MINUTES

WORKS AND URBAN DEVELOPMENT COMMITTEE

22 MARCH 2016

APPROVED FOR RELEASE

MARTIN MILEHAM
CHIEF EXECUTIVE OFFICER

CITY of PERTH

MINUTES

WORKS AND URBAN DEVELOPMENT COMMITTEE

22 MARCH 2016

THESE MINUTES ARE HEREBY CERTIFIED AS CONFIRMED

PRESIDING MEMBER'S SIGNATURE

DATE:---------- 12/4/2016.

WORKS AND URBAN DEVELOPMENT COMMITTEE

INDEX

Minutes of the meeting of the City of Perth **Works and Urban Development Committee** held in Committee Room 1, Ninth Floor, Council House, 27 St Georges Terrace, Perth on **Tuesday, 22 March 2016**.

MEMBERS IN ATTENDANCE

Cr McEvoy - Acting Presiding Member
Cr Harley (Deputy)

OFFICERS

Mr Mileham - Chief Executive Officer
Mr Ridgwell - Manager Governance
Mr Watts - Manager Transport
Ms Mannolini - Lead City Designer (departed the meeting at 5.56pm)
Ms Denton - Governance Coordinator
Ms Best - Governance and Risk Officer

GUESTS AND DEPUTATIONS

Nil

WK38/16 DECLARATION OF OPENING

In accordance with Section 5.6 of the *Local Government Act 1995,* the Chief Executive Officer sought nominations for a member to preside over the meeting.

Cr Harley nominated Cr McEvoy to preside over the meeting.

Cr McEvoy accepted the nomination.

There being no further nominations, Cr McEvoy accepted the nomination and assumed the Chair.

5.54pm The Acting Presiding Member declared the meeting open.

WK39/16 APOLOGIES AND MEMBERS ON LEAVE OF ABSENCE

Cr Limnios (Apology)
The Lord Mayor (Apology)

WK40/16 QUESTION TIME FOR THE PUBLIC

Nil

WK41/16 CONFIRMATION OF MINUTES

Moved by Cr Harley, seconded by Cr McEvoy

That the minutes of the meeting of the Works and Urban Development Committee held on 1 March 2016 be confirmed as a true and correct record.

The motion was put and carried

The votes were recorded as follows:

For: Crs McEvoy and Harley

Against: Nil

WK42/16 CORRESPONDENCE

Nil

WK43/16 DISCLOSURE OF MEMBERS' INTERESTS

Member / Officer	Minute No.	Item Title.	Nature / Extent of Interest
Cr Harley	WK45/16	City Laneways Enhancement Project – Mclean Lane	Financial Interest. Extent: Cr Harley is currently negotiating a potential lease on the subject street.

5.56pm The Lead City Designer departed the meeting and did not return.

WK44/16 WILLIAM STREET PUBLIC TRANSIT ZONE STAGE 2 – TRANSPORT MODELLING AND IMPLEMENTATION

BACKGROUND:

FILE REFERENCE: P1000570-12
REPORTING UNIT: Transport
RESPONSIBLE DIRECTORATE: Planning & Development
DATE: 3 March 2016

MAP / SCHEDULE: Schedule 1 – Transit Mall Locality Map
Schedule 2 – 'William Street Transit Zone (Modelling Report)
Confidential Schedule 3 – Technical Report – Modelling, Design and Consultation. (distributed to Elected Members under separate cover)
Schedule 4 – Transit Zone Fact Sheet

The Public Transport Authority (PTA) has proposed that the section of William Street between Murray Street and Hay Street become a transit zone, for the use of buses, cyclists, taxis and authorised vehicles only. The proposal is in line with the City of Perth's "Perth City Streets, Transport Plan Strategic Agreement July 2010" plan. The Transit Mall concept has subsequently been presented to Council on 10 December 2013, to Council Briefing on 7 September 2015 and then endorsed by Council on 13 October 2015.

At the meeting of Council held on **13 October 2015,** Council endorsed the following resolution:

"1. receives the outcomes of the second stage of public consultation undertaken by the Public Transport Authority for public transport improvements on William Street and notes that all stakeholder issues have been satisfactorily addressed and resolved;

2. notes that localised transport modelling of William Street has been undertaken by the Public Transport Authority which has provided an indication of the expected benefits to public transport reliability and pedestrian wait times at signals; however wider area transport modelling has not yet been completed to the satisfaction of the City of Perth to assess whether city traffic will be subject to additional congestion as a result of removing general traffic from part of William Street;

3. notes the various options for delivery of the William Street Transit Zone project set out in this report including the relation of each option to the intended completion of the City's Barrack Street Two Way project;

4. notes the acceptability of the Transit Zone (stage 2) project including its wider impact on the City road network is yet to be proven which shall be reported back to Council for consideration at a future meeting once all outstanding transport modelling information has been received and reviewed;

5. notes that details of the Stage 3 William Street Transit Zone 'Urban Environment Upgrade' shall be reported back to Council for consideration at a future meeting;

6. endorses that the City continues with completion of the Barrack Street Two Way project at the end of November 2015 in line with Option 3 of this report, separately to consideration of the Transit Zone project at a later date; and

7. authorises the Chief Executive Officer of City of Perth to negotiate with the Public Transport Authority on the timing of the relocation of the Blue CAT bus service away from Barrack Street, separately to consideration of the Transit Zone project at a later date."

This report sets out the PTA's activity in addressing Council's issues detailed in points 2 and 4 of the above. This report also comments on the acceptability of the project including its operation and the City of Perth's requirement for ongoing monitoring of the Transit Zone.

LEGISLATION / STRATEGIC PLAN / POLICY:

Integrated Planning and Reporting Framework Implications	**Corporate Business Plan**	
	Council Four Year Priorities: Getting Around Perth	
	S4	Enhanced Accessibility in and around the City including parking
	4.1	Develop Business Plan for future car park development

DETAILS:

Since January 2015, the PTA and Department of Transport (DoT) have worked with the City of Perth and Main Roads WA to address the resolutions of Council.

Prior to the meeting of Council on **13 October 2015** above, the Public Transport Authority (PTA) presented the need and justification for transport improvements in William Street including improved bus running times and reliability in William Street, which took place during a special briefing for Elected Members on Monday, 7 September 2015.

At that briefing, the PTA also confirmed majority support for the scheme had been received from stakeholders with some vehicles requiring access to properties within and surrounding the Transit Zone being considered as 'authorised vehicles' with permissions being administered by the PTA.

Transport Modelling of Transit Zone

In addressing the Council resolutions for further traffic modelling, the PTA has provided the following information.

Localised Area Modelling:

Localised traffic modelling data for the William Street corridor has been provided by the PTA which indicates expected benefits of the William Street Transit Zone in terms of improved public transport journey times and reliability for all buses and improved pedestrian wait times at the William Street/Murray Street intersection. Based on the submitted results of the localised modelling, intersections with William Street, between and including St Georges Terrace to Wellington Street, shall experience improvements in efficiency should the Transit Zone be endorsed and implemented.

Wider Area Modelling:

The PTA has also undertaken a wide area transport modelling assessment using the multi-agency agreed Central Area Transport Plan PARAMICS peak hour model to test the potential traffic reassignment as a result of the Transit Zone proposal. The detail of this assessment is contained within the submitted modelling report indicated in Schedule 2. A summary of the modelling, design and previously endorsed stakeholder consultation is contained in the Technical Report detailed in Confidential Schedule 3.

The modelling has demonstrated that with the implementation of the Transit Zone there will be a decrease in traffic volumes along William Street, due to the restrictions proposed for general traffic movements; hence the signal intersections with William Street are predicted to continue to operate at comparable/improved levels of service to the current situation.

The effect of this decrease in traffic on William Street results in a corresponding increase in vehicle trips on other links through demand reassigning to Milligan Street to the west via Wellington Street or Murray Street before travelling eastbound along St Georges Terrace to continue the original journey route.

An assessment of the level of service at intersections predicted to experience an increase in vehicle volume, specifically Wellington/Milligan, Milligan/Murray, Milligan/Hay and St Georges Terrace/Milligan, has determined that these intersections shall continue to operate with similar levels of service when compared to their current operation, despite the increased vehicle demand. This increased vehicle demand is able to be accommodated due to the spare capacity of these intersections in the southbound direction and specifically the left turn movement from Milligan Street to St Georges Terrace which is afforded green time in two of the four signal stages allowing this diversionary route to be plausible.

However, as part of the above, it is recommended that the PTA consult with the businesses and properties on the eastern side of Milligan Street, between Murray and Hay Streets to install an AM and PM peak period clearway in the southbound direction. This shall allow for greater capacity on Milligan Street in the southbound direction, creating greater resilience and flexibility in the road network to cope with any variations in traffic demand as a result of the redistributed traffic. This shall also be in keeping with the clearway restrictions currently in place on the western side (northbound) of Milligan Street.

Changes to Bus Services:

The PTA has confirmed that the Wellington Street Underground Bus Station shall change several bus routes entering the City. Routes 16 and 66 will terminate at the Wellington Street Underground Bus Station, removing 8 buses in the peak hour from the William Street Corridor. Additional to this, routes 23, 102, 107, 881 and 940 will now terminate in the Elizabeth Quay Bus Station, resulting in a further reduction of 14 buses per hour. The effect of this reduction in bus services is included within the transport modelling provided by PTA.

The reduction in bus services combined with the removal of general vehicle movements through William Street should make it possible for signal cycle times to reduce (subject to Main Roads WA approval and implementation) which shall directly improve the opportunities for pedestrians to cross the road with pedestrian phases occurring more often.

Authorised Vehicles Access to Transit Zone

Concerns with regards to the enforcement of authorised vehicle access have been raised with the PTA in terms of the potential for abuse of the Transit Zone by through vehicles. In relation to the vehicle types and stakeholders which shall be permitted to access the Transit Zone area, the PTA has confirmed the following:

- Buses, taxis and cyclists will all be authorised vehicles through the Transit Zone.
- Some general vehicles will have 'authorised access' through the Transit Zone.

Building access to 108 St Georges Terrace and the buildings within the Transit Zone will have authorised access. For vehicles accessing allocated parking from within the Transit Zone, this will be managed similarly to other bus lane access, i.e. vehicles may enter a bus lane to make a turn within 100 metres in accordance with the Road Traffic Code. Access to 108 St Georges Terrace will be granted by a letter administered by the PTA. Each letter will be addressed to the individual driver, and will allow southbound travel during the morning peak (6.00 - 9.00am) only.

It is intended that buses, taxis and cyclists will be able to turn right from Murray Street to William Street. The Red CAT bus operates a short service that is required to turn right here, and the taxi rank on Murray Street will benefit from being able to make this turn.

The above arrangements may be open to opportunistic or 'unauthorised' trips through the Transit Zone, however the PTA intends to monitor the access over the first 12 months of operation. If it is felt that excessive unauthorised traffic the within Transit Zone is impacting on bus operations, then the PTA will report this abuse to the WA Police requesting enforcement of the restrictions against general vehicles.

However, WA Police have previously confirmed to Officers of the City of Perth that they will not assign resources to enforcing compliance of bus lanes, which includes a Transit Zone, unless it directly relates to a safety concern.

The PTA is also developing camera enforcement technology for bus lanes and intends to implement this technology within the Transit Zone. However, new legislation is required to allow this to occur. The PTA is currently working towards this goal, although timescales for this may realistically be within the next two years.

The PTA will be responsible for enforcement or resolution of non-compliance with the Transit Zone restrictions, and has confirmed their intention for the transit zone to be

monitored and enforced by the State in the same way as all other PTA bus priority infrastructure is in accordance with the Road Traffic Code.

This commitment by the PTA to monitor the operation and effectiveness of the Transit Zone over the first 12 months of operation including a commitment to the future use of camera enforcement technology is an acceptable approach to enable the refinement or resolution of any issues with the Transit Zone and its operation by PTA in liaison with the City of Perth.

The City of Perth and Main Roads WA shall liaise with the PTA on the detailed design of the required line marking, signage and traffic signal modifications so that the restrictions are legible and in accordance with regulation to ensure the permitted movements and restrictions can be legally enforced.

Construction Timescale

Should Council agree to endorse the recommendations of this report, the PTA has advised that construction of the street modifications to facilitate Transit Zone Stage 2, could commence during mid April 2016, subject to relevant approvals of detailed design documentation by the City of Perth and Main Roads WA. The construction of Stage 2 is anticipated to last for approximately three weeks duration, subject to other events and granting of the City of Perth obstruction permits. This is currently a provisional timescale and may be subject to change.

FINANCIAL IMPLICATIONS:

There are no financial implications to the City of Perth resulting from the recommendations of this report in association with Stage 2 street modifications. Subject to the endorsement of Stage 2 works, the future Stage 3 of the Transit Zone project 'Urban Environment Upgrade' shall require funding from the State Government and the PTA is committed to seek funding for the street upgrade works from the Perth Parking Management Fund (PPMF). The PTA has advised that $2 million of funding is currently proposed to be allocated to this project within the 2016/17 financial year with potential for this to be increased. It should be noted that no formal agreement exists yet for provision of this funding, which is potentially a risk in terms of the longer term street upgrade. Details of the Stage 3 works and agreements shall be reported back to Council at a future meeting.

COMMENTS:

Council previously received the outcomes of PTA's public consultation undertaken for public transport improvements on William Street and noted that all stakeholder issues have been satisfactorily addressed and resolved.

As required by Council, PTA were requested to provide all outstanding wide area transport modelling prior to Council making a decision on the acceptability of the Transit Zone project.

The outstanding data has now been received by the City of Perth and the assessment of the impact of the implementation of the Transit Zone has concluded that there is forecast to be no significant adverse impact on traffic movement within the study area as a result of the proposal. The assessment has identified a shift in traffic volumes away from William Street, primarily to Milligan Street. However, the network is shown to remain operating well with similar operating levels both with and without the planned Transit Zone.

The operation of key intersections within the study has been assessed and there is no noticeable adverse impact on intersection operation. In particular, intersections along Wellington Street, Milligan Street and St George's Terrace, are not shown to have deterioration in peak period traffic operating conditions.

The Transit Zone will provide benefits to public transport users, through reduced running times along William Street and additional stop capacities and facilities. The proposed Transit Zone is forecast to result in a transport network which operates well, with no unreasonable delay or queuing forecast to occur within the study area.

The provision of the Transit Zone will also improve the walkability of the area adjacent to the Perth Underground Station with improved signal phasing for pedestrians being available due to fewer through movements. In addition, the proposed funding by the PTA of $2 million for Streetscape improvements as part of Stage 3 will declutter the area again improving pedestrian amenity and movement.

It is recommended that Council endorses the implementation of Stage 2 of the proposed Transit Zone project with access only for pedestrians, cyclists, public transport, taxis and authorised vehicles.

OFFICER RECOMMENDATION

That Council:

1. endorses the implementation of Stage 2 of the proposed Transit Zone project with access only for pedestrians, cyclists, public transport, taxis and authorised vehicles subject to:

    1.1 a communication plan being prepared and implemented by the Public Transport Authority, to the satisfaction of the City of Perth, to impacted businesses, residents, workers and visitors prior to the commencement of construction works;

    1.2 the Public Transport Authority being responsible for administering and monitoring the 'Authorised Vehicle Access' within the Transit Zone;

    (Cont'd)

    1.3 all costs associated with the implementation of the Transit Zone, including remedial works identified through the 12 month review, being borne by the Public Transport Authority;

1.4 the Public Transport Authority agreeing to undertake a 12 month review of the operation of the Transit Zone in collaboration with the City of Perth;

1.5 finalisation of a funding agreement between the City of Perth and Public Transport Authority for implementation of Stage 3 (Streetscape) works, with a minimum contribution of $2 million, prior to the commencement of Stage 2 construction works;

2. authorises the Chief Executive Officer of City of Perth to endorse the progression and approval of detailed design documentation by the Public Transport Authority to facilitate construction of the Transit Zone street modifications;

3. authorises the Chief Executive Officer to finalise and execute the funding agreement in relation to recommendation 1.5 above;

4. notes that the conditions set by Council have been met by the Public Transport Authority and the City of Perth has completed all works associated;

5. notes that details of the Stage 3 William Street Transit Zone 'Urban Environment Upgrade' shall be reported back to Council at a future meeting.

The Works and Urban Development Committee agreed to defer the item as follows:

Moved by Cr Harley, seconded by Cr McEvoy

That the Works and Urban Development Committee defer consideration of the report titled "William Street Public Transit Zone Stage 2 – Transport Modelling and Implementation" to allow further information to be provided around the cost benefits that this proposal will bring to the City and the impacts that the City will encounter as a result of this proposal.

The motion was put and carried

The votes were recorded as follows:

For: Crs McEvoy and Harley

Reason: The Works and Urban Development Committee expressed their concerns around the impact to the amenity of that area within the City, including the impact of the traffic being diverted from William Street to neighbouring streets.

WK45/16 CITY LANEWAYS ENHANCEMENT PROJECT – MCLEAN LANE

Meeting note: The Chief Executive Officer advised that the Item WK45/16 titled "City Laneways Enhancement Project – Mclean Lane" could not be discussed by the Works and Urban Development Committee due to a previously declared financial interest at item WK43/16, which would result in a loss of Committee quorum. This item will be presented directly to the next meeting of Council.

WK46/16 MOTIONS OF WHICH PREVIOUS NOTICE HAS BEEN GIVEN

Nil

WK47/16 GENERAL BUSINESS

Responses to General Business from a Previous Meeting

Nil

New General Business

Nil

WK48/16 ITEMS FOR CONSIDERATION AT A FUTURE MEETING

Outstanding Items:

Nil

WK49/16 CLOSE OF MEETING

7.00pm There being no further business the Acting Presiding Member declared the meeting closed.

SCHEDULES

FOR THE MINUTES OF THE WORKS AND URBAN DEVELOPMENT COMMITTEE MEETING

HELD ON

22 MARCH 2016


Murray St
Wellington St
Hay St
Transit Mall
location
St Georges Tce
William St
Barrack St

SCHEDULE 1

Department of Transport

William Street Transit Zone

18 January 2016

PARSONS BRINCKERHOFF

Document information
Client: Department of Transport Title: William Street Transit Zone Document No: 2196929A-TPT-REP-001 RevC Date: 18 January 2016

Rev	Date	Details
A	08/12/2015	Draft
B	12/01/2016	Final
C	15/01/2016	Final - incorporating DoT comments
D	18/01/2016	Final - incorporating DoT comments

Author, Reviewer and Approver details			
Prepared by:	Sam Kendall (Flyt)	Date: 18/01/2016	Signature: 
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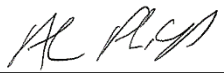
Approved by:	Alan Philp	Date: 18/01/2016	Signature: 

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Executive summary

The Department of Transport has engaged WSP | Parsons Brinckerhoff to undertake an assessment of a proposed Transit Zone on William Street. The Transit Zone comprises converting William Street, between Murray Street and Hay Street, into a restricted access road accessible to only buses, taxis and bicycles. Following earlier stages of design and modelling undertaken by WSP | Parsons Brinckerhoff together with our sub-consultants Flyt, the work documented in this report involved the development of Paramics modelling for the purpose of assessing the impact of the planned Transit Zone on the surrounding transport network.

The Paramics modelling initially comprised the development of AM and PM peak Project Base models at year 2015. The 2015 Project Base models were developed based on the 2015 Central Area Transport Plan (CATP) models, developed during an earlier study, together with the inclusion of a number of transport network modifications which are either already in place or are planned to be implemented shortly. The Project Base models were developed in collaboration with the City of Perth.

The Transit Zone was then tested within the Paramics model, thereby providing analysis results to compare the “with” and “without” Transit Zone scenarios and identify if there is any expected impact on the road network within the Central Business District (CBD). For the Transit Zone scenario, in addition to the restriction on vehicle movements imposed on William Street, between Murray Street and Hay Street, the Blue CAT was re-routed to use William Street rather than Barrack Street.

The assessment of the impact of the implementation of the Transit Zone has concluded that there is forecast to be no significant adverse impact on traffic movement within the study area as a result of the proposal. The assessment has identified a shift in traffic volumes away from William Street, primarily to Milligan Street. However, the network is shown to remain operating well with similar operating levels both with and without the planned Transit Zone.

The operation of key intersections within the study has been assessed and there is no noticeable adverse impact on intersection operation. In particular, intersections along Wellington Street, Milligan Street and St George’s Terrace, are not shown to have deterioration in peak period traffic operating conditions.

The Transit Zone will provide benefits to public transport users, through reduced running times along William Street and additional stop capacities and facilities. The planned Transit Zone is forecast to result in a transport network which operates well, with no unreasonable delay or queueing forecast to occur within the study area. As the future road network is forecast to operate well and there is no significant identified adverse impact associated with the Transit Zone, it is concluded that there are no forecast traffic operation reasons for not implementing the Transit Zone and that the project may progress to detailed design and implementation.

1. Introduction

In 2015 the Department of Transport (DoT) and Public Transport Authority (PTA) have pursued the closure of the section of William Street between Murray Street and Hay Street to general traffic. This section will become a Transit Zone for exclusive use by pedestrians, buses, taxis, and cyclists.

A concept design, based on the design proposed under the MAX Light Rail Plan and Commuter modelling of the corridor, was previously undertaken by WSP | Parsons Brinckerhoff and Flyt. The purpose of this current engagement is to understand the wider area impacts that the Transit Zone might have. This report presents the modelling undertaken and resulting outputs focussing on an inner area surrounding the William Street corridor.

In order to understand the impacts solely associated with the Transit Zone proposals, it was necessary to establish a set of models to be used as a comparison or reference point. It was agreed with the DoT, PTA and City of Perth that the following models would be produced:

- AM and PM Project Base Models
- AM and PM Project Base Models (+Blue CAT test)
- AM and PM Transit Zone Models.

The basis for these models has been the recently approved AM and PM 2015 Base Paramics models produced by the DoT for testing the Central Area Transport Plan schemes. An overview of the modelling process is provided in Figure 1-1.

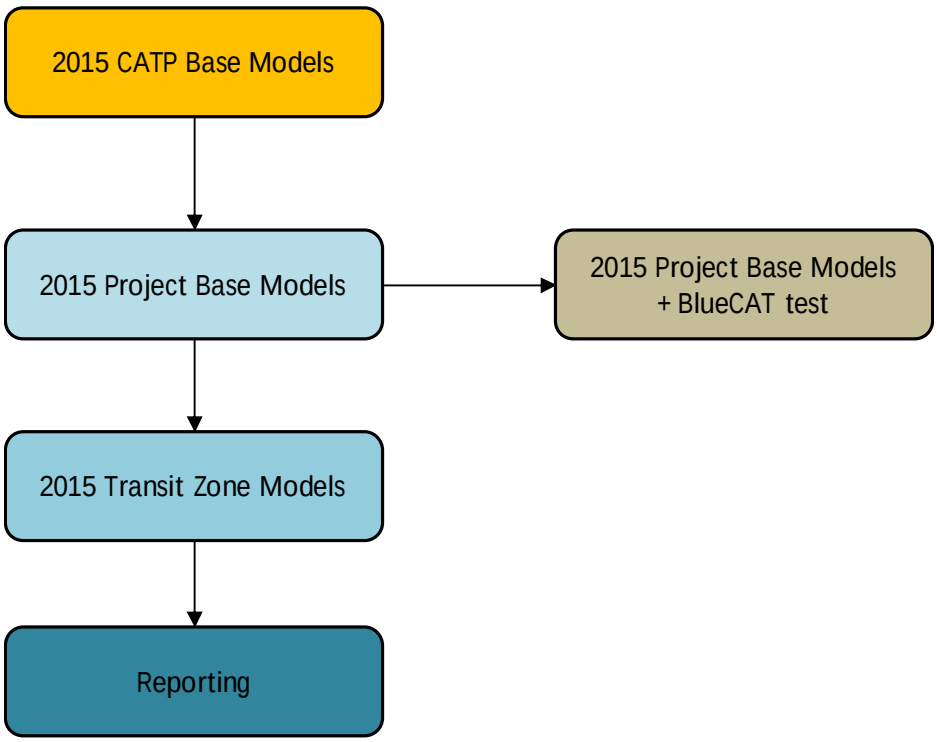


Figure 1-1 Modelling process overview

The models which were developed are described in Sections 2 and 3, with the results of the analysis included in Section 4 followed by the conclusions in Section 5.

2. Project base

The Project Base models take the currently approved 2015 CATP Base models forward to represent schemes that are or will be likely to be in place when the Transit Zone is proposed to open to facilitate an accurate comparison.

It should be noted that the original 2015 CATP Base model demands have been retained, therefore the Project Base models do not account for any change in travel demand that may occur as a result of these schemes. For example, the use of Barrack Street in its two-way configuration would be limited to existing trips using this part of the network as a route choice alternative.

Figure 2-1 outlines the location of the Project Base model changes and updates from the 2015 CATP Base models.

Figure 2-1 Project base changes

1. Barrack Street two–way scheme
2. Hay Street between Pier Street and Barrack Street two-way
3. Red CAT stop removal from Barrack Street
4. William Street two lane Northbound approach at Hay Street
5. William Street and Wellington Street intersection upgrade (associated with tunnel entry)

6. Tunnel entry to City Busport
7. Wellington Street revised configuration between King Street and Milligan Street
8. Bus service and route update to reflect City Busport being open
9. Esplanade westbound kerbside lane opened
10. Barrack Street and Esplanade intersection upgrade
11. Barrack Square and Riverside Drive intersection upgrade.

The configurations of these proposed adjustments are provided in Appendix A.

2.1 Public transport adjustment

The PTA provided confirmation of the adjustments that were required to correctly represent the bus routes and schedules. The following adjustments were applied to the 2015 CATP Base year models:

- Routes 30, 31, 34, 881 & 940 run up William St from the Esplanade Busport to access the City Busport via the Wellington St Entry
- Routes 102 & 107 are permanently truncated at Esplanade Busport
- Routes 16, 66, 67 & 68 will no longer run south to the Esplanade Busport, instead terminating at the City Busport via the Wellington St Entry
- Route 28 will continue to operate along Wellington St, but will deviate through the City Busport via the Wellington St Entry
- Route 220 will terminate at the City Busport via the Wellington St Entry
- Red CAT bus stop removed from Barrack Street.

2.2 Project base outputs

Through collaboration with the City of Perth, the overleaf details were included in the 2015 CATP Base models with the Barrack Street signal timings also input and refined to achieve simulations that appeared representative of logical operation.

Table 2-1 and Table 2-2 below present the summary network statistics comparing the 2015 CATP Base models with the Project Base models. A level of difference was expected due to the number of network updates included in the Project Base models, as well as the demand matrices remaining constant between the two sets of models. The mean (average) outputs for the Project Base have been colour coded to suggest an increase (orange) or decrease (green). The colour coding should not be interpreted as benefits or dis-benefits as an increase or decrease will have different meanings depending on the output data.

Table 2-1 AM Peak project base summary statistics

Seed	Vehicle Kilometres Travelled		Vehicle Hours Travelled		Average Speed (kph)	
	CATP Base	Project Base	CATP Base	Project Base	CATP Base	Project Base
560	46,680	46,571	2,230	2,225	21	21
28	47,228	47,024	2,350	2,332	20	20
7771	46,829	46,457	2,334	2,293	20	20
86524	47,578	47,588	2,285	2,291	21	21
2849	46,768	47,030	2,341	2,304	20	20
Statistics						
Mean	47,017	46,934	2,308	2,289	20	21
Standard Deviation	377	448	50	39	0.5	0
Accuracy	1%	1%	3%	2%	3%	2%

The AM outputs show consistency between the 2015 CATP Base and Project Base models with a slight reduction in average Vehicle Kilometres Travelled (VKT) and Vehicle Hours Travelled (VHT), despite the changes included. The average network wide speed has also increased very slightly. The number of trips simulated in these AM models is also very consistent. These outputs suggest that with the changed network, the existing travel demands are accommodated and the modelled network performs with slight improvements over the CATP Base.

Table 2-2 PM Peak project base summary statistics

Seed	Vehicle Kilometres Travelled		Vehicle Hours Travelled		Average Speed (kph)	
	CATP Base	Project Base	CATP Base	Project Base	CATP Base	Project Base
560	48,383	47,336	2,400	2,395	20	20
28	48,519	47,134	2,540	2,363	19	20
7771	47,924	47,250	2,561	2,358	19	20
86524	48,413	47,489	2,387	2,478	20	19
2849	48,150	48,226	2,489	2,505	19	19
Statistics						
Mean	48,278	47,487	2,475	2,420	20	20
Standard Deviation	239	433	79	67	0.7	0
Accuracy	1%	1%	4%	3%	4%	3%

The PM model outputs show a similar trend to the AM peak where there is a decreased in VKT and VHT across the modelled network in the Project Base models.

AM and PM turning movement difference diagrams between the 2015 CATP Base and Project Base models are provided in Appendix B. In the AM peak, these show approximately 120 southbound trips using the newly opened Barrack St two-way (this drops to approximately 95 for the approach to St Georges Terrace) and a southbound reduction of approximately 75 along William Street.

The PM difference diagram also outputs 120 southbound trips along the length of Barrack Street with minimal change to William Street southbound.

2.3 Blue CAT test

With the Project Base models approved for use by the DoT and CoP, the Blue CAT test was undertaken where all details remained consistent with the Project Base, aside from the Blue CAT not stopping at the existing Barrack Street stop.

Table 2-3 and Table 2-4 outline the summary network statistics for the AM and PM Project Base and Project Base + BlueCAT test models.

Table 2-3 AM Peak project base + Blue CAT test summary statistics

Seed	Vehicle Kilometres Travelled		Vehicle Hours Travelled		Average Speed (kph)	
	Project Base	Blue CAT	Project Base	Blue CAT	Project Base	Blue CAT
560	46,571	45,796	2,225	2,232	21	20
28	47,024	47,278	2,332	2,357	20	20
7771	46,457	46,729	2,293	2,289	20	20
86524	47,588	47,306	2,291	2,310	21	20
2849	47,030	47,275	2,304	2,272	20	20
Statistics						
Mean	46,934	46,877	2,289	2,292	21	20
Standard Deviation	448	650	39	47	0	0
Accuracy	1%	2%	2%	3%	2%	1%

The summary network statistics show a small amount of variance around the average in the AM (appears to be caused by a slightly different simulation for seed 560), but across the five seeds is generally quite consistent with the Project Base models.

Table 2-4 PM Peak project base + Blue CAT test summary statistics

Seed	Vehicle Kilometres Travelled		Vehicle Hours Travelled		Average Speed (kph)	
	Project Base	Blue CAT	Project Base	Blue CAT	Project Base	Blue CAT
560	47,336	47,574	2,395	2,347	20	19
28	47,134	47,108	2,363	2,375	20	19
7771	47,250	47,537	2,358	2,386	20	19
86524	47,489	47,704	2,478	2,459	19	19
2849	48,226	48,008	2,505	2,499	19	19
Statistics						
Mean	47,487	47,586	2,420	2,413	20	19
Standard Deviation	433	325	67	63	0	0
Accuracy	1%	1%	3%	3%	3%	2%

PM outputs for the Blue CAT test are also quite closely aligned with the PM Project Base model outputs. The percentage of simulated trips for the AM and PM are also very similar to the Project Base outputs.

The on screen simulations show a similar level of operation along the Barrack Street corridor to the Project Base models. Analysis of the Barrack Street section between St Georges Terrace and Wellington Street outputs a slight reduction in average vehicle volume (less than 20 vehicles northbound) for the AM peak hour Blue CAT test, although a slight increase in average link travel time (less than one minute between St Georges Terrace and Wellington Street) . The travel time appears to be affected more by the left turning vehicles into Wellington Street blocking back when waiting for the pedestrian crossing than the removal of the Blue CAT stopping time.

The PM Blue CAT test outputs average travel time and volumes that are quite consistent with the PM project Base model.

3. Transit zone

The Transit Zone models were built using the Project Base models as a starting point, and include specific details relating to the Transit Zone scenario. Figure 3-1 shows the following adjustments that were included to represent the Transit Zone proposals:

1. Public transport only link on William Street between Murray Street and Hay Street
2. Blue CAT route adjusted to utilise William Street Transit Zone rather than Barrack Street.

Figure 3-1 Transit zone changes

Similarly to the 2015 Base, and the Project Base, the Transit Zone AM and PM models were run through Processor using the same seed values and the modelled changes output.

4. Results and commentary

An initial comparison between the Project Base and Transit Zone models was undertaken on a network wide basis, comparing the summary statistics. These statistics are presented for each of the separate seed assignments as well as their average.

Table 4-1 and Table 4-2 show the AM and PM comparison statistics for the Project Base and Transit Zone models.

Table 4-1 AM Peak transit zone summary statistics

Seed	Vehicle Kilometres Travelled		Vehicle Hours Travelled		Average Speed (kph)	
	Project Base	Transit Zone	Project Base	Transit Zone	Project Base	Transit Zone
560	46,571	46,256	2,225	2,304	21	20
28	47,024	47,237	2,332	2,372	20	20
7771	46,457	46,791	2,293	2,352	20	20
86524	47,588	47,227	2,291	2,357	21	20
2849	47,030	46,965	2,304	2,308	20	20
Statistics						
Mean	46,934	46,895	2,289	2,339	21	20
Standard Deviation	448	403	39	31	0	0
Accuracy	1%	1%	2%	2%	2%	1%

The AM peak outputs are very consistent between the Project Base and Transit Zone models. There is a slightly lower standard deviation and improved accuracy between the separate assignments for the Transit Zone model suggesting less variability, or a more consistent operation of the network between separate seed assignments. The Transit Zone outputs an average 0.08% decrease in VKT and 2.17% increase in VHT over the AM Project Base suggesting the Transit Zone results in minimal difference between the models when compared across the modelled network.

Table 4-2 PM Peak transit zone summary statistics

Seed	Vehicle Kilometres Travelled		Vehicle Hours Travelled		Average Speed (kph)	
	Project Base	Transit Zone	Project Base	Transit Zone	Project Base	Transit Zone
560	47,336	47,388	2,395	2,499	20	19
28	47,134	47,871	2,363	2,546	20	19
7771	47,250	48,573	2,358	2,542	20	19
86524	47,489	47,571	2,478	2,566	19	19
2849	48,226	48,199	2,505	2,509	19	19
Statistics						
Mean	47,487	47,920	2,420	2,532	20	19
Standard Deviation	433	478	67	28	0	0
Accuracy	1%	1%	3%	1%	3%	2%

There are slightly higher VKT and VHT values output for the PM Transit Zone model when compared to the Project Base. These equate to a 0.91% and 4.66% average increase in VKT and VHT for the Transit Zone model.

An additional comparison was undertaken to compare the number of trips able to be simulated through each of the assignments. The high percentages in the Project Base models illustrate a network that is generally able to accommodate the vehicle demands without unrealistic queueing at the edges of the model. Table 4-3 and Table 4-4 present the AM and PM trip simulation comparison.

Table 4-3 AM Peak transit zone trip simulation

Seed	AM Peak (Project Base)			AM Peak (Transit Zone)		
	Trips input	Trips Simulated	% simulated	Trips input	Trips Simulated	% simulated
560	27,795	26,533	95%	27,795	26,281	95%
28		26,391	95%		26,352	95%
7771		26,294	95%		26,293	95%
86524		26,857	97%		26,568	96%
2849		26,533	95%		26,444	95%
Average		26,522	**95%**		26,388	**95%**

Table 4-4 PM Peak transit zone trip simulation

Seed	PM Peak (Project Base)			PM Peak (Transit Zone)		
	Trips input	Trips Simulated	% simulated	Trips input	Trips Simulated	% simulated
560	28,158	27,373	97%	28,158	26,789	95%
28		27,039	96%		27,199	97%
7771		27,022	96%		27,441	97%
86524		27,103	96%		27,092	96%
2849		27,380	97%		27,480	98%
Average		27,183	**97%**		27,200	**97%**

Both AM and PM outputs show comparable numbers of trips are able to be simulated between the Project Base and Transit Zone models. The consistent, high, trip simulation shows that with the Transit Zone modelled, there is little impact to vehicle demands being released into the network.

4.1 Volumetric difference plots

Difference plots were extracted from Paramics' Analyser module to understand the magnitude and location of volumetric change that occurred with the Transit Zone proposals when compared with the Project Base model outputs. Figure 4-1 and Figure 4-2 show the AM peak hour difference plots for the whole network and also zoomed into the key area of difference.

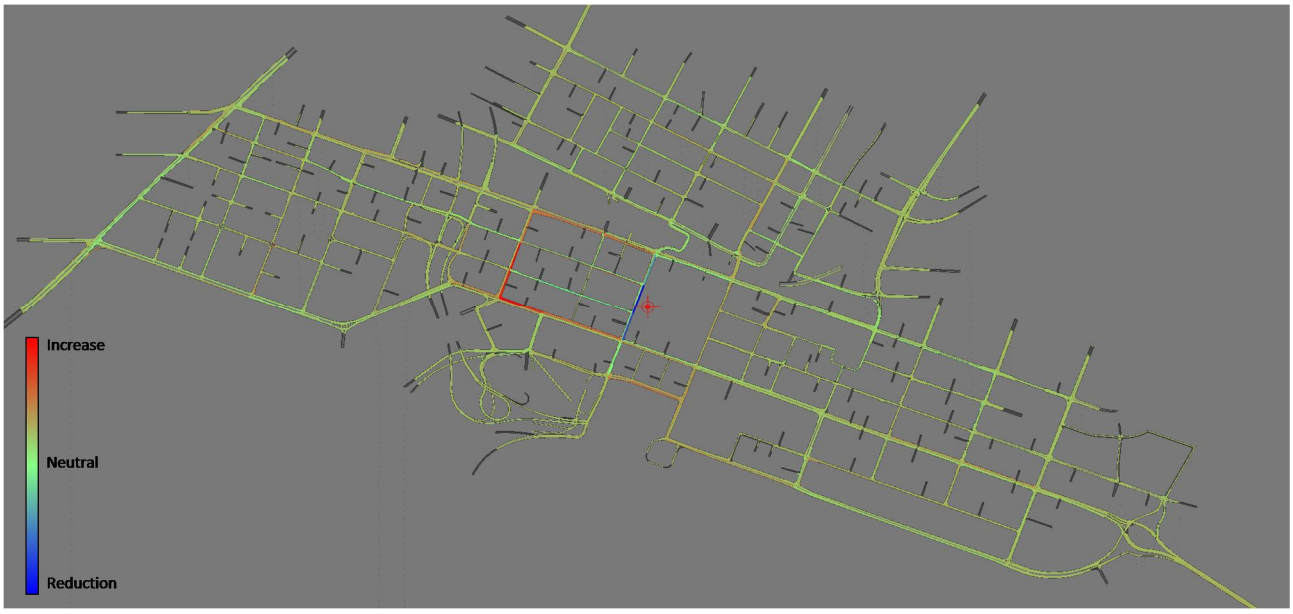


Figure 4-1 AM Peak volumetric difference plot

A red colour indicates an increase in volume, while blue indicates a decrease. The whole network plot shows that the areas of greater change are quite contained to the network bound by Milligan Street and William Street.

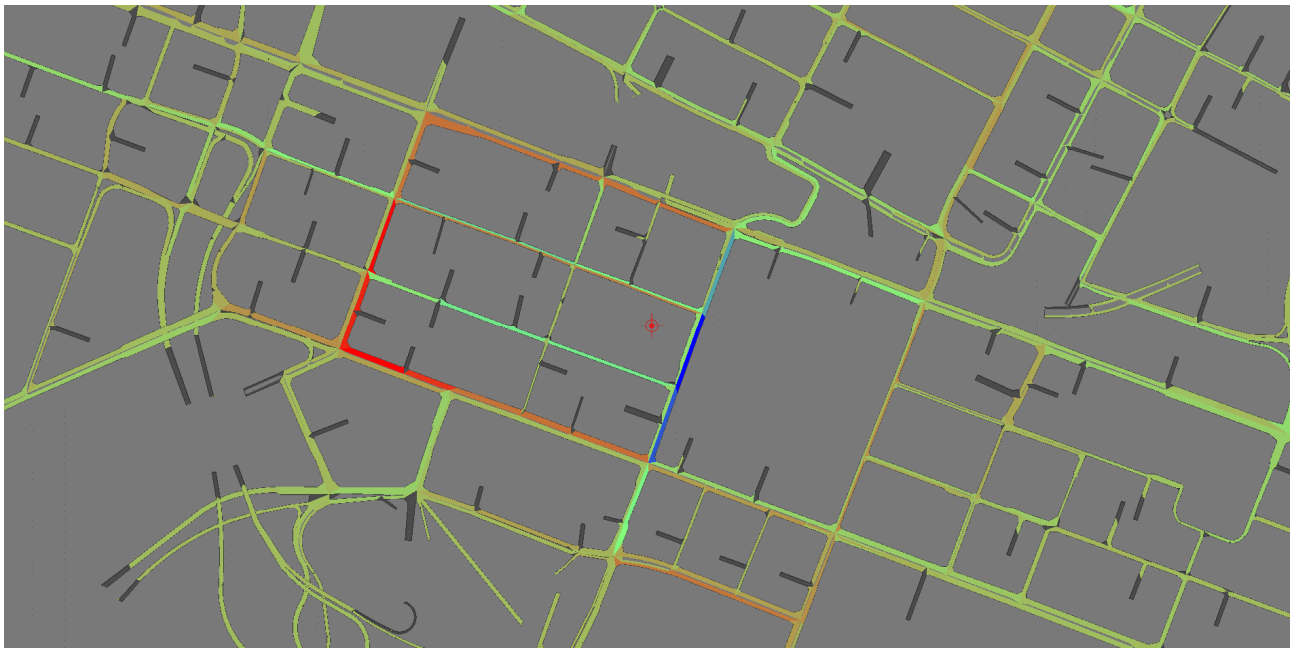


Figure 4-2 AM Peak volume difference plot - zoomed

The zoomed plot shows the change in volumes more clearly where the greatest increase in volume is modelled to occur on Milligan Street southbound between Murray Street and Hay Street (approx. 235 vehicles increase) while the southbound direction along William Street outputs a reduction of 420 vehicles.

The PM plots are included as Figure 4-3 and Figure 4-4.

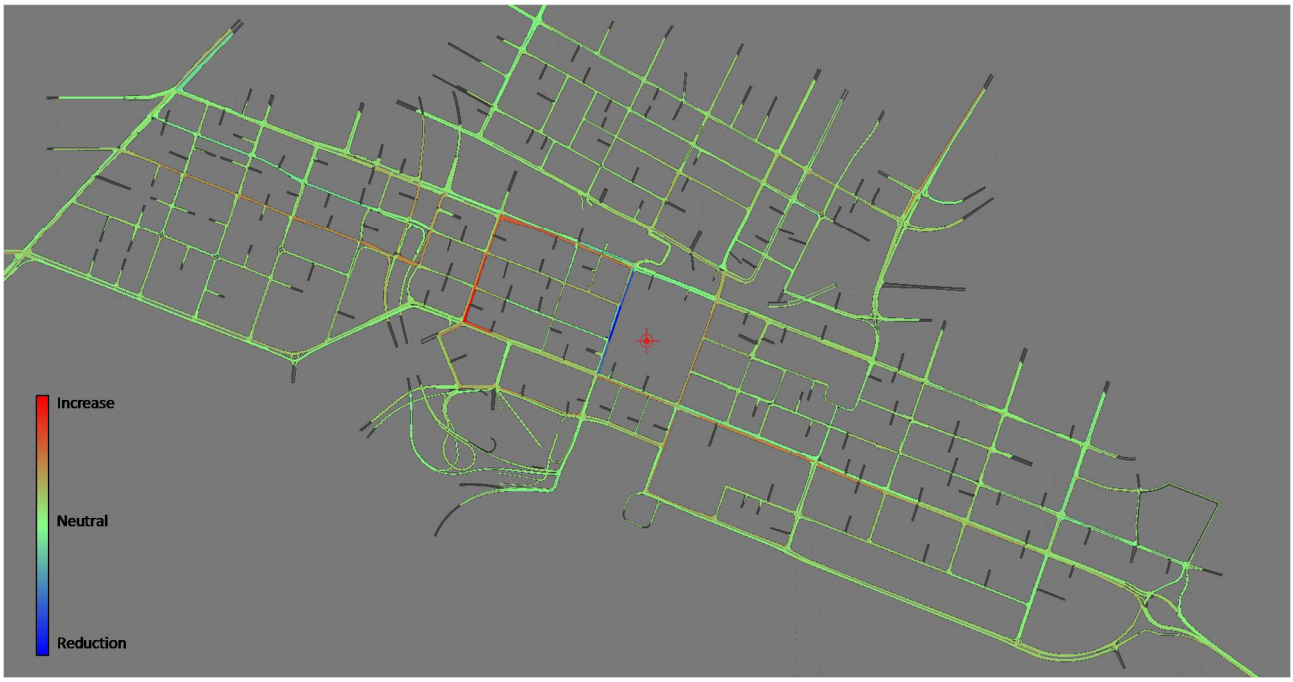


Figure 4-3 PM Peak volume difference plot

The PM difference plots show a similar pattern of reassignment away from William Street to that modelled in the AM Transit Zone outputs. The reduction southbound along William Street is approximately 390 vehicles, and 125 vehicles northbound. The increase along Wellington Street, Milligan Street and St Georges Terrace is the greatest on Milligan Street between Hay Street and St Georges Terrace (230 vehicles).

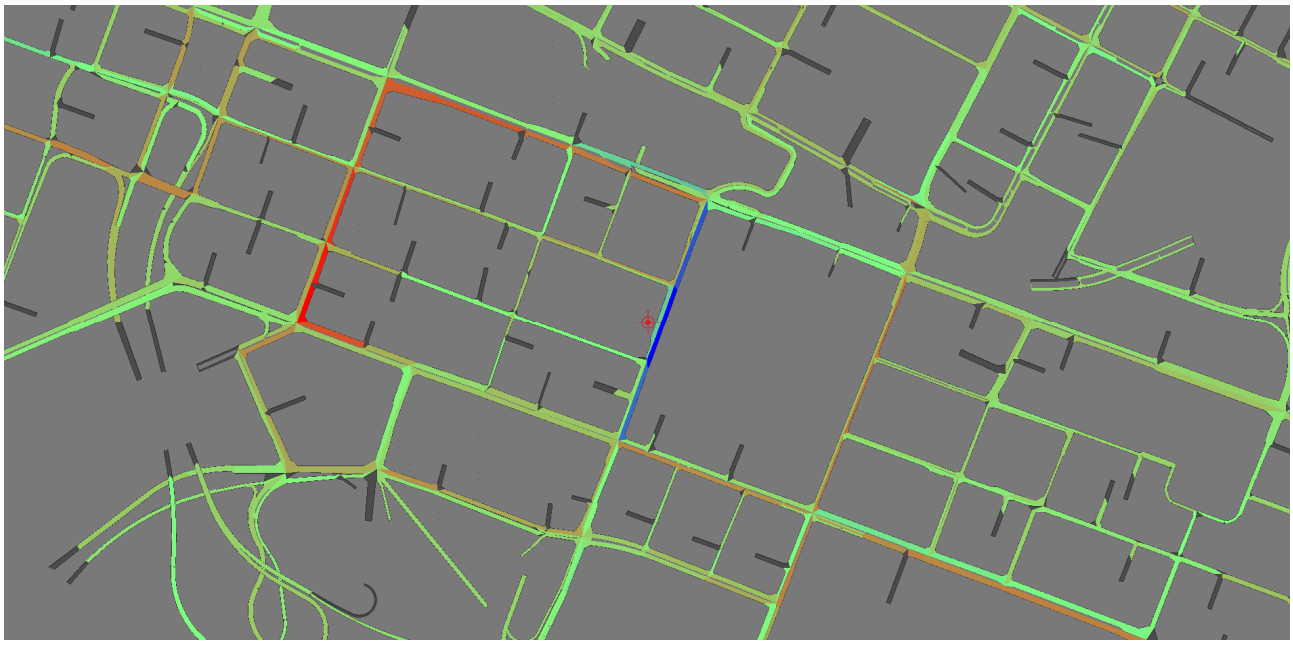


Figure 4-4 PM Peak volume difference plot - zoomed

4.2 Turning movement change

The volumetric difference plots highlighted the primary area of change in volumes for the AM and PM peak models, between Milligan Street and Barrack Street. These links were analysed further to output the turning movement differences at key intersections to provide more clarity. The turning movement differences are

based on the Transit Zone coding that was included in the models, and reflect the volumetric difference plots overleaf. The AM and PM turning movement difference plots are provided in Appendix C.

4.2.1 AM peak difference summary

The reduction in the AM peak hour demand along William Street is 420 vehicles southbound and approximately 40 vehicles northbound. The greatest increase (approximately 235 vehicles) in AM peak hour demand was modelled to occur southbound along Milligan Street at the approach to Hay Street. The pattern of reassignment is generally for demand originating north of the railway to route westbound along Wellington Street (and an amount westbound along Murray Street), south along Milligan Street and eastbound along St Georges Terrace. The demand that previously travelled eastbound along Murray Street and then south along William Street is able to route along Elder Street southbound and join St Georges Terrace eastbound as a parallel route. This results in the intersection of Milligan Street and St Georges Terrace experiencing the greatest overall increase in AM peak reassigned demand. The impact of this in terms of intersection operation will be discussed in Section 4.3.

4.2.2 PM peak difference summary

The PM peak hour in the Project Base model has a slightly lower William Street southbound volume and a greater William Street northbound vehicle demand than in the AM peak hour. This is reflected in the Project Base to Transit Zone difference plots where William Street southbound experiences a reduction of 390 vehicles while the northbound reduces by 124 vehicles. The greatest increase in vehicle demand in the PM peak hour is to Milligan Street southbound (211 vehicles), although the intersection that experiences the greatest increase in demand when calculated across all turning movements is Milligan Street and Murray Street. Again, the impact of this in terms of intersection operation will be discussed in Section 4.3.

4.3 Link and intersection delay change

The predominant changes identified through the volumetric difference plots and turning movement differences focuses attention on Milligan Street where the majority of reassignment is located. Link delays for the approach to the key intersections were extracted to compare the level of change between Project Base and Transit Zone models in the key area. For a simplified comparison, these link delays were translated to a Level of Service (LOS) value for the approach and then averaged to output an intersection average LOS. The HCM range applied is included in Table 4-5 for reference.

Table 4-5 LOS ranges

Delay (sec)	LOS
0 - 10	A
11 - 20	B
21 - 35	C
36 - 55	D
56 - 80	E
81 +	F

It should be noted that the LOS values have been calculated using only a single link that enters the intersection rather than an accumulation of links and delays and should therefore be used for comparison purposes only, between the Project Base and Transit Zone outputs.

The AM peak Project Base intersection average LOS (calculated as the average across all approaches) is shown in Figure 4-5 for the core area, and the Transit Zone outputs shown as Figure 4-6. Additional details for the Milligan Street intersections, where the greatest increase in vehicle demands were modelled, are

provided in Table 4-6 to Table 4-9 where the approach LOS values are output for the Project Base and Transit Zone models.

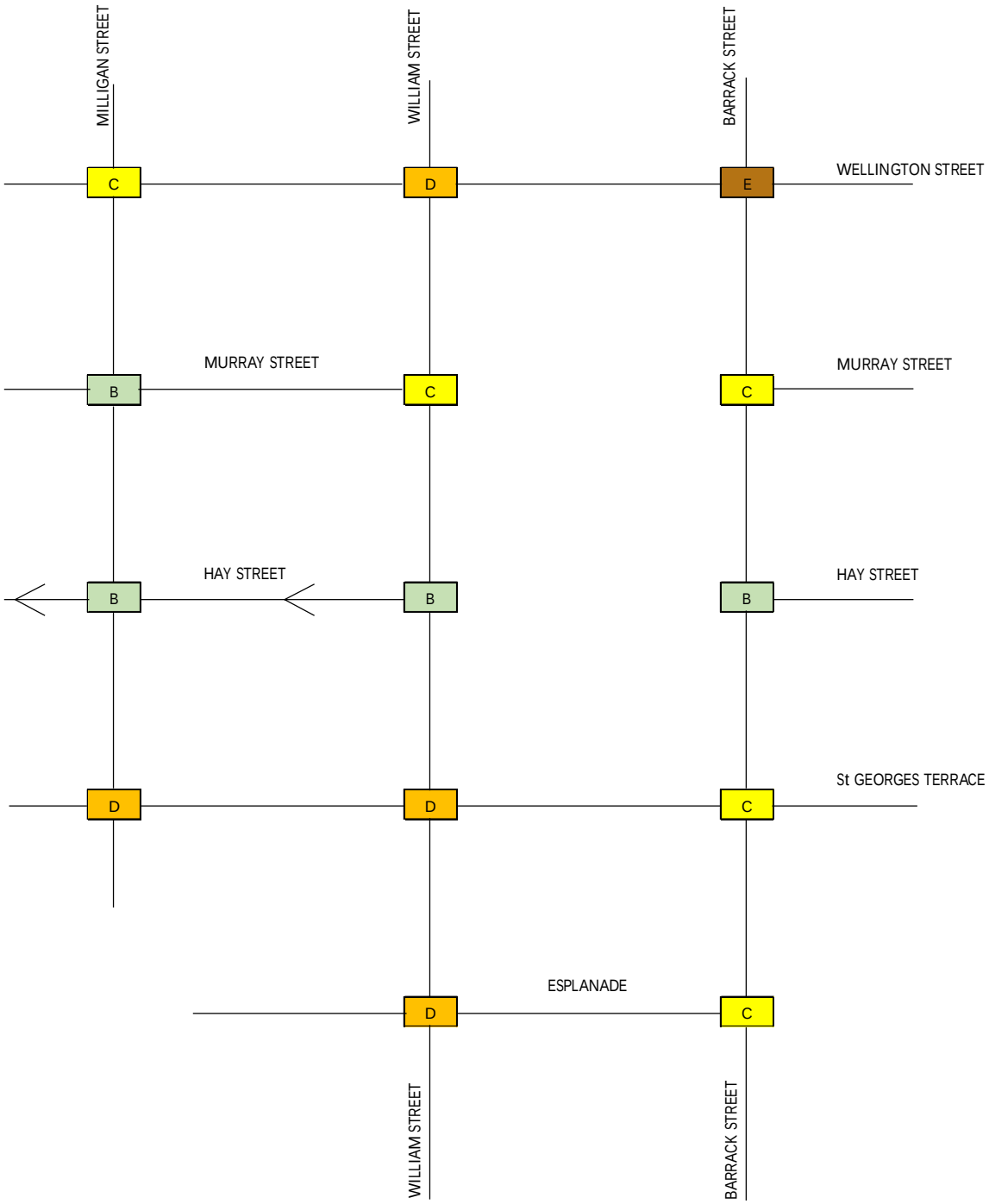


Figure 4-5 AM Project base LOS summary

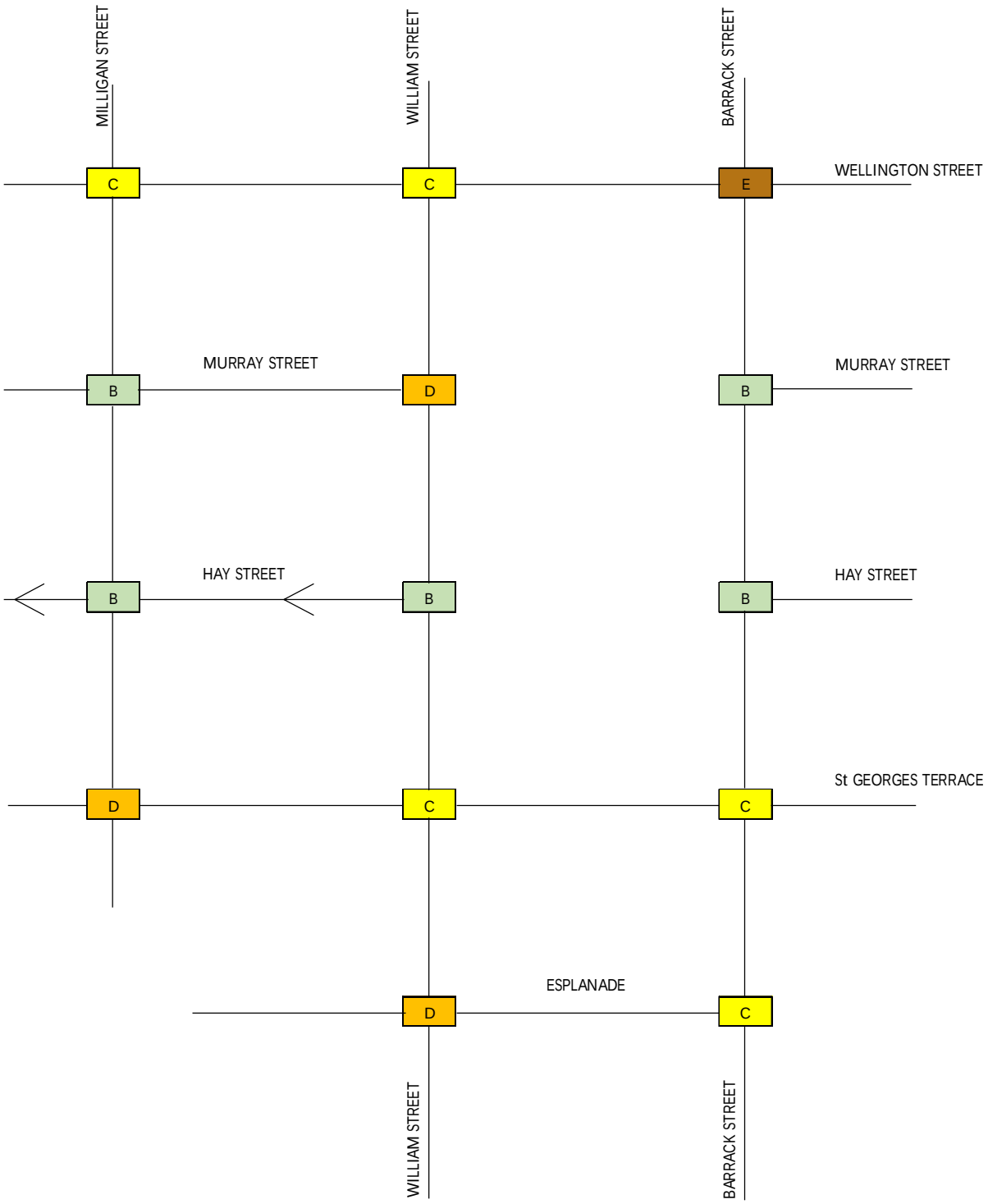


Figure 4-6 AM Transit zone LOS summary

Table 4-6 AM Peak Wellington St and Milligan St LOS

Wellington St / Milligan St	AM Project Base	AM Transit Zone
Milligan St NB	D	D
Wellington St EB	B	B
Arena Access SB	D	D
Wellington St WB	C	C
Intersection Average	C	C

The Transit Zone AM peak turning movements experience an increase in demand for the Wellington Street westbound left turn to Milligan Street southbound (+91 vehicles) and a slight increase in average link delay (+3 seconds), although the LOS remains consistent with the Project Base.

Table 4-7 AM Peak Murray St and Milligan St LOS

Murray St / Milligan St	AM Project Base	AM Transit Zone
Milligan St NB	C	C
Murray St EB	A	A
Milligan St SB	C	C
Murray St WB	B	B
Intersection Average	B	B

Table 4-8 AM Peak Hay St and Milligan St LOS

Hay St / Milligan St	AM Project Base	AM Transit Zone
Milligan St SB	A	A
Hay St WB	B	B
Milligan St EB	A	A
Intersection Average	B	B

The link delays and LOS outputs are almost identical for the Project Base and the Transit Zone models for both the Murray Street and Hay Street intersections with Milligan Street.

Table 4-9 AM Peak St Georges Terrace and Milligan St LOS

St Georges Terrace / Milligan St	AM Project Base	AM Transit Zone
Mounts St NB	C	C
St Georges Terrace EB	D	D
Milligan St SB	B	C
St Georges Terrace WB	E	E
Intersection Average	D	D

The Milligan Street southbound demand increases in the Transit Zone model due to reassignment away from William Street. This results in an increase in average link delay (approximately five seconds) over the modelled hour which changes the LOS output from a B to a C. The overall intersection average LOS remains at D.

Change in LOS values away from the key Milligan Street corridor are summarised as:

- Wellington Street and William Street average intersection LOS improved from D to C in the AM Transit Zone model where there are vehicle demand and link delay reductions, particularly for the Horseshoe Bridge southbound.
- St Georges Terrace and William Street average intersection LOS improved from D to C in the AM Transit Zone model where there are vehicle demand and link delay reductions to the William Street southbound approach.

- Murray Street and William Street average intersection LOS changes from a C to D where an increase in Murray St eastbound approach to William Street delay (+10 seconds average delay) was modelled. The average intersection LOS increased from 35 seconds to 38 seconds where the range used for LOS C = 21 – 35 seconds.

The PM peak average intersection LOS diagrams for the Project Base and the Transit Mall models are included as Figure 4 7 and Figure 4 8. The PM outputs for the Milligan Street intersections are shown in Table 4 10 to Table 4 13.

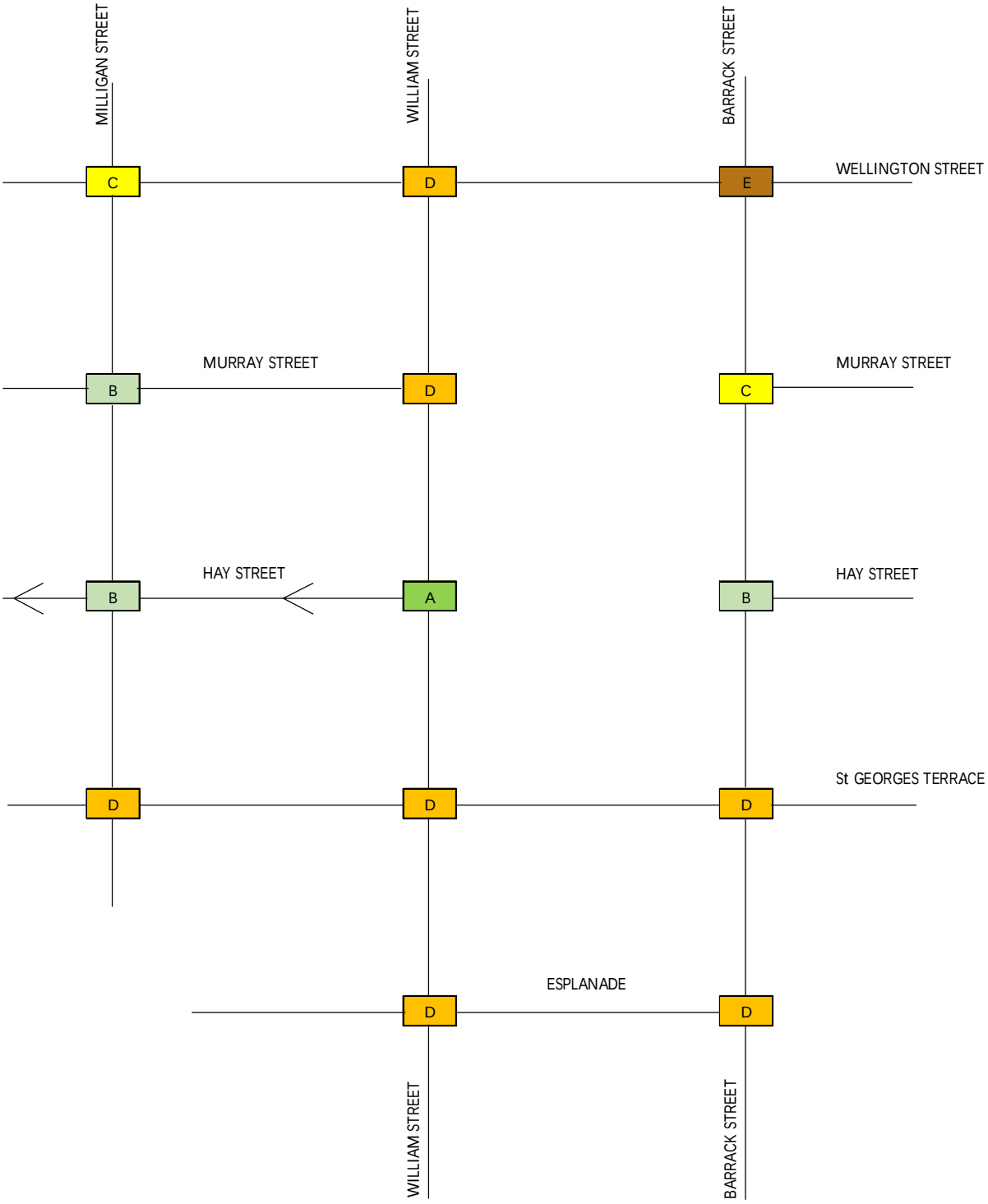


Figure 4-7 PM Project base LOS summary

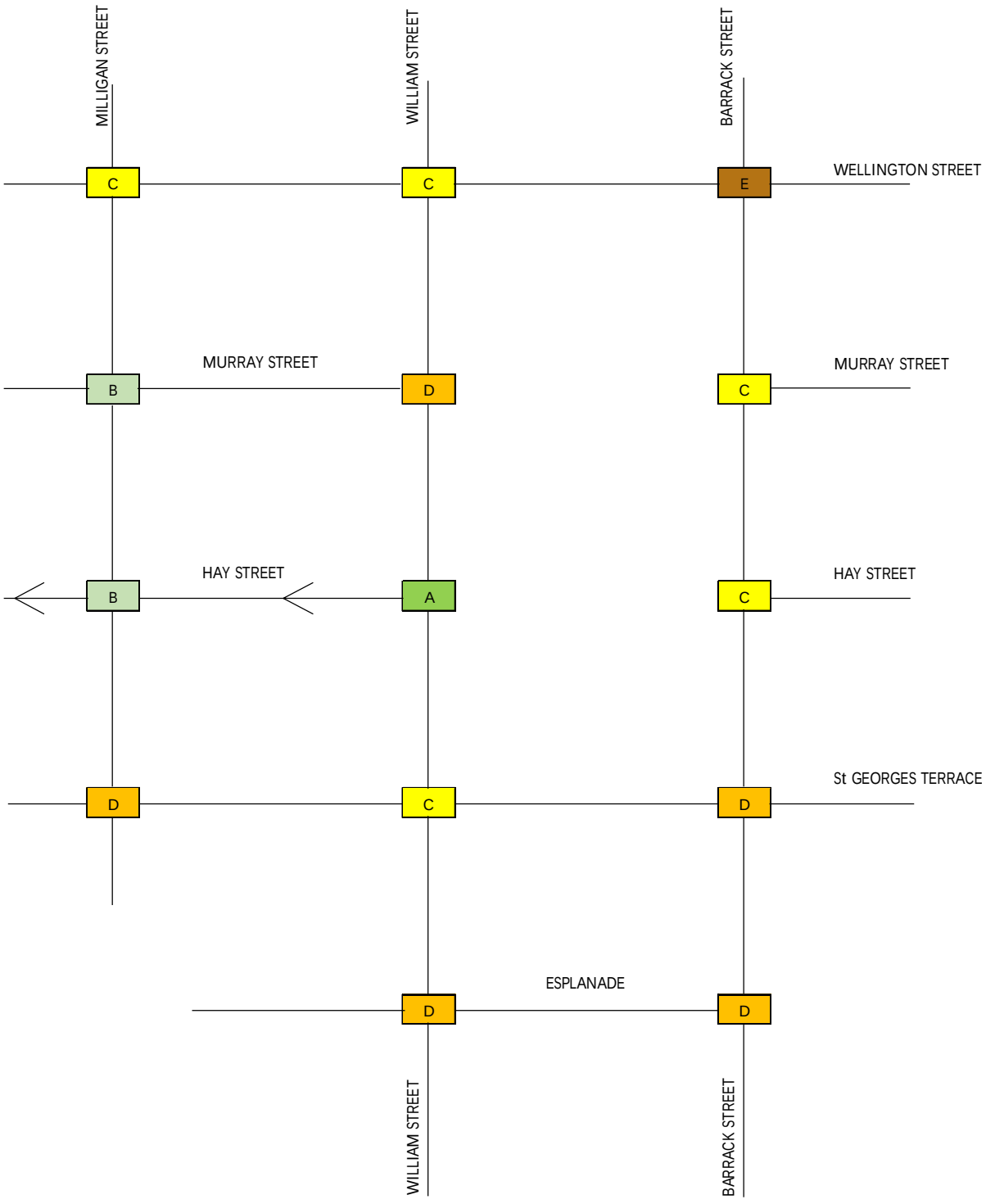


Figure 4-8 PM Transit zone LOS summary

Table 4-10 PM Peak Wellington St and Milligan St LOS

Wellington St / Milligan St	PM Project Base	PM Transit Zone
Milligan St NB	C	C
Wellington St EB	B	B
Arena Access SB	D	D
Wellington St WB	C	C
Intersection Average	C	C

The link delay outputs (and LOS outputs calculated) between the Project Base and Transit Zone models are consistent despite an increase in the westbound Wellington Street PM peak hour vehicle volumes (+92).

Table 4-11 PM Peak Murray Street and Milligan Street LOS

Murray St / Milligan St	PM Project Base	PM Transit Zone
Milligan St NB	C	C
Murray St EB	A	A
Milligan St SB	C	C
Murray St WB	B	B
Intersection Average	B	B

Table 4-12 PM Peak Hay Street and Milligan Street LOS

Hay St / Milligan St	PM Project Base	PM Transit Zone
Milligan St SB	B	B
Hay St WB	B	B
Milligan St EB	B	B
Intersection Average	B	B

The link delays and LOS outputs remain comparable between the Project Base and the Transit Zone models for both the Murray Street and Hay Street intersection with Milligan Street.

Table 4-13 PM Peak St Georges Terrace and Milligan Street LOS

St Georges Terrace / Milligan St	PM Project Base	PM Transit Zone
Mounts St NB	C	C
St Georges Terrace EB	D	D
Milligan St SB	C	C
St Georges Terrace WB	D	D
Intersection Average	D	D

The calculated LOS outputs for St Georges Terrace and Milligan Street remain consistent between the Project Base and Transit Zone PM models. Of particular relevance is that although there has been an increase in PM peak hour vehicle volume (+229) for the Milligan Street southbound approach to St Georges Terrace, the average link delay is almost identical between the Project Base and Transit Zone models resulting in a LOS value that is the same. The increased volume is able to be accommodated here where 92% of the additional vehicles (211 of the 229) make the southbound left turn from Milligan Street into St Georges Terrace. This movement is afforded green time in two of the four signal stages allowing the reassigned volume to clear the intersection without impact.

Change in LOS values away from the key Milligan Street corridor are summarised as:

- Wellington Street and William Street average intersection LOS improved from D to C in the PM Transit Zone model. In the Transit Zone model the northbound left turn volume was shown to decrease (-65

vehicles) which reduced the interaction with the parallel walk stage and reduced the William Street northbound link delay. The Horseshoe Bridge southbound vehicle volume also experiences a reduction due to reassignment from the Transit Zone (-74 vehicles), reducing the approach delay.

- St Georges Terrace and William Street average intersection LOS improved from D to C in the PM Transit Zone model. The large reduction in William Street southbound vehicle volume due to the Transit Zone has been the main contributing factor to the reduction in the average intersection link delay.
- Barrack Street and Hay Street average intersection LOS changed from a B to a C in the PM Transit Zone model. The change in output in the Transit Zone model has occurred for the northbound Barrack Street link delay (a change from approximately 20 seconds to 40 seconds) which has resulted in the average intersection delay changing from 16 seconds to 26 seconds. These values fall either side of the LOS range. It should be noted that this change in link delay is specific to a single seed assignment, and that the other assignments result in similar or lower delays than the PM Project Base models. The average link delay of the 5 assignments for both Project Base and Transit Zone models are consistent for the Barrack Street northbound movement at 21 seconds.

5. Summary and conclusions

5.1 Summary

WSP | Parsons Brinckerhoff and Flyt have undertaken wider area modelling to understand the potential impact and reassignment associated with the Transit Zone proposals. To facilitate this modelling work, the recently re-based 2015 Paramics model established for the Central Area Transport Plan testing was used.

Through discussion with the DoT, PTA and CoP it was agreed that the Transit Zone proposals should be tested and compared against a Project Base scenario to ensure that the Transit Zone operation was isolated. The Project Base models took the re-based 2015 CATP models and included coding updates to represent Barrack Street two-way, Wellington Street tunnel entry to the City Busport and several other network adjustments that have either been installed or will be in place by the time the Transit Zone is proposed to be operational. The vehicle demand matrices have been retained, and there has been no mode shift possibility included.

The outputs from the modelling were to identify change between the Project Base and Transit Zone models in an area wider than the William Street corridor. The key elements analysed were:

- Global network summary statistics (Vehicle Kilometers/Hours Travelled, Network Speed and Trip Simulation)
- Volumetric Difference Plots
- Turning Movement Difference Plots
- Link Delay (used for LOS comparison).

Across each of outputs which provide increasing levels of detail, the impact of the Transit Zone in both the AM and PM models were seen to be minimal when compared to the Project Base models. This modelling gives confidence that the Transit Zone proposals can be accommodated without impact to the rest of the network, and that changes in vehicle volumes resulting from the closure of William Street between Hay Street and Murray Street to general traffic are locally contained.

5.1.1 Global network statistics

Analysis of the global network statistics showed a consistency between the Project Base and Transit Zone models with similar output statistics. The average outputs across the five separate assignments for the AM peak show a 0.08% decrease in VKT and 2.17% increase in VHT while the PM peak equates to a 0.91% and 4.66% average increase in VKT and VHT for the Transit Zone model. These changes equate to very small change across the modelled network suggesting that the change in vehicle travel and movements as a result of the Transit Zone proposals is not significant. The network speeds and percentage of simulated trips has also remained consistent between the Project Base and Transit Zone models, again suggesting that the Transit Zone proposals are not modelled to have a detrimental impact across the wider network.

5.1.2 Volume difference plots

The volumetric difference plots of the whole modelled network show, that in both the AM and PM Transit Zone models, there was a reassignment of general traffic away from William Street where the section between Murray Street and Hay Street is for exclusive use by pedestrians, buses, taxis, and cyclists. The main areas of volumetric change were generally confined to the area between Barrack Street and Milligan

Street. The other areas of the network show very minimal change and the Transit Zone is not forecast to cause noticeable difference.

5.1.3 Turning movement differences

The volume difference plots focused attention on the area between Milligan Street and Barrack Street where detailed intersection turning movement difference plots were produced. This analysis provided more detail around the demand reassigning towards Milligan Street via Wellington Street or Murray Street westbound before travelling eastbound along St Georges Terrace and continuing along the original routes. A proportion of the demand that travelled eastbound along Murray Street, and turned right onto William Street southbound, also reassigns to St Georges Terrace, via either Milligan Street or Elder Street.

The volumetric change in both AM and PM Transit Zone models occurs in similar areas, with the greatest increase in demands being located on Milligan Street (approximately 230 vehicles) together with a southbound reduction of around 400 vehicles along William Street. These detailed turning movement analyses have confirmed the predominant areas of reassignment shown in the volume difference plots and provided clarity around specific turning movement changes helping to understand the changes in possible link delay outputs.

5.1.4 Link delay differences

Average link delays were output from the Project Base and Transit Zone models for comparison. The main area of focus for the delay comparison was along the Milligan Street corridor identified to experience the main increase in vehicle volume as a result of reassignment away from William Street. The increase in demand at the Milligan Street and St Georges Terrace intersection does not increase the link delays and when using the link delays to present a Level of Service range, both AM and PM models, in the Project Base and Transit Zone scenarios remain consistent.

William Street intersections with Wellington Street and St Georges Terrace show an improvement of LOS from D to C for both the AM and PM peak Transit Zone models based on the approach link delays where there have been key reductions in vehicle demand as a result of reassignment away from William Street.

Comparison of other key intersections does not show any detrimental change to average link delays as a result of the Transit Zone proposals. This gives further confidence that the closure of William Street to general traffic does not materially impact any one route or intersection to such a degree that further road improvements are necessary elsewhere on the network.

5.2 Conclusions

The assessment of the impact of the implementation of the Transit Zone has concluded that there is forecast to be no significant adverse impact on traffic movement within the study area as a result of the proposal. The assessment has identified a shift in traffic volumes away from William Street, primarily to Milligan Street. However, the network is shown to remain operating well with similar operating levels both with and without the planned Transit Zone.

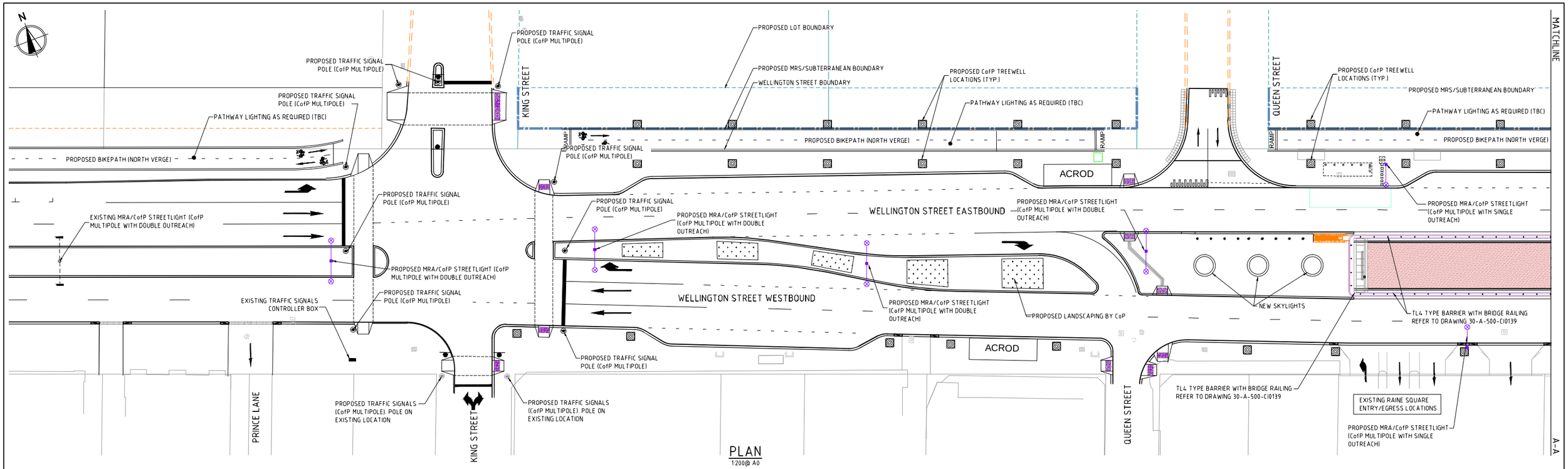
The operation of key intersections within the study has been assessed and there is no noticeable adverse impact on intersection operation. In particular, intersections along Wellington Street, Milligan Street and St George's Terrace, are not shown to have deterioration in peak period traffic operating conditions.

The Transit Zone will provide benefits to public transport users, through reduced running times along William Street and additional stop capacities and facilities. The planned Transit Zone is forecast to result in a transport network which operates well, with no unreasonable delay or queueing forecast to occur within the study area. As the future road network is forecast to operate well and there is no significant identified

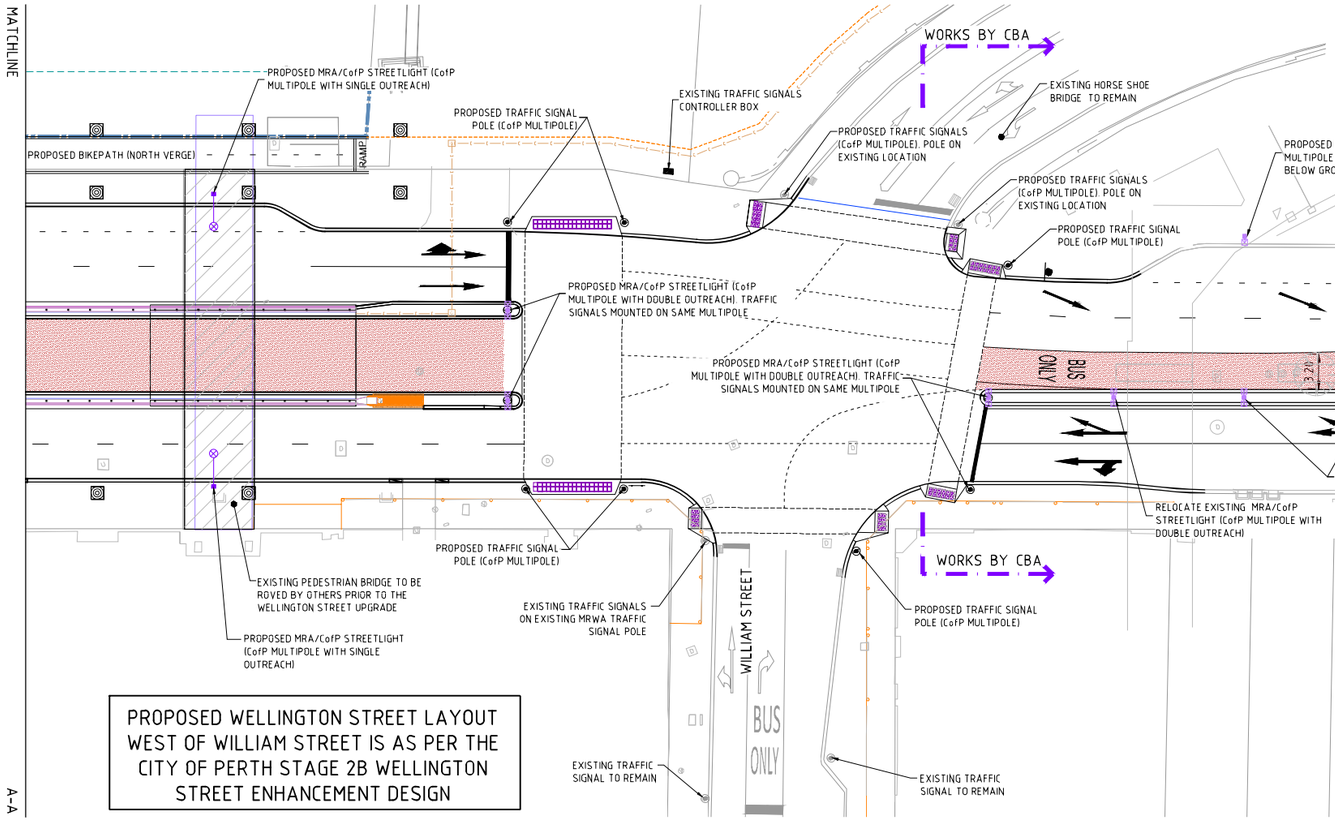
adverse impact associated with the Transit Zone, it is concluded that there are no forecast traffic operation reasons for not implementing the Transit Zone and that the project may progress to detailed design and implementation.

Appendix A

Configuration of proposed network adjustments



PLAN
1:200@ A0



PLAN
1:200

PROPOSED WELLINGTON STREET LAYOUT WEST OF WILLIAM STREET IS AS PER THE CITY OF PERTH STAGE 2B WELLINGTON STREET ENHANCEMENT DESIGN

NOTE: PROPOSED LIGHTING SHOWN INDICATIVE ONLY. DETAILED DESIGN OF STREET LIGHTING TO BE UNDERTAKEN BY CITY OF PERTH, WITH THESE LIGHT LOCATIONS USED AS A BASE CASE.

NOTES:
1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE.
2. FOR EXISTING AND PROPOSED SERVICES REFER TO DRAWING 30-A-500-CI0101 & 103.

LEGEND:
BUS LANE

ULTIMATE WELLINGTON STREET LAYOUT FOR INFORMATION ONLY. DETAILED DESIGN, CONSTRUCTION AND FUNDING BY OTHERS U.O.N.

KEY PLAN:

REV	DATE	AMENDMENT	DRN	CHKD	APP
B	19.02.2015	RE-ISSUED FOR 85% ROAD SAFETY AUDIT	SP	DP	AP
A	27.02.2015	ISSUED FOR 85% ROAD SAFETY AUDIT	SP	DP	AP

ORIG SIZE: A0
CAD DRAWING PATHNAME: P:\P12151 WELLINGTON ST BUSPORT\100 DRAWINGS\102 Civil\AutoCAD\30-A-500-CI0161.dwg

INDEPENDANT VERIFIER COMPANY
INDEPENDANT VERIFIER CHECK
DATE

CITY BUSPORT ALLIANCE
Public Transport Authority
Brookfield MULTIPLEX Engineering + Infrastructure
BM
BG&E

DESIGNED	DESIGN CHECK	DESIGN MANAGER
DATE	DATE	
DRAWN	DRAFTING CHECK	ALLIANCE MANAGER
DATE	DATE	DATE

MEETS PTA REQUIREMENTS
Date Date
Date Date

MAJOR PROJECTS UNIT
SCALE: 1:200 (@ A0)
DATUM: HORIZONTAL: PCG94 VERTICAL: AHD71
APPROVED FOR ISSUE
EXECUTIVE DIRECTOR Major Projects Unit
Date

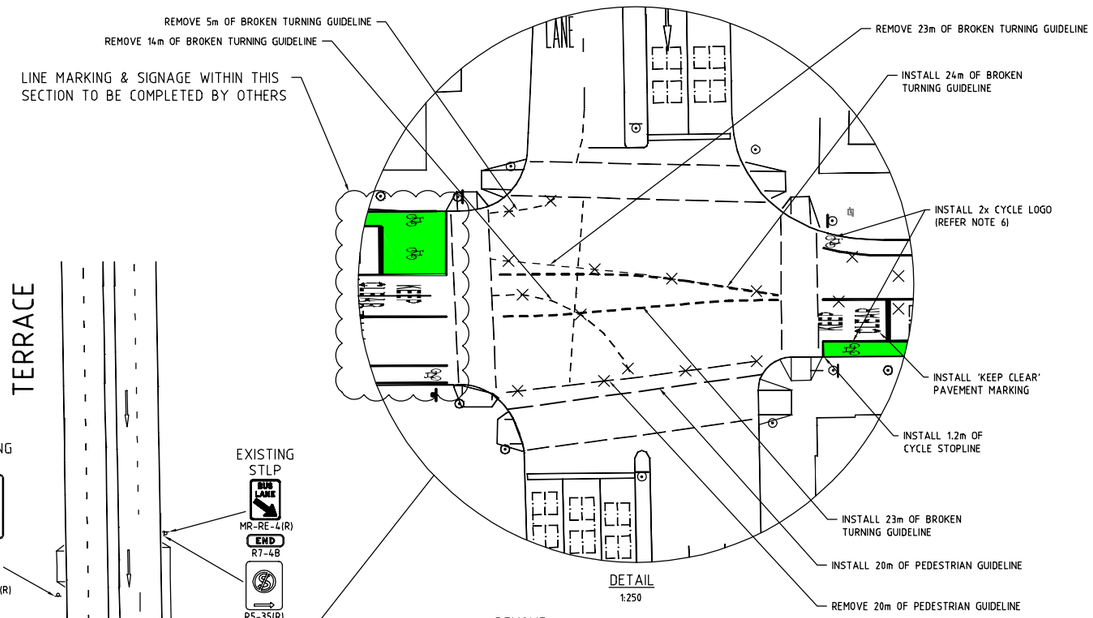
0 10 20 30 40 50 100mm

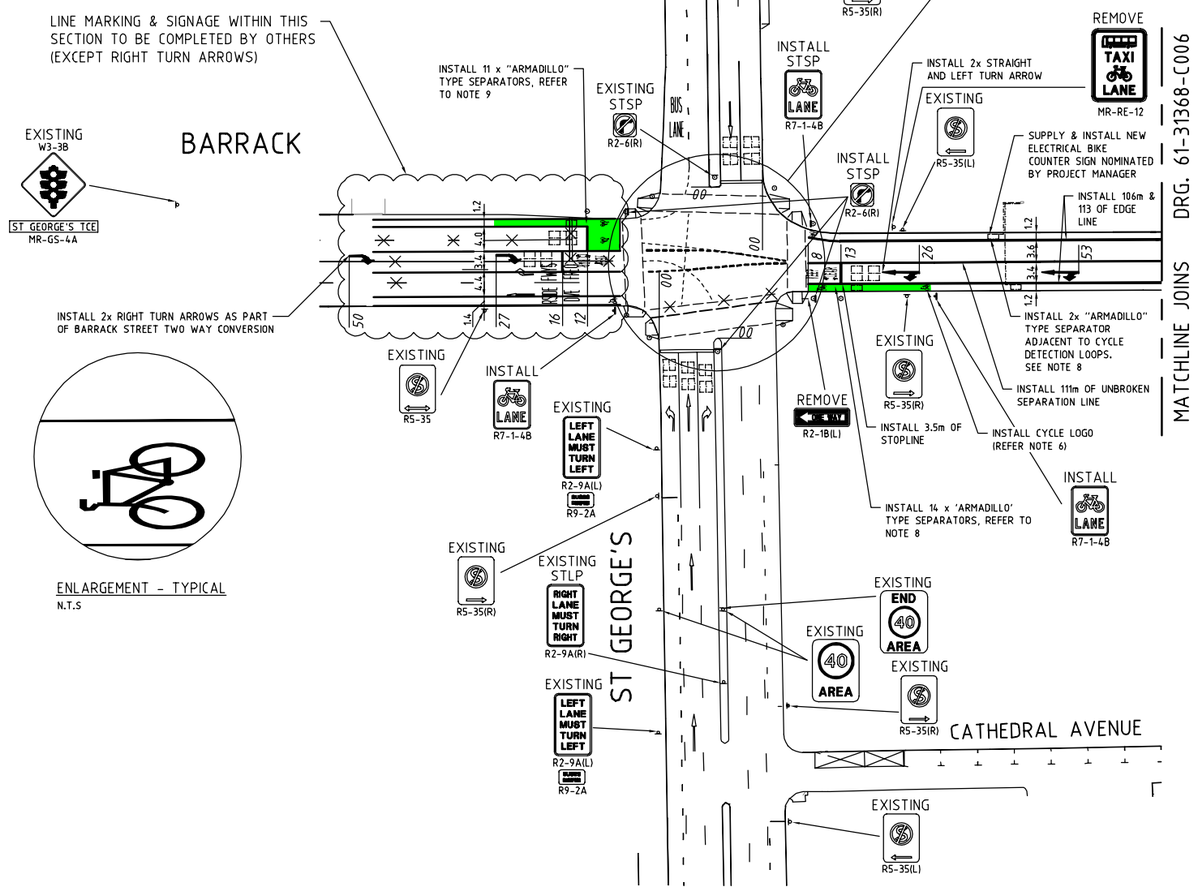
Government of Western Australia Public Transport Authority

PERTH BUSPORT PROJECT
WELLINGTON STREET ENTRANCE
WELLINGTON STREET
ULTIMATE STREET LIGHTING PLAN
PTA DRG No: 30-A-500-CI0161 | REV: B

LEGEND

- NEW PAINTED LINE
- NEW PEDESTRIAN GUIDELINE
- NEW TURNING GUIDELINE
- NEW STOPLINE
- NEW GIVEWAY LINE
- NEW PAVEMENT ARROW
- NEW ONE POST SIGN
- EXISTING PAVEMENT MARKINGS AND RRPM'S TO BE REMOVED
- TRAFFIC SIGNAL POST
- TRAFFIC SIGNAL DETECTOR LOOP
- EXISTING PAINTED LINE
- EXISTING PAINTED PEDESTRIAN GUIDELINE
- EXISTING PAINTED STOPLINE
- EXISTING PAINTED GIVEWAY LINE
- EXISTING PAINTED PAVEMENT ARROW
- EXISTING ONE POST SIGN
- NEW GREEN DEMARCATION SURFACE
- STSP STRAP TO SIGNAL POST
- STLP STRAP TO LIGHT POST





ROAD MARKING AND LINING CONSTRUCTION DETAILS

1. ROAD MARKINGS TO BE "4 YEAR LIFE." AND ROAD LINING TO BE PAINT.
2. ALL ROAD MARKINGS AND LINING TO BE APPLIED WITH GLASS BEADS.
3. REFER TO MRWA STANDARD DRGS 9931-0198, 9120-0158, 200331-093, 200331-094 & 200231-008

BROKEN/SEPARATION LANE LINE (80mm WIDE LINE)	3.0m LINE AND 9.0m GAP	STOPLINE (450mm WIDE LINE - UNLESS OTHERWISE SPECIFIED)	
BARRIER LINES ONE DIRECTION (80mm WIDE LINE, 80mm GAP)	3.0m LINE AND 9.0m GAP	GIVEWAY/HOLD LINE (450mm WIDE LINE) (300mm WIDE AT UNSIGNALISED INTERSECTIONS)	0.6m LINE AND GAP
DOUBDLE TWO WAY BARRIER LINE (80mm WIDE LINE, 80mm GAP)		PEDESTRIAN GUIDELINES (150mm WIDE LINE) MARKINGS TO BE INSTALLED ADJACENT TO EACH OTHER	0.9m LINE AND 0.3 GAP
UNBROKEN SEPARATION/ LANE LINE (80mm WIDE LINE)		TURNING GUIDELINES (80mm WIDE LINE) MARKINGS TO BE INSTALLED ADJACENT TO EACH OTHER	0.6m LINE AND GAP
EDGE LINE (120mm WIDE LINE)			
CONTINUITY LINE (120mm WIDE LINE)	1.0m LINE AND 3.0m GAP		

AMENDMENTS

No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR 85% DESIGN REVIEW	STT 04.09.2014
B	ISSUED FOR 100% DESIGN REVIEW	MU 03.10.2014
C	RE-ISSUED FOR 100% DESIGN REVIEW	STT 22.12.2014
0	ISSUED MRWA APPROVAL/CONSTRUCTION	STT 10.04.2015
1	2 RIGHT TURN ARROWS INSTALLED	STT 08.05.2015
2	INTERSECITON WARNING SIGNS REMOVED	STT 26.05.2015
3	UPDATED WITH ADDITIONAL COMMENT FROM MRWA	STT 17.06.2015

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE MRWA SPECIFICATIONS.
2. PAVEMENT MARKINGS TO BE ADDED/REMOVED AS SHOWN.
3. SIGNS TO BE ADDED/REMOVED/RELOCATED AS SHOWN.
4. USE ALL EXISTING MATERIALS ON SITE WHERE POSSIBLE.
5. ALL EXISTING PAVEMENT MARKINGS TO BE REMOVED BY WET GRINDING.
6. REFER TO MRWA STANDARD DRAWING 20531-0006 FOR SETTING OUT DETAILS.
7. INSTALL MR-GT-20 SIGNS ON POLES 2,3,6,8,9 & 12 FOR A 3 MONTH PERIOD.
8. "ARMADILLO' ZEBRA 5 TYPE SEPARATORS OR SIMILAR IN BLACK WITH WHITE REFLECTIVE BEADING, 120mm WIDE x 748mm LONG x 50mm HIGH . INSTALL ON CYCLE LANE WHITE LINE MARKING, AT 1.5 METERS SPACING CENTRE TO CENTRES FOR FULL LENGTH OF GREEN SURFACING AREA.
9. SAME AS NOTE 8, EXCEPT INSTALL "ARMADILLO" SEPARATORS BACK FROM VEHICLE STOP LINE.

EXISTING SITE - LM029

REFERENCES

DESCRIPTION	DRAWING No.
LEGEND (TRAFFIC SIGNALS)	8320-0400
LEGEND (SYMBOLS)	8525-0316 & 8525-0317
CONDUITS (STANDARD)	8420-0700
RAISED PAVEMENT MARKERS	9120-0158 & 9120-0159
PEDESTRIAN RAMP DETAILS	C.O.P
KERBING TYPE	C.O.P
CHANNELISATION	C.O.P
TRAFFIC SIGNAL POLE AND LOOP LAYOUT	61-31368-C001
MINOR SIGNING AND PAVEMENT MARKINGS	-

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DRAWING NUMBER/DOCUMENT ID G:\61\31368\CADD\Drawings

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SCALES 1:250 1:500 A1

MRWA FILE NUMBER

APPROVED (MRWA)

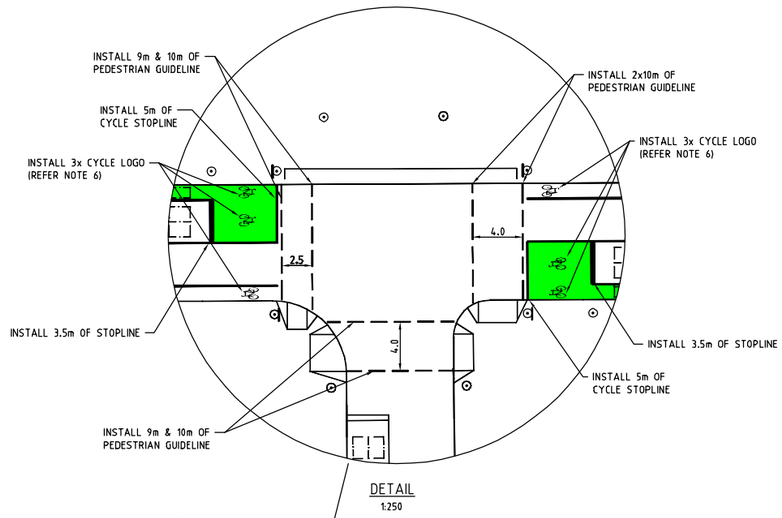
ST GEORGE'S TERRACE (001)
BARRACK STREET (041)
PAVEMENT MARKINGS & MINOR SIGNING

LOCAL AUTHORITY (124) CITY OF PERTH

MRWA DRAWING NUMBER
61-31368-C005 -3

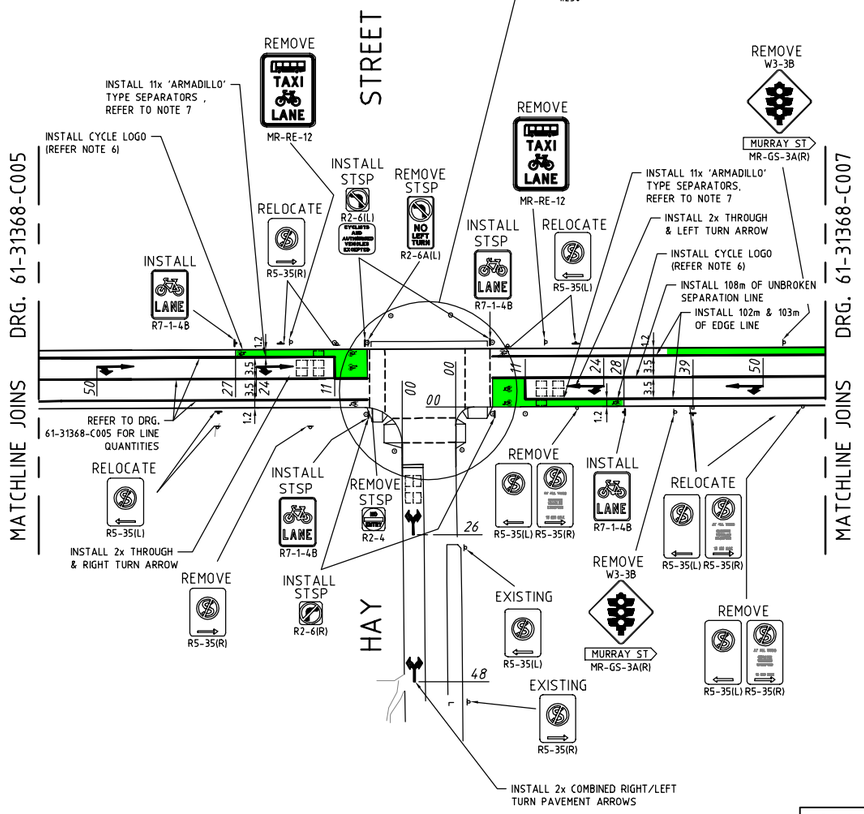
LEGEND

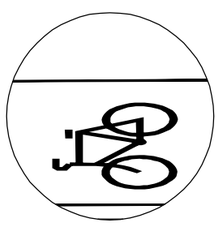
- NEW PAINTED LINE
- NEW PEDESTRIAN GUIDELINE
- NEW TURNING GUIDELINE
- NEW STOPLINE
- NEW GIVEWAY LINE
- NEW PAVEMENT ARROW
- NEW ONE POST SIGN
- EXISTING PAVEMENT MARKINGS AND RRPM'S TO BE REMOVED
- TRAFFIC SIGNAL POST
- TRAFFIC SIGNAL DETECTOR LOOP
- EXISTING PAINTED LINE
- EXISTING PAINTED PEDESTRIAN GUIDELINE
- EXISTING PAINTED STOPLINE
- EXISTING PAINTED GIVEWAY LINE
- EXISTING PAINTED PAVEMENT ARROW
- EXISTING ONE POST SIGN
- NEW GREEN DEMARCATION SURFACE
- STSP STRAP TO SIGNAL POST



DETAIL
1:250

BARRACK STREET





ENLARGEMENT - TYPICAL
N.T.S

ROAD MARKING AND LINING CONSTRUCTION DETAILS

1. ROAD MARKINGS TO BE "4 YEAR LIFE." AND ROAD LINING TO BE PAINT.
2. ALL ROAD MARKINGS AND LINING TO BE APPLIED WITH GLASS BEADS.
3. REFER TO MRWA STANDARD DRGS 9931-0198-2, 9120-0158-7, 200331-093 & 200331-094

- BROKEN LANE LINE (80mm WIDE LINE) — 3.0m LINE AND 9.0m GAP
- DOUBLE TWO WAY (80mm WIDE LINE, 80mm GAP)
- UNBROKEN LANE LINE/ UNBROKEN SEPARATION LINE (80mm WIDE LINE)
- EDGE LINE (120mm WIDE LINE)
- CONTINUITY LINE (120mm WIDE LINE) — 1.0m LINE AND 3.0m GAP
- STOPLINE (450mm WIDE LINE - UNLESS OTHERWISE SPECIFIED)
- GIVEWAY/HOLD LINE (450mm WIDE LINE) (300mm WIDE AT UNSIGNALISED INTERSECTIONS) — 0.6m LINE AND GAP
- PEDESTRIAN GUIDELINES (150mm WIDE LINE) MARKINGS TO BE INSTALLED ADJACENT TO EACH OTHER — 0.9m LINE AND 0.3 GAP

AMENDMENTS

No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR 85% DESIGN REVIEW	AW 30.09.2014
B	RE-ISSUED FOR 85% DESIGN REVIEW	STT 22.12.2014
0	ISSUED MRWA APPROVAL/CONSTRUCTION	STT 08.05.2015
1	INTERSECTION WARNING SIGNS REMOVED	STT 26.05.2015
2	UPDATED WITH ADDITIONAL COMMENT FROM MRWA	STT 17.06.2015
3	SUPPLEMENTARY CYCLISTS (SOUTHBOUND) SIGNS DELETED	STT 23.10.2015

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE MRWA SPECIFICATIONS.
2. PAVEMENT MARKINGS TO BE ADDED/REMOVED AS SHOWN.
3. SIGNS TO BE ADDED/REMOVED/RELOCATED AS SHOWN.
4. USE ALL EXISTING MATERIALS ON SITE WHERE POSSIBLE.
5. ALL EXISTING PAVEMENT MARKINGS TO BE REMOVED BY WET GRINDING.
6. REFER TO MRWA STANDARD DRAWING 20531-0006 FOR SETTING OUT DETAILS FOR CYCLIST ADVANCE STOP LINE.
7. "ARMADILLO' ZEBRA 5 TYPE SEPARATORS OR SIMILAR IN BLACK WITH WHITE REFLECTIVE BEADING, 120mm WIDE X 748mm LONG X50mm HIGH . INSTALL ON CYCLE LANE WHITE LINE MARKING, AT 1.5 METERS SPACING CENTRE TO CENTRES BACK FROM VEHICLE STOP LINE.

EXISTING SITE - LM026

REFERENCES

DESCRIPTION	DRAWING No.
LEGEND (TRAFFIC SIGNALS)	8320-0400
LEGEND (SYMBOLS)	8525-0316 & 8525-0317
CONDUITS (STANDARD)	8420-0700
RAISED PAVEMENT MARKERS	9120-0158 & 9120-0159
PEDESTRIAN RAMP DETAILS	C.O.P
KERBING TYPE	C.O.P
CHANNELISATION	C.O.P
TRAFFIC SIGNAL POLE AND LOOP LAYOUT	61-31368-C002
MINOR SIGNING AND PAVEMENT MARKINGS	-

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DRAWING NUMBER/DOCUMENT ID G:\61\31368\CADD\Drawings

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SCALES 1:250 1:500 A1

MRWA FILE NUMBER

APPROVED (MRWA)

HAY STREET (110)
BARRACK STREET (041)

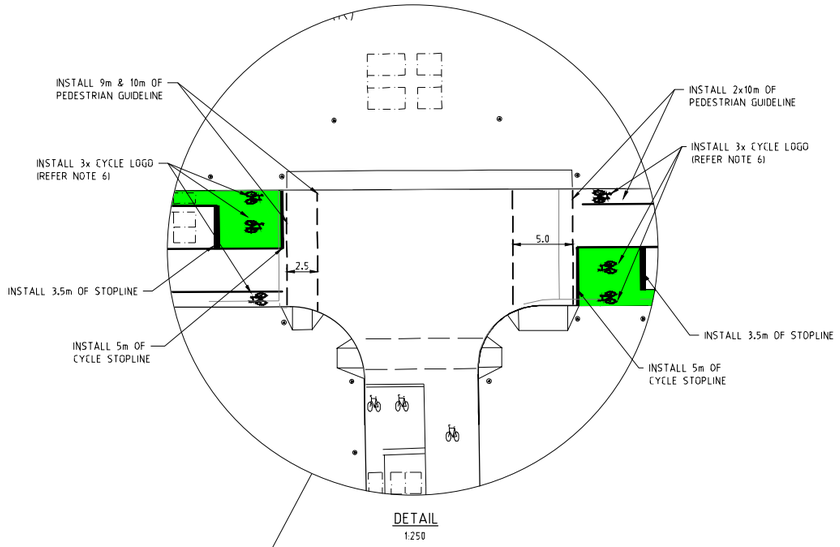
PAVEMENT MARKINGS & MINOR SIGNING

LOCAL AUTHORITY (124) CITY OF PERTH

MRWA DRAWING NUMBER
61-31368-C006 -3

LEGEND

- NEW PAINTED LINE
- NEW PEDESTRIAN GUIDELINE
- NEW TURNING GUIDELINE
- NEW STOPLINE
- NEW GIVEWAY LINE
- NEW PAVEMENT ARROW
- NEW ONE POST SIGN
- EXISTING PAVEMENT MARKINGS AND RRPM'S TO BE REMOVED
- TRAFFIC SIGNAL POST
- TRAFFIC SIGNAL DETECTOR LOOP
- EXISTING PAINTED LINE
- EXISTING PAINTED PEDESTRIAN GUIDELINE
- EXISTING PAINTED STOPLINE
- EXISTING PAINTED GIVEWAY LINE
- EXISTING PAINTED PAVEMENT ARROW
- EXISTING ONE POST SIGN
- NEW GREEN DEMARCATION SURFACE
- STSP STRAP TO SIGNAL POST



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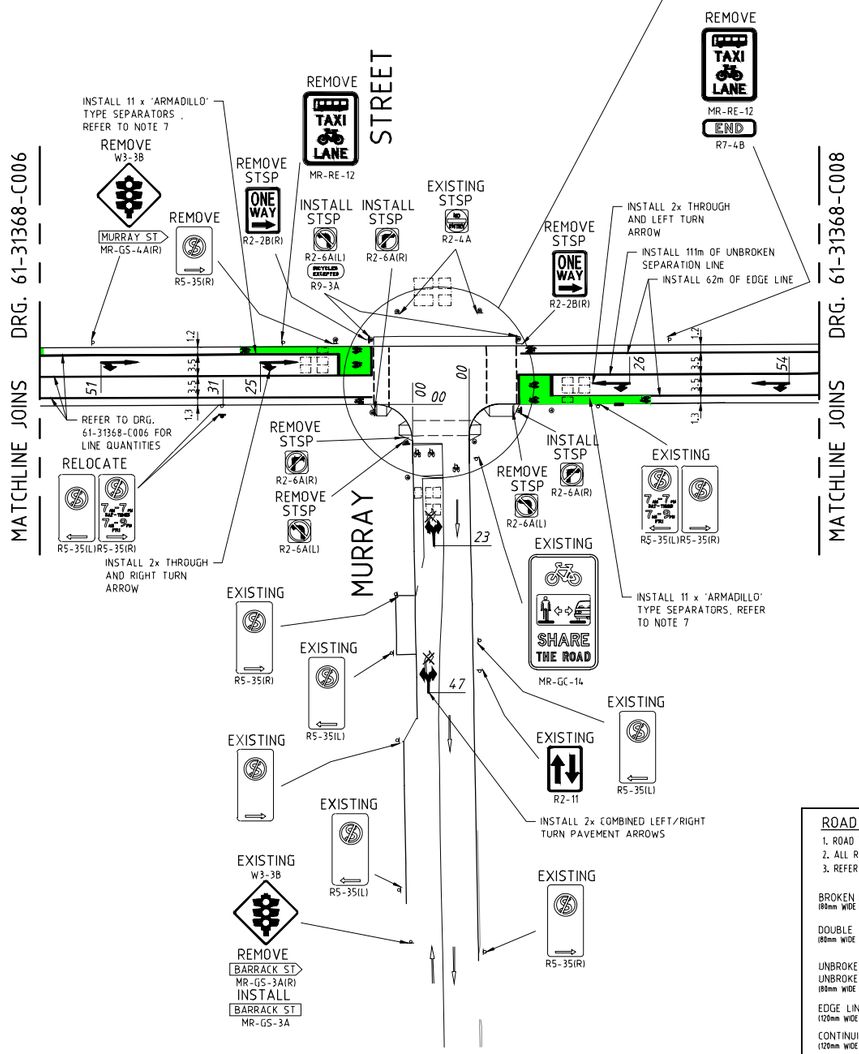
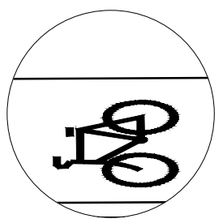
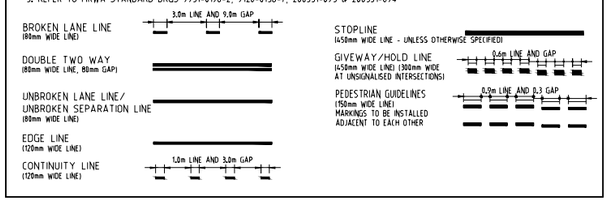




ENLARGEMENT - TYPICAL
N.T.S

ROAD MARKING AND LINING CONSTRUCTION DETAILS

1. ROAD MARKINGS TO BE "4 YEAR LIFE." AND ROAD LINING TO BE PAINTED.
2. ALL ROAD MARKINGS AND LINING TO BE APPLIED WITH GLASS BEADS.
3. REFER TO MRWA STANDARD DRGS 9931-0198-2, 9120-0158-7, 200331-093 & 200331-094



AMENDMENTS

No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR 85% DESIGN REVIEW	AW 30.09.2014
B	RE-ISSUED FOR 85% DESIGN REVIEW	STT 22.12.2014
0	ISSUED MRWA APPROVAL/CONSTRUCTION	STT 10.04.2015
1	BICYCLES EXCEPTED SIGNS ADDED	STT 08.05.2015
2	INTERSECTION WARNING SIGNS REMOVED	STT 26.05.2015
3	UPDATED WITH ADDITIONAL COMMENT FROM MRWA	STT 17.06.2015
4	SUPPLEMENTARY (R9-3A) CYCLISTS (SOUTHBOUND) SIGN DELETED	STT 23.10.2015
5	SUPPLEMENTARY (R9-3A) CYCLISTS (MALL) SIGNS DELETED	STT 23.10.2015

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE MRWA SPECIFICATIONS.
2. PAVEMENT MARKINGS TO BE ADDED/REMOVED AS SHOWN.
3. SIGNS TO BE ADDED/REMOVED/RELOCATED AS SHOWN.
4. USE ALL EXISTING MATERIALS ON SITE WHERE POSSIBLE.
5. ALL EXISTING PAVEMENT MARKINGS TO BE REMOVED BY WET GRINDING.
6. REFER TO MRWA STANDARD DRAWING 20531-0006 FOR SETTING OUT DETAILS FOR CYCLIST ADVANCE STOPLINE.
7. "ARMADILLO" ZEBRA 5 TYPE SEPARATORS OR SIMILAR IN BLACK WITH WHITE REFLECTIVE BEADING, 120mm WIDE X 748mm LONG X50mm HIGH . INSTALL ON CYCLE LANE WHITE LINE MARKING, AT 1.5 METERS SPACING CENTRE TO CENTRES BACK FROM VEHICLE STOP LINE.

EXISTING SITE - LM027

REFERENCES

DESCRIPTION	DRAWING No.
LEGEND (TRAFFIC SIGNALS)	8320-0400
LEGEND (SYMBOLS)	8525-0316 & 8525-0317
CONDUITS (STANDARD)	8420-0700
RAISED PAVEMENT MARKERS	9120-0158 & 9120-0159
PEDESTRIAN RAMP DETAILS	C.O.P
KERBING TYPE	C.O.P
CHANNELISATION	C.O.P
TRAFFIC SIGNAL POLE AND LOOP LAYOUT	61-31368-C003
MINOR SIGNING AND PAVEMENT MARKINGS	-

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DRAWING NUMBER/DOCUMENT ID G:\61\31368\CADD\Drawings

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VERIFIED	N. AHMED
DIRECTOR	S. T. TAN

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mainroads WESTERN AUSTRALIA
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SCALES 1:250 1:500 A1

MRWA FILE NUMBER

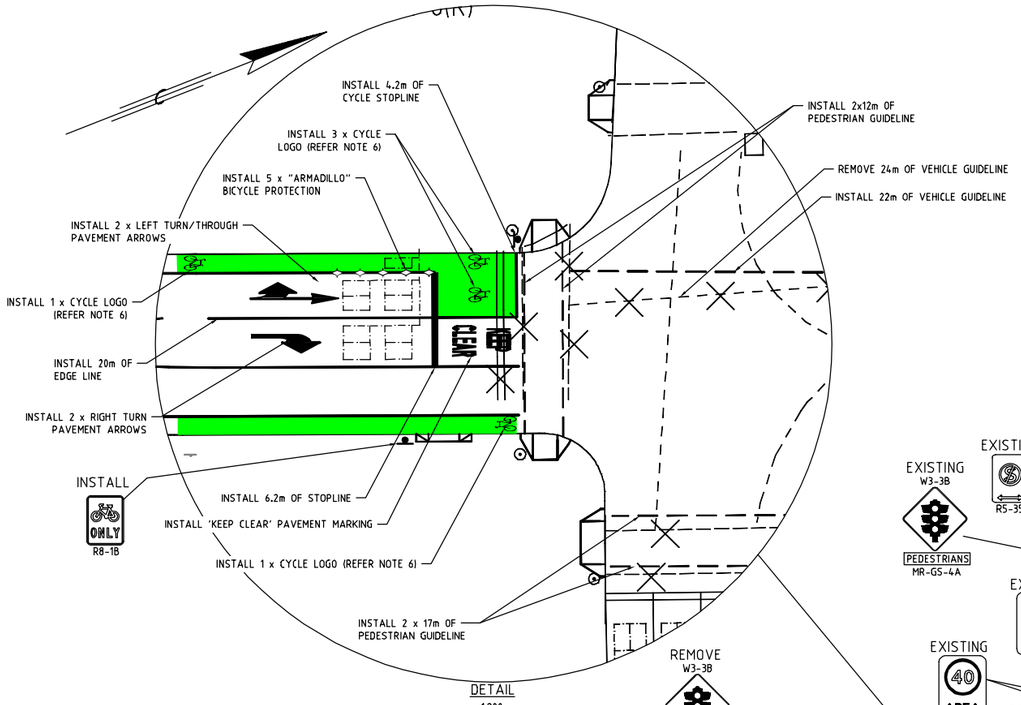
APPROVED (MRWA)

MURRAY STREET (112)
BARRACK STREET (041)

PAVEMENT MARKINGS & MINOR SIGNING

LOCAL AUTHORITY (124) CITY OF PERTH

MRWA DRAWING NUMBER
61-31368-C007 -5



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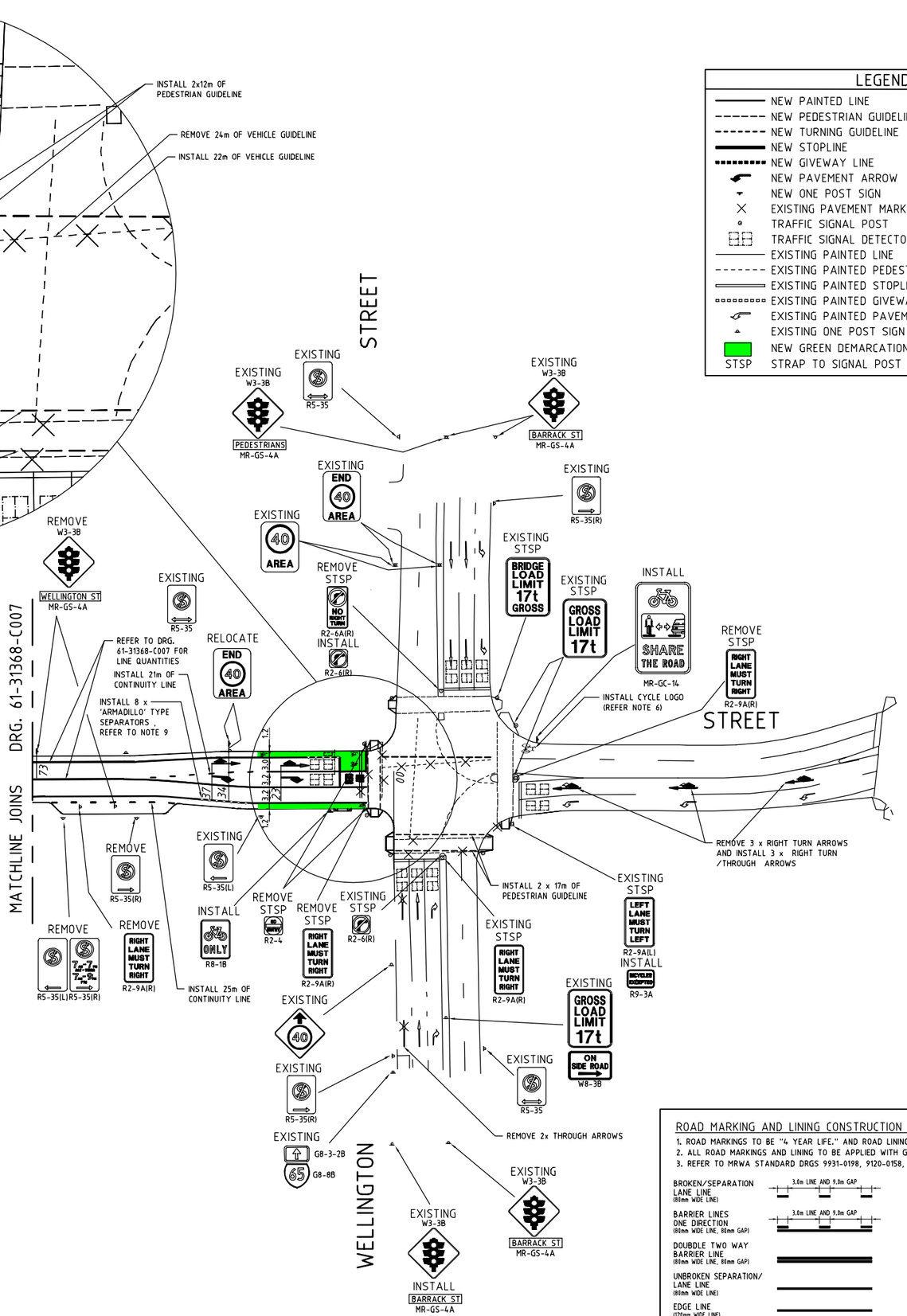
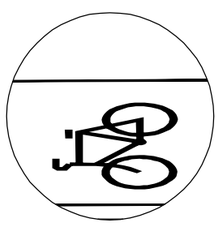


LEGEND

- NEW PAINTED LINE
- NEW PEDESTRIAN GUIDELINE
- NEW TURNING GUIDELINE
- NEW STOPLINE
- NEW GIVEWAY LINE
- NEW PAVEMENT ARROW
- NEW ONE POST SIGN
- EXISTING PAVEMENT MARKINGS AND RRPM'S TO BE REMOVED
- TRAFFIC SIGNAL POST
- TRAFFIC SIGNAL DETECTOR LOOP
- EXISTING PAINTED LINE
- EXISTING PAINTED PEDESTRIAN GUIDELINE
- EXISTING PAINTED STOPLINE
- EXISTING PAINTED GIVEWAY LINE
- EXISTING PAINTED PAVEMENT ARROW
- EXISTING ONE POST SIGN
- NEW GREEN DEMARCATION SURFACE
- STSP STRAP TO SIGNAL POST



ENLARGEMENT - TYPICAL
N.T.S

ROAD MARKING AND LINING CONSTRUCTION DETAILS

1. ROAD MARKINGS TO BE "4 YEAR LIFE." AND ROAD LINING TO BE PAINT.
2. ALL ROAD MARKINGS AND LINING TO BE APPLIED WITH GLASS BEADS.
3. REFER TO MRWA STANDARD DRGS 9931-0198, 9120-0158, 200331-093, 200331-094 & 200231-008

BROKEN/SEPARATION LANE LINE (86mm WIDE LINE) — 3.6m LINE AND 9.8m GAP
BARRIER LINES ONE DIRECTION (86mm WIDE LINE, 86mm GAP) — 3.6m LINE AND 9.8m GAP
DOUBDLE TWO WAY BARRIER LINE (86mm WIDE LINE, 86mm GAP)
UNBROKEN SEPARATION/ LANE LINE (86mm WIDE LINE)
EDGE LINE (124mm WIDE LINE)
CONTINUITY LINE (124mm WIDE LINE) — 1.6m LINE AND 3.8m GAP
STOPLINE (450mm WIDE LINE - UNLESS OTHERWISE SPECIFIED)
GIVEWAY/HOLD LINE (450mm WIDE LINE) (300mm WIDE AT UNSIGNALISED INTERSECTIONS) — 0.6m LINE AND GAP
PEDESTRIAN GUIDELINES (150mm WIDE LINE) MARKINGS TO BE INSTALLED ADJACENT TO EACH OTHER — 0.9m LINE AND 0.3 GAP
TURNING GUIDELINES (86mm WIDE LINE) MARKINGS TO BE INSTALLED ADJACENT TO EACH OTHER — 0.6m LINE AND GAP

AMENDMENTS

No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR 85% DESIGN REVIEW	AW 30.09.2014
B	RE-ISSUED FOR 85% DESIGN REVIEW	STT 22.12.2014
0	ISSUED MRWA APPROVAL/CONSTRUCTION	STT 10.04.2015
1	GUIDELINE AND LOCATION OF CYCLISTS SYMBOLS AMENDED	STT 08.05.2015
2	RAMPS UPDATED	STT 26.05.2015
3	UPDATED WITH ADDITIONAL COMMENT FROM MRWA	STT 17.06.2015
4	INSTALL R9-3A SIGN STSP POLE 6	STT 19.06.2015
5	BIKE LANE AMENDED	STT 24.07.2015

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE MRWA SPECIFICATIONS.
2. PAVEMENT MARKINGS TO BE ADDED/REMOVED AS SHOWN.
3. SIGNS TO BE ADDED/REMOVED/RELOCATED AS SHOWN.
4. USE ALL EXISTING MATERIALS ON SITE WHERE POSSIBLE.
5. ALL EXISTING PAVEMENT MARKINGS TO BE REMOVED BY WET GRINDING.
6. REFER TO MRWA STANDARD DRAWING 20531-0006 FOR SETTING OUT DETAILS FOR CYCLIST ADVANCE STOP LINE.
7. REFER TO MRWS STANDARD DRG. 20131-0018 FOR SIZE OF BICYCLE SYMBOLS FOR SEALED SHOULDER OR BICYCLE LANE
8. INSTALL MR-GT-20 SIGNS ON POLES 3,6,8,9 & 11 FOR A 3 MONTH PERIOD.
9. "ARMADILLO" ZEBRA 5 TYPE SEPARATORS OR SIMILAR IN BLACK WITH WHITE REFLECTIVE BEADING, 120mm WIDE X 748mm LONG X 50mm HIGH. INSTALL ON CYCLE LANE WHITE LINE MARKING, AT 1.5 METERS SPACING CENTRE TO CENTRES FROM CHAINAGE 30 TOWARDS HAY STREET.

EXISTING SITE - LM028

REFERENCES

DESCRIPTION	DRAWING No.
LEGEND (TRAFFIC SIGNALS)	8320-0400
LEGEND (SYMBOLS)	8525-0316 & 8525-0317
CONDUITS (STANDARD)	8420-0700
RAISED PAVEMENT MARKERS	9120-0158 & 9120-0159
PEDESTRIAN RAMP DETAILS	C.O.P
KERBING TYPE	C.O.P
CHANNELISATION	C.O.P
TRAFFIC SIGNAL POLE AND LOOP LAYOUT	61-31368-C004
MINOR SIGNING AND PAVEMENT MARKINGS	-

CITY of PERTH

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DRAWING NUMBER/DOCUMENT ID G:\61\31368\CADD\Drawings

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VERIFIED	N. AHMED
DIRECTOR	S. T. TAN

Government of Western Australia
mainroads WESTERN AUSTRALIA
PLANNING AND TECHNICAL SERVICES DIRECTORATE
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SCALES 1:200 1:500 A1

MRWA FILE NUMBER

APPROVED (MRWA)

WELLINGTON STREET (1010)
BARRACK STREET (041)

PAVEMENT MARKINGS & MINOR SIGNING

LOCAL AUTHORITY (124) CITY OF PERTH

MRWA DRAWING NUMBER
61-31368-C008 -5

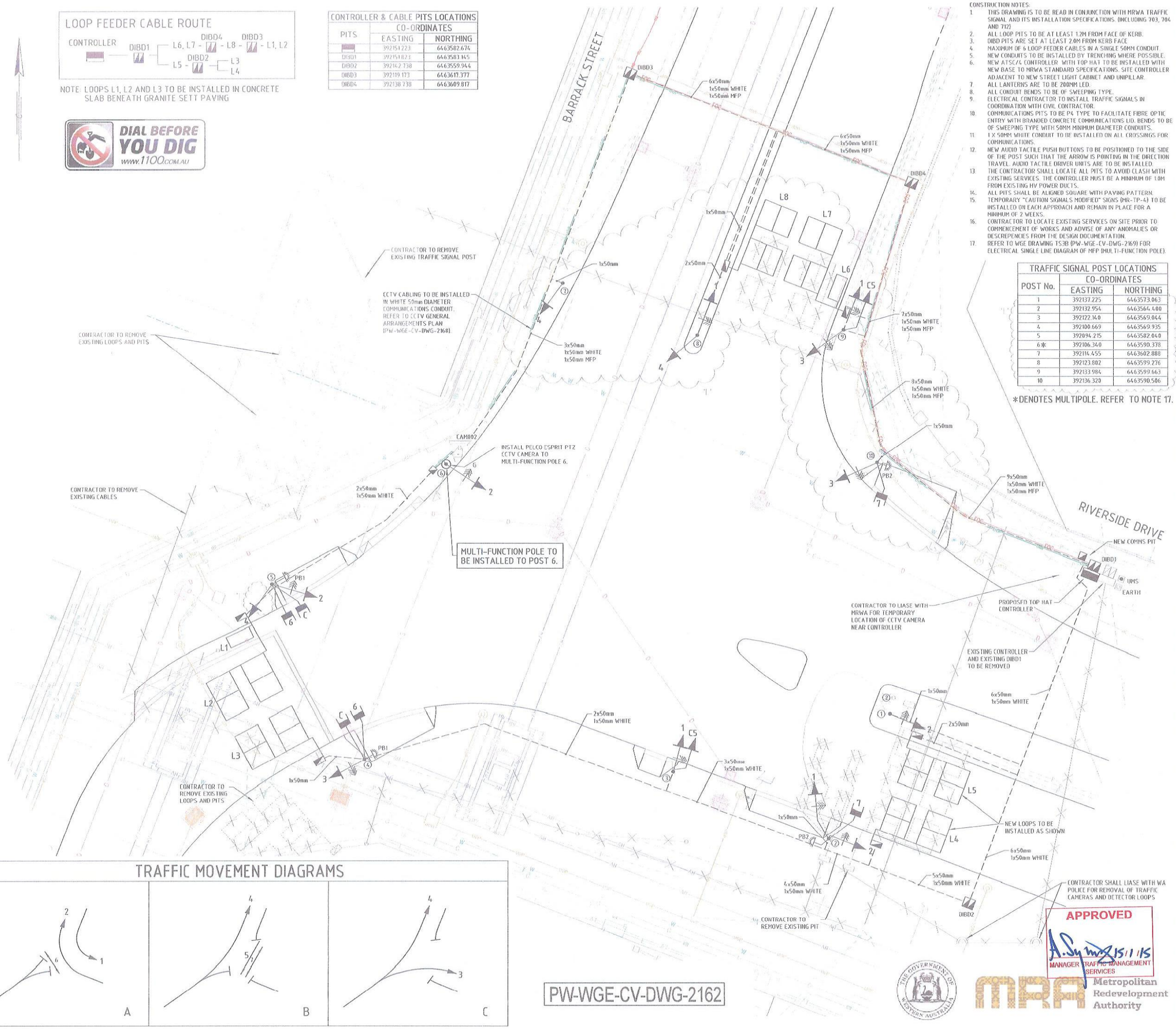
LOOP FEEDER CABLE ROUTE

CONTROLLER — DIBD1 — L6, L7 - DIBD4 - L8 - DIBD3 - L1, L2
DIBD2 — L5 - L3, L4

NOTE: LOOPS L1, L2 AND L3 TO BE INSTALLED IN CONCRETE SLAB BENEATH GRANITE SETT PAVING

DIAL BEFORE YOU DIG www.1100.com.au

CONTROLLER & CABLE PITS LOCATIONS		
PITS	CO-ORDINATES	
	EASTING	NORTHING
	392151.223	6463582.674
DIBD1	392151.823	6463583.145
DIBD2	392142.738	6463559.944
DIBD3	392119.173	6463617.377
DIBD4	392138.738	6463609.817



TRAFFIC MOVEMENT DIAGRAMS

PW-WGE-CV-DWG-2162

CONSTRUCTION NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH MRWA TRAFFIC SIGNAL AND ITS INSTALLATION SPECIFICATIONS. (INCLUDING 703, 704 AND 712)
2. ALL LOOP PITS TO BE AT LEAST 1.2M FROM FACE OF KERB.
3. DIBD PITS ARE SET AT LEAST 2.0M FROM KERB FACE.
4. MAXIMUM OF 6 LOOP FEEDER CABLES IN A SINGLE 50MM CONDUIT.
5. NEW CONDUITS TO BE INSTALLED BY TRENCHING WHERE POSSIBLE.
6. NEW ATSC/4 CONTROLLER WITH TOP HAT TO BE INSTALLED WITH NEW BASE TO MRWA STANDARD SPECIFICATIONS. SITE CONTROLLER ADJACENT TO NEW STREET LIGHT CABINET AND UNIPILLAR.
7. ALL LANTERNS ARE TO BE 200MM LED.
8. ALL CONDUIT BENDS TO BE OF SWEEPING TYPE.
9. ELECTRICAL CONTRACTOR TO INSTALL TRAFFIC SIGNALS IN COORDINATION WITH CIVIL CONTRACTOR.
10. COMMUNICATIONS PITS TO BE P4 TYPE TO FACILITATE FIBRE OPTIC ENTRY WITH BRANDED CONCRETE COMMUNICATIONS LID. BENDS TO BE OF SWEEPING TYPE WITH 50MM MINIMUM DIAMETER CONDUITS.
11. 1 X 50MM WHITE CONDUIT TO BE INSTALLED ON ALL CROSSINGS FOR COMMUNICATIONS.
12. NEW AUDIO TACTILE PUSH BUTTONS TO BE POSITIONED TO THE SIDE OF THE POST SUCH THAT THE ARROW IS POINTING IN THE DIRECTION TRAVEL. AUDIO TACTILE DRIVER UNITS ARE TO BE INSTALLED.
13. THE CONTRACTOR SHALL LOCATE ALL PITS TO AVOID CLASH WITH EXISTING SERVICES. THE CONTROLLER MUST BE A MINIMUM OF 1.0M FROM EXISTING HV POWER DUCTS.
14. ALL PITS SHALL BE ALIGNED SQUARE WITH PAVING PATTERN.
15. TEMPORARY "CAUTION SIGNALS MODIFIED" SIGNS (MR-TP-4) TO BE INSTALLED ON EACH APPROACH AND REMAIN IN PLACE FOR A MINIMUM OF 2 WEEKS.
16. CONTRACTOR TO LOCATE EXISTING SERVICES ON SITE PRIOR TO COMMENCEMENT OF WORKS AND ADVISE OF ANY ANOMALIES OR DESCREPENCIES FROM THE DESIGN DOCUMENTATION.
17. REFER TO WGE DRAWING TS3B (PW-WGE-CV-DWG-2169) FOR ELECTRICAL SINGLE LINE DIAGRAM OF MFP (MULTI-FUNCTION POLE).

TRAFFIC SIGNAL POST LOCATIONS		
POST No.	CO-ORDINATES	
	EASTING	NORTHING
1	392137.225	6463573.063
2	392132.954	6463564.400
3	392122.140	6463569.044
4	392100.669	6463569.935
5	392094.215	6463582.040
6*	392106.340	6463590.378
7	392114.455	6463602.888
8	392123.802	6463599.276
9	392133.984	6463599.663
10	392136.320	6463590.506

*DENOTES MULTIPOLE. REFER TO NOTE 17.

AMENDMENTS		
NO.	DESCRIPTION	APPROVED & DATE
I.	ISSUED FOR STAKEHOLDER REVIEW	
J.	ISSUED FOR APPROVAL	G.H. 18/7/14
K.	ISSUED FOR APPROVAL	G.H. 1/8/14
L.	ISSUED FOR APPROVAL	11/11/14

LEGEND

- NEW KERB
- EXISTING KERB
- PROPOSED TRAFFIC SIGNAL POST
- PROPOSED 11.4m MULTI-FUNCTION POLE
- EXISTING POSTS TO REMAIN OR BE REMOVED AS NOTED. REUSE EXISTING POSTS WHERE POSSIBLE
- PELCO ESPRIT PTZ CAMERA
- PROPOSED POST NUMBER
- CONTROLLER WITH TOP HAT
- PAVEMENT JUNCTION BOX
- P-TYPE CABLE PIT
- DRAW IN BOX (DOUBLE LID)
- PROPOSED CONDUIT
- W — WATER MAIN
- SEWER MAIN
- DRAINAGE PIPE
- TELSTRA CABLE
- GAS PIPE
- STREET LIGHTING CONDUIT
- FOC — FIBRE OPTIC CABLE
- HV — HIGH VOLTAGE POWER TRENCH

SITE - LM064

CONTROLLER	ATSC/4 WITH TOP HAT
LANTERNS	200mm LED
COMMUNICATIONS	FIBRE CONNECTION

REFERENCES

DESCRIPTION	DRAWING No
LEGEND (TRAFFIC SIGNALS)	8320-0400
LEGEND (SYMBOLS)	8525-0316 & 8525-0317
CONDUITS (STANDARD)	8420-0700
RAISED PAVEMENT MARKERS	9120-0158
PEDESTRIAN RAMP DETAILS	9831-5649
KERBING TYPE	9331-376
CHANNELISATION	0648-2198
TRAFFIC SIGNAL POLE AND LOOP LAYOUT	0648-2199
MINOR SIGNING AND PAVEMENT MARKINGS	0648-2200
VEHICLE DETECTOR LOOPS INSTALLATION DETAILS	200431-0167 & 200431-0168

METADATA

GROUND SURVEY STANDARD:	N/A
DATE OF CAPTURE:	N/A
MAPPING SURVEY STANDARD:	N/A
DATE OF CAPTURE:	N/A
MAIN ROADS PROJECT ZONE:	MGA 94 ZONE 50
HEIGHT DATUM:	AHD

Government of Western Australia — mainroads WESTERN AUSTRALIA
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DRAWING NUMBER/DOCUMENT ID
DESIGNED / DRAWN: WOOD AND GRIEVE ENGINEERS
VERIFIED
DIRECTOR

SCALES 1:125 — A1

MRWA FILE NUMBER
APPROVED (MRWA)

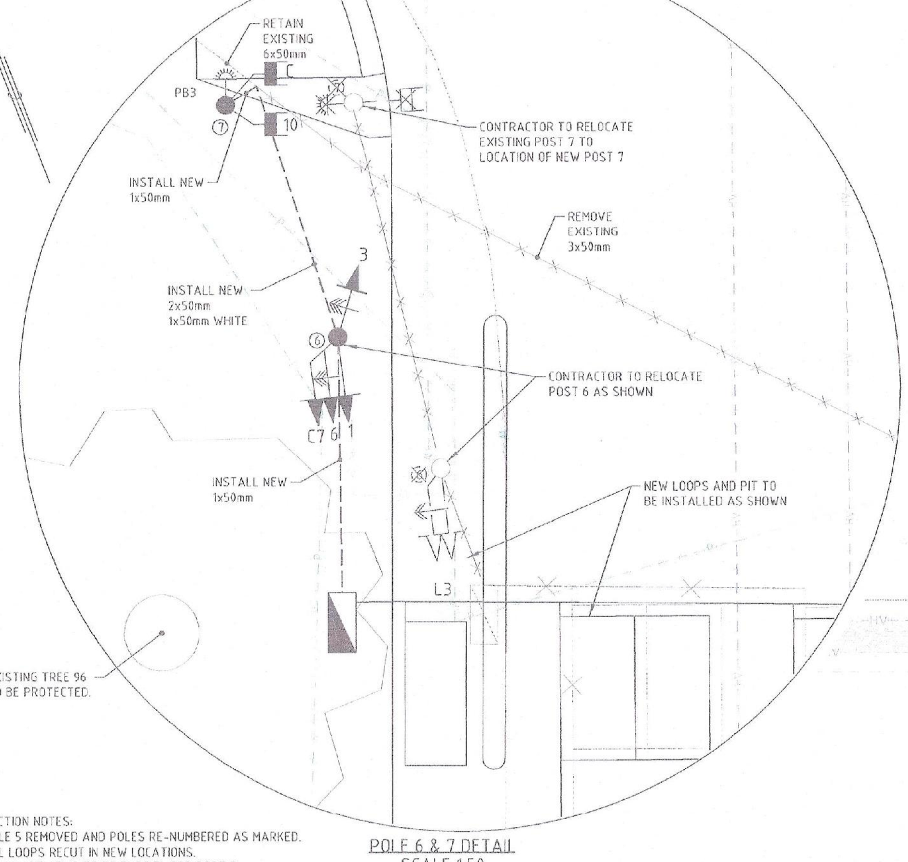
APPROVED
MANAGER TRAFFIC MANAGEMENT SERVICES
15/11/15

THE GOVERNMENT OF WESTERN AUSTRALIA
MRA Metropolitan Redevelopment Authority

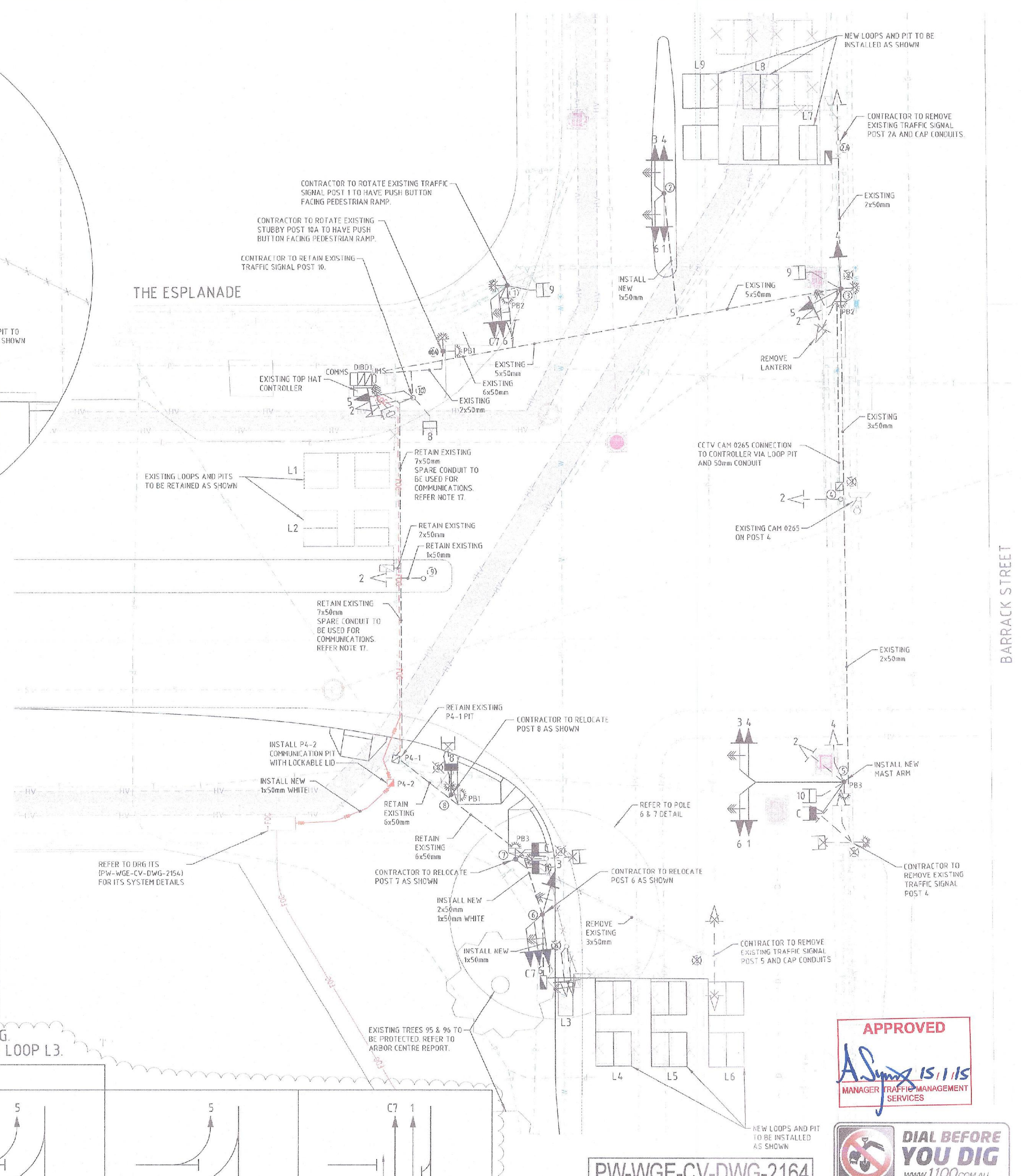
ELIZABETH QUAY
BARRACK STREET - RIVERSIDE DRIVE EAST

TRAFFIC SIGNALS
SHEET 3 OF 5

LOCAL AUTHORITY CITY OF PERTH
MRWA DRAWING NUMBER
TS3



POLE 6 & 7 DETAIL
SCALE 1:50



CONSTRUCTION NOTES:

1. POLE 5 REMOVED AND POLES RE-NUMBERED AS MARKED.
2. ALL LOOPS RECUT IN NEW LOCATIONS.
3. NEW MAST ARMS TO BE TYPE 5L FOR POST 5.
4. REFER TO MANUFACTURER DRAWING FOR 5.5M OUTREACH GENERAL ARRANGEMENT AND DETAILS.
5. REFER TO MRWA DWG NO. 0330-1944 FOR MAST ARM DETAIL.
6. REFER TO DWG NO. 1048-0467 FOR MOUNTING PLATE DETAIL.
7. LUGS ON THE MAST ARM TO BE AS PER TAPERLINE CATALOGUE NUMBER TYPE 5 MODIFIED.
8. TEMPORARY MR-GT-20 SIGN TO BE INSTALLED ON POLE 10 AND REMOVED AFTER 3 MONTHS.
9. "CAUTION SIGNALS MODIFIED" SIGNS (MR-TP-4) TO BE INSTALLED ON ALL APPROACHES AND REMAIN IN PLACE FOR A MINIMUM OF TWO WEEKS.
10. ALL LOOP PITS TO BE AT LEAST 1.2M FROM FACE OF KERB.
11. DIBD PITS ARE SET AT LEAST 2.0M FROM KERB FACE
12. MAXIMUM OF 6 LOOP FEEDER CABLES IN A SINGLE 50MM CONDUIT.
13. AUDIO-TACTILE PUSH BUTTONS TO BE POSITIONED TO THE SIDE OF THE POST SUCH THAT THE ARROW IS POINTING IN THE DIRECTION OF TRAVEL.
14. SIGNAL POSTS WITH PUSHBUTTONS TO BE WITHIN 300MM OF RAMP.
15. CENTRE OF PUSHBUTTON 1050MM ABOVE FOOT LEVEL.
16. UNUSED CONDUITS TO BE CAPPED.
17. EXISTING SPARE 1x50mm POWER CONDUIT (ORANGE) CAN BE USED FOR COMMUNICATIONS IF REQUIRED. END OF SLEEVE TO BE COATED WHITE TO INDICATE COMMUNICATION SERVICES.

POST No.	EASTING	NORTHING
1	EXISTING	EXISTING
2	392191.368	6463776.072
2A	REMOVE	REMOVE
3	EXISTING	EXISTING
4	EXISTING	EXISTING
5	392188.646	6463742.060
6	392170.284	6463741.449
7	392170.031	6463744.839
8	392168.028	6463749.492
9	EXISTING	EXISTING
10	EXISTING	EXISTING
10A	EXISTING	EXISTING

CONTROLLER & CABLE PITS LOCATIONS

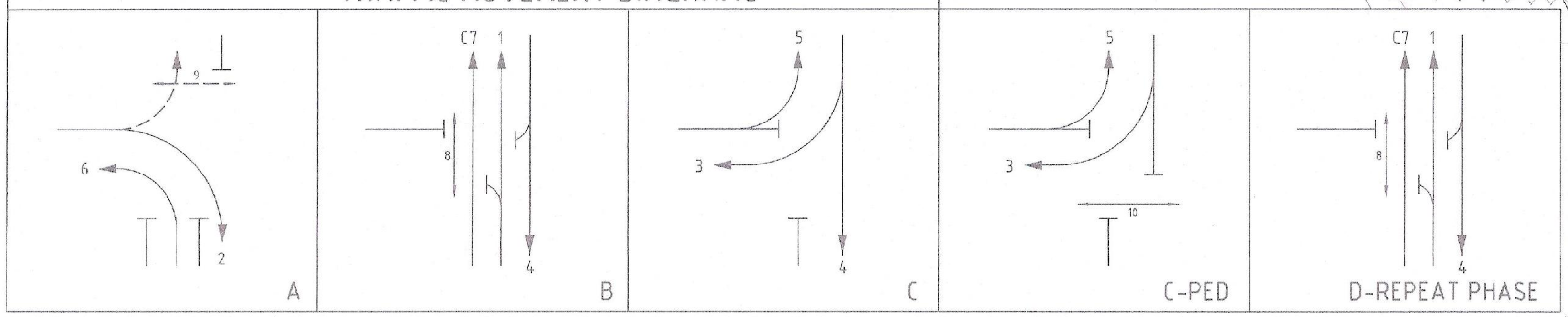
PITS	CO-ORDINATES	
	EASTING	NORTHING
(controller)	392171.909	6463772.156
DIBD1	392172.105	6463772.688
P4-1	392165.889	6463752.451
P4-2	392165.889	6463752.451

LOOP FEEDER CABLE ROUTE

CONTROLLER — DIBD1 — L1; L7, L8, L9; L2 – P4-1 – L3, L4, L5, L6

NOTE: SG5 TO PROVIDE A TIMED ARROW PROTECTION TO PED2 CROSSING.
D - REPEAT PHASE IS SUBJECT TO DEMAND INPUT FROM BICYCLE LOOP L3.

TRAFFIC MOVEMENT DIAGRAMS



APPROVED
MANAGER TRAFFIC MANAGEMENT SERVICES
15/1/15

PW-WGE-CV-DWG-2164

DIAL BEFORE YOU DIG www.1100.com.au

Metropolitan Redevelopment Authority

AMENDMENTS

NO.	DESCRIPTION	APPROVED & DATE
C.	ISSUED FOR APPROVAL	G. M. 3/9/13
D.	ISSUED FOR DESIGN DEVELOPMENT REPORT	G. M. 18/9/13
E.	ISSUED FOR APPROVAL	G. M. 15/11/13
F.	ISSUED FOR APPROVAL	G. M. 13/5/14
G.	ISSUED FOR STAKEHOLDER REVIEW	
H.	ISSUED FOR APPROVAL	G. M. 5/9/14
I.	ISSUED FOR APPROVAL	12/11/14

NOTES

- NEW KERB
- EXISTING KERB
- PROPOSED TRAFFIC SIGNAL POST
- EXISTING POSTS TO REMAIN OR REMOVED AS NOTED. REUSE EXISTING POSTS WHERE POSSIBLE
- PROPOSED MAST ARM
- PROPOSED POST NUMBER
- CONTROLLER WITH TOP HAT
- PAVEMENT JUNCTION BOX
- P-TYPE CABLE PIT
- DRAW IN BOX DOUBLE
- EXISTING CONDUIT
- PROPOSED CONDUIT
- WATER MAIN
- SEWER MAIN
- DRAINAGE PIPE
- TELSTRA CABLE
- POWER CABLE
- FOC FIBRE OPTIC CABLE
- HV HIGH VOLTAGE POWER TRENCH

SITE - LM145

CONTROLLER	ATSC/4 WITH TOP HAT
LANTERNS	200mm LED
COMMUNICATIONS	ADSL CONNECTION

REFERENCES

DESCRIPTION	DRAWING No
LEGEND (TRAFFIC SIGNALS)	8320-0400
LEGEND (SYMBOLS)	8525-0316 & 8525-0317
CONDUITS (STANDARD)	8420-0700
RAISED PAVEMENT MARKERS	9120-0158 & 9120-0159
PEDESTRIAN RAMP DETAILS	9831-5649
KERBING TYPE	9331-376
CHANNELISATION	0648-2198
TRAFFIC SIGNAL POLE AND LOOP LAYOUT	0648-2199
MINOR SIGNING AND PAVEMENT MARKINGS	0648-2200

METADATA

GROUND SURVEY STANDARD	N/A
DATE OF CAPTURE	XX/XX/XX
MAPPING SURVEY STANDARD	N/A
DATE OF CAPTURE	XX/XX/XX
MAIN ROADS PROJECT ZONE	MGA 94 ZONE 50
HEIGHT DATUM	AHD

Government of Western Australia
mainroads WESTERN AUSTRALIA
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DESIGNED / DRAWN: WOOD AND GRIEVE ENGINEERS
VERIFIED
DIRECTOR
SCALES 1:125
A1
MRWA FILE NUMBER
APPROVED (MRWA)

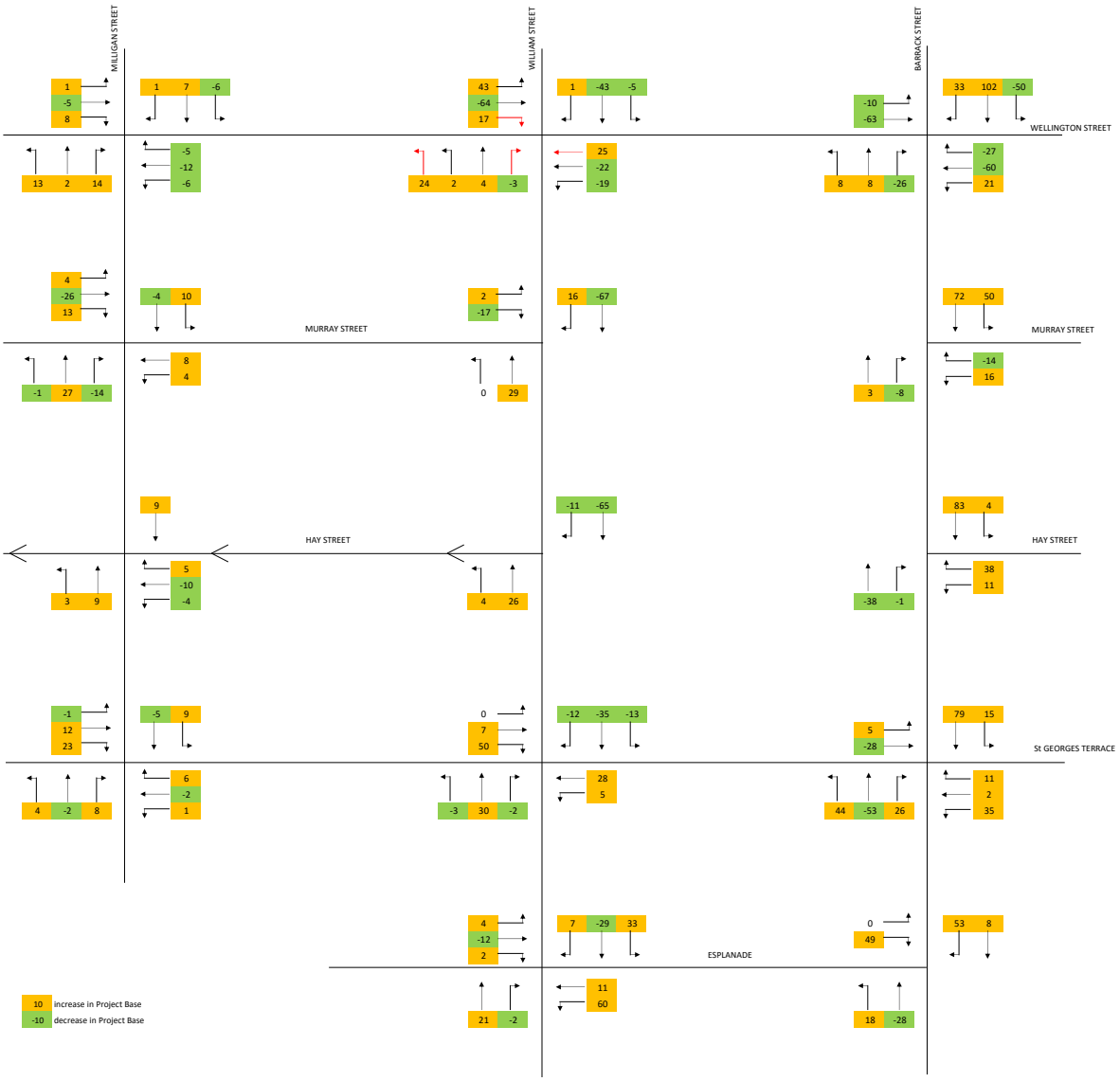
ELIZABETH QUAY
THE ESPLANADE - BARRACK STREET

TRAFFIC SIGNALS
SHEET 5 OF 5

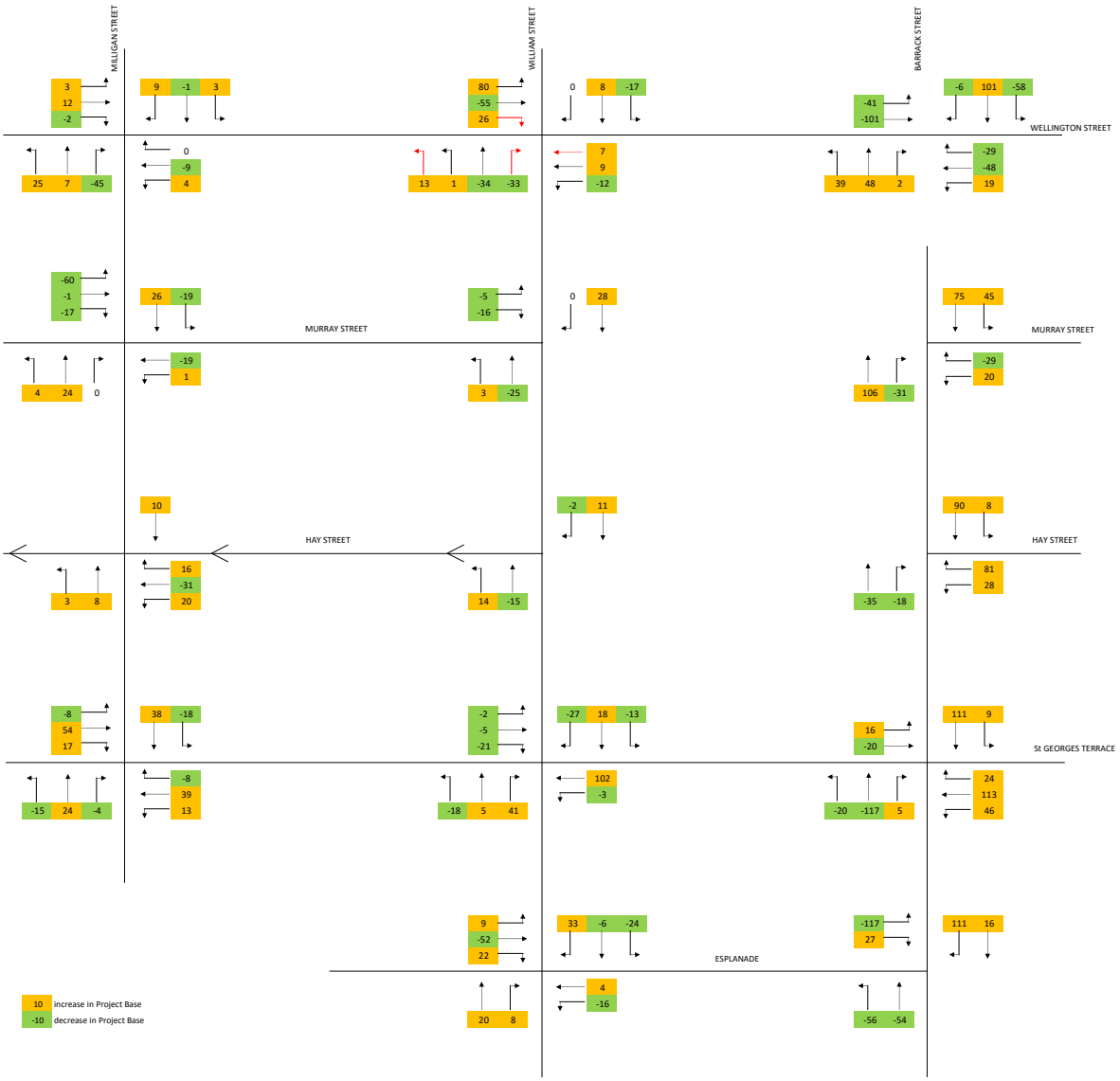
LOCAL AUTHORITY: CITY OF PERTH
MRWA DRAWING NUMBER: TS5

Appendix B

Turning movement differences – 2015 CATB base to project base



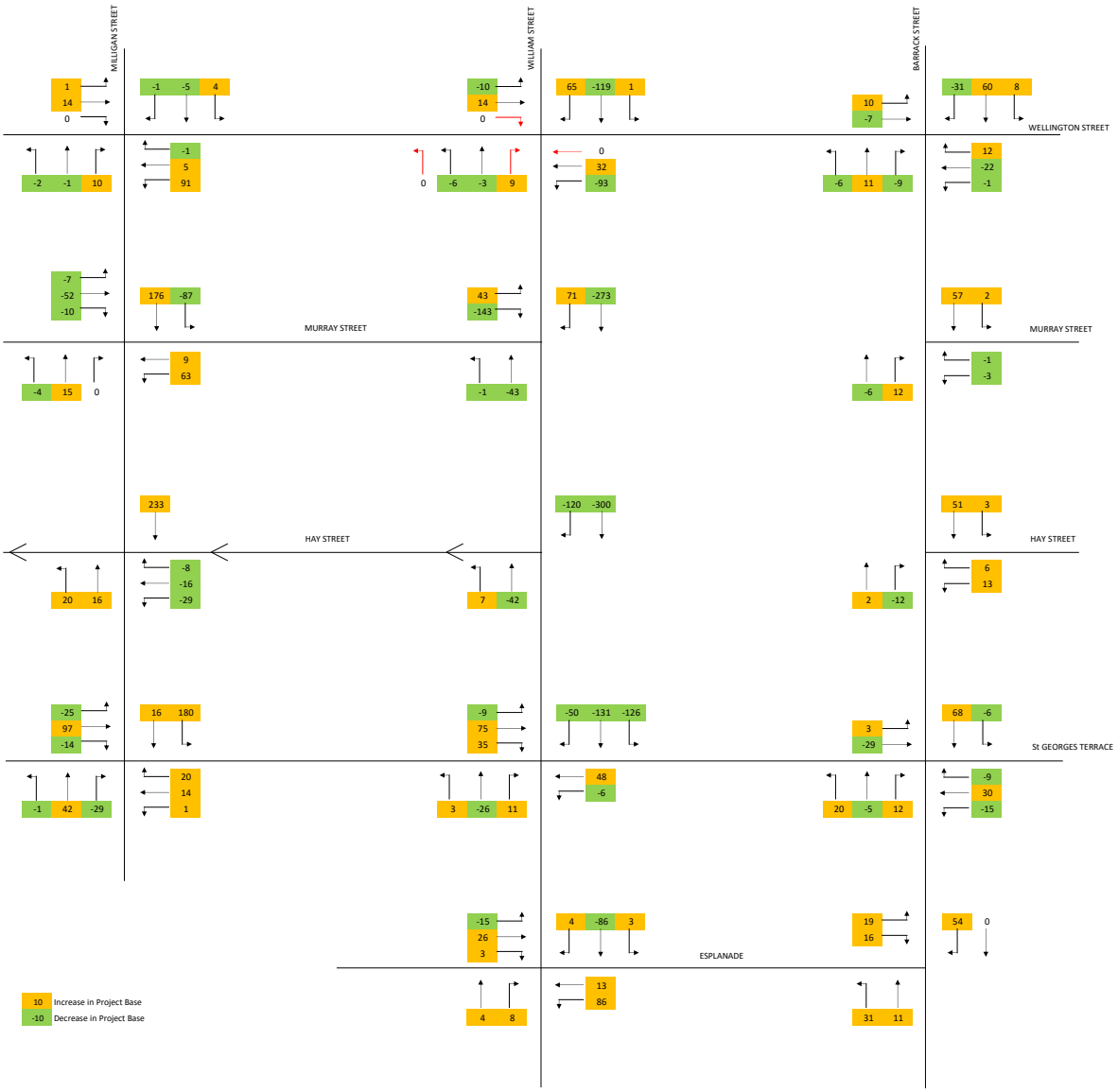
AM Turning Difference Plot
2015 Original Base to Project Base



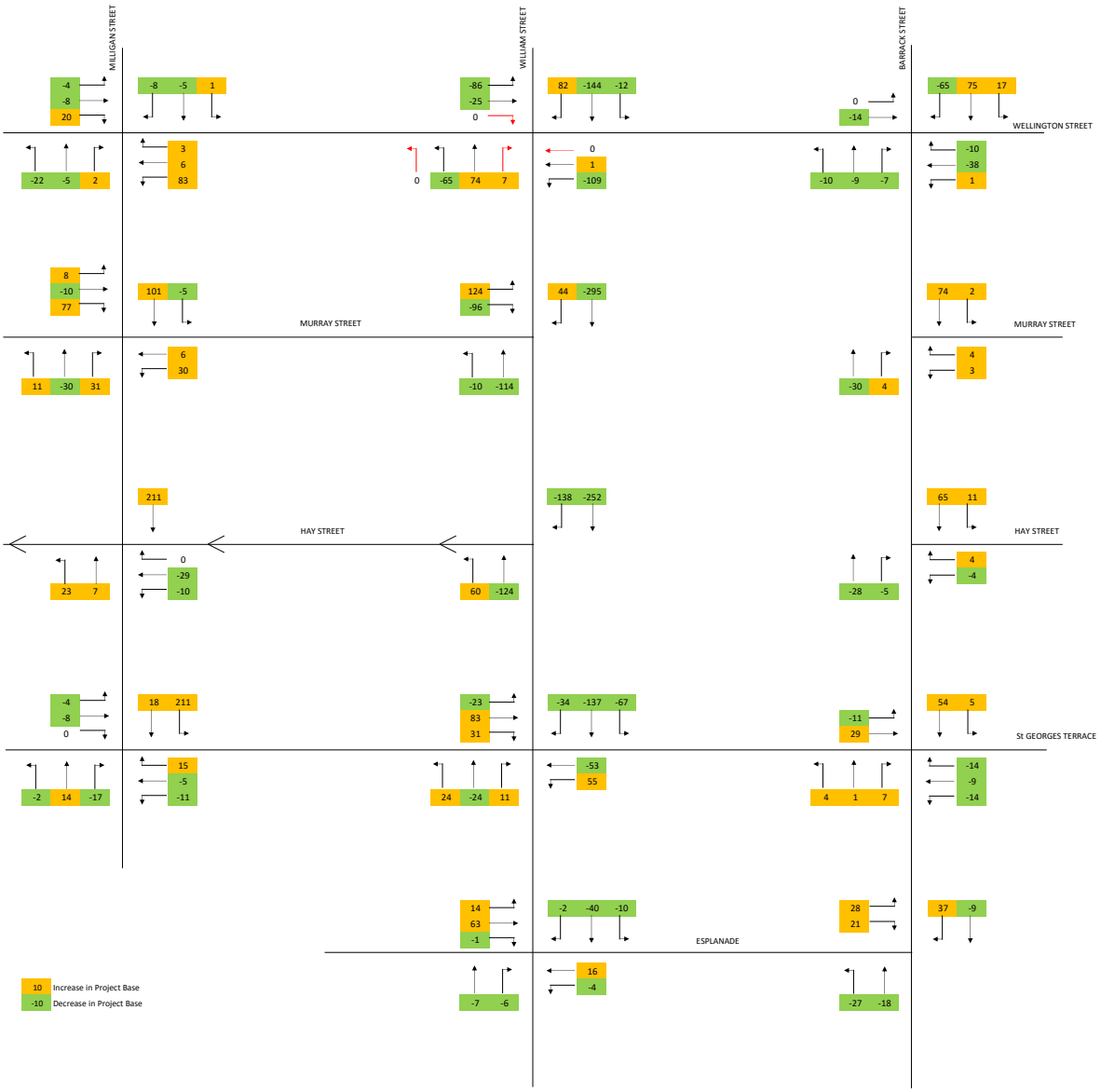
PM Turning Difference Plot
2015 Original Base to Project Base

Appendix C

Turning movement differences – project base to transit zone



AM Turning Difference Plot
Project Base to Transit Zone



PM Turning Difference Plot
Project Base to Transit Zone

Works and Urban Development Committee
Confidential Schedule 3
(Minute WK44/16 refers)

Distributed to Elected Members under separate cover

Bound in Consolidated Committee

Confidential Minute Book

Volume 1 2016

SCHEDULE 4

Public Transport Authority

William Street bus only road
(between Hay and Murray streets)

FACT SHEET • July 2015

William Street Bus Only – looking north from Hay Street

The Public Transport Authority is working closely with the City of Perth to create a bus-only section of William Street, between Hay and Murray streets, which can also be accessed by taxis and cyclists.

How it will work

Once approved, William Street (between Murray and Hay streets only) will become a bus only road, which cyclists and taxis only can also access.

Buildings with driveways or access points in this section of road can continue to access their buildings. Pedestrians will also continue to use the footpaths.

General traffic will not be able to enter this section of William Street and will be redirected as appropriate. The City of Perth is converting Barrack Street to two-way traffic to encourage general traffic to use this route for north-south travel in the CBD.

THE BENEFITS →

Focusing all bus services along William Street provides major benefits to the CBD road network and public transport passenger:

- **Easier access for bus passengers with all north and south bus movements (excluding Red CAT service) located on the one CBD street**
- **Improved bus running time**
- **Improved CBD traffic with Barrack Street freed up for general traffic and Red CAT services**
- **Improved exiting for vehicles leaving car parks accessed from William Street**
- **Improved cycle network with dedicated lanes along Barrack Street**

These benefits are supported by independent traffic modelling which found bus services along William Street (particularly southbound services during the PM peak) will be more efficient with faster, more reliable running times.

The modelling also showed by redirecting general traffic gaps in traffic were created to provide better opportunities for William Street car park users to exit the car parks. It showed clear gains to the level of service at these intersections where exiting traffic can turn right and left from each exit.

Works completed to date

Stage 1 and 2 of this work is completed, which involved creating a left turn only lane at William-Hay Street intersection for northbound traffic and replacing street parking and a loading bay on the western side of this section of road into four bus stops.

All northbound bus services, except the Red CAT service, which previously travelled along Barrack Street were then relocated to William Street. This is to focus bus movements to this main route through the CBD, freeing Barrack Street up for general traffic.

Coinciding with these stages is the City of Perth's work to convert Barrack Street into two-way traffic between St Georges Terrace and Wellington Street (which will force Blue CAT services to use William Street) and introduce dedicated cycle lanes to significantly improve the CBD's cycle network.

NEXT STAGES

The PTA is about to seek approval to complete the final stage of this work, which will see William Street (between Hay and Murray streets only) become an exclusive cycle/bus/taxi zone.

General traffic will not be able to use William Street between Hay and Murray streets when the final conversion begins.

The bus-only section of William Street will be clearly identified with line-markings, signage and red asphalt.

This work, which sees the restricted access begin, is expected to start in late 2015 once approval is gained.

William Street Bus Only – looking south from Murray Street

PROJECT INFORMATION

Project information will be regularly updated at **www.pta.wa.gov.au**

13 62 13 • projects@pta.wa.gov.au • **www.pta.wa.gov.au**

Transperth service information **www.transperth.wa.gov.au**

Public Transport Authority