

**Before a Board of Inquiry
Basin Bridge Proposal**

Under the Resource Management Act 1991 (the Act)

In the matter of a Board of Inquiry appointed under section 149J of the Act to consider the New Zealand Transport Agency's notice of requirement and five resource consent applications for the Basin Bridge Proposal.

**Supplementary evidence of Richard Leonard Cheyne Reid
for the Mt Victoria Residents Association and Richard Reid
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Introduction

1 As part of my involvement in the Board of Inquiry Hearing I have prepared evidence-in-chief and rebuttal evidence on transport planning.

2 Throughout the hearing process NZTA and other submitters have introduced new elements which I have not had the opportunity to respond to.

3 Opinions have been expressed recently concerning the incapability of the roundabout to provide improvements and benefits for a bus rapid transit system without the removal of state highway flows.

4 Mr Troy from Greater Wellington Regional Council (GWRC) stated in his cross-examination by Mr Cameron on 20 February in paragraph 5 / page 1477:

MR TROY: "A bus priority outcome might be achieved but with significantly lesser benefits. What would not be able to be achieved is a Bus Rapid Transit option.

MR CAMERON: And that is because?

MR TROY: That is because without removing the significant volumes of traffic there would not be the opportunity to provide dedicated lanes of this sort and the priority at intersections to allow the free flow of those buses through the network."

5 As far as I am aware no evidence has been produced by the applicant, GWRC or other submitters to demonstrate the veracity of Mr Troy's comments.

6 I note that the applicant and GWRC have yet to produce a roundabout layout for a bus priority outcome which provides continuous dedicated bus lanes and priority up to all intersections, even with significant volumes of traffic removed from the roundabout.

7 I also note that NZTA and GWRC, despite their mutual interests, have not yet produced a layout for the preferred transit system, Bus Rapid Transit (BRT).

8 Further complicating the situation is Wellington City Council's need to designate land and acquire property along the whole eastern side of Adelaide Rd before BRT can be accommodated.

9 As a consequence of the apparent gap between opinion and evidence, I have prepared supplementary evidence which illustrates my practice's investigations into providing BRT along the arterial roads of Kent Tce and Adelaide Rd and through the roundabout.

10 I do this on the basis that whilst this work is provisional, indicative only and restricted to a few options amongst many possible configurations, it may nevertheless give the Board direction that:

- i) an enhancement of the roundabout can provide public transport improvements and benefits for BRT;
- ii) that these benefits enable sufficient capacity and priority to be afforded to BRT both on and off the roundabout;
- iii) these benefits are likely not far removed from what the roundabout would deliver with grade-separation provided by a flyover; and
- iv) BRREO is able to adopt the Public Transport Spine Study's own indicative cross sections for BRT.

11 As way of background, my practice has investigated the provision of BRT on the Southern Spine over many months and has made submissions (both written and oral) on the Public Transport Spine Study. Until this point in time I have not incorporated our research and design thinking into BRREO and therefore underline that the options presented as evidence are not final or the only solution.

12 Please see Appendix 1 for a list of the BRT issues I think still need to be resolved.

Basin Reserve Roundabout Enhancement Option (BRREO) with BRT

13 In this section I refer to the following drawings:

- i) **Dwg BRR_529**_Wellington Public Transport Spine Study_Southern Spine_Cambridge & Kent Tce cross sections
- ii) **Dwg BRR_533**_Basin Reserve Roundabout Enhancement Option_Cross section Cambridge & Kent Tce boulevard
- iii) **Dwg BRR_522**_Basin Reserve Roundabout 2021 > BRT with tunnel duplication (excl. Adelaide Rd upgrade)

The following comments only apply to the section of Kent Tce between Vivian St and the Basin Reserve for the Southern Spine

- 14 The Public Transport Spine Study (PTSS) cross section for Kent Tce envisages it will consist of four traffic lanes, three of which are general traffic lanes with the fourth a separated dedicated bus lane against the central median (Canal Reserve). A cycle lane is provided against the eastern kerbline and is separated from general traffic by a painted median spacer. **[Dwg BRR_529]**
- 15 Based upon the existing alignment of routes using Kent Tce, the cross section indicates that the two lanes closest to the cycle lane will head east on State Highway 1 towards Mt Victoria Tunnel whilst the third general traffic lane heads south to the Dufferin/Paterson St intersection
- 16 The cross section indicates the existing bus stop on the eastern side of Kent Tce will be removed in place of new bus stations along the central median. This removes the awkward crossing of two lanes that buses must make in order to access the only traffic lane heading south.
- 17 The cross section also indicates that land will need to be taken from the central median (Canal Reserve) to achieve the PTSS arrangement and spacings shown. This will likely trigger significant resource consent issues.
- 18 BRREO retains the same number of lanes and transport modes but reorganises the cross section so that the cycle lane is against the central median and no additional land is required from the Canal Reserve. **[Dwg BRR_533]**
- 19 This is because the main north-south route for cyclists uses the Basin Reserve Cricket Ground as a traffic-free connection to Adelaide Rd instead of sharing traffic lanes on the existing roundabout. The roundabout lanes are not wide enough or safe for both users, including for NZTA's proposed layout. BRREO places the cyclists on the side which best aligns with this traffic-free route. Cycling is brought alongside the central median, the safest and most generous location within Kent Tce for active modes.
- 20 In BRREO no bus station is provided in this section of Kent Tce so cyclists will not conflict with BRT stopping alongside the central median, allowing cyclists a traffic-free route to and from the Basin Reserve. See paragraphs 24-31 for an explanation for this.

- 21 In the BRREO plan, the bus priority lane for BRT continues beyond the pedestrian crossing on Kent Tce and well into the roundabout configuration, approximately half-way around Ellice St and half-way to the Dufferin St/Paterson St intersection. [**Dwg BRR_522**]
- 22 This enables BRT to bypass all other traffic and any congestion on Kent Tce and arrive close to the Dufferin/Paterson St intersection which is widened to three lanes (either before or after tunnel duplication).
- 23 Hence, BRREO provides both priority and capacity for typically the slowest section of the roundabout for traffic to pass through (once the Buckle St Underpass is in place). This is a significant improvement upon the existing situation and provides a balance to the extra capacity given to Paterson St for state highway traffic.
- 24 The lane selection for BRT at the Dufferin/Paterson St intersection depends upon what alignment is chosen for BRT on Adelaide Rd – for a central median on Adelaide Rd, BRT will take the middle lane at the intersection; against the kerbside on Adelaide Rd, BRT moves to the left hand lane.
- 25 The bus priority lane on the right hand side of Kent Tce/Ellice St and the 3 lanes approaching the Dufferin/Paterson St intersection enables BRT the choice of two lanes at the intersection and thence both sides of Adelaide Rd. The Basin Bridge Proposal will struggle to match this flexibility unless it provides 3 lanes at the Dufferin/Paterson St intersection and rethinks its tracking curve plan for the Rugby St/Adelaide Rd intersection (see David Dunlop Rebuttal Evidence – Annexure B, Fig. 7-1).
- 26 One may conclude from this arrangement that planning for BRT has little to do with the amount of traffic removed from the roundabout and more about astute and efficient planning.

BRT bus stations on Kent Tce and Adelaide Rd

- 27 In this section I refer to the following drawings:
- i) **Dwg BRR_530**_Wellington Public Transport Spine Study_Southern Spine__Bus Priority & BRT Scenario Alignments

ii) **Dwg BRR_531_Bus stops vs number of passengers_Southern Spine**

- 28 Studies for the location of bus stations along the PT Spine [Medium List Technical Note 27 July 2012] show different outcomes for bus priority and BRT. **[Dwg BRR_530]**
- 29 Bus priority is essentially seen as a prioritised local service stopping at all existing stops along the alignment. BRT is seen as a rapid connector between the start and end points of the alignment and therefore stops only at key locations along the route.
- 30 BRT's greater seating capacity, less frequent stops, further bus station spacings, removal or restrictions in car parking, faster travel times, integrated ticketing and smoother service free up space on the Golden Mile, creating a virtuous circle of benefits because the faster and more reliable service attracts more customers who will walk further distances to access the service, further increasing the travel time savings.
- 31 The PTSS Medium List for BRT shows only bus stations located at Courtney Place and Adelaide Rd at the Basin Reserve, with no other stops between. This covers a distance of approximately 1.1km and exceeds the recommended distance for a BRT service (500-800m). It also avoids picking up – or making walk too far - potential passengers from the Mt Victoria suburb which is a different catchment area from Courtney Place.
- 32 Mr Dunlop in Technical Report 4 provides a table which demonstrates that this catchment is an important collection and discharge point for bus passengers heading along both directions of the Southern Spine journey (Railway Station to Hospital route). **[Dwg BRR_531]**
- 33 The table shows there is a clear peak in passenger numbers at key locations. From Courtney Place onwards the high volume stations are Kent Tce at Pirie; Adelaide Rd at the Basin Reserve; and Adelaide Rd at the Hospital. These are approximately 450-550m apart.
- 34 Low patronage occurs at distances approximately halfway between these peak stations. The 'trough' stations are Kent/Cambridge Tce at the Basin Reserve; and Adelaide Rd at Broomhedge St. These are all 240-280m away from the peak stations.

35 The chart suggests a BRT station on Kent Tce at Pirie St would be beneficial but a station on Kent Tce at the Basin Reserve inefficient and unnecessary. Hence, BRREO removes the bus stop/station on Kent Tce at the Basin Reserve.

BRT on Adelaide Rd

36 In this section I refer to the following drawing:

i) **Dwg BRR_528**_Wellington Public Transport Spine Study_Southern Spine_Adelaide Rd cross sections

37 The PTSS cross sections for Adelaide Rd show that the existing road reserve and carriageway will need to be widened by at least 3.1m to accommodate BRT with bus stations in the arrangement shown in BRR_528 (no stations would translate to another 1km without stops). This does not factor in widening the footpaths for an increased number of pedestrians or a different arrangement of transport modes in cross section. **[Dwg BRR_528]**

38 The PTSS does not factor in any urban design thinking for Adelaide Rd, nor whether urban design is an important consideration in any designation sought for widening the street.

39 Like the rest of the PTSS, there is no real physical context provided for the evaluation of cross sections and modal options and there seems no awareness that urban design and spatial accessibility may influence or help direct the transport outcome.

40 My practice has studied Adelaide Rd in some depth from both traffic and urban design perspectives.

41 These have established that road widening of Adelaide Rd is required and will be a positive outcome for the urban design of the street. I believe a wider Adelaide Road will improve its spatial structure, architectural proportions and urban amenity.

BRT options for Adelaide Rd

42 I have supplied three options in this supplementary evidence from our numerous investigations into BRT on Adelaide Rd.

43 These three options are:

- i) Option 1 – BRREO adopts the PTSS cross section for Adelaide Rd
- ii) Option 2 – BRREO combines central median and kerbside stations
- iii) Option 3 – BRREO provides only kerbside stations

44 With each option I describe its cross section arrangement and list its potential positive and potential negative outcomes. These are not meant to be read as a final and comprehensive list.

45 I do not draw a conclusion as to which option is the better in relation to the others. These options only serve to show at this stage there are real world options for BRT on Adelaide Rd with degrees of functionality and value not dependent upon a flyover and which can be adapted to an enhanced roundabout option, as set out in paragraph 10 of this supplementary evidence.

46 All raise issues which need to be addressed at a more detailed level of design and with the factors in Appendix 1 incorporated.

Adelaide Rd with BRT - Option 1

See **Dwg BRR_535_Basin Reserve Street Context 2021** > Indicative BRT Option 1

47 Description

BRREO with the PTSS cross section for BRT and bus stations on Adelaide Rd

- i) Cycle lanes in each direction against the kerb
- ii) One general traffic lane in each direction
- iii) Two dedicated bus lanes for BRT as a core spine in the centre of Adelaide Rd
- iv) One raised median separating general traffic heading north from BRT
- v) Bus stations at the head of Adelaide Rd with the raised median serving as a passenger footpath. Buses in both directions share the central median for stopping at stations.
- vi) One dedicated bus lane on Rugby St East (within the roundabout) for BRT priority to Adelaide Rd

Potential positive outcomes from Option 1

- i) Priority access to and from the roundabout for BRT
- ii) Good alignment for BRT heading north for access onto the 3rd lane of Rugby St West
- iii) Continuous bus lanes on Adelaide Rd
- iv) Suppresses general traffic heading north in favour of public transport (provides only one general traffic lane accessing the roundabout)
- v) Suppresses general traffic heading south in favour of public transport (provides only one general traffic lane accessing Adelaide Rd off the roundabout)
- vi) Wider footpaths than existing on both sides of Adelaide Rd
- vii) More pedestrian crossings along Adelaide Rd to accommodate higher density development and reduce jay-walking
- viii) Rationalisation of bus stops to increase distance between stops and improve bus travel times

Potential negative outcomes from Option 1

- i) Potential free flow conflict of BRT with pedestrians at intersections. The design of the intersection may prioritise BRT over pedestrians and require two separate crossings over the general traffic lane and BRT lane
- ii) Walking and jay-walking will likely be dangerous because buses use the same side of the road but travel in opposite directions. An assumption that the lanes are free to cross after looking one way may not be correct (like Manners St) i.e. the layout requires an element of counter-intuitive behaviour by the public so that their safety is not compromised
- iii) The raised median is only lane across from the western footpath and may encourage jay-walking
- iv) The raised median may not provide sufficient space for buses from both directions discharging passengers onto it at peak hours
- v) The proximity of bus stations at the head of Adelaide Rd for access to pedestrian crossings may be compromised by the distance needed for buses arriving from the north to pass buses heading to the north
- vi) There is no flexibility for other traffic movement
- vii) There is no room for private vehicle growth
- viii) Right hand turns for general traffic at intersections may be difficult and will likely block BRT movements in both directions

- ix) The existing bus fleet cannot use the bus stations when heading south because their doors do not open on the right hand side
- x) Needs to be implemented in one stage

Adelaide Rd with BRT - Option 2

See **Dwg BRR_527_** Basin Reserve Street Context 2021 > Indicative BRT Option 2

50 Description

BRREO with a combination of a central median alignment for BRT on the western side of Adelaide Rd and a kerbside alignment on the eastern side

- i) Cycle lanes in each direction against the kerb which are separated from bus lanes with raised markers
- ii) Dedicated bus lanes for BRT along Adelaide Rd with BRT travelling north adjacent to the central median and away from the kerb travelling south
- iii) Two general traffic lanes travelling north and one general traffic lane travelling south
- iv) One raised central median separating the two directions of traffic

51 Potential positive outcomes from Option 2

- i) Priority access to the roundabout from Adelaide Rd
- ii) Good alignment for BRT heading north for access onto the 3rd lane of Rugby St West
- iii) Continuous bus lanes on Adelaide Rd
- iv) Off-road bus stop heading south enables bus passing without compromising other traffic movement
- v) Extra general traffic lane reduces existing traffic congestion and accommodates general traffic growth without compromising BRT service
- vi) Provides two general traffic lanes exiting off the roundabout
- vii) Pedestrian crossings without conflict
- viii) Central median logical and safe
- ix) Central median has potential to become a north-south walking spine
- x) Wider footpaths than existing on both sides of Adelaide Rd
- xi) Pedestrians more likely to walk along the edges of the street or up-down the central median than jay-walk

- xii) More pedestrian crossings along Adelaide Rd to accommodate higher density development/population and reduce jay-walking
- xiii) Rationalisation of bus stops to increase distance between stops and improve bus travel times

52 Potential negative outcomes from Option 2

- i) Potential confusion with BRT alignment against the median travelling north and against the kerb travelling south
- ii) Buses share inside lane with general traffic on eastern side of Adelaide Rd until the dedicated bus lane begins after the first bus stop
- iii) Requires BRT fleet with doors that open both sides (the Eastern Spine alignment is illustrated against the kerb as well)
- iv) The existing bus fleet is not able to use bus stations on the western side of Adelaide Rd because their doors do not open on the right hand side (unless bus stops for them are retained against the kerb)
- v) Requires the purchase of more land to secure off-road bus stops on the eastern side of Adelaide Rd
- vi) The raised median may encourage jay-walking
- vii) Option needs to be implemented in one stage

Adelaide Rd with BRT - Option 3

See **Dwg BRR_537_** Basin Reserve Street Context 2021 > Indicative BRT Option 3

53 Description

BRREO with kerbside alignments for BRT on both sides of Adelaide Rd

- i) Cycle lanes in each direction against the kerb which are separated from bus lanes with raised markers
- ii) Dedicated bus lanes for BRT away from the kerb on both sides of Adelaide Rd
- iii) Two general traffic lanes travelling north and one general traffic lane travelling south
- iv) Painted central median separating the two directions of traffic

54 Positive outcomes from Option 3

- i) Priority access to the roundabout from Adelaide Rd includes pre-emption signal at Rugby St intersection
- ii) Continuous bus lanes on Adelaide Rd
- iii) Off-road bus stop heading south enables bus passing without compromising other traffic
- iv) Extra general traffic lane reduces existing traffic congestion and accommodates general traffic growth without compromising BRT service
- v) Provides two general traffic lanes exiting off the roundabout
- vi) Pedestrian crossings without conflict
- vii) Wider footpaths than existing on both sides of Adelaide Rd
- viii) More pedestrian crossings along Adelaide Rd to accommodate higher density development/population and reduce jay-walking
- ix) Rationalisation of bus stops to increase distance between stops and improve bus travel times
- x) Existing bus fleet can service Adelaide Rd
- xi) Option can be implemented after widening of Adelaide Rd without infrastructure investment for BRT on a central median
- xii) More achievable with limited resources
- xiii) More economical use of road space

55 Potential negative outcomes from Option 3

- i) Kerb alignment for BRT heading north means access onto the 3rd lane of Rugby St West could be awkward on a general green light
- ii) Buses share inside lane with general traffic on the eastern side of Adelaide Rd until the dedicated bus lane begins after the first bus stop
- iii) Requires BRT fleet with doors that open on the left hand side (the Eastern Spine alignment is illustrated against the kerb as well)
- iv) Requires the purchase of more land to secure off-road bus stops on the eastern side of Adelaide Rd

56 Appendix 1 – Supplementary Evidence – Potential factors affecting BRT

For the record, the supplementary drawings do not take account of the following factors which have yet to be measured, determined or approved:

- i) The potential change in traffic volumes and travel patterns after the opening of the Buckle St Underpass
- ii) The Mt Victoria Tunnel Duplication Project has not been traffic modelled for public transport
- iii) The capacity of Vivian St beyond 2021
- iv) The trend in private vehicle use to continue to decline, especially amongst the youngest driving age group
- v) BRT routes and stops have not been finalised
- vi) Specification of the BRT route service standard targets for the whole routes have not been set
- vii) Essential criteria has not been set relating to the limit of disturbance to general traffic
- viii) BRT vehicle design details are not known
- ix) Resource consent has not been given for the required public reserve land-take and landscape despoilation of the Town Belt by the PTSS Eastern Spine indicative route
- x) Resource consent has not been given for the public reserve land-take and potential urban despoilation of the Canal Reserve and Cambridge/Kent Tce's required by the PTSS Southern Spine indicative route
- xi) WCC has not secured a designation and road widening for BRT (with or without bus stations) on Adelaide Road
- xii) The management of BRT services in relation to the existing bus fleet, routes and stops has not been determined

57 Appendix 2 – Supplementary Evidence Drawing Set

- i) **Dwg BRR_522**_Basin Reserve Roundabout 2021 > BRT with tunnel duplication (excl. Adelaide Rd upgrade)
- ii) **Dwg BRR_529**_Wellington Public Transport Spine Study_Southern Spine _Cambridge & Kent Tce cross sections
- iii) **Dwg BRR_533**_Basin Reserve Roundabout Enhancement Option_Cross section Cambridge & Kent Tce boulevard

- iv) **BRR_530**_Wellington Public Transport Spine Study_Southern Spine__Bus Priority & BRT Scenario Alignments
- v) **Dwg BRR_531**_Bus stops vs number of passengers_Southern Spine
- vi) **Dwg BRR_528**_Wellington Public Transport Spine Study_Southern Spine_Adelaide Rd cross sections
- vii) **Dwg BRR_535**_Basin Reserve Street Context 2021 > Indicative BRT Option 1
- viii) **Dwg BRR_527**_ Basin Reserve Street Context 2021 > Indicative BRT Option 2
- ix) **Dwg BRR_537**_ Basin Reserve Street Context 2021 > Indicative BRT Option 3
- x) **Dwg BRR_532**_NZTA Basin Bridge Proposal_Roundabout Layout

Richard Reid

On behalf of Mt Victoria Residents Association and Richard Reid & Associates Ltd

5 March 2014