Addendum Transport and Access Report

Parramatta Over and Adjacent Station Development

May 2024

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Contents

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Amendment Record

DATE	REVISION	AMENDMENT DESCRIPTION	AUTHOR
13/05/2024	A	Final	Danielle Bahra

Glossary

Term	Definition
ASD	Adjacent Station Development
CBD	Central business district
Concept and Stage 1 CSSI Approval	SSI-10038, approved 11 March 2021, including all major civil construction works between Westmead and The Bays, including station excavation and tunnelling, associated with the Sydney Metro West railway line
Concept SSDA	A concept development application as defined in Section 4.22 of the EP&A Act, as a development application that sets out concept proposals for the development of a site, and for which detailed proposals for the site or for separate parts of the site are to be the subject of a subsequent development application or applications.
CoPC	City of Parramatta Council
CSSI	Critical State Significant Infrastructure
DCP	Development Control Plan
DPHI	Department of Planning, Housing and Infrastructure
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979
GFA	Gross floor area
OSD	Over Station Development
PLR	Parramatta Light Rail
PDCP	City of Parramatta Development Control Plan
RFI	Request for Further Information
SEARs	Secretary's Environmental Assessment Requirements
SSDA	State Significant Development Application
SSI	State Significant Infrastructure
Stage 2 CSSI Approval	SSI-19238057, approved 24 August 2022, including major civil construction works between The Bays and Sydney CBD including

Term	Definition
	station excavation and tunnelling, associated with the Sydney Metro West railway line
Stage 3 CSSI Approval	SSI-22765520, approved 25 January 2023, including rail infrastructure, stations, precincts and operation of the Sydney Metro West line
Sydney Metro West	Construction and operation of a metro rail line and associated stations between Westmead and the Sydney CBD as described in Section 1.1
TfNSW	Transport for New South Wales
The site	The Parramatta Over and Adjacent Station Development site

Executive Summary

This addendum to the Transport and Access report supports a Concept State Significant Development Application (Concept SSDA) submitted to the Department of Planning and Environment (now Department of Planning, Housing and Infrastructure (DPHI)) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Sydney Metro is seeking to secure approval within the meaning of section 4.22 of the EP&A Act, for an over station development (OSD) and adjacent station development (ASD). The Concept SSDA is seeking consent for maximum building envelopes, proposed land uses, maximum building heights, maximum Gross Floor Area (GFA) and car parking. The proposed development comprises four buildings (Buildings A, B, C and D), consisting of three new commercial office buildings (Buildings A, C and D) and one residential accommodation building (Building B).

The Concept SSDA was lodged with the DPHI on 10 November 2022 and was placed on public exhibition for 28 days between 16 November 2022 and 13 December 2022. In total, advice was received from 11 State and local government agencies and 15 submissions were received from key stakeholders, community organisations and the community.

DPHI issued a letter to Sydney Metro on 16 December 2022 requesting a response to the issues raised during the public exhibition of the application. DPHI also issued a further Request for Further Information (RFI) on 6 February 2023 and the Submissions Report provides a response to these matters.

- Agency advice and submissions have been received in response to the EIS. This addendum report addresses the traffic and transport issues raised in agency advice and submissions from DPHI, City of Parramatta Council (CoPC), Transport for NSW (TfNSW), and Mirvac (75 George Street). Responses note design refinements have been undertaken to respond to agency advice, submissions and matters raised in the DPHI RFI.
- Future stages of design of the proposal would ensure that traffic and transport impacts to occupants are comprehensively assessed, which would be outlined in a future detailed SSDA. The detailed design would be consistent with the Parramatta Over and Adjacent Station Development Traffic and Transport Assessment including:
- Applicable criteria associated with the Stage 3 CSSI Conditions of Approval
- Stated mitigation measures.

1 Introduction

This addendum to the Transport and Access report supports a Concept State Significant Development Application (Concept SSDA) submitted to the Department of Planning, Housing and Infrastructure (DPHI) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Sydney Metro is seeking to secure approval within the meaning of section 4.22 of the EP&A Act, for an over station development (OSD) and adjacent station development (ASD). The Concept SSDA is seeking consent for maximum building envelopes, proposed land uses, maximum building heights, maximum Gross Floor Area (GFA) and car parking. The proposed development comprised four buildings (Buildings A, B, C and D), consisting of three new commercial office buildings (Buildings A, C and D) and one residential accommodation building (Building B).

Previously, traffic and transport impacts were assessed as part of the Transport and Access report, prepared to support the Concept SSDA.

The Concept SSDA was lodged with the DPHI on 10 November 2022 and was placed on public exhibition for 28 days between 16 November 2022 and 13 December 2022. In total, advice was received from 11 State and local government agencies and 15 submissions were received from key stakeholders, community organisations and the community.

DPHI issued a letter to Sydney Metro on 16 December 2022 requesting a response to the issues raised during the public exhibition of the application. DPHI also issued a further Request for Further Information (RFI) on 6 February 2023 and the Submissions Report provides a response to these matters.

Advice from NSW government agencies have been received in response to the Concept SSDA EIS. This addendum report addresses traffic and transport related issues raised in agency advice and submissions from DPHI, CoPC, TfNSW, and Mirvac (75 George Street).

This report responds to comments raised in agency advice and submissions received during the public exhibition of the Concept SSDA submitted to DPHI.

This report is broken down into the following chapters:

- Chapter 1 – introduces the project and this report
- Chapter 2 – outlines the agency advice received from DPHI
- Chapter 3 – outlines the agency advice received from CoPC
- Chapter 4 – outlines the agency advice received from TfNSW
- Chapter 5 – outlines the submissions received from Mirvac at 75 George Street

This report should be read in conjunction with the Parramatta Over and Adjacent Station Development Transport and Access Report (Appendix EE) submitted with the Concept SSDA which details the methodology and proposed mitigation measures. DPHI Submission

1 DPHI advice

1.1 Traffic and parking

DPHI Comment

Clarify whether pedestrian counts, which were collected in March 2021, factored-in any COVID-19 reduction, similar to the reduction factored into the vehicle traffic counts. A similar methodology should be used to ensure consistency.

Response

Pedestrian counts were collected in March 2021 on footpaths and at signalised intersections in the vicinity of the Parramatta Station precinct. Pedestrian patterns were impacted by the Parramatta Light Rail works. In addition, population and employment forecasts overestimate future growth and do not consider the impacts of COVID-19, such as reduction in migration and increased working from home.

Whilst the pedestrian surveys and numbers might have been affected by COVID-19, it is difficult to quantify and would have been difficult to develop a robust methodology to justify any increase or reduction in the pedestrian counts. The pedestrian counts remain a statement of fact at the time and have not been adjusted, unlike the vehicle traffic counts, where survey data was factored up 3% based on a comparative review of permanent count data from 2019 and 2021. The vehicle traffic counts are also considered to be a high growth scenario, as they do not consider the long-term impacts of COVID-19.

In addition, the proposed development at Parramatta Station includes a new civic link that will be aligned north-south over the station from Macquarie Street to George Street An east-west link located between Smith Street and Church Street will prioritise pedestrian movements through the precinct and around the metro station. Both additional elements will assist in improving future pedestrian flows.

DPHI Comment

Confirm the provision, timing, and allocation of:

i. Bicycle parking, including suitable access to bicycle parking areas

ii. Car-share and motorcycle parking

Response

Bicycle Parking

Bicycle parking will be provided in the basements serving the proposed development. The commercial facilities are accessed via lifts or bicycle stairways. The residential bicycle parking is accessed via a lift from the east-west laneway through the site.

The Parramatta DCP requires the following number of bicycle parking spaces:

- One bicycle space per two residential dwellings
- One bicycle space per 200m^2 of commercial and retail floor spaces.

Bicycle parking is to be in the form of Class 2 compounds (bicycle cages).

The number of bicycle facilities required for the proposed development are set out in Table 1-1. Note this is subject to change as land use quantities are refined.

Bicycle access and the location are to be confirmed as part of the Detailed SSDA.

Table 1-1 Required bicycle parking

Building	Use type	Required bicycle racks (no.)	Recommended bicycle racks (no.)
Building A	Commercial	370	380
	Retail	18	20
Building B	Residential	73	80
	Retail	6	10
Building C	Commercial	188	190
Building D	Commercial	286	290
	Retail	19	20

Car Share Parking

The proposed development has more than 50 residential units or 5,000m^2 of floor space and is within 800m of a railway station, and under Parramatta DCP is therefore required to provide at least one car share parking space. As the Parramatta DCP does not have any further specific guidance on number of car share parking spaces, the City of Sydney 2012 DCP guide and 2014 amendment[1] is used for reference, which gives the following rates in the Sydney CBD:

- 1 car share space per 50 residential car spaces
- 1 car share space per 30 commercial or retail car spaces.

A summary of the recommended number of car share spaces for each basement is provided in Table 1-2. The allocation and locations of the car share spaces are to be confirmed as the design develops.

Table 1-2 Recommended number of car share spaces for the proposed SSD development

Basement	Proposed parking spaces		Recommended car share spaces
	Commercial	Residential	Total
Northern	156	73	7
Southern	226	0	8

Motorcycle Parking

The Parramatta DCP specifies that separate parking for motorcycles should be provided, with a minimum area of one car parking space for every 50 car parking spaces provided.

The allocation and location of the motorcycle parking is to be confirmed for the proposed development as the design develops.

[1] City of Sydney 2012/2014, Sydney Development Control Plan 2012, and Attachment B Minor Policy and Housekeeping Amendments 2014

2 City of Parramatta Council advice

2.1 Traffic and Vehicular Access

CoPC Comment

Driveway from Smith Street

The estimated inbound + outbound in the AM and PM peak for the southern basement are 184. This number exceeds the TfNSW requirements for a Shared Zone which states that Shared Zones must have less than 100 vehicles per hour and less than 1,000 vehicles per day. It is further noted that the main pedestrian entrance for the Metro Station will be located within proximity to this driveway/shared zone meaning that there will be a significant volume of pedestrians. As such, the proposed vehicle entrance to the southern basement carpark is not considered safe due to the vehicle pedestrian conflict.

Recommendation 19

The location and type of vehicle entrance must be revised such that the conflict between high vehicle volumes and high pedestrian volumes is removed and separated.

Retaining the access restriction of Macquarie Lane in its current configuration of left-in left-out will force the traffic coming from the north to use Parkes Street and Station Street to access the site. Northbound queues in Station Street at Hassall Street extend back to Parkes Street during the peak periods, and traffic in both directions turning from Parkes Street into Station Street causes delays in Parkes Street. Council is currently considering a restriction on the right turn from Parkes Street into Station Street (northbound). Council has concerns about adding additional traffic to the right turn from Parkes Street onto Station Street and to northbound traffic on Station Street due to the lack of options for traffic entering the car park for the southern part of the Metro Station development.

Response

Sydney Metro has proposed several design refinements that respond to the Civic Link Design Guidelines, and Macquarie Lane is no longer a shared zone. The lane will have a cross section like that recommended in the design guidelines. A continuous footpath treatment is now proposed along Smith Street, at its crossing of Macquarie Lane. The continuous footpath treatment across Macquarie Lane satisfies the following criteria outlined in Technical Direction for Traffic, transport and safety practitioners TDT 2013/05:

- Forecast traffic movements in Macquarie Lane are low, peaking at 130-200vph, during the AM and PM peaks. It is functioning as a service lane for local development and there is no through traffic circulation. Although the forecast traffic movements are higher than what is typically recommended in the TDT (45 vehicles per hour), a continuous footpath is still the preferred treatment as it prioritises pedestrian movements and reduces the car-dominant appearance of this location.
- The northern side of Macquarie Lane is a major east-west pedestrian link between the metro station and the Smith Street bus interchange with 2036 AM Peak hour forecast flows up to 1800 pedestrians per hour. There are significant north-south pedestrian movements crossing Macquarie Lane at the Smith Street footpath crossing, up to 1400 pedestrians per hour, during the 2036 AM Peak hour.

- Whilst this facility maintains priority for service vehicle access, it signals to drivers they are entering a precinct with heavy pedestrian activity and physically slows traffic exiting and entering the precinct.
- Macquarie Lane is short, has a narrow 2-way roadway cross section (up to 7.0m width) and has a sharp 90-degree bend in its alignment. The road configuration encourages a low-speed environment. The proposed continuous footpath treatment is consistent with, and would complement, the traffic speed behaviour in this service lane.
- Give-way control signage would be provided in Macquarie Lane for traffic exiting onto Smith Street. Pedestrian warning signs would be provided on Smith Street for traffic making the left turn entry into Macquarie Lane.

CoPC Comment

Recommendation 20

It is recommended that an additional access be provided to the southern basement (e.g., either directly from Macquarie Street or the new Horwood Place) to facilitate access of the vehicles coming from the north to the southern basement. Delivery and service vehicle access must be maintained to 238-262 Church Street Parramatta.

Response

Sydney Metro has investigated opportunities for additional access points to the southern basement noting access is restricted from Macquarie Street by Parramatta Light Rail.

City of Parramatta Council has a long-term vision to provide another connection as part of the PDCP. This would provide an alternative access for Mirvac (75 George Street) at the north corner, but this cannot be determined by Sydney Metro.

There is also a future proposal for the United Lane connection between George Street and Macquarie Street providing a north-south one way link south, and back up north to George Street via Horwood Place. This would provide more opportunities for developments to the west. They could have access from George Street and enter a basement connection to United Lane or Horwood Place. This again cannot be determined by Sydney Metro.

Alternate access from United Lane into the southern basement is restricted by:

- vehicular swept path requirements
- the proposed location of the OSD lift cores

The investigation of additional access points to the southern basement could be investigated as part of the Detailed SSDA development process. Noting the relocation of the station loading dock from the southern basement to the eastern station building (from Macquarie Lane) may provide more flexibility for access to the southern basement to be further investigated.

Church Street ‘Eat Street’ which is a retail, food and beverage, and recreation area is located to the west of the proposed development site. This road will include a pedestrianised zone when Parramatta Light Rail is operational and will be one of the key desired pedestrian links around the precinct. Delivery and service vehicle access to 238-262 Church Street will be via the proposed United Lane connection between George Street and Macquarie Street.

Macquarie Street and Shared Zones

The proposed Shared Zone within the Civil Link between Macquarie Street and George Street and in any part of Macquarie Street as shown within Appendix E (Built Form and Urban Design Report) is not supported as the vehicle volumes will be too high to comply with TfNSW Policy and Guidelines which state that Shared Zones must have less than 100 vehicles per hour and less than 1,000 vehicles per day. It is noted that as per the PLR Stage 2 EIS submission, the volume of traffic they have shown to be carried on Macquarie Street in the morning peak hour was 476 vehicles and, in the afternoon peak hour, it was 542 vehicles. This high volume of traffic cannot be safely accommodated within a Shared Zone. It is noted that traffic volumes for Macquarie Street between Marsden Street and Horwood Place have not been provided as part of the Metro submission due to previous road closures as part of the PLR Stage 1 works.

CoPC Comment

Recommendation 21

Shared zone within Civic link between Macquarie Street and George Street not supported.

Response

The design refinements have responded to the Civic Link Design Guidelines, and the Civic Link between Macquarie Street and George Street is no longer a shared zone. Civic Link will be a green spine, creating a permanent landscape element in the centre of the public domain corridor that maximises space for planting and flexible community and cultural uses.

Civic Link will provide a safe environment for pedestrians and cyclists. The only vehicles expected on Civic Link are for event loading, Council waste collection and emergency vehicle. Access will be permitted via controlled entry points.

CoPC Comment

Recommendation 22

It is recommended that a Construction Pedestrian and Traffic Management Plan (CPTMP) report as part of the SSD process to demonstrate how the construction of the proposed development will be managed to ensure that the impact of the construction activities of the proposed development on the vehicular and pedestrian movements on the operation of the surrounding road network are minimised. The CPTMP report is to be assessed prior to the application determination.

Response

These comments are noted, and the Construction Pedestrian and Traffic Management Plan will be developed as part of the future Detailed SSDA(s).

3 Transport for NSW advice

Traffic Model

TfNSW comment

The report does not include evidence of any model calibration and validation to enable a critical assessment of the traffic impacts to Parramatta Light Rail. When validating the model, the Applicant should demonstrate that the model meets the requirements of TfNSW Traffic Modelling Guidelines.

Recommendation

The Applicant should submit details to TfNSW for acceptance, of the baseline conditions where they will be assessed to be satisfactorily validated for the peak time periods of the day, in accordance with the procedures set out in the models' reference publication. TfNSW requests that the model includes Parramatta Light Rail and that an electronic copy of the SIDRA modelling files for review and verification, to be provided as part of the 'Response to Submissions' (RtS).

Response

A SIDRA model calibration report is provided in Appendix A. Transport for NSW have reviewed models as part of the Stage 3 CSSI approval and have also been engaged as part of the process. Future consultation with TfNSW can take place as part of the Detailed SSDA(s) if required.

There are no traffic impacts to Parramatta Light Rail (PLR). The proposal does not change any traffic arrangements being implemented for the opening of the PLR or Sydney Metro Station.

Sydney Metro has demonstrated that the models have been calibrated and validated against SCATS data and timings. We have calibrated queue lengths and timings of signals to what was observed at the time. There is no calibration required on the turning volumes.

The SIDRA analysis includes Parramatta Light Rail traffic arrangements at George Street, Smith Street and Macquarie Street. During further design development, no traffic arrangements or turning movements have changed. The OSD and ASD traffic is incorporated into the cumulative impact of the traffic operation and the LOS is operating as C or better in the AM and PM peak.

The Base case SIDRA modelling files were provided as part of the Stage 3 CSSI approval. The forecasts analysis has recently been updated as part of the Stage 1 metro design and is summarised in the attached calibration report.

The updated baseline models were submitted to TfNSW on 21 March 2024.

3.1 Parramatta Light Rail

TfNSW comment

A construction pedestrian and traffic management plan is to be provided showing the proposed construction vehicle access routes, type of vehicles, frequency of vehicle movements etc for GRCLR's review and comment. Any construction vehicles associated with the proposed development must not park, access through or encroach into the PLR corridor without prior consultation with and approval by GRCLR. This applies to throughout the PLR construction, T&C and operations phases.

Like the comment above, any permanent vehicle access in the end state of the proposed development must not impact or jeopardise the safety, operations or

maintenance of the PLR services and activities. No parking, access through or encroachment into the PLR corridor by any vehicles (including private, commercial and maintenance etc) will be permitted without prior consultation with and approval by GRCLR. No vehicle access to be allowed along Church Street from south of Lennox Bridge to Macquarie Street in particular.

Recommendation

GRCLR's consultation and approval must be sought for any ROL applications related to this proposed development site including its construction stage and end state.

PLR track settlement monitoring would need to be conducted by the applicant to ensure that the PLR tracks would not be impacted because of the construction / demolition works associated with the proposed development.

No signalised pedestrian crossings shall be installed without prior consultation with and approval by GRCLR as the PLR operations, in particular the journey times, could be impacted by extra waiting times which have not been foreseen or factored in for the PLR.

There needs to be a "Solar Reflectivity Assessment" carried out for the proposed development to demonstrate that the visibility of the tram drivers in PLR trams running in both directions along the PLR alignment would not be impacted because of solar reflectivity / glares from the proposed development.

Response

These comments are noted, and the Construction Pedestrian and Traffic Management Plan will be developed as part of the future Detailed SSDA(s).

3.2 Green Travel Plan

TfNSW comment

TfNSW's Travel Demand Management (TDM) team have reviewed the Parramatta Over and Adjacent Station development Transport and Access Report prepared by Sydney METRO West (October 2022) and can provide the following comments.

Recommendation

Further, from the SEARS compliance Table (Table 1.1 Transport and Accessibility Impact Assessment report) asks for a Green Travel Plan (GTP) to be implemented:

"proposals to promote sustainable travel choices for employees, residents, guests and visitors, such as connections into existing walking and cycling networks, minimising car parking provision, encouraging car share and public transport, providing adequate bicycle parking and high-quality end-of-trip facilities, and implementing a Green Travel Plan."

TfNSW asks that a GTP is prepared and implemented for the Over and Adjacent Station Development.

Response

These comments are noted, and the Green Travel Plan will be developed as part of the future Detailed SSDA.

3.3 Car Parking

TfNSW comment

TfNSW would ask that the amount of car parking is reduced, and public transport and active transport modes are promoted over car driving – this is consistent with The

Future Transport Strategy (Future Transport (nsw.gov.au) in which Travel Demand Management (TDM) is one of TfNSW key actions. This is particularly the case given the proximity to rail, METRO, buses, future light rail, and ferry services, as well as active transport options.

Response

The proposed provision of parking has been detailed and referenced against the requirements of the Parramatta DCP 2011 and Parramatta LEP 2011.

The proposed maximum car parking provision of 451 spaces is substantially less than the 550 spaces permitted under the Parramatta LEP 2011 based on a GFA of 176,360m2.

The car parking provision will be reviewed as part of the future Detailed SSDA(s).

Public transport and active transport modes will be promoted over private vehicle use in the Green Travel Plan.

3.4 Bicycle Parking and End of Trip (EoT)

TfNSW comment

TfNSW appreciates the proposed parking for bicycles and End of Trip (EoT) facilities at Buildings A, B, C and D. TfNSW recommend that this bicycle parking and any EoT be monitored over time to ensure sufficient supply to encourage active transport both to/from the site, for employees, residents, and visitors. The bicycle parking should be located at the development site at convenient locations, be safe, secured and under cover. Some further guidance on bicycle parking and end of trip facilities can be found in the cycleway design toolkit.

Response

These comments are noted and will be considered as part of the future Detailed SSDA(s). Monitoring of bicycle parking and EoT facilities will be considered in the Green Travel Plan.

3.5 Travel Access Guide

TfNSW comment

TfNSW asks that a Travel Access Guide (TAG) be developed and should be included as an appendix in the GTP. The TAG should include separate route maps of all modes of transport; buses (private and public), trains, light rail (when it comes on stream), walking, as well as times for these public transport options.

Recommendation

The GTP should be submitted to TfNSW for review prior to occupation.

Response

These comments are noted, and the TAG will be included in the GTP being developed as part of the future Detailed SSDA(s).

3.6 Construction Pedestrian and Traffic Management Plan (CPTMP)

TfNSW comment

To mitigate any construction impacts to the surrounding classified road network and multiple active development sites, including the State Significant Infrastructure (SSI) projects of Sydney Metro, TfNSW recommends that the Applicant is conditioned to prepare a Construction Pedestrian and Traffic Management Plan (CPTMP).

Recommendation

No construction zone would be allowed in Macquarie Street and nor site vehicular access including construction vehicles to/from Macquarie Street.

The Applicant is conditioned to prepare a Construction Pedestrian and Traffic Management Plan (CPTMP) in consultation with TfNSW.

Response

These comments are noted and the CPTMP will be as part of the future Detailed SSDA(s) in consultation with TfNSW.

4 Mirvac (75 George Street, Parramatta) Submission

Mirvac Comment

Mirvac submits that the Sydney Metro proposal or conditions should be imposed on any approval for the project, permitting Macquarie Lane to be used for vehicular access to 75 George Street as part of the redevelopment of 75 George Street.

Response

Access off Macquarie Lane would be a poor outcome for precinct accessibility as all Mirvac servicing movements would have to cross a major east-west pedestrian corridor along the northern side of Macquarie Lane. This is part of an east-west pedestrian corridor linking Smith Street and Church Street and which connects the Smith Street bus interchange with Sydney Metro station and the north-south Civic Link corridor. The existing Mirvac access off Smith Street has been maintained as part of the Smith Street bus interchange design.

Appendix A SIDRA Model Calibration Report

MOTT MACDONALD

Project:	Sydney Metro West - Parramatta Over and Adjacent Station Development		
Our reference:	Addendum to SMWSTEDS-SMD-PTA-SN600-TP-RPT-044002	**Your reference:**	Addendum to SMWSTEDS-SMD-PTA-SN600-TP-RPT-044002
Prepared by:	Gary See	**Date:**	02/02/2024
Approved by:	Matthew Stephens	**Checked by:**	Matthew Stephens
Subject:	SIDRA Model Calibration Report		

1 Modelling Methodology

1.1 Background

The Parramatta Station is situated in the central city bound by Macquarie Street, Smith Street, George Street and Church Street. The station location is illustrated in Figure 1.1 below.

The project area is part of the Sydney Metro West which includes a new metro station in the city of Parramatta. The station ISD (integrated Station development) includes commercial, retail, and residential space.

Figure 1.1: The proposed Parramatta Metro Station with its surrounding network.

1.2 Project Objective

The transport model was carried out to assess the impacts of the proposed traffic (vehicular and pedestrian) generated by the Metro station and the station developments. The future model was used to explore the optimum options minimising the delay on the surrounding network.

1.3 Scope Of Work

The scope of traffic modelling includes:

- Impact assessment of the traffic generated from the development and metro station.
- Performance of Parramatta Light Rail

1.4 Stakeholders

This memo is aimed at reporting the analysis to Transport of New South Wales (tfNSW)

1.5 Report Outline

The memo is broken down into chapters as the following:

- Section 2 with the model data inputs and assumptions.
- Section 3: The calibration process on the Base model and the Sidra outputs in comparison with the observed data.
- In Section 4, the memo includes the impact assessment of the future scenarios in 2036 with Metro and its station developments. The future model is based on the calibrated model in Section 3

1.6 Assessment Years and Periods

The base model is built against the current traffic operation in March 2021. The future model includes the Parramatta Station, the station developments, and the Parramatta Light Rail (PLR) in 2036. The study periods are AM peak (8-9 am) and PM Peak (5-6 pm)

2 Input data

2.1 Traffic Surveys

- A traffic survey was conducted on the 16th of March 2021 which included the turning movement of each vehicle class.
- The vehicle classes are cyclists, light and heavy vehicles, and buses.
- Pedestrians were also included on each approach.
- A queue length survey was conducted for model calibration.
- Nine intersections were surveyed surrounding the proposed Parramatta Station (Table 2.1).

The traffic count can be found in Appendix A.1

Table 2.1: intersection survey

Street 1	Street 2
George Street	Marsden Street
George Street	Church Street
George Street	Horwood Place
George Street	Smith Street
Smith Street	Macquarie Lane
Macquarie Street	Marsden Street
Macquarie Street	Horwood Place
Macquarie Street	Smith Street

2.2 Traffic Inputs and Assumptions

2.2.1 COVID-19 uplift

A COVID-19 uplift factor was also applied to traffic surveys to account for the reduced traffic volume, 3.0% and 2.6%, respectively for AM and PM Peaks. The factors were based on a review of permanent count site data comparing March 2019 and March 2021. The restricted movements started from July 2020 to September 2021 when many areas in NSW came out of lockdowns[1]. It was therefore affected the traffic count carried out in March 2021.

2.2.2 Background Traffic Growth

The 2021 to 2036 growth rate factor for background traffic movements in the Parramatta Station precinct is 1.18. This growth factor was based on PTPM forecasts traffic growth at seven Parramatta CBD sample sites on the PTPM model network, including: 1) Great Western highway, 2) Church Street, 3) Pitt Street, 4) Parkes Street. 5) Macarthur St, 6) O'Connell Street and 7) Smith Street.

The growth factor was applied to 2021 traffic survey flows, after any COVID-19 related adjustments, to estimate future year 2036 traffic flows with and without SMW.

The traffic growth factor in the Parramatta Station precinct assumes Metro is operational. The growth factor was applied uniformly across traffic flows through the station precinct.

These forecasts are considered a 'high' scenario, as it does not consider long-term impacts of COVID-19 such as reduced population growth, increased working from home, and on-going changes in transport preferences.

2.2.3 Background Pedestrian Growth

The 2021 to 2036 growth rate factor for background pedestrian movements in the Parramatta Station precinct is 1.34. This pedestrian growth factor was derived from a comparison of population and employment forecasts of travel zones within 800m of the station. This approximates a 15-minute walk catchment.

The population and employment data comes from official NSW projections, TZP19, available on OpenData. The analysis considers the sum of population and employment, to calculate these rates, as they both drive background pedestrian demand.

[1] Public Health (COVID-19 Restrictions on Gathering and Movement) Order (No 4) 2020

The growth rates were applied uniformly to the existing precinct flows.

Considering directionality would introduce complexity inappropriate to the coarse resolution of the source data (both the counts and the projection travel zones).

The pedestrian growth factors are considered a 'high' scenario, as they do not consider long-term impacts of COVID-19 such as reduced population growth and increased working from home.

2.2.4 Metro pedestrian Impacts

In addition to background pedestrian growth, Metro related pedestrian flows were overlayed on the pedestrian network. The Metro station is forecast to generate 5,210 entry movements and 3,170 exit movements during the 2036 AM Peak hour.

These forecasts have been developed by the Sydney Metro Customer and Product team for the purpose of assessing the station designs. They were sourced from the Enhanced Train Capacity Model (ETCM) outputs for run R20305 (this is the "project case" model run for 2036, for a 9-station Metro West line with land use uplift for all 9 stations).

The PTPM (Run 20305, Nov 2020) informed the expected mode share for entries and exits at each station, including bus, ferry, and light rail interchange, and walking trips to land uses. Trips to and from bus, ferry and light rail were assigned to individual transit stops with station-specific assumptions.

Walk trips were assigned to approach cordons at the edge of the precinct, based on detailed PTPM Run 20305 outputs showing the origin/destination of walk trips, at the project zone level. The approach cordon assignment for walking trips was undertaken in GIS, manually assigned zones to approaches considering shortest path and amenity of potential passengers.

The station forecasts do not account for COVID-19 and its potential long-term impacts. These may include some continuation of remote working, changes in travel mode and timing preferences, and shifts in residential location choice.

2.3 Traffic Signals

The signal data of the following intersections (Table 2.2) were requested from the Transport of New South Wales. This includes.

- The phase data such as Late Start, amber and red time.
- SCATS Graphic with the latest layout, loop location and phase sequence (Appendix A.2)
- SCATS History that contains the phases operated on the day of surveying with the respective phase time, pedestrian Walk and called frequency. (Appendix A.3)
- Traffic Control Signal (TCS) plans with the information of the signal logic. (Appendix A.4)

Table 2.2: Traffic Control Signal plans and version used in the Base Model.

Site ID	Street 1	Street 2	Version
1093	George Street	Marsden Street	XA
0109	George Street	Church Street	Not received. Configuration based on SCATS Graphic
1101	George Street	Smith Street	1B
1095	Macquarie Street	Marsden Street	1M
1102	Macquarie Street	Smith Street	1O

2.4 Modelling Platform

Sidra Intersection (version 9.0) was used to model the network to analyse the performance of the closely spaced intersections. Some Sidra Model parameters were adjusted according to Traffic Modelling Guidelines by the Transport of New South Wales

- The level of Service Method Delay (LOS) was set to RTA NSW and the target was set to “LOS C”.
- Passenger car units were adjusted according to Table 2.3 below.

Table 2.3: Passenger Car Units

Vehicle Type	PCU factor
Passenger Car	1.0
Light commercial vehicles (LCV)	1.0
Bus	2.0

3 Base Year Model

3.1 Existing condition analysis

Figure 3.1 shows the Sidra network carried out the assess the performance of the base network in March 2021. Part of the network was closed for PLR construction thus the model has been adjusted to reflect the actual layout and movements operated on the street. This includes Church Street / Macquarie Street that was not modelled in the base scenario. There was no major congestion during the traffic survey.

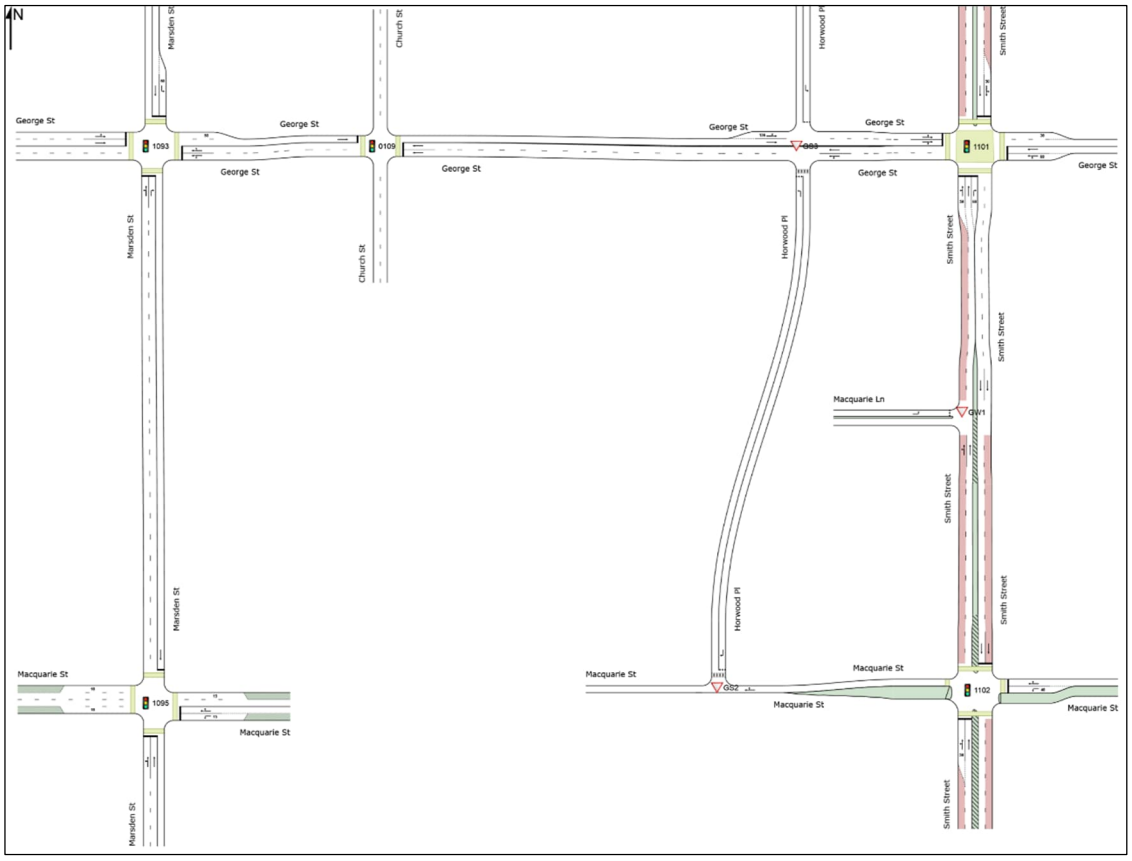


Figure 3.1: The base model network analysed in Sidra.

3.2 Calibration / Validation Targets and Assumptions

SIDRA model has been calibrated against the follow criteria:

- The observed queue length data surveyed on 16th of March 2021
- Average modelled cycle time for each 1-hour period to be within 10% of observed SCATS cycle time for the same period.
- Total green time over each 1 hour to be within 10% of observed SCATS equivalent for each phase.

Traffic management was in placed during the traffic survey which potentially affects the driving behaviour. All the calibration at these intersections didn't bring forward into the future scenario.

The kerbside bus lane along Smith Street is mostly used for bus stops which means all buses will travel on lane 2 unless into kerbside lane to pick up / drop off passengers. Hence the kerbside lane only can be used by a user-defined class "stop bus" with 1 veh/hr to simulate the blockage.

3.3 Model Calibration and Validation

This section summarises the comparison between the observed and modelled data (signal phasing and queue length). The results show that the modelled and observed data are reasonably close and they meet the target calibration requirement (Section 3.2). All the signals were modelled with a 96-second cycle, consistent with the operation of collected data. Sidra was allowed to adjust the phase split with the traffic demand. This way validation can be made when compared with the SCATS History.

3.3.1 George Street / Marsden Street

The phase split and queue length data were mostly similar between the modelled and SCATS data. Calibrations were made with the following assumptions.

- AM / PM peaks – the signal coordination arrival time on the north approach is set to Type 5 (Highly Favourable) assuming good coordination from Marsden Street / Philip Street
- AM peak - the signal coordination arrival time on the north approach is set to Type 2 (Unfavourable) with high traffic volume arriving during the red from Macquarie Street.

Table 3.1: George Street / Marsden Street Signal Data Comparison

Phase	AM Peak					PM Peak				
	SCATS		Modelled		<10%	SCATS		Modelled		<10%
A	44s	46%	46s	48%	Yes	54s	57%	50s	52%	Yes
B	24s	25%	28s	29%	Yes	16s	16%	22s	23%	Yes
C	28s	29%	22s	23%	Yes	26s	28%	24s	25%	Yes
Total	**96s**	**100%**	**96s**	**100%**	**Yes**	**96s**	**100%**	**96s**	**100%**	**Yes**

Table 3.2: George Street / Marsden Street Queue Length Comparison (Vehicles)

Approach	AM Peak		PM Peak	
	Observed	Modelled	Observed	Modelled
Marsden Street (south)	17	17	9	7
George Street (east)	6	8	11	8
Marsden Street (north)	10	11	16	16
George Street (west)	13	11	6	6
Intersection	**17**	**17**	**16**	**16**

3.3.2 George Street / Church Street

Church Street was closed for PLR construction during the observation. With the lack of traffic out of the north and south approaches, the B and C phases were governed by the pedestrian walk and clearance time in the base model. Calibrations were made to adjust the queue length in the model. The results are very close, as shown in Table 3.3 and Table 3.4. Calibration of the intersection as below:

- AM peak – the signal coordination on the west approach, the arrival type changed to Type 4 (Favourable) for the George Street coordination in the eastbound direction.
- On the east approach, the arrival type changed to Type 2 to reflect inefficiency.

Table 3.3 George Street / Church Street Signal Data Comparison

Phase	AM Peak					PM Peak				
	SCATS		Modelled		<10%	SCATS		Modelled		<10%
A	58	60%	58	60%	Yes	58	61%	54	56%	Yes
B	20	20%	19	20%	Yes	20	20%	21	22%	Yes
C	19	19%	19	20%	Yes	18	19%	21	22%	Yes
Total	**96**	**100%**	**96**	**100%**	**Yes**	**96**	**100%**	**96**	**100%**	**Yes**

Table 3.4: George Street / Church Street Queue Length Comparison (Vehicles)

Approach	AM Peak		PM Peak	
	Observed	Modelled	Observed	Modelled
Church Street (south)	Closed for construction			
George Street (east)	5	3	11	7
Church Street (north)	Closed for construction			
George Street (west)	11	9	11	9
Intersection	**11**	**9**	**11**	**9**

3.3.3 George Street / Harwood Place

The model shows no queue at the intersection. The surveyors likely considered a queue when a vehicle stopped briefly to check for an acceptable gap the side streets are controlled by a Stop sign. The difference was negligible.

Table 3.5: George Street / Harwood Place Queue Length Comparison (vehicles)

Approach	AM Peak		PM Peak	
	Observed	Modelled	Observed	Modelled
Harwood Place (south)	2	0	3	0
George Street (east)	0	0	0	0
Harwood Place (north)	2	0	1	0
George Street (west)	0	0	0	0
Intersection	**2**	**0**	**3**	**0**

3.3.4 George Street / Smith Street

Table 3.6 and Table 3.7 shows the George Street / Smith Street phase split outputs that were very close to SCATS data. The queue length on the AM peak was very close but PM peaks were still slightly different on the northern and eastern approach. Settings have been made to calibrate as close as possible:

- AM peak – the signal coordination on the northern approach, the arrival type changed to Type 6 (Exceptional Favourable) assuming good coordination from Smith Street / Philip Street.
- The coordination was set on Smith Street in the southbound direction.
- Kerbside lane utilisation on the west approach (George Street) was changed to 60% and 70% respectively for AM and PM peaks, calibrated with lane-by-lane queue length collected on the approach.

Table 3.6: George Street / Smith Street Signal Data Comparison

Phase	AM Peak					PM Peak				
	SCATS		Modelled		<10%	SCATS		Modelled		<10%
A	27s	27%	26s	27%	Yes	24s	25%	20s	21%	Yes
B	13s	13%	12s	13%	Yes	12s	13%	18s	19%	Yes
C	35s	36%	30s	31%	Yes	34s	35%	30s	31%	Yes
D	23s	24%	28s	29%	Yes	26s	27%	28s	29%	Yes
Total	**98s**	**100%**	**96s**	**100%**	**Yes**	**96s**	**100%**	**96s**	**100%**	**Yes**

Table 3.7: George Street / Smith Street Queue Length Comparison (vehicles)

Approach	AM Peak		PM Peak	
	Observed	Modelled	Observed	Modelled
Smith Street (south)	6	4	9	8
George Street (east)	7	5	10	7
Smith Street (north)	10	10	13	9
George Street (west)	9	10	8	8
Intersection	**10**	**10**	**13**	**9**

3.3.5 Smith Street / Macquarie Lane

No queue was estimated from the model based on the intersection demand. Especially in the PM peak, there were six vehicles recorded on the north and west approaches. Looking into the queue length there was a spike in queue length around 5 pm but in general, the Macquarie Lane queue is between one to two vehicles. There was potentially some localised blockage between the intersection during the data collection.

Table 3.8: Smith Street / Macquarie Lane Queue Length Comparison (vehicles)

Approach	AM Peak		PM Peak	
	Observed	Modelled	Observed	Modelled
Smith Street (south)	1	0	1	0
Smith Street (north)	2	0	6	0
Macquarie Lane (west)	1	0	6	0
Intersection	**2**	**0**	**6**	**0**

3.3.6 Smith Street / Macquarie Street

Similar to Church Street / George Street, Smith Street / Macquarie Street was under traffic management where lanes were closed for PLR construction. The intersection layout (Figure 3.2) and phasing were

modified to represent the operation as closely as possible. Pedestrians' clearance timers were retained even though the crossing time on the live lane was shorter. The Walk Time was 12 seconds as recorded in Traffic History. The logic in the controller was assumed unchanged. The number of phases were reduced to match the SCATS History.

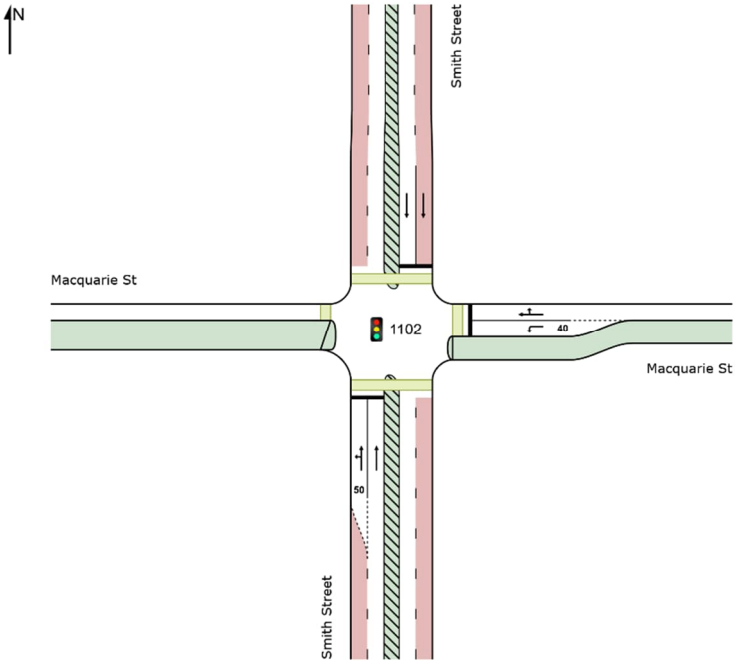


Figure 3.2: Macquarie Street / Smith Street temporary Layout for the Base Case.

The phase split outputs were very close. The queue between the modelled and observed are closed for the AM peak but the northern queue modelled is half of the observed value. It is assumed that the discrepancy was caused by the temporary arrangement of the intersection for PLR construction. No calibration was made as the layout will be changed in the future scenarios.

Table 3.9: Smith Street / Macquarie Street Signal Data Comparison

Phase	AM Peak					PM Peak				
	SCATS		Modelled		<10%	SCATS		Modelled		<10%
A	53s	56%	52s	54%	Yes	62s	66%	58s	64%	Yes
B	42s	44%	44s	46%	Yes	32s	34%	38s	36%	Yes
Total	95s	100%	96s	100%	**Yes**	94s	100%	96s	100%	**Yes**

Table 3.10: Smith Street / Macquarie Street Queue Length Comparison (vehicles)

Approach	AM Peak		PM Peak	
	Observed	Modelled	Observed	Modelled
Smith Street (south)	7	7	7	6
Macquarie Street (east)	3	4	5	4
Smith Street (north)	3	4	15	7
Intersection	**7**	**7**	**15**	**7**

3.3.7 Macquarie Street / Harwood Place

There no queue was estimated at Macquarie Street / Harwood place from the model. This was consistent with the data recorded.

Table 3.11: Macquarie Street / Harwood Place Queue Length Comparison (vehicles)

Approach	AM Peak		PM Peak	
	Observed	Modelled	Observed	Modelled
Macquarie Street (south)	0	0	0	0
Macquarie Street (east)	0	0	0	0
Harwood Place (north)	0	0	0	0
Intersection	**0**	**0**	**0**	**0**

3.3.8 Marsden Street / Macquarie Street

The model outputs are very close to the observed data as in Table 3.12 and Table 3.13. The PM peak phasing was higher in the B phase but still within the tolerance (<10%).

The following data extracted from SCATS History

- Pedestrian Walk = 8 seconds
- Signal Group 3 Late Start = 6 seconds

Calibration was made on the northern approach to match the observed queue for AM and PM peak - 70% was assumed arrived during Green in the signal coordination setting.

Table 3.12: Marsden Street / Macquarie Street Signal Data Comparison

Phase	AM Peak					PM Peak				
	SCATS		Modelled		<10%	SCATS		Modelled		<10%
A	65	69%	68	71%	Yes	74	80%	68	71%	Yes
B	29	31%	28	29%	Yes	19	20%	28	29%	Yes
Total	**94**	**100%**	**96**	**100%**	**Yes**	**93**	**100%**	**96**	**100%**	**Yes**

Table 3.13: Marsden Street / Macquarie Street Queue Length Comparison (vehicles)

Approach	AM Peak		PM Peak	
	Observed	Modelled	Observed	Modelled
Marsden Street (south)	12	12	12	11
Macquarie Street (east)	0	0	0	0
Marsden Street (north)	8	9	20	19
Macquarie Street (west)	na	na	na	na
Intersection	**12**	**12**	**20**	**19**

3.4 Base Model Outputs

The base model was calibrated, and the output comparison satisfies the modelling validation target criteria as required in Roads and Maritime modelling guidelines. It is also adjusted with uplifted demand to account for the COVID-19 movement restrictions, as described in Section 2.2.

The network performance around the proposed station is shown in Table 3.14. The summary table indicates no congestion on the network with Level of Service C or better for the AM and PM peaks.

Table 3.14: Existing intersection performance – Parramatta Station (March 2021)

	AM peak		PM peak	
Intersection	**Average delay**	**LOS**	**Average delay**	**LOS**
George Street/Marsden Street	23	B	14	A
George Street/ Church Street	12	A	17	B
George Street/Horwood Place*	8	A	9	A
George Street/Smith Street	31	C	37	C
Smith Street/Macquarie Lane*	4	A	4	A
Macquarie Street/Marsden Street	10	A	11	A
Macquarie Street/Horwood Place*	5	A	5	A
Macquarie Street/Smith Street	13	A	15	B

* Worst Movement LoS

4 Option Testing

4.1 Scenario Testing

This section outlines the traffic impact assessment of the future scenario that includes:

- Network changes with the implementation of ISD and Parramatta Metro Station
- Future year peak hours analysis 2036
- Parramatta Light Rail along Church Street and Macquarie Street

4.2 Future Model Assumptions

4.2.1 Traffic Demand and Growth

The traffic growth factors outlined in Section 2.2 were applied to the 2036 forecasts models.

It is important to note that these traffic and pedestrian growth rates are cumulative forecasts, and include all growth associated with Metro or Metro precinct developments. The traffic and pedestrian demands associated with the ISD are already accounted for in these forecasts. The analysis in the following sections identifies the individual contributions of each ISD to those cumulative forecasts.

4.2.2 ISD generation and assumption

Table 4.1 shows the access locations of ISD traffic generated from the station developments in 2036. The northern access is located at No.41 George Street. The Macquarie Lane is the other access to the eastern side. The traffic accesses the United Lane via Macquarie Street and exits via Horwood Place. The future network flow can be found in Appendix A.5

Table 4.1: ISD trip in the 2036 Metro Scenario

ISD	Connecting Street	AM		PM	
		In	Out	In	Out
Northern Access	George Street	125	52	47	124
Eastern Access	Macquarie Lane	122	31	31	122
Southern Access	United Lane	78	23	20	75

4.3 Traffic Signals

The model has been optimised in response to future traffic patterns by altering signal timing and coordination.

- A new signal coordination is set for Marden Street.
- Church Street / George Street is no longer coordinated to prioritise PLR operation.
- No coordination along Smith Street to minimise the interruption of the PLR operation at Macquarie Street.

The future network is illustrated in Figure 4.1.

There are four new intersection layouts in the future model as listed in Table 4.2. The TCS plans can be found in Appendix A.6.

Table 4.2: Traffic Control Signal plans and version used in the Future Model.

Site ID	Street 1	Street 2	Version
0109	George Street	Church Street	22A
1095	Macquarie Street	Marsden Street	TDL-1C
1084	Macquarie Street	Church Street	18A
1102	Macquarie Street	Smith Street	TDL-2B

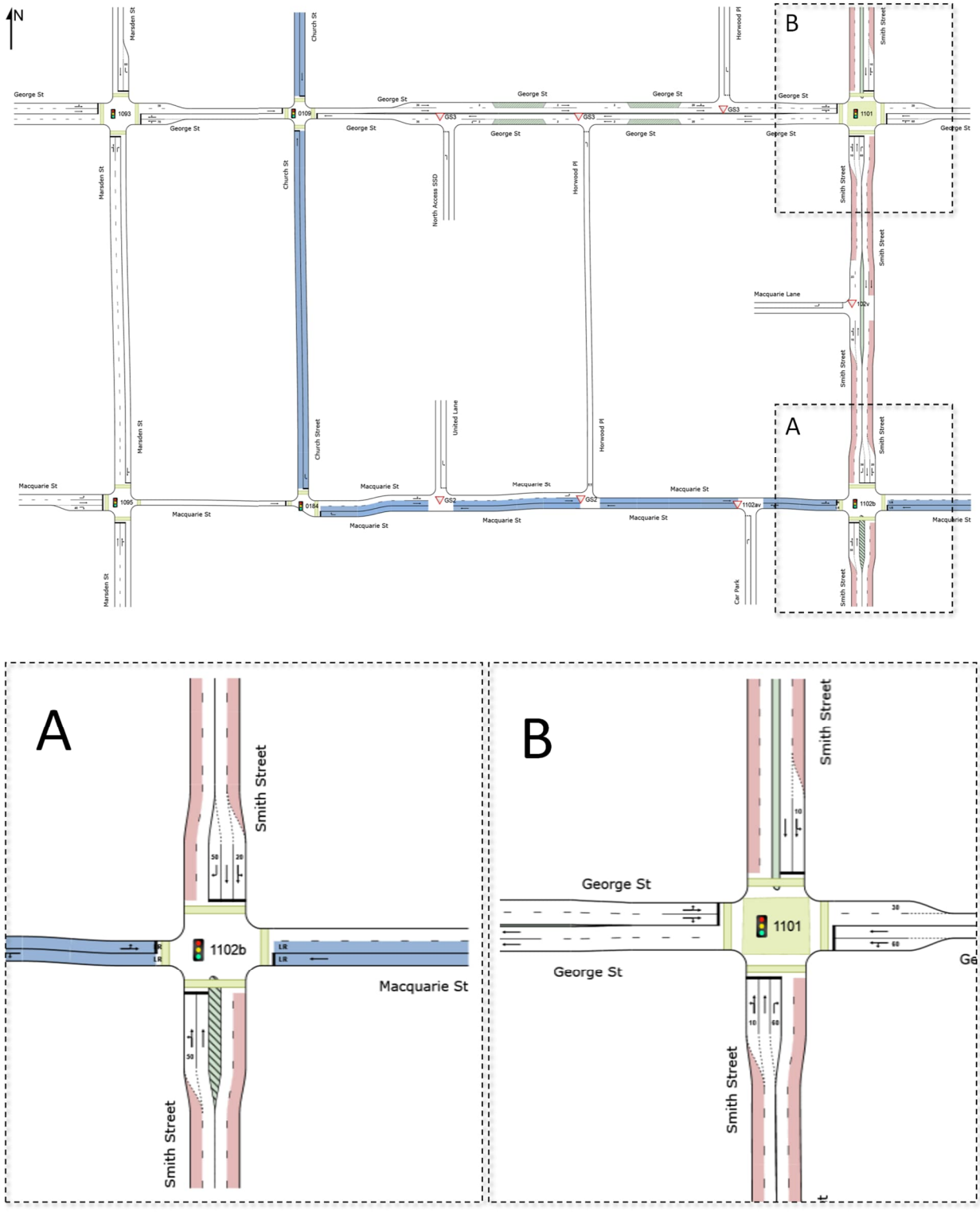


Figure 4.1: The future model network of Parramatta Station in 2036.

4.4 Model Calibration

The following calibrations were from the base model carried forward to the future scenario.

- Marsden Street / George Street – north approach signal coordination, Type 5 (Highly Favourable), assumed a good coordination from Marsden / Philip St
- George Street / Smith Street,
  - AM Peak - Type 6 (Exceptional Favourable), assuming a good coordination from Smith Street / Philip Street.
  - West approach lane utilisation of lane 1 increased to 60% and 70% for AM and PM peak respectively.

The following calibrations were not carried forward:

- Marsden Street – a new signal coordination is set for the Marden Street for the future scenario due to the PLR operation on Church Street.
- Church Street / George Street is no longer coordinated with PLR priority.
- No coordination along Smith Street to allow Smith Street / Macquarie Street to prioritise the PLR operation.
- Smith Street / Macquarie Street – the intersection has a brand-new layout and phasing arrangement with include a dedicated tram lanes.

4.5 Option Operational Results and Conclusion

Table 4.3 shows the intersection performance of the future scenario with Parramatta Station and its station developments. All the intersections perform satisfactorily with LoS D or less.

The intersections with light rail services along Church Street is LoS B or less. The Smith Street / Macquarie Street has higher delay to accommodate general vehicles and buses but still operate well with LoS C.

Table 4.3: Future intersection performance – Parramatta Station with ISD (2036)

	AM peak		PM peak	
Intersection	**Average delay**	**LOS**	**Average delay**	**LOS**
George Street/Marsden Street	18	B	22	B
George Street/ Church Street	10	A	13	A
George Street/North Access SSD*	4	A	4	A
George Street/Horwood Place*	8	A	6	A
George Street/Smith Street	39	C	45	D
Smith Street/Macquarie Lane*	4	A	4	A
Macquarie Street/Marsden Street	19	B	14	A
Macquarie Street/Church Street	25	B	26	B
Macquarie Street/United Lane*	5	A	5	A
Macquarie Street/Horwood Place*	6	A	6	A
Macquarie Street/Smith Street	29	C	20	B

* Worst Movement LoS

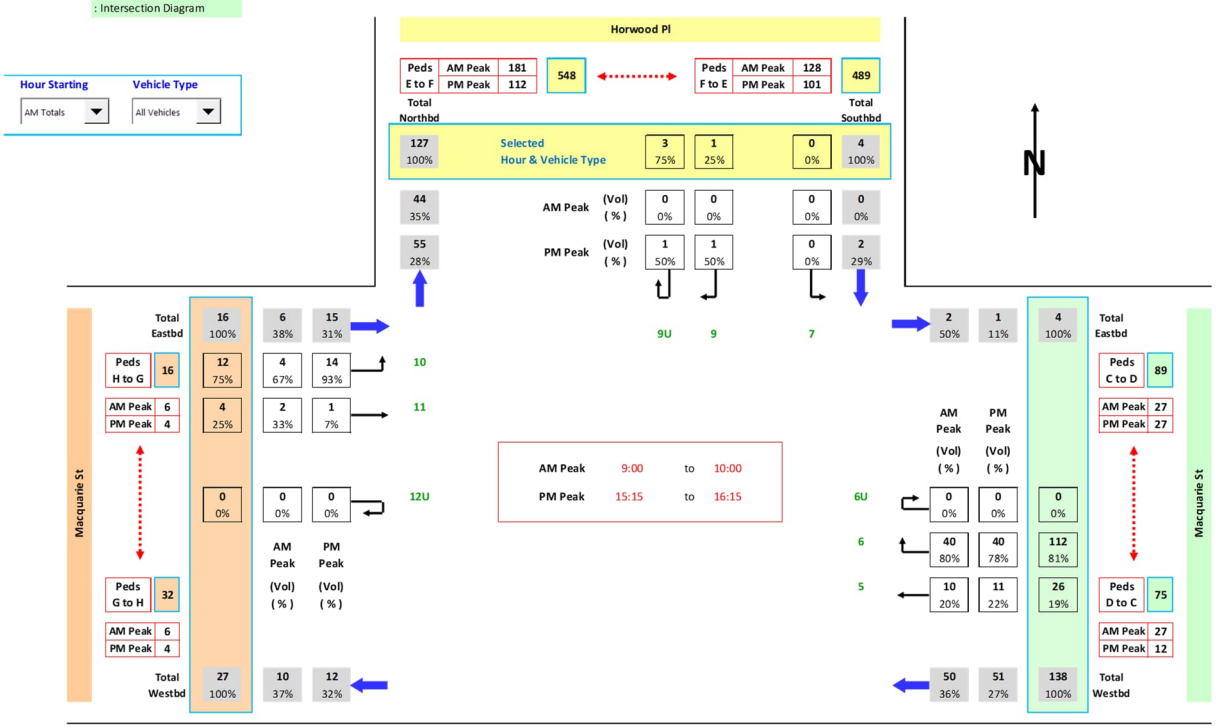
A. Appendix

A.1 Traffic Count

Job No. : N6237
Client : TfNSW
Suburb : ESC 152
Location : E15. Macquarie St / Horwood Pl

Day/Date : Tue, 16th March 2021
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

MATRIX Traffic and Transport Data

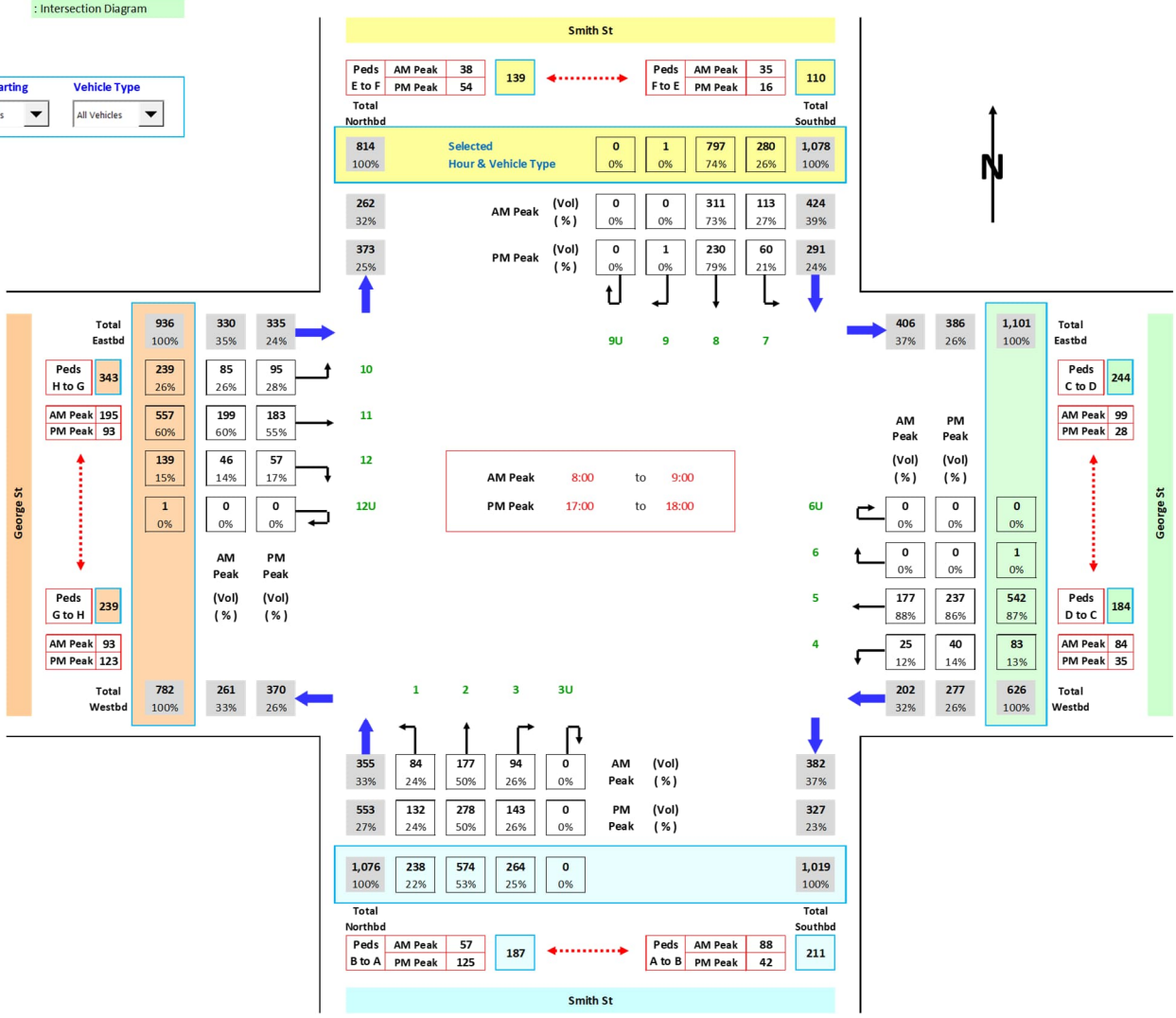


Job No. : N6237
Client : TfNSW
Suburb : ESC 152
Location : E6. George St / Smith St

Day/Date : Tue, 16th March 2021
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

MATRIX Traffic and Transport Data

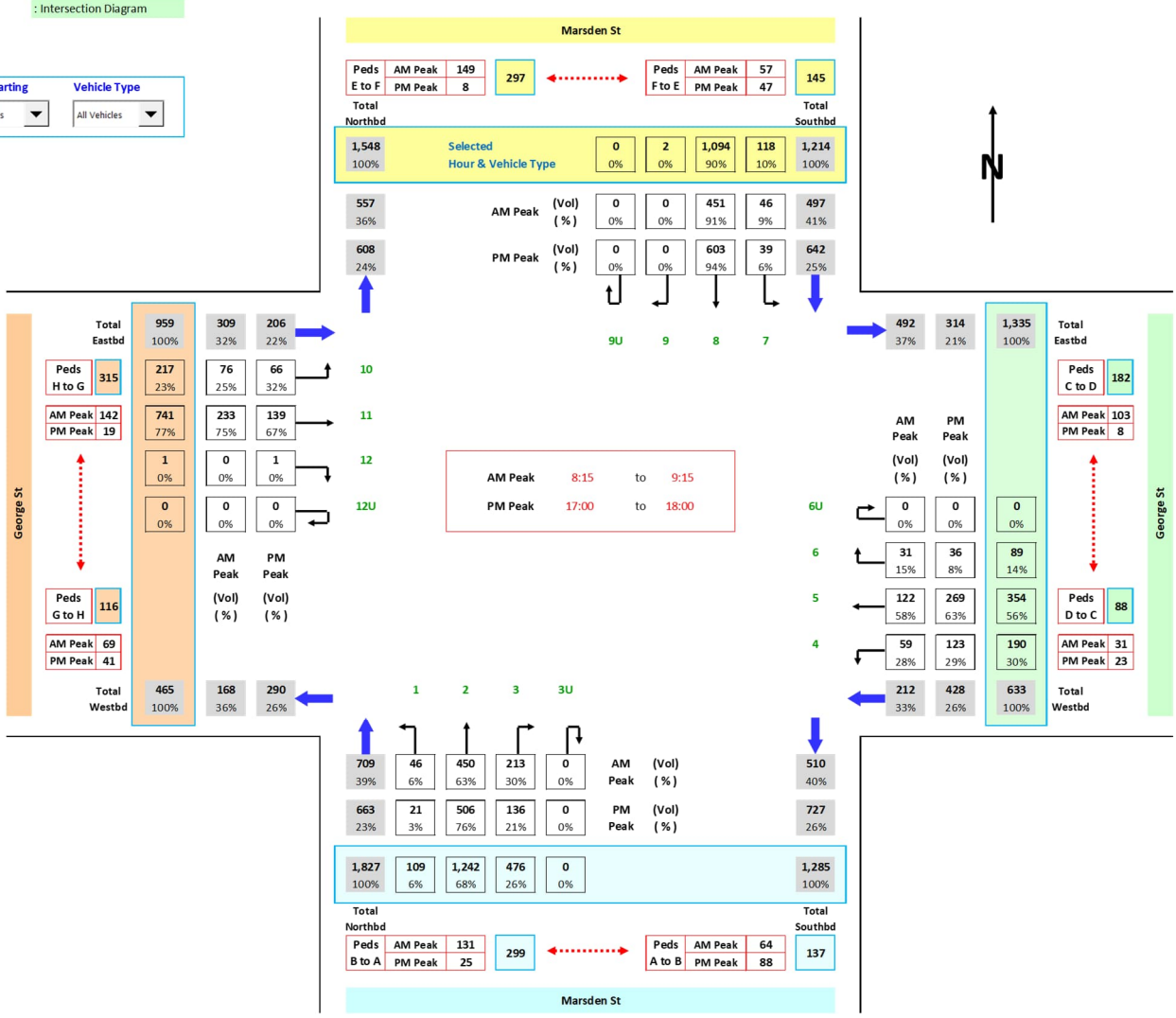
Hour Starting AM Totals
Vehicle Type All Vehicles



Job No. : N6237
Client : TfNSW
Suburb : ESC 152
Location : E9. George St / Marsden St

Day/Date : Tue, 16th March 2021
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

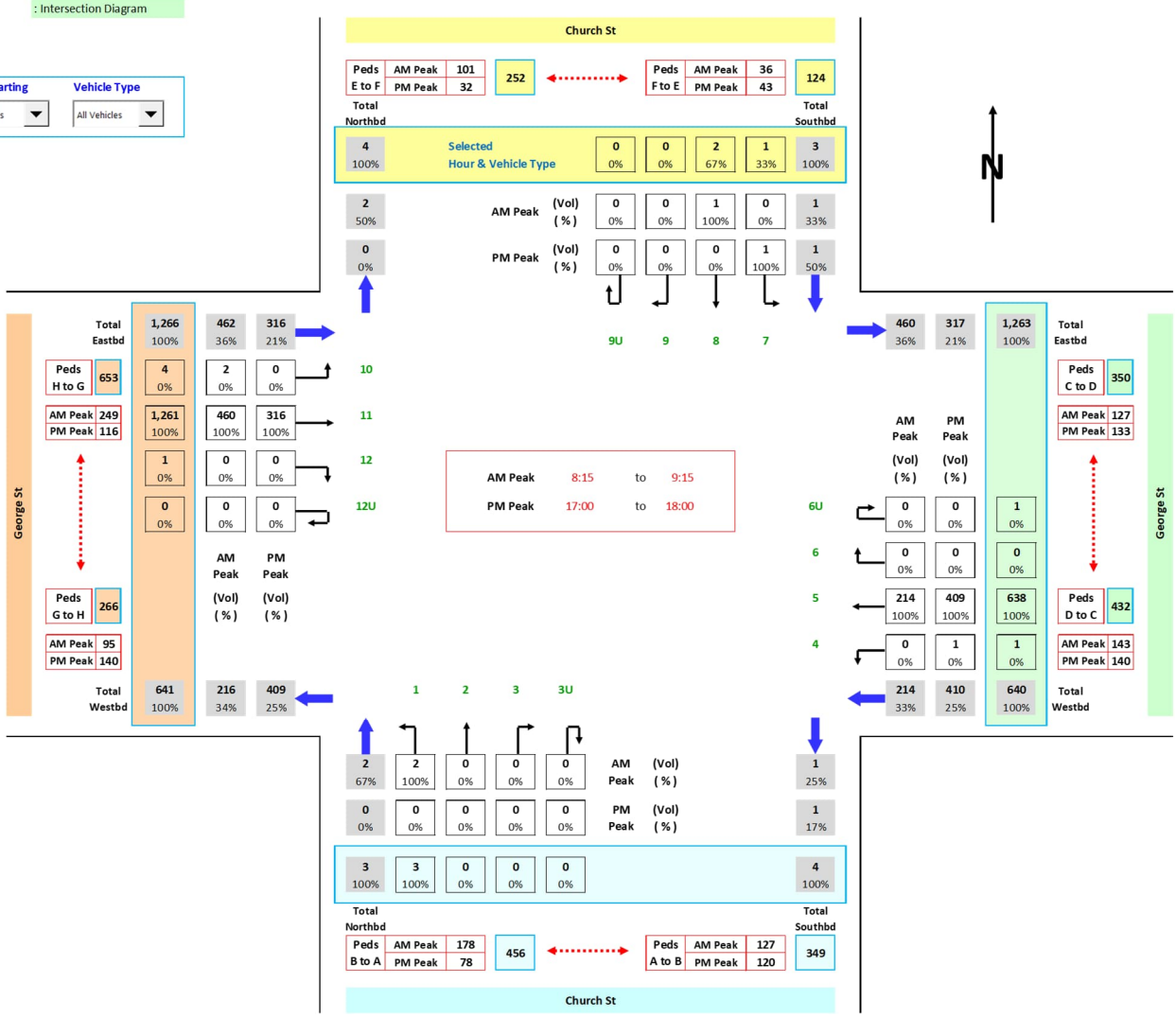
MATRIX Traffic and Transport Data



Job No. : N6237
Client : TfNSW
Suburb : ESC 152
Location : E10. George St / Church St

Day/Date : Tue, 16th March 2021
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

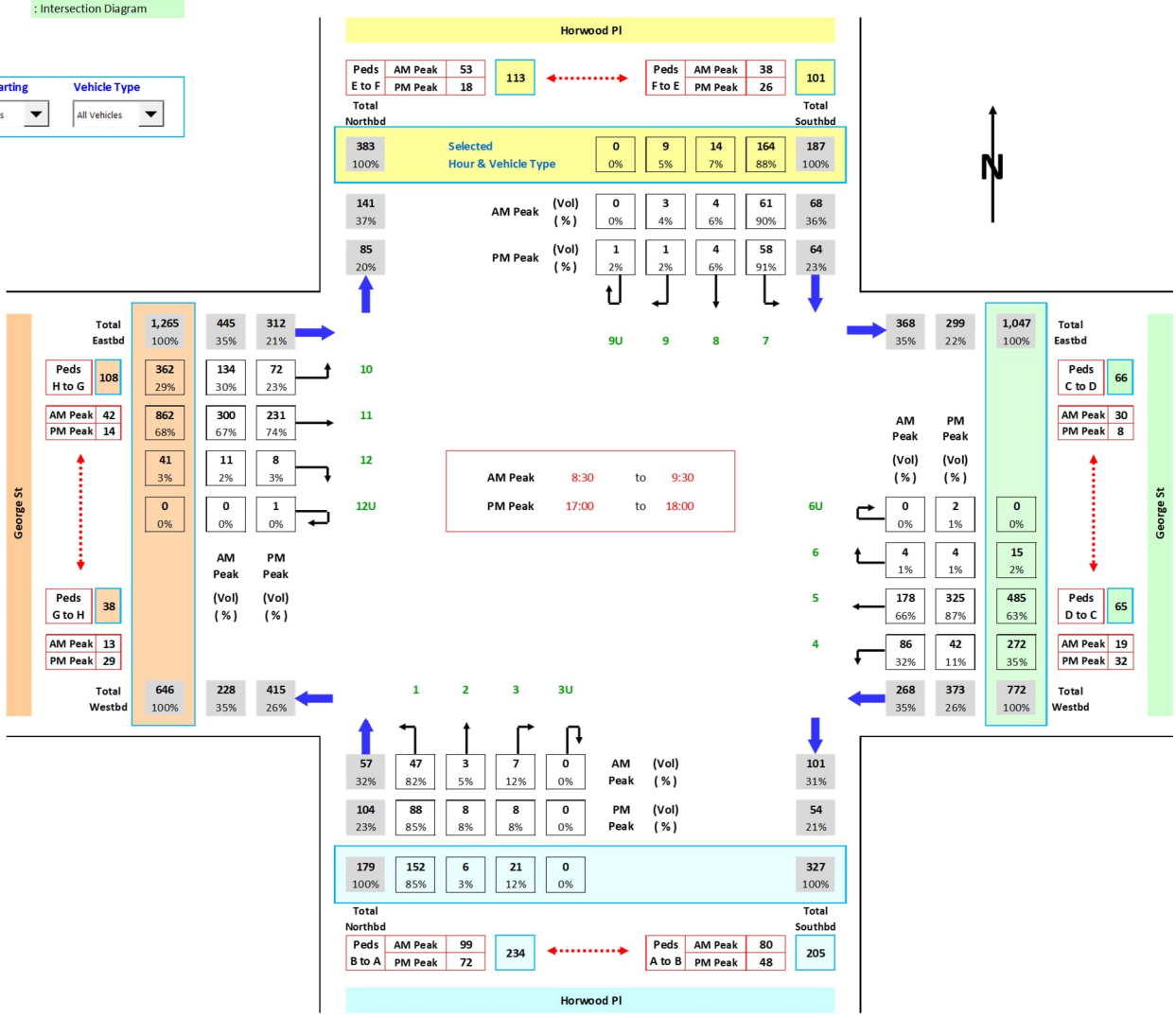
MATRIX Traffic and Transport Data



Job No. : N6237
Client : TfNSW
Suburb : ESC 152
Location : E11. George St / Horwood Pl

Day/Date : Tue, 16th March 2021
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

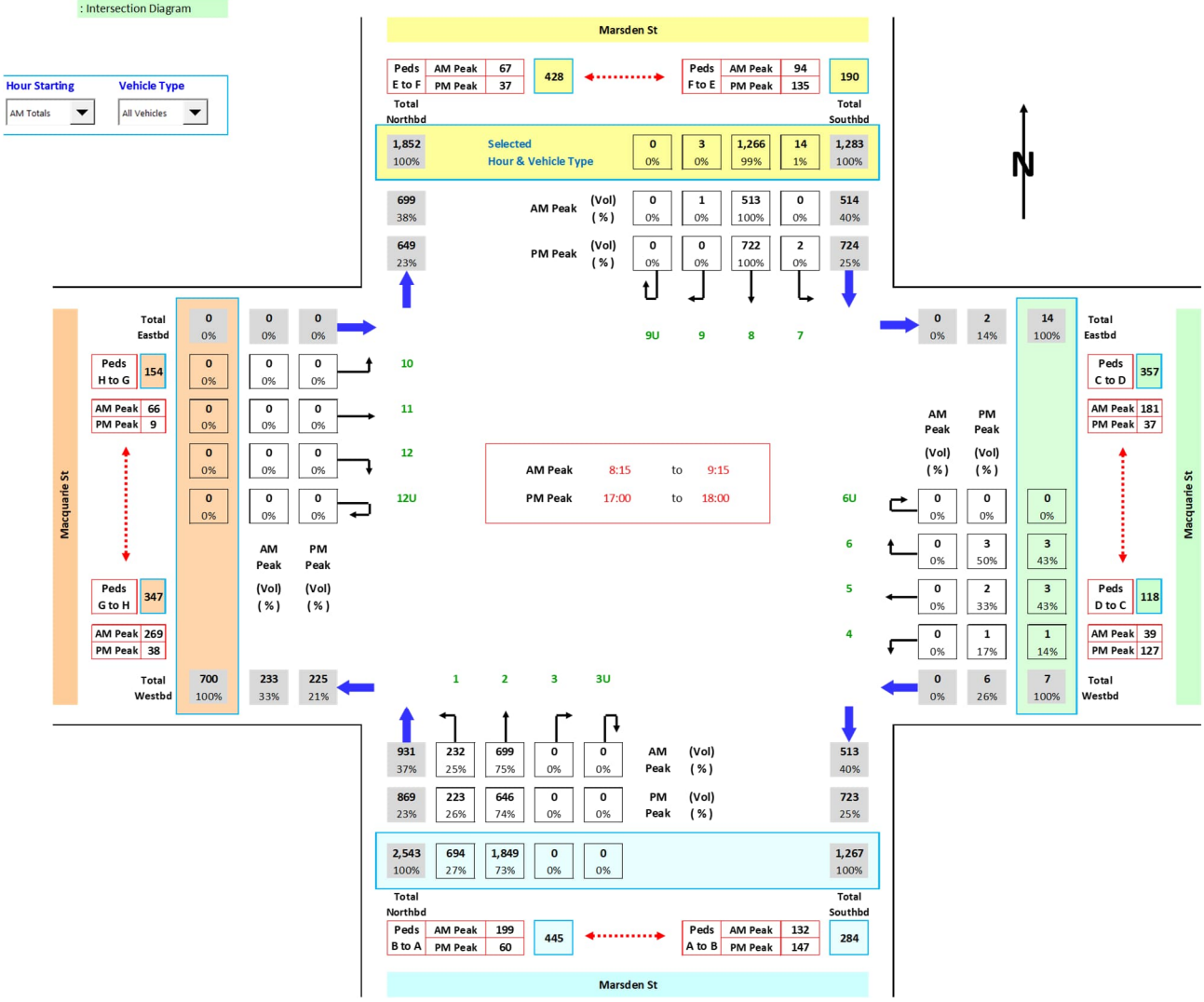
MATRIX Traffic and Transport Data



Job No. : N6237
Client : TfNSW
Suburb : ESC 152
Location : E12. Macquarie St / Marsden St

Day/Date : Tue, 16th March 2021
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

MATRIX Traffic and Transport Data

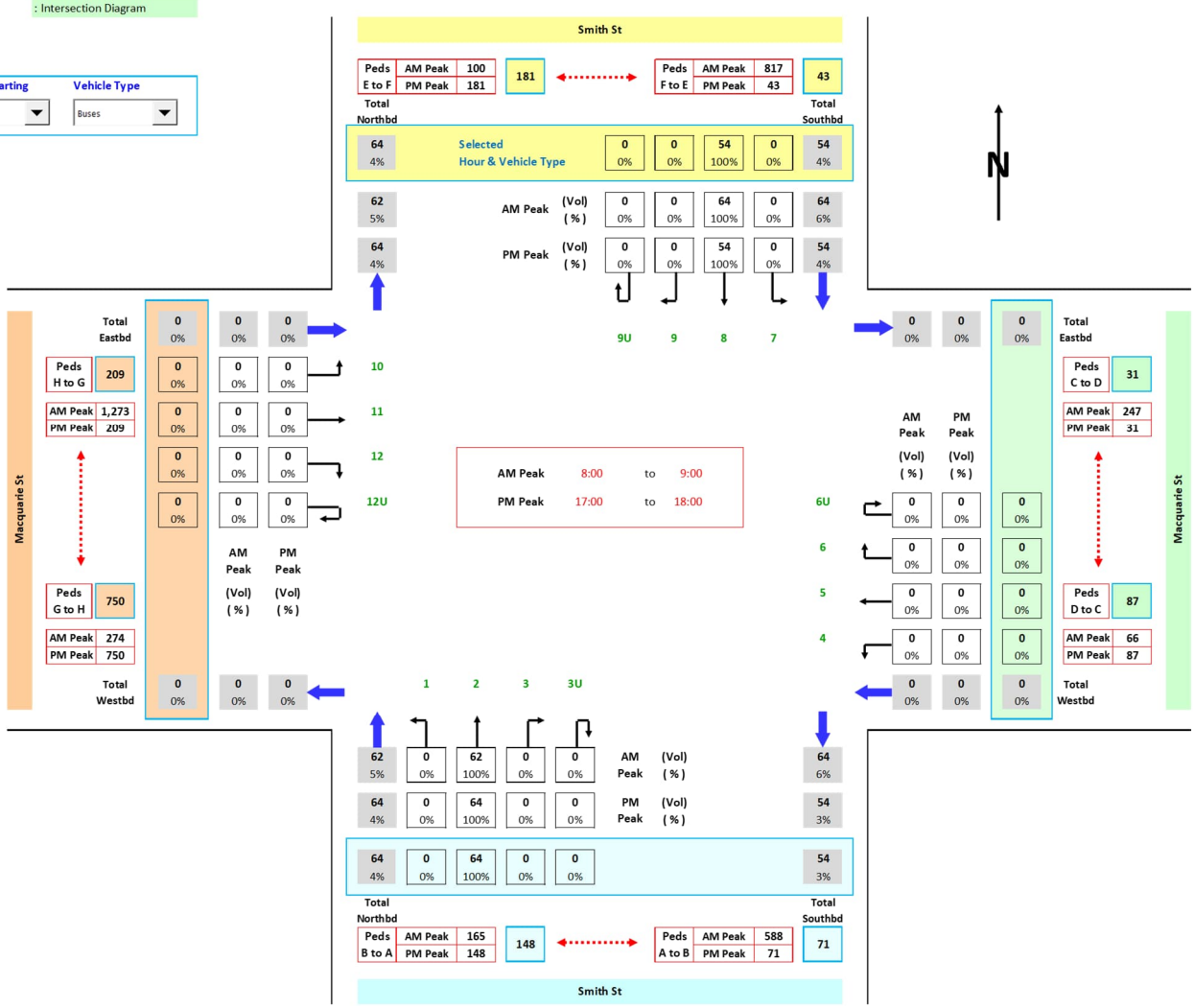


Job No. : N6237
Client : TfNSW
Suburb : ESC 152
Location : E13. Macquarie St / Smith St

Day/Date : Tue, 16th March 2021
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

MATRIX Traffic and Transport Data

Hour Starting: 17:00 | Vehicle Type: Buses

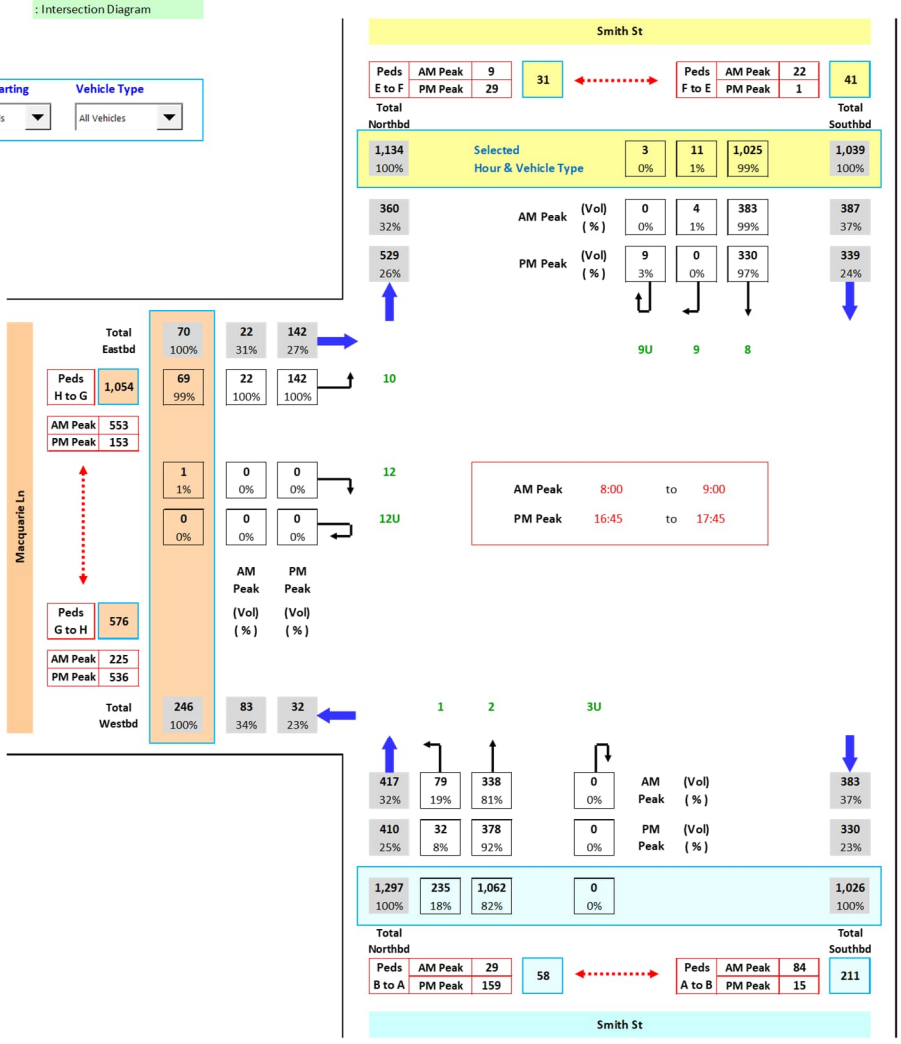


Job No. : N6237
Client : TfNSW
Suburb : ESC 152
Location : E14. Smith St / Macquarie Ln

Day/Date : Tue, 16th March 2021
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

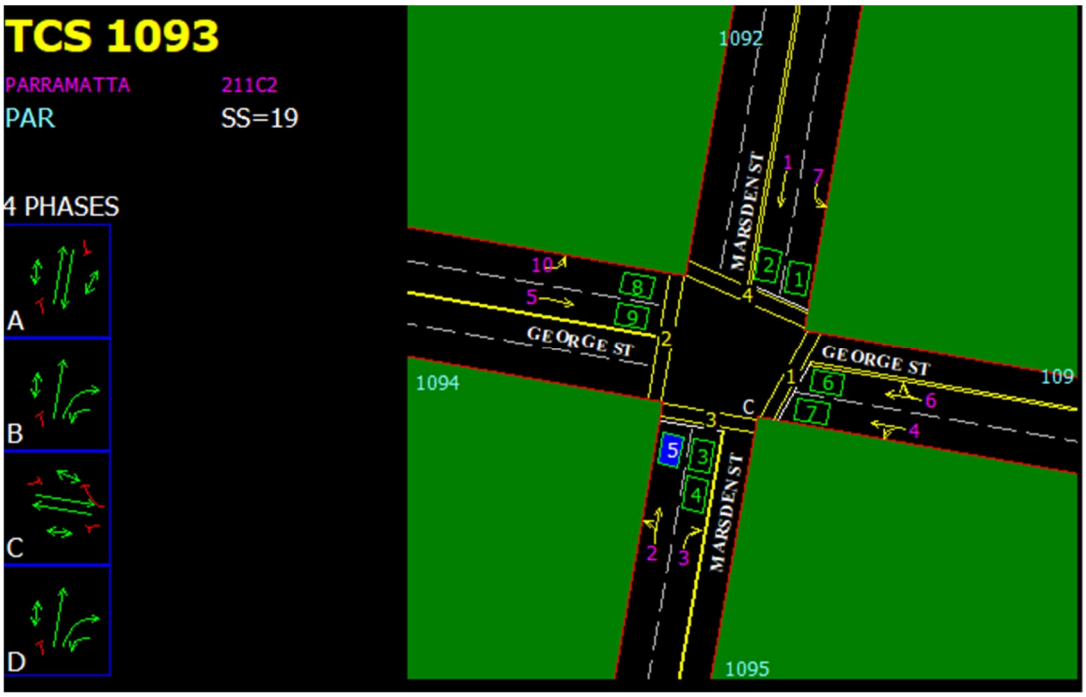
MATRIX Traffic and Transport Data

Hour Starting AM Totals | **Vehicle Type** All Vehicles

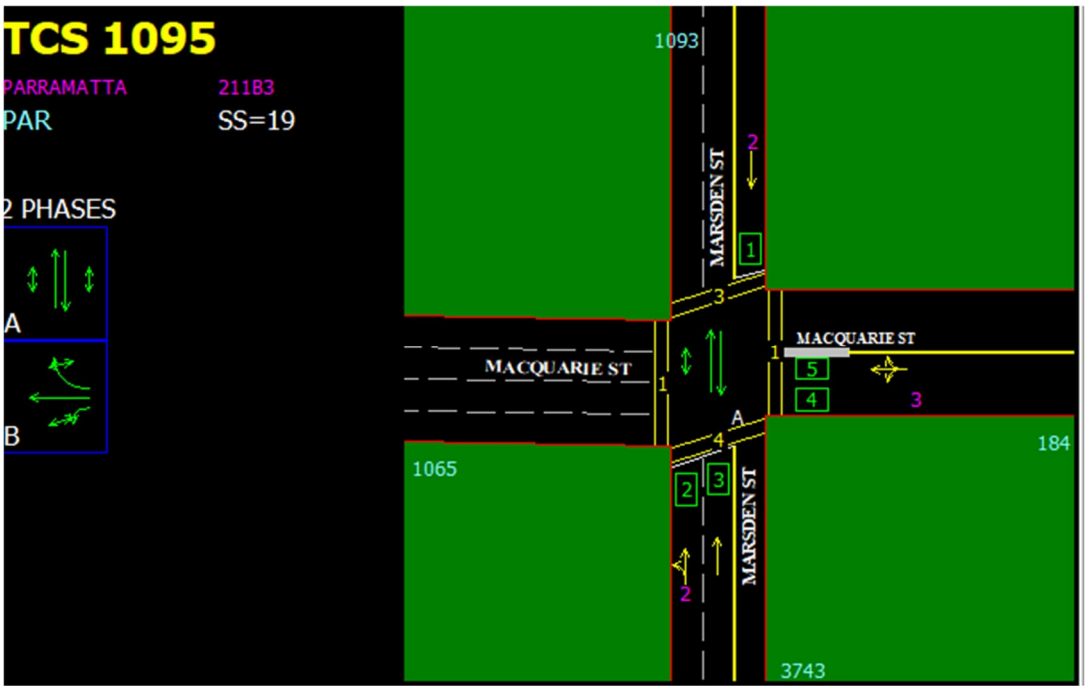


A.2 SCATS Graphic

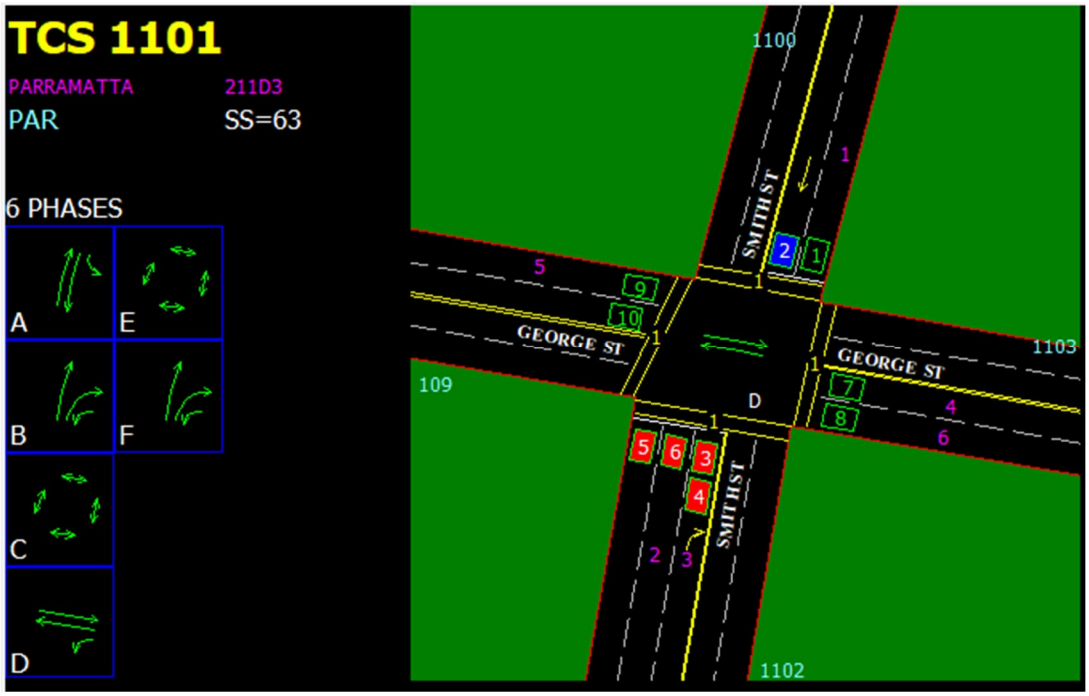
TCS 1093 - George Street / Marsden Street



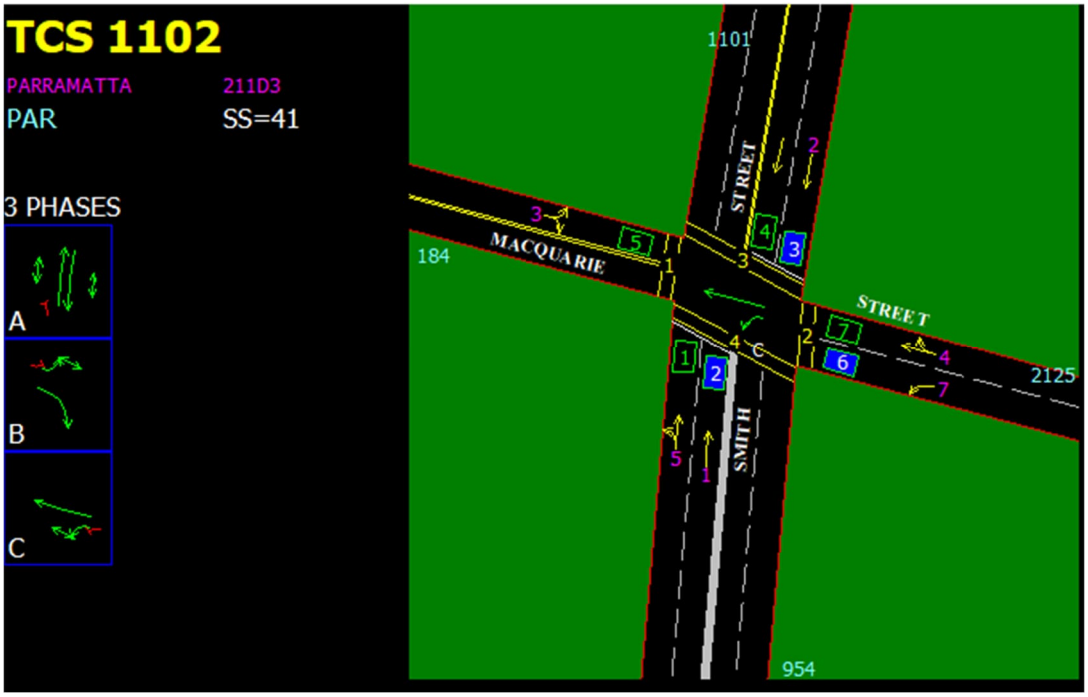
TCS 1095 - Macquarie Street / Marsden Street



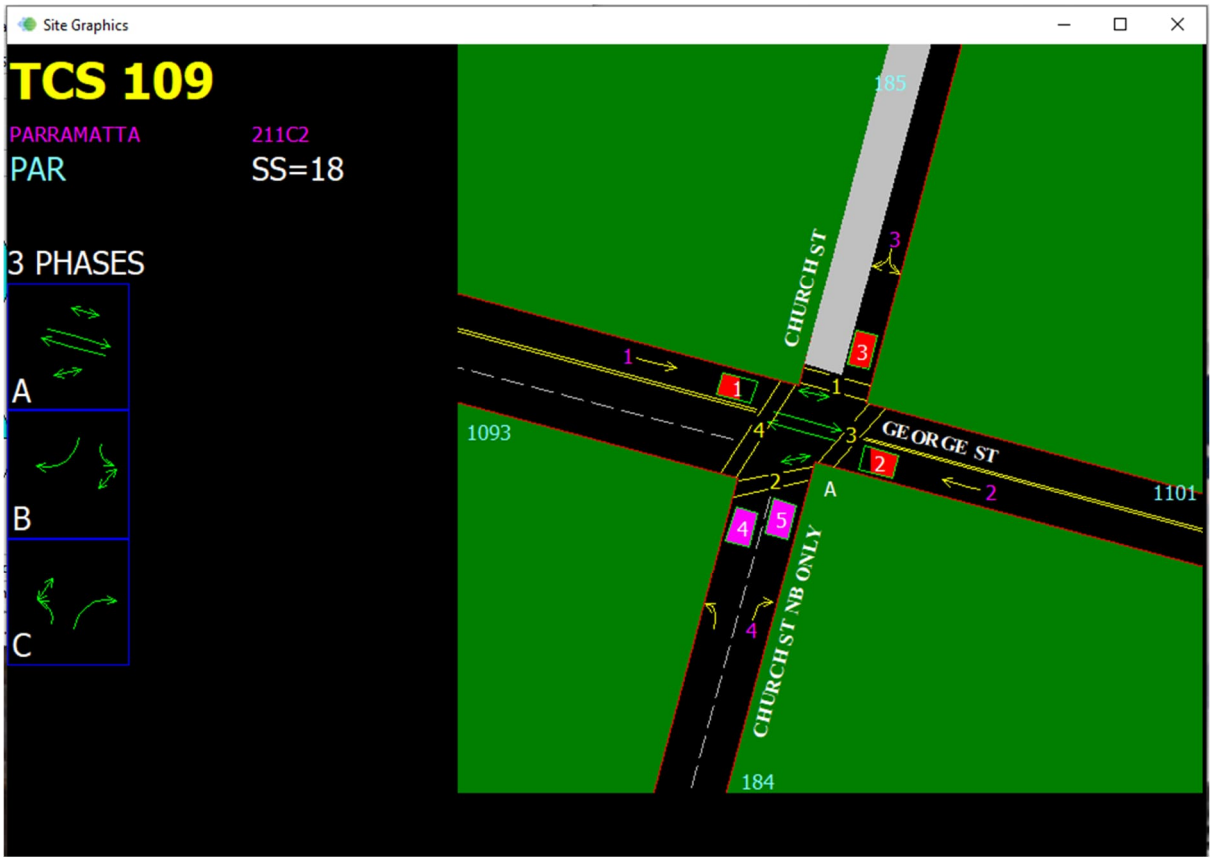
TCS 1101 - George Street / Smith Street



TCS 1102 - Macquarie Street / Smith Street



TCS 0109 - George Street / Church Street



A.3 SCATS History

TCS 1093 - George Street / Marsden Street

Tuesday, 16 March 2021, 8:00:00 AM AEDT to Tuesday, 16 March 2021, 8:15:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	33	78	49	447
B phase	8	14	28	20	167
C phase	9	21	33	27	247
Nominal cycle length	6	90	100	95	574
Active cycle length	6	90	100	95	574
Actual cycle	8	75	120	91	732
Signal group 1	9	27	72	43	393
Signal group 2	8	48	82	58	465
Signal group 3	8	8	22	14	119
Signal group 4	9	15	27	21	193
Signal group 5	9	15	27	21	193
Signal group 9	8	8	22	14	119
Signal group 11	4	8	8	8	32
Signal group 12	7	8	8	8	56
Signal group 13	9	8	8	8	72
Signal group 14	8	8	8	8	64

Tuesday, 16 March 2021, 8:15:00 AM AEDT to Tuesday, 16 March 2021, 8:30:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	26	61	38	347
B phase	7	14	38	33	231
C phase	10	20	43	27	275
Nominal cycle length	4	90	99	93	375
Active cycle length	4	90	99	93	375
Actual cycle	9	53	118	91	827
Signal group 1	9	20	55	32	293
Signal group 2	9	20	92	58	524
Signal group 3	7	8	32	27	189
Signal group 4	10	14	37	21	215
Signal group 5	10	14	37	21	215
Signal group 9	7	8	32	27	189
Signal group 11	6	8	9	8	49
Signal group 12	9	8	9	8	73
Signal group 13	10	8	9	8	81
Signal group 14	10	8	9	8	81

Tuesday, 16 March 2021, 8:30:00 AM AEDT to Tuesday, 16 March 2021, 8:45:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	31	63	43	394
B phase	10	14	35	26	261
C phase	9	20	36	25	226
Nominal cycle length	3	90	100	95	286
Active cycle length	3	90	100	95	286
Actual cycle	8	84	124	95	760
Split plan 1	1	100	100	100	100
Split plan 2	1	100	100	100	100
Signal group 1	9	25	57	37	340
Signal group 2	9	52	83	62	566
Signal group 3	10	8	29	20	201
Signal group 4	9	14	30	18	170
Signal group 5	9	14	30	18	170
Signal group 9	10	8	31	20	207
Signal group 11	9	8	8	8	72
Signal group 12	8	8	8	8	64
Signal group 13	9	8	9	8	73
Signal group 14	9	8	9	8	73

Tuesday, 16 March 2021, 8:45:00 AM AEDT to Tuesday, 16 March 2021, 9:00:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	38	57	44	397
B phase	9	18	29	21	192
C phase	8	25	40	32	257
Nominal cycle length	4	90	100	97	388
Active cycle length	4	90	100	97	388
Actual cycle	8	90	103	96	771
Signal group 1	9	32	51	38	343
Signal group 2	9	53	69	59	535
Signal group 3	9	12	23	15	138
Signal group 4	8	19	34	26	209
Signal group 5	8	19	34	26	209
Signal group 9	9	12	23	15	138
Signal group 11	7	8	8	8	56
Signal group 12	9	8	8	8	72
Signal group 13	9	8	8	8	72
Signal group 14	9	8	8	8	72

Tuesday, 16 March 2021, 5:00:00 PM AEDT to Tuesday, 16 March 2021, 5:15:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	39	65	52	469
B phase	10	14	16	15	153
C phase	10	21	34	26	269
Nominal cycle length	7	81	100	90	636
Active cycle length	7	81	100	90	636
Actual cycle	9	77	113	94	850
Split plan 4	1	100	100	100	100
Signal group 1	9	33	59	46	415
Signal group 2	9	48	73	61	552
Signal group 3	10	8	10	9	93
Signal group 4	10	15	28	20	209
Signal group 5	10	15	28	20	209
Signal group 9	10	8	15	9	99
Signal group 11	7	8	9	8	57
Signal group 12	6	8	9	8	49
Signal group 13	9	8	8	8	72
Signal group 14	7	8	8	8	56

Tuesday, 16 March 2021, 5:15:00 PM AEDT to Tuesday, 16 March 2021, 5:30:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	45	63	53	426
B phase	9	15	15	15	135
C phase	9	24	32	28	254
Nominal cycle length	3	90	100	96	290
Active cycle length	3	90	100	96	290
Actual cycle	8	87	107	96	775
Signal group 1	8	39	57	47	378
Signal group 2	8	54	72	62	498
Signal group 3	9	9	9	9	81
Signal group 4	9	18	26	22	200
Signal group 5	9	18	26	22	200
Signal group 9	9	9	15	10	93
Signal group 11	3	8	8	8	24
Signal group 12	5	8	8	8	40
Signal group 13	7	8	8	8	56
Signal group 14	1	8	8	8	8

Tuesday, 16 March 2021, 5:30:00 PM AEDT to Tuesday, 16 March 2021, 5:45:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	49	74	60	546
B phase	8	14	16	15	120
C phase	9	21	28	24	220
Nominal cycle length	2	90	100	95	190
Active cycle length	2	90	100	95	190
Actual cycle	8	87	107	94	759
Signal group 1	9	43	68	54	492
Signal group 2	9	57	83	66	597
Signal group 3	8	8	10	9	72
Signal group 4	9	15	22	18	166
Signal group 5	9	15	22	18	166
Signal group 9	8	9	14	9	78
Signal group 11	1	8	8	8	8
Signal group 12	6	8	8	8	48
Signal group 13	7	8	8	8	56
Signal group 14	5	8	8	8	40

Tuesday, 16 March 2021, 5:45:00 PM AEDT to Tuesday, 16 March 2021, 6:00:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	52	64	56	505
B phase	9	15	22	16	151
C phase	8	22	30	25	206
Nominal cycle length	4	98	100	99	396
Active cycle length	4	98	100	99	396
Actual cycle	8	90	109	98	791
Signal group 1	9	46	58	50	451
Signal group 2	9	62	73	66	602
Signal group 3	9	9	16	10	97
Signal group 4	8	16	24	19	158
Signal group 5	8	16	24	19	158
Signal group 9	9	9	22	12	109
Signal group 11	3	8	8	8	24
Signal group 12	4	8	8	8	32
Signal group 13	7	8	8	8	56
Signal group 14	5	8	8	8	40

TCS 1095 - Macquarie Street / Marsden Street

Tuesday, 16 March 2021, 8:00:00 PM AEDT to Tuesday, 16 March 2021, 8:15:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	18	14	51	30	542
B phase	18	15	23	16	303
Nominal cycle length	7	30	75	51	359
Active cycle length	7	30	75	51	359
Actual cycle	17	29	69	46	784
Signal group 1	18	8	45	24	434
Signal group 2	18	4	45	23	416
Signal group 3	19	4	17	7	140
Signal group 9	3	6	8	7	22
Signal group 11	5	6	7	6	33
Signal group 12	6	6	7	6	39

Tuesday, 16 March 2021, 8:15:00 PM AEDT to Tuesday, 16 March 2021, 8:30:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	21	14	38	26	552
B phase	21	15	17	16	338
Nominal cycle length	4	30	55	42	170
Active cycle length	4	30	55	42	170
Actual cycle	21	29	55	42	890
Signal group 1	21	8	32	20	426
Signal group 2	21	8	32	19	414
Signal group 3	21	4	11	7	152
Signal group 9	2	8	8	8	16
Signal group 11	6	6	7	6	39
Signal group 12	8	6	7	6	50

Tuesday, 16 March 2021, 8:30:00 PM AEDT to Tuesday, 16 March 2021, 8:45:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	22	14	38	22	490
B phase	23	15	17	15	365
Nominal cycle length	3	30	55	38	115
Active cycle length	3	30	55	38	115
Actual cycle	22	29	55	38	838
Signal group 1	23	8	32	15	367
Signal group 2	23	8	32	15	355
Signal group 3	23	4	11	6	155
Signal group 9	2	8	8	8	16
Signal group 11	3	6	7	6	19
Signal group 12	10	6	7	6	63

Tuesday, 16 March 2021, 8:45:00 PM AEDT to Tuesday, 16 March 2021, 9:00:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	22	14	38	24	540
B phase	22	15	17	16	355
Nominal cycle length	3	30	55	46	140
Active cycle length	3	30	55	46	140
Actual cycle	21	29	55	40	846
Signal group 1	22	8	32	18	409
Signal group 2	22	8	32	18	397
Signal group 3	22	4	11	6	151
Signal group 9	2	8	8	8	16
Signal group 11	4	6	7	6	25
Signal group 12	9	6	7	6	59

Tuesday, 16 March 2021, 5:00:00 PM AEDT to Tuesday, 16 March 2021, 5:15:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	64	82	75	676
B phase	10	18	24	19	192
Nominal cycle length	7	81	100	90	636
Active cycle length	7	81	100	90	636
Actual cycle	9	82	105	93	844
Signal group 1	9	58	76	69	622
Signal group 2	9	52	76	65	586
Signal group 3	10	6	12	7	72
Signal group 9	7	8	8	8	56
Signal group 11	9	8	8	8	72
Signal group 12	9	8	8	8	72

Tuesday, 16 March 2021, 5:15:00 PM AEDT to Tuesday, 16 March 2021, 5:30:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	69	82	77	622
B phase	9	16	21	18	165
Nominal cycle length	3	90	100	96	290
Active cycle length	3	90	100	96	290
Actual cycle	8	87	100	95	766
Signal group 1	8	63	76	71	574
Signal group 2	8	62	76	68	550
Signal group 3	9	4	9	6	57
Signal group 9	4	8	8	8	32
Signal group 11	9	6	8	7	70
Signal group 12	8	6	8	7	62

Tuesday, 16 March 2021, 5:30:00 PM AEDT to Tuesday, 16 March 2021, 5:45:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	71	82	78	626
B phase	9	18	18	18	162
Nominal cycle length	2	90	100	95	190
Active cycle length	2	90	100	95	190
Actual cycle	8	89	100	96	770
Signal group 1	9	65	76	72	654
Signal group 2	9	59	76	68	618
Signal group 3	9	6	6	6	54
Signal group 9	6	8	8	8	48
Signal group 11	9	8	8	8	72
Signal group 12	9	8	8	8	72

Tuesday, 16 March 2021, 5:45:00 PM AEDT to Tuesday, 16 March 2021, 6:00:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	81	82	81	734
B phase	9	18	18	18	162
Nominal cycle length	4	98	100	99	396
Active cycle length	4	98	100	99	396
Actual cycle	8	99	100	99	796
Signal group 1	9	75	76	75	680
Signal group 2	9	69	76	72	650
Signal group 3	9	6	6	6	54
Signal group 9	5	8	8	8	40
Signal group 11	9	8	8	8	72
Signal group 12	9	8	8	8	72

TCS 1101 - George Street / Smith Street

Tuesday, 16 March 2021, 8:00:00 AM AEDT to Tuesday, 16 March 2021, 8:15:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	22	45	28	260
B phase	9	12	12	12	108
C phase	9	35	35	35	315
D phase	9	16	24	19	179
Nominal cycle length	6	90	100	95	574
Active cycle length	7	89	101	96	674
Actual cycle	8	89	111	95	762
Split plan 1	1	570	570	570	570
Split plan 2	1	96	96	96	96
Signal group 1	9	16	39	22	206
Signal group 2	9	28	51	34	314
Signal group 3	9	6	6	6	54
Signal group 4	10	10	18	13	136
Signal group 5	10	10	18	13	136
Signal group 6	9	6	6	6	54
Signal group 7	9	8	8	8	72

Tuesday, 16 March 2021, 8:15:00 AM AEDT to Tuesday, 16 March 2021, 8:30:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	10	15	41	26	260
B phase	10	12	12	12	120
C phase	9	35	35	35	315
D phase	9	15	22	18	170
Nominal cycle length	4	90	99	93	375
Active cycle length	7	89	100	93	654
Actual cycle	9	84	109	92	834
Split plan 1	1	292	292	292	292
Split plan 2	1	92	92	92	92
Signal group 1	10	9	35	20	200
Signal group 2	10	21	47	32	320
Signal group 3	10	6	6	6	60
Signal group 4	9	9	16	12	116
Signal group 5	9	9	16	12	116
Signal group 6	10	6	6	6	60
Signal group 7	10	8	8	8	80

Tuesday, 16 March 2021, 8:30:00 AM AEDT to Tuesday, 16 March 2021, 8:45:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	19	51	29	263
B phase	9	12	14	12	110
C phase	9	35	35	35	315
D phase	9	20	28	23	210
Nominal cycle length	3	90	100	95	286
Active cycle length	6	89	116	98	591
Actual cycle	8	88	108	97	777
Split plan 1	1	200	200	200	200
Signal group 1	9	13	45	23	209
Signal group 2	9	25	57	35	319
Signal group 3	9	6	8	6	56
Signal group 4	9	14	22	17	156
Signal group 5	9	14	22	17	156
Signal group 6	9	6	8	6	56
Signal group 7	9	8	8	8	72

Tuesday, 16 March 2021, 8:45:00 AM AEDT to Tuesday, 16 March 2021, 9:00:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	16	32	22	206
B phase	9	12	13	12	109
C phase	9	35	35	35	315
D phase	10	23	27	24	249
Nominal cycle length	4	90	100	97	388
Active cycle length	6	90	100	96	578
Actual cycle	9	88	103	95	855
Split plan 2	2	100	290	195	390
Split plan 3	2	100	380	240	480
Signal group 1	9	10	26	17	153
Signal group 2	9	22	38	29	261
Signal group 3	9	6	7	6	55
Signal group 4	9	17	21	19	171
Signal group 5	9	17	21	19	171
Signal group 6	9	6	7	6	55
Signal group 7	9	8	8	8	72

Tuesday, 16 March 2021, 5:00:00 PM AEDT to Tuesday, 16 March 2021, 5:15:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	15	32	18	148
B phase	9	12	12	12	108
C phase	9	35	35	35	315
D phase	9	23	35	30	270
Nominal cycle length	7	81	100	90	636
Active cycle length	8	82	101	92	736
Actual cycle	8	87	107	96	771
Signal group 1	8	9	26	12	100
Signal group 2	8	21	38	24	196
Signal group 3	9	6	6	6	54
Signal group 4	9	17	29	24	216
Signal group 5	9	17	29	24	216
Signal group 6	9	6	6	6	54
Signal group 7	9	8	8	8	72

Tuesday, 16 March 2021, 5:15:00 PM AEDT to Tuesday, 16 March 2021, 5:30:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	16	48	28	225
B phase	9	12	13	12	110
C phase	9	35	35	35	315
D phase	8	25	33	29	238
Nominal cycle length	3	90	100	96	290
Active cycle length	4	90	114	100	403
Actual cycle	7	89	128	106	746
Split plan 3	2	100	100	100	200
Split plan 4	2	100	280	190	380
Signal group 1	8	10	42	22	177
Signal group 2	8	22	54	34	275
Signal group 3	9	6	7	6	56
Signal group 4	8	19	27	23	190
Signal group 5	8	19	27	23	190
Signal group 6	9	6	7	6	56
Signal group 7	9	8	8	8	72

Tuesday, 16 March 2021, 5:30:00 PM AEDT to Tuesday, 16 March 2021, 5:45:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	15	33	25	229
B phase	9	12	12	12	108
C phase	9	35	35	35	315
D phase	9	20	30	24	219
Nominal cycle length	2	90	100	95	190
Active cycle length	5	90	100	96	480
Actual cycle	9	89	105	96	871
Split plan 1	1	100	100	100	100
Split plan 2	2	100	100	100	200
Split plan 3	2	100	370	235	470
Split plan 4	1	100	100	100	100
Signal group 1	9	9	27	19	175
Signal group 2	9	21	39	31	283
Signal group 3	9	6	6	6	54
Signal group 4	9	14	24	18	165
Signal group 5	9	14	24	18	165
Signal group 6	9	6	6	6	54
Signal group 7	9	8	8	8	72

Tuesday, 16 March 2021, 5:45:00 PM AEDT to Tuesday, 16 March 2021, 6:00:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	21	74	31	252
B phase	9	12	12	12	108
C phase	8	35	35	35	280
D phase	9	14	30	25	225
Nominal cycle length	4	98	100	99	396
Active cycle length	4	98	100	99	396
Actual cycle	8	52	145	99	793
Split plan 2	2	100	198	149	298
Split plan 3	3	100	200	133	400
Split plan 4	1	98	98	98	98
Signal group 1	8	15	68	25	204
Signal group 2	8	27	80	37	300
Signal group 3	9	6	6	6	54
Signal group 4	9	8	24	19	171
Signal group 5	9	8	24	19	171
Signal group 6	9	6	12	6	60
Signal group 7	8	8	8	8	64

TCS 1102 - Macquarie Street / Smith Street

Tuesday, 16 March 2021, 8:00:00 AM AEDT to Tuesday, 16 March 2021, 8:15:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	49	66	58	523
B phase	9	33	41	37	333
Nominal cycle length	6	90	100	95	574
Active cycle length	6	90	100	95	574
Actual cycle	8	83	103	96	768
Split plan 3	1	98	98	98	98
Signal group 1	9	43	60	52	469
Signal group 2	9	43	60	52	469
Signal group 3	10	28	36	31	313
Signal group 7	9	8	12	9	84
Signal group 8	9	37	54	45	413
Signal group 9	10	12	13	12	125
Signal group 10	10	12	13	12	125

Tuesday, 16 March 2021, 8:15:00 AM AEDT to Tuesday, 16 March 2021, 8:30:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	10	39	58	47	477
B phase	9	34	54	43	395
Nominal cycle length	4	90	99	93	375
Active cycle length	4	90	99	93	375
Actual cycle	9	86	102	92	833
Signal group 1	10	34	52	41	417
Signal group 2	10	34	52	41	417
Signal group 3	9	28	49	38	343
Signal group 7	10	12	13	12	122
Signal group 8	10	28	46	35	356
Signal group 9	10	12	13	12	126
Signal group 10	10	12	13	12	126

Tuesday, 16 March 2021, 8:30:00 AM AEDT to Tuesday, 16 March 2021, 8:45:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	40	55	49	441
B phase	9	38	55	47	425
Nominal cycle length	3	90	100	95	286
Active cycle length	3	90	100	95	286
Actual cycle	9	88	106	96	866
Signal group 1	9	33	49	42	385
Signal group 2	9	33	49	42	385
Signal group 3	9	31	49	41	369
Signal group 7	9	12	12	12	108
Signal group 8	9	28	43	37	333
Signal group 9	9	12	13	12	111
Signal group 10	9	12	13	12	111

Tuesday, 16 March 2021, 8:45:00 AM AEDT to Tuesday, 16 March 2021, 9:00:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	42	65	57	458
B phase	9	34	45	40	360
Nominal cycle length	4	90	100	97	388
Active cycle length	4	90	100	97	388
Actual cycle	8	80	105	97	777
Signal group 1	8	36	59	51	410
Signal group 2	8	36	59	51	410
Signal group 3	9	28	39	34	307
Signal group 7	9	12	13	12	110
Signal group 8	8	30	53	45	362
Signal group 9	9	12	13	12	115
Signal group 10	9	12	13	12	115

Tuesday, 16 March 2021, 5:00:00 PM AEDT to Tuesday, 16 March 2021, 5:15:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	35	71	60	542
B phase	9	28	37	31	287
Nominal cycle length	7	81	100	90	636
Active cycle length	7	81	100	90	636
Actual cycle	8	70	102	93	749
Split plan 1	2	100	100	100	200
Split plan 2	2	100	284	192	384
Split plan 3	1	100	100	100	100
Signal group 1	9	30	66	54	490
Signal group 2	9	30	66	54	490
Signal group 3	9	22	31	25	232
Signal group 7	9	8	9	8	74
Signal group 8	9	24	60	48	436
Signal group 9	7	12	13	12	87
Signal group 10	8	12	13	12	101

Tuesday, 16 March 2021, 5:15:00 PM AEDT to Tuesday, 16 March 2021, 5:30:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	57	72	63	568
B phase	8	30	39	33	269
Nominal cycle length	3	90	100	96	290
Active cycle length	3	90	100	96	290
Actual cycle	8	87	110	97	779
Split plan 1	1	90	90	90	90
Split plan 2	1	100	100	100	100
Split plan 3	2	100	200	150	300
Split plan 4	1	100	100	100	100
Signal group 1	9	50	66	57	513
Signal group 2	9	50	66	57	513
Signal group 3	9	24	33	27	248
Signal group 7	9	8	9	8	73
Signal group 8	9	44	60	51	460
Signal group 9	8	12	13	12	99
Signal group 10	8	12	13	12	100

Tuesday, 16 March 2021, 5:30:00 PM AEDT to Tuesday, 16 March 2021, 5:45:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	47	75	66	595
B phase	9	31	32	31	283
Nominal cycle length	2	90	100	95	190
Active cycle length	2	90	100	95	190
Actual cycle	9	78	107	97	878
Split plan 1	1	300	300	300	300
Split plan 2	2	90	190	140	280
Split plan 3	1	90	90	90	90
Signal group 1	9	41	69	60	541
Signal group 2	9	41	69	60	541
Signal group 3	9	25	26	25	229
Signal group 7	10	8	9	8	82
Signal group 8	9	35	63	54	487
Signal group 9	9	12	13	12	112
Signal group 10	9	12	13	12	112

Tuesday, 16 March 2021, 5:45:00 PM AEDT to Tuesday, 16 March 2021, 6:00:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	57	69	64	517
B phase	9	31	38	34	306
Nominal cycle length	4	98	100	99	396
Active cycle length	4	98	100	99	396
Actual cycle	8	92	106	98	791
Split plan 2	2	98	100	99	198
Split plan 3	3	100	100	100	300
Split plan 4	2	98	100	99	198
Signal group 1	8	51	63	58	468
Signal group 2	8	51	63	58	468
Signal group 3	9	25	32	28	252
Signal group 7	9	8	9	8	74
Signal group 8	8	45	57	52	418
Signal group 9	7	12	13	12	88
Signal group 10	9	12	13	12	112

TCS 0109 - George Street / Church Street

Tuesday, 16 March 2021, 8:00:00 AM AEDT to Tuesday, 16 March 2021, 8:15:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	53	70	58	528
B phase	9	19	19	19	171
C phase	9	18	18	18	162
Nominal cycle length	6	90	100	95	574
Active cycle length	6	90	100	95	574
Actual cycle	8	90	107	95	761
Signal group 1	9	47	64	52	474
Signal group 2	9	47	64	52	474
Signal group 3	9	13	13	13	117
Signal group 4	9	12	12	12	108
Signal group 7	9	43	60	48	438
Signal group 8	9	44	61	49	447
Signal group 9	10	6	6	6	60
Signal group 10	9	6	6	6	54

Tuesday, 16 March 2021, 8:15:00 AM AEDT to Tuesday, 16 March 2021, 8:30:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	45	66	54	494
B phase	9	19	19	19	171
C phase	10	18	18	18	180
Nominal cycle length	4	90	99	93	375
Active cycle length	4	90	99	93	375
Actual cycle	9	82	103	91	827
Signal group 1	10	39	60	48	487
Signal group 2	10	39	60	48	487
Signal group 3	9	13	13	13	117
Signal group 4	10	12	12	12	120
Signal group 7	10	35	56	44	447
Signal group 8	10	36	57	45	457
Signal group 9	9	6	6	6	54
Signal group 10	10	6	6	6	60

Tuesday, 16 March 2021, 8:30:00 AM AEDT to Tuesday, 16 March 2021, 8:45:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	44	72	58	527
B phase	10	19	19	19	190
C phase	9	18	18	18	162
Nominal cycle length	3	90	100	95	286
Active cycle length	3	90	100	95	286
Actual cycle	8	81	109	96	770
Signal group 1	9	38	66	52	473
Signal group 2	9	38	66	52	473
Signal group 3	10	13	13	13	130
Signal group 4	10	12	12	12	120
Signal group 7	9	34	62	48	437
Signal group 8	9	35	63	49	446
Signal group 9	10	6	6	6	60
Signal group 10	10	6	6	6	60

Tuesday, 16 March 2021, 8:45:00 AM AEDT to Tuesday, 16 March 2021, 9:00:00 AM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	44	72	60	542
B phase	9	19	19	19	171
C phase	9	18	18	18	162
Nominal cycle length	4	90	100	97	388
Active cycle length	4	90	100	97	388
Actual cycle	9	81	109	97	875
Signal group 1	9	38	66	54	488
Signal group 2	9	38	66	54	488
Signal group 3	9	13	13	13	117
Signal group 4	9	12	12	12	108
Signal group 7	9	34	62	50	452
Signal group 8	9	35	63	51	461
Signal group 9	9	6	6	6	54
Signal group 10	9	6	6	6	54

Tuesday, 16 March 2021, 5:00:00 PM AEDT to Tuesday, 16 March 2021, 5:15:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	29	72	58	526
B phase	9	19	19	19	171
C phase	9	18	18	18	162
Nominal cycle length	7	81	100	90	636
Active cycle length	7	81	100	90	636
Actual cycle	9	66	109	95	859
Signal group 1	9	23	66	52	472
Signal group 2	9	23	66	52	472
Signal group 3	9	13	13	13	117
Signal group 4	9	12	12	12	108
Signal group 7	9	19	62	48	436
Signal group 8	9	20	63	49	445
Signal group 9	9	6	6	6	54
Signal group 10	9	6	6	6	54

Tuesday, 16 March 2021, 5:15:00 PM AEDT to Tuesday, 16 March 2021, 5:30:00 PM AEDT:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	44	74	59	531
B phase	10	19	19	19	190
C phase	9	18	18	18	162
Nominal cycle length	3	90	100	96	290
Active cycle length	3	90	100	96	290
Actual cycle	8	81	111	96	774
Signal group 1	9	38	68	53	477
Signal group 2	9	38	68	53	477
Signal group 3	10	13	13	13	130
Signal group 4	9	12	12	12	108
Signal group 7	9	34	64	49	441
Signal group 8	9	35	65	50	450
Signal group 9	10	6	6	6	60
Signal group 10	9	6	6	6	54

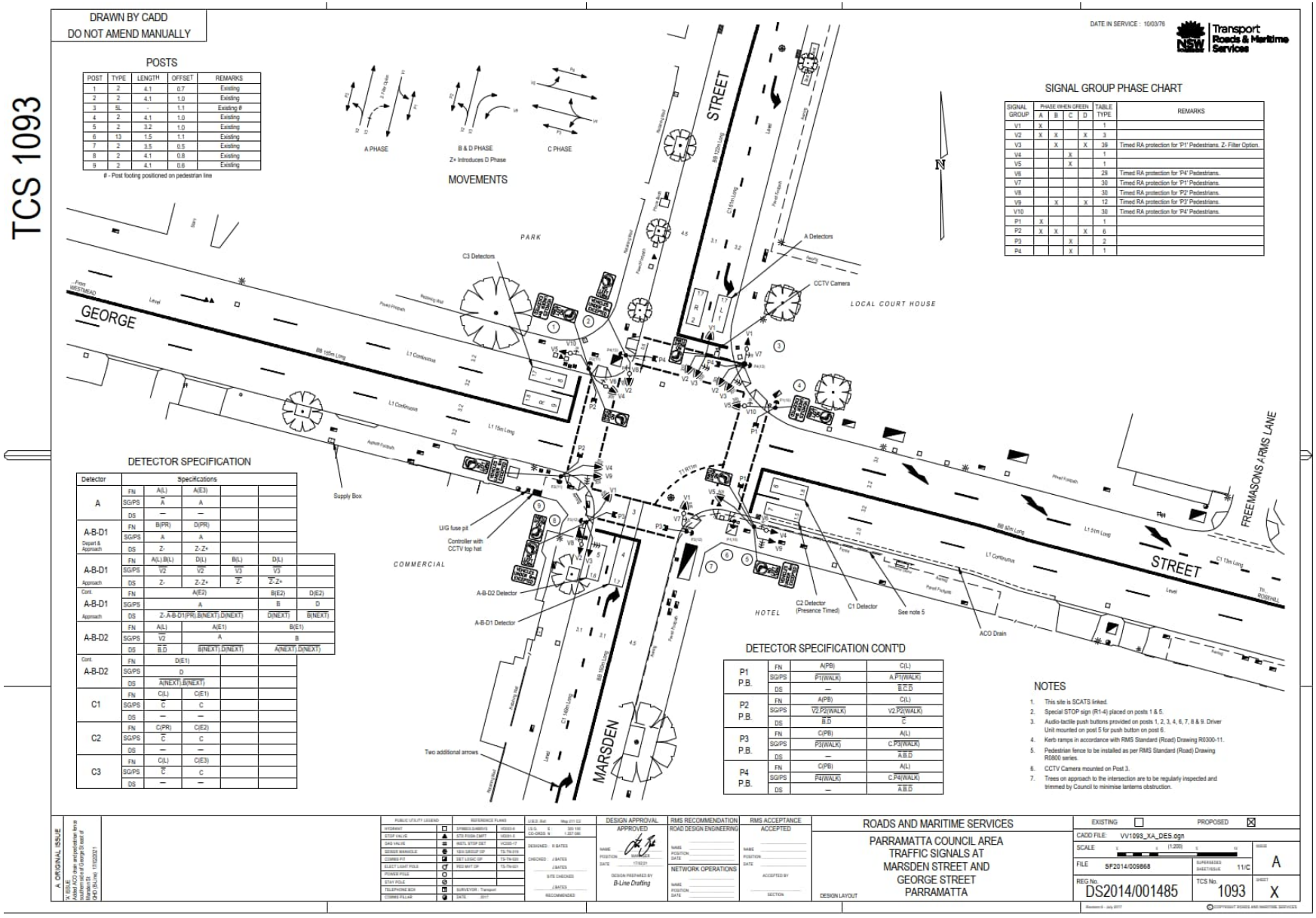
Tuesday, 16 March 2021, 5:30:00 PM AEDT to Tuesday, 16 March 2021, 5:45:00 PM AEDT:

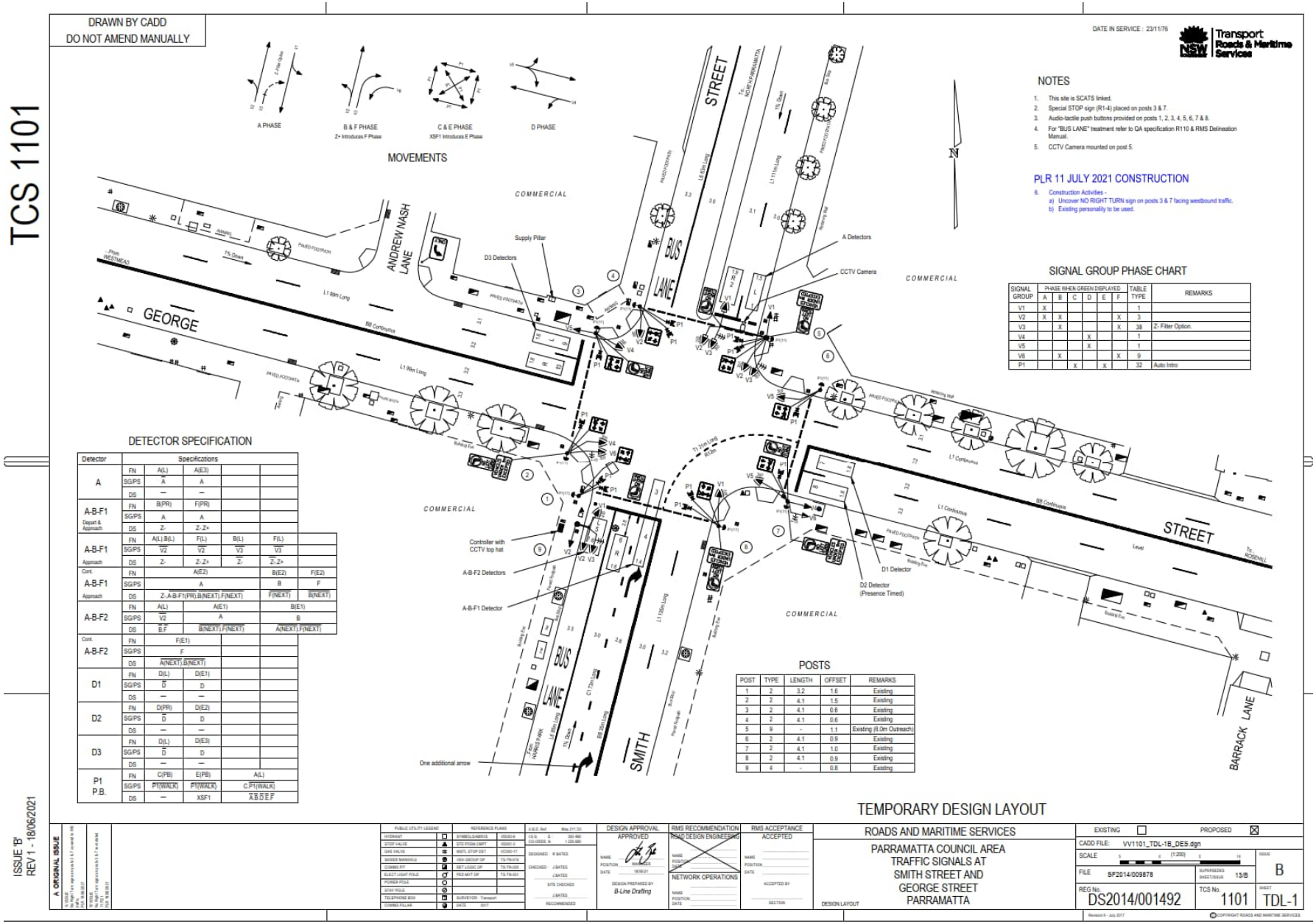
Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	44	72	60	546
B phase	9	19	19	19	171
C phase	9	18	18	18	162
Nominal cycle length	2	90	100	95	190
Active cycle length	2	90	100	95	190
Actual cycle	9	81	109	97	879
Signal group 1	9	38	66	54	492
Signal group 2	9	38	66	54	492
Signal group 3	9	13	13	13	117
Signal group 4	9	12	12	12	108
Signal group 7	9	34	62	50	456
Signal group 8	9	35	63	51	465
Signal group 9	9	6	6	6	54
Signal group 10	9	6	6	6	54

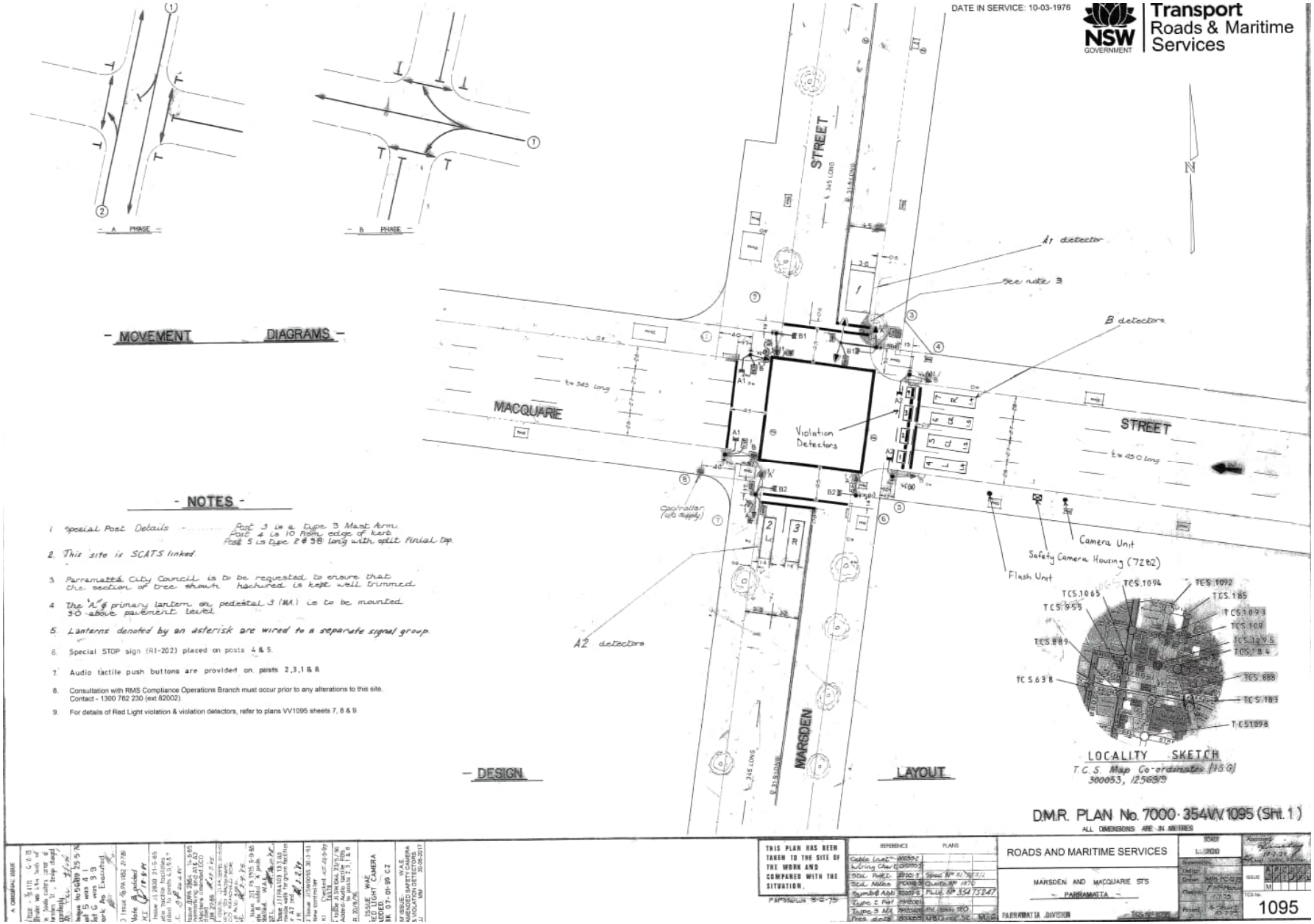
Tuesday, 16 March 2021, 5:45:00 PM AEDT to Tuesday, 16 March 2021, 6:00:00 PM AEDT:

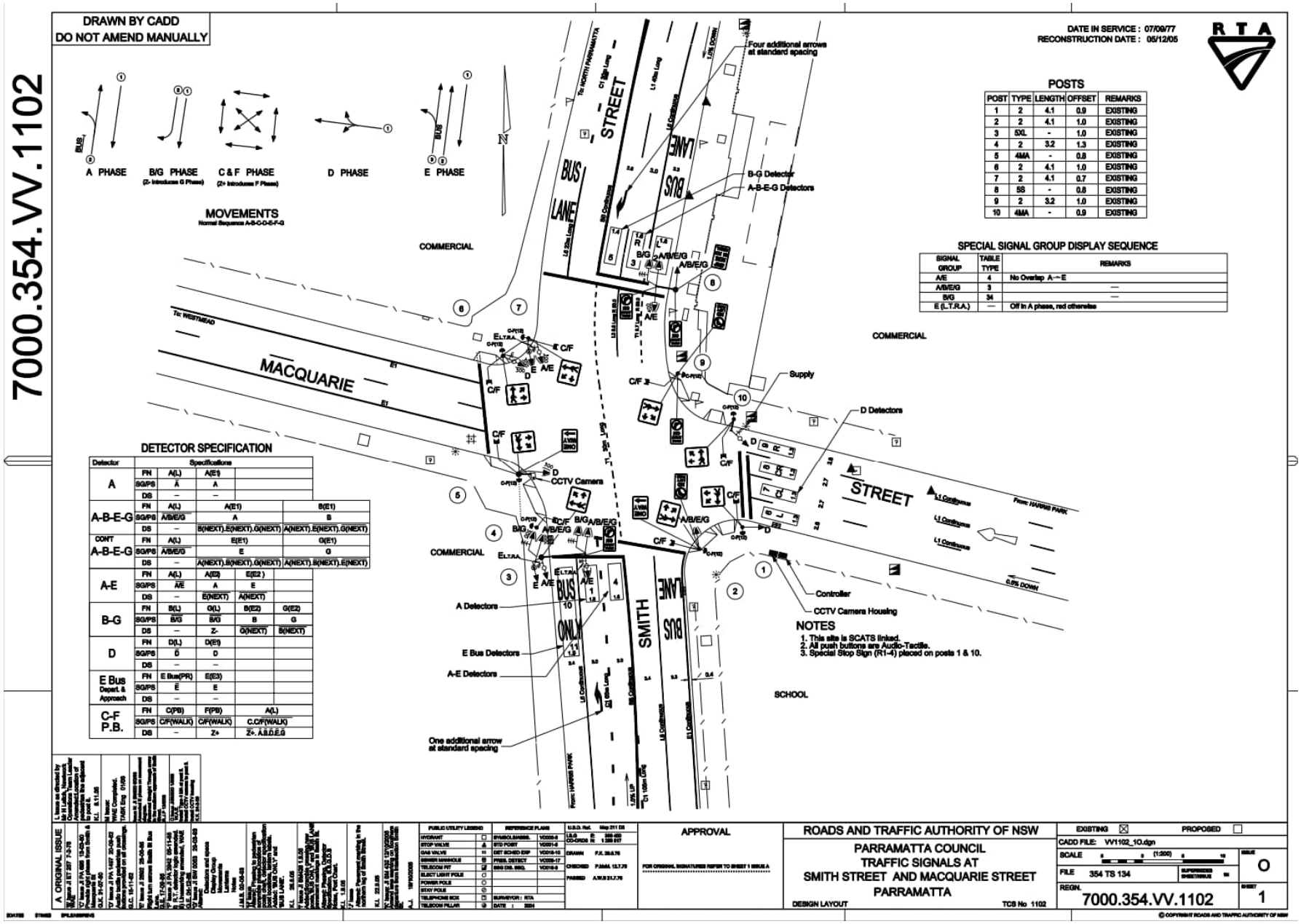
Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	60	64	62	500
B phase	9	19	19	19	171
C phase	9	18	18	18	162
Nominal cycle length	4	98	100	99	396
Active cycle length	4	98	100	99	396
Actual cycle	8	97	101	99	796
Signal group 1	8	54	58	56	452
Signal group 2	8	54	58	56	452
Signal group 3	9	13	13	13	117
Signal group 4	9	12	12	12	108
Signal group 7	8	50	54	52	420
Signal group 8	8	51	55	53	428
Signal group 9	9	6	6	6	54
Signal group 10	9	6	6	6	54

A.4 TCS Plans (Base Model)




DRAWN BY CADD
DO NOT AMEND MANUALLY
TCS 1101
DATE IN SERVICE : 23/11/76
Transport Roads & Maritime Services
NOTES
1. This site is SCATS linked.
2. Special STOP sign (R1-4) placed on posts 3 & 7.
3. Audio-tactile push buttons provided on posts 1, 2, 3, 4, 5, 6, 7 & 8.
4. For "BUS LANE" treatment refer to QA specification R110 & RMS Delineation Manual.
5. CCTV Camera mounted on post 5.
PLR 11 JULY 2021 CONSTRUCTION
6. Construction Activities -
a) Uncover NO RIGHT TURN sign on posts 3 & 7 facing westbound traffic.
b) Existing personality to be used.
A PHASE
B & F PHASE
Z+ Introduces F Phase
C & E PHASE
XSF1 Introduces E Phase
D PHASE
MOVEMENTS
COMMERCIAL
GEORGE STREET
ANDREW NASH LANE
BUS LANE
SMITH STREET
BARRACK LANE
Supply Pillar
D3 Detectors
A Detectors
CCTV Camera
Controller with CCTV top hat
A-B-F2 Detectors
A-B-F1 Detector
D1 Detector
D2 Detector (Presence Timed)
One additional arrow
SIGNAL GROUP PHASE CHART
SIGNAL GROUP | PHASE WHEN GREEN DISPLAYED A B C D E F | TABLE TYPE | REMARKS
V1 X 1
V2 X X X 3
V3 X X 38 Z- Filter Option.
V4 X 1
V5 X 1
V6 X X 9
P1 X X 32 Auto Intro
DETECTOR SPECIFICATION
Detector | Specifications
A: FN A(L) A(E3); SG/PS A A; DS – –
A-B-F1 Depart & Approach: FN B(PR) F(PR); SG/PS A A; DS Z- Z-,Z+
A-B-F1 Approach: FN A(L),B(L) F(L) B(L) F(L); SG/PS V2 V2 V3 V3; DS Z- Z-,Z+ Z- Z-,Z+
A-B-F1 Cont. Approach: FN A(E2) B(E2) F(E2); SG/PS A B F; DS Z-,A-B-F1(PR),B(NEXT),F(NEXT) F(NEXT) B(NEXT)
A-B-F2: FN A(L) A(E1) B(E1); SG/PS V2 A B; DS B,F B(NEXT),F(NEXT) A(NEXT),F(NEXT)
A-B-F2 Cont.: FN F(E1); SG/PS F; DS A(NEXT),B(NEXT)
D1: FN D(L) D(E1); SG/PS D D; DS – –
D2: FN D(PR) D(E2); SG/PS D D; DS – –
D3: FN D(L) D(E3); SG/PS D D; DS – –
P1 P.B.: FN C(PB) E(PB) A(L); SG/PS P1(WALK) P1(WALK) C,P1(WALK); DS – XSF1 A,B,D,E,F
POSTS
POST | TYPE | LENGTH | OFFSET | REMARKS
1 2 3.2 1.6 Existing
2 2 4.1 1.5 Existing
3 2 4.1 0.6 Existing
4 2 4.1 0.6 Existing
5 9 - 1.1 Existing (0.0m Outreach)
6 2 4.1 0.9 Existing
7 2 4.1 1.0 Existing
8 2 4.1 0.9 Existing
9 4 - 0.8 Existing
TEMPORARY DESIGN LAYOUT
ISSUE 'B'
REV 1 - 18/06/2021
A. ORIGINAL ISSUE
DESIGN APPROVAL APPROVED
RMS RECOMMENDATION ROAD DESIGN ENGINEERING
NETWORK OPERATIONS
RMS ACCEPTANCE ACCEPTED
ROADS AND MARITIME SERVICES
PARRAMATTA COUNCIL AREA
TRAFFIC SIGNALS AT
SMITH STREET AND
GEORGE STREET
PARRAMATTA
DESIGN LAYOUT
EXISTING PROPOSED
CADD FILE: VV1101_TDL-1B_DES.dgn
SCALE (1:200)
FILE SF2014/009878
SUPERSEDES SHEET/ISSUE 13/B
ISSUE B
REG No. DS2014/001492
TCS No. 1101
SHEET TDL-1


DATE IN SERVICE: 10-03-1976
Transport Roads & Maritime Services
NSW GOVERNMENT
- MOVEMENT DIAGRAMS -
- A PHASE -
- B PHASE -
- NOTES -
1. Special Post Details - Post 3 is a Type 3 Mast Arm. Post 4 is 10 from edge of kerb. Post 5 is Type 2 @ 3.8 long with split finial top.
2. This site is SCATS linked.
3. Parramatta City Council is to be requested to ensure that the section of tree shown hachured is kept well trimmed.
4. The 'A' & primary lantern on pedestal 3 (MA) is to be mounted 3.0 above pavement level.
5. Lanterns denoted by an asterisk are wired to a separate signal group.
6. Special STOP sign (R1-202) placed on posts 4 & 5.
7. Audio tactile push buttons are provided on posts 2,3,1 & 8.
8. Consultation with RMS Compliance Operations Branch must occur prior to any alterations to this site. Contact - 1300 782 230 (ext 82002)
9. For details of Red Light violation & violation detectors, refer to plans VV1095 sheets 7, 8 & 9.
- DESIGN -
- LAYOUT -
MACQUARIE STREET
MARSDEN STREET
A1 detector
see note 3
B detectors
Violation Detectors
A2 detectors
Controller (c/w supply)
Flash Unit
Safety Camera Housing (7282)
Camera Unit
LOCALITY SKETCH
T.C.S. Map Co-ordinates (15 Q) 300053, 6256979
TCS 1094
TCS 1092
TCS 1065
TCS 1085
TCS 955
TCS 1093
TCS 1091
TCS 889
TCS 1095
TCS 884
TCS 638
TCS 888
TCS 183
TCS 1098
D.M.R. PLAN No. 7000-354 VV 1095 (Sht. 1)
ALL DIMENSIONS ARE IN METRES
THIS PLAN HAS BEEN TAKEN TO THE SITE OF THE WORK AND COMPARED WITH THE SITUATION.
ROADS AND MARITIME SERVICES
MARSDEN AND MACQUARIE ST'S
- PARRAMATTA -
PARRAMATTA DIVISION
1095

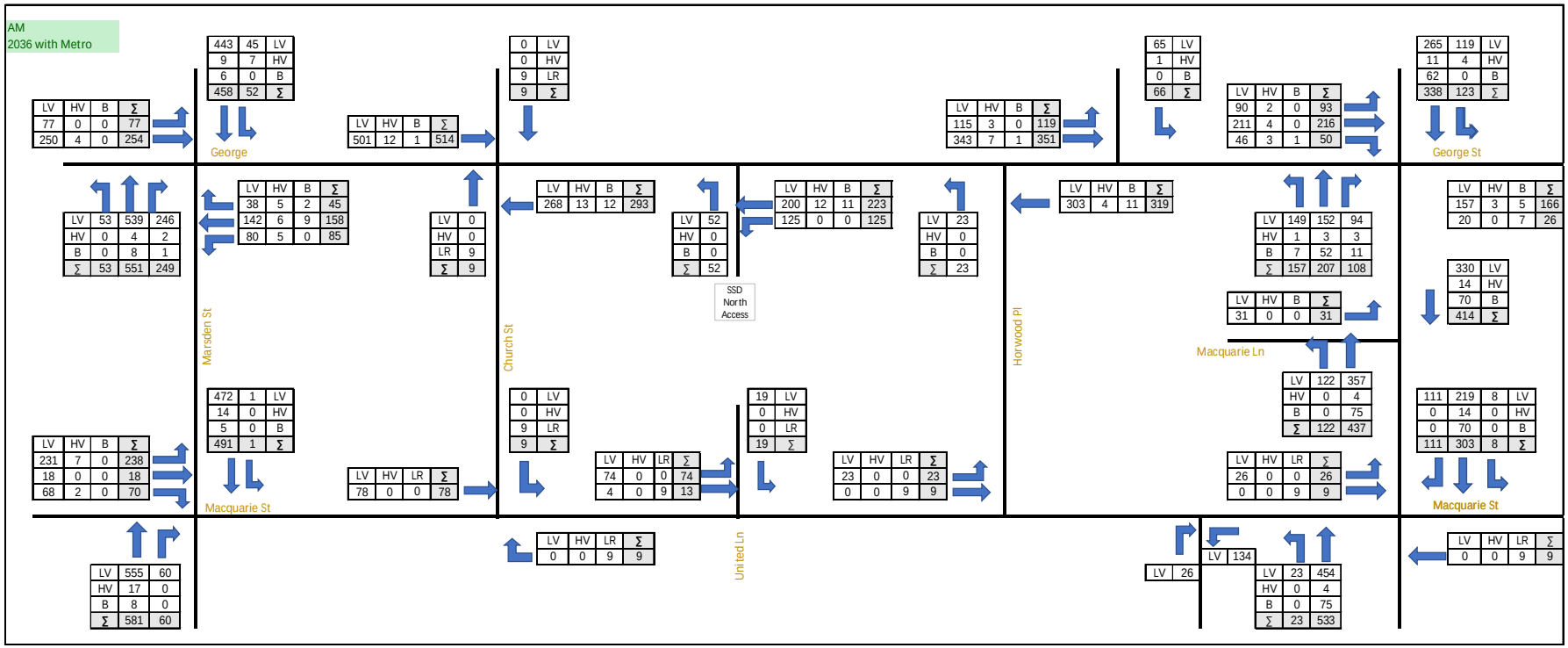


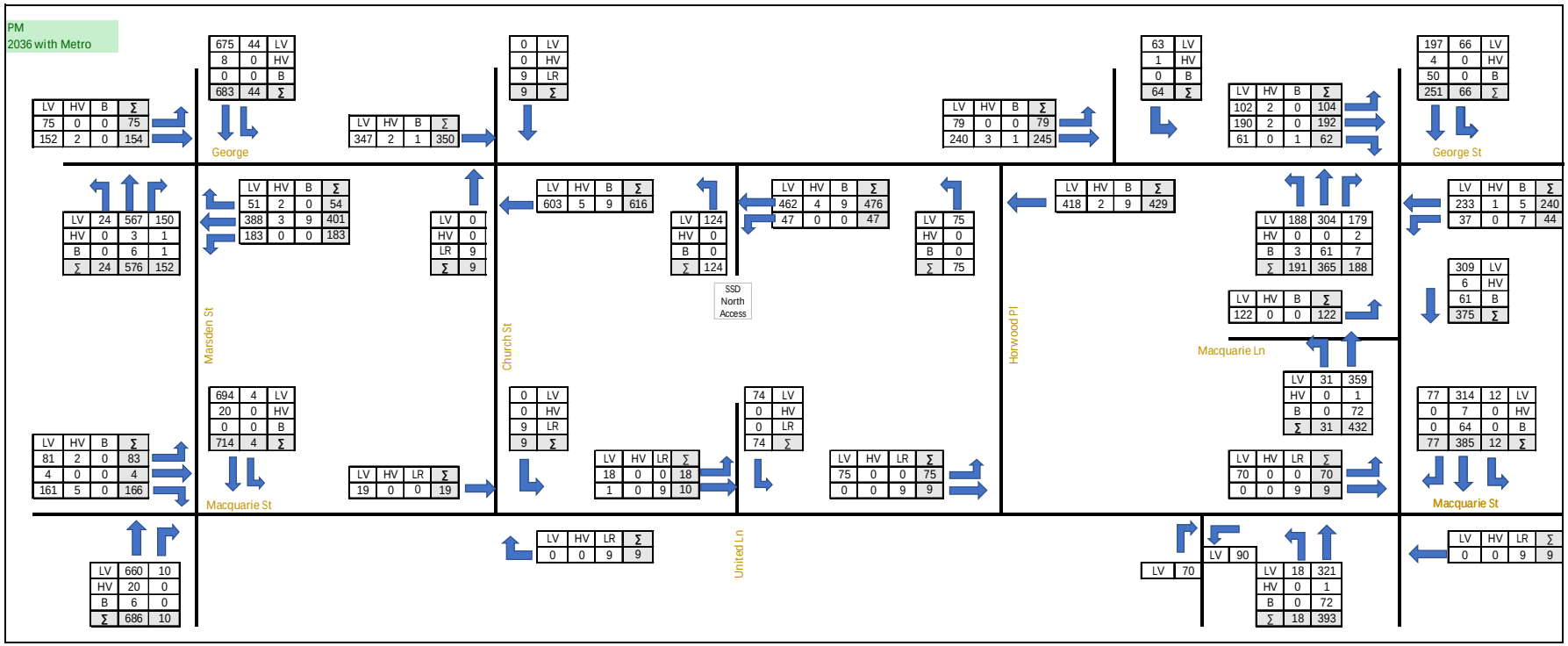
POST	TYPE	LENGTH	OFFSET	REMARKS
1	2	4.1	0.9	EXISTING
2	2	4.1	1.0	EXISTING
3	5XL	-	1.0	EXISTING
4	2	3.2	1.3	EXISTING
5	4MA	-	0.8	EXISTING
6	2	4.1	1.0	EXISTING
7	2	4.1	0.7	EXISTING
8	5S	-	0.8	EXISTING
9	2	3.2	1.0	EXISTING
10	4MA	-	0.9	EXISTING

SIGNAL GROUP	TABLE TYPE	REMARKS
A/E	4	No Overlap A→E
A/B/E/G	3	—
B/G	34	—
E (L.T.R.A.)	—	Off in A phase, red otherwise

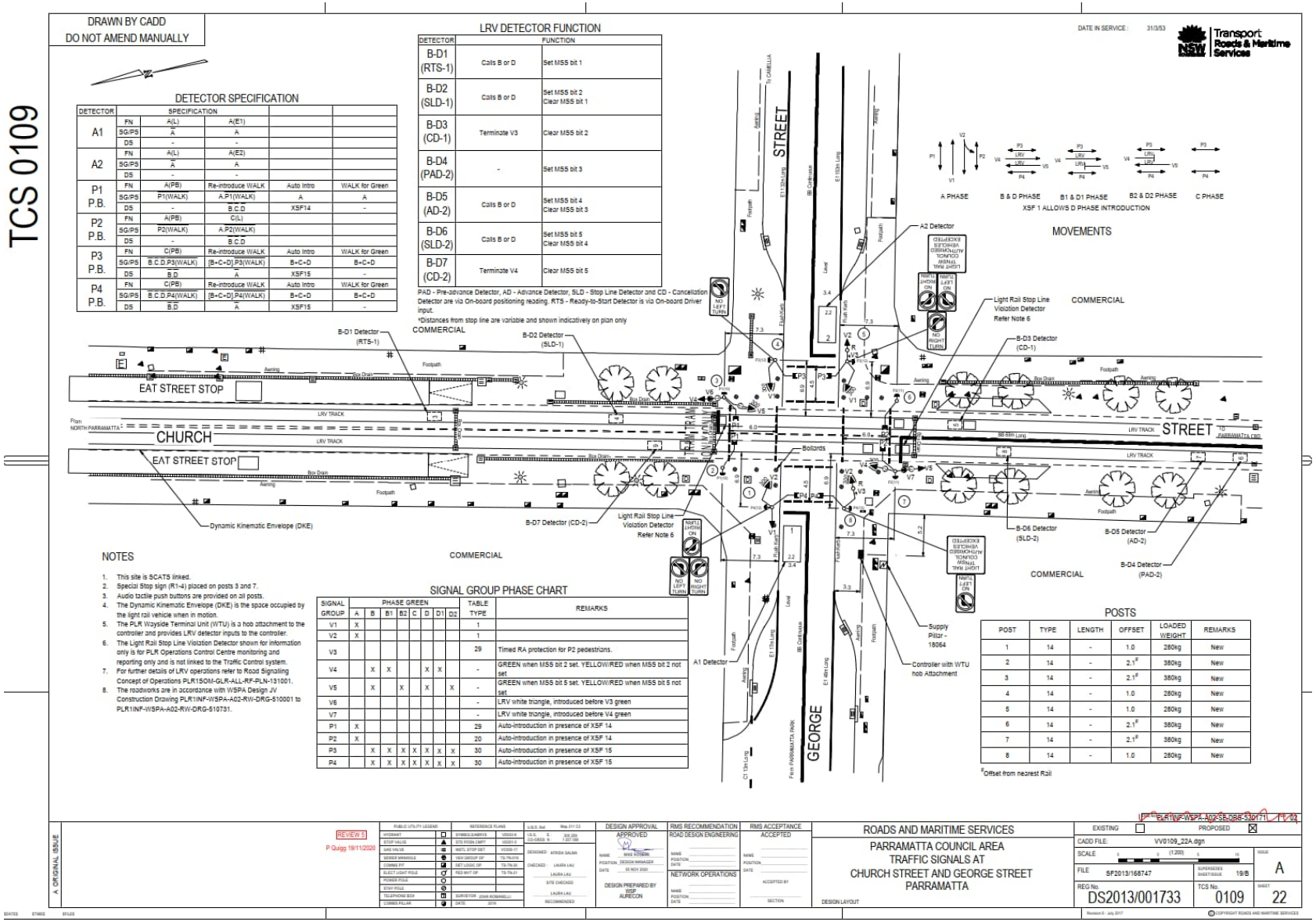
Detector		Specifications			
A	FN	A(L)	A(E1)		
	SG/PS	A	A		
	DS	–	–		
A-B-E-G	FN	A(L)	A(E1)		B(E1)
	SG/PS	A/B/E/G	A		B
	DS	–	B(NEXT),E(NEXT),G(NEXT)		A(NEXT),E(NEXT),G(NEXT)
CONT A-B-E-G	FN	A(L)	E(E1)		G(E1)
	SG/PS	A/B/E/G	E		G
	DS	–	A(NEXT),B(NEXT),G(NEXT)		A(NEXT),B(NEXT),E(NEXT)
A-E	FN	A(L)	A(E2)	E(E2)	
	SG/PS	A/E	A	E	
	DS	–	E(NEXT)	A(NEXT)	
B-G	FN	B(L)	G(L)	B(E2)	G(E2)
	SG/PS	B/G	B/G	B	G
	DS	–	Z-	G(NEXT)	B(NEXT)
D	FN	D(L)	D(E)		
	SG/PS	D	D		
	DS	–	–		
E Bus Depart. & Approach	FN	E Bus(PR)	E(E3)		
	SG/PS	E	E		
	DS	–	–		
C-F P.B.	FN	C(PB)	F(PB)	A(L)	
	SG/PS	C/F(WALK)	C/F(WALK)	C.C/F(WALK)	
	DS	–	Z+	Z+, A,B,D,E,G	

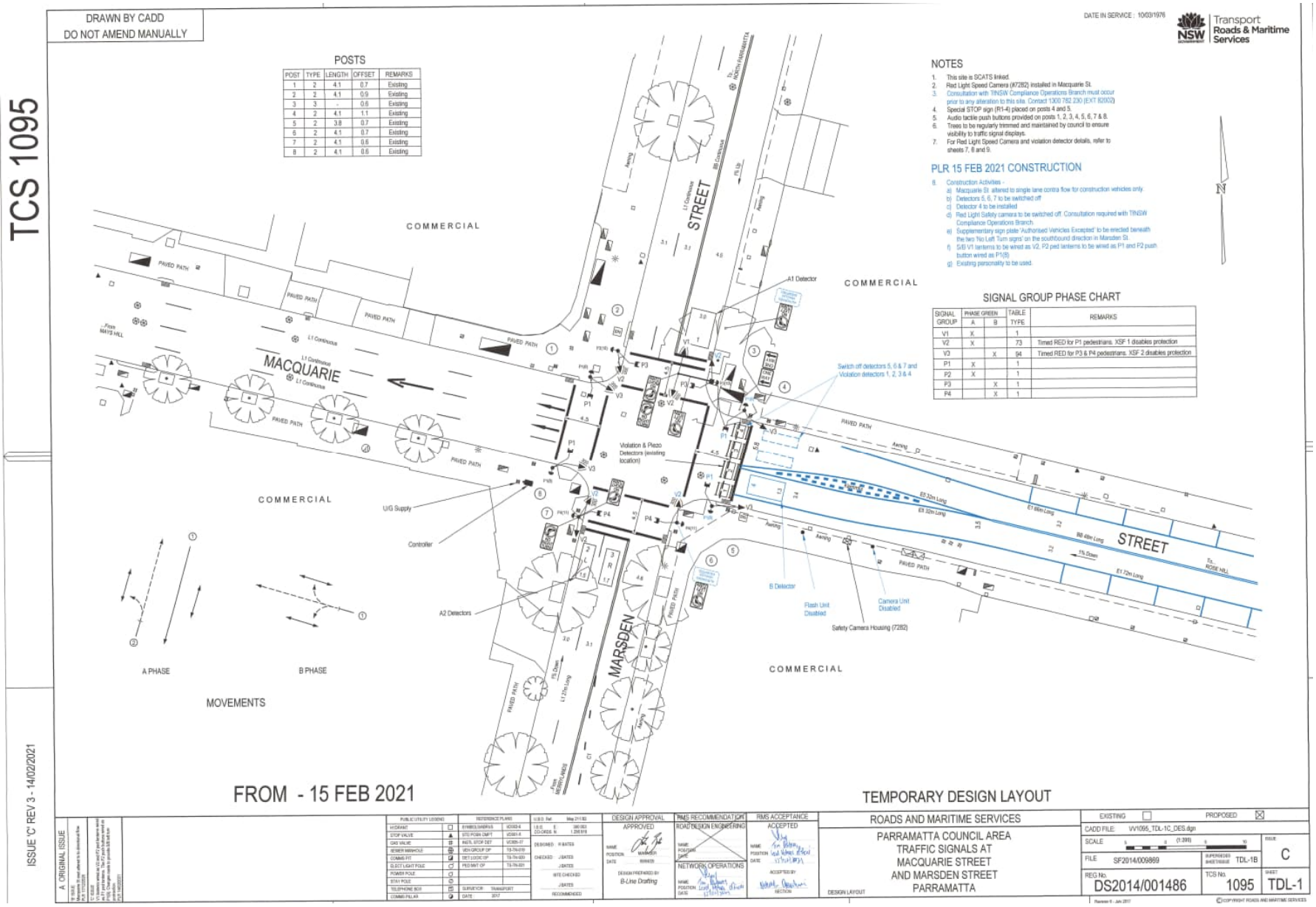
A.5 Future Scenario Traffic Flow




PM
2036 with Metro
George
George St
Marsden St
Church St
SSD
North
Access
Horwood Pl
Macquarie Ln
Macquarie St
Macquarie St
United Ln

A.6 TCS Plans (Future Model)




DRAWN BY CADD
DO NOT AMEND MANUALLY
TCS 1095
ISSUE 'C' REV 3 - 14/02/2021
A. ORIGINAL ISSUE
DATE IN SERVICE : 10/03/1976
Transport Roads & Maritime Services
POSTS
POST TYPE LENGTH OFFSET REMARKS
1 2 4.1 0.7 Existing
2 2 4.1 0.9 Existing
3 3 - 0.6 Existing
4 2 4.1 1.1 Existing
5 2 3.8 0.7 Existing
6 2 4.1 0.7 Existing
7 2 4.1 0.6 Existing
8 2 4.1 0.6 Existing
NOTES
1. This site is SCATS linked.
2. Red Light Speed Camera (#7282) installed in Macquarie St.
3. Consultation with TfNSW Compliance Operations Branch must occur prior to any alteration to this site. Contact 1300 782 230 (EXT 82002)
4. Special STOP sign (R1-4) placed on posts 4 and 5.
5. Audio tactile push buttons provided on posts 1, 2, 3, 4, 5, 6, 7 & 8.
6. Trees to be regularly trimmed and maintained by council to ensure visibility to traffic signal displays.
7. For Red Light Speed Camera and violation detector details, refer to sheets 7, 8 and 9.
PLR 15 FEB 2021 CONSTRUCTION
8. Construction Activities -
a) Macquarie St altered to single lane contra flow for construction vehicles only.
b) Detectors 5, 6, 7 to be switched off
c) Detector 4 to be installed
d) Red Light Safety camera to be switched off. Consultation required with TfNSW Compliance Operations Branch.
e) Supplementary sign plate 'Authorised Vehicles Excepted' to be erected beneath the two 'No Left Turn signs' on the southbound direction in Marsden St.
f) S/B V1 lanterns to be wired as V2, P2 ped lanterns to be wired as P1 and P2 push button wired as P1(B)
g) Existing personality to be used.
SIGNAL GROUP PHASE CHART
SIGNAL GROUP A B TABLE TYPE REMARKS
V1 X 1
V2 X 73 Timed RED for P1 pedestrians. XSF 1 disables protection
V3 X 94 Timed RED for P3 & P4 pedestrians. XSF 2 disables protection
P1 X 1
P2 X 1
P3 X 1
P4 X 1
COMMERCIAL
MACQUARIE
STREET
MARSDEN
PAVED PATH
A1 Detector
B Detector
A2 Detectors
U/G Supply
Controller
Violation & Piezo Detectors (existing location)
Switch off detectors 5, 6 & 7 and Violation detectors 1, 2, 3 & 4
Flash Unit Disabled
Camera Unit Disabled
Safety Camera Housing (7282)
A PHASE
B PHASE
MOVEMENTS
FROM - 15 FEB 2021
TEMPORARY DESIGN LAYOUT
DESIGN APPROVAL
APPROVED
B-Line Drafting
RMS RECOMMENDATION
ROAD DESIGN ENGINEERING
NETWORK OPERATIONS
RMS ACCEPTANCE
ACCEPTED
ROADS AND MARITIME SERVICES
PARRAMATTA COUNCIL AREA
TRAFFIC SIGNALS AT
MACQUARIE STREET
AND MARSDEN STREET
PARRAMATTA
DESIGN LAYOUT
EXISTING
PROPOSED
CADD FILE: VV1095_TDL-1C_DES.dgn
SCALE (1:200)
FILE: SF2014/009869
REG No. DS2014/001486
TCS No. 1095
ISSUE C
SUPERSEDES DWG/ISSUE TDL-1B
SHEET TDL-1

TCS 0184

DRAWN BY CADD
DO NOT AMEND MANUALLY

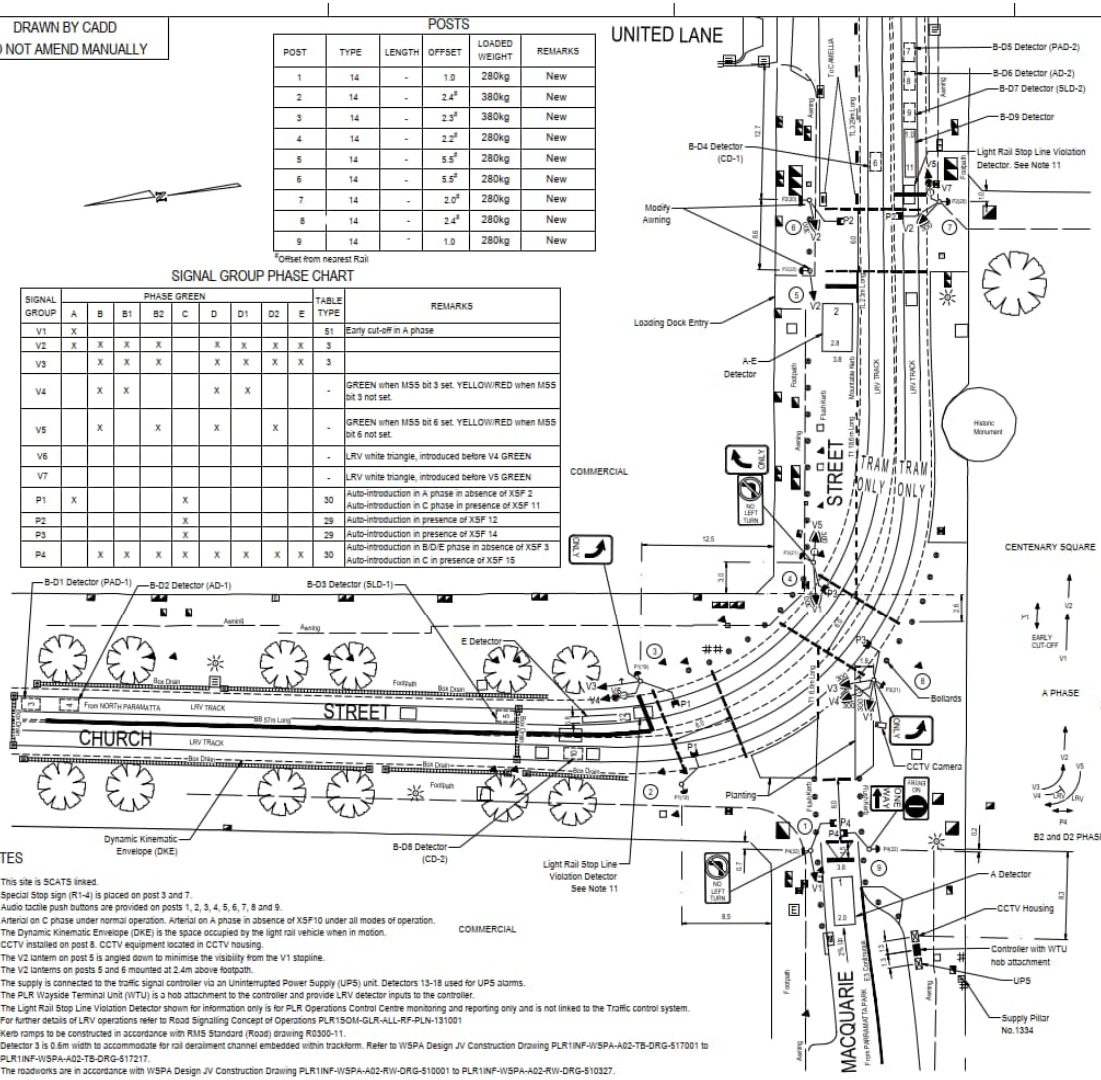
POSTS

POST	TYPE	LENGTH	OFFSET	LOADED WEIGHT	REMARKS
1	14	-	1.0	280kg	New
2	14	-	2.4#	380kg	New
3	14	-	2.3#	380kg	New
4	14	-	2.2#	280kg	New
5	14	-	5.5#	280kg	New
6	14	-	5.5#	280kg	New
7	14	-	2.0#	280kg	New
8	14	-	2.4#	280kg	New
9	14	-	1.0	280kg	New

#Offset from nearest Rail

SIGNAL GROUP PHASE CHART

SIGNAL GROUP	PHASE GREEN									TABLE TYPE	REMARKS
	A	B	B1	B2	C	D	D1	D2	E		
V1	X									51	Early cut-off in A phase
V2	X	X	X	X		X	X	X	X	3	
V3		X	X	X		X	X	X	X	3	
V4		X	X			X	X			-	GREEN when MS5 bit 3 set. YELLOW/RED when MS5 bit 3 not set.
V5		X		X		X		X		-	GREEN when MS5 bit 6 set. YELLOW/RED when MS5 bit 6 not set.
V6										-	LRV white triangle, introduced before V4 GREEN
V7										-	LRV white triangle, introduced before V5 GREEN
P1	X				X					30	Auto-introduction in A phase in absence of X5F 2 Auto-introduction in C phase in presence of X5F 11
P2					X					29	Auto-introduction in presence of X5F 12
P3					X					29	Auto-introduction in presence of X5F 14
P4		X	X	X	X	X	X	X	X	30	Auto-introduction in B/D/E phase in absence of X5F 3 Auto-introduction in C in presence of X5F 15



DETECTOR SPECIFICATION

DATE IN SERVICE : 18/05/61

DETECTOR	SPECIFICATION					
A	FN	A(L)	A(E1)			
	SG/PS	$\overline{A}$	A			
	DS	-	-			
A-E	FN	A(L)	A(E2)	E(E2)		
	SG/PS	$\overline{A}$	A	E		
	DS	-	RED NEXT	RED NEXT		
B-D9	FN	B(L)	B(E1)	D(E1)		
	SG/PS	$\overline{V3}$	V3	V3		
	DS	$\overline{D}$	$\overline{D(NEXT)}$	$\overline{B(NEXT)}$		
E	FN	E(PR)	E(E1)			
	SG/PS	$\overline{V3}$	V3			
	DS	MS53	-			
P1 P.B.	FN	C(PB)	Re-introduce WALK	Auto Intro	Auto Intro	WALK for GREEN
	SG/PS	A.C.P1(WALK)	[A+C].P1(WALK)	A	C	A+C
	DS	$\overline{A}$	$\overline{B.D.E}$	X5F2	X5F11	-
P2 P.B.	FN	C(PB)	Re-introduce WALK	Auto Intro	WALK for GREEN	
	SG/PS	P2(WALK)	C. P2(WALK)	C	C	
	DS	-	$\overline{A.B.D.E}$	X5F12	-	
P3 P.B.	FN	C(PB)	Re-introduce WALK	Auto Intro	WALK for GREEN	
	SG/PS	P3(WALK)	C. P3(WALK)	C	C	
	DS	-	$\overline{A.B.D.E}$	X5F14	-	
P4 P.B.	FN	C(PB)	Re-introduce WALK	Auto Intro	Auto Intro	WALK for GREEN
	SG/PS	B.C.D.E.P4(WALK)	C.P4(WALK)	B+D+E	C	C
	DS	$\overline{B.D.E}$	$\overline{A.B.D.E}$	X5F3	X5F15	-

LRV DETECTOR FUNCTION

DETECTOR	FUNCTION	
B-D1 (PAD-1)	-	Set MS5 bit 1
B-D2 (AD-1)	Calls B or D	Clear MS5 bit 1 Set MS5 bit 2
B-D3 (SLD-1)	Calls B or D	Clear MS5 bit 2 Set MS5 bit 3
B-D4 (CD-1)	Terminates V4	Clear MS5 bit 3
B-D5 (PAD-2)	-	Set MS5 bit 4
B-D6 (AD-2)	Calls B or D	Clear MS5 bit 4 Set MS5 bit 5
B-D7 (SLD-2)	Calls B or D	Clear MS5 bit 5 Set MS5 bit 6
B-D8 (CD-2)	Terminates V5	Clear MS5 bit 6

PAD - Pre-advance Detector, AD - Advance Detector, SLD - Stop Line Detector and CD - Cancellation Detector are via On-board positioning reading. RTS - Ready-to-Start Detector is via On-board Driver input.
*Distances from stop line are variable and shown indicatively on plan only

MOVEMENTS
Normal Sequence: CDABE
Alternate Sequence: ABCDE

NOTES

1. This site is SCATS linked.
2. Special Stop sign (R1-4) is placed on post 3 and 7.
3. Audio tactile push buttons are provided on posts 1, 2, 3, 4, 5, 6, 7, 8 and 9.
4. Arterial on C phase under normal operation. Arterial on A phase in absence of X5F10 under all modes of operation.
5. The Dynamic Kinematic Envelope (DKE) is the space occupied by the light rail vehicle when in motion.
6. CCTV installed on post 8. CCTV equipment located in CCTV housing.
7. The V2 lantern on post 5 is angled down to minimise the visibility from the V1 stopline.
8. The V2 lanterns on posts 5 and 6 mounted at 2.4m above footpath.
9. The supply is connected to the traffic signal controller via an Uninterrupted Power Supply (UPS) unit. Detectors 13-18 used for UPS alarms.
10. The PLR Wayside Terminal Unit (WTU) is a hob attachment to the controller and provide LRV detector inputs to the controller.
11. The Light Rail Stop Line Violation Detector shown for information only is for PLR Operations Control Centre monitoring and reporting only and is not linked to the Traffic control system.
12. For further details of LRV operations refer to Road Signalling Concept of Operations PLR1SOM-GLR-ALL-RF-PLN-131001
13. Kerb ramps to be constructed in accordance with RMS Standard (Road) drawing R0300-11.
14. Detector 3 is 0.6m width to accommodate for rail derailment channel embedded within trackform. Refer to WSPA Design JV Construction Drawing PLR1INF-WSPA-A02-TB-DRG-517001 to PLR1INF-WSPA-A02-TB-DRG-517217.
15. The roadworks are in accordance with WSPA Design JV Construction Drawing PLR1INF-WSPA-A02-RW-DRG-510001 to PLR1INF-WSPA-A02-RW-DRG-510327.

A ORIGINAL ISSUE

DESIGN APPROVAL: APPROVED — MIKE ROGERS, DESIGN MANAGER, 01 APR 2021
DESIGN PREPARED BY: WSP AURECON
DESIGNED: AFRIDA SALMA
CHECKED: JO PAYNE, LAURA LAU
SITE CHECKED: LAURA LAU
RECOMMENDED
RMS RECOMMENDATION: ROAD DESIGN ENGINEERING; NETWORK OPERATIONS
RMS ACCEPTANCE: ACCEPTED

ROADS AND MARITIME SERVICES
PARRAMATTA COUNCIL AREA
TRAFFIC SIGNALS AT
CHURCH STREET AND MACQUARIE STREET
PARRAMATTA
DESIGN LAYOUT

DRG No. PLR1INF-WSPA-A02-SE-DRG-520181 REV 04
EXISTING ☐ PROPOSED ☒
CADD FILE: VV0184_A18.dgn
SCALE 1:200
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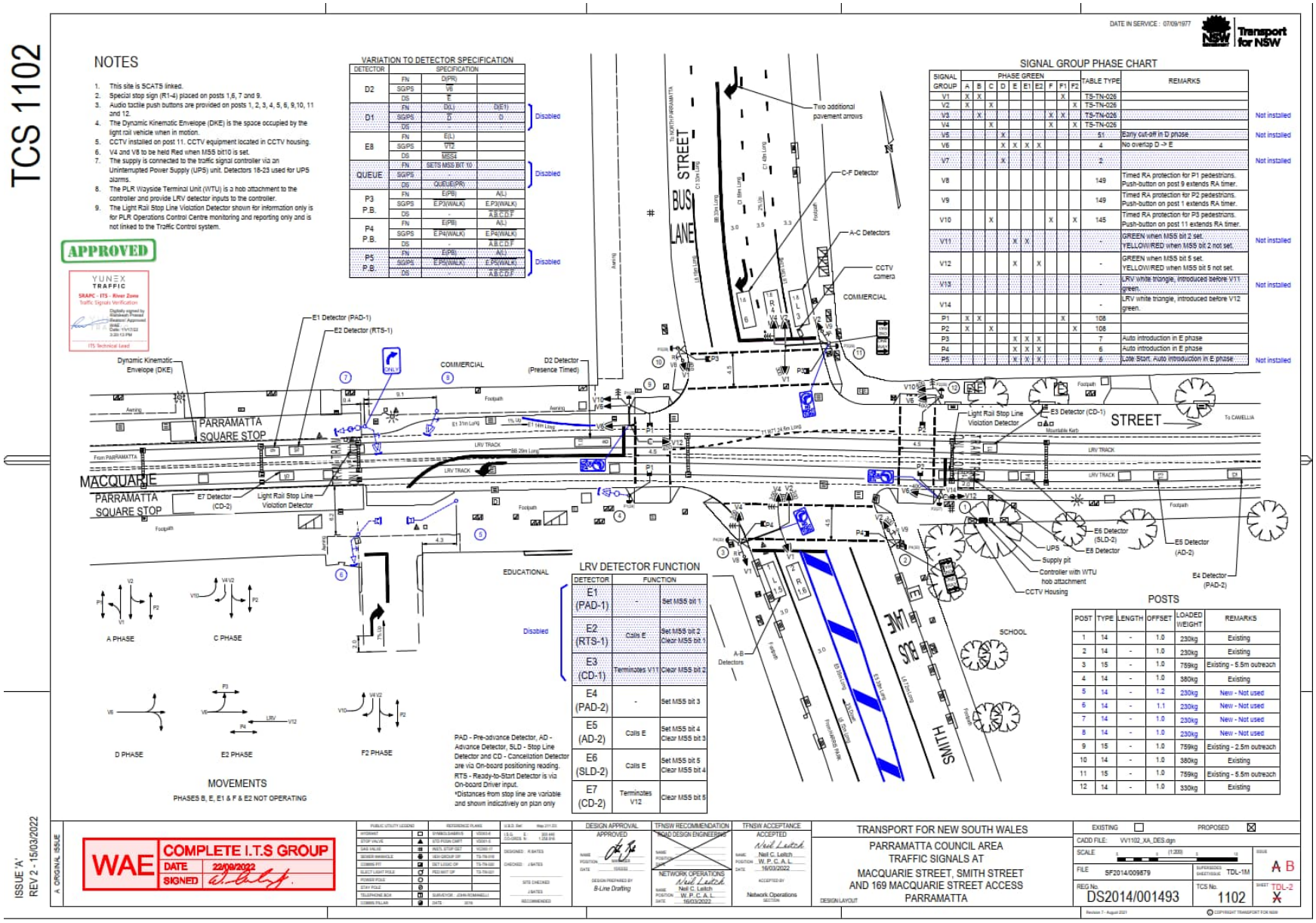

VARIATION TO DETECTOR SPECIFICATION			
DETECTOR		SPECIFICATION	
D2	FN	D(PR)	
	SG/PS	V6	
	DS	E	
D1	FN	D(L)	D(E1)
	SG/PS	D	D
	DS	-	
E8	FN	E(L)	
	SG/PS	V12	
	DS	MS4	
QUEUE	FN	SETS MS5 BIT 10	
	SG/PS	-	
	DS	QUEUE(PR)	
P3 P.B.	FN	E(PB)	A(L)
	SG/PS	E.P3(WALK)	E.P3(WALK)
	DS	-	A.B.C.D.F
P4 P.B.	FN	E(PB)	A(L)
	SG/PS	E.P4(WALK)	E.P4(WALK)
	DS	-	A.B.C.D.F
P5 P.B.	FN	E(PB)	A(L)
	SG/PS	E.P5(WALK)	E.P5(WALK)
	DS	-	A.B.C.D.F

Disabled
Disabled
Disabled

SIGNAL GROUP	PHASE GREEN A	B	C	D	E	E1	E2	F	F1	F2	TABLE TYPE	REMARKS	
V1	X	X							X		TS-TN-026		
V2	X		X							X	TS-TN-026		
V3		X						X	X		TS-TN-026		Not installed
V4			X					X		X	TS-TN-026		
V5				X							51	Early cut-off in D phase.	Not installed
V6				X	X	X	X				4	No overlap D -> E	
V7				X							2		Not installed
V8											149	Timed RA protection for P1 pedestrians. Push-button on post 9 extends RA timer.	
V9											149	Timed RA protection for P2 pedestrians. Push-button on post 1 extends RA timer.	
V10			X					X		X	145	Timed RA protection for P3 pedestrians. Push-button on post 11 extends RA timer.	
V11					X	X					-	GREEN when MS5 bit 2 set. YELLOW/RED when MS5 bit 2 not set.	Not installed
V12					X		X				-	GREEN when MS5 bit 5 set. YELLOW/RED when MS5 bit 5 not set.	
V13											-	LRV white triangle, introduced before V11 green.	Not installed
V14											-	LRV white triangle, introduced before V12 green.	
P1	X	X							X		108		
P2	X		X							X	108		
P3					X	X	X				7	Auto introduction in E phase	
P4					X	X	X				6	Auto introduction in E phase	
P5					X	X	X				6	Late Start, Auto introduction in E phase	Not installed

POSTS					
POST	TYPE	LENGTH	OFFSET	LOADED WEIGHT	REMARKS
1	14	-	1.0	230kg	Existing
2	14	-	1.0	230kg	Existing
3	15	-	1.0	759kg	Existing - 5.5m outreach
4	14	-	1.0	380kg	Existing
5	14	-	1.2	230kg	New - Not used
6	14	-	1.1	230kg	New - Not used
7	14	-	1.0	230kg	New - Not used
8	14	-	1.0	230kg	New - Not used
9	15	-	1.0	759kg	Existing - 2.5m outreach
10	14	-	1.0	380kg	Existing
11	15	-	1.0	759kg	Existing - 5.5m outreach
12	14	-	1.0	330kg	Existing

LRV DETECTOR FUNCTION		
DETECTOR	FUNCTION	
E1 (PAD-1)	-	Set MS5 bit 1
E2 (RTS-1)	Calls E	Set MS5 bit 2 Clear MS5 bit 1
E3 (CD-1)	Terminates V11	Clear MS5 bit 2
E4 (PAD-2)	-	Set MS5 bit 3
E5 (AD-2)	Calls E	Set MS5 bit 4 Clear MS5 bit 3
E6 (SLD-2)	Calls E	Set MS5 bit 5 Clear MS5 bit 4
E7 (CD-2)	Terminates V12	Clear MS5 bit 5