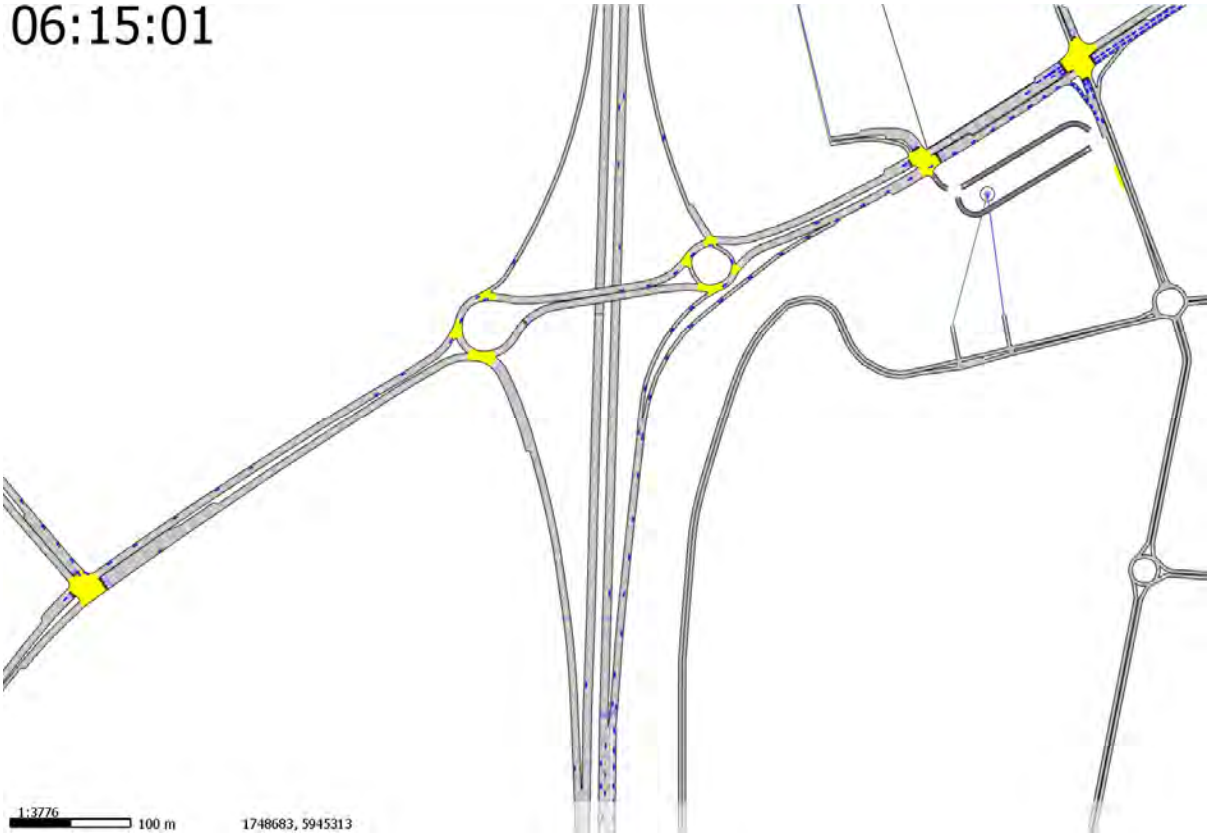
18:30:09

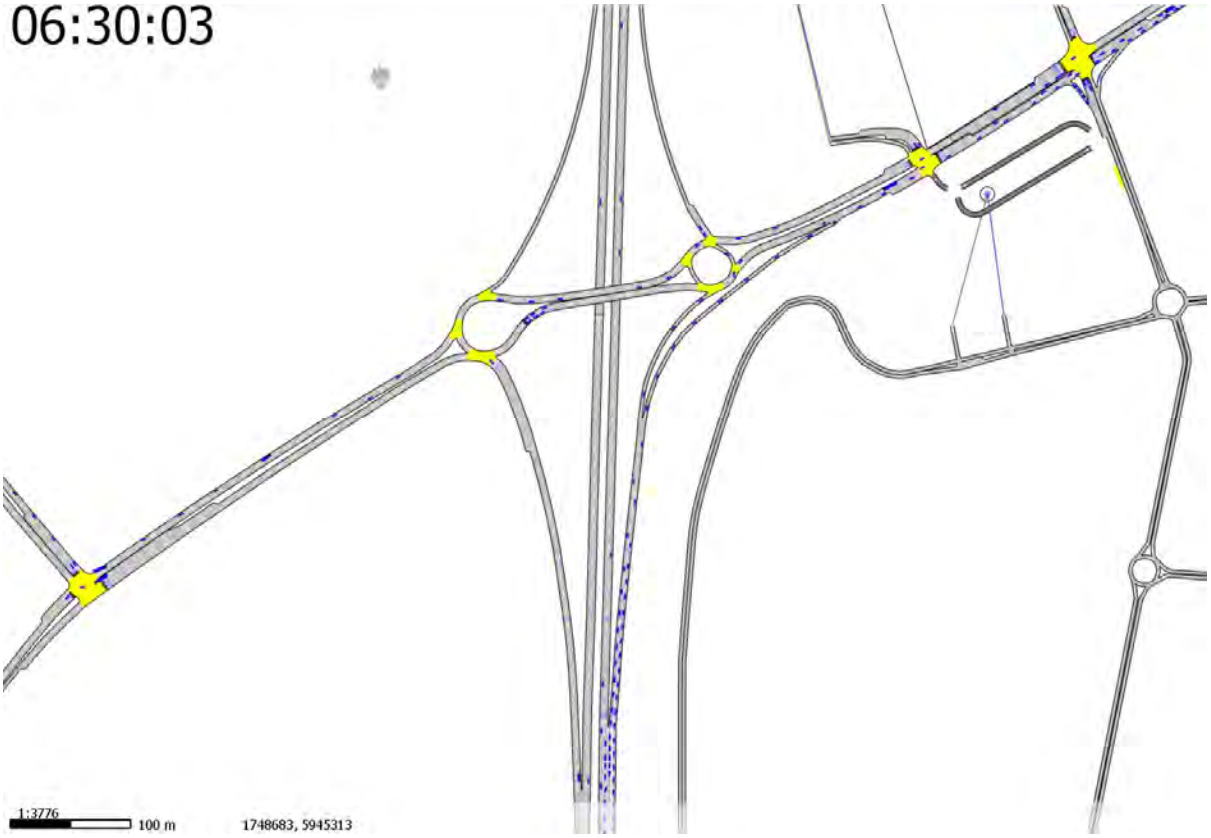


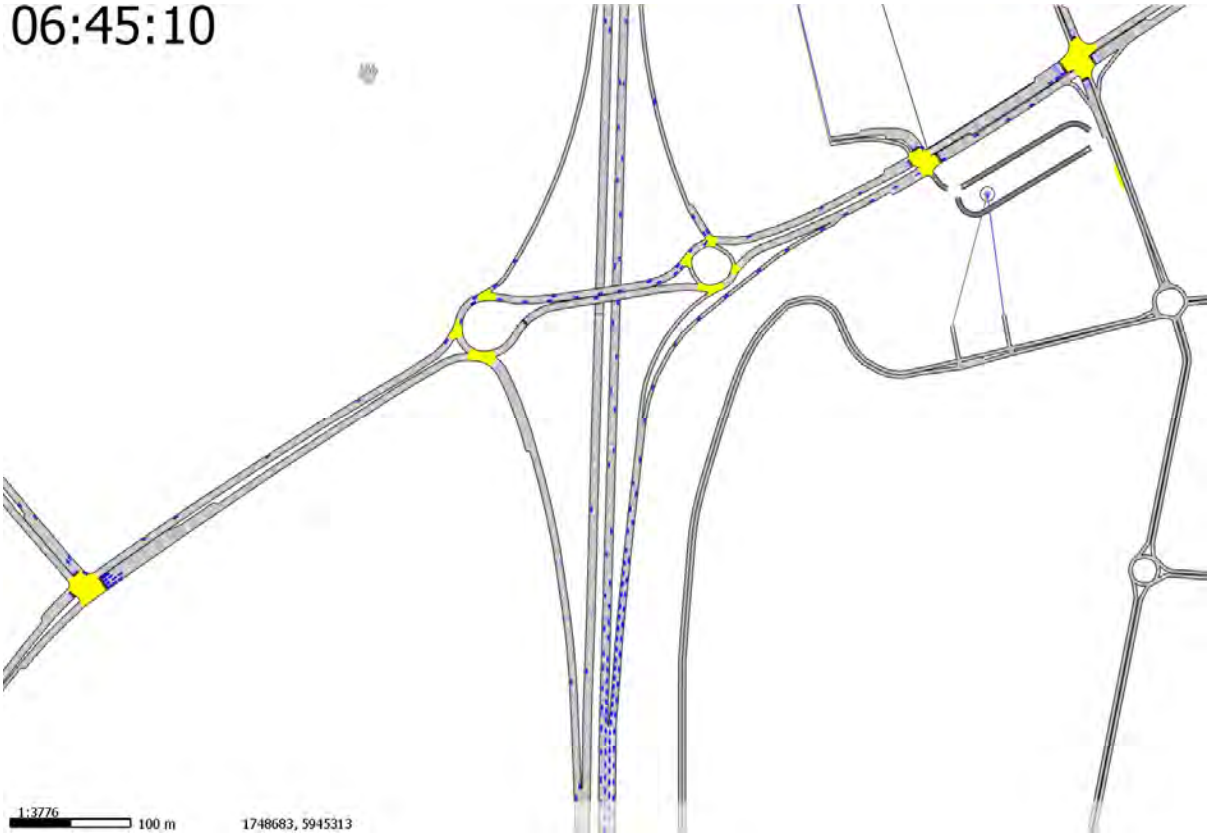
18:45:08

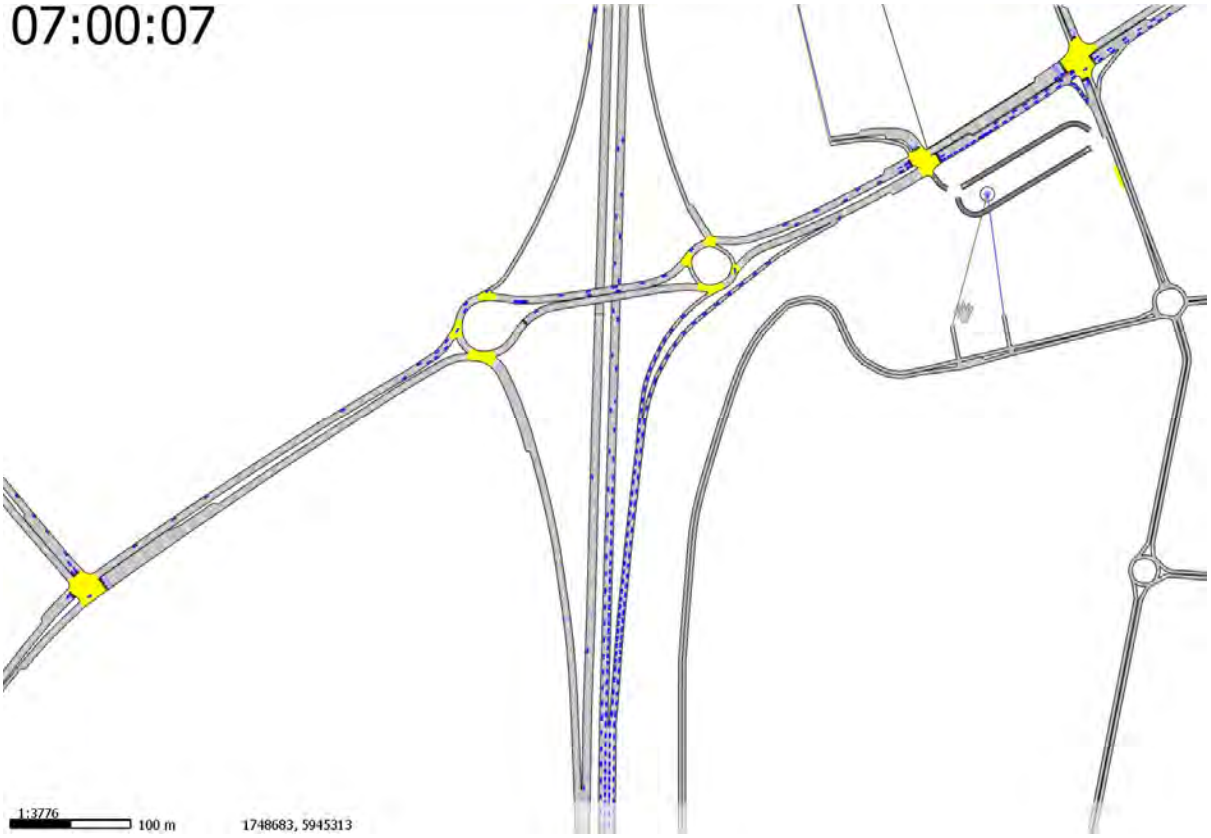


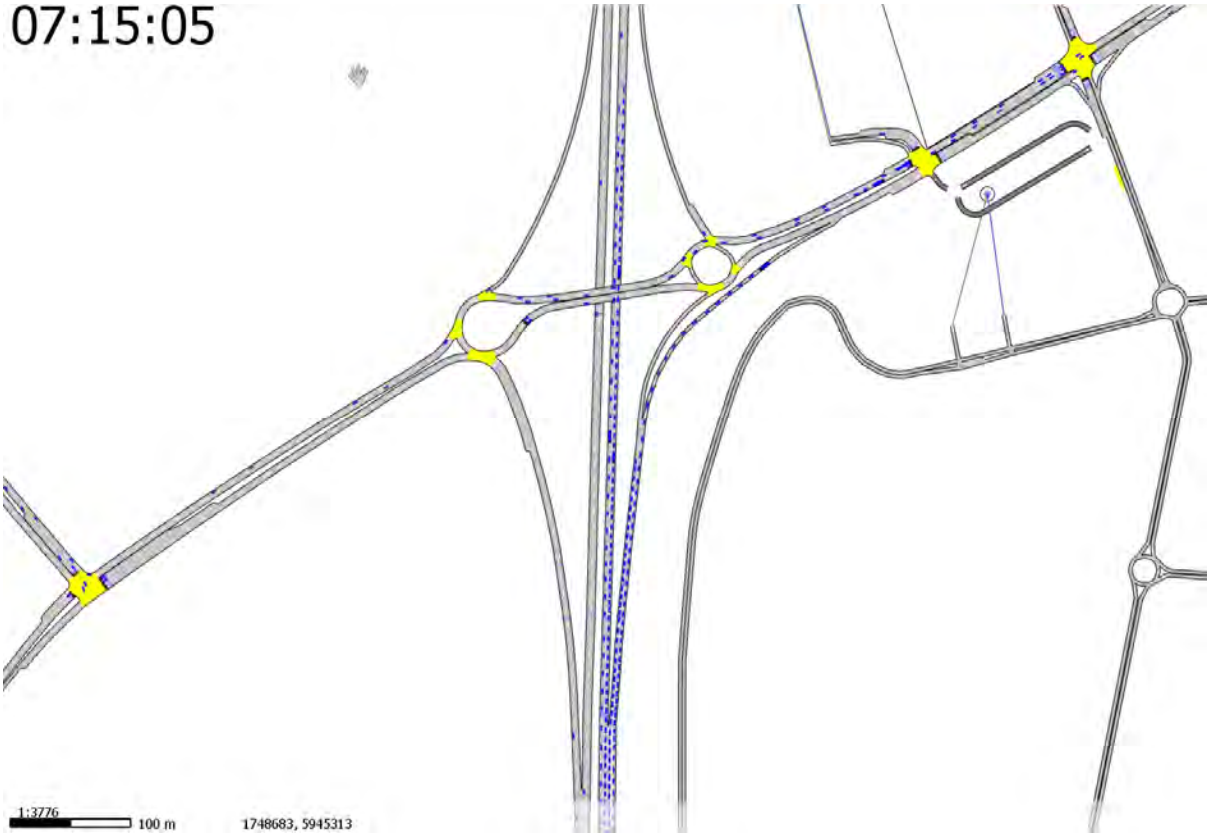

18:59:56
1:3549
100 m
1748688, 5947850

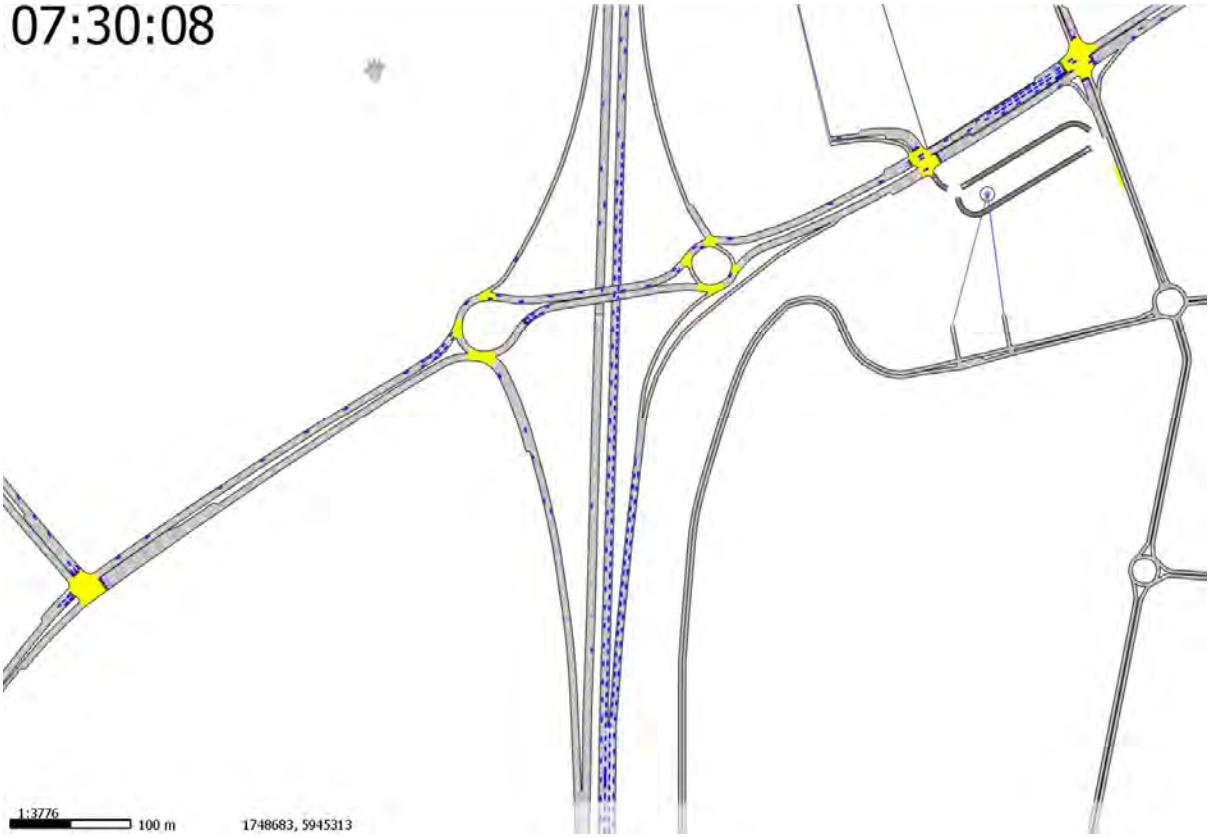

06:15:01
1:3776
100 m
1748683, 5945313


06:30:03
1:3776
100 m
1748683, 5945313

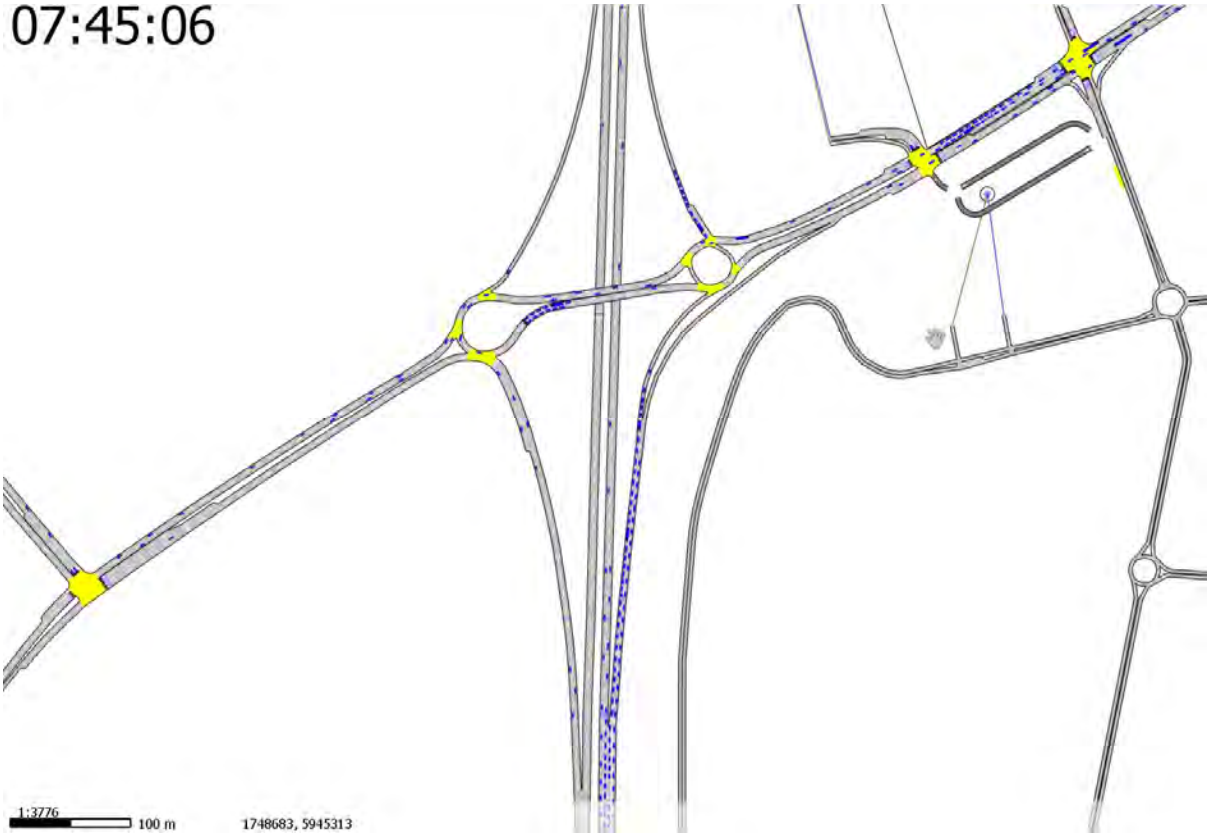

06:45:10
1:3776
100 m
1748683, 5945313


07:00:07
1:3776
100 m
1748683, 5945313

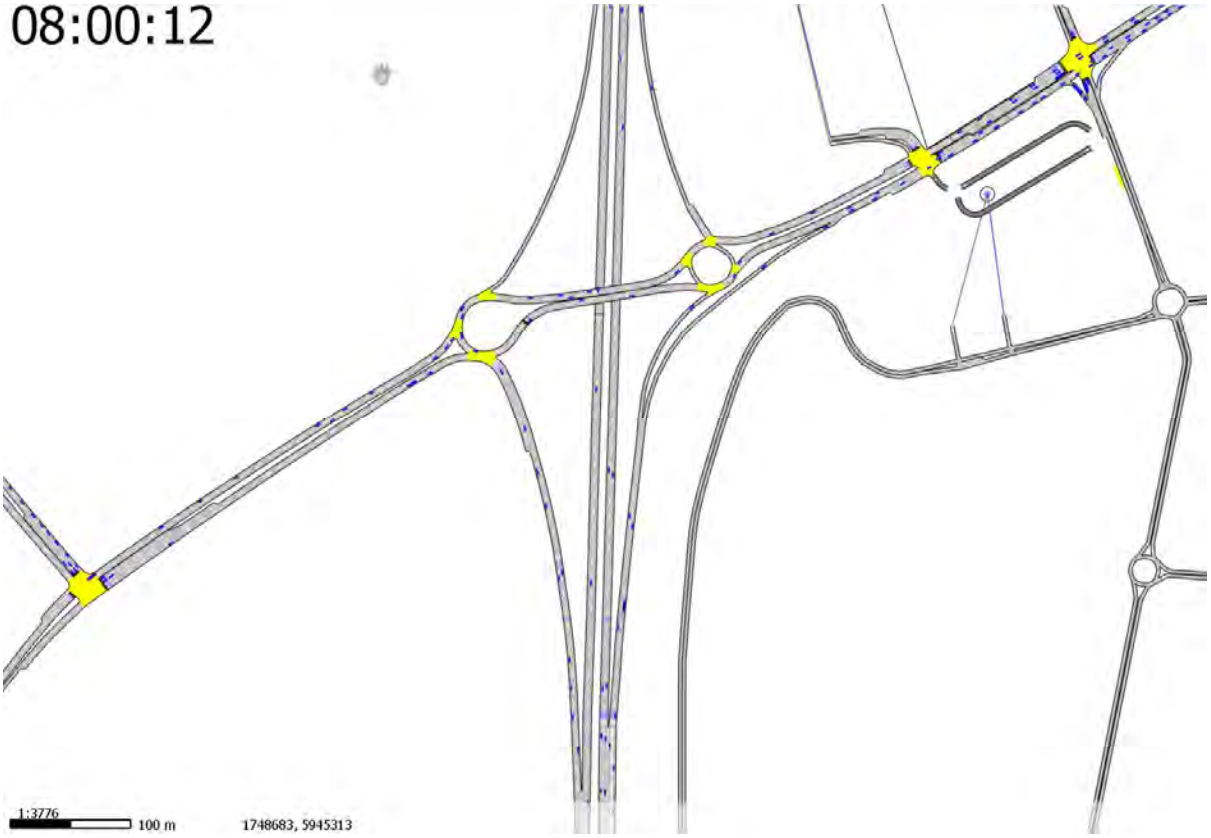

07:15:05
1:3776
100 m
1748683, 5945313


07:30:08
1:3776
100 m
1748683, 5945313

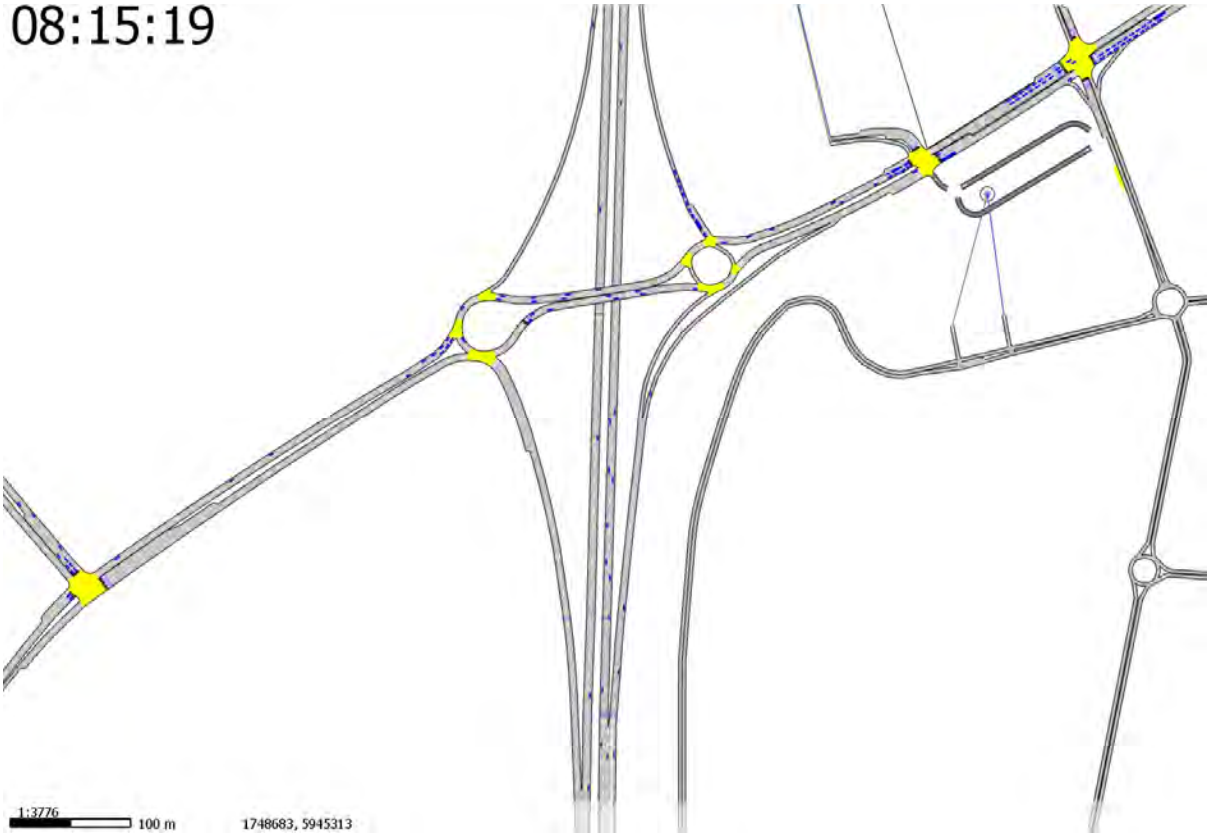
07:45:06



08:00:12

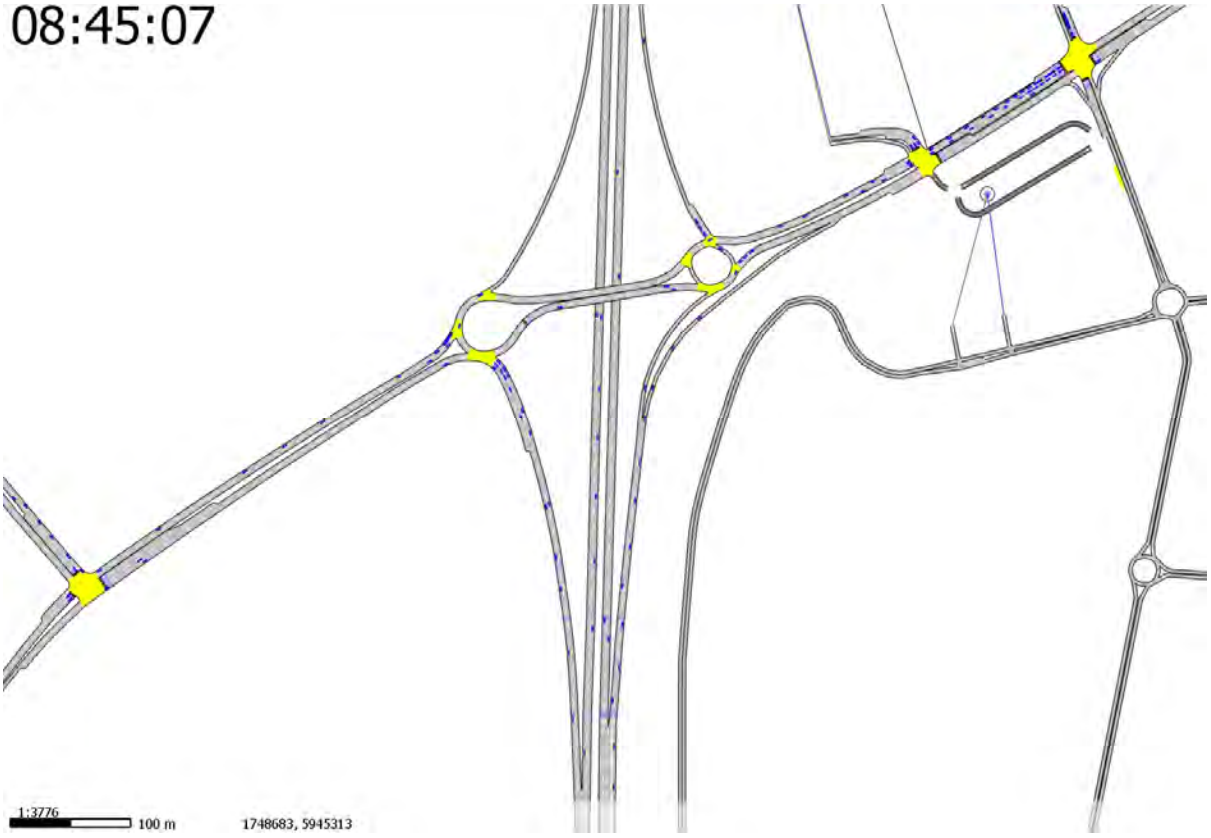


08:15:19

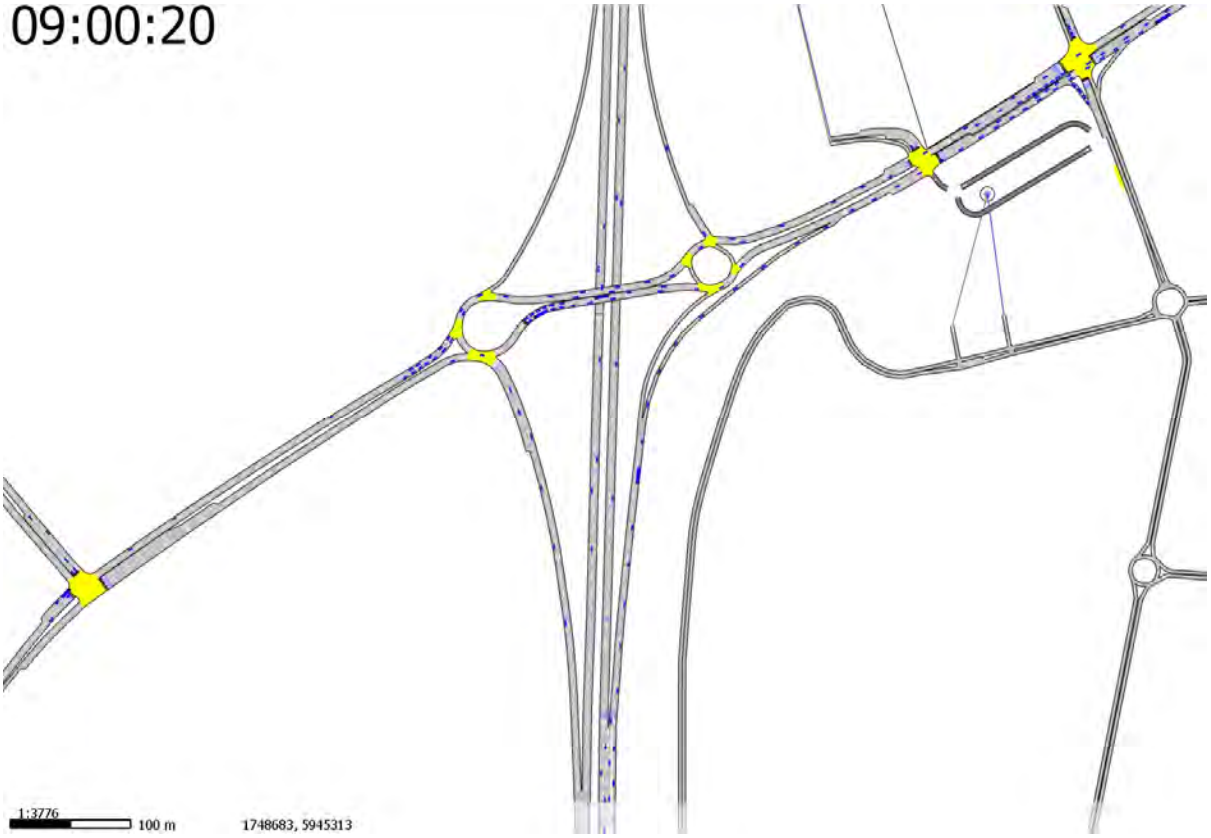


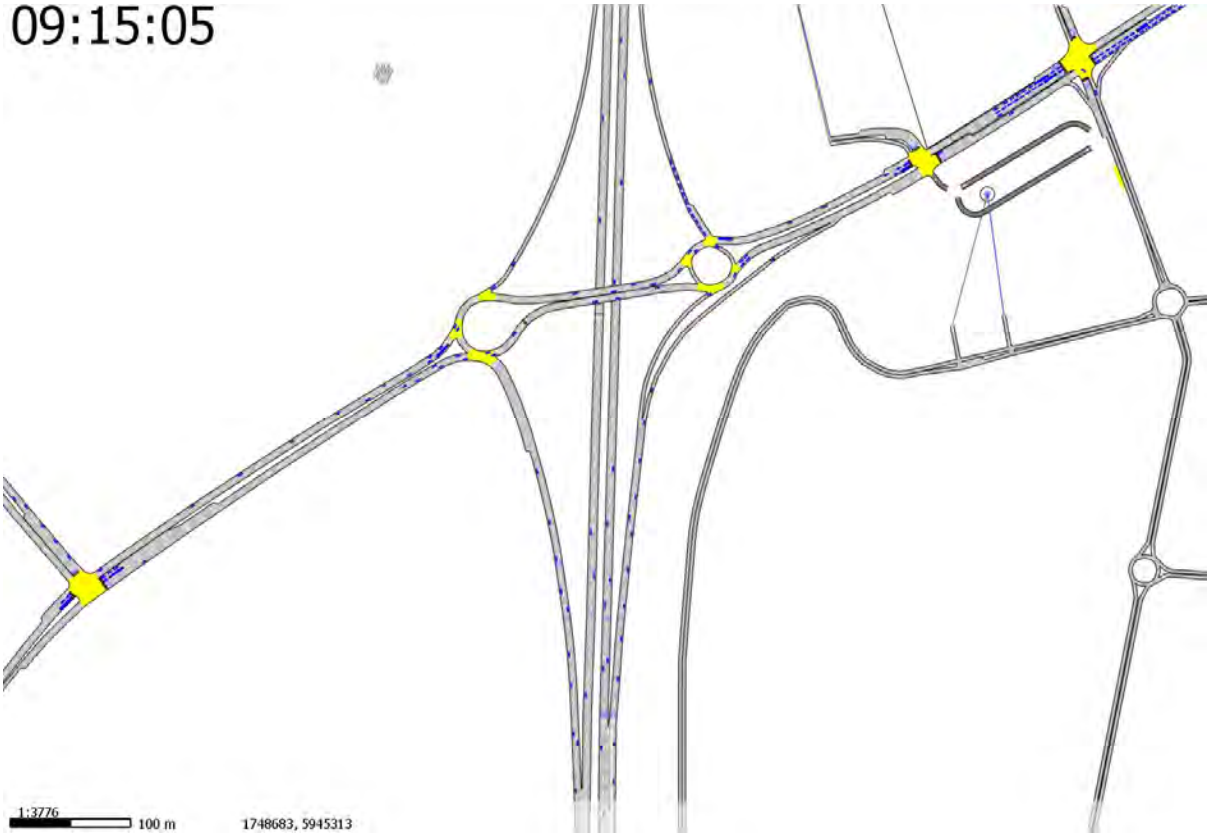
08:30:08

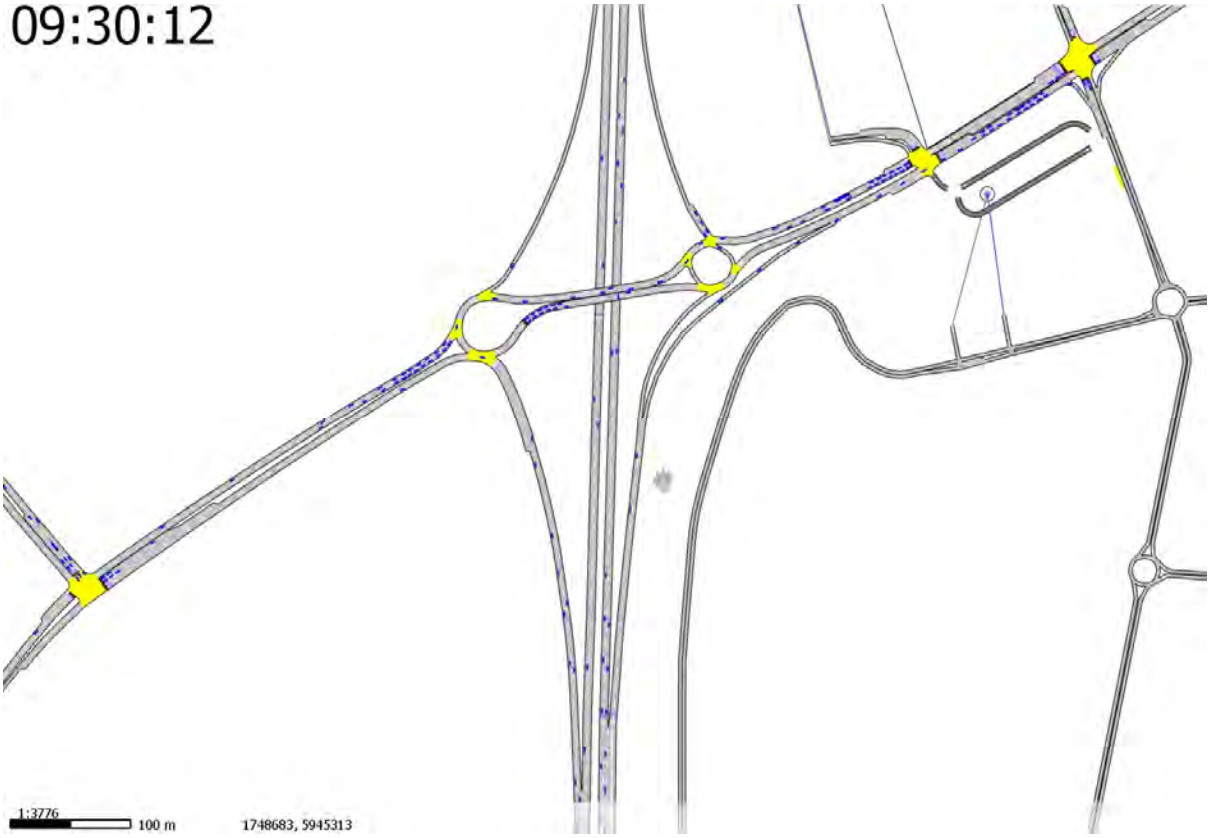
08:45:07



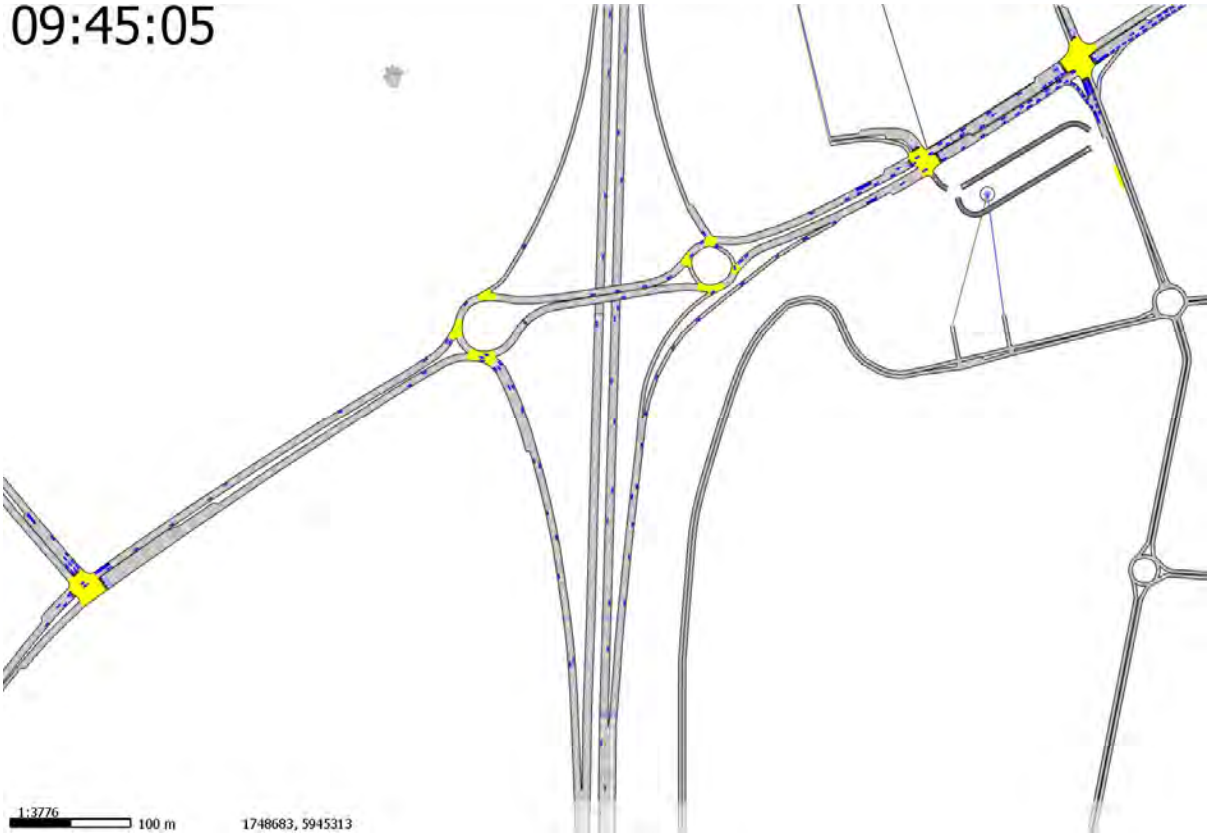
09:00:20



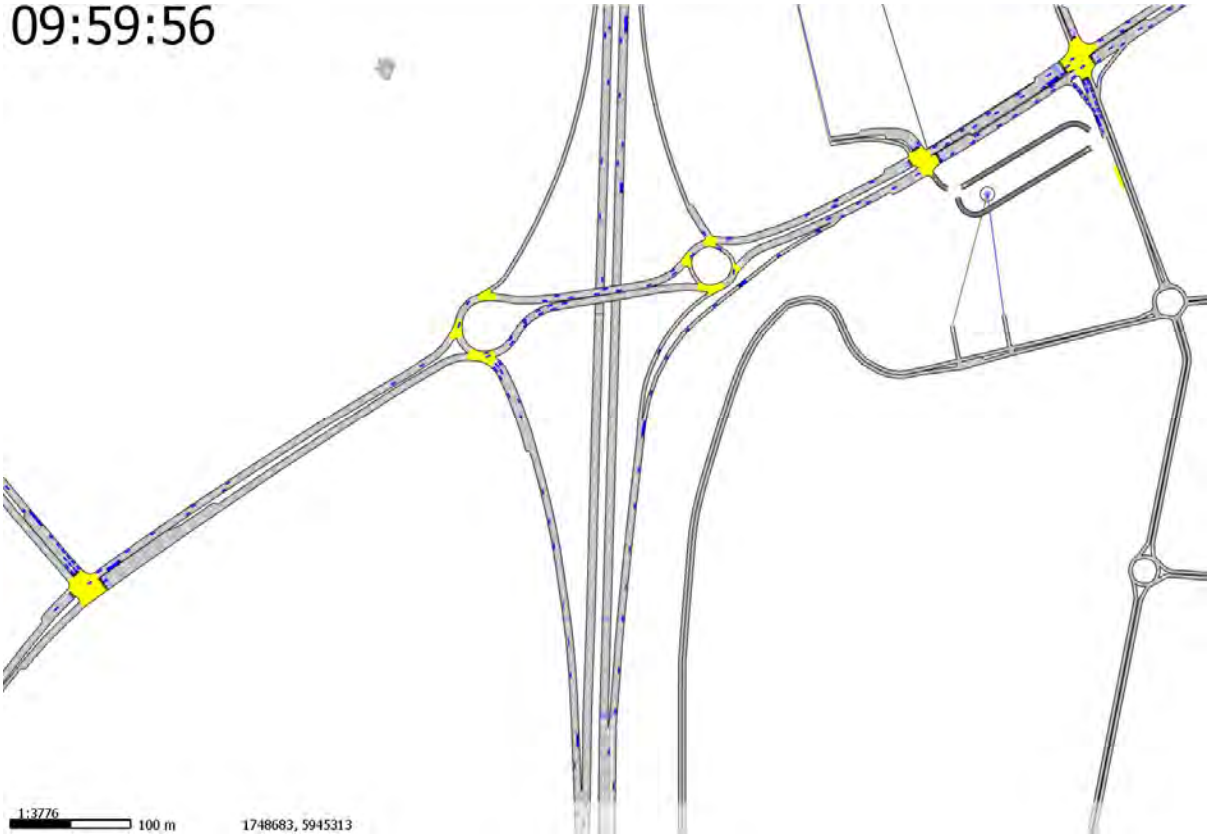

09:15:05
1:3776
100 m
1748683, 5945313


09:30:12
1:3776
100 m
1748683, 5945313

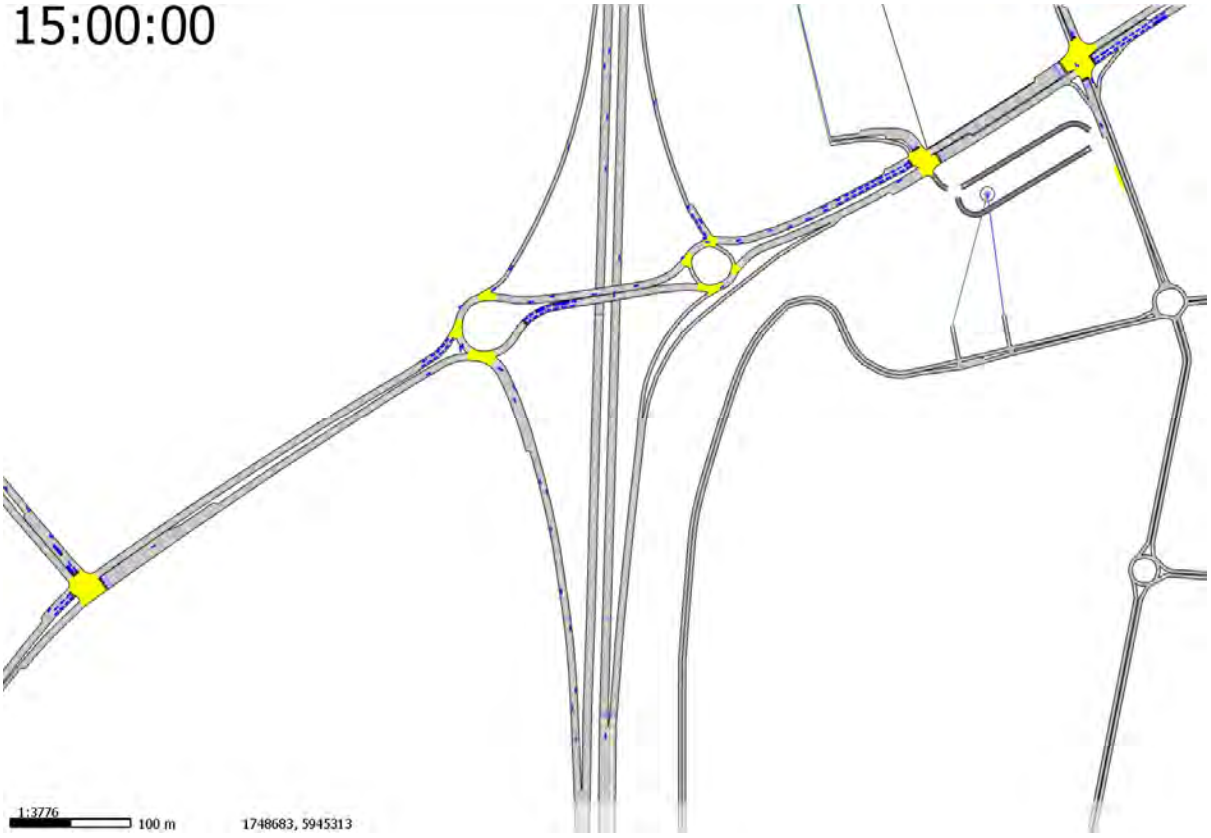
09:45:05



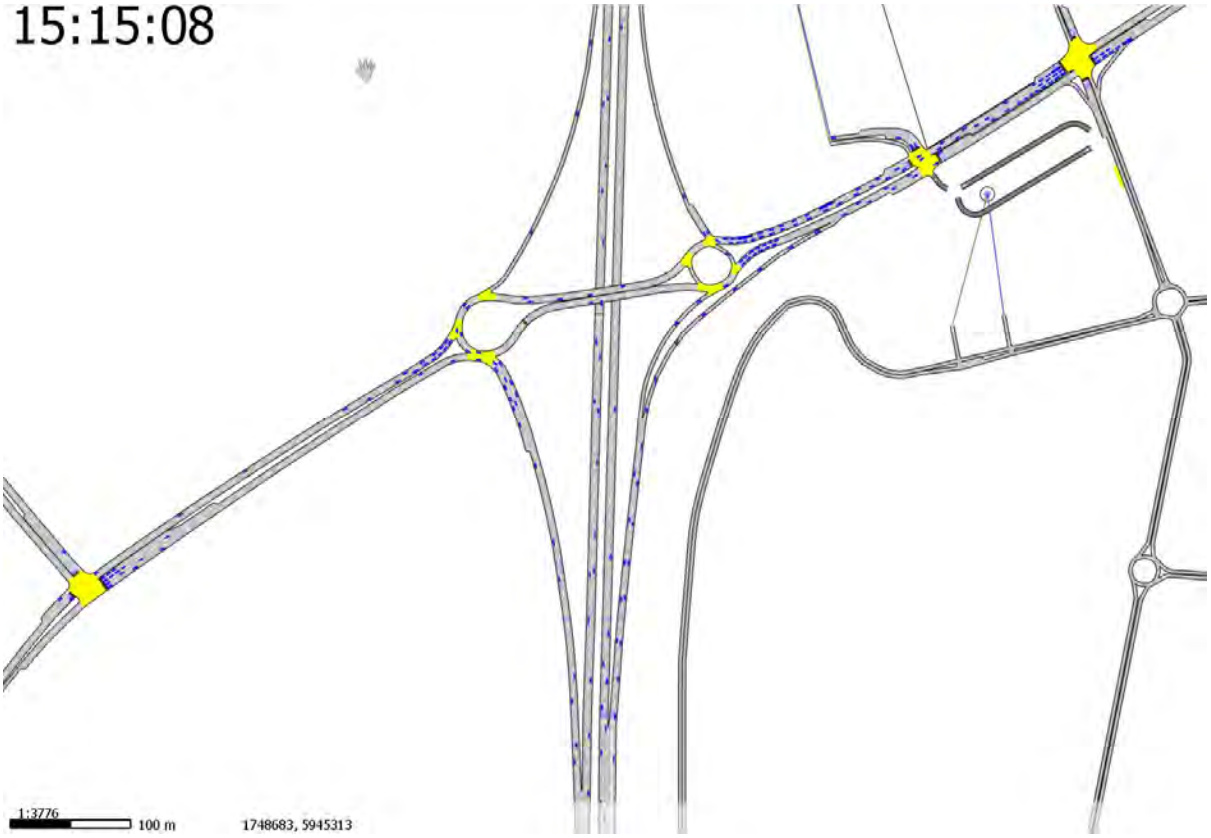
09:59:56

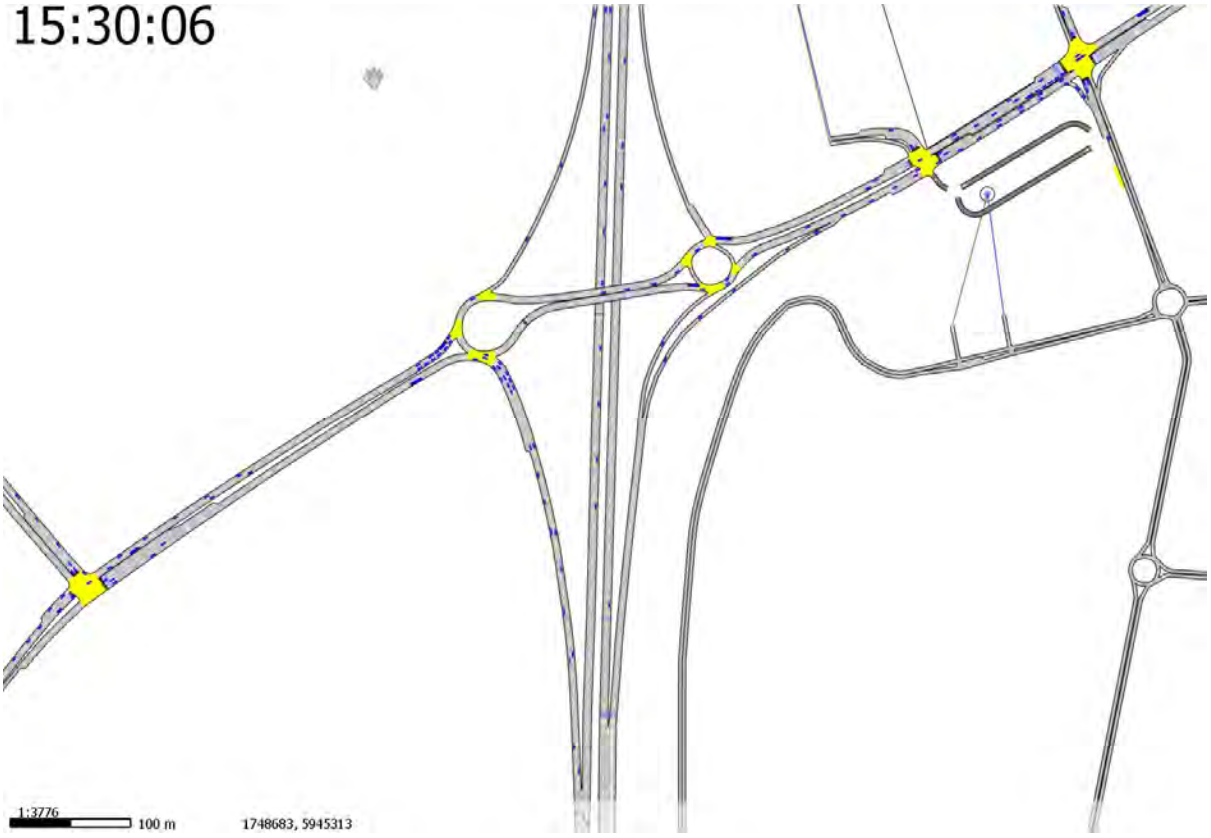


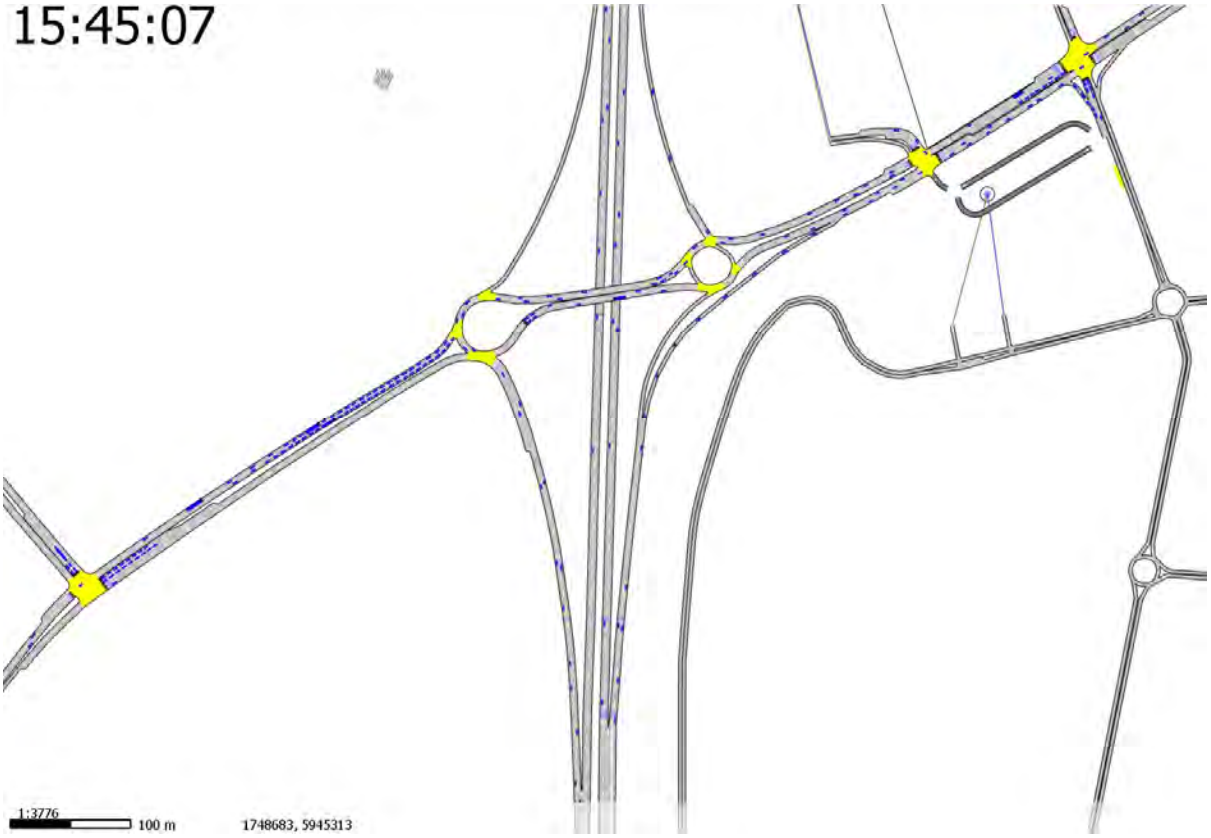
15:00:00



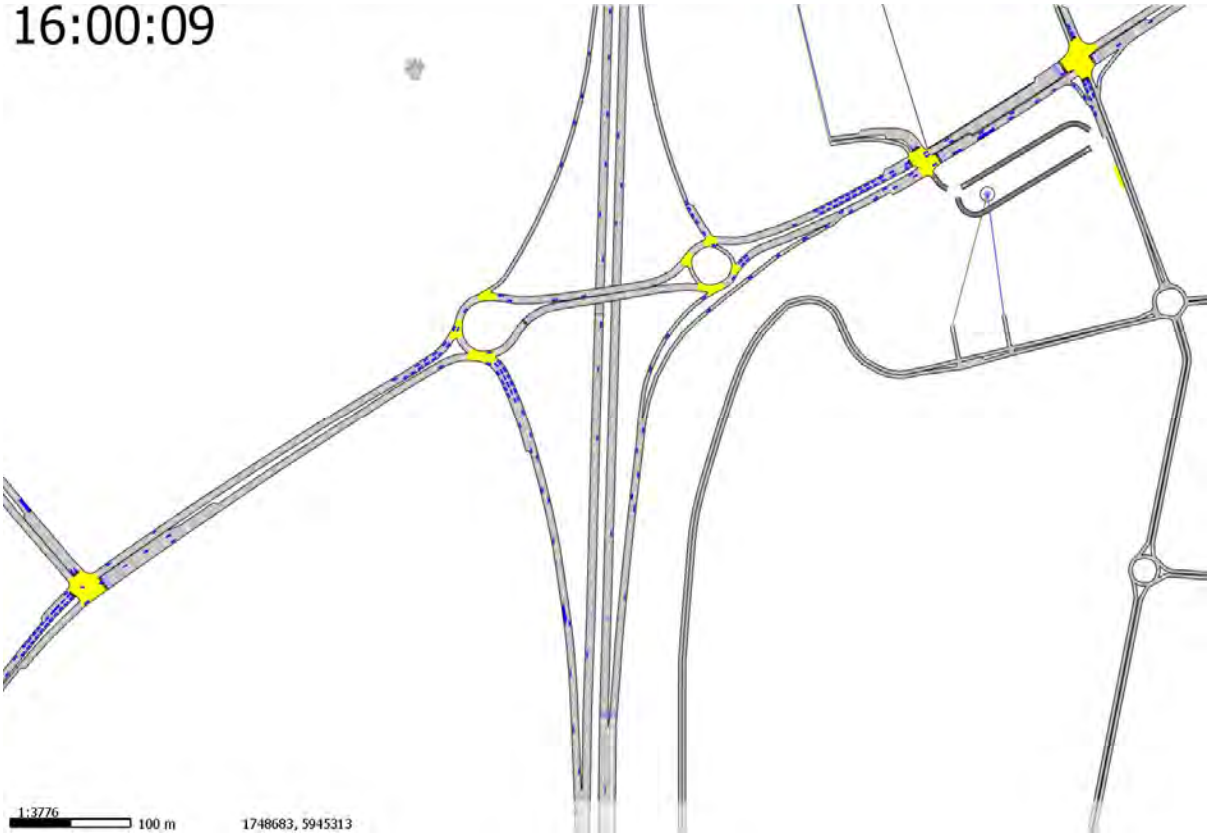
15:15:08



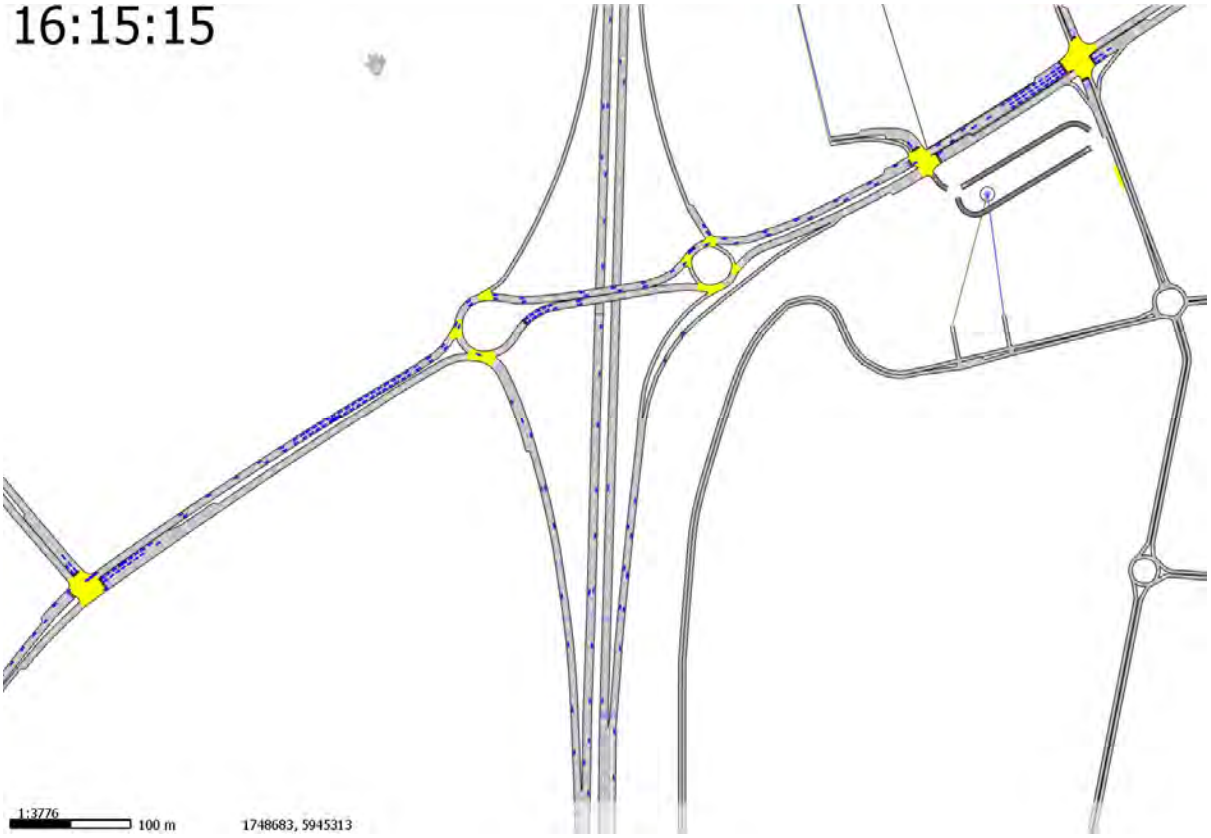

15:30:06
1:3776
100 m
1748683, 5945313

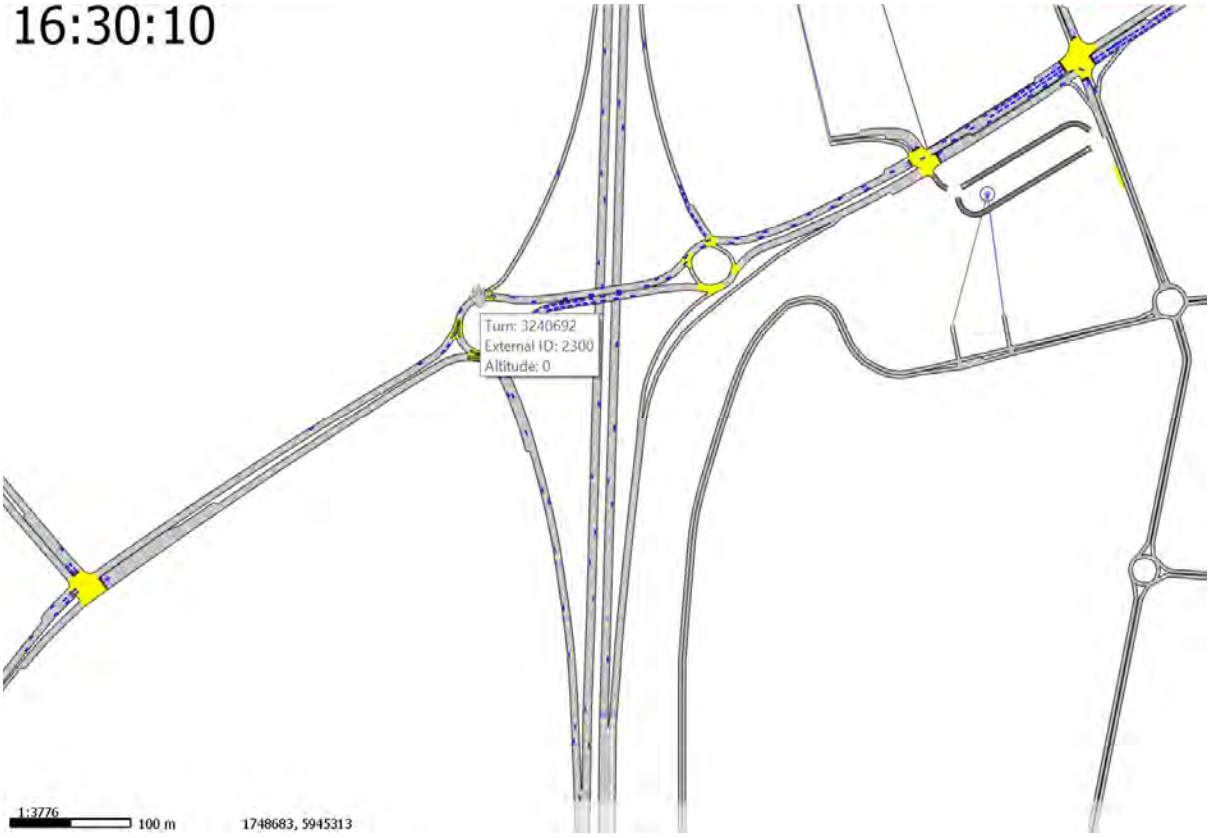

15:45:07
1:3776
100 m
1748683, 5945313

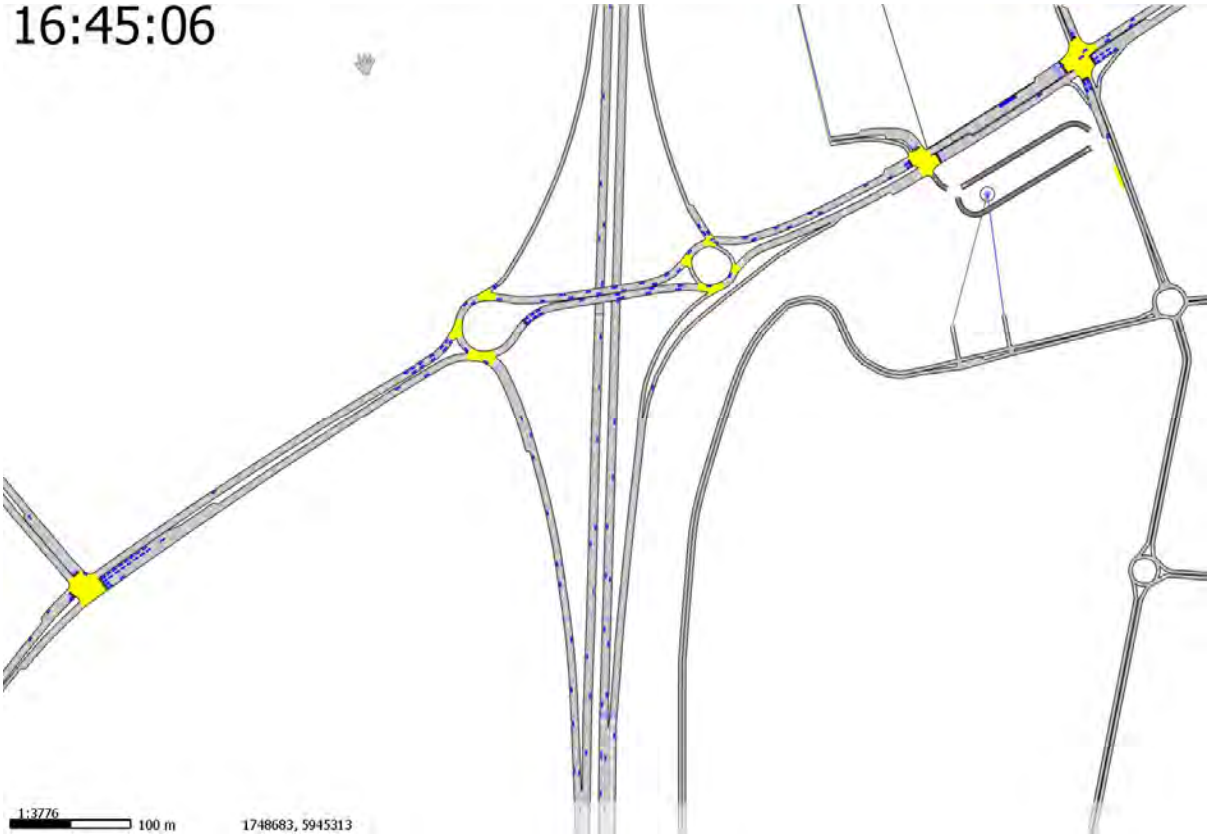
16:00:09

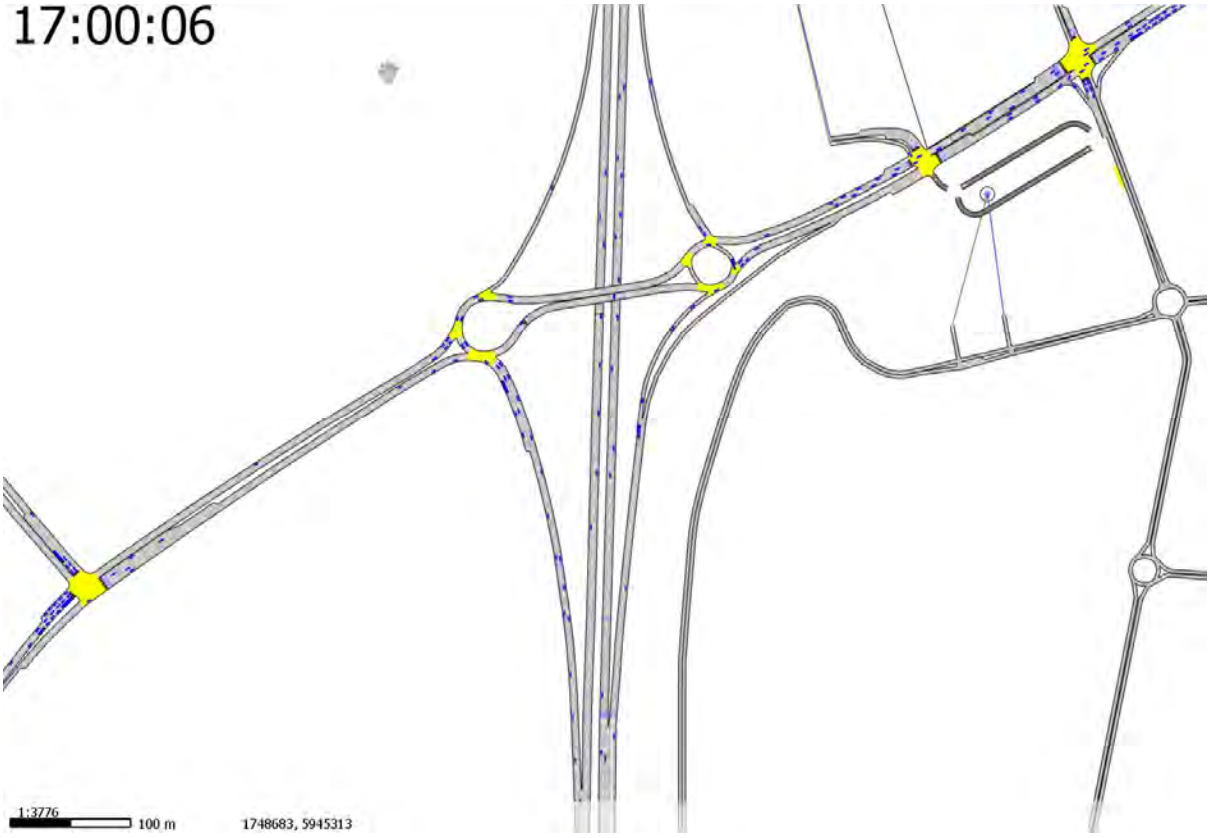


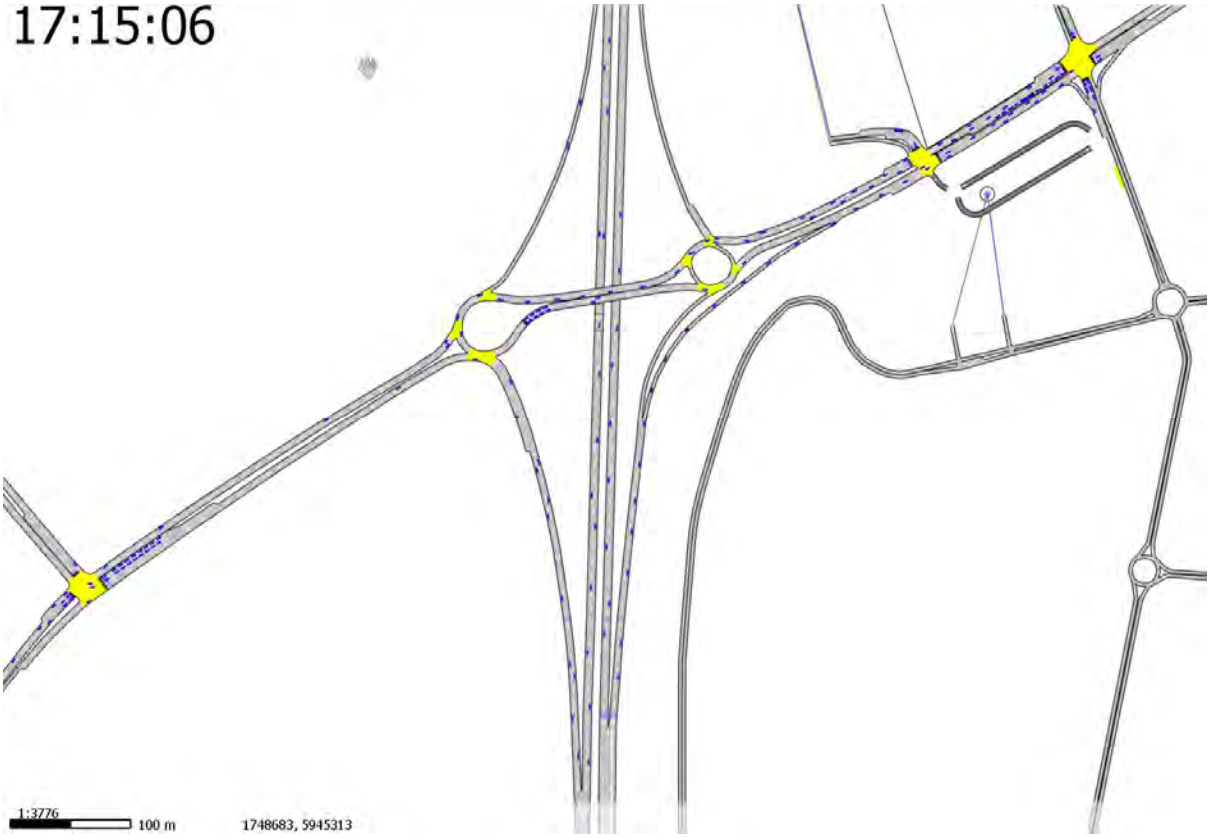
16:15:15

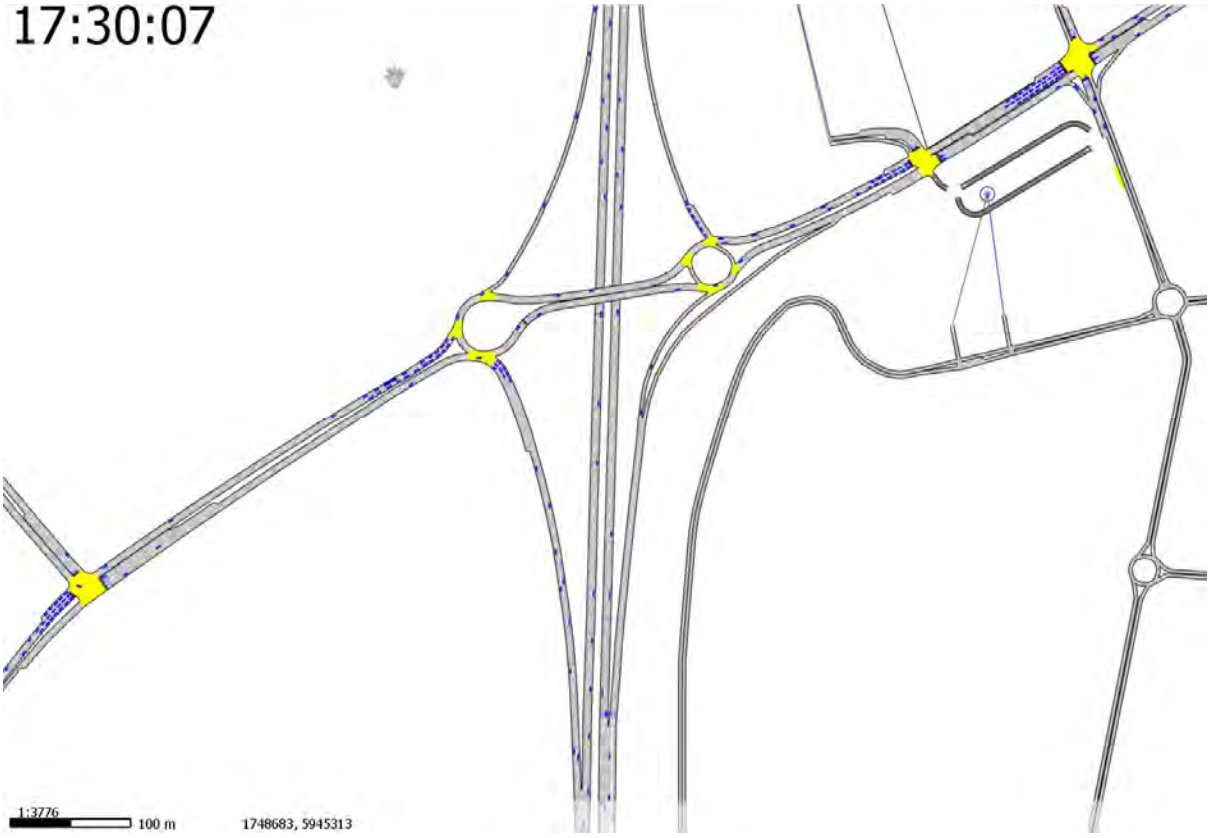


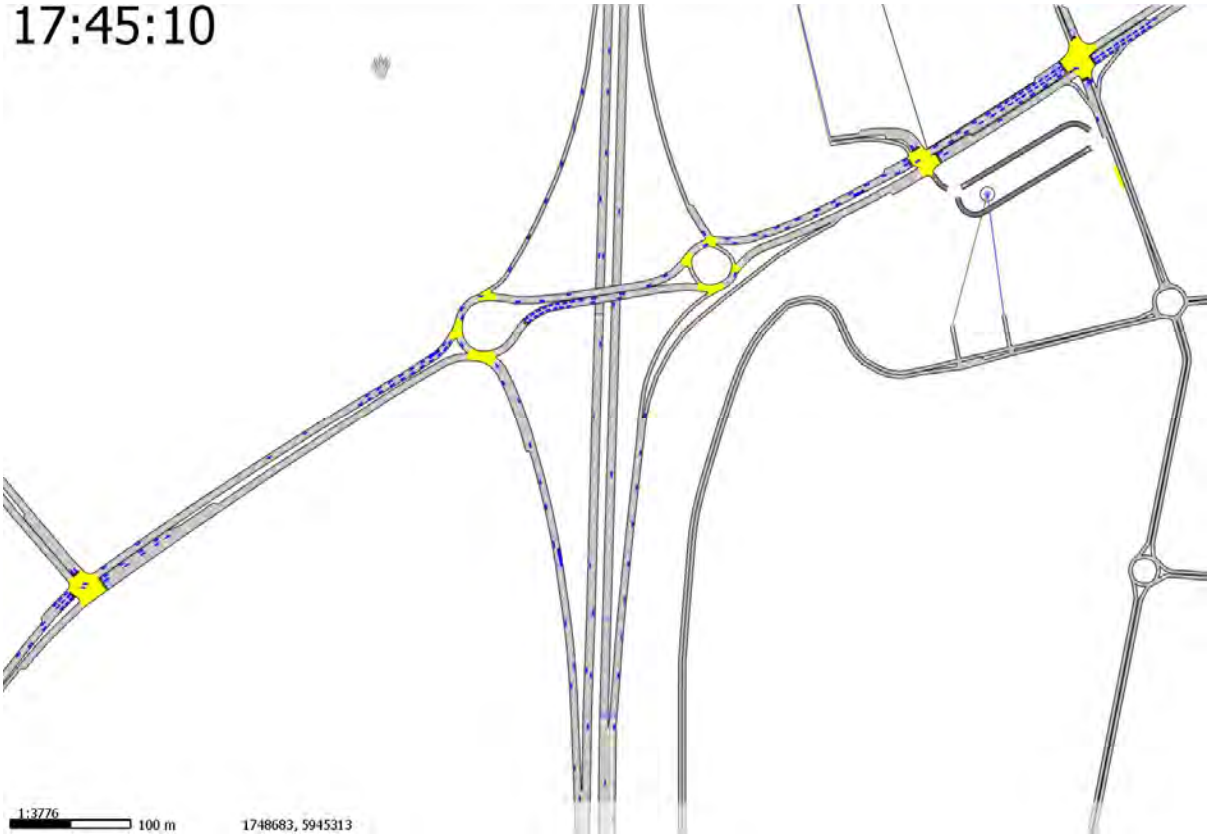

16:30:10
Turn: 3240692
External ID: 2300
Altitude: 0
1:3776
100 m
1748683, 5945313

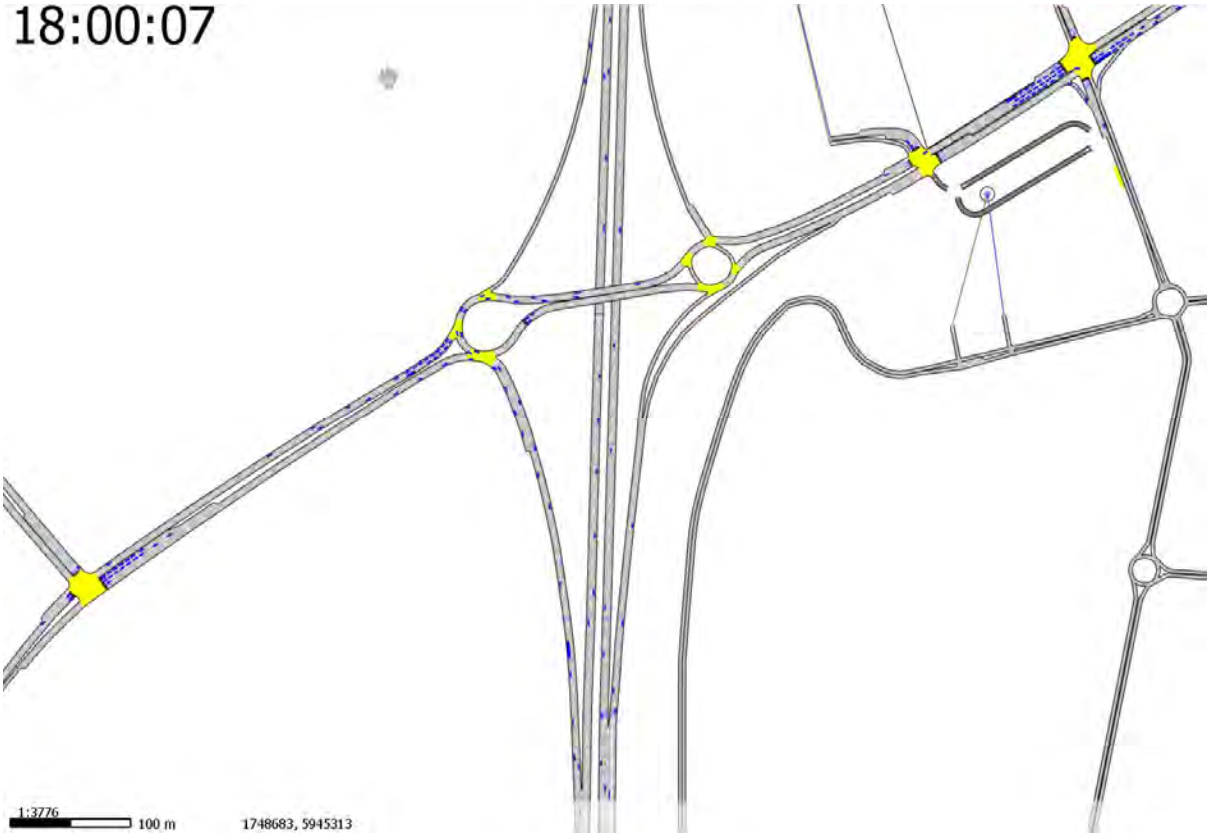

16:45:06
1:3776
100 m
1748683, 5945313

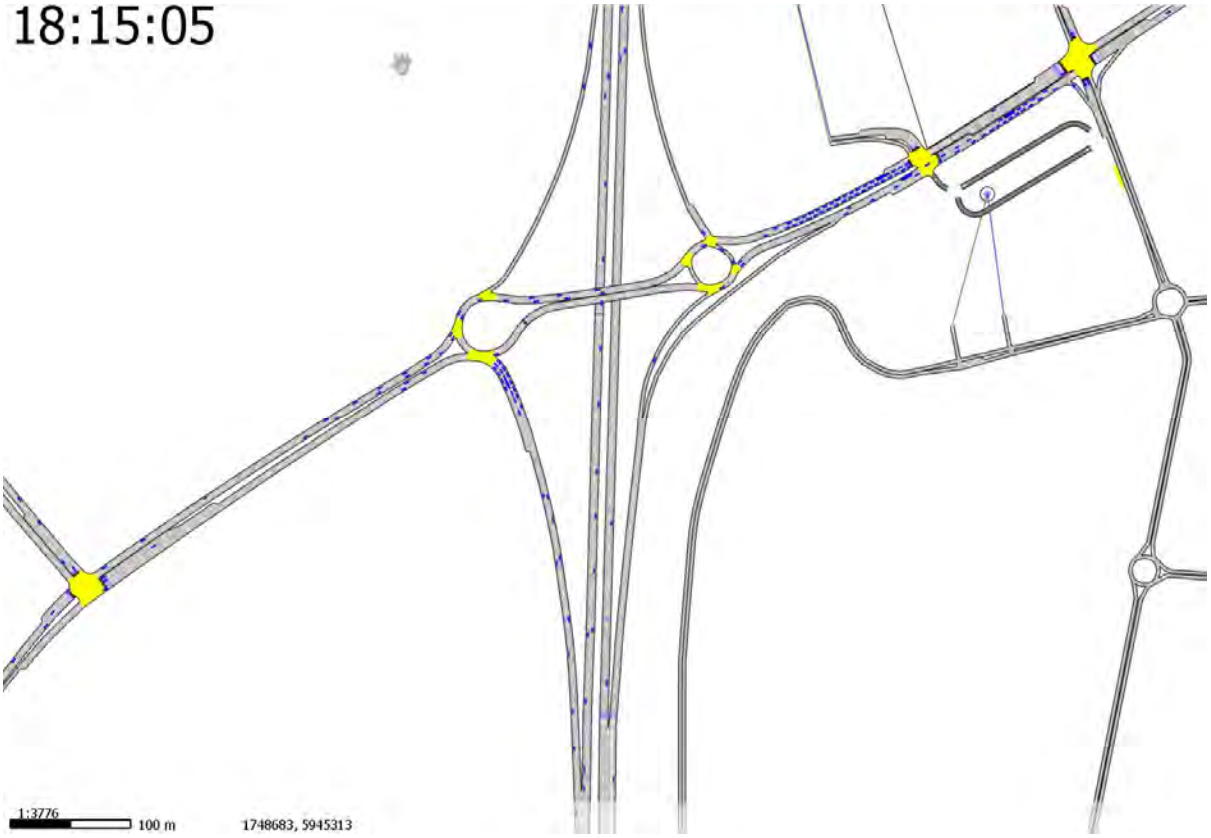

17:00:06
1:3776
100 m
1748683, 5945313

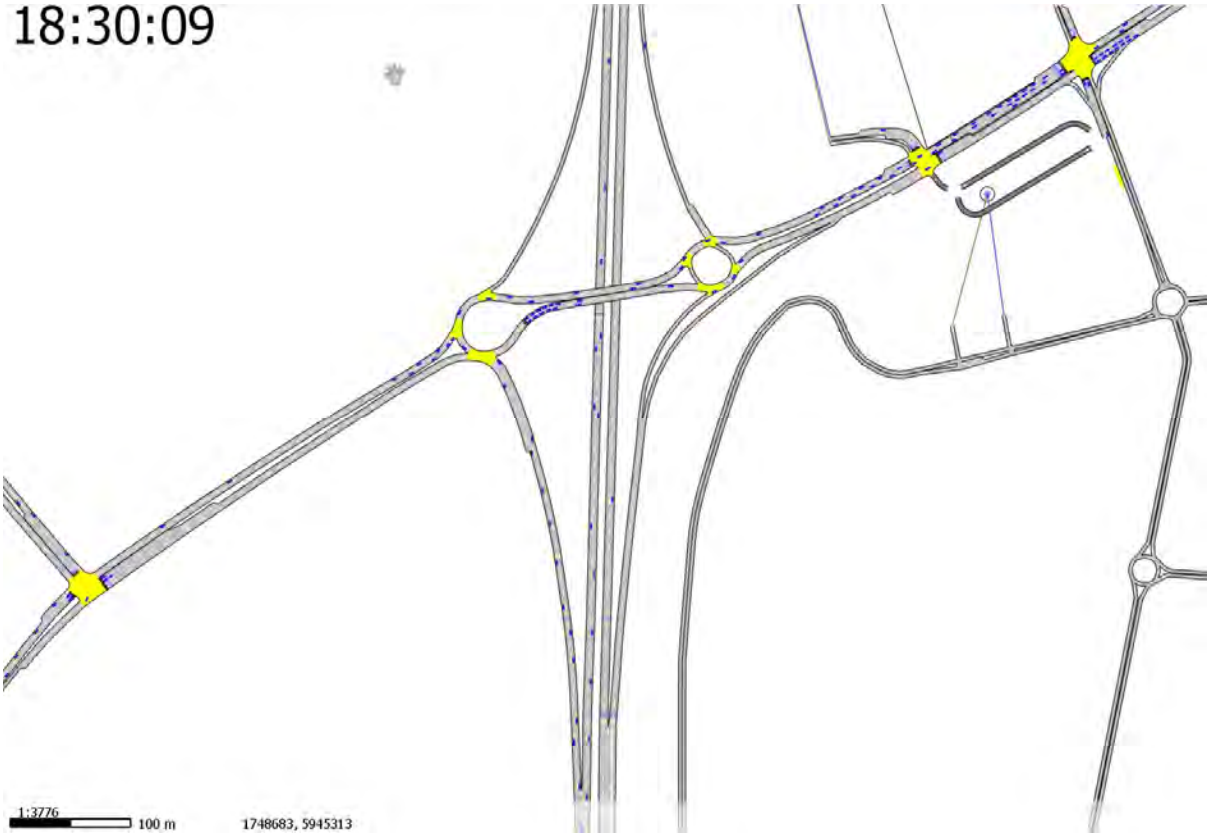

17:15:06
1:3776
100 m
1748683, 5945313

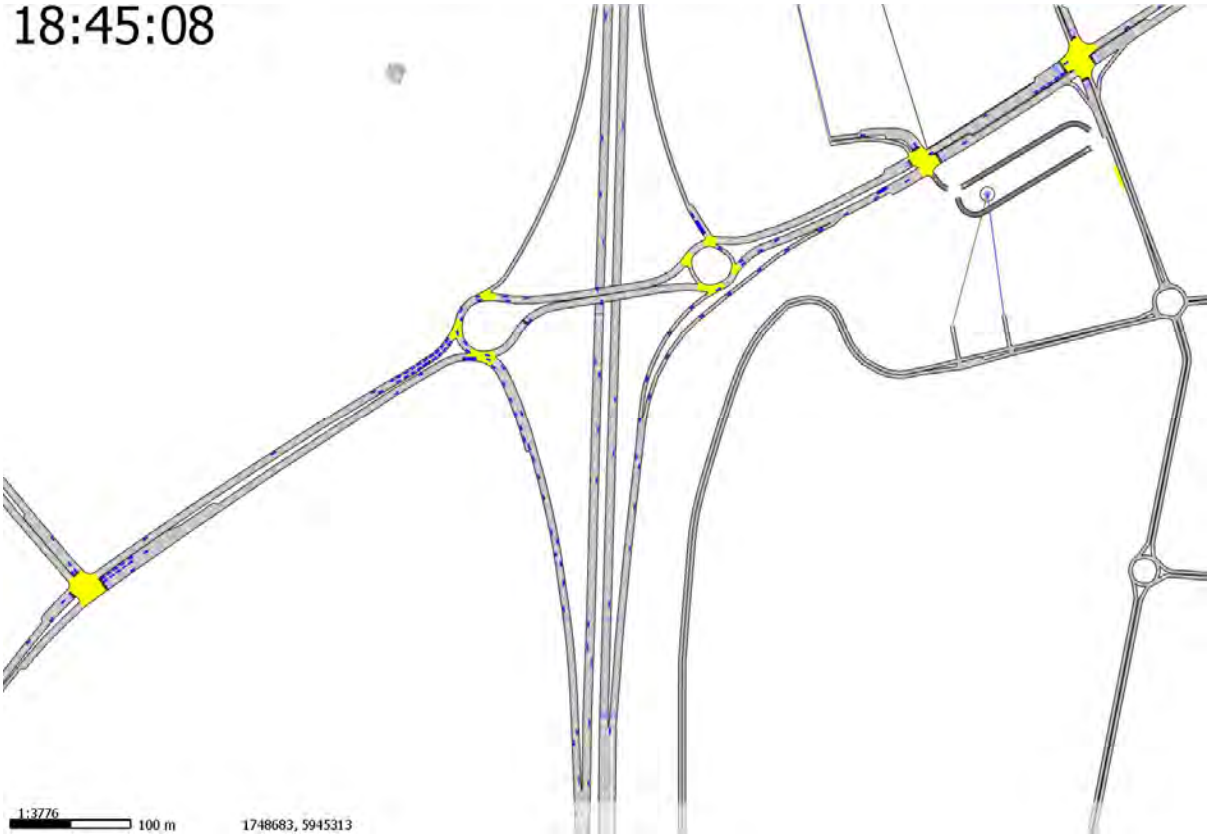

17:30:07
1:3776
100 m
1748683, 5945313


17:45:10
1:3776
100 m
1748683, 5945313


18:00:07
1:3776
100 m
1748683, 5945313

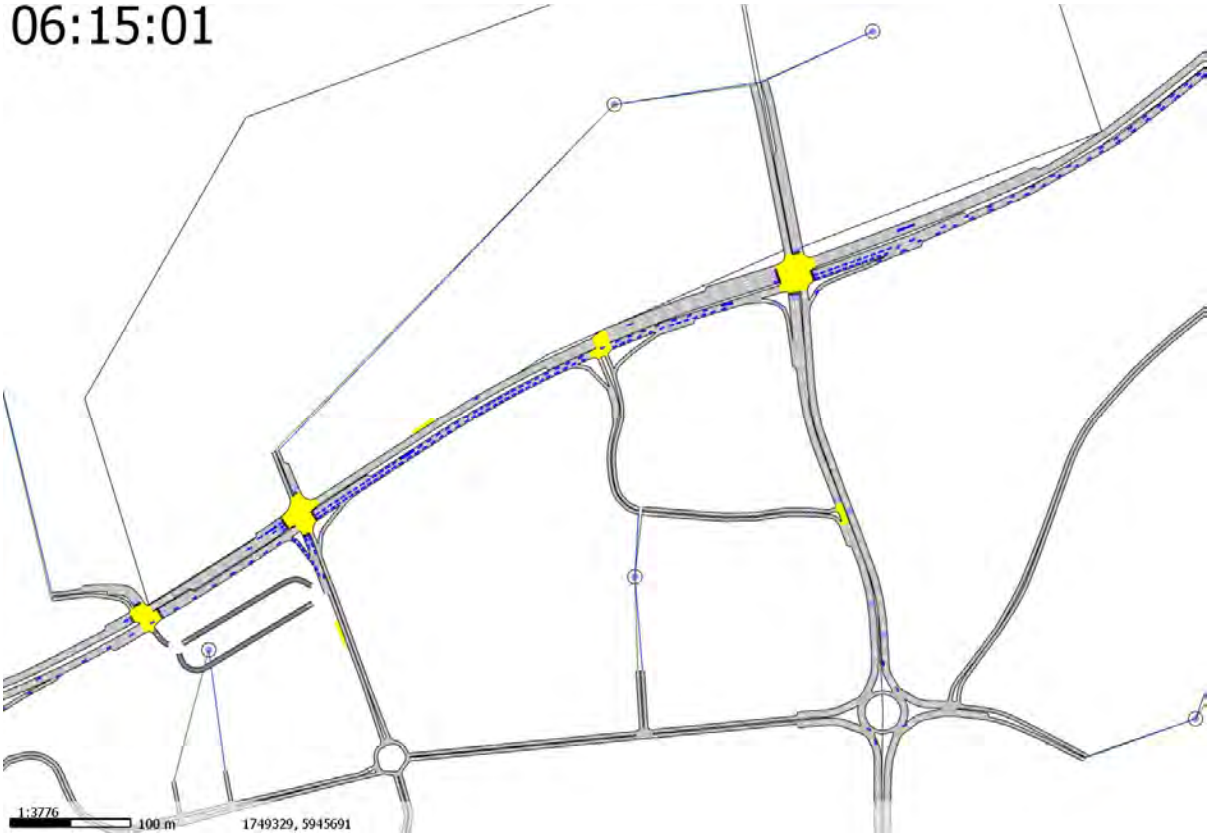

18:15:05
1:3776
100 m
1748683, 5945313


18:30:09
1:3776
100 m
1748683, 5945313

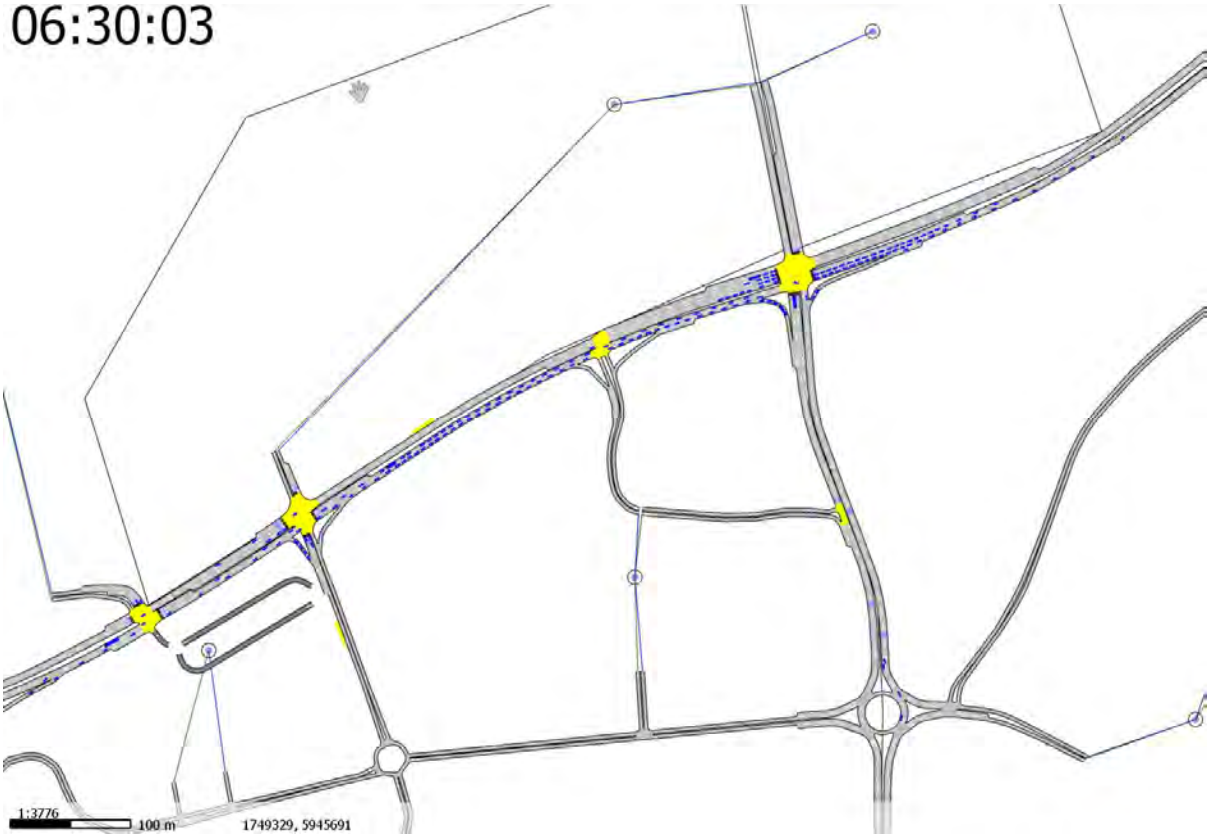

18:45:08
1:3776
100 m
1748683, 5945313


18:59:56
1:3776
100 m
1748683, 5945313

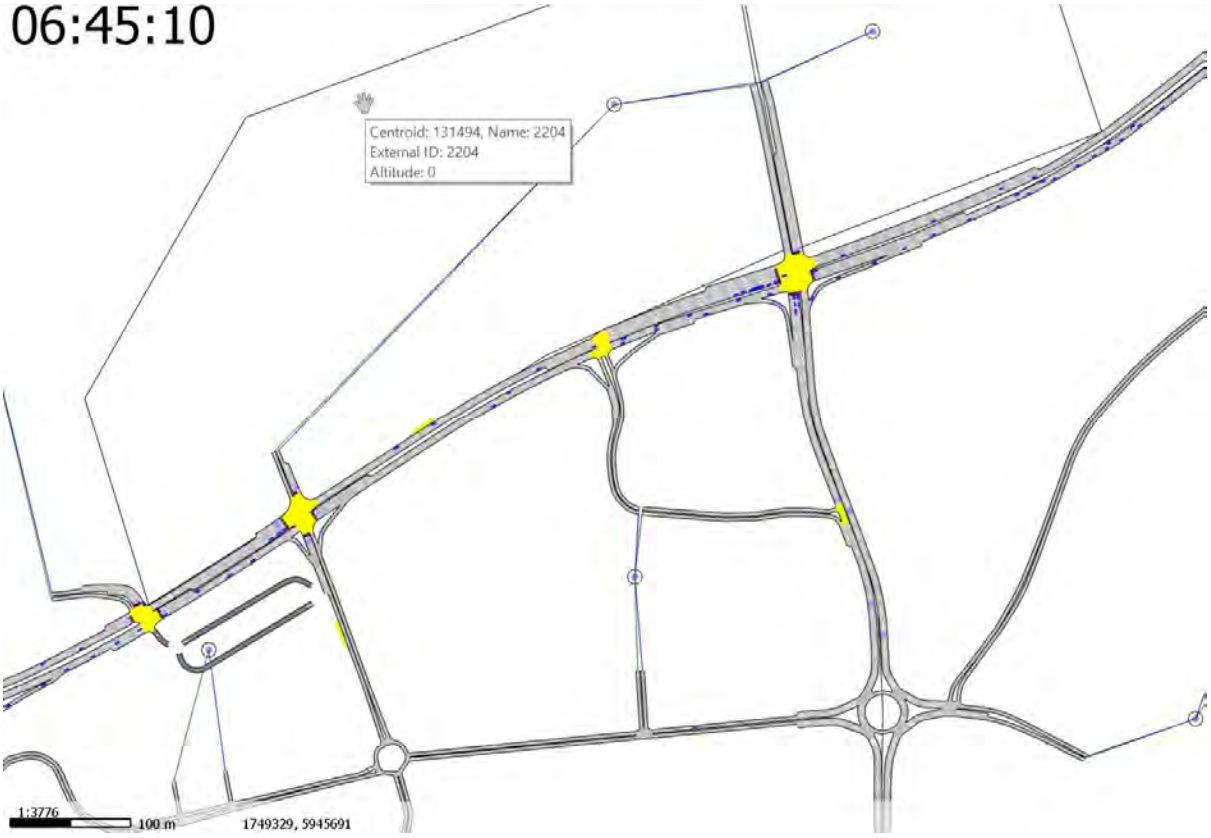
06:15:01



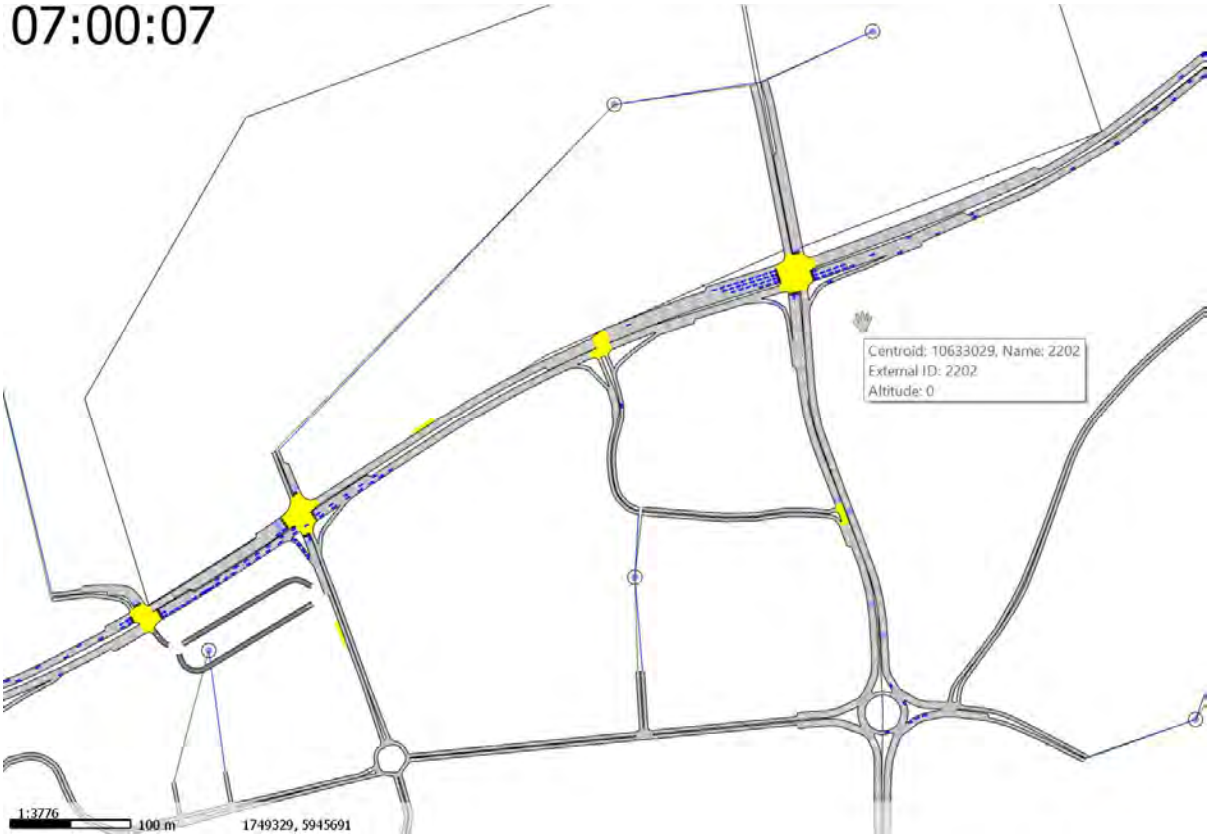
06:30:03



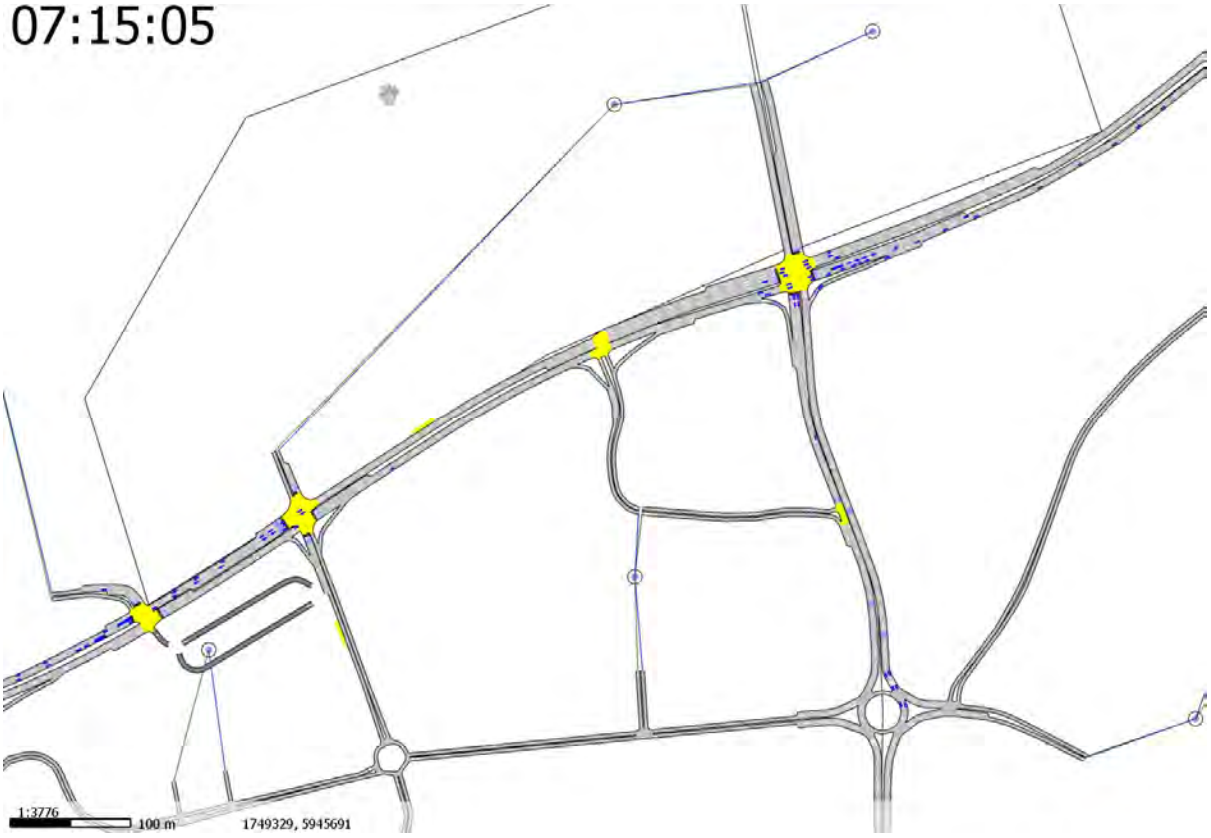
06:45:10



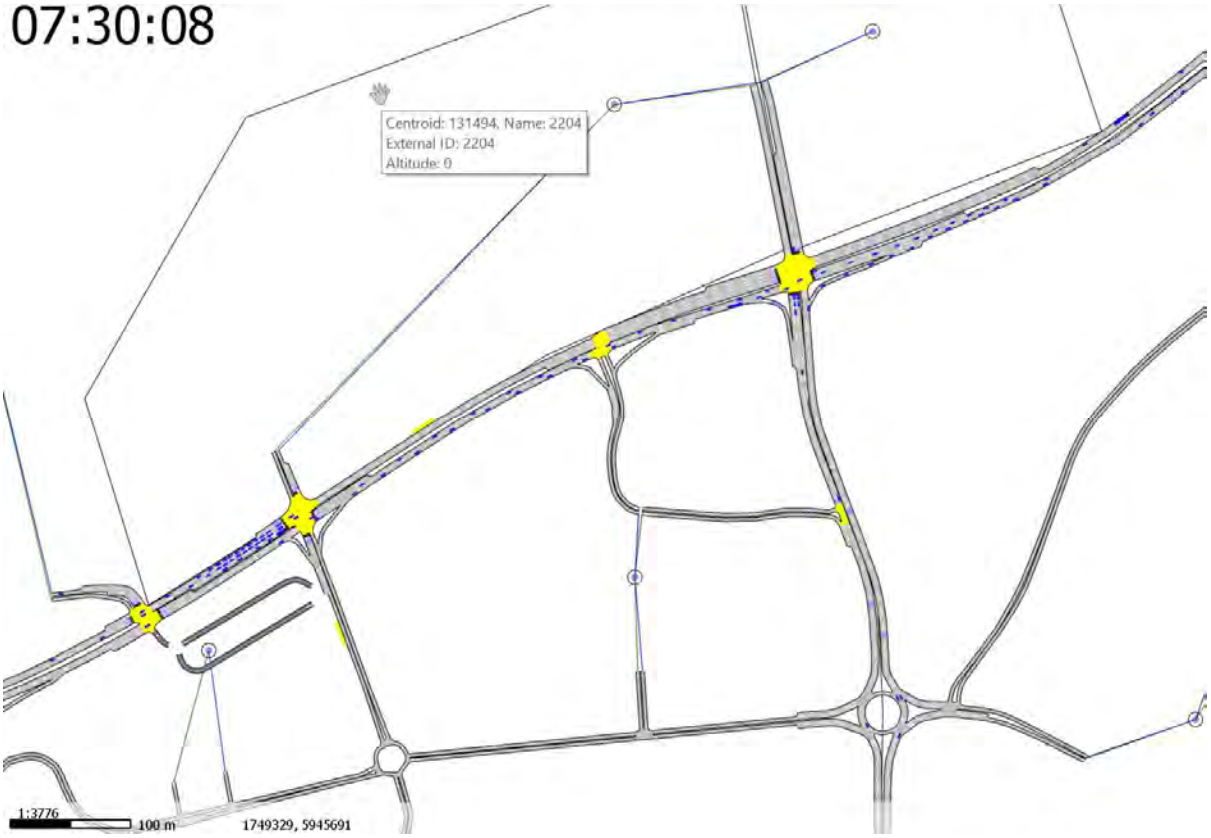
07:00:07



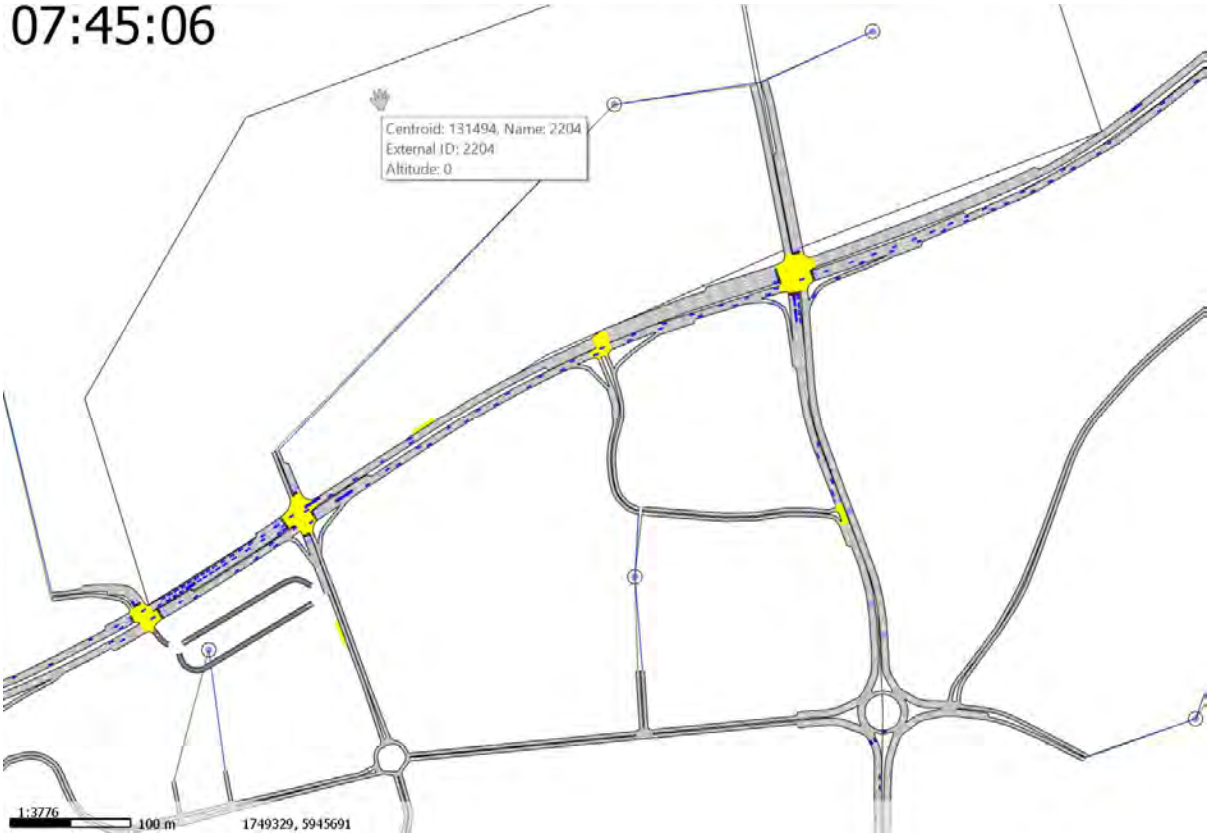
07:15:05



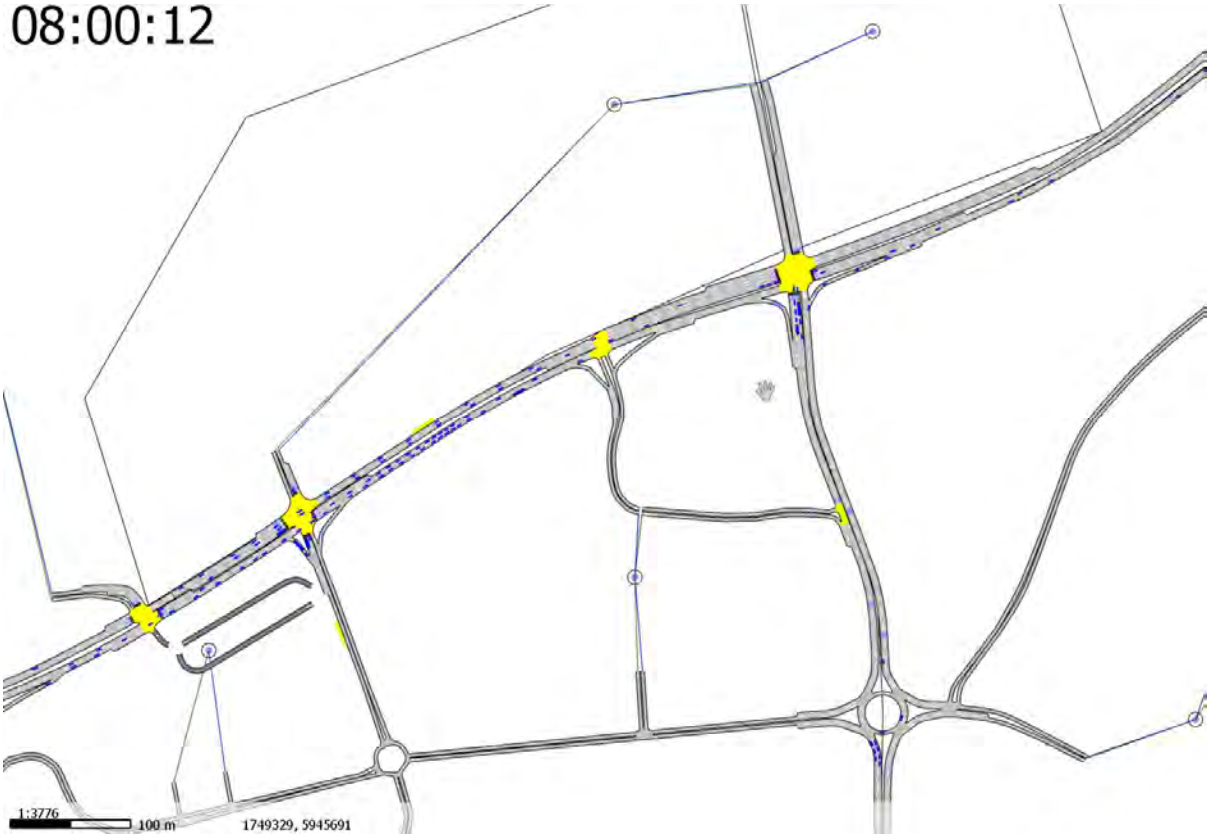
07:30:08



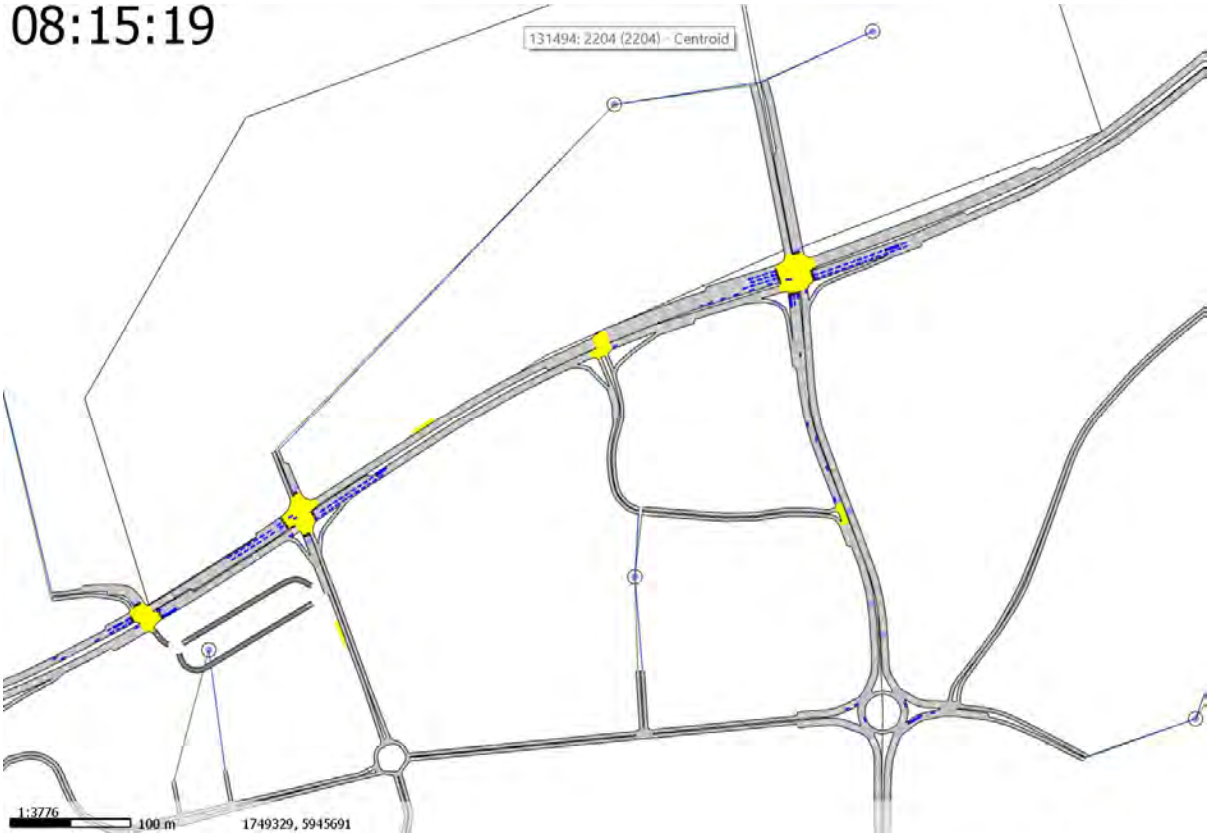
07:45:06



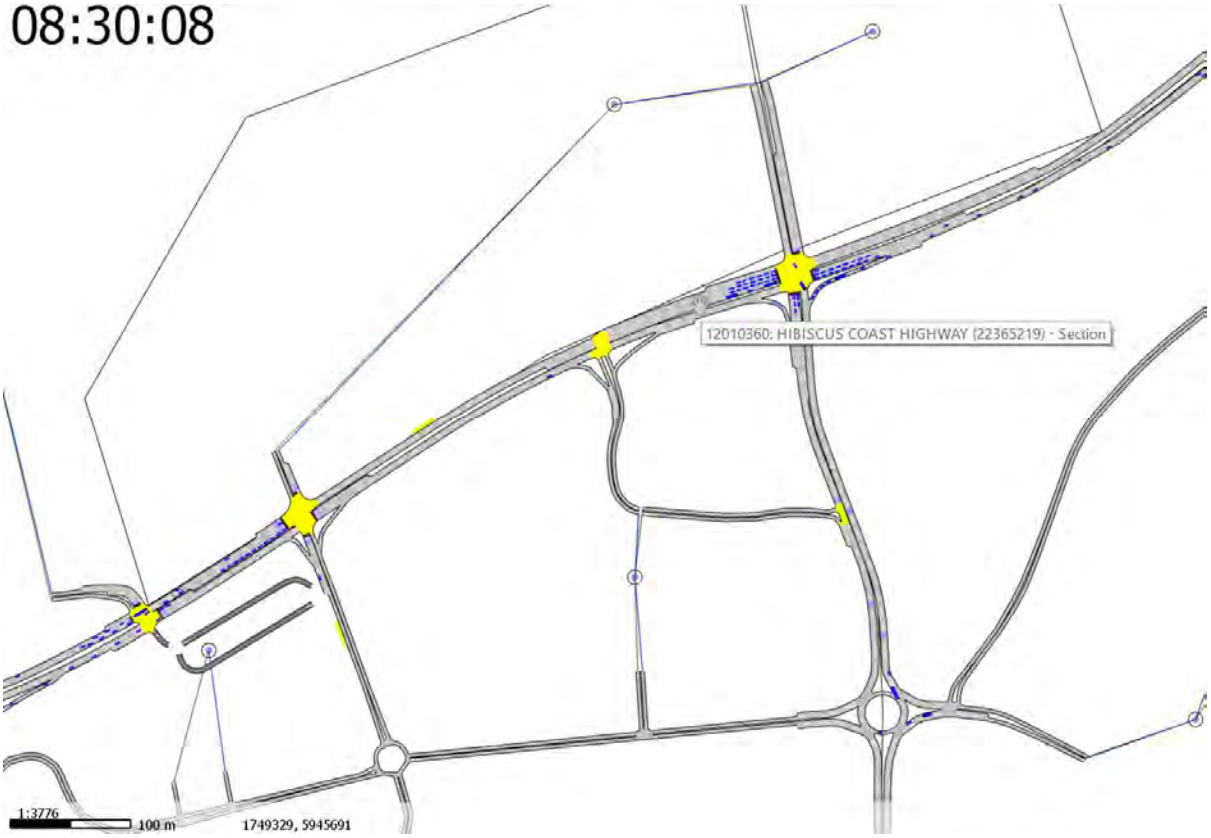
08:00:12



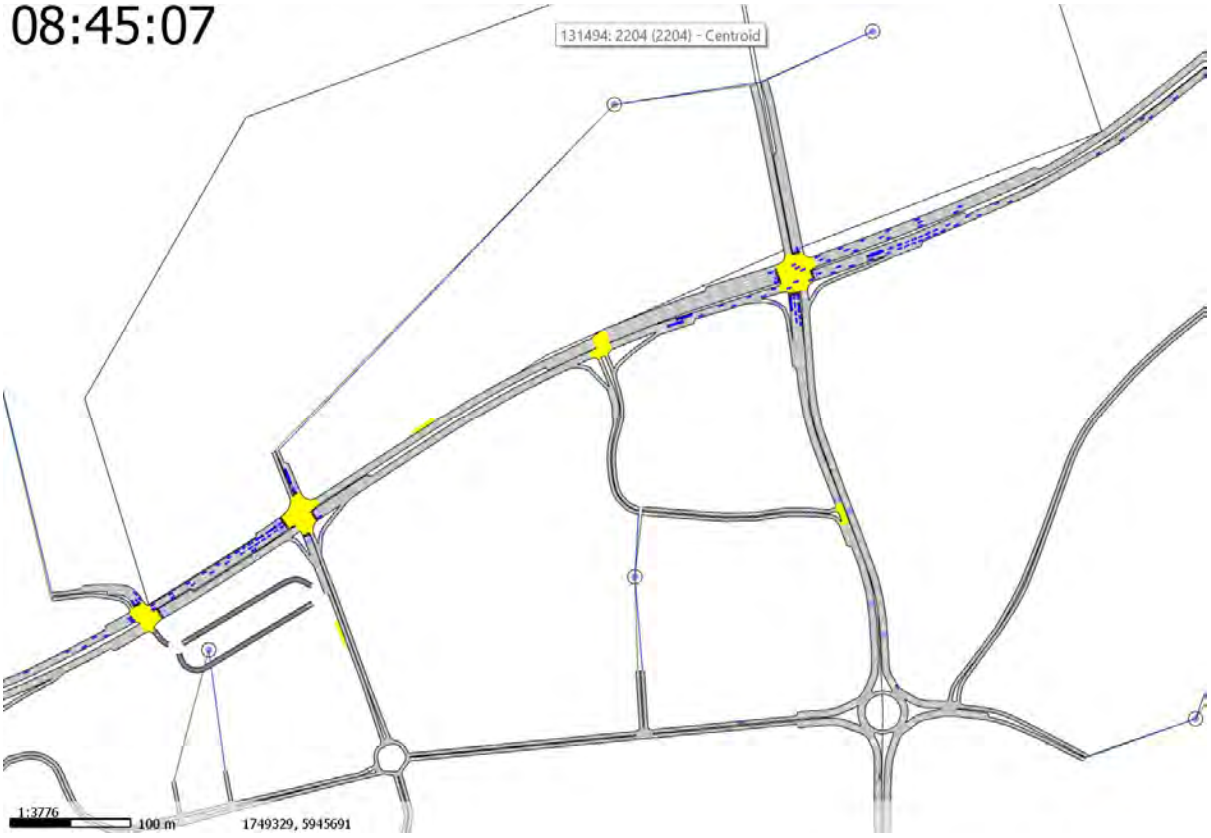
08:15:19



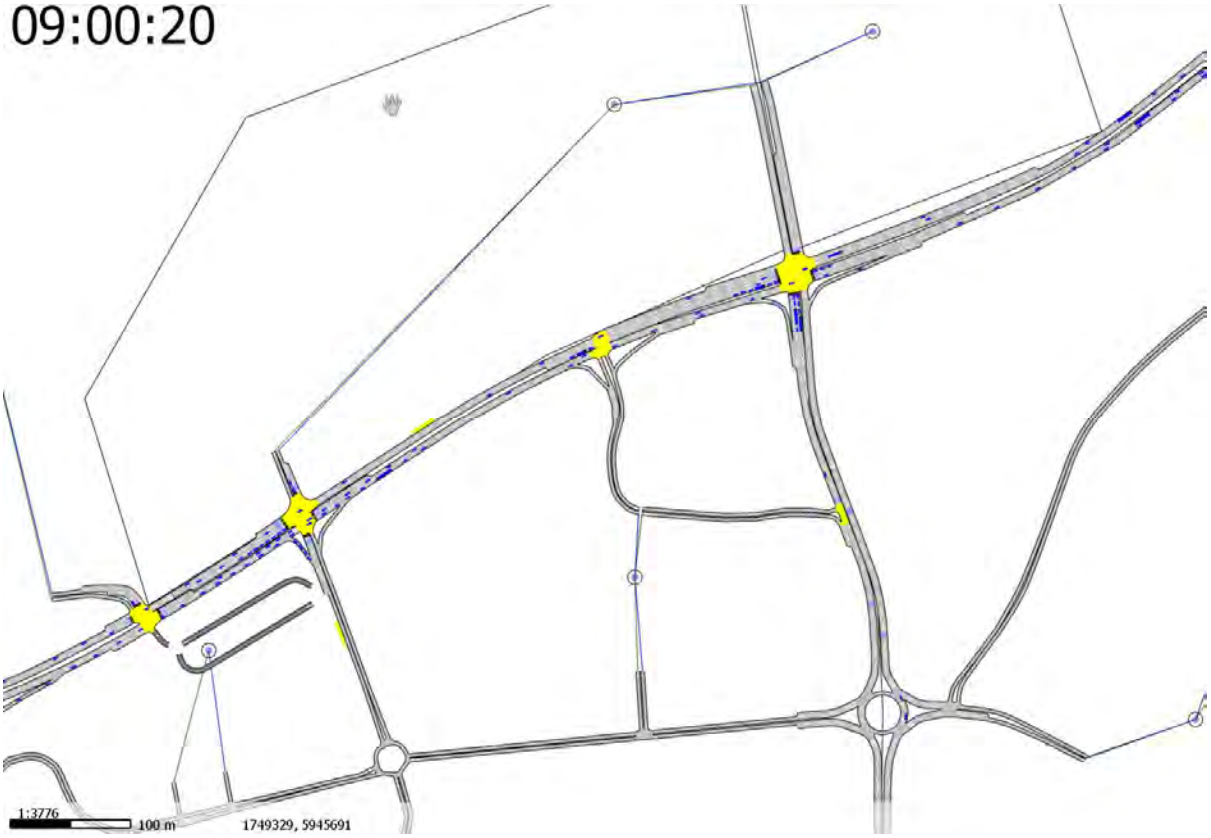
08:30:08



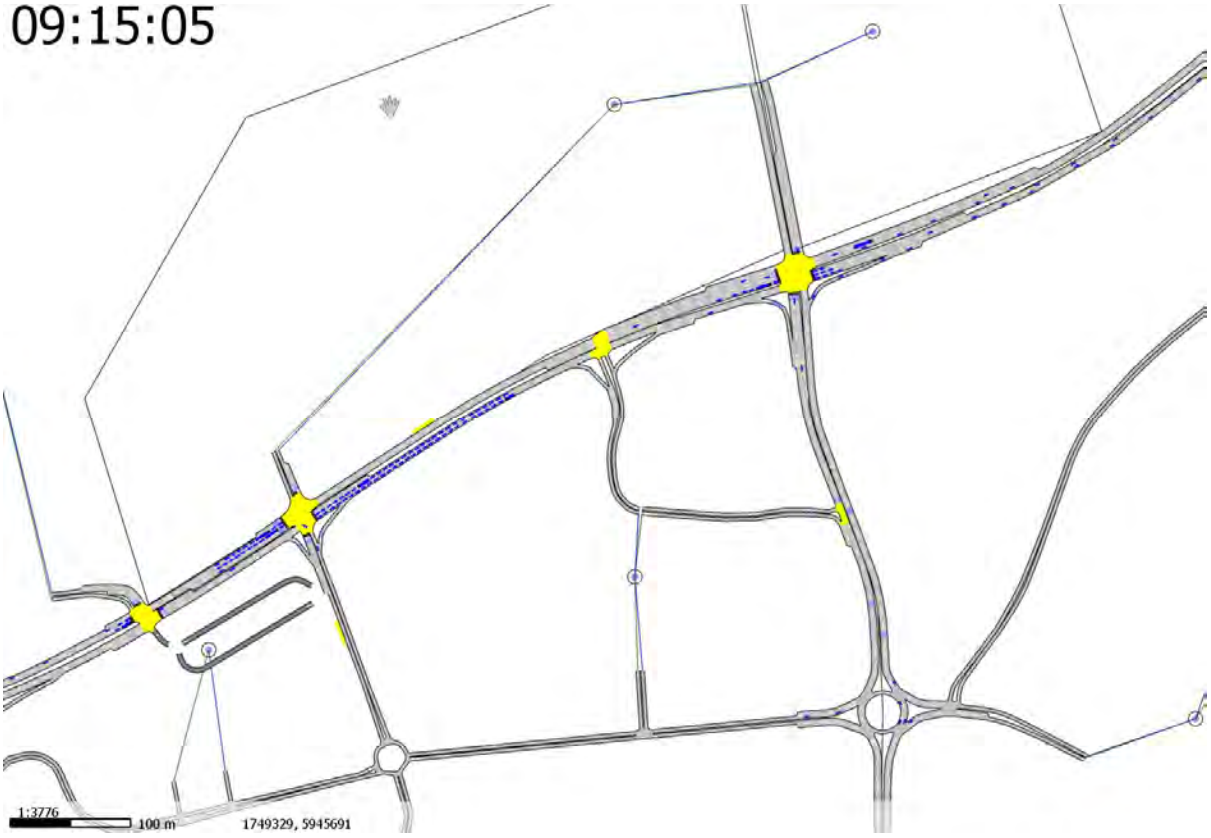
08:45:07



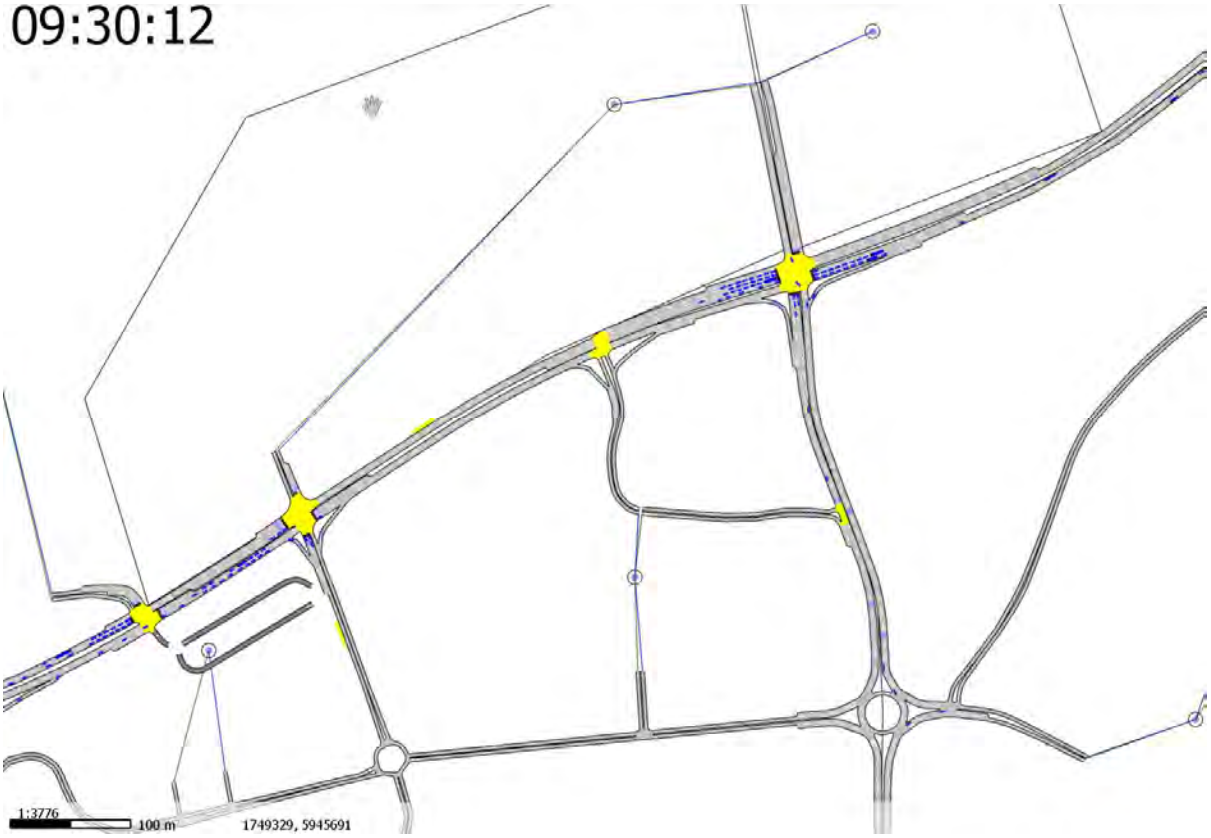
09:00:20



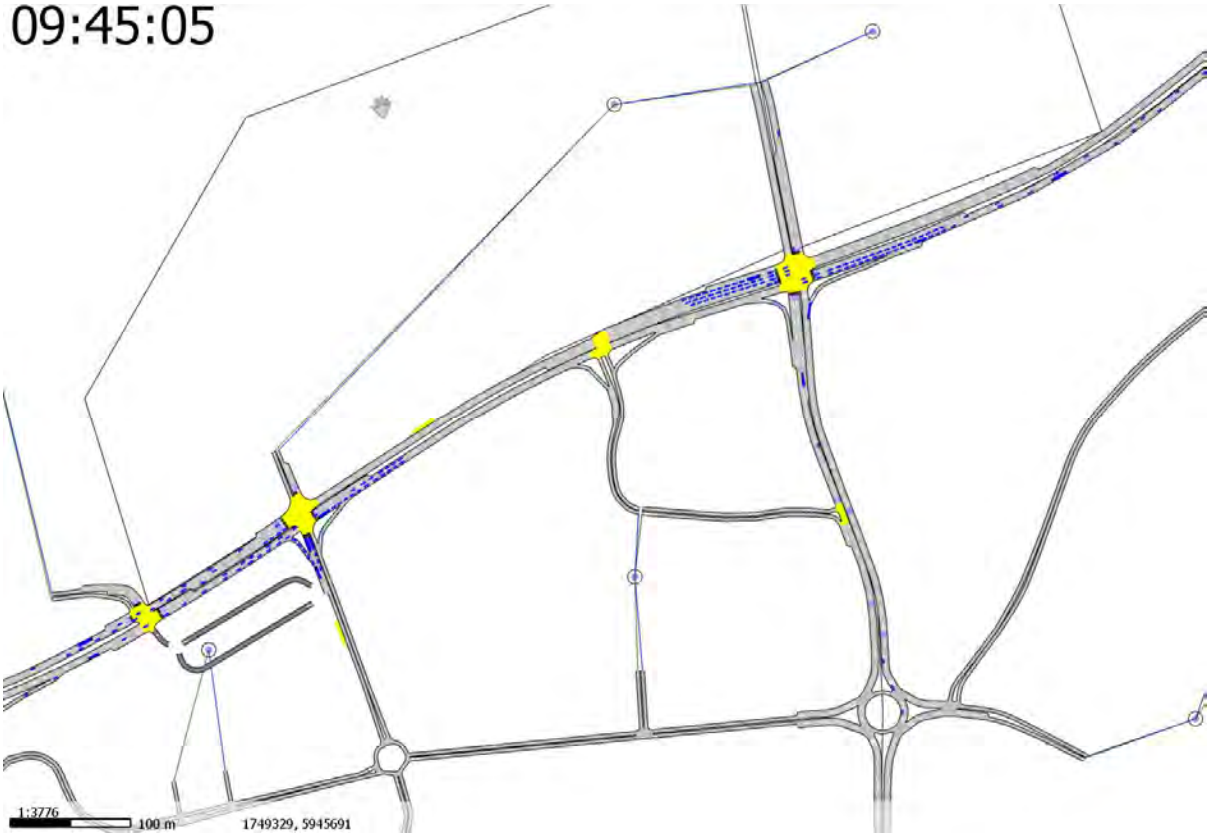
09:15:05



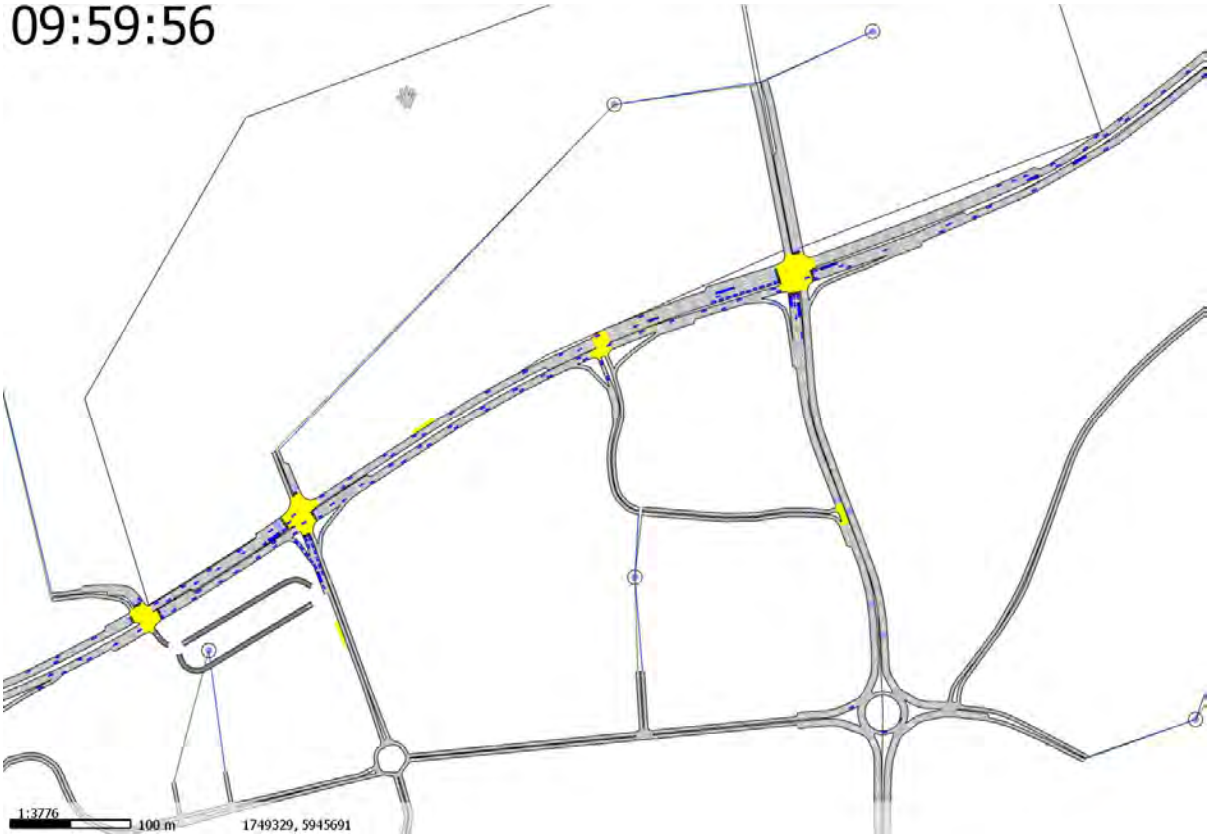
09:30:12



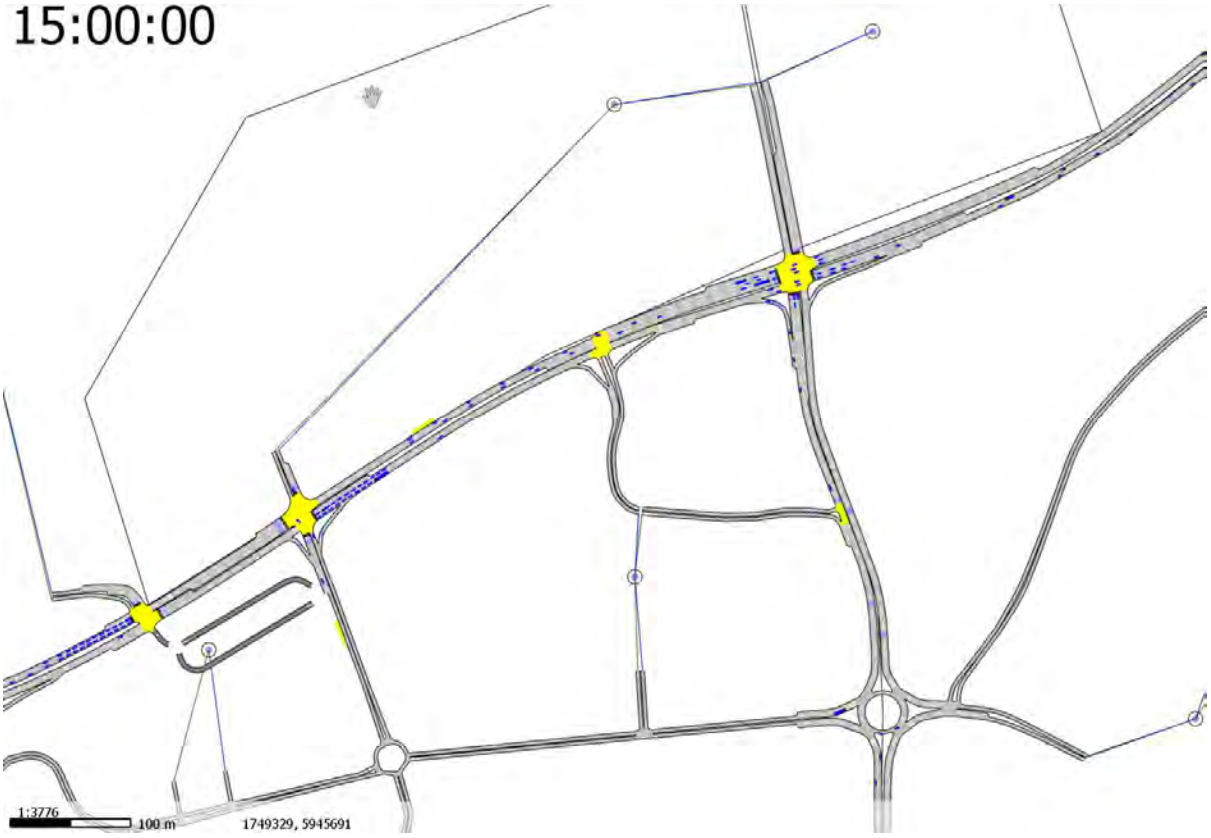
09:45:05



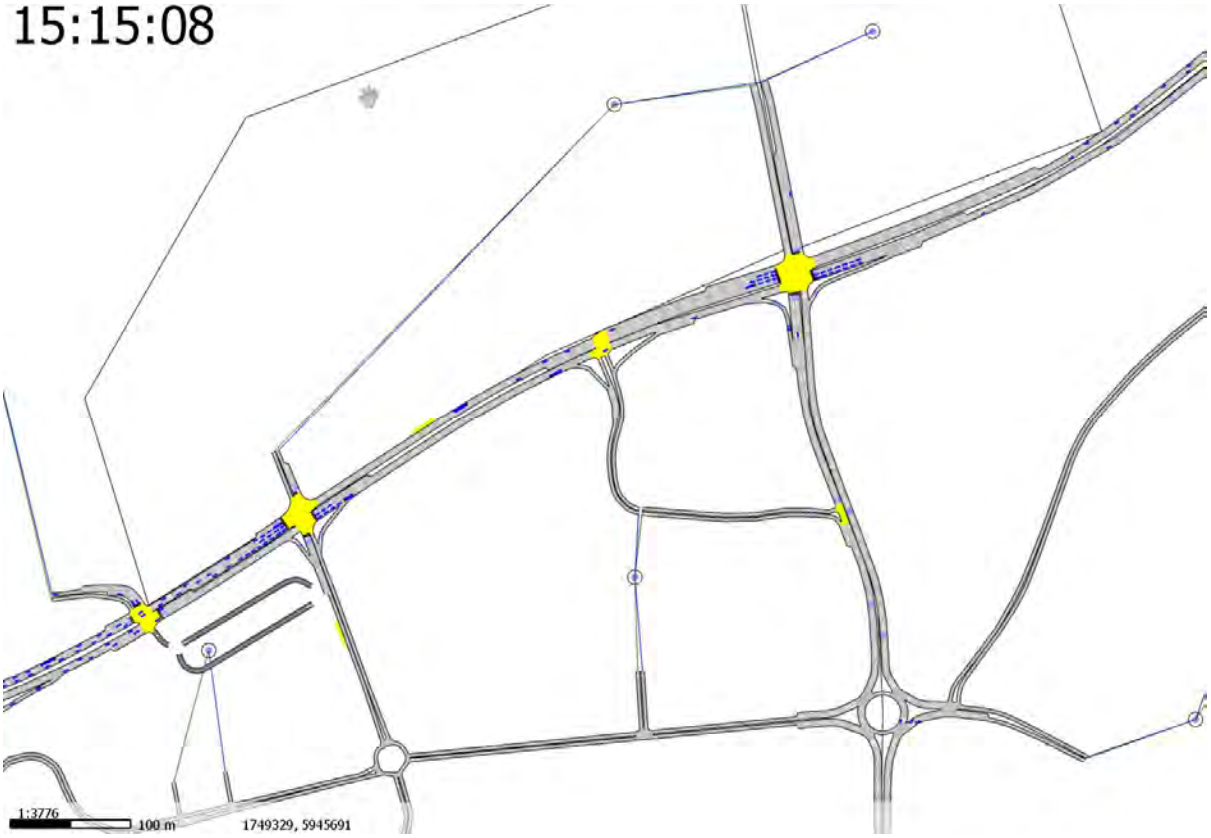
09:59:56



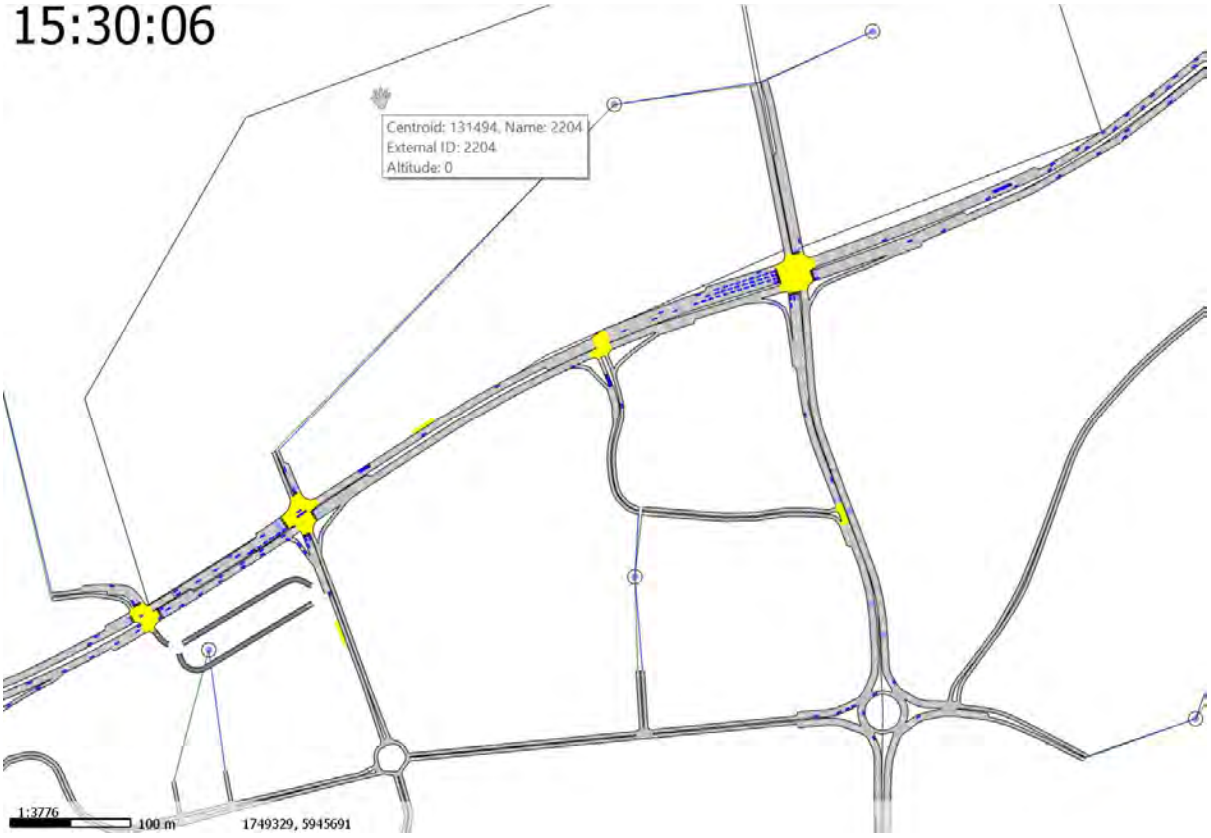
15:00:00



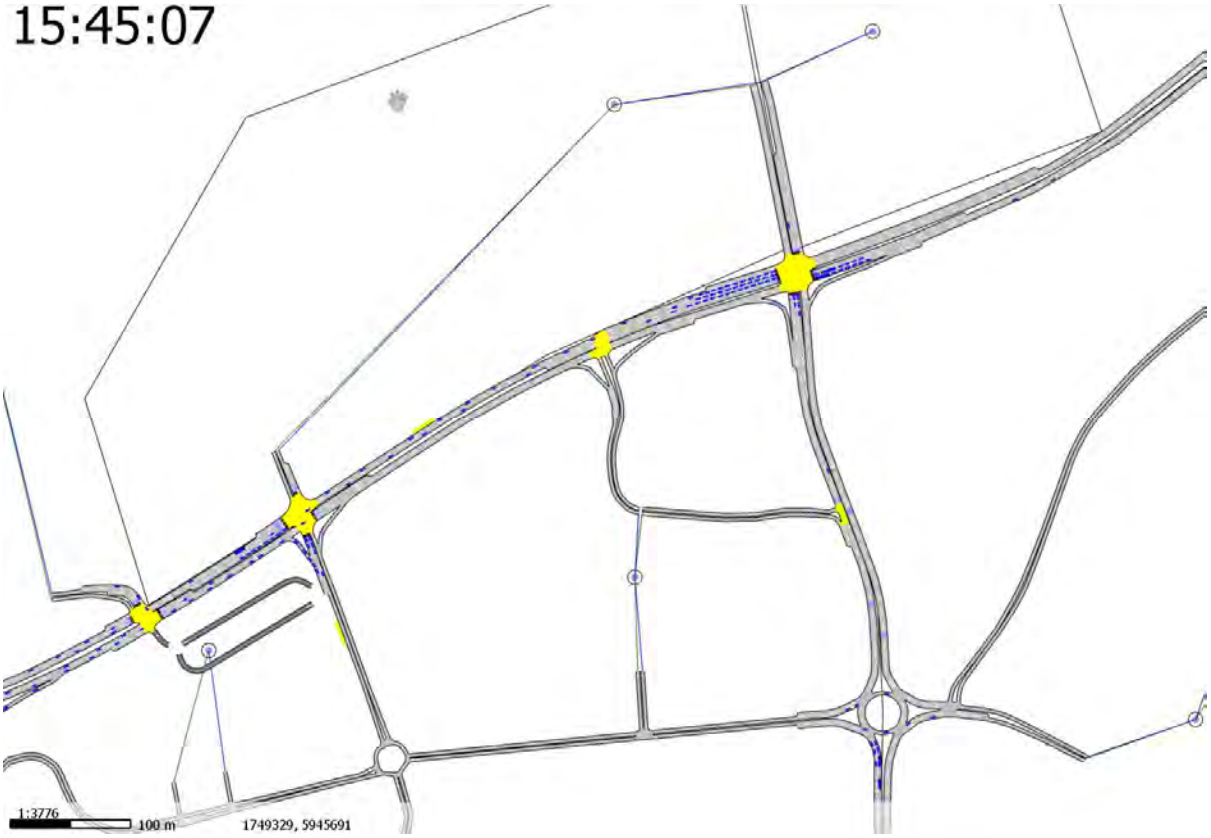
15:15:08



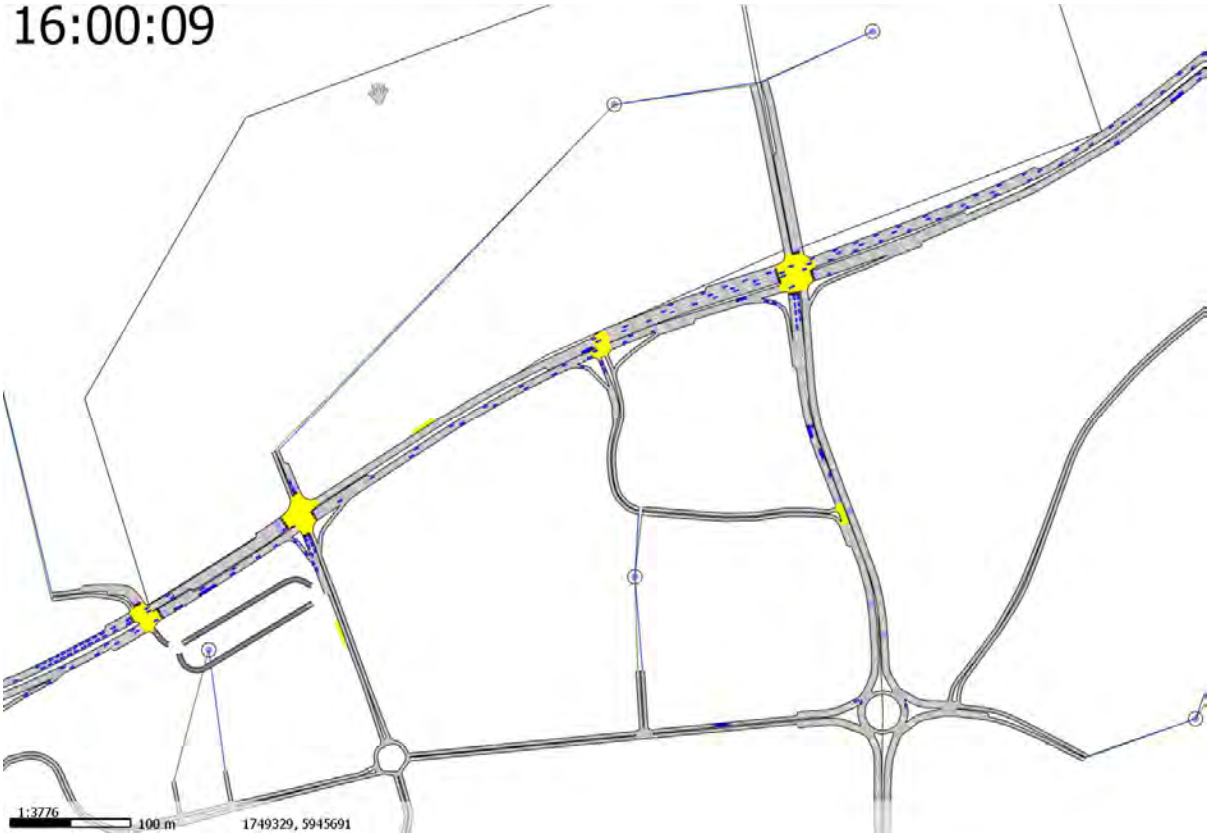
15:30:06



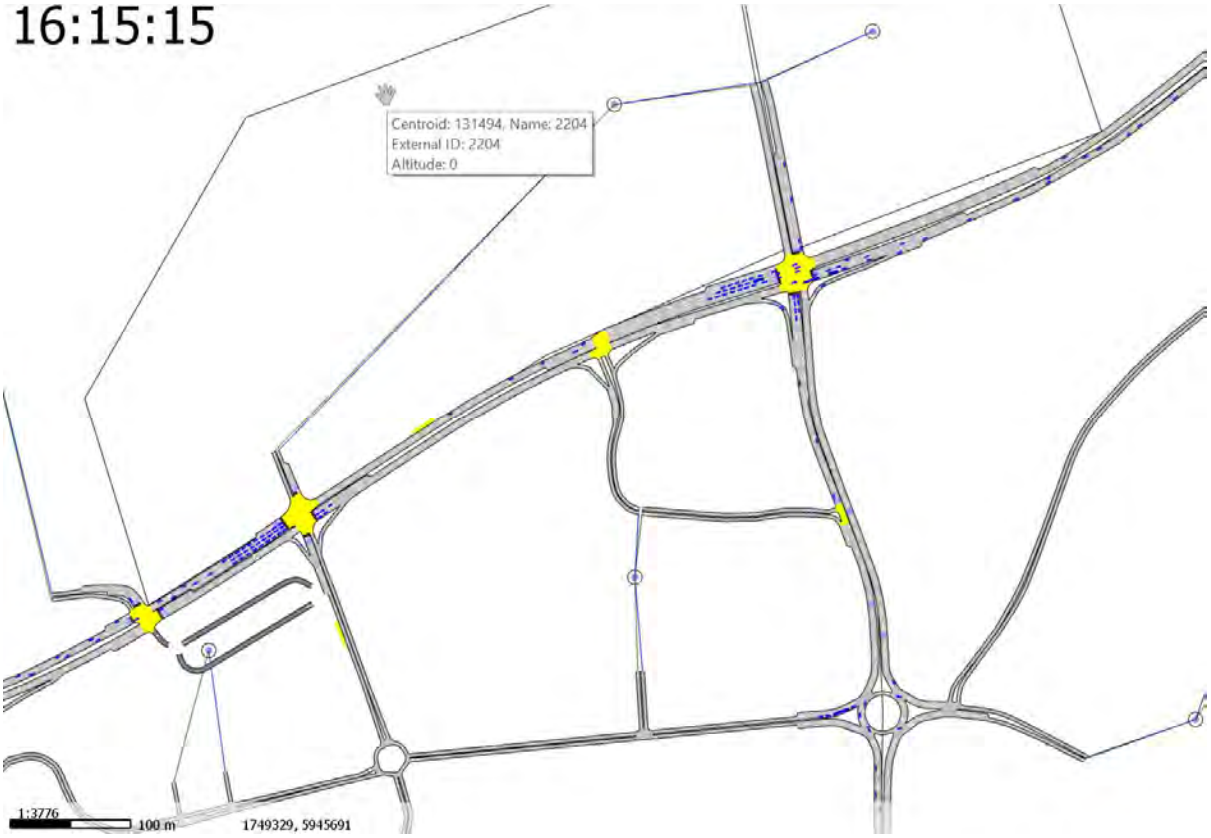
15:45:07



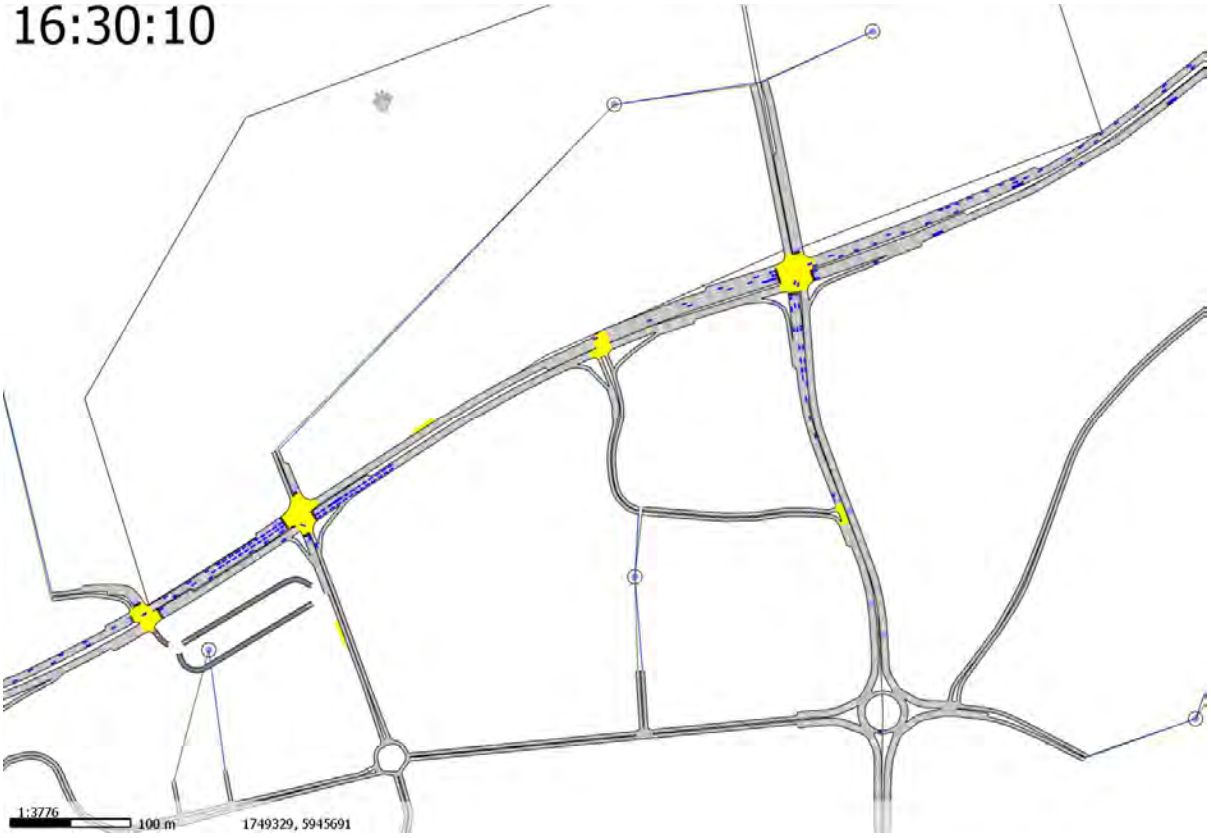
16:00:09



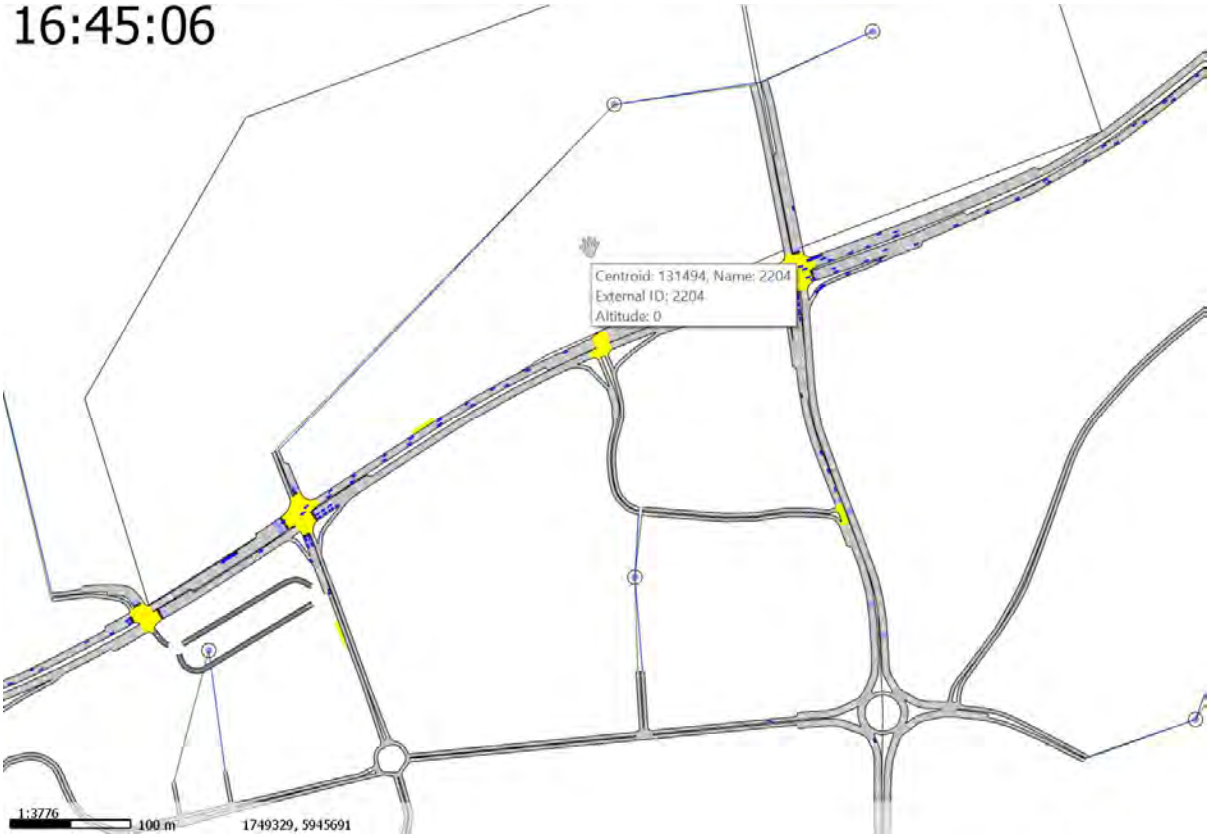
16:15:15



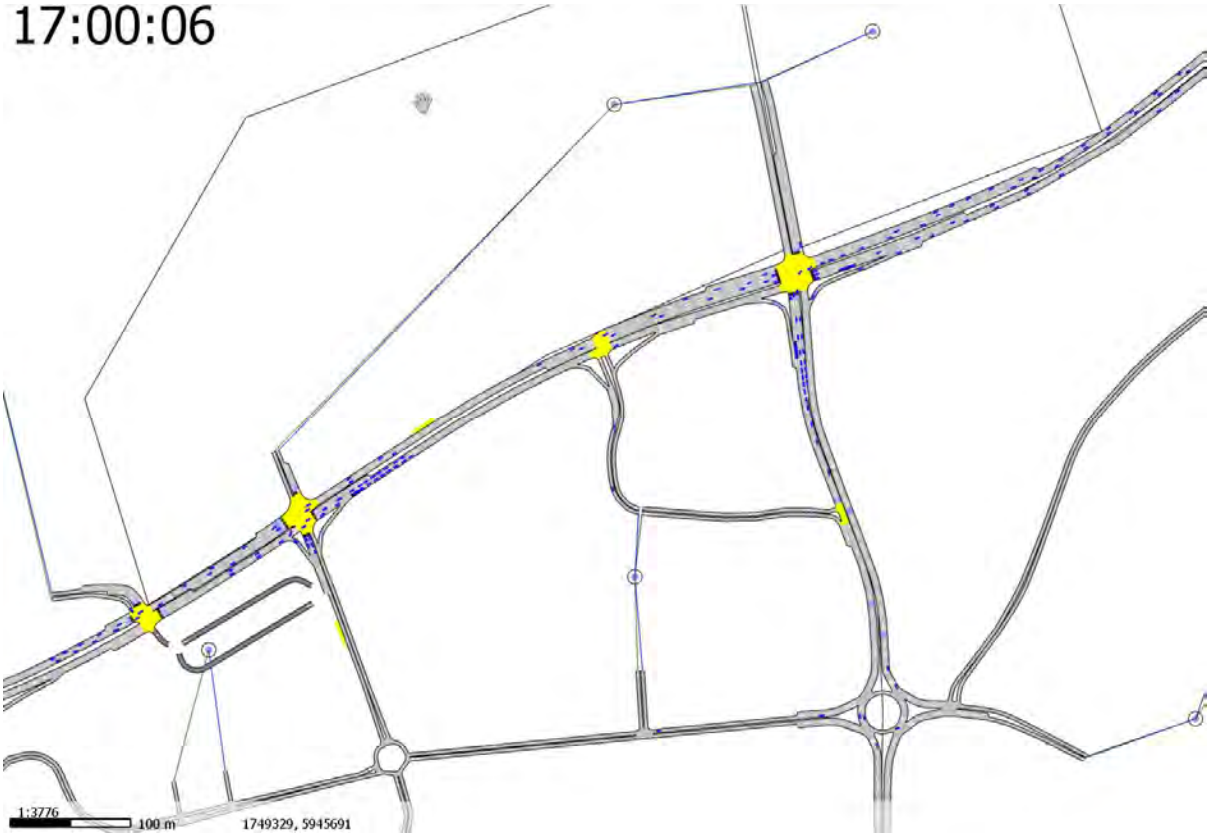
16:30:10



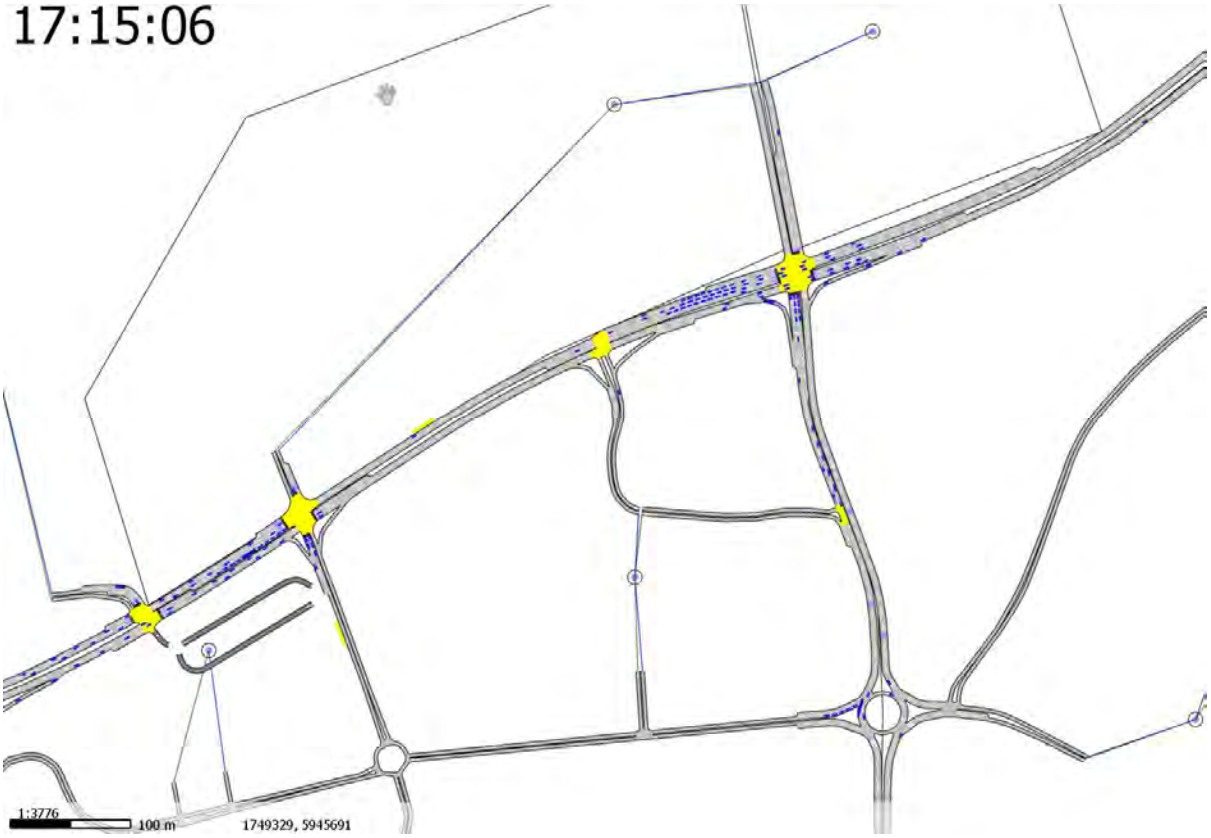
16:45:06



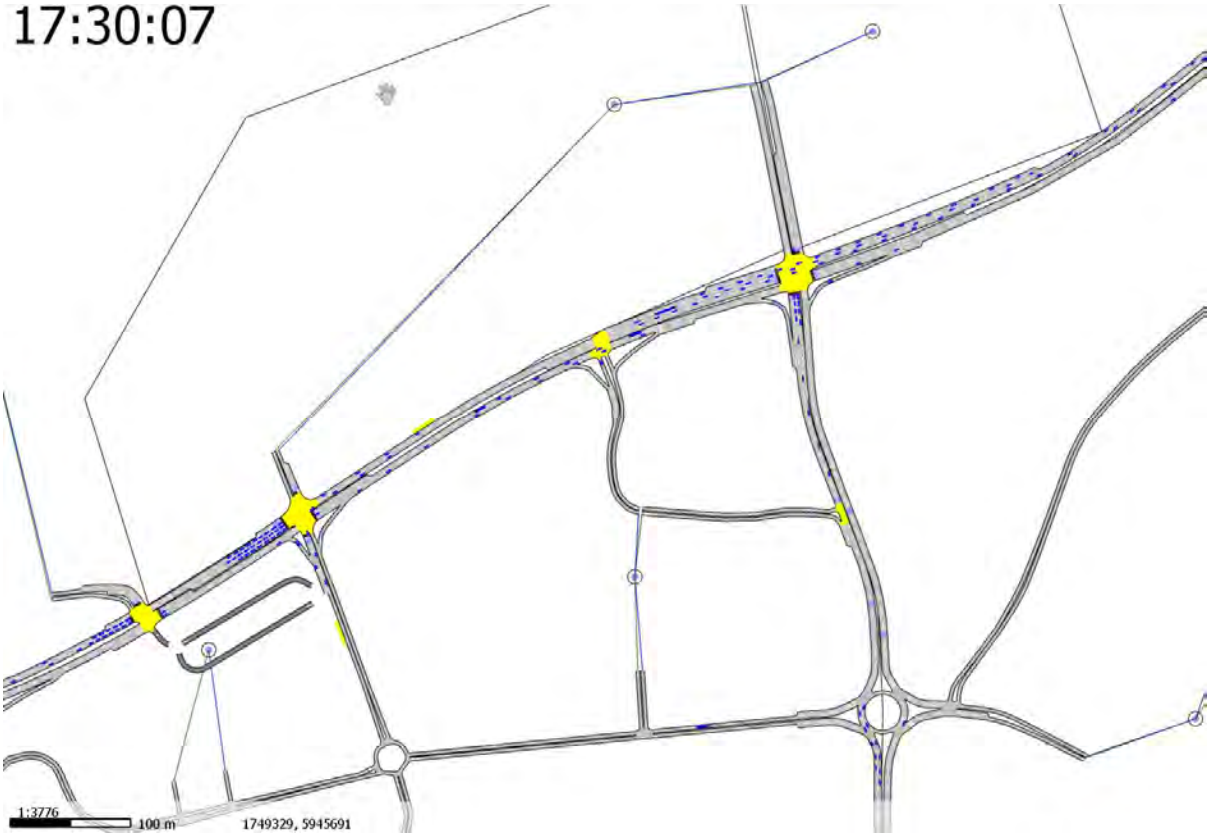
17:00:06



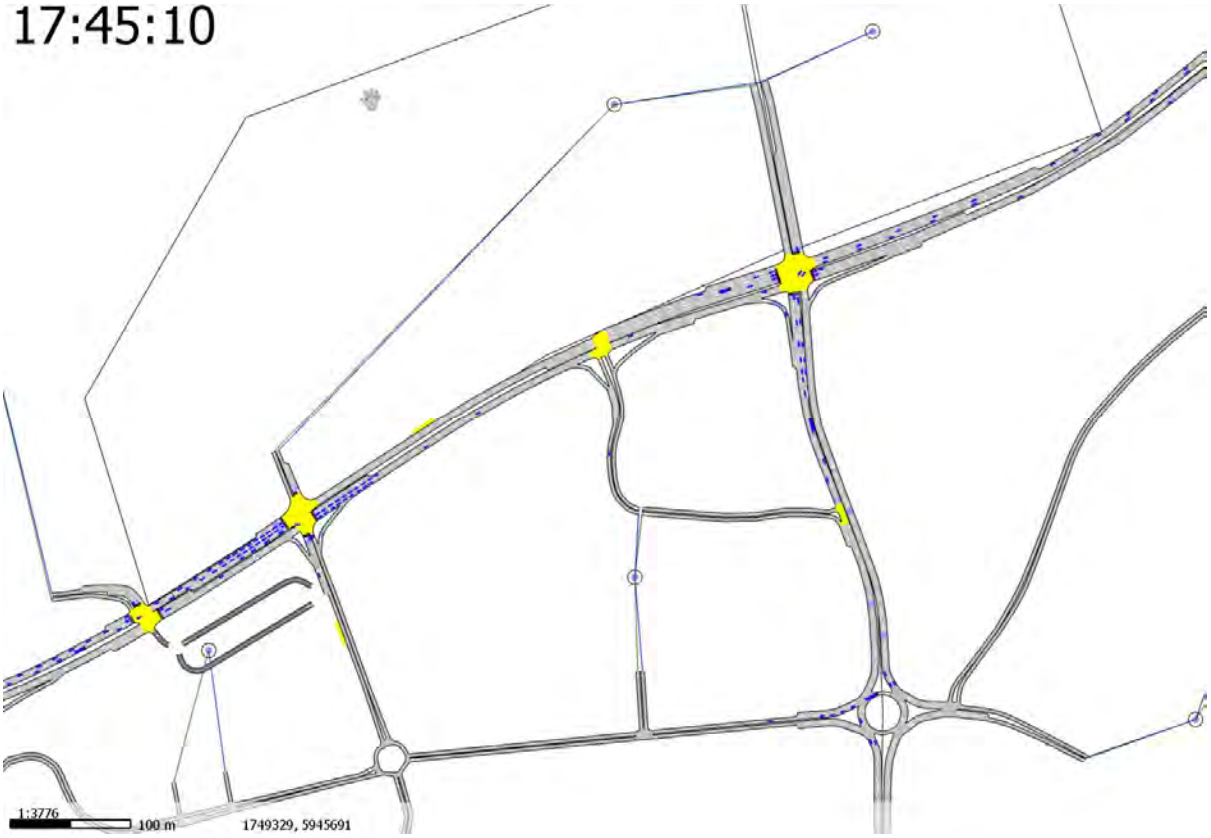
17:15:06



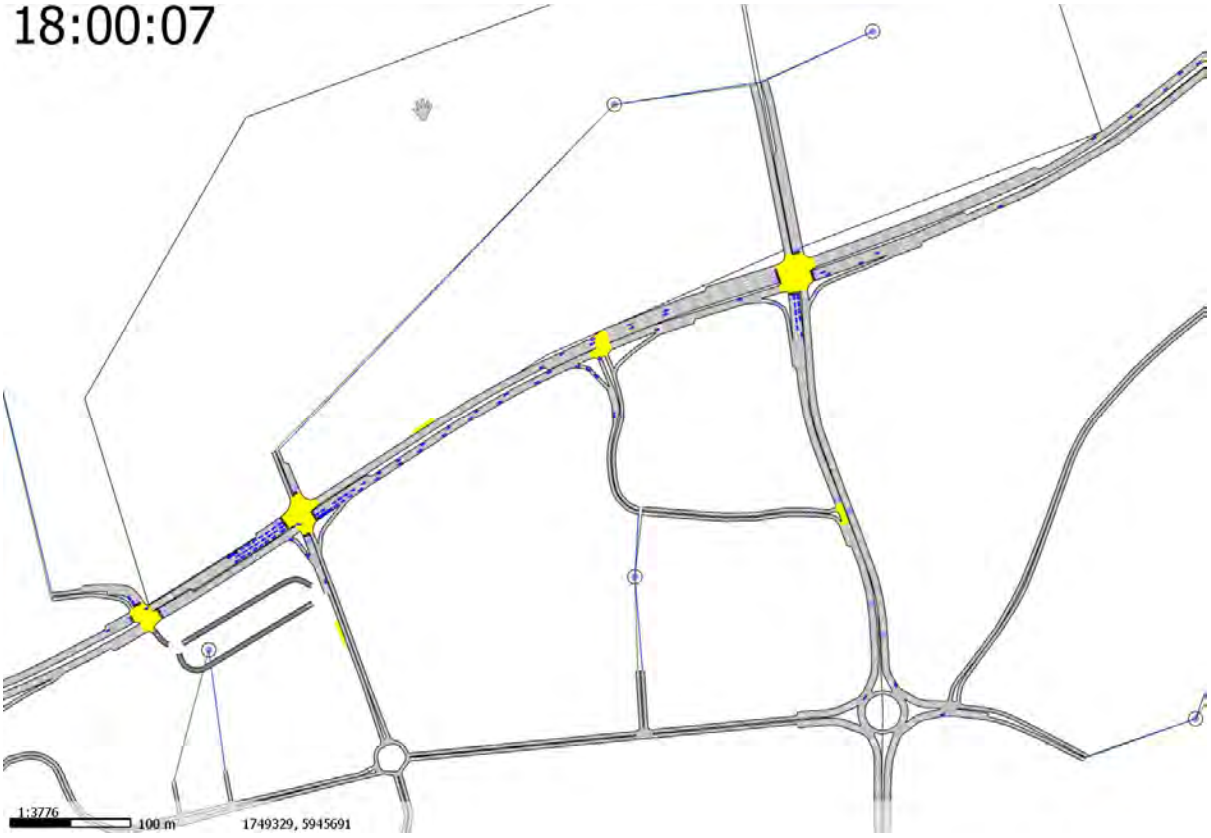
17:30:07



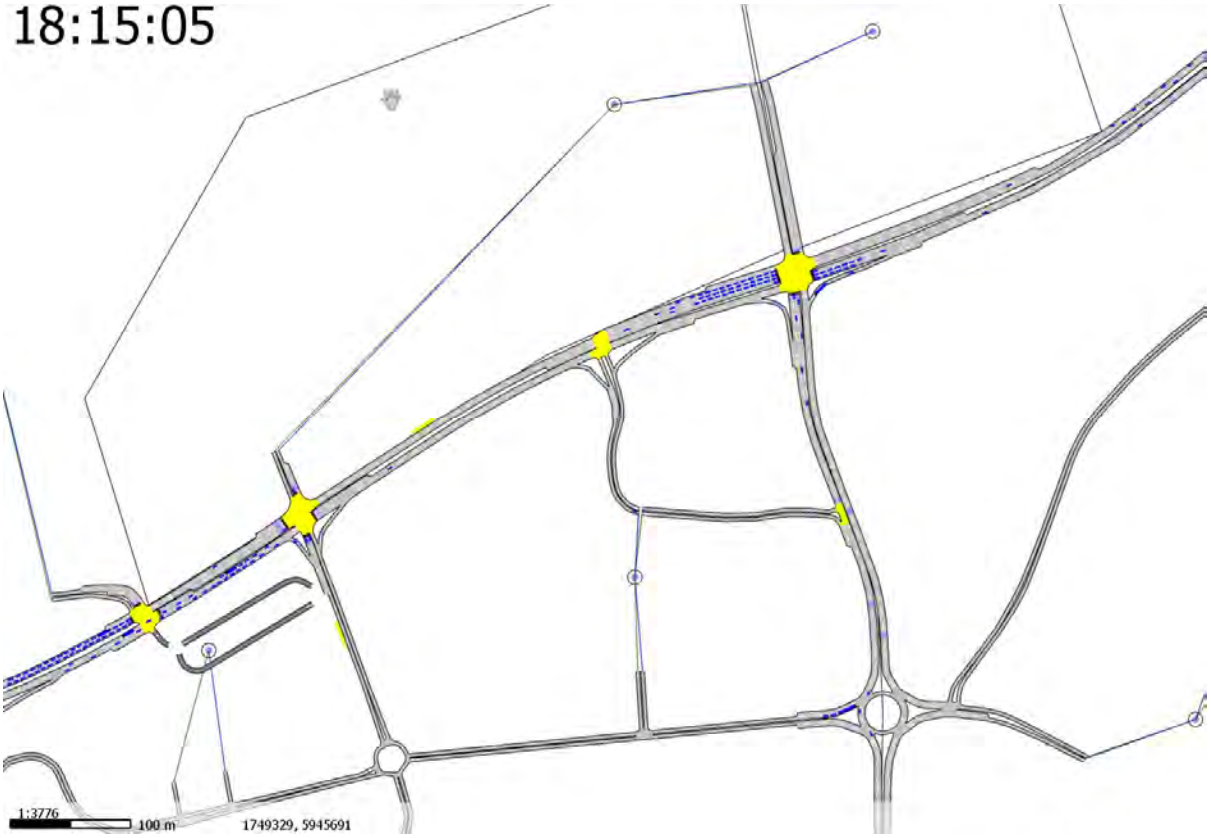
17:45:10



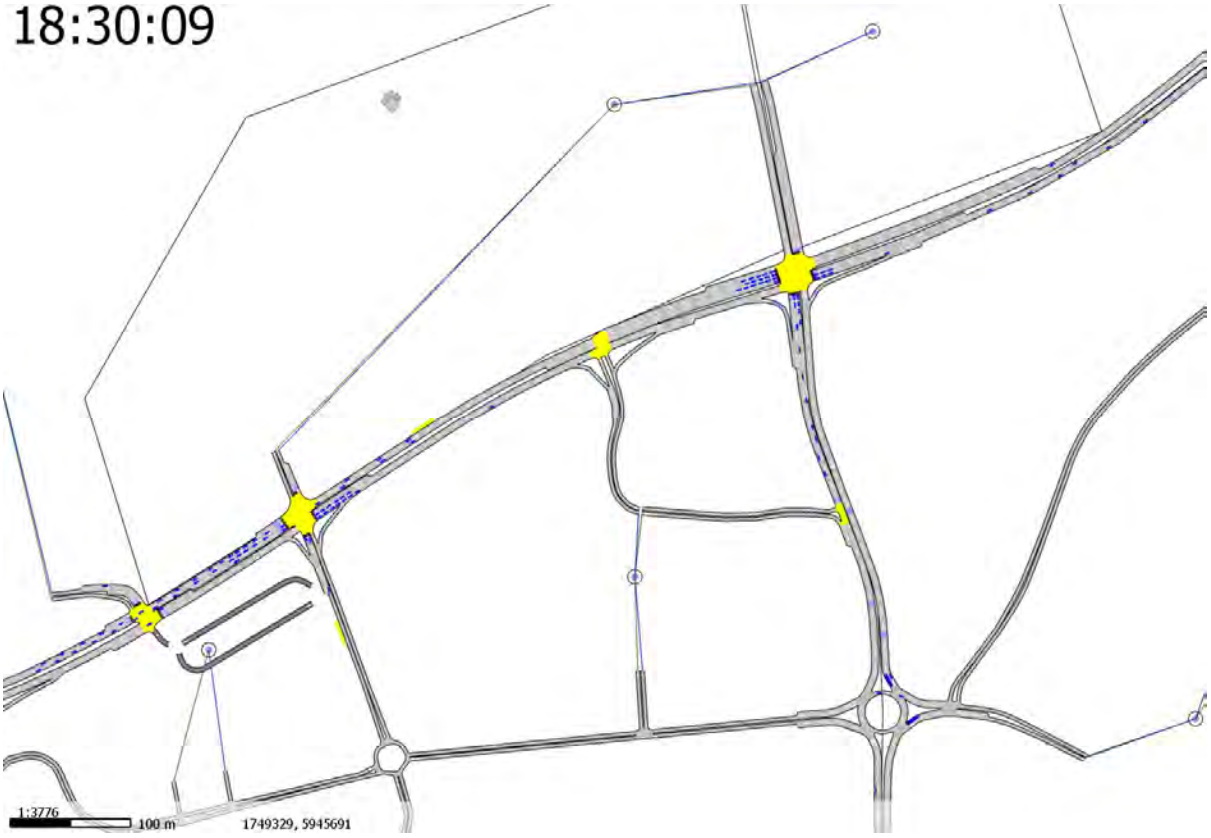
18:00:07



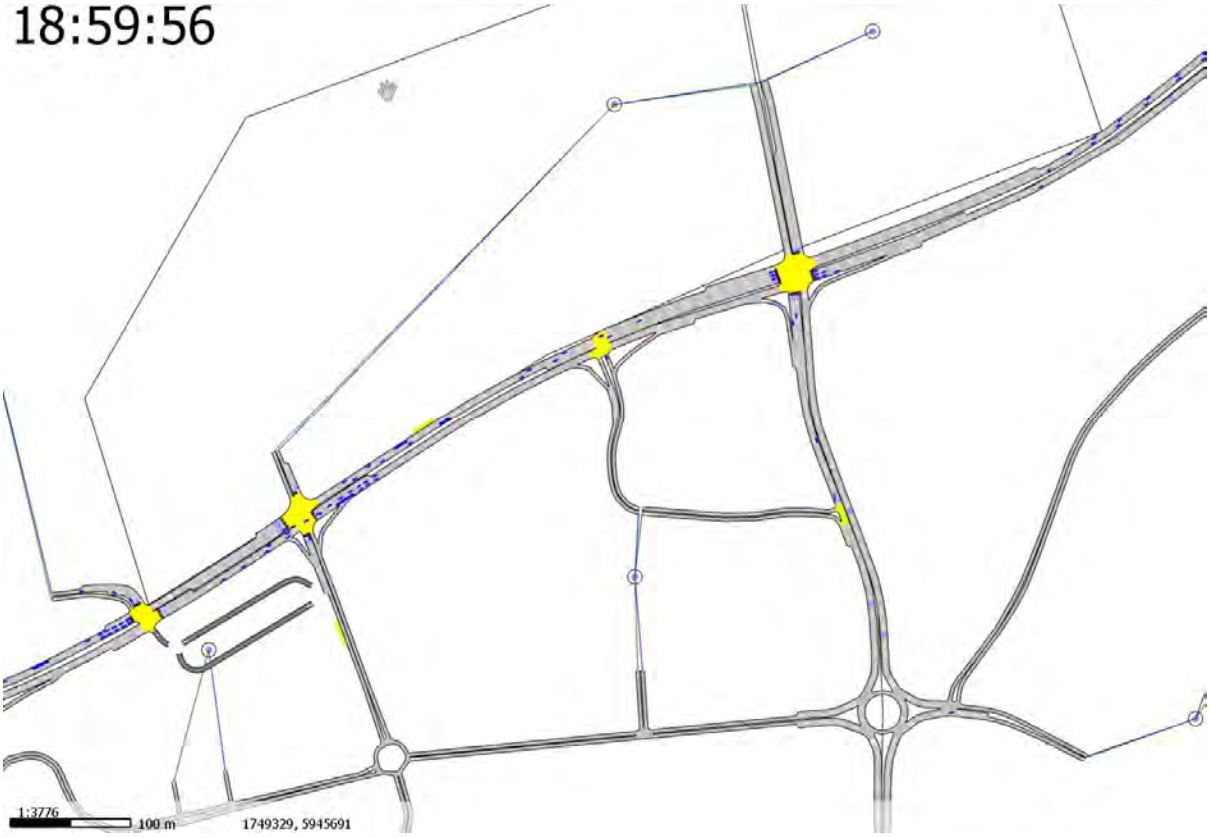
18:15:05



18:30:09

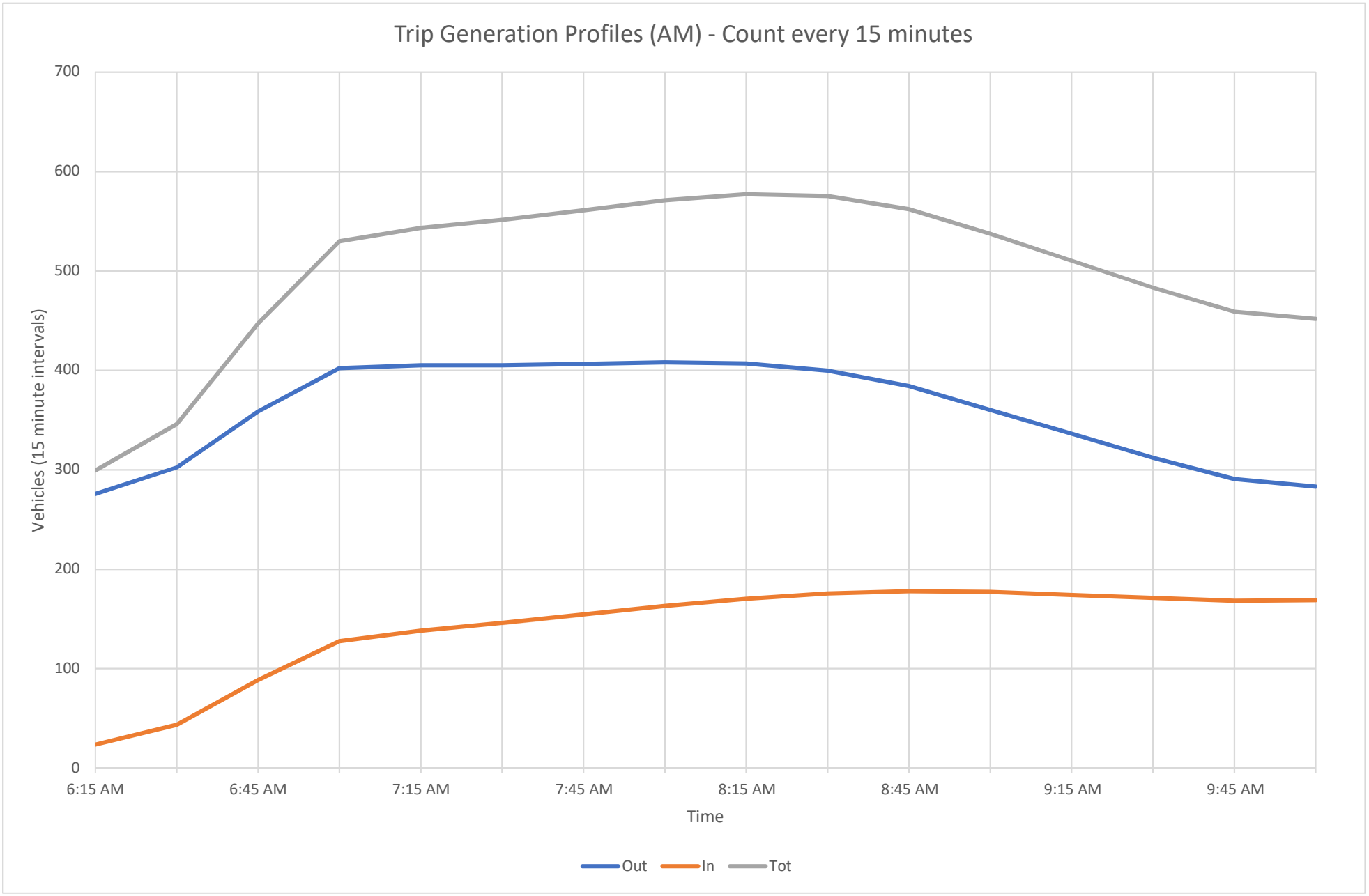


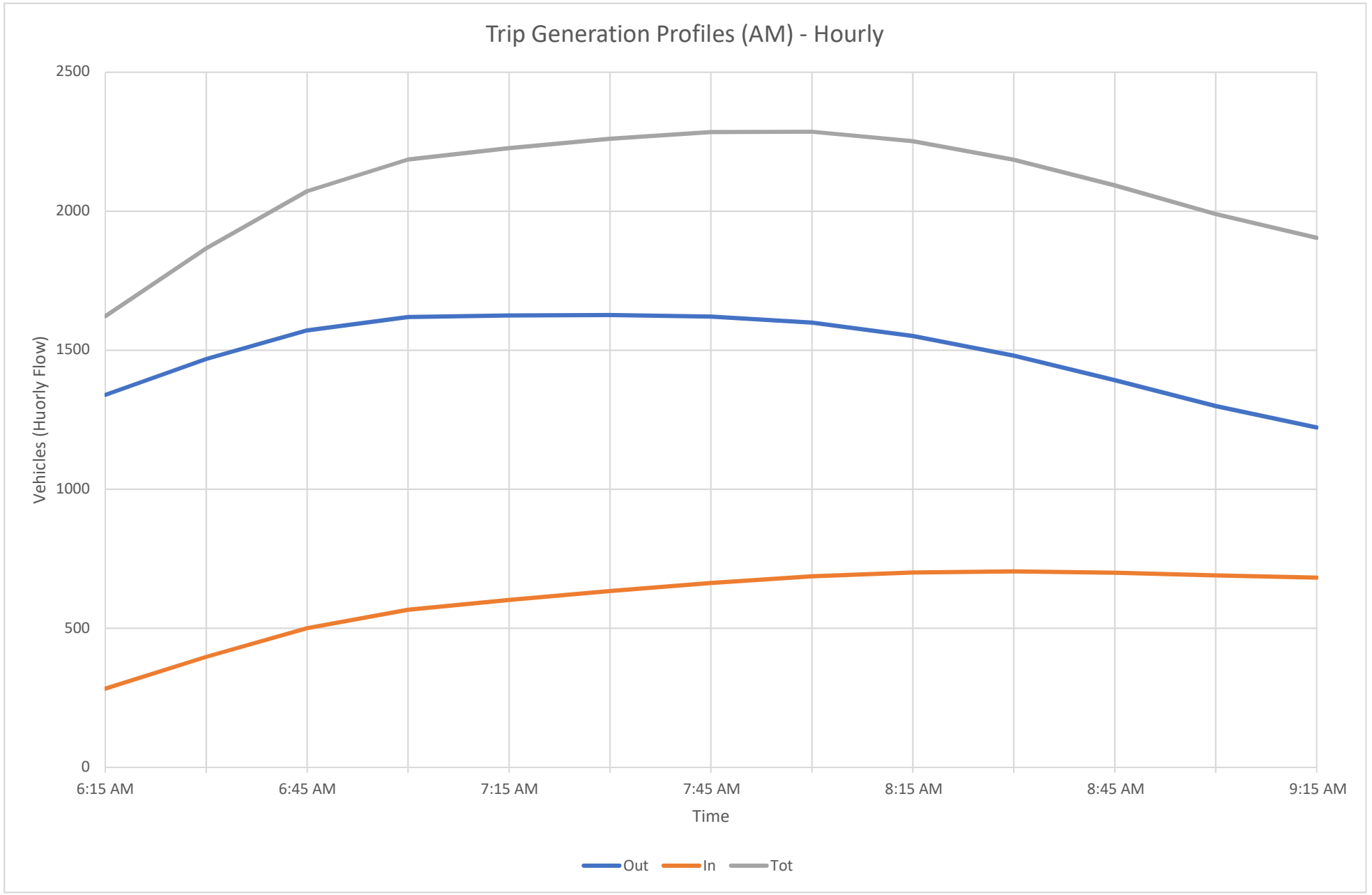
18:45:08

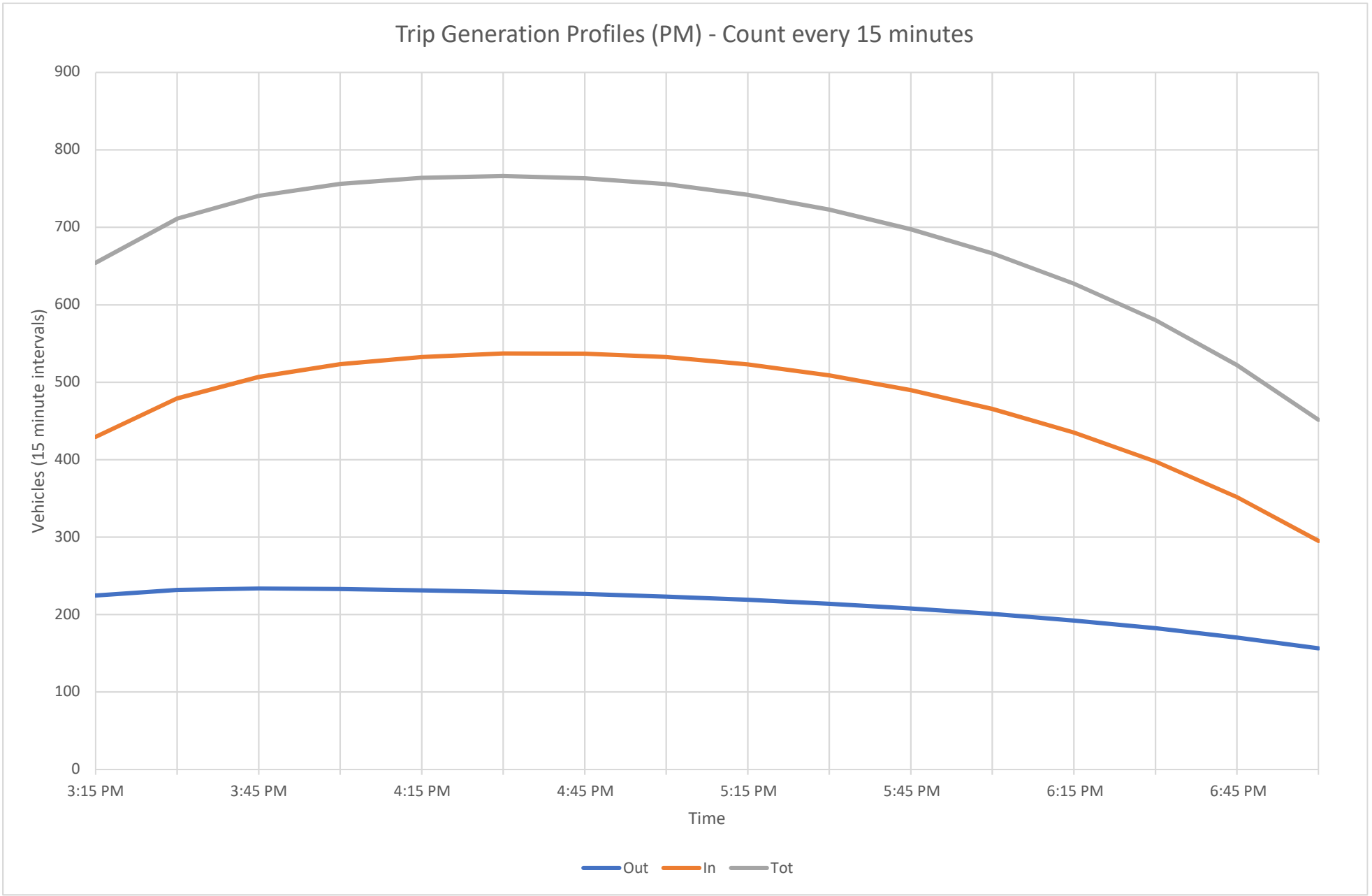

18:59:56
1:3776
100 m
1749329, 5945691

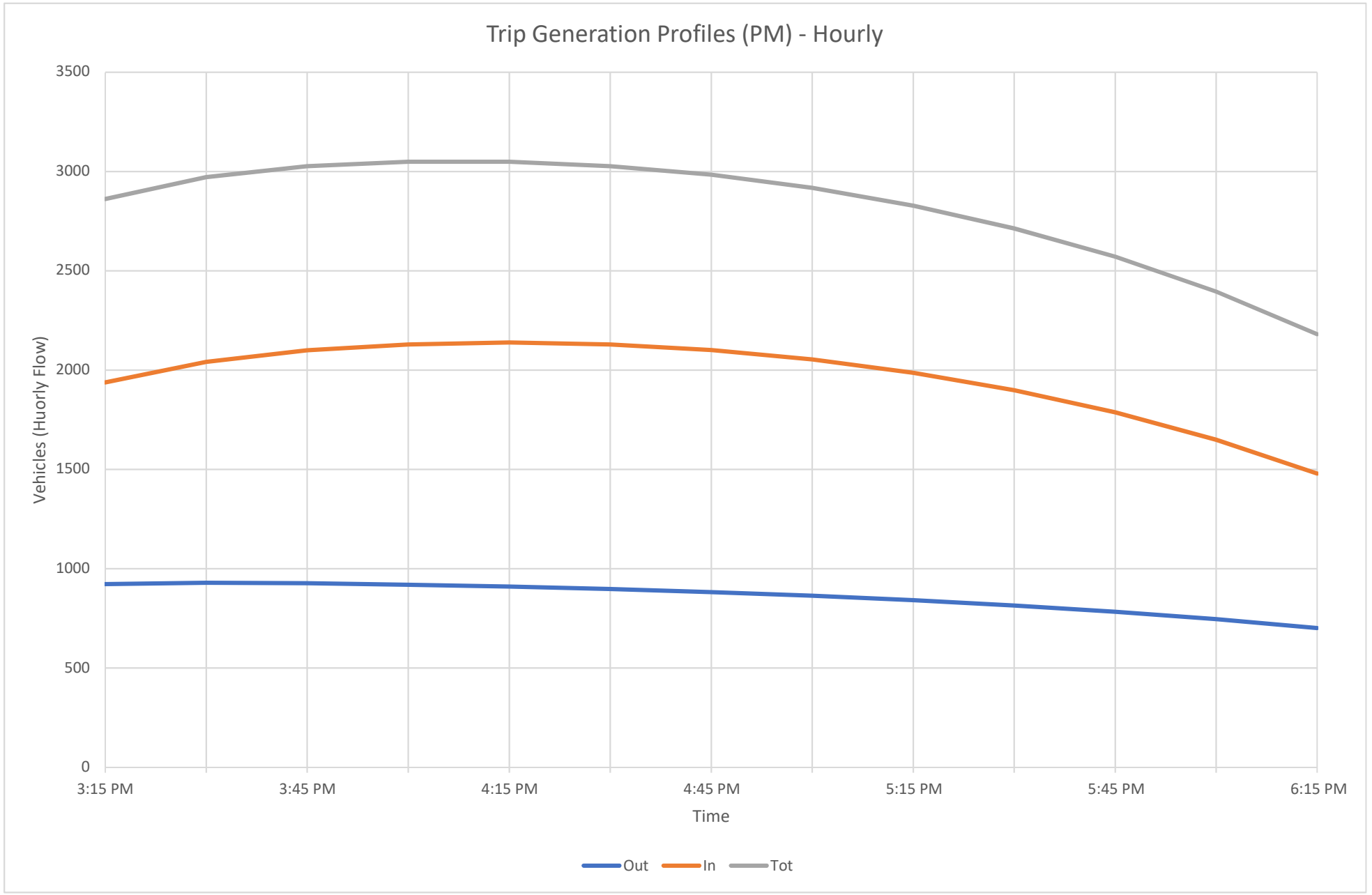
Trip Generation Profiles

- AM at 15-minute intervals
- AM – hourly
- PM at 15-minute intervals
- PM - hourly


Trip Generation Profiles (AM) - Count every 15 minutes
700
600
500
400
300
200
100
0
Vehicles (15 minute intervals)
6:15 AM
6:45 AM
7:15 AM
7:45 AM
8:15 AM
8:45 AM
9:15 AM
9:45 AM
Time
Out
In
Tot


Trip Generation Profiles (AM) - Hourly
2500
2000
1500
1000
500
0
Vehicles (Huorly Flow)
6:15 AM
6:45 AM
7:15 AM
7:45 AM
8:15 AM
8:45 AM
9:15 AM
Time
Out
In
Tot


Trip Generation Profiles (PM) - Count every 15 minutes
900
800
700
600
500
400
300
200
100
0
Vehicles (15 minute intervals)
3:15 PM
3:45 PM
4:15 PM
4:45 PM
5:15 PM
5:45 PM
6:15 PM
6:45 PM
Time
Out
In
Tot


Trip Generation Profiles (PM) - Hourly
3500
3000
2500
2000
1500
1000
500
0
Vehicles (Huorly Flow)
3:15 PM
3:45 PM
4:15 PM
4:45 PM
5:15 PM
5:45 PM
6:15 PM
Time
Out
In
Tot

Filenote

Job: 13041.022

To: Alastair Lovell (AT)
Mike Wood (NZTA)
Joe Phillips (Beca, for AT)
Andrew Mein (Flow, for NZTA)
Tim James (Woods)
Jamie Whyte (Woods)
Brett Harries (TDG, now Stantec)

From: Trevor Lee-Joe

Date: 12 July 2018

Subject: Technical Discussions - Milldale

These notes summarise the discussions held at the meeting of 12 July 2018 in respect of the modelling which has been undertaken for Milldale.

Attendees:
Mike Wood
Andrew Mein
Joe Phillips
Tim James
Jamie Whyte
Brett Harries
Trevor Lee-Joe

Discussions (relevant actions are in bold font):

1. Trevor went through the contents of the Filenote which was distributed on 11 July 2018. This covered the SH1 travel times, queuing snapshots and trip generation profiles from the modelling.

2. There is still an issue regarding trip generation rates in the TFUG model (and the MSM model which informs it). Joe requested that a first principles approach be adopted for the site as a sensitivity check. **Trevor to undertake this assessment**. However, simply applying a higher rate to the TFUG model may not provide the right answers as there could be wider distributional effects from the MSM model as a consequence of the change of household composition. **Andrew to co-ordinate a meeting with the AFC and SGA to discuss further**.

3. A PT meeting is scheduled for Monday 16 July at 12:30pm.

4. Table 24 of the ITA to be updated with respect to the timing for the Argent Lane / Wainui Road roundabout improvement as this is driven more by safety rather than capacity.

5. A separate pedestrian/cycle link needs to be considered since the Highgate-Milldale overbridge is not scheduled to be completed till circa 2,000 dwellings and the Wainui overbridge is no longer proposed to be widened. Woods have identified that this is a work-in-progress (with a new link potentially provided to the north). **Tim to provide an update at the next meeting**.

6. Confirmation of the total GFA within Milldale (40,000 or 50,000sqm) is to be provided.

Meeting ended at 10:00am

Filenote

Job: 13041.022

To: Alastair Lovell (AT)
Mike Wood (NZTA)
Joe Phillips (Beca, for AT)
Andrew Mein (Flow, for NZTA)
Tim James (Woods)
Jamie Whyte (Woods)
Brett Harries (TDG, now Stantec)

From: Trevor Lee-Joe

Date: 6 August 2018

Subject: Technical Discussions - Milldale

These notes summarise the discussions held at the meeting of 2 August 2018 in respect of the modelling which has been undertaken for Milldale.

Attendees:
Mike Wood
Alastair Lovell
Joe Phillips
Jamie Whyte
Trevor Lee-Joe

Discussions (relevant actions are in bold font):

1. A breakdown of housing typologies and anticipated quantities of each housing type for Milldale was tabled (attached to this note as **Attachment 1**). The typical RTA rates and the rates adopted for the trip generation assessment were also included. It was noted that the adopted rates were generally higher than those which have been used recently for the Redhills Precinct in west Auckland. The Redhills trip generation rates are shown in **Table 1**. For comparison the Milldale rates are also shown.

PO Box 2592, Shortland St, Auckland 1140
New Zealand
P: +64 9 531 5006
www.tdg.co.nz

Land Use	Assumed Trip Rate Red Hills	Assumed Trip Rate Milldale
Resi – High density	0.40	0.45
Resi – Medium density	0.50	0.60
Resi – Low Density	0.65	0.85
Overall residential	**0.49**	**0.60**

Table 1: Trip Generation rates (Red Hills vs Milldale)

2. It was noted that the Red Hills area is relatively close to the Westgate commercial area and that trip generation rates could be different as a consequence. However, it was also noted that Milldale is also located close to commercial areas such as the Highgate Business Park (currently under construction), the Silverdale town centre and the Silverdale industrial area.

3. A separate meeting was held with Auckland Transport's (AT) PT team on Monday 16 July to discuss potential PT options/strategy for the site and Woods are currently revising their plans in the light of those discussions. Further discussions will take place through the process. Assuming a 5% Public Transport (PT) proportion the overall trip generation for the Milldale site is around 0.60 trips/dwelling. **PT timing and strategy to be included as part of the final ITA**.

4. At the previous meeting comments were also raised regarding the AM trip profiles which have been used for Milldale in the North TFUG model. It was noted that they appeared to be relatively flat. Trevor provided the AM profile patterns currently observed at the Wainui interchange southbound on-ramp (as taken from the NZTA's traffic count database in June 2018). This is attached to the Filenote as **Attachment 2**. As can be seen, the profile shows a peak for the profile which does not appear to be reproduced in the model. **As such, Trevor will update the demand profiles in the North TFUG model and re-run the model**.

5. Preliminary results showing the effect of the re-profiling of the AM demand matrices were tabled at the meeting (also attached to this Filenote as **Attachment 3**).

6. It was noted that the PM trip generation in the model (at around 0.66/dwelling) is around 10% higher than the overall trip generation rate. It was agreed that this rate would not be adjusted but that some extra commentary would be provided in the ITA which makes note of this.

7. Infrastructure staging was discussed. The low density lots have a higher trip rate. If these are developed earlier then the trip generations could potentially be higher initially, which could affect the proposed infrastructure timing. **Jamie to provide a more detailed programme for staging and Trevor to provide further commentary around this in the ITA**.

8. Trip Distribution to be checked. **Mike to discuss further with Andrew**.

9. Cycle routes. Woods have almost completed their draft plan which provides additional linkage to Millwater via a separate cycle link. **Jamie to distribute the draft cycle plan when it is ready**.

10. School(s). The Ministry of Education has identified a suitable site for the school(s) (potentially primary and secondary). The timing for construction is still to be determined and an agreement for the land is still to be formalised. However, the location has now been set

aside in the precinct plan.

11. Dairy Flat speed limits. Alastair to follow up with Warren Budd as to what is intended for Dairy Flat in the future.

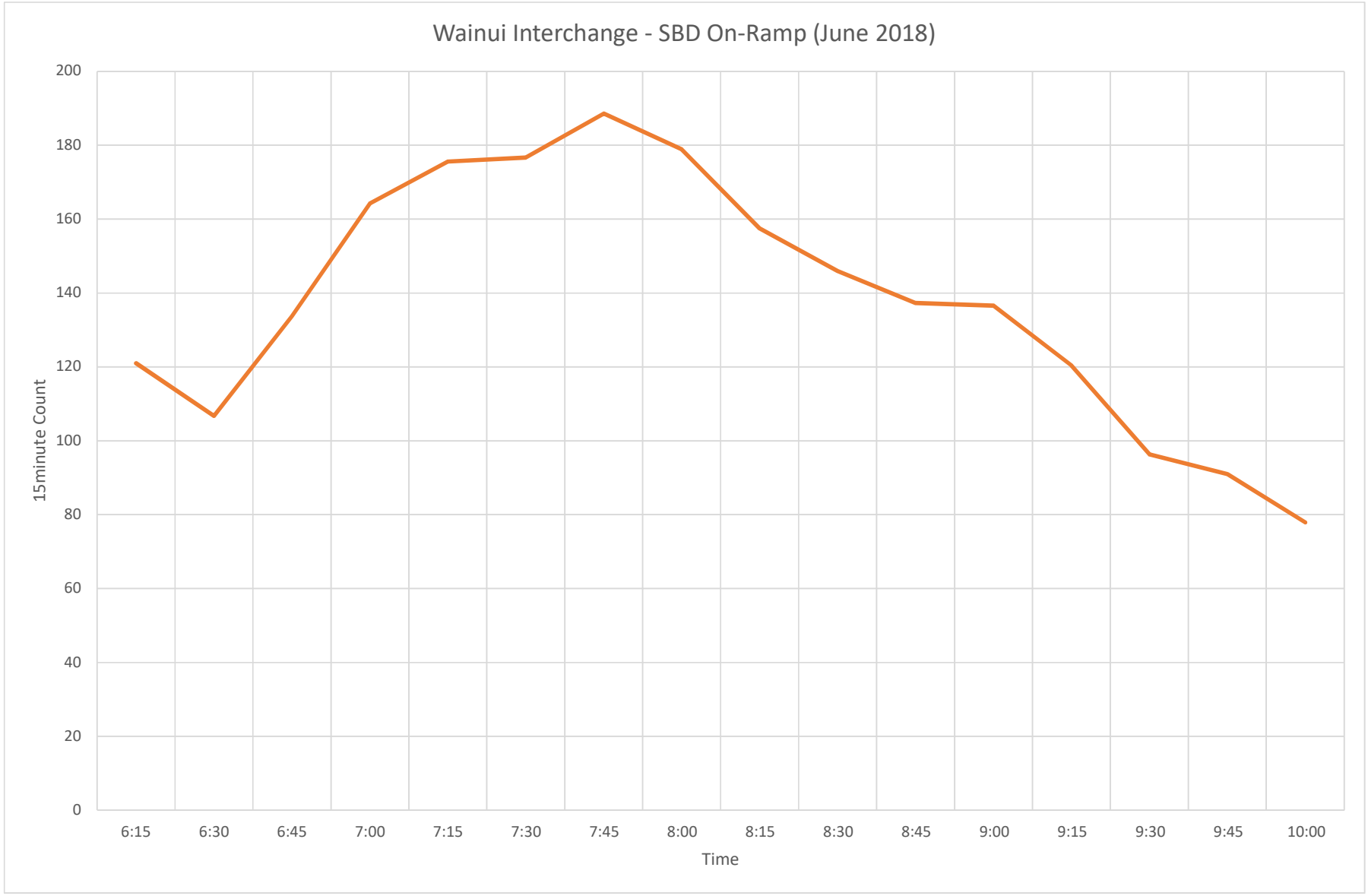
12. Wainui Overbridge. Currently has footpaths on both sides. Need to look at pedestrian/cyclist desire lines.

Meeting ended at 9:45am

Attachments:
1 – Trip Generation rates
2 – Wainui Interchange southbound on-ramp profile (June 2018)
3 – AM preliminary trip gen profiles from model after re-profiling

Typology	Quantity	Percentage	RTA Rate	Assumed		Trips
Apartments (THAB)	582	13%	0.4-0.5	0.45		262
Apartments (Central)	262	6%	0.4-0.5	0.45		118
Semi-Attached Terraces (SuperLots)	758	17%	0.4-0.5	0.45		341
Small Standalone lots	390	9%	0.5-0.65	0.6		234
Medium Standalone lots	1181	27%	0.5-0.65	0.6		709
Large Standalone lots	821	19%	0.85	0.85		698
600sqm and over	424	10%	0.85	0.85		360
	4418					2722

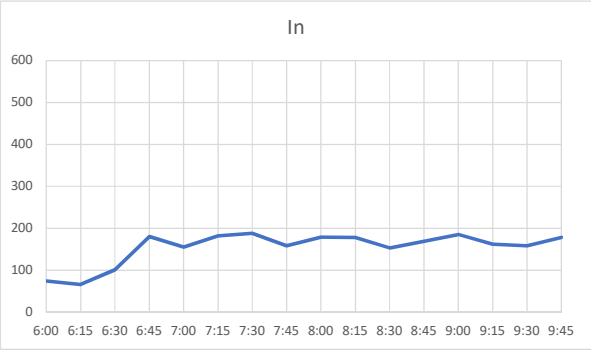
PT	5%
PT Trips	136
Excl PT	2586
OA Rate	0.59



Attachment 2

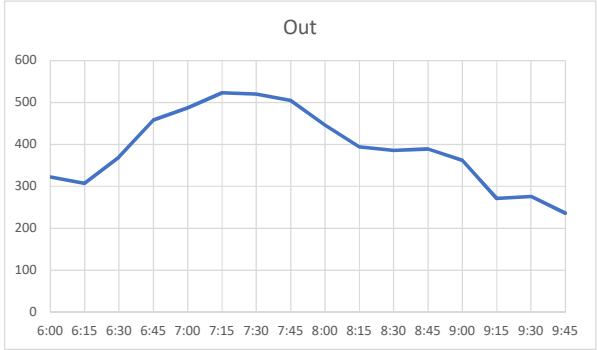
did	12037387
Direction	In
sid	0

Sum of count	Column Labels							
Row Labels	**2401**	**2403**	**2404**	**2405**	**2407**	2402	2406	Total
1	8	8	15	12	10	14	7	74
2	10	9	4	12	13	7	11	66
3	16	16	15	10	11	19	14	101
4	24	25	25	22	27	32	25	180
5	26	25	24	20	19	14	27	155
6	29	23	29	23	27	26	25	182
7	31	25	26	23	31	31	21	188
8	16	21	26	23	24	29	19	158
9	23	31	20	15	26	23	41	179
10	31	28	26	25	30	22	16	178
11	25	23	21	28	26	10	20	153
12	25	24	29	22	23	22	24	169
13	27	24	27	30	28	26	23	185
14	26	14	22	29	25	23	23	162
15	16	19	24	27	20	20	32	158
16	22	16	38	24	30	18	30	178



did	12037387
Direction	Out
sid	0

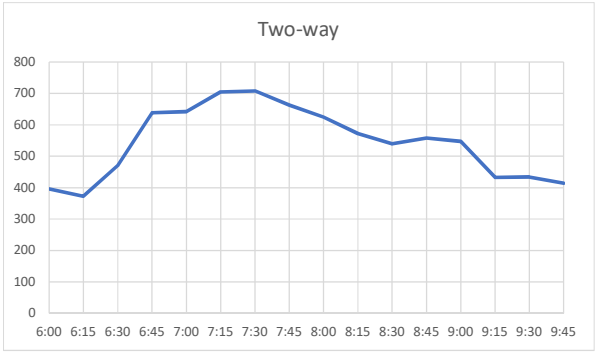
Sum of count	Column Labels							
Row Labels	**2401**	**2403**	**2404**	**2405**	**2407**	2402	2406	Total
1	36	51	50	44	46	48	47	322
2	41	40	54	49	41	46	36	307
3	53	48	53	51	57	57	51	370
4	74	65	65	72	67	53	62	458
5	66	75	71	76	91	48	60	487
6	81	71	66	95	77	67	66	523
7	86	55	95	87	64	61	72	520
8	64	57	88	98	73	59	66	505
9	68	57	68	61	68	63	61	446
10	50	52	63	59	60	61	49	394
11	55	42	66	57	45	62	59	386
12	53	51	62	52	67	47	57	389
13	46	50	57	48	48	52	61	362
14	37	35	37	31	41	36	54	271
15	46	33	39	34	33	39	52	276
16	32	44	27	32	35	30	36	236



4500 HH

Start	Two-way Total	Hourly
6:00	396	1878
6:15	373	2124
6:30	471	2456
6:45	638	2693
7:00	642	2718
7:15	705	2701
7:30	708	2568
7:45	663	2399
8:00	625	2294
8:15	572	2216
8:30	539	2077
8:45	558	1972
9:00	547	1828
9:15	433	
9:30	434	
9:45	414	

0.60 PkHr



Filenote

Job: 13041.022

To: Alastair Lovell (AT)
Mike Wood (NZTA)
Joe Phillips (Beca, for AT)
Andrew Mein (Flow, for NZTA)
Tim James (Woods)
Jamie Whyte (Woods)
Brett Harries (TDG, now Stantec)

From: Trevor Lee-Joe

Date: 23 August 2018

Subject: Technical Discussions - Milldale

These notes summarise the discussions held at the meeting of 13 August 2018 in respect of the modelling which has been undertaken for Milldale.

Attendees:
Mike Wood
Alastair Lovell
Joe Phillips
Tim James
Trevor Lee-Joe

Discussions (relevant actions are in bold font):

1. Treatment of the Dairy Flat/Argent Lane intersection. Graham Norman (Commute) to look into this further as part of his involvement with the SGA. It was agreed that some sort of treatment is required at this intersection but this need not be defined at this stage. Still need feedback from AT as to the likely speed environment in the future.

2. Public Transport assumptions. **Joe to discuss further with Ian Clark of Flow Transportation Specialists to see what has been assumed for Red Hills.**

3. Traffic Distribution. **Mike to discuss further with Andrew.**

4. Cycling. Would be useful for the ITA to show existing network and connectivity to that network. **Trevor to include this in the final ITA. Tim to distribute draft plan to Mike for further discussion with the AMA.**

PO Box 2592, Shortland St, Auckland 1140
New Zealand
P: +64 9 531 5006
www.tdg.co.nz

5. Milldale / Highgate Overbridge. Land is required for construction of the abutments. Discussions around what is required in terms of the extent of the Armco barriers (potentially 15-20m into the Highgate site). **Alistair to discuss further with Alistair White (Consultant Planner for Highgate development).**

Meeting ended at 10:30am

Filenote

Job: 13041.022

To: Alastair Lovell (AT)
Mike Wood (NZTA)
Joe Phillips (Beca, for AT)
Andrew Mein (Flow, for NZTA)
Tim James (Woods)
Jamie Whyte (Woods)
Brett Harries (TDG, now Stantec)

From: Trevor Lee-Joe

Date: 30 August 2018

Subject: Technical Discussions - Milldale

These notes summarise the discussions held at the meeting of 30 August 2018 in respect of the modelling which has been undertaken for Milldale.

Attendees:
Mike Wood
Andrew Mein
Joe Phillips
Jamie Whyte
Trevor Lee-Joe

Discussions (relevant actions are in bold font):

1. Trevor provided an update on the latest round of modelling and presented the updated trip generation profiles and model outputs. The modelling is now generally accepted by the review team. There is still an issue of how trip generation rates might be affected by PT provision. This is difficult to quantify particularly in respect to when dwellings are deemed to be 'operational' or occupied following completion of construction. **Jamie to talk to Tim about how this has been managed through the Millwater process**.

2. PT discussions need to be worked into the Infrastructure Funding Agreement (inclusive of timeframes) – **Alistair to investigate further**. AT will need to work out when the infrastructure is required and work out operational costs of achieving proposed services. Steve Wrenn is probably the best person to talk to on this.

3. Milldale Stages 1 to 3 are already being processed – approximate yield of 1,000 dwellings.

PO Box 2592, Shortland St, Auckland 1140
New Zealand
P: +64 9 531 5006
www.tdg.co.nz

Each stage is subject to its own consent. Mitra Prasad is working through the consenting processes for each stage.

4. Cycling. A new shared path is proposed to the north – indicative plans have been circulated by Woods. **Mike is meeting with the Auckland Motorway Alliance to discuss and will report back.**

Meeting ended at 10:30am

Filenote

Job: 13041.022

To: Alastair Lovell (AT)
Mike Wood (NZTA)
Joe Phillips (Beca, for AT)
Andrew Mein (Flow, for NZTA)
Tim James (Woods)
Jamie Whyte (Woods)
Brett Harries (TDG, now Stantec)
Michael Hall (TDG, now Stantec)

From: Trevor Lee-Joe

Date: 14 September 2018

Subject: Technical Discussions - Milldale

These notes summarise the discussions held at the meeting of 14 September 2018 in respect of the modelling which has been undertaken for Milldale.

Attendees:
Alastair Lovell
Mike Wood
Andrew Mein
Joe Phillips
Jamie Whyte
Tim James
Brett Harries
Michael Hall
Trevor Lee-Joe

Discussions (relevant actions are in bold font):

1. Trevor circulated the minutes from the previous meeting and discussed the matters raised. The modelling outputs for the latest round of modelling (which increases the trip generation rates for the morning peak hour) have been updated in the latest ITA. At the moment the ITA provides indicative plans for the cycle and PT facilities but discussions on these matters are on-going with AT. **Jamie to provide an updated PT plan for inclusion in the ITA**. **Trevor to circulate the ITA sometime next week**.

2. PT. Alastair mentioned that Colin Homan will be assisting Steve Wrenn with regard to

further PT discussions. Steve has a more PT planning focus while Colin has a funding focus. It is understood that from previous discussions with AT, FHLDL will provide the facilities (i.e bus shelters) and will ensure that the roading infrastructure is provided to support the PT plans. AT will determine the best locations for bus stops and the best routes for services. FHLDL are prepared to put the concrete pads for the shelters in during construction but need prior AT approval for this to occur. Need further discussion and certainty around locations. **Alastair to arrange a meeting for next week with AT PT team**.

3. Stages 1 and 2 of the Milldale development have been approved. Stage 3 consent has been submitted and Woods are currently working through a number of Section 92 matters which have been raised regarding road cross-section layouts.

4. New Shared Path. This is in the north near the Wainui interchange. Will most likely cater for recreational users. Woods are currently working on a sewage tunnel in the area. A temporary access lane has been constructed for trucks and the shared path could feasibly follow that same road once tunnel construction is complete. This is to be discussed further with the AT walking/cycling team.

5. Trevor noted that the ITA is almost complete. Some rationale for the infrastructure triggers is needed but this could potentially be provided separately.

6. Wainui interchange. Some discussion was held previously around relocating the pedestrian crossing at the intersection at the eastern end of the Wainui overbridge to be on the southern approach rather than the northern approach as it currently exists. Having the pedestrian crossing on the southern approach has the potential to affect the right turn movements off the overbridge which could then reduce the capacity of the intersection. It was recommended that the pedestrian crossing to remain where it currently is. Alastair noted that some improvements may be required when the northern side of Wainui Road (zoned Future Urban) is further developed. However, once that area is developed that opens opportunities for the Kowhai Road link to be completed which provides a parallel roading link between Milldale and Millwater.

7. Alastair asked about the straightening of Sidwell Road which was identified in the original IFA. Tim responded that the straightening was an option which was tabled if the Sidwell/Wainui intersection was to be signalised. However, current modelling indicates that signalisation of the intersection was not warranted, therefore straightening of Sidwell Road was no longer required.

8. Alastair has been asked by the Highgate Planner as to restrictions on access points due to the Highgate Bridge structure requirements. **Tim will get his Bridge team to investigate further and report back to Alastair**.

Meeting ended at 9:45am

Lee-Joe, Trevor

From: Exeter, Sven <Sven.Exeter@mottmac.com>
Sent: Tuesday, 6 August 2019 11:46 a.m.
To: joseph.Phillips@beca.com; Alastair Lovell (AT); DEWE, Gregory; tim.james@woods.co.nz; Lee-Joe, Trevor
Cc: Marion Forman (AT); Barwick, Aimee; Milldale Development - Infrastructure Projects; Sonya McCall (AT); Jade Ansted (AT)
Subject: Meeting to discuss Pine Valley Road and Dairy Flat Highway Intersection requirements - MINUTES

Hi all

Thanks for this morning's meeting.

Key notes / outcomes and actions:

1. **ACTION – Trevor** - Milldale ITA to be updated and sent to AT for approval:

    A. Stage 1: 4 lane intersection at Pine Valley Road ("PVR") and Dairy Flat Highway ("DFH" - as per previous ITA) required to accommodate 2,800 homes. Insert previous 4 lane intersection figure.
    B. Stage 2: 6 lane intersection at Pine Valley Road and Dairy Flat Highway required to accommodate 4,500 homes.
    C. Add commentary on performance and H&S etc to support A & B above.

2. **ACTION: AT** to approve ITA ~2 weeks after receipt of Final ITA.
3. **ACTION: Mott's** – drawings for 6 lane intersection required to support NOR to be updated ASAP.
4. Supporting Growth Alliance (SGA) – Argent arterial extension from south of DFH no longer required. T-intersection at DFH and PVR sufficient.
5. SGA – rapid transit to cut through / under / near DFH and PVR intersection in future. IBC TBC.
6. ACTION: **AT** & **Mott's** to liaise with NZTA to confirm and discuss ITA & NOR approach and synchronisation with SH1 slip lane.
7. AT - funding for future 6 lanes – TBC.
8. **ACTION: AT** to provide **Mott's** details on speed limit review for DFH.

Feel free to email any changes to the above.

Ngā mihi / Kind regards

Sven Exeter
Senior Consultant
D +64 (0)9 374 1574 M +64 (0)273037354
sven.exeter@mottmac.com

MOTT MACDONALD

Mott MacDonald
Mason Bros. Building
Level 2, 139 Pakenham Street West
Wynyard Quarter
Auckland 1010
PO Box 37525 Parnell 1151
New Zealand

Website | **Twitter** | **LinkedIn** | **Facebook** | **YouTube**

Auckland (TDG office)
Level 1, 103 Carlton Gore Road
Newmarket, Auckland 1023
PO Box 13-052, Armagh
Christchurch 8141
Tel +64 9 531 5006

Please visit **www.stantec.com** to learn more about how Stantec design with community in mind.

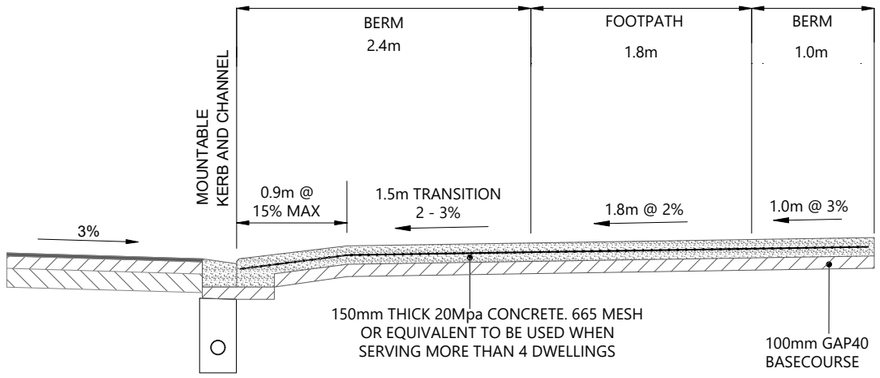
Stantec

Appendix B Milldale Street Map

MILLDALE

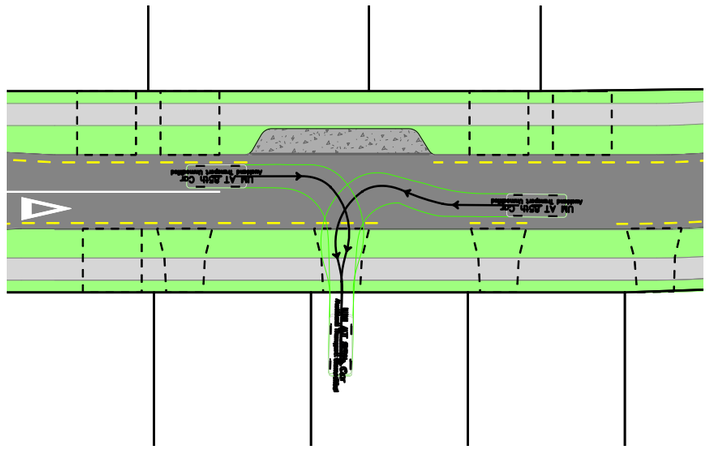
STREET NAMES
MAY 2024

Appendix C Departures from Standards



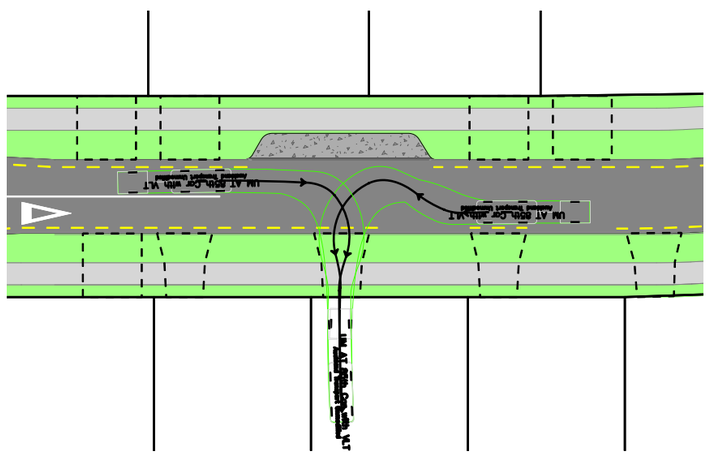
TYPICAL VEHICLE CROSSING TYPE A - LOCAL ROAD -SECTION

Scale: 1:50



TYPICAL VEHICLE CROSSING - LOCAL ROAD TYPE A: CAR MOVEMENT

Scale: 1:500

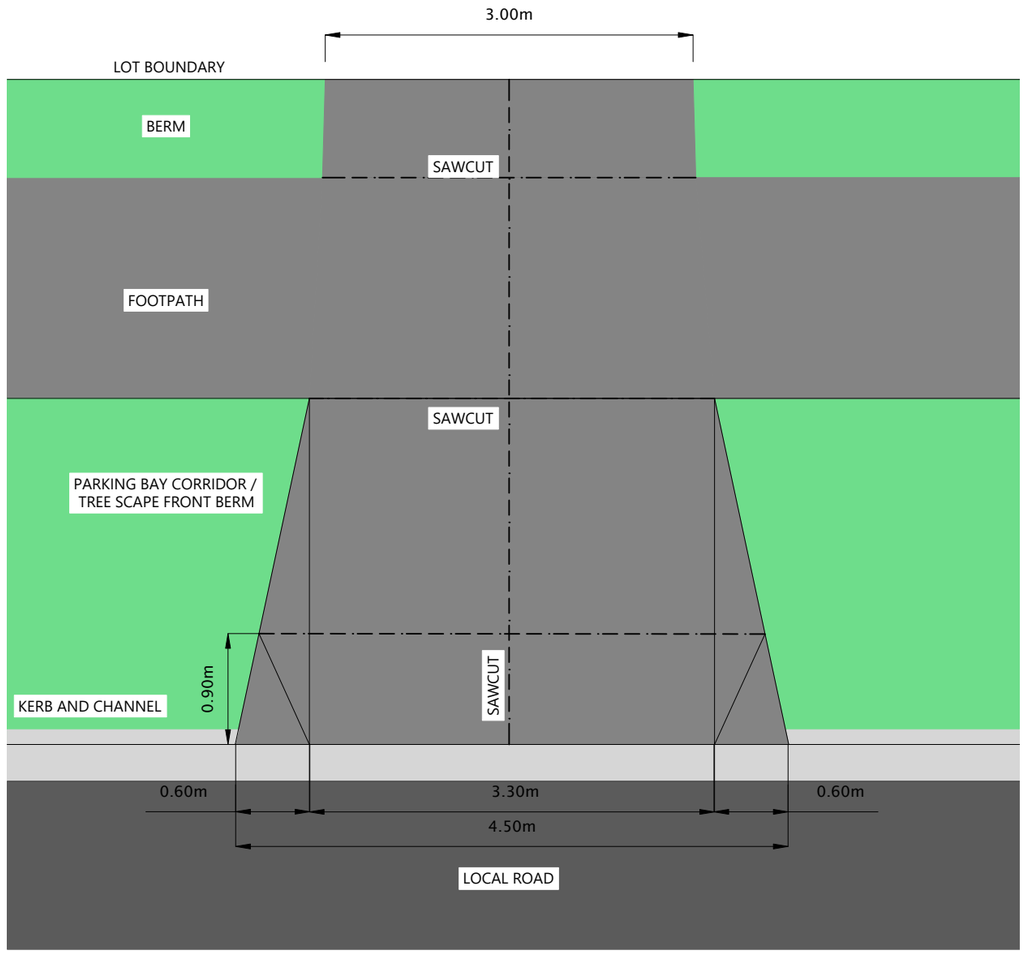


TYPICAL VEHICLE CROSSING - LOCAL ROAD TYPE A: CAR AND TRAILER MOVEMENT

Scale: 1:500

NOTES:

1. PAVEMENT THICKNESS AS SPECIFIED ON PLAN WITH MINIMUM CBR OF 3.
2. CONSTRUCT IN SAME MATERIAL AND FINISH AS SURROUNDING FOOTPATH
3. ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF LESS THAN 14m SHALL CONSTRUCT A TYPE A VEHICLE CROSSING.
4. ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF 14m OR GREATER SHALL CONSTRUCT EITHER A TYPE A VEHICLE CROSSING OR A TYPE B VEHICLE CROSSING.
5. ALL LOTS FRONTING ONTO ARTERIAL OR COLLECTOR ROADS WITH A FRONT BOUNDARY WIDTH OF LESS THAN 14m SHALL CONSTRUCT A TYPE A VEHICLE CROSSING.
6. ALL LOTS FRONTING ONTO ARTERIAL OR COLLECTOR ROADS WITH A FRONT BOUNDARY WIDTH OF 14m OR GREATER SHALL CONSTRUCT EITHER A TYPE A VEHICLE CROSSING OR A TYPE B VEHICLE CROSSING.
7. ALL CORNER LOTS SHALL CONSTRUCT A TYPE B VEHICLE CROSSING.
8. ALL JOAL VEHICLE CROSSINGS ARE TO BE CONSTRUCTED TO AUCKLAND TRANSPORT STANDARDS.



VEHICLE CROSSING TYPE A TYPICAL DETAIL

Scale: 1:50

SCALEBAR (m)

0 5 10 25

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	AP	OCT 2024

SURVEYED	WOODS	SIDWELL ROAD WAINUI AUCKLAND
DESIGNED	AP	
DRAWN	AP	
CHECKED	AP	
APPROVED	JW	WOODS.CO.NZ

N

MILLDALE
Connecting Lifestyles

MILLDALE FAST TRACK STAGES 10 - 13

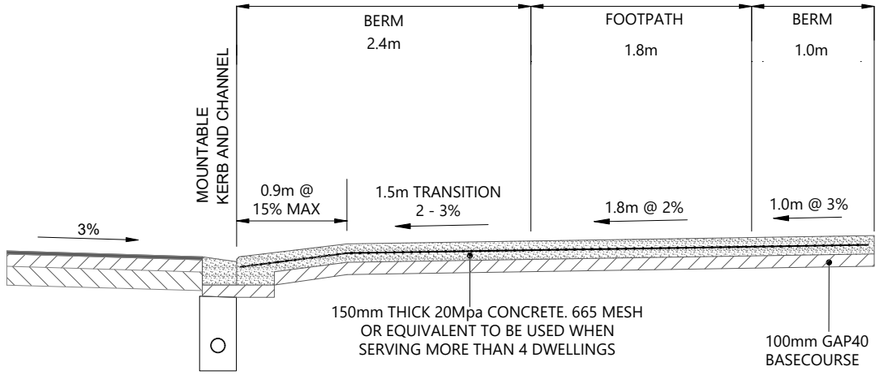
TYPICAL VEHICLE CROSSING LOCAL ROAD TYPE A DETAILS

STATUS	ISSUED FOR CONSENT	REV
SCALE	AS SHOWN	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-128-00-2070-RD	

WOODS Est.1970

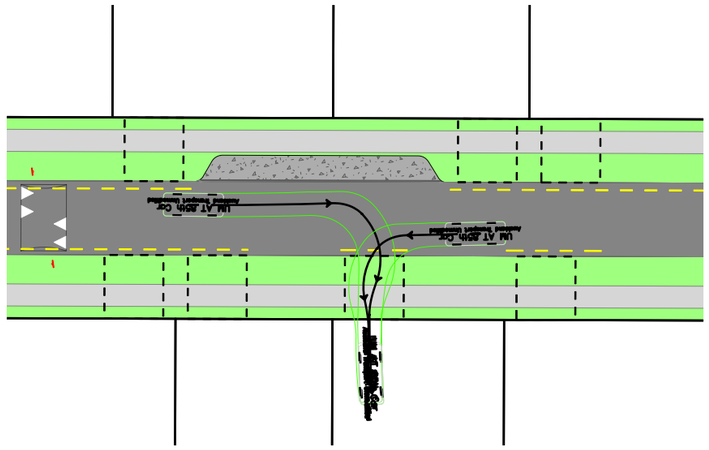
Plot Date: 2:20:04 pm,3 December 2024, FATINA

File: C:\12DSYNERGY\DATA\WP-PEN-APP-01\P24-128 - MDL - FAST TRACK APPLICATION_21627\02 DRAWINGS\01 ENG\P24-128-00-2070-RD-VEHICLE CROSSING DETAILS.DWG



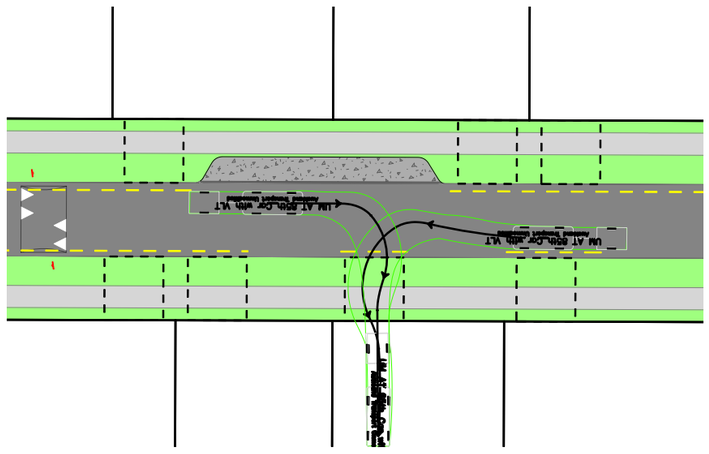
TYPICAL VEHICLE CROSSING TYPE B - LOCAL ROAD -SECTION

Scale: 1:50



TYPICAL VEHICLE CROSSING - LOCAL ROAD TYPE B: CAR MOVEMENT

Scale: 1:500

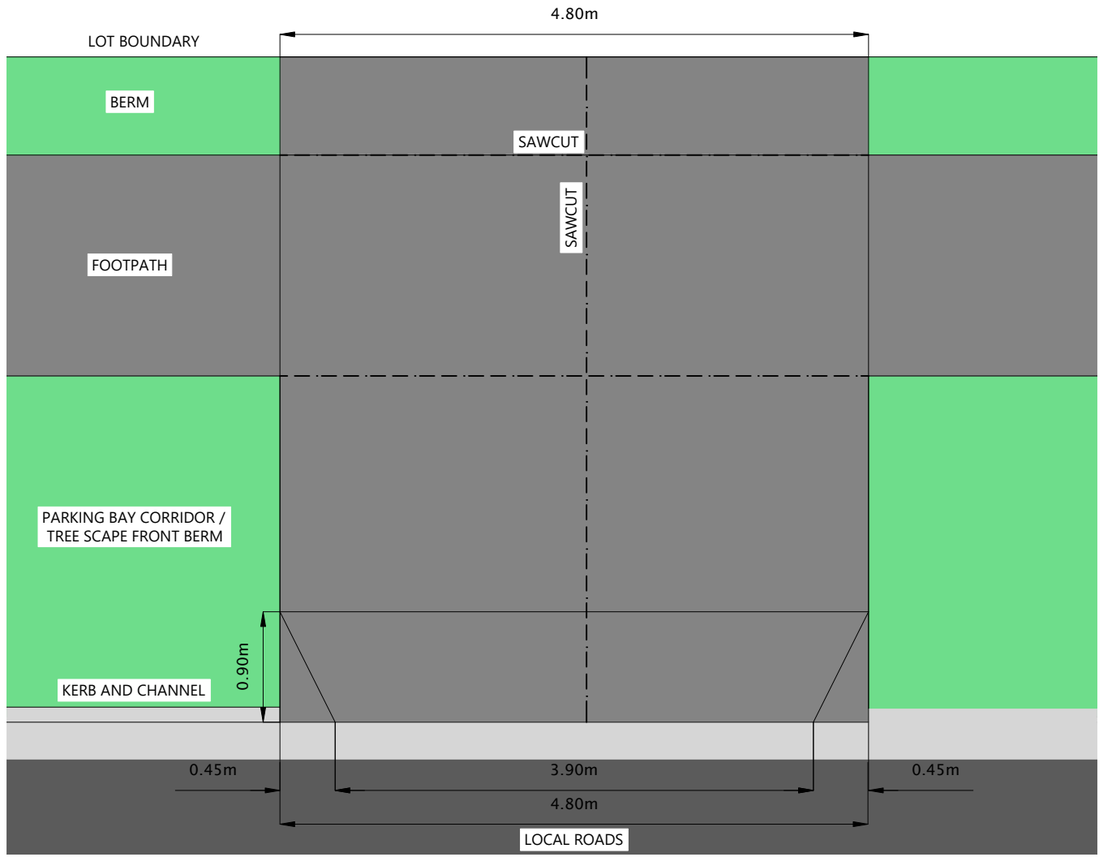


TYPICAL VEHICLE CROSSING - LOCAL ROAD TYPE B: CAR AND TRAILER MOVEMENT

Scale: 1:500

NOTES:

1. PAVEMENT THICKNESS AS SPECIFIED ON PLAN WITH MINIMUM CBR OF 3.
2. CONSTRUCT IN SAME MATERIAL AND FINISH AS SURROUNDING FOOTPATH
3. ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF LESS THAN 14m SHALL CONSTRUCT A TYPE A VEHICLE CROSSING.
4. ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF 14m OR GREATER SHALL CONSTRUCT EITHER A TYPE A VEHICLE CROSSING OR A TYPE B VEHICLE CROSSING.
5. ALL LOTS FRONTING ONTO ARTERIAL OR COLLECTOR ROADS WITH A FRONT BOUNDARY WIDTH OF LESS THAN 14m SHALL CONSTRUCT A TYPE A VEHICLE CROSSING.
6. ALL LOTS FRONTING ONTO ARTERIAL OR COLLECTOR ROADS WITH A FRONT BOUNDARY WIDTH OF 14m OR GREATER SHALL CONSTRUCT EITHER A TYPE A VEHICLE CROSSING OR A TYPE B VEHICLE CROSSING.
7. ALL CORNER LOTS SHALL CONSTRUCT A TYPE B VEHICLE CROSSING.
8. ALL JOAL VEHICLE CROSSINGS ARE TO BE CONSTRUCTED TO AUCKLAND TRANSPORT STANDARDS.



VEHICLE CROSSING TYPE B TYPICAL DETAIL

Scale: 1:50

SCALEBAR (m)

0 5 10 25

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	AP	OCT 2024

SURVEYED	WOODS	SIDWELL ROAD WAINUI AUCKLAND
DESIGNED	AP	
DRAWN	AP	
CHECKED	AP	
APPROVED	JW	WOODS.CO.NZ

N

MILLDALE
Connecting Lifestyles

MILLDALE FAST TRACK STAGES 10 - 13

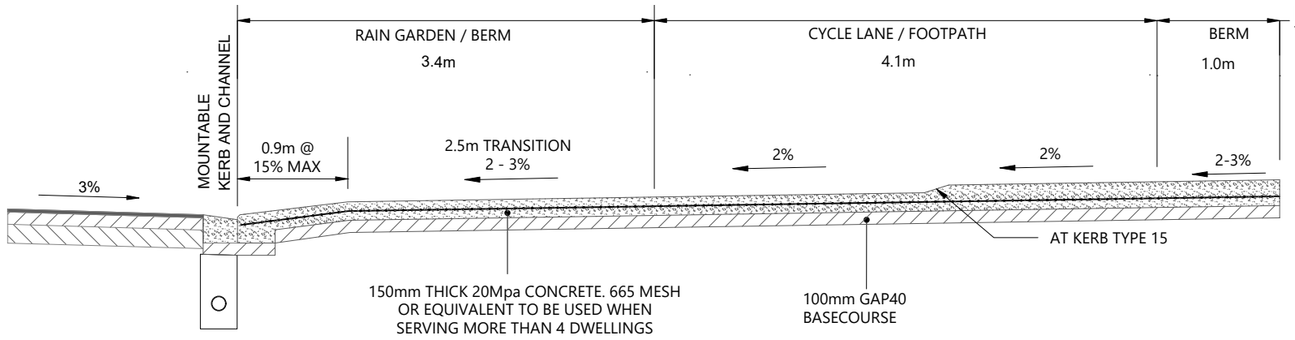
TYPICAL VEHICLE CROSSING LOCAL ROAD TYPE B DETAILS

STATUS	ISSUED FOR CONSENT	REV
SCALE	AS SHOWN	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-128-00-2071-RD	

WOODS Est.1970

Plot Date: 2:20:07 pm,3 December 2024, FATINA

File: C:\12DSYNERGY\DATA\WP-PBN-APP-01\P24-128 - MDL - FAST TRACK APPLICATION_21627\02 DRAWINGS\01 ENG\P24-128-00-2070-RD-VEHICLE CROSSING DETAILS.DWG

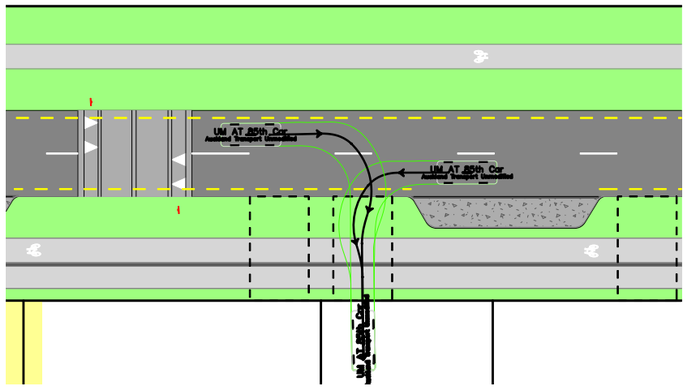


TYPICAL VEHICLE CROSSING TYPE B - COLLECTOR ROAD -SECTION

Scale: 1:50

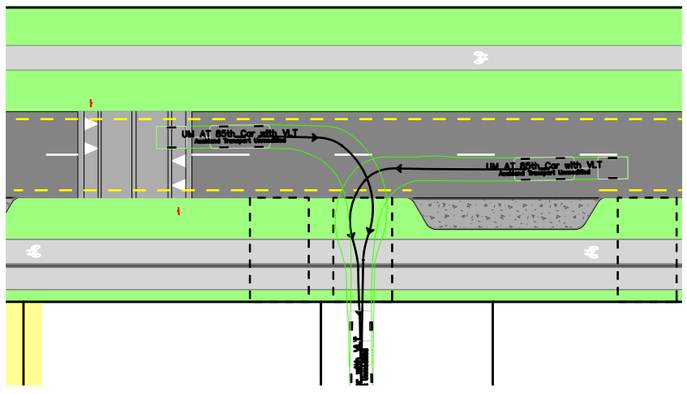
NOTES:

1. PAVEMENT THICKNESS AS SPECIFIED ON PLAN WITH MINIMUM CBR OF 3.
2. CONSTRUCT IN SAME MATERIAL AND FINISH AS SURROUNDING FOOTPATH
3. ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF LESS THAN 14m SHALL CONSTRUCT A TYPE A VEHICLE CROSSING.
4. ALL LOTS FRONTING ONTO LOCAL ROADS WITH A FRONT BOUNDARY WIDTH OF 14m OR GREATER SHALL CONSTRUCT EITHER A TYPE A VEHICLE CROSSING OR A TYPE B VEHICLE CROSSING.
5. ALL LOTS FRONTING ONTO ARTERIAL OR COLLECTOR ROADS WITH A FRONT BOUNDARY WIDTH OF LESS THAN 14m SHALL CONSTRUCT A TYPE A VEHICLE CROSSING.
6. ALL LOTS FRONTING ONTO ARTERIAL OR COLLECTOR ROADS WITH A FRONT BOUNDARY WIDTH OF 14m OR GREATER SHALL CONSTRUCT EITHER A TYPE A VEHICLE CROSSING OR A TYPE B VEHICLE CROSSING.
7. ALL CORNER LOTS SHALL CONSTRUCT A TYPE B VEHICLE CROSSING.
8. ALL JOAL VEHICLE CROSSINGS ARE TO BE CONSTRUCTED TO AUCKLAND TRANSPORT STANDARDS.



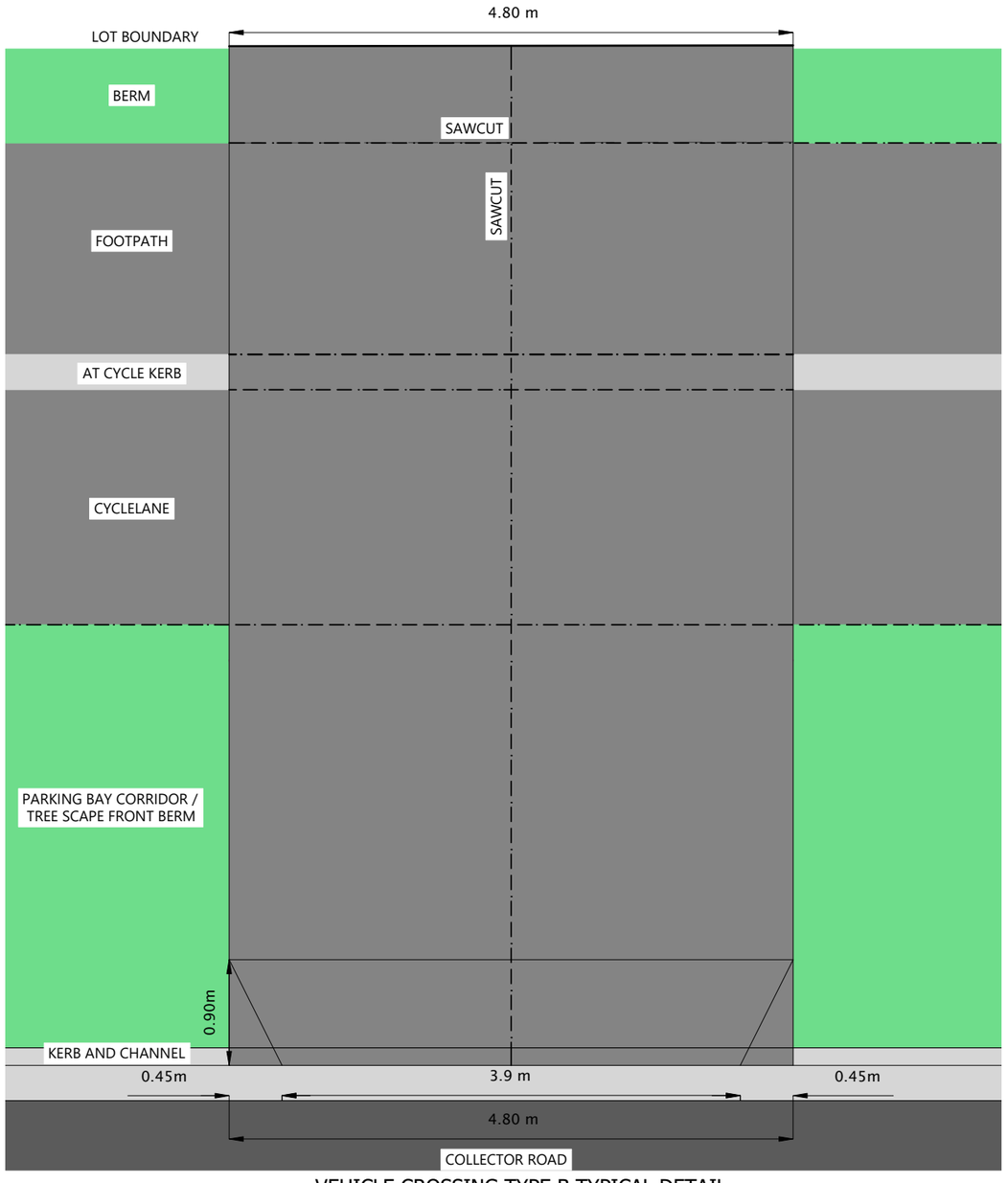
TYPICAL VEHICLE CROSSING - COLLECTOR ROAD TYPE B: CAR MOVEMENT

Scale: 1:500



TYPICAL VEHICLE CROSSING - COLLECTOR ROAD TYPE B: CAR AND TRAILER MOVEMENT

Scale: 1:500



VEHICLE CROSSING TYPE B TYPICAL DETAIL

Scale: 1:50

SCALEBAR (m)
0 5 10 25

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	AP	OCT 2024

SURVEYED	WOODS	SIDWELL ROAD WAINUI AUCKLAND
DESIGNED	AP	
DRAWN	AP	
CHECKED	AP	
APPROVED	JW	WOODS.CO.NZ

MILLDALE
Connecting Lifestyles

MILLDALE FAST TRACK STAGES 10 - 13

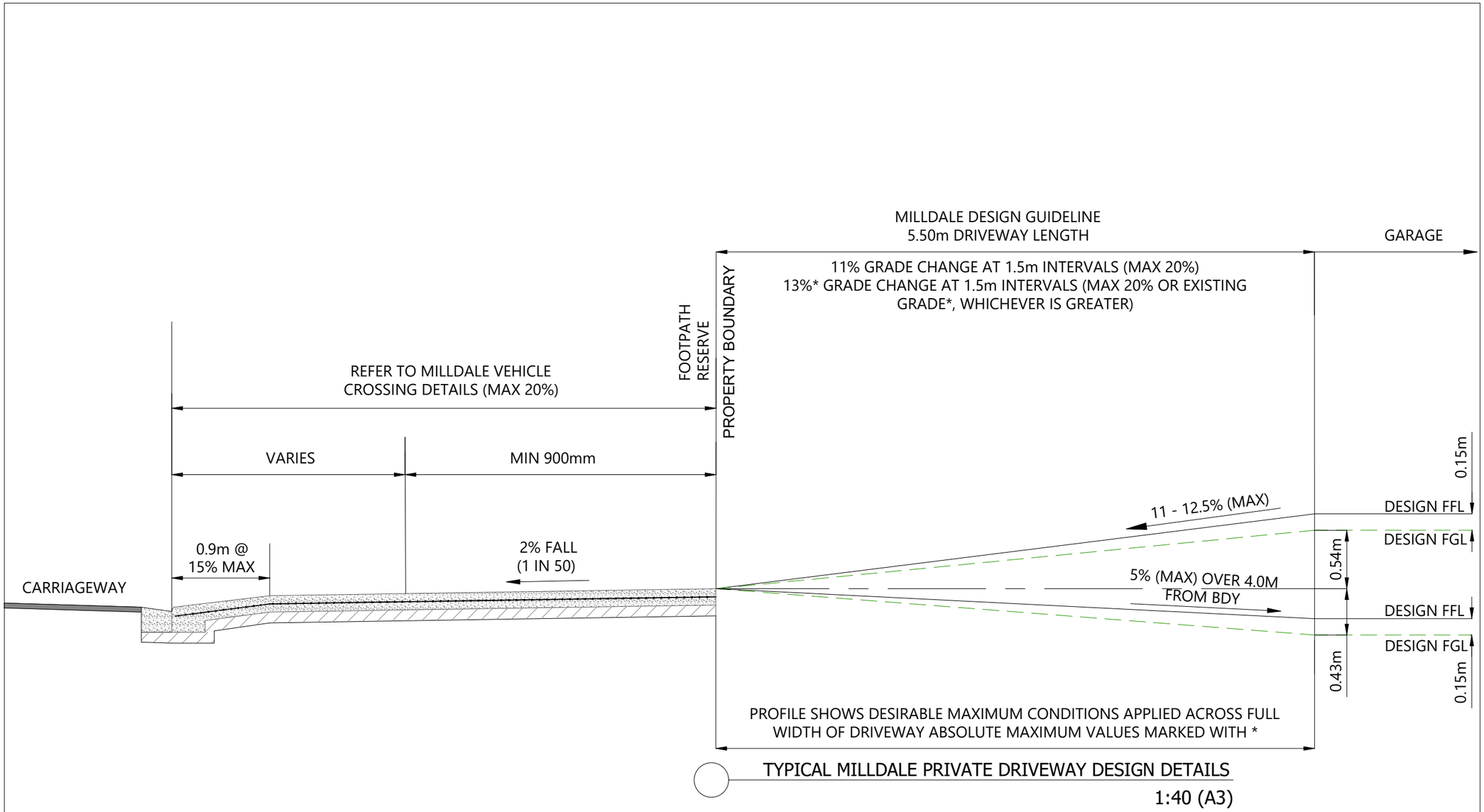
TYPICAL VEHICLE CROSSING COLLECTOR ROAD TYPE B DETAILS

STATUS	ISSUED FOR CONSENT	REV
SCALE	AS SHOWN	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-128-00-2072-RD	

WOODS Est.1970

Plot Date: 2:20:09 pm,3 December 2024, FATINA

File: C:\12DSYNERGY\DATA\WP-PEN-APP-01\P24-128 - MDL - FAST TRACK APPLICATION_21627\00 DRAWINGS\01 ENG\P24-128-00-2070-RD-VEHICLE CROSSING DETAILS.DWG



TYPICAL MILLDALE PRIVATE DRIVEWAY DESIGN DETAILS

1:40 (A3)

SCALEBAR (m) 0 0.4 0.8 2

SCALE | 1:40 @A3 | 1:20 @A1|

WOODS Est.1970

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	JW	DEC 2024

SURVEYED	WOODS	SIDWELL ROAD WAINUI AUCKLAND
DESIGNED	WOODS	
DRAWN	FA	
CHECKED	AP	
APPROVED	JW	WOODS.CO.NZ

MILLDALE
Connecting Lifestyles

MILLDALE FAST TRACK STAGES 10 - 13

TYPICAL PRIVATE DRIVEWAY DESIGN DETAILS

STATUS	ISSUED FOR CONSENT	REV
SCALE	1:40 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-128-00-2080-RD	

Plot Date: 4:16:46 pm,13 December 2024, FATINA

File: C:\12DSYNERGY\DATA\WP-PEN-APP-01\P24-128 - MDL - FAST TRACK APPLICATION_21627\02 DRAWINGS\01 ENG\P24-128-00-2080-PRIVATE DRIVEWAY DESIGN.DWG

Appendix D Detailed Modelling Results

AM-4500-Stage 10-13 07:15 - 08:15

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 10 - Intersection 1	East Left	3	0	0	A	6	A
	East Thru	146	0				
	South Left	85	2	6	A		
	South Right	15	6				
	West Right	156	2	2	A		
	West Thru	409	0				
Stage 10 - Intersection 2	East Left	6	0	0	A	1	A
	East Thru	95	0				
	South Left	4	0	1	A		
	South Right	15	1				
	West Right	2	0	0	A		
	West Thru	157	0				
Stage 10 - Intersection 3	East Left	6	2	2	A	2	A
	East Thru	100	0				
	South Left	1	2	2	A		
	South Right	13	1				
	West Right	1	0	0	A		
	West Thru	171	0				
Stage 10 - Intersection 4	East Left	38	2	2	A	5	A
	East Thru	80	0				
	South Left	25	4	5	A		
	South Right	169	5				
	West Right	12	3	3	A		
	West Thru	171	0				
Stage 10 - Intersection 5	North Right	15	3	3	A	5	A
	North Thru	34	1				
	South Left	2	5	5	A		
	South Thru	136	3				
	West Left	58	3	3	A		
	West Right	3	2				
Stage 10 - Intersection 6	East Right	3	5	5	A	5	A
	East Thru	14	0				
	North Left	7	1	1	A		
	North Right	0	0				
	West Left	2	0	0	A		
	West Thru	53	0				
Stage 10 - Intersection 7	East Right	4	0	0	A	3	A
	East Thru	10	0				
	North Left	16	2	2	A		
	North Right	1	0				
	West Left	3	3	3	A		
	West Thru	39	0				
Stage 10 - Intersection 8	East Left	1	14	9	A	4	A
	East Right	1	12				
	East Thru	4	8				
	East U-Turn	0	0				
	North Left	2	0	5	A		
	North Right	12	5				
	North Thru	22	6				
	North U-Turn	0	0				
	South Left	6	2	4	A		
	South Right	0	0				
	South Thru	65	4				
	South U-Turn	0	0				
	West Left	69	2	3	A		
	West Right	2	9				
	West Thru	1	3				
	West U-Turn	0	0				

AM-4500-Stage 10-13 07:15 - 08:15

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 10 - Intersection 9	East Left	5	1	1	A	4	A
	East Right	6	0				
	North Left	23	0	0	A		
	North Thru	31	0				
	South Right	20	4	4	A		
	South Thru	116	3				
Stage 10 - Intersection 10	East Left	2	3	5	A	5	A
	East Right	3	5				
	East Thru	1	0				
	North Left	1	0	0	A		
	North Right	4	0				
	North Thru	33	0				
	South Left	6	0	0	A		
	South Right	10	0				
	South Thru	116	0				
	West Left	1	0	2	A		
	West Right	12	2				
	West Thru	1	0				
Stage 10 - Intersection 11	East Left	1	8	8	A	8	A
	East Right	3	0				
	East Thru	0	0				
	North Left	2	0	0	A		
	North Right	4	0				
	North Thru	30	0				
	South Left	4	0	0	A		
	South Right	1	0				
	South Thru	120	0				
	West Left	6	5	5	A		
	West Right	2	1				
	West Thru	0	0				
Stage 10 - Intersection 12	East Left	22	0	0	A	5	A
	East Thru	213	0				
	South Left	29	5	5	A		
	South Right	105	4				
	West Right	15	4	4	A		
	West Thru	452	0				
Stage 10 - Intersection 13	East Left	3	2	2	A	2	A
	East Thru	228	0				
	South Left	6	0	1	A		
	South Right	12	1				
	West Right	3	1	1	A		
	West Thru	554	0				
Stage 11 - Intersection 1	East Left	5	0	0	A	3	A
	East Thru	238	0				
	South Left	22	2	2	A		
	South Right	8	2				
	West Right	7	3	3	A		
	West Thru	460	0				
Stage 11 - Intersection 2	East Right	4	1	1	A	1	A
	East Thru	7	0				
	North Left	4	1	1	A		
	North Right	7	0				
	West Left	1	0	0	A		
	West Thru	9	0				
Stage 11 - Intersection 3	East Right	1	1	1	A	1	A
	East Thru	13	0				
	North Left	4	0	1	A		
	North Right	8	1				
	West Left	2	0	0	A		
	West Thru	7	0				

AM-4500-Stage 10-13 07:15 - 08:15

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 11 - Intersection 4	East Right	1	0	0	A	1	A
	East Thru	20	0				
	North Left	2	0	1	A		
	North Right	8	1				
	West Left	3	0	0	A		
	West Thru	8	0				
Stage 11 - Intersection 5	East Right	1	0	0	A	0	A
	East Thru	27	0				
	North Left	2	0	0	A		
	North Right	7	0				
	West Left	3	0	0	A		
	West Thru	8	0				
Stage 11 - Intersection 6	East Right	1	1	1	A	1	A
	East Thru	33	0				
	North Left	1	0	1	A		
	North Right	11	1				
	West Left	5	0	0	A		
	West Thru	11	0				
Stage 11 - Intersection 7	East Right	1	5	5	A	9	A
	East Thru	43	0				
	North Left	0	0	2	A		
	North Right	47	2				
	West Left	17	9	9	A		
	West Thru	16	1				
Stage 11 - Intersection 8	East Left	86	12	12	B	12	B
	East Right	4	8				
	North Left	2	1	3	A		
	North Thru	604	3				
	South Right	30	10	10	A		
	South Thru	187	0				
Stage 11 - Intersection 9	East Left	90	15	10	B	5	A
	East Right	128	10				
	East Thru	47	4				
	East U-Turn	0	0				
	North Left	321	1	1	A		
	North Right	14	1				
	North Thru	406	1				
	North U-Turn	0	0				
	South Left	51	13	10	B		
	South Right	46	11				
	South Thru	86	9				
	South U-Turn	0	0				
	West Left	15	3	6	A		
	West Right	97	9				
	West Thru	93	5				
	West U-Turn	0	0				
Stage 11 - Intersection 10	East Left	4	0	0	A	5	A
	East Thru	255	0				
	South Left	10	5	5	A		
	South Right	7	2				
	West Right	4	5	5	A		
	West Thru	461	2				
Stage 12 - Intersection 1	East Left	1	1	6	A	6	A
	East Right	62	6				
	North Left	45	4	4	A		
	North Thru	60	0				
	South Right	0	0	0	A		
	South Thru	123	0				

AM-4500-Stage 10-13 07:15 - 08:15

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 12 - Intersection 2	North Right	19	4	4	A	4	A
	North Thru	26	2				
	South Left	0	0	0	A		
	South Thru	28	0				
	West Left	35	3	3	A		
	West Right	0	0				
Stage 12 - Intersection 3	North Right	14	2	2	A	4	A
	North Thru	12	0				
	South Left	0	0	0	A		
	South Thru	21	0				
	West Left	7	0	4	A		
	West Right	27	4				
Stage 12 - Intersection 4	North Right	3	0	0	A	3	A
	North Thru	43	0				
	South Left	23	3	3	A		
	South Thru	16	0				
	West Left	7	0	2	A		
	West Right	63	2				
Stage 12 - Intersection 5	East Left	0	0	0	A	0	A
	East Right	0	0				
	East Thru	0	0				
	North Left	0	0	0	A		
	North Right	0	0				
	North Thru	1	0				
	South Left	0	0	0	A		
	South Right	0	0				
	South Thru	1	0				
	West Left	0	0	0	A		
	West Right	0	0				
	West Thru	0	0				
Stage 12 - Intersection 6	East Left	0	0	9	A	10	A
	East Right	1	9				
	East Thru	1	9				
	North Left	5	0	0	A		
	North Right	0	0				
	North Thru	6	0				
	South Left	0	0	0	A		
	South Right	0	0				
	South Thru	11	0				
	West Left	0	0	10	A		
	West Right	0	0				
	West Thru	1	10				
Stage 13 - Intersection 1	East Left	9	2	3	A	3	A
	East Right	25	1				
	East Thru	81	3				
	East U-Turn	0	0				
	North Left	97	3	3	A		
	North Right	0	0				
	North Thru	8	0				
	North U-Turn	0	0				
	South Left	1	0	1	A		
	South Right	25	1				
	South Thru	6	1				
	South U-Turn	0	0				
	West Left	7	0	3	A		
	West Right	1	0				
	West Thru	218	3				
	West U-Turn	0	0				

AM-4500-Stage 10-13 07:15 - 08:15

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 13 - Intersection 2	East Left	0	0	0	A	0	A
	East Right	2	0				
	East Thru	0	0				
	North Left	4	0	0	A		
	North Right	6	0				
	North Thru	7	0				
	South Left	0	0	0	A		
	South Right	0	0				
	South Thru	16	0				
	West Left	15	0	0	A		
	West Right	0	0				
	West Thru	0	0				
Stage 13 - Intersection 3	East Left	0	0	0	A	0	A
	East Right	0	0				
	East Thru	0	0				
	East U-Turn	0	0				
	North Left	1	0	0	A		
	North Right	2	0				
	North Thru	5	0				
	North U-Turn	0	0				
	South Left	3	0	0	A		
	South Right	0	0				
	South Thru	5	0				
	South U-Turn	0	0				
	West Left	10	0	0	A		
	West Right	4	0				
	West Thru	0	0				
	West U-Turn	0	0				
Stage 13 - Intersection 4	North Right	2	0	0	A	0	A
	North Thru	31	0				
	South Left	7	0	0	A		
	South Thru	14	0				
	West Left	2	0	0	A		
	West Right	27	0				
Stage 13 - Intersection 5	East Right	20	3	4	A	3	A
	East Thru	51	5				
	East U-Turn	0	0				
	North Left	58	4	4	A		
	North Right	1	0				
	North U-Turn	0	0				
	West Left	0	0	3	A		
	West Thru	156	3				
	West U-Turn	0	0				
Stage 13 - Intersection 6	East Right	39	1	1	A	10	B
	East Thru	19	0				
	North Left	93	10	10	B		
	North Right	4	3				
	West Left	3	0	0	A		
	West Thru	40	0				
Stage 13 - Intersection 7	East Left	6	3	3	A	12	B
	East Right	0	0				
	East Thru	3	0				
	North Left	1	8	11	B		
	North Right	2	9				
	North Thru	11	11				
	South Left	8	10	12	B		
	South Right	14	12				
	South Thru	3	11				
	West Left	2	1	2	A		
	West Right	13	2				
	West Thru	2	0				

AM-4500-Stage 10-13 07:15 - 08:15

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 13 - Intersection 8	East Left	8	2	2	A	2	A
	East Right	17	0				
	North Left	17	0	0	A		
	North Thru	8	0				
	South Right	23	1	1	A		
	South Thru	14	0				
Stage 13 - Intersection 9	East Left	3	1	1	A	24	C
	East Right	8	1				
	East Thru	16	0				
	North Left	32	24	24	C		
	North Right	0	0				
	North Thru	1	9				
	South Left	9	9	12	B		
	South Right	9	12				
	South Thru	0	0				
	West Left	0	0	3	A		
	West Right	7	3				
	West Thru	32	1				
Stage 13 - Intersection 10	East Left	2	0	0	A	13	B
	East Right	0	0				
	East Thru	21	0				
	North Left	0	0	9	A		
	North Right	4	9				
	North Thru	1	9				
	South Left	3	9	13	B		
	South Right	7	13				
	South Thru	1	10				
	West Left	4	0	3	A		
	West Right	2	0				
	West Thru	68	3				
Stage 13 - Intersection 11	East Left	12	2	2	A	20	C
	East Right	14	2				
	East Thru	22	0				
	North Left	31	19	19	C		
	North Right	0	0				
	North Thru	0	0				
	South Left	2	9	20	C		
	South Right	34	20				
	South Thru	0	0				
	West Left	1	0	0	A		
	West Right	2	0				
	West Thru	72	0				
Stage 13 - Intersection 12	East Left	19	3	3	A	26	D
	East Right	0	0				
	East Thru	48	1				
	North Left	0	0	9	A		
	North Right	0	0				
	North Thru	1	9				
	South Left	0	0	26	D		
	South Right	51	26				
	South Thru	0	0				
	West Left	0	0	2	A		
	West Right	1	0				
	West Thru	135	2				

AM-4500-Stage 10-13 07:15 - 08:15

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 13 - Intersection 13	East Left	0	0	0	A	9	A
	East Right	0	0				
	East Thru	0	0				
	North Left	0	0	8	A		
	North Right	0	0				
	North Thru	1	8				
	South Left	0	0	9	A		
	South Right	0	0				
	South Thru	2	9				
	West Left	0	0	0	A		
	West Right	0	0				
	West Thru	0	0				
Stage 7 - Intersection 6	East Left	269	42	43	D	22	C
	East Right	59	40				
	East Thru	34	52				
	East U-Turn	0	0				
	North Left	72	21	23	C		
	North Right	22	21				
	North Thru	1287	23				
	North U-Turn	14	14				
	South Left	6	6	13	B		
	South Right	129	22				
	South Thru	317	10				
	South U-Turn	48	11				
	West Left	4	3	10	B		
	West Right	383	10				
	West Thru	41	15				
	West U-Turn	0	0				
Stage 7 - Intersection 12	East Left	101	6	6	A	4	A
	East Right	16	6				
	East Thru	10	5				
	East U-Turn	0	0				
	North Left	12	5	5	A		
	North Right	6	6				
	North Thru	367	5				
	North U-Turn	2	6				
	South Left	65	4	4	A		
	South Right	20	4				
	South Thru	112	4				
	South U-Turn	0	0				
	West Left	5	2	3	A		
	West Right	217	3				
	West Thru	4	3				
	West U-Turn	0	0				

PM-4500-Stage 10-13 16:00 - 17:00

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 10 - Intersection 1	East Left	13	0	0	A	19	C
	East Thru	893	0				
	South Left	144	19	19	C		
	South Right	6	15				
	West Right	84	17	17	C		
	West Thru	232	0				
Stage 10 - Intersection 2	East Left	20	2	2	A	2	A
	East Thru	149	0				
	South Left	1	0	1	A		
	South Right	14	1				
	West Right	3	1	1	A		
	West Thru	95	0				
Stage 10 - Intersection 3	East Left	19	3	3	A	3	A
	East Thru	167	0				
	South Left	2	2	2	A		
	South Right	7	2				
	West Right	2	0	0	A		
	West Thru	107	0				
Stage 10 - Intersection 4	East Left	184	5	5	A	8	A
	East Thru	172	0				
	South Left	13	3	6	A		
	South Right	82	6				
	West Right	30	8	8	A		
	West Thru	83	0				
Stage 10 - Intersection 5	North Right	59	6	6	A	6	A
	North Thru	156	3				
	South Left	4	6	6	A		
	South Thru	66	3				
	West Left	28	1	3	A		
	West Right	4	3				
Stage 10 - Intersection 6	East Right	10	7	7	A	7	A
	East Thru	53	0				
	North Left	4	1	1	A		
	North Right	0	0				
	West Left	3	0	0	A		
	West Thru	28	0				
Stage 10 - Intersection 7	East Right	15	0	0	A	4	A
	East Thru	38	0				
	North Left	8	4	4	A		
	North Right	2	1				
	West Left	7	4	4	A		
	West Thru	23	0				
Stage 10 - Intersection 8	East Left	1	10	11	B	6	A
	East Right	1	9				
	East Thru	3	12				
	East U-Turn	0	0				
	North Left	0	0	8	A		
	North Right	32	6				
	North Thru	93	9				
	North U-Turn	1	2				
	South Left	13	1	1	A		
	South Right	2	0				
	South Thru	42	1				
	South U-Turn	0	0				
	West Left	41	8	7	A		
	West Right	2	8				
	West Thru	3	3				
	West U-Turn	0	0				

PM-4500-Stage 10-13 16:00 - 17:00

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 10 - Intersection 9	East Left	20	4	4	A	8	A
	East Right	20	1				
	North Left	13	0	0	A		
	North Thru	106	0				
	South Right	17	8	8	A		
	South Thru	68	3				
Stage 10 - Intersection 10	East Left	11	5	11	B	11	B
	East Right	1	11				
	East Thru	1	0				
	North Left	1	0	0	A		
	North Right	4	0				
	North Thru	101	0				
	South Left	11	0	0	A		
	South Right	8	0				
	South Thru	64	0				
	West Left	2	0	3	A		
	West Right	14	3				
	West Thru	1	0				
Stage 10 - Intersection 11	East Left	1	4	4	A	4	A
	East Right	4	4				
	East Thru	0	0				
	North Left	6	0	0	A		
	North Right	5	0				
	North Thru	111	0				
	South Left	4	0	1	A		
	South Right	3	1				
	South Thru	53	0				
	West Left	3	4	4	A		
	West Right	4	2				
	West Thru	1	1				
Stage 10 - Intersection 12	East Left	109	1	1	A	18	C
	East Thru	923	1				
	South Left	26	17	17	C		
	South Right	37	15				
	West Right	23	18	18	C		
	West Thru	283	0				
Stage 10 - Intersection 13	East Left	10	3	3	A	9	A
	East Thru	1029	0				
	South Left	5	3	8	A		
	South Right	3	8				
	West Right	8	9	9	A		
	West Thru	312	0				
Stage 11 - Intersection 1	East Left	8	0	1	A	12	B
	East Thru	941	1				
	South Left	13	8	8	A		
	South Right	4	5				
	West Right	21	12	12	B		
	West Thru	302	0				
Stage 11 - Intersection 2	East Right	6	3	3	A	3	A
	East Thru	10	0				
	North Left	3	1	1	A		
	North Right	5	0				
	West Left	7	0	0	A		
	West Thru	14	0				
Stage 11 - Intersection 3	East Right	4	2	2	A	2	A
	East Thru	11	0				
	North Left	2	0	1	A		
	North Right	4	1				
	West Left	11	1	1	A		
	West Thru	18	0				

PM-4500-Stage 10-13 16:00 - 17:00

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 11 - Intersection 4	East Right	1	0	0	A	1	A
	East Thru	13	0				
	North Left	1	1	1	A		
	North Right	4	1				
	West Left	10	1	1	A		
	West Thru	28	0				
Stage 11 - Intersection 5	East Right	2	0	0	A	2	A
	East Thru	16	0				
	North Left	2	0	2	A		
	North Right	6	2				
	West Left	11	1	1	A		
	West Thru	36	0				
Stage 11 - Intersection 6	East Right	0	0	0	A	2	A
	East Thru	22	0				
	North Left	1	0	2	A		
	North Right	10	2				
	West Left	21	2	2	A		
	West Thru	46	0				
Stage 11 - Intersection 7	East Right	1	8	8	A	10	B
	East Thru	32	0				
	North Left	0	0	4	A		
	North Right	34	4				
	West Left	59	10	10	B		
	West Thru	68	3				
Stage 11 - Intersection 8	East Left	62	16	16	C	16	C
	East Right	4	7				
	North Left	3	1	3	A		
	North Thru	422	3				
	South Right	123	9	9	A		
	South Thru	411	0				
Stage 11 - Intersection 9	East Left	143	14	10	B	10	A
	East Right	726	10				
	East Thru	82	6				
	East U-Turn	0	0				
	North Left	213	1	1	A		
	North Right	16	2				
	North Thru	208	1				
	North U-Turn	0	0				
	South Left	149	19	18	B		
	South Right	70	23				
	South Thru	174	14				
	South U-Turn	0	0				
	West Left	23	5	13	B		
	West Right	64	20				
	West Thru	50	8				
	West U-Turn	0	0				
Stage 11 - Intersection 10	East Left	10	0	1	A	20	C
	East Thru	942	1				
	South Left	8	8	8	A		
	South Right	5	4				
	West Right	16	20	20	C		
	West Thru	320	2				
Stage 12 - Intersection 1	East Left	1	10	10	A	10	A
	East Right	40	5				
	North Left	98	4	4	A		
	North Thru	129	0				
	South Right	0	0	0	A		
	South Thru	86	0				

PM-4500-Stage 10-13 16:00 - 17:00

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 12 - Intersection 2	North Right	46	5	5	A	5	A
	North Thru	52	3				
	South Left	1	0	0	A		
	South Thru	18	0				
	West Left	22	2	2	A		
	West Right	0	0				
Stage 12 - Intersection 3	North Right	36	2	2	A	4	A
	North Thru	16	0				
	South Left	3	0	0	A		
	South Thru	14	0				
	West Left	5	0	4	A		
	West Right	14	4				
Stage 12 - Intersection 4	North Right	8	1	1	A	6	A
	North Thru	25	0				
	South Left	78	6	6	A		
	South Thru	22	0				
	West Left	2	0	4	A		
	West Right	52	4				
Stage 12 - Intersection 5	East Left	1	12	12	B	12	B
	East Right	0	0				
	East Thru	0	0				
	North Left	0	0	0	A		
	North Right	0	0				
	North Thru	1	0				
	South Left	0	0	0	A		
	South Right	0	0				
	South Thru	3	0				
	West Left	0	0	0	A		
	West Right	0	0				
	West Thru	0	0				
Stage 12 - Intersection 6	East Left	0	0	9	A	9	A
	East Right	0	0				
	East Thru	1	9				
	North Left	6	0	0	A		
	North Right	0	0				
	North Thru	9	0				
	South Left	0	0	0	A		
	South Right	0	0				
	South Thru	7	0				
	West Left	0	0	9	A		
	West Right	0	0				
	West Thru	1	9				
Stage 13 - Intersection 1	East Left	19	4	5	A	4	A
	East Right	91	3				
	East Thru	276	5				
	East U-Turn	0	0				
	North Left	71	5	5	A		
	North Right	0	0				
	North Thru	7	1				
	North U-Turn	0	0				
	South Left	1	1	5	A		
	South Right	17	6				
	South Thru	5	0				
	South U-Turn	0	0				
	West Left	5	0	4	A		
	West Right	1	1				
	West Thru	152	4				
	West U-Turn	0	0				

PM-4500-Stage 10-13 16:00 - 17:00

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 13 - Intersection 2	East Left	0	0	0	A	1	A
	East Right	1	0				
	East Thru	0	0				
	North Left	3	0	1	A		
	North Right	17	1				
	North Thru	6	0				
	South Left	0	0	0	A		
	South Right	0	0				
	South Thru	13	0				
	West Left	9	0	0	A		
	West Right	0	0				
	West Thru	0	0				
Stage 13 - Intersection 3	East Left	0	0	0	A	0	A
	East Right	1	0				
	East Thru	0	0				
	East U-Turn	0	0				
	North Left	0	0	0	A		
	North Right	1	0				
	North Thru	5	0				
	North U-Turn	0	0				
	South Left	13	0	0	A		
	South Right	0	0				
	South Thru	4	0				
	South U-Turn	0	0				
	West Left	8	1	1	A		
	West Right	2	0				
	West Thru	0	0				
	West U-Turn	0	0				
Stage 13 - Intersection 4	North Right	2	0	0	A	0	A
	North Thru	17	0				
	South Left	27	0	0	A		
	South Thru	46	0				
	West Left	2	0	0	A		
	West Right	14	0				
Stage 13 - Intersection 5	East Right	72	2	4	A	4	A
	East Thru	175	4				
	East U-Turn	0	0				
	North Left	30	4	4	A		
	North Right	0	0				
	North U-Turn	0	0				
	West Left	0	0	5	A		
	West Thru	94	5				
	West U-Turn	0	0				
Stage 13 - Intersection 6	East Right	103	1	1	A	12	B
	East Thru	49	0				
	North Left	70	12	12	B		
	North Right	4	2				
	West Left	2	0	0	A		
	West Thru	25	0				
Stage 13 - Intersection 7	East Left	20	5	5	A	15	C
	East Right	1	0				
	East Thru	3	0				
	North Left	1	11	14	B		
	North Right	2	12				
	North Thru	5	14				
	South Left	13	15	15	C		
	South Right	8	15				
	South Thru	10	15				
	West Left	3	0	5	A		
	West Right	10	5				
	West Thru	4	0				

PM-4500-Stage 10-13 16:00 - 17:00

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 13 - Intersection 8	East Left	27	2	2	A	4	A
	East Right	14	0				
	North Left	31	1	1	A		
	North Thru	8	0				
	South Right	16	4	4	A		
	South Thru	10	0				
Stage 13 - Intersection 9	East Left	10	1	2	A	18	C
	East Right	43	2				
	East Thru	34	0				
	North Left	19	18	18	C		
	North Right	1	8				
	North Thru	1	8				
	South Left	7	9	15	C		
	South Right	5	15				
	South Thru	1	8				
	West Left	0	0	5	A		
	West Right	11	5				
	West Thru	36	4				
Stage 13 - Intersection 10	East Left	11	2	2	A	15	B
	East Right	0	0				
	East Thru	80	0				
	North Left	1	9	12	B		
	North Right	5	9				
	North Thru	1	12				
	South Left	1	9	15	B		
	South Right	4	15				
	South Thru	0	0				
	West Left	8	0	1	A		
	West Right	4	1				
	West Thru	48	1				
Stage 13 - Intersection 11	East Left	37	7	7	A	30	D
	East Right	42	3				
	East Thru	89	0				
	North Left	23	20	20	C		
	North Right	0	0				
	North Thru	1	9				
	South Left	2	11	30	D		
	South Right	24	30				
	South Thru	1	10				
	West Left	6	2	2	A		
	West Right	2	0				
	West Thru	45	0				
Stage 13 - Intersection 12	East Left	65	4	4	A	27	D
	East Right	0	0				
	East Thru	168	2				
	North Left	0	0	8	A		
	North Right	0	0				
	North Thru	1	8				
	South Left	1	10	27	D		
	South Right	34	27				
	South Thru	1	9				
	West Left	0	0	2	A		
	West Right	0	0				
	West Thru	91	2				

PM-4500-Stage 10-13 16:00 - 17:00

Intersection	Appr & Turn	Flow	Mvmt Delay	App Delay	App LOS	Int Del	Int LOS
Stage 13 - Intersection 13	East Left	0	0	0	A	10	A
	East Right	0	0				
	East Thru	0	0				
	North Left	1	10	10	A		
	North Right	1	7				
	North Thru	1	7				
	South Left	0	0	9	A		
	South Right	0	0				
	South Thru	2	9				
	West Left	0	0	0	A		
	West Right	0	0				
	West Thru	0	0				
Stage 7 - Intersection 6	East Left	186	20	22	C	22	C
	East Right	131	25				
	East Thru	74	20				
	East U-Turn	0	0				
	North Left	227	28	24	C		
	North Right	64	23				
	North Thru	714	24				
	North U-Turn	119	13				
	South Left	14	12	21	C		
	South Right	533	33				
	South Thru	972	15				
	South U-Turn	40	15				
	West Left	7	13	27	C		
	West Right	153	23				
	West Thru	99	33				
	West U-Turn	0	0				
Stage 7 - Intersection 12	East Left	56	3	3	A	4	A
	East Right	15	3				
	East Thru	11	3				
	East U-Turn	0	0				
	North Left	43	5	5	A		
	North Right	5	5				
	North Thru	216	5				
	North U-Turn	1	6				
	South Left	241	4	5	A		
	South Right	62	5				
	South Thru	313	5				
	South U-Turn	0	0				
	West Left	4	3	4	A		
	West Right	147	4				
	West Thru	5	3				
	West U-Turn	0	0				

With every community, we redefine what's possible.

Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

Stantec New Zealand
Level 4
105 Carlton Gore Road
Newmarket, Auckland 1023
NEW ZEALAND
Mail to: PO Box 13052, Christchurch 8140
Stantec.com